ARINC

AOC AIR-GROUND DATA AND MESSAGE EXCHANGE FORMAT

ARINC SPECIFICATION 633-1

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AN ARINC DOCUMENT

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FOREWORD

Aeronautical Radio, Inc., the AEEC, and ARINC Standards

ARINC organizes aviation industry committees and participates in related industry activities that benefit aviation at large by providing technical leadership and guidance. These activities directly support aviation industry goals: promote safety, efficiency, regularity, and cost-effectiveness in aircraft operations.

ARINC Industry Activities organizes and provides the secretariat for international aviation organizations (AEEC, AMC, FSEMC) which coordinate the work of aviation industry technical professionals and lead the development of technical standards for airborne electronic equipment, aircraft maintenance equipment and practices and flight simulator equipment and used in commercial, military, and business aviation. The AEEC, AMC, and FSEMC develop consensus-based, voluntary standards that are published by ARINC and are known as ARINC Standards. The use of ARINC Standards results in substantial benefits to the aviation industry by allowing avionics interchangeability and commonality and reducing avionics cost by promoting competition.

There are three classes of ARINC Standards:

a) ARINC Characteristics – Define the form, fit, function, and interfaces of avionics and other airline electronic equipment. ARINC Characteristics indicate to prospective manufacturers of airline electronic equipment the considered and coordinated opinion of the airline technical community concerning the requisites of new equipment including standardized physical and electrical characteristics to foster interchangeability and competition.

b) ARINC Specifications – Are principally used to define either the physical packaging or mounting of avionics equipment, data communication standards, or a high-level computer language.

c) ARINC Reports – Provide guidelines or general information found by the airlines to be good practices, often related to avionics maintenance and support.

The release of an ARINC Standard does not obligate any organization or ARINC to purchase equipment so described, nor does it establish or indicate recognition or the existence of an operational requirement for such equipment, nor does it constitute endorsement of any manufacturer's product designed or built to meet the ARINC Standard.

In order to facilitate the continuous product improvement of this ARINC Standard, two items are included in the back of this volume:

An Errata Report solicits any corrections to the text or diagrams in this ARINC Standard.

An ARINC IA Project Initiation/Modification (APIM) form solicits any recommendations for addition of substantive material to this volume which would be the subject of a new Supplement.

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1.0 INTRODUCTION

1.1 Purpose of Document

The purpose of this specification is to support the exchange of certain Aeronautical Operational Control (AOC) air-ground and ground-ground messages. These messages are defined in this specification, apart from those defined in ARINC Specification 620, because they have unique qualities. Like the messages defined in ARINC 620, their usage necessitates a single definition. Further, the messages have at least one of the following characteristics:

- The message is defined by an airframe manufacturer, EFB or avionics vender such that it is not modifiable by the airline and does not fit into an existing ARINC Specification e.g., ARINC 622 (FANS), ARINC 623 (ATS) or ARINC 702 (FMS).
- The distribution of the message is outside the control of a single airline, for example, messages shared by multiple parties such as de-icing services shared in common among a group of airlines from a single supplier.

COMMENTARY

Airlines may choose to define AOC applications in this specification that have safety implications. In the USA, the FAA may classify the results of the delivery of such a message as constituting more than a “minor hazard” should certain data contained in the message become corrupted. In this case, the principles specified in RTCA DO-296 need to be observed by the implementer. During the development of this specification some assessment of the safety impact of specified applications was performed, However, the airlines choosing to implement communication services defined in this specification will need to consult their local authorities and may have to perform a hazard analysis for certification of such applications.

This specification provides guidance for the encoding of the messages to be transmitted over the traditional ACARS air-ground links (VHF, SATCOM, and HF). The communications network technology onboard aircraft is evolving to include Ethernet and TCP/IP based networks. Air-ground links that support these commercial protocols have been available for some time. The configuration and equipage of cockpits is expanding to accept data through these commercial media. It is the intent of this specification to support multiple methods of transmission: e.g., traditional character-oriented ACARS air-ground links and commercial network based environments that utilize IP routing protocol and typically UDP or TCP Transport protocol.

When using TCP/IP based ground-ground and air-ground links, this specification encourages the use of XML for message coding. Therefore, for most applications, ACARS and XML message definitions (Schemas) have been designed.

COMMENTARY

Supplement 1 (ARINC 633-1) introduced a break in compatibility with the initial release schema of ARINC 633

(ARINC 633-0), and thus initial ARINC 633-0 applications and data sets. The AOC Subcommittee responsible for developing this specification elected this path in order to provide a better foundation for future updates that will ultimately improve support for airline operations. Their rationale was that an early break in compatibility would have less of an effect (with fewer fielded systems) as opposed to a future release. Support of ARINC 633-1 schema rather than the ARINC 633-0 schema is thus the recommended solution.

However, airlines and suppliers need to keep in mind that ground data providers will need to produce two unique sets of data (initial ARINC 633-0 - compliant, and ARINC 633-1 – compliant) until such time as the aircraft ARINC 633-0 installations are phased out.

1.2 Scope

The scope of this specification covers all the provisions necessary to enable communication between airborne and ground applications.

Various types of communication can take place between aircraft and ground:

1. ACARS system traditionally **enables the** exchange of messages. These messages can be exchanged asynchronously or in a synchronous way (see note below)
2. Most EFB type applications also use messages to communicate (e.g. eFF, WBA..)
3. EFB applications will need to be able to use other types of communications (transactional communications, such as database access, web access….) that do not involve individual messages exchanges.

This specification addresses the first 2 types of communications. When the need for standardization arises, other types of exchanges than message exchanges will be added.

Depending on the type of exchanges, asynchronous or synchronous message exchanges are addressed in this document.

Note:

‘**Asynchronous** ‘ communications means that there is no need for the end applications to be active and ready to communicate during the communication. Typically, an application can send a message to a ground message server, and the receiving application can retrieve it when it gets activated.

‘**Synchronous’** communications is used here to depict exchanges where both end applications are active and communicating, allowing real bidirectional exchanges.

Transport technologies (especially TCP/IP based networks) are evolving rapidly; therefore the present document segregates application level functionalities from transport functionalities.

1.0 INTRODUCTION

The document covers the air-ground communication function that can be functionally split into (see figure below):

- Applicative communications (the communication part of the application)
    - Message Structure, content and encoding (ACARS and/or XML depending on the application)
    - Minimum requirements on message processing / Dynamic aspects
    - The objective here is to define ONLY those features necessary for interoperability – the document focuses on data description (XML schemas), but also specifies minimum communication services. The way the data are processed / operated is not defined in this specification.
- Transport (over ACARS, IP and physical media)
    - This specification defines how the messages are transferred using ACARS, IP networks, and physical media, i.e. USB stick or CD/DVD:
        - Data packaging (e.g. ARINC 665 for IP/Physical media)
        - Transport of data (e.g. HTTPs over TCP/IP, or ACARS)
- Security services: Encryption and compaction provisions (provisions only at the time of this writing)

Note: Some definitions to complement text above.

1. **Message Structure** designates the way a message is organized and what data it contains in an abstract language (before encoding for transmission) – in this specification, the message structure and content definition is done directly through definition of message encoding.
2. Data Encoding designates the way the data are represented (ASCII, fixed, variable length…) – for example, there is a specific encoding in ACARS, and in XML.
3. Message encoding designates the way a message is represented (in terms of structure and data) and data inside these messages are separated, and encoded, before transmission (ASCII, fixed, variable length…) – for example, there is a specific encoding for a given message in ACARS, and in XML.
4. Packaging designates the way the data (or files) are encapsulated and associated to other data for transport (e.g. Packaging a given file or message in an ARINC 633 signed load).

Listing operational requirements or specifying the applications that lead to these message formats is outside the scope of this document. The messages are standardized, but not the functionality that necessitates them. This is not a functional spec. However, some guidelines about how the standardized AOC messages may be used are provided. This is done in two ways:

Some definition tables contain a column called “Meaning” or “Purpose” explaining the operational or functional context in which the message, element or parameter could generally be used.

Some definition tables contain a column called “Example” and some paragraphs contain textual examples that give guidance as to which values could appear under specific conditions in a message, element or parameter.

It should be noted that using messages compliant to this specification may not be sufficient to ensure that a complex air-/ground systems runs properly.

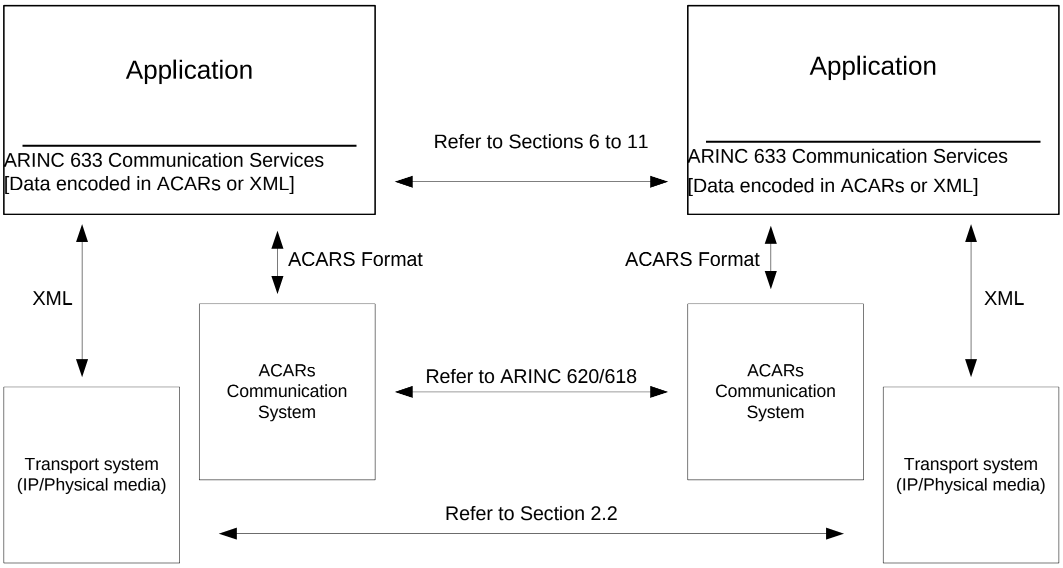


Figure 1.2-1 – Overview of ARINC 633

1.3 Document Organization

This specification is composed of 2 deliverables:

- A text (electronic or paper) document, constituting the body of the specification
- Electronic schema, an electronic attachment to this document, containing all XML data and message definitions.

1.3.1 “Text” Document

This document is organized as follows:

Section 1	Introductory Material
Section 2	Gives main rules and constraints for definition of messages to be transported over ACARS, IP, or physical media. Also specifies how these messages are transported (what protocols..) over each medium (ACARS, IP, Physical media)
Section 3	ACARS security – at the time of this writing, this section is informative only (security for ACARS is not defined yet)
Section 4	This section defines how the messages will be structured (especially the headers and trailers content are defined), for ACARS and for XML (structures are different).
Section 5	Section 5 defines common elements, i.e. communication services / messages that can be used by various applications, but also data structures that can be used in the messages of various applications.
From Section 6 to last section	Define the applicative communication services as well as message contents, on an application per application basis.
Appendix A	Glossary and acronyms
Appendix B	Transportation of ARINC 633 messages over ACARS – examples of ACARS messages
Appendix C	ACARS messages routing
Appendix D	Aircraft Parameters list

It should be noted that XML schemas are not defined in this document. The XML schemas are located in the electronic portion of this specification. See Section 1.3.2.

1.3.2 “Electronic” Document

This electronic attachment can be obtained from web site ***http://www.aviation-ia.com/aeec/SupportFiles/633-1/***.

The electronic document only contains XML specification of the messages, as well as examples. The electronic document complements the “text” document and has precedence over it for schema definitions.

The electronic document is structured as follows: (see the zip archive)

- The file associated with the initial adopion is a ZIP file, with following name: ‘**633.zip**”.
- **Subsequent** versions of this electronic file will follow ARINC specification naming convention, e.g.,’ **633-1.zip**’ **is used to represent ARINC 633 Supplement 1**.
- The zip file contains folders, and files (schemas and example files) as follows:
  - schemas – contains all applicable definition (.xsd files)
  - examples – contains example xml files

  Note: The definitions to be applied are the ones embedded in the 'schema' folder.

  - 'schema' contains:
    - m633header defines mandatory and supplementary headers
    - m633common defines data types common to several applications
    - CommonData defines the content of data potentially used by multiple applications (e.g., flight plan, NOTAM..)
    - 1 folder per application defines the messages using one xsd file per application type (EFF, FUEL...)

As application schemas and instance examples may reference schemas from the ‘CommonData’, ‘m633common’, and ‘m633headers’ folders by relative paths, filenames, directory, and document names and location should not be changed.

XML Schemas and Instance examples can be viewed and edited with every Editor. However, there are several tools (many of them freeware) available, which makes manipulating them much easier.

1.4 Related Documents

1.4.1 Relationship of this Document to Other ARINC Documents

A list of other ARINC documents that contain provisions that are related to the provisions defined in this specification include:

ARINC Specification 618: *Air/Ground Character-Oriented Protocol*

ARINC Specification 619: ACARS® Protocols for Avionics End Systems

ARINC Specification 620: *Data Link Ground System Standard and Interface*

ARINC Specification 622: *ATS Data Link Applications over ACARS Air-Ground Network*

When avionics systems and subsystems are designed to use the capabilities provided by an ARINC Standard, designers should reference the most recent version (modified by Supplement) of the standard.

COMMENTARY

> Eurocae has codified Air Traffic Service (ATS) messages in ED-85, ED-89, and ED-106. Although the restrictions that apply to ATS message are more severe than those that apply to the AOC messages define herein, it may be edifying to use these documents as reference material in establishing a context in which critical communications should be conducted.

1.4.2 Relationship to Internet Documents

The Institute of Electrical and Electronic Engineers (IEEE) develops standards for a number of commercial industries, including the telecommunications industry and the computer industry. Some of these standards are shared with the American National Standards Institute (ANSI). On occasion, these standards are endorsed as international standards under the International Organization for Standardization (ISO) and the International Electrotechnical Committee (IEC) standardization program. The Ethernet network protocols utilized in a commercial environment are defined by IEEE 802.3. Specifically, IEEE Std 802.3, 2000 Edition, Information Technology – Telecommunications, and information exchange between systems – Local and metropolitan area networks – Specific Requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method And Physical Layer Specifications.

The Internet Engineering Task Force has created Request for Comment (RFC) documents that serve as the commercial standards. Table 1.4.1 lists those that may serve as a convenient resource.

Table 1.4.1 Useful RFC references

RFC	Title
IETF RFC 768	User Datagram Protocol, Aug-28-1980 (Status: STANDARD)
IETF RFC 791	Internet Protocol, Sep-01-1981, (Status: STANDARD)
IETF RFC 793	Transmission Control Protocol, Sep-1981 (Status: STANDARD)
IETF RFC 959	File Transfer Protocol, Oct-01-1985
	(Updated by RFC2228, RFC2640) (Status: STANDARD)
IETF RFC 1122	Requirements for Internet hosts - communication layers, Oct-01-1989,
	(Status: STANDARD)
IETF RFC 1123	Requirements for Internet hosts - application and support, Oct-01-1989,
	(Updated by RFC2181) (Status: STANDARD)

IETF RFC 1155	Structure and identification of management information for TCP/IP-based internets, May 1990. (Status: STANDARD)
IETF RFC 2616	RFC2616 -- Hypertext Transfer Protocol -- HTTP/1.1 http://www.ietf.org/rfc/rfc2616.txt
IETF RFC 2246	RFC2246 -- The TLS Protocol -- Version 1.0 http://www.ietf.org/rfc/rfc2246.txt

Other documents

Document ref	**Title**
	Extensible Markup Language (XML) 1.0 (Third Edition) W3C Recommendation 04 February 2004

COMMENTARY

RFCs are never modified or changed, only superseded. The list of which RFCs are current is published in an RFC identified as Standard 1. Standard 1 is contained within the most current RFC. Knowing which RFC contains Standard 1 identifies a well-known and invariant set of Internet Standards that are being used at that point in time (i.e., the current configuration of the Internet).

1.5 Document Precedence

This document incorporates commercial standards by reference. In the case of a conflict between this specification and the applicable ISO, IETF, or IEEE standards, it should be assumed that the deviation is intentional and that this specification should have precedence.

1.6 Regulatory Approval

Compliance with this specification, in and of itself, will NOT ensure regulatory approval. Implementers are urged to obtain all necessary information necessary for regulatory approval and work in close coordination with the appropriate regulatory authorities to gain certification as applicable.

1.7 Compliancy

In order to be ARINC 633 application compliant,

- a system should have implemented all services specified for that application as described in the corresponding section of this specification. Note that applications often contain optional services, messages or parameters. In this case, an ARINC 633 compliant application should allow the user or administrator to inhibit or enable these optional elements, as long as implementing these optional elements is technically feasible in a given environment (e.g. aircraft design).
- a CMU-like system does not need to use the XML-based message definitions, even when IP networks are used (e.g. in the case of ACARS over IP protocol)
- an EFB-like system does not need to use the ACARS message definitions

- an airborne system should be able to communicate electronically with ground systems, either through a physical media or through a wireless connection.
- a ground system should be able to communicate electronically with airborne systems or ground systems either through a physical media, through a wireless connection or through a wired connection.
- as a minimum, an airborne system should support at least the Transport layer for physical media or the Transport layer for wireless IP connections as defined herein, or the airborne system should use ACARS.
- a ground system should support the Transport layers for all paths it offers.
- a ground system should support ACARS based message definitions, if they have been defined for the air-ground link.

In order to be ARINC 633 security compliant:

- a system should be able to execute all security features described in this specification for the transport path(s) it offers. A user or system administrator may or may not be able to switch off these features and/or replace them by a non-standardized security feature.

Requirements for compliance with security features for physical transport, IP transport or ACARS will be added in a future supplement to this specification.

2.0 MESSAGE ENCODING AND TRANSPORT

2.1 Message Encoding Rules

2.1.1 ACARS/AOA

This section summarizes the major constraints imposed by ACARS protocols for encoding the messages.

ACARS is a character oriented protocol. Therefore, the following constraints apply:

- Character set restricted to ISO#5 per ARINC 618 Attachment 3. Note that an application may restrict itself to the VHF-Baudot-subset as shown in ARINC 618 Attachment 3.

ACARS messages are limited in size. Therefore, the following constraints apply:

- Message envelope can only contain one content element
- Message length is limited to 16 ARINC 618 blocks. After subtracting sub-label, a maximum of three additional supplemental addresses and a 4 byte end-to-end CRC, messages should contain a maximum of 3411 uplink application text chars and a maximum of 3267 downlink application text chars

ACARS message encoding rules

- The number of parameters is fixed at a pre-determined number.
- Parameters can be defined as fixed length or variable length.
- Parameters can be defined as optional or mandatory. An optional parameter is a parameter that may be omitted, even if it has been defined as fixed length.
- Optional and mandatory parameters of variable length should always be followed by a comma "," delimiter.
- Optional parameters of fixed length should always be followed by a comma "," delimiter.
- Mandatory parameters of fixed length may immediately be followed by the next parameter, if especially defined that way in their ACARS message definition section, otherwise, they are also to be followed by a comma (i.e., ",") delimiter
- The parameters of the messages will always be transmitted in the order shown in the element format tables (fixed order)
- Missing (optional) parameters are indicated by consecutive commas (i.e., “,,”)

ACARS message encoding rules for legacy systems

- For compatibility with legacy systems <CR> and <LF> should not appear outside the “FreeText” parameter of uplinks that end in a CMU. <CR> and <LF> may appear anywhere in messages that are forwarded to other end-systems, e.g. EFBs.
- The Generic Message Envelope contains a Free Text parameter that can contain any ISO#5 characters, including <CR>, <LF>, but excluding “,” and “<” or “>” characters.

COMMENTARY

These additional rules are needed for compatibility with legacy systems.

2.1.2 ACARS Over IP

When it is intended to use the ACARS Over IP protocol, Section 2.1 message encoding rules should be applied.

COMMENTARY

There is no industry standard for ACARS Over IP. This section will be completed when need arise.

2.1.3 XML

This section defines the main rules and conventions applied for creation of XML schemas. It is intended to be used when defining an ARINC 633 XML schema.

2.1.3.1 General: Schema Use

XML messages and data defined in this specification apply XML version 1.0 as defined in “Extensible Markup Language (XML) 1.0 (Third Edition) W3C Recommendation 04 February 2004”

- Schemas are used versus Document Type Definition (DTD).
- When creating a Schema, define the following:
  - Default Element names: qualified
  - Default Attributes names: unqualified
  - Define a target namespace
  - Define an abbreviation for the target namespace

2.1.3.2 Typing & Grouping

- XML Schemas allow to create types for elements
  - A type is suffixed with the "Type" string
  - Example: "MyElementType" is the type for <MyElement/>
- XML Schemas allow to create groups of elements
  - A group is suffixed with the ".Grp" string
  - Example: subFolder.Grp
- XML Schemas allow to create attribute groups
  - An attribute group is suffixed with the ".AttGrp" string
  - Example: document.AttGrp

2.1.3.3 XML Data Naming Rules

Table 2.1.3.3-1 XML Element Naming Convention

Convention	Examples
If it is a commonly known acronym, all uppercase should be used	<FOB>, </STD>
If it is not an abbreviation: First letter in uppercase, then first letter of all following words in uppercase	<ThisIsANewElement>, </TaxiFuel>
If it is a mixture of both: Abbreviation is uppercase	<ATCFlightPlan>, <ICAOAirportCode>

Table 2.1.3.3-2 XML Attribute Naming Convention

Convention	Examples
same as for XML Elements, but first letter of attributes should always start in lowercase	<element thisIsAnAttribute="myAttribute"/>

COMMENTARY

ACARS Parameters should generally be named like XML attributes. If a corresponding XML schema exists, in which an ACARS parameter appears as an element, it should still follow the XML attribute naming convention.

2.2 Transport System

This section defines how the messages from applications can be transported over the various available communication systems.

There are three ways today for transferring data to/from aircraft:

1. ACARS communication system
   a. Using VHF/VDL2 AOA, Satcom, HFDL media
4. TCP/IP communication system
   b. Using e.g. Wifi technologies, Satcom media, Cellular technologies
5. Physical media
   c. USB memory stick, CD/DVD

This section addresses all 3 systems.

ACARS system has a very low throughput and therefore imposes strong limitations on the way the data are encoded (see Section 2.1) but also on the way they are packaged for transmission. Seen the low throughput available, the overhead for data encoding is designed to be minimized on ACARS (refer to Section 4 for details)(this precludes the use of XML).

On the other side, TCP/IP and physical media such as USB memory stick and DVD/CD have less limitation in terms of data volume, but due to the wide usage of IT technologies, there are other issues such as security.

Therefore, specific means for transport of data over these media are defined in this section.

Moreover, it has been decided, for those messages sent over ACARS, to define an optimized specific language and encoding scheme. Another language has been defined for the other media: XML.

However, applying one encoding scheme should not constrain on the medium to be used: for example, it should be possible to send ACARS encoded messages over IP.

If an airborne end system (CMU or EFB) uses UDP or TCP over IP only, then it is expected to use XML for message encoding. If an airborne end system uses ACARS or ACARS over IP, then it may use ACARS for message encoding. However, no general rule can be defined: please refer to the appropriate sections for recommended formats for air-ground and ground-ground exchanges.

2.2.1 Transport Over ACARS Communication System

Messages from application should be sent encoded as specified in the appropriate section of this document (depending on the application: from Section 6 to 11).

See appendix B for illustration of how ARINC 633 ACARS messages are structured and the relationship with the other ACARS protocol layers.

2.2.2 Transport Over TCP/IP and Physical Media

New applications are now developed to exchange data with the ground using TCP/IP networks, and physical media such as USB memory stick and DVD/CD.

ACARS format is less and less used. For these new communication systems, security is becoming a bigger issue seen the fact that airborne systems are using COTS and communication protocols widespread, and are therefore more subject to security threats.

COMMENTARY

> Current edition of this specification includes preliminary specification on transport technologies – it defines minimum requirements to be satisfied.

Future work will consist of defining the complete communication stack for full interoperability. System designers, suppliers, and users are thus advised to follow the development of future editions of this specification.

Although it does not specify any security mechanism above the transport services (e.g., HTTPs), implementers may chose to implement security functions between applications and HTTP as well as for transport of files over physical media.

2.2.2.1 Transmission over TCP/IP Networks

2.2.2.1.1 General

Transport of ARINC 633 messages to/from the aircraft is managed by ground and aircraft communication services. These services support the air-ground communication stack.

The air-ground TCP/IP communication system provides inter-networked communication from aircraft applications to the ground applications located in the airline information system.

The airborne communication function and ground communication function should support HTTPS (HTTP 1.1 over TLS 1.0) to exchange messages and files.

The airborne communication function should behave as a client in HTTPS sessions – this client should poll regularly the server for presence of message to this aircraft.

The ground communication function should behave as a server in HTTPS sessions and manage a repository of messages/files to/from aircraft.

The airborne communication server should initiate all exchanges. GET and POST commands should be supported.

In the future, figures and examples will be added to illustrate how ARINC 633 messages are transferred to the aircraft using TCP/IP/HTTPs.

COMMENTARY

> Today only one technology is required – it is possible that in future editions, several transport technologies be allowed. In this case, the ground communication products should support all of them, while the aircraft systems should select at least one among the list of possible options.

2.3 Physical Media Transportation Rules

The purpose of this section is to standardize how flight related information should be organized, formatted and stored, before it is brought aboard the aircraft or from the aircraft to the ground by a physical media. Due to the characteristics of physical media, it should be noted that:

- No online connection between ground and airborne application available. Therefore, the sender typically does not know whether and when the receiver has received the information correctly.
- The transport may take some time. The information transported over physical media should be "self contained" and not of a "request/response" type.
- The files which reside on physical media may be signed and/or encrypted.

The following physical media may be supported:

- CD
- DVD
- USB memory stick

2.3.1 File System, Naming Structure, and Documents Organization

The file system depends on the peripheral used (USB stick, DVD...). See following sections for details.

The Character set to be used for naming directories and filenames should be the following: see parameter type F in Table 4.1.2

COMMENTARY

It was decided not to allow the use of lower case character due to the discrepancies between various OS/file systems.

Maximum filename (including the path) length should be 120 characters. Maximum filename should be 64 characters.

This 64 characters limitation for filename is due to Joliet CD system limitation.

2.3.1.1 Folder and File Structure

Various options are available for transferring files over physical media: activating security or not.

If no security is used, the folders should be present in the root directory of the physical media used.

The names of the folders can be found in the corresponding application sections.

Data from multiple applications on a single physical device is allowed. If in this case authentication is used, each data package is treated separately.

Alternate solutions for folders and file structures are allowed if security is used.

2.3.2 Media Specificities

2.3.2.1 CD

Any type of CD should be accepted by the receiving system.

The ISO9660 file system and the IEEE standard Rock Ridge extension should be used. Alternately, the Joliet extension may be used.

2.3.2.2 DVD

Any type of DVD should be accepted by the receiving system.

It is recommended to use UDF.

2.3.2.3 PC-Card, USB Stick, and Similar

The file system should be FAT32.

2.3.3 Rules or Import/Export of Files

The system should prohibit Autorun; however, Autodetect should be allowed.

It is recommended that receiving systems do not erase automatically files read on a physical medium. However, if supported by the physical media, erasing files may be possible as an administrator or user option.

If the airborne application, receiving a data package on a physical media, requires writing on the media, this will be mentioned in the section in this specification that describes the application.

3.0 ACARS MESSAGE SECURITY AND COMPRESSION

This section introduces ACARS security and is for information purposes only; refer to ARINC Specification 823 (Parts 1 and 2) for detailed provisions. Security services applicable to IP links and IP networks will be added in a future supplement.

The aeronautical datalink communications environment is vulnerable to attacks by unauthorized entities that may access or modify AOC messages, the consequence of which may be to jeopardize the safety and integrity of aircraft operations or to expose sensitive information. The primary targets of exploitation are the air-ground data links, which are open RF channels, and the ground-ground networks, which may include both private and public communication networks.

Airlines and aircraft operators recognize the benefits of protecting aeronautical datalink messages to ensure safety of flight, to maintain competitive advantage, to reduce operational liability, and to comply with legislative and/or regulatory requirements for protecting information linked to individuals. Consequently, airlines have indicated their desire for the capability to protect the datalink messages defined herein from unauthorized disclosure and modification. This section sets forth, through reference, the provisions available for the airlines to achieve this objective.

3.1 Airline Operations Considerations

The primary goal of message security is to provide protection appropriate for AOC messages, with consideration of the systems involved (e.g., legacy issues), end-users needs, and existing airline operations.

Until recently the aircraft has operated autonomously from the airline ground data communications network infrastructure. Datalink connections to the aircraft were made over dedicated, private ACARS links (VHF, HF, and SATCOM) provided by a Datalink communication Service Provider (DSP). Other commercial links provided dedicated passenger services (e.g., telephone, television, and more recently, access to the Internet) as an independent function. However, airlines are investigating new air-ground links and airborne networking architectures that will increase the use of shared services and further blur the distinctions among onboard functions.

COMMENTARY

The scope of this current specification of security services is limited to paths supporting ACARS messages. However, as airlines take advantage of new broadband communication links to provide connectivity to the aircraft, security services must also be extended to protect AOC message exchanges via IP-based links.

From an airline operations perspective, it is also important to note that information security solutions are not simply the introduction of cryptographic algorithms, but rather they include an inter-related set of management, operational and technical security controls, where:

- Management controls focus on processes that are performed by an airline to maintain aircraft information system security to an acceptable level of risk. Examples include specification of a security policy and configuration management of information systems in accordance with the specified security policy.

- Operational controls focus on processes that are performed by people. Examples include training of airline personnel in the proper operation of information security systems and periodic security maintenance (e.g., updating keys and certificates in accordance with airline security policy).
- Technical controls include those mechanisms that are implemented primarily in hardware, software, and firmware. Examples include encryption, message authentication, and data integrity algorithms.

In general, an operational control has one or more associated management controls, and a technical control has one or more associated operational and management controls. Investment in supporting management and operational controls is necessary to achieve effective implementation, deployment, operation, and maintenance of technical controls.

3.2 ACARS Message Security

In May 2005 in response to the security needs identified by the AOC Standardization Subcommittee, the AEEC Data Link Systems (DLK) Subcommittee proposed a work effort to develop ARINC **Specification** 823 an ACARS Message Security (AMS) Standard. Development of the AMS Standard was guided by ARINC Report 811: *Commercial Aircraft Information Security Concepts of Operation and Process Framework*, which describes a risk-based information security process that facilitates identification of appropriate cost-effective security controls to reduce risk to an acceptable level.

The ACARS Message Security (AMS) Standard is a two-part document.

ARINC 823: DataLink Security – Part 1, *ACARS Message Security* specifies provisions for protecting messages that are exchanged via the existing ACARS communications infra-structure, independent of the underlying ACARS datalink sub-network (e.g., VHF, HF, or SATCOM). ARINC 823, Part 1, includes policy-based security, which permits each airline to apply its organizational security policies regarding protection of AOC messages. Airlines select the messages that require protection and select the security services, which include:

- **Data Confidentiality (i.e., encryption) –** Provides assurance that AOC message content is protected from disclosure to unauthorized entities during transmission. ARINC 823 supports multiple encryption algorithms, which permits airlines to select the algorithm and level of protection that is consistent with its organizational security policies regarding protection of AOC messages.
- **Data Integrity** – **Provides assurance that an AOC message is protected against modification subsequent to creation and transmission by an authorized source.**
- **Message Authentication** – **Mitigates spoofing threats and provides a message recipient with assurance that the source of an AOC message is as-claimed.**
- **In addition, ARINC 823 Part 1 includes data compression techniques, which reduce the transmitted message size and minimize the effects of security overhead. As in the case of**

encryption algorithms, the AMS standard also supports multiple compression algorithms, which permits algorithm selection based on the message characteristics (e.g., character-oriented versus bit-oriented).

ARINC 823: DataLink Security – Part 2, *Key Management* includes guidance and provisions for life-cycle management (i.e., assignment, generation, distribution, installation, maintenance, termination) of the cryptographic keys that are necessary for operation of the data confidentiality, data integrity, and message authentication security services. ARINC 823 Part 2 includes two key management alternatives: Public Key Infrastructure (PKI) and shared secret key. These key management alternatives provide an organization (e.g., airline and/or third-party service provider) with the flexibility to manage keys in a manner that is consistent with its organizational security policies and operations.

3.3 IP-Based Security

To be addressed in a future supplement.

4.0 MESSAGE STRUCTURE

This section defines common rules for structuring, composing and encoding the messages. Three technologies are available for transmission of these messages: ACARS, IP, and physical media. It has been decided, for those messages sent over ACARS, to define an optimized specific language and encoding scheme. Another language has been defined for the other media: XML.

However, applying one encoding scheme should not constrain the medium to be used: for example, it should be possible to send ACARS encoded messages over IP.

If an airborne end system (CMU or EFB) uses UDP or TCP over IP only, then it is expected to use XML for message encoding. If an airborne end system uses ACARS or ACARS over IP, then it may use ACARS for message encoding. However, no general rule can be defined: please refer to the appropriate sections for recommended formats for air-ground and ground-ground exchanges.

Section 4.1 specifies the Meta definitions, i.e. the vocabulary that we will use to define parameter types.

Section 4.2 specifies the standard parameter types that are used in message definitions.

Section 4.3 defines the generic element structure (messages are composed of elements).

Section 4.4 defines the generic message structure for ACARS and XML formats. All messages defined in this document (in the following sections) are compliant to this generic message structure.

4.1 Meta-Definitions

Parameters are defined using the following conventions:

Table 4.1.1 – Parameter Length

Code	Range	Example
"integer"	A number directly preceding a meta character defines how many times the meta character should appear and therefore defines how long that part of the parameter is. Note that e.g. 3A has the same meaning as AAA	3A
("min"-"max")	Value range between minimum and maximum value	(3-5)A
(0-n)	Optional parameter of variable length	(0-n)C
V	Variable (1 - max length shown)	

Table 4.1.2: Parameter Format

Code	Range
A	A...Z
B	Boolean (0, 1)
C	(A...Z)+ (0...9) + (.) + (-) + (sp)
DD, DDD	Degrees (00..90) or (000..180)
E	(A...Z) + (a...z)
F	(A...Z) + (0...9) + (.) + (-) + (_)
<hh> or HH	Hours (00..23)
I	A single ISO #5 character between hex 20 and hex 7E, except "," or "/"
J	Hex (0...9) + (A...F)
<mm> or MM	Minutes (00..59)
N	0..9
SS	Seconds (00..59)
T	Tenth of Minutes (0..9)
X	(A...Z) + (0..9)
Q	Sign (+,-), where (+) is optional
Y	Compass Direction (N, S)
Z	Compass Direction (E, W)
[ ]	Optional content. May or may not appear within a parameter

Table 4.1.3 – Other Meta Descriptions

Entry	Interpretation
Underlined characters or characters in "apostrophes"	Constants
<lower case character>	Description of variable text to be displayed or printed

4.2 Parameters Definitions

4.2.1 General

- A parameter is an object that contains data.
- A parameter can be defined directly by the use of Meta definitions in Section 4.1 or indirectly by the use of existing parameter type definitions.
- For the definition of physical values, a parameter type definition should use units typically used in aviation. If multiple units are in use, metric units should be used for communications. Applications may deviate from this general rule.
- Parameter type definitions which are useful for multiple applications are defined in Section 4.2.2.
- A parameter is referenced by its name. When naming parameters, it is suggested, to concatenate the words that build the parameter name and capitalize the first letter of each word, e.g. DepartureAirport.

COMMENTARY

The following conversion rules between metric and non metric units are deemed acceptable – this will have to be checked with the appropriate authorities when operational approval is needed:

- kg ==> lb 1 / 0.45359237
- lb ==> kg 1 x 0.45359237
- l ==> usg 1 x 0.2641721
- usg ==> l 1 x 3.785412
- M ==> in 1 x 39.37008
- in ==> m 1 x 0.0254

The structure of the parameter is defined by the parameter type definition. All parameter types are simple one dimensional character strings of fixed or variable length and defined structure. Parameter content which does not conform to its parameter type is considered invalid data.

COMMENTARY

All mass parameters in this specification have been named as weights, because the term weight is more commonly used than the term mass.

4.2.2 Parameter Type Definitions

The Parameter Type Definition Table defines parameters, which may appear in multiple applications.

Table 4.2.2-1 – Standard ACARS Parameter Type Definition Table

Parameter Type	Parameter Definition	Description	Content Example
dateTime	YYMMDD HHMMSS	full UTC date format (Year, Month, Day, Hour, Minute, Second)	050217235959
date	YYMMDD	date format (Year, Month, Day) 2 digits each	050217
day	DD	day, always in 2 digits	01, 17
time	HHMMSS	UTC time format (Hours, Minutes, Seconds), 2 digits each	235959, 000000
timeMin	HHMM	abbreviated UTC time format (Hours, Minutes), 2 digits each	2359, 1234
boolean	B	1= Yes or normal, 0 = No, degraded or broken Empty or any other number means not defined.	0
string	(0-n)I	any unstructured string	AEEC633
name	(0-50)E	up to 50 alpha characters	Smith
integer	(1-9)N	Integer value between 0 and 999999999.	123

Standard XML Type Definitions:

Note: Standard ACARS and standard XML types may be coded differently, e.g. W3C defines "dateTime" as:

"YYYY-MM-DDTHH:MM:SS-0x:00", while in ACARS "dateTime" is defined in this document as "YYMMDDHHMMSS".

Table 4.2.2-2 – Specific ACARS Parameter Type Definition Table

Parameter Type	**Parameter Definition**	**Description**	**Content Example**
FlightIdentifierType	(1-10)C	Flight Identifier = ATC call sign. This parameter is the parameter used when filing the flight plan to the ATC. On the aircraft, it is the parameter entered on the FMS by the crew. This parameter is most of the time compliant to ICAO Doc 4444 Appendix 2 field 7 but there may be local regulations allowing different formats for their national flights.	KLM5K, AFR5556
FlightNumberType	(1-10)C	Flight number = commercial flight number generally compliant to IATA Flight No	LH012T, BA12345
AircraftRegistration Type	(5-7)C	Aircraft registration in official format (preferably without leading periods). Checks from receiving systems should be tolerant to the presence of leading periods. Note: hyphens are often used in the official aircraft registration.	N712UA, . F-GGEG D-AIPA, F-WWOW
mass-ttType	(3-4)N	mass in tenth of tons	890
mass-kgType	Q(1-6)N	mass in kilograms	89015
volume-ltType	(1-6)N	volume in liters	0,135998
center-of-gravityType	NNN	center of gravity values in tenth of percent of mean aerodynamic chord	324
density-mType	NNN	metric density: 1000 * mass in kilogram / volume in liters	802
provider-idType	AAA	provider ID, e.g. the international standardized fuel supplier codes	SHL
nameType	(0-50)E	up to 50 alpha characters	Smith
labelType	XX	ACARS label	RF
Char3Type	XXX	can be used for service or message ID	SUB
ICAOType	XXXX	ICAO 4-character airport code	LFBO
IATAType	XXX	IATA 3 characters code	TLS
aircraftType	(2-4)X	ICAO A/C type (as per document 4444 appendix 2 (see ICAO doc using the aircraft designator as specified in ICAO 8643) – if no such designator has been assigned, insert ZZZZ.)	B734 (for B737-400)
aircraftSubType	(0-4)C	Additional A/L specific aircraft type definition	
waterquantityType	**(1-4)N**	**Water quantity in tenth of percent**	**80**

For specific XML Type Definitions: refer to Section 5.

4.3 Generic Element Structure

4.3.1 General

- An element is an object within a message, which forms a logical block.
- Elements consisting of parameters that are not part of the message envelope are called content elements.
- For IP messages, elements are defined using XML Schema version 1.0 syntax
- For ACARS messages, elements are defined using Message Definition Tables.
- An element or an ACARS message is referenced by its name. See the definition of element names below

Example of a XML-attribute coded content element containing 8 out of 13 parameters:

```
<SSSMMM orderFlag="1" acknowledgeFlag="1" finalFlag="1"
actualFlag="1" serviceAirport="" intoPlaneService="BPC"
serviceFlight="" blockFuel="87" taxiFuel="200" tripFuel="3450"
remaining="" aircraftMassUnitDisplay="" limitMass="" limitType=""/>
```

Example of the same element, coded for ACARS (no header is shown here):

```
1,1,1,1,,BPC,,87,200,3450,,,
```

4.3.2 Element Names

- In ACARS, the element name appears as part of the message envelope before the contents of the element. See Section 4.4.2.
- Elements are referenced by an alphanumeric name. In ACARS, element name consists of serviceId followed by MessageId and version number as specified in Section 4.4.2 (e.g. FDASUB01). In XML, the ServiceId followed by message Id is used to name the element – version number is defined as an attribute of the element.
- In an IP environment, the element name appears before and after the contents of the element, as it is usual for XML. Refer to Section 4.4.3 for details.

For some messages, the application needs to be formally identified. The application is identified using the SMI it supports (3 characters). When a given application supports multiple labels, then one SMI supported by this application will be selected as an identifier.

See the following table for list of element and application identifiers.

Table 4.3.2.1 – Application Ids, and Element name formats

Number of Chars	Parameter Name	Format / parameter type	Example	Note
3	ApplicationID	Char3Type	JRF	
3	ServiceID	Char3Type	FPA	
3	MessageID	Char3Type	SUB	
2	VersionNb	NN	01	

Notes:

1. The term "**Application**" is used for a group of functions (called services) which are typically closely related to each other and which originate in one end-system and end in one end-system. Application Identifiers needs to be unique within this document. For ACARS, the SMI is used as Application Identifier. An end-system like the CMU AOC can consist of multiple applications.
2. A "**Service**" consists of a flow of one or more messages to fulfill a given function. The service definition consists of element structure definitions and dynamic information giving guidelines about the conditions when the messages are generated and what they trigger when received by the sink. Service Identifiers need to be unique within each application
3. The **Messages Identifier** (MessageID) identifies the purpose of a message or element within a service. Message Identifiers need to be unique within each service.
4. The **Version Number** identifies the version of the message. All messages used within a service should have the same version number (VersionNb).

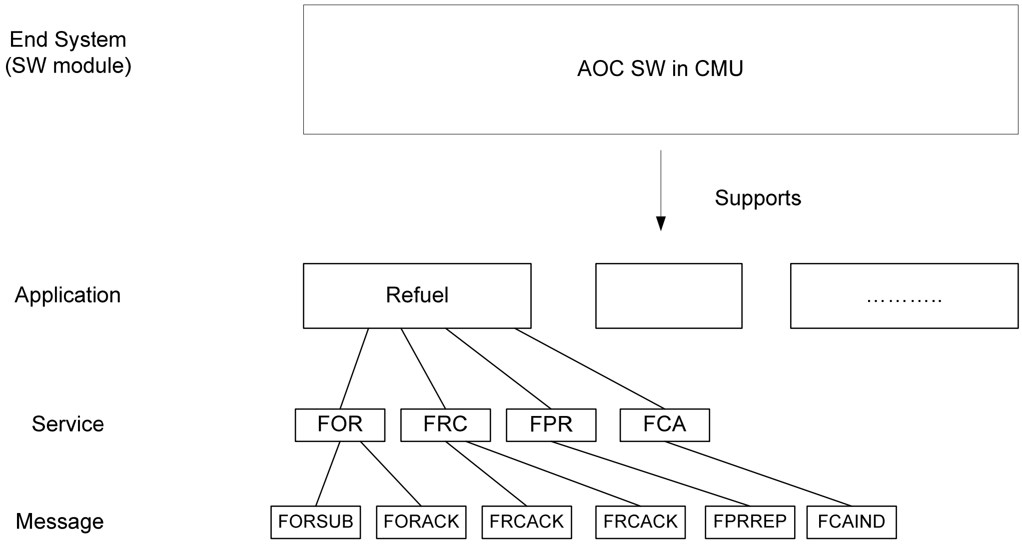


Figure 2.1.1-1 – Illustration of Application-Service-Message Concept

The following table gives some guidelines when defining Message Identifiers:

Table 4.3.2.2 – Message Identifier Table

Message Identifier	Description
IND	Element used to indicate an event
COM	Element used to command an action
REQ	Element used to request parameters
REP	Element used to report parameters
SUB	Element used to submit (insert) parameters
ACK	Element used to acknowledge parameters

4.4 Generic Message Structure

4.4.1 General

- A message is an object which can be transmitted over a communication channel independently from other objects.
- An ARINC 633 Message is a message which follows the message definitions of this document. It consists of one message envelope containing one message header, null or one content elements and one trailer. It can be either coded using ACARS or XML conventions.
- An ACARS message, in the context of this document, is an ARINC 633 message contained in an ARINC 618/620 envelope. An ARINC 633 ACARS message can only contain null or one content element. In an ACARS environment, an "element definition" is a message definition, except that it does not include the 633 message envelope.
- An XML message, in the context of this document, is an ARINC 633 message coded using XML conventions and typically sent over an IP protocol stack or physical media

COMMENTARY

In the first meeting of the work group (FRA, 06DEC04) it has been decided to reserve a block of ACARS message labels in 620 and use separate ACARS labels for separate functions. That means that at least for the time being and for ACARS a message can contain only one content element. However, it has also been decided to repeat the functional meaning in the element itself. In this specification this is done by writing the element name in front of the list of element parameters.

In the second meeting of the work group (MEM, 16FEB05) it has been decided to use one label per application. An Application can not be spread over multiple end-systems, but an end-system can have multiple applications.

4.4.2 ACARS Message Envelope

4.4.2.1 General

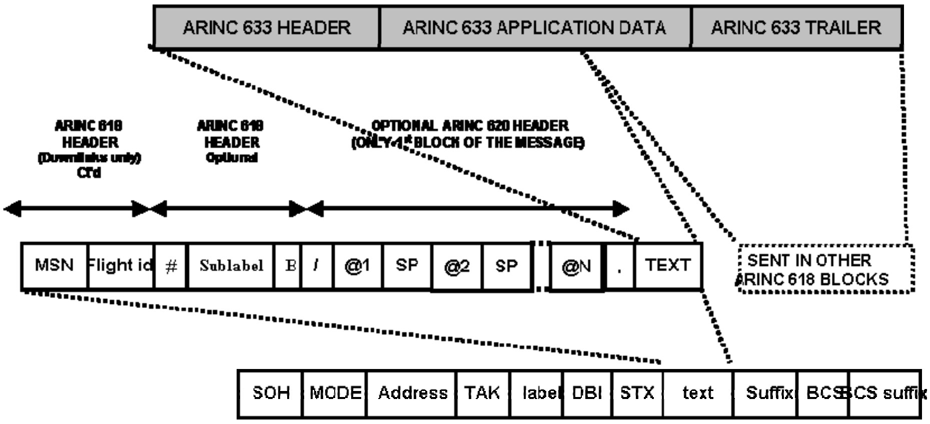
- ACARS messages are defined by the use of two tables: Message Envelope Table and Supplementary Downlink Header Table
- The Message Envelope Table shows everything, except preceding MFI and/or supplementary addresses, which is inserted in the text field portion of an ARINC 620/618 message. The Supplementary Downlink Header and the Content Element are nested within the Message Envelope
- The Supplementary Header Table contains additional header parameters that may be used by an application for downlinks and uplinks
- The ARINC 618 label and optionally sub-label will be specific to each application, for example the label "RF" is used for the Refuel-CG Targeting application.

ACARS messages are sent and received by the aircraft using ARINC 618 protocol. ARINC 633 messages are encapsulated with ARINC 620 format, and then sent/received using ARINC 618 protocol. ARINC 618 protocol is outside the scope of the application (managed by the CMU). The present document only encompasses ARINC 633 header, application data and trailer. Specifications ARINC 618 and 620 cover other protocol fields.

The ARINC 633 message fields are inserted as text field of ARINC 620/618 messages – and may be preceded by MFI and/or supplementary addresses.

The ARINC 618 label and optionally sub label and MFI will be specific to each application.

Please refer to ARINC Specifications 618 and 620 for further details on ACARS message format. Below is an example of how an ARINC 633 ACARS Message, composed of a header, application data and trailer, is split and inserted by the CMU in ARINC 618 downlink blocks. Also refer to appendix B for illustration of ARINC 618, 620 and 633 protocols relationships.



Example of ARINC 618/620/633 protocol encapsulation for Downlinks

NB: @= supplementary address (1st one maybe an MFI)
"SP" stands for space character

4.4.2.2 ACARS Message Envelope Structure

Table 4.4.2.2.1 – ACARS Message Envelope

Size in Char	Parameter Name	Format or parameter type	Example	Option	Note
0-n1	reserved				
1	delimiter	comma	,	No	
3	serviceID	Char3Type	FPA	No	6
3	messageID	Char3Type	SUB	No	6
2	versionNb	NN	01	No	6
12	headerTimestamp	datetime	050217115932	No	
0-n2	Supplementary Header Element	see Table 4.4.3.2.2 below	see example	Yes	6
1	ContentElementStartCharacter	slash	/	No	7
0-n3	Message Content Element	See messages definition		Yes	
1	Parameter Delimiter	comma	,	No	
1	FreeTextStartCharacter	slash	/ Free Text	see note	3
0-n4	FreeText	(0-n)I		Yes	
4	Application CRC (16 bit)	JJJJ	12AB	No	4

Notes:

1. This value may be omitted to indicate raw content or may specify an encoding type.
2. Specifies the schema version for the content. If this field is specified, the preceding field must be spacified as well.
3. The FreeTextStartCharacter is only needed if followed by FreeText.
4. Applications may or may not use this element. However, if an individual ACARS message definition mandates it, it is not optional.
5. CRC is mandatory for ACARS encoded ARINC 633 messages, the same calculation as used in ARINC 622, and covers all ARINC 633 fields of the message envelope table, except the CRC itself.
6. As defined in Section 4.3.2, the element name, which split into application identifier (label), service identifier, message identifier and version number, is part of the Generic Message Structure in ACARS encoded messages and is part of the content element in IP encoded messages
7. In order to stay compatible with possible future header changes, it is recommended that applications check for this character instead of counting the elements in the header in order to identify the start of the content element.

Table 4.4.2.2.2 – ACARS Supplementary Header Table

Size in Char	Parameter Name	Format or parameter type	Example	Option	Note
4	depICAOCd	ICAOType	LFPO	Yes	1, 2
1	delimiter	comma	,	No	
3	depIATACd	IATAType	CDG	Yes	2
1	delimiter	comma	,	No	
4	destICAOCd	ICAOType	LFBO	Yes	1, 2
1	delimiter	comma	,	No	
3	destIATACd	IATAType	TLS	Yes	2
1	delimiter	comma	,	No	
1-7	flightID	flightIdType	AFR5556	Yes	3, 4
1	delimiter	comma	,	No	
1-8	flightNum	flightNumType	AF5556	Yes	3, 4
1	delimiter	comma	,	No	
6	departureDate	Date	050217	No	
1	delimiter	comma	,	No	
4	departureTime	timeMin	1235	Yes	5
1	delimiter	comma	,	No	
3-4	acType	aircraftType	A380	No	
1	delimiter	comma	,	No	
3-4	acSubType	aircraftSubType	800	Yes	
1	delimiter	comma	,	No	
5-7	regist	RegistType	F-WWOW	No	
1	delimiter	comma	,	No	
0-n	Reserved			Yes	

The supplementary header fields should be used at least to associate the data to a given aircraft and flight. Some airborne applications may decide to check if the messages are intended to the right entity. In this case, it is advised to use primarily the aircraft registration (flightID and flightNum format can vary).

COMMENTARY

Supplementary header structure is designed to be consistent with XML supplementary header. Some differences exist but they only apply to parameter type definition. For example, IATA airport code is defined as 'XXX' in ACARS while it is a 3 characters string in XML.

Notes:

1. Per ICAO Document 4444
2. Destination and Departure airport codes are mandatory, but ICAO or IATA format can be used: ICAO code only, IATA code only, or both are allowed.
3. At least one identifier for the flight is required, but either Flight Id or Flight number can be used, or both.
4. The flight id or flight num used should designate the flight to which the message is applicable, that may be different from the current flight (for example next flight).
5. May be STD (Scheduled Time of Departure) or EOBT (Estimated OffBlock Time). This parameter is optional and should not be used for identification of flight (automatic matching of received messages with local flight information).

4.4.2.3 Examples

ACARS encoded uplink example with supplementary header (excluding ARINC 620 header and label)

```
,FRCSUB01050217065159
LFPG,,KJFK,,AFR5556,,050217,,A380,,F-WWOW,
/CAFS,BPC,H10556,1,8522A,58100,LT,802,45596,KG,,,xxxx
```

Note: xxxx is the CRC

Notes:

1. The "633 part" of an ARINC 633 ACARS message is contained in the "free text" section of a 618/619/620 message. The samples show only this "633 part", the 618/619/620 header and trailer are not shown. Therefore, the ACARS address (e.g. the aircraft registration) and the label or SMI is not shown in the examples. For informational purposes, appendix B contains examples including the full 618/619/620 header and trailer.
2. The 633 part of an ARINC 633 ACARS messages does not contain control characters like carriage return, line feed or similar. If sample messages are split in separate lines, this is done for better readability only.
3. For the sample messages, the CRC has not been calculated. Therefore, it is added as "xxxx".

4.4.3 XML Message Definition

4.4.3.1 General

XML messages are defined using XML Schemas version 1.0 as defined by W3C.

All schemas have precedence over the text.

4.4.3.2 XML Message Envelope Structure

Message Envelope XML Schema

XML message structure should be the same for uplinks and downlinks.

The root element of an XML encoded message should be named as follows:

```
<xs:element name="XXXYYY">
```

where XXX is the ServiceId (3 characters) followed by YYY, the MessageId ident (3 characters).

The message should include the mandatory header

```
<xs:element ref="M633Header"/>
```

and the supplementary header

```
<xs:element ref="M633SupplementaryHeader"/>
```

Depending on the application, and especially if there is a user involved in the message processing, it may be useful to add free text.

It is recommended that the free text be included as a specific element (string) under the service+message element definition. It is recommended to use the element name ‘FreeText’.

4.4.3.3 Examples

Hereafter is an example of how an XML definition of a set of messages looks like. This definition is embedded in a schema. There is one schema per application (here it is REFUELING). This schema also refers to the M633 headers definition (in a separate schema, called m633headers). The schema below defines several messages (please note that the refueling application (Section 6.3) supports more than these 3 messages. The schema below is provided as EXAMPLE ONLY: it is not complete – please refer to the Electronic Document for complete definition of fuel XML schemas.

```
<?xml version="1.0" encoding="UTF-8" ?>
xs:schema xmlns="http://aeec.aviation-ia.net/633"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://aeec.aviation-ia.net/633"
elementFormDefault="qualified" attributeFormDefault="unqualified"
version="2">
<!--************************************************************-->
  <xs:include schemaLocation="../m633headers/m633headers.xsd" />
<!--************************************************************-->
<!--  FCA (Fuel CG Advisory) messages Definition  -->
<!--************************************************************-->
  <xs:element name="FCAIND" nillable="false">
    <xs:complexType>
      <xs:sequence>
```

```
      <xs:element ref="M633Header"/>
      <xs:element ref="M633SupplementaryHeader"/>
      <xs:element name="FwdTakeoffCenterOfGravityLimit"
nillable="false">
        <xs:annotation>
          <xs:documentation>fwd limit for takeoff CG in percent of
mean aerodynamic chord according operational envelope
</xs:documentation>
        </xs:annotation>
        <xs:simpleType>
          <xs:restriction base=”xs:float”>
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="100"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="AftTakeoffCenterOfGravityLimit"
nillable="false">
        <xs:annotation>
          <xs:documentation>aft limit for takeoff CG in percent of
mean aerodynamic chord according operational envelope
</xs:documentation>
        </xs:annotation>
        <xs:simpleType>
          <xs:restriction base="xs:float">
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="100"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="CalculatedTakeoffCenterOfGravity"
nillable="false">
        <xs:annotation>
          <xs:documentation>CG value calculated for takeoff in
percent of mean aerodynamic chord</xs:documentation>
        </xs:annotation>
        <xs:simpleType>
          <xs:restriction base="xs:float">
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="100"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="TakeoffWeight" nillable="false">
        <xs:complexType>
          <xs:simpleContent>
            <xs:extension base="xs:nonNegativeInteger">
              <xs:attribute name="unit" type="weightUnitType"
use="required"/>
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
      <xs:element  name="TaxiFuel" nillable="false">
        <xs:complexType>
          <xs:simpleContent>
            <xs:extension base="xs:nonNegativeInteger">
              <xs:attribute name="unit" type="weightUnitType"
use="required"/>
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
```

```
  </xs:element>
<!--***********************************************************-->
<!--   FRC (Fuel ReCeipt) messages Definition  -->
<!--***********************************************************-->
 <xs:element name="FRCSUB">
.
.
 </xs:element>
<!--***********************************************************-->
 <xs:element name="FORACK">
.
.
</xs:element>
</xs:schema>
```

4.4.4 M633Headers

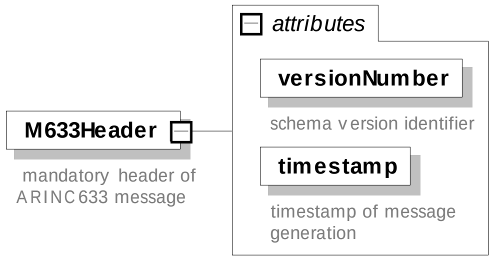
M633 headers are inserted mainly to identify the flight in terms of:

- Used XML schema version (@versionNumber)
- Timestamp of the message generation (@timestamp)
- FlightIdentifier
- Commercial Flight Number (CommercialFlightNumber)
- Scheduled Time of Departure (@flightOriginDate; @scheduledTimeOfDeparture)
- Departure Airport (DepartureAirport)
- Arrival Airport (ArrivalAirport)
- Etc.

4.4.4.1 M633Header

M633Header is a mandatory header of ARINC633 message

element M633Header

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>used by</td><td><table><tr><td>elements</td><td><i>AirportData AirspaceData GERIND FlightPlan FlightPlanAtcIcao UpperAirData WIFSUB WIISUB WIMSUB WIRREP EFFREQ EFDREP EFUSUB DORACK DORIND DORSUB DPRREP DRCACK DRCSUB FCAIND FDAACK FDACOM FDASUB FENIND FERIND FORACK FORSUB FPRREP FRCACK FRCSUB FSTREP FSTREQ FTBIND FTEIND FTIIND</i></td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>versionNumber</i></td><td>xs:nonNegativeInteger</td><td>required</td><td></td><td></td><td>documentation
schema version identifier. e.g. versionNumber = 2 for A633-1 schema. See table below.</td></tr><tr><td><i>timestamp</i></td><td>xs:dateTime</td><td>required</td><td></td><td></td><td>documentation
timestamp of message generation</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
mandatory header of ARINC633 message</td></tr>
</table>

attribute M633Header/@versionNumber

<table>
<tr><td>type</td><td>restriction of xs:nonNegativeInteger</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>use</td><td>required</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>minIncl</td><td>2</td></tr><tr><td>maxIncl</td><td>2</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
schema version identifier</td></tr>
</table>

The version number of the schemas in the original gray cover ARINC 633 is versionNumber = 1. Thus, the version number of the schema will always lead the number of the associated gray cover supplement by one. For example, the version number of the schema associated with Supplement 1 has versionNumber = 2.

Standard	versionNumber
ARINC 633	1
ARINC 633-1	2

As shown in this table, the lack of synchronism among the supplement number and the schema number can lead to confusion when references are made. Care must be taken when such references are formulated not to rely solely on the number.

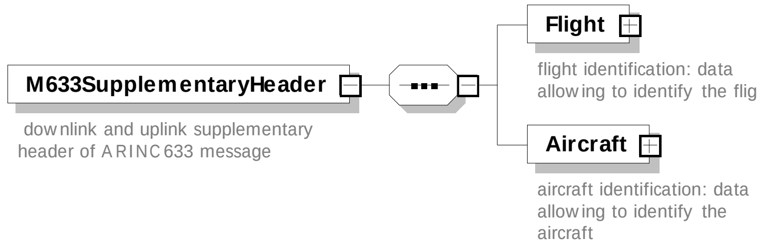
attribute M633Header/@timestamp

type	**xs:dateTime**
properties	**isRef** 0 **use** required
annotation	**documentation** timestamp of message generation

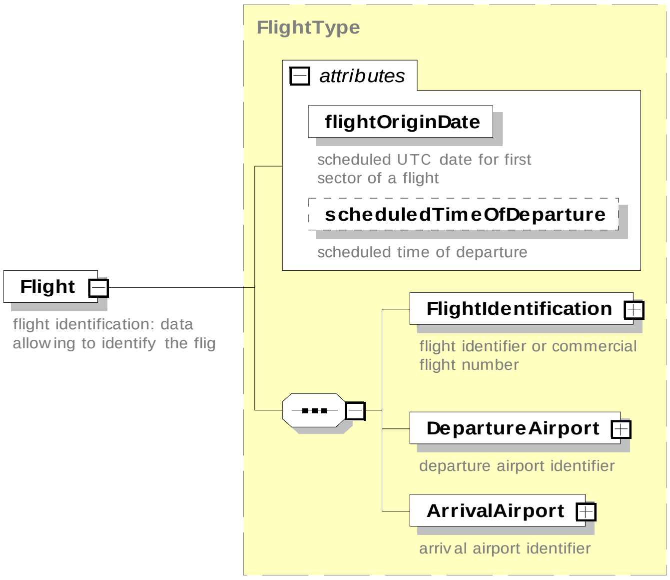
4.4.4.2 M633SupplementaryHeader

M633SupplementaryHeader is a mandatory supplementary header of the ARINC633 XML message.

element M633SupplementaryHeader

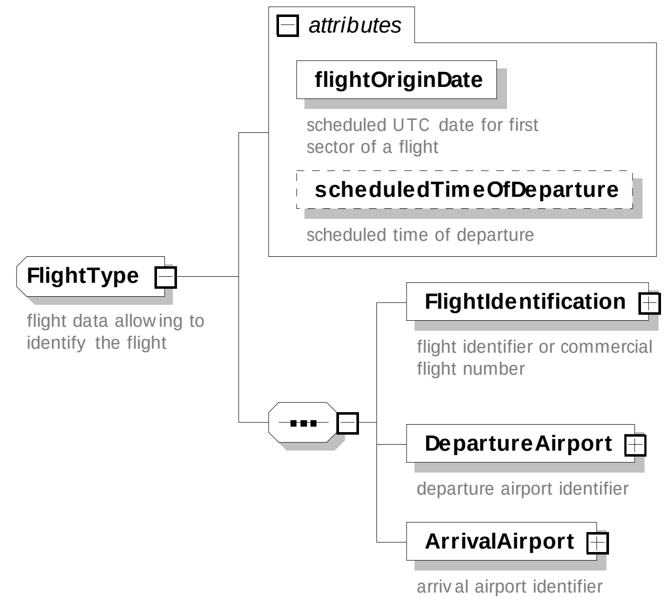
diagram	
properties	**content** complex **nillable** false
children	*Flight Aircraft*
used by	**elements** *AirportData AirspaceData GERIND FlightPlan FlightPlanAtcIcao UpperAirData WIFSUB WIISUB WIMSUB WIRREP EFFREQ EFDREP EFUSUB DORACK DORIND DORSUB DPRREP DRCACK DRCSUB FCAIND FORACK FORSUB FPRREP FRCACK FRCSUB*
annotation	**documentation** downlink and uplink supplementary header of ARINC633 message

element M633SupplementaryHeader/Flight

diagram	
type	*FlightType*
properties	**isRef** 0 **content** complex **nillable** false
children	*FlightIdentification DepartureAirport ArrivalAirport*

attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	flightOriginDate	**xs:date**	**required**			**documentation** **scheduled UTC date for first sector of a flight**
	scheduledTimeOfDeparture	**xs:dateTime**	**optional**			**documentation** **scheduled time of departure**
annotation	**documentation** **flight identification: data to enable flight identify discovery**					

complexType FlightType

diagram						
children	***FlightIdentification DepartureAirport ArrivalAirport***					
used by	**element** ***M633SupplementaryHeader/Flight***					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	flightOriginDate	**xs:date**	**required**			**documentation** **scheduled UTC date for first sector of a flight**
	scheduledTimeOfDeparture	**xs:dateTime**	**optional**			**documentation** **scheduled time of departure**
annotation	**documentation** **flight data allowing to identify the flight**					

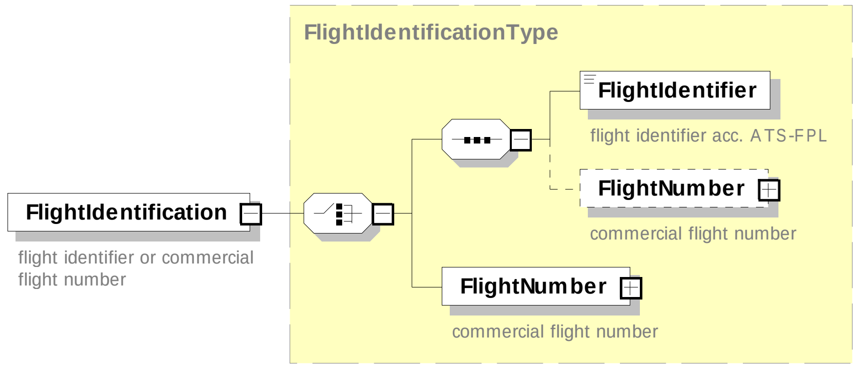
attribute FlightType/@flightOriginDate

type	**xs:date**
properties	**isRef 0** **use required**
annotation	**documentation** **scheduled UTC date for first sector of a flight**

attribute FlightType/@scheduledTimeOfDeparture

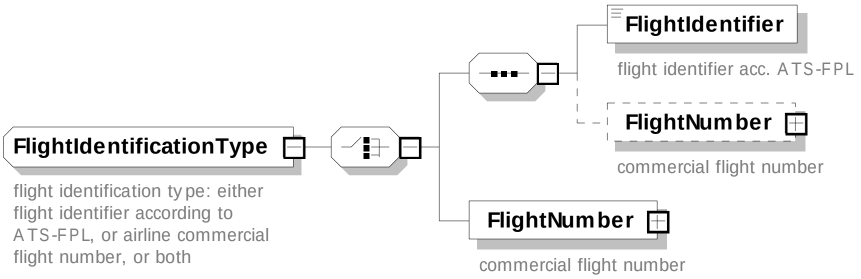
type	**xs:dateTime**
properties	**isRef 0** **use optional**
annotation	**documentation** **scheduled time of departure**

element FlightType/FlightIdentification

<table>
<tr><td>diagram</td><td>


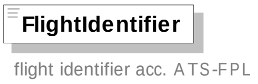
</td></tr>
<tr><td>type</td><td><i>FlightIdentificationType</i></td></tr>
<tr><td>properties</td><td>isRef 0
content complex
nillable false</td></tr>
<tr><td>children</td><td><i>FlightIdentifier FlightNumber FlightNumber</i></td></tr>
<tr><td>annotation</td><td>documentation
flight identifier or commercial flight number</td></tr>
</table>

complexType FlightIdentificationType

<table>
<tr><td>diagram</td><td>


</td></tr>
<tr><td>children</td><td><i>FlightIdentifier FlightNumber FlightNumber</i></td></tr>
<tr><td>used by</td><td>element <i>FlightType/FlightIdentification</i></td></tr>
<tr><td>annotation</td><td>documentation
flight identification type: either flight identifier according to ATS-FPL, or airline commercial flight number, or both</td></tr>
</table>

element FlightIdentificationType/FlightIdentifier

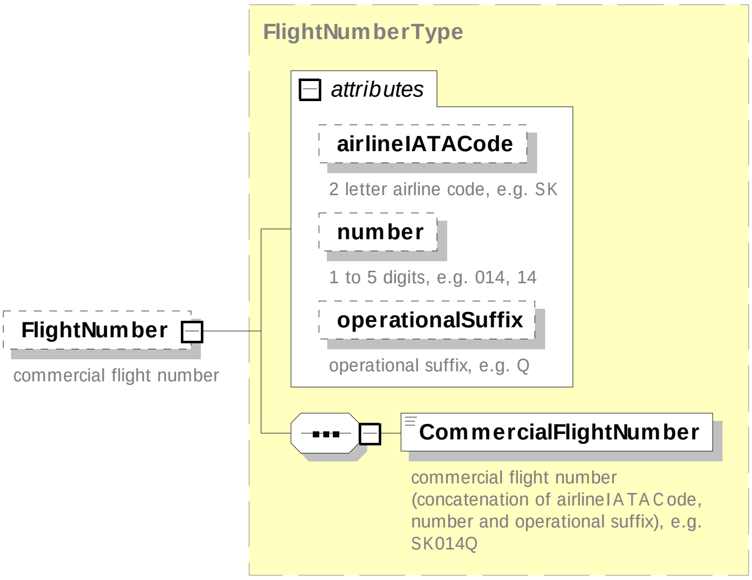
<table>
<tr><td>diagram</td><td>


</td></tr>
<tr><td>type</td><td>restriction of <i>FlightIdentiferType</i></td></tr>
<tr><td>properties</td><td>isRef 0
content simple
nillable false</td></tr>
<tr><td>facets</td><td>minLength 2</td></tr>
<tr><td>annotation</td><td>documentation
flight identifier acc. ATS-FPL</td></tr>
</table>

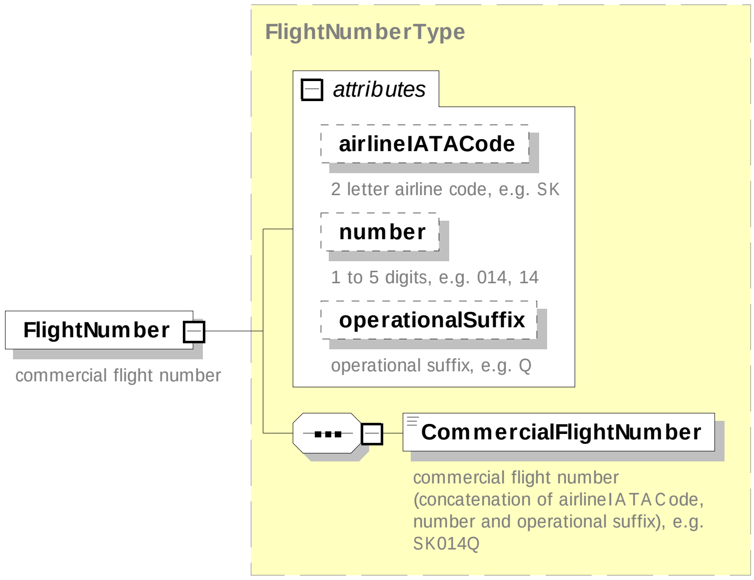
simpleType FlightIdentiferType

type	**xs:string**
used by	**element *FlightIdentificationType/FlightIdentifier***

element FlightIdentificationType/FlightNumber

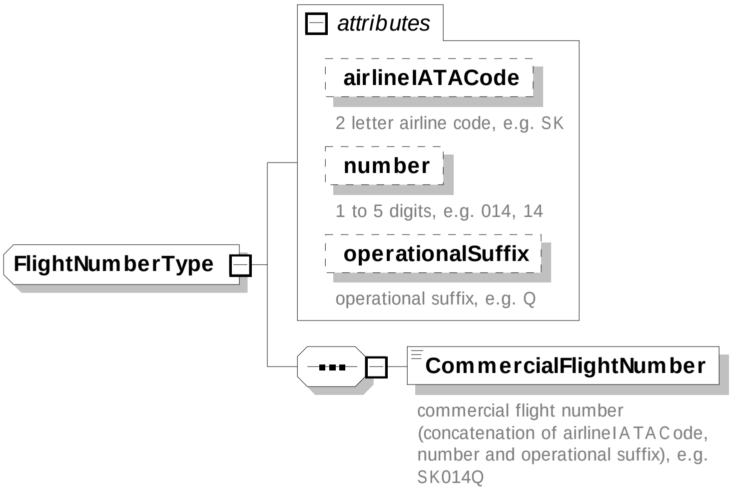
<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td><i>FlightNumberType</i></td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td><i>CommercialFlightNumber</i></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><i>airlineIATACode</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
2 letter airline code, e.g. SK</td></tr>
<tr><td><i>number</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
1 to 5 digits, e.g. 014, 14</td></tr>
<tr><td><i>operationalSuffix</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
operational suffix, e.g. Q</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
commercial flight number</td></tr>
</table>

element FlightIdentificationType/FlightNumber

diagram	
type	*FlightNumberType*
properties	isRef 0 content complex mixed true nillable false
children	*CommercialFlightNumber*
attributes	see below
annotation	documentation commercial flight number

Name	Type	Use	Default	Fixed	annotation
airlineIATACode	derived by: xs:string	optional			documentation 2 letter airline code, e.g. SK
number	derived by: xs:string	optional			documentation 1 to 5 digits, e.g. 014, 14
operationalSuffix	derived by: xs:string	optional			documentation operational suffix, e.g. Q

complexType FlightNumberType

diagram	
properties	mixed true
children	*CommercialFlightNumber*
used by	elements *FlightIdentificationType/FlightNumber FlightIdentificationType/FlightNumber*

attributes	Name	Type	Use	Default	Fixed	annotation
	airlineIATACode	derived by: xs:string	optional			documentation 2 letter airline code, e.g. SK
	number	derived by: xs:string	optional			documentation 1 to 5 digits, e.g. 014, 14
	operationalSuffix	derived by: xs:string	optional			documentation operational suffix, e.g. Q

attribute FlightNumberType/@airlineIATACode

type	restriction of xs:string
properties	isRef 0 use optional
facets	length 2
annotation	documentation 2 letter airline code, e.g. SK

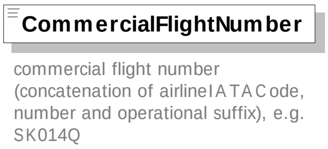
attribute FlightNumberType/@number

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 maxLength 5
annotation	documentation 1 to 5 digits, e.g. 014, 14

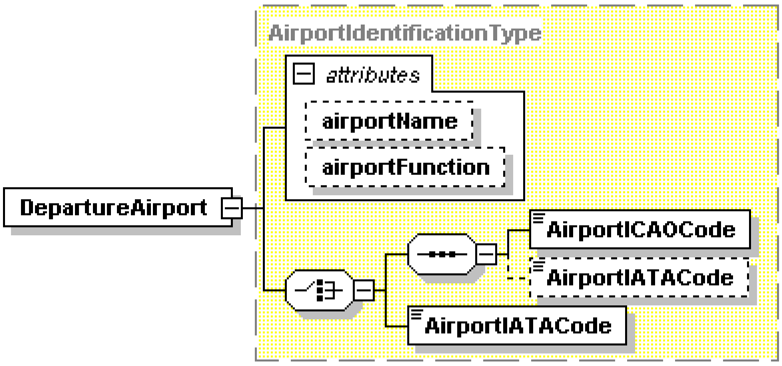
attribute FlightNumberType/@operationalSuffix

type	restriction of xs:string
properties	isRef 0 use optional
facets	length 1
annotation	documentation operational suffix, e.g. Q

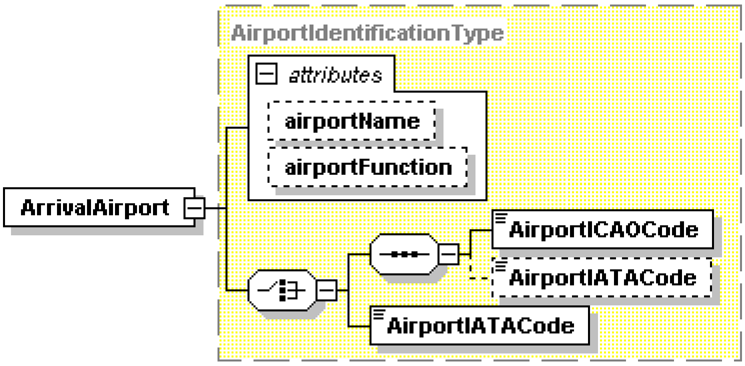
element FlightNumberType/CommercialFlightNumber

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	minLength 3 maxLength 9
annotation	documentation commercial flight number (concatenation of airlineIATACode, number and operational suffix), e.g. SK014Q

element FlightType/DepartureAirport

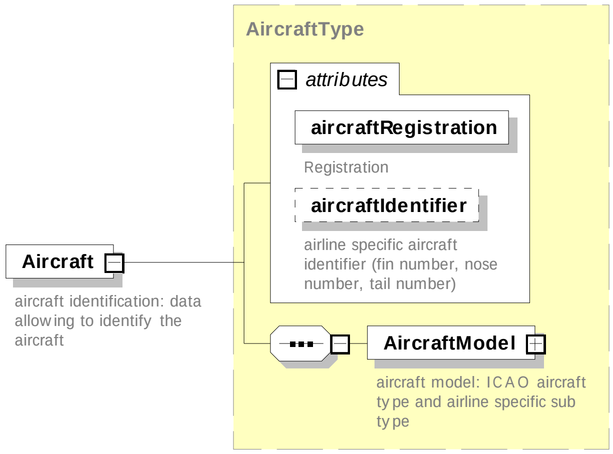
diagram	
type	*AirportIdentificationType*
properties	isRef 0 content complex nillable false
children	*AirportICAOCode AirportIATACode AirportIATACode*
attributes	Name / Type / Use / Default / Fixed / annotation *airportName* / derived by: xs:string / / / / documentation airport name e.g. WASHINGTON DULLES INTL *airportFunction* / derived by: xs:string / / / / documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport
annotation	documentation departure airport identifier

element FlightType/ArrivalAirport

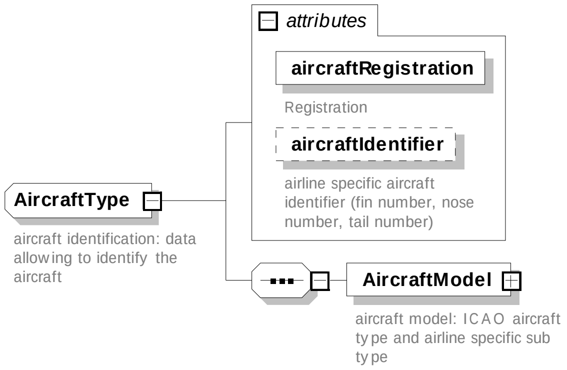
diagram	
type	*AirportIdentificationType*
properties	isRef 0 content complex nillable false
children	*AirportICAOCode AirportIATACode AirportIATACode*
attributes	Name / Type / Use / Default / Fixed / annotation *airportName* / derived by: xs:string / / / / documentation airport name e.g. WASHINGTON DULLES INTL *airportFunction* / derived by: xs:string / / / / documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport
annotation	documentation arrival airport identifier

documentation
aircraft
identification:
data allowing
to identify the
aircraft

element M633SupplementaryHeader/Aircraft

diagram						
type	*AircraftType*					
properties	**isRef** **0** **content** **complex** **nillable** **false**					
children	*AircraftModel*					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	aircraftRegistration	**derived by: xs:string**	**required**			**documentation** **Registration**
	aircraftIdentifier	**derived by: xs:string**	**optional**			**documentation** **airline specific aircraft identifier (fin number, nose number, tail number)**
annotation	**documentation** **aircraft identifications: data allowing to identify the aircraft**					

complexType AircraftType

diagram						
children	*AircraftModel*					
used by	**element** ***M633SupplementaryHeader/Aircraft***					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	aircraftRegistration	**derived by: xs:string**	**required**			**documentation** **Registration**
	aircraftIdentifier	**derived by: xs:string**	**optional**			**documentation** **airline specific aircraft identifier (fin number, nose number, tail number)**
annotation	**documentation** **aircraft identification: data allowing to identify the aircraft**					

attribute AircraftType/@aircraftRegistration

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1 whiteSpace preserve
annotation	documentation Registration

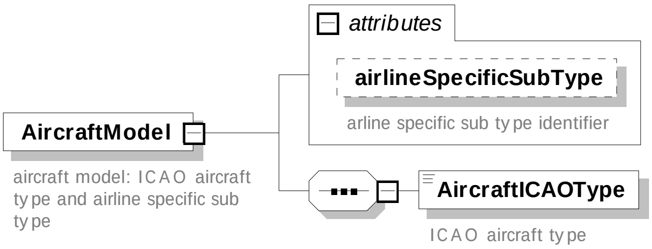
simpleType AircraftRegistrationType

type	restriction of xs:string
facets	minLength 5 maxLength 7
annotation	documentation definition of registration type 5-7 char

attribute AircraftType/@aircraftIdentifier

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation airline specific aircraft identifier (fin number, nose number, tail number)

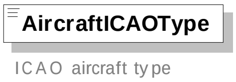
element AircraftType/AircraftModel

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>isRef 0
content complex
nillable false</td></tr>
<tr><td>children</td><td><i>AircraftICAOType</i></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><i>airlineSpecificSubType</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
airline specific sub type identifier</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
aircraft model: ICAO aircraft type and airline specific sub type</td></tr>
</table>

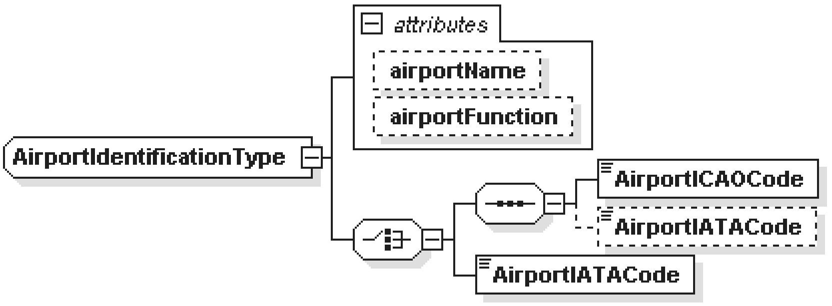
attribute AircraftType/AircraftModel/@airlineSpecificSubType

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation airline specific sub type identifier

element AircraftType/AircraftModel/AircraftICAOType

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	length 4
annotation	documentation ICAO aircraft type

complexType AirportIdentificationType

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>children</td><td>*AirportICAOCode AirportIATACode AirportIATACode*</td></tr>
<tr><td>used by</td><td>elements *flightPlanCore.Grp/ETOPSSummary/AdequateAirports/AdequateAirport
AlternateRoute/Airport FuelHeaderLineAirportType/Airport
flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/Airport
flightPlanCore.Grp/AirportDataList/AirportData/Airport
AirportData/Airport/AirportIdentification FlightType/ArrivalAirport
FlightType/DepartureAirport
FuelHeaderLineContingencyType/ContingencyPolicy/EnrouteAlternateAirport
LMCLineDestination*</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>*airportName*</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airport name e.g. WASHINGTON DULLES INTL</td></tr>
<tr><td>*airportFunction*</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Airport type: either ICAO code, or IATA code, or both</td></tr>
</table>

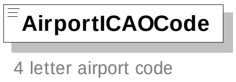
attribute AirportIdentificationType/@airportName

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve
annotation	documentation airport name e.g. WASHINGTON DULLES INTL

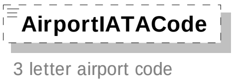
attribute AirportIdentificationType/@airportFunction

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve
annotation	documentation The content of this attribute is open. Nonetheless it is recommended to use the following airportFunctions to ensure a proper interpretation from all applications: DepartureAirport, DepartureAlternateAirport, ArrivalAirport, ArrivalAlternateAirport, ContingencySavingsAirport, ContingencySavingsAlternateAirport, EnrouteAirport, AdequateAirport, SuitableAirport

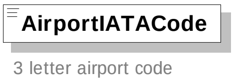
element AirportIdentificationType/AirportICAOCode

diagram	
type	*AirportICAOCodeType*
properties	isRef 0 content simple nillable false
facets	length 4
annotation	documentation 4 letter airport code

element AirportIdentificationType/AirportIATACode

diagram	
type	*AirportIATACodeType*
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation 3 letter airport code

element AirportIdentificationType/AirportIATACode

diagram	
type	*AirportIATACodeType*
properties	isRef 0 content simple nillable false
facets	length 3
annotation	documentation 3 letter airport code

simpleType AirportIATACodeType

type	restriction of xs:string
used by	elements *AirportIdentificationType/AirportIATACode AirportIdentificationType/AirportIATACode*
facets	length 3

simpleType AirportICAOCodeType

type	**restriction of xs:string**
used by	**element** ***AirportIdentificationType/AirportICAOCode*** **attributes** ***AirspaceData/Airspace/@airspaceICAOCode waypoint.Grp/Airspace/@airspaceICAOCode***
facets	**length 4**

4.5 TSE2 Encoding

To be added by a future supplement.

5.0 COMMON ELEMENTS

Application Name	**Not Applicable**
ACARS Label	corresponds to the application in which the element is used
Introduced	2005
Purpose	Common elements are elements that may be used in multiple applications, e.g. error or caution elements.
Stake Holder	All
Airborne System	All
Ground Systems	All
Network	ACARS and IP
Downlink Routing	

Element List

Element Name	**Element ID**	**Service Version**	**DL/UL**	**Purpose**
General Error Indication	GERIND	01	DL/UL	General error service

Section 5 defines how complex data sets used by various applications should be structured and encoded. It also defines common communication services, such as general error services.

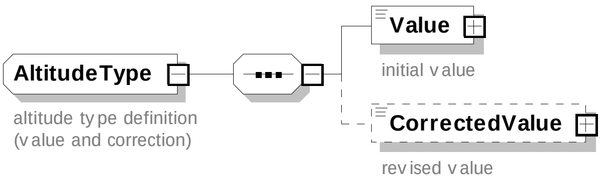
The data addressed are generally complex and structured data, gathering strongly related parameters. For example, Flight plan is considered as a global data set. Weather and NOTAMs are also separate data sets.

Definitions are essentially done using XML. The definitions are expected to be used/included in individual application schemas.

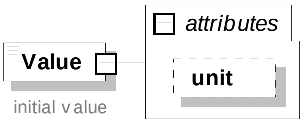
Thanks to the strength of XML, it is possible to dissociate data (XML instance) and the representation of the content of the data (XML Stylesheets).

The purpose here is not to standardize the way the data are to be displayed, but to standardize the naming and organization of some elements in order to easily find information in an XML instance of the data.

complexType AltitudeType

diagram		
properties	**mixed**	**true**
children	***Value CorrectedValue***	
used by	**elements**	***AltitudeBasicType/ActualAltitude*** ***flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/Altitude*** ***UpperAirData.grp/AltitudeSpecificPredictedInformation/Altitude*** ***AltitudeBasicType/EstimatedAltitude*** ***RouteInformation/InitialAltitude*** ***flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/MinimumSafeAltitude*** ***waypoint.Grp/MinimumSafeAltitude*** ***UpperAirData/CruisePhase/Waypoint/Tropopause*** ***waypoint.Grp/Tropopause***
annotation	**documentation** **altitude type definition (value and correction)**	

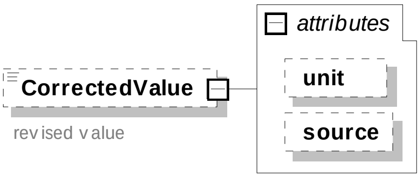
element AltitudeType/Value

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>true</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>unit</i></td><td><i>altitudeUnitType</i></td><td></td><td>ft/100</td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

attribute AltitudeType/Value/@unit

<table>
<tr><td>type</td><td><i>altitudeUnitType</i></td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>default</td><td>ft/100</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>enumeration</td><td>ft/100</td></tr><tr><td>enumeration</td><td>ft/1000</td></tr><tr><td>enumeration</td><td>ft</td></tr><tr><td>enumeration</td><td>m/100</td></tr><tr><td>enumeration</td><td>m/10</td></tr><tr><td>enumeration</td><td>m</td></tr></table></td></tr>
</table>

element AltitudeType/CorrectedValue

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>true</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
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xs:string</td><td></td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
revised value</td></tr>
</table>

attribute AltitudeType/CorrectedValue/@unit

<table>
<tr><td>type</td><td><i>altitudeUnitType</i></td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>default</td><td>ft/100</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>enumeration</td><td>ft/100</td></tr><tr><td>enumeration</td><td>ft/1000</td></tr><tr><td>enumeration</td><td>ft</td></tr><tr><td>enumeration</td><td>m/100</td></tr><tr><td>enumeration</td><td>m/10</td></tr><tr><td>enumeration</td><td>m</td></tr></table></td></tr>
</table>

attribute AltitudeType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

simpleType char3Type

type	restriction of xs:string
used by	attributes *GeneralErrorType/@erroneousElement GeneralErrorType/@erroneousService GeneralErrorType/@erroneousSMI TypeOfError/@erroneousService TypeOfError/@erroneousElement*
facets	length 3

attributeGroup coordinateType.grp

used by	elements *AirportData/Airport/AirportReferencePoint UpperAirData/CruisePhase/Waypoint/Coordinates AirportData/Airport/TerminalProcedures/Waypoint/Coordinates BorderPointType/Coordinates BorderPointType/NearestWaypoint/Coordinates flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/Coordinates waypoint.Grp/Coordinates AirportData/Airport/Runway/LandingThreshold*
attributes	Name Type Use Default Fixed annotation *latitude* derived by: xs:float required *longitude* derived by: xs:float required
annotation	documentation definition for latitude and longitude, resolution in seconds, positive values representing North/East, negative values representing South/West

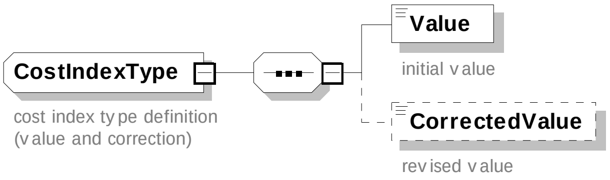
attribute coordinateType.grp/@latitude

type	restriction of xs:float
properties	isRef 0 use required
facets	minInclusive -324000 maxInclusive 324000

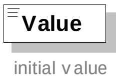
attribute coordinateType.grp/@longitude

type	restriction of xs:float
properties	isRef 0 use required
facets	minInclusive -648000 maxInclusive 648000

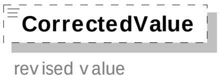
complexType CostIndexType

diagram	
properties	mixed true
children	*Value CorrectedValue*
used by	element *SpeedProcedureType/CostIndex*
annotation	documentation cost index type definition (value and correction)

element CostIndexType/Value

diagram	
type	**restriction of xs:nonNegativeInteger**
properties	**isRef 0** **content simple** **nillable false**
facets	**minInclusive 0** **maxInclusive 999**
annotation	**documentation** **initial value**

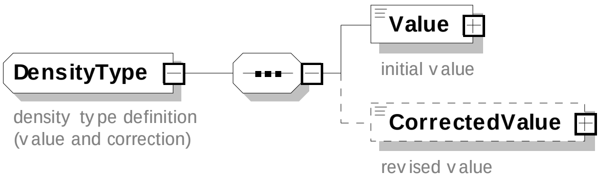
element CostIndexType/CorrectedValue

diagram	
type	**restriction of xs:nonNegativeInteger**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minInclusive 0** **maxInclusive 999**
annotation	**documentation** **revised value**

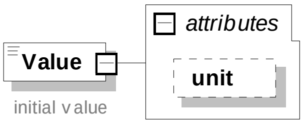
simpleType CountryICAOCodeType

type	**restriction of xs:string**
used by	**attribute** ***waypointIdentification.grp/@countryICAOCode***
facets	**length 2**
annotation	**documentation** **2 letter ICAO Country Code**

complexType DensityType

diagram	
children	***Value CorrectedValue***
used by	**element** ***fuelHeader.Grp/PossibleExtraFuel/MaximumFuelWeight/Density***
annotation	**documentation** **density type definition (value and correction)**

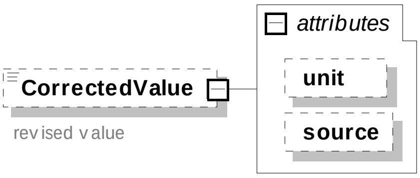
element DensityType/Value

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>true</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>unit</i></td><td><i>densityUnitType</i></td><td></td><td>kg/l</td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

attribute DensityType/Value/@unit

<table>
<tr><td>type</td><td><i>densityUnitType</i></td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>default</td><td>kg/l</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>enumeration</td><td>g/cm3</td></tr><tr><td>enumeration</td><td>lb/l</td></tr><tr><td>enumeration</td><td>lb/ug</td></tr><tr><td>enumeration</td><td>lb/m3</td></tr><tr><td>enumeration</td><td>lb/ig</td></tr><tr><td>enumeration</td><td>kg/l</td></tr><tr><td>enumeration</td><td>kg/m3</td></tr><tr><td>enumeration</td><td>kg/ig</td></tr><tr><td>enumeration</td><td>kg/ug</td></tr></table></td></tr>
</table>

element DensityType/CorrectedValue

<table>
<tr><td>diagram</td><td> </td></tr>
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<tr><td>annotation</td><td>documentation
revised value</td></tr>
</table>

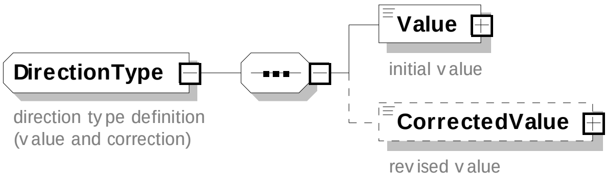
attribute DensityType/CorrectedValue/@unit

type	*densityUnitType*
properties	isRef 0 default kg/l
facets	enumeration g/cm3 enumeration lb/l enumeration lb/ug enumeration lb/m3 enumeration lb/ig enumeration kg/l enumeration kg/m3 enumeration kg/ig enumeration kg/ug

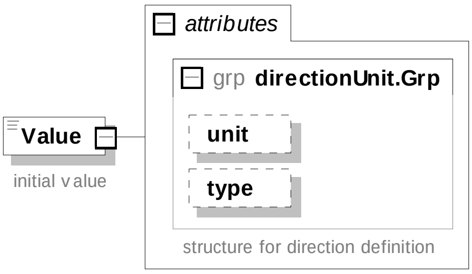
attribute DensityType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

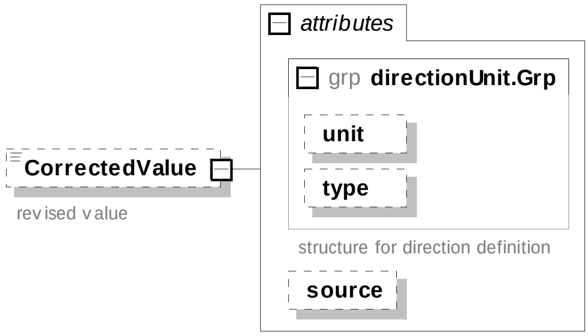
complexType DirectionType

diagram	
properties	mixed true
children	*Value CorrectedValue*
used by	elements *WindType/Direction Tracks/InboundTrack Tracks/OutboundTrack Tracks/SegmentTrack*
annotation	documentation direction type definition (value and correction)

element DirectionType/Value

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
content complex
mixed true
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><i>unit</i></td><td><i>directionUnitType</i></td><td>optional</td><td>deg</td><td></td><td></td></tr>
<tr><td><i>type</i></td><td>derived by: xs:string</td><td>optional</td><td>magnetic</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

element DirectionType/CorrectedValue

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name Type Use Default Fixed annotation *unit* *directionUnitType* optional deg *type* derived by: xs:string optional magnetic *source* derived by: xs:string
annotation	documentation revised value

attribute DirectionType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

attributeGroup directionUnit.Grp

used by	elements *DirectionType/CorrectedValue DirectionType/Value*
attributes	Name Type Use Default Fixed annotation *unit* *directionUnitType* optional deg *type* derived by: xs:string optional magnetic
annotation	documentation structure for direction definition

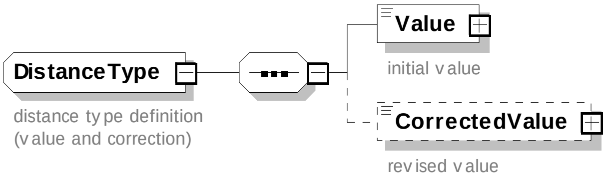
attribute directionUnit.Grp/@unit

type	*directionUnitType*
properties	isRef 0 default deg use optional
facets	enumeration deg enumeration rad

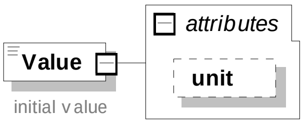
attribute directionUnit.Grp/@type

type	restriction of xs:string
properties	isRef 0 default magnetic use optional
facets	enumeration magnetic enumeration true

complexType DistanceType

diagram	
properties	**mixed** **true**
children	***Value CorrectedValue***
used by	**elements** ***RouteInformation/AirDistance waypoint.Grp/AirDistance RouteInformation/GreatCircleDistance RouteInformation/GroundDistance waypoint.Grp/GroundDistance flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingAirDistance waypoint.Grp/RemainingAirDistance flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingGroundDistance waypoint.Grp/RemainingGroundDistance***
annotation	**documentation** **distance type definition (value and correction)**

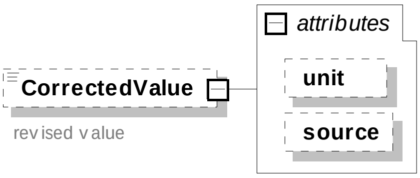
element DistanceType/Value

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
content complex
nillable false</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>unit</i></td><td><i>distanceUnitType</i></td><td></td><td>NM</td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

attribute DistanceType/Value/@unit

type	***distanceUnitType***
properties	**isRef** **0** **default** **NM**
facets	**enumeration** **m** **enumeration** **km** **enumeration** **NM** **enumeration** **ft**

element DistanceType/CorrectedValue

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>unit</i></td><td><i>distanceUnitType</i></td><td></td><td>NM</td><td></td><td></td></tr><tr><td><i>source</i></td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation</td></tr>
</table>

	revised value

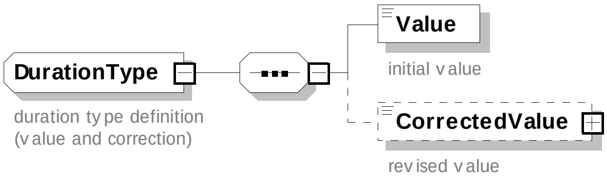
attribute DistanceType/CorrectedValue/@unit

type	*distanceUnitType*
properties	isRef 0 default NM
facets	enumeration m enumeration km enumeration NM enumeration ft

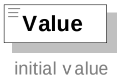
attribute DistanceType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

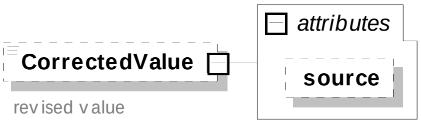
complexType DurationType

diagram	
properties	mixed true
children	*Value CorrectedValue*
used by	elements *DurationBasicType/ActualTime* *flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/CriticalTime* *fuelHeaderLineBasic.Grp/Duration DurationBasicType/EstimatedTime* *flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingFlightTime*
annotation	documentation duration type definition (value and correction)

element DurationType/Value

diagram	
type	xs:duration
properties	isRef 0 content simple nillable false
annotation	documentation initial value

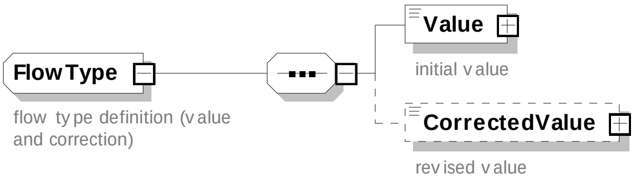
element DurationType/CorrectedValue

diagram	
type	extension of xs:duration
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name / Type / Use / Default / Fixed / annotation *source* / derived by: xs:string
annotation	documentation revised value

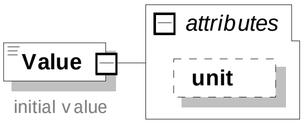
attribute DurationType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

complexType FlowType

diagram	
properties	mixed true
children	*Value CorrectedValue*
used by	element *FlightPlanHeader/AverageFuelFlow*
annotation	documentation flow type definition (value and correction)

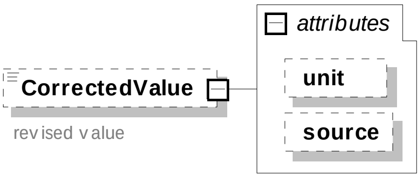
element FlowType/Value

diagram	
type	extension of xs:float
properties	isRef 0 content complex mixed true nillable false
attributes	Name / Type / Use / Default / Fixed / annotation *unit* / *flowUnitType* / / kg/h
annotation	documentation initial value

attribute FlowType/Value/@unit

type	*flowUnitType*
properties	isRef 0 default kg/h
facets	enumeration kg/h enumeration kg/s enumeration lb/h enumeration lb/s

element FlowType/CorrectedValue

<table>
<tr><td>diagram</td><td colspan="6">
</td></tr>
<tr><td>type</td><td colspan="6">extension of xs:float</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
minOcc 0
maxOcc 1
content complex
mixed true
nillable false</td></tr>
<tr><td rowspan="3">attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><i>unit</i></td><td><i>flowUnitType</i></td><td></td><td>kg/h</td><td></td><td></td></tr>
<tr><td><i>source</i></td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>annotation</td><td colspan="6">documentation
revised value</td></tr>
</table>

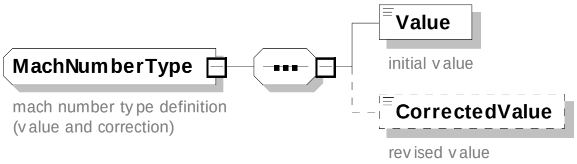
attribute FlowType/CorrectedValue/@unit

type	*flowUnitType*
properties	isRef 0 default kg/h
facets	enumeration kg/h enumeration kg/s enumeration lb/h enumeration lb/s

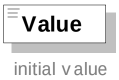
attribute FlowType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

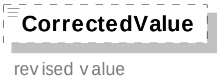
complexType MachNumberType

diagram	
properties	**mixed** **true**
children	*Value CorrectedValue*
used by	**elements** *MachNumberBasicType/ActualMachNumber MachNumberBasicType/EstimatedMachNumber SpeedProcedureType/MachNumber*
annotation	**documentation** **mach number type definition (value and correction)**

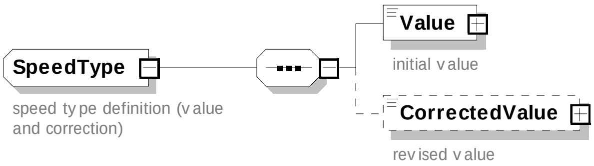
element MachNumberType/Value

diagram	
type	**restriction of xs:decimal**
properties	**isRef** **0** **content** **simple** **nillable** **false**
facets	**minInclusive** **0**
annotation	**documentation** **initial value**

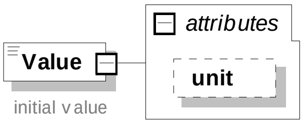
element MachNumberType/CorrectedValue

diagram	
type	**restriction of xs:decimal**
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **simple** **nillable** **false**
facets	**minInclusive** **0**
annotation	**documentation** **revised value**

complexType SpeedType

diagram	
properties	**mixed** **true**
children	*Value CorrectedValue*
used by	**elements** *SpeedBasicType/ActualSpeed RouteInformation/AverageWindComponent flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageWindComponent SpeedBasicType/EstimatedSpeed SpeedProcedureType/IndicatedAirSpeed waypoint.Grp/SegmentShearRate/SegmentVerticalWindChange WindType/Speed SpeedProcedureType/TrueAirSpeed UpperAirData.grp/AltitudeSpecificPredictedInformation/WindData/VerticalWind*
annotation	**documentation** **speed type definition (value and correction)**

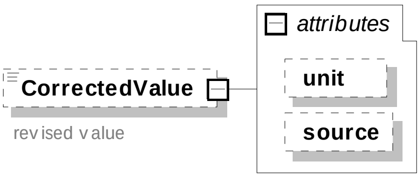
element SpeedType/Value

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td><i>unit</i></td><td><i>speedUnitType</i></td><td></td><td>kt</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

attribute SpeedType/Value/@unit

<table>
<tr><td>type</td><td><i>speedUnitType</i></td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>default</td><td>kt</td></tr>
</table></td></tr>
<tr><td>facets</td><td><table>
<tr><td>enumeration</td><td>kt</td></tr>
<tr><td>enumeration</td><td>m/s</td></tr>
<tr><td>enumeration</td><td>km/h</td></tr>
<tr><td>enumeration</td><td>ft/min</td></tr>
</table></td></tr>
</table>

element SpeedType/CorrectedValue

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td><i>unit</i></td><td><i>speedUnitType</i></td><td></td><td>kt</td><td></td><td></td></tr>
<tr><td><i>source</i></td><td>derived by:
xs:string</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
revised value</td></tr>
</table>

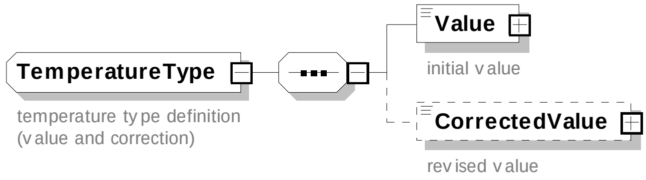
attribute SpeedType/CorrectedValue/@unit

<table>
<tr><td>type</td><td><i>speedUnitType</i></td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>default</td><td>kt</td></tr>
</table></td></tr>
<tr><td>facets</td><td><table>
<tr><td>enumeration</td><td>kt</td></tr>
<tr><td>enumeration</td><td>m/s</td></tr>
<tr><td>enumeration</td><td>km/h</td></tr>
<tr><td>enumeration</td><td>ft/min</td></tr>
</table></td></tr>
</table>

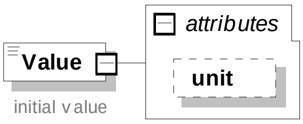
attribute SpeedType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

complexType TemperatureType

diagram	
properties	mixed true
children	*Value* CorrectedValue
used by	elements *RouteInformation/AverageISADeviation* *flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageISADeviation* *RouteInformation/AverageTemperature* *flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageTemperature* *UpperAirData.grp/AltitudeSpecificPredictedInformation/TemperatureData/ISADeviation* *waypoint.Grp/SegmentISADeviation* *waypoint.Grp/SegmentTemperature* *UpperAirData.grp/AltitudeSpecificPredictedInformation/TemperatureData/Temperature*
annotation	documentation temperature type definition (value and correction)

element TemperatureType/Value

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
content complex
mixed true
nillable false</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>unit</i></td><td><i>temperatureUnitType</i></td><td></td><td>C</td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
initial value</td></tr>
</table>

attribute TemperatureType/Value/@unit

type	*temperatureUnitType*
properties	isRef 0 default C
facets	enumeration C enumeration F enumeration K

attribute WeightType/CorrectedValue/@unit

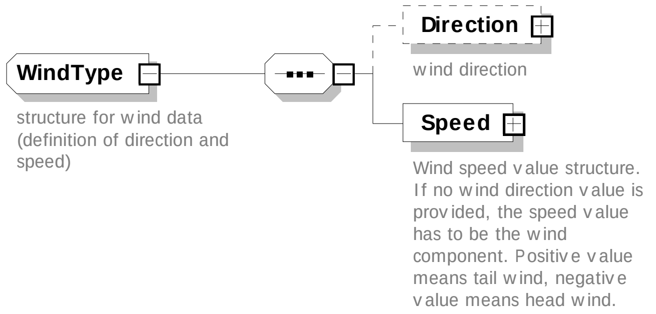
type	*weightUnitType*
properties	isRef 0 default kg
facets	enumeration kg enumeration t enumeration lb

5.0 COMMON ELEMENTS

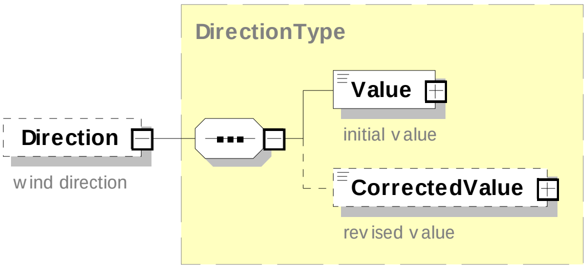
attribute WeightType/CorrectedValue/@source

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1

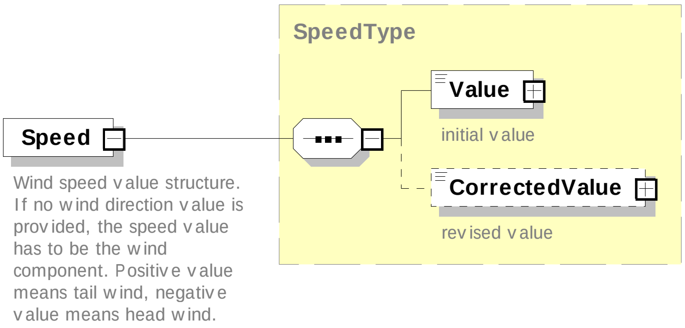
complexType WindType

diagram	
children	*Direction Speed*
used by	elements *RouteInformation/AverageWind* *flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageWind UpperAirData.grp/AltitudeSpecificPredictedInformation/WindData/HorizontalWind* *waypoint.Grp/SegmentWind*
annotation	documentation structure for wind data (definition of direction and speed)

element WindType/Direction

diagram	
type	*DirectionType*
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	*Value CorrectedValue*
annotation	documentation wind direction

element WindType/Speed

diagram	
type	***SpeedType***
properties	**isRef 0** **content complex** **mixed true** **nillable false**
children	***Value CorrectedValue***
annotation	**documentation** **Wind speed value structure. If no wind direction value is provided, the speed value has to be the wind component. Positive value means tail wind, negative value means head wind.**

simpleType altitudeUnitType

type	**restriction of xs:string**
used by	**attributes** ***AirportData/Airport/Runway/Elevation/@unit AirportData/Airport/Elevation/@unit AltitudeType/Value/@unit AltitudeType/CorrectedValue/@unit waypoint.Grp/SegmentShearRate/AltitudeDifference/@unit***
facets	**enumeration ft/100** **enumeration ft/1000** **enumeration ft** **enumeration m/100** **enumeration m/10** **enumeration m**
annotation	**documentation** **altitude unit type definition (enumerated units)**

simpleType densityUnitType

type	**restriction of xs:string**
used by	**attributes** ***DensityType/Value/@unit DensityType/CorrectedValue/@unit***
facets	**enumeration g/cm3** **enumeration lb/l** **enumeration lb/ug** **enumeration lb/m3** **enumeration lb/ig** **enumeration kg/l** **enumeration kg/m3** **enumeration kg/ig** **enumeration kg/ug**
annotation	**documentation** **density unit type definition (enumerated units)**

simpleType directionUnitType

type	**restriction of xs:string**
used by	**attributes** ***AirportData/Airport/Runway/QFU/@unit AirportData/Airport/Runway/Slope/@unit directionUnit.Grp/@unit***
facets	**enumeration deg** **enumeration rad**
annotation	**documentation** **direction unit type definition (enumerated units)**

simpleType distanceUnitType

type	restriction of xs:string	
used by	attributes	*AirportData/Airport/Runway/Approach/RequiredHorizontalVisibility/@unit* *AirportData/Airport/Runway/Approach/RequiredVerticalVisibility/@unit* *AirportData/Airport/Runway/LandingDistanceAvailable/@unit* *AirportData/Airport/Runway/TakeoffDistanceAvailable/@unit* *AirportData/Airport/Runway/TakeoffRunAvailable/@unit* *AirspaceData/Airspace/GreatCircleDistance/@unit* *AirspaceData/Airspace/GroundDistance/@unit* *BorderPointType/CumulatedGroundDistance/@unit DistanceType/Value/@unit* *DistanceType/CorrectedValue/@unit*
facets	enumeration enumeration enumeration enumeration	m km NM ft
annotation	documentation distance unit type definition (enumerated units)	

simpleType flowUnitType

type	restriction of xs:string	
used by	attributes	*FlowType/Value/@unit FlowType/CorrectedValue/@unit*
facets	enumeration enumeration enumeration enumeration	kg/h kg/s lb/h lb/s
annotation	documentation flow unit type definition (enumerated units)	

simpleType speedUnitType

type	restriction of xs:string	
used by	attributes	*SpeedType/Value/@unit SpeedType/CorrectedValue/@unit*
facets	enumeration enumeration enumeration enumeration	kt m/s km/h ft/min
annotation	documentation speed unit type definition (enumerated units)	

simpleType temperatureUnitType

type	restriction of xs:string	
used by	attributes	*TemperatureType/Value/@unit* TemperatureType/CorrectedValue/@unit
facets	enumeration enumeration enumeration	C F K
annotation	documentation temperature unit type definition (enumerated units)	

simpleType volumeUnitType

type	restriction of xs:string	
used by	attributes	VolumeType/Value/@unit VolumeType/CorrectedValue/@unit
facets	enumeration enumeration enumeration enumeration enumeration	l ug ig m3 cm3
annotation	documentation volume unit type definition (enumerated units)	

simpleType weightUnitType

type	restriction of xs:string
used by	attributes *WeightType/Value/@unit* *WeightType/CorrectedValue/@unit* *flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelValue/@unit*
facets	enumeration kg enumeration t enumeration lb
annotation	documentation weight unit type definition (enumerated units)

attributeGroup waypointIdentification.grp

used by	elements *BorderPointType/NearestWaypoint* *UpperAirData/CruisePhase/Waypoint* *AirportData/Airport/TerminalProcedures/Waypoint* complexType *WaypointType*					
attributes	Name	Type	Use	Default	Fixed	annotation
	waypointId	*WaypointIdType*	optional			
	waypointName	derived by: xs:string	optional			
	countryICAOCode	*CountryICAOCodeType*	optional			
annotation	documentation group definition for waypoint (waypointId: 1..5 letter code, waypointName, countryICAOCode)					

attribute waypointIdentification.grp/@waypointId

type	*WaypointIdType*
properties	isRef 0 use optional
facets	minLength 1 maxLength 5

attribute waypointIdentification.grp/@waypointName

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve

attribute waypointIdentification.grp/@countryICAOCode

type	*CountryICAOCodeType*
properties	isRef 0 use optional
facets	length 2

simpleType WaypointIdType

type	restriction of xs:string
used by	attribute *waypointIdentification.grp/@waypointId*
facets	minLength 1 maxLength 5
annotation	documentation waypoint id - 1..5 letter code

5.0 COMMON ELEMENTS

5.1 Important Parameters Used in Common Elements

Will be added in later

5.2 Common Communication Services

5.2.1 General Error Service

5.2.1.1 General ERror INDication ACARS Element Structure

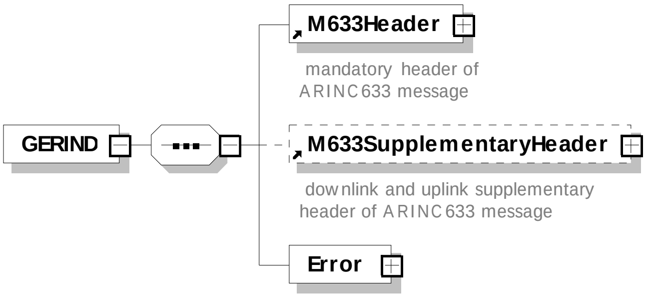
Table 5.2.1.1 – GERIND01 ACARS Definition

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed Text	Parameter Type					
ErroneousSMI	SMI of the application that caused the generation of this error element		Char3TypeType	YES				JRE
parameter separator		comma		NO				,
ErroneusService	Service that caused the generation of this error element		Char3Type	NO				FOR
ErroneusElement	Element which, upon reception, has triggered the generation of this error element		Char3Type	NO				SUB
ErroneusVersion	Version of the element which, upon reception, has triggered the generation of this error element		NN	NO				01
parameter separator		comma		NO				,
ErrorClass	see separate table		integer	YES	0...3			
parameter separator		comma		NO				,
ErrorType	see separate table		integer	YES	0...99			
parameter separator		comma		NO				,
ErrorData	to be interpreted by application		(0-n)I	YES				Message Undeliverable
parameter separator		comma		NO				,
TryAgain	Missing: not specified 0: Receiving application should not try again 1: Receiving application may retry to send the element that caused the error		boolean	YES				0

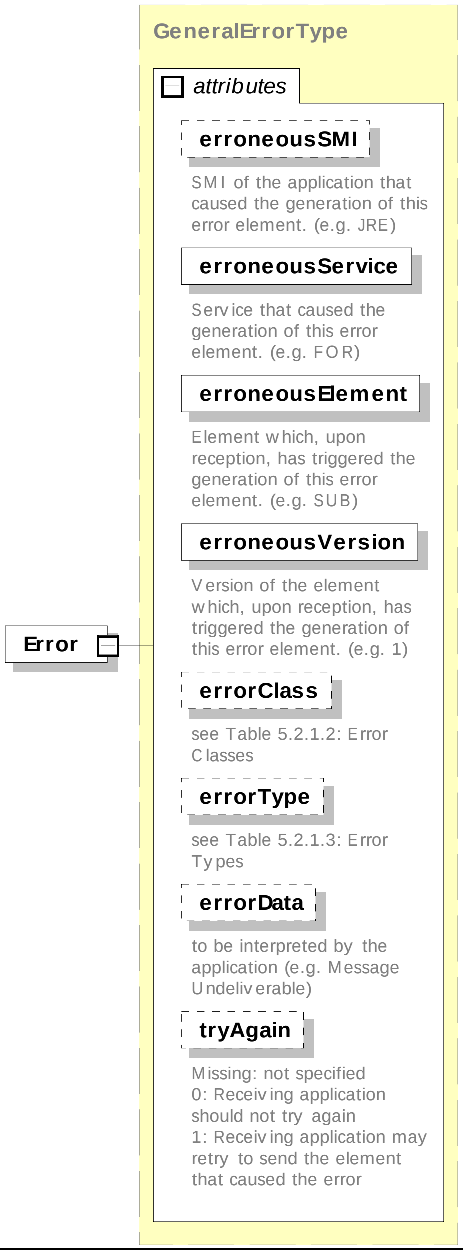
5.2.1.2 General ERror INDication XML Format

General Error XML Schema definition is based on the ACARS definition

element GERIND

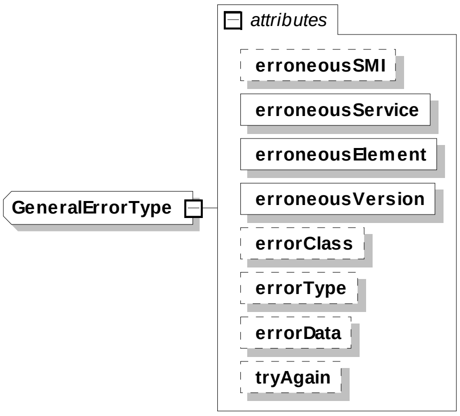
diagram	
namespace	**http://aeec.aviation-ia.net/633**
properties	**content** **complex** **nillable** **false**
children	***M633Header M633SupplementaryHeader Error***

element GERIND/Error

diagram	

<table>
<tr><td>namespace</td><td>http://aeec.aviation-ia.net/633</td></tr>
<tr><td>type</td><td>GeneralErrorType</td></tr>
<tr><td>properties</td><td>
<table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table>
</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td><i>erroneousSMI</i></td><td><i>char3Type</i></td><td>optional</td><td></td><td></td><td>documentation
SMI of the application that caused the generation of this error element. (e.g. JRE)</td></tr>
<tr><td><i>erroneousService</i></td><td><i>char3Type</i></td><td>required</td><td></td><td></td><td>documentation
Service that caused the generation of this error element. (e.g. FOR)</td></tr>
<tr><td><i>erroneousElement</i></td><td><i>char3Type</i></td><td>required</td><td></td><td></td><td>documentation
Element which, upon reception, has triggered the generation of this error element. (e.g. SUB)</td></tr>
<tr><td><i>erroneousVersion</i></td><td>xs:nonNegativeInteger</td><td>required</td><td></td><td></td><td>documentation
Version of the element which, upon reception, has triggered the generation of this error element. (e.g. 1)</td></tr>
<tr><td><i>errorClass</i></td><td>xs:nonNegativeInteger</td><td>optional</td><td></td><td></td><td>documentation
see Table 5.2.1.2: Error Classes</td></tr>
<tr><td><i>errorType</i></td><td>xs:nonNegativeInteger</td><td>optional</td><td></td><td></td><td>documentation
see Table 5.2.1.3: Error Types</td></tr>
<tr><td><i>errorData</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
to be interpreted by the application (e.g. Message Undeliverable)</td></tr>
<tr><td><i>tryAgain</i></td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
Missing: not specified
0: Receiving application should not try again
1: Receiving application may retry to send the element that caused the error</td></tr>
</table>
</td></tr>
</table>

complexType GeneralErrorType

diagram	

attributes	Name	Type	Use	Default	Fixed	annotation
	erroneousSMI	*char3Type*	optional			documentation SMI of the application that caused the generation of this error element. (e.g. JRE)
	erroneousService	*char3Type*	required			documentation Service that caused the generation of this error element. (e.g. FOR)
	erroneousElement	*char3Type*	required			documentation Element which, upon reception, has triggered the generation of this error element. (e.g. SUB)
	erroneousVersion	xs:nonNegativeInteger	required			documentation Version of the element which, upon reception, has triggered the generation of this error element. (e.g. 1)
	errorClass	xs:nonNegativeInteger	optional			documentation see Table 5.2.1.2: Error Classes
	errorType	xs:nonNegativeInteger	optional			documentation see Table 5.2.1.3: Error Types
	errorData	xs:string	optional			documentation to be interpreted by the application (e.g. Message Undeliverable)
	tryAgain	xs:boolean	optional			documentation Missing: not specified 0: Receiving application should not try again 1: Receiving application may retry to send the element that caused the error

attribute GeneralErrorType/@erroneousSMI

type	*char3Type*
properties	isRef 0 use optional
facets	length 3

attribute GeneralErrorType/@erroneousService

type	*char3Type*
properties	isRef 0 use required
facets	length 3

attribute GeneralErrorType/@erroneousElement

type	*char3Type*
properties	isRef 0 use required
facets	length 3

attribute GeneralErrorType/@erroneousVersion

type	**xs:nonNegativeInteger**
properties	**isRef 0** **use required**

attribute GeneralErrorType/@errorClass

type	**xs:nonNegativeInteger**
properties	**isRef 0** **use optional**

attribute GeneralErrorType/@errorType

type	**xs:nonNegativeInteger**
properties	**isRef 0** **use optional**

attribute GeneralErrorType/@errorData

type	**xs:string**
properties	**isRef 0** **use optional**
facets	**minLength 1**

attribute GeneralErrorType/@tryAgain

type	**xs:boolean**
properties	**isRef 0** **use optional**

5.2.1.3 Error Classes

Table 5.2.1.3.1 – Error Classes

Sender's Situation	Class Name	Class ID	Action to be taken by receiver	Suggested text to user (e.g. flightcrew)	Comment
not specified	undefined class	<nil> or 0	not specified	Undefined Error	
Upon reception of an element that caused an error, the transaction had to be aborted	fatal error	1	abort transaction and alert user	Transaction aborted	
The contents of a received element had been ignored, the transaction stays open	non-fatal error	2	inform user about the failure of last message	Message rejected	
The contents of a received element had been processed, but look strange	Caution	3	inform user about the caution	Message accepted	

5.2.1.4 Error Types

Note: The following table defines standard error types, common to most applications (from 0 to 19) – application-specific error types are also possible, and they range from 20 to 99. Refer to individual application sections for more details.

Table 5.2.1.4.1 – Error Types

Sender's Situation	Type Name	Type ID	Suggested text to user (e.g. flightcrew)	Comment
not specified	unknown-error	0	Unknown Error	
Message was received too late	time-out	1	Time Out	
Message was received too early or out of order	flow	2	Too early or out of order	
Received message contains unknown syntax	syntax	3	Syntax Error	
Message triggered an internal error of receiving application	internal	4	Internal Error	
Message received uses a service version not supported	service	5	Service version not supported	
Message received contains a service or message ID not known	unknown-service	6	Unknown service	
Mandatory parameters not available	missing-data	7	Parameters mandatory to generate/process messages are not available or are invalid	
Invalid CRC	CRC	8	Checksum error	
Message related to a service which is temporarily not available	temporarily-unavailable	9	Service Temporarily Unavailable	
Message related to a service which is not available	unavailable	10	Service Unavailable	
Received message could not be delivered to the right end system	undeliverable	11	Message Undeliverable	

5.2.1.5 ACARS encoded example (excluding ARINC 620 header)

```
GERIND01 downlink:
,GERIND01050217065159KLAX,LAX,LFPG,CDG,AF1234,,051217,,A380,,F-WOWW,
/JRE,FORSUB01,1,8,F3A2,1,xxxx
Note:  xxxx is the CRC
```

Note: xxxx is the CRC.

5.2.1.6 XML encoded example (GERIND Example 1.xml)

```
<GERIND xsi:schemaLocation="http://aeec.aviation-ia.net/633 ERR.xsd"
xmlns="http://aeec.aviation-ia.net/633"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <M633Header timestamp="2005-12-17T06:51:59" versionNumber="2"/>
  <M633SupplementaryHeader>
    <Flight flightOriginDate="2005-12-17"
scheduledTimeOfDeparture="2005-12-17T11:10:00">
      <FlightIdentification>
        <FlightNumber airlineIATACode="AF" number="1234">
      <CommercialFlightNumber>AF1234</CommercialFlightNumber>
        </FlightNumber>
      </FlightIdentification>
      <DepartureAirport>
        <AirportICAOCode>LFPG</AirportICAOCode>
        <AirportIATACode>CDG</AirportIATACode>
      </DepartureAirport>
      <ArrivalAirport>
        <AirportICAOCode>KLAX</AirportICAOCode>
        <AirportIATACode>LAX</AirportIATACode>
      </ArrivalAirport>
    </Flight>
    <Aircraft aircraftRegistration="F-WWOW">
      <AircraftModel>
        <AircraftICAOType>A380</AircraftICAOType>
      </AircraftModel>
    </Aircraft>
  </M633SupplementaryHeader>
  <Error erroneousSMI="JRE" erroneousService="FOR"
erroneousElement="SUB" erroneousVersion="1" errorClass="1"
errorType="8" errorData="F3A2" tryAgain="1"/>
</GERIND>
```

5.3 Flight Info

To be added in a future supplement.

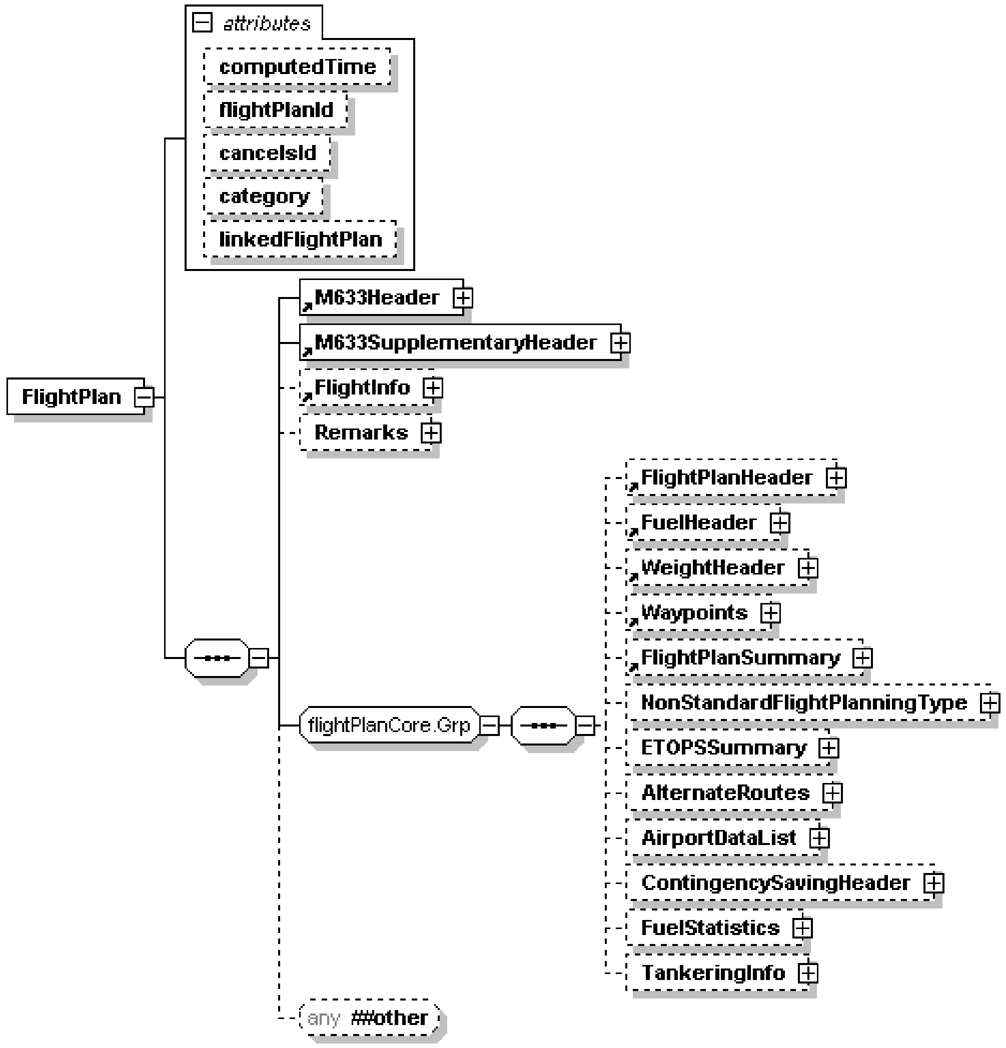
5.4 Operational Flight Plan

The XML Schema of the operational flight plan discussed in this section follows the requirements of EU-OPS 1.1060, **FAR 121.639, FAR 91.167** and the needs of major airlines. As usual with XML, the presentation depends on a stylesheet and can be freely chosen by the airlines.

In fact, the sending application does not even need to know how the data is presented. Also, by standardizing the naming and organization of the contained elements, the data becomes accessible by a number of applications without human intervention.

In cases where an airline needs to add elements not contained in FlightPlan.xsd, the schema contains attachpoints (usually named "##other") where such elements can be added. However, it should be noted, that standard EFB applications will usually not be able to process elements added here, as long as the ARINC 633 schema has not been added.

element FlightPlan

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
nillable false</td></tr>
<tr><td>children</td><td><i>M633Header M633SupplementaryHeader FlightInfo Remarks FlightPlanHeader FuelHeader WeightHeader Waypoints FlightPlanSummary NonStandardFlightPlanningType ETOPSSummary AlternateRoutes AirportDataList ContingencySavingHeader FuelStatistics TankeringInfo</i></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><i>computedTime</i></td><td>xs:dateTime</td><td>optional</td><td></td><td></td><td>documentation
computation time</td></tr>
<tr><td><i>flightPlanId</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
identifier of the operational flight plan</td></tr>
<tr><td><i>cancelsId</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
gives the reference to the operational flight plan it cancels</td></tr>
<tr><td><i>category</i></td><td>derived by: xs:string</td><td>optional</td><td>normal</td><td></td><td>documentation
Indicates whether this flight plan is a normal, an alternate or a rerouting flight plan.</td></tr>
<tr><td><i>linkedFlightPlan</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
Identifier of the linked flight plan if any (depends on the category)</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
flight plan definition</td></tr>
</table>

attribute FlightPlan/@computedTime

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation computation time

attribute FlightPlan/@flightPlanId

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation identifier of the operational flight plan. The application should use this attribute to identify a flightplan if multiple flightplans exist for a given flight. It’s different from ATC call sign and commercial flight number. (e. g.OFP12)

attribute FlightPlan/@cancelsId

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation gives the reference to the operational flightPlanId it cancels

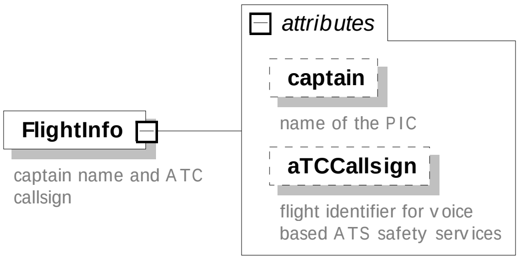
attribute FlightPlan/@category

type	restriction of xs:string
properties	isRef 0 default normal use optional
facets	enumeration normal enumeration alternate enumeration reroute
annotation	documentation Indicates whether this flight plan is a normal (the flight plan that was filed and sent to ATC), an alternate (informational flight plans or flight plan amendments) or a reroute (for lateral and/or vertical changes; inflight flight plan) flight plan.

attribute FlightPlan/@linkedFlightPlan

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation Identifier of the linked flightPlanId if any (depends on the category)

element FlightInfo

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
nillable false</td></tr>
<tr><td>used by</td><td>element <i>FlightPlan</i></td></tr>
<tr><td>attributes</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td><i>captain</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
name of the PIC</td></tr>
<tr><td><i>aTCCallsign</i></td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
flight identifier for voice based ATS safety services</td></tr>
</table>
</td></tr>
<tr><td>annotation</td><td>documentation
captain name and ATC callsign</td></tr>
</table>

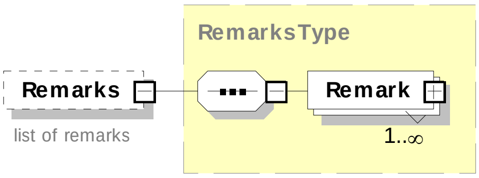
attribute FlightInfo/@captain

type	**restriction of xs:string**
properties	**isRef** **0** **use** **optional**
facets	**minLength** **1** **whiteSpace** **preserve**
annotation	**documentation** **name of the PIC**

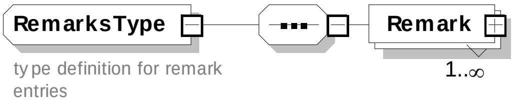
attribute FlightInfo/@aTCCallsign

type	**restriction of xs:string**
properties	**isRef** **0** **use** **optional**
facets	**minLength** **1**
annotation	**documentation** **flight identifier for voice based ATS safety services**

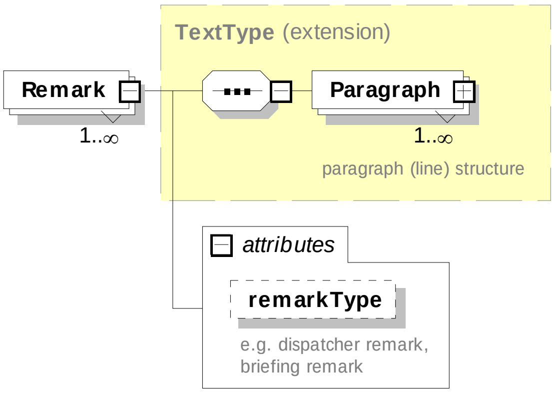
element FlightPlan/Remarks

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td><i>RemarksType</i></td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>children</td><td><i>Remark</i></td></tr>
<tr><td>annotation</td><td>documentation
list of remarks</td></tr>
</table>

complexType RemarksType

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>children</td><td><i>Remark</i></td></tr>
<tr><td>used by</td><td>elements <i>FlightPlan/Remarks waypoint.Grp/Remarks</i></td></tr>
<tr><td>annotation</td><td>documentation
type definition for remark entries</td></tr>
</table>

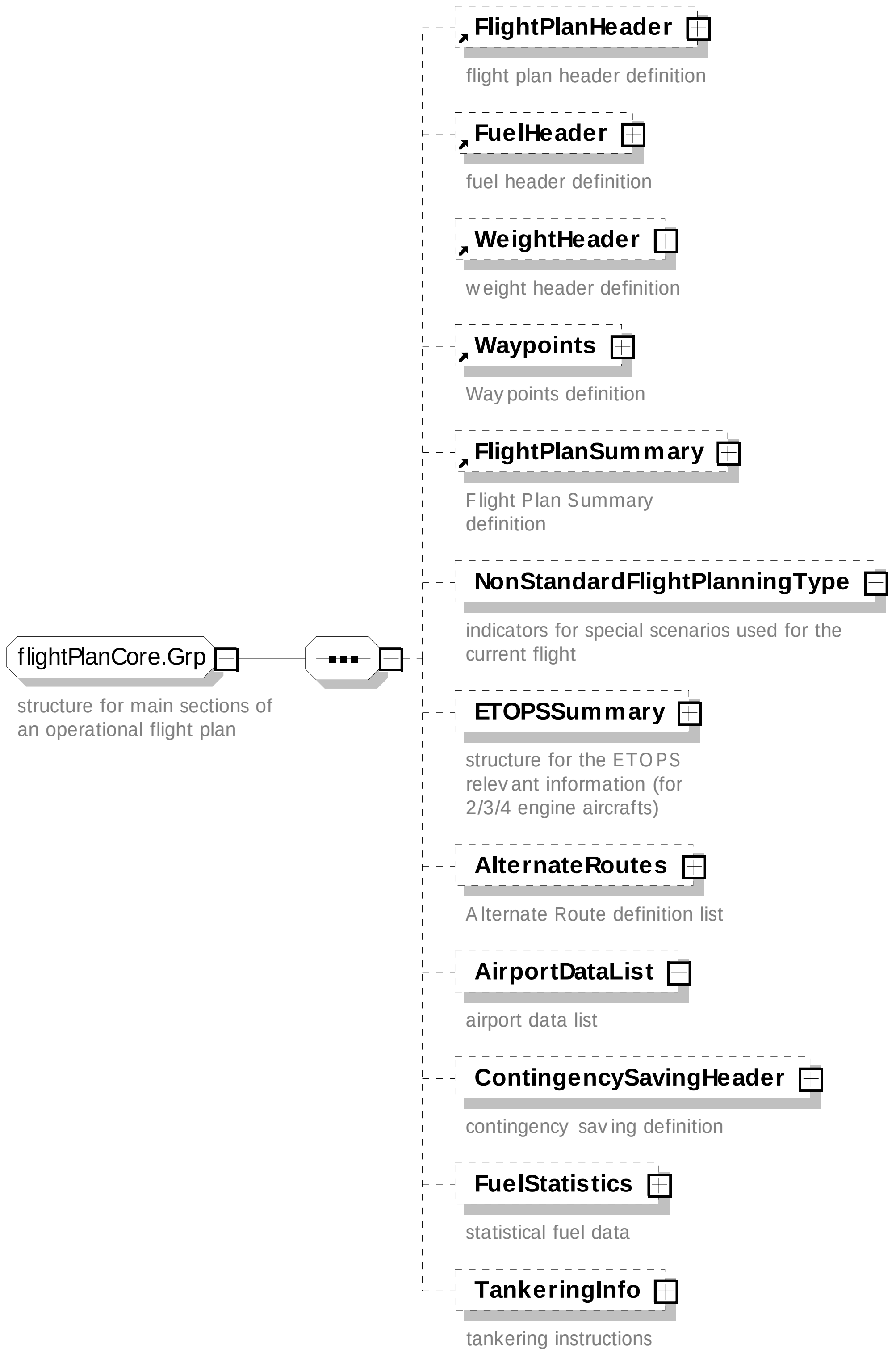
element RemarksType/Remark

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of TextType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>1</td></tr><tr><td>maxOcc</td><td>unbounded</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>Paragraph</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td><i>remarkType</i></td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. dispatcher remark, briefing remark</td></tr></table></td></tr>
</table>

attribute RemarksType/Remark/@remarkType

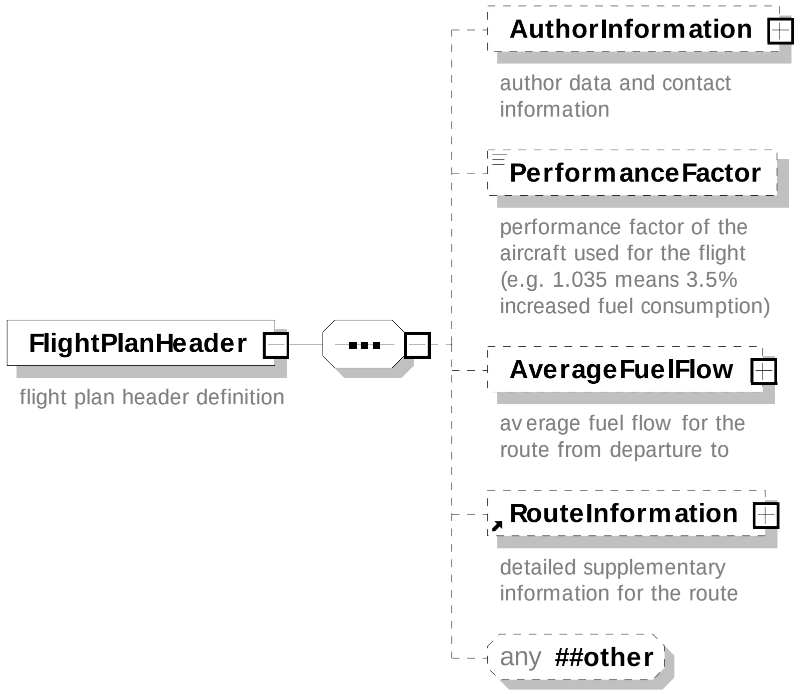
<table>
<tr><td>type</td><td>restriction of xs:string</td></tr>
<tr><td>properties</td><td>isRef 0</td></tr>
<tr><td>facets</td><td><table><tr><td>minLength</td><td>1</td></tr><tr><td>whiteSpace</td><td>preserve</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
e.g. dispatcher remark, briefing remark</td></tr>
</table>

group flightPlanCore.Grp

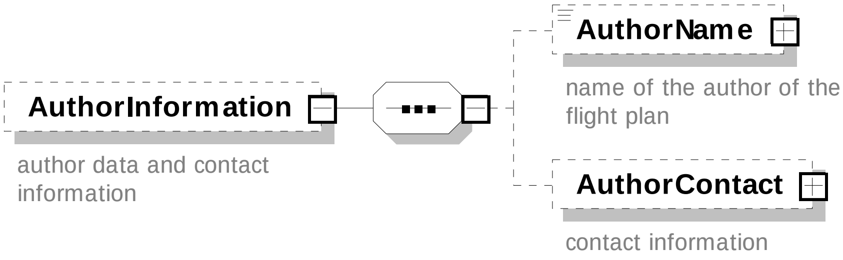
diagram	
children	*FlightPlanHeader FuelHeader WeightHeader Waypoints FlightPlanSummary NonStandardFlightPlanningType ETOPSSummary AlternateRoutes AirportDataList ContingencySavingHeader FuelStatistics TankeringInfo*
used by	**element** *FlightPlan*
annotation	**documentation** **structure for main sections of an operational flight plan**

The FlightPlanHeader is intended to store general information for the flight.

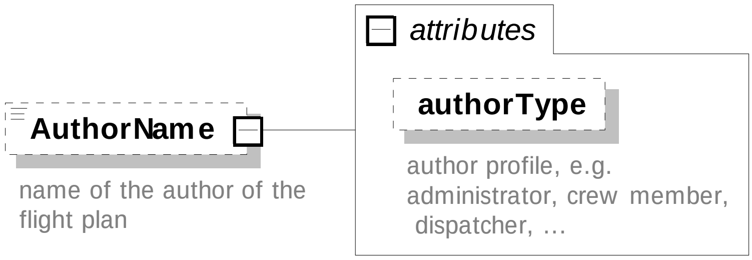
element FlightPlanHeader

diagram	
properties	**content** **complex** **nillable** **false**
children	***AuthorInformation PerformanceFactor AverageFuelFlow RouteInformation***
used by	**group** ***flightPlanCore.Grp***
annotation	**documentation** **flight plan header definition**

element FlightPlanHeader/AuthorInformation

diagram	
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **complex** **nillable** **false**
children	***AuthorName AuthorContact***
annotation	**documentation** **author data and contact information**

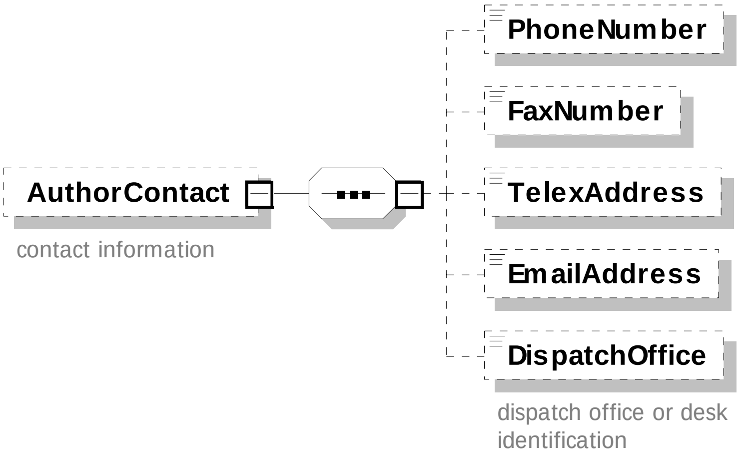
element FlightPlanHeader/AuthorInformation/AuthorName

diagram						
type	extension of xs:string					
properties	isRef minOcc maxOcc content mixed nillable	0 0 1 complex true false				
attributes	Name	Type	Use	Default	Fixed	annotation
	authorType	derived by: xs:string				documentation author profile, e.g. administrator, crew member, dispatcher, ...
annotation	documentation name of the author of the flight plan					

attribute FlightPlanHeader/AuthorInformation/AuthorName/@authorType

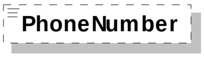
type	restriction of xs:string	
properties	isRef	0
facets	minLength whiteSpace	1 preserve
annotation	documentation author profile, e.g. administrator, crew member, dispatcher, ...	

element FlightPlanHeader/AuthorInformation/AuthorContact

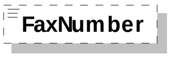
diagram		
properties	isRef minOcc maxOcc content nillable	0 0 1 complex false
children	*PhoneNumber Fax Number TelexAddress EmailAddress DispatchOffice*	
annotation	documentation contact information	

5.0 COMMON ELEMENTS

element FlightPlanHeader/AuthorInformation/AuthorContact/PhoneNumber

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve

element FlightPlanHeader/AuthorInformation/AuthorContact/FaxNumber

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve

element FlightPlanHeader/AuthorInformation/AuthorContact/TelexAddress

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 7 whiteSpace preserve

element FlightPlanHeader/AuthorInformation/AuthorContact/EmailAddress

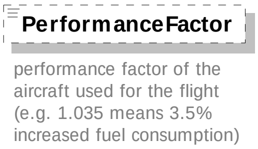
diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve

element FlightPlanHeader/AuthorInformation/AuthorContact/DispatchOffice

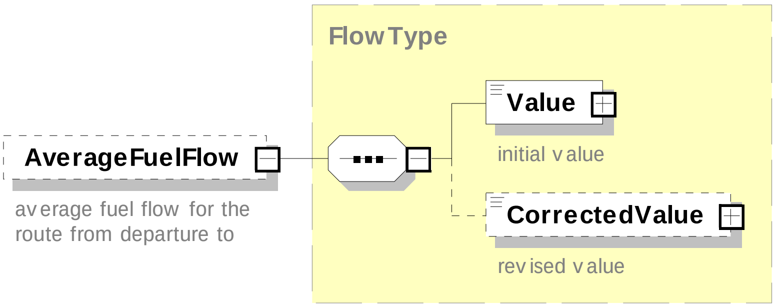
diagram	 dispatch office or desk identification
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1

	content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation dispatch office or desk identification

element FlightPlanHeader/PerformanceFactor

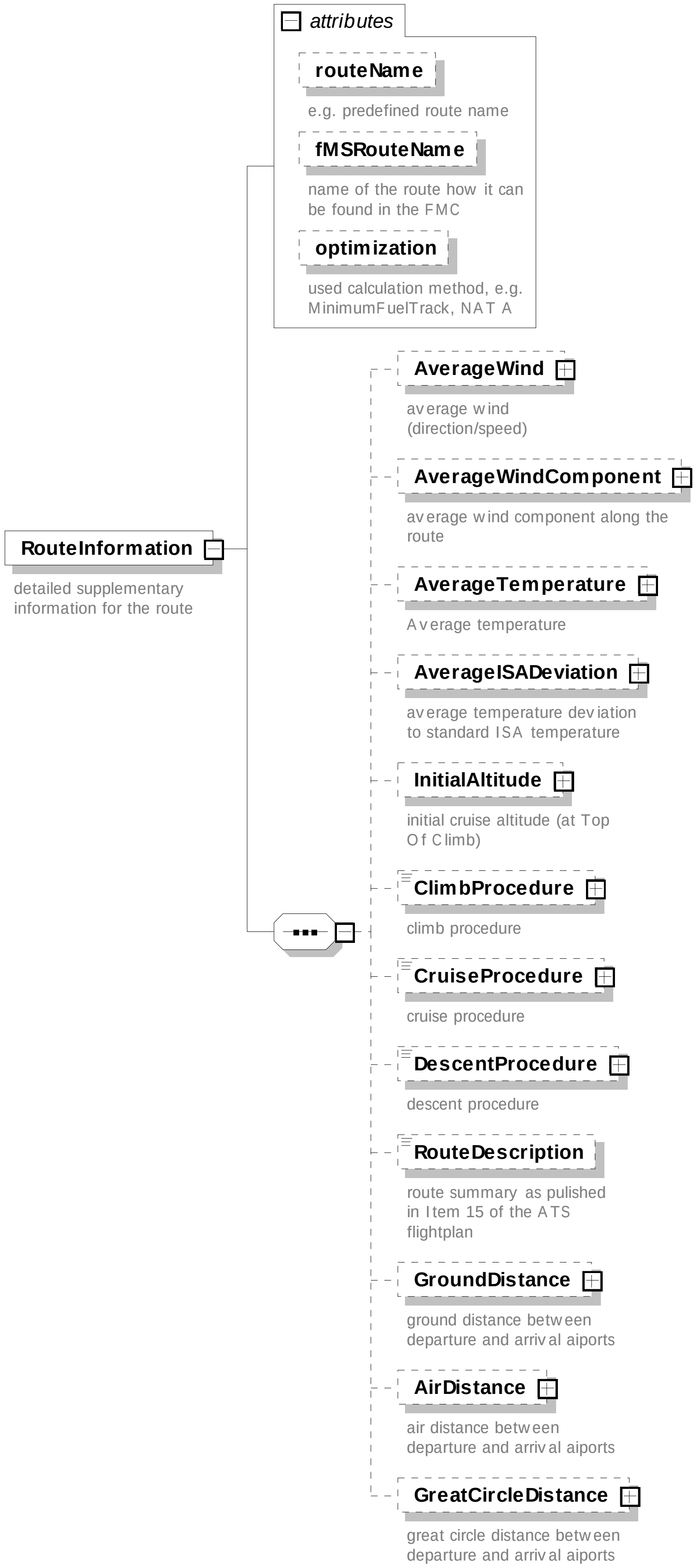
diagram	
type	restriction of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive 0.8 maxInclusive 1.5
annotation	documentation performance factor of the aircraft used for the flight (e.g. 1.035 means 3.5% increased fuel consumption)

element FlightPlanHeader/AverageFuelFlow

diagram	
type	*FlowType*
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	*Value CorrectedValue*
annotation	documentation average fuel flow for the route from departure to arrival airport

5.0 COMMON ELEMENTS

element RouteInformation

diagram	

properties	content complex nillable false
children	*AverageWind AverageWindComponent AverageTemperature AverageISADeviation InitialAltitude ClimbProcedure CruiseProcedure DescentProcedure RouteDescription GroundDistance AirDistance GreatCircleDistance*
used by	elements *AlternateRoute FlightPlanHeader*
attributes	see below
annotation	documentation detailed supplementary information for the route from departure to arrival airport

Name	Type	Use	Default	Fixed	annotation
routeName	derived by: xs:string	optional			documentation e.g. predefined route name
fMSRouteName	derived by: xs:string	optional			documentation name of the route how it can be found in the FMC
optimization	derived by: xs:string	optional			documentation used calculation method, e.g. MinimumFuelTrack, NAT A

attribute RouteInformation/@routeName

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation e.g. predefined route name

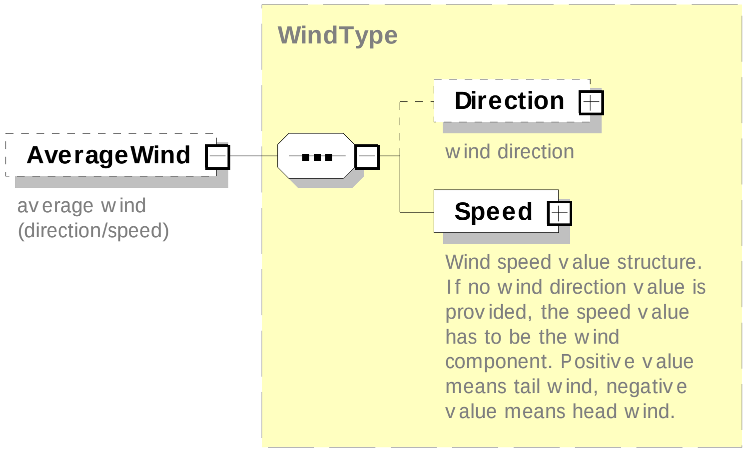
attribute RouteInformation/@fMSRouteName

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation name of the route how it can be found in the FMC

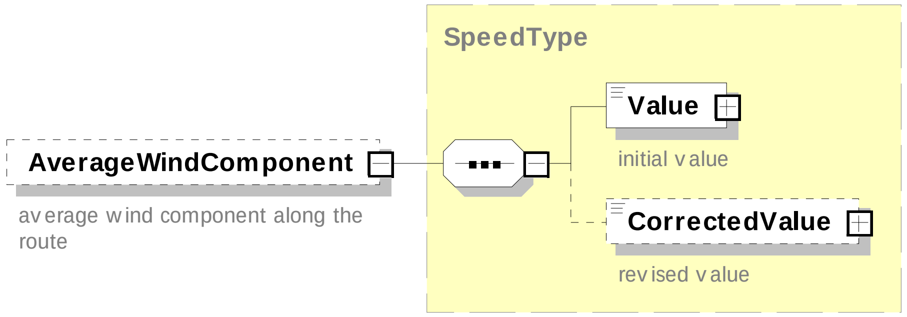
attribute RouteInformation/@optimization

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation used calculation method, e.g. MinimumFuelTrack, NAT A

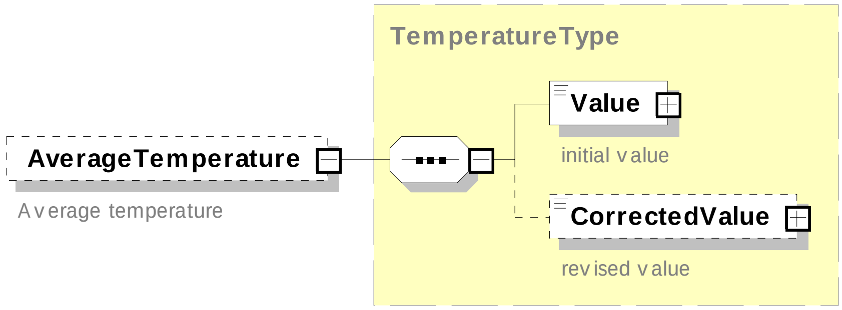
element RouteInformation/AverageWind

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>WindType</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>children</td><td>Direction Speed</td></tr>
<tr><td>annotation</td><td>documentation
average wind (direction/speed) for the route from departure to arrival airport</td></tr>
</table>

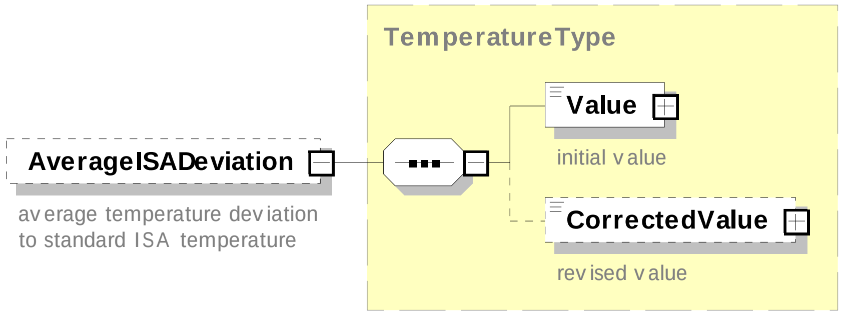
element RouteInformation/AverageWindComponent

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>SpeedType</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
mixed true
nillable false</td></tr>
<tr><td>children</td><td>Value CorrectedValue</td></tr>
<tr><td>annotation</td><td>documentation
average wind component for the route from departure to arrival airport</td></tr>
</table>

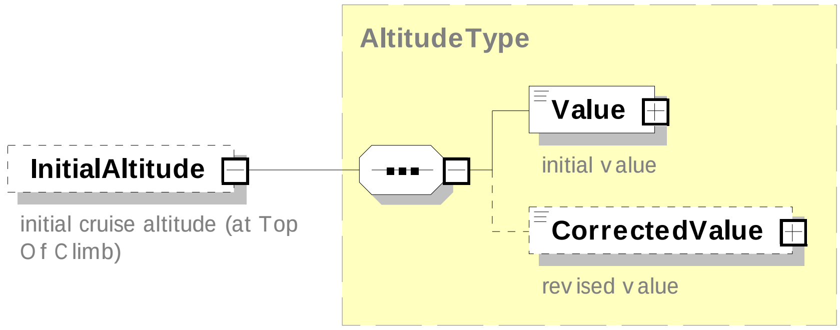
element RouteInformation/AverageTemperature

diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Average temperature for the route from departure to arrival airport

element RouteInformation/AverageISADeviation

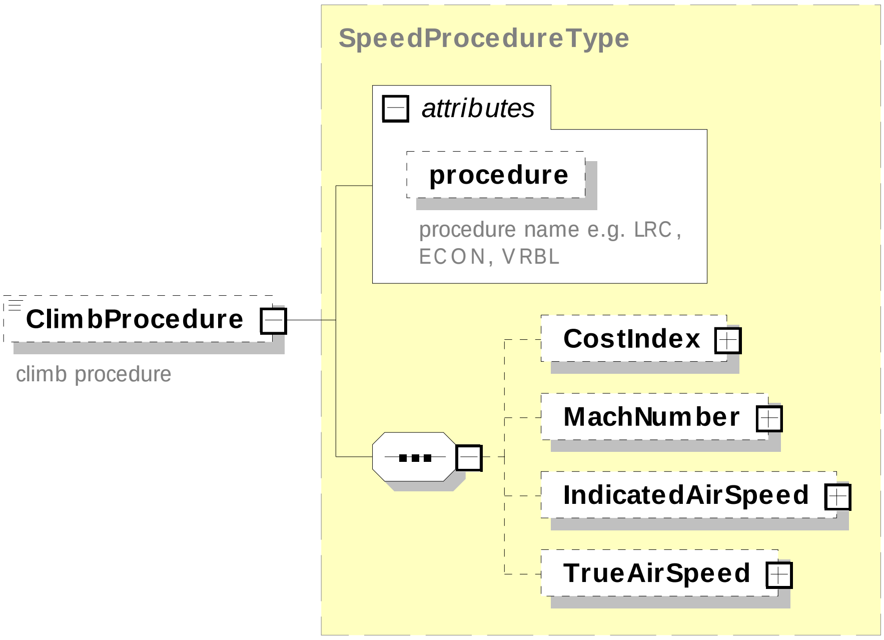
diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation average temperature deviation to standard ISA temperature for the route from departure to arrival airport

element RouteInformation/InitialAltitude

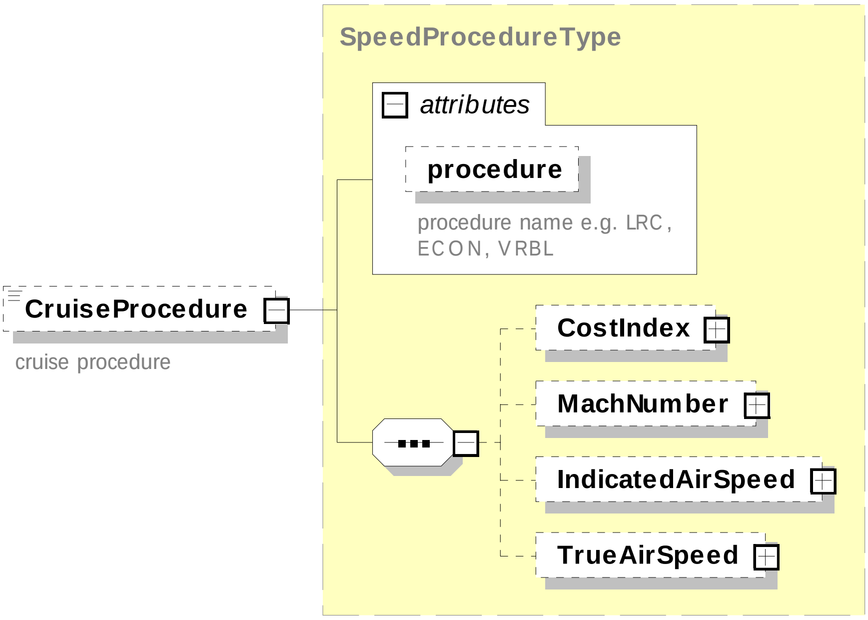
diagram	
type	AltitudeType

properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation initial cruise altitude (at Top Of Climb)

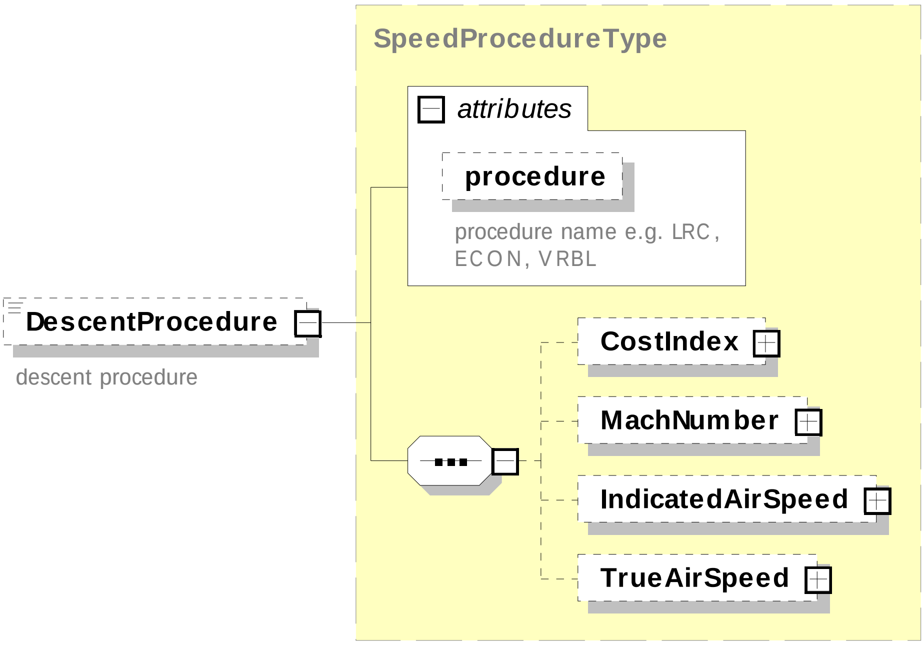
element RouteInformation/ClimbProcedure

diagram	
type	SpeedProcedureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	CostIndex MachNumber IndicatedAirSpeed TrueAirSpeed
attributes	Name: procedure Type: derived by: xs:string Use: optional Default: Fixed: annotation: documentation procedure name e.g. LRC, ECON, VRBL
annotation	documentation climb procedure

element RouteInformation/CruiseProcedure

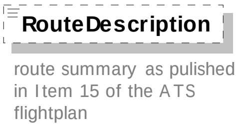
<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>SpeedProcedureType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>true</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>CostIndex MachNumber IndicatedAirSpeed TrueAirSpeed</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>procedure</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
procedure name e.g. LRC, ECON, VRBL</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
cruise procedure</td></tr>
</table>

element RouteInformation/DescentProcedure

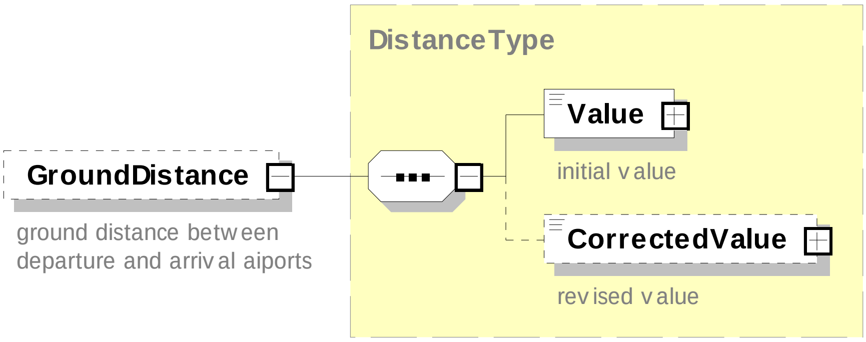
<table>
<tr><td>diagram</td><td> </td></tr>
</table>

type	SpeedProcedureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	CostIndex MachNumber IndicatedAirSpeed TrueAirSpeed
attributes	Name: procedure Type: derived by: xs:string Use: optional Default: Fixed: annotation: documentation procedure name e.g. LRC, ECON, VRBL
annotation	documentation descent procedure

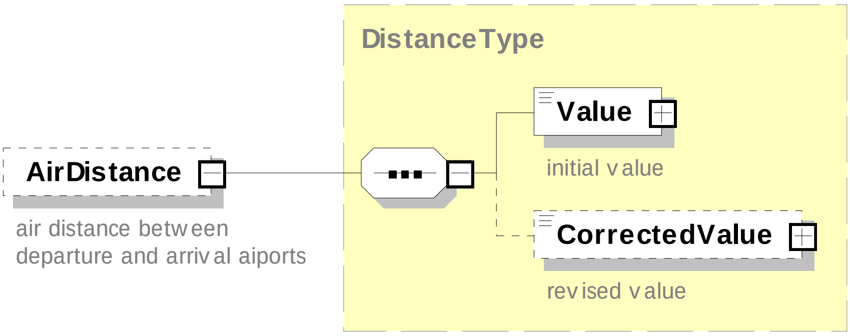
element RouteInformation/RouteDescription

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation Free text route summary as pulished in Item 15 of the ATS flightplan

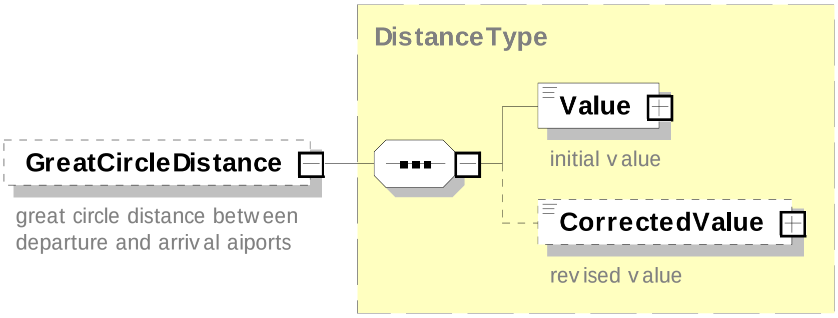
element RouteInformation/GroundDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation ground distance between departure and arrival aiports

element RouteInformation/AirDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation air distance between departure and arrival aiports

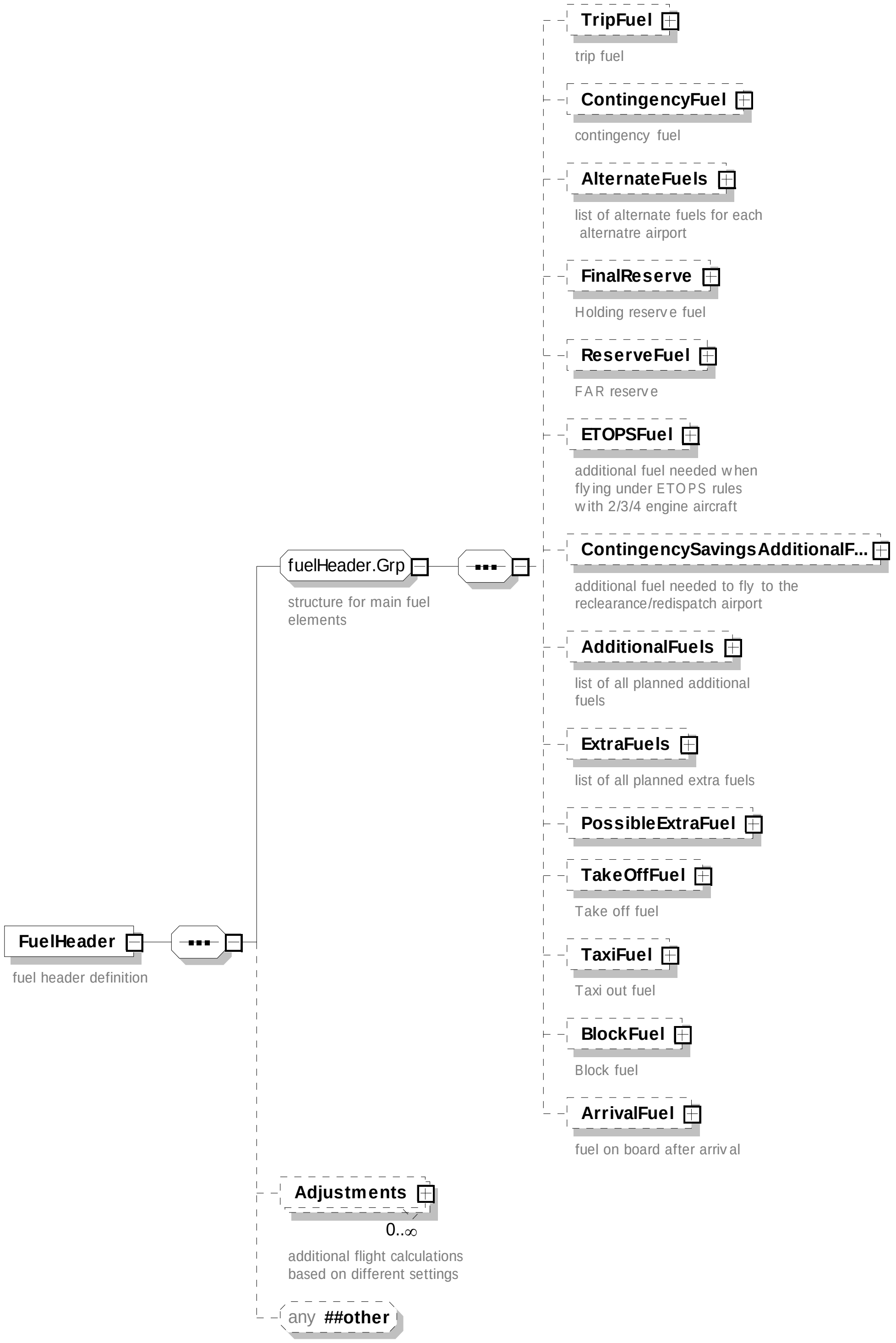
element RouteInformation/GreatCircleDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation great circle distance between departure and arrival aiports

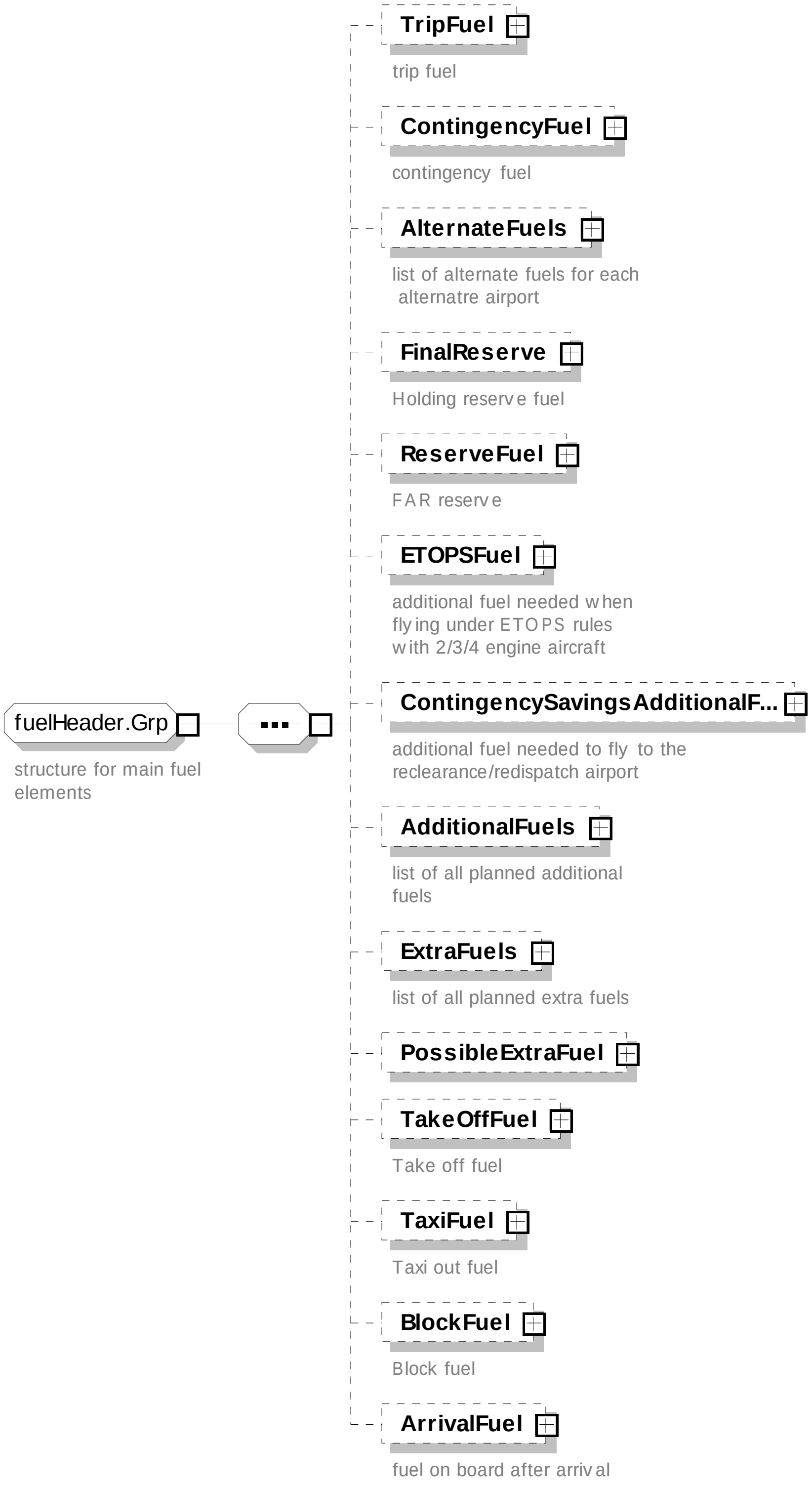
5.0 COMMON ELEMENTS

The FuelHeader is intended to store general information regarding fuel.

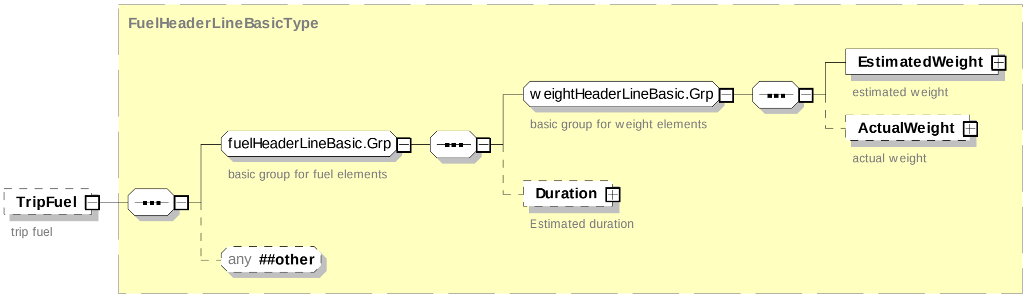
element FuelHeader

diagram	
properties	**content complex** **nillable false**
children	**TripFuel ContingencyFuel AlternateFuels FinalReserve ReserveFuel ETOPSFuel ContingencySavingsAdditionalFuel AdditionalFuels ExtraFuels PossibleExtraFuel TakeOffFuel TaxiFuel BlockFuel ArrivalFuel Adjustments**
used by	**element flightPlanCore.Grp/ContingencySavingHeader** **group flightPlanCore.Grp**
annotation	**documentation** **fuel header definition**

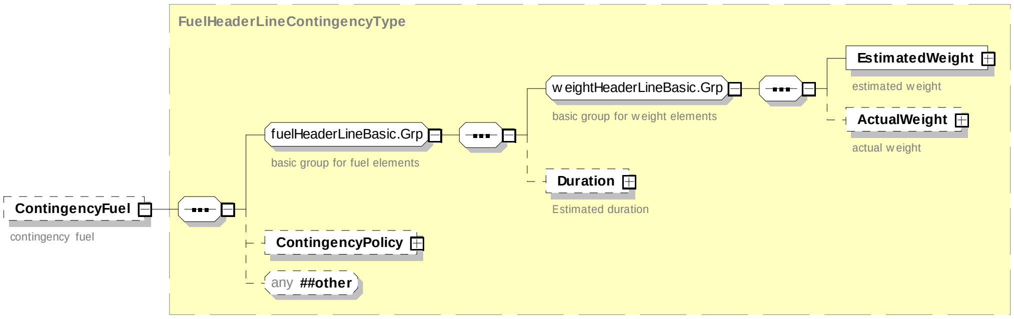
group fuelHeader.Grp

diagram	
children	TripFuel ContingencyFuel AlternateFuels FinalReserve ReserveFuel ETOPSFuel ContingencySavingsAdditionalFuel AdditionalFuels ExtraFuels PossibleExtraFuel TakeOffFuel TaxiFuel BlockFuel ArrivalFuel
used by	element FuelHeader
annotation	documentation structure for main fuel elements

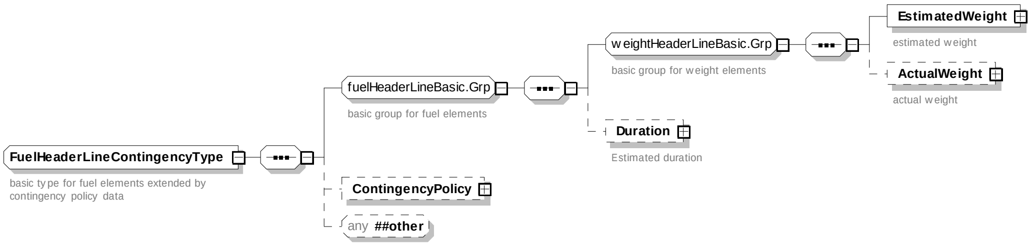
element fuelHeader.Grp/TripFuel

diagram	
type	FuelHeaderLineBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight Duration
annotation	documentation trip fuel

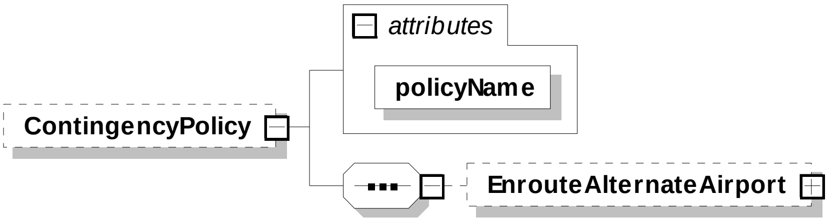
element fuelHeader.Grp/ContingencyFuel

diagram	
type	FuelHeaderLineContingencyType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight Duration ContingencyPolicy
annotation	documentation contingency fuel

complexType FuelHeaderLineContingencyType

diagram	
children	EstimatedWeight ActualWeight Duration ContingencyPolicy
used by	elements fuelHeader.Grp/ContingencyFuel fuelHeader.Grp/ReserveFuel
annotation	documentation basic type for fuel elements extended by contingency policy data

element FuelHeaderLineContingencyType/ContingencyPolicy

<table>
<tr><td>diagram</td><td>
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<tr><td>children</td><td>EnrouteAlternateAirport</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>policyName</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>e.g. 3% + ERA, 20Min, 5%</td></tr></table></td></tr>
</table>

attribute FuelHeaderLineContingencyType/ContingencyPolicy/@policyName

<table>
<tr><td>type</td><td>restriction of xs:string</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>use</td><td>required</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>minLength</td><td>1</td></tr><tr><td>whiteSpace</td><td>preserve</td></tr></table></td></tr>
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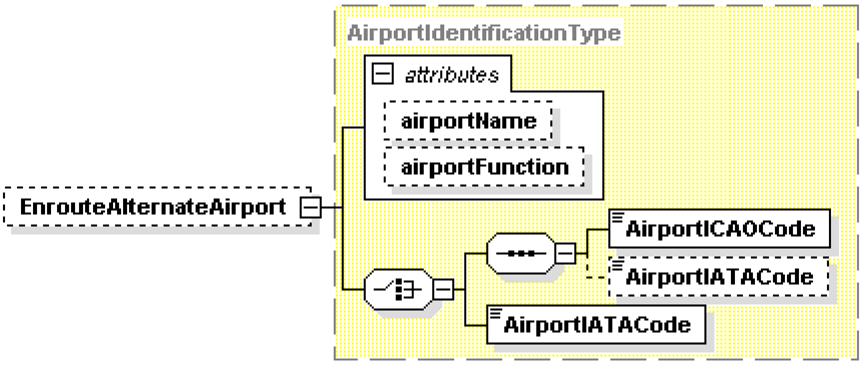
element FuelHeaderLineContingencyType/ContingencyPolicy/EnrouteAlternateAirport

<table>
<tr><td>diagram</td><td>
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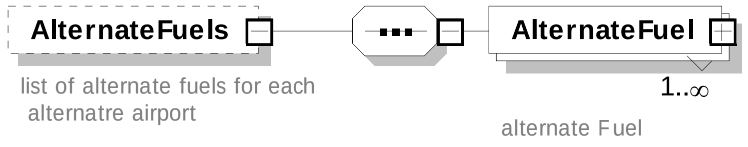
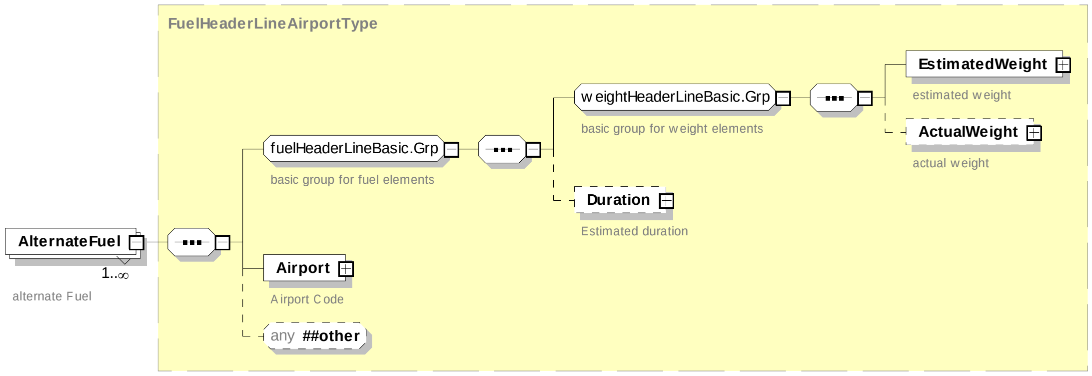
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>AirportICAOCode AirportIATACode AirportIATACode</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>airportName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airport name e.g. WASHINGTON DULLES INTL</td></tr><tr><td>airportFunction</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport</td></tr></table></td></tr>
</table>

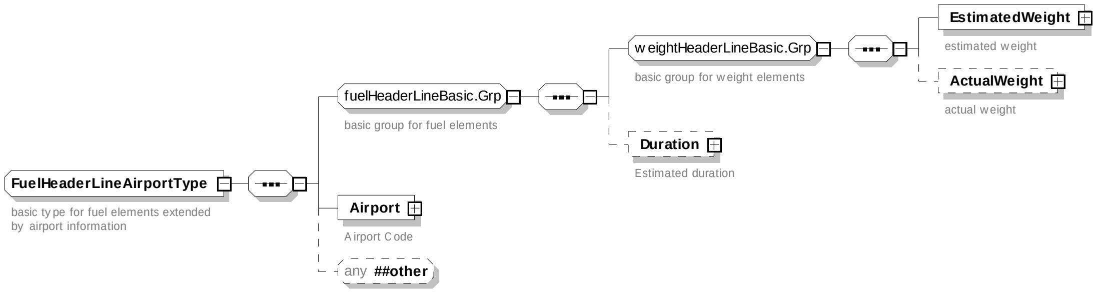
element fuelHeader.Grp/AlternateFuels

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AlternateFuel
annotation	documentation list of alternate fuels for each planned alternate airport

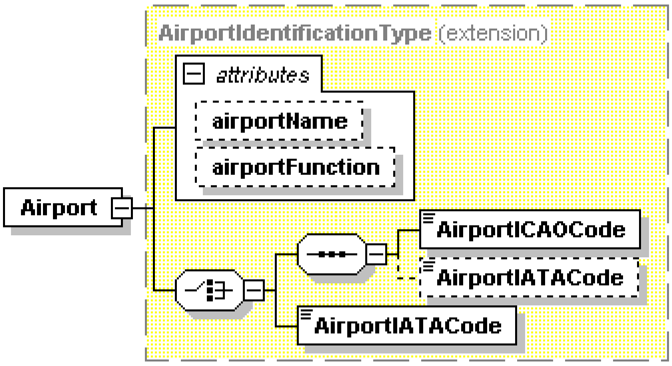
element fuelHeader.Grp/AlternateFuels/AlternateFuel

diagram	
type	FuelHeaderLineAirportType
properties	isRef 0 minOcc 1 maxOcc unbounded content complex nillable false
children	EstimatedWeight ActualWeight Duration Airport
annotation	documentation alternate Fuel

complexType FuelHeaderLineAirportType

diagram	
children	EstimatedWeight ActualWeight Duration Airport
used by	element fuelHeader.Grp/AlternateFuels/AlternateFuel
annotation	documentation basic type for fuel elements extended by airport information

element FuelHeaderLineAirportType/Airport

<table>
<tr><td>diagram</td><td>
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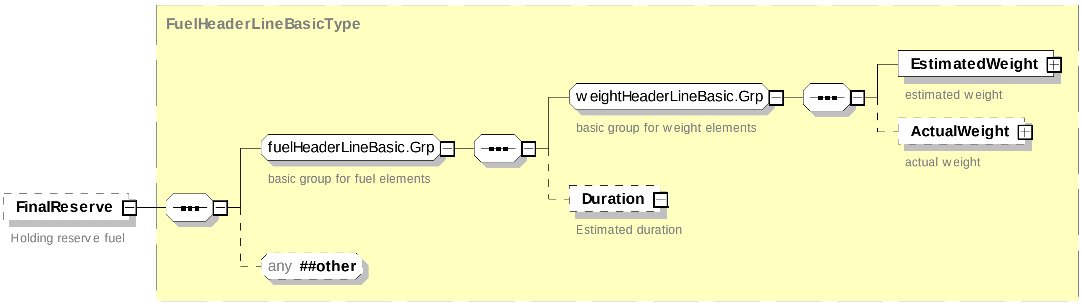
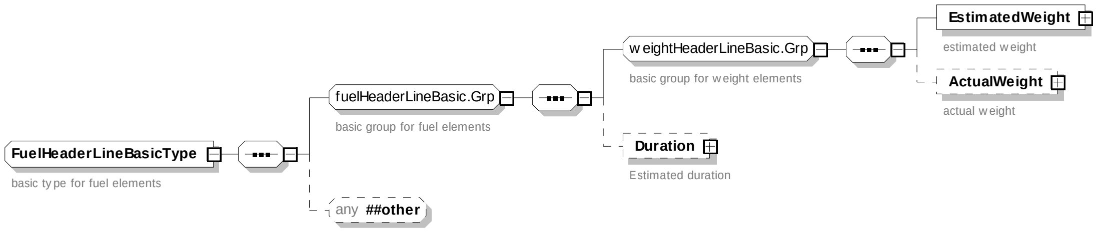
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>airportName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airport name e.g. WASHINGTON DULLES INTL</td></tr>
<tr><td>airportFunction</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
airport identification of the alternate airport</td></tr>
</table>

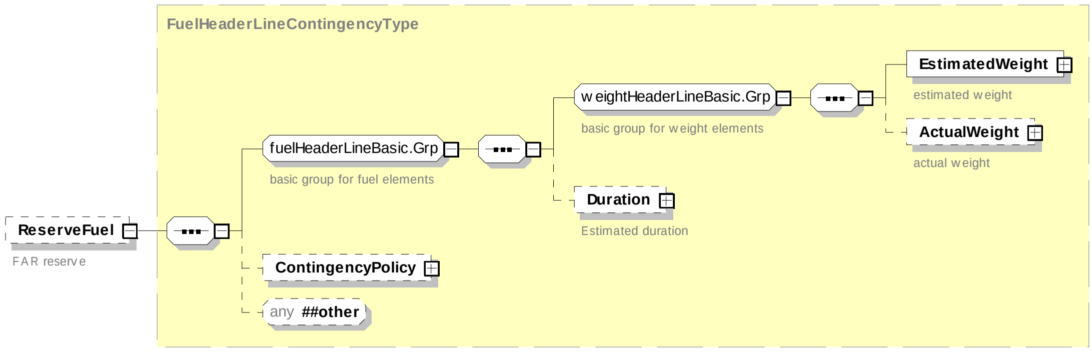
element fuelHeader.Grp/FinalReserve

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>FuelHeaderLineBasicType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>EstimatedWeight ActualWeight Duration</td></tr>
<tr><td>annotation</td><td>documentation
Holding reserve fuel
Fuel for holding flight over destination/alternate airport at a certain height above airport elevation for a specific time period.</td></tr>
</table>

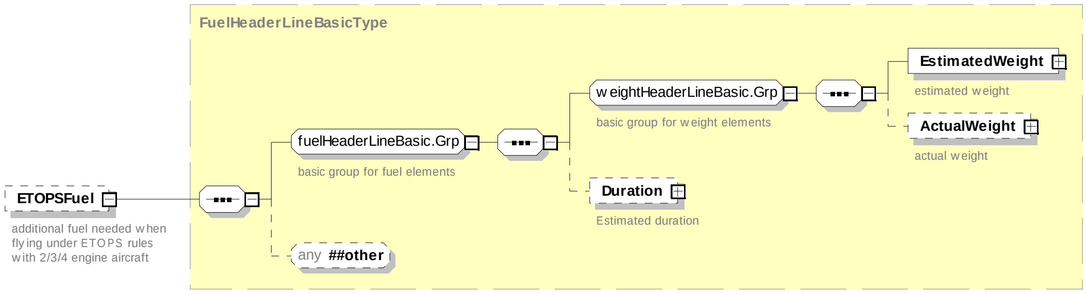
complexType FuelHeaderLineBasicType

diagram	
children	EstimatedWeight ActualWeight Duration
used by	elements fuelHeader.Grp/ArrivalFuel fuelHeader.Grp/ContingencySavingsAdditionalFuel fuelHeader.Grp/ETOPSFuel fuelHeader.Grp/FinalReserve fuelHeader.Grp/TakeOffFuel fuelHeader.Grp/TaxiFuel fuelHeader.Grp/TripFuel
annotation	documentation basic type for fuel elements

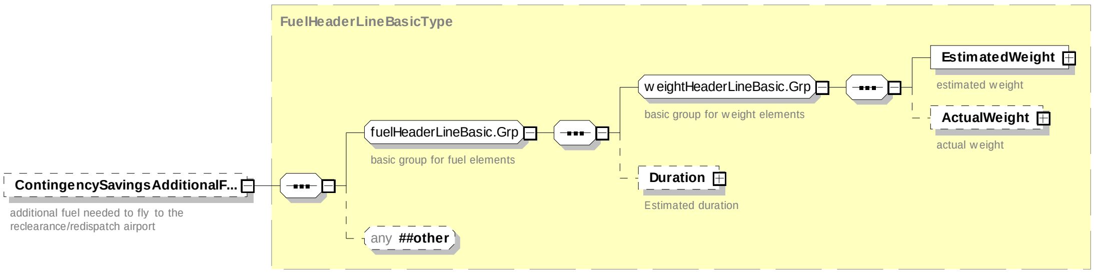
element fuelHeader.Grp/ReserveFuel

diagram	
type	FuelHeaderLineContingencyType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight Duration ContingencyPolicy
annotation	documentation reserve fuel according FAR 121.639

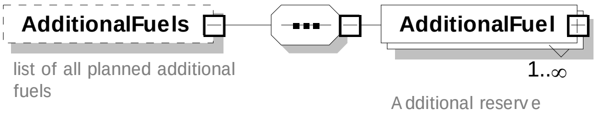
element fuelHeader.Grp/ETOPSFuel

diagram	
type	FuelHeaderLineBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight Duration
annotation	documentation additional fuel needed when flying under ETOPS rules with 2/3/4 engine aircraft

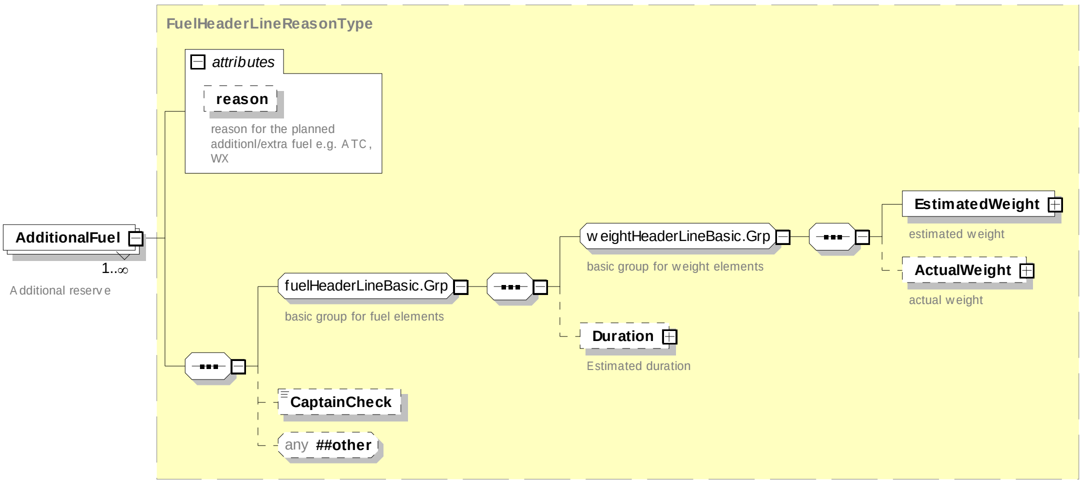
element fuelHeader.Grp/ContingencySavingsAdditionalFuel

diagram	
type	[FuelHeaderLineBasicType]
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	EstimatedWeight ActualWeight Duration
annotation	**documentation** **additional fuel needed to fly to the reclearance/redispatch airport**

element fuelHeader.Grp/AdditionalFuels

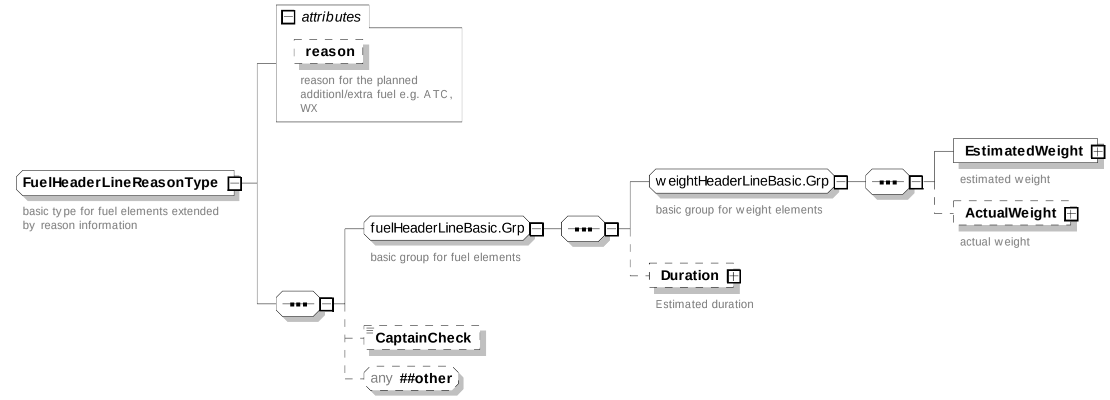
diagram	
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	AdditionalFuel
annotation	**documentation** **list of all planned additional fuels.** **The unbounded number of AdditionalFuel Values enables entery of a separate value for each planned type of additional fuel**

element fuelHeader.Grp/AdditionalFuels/AdditionalFuel

diagram	
type	FuelHeaderLineReasonType
properties	**isRef** 0 **minOcc** 1 **maxOcc** unbounded **content** complex **nillable** false
children	EstimatedWeight ActualWeight Duration CaptainCheck

attributes	Name	Type	Use	Default	Fixed	annotation
	reason	derived by: xs:string	optional			documentation reason for the planned additional/extra fuel e.g. ATC, WX
annotation	documentation Additional reserve fuel. The required fuel for the transportation of the AdditionalFuel is included in the TripFuel.					

complexType FuelHeaderLineReasonType

diagram						
children	EstimatedWeight ActualWeight Duration CaptainCheck					
used by	elements	fuelHeader.Grp/AdditionalFuels/AdditionalFuel fuelHeader.Grp/ExtraFuels/ExtraFuel				
attributes	Name	Type	Use	Default	Fixed	annotation
	reason	derived by: xs:string	optional			documentation reason for the planned additional/extra fuel e.g. ATC, WX
annotation	documentation basic type for fuel elements extended by reason information					

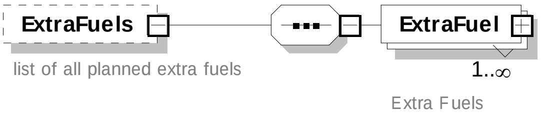
attribute FuelHeaderLineReasonType/@reason

type	restriction of xs:string	
properties	isRef	0
	use	optional
facets	minLength	1
annotation	documentation reason for the planned additional/extra fuel e.g. ATC, WX	

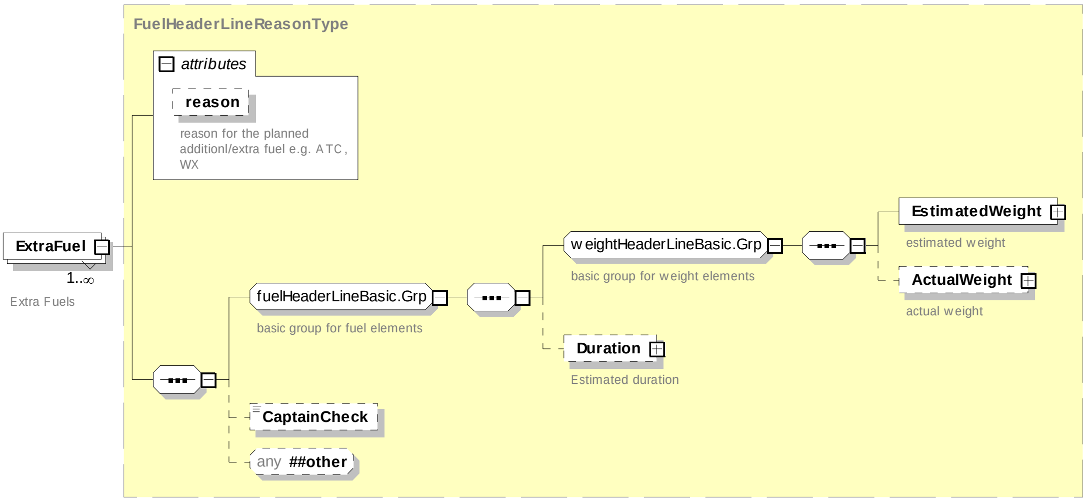
element FuelHeaderLineReasonType/CaptainCheck

diagram		
type	restriction of xs:string	
properties	isRef	0
	minOcc	0
	maxOcc	1
	content	simple
	nillable	false
facets	minLength	1

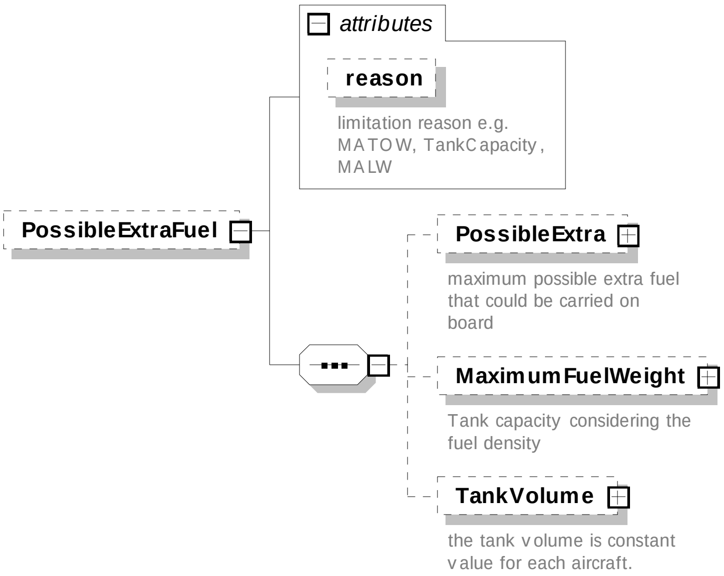
element fuelHeader.Grp/ExtraFuels

diagram	
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **complex** **nillable** **false**
children	**ExtraFuel**
annotation	**documentation** **list of all planned extra fuels.** **The unbounded number of ExtraFuel values enables entry of a separate value for each planned type of extra fuel**

element fuelHeader.Grp/ExtraFuels/ExtraFuel

diagram	
type	**FuelHeaderLineReasonType**
properties	**isRef** **0** **minOcc** **1** **maxOcc** **unbounded** **content** **complex** **nillable** **false**
children	**EstimatedWeight** **ActualWeight** **Duration** **CaptainCheck**
attributes	**Name**: **reason** **Type**: **derived by: xs:string** **Use**: **optional** **Default**: **Fixed**: **annotation**: **documentation** **reason for the planned additional/extra fuel e.g. ATC, WX**
annotation	**documentation** **Planned extra fuel or added at fuel order. The required fuel for the transportation of the ExtraFuel is NOT included in the TripFuel**

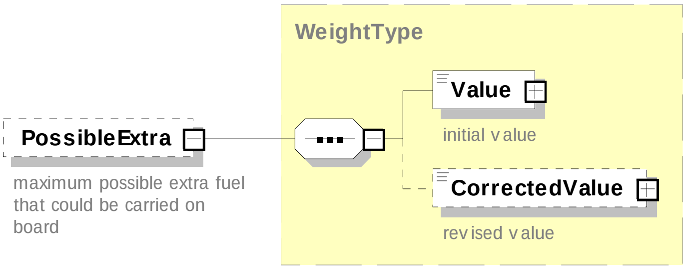
element fuelHeader.Grp/PossibleExtraFuel

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex
children	PossibleExtra MaximumFuelWeight TankVolume
attributes	Name Type Use Default Fixed annotation reason documentation limitation reason e.g. MTOW reached, TankCapacity reached, MLW reached

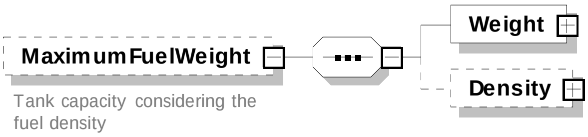
attribute fuelHeader.Grp/PossibleExtraFuel/@reason

properties	isRef 0
annotation	documentation limitation reason e.g. MTOW reached, TankCapacity reached, MLW reached

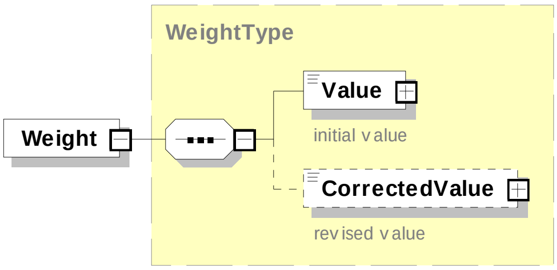
element fuelHeader.Grp/PossibleExtraFuel/PossibleExtra

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation maximum possible extra fuel that could be carried on board

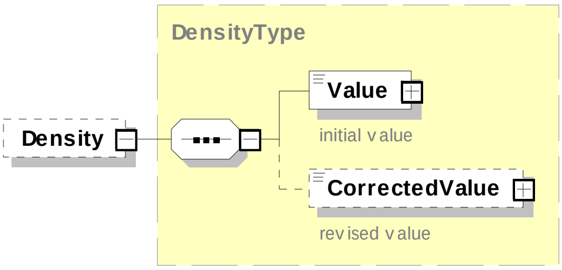
element fuelHeader.Grp/PossibleExtraFuel/MaximumFuelWeight

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Weight Density
annotation	documentation Tank capacity considering the fuel density

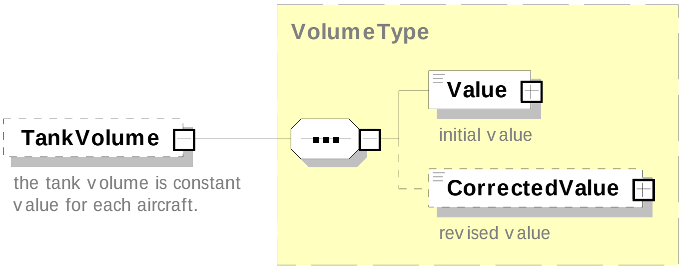
element fuelHeader.Grp/PossibleExtraFuel/MaximumFuelWeight/Weight

diagram	
type	WeightType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

element fuelHeader.Grp/PossibleExtraFuel/MaximumFuelWeight/Density

diagram	
type	DensityType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Value CorrectedValue

element fuelHeader.Grp/PossibleExtraFuel/TankVolume

<table>
<tr><td>diagram</td><td>
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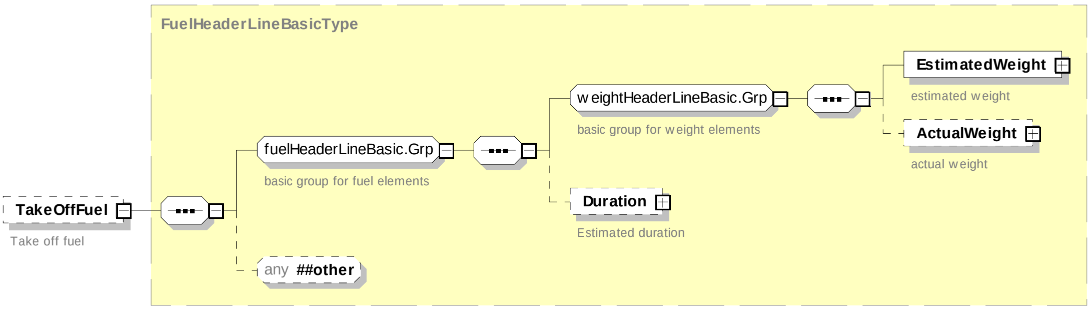
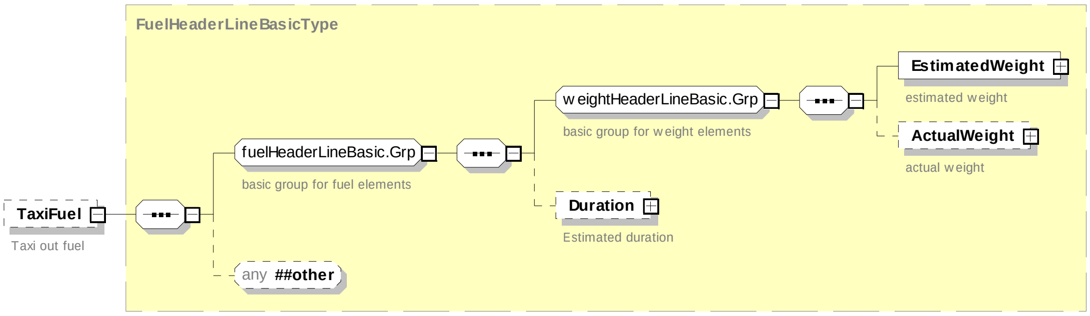
<tr><td>type</td><td>VolumeType</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
mixed true
nillable false</td></tr>
<tr><td>children</td><td>Value CorrectedValue</td></tr>
<tr><td>annotation</td><td>documentation
the tank volume is a constant value for each aircraft.</td></tr>
</table>

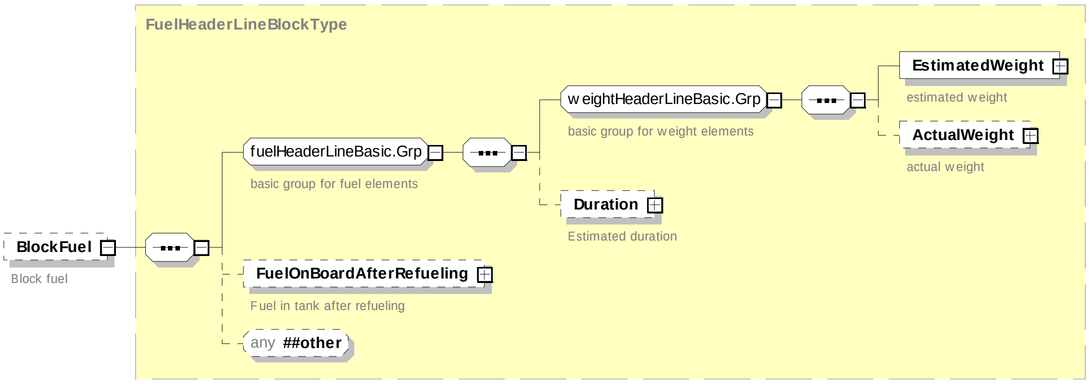
element fuelHeader.Grp/TakeOffFuel

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>FuelHeaderLineBasicType</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>children</td><td>EstimatedWeight ActualWeight Duration</td></tr>
<tr><td>annotation</td><td>documentation
Take off fuel.
TakeOffFuel = BlockFuel - TaxiFuel</td></tr>
</table>

element fuelHeader.Grp/TaxiFuel

diagram	
type	FuelHeaderLineBasicType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	EstimatedWeight ActualWeight Duration
annotation	documentation Taxi out fuel Fuel needed for taxiing out from the parking position to the take off runway

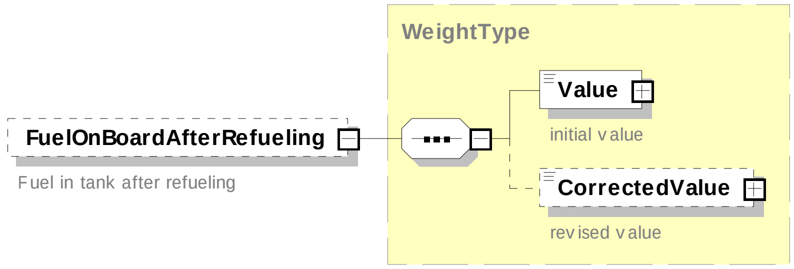
element fuelHeader.Grp/BlockFuel

diagram	
type	FuelHeaderLineBlockType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	EstimatedWeight ActualWeight Duration FuelOnBoardAfterRefueling
annotation	documentation Block fuel BlockFuel = TripFuel + ContingencyFuel + AlternateFuel(only for the planned alternate airport) + FinalReserve + ReserveFuel + ETOPSFuel + ContingencySavingsAdditionalFuel + AdditionalFuels + ExtraFuels + TaxiFuel Note: BlockFuel/EstimatedWeight/Value is provided by the flight planning system. The pilot may adjust BlockFuel/EstimatedWeight/Value to BlockFuel/EstimatedWeight/CorrectedValue. The final fuel order (usually a rounded value) is also stored in the BlockFuel/EstimatedWeight/CorrectedValue. At the end of re-/defueling, the fuel on board is BlockFuel/FuelOnBoardAfterRefueling/Value. At OutTime, the total fuel on board is BlockFuel/ActualWeight/Value. A difference between BlockFuel/FuelOnBoardAfterRefueling/Value and BlockFuel/ActualWeight/Value can be caused by APU consumption after refueling.

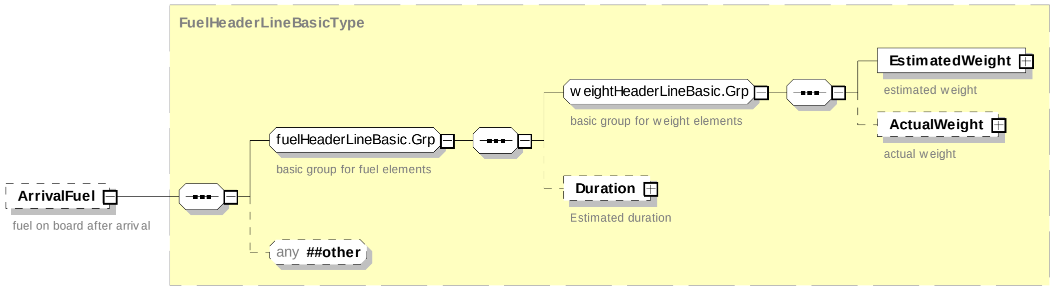
complexType FuelHeaderLineBlockType

diagram	
children	EstimatedWeight ActualWeight Duration FuelOnBoardAfterRefueling
used by	element fuelHeader.Grp/Block Fuel
annotation	documentation basic type for fuel elements extended by fuel on board after refueling information

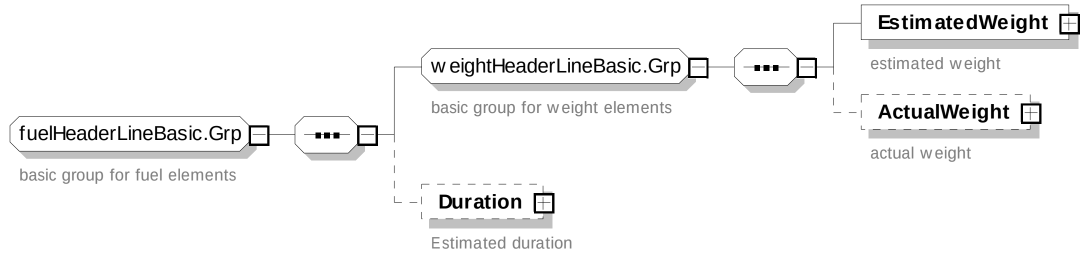
element FuelHeaderLineBlockType/FuelOnBoardAfterRefueling

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Fuel in tank after refueling

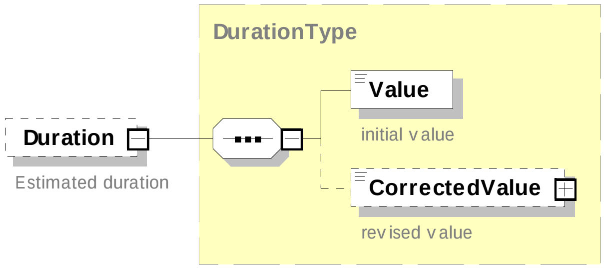
element fuelHeader.Grp/ArrivalFuel

diagram	
type	FuelHeaderLineBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight Duration
annotation	documentation fuel on board after arrival

group fuelHeaderLineBasic.Grp

diagram	
children	EstimatedWeight ActualWeight Duration
used by	**complexTypes** FuelHeaderLineAirportType FuelHeaderLineBasicType FuelHeaderLineBlockType FuelHeaderLineContingencyType FuelHeaderLineReasonType
annotation	**documentation** **basic group for fuel elements**

element fuelHeaderLineBasic.Grp/Duration

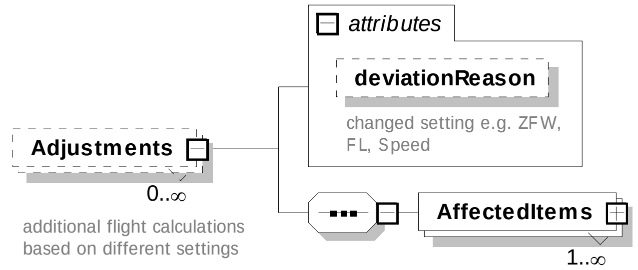
diagram	
type	DurationType
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **mixed true** **nillable false**
children	Value CorrectedValue
annotation	**documentation** **Estimated duration**

Other values can be calculated based on the values that are already described above

Value	Calculation
MinimumRequiredFuel	**The Minimum Required Fuel for one flight is based on the Airline's fuel policy. Its definition may be different for a different airline.** **E.g. a number of Airlines' fuel policies define it as follows:** **MinimumRequiredFuel = TripFuel + ContingencyFuel + AlternateFuel(only to the planned alternate airport) + FinalReserve + ETOPSFuel + ContingencySavingsAdditionalFuel +TaxiFuel**

Note: For legal definitions of required fuel masses, see the appropriate regulations, e.g. EU-OPS 1.255, FAR-121, FAR-91

element FuelHeader/Adjustments

<table>
<tr><td>diagram</td><td>
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<tr><td>properties</td><td>
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<tr><td>minOcc</td><td>0</td></tr>
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<tr><td>content</td><td>complex</td></tr>
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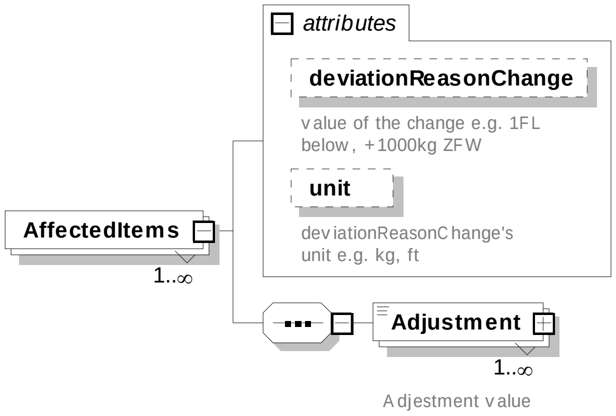
<tr><td>children</td><td>AffectedItems</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>deviationReason</td><td>xs:string</td><td></td><td></td><td></td><td>documentation
changed setting e.g. ZFW, FL, Speed</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
additional fuel calculations based on different settings</td></tr>
</table>

attribute FuelHeader/Adjustments/@deviationReason

<table>
<tr><td>type</td><td>xs:string</td></tr>
<tr><td>properties</td><td>isRef 0</td></tr>
<tr><td>annotation</td><td>documentation
changed setting e.g. ZFW, FL, Speed</td></tr>
</table>

element FuelHeader/Adjustments/AffectedItems

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>
<table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>1</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>false</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>Adjustment</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>deviationReasonChange</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
value of the change e.g. 1FL below, +1000kg ZFW</td></tr>
<tr><td>unit</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
deviationReasonChange's unit e.g. kg, ft</td></tr>
</table></td></tr>
</table>

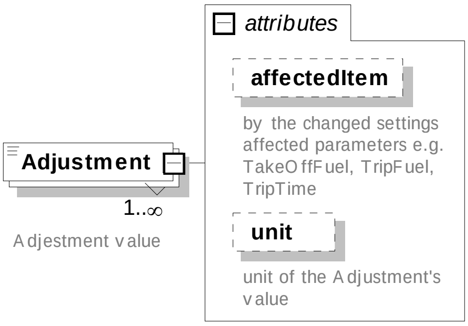
attribute FuelHeader/Adjustments/AffectedItems/@deviationReasonChange

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation value of the change e.g. 1FL below, +1000kg ZFW

attribute FuelHeader/Adjustments/AffectedItems/@unit

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation deviationReasonChange's unit e.g. kg, ft

element FuelHeader/Adjustments/AffectedItems/Adjustment

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:string</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 1
maxOcc unbounded
content complex
mixed true
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>affectedItem</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
by the changed settings affected parameters e.g. TakeOffFuel, TripFuel, TripTime</td></tr>
<tr><td>unit</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
unit of the Adjustment's value</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Adjestment value</td></tr>
</table>

attribute FuelHeader/Adjustments/AffectedItems/Adjustment/@affectedItem

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation by the changed settings affected parameters e.g. TakeOffFuel, TripFuel, TripTime

attribute FuelHeader/Adjustments/AffectedItems/Adjustment/@unit

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation unit of the Adjustment's value

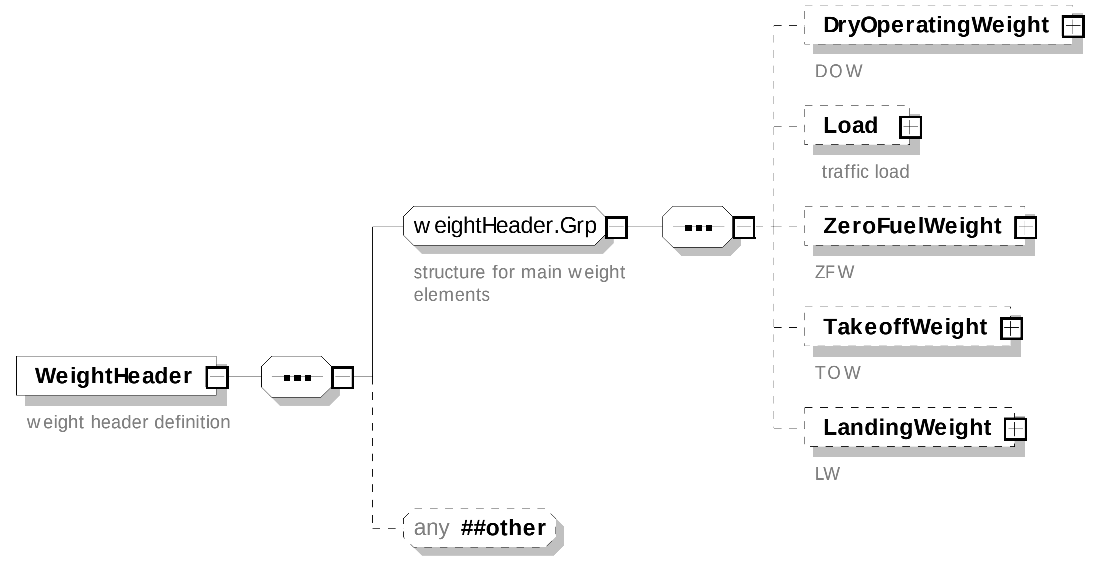
5.0 COMMON ELEMENTS

Note: Please consider, that both attributes FuelHeader/Adjustments/AffectedItems/@unit and FuelHeader/Adjustments/AffectedItemsAdjustment/@unit are not explicitly defined to provide the data structure more flexibility.

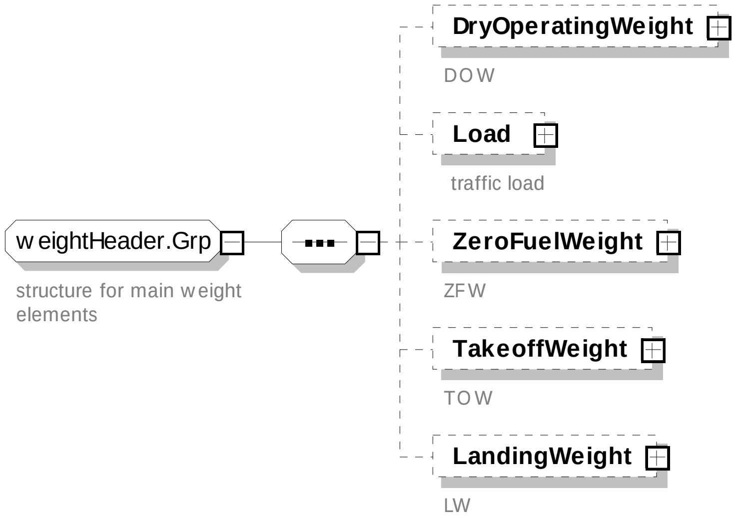
The data provider has to ensure their proper use to prevent the application from incorrect interpretation of the values. It is recommended to use the already defined Unit Types in Section 5.0

The WeightHeader should contain weight information.

element WeightHeader

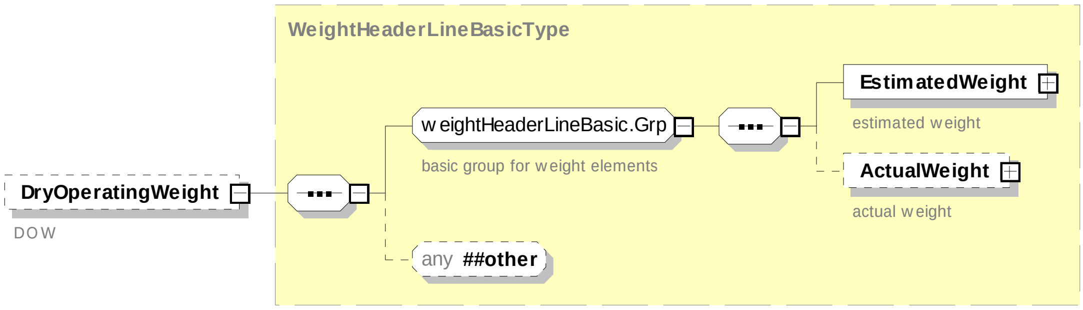
diagram	
properties	**content** **complex** **nillable** **false**
children	**DryOperatingWeight Load ZeroFuelWeight TakeoffWeight LandingWeight**
used by	**group** **flightPlanCore.Grp**
annotation	**documentation** **weight header definition**

group weightHeader.Grp

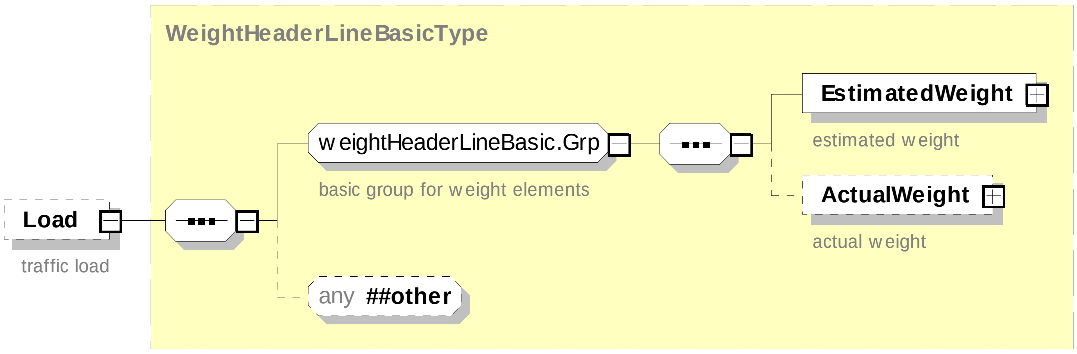
diagram	

children	DryOperatingWeight Load ZeroFuelWeight TakeoffWeight LandingWeight
used by	element WeightHeader
annotation	documentation structure for main weight elements

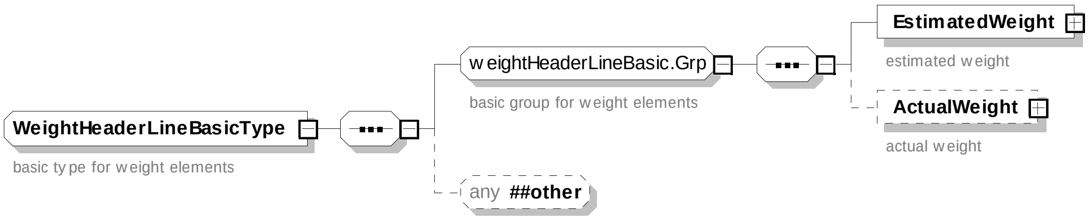
element weightHeader.Grp/DryOperatingWeight

diagram	
type	WeightHeaderLineBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight
annotation	documentation DOW The total weight of an aircraft ready for a specific type of operation excluding all usable fuel and traffic load. Operational Empty Weight plus items specific to the type of flight, i.e. catering, newspapers, pantry equipment, extra crew etc…

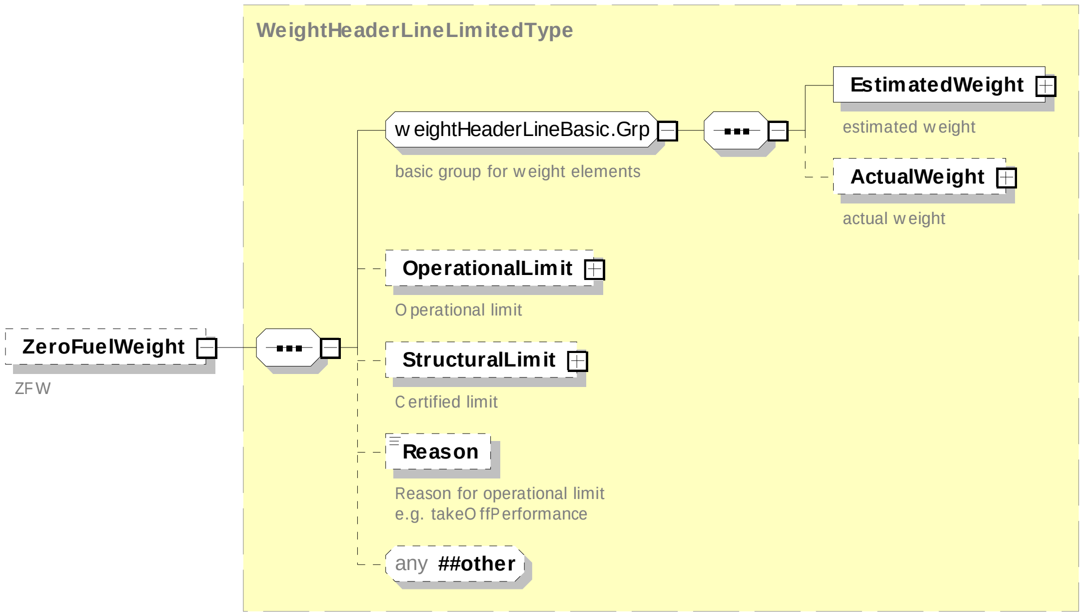
element weightHeader.Grp/Load

diagram	
type	WeightHeaderLineBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight
annotation	documentation traffic load

complexType WeightHeaderLineBasicType

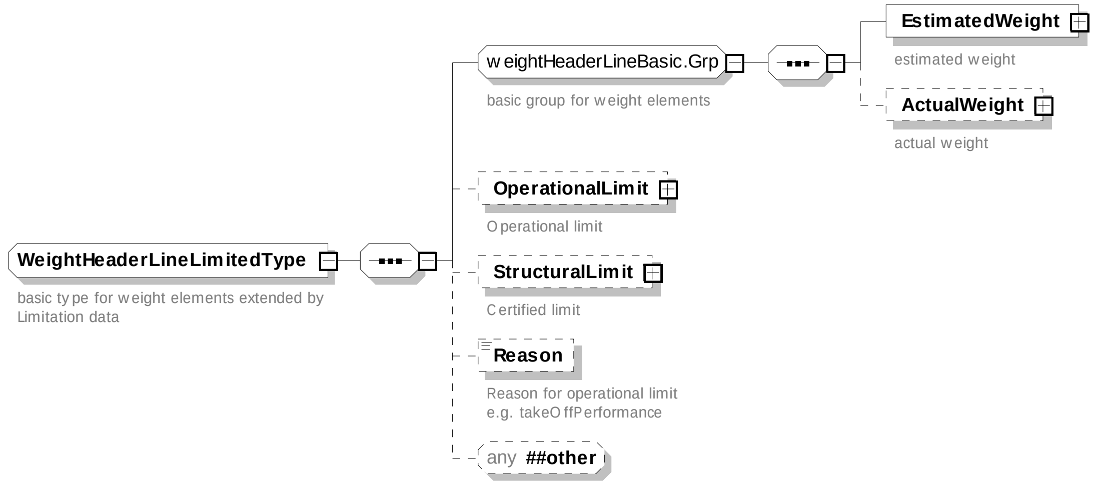
diagram	
children	EstimatedWeight ActualWeight
used by	**elements** weightHeader.Grp/DryOperatingWeight weightHeader.Grp/Load
annotation	**documentation** basic type for weight elements

element weightHeader.Grp/ZeroFuelWeight

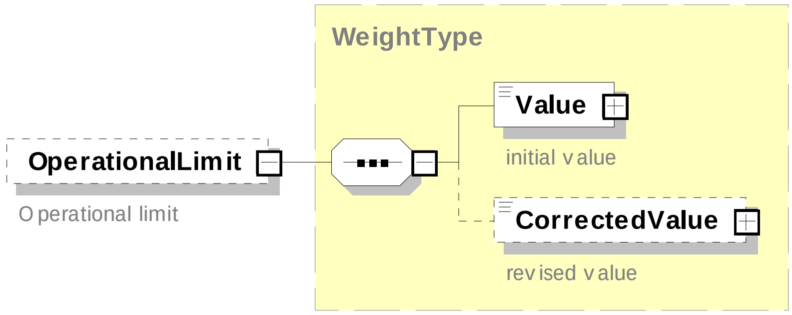
diagram	
type	WeightHeaderLineLimitedType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	EstimatedWeight ActualWeight OperationalLimit StructuralLimit Reason
annotation	**documentation** ZFW

5.0 COMMON ELEMENTS

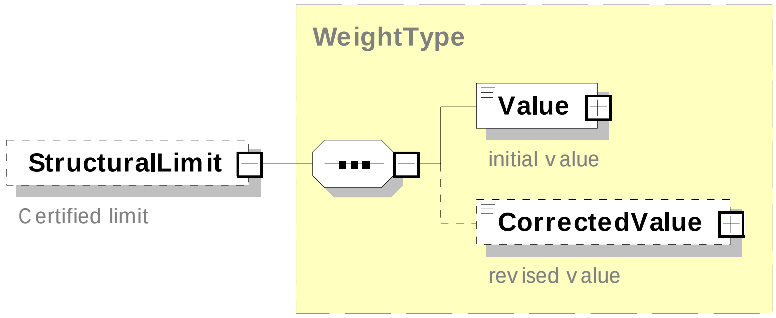
complexType WeightHeaderLineLimitedType

diagram	
children	EstimatedWeight ActualWeight OperationalLimit StructuralLimit Reason
used by	**elements** weightHeader.Grp/LandingWeight weightHeader.Grp/TakeoffWeight weightHeader.Grp/ZeroFuelWeight
annotation	**documentation** basic type for weight elements extended by Limitation data

element WeightHeaderLineLimitedType/OperationalLimit

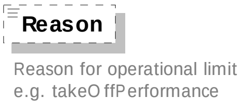
diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	**documentation** Operational limit fort the specific flight. (e.g. due to runway restrictions, the MTOW is limited)

element WeightHeaderLineLimitedType/StructuralLimit

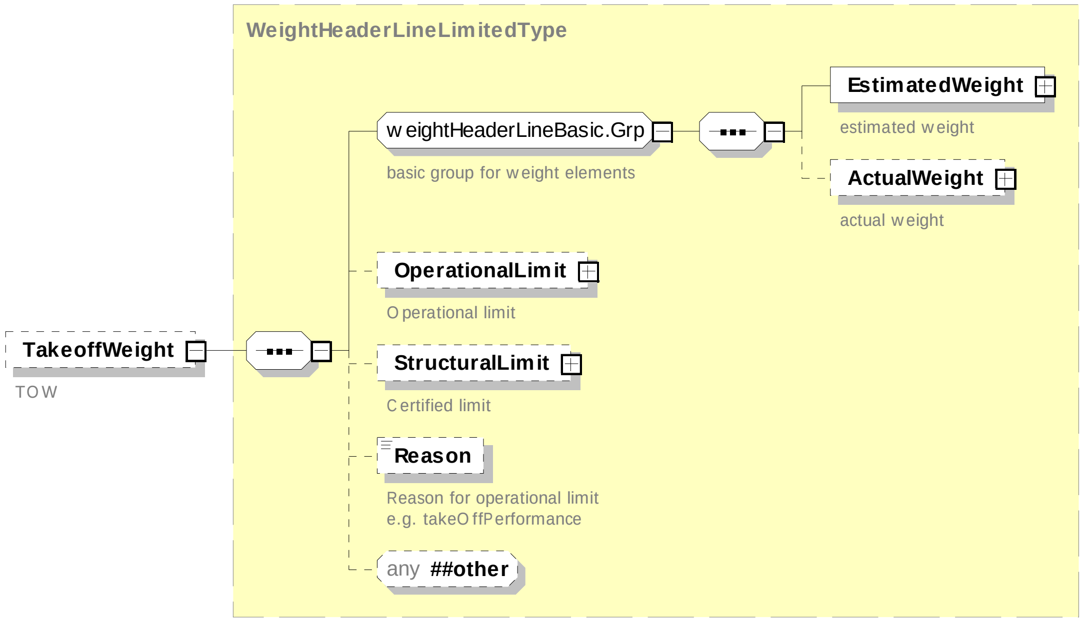
diagram	

type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation maximum certified weight (could vary from the structural weight)

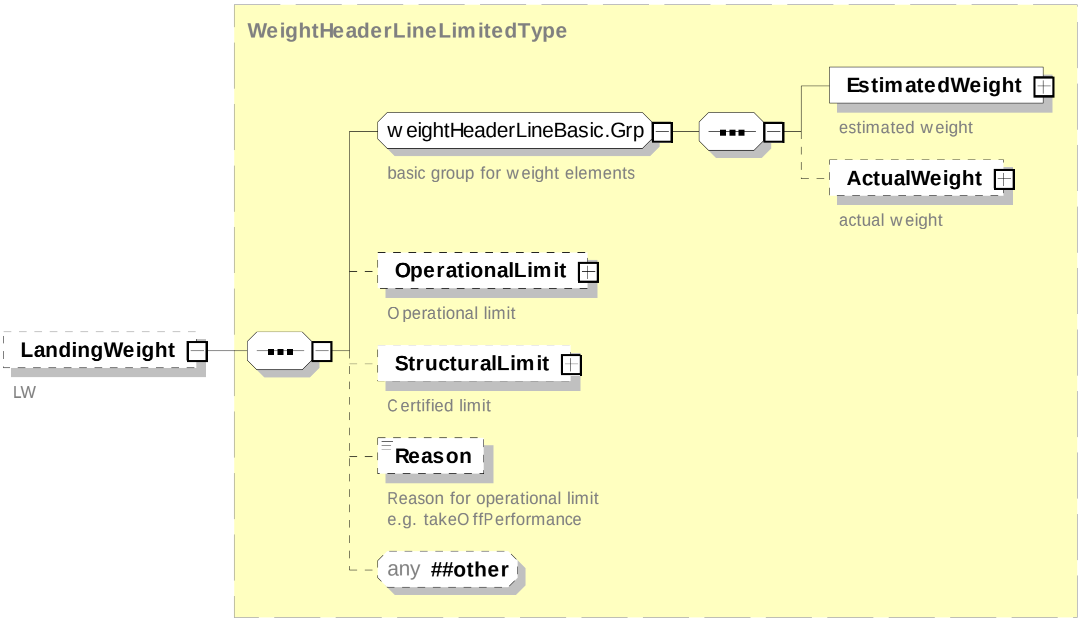
element WeightHeaderLineLimitedType/Reason

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1
annotation	documentation Reason for operational limit e.g. takeOffPerformance

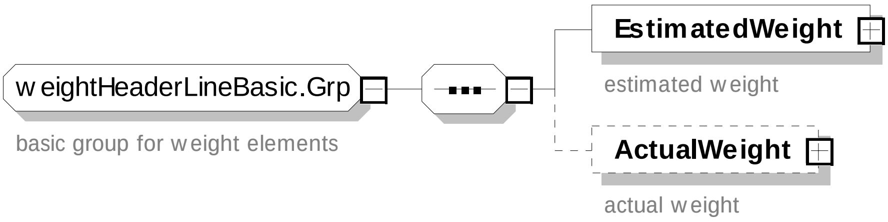
element weightHeader.Grp/TakeoffWeight

diagram	
type	WeightHeaderLineLimitedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight OperationalLimit StructuralLimit Reason
annotation	documentation TOW

element weightHeader.Grp/LandingWeight

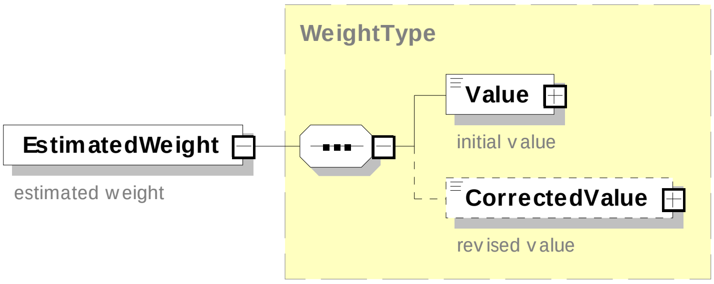
diagram	
type	WeightHeaderLineLimitedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight OperationalLimit StructuralLimit Reason
annotation	documentation LW

group weightHeaderLineBasic.Grp

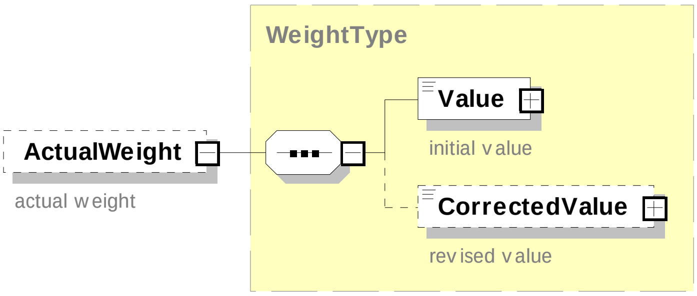
diagram	
children	EstimatedWeight ActualWeight
used by	elements waypoint.Grp/AircraftWeight waypoint.Grp/BurnOff waypoint.Grp/CumulatedBurnOff waypoint.Grp/FuelOnBoard complexTypes WeightHeaderLineBasicType WeightHeaderLineLimitedType group fuelHeaderLineBasic.Grp
annotation	documentation basic group for weight elements

5.0 COMMON ELEMENTS

element weightHeaderLineBasic.Grp/EstimatedWeight

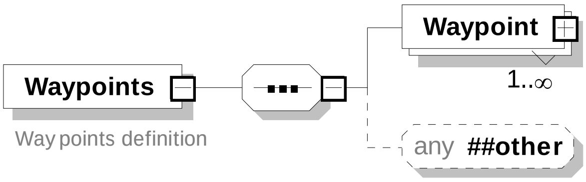
diagram	
type	WeightType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation estimated weight

element weightHeaderLineBasic.Grp/ActualWeight

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation actual weight

Waypoints are used to identify the route of the operational flight plan
Waypoints is a list of Waypoint.

element Waypoints

diagram	
properties	content complex nillable false
children	Waypoint
used by	elements AlternateRoute flightPlanCore.Grp/ContingencySavingHeader group flightPlanCore.Grp
annotation	documentation Waypoints definition

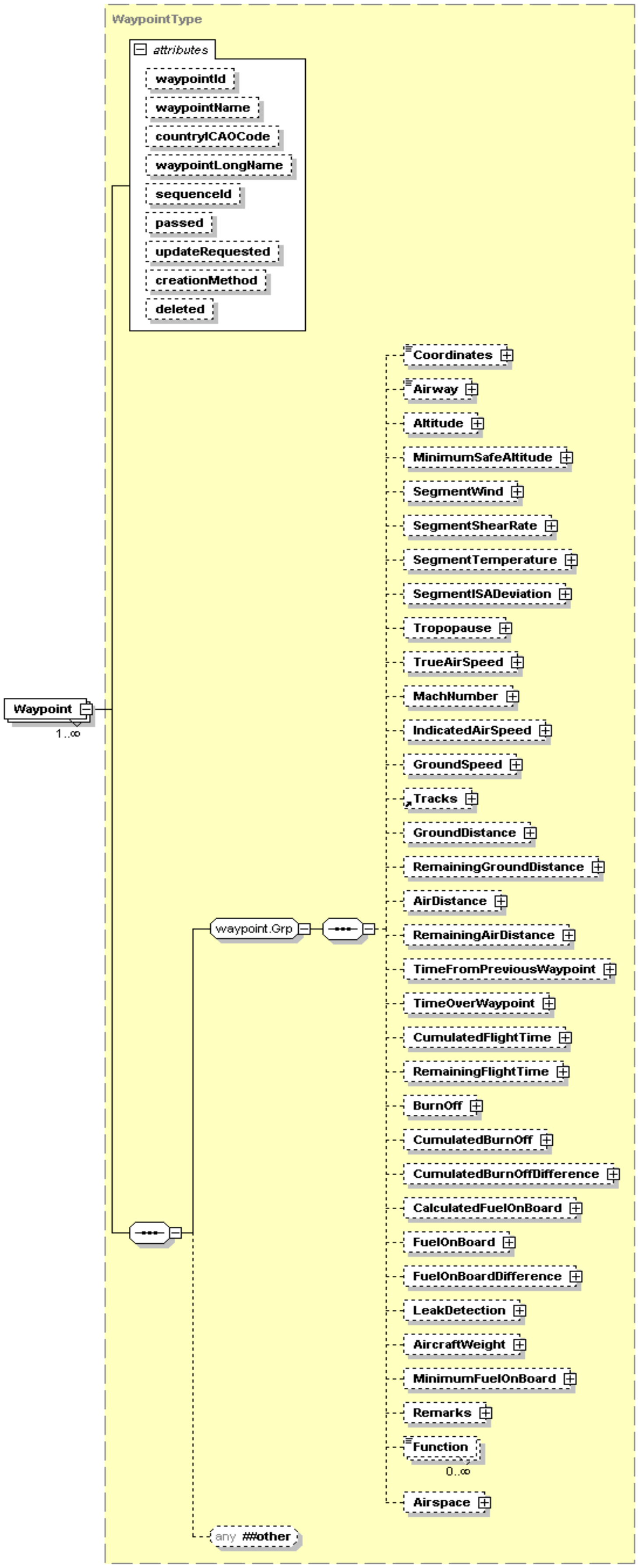
A Waypoint is every designated AIP position used in the flight route, but can also be an another artificial routing position such as Top of Climb, Top of Descend, Point of Equal Time or just a routing position identified by its geographical coordinates.

Notes:

1. **The first waypoint of each flightplan should specify the departure airport. The last waypoint should specify the arrival airport.**
2. **In case of inflight flightplan the first waypoint should specify the waypoint from which the flightplan has been calculated.**
3. **The first waypoint of the flightPlanCore.Grp/ContingencySavingHeader/Waypoints should specify the decision waypoint.**
4. **All segment related elements in the waypoint structure are related for the segment from the previous to the current waypoint.**

5.0 COMMON ELEMENTS

element Waypoints/Waypoint

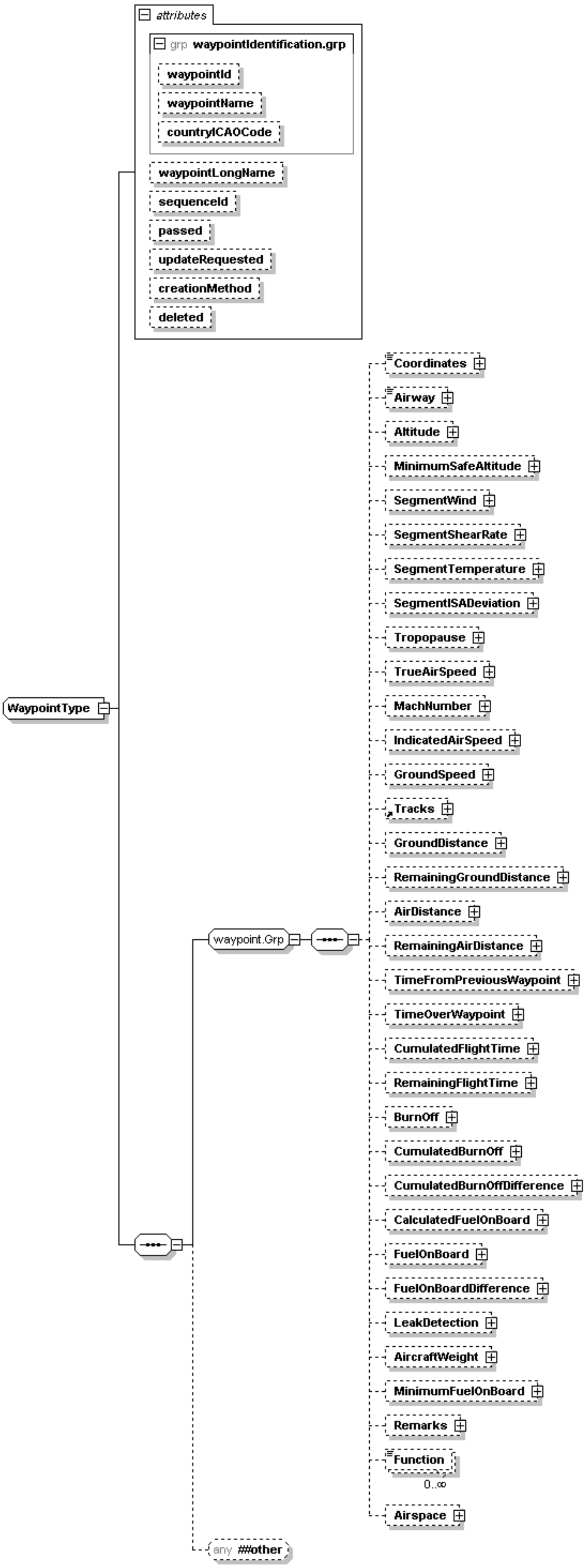
diagram	

type	WaypointType
properties	isRef 0 minOcc 1 maxOcc unbounded content complex nillable false
children	Coordinates Airway Altitude MinimumSafeAltitude SegmentWind SegmentShearRate SegmentTemperature SegmentISADeviation Tropopause SegmentTropopauseShearRate TrueAirSpeed MachNumber IndicatedAirSpeed GroundSpeed Tracks GroundDistance RemainingGroundDistance AirDistance RemainingAirDistance TimeFromPreviousWaypoint TimeOverWaypoint CumulatedFlightTime RemainingFlightTime BurnOff CumulatedBurnOff CumulatedBurnOffDifference CalculatedFuelOnBoard FuelOnBoard FuelOnBoardDifference LeakDetection AircraftWeight MinimumFuelOnBoard Remarks Function Airspace

attributes	Name	Type	Use	Default	Fixed	annotation
	waypointId	WaypointIdType	optional			
	waypointName	derived by: xs:string	optional			
	countryICAOCode	CountryICAOCodeType	optional			
	waypointLongName	derived by: xs:string	optional			documentation waypoint long name
	sequenceId	xs:nonNegativeInteger				documentation sequence number of the waypoint in the waypoint list
	passed	xs:boolean	optional			documentation Indicates whether this waypoint has been passed or not. (true / false)
	updateRequested	xs:boolean	optional			documentation Intends to store if the update has been requested on this waypoint or not.
	creationMethod	derived by: xs:string	optional	auto		documentation auto / manual
	deleted	xs:boolean	optional			documentation true / false

complexType WaypointType

diagram



<table>
<tr><td>children</td><td>Coordinates Airway Altitude MinimumSafeAltitude SegmentWind SegmentShearRate SegmentTemperature SegmentISADeviation Tropopause TrueAirSpeed MachNumber IndicatedAirSpeed GroundSpeed Tracks GroundDistance RemainingGroundDistance AirDistance RemainingAirDistance TimeFromPreviousWaypoint TimeOverWaypoint CumulatedFlightTime RemainingFlightTime BurnOff CumulatedBurnOff CumulatedBurnOffDifference CalculatedFuelOnBoard FuelOnBoard FuelOnBoardDifference LeakDetection AircraftWeight MinimumFuelOnBoard Remarks Function Airspace</td></tr>
<tr><td>used by</td><td>element Waypoints/Waypoint</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>waypointId</td><td>WaypointIdType</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>waypointName</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>countryICAOCode</td><td>CountryICAOCodeType</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>waypointLongName</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
waypoint long name</td></tr>
<tr><td>sequenceId</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation
sequence number of the waypoint in the waypoint list</td></tr>
<tr><td>passed</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
Indicates whether this waypoint has been passed or not. (true / false)</td></tr>
<tr><td>updateRequested</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
Intends to store if the update has been requested on this waypoint or not.</td></tr>
<tr><td>creationMethod</td><td>derived by: xs:string</td><td>optional</td><td>auto</td><td></td><td>documentation
auto / manual</td></tr>
<tr><td>deleted</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
true / false</td></tr>
</table>
</td></tr>
<tr><td>annotation</td><td>documentation
type definition for waypoint</td></tr>
</table>

attribute WaypointType/@waypointLongName

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation waypoint long name

attribute WaypointType/@sequenceId

type	xs:nonNegativeInteger
properties	isRef 0
annotation	documentation sequence number of the waypoint in the waypoint list

attribute WaypointType/@passed

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Indicates whether this waypoint has been passed or not. (true / false)

attribute WaypointType/@updateRequested

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Intends to store if the update has been requested on this waypoint or not.

attribute WaypointType/@creationMethod

type	restriction of xs:string
properties	isRef 0 default auto use optional
facets	enumeration auto enumeration manual
annotation	documentation auto / manual

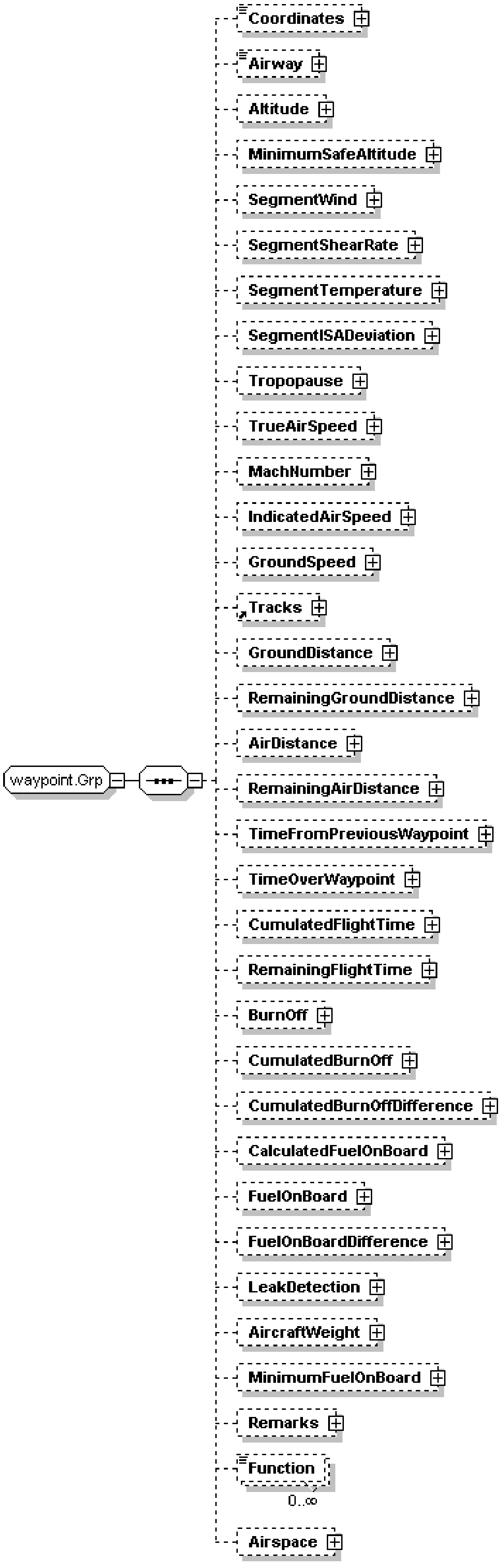
attribute WaypointType/@deleted

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation true / false

5.0 COMMON ELEMENTS

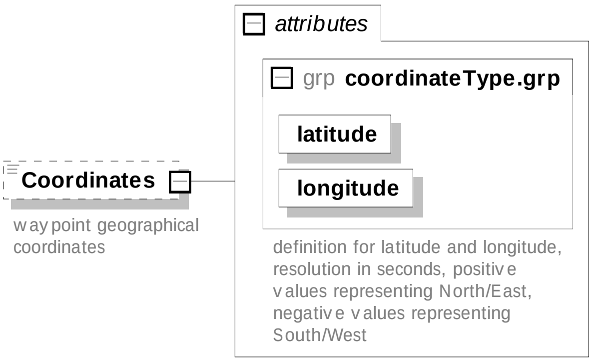
group waypoint.Grp

diagram



children	Coordinates Airway Altitude MinimumSafeAltitude SegmentWind SegmentShearRate SegmentTemperature SegmentISADeviation Tropopause TrueAirSpeed MachNumber IndicatedAirSpeed GroundSpeed Tracks GroundDistance RemainingGroundDistance AirDistance RemainingAirDistance TimeFromPreviousWaypoint TimeOverWaypoint CumulatedFlightTime RemainingFlightTime BurnOff CumulatedBurnOff CumulatedBurnOffDifference CalculatedFuelOnBoard FuelOnBoard FuelOnBoardDifference LeakDetection AircraftWeight MinimumFuelOnBoard Remarks Function Airspace
used by	complexType WaypointType
annotation	documentation structure for waypoint elements

element waypoint.Grp/Coordinates

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:string</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>latitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>longitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
waypoint geographical coordinates</td></tr>
</table>

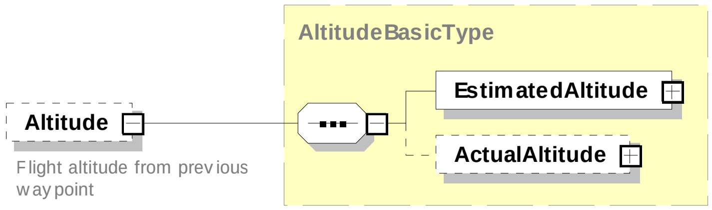
element waypoint.Grp/Airway

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:string</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>type</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airway type e.g. SID, STAR, RNAV, Direct</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Airway from previous to current waypoint e.g. airwayId, SIDname, STARname</td></tr>
</table>

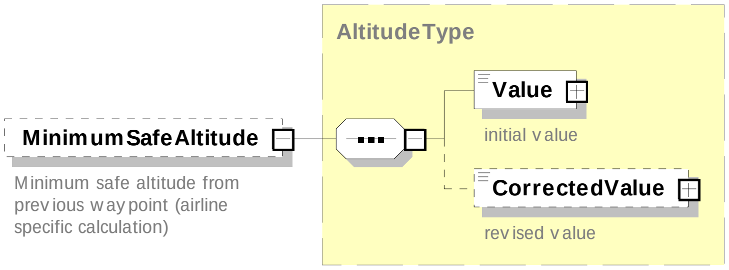
attribute waypoint.Grp/Airway/@type

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation airway type e.g. SID, STAR, RNAV, Direct

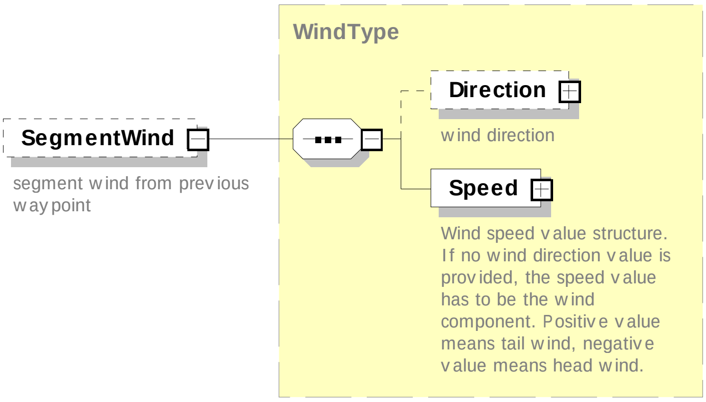
element waypoint.Grp/Altitude

diagram	
type	AltitudeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedAltitude ActualAltitude
annotation	documentation Flight altitude from previous to current waypoint

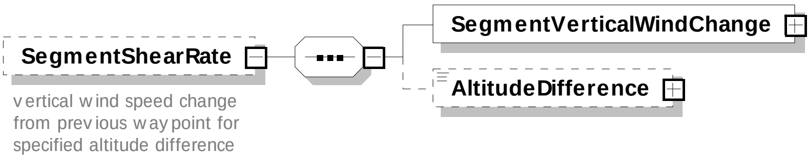
element waypoint.Grp/MinimumSafeAltitude

diagram	
type	AltitudeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Minimum safe altitude from previous to current waypoint (airline specific calculation)

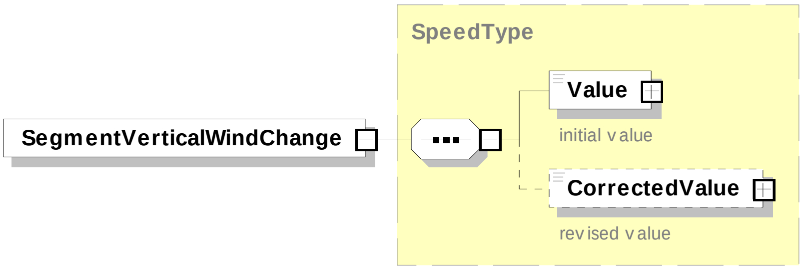
element waypoint.Grp/SegmentWind

diagram	
type	WindType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	Direction Speed
annotation	**documentation** **segment wind from previous to current waypoint**

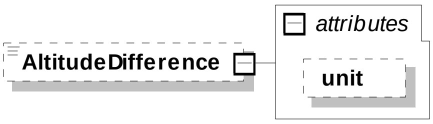
element waypoint.Grp/SegmentShearRate

diagram	
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
children	SegmentVerticalWindChange AltitudeDifference
annotation	**documentation** **vertical wind speed change from previous to current waypoint for specified altitude difference**

element waypoint.Grp/SegmentShearRate/SegmentVerticalWindChange

diagram	
type	SpeedType
properties	**isRef** 0 **content** complex **mixed** true **nillable** false
children	Value CorrectedValue

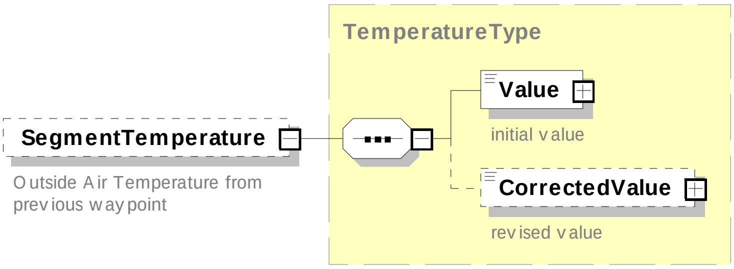
element waypoint.Grp/SegmentShearRate/AltitudeDifference

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name Type Use Default Fixed annotation unit altitudeUnitType optional ft

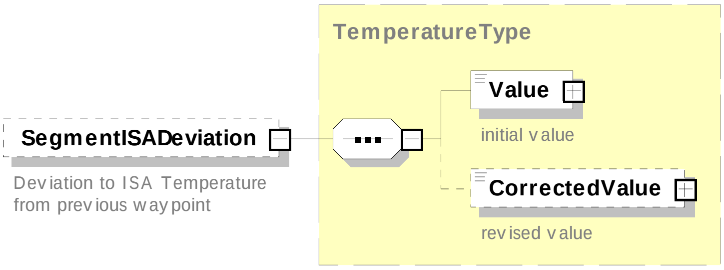
attribute waypoint.Grp/SegmentShearRate/AltitudeDifference/@unit

type	altitudeUnitType
properties	isRef 0 default ft use optional
facets	enumeration ft/100 enumeration ft/1000 enumeration ft enumeration m/100 enumeration m/10 enumeration m

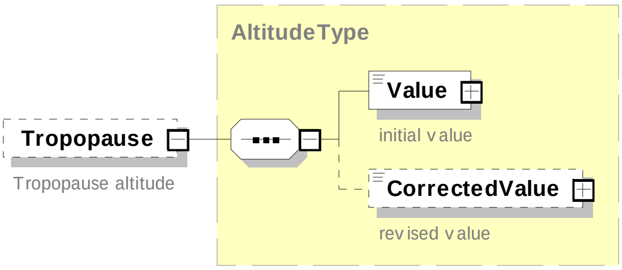
element waypoint.Grp/SegmentTemperature

diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Outside Air Temperature from previous to current waypoint

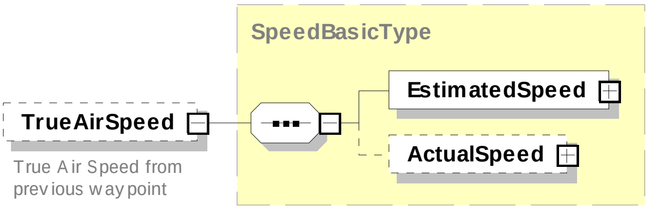
element waypoint.Grp/SegmentISADeviation

diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Deviation to ISA Temperature from previous to current waypoint

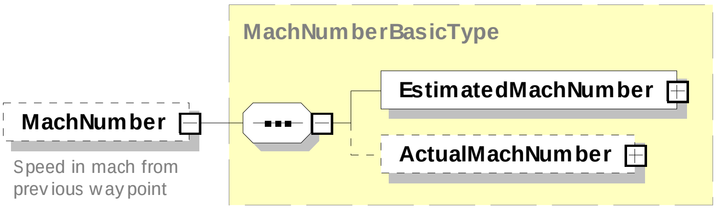
element waypoint.Grp/Tropopause

diagram	
type	AltitudeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Tropopause altitude

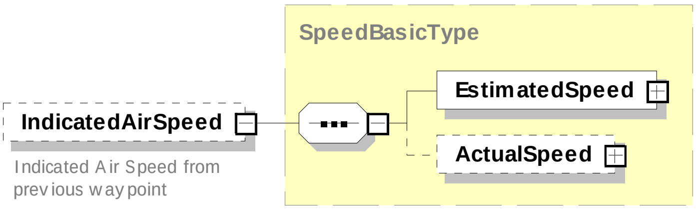
element waypoint.Grp/TrueAirSpeed

diagram	
type	SpeedBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedSpeed ActualSpeed
annotation	documentation True Air Speed from previous to current waypoint

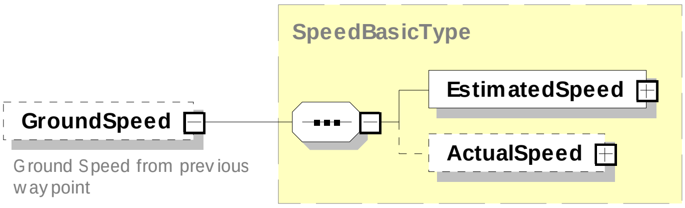
element waypoint.Grp/MachNumber

diagram	
type	MachNumberBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedMachNumber ActualMachNumber
annotation	documentation Speed in mach from previous to current waypoint

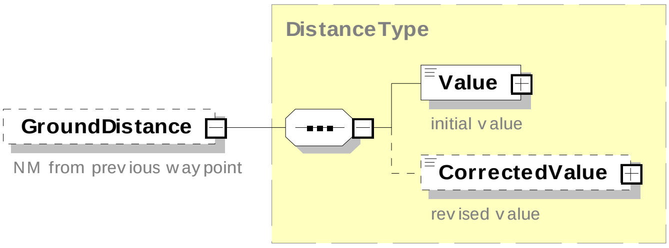
element waypoint.Grp/IndicatedAirSpeed

diagram	
type	SpeedBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedSpeed ActualSpeed
annotation	documentation Indicated Air Speed from previous to current waypoint

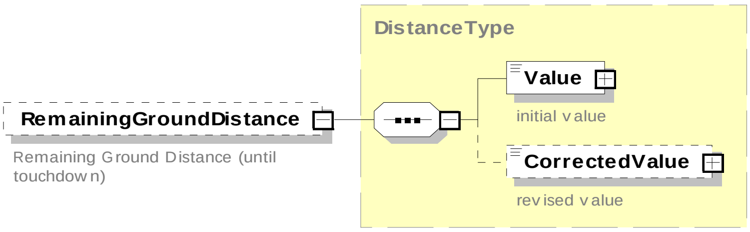
element waypoint.Grp/GroundSpeed

diagram	
type	SpeedBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedSpeed ActualSpeed
annotation	documentation Ground Speed from previous to current waypoint

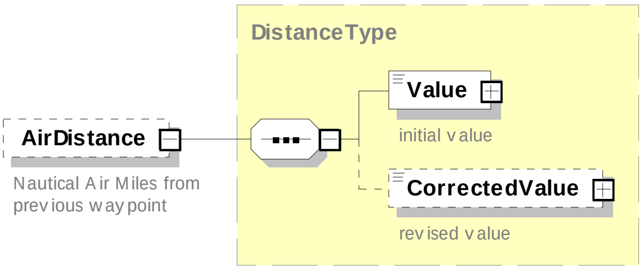
element waypoint.Grp/GroundDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation NM from previous to current waypoint

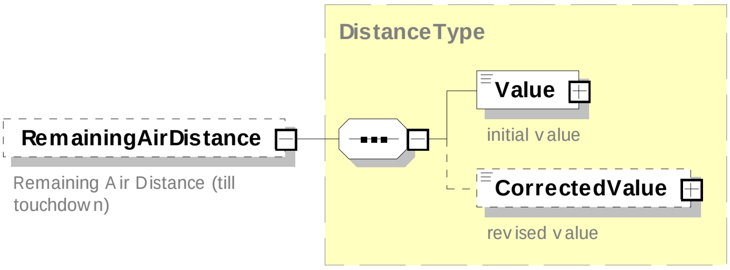
element waypoint.Grp/RemainingGroundDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Remaining Ground Distance (until touchdown)

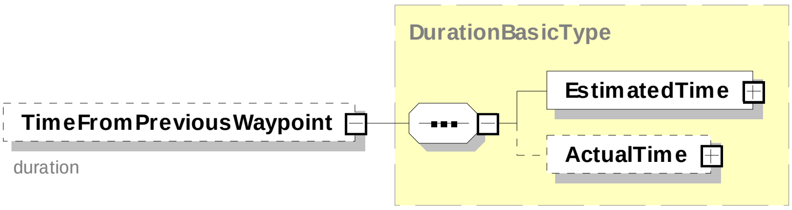
element waypoint.Grp/AirDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Nautical Air Miles from previous to current waypoint

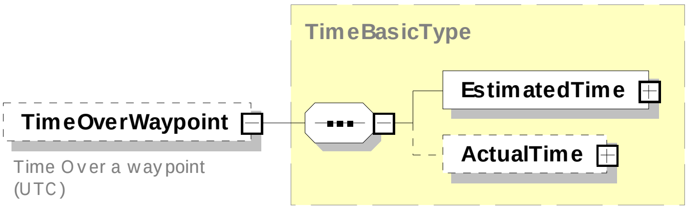
element waypoint.Grp/RemainingAirDistance

diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Remaining Air Distance (till touchdown)

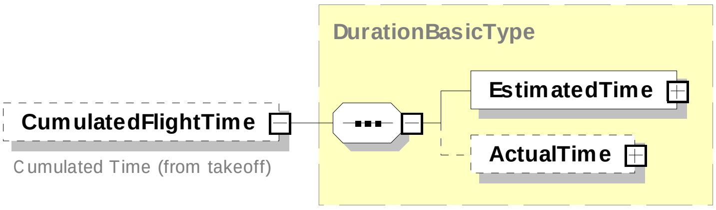
element waypoint.Grp/TimeFromPreviousWaypoint

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation Flight duration from previous to current waypoint

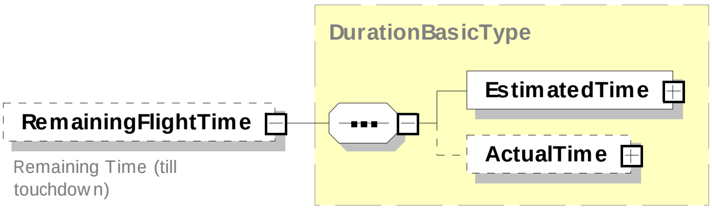
element waypoint.Grp/TimeOverWaypoint

diagram	
type	TimeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation Time Over a waypoint (UTC)

element waypoint.Grp/CumulatedFlightTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation Cumulated Time (from takeoff to current waypoint)

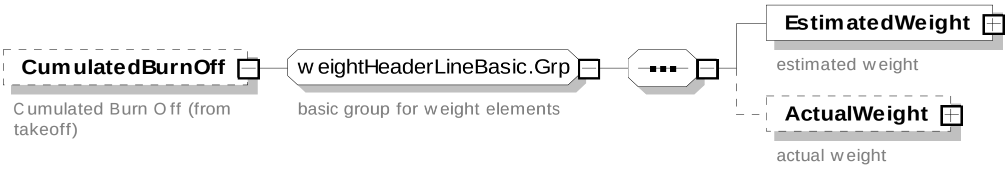
element waypoint.Grp/RemainingFlightTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation Remaining Time (till touchdown)

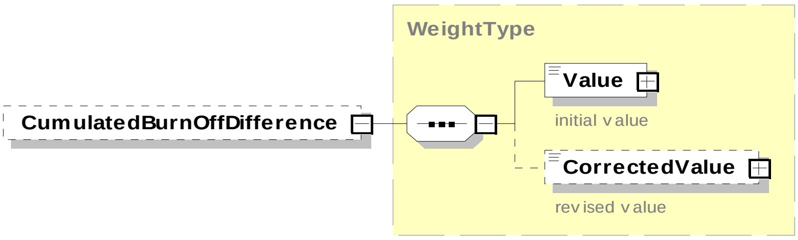
element waypoint.Grp/BurnOff

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight
annotation	documentation Burn off from previous to current waypoint

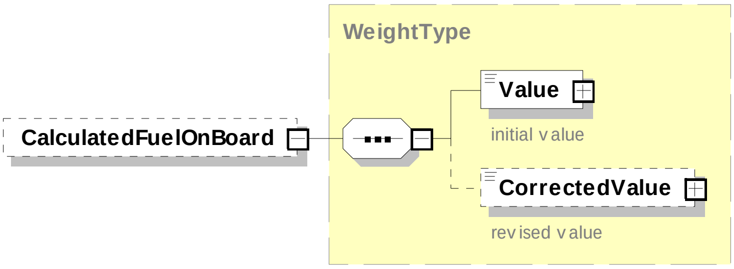
element waypoint.Grp/CumulatedBurnOff

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight
annotation	documentation Cumulated Burn Off (from takeoff)

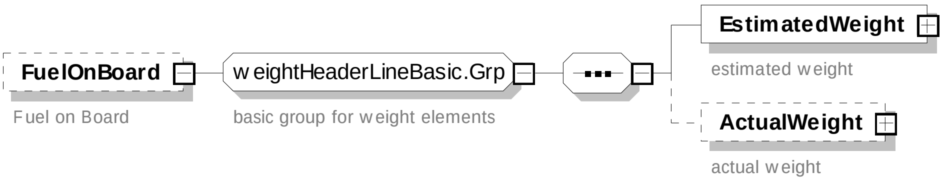
element waypoint.Grp/CumulatedBurnOffDifference

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation difference between the estimated and actual CumulatedBurnOff up to the current waypoint

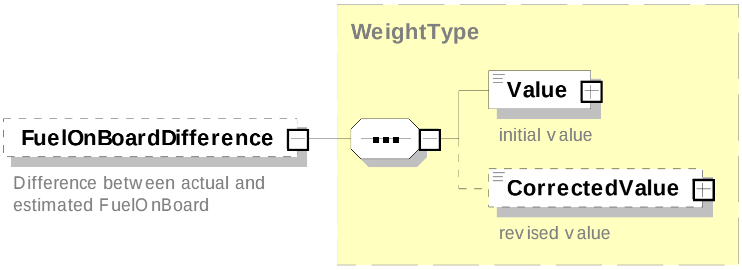
element waypoint.Grp/CalculatedFuelOnBoard

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation difference between the CumulatedBurnOff and actual TakeOffFuel. This value needs to be compared to the estimated fuel on board at the current waypoint (FuelOnBoard).

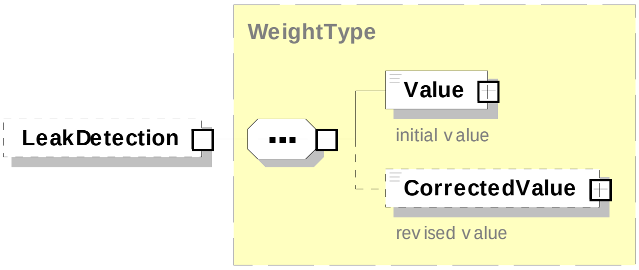
element waypoint.Grp/FuelOnBoard

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedWeight ActualWeight
annotation	documentation Fuel on Board at current waypoint. Note: The remaining fuel on board at touchdown should be coded in as actual FuelOnBoard of the last waypoint.

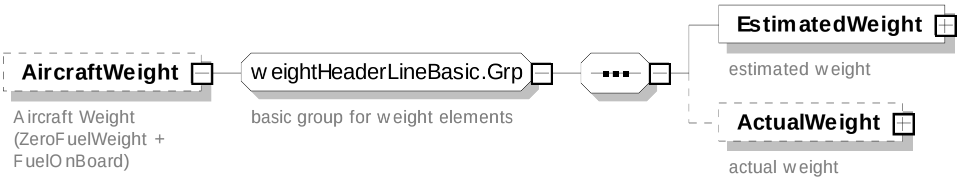
element waypoint.Grp/FuelOnBoardDifference

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation difference between estimated and actual FuelOnBoard

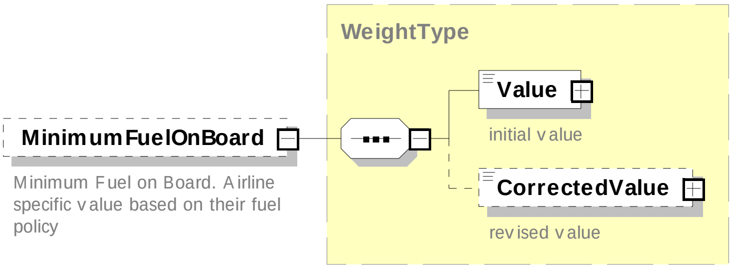
element waypoint.Grp/LeakDetection

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Sum of FuelOnBoardDifference and CumulatedBurnOffDifference

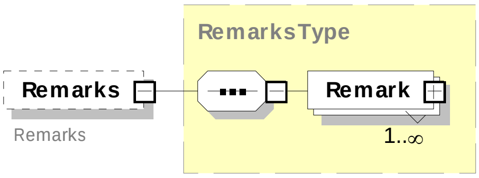
element waypoint.Grp/AircraftWeight

diagram	
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **complex** **nillable** **false**
children	**EstimatedWeight** **ActualWeight**
annotation	**documentation** **Aircraft Gross Weight at current waypoint (ZeroFuelWeight + FuelOnBoard)**

element waypoint.Grp/MinimumFuelOnBoard

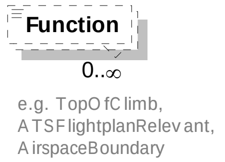
diagram	
type	**WeightType**
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **complex** **mixed** **true** **nillable** **false**
children	**Value** **CorrectedValue**
annotation	**documentation** **Minimum Fuel on Board. Airline specific value based on its fuel policy**

element waypoint.Grp/Remarks

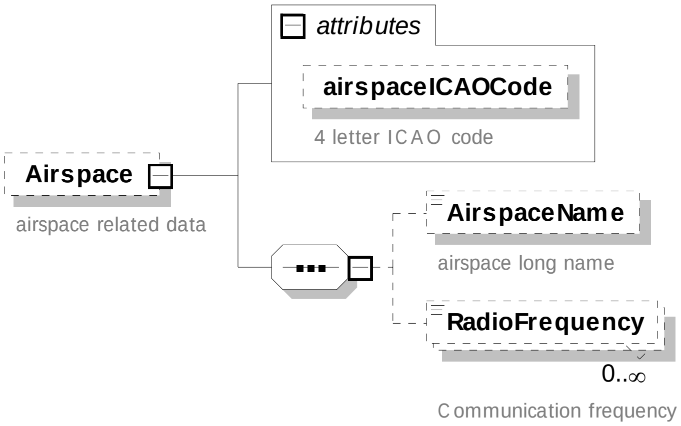
diagram	
type	**RemarksType**
properties	**isRef** **0** **minOcc** **0** **maxOcc** **1** **content** **complex** **nillable** **false**
children	**Remark**
annotation	**documentation** **Remarks**

5.0 COMMON ELEMENTS

element waypoint.Grp/Function

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc unbounded content simple nillable false
facets	minLength 1
annotation	documentation The content of this element is open. nonetheless it is recommended to use the following waypoint functions to ensure their proper interpretation from all applications: DepartureAirport, ArrivalAirport,TopOfClimb, TopOfDescent, BottomOfClimb, BottomOfDescend, AirspaceBoundary, OceanicAirspaceBoundary, PointOfSafeReturn, PointOfNoReturn, Compulsory, ReportingPoint, GridPoint, FreeFlightEnroutePoint, NDB_NavAid, VOR_NavAid, EtopsEntryPosition, EtopsExitPosition, PointOfEqualTime, PointOfEqualFuel, RedispatchDecisionPoint, ATCFlightplanRelevant, TerrainClearenceDecisionPoint

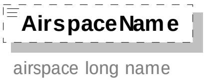
element waypoint.Grp/Airspace

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AirspaceName RadioFrequency
attributes	Name: airspaceICAOCode Type: AirportICAOCodeType Use: Default: Fixed: annotation: documentation 4 letter ICAO code of the airspace
annotation	documentation airspace related data

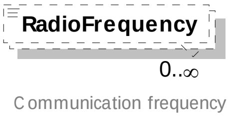
attribute waypoint.Grp/Airspace/@airspaceICAOCode

type	AirportICAOCodeType
properties	isRef 0
facets	length 4
annotation	documentation 4 letter ICAO code of the airspace

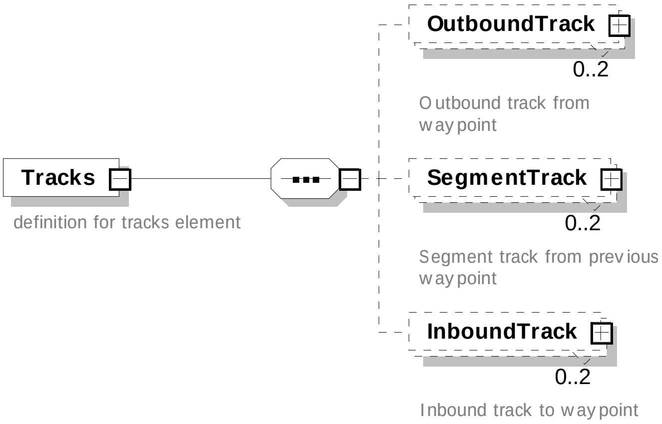
element waypoint.Grp/Airspace/AirspaceName

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1
annotation	documentation airspace long name

element waypoint.Grp/Airspace/RadioFrequency

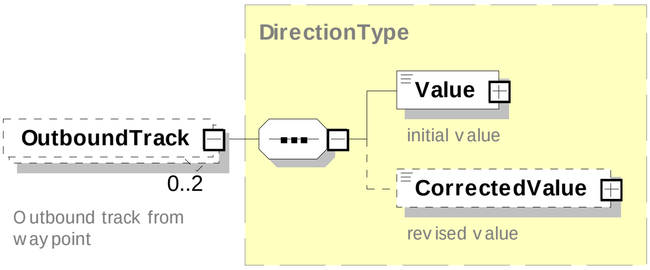
diagram	
type	xs:float
properties	isRef 0 minOcc 0 maxOcc unbounded content simple nillable false
annotation	documentation Communication frequency

element Tracks

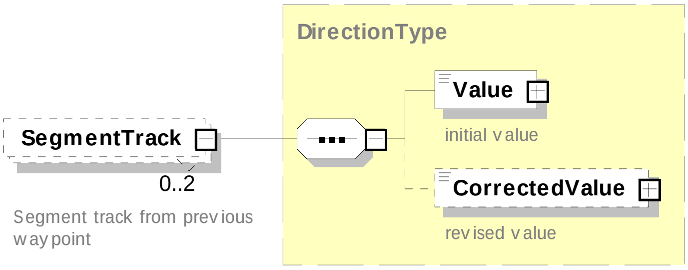
diagram	
properties	content complex nillable false
children	OutboundTrack SegmentTrack InboundTrack
used by	element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport group waypoint.Grp
annotation	documentation definition for tracks element

The Structure of OutboundTrack, SegmentTrack and InboundTrack enables entry of up to two sets of data, e.g., True Track and Magnetic track data.

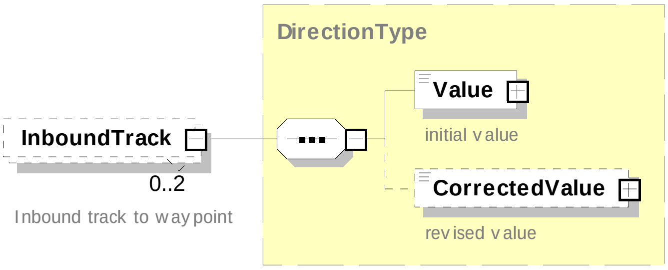
element Tracks/OutboundTrack

diagram	
type	DirectionType
properties	isRef 0 minOcc 0 maxOcc 2 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Outbound track from current waypoint

element Tracks/SegmentTrack

diagram	
type	DirectionType
properties	isRef 0 minOcc 0 maxOcc 2 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Segment track from previous to current waypoint

element Tracks/InboundTrack

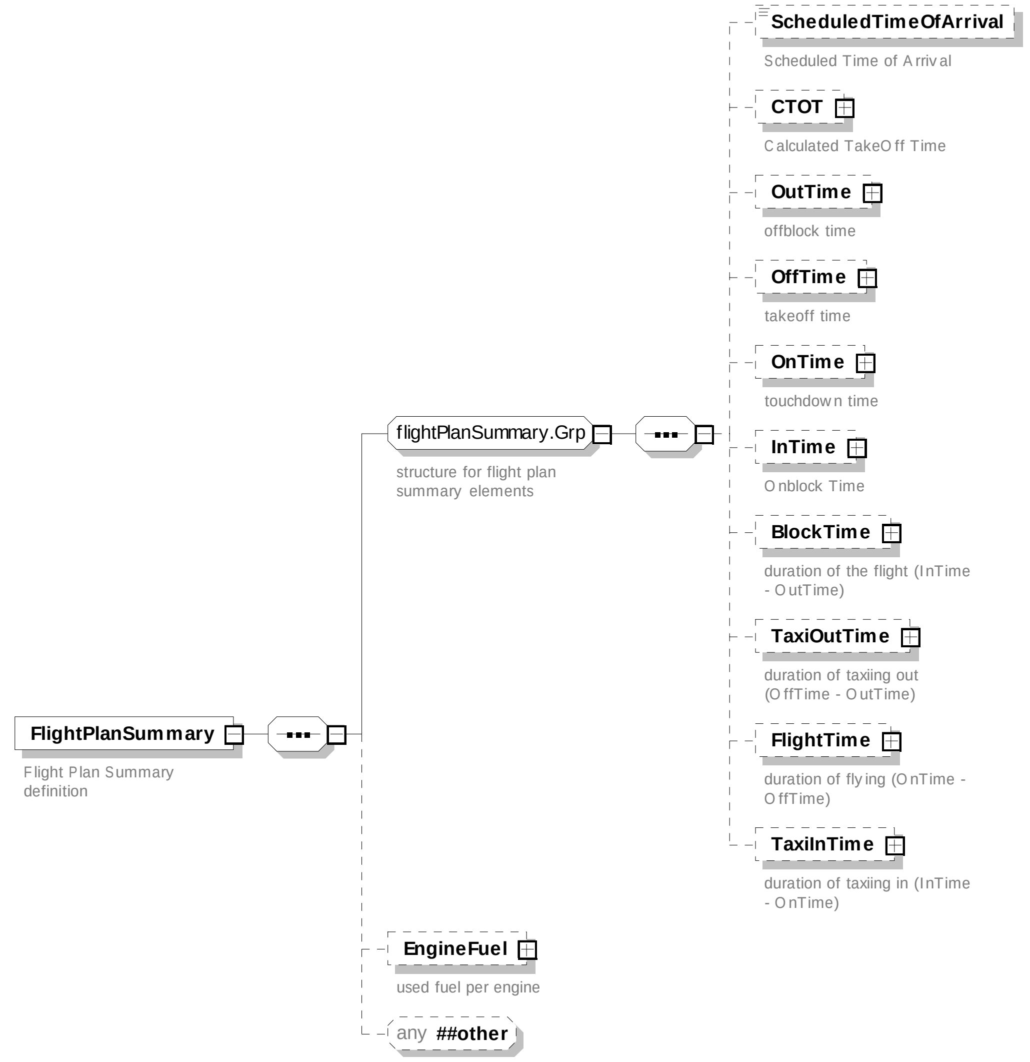
diagram	
type	DirectionType
properties	isRef 0 minOcc 0 maxOcc 2 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Inbound track to current waypoint

Other values can be calculated based on the values that are already described above

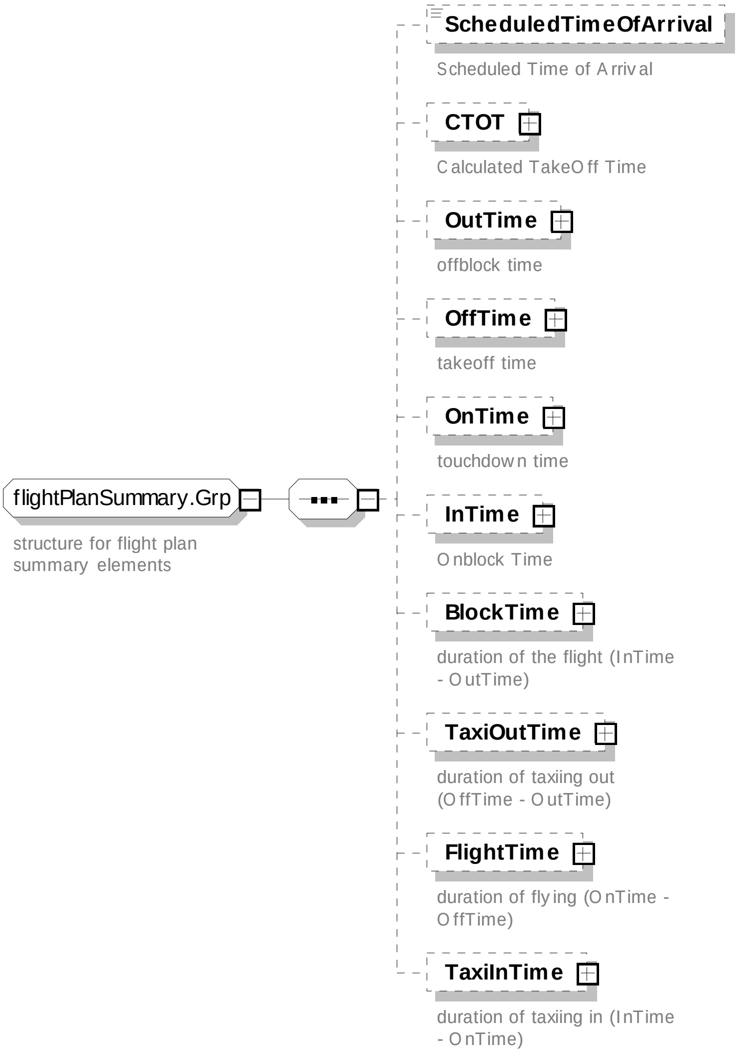
Value	Calculation
Wind Component	Average Wind Component for the segment from previous to current waypoint can be computed by the application as follows: $WindComponent = GroundSpeed - TrueAirSpeed$

FlightPlanSummary gathers global parameters of the flight calculated before flight and updated during flight

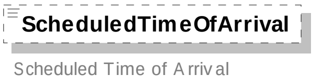
element FlightPlanSummary

diagram	
properties	**content** **complex** **nillable** **false**
children	**ScheduledTimeOfArrival CTOT OutTime OffTime OnTime InTime BlockTime TaxiOutTime FlightTime TaxiInTime EngineFuel**
used by	**group** **flightPlanCore.Grp**
annotation	**documentation** **Flight Plan Summary definition**

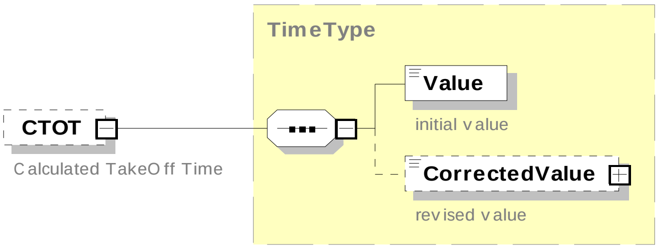
group flightPlanSummary.Grp

diagram	
children	[ScheduledTimeOfArrival]() [CTOT]() [OutTime]() [OffTime]() [OnTime]() [InTime]() [BlockTime]() [TaxiOutTime]() [FlightTime]() [TaxiInTime]()
used by	**element** [FlightPlanSummary]()
annotation	**documentation** **structure for flight plan summary elements**

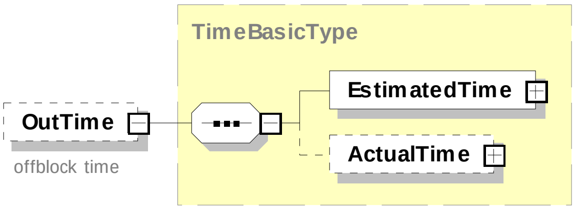
element flightPlanSummary.Grp/ScheduledTimeOfArrival

diagram	
type	**xs:dateTime**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
annotation	**documentation** **Scheduled Time of Arrival**

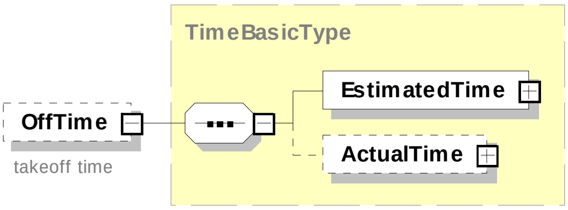
element flightPlanSummary.Grp/CTOT

diagram	
type	TimeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Calculated Takeoff Time. CTOT is typically issued by ATC and specifies the time at which the aircraft is expected to report ready for takeoff at the departure runway.

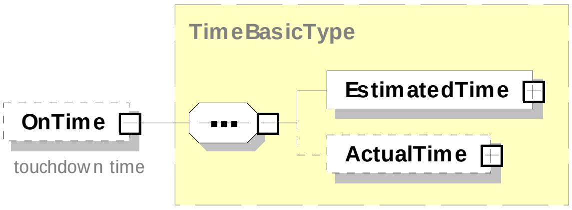
element flightPlanSummary.Grp/OutTime

diagram	
type	TimeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation offblock time

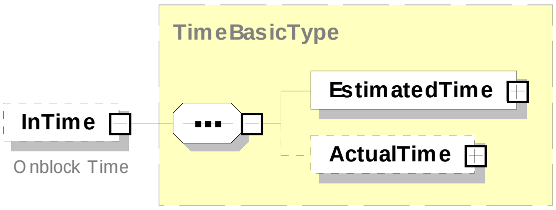
element flightPlanSummary.Grp/OffTime

diagram	
type	TimeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation takeoff time

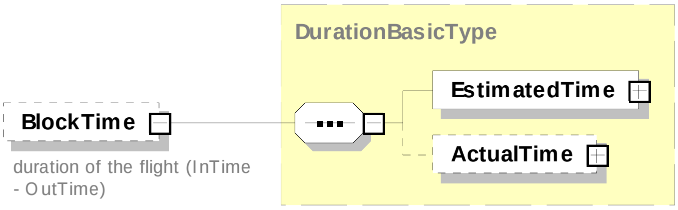
element flightPlanSummary.Grp/OnTime

diagram	
type	TimeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation touchdown time

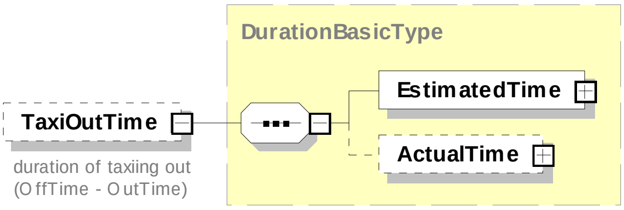
element flightPlanSummary.Grp/InTime

diagram	
type	TimeBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation Onblock Time

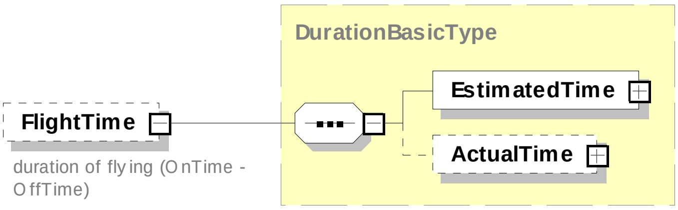
element flightPlanSummary.Grp/BlockTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation duration of the flight (InTime - OutTime)

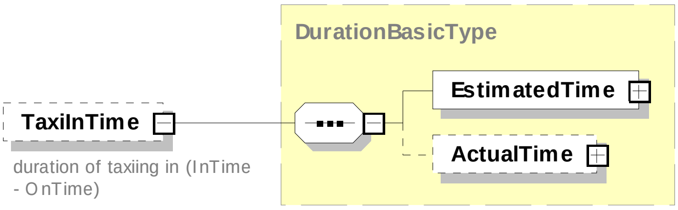
element flightPlanSummary.Grp/TaxiOutTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation duration of taxiing out (OffTime - OutTime)

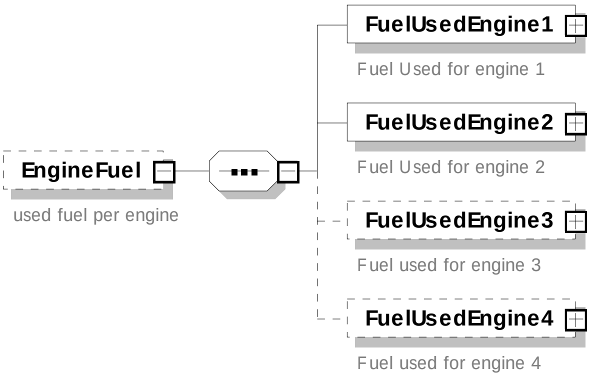
element flightPlanSummary.Grp/FlightTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation duration of flying (OnTime - OffTime)

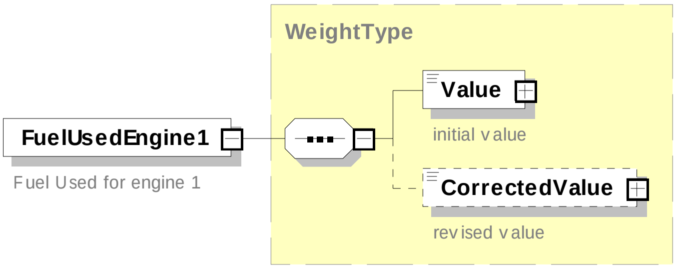
element flightPlanSummary.Grp/TaxiInTime

diagram	
type	DurationBasicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	EstimatedTime ActualTime
annotation	documentation duration of taxiing in (InTime - OnTime)

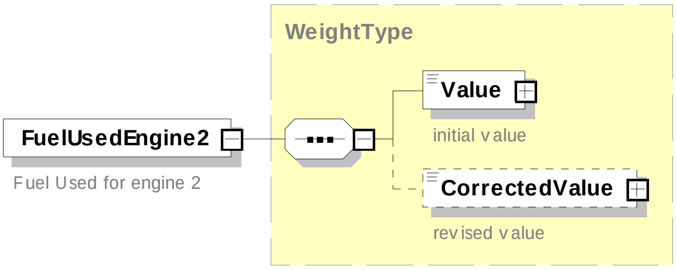
element FlightPlanSummary/EngineFuel

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex
children	FuelUsedEngine1 FuelUsedEngine2 FuelUsedEngine3 FuelUsedEngine4
annotation	documentation used fuel per engine

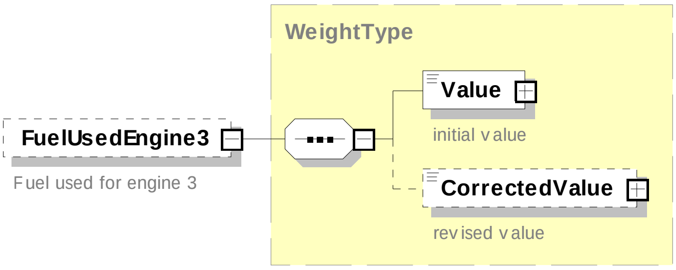
element FlightPlanSummary/EngineFuel/FuelUsedEngine1

diagram	
type	WeightType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Fuel Used for engine 1

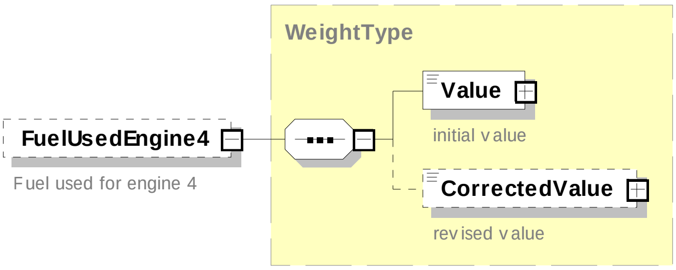
element FlightPlanSummary/EngineFuel/FuelUsedEngine2

diagram	
type	WeightType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Fuel Used for engine 2

element FlightPlanSummary/EngineFuel/FuelUsedEngine3

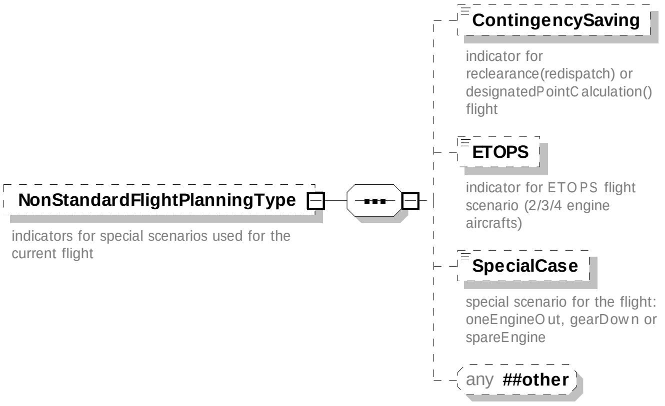
diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Fuel used for engine 3

element FlightPlanSummary/EngineFuel/FuelUsedEngine4

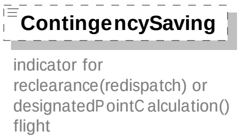
diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation Fuel used for engine 4

NonStandardFlightPlanningType is used to identify the used scenario for the current flight plan. If the element is not used, means that this is a "normal" flight plan. A combination of several Non-standard flight planning types is also possible.

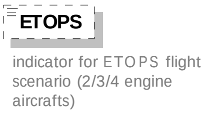
element flightPlanCore.Grp/NonStandardFlightPlanningType

diagram	
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **mixed false** **nillable false**
children	**ContingencySaving ETOPS SpecialCase**
annotation	**documentation** **indicators for special scenarios used for the current flight**

element flightPlanCore.Grp/NonStandardFlightPlanningType/ContingencySaving

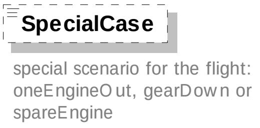
diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**enumeration reclearance** **enumeration designatedPointCalculation**
annotation	**documentation** **indicator for reclearance (redispatch) or designatedPointCalculation (the decision point for the Reclearance/Redispatch flight plan was been selected automatically or was predefined by the airline) flight**

element flightPlanCore.Grp/NonStandardFlightPlanningType/ETOPS

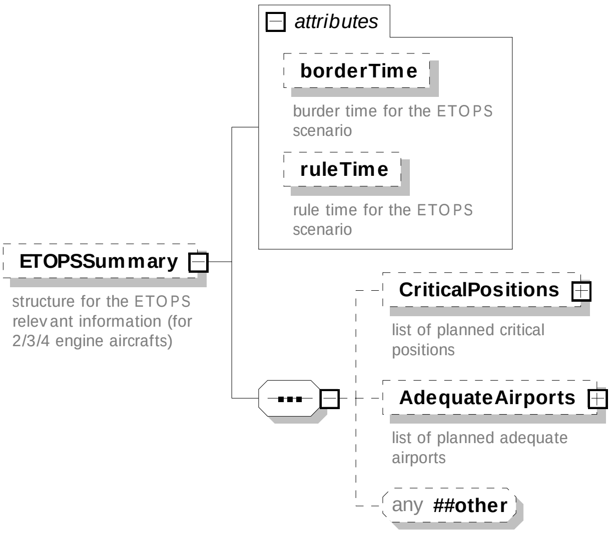
diagram	
type	**xs:boolean**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**

annotation	documentation indicator for ETOPS flight scenario (2/3/4 engine aircrafts)

element flightPlanCore.Grp/NonStandardFlightPlanningType/SpecialCase

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	enumeration oneEngineOut enumeration gearDown enumeration spareEngine
annotation	documentation special scenario for the flight: oneEngineOut, gearDown or spareEngine

element flightPlanCore.Grp/ETOPSSummary

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>children</td><td>CriticalPositions AdequateAirports</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>borderTime</td><td>xs:duration</td><td>optional</td><td></td><td></td><td>documentation
border time for the ETOPS scenario</td></tr>
<tr><td>ruleTime</td><td>xs:duration</td><td>optional</td><td></td><td></td><td>documentation
rule time for the ETOPS scenario</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
structure for the ETOPS relevant information (for 2/3/4 engine aircrafts)</td></tr>
</table>

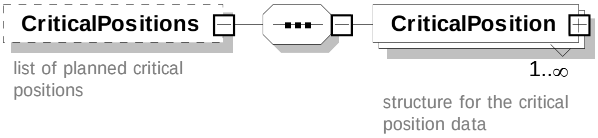
attribute flightPlanCore.Grp/ETOPSSummary/@borderTime

type	**xs:duration**
properties	**isRef 0** **use optional**
annotation	**documentation** **border time for the ETOPS scenario. Applicable flight time radius (based on standard still air conditions) around ETOPS adequate airports. An airport may be used as adequate airport for a specific routing position, if it can be reached from this position within the time interval defined here.**

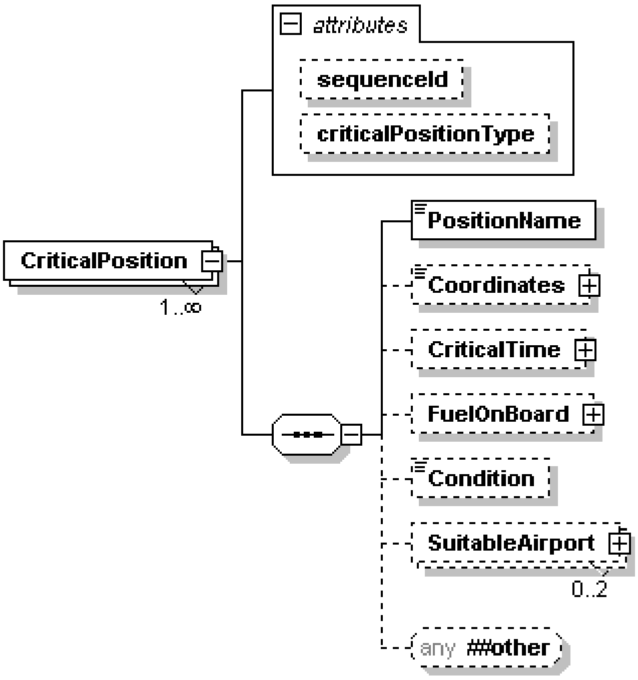
attribute flightPlanCore.Grp/ETOPSSummary/@ruleTime

type	**xs:duration**
properties	**isRef 0** **use optional**
annotation	**documentation** **rule time for the ETOPS scenario. Applicable flight time radius (based on standard still air conditions) around ETOPS suitable airports. An airport may be used as suitable airport for a specific routing position, if it can be reached from this position within the time interval defined here.**

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions

diagram	
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **nillable false**
children	**CriticalPosition**
annotation	**documentation** **list of planned critical positions**

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition

diagram	

<table>
<tr><td>properties</td><td>isRef 0
minOcc 1
maxOcc unbounded
content complex
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>sequenceId</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation
sequence number of the Critical Position</td></tr>
<tr><td>criticalPositionType</td><td>xs:string</td><td></td><td></td><td></td><td>documentation
Type of the critical position. Recommended values are For ETOPS Area Entry position - ENTRY, for ETOPS Area Exit position - EXIT, for Equal Time Position - ETP, for Equal Fuel Position - EFP</td></tr>
</table></td></tr>
<tr><td>children</td><td>PositionName Coordinates CriticalTime FuelOnBoard Condition SuitableAirport</td></tr>
<tr><td>annotation</td><td>documentation
structure for the critical position data</td></tr>
</table>

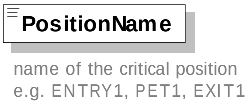
attribute flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/@sequenceId

type	xs:nonNegativeInteger
properties	isRef 0
annotation	documentation sequence number of the Critical Position

attribute flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/@criticalPositionType

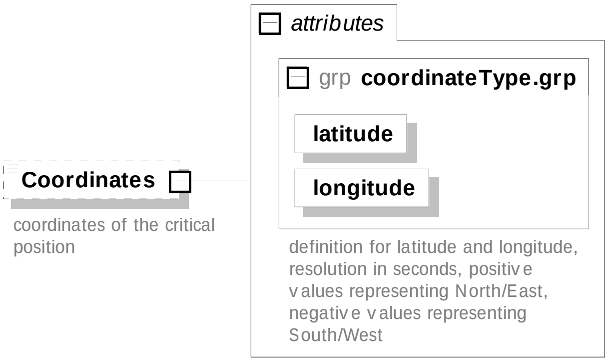
type	xs:string
properties	isRef 0
annotation	documentation Type of the critical position. Recommended values are For ETOPS Area Entry position - ENTRY, for ETOPS Area Exit position - EXIT, for Equal Time Position - ETP, for Equal Fuel Position - EFP

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/PositionName

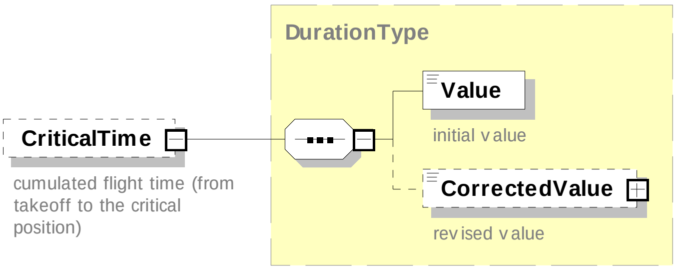
diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation name of the critical position The definition of this element is open. Nonetheless it is recommended to use the following labels to ensure a proper interpretation from all applications: ENTRY1, ETP1, ETP2…, EFP1, EFP2, … EXIT1…ENTRY2, EXIT2

5.0 COMMON ELEMENTS

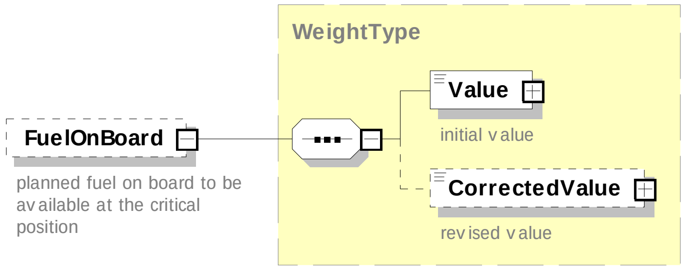
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/Coordinates

diagram	
type	extension of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name / Type / Use / Default / Fixed / annotation latitude / derived by: xs:float / required longitude / derived by: xs:float / required
annotation	documentation coordinates of the critical position

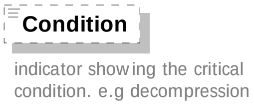
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/CriticalTime

diagram	
type	DurationType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation cumulated flight time (from takeoff to the critical position)

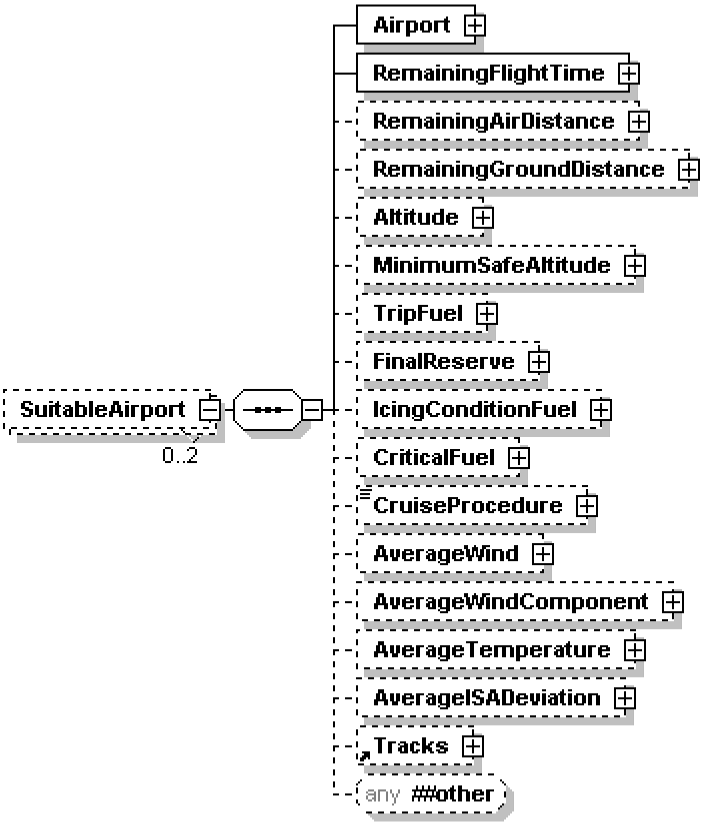
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/FuelOnBoard

diagram	
type	WeightType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **mixed** true **nillable** false
children	Value CorrectedValue
annotation	documentation planned fuel on board to be available at the critical position

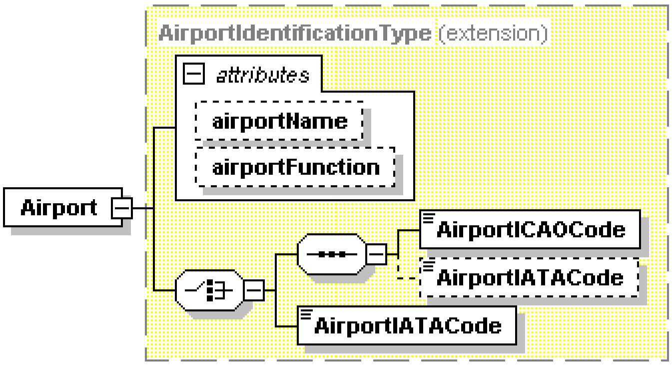
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/Condition

diagram	
type	FlightConditionsType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple **nillable** false
facets	**enumeration** decompression with one engine out **enumeration** decompression **enumeration** one engine out **enumeration** two engines out
annotation	documentation indicator showing the critical condition. e.g. decompression

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport

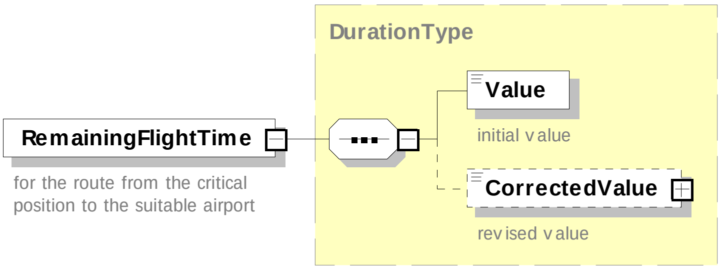
diagram	
properties	isRef 0 minOcc 0 maxOcc 2 content complex nillable false
children	Airport RemainingFlightTime RemainingAirDistance RemainingGroundDistance Altitude MinimumSafeAltitude TripFuel FinalReserve IcingConditionFuel CriticalFuel CruiseProcedure AverageWind AverageWindComponent AverageTemperature AverageISADeviation Tracks
annotation	documentation up to two suitable airports per critical position

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/Airport

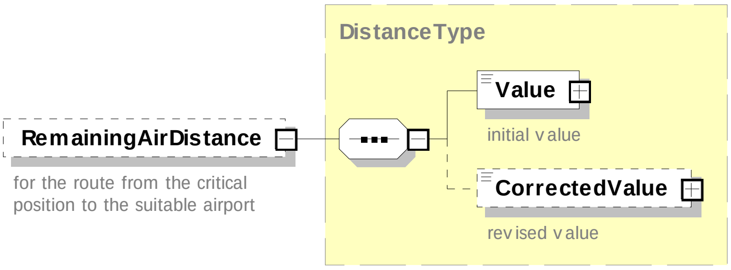
diagram	
type	extension of AirportIdentificationType
properties	isRef 0 content complex mixed false nillable false
children	AirportICAOCode AirportIATACode AirportIATACode
attributes	Name Type Use Default Fixed annotation

	airportName derived by: xs:string documentation airport name e.g. WASHINGTON DULLES INTL airportFunction derived by: xs:string documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport
annotation	documentation suitable airport identification

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingFlightTime

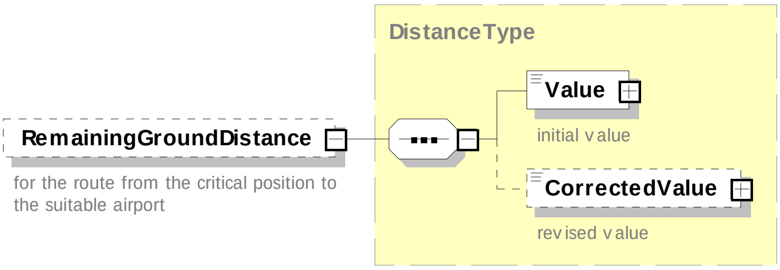
diagram	
type	DurationType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation for the route from the critical position to the suitable airport

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingAirDistance

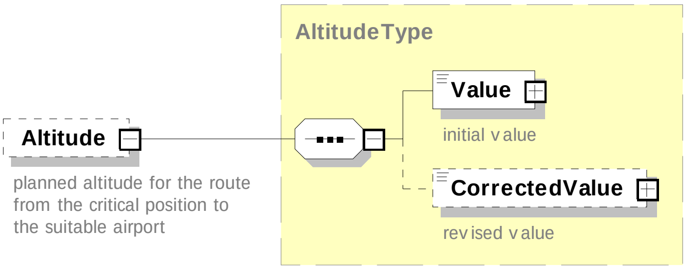
diagram	
type	DistanceType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation for the route from the critical position to the suitable airport

5.0 COMMON ELEMENTS

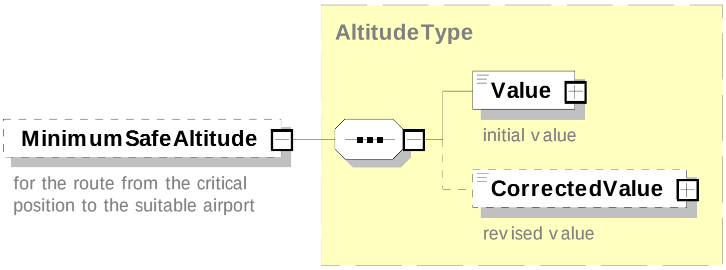
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/RemainingGroundDistance

diagram	
type	**DistanceType**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **mixed** true **nillable** false
children	**Value CorrectedValue**
annotation	**documentation** **for the route from the critical position to the suitable airport**

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/Altitude

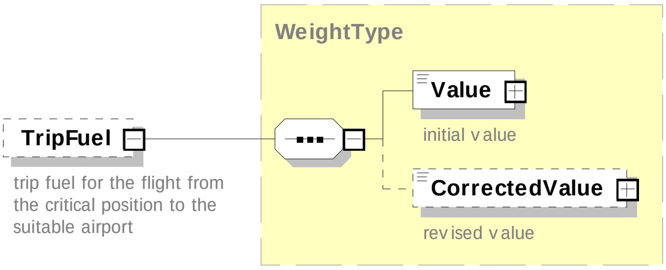
diagram	
type	**AltitudeType**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **mixed** true **nillable** false
children	**Value CorrectedValue**
annotation	**documentation** **planned altitude for the route from the critical position to the suitable airport**

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/MinimumSafeAltitude

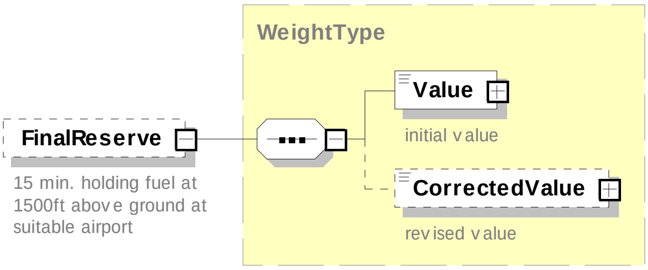
diagram	
type	**AltitudeType**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1

	content complex **mixed** true **nillable** false
children	Value CorrectedValue
annotation	**documentation** for the route from the critical position to the suitable airport

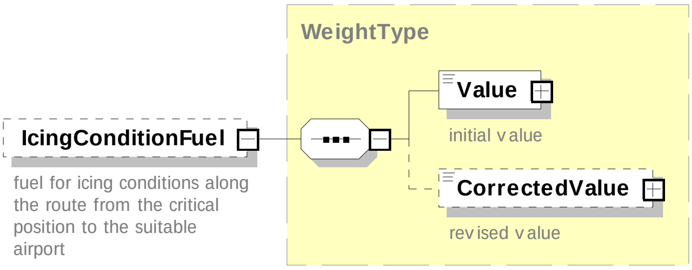
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/TripFuel

diagram	
type	WeightType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **mixed** true **nillable** false
children	Value CorrectedValue
annotation	**documentation** trip fuel for the flight from the critical position to the suitable airport

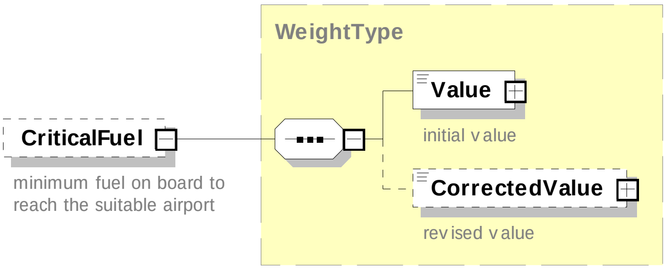
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/FinalReserve

diagram	
type	WeightType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **mixed** true **nillable** false
children	Value CorrectedValue
annotation	**documentation** 15 min. holding fuel at 1500ft above ground at suitable airport

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/IcingConditionFuel

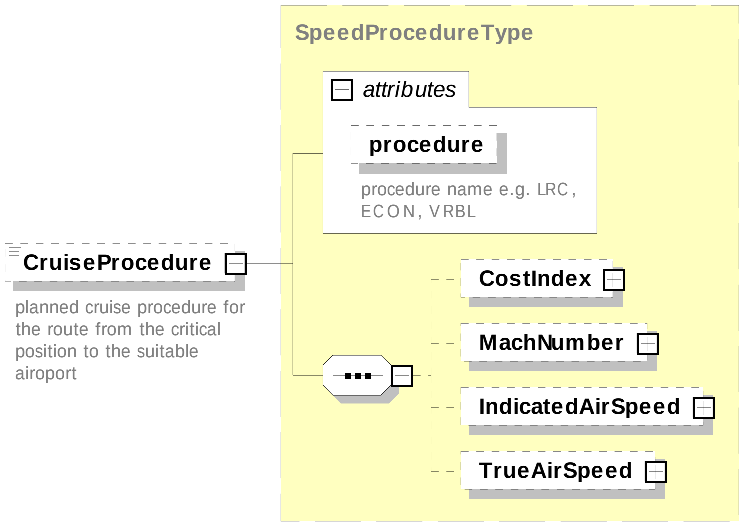
diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation fuel for icing conditions along the route from the critical position to the suitable airport

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/CriticalFuel

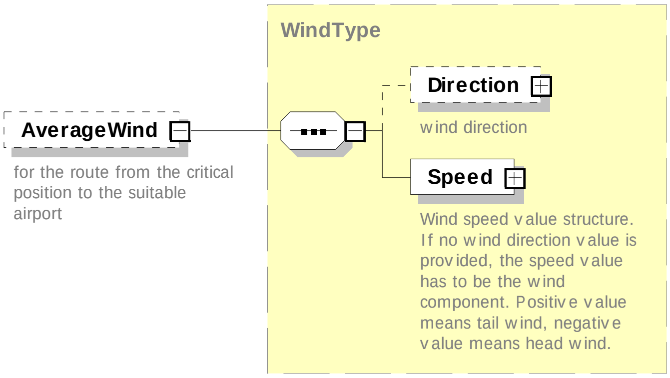
diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation minimum fuel on board to reach the suitable airport

The following element CruiseProcedure shows the planned procedure for the segment after the descent to safe flightlevel (e.g. LRC, OneEngineInoperative TAS, etc.)

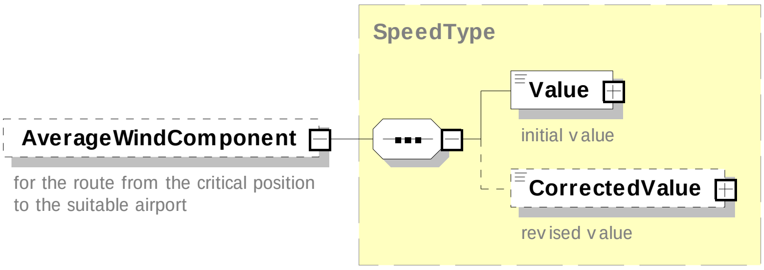
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/CruiseProcedure

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>SpeedProcedureType</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>CostIndex MachNumber IndicatedAirSpeed TrueAirSpeed</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>procedure</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
procedure name e.g. LRC, ECON, VRBL</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
planned cruise procedure for the route from the critical position to the suitable airport</td></tr>
</table>

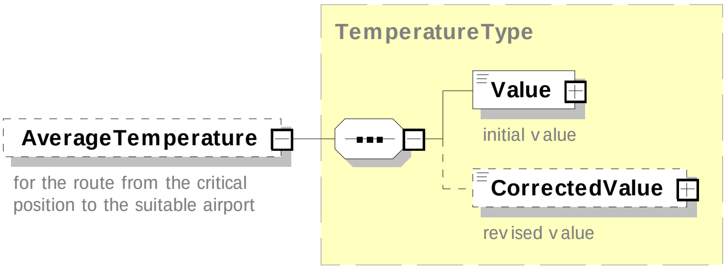
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageWind

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>WindType</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>Direction Speed</td></tr>
<tr><td>annotation</td><td>documentation
for the route from the critical position to the suitable airport</td></tr>
</table>

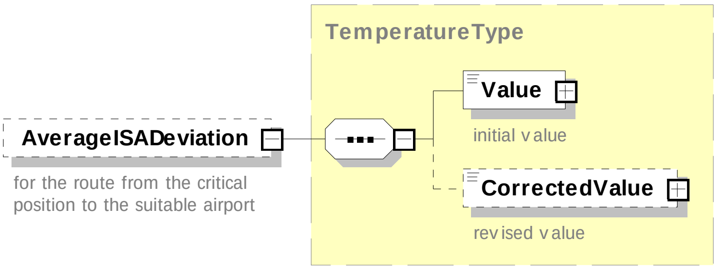
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageWindComponent

diagram	
type	SpeedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation for the route from the critical position to the suitable airport

element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageTemperature

diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation for the route from the critical position to the suitable airport

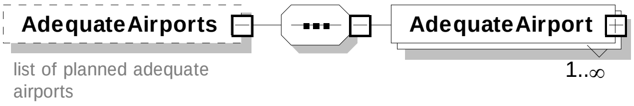
element flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/AverageISADeviation

diagram	
type	TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation for the route from the critical position to the suitable airport

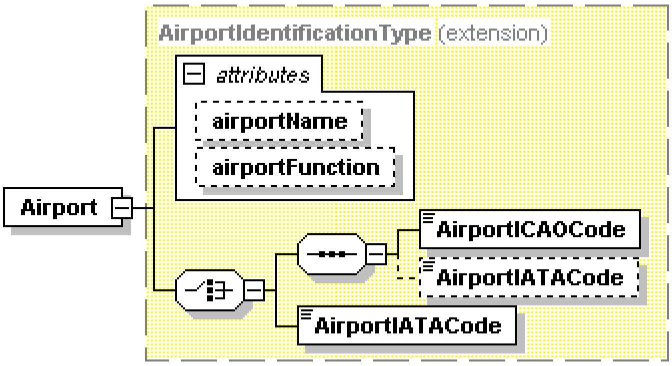
simpleType FlightConditionsType

type	restriction of xs:string	
used by	element	flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/Condition
facets	enumeration	decompression with one engine out
	enumeration	decompression
	enumeration	one engine out
	enumeration	two engines out
annotation	documentation critical conditions for ETOPS operation	

element flightPlanCore.Grp/ETOPSSummary/AdequateAirports

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AdequateAirport
annotation	documentation list of planned adequate airports

element flightPlanCore.Grp/ETOPSSummary/AdequateAirports/AdequateAirport

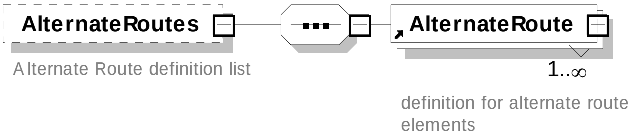
diagram	
type	AirportIdentificationType
properties	isRef 0 minOcc 1 maxOcc unbounded content complex nillable false
children	AirportICAOCode AirportIATACode AirportIATACode
attributes	Name / Type / Use / Default / Fixed / annotation airportName / derived by: xs:string / / / / documentation airport name e.g. WASHINGTON DULLES INTL airportFunction / derived by: xs:string / / / / documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport

Other values can be calculated based on the values that are already described above

Value	Calculation
ICE Coefficient	Ratio of required Icing Fuel in relation to the TripFuel without Icing Fuel (for the routing between the Critical Position and the Suitable Airport) can be calculated by an application as follows: $ICECoefficient = \frac{IcingConditionFuel}{TripFuel - IcingConditionFuel}$

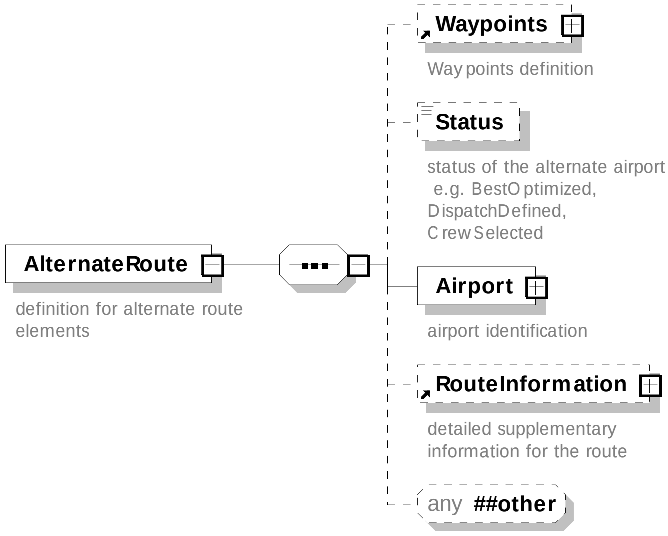
The structure AlternateRoutes contains a list with all planned alternate airports.

element flightPlanCore.Grp/AlternateRoutes

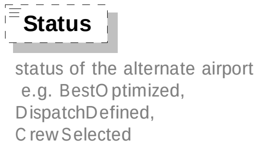
diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AlternateRoute
annotation	documentation Alternate Route definition list

5.0 COMMON ELEMENTS

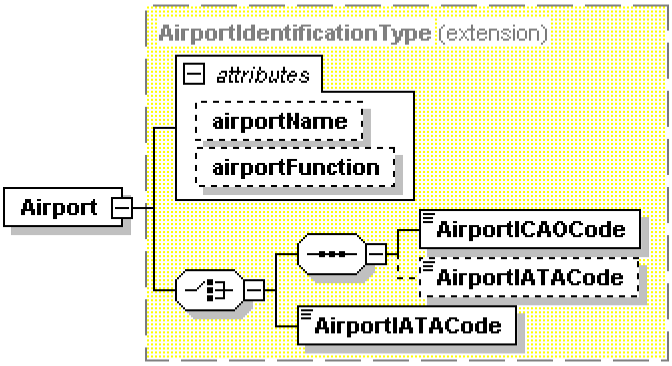
element AlternateRoute

diagram	
properties	content complex nillable false
children	Waypoints Status Airport RouteInformation
used by	elements flightPlanCore.Grp/AlternateRoutes flightPlanCore.Grp/ContingencySavingHeader
annotation	documentation definition for alternate route elements

element AlternateRoute/Status

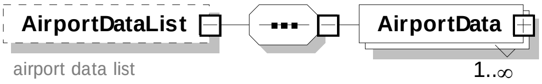
diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation The content of this element is open. Nonetheless it is recommended to use the following alternate airport's status to ensure a proper interpretation from all applications. BestOptimized, DispatcherDefined, CrewSelected, Info. Where "BestOptimized" is used for the alternate airport proposed by the flight planning system, which requires the minimum fuel, "Info" are any additional alternate airports listed, DispatcherDefined if the sequence of the alternate airports is set by the dispatcher and "PilotSelected" corresponds to the alternate used for the flight.

element AlternateRoute/Airport

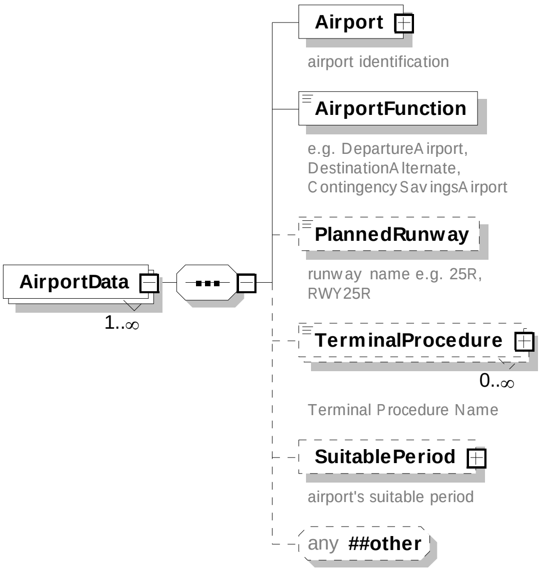
<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>AirportIdentificationType</td></tr>
<tr><td>properties</td><td>isRef 0
content complex
nillable false</td></tr>
<tr><td>children</td><td>AirportICAOCode AirportIATACode AirportIATACode</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>airportName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airport name e.g. WASHINGTON DULLES INTL</td></tr>
<tr><td>airportFunction</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
airport identification</td></tr>
</table>

The structure AirportDataList contains a list of Airport data for all airports used in the flightplan.

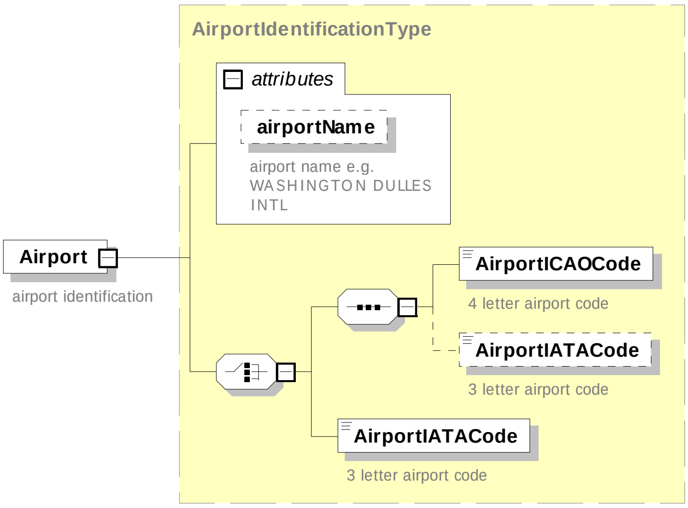
element flightPlanCore.Grp/AirportDataList

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AirportData
annotation	documentation airport data list

element flightPlanCore.Grp/AirportDataList/AirportData

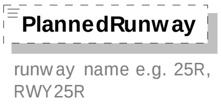
diagram	
properties	isRef 0 minOcc 1 maxOcc unbounded content complex mixed false nillable false
children	Airport PlannedRunway TerminalProcedure SuitablePeriod

element flightPlanCore.Grp/AirportDataList/AirportData/Airport

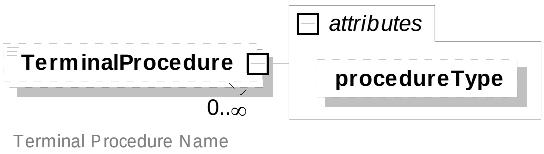
diagram	
type	AirportIdentificationType
properties	isRef 0 content complex nillable false
children	AirportICAOCode AirportIATACode AirportIATACode
attributes	Name / Type / Use / Default / Fixed / annotation airportName / derived by: xs:string / / / / documentation airport name e.g. WASHINGTON DULLES INTL airportFunction / derived by: xs:string / / / / documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport
annotation	documentation airport identification

5.0 COMMON ELEMENTS

element flightPlanCore.Grp/AirportDataList/AirportData/PlannedRunway

diagram		
type	**restriction of xs:string**	
properties	**isRef**	**0**
	minOcc	**0**
	maxOcc	**1**
	content	**simple**
	nillable	**false**
facets	**minLength**	**1**
	whiteSpace	**preserve**
annotation	**documentation** **runway name e.g. 25R, RWY25R**	

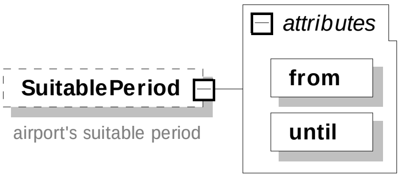
element flightPlanCore.Grp/AirportDataList/AirportData/TerminalProcedure

diagram						
type	**extension of xs:string**					
properties	**isRef**	**0**				
	minOcc	**0**				
	maxOcc	**unbounded**				
	content	**complex**				
	mixed	**true**				
	nillable	**false**				
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	procedureType	**derived by: xs:string**				
annotation	**documentation** **Terminal Procedure Name**					

attribute flightPlanCore.Grp/AirportDataList/AirportData/TerminalProcedure/@procedureType

type	**restriction of xs:string**	
properties	**isRef**	**0**
facets	**minLength**	**1**
	whiteSpace	**preserve**

element flightPlanCore.Grp/AirportDataList/AirportData/SuitablePeriod

diagram						
properties	**isRef**	**0**				
	minOcc	**0**				
	maxOcc	**1**				
	content	**complex**				
	nillable	**false**				
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	from	**xs:dateTime**	**required**			
	until	**xs:dateTime**	**required**			
annotation	**documentation** **airport's suitable period**					

attribute flightPlanCore.Grp/AirportDataList/AirportData/SuitablePeriod/@from

type	xs:dateTime
properties	isRef 0 use required

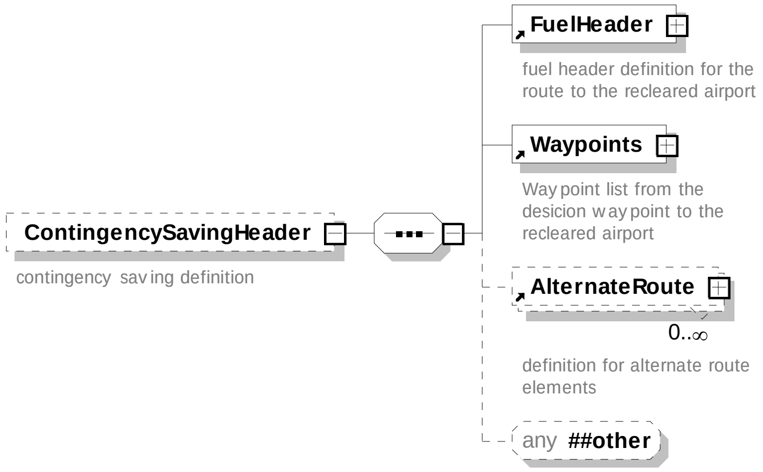
attribute flightPlanCore.Grp/AirportDataList/AirportData/SuitablePeriod/@until

type	xs:dateTime
properties	isRef 0 use required

The structure ContingencySavingHeader contains Fuel data related to the routing from DepartureAirport to ContingencySavingAirport (Reclearance/Redispatch airport), list of Waypoints (from decision waypoint to ContingencySavingAirport) and a list of ContingencySavingAlternateAirports but only if ContingencySaving scenario was used for the planning of the flight. The structure uses only the already defined structures: FuelHeader Waypoints AlternateRoute.

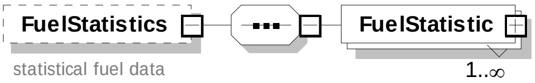
If the Fuel required for the routing to the ContingencySavingAirport is more than the fuel to ArrivalAirport, their difference has to be inserted in FlightPlan/FuelHeader/ContingencySavingsAdditionalFuel, and the FlightPlan/FuelHeader/TakeOffFuel and FlightPlan/FuelHeader/BlockFuel have to consider this ContingencySavingsAdditionalFuel as well.

element flightPlanCore.Grp/ContingencySavingHeader

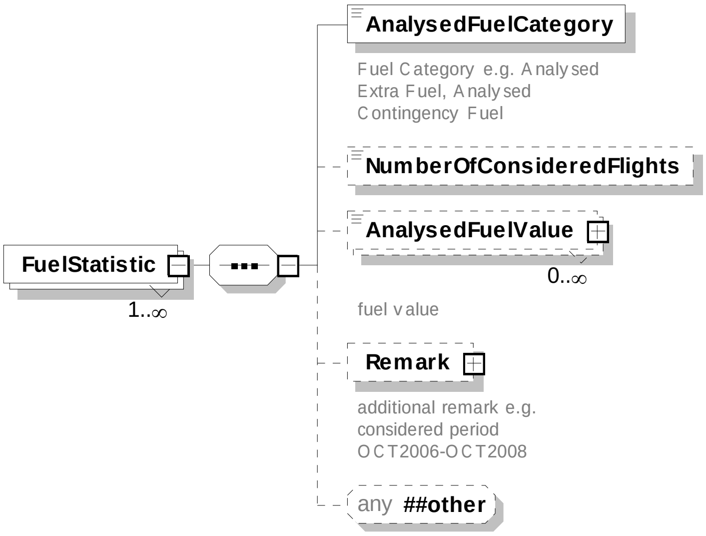
diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	FuelHeader Waypoints AlternateRoute
annotation	documentation contingency saving definition

The structure FuelStatistics contains a list of statistical information considered for this flight or just as additional information for the pilot.

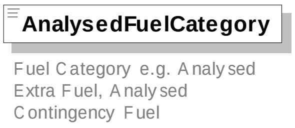
element flightPlanCore.Grp/FuelStatistics

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	FuelStatistic
annotation	documentation statistical fuel data

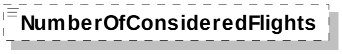
element flightPlanCore.Grp/FuelStatistics/FuelStatistic

diagram	
properties	isRef 0 minOcc 1 maxOcc unbounded content complex nillable false
children	AnalysedFuelCategory NumberOfConsideredFlights AnalysedFuelValue Remark

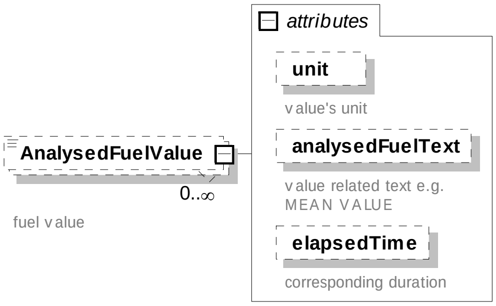
element flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelCategory

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation Fuel Category e.g. Analysed Extra Fuel, Analysed Contingency Fuel

element flightPlanCore.Grp/FuelStatistics/FuelStatistic/NumberOfConsideredFlights

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false

element flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelValue

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc unbounded
content complex
mixed true
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>unit</td><td>weightUnitType</td><td>optional</td><td>kg</td><td></td><td>documentation
value's unit</td></tr>
<tr><td>analysedFuelText</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
value related text e.g. MEAN VALUE</td></tr>
<tr><td>elapsedTime</td><td>xs:duration</td><td></td><td></td><td></td><td>documentation
corresponding duration</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
fuel value</td></tr>
</table>

attribute flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelValue/@unit

type	weightUnitType
properties	isRef 0 default kg use optional
facets	enumeration kg enumeration t enumeration lb
annotation	documentation value's unit

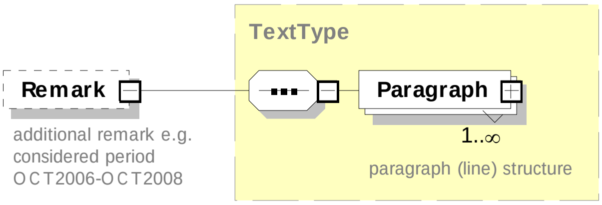
attribute flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelValue/@analysedFuelText

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation value related text e.g. MEAN VALUE

attribute flightPlanCore.Grp/FuelStatistics/FuelStatistic/AnalysedFuelValue/@elapsedTime

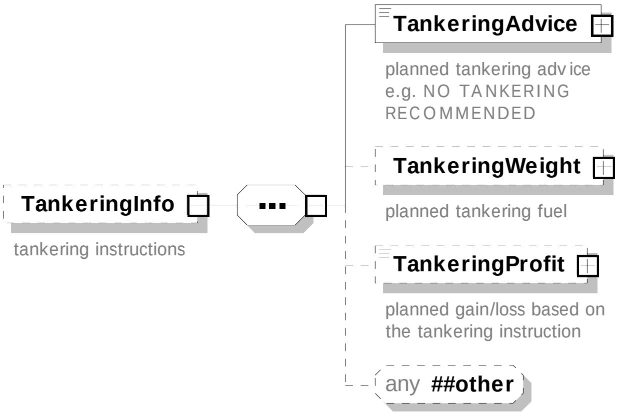
type	xs:duration
properties	isRef 0
annotation	documentation corresponding duration

element flightPlanCore.Grp/FuelStatistics/FuelStatistic/Remark

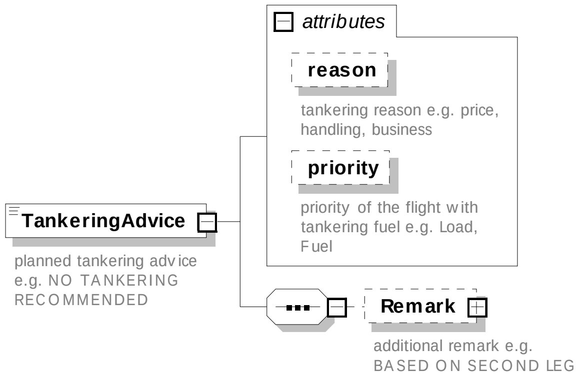
diagram	
type	TextType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Paragraph
annotation	documentation additional remark e.g. considered period OCT2006-OCT2008

The structure TankeringInfo contains data giving an advice to the pilot regarding additional fuel for tankering reasons.

element flightPlanCore.Grp/TankeringInfo

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	TankeringAdvice TankeringWeight TankeringProfit
annotation	documentation tankering instructions

element flightPlanCore.Grp/TankeringInfo/TankeringAdvice

diagram	
properties	isRef 0 content complex mixed true nillable false
children	Remark
attributes	Name Type Use Default Fixed annotation reason derived by: xs:string documentation tankering reason e.g. price, handling, business priority derived by: xs:string documentation priority of the flight with tankering fuel e.g. Load, Fuel
annotation	documentation planned tankering advice e.g. NO TANKERING RECOMMENDED

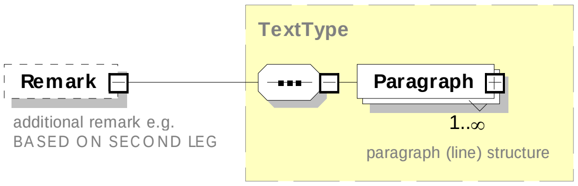
attribute flightPlanCore.Grp/TankeringInfo/TankeringAdvice/@reason

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation tankering reason e.g. price, handling, business

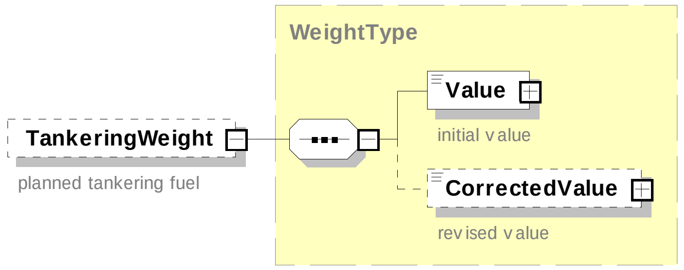
attribute flightPlanCore.Grp/TankeringInfo/TankeringAdvice/@priority

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation priority of the flight with tankering fuel e.g. Load, Fuel

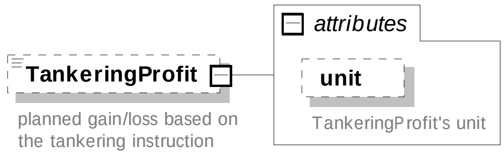
element flightPlanCore.Grp/TankeringInfo/TankeringAdvice/Remark

diagram	
type	TextType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Paragraph
annotation	documentation additional remark e.g. BASED ON SECOND LEG

element flightPlanCore.Grp/TankeringInfo/TankeringWeight

diagram	
type	WeightType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue
annotation	documentation planned tankering fuel

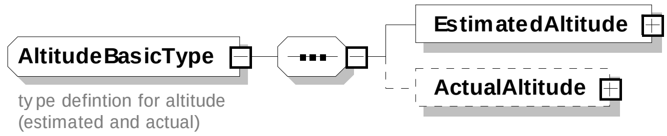
element flightPlanCore.Grp/TankeringInfo/TankeringProfit

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>type</td><td colspan="6">extension of xs:string</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
minOcc 0
maxOcc 1
content complex
mixed true
nillable false</td></tr>
<tr><td rowspan="2">attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>unit</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
TankeringProfit's unit</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
planned gain/loss based on the tankering instruction</td></tr>
</table>

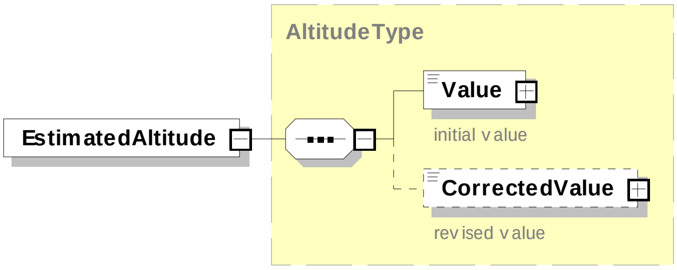
attribute flightPlanCore.Grp/TankeringInfo/TankeringProfit/@unit

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation TankeringProfit's unit

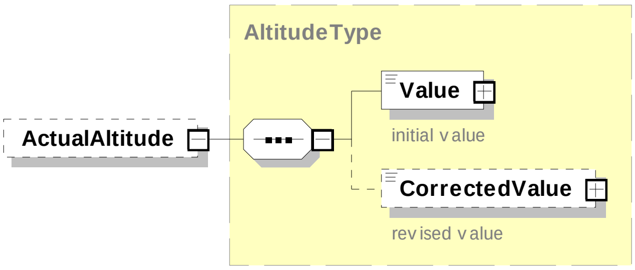
complexType AltitudeBasicType

diagram	
children	EstimatedAltitude ActualAltitude
used by	element waypoint.Grp/Altitude
annotation	documentation type definition for altitude (estimated and actual)

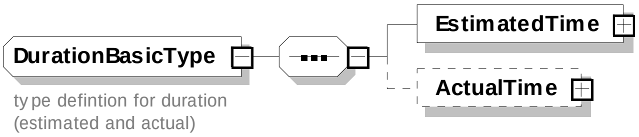
element AltitudeBasicType/EstimatedAltitude

diagram	
type	AltitudeType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

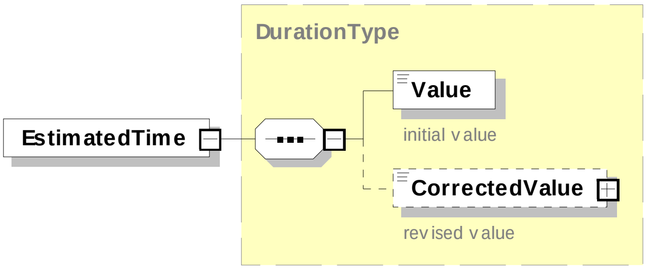
element AltitudeBasicType/ActualAltitude

diagram	
type	AltitudeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

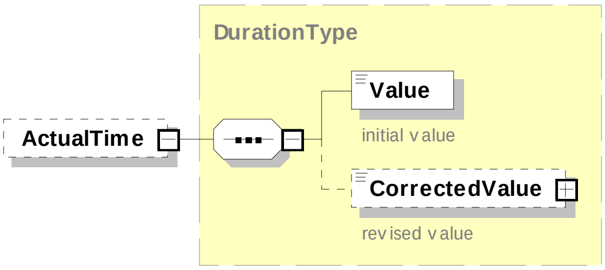
complexType DurationBasicType

diagram	
children	EstimatedTime ActualTime
used by	elements flightPlanSummary.Grp/BlockTime waypoint.Grp/CumulatedFlightTime flightPlanSummary.Grp/FlightTime waypoint.Grp/RemainingFlightTime flightPlanSummary.Grp/TaxiInTime flightPlanSummary.Grp/TaxiOutTime waypoint.Grp/TimeFromPreviousWaypoint
annotation	documentation type definition for duration (estimated and actual)

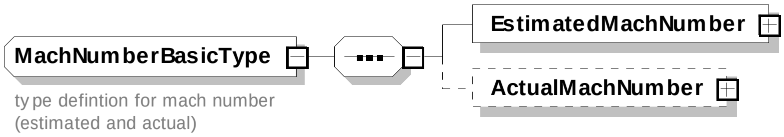
element DurationBasicType/EstimatedTime

diagram	
type	DurationType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

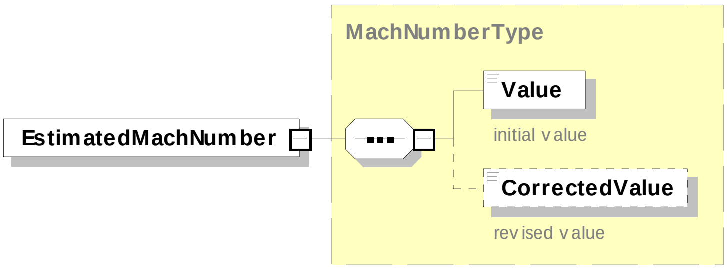
element DurationBasicType/ActualTime

diagram	
type	DurationType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

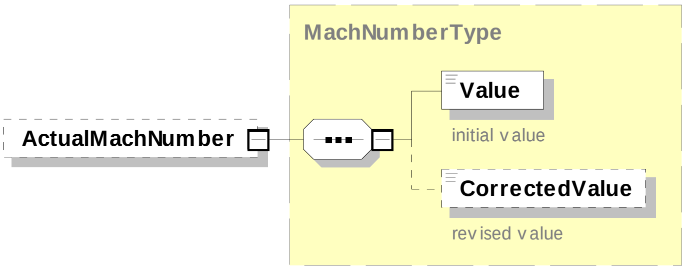
complexType MachNumberBasicType

diagram	
children	EstimatedMachNumber ActualMachNumber
used by	element waypoint.Grp/MachNumber
annotation	documentation type definition for mach number (estimated and actual)

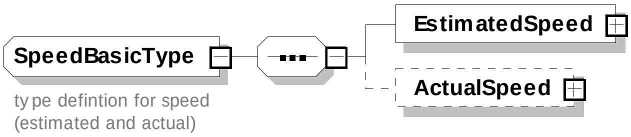
element MachNumberBasicType/EstimatedMachNumber

diagram	
type	MachNumberType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

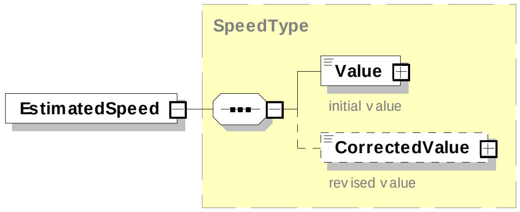
element MachNumberBasicType/ActualMachNumber

diagram	
type	MachNumberType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

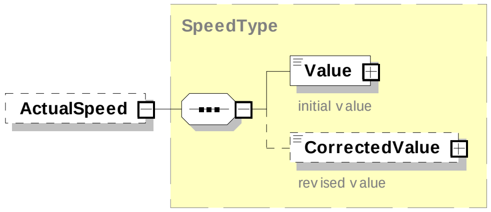
complexType SpeedBasicType

diagram	
children	EstimatedSpeed ActualSpeed
used by	elements waypoint.Grp/GroundSpeed waypoint.Grp/IndicatedAirSpeed waypoint.Grp/TrueAirSpeed
annotation	documentation type definition for speed (estimated and actual)

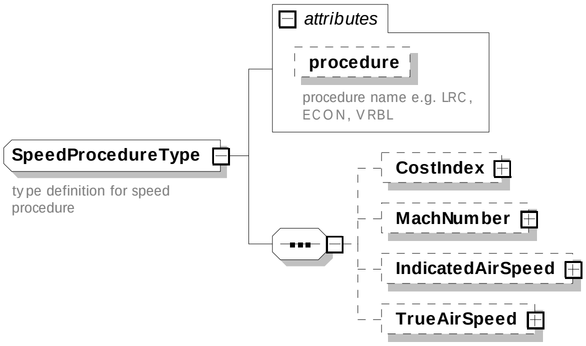
element SpeedBasicType/EstimatedSpeed

diagram	
type	SpeedType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

element SpeedBasicType/ActualSpeed

diagram	
type	SpeedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

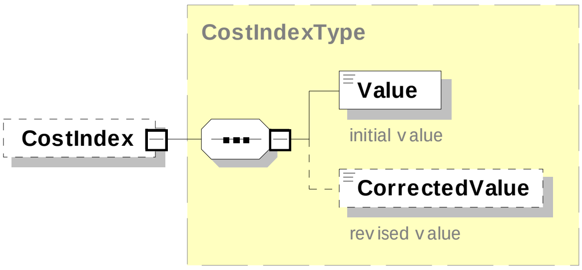
complexType SpeedProcedureType

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>mixed true</td></tr>
<tr><td>children</td><td>CostIndex MachNumber IndicatedAirSpeed TrueAirSpeed</td></tr>
<tr><td>used by</td><td>elements RouteInformation/ClimbProcedure RouteInformation/CruiseProcedure flightPlanCore.Grp/ETOPSSummary/CriticalPositions/CriticalPosition/SuitableAirport/CruiseProcedure RouteInformation/DescentProcedure</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>procedure</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
procedure name e.g. LRC, ECON, VRBL</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
type definition for speed procedure</td></tr>
</table>

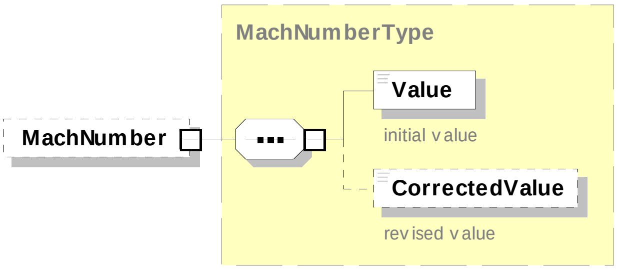
attribute SpeedProcedureType/@procedure

type	**restriction of xs:string**
properties	**isRef 0** **use optional**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **procedure name e.g. LRC, ECON, VRBL**

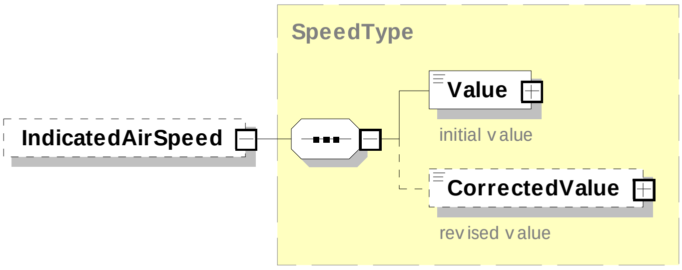
element SpeedProcedureType/CostIndex

diagram	
type	**CostIndexType**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **mixed true** **nillable false**
children	**Value CorrectedValue**

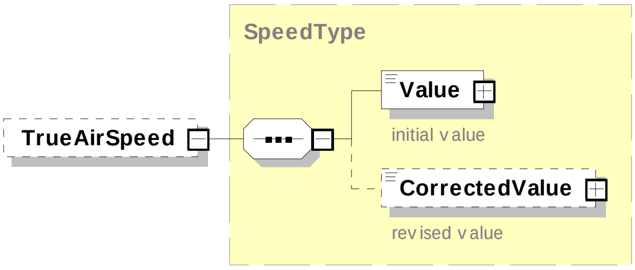
element SpeedProcedureType/MachNumber

diagram	
type	**MachNumberType**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **mixed true** **nillable false**
children	**Value CorrectedValue**

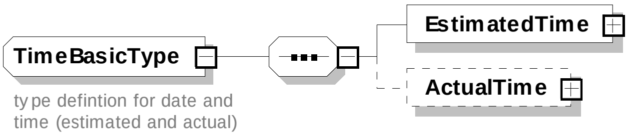
element SpeedProcedureType/IndicatedAirSpeed

diagram	
type	SpeedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

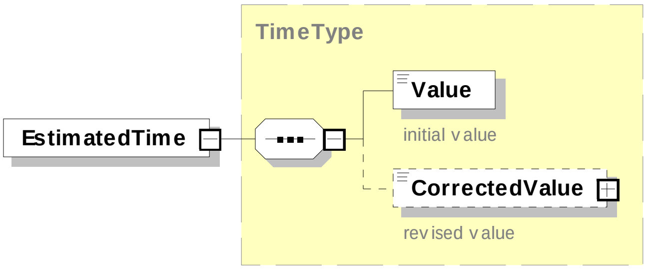
element SpeedProcedureType/TrueAirSpeed

diagram	
type	SpeedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

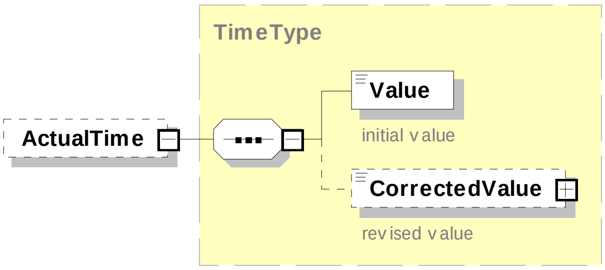
complexType TimeBasicType

diagram	
children	EstimatedTime ActualTime
used by	elements flightPlanSummary.Grp/InTime flightPlanSummary.Grp/OffTime flightPlanSummary.Grp/OnTime flightPlanSummary.Grp/OutTime waypoint.Grp/TimeOverWaypoint
annotation	documentation type definition for date and time (estimated and actual)

element TimeBasicType/EstimatedTime

diagram	
type	TimeType
properties	isRef 0 content complex mixed true nillable false
children	Value CorrectedValue

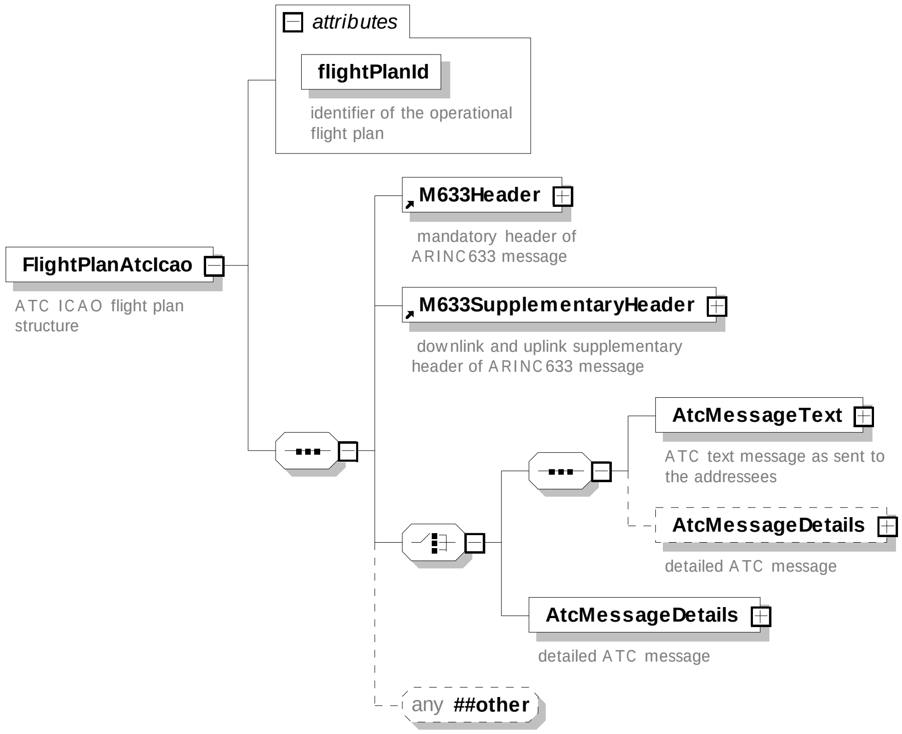
element TimeBasicType/ActualTime

diagram	
type	TimeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
children	Value CorrectedValue

5.5 ATC Flight Plan

See proposal

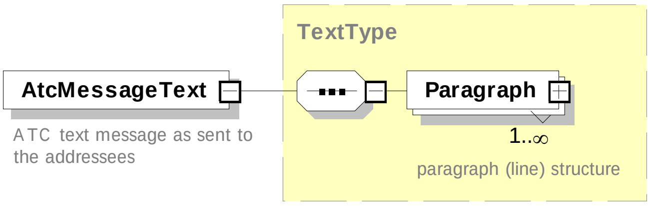
element FlightPlanAtcIcao

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex</td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader AtcMessageText AtcMessageDetails AtcMessageDetails</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>flightPlanId</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
identifier of the operational flight plan</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
ATC ICAO flight plan structure</td></tr>
</table>

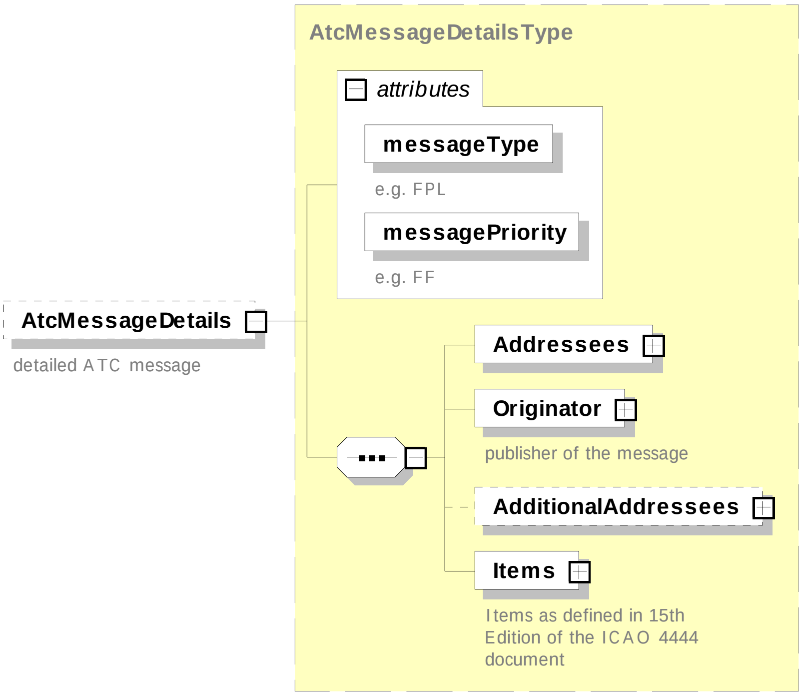
attribute FlightPlanAtcIcao/@flightPlanId

type	**restriction of xs:string**
properties	**isRef 0** **use required**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **identifier of the operational flight plan**

element FlightPlanAtcIcao/AtcMessageText

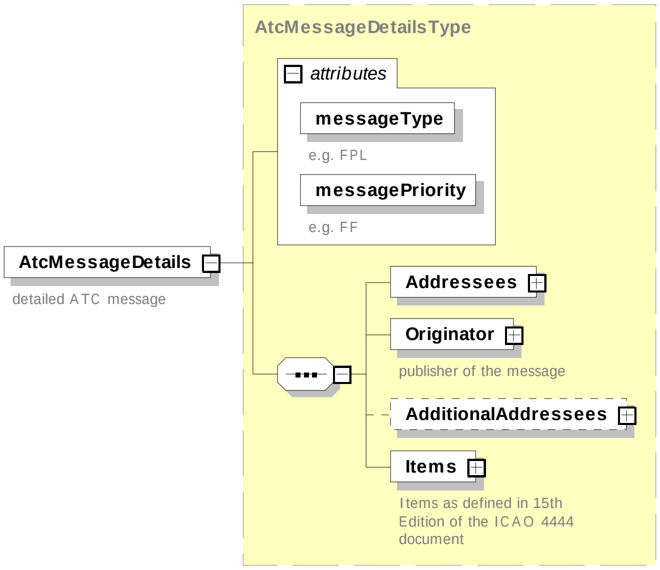
diagram	
type	TextType
properties	**isRef** 0 **content** complex
children	Paragraph
annotation	**documentation** **ATC text message as sent to the addressees**

element FlightPlanAtcIcao/AtcMessageDetails

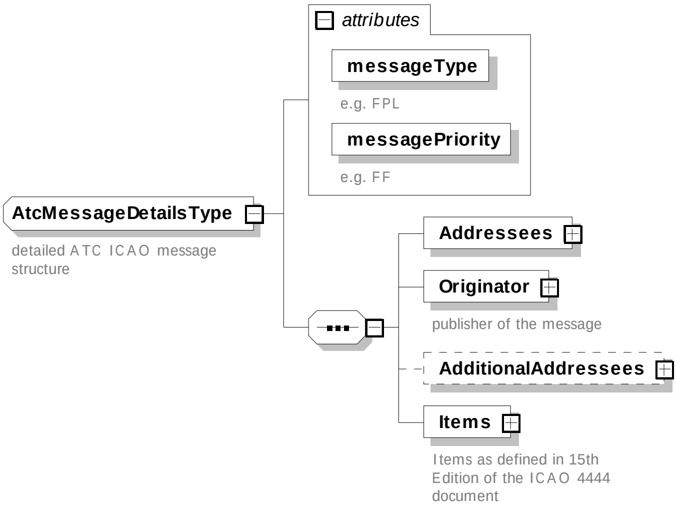
diagram	
type	AtcMessageDetailsType
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex
children	Addressees Originator AdditionalAddressees Items
attributes	see below
annotation	**documentation** **detailed ATC message**

Name	Type	Use	Default	Fixed	annotation
messageType	derived by: xs:string	required			documentation e.g. FPL
messagePriority	derived by: xs:string	required			documentation e.g. FF

element FlightPlanAtcIcao/AtcMessageDetails

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>AtcMessageDetailsType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>content</td><td>complex</td></tr></table></td></tr>
<tr><td>children</td><td>Addressees Originator AdditionalAddressees Items</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>messageType</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
e.g. FPL</td></tr>
<tr><td>messagePriority</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
e.g. FF</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
detailed ATC message</td></tr>
</table>

complexType AtcMessageDetailsType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>children</td><td>Addressees Originator AdditionalAddressees Items</td></tr>
<tr><td>used by</td><td>elements FlightPlanAtcIcao/AtcMessageDetails FlightPlanAtcIcao/AtcMessageDetails</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>messageType</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
e.g. FPL</td></tr>
<tr><td>messagePriority</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>Documentation
e.g. FF</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
detailed ATC ICAO message structure</td></tr>
</table>

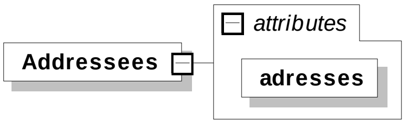
attribute AtcMessageDetailsType/@messageType

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation e.g. FPL

attribute AtcMessageDetailsType/@messagePriority

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation e.g. FF

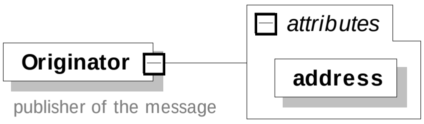
element AtcMessageDetailsType/Addressees

diagram						
properties	isRef 0 content complex					
attributes	Name	Type	Use	Default	Fixed	annotation
	addresses	derived by: xs:string	required			

attribute AtcMessageDetailsType/Addressees/@addresses

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

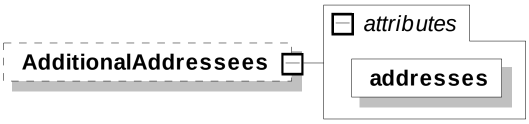
element AtcMessageDetailsType/Originator

diagram						
properties	isRef 0 content complex					
attributes	Name	Type	Use	Default	Fixed	annotation
	address	derived by: xs:string	required			
annotation	documentation publisher of the message					

attribute AtcMessageDetailsType/Originator/@address

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

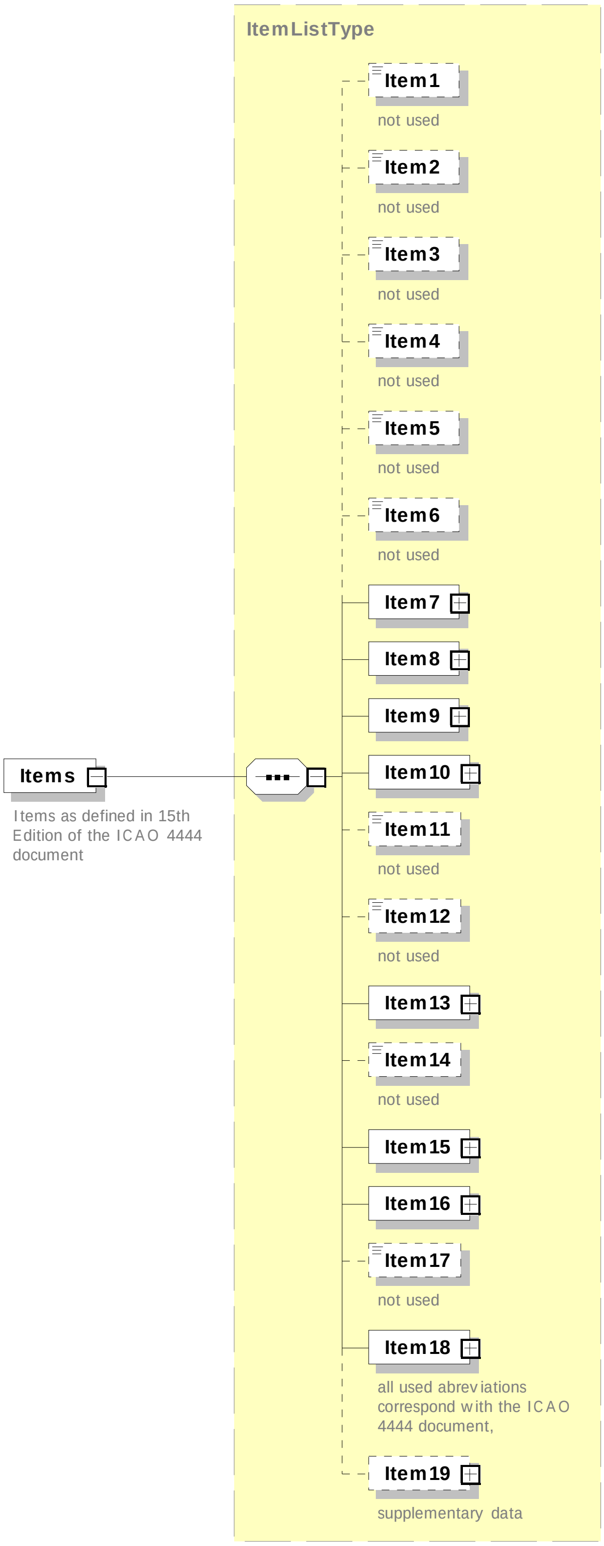
element AtcMessageDetailsType/AdditionalAddressees

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex
attributes	Name: addresses; Type: derived by: xs:string; Use: required; Default: ; Fixed: ; annotation:

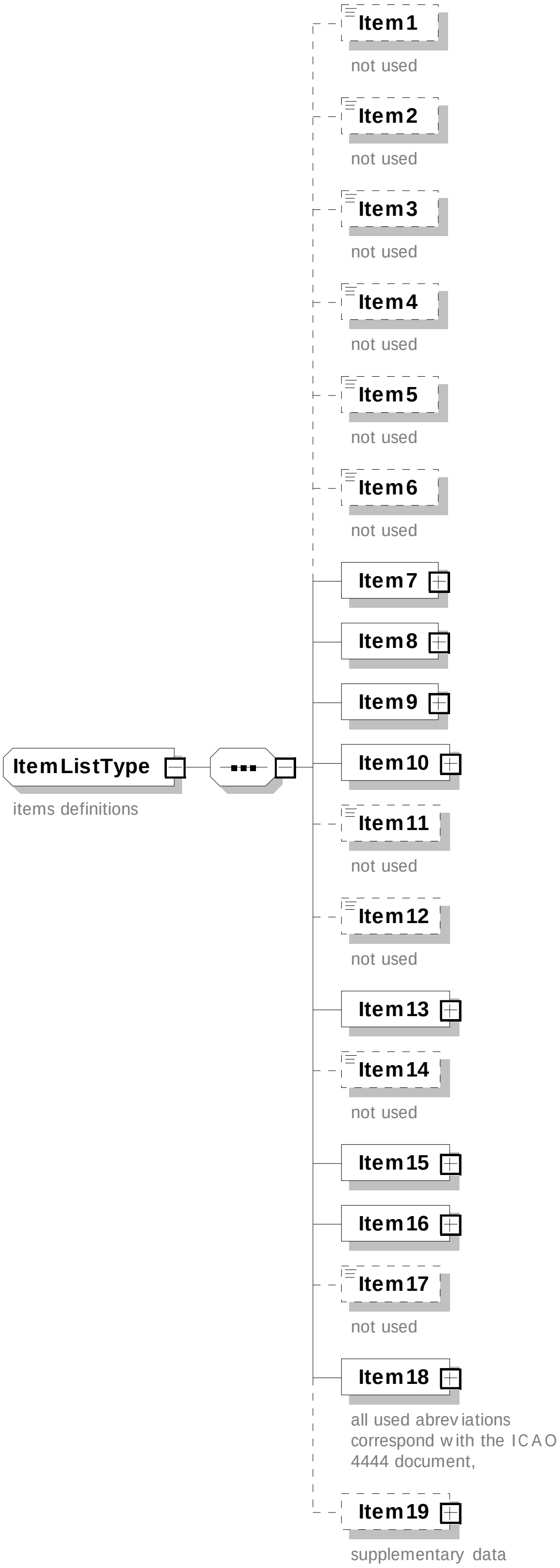
attribute AtcMessageDetailsType/AdditionalAddressees/@addresses

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

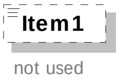
element AtcMessageDetailsType/Items

diagram	
type	ItemListType
properties	isRef 0 content complex
children	Item1 Item2 Item3 Item4 Item5 Item6 Item7 Item8 Item9 Item10 Item11 Item12 Item13 Item14 Item15 Item16 Item17 Item18 Item19
annotation	documentation Items as defined in 15th Edition of the ICAO 4444 document

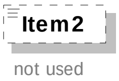
complexType ItemListType

diagram	
children	Item1 Item2 Item3 Item4 Item5 Item6 Item7 Item8 Item9 Item10 Item11 Item12 Item13 Item14 Item15 Item16 Item17 Item18 Item19
used by	**element** AtcMessageDetailsType/Items
annotation	**documentation** **items definitions**

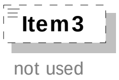
element ItemListType/Item1

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

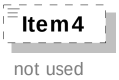
element ItemListType/Item2

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

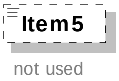
element ItemListType/Item3

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

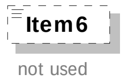
element ItemListType/Item4

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

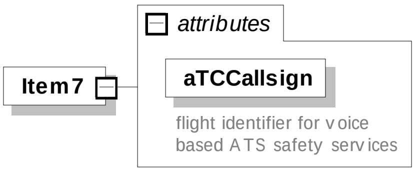
element ItemListType/Item5

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

element ItemListType/Item6

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

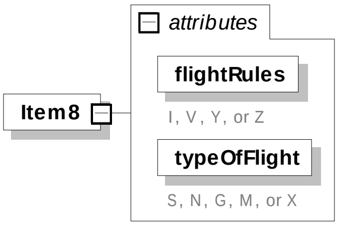
element ItemListType/Item7

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
content complex</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>aTCCallsign</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
flight identifier for voice based ATS safety services</td></tr>
</table></td></tr>
</table>

attribute ItemListType/Item7/@aTCCallsign

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1 maxLength 7
annotation	documentation flight identifier for voice based ATS safety services

element ItemListType/Item8

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
content complex</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>flightRules</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
I, V, Y, or Z</td></tr>
<tr><td>typeOfFlight</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
S, N, G, M, or X</td></tr>
</table></td></tr>
</table>

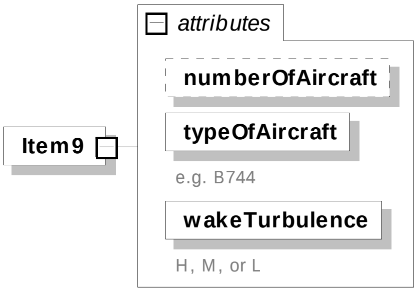
attribute ItemListType/Item8/@flightRules

type	restriction of xs:string
properties	isRef 0 use required
facets	length 1
annotation	documentation I, V, Y, or Z

attribute ItemListType/Item8/@typeOfFlight

type	restriction of xs:string
properties	isRef 0 use required
facets	length 1
annotation	documentation S, N, G, M, or X

element ItemListType/Item9

diagram						
properties	isRef 0 content complex					
attributes	Name	Type	Use	Default	Fixed	annotation
	numberOfAircraft	derived by: xs:string	optional			
	typeOfAircraft	derived by: xs:string	required			documentation e.g. B744
	wakeTurbulence	derived by: xs:string	required			documentation H, M, or L

attribute ItemListType/Item9/@numberOfAircraft

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 maxLength 2

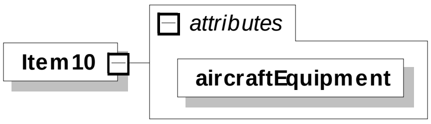
attribute ItemListType/Item9/@typeOfAircraft

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 2 maxLength 4
annotation	documentation e.g. B744

attribute ItemListType/Item9/@wakeTurbulence

type	**restriction of xs:string**
properties	**isRef 0** **use required**
facets	**length 1**
annotation	**documentation** **H, M, or L**

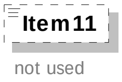
element ItemListType/Item10

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>isRef 0
content complex</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>aircraftEquipment</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

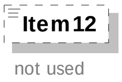
attribute ItemListType/Item10/@aircraftEquipment

type	**restriction of xs:string**
properties	**isRef 0** **use required**
facets	**minLength 1**

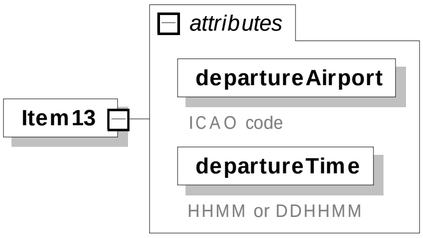
element ItemListType/Item11

diagram	
properties	**isRef 0** **minOcc 0** **maxOcc 1**
annotation	**documentation** **not used**

element ItemListType/Item12

diagram	
properties	**isRef 0** **minOcc 0** **maxOcc 1**
annotation	**documentation** **not used**

element ItemListType/Item13

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
content complex</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>departureAirport</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
ICAO code</td></tr>
<tr><td>departureTime</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
HHMM or DDHHMM</td></tr>
</table></td></tr>
</table>

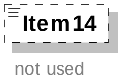
attribute ItemListType/Item13/@departureAirport

type	restriction of xs:string
properties	isRef 0 use required
facets	length 4
annotation	documentation ICAO code

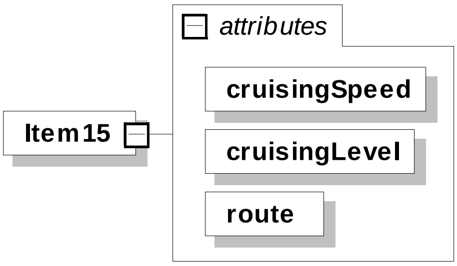
attribute ItemListType/Item13/@departureTime

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 4 maxLength 6
annotation	documentation HHMM or DDHHMM

element ItemListType/Item14

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1</td></tr>
<tr><td>annotation</td><td>documentation
not used</td></tr>
</table>

element ItemListType/Item15

<table>
<tr><td>diagram</td><td> </td></tr>
</table>

properties	isRef 0 content complex					
attributes	Name	Type	Use	Default	Fixed	annotation
	cruisingSpeed	derived by: xs:string	required			
	cruisingLevel	derived by: xs:string	required			
	route	derived by: xs:string	required			

attribute ItemListType/Item15/@cruisingSpeed

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1 maxLength 5

attribute ItemListType/Item15/@cruisingLevel

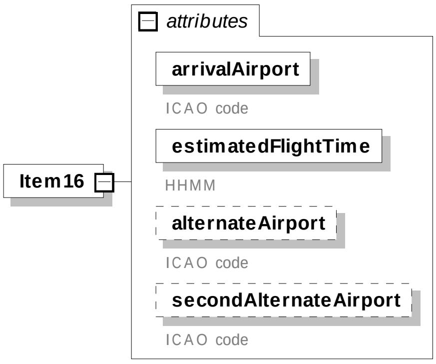
type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1 maxLength 5

attribute ItemListType/Item15/@route

type	restriction of xs:string
properties	isRef 0 use required
facets	whiteSpace preserve

element ItemListType/Item16

diagram



properties	isRef 0 content complex					
attributes	Name	Type	Use	Default	Fixed	annotation
	arrivalAirport	derived by: xs:string	required			documentation ICAO code
	estimatedFlightTime	derived by: xs:string	required			documentation HHMM
	alternateAirport	derived by: xs:string	optional			documentation ICAO code
	secondAlternateAirport	derived by: xs:string	optional			documentation ICAO code

attribute ItemListType/Item16/@arrivalAirport

type	restriction of xs:string
properties	isRef 0 use required
facets	length 4
annotation	documentation ICAO code

attribute ItemListType/Item16/@estimatedFlightTime

type	restriction of xs:string
properties	isRef 0 use required
facets	length 4
annotation	documentation HHMM

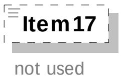
attribute ItemListType/Item16/@alternateAirport

type	restriction of xs:string
properties	isRef 0 use optional
facets	length 4
annotation	documentation ICAO code

attribute ItemListType/Item16/@secondAlternateAirport

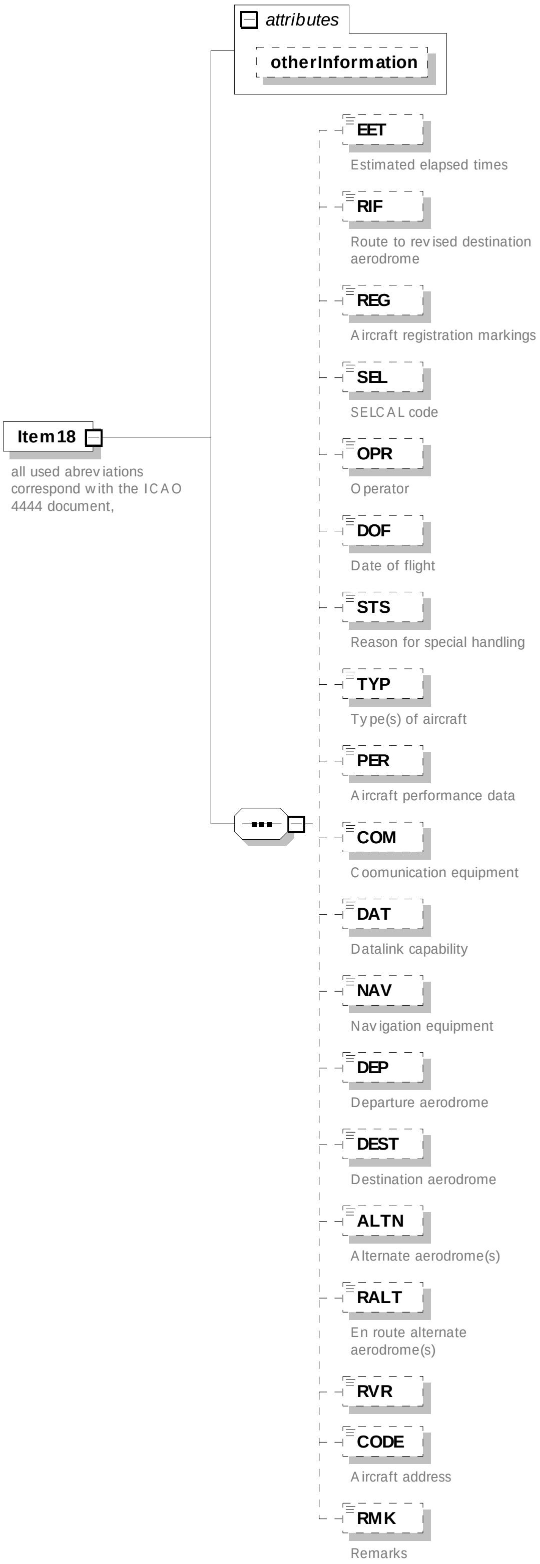
type	restriction of xs:string
properties	isRef 0 use optional
facets	length 4
annotation	documentation ICAO code

element ItemListType/Item17

diagram	
properties	isRef 0 minOcc 0 maxOcc 1
annotation	documentation not used

5.0 COMMON ELEMENTS

element ItemListType/Item18

diagram	
properties	**isRef** **0** **content** **complex**
children	**EET RIF REG SEL OPR DOF STS TYP PER COM DAT NAV DEP DEST ALTN RALT RVR CODE RMK**
attributes	**Name** **Type** **Use** **Default** **Fixed** **annotation** **otherInformation** **derived by: xs:string** **optional**
annotation	**documentation** **all used abbreviations correspond with the ICAO 4444 document,**

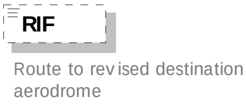
attribute ItemListType/Item18/@otherInformation

type	**restriction of xs:string**
properties	**isRef 0** **use optional**
facets	**minLength 1** **whiteSpace preserve**

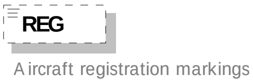
element ItemListType/Item18/EET

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Estimated elapsed times**

element ItemListType/Item18/RIF

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Route to revised destination aerodrome**

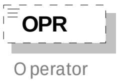
element ItemListType/Item18/REG

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Aircraft registration markings**

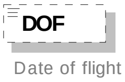
element ItemListType/Item18/SEL

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **SELCAL code**

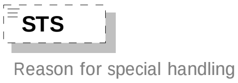
element ItemListType/Item18/OPR

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Operator**

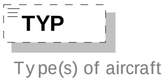
element ItemListType/Item18/DOF

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Date of flight**

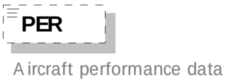
element ItemListType/Item18/STS

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Reason for special handling**

element ItemListType/Item18/TYP

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Type(s) of aircraft**

element ItemListType/Item18/PER

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Aircraft performance data**

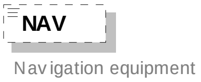
element ItemListType/Item18/COM

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Coomunication equipment**

element ItemListType/Item18/DAT

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Datalink capability**

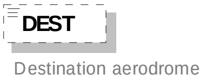
element ItemListType/Item18/NAV

diagram	
type	**restriction of xs:string**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple **nillable** false
facets	**minLength** 1 **whiteSpace** preserve
annotation	**documentation** Navigation equipment

element ItemListType/Item18/DEP

diagram	
type	**restriction of xs:string**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple **nillable** false
facets	**minLength** 1 **whiteSpace** preserve
annotation	**documentation** Departure aerodrome

element ItemListType/Item18/DEST

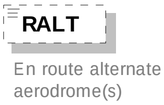
diagram	
type	**restriction of xs:string**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple **nillable** false
facets	**minLength** 1 **whiteSpace** preserve
annotation	**documentation** Destination aerodrome

element ItemListType/Item18/ALTN

diagram	
type	**restriction of xs:string**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple **nillable** false
facets	**minLength** 1 **whiteSpace** preserve
annotation	**documentation** Alternate aerodrome(s)

5.0 COMMON ELEMENTS

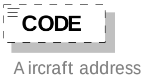
element ItemListType/Item18/RALT

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation En route alternate aerodrome(s)

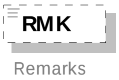
element ItemListType/Item18/RVR

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve

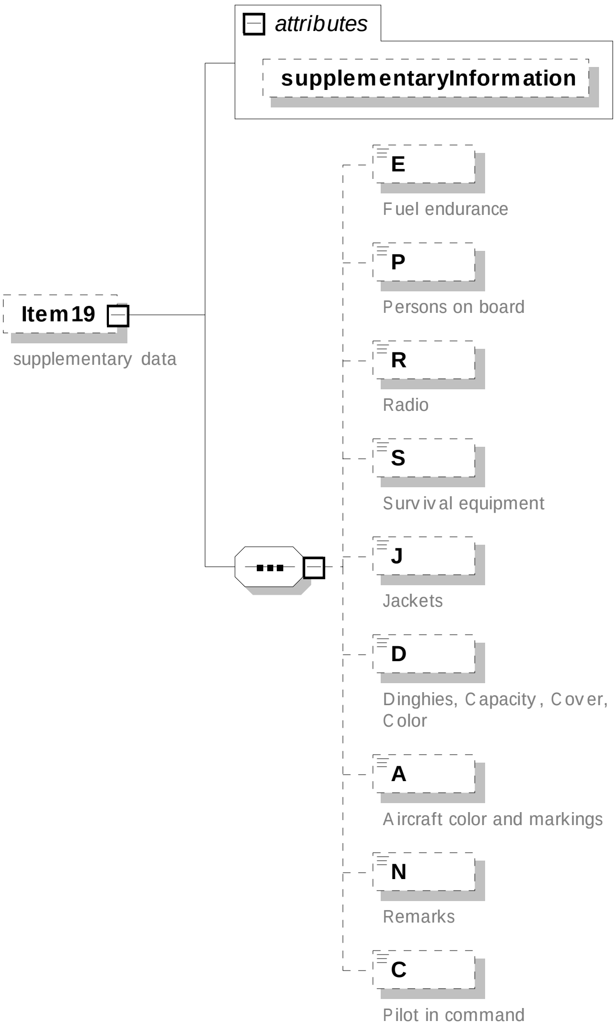
element ItemListType/Item18/CODE

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation Aircraft address

element ItemListType/Item18/RMK

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation Remarks

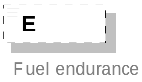
element ItemListType/Item19

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr></table></td></tr>
<tr><td>children</td><td>E P R S J D A N C</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>supplementaryInformation</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
supplementary data</td></tr>
</table>

attribute ItemListType/Item19/@supplementaryInformation

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve

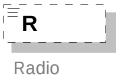
element ItemListType/Item19/E

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Fuel endurance**

element ItemListType/Item19/P

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Persons on board**

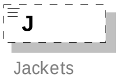
element ItemListType/Item19/R

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Radio**

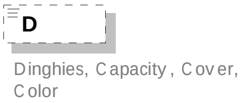
element ItemListType/Item19/S

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Survival equipment**

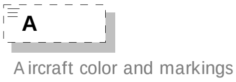
element ItemListType/Item19/J

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Jackets**

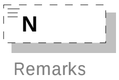
element ItemListType/Item19/D

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Dinghies, Capacity, Cover, Color**

element ItemListType/Item19/A

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Aircraft color and markings**

element ItemListType/Item19/N

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1** **whiteSpace preserve**
annotation	**documentation** **Remarks**

element ItemListType/Item19/C

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 whiteSpace preserve
annotation	documentation Pilot in command

5.6 Airport Weather

This section contains guidelines for interim implementations and will be revisited when Eurocae WG44 and WG53 will have defined OSED and standardized a format for these data.

The currently available schema WeatherText.xsd will be reworked and provided with a future supplement.

5.7 SIGMET

To be added in a future supplement

5.8 Weather Chart

To be added in a future supplement

5.9 NOTAM

IA Staff Note: This section contains guidelines for interim implementations and will be revisited when Eurocae WG44 and WG53 will have defined OSED and standardized a format for these data.

The currently available schema Notam.xsd will be reworked and provided with a future supplement.

5.10 NOTOC

To be added in a future supplement

5.11 Load and Trim Sheet

To be added in a future supplement

5.12 Crew List

To be added in a future supplement

5.13 Pax list

To be added in a future supplement

5.14 Oceanic Track

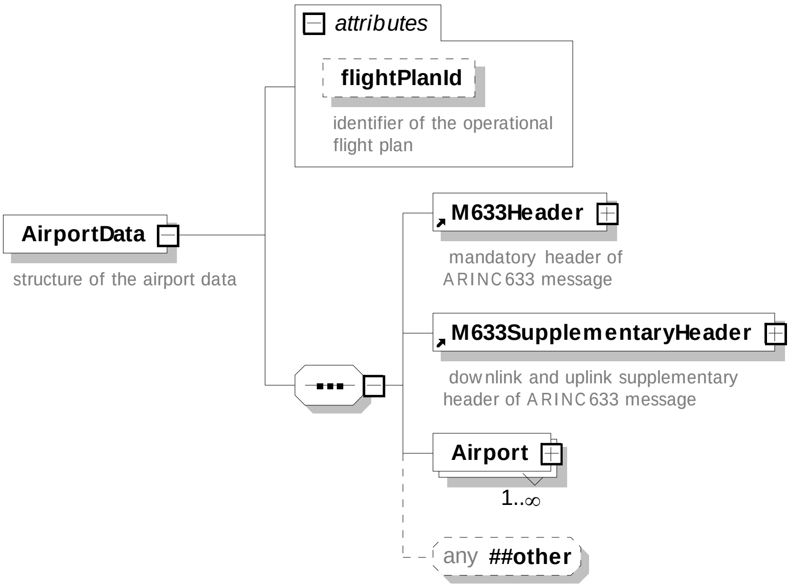
To be added in a future supplement

5.15 Navigational Chart

To be added in a future supplement

5.16 Airport Information

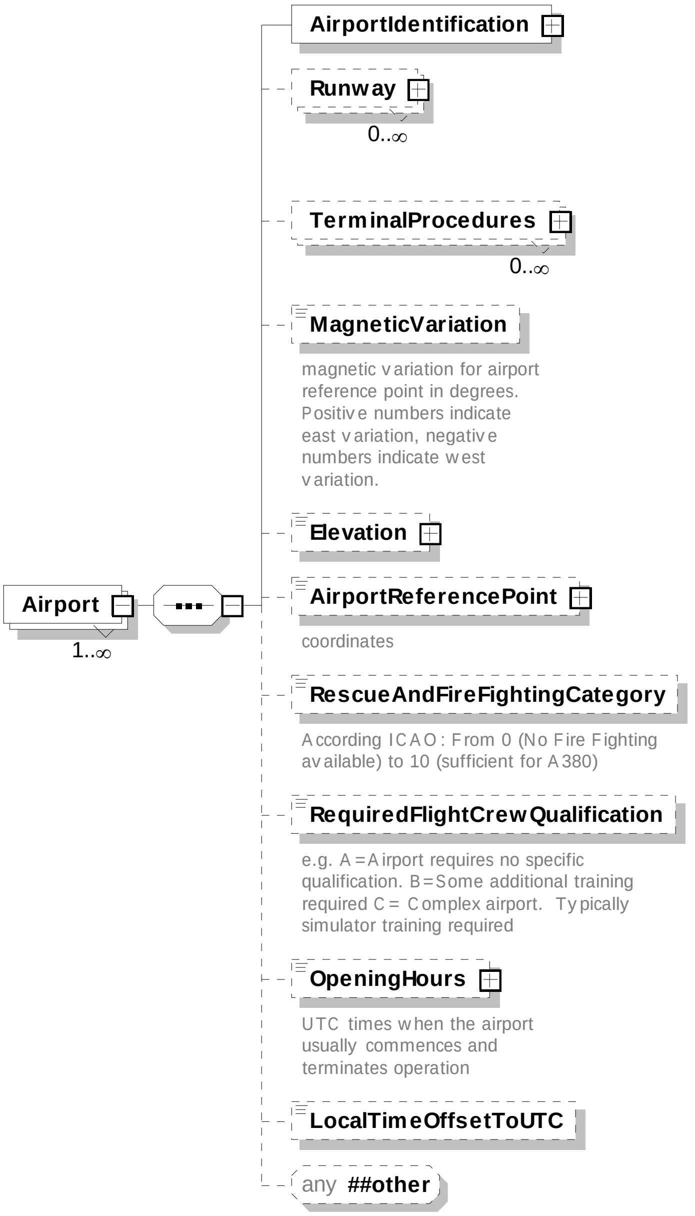
element AirportData

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>content complex
nillable false</td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader Airport</td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>flightPlanId</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
identifier of the operational flight plan</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
structure of the airport data</td></tr>
</table>

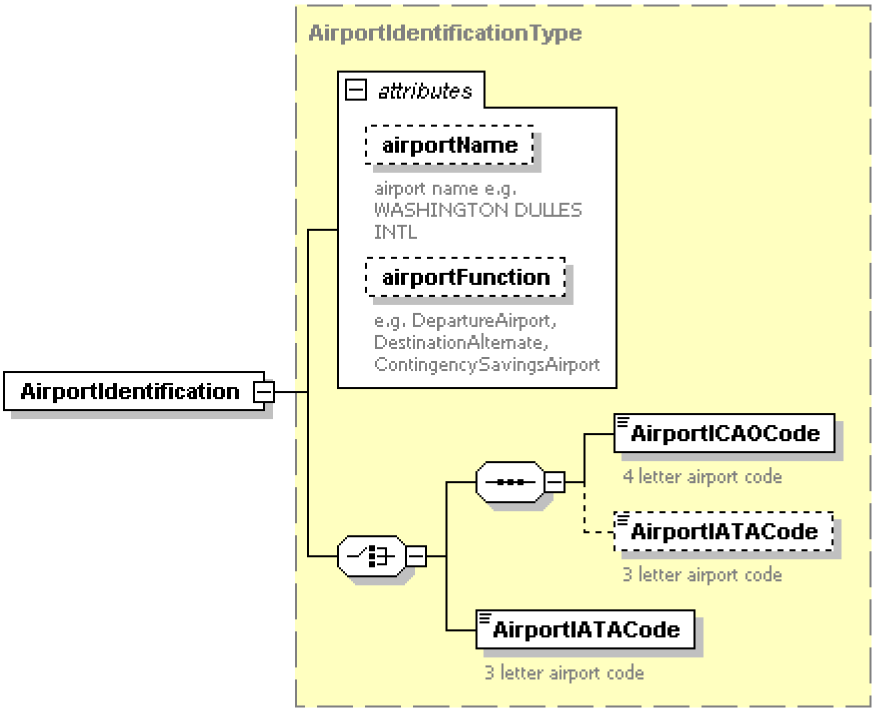
attribute AirportData/@flightPlanId

type	**restriction of xs:string**
properties	**isRef** **0**
facets	**minLength** **1** **whiteSpace** **preserve**
annotation	**documentation** **identifier of the operational flight plan**

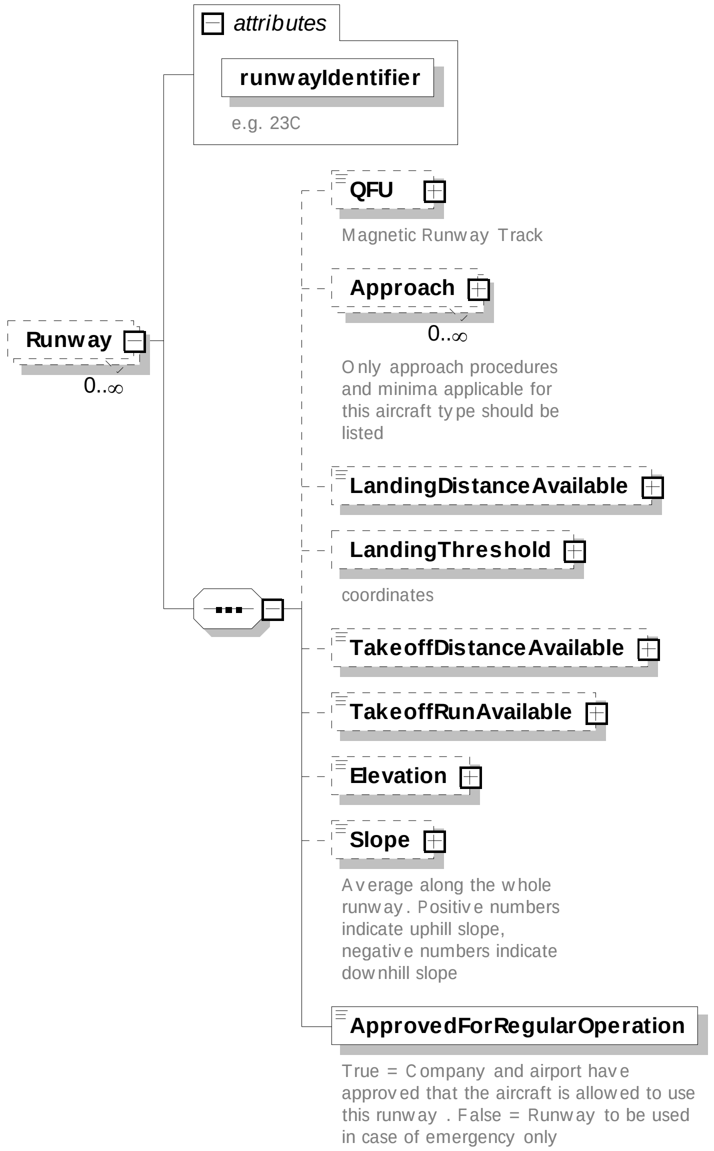
element AirportData/Airport

diagram	
properties	**isRef** **0** **minOcc** **1** **maxOcc** **unbounded** **content** **complex** **nillable** **false**
children	**AirportIdentification Runway TerminalProcedures MagneticVariation Elevation AirportReferencePoint RescueAndFireFightingCategory RequiredFlightCrewQualification OpeningHours LocalTimeOffsetToUTC**

element AirportData/Airport/AirportIdentification

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>AirportIdentificationType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>content</td><td>complex</td></tr></table></td></tr>
<tr><td>children</td><td>AirportICAOCode AirportIATACode AirportIATACode</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>airportName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
airport name e.g. WASHINGTON DULLES INTL</td></tr>
<tr><td>airportFunction</td><td>derived by: xs:string</td><td></td><td></td><td></td><td>documentation
e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport</td></tr>
</table></td></tr>
</table>

element AirportData/Airport/Runway

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>QFU Approach LandingDistanceAvailable LandingThreshold TakeoffDistanceAvailable TakeoffRunAvailable Elevation Slope ApprovedForRegularOperation</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>runwayIdentifier</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
e.g. 23C</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation</td></tr>
</table>

attribute AirportData/Airport/Runway/@runwayIdentifier

<table>
<tr><td>type</td><td>restriction of xs:string</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>use</td><td>required</td></tr>
</table></td></tr>
<tr><td>facets</td><td><table>
<tr><td>minLength</td><td>2</td></tr>
<tr><td>maxLength</td><td>3</td></tr>
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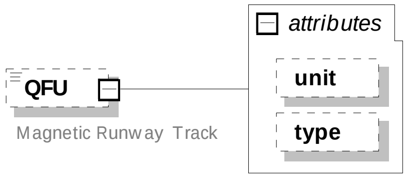
<tr><td>annotation</td><td>documentation
e.g. 23C</td></tr>
</table>

element AirportData/Airport/Runway/QFU

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>unit</td><td>directionUnitType</td><td></td><td></td><td>deg</td><td></td></tr>
<tr><td>type</td><td>xs:string</td><td></td><td></td><td>magnetic</td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Magnetic Runway Track</td></tr>
</table>

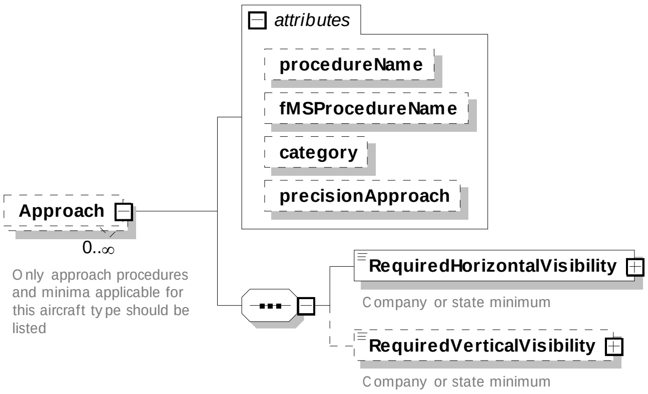
attribute AirportData/Airport/Runway/QFU/@unit

<table>
<tr><td>type</td><td>directionUnitType</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>fixed</td><td>deg</td></tr>
</table></td></tr>
<tr><td>facets</td><td><table>
<tr><td>enumeration</td><td>deg</td></tr>
<tr><td>enumeration</td><td>rad</td></tr>
</table></td></tr>
</table>

attribute AirportData/Airport/Runway/QFU/@type

<table>
<tr><td>type</td><td>xs:string</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>fixed</td><td>magnetic</td></tr>
</table></td></tr>
</table>

element AirportData/Airport/Runway/Approach

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>RequiredHorizontalVisibility RequiredVerticalVisibility</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>procedureName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>fMSProcedureName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>category</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>precisionApproach</td><td>xs:boolean</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

annotation	documentation Only approach procedures and minima applicable for this aircraft type should be listed

attribute AirportData/Airport/Runway/Approach/@procedureName

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

attribute AirportData/Airport/Runway/Approach/@fMSProcedureName

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

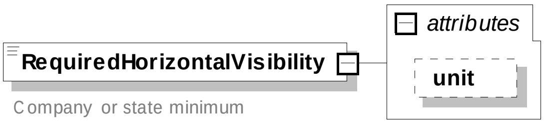
attribute AirportData/Airport/Runway/Approach/@category

type	restriction of xs:string
properties	isRef 0
facets	enumeration 1 enumeration 2 enumeration 3 enumeration 3a enumeration 3b enumeration 3c

attribute AirportData/Airport/Runway/Approach/@precisionApproach

type	xs:boolean
properties	isRef 0

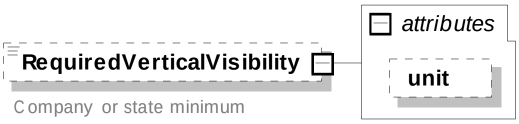
element AirportData/Airport/Runway/Approach/RequiredHorizontalVisibility

diagram						
type	extension of xs:float					
properties	isRef 0 content complex nillable false					
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	distanceUnitType		m		
annotation	documentation Company or state minimum					

attribute AirportData/Airport/Runway/Approach/RequiredHorizontalVisibility/@unit

type	distanceUnitType
properties	isRef 0 default m
facets	enumeration m enumeration km enumeration NM enumeration ft

element AirportData/Airport/Runway/Approach/RequiredVerticalVisibility

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name: unit Type: distanceUnitType Use: Default: ft Fixed: annotation:
annotation	documentation Company or state minimum

attribute AirportData/Airport/Runway/Approach/RequiredVerticalVisibility/@unit

type	distanceUnitType
properties	isRef 0 default ft
facets	enumeration m enumeration km enumeration NM enumeration ft

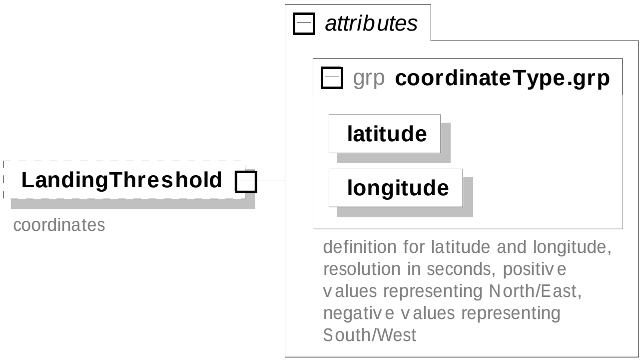
element AirportData/Airport/Runway/LandingDistanceAvailable

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name: unit Type: distanceUnitType Use: Default: m Fixed: annotation:

attribute AirportData/Airport/Runway/LandingDistanceAvailable/@unit

type	distanceUnitType
properties	isRef 0 default m
facets	enumeration m enumeration km enumeration NM enumeration ft

element AirportData/Airport/Runway/LandingThreshold

diagram						
properties	isRef	0				
	minOcc	0				
	maxOcc	1				
	content	complex				
	nillable	false				
attributes	Name	Type	Use	Default	Fixed	annotation
	latitude	derived by: xs:float	required			
	longitude	derived by: xs:float	required			
annotation	documentation coordinates					

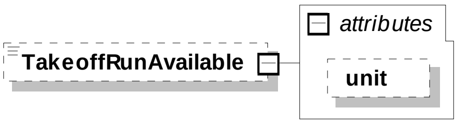
element AirportData/Airport/Runway/TakeoffDistanceAvailable

diagram						
type	extension of xs:float					
properties	isRef	0				
	minOcc	0				
	maxOcc	1				
	content	complex				
	nillable	false				
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	distanceUnitType		m		

attribute AirportData/Airport/Runway/TakeoffDistanceAvailable/@unit

type	distanceUnitType	
properties	isRef	0
	default	m
facets	enumeration	m
	enumeration	km
	enumeration	NM
	enumeration	ft

element AirportData/Airport/Runway/TakeoffRunAvailable

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td>

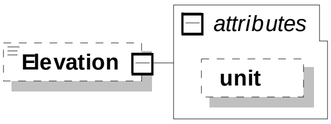
Name	Type	Use	Default	Fixed	annotation
unit	distanceUnitType		m		

</td></tr>
</table>

attribute AirportData/Airport/Runway/TakeoffRunAvailable/@unit

type	distanceUnitType
properties	isRef 0 default m
facets	enumeration m enumeration km enumeration NM enumeration ft

element AirportData/Airport/Runway/Elevation

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td>

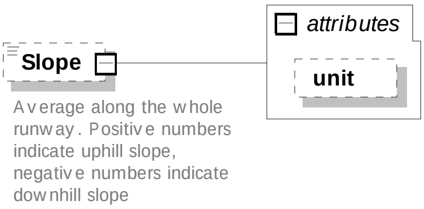
Name	Type	Use	Default	Fixed	annotation
unit	altitudeUnitType		ft		

</td></tr>
</table>

attribute AirportData/Airport/Runway/Elevation/@unit

type	altitudeUnitType
properties	isRef 0 default ft
facets	enumeration ft/100 enumeration ft/1000 enumeration ft enumeration m/100 enumeration m/10 enumeration m

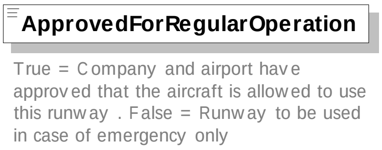
element AirportData/Airport/Runway/Slope

diagram	
type	**extension of xs:float**
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** complex **nillable** false
attributes	<table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr><tr><td>unit</td><td>directionUnitType</td><td></td><td>deg</td><td></td><td></td></tr></table>
annotation	**documentation** **Average along the whole runway. Positive numbers indicate uphill slope, negative numbers indicate downhill slope**

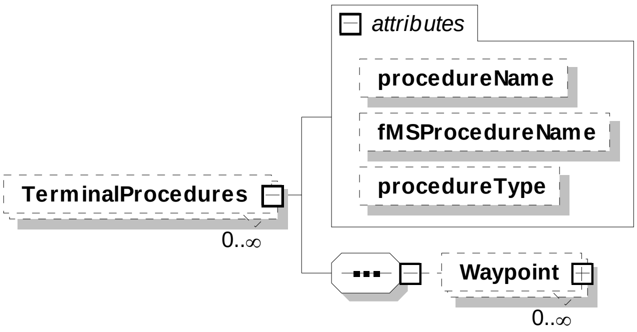
attribute AirportData/Airport/Runway/Slope/@unit

type	**directionUnitType**
properties	**isRef** 0 **default** deg
facets	**enumeration** deg **enumeration** rad

element AirportData/Airport/Runway/ApprovedForRegularOperation

diagram	
type	**xs:boolean**
properties	**isRef** 0 **content** simple **nillable** false
annotation	**documentation** **True = Company and airport have approved that the aircraft is allowed to use this runway. False = Runway to be used in case of emergency only**

element AirportData/Airport/TerminalProcedures

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>Waypoint</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>procedureName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>fMSProcedureName</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
<tr><td>procedureType</td><td>derived by: xs:string</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

attribute AirportData/Airport/TerminalProcedures/@procedureName

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

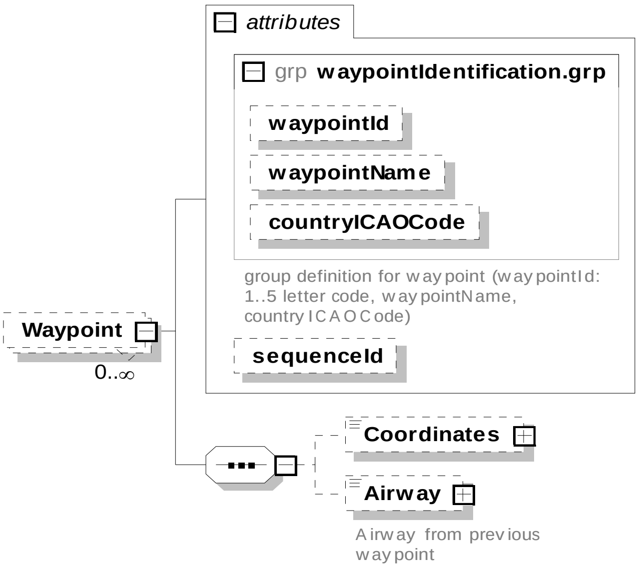
attribute AirportData/Airport/TerminalProcedures/@fMSProcedureName

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

attribute AirportData/Airport/TerminalProcedures/@procedureType

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve

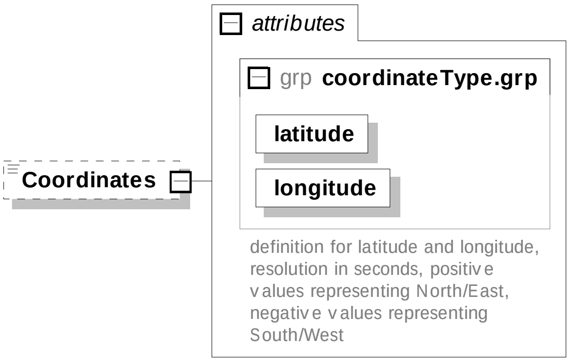
element AirportData/Airport/TerminalProcedures/Waypoint

diagram						
properties	isRef minOcc maxOcc content mixed nillable	0 0 unbounded complex false false				
children	Coordinates Airway					
attributes	Name	Type	Use	Default	Fixed	annotation
	waypointId	WaypointIdType	optional			
	waypointName	derived by: xs:string	optional			
	countryICAOCode	CountryICAOCodeType	optional			
	sequenceId					

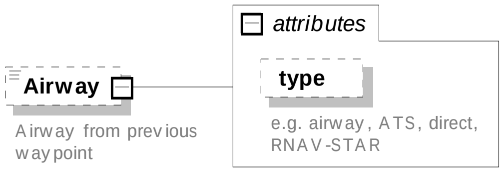
attribute AirportData/Airport/TerminalProcedures/Waypoint/@sequenceId

properties	isRef	0

element AirportData/Airport/TerminalProcedures/Waypoint/Coordinates

diagram						
properties	isRef minOcc maxOcc content mixed nillable	0 0 1 complex true false				
attributes	Name	Type	Use	Default	Fixed	annotation
	latitude	derived by: xs:float	required			
	longitude	derived by: xs:float	required			

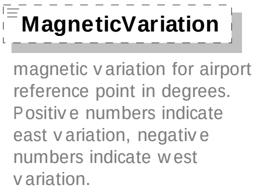
element AirportData/Airport/TerminalProcedures/Waypoint/Airway

diagram	
type	extension of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name: type Type: derived by: xs:string Use: optional Default: Fixed: annotation: documentation e.g. airway, ATS, direct, RNAV-STAR
annotation	documentation Airway from previous waypoint

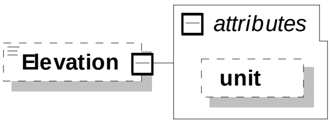
attribute AirportData/Airport/TerminalProcedures/Waypoint/Airway/@type

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation e.g. airway, ATS, direct, RNAV-STAR

element AirportData/Airport/MagneticVariation

diagram	
type	restriction of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive -180 maxInclusive 180
annotation	documentation Magnetic variation for airport reference point in degrees. Positive numbers indicate east variation, negative numbers indicate west variation.

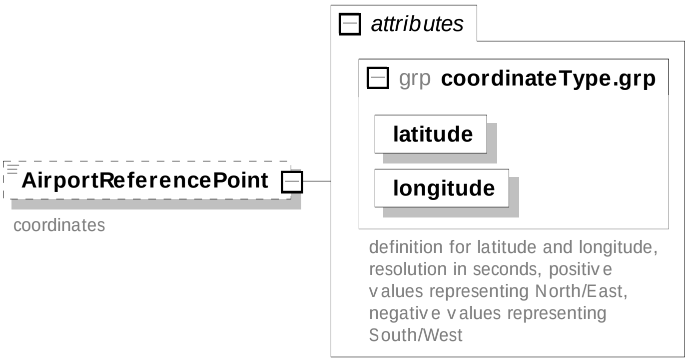
element AirportData/Airport/Elevation

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:float</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr><tr><td>unit</td><td>altitudeUnitType</td><td></td><td>ft</td><td></td><td></td></tr></table></td></tr>
</table>

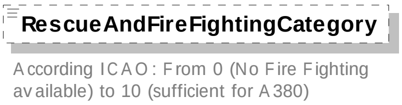
attribute AirportData/Airport/Elevation/@unit

<table>
<tr><td>type</td><td>altitudeUnitType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>default</td><td>ft</td></tr></table></td></tr>
<tr><td>facets</td><td><table><tr><td>enumeration</td><td>ft/100</td></tr><tr><td>enumeration</td><td>ft/1000</td></tr><tr><td>enumeration</td><td>ft</td></tr><tr><td>enumeration</td><td>m/100</td></tr><tr><td>enumeration</td><td>m/10</td></tr><tr><td>enumeration</td><td>m</td></tr></table></td></tr>
</table>

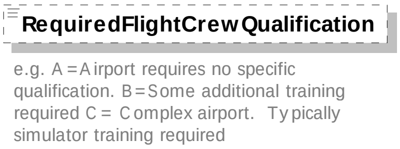
element AirportData/Airport/AirportReferencePoint

<table>
<tr><td>diagram</td><td>
definition for latitude and longitude, resolution in seconds, positive values representing North/East, negative values representing South/West</td></tr>
<tr><td>type</td><td>extension of xs:string</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>1</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr><tr><td>latitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr><tr><td>longitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
coordinates</td></tr>
</table>

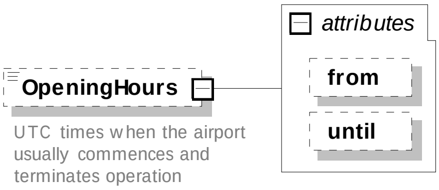
element AirportData/Airport/RescueAndFireFightingCategory

diagram	
type	**restriction of xs:nonNegativeInteger**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minInclusive 0** **maxInclusive 15**
annotation	**documentation** **According ICAO: From 0 (No Fire Fighting available) to 10 (sufficient for A380)**

element AirportData/Airport/RequiredFlightCrewQualification

diagram	
type	**restriction of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content simple** **nillable false**
facets	**minLength 1**
annotation	**documentation** **e.g. A = Airport requires no specific qualification. B = Some additional training required C = Complex airport. Typically simulator training required**

element AirportData/Airport/OpeningHours

diagram	
type	**extension of xs:string**
properties	**isRef 0** **minOcc 0** **maxOcc 1** **content complex** **nillable false**
attributes	**Name Type Use Default Fixed annotation** **from xs:time** **until xs:time**
annotation	**documentation** **UTC times when the airport usually commences and terminates operation**

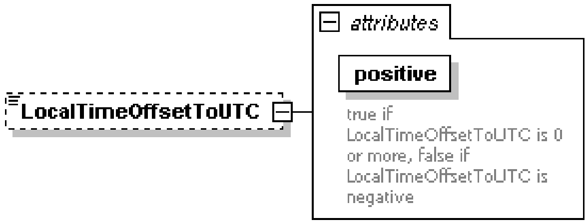
attribute AirportData/Airport/OpeningHours/@from

type	**xs:time**
properties	**isRef 0**

attribute AirportData/Airport/OpeningHours/@until

type	xs:time
properties	isRef 0

element AirportData/Airport/LocalTimeOffsetToUTC

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>xs:duration</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content simple
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>positive</td><td>xs:boolean</td><td>required</td><td></td><td></td><td>documentation
true if LocalTimeOffsetToUTC is 0 or more, false if LocalTimeOffsetToUTC is negative</td></tr>
</table></td></tr>
</table>

attribute AirportData/Airport/LocalTimeOffsetToUTC/@positive

type	xs:boolean
properties	isRef 0 use required
annotation	documentation true if LocalTimeOffsetToUTC is 0 or more, false if LocalTimeOffsetToUTC is negative

5.17 Security Information

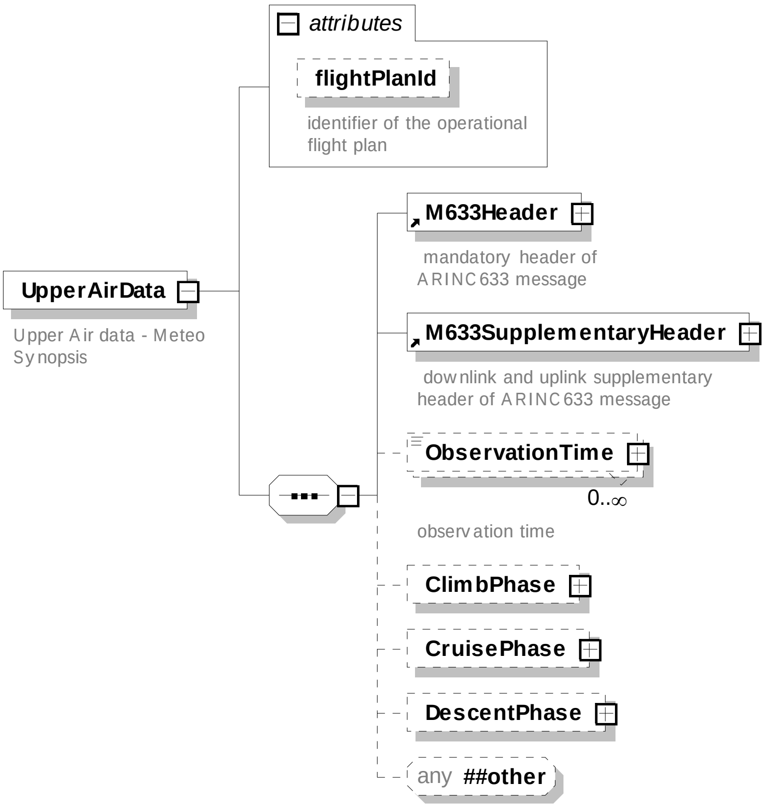
To be added in a future supplement

5.18 Airline Defined

To be added in a future supplement

5.19 Upper Air Data

element UpperAirData

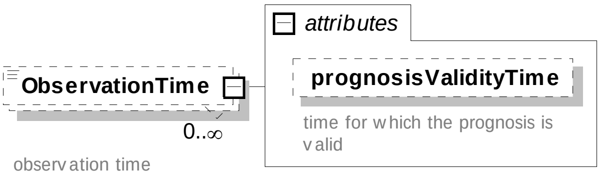
diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader ObservationTime ClimbPhase CruisePhase DescentPhase
attributes	Name: flightPlanId Type: derived by: xs:string Use: Default: Fixed: annotation: documentation identifier of the operational flight plan
annotation	documentation Upper Air data - Meteo Synopsis

attribute UpperAirData/@flightPlanId

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 whiteSpace preserve
annotation	documentation identifier of the operational flight plan

5.0 COMMON ELEMENTS

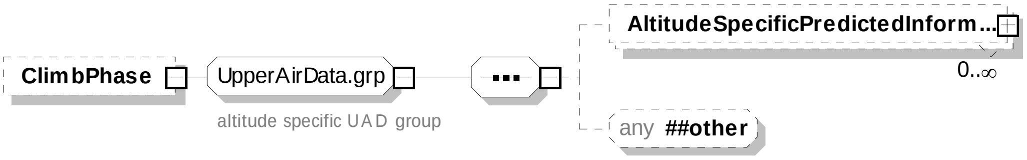
element UpperAirData/ObservationTime

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:dateTime</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>prognosisValidityTime</td><td>xs:dateTime</td><td></td><td></td><td></td><td>documentation
time for which the prognosis is valid</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
observation time</td></tr>
</table>

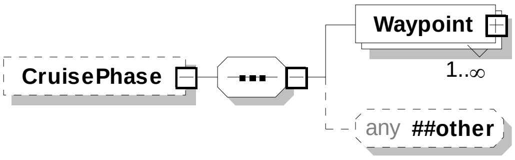
attribute UpperAirData/ObservationTime/@prognosisValidityTime

type	**xs:dateTime**
properties	**isRef** **0**
annotation	**documentation** **time for which the prognosis is valid**

element UpperAirData/ClimbPhase

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>false</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>AltitudeSpecificPredictedInformation</td></tr>
</table>

element UpperAirData/CruisePhase

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
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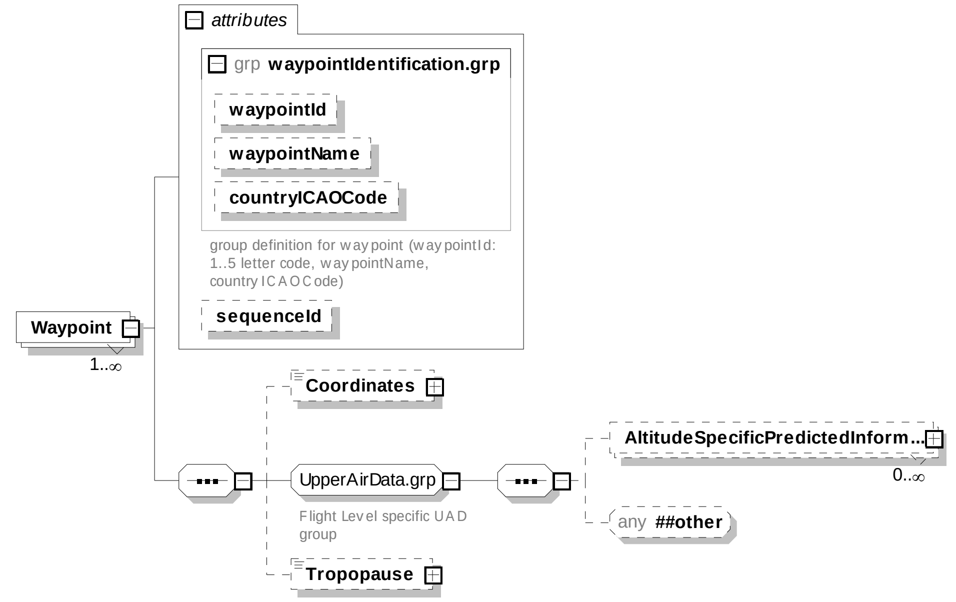
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>false</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>Waypoint</td></tr>
</table>

element UpperAirData/CruisePhase/Waypoint

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
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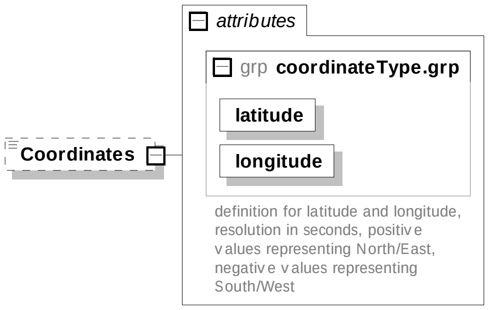
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>false</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>Coordinates AltitudeSpecificPredictedInformation Tropopause</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>waypointId</td><td>WaypointIdType</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>waypointName</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>countryICAOCode</td><td>CountryICAOCodeType</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>sequenceId</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

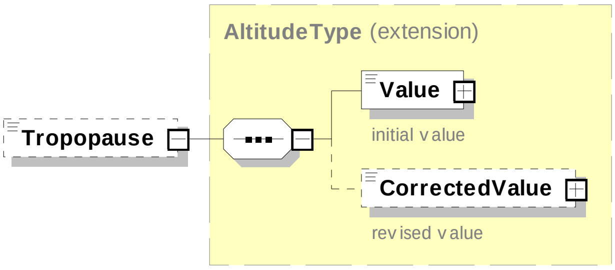
attribute UpperAirData/CruisePhase/Waypoint/@sequenceId

type	xs:nonNegativeInteger
properties	isRef 0

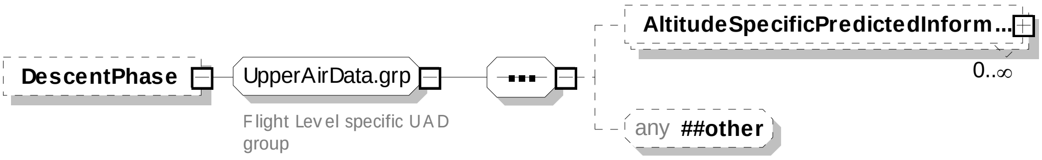
element UpperAirData/CruisePhase/Waypoint/Coordinates

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>latitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>longitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

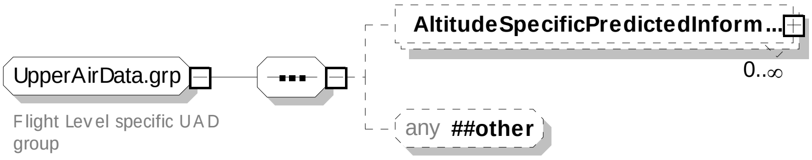
element UpperAirData/CruisePhase/Waypoint/Tropopause

diagram	
type	extension of AltitudeType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Value CorrectedValue

element UpperAirData/DescentPhase

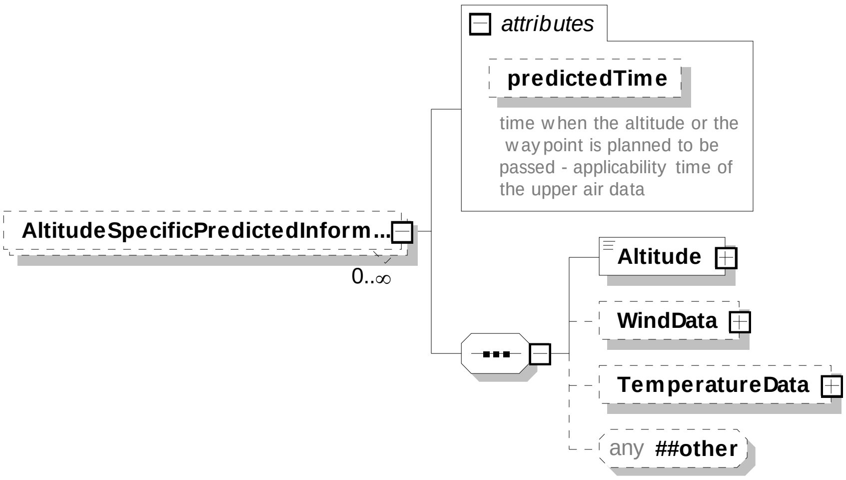
diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	AltitudeSpecificPredictedInformation

group UpperAirData.grp

diagram	
children	AltitudeSpecificPredictedInformation
used by	elements UpperAirData/ClimbPhase UpperAirData/DescentPhase UpperAirData/CruisePhase/Waypoint
annotation	documentation Flight Level specific UAD group

5.0 COMMON ELEMENTS

element UpperAirData.grp/AltitudeSpecificPredictedInformation

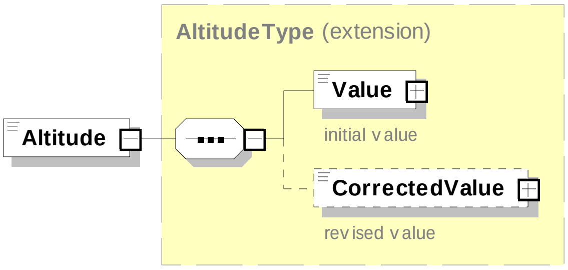
diagram	
properties	isRef 0 minOcc 0 maxOcc unbounded content complex nillable false
children	Altitude WindData TemperatureData
attributes	see below

Name	Type	Use	Default	Fixed	annotation
predictedTime	xs:dateTime				documentation time when the altitude or the waypoint is planned to be passed - applicability time of the upper air data

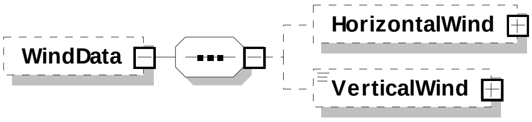
attribute UpperAirData.grp/AltitudeSpecificPredictedInformation/@predictedTime

type	xs:dateTime
properties	isRef 0
annotation	documentation time when the altitude or the waypoint is planned to be passed - applicability time of the upper air data

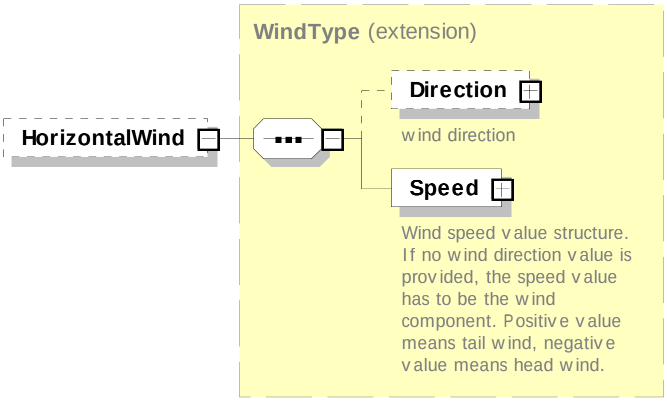
element UpperAirData.grp/AltitudeSpecificPredictedInformation/Altitude

diagram	
type	extension of AltitudeType
properties	isRef 0 content complex mixed false nillable false
children	Value CorrectedValue

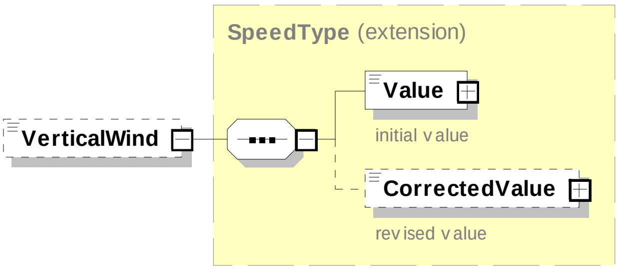
element UpperAirData.grp/AltitudeSpecificPredictedInformation/WindData

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	HorizontalWind VerticalWind

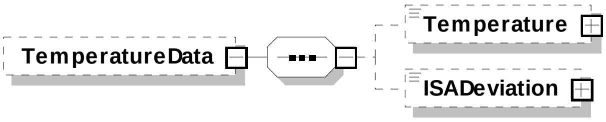
element UpperAirData.grp/AltitudeSpecificPredictedInformation/WindData/HorizontalWind

diagram	
type	extension of WindType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Direction Speed

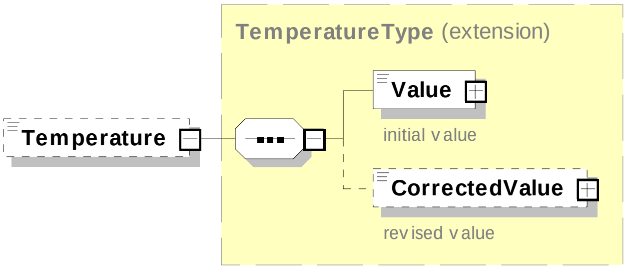
element UpperAirData.grp/AltitudeSpecificPredictedInformation/WindData/VerticalWind

diagram	
type	extension of SpeedType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Value CorrectedValue

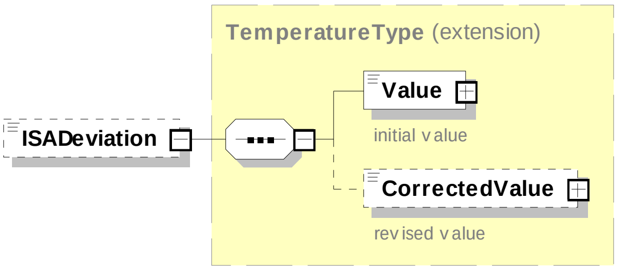
element UpperAirData.grp/AltitudeSpecificPredictedInformation/TemperatureData

diagram	
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Temperature ISADeviation

element UpperAirData.grp/AltitudeSpecificPredictedInformation/TemperatureData/Temperature

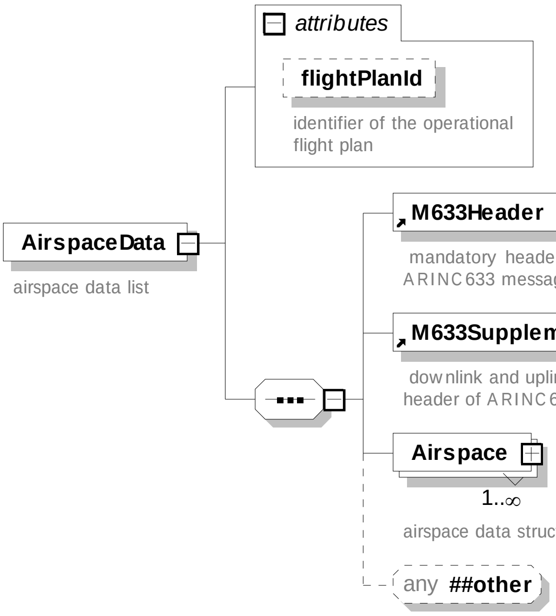
diagram	
type	extension of TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Value CorrectedValue

element UpperAirData.grp/AltitudeSpecificPredictedInformation/TemperatureData/ISADeviation

diagram	
type	extension of TemperatureType
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed false nillable false
children	Value CorrectedValue

5.20 Airspace Data

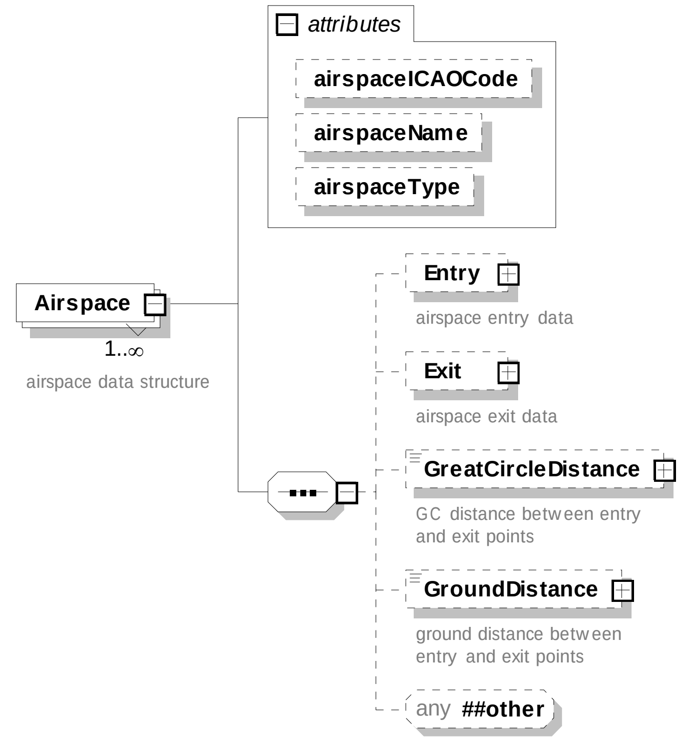
element AirspaceData

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader Airspace
attributes	Name: flightPlanId; Type: derived by: xs:string; Use: optional; Default: ; Fixed: ; annotation: documentation identifier of the operational flight plan
annotation	documentation airspace data list

attribute AirspaceData/@flightPlanId

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve
annotation	documentation identifier of the operational flight plan

element AirspaceData/Airspace

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 1
maxOcc unbounded
content complex
nillable false</td></tr>
<tr><td>children</td><td>Entry Exit GreatCircleDistance GroundDistance</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>airspaceICAOCode</td><td>AirportICAOCodeType</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>airspaceName</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>airspaceType</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
airspace data structure</td></tr>
</table>

attribute AirspaceData/Airspace/@airspaceICAOCode

type	AirportICAOCodeType
properties	isRef 0 use optional
facets	length 4

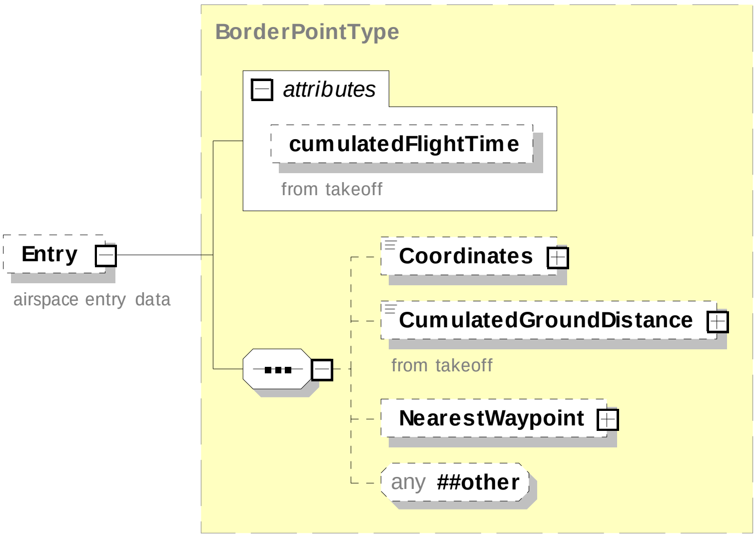
attribute AirspaceData/Airspace/@airspaceName

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve

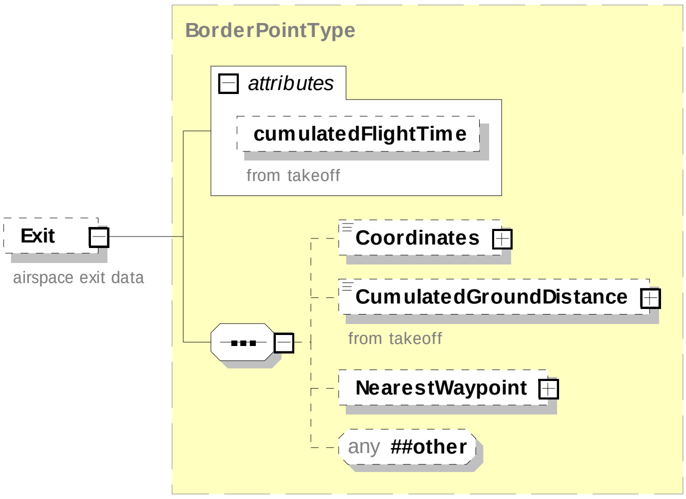
attribute AirspaceData/Airspace/@airspaceType

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1 whiteSpace preserve

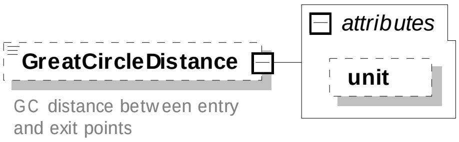
element AirspaceData/Airspace/Entry

diagram	
type	BorderPointType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Coordinates CumulatedGroundDistance NearestWaypoint
attributes	Name: cumulatedFlightTime Type: xs:duration Use: optional Default: Fixed: annotation: documentation from takeoff
annotation	documentation airspace entry data

element AirspaceData/Airspace/Exit

diagram	
type	BorderPointType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Coordinates CumulatedGroundDistance NearestWaypoint
attributes	Name: cumulatedFlightTime Type: xs:duration Use: optional Default: Fixed: annotation: documentation from takeoff
annotation	documentation airspace exit data

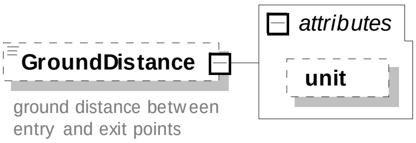
element AirspaceData/Airspace/GreatCircleDistance

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name Type Use Default Fixed annotation unit distanceUnitType NM
annotation	documentation GC distance between entry and exit points

attribute AirspaceData/Airspace/GreatCircleDistance/@unit

type	distanceUnitType
properties	isRef 0 default NM
facets	enumeration m enumeration km enumeration NM enumeration ft

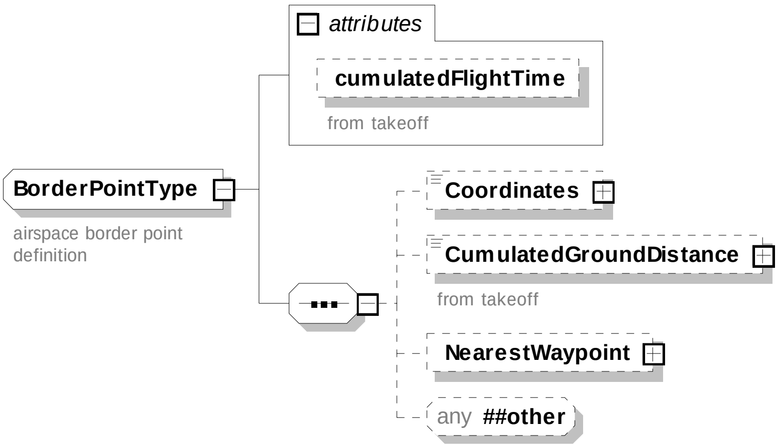
element AirspaceData/Airspace/GroundDistance

diagram	
type	extension of xs:float
properties	isRef 0 minOcc 0 maxOcc 1 content complex mixed true nillable false
attributes	Name Type Use Default Fixed annotation unit distanceUnitType NM
annotation	documentation ground distance between entry and exit points

attribute AirspaceData/Airspace/GroundDistance/@unit

type	distanceUnitType
properties	isRef 0 default NM
facets	enumeration m enumeration km enumeration NM enumeration ft

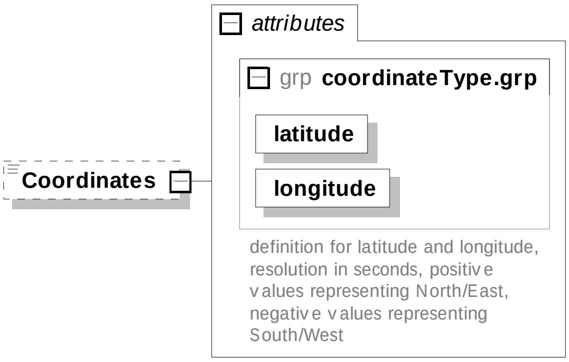
complexType BorderPointType

diagram	
children	Coordinates CumulatedGroundDistance NearestWaypoint
used by	elements AirspaceData/Airspace/Entry AirspaceData/Airspace/Exit
attributes	Name: cumulatedFlightTime; Type: xs:duration; Use: optional; Default: ; Fixed: ; annotation: documentation from takeoff
annotation	documentation airspace border point definition

attribute BorderPointType/@cumulatedFlightTime

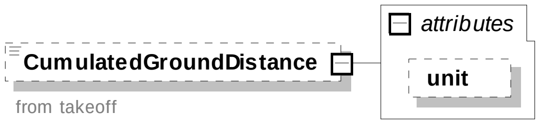
type	xs:duration
properties	isRef 0 use optional
annotation	documentation from takeoff

element BorderPointType/Coordinates

diagram	
type	extension of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name / Type / Use / Default / Fixed / annotation latitude / derived by: xs:float / required longitude / derived by: xs:float / required

5.0 COMMON ELEMENTS

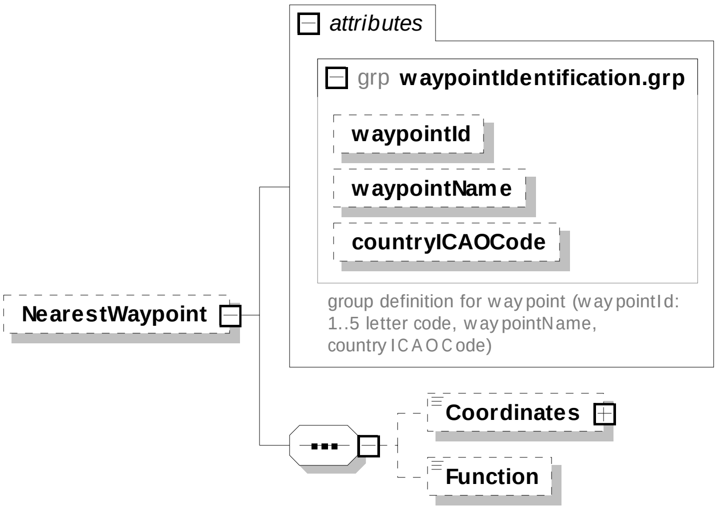
element BorderPointType/CumulatedGroundDistance

diagram						
type	extension of xs:float					
properties	isRef	0				
	minOcc	0				
	maxOcc	1				
	content	complex				
	mixed	true				
	nillable	false				
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	distanceUnitType		NM		
annotation	documentation from takeoff					

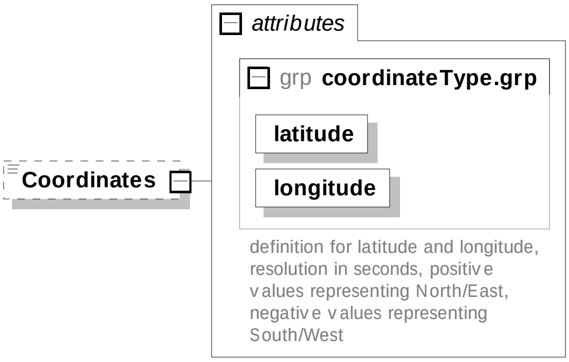
attribute BorderPointType/CumulatedGroundDistance/@unit

type	distanceUnitType	
properties	isRef	0
	default	NM
facets	enumeration	m
	enumeration	km
	enumeration	NM
	enumeration	ft

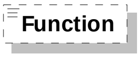
element BorderPointType/NearestWaypoint

diagram						
properties	isRef	0				
	minOcc	0				
	maxOcc	1				
	content	complex				
children	Coordinates Function					
attributes	Name	Type	Use	Default	Fixed	annotation
	waypointId	WaypointIdType	optional			
	waypointName	derived by: xs:string	optional			
	countryICAOCode	CountryICAOCodeType	optional			

element BorderPointType/NearestWaypoint/Coordinates

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:string</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
mixed true
nillable false</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>latitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>longitude</td><td>derived by: xs:float</td><td>required</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

element BorderPointType/NearestWaypoint/Function

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>restriction of xs:string</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content simple</td></tr>
<tr><td>facets</td><td>minLength 1
whiteSpace preserve</td></tr>
</table>

6.0 FUEL

6.1 Introduction

Refuel applications are used to support the aircraft's refuel processes. The following applications have been defined:

Section	Application	SMI	Label	Description
6.2	CG Targeting	JRF	RF	On “CG targeting” capable aircraft such as the Airbus A380, the refueling of the aircraft does not support a predefined, static fuel distribution like “wings, center, trim”, but a dynamic fuel distribution that targets a certain take off center of gravity (TOCG). The entry parameters for this algorithm are ZFW, ZFCG and PFQ (Pre-selected fuel quantity).
6.3	Refueling	JRE	RE	Application supports the exchange of refueling related data between aircraft and providers like fueling into-plane-services or ground ops companies.

Common XML FuelTypes: See electronic document ‘ARINC633-1 AOC.zip’ for details and examples. Common fuel types are defined in the folder schema/FUEL/ fuelcommon.xsd.

6.2 Aircraft Refueling - CG Targeting

ZFW, ZFCG are usually calculated by a ground weight & balance system and PFQ is usually calculated by a ground flight planning system. All 3 parameters can be updated during and after the refuel process. To simplify the refueling task, the fuel quantity monitoring system may be controlled by ACARS messages.

This section specifies the messages to be supported for remote control of ‘CG targeting’ capable Fuel Quantity Monitoring airborne systems.

Fuel Distribution operation for CG targeting uses the following datalink services:

1. **FUEL STATUS**: the ground operations center can request a fuel status report indicating current refuel parameters. This service is named ‘FST’ (Fuel STatus).
2. **FUEL DATA SUBMISSION**: the ground operation center can initialize or update the refueling system with new values before refueling. This service is named ‘FDA’ (Fuel DAta submission).
3. **AUTOMATIC REFUEL END**: the aircraft fuel system informs the ground operation center that refueling have completed normally. This service is named FEN (reFuel ENd).
4. **AUTO GROUND TRANSFER START**: the aircraft fuel system informs the ground operation center that an auto ground transfer has started. This service is named FTB (Fuel auto ground Transfer Begins).
5. **AUTO GROUND TRANSFER END**: the aircraft fuel system informs the ground operation center that auto ground transfer has completed normally. This service is named FTE (Fuel auto ground Transfer End).
6. **AUTO GROUND TRANSFER INTERRUPTION**: the aircraft fuel system informs the ground operation center that auto ground transfer was prematurely interrupted or has failed to complete successfully for any reason (for example, due to crew deselection, due to a failure…). This service is named FTI (Fuel auto ground Transfer Interrupted).

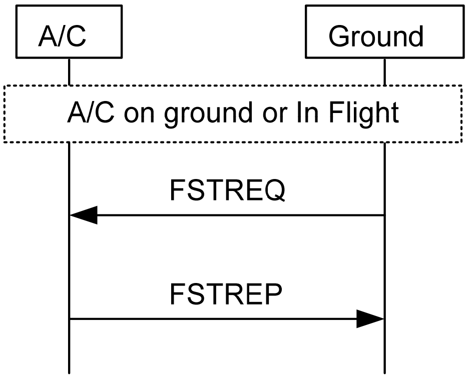
In addition to the 6 above operational services, an error service is defined to handle indication of errors to the ground.

These steps may require one or more of the following and any number of common elements to be sent. The following table shows the fuel elements defined in this section:

Table 6.2: CG-Targeting Element Table

Element Name	ACARS Label	Service Version	DL/UL	Purpose
FSTREQ	RF	1	UL	**Fuel-STatus-REQuest** Requests a fuel status report downlink
FSTREP	RF	1	DL	**Fuel-STatus-REPort** Informs the ground about the aircraft fuel status
FDASUB	RF	1	UL	**Fuel-DAta submission-SUBmit :** Submits parameters to an aircraft's refueling system
FDAACK	RF	1	DL	**Fuel-DAta submission-ACK** Mirrors submitted parameters to the ground for confirmation
FDACOM	RF	1	UL	**Fuel-DAta submission-COMmand** Activates submitted parameters after fuel-data -ack has been received
FENIND	RF	1	DL	**reFuel ENd INDication** Informs the ground of normal completion of refueling process
FTIIND	RF	1	DL	**Fuel Transfer Interrupted INDication** is sent by the airborne system when automatic fuel ground transfer has not completed successfully for any reason (for example, due to crew deselection or abort due to a failure…)
FTEIND	RF	1	DL	**Fuel auto ground Transfer End INDication** Informs the ground of normal completion of fuel transfer process
FTBIND	RF	1	DL	**Fuel-Transfer-Begins-INDication** FTBIND is sent by the airborne system when an automatic ground transfer process starts.
FERIND	RF	1	DL	**Fuel-Error INDication** Indicates an error for fuel datalink services

6.2.1 Fuel-Status



Typical Fuel Status Exchange

The fuel-status element is used to inform ground systems about the fuel situation onboard, e.g. to transmit fuel figures to a ground based weight & balance system.

The following subsections define version 1 of FST service.

Operational parameters ranges and resolution in all messages will vary depending on aircraft type. Therefore, the airline and ground operator should ensure that only messages with ranges and resolutions fitting the aircraft type will be used.

6.2.1.1 Fuel-status-request Uplink (FSTREQ)

Element Name: **FSTREQ**

The Fuel-status-request uplink should contain no parameters – and thus only contain the header.

The fuel status request uplink may contain one or several optional supplementary address(es) (as per ARINC 620).

6.2.1.2 Fuel-status-report Downlink (FSTREP)

Element Name: **FSTREP**

The fuel status report downlink may contain one or several optional supplementary address(es) (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) in the associated FSTREQ.

6.2.1.3 Dynamic Aspects

FSTREP should only be sent in response to FSTREQ.

The airborne application should also perform the actions specified in the following table. The standard application state is “listening for ACARS messages” (called “listening mode”).

Table 6.2.1.3.1 – Airborne Processing Of Non Nominal Conditions

Aircraft condition	Event	Aircraft action	Comment
Fuel system degraded mode or airborne application internal error	FSTREQ received	Send FERIND with appropriate error code and return to listening mode	
ANY	Erroneous FSTREQ received	Send FERIND with appropriate error code and return to listening mode	
ANY	FSTREQ received with a non supported version number	Send FERIND with appropriate error code 5 and supported version numbers and return to listening mode	

The ground application should also perform the actions specified in the following table.

Table 6.2.1.3.1.2 – Ground Processing Of Non-Nominal Conditions

Ground Condition	Event	Ground action	Comment
FSTREQ was sent – wait for FSTREP	Receive FERIND with error code 5 (and list of supported versions)	Analyze list of supported versions – at user's discretion – it is recommended that if one matches the versions supported by the ground, then re-send the message with good version number	
FSTREQ was sent – wait for FSTREP	Receive FERIND with error code 2, 3 or 6 (message considered erroneous)	at ground user's discretion - it is recommended that the message is corrected and re-sent	
FSTREQ was sent – wait for FSTREP	FERIND received with error code 0, 1, 4, 7, 9, 10, 11 (A/C cannot reply)	at ground user's discretion – it is recommended that at least one retry is performed before giving up	
FSTREQ was sent – wait for FSTREP	More than 10 minutes (value at user's discretion) waiting	at ground user's discretion – it is recommended that at least one retry is performed before giving up refuel targets by data link and switching to manual back up – the ground application could check if FSTREQ was declared received by the aircraft (use of ARINC Message Assurance service)	
FSTREQ was sent – wait for FSTREP	FSTREP received containing invalid data	at ground user's discretion – it is recommended that at least one retry is performed before giving up refuel targets by data link and switching to manual back up	

6.2.1.4 ACARS format

The message should only contain element one element. No supplementary header should be used here.

Label used is "RF"

Element Name: **FSTREQ01**
No data field should be embedded in FSTREQ01 message (only header and CRC information and optional supplementary addresses).

Element Name: **FSTREP01**
The element parameters should be encoded in ACARS, as follows.

Table 6.2.1.4.1 – FSTREP01 ACARS Definition

Field name	**Meaning**	**Field length (in Char)**	**Contents**		**Option**	**Range**	**Resolution**	**Unit**	**Example**
			Fixed text	**Parameter type**					
CurrentZFW	The current metric value of the aircraft's Zero Fuel Weight (Mass) parameter.	1-6		mass-kg	NO	0 to 999999	1	kg	320500
parameter separator		1	comma		NO				,
CurrentZFWSource	source that last changed ZFW (F = FMS, A = ACARS, N = EFB, Q = FQMS)	1		A	NO	'F', 'A', 'N', 'Q'	N/A		F
parameter separator		1	comma		NO				,
ZFWEntryDate	date when ZFW was last changed	6		date	NO				050125
parameter separator		1	comma		NO				,
ZFWEntryTime	time when ZFW was last changed	4		timeMin	NO				0055
parameter separator		1	comma		NO				,
CurrentZFCG	The current value of the aircraft's Zero Fuel Center-of-Gravity parameter.	3		center-of-gravity	NO	0 to 999	tenth of percent	tenth of percent	385
parameter separator		1	comma		NO				,
CurrentZFCGSource	source that last changed ZFW (F = FMS, A = ACARS, N = EFB, Q = FQMS)	1		A	NO	'F', 'A', 'N', 'Q'			A
parameter separator		1	comma		NO				,
ZFCGEntryDate	date when ZFCG was last changed	6		date	NO				050124
parameter separator		1	comma		NO				,
ZFCGEntryTime	time when ZFCG was last changed	4		timeMin	NO				2359
parameter separator		1	comma		NO				,
CurrentPFQ	The current metric value of the aircraft's Preselected Fuel Quantity parameter. This value specifies the end-quantity of the next aircraft refueling process	1-6		mass-kg	NO	0 to 999999	1	kg	230000
parameter separator		1	comma		NO				,
CurrentPFQSource	source that last changed ZFW (F = FMS, A = ACARS, N = EFB, Q = FQMS, I = Integrated Refuel panel)	1		A	NO	'F', 'A', 'N', 'Q', I			N
parameter separator		1	comma		NO				,
PFQEntryDate	date when PFQ was last changed	6		date	NO				050124
parameter separator		1	comma		NO				,
CurrentPFQTime	time when PFQ was last changed	4		timeMin	NO				2329
parameter separator		1	comma		NO				,
GWCG	The current value	3		center-of-	NO	000 to	tenth of	tenth of	397

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	of the aircraft's Gross Weight Center-of-Gravity parameter			gravity		999	percent	percent	
parameter separator		1	comma		NO				,
GWCGAccuracyState	Value of parameter accuracy ['N' (normal = all sensors agree on a value) , 'D' (degraded = error on accuracy), 'F'(Failed = impossible to report a consolidated value)]	1		A	NO	'N', 'D', 'F'			N
parameter separator		1	comma		NO				,
FOB	The current metric value of the aircraft's Fuel On Board parameter	1-6		mass-kg	NO	0 to 999999	1	kg	230100
parameter separator		1	comma		NO				,
FOBAccuracyState	Value of parameter accuracy ['N' (normal = all sensors agree on a value) , 'D' (degraded = error on accuracy), 'F' (Failed = impossible to report a consolidated value)]	1		A	NO	'N', 'D', 'F'			N
parameter separator		1	comma		NO				,
TTK	The current value of the aircraft's Trim Tank Fuel quantity	1-6		mass-kg	YES	0 to 999999	1		4200
parameter separator		1	comma		NO				,
TTKAccuracyState	Value of parameter accuracy ['N' (normal = all sensors agree on a value), 'D' (degraded = error on accuracy), 'F' (Failed = impossible to report a consolidated value)]	1		A	YES	'N', 'D', 'F'			N
parameter separator		1	comma		NO				,
Aircraft MassUnitDisplayed	Unit used for pilot display, e.g. FMS or ECAM/EICAS	2		AA	NO	KG' (for KG) or 'LB' (for Lbs)			KG

Example: (example below includes ARINC 633 header information)

```
FSTREQ01 uplink:
,FSTREQ01050125221536
/,xxxx

FSTREP01 downlink:
,FSTREP01050125221545
/320500,F,050125,0055,385,A,050124,2359,230000,N,050124,2329,397,N,23
0100,N,4200,N,KG,xxxx
```

Note: xxxx is the CRC

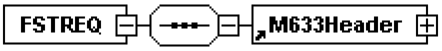
6.2.1.5 XML Format

Presently, this format should be used for ground-ground message exchanges only. Technically, it could also be used for air-ground message exchanges.

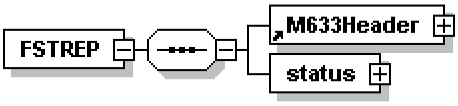
COMMENTARY

Presently, all refuel applications are connected to ACARS only and do not use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

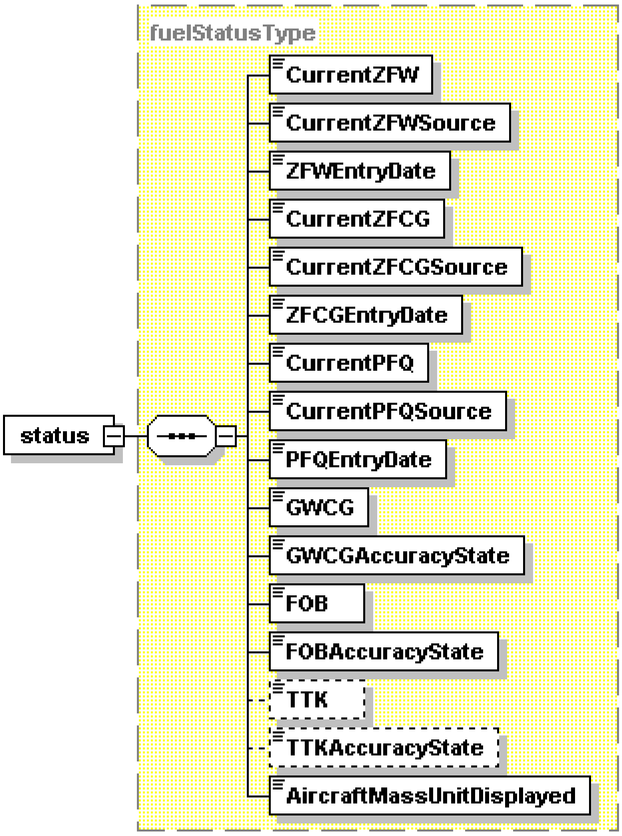
element FSTREQ

diagram	
properties	**content** **complex**
children	**M633Header**

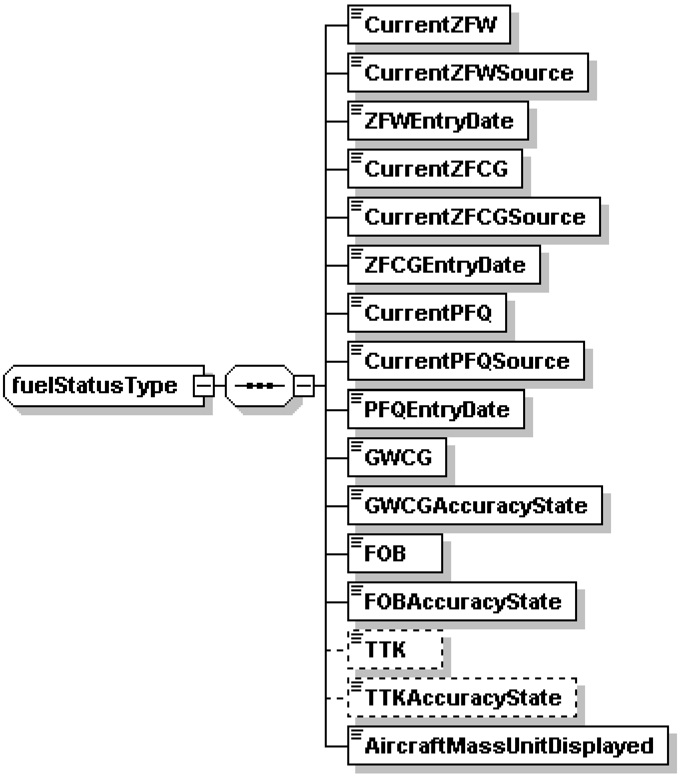
element FSTREP

diagram	
properties	**content** **complex** **nillable** **false**
children	**M633Header** **status**

element FSTREP/status

diagram	
type	fuelStatusType
properties	isRef 0 content complex nillable false
children	CurrentZFW CurrentZFWSource ZFWEntryDate CurrentZFCG CurrentZFCGSource ZFCGEntryDate CurrentPFQ CurrentPFQSource PFQEntryDate GWCG GWCGAccuracyState FOB FOBAccuracyState TTK TTKAccuracyState AircraftMassUnitDisplayed

complexType fuelStatusType

diagram	
children	CurrentZFW CurrentZFWSource ZFWEntryDate CurrentZFCG CurrentZFCGSource ZFCGEntryDate CurrentPFQ CurrentPFQSource PFQEntryDate GWCG GWCGAccuracyState FOB FOBAccuracyState TTK TTKAccuracyState AircraftMassUnitDisplayed
used by	elements FSTREP/status FENIND/status FTEIND/status FTIIND/status

element fuelStatusType/CurrentZFW

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 content simple

element fuelStatusType/CurrentZFWSource

diagram	
type	xs:string
properties	isRef 0 content simple

element fuelStatusType/ZFWEntryDate

diagram	
type	xs:dateTime
properties	isRef 0 content simple

element fuelStatusType/CurrentZFCG

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 content simple

element fuelStatusType/CurrentZFCGSource

diagram	
type	xs:string
properties	isRef 0 content simple

element fuelStatusType/ZFCGEntryDate

diagram	
type	xs:dateTime
properties	isRef 0 content simple

element fuelStatusType/CurrentPFQ

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 content simple

element fuelStatusType/CurrentPFQSource

diagram	
type	xs:string
properties	isRef 0 content simple

element fuelStatusType/PFQEntryDate

diagram	
type	xs:dateTime
properties	isRef 0 content simple

element fuelStatusType/GWCG

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 content simple

element fuelStatusType/GWCGAccuracyState

diagram	
type	xs:string
properties	isRef 0 content simple

element fuelStatusType/FOB

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 content simple

element fuelStatusType/FOBAccuracyState

diagram	
type	xs:string
properties	isRef 0 content simple

element fuelStatusType/TTK

diagram	
type	xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple

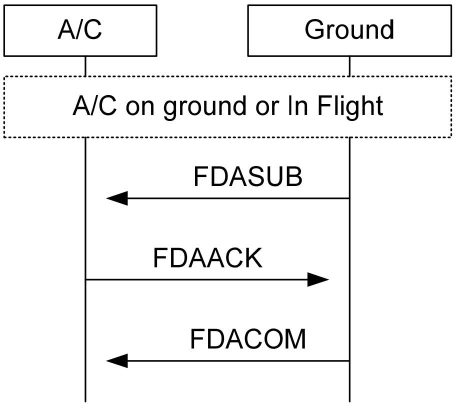
element fuelStatusType/TTKAccuracyState

diagram	
type	xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple

element fuelStatusType/AircraftMassUnitDisplayed

diagram	
type	xs:string
properties	isRef 0 content simple

6.2.2 Fuel Data Submission Service



Typical Fuel data submission exchange

The elements defined here are needed to specify the data required by the aircraft fuel system to perform refueling using CG targeting. Data uplinked to the aircraft “fuel system” is acknowledged by mirroring the uplinked values to the ground. A separate command uplink is needed for activation. This uplink also specifies if a message needs to be sent at completion of refuel operation (FENIND). Typically the three messages are sent in the order submit, ack and command. Typically the messages are used on the ground during preflight but may be exchanged at any time before, during or after the flight. Detailed use of these data by the fuel system is Aircraft implementation dependent and is outside the scope of this document.

This section defines version 1 of Fuel data service.

Operational parameters ranges and resolution in all messages will vary depending on aircraft type. Therefore, the airline and ground operator should ensure that only messages with ranges and resolutions fitting the aircraft type will be used.

6.2.2.1 Fuel-DAta-SUBmit uplink (FDASUB)

Element Name: **FDASUB**

The fuel data submit uplink may contain one and a maximum of one optional supplementary address (as per ARINC 620).

All the data fields of this element are optional – at least one should be specified in FDASUB01 message.

6.2.2.2 Fuel-DAta-ACK downlink (FDAACK)

Element Name: **FDAACK**

The fuel data ack downlink may contain one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address (if present) in the associated FDASUB.

This element should contain copies of the parameter values received in the FDASUB message. If a given value has been detected as invalid (out of range) by the airborne application, character ‘X’ should be sent instead of the concerned parameter.

6.2.2.3 Fuel-DAta-COMmand uplink (FDACOM)

Element Name: **FDACOM**

The fuel data command uplink may contain one and a maximum of one optional supplementary address (as per ARINC 620).

6.2.2.4 Dynamic aspects

- FDASUB, FDAACK and FDACOM should always be sent in the order specified above.
- When a valid FDASUB message has been received, the airborne refuel application should consider that a transaction has been ‘opened’. A transaction should be considered ‘closed’ when the airborne application has received the FDACOM from ground or when a time out after transmission of FDAACK has elapsed without receiving any FDACOM.
- The ground should generate FDACOM message within a delay following reception of FDAACK, compatible with the time-out value used by the airborne system.
- The aircraft should generate FDAACK message within a delay following reception of FDASUB, compatible with the time out value used by the ground system.

COMMENTARY

10mn can be considered as a reasonable value for airborne and ground time-out delays.

COMMENTARY

The airborne application may only support one transaction at a time. If no supplementary addresses are embedded in the messages, may consider that two ground applications are the same application.

- If multiple ground applications interact with the aircraft fuel system, supplementary addresses should be used to identify unambiguously the ground application.
- The airborne system is likely to clear received data at a point in the flight cycle as specified by the system supplier. Data should not be sent to the system during this flight phase(s).

COMMENTARY

The time when the airborne system can clear the received data is implementation dependent and may be obtained from supplier documentation.

The following tables define the required or recommended behavior (detailed in the tables) for the aircraft application and ground application for non-nominal conditions.

Table 6.2.2.4.1 – Airborne Processing Of Non Nominal Conditions

Aircraft Condition	Event	Aircraft Action	Comment
Any	Erroneous FDASUB (Includes condition where ‘final refuel’ flag is absent and current_PFQ is specified and the contrary) or FDACOM received	Send FERIND with appropriate error code No change on on-going transaction if started	
No transaction opened or FDAACK not yet sent	FDACOM received	- Send FERIND with error code 2 - current transaction continues	
Transaction opened	FDASUB received	- Send FERIND with error code 21 - current transaction continues	
FDAACK was sent following reception of FDASUB	No FDACOM received after FDAACK transmission before airborne time out delay	Send FERIND with error code 1 Abort transaction	
Any	FDASUB or FDACOM received with a non supported version number	-Send FERIND with error code 5 and list of supported versions of this service -- current transaction continues (if any)	
Fuel system degraded mode or airborne application internal error	Message received	-Send FERIND with appropriate error code - Abort transaction if any	
No transaction opened	FDASUB with "Out of range" parameters	-Send FDAACK with ‘X’ for the concerned parameter (s) -Transaction opened (wait for FDACOM with ‘cancel’)	

Table 6.2.2.4.2 – Ground processing of Non Nominal Conditions

Ground condition	Event	Ground action	Comment
Any	FERIND received with error codes 0, 1, 4, 7, 9, 10, 11 (Fuel system degraded mode or airborne application internal error)	At ground user's discretion – it is recommended that at least one retry appropriate to the error code is performed before giving up refuel targets by data link and switching to manual back up	
FDASUB transmitted to the aircraft	FDAACK not received by the ground before ground time out delay, following FDASUB transmission to the aircraft	At ground user's discretion – it is recommended that at least one retry is performed before giving up refuel targets by data link and switching to manual back up – the ground application should check if FDASUB was declared received by the aircraft (use of ARINC Message Assurance service)	
FDASUB transmitted to the aircraft	FDAACK received containing invalid data (Includes condition where 'final refuel' flag is absent and current_PFQ is specified and the contrary)	at ground user's discretion – it is recommended that at least one retry is performed before giving up refuel targets by data link and switching to manual back up and send FDACOM with cancel	
Any	Receive FERIND with error code 5 (and list of supported versions)	Analyze list of supported versions – at user's discretion – it is recommended that if one matches the versions supported by the ground, then re-send the message with good version number	
after any message sent	Receive FERIND with error code 2, 3 or 6 (message considered erroneous)	at ground user's discretion - it is recommended that the message is corrected and re-sent	
FDASUB transmitted to the aircraft	FERIND received with code 21	Wait for airborne time out delay before sending FSTREQ for checking new values then resubmitting the message if always needed, or check with other ground system that controls refueling.	
FDASUB transmitted to the aircraft	FDAACK received with 'X' value for some parameters	Ground system should cancel the transaction by sending FDACOM (cancel).	

6.2.2.5 ACARS format

The message will only contain one element. No supplementary header should be used here. Label used is "RF"

Table 6.2.2.5.1 – FDASUB01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter type					
CurrentZFW	The current metric value of the aircraft's Zero Fuel Weight (Mass) parameter or, if out of value, the constant "X"	1-6		mass-kg	YES	0 to 999999	1	kg	320500
parameter separator		1	comma		NO				,
CurrentZFCG	The current value of the aircraft's Zero Fuel Center-of-Gravity parameter.	3		center-of-gravity	YES	000 to 999	tenth of percent	tenth of percent	385
parameter separator		1	comma		NO				,
CurrentPFQ	The current metric value of the aircraft's Preselected Fuel Quantity parameter. This value specifies the end-quantity of the next aircraft refueling process	1-6		mass-kg	YES	0 to 999999	1	kg	230000
parameter separator		1	comma		NO				,
FinalRefuelOperation	Indicates if this Fuel data submission will be the final one – (1 = final refuel operation) - see Section 6.2.3.1 FENIND dynamic description for details	1		boolean	YES, but always present, if Current PFQ parameter is defined	'0' or '1'			1

FDASUB should contain at least one parameter (current ZFW, ZFCG or PFQ).

Note: If FDASUB is sent without any value, it is regarded as erroneous and generates FERIND with appropriate error code.

Table 6.2.2.5.2 – FDAACK01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter Type					
CurrentZFW	The current metric value of the aircraft's Zero Fuel Weight (Mass) parameter.	1-6		mass-kg or constant	YES (present if parameter was received in FDA-SUB message)	0 to 999999 or 'X'	1	kg	320500
parameter separator		1	comma		NO				,
CurrentZFCG	The current value of the aircraft's Zero Fuel Center-of-Gravity parameter.	3		center-of-gravity or constant	YES (present if parameter was received in FDA-SUB message)	000 to 999 or 'X'	tenth of percent	tenth of percent	385
parameter separator		1	comma		NO				,
CurrentPFQ	The current metric value of the aircraft's Preselected Fuel Quantity parameter. This value specifies the end-quantity of the next aircraft refueling process	1-6		mass-kg	YES	0 to 999999	1	kg	230000
parameter separator		1	comma		NO				,
FinalRefuelOperation	Indicates if this Fuel data submission will be the final one: (1 = final refuel operation). See Section 6.2.3.1 FENIND dynamic description for details.	1		boolean	YES, but always present, if CurrentPFQ parameter is defined	'0' or '1'			1

Table 6.2.2.5.3 – FDACOM01 ACARS Definition

Field name	**Meaning**	**Field length (in Char)**	**Contents**		**Option**	**Range**	**Resolution**	**Unit**	**Example**
			Fixed text	Variable text					
Confirm Status	'1' = Confirm (FDAACK received correctly and matches FDASUB), '0' or any other value means cancel	1		B	NO	0 to 1			1

Example

In the following scenario an A380 is fueled to 230000 kg. The estimated ZFW of 320500 kg and the estimated ZFCG of 38.5%, which are needed for the A380 specific CG Targeting process, become available later. Due to a ZFCG out of range (A380 Fuel system allows a max of ZFCG = 44%), the ground canceled the transaction and a corrected message resent.

```
FDASUB01 uplink:
,FDASUB01050125221536
/,,230000,0,xxxx
FDAACK01 downlink:
,FDAACK01050125221539
/,,230000,0,xxxx
FDACOM01 uplink:
,FDACOM01050125221539
/1,xxxx

FDASUB01 uplink:
,FDASUB01050125221902
/320500,500,,,xxxx
FDAACK01 downlink:
,FDAACK01050125221909
/320500,X,,,xxxx
FDACOM01 uplink:
,FDACOM01050125221912
/0,xxxx

FDASUB01 uplink:
,FDASUB01050125223502/320500,385,,,xxxx
FDAACK01 downlink:
,FDAACK01050125223509
/320500,385,,,xxxx
FDACOM01 uplink:
,FDACOM01050125223512
/1,xxxx
```

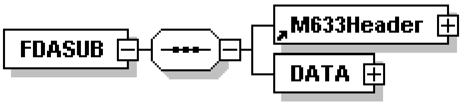
6.2.2.6 XML Format

This format should be used for ground-ground message exchanges only.

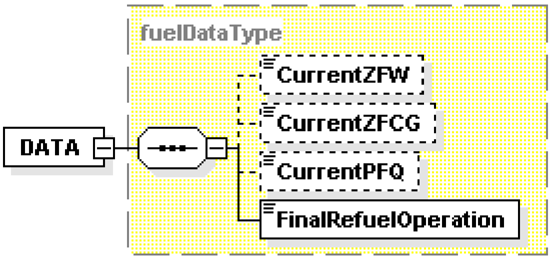
COMMENTARY

Presently, all refuel applications are connected to ACARS only and do NOT use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

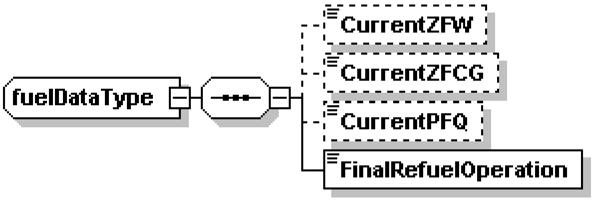
element FDASUB

diagram	
properties	**content** **complex**
children	M633Header DATA

element FDASUB/DATA

diagram	
type	**fuelDataType**
properties	**isRef** 0 **content** complex
children	CurrentZFW CurrentZFCG CurrentPFQ FinalRefuelOperation

complexType fuelDataType

diagram	
children	CurrentZFW CurrentZFCG CurrentPFQ FinalRefuelOperation
used by	**elements** FDASUB/DATA FDAACK/DATA

element fuelDataType/CurrentZFW

diagram	
type	xs:nonNegativeInteger
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple

element fuelDataType/CurrentZFCG

diagram	
type	xs:nonNegativeInteger
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple

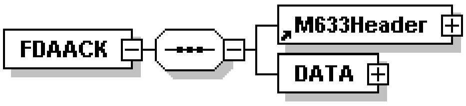
element fuelDataType/CurrentPFQ

diagram	
type	xs:nonNegativeInteger
properties	**isRef** 0 **minOcc** 0 **maxOcc** 1 **content** simple

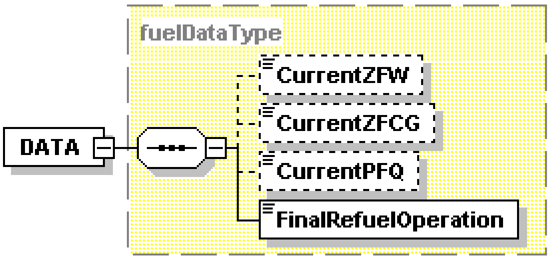
element fuelDataType/FinalRefuelOperation

diagram	
type	xs:boolean
properties	isRef 0 content simple

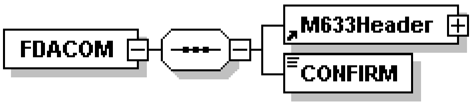
element FDAACK

diagram	
properties	content complex
children	M633Header DATA

element FDAACK/DATA

diagram	
type	fuelDataType
properties	isRef 0 content complex
children	CurrentZFW CurrentZFCG CurrentPFQ FinalRefuelOperation

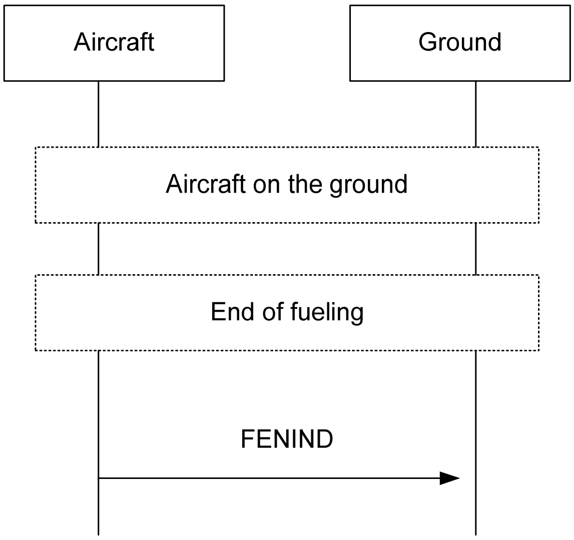
element FDACOM

diagram	
properties	content complex
children	M633Header CONFIRM

element FDACOM/CONFIRM

diagram	
type	xs:boolean
properties	isRef 0 content simple

6.2.3 reFuel ENd



Typical Fuel end exchange

End of refueling event is necessary to allow generation by ground system of a precise Load and Trim Sheet (fuel quantities in tanks may differ from the one known by ground system during refueling process).

This section defines version 1 of reFuel End service.

6.2.3.1 reFuel-ENd-INDication downlink (FENIND)

Element Name: **FENIND**

6.2.3.2 Dynamic Aspects

FENIND is sent by the airborne system at the end of a successful refueling process.

FENIND should not be generated if the PFQ used for refuel was received in a FDASUB message with ‘Final refuel operation’ flag set to ‘0’. FENIND should be generated in all other cases (remote, i.e. activation by FDASUB with flag set to ‘1’, or locally by airborne system or locally on the aircraft (from FMS, Integrated Refuel panel...)).

If fuel system data necessary for FENIND transmission the system are missing at the end of a Refuel operation, then FENIND message should not be sent and error message with error type ‘missing data, code 7 should be sent , with FENIND referenced as erroneous service and element

6.2.3.3 ACARS Format

The message will only contain one element. The refuel end indication downlink may contain one or several optional supplementary address(es) (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) in the last RF uplink (if received).

Label used is “RF”

FENIND01

The element should be encoded in ACARS exactly as FSTREP01 element (refer to Section 6.2.1.4).

Example: (example below includes header information)

```
FENIND01 downlink:
,FENIND01050125221545
/320500,F,050125,0055,385,A,050124,2359,230000,N,050124,2329,397,N,23
0100,N,4200,N,KG,xxxx
```

(Note: xxxx is the CRC)

6.2.3.4 XML Format

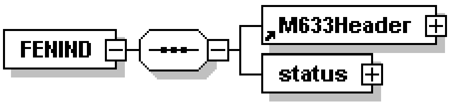
This format should be used for ground-ground message exchanges only.

COMMENTARY

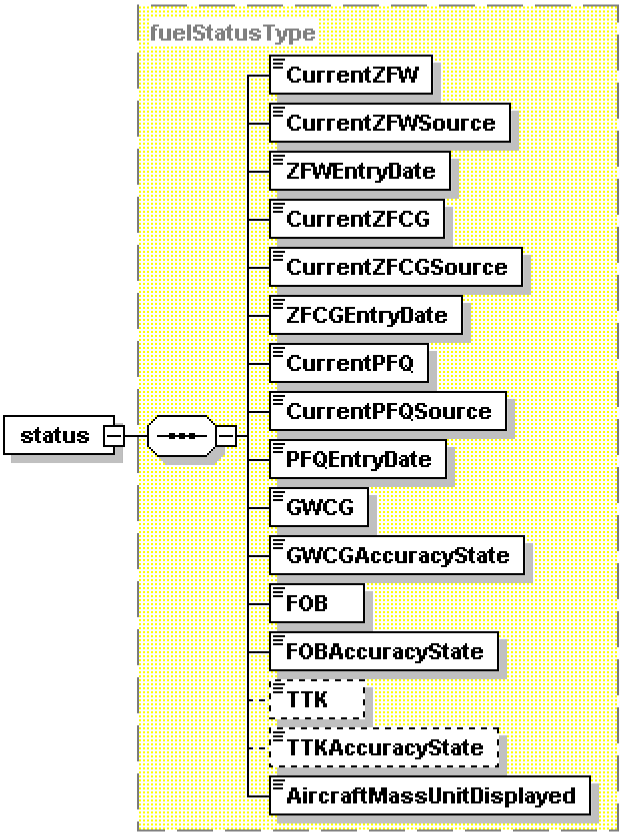
> Presently, all refuel applications are connected to ACARS only and do NOT use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

FEN XML Schema Definition (including the ARINC 633 header)

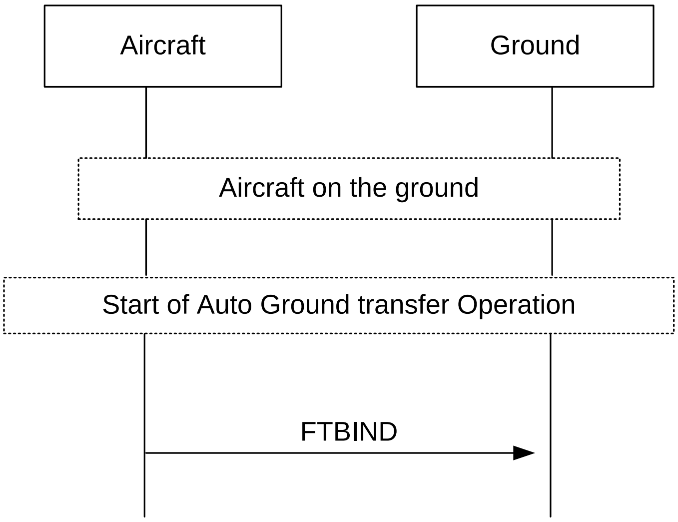
element FENIND

diagram	
properties	**content** **complex**
children	M633Header status

element FENIND/status

diagram	
type	fuelStatusType
properties	isRef 0 content complex
children	CurrentZFW CurrentZFWSource ZFWEntryDate CurrentZFCG CurrentZFCGSource ZFCGEntryDate CurrentPFQ CurrentPFQSource PFQEntryDate GWCG GWCGAccuracyState FOB FOBAccuracyState TTK TTKAccuracyState AircraftMassUnitDisplayed

6.2.4 Automatic Ground Transfer Start



Typical Auto Ground Fuel Transfer Start Exchange

This section defines version 1 of Automatic ground transfer start indication.

6.2.4.1 Fuel-Transfer-Begins-INDication Downlink (FTBIND)

Element name: **FTBIND**

FTBIND message transfer should be optional.

6.2.4.2 Dynamic Aspects

FTBIND is sent by the airborne system when an automatic ground transfer process starts.

6.2.4.3 ACARS Format

The message will only contain one element. The fuel automated transfer end indication downlink may contain one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) in the last RF uplink (if received).

Label used is “RF”

FTBIND01

The Fuel-transfer-begin-indication downlink should contain no parameters – and thus only contain the basic header (not the supplementary header).

COMMENTARY

Time and Date are needed for this message – it has been deemed acceptable to use the information already contained in the ARINC 633 header.

Example: (example below includes header information)

```
FTBIND01 downlink:
,FTBIND01050125221545
/,xxxx
```

Note: xxxx is the CRC

6.2.4.4 XML Format

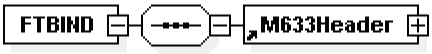
This format should be used for ground-ground message exchanges only.

COMMENTARY

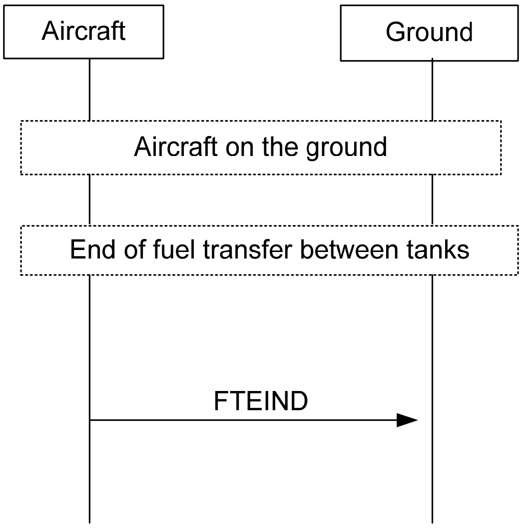
Presently, all refuel applications are connected to ACARS only and do NOT use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

FTB XML Schema Definition (including the ARINC 633 header)

element FTBIND

diagram	
properties	**content** **complex**
children	**M633Header**

6.2.5 Automatic Ground Transfer End



Typical Auto ground Fuel Transfer End exchange

End of auto ground transfer event is necessary to allow generation by ground system of a precise Load and Trim Sheet (fuel quantities in various tanks may differ from the one known by ground system during refueling process).

This section defines version 1 of automatic ground Transfer End INDication.

6.2.5.1 Fuel-automatic-Transfer-End-INDication Downlink (FTEIND)

Element Name: **FTEIND**

6.2.5.2 Dynamic Aspects

FTEIND is sent by the airborne system at the end of a successful automatic ground transfer process.

COMMENTARY

A380 examples of premature cessation include de-selection by the pilot of the ground transfer process and termination of the AGT due to engine start.

If fuel system data necessary for the system are missing at the end of an Auto ground fuel transfer operation, then FTEIND message should not be sent and the error message with the error type ‘missing data’, code 7, should be sent with FTEIND referenced as erroneous service and element.

6.2.5.3 ACARS Format

The message will only contain one element. The fuel automated transfer end indication downlink may contain one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) in the last RF uplink (if received).

If fuel system data necessary for the system are missing at the end of a Refuel operation, then an FENIND message should not be sent and the error message with the error type ‘missing data’, code 7, should be sent.

Label used is “RF”

FTEIND01

The element should be encoded in ACARS exactly as FSTREP01 element (refer to Section 6.2.1.4).

Example: (example below includes header information)

```
FTEIND01 downlink:
,FTEIND01050125221545
/320500,F,050125,0055,385,A,050124,2359,230000,N,050124,2329,397,N,23
0100,N,4200,N,KG,xxxx
```

Note: xxxx is the CRC

6.2.5.4 XML Format

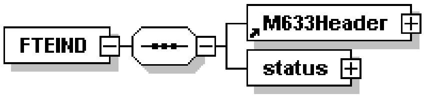
This format should be used for ground-ground message exchanges only.

COMMENTARY

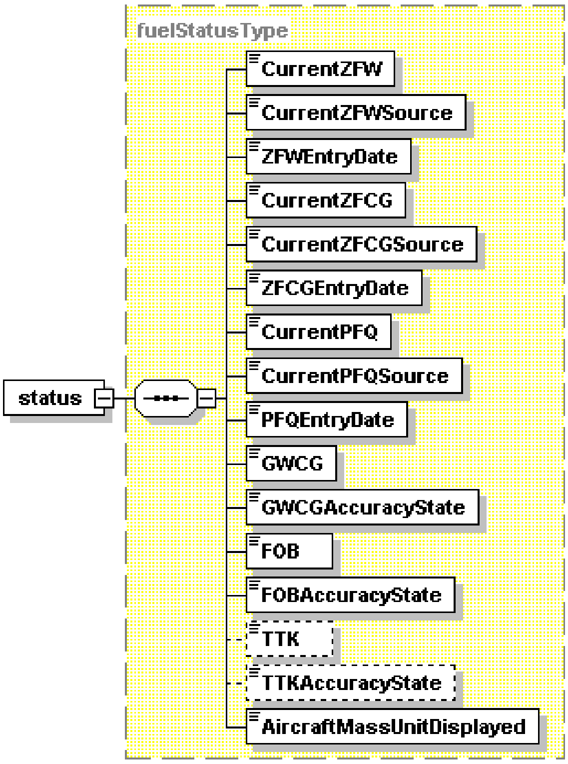
Presently, all refuel applications are connected to ACARS only and do NOT use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

FTE XML Schema Definition (including the 633 header)

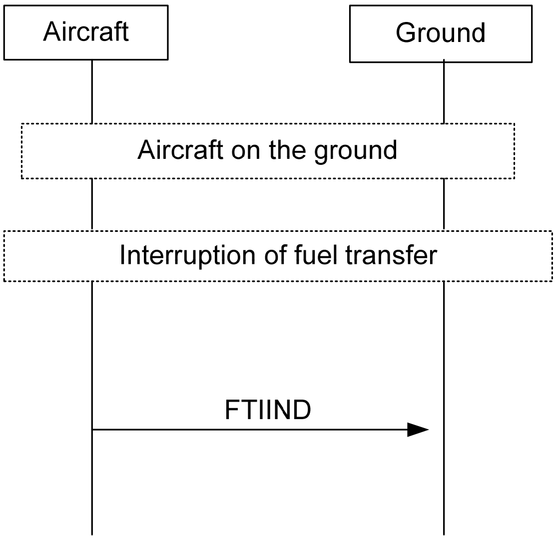
element FTEIND

diagram	
properties	**content** **complex**
children	**M633Header** **status**

element FTEIND/status

diagram	
type	fuelStatusType
properties	isRef 0 content complex
children	CurrentZFW CurrentZFWSource ZFWEntryDate CurrentZFCG CurrentZFCGSource ZFCGEntryDate CurrentPFQ CurrentPFQSource PFQEntryDate GWCG GWCGAccuracyState FOB FOBAccuracyState TTK TTKAccuracyState AircraftMassUnitDisplayed

6.2.6 Automatic Ground Transfer Interrupted



Typical Auto Ground Fuel Transfer Interruption Exchange

This section defines version 1 of automatic ground Transfer Interruption Indication.

6.2.6.1 Fuel-automatic-Transfer-Interruption-Indication Downlink (FTIIND)

Element Name: **FTIIND**

6.2.6.2 Dynamic Aspects

FTIIND is sent by the airborne system when automatic fuel ground transfer has not completed successfully for any reason (for example, due to crew deselection or abort due to a failure). Automatic Fuel ground transfer operation is prematurely interrupted.

If fuel system data necessary for FTIIND transmission the system are missing at the end of an interrupted Auto ground fuel transfer operation, then FTIIND message should not be sent and error message with error type 'missing data, code 7 should be sent with FTIIND referenced as erroneous service and element".

6.2.6.3 ACARS Format

The message will only contain one element. The fuel automated transfer Interruption indication downlink may contain one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address (es) (if present) in the last RF uplink (if received).

Label used is "RF"

FTIIND01
The element should be encoded in ACARS exactly as FSTREP01 element (refer to Section 6.2.1.4).

Example: (example below includes header information)

`FTIIND01 downlink:`

```
,FTIIND01050125221545
/320500,F,050125,0055,385,A,050124,2359,230000,N,050124,2329,397,
N,230100,N,4200,N,KG,xxxx
```

Note xxxx is the CRC

6.2.6.4 XML Format

This format should be used for ground-ground message exchanges only.

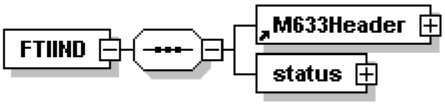
COMMENTARY

Presently, all refuel applications are connected to ACARS only and do NOT use any XML messages. The XML messages defined in Section 6.2 may be used instead of the ACARS messages on IP-based ground-ground links only.

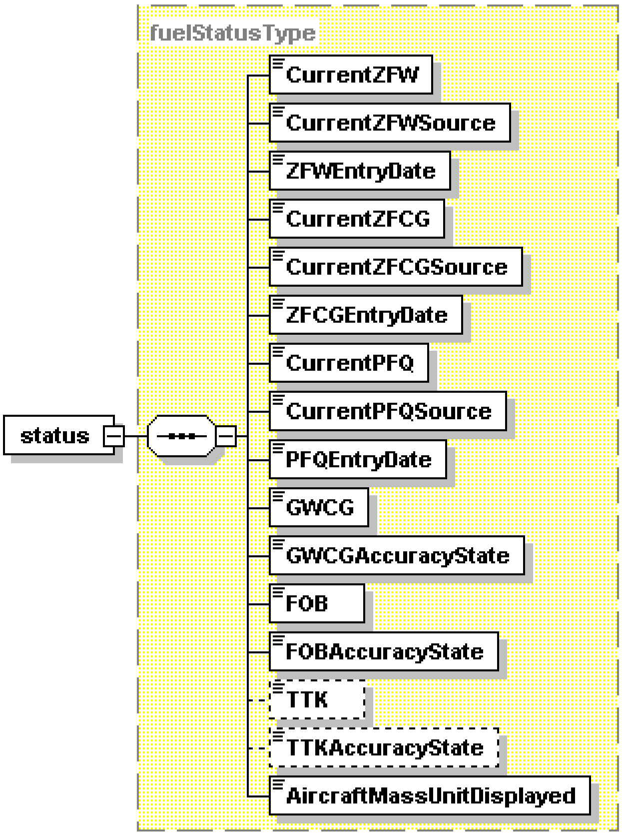
FTE XML Schema Definition (including the 633 header)

6.0 FUEL

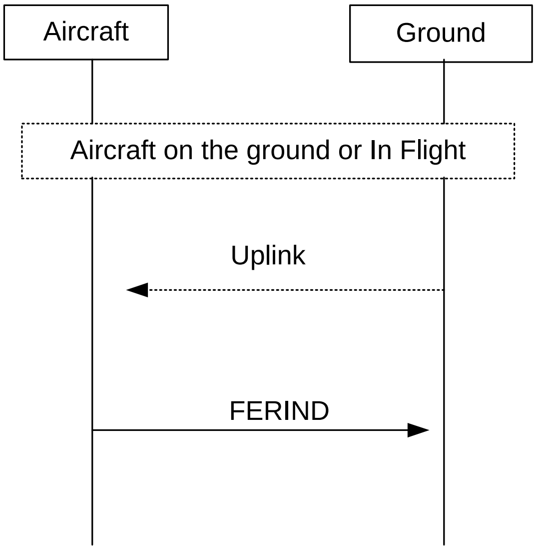
element FTIIND

diagram	
properties	content complex
children	M633Header status

element FTIIND/status

diagram	
type	fuelStatusType
properties	isRef 0 content complex
children	CurrentZFW CurrentZFWSource ZFWEntryDate CurrentZFCG CurrentZFCGSource ZFCGEntryDate CurrentPFQ CurrentPFQSource PFQEntryDate GWCG GWCGAccuracyState FOB FOBAccuracyState TTK TTKAccuracyState AircraftMassUnitDisplayed

6.2.7 Error Service



Typical Error exchange

This service is used to report any error detected by the aircraft Fuel application to the Ground.

Depending on the type of received uplink and on its content, various types of errors will be reported by the aircraft (see in Sections 6.2.1 and 6.2.2 and in table below for list of possible error codes).

FERIND uplinks are not used by this Error service.

6.2.7.1 Fuel-Error-Indication uplink/downlink (FERIND)

Element Name: **FERIND**

6.2.7.2 Dynamic Aspects

Refer to other sections for details.

6.2.7.3 ACARS Format

The message will only contain one element. The Fuel error indication downlink may contain one or several optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) contained in last received uplink.

Label used is “RF”

Table 6.2.7.3.1 – FERIND01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter type					
parameter separator		1	comma		NO				,
erroneous Service	Service that caused the error	3		Char3Type	NO	‘XXX’ is reserved to indicate that service is unknown			FST
erroneous Element	Element that caused the error	3		Char3Type	NO	‘XXX’ is reserved to indicate that service is unknown			REP
service Version Nb	Version number of the service that caused the error	2		NN	NO				01
parameter separator		1	comma		NO				,
ErrorClass	category of error – indicates if the error is recoverable or not see Section 5.1.2	1		Integer	NO	0-3			1
parameter separator		1	comma		NO				,
errorType	See table below	2		integer	NO	00-99			1
parameter separator		1	comma		NO				,
errorData	See table below	N		(0-n)I	YES				
Parameter separador		1	comma		NO				,

Table 6.2.7.3.2 – Application Specific Error Types

Sender's Situation	Type Name	Type ID	Suggested text to user (e.g. flightcrew)	Comment
Aircraft fuel system is not able to process the uplink (i.e. Submit Fuel data process on going with another Ground system)	Busy	21		
Communication is broken with the avionics fuel system, datalink application is not able to send data to the fuel system – therefore, FDASUB is not available.	read-only	22		

Application Specific Use of Error Data

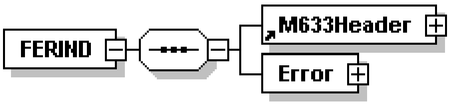
Contains vendor specific detailed information for troubleshooting (software status, source of the error, parameters values…).

In case of error 5, should only list the supported versions of the service (NN separated by spaces)

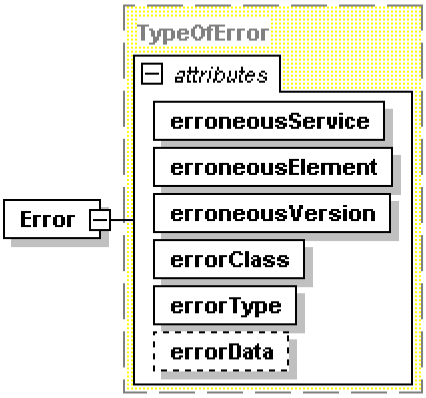
6.2.7.4 XML format

This format should be used for ground-ground message exchanges only.

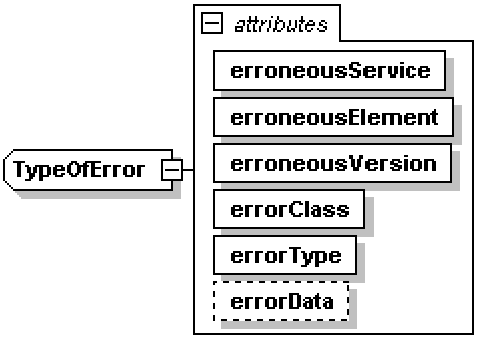
element FERIND

diagram	
properties	**content complex**
children	**M633Header Error**

element FERIND/Error

diagram						
type	**TypeOfError**					
properties	**isRef 0** **content complex**					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	erroneousService	**char3Type**	**required**			
	erroneousElement	**char3Type**	**required**			
	erroneousVersion	**xs:nonNegativeInteger**	**required**			
	errorClass	**xs:nonNegativeInteger**	**required**			
	errorType	**xs:nonNegativeInteger**	**required**			
	errorData	**xs:string**	**optional**			

complexType TypeOfError

diagram						
used by	**element FERIND/Error**					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**annotation**
	erroneousService	**char3Type**	**required**			
	erroneousElement	**char3Type**	**required**			
	erroneousVersion	**xs:nonNegativeInteger**	**required**			
	errorClass	**xs:nonNegativeInteger**	**required**			
	errorType	**xs:nonNegativeInteger**	**required**			
	errorData	**xs:string**	**optional**			

attribute TypeOfError/@erroneousService

type	**char3Type**
properties	**isRef** 0 **use** required
facets	**length** 3

attribute TypeOfError/@erroneousElement

type	**char3Type**
properties	**isRef** 0 **use** required
facets	**length** 3

attribute TypeOfError/@erroneousVersion

type	**xs:nonNegativeInteger**
properties	**isRef** 0 **use** required

attribute TypeOfError/@errorClass

type	**xs:nonNegativeInteger**
properties	**isRef** 0 **use** required

attribute TypeOfError/@errorType

type	**xs:nonNegativeInteger**
properties	**isRef** 0 **use** required

attribute TypeOfError/@errorData

type	**xs:string**
properties	**isRef** 0 **use** optional

6.3 Refueling

Application Name	Refueling
ACARS Label	RE
Introduced	2005
Purpose	The idea behind standardizing air-/ground messages related to the aircraft refueling process is the wish to refuel an aircraft - just in time and without transporting paper - with the help of airline independent into-plane-service or handling companies
Stake Holder	airlines, into-plane-services, ops handling agents
Airborne System	AOC
Ground Systems	Into plane service fuel handling system, airline or airport host, airline or airport departure control system, airline or handling agent weight & balance system
Network	ACARS
Downlink Routing	Label, Airport, Airline

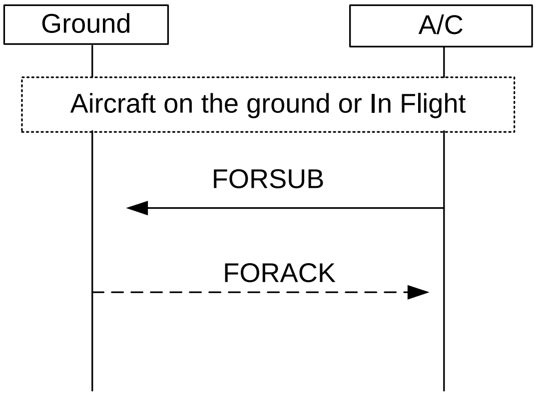
Table 6.3.0.1 – Refueling Service Table

Service Name	Service ID	Description
Fuel Order	FOR	Fuel Order: The into plane service (fuel supplier) needs to know, that a customer wants him to serve a particular flight. The into plane service or the aircraft’s refueling computer or the airline’s weight and balance department needs to know with how much fuel the pilot wants to depart
Fuel Receipt	FRC	Fuel receipt: The into plane service should tell someone how much fuel has been refilled and who was the owner of the transferred fuel. “Someone” may be the pilot who may have to verify the commercial transaction after checking his fuel gauges with an (electronic) signature.
Fuel Process	FRP	Fuel Process: During aircraft turnaround, other processes may depend on the fueling process. Therefore handling partners may need to know when fueling starts and when it is finished.
Fuel CG Advisory	FCA	Fuel CG Advisory: The CG Advisory service should inform the flight crew that the aircraft is presently out of trim and that this situation can be corrected by a re-distribution of fuel.

Table 6.3.0.2 – Refueling Element Table

Element Name	ACARS Label	Service Version	DL/UL	Purpose
FORSUB	RE	1	DL	fuel-order-submit: Submits parameters to a ground handling system. Requests or cancels a fuel track
FORACK	RE	1	UL	fuel-order-acknowledge: Confirms the reception of a fuel-order-submit downlink
FRCSUB	RE	1	UL	fuel-receipt-submit: Tells the aircraft how much volume has been supplied. May replace paper fuel receipt
FRCACK	RE	1	DL	fuel-receipt-acknowledge: Confirms the reception of a fuel-receipt-submit uplink
FPRREP	RE	1	DL/UL	fuel-process-report: Informs about fueling progress, e.g. start or end of fueling
FCAIND	RE	1	UL	Fuel CG Advisory Indication: Informs about out of trim conditions

6.3.1 Fuel Order service



Typical Fuel Order Exchange

The fuel-order element is needed to request fuel from an into-plane fuel service provider. It can be sent in all flight phases. It can be used to tell the fuel supplier that no fuel is needed today or to cancel a fuel truck previously ordered. It may contain the remaining fuel, so that the into-plane service can calculate the amount of fuel to be uploaded in the refueling process. It may either state the minimum fuel required (if block fuel has not yet been finalized, or the final block fuel.

The following subsections define version 1 of FOR service.

6.3.1.1 Fuel-order-submit downlink

Element Name: **FORSUB**

Table 6.3.1.1 – FORSUB01 and FORACK01 ACARS Definition

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed Text	Parameter Type					
OrderFlag	0 = No Fueling required, 1 = Fueling required		boolean	No				1
AcknowledgeFlag	0 = No acknowledge wanted 1 = Acknowledge requested		boolean	No				1
FinalFlag	0 = Preliminary fuel, e.g. minimum fuel before top of or not applicable 1 = Final fuel		boolean	No				0
ActualFlag	0 = Estimated remaining or not applicable 1 = Actual Remaining		boolean	No				1
parameter separator		comma		No				,
ServiceAirport	ICAO code of airport, where fueling shall take place		airport	Yes				KJFK
parameter separator		comma		No				,
IntoPlaneService	A three digit code unique to an into-plane-service company		provider-id	Yes				ABC
parameter separator		comma		No				,
ServiceFlight	Commercial flight		flight-no	YES				AF123A

	number of flight to be fueled							
parameter separator		comma		No				,
BlockFuel	Amount of fuel that should be in the aircraft after refueling or also called total fuel		mass-tt	Yes	0 - 9999 (= 999.9 tons)	100 kg	tenth of metric tons	87
parameter separator		comma		No				,
TaxiFuel	Amount of fuel required from offblock until begin of takeoff run		mass-kg	Yes	0-99999 (= 99.9 tons)	1 kg	Kilogram	200
parameter separator		comma		No	","			,
TripFuel	Amount of fuel required from begin of takeoff run until touchdown		mass-kg	Yes	0-999999 (= 999.9 tons)	1 kg	Kilogram	3450
parameter separator		comma		No	","			,
Remaining	Amount of fuel that is estimated to be in the aircraft or which is actual in the aircraft by the time the fueling starts		mass-tt	Yes	0 - 9999 (= 999.9 tons)	100 kg	tenth of metric tons	85
parameter separator		comma		No				,
AircraftMassUnitDisplay	Unit used for pilot display (Kilograms or pounds)		"KG" or "LB"	Yes				KG
parameter separator		comma		No				,
LimitMass	Most restrictive limitation on TOW, ZFW or LAW		mass-tt	YES	0-9999 (= 999.9 tons)	100 kg	tenth of metric tons	5232
parameter separator		comma		No				,
LimitType	Type of most restrictive limitation: "T" for TOW, "Z" for ZFW, "L" for LAW		U	Yes				T
parameter separator		comma		No				,
FuelTruckSTBY	Information whether the fuel truck can leave the airplane after refueling		Boolean	Yes				1

6.3.1.2 Fuel-order-acknowledge uplink

Element Name: **FORACK**

The FORACK element follows the same ACARS and XML definition as the FORSUB element.

6.3.1.3 Dynamic aspects

FORSUB and FORACK should always be sent in the order specified above.

Upon reception of a correct FORSUB, the ground system should:

- Forward the data to the appropriate end-systems. If this is not possible, the ground system should send the appropriate GENERR message
- Check the AcknowledgeFlag parameter of the FORSUB downlink. If it is set to "1", the ground system should send the FORACK message

Upon reception of an erroneous FORSUB, the ground system should send the appropriate GENERR message.

Upon receiving a GENERR message, the airborne system should, if the FORSUB was manually triggered, display a failure message to the flightcrew. The text of the failure message depends on error class and error type.

Scenario 1

An A320 sends a general fuel truck cancellation before landing in EDDF. The cancellation is confirmed by the ground.

After touchdown in EDDF, this decision is revised. In the second downlink, it asks ABC to send a fuel truck and fill up the aircraft to the minimum fuel of 8.7 tons. Its actual remaining is 8.5 tons. Again, the message is confirmed.

The third downlink is sent, after the block fuel has been finalized to 9.0 tons. Taxi fuel is specified as 200 kg, TripFuel as 3450 kg. Again, the message is confirmed.

All message envelopes have been omitted.

ACARS Example

```
FORSUB01 downlink:
,FORSUB01050324115159LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/0100,EDDF,,LH5678,,,,,,,,xxxx
FORACK01 uplink:
,FORACK01050324115202LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/0100,EDDF,,LH5678,,,,,,,,xxxx

FORSUB01 downlink:
,FORSUB01050324122359LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/1101,EDDF,ABC,,87,200,,85,KG,680,T,1,xxxx
FORACK01 uplink:
,FORACK01050324122407LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/1101,EDDF,ABC,,87,200,,85,KG,680,T,1,xxxx

FORSUB01 downlink:
,FORSUB01050324123200LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/1111,EDDF,ABC,,90,200,3450,85,KG,680,T,0,xxxx
FORACK01 uplink:
,FORACK01050324123205LFPG,,KJFK,,AFR5556,,050324,,A320,,F-WWOW,
/1111,EDDF,ABC,,90,200,3450,85,KG,680,T,0,xxxx
```

Scenario 2

An A380 in JFK asks to be filled up to a final block fuel of 125 tons. However, the fuel order service is temporarily not available.

ACARS Example

```
FORSUB01 downlink:
,FORSUB01050325050015LFPG,,KJFK,,AFR5556,,050325,,A380,,F-WWOW,
/1111,KJFK,,,1250,1000,95650,285,KG,5400,T,,xxxx

GERIND01 uplink:
,GERIND01050325050024LFPG,,KJFK,,AFR5556,,050325,,A380,,F-WWOW,
/JRE,FORSUB01,1,9,Fuel Order Error Transaction aborted Service
temporarily unavailable,0,/sorry crewxxxx
```

The flightcrew might receive the following error text:

```
Fuel Order Error

Transaction aborted

Service temporarily unavailable

sorry crew
```

6.3.1.4 ACARS format

The ACARS format specified in Table 6.3.1.1 may be used for air-ground and ground-ground messages

When using the ACARS format, the supplementary header should be used.

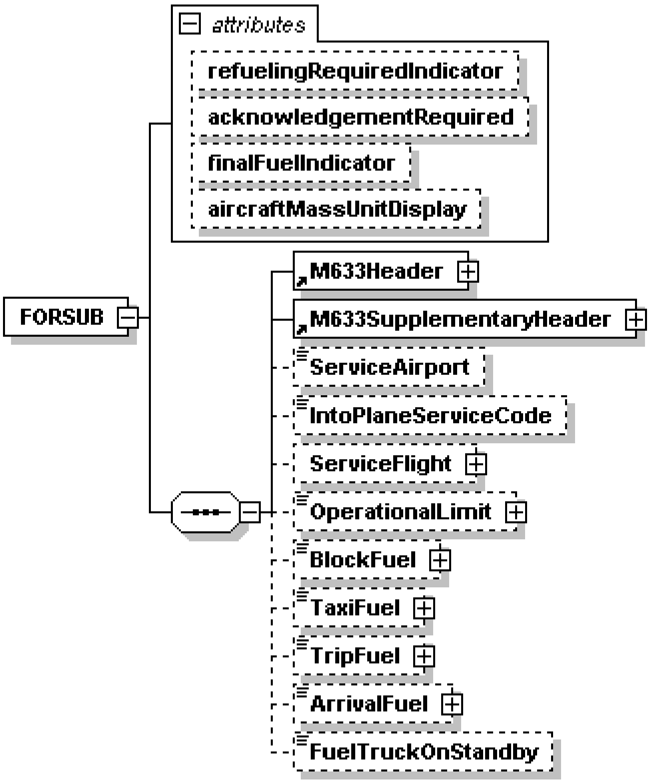
ACARS Label used should be “RE”.

6.3.1.5 XML Format

The IP/XML format may be used for air-ground and ground-ground messages.

When using the IP/XML format, the supplementary header should be used.

element FORSUB

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table><tr><td>content</td><td>complex</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader ServiceAirport IntoPlaneServiceCode ServiceFlight OperationalLimit BlockFuel TaxiFuel TripFuel ArrivalFuel FuelTruckOnStandby</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>refuelingRequiredIndicator</td><td>xs:boolean</td><td></td><td></td><td></td><td>documentation
true, if refueling/(defueling) is required, false, if no refueling(defueling) action is necessary</td></tr>
<tr><td>acknowledgementRequired</td><td>xs:boolean</td><td></td><td></td><td></td><td>documentation
true, if recipient of the FORSUB message shall provide an FORACK message</td></tr>
<tr><td>finalFuelIndicator</td><td>xs:boolean</td><td></td><td></td><td></td><td>documentation
false, if a preliminary fuel amount is being ordered/reported</td></tr>
<tr><td>aircraftMassUnitDisplay</td><td>weightUnitType</td><td></td><td></td><td></td><td>documentation
unit used for display to the pilot</td></tr>
</table></td></tr>
</table>

attribute FORSUB/@refuelingRequiredIndicator

<table>
<tr><td>type</td><td>xs:boolean</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
true, if refueling/(defueling) is required, false, if no refueling(defueling) action is necessary</td></tr>
</table>

attribute FORSUB/@acknowledgementRequired

type	xs:boolean
properties	isRef 0
annotation	documentation true, if recipient of the FORSUB message shall provide an FORACK message

attribute FORSUB/@finalFuelIndicator

type	xs:boolean
properties	isRef 0
annotation	documentation false, if a preliminary fuel amount is being ordered/reported

attribute FORSUB/@aircraftMassUnitDisplay

type	weightUnitType
properties	isRef 0
facets	enumeration kg enumeration t enumeration lb
annotation	documentation unit used for display to the pilot

element FORSUB/ServiceAirport

diagram	
type	AirportICAOCodeType
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 4
annotation	documentation Airport identification at which refueling/defueling shall take place

element FORSUB/IntoPlaneServiceCode

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation code of the into plane service company according to the IATA Fuel Quality Pool list

element FORSUB/ServiceFlight

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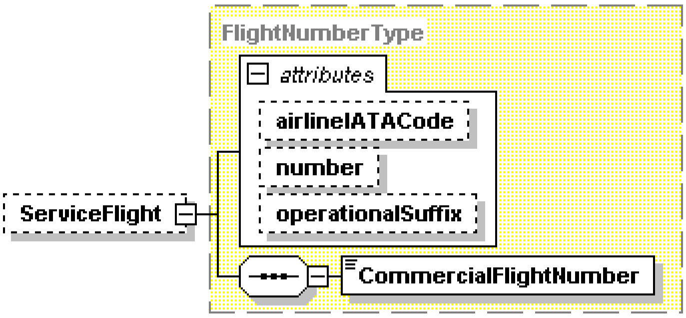
<tr><td>diagram</td><td>
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2 letter airline code, e.g. SK</td></tr>
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operational suffix, e.g. Q</td></tr>
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Commercial Flight Number of flight to be refueled/defueled</td></tr>
</table>

element FORSUB/OperationalLimit

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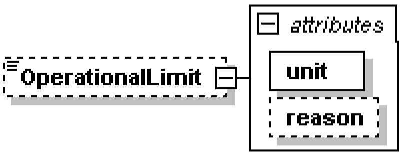
<tr><td>diagram</td><td>
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reason for operational limit</td></tr>
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Maximum Allowable Takeoff Weight</td></tr>
</table>

attribute FORSUB/OperationalLimit/@unit

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<tr><td>facets</td><td><table>
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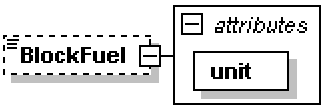
<tr><td>enumeration</td><td>t</td></tr>
<tr><td>enumeration</td><td>lb</td></tr>
</table></td></tr>
</table>

attribute FORSUB/OperationalLimit/@reason

type	xs:string
properties	isRef 0
annotation	documentation reason for operational limit

element FORSUB/BlockFuel

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
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maxOcc 1
content complex
nillable false</td></tr>
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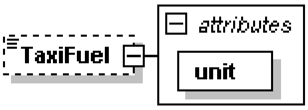
<tr><td>unit</td><td>weightUnitType</td><td>required</td><td></td><td></td><td></td></tr>
</table>

attribute FORSUB/BlockFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

element FORSUB/TaxiFuel

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
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maxOcc 1
content complex
nillable false</td></tr>
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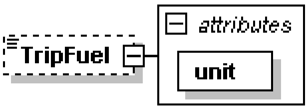
<tr><td>unit</td><td>weightUnitType</td><td>required</td><td></td><td></td><td></td></tr>
</table>

attribute FORSUB/TaxiFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

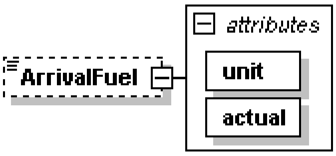
element FORSUB/TripFuel

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name: unit Type: weightUnitType Use: required Default: Fixed: annotation:

attribute FORSUB/TripFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

element FORSUB/ArrivalFuel

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name: unit Type: weightUnitType Use: required Default: Fixed: annotation: Name: actual Type: xs:boolean Use: required Default: Fixed: annotation: documentation true, if actual false, if estimated
annotation	documentation estimated or actual arrival fuel of the previous flight

attribute FORSUB/ArrivalFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

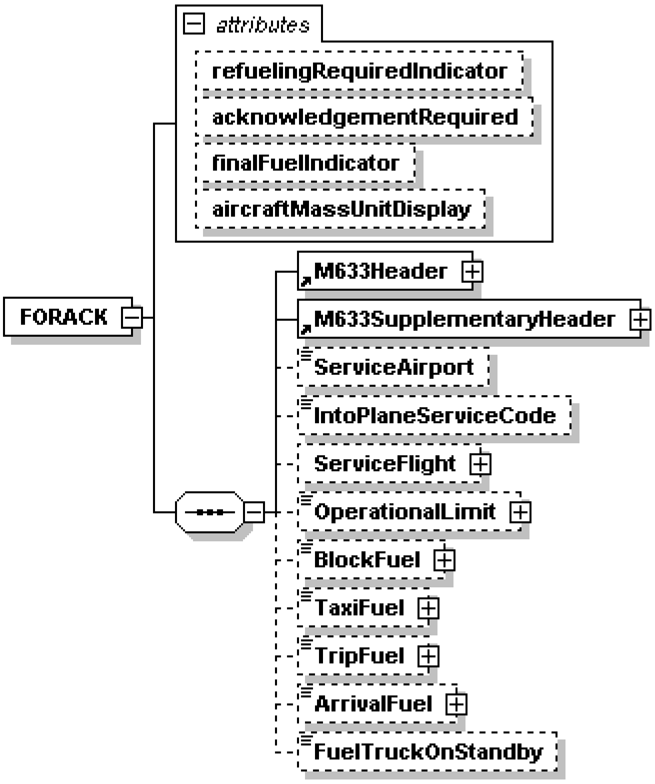
attribute FORSUB/ArrivalFuel/@actual

type	xs:boolean
properties	isRef 0 use required
annotation	documentation true, if actual false, if estimated

element FORSUB/FuelTruckOnStandby

diagram	
type	xs:boolean
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation information whether or not the fuel truck can leave the parking stand after refueling

element FORACK

<table>
<tr><td>diagram</td><td>
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false, if a preliminary fuel amount is being ordered/reported</td></tr>
<tr><td>aircraftMassUnitDisplay</td><td>weightUnitType</td><td></td><td></td><td></td><td>documentation
unit used for display to the pilot</td></tr>
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attribute FORACK/@refuelingRequiredIndicator

<table>
<tr><td>type</td><td>xs:boolean</td></tr>
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<tr><td>annotation</td><td>documentation
true, if refueling/(defueling) is required, false, if no refueling(defueling) action is necessary</td></tr>
</table>

attribute FORACK/@acknowledgementRequired

type	xs:boolean
properties	isRef 0
annotation	documentation true, if recipient of the FORSUB message shall provide an FORACK message

attribute FORACK/@finalFuelIndicator

type	xs:boolean
properties	isRef 0
annotation	documentation false, if a preliminary fuel amount is being ordered/reported

attribute FORACK/@aircraftMassUnitDisplay

type	weightUnitType
properties	isRef 0
facets	enumeration kg enumeration t enumeration lb
annotation	documentation unit used for display to the pilot

element FORACK/ServiceAirport

diagram	
type	AirportICAOCodeType
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 4
annotation	documentation Airport identification at which refueling/defueling shall take place

element FORACK/IntoPlaneServiceCode

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation code of the into plane service company according to the IATA Fuel Quality Pool list

element FORACK/ServiceFlight

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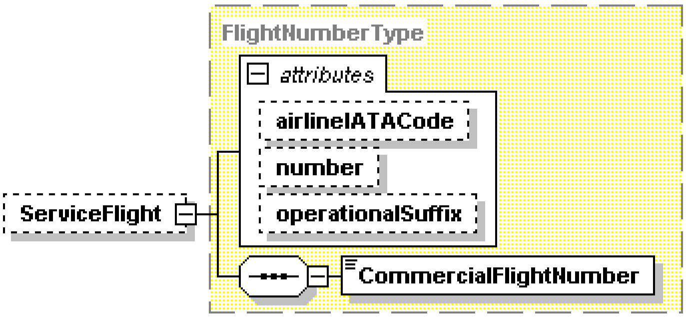
<tr><td>diagram</td><td>
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1 to 5 digits, e.g. 014, 14</td></tr>
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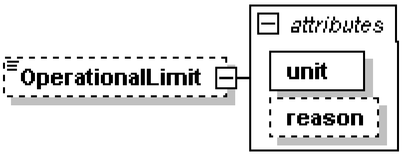
element FORACK/OperationalLimit

<table>
<tr><td>diagram</td><td>
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reason for operational limit</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Maximum Allowable Takeoff Weight</td></tr>
</table>

attribute FORACK/OperationalLimit/@unit

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<tr><td>use</td><td>required</td></tr>
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<tr><td>enumeration</td><td>t</td></tr>
<tr><td>enumeration</td><td>lb</td></tr>
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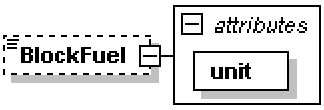
attribute FORACK/OperationalLimit/@reason

type	xs:string
properties	isRef 0
annotation	documentation reason for operational limit

element FORACK/BlockFuel

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
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content complex
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weightUnitType</td><td>Use
required</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
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attribute FORACK/BlockFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

element FORACK/TaxiFuel

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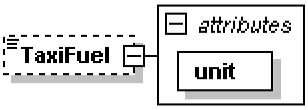
<tr><td>diagram</td><td colspan="6"> </td></tr>
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maxOcc 1
content complex
nillable false</td></tr>
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unit</td><td>Type
weightUnitType</td><td>Use
required</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
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attribute FORACK/TaxiFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

element FORACK/TripFuel

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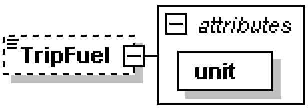
<tr><td>diagram</td><td>
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<tr><td>properties</td><td><table>
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attribute FORACK/TripFuel/@unit

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<tr><td>use</td><td>required</td></tr>
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<tr><td>enumeration</td><td>kg</td></tr>
<tr><td>enumeration</td><td>t</td></tr>
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element FORACK/ArrivalFuel

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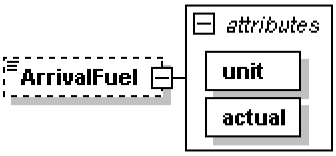
<tr><td>diagram</td><td>
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true, if actual false, if estimated</td></tr>
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<tr><td>annotation</td><td>documentation
estimated or actual arrival fuel of the previous flight</td></tr>
</table>

attribute FORACK/ArrivalFuel/@unit

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<tr><td>properties</td><td><table>
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<tr><td>facets</td><td><table>
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<tr><td>enumeration</td><td>t</td></tr>
<tr><td>enumeration</td><td>lb</td></tr>
</table></td></tr>
</table>

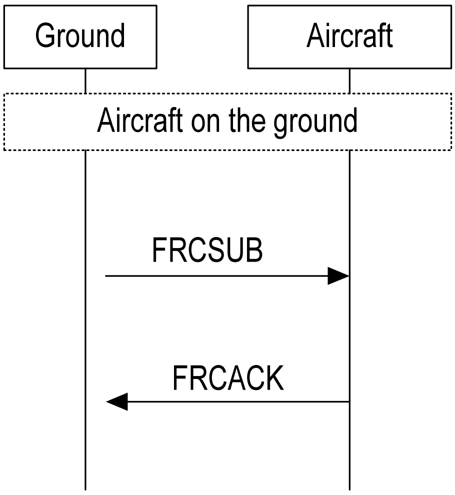
attribute FORACK/ArrivalFuel/@actual

type	xs:boolean
properties	isRef 0 use required
annotation	documentation true, if actual false, if estimated

element FORACK/FuelTruckOnStandby

diagram	
type	xs:boolean
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation information whether or not the fuel truck can leave the parking stand after refueling

6.3.2 Fuel Receipt service



Typical Fuel Receipt Exchange

Purpose of the Fuel Receipt Service is to eliminate the need for a paper fuel receipt after the end of aircraft refueling. Such a receipt fulfills at least two functions.

The fuel receipt is used to check that the aircraft has enough fuel for the next flight. This check is usually performed by the flight crew

The fuel receipt is used to check the commercial bill from the fuel supplier. This check is usually performed by ground personnel

The fuel-receipt element is used to uplink the fuel receipt to the aircraft after the end of refueling. It contains data needed to check the international fuel supplier code, a refuel-defuel flag, a fuel receipt number, the volume or the mass of fuel uplift and the corresponding units, as well as the fuel density,. Note that the fuel volume or mass unit used is, if different from the metric units, liters and kg, not the unit used for the transmission of the supplied fuel uplift value. All transmitted values are always metric and should be converted by the application if required into the airline's or pilot’s chosen unit.

The following subsections define version 1 of FRC service.

6.3.2.1 Fuel Receipt Submit Uplink

Table 6.3.2.1 – FRCSUB01 and FRCACK01 ACARS Definition

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed Text	Parameter Type					
IntoPlaneService	A three digit code unique to an into-plane-service company based on the IATA Fuel Quality Pool list (IFQP)		provider-id	No				AFS
parameter separator		comma		No	","			,
FuelSupplier	A three digit international supplier code unique to a fuel supplier based on the IATA Fuel Quality Pool list (IFQP)		provider-id	Yes				BPC
parameter separator		comma		No	","			,
FuelTruckID	Fuel truck identification number		(0-10)Y	Yes	up to 10 chars			H10556
parameter separator		comma		No	","			,
Refuel/Defuel mode	<nil> or 1 = Refueling with one fuel truck, 2 = Refueling with 2 trucks, 5 = Defueling with one trucks, 6 = Defueling with 2 trucks		integer	No				1
parameter separator		comma		No	","			,
FuelReceiptNumber	Fuel receipt number		(0-20)Y	No	up to 20 chars			8522A
parameter separator		comma		No	","			,
SuppliedVolume	supplied (uplifted) fuel volume (should be given, if measured directly)		volume-lt	Yes	0...999 999	1 liter	liter	58100 see note 2
parameter separator		comma		No	","			,
FuelVolumeMeasureUnit	Unit used by the IntoPlaneService if the fuel volume has been measured (Liters, Imperial Gallons or US Gallons)		"LT" or "IG" or “UG”	Yes,				LT See note 3
parameter separator		comma		No	","			,
SuppliedDensity	mean density of supplied fuel		density	No	700...900	kg/liter/1000	kg/liter *1000	802
parameter separator		comma		No	","			,
SuppliedMass	supplied (uplifted) fuel mass (should be only given, if measured directly)		mass-kg	Yes	0...999 999	1 kg	kg	46596 See note 2
parameter separator		comma		No	","			,

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed Text	Parameter Type					
FuelMassMeasureUnit	Unit used by the IntoPlaneService if the fuel mass has been determined (Kilograms or pounds))		“KG” or “LB”	Yes,				KG See note 3
parameter separator		comma		No	","			,
FuelType	Supplied fuel type		(0-10)Y	Yes	Up to 10 chars			JET A1 See note 1

Notes:

1. There are several fuel types used over the world, most common are JET A1 and JET A. All of the fuel types have different freezing points requiring the pilots to work special procedures when a “LOW FUEL TEMPERATURE” WARNING is announced in-flight.
2. SuppliedVolume has to be specified if, during refueling, the fuel volume has been measured by the refueler. SuppliedMass should not be filled in this case. If elsewise the mass of the supplied fuel has been determined during refueling, SuppliedMass should be specified instead of SuppliedVolume.
3. This/these parameter(s) should show the unit in which the supplied volume or the supplied mass was originally measured. This parameter should be present if associated parameter (SuppliedVolume or SuppliedMass) has been specified.

6.3.2.2 Fuel Receipt Acknowledge Downlink

Same data as fuel-receipt-submit uplink

6.3.2.3 ACARS format

The ACARS format specified in Table 6.3.2.1 may be used for air-ground and ground-ground messages

When using the ACARS format, the supplementary header should be used.

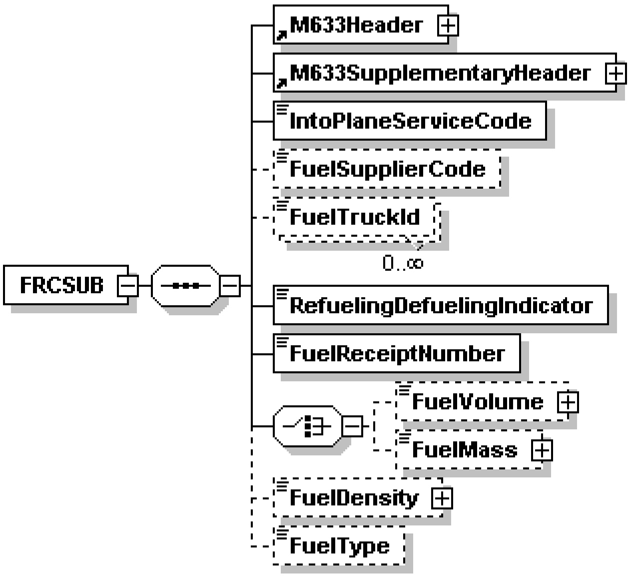
ACARS Label used should be “RE”.

6.3.2.4 XML format

The IP/XML format may be used for air-ground and ground-ground messages.

When using the IP/XML format, the supplementary header should be used.

element FRCSUB

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader IntoPlaneServiceCode FuelSupplierCode FuelTruckId RefuelingDefuelingIndicator FuelReceiptNumber FuelVolume FuelMass FuelDensity FuelType

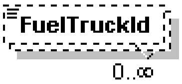
element FRCSUB/IntoPlaneServiceCode

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	length 3
annotation	documentation code of the into plane service company according to the IATA Fuel Quality Pool list

element FRCSUB/FuelSupplierCode

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation code of the fuel supplier company according to the IATA Fuel Quality Pool list

element FRCSUB/FuelTruckId

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc unbounded content simple nillable false
facets	minLength 1 maxLength 10
annotation	documentation identification number of the fuel truck

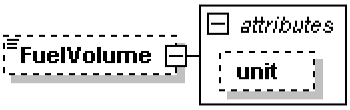
element FRCSUB/RefuelingDefuelingIndicator

diagram	
type	xs:boolean
properties	isRef 0 content simple nillable false
annotation	documentation false in case of refueling, true in case of defueling

element FRCSUB/FuelReceiptNumber

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	minLength 1 maxLength 20

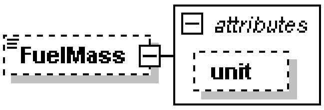
element FRCSUB/FuelVolume

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>extension of xs:nonNegativeInteger</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>unit</td><td>volumeUnitType</td><td></td><td></td><td></td><td>documentation
Fuel Volume
Measure Unit</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
fuel volume, if measured by the into plane service</td></tr>
</table>

attribute FRCSUB/FuelVolume/@unit

type	volumeUnitType
properties	isRef 0
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3
annotation	documentation Fuel Volume Measure Unit

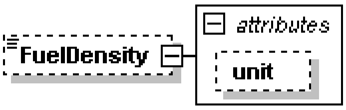
element FRCSUB/FuelMass

diagram						
type	extension of xs:integer					
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false					
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	weightUnitType				documentation Fuel Mass Measure Unit
annotation	documentation fuel mass, if measured by the into plane service					

attribute FRCSUB/FuelMass/@unit

type	weightUnitType
properties	isRef 0
facets	enumeration kg enumeration t enumeration lb
annotation	documentation Fuel Mass Measure Unit

element FRCSUB/FuelDensity

diagram						
type	extension of xs:nonNegativeInteger					
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false					
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	densityUnitType				documentation fuel density unit

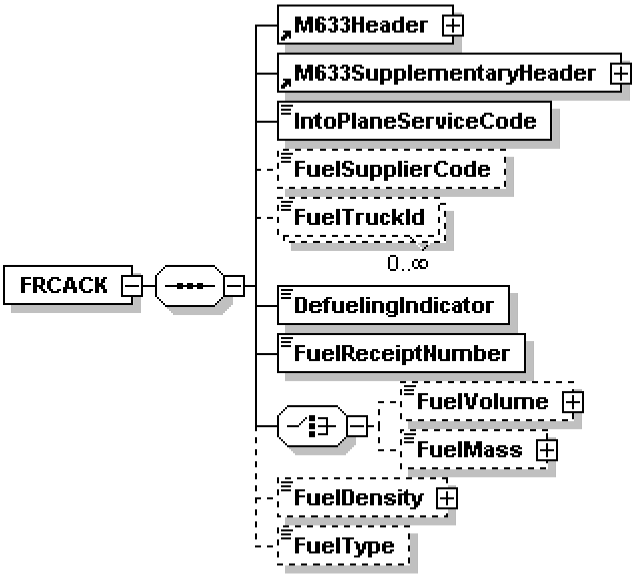
attribute FRCSUB/FuelDensity/@unit

type	densityUnitType
properties	isRef 0
facets	enumeration g/cm3 enumeration lb/l enumeration lb/ug enumeration lb/m3 enumeration lb/ig enumeration kg/l enumeration kg/m3 enumeration kg/ig enumeration kg/ug
annotation	documentation fuel density unit

element FRCSUB/FuelType

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 maxLength 10
annotation	documentation supplied fuel type

element FRCACK

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader IntoPlaneServiceCode FuelSupplierCode FuelTruckId DefuelingIndicator FuelReceiptNumber FuelVolume FuelMass FuelDensity FuelType

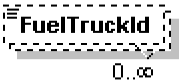
element FRCACK/IntoPlaneServiceCode

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	length 3
annotation	documentation code of the into plane service company according to the IATA Fuel Quality Pool list

element FRCACK/FuelSupplierCode

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation code of the fuel supplier company according to the IATA Fuel Quality Pool list

element FRCACK/FuelTruckId

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc unbounded content simple nillable false
facets	minLength 1 maxLength 10
annotation	documentation identification number of the fuel truck

element FRCACK/DefuelingIndicator

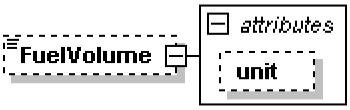
diagram	
type	xs:boolean
properties	isRef 0 content simple nillable false
annotation	documentation false in case of refueling, true in case of defueling

6.0 FUEL

element FRCACK/FuelReceiptNumber

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	minLength 1 maxLength 20

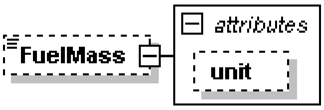
element FRCACK/FuelVolume

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>type</td><td colspan="6">extension of xs:nonNegativeInteger</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td>Name
unit</td><td>Type
volumeUnitType</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation
documentation
Fuel Volume Measure Unit</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
fuel volume, if measured by the into plane service</td></tr>
</table>

attribute FRCACK/FuelVolume/@unit

type	volumeUnitType
properties	isRef 0
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3
annotation	documentation Fuel Volume Measure Unit

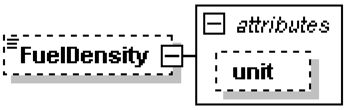
element FRCACK/FuelMass

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>type</td><td colspan="6">extension of xs:integer</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td>Name
unit</td><td>Type
weightUnitType</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation
documentation
Fuel Mass Measure Unit</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
fuel mass, if measured by the into plane service</td></tr>
</table>

attribute FRCACK/FuelMass/@unit

type	weightUnitType
properties	isRef 0
facets	enumeration kg enumeration t enumeration lb
annotation	documentation Fuel Mass Measure Unit

element FRCACK/FuelDensity

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>extension of xs:nonNegativeInteger</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex
nillable false</td></tr>
<tr><td>attributes</td><td><table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>unit</td><td>densityUnitType</td><td></td><td></td><td></td><td>documentation
fuel density unit</td></tr>
</table></td></tr>
</table>

attribute FRCACK/FuelDensity/@unit

type	densityUnitType
properties	isRef 0
facets	enumeration g/cm3 enumeration lb/l enumeration lb/ug enumeration lb/m3 enumeration lb/ig enumeration kg/l enumeration kg/m3 enumeration kg/ig enumeration kg/ug
annotation	documentation fuel density unit

element FRCACK/FuelType

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 maxLength 10
annotation	documentation supplied fuel type

6.3.2.5 Dynamic Aspects

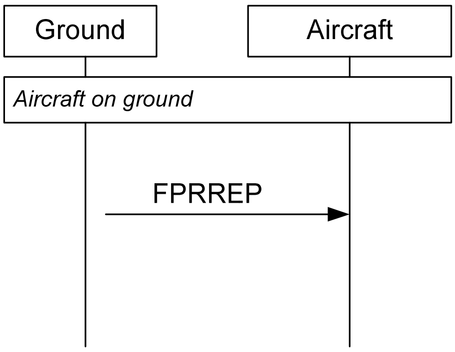
As multiple fuel receipt submit messages could be uplinked, the aircraft application should use a combination of IntoPlaneService and FuelReceiptNumber to identify a consecutive fuel receipt submit message.

In the following scenario a B747 is refueled by 2 BP fuel trucks (with fuel truck numbers H10556 and H10889) simultaneously. One fuel truck measures volume, the other measures mass and density and calculates the volume. The fuel receipts are uplinked independently. Together, both trucks have supplied 123530 liter.

ACARS Example:

```
FRCSUB01 uplink:
,FRCSUB01050324123200LFPG,,KJFK,,AFR5556,,050324,,B747,,F-WWOW,
/AFS,BPC,H10556,,8522,65430,,,JETA1,LT,xxxx
FRCACK01 downlink:
,FRCACK01050324123205LFPG,,KJFK,,AFR5556,,050324,,B747,,F-WWOW,
/AFS,BPC,H10556,,8522,65430,,,LT,xxxx

FRCSUB01 uplink:
,FRCSUB01050324123404LFPG,,KJFK,,AFR5556,,050324,,B747,,F-WWOW,
/AFS, ,H10889,,8522A,58100,802,46596,JETA1,LT,xxxx
FRCACK01 downlink:
,FRCACK01050324123409LFPG,,KJFK,,AFR5556,,050324,,B747,,F-WWOW,
/AFS,,H10889,,8522A,58100,802,46596,JETA1,LT,xxxx
```

6.3.3 Fuel Process service



Typical Fuel Process Report Exchange

The fuel-process-report element is used to inform ground or airborne systems about the progress of the current refueling, e.g. fueling has started or fueling is finished. It should be used only, while the aircraft is on ground. There is no message confirmation on application level.

The following subsections define version 1 of FPR service.

6.3.3.1 Fuel Process Report Element

Element Name: **FPRREP**

6.3.3.2 ACARS format

ACARS format should be used for air-ground communications. It may also be used end to end, i.e. on ground.

The ACARS format specified in Table 6.3.3.2.1 may be used for air-ground and ground-ground messages

When using the ACARS format, the supplementary header should be used.

ACARS Label used should be “RE”.

Table 6.3.3.2.1 – FPRREP01 ACARS Definition

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed Text	Parameter Type					
IntoPlaneService	A three digit code unique to an into-plane-service company		provider-id	No				AFS
parameter separator		Comma		No	","			,
FuelSupplier	A three digit international supplier code unique to a fuel supplier		provider-id	Yes				BPC
parameter separator		Comma		No	","			,
FuelTruckID	Fuel truck identification number		(0-10)Y	Yes	up to 10 chars			H10556
parameter separator		Comma		No	","			,
RefuelDefuel Mode	<nil> or 1 = Refueling with one fuel truck, 2 = Refueling with 2 trucks, 5 = Defueling with one fuel truck, 6 = Defueling with 2 trucks		integer	Yes				1
parameter separator		Comma		No	","			,
FuelProgressReportStatus	see table below		integer	No	0-99			1
parameter separator		Comma		No	","			,
ProcessTimestamp	date and time when the process has been archived		datetime	Yes		seconds	YYMMDDHHMMSS	050324 235959

Table 6.3.3.2.2 – Fuel Progress Report Status Table

Trigger Condition	Status Name	Type ID	Meaning	Comment
Into plane service company receives notice that no fuel is needed	fueling-cancelled	0	Fuel truck has been cancelled	
Into plane service company receives notice that fuel is needed	ordered-for-fueling	1	Fuel truck has been ordered	
Into plane service company receives preliminary fuel notice (MINTOF, BLOCK w/o Final flag)	ordered-for-fueling-preliminary	11	Non-Final fuel data received	
Into plane service company receives final fuel notice (BLOCK w/ Final flag)	ordered-for-fueling-Final	12	Final fuel data received	
Into plane service confirms fuel truck assignment	fueling-assignment	21	Work order to refuel/defuel an aircraft has been generated	
Fuel truck driver indicates that fuel truck is available for fueling	available-for-fueling	22	Fuel truck has arrived at the aircraft or is waiting for the aircraft	
Fuel hose connected (either	ready-for-refueling	23	Fuel hose is connected	

Trigger Condition	Status Name	Type ID	Meaning	Comment
sensed by the aircraft or signaled by the fuel truck driver)				
Refueling starts (fuel is flowing through fuel hose to the aircraft)	start-of-fueling	34	Start of Refueling	
Refueling is finished (either no more fuel flowing through fuel hose, pump switched off or amount ordered equals indicated fuel on board)	end-of-fueling	35	End of Refueling	
Fuel truck driver has released fuel receipt		36	Fuel Receipt transferred	
Defueling starts (fuel is flowing through fuel hose from the aircraft)		44	Start of Defueling	
Defueling is finished (either no more fuel flowing through fuel hose, pump switched off		45	End of Defueling	
Fuel transfer starts		54	Start of Fuel Transfer	
Fuel transfer ends		55	End of Fuel Transfer	

In the following scenario a fuel truck uplinks that he is now ready for fueling.

Later the aircraft reports the time, when it has sensed that fueling is finished.

ACARS Example

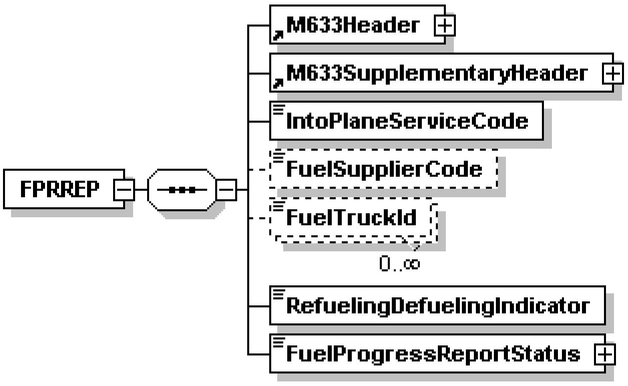
```
FPRREP01 uplink:
,FPRREP01050324123205LFPG,,KJFK,,AFR5556,,050324,,A380,,F-WWOW,
/TFG,,H10483,,23,,xxxx

FPRREP01 downlink:
,FPRREP01050324125200LFPG,,KJFK,,AFR5556,,050324,,A380,,F-WWOW,
/TFG,,H10483,5,55,050324125159,xxxx
```

6.3.3.3 XML format

The IP/XML format may be used for ground-ground messages and for air-ground messages as an alternative to ACARS.

When using the IP/XML format, the supplementary header should be used.

element FPRREP

diagram	
properties	**content** **complex** **nillable** **false**
children	**M633Header M633SupplementaryHeader IntoPlaneServiceCode FuelSupplierCode FuelTruckId RefuelingDefuelingIndicator FuelProgressReportStatus**

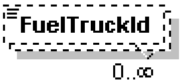
element FPRREP/IntoPlaneServiceCode

diagram	
type	restriction of xs:string
properties	isRef 0 content simple nillable false
facets	length 3
annotation	documentation code of the into plane service company according to the IATA Fuel Quality Pool list

element FPRREP/FuelSupplierCode

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation code of the fuel supplier company according to the IATA Fuel Quality Pool list

element FPRREP/FuelTruckId

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc unbounded content simple nillable false
facets	minLength 1 maxLength 10
annotation	documentation identification number of the fuel truck

element FPRREP/RefuelingDefuelingIndicator

diagram	
type	xs:boolean
properties	isRef 0 content simple nillable false
annotation	documentation false in case of refueling, true in case of defueling

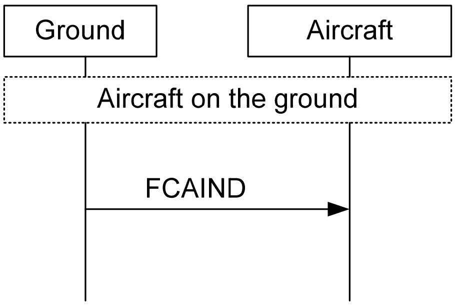
element FPRREP/FuelProgressReportStatus

diagram	
type	extension of xs:string
properties	isRef 0 content complex nillable false
attributes	Name Type Use Default Fixed annotation dateTime
annotation	documentation status name for the refueling process according to Table 6.3.3.2.2 of the ARINC633 document

attribute FPRREP/FuelProgressReportStatus/@dateTime

properties	isRef 0

6.3.4 Fuel CG Advisory Service



Typical Fuel CG Advisory INDication Message Exchange

Purpose of the Fuel CG Advisory service is to inform the flight crew that a fuel distribution change is needed to reach a takeoff center of gravity value within operational limits. Besides, with this service the flight crew should be ~~en~~able~~d~~ to decide to end a fuel distribution change (fuel ground transfer) prematurely, e.g. as soon as the takeoff center of gravity has reached the operational limit. **A d**~~D~~ecision against a complete fuel transfer could be useful ~~to~~**in** get**ting** the aircraft ready for takeoff with minimum departure delay.

The service is mainly applicable to operation of ground-based load and trim control.

The Fuel CG Advisory INDication element is used to uplink the actual limit of the operational CG envelope.

The following subsections define version 1 of FCA service.

6.3.4.1 Fuel CG Advisory INDication Uplink

Table 6.3.4.1 – FCAIND01 ACARS Definition

Parameter Name	Meaning	Contents		Option	Range	Resolution	Unit	Example
		Fixed text	Parameter Type					
ForwardTOCGLimit	The forward limit value of the aircraft's Takeoff Weight Center-of-Gravity parameter		center-of-gravity	Yes	NO	000 to 999	tenth of percent	365
parameter separator		comma		No	","			,
AftTOCGLimit	The aft limit value of the aircraft's Takeoff Weight Center-of-Gravity parameter		center-of-gravity	Yes	NO	000 to 999	tenth of percent	425
parameter separator		comma		No	","			,
CalculatedTOCG	The limit value of the aircraft's Gross Weight Center-of-Gravity parameter		center-of-gravity	Yes	NO	000 to 999	tenth of percent	351
parameter separator		comma		No	","			,
TOW	Take Off Weight value used for TOCG computation		mass-kg	Yes	0 to 999999	1	kg	500300
parameter separator		comma		No	","			,
TaxiFuel	Planned Taxi Fuel		mass-kg	Yes	0 to 999999	1	kg	1125

Example:

In the following scenario the ground based load and trim control system detected the aircraft being currently outside of the operation CG envelope. The TOCG, as presently calculated on the ground, is 35.1%; the operational limits are 36.5% and 42.5%. The CG needs to be shifted at least 1.4% aft. Aircraft GW is 500.3 tons. Estimated taxi fuel is 1125kg. The onboard AOC application should create a text advisory to the flight crew.

6.3.4.2 ACARS Format

The ACARS format specified in Table 6.3.4.1 may be used for air-ground and ground-ground messages.

When using the ACARS format, the supplementary header should not be used.

ACARS Label used should be “RE”.

ACARS Example

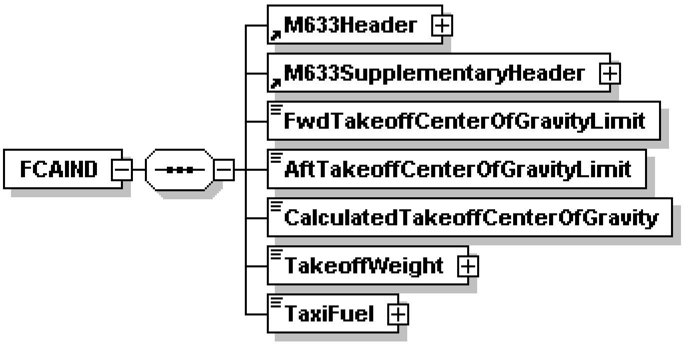
```
FCAIND01 uplink:
,FCAIND01050125221536LFPG,,KJFK,,AFR5556,,050125,,A380,,F-WWOW,
/365,425,351,500300,1125,xxxx
```

6.3.4.3 XML Format

The IP/XML format may be used for air-ground and ground-ground messages.

When using the IP/XML format, the supplementary header should be used.

element FCAIND

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader FwdTakeoffCenterOfGravityLimit AftTakeoffCenterOfGravityLimit CalculatedTakeoffCenterOfGravity TakeoffWeight TaxiFuel

element FCAIND/FwdTakeoffCenterOfGravityLimit

diagram	
type	restriction of xs:float
properties	isRef 0 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation fwd limit for takeoff CG in percent of mean aerodynamic chord according operational envelope

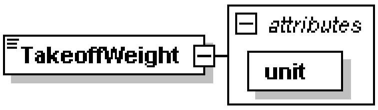
element FCAIND/AftTakeoffCenterOfGravityLimit

diagram	
type	restriction of xs:float
properties	isRef 0 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation aft limit for takeoff CG in percent of mean aerodynamic chord according operational envelope

element FCAIND/CalculatedTakeoffCenterOfGravity

diagram	
type	restriction of xs:float
properties	isRef 0 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation CG value calculated for takeoff in percent of mean aerodynamic chord

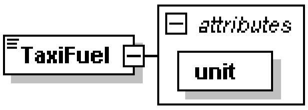
element FCAIND/TakeoffWeight

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 content complex nillable false
attributes	Name Type Use Default Fixed annotation unit weightUnitType required

attribute FCAIND/TakeoffWeight/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

element FCAIND/TaxiFuel

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 content complex nillable false
attributes	Name Type Use Default Fixed annotation unit weightUnitType required

attribute FCAIND/TaxiFuel/@unit

type	weightUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb

7.0 ELECTRONIC LOGBOOK

This section addresses the Electronic logbook data. These data are exchanged between airborne logbook application and ground logbook application, and then between ground logbook application and ground maintenance system.

Logbook Data structure has been defined by ATA Spec 2000 Chapter 17**.**

7.1 Introduction

To be added in a future supplement

7.2 Logbook Messages

Application	SMI	Downlink		Uplink		Description
		Label	Sub Label/MFI	Label	Sub Label/MFI	
Tech logbook	JLS JLT	LS	N/A	LT	N/A	Technical (Cockpit) E-Logbook application messages in CMU.
	EF1	F1	**F1/LT**	H1	**F1/LT**	Technical (Cockpit) E-Logbook application messages in EFB 1.
	EF2	F2	**F2/LT**	H1	**F2/LT**	Technical (Cockpit) E-Logbook application messages in EFB 2.
Cabin Logbook	JLB JLC	LB	N/A	LC	N/A	Cabin E logbook application messages
	TTx	Tx	**Tx/LC**	H1	**Tx/LC**	Cabin E logbook application messages in Cabin Terminal x

7.3 Encoding of ATA schema

Detail mapping of ELPT schema to TSE2 mnemonics.

To be added in a future supplement.

8.0 CONFIGURATION CONTROL

Application	**SMI**	**Downlink**		**Uplink**		**Description**
		Label		**Sub Label**	**Label**	
DLCS	JDL	DL		N/A	DL	Data Loading and Configuration System

To be added in a future supplement.

9.0 WEIGHT AND BALANCE (WBA)

On some aircraft, the pilot will have the possibility to use an airborne electronic weight and balance application to perform weight and CG calculation and issue on board the aircraft a Load and Trim Sheet (LTS).

To do so, an air ground communication means will be available to allow the initialization of the on board application and the sending of the LTS to the ground.

Weight and balance operations are usually composed of the following operations:

- The ground airline application computes the initialization parameters needed to initialize the On board weight and balance application
- The ground sends those data to the onboard weight and balance application (WIM, WII or WIF services)
- The WBA initializes its inputs with the data sent from ground. If an error is raised a downlink message (WIRREP) is sent to the ground base
- The WBA computes and issues an LTS. Today, the WBA generates Load and Trim Sheet in formats specified by IATA as AHM517 (full format) and AHM518 (ACARS-compatible format).
- The pilot performs necessary checks the LTS and sends it back to the ground before dispatch using same service as eFF (EFF download service: EFDREP01). The LTS is included as a file in an eFFpackage

Note: The Weight and Balance application deviates from the general "unit use rule" (4.1) and **enables** the use of non-metric units in its air-ground messages.

Element Name	Gatelink Label	Service Version	DL/UL	Purpose
WIMSUB	N/A	1	UL	**Weight-balance-Init Minimum - SUBmit :** Submits initialization parameters to an aircraft's weight and balance system with minimum profile (Only Mandatory data sent)
WIISUB	N/A	1	UL	**Weight-balance-Init Intermediate - SUBmit :** Submits initialization parameters to an aircraft's weight and balance system with intermediate profile (Mandatory + data contained on AHM517 for ZFW and CG computation sent)
WIFSUB	N/A	1	UL	**Weight-balance-Init Full - SUBmit :** Submits initialization parameters to an aircraft's weight and balance system (full data are sent)
EFDREP	N/A	1	DL	**EFf Download REPort:** Send the LTS to ground – as a specific file embedded in an eFF package.
WIRREP	N/A	1	DL	**Weight-balance-Init- eRror- REPort** Indicates an error for weight and balance initialization

COMMENTARY

AHM517 (full format) and AHM518 (ACARS-compatible format) are Load and Trim Sheet formats specified by IATA.

9.0 WEIGHT AND BALANCE (WBA)

9.1 Weight-and balance – common elements and data

This section defines the parameters and data structures that are shared by various types of Weight and Balance services.

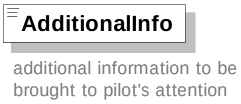
9.1.1 ACARS format

N/A

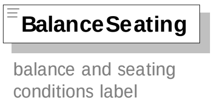
9.1.2 XML format

A number of common schemas are defined for Weight and Balance services – these schemas are called by the appropriate services (see “include” command in the service schemas).

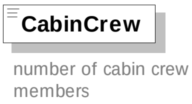
element AdditionalInfo

diagram	
type	restriction of xs:string
properties	content simple nillable false
used by	elements WIFSUB WIISUB WIMSUB
facets	minLength 1
annotation	documentation additional information to be brought to pilot's attention

element BalanceSeating

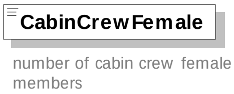
diagram	
type	restriction of xs:string
properties	content simple nillable false
used by	elements WIFSUB WIISUB
facets	minLength 1
annotation	documentation balance and seating conditions label

element CabinCrew

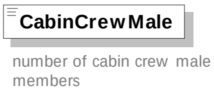
diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	group CabinCrewLineUp
annotation	documentation number of cabin crew members

9.0 WEIGHT AND BALANCE (WBA)

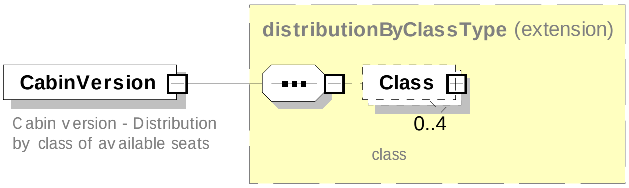
element CabinCrewFemale

diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	group CabinCrewLineUp
annotation	documentation number of cabin crew female members

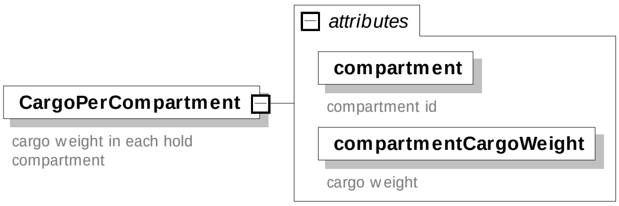
element CabinCrewMale

diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	group CabinCrewLineUp
annotation	documentation number of cabin crew male members

element CabinVersion

diagram	
type	extension of distributionByClassType
properties	content complex mixed false nillable false
children	Class
used by	element WIMSUB group PayloadPax.Grp
annotation	documentation Cabin version - Distribution by class of available seats

element CargoPerCompartment

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>properties</td><td colspan="6">content complex
mixed false
nillable false</td></tr>
<tr><td>used by</td><td colspan="6">element CargoDistribution</td></tr>
<tr><td>attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td></td><td>compartment</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
compartment id</td></tr>
<tr><td></td><td>compartmentCargoWeight</td><td>weightType</td><td>required</td><td></td><td></td><td>documentation
cargo weight</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
cargo weight in each hold compartment</td></tr>
</table>

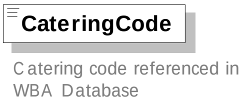
attribute CargoPerCompartment/@compartment

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation compartment id

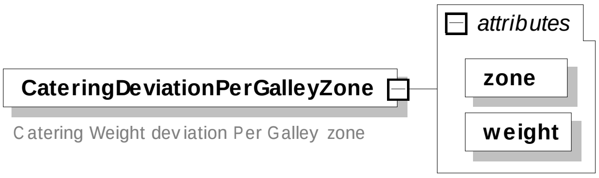
attribute CargoPerCompartment/@compartmentCargoWeight

type	weightType
properties	isRef 0 use required
annotation	documentation cargo weight

element CateringCode

diagram	
type	restriction of xs:string
properties	content simple
facets	minLength 1
annotation	documentation Catering code referenced in WBA Database

element CateringDeviationPerGalleyZone

diagram	
properties	content complex mixed false nillable false
used by	group CateringDeviation.Grp
attributes	Name Type Use Default Fixed annotation zone derived by: xs:string required weight weightType required
annotation	documentation Catering Weight deviation Per Galley zone

attribute CateringDeviationPerGalleyZone/@zone

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

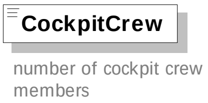
attribute CateringDeviationPerGalleyZone/@weight

type	weightType
properties	isRef 0 use required

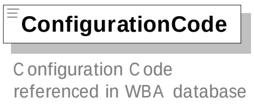
element CheckedBy

diagram	
type	restriction of xs:string
properties	content simple
used by	elements WIFSUB WIISUB
facets	minLength 1
annotation	documentation LoadSheet agent name

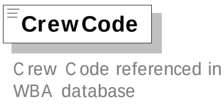
element CockpitCrew

diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	element CrewNumber
annotation	documentation number of cockpit crew members

element ConfigurationCode

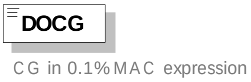
diagram	
type	restriction of xs:string
properties	content simple
used by	elements Configuration WIISUB WIMSUB
facets	minLength 1
annotation	documentation Configuration Code referenced in WBA database

element CrewCode

diagram	
type	restriction of xs:string
properties	content simple
used by	element Configuration
facets	minLength 1
annotation	documentation Crew Code referenced in WBA database

9.0 WEIGHT AND BALANCE (WBA)

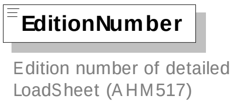
element DOCG

diagram	
type	restriction of xs:integer
properties	content simple nillable false
used by	element DryOperating
facets	minInclusive 0 maxInclusive 999
annotation	documentation CG in 0.1%MAC expression

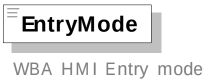
element DOW

diagram	
type	weightType
properties	content simple nillable false
used by	element DryOperating
annotation	documentation Dry Operating Weight

element EditionNumber

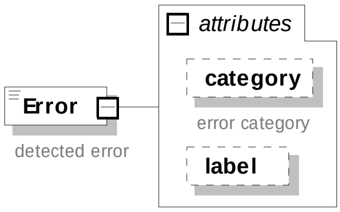
diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	elements WIFSUB WIISUB
annotation	documentation Edition number of detailed LoadSheet (AHM517)

element EntryMode

diagram	
type	restriction of xs:string
properties	content simple nillable false
used by	element Configuration
facets	minLength 1
annotation	documentation WBA HMI Entry mode

9.0 WEIGHT AND BALANCE (WBA)

element Error

diagram	
properties	content complex mixed true nillable false
used by	element [WI_Error]()
attributes	Name / Type / Use / Default / Fixed / annotation [category]() / derived by: xs:string / / / / documentation error category [label]() / derived by: xs:string
annotation	documentation detected error

attribute Error/@category

type	restriction of xs:string
properties	isRef 0
facets	minLength 1 enumeration WARNING enumeration ERROR
annotation	documentation error category

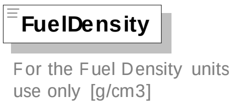
attribute Error/@label

type	restriction of xs:string
properties	isRef 0
facets	minLength 1

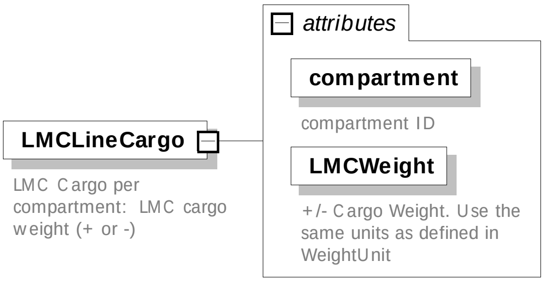
element FOB

diagram	
type	weightType
properties	content simple
used by	group Fuel.Grp
annotation	documentation Fuel On Board

element FuelDensity

diagram	
type	densityType
properties	content simple nillable false
used by	group Fuel.Grp
facets	minInclusive 0.5 maxInclusive 1
annotation	documentation For the Fuel Density units use only [g/cm3]

element LMCLineCargo

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>properties</td><td colspan="6">content complex
mixed false
nillable false</td></tr>
<tr><td>used by</td><td colspan="6">element LMC/LMCLine</td></tr>
<tr><td>attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td></td><td>compartment</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
compartment ID</td></tr>
<tr><td></td><td>LMCWeight</td><td>derived by: xs:integer</td><td>required</td><td></td><td></td><td>documentation
+/- Cargo Weight. Use the same units as defined in WeightUnit</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
LMC Cargo per compartment: LMC cargo weight (+ or -)</td></tr>
</table>

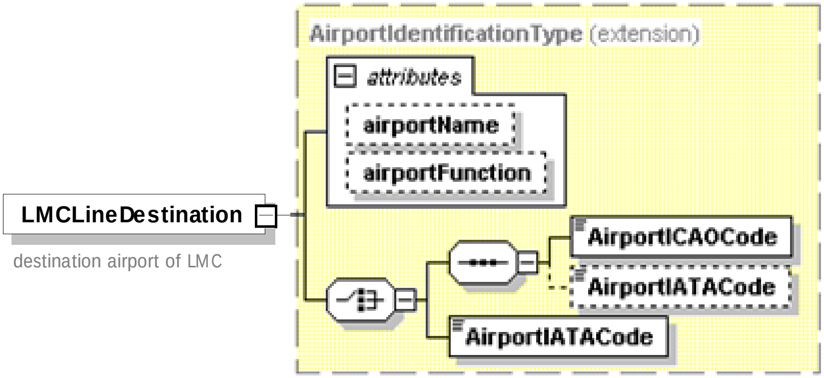
attribute LMCLineCargo/@compartment

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation compartment ID

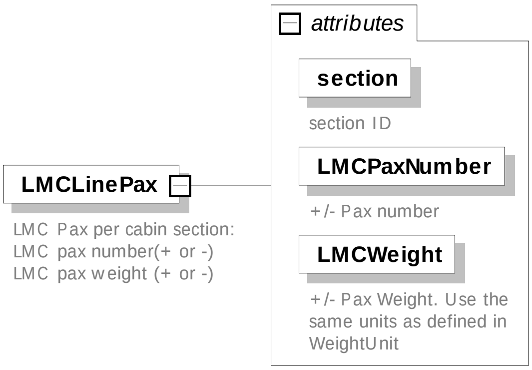
attribute LMCLineCargo/@LMCWeight

type	restriction of xs:integer
properties	isRef 0 use required
annotation	documentation +/- Cargo Weight. Use the same units as defined in WeightUnit

element LMCLineDestination

diagram						
type	extension of AirportIdentificationType					
properties	content	complex				
	mixed	false				
	nillable	false				
children	AirportICAOCode AirportIATACode AirportIATACode					
used by	element	LMC/LMCLine				
attributes	Name	Type	Use	Default	Fixed	annotation
	airportName	derived by: xs:string				documentation airport name e.g. WASHINGTON DULLES INTL
	airportFunction	derived by: xs:string				documentation e.g. DepartureAirport, DestinationAlternate, ContingencySavingsAirport
annotation	documentation destination airport of LMC					

element LMCLinePax

diagram						
properties	content	complex				
	mixed	false				
	nillable	false				
used by	element	LMC/LMCLine				
attributes	Name	Type	Use	Default	Fixed	annotation
	section	derived by: xs:string	required			documentation section ID
	LMCPaxNumber	xs:integer	required			documentation +/- Pax number
	LMCWeight	xs:integer	required			documentation +/- Pax Weight. Use the same units as defined in WeightUnit
annotation	documentation LMC Pax per cabin section: LMC pax number(+ or -) LMC pax weight (+ or -)					

attribute LMCLinePax/@section

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation section ID

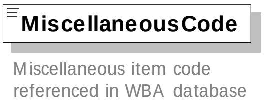
attribute LMCLinePax/@LMCPaxNumber

type	xs:integer
properties	isRef 0 use required
annotation	documentation +/- Pax number

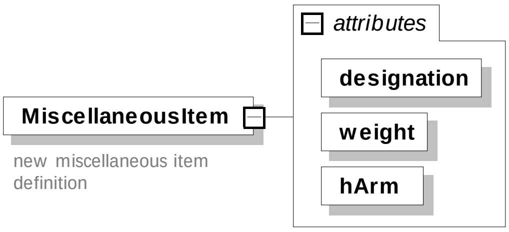
attribute LMCLinePax/@LMCWeight

type	xs:integer
properties	isRef 0 use required
annotation	documentation +/- Pax Weight. Use the same units as defined in WeightUnit

element MiscellaneousCode

diagram	
type	restriction of xs:string
properties	content simple
used by	group Miscellaneous.Grp
facets	minLength 1
annotation	documentation Miscellaneous item code referenced in WBA database

element MiscellaneousItem

<table>
<tr><td>diagram</td><td colspan="6"> </td></tr>
<tr><td>properties</td><td colspan="6">content complex
mixed false
nillable false</td></tr>
<tr><td>used by</td><td colspan="6">group Miscellaneous.Grp</td></tr>
<tr><td rowspan="4">attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>designation</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>weight</td><td>weightType</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>hArm</td><td>hArmType</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>annotation</td><td colspan="6">documentation
new miscellaneous item definition</td></tr>
</table>

attribute MiscellaneousItem/@designation

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

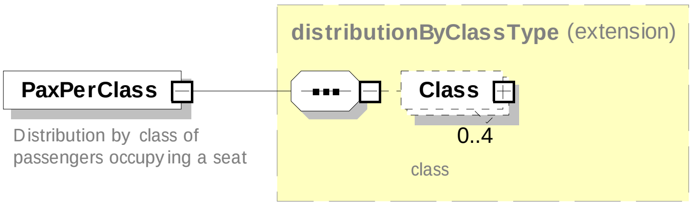
attribute MiscellaneousItem/@weight

type	weightType
properties	isRef 0 use required

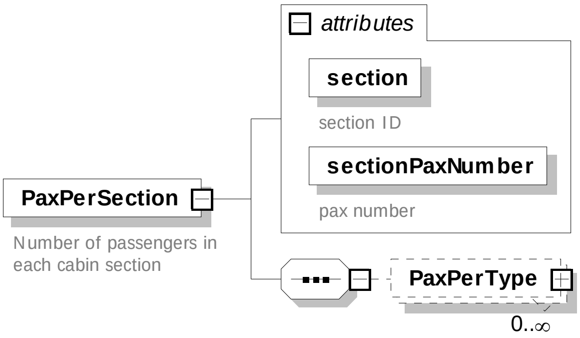
attribute MiscellaneousItem/@hArm

type	hArmType
properties	isRef 0 use required
facets	minInclusive 0

element PaxPerClass

diagram	
type	extension of distributionByClassType
properties	content complex mixed false nillable false
children	Class
used by	element WIMSUB group PayloadPax.Grp
annotation	documentation Distribution by class of passengers occupying a seat

element PaxPerSection

diagram	
properties	content complex mixed false nillable false
children	PaxPerType
used by	element PaxDistribution
attributes	Name: section — Type: derived by: xs:string — Use: required — annotation: documentation section ID Name: sectionPaxNumber — Type: xs:nonNegativeInteger — Use: required — annotation: documentation pax number
annotation	documentation Number of passengers in each cabin section

Attributes:

Name	Type	Use	Default	Fixed	annotation
section	derived by: xs:string	required			documentation section ID
sectionPaxNumber	xs:nonNegativeInteger	required			documentation pax number

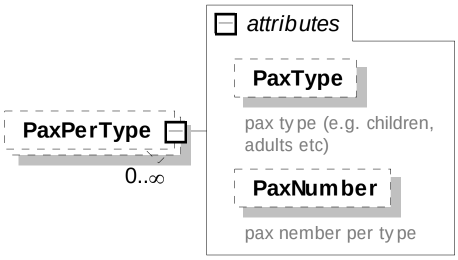
attribute PaxPerSection/@section

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation section ID

attribute PaxPerSection/@sectionPaxNumber

type	xs:nonNegativeInteger
properties	isRef 0 use required
annotation	documentation pax number

element PaxPerSection/PaxPerType

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>minOcc</td><td>0</td></tr><tr><td>maxOcc</td><td>unbounded</td></tr><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>false</td></tr></table></td></tr>
<tr><td>attributes</td><td><table><tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr><tr><td>PaxType</td><td>paxTypeType</td><td></td><td></td><td></td><td>documentation
pax type (e.g. children, adults etc)</td></tr><tr><td>PaxNumber</td><td>xs:nonNegativeInteger</td><td></td><td></td><td></td><td>documentation
pax nember per type</td></tr></table></td></tr>
</table>

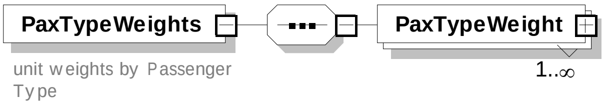
attribute PaxPerSection/PaxPerType/@PaxType

type	paxTypeType
properties	isRef 0
facets	minLength 1
annotation	documentation pax type (e.g. children, adults etc)

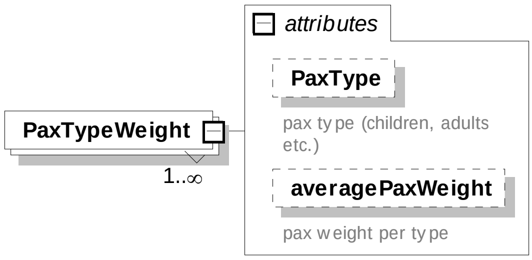
attribute PaxPerSection/PaxPerType/@PaxNumber

type	xs:nonNegativeInteger
properties	isRef 0
annotation	documentation pax nember per type

element PaxTypeWeights

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td><table><tr><td>content</td><td>complex</td></tr><tr><td>mixed</td><td>false</td></tr><tr><td>nillable</td><td>false</td></tr></table></td></tr>
<tr><td>children</td><td>PaxTypeWeight</td></tr>
<tr><td>used by</td><td>group PayloadPax.Grp</td></tr>
<tr><td>annotation</td><td>documentation
unit weights by Passenger Type</td></tr>
</table>

element PaxTypeWeights/PaxTypeWeight

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>1</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>false</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>PaxType</td><td>paxTypeType</td><td></td><td></td><td></td><td>documentation
pax type (children, adults etc.)</td></tr>
<tr><td>averagePaxWeight</td><td>weightType</td><td></td><td></td><td></td><td>documentation
pax weight per type</td></tr>
</table></td></tr>
</table>

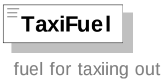
attribute PaxTypeWeights/PaxTypeWeight/@PaxType

type	paxTypeType
properties	isRef 0
facets	minLength 1
annotation	documentation pax type (children, adults etc.)

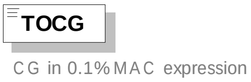
attribute PaxTypeWeights/PaxTypeWeight/@averagePaxWeight

type	weightType
properties	isRef 0
annotation	documentation pax weight per type

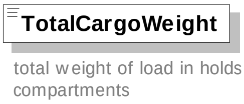
element TaxiFuel

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>weightType</td></tr>
<tr><td>properties</td><td><table>
<tr><td>content</td><td>simple</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>used by</td><td>group Fuel.Grp</td></tr>
<tr><td>annotation</td><td>documentation
fuel for taxiing out</td></tr>
</table>

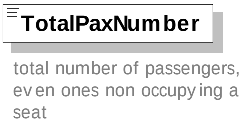
element TOCG

diagram	
type	restriction of xs:integer
properties	content simple nillable false
used by	element TO_Check
facets	minInclusive 0 maxInclusive 999
annotation	documentation CG in 0.1%MAC expression

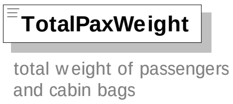
element TotalCargoWeight

diagram	
type	weightType
properties	content simple nillable false
used by	group PayloadCargo.Grp
annotation	documentation total weight of load in holds compartments

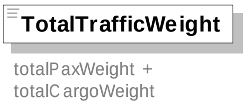
element TotalPaxNumber

diagram	
type	xs:nonNegativeInteger
properties	content simple nillable false
used by	element WIMSUB group PayloadPax.Grp
annotation	documentation total number of passengers, even ones non occupying a seat

element TotalPaxWeight

diagram	
type	weightType
properties	content simple nillable false
used by	group PayloadPax.Grp
annotation	documentation total weight of passengers and cabin bags

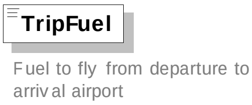
element TotalTrafficWeight

diagram	
type	weightType
properties	content simple nillable false
used by	element Payload
annotation	documentation totalPaxWeight + totalCargoWeight

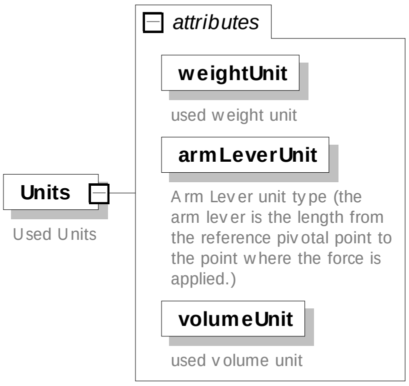
element TOW

diagram	
type	weightType
properties	content simple nillable false
used by	element TO_Check
annotation	documentation Take Off Weight

element TripFuel

diagram	
type	weightType
properties	content simple nillable false
used by	group Fuel.Grp
annotation	documentation Fuel to fly from departure to arrival airport

element Units

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
mixed false
nillable false</td></tr>
<tr><td>used by</td><td>elements WIFSUB WIISUB WIMSUB</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>weightUnit</td><td>weightUnitType</td><td>required</td><td></td><td></td><td>documentation
used weight unit</td></tr>
<tr><td>armLeverUnit</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
Arm Lever unit type (the arm lever is the length from the reference pivotal point to the point where the force is applied.)</td></tr>
<tr><td>volumeUnit</td><td>volumeUnitType</td><td>required</td><td></td><td></td><td>documentation
used volume unit</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Used Units</td></tr>
</table>

attribute Units/@weightUnit

type	volumeUnitType
properties	isRef 0 use required
facets	enumeration kg enumeration t enumeration lb
annotation	documentation used weight unit

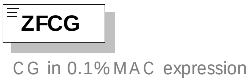
attribute Units/@armLeverUnit

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation Arm Lever unit type (the arm lever is the length from the reference pivotal point to the point where the force is applied.)

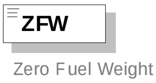
attribute Units/@volumeUnit

type	volumeUnitType
properties	isRef 0 use required
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3
annotation	documentation used volume unit

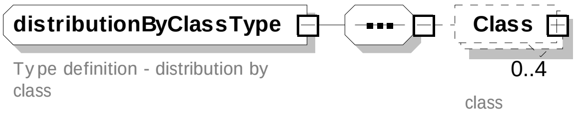
element ZFCG

diagram	
type	restriction of xs:integer
properties	content simple nillable false
used by	element ZF_CGTarget group ZeroFuel.Grp
facets	minInclusive 0 maxInclusive 999
annotation	documentation CG in 0.1%MAC expression

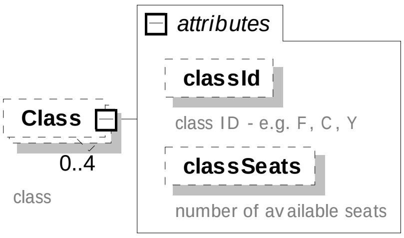
element ZFW

diagram	
type	weightType
properties	content simple nillable false
used by	element ZF_CGTarget group ZeroFuel.Grp
annotation	documentation Zero Fuel Weight

complexType distributionByClassType

diagram	
children	Class
used by	elements CabinVersion PaxPerClass
annotation	documentation Type definition - distribution by class

element distributionByClassType/Class

diagram	
properties	isRef 0 minOcc 0 maxOcc 4 content complex mixed false nillable false
attributes	Name Type Use Default Fixed annotation classId derived by: xs:string documentation class ID - e.g. F, C, Y classSeats xs:nonNegativeInteger documentation number of available seats
annotation	documentation class

attribute distributionByClassType/Class/@classId

type	restriction of xs:string
properties	isRef 0
facets	minLength 1
annotation	documentation class ID - e.g. F, C, Y

attribute distributionByClassType/Class/@classSeats

type	xs:nonNegativeInteger
properties	isRef 0
annotation	documentation number of available seats

simpleType CGType

type	restriction of xs:integer
facets	minInclusive 0 maxInclusive 999
annotation	documentation CG in 0.1%MAC expression

simpleType crewMembersType

type	xs:nonNegativeInteger
annotation	documentation number of crew members expression

simpleType densityType

type	restriction of xs:double
used by	element FuelDensity
facets	minInclusive 0.5 maxInclusive 1
annotation	documentation fuel density expression

simpleType hArmType

type	restriction of xs:double
used by	attribute MiscellaneousItem/@hArm
facets	minInclusive 0
annotation	documentation harm expression

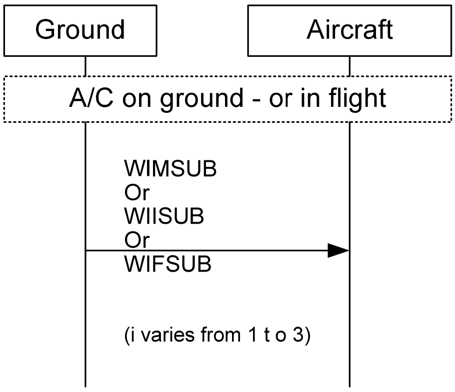
simpleType paxTypeType

type	restriction of xs:string
used by	attributes PaxTypeWeights/PaxTypeWeight/@PaxType PaxPerSection/PaxPerType/@PaxType
facets	minLength 1
annotation	documentation Passenger type expression

simpleType weightType

type	xs:nonNegativeInteger	
used by	elements	DOW FOB TaxiFuel TotalCargoWeight TotalPaxWeight TotalTrafficWeight TOW TripFuel ZFW
	attributes	PaxTypeWeights/PaxTypeWeight/@averagePaxWeight CargoPerCompartment/@compartmentCargoWeight CateringDeviationPerGalleyZone/@weight MiscellaneousItem/@weight
annotation	documentation weight expression	

9.2 Weight and Balance initialization



Typical Weight and balance init transmission

The Weight and Balance Init data is used to initialize the onboard W&B application. The aim of this transmission is to send preliminary W&B data from a W&B ground system to the airborne Weight and balance application (WBA).

3 levels of service are possible for Weight & Balance application initialization: minimum, intermediate and full – see appropriate sections for detailed description of these services.

9.2.1 Weight-and balance- Minimum Init service

This section defines version 1 of the Minimum initialization service (WIM service).

9.2.1.1 Weight and balance Initialization Minimum – SUBmit uplink

Element Name: **WIMSUB**

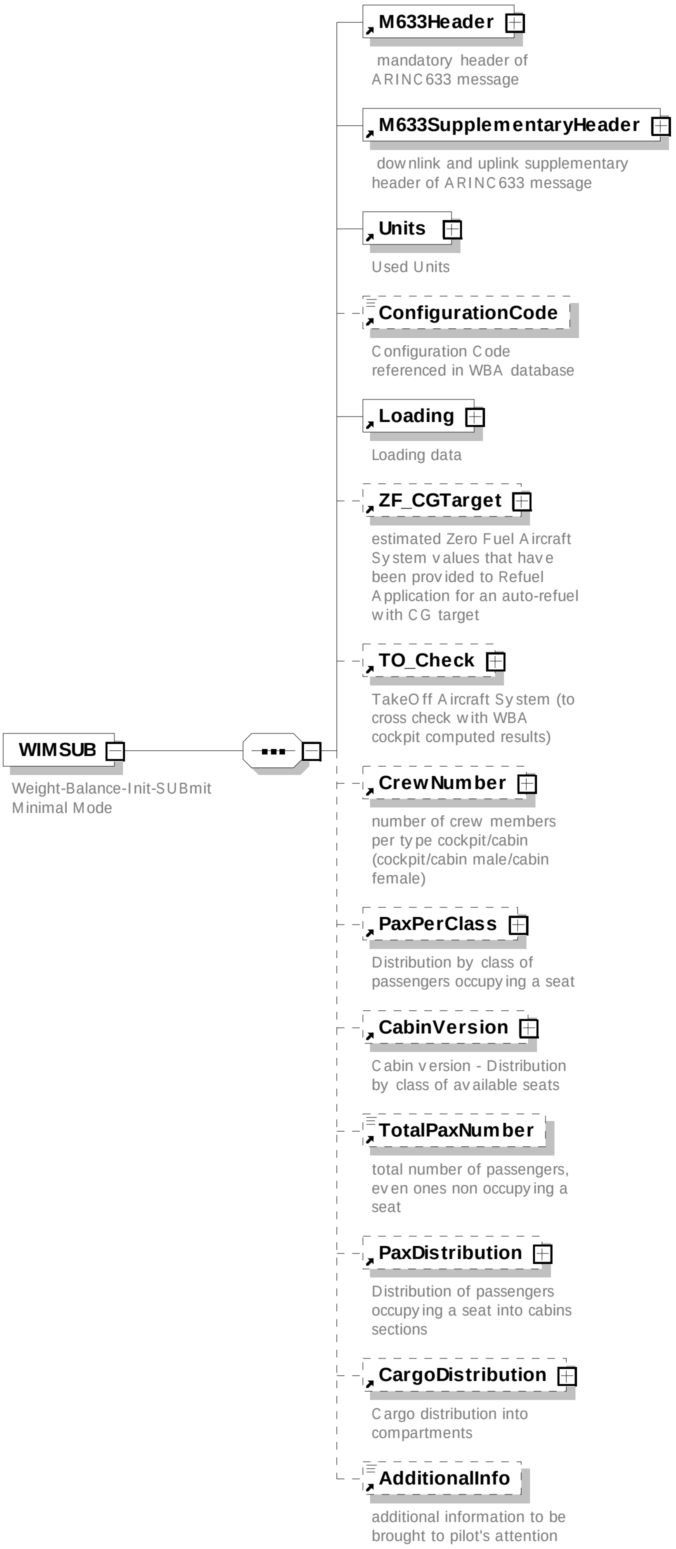
While operating using this mode the ground system sends only mandatory data to the aircraft and the aircraft can only generate and send to the ground AHM518. The crew may also have to enter some parameters to complete WBA application initialization and/or to complete the LTS computation (see list of optional parameters in the element definition).

9.2.1.1.1 ACARS format

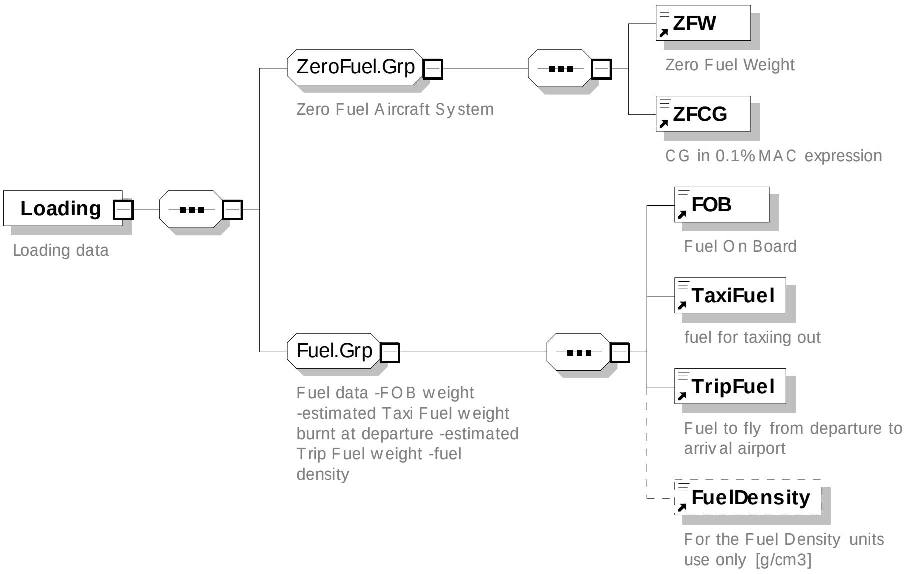
N/A

9.2.1.1.2 XML format

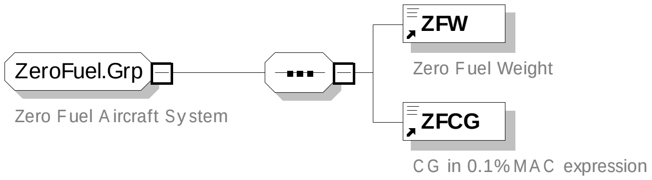
element WIMSUB

diagram	
properties	content complex
children	M633Header M633SupplementaryHeader Units ConfigurationCode Loading ZF_CGTarget TO_Check CrewNumber PaxPerClass CabinVersion TotalPaxNumber PaxDistribution CargoDistribution AdditionalInfo
annotation	documentation Weight-Balance-Init-SUBmit Minimal Mode

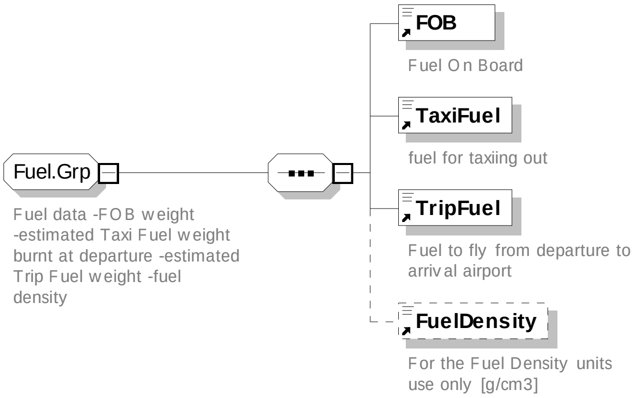
element Loading

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>content complex
mixed false
nillable false</td></tr>
<tr><td>children</td><td>ZFW ZFCG FOB TaxiFuel TripFuel FuelDensity</td></tr>
<tr><td>used by</td><td>elements WIFSUB WIISUB WIMSUB</td></tr>
<tr><td>annotation</td><td>documentation
Loading data</td></tr>
</table>

group ZeroFuel.Grp

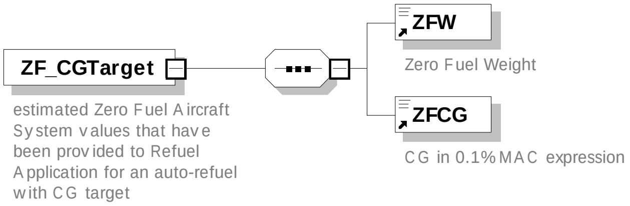
<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>children</td><td>ZFW ZFCG</td></tr>
<tr><td>used by</td><td>element Loading</td></tr>
<tr><td>annotation</td><td>documentation
Zero Fuel Aircraft System</td></tr>
</table>

group Fuel.Grp

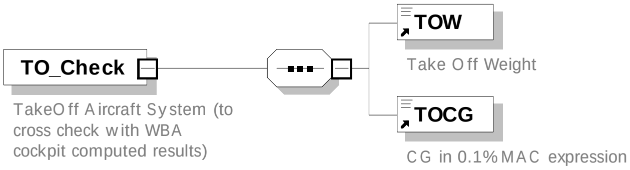
<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>children</td><td>FOB TaxiFuel TripFuel FuelDensity</td></tr>
<tr><td>used by</td><td>element Loading</td></tr>
<tr><td>annotation</td><td>documentation
Fuel data -FOB weight -estimated Taxi Fuel weight burnt at departure -estimated Trip Fuel weight -fuel density</td></tr>
</table>

9.0 WEIGHT AND BALANCE (WBA)

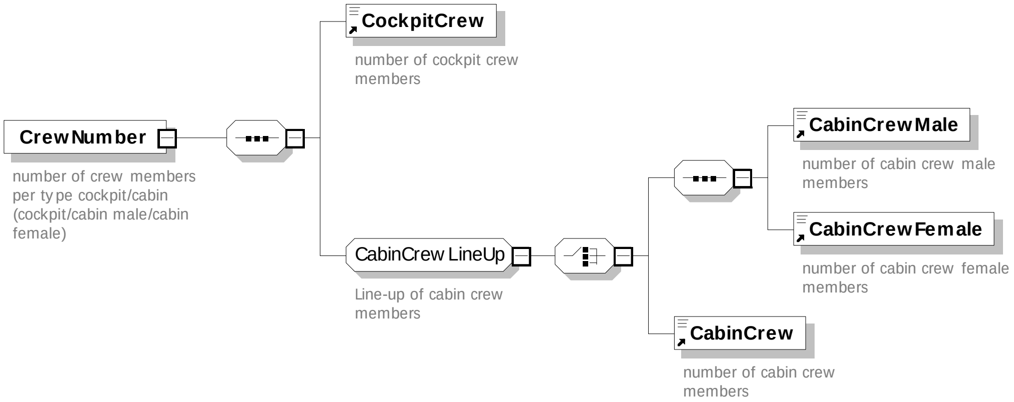
element ZF_CGTarget

diagram	
properties	content complex mixed false nillable false
children	ZFW ZFCG
used by	elements WIFSUB WIISUB WIMSUB
annotation	documentation estimated Zero Fuel Aircraft System values that have been provided to Refuel Application for an auto-refuel with CG target

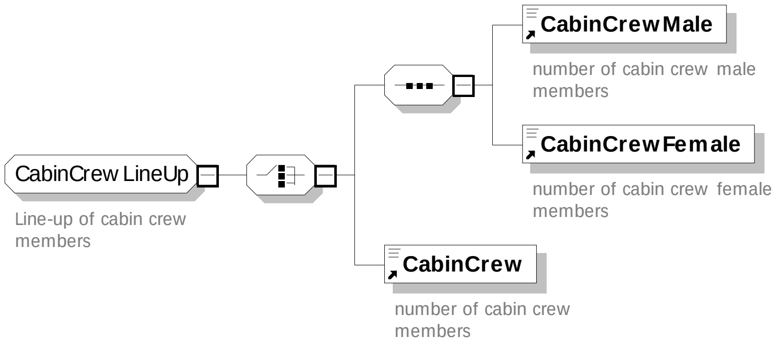
element TO_Check

diagram	
properties	content complex mixed false nillable false
children	TOW TOCG
used by	elements WIFSUB WIISUB WIMSUB
annotation	documentation TakeOff Aircraft System (to cross check with WBA cockpit computed results)

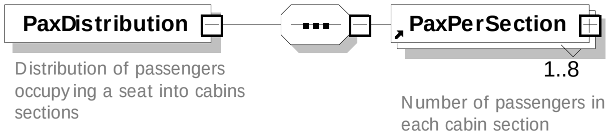
element CrewNumber

diagram	
properties	content complex mixed false nillable false
children	CockpitCrew CabinCrewMale CabinCrewFemale CabinCrew
used by	elements WIFSUB WIISUB WIMSUB
annotation	documentation number of crew members per type cockpit/cabin (cockpit/cabin male/cabin female)

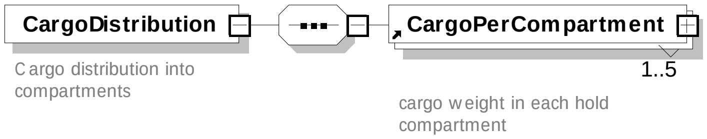
group CabinCrewLineUp

diagram	
children	CabinCrewMale CabinCrewFemale CabinCrew
used by	element CrewNumber
annotation	documentation Line-up of cabin crew members

element PaxDistribution

diagram	
properties	content complex mixed false nillable false
children	PaxPerSection
used by	element WIMSUB group PayloadPax.Grp
annotation	documentation Distribution of passengers occupying a seat into cabins sections

element CargoDistribution

diagram	
properties	content complex mixed false nillable false
children	CargoPerCompartment
used by	element WIMSUB group PayloadCargo.Grp
annotation	documentation Cargo distribution into compartments

9.2.2 Weight-and balance- Intermediate Init service

9.2.2.1 Weight and balance Initialization Intermediate – SUBmit uplink

Element Name: **WIISUB**

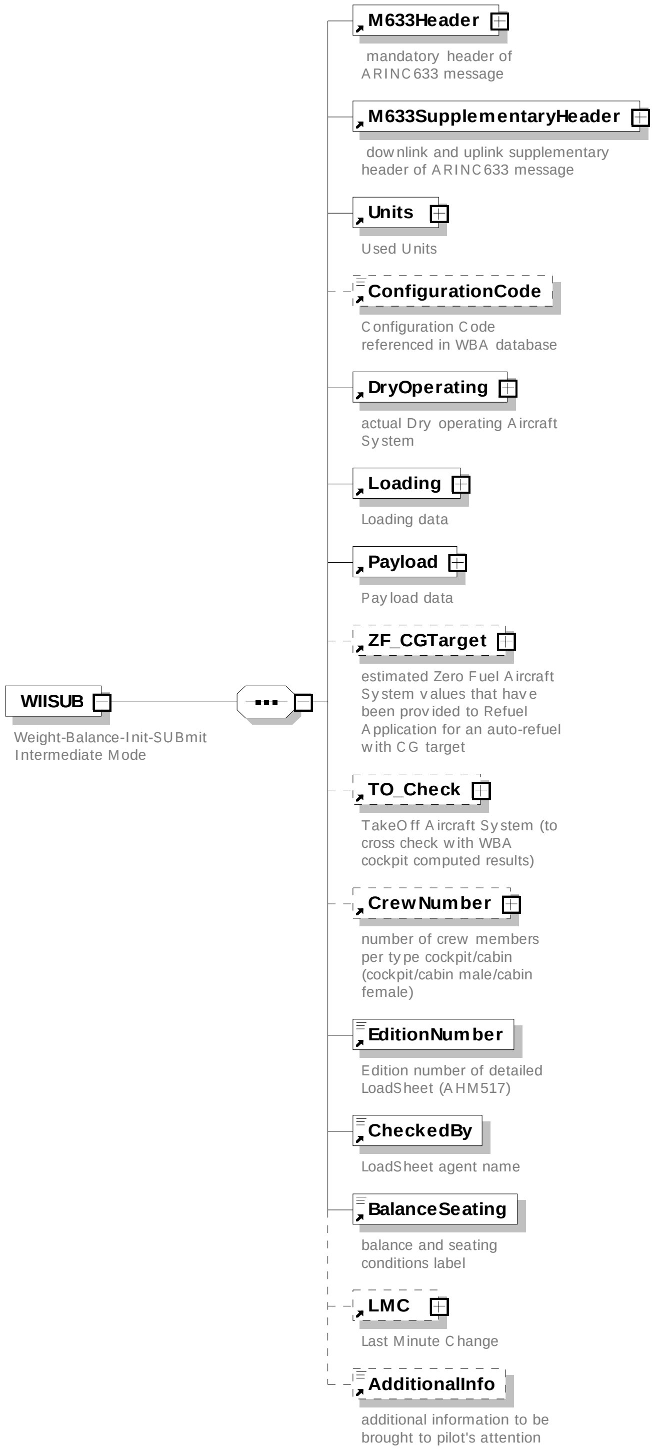
While operating using this mode the ground system sends Minimum init service data plus the additional data to the aircraft corresponding to the AHM517 input and the aircraft can generate and send to the ground AHM518 and AHM517.

9.2.2.1.1 ACARS format

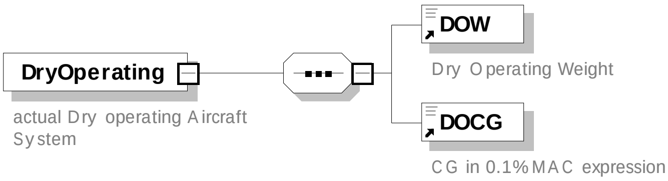
N/A

9.2.2.1.2 XML format

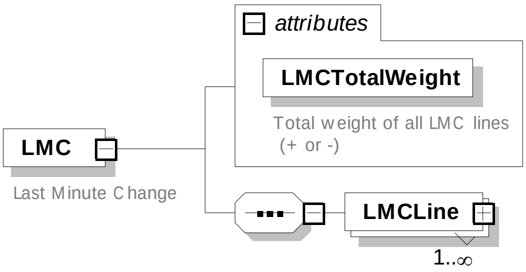
element WIISUB

diagram	
properties	content complex
children	M633Header M633SupplementaryHeader Units ConfigurationCode DryOperating Loading Payload ZF_CGTarget TO_Check CrewNumber EditionNumber CheckedBy BalanceSeating LMC AdditionalInfo
annotation	documentation Weight-Balance-Init-SUBmit Intermediate Mode

element DryOperating

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
mixed false
nillable false</td></tr>
<tr><td>children</td><td>DOW DOCG</td></tr>
<tr><td>used by</td><td>elements WIFSUB WIISUB</td></tr>
<tr><td>annotation</td><td>documentation
actual Dry operating Aircraft System</td></tr>
</table>

element LMC

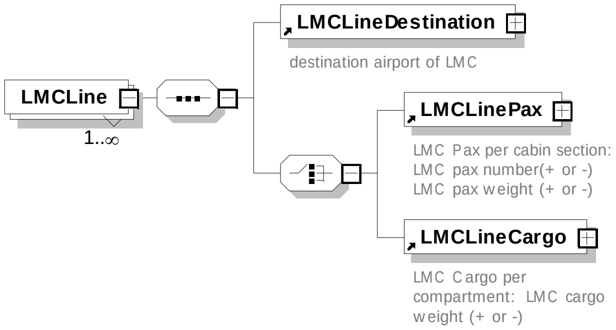
<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
mixed false
nillable false</td></tr>
<tr><td>children</td><td>LMCLine</td></tr>
<tr><td>used by</td><td>elements WIFSUB WIISUB</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>LMCTotalWeight</td><td>xs:integer</td><td>required</td><td></td><td></td><td>documentation
Total weight of all LMC lines (+ or -)</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Last Minute Change</td></tr>
</table>

attribute LMC/@LMCTotalWeight

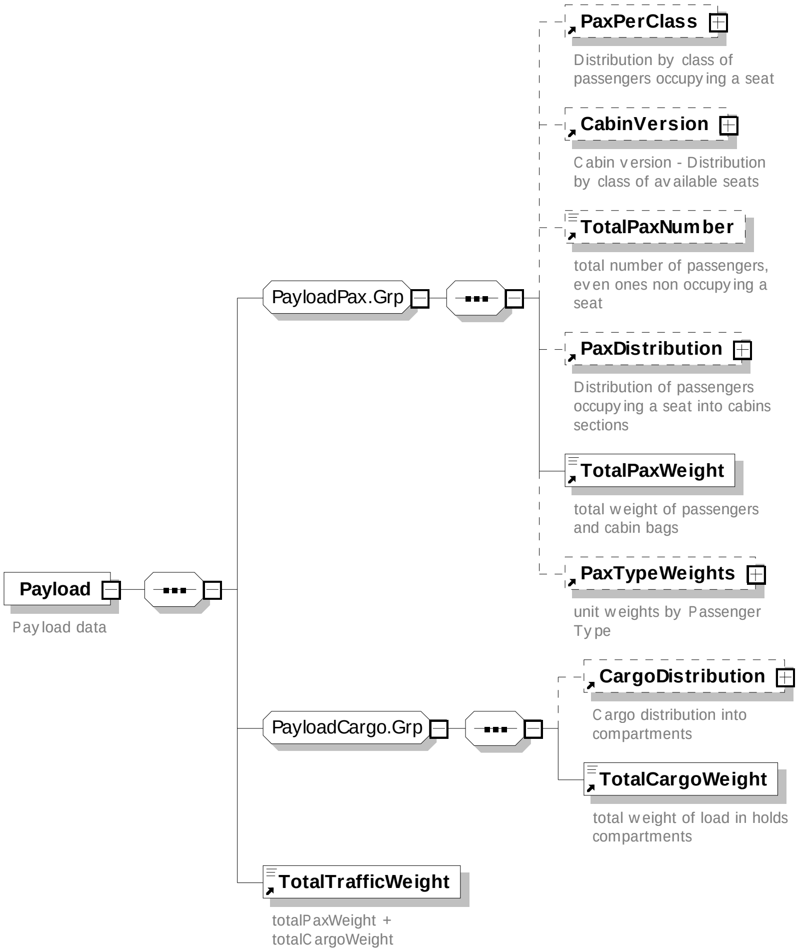
type	xs:integer
properties	isRef 0 use required
annotation	documentation Total weight of all LMC lines (+ or -)

9.0 WEIGHT AND BALANCE (WBA)

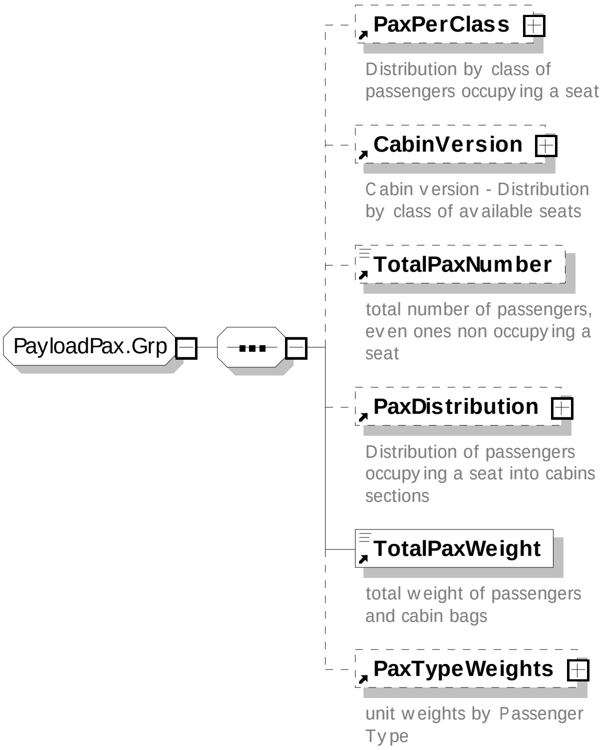
element LMC/LMCLine

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 1
maxOcc unbounded
content complex
mixed false
nillable false</td></tr>
<tr><td>children</td><td>LMCLineDestination LMCLinePax LMCLineCargo</td></tr>
</table>

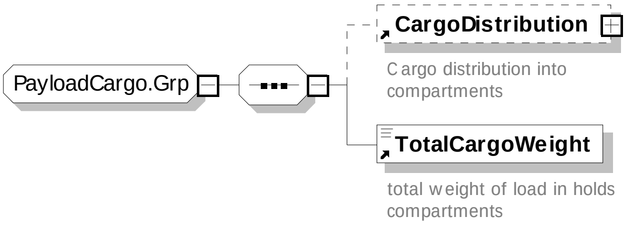
element Payload

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>content complex
mixed false
nillable false</td></tr>
<tr><td>children</td><td>PaxPerClass CabinVersion TotalPaxNumber PaxDistribution TotalPaxWeight PaxTypeWeights CargoDistribution TotalCargoWeight TotalTrafficWeight</td></tr>
<tr><td>used by</td><td>elements WIFSUB WIISUB</td></tr>
<tr><td>annotation</td><td>documentation
Payload data</td></tr>
</table>

group PayloadPax.Grp

diagram	
children	PaxPerClass CabinVersion TotalPaxNumber PaxDistribution TotalPaxWeight PaxTypeWeights
used by	element Payload

group PayloadCargo.Grp

diagram	
children	CargoDistribution TotalCargoWeight
used by	element Payload

9.2.3 Weight-and balance- Full Init – service

9.2.3.1 Weight and balance Initialization Full – SUBmit uplink

Element Name: **WIFSUB**

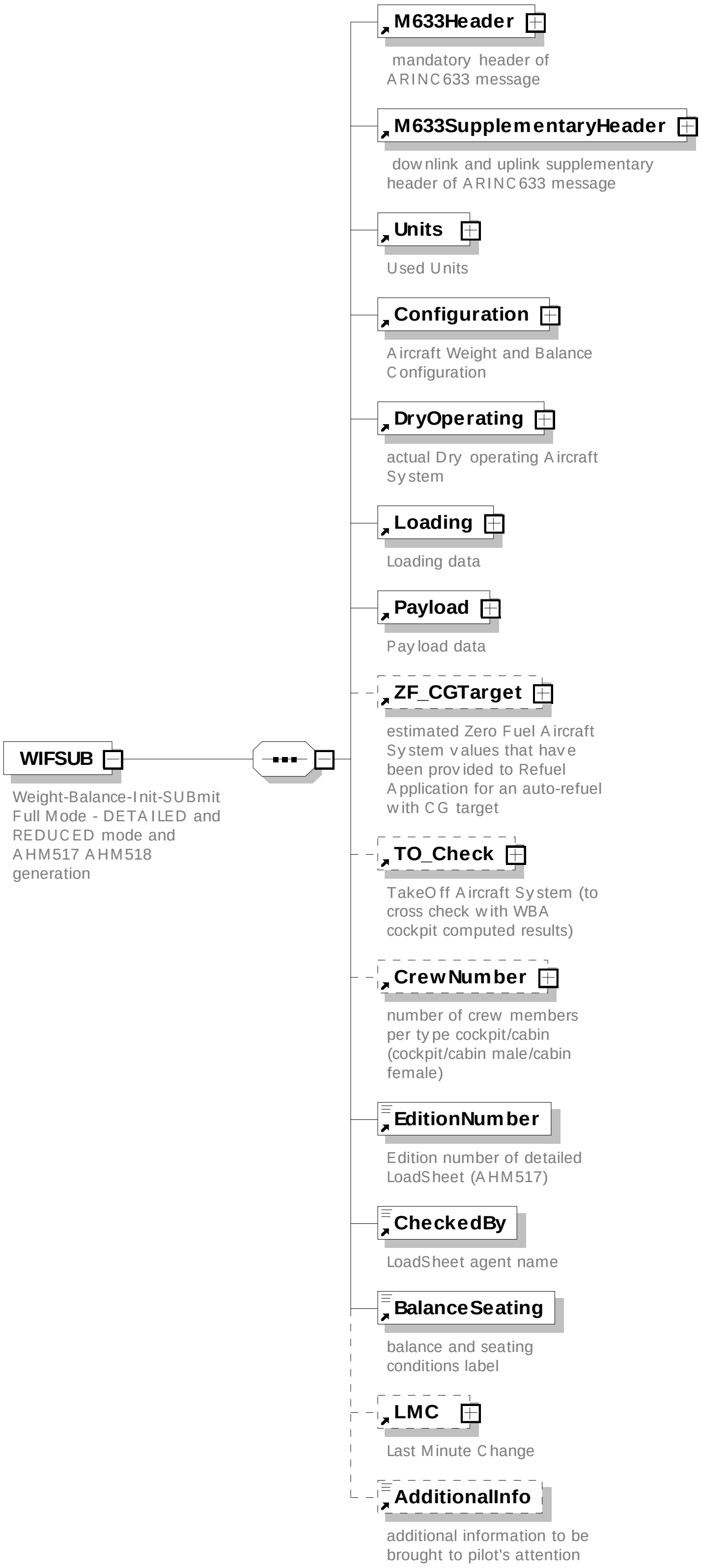
While operating using this mode the ground system sends a complete set of data to the aircraft in order to fully initialize the W&B airborne application and the aircraft can generate and send to the ground AHM518 and AHM517.

9.2.3.1.1 ACARS format

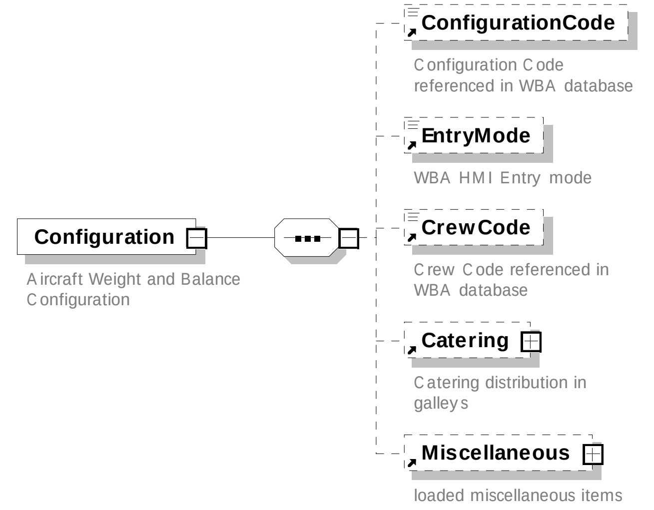
N/A

9.2.3.1.2 XML format

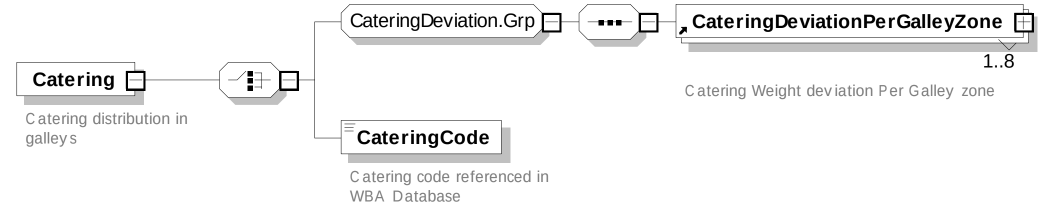
element WIFSUB

diagram	
properties	content complex
children	M633Header M633SupplementaryHeader Units Configuration DryOperating Loading Payload ZF_CGTarget TO_Check CrewNumber EditionNumber CheckedBy BalanceSeating LMC AdditionalInfo
annotation	documentation Weight-Balance-Init-SUBmit Full Mode - DETAILED and REDUCED mode and AHM517 AHM518 generation

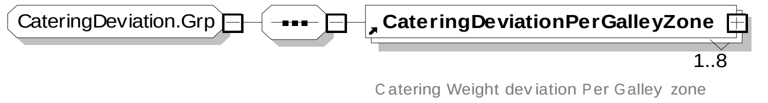
element Configuration

diagram	
properties	content complex mixed false nillable false
children	ConfigurationCode EntryMode CrewCode Catering Miscellaneous
used by	element WIFSUB
annotation	documentation Aircraft Weight and Balance Configuration

element Catering

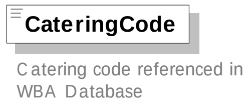
diagram	
properties	content complex mixed false nillable false
children	CateringDeviationPerGalleyZone CateringCode
used by	element Configuration
annotation	documentation Catering distribution in galleys

group CateringDeviation.Grp

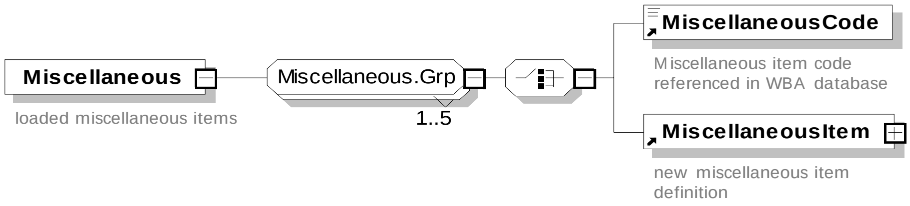
diagram	
children	CateringDeviationPerGalleyZone
used by	element Catering

9.0 WEIGHT AND BALANCE (WBA)

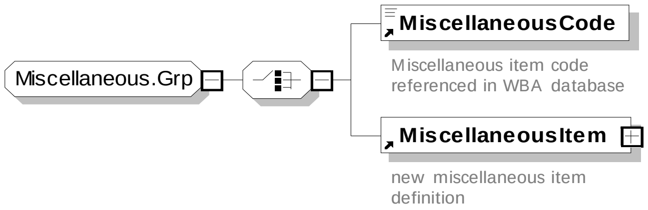
element Catering/CateringCode

diagram	
type	restriction of xs:string
properties	isRef 0 content simple
facets	minLength 1
annotation	documentation Catering code referenced in WBA Database

element Miscellaneous

diagram	
properties	content complex mixed false nillable false
children	MiscellaneousCode MiscellaneousItem
used by	element Configuration
annotation	documentation loaded miscellaneous items

group Miscellaneous.Grp

diagram	
children	MiscellaneousCode MiscellaneousItem
used by	element Miscellaneous

9.2.4 Dynamic aspects

The initialization should only consist in simple transmission of the SUBmit element from the ground to the aircraft WBA.

COMMENTARY

Transport services will ensure reliable and error free transmission of the data to the airborne application.

The initialization service should be usable at any time (in ground, during flight preparation, or in flight, if the crew decides to anticipate next flight preparation).

WIxSUB element should apply to flight under preparation. The supplementary header should specify the aircraft and the flight to which the data are associated (flight under preparation).

COMMENTARY

> The crew may not have yet entered a valid flight number when the init data are received (the communication systems may use last flight number).

Upon reception of an erroneous initialization message (WIMSUB, WIISUB or WIFSUB), the airborne system should log an error message on board the aircraft, inform the crew that the received message is erroneous, and generate a corresponding error message (WIRREP) (see Section 9.4).

9.3 Weight and balance Report (LTS) transmission services

This service consists in the airborne application transmitting to the ground airline application the Load and Trim Sheet (LTS) calculated on board.

There is no specific service for the Weight and balance Application (WBA) – WBA should use the eFF download service (EFDREP) specified in Section 10.3.

The only exception to the use of EFDREP service is the file extension to be used: WBA should generate an '.lds' file (and not '.eff'), containing eFF structure and the LTS as a specific document. Other documents may be included in the eFF.

The LTS should be embedded in the eFF folder associated with the topic 'LoadTrimSheet' (see Section 10 for more details).

9.4 Weight and Balance Init Error service.

Weight-balance-**I**nit-e**R**ror- **REP**ort service

This service is composed of a single message: WIRREP downlink.

Element Name: **WIRREP**

This service **enables** the airborne WBA application to indicate to the ground that an error was detected on a received initialization message (WIMSUB, WIISUB, and WIFSUB).

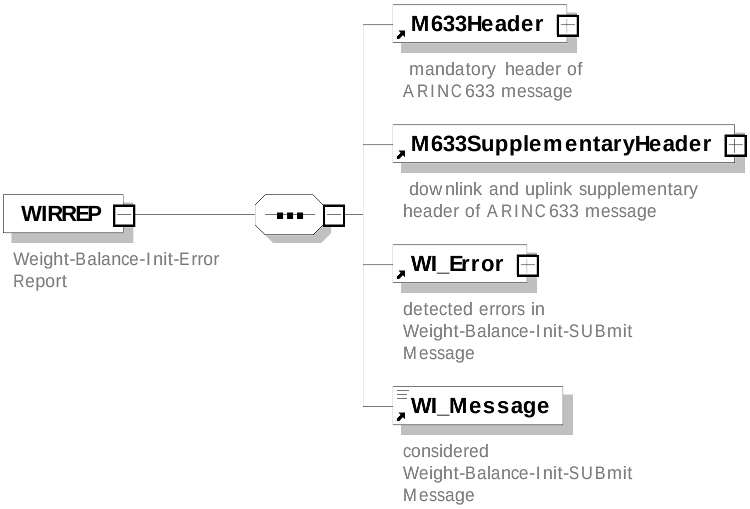
9.4.1 Weight and Balance Init eRror REPort (WIRREP) downlink

9.4.1.1 ACARS Format

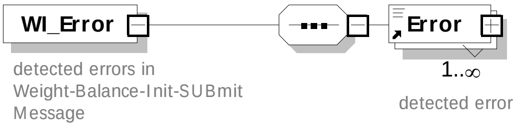
N/A

9.4.1.2 XML Format

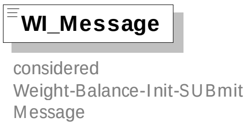
element WIRREP

diagram	
properties	content complex
children	M633Header M633SupplementaryHeader WI_Error WI_Message
annotation	documentation Weight-Balance-Init-Error Report

element WI_Error

diagram	
properties	content complex mixed false nillable false
children	Error
used by	element WIRREP
annotation	documentation detected errors in Weight-Balance-Init-SUBmit Message

element WI_Message

diagram	
type	restriction of xs:string
properties	content simple
used by	element WIRREP
facets	minLength 1
annotation	documentation considered Weight-Balance-Init-SUBmit Message

9.4.2 Dynamic aspects

The weight and balance init report service should only consist in simple transmission of the REPort element (WIRREP) from the aircraft WBA to the ground.

COMMENTARY

Transport services will ensure reliable and error free transmission of the data to the airborne application.

9.5 WBA files packaging

WBA messages should be transported as files with the extension ‘.wba’ and filenames with the following structure:

See Section 2.3 for general live IP transportation rules.

Each WBA file message (except LTS download) should be transported through a unique file with extension “.wba”.

It should be compliant with the corresponding element of the WBA.xsd schema:

- WIMSUB
- WIISUB
- WIFSUB
- WIRREP

It should be named as depicted in Section below:

The name of the files for the above mentioned messages should be structured as follows:

Sub field name	Description	Format (see Table 4.1.2)	Example
aircraftRegistration	**The registration number assigned by the local authority,**	**Specific format is defined by the local authority and contains a combination of alpha-numeric string and an optional hyphen.**	**“N12345”**
Delimiter	One Underscore		“_”
FlightIdentification	**Either Flight Identifier or Flight number**	(1-10)C	“DLH1234ABC
Delimiter	One Underscore		“_”
departureDate	Identifying flight date	YYMMDD	“050822”
Delimiter	One Underscore		“_”
DepartureAirport	Either Airport IATA Code or Airport ICAO Code	XXX or (exclusive) XXXX	“FRA”
Delimiter	One Underscore		“_”
ArrivalAirport	Either Airport IATA Code or Airport ICAO Code	XXX or (exclusive) XXXX	“TLS”
Delimiter	One Underscore		“_”
DateTimestamp	YYMMDDHHMMSS		050822173214
File Type	One period and the letters “wba”		“.wba”

Examples:

```
DAIHA_LH436_050822_DUS_ORD_050822122634.wba
N1234_UA575_050822_KORD_KSEA_050821122634.wba
F1234_CFG3214D_050401_XRY_PMI_050402052658.wba
```

The file extension “.wba” indicates that this is an xml File.

```
Concerning Weight and balance Report (LTS) transmission services
(download of LTS using EFDREP service), refer to Section 10.3 (eFF
file packaging), except that the extension shall be ‘.lds’ and not
‘.eff'. The LTS file enclosed in the eFF can be of any format.
```

10.0 ELECTRONIC FLIGHT FOLDER

10.1 General

The purpose of this section is to standardize how operational information regarding a flight segment is technically organized in a flight folder that is accessed by the pilot electronically. This does not intend to provide a standard organization of the documents in the flight folder, but rather a technical mean that would allow carrying a structured organization of flight documents.

As the electronic flight folder is also the support of the operational flight plan, and as operational flight plan contain many important data for the flight that can be passed to other applications, it was deemed necessary to standardize data in an operational flight plan. As there are many different ways to display an operational flight plan, the aim here is to try to have a generic model to handle the data that are available in the operational flight plan, but not on this format. This could be easily handled by XML, as XML is able to separate the data and the way it is displayed.

Future version of this document may define data other than the operational flight plan.

This section defines:

- An overview of eFF operational concept (i.e. how the data package is elaborated, updated, and finalized)
- The structure of eFF data package, which parameters are defined and how they are used
- The packaging of eFF data into an '.eff' file
- The rules of transportation via an IP network or with physical media (e.g. USB media) are described. The transportation subsection also covers the option to request and transport updates to an existing eFF. Updates can apply either to a part of the eFF which the user wants to update or the whole eFF.

The definition of some document contents can be found in Section 5.2 'Common Data'.

Note: The way eFF is transported is outside the scope of this section and is addressed in Section 2.3.

10.1.1 Review of the eFF Workflow

Once the contents for the eFF are gathered or created and the eFF is packed properly the question of the eFF data package usability arises. The following actions are possible with an eFF data package:

- Transport an eFF data package from one System to another (e.g. from ground to an airborne system and vice versa). Update whole or in-part, the documents within the eFF data package(i.e. pilot inputs/modifications)
- Use content of the eFF. Data package
- Note: This is out of scope of this document. It is the responsibility of the applications working with the eFF.

The eFF data package is exchanged between ground and airborne applications. These applications are known as:

- Ground tool at main base: (ground application used by dispatcher to generate the eFF)
- eFF ground application (used by the flight crew on ground at main briefing room)
- eFF airborne application (used by the crew onboard the aircraft)

During its lifecycle, the eFF data package (known as 'eFF') is produced, modified and processed by any of the above mentioned applications. Figure 1 shows an example of the process for uplinking of the eFF data package during preflight operations. Figure 2 shows an example process for downlinking of the eFF data package during postflight operations.

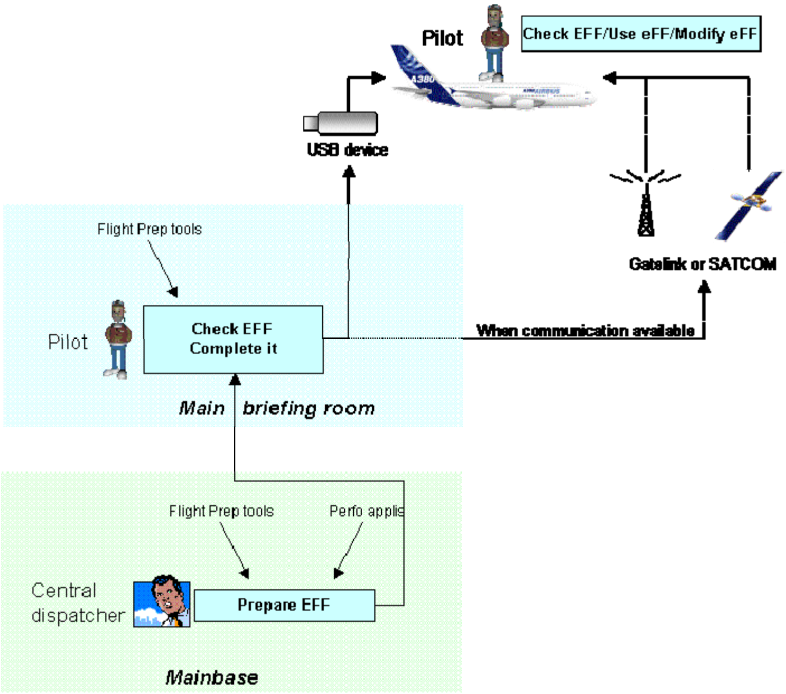


Figure 1 – Preflight process example

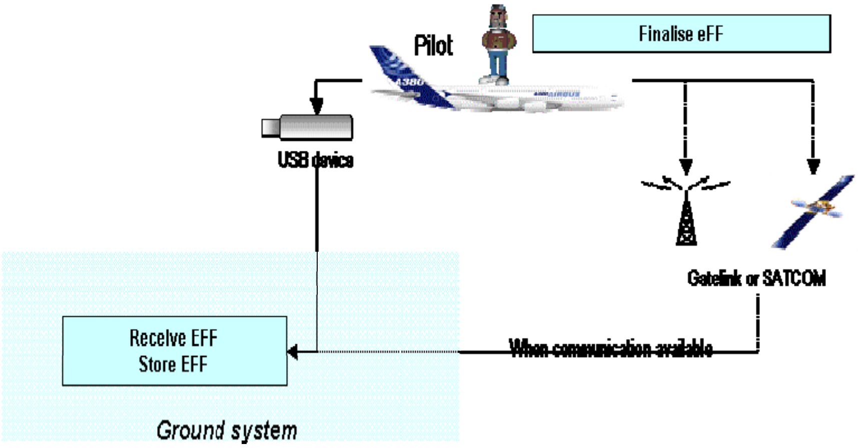


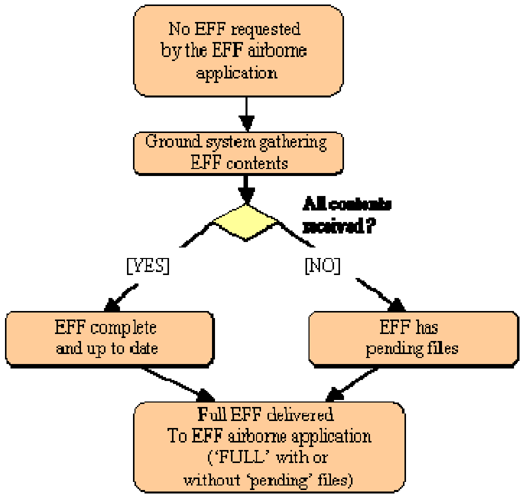
Figure 2 – Postflight process example

10.1.2 The eFF Lifecycle and Associated Communication Services

The eFF has the following life cycle:

- A ground tool, e.g. an Airline Flight Data Processing System, generates an eFF data package.
- The initial eFF data package is marked as FULL ("fullPackage" attribute of the root element is set). This initial data package may have all needed documents or folders marked as pending to be sent in subsequent eFF data package updates marked as UPDATE ("fullPackage" attribute of the root element is not set). The system which composes the eFF decides when not to include a document in the eFF data package. The decision to not include a document may be based on (but not limited to) performance reasons, timed out request or unavailable document. An UPDATE avoids sending all documents that were previously sent to the aircraft.
- Preflight / In-Flight
    - eFF data packages (FULL and UPDATEs) are transported from the eFF ground application to the EFB using the *eFF Uplink Service*.
        - An eFF data package marked as FULL replaces all previous eFF data package(s) for the same flight. In this case it may be useful to keep track of the modifications performed on the previous eFF data package(s) by the crew and apply them to the new eFF data package.
        - An eFF data package marked as an UPDATE will contain replacement document(s) and/or document(s) that were previously marked as "pending" and/or new documents. It may be useful to keep track of the modifications performed on the previous documents(s) by the crew and apply them to the new documents.
    - The eFF document(s) are enriched by flight crew or airborne systems.
- Post-Flight
    - The eFF document(s) are enriched by flight crew or airborne systems.
    - Parts of or the entire eFF data package is sent from airborne eFF application to the ground application using the *eFF Downlink Service*.

10.0 ELECTRONIC FLIGHT FOLDER



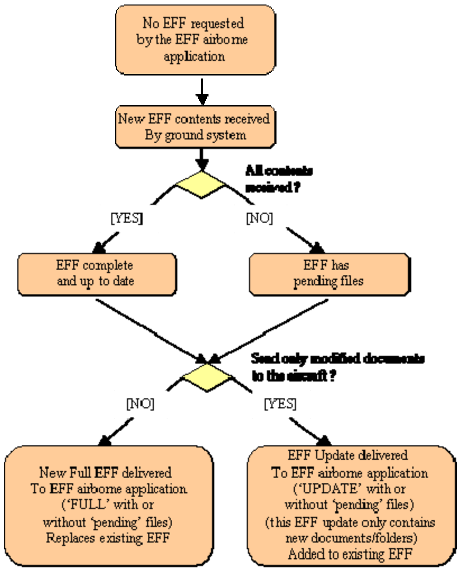
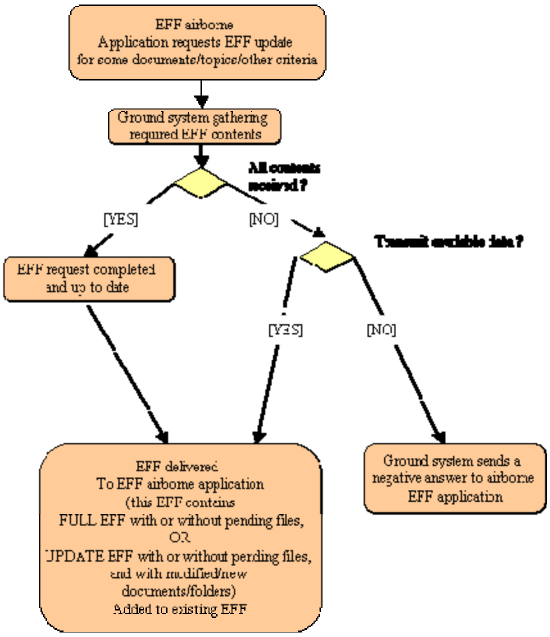


Illustration of Initial eFF
generation and uplink
(sent in EFUSUB message)

Illustration of Unsolicited eFF modification
(sent in EFUSUB message)



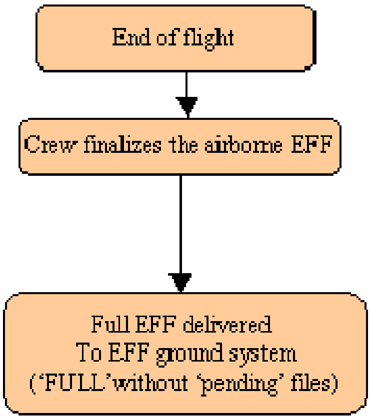


Illustration of EFF requested by Aircraft
(EFUSUB message sent following
EFFREQ message)

Illustration of EFF sent to
ground system at flight closure
(sent in EFDREP message)

COMMENTARY

'Unsollicited' means 'the EFF airborne application has not sent a request to the ground tool' – see Section 2 for details on how the transport level exchanges are managed. .

10.2 eFF Structure

10.2.1 Introduction

The individual documents of a briefing are not sufficient to generate a usable system for a crew member who has to operate a flight leg. To achieve usability, the documents have been assigned a structure with optional parameters which **enables** the grouping of various documents into a usable data package.

The main idea is to add an XML-File with the essential structural information and metadata to the documents.

The interrelation between the documents and this XML-file (which is called “eff.xml” or “structure file”) is described in the following subsections.

10.2.2 Documents Storable in an eFF

The standard presently does not define the structure of any documents that can be stored in the eFF data package. The standard only describes how a document is stored within the eFF data package structure. The format of the document is dependent of the tool used to create it and the eFF application which displays the document. Even so, one eFF tool can allow storing PDF documents, while another eFF application may not support the display of PDF documents. To eliminate this problem, a MIME type is associated with each document.

The enclosed definition of eFF XML schemas provide a predefined list of common MIME types that should be supported. (See definition of DocumentMimeType in the XML schemas)

10.2.3 Documents / Operational Flight Plan Documents

Documents as they are described in the XML structure file (‘eff.xml’ file) should be of one of the following types:

- Basic documents
  - A basic document is made of
    - The document file itself (ex : a text file, a graphic file, a PDF file)
    - Optional comment file(s) which contains annotations to the document.
  - One optional parameter file. These parameters can be used by other applications, e.g.: result of a take-off performance computation.
- Operational Flight plan documents
  - Operational Flight plan documents are data that use a style sheet to be displayed. They are not associated to a static representation to be displayed.
  - Operational Flight plan documents are associated with a set of style sheets (called a display model). Display models are part of the configuration of the application. Display models shall be managed in configuration by the operator to ensure the display of information after a long period of time.
  - Further information for the Operational Flight plan can be found in paragraph 5.4, Operational Flight Plan.

10.2.4 Contents of the eElectronic Flight Folder (*.eff file)

There are two files that are mandatory - the XML structure file (‘eff.xml’ file) and the integrity check file (‘*.lst’ file). The rest of the contents of the eFF are highly dependent on the operational procedures of the airline that operates the flight.

An eFF data package should be made of the following files:

- One XML structure file (‘eff.xml’ file)
    - XML elements called subfolders are used to organize the documents in the structure file.
- All the document files.
    - Type is arbitrary.
    - Each of them is referenced in the XML structure file (‘eff.xml’ file).
    - There can be several operational flight plans (one can be declared as ‘active’)
- Comment files
    - Comment files are Optional.
    - Comments are associated to documents by the XML structure file (‘eff.xml’ file).
- Parameters files
    - For documents that have associated parameters
    - Parameter files are associated to documents by the XML structure file (‘eff.xml’ file).
- One integrity check file
    - This file references all the files in the packages and provides a hashcode for each of them to ensure their integrity.
    - The modification of any of these file will modify their hashcode so that it is no more compliant with the stored hashcode in the integrity check file

COMMENTARY

These files will be zipped together in a single ‘*.eff’ file – see Section 10.3 for details.

10.2.5 Topic Concept

The eFF brings the notion of a topic concept.

The topic represents a functional identifier for one or more document(s) of the same kind. The functional identifier is a technical identification of the subject of the document which provides a common means of identification. This identification can be attached to each document mentioned in the XML structure file (eff.xml). This may help other applications that need to get data from the eFF data package to search for a technical identifier instead of a human readable identifier.

For example, an ATC flight plan can be named “Flight Plan” or “Plan de vol”, or something else. If we identify the ATC Flight plan with a Topic “FlightPlan/ATC”, then any application that requires getting the ATC Flight Plan can look in the eFF for the relevant topic “FlightPlan/ATC”. Flight briefing tool providers are free to define additional topics. Table 1 shows recommended topics which should be used when applicable.

The topic identifiers consist of one or more parts divided by a slash. The first part of the topic identifier describes the general scope (e.g. “FlightPlan” or “Weather”). Additional parts of the topic identifiers are applied cumulative. For example the topic “Weather” could be applied to all documents that contain weather information, “Weather/Text” is applied to all documents that contain textual information about weather conditions and “Weather/Text/METAR” is applied to textual METAR information.

Please note that a topic identifier can be associated to several documents but a document can refer only to one topic identifier.

complexType TopicType

diagram	
namespace	http://aeec.aviation-ia.net/633
used by	elements EFFREQType/UpdateRequest/Topic BaseDocumentType/Topic SubFolder.Template.Grp/Topic
attributes	Name: name Type: TopicValuesType Use: required Default: Fixed: annotation: documentation Topic name identifier
annotation	documentation Any topic associated to a subfolder or a document

attribute TopicType/@name

type	TopicValuesType
properties	isRef 0 use required
annotation	documentation Topic name identifier

simpleType TopicValuesType

type	union of (xs:string, restriction of xs:string)
used by	attribute TopicType/@name

Table 10.2.5.1 – Recommended Topic name values for TopicType/@name

Topic	Definition
FlightInfo	General flight information summary on the flight
FlightPlan	Gives general information on a flight plan
FlightPlan/ATCNon-ICAO	This topic should be used for the ATC-Flightplan only (for CAAs not compliant with ICAO).
FlightPlan/ATCICAO	This topic should be used for the ATC-Flightplan only (for CAAs compliant with ICAO).
FlightPlan/Operational	This topic should be used for the OFP only.
Weather	General weather information
Weather/Text	General textual weather information
Weather/Text/METAR	The airport weather topic contains the latest METAR information for all airports relevant for the planned flight
Weather/Text/TAF	The airport weather topic contains the latest TAF information for all airports relevant for the planned flight
Weather/Text/SIGMET	The SIGnificant METerological topic contains information about all significant weather phenomena in airspaces (e.g. FIRs or UIRs) relevant for the planned flight
Weather/Chart	The weather chart topic contains wind charts and significant weather charts relevant for the planned flight
Weather/Chart/Profile	Weather profile chart
Weather/Chart/Sat	Satellite image
Weather/Chart/SigWX	Signification weather chart
Weather/Chart/WindTemp	Wind & Temperature chart
NOTAM/ATC	The NOtice To AirMan topic contains other (non-weather) geo-referenced information relevant for the planned flight issued by ATC.
NOTAM/Company	The NOtice To AirMan topic contains other (non-weather) geo-referenced information relevant for the planned flight issued by the company.
NOTOC	The NOtification TO Captain topic contains dangerous goods and other information relevant of the loading of the aircraft. (See also IATA Airport Handling Manual)
NOTOC/DG	Dangerous goods
NOTOC/Others	Other notification to captain (not a dangerous good)
LoadTrimSheet	The Load and Trim Sheet topic contains information about the distribution of masses along the aircraft's longitudinal axes. See also IATA Airport Handling Manual
CrewList	The Crew list topic contains names and other information about the crew member aboard the aircraft
PaxList	The Pax list topic contains information on passengers
OceanicTracks	The Oceanic Tracksystem Track topic contains general information about Oceanic Tracks
OceanicTracks/Chart	The oceanic Tracksystem Track Chart topic contains a chart showing the current organization of the oceanic track system in graphical form
OceanicTracks/Text	The oceanic Tracksystem Track Text topic contains the coordinates of the current oceanic track system in text form
NavChart	The Navigation Chart topic contains navigational charts that are relevant to the planed flight, e.g. updates of charts
AirportInformation	General information regarding airports
SecurityInformation	General information regarding security
AirlineDefined	User defined information – use of additional parts of the topic identifier is recommended
UpperAirData	Upper Air Data information - two wind/temperature types will be supported: spot and segment
RVSMAltimeterCheck	Fields proposed for recording of altimeter checks in RVSM airspace
AirspaceData	List of Airspace related data

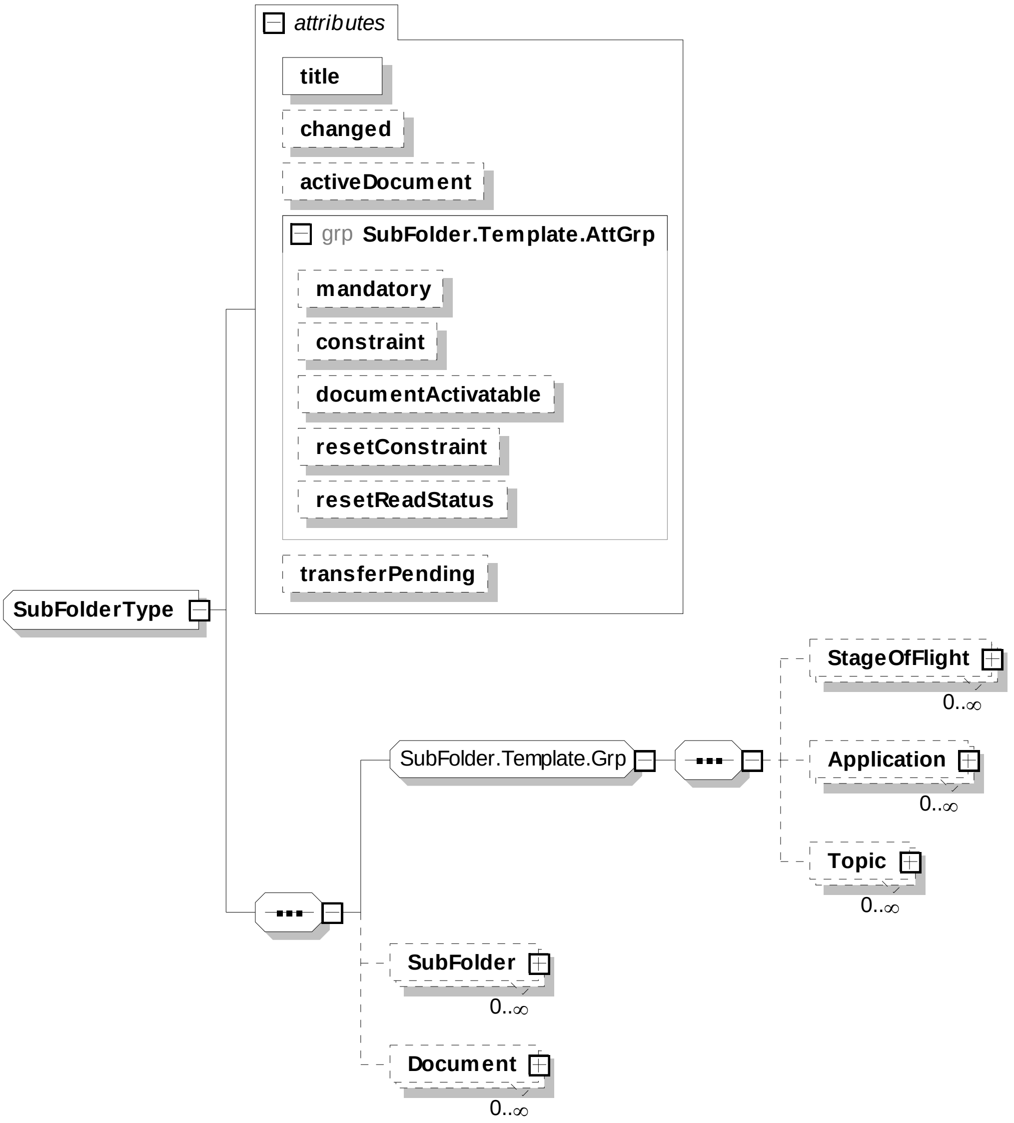
10.2.6 Subfolders Properties

Subfolders are structural information (elements) in the XML structure file that provides a way to group similar documents (e.g. all operational flight plans). The eFF itself contains no folders in terms of a traditional file system. Subfolder elements in the XML structure file can contain:

- Other subfolders
- Documents

A subfolder has several properties which are described in the following tables.

complexType SubFolderType

diagram		
children	StageOfFlight Application Topic SubFolder Document	
used by	elements	EFFType/SubFolder SubFolderType/SubFolder

attributes	Name	Type	Use	Default	Fixed	annotation
	title	derived by: xs:string	required			documentation Title of the subfolder
	changed	ChangeValuesType	optional	New		documentation Change code : - Unchanged - Revised - Deactivated - New
	activeDocument	derived by: xs:IDREF	optional			documentation Boolean state. Specifies that we can have an active document in this subfolder. Typically, active document are mostly used for flight plan. See Note [1] below.
	mandatory	xs:boolean	optional			documentation Specifies that documents in this subfolders or recursive subfolders must be exchanged
	constraint	derived by: xs:string	optional	None		documentation Possible values are: - None - CheckOne (at least one document shall be checked in the subfolder) - CheckAll (all the documents of the subfolder shall be checked) - Sign (one document of the subfolder shall be signed)
	documentActivatable	xs:boolean	optional			documentation Tells in the user can "activate" a specific document in this folder
	resetConstraint	resetCommandsType	optional	never		documentation Tells when to reset the constraint. Possible values are : - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument: When a new document is inserted in this folder - OnLoad : On any load
	resetReadStatus	resetCommandsType	optional	never		documentation Tells when to reset the read status - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument : When a new document is inserted in this folder - OnLoad : On any load
	transferPending	xs:boolean	optional			

attribute SubFolderType/@title

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation Title of the subfolder

attribute SubFolderType/@changed

type	ChangeValuesType
properties	isRef 0 default New use optional
facets	enumeration New enumeration Unchanged enumeration Revised enumeration Deactivated
annotation	documentation Change information. This information describes the differences between updates of an EFF. When an EFF is fetched the first time all subfolders will have the changed status New. In the frame of incremental deliveries, it helps to know the difference between data that are New, data that existed but Revised. Unchanged may be used in the case of a complete delivery of an EFF, but partially updated. Legend: Value — Semantics 'New' — New Subfolder; in the last received eFF package weren't such a subfolder. 'Unchanged' — Unchanged. 'Revised' — The contents of the subfolder have been updated. 'Deactivated' — The subfolder is outdated. Its contents should not be used anymore.

simpleType ChangeValuesType

type	restriction of xs:string
used by	attributes SubFolderType/@changed DocumentType/@changed
facets	enumeration New enumeration Unchanged enumeration Revised enumeration Deactivated

attribute SubFolderType/@activeDocument

type	restriction of xs:IDREF
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation Specifies the identifier of one document which is active in this subfolder (optional). Active notion is similar to the notion of active flight plan in the FMS. Only one document can be active any time. Active documents relates mainly to flight plan documents. An active flight plan is the flight plan known as "active" (meaning currently in use) by the FMS. It is there to be consistent with the FMS philosophy of activation. See Note [1] below.

attribute SubFolderType/@transferPending

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Declares that the documents in this folder are missing for some reason. The same as if all documents in this folder where marked "transferPending". This attribute may be used for partly delivery of an EFF, e.g. when gathering of some Files would take too much time. The pending files should be delivered with the next update of the EFF. The Pilot should be informed if there is pending information and the EFF therefore is not complete.

attributeGroup SubFolder.Template.AttGrp

used by	complexType	SubFolderType				
attributes	Name	Type	Use	Default	Fixed	annotation
	mandatory	xs:boolean	optional			
	constraint	derived by: xs:string	optional	None		documentation Possible values are: - None - CheckOne (at least one document shall be checked in the subfolder) - CheckAll (all the documents of the subfolder shall be checked) - Sign (one document of the subfolder shall be signed)
	documentActivatable	xs:boolean	optional			documentation Tells in the user can "activate" a specific document in this folder
	resetConstraint	resetCommandsType	optional	never		documentation Tells when to reset the constraint. Possible values are : - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument: When a new document is inserted in this folder - OnLoad : On any load
	resetReadStatus	resetCommandsType	optional	never		documentation Tells when to reset the read status - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument : When a new document is inserted in this folder - OnLoad : On any load
annotation	documentation Attribute group for template attributes for a subfolder					

attribute SubFolder.Template.AttGrp/@mandatory

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Specifies that documents in this subfolders or recursive subfolders must be exchanged. This attribute should be set by the ground system to specify to the airborne system which folders are mandatory in eFF downlinks. Mandatory at the level of the subfolder means that “all” the documents in such a subfolder are mandatory.

attribute SubFolder.Template.AttGrp/@constraint

type	restriction of xs:string
properties	isRef 0 default None use optional
facets	enumeration None enumeration CheckOne enumeration CheckAll enumeration Sign
annotation	documentation Defines the constraints on these document subfolders. Constraints can be one of the following: “None” : No specific constraint “CheckOne” : The pilot is required to check at least one document in this subfolder “CheckAll” : The pilot is required to check all the documents in this subfolder “Sign” : The pilot is required to sign documents in this subfolder

attribute SubFolder.Template.AttGrp/@documentActivatable

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Tells in the user can "activate" a specific document in this folder. Specifies that we can have an active document in this subfolder. Typically, active document are mostly used for flight plan. See Note [1] below.

attribute SubFolder.Template.AttGrp/@resetConstraint

type	resetCommandsType
properties	isRef 0 default never use optional
facets	enumeration never enumeration onLoadOnBoard enumeration onLoadOnGround enumeration onNewDocument enumeration onLoad
annotation	documentation Tells when to reset the constraint. Possible values are : - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument: When a new document is inserted in this folder - OnLoad : On any load

attribute SubFolder.Template.AttGrp/@resetReadStatus

type	resetCommandsType
properties	isRef 0 default never use optional
facets	enumeration never enumeration onLoadOnBoard enumeration onLoadOnGround enumeration onNewDocument enumeration onLoad
annotation	documentation Tells when to reset the read status - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument : When a new document is inserted in this folder - OnLoad : On any load

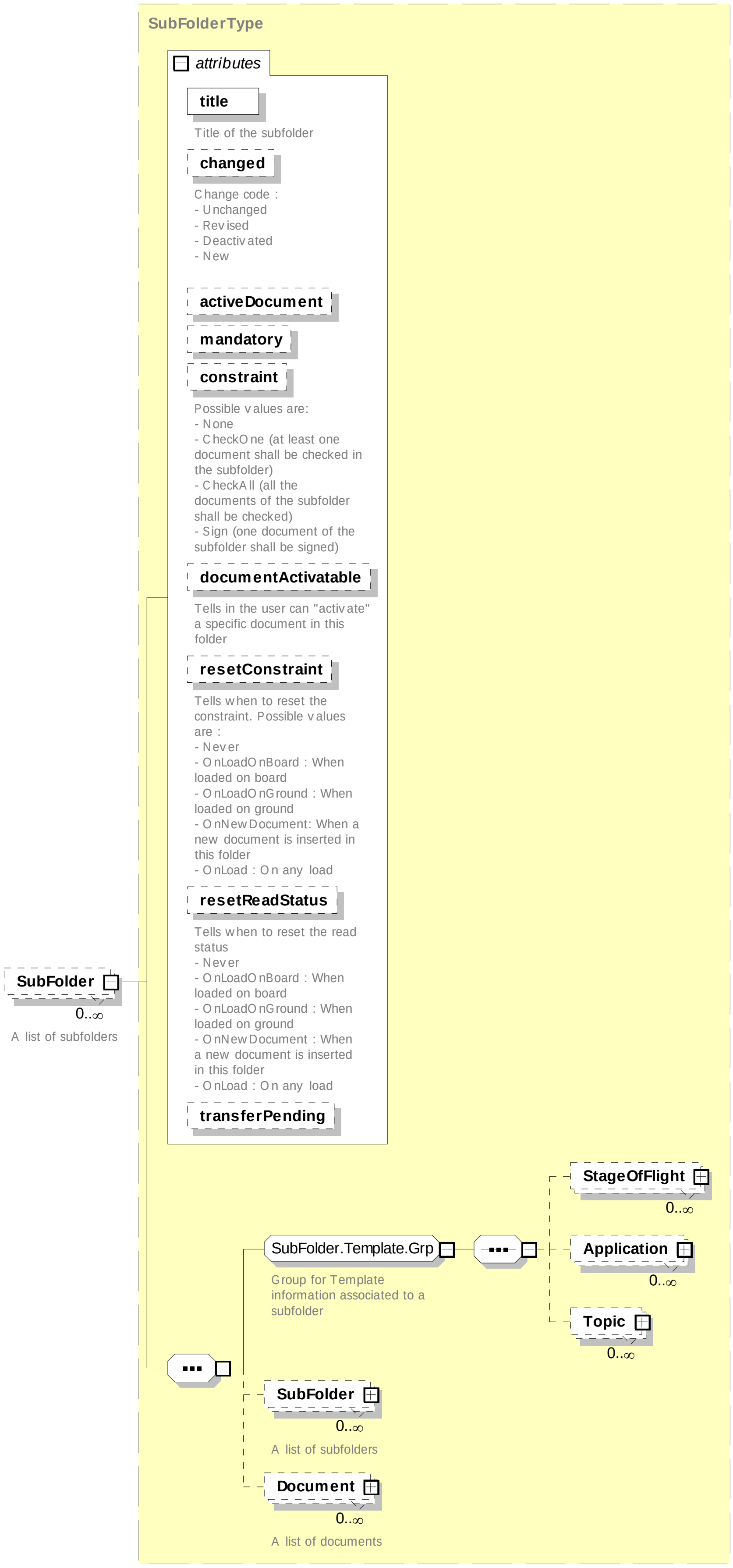
simpleType resetCommandsType

type	restriction of xs:string
used by	attributes SubFolder.Template.AttGrp/@resetConstraint SubFolder.Template.AttGrp/@resetReadStatus
facets	enumeration never enumeration onLoadOnBoard enumeration onLoadOnGround enumeration onNewDocument enumeration onLoad

Note[1] The notion of ‘active’ document was defined mainly for flight plan, Load and Trim sheet, Take Off performance documents – it enables the pilots to identify without ambiguity which document is to be applied for the flight. The attribute ‘documentactivatable’ is used to specify that this

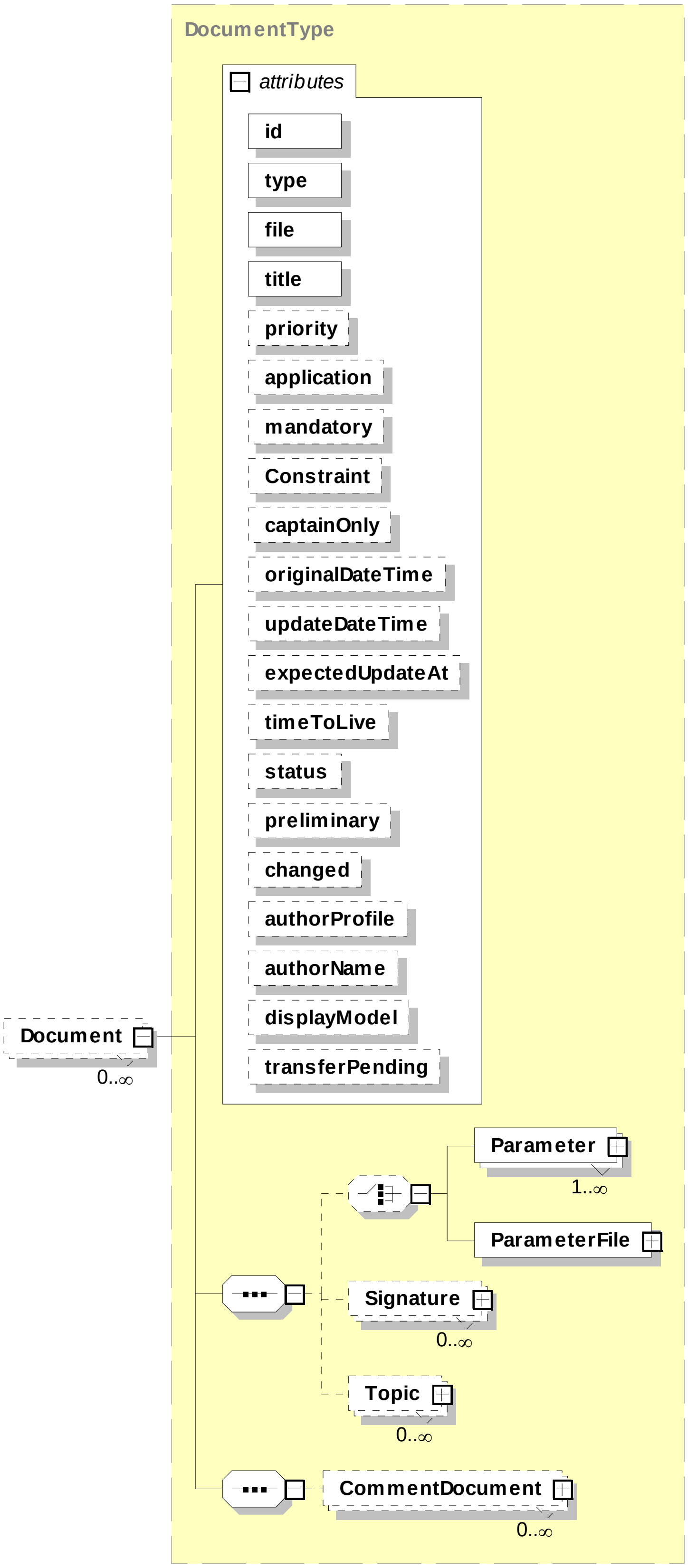
folder can contain a document tagged as ‘active’. If documentactivatable’ attribute is absent or not set, it means that no document should be declared active in this folder.

element SubFolderType/SubFolder

diagram	

<table>
<tr><td>type</td><td>SubFolderType</td></tr>
<tr><td>properties</td><td>
<table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>unbounded</td></tr>
<tr><td>content</td><td>complex</td></tr>
</table>
</td></tr>
<tr><td>children</td><td>StageOfFlight Application Topic SubFolder Document</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>annotation</th></tr>
<tr><td>title</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
Title of the subfolder</td></tr>
<tr><td>changed</td><td>ChangeValuesType</td><td>optional</td><td>New</td><td></td><td>documentation
Change code :
- Unchanged
- Revised
- Deactivated
- New</td></tr>
<tr><td>activeDocument</td><td>derived by: xs:IDREF</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>mandatory</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td></td></tr>
<tr><td>constraint</td><td>derived by: xs:string</td><td>optional</td><td>None</td><td></td><td>documentation
Possible values are:
- None
- CheckOne (at least one document shall be checked in the subfolder)
- CheckAll (all the documents of the subfolder shall be checked)
- Sign (one document of the subfolder shall be signed)</td></tr>
<tr><td>documentActivatable</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
Tells in the user can "activate" a specific document in this folder</td></tr>
<tr><td>resetConstraint</td><td>resetCommandsType</td><td>optional</td><td>never</td><td></td><td>documentation
Tells when to reset the constraint. Possible values are :
- Never
- OnLoadOnBoard : When loaded on board
- OnLoadOnGround : When loaded on ground
- OnNewDocument: When a new document is inserted in this folder
- OnLoad : On any load</td></tr>
<tr><td>resetReadStatus</td><td>resetCommandsType</td><td>optional</td><td>never</td><td></td><td>documentation
Tells when to reset the read status
- Never
- OnLoadOnBoard : When loaded on board
- OnLoadOnGround : When loaded on ground
- OnNewDocument : When a new document is inserted in this folder
- OnLoad : On any load</td></tr>
<tr><td>transferPending</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>annotation</td><td>documentation
A list of subfolders</td></tr>
</table>

element SubFolderType/Document

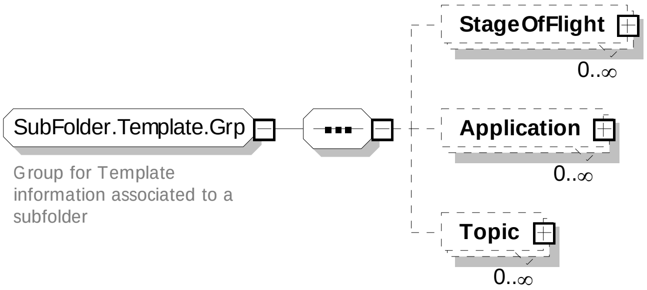
diagram	
type	DocumentType
properties	isRef 0 minOcc 0 maxOcc unbounded content complex

children	Parameter ParameterFile Signature Topic CommentDocument					
attributes	Name	Type	Use	Default	Fixed	annotation
	id	xs:ID	required			
	type	DocumentMimeType	required			documentation Type is the associated mime/type of the document. type shall be filled in uppercase
	file	xs:anyURI	required			
	title	xs:string	required			
	priority	xs:int	optional			documentation Number between 0 and 15 indicating the priority for data transfers or other treatments. The higher the number the more important the Document.
	application	xs:string	optional			documentation Describes what is the application originator for the data. (Associated with the parameters)
	mandatory	xs:boolean	optional			
	Constraint	derived by: xs:string	optional	None		documentation Possible values are : - None - Check - Sign
	captainOnly	xs:boolean	optional			documentation Document is only visible by the captain of the Flight
	originalDateTime	xs:dateTime	optional			documentation Original date/time of the inserted document
	updateDateTime	xs:dateTime	optional			documentation last modification date and time
	expectedUpdateAt	xs:dateTime	optional			documentation TimeDate stamp at which it is expected that an update to the present document may be available
	timeToLive	xs:dateTime	optional			documentation TimeDate stamp from which on the document should no longer be presented as a valid document
	status	derived by: xs:string	optional	None		documentation Status of the document: - None - Read - Checked - Signed
	preliminary	xs:boolean				
	changed	ChangeValuesType	optional	New		documentation Change code : - Unchanged - Revised - Deactivated - New
	authorProfile	derived by: xs:string	optional			documentation To specify the profile of the author (to be able to set message when a document is inserted depending on the profile of the user who inserted the document and the profile of the user who is consulting the document)
	authorName	xs:string				
	displayModel	xs:string	optional			documentation A reference to the associated display model
	transferPending	xs:boolean	optional			documentation This attribute notes that the document is not present in the .EFF package and should be downloaded at a later time.
annotation	documentation A list of documents					

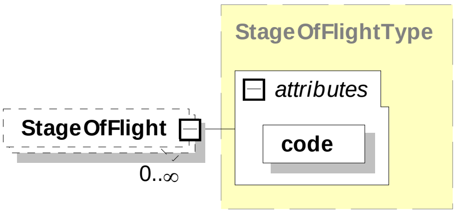
10.2.7 Subfolder Associations

A subfolder has several associations which are described in the following tables

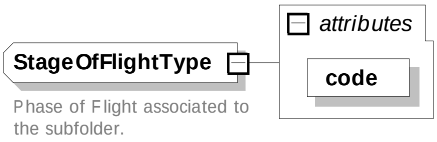
group SubFolder.Template.Grp

diagram	
children	StageOfFlight Application Topic
used by	complexType SubFolderType
annotation	documentation Group for Template information associated to a subfolder

element SubFolder.Template.Grp/StageOfFlight

diagram	
type	StageOfFlightType
properties	isRef 0 minOcc 0 maxOcc unbounded content complex
attributes	Name / Type / Use / Default / Fixed / annotation code / derived by: xs:string / required / / / represents the stage of flight e.g.: Pre-flight In-flight Post-flight

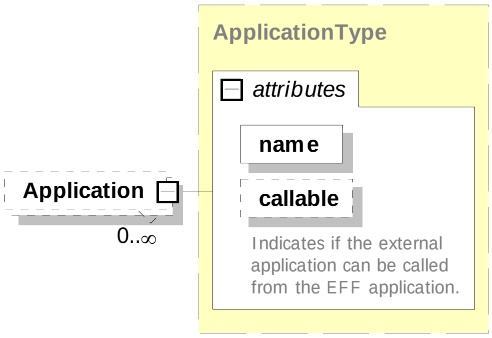
complexType StageOfFlightType

diagram	
used by	element SubFolder.Template.Grp/StageOfFlight
attributes	Name / Type / Use / Default / Fixed / annotation code / derived by: xs:string / required / / / represents the stage of flight e.g.: Pre-flight In-flight Post-flight
annotation	documentation Phase of Flight associated to the subfolder.

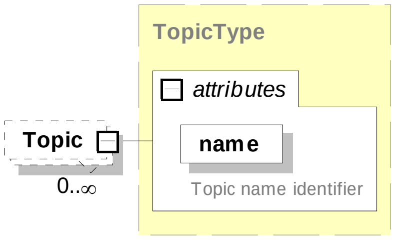
attribute StageOfFlightType/@code

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

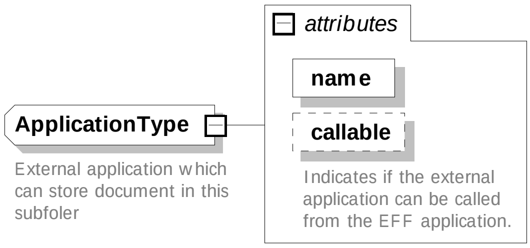
element SubFolder.Template.Grp/Application

<table>
<tr><td>diagram</td><td colspan="7">
</td></tr>
<tr><td>type</td><td colspan="7">ApplicationType</td></tr>
<tr><td>properties</td><td colspan="7">isRef 0
minOcc 0
maxOcc unbounded
content complex</td></tr>
<tr><td>attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td colspan="2">annotation</td></tr>
<tr><td></td><td>name</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td colspan="2">documentation
Association with an application.
Represents the identifier of the application on the target platform.</td></tr>
<tr><td></td><td>callable</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td colspan="2">documentation
Indicates if the external application can be called from the EFF application.</td></tr>
</table>

element SubFolder.Template.Grp/Topic

<table>
<tr><td>diagram</td><td colspan="6">
</td></tr>
<tr><td>type</td><td colspan="6">TopicType</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
minOcc 0
maxOcc unbounded
content complex</td></tr>
<tr><td>attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td></td><td>name</td><td>TopicValuesType</td><td>required</td><td></td><td></td><td>documentation
Topic name identifier</td></tr>
<tr><td>annotation</td><td colspan="6">documentation
Represents a topic associated to this subfolder. (See topic concept for definition of list of topics)</td></tr>
</table>

complexType ApplicationType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>used by</td><td>element SubFolder.Template.Grp/Application</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>name</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>Documentation
Association with an application.
Represents the identifier of the application on the target platform.</td></tr>
<tr><td>callable</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
Indicates if the external application can be called from the EFF application.</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
External application which can store document in this subfolder</td></tr>
</table>

attribute ApplicationType/@name

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation Association with an application. Represents the identifier of the application on the target platform.

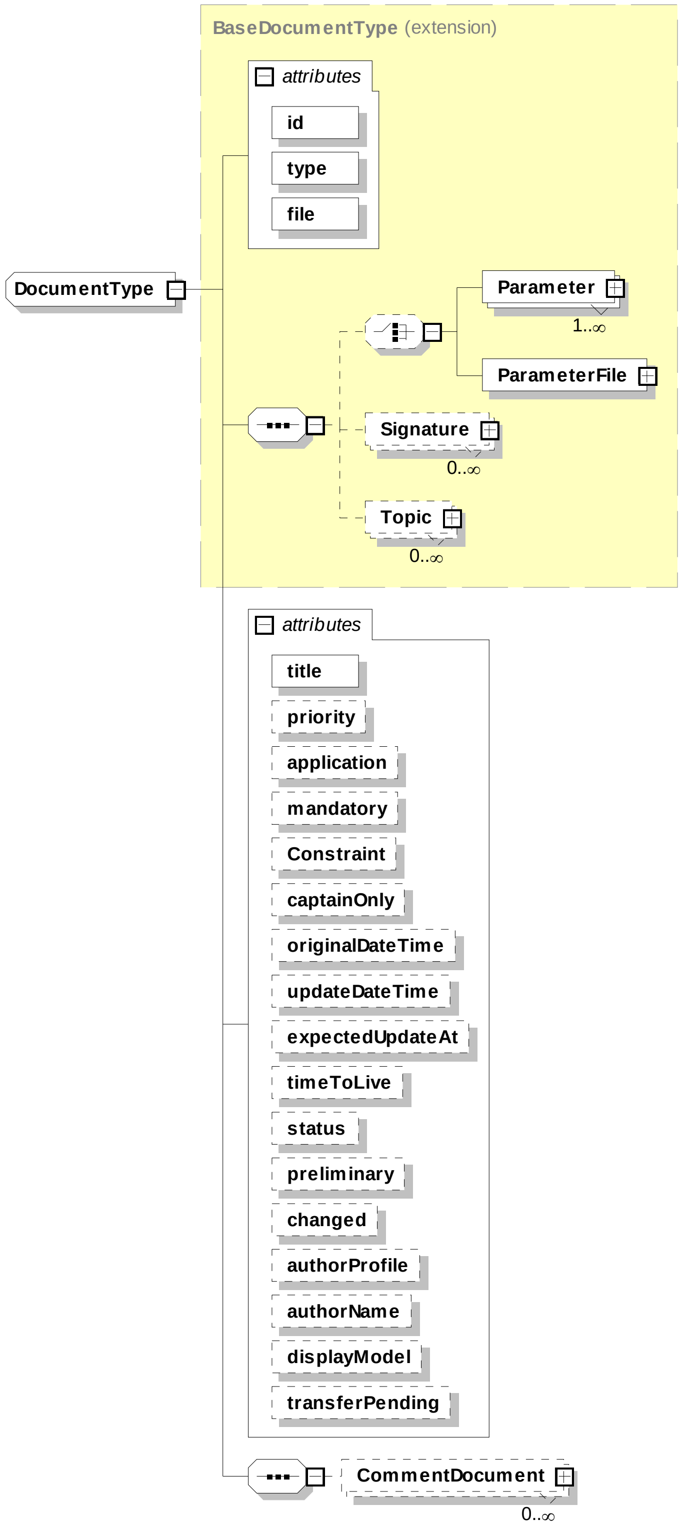
attribute ApplicationType/@callable

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Indicates if the external application can be called from the EFF application.

10.2.8 Documents Properties

The following definitions apply to all documents

complexType DocumentType

diagram	
type	extension of BaseDocumentType
properties	base BaseDocumentType
children	Parameter ParameterFile Signature Topic CommentDocument
used by	element SubFolderType/Document

attributes	Name	Type	Use	Default	Fixed	annotation
	id	xs:ID	required			documentation Technical identifier of the document. It shall be unique in the whole EFF
	type	DocumentMimeType	required			documentation Type is the associated mime/type of the document. type shall be filled in uppercase
	file	xs:anyURI	required			documentation If in the eff.xml structure, this references the physical file as embedded in the .EFF package
	title	xs:string	required			documentation Title of the Document – can be different from the filename
	priority	xs:int	optional			documentation Number between 0 and 15 indicating the priority for data transfers or other treatments. The higher the number the more important the Document.
	application	xs:string	optional			documentation Describes what is the application originator for the data. (Associated with the parameters)
	mandatory	xs:boolean	optional			
	Constraint	derived by: xs:string	optional	None		documentation Possible values are : - None - Check - Sign
	captainOnly	xs:boolean	optional			documentation Document is only visible by the captain of the Flight
	originalDateTime	xs:dateTime	optional			documentation Original date/time of the first release of the inserted document
	updateDateTime	xs:dateTime	optional			documentation Last update date/ time of the inserted document
	expectedUpdateAt	xs:dateTime	optional			documentation TimeDate stamp at which it is expected that an update to the present document may be available
	timeToLive	xs:dateTime	optional			documentation TimeDate stamp from which on the document should no longer be presented as a valid document
	status	derived by: xs:string	optional	None		documentation Status of the document: - None - Read - Checked - Signed
	preliminary	xs:boolean				documentation Indicates Data that is provided as information only.
	changed	ChangeValuesType	optional	New		documentation Change code : - Unchanged - Revised - Deactivated - New
	authorProfile	derived by: xs:string	optional			documentation To specify the profile of the author (to be able to set message when a document is inserted depending on the profile of the user who inserted the document and the profile of the user who is consulting the document)
	authorName	xs:string				documentation Name of the author of the document (string)
	displayModel	xs:string	optional			documentation A reference to the associated display model
	transferPending	xs:boolean	optional			documentation This attribute notes that the document is not present in the .EFF package and should be downloaded at a later time.

attribute DocumentType/@title

type	xs:string
properties	isRef 0 use required
annotation	documentation Title of the Document – can be different from the filename

attribute DocumentType/@priority

type	xs:int
properties	isRef 0 use optional
annotation	documentation Number between 0 and 15 indicating the priority for data transfers or other treatments. The higher the number the more important the Document.

attribute DocumentType/@application

type	xs:string
properties	isRef 0 use optional
annotation	documentation Describes what is the application originator for the data. (Associated with the parameters)

attribute DocumentType/@mandatory

type	xs:boolean
properties	isRef 0 use optional

attribute DocumentType/@Constraint

type	restriction of xs:string
properties	isRef 0 default None use optional
facets	enumeration None enumeration Check enumeration Sign
annotation	documentation Possible values are : - None - Check - Sign

attribute DocumentType/@captainOnly

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation Document is only visible by the captain of the Flight

attribute DocumentType/@originalDateTime

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation Original date/time of the first release of the inserted document

attribute DocumentType/@updateDateTime

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation Last update date/ time of the inserted document

attribute DocumentType/@expectedUpdateAt

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation TimeDate stamp at which it is expected that an update to the present document may be available

attribute DocumentType/@timeToLive

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation TimeDate stamp from which on the document should no longer be presented as a valid document

attribute DocumentType/@status

type	restriction of xs:string
properties	isRef 0 default None use optional
facets	enumeration None enumeration Read enumeration Check enumeration Signed
annotation	documentation Status of the document: - None - Read - Checked - Signed

attribute DocumentType/@preliminary

type	xs:boolean
properties	isRef 0
annotation	documentation Indicates Data that is provided as information only.

attribute DocumentType/@changed

type	ChangeValuesType
properties	isRef 0 default New use optional
facets	enumeration New enumeration Unchanged enumeration Revised enumeration Deactivated
annotation	documentation Change code : - Unchanged - Revised - Deactivated - New

attribute DocumentType/@authorProfile

type	restriction of xs:string
properties	isRef 0 use optional
facets	enumeration crewmember enumeration dispatcher enumeration admin enumeration #
annotation	documentation To specify the profile of the author (to be able to set message when a document is inserted depending on the profile of the user who inserted the document and the profile of the user who is consulting the document) Predefined values are: Administrator Dispatcher CrewMember Other values can be used

attribute DocumentType/@authorName

type	xs:string
properties	isRef 0
annotation	documentation Name of the author of the document (string)

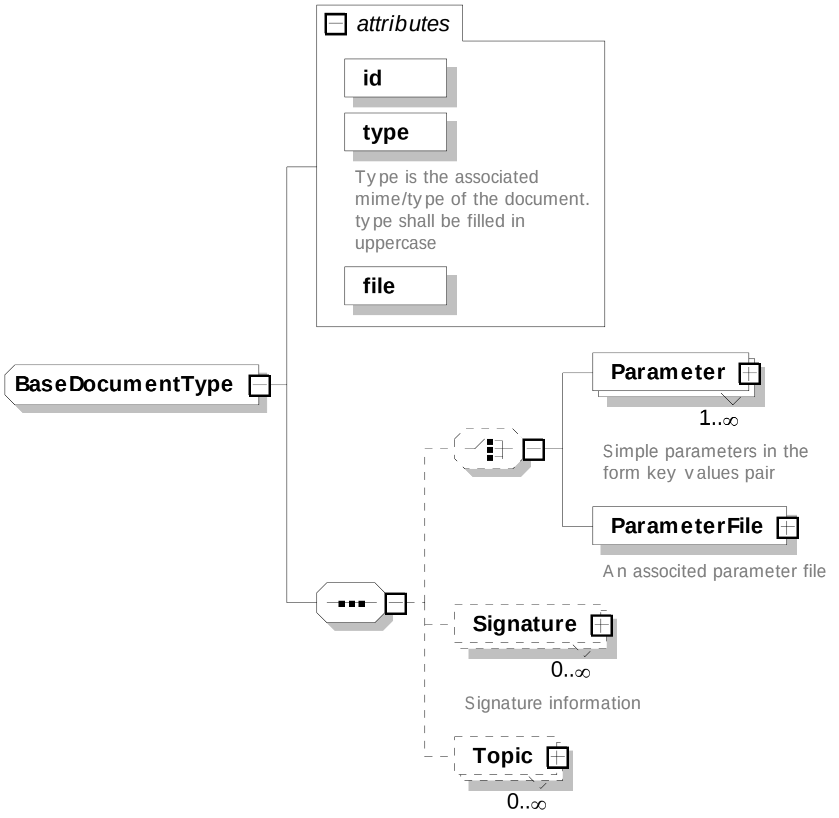
attribute DocumentType/@displayModel

type	xs:string
properties	isRef 0 use optional
annotation	documentation A reference to the associated display model. This is valid only for documents of type (Text/XML)

attribute DocumentType/@transferPending

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation This attribute notes that the document is not present in the .EFF package and should be downloaded at a later time.

complexType BaseDocumentType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>children</td><td>Parameter ParameterFile Signature Topic</td></tr>
<tr><td>used by</td><td><table><tr><td>element</td><td>DocumentType/CommentDocument</td></tr><tr><td>complexType</td><td>DocumentType</td></tr></table></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>id</td><td>xs:ID</td><td>required</td><td></td><td></td><td>Documentation
Technical identifier of the document. It shall be unique in the whole eFF</td></tr>
<tr><td>type</td><td>DocumentMimeType</td><td>required</td><td></td><td></td><td>documentation
Type is the associated mime/type of the document.
type shall be filled in uppercase</td></tr>
<tr><td>file</td><td>xs:anyURI</td><td>required</td><td></td><td></td><td>documentation
If in the eff.xml structure, this references the physical file as embedded in the .eff package</td></tr>
</table></td></tr>
</table>

attribute BaseDocumentType/@id

<table>
<tr><td>type</td><td>xs:ID</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>use</td><td>required</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
Technical identifier of the document. It shall be unique in the whole eFF</td></tr>
</table>

attribute BaseDocumentType/@type

<table>
<tr><td>type</td><td>DocumentMimeType</td></tr>
<tr><td>properties</td><td><table><tr><td>isRef</td><td>0</td></tr><tr><td>use</td><td>required</td></tr></table></td></tr>
<tr><td>annotation</td><td>documentation
Type is the associated mime/type of the document. type shall be filled in uppercase</td></tr>
</table>

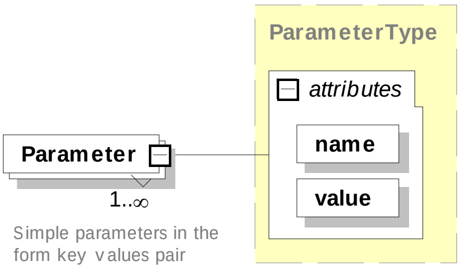
simpleType DocumentMimeType

type	union of (restriction of xs:string)
used by	attribute BaseDocumentType/@type
annotation	documentation Definition for a mime type association. Defines the standard mime types allowed for a document

attribute BaseDocumentType/@file

type	xs:anyURI
properties	isRef 0 use required
annotation	documentation If in the eff.xml structure, this references the physical file as embedded in the .eff package

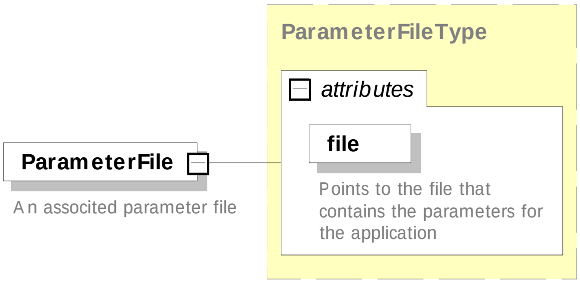
element BaseDocumentType/Parameter

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>ParameterType</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 1
maxOcc unbounded
content complex</td></tr>
<tr><td>attributes</td><td>

Name	Type	Use	Default	Fixed	annotation
name	derived by: xs:string	required			
value	derived by: xs:string	required			

</td></tr>
<tr><td>annotation</td><td>documentation
Simple parameters in the form key values pair.
Used by the application to trace the context in which a document was generated
(e.g. Performance calculation input parameters)</td></tr>
</table>

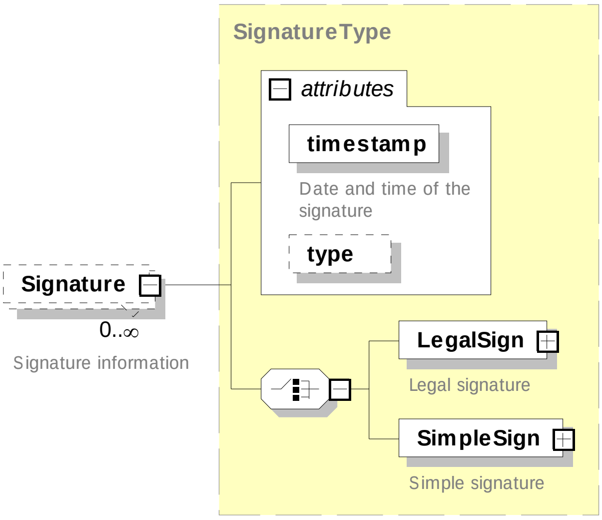
element BaseDocumentType/ParameterFile

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>ParameterFileType</td></tr>
<tr><td>properties</td><td>isRef 0
content complex</td></tr>
<tr><td>attributes</td><td>

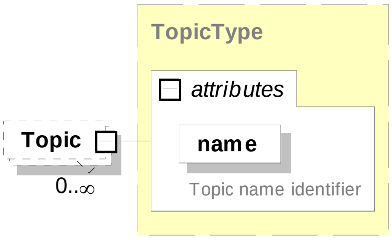
Name	Type	Use	Default	Fixed	annotation
file	derived by: xs:anyURI	required			documentation Points to the file that contains the parameters for the application

</td></tr>
<tr><td>annotation</td><td>documentation
An associted parameter file</td></tr>
</table>

element BaseDocumentType/Signature

diagram	
type	SignatureType
properties	isRef 0 minOcc 0 maxOcc unbounded content complex
children	LegalSign SimpleSign
attributes	Name / Type / Use / Default / Fixed / annotation timestamp / xs:dateTime / required / / / documentation Date and time of the signature type / derived by: xs:string / optional / SHA / /
annotation	documentation Signature information

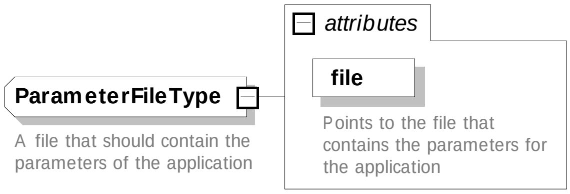
element BaseDocumentType/Topic

diagram	
type	TopicType
properties	isRef 0 minOcc 0 maxOcc unbounded content complex
attributes	Name / Type / Use / Default / Fixed / annotation name / TopicValuesType / required / / / documentation Topic name identifier
annotation	documentation Represents a topic associated to this subfolder. (See topic concept for definition of list of topics)

10.2.9 Document Associations

A document has several associations (XML elements) which are described in the following tables.

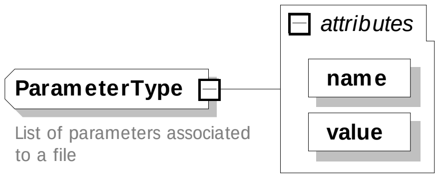
complexType ParameterFileType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>used by</td><td>element <u>BaseDocumentType/ParameterFile</u></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><u>file</u></td><td>derived by: xs:anyURI</td><td>required</td><td></td><td></td><td>documentation
Points to the file that contains the parameters for the application</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>Documentation
A file that should contain the parameters of the application.</td></tr>
</table>

attribute ParameterFileType/@file

<table>
<tr><td>type</td><td>restriction of xs:anyURI</td></tr>
<tr><td>properties</td><td>isRef 0
use required</td></tr>
<tr><td>facets</td><td>minLength 1</td></tr>
<tr><td>annotation</td><td>documentation
Points to the file that contains the parameters for the application
A file that should contain the parameters of the application. Function similar to <u>BaseDocumentType/Parameter</u> element except that all parameters are stored in a file</td></tr>
</table>

complexType ParameterType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>used by</td><td>element <u>BaseDocumentType/Parameter</u></td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td><u>name</u></td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>Documentation
Parameter name</td></tr>
<tr><td><u>value</u></td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>Documentation
Parameter value</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
List of parameters associated to a file.
Used by the application to trace the context in which a document was generated (e.g. Performance calculation input parameters)</td></tr>
</table>

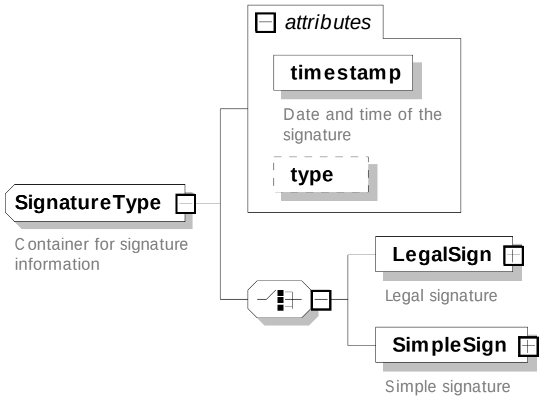
attribute ParameterType/@name

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

attribute ParameterType/@value

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1

complexType SignatureType

diagram	
children	LegalSign SimpleSign
used by	element BaseDocumentType/Signature
attributes	Name — Type — Use — Default — Fixed — annotation timestamp — xs:dateTime — required — documentation Date and time of the signature type — derived by: xs:string — optional — SHA
annotation	documentation Container for signature information

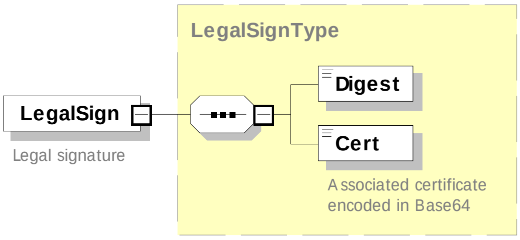
attribute SignatureType/@timestamp

type	xs:dateTime
properties	isRef 0 use required
annotation	documentation Date and time of the signature

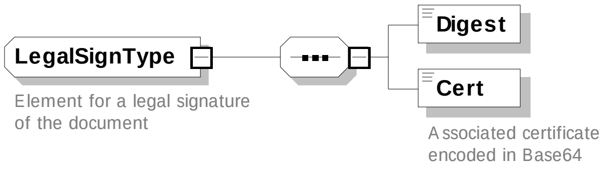
attribute SignatureType/@type

type	restriction of xs:string
properties	isRef 0 default SHA use optional
facets	enumeration FLAG enumeration SHA enumeration MD5 enumeration RSA

element SignatureType/LegalSign

diagram	
type	LegalSignType
properties	isRef 0 content complex nillable false
children	Digest Cert
annotation	documentation Legal signature

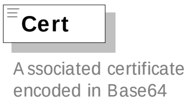
complexType LegalSignType

diagram	
children	Digest Cert
used by	element SignatureType/LegalSign
annotation	documentation Element for a legal signature of the document

element LegalSignType/Digest

diagram	
type	DigestType
properties	isRef 0 content simple
facets	minLength 1

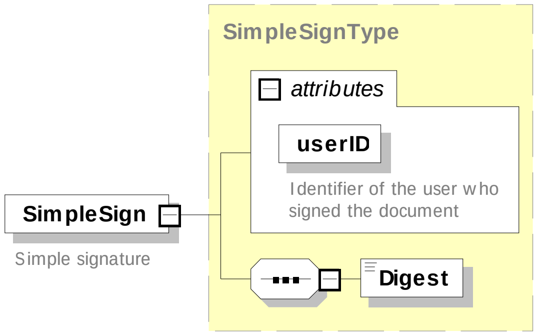
element LegalSignType/Cert

diagram	
type	CertType
properties	isRef 0 content simple
facets	minLength 1
annotation	documentation Associated certificate encoded in Base64

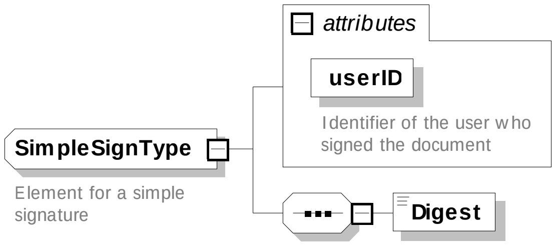
simpleType CertType

type	restriction of xs:string
used by	element LegalSignType/Cert
facets	minLength 1
annotation	documentation Type for a certificate

element SignatureType/SimpleSign

diagram	
type	SimpleSignType
properties	isRef 0 content complex nillable false
children	Digest
attributes	Name / Type / Use / Default / Fixed / annotation userID / derived by: xs:string / required / / / documentation Identifier of the user who signed the document
annotation	documentation Simple signature

complexType SimpleSignType

diagram	
children	Digest
used by	element SignatureType/SimpleSign
attributes	Name / Type / Use / Default / Fixed / annotation userID / derived by: xs:string / required / / / documentation Identifier of the user who signed the document
annotation	documentation Element for a simple signature

attribute SimpleSignType/@userID

type	restriction of xs:string
properties	isRef 0 use required
facets	minLength 1
annotation	documentation Identifier of the user who signed the document

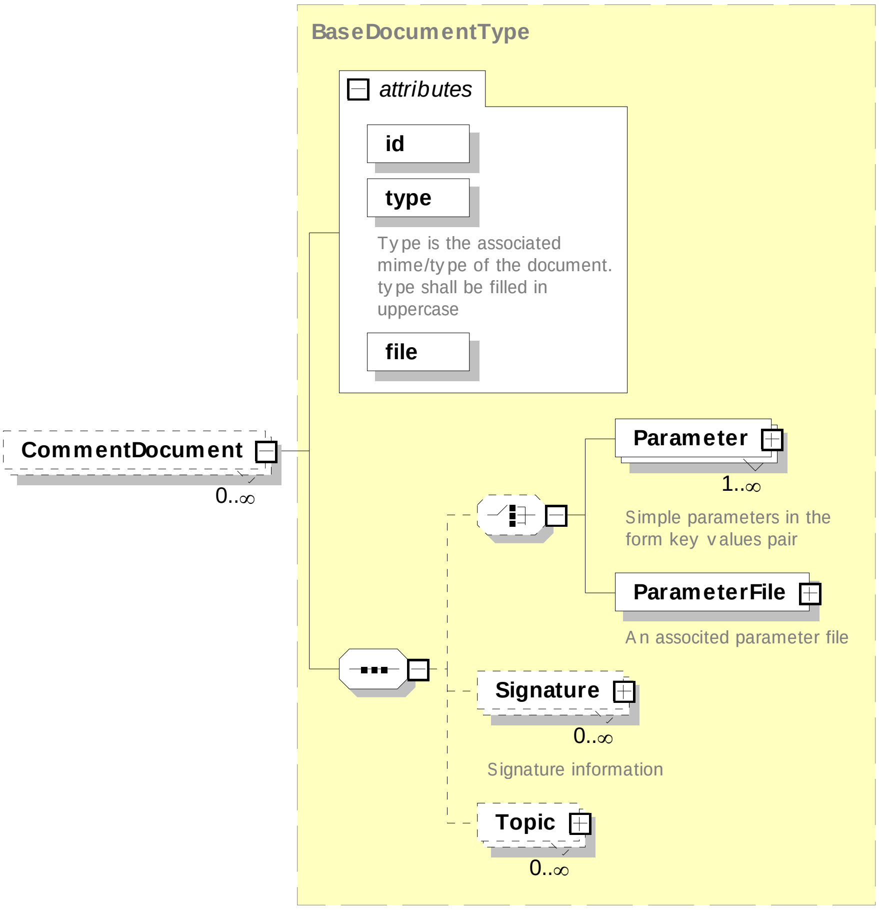
element SimpleSignType/Digest

diagram	
type	DigestType
properties	isRef 0 content simple
facets	minLength 1

simpleType DigestType

type	restriction of xs:string
used by	elements SimpleSignType/Digest LegalSignType/Digest
facets	minLength 1
annotation	documentation Type of Digest

element DocumentType/CommentDocument

diagram	
type	BaseDocumentType
properties	isRef 0 minOcc 0 maxOcc unbounded content complex
children	Parameter ParameterFile Signature Topic
attributes	Name / Type / Use / Default / Fixed / annotation id / xs:ID / required type / DocumentMimeType / required / documentation Type is the associated mime/type of the document. type shall be filled in uppercase file / xs:anyURI / required
annotation	documentation Optional commentary files associated to the document

10.2.10 Flight Folder Properties

Several information entries should be attached at the level of the eFF itself.

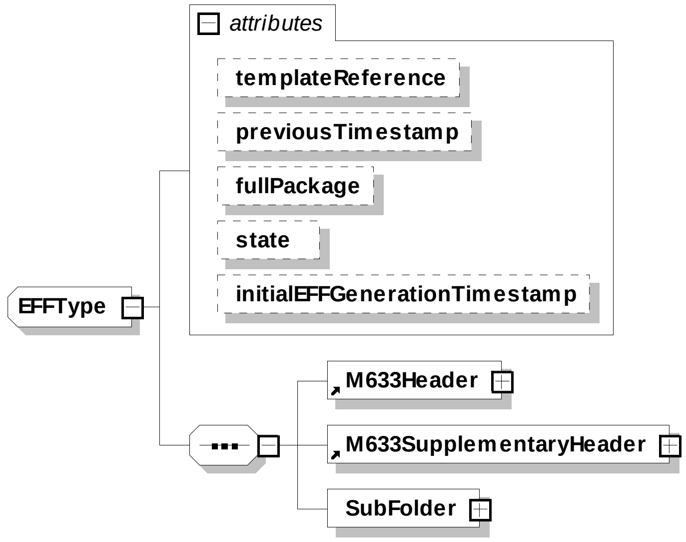
The eFF flight identification is defined in the ARINC 633 supplementary header (see Section 4.4.4.2) and the eff.xsd schema. By the nature of mobile devices there will be multiple instances of an eFF data packages (different versions) at the same time at different locations. It is the responsibility of the involved systems to handle this circumstance correctly. For example, at a given time, the version of eFF data package onboard is older than the new eFF data package computed onground and pending for transmission. The version of eFF data package is identified by the timestamp of its generation. Additionally, a given eFF data package contains the timestamp of the previous version. The timestamps allow the system to track all versions of an eFF data package.

If parts of an eFF data package are to be updated these updates are generated as another eFF data package with the same flight identification as the target eFF. The “Changed” attribute is used to control how the documents are to be merged with existing eFF data package.

10.2.11 eFF Schema

The definition of the operational flight plan and the M633Header and M633SupplementaryHeader are explained in Sections 5.4; 4.4.4.1 and 4.4.4.2.

complexType EFFType

<table>
<tr><td>diagram</td><td colspan="6">
</td></tr>
<tr><td>children</td><td colspan="6">M633Header M633SupplementaryHeader SubFolder</td></tr>
<tr><td>used by</td><td>elements</td><td colspan="5">EFDREP EFUSUB</td></tr>
<tr><td>attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td></td><td>templateReference</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
An optional reference to a template.
When referencing the template, template information in the eff will be overwritten by the template.
This identifies the reference of the eFF template model. This is to be used when importing an eFF from the ground using the template possibilities</td></tr>
<tr><td></td><td>previousTimestamp</td><td>xs:dateTime</td><td>optional</td><td></td><td></td><td>Documentation
Gives the timestamp (timestamp element of m633header) of the previous eFF to ensure sequencing.
This attribute is mandatory when eFF is an update.
It shall be omitted if eFF is not an update but a full version of an eFF. When an eFF is an update, this data can be used to ensure that previous update is not missing in the update process. The application may</td></tr>
</table>

					choose to discard this update if the previous one does not have this value for timestamp.
	fullPackage	xs:boolean	optional	false	documentation This attribute states that this EFF cancels and replaces any other flight folders identified with the same flight information. This prevents from doing an update to an EFF and should replace the EFF that was found.
	state	derived by: xs:string	optional		documentation Denotes the current state in the lifecycle of the EFF. The values are : - New : EFF not sent yet to AC - Uplink : EFF on transportation to AC - OnAC : EFF stored onboard and ready for access - Active : EFF used for the flight - DownlinkPartial : Partial EFF downlink - DownlinkClosed : EFF sent on ground at the end of the flight
	initialEFFGenerationTimestamp	xs:dateTime			documentation Specify the date and time of generation of that full eFF considered as reference eFF for the flight. It enables the following eFF for the same flight to point to this "referenced eFF"

attribute EFFType/@templateReference

type	restriction of xs:string
properties	isRef 0 use optional
facets	minLength 1
annotation	documentation An optional reference to a template. When referencing the template, template information in the eff will be overwritten by the template

attribute EFFType/@previousTimestamp

type	xs:dateTime
properties	isRef 0 use optional
annotation	documentation Gives the previous timestamp of any update to ensure sequencing. This attribute is mandatory when eFF is an update. It shall be omitted if the eFF is not an update but a full version of an eFF.

attribute EFFType/@fullPackage

type	xs:boolean
properties	isRef 0 default false use optional
annotation	documentation This attribute states that this eFF cancels and replaces any other flight folders identified with the same flight information. This prevents from doing an update to an eFF.

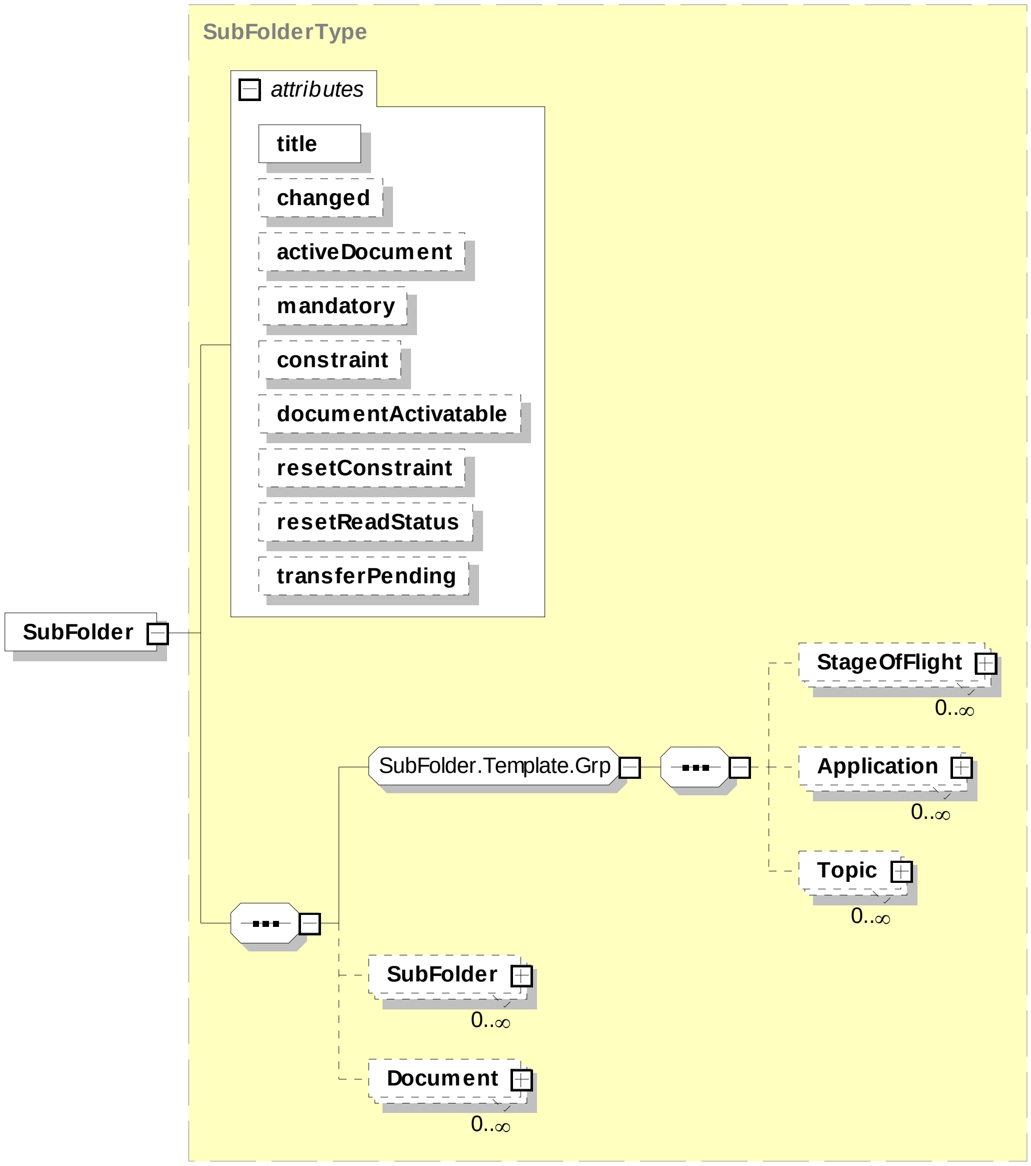
attribute EFFType/@state

type	restriction of xs:string
properties	isRef 0 use optional
facets	enumeration New enumeration Uplink enumeration OnAC enumeration Active enumeration DownlinkPartial enumeration DownlinkClosed
annotation	documentation Denotes the current state in the lifecycle of the EFF. The values are : - New : eFF not sent yet to AC - Uplink : eFF on transportation to AC - OnAC : eFF stored onboard and ready for access - Active : eFF used for the flight - DownlinkPartial : Partial eFF downlink - DownlinkClosed : eFF sent on ground at the end of the flight

attribute EFFType/@initialEFFGenerationTimestamp

type	xs:dateTime
properties	isRef 0
annotation	documentation Specify the date and time of generation of that full eFF considered as reference eFF for the flight. It enables the following eFF for the same flight to point to this "referenced eFF"

element EFFType/SubFolder

diagram	
type	SubFolderType
properties	isRef 0 content complex
children	StageOfFlight Application Topic SubFolder Document

attributes	Name	Type	Use	Default	Fixed	annotation
	title	derived by: xs:string	required			documentation Title of the subfolder
	changed	ChangeValuesType	optional	New		documentation Change code : - Unchanged - Revised - Deactivated - New
	activeDocument	derived by: xs:IDREF	optional			
	mandatory	xs:boolean	optional			
	constraint	derived by: xs:string	optional	None		documentation Possible values are: - None - CheckOne (at least one document shall be checked in the subfolder) - CheckAll (all the documents of the subfolder shall be checked) - Sign (one document of the subfolder shall be signed)

	documentActivatable	xs:boolean	optional		documentation Tells the user can "activate" a specific document in this folder
	resetConstraint	resetCommandsType	optional	never	documentation Tells when to reset the constraint. Possible values are : - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument: When a new document is inserted in this folder - OnLoad : On any load
	resetReadStatus	resetCommandsType	optional	never	documentation Tells when to reset the read status - Never - OnLoadOnBoard : When loaded on board - OnLoadOnGround : When loaded on ground - OnNewDocument : When a new document is inserted in this folder - OnLoad : On any load
	transferPending	xs:boolean	optional		
annotation	documentation A list of sub folders. The EFF itself contains no folders in terms of a traditional file system. Subfolder elements in XML structure file can contain: Other subfolders Documents				

10.3 EFF File Creation

10.3.1 EFF Packaging

Figure 3 shows the principle of .eFF packaging:

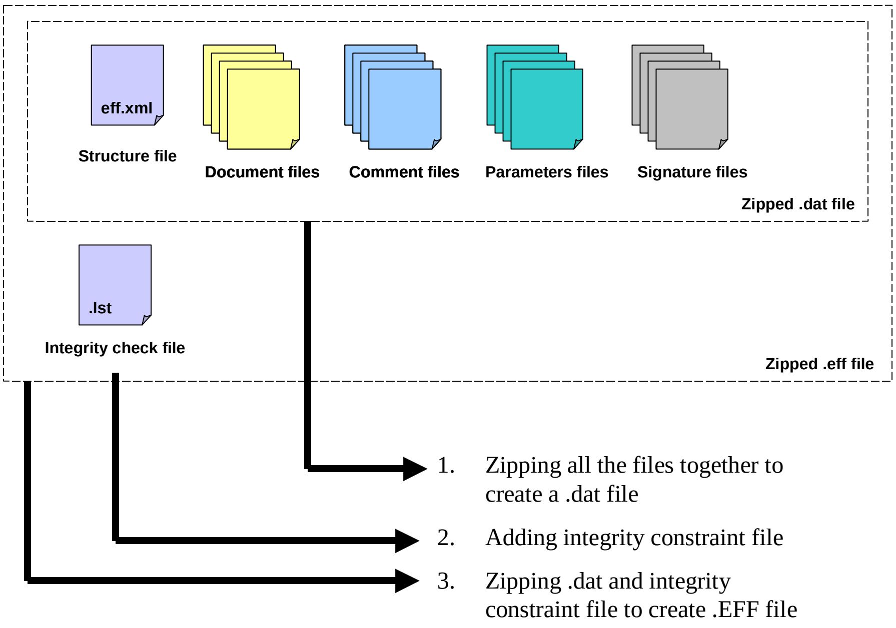


Figure 1 – eFF Package Format

COMMENTARY

All of these files are embedded in a single zipped file (file extension '.eff') for transportation convenience. This improves consistency by making sure files are not missing during the transportation process.

eFF should be transported in the form of a unique file. The same conventions apply in case the file is transported over IP connections or via physical media. eFF should be transported through a unique file with extension ".eff".

This file should be generated as follows:

- Creation of structure file: eff.xml file (compliant with eff.xsd' schema)
- All files referenced in eff.xml are gathered
- All these files are zipped together in one "*.dat" file (only one *.dat file is allowed)
- One "*.lst" integrity xml file is created (encompasses all files)
- A final '*.eff' file is created, by zipping together the "*.dat" file and the "*.lst" file. This final *.eff file is named as depicted in Section 10.3.2.

Zip algorithm

The compression format and algorithm that should be used for eFF compression are specified in RFC 1950 (ZLIB Compressed Data Format Specification version 3.3), and RFC 1951 (DEFLATE Compressed Data Format Specification version 1.3).

COMMENTARY

At the time of this writing, the ZIP algorithm can be found through the following hyperlink:

http://java.sun.com/j2se/1.4.2/docs/api/java/util/zip/package-summary.html

10.3.2 Structure of eFF File Name

When the file is created as described above it has to get a name that makes the most important properties of the eFF visible without unpacking.

The eFF filename is defined in the following table:

Table 10.3.2.1 – eFF Filename Definition

Sub field name	Description	Format (see Table 4.1.2)	Example
aircraftRegistration	The registration number assigned by the local authority,	Specific format is defined by the local authority and contains a combination of alpha-numeric string and an optional hyphen.	"N12345"
Delimiter	One Underscore		"_"
FlightIdentification	Either Flight Identifier or Flight	(1-10)C	"DLH1234ABC

	number		
Delimiter	One Underscore		“_”
departureDate	Identifying flight date	YYMMDD	“050822”
Delimiter	One Underscore		“_”
DepartureAirport	Either Airport IATA Code or Airport ICAO Code	XXX or (exclusive) XXXX	“FRA”
Delimiter	One Underscore		“_”
ArrivalAirport	Either Airport IATA Code or Airport ICAO Code	XXX or (exclusive) XXXX	“TLS”
Delimiter	One Underscore		“_”
eFF update or Full eFF	‘F’ (for Full eFF) or ‘U’ for Update	‘F’ or ‘U’	‘F’
DateTimestamp	YYMMDDHHMMSS		050822173214
File Type	One period and the letters “eff”		“.eff”

Examples:

```
DAIHA_LH436_050822_DUS_ORD_U050822122634.eff
N1234_UA575_050822_ORD_SEA_F050821122634.eff
F1234_CFG3214D_050401_XRY_PMI_U050402052658.eff
```

COMMENTARY

There is a possibility of inconsistency in the assignment of the Flight Date. When the current flight is the second leg of a multi-leg flight, some airlines use the scheduled date of the initial leg. While the use of the date of the current flight leg would be equally valid, it is essential that a consistent method be used within an airline.

10.3.3 Structure of the integrity XML File (*.lst file)

This file references all the files in the package and provides a non cryptographic MD5 hash code for each of them to ensure their integrity, providing protection against unintentional modification.

In the integrity file (*.lst file) all contents of the eff.dat file are listed and the MD5 hash generated with the according file is given. So every application can easily check if the data in the eFF is corrupted.

The integrity file is identified by its extension (.lst) and should follow the structure of the sample given below:

```
<?xml version="1.0" encoding="UTF-8"?>
<hashfilelist version="1.0" toolVersion="1.0">
  <checkcode>bzGFcO/mO5v8KFfZgEQ+lg==</checkcode>
  <hashedfile href="file1.xml">bro+2/iN72G15gj/1ZdvgA==</hashedfile>
  <hashedfile href="file2.doc">CbMgaSKuEKYwg5k74cGlIQ==</hashedfile>
  <hashedfile href="file3.txt">Ruxb8AIwEPc+XdtFCiwV4w==</hashedfile>
  <hashedfile href="file4.txt">VqzvypjT7DA2RBBRj2brHA==</hashedfile>
  <hashedfile href="file5.txt">ua0XS0ZpgE8wJcL+GbhXQw==</hashedfile>
  <hashedfile href="file6.txt">VqzvypjT7DA2RBBRj2brHA==</hashedfile>
  <hashedfile href="file7.doc">eFvP4D0RDo0XMxo4JnQIYQ==</hashedfile>
</hashfilelist>
```

Where:

‘version’ attribute of hashedfilelist represents the version of the integrity computation function, i.e. version 1 supports only MD5 hash.

‘toolversion’ attribute of hashedfilelist represents the version of the tool that generates the integrity computation

<checkcode> represents the MD5 digest of the .dat file, represented in base64 (see Section 10.3.1).

<hashedfile href=”file.txt”> represents the MD5 digest of the file mentioned in href.

10.4 eFF Communication Services

This eFF data package can be transmitted between airborne eFF application and ground application using the communication services defined in this section.

Three communication services are defined:

- **EFU**
  - eFF Uplink service enables an EFF data package to be sent by a ground tool to an EFB
  - eFF can be sent asynchronously or upon request (answer to EFR service)
- **EFD**
  - eFF Downlink service **enables** the EFF data package to be downlinked to the ground or to another EFB
  - eFF is sent asynchronously
- **EFF**
  - eFF request service **enables** the eFF airborne updates of an eFF data package
  - This service is synchronous (requires real time interaction between airborne and ground eFF applications)

COMMENTARY

Asynchronous means here that there is no guarantee that the receiving application is active and has received the data. However, the sending application may receive indication that the message was properly received by the ground communication system.

COMMENTARY

There exists a possibility that an UPDATE may arrive prior to reception of a FULL data package. This possibility will need to be considered in the design.

COMMENTARY

The use of ‘EFUSUB’ as root element denotes that this eFF data package was generated by a ground tool for use by an EFB, while the use of ‘EFDREP’ root element denotes that the eFF data package is generated by an EFB.

These services are fulfilled by the exchange of messages (see Table 8):

Table 8 – Service Elements

Element Name	Gatelink Label	Service Version	DL/UL	Purpose
EFUSUB	N/A	1	UL	Eff Uplink- SUBmit : Ground tool submits a FULL or UPDATE eFF data package to an EFB
EFDREP	N/A	1	DL	EFf Downlink REPort: An EFB exports/sends eFF data package to the ground or other EFB
EFFREQ	N/A	1	DL	Eff uplink- REQuest Requests a FULL or UPDATE (with specific criteria (e.g. some topics only…)) eFF data package to be uplinked.

10.4.1 eFF Uplink Service (EFU)

This service is used to uplink an eFF data package to an EFB application (i.e. airborne eFF application or to a Class 1 or 2 EFB application on ground). The eFF can either be a FULL eFF or an UPDATE. The EFU service only transmits an EFUSUB message from the ground to the EFB.

EFUSUB message should contain the eFF data package to be sent to the aircraft.

EFUSUB can either be sent asynchronously, or following a specific request (EFFREQ).

Asynchronous transmission of EFUSUB message should be supported, while the support of synchronous EFUSUB message transmission following EFRREQ reception is optional.

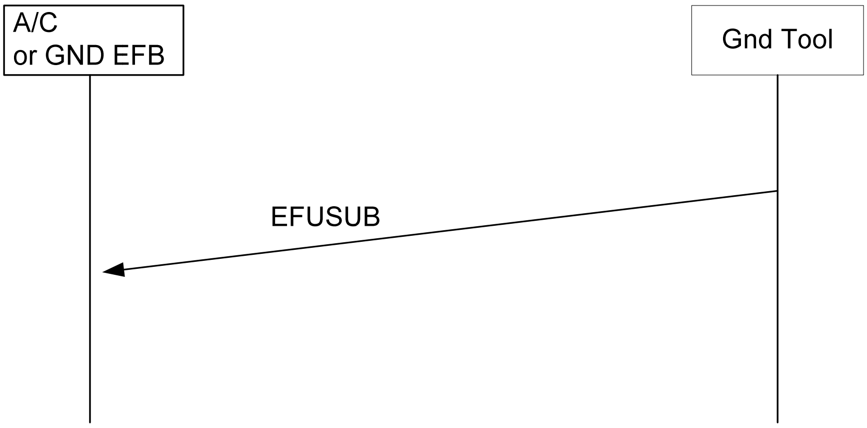


Figure 4 – Typical EFUSUB Exchange

COMMENTARY

While eFF application level communications only consist in simple transmission of EFUSUB message, lower communication layers are in charge of ensuring reliable transmission of this message – these lower communication layers will thus involve bidirectional communications (initiated by the aircraft for security reasons).

10.4.1.1 EFUSUB Message

Message: EFUSUB (version 1).

This message should be only sent as an .eff file in the appropriate format for the transport over physical media or IP communication links.

10.4.1.2 Dynamic Aspects

For asynchronous transmission, EFUSUB message should be transmitted either through physical media (see Section 2.3) or using IP air-ground communication links (see Section 2.2).

Synchronous transmission of EFUSUB message (following reception of EFRREQ message) should be performed only through IP air-ground communication links (see Section 2.2).

Several eFF files can be transported simultaneously over the same media (especially when a physical media is used). When the transport system will have sent the '.eff' files to the application, the EFF application should sort out the various files according to the flight segment to which they apply, the generation time stamp, and the 'fullPackage' attribute of the root element.

Upon reception of an EFUSUB message, the EFF airborne application should determine to which flight segment the eFF data package is associated, by using the M633SupplementaryHeader element received in eff.xml file.

Reception of a single eFF data package (one EFUSUB reception):

If a single eFF data package is received, the EFF airborne application should compose the eFF data package as follows:

- If the received eFF package is FULL ('fullPackage' attribute of the root element is set), then this new eFF data package should replace the preceding one for same flight segment, if timestamp is more recent than last received eFF data package. The eFF application should keep track of the modifications done on the preceding eFF data package (the way to retain the history of modifications is implementation dependent).
- If the received eFF is an UPDATE ('fullPackage' attribute of the root element is NOT set), then this new eFF data package should be added to the current one without impacting the documents and folders not updated in the received data package. The EFF application should keep track of the modifications done on the preceding eFF data package (the way to retain the history of modifications is implementation dependent).

Reception of multiple eFF data packages (several EFUSUB receptions):

For same flight segment ('flight' attribute of M633 header with same values), if several eFF files are received simultaneously, the EFF airborne application should compose the eFF data package as follows:

- Find the most recent FULL eFF data package received ('fullPackage' attribute of the root element is set)
- Ignore all data packages generated before the last FULL eFF data package

- Then add the more recent eFF data packages if they are ‘UPDATE’ data packages as defined in the single data package reception processing.

Example of multiple eff files received (multiple EFUSUB messages received):

```
N1234UA_UA575_050822_ORD_SEA_F050821222634.eff
N1234UA_UA575_050822_ORD_SEA_U050821235712.eff
N1234UA_UA575_050822_ORD_SEA_U050822021246.eff
N1234UA_UA575_050822_ORD_SEA_U050822022355.eff
```

The eFF with the earliest time stamp must be the FULL eFF (‘F’ character in the filename and ‘fullPackage’ attribute set). The following eFFs are updates. By reading the eFFs in the order of their timestamps an eFF can be composed that has exactly the same status and contents as if all the updates happened via an IP network.

Non nominal cases

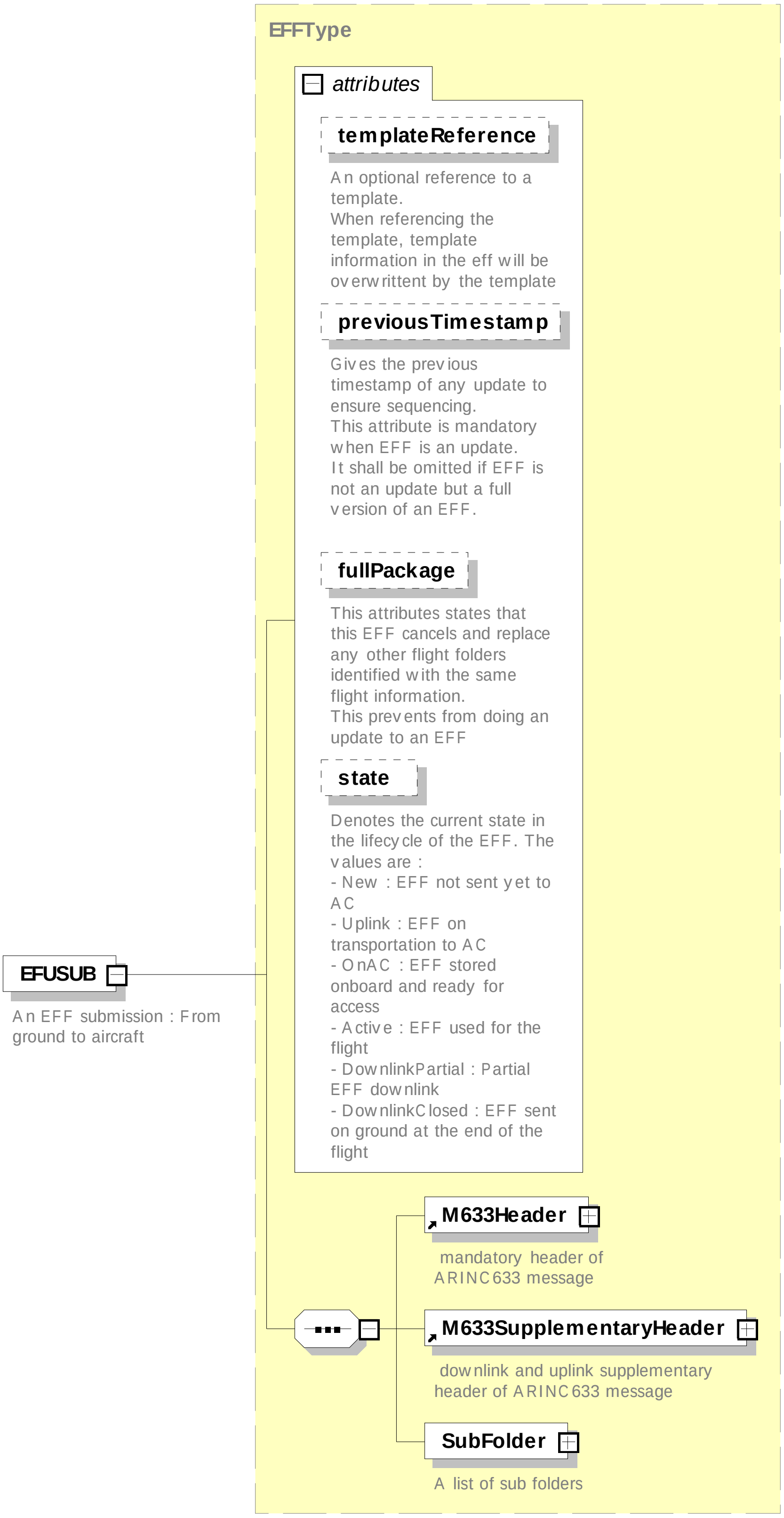
Reception of reception of invalid or out of sequence message:

- If the airborne application receives an erroneous message, for example EFDREP instead of EFUSUB, the application should send a GERIND (general error message) to the ground system if supported by the application.

10.4.1.3 XML Format

The .eff file for EFUSUB message should contain an eff.xml file using the EFUSUB element as root element.

element EFUSUB

diagram	
type	EFFType
properties	content complex
children	M633Header M633SupplementaryHeader SubFolder

attributes	Name	Type	Use	Default	Fixed	annotation
	templateReference	derived by: xs:string	optional			documentation An optional reference to a template. When referencing the template, template information in the eff will be overwritten by the template
	previousTimestamp	xs:dateTime	optional			documentation Gives the previous timestamp of any update to ensure sequencing. This attribute is mandatory when eFF is an update. It shall be omitted if eFF is not an update but a full version of an eFF.
	fullPackage	xs:boolean	optional	false		documentation This attribute states that this eFF cancels and replaces any other flight folders identified with the same flight information. This prevents from doing an update to an eFF
	state	derived by: xs:string	optional			documentation Denotes the current state in the lifecycle of the eFF. The values are : - New : eFF not sent yet to AC - Uplink : eFF on transportation to AC - OnAC : eFF stored onboard and ready for access - Active : eFF used for the flight - DownlinkPartial : Partial eFF downlink - DownlinkClosed : eFF sent on ground at the end of the flight
	initialEFFGenerationTimestamp	xs:dateTime				documentation Specify the date and time of generation of that full eFF considered as reference eFF for the flight. It enables the following eFF for the same flight to point to this "referenced eFF"
annotation	documentation An eFF submission : From ground to aircraft					

10.4.1.3.1 Transportation Over IP

The service should here use the IP communication services defined in Section 2.2.

10.4.1.3.2 Transportation via Physical Media

Uplink via physical media is nothing more than copying the eFF on a physical media, carrying the media to the EFB and then copying the eFF from the physical media to the EFB. The service should here use the physical media transportation rules defined in Section 2.3.

10.4.2 EFF Downlink Service (EFD)

This service is used to downlink an eFF data package to the ground system or to another EFB (export-import function). The eFF can either be a FULL eFF, or an UPDATE. EFD service only consists in transmission from the aircraft to the ground of EFDREP message.

EFDREP message should contain the eFF data package to be sent to the ground.

EFDREP should always be sent asynchronously.

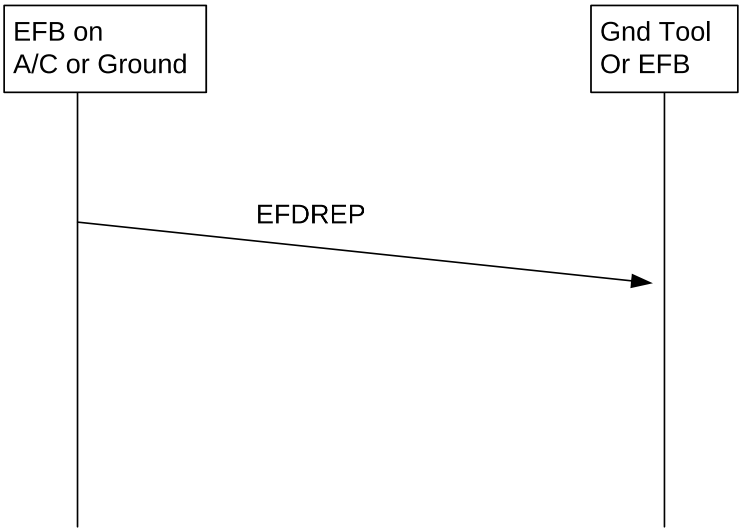


Figure 5 – Typical EFDREP exchange

COMMENTARY

While eFF application level communications only consist in simple transmission of EFDREP message, lower communication layers are in charge of ensuring reliable transmission of this message – these lower communication layers will thus involve directional communications (initiated by the aircraft for security reasons).

10.4.2.1 EFDREP Message

Message: EFDREP (version 1).

This message should be only sent as an .eff file (packaged as per Section 10.3) in the appropriate format for the transport over physical media or IP communication links.

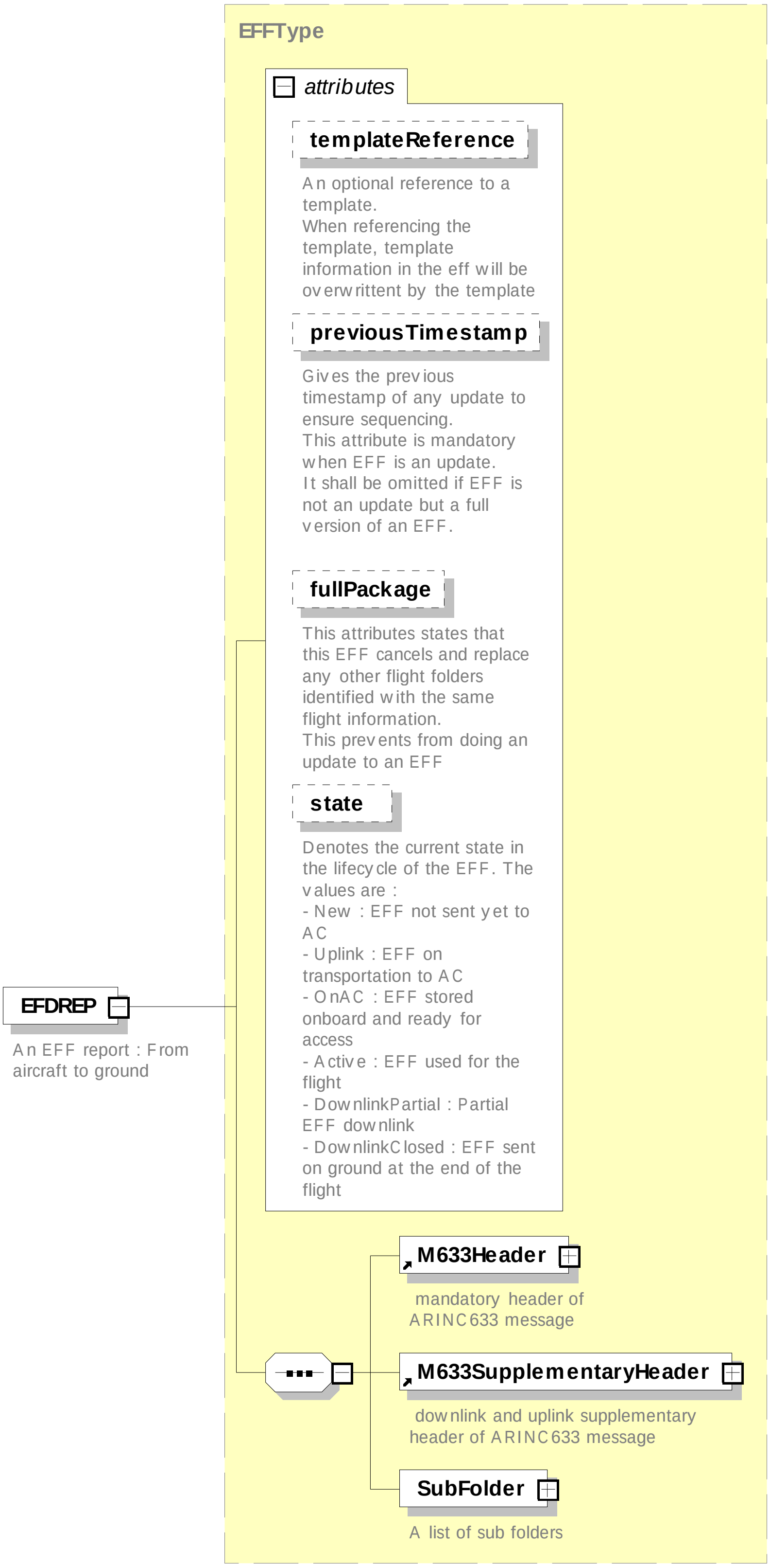
10.4.2.2 Dynamic Aspects

EFDREP message should be transmitted asynchronously (i.e. without setting up a transaction with the ground application); either through physical media (see Section 2.3) or using IP air-ground communication links (see Section 2.2).

10.4.2.3 XML Format

The .eff file for EFDREP message should contain an eff.xml file using the EFDREP element as root element. This **enables** unambiguous determination that it is a downlink EFF. ‚version**Number**’ attribute of M633Header element should be set to **2**. **See Section 4.4.4.1.**

element EFDREP

diagram	
type	EFFType
properties	content complex
children	M633Header M633SupplementaryHeader SubFolder

attributes	Name	Type	Use	Default	Fixed	annotation
	templateReference	derived by: xs:string	optional			documentation An optional reference to a template. When referencing the template, template information in the eff will be overwritten by the template
	previousTimestamp	xs:dateTime	optional			documentation Gives the previous timestamp of any update to ensure sequencing. This attribute is mandatory when eFF is an update. It shall be omitted if eFF is not an update but a full version of an eFF.
	fullPackage	xs:boolean	optional	false		documentation This attribute states that this eFF cancels and replaces any other flight folders identified with the same flight information. This prevents from doing an update to an eFF
	state	derived by: xs:string	optional			documentation Denotes the current state in the lifecycle of the eFF. The values are : - New : eFF not sent yet to AC - Uplink : eFF on transportation to AC - OnAC : eFF stored onboard and ready for access - Active : eFF used for the flight - DownlinkPartial : Partial eFF downlink - DownlinkClosed : eFF sent on ground at the end of the flight
	initialEFFGenerationTimestamp	xs:dateTime				documentation Specify the date and time of generation of that full eFF considered as reference eFF for the flight. It enables the following eFF for the same flight to point to this "referenced eFF"
annotation	documentation An eFF report : From aircraft to ground					

10.4.2.3.1 Transportation over IP

The service here should use the IP communication services defined in Section 2.2.

10.4.2.3.2 Transportation via Physical Media

Uplink via physical media is nothing more than copying the eFF on a physical media, carrying the media to the EFB and then copying the eFF from the physical media to the EFB. The service should here use the physical media transportation rules defined in Section 2.3.

10.4.3 eFF Request Service

Up-to-dateness is essential for the usage of eFF data or to in other words: The documents in an eFF are aging rapidly. The document properties “ExpectedUpdateAt” and “TimeToLive” should be used to display the pilot when a document is outdated. In various cases the pilot might be willing to update the contents of the eFF without such a notification (e.g. WX).

Thus there has to be a possibility to get updates for an eFF that was fetched earlier. This update has to be transferred over potentially slow or expensive connections which demand the possibility to update only parts of the eFF or even single documents.

This service (eFF request service) **enables** the eFF airborne application to request an eFF data package update. The answer to this request should be an eFF data package tagged ‘UPDATE’ (i.e. not a FULL eFF), or a FULL eFF package (i.e. tagged ‘FULL’).

The eFF request service should thus allow to request:

- **Full eFF** data package containing all available documents (even those that did not change since generation of last eFF data package on the aircraft). Some documents may be marked as pending.
- **Update of ALL modified/new documents** in a given eFF data package (identified by its flight segment and timestamp) – the answer should be a ‘UPDATE’ eFF data package containing all new or modified documents since the generation of the eFF data package referenced in the request. The answer should be a ‘UPDATE’ eFF data package containing only the documents required in the request.
- **Selective updates**: updates of documents of a given list of topic, or update of an explicit list of documents of a given eFF data package (identified by its flight segment and timestamp). The answer should be a ‘UPDATE’ eFF data package containing only the documents required in the request.

The key to partial updates of an eFF is the XML-Structure file – this information is common to the ground system and the EFB – as the ground system deliver this information to the EFB.

Parts of the eFF are referenced using the topic identifier. If a topic identifier is given in an update request all documents marked with this topic identifier are checked if they are outdated.

If a document ID is given only the referenced document is delivered in the update. Other criteria, such as ‘mandatory’ attribute of a subfolder, can be used.

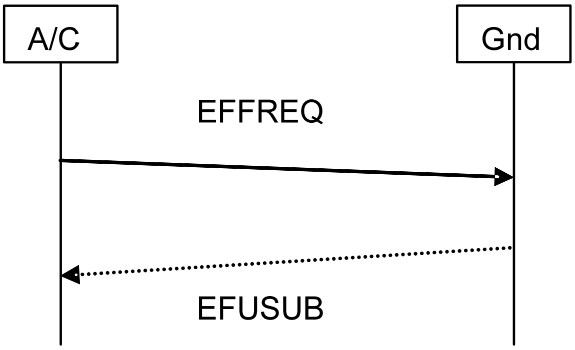


Figure 6 – Typical EFFREQ Exchange

10.4.3.1 EFFREQ Message

Message: EFFREQ (version 1).

This message should be only sent as an .xml file (i.e. NOT packaged as per Section 10.3) for the transport over IP communication links.

10.4.3.2 Dynamic Aspects

The answer to an update request should always be an eFF with complete information in the eff.xml structure file (EFUSUB message of EFU service). The eff.xml in this package has the ‘changed’ flag set properly for all files. If no full eFF is requested, documents are included only when their ‘change’ status is “new” or “revised”.

The aircraft can specify in the request a priority level associated to the requested documents/topics for requested eFF. 3 levels are defined and, when specified, the ground should use the priority attribute as a hint to package eFF data and answer the request (trying to send first higher priority data).

A ‘document’ (file tagged as ‘document’ in the eFF structure by using the ‘document’ element in the eff.xml file) can be associated with various files (if necessary), in which case these are mentioned in the eFF (‘struct.eff’ file):

- The document content itself
- The associated parameters (if any)
- The associated signature (if any)
- The associated comments (if any)

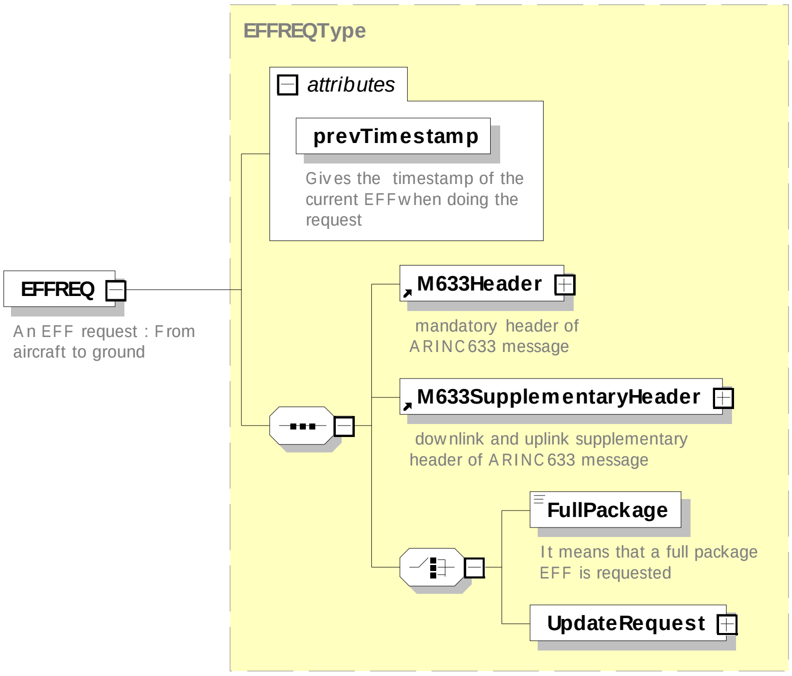
With this package the EFB does not only receive a new document or new documents of the requested topic, it receives complete information about the status of all documents in the eFF.

Please note that the server which delivers the updates has to track which file was sent to whom to be able to compose the appropriate updates.

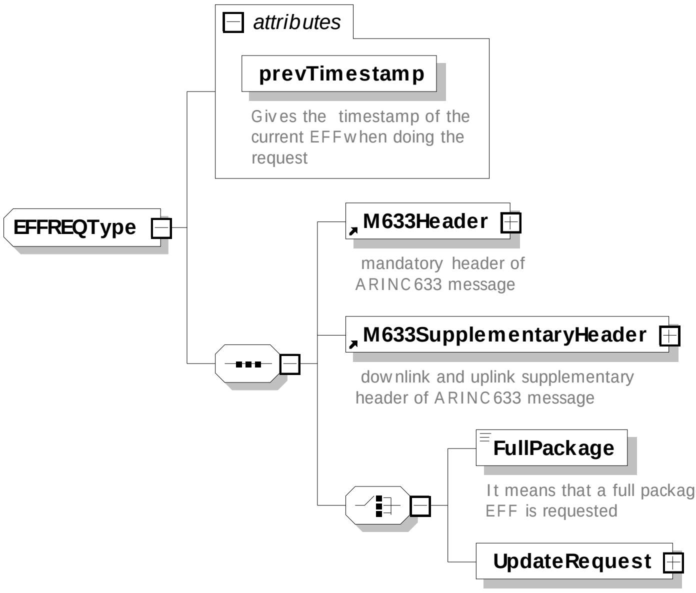
10.4.3.3 XML Format

The EFFREQ message should be embedded in an XML file, with EFFREQ as root element only.

element EFFREQ

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>EFFREQType</td></tr>
<tr><td>properties</td><td>content complex</td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader FullPackage UpdateRequest</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>prevTimestamp</td><td>xs:dateTime</td><td>required</td><td></td><td></td><td>documentation
Gives the timestamp of the current eFF when doing the request</td></tr>
</table>
</td></tr>
<tr><td>annotation</td><td>documentation
An eFF request : From aircraft to ground</td></tr>
</table>

complexType EFFREQType

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader FullPackage UpdateRequest</td></tr>
<tr><td>used by</td><td>element EFFREQ</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>prevTimestamp</td><td>xs:dateTime</td><td>required</td><td></td><td></td><td>documentation
Gives the timestamp of the current efferent doing the request</td></tr>
</table>
</td></tr>
</table>

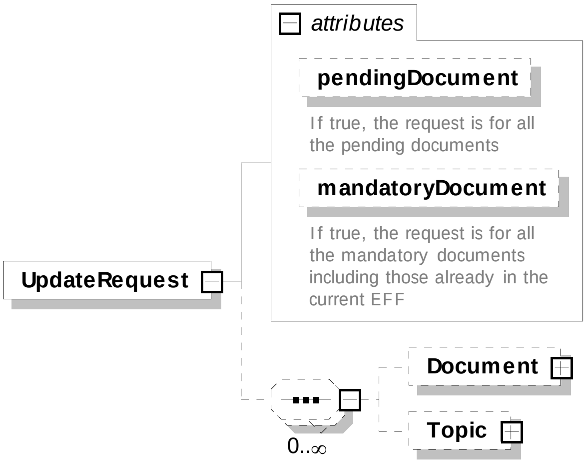
attribute EFFREQType/@prevTimestamp

type	xs:dateTime
properties	isRef 0 use required
annotation	documentation Gives the timestamp of the current EFF when doing the request

element EFFREQType/FullPackage

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>type</td><td>xs:boolean</td></tr>
<tr><td>properties</td><td>isRef 0
content simple</td></tr>
<tr><td>annotation</td><td>documentation
It means that a full package eFF is requested</td></tr>
</table>

element EFFREQType/UpdateRequest

<table>
<tr><td>diagram</td><td colspan="6">
</td></tr>
<tr><td>properties</td><td colspan="6">isRef 0
content complex</td></tr>
<tr><td>children</td><td colspan="6">Document Topic</td></tr>
<tr><td rowspan="3">attributes</td><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>pendingDocument</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
If true, the request is for all the pending documents</td></tr>
<tr><td>mandatoryDocument</td><td>xs:boolean</td><td>optional</td><td></td><td></td><td>documentation
If true, the request is for all the mandatory documents including those already in the current eFF</td></tr>
</table>

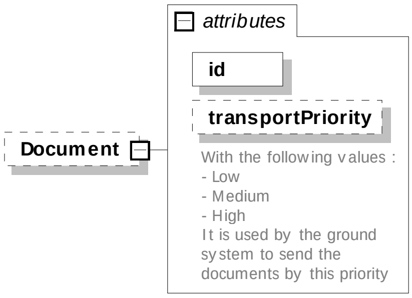
attribute EFFREQType/UpdateRequest/@pendingDocument

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation If true, the request is for all pending documents

attribute EFFREQType/UpdateRequest/@mandatoryDocument

type	xs:boolean
properties	isRef 0 use optional
annotation	documentation If true, the request is for all mandatory documents including those already in the current EFF

element EFFREQType/UpdateRequest/Document

<table>
<tr><td>diagram</td><td>
</td></tr>
<tr><td>properties</td><td>isRef 0
minOcc 0
maxOcc 1
content complex</td></tr>
<tr><td>attributes</td><td>
<table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>id</td><td>xs:ID</td><td>required</td><td></td><td></td><td></td></tr>
<tr><td>transportPriority</td><td>PriorityType</td><td>optional</td><td></td><td></td><td>documentation
With the following values :
- Low
- Medium
- High
It is used by the ground system to send the documents by this priority</td></tr>
</table>
</td></tr>
</table>

attribute EFFREQType/UpdateRequest/Document/@id

type	xs:ID
properties	isRef 0 use required

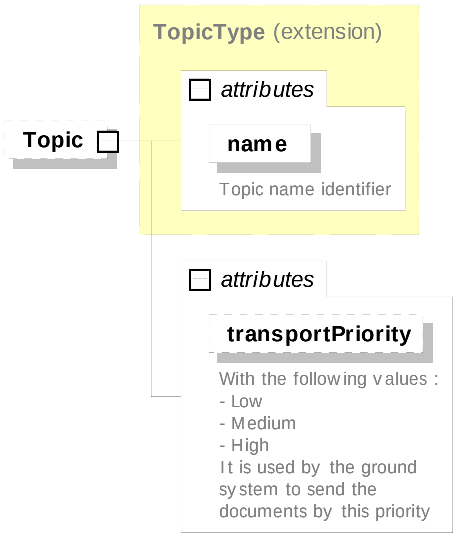
attribute EFFREQType/UpdateRequest/Document/@transportPriority

type	PriorityType
properties	isRef 0 use optional
facets	enumeration Low enumeration Medium enumeration High
annotation	documentation With the following values : - Low - Medium - High It is used by the ground system to send the documents by this priority

simpleType PriorityType

type	restriction of xs:string
used by	attributes EFFREQType/UpdateRequest/Document/@transportPriority EFFREQType/UpdateRequest/Topic/@transportPriority
facets	enumeration Low enumeration Medium enumeration High

element EFFREQType/UpdateRequest/Topic

diagram	
type	extension of TopicType
properties	isRef 0 minOcc 0 maxOcc 1 content complex
attributes	Name · Type · Use · Default · Fixed · annotation name · TopicValuesType · required · · · documentation Topic name identifier transportPriority · PriorityType · optional · · · documentation With the following values : - Low - Medium - High It is used by the ground system to send the documents by this priority
annotation	documentation Represents a topic associated to this subfolder. (See topic concept for definition of list of topics)

attribute EFFREQType/UpdateRequest/Topic/@transportPriority

type	PriorityType
properties	isRef 0 use optional
facets	enumeration Low enumeration Medium enumeration High
annotation	documentation With the following values : - Low - Medium - High It is used by the ground system to send the documents by this priority

10.4.3.3.1 Request Associations

A request has several associations (see XML schema for more details).

All criteria are ‘AND associated’, i.e. if ‘mandatory’ is set, and topic(s) are requested, then the answer is: all mandatory documents PLUS all documents (mandatory or not) of the requested topics.

10.4.3.3.2 Transportation Over IP

The service should here use the IP communication services defined in Section 2.2.

10.4.3.3.3 Transportation via Physical Media

Not recommended – can be used if needed – however, the EFUSUB message (eFF sent from ground) could be conveyed by physical media. The airborne system should handle these situations.

11.0 DE-ICING

Table 11.0-1 – De-Icing Information Table

Application Name	De-Icing
ACARS Label	DI (SMI = JDI)
Introduced	2005
Purpose	De-icing messages should be standardized to enable de-icing providers in directly providing the flight crew with digital information on the de-icing process. Voice frequency congestion in busy de-icing periods and therefore departure delays can be reduced.
Stake Holder	airlines, de-icing providers, airport operators
Airborne System	AOC
Ground Systems	De-icing provider dispatch system, airline or airport host, airline, airport and ATC departure management system
Network	ACARS
Downlink Routing	Label, Airport, Airline

Table 11.0-2 – De-Icing Service Table

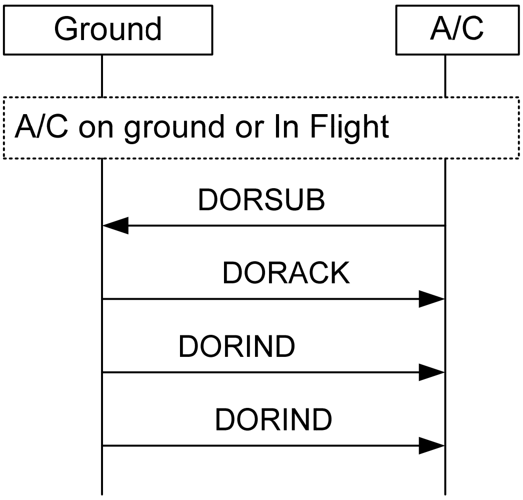
Service Name	Service ID	Description
De-Icing Order	DOR	**De-Icing Order:** The de-icing provider needs to know, that a customer wants him to serve a particular flight. The flight crew needs information on the estimated times and/or the sequence of the de-icing process.
De-Icing Receipt	DRC	**De-Icing Receipt:** The de-icing provider should inform the flight crew (and other entities), which fluids have been used for de-icing and anti-icing the aircraft and when the de-icing/anti-icing processes were conducted. With this information the pilot can calculate the hold-over time.
De-Icing Report	DPR	**De-Icing Process Report:** A de-icing application service enabling the flight crew in sending a de-icing process monitoring report and documenting the anti-icing code.

Table 11.0-3 – De-Icing Element Table

Element Name	ACARS Label	Service Version	DL/UL	Purpose
DORSUB	DI	1	DL	**De-icing order-submit:** Submits information to a de-icing providers dispatch system. Requests or cancels the de-icing of an aircraft.
DORACK	DI	1	UL	**De-icing order-acknowledge:** Confirms the reception of a de-icing request-submit downlink
DORIND	DI	1	UL	**De-Icing-order-indication:** Gives details on the de-icing order, e.g. estimated begin times
DRCSUB	DI	1	UL	**De-icing-receipt-submit:** Informs on the de-icing/anti-icing fluids and times.
DRCACK	DI	1	DL	**De-Icing-receipt-acknowledge:** Confirms the reception of a de-icing-receipt-submit uplink
DPRREP	DI	1	DL	**De-Icing report:** Flight crew confirmation of anti-icing code and de-icing/anti-icing times.

11.0 DE-ICING

11.1 De-Icing Order Service



Typical De-Icing Order exchange

With the use of the de-icing order submit element, the de-icing provider will be informed on the need for de-icing/anti-icing an aircraft. It can be sent in all flight phases.

It can also be used to cancel the de-icing/anti-icing previously ordered.

The de-icing-order-indication element is used by the de-icing provider to inform the flight crew about time and place of the de-icing/anti-icing event.

Following subsections define version 1 of DOR service.

11.1.1 De-icing-ORder-SUBmit Downlink

Element Name: **DORSUB**

DORSUB message should convey a request for de or anti icing, together with the appropriate data.

11.1.2 De-icing-ORder-ACKnowledge Uplink

Element Name: **DORACK**

The de-icing order acknowledgement downlink should only contain the ARINC 633 application header and trailer, no application data itself.

DORACK message is optional (see Section 11.1.3 for details).

11.1.3 De-icing-ORder-INDication Uplink

Element Name: **DORIND**

The de-icing-order-indication element should be used by the de-icing provider to inform the flight crew about time and place of the de-icing/anti-icing event.

11.1.4 DOR ACARS Format

The ACARS format may be used for air-ground and ground-ground messages.

When using the ACARS format, the supplementary header should be used.

ACARS Label used is “DI”

Free Text is allowed.

Table 11.1.4-1 – DORSUB01 ACARS Definition

Parameter Name	Meaning	Field Length (in Char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed Text	Parameter Type					
OrderFlag	0 = No De-Icing/Anti-icing required, 1 = De-Icing/Anti-Icing required	1		Boolean	No				1
AcknowledgeFlag	0 = No acknowledge wanted 1 = Acknowledge requested	1		Boolean	No				1
Parameter separator		1	comma		No				,
ServiceAirport	ICAO code of airport, where de-icing/anti-Icing shall take place or has to be cancelled	4		Airport	Yes				KJFK
Parameter separator		1	comma		No				,
De-IcingProviderID	A three digit code unique to an de-icing provider	3		provider-id	Yes				ABC
Parameter separator		1	comma		No				,
ServiceFlight	IATA flight number of flight to be de-iced/anti-iced if different from current flight	5-8		flight-no	YES				AF123A

Table 11.1.4-2 – DORIND01 ACARS Definition

Parameter Name	Meaning	Field Length (in Char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed Text	Parameter Type					
De-IcingPlaceType	P = Position, R = Remote Position (Pad)	1		A	YES	‘P’, ‘R’	N/A		P
Parameter separator		1	comma		No				,
De-IcingPlace	Apron position identifier or Pad name	1-4		String	YES				V153, PAD3, D3
Parameter separator		1	comma		No				,
EstDe-IcingBeginTime	De-Icing/Anti-Icing begin time as calculated by the de-icing provider	4		timeMin	YES				0058
Parameter separator		1	comma		No				,
EstDe-IcingEndTime	De-Icing/Anti-Icing end time as calculated by the de-icing provider	4		timeMin	YES				0113
Parameter separator		1	comma		No				,
De-IcingSequenceNbr		2		Integer	YES	1-99			12
Parameter separator		1	comma		No				,
De-IcingOpsIndicator	N = normal operation, A = adverse weather operation	1		A	NO	‘N’, ‘A’	N/A		N

COMMENTARY

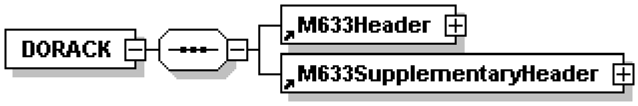
At some airports, de-icing providers distinguish between “normal” de-icing operation and “adverse weather” de-icing operation. In the second case, de-icing/anti-icing must be conducted near the takeoff runway threshold because of very short hold-over time. For instance, after announcing “adverse weather” de-icing operation, all previously sent information on times and positions becomes invalid and only remote position de-icing/anti-icing will be performed. Instead of providing estimated begin and end times, the de-icing provider publishes the de-icing sequence number with the de-icing position, only.

11.1.5 DOR XML Schema

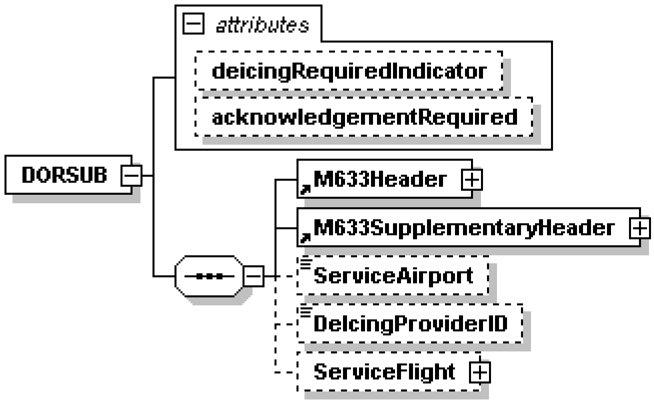
The IP/XML format may be used for air-ground and ground-ground messages.

When using the IP/XML format, the supplementary header should be used.

element DORACK

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader

element DORSUB

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td>content complex
nillable false</td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeaderServiceAirport DeIcingProviderID ServiceFlight</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>deicingRequiredIndicator</td><td></td><td></td><td></td><td></td><td>documentation
true, if de/anti--icing is required,
false, if no de-/anti-icing action is necessary</td></tr>
<tr><td>acknowledgementRequired</td><td>xs:boolean</td><td></td><td></td><td></td><td>documentation
true, if recipient of the DORSUB message shall provide an DORACK message</td></tr>
</table></td></tr>
</table>

attribute DORSUB/@deicingRequiredIndicator

properties	isRef 0
annotation	documentation true, if de/anti--icing is required, false, if no de-/anti-icing action is necessary

attribute DORSUB/@acknowledgementRequired

type	xs:boolean
properties	isRef 0
annotation	documentation true, if recipient of the DORSUB message shall provide an DORACK message

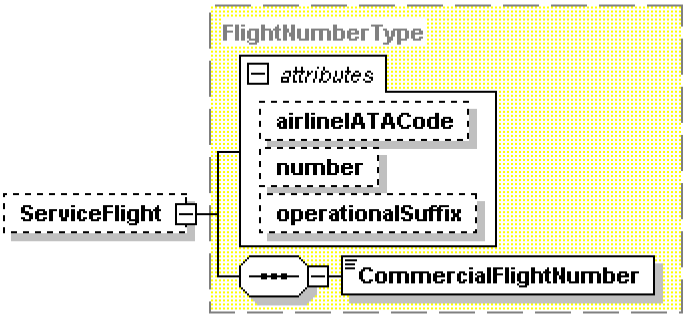
element DORSUB/ServiceAirport

diagram	
type	AirportICAOCodeType
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 4
annotation	documentation Airport identification at which refueling/defueling shall take place

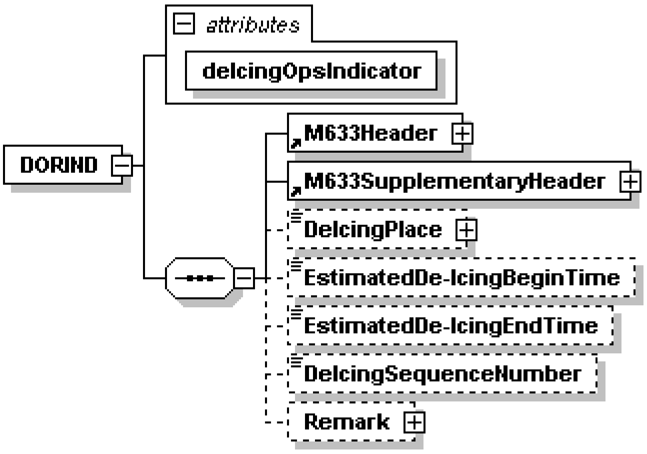
element DORSUB/DeIcingProviderID

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation A three digit code unique to an de-icing provider

element DORSUB/ServiceFlight

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>type</td><td>FlightNumberType</td></tr>
<tr><td>properties</td><td><table>
<tr><td>isRef</td><td>0</td></tr>
<tr><td>minOcc</td><td>0</td></tr>
<tr><td>maxOcc</td><td>1</td></tr>
<tr><td>content</td><td>complex</td></tr>
<tr><td>mixed</td><td>true</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>CommercialFlightNumber</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>airlineIATACode</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
2 letter airline code, e.g. SK</td></tr>
<tr><td>number</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
1 to 5 digits, e.g. 014, 14</td></tr>
<tr><td>operationalSuffix</td><td>derived by: xs:string</td><td>optional</td><td></td><td></td><td>documentation
operational suffix, e.g. Q</td></tr>
</table></td></tr>
<tr><td>annotation</td><td>documentation
Commercial Flight Number of flight to be refueled/defueled</td></tr>
</table>

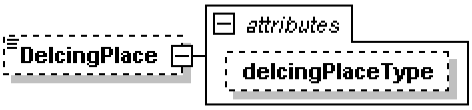
element DORIND

<table>
<tr><td>diagram</td><td> </td></tr>
<tr><td>properties</td><td><table>
<tr><td>content</td><td>complex</td></tr>
<tr><td>nillable</td><td>false</td></tr>
</table></td></tr>
<tr><td>children</td><td>M633Header M633SupplementaryHeader DeIcingPlace EstimatedDe-IcingBeginTime EstimatedDe-IcingEndTime DeIcingSequenceNumber Remark</td></tr>
<tr><td>attributes</td><td><table>
<tr><td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>annotation</td></tr>
<tr><td>deIcingOpsIndicator</td><td>derived by: xs:string</td><td>required</td><td></td><td></td><td>documentation
informs about normal or special de-icing operations</td></tr>
</table></td></tr>
</table>

attribute DORIND/@deIcingOpsIndicator

type	restriction of xs:string
properties	isRef 0 use required
facets	enumeration normal enumeration adverse
annotation	documentation informs about normal or special de-icing operations

element DORIND/DeIcingPlace

diagram	
type	extension of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name: deIcingPlaceType Type: derived by: xs:string Use: Default: Fixed: annotation: documentation provides information whether the de-/anti-icing will be conducted at the stand or on a remote location
annotation	documentation Apron position identifier or Pad name

attribute DORIND/DeIcingPlace/@deIcingPlaceType

type	restriction of xs:string
properties	isRef 0
facets	whiteSpace preserve enumeration at Stand (Gate) enumeration at Pad (remote)
annotation	documentation provides information whether the de-/anti-icing will be conducted at the stand or on a remote location

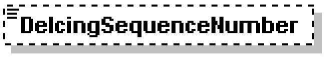
element DORIND/EstimatedDe-IcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Estimated De-Icing Begin Time - De-Icing/Anti-Icing begin time as calculated by the de-icing provider

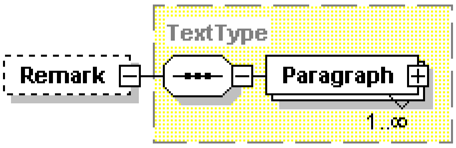
element DORIND/EstimatedDe-IcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Estimated De-Icing End Time - De-Icing/Anti-Icing end time as calculated by the de-icing provider

element DORIND/DeIcingSequenceNumber

diagram	
type	xs:positiveInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false

element DORIND/Remark

diagram	
type	TextType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Paragraph

11.1.6 Dynamic Aspects

In contrast to many local procedures, all times included in the DOR service should be UTC times.

DORSUB and DORACK should always be sent in the order specified above.

Upon reception of a correct DORSUB, the ground system (see appendix C – routing options) should forward the data to the appropriate end-system. If this is not possible, the ground system should send the appropriate GERIND message.

The de-icing provider’s ground system should check the AcknowledgeFlag parameter of the DORSUB downlink. If it is set to "1", the ground system should send the DORACK message.

Upon reception of an erroneous DORSUB, the ground system should send the appropriate GERIND message.

Upon receiving a GERIND message, the airborne system should, if the DORSUB was manually triggered, display a failure message to the flightcrew. The text of the failure message depends on error class and error type.

The DORACK message should be seen as technical acknowledgement to the corresponding DORSUB element, whereas the DORIND service, by providing planning data for the de-icing/anti-icing event, can confirm the reception of an order from a commercial and dispatch point of view.

After receiving the de-icing order submit downlink, the de-icing sequence within the provider’s ground system is normally being updated according to request time, scheduled departure time etc. If de-icing place and time are defined/calculated, this information will be forwarded to the requesting aircraft. More than 1 DORIND messages can be triggered within the De-icing Order service.

EXAMPLES:

Scenario 1

Based on latest ATIS information, the flight crew of an MD83 aircraft decides to request de-icing/anti-icing before the next takeoff from EKCH by sending a DORSUB downlink. A technical acknowledgement is generated from the provider’s EDP-system.

Due to aircraft rotation changes, this decision is revised after onblock in EKCH. An appropriate ground cancellation confirmation is not generated because it was not required. All message envelopes have been omitted.

ACARS Example

```
DORSUB01 downlink:
,DORSUB01050324052300LFPG,,KJFK,,AFR5556,,050324,,A380,,F-WWOW,
/11,EKCH,LRV,SA345,xxxx

DORACK01 uplink:
,DORACK01050324052613LFPG,,KJFK,,AFR5556,,050324,,A380,,F-WWOW,
/,xxxx

DORSUB01 downlink:
,DORSUB01050324055944LFPG,,KJFK,,AFR5556,,050324,,A380,,F-WWOW,
/00,EKCH,LRV,SA345,xxxx
```

Scenario 2

Pre-flight, the aircrew of flight SQ103H requests de-icing, which is acknowledged by the ground system.

Later on, an information uplink on “normal” position de-icing with estimated de-icing begin time 1429 and position B12 are sent by the de-icing provider. The second DORIND message is a revision to the first one and informs about position de-icing changed to remote position de-icing at PAD2 with estimated de-icing begin time 1438 and estimated de-icing end time 1452.

Due to severe snow precipitation, at 1424 the de-icing provider announces “adverse weather” de-icing operation switching to remote position de-icing only. For detailed Information on the de-icing process the free_text field is used. After recalculating the de-icing sequence, a new uplink informing about remote position de-icing at PAD2 and sequence number 7 is triggered.

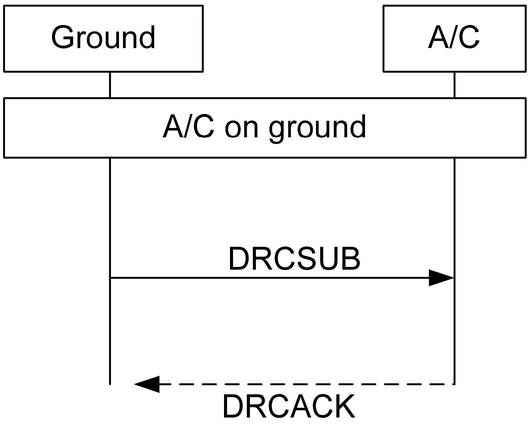
ACARS Example

```
DORSUB01 downlink:
,DORSUB01051204135850LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/11,EDDF,,SQ103H,xxxx

DORACK01 uplink:
,DORACK01051204135859LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/,xxxx

DORIND01 uplink:
,DORIND01051204140327LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/1425,1450,P,B12,1429,,,N,xxxx

DORIND01 uplink:
,DORIND01051204141303LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/1425,1427,R,PAD2,1438,1452,,N,xxxx

DORIND01 uplink:
,DORIND01051204142411LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/1425,,,,,,,A,/DISREGARD ALL RECEIVED DE-ICING MESSAGES,xxxx

DORIND01 uplink:
,DORIND01051204142520LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/1425,,R,,,,,A,/EXPECT DE-ICING DELAY OF 1 HOUR – STANDBY ON 135.225
FOR NEXT INFO,xxxx

DORIND01 uplink:
,DORIND01051204143736LFPG,,KJFK,,AFR5556,,051204,,A380,,F-WWOW,
/1440,1443,R,PAD2,,,7,A,xxxx
```

XML Examples

See electronic document ‘**ARINC633-1 AOC.zip**’ for details and examples of DOR service messages.

11.2 De-icing Receipt Service



Typical De-Icing Receipt Exchange

Purpose of the De-Icing Receipt Service is to inform flight crews and airlines on the de-icing details, which are required to a) calculate the hold-over-time and b) establish a cost-effective de-icing provider monitoring process.

The De-Icing receipt element is used to provide the anti-icing code to the flight crew as well as informing on additional data regarding the De-Icing/Anti-icing process. The uplink message will be generated after the de-icing/anti-icing has been performed. Note that the volume unit used for display is optional and, if different from the metric unit liters, not the unit used for the transmission of the amount of de-icing fluid. All transmitted values are always metric and should be converted by the application into the airline's chosen unit.

Following subsections define version 1 of DRC service.

COMMENTARY

> One key data of DRC service is the anti icing code received in the message that describes the fluid type and timestamp. These data are important because, when the take off clearance is received by the crew, the crew will check that the anti icing operation is still valid (timestamp acceptable). Therefore the integrity of the timestamp is important. Before going, as part of the procedure, the crew will make a visual observation of whether or not light freezing rain conditions exist. Errors in the messages, or during visual observation by the crew, can have negative effects on the flight. Airlines should perform hazard analysis to confirm with their authorities that the definition specified in this document is acceptable.

11.2.1 De-Icing Receipt Submit Uplink

Element Name: **DRCSUB**

Message DRCSUB should convey anti icing code to the crew as well as additional data on the de/anti icing process.

11.2.2 De-Icing Receipt Acknowledge Downlink

Element Name: **DRCACK**

Message DRCSUB should acknowledge correct reception and validation of DRCSUB message.

This message is optional (see details on Section 11.2.5).

11.2.3 DRC ACARS format

The ACARS format may be used for air-ground and ground-ground messages.

When using the ACARS format, the supplementary header should be used.

ACARS Label used is “DI”

Table 11.2.3.1 – DRCSUB01 ACARS Definition

Parameter Name	Meaning	Field length (in char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter Type					
De-IcingProviderID	A three digit code unique to a de-icing provider	3		provider-id	Yes				NCE
parameter separator		1	comma		No	","			,
De-IcingReceiptNbr	Commercial De-Icing receipt number	0-20		(0-20)Y	Yes	up to 20 chars			8522A

11.0 DE-ICING

Parameter Name	Meaning	Field length (in char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter Type					
parameter separator		1	comma		No	","			,
De-Icing performed	0 = No 1 = Yes	1		boolean	No				0
parameter separator		1	comma		No	","			,
De-IcingFluidType	Fluid type used for aircraft de-icing	1		Y	Yes	[1-4]			2
parameter separator		1	comma		No	","			,
De-IcingFluidMix	De-Icing fluid percentage of the fluid-water mixture used for aircraft de-icing	2-3		(2-3)Y	Yes	[25-100]	1 percent		50
parameter separator		1	comma		No	","			,
De-IcingFluidVolume	De-Icing fluid volume	0-6		volume-lt	Yes	0... 999999	1 liter	liter	600
parameter separator		1	comma		No	","			,
ActualDe-icingBeginTime	Time when the process of de-icing was started	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
ActualDe-icingEndTime	Time when the process of de-icing was finished	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
Anti-Icing performed	0 = No 1 = Yes	1		boolean	No				0
parameter separator		1	comma		No	","			,
Anti-IcingFluidTyp	Fluid type used for aircraft anti-icing	1		Y	Yes, but mandatory if anti-icing was performed	[1-4]			4
parameter separator		1	comma		No	","			,
Anti-icingFluidMix	Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing	2-3		(2-3)Y	Yes, but mandatory if anti-icing was performed	[25-100]	1 percent		100
parameter separator		1	comma		No	","			,
Anti-IcingFluidVolume	Anti-Icing fluid volume	0-6		volume-lt	Yes	0...999999	1 liter	liter	600
parameter separator		1	comma		No	","			,
ActualAnti-icingBeginTime	Time when the process of anti-icing was started	4		timeMin	Yes, but mandatory if anti-icing was performed				1753
parameter separator		1	comma		No	","			,
ActualAnti-IcingEndTime	Time when the process of anti-icing was finished	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
AircraftVolumeUnitDisplay	Unit used by the IntoPlaneService (Liters, Imperial Gallons or US Gallons)	2		"LT" or "IG" or “UG”	Yes				LT

Table 11.2.3.2 – DRCACK01 ACARS Definition

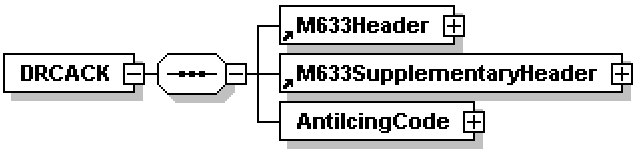
Parameter Name	Meaning	Field length (in char)	Contents		Option	Range	Resolution	Unit	Example
			Fixed text	Parameter Type					
Anti-IcingFluidTyp	Fluid type used for aircraft anti-icing	1		Y	Yes, but mandatory if anti-icing was performed	[1-4]			4
parameter separator		1	comma		No	","			,
Anti-icingFluidMix	Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing	2-3		(2-3)Y	Yes, but mandatory if anti-icing was performed	[25-100]	1 percent		100
parameter separator		1	comma		No	","			,
ActualAnti-icingBeginTime	Time when the process of anti-icing was started	4		timeMin	Yes, but mandatory if anti-icing was performed				1753

11.2.4 XML Schema

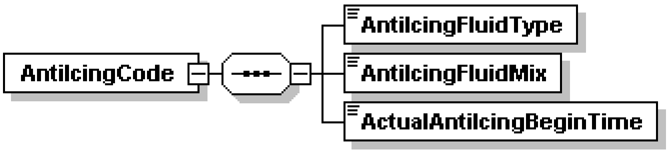
The IP/XML format may be used for air-ground and ground-ground messages.

When using the IP/XML format, the supplementary header should be used.

element DRCACK

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader AntiIcingCode

element DRCACK/AntiIcingCode

diagram	
properties	isRef 0 content complex nillable false
children	AntiIcingFluidType AntiIcingFluidMix ActualAntiIcingBeginTime

element DRCACK/AntiIcingCode/AntiIcingFluidType

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Fluid type used for aircraft anti-icing

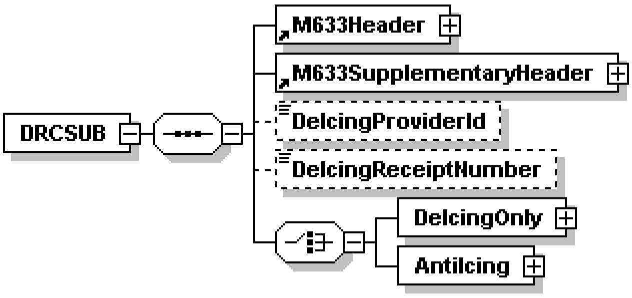
element DRCACK/AntiIcingCode/AntiIcingFluidMix

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing

element DRCACK/AntiIcingCode/ActualAntiIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 content simple nillable false
annotation	documentation Actual Anti-Icing Begin Time - Time when the process of anti-icing was started

element DRCSUB

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader DeIcingProviderId DeIcingReceiptNumber DeIcingOnly AntiIcing

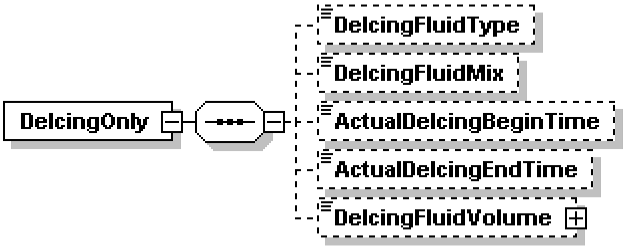
element DRCSUB/DeIcingProviderId

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	length 3
annotation	documentation A three digit code unique to a de-icing provider

element DRCSUB/DeIcingReceiptNumber

diagram	
type	restriction of xs:string
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minLength 1 maxLength 20
annotation	documentation Commercial De-Icing receipt number

element DRCSUB/DeIcingOnly

diagram	
properties	isRef 0 content complex nillable false
children	DeIcingFluidType DeIcingFluidMix ActualDeIcingBeginTime ActualDeIcingEndTime DeIcingFluidVolume

element DRCSUB/DeIcingOnly/DeIcingFluidType

diagram	
type	restriction of xs:positiveInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	enumeration 1 enumeration 2 enumeration 3 enumeration 4
annotation	documentation Fluid type, in case aircraft was de-iced with fluids

element DRCSUB/DeIcingOnly/DeIcingFluidMix

diagram	
type	restriction of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation De-Icing fluid percentage of the fluid-water mixture in case the aircraft was de-iced with fluids

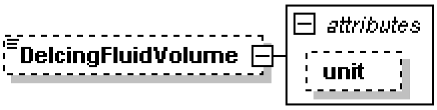
element DRCSUB/DeIcingOnly/ActualDeIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing Begin Time - Time when the process of de-icing was started

element DRCSUB/DeIcingOnly/ActualDeIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing End Time - Time when the process of de-icing was finished

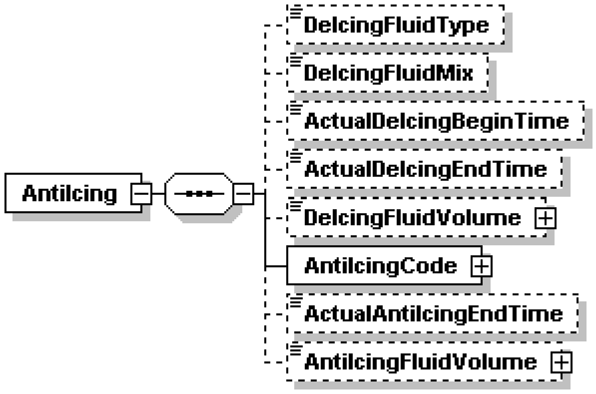
element DRCSUB/DeIcingOnly/DeIcingFluidVolume

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name Type Use Default Fixed annotation unit volumeUnitType
annotation	documentation De-Icing fluid volume

attribute DRCSUB/DeIcingOnly/DeIcingFluidVolume/@unit

type	volumeUnitType
properties	isRef 0
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3

element DRCSUB/AntiIcing

diagram	
properties	isRef 0 content complex nillable false
children	DeIcingFluidType DeIcingFluidMix ActualDeIcingBeginTime ActualDeIcingEndTime DeIcingFluidVolume AntiIcingCode ActualAntiIcingEndTime AntiIcingFluidVolume

element DRCSUB/AntiIcing/DeIcingFluidType

diagram	
type	restriction of xs:positiveInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	enumeration 1 enumeration 2 enumeration 3 enumeration 4
annotation	documentation Fluid type, in case aircraft was de-iced with fluids

element DRCSUB/AntiIcing/DeIcingFluidMix

diagram	
type	restriction of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation De-Icing fluid percentage of the fluid-water mixture in case the aircraft was de-iced with fluids

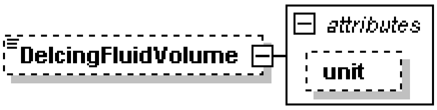
element DRCSUB/AntiIcing/ActualDeIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing Begin Time - Time when the process of de-icing was started

element DRCSUB/AntiIcing/ActualDeIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing End Time - Time when the process of de-icing was finished

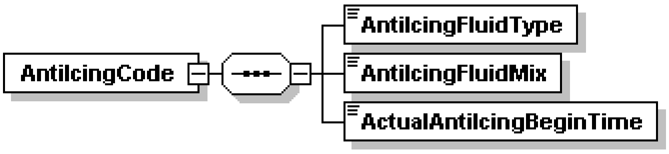
element DRCSUB/AntiIcing/DeIcingFluidVolume

diagram						
type	extension of xs:nonNegativeInteger					
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false					
attributes	Name	Type	Use	Default	Fixed	annotation
	unit	volumeUnitType				
annotation	documentation De-Icing fluid volume					

attribute DRCSUB/AntiIcing/DeIcingFluidVolume/@unit

type	volumeUnitType
properties	isRef 0
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3

element DRCSUB/AntiIcing/AntiIcingCode

diagram	
properties	isRef 0 content complex nillable false
children	AntiIcingFluidType AntiIcingFluidMix ActualAntiIcingBeginTime

element DRCSUB/AntiIcing/AntiIcingCode/AntiIcingFluidType

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Fluid type used for aircraft anti-icing

element DRCSUB/AntiIcing/AntiIcingCode/AntiIcingFluidMix

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing

element DRCSUB/AntiIcing/AntiIcingCode/ActualAntiIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 content simple nillable false
annotation	documentation Actual Anti-Icing Begin Time - Time when the process of anti-icing was started

element DRCSUB/AntiIcing/ActualAntiIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual Anti-Icing End Time - Time when the process of anti-icing was finished

element DRCSUB/AntiIcing/AntiIcingFluidVolume

diagram	
type	extension of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
attributes	Name Type Use Default Fixed annotation unit volumeUnitType
annotation	documentation Anti-Icing fluid volume

attribute DRCSUB/AntiIcing/AntiIcingFluidVolume/@unit

type	volumeUnitType
properties	isRef 0
facets	enumeration l enumeration ug enumeration ig enumeration m3 enumeration cm3

11.2.5 Dynamic Aspects

In contrast to many local procedures, all times included in the DRC service should be UTC times.

EXAMPLES

Scenario 1

In the following scenario a B735 has been de-iced and anti-iced. For de-icing purposes, 600 liters of fluid type 1 with a mixture of 50% fluid and 50% hot water were used. Process started at 0624 and took until 0631. Beginning at 0631, the aircraft has then been protected against new icing with 700 liters of 100% concentrated fluid type 4. Anti-icing was finished with the generation of the DRCSUB message at 0639.

ACARS Example:

```
DRCSUB01 uplink:
,DRCSUB01050107063912LFPG,,KJFK,,AFR5556,,050107,,A380,,F-WWOW,
/NCE,,1,1,50,600,0624,0631,1,4,100,700,0631,0639,LT,xxxx

DRCACK01 downlink:
,DRCACK01050107063914LFPG,,KJFK,,AFR5556,,050107,,A380,,F-WWOW,
/4,100,0631,xxxx
```

Scenario 2

De-icing provider sends information on the anti-icing process. De-icing was not performed, but anti-icing the aircraft was conducted with 400 liters of fluid type 2 and a 75:25 fluid: hot water mixture.

However, this uplink is rejected due to missing mandatory data (de-icing/anti-icing performed indicators). Error is classified as non-fatal error, error type is syntax error.

After processing the error downlink, the de-icing service provider sends a revised DRCSUB message.

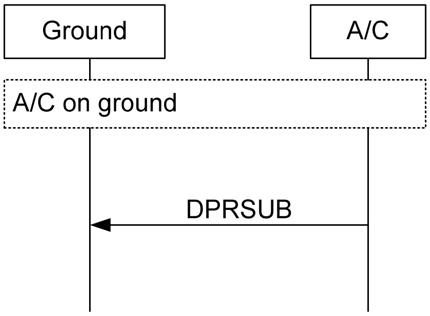
ACARS Example:

```
DRCSUB01 uplink:
,DRCSUB01050311081212LFPG,,KJFK,,AFR5556,,050311,,A380,,F-WWOW,
/ABC,E4567,,,,,,2,75,400,0801,0809,LT,xxxx

GERIND01 downlink:
,GERIND01050311081214LFPG,,KJFK,,AFR5556,,050311,,A380,,F-WWOW,
/,DRCSUB01,2,3,,1,xxxx

DRCSUB01 uplink:
,DRCSUB01050311081935LFPG,,KJFK,,AFR5556,,050311,,A380,,F-WWOW,
/ABC,E4567R,0,,,,,1,2,75,400,0801,0809,LT,xxxx
```

XML Example

See electronic document ‘**633-1.zip**’ for details and examples of DRC service messages.

11.3 De-Icing Process Report Service



Purpose of the De-Icing Process Report Service is to document anti-icing code as well as to monitor the de-icing provider performance.

The following subsections define version 1 of DPRREP service.

11.3.1 De-Icing Report Downlink

Element Name: **DPRREP**

The De-Icing process report element is used to downlink the anti-icing code and other data related to the de-icing process to the airline’s ground host. Even if not a “third-party” message, it is included to enable application designers in providing a de-icing application covering all the airline’s needs.

11.3.2 DPR ACARS format

The ACARS format may be used for air-ground and ground-ground messages.

When using the ACARS format, the supplementary header should be used.

ACARS Label used is “DI”

Table 11.3.1.1 – DPRREP01 ACARS Definition

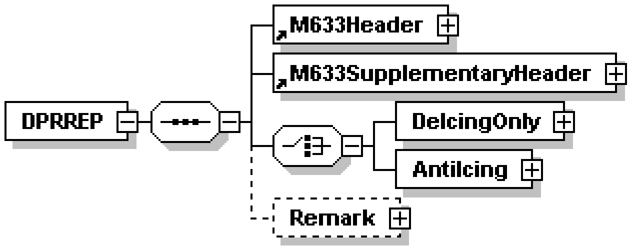
Parameter Name	**Meaning**	**Field length (in char)**	**Contents**		**Option**	**Range**	**Resolution**	**Unit**	**Example**
			Fixed text	**Parameter Type**					
De-IcingFluidTyp	Fluid type used for aircraft de-icing	1		Y	Yes	[1-4]			2
parameter separator		1	comma		No	","			,
De-IcingFluidMix	De-Icing fluid percentage of the fluid-water mixture used for aircraft de-icing	2-3		(2-3)Y	Yes	[25-100]	1 percent		50
parameter separator		1	comma		No	","			,
ActualDe-icingBeginTime	Time when the process of de-icing was started	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
ActualDe-icingEndTime	Time when the process of de-icing was finished	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
Anti-IcingFluidTyp	Fluid type used for aircraft anti-icing	1		Y	Yes	[1-4]			4
parameter separator		1	comma		No	","			,
Anti-icingFluidMix	Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing	2-3		(2-3)Y	Yes	[25-100]	1 percent		100
parameter separator		1	comma		No	","			,
ActualAnti-icingBeginTime	Time when the process of anti-icing was started	4		timeMin	Yes				1753
parameter separator		1	comma		No	","			,
ActualAnti-IcingEndTime	Time when the process of anti-icing was finished	4		timeMin	Yes				1753

11.3.3 XML Schema

The IP/XML format may be used for air-ground and ground-ground messages.

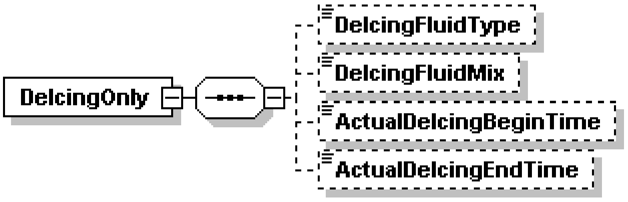
When using the IP/XML format, the supplementary header should be used.

element DPRREP

diagram	
properties	content complex nillable false
children	M633Header M633SupplementaryHeader DeIcingOnly AntiIcing Remark

11.0 DE-ICING

element DPRREP/DeIcingOnly

diagram	
properties	isRef 0 content complex nillable false
children	DeIcingFluidType DeIcingFluidMix ActualDeIcingBeginTime ActualDeIcingEndTime

element DPRREP/DeIcingOnly/DeIcingFluidType

diagram	
type	restriction of xs:positiveInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	enumeration 1 enumeration 2 enumeration 3 enumeration 4
annotation	documentation Fluid type, in case aircraft was de-iced with fluids

element DPRREP/DeIcingOnly/DeIcingFluidMix

diagram	
type	restriction of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation De-Icing fluid percentage of the fluid-water mixture in case the aircraft was de-iced with fluids

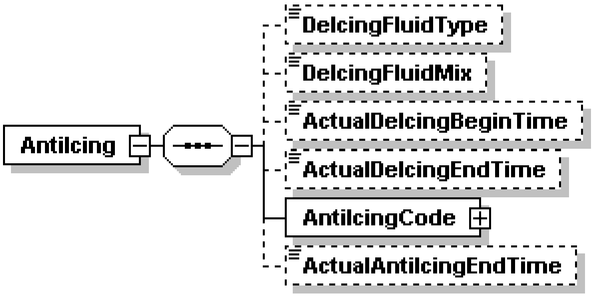
element DPRREP/DeIcingOnly/ActualDeIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing Begin Time - Time when the process of de-icing was started

element DPRREP/DeIcingOnly/ActualDeIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing End Time - Time when the process of de-icing was finished

element DPRREP/AntiIcing

diagram	
properties	isRef 0 content complex nillable false
children	DeIcingFluidType DeIcingFluidMix ActualDeIcingBeginTime ActualDeIcingEndTime AntiIcingCode ActualAntiIcingEndTime

element DPRREP/AntiIcing/DeIcingFluidType

diagram	
type	restriction of xs:positiveInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	enumeration 1 enumeration 2 enumeration 3 enumeration 4
annotation	documentation Fluid type, in case aircraft was de-iced with fluids

element DPRREP/AntiIcing/DeIcingFluidMix

diagram	
type	restriction of xs:nonNegativeInteger
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
facets	minInclusive 0 maxInclusive 100
annotation	documentation De-Icing fluid percentage of the fluid-water mixture in case the aircraft was de-iced with fluids

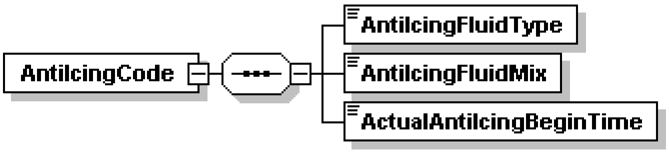
element DPRREP/AntiIcing/ActualDeIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing Begin Time - Time when the process of de-icing was started

element DPRREP/AntiIcing/ActualDeIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual De-Icing End Time - Time when the process of de-icing was finished

element DPRREP/AntiIcing/AntiIcingCode

diagram	
properties	isRef 0 content complex nillable false
children	AntiIcingFluidType AntiIcingFluidMix ActualAntiIcingBeginTime

element DPRREP/AntiIcing/AntiIcingCode/AntiIcingFluidType

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Fluid type used for aircraft anti-icing

element DPRREP/AntiIcing/AntiIcingCode/AntiIcingFluidMix

diagram	
type	xs:positiveInteger
properties	isRef 0 content simple nillable false
annotation	documentation Anti-Icing fluid percentage of the fluid-water mixture used for aircraft anti-icing

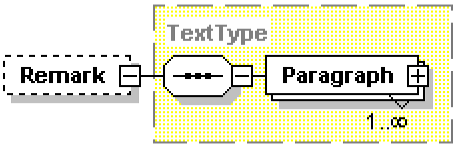
element DPRREP/AntiIcing/AntiIcingCode/ActualAntiIcingBeginTime

diagram	
type	xs:dateTime
properties	isRef 0 content simple nillable false
annotation	documentation Actual Anti-Icing Begin Time - Time when the process of anti-icing was started

element DPRREP/AntiIcing/ActualAntiIcingEndTime

diagram	
type	xs:dateTime
properties	isRef 0 minOcc 0 maxOcc 1 content simple nillable false
annotation	documentation Actual Anti-Icing End Time - Time when the process of anti-icing was finished

element DPRREP/Remark

diagram	
type	TextType
properties	isRef 0 minOcc 0 maxOcc 1 content complex nillable false
children	Paragraph

11.3.4 Dynamic Aspects

In contrast to many local procedures, all times included in the DPR service should be UTC times.

EXAMPLES

In the following scenario a CRJ7 has been de-iced and anti-iced. For de-icing purposes, fluid type 1 with a mixture of 50% fluid and 50% hot water were used. Anti-icing was started at 06:31 with fluid type 3 and mixture of 75:25. The de-icing service provider did not forward any other than these data. For de-icing provider monitoring purposes, flight crew therefore entered de-icing begin (06:20) and anti-icing end-time (06:39). Free text was added by the flight crew to inform the airline operation people about new fluid types available at the departure airport. Ground host appropriately handles the free text.

ACARS Example:

```
DPRREP01 downlink:
,DPRREP01050107064155LFPG,,KJFK,,AFR5556,,050107,,A380,,F-WWOW,
/1,50,0620,0631,3,75,0631,0639,/ACC.TO PROVIDER, TYPE 4 FLUID IS NOW
AVBL IN EPWAxxxx
```

XML Example

See electronic document ‘633-1.zip’ for details and examples of DPR service messages. Examples are available in examples folder.

12.0 POTABLE WATER SYSTEM

12.1 Introduction

The Potable Water System provides the aircraft's cabin systems like water faucets, toilets and galleys with potable water, which has to be filled in tanks on board before flight. In standard aircraft a water quantity pre-selection function is available. That means, during water servicing, the water system controls the water level in the tanks and stops water filling when a certain quantity is reached. This quantity, named Pre-selected Water Quantity (PSWQ), can be formally set in a typical standard aircraft either by a flight attendant or by the ground service personnel.

On some aircraft, it will be additionally possible to set the PSWQ via ACARS from ground before the aircraft arrives at the gate. The potable water remote pre-selection application is used to support the aircraft's ground servicing processes and to optimize the take-off weight depending on the pax load. The following application has been defined:

Section	Application	SMI	Label	Description
12.2	Potable Water Remote Pre-selection	JWP	WP	Request Status of Pre-selection on ground; set PSWQ from ground

12.2 Potable Water Remote Pre-selection

The water quantity pre-selection function may be used to define in advance the water quantity to be refilled during the service procedure. To simplify the ground servicing task, the water quantity monitoring system may be controlled by ACARS messages.

This section specifies the messages to be supported for remote control of the potable water pre-selection.

The Potable Water Remote Pre-selection uses the following datalink services:

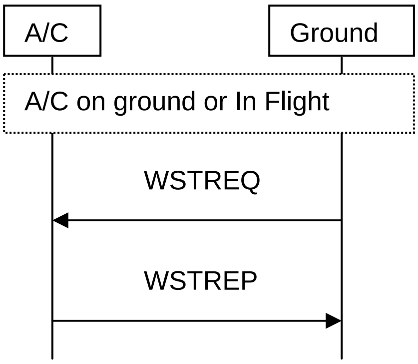
1. WATER STATUS: the ground operations center can request a Potable Water System (PWS) status report indicating current parameters of the system. This service is named 'WST' (Water STatus).
2. WATER DATA SUBMISSION: the ground operation center can provide the PWS with a new PSWQ before refilling. This service is named 'WDA' (Water DAta submission).
3. ERRORS: in case of failed operation, the ground operation center is informed. The General Error Service ('GER', refer to Section 5.2.1) is used to indicate errors.

These steps may require one or more of the following and any number of common elements to be sent. The following table shows the water elements defined in this section:

Table 12.2.1 – Potable Water Remote Pre-selection Element Table

Element Name	ACARS Label	Service Version	DL/UL	Purpose
WSTREQ	WP	1	UL	Water-STatus-REQuest Requests a potable water status report downlink
WSTREP	WP	1	DL	Water-STatus-REPort Informs the ground about the aircraft PWS status
WDASUB	WP	1	UL	Water-DAta submission-SUBmit : Submits PSWQ to an aircraft's PWS
WDAACK	WP	1	DL	Water-DAta submission-ACK A/C adapts submitted PSWQ and replies the value to the ground for confirmation
WDACOM	WP	1	UL	Water-DAta submission-COMmand Activates PSWQ received by ACK message
WDACON	WP	1	DL	Water-DAta submission-CONfirm Confirms that PSWQ has been set successfully

12.2.1 Water-Status



Typical Water-Status exchange

The Water-Status element is used to inform ground systems about the water situation onboard.

The following subsections define version 01 of WST service.

Operational parameters ranges and resolution in all messages will vary depending on aircraft type. Therefore, the airline and ground operator should ensure that only messages with ranges and resolutions fitting the aircraft type will be used.

12.2.1.1 Water-status-request uplink (WSTREQ)

Element Name: WSTREQ

The Water-status-request uplink should contain no parameters – and thus only contain the header.

The water status request uplink may contain one or several optional supplementary address(es) (as per ARINC 620).

12.2.1.2 Water-status-report downlink (WSTREP)

Element Name: WSTREP

The water status report downlink may contain one or several optional supplementary address(es) (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) in the associated WSTREQ.

12.2.1.3 Dynamic aspects

WSTREP01 should only be sent in response to WSTREQ01.

The airborne application should also perform the actions specified in the following table. The standard application state is “listening for ACARS messages” (called “listening mode”).

Table 12.2.1.3.1 – Airborne processing of non nominal conditions

A/C condition	Event	A/C action	Comment
Water system degraded mode or airborne application internal error	WSTREQ received	Send GERIND with appropriate error code and return to listening mode	
ANY	Erroneous WSTREQ received	Send GERIND with appropriate error code and return to listening mode	
ANY	WSTREQ received with a non supported version number	Send GERIND with appropriate error code 5 and supported version numbers and return to listening mode	

The ground application should also perform the actions specified in the following table.

Table 12.2.1.3.2 – Ground processing of non nominal conditions

Ground condition	Event	Ground action	Comment
WSTREQ was sent – wait for WSTREP	Receive GERIND with error code 5 (and list of supported versions)	Analyze list of supported versions – at user’s discretion – it is recommended that if one matches the versions supported by the ground, then re-send the message with good version number	
WSTREQ was sent – wait for WSTREP	Receive GERIND with error code 3 or 6 (message considered erroneous)	at ground user’s discretion - it is recommended that the message is corrected and re-sent	
WSTREQ was sent –	GERIND received with	at ground user’s	

Ground condition	Event	Ground action	Comment
wait for WSTREP	error code 0, 4, 8, 9, 10, 11	discretion – it is recommended that at least one retry is performed before giving up	
WSTREQ was sent – wait for WSTREP	More than 10 minutes (value at user's discretion) waiting	at ground user's discretion – it is recommended that at least one retry is performed before giving up – the ground application could check if WSTREQ was declared received by the aircraft (use of ARINC Message Assurance service)	
WSTREQ was sent – wait for WSTREP	WSTREP received containing invalid data	at ground user's discretion – it is recommended that at least one retry is performed before giving up	

12.2.1.4 ACARS format

The message should only contain one element. No supplementary header should be used here.

Label used is “WP“

WSTREQ01

No data field should be embedded in WSTREQ01 message (only header and CRC information and optional supplementary addresses).

WSTREP01

The element parameters should be encoded in ACARS, as follows.

Table 12.2.1.4.1 – WSTREP01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Parameter type					
Current Water Quantity	The current percentage of the filling quantity of the water tanks	1-4		Water quantity	NO	0 to 999	Percent	Percent	55
parameter separator		1	, (comma)		NO				,
Current PSWQ	The current value in percent of	1-3		Water quantity	NO	0 to 999	Percent	Percent	80

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Parameter type					
	the aircraft's pre-selected water quantity parameter. This value specifies the end quantity of the next aircraft water refilling process								
parameter separator		1	, (comma)		NO				,
CurrentPSWQSource	Source that last changed PSWQ (0: None, 1: A/C Cabin, 2: A/C Body, 3: ACARS)	1		N	NO	0 to 9			1
parameter separator		1	, (comma)		NO				,
PSWQReceiveDate	Date when PSWQ was set	6		date	NO				061006
parameter separator		1	, (comma)		NO				,
PSWQReceiveTime	Time when PSWQ was set	4		timemin	NO				1318

Example: (example below includes ARINC 633 header information)

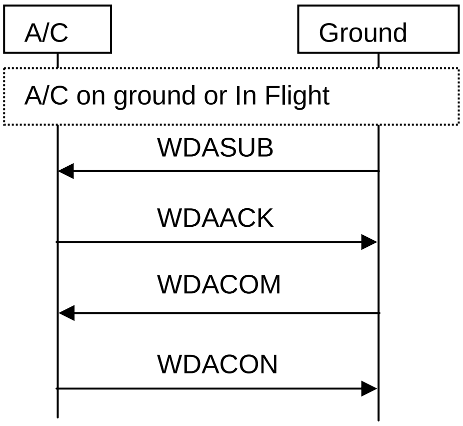
```
Uplink:   ,WSTREQ01061006141536/,xxxx
Downlink: ,WSTREP01061006141545/55,80,1,061006,1318,xxxx
```

Note: xxxx is the CRC.

12.2.1.5 XML Format

To be added in a future supplement

12.2.2 ~~12.2.2~~ Water Data Submission Service



Typical Water data submission exchange

The elements defined here are needed to specify the data required to perform potable water remote pre-selection. Data uplinked to the aircraft “water system” is acknowledged by sending back a valid value derived from the uplinked value. A separate command uplink is needed for activation and a final confirmation downlink to indicate whether the value is set successfully in the A/C. Typically the four messages are sent in the order SUB, ACK, COM and CON. Typically the messages are used on the ground during preflight but may be exchanged at any time before, during or after the flight. Detailed use of these data by the water system is Aircraft implementation dependent and is outside the scope of this document.

This section defines version 01 of Water data service.

Operational parameters ranges and resolution in all messages will vary depending on aircraft type. Therefore, the airline and ground operator should ensure that only messages with ranges and resolutions fitting the aircraft type will be used.

12.2.2.1 Water-DAta-SUBmit uplink (WDASUB)

Element Name: WDASUB

The water data submit uplink may contain one and a maximum of one optional supplementary address (as per ARINC 620).

This element should contain the potable water pre-selection value set on ground.

12.2.2.2 Water-DAta-ACK downlink (WDAACK)

Element Name: WDAACK

The water data Ack downlink may contain one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address (if present) in the associated WDASUB.

This element should contain a valid value for the pre-selection derived from the value received in the WDASUB message. If the received value has been detected as invalid, the rounded up value is returned and the type of invalidity is set appropriately.

12.2.2.3 Water-DAta-COMmand uplink (WDACOM)

Element Name: WDACOM

The water data command uplink may contain one and a maximum of one optional supplementary address (as per ARINC 620).

This element should contain the information to set or to cancel the value received in WDAACK.

12.2.2.4 Water-DAta-CONfirm downlink (WDACON)

Element Name: WDACON

The water data command uplink may contain one and a maximum of one optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address (if present) in the associated WDACOM.

12.2.2.5 Dynamic aspects

- WDASUB, WDAACK, WDACOM and WDACON should always be sent in the order specified above.
- When a valid WDASUB message has been received, the airborne water pre-selection application should consider that a transaction has been ‘opened’. A transaction should be considered ‘closed’ when the airborne application has received the WDACOM from ground and returned the WDACON or when a time out after transmission of WDAACK has elapsed without receiving any WDACOM.
- The aircraft should generate WDAACK message within a delay following reception of WDASUB, compatible with the time out value used by the ground system.
- The ground should generate WDACOM message within a delay following reception of WDAACK, compatible with the time-out value used by the airborne system. WDACOM should only be sent upon reception of WDAACK.
- The aircraft should generate WDACON message within a delay following reception of WDACOM, compatible with the time-out value used by the ground system.

COMMENTARY

10 min can be considered as a reasonable value for airborne and ground time-out delays.

COMMENTARY

The airborne application may only support one transaction at a time. If no supplementary addresses are embedded in the messages, may consider that two ground applications are the same application.

- If multiple ground applications interact with the aircraft water system, supplementary addresses should be used to identify unambiguously the ground application.
- The airborne system is likely to clear received data at a point in the flight cycle as specified by the system supplier.

COMMENTARY

The time when the airborne system can clear the received data is implementation dependent and may be obtained from supplier documentation.

The following tables define the required or recommended behavior (detailed in the tables) for the aircraft application and ground application for non-nominal conditions.

Table 12.2.2.5.1 – Airborne Processing Of Non Nominal Conditions

Aircraft Condition	Event	Aircraft Action	Comment
ANY	Erroneous WDASUB or WDACOM received	Send GERIND with appropriate error code No change on on-going transaction if started	
No transaction opened or WDAACK not yet sent	WDACOM received	- Send GERIND with error code 2 - current transaction continues	
Transaction opened	WDASUB received	- Send GERIND with error code 21 - current transaction continues	
WDAACK was sent following reception of WDASUB	No WDACOM received after WDAACK transmission before airborne time out delay	Send GERIND with error code 1 Abort transaction	
ANY	WDASUB or WDACOM received with a non supported version number	-Send GERIND with error code 5 and list of supported versions of this service - current transaction continues (if any)	
Water system degraded mode or airborne application internal error	Message received	-Send GERIND with appropriate error code - Abort transaction if any	
No transaction opened	WDASUB with "Out of range" parameters	-Send WDAACK with valid value and invalid type -Transaction opened (wait for WDACOM)	

Table 12.2.2.5.2 – Ground Processing of Non Nominal Conditions

Ground condition	Event	Ground action	Comment
ANY	GERIND received with error codes 0, 1, 2, 4, 7, 8, 9, 10, 11	At ground user's discretion – it is recommended that at least one retry appropriate to the error code is performed before giving up	
WDASUB transmitted to the aircraft	WDAACK not received by the ground before ground time out delay, following WDASUB transmission to the aircraft	At ground user's discretion – it is recommended that at least one retry is performed before giving up – the ground application should check if WDASUB was declared received by the aircraft (use of ARINC Message Assurance service)	
WDASUB transmitted to the aircraft	WDAACK received containing invalid data	Send WDACOM with cancel – at ground user's discretion to retry with WDASUB after received WDACON	
ANY	Receive GERIND with error code 5 (and list of supported versions)	Analyze list of supported versions – at user's discretion – it is recommended that if one matches the versions supported by the ground, then re-send the message with good version number	
after any message sending	Receive GERIND with error code 3 or 6 (message considered erroneous)	at ground user's discretion - it is recommended that the message is corrected and re-sent	
WDASUB transmitted to the aircraft	GERIND received with code 21	Wait for airborne time out delay before sending WSTREQ for checking new values then resubmitting the message if always needed, or check with other ground system that controls potable water remote pre-selection.	
WDACOM transmitted to the aircraft	WDACON not received by the ground before ground time out delay, following WDACOM transmission to the	At ground user's discretion – it is recommended that at least one retry is performed before	

Ground condition	Event	Ground action	Comment
	aircraft	giving up – the ground application should check if WDACOM was declared received by the aircraft (use of ARINC Message Assurance service)	

12.2.2.6 ACARS format

The message will only contain one element. No supplementary header should be used here.

Label used is “WP“

Table 12.2.2.6.1 – WDASUB01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Parameter type					
RemotePSWQ	RemotePre-selected Water Quantity	1-4		Waterquantity	NO	0-1000	Tenth of Percent	tenth of percent	800

Table 12.2.2.6.2 – WDAACK01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Parameter Type					
InvalidType	Type of invalidity of received value	1		N	NO	0-9	1	-	0
parameter separator		1	, (comma)		NO				,
Revised PSWQ	Revised Pre-selected Water Quantity	1-4		waterquantity	NO	0-1000	Tenth of Percent	tenth of percent	800
parameter separator		1	, (comma)		NO				,
AckDate	Date when Submit was received and ACK was sent	6		date	YES				061006
parameter separator		1	, (comma)		NO				,
AckTime	Time when Submit was received and ACK was sent	4		timemin	YES				1318

Table 12.2.2.6.3 – WDACOM01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Variable text					
Command	‘1’ = Command (WDAACK received correctly and confirmed by user), ‘0’ or any other value means cancel.	1		B	NO	0 to 1			1

Table 12.2.2.6.4 – WDACON01 ACARS Definition

Field name	Meaning	Field length (in Char)	Contents		Option	range	resolution	Unit	Example
			Fixed text	Variable text					
PSWQ Setting Status	'1' = PSWQ Setting successful '0' or any other value means canceled	1		B	NO	0 to 1			1

Examples:

In the first example a pre-selection of 80% is submitted and successfully set.

In the second example an invalid value is entered as pre-selection value and in the ACK message the next valid value is indicated, which is subsequent confirmed.

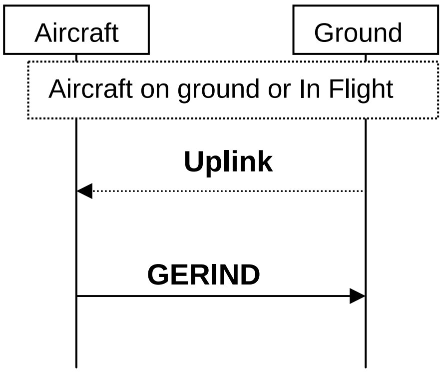
```
Uplink:      ,WDASUB01061009144432/80,xxxx
Downlink:    ,WDAACK01061009144452/0,80,061006,1318,xxxx
Uplink:      ,WDACOM01061009144517/1,xxxx
Downlink:   ,WDACON01061009144610/1,xxxx

Uplink:      ,WDASUB01061009154432/67,xxxx
Downlink:    ,WDAACK01061009154452/6,70,061006,1318,xxxx
Uplink:      ,WDACOM01061009154517/1,xxxx
Downlink:   ,WDACON01061009154610/1,xxxx
```

12.2.2.7 XML Format

To be added in a future supplement

12.2.3 Errors

General Error Service to be used.



Typical Error exchange

The General Error Service ('GER', refer to Section 5.2.1) is used to report any error detected by the aircraft Water application to the Ground. The General Error Service contains one element named 'IND' (INDication)

Depending on the type of received uplink and on its content, various types of errors will be reported by the aircraft (see in Sections 12.2.1 and 12.2.2 and in table below for list of possible error codes).

GERIND uplinks are not used by the Potable Water System.

12.2.3.1 Water-Error-Indication downlink (GERIND)

Element Name: GERIND

12.2.3.2 Dynamic aspects

Refer to other sections for details.

12.2.3.3 ACARS format

For the General Error Indication element structure refer to Section 5.2.1.1.

The General Error Indication downlink may contain one or several optional supplementary address (as per ARINC 620), which will be the copy of the supplementary address(es) (if present) contained in last received uplink.

Table 12.2.3.3.1 – Application Specific Error Types

Sender's Situation	Type Name	Type ID	Suggested text to user (e.g. flightcrew)	Comment
As defined in Section 5		0		
		1		
		2		
		3		
		4		
		5		
		6		
		7		
		8		
		9		
		10		
		11		
Aircraft water system is not able to process the uplink (i.e. Submit Water data process on going with another Ground system)	Busy	21		
Communication is broken with the avionics water system, datalink application is not able to send data to the water system – therefore, WDASUB is not available.	read-only	22		
ACARS transaction procedure overruled and aborted by source on A/C	Aborted	23		
Disabled on A/C due to e.g. servicing procedure	disabled	24		

Application Specific Use Of Error Data

Contains vendor specific detailed information for troubleshooting (software status, source of the error, parameters values…).

In case of error 5, should only list the supported versions of the service (NN separated by spaces).

12.2.3.4 XML format

This format should be used for ground-ground message exchanges only.

ATTACHMENT 1 AOC APPLICATION ELECTRONIC DOCUMENT

1.1 Schema

As stated in Section 1.3.2, the electronic document has precedence over the text portion of this standard. The electronic document consists of multiple XML schemas. These schemas are provided to ensure application interoperability and to assist the software designer in proper coding of applications defined in this specification.

COMMENTARY

While the best intent and care has been taken in their construction, no assurances can be made that they are flawless. The reader should report any omissions or inconsistencies to the ARINC IA staff using the attached errata sheet.

The schemas are contained in a separate .zip file with a schema folder containing files with the XML extension of .xsd. The .zip file is available at the namespace ***www.aviation-ia.com/aeec/SupportFiles/633-1/***.

The schemas are located within the ARINC Store and therefore access is limited. AEEC Member Organizations (AMO) and ARINC IA Corporate Sponsors are provided a password with their membership and may download this file at no additional charge. All others will be required to place an order through the ARINC store.

Those who download the schema file will also receive the associated XML shema example files. See Appendix E.

APPENDIX A GLOSSARY & ACRONYMS

The following table contains acronyms and definitions used in the document text.

For the definition of parameters used in actual messages, see Appendix D.

Abbreviation	Description	Note/Clarification
ACARS	Aircraft Communication Addressing and Reporting System	In the context of this document, the acronym ACARS is usually used for the ACARS air/ground link consisting of a protocol stack defined in the 1970s
AOA	ACARS Over AVLC	A 1990s extension of the original ACARS protocol stack, allowing the use of classical ACARS messages over a modernized subnetwork called VDL Mode 2
AOC	Aeronautical Operational Control	A group or the entirety of applications used for communication of an aircraft with its airline or service partner pendants on the ground An "AOC" super-application could be hosted on a CMU or an EFB platform
ARINC	Aeronautical Radio Incorporated	
AMS	ACARS Message Security	
ATA	Air Transport Association	
ATS	Air Traffic Service(s)	Group of applications used for communication of an aircraft with Air Traffic Control entities on the ground
CA	Certificate Authority	
CG	Center of Gravity	usually expressed in percent of MAC (Mean aerodynamic coord)
CMU	Communication Management Unit	Avionics system used as an intermediate system (communication router or gateway) or endsystem.
CRC	Cyclic Redundancy Code	A method to assure integrity of messages against unattended corruption
DL	Downlink	message from aircraft to ground
DSP	Datalink communication Service Provider	e.g. SITA and ARINC
ECAM	Electronic Centralized Monitoring System	
EFB	Electronic Flight Bag	An EFB is an airborne system capable of communicating with ground systems and providing an interface to the flight crew. The EFB is not part of the classical avionics systems. Note that other ARINC documents use the acronym NSS instead of EFB
EICAS	Engine Indication and Crew Alerting System	

APPENDIX A
GLOSSARY & ACRONYMS

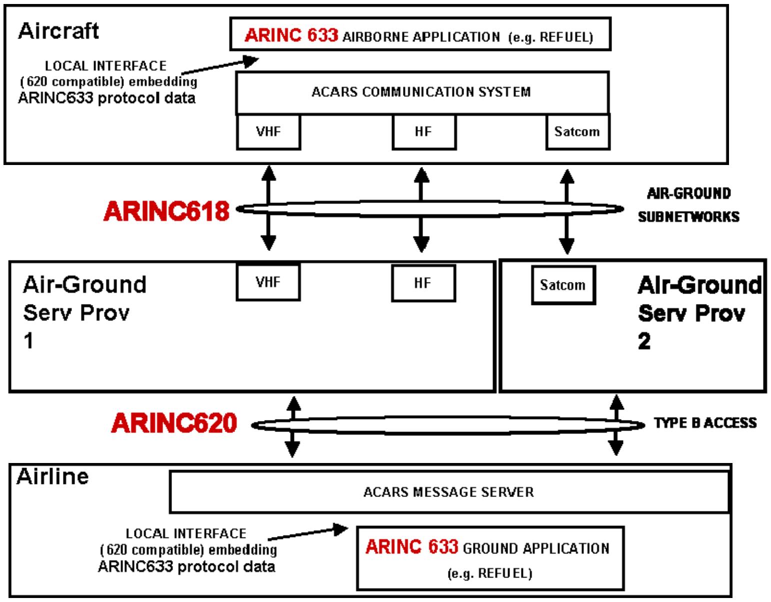
Abbreviation	Description	Note/Clarification
EFF or EFF system	Electronic Flight Folder	An application, typically hosted on an EFB, which ~~allows~~**enables** pilots to access and manipulate briefing information during all flight phases.
eff data package (eFF)		The data processed by the EFF application. Always related to one specific flight sector. A full eff data package usually contains more than 100 kBytes of flight related data.
FMS	Flight Management System	Avionics system used by the flight crew for navigation and other flight related tasks. A FMS can be the airborne endsystem of air-/ground messages
FOB	Fuel On Board	Amount of fuel mass contained in aircraft fuel tanks
FQMS	Fuel Quantity Management System	Avionics system managing fuel related tasks, e.g. distribution of fuel in multiple aircraft tanks
FCA	Fuel CG Advisory	
FCAIND	Fuel CG Advisory Indication	
FDA	Fuel Data	
FDAACK	Fuel Data Acknowledge	
FDACOM	Fuel Data Submit Command	
FDASUB	Fuel Data Submit	
FEN	Automatic Refuel End	
FENIND	Automatic Refuel End Indication	
FERIND	Fuel Error Indication	
FO	Fuel Order	
FORACK	Fuel Order Acknowledge	
FORSUB	Fuel Order Submit	
FPR	Fuel Process	
FPRACK	Fuel Process Acknowledge	
FPRREP	Fuel Process Report	
FQMS	Fuel Quantity Management System	
FR	Fuel Receipt	
FRCACK	Fuel Receipt Acknowledge	
FRCSUB	Fuel Receipt Submit	
FST	Fuel Status	
FSTREP	Fuel Status Report	
FSTREQ	Fuel Status Request	
FTB	Fuel auto ground Transfer Begins	
FTBIND	Fuel Transfer Begin Indication	
FTE	Fuel auto ground Transfer End	
FTEIND	Fuel auto ground Transfer End Indication	
FTI	Fuel auto ground Transfer Interrupted	
FTIIND	Fuel auto ground Transfer Interrupted Indication	
HF	High Frequency	
ICAO	International Civil Aviation Organization	
IEC	International Electrotechnical Committee	
IEEE	Institute of Electrical and Electronic Engineers	
IETF		

APPENDIX A
GLOSSARY & ACRONYMS

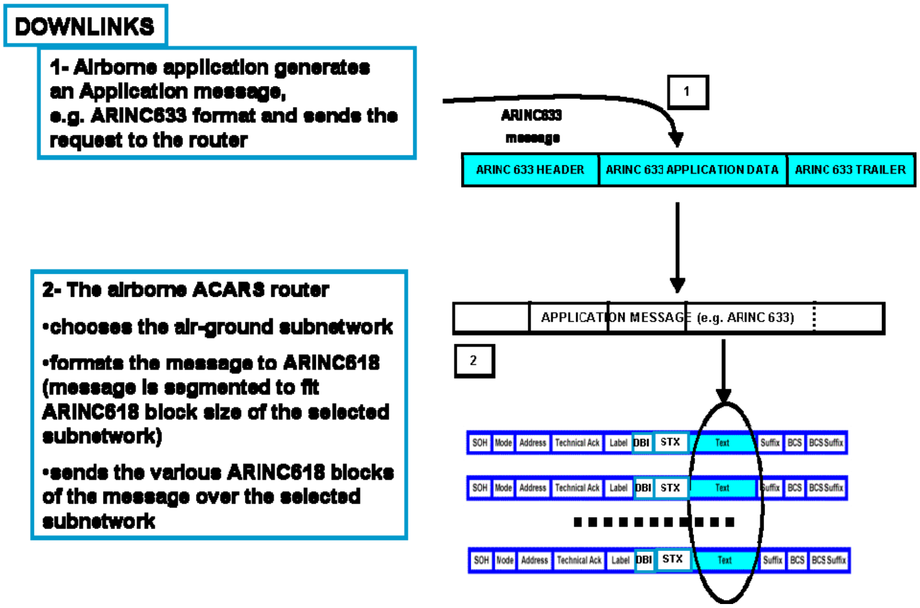
Abbreviation	Description	Note/Clarification
IP	Internet Protocol	
ISO	International Standards Organization	
LLC	Limited Liability Corporation	
LTS	Load Trim Sheet	A document or information package containing data about the aircraft's weights and weights distribution
MFI	Message Function Identifier	
N/A	Not Applicable	
PKI	Public Key Infrastructure	
RFC	Request for Comment	
SATCOM	Satellite Communication	
SMI	Standard Message Identifier	
TCP	Transmission control Protocol	
UL	Uplink	message from ground to aircraft
VHF	Very High Frequency	
WBA	Weight and Balance Application	
WERIND	Weight and Balance Error Indication	
WIFSUB	Weight and Balance Initialize (Full) Submit	
WIISUB	Weight and Balance Initialize (Intermediate) Submit	
WIMSUB	Weight and Balance Initialize (Minimum) Submit	
WISUB	Weight and Balance Initialization Submit	
WR1REP	Weight and Balance Report	
WR2REP	Weight and Balance Report	
XML	Extensible Markup Language	

APPENDIX B TUTORIAL ON TRANSPORTATION OF ARINC 633 MESSAGES OVER ACARS

This appendix explains how ARINC 633, 618 and 620 interact, gives examples and references for message structure for each of these protocols.



Location and interaction between ARINC ACARS protocols



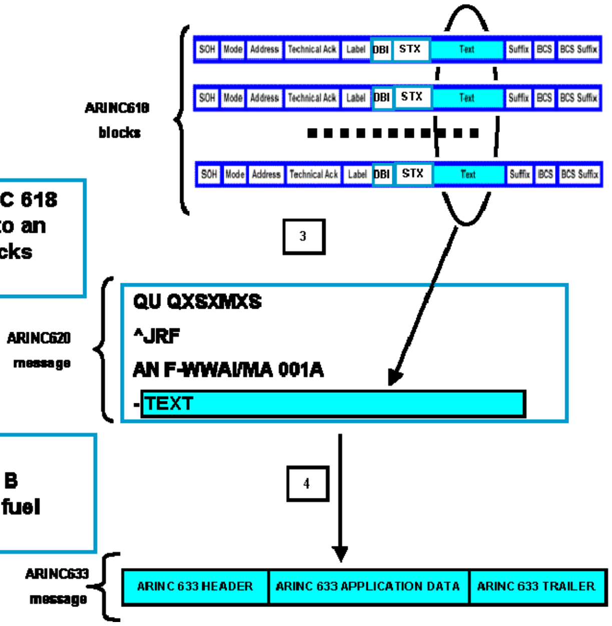
Protocol interactions for ARINC 633 Downlinks

APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS

DOWNLINKS (C'td)

3- The DSP receives the ARINC 618 blocks, and converts them into an ARINC620 message (after blocks reassembly)

4- The airline ACARS server receives the ARINC620 Type B message and relays it to the fuel application in a local format



Protocol interactions for ARINC 633 Downlinks (continued)

DOWNLINKS (C'td)

6- The ground application checks the header, and trailer, before processing the data

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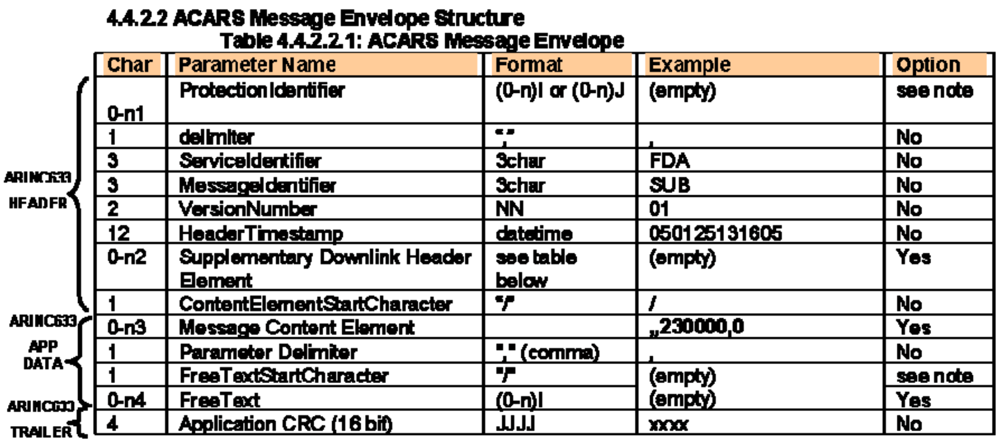
UPLINKS TRANSMISSION PROCESS IS SYMETRIC

Protocol interactions for ARINC 633 Downlinks (continued)

APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS



4.4.2.2 ACARS Message Envelope Structure

Table 4.4.2.2.1: ACARS Message Envelope

Char	Parameter Name	Format	Example	Option
0-n1	ProtectionIdentifier	(0-n)I or (0-n)J	(empty)	see note
1	delimiter	","	,	No
3	ServiceIdentifier	3char	FDA	No
3	MessageIdentifier	3char	SUB	No
2	VersionNumber	NN	01	No
12	HeaderTimestamp	datetime	050125131605	No
0-n2	Supplementary Downlink Header Element	see table below	(empty)	Yes
1	ContentElementStartCharacter	"/"	/	No
0-n3	Message Content Element		,,230000,0	Yes
1	Parameter Delimiter	"," (comma)	,	No
1	FreeTextStartCharacter	"/"	(empty)	see note
0-n4	FreeText	(0-n)I	(empty)	Yes
4	Application CRC (16 bit)	JJJJ	xxxx	No

EXAMPLE ARINC 633 FDASUB REFUEL MESSAGE IS THUS:
« ,FDASUB01050125131605/,,230000,0,xxxx »

ARINC 633 MESSAGE STRUCTURE

1 ACARS MESSAGE

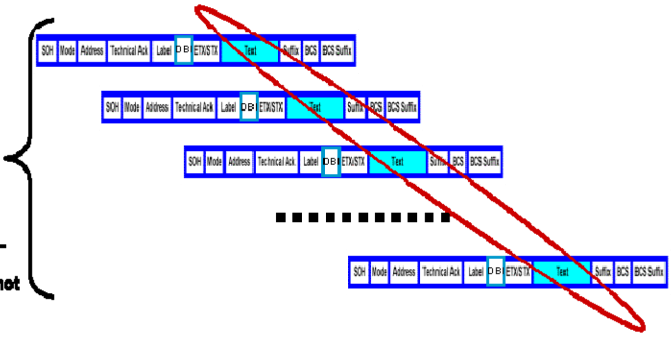
=

UP TO 16

ARINC 618 BLOCKS

(Satcom, HF and VHF Mode A and VDL mode2 AOA)

Note: AOA allows various Block sizes – depending on the block size, the max number of blocks will vary – what does not vary is the total max message size)



1 ARINC 618 BLOCK

=

220 Text characters (Satcom, HF and VHF Mode A)

NOTE: THIS IS AN EXAMPLE FOR DOWNLINK MESSAGES

ARINC 618 message structure in blocks

APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS

HEREAFTER IS THE FORMAT OF AN ARINC 618 BLOCK

SAME FORMAT IS APPLICABLE TO ALL SUBNETWORKS, EXCEPT FOR VDL MODE 2 – AOA

<u>for some DSPs only</u> WHERE THE ONLY DIFFERENCE IS THE BLOCK MAX TEXT SIZE, THAT CAN BE BIGGER (1008 instead of 220 for some implementations, can go up to 2032 bytes)

<u>NAME OF FIELD</u>	**<u>FIELD LENGTH (CHARACTERS)</u>**
Start of Header	1
Mode	1
Address	7
Technical Acknowledgment	1
Label	2
Uplink/Downlink Block Identifier	1
Start of Text	1
Text	**0 to 220 max (except for VDL2 AOA: 220 or 1008 depending on the DSP)** <u>Note</u>: AOA text size= (N1 value (in bits)/8) – 31 Default N1 value=8312b → 1008 characters for SITA Min value for AOA= 2008b → 220 characters for ARINC Max value of N1=16504b → 2032 characters
Suffix	1
Block Check Sequence	2
BCS Suffix	1

ARINC 618 Block structure

UPLINK TO A LOCAL APPLICATION

NAME	SCH	MODE	address	TAK	LABEL	UBI	STX (<u>if text</u>)	APPL TEXT (<u>option</u>)	SUFFIX	BCS	BCS Sufix (<DEL>)
SIZE	1	1	7	1	2	1	1	0 - 220	1	2	1
example	<SOH>	2	.N123XX	3	10	A	<STX>		<ETX> or <ETB> for last block of msg		<DEL>

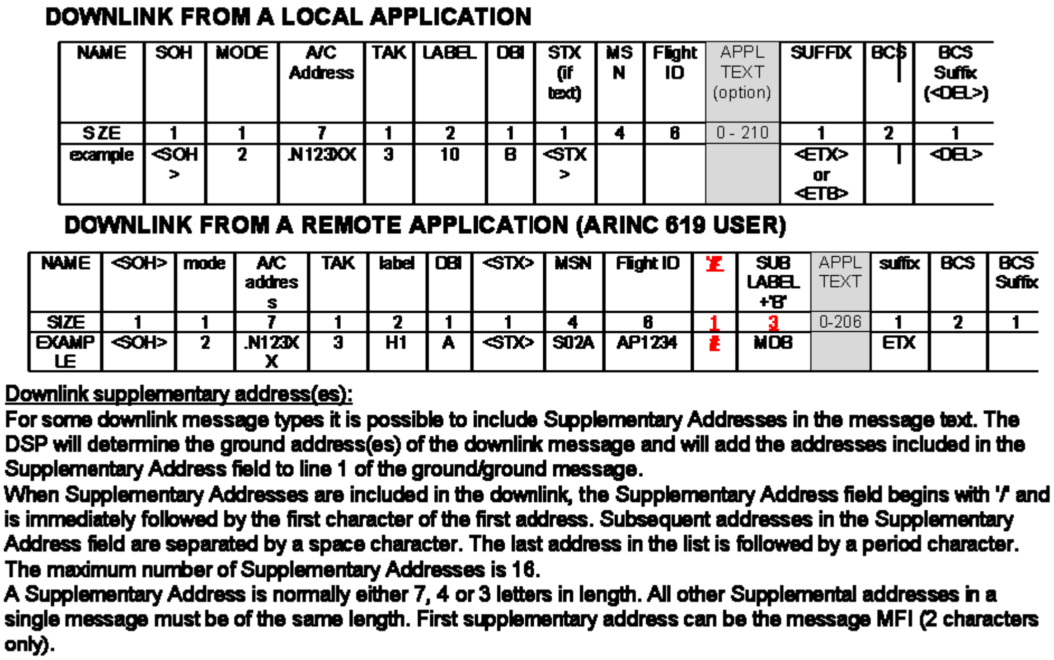
UPLINK TO A REMOTE APPLICATION (ARINC 619 USER)

NAME	<SOH>	MODE	address	TAK	LABEL	UBI	<STX>	'-'	<SP> (space char)	'#'	SUB LABEL	APPL TEXT (option)	SUFFIX	BCS	BCS Suffix (<DEL>)
SIZE	1	1	7	1	2	1	1	1	1	1	2	0-215	1	2	1
EXAMPLE	<SOH>	2	.N123XX	3	H1	A	<STX>	'-'	<SP>	#	MD		<ETB> or <ETX>		<DEL>

<u>Uplink supplementary address(es):</u>
Some uplink messages permit the inclusion of a supplementary address field. The supplementary address field of the uplink message, if present, will contain the address of the source (End system) that is providing the uplink message. In the case of ATS messages, the Supplementary address will typically be that of the ATC facility that is responsible for the airspace in which the aircraft is located, or into which the aircraft is expected to travel.
The information in the supplementary address field is used to address the response, to the message, if any. The supplementary address field may contain additional addresses, designating secondary recipients of any subsequent downlink generated by the aircraft avionics in response to the uplink message. First supplementary address can be the message MFI (2 characters only).

ARINC 618 block structure for uplink

APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS



DOWNLINK FROM A LOCAL APPLICATION

NAME	SOH	MODE	A/C Address	TAK	LABEL	DBI	STX (if text)	MSN	Flight ID	APPL TEXT (option)	SUFFIX	BCS	BCS Suffix (<DEL>)
SIZE	1	1	7	1	2	1	1	4	6	0 - 210	1	2	1
example	<SOH>	2	.N123XX	3	10	B	<STX>				<ETX> or <ETB>		<DEL>

DOWNLINK FROM A REMOTE APPLICATION (ARINC 619 USER)

NAME	<SOH>	mode	A/C address	TAK	label	DBI	<STX>	MSN	Flight ID	'E'	SUB LABEL +'B'	APPL TEXT	suffix	BCS	BCS Suffix
SIZE	1	1	7	1	2	1	1	4	6	1	3	0-206	1	2	1
EXAMPLE	<SOH>	2	.N123XX	3	H1	A	<STX>	S02A	AP1234	E	MDB		ETX		

Downlink supplementary address(es):

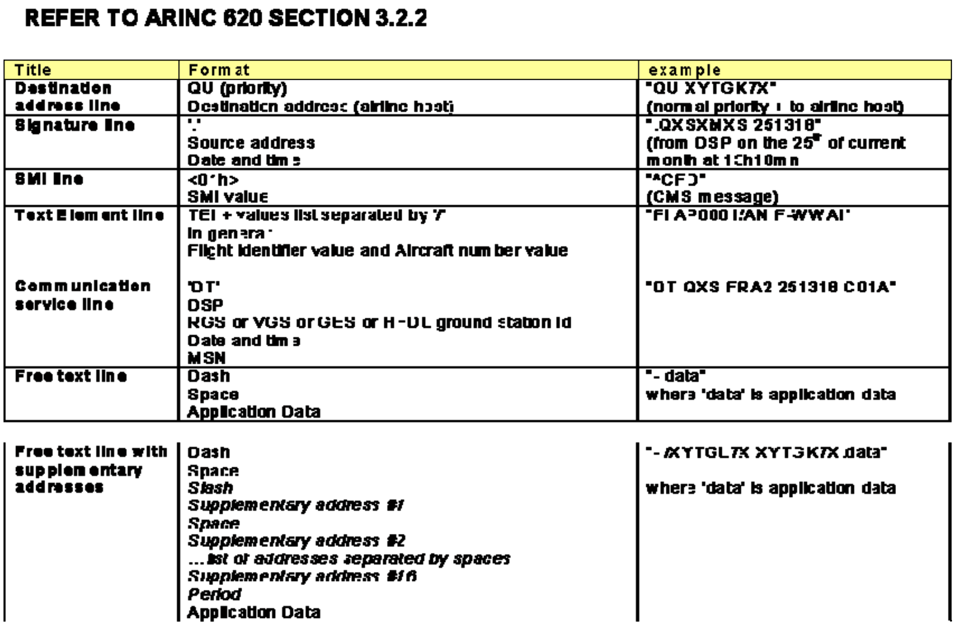
For some downlink message types it is possible to include Supplementary Addresses in the message text. The DSP will determine the ground address(es) of the downlink message and will add the addresses included in the Supplementary Address field to line 1 of the ground/ground message.

When Supplementary Addresses are included in the downlink, the Supplementary Address field begins with '/' and is immediately followed by the first character of the first address. Subsequent addresses in the Supplementary Address field are separated by a space character. The last address in the list is followed by a period character.

The maximum number of Supplementary Addresses is 16.

A Supplementary Address is normally either 7, 4 or 3 letters in length. All other Supplemental addresses in a single message must be of the same length. First supplementary address can be the message MFI (2 characters only).

ARINC 618 block structure for downlink

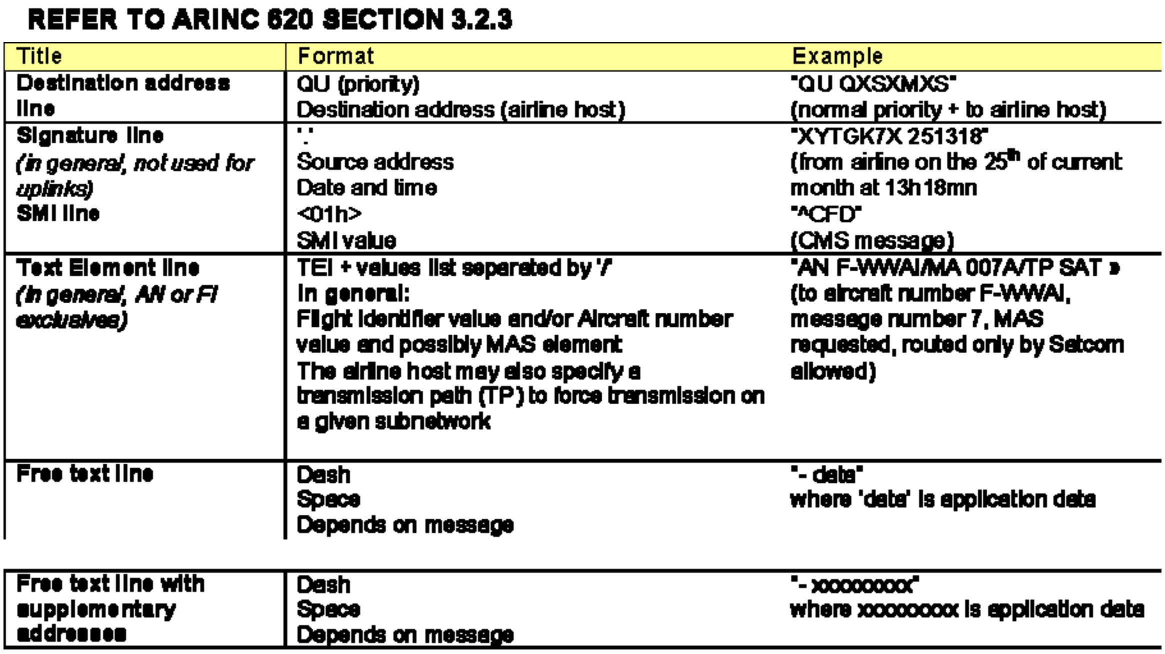


REFER TO ARINC 620 SECTION 3.2.2

Title	Format	example
Destination address line	QU (priority) Destination address (airline host)	"QU XYTGK7X" (normal priority - to airline host)
Signature line	'.' Source address Date and time	".QXSXMXS 251318" (from DSP on the 25th of current month at 13h10mn
SMI line	<01h> SMI value	"^CFD" (CMS message)
Text Element line	TEI + values list separated by '/' In general: Flight identifier value and Aircraft number value	"FI AF0001/AN F-WWAI"
Communication service line	'DT' DSP RGS or VGS or GES or H-DL ground station id Date and time MSN	"DT QXS FRA2 251318 C01A"
Free text line	Dash Space Application Data	"- data" where 'data' is application data
Free text line with supplementary addresses	Dash Space *Slash* *Supplementary address #1* *Space* *Supplementary address #2* *…list of addresses separated by spaces* *Supplementary address #16* *Period* Application Data	"- /XYTGL7X XYTGK7X.data" where 'data' is application data

ARINC 620 block structure for downlink

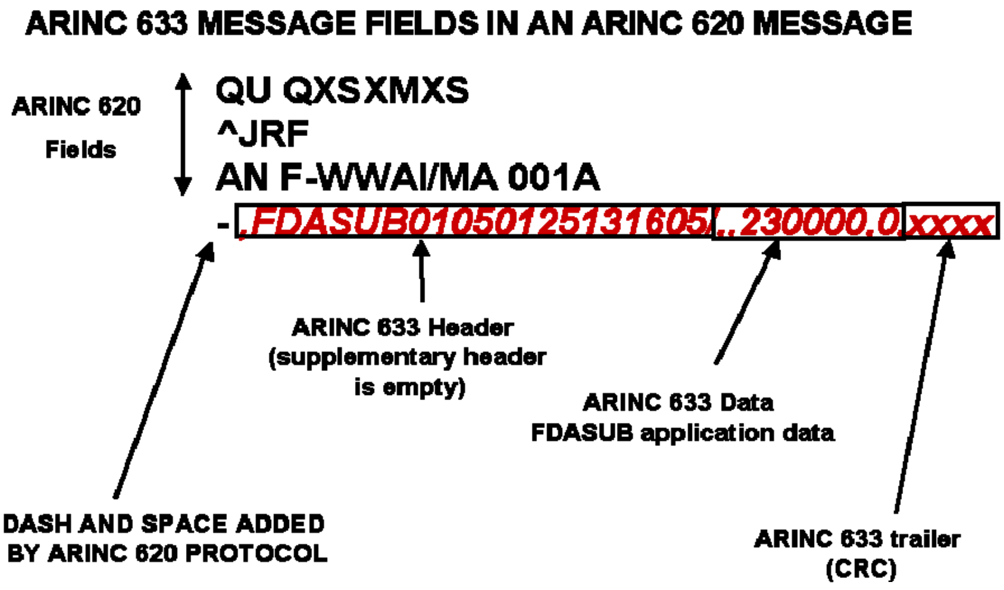
APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS



REFER TO ARINC 620 SECTION 3.2.3

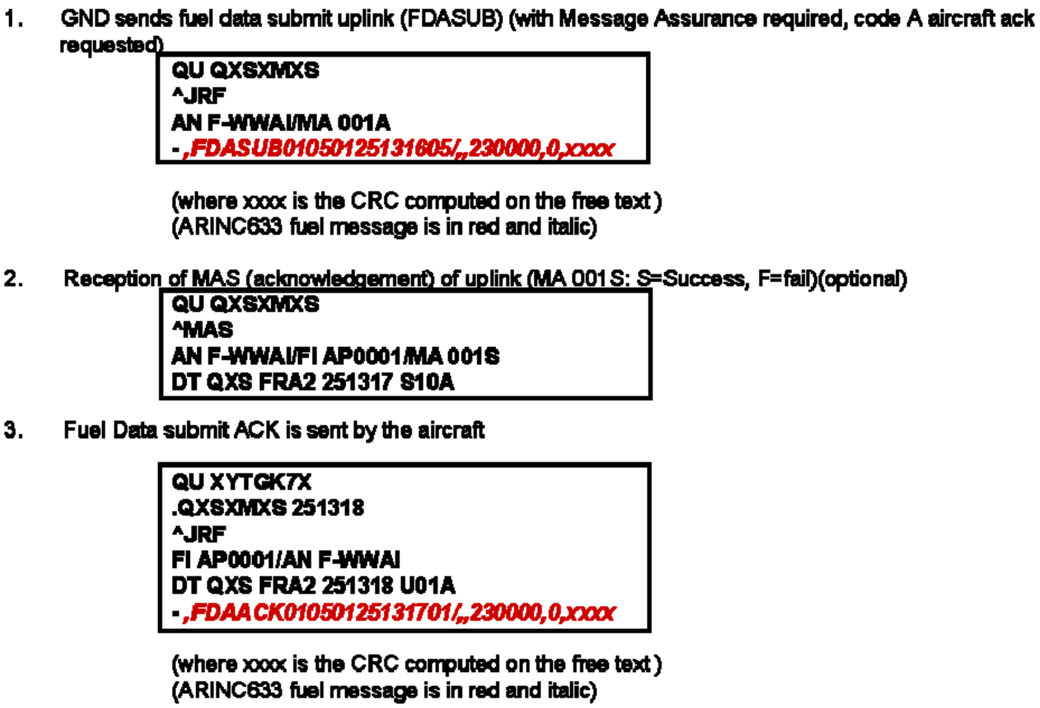
Title	Format	Example
Destination address line	QU (priority) Destination address (airline host)	"QU QXSXMXS" (normal priority + to airline host)
Signature line *(in general, not used for uplinks)* **SMI line**	'.' Source address Date and time <01h> SMI value	"XYTGK7X 251318" (from airline on the 25th of current month at 13h18mn "^CFD" (CMS message)
Text Element line *(in general, AN or FI exclusives)*	TEI + values list separated by '/' In general: Flight Identifier value and/or Aircraft number value and possibly MAS element The airline host may also specify a transmission path (TP) to force transmission on a given subnetwork	"AN F-WWAI/MA 007A/TP SAT » (to aircraft number F-WWAI, message number 7, MAS requested, routed only by Satcom allowed)
Free text line	Dash Space Depends on message	"- data" where 'data' is application data
Free text line with supplementary addresses	Dash Space Depends on message	"- xxxxxxxxx" where xxxxxxxxx is application data

ARINC 620 block structure for Uplink



Example of an ARINC 633 message decoded at ARINC 620 level

APPENDIX B
TUTORIAL ON TRANSPORTATION OF 633 MESSAGES OVER ACARS



1. GND sends fuel data submit uplink (FDASUB) (with Message Assurance required, code A aircraft ack requested)

```
QU QXSXMXS
^JRF
AN F-WWAI/MA 001A
- ,FDASUB01050125131605/,,230000,0,xxxx
```

(where xxxx is the CRC computed on the free text)
(ARINC633 fuel message is in red and italic)

2. Reception of MAS (acknowledgement) of uplink (MA 001 S: S=Success, F=fail)(optional)

```
QU QXSXMXS
^MAS
AN F-WWAI/FI AP0001/MA 001S
DT QXS FRA2 251317 S10A
```

3. Fuel Data submit ACK is sent by the aircraft

```
QU XYTGK7X
.QXSXMXS 251318
^JRF
FI AP0001/AN F-WWAI
DT QXS FRA2 251318 U01A
- ,FDAACK01050125131701/,,230000,0,xxxx
```

(where xxxx is the CRC computed on the free text)
(ARINC633 fuel message is in red and italic)

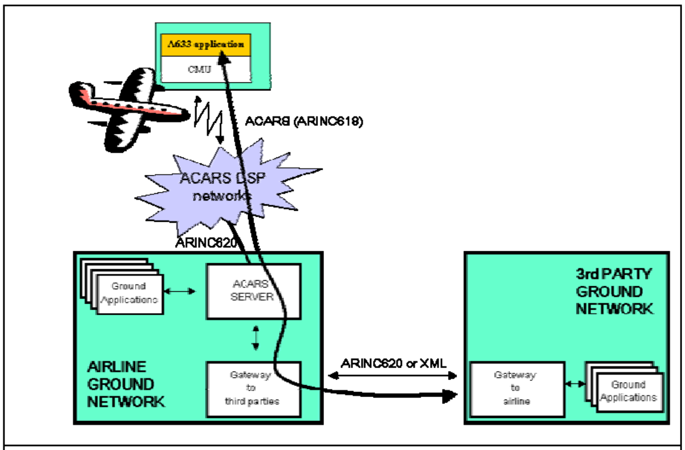
Example of Fuel exchanges at ARINC 620 level

APPENDIX C POSSIBLE SCENARIOS FOR ROUTING ACARS MESSAGES TO MULTIPLE PARTIES

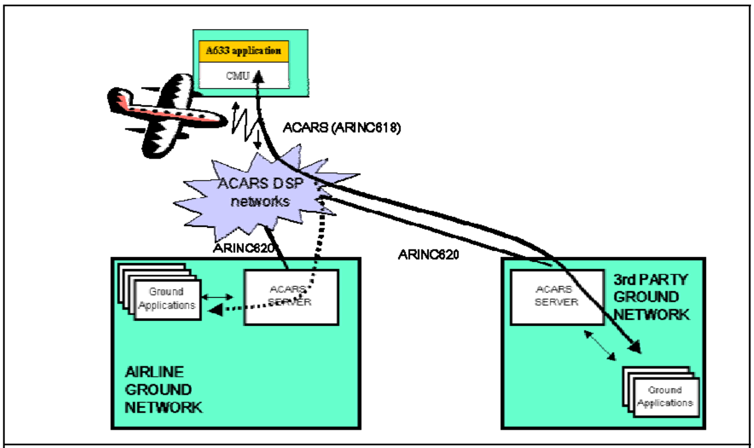
This appendix gives some examples of implementation of routing of downlink messages to multiple ground parties.

3 main scenarios are identified:

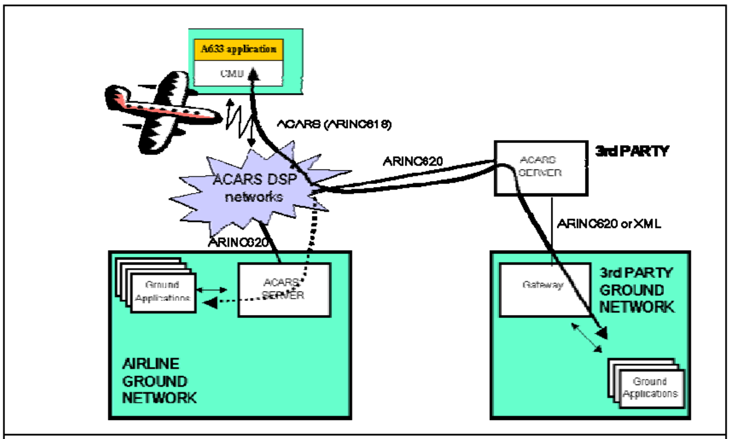
1. Centralized at airline
2. Decentralized: all parties have access to the ACARS network and DSP routes downlink messages to all interested parties (identified either statically or via supplementary addresses)
3. Centralized at a third party: maybe the DSP or any other party.



Scenario #1 for routing downlink 633 messages to ground third parties: gateway in the airline



Scenario #2 for routing downlink 633 messages to ground third parties: 3rd party has access to ACARS network



Scenario #3 for routing downlink 633 messages to ground third parties: a specific 3rd party relays the messages

APPENDIX D PARAMETER TABLE

The following table lists parameters that may be available to typical Datalink installations and could be used in ARINC 633 message definition.

In a given aircraft installation, only a subset of these parameters may be available. Parameters that appear in standardized messages have been added to this list.

Parameter Name	Def	Meaning	Example
A/THREngaged			
A623Connected			
AcrStatus			
Airborne			
AircraftConfiguration			
AircraftFleetIdentification			
AircraftType			
AircraftMassUnitDisplay			
AirlineIdentification			
AirportDestinationAlternate			
Altitude			
AltitudeCabinCurrent			
AltitudeCabinTarget			
APEngaged			
APEngagedMessageOnFMA			
APUAirIntake			
APUAvailable			
APUFaultPresent			
APUFuelLowPressure			
APURequired			
APUShutDown			
APUBleedValveClosed			
APUEGT			
APUFuelFlow			
APULowOilPressure			
APUOilPressure			
APUOilQuantity			
APUOilTemperature			
APUOperatingHours			
APURPMOutput			
APURunning			
APUStart			
APUStartCycles			
AverageWheelSpeed			
BaroAltitude			
Citypair			
CommandType			

APPENDIX D
PARAMETER TABLE

Parameter Name	Def	Meaning	Example
CompanyRoute			
ComputedAirspeed			
CurrentDate			
CurrentFOB			
CurrentPFQ			
CurrentPFQDate			
CurrentPFQSource			
CurrentPFQTime			
CurrentTime			
CurrentTTF			
CurrentZFCG			
CurrentZFCGDate			
CurrentZFCGSource			
CurrentZFCGTime			
CurrentZFW			
CurrentZFWDate			
CurrentZFWSource			
CurrentZFWTime			
DesiredTrack			
DestinationLatitude			
DestinationLogitude			
DistanceToDestination			
DistanceToWaypoint			
DoorCargo1Closed			
DoorCargo2Closed			
DoorCargo3Closed			
DoorCargo4Closed			
DoorEbayClosed			
DoorEntry1Closed			
DoorEntry2Closed			
DoorEntry3Closed			
DoorEntry4Closed			
DoorEntry5Closed			
DoorEntry6Closed			
DoorEntry7Closed			
DoorEntry8Closed			
DoorFlightDeckClosed			
DoorMainFwdClosed			
DoorsAllCabinClosed			
DoorsAllClosed			
DoorServiceClosed			
DriftAngle			
ECSPack1On			
ECSPack2On			
ECSPack3On			
Eng1BleedValveClosed			
Eng1EGT			

APPENDIX D
PARAMETER TABLE

Parameter Name	**Def**	**Meaning**	**Example**
Eng1EPR			
Eng1FuelCutoff			
Eng1FuelFlow			
Eng1InletTurbineTemp			
Eng1LowOilPressure			
Eng1Mode			
Eng1N1			
Eng1N2			
Eng1OilPressure			
Eng1OilQuantity			
Eng1OilTemperature			
Eng1Running			
Eng1TargetN1			
Eng1VibHP			
Eng1VipLP			
Engine identification			
Engine type			
ETAToDestination			
ETAToWaypoint			
FD engagement status			
FlapPosition			
Flight Phase FWC			
FlightIdentifier			
FlightNumber			
FMA modes engaged			
FMSActiveRoute			
FMSDate			
FMSDestinationAirport			
FMSDestinationRunway			
FMSFlightID			
FMSFlightPhase			
FMSOriginAirport			
FMSTime			
FOB			
FOBAccuracyState			
FQMS Fault			
FuelCenterTank			
FuelFlow			
FuelOnBoard-Unit			
FuelQuantity-Unit			
FuelDensity			
FuelOnBoard			
FuelQtyTank1			
FuelQtyTank2			
FuelQtyTank3			
FuelTemperature			
GearLeverDown			

APPENDIX D
PARAMETER TABLE

Parameter Name	**Def**	**Meaning**	**Example**
Grossweight			
GroundSpeed			
GWCG			
GWCGAccuracyState			
ICAOAircraftAddrXPDR			
IndicatedAirspeed			
Jettison fault			
LandingCenterGear			
LandingGearOnGround			
LandingGearRetactionFault			
LandingGearStatusFailures			
LandingGearSystemFault			
LandingGearSystemInControl			
LandingGearDown			
Mach			
MagneticHeading			
MagneticVariation			
MinimumAirspeed			
NavDatabase-Active			
OOOI1InDiscrete			
OOOI2InDiscrete			
OOOI3InDiscrete			
OOOI4InDiscrete			
OOOI5InDiscrete			
OOOI6InDiscrete			
OOOI7InDiscrete			
OOOI8InDiscrete			
OOOIOnOffInDiscrate			
OutsideAirTemperature			
PackValve1CmdOpen			
PackValve2CmdOpen			
ParkingBrakeSet			
PitchAngle			
PresentPositionLatitude			
PresentPositionLatLon			
PresentPositionLongitude			
PressureAltitude			
RadioHeightC			
RadioHeightL			
RadioHeightR			
ReceivedDatalinkPFQ			
ReceivedDatalinkPFQOutOfRange			
ReceivedDatalinkZFCG			
ReceivedDatalinkZFCGOutOfRange			
ReceivedDatalinkZFW			
ReceivedDatalinkZFWOutOfRange			
Refuel Panel Status			

APPENDIX D
PARAMETER TABLE

Parameter Name	Def	Meaning	Example
Refuel Progress Parameter			
RegistrationNumber			
RollAngle			
RotatingBeaconOn			
SCI-ApplicationStatus			
SCI-Status			
SDUInstalled			
SelectedAirspeed			
SelectedAltitude			
SlideStatus			
StaticAirTemperature			
SubmittedPFQ			
SubmittedZFCG			
SubmittedZFW			
ThrottleLeverAngle1			
ThrottleLeverAngle2			
ThrottleLeverAngle3			
ThrottleLeverAngle4			
TimeToDestination			
TimeToTopOfClimb			
TimeToTopOfDescent			
TimeToWaypoint			
TotalAirTemperature			
TrackAngleTrueValue			
TrackAngle			
TrimTankFuelQuantity			
TrueAirspeed			
TrueHeading			
TTF			
TTFAccuracyState			
Waypoint sequenced			
Weight-GWReinitRequest			
Weight-GW-ZFWUnit			
Weight-ZFW(used for performance computation)			
Weight-ZFWReinitRequest			
WeightOnWheels			
WindDirection			
WindSpeed			
WingAntiIceSwOn			
ZeroFuelWeight			

Parameter Name	Def.	Meaning	Example
acMod	acType	Aircraft Equipment subtype according to ICAO 4444	A346
aircraftMassUnitDisplay	AA	Unit used for pilot display, e.g. FMS or ECAM/EICAS	KG

Parameter Name	Def.	Meaning	Example
applicationID	Char3Type	Identification of the airborne application	JRE
ATO		Actual Time Over a Waypoint	
commandType	boolean	1 = Confirm, 0 or any other value means cancel	1
departureTime	time	Estimate of the time the aircraft leaves its parking stand	
departureDate	date	Estimate of the date the aircraft leaves its parking stand	
ETA	time	Estimate of the time the aircraft touches down	
ETimeOff	time	Estimate of the time the aircraft takes off	
ETimeIn	time	Estimate of the time the aircraft reaches parking stand	
FOB	mass-kg	The current metric value of the aircraft's Fuel On Board parameter	98100
TTK	mass-kg	The current metric value of the aircraft's Trim Tank Fuel parameter	7500
currentPFQ	mass-kg	The current metric value of the aircraft's Preselected Fuel Quantity parameter. This value specifies the end-quantity of the next aircraft refueling process	230000
PFQ	mass-kg	Amount of fuel that is wished to be in the aircraft after refueling. After fueling is finished PFQ should equal FOB	230000
PFQEntryDate	date	date when PFQ was last changed	050124, 061224
currentPFQSource	A	source that changed PFQ	F (for FMS)
currentPFQTime	time	time when PFQ was last changed	2329
currentZFCG	center-of-gravity	The current value of the aircraft's Zero Fuel Center-of-Gravity parameter.	385
ZFCGEntryDate	date	date when ZFCG was last changed	050124
currentZFCGSource	A	source that changed ZFCG	'A' (for ACARS)
ZFCGEntryTime	time	time when ZFCG was last changed	2359
currentZFW	mass-kg	The current metric value of the aircraft's Zero Fuel Weight (Mass) parameter.	320500
ZFWEntryDate	date	date when ZFW was last changed	050125
currentZFWSource	A	source that changed ZFW	'F' (for FMS)
ZFWEntryTime	time	time when ZFW was last	000055

Parameter Name	Def.	Meaning	Example
		changed	
dep	airport		LFPG
dest	airport		KJFK
flightDate	String	Flight date (YYMMDD)	051231
FOB	mass-kg	The current metric value of the aircraft’s Fuel On Board parameter. Amount of fuel mass contained in aircraft fuel tanks	230100
FOBAccuracyState	boolean	1 = Normal, 0 = Degraded	0
GW	mass-kg	Total aircraft mass. GW includes taxi fuel and therefore GW is higher than TOW	56700
GWCG	center-of-gravity	The current value of the aircraft’s Gross Weight Center-of-Gravity parameter	397
GWCGAccuracyState	boolean	1 = Normal, 0 = Degraded	1
messageID	Char3Type		SUB
receivedDatalinkPFQ	mass-kg	Contains the metric Preselected Fuel Quantity value to which the aircraft’s refuel panel is to be set. This value specifies the end-quantity of the next aircraft refueling process	230000
receivedDatalinkPFQOutOfRange	mass-kg	same parameter, but received value out of range	
receivedDatalinkZFCG	center-of-gravity	Contains the Zero Fuel Weight Center-of-Gravity value. An A380 needs this value to distribute the fuel correctly	
receivedDatalinkZFCGOutOfRange	center-of-gravity	same parameter, but received value out of range	585
receivedDatalinkZFW	mass-kg	Contains the Zero Fuel Weight value. An A380 needs this value to distribute the fuel correctly.	320500
receivedDatalinkZFWOutOfRange	mass-kg	same parameter, but received value out of range	
serviceID	Char3Type		FPR
submittedPFQ	mass-kg	Contains the metric Preselected Fuel Quantity value to which the aircraft’s refuel panel is to be set. This value specifies the end-quantity of the next aircraft refueling process	230000
submittedZFCG	center-of-gravity	Contains the Zero Fuel Weight Center-of-Gravity value. An A380 needs this value to distribute the fuel	385

APPENDIX D
PARAMETER TABLE

Parameter Name	Def.	Meaning	Example
		correctly.	
submittedZFW	mass-kg	Contains the Zero Fuel Weight value. An A380 needs this value to distribute the fuel correctly.	320500
TimeOut	time	Actual time the aircraft leaves its parking stand	
TimeIn	time	Actual time the aircraft reaches parking stand	
TimeOff	time	Actual time the aircraft takes off	
TOCG	center-of-gravity	Take-off Center of Gravity	350
TTF	mass-kg	The current value of the aircraft’s Trim Tank Fuel quantity	4200
TTFAccuracyState	boolean	1 = Normal, 0 = Degraded	1
TTK	mass-kg	Amount of Fuel in Trim Tank. While aircraft fuel tanks are usually in the wings and the airframe between the wings, the trim tank is usually in the aft of the aircraft, e.g. the stabilizer. Therefore filling or emptying the trim tank strongly effects the aircraft's CG	4500
versionNb	Int	Version Number	1
ZFW	mass-kg	Zero Fuel Weight. Mass of a fully loaded aircraft, except for the fuel	
ZFWCG	center-of-gravity	Zero Fuel Weight Center of Gravity	390

Avionics Parameter Table

Note: Parameter definitions taken from Strawman of ARINC document 821.

Parameter Name	Def.	Meaning	Example
WhoAmI			
AirlineID	IATA 767, 1-999		
AircraftID	ICAO, 1-7 char		
AircraftType	ICAO, 4 char		
AircraftTailNumber	alpha, 1-7 char		
FlightNumber	alpha, 1-6 char		
WhereAmI			
Latitude	degrees +/-180		
Longitude	degrees +/-180		
BaroCorrectedAltitude	feet (0-131072)		

APPENDIX D
PARAMETER TABLE

Parameter Name	**Def.**	**Meaning**	**Example**
ComputedAirspeed	knots +/-1024		
TrueAirspeed	knots +/- 2048		
Mach	0 - 4.096		
TrueHeading	degrees +/-180		
StaticAirTemp	degreesC, +/-180		
VerticalSpeed	FPM, +/-32768		
Origin	alpha, 4 chars		
Destination	alpha, 4 chars		
DistanceToDestination	NM, 0-32768		
TimeToDestination	Minutes, 0-8192		
WindSpeed	knots, 0-256		
WindDirection	degree, +/-180		
TrueTrack	degree, +/-180		
OOOI	packed discrete	as per ARINC 758	
WhenAmI			
TimeUTC	alpha, HH:MM:SS.SS		
Date	DD:MM:YY		
WeightOnWheels	0 = ground		
FlightPhase	{Gate, Taxi, TakeOff, Climb, Cruise, Descent}		

COMMENTARY

All mass parameters in this specification have been named as weights, because the term weight is more commonly used than the term mass.

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ARINC SPECIFICATION 633-1

AOC AIR-GROUND DATA AND MESSAGE EXCHANGE FORMAT

Published: May 26, 2010

Prepared by the AEEC

Adopted by the AEEC Executive Committee: October 28, 2009

A. PURPOSE OF THIS DOCUMENT

This Supplement provides corrections or updates to the structure of the XML applications, particularly the electronic Flight Folder (eFF). Within the eFF, more changes were applicable to the headers and FlightPlan. The reader should be aware that the changes to the parameter nomenclature have rendered these schema versions not to be backward compatible with the original ARINC 633 schema.

B. ORGANIZATION OF THIS SUPPLEMENT

In this document **blue bold** text is used to indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC SPECIFICATION 633-1 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete listing of the changes to the document introduced by this Supplement. Each change is identified by the section number and the title as it will appear in the complete document. Where necessary, a brief description of the change is included.

1.1 Purpose of Document

A new (second) COMMENTARY was added at the end of the section.

1.3.2 “Electronic” Document

The web site address was updated to reflect the current location of the associated files.

The description of sequential schema naming was expanded, indicating that the filename for A633 Supplement 1 is ARINC633-1_AOC.zip.

3.0 ACARS MESSAGE SECURITY AND COMPRESSION

The introduction was expanded by the addition of an advisory in a box declaring that ARINC Specification 823 has precedence. Security guidance in this document (ARINC 633) is provided as general guidance.

3.1 Airline Operations Considerations

A new COMMENTARY was added after paragraph 2.

3.2 ACARS Message Security

New text was added to introduce and reference ARINC 823 (Parts 1 and 2). The definitions of Data Integrity and Message Authentication were tightened.

4.2.2 Parameter Type Definitions

A new parameter type, waterquantityType, was added to Table 4.2.2-2: Specific ACARS Parameter Type Definition Table.

4.4.4 M633Headers

A new section and its sub-sections (4.4.4.1 – 4.4.4.2) were added.

5.0 Common Elements

Fully-documented common elements and attributes were added.

5.2.1.2 General ERror INDication XML Format

Fully-documented common elements and attributes were added.

5.4 Operational Flight Plan

FAR 121.639 and FAR 91.167 are cited as requirements documents that drive the definition of flight plan applications. Fully-documented common elements and attributes were added.

5.16 Airport Information

Fully-documented common elements and attributes were added.

5.17 Security Information

This section was deleted by Supplement 1.

5.18 Airline Defined

This section was deleted by Supplement 1.

5.19 Upper Air Data

Fully-documented common elements and attributes were added.

5.20 Airspace Data

Fully-documented common elements and attributes were added.

6.2.2.6 XML Format

Fully-documented common elements and attributes were added.

6.2.3.4 XML Format

Fully-documented common elements and attributes were added.

6.2.4.4 XML Format

Fully-documented common elements and attributes were added.

6.2.5.4 XML Format

Fully-documented common elements and attributes were added.

6.2.6.4 XML Format

Fully-documented common elements and attributes were added.

6.2.7.4 XML Format

Fully-documented common elements and attributes were added.

6.3.1.5 XML Format

Fully-documented common elements and attributes were added.

6.3.2.4 XML Format

Fully-documented common elements and attributes were added.

6.3.3.3 XML Format

Fully-documented common elements and attributes were added.

6.3.4.3 XML Format

Fully-documented common elements and attributes were added.

9.1.2 XML Format

Fully-documented common elements and attributes were added.

9.2.1.1.2 XML format

Fully-documented common elements and attributes were added.

9.2.2.1.2 XML format

Fully-documented common elements and attributes were added.

9.2.3.1.2 XML format

Fully-documented common elements and attributes were added.

9.4.1.2 XML format

Fully-documented common elements and attributes were added.

10.2.5 Topic concept

Fully-documented common elements and attributes were added.

10.2.6 Subfolders Properties

Fully-documented common elements and attributes were added.

10.2.7 Subfolder Associations

Fully-documented common elements and attributes were added.

10.2.8 Documents Properties

Fully-documented common elements and attributes were added.

10.2.9 Document Associations

Fully-documented common elements and attributes were added.

10.2.11 eFF Schema

Fully-documented common elements and attributes were added.

10.4.1.4 XML Format

Fully-documented common elements and attributes were added.

10.4.2.3 XML Format

Fully-documented common elements and attributes were added.

10.4.3.3 XML Format

Fully-documented common elements and attributes were added.

11.1.5 DOR XML Schema

Fully-documented common elements and attributes were added.

11.2.4 XML Schema

Fully-documented common elements and attributes were added.

11.3.3 XML Schema

Fully-documented common elements and attributes were added.

ARINC Standard – Errata Report

1. Document Title

ARINC Specification 633-1: AOC *Air-Ground Data and Message Exchange Format*
Published: May 21, 2010

2. Reference

Page Number: ______ Section Number: ______________ Date of Submission: ______________

3. Error

(Reproduce the material in error, as it appears in the standard.)

4. Recommended Correction

(Reproduce the correction as it would appear in the corrected version of the material.)

5. Reason for Correction *(Optional)*

(State why the correction is necessary.)

6. Submitter (Optional)

(Name, organization, contact information, e.g., phone, email address.)

Please return comments to fax +1 410-266-2047 or standards@arinc.com

Note: Items 2-5 may be repeated for additional errata. All recommendations will be evaluated by the staff. Any substantive changes will require submission to the relevant subcommittee for incorporation into a subsequent Supplement.

[To be completed by IA Staff]

Errata Report Identifier: ______________ **Engineer Assigned:** ________________________

Review Status: ____

ARINC IA Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM #: _____

(Insert name of proposed project.)

1.1 Name of Originator and/or Organization

(Insert name of individual and their organization that initiated the APIM)

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

(Identify an existing or new AEEC group.)

2.2 Support for the activity (as verified)

Airlines: (Identify each company by name.)

Airframe Manufacturers:

Suppliers:

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines:

Airframe Manufacturers:

Suppliers:

Others:

2.4 Recommended Coordination with other groups

(List other AEEC subcommittees or other groups.)

3.0 Project Scope (why and when standard is needed)

3.1 Description

(Insert description of the scope of the project.)

3.2 Planned usage of the envisioned specification

Use the following symbol to check yes or no below. ☒

New aircraft developments planned to use this specification yes ☐ no ☐

Airbus: (aircraft & date)
Boeing: (aircraft & date)
Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☐ no ☐

Specify: (aircraft & date)

Needed for airframe manufacturer or airline project yes ☐ no ☐

Specify: (aircraft & date)

Mandate/regulatory requirement yes ☐ no ☐

Program and date: (program & date)

Is the activity defining/changing an infrastructure standard? yes ☐ no ☐

Specify (e.g., ARINC 429)

When is the ARINC standard required?
______(month/year)__________

What is driving this date? _______(state reason)_____________________

Are 18 months (min) available for standardization work? yes ☐ no ☐

If NO please specify solution: _________________

Are Patent(s) involved? yes ☐

If YES please describe, identify patent holder: _________________

3.3 Issues to be worked

(Describe the major issues to be addressed.)

4.0 Benefits

4.1 Basic benefits

Operational enhancements yes ☐ no ☐

For equipment standards:

a. Is this a hardware characteristic? yes ☐ no ☐

b. Is this a software characteristic? yes ☐ no ☐

c. Interchangeable interface definition? yes ☐ no ☐

d. Interchangeable function definition? yes ☐ no ☐

If not fully interchangeable, please explain: _________________

Is this a software interface and protocol standard? yes ☐ no ☐

Specify: _________________

Product offered by more than one supplier yes ☐ no ☐

Identify: (company name)

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

(Describe any benefits unique to the airline point of view.)

4.2.2 Benefits for Airframe Manufacturers

(Describe any benefits unique to the airframe manufacturer’s point of view.)

4.2.3 Benefits for Avionics Equipment Suppliers

(Describe any benefit unique to the equipment supplier’s point of view.)

5.0 Documents to be Produced and Date of Expected Result

One/Two Project Papers are expected to be completed per the table below.

5.1 Meetings and Expected Document Completion

The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Document a	*# of mtgs*	*# of mtg days*	*mm/yyyy*	*mm/yyyy*
	*# of mtgs **	*# of mtg days **		
Document b	*# of mtgs*	*# of mtg days*	*mm/yyyy*	*mm/yyyy*
	*# of mtgs **	*# of mtg days **		

* Indicate unsupported meetings and meeting days, i.e., technical working group or other ad hoc meetings that do not requiring IA staff support.

6.0 Comments

(Insert any other information deemed useful to the committee for managing this work.)

6.1 Expiration Date for the APIM

April/October 20XX

For IA staff use only

Date Received: Jan 15, 2010 IA staff : ____________

Potential impact: ______

*(**A**. Safety **B**. Regulatory **C**. New aircraft/system **D**. Other)*

Resolution: _______

Authorized, Deferred, Withdrawn, More Detail Needed, Rejected)

Assigned to SC/WG:________________

12.0 Potable Water System

New section added.