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SERIES Q: SWITCHING AND SIGNALLING

Organization of NGN service user data

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Supplement 56 to ITU-T Q-series Recommendations

Organization of NGN service user data

Summary

NGN release 1 defines the user profile functions, which provide capabilities for managing user profiles and making the user profile information available to other NGN functions. A user profile is a set of data information related to a user. The user profile functions support the identified service and control functions in the service stratum, as well as the network access control functions in the transport stratum [ITU-T Sup.1-Y]. This Supplement provides details concerning user data to be stored in the service user profile functional entity and other functional entities to enable user services and applications.

Source

Supplement 56 to ITU-T Q-series Recommendations was agreed on 27 April 2007 by ITU-T Study Group 11 (2005-2008).

Keywords

NGN, service user data, user data.

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Organization of NGN service user data

1 Scope

This Supplement defines the data structure and detailed parameter information of service user data in the service stratum of a next generation network (NGN), and where the parameter information is to be stored.

2 References

[ITU-T Sup.1-Y] ITU-T Y.2000 series Supplement 1 (2006), *NGN release 1 Scope*.

[ITU-T Y.2011] ITU-T Recommendation Y.2011 (2004), *General principles and general reference model for Next Generation Networks.*

[ITU-T Y.2012] ITU-T Recommendation Y.2012 (2006), *Functional requirements and architecture of the NGN release 1*.

[ITU-T Y.2021] ITU-T Recommendation Y.2021 (2006), *IMS for Next Generation Networks*.

[ITU-T Y.2031] ITU-T Recommendation Y.2031 (2006), *PSTN/ISDN emulation architecture*.

[ETSI TS 123 218] ETSI TS 123 218 V6.4.0 (2006), *IP Multimedia (IM) session handling; IM call model; Stage 2*.

[IETF RFC 2486] IETF RFC 2486 (1999), *The Network Access Identifier*.

[IETF RFC 2617] IETF RFC 2617 (1999), *HTTP Authentication: Basic and Digest Access Authentication*.

[IETF RFC 3261] IETF RFC 3261 (2002), *SIP session initiation protocol*.

[IETF RFC 3310] IETF RFC 3310 (2002), *Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA).*

[IETF RFC 3966] IETF RFC 3966 (2004), *The tel URI for telephone numbers.*

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 NGN service stratum [ITU-T Y.2011]: That part of the NGN which provides the user functions that transfer service-related data and the functions that control and manage service resources and network services to enable user services and applications.

3.2 Terms defined in this Supplement

This Supplement defines the following terms:

3.2.1 user data: All information that specifies identification, authentication, subscribed services, service provisions, access configuration, location management, routing and charging for the NGN user. Some user data are referred to as permanent user data, i.e., they can only be changed by administration means. Other data are temporary user data which may change as a result of normal operation of the system.

3.2.2 service user data: The user data that is stored, handled and maintained by the functional entities in the service stratum.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

AGCF	Access Gateway Control Function
AKA	Authentication and Key Agreement
AMG	Access Media Gateway
APL-GW-FE	Application Gateway Functional Entity
AS	Application Server
ASF	Application Server Functions
AS-FE	Application Server Functional Entity
CCF	Call Control Function
CSCF	Call Session Control Function
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Subsystem
PIEA	PSTN/ISDN Emulation Architecture
PSI	Public Service Identity
SAA	Service Authentication and Authorization
SCF	Service Control Function
S-CSCF	Serving CSCF
SPF	Service Provide Function
SUP-FE	Service User Profile Functional Entity

5 Conventions

None.

6 Generic requirements on NGN service user data

NGN service user data indicates all information in the service stratum associated with a NGN user which is required to represent the user and to provide subscribed services of the user. The objectives for NGN release 1 are to provide an extensible platform and architecture supporting:

- multimedia services (including PSTN/ISDN simulation services);
- PSTN/ISDN replacement support (emulation services);
- data communication services;
- public interest aspects (for both multimedia services and PSTN/ISDN replacement support) [ITU-T Sup.1-Y].

The overall architecture of the service stratum of NGN release 1 is designed to support the above NGN services in [ITU-T Y.2012]. In addition, three visualized architectures are designed for more intelligibility and operability, namely, Call Server-based PSTN/ISDN emulation subsystem [ITU-T Y.2031] and IMS-based PSTN/ISDN emulation subsystem [ITU-T Y.2031] and IP multimedia subsystem [ITU-T Y.2021]. Except public interest aspects services that should be supported in all architectures, the PSTN/ISDN emulation subsystem is designed to provide PSTN/ISDN emulation services, while the IP multimedia subsystem is focused on offering multimedia services (including PSTN/ISDN simulation services).

Since the three architectures vary in functional entities, service capabilities and supporting user types, which are important factors impacting the organization, storage and invoking of service user data, it is supposed to describe NGN service user data in three categories:

- user data for Call Server-based PSTN/ISDN emulation subsystem;
- user data for IMS-based PSTN/ISDN emulation subsystem;
- user data for IP multimedia subsystem.

NGN service user data is stored in a set of functional entities of the three architectures. Some user data are referred to as permanent information while some as temporary information.

6.1 User data for Call Server-based PSTN/ISDN emulation subsystem

- The basic user data should consist of:
  - subscription, identification and numbering;
  - registration;
  - service and service triggers;
  - core network services authorization.
- Functional entities

  In Call Server-based PSTN/ISDN emulation subsystem, user data are potentially stored in functional entities of SUP-FE, CCF, SPF and AS-FE [ITU-T Y.2031].

6.2 User data for IMS-based PSTN/ISDN emulation subsystem

- The basic user data should consist of:
  - subscription, identification and numbering;
  - registration;
  - location information;
  - service sessions;
  - charging;
  - authentication.
- Functional entities

  In IMS-based PSTN/ISDN emulation subsystem, user data are potentially stored in functional entities of SUP-FE, CSCFs, AGCF and ASF [ITU-T Y.2031].

6.3 User data for IP multimedia subsystem

- The basic user data should consist of:
  - subscription, identification and numbering;
  - registration;
  - location and presence information;
  - service sessions;
  - charging;
  - authentication.
- Functional entities

  In IP multimedia subsystem, user data are potentially stored in functional entities of SUP-FE, CSCFs and AS-FE [ITU-T Y.2021].

7 User data for Call Server-based PSTN/ISDN emulation subsystem

7.1 Data related to subscription, identification and numbering

7.1.1 User identity

The user identity is an E.164 number and stored permanently in the SUP-FE and CCF.

7.2 Data related to registration

7.2.1 AGCF ID

The AGCF ID identifies the AGCF currently serving the user equipment of Call Server-based PSTN/ISDN emulation user. The AGCF ID is stored permanently in the SUP-FE and CCF.

7.2.2 AMG-FE ID

The AMG-FE ID identifies the AMG-FE to which the user equipment of Call Server-based PSTN/ISDN emulation user is connected. The AMG-FE ID is permanent data stored in the AGCF.

7.2.3 CCF name

The CCF name identifies the CCF allocated to the user when the user is registered to Call Server-based PSTN/ISDN emulation subsystem. The CCF name shall be in the form of a SIP URL [IETF RFC 3261].

The CCF name is temporary data and is stored in the SUP-FE.

7.3 Data related to service and service triggers

7.3.1 Data related to value-added service and service triggers

7.3.1.1 Initial filter criteria

A set of initial filter criteria are stored for each user, for each application or service that the user request may invoke.

Each set of filter criteria includes the application server address (identifier for AS-FE, APL-GW-FE or legacy IN SCF), priority of the filter criteria, default handling, trigger points and optional service information.

The initial filter criteria are stored permanently in SUP-FE and temporarily in the CCF.

7.3.1.2 Application server information

The SUP-FE may store application server-specific information for each user. This information may include service key, trigger points, and service scripts, etc.

The application server information is stored permanently in one or more AS-FE, APL-GW-FE or SCF.

7.3.1.3 Service-related data

The service-related data is used by some value-added service logic.

The service-related data is stored permanently in one or more AS-FE or SCF.

7.3.2 Data related to supplementary service and service triggers

7.3.2.1 Service subscription information

The service subscription information is used to indicate which supplementary services are subscribed by a user.

The service subscription information is stored permanently in either the SPF or SUP-FE. When stored in the SUP-FE, this information may be downloaded to the SPF and stored temporarily.

7.3.2.2 Service-related data

The service-related data is used by some supplementary service logic, such as call forwarding number.

The service-related data is stored permanently in the SPF.

7.4 Data related to core network services authorization

7.4.1 Subscribed media profile

The subscribed media profile identifies a set of session description parameters that the user is authorized to request.

The subscribed media profile is permanent data stored in the CCF.

8 User data for IMS-based PSTN/ISDN emulation subsystem

8.1 Data related to subscription, identification and numbering

8.1.1 Private user identity

The private user identity is used for subscription identification and authentication purpose. One private user identity is assigned to a user. It may be associated with several public user identities and several service profiles. The format of private user identity could be the format of a NAI [IETF RFC 2486]. In a IMS-based PSTN/ISDN emulation subsystem, the private user identity could be shared by a group of users under AMG.

The private user identity is permanent user data and is stored in the SUP-FE and S-CSCF.

8.1.2 Public user identities

Refer to 9.1.2 for a detailed definition.

8.1.3 Public service identity

Refer to 9.1.3 for a detailed definition.

8.1.4 Barring indication

Refer to 9.1.4 for a detailed definition.

8.1.5 General subscription information

Refer to 9.1.6 for a detailed definition.

8.1.6 Device information

Refer to 9.1.7 for a detailed definition.

8.1.7 Line identifier

The line identifier contains an AMG identifier associated to the AMG. The information can be used for group user authentication which are under certain AMGs.

The line identifier is permanent user data and is stored in the SUP-FE and S-CSCF.

8.2 Data related to registration

8.2.1 User registration status

Refer to 9.2.1 for a detailed definition.

8.2.2 S-CSCF name

Refer to 9.2.2 for a detailed definition.

8.2.3 S-CSCF capabilities

Refer to 9.2.3 for a detailed definition.

8.3 Data related to location

Refer to 9.3.2 for a detailed definition.

8.4 Data related to service sessions

8.4.1 Service identity

Refer to 9.4.1 for a detailed definition.

8.4.2 Service priority

Refer to 9.4.2 for a detailed definition.

8.4.3 Service trigger points

For a definition and handling of these data, see [ETSI TS 123 218].

8.4.4 Application server address

Refer to 9.4.4 for a detailed definition.

8.4.5 General service information

Refer to 9.4.5 for a detailed definition.

8.4.6 Application server specific information

Refer to 9.4.6 for a detailed definition.

8.5 Data related to charging

8.5.1 Charging information

Refer to 9.5.1 for a detailed definition.

8.6 Data related to authentication

8.6.1 Authentication scheme

The authentication scheme indicates the scheme of user authentication procedure between S-CSCF and SUP-FE. The authentication scheme of IMS-based PSTN/ISDN emulation subsystem may include line identity-based authentication.

The authentication scheme is permanent data and is stored in the SUP-FE.

8.6.2 Authentication data

The authentication data contains essential information used for a specific user authentication procedure. The authentication data for line identity based authentication contains line identifier (see 8.1.7).

The authentication data is permanent data and is stored in the SUP-FE.

9 User data for the IP multimedia subsystem

User data for the IP multimedia subsystem includes identities of users, service identities and information, address of related functional entities such as application server, S-CSCF, I-CSCF, and authentication vectors.

Figure 9-1 describes an example of service user data in the IP Multimedia Subsystem. For one private user identity, several service profiles and several public user identities can be matched. Public user identity and barring indication flag are mandatory and permanently stored in the SUP-FE. Registration status, S-CSCF name, client address of S-CSCF and authentication vectors are mandatory and temporarily stored in the SUP-FE, which are created dynamically when a user is registered or authenticated. Server address of SUP-FE is mandatory and temporarily stored in the S-CSCF, I-CSCF and ASF. Service profile includes information for a service. It includes triggering information, service priority, application server address and specific user data for a specific application server.

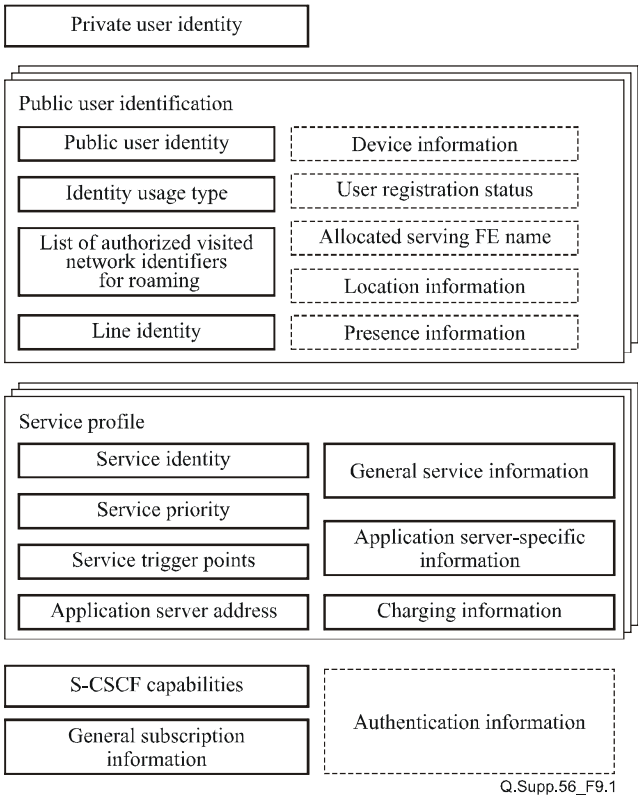

Figure 9-1 – Example of service user data in the IP multimedia subsystem

9.1 Data related to subscription, identification and numbering

9.1.1 Private user identity

The private user identity is used for subscription identification and authentication purposes. One private user identity is assigned to a user. It is associated with several public user identities and several service profiles. It takes the format of a NAI [IETF RFC 2486].

The private user identity is permanent user data and is stored in the SUP-FE and S-CSCF.

9.1.2 Public user identities

A user contains one or several instances of public user identity. The home operator is responsible for allocating these public user identities to each user. The format can be either a SIP URI [IETF RFC 3261] or a tel URI [IETF RFC 3966].

The public user identities are permanent user data and are stored in the SUP-FE and S-CSCF.

9.1.3 Public service identity

The public service identity is allocated to a number of services hosted in an application server. A public service identity identifies a service on an application server.

The public service identity is permanent user data and is stored in the SUP-FE and S-CSCF.

9.1.4 Barring indication

It is associated to each public user identity and indicates that the identity is barred from any communications. A public user identity that is barred is allowed only for registration purposes, but not for any other communications.

The barring indication is permanent user data and is stored in the SUP-FE and in the S-CSCF.

9.1.5 List of authorized visited network identifiers for roaming

This list is associated with the public user identities of IMS and indicates which visited network identifiers are allowed for roaming.

The list of authorized visited network identifiers is permanent user data and is stored in the SUP-FE.

9.1.6 General subscription information

The general subscription information contains user's general information, name, address, phone number, e-mail, etc.

The general subscription information is permanent data and is stored in the SUP-FE.

9.1.7 Device information

The device information (e.g., UICC model/type/sequential number, terminal model/type/sequential number, MAC address) can be used for a service of an application server.

The device information is permanent data and is stored in the SUP-FE.

9.1.8 Line identifier

The line identifier contains a default line identifier of the user's network termination associated to the user.

The line identifier is permanent user data and is stored in the SUP-FE and S-CSCF.

9.2 Data related to registration

9.2.1 User registration status

The user registration status contains the status of registration of a Public User Identity (e.g., registered, not registered, unregistered).

The user registration status is temporary user data and is stored in the SUP-FE.

9.2.2 S-CSCF name

The S-CSCF name identifies the S-CSCF allocated to the user when the user is registered to IP multimedia services. The S-CSCF name shall be in the form of a SIP URL [IETF RFC 3261].

The S-CSCF name is temporary data and is stored in the SUP-FE.

9.2.3 S-CSCF capabilities

The S-CSCF capabilities contain information to assist the I-CSCF in the selection of S-CSCF.

The S-CSCF capabilities information is permanent data and is stored in the SUP-FE.

9.3 Data related to location and presence

9.3.1 Presence information

The presence information contains current presence state of a Public User Identity (e.g., online, off, waiting, sleep, ...).

The presence information is temporary data and is stored in the AS-FE.

9.3.2 User location information

The user location information (e.g., IP address, address information, switch information) received from transport stratum and stored in P-CSCF is temporary data.

9.4 Data related to service sessions

9.4.1 Service identity

A service of an application server has unique identity and address (e.g., SIP URI).

The service identity is permanent data and is stored in the SUP-FE.

9.4.2 Service priority

If there are several services assigned to a service identity, the service priority is used to choose the service of highest priority.

The service priority is permanent data and is stored in the SUP-FE.

9.4.3 Service trigger points

The service trigger points are invoked when a user requests a service. It determines whether user request should forward to an application server. It contains request URI, request method, and some optional conditions for forwarding.

For definition and handling of these data, see [ETSI TS 123 218].

The service trigger points are permanent data and are stored in the SUP-FE and S-CSCF.

9.4.4 Application server address

It contains the address of application server to be accessed when a user request is invoked.

The application server address is permanent data and is stored in the SUP-FE and AS-FE.

9.4.5 General service information

The general service information includes service description, categories, target user description, type of service.

The general service information is permanent data and is stored in the SUP-FE.

9.4.6 Application server-specific information

Service user profile may store application server-specific information for each user. This information may include service key, trigger points, and service scripts, etc. [ETSI TS 123 218].

The application server-specific information is permanent data and is stored in the SUP-FE.

9.5 Data related to charging

9.5.1 Charging information

The charging information includes the address of charging server for the service.

The charging information is permanent data stored in the SUP-FE.

9.6 Data related to authentication

9.6.1 Authentication scheme

The authentication scheme indicates the scheme of user authentication procedure between S-CSCF and SUP-FE. The authentication scheme of the IP multimedia subsystem may include line identity-based authentication, HTTP Digest-based Authentication and AKA-based authentication.

The authentication scheme is permanent data and is stored in the SUP-FE.

9.6.2 Authentication data

The authentication data contains essential information used for a specific user authentication procedure. The authentication data for Line Identity-based authentication contains Line Identity (see 9.1.8). The authentication data for HTTP Digest-based authentication or AKA-based authentication contains realm, nonce, algorithm, response, etc. (see [IETF RFC 2617] and [IETF RFC 3310]).

The authentication data is permanent data and is stored in the SUP-FE.

Appendix I

Relationship of the service user profile functional entities

Table I.1 shows the relationship between the service user profile functional entities and the reference points specified in [ITU-T Y.2012], [ITU-T Y.2021] and [ITU-T Y.2031].

Table I.1 – Correspondence among service user profiles functional entities among NGN architectures

NGN FEs [ITU-T Y.2012]	[ITU-T Y.2021]		IMS-based PIEA [ITU-T Y.2031]		CS-based PIEA [ITU-T Y.2031]	
	FEs	Reference point	FEs	Reference point	FEs	Reference point
SL-FE	SL-FE	None	SLF	None	Not defined	None
SUP-FE	SUP-FE (with SAA-FE)	None	SUP-FE (with SAA-FE)	None	SUP-FE	None
SAA-FE					Not defined	None
I-CSC-FE/ S-CSC-FE	I-CSCF/ S-CSCF	Cx: SUP-FE Dx: SL-FE	I-CSCF/ S-CSCF	Cx: SUP-FE (with SAA-FE) Dx: SLF	CCF/RF	I11: SUP-FE
ASF&SSF	AS-FE	Sh: SUP-FE Dh: SL-FE	ASF	Sh: SUP-FE (with SAA-FE) Dh: SLF	AS-FE	I12: SUP-FE

Appendix II

Example of data flow of service user data in IMS

Service user data is used by functional entities with interfaces over SUP-FE and I-CSCF, S-CSCF or ASF. They have different purposes and different data content. Figure II.1 describes an example of data flow of service user data in the IMS. Usually, permanent user data is created at the moment when a user subscribes through operator's interfaces. Permanent user data is read or downloaded through interfaces from SUP-FE to S-CSCF and ASF. Temporary user data such as User Registration Status or S-CSCF Name is transferred through the SUP-FE and S-CSCF or ASF.

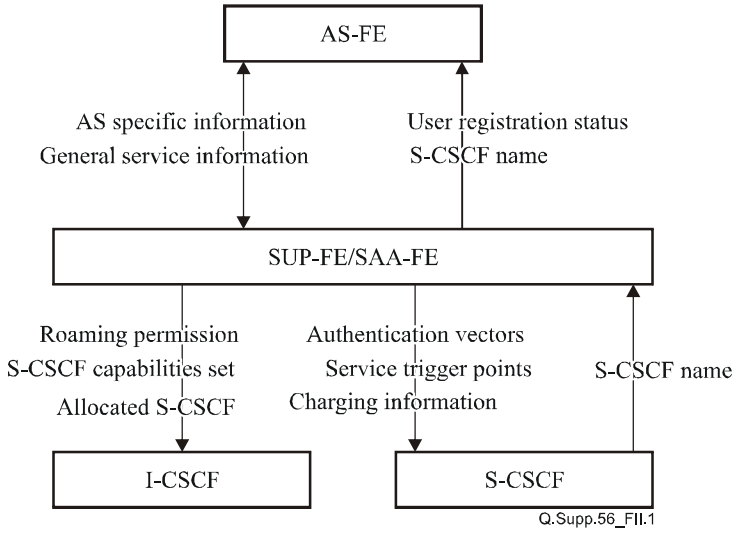

Figure II.1 – Example of data flow of service user data in the IMS

Figure II.1 shows all the relationships and exchanged data between the SUP-FE and the related FEs in registration and service time. The data flows through FEs are as follows:

– The I-CSCF requests the SUP-FE/SAA-FE to authenticate a user by checking the user's home network subscription status and to check a roaming agreement with the visited network, at the registration phase. Also, the I-CSCF receives the capabilities set of the S-CSCF from the SUP-FE/SAA-FE to assign the S-CSCF to the user. If the S-CSCF was already assigned, its address is returned to the I-CSCF.

– At the registration phase, the S-CSCF requests for the authentication vector and user profile from the SAA-FE/SUP-FE, and the S-CSCF sends its own S-CSCF address back to the SAA-FE/SUP-FE, thus informing its address to the related AS-FEs or FEs.

– The SUP-FE/SAA-FE can notify the S-CSCF with updated user profile and registration (deregistering) status.

– The AS-FE reads or updates transparent data for a specified user from or to the SUP-FE, i.e., application server-specific information and general service information.

– The AS-FE queries the S-CSCF name serving the relevant user, user registration status and other information from the SUP-FE.

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