EUROCONTROL Specification for Surveillance Data Exchange – Part 1

All Purpose Structured EUROCONTROL Surveillance Information Exchange (ASTERIX)

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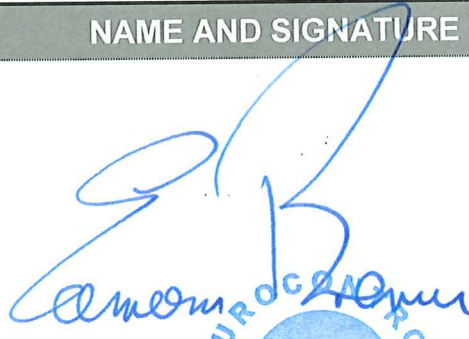
DOCUMENT IDENTIFIER : EUROCONTROL-SPEC-0149

Edition Number	:	3.1
Edition Date	:	23/11/2021
Status	:	Released Issue
Intended for	:	General Public
Category	:	EUROCONTROL Specification

DOCUMENT CHARACTERISTICS

TITLE	
EUROCONTROL Specification for Surveillance Data Exchange - Part 1 All Purpose Structured EUROCONTROL Surveillance Information Exchange (ASTERIX)	
Publications Reference:	SPEC-0149
ISBN Number:	978-2-87497-028-3
Document Identifier **Edition Number:**	3.1
EUROCONTROL-SPEC-0149 **Edition Date:**	23/11/2021

Abstract
This document presents the general structure of the ASTERIX format.

Keywords			
Data Exchange	Messages	SAC	SIC
Data Category	Data Item	Data Block	Data Item
ASTERIX	UAP		

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STATUS, AUDIENCE AND ACCESSIBILITY					
Status		**Intended for**		**Accessible via**	
Working Draft	☐	General Public	☑	Intranet	☐
Draft	☐	EUROCONTROL	☐	Extranet	☐
Proposed Issue	☐	Restricted	☐	Internet (www.eurocontrol.int)	☑
Released Issue	☑				

DOCUMENT APPROVAL

AUTHORITY	NAME AND SIGNATURE	DATE
Director General	Mr. Eamonn BRENNAN	23/11/21

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
Released Ed 1.0	November 1997	Adoption by the EUROCONTROL Permanent Commission	
Working Draft Ed 1.1	August 1998	Suppress RFS, units, add migration policy and compound Data Item structure.	
Draft Ed 1.2	October 1998	• Where applicable the term Radar replaced by Surveillance • Introduction amended (1) • X.121 reference suppressed. (2) • Documents referenced in paragraph 2.2 updated (2.2) • Definitions, acronyms and abbreviations updated.(3) • Characteristics of the data suppressed.(4) • Data item symbolic reference changed.(4) • UAP unique per Category as a rule.(4) • Source Identification must be present in every record.(4) • Explicit Length data fields suppressed.(4) • Conventions updated to be more general.(5) • Annex A redesigned and changed to informative. (A) • Annex B replaced by list of SACs affected to USA, Canada & Mexico. (B) • Annex C suppressed. (C)	ALL
Draft Ed 1.21	January 1999	• 1.1 reworded • Explicit Length data fields re-introduced. (4) • Reserved Expansion field added. (4) • Migration Policy reworded. (7)	ALL
Draft Ed 1.22	March 1999	• Editorial corrections	ALL

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
Proposed Ed 1.24	September 1999	• Editorial corrections	ALL
Proposed Ed 1.26	November 2000	• SAC added for UK and for Ukraine • Annex A updated	6.4 A
Working Draft Ed 1.27	November 2001	• Editorial correction • List of SAC removed • Annex A updated • Annex B removed	4.1.1.5 6.4.1 A B
Working Draft Ed 1.28	December 2001	• Editorial corrections • Annex A removed	A
Working Draft Ed 1.29	February 2002	• Note on Reserved Expansion field added • Editorial corrections	4.2.6.4 4.2.7.4
Released Issue Ed 1.30	November 2007	• Document ID-sheet updated • Signature Page updated • Status: Released Issue	
Draft Specification Ed 2.00	October 2012	• Transposition into an EUROCONTROL Specification. Successor of EUROCONTROL Standard SUR.ET1.ST05.2000-STD-01-01 • Introduction of the traceability to the relevant provisions of the Commission Implementing Regulation (EU) No 1207/2011	All Annex A
Ed 2.1	April 2013	• Chapter 7.2.3 updated	7.2.3
Ed 2.2	October 2014	• New Record Structure	3.1.2 4.2.1.5 4.3.2 4.3.3 4.3.6 7.2.3.2 Annex B
Ed 2.3	Nov. 2015	• Allow virtualisation of ASTERIX Systems • List of ASTERIX Categories updated	6.1 6.3.2.1 6.4.2.1 Annex B Annex C

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
Ed 2.4	Sept. 2016	• Clarification on blocking mechanism	4.3.2.5
		• Clarification on List of ASTERIX Categories	Annex B Annex C
		• Annex D added	Annex D
Ed 3.0	November 2020	• Editorial corrections	ALL
		• Refactoring of the "Description and Principle of ASTERIX" and "Modifications" section	5 & 7
		• Refactoring of the Modifications section	7
		• New Management procedures section	4
		• Annexes B, C and D transferred to the "List of ASTERIX categories"	Annexes B, C, D
		• More details on changes in Chapter 1.1	1.1
Ed 3.1	November 2021	• "Element Populated Bit" introduced	5.2.5.2.2
		• "Absence of Information" introduced	5.2.5.2.4
		• Symbolic References updated	5.2.6

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EXECUTIVE SUMMARY

This EUROCONTROL specification describes the basic rules and procedures to be applied when implementing the ASTERIX data format.

It provides information on the way ASTERIX data is organised, defines the structure of ASTERIX Messages and specifies the format conventions to be respected when encoding and decoding ASTERIX Messages.

Finally the ASTERIX addressing scheme is defined as well as the procedure to be followed in the evolution of ASTERIX Category definitions.

This EUROCONTROL specification is the successor of the EUROCONTROL Standard SUR.ET1.ST05.2000-STD-01-01.

1. INTRODUCTION

1.1 Updates in Edition 3.0 of Part 1 of ASTERIX

Version 3.0 of Part 1 of ASTERIX contains some specific encoding rules which were so far not explicitly prescribed and which potentially make some existing implementations not compliant.

Such new/explicit rules are affecting the following:

- Compound Data Item primary subitem – see chapter 5.2.5.1.5,
- Data Items identified as Mandatory – see chapter 5.2.4,
- Data Items identified as Never Present – see chapter 5.2.4,
- Data Item identified as Conditionally Present - see chapter 5.2.4,
- Values outside the specified range – see chapter 5.2.5.2.1.

ASTERIX implementers are asked to consider those new encoding rules when defining or updating their implementation.

In addition, the version 3.0 of Part 1 of ASTERIX highlights possible interoperability issues with the Extended Length Data Items and legacy values like "Not Defined" and "Invalid". ASTERIX implementers are asked to consider those.

1.2 Updates in Edition 3.1 of Part 1 of ASTERIX

In this Edition 3.1 two new concepts were introduced:

Information not available

This concept, described in chapter 5.2.5.2.4, has been introduced to allow to indicate if in an Element the payload information is not available and therefore the Element does not carry meaningful information.

Element Populated Bit

This bit is a special case of the "Information not available" concept and allows to indicate whether the contents of an Element were actively populated or not. This allows to determine the validity of the information contained in the respective Element. The Element Populated bit is defined in chapter 5.2.5.2.2.

1.3 General

This EUROCONTROL Specification describes the message structure, known by the acronym **ASTERIX**, originally standing for "**A**ll Purpose **ST**ructured **E**UROCONTROL **R**adar **I**nformation E**x**change", devised by the Study Group on the exchange of surveillance related data between processors of ATC systems. This group was a subgroup of the former Radar Systems Specialist Panel (RSSP), whose responsibilities were taken over by the Surveillance Team (SURT) as from April 1994. ASTERIX was approved by the former RSSP at their 15th Meeting held on 1/4 July 1986. The ASTERIX Specification is now under the responsibility of the ASTERIX Maintenance Group (AMG), a working arrangement under the EUROCONTROL SUR SG. The expansion of the application domains of ASTERIX beyond radar led to a modification of the significance of the acronym ASTERIX, now standing for "**A**ll Purpose **ST**ructured **E**UROCONTROL Su**R**veillance **I**nformation E**x**change". Despite ASTERIX being used now for applications beyond surveillance, the name has not been changed.

Throughout this document the following conventions apply:

- Requirements using the operative verb "**shall**" must be implemented to achieve the minimum objectives of this specification.
- Requirements using the operative verb "**should**" are recommended to achieve the best possible implementation of this specification.
- Requirements using the operative verb "**may**" indicate options

1.4 ASTERIX Scope

ASTERIX is an application/presentation layer protocol, responsible for data definition and data assembly. It was developed to support the transmission and exchange of surveillance related data but is now also used for applications beyond surveillance.

Its purpose is to allow a syntactically and semantically meaningful transfer of information between two application entities using a mutually agreed representation of the data to be exchanged.

The ASTERIX Specification (consisting of this Part 1 as well as the category definitions) refers to the Presentation and Application layers (layers six and seven) as defined by the Open Systems Interconnection (OSI) Reference Model (International Standards Organization (ISO) Standard 7498) [Ref. 1].

The definition of the lower telecommunication support layers (layers one to five) is out of the scope of the ASTERIX Specification. Transmission of ASTERIX coded surveillance information can make use of any available communication medium, for instance a packet switched Wide Area Network (WAN) as well as a Local Area Network (LAN).

The lower layer telecommunication protocol levels will be agreed between the partners of the data exchange.

The ASTERIX Specification, as a Presentation protocol, defines the structure of the data to be exchanged over the communication medium, from the encoding of every bit of information up to the organisation of the data within an ASTERIX Message.

Considering that there is information common to all systems, ASTERIX specifies minimum requirements at the Application level, so as to ease the data exchange between heterogeneous applications. The communication between two different systems is thus made possible, based on a core of commonly used data, transferred in the same way by the ASTERIX Presentation layer.

In order to achieve the intended level of interoperability the implementation of the individual ASTERIX categories **shall** be performed exactly like specified in the latest editions of the respective definitions as published on the EUROCONTROL ASTERIX website (www.eurocontrol.int/asterix).

If two users need to exchange specific information beyond the contents of the latest available definition of a category, this information **shall** be encoded exclusively in the "Special Purpose Field" as defined in Chapter 5.2.5.4 below.

This Edition of Part 1 does not apply to Categories 001, 002 and 008. The implementation of these categories **shall** follow the rules as described in the corresponding specifications.

The blocking mechanism described in this document only applies at the ASTERIX presentation layer (i.e. for ASTERIX messages). Blocking at lower levels (such as the network layer) is not subject to this rule.

2. REFERENCES

1. ISO/IEC 7498-1: 1994 [ITU-Rec.X.200 (1994)]
    Information Processing Systems - OSI Reference Model - The Basic Model

2. Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 as amended by (EU) No 1028/2014 of 26 September 2014, (EU) 2017/386 of 6 March 2017 and (EU) 2020/587 of 29 April 2020

3. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Definitions

For the purposes of this EUROCONTROL Specification, the following definitions **shall** apply:

ASTERIX Message	Unit of ASTERIX information including the data to be exchanged between ASTERIX users. An ASTERIX Message may be an ASTERIX Data Block or an ASTERIX Record.
Catalogue of Data Items:	List of all the possible Data Items of each Data Category describing the Data Items by their reference, structure and size.
ASTERIX Data Block:	Unit of information seen by the application as a discrete entity by its contents. An ASTERIX Data Block contains a Data Category (CAT) identifier, a Length Indicator (LEN) and one or more Data Record(s) containing data of the same Category. This principle is used for Categories defined until and including Edition 2.1 of Part 1. Further details can be found in Chapter 5.2.2.
ASTERIX Record:	Unit of information seen by the application as a discrete entity by its contents. An ASTERIX Record contains a Data Category (CAT) identifier, a Length Indicator (LEN) and one Data Record containing data of the Category indicated by the CAT identifier. This principle is used for Categories created as of Edition 2.2 of Part 1. Further details can be found in Chapter 5.2.3.
Data Category:	Classification of the data in order to permit inter-alia an easy identification.
Data Field:	Physical implementation for the purpose of communication of a Data Item, it is associated with a unique Field Reference Number (FRN) giving the sequence of Data Items in a Data Record in line with the UAP (see Chapter 5.1.4).
Data Item:	The main unit of information in each Data Category.
Data Record:	A collection of transmitted Data Items of the same Category preceded by a Field Specification field (FSPEC), signalling the presence/absence of the various Data Items.
Standard Data Item:	A standardised Data Item usable within the standard ASTERIX Categories.
Subitem:	The main unit of information in each Standard Data Item (see Chapter 5.2.5).
Element:	The smallest unit of information in each Subitem.
User Application Profile:	The mechanism describing the way an ASTERIX record is composed. Further details are available in Chapter 5.1.4.
Part	The ASTERIX Library is sub-divided into several Parts. Part 1 (this specification) contains the basic ASTERIX rules and principles. Parts 2 and above contain the Category specifications or other additional information.

3.2 Acronyms and Abbreviations

For the purposes of this EUROCONTROL Specification the following shall apply:

ASTERIX	All Purpose STructured EUROCONTROL suRveillance Information EXchange
AMG	ASTERIX Maintenance Group
ATC	Air Traffic Control
CAT	Data Category
CNS	Communication, Navigation, Surveillance
FRN	Field Reference Number
FSPEC	Field Specification
FX	Field Extension Indicator
ISO	International Standards Organization
LAN	Local Area Network
LEN	Length Indicator
LSB	Least Significant Bit
MSB	Most Significant Bit
OSI	Open Systems Interconnection
RDE-TF	Surveillance Data Exchange Task Force
RE	Reserved Expansion Indicator
REF	Reserved Expansion Field
REP	Field Repetition Indicator
RSSP	Radar Systems Specialist Panel
SAC	System Area Code
SIC	System Identification Code
SP	Special Purpose Indicator
SPF	Special Purpose Field
SUR SG	Surveillance Steering-Group
SURT	Surveillance Team
UAP	User Application Profile
UTC	Co-ordinated Universal Time
WAN	Wide Area Network

4. ASTERIX MANAGEMENT PROCEDURES

4.1 Definition of New ASTERIX Categories

The definition of new ASTERIX categories is performed as a joint activity of the AMG and the entity proposing the new specification. Details are described in Chapter 5.1.2.

4.2 Maintenance of Existing ASTERIX Documentation

Maintenance of the existing ASTERIX documents is performed by the EUROCONTROL ASTERIX team in coordination with the ASTERIX Maintenance Group (AMG).

Maintenance requests (i.e. corrections or improvements of existing Categories) **shall** be submitted to EUROCONTROL's ASTERIX Manager (asterix@eurocontrol.int).

The maintenance task will be performed using collaborative tools (e.g. OneSky Team, Webex, emails). As far as possible, AMG members will be asked to review and agree proposed modifications by correspondence. Where justified by the amount or nature of tasks, the AMG will meet face-to-face as required.

Stakeholders wishing to participate in the AMG should send a request by e-mail to EUROCONTROL's ASTERIX Manager (asterix@eurocontrol.int).

4.3 Endorsement of ASTERIX Documents

The endorsement of ASTERIX documentation is the responsibility of the AMG.

Proposed Editions of ASTERIX documents **shall** be submitted by the EUROCONTROL ASTERIX Manager to the members of the AMG for review.

Following the review period the proposed Edition of an ASTERIX document **shall** be updated by the ASTERIX Manager or the drafting group and the members of the AMG will be notified about the update.

4.4 Publication of ASTERIX Documents

Once the ASTERIX document has been approved by the members of the AMG following the procedure outlined in chapter 4.3 above, the new Edition of the document **shall** be published on the EUROCONTROL ASTERIX website (www.eurocontrol.int/asterix) for official use.

5. DESCRIPTION AND PRINCIPLES OF ASTERIX

5.1 Organisation of the Data

Data exchanged between the users **shall** be organised as shown in Figure 1.

	USER APPLICATION PROFILE							
	DATA FIELD (1)	DATA FIELD (2)	DATA FIELD (3)	DATA FIELD (4)	DATA FIELD (5)	DATA FIELD (6)	DATA FIELD (7)	DATA FIELD (8)
DATA ITEM (1)		x						
DATA ITEM (2)						x		
DATA ITEM (3)	x							
DATA ITEM (4)				x				
DATA ITEM (5)								
...								
DATA ITEM (x)			x					
DATA ITEM (x + 1)								x
...								
DATA ITEM (q)					x			
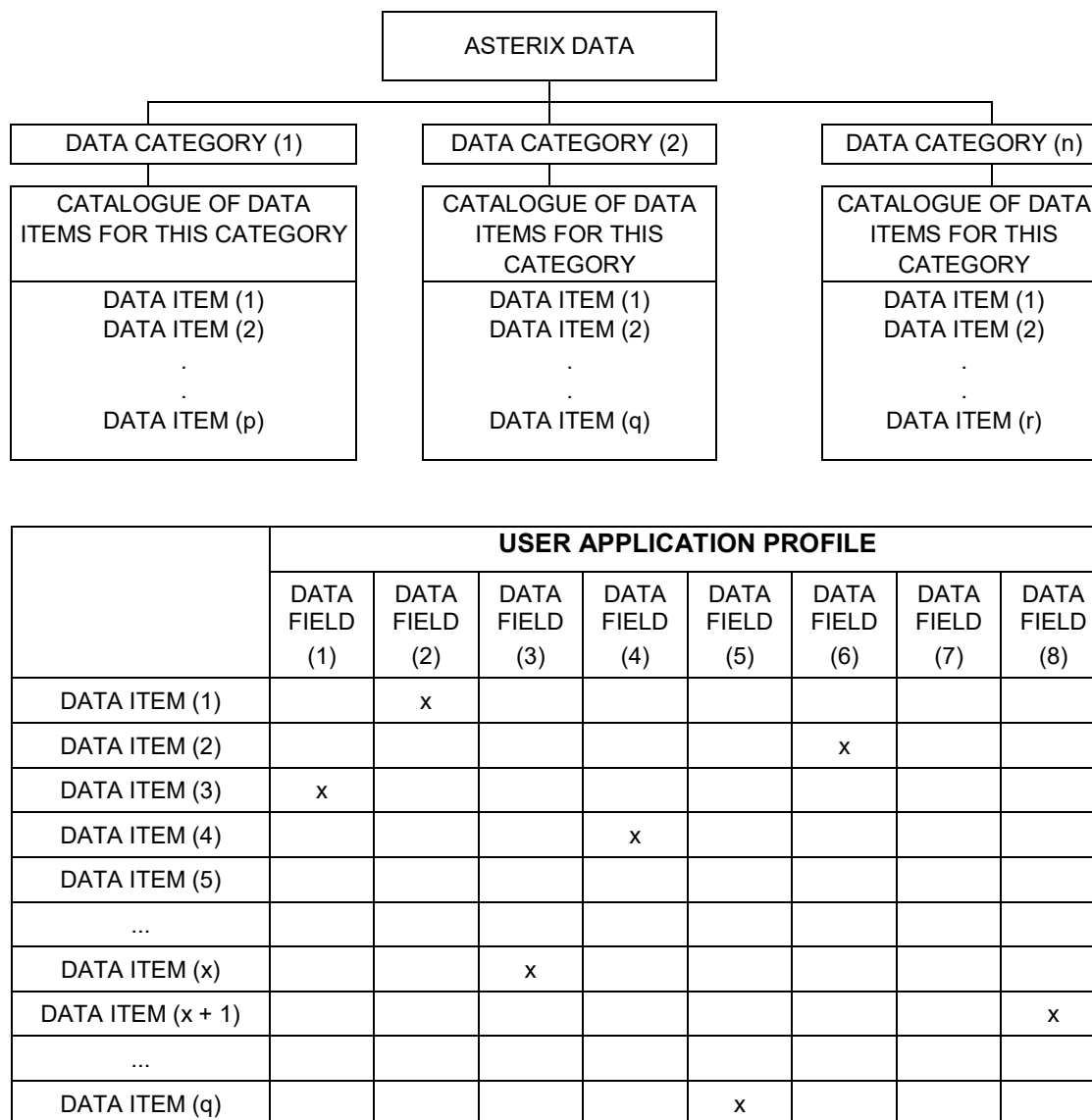
Figure 1 - Organisation of the Data

5.1.1 Data Categories

The data exchanged over the communication medium between the different users **shall** be organised in Data Categories.

Those Data Categories describe the data to be exchanged and the format to be applied. The Data Categories **shall** be standardised and applied by all users of ASTERIX.

The purpose of such a classification **shall** be to:

- allow easy identification and subsequent processing of the data;
- facilitate the dispatching of the data to the appropriate application task in the receiving unit;

The Category symbolic reference **shall** consist of a six-character reference of the form **CATnnn**, where:

- CAT   is a keyword meaning Category;
- nnn   is a three digit decimal number which indicates the Data Category (000 to 255).

5.1.2 Allocation and Management of ASTERIX Categories

If the creation of a new ASTERIX Category is proposed, the requester shall contact the ASTERIX Manager at asterix@eurocontrol.int providing a short description of the intended application of the proposed Category.

The allocation of the number of a newly drafted Category is the responsibility of the AMG based on a proposal from the ASTERIX Manager.

Part of the discussion between the requester and the AMG will be the determination whether the new Category specification will be managed by the AMG or coordinated with the AMG. The difference between the two is that any Category that is classified as "managed by the AMG" is subject to approval from the AMG members prior to publication on the ASTERIX website. This applies to both, the original specification as well as subsequent revisions during the maintenance of a Category. If a Category is "coordinated with the AMG", only the allocation of the Category number is performed by the AMG whereas the development and maintenance of the specification will be performed by the requester itself. It is expected that also specifications for Categories that are "coordinated with the AMG" will be made available for upload to the EUROCONTROL ASTERIX website – unless this is considered inappropriate for reasons of confidentiality.

Information on this principle and on the current status of the published specifications can be found on the EUROCONTROL ASTERIX website at: https://www.eurocontrol.int/publication/list-asterix-categories-and-their-statuses. This document also contains information on whether or not blocking of a specific Category is allowed or not (in line with Chapter 5.2.2 below).

The basic principles to be applied during the evolution of existing or the definition of new Categories as well as the migration to a new Category Number for an existing application are described in Chapter 7 "Modifications".

5.1.3 Data Items and Catalogue of Data Items

A Data Item is the main unit of information that is defined and standardised. For each Data Category, a Catalogue of Data Items **shall** be standardised.

Applications involving the exchange of information of a given Data Category, **shall** exclusively make use of the Data Items standardised in such Catalogue(s) of Data Items. In cases were non-standardised information needs to be exchanged ASTERIX provides the mechanism of the "Special Purpose Field" (see Chapter 5.2.5.4).

Each Data Item **shall** be given a unique reference which unambiguously identifies this item in the relevant catalogue.

The Data Item symbolic reference **shall** consist of an eight-character reference of the form **Innn/AAA**, where:

- I indicates that this represents a Data Item;
- nnn is a three digit decimal number which indicates the Data Category to which this Data Item belongs (000 to 255);
- AAA is a three digit decimal number which indicates the Data Item.

5.1.4 Data Fields & User Application Profile

The UAP is the mechanism describing the way a Data Record is to be composed.

The UAP **shall** be standardised for each ASTERIX Category.

For the purposes of sequencing and to encode a Data Record, each Data Item within the UAP will be allocated to a Data Field referenced by a Field Reference Number (FRN) which will give the position of the Data Item within a single Data Record. The basic principle of this allocation is shown in Figure 1.

The UAP **shall** be used as a control table attached to the message assembly/disassembly programs resident in the relevant processing systems.

It essentially defines the sequence in which the catalogued Data Items are to be included in each Data Record, their length (where applicable), their assignment to the Data Fields and any specific requirements which need to be standardised for the successful transmission and interpretation of the messages. The mechanism used to indicate the presence or absence of individual Data Fields in a specific Data Record is the Field Specification (FSPEC) as described in chapter 5.2.7.

NOTE -   With this mechanism, it is easy to optimise the transmission efficiency without program modification by taking into account the frequency of occurrence of specific Data Items.

An example of a UAP can be found in Figure 2 below.

FRN	Data Item	Information	Length
1	**Innn/010**	Data Source Identifier	2
2	-	Spare	-
3	**Innn/015**	Service Identification	1
4	**Innn/070**	Time Of Track Information	3
5	**Innn/105**	Calculated Track Position (WGS-84)	8
6	**Innn/100**	Calculated Track Position (Cartesian)	6
7	**Innn/185**	Calculated Track Velocity (Cartesian)	4
FX	-	Field extension indicator	-
8	**Innn/210**	Calculated Acceleration (Cartesian)	2
9	**Innn/060**	Track Mode 3/A Code	2
10	**Innn/245**	Target Identification	7
11	-	Spare	-
12	-	Spare	-
13	-	Spare	-
14	-	Spare	-
FX	-	Field extension indicator	-

Figure 2 – Example of UAP

Spare bits in the UAP **shall** be set to zero.

For each Category exactly one UAP **should** be defined.

NOTE - The UAP forms an integral part of a Category and is defined within the respective specification.

To satisfy the interoperability requirement (ref. 5.2.2), for Categories defined until and including Edition 2.1 of Part 1 of the ASTERIX documentation, once a Category is released as Edition 1.0, its UAP **shall** not be modified.

To satisfy the interoperability requirement (ref. 5.2.3), for Categories defined as of Edition 2.2 of Part 1 of the ASTERIX documentation, once a Category is released as Edition 1.0, its UAP **may** only be extended with new entries appended at the end of the UAP.

5.2 General Message Structure

5.2.1 General

An ASTERIX Message is a unit of ASTERIX information including the data to be exchanged over a communication medium between ASTERIX users. An ASTERIX Message may be an ASTERIX Data Block or an ASTERIX Record.

5.2.2 ASTERIX Data Block

For Categories defined until and including Edition 2.1 of Part 1 of the ASTERIX documentation, a blocking mechanism **may** be used to combine several Data Records in an ASTERIX Data Block. All Categories existing before the release of Edition 2.2 of Part 1 **may** continue to use the blocking principle as far as deemed appropriate, even for Editions of these Categories that are released after Edition 2.1 of Part 1 of the ASTERIX documentation.

For each Category the status with respect to whether or not blocking is permitted can be derived from the list of categories as published on the EUROCONTROL ASTERIX website: https://www.eurocontrol.int/publication/list-asterix-categories-and-their-statuses.

For Categories defined until and including Edition 2.1 of Part 1 of the ASTERIX documentation, an ASTERIX Data Block **shall** consist of:

- a one-octet Data Category (CAT) field, indicating the ASTERIX Category;
- a two-octet Length Indicator (LEN) field, indicating the total length (in octets) of the ASTERIX Data Block, including the CAT and LEN fields;
- one or more Data Record(s) (see below).

NOTE - The ASTERIX Data Block structure is depicted in Figure 3.

Each Data Record is of variable length but aligned on an octet boundary. The length of an ASTERIX Data Block is thus variable but **shall** always be a multiple of an octet.

The maximum size of an ASTERIX Data Block **shall** be mutually agreed between data sources and users. Because of the size of the Length Indicator the maximum possible length of an ASTERIX Data Block is 65.535 octets.
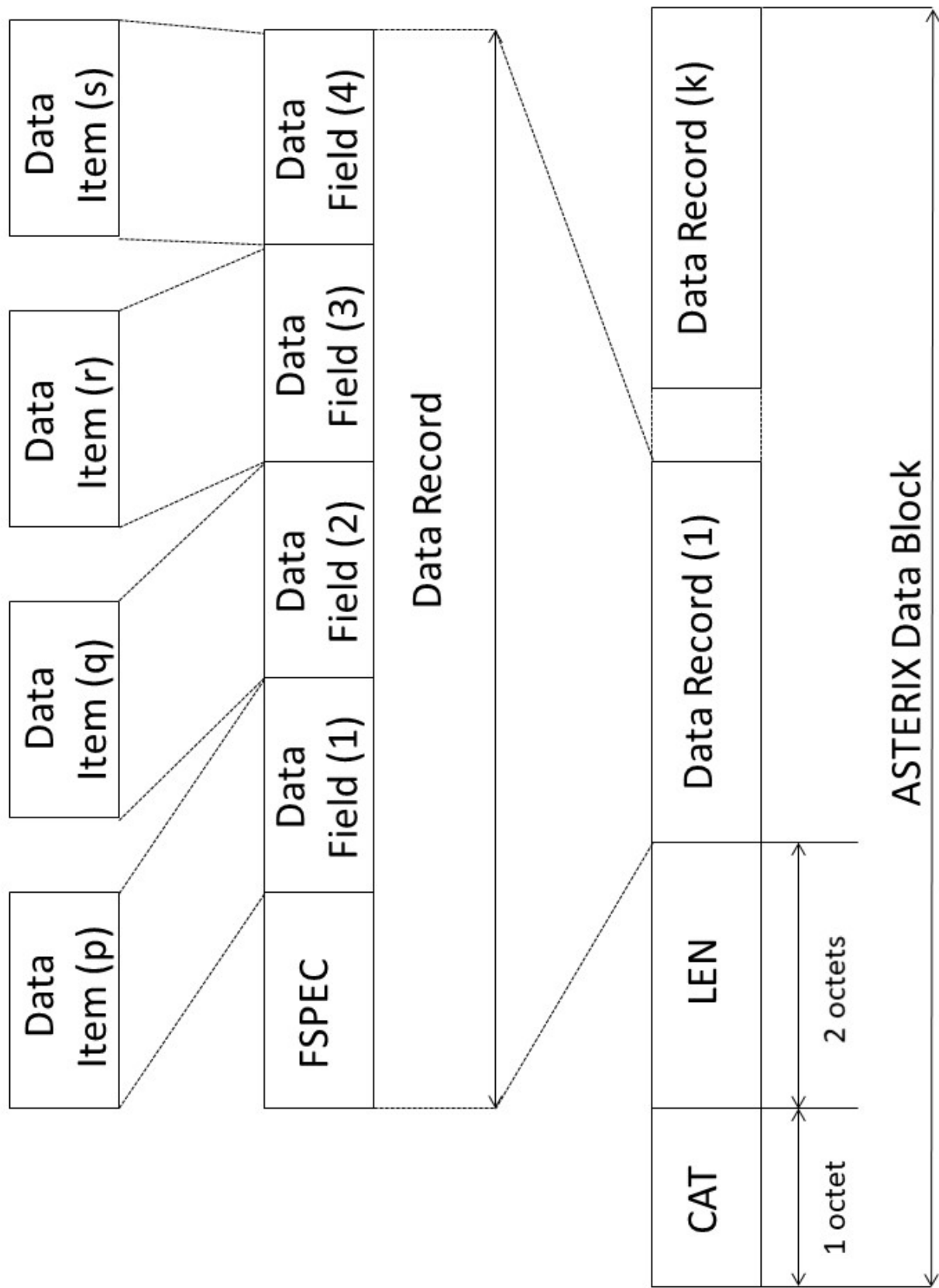
Figure 3 - ASTERIX Data Block Structure until Edition 2.1 of Part 1

5.2.3 ASTERIX Record

For all ASTERIX Categories that are created as of Edition 2.2 of Part 1 of the ASTERIX documentation, an ASTERIX Record **shall** consist of:

- a one-octet Data Category (CAT) field indicating the ASTERIX Category;
- a two-octet ASTERIX Record Length Indicator (LEN) field indicating the total length (in octets) of the ASTERIX Record, including the CAT and LEN fields
- a Data Record (see below).

NOTE - The ASTERIX Record structure is depicted in Figure 4. It has been chosen in a way that it is in line with the blocking structure applied before Edition 2.2 of Part 1. This allows any ASTERIX decoder to process ASTERIX messages defined in this way as in principle it implements a "Block with a single Data Record" – something which has been possible even before Edition 2.2 of Part 1.

The Data Record is of variable length but aligned on an octet boundary.

The length of an ASTERIX Record is thus variable but **shall** always be a multiple of an octet. Because of the size of the Length Indicator the maximum possible length of an ASTERIX Record is 65.535 octets.

For each Category the status with respect to whether or not blocking is permitted can be derived from the list of categories as published on the EUROCONTROL ASTERIX website: https://www.eurocontrol.int/publication/list-asterix-categories-and-their-statuses.
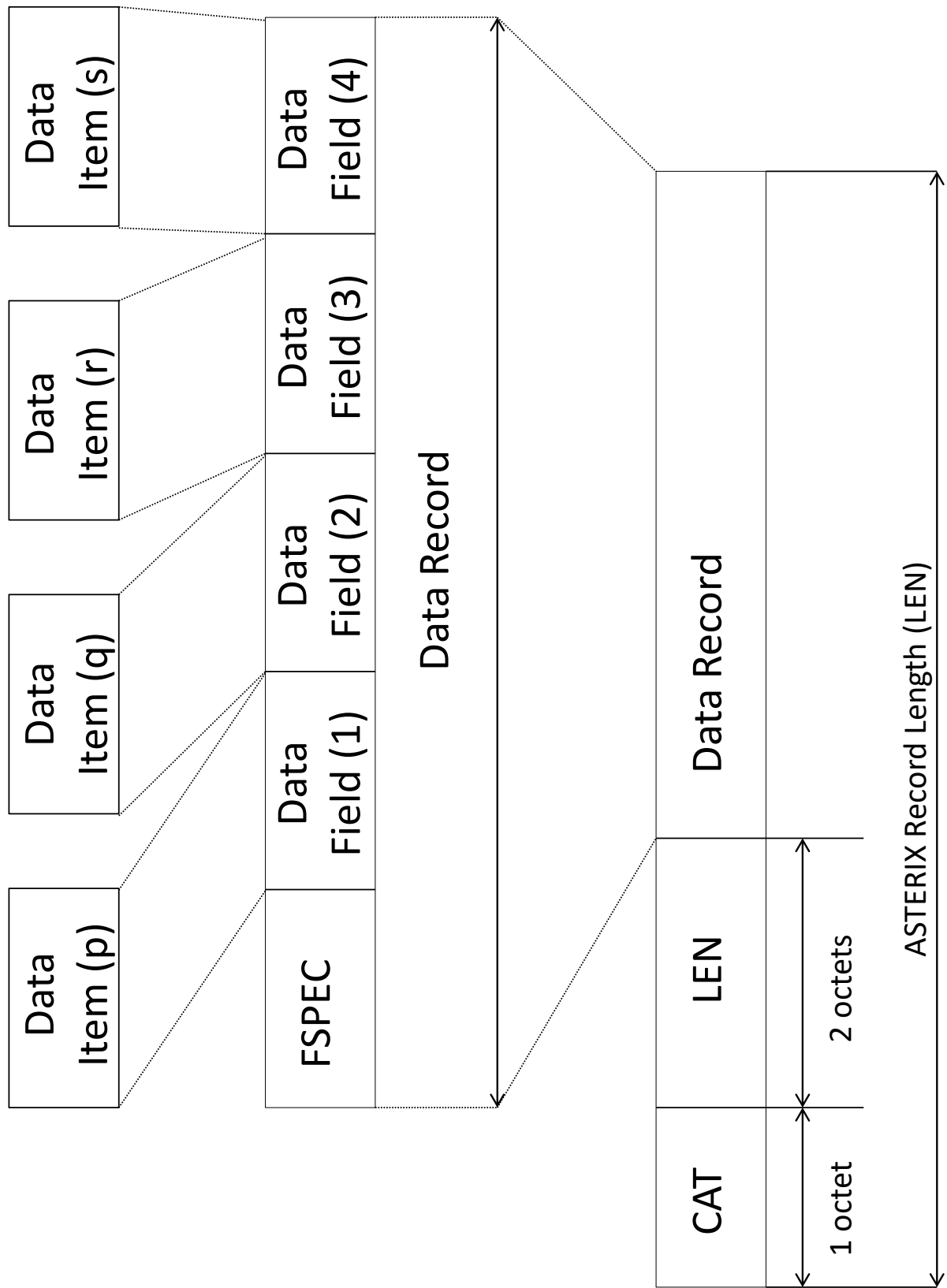
Figure 4 - ASTERIX Record structure as of Edition 2.2 of Part 1

5.2.4 Data Record

A Data Record **shall** consisting of:

- a Field Specification (FSPEC) of variable length, considered as a table of contents, in the form of a bit sequence, where every individual bit signals the presence (bit set to one) or absence (bit set to zero) of a well defined Data Field assigned to it;
- a variable number of Data Items. The sequence of Data Items is defined by the FRN as specified in the UAP (see Chapter 5.1.4).

An ASTERIX Category **may** define several Message Types which are meant to specify different sets of Data Items.

The Message Types **should** be identified in Data Item 000 (i.e. Innn/000).

The Message Types Data Item **should** be contained in the UAP with a low FRN, ideally behind the SAC/SIC Data Item or if applicable behind the Service ID Data Item.

For each Data Item the ASTERIX Category specification **shall** contain, for each Message Type, an Encoding Rule indicating whether the Data Item is:

- Mandatory,
- Conditionally Present,
- Optionally Present, or
- Never Present.

Data Items identified as Mandatory **shall** be unconditionally present. A Data Record in which a Data Item identified as Mandatory is missing is not valid.

The conditions under which a Data Item identified as Conditionally Present shall be included in the Data Record **shall** be specified in the ASTERIX Category. A Data Record not satisfying the conditions under which a Data Item identified as Conditionally Present shall be present or not present is not valid.

Data Item identified as Never Present **shall** be unconditionally not present. A Data Record containing a Data Item identified as Never Present is not valid.

The length of each Data Record is implicit from the presence or absence of each Data Item according to the FSPEC and the actual structure of each included Data Item.

5.2.5 Structure of Data Items

5.2.5.1 Standard Data Item Formats

Standard Data Items are composed of one or several Subitems.

The length of Standard Data Items **shall** be of an integral number of octets and either fixed or variable, as defined below.

5.2.5.1.1 Fixed Length Data Items

Fixed length Data Items, depicted in Figure 5, **shall** comprise one Subitem of a fixed number of octets.

n Octets
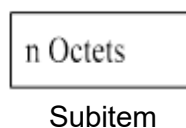
Subitem

Figure 5 - Fixed length Data Item

5.2.5.1.2 Extended Length Data Items

Extended Length Data Items (also known as Variable Length Data Items), depicted in Figure 6, being of a variable length, **shall** contain a primary subitem of pre-determined length, immediately

followed by a number of secondary subitems (also known as extensions), each of pre-determined length.

The presence of the next following secondary subitem **shall** be indicated through the Field Extension (FX) mechanism (ref. 5.2.5.3), i.e. by setting to one the Least Significant Bit (LSB) of the last octet of the preceding subitem (either the primary subitem or a secondary subitem).
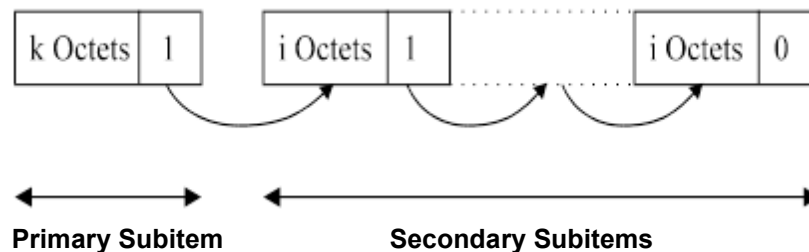
Figure 6 - Extended Length Data Item

Encoding of secondary subitems with all bits (including the FX-bit) set to '0'

As per the legacy ASTERIX philosophy, a secondary subitem of Extended Length Data Items with all its bits (including the FX-bit) set to '0' was, unless otherwise specified, implicitly not expected to be encoded.

However, this legacy ASTERIX philosophy was never documented and, unless otherwise specified, the absence of a secondary subitem may be interpreted in two different ways:

- The information is available as if all the secondary subitem bits were set to '0',
- The information is not available.

To avoid interoperability issues, the way to interpret the absence of an Extended Length Data Item secondary subitem **shall** be described in the ICD of the system delivering ASTERIX Messages.

Unless otherwise specified in the explicit Encoding Rule for the specific Data Item, secondary subitems of Extended Length Data Items in which all Elements have an "Element Populated Bit" and where all the "Element Populated Bits" and the FX-bit are set "0" **may** be omitted during the encoding process without the above mentioned interpretation issue.

5.2.5.1.3 Explicit Length Data Items

Explicit Length Data Items **shall** comprise a one-octet Length Indicator subitem (LEN) giving the total item length in octets (including the Length Indicator itself), followed by one subitem of the total item length minus one octet.

5.2.5.1.4 Repetitive Data Items

Repetitive Data Items, depicted in Figure 7, being of a variable length, **shall** comprise a Repetition Indicator subitem (REP) of a fixed number of octets, signalling the presence of N consecutive subitems, followed by N consecutive subitems each of the same pre-determined length and structure.
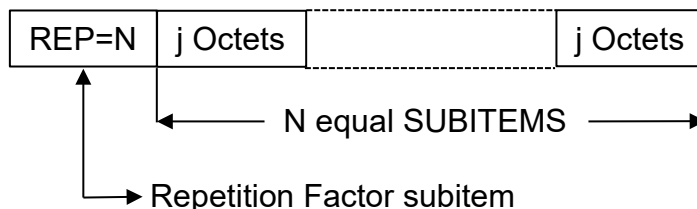
Figure 7 - Repetitive Data Item

5.2.5.1.5 Compound Data Items

Compound Data Items, depicted in Figure 8, being of a variable length, **shall** comprise a primary subitem, followed by data subitems.

The Compound Data Item primary subitem determines the presence or absence of the subsequent data subitems and is made of a first part of one octet extendible using the Field Extension (FX) mechanism (ref. 5.2.5.3).

The definition, structure and format of the data subitems are part of the description of the relevant Compound Data Item.

Compound Data Item subitems **shall** be either Fixed Length Data Item, Extended Length Data Item, Explicit Length Data Item or Repetitive Data Item, but not Compound Data Item.

A Compound Data Item **shall** only be included in a Data Record if at least one Bit in the primary subitem is set to "1", i.e. at least one data subitem is available. (Please note that the setting of the FX bit follows the rules as described in 5.2.5.3)

Primary Subitem

Octet No.1

8	7	6	5	4	3	2	1
SI1	SI2	SI3	SI4	SI5	SI6	SI7	FX

bits-8/2	(SI n)	= 0	Absence of Subitem n
		= 1	Presence of Subitem n
bit-1	(FX)	= 0	End of Primary Subitem
		= 1	Extension of Primary Subitem into next octet

Data Subitem No 1

Octet No.1　　　　　　　　　　　　Octet No.2

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
							Data Subitem 1								

.
.
.
.
.

Data Subitem No 7

Octet No.1

8	7	6	5	4	3	2	1
			Data Subitem 7				

Figure 8 - Compound Data Item

5.2.5.2 Subitem Structure

5.2.5.2.1 Elements

Each Standard Data Item subitem containing data **shall** be decomposed into one or several Elements. The FX-bit is not considered to be an element.

Note:

This requirement does not apply to the Compound Data Items primary subitem, the Explicit Length LEN subitem and the Repetitive Data Item REP subitem which do not contain data.

An Element **may** be made of one or several bits, possibly over several octets, but cannot overlap an FX bit.

An Element **shall** be described by a range of bits (e.g. bits 8-7) and the way to interpret the information.

Elements may be of the following types:

- Standard Element types
  - o Enumeration type: A lookup table defines the relation between the decoded and encoded values,
  - o LSB type: The Least Significant Bit (LSB) value defines the factor to be applied to transform the encoded value into the decoded value and vice versa (i.e. decoded = encoded * LSB). A LSB of 1 is assumed when the LSB is not explicitly specified.
- Non-standard Element type: The way to interpret the information is none of the above ones and needs to be specifically identified.

When specifying an ASTERIX Category, it is recommended to use Standard Element types as they are conveniently handled by ASTERIX encoders and decoders.

For Elements of LSB type, minimum and maximum decoded values **may** be specified. The range of decoded values allowed in the data item **may** be smaller from the range that physically can be encoded in the data item.

For Elements of LSB type, when minimum and/or maximum decoded values are specified, only values inside the specified range **shall** be set (i.e. encoded). Data Records containing values outside the specified range **shall** be considered to be invalid Data Records.

Elements of LSB type supporting both Positive and Negative values **shall** be represented in two's complement form.

Elements of LSB type supporting only Negative values **shall** be represented with a negative LSB (i.e. not in two's complement form).

Where applicable, the Elements system units **shall** be specified.

Where applicable, the Elements numerical base (e.g. octal, decimal) **shall** be specified.

When several Message Types are defined, the Elements **shall** have the same range of bits for all Message Types.

When several Message Types are defined, the Elements **should** have the same way to interpret the information for all Message Types.

An Element **shall** not be named with the following ASTERIX keywords: REF, SPF, FX, REP, FRN, UAP, FSPEC.

Subitem Structure

				Octet No.1								Octet No.2			
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
EL1	EL2	EL3	EL4		EL5		LSB		EL6		EL7		EL8		

bit-16	(EL1)	Element 1 Description
		= 0 Value #1
		= 1 Value #2

bit-15	(EL2)	Element 2 Description
		= 0 Value #1
		= 1 Value #2

[…]

bit-12/9	(EL5)	Element 5 Description,
		(*optional*) in two's complement
		(*optional*) min. = Y "unit", max. = Z "unit"
bit-9	(LSB)	= X "unit"

bit-8/6	(EL6)	Element 6 Description
		= 0 Information not available
		= 1 Value #1
		= 2-7 Reserved for future use

[…]

Figure 9 – Example of Subitem Structure

Note:

In this context, the term "optional" is used to indicate that the respective description is only present when applicable.

5.2.5.2.2 Element Populated Bit

The "Element Populated Bit" is a means to indicate whether the payload information to be transmitted with the respective Element is available or not.

If implemented, the "Element Populated Bit" **shall** be the MSB of the respective Element.

The "Element Populated Bit" **shall** be set to "0" when the respective Element has not been actively populated.

The "Element Populated Bit" **shall** be set to "1" when the respective Element has been actively populated.

In Elements where the "Element Populated Bit" has been set to "0" all other bits **shall** be set to "0".

Note:

The "Element Populated Bit" effectively subdivides an Element into:

- an Element Populated Bit qualifier (#EP), and
- a Value part (#VAL).

Octet No.1

8	7	6	5	4	3	2	1
EL1		0		EL2		LSB	FX

bits-8/7	(EL1)	Element 1 Description
bit-8	(EL1#EP)	Element Populated Bit
		= 0 Element not populated
		= 1 Element populated
bit-7	(EL1#VAL)	Value
		= 0 Value #1
		= 1 Value #2
bit-6		Spare bit, set to 0
bits-5/2	(EL2)	Element 2 Description,
		(optional) in two's complement
		(optional) min. = Y "unit", max. = Z "unit"
bit-5	(EL2#EP)	Element Populated Bit
		= 0 Element not populated
		= 1 Element populated
bit-4/2	(EL2#VAL)	Value
bit-2	(LSB)	= X "unit"
bit-1	(FX)	= 0 End of data item
		= 1 Extension into next extent

Figure 10 – Example of "Element Populated Bit"

Note:

In this context, the term "optional" is used to indicate that the respective description is only present when applicable.

5.2.5.2.3 Reserved Values

In an Enumeration type Element, enumeration values which are not assigned in a specific edition of the Category Specification but reserved for future use **shall** be marked as "**Reserved for future use**".

"Reserved for future use" enumeration values **shall** not be set (i.e. not encoded) by ASTERIX encoders applying the specific Edition of the Category Specification.

In an Enumeration type Element, enumeration values which are meant to be never used (even in future Editions of the Category Specification) **shall** be marked as "**Invalid ASTERIX value**".

In an Enumeration type Element, enumeration values marked as "Invalid ASTERIX value" **shall** never be changed during the evolution of the specification.

"Invalid ASTERIX value" enumeration values **shall** not be set (i.e. not encoded).

In an Element, the absence of information may have to be reflected. In that case, absence of information **shall** be marked either using an enumeration value "**Information not available**" or by applying the Element Populated Bit (see 5.2.5.2.2).

> **NOTE:**
>
> - "Reserved for future use" provides more flexibility for ASTERIX maintainability and should be preferred to "Invalid ASTERIX value".
>
> - All values except "Reserved for future use" and "Invalid ASTERIX value" are considered as valid ASTERIX values.
>
> - More details about compatibility between different editions of ASTERIX Specifications can be found in Chapter 7.
>
> - Some legacy values like "Not Defined", "Undefined", "Reserved", "Not Assigned", "Invalid", may be interpreted as valid values or invalid values. To avoid interoperability issues, the way to interpret legacy values like "Not Defined", "Undefined", "Reserved", "Not Assigned", "Invalid" **shall** be described in the ICD of the system delivering ASTERIX Messages.

5.2.5.2.4 Absence of information

In an Element a possibility **should** be foreseen to reflect the absence of information. In an Enumeration Type Element this **may** be achieved either using the enumeration value "Information not available" (see 5.2.5.2.3) or by applying the "Element Populated Bit" (see 5.2.5.2.2). In an LSB Type Element or a Non-standard Element, an "Element Populated Bit" **should** be foreseen. The decision not to include an "Element Populated Bit" rests with the AMG on a case-by-case basis.

> **NOTE -** Applying above recommendation, it is recommended to represent Boolean Values over two bits (e.g. either as "True, False, Information not available, Reserved for future use" or as "Element Populated Bit, True, False").

5.2.5.2.5 Spare Bits

In a Data Item, bits which are not assigned in a specific edition but reserved for future use **shall** be marked as "Spare bit".

NOTE: More details about compatibility between different editions of ASTERIX Specifications can be found in Chapter 7.

Spare bits in the Data Items **shall** be set to zero.

Spare Bit

Octet No.1

8	7	6	5	4	3	2	1
EL1	EL2	0	0	EL3			

bit 8   (EL1)
bit 7   (EL2)
bits 6-5   Spare bits, set to 0
bits 4-1   (EL3)

Figure 11 – Example of Spare Bit

5.2.5.3 Field Extension (FX) mechanism

The Field Extension (FX) mechanism allows extending a data item with a variable number of extensions, each made of the same number of octets. This is achieved by assigning a special meaning to the Least Significant Bit (LSB) of any extension of a data item. This bit which is reserved for that purpose is called the Field Extension Indicator (FX).

The presence of the next extension is indicated by the setting the FX to one. The absence of the next extension (i.e. the end of the field) is indicated by the setting the FX to zero.

Extend with FX

Octet No.x

8	7	6	5	4	3	2	1
EL1							FX

bits-8/2   (EL1)

bit-1   (FX)   = 0   End of data item
                                  = 1   Extension into next extension

Figure 12 – Example of Extension with FX

5.2.5.4 Non-Standard/Special Purpose Data Field (SPF)

There is a special feature, called Special Purpose Data Field (SPF), allowing a user subgroup to exchange a variable length item which **shall** be transparent to non-interested users. It completes the ASTERIX Data Record assembly mechanism and is intended to provide an escape mechanism for the exceptional exchange of non-standard information. When this feature is used, a Special Purpose Indicator, (the SP-bit) **shall** be reserved in the FSPEC field.

The first octet **shall** contain the explicit length of the field expressed in octets and including the Length Indicator itself. The following octet(s) **may** contain information such as a Data Item not defined, a text string for operator communication, test data, etc.

The contents of a SPF **shall** be agreed between the users concerned, while those not concerned **may** skip the data. The contents of the SPF **shall** be described in the ICD of the system delivering the ASTERIX Messages.

5.2.5.5 Reserved Expansion Data Field (REF)

5.2.5.5.1 REF for Categories with Blocking

The Reserved Expansion Field (REF) is used only for Categories defined until and including Edition 2.1 of Part 1 of the ASTERIX documentation. For these Categories blocking as described in Chapter 5.2.2 above is permitted.

The list of Categories for which this is applied is available from the ASTERIX Website at: https://www.eurocontrol.int/publication/list-asterix-categories-and-their-statuses.

The REF is intended to provide a mechanism to introduce intermediate changes to a given Category, as explained in Chapter 7.

The REF **shall** be implemented in all Categories defined until and including Edition 2.1 of Part 1 of the ASTERIX documentation.

At least one Reserved Expansion Indicator (RE-bit) **shall** be allocated in the FSPEC field.

The first octet **shall** be named 'Length Indicator' and contain the explicit length of the field expressed in octets, including the Length Indicator itself.

The following octet(s) **shall** be named 'Items Indicator' and determine the presence or absence of the REF Data Items.

The REF 'Items Indicator' **may** be a fixed length Data Item or, preferably, a variable length Data Item comprising a first part of one octet extendible using the Field Extension (FX) mechanism (ref. 5.2.5.3).

The contents of the REF **shall** be agreed by the AMG.

The REF Data Items **shall** use the Standard Data Items (ref. 5.2.5.1).

The REF **shall** be included in a Data Record only if at least one of the defined REF Data Items is present (i.e. at least one bit (excluding the FX-Bit(s)) in the Item Indicator is set to "1").

The contents of the REF, for a given Category, will be described in a separate document from the corresponding ASTERIX Category Specification.

This document will be available on the EUROCONTROL Web Site (http://www.eurocontrol.int/asterix) and a reference to it will be present near the appropriate ASTERIX Category definition document.

5.2.5.5.2 REF for Categories without Blocking

As of Edition 2.2 of Part 1 of the ASTERIX documentation the Reserved Expansion Field **shall** no longer be used for new Categories.

The presence of the length of each individual Data Record, makes it possible to add new Data Items at the end of the UAP in order to further evolve the specification of an ASTERIX Category. This makes the use of the mechanism of the Reserved Expansion Field no longer necessary.

5.2.6 Symbolic References

5.2.6.1 Symbolic References to Data Items

The symbolic reference to a Reserved Expansion Data Field **shall** consist of a reference of the form CATnnn/REF, where:

- CATnnn   is the reference to the Data Category,
- REF   means Reserved Expansion Data Field.

The symbolic reference to a Data Item of a Reserved Expansion Data Field **shall** consist of a reference of the form Innn/REF/Z*, where:

- Innn/REF   is the reference to the Reserved Expansion Data Field,
- Z*   is a keyword (made of a one to several digits or characters) which indicates the Data Item.

The symbolic reference to a Special Purpose Data Field **shall** consist of a reference of the form CATnnn/SPF, where:

- CATnnn   is the reference to the Data Category,
- SPF   means Special Purpose Data Field.

The symbolic reference to a Data Item of a Special Purpose Data Field **shall** consist of a reference of the form Innn/SPF/Z*, where:

- Innn/SPF   is the reference to the Special Purpose Data Field,
- Z*   is a keyword (made of a one to several digits or characters) which indicates the Data Item.

The symbolic reference to a Subitem of a Data Item **shall** consist of a reference of the form <ItemRef>/SI#nb, where:

- <ItemRef>   is the symbolic reference to the Data Item (Innn/AAA, Innn/REF/AAA or Innn/SPF/AAA),
- SI   means Subitem,
- nb   is a decimal number which indicates the Subitem number.

The symbolic reference to a Repetition of a Data Item **shall** consist of a reference of the form <ItemRef>/R#nb, where:

- <ItemRef>   is the symbolic reference to the Data Item (e.g. Innn/AAA, Innn/REF/AAA or Innn/SPF/AAA),
- R   means Repetition,
- nb   is a decimal number which indicates the Repetition number.

5.2.6.2 Symbolic References to Elements

The symbolic reference to an Element of a Data Item, a Subitem or a Repetition **shall** consist of a reference of the form <ItemRef>/X*, <SubitemRef>/X* or <RepetitionRef>/X*, where:

- <ItemRef>   is the symbolic reference to the Data Item (e.g. Innn/AAA, Innn/REF/AAA or Innn/SPF/AAA),

- <SubitemRef>   is the symbolic reference to the Data Item Subitem (e.g. <ItemRef>/SI#nb)
- <RepetitionRef>   is the symbolic reference to the Data Item Repetition (e.g. <ItemRef>/R#nb)
- X*   is a keyword (made of a one to several digits or characters) which indicates the Element.

The symbolic reference to the "Element Populated Bit" qualifier of an Element **shall** consist of a reference of the form <ElementRef>#EP, where:

- <ElementRef>   is the symbolic reference to the Element,
- #EP   is a constant keyword

The symbolic reference to the "Value" part of an Element **shall** consist of a reference of the form <ElementRef>#VAL, where:

- <ElementRef>   is the symbolic reference to the Element,
- #VAL   is a constant keyword

The symbolic reference to the LSB of an Element **shall** consist of a reference of the form <ElementRef>#LSB, where:

- <ElementRef>   is the symbolic reference to the Element,
- #LSB   is a constant keyword

5.2.7 FSPEC - Field Organisation

In a Data Record, Data Fields **shall** be sent in the order of increasing FRNs.
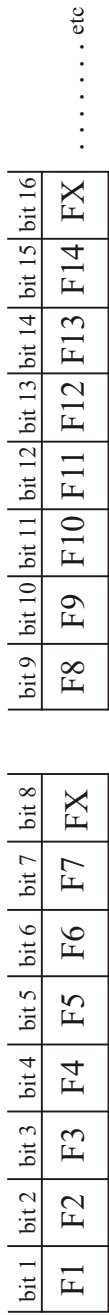
The minimum length of the FSPEC field **shall** be one octet, which allows the composition of Data Records consisting of any combination of Data Fields with FRNs from one up to and including seven (the LSB is used as FX-bit).

When the Data Fields with FRNs greater than seven have to be transmitted, the FSPEC extension mechanism **shall** be used. This is achieved by assigning a special meaning to the LSB of any FSPEC octet. The LSB, when set to one, signals the continuation of the FSPEC field with at least one further octet, until finally an octet is encountered with the LSB set to zero. The LSB in the FSPEC field is called the Field Extension Indicator (FX). The mechanism of the FX-bit is described in more detail in Chapter 5.2.5.1.2.

> **NOTE -** For illustrative purposes two examples of Data Record Structures are shown in Figure 13. The first example contains a Data Record with a single-octet FSPEC, whereas the second one highlights a case with a multi-octet FSPEC.

In order to illustrate all elements of a Data Record composition an example is depicted in Figure 14 where FSPEC bit-14 is dedicated to the SP feature.

STRUCTURE OF THE FIELD SPECIFICATION (FSPEC)

bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7	bit 8
F1	F2	F3	F4	F5	F6	F7	FX

bit 9	bit 10	bit 11	bit 12	bit 13	bit 14	bit 15	bit 16
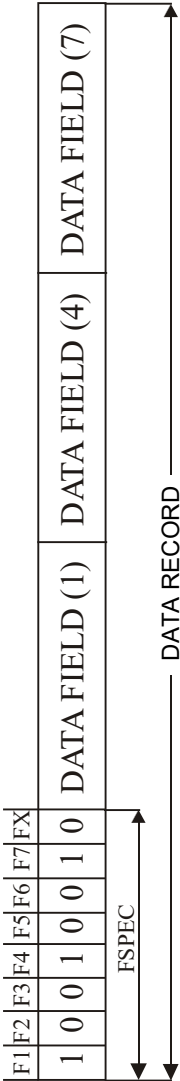| F8 | F9 | F10 | F11 | F12 | F13 | F14 | FX | . . . . .etc

F1 to F7:   FIELD PRESENCE INDICATOR

|= 0 Data Field not present
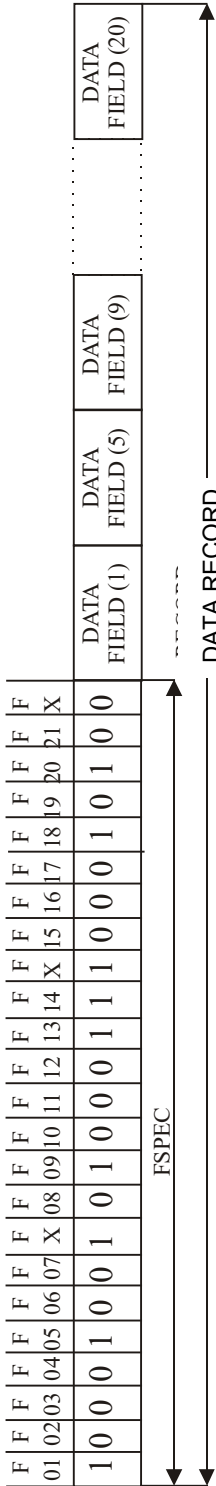|= 1 Data Field present

FX   :   FIELD EXTENSION INDICATOR

|= 0 No Field Specification extension
|= 1 Following octet contains a Field Specification extension

EXAMPLE OF ONE-OCTET FSPEC

F1	F2	F3	F4	F5	F6	F7	FX
1	0	0	1	0	0	1	0

FSPEC | DATA FIELD (1) | DATA FIELD (4) | DATA FIELD (7)

DATA RECORD

EXAMPLE OF A MULTI-OCTET FSPEC

F 01	F 02	F 03	F 04	F 05	F 06	F 07	X 08	F 09	F 10	F 11	F 12	F 13	14 X	X 15	F 16	F 17	F 18	F 19	F 20	21 X
1	0	0	0	1	0	0	1	0	1	0	0	0	1	1	1	0	0	1	0	1	0	0

FSPEC | DATA FIELD (1) | DATA FIELD (5) | DATA FIELD (9) | DATA FIELD (20)

DATA RECORD

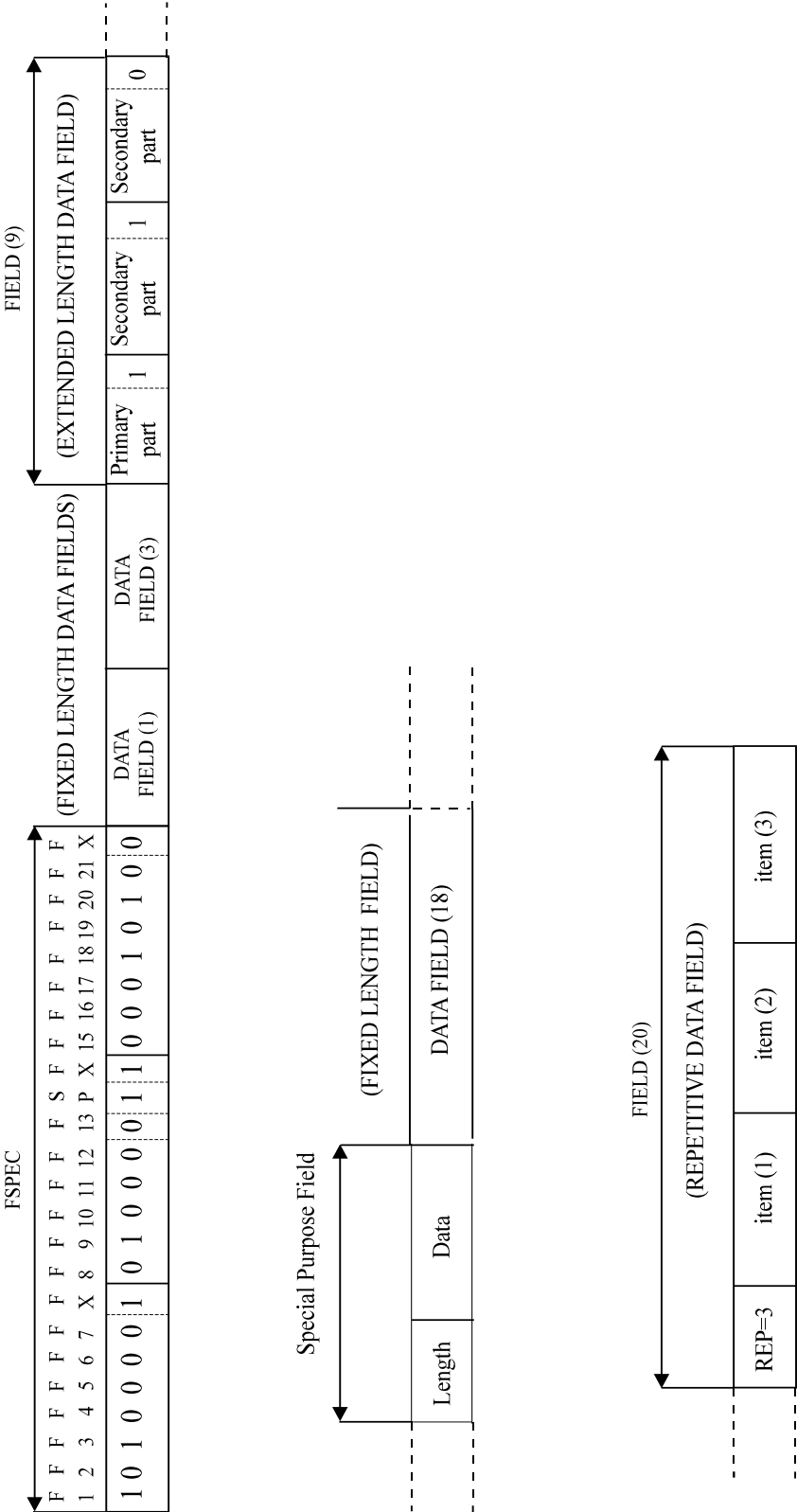**Figure 13 - Field Sequencing Organisation**

Figure 14 - Overall Data Record Structure

5.3 Conventions

5.3.1 Bit Numbering

All bit positions within a one octet item **shall** be numbered right to left from one to eight.

For an item consisting of n octets (with n>1):

- the octets shall be numbered left to right from one to n;
- the bit positions shall be numbered right to left from one to n x 8.

With an FSPEC field the following exceptions for bit positions **shall** apply:

- in a one-octet FSPEC the bits will be numbered left to right from one to eight;
- in a FSPEC consisting of p octets (with p>1) the bits will be numbered left to right from one to p x 8.

Data **shall** be presented to the application at the receiving end in the same order as generated at the transmitting end.

5.3.2 Time Management

Time stamping **shall** be expressed as Co-ordinated Universal Time (UTC).
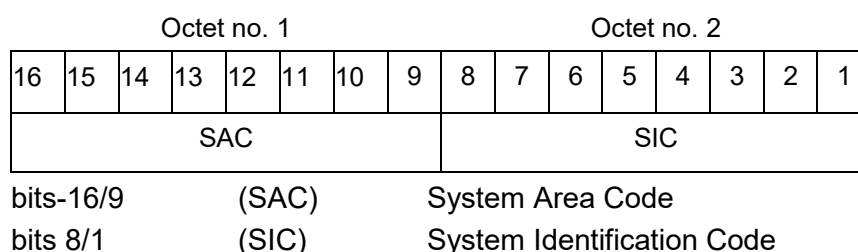
6. ASTERIX ADDRESSING SCHEME

6.1 General

In order to avoid ambiguity, every system **shall** have a unique identification in an area where ASTERIX is used for the exchange of data.

To allow for flexible adaptation of the system configuration to user requirements, virtualisation of an ASTERIX system **shall** be permitted resulting in the allocation of more than one SIC to a physical ASTERIX system. The allocation of the SAC remains the responsibility of the AMG.

6.2 Syntax

The ASTERIX System Identifier Data Item **shall** be a Two-Octet Fixed length Data Item composed of two Elements as illustrated below:

	Octet no. 1							Octet no. 2							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SAC								SIC							

bits-16/9   (SAC)   System Area Code
bits 8/1   (SIC)   System Identification Code

It is recommended to name the ASTERIX System Identifier Data Item 'Data Source Identifier' and to assign it to Data Item 010 (i.e. Innn/010). The "Data Source Identifier" Item **should** be located at the beginning of the UAP (i.e. FRN=1).

6.2.1 System Area Code (SAC)

The SAC Element **shall** consist of an eight-bit number assigned to a geographical area, a country or a specific application.

6.2.2 System Identification Code (SIC)

The SIC Element **shall** consist of an eight-bit number assigned to every system (surveillance station, processing system, server, etc.) located in the geographical area or country defined by the SAC. In case of virtualised surveillance systems, more than one SIC may be assigned to the same physical system.

6.3 Assignment of the Systems Identifiers

6.3.1 System Area Codes

One SAC **should** be assigned to each geographical area or country.

> **NOTE** - *When needed, more than one SAC **may** be assigned to a single country, for example to differentiate between civil and military applications.*

Upon a request to the ASTERIX Manager a dedicated SAC may be assigned to a specific application

Assignment of SACs **shall** be co-ordinated by the AMG.

> **NOTE** - The up-to-date list of SACs is published on the EUROCONTROL Web Site (http://www.eurocontrol.int/asterix).

6.3.2 System Identification Codes

The individual SICs **shall** be assigned by the State concerned within the area identified by the SAC applying national arrangements. In case of virtualisation of ASTERIX Systems, more than one SIC may be allocated to the physical system.

Within one geographical area or country identified by a SAC, up to 256 individual codes (SICs) can be assigned.

7. Modifications

Modifications to existing Categories **shall** be performed in a way that supports forward compatibility (i.e. the ability for old implementations to process data from the new edition of a Category Specification).

"Forward Compatibility" for the purposes of ASTERIX is applied at the level of the ASTERIX structure. The evolution of an existing ASTERIX Category will be performed in a way that an ASTERIX Decoder is able to decode a Data Record which has been encoded following the updated Specification. This means that the Decoder is able to identify and skip newly added elements, such as additional secondary subitems in an Extended Length Data Item. By following this rule it is ensured that the Sender and the Receiver of an ASTERIX data-stream can migrate to the subsequent edition of a Category independently from each other. If, for whatever reason, the evolution of an ASTERIX Category does not follow this principle this **shall** be described in the ASTERIX Specification.

"Forward Compatibility" for the purposes of ASTERIX is not implemented at the level of the content of a Data Record and does not imply that an ASTERIX decoder **shall** be able to **process** the new information contained in an updated Edition of an existing Category. Normally a Decoder has no means of interpreting the contents of newly added Data Items but is able to skip them. It is up to the decision of the operator of the receiving system to process the received information as far as possible or to suppress the whole Data Record. This behaviour **shall** be described in the system ICD.

This rule implies that existing content (except spare bits and "Reserved for future use" values) and rules cannot be modified, only new content can be added.

This rule **shall** be respected to the maximum extent possible, but can only be guaranteed to specifications which have reached the status "Released Issue".

This rule ensures compatibility in cases where the Encoder of ASTERIX data has been migrated to a newer ASTERIX Edition of a specification earlier than the Decoder of ASTERIX data.

Decoders of ASTERIX data **shall** support the forward compatibility and never assume and rely on:

- Specific settings of Spare Bits,
- Specific settings of "Reserved for future use" values,
- Specific maximum number of Extended Length Data Item secondary subitems,
- Specific maximum number of Data Items (including in a Reserved Expansion Field),
- Specific content of Special Purpose Field,
- Specific list of Message Types.

Decoders of ASTERIX data **shall** skip Data Items added in a sub-sequent Edition of the Specification (including in a Reserved Expansion Field and Special Purpose Field) and Data Records including unknown Message Types.

> NOTE - The information in the Record Length Indicator (LEN) of an ASTERIX Record or the Length Indicator of the REF in a Data Record can be used to skip extra Data Items.

For documents in status "Working Draft" or "Draft" backwards compatibility cannot be guaranteed as they are still under development and may need to be modified substantially during this process. Implementing ASTERIX Categories that are not yet released is at the risk of the implementer.

To allow Decoder of ASTERIX data to support any older ASTERIX Edition, existing content **shall** never be removed from a Category description (it may however be marked as "deprecated", "obsolete", etc.).

ANNEX A – Traceability between ASTERIX Specifications and Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 as amended by (EU) No 1028/2014 of 26 September 2014, (EU) 2017/386 of 6 March 2017 and (EU) 2020/587 of 29 April 2020

A.1   General

Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 as amended by (EU) No 1028/2014 of 26 September 2014, (EU) 2017/386 of 6 March 2017 and (EU) 2020/587 of 29 April 2020 lays down requirements for the performance and interoperability of surveillance for the Single European Sky.

ASTERIX as data format for the exchange of surveillance related data is fully consistent with the relevant requirements of the Regulation therefore it may be used by the stakeholders in the implementation of these requirements. In order to facilitate the implementation as well as the demonstration of compliance, Annex A.2 provides the traceability between the relevant regulatory requirements and content of the ASTERIX Specification.

To be considered compliant with the interoperability requirements of the regulation the basic principles as laid down in Part 1 of ASTERIX have to be respected and the ASTERIX Categories have to be implemented as described in the respective definitions.

To be compliant with the interoperability requirements of the regulation it is assumed that the appropriate surveillance infrastructure has been implemented.

A.2 Compliance Matrix

Commission Implementing Regulation (EU) No 1207/2011 of 22 November 2011 as amended by (EU) No 1028/2014 of 26 September 2014, (EU) 2017/386 of 6 March 2017 and (EU) 2020/587 of 29 April 2020 Regulatory Requirements	ASTERIX Requirements
Generic interoperability requirements	As attachments to this EUROCONTROL specification, the ASTERIX Category definitions (containing the detailed format descriptions of the various ASTERIX Categories) are considered as Means of Compliance to Commission Regulation No 2020/587 only as long as they are implemented following the version as published on the ASTERIX website. (www.eurocontrol.int/asterix).
Annex III: Surveillance data exchange requirements referred to in Article 5(1): Identification of data source	Data source identifier (SAC/SIC) present in all ASTERIX Categories.
Annex III: Surveillance data exchange requirements referred to in Article 5(1): Identification of the type of data	Category indication present in all ASTERIX blocks.
Annex III: Surveillance data exchange requirements referred to in Article 5(1): Time stamping requirements	Time of Day (expressed in UTC) present in all ASTERIX Categories.

Table 1 - Compliance matrix

ANNEX B: Document Update Procedures

It is necessary to periodically check this EUROCONTROL Specification for consistency with referenced material. In addition, the content of this Specification can evolve following feedback from implementation projects and field experience.

The main objectives of a regular review are to:

a)   improve the quality of the specifications (e.g. clarity, testability, etc.).

b)   verify that the level of detail published is adequate.

c)   make all stakeholders including industry aware of the latest developments.

The update of this Specification is expected to be initiated by stakeholders directly or through EUROCONTROL Agency working arrangements. Any stakeholder that wishes to request a change to these guidelines can submit a change request (CR) to the document editors (page 2) or the generic email address: standardisation@eurocontrol.int.

The CR needs to provide following minimum elements:

- Originator information (name, Organisation, contact details).
- Specification title, number and edition date.
- Page, chapter, section (subsection) where the issue appears.
- Description of the issue and reason for change.
- Specific change proposal text (incl. potential alternatives, if any).

Main steps towards a revised edition:

- EUROCONTROL will assess each CR and consult relevant working arrangements.
- The CR will be classified in terms of urgency and impact.
- A resolution proposal(s) will be prepared and, if needed, discussed with the originator.
- Agreed changes will be integrated into a new draft edition including a summarised list of changes in the document record which will then be handled in accordance with EUROCONTROL ERAF procedures.

Note: Identified errors which may cause potential problems when implementing, may be corrected directly via separate "Corrigendum".

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