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Universal Mobile Telecommunications System (UMTS);
LTE;
IP Multimedia Subsystem (IMS) Application Server (AS) service
data descriptions for AS interoperability
(3GPP TS 29.364 version 9.3.1 Release 9)**



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Foreword

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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 3GPP 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".
- [20] 3GPP TS 22.182: "Customized Alerting Tones (CAT) Requirements; Stage 1".
- [21] 3GPP TS 24.182: " IP Multimedia Subsystem (IMS) Customized Alerting Tones (CAT); Protocol specification".
- [22] 3GPP TS 32.280: "Telecommunication management; Charging management; Advice of Charge (AoC) service".
- [23] ISO 4217: "Codes for the representation of currencies and funds ".

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
AOC-I	Advice Of Charge - for Information
AOC-S	Advice Of Charge - at communication Set-up time
AS	Application Server
CAT	Customized Alerting Tones
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

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.

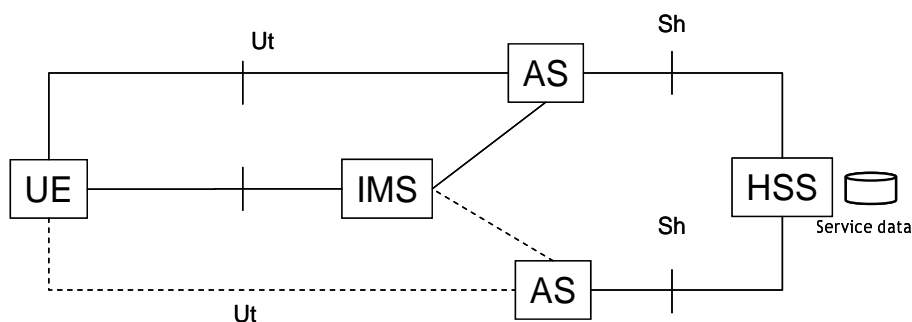


Figure 5-1: Functional architecture for AS interoperability

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 content 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 Technical Specifications:

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]
Customized Alerting Tones (CAT)	3GPP TS 24.182 [21]

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
<i>Served user</i> receives indication that a communication has been forwarded (indication of communication diversion to the diverting user).	No (default) Yes	CFU CFB CFNR CFNRc
<i>Originating user</i> receives notification that his communication has been diverted (forwarded or deflected).	No Yes (default)	CFU CFB CFNR CFNRc CFNL CD
<i>Served user</i> allows the presentation of diverted to URI to <i>originating user</i> in diversion notification.	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
<i>Served user</i> receives reminder indication on outgoing communication that CDIV is currently activated.	No (default) Yes	CFU CFB CFNR CFNRc CFNL CDIVN
<i>Served user</i> allows the presentation of his/her URI to <i>diverted-to user</i> .	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
<i>Served user</i> allows the presentation of his/her URI to <i>originating user</i> in diversion notification.	No Not reveal as GRUU Yes (default)	CFU CFB CFNR CFNRc CFNL CD
<i>Served user</i> 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.
 - Communication forwarding on no reply timer : Timer duration is a network provider option.

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.

6.1.2.7.9 Network provider options for CDIV services

The network provider options for CDIV services supported with the binary option are those described in 3GPP TS 24.604 [2] Table 4.3.1.2, with the exception of the CDIVN Buffer Timer / Timer Value for AS to store CDIVN that is not supported.

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 32.280 [22] and in 3GPP TS 24.647 [13]. It comprises 3 services AOC-S, AOC-D, AOC-E.

AOC matches the corresponding PSTN/ISDN and CS service.

- Information elements
 - Service Authorized (for each service AOC-S, AOC-D, AOC-E)
 - Service Activated (for each service AOC-S, AOC-D, AOC-E).
 - AOC service type: as described in 3GPP TS 32.280 [22]
 - AOC service obligatory type: as described in 3GPP TS 32.280 [22]

- Preferred AOC currency: as described in 3GPP TS 32.280 [22]
- AOC format: as described in 3GPP TS 32.280 [22]

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 3GPP TS 24.239 [15].

- Information elements for the FA Pilot of a FA group
 - Service Authorized
 - Service Activated.
 - Single user, Multiple users: as described in 3GPP TS 24.239 [15]
 - Pilot/Member status: states if the FA Pilot identity is also a FA Member identity
 - Membership: Demand or Permanent as described in 3GPP TS 24.239 [15]
 - List of FA Members identities
- Information elements for the FA member
 - Service Authorized
 - List of FA groups to which the FA member belongs to
 - FA Member status: Active / Inactive on a per FA group basis
 - Default FA groups for the FA member

6.1.2.21 Customized Alerting Tones (CAT)

CAT is described in 3GPP TS 24.182 [21] and matches the corresponding CS supplementary service.

- Information elements
 - Service Authorized
 - Service Activated.

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, the following datasets are defined:

- the MMTELPSTN-ISDN-CS dataset containing parameters associated to the subset of MMTEL services matching the PSTN/ISDN and CS supplementary services.
- the AOC dataset containing parameters for the AOC service,
- the FA pilot dataset containing parameters of the FA pilot in the FA service,
- the FA member dataset containing parameters of the FA member in the FA service.

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

6.2.3 Service Indications

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

The Service indication with the value "MMTEL-PSTN-ISDN-CS-BINARY" shall have a Service Data field containing:

- the MMTEL-PSTN-ISDN-CS dataset.
- the AOC dataset when the AOC service is configured for the user.

The Service indication with the value "MMTEL-EXTENSION-BINARY-1" shall be used when the FA service is configured for a user and shall have a Service Data field containing the FA dataset.

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 subclause 6.3 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. $\text{offset} \geq \text{fixed size of the fixed part of the dataset}$ (unless $\text{offset} == 0$), and
- ii. $\text{offset} + \text{length} \leq \text{total size of the dataset}$.
- 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	0	0	0	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	0	0	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	-----																																
44	CFB_param																																
48	-----																																
52	CFNR_param																																
56	-----																																

60	CFNRc_param
64	
68	CFNL_param
72	
76	CD_param
80	
84	CDIV_network_provider_options
88	CW_param
92	
96	ICB_param
100	
104	OCB_param
108	
112	RESERVED
116	
120	RESERVED
124	
	Data with variable length
n	

NOTE: ACR, HOLD, CCBS, CCNR, MWI, CONF, AOC, ECT, CAT 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
Bit-28	CAT
Bit-29	FA

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	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0
28	(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	Permanent mode Temporary mode	Bit 31 0 0	Bit 30 0 1
(b)	OIR Temporary Mode Default	Presentation restricted Presentation not restricted	Bit 29 0 0	Bit 28 0 1
(c)	OIR restriction	Restrict the asserted identity Restrict all private information appearing in headers	Bit 27 0 0	Bit 26 0 1
(d)	OIP Override capability	No Yes	Bit 25 0 0	Bit 24 0 1
(e)	TIR Mode	Permanent mode Temporary mode	Bit 23 0 0	Bit 22 0 1
(f)	TIR Temp Mode Default	Presentation restricted Presentation not restricted	Bit 21 0 0	Bit 20 0 1
(g)	TIP Override capability	No Yes	Bit 19 0 0	Bit 18 0 1
(h)	Reserved			
(i)	MCID Mode	Permanent Temporary	Bit 15 0 0	Bit 14 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 2 1 1 1 1 1 1 1 1 0 0 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
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 2 1 1 1 1 1 1 1 1 0 0 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
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	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 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
48	no_reply_timer	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.
- no_reply_timer is an integer with values between 0 and 180 seconds for communication forwarding on no reply timer.

6.4.2.9 CFNRc_param

Table 6.4.2.9-1: CFNRc_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 1 0 0 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
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	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 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
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	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	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	
72	RESERVED														CD_subscription_options (a) (b) (c) (d) (e) (f) (g) (h)																		
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

1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0	0	
(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	No Yes	Bit 15 0 0	Bit 14 0 1	CFU CFB CFNR CFNRc
(b)	Originating user receives notification that his communication has been diverted (forwarded or deflected).	No Yes	Bit 13 0 0	Bit 12 0 1	CFU CFB CFNR CFNRc CFNL CD
(c)	Served user allows the presentation of diverted to URI to originating user in diversion notification.	No Not reveal as GRUU Yes	Bit 11 0 1 0	Bit 10 0 0 1	CFU CFB CFNR CFNRc CFNL CD
(d)	Served user receives reminder indication on outgoing communication that CDIV is currently activated.	No Yes	Bit 9 0 0	Bit 8 0 1	CFU CFB CFNR CFNRc CFNL
(e)	Served user allows the presentation of his/her URI to diverted-to user.	No Not reveal as GRUU Yes	Bit 7 0 1 0	Bit 6 0 0 1	CFU CFB CFNR CFNRc CFNL CD
(f)	Served user allows the presentation of his/her URI to originating user in diversion notification.	No Not reveal as GRUU Yes	Bit 5 0 1 0	Bit 4 0 0 1	CFU CFB CFNR CFNRc CFNL CD
(g)	Reserved				
(h)	Reserved				

6.4.2.12A CDIV_network_provider_options

Table 6.4.2.12A-1: CDIV_network_provider_options fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	1 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
80	(a)	(b)																				number_of diversions								
84	CDIV_indication_timer																			RESERVED										

- Fields (a) and (b)

Table 6.4.2.12A-2: CDIV_network_provider_options values

Field	Network provider option	Value	Binary value		Applicability
(a)	Served user communication retention on invocation of diversion	Retain communication to the served user until alerting begins at the diverted-to user	Bit 31 0	Bit 30 1	CFNR CD
		Clear communication to the served user on invocation of call diversion	0	0	
(b)	Served user communication retention when diverting is rejected at diverted-to user.	Continue to alert the diverting user	Bit 29 0	Bit 28 1	CFNR CD
		No action at the diverting user	0	0	

- number_of diversions is an integer giving the total number of all diversions for each communication
- CDIV_indication_timer is an integer with values between 0 and 60 seconds.

6.4.2.13 CW_param

Table 6.4.2.13-1: CW_param fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	1 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
88	(a)	RESERVED														RESERVED													

Table 6.4.2.13-2: CW_param values

Field	CW Parameters	Value	Binary value	
(a)	calling user receives notification that his call is waiting	No	Bit 31 0	Bit 30 0
		Yes	0	1

6.4.2.14 ICB_param

Table 6.4.2.14-1: ICB_param fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	1 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 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	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	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						
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.

6.4.2.16 Void

6.4.3 AOC Dataset

6.4.3.1 AOC Dataset content

Table 6.4.3.1-1: AOC Dataset fields

4-byte tuple	3	3	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	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	AOC_service_type						AOC_service_obligatory_type						RESERVED						AOC_format																			
8	Preferred_AOC_currency																																					

6.4.3.2 Dataset Header

- dataset_identifier

The value of dataset_identifier of the AOC Dataset is 2.

6.4.3.3 AOC_service_type

Table 6.4.3.3-1: AOC_service_type fields

4-byte tuple	3	3	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	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							
4	(a)	(b)	(c)	(d)																																			

Table 6.4.a.3-2: AOC_service_type values

Field	AOC service type	Value	Binary value	
(a)	AOC service type (AOC-S)	No	Bit 31	Bit 30
		Yes	0	0
(b)	AOC service type (AOC-D)	No	0	0
		Yes	0	1
(c)	AOC service type (AOC-E)	No	Bit 27	Bit 26
		Yes	0	0

(d)	RESERVED		Bit 25	Bit 24
-----	----------	--	--------	--------

6.4.3.4 AOC_service_obligatory_type

Table 6.4.3.4-1: AOC_service_obligatory_type 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	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						
4													(a)	(b)	(c)	(d)																						

Table 6.4.3.4-2: AOC_service_obligatory_type values

Field	AOC service obligatory type	Value	Binary value	
(a)	AOC service obligatory type for AOC-S	None	Bit 23	Bit 22
		AOC-I	0	0
		AOC-C	0	1
			1	0
(b)	AOC service obligatory type for AOC-D	None	Bit 21	Bit 20
		AOC-I	0	0
		AOC-C	0	1
			1	0
(c)	AOC service obligatory type for AOC-E	None	Bit 19	Bit 18
		AOC-I	0	0
		AOC-C	0	1
			1	0
(d)	RESERVED		Bit 17	Bit 16

6.4.3.5 Preferred_AOC_currency

Preferred_AOC_currency is of type Unsigned32 and contains the currency numeric code as defined in ISO 4217 [23].

6.4.3.6 AOC_format

Table 6.4.3.6-1: AOC_format 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	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						
4													(a)	(b)	(c)	(d)																						

Table 6.4.3.6-2: AOC_format values

Field	AOC_format	Value	Binary value	
(a)	AOC format for AOC-S	None	Bit 23	Bit 22
		Monetary	0	0
		Non Monetary	0	1
		CAI	1	0
			1	1
(b)	AOC format for AOC-D	None	Bit 21	Bit 20
		Monetary	0	0
		Non Monetary	0	1
		CAI	1	0
			1	1

(c)	AOC format for AOC-E	None Monetary Non Monetary CAI	Bit 19 0 0 1 1	Bit 18 0 1 0 1
(d)	RESERVED		Bit 17	Bit 16

6.4.4 FA Pilot Dataset

6.4.4.1 FA Pilot Dataset contentTable

6.4.4.1-1: FA Pilot Dataset fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	1 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	0 0	0 9	0 8	0 7	0 6	0 5	0 4	0 3	0 2	0 1	0 0
0	DATASET_HEADER																															
4	FA_pilot_param																															
8	FA_members_list_pointer																FA_members_number															
12	FA members list																															

	FA member IMPU																															

	FA member IMPU																															

6.4.4.2 Dataset Header

- dataset_identifier

The value of dataset_identifier of the FA Pilot Dataset is 3.

6.4.4.3 FA_pilot_param

Table 6.4.4.3-1: FA_pilot_param fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	1 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	1 0	0 9	0 8	0 7	0 6	0 5	0 4	0 3	0 2	0 1	0 0
	Reserved																Reserved															

Table 6.4.4.3-2: FA_pilot_param values

Field	FA Pilot Parameters	Value	Binary value
-------	---------------------	-------	--------------

(a)	Pilot/Member status	FA Pilot is not FA Member FA Pilot is FA Member	Bit 31 0 1	
(b)	Single/multiple user	Single User Multiple Users	Bit 30 0 1	
(c)	Membership	FA Membership is Permanent FA Membership is on Demand	Bit 29 0 1	

6.4.4.4 FA_members_list_pointer

The FA_members_list_pointer is an offset, as defined in clause 6.3.6, pointing to the beginning of FA_members_list.

6.4.4.5 FA_members_number

FA_members_number indicates the number of FA members and is an integer.

6.4.4.6 FA_members_list

Table 6.4.4.6-1: FA_members_list 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	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	0	0	0	0	0
	FA_member_offset											FA_member_length																										
	Reserved																																					
	FA_member_offset											FA_member_length																										
Reserved																																						

FA_members_list comprises identical field sets of which the number is the number of FA members.

Each field set comprises:

- FA_member_offset: as defined in clause 6.3.6, it points to the beginning of the FA member IMPU field
- FA_member_length: it gives the length of the FA_member_IMPU field
- A Reserved field

6.4.4.7 FA_member_IMPU

FA_member_IMPU gives the IMPU of a FA member and is a string of variable length.

6.4.5 FA Member Dataset

6.4.5.1 FA Member Dataset content

Table 6.4.5.1-1: FA Member Dataset fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	2 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	1 0	0 9	0 8	0 7	0 6	0 5	0 4	0 3	0 2	0 1	0 0
0	DATASET_HEADER																															
4	FA_member_param																															
8	FA_groups_list_pointer																FA_groups_number															
12	FA groups list																															

	FA pilot IMPU																															

	FA pilot IMPU																															

6.4.5.2 Dataset Header

- dataset_identifier

The value of dataset_identifier of the FA Member Dataset is 4.

6.4.5.3 FA_member_param

Table 6.4.5.3-1: FA_member_param fields

4-byte tuple	3 1	3 0	2 9	2 8	2 7	2 6	2 5	2 4	2 3	2 2	2 1	2 0	1 9	1 8	1 7	1 6	1 5	1 4	1 3	1 2	1 1	1 0	0 9	0 8	0 7	0 6	0 5	0 4	0 3	0 2	0 1	0 0
	Reserved																Reserved															

6.4.5.4 FA_groups_list_pointer

The FA_groups_list_pointer is an offset, as defined in clause 6.3.6, pointing to the beginning of FA_groups_list.

6.4.5.5 FA_groups_number

FA_groups_number indicates the number of FA groups which the FA member belongs to and is an integer.

6.4.5.6 FA_groups_list

Table 6.4.5.6-1: FA_groups_list fields

4-byte tuple	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	0	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		
	FA_group_offset																FA_group_length																	
	FA_group_param																Reserved																	
	FA_group_offset																FA_group_length																	
FA_group_param																Reserved																		

FA_groups_list comprises identical field sets of which the number is the number of FA groups.

Each field set comprises:

- FA_group_offset: as defined in clause 6.3.6, it points to the beginning of the FA_Pilot_IMPUP field
- FA_member_length: it gives the length of the FA_pilot_IMPUP field
- FA_group_param
- A Reserved field

6.4.5.7 FA_group_param

Table 6.4.5.7-1: FA_group_param fields

4-byte tuple	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0	0	0	0	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	
a	b	Reserved																Reserved															

Table 6.4.5.7-2: FA_group_param values

Field	FA Group Parameters	Value	Binary value
(a)	FA Member status in the FA group	FA Member is inactive in the FA group	Bit 31 0
		FA Member is active in the FA group	1
(b)	Default FA group	The FA group is not a default FA group for the FA member	Bit 30 0
		The FA group is a default FA group for the FA member	1

6.4.5.8 FA_pilot_IMPUP

FA_pilot_IMPUP gives the IMPUP of the FA pilot of the FA group and is a string of variable length.

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 datasets. An AS shall not modify the content of such reserved fields when updating a 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

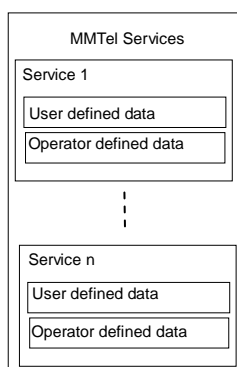


Figure 7.1-1: General structure of MMTEL service document

The MMTEL document consists of the services. Each service consists of a user defined part and an operator defined part. 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

7.2.0 Service Indications

A dedicated Service Indication shall be used within the XML option for MMTel services. The value of the Service Indication shall be "MMTEL-Services".

Proprietary extensions shall use not standardized Service Indications. There is no constraint for the data structure of the proprietary Service Data.

7.2.1 MMTEL services schema

The following shows the MMTEL Services schema:

```

<?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="XCAP.xsd"/>
  <xs:include schemaLocation="operator-common-data.xsd"/>
  <xs:include schemaLocation="originating-identity-presentation.xsd"/>
  <xs:include schemaLocation="terminating-identity-presentation.xsd"/>
  <xs:include schemaLocation="communication-diversion.xsd"/>
  <xs:include schemaLocation="communication-waiting.xsd"/>
  <xs:include schemaLocation="communication-barring.xsd"/>
  <xs:include schemaLocation="operator-originating-identity-presentation.xsd"/>
  <xs:include schemaLocation="operator-terminating-identity-presentation.xsd"/>
  <xs:include schemaLocation="operator-malicious-communication-identification.xsd"/>
  <xs:include schemaLocation="operator-communication-diversion.xsd"/>
  <xs:include schemaLocation="operator-communication-waiting.xsd"/>
  <xs:include schemaLocation="operator-communication-hold.xsd"/>
  <xs:include schemaLocation="operator-communication-barring.xsd"/>
  <xs:include schemaLocation="operator-completion-of-communication.xsd"/>
  <xs:include schemaLocation="operator-message-waiting-indication.xsd"/>
  <xs:include schemaLocation="operator-conference.xsd"/>
  <xs:include schemaLocation="operator-advice-of-charge.xsd"/>
  <xs:include schemaLocation="operator-explicit-communication-transfer.xsd"/>
  <xs:include schemaLocation="operator-customized-alerting-tone.xsd"/>
  <xs:include schemaLocation="operator-flexible-alerting.xsd"/>
  <xs:include schemaLocation="flexible-alerting.xsd"/>
  <xs:element name="MMTelServices" type="ss:tMMTelServicesType"/>
  <xs:complexType name="tMMTelServicesType">
    <xs:sequence>
      <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:element name="complete-malicious-communication-identification" type="ss:complete-
malicious-communication-identification-type" minOccurs="0"/>
      <xs:element name="complete-communication-diversion" type="ss:complete-communication-
diversion-type" minOccurs="0"/>
      <xs:element name="complete-communication-waiting" type="ss:complete-communication-
waiting-type" minOccurs="0"/>
      <xs:element name="complete-communication-hold" type="ss:complete-communication-hold-
type" minOccurs="0"/>
      <xs:element name="complete-communication-barring" type="ss:complete-communication-
barring-type" minOccurs="0"/>
      <xs:element name="complete-completion-of-communication-busy-subscriber"
type="ss:complete-completion-of-communication-busy-subscriber-type" minOccurs="0"/>
      <xs:element name="complete-completion-of-communication-no-reply" type="ss:complete-
completion-of-communication-no-reply-type" minOccurs="0"/>
      <xs:element name="complete-message-waiting-indication" type="ss:complete-message-
waiting-indication-type" minOccurs="0"/>
      <xs:element name="complete-conference" type="ss:complete-conference-type"
minOccurs="0"/>
      <xs:element name="complete-advice-of-charge" type="ss:complete-advice-of-charge-type"
minOccurs="0"/>
      <xs:element name="complete-explicit-communication-transfer" type="ss:complete-explicit-
communication-transfer-type" minOccurs="0"/>
      <xs:element name="complete-customized-alerting-tone" type="ss:complete-customized-
alerting-tone-type" minOccurs="0"/>
      <xs:element name="complete-flexible-alerting" type="ss:complete-flexible-alerting-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:complexType name="complete-malicious-communication-identification-type">
  <xs:sequence>
    <xs:element ref="ss:operator-malicious-communication-identification"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-communication-diversion-type">
  <xs:sequence>
    <xs:element ref="ss:communication-diversion"/>
    <xs:element ref="ss:operator-communication-diversion"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-communication-waiting-type">
  <xs:sequence>
    <xs:element ref="ss:communication-waiting"/>
    <xs:element ref="ss:operator-communication-waiting"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-communication-hold-type">
  <xs:sequence>
    <xs:element ref="ss:operator-communication-hold"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-communication-barring-type">
  <xs:sequence>
    <xs:element ref="ss:incoming-communication-barring"/>
    <xs:element ref="ss:outgoing-communication-barring"/>
    <xs:element ref="ss:operator-incoming-communication-barring"/>
    <xs:element ref="ss:operator-outgoing-communication-barring"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-completion-of-communication-busy-subscriber-type">
  <xs:sequence>
    <xs:element ref="ss:operator-completion-of-communication-busy-subscriber"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-completion-of-communication-no-reply-type">
  <xs:sequence>
    <xs:element ref="ss:operator-completion-of-communication-no-reply"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-message-waiting-indication-type">
  <xs:sequence>
    <xs:element ref="ss:operator-message-waiting-indication"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-conference-type">
  <xs:sequence>
    <xs:element ref="ss:operator-conference"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-advice-of-charge-type">
  <xs:sequence>
    <xs:element ref="ss:operator-advice-of-charge"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-explicit-communication-transfer-type">
  <xs:sequence>
    <xs:element ref="ss:operator-explicit-communication-transfer"/>
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="complete-customized-alerting-tone-type">
  <xs:sequence>
    <xs:element ref="ss:operator-customized-alerting-tone"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="complete-flexible-alerting-type">
  <xs:sequence>
    <xs:element ref="ss:flexible-alerting-default"/>
    <xs:element ref="ss:flexible-alerting-specific"/>
    <xs:choice>
      <xs:element ref="ss:operator-flexible-alerting"/>
      <xs:element ref="ss:operator-flexible-alerting-group"/>
    </xs:choice>
  </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="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:identityPresentationRestrictionType"/>
          </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 Malicious Communication Identification (MCID) service
    </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: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:sequence>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
  </xs:element>
</xs:schema>

```

```

        </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>

```

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 Hold 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

7.2.12.1 User defined data

No user defined data specified in 3GPP TS 24.642 [12].

7.2.12.2 Operator defined data

7.2.12.2.1 Data semantics

The CCBS and CCNR service is authorized and activated by the operator by setting the "authorized" attribute of <operator-completion-of-communication-busy-subscriber> and <operator-completion-of-communication-no-reply>, respectively, to "true".

7.2.12.2.1 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 Completion of Communication (CC) service
    </xs:documentation>
  </xs:annotation>
  <!--xs:include schemaLocation="operator-common-data.xsd"/-->
  <xs:element name="operator-completion-of-communication-busy-subscriber"
substitutionGroup="ss:absOperatorService" nillable="true"/>
  <xs:element name="operator-completion-of-communication-no-reply"
substitutionGroup="ss:absOperatorService" nillable="true"/>
</xs:schema>
```

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".

7.2.13.2.1 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

AOC service is described in 3GPP TS 32.280 [22] and in 3GPP TS 24.647 [13]. It consists of 3 services types AOC-S, AOC-D, AOC-E paired with an AOC Service obligatory type.

Information elements

- Service Authorized (for each service type AOC-S, AOC-D, AOC-E)
- AOC service type as described in 3GPP TS 32.280 [22]
- AOC service obligatory type as described in 3GPP TS 32.280 [22]
- Preferred AOC currency as described in 3GPP TS 32.280 [22]
- AOC format as described in 3GPP TS 32.280 [22]

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" substitutionGroup="ss:absOperatorService"
nillable="true">
    <xs:complexType>
      <xs:complexContent>
        <xs:extension base="ss:operatorServiceConfigType">
          <xs:sequence>
            <xs:element name="service-type" type="ss:service-typeType"/>
            <xs:element name="Currency" type="ss:CurrencyType"/>
          </xs:sequence>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
  </xs:element>
  <xs:complexType name="service-typeType">
    <xs:sequence>
      <xs:element name="operator-aoc-d" type="ss:operator-aoc-type" nillable="true"
minOccurs="0"/>
      <xs:element name="operator-aoc-e" type="ss:operator-aoc-type" nillable="true"
minOccurs="0"/>
      <xs:element name="operator-aoc-s" type="ss:operator-aoc-type" nillable="true"
minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="CurrencyType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z]{3}"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="operator-aoc-type">
    <xs:sequence>
      <xs:element name="aoc-obligatory-type" type="ss:obligatory-typeType"/>
    </xs:sequence>
    <xs:attribute name="activated" type="xs:boolean" use="required"/>
  </xs:complexType>
  <xs:simpleType name="obligatory-typeType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="AoCI"/>
      <xs:enumeration value="AoCC"/>
    </xs:restriction>
  </xs:simpleType>
</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

NOTE: The reverse charging service is not defined

7.2.18 CUG service

7.2.18.1 User defined data

CUG is not supported for the XML option.

7.2.18.2 Operator defined data

CUG is not supported for the XML option.

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

7.2.20.1 User defined data

The XML schema as defined in 3GPP TS 24.239 [15] subclause 4.8.3 shall be used.

7.2.20.1 Operator defined data

7.2.20.1.1 Data semantics

The FA service is authorized and activated by the operator by setting the "authorized" attribute of <operator-flexible-alerting> to true.

7.2.20.1.2 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:include schemaLocation="operator-common-data.xsd"/>
  <xs:element name="operator-flexible-alerting" substitutionGroup="ss:absOperatorService"
    nillable="true">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Operator part of the Flexible Alerting (FA) service
      </xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:complexContent>
        <xs:extension base="ss:operatorServiceConfigType">
          <xs:sequence>
            <xs:element name="default-group" type="xs:anyURI"/>
          </xs:sequence>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>

```



```

</xs:element>

<xs:element name="operator-flexible-alerting-group" substitutionGroup="ss:absOperatorService"
nillable="true">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Operator schema per Flexible Alerting (FA) group
    </xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="ss:operatorServiceConfigType">
        <xs:sequence>
          <xs:element name="identity" type="xs:anyURI"/>
          <!--Pilot identity of the FA group-->
          <xs:element name="group-type">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:enumeration value="single-user"/>
                <xs:enumeration value="multiple-users"/>
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
          <xs:element name="membership">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:enumeration value="demand"/>
                <xs:enumeration value="permanent"/>
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
          <xs:element name="members">
            <!--List of members of the FA group-->
            <xs:complexType>
              <xs:sequence>
                <xs:element name="member" minOccurs="0" maxOccurs="unbounded">
                  <xs:complexType>
                    <xs:simpleContent>
                      <xs:extension base="xs:anyURI">
                        <xs:attribute name="active" type="xs:boolean"/>
                      </xs:extension>
                    </xs:simpleContent>
                  </xs:complexType>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
</xs:schema>

```

7.2.21 Void

7.2.22 CAT service

7.2.22.1 User defined data

No user data is defined in 3GPP TS 24.182 [21].

7.2.22.2 Operator defined data

7.2.22.2.1 Data semantics

The CAT service is authorized and activated by the operator by setting the "authorized" attribute of <operator-customized-alerting-tone> to "true".

7.2.22.2.2 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 Customized Alerting Tone (CAT) service
    </xs:documentation>
  </xs:annotation>
  <xs:element name="operator-customized-alerting-tone" substitutionGroup="ss:absOperatorService"
nillable="true">
    </xs:element>
  </xs:schema>
```

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

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

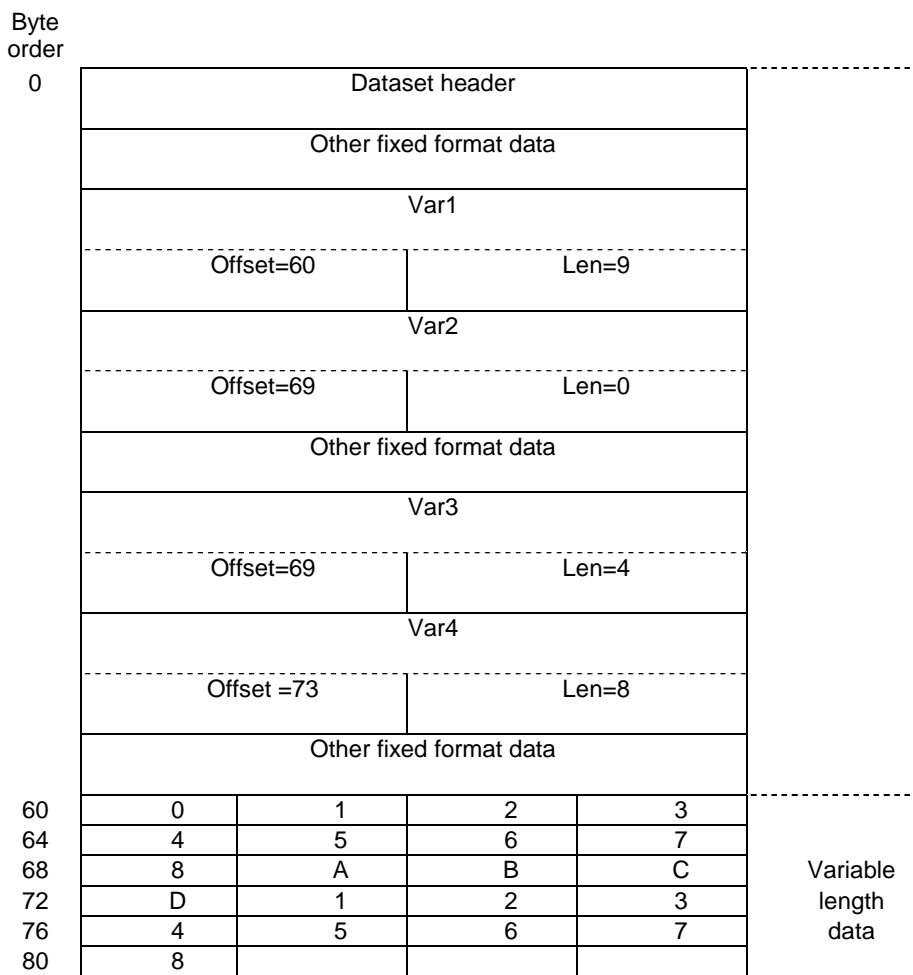
Var2 empty

Var3 = ABCD

Var4= 124345678

The coding of the dataset is as follows:

Figure Annex A-1: Dataset example



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
2009-03	CT#43	CP-090027	0001	1	Network provider options for CDIV with binary option	8.0.0	8.1.0
			0002	1	Complement on NDUB parameter in the binary option		
			0003	1	IMS CAT description with binary option		
			0004	1	AOC parameters with binary option		
			0005	2	Editor's notes and Service names corrections		
			0006		AOC Service with XML option		
			0007		Service Indication for XML format		
			0008		Addition of schema locations for XML files		
			0009		Cleanup of XML files for operator common data		
			0010	1	NDUB parameter in XML option		
			0011	1	CUG not supported in XML option		
			0012	2	CAT parameters in XML option		
			0013	1	Reverse charging note in XML		
			0014	1	CC parameters in XML option		
2009-06	CT#44	CP-090304	0016	1	Document references in AOC subclause	8.1.0	8.2.0
			0017	1	Editorial Changes		
2009-06					Styles and format errors corrected in tables caused by implementation in v.8.2.0, e.g. bullets removed.	8.2.0	8.2.1
2009-09	CT#45	CP-090551	0018	1	Flexible Alerting with binary option	8.2.1	8.3.0
			0019		CAT User configuration		
			0020	1	XML schema for Flexible Alerting		
2009-12	-	-	-	-	Update to Rel-9 version (MCC)	8.3.0	9.0.0
2011-09	CT#53	CP-110556	0022		OIP/OIR data syntax	9.0.0	9.1.0
2012-12	CT#58	CP-120715	0025	3	XML corrections	9.1.0	9.2.0
2013-03	CT#59	CP-130012	0039	-	XML document Version	9.2.0	9.3.0
2013-05					The history table corrected	9.3.0	9.3.1

History

Document history		
V9.0.0	January 2010	Publication
V9.1.0	October 2011	Publication
V9.2.0	January 2013	Publication
V9.3.1	May 2013	Publication