



ATNP/WG3/ IP 17-29

22 September 1999

AERONAUTICAL TELECOMMUNICATION NETWORK PANEL

WORKING GROUP 3 (APPLICATIONS AND UPPER LAYERS)

Gran Canaria, Spain, 28 September – 1 October 1999

Agenda Item 7: PICS and OICS

PICS/OICS Guidance Material

Prepared by: Mike Harcourt

SUMMARY

This paper provides the guidance material for the PICS/OICS Proforma tables.

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1. INTRODUCTION

1.1 Purpose and Scope

This document provides the guidance material for all aspects of PICS/OICS. It provides a detailed description of the format and layout of PICS/OICS proformas, guidance for producing new PICS/OICS proformas and operational profiles, and guidance for completing a proforma.

Its intended readership is anyone who needs an understanding of the PICS/OICS proformas; this includes the writers of new PICS/OICS proformas, the writers of operational profiles and systems implementers who need to complete the proformas.

A number of PICS/OICS proformas for ATN applications are being developed by ATNP WG3/SG2:

- ADS Airborne, Ground and Report Forwarding AEs PICS/OICS Proformas
- CM Airborne and Ground AEs PICS/OICS Proformas
- CPDLC Airborne and Ground AEs PICS/OICS Proformas
- FIS Airborne and Ground AEs PICS/OICS Proformas

1.2 Document Structure

The remainder of this document is divided into sections which cover the following topics:

Section 2: An introduction to PICS/OICS explaining how they have evolved and their relationship to base standards.

Section 3: Describes the proforma format and classification scheme.

Section 4: Gives guidance to the writers of Operational Profiles.

Section 5: Gives guidance on completing a proforma.

Section 6: Contains the application specific guidance material.

1.3 References

- [1] ICAO Manual of Air Traffic Services (ATS) Data Link Applications
- [2] ICAO Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN). Doc 9705-AN/956 (First Edition – 1998)
- [3] ISO 9646-7 OSI Conformance testing methodology and framework – Implementation Conformance Statements.

2. PICS/OICS OVERVIEW

2.1 History and Development of PICS/OICS

The need to have a mechanism for conformance testing and capturing the conformance of implementations of international data communications standards was first recognised and developed by the International Standards Organisation (ISO) during the 1970s and 1980s. This resulted in a series of ISO standards, ISO 9646 OSI Conformance Testing Methodology and Framework. One of this series "Implementation Conformance Statements" [3] was used as the basis for the development of the ATN PICS/OICS.

The ATN context requires two levels of conformance to be addressed:

- Conformance at the protocol and encoding level. This corresponds directly to the ISO protocol conformance statements and uses the same name, Protocol Implementation Conformance Statement or PICS.
- The second is conformance at an operational level, hence Operational Implementation Conformance Statement or OICS.

A conformance statement sets out in tabular form a precise analysis of the various services and protocol elements as defined in base standards, in the ATN context the SARPs are the base standards, reference [1]. A completed conformance statement provides a structured basis determining an implementations conformance to a standard or profile, and can provide the basis for comparison of implementations in order to determine whether there are any interoperability issues.

The proformas have been developed to meet not only the need for conformance to the SARPs in the "ATN Profile" but also to allow differing requirements for operation in different areas to be classified in an "Operational Profile".

The ATN profile identifies and classifies:

- the services which must be implemented for a minimum level of interoperability;
- the selection of options within those services for added functionality;
- the protocol elements which must be implemented for a minimum level of interoperability;
- the selection of optional protocol elements which must be implemented for optional services;
- the restrictions and constraints that apply to the use of services and protocol elements

An Operational Profile not only takes into account the ATN profile but also adds specific interpretations and constraints which are applicable to an implementation for operation within a specified area.

2.2 PICS/OICS Relationship to Standards and Requirements

The PICS/OICS proformas are derived through a series of requirements, specifications and interactions which are modelled in Figure 2-1; specifications are shown in boxes and the interactions are shown by arrows. The dotted lines around the profile specification boxes indicates that the specification may only exist as part of the proforma. The figure shows the derivation of both the ATN Profile and an Operational Profile and indicates the body responsible for the specification or proforma.

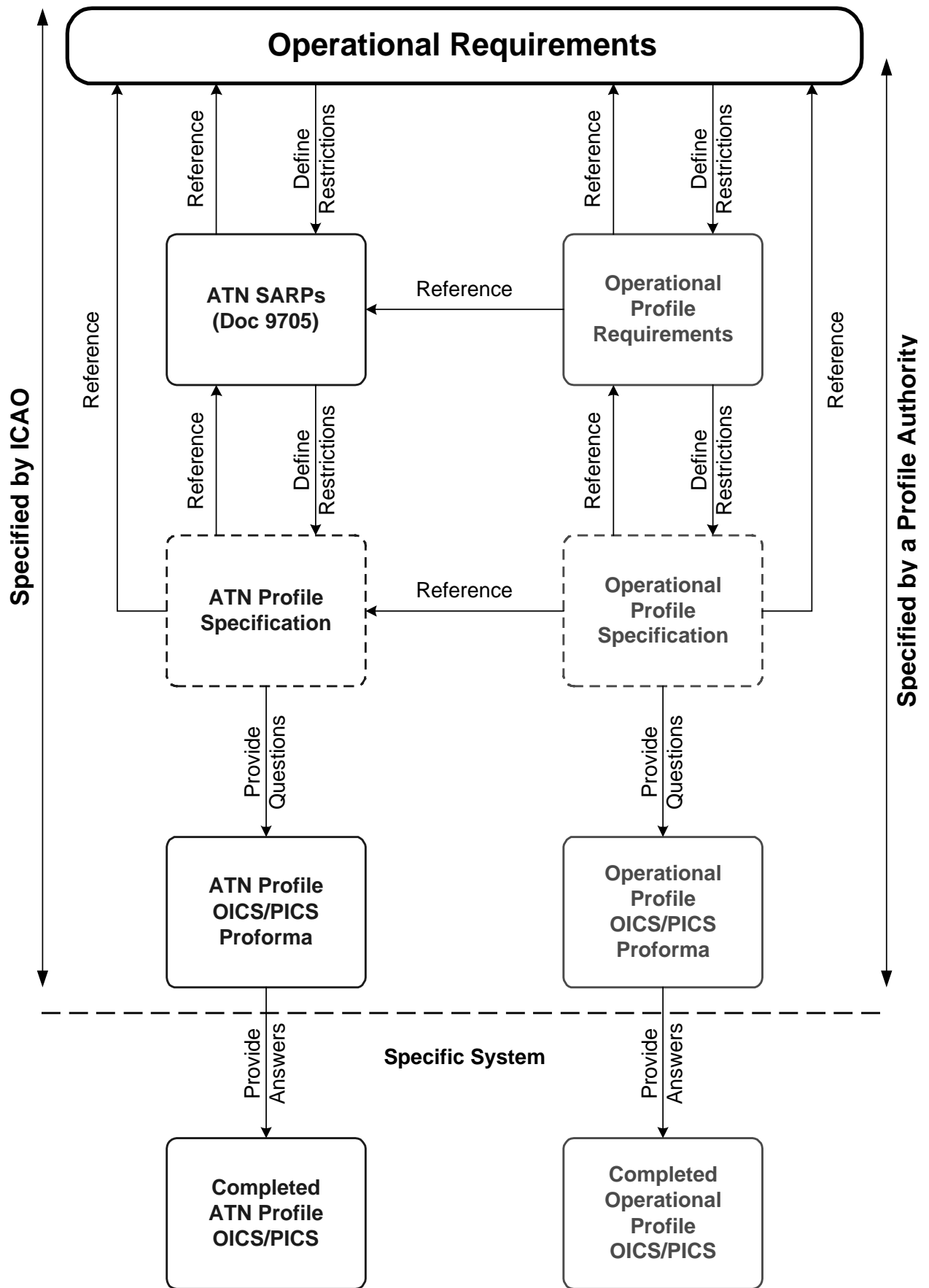


Figure 2-1: Relationships between Requirements, Specifications, Proformas and OICS/PICS

2.3 PICS/OICS Relationship

To illustrate the relationship between an OICS and a PICS, a model of a typical ATN application is shown in Figure 2-2 . The top level is at the operational level which provides or uses the application information. This may include an HMI for interaction with a controller or aircrew. The OICS relates to this level and is associated with the service description in the SARPs. The bottom level is at the communication level which handles the communications, PDU encoding and decoding and state transitions. The PICS relates to this level and is associated with the ASN.1 definition in the SARPs.

The middle level is the automation level which handles the service primitives of the communications level, and makes handling decisions based on built-in "rules". It also passes information to and from the operational level as appropriate. Its boundaries with the operational and communications layers are show as wavy lines to indicate it is a fuzzy layer which may sometimes be treated as null.

The OICS captures those elements which are visible at the operational layer and the PICS capture those elements which are visible at the communications layer.

In the POIC/OICS tables the service elements are shown in the OICS columns and the protocol elements are shown in the PICS columns. By showing both along side each other the 1:1 correspondence between service and protocol is maintained.

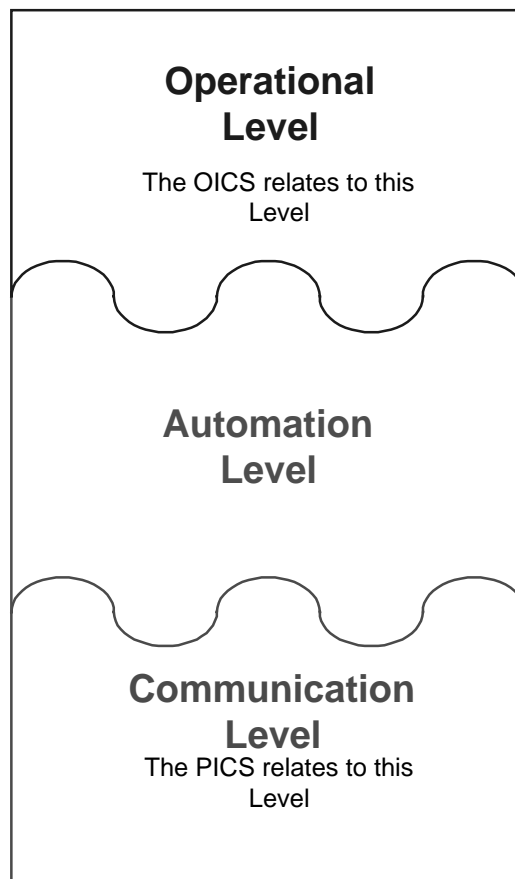


Figure 2-2: ATN Application Model

3. PICS/OICS PROFORMAS

3.1 General Format

3.1.1 File Structure

The proformas consist of a number of tables some of which are common to all ATN applications and some of which are specific to an application. The common tables are discussed in Section 3.1.2 below. The tables are implemented as spreadsheets with each table held in a separate spreadsheet¹.

For Air/Ground applications there are two proformas one for the airborne system and one for the ground system. For Ground/Ground applications there are also two proformas one for the initiating system and one for the receiving system. Each proforma is held in a separate file.

Within each file the tables are grouped together in sections, with each table and spreadsheet/worksheet identified by section identifier and table number within section. The sections and identifiers are:

- I** Information Section. Contains the reference information about profiles and implementations.
- S** Configurations and Services Section. Contains the proforma for operational configurations, protocol options, ASE abstract services and timers
- M** Messages Section. Contains the proforma for the top level message elements.
- P** Parameters section. Contains the proforma of all the remaining protocol elements.

Examples of section and table identification are shown in the rest of this section.

3.1.2 Information Section

The tables described below are common to all proformas; their main purpose is to capture reference information about a profiles and implementations.

3.1.2.1 PICS/OICS Identification (Table I-1)

The table is divided into three areas. The first two contain the dates and reference or serial numbers for a completed PICS and/or OICS which are completed by implementers. The third section contains details of the profile to which the PICS/OICS applies. This section is completed by the profile authority as part of the process of creating a profile specific proforma.

An example of a completed table including entries in all three sections is shown in Figure 3-1.

Ref No	PICS Identification	Implementation PICS
1	Date of Statement	1 April 1999
2	PICS Serial Number	P/99/12345/001
	OICS Identification	Implementation OICS
3	Date of Statement	1 April 1999
4	OICS Serial Number	O/99/12345/001

¹ The proformas have been developed using Microsoft Excel, each PICS/OICS Proforma is a "Workbook" containing "Worksheets" for each table.

	Profile Identification	Profile Details
5	Profile Name	<i>European ATN Trails</i>
6	Version	<i>1.0</i>
7	Profile Authority Name	<i>ATC Europe</i>
8	Profile Applicability (Areas, Countries, Organisations etc where the profile can be applied)	<i>Western Europe</i>
9	Date of effect	<i>1 January 1999</i>
10	Other Information	<i>The data contained in this table and the other examples in this section is shown in green and italics to indicate that it is not real data but has been invented as an example for this document.</i>

Figure 3-1: PICS/OICS Identification Example

3.1.2.2 Supplier and Implementation Identification (Table I-2)

This table contains the name and contact details of a supplier and the details of the implementation to which a completed PICS/OICS applies. An example is shown in

Ref No	Supplier Information	Supplier Details
11	Organization Name	<i>ATN Implementers Ltd</i>
12	Contact Name(s)	<i>J Smith</i>
13	Address	<i>ATNI House Airport Road</i>
14	Telephone Number	<i>+44 1234 567890</i>
15	Telex Number	<i>-</i>
16	Fax Number	<i>+44 1234 567910</i>
17	E-mail Address	<i>jsmith@atni.co.uk</i>
18	Other Information	
	Implementation Information	Implementation Details
19	Implementation Name	
20	Implementation Version	
21	Hardware Name	
22	Hardware Version	
23	Operating System Name	
24	Operating System Version	
25	Special Configuration	
26	Other Information	

3.1.2.3 Application Protocol Identification (Table I-3)

This table lists the base standards, protocol version, amendments and defect reports which apply to the classification of the ATN and/or profile requirements for a specific application; together with the information for an implementation in a completed proforma.

3.1.3 Configurations and Services Section

3.1.3.1 Application Protocol Options (Table S-1)

This table details the protocol options and associated predicates for a specific application.

3.1.3.2 Application Conformant Configurations (Table S-2)

This table details the configurations for a specific application

3.1.3.3 Supported Service Primitives (Table S-3)

This table details the support for the primitives of an application's abstract service.

3.1.3.4 Service Tables

The remaining tables in this section detail each abstract service. Conformance for the support of the parameters of an abstract service is phrased in terms of the capability of an implementation to support the parameters since the SARPs do not specify or constrain how an abstract service is implemented. Where the values of a parameter are specified using an ASN.1 type definition the ASN.1 Description column of the table contains a reference to the table containing the type definition.

3.1.4 Messages Section

The tables in the section detail the PDUs and top level messages exchanged by the application peers.

3.1.5 Parameters Section

The tables in the section detail the protocol elements exchanged in PDUs or messages.

3.1.6 Column Headings

The layout of the column headings used in the protocol tables is shown in Figure 3-2. The table is divided into two sections one covering the operational and one covering the protocol aspects of the conformance statements.

Column 1: **Source:** Contains a reference to the Chapter in the SARPs [2] from which the content of the table has been derived.

Ref No. Contains the reference number which is a unique identifier for each information field, service or protocol element in the PICS/OICS for an application. The reference number format is an integer with an optional decimal part for any components of the element. For example the entry for Latitude Direction used in CPDLC has a table entry of:

844	Latitude Direction
844.01	North
844.02	South

Column 2: **Operational Elements.** Contains the name of the item from an operational aspect. If the item contains a value, the units, permitted range of values and resolution as specified for the ATN Profile are also shown. For example the value of minutes of latitude or longitude used in CPDLC are expressed in 100ths of a minute using the MinutesLatLon protocol element; the corresponding entry in the table is:

MinutesLatLon (0-59.99)/0.01

Column 3: **ATN Profile.** Contains the required support of the item by an implementation for conformance to the ATN Profile.

Column 4: **Profile Status.** Contains the required support of the item by an implementation for conformance to a Profile. If the proforma is for a profile the details of the profile are given in the PICS/OICS identification table, see Section 3.1.2.1.

Column 5: **Profile Cons.** Contains the constraints which apply to a Profile where they differ from those of the ATN Profile. These then become the constraints against which implementers complete the conformance tables.

Column 6: **Implementation Status.** Contains the support for the item by an implementation in a completed proforma.

Column 7: **Implementation Cons.** Contains the constraints which apply to an implementation where they differ from those of either the ATN Profile or Operational Profile.

Column 8: **ASN.1 Protocol Elements.** Contains the ASN.1 protocol elements. A type name is always followed by the ASN.1 type and if an element is an ASN.1 basic type this is followed by any constrains, for example the entry for the ASD Intermediate Intent type is:

IntermediateIntent
SEQUENCE SIZE(0..7) OF SEQUENCE
INTEGER (1..8000)
DegreesDirection
Level
ProjectionTime

Column 9: **Encoding: ATN Status.** Contains the required support for the element when encoding into ASN.1 for the ATN Profile.

Column 10: **Encoding: Profile Status.** Contains the required support for the element when encoding into ASN.1 for the Operational Profile. If the ATN Profile has a conditional status in the previous column, the Operational Profile column should show how this condition is resolved for the Profile.

Column 11: **Encoding: IMP Status.** Contains the support by an implementation when encoding the element in a completed proforma.

Column 12: **Decode/Understand: ATN Status.** Contains the required support for the element when decoding from ASN.1 for the ATN Profile.

Column 13: **Decode/Understand: Profile Status.** Contains the required support for the element when decoding from ASN.1 for the Operational Profile.

Column 14: **Decode/Understand: IMP Status.** Contains the support by an implementation when decoding the element in a completed proforma

Column 15: **Notes.** The column may be used to add additional notes about the item. The note is identified by a letter in the column; all the notes are found after the end of the table.

3.1.7 Notes and Conditional Status

Any Notes or Conditional Status descriptions are listed after the end of the table. A conditional status is written as **C.n** or **P.n**, where **n** is a number used to identify the condition within a table. The **C** signifies an SARPs derived conditional and **P** signifies an operational profile derived conditional. A conditional statement is written in the form of an "if" statement which resolves the element status according to whether the condition is true or false:

IF (condition) **THEN** (status if condition is true) **ELSE** (status if condition is false)

Complex conditions may include brackets () and the Boolean **AND** or **OR** operators.

An example of a conditional description from ADS is:

C.1 If (Periodic (G-PC-FU) or Event (G-EC-FU) contract supported) then **M** else —

3.1.8 Formatting and Colours

In the tables item names and identifiers are show in **bold** type; the elements that make up a item are shown in normal type. The names of ASN.1 enumerated types are shown in *italic* type.

Colours are used as follows:

- | | |
|------------|---|
| Blue | Column 1 reference numbers |
| Red | Profile classification (columns 4, 5, 10, 13) |
| Light grey | Element is not applicable in this context. |

Protocol Table Headings

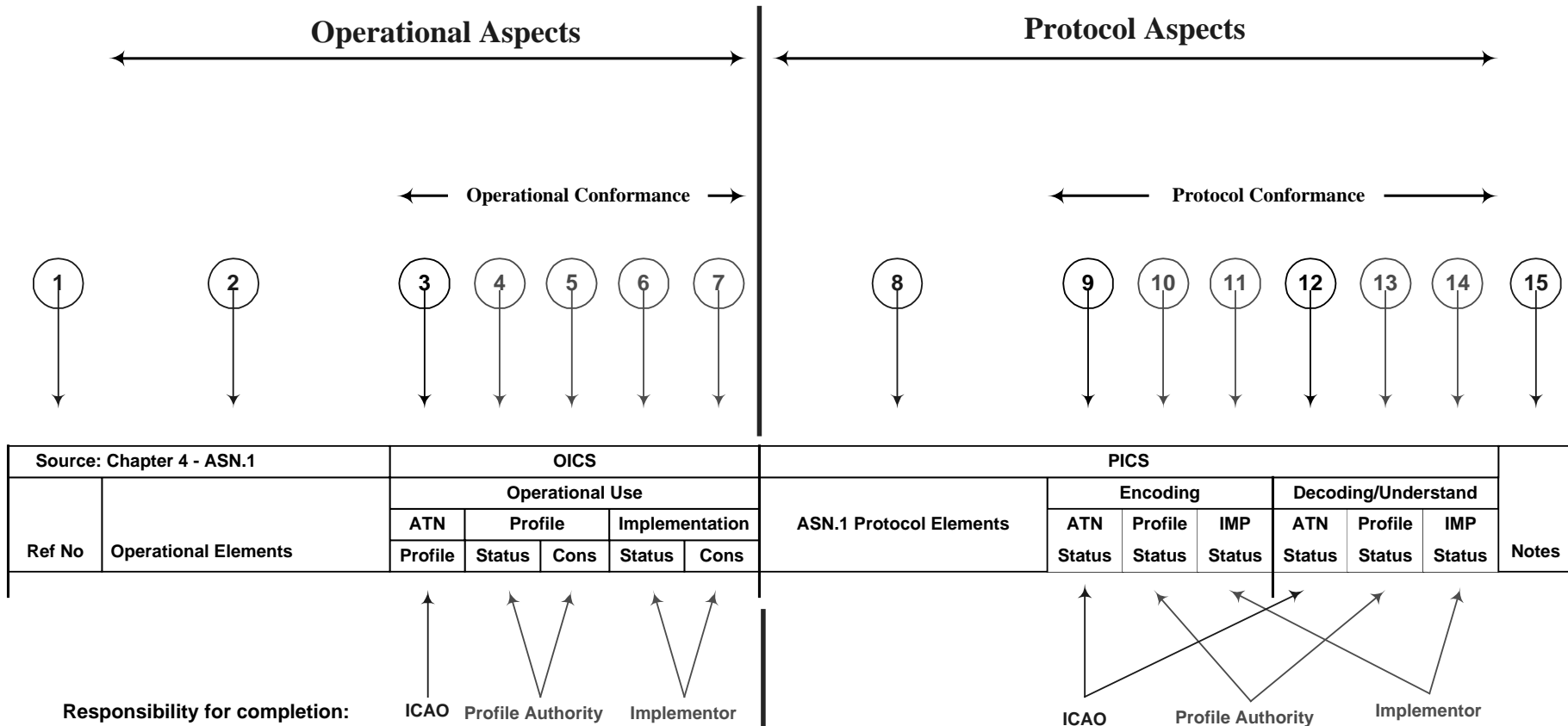


Figure 3-2: Column Headings

3.2 Classification Scheme

3.2.1 Overview

The status of each service and protocol element or item is given a classification based on the following general rules:

- An item is **Mandatory** if in at least one circumstance it has to be used.
- An item is **Optional** if there are no circumstances in which it must be used.
- An item is **Conditional** if it has to be used when a given circumstance or set of circumstances are true. A conditional status applies relative to where the item is within the hierarchy of the service or protocol definition.
- If a condition only resolves to **Optional** or **Not Used**, the item is not considered to be **Conditional** but is made **Optional** or **Not Used**. Only if there is at least one circumstance in which an item must be used is it classified as conditional.

The use of the rules is shown in the following example of "Fix Name" taken from CPDLC Route Clearance.

(Note: Only significant columns are shown in the example)

Source: Chapter 4 – ASN.1		OICS	PICS		
Ref No	Operational Elements	ATN Profile	ASN.1 Protocol Elements	Encode	Decode
				ATN Status	ATN Status
1419	Fix	M	IA5String SIZE(1..)	C.4	M
1420	Fix Name	O	FixName ::= SEQUENCE	C.4	M
1420.01	Fix	M	[0] Fix	M	M
1420.02	Latitude and Longitude	O	[1] LatitudeLongitude	O	M
1430	Latitude and Longitude	O	LatitudeLongitude ::= SEQUENCE	C.4	M
1430.1	Latitude	M	[0] Latitude	M	M
1430.2	Longitude	M	[1] Longitude	M	M

Operationally (OICS) Fix Name is optional. In the PICS it is conditional for encoding; the condition being if it is supported for messages that are sent then it must be possible to encode the element. For decode it is mandatory because it must always be possible to decode and understand the element even if it is not supported operationally.

Fix (1419) is mandatory because it is only referenced by Fix Name in which it is mandatory. Latitude and Longitude is optional because it is optional in Fix Name. In the PICS the same statuses apply to both Fix and Latitude and Longitude for encoding for the same reasons.

3.2.2 OICS Classification

3.2.2.1 ATN Profile/Operational Profile Status

The operational status of an item is indicated in either the ATN Profile or Profile Status columns 3 and 4 in **Figure 3-2**

- M** Mandatory the capability is required to be implemented in accordance with the operational requirements of either the SARPs or the Operational Profile.

- O** Optional the capability may be implemented, and if it is implemented it is required to conform to the operational requirements of either the SARPs or Operational Profile.
- C or P** Conditional the requirement on the capability depends on the selection of other optional or conditional items. **C** is used for conditions specified by the SARPs and **P** is used for conditions specified by an operational profile.
- X** Prohibited there is a requirement **NOT** to use this capability in this context.
- Not applicable in the given context either the SARPs or Operational Profile make it impossible to use this capability.
- I** Out of scope the capability is outside of the scope of the given context.

3.2.3 PICS Classification

3.2.3.1 ATN/Profile Status

The status of an item is indicated in the ATN and Profile Status columns 9, 10, 12 and 13 in **Figure 3-2**.

- M** Mandatory the capability is required to be implemented in accordance with the technical requirements of either the SARPs or the Operational Profile. For encoding this means the element must be encoded according to the ASN.1 definition and encoding rules. For decoding this means decoding the element according to the ASN.1 definition and encoding rules, and being able to understand² the element once it has been decoded.
- O** Optional the capability may be implemented, and if it is implemented it is required to conform to the technical requirements of either the SARPs or Operational Profile.
- C or P** Conditional the requirement on the capability depends on the selection of other optional or conditional items. **C** is used for conditions specified by the SARPs and **P** is used for conditions specified by an operational profile.
- X** Prohibited there is a requirement **NOT** to use this capability in this context.
- Not applicable in the given context either the SARPs or Operational Profile make it impossible to use this capability.
- I** Out of scope the capability is outside of the scope of the given context.

² Where an element is not supported operationally and it is received unexpectedly this means an implementation must at least have the capability to recognise it and treat it as an exception.

4. GUIDANCE FOR DEFINING OPERATIONAL PROFILES

Operational Profiles provide a mechanism for specifying the requirements that are needed for a operating within a specific airspace. Typically a profile is used to define the minimum subset required for interoperability within the airspace.

For services and elements that are classified as either optional or conditional, it should be possible to resolve many of these in defining a profile.

If an element is not required to be supported by a profile, consideration should be given as to whether it is classified as **X** (Prohibited) or **I** (Out of scope). It is recommended that out of scope is used unless it is absolutely necessary to prohibit the use³.

5. GUIDANCE FOR COMPLETING A PROFORMA

The supplier of an implementation completes a proforma by filling in the Implementation Status and Cons columns 6 and 7 in **Figure 3-2** for the Operational conformance and by filling in the IMP Status columns 11 and 14 in **Figure 3-2** for the Protocol conformance.

Y or y	The implementation supports the item
N or n	The implementation does not support the item or only implements some aspects of the item. In the latter case the supplier should indicate in a note the degree of support for the item.
—	The item is not applicable in this context

Where a supplier indicates non-support and the reason for non-support includes a constraint which differs from the ATN or Operational Profile, the Implementation Cons column 7 in **Figure 3-2** is used to specify the actual constrains of the implementation.

6. APPLICATION SPECIFIC GUIDANCE

6.1 Introduction

This section contains guidance material for the PICS/OICS for each of the ATN applications. The information is in addition to the general guidance contained in Sections 1 to 5 of this document.

6.2 Guidance for ADS

6.2.1 Introduction

The ADS application uses the standard set of proforma tables.

6.2.2 Proforma Tables

The same list of tables are used for both the airborne and ground ADS implementations:

Information Section

- Table I-1: PICS/OICS Identification
- Table I-2: Supplier and Implementation Identification
- Table I-3: ADS Protocol Identification

Configuration and Services Section

- Table S-1: ADS Protocol Options

³ Prohibiting the use of an element has implications for testing.

Table S-2: ADS Operational Configurations
Table S-3: Supported ADS Service Primitives - Airborne or Ground ASE
Table S-4: ADS Demand Contract Service
Table S-5: ADS Event Contract Service
Table S-6: ADS Periodic Contract Service
Table S-7: ADS Report Service
Table S-8: ADS Cancel Service
Table S-8: ADS Cancel All Contracts Service
Table S-10: ADS Emergency Report Service
Table S-11: ADS Modify Emergency Contract Service
Table S-12: ADS User Abort Service
Table S-13: ADS Provider Abort Service
Table S-14: ADS Timers

Messages Section

Table M-1: ADS Messages (top level)
Table M-2: ADS Message Components

Parameters Section

Table P-1: ADS Reports And Their Components
Table P-2: Components of ADS Contracts
Table P-3: Miscellaneous Components
Table P-4: Common ADS Components

6.3 Guidance for CM

6.3.1 Introduction

The CM application uses the standard set of proforma tables.

6.3.2 Proforma Tables

The same list of tables are used for both the airborne and ground CM implementations:

Information Section

Table I-1: PICS/OICS Identification
Table I-2: Supplier and Implementation Identification
Table I-3: CM Protocol Identification

Configuration and Services Section

Table S-1: CM Protocol Options
Table S-2: CM-ASE Conformant Configurations
Table S-3: Supported CM Service Primitives – Airborne or Ground ASE
Table S-4: CM Logon Service
Table S-5: CM Update Service
Table S-6: CM Contact Service
Table S-7: CM End Service
Table S-8: CM Forward Service (Initiator)
Table S-9: CM Forward Service (Responder)
Table S-10: CM Technical Timers

Messages Section

Table M-1: CM Messages (top level)

Parameters Section

Table P-1: CM Message Components

6.4 Guidance for CPDLC

6.4.1 Introduction

The CPDLC application differs from the other ATN applications in several important ways that affect how the PICS/OICS proforma is defined. In CPDLC it is the content of the uplink and downlink message that determine the majority of options and choices. The same data types are used different messages but the options used within the types may also be different depending on the message context. In addition some data types are used several times within the same message, again with the possibility of selecting different options.

For these reasons the CPDLC PICS/OICS sections for tables and parameters are structured to allow conformance to be specified based on groups of messages or a single message. This enables the PICS/OICS to be completed by either a profile writer or implementers starting from a list of the supported uplink and downlink messages.

6.4.2 Proforma Tables

The Information and, Configuration and Services sections are standard; the Messages and Parameters sections contain the non-standard tables which are specific to CPDLC. In the list of tables given below those shown in *italics* are the CPDLC specific tables. The Parameters section tables include a list of the CPDLC message level ASN.1 types included in each table.

Information Section

- Table I-1: PICS/OICS Identification
- Table I-2: Supplier and Implementation Identification
- Table I-3: CPDLC Protocol Identification

Configuration and Services Section

- Table S-1: CPDLC Protocol Options
- Table S-2: CPDLC-ASE Conformance Configurations
- Table S-3: Supported CPDLC Service Primitives - Airborne ASE
- Table S-4: Air Initiated CPDLC Start Service Parameters
- Table S-5: Ground Initiated CPDLC Start Service Parameters
- Table S-6: CPDLC Message Service Parameters
- Table S-7: CPDLC End Service Parameters
- Table S-8 : DSC Start Service Parameters
- Table S-9: DSC End Service Parameters
- Table S-10: Forward (Initiator) Service Parameters
- Table S-11: Forward (Responder) Service Parameters
- Table S-12: CPDLC User Abort Service Parameters
- Table S-13: CPDLC Provider Abort Service Parameters
- Table S-14: CPDLC Timers

Messages Section

- Table M-1: Ground Generated Messages
- Table M-2: Aircraft Generated Messages
- Table M-3: Uplink and Downlink Messages Common Elements
- Table M-4: Uplink Message Elements*
- Table M-5: Uplink Messages Permitted Operational Responses*
- Table M-6: Downlink Message Elements*
- Table M-7: Downlink Messages Permitted Operational Responses*
- Table M-8: Message Parameter Elements
- Table M-9: Ground Forward Initiator
- Table M-10: Ground Forward Responder

Parameters Section

Table P-1: Airport Parameter
Table P-2: Altimeter Parameter
Table P-3: ATIS Code Parameter
Table P-4: Clearance Type Parameter
Table P-5: Code Parameter
Table P-6: Degrees Parameter
Table P-7: Departure Clearance Parameter
Table P-8: Direction Parameter
Table P-9: Distance Parameter
Table P-10: Distance Specified Direction Parameter
Table P-11: Error Information Parameter
Table P-12: Facility Designation Parameter
Table P-13: Fix Name Parameter
Table P-14: FreeText Parameter
Table P-15: Frequency Parameter
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Table P-17: Latitude Degrees Parameter
Table P-18: Latitude Direction Parameter
Table P-19: Latitude Longitude Parameter
Table P-20: Leg Type Parameter
Table P-21: Level Parameter
Table P-22: Longitude Degrees Parameter
Table P-23: Longitude Direction Parameter
Table P-24: Navaid Parameter
Table P-25: Persons on Board Parameter
Table P-26: Place Bearing Parameter
Table P-27: Place Bearing Distance Parameter
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Table P-30: Position Report Parameter
Table P-31: Procedure Name Parameters
Table P-32: Published Identifier Parameter
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Table P-36: Route Information Parameter
Table P-37: Runway Parameter
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Table P-39: Speed Parameter
Table P-40: Speed Ground Parameter
Table P-41: Speed Type Parameter
Table P-42: Time Parameter
Table P-43: Time Time Parameter
Table P-44: Time Tolerance Parameter
Table P-45: To From Parameter
Table P-46: Traffic Type Parameter
Table P-47: Unit Name Parameter
Table P-48: Version Number Parameter
Table P-49: Vertical Rate Parameter

6.4.2.1 Table M-4: Uplink Message Elements

The table has standard column headings as shown in **Figure 3-2** but in the Notes column for those messages that have parameters there is a reference to the Parameter table containing the message parameters.

6.4.2.2 Table M-5: Uplink Messages Permitted Operational Responses

The table shows all of the messages that are permitted in response to those uplink messages which require a response, i.e. those having a “Y” Response Attribute.

6.4.2.3 Table M-6: Downlink Message Elements

The table has standard column headings as shown in **Figure 3-2** but in the Notes column for those messages that have parameters there is a reference to the Parameter table containing the message parameters.

6.4.2.4 Table M-7: Downlink Messages Permitted Operational Responses

The table shows all of the messages that are permitted in response to those downlink messages which require a response, i.e. those having a “Y” Response Attribute.

6.4.2.5 Table M-8: Message Parameter Elements

This table contains all of the top level message ASN.1 types that are combinations of other types.

6.4.2.6 Parameter Tables

These tables are referenced either from the top level parameter in a message or from other tables. Each type is defined only once, where a type is used as an element within another type the table containing the type definition is referenced in the notes column.

When completing proforma, implementers are required to copy the tables and complete separately for each time a type is used differently. This may include different messages or different uses within the same message. Section 6.4.3 gives a hierarchical breakdown of the more complex types.

The tables have the standard column headings as shown in **Figure 3-2**.

6.4.3 Message Parameter Hierarchy

The structure of some of the ASN.1 types used in some messages are complex with the same type being reused in several places. As an aid to understanding the structure and to assist in completion of the proforma, the parameter hierarchies of these types are given in this section.

In the figures the following abbreviations are used to indicate the element's ASN.1 type and if it appears more than once:

- (C) Choice
- (S) Sequence
- (B) Bit String
- (E) Enumerated
- (I) Integer
- (T) IA5 String

** Indicates that this type appears more than once in the parameter sequence.

Type names shown in **bold** text are mandatory items, those shown in normal text are optional.

ASN.1 basic types are shown in rectangular boxes and constructed types are shown in rounded boxes; each constructed type is decomposed only once in the hierarchy.

6.4.3.1 Departure Clearance (Table P-7)

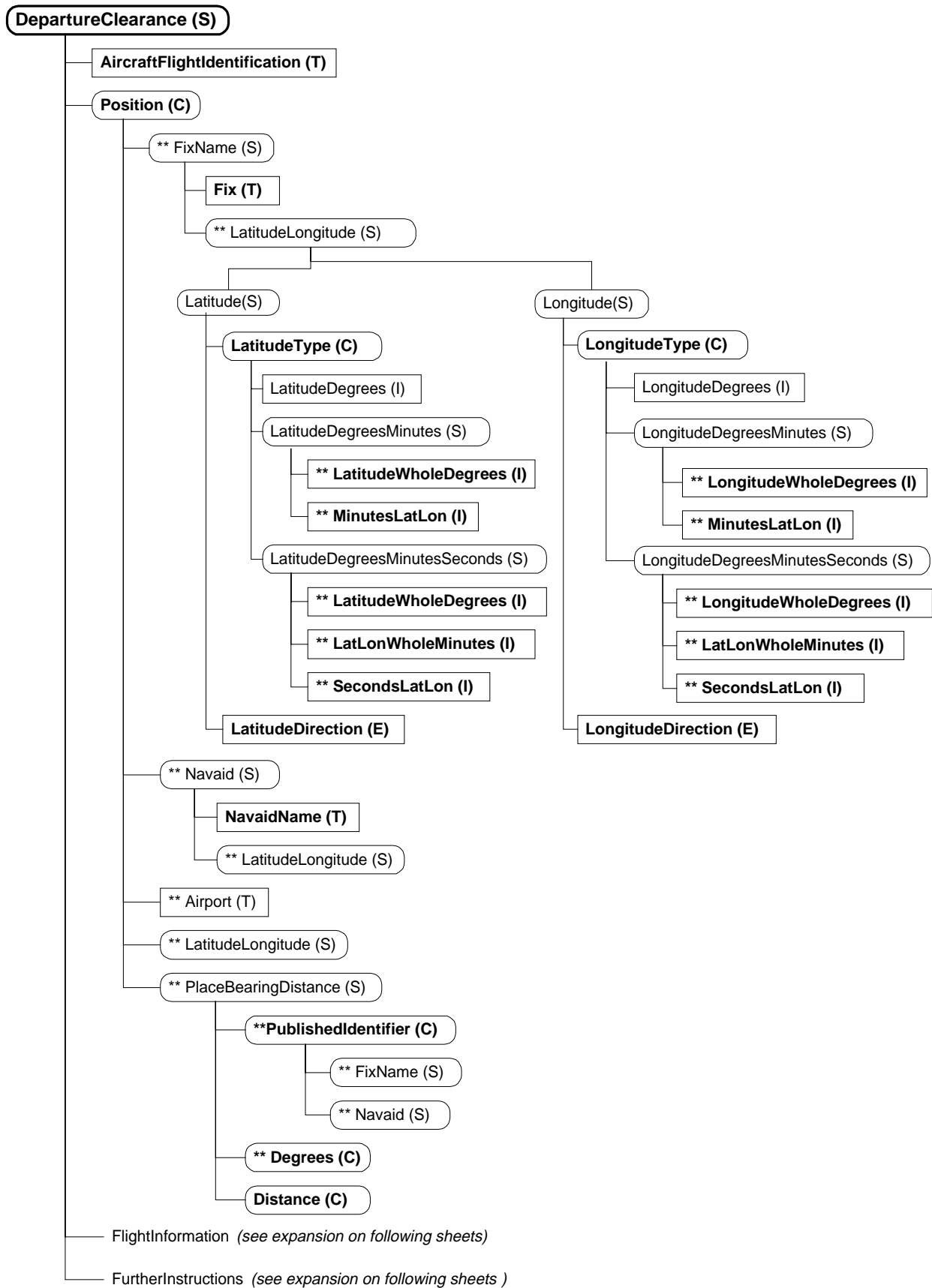


Figure 6-1: Departure Clearance – Part 1

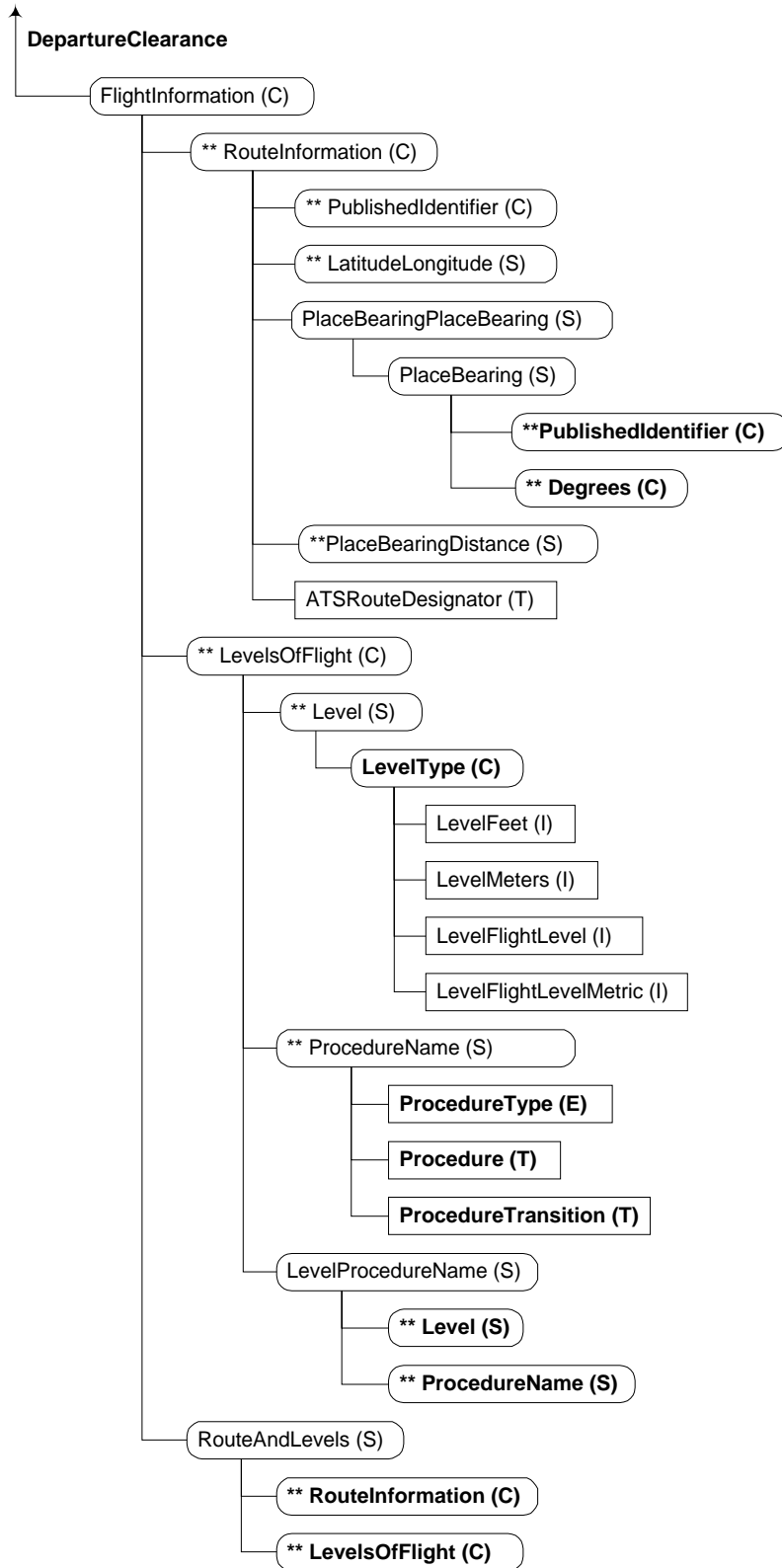


Figure 6-2: Departure Clearance – Part 2

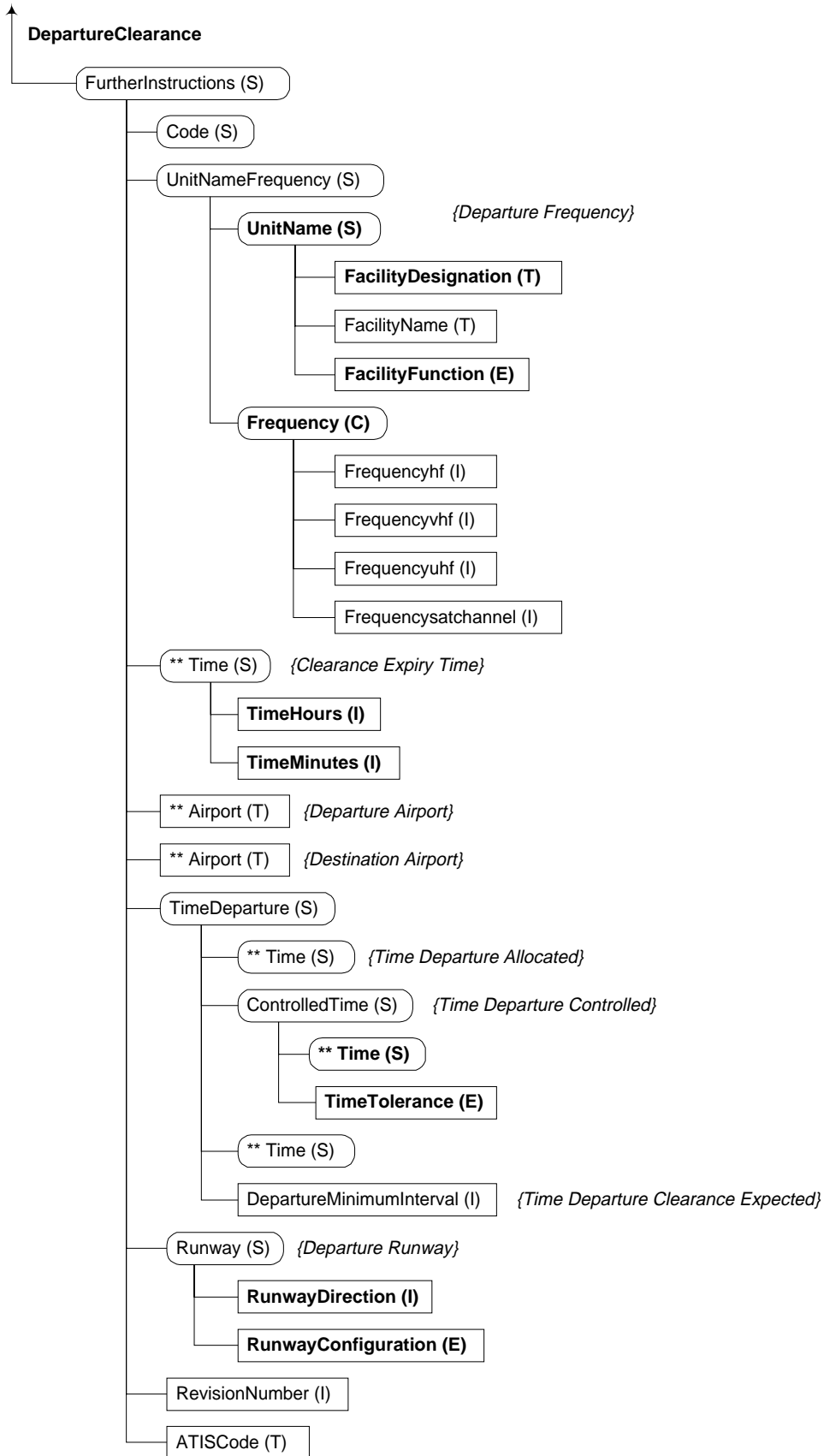
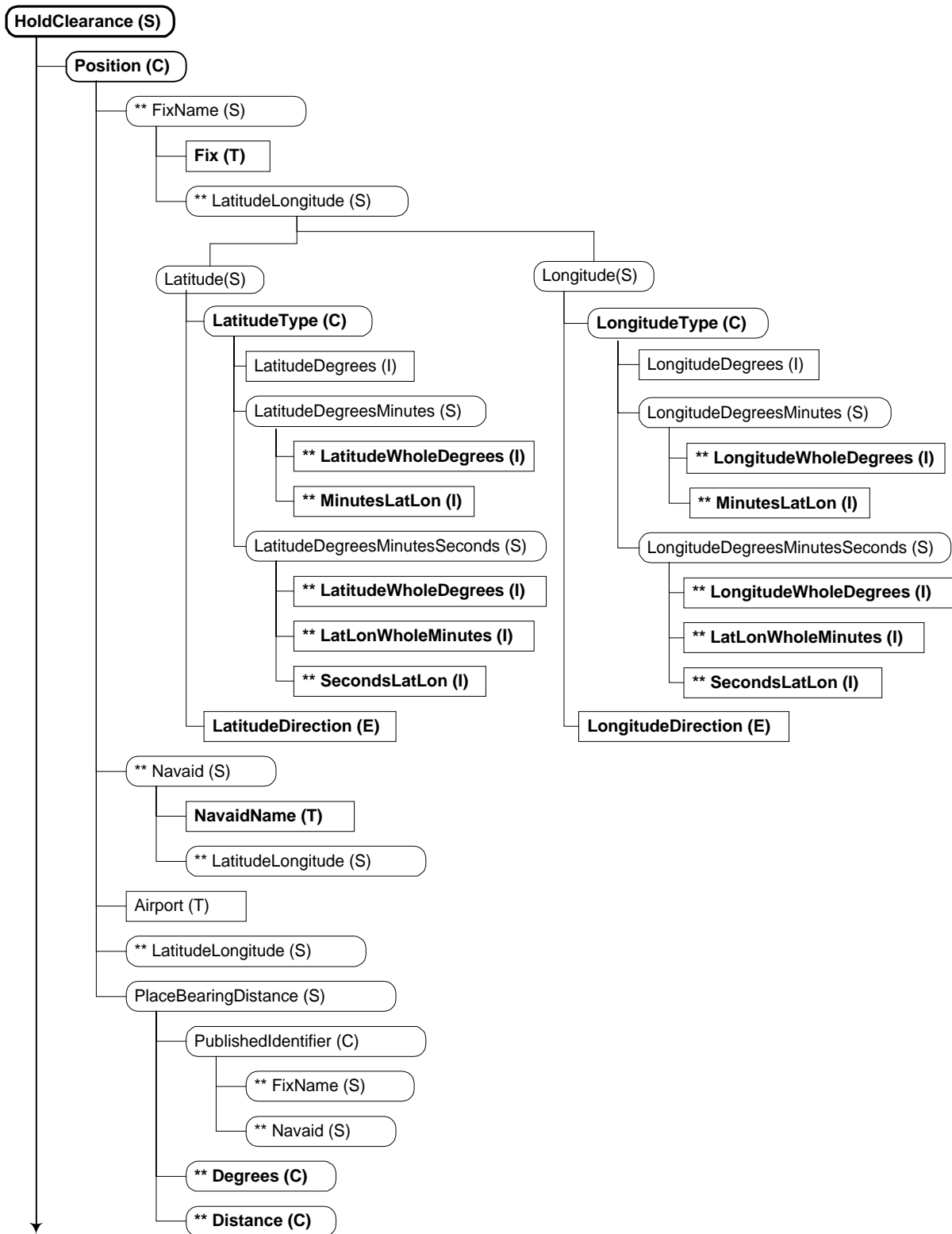


Figure 6-3: Departure Clearance – Part 3

6.4.3.2 Hold Clearance (Table P-16)



Continued on next sheet

Figure 6-4: Hold Clearance - Part 1

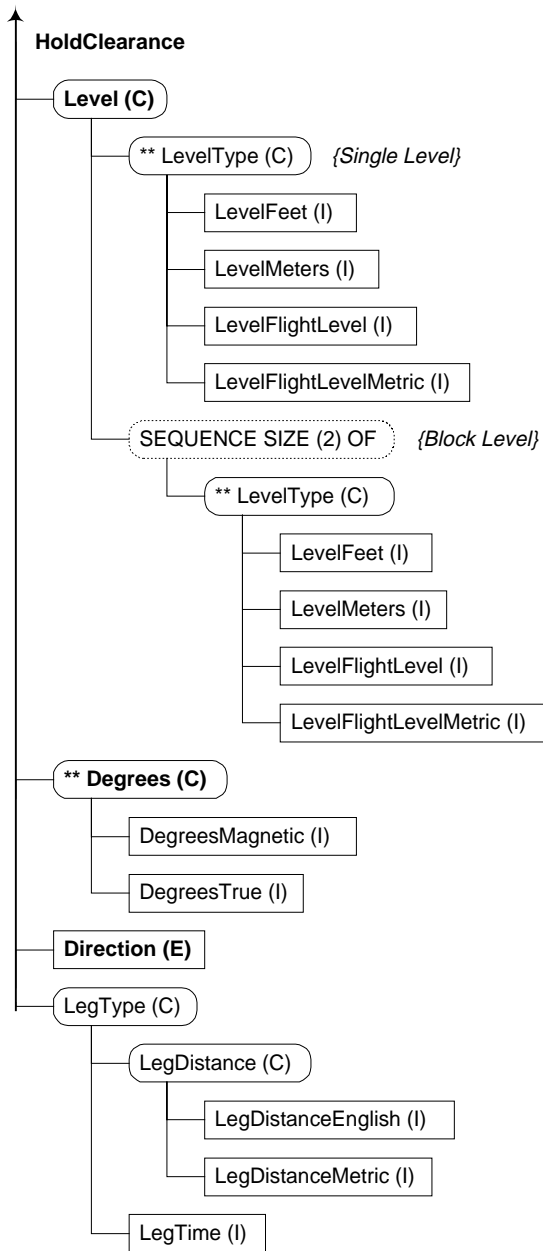


Figure 6-5: Hold Clearance - Part 2

6.4.3.3 Position (Table P-29)

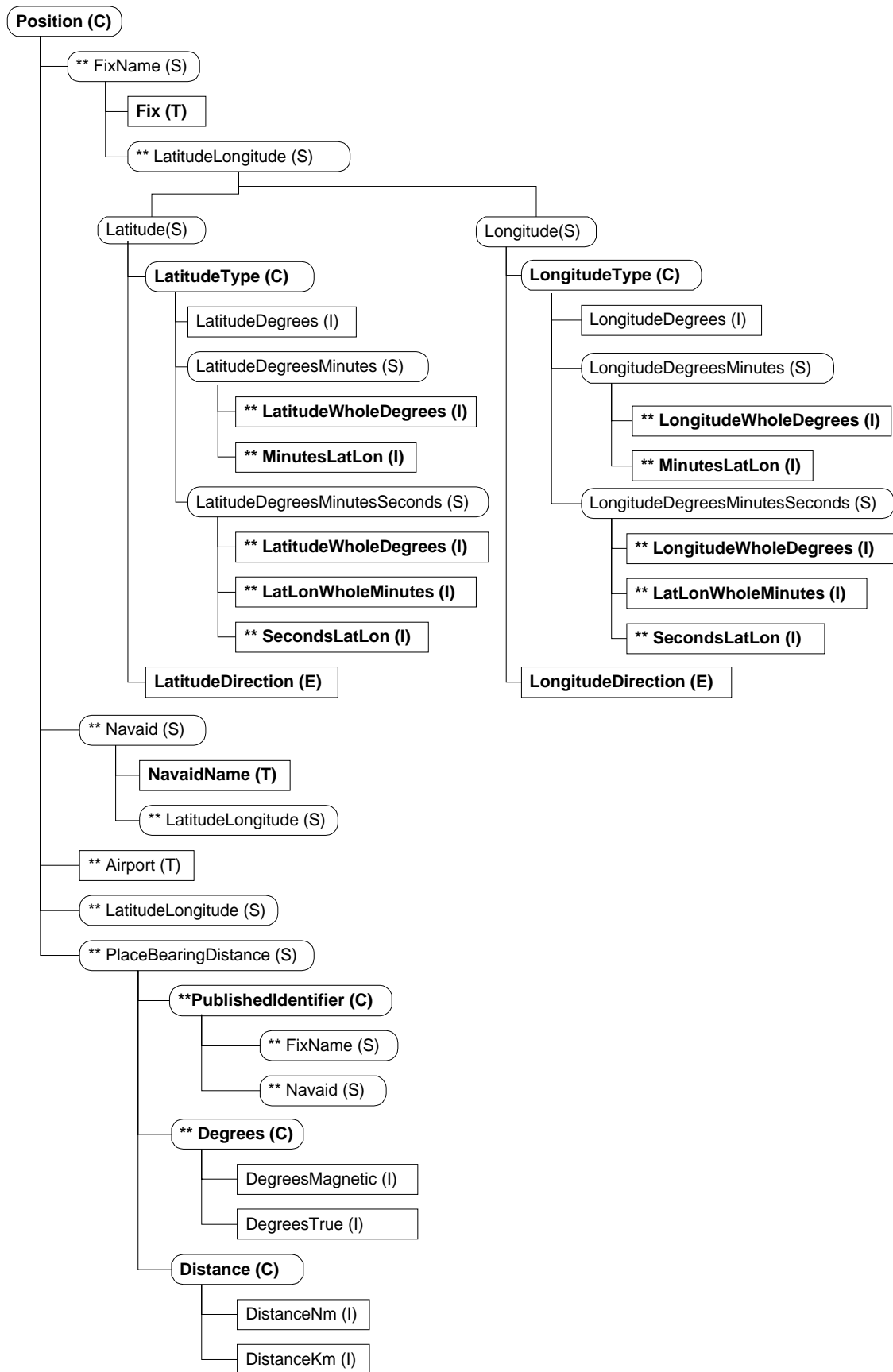
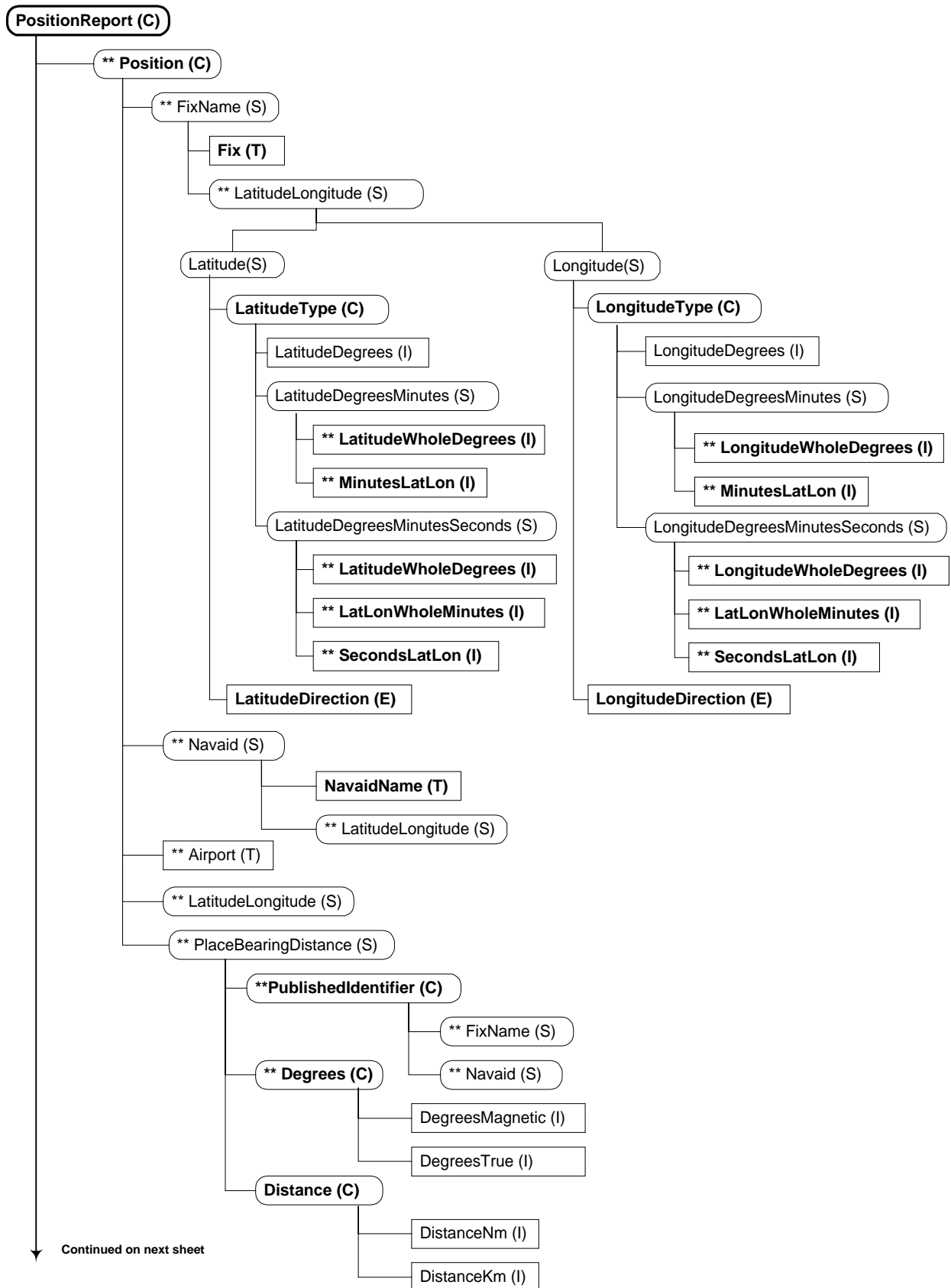


Figure 6-6: Position

6.4.3.4 Position Report (Table P-30)



Continued on next sheet

Figure 6-7: Position Report – Part 1

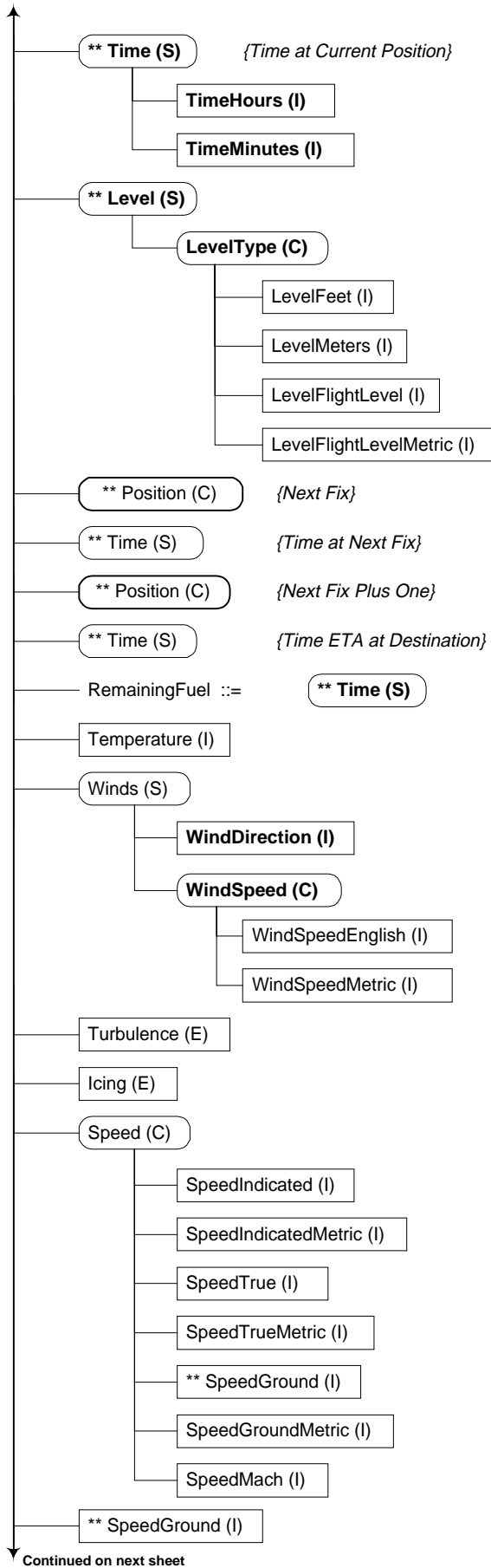


Figure 6-8: Position Report – Part 2

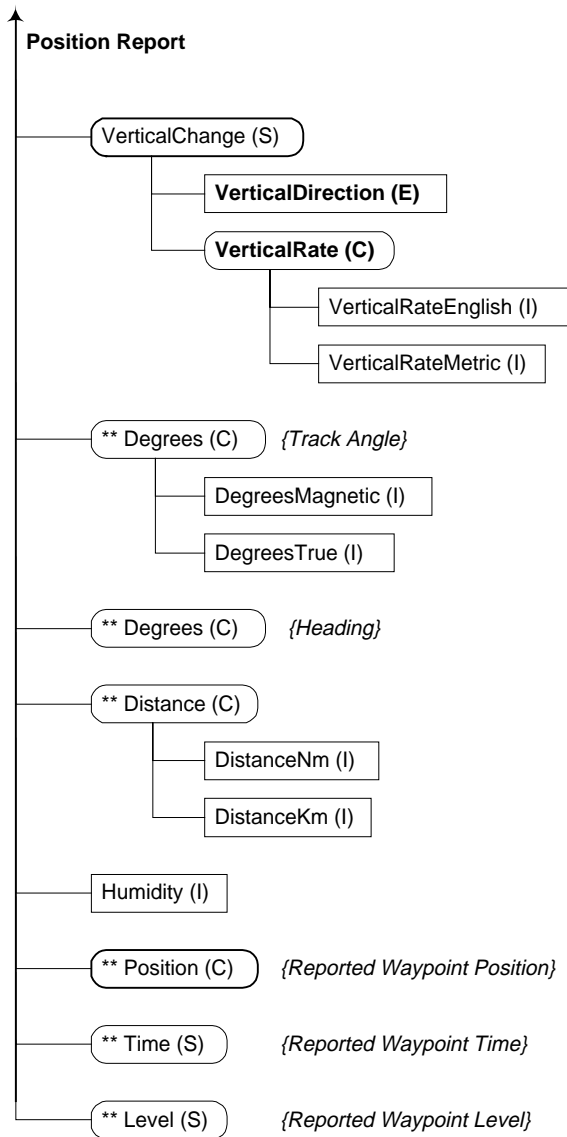


Figure 6-9: Position Report – Part 3

6.4.3.5 Route Clearance (Table P-34)

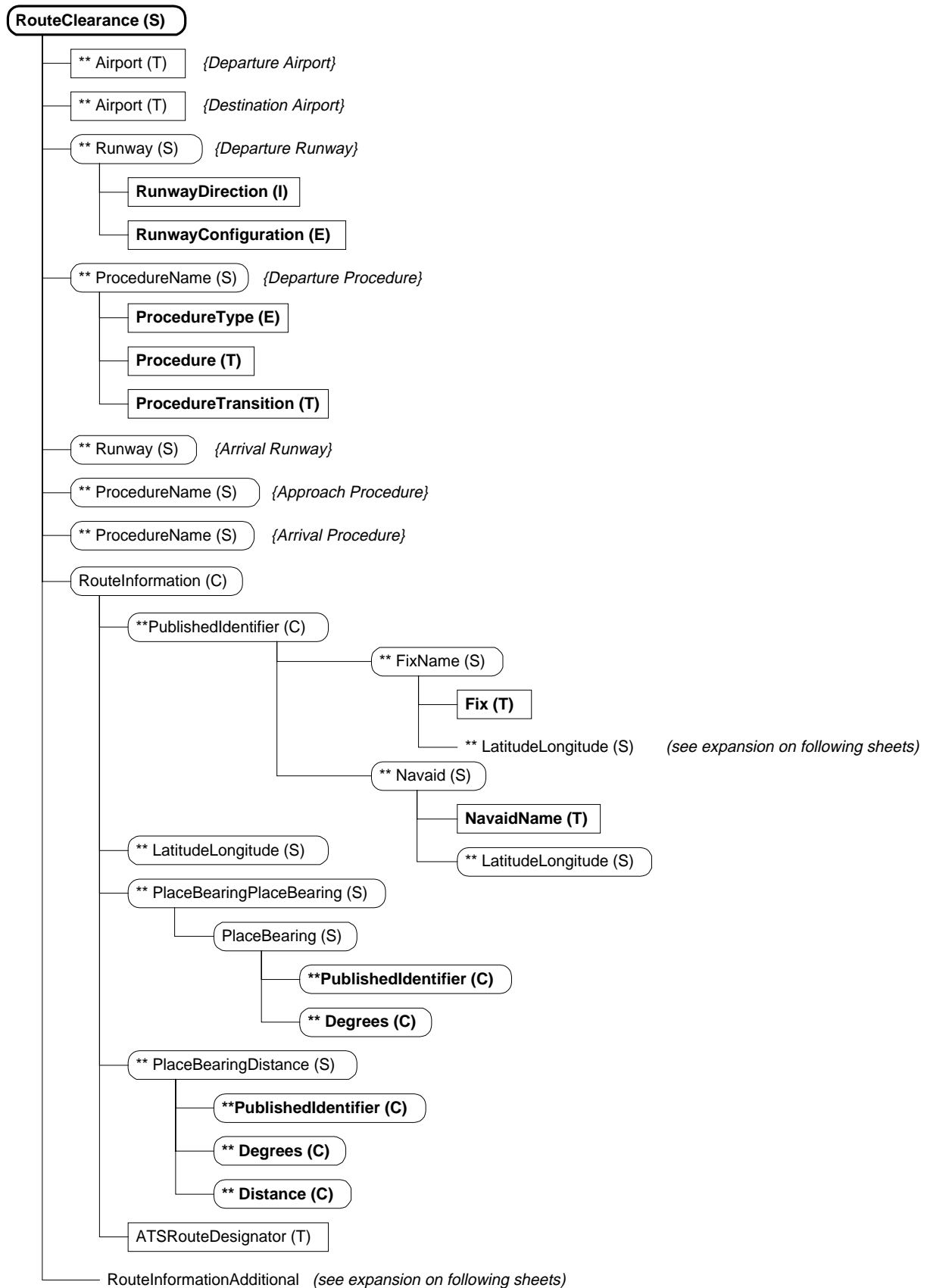


Figure 6-10: Route Clearance – Part 1

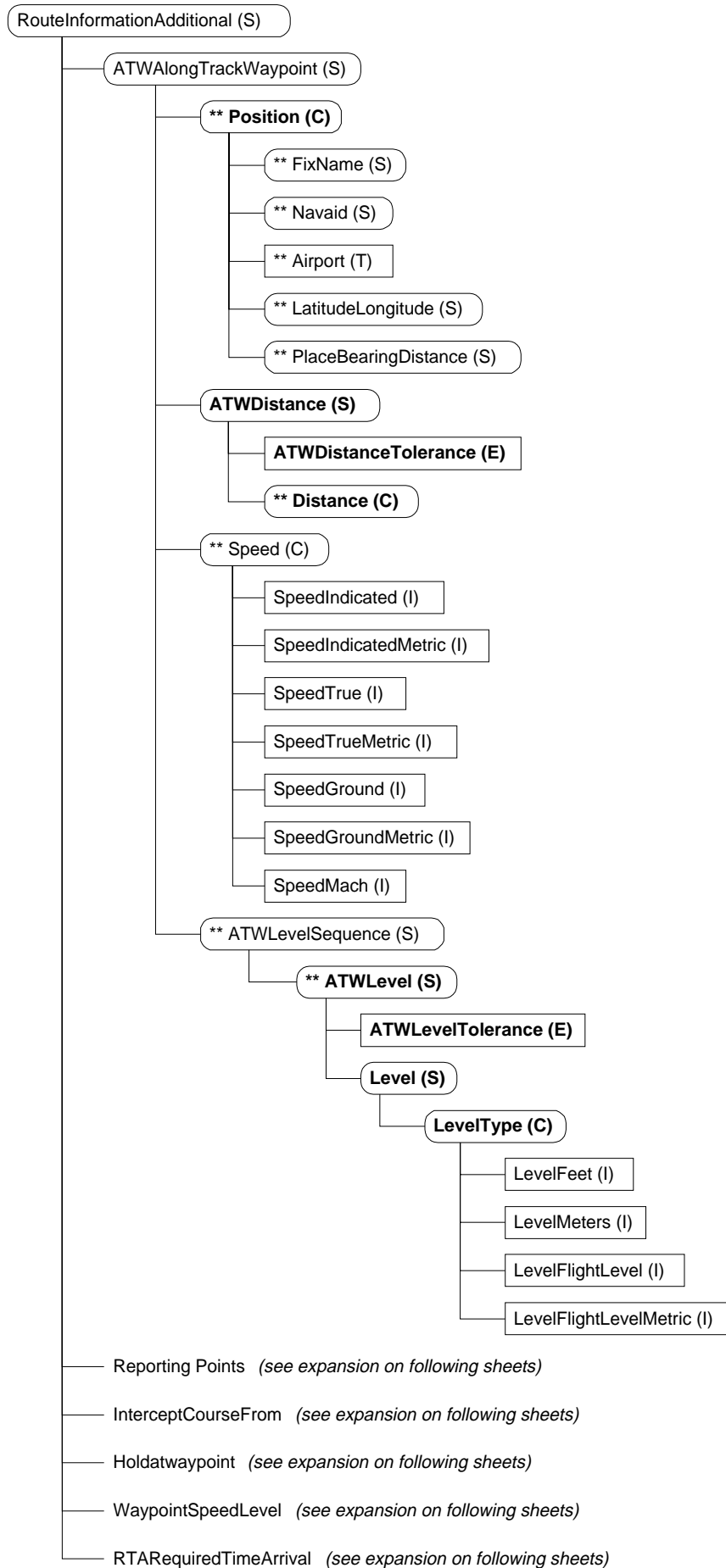


Figure 6-11: Route Clearance – Part 2

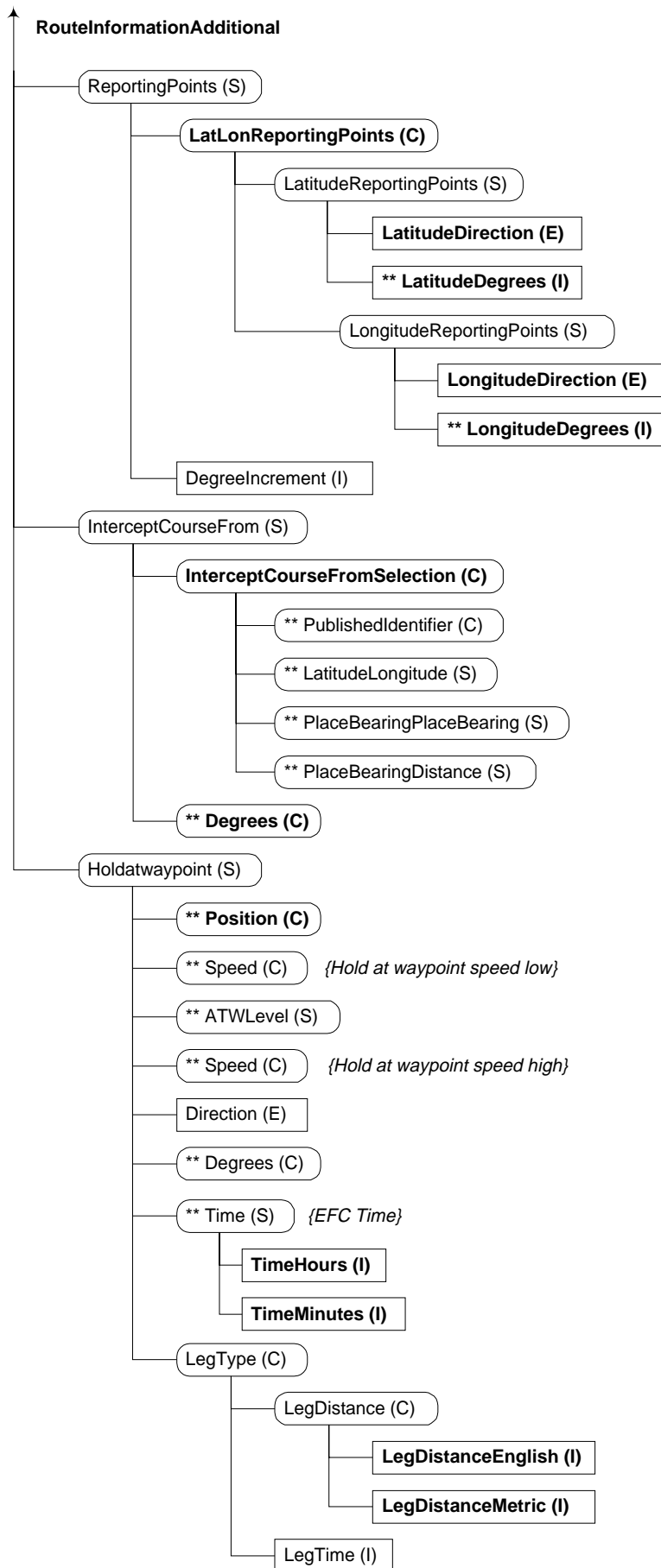


Figure 6-12: Route Clearance – Part 3

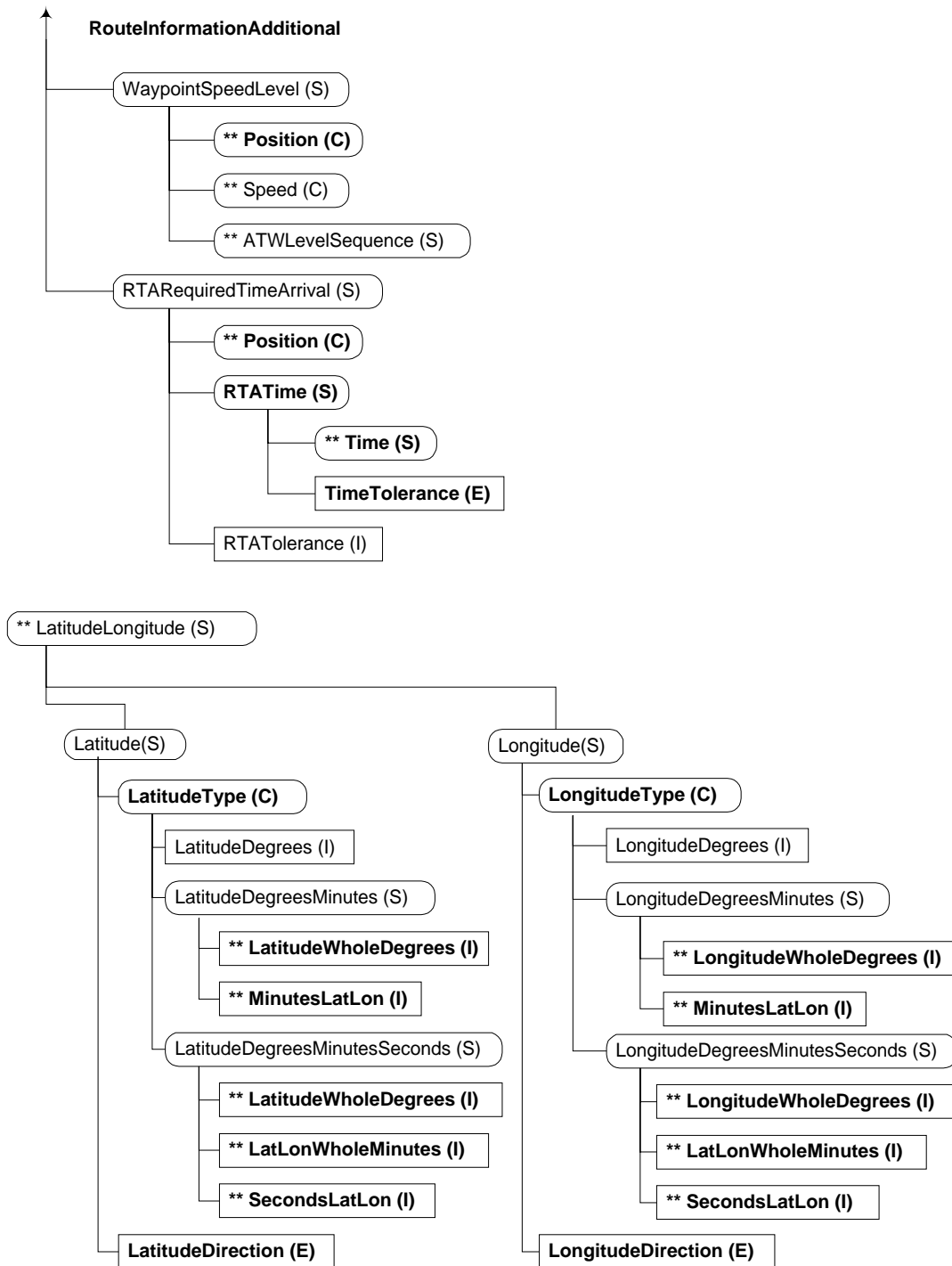


Figure 6-13: Route Clearance – Part 4

6.4.4 Profiles

A profile may specify a subset of the CPDLC messages which must be supported; this can result in some parameter tables being no longer applicable because none of the parameters they contain are required. In these cases it is recommended that the initial part of the table containing the top level message parameters is retained, indicating that none of the parameters are applicable, but that the detailed part may be deleted.

6.4.5 Guidance for Implementers

The parameter tables, as presented in the PICS/OICS, contain only one copy of the proforma for each set of message parameters. There may be circumstances when it is not possible for implementers to complete only one copy of a proforma. For example, an ASN.1 type containing choices may use a different set of options depending on the message or the type may be used more than once within a message with different options depending on the context. In such circumstances implementers are required to complete additional copies of the proforma as follows:

- i) Make a copy of the blank proforma.
- ii) Complete the copy of the proforma for each different message parameter/choice combination.
- iii) Add notes listing the context and all of the uplink and downlink messages to which the completed proforma applies.

6.5 Guidance for FIS