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**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
IP Multimedia Subsystem (IMS) Application Server (AS)
service data descriptions for AS interoperability
(3GPP TS 29.364 version 18.0.0 Release 18)**



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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.

IMS CAMEL subscription data may be transferred to the IM-SSF AS using Sh interface.

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.
- the structure and the coding of a set of generic IMS user group data over the Sh interface.
- the structure and the coding of the service data (ODB Information for IMS Oriented Services) that are transported over the Sh interface between an Application Server supporting services that are subject to IMS-ODB as defined in 3GPP TS 22.041[25] and the HSS.
- the structure and the coding of the IMS CAMEL subscription data transported using Sh interface.

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 ".
- [24] 3GPP TS 23.003: "Numbering, addressing and identification".
- [25] 3GPP TS 22.041: "Operator Determined Barring (ODB)".
- [26] 3GPP TS 23.278: "Customised Applications for Mobile network Enhanced Logic (CAMEL); IP Multimedia System (IMS) interworking; Stage 2".
- [27] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

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
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
DC	Data Channel
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/IMS CAMEL 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/IMS CAMEL 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/IMS CAMEL 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 MMTEL 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.

An XML format is defined for the structure and the coding of the IMS CAMEL Subscription Data.

5 Architecture

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

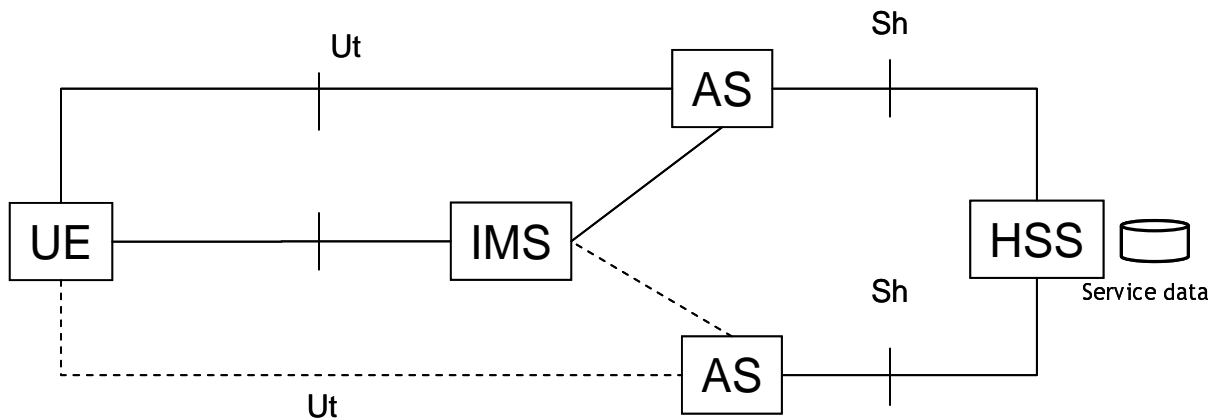


Figure 5-1: Functional architecture for AS interoperability

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)

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

PSTN/ISDN and CS Call forwarding services have similar subscription options.

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 Void

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.

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 barring 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.

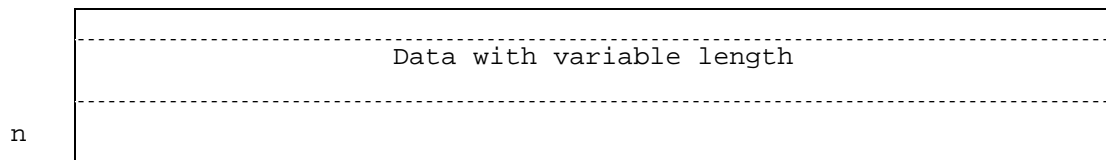
The `variable_data_offset` is the offset (in bytes) from the beginning of dataset to the beginning of a variable data. The `variable_data_length` determines the end of the variable data. A `variable_data_offset` of 0 indicates a non-provided sequence.

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. `offset` \geq fixed size of the fixed part of the dataset (unless `offset` == 0), and
- ii. `offset+length` \leq total size of the dataset.
- iii. there is no overlap between variable data.

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	



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.

Offset	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 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
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
5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
(a) (b) (c) (d) (e) (f) (g) (h)

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

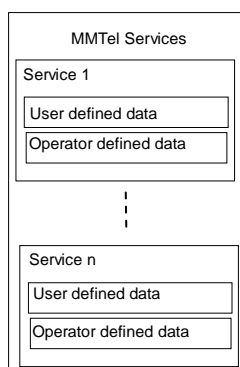


Figure 7.1-1: General structure of MMTEL service document

The MMTEL document consists of the services and the DC subscription data. 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. The DC subscription data includes authorization information to indicate whether the subscriber can use DC.

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:sequence>
  </xs:complexType>
</xs:schema>
```

```

        <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: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: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: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".

7.2.13.2.2 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

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>
</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:sequence>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
  </xs:element>
</xs:schema>
```



```

    <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]

9 IMS user group

9.1 General

An IMS user group comprises a list of IMS users which are members of the group and for which a certain service is offered specific to the group. Some generic data with the same meaning may appear for any IMS user group, especially the ones related to the relations between the IMS user group and its members, e.g. the list of the users that are members of the group. This specification only addresses the case when this generic data is stored in the HSS and transferred to the HSS through Sh as transparent data.

This specification standardizes the coding of a set of generic IMS user group data over the Sh interface within the repository data and the associated service indications.

The generic IMS user group data is defined in clause 9.3

Data describing service or feature content supported by an IMS user group is not considered as generic data associated to this IMS user group or to a member of this IMS user group. Such data is outside the scope of this specification.

9.2 Group identification and service indications

An IMS user group may be identified by

- a Public Service Identity of which the form is described in 3GPP TS 23.003 [24] or
- a Public User Identity when the group is identified by one of its user (e.g. the group controller).

The group identifier is handled as part of an IMS subscription but is used solely for Sh transparent data handling. The only intention of the IMS user group identifier is to identify a data container into HSS. IMS subscription management or traffic procedures of an IMS user group identifier do not apply to the group as such or any of its members. E.g. if IMPU1 is used to identify an IMS user group that consists of two users, identified by IMPU1 and IMPU2, if IMPU1 is registered, it does not have any effect in the group as such, i.e. IMPU2 registration status is not modified. The only intention of the usage of IMPU1 as the group identifier is to identify IMPU1 as the subscriber in HSS where the group transparent information (see 9.3.1) is stored.

The generic IMS user group data associated to an IMS user group shall be contained in the Service Data of the Repository data with the Service Indication having the value "IMS-GROUP".

The generic IMS group member data associated to an IMS user, identified by its public user identity, that is member of one or more IMS user groups shall be contained in the Service data of the Repository Data of this user with a Service Indication having the value "IMS-GROUP-MEMBER".

When a user belongs to different IMS groups, the Service Data comprises different subsets of IMS group member data, each associated to an IMS user group.

9.3 Information elements

9.3.1 Information elements associated to a IMS user group

The generic IMS user group data associated to an IMS user group comprises:

- the list of members of the IMS user group that comprises the public user identity of each member

Specific IMS user group data in particular parameters depending of the service content and attached to the group or to a member of the group is not standardised in this specification. It is implementation dependent to describe this data in repository data with specific AS dependent service indications.

9.3.2 Information elements associated to a IMS group member

The generic IMS user group member data of a user that is member of one or more IMS user groups associated comprises:

- the identities of the IMS groups to which the user belongs to

Specific group member data in particular parameters depending of the service content of the group for this member is not standardised in this specification. It is implementation dependent to describe this data in repository data with specific AS dependent service indications.

9.4 XML schemas

9.4.1 XML schema of the IMS group data

The hereafter XML schema describes the structure and content of the IMS group data. It will allow future extensions for adding new generic IMS group data.

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="Group" type="tGroup" />
  <xs:complexType name="tGroup">
```

```

    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" name="GroupMember" type="tGroupMember" />
      <xs:any minOccurs="0" maxOccurs="unbounded" namespace="##other" processContents="lax" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="tGroupMember">
    <xs:sequence>
      <xs:element name="GroupMemberIdentity" type="tGroupMemberIdentity" />
      <xs:any minOccurs="0" maxOccurs="unbounded" namespace="##other" processContents="lax" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="tGroupMemberIdentity" final="restriction list">
    <xs:union memberTypes="tSIP_URL tTEL_URL" />
  </xs:simpleType>
  <xs:simpleType name="tSIP_URL" final="restriction list">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
  <xs:simpleType name="tTEL_URL" final="restriction list">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
</xs:schema>

```

9.4.2 XML schema of the IMS group member data

The hereafter XML schema describes the structure and content of the IMS group data. It will allow future extensions for adding new generic IMS group data.

```

<?xml version="1.0" encoding="utf-8" ?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="GroupsMembership" type="tGroupsMembership" />
  <xs:complexType name="tGroupsMembership">
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" name="GroupMembership" type="tGroupMembership" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="tGroupMembership">
    <xs:sequence>
      <xs:element name="GroupIdentity" type="tGroupIdentity" />
      <xs:any minOccurs="0" maxOccurs="unbounded" namespace="##other" processContents="lax" />
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="tGroupIdentity" final="restriction list">
    <xs:union memberTypes="tSIP_URL tTEL_URL" />
  </xs:simpleType>
  <xs:simpleType name="tSIP_URL" final="restriction list">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
  <xs:simpleType name="tTEL_URL" final="restriction list">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
</xs:schema>

```

10 ODB Information for IMS Oriented Services

10.1 Service Indication

A dedicated Service Indication value shall be used for repository data containing ODB Information for IMS Oriented Services formatted according to the XML schema specified in clause 10.2. The value of the Service Indication shall be "IMS-ODB-Information".

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

10.2 IMS-ODB-Information schema

The following shows the IMS-ODB-Information schema:

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">

  <xs:simpleType name="tOutgoingBarring" final="list restriction">
    <xs:restriction base="xs:unsignedByte">
      <xs:maxInclusive value="3"/>
      <xs:enumeration value="0">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF OUTGOING COMMUNICATION</label>
            <definition xml:lang="en">outgoing communication barred</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="1">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF OUTGOING INTERNATIONAL COMMUNICATIONS</label>
            <definition xml:lang="en">outgoing international communications barred</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="2">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF OUTGOING INTERNATIONAL COMMUNICATIONS EXHPLMNC</label>
            <definition xml:lang="en">outgoing international communications barred except those
directed to the home plmn country</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="3">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF OUTGOING COMMUNICATIONS WHEN ROAMING</label>
            <definition xml:lang="en">outgoing communications barred when roaming outside the hplmn
country</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tIncomingBarring" final="list restriction">
    <xs:restriction base="xs:unsignedByte">
      <xs:maxInclusive value="1"/>
      <xs:enumeration value="0">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF INCOMING COMMUNICATION</label>
            <definition xml:lang="en">incoming communication barred</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="1">
        <xs:annotation>
          <xs:documentation>
            <label xml:lang="en">BARRING OF INCOMING COMMUNICATIONS WHEN ROAMING</label>
            <definition xml:lang="en">incoming communications barred when roaming outside the hplmn
country</definition>
          </xs:documentation>
        </xs:annotation>
      </xs:enumeration>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tBarringOfRoaming" final="list restriction">
    <xs:restriction base="xs:unsignedByte">
      <xs:maxInclusive value="1"/>
      <xs:enumeration value="0">
        <xs:annotation>
          <xs:documentation>

```

```

        <label xml:lang="en">BARRING OF ROAMING OUTSIDE THE HOME PLMN</label>
        <definition xml:lang="en">roaming outside hplmn barred</definition>
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="1">
    <xs:annotation>
      <xs:documentation>
        <label xml:lang="en">BARRING OF ROAMING OUTSIDE THE HPLMN COUNTRY</label>
        <definition xml:lang="en">roaming outside hplmn country barred</definition>
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="tDivertedToAddressRegistrationBarring" final="list restriction">
  <xs:restriction base="xs:unsignedByte">
    <xs:maxInclusive value="2"/>
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF REGISTRATION OF ANY COMMUNICATION DIVERTED-TO
ADDRESS</label>
          <definition xml:lang="en">registration of any communication diverted-to address
barred</definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF REGISTRATION OF ANY INTERNATIONAL COMMUNICATION
DIVERTED-TO ADDRESS</label>
          <definition xml:lang="en">registration of any international communication diverted-to
address barred</definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="2">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF REGISTRATION OF ANY INTERNATIONAL COMMUNICATION
DIVERTED-TO ADDRESS EXHPLMNC</label>
          <definition xml:lang="en">registration of any international communication diverted-to
address except addresses within the hplmn country barred</definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="tSimpleInvocationOfCommunicationTransferBarring" final="list restriction">
  <xs:restriction base="xs:unsignedByte">
    <xs:maxInclusive value="2"/>
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF INVOCATION OF COMMUNICATION TRANSFER</label>
          <definition xml:lang="en">invocation of communication transfer barred</definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF INVOCATION OF COMMUNICATION TRANSFER WHERE AT LEAST ONE
LEG IS CHARGED</label>
          <definition xml:lang="en">invocation of communication transfer where at least one of the
two communications is a communication charged to the served subscriber barred</definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="2">
      <xs:annotation>
        <xs:documentation>
          <label xml:lang="en">BARRING OF INVOCATION OF COMMUNICATION TRANSFER WHERE AT LEAST ONE
LEG IS CHARGED AT INTERNATIONAL RATES</label>

```

```

        <definition xml:lang="en">invocation of communication transfer where at least one of the
two communications is a communication charged to the served subscriber at international rates
barred</definition>
    </xs:documentation>
    </xs:annotation>
    </xs:enumeration>
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="tBool">
<xs:restriction base="xs:boolean" />
</xs:simpleType>

<xs:complexType name="tExtension">
<xs:sequence>
    <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

<xs:complexType name="tOutgoingPremiumRateBarring">
<xs:sequence>
    <xs:element name="PremiumRateCommunicationsInformation" type="tBool" default="0"
minOccurs="0" />
    <xs:element name="PremiumRateCommunicationsEntertainment" type="tBool" default="0"
minOccurs="0" />
    <xs:element name="PremiumRateCallsInformationWhenRoamingOutsideHplmnCountry" type="tBool"
default="0" minOccurs="0" />
    <xs:element name="PremiumRateCallsEntertainmentWhenRoamingOutsideHplmnCountry" type="tBool"
default="0" minOccurs="0" />
    <xs:element name="Extension" type="tExtension" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

<xs:complexType name="tOperatorSpecificBarring">
<xs:sequence>
    <xs:element name="Type1" type="tBool" default="0" minOccurs="0" />
    <xs:element name="Type2" type="tBool" default="0" minOccurs="0" />
    <xs:element name="Type3" type="tBool" default="0" minOccurs="0" />
    <xs:element name="Type4" type="tBool" default="0" minOccurs="0" />
    <xs:element name="Extension" type="tExtension" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

<xs:complexType name="tOdbForImsMultimediaTelephonyServices">
<xs:sequence>
    <xs:element name="OutgoingBarring" type="tOutgoingBarring" minOccurs="0" />
    <xs:element name="IncomingBarring" type="tIncomingBarring" minOccurs="0" />
    <xs:element name="BarringOfRoaming" type="tBarringOfRoaming" minOccurs="0" />
    <xs:element name="OutgoingPremiumRateBarring" type="tOutgoingPremiumRateBarring"
minOccurs="0" />
    <xs:element name="OperatorSpecificBarring" type="tOperatorSpecificBarring" minOccurs="0" />
    <xs:element name="BarringOfSupplementaryServicesManagement" type="tBool" default="0"
minOccurs="0" />
    <xs:element name="DivertedToAddressRegistrationBarring"
type="tDivertedToAddressRegistrationBarring" minOccurs="0" />
    <xs:element name="SimpleInvocationOfCommunicationTransferBarring"
type="tSimpleInvocationOfCommunicationTransferBarring" minOccurs="0" />
    <xs:element name="InvocationOfChargeableCommunicationTransferBarring" type="tBool"
default="0" minOccurs="0" />
    <xs:element name="MultipleInvocationOfCommunicationTransferBarring" type="tBool" default="0"
minOccurs="0" />
    <xs:element name="Extension" type="tExtension" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

<xs:complexType name="tOdbForImsOrientedServices">
<xs:sequence>
    <xs:element name="OdbForImsMultimediaTelephonyServices"
type="tOdbForImsMultimediaTelephonyServices" minOccurs="0" />
    <xs:element name="Extension" type="tExtension" minOccurs="0" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

<xs:element name="OdbForImsOrientedServices" type="tOdbForImsOrientedServices" />

```

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

11 IMS CAMEL Services

11.1 General

IMS CAMEL related subscription data, including O-IM-CSI, D-IM-CSI and VT-IM-CSI, are provisioned in the HSS and downloaded to the IM-SSF AS to support Customized Applications for Mobile network Enhanced Logic (CAMEL) feature for the IP Multimedia Core Network (IM CN) Subsystem, as defined in the 3GPP TS 23.278 [26].

This specification standardizes the coding of the IMS CAMEL subscription data based on XML when transported via Sh interface within the repository data and the associated service indications.

11.2 Service Indications

A dedicated Service Indication shall be used for IMS CAMEL services. The value of the Service Indication shall be "IMS-CAMEL-Services".

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

11.3 XML schemas

11.3.1 XML schema of IMS CAMEL Services

The following XML schema describes the IMS CAMEL Subscription data.

NOTE: The XML schema follows the encoding for IM CSI subscription data as defined in 3GPP TS 29.002 [27].

```
<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> IM CSI Information </xs:documentation>
  </xs:annotation>

  <xs:include schemaLocation="im-ssf-comm.xsd"/>
  <xs:include schemaLocation="o-IM-CSI.xsd"/>
  <xs:include schemaLocation="o-IM-bcsm-camel-TDP-criteria-list.xsd"/>
  <xs:include schemaLocation="d-IM-CSI.xsd"/>
  <xs:include schemaLocation="vt-IM-CSI.xsd"/>
  <xs:include schemaLocation="vt-bcsm-camel-TDP-criteria-list.xsd"/>

  <xs:element name="im-csi-information" type="ss:im-csi-information-type"/>
  <xs:complexType name="im-csi-information-type">
    <xs:sequence>
      <xs:element name="supported-imssf-camel-phases" type="ss:supported-camel-phases-type"/>
      <xs:element name="camel-subscription-info" type="ss:camel-subscription-info-type"/>
      <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="supported-camel-phases-type">
    <xs:restriction base="xs:string">
      <xs:enumeration value="phase1"/>
      <xs:enumeration value="phase2"/>
      <xs:enumeration value="phase3"/>
      <xs:enumeration value="phase4"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="camel-subscription-info-type">
    <xs:sequence>
```



```

    <xs:element ref="ss:o-IM-CSI" minOccurs="0" />
    <xs:element ref="ss:o-IM-bcsm-camel-TDP-criteria-list" minOccurs="0"/>
    <xs:element ref="ss:d-IM-CSI" minOccurs="0"/>
    <xs:element ref="ss:vt-IM-CSI" minOccurs="0"/>
    <xs:element ref="ss:vt-bcsm-camel-TDP-criteria-list" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

11.3.2 XML schema of Common Data for IMS CAMEL Services

The file "im-ssf-comm.xsd" contains all the common types of IMS CAMEL Subscription data. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> Common Data of Intelligent Network Subscriber Information
  </xs:documentation>
  </xs:annotation>

  <xs:element name="service-key">
    <xs:simpleType>
      <xs:restriction base="xs:positiveInteger">
        <xs:minInclusive value="0"/>
        <xs:maxInclusive value="2147483647"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="gsm-SCF-address">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value="[a-zA-E0-9]{1,40}"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="default-call-handling">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="continue-call"/>
        <xs:enumeration value="release-call"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="o-bcsm-trigger-detection-point">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="collected-info"/>
        <xs:enumeration value="route-select-failure"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="dialled-number">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value="[a-zA-E0-9]{1,40}"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="camel-capability-handling">
    <xs:simpleType>
      <xs:restriction base="xs:positiveInteger">
        <xs:minInclusive value="1"/>
        <xs:maxInclusive value="16"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="destination-number">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value="[a-zA-E0-9]{1,40}"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>

```

```

</xs:simpleType>
</xs:element>
<xs:element name="destination-number-length">
<xs:simpleType>
  <xs:restriction base="xs:positiveInteger">
    <xs:minInclusive value="1"/>
    <xs:maxInclusive value="15"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="basic-service-criteria">
<xs:sequence>
  <xs:element ref="ss:ext-bearer-service" minOccurs="0"/>
  <xs:element ref="ss:ext-tele-service" minOccurs="0"/>
</xs:sequence>
</xs:element>
<xs:element name="ext-bearer-service">
<xs:simpleType>
  <xs:restriction base="xs:string">
    <xs:pattern value="[a-zA-E0-9]{1,10}"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="ext-tele-service">
<xs:simpleType>
  <xs:restriction base="xs:string">
    <xs:pattern value="[a-zA-E0-9]{1,10}"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="t-bcsm-trigger-detection-point">
<xs:simpleType>
  <xs:restriction base="xs:string">
    <xs:enumeration value="term-attempt-authorized"/>
    <xs:enumeration value="t-busy"/>
    <xs:enumeration value="t-no-answer"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
</xs:schema>

```

11.3.3 XML schema for O-IM-CSI

The file "o-IM-CSI.xsd" contains the XML schema for O-IM-CSI. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> Intelligent Network Subscriber Information of o-IM-CSI
  </xs:documentation>
</xs:annotation>

  <xs:element name="o-IM-CSI" type="ss:o-IM-CSI-type"/>
  <xs:complexType name="o-IM-CSI-type">
    <xs:sequence>
      <xs:element name="o-bcsm-camel-TDP-data-list" type="ss:o-bcsm-camel-TDP-data-list-type"/>
      <xs:element ref="ss:camel-capability-handling" minOccurs="0"/>
      <xs:element name="csi-active" minOccurs="0"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="o-bcsm-camel-TDP-data-list-type">
    <xs:sequence>
      <xs:element name="o-bcsm-camel-TDP-data" type="ss:o-bcsm-camel-TDP-data-type"
maxOccurs="10"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="o-bcsm-camel-TDP-data-type">
    <xs:sequence>
      <xs:element ref="ss:o-bcsm-trigger-detection-point"/>

```

```

    <xs:element ref="ss:service-key"/>
    <xs:element ref="ss:gsm-SCF-address"/>
    <xs:element ref="ss:default-call-handling"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

11.3.4 XML schema for O-IM-BcsmCamelTDP-CriteriaList

The file "o-IM-bcsm-camel-TDP-criteria-list.xsd" contains the XML schema for O-IM-BcsmCamelTDP-CriteriaList. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> Intelligent Network Subscriber Information of o-IM-bcsm-camel-
TDP-criteria-list </xs:documentation>
  </xs:annotation>

  <xs:element name="o-IM-bcsm-camel-TDP-criteria-list" type="ss:o-IM-bcsm-camel-TDP-criteria-list-
type"/>
  <xs:complexType name="o-IM-bcsm-camel-TDP-criteria-list-type">
    <xs:sequence>
      <xs:element name="o-IM-bcsm-camel-TDP-criteria" type="ss:o-IM-bcsm-camel-TDP-criteria-type"
maxOccurs="10"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="o-IM-bcsm-camel-TDP-criteria-type">
    <xs:sequence>
      <xs:element ref="ss:o-bcsm-trigger-detection-point"/>
      <xs:element name="destination-number-criteria" type="ss:destination-number-criteria-type"
minOccurs="0"/>
      <xs:element ref="ss:basic-service-criteria" minOccurs="0" maxOccurs="5"/>
      <xs:element ref="call-type-criteria" minOccurs="0"/>
      <xs:element ref="o-cause-value-criteria" minOccurs="0" maxOccurs="5"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="destination-number-criteria-type">
    <xs:sequence>
      <xs:element ref="ss:match-type"/>
      <xs:element name="destination-number-list" type="ss:destination-number-list-type"
minOccurs="0"/>
      <xs:element name="destination-number-length-list" type="ss:destination-number-length-list-
type" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="call-type-criteria">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="forwarded"/>
        <xs:enumeration value="not-forwarded"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="o-cause-value-criteria">
    <xs:simpleType>
      <xs:restriction base="xs:positiveInteger">
        <xs:minInclusive value="0"/>
        <xs:maxInclusive value="254"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="match-type">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="inhibiting"/>
        <xs:enumeration value="enabling"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>

```

```

<xs:complexType name="destination-number-list-type">
<xs:sequence>
  <xs:element ref="ss:destination-number" minOccurs="0" maxOccurs="10"/>
</xs:sequence>
</xs:complexType >
<xs:complexType name="destination-number-length-list-type">
<xs:sequence>
  <xs:element ref="ss:destination-number-length" minOccurs="0" maxOccurs="3"/>
</xs:sequence>
</xs:complexType>
</xs:schema>

```

11.3.5 XML schema for D-IM-CSI

The file "d-IM-CSI.xsd" contains the XML schema for D-IM-CSI. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> Intelligent Network Subscriber Information of d-IM-CSII
  </xs:documentation>
  </xs:annotation>

  <xs:element name="d-IM-CSI" type="ss:d-IM-CSI-type"/>
  <xs:complexType name="d-IM-CSI-type">
    <xs:sequence>
      <xs:element name="dp-analysed-info-criteria-list" type="ss:dp-analysed-info-criteria-list-
type" minOccurs="0"/>
      <xs:element ref="ss:camel-capability-handling" minOccurs="0"/>
      <xs:element name="csi-active" minOccurs="0"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="dp-analysed-info-criteria-list-type">
    <xs:sequence>
      <xs:element name="dp-analysed-info-criteria" type="ss:dp-analysed-info-criteria-type"
maxOccurs="10"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="dp-analysed-info-criteria-type">
    <xs:sequence>
      <xs:element ref="ss:dialled-number"/>
      <xs:element ref="ss:service-key"/>
      <xs:element ref="ss:gsm-SCF-address"/>
      <xs:element ref="ss:default-call-handling"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:schema>

```

11.3.6 XML schema for VT-IM-CSI

The file "vt-IM-CSI.xsd" contains the XML schema for VT-IM-CSI. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation xml:lang="en"> Intelligent Network Subscriber Information of vt-IM-CSI
  </xs:documentation>
  </xs:annotation>

  <xs:element name="vt-IM-CSI" type="ss:vt-IM-CSI-type"/>
  <xs:complexType name="vt-IM-CSI-type">
    <xs:sequence>
      <xs:element name="t-bcsm-camel-TDP-data-list" type="ss:t-bcsm-camel-TDP-data-list-type" />
      <xs:element ref="ss:camel-capability-handling" minOccurs="0"/>
      <xs:element name="csi-active" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

```

```

        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="t-bcsm-camel-TDP-data-list-type">
    <xs:sequence>
        <xs:element name="t-bcsm-camel-TDP-data" type="ss:t-bcsm-camel-TDP-data-type"
maxOccurs="10" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="t-bcsm-camel-TDP-data-type">
    <xs:sequence>
        <xs:element ref="ss:t-bcsm-trigger-detection-point" />
        <xs:element ref="ss:service-key" />
        <xs:element ref="ss:gsm-SCF-address" />
        <xs:element ref="ss:default-call-handling" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

11.3.7 XML schema for VT-IM-BCSM-CAMEL-TDP-CriteriaList

The file "vt-bcsm-camel-TDP-criteria-list.xsd" contains the XML schema for VT-IM-BCSM-CAMEL-TDP-CriteriaList. This schema is defined as

```

<?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"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/xcap" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:annotation>
        <xs:documentation xml:lang="en"> Intelligent Network Subscriber Information of vt-bcsm-camel-
TDP-criteria-list </xs:documentation>
    </xs:annotation>

    <xs:element name="vt-bcsm-camel-TDP-criteria-list" type="ss:vt-bcsm-camel-TDP-criteria-list-
type" />
    <xs:complexType name="vt-bcsm-camel-TDP-criteria-list-type">
        <xs:sequence>
            <xs:element name="vt-bcsm-camel-TDP-criteria" type="ss:vt-bcsm-camel-TDP-criteria-type"
maxOccurs="10" />
            <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded" />
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="vt-bcsm-camel-TDP-criteria-type">
        <xs:sequence>
            <xs:element ref="ss:t-bcsm-trigger-detection-point" />
            <xs:element ref="ss:basic-service-criteria" minOccurs="0" maxOccurs="5" />
            <xs:element name="t-cause-value-criteria" type="ss:t-cause-value-criteria-type"
minOccurs="0" maxOccurs="5" />
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="t-cause-value-criteria-type">
        <xs:restriction base="xs:unsignedByte">
            <xs:minInclusive value="0" />
            <xs:maxInclusive value="254" />
        </xs:restriction>
    </xs:simpleType>
</xs:schema>

```

12 Shared Repository Data identification

12.1 General

This clause describes an optional solution to avoid potential large amount of update, and possible notification, operations in Sh when data is shared among multiple subscribers. Only Repository Data may be shared among multiple subscribers.

12.2 Description

Shared Repository Data among multiple subscribers may be supported in the HSS. Each shared Repository Data is uniquely identified by a distinct IMS Public Service Identity and a Service Indication.

This PSI is only used for accessing the shared Repository Data via Sh interface. This PSI shall not exist from an IMS management point of view and thus it shall not be allowed to be unregistered or to be used as an IMS user in any way. The PSI Activation State shall be set to Inactive.

The PSI(s) used to identify a shared Repository Data are contained in a specific Repository Data (identified by a dedicated Service Indication value "SHARED-REPOSITORY-DATA-IDENTIFICATION") stored for each subscriber to whom this shared Repository Data applies.

One or multiple shared Repository Data may be stored in the HSS, while a subscriber may reference one or several of them.

When an AS wants to read a shared Repository Data for a subscriber, the AS should retrieve first the PSI(s) contained in the Repository Data identified by the dedicated Service Indication value "SHARED-REPOSITORY-DATA-IDENTIFICATION" and the Public Identity of this subscriber. Then, the AS uses received PSI(s) to retrieve the shared Repository Data, using corresponding specific Service Indication.

The AS should store the shared Repository Data locally and it should subscribe to notifications on changes. If shared Repository Data is modified, the HSS notifies the AS about it with a single Sh notification.

See figure 12.2-1 for an example of shared Repository Data usage.

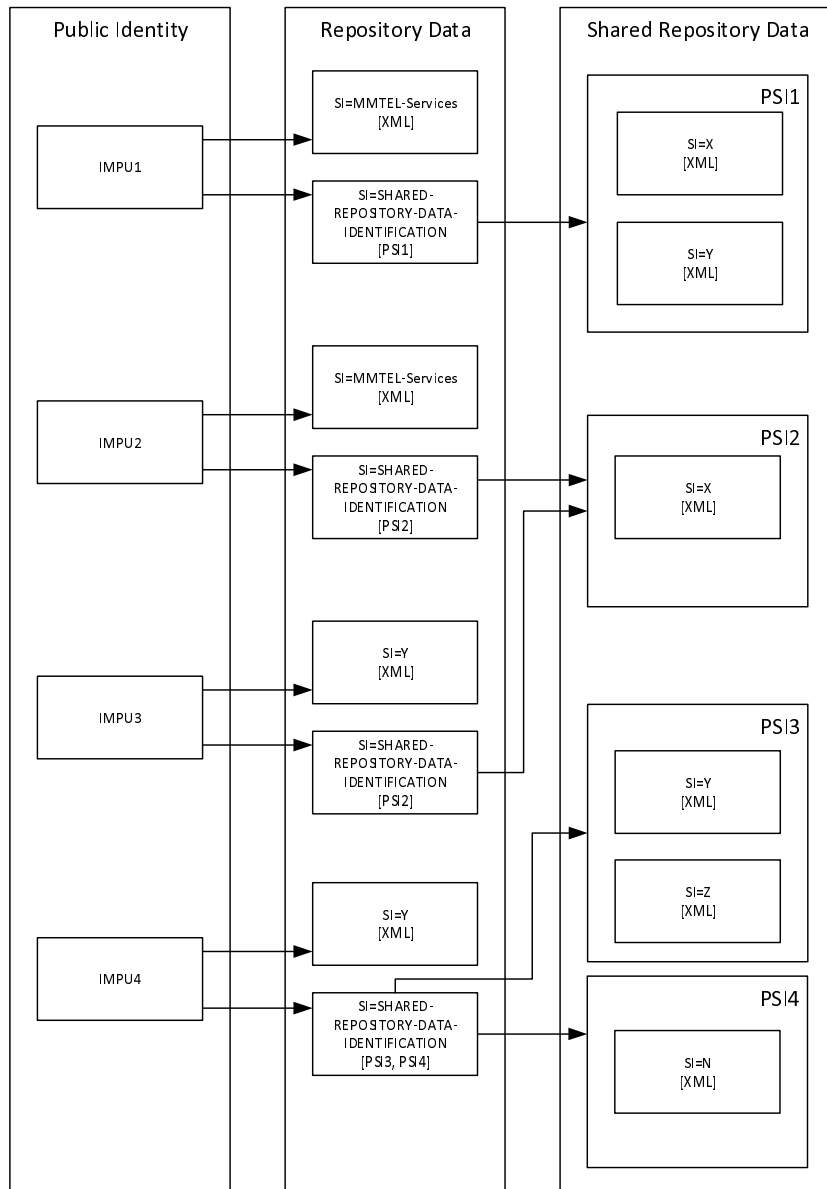


Figure 12.2-1: Shared Data example

If the same Repository Data is defined for a subscriber both as individual Repository Data and shared Repository Data, the individual one shall take precedence.

The same Repository Data shall not be defined as different shared Repository Data for the same subscriber.

12.3 Service Indication

The shared Repository Data identification shall be contained in the Service Data of the Repository Data with the Service Indication having the value "SHARED-REPOSITORY-DATA-IDENTIFICATION".

12.4 Information elements

12.4.1 Shared Repository Data reference

A shared Repository Data identification is a distinct IMS Public Service Identity, as described in 3GPP TS 23.003 [24].

12.5 XML schemas

12.5.1 Shared Repository Data identification

The XML schema below describes the structure and content of the shared Repository Data identification.

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="sharedRepositoryDataIdentification" type="tSharedRepositoryDataIdentification"
/>
  <xs:simpleType name="tSharedRepositoryDataIdentification" final="restriction list">
    <xs:restriction base="xs:anyURI" />
  </xs:simpleType>
</xs:schema>
```


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

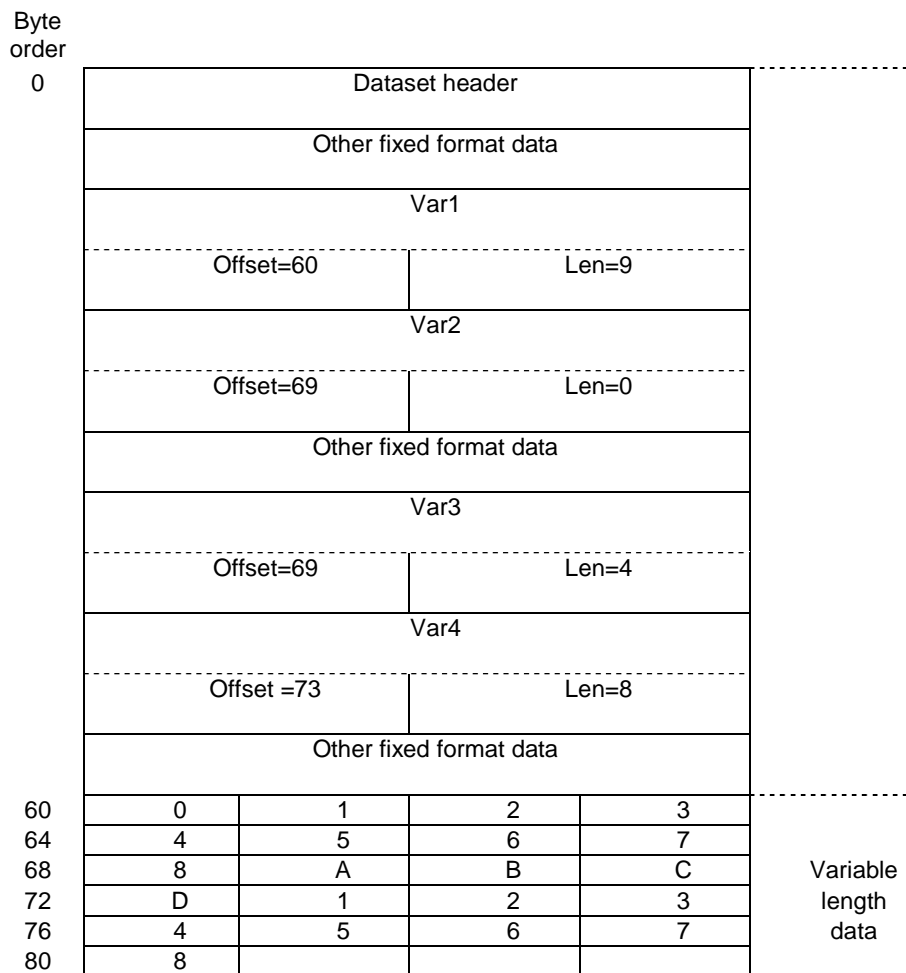
Var2 empty

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	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2008-12	CT#42	CP-080720				V1.0.0 approved in CT#42	8.0.0
2009-03	CT#43	CP-090027	0001	1		Network provider options for CDIV with binary option	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	8.2.0
			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.	8.2.1
2009-09	CT#45	CP-090551	0018	1		Flexible Alerting with binary option	8.3.0
			0019			CAT User configuration	
			0020	1		XML schema for Flexible Alerting	
2009-12	-	-	-	-		Update to Rel-9 version (MCC)	9.0.0
2011-03	-	-	-	-		Update to Rel-10 version (MCC)	10.0.0
2011-09	CT#53	CP-110556	0023	-		OIP/OIR data syntax	10.1.0
2012-09	CT#57	CP-120482	0027	-		IMS user group over Sh	11.0.0
2012-12	CT#58	CP-120715	0028	1		XML corrections	11.1.0
		CP-120876	0029	2		Transparent Data coding of IMS ODB info	
2013-03	CT#59	CP-130012	0041	-		XML document Version	11.2.0
2013-03	CT#59	CP-130034	0030	2		IM-SSF Service Data Definition based on XML	12.0.0
			0031	2		XML Schema for IM-SSF	
2013-06	CT#60	CP-130302	0042	-		Correction on XML Schema for IMS CAMEL Data	12.1.0
2014-06	CT#64	CP-140240	0043	1		Correction on XML Schema for IMS CAMEL Services	12.2.0
2015-03	CT#67	CP-150016	0048	-		Removal of CDIVN service	12.3.0
2015-06	CT#68	CP-150273	0050	1		Shared Repository Data reference	13.0.0
2015-12	CT#70	CP-150750	0051	-		Communication Barring wording correction	13.1.0
2017-03	CT#75	-	-	-		Update to Rel-14 version (MCC)	14.0.0
2018-06	CT#80	-	-	-		Update to Rel-15 version (MCC)	15.0.0
2020-07	CT#88e	-	-	-		Update to Rel-16 version (MCC)	16.0.0
2022-04	-	-	-	-		Update to Rel-17 version (MCC)	17.0.0
2024-03	CT#103	CP-240043	0052	1	B	Extension of MMTEL service profile to support DC	18.0.0

History

Document history		
V18.0.0	May 2024	Publication