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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
LTE;
IMS Application Server Service Data Descriptions for AS interoperability
(3GPP TS 29.364 version 8.0.0 Release 8)**

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Foreword

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Introduction

Application Servers can store their service data on the HSS through the Sh interface as transparent data, meaning that the HSS may not be aware of the structure and the semantics of this data, only the Application Server has this knowledge. Standardizing the data formats would facilitate interoperation among Application Servers supplied by the same, or different, vendors. These Application Server vendors may be primary and secondary suppliers of the same service provider within a service provider"s IMS network. This is especially true for the Multimedia Telephony supplementary services that can achieve a wide deployment and are here addressed by this specification.

1 Scope

This specification standardizes the structure and the coding of the service data that are transported over the Sh interface between an Application Server supporting Multimedia Telephony supplementary services as defined in 3GPPP TS 22.173 [1] and the HSS. Two optional formats are specified. One is based on a binary coding of the service data and supports the subset of MMTEL services corresponding to PSTN/ISDN and CS supplementary services. The other uses an XML format and supports the full set of MMTEL Services.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 22.173: "IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1".

[2] 3GPP TS 24.604: "Communication Diversion (CDIV); Protocol specification using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification ".

[3] 3GPP TS 24.605: "Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[4] 3GPP TS 24.606: "Message Waiting Indication (MWI) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[5] 3GPP TS 24.607: "Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[6] 3GPP TS 24.608: "Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[7] 3GPP TS 24.610: "Communication HOLD (HOLD) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[8] 3GPP TS 24.611: "Anonymous Communication Rejection (ACR) and Communication Barring (CB) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[9] 3GPP TS 24.615: "Communication Waiting (CW) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[10] 3GPP TS 24.616: "Malicious Communication Identification (MCID) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[11] 3GPP TS 24.629: "Explicit Communication Transfer (ECT) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[12] 3GPP TS 24.642: "Completion of Communications to Busy Subscriber (CCBS), Completion of Communications by No Reply (CCNR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[13] 3GPP TS 24.647: "Advice Of Charge (AOC) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[14] 3GPP TS 24.654: "Closed User Group (CUG) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[15] 3GPP TS 24.239: "Flexible Alerting (FA) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[16] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[17] 3GPP TS 29.328: "IP Multimedia (IM) Subsystem Sh interface; Signalling flows and message contents".

[18] 3GPP TS 24.238: " Session Initiation Protocol (SIP) based user configuration; Stage 3".

[19] IETF RFC 2045: "Multipurpose Internet Mail Extension (MIME) Part One: Format of Internet Message Bodies".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [16] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [16].

3PTY	Three-Party Communication
ACR	Anonymous Communication Rejection
AOC-C	Advice Of Charge - Charging
AOC-D	Advice Of Charge - During the communication
AOC-E	Advice Of Charge - at the End of the communication
AS	Application Server
CB	Communication session Barring
CCBS	Completion of Communication sessions to Busy Subscriber
CCNR	Completion of Communication sessions on No Reply
CD	Communication Deflection
CDIV	Communication DIVersion
CDIVN	CDIV Notification
CFB	Communication Forwarding Busy
CFNL	Communication Forwarding on Not Logged-in
CFNR	Communication Forwarding No Reply
CFNRc	Communication Forwarding on Subscriber Not Reachable
CFU	Communication Forwarding Unconditional
CONF	CONFerence
CUG	Closed User Group
CW	Communication Waiting
ECT	Explicit Communication Transfer
FA	Flexible Alerting
GRUU	Globally Routable User agent URI
HOLD	Communication HOLD
ICB	Incoming Communications Barring
MCID	Malicious Communication IDentification
MMTEL	MultiMedia Telephony
MWI	Message Waiting Indication
OCB	Outgoing Communications Barring
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction

4 General

Editor"s note: this section describes the general principles on which the specification will rely, in particular the 2 options: binary format and XML format.

MMTEL Services are supported by Application Servers that may store the Service Data attached to each user in the HSS via the Sh Interface. This data is referred to as transparent data and is understood syntactically but not semantically by the HSS.

Different ASs providing MMTEL services for a given user may be required. Therefore several ASs should access, utilise and update the Service Data for the user stored in the HSS. The ASs should interoperate and share the Service Data attached to this user.

To aid the interoperability between ASs, this specification defines:

- the structure and the coding of the Service Data transferred over the Sh interface between the HSS and the ASs for MMTEL services,

- the use of the Sh procedures to ensure the sharing and synchronization of these Service Data between ASs,

- additional transfer mechanism such as base64 encoding.

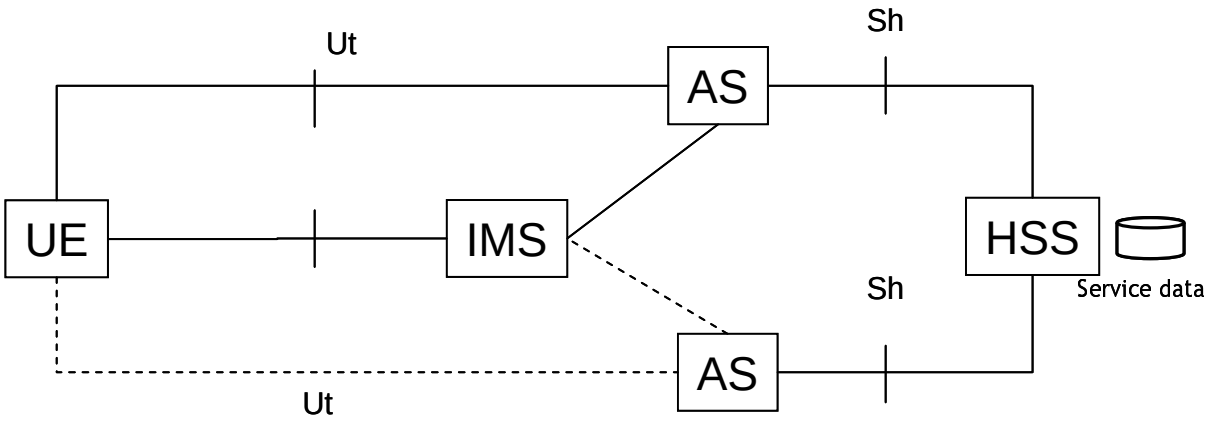
Two optional formats are defined for the structure and the coding of the Service Data:

- A XML format supporting the Service Data for the complete MMTEL Services.
- A binary format supporting the Service Data for the subset of MMTEL Services corresponding to the PSTN/ISDN and CS supplementary services.

5 Architecture

Figure 5-1 presents the functional architecture for AS interoperability.

Figure 5-1: Functional architecture for AS interoperability



The MMTEL communications of a given user equipment are routed to an AS according to the content of the filter criteria.

If AS interoperability is supported, the Service Data attached to a user shall be stored in the HSS and the AS shall access and update, when required, the Service Data via the Sh interface.

The user may configure some of its Service Data via the Ut interface, via SIP based user configuration as described in 3GPP TS 24.238 [18], or via other means.

Some Service Data is configured by the service provider e.g. from its OSS, either directly into the HSS or via an AS that will store these Service Data in the HSS.

The AS associated to a given user for MMTEL services may vary over time.

The same format of the Service Data stored in the HSS shall be supported for interoperability between ASs utilising the Service Data.

6 Specification with the binary option

6.1 MMTEL service sontent with the binary option

6.1.1 List of IMS Multimedia Telephony supplementary services

This list of MMTEL services refers to the list identified in 3GPP TS 22.173 [1] and mentions the associated 3GPP TS 24.6xx:

Originating Identification Presentation (OIP) 3GPP TS 24.607 [5]

Originating Identification Restriction (OIR)	3GPP TS 24.607 [5]
Terminating Identification Presentation (TIP)	3GPP TS 24.608 [6]
Terminating Identification Restriction (TIR)	3GPP TS 24.608 [6]
Malicious Communication IDentification (MCID)	3GPP TS 24.616 [10]
Anonymous Communication Rejection (ACR)	3GPP TS 24.611 [8]
Communication DIVersion (CDIV)	3GPP TS 24.604 [2]
Communication Waiting (CW)	3GPP TS 24.615 [9]
Communication HOLD (HOLD)	3GPP TS 24.610 [7]
Communication Barring (CB)	3GPP TS 24.611 [8]
Completion of Communications to Busy Subscriber (CCBS)	3GPP TS 24.642 [12]
Completion of Communications on No Reply (CCNR)	3GPP TS 24.642 [12]
Message Waiting Indication (MWI)	3GPP TS 24.606 [4]
CONFerence (CONF)	3GPP TS 24.605 [3]
Advice Of Charge (AOC)	3GPP TS 24.647 [13]
Explicit Communication Transfer (ECT)	3GPP TS 24.629 [11]
Reverse charging	
Closed User Group (CUG)	3GPP TS 24.654 [14]
Three-Party (3PTY)	3GPP TS 24.605 [5]
Flexible Alerting (FA)	3GPP TS 24.239 [15]

This list is taken as the reference to address the services and their content that the binary option shall support.

6.1.2 Subset of MMTEL services matching PSTN/ISDN and CS supplementary services

The binary option shall support the subset of MMTEL services matching PSTN/ISDN and CS supplementary services.

The following subclauses indicate:

- for each MMTEL Service how it matches the corresponding PSTN/ISDN and CS supplementary service,
- the relevant information elements of the service as defined in 3GPP TS 22.173 [1] and 3GPP TS 24.6xxx series and that shall be coded in the Service Data.

6.1.2.1 Originating Identification Presentation (OIP)

OIP is described in 3GPP TS 24.607 [5] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Override Capability.

6.1.2.2 Originating Identification Restriction (OIR)

OIR is described in 3GPP TS 24.607 [5] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements

- Service Authorized
- Service Activated
- Mode: permanent mode; temporary mode
- Temporary mode default: presentation restricted; presentation not restricted
- Restriction: restrict the asserted identity; restrict all private information appearing in headers.

6.1.2.3 Terminating Identification Presentation (TIP)

TIP is described in 3GPP TS 24.608 [6] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Override Capability.

6.1.2.4 Terminating Identification Restriction (TIR)

TIR is described in 3GPP TS 24.608 [6] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Mode: permanent mode; temporary mode
  - Temporary mode default: presentation restricted; presentation not restricted.

6.1.2.5 Malicious Communication IDentification (MCID)

MCID is described in 3GPP TS 24.616 [10] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Mode: permanent mode; temporary mode.

6.1.2.6 Anonymous Communication Rejection (ACR)

ACR is described in 3GPP TS 24.611 [8] and matches the corresponding PSTN/ISDN and CS supplementary service.

ACR is identified as a supplementary service in 3GPP TS 22.173 [1]. Its stage 3 specification is a special case of the incoming Communication Barring (ICB) service (c.f. subclause 4.2.1 of 3GPP TS 24.611 [8]).

- Information elements
  - Service Authorized
  - Service Activated

6.1.2.7 Communication DIVersion (CDIV)

CDIV is described in 3GPP TS 24.604 [2]

Subclause 8.2.7.1 in 3GPP TS 22.173 [1] defines the following Communication DIVersion services:

- Communication Forwarding Unconditional (CFU)
- Communication Forwarding Busy (CFB)
- Communication Forwarding No Reply (CFNR)
- Communication Forwarding on Not Logged in (CFNL)
- Communication Deflection (CD)
- Communication Forwarding on Subscriber Not Reachable (CFNRc)
- Communication Diversion Notification (CDIVN); this service is applicable to all other CDIV services.

The service content matching PSTN/ISDN and CS supplementary services and supported by the binary option is hereafter described for each of the CDIV services.

6.1.2.7.1 Subscription options for CDIV services

3GPP TS 24.604 [2] Table 4.3.1.1 describes the following subscription options:

Table 6.1.2.7.1-1: Subscription options for CDIV services

Subscription options	Value	Applicability
Served user receives indication that a communication has been forwarded (indication of communication diversion to the diverting user).	No (default) Yes	CFU CFB CFNR CFNRc
Originating user receives notification that his communication has been diverted (forwarded or deflected).	No Yes (default)	CFU CFB CFNR CFNRc CFNL CD
Served user allows the presentation of diverted to URI to *originating* user in diversion notification.	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
Served user receives reminder indication on outgoing communication that CDIV is currently activated.	No (default) Yes	CFU CFB CFNR CFNRc CFNL CDIVN
Served user allows the presentation of his/her URI to *diverted-to* user.	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
Served user allows the presentation of his/her URI to *originating* user in diversion notification.	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
Served user receives notifications (CDIVN) of their communication diversions.	No (default) Yes	CDIVN

PSTN/ISDN and CS Call forwarding services have similar subscription options except for the Call Diversion Notification that has no equivalent in PSTN/ISDN and CS supplementary services.

6.1.2.7.2 Communication Forwarding Unconditional (CFU)

CFU fulfils the corresponding PSTN/ISDN and CS supplementary service, taking into account that the communication diversion rule conditions described in 3GPP TS 24.604 [2] subclause 4.9.1.3 shall not be used.

- Information elements
    - Service Authorized
    - Service Activated
    - Diverted-to destination
    - Subscription options for CFU.

6.1.2.7.3 Communication Forwarding Busy (CFB)

To fulfil the corresponding PSTN/ISDN and CS supplementary service, only the busy condition among the communication diversion rule conditions described in 3GPP TS 24.604 [2] subclause 4.9.1.3 is used.

- Information elements
    - Service Authorized
    - Service Activated
    - Diverted-to destination: A SIP URI or a TEL URI
    - Subscription options for CFB.

6.1.2.7.4 Communication Forwarding No Reply (CFNR)

To fulfil the corresponding PSTN/ISDN and CS supplementary service, only the no-answer condition among the communication diversion rule conditions described in 3GPP TS 24.604 [2] subclause 4.9.1.3 is used.

- Information elements
    - Service Authorized
    - Service Activated
    - Diverted-to destination: A SIP URI or a TEL URI
    - Subscription options for CFNR.

6.1.2.7.5 Communication Forwarding on Not Logged in (CFNL)

To fulfil the corresponding CS supplementary service, only the not-registered condition among the communication diversion rule conditions described in 3GPP TS 24.604 [2] subclause 4.9.1.3 is used.

- Information elements
    - Service Authorized
    - Service Activated
    - Diverted-to destination: A SIP URI or a TEL URI
    - Subscription options for CFNL.

6.1.2.7.6 Communication Deflection (CD)

CD matches the corresponding PSTN/ISDN supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Subscription options for CD.

6.1.2.7.7 Communication Forwarding on Subscriber Not Reachable (CFNRc)

To fulfil the corresponding CS supplementary service, only the not-reachable condition among the communication diversion rule conditions described in 3GPP TS 24.604 [2] subclause 4.9.1.3 is used.

- Information elements
  - Service Authorized
  - Service Activated
  - Diverted-to destination: A SIP URI or a TEL URI.
  - Subscription options for CFNRc.

6.1.2.7.8 Communication Diversion Notification (CDIVN)

CDIV notification has no equivalent PSTN/ISDN or CS supplementary service and then is not supported by the binary option.

6.1.2.8 Communication Waiting (CW)

CW is described in 3GPP TS 24.615 [9] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated
  - Subscription option: Served user subscribes to 'calling user receives notification that his call is waiting".

6.1.2.9 Communication HOLD (HOLD)

HOLD is described in 3GPP TS 24.610 [7] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated.

6.1.2.10 Communication Barring (CB)

CB is described in 3GPP TS 24.611 [8] and comprises 2 services: Incoming Communication Barring (ICB) and Outgoing Communication Barring (OCB).

CB partially matches the corresponding PSTN/ISDN and CS Call Barring supplementary service. As no one of the communication diversion rule conditions described in 3GPP TS 24.611 [8] subclause 4.9.1.4 applies to the corresponding PSTN/ISDN and CS Call Barring service, ICB applies to all incoming communications and OCB applies to all outgoing communications.

- Information elements for ICB
    - Service Authorized
    - Service Activated.
- Information elements for OCB
    - Service Authorized
    - Service Activated.

6.1.2.11 Completion of Communications to Busy Subscriber (CCBS)

CCBS is described in 3GPP TS 24.642 [12] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
    - Service Authorized
    - Service Activated.

6.1.2.12 Completion of Communications on No Reply (CCNR)

CCNR is described in 3GPP TS 24.642 [12] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
    - Service Authorized
    - Service Activated.

6.1.2.13 Message Waiting Indication (MWI)

MWI is described in 3GPP TS 24.606 [4] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
    - Service Authorized
    - Service Activated.

6.1.2.14 CONFerence (CONF)

CONF is described in 3GPP TS 24.605 [3] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
    - Service Authorized
    - Service Activated.

6.1.2.15 Advice Of Charge (AOC)

AOC is described in 3GPP TS 24.647 [13] and comprises 3 services AOC-S, AOC-D, AOC-E.

AOC matches the corresponding PSTN/ISDN and CS service.

- Information elements (for each service AOC-S, AOC-D, AOC-E)
    - Service Authorized
    - Service Activated.

6.1.2.16 Explicit Communication Transfer (ECT)

ECT is described in 3GPP TS 24.629 [11] and matches the corresponding PSTN/ISDN and CS supplementary service.

- Information elements
  - Service Authorized
  - Service Activated.

6.1.2.17 Reverse Charging

Reverse charging for the binary option is not supported in this release.

6.1.2.18 Closed User Group (CUG)

CUG is described in 3GPP TS 24.654 [14].

CUG for the binary option is not supported in this release.

6.1.2.19 Three-Party (3PTY)

3PTY is described in 3GPP TS 24.605 [3] as a particular case of CONF service and matches the corresponding PSTN/ISDN and CS supplementary service.

6.1.2.20 Flexible Alerting (FA)

FA is described in TS 24.239 [15].

FA for the binary option is not supported in this release.

6.2 Datasets and Service Indications

6.2.1 Introduction

The subclause 6.2 specifies the binary description of the service data of the subset of MMTEL service to be stored on the HSS and corresponding to the PSTN/ISDN and CS supplementary services. Care has been taken to define rules for extendibility, backward compatibility and compactness, since future data structures can evolve from this definition.

The Service Data contained in the Repository Data of one Service Indication may be a complete service suite definition, or can be viewed as a portion of a service definition. The remaining portion of a service definition may be comprised of elements specific to a subsequent part of the standardised service or a later addition of elements due to new functionalities of a service in a new release, or proprietary extensions.

To ensure these possibilities, Service Data for the binary option are grouped in a certain number of binary datasets hereafter presented.

6.2.2 Datasets

The structure of datasets described in subclause 6.3.2 allows to define different types of datasets. In this release, only one dataset is defined:

- the MMTELPSTN-ISDN-CS dataset containing parameters associated to the subset of MMTEL services matching the PSTN/ISDN and CS supplementary services.

Additional services (e.g. new MMTEL services or proprietary MMTEL services) may be defined using new datasets.

6.2.3 Service Indications

A dedicated Service Indication shall be used within the binary option for the subset of MMTEL services corresponding to the PSTN/ISDN and CS supplementary services.

The Service Data associated to this Service indication shall contain the MMTEL-PSTN-ISDN-CS dataset.

The value of the Service Indication used within the binary option for the subset of MMTEL services corresponding to the PSTN/ISDN and CS supplementary services shall be "MMTEL-PSTN-ISDN-CS-BINARY".

New Service Indications can be introduced in the future and associated to new types of datasets.

Proprietary extensions shall use not standardized Service Indications. There is no constraint for the data structure of the proprietary Service Data. Nevertheless, the concept of dataset can be used with a proprietary content.

6.3 Binary coding general

6.3.1 Introduction

The subclause6.3 gives the general specifications to describe the MMTEL Service data in a binary coding.

6.3.2 Dataset layout

The datasets are defined with a compact structure. The compact structure shall consist:

- of a tag-length-value format: this includes a defined "dataset identifier" and "length",
- followed by a fixed format structure, wherein defined bits, bytes, 4byte tuples represent known or reserved information elements of a MMTEL service,
- finally, to accommodate length variation of some data (e.g. SIP-URI), it accommodates a variable length section.

A dataset shall be 4-byte aligned.

Within a dataset structure, different common data forms are defined. These include some fairly standard terms and rules, derived from common practice for 32-bit processors:

Byte == octet

Long == 4 bytes (signed and unsigned)

Short == 2 bytes (signed, unsigned)

Data alignment is such that the size of the data set shall be a 4-byte multiple and be achieved with a padding feature at the end of the dataset.

Bit fields take up only the number of bits they say they do. Alignment of bit fields is not across a 4-byte boundary.

6.3.3 Order

Network byte ordering means most significant byte first.

Bit field order: Most significant bit first.

6.3.4 Character representation

Character representation uses UTF-8 representation.

String representations should be displayable.

6.3.5 Byte representation

Byte structures can be variable in length. They use the tag-length value approach, wherein the length defines the end of a variable length byte definition.

Variable byte structures interpreted as strings should not contain the null character.

If no variable length data were defined, then a dataset would have fixed length.

When there are variable length data, the dataset length will not remain constant from subscriber to subscriber, as each may have different variable length parameters.

6.3.6 Variable size data

Some data must remain flexibly defined regarding their length. Main example is strings, such as URIs, digit-strings, IMPUs.

The fixed format part of the dataset contains the information that is used when identifying variable length data described in the dataset. This information comprises:

- variable_data_offset (unsigned short): byte offset from the dataset start
- variable_data_length (unsigned short): number of bytes.

The variable_data_offset is the offset (in bytes) from the beginning of dataset to the beginning of a variable data. The variable_data_length determines the end of the variable data. A variable_data_offset of 0 indicates a non-provided sequence.

A specific dataset does not have a specific size, although it will at least have a minimum size (the size if no variable data are defined at all).

The offset plus the length information shall verify:

i. offset >= fixed size of the fixed part of the dataset (unless offset == 0), and

ii. offset+length <= total size of the dataset.

iii. there is no overlap between variable data.

6.3.7 Variable length data constraints

The following complements the usage of the pointer references (offset and length):

a) The order of variable data values in the variable section of the dataset shall match the order of the offset + length elements in the fixed section of the dataset. Offsets to data shall have increasing values in the order the offsets are encountered in the fixed portion of the dataset.

b) When the size of a variable length data field increases, the entire variable length section of the dataset must be realigned.

c) When there is no variable data associated to an offset data, the length shall be 0, and the offset shall have a value equal to the value of the next offset encountered in the fixed portion of the dataset.

d) If the same data value appears more than once in a given dataset, it shall not be implemented as two pointers to the same value.

e) Holes should not occur between variable data values.

If they do, then the AS is not responsible for maintaining the information in these holes and alternate ASs may remove them in subsequent write actions.

f) Space after the last variable data value is not significant, and may not be retained.

An example of a dataset with variable length data is given for information in Annex A.

6.4 Binary coding of datasets

6.4.1 Dataset Header

Each dataset shall start with a Dataset Header.

- DATASET_HEADER

Table 6.4.1-1: Dataset Header

	3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
	1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
	dataset_identifier | dataset_length
	|

- dataset_identifier

It differentiates the data sets contained in the Service Data of the same Service Indication. It identifies the data structure of the dataset.

- dataset_length

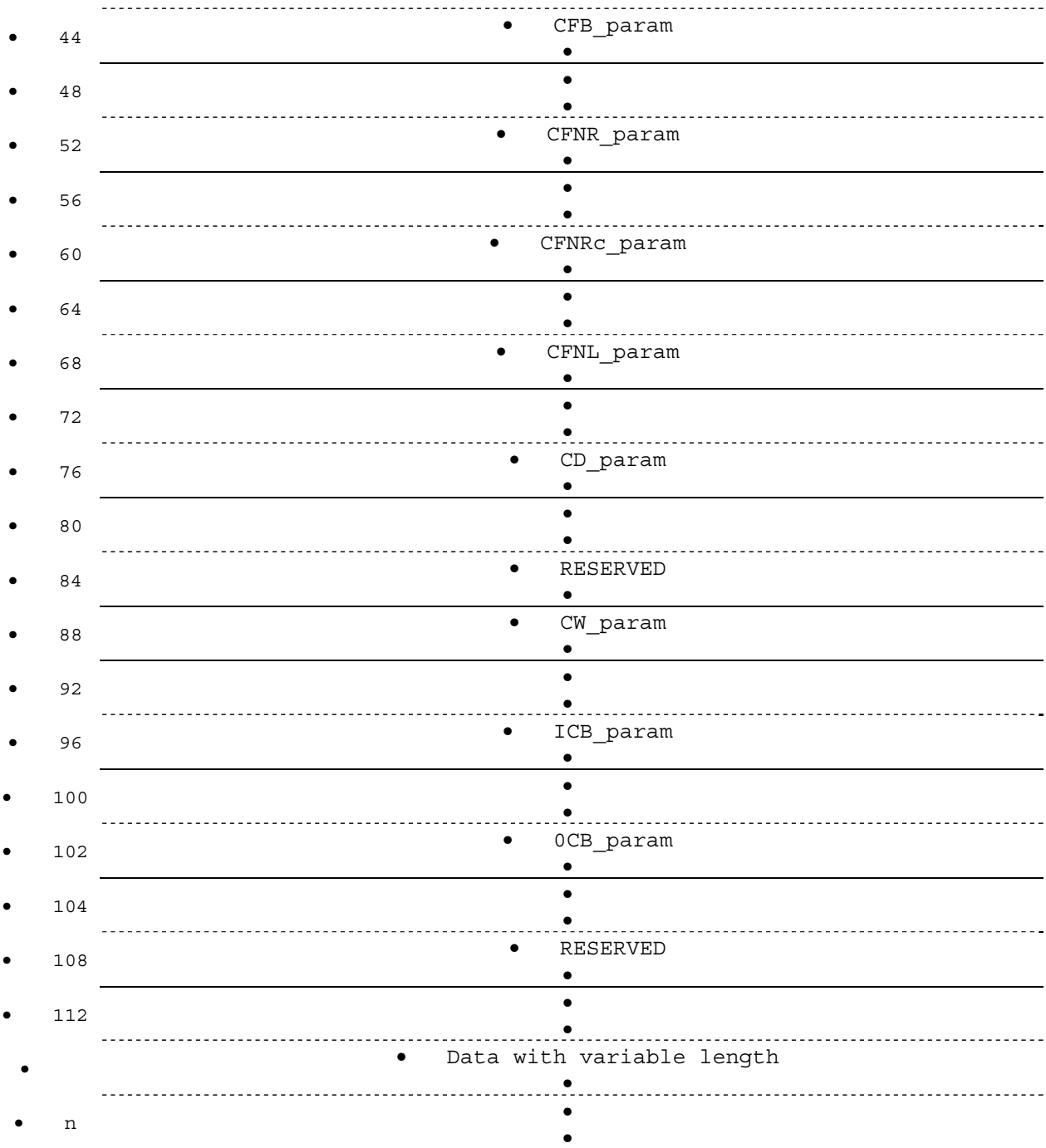
Length in bytes of the dataset including the DATASET_HEADER.

6.4.2 MMTEL-PSTN-ISDN-CS Dataset

6.4.2.1 MMTEL-PSTN-ISDN-CS Dataset content

Table 6.4.2.1-1: MMTEL-PSTN-ISDN-CS Dataset fields

4-byte tuple	3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
0	DATASET_HEADER
4	
8	service_authorisation
12	
16	service_activation
20	
24	RESERVED
28	identity_services_param
32	
36	CFU_param
40	



NOTE: ACR, HOLD, CCBS, CCNR, MWI, CONF, AOC, ECT have no parameter field.

6.4.2.2 Dataset Header

- `dataset_identifier`

The value of `dataset_identifier` of the MMTEL-PSTN-ISDN-CS Dataset is 1.

6.4.2.3 service_authorisation

Bit field that can support up to 64 services. A bit is associated to a MMTEL Service and indicates if:

- it is authorized: bit value 1,
- or not: bit value 0.

Bit-0 Reserved
Bit-1 OIP
Bit-2 OIR
Bit-3 TIP
Bit-4 TIR
Bit-5 MCID
Bit-6 ACR
Bit-7 CFU
Bit-8 CFB
Bit-9 CFNR
Bit-10 CFNRc
Bit-11 CFNL
Bit-12 CD
Bit-13 Reserved
Bit-14 CW
Bit-15 HOLD
Bit-16 Incoming CB
Bit-17 Outgoing CB
Bit-18 CCBS
Bit-19 CCNR
Bit-20 MWI
Bit-21 CONF
Bit-22 AOC-S
Bit-23 AOC-D
Bit-24 AOC-E
Bit-25 Reserved
Bit-26 Reserved
Bit-27 ECT

6.4.2.4 service_activation

Bit field that can support up to 64 services. A bit is associated to a MMTEL Service and indicates if the MMTEL service is activated. Indexation is the same as for `service_authorization`.

6.4.2.5 identity_services_param

Table 6.4.2.5-1: `identity_services_param` fields

• 4-byte tuple • 28	• 3|3|2|2|2|2|2|2|2|2|2|2|1|1|1|1|1|1|1|1|1|0|0|0|0|0|0|0|0|0 • 1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0 • (a)|(b)|(c)|(d)|(e)|(f)|(g)|(h)|(i)| RESERVED • | | | | | | | | |

Table 6.4.2.5-2: `identity_services_param` values

Field	Identity services Parameters	Value	Binary value	
(a)	OIR mode		Bit 31	Bit 30
		Permanent mode	0	0
		Temporary mode	0	1
(b)	OIR Temporary Mode Default		Bit 29	Bit 28
		Presentation restricted	0	0
		Presentation not restricted	0	1
(c)	OIR restriction		Bit 27	Bit 26
		Restrict the asserted identity	0	0
		Restrict all private information appearing in headers	0	1
(d)	OIP Override capability		Bit 25	Bit 24
		No	0	0
		Yes	0	1
(e)	TIR Mode		Bit 23	Bit 22
		Permanent mode	0	0
		Temporary mode	0	1
(f)	TIR Temp Mode Default		Bit 21	Bit 20
		Presentation restricted	0	0
		Presentation not restricted	0	1
(g)	TIP Override capability		Bit 19	Bit 18
		No	0	0
		Yes	0	1
(h)	Reserved			
(i)	MCID Mode		Bit 15	Bit 14
		Permanent	0	0
		Temporary	0	1

6.4.2.6 CFU_param

Table 6.4.2.6-1: `CFU_param` fields

- 4-byte tuple
  - 3|3|2|2|2|2|2|2|2|2|2|1|1|1|1|1|1|1|1|1|0|0|0|0|0|0|0|0|0
  - 1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0
- 32
  - RESERVED | CFU_subscription_options
  - | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h)
- 36
  - CFU_divertedto_destination_Offset | CFU_divertedto_destination_Length

- `CFU_divertedto_destination_offset` is the pointer to CFU diverted-to destination in the variable part of the MMTEL-PSTN-ISDN-CS Dataset.
- `CFU_subscription_options`: described in subclause 6.4.2.12.

6.4.2.7 CFB_param

Table 6.4.2.7-1: `CFB_param` fields

- 4-byte tuple
  - 3|3|2|2|2|2|2|2|2|2|2|1|1|1|1|1|1|1|1|1|0|0|0|0|0|0|0|0|0
  - 1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0|9|8|7|6|5|4|3|2|1|0
- 40
  - RESERVED | CFB_subscription_options
  - | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h)

• 44	• CFB_divertedto_destination_ Offset	CFB_divertedto_destination_ Length

- CFB_divertedto_destination_offset is the pointer to CFB diverted-to destination in the variable part of the MMTEL-PSTN-ISDN-CS Dataset.

- CFB_subscription_options: described in subclause 6.4.2.12.

6.4.2.8 CFNR_param

Table 6.4.2.8-1: CFNR_param fields

4-byte tuple	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
48	RESERVED	CFNR_subscription_options (a) (b) (c) (d) (e) (f) (g) (h)
52	CFNR divertedto destination Offset	CFNR divertedto destination Length

- CFNR_divertedto_destination_offset is the pointer to CFNR diverted-to destination in the variable part of the MMTEL-PSTN-ISDN-CS Dataset.

- CFNR_subscription_options: described in subclause 6.4.2.12.

6.4.2.9 CFNRc_param

Table 6.4.2.9-1: CFNRc_param fields

4-byte tuple	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
56	RESERVED	CFNRc_subscription_options (a) (b) (c) (d) (e) (f) (g) (h)
60	CFNRc divertedto destination Offset	CFNRc divertedto destination Length

- CFNRc_divertedto_destination_offset is the pointer to CFNRc diverted-to destination in the variable part of the MMTEL-PSTN-ISDN-CS Dataset.

- CFNRc_subscription_options: described in subclause 6.4.2.12.

6.4.2.10 CFNL_param

Table 6.4.2.10-1: CFNL_param fields

4-byte tuple	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
64	RESERVED	CFNL_subscription_options (a) (b) (c) (d) (e) (f) (g) (h)
68	CFNL divertedto destination Offset	CFNL divertedto destination Length

- CFNL_divertedto_destination_offset is the pointer to CFNL diverted-to destination in the variable part of the MMTEL-PSTN-ISDN-CS Dataset.

- CFNL_subscription_options: described in subclause 6.4.2.12.

6.4.2.11 CD_param

Table 6.4.2.11-1: `CD_param` fields

4-byte tuple	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
72	RESERVED																CD_subscription_options (a)																
76	RESERVED																RESERVED																

- `CD_subscription_options`: described in subclause 6.4.2.12.

6.4.2.12 Subscription options of CDIV Services

`CFU_subscription_options`, `CFB_subscription_options`, `CFNR_subscription_options`, `CFNRc_subscription_options`, `CFNL_subscription_options`, `CD_subscription_options` use the same format with bit fields according to the following tables:

Table 6.4.2.12-1: CDIV Subscription options bit field

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
(a)		(b)		(c)		(d)		(e)		(f)		(g)		(h)	

Table 6.4.2.12-2: CDIV Subscription options binary values

Field	Subscription options	Value	Binary value		Applicability
(a)	*Served user* receives indication that a communication has been forwarded		Bit 15	Bit 14	CFU CFB CFNR CFNRc
		No	0	0	
		Yes	0	1	
(b)	*Originating* user receives notification that his communication has been diverted (forwarded or deflected).		Bit 13	Bit 12	CFU CFB CFNR CFNRc CFNL CD
		No	0	0	
		Yes	0	1	
(c)	Served user allows the presentation of diverted to URI to *originating* user in diversion notification.		Bit 11	Bit 10	CFU CFB CFNR CFNRc CFNL CD
		No	0	0	
		Not reveal as GRUU	1	0	
		Yes	0	1	
(d)	Served user receives reminder indication on outgoing communication that CDIV is currently activated.		Bit 9	Bit 8	CFU CFB CFNR CFNRc CFNL
		No	0	0	
		Yes	0	1	
(e)	Served user allows the presentation of his/her URI to *diverted-to* user.		Bit 7	Bit 6	CFU CFB CFNR CFNRc CFNL CD
		No	0	0	
		Not reveal as GRUU	1	0	
		Yes	0	1	
(f)	Served user allows the presentation of his/her URI to *originating* user in diversion notification.		Bit 5	Bit 4	CFU CFB CFNR CFNRc CFNL CD
		No	0	0	
		Not reveal as GRUU	1	0	
		Yes	0	1	
(g)	Reserved				
(h)	Reserved				

6.4.2.13 CW_param

Table 6.4.2.13-1: `CW_param` fields

4-byte tuple	31 30	29 28	27 26 25 24 23 22 21 20	19 18 17 16	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
88	(a)	(b)	RESERVED		RESERVED

Table 6.4.2.13-2: `CW_param` values

Field	CW Parameters	Value	Binary value	
(a)	Network Determined User Busy (NDUB) option		Bit 31	Bit 30
		No	0	0
		Yes	0	1
(b)	calling user receives notification that his call is waiting		Bit 29	Bit 28
		No	0	0
		Yes	0	1

Editor"s note: Inclusion of NDUB parameter to be considered according to 22.173 and 24.615.

6.4.2.14 ICB_param

Table 6.4.2.14-1: `ICB_param` fields

•	4-byte tuple	• 3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 • 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
•	92	• RESERVED | RESERVED •
•	96	• RESERVED | RESERVED •

In this release, as indicated in subclause 6.1.2.10, there is no parameter that applies to the ICB service; `ICB_param` fields are Reserved.

6.4.2.15 OCB_param

Table 6.4.2.15-1: `OCB_param` fields

•	4-byte tuple	• 3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 • 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
•	100	• RESERVED | RESERVED •
•	102	• RESERVED | RESERVED •

In this release, as indicated in subclause 6.1.2.10, there is no parameter that applies to the OCB service; `OCB_param` fields are Reserved.

6.5 Compatibility mechanism

6.5.1 General

The subclause 6.5 describes the mechanism to aid compatibility of the binary format when introducing extensions to the binary option content given in subclause 6.1.2 for new features in the services supported or for new services.

An AS supporting the new feature/service may generate transparent data where reserved fields of a dataset are allocated or new datasets are defined. This transparent data may be accessed by another AS that does not support the extensions which may cause interoperability issues.

6.5.2 Reserved fields

Reserved fields are defined in the MMTEL-PSTN-ISDN-CS dataset. An AS shall not modify the content of such reserved fields when updating the dataset in the HSS.

6.5.3 Addition of new datasets

As new datasets defined according to subclause 6.2.2 may be introduced in the same transparent data containing the MMTEL-PSTN-CS dataset and so associated to the same service indication, an AS that does not support these new datasets shall not modify the content of these datasets when rewriting the transparent data in the HSS.

7 MMTEL service data definition based on XML

7.1 General principles

The general structure of the MMTEL service data document is shown in Figure 7.1-1

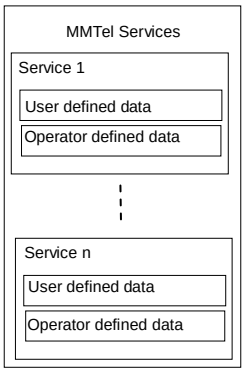


Figure 7.1-1: General structure of MMTEL service document

The MMTEL document consists of the services. Each service consists of a user defined part and an operator defined part. At the MMTEL level of this document a version parameter exists to identify which release of the services this document supports. The user defined data is found in each of the MMTEL supplementary service specifications. The operator defined part consists of authorization of the service, and of the subscription options for each of the services.

7.2 MMTEL services specification

7.2.1 MMTEL services schema

The following shows the MMTEL Services schema:

Editor's Note: Contains currently TIP/TIR and OIP/OIR services.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:cp="urn:ietf:params:xml:ns:common-policy"
xmlns:ocp="urn:oma:xml:xdm:common-policy"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:include schemaLocation="simservs.xsd"/>
    <xs:include schemaLocation="originating-identity-presentation.xsd"/>
    <xs:include schemaLocation="terminating-identity-presentation.xsd"/>
    <xs:include schemaLocation="operator-common-data.xsd"/>
    <xs:include schemaLocation="operator-originating-identity-presentation.xsd"/>
    <xs:include schemaLocation="operator-terminating-identity-presentation.xsd"/>
    <xs:element name="MMTelServices" type="ss:tMMTelServicesType"/>
    <xs:complexType name="tMMTelServicesType">
        <xs:sequence>
            <xs:element name="version" type="xs:integer"/>
            <xs:element name="complete-originating-identity-presentation" type="ss:complete-
originating-identity-presentation-type" minOccurs="0"/>
            <xs:element name="complete-originating-identity-restriction" type="ss:complete-
originating-identity-restriction-type" minOccurs="0"/>
            <xs:element name="complete-terminating-identity-presentation" type="ss:complete-
terminating-identity-presentation-type" minOccurs="0"/>
            <xs:element name="complete-terminating-identity-restriction" type="ss:complete-
terminating-identity-restriction-type" minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="complete-originating-identity-presentation-type">
        <xs:sequence>
            <xs:element ref="ss:originating-identity-presentation"/>
            <xs:element ref="ss:operator-originating-identity-presentation"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="complete-originating-identity-restriction-type">
        <xs:sequence>
            <xs:element ref="ss:originating-identity-presentation-restriction"/>
            <xs:element ref="ss:operator-originating-identity-presentation-restriction"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="complete-terminating-identity-presentation-type">
        <xs:sequence>
            <xs:element ref="ss:terminating-identity-presentation"/>
            <xs:element ref="ss:operator-terminating-identity-presentation"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="complete-terminating-identity-restriction-type">
        <xs:sequence>
            <xs:element ref="ss:terminating-identity-presentation-restriction"/>
            <xs:element ref="ss:operator-terminating-identity-presentation-restriction"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>
```

The file "operator-common-data.xsd" contains all the common types of the operator data. This schema is defined as

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <!-- This schema file contains common types for the operator data-->
    <xs:element name="absOperatorService" type="ss:operatorServiceConfigType" abstract="true"/>
    <xs:complexType name="operatorServiceConfigType">
        <xs:attribute name="authorized" type="xs:boolean" use="required"/>
        <xs:anyAttribute namespace="##any" processContents="lax"/>
    </xs:complexType>
    <xs:simpleType name="identityPresentationModeType">
        <xs:restriction base="xs:string">
            <xs:enumeration value="permanent"/>
            <xs:enumeration value="temporary"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="identityPresentationDefaultTemporaryType">
        <xs:restriction base="xs:string">
            <xs:enumeration value="presentation-not-restricted"/>
            <xs:enumeration value="presentation-restricted"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="identityPresentationRestrictionType">
```

```
        <xs:restriction base="xs:string">
            <xs:enumeration value="only-identity"/>
            <xs:enumeration value="all-private-information"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="identityPresentationRestrictionOverrideType">
        <xs:restriction base="xs:string">
            <xs:enumeration value="override-active"/>
            <xs:enumeration value="override-not-active"/>
        </xs:restriction>
    </xs:simpleType>
</xs:schema>
```

7.2.2 OIP service

The OIP service is specified together with OIR service in subclause 7.2.3.

7.2.3 OIR service

7.2.3.1 User defined data

The schema defined in subclause 4.10.2 of 3GPP TS 24.607 [5] shall be used.

7.2.3.2 Operator defined data

7.2.3.2.1 Data semantics

The OIP and OIR services are authorized by the operator by setting the "authorized" attributes of <operator-originating-identity-presentation> and <operator-originating-identity-presentation-restriction>, respectively, to "true".

7.2.3.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Originating Identity Presentation (OIP) and Originating Identity
Restriction (OIR) services
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-originating-identity-presentation"
substitutionGroup="ss:absOperatorService" nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="restriction-override"
type="ss:identityPresentationRestrictionOverrideType" default="override-not-active" minOccurs="0"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
    <xs:element name="operator-originating-identity-presentation-restriction"
substitutionGroup="ss:absOperatorService" nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="mode" type="ss:identityPresentationModeType"/>
                        <xs:element name="restriction" type="ss:identityPresentationModeType"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
```

```
</xs:schema>
```

7.2.4 TIP service

The TIP service is specified together with TIR service, see subclause 7.2.5.

7.2.5 TIR service

7.2.5.1 User defined data

The schema defined in subclause 4.9.2 of 3GPP TS 24.608 [6] shall be used.

7.2.5.2 Operator defined data

7.2.5.2.1 Data semantics

The TIP and TIR services are authorized by the operator by setting the "authorized" attributes of <operator-terminating-identity-presentation> and <operator-terminating-identity-presentation-restriction>, respectively, to "true".

7.2.5.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Terminating Identity Presentation (TIP) and Terminating Identity
Restriction (TIR) services
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-terminating-identity-presentation"
substitutionGroup="ss:absOperatorService" nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="restriction-override"
type="ss:identityPresentationRestrictionOverrideType" default="override-not-active" minOccurs="0"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
    <xs:element name="operator-terminating-identity-presentation-restriction"
substitutionGroup="ss:absOperatorService" nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="mode" type="ss:identityPresentationModeType"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

7.2.6 MCID service

7.2.6.1 User defined data

No user data associated with MCID service is defined in 3GPP TS 24.616 [10].

7.2.6.2 Operator defined data

7.2.6.2.1 Data semantics

The MCID service is authorized and activated by the operator by setting the "authorized" attribute of <operator-malicious-communication-identification> to "true".

7.2.6.2.2 XML schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Originating Identity Presentation (OIP) and Originating Identity
Restriction (OIR) services
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-malicious-communication-identification"
substitutionGroup="ss:absOperatorService" nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="mode">
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:enumeration value="permanent"/>
                                    <xs:enumeration value="temporary"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

7.2.7 ACR service

ACR is a subset of the ICB service, specified in subclause 7.2.11.

7.2.8 CDIV service

7.2.8.1 User defined data

The schema defined in subclause 4.9.2 of 3GPP TS 24.604 [2] shall be used.

7.2.8.2 Operator defined data

7.2.8.2.1 Data semantics

The CDIV service is authorized by the operator by setting the "authorized" attribute of <operator-communication-diversion> to "true".

7.2.8.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
```

```
        <xs:documentation xml:lang="en">
        Operator part of the Communication Diversion (CDIV) services
        </xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="operator-common-data.xsd"/>
    <xs:element name="operator-communication-diversion" substitutionGroup="ss:absOperatorService"
nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="communication-retention-on-invocation" default="clear-
communication-on-invocation-of-diversion">
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:enumeration value="retain-until-alerting-at-diverted-to-
user"/>
                                    <xs:enumeration value="clear-communication-on-invocation-of-
diversion"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="retention-when-diverting-rejected-at-diverted-to-user"
default="no-action-at-diverting-user">
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:enumeration value="continue-to-alert-diverting-user"/>
                                    <xs:enumeration value="no-action-at-diverting-user"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="total-number-of-diversions-for-each-communication"
type="xs:integer"/>
                        <xs:element name="cdiv-indication-timer">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:minInclusive value="0"/>
                                    <xs:maxInclusive value="60"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="communication-forwarding-on-no-reply-timer">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:minInclusive value="0"/>
                                    <xs:maxInclusive value="180"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="cdivn-buffer-timer" default="86400">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:minInclusive value="0"/>
                                    <xs:maxInclusive value="86400"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

7.2.9 CW service

7.2.9.1 User defined data

The XML schema as defined in 3GPP TS 24.615 [9] subclause 4.8.3 shall be used.

7.2.9.2 Operator defined data

7.2.9.2.1 Data semantics

The CW service is authorized by the operator by setting the "authorized" attribute of <operator-communication-waiting> to "true".

7.2.9.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Communication Waiting (CW) service
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-communication-waiting" substitutionGroup="ss:absOperatorService"
nillable="true">
        <xs:complexType>
            <xs:complexContent>
                <xs:extension base="ss:operatorServiceConfigType">
                    <xs:sequence>
                        <xs:element name="calling-user-receives-notification-his-call-is-waiting"
default="false" type="xs:boolean"/>
                    </xs:sequence>
                </xs:extension>
            </xs:complexContent>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

Editor"s note: inclusion of NDUB parameter to be considered according to 22.173 and 24.615

7.2.10 HOLD service

7.2.10.1 User defined data

No user data is defined in 3GPP TS 24.610 [7]

7.2.10.2 Operator defined data

7.2.10.2.1 Data semantics

The HOLD service is authorized and activated by the operator by setting the "authorized" attribute of <operator-communication-hold> to "true".

7.2.10.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Communication Waiting (CW) service
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-communication-hold" substitutionGroup="ss:absOperatorService"
nillable="true">
    </xs:element>
</xs:schema>
```

7.2.11 CB service

7.2.11.1 User defined data

The XML schema as defined in 3GPP TS 24.611 [8] subclause 4.9.2 shall be used.

7.2.11.2 Operator defined data

7.2.11.2.1 Data semantics

The ICB and OCB services are authorized by the operator by setting the "authorized" attribute of <operator-incoming-communication-barring> and <operator-outgoing-communication-barring> to "true".

7.2.11.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Communication Barring (CB) service
        </xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="operator-common-data.xsd"/>
    <xs:element name="operator-incoming-communication-barring"
substitutionGroup="ss:absOperatorService" nillable="true"/>
    <xs:element name="operator-outgoing-communication-barring"
substitutionGroup="ss:absOperatorService" nillable="true"/>
</xs:schema>
```

7.2.12 CCBS/CCNR service

Editor's Note: To be completed when 3GPP TS 24.642 [12] reaches a stable state.

7.2.12.1 User defined data

7.2.12.2 Operator defined data

7.2.13 MWI service

7.2.13.1 User defined data

No user data is defined in 3GPP TS 24.606 [4].

7.2.13.2 Operator defined data

7.2.13.2.1 Data semantics

The MWI service is authorized and activated by the operator by setting the "authorized" attribute of <operator-message-waiting-indication> to "true".

7.2.13.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
```

```
        Operator part of the Message Waiting Indication (MWI) service
        </xs:documentation>
    </xs:annotation>
    <!--xs:include schemaLocation="operator-common-data.xsd"/-->
    <xs:element name="operator-message-waiting-indication" substitutionGroup="ss:absOperatorService"
nillable="true">
    </xs:element>
</xs:schema>
```

7.2.14 CONF service

7.2.14.1 User defined data

No user data is defined in 3GPP TS 24.605 [3]

7.2.14.2 Operator defined data

7.2.14.2.1 Data semantics

The Conference service is authorized and activated by the operator by setting the "authorized" attribute of <operator-conference> to "true".

7.2.14.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Conference (CONF) service
        </xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="operator-common-data.xsd"/>
    <xs:element name="operator-conference" substitutionGroup="ss:absOperatorService"
nillable="true"/>
</xs:schema>
```

7.2.15 AOC service

7.2.15.1 User defined data

No user data is defined in 3GPP TS 24.647 [13]

7.2.15.2 Operator defined data

7.2.15.2.1 Data semantics

The AOC services are authorized and activated by the operator by setting the "authorized" attribute of <operator-advice-of-charge-s>, <operator-advice-of-charge-d>, <operator-advice-of-charge-e> to "true".

7.2.15.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Advice of Charge (AOC) service
        </xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="operator-common-data.xsd"/>
```

```
    <xs:element name="operator-advice-of-charge-s" substitutionGroup="ss:absOperatorService"
nillable="true"/>
    <xs:element name="operator-advice-of-charge-d" substitutionGroup="ss:absOperatorService"
nillable="true"/>
    <xs:element name="operator-advice-of-charge-e" substitutionGroup="ss:absOperatorService"
nillable="true"/>
</xs:schema>
```

7.2.16 ECT service

7.2.16.1 User defined data

No user data is defined in 3GPP TS 24.629 [11].

7.2.16.2 Operator defined data

7.2.16.2.1 Data semantics

The ECT service is authorized and activated by the operator by setting the "authorized" attribute of <operator-explicit-communication-transfer> to "true".

7.2.16.2.2 XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:ss="http://uri.etsi.org/ngn/params/xml/simservs/xcap"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en">
        Operator part of the Explicit Communication Transfer (ECT) service
        </xs:documentation>
    </xs:annotation>
    <xs:include schemaLocation="operator-common-data.xsd"/>
    <xs:element name="operator-explicit-communication-transfer"
substitutionGroup="ss:absOperatorService" nillable="true"/>
</xs:schema>
```

7.2.17 Reverse charging service

Editor's Note: This service is not supported since no stage 3 exists for Reverse Charging.

7.2.18 CUG service

7.2.18.1 User defined data

7.2.18.2 Operator defined data

7.2.19 3PTY service

3PTY service is a subset of the CONF service specified in subclause 7.2.14.

7.2.20 FA service

Editor's Note: To be completed when 3GPP TS 24.239 [15] reaches a stable state.

8 Mechanisms for transfer of Service Data between Application Server and the HSS for AS interoperability

Editor"s note: this section describes Mechanisms for Transfer of Service Data between Application Server and the HSS for AS interoperability, such as data binary encoding / compression.

Editor's Note: This chapter specifies the procedures for the TASes that share service data to be synchronized with respect to the shared data.

8.1 Sh procedures to transfer Service Data

Standardized procedures of the Sh interface described in 3GPP TS 29.328 [18] are used between the AS and the HSS to access and update the Service Data attached to a user.

To aid a proper interoperability between AS, a certain number of additional recommendations are hereafter described:

- After an AS has created or modified Service Data, it shall update the Service Data in the HSS with the Sh-Update procedure.
- After an AS has downloaded Service Data from the HSS for a given user, it should subscribe to the notification of Service Data with the Sh-Subs-Notif
- If the AS has subscribed to the notification of Service Data, the AS shall support the Sh-Notif procedure to be informed of the changes in the Service Data.
- HSS and AS shall use Sequence Number information to ensure data synchronization

8.2 Base64 data encoding

As the Service Data for the binary option are in binary format, it shall be transcoded in a character mode to be transferred over the Sh interface.

The standard used for this transcoding is the base64 encoding mechanism as described in IETF RFC 2045 [19].

In reference to 3GPP TS 29.328 [18], Annex D, Tables D.1 and D.2, MMTEL Service Data used for AS interoperability is defined according to Table 8.2-1 regarding the XML schema for the Sh user profile interface.

Table 8.2-1: Data type for Service Data in the XML schema for the Sh user profile interface

Data type	Tag	Base type	Comments
tServiceData	ServiceData	String	Base64 encoded according to RFC 2045 [19]

Annex A (informative): Dataset example with variable length data

This example illustrates the use of offset and length elements to point variable data in a dataset.

Four variables are defined, each with the following values:

Var1 = 012345678

Var2 empty

Var3 = ABCD

Var4= 124345678

The coding of the dataset is as follows:

Figure Annex A-1: Dataset example

Byte order					
0		Dataset header			
		Other fixed format data			
		Var 1			
	Offset =60		Len=9		
		Var2			
	Offset =69		Len=0		
		Other fixed format data			
		Var3			Fixed part
	Offset =69		Len=4		
		Var4			
	Offset =73		Len=8		
		Other fixed format data			
60	0	1	2	3	
64	4	5	6	7	
68	8	A	B	C	Variable
72	D	1	2	3	length
76	4	5	6	7	data
80	8				

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2008-12	CT#42	CP-080720			V1.0.0 approved in CT#42	1.0.0	8.0.0

History

Document history		
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