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Contents

Foreword

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1 Scope

The present document describes the architecture and functionality required to support enterprise and corporate services as IMS applications hosted in the NGN operator's network on behalf of an enterprise (Hosted Enterprise Services).

The present document also specifies the protocol requirements for the UE to attach to the NGN (in particular the IMS) and also any protocol requirements related to application servers provided in support of hosted enterprise services.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] ETSI ES 282 001 (V3.4.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1".

[2] ETSI ES 282 007 (V2.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".

[3] ETSI TS 182 012 (V2.1.4): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based PSTN/ISDN Emulation Subsystem; Functional architecture".

[4] ETSI ETS 300 738 (First edition): "Human Factors (HF); Minimum Man-Machine Interface (MMI) to public network based supplementary services".

[5] 3GPP TS 23.228: "Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2".

[6] 3GPP TS 23.167: "Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions".

[7] 3GPP TS 33.203: "Technical Specification Group Services and System Aspects; 3G Security; Access security for IP-based services".

[8] Void.

[9] IETF RFC 3323 (December 2002): "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

[10] IETF RFC 3325 (December 2002): "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[11] Void.

[12] ETSI ES 282 002 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation Subsystem (PES); Functional Architecture".

[13] 3GPP TS 32.260: "Technical Specification Group Services and System Aspects; Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[14]   3GPP TS 22.519: "Technical Specification Group Services and System Aspects; Business communication requirements".

[15]   3GPP TS 24.229: "Technical Specification Group Core Network and Terminals; IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[16]   ETSI TS 183 043 (V3.4.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS based PSTN/ISDN Emulation Stage 3 specification".

[17]   3GPP TS 24.628: "Technical Specification Group Core Network and Terminals; Common Basic Communication procedures using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[18]   Void.

[19]   IETF RFC 5031 (January 2008): "A Uniform Resource Name (URN) for Emergency and Other Well-Known Services".

[20]   3GPP TS 24.611: "Technical Specification Group Core Network and Terminals; Anonymous Communication Rejection (ACR) and Communication Barring (CB) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[21]   IETF RFC 3966 (December 2004): "The tel URI for Telephone Numbers".

[22]   IETF RFC 3261 (July 2002): "SIP: Session Initiation Protocol".

[23]   IETF RFC 4967 (July 2007): "Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier".

[24]   draft-vanelburg-sipping-private-network-indication-06 (March 2014): "The Session Initiation Protocol (SIP) P-Private-Network-Indication Private-Header (P-Header)".

3   Definitions, symbols and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 22.519 [14], 3GPP TS 24.229 [15] and ETSI TS 183 043 [16] apply:

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

AGCF	Access Gateway Control Function
AGF	Access Gateway Function
AS	Application Server
BGCF	Breakout Gateway Control Function
BGF	Border Gateway Function
CNGCF	Customer Network Gateway Configuration Function
CS	Circuit Switched
CSCF	Call Session Control Function
HES	Hosted Enterprise Services
I-BGF	Interconnection-Border Gateway Function
I-CSCF	Interrogating-Call Session Control Function
IFC	Initial filter Criteria
IMS	IP Multimedia Subsystem
IN	Intelligent Network
IP	Internet Protocol
IPCAN	IP Connectivity Access Network

ISC	IMS Service Control
ISDN	Integrated Services Digital Network
LDAP	Lightweight Directory Access Protocol
MGCF	Media Gateway Control Function
MGF	Media Gateway Function
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
NASS	Network Attachment SubSystem
NGCN	Next Generation Corportate Network
NGN	Next Generation Network
NGN	Next Generation Network
P-CSCF	Proxy-Call Session Control Function
PES	PSTN/ISDN Emulation Subsystem
PSTN	Public Switched Telephony Network
RACS	Resource and Admission Control Subsystem
RG	Residential Gateway
SCP	Service Control Functio
S-CSCF	Serving-Call Session Control Function
SGF	Signalling Gateway Function
SIP	Session Initiation Protocol
SLF	Subscription Locator Function
SPDF	Service-based Policy Decision Function
T-MGF	Trunking-Media Gateway Function
UE	User Equipment
UEE	User Equipment Emulation
UPSF	User Profile Server Function
URI	Uniform Resource Identifier
URN	Uniform Resource Name
VGW	Voice over IP Gateway

4 Overview

Hosted Enterprise Services (HES) refers to a solution where an NGN hosts all business communication capabilities to a set of endpoints connected to a plurality of access points to this network. This type of network solution is also known as IP Centrex.

In the simplest configuration all endpoints are connected to a TISPAN NGN IP-CAN. Endpoints may be SIP phones or legacy phones (Analogue or ISDN) connected to a gateway. All services by HES are provided by application servers using standard IMS procedures. User may access services that are specific to the enterprise they belong to as well as services available to any other IMS users.

In more complex configurations some of the endpoints may be connected to a 3GPP IPCAN and/or a circuit-switched network, which is itself connected to the IMS via an MGCF. Endpoints connected to heterogeneous access networks may be served by the same HES.

Endpoints served by a HES shall have the ability to setup a session, identifying the communication target by:

- a SIP URI of the form user @domain;

- an E.164 telephone number;

- a number within a private numbering plan;

- local service numbers.

With regard to supplementary services, HES have strong similarities with the provision of PSTN/ISDN simulation services, although the actual set of services may be different. Examples of services that are enabled by the architecture described in the present document are:

- All commonly used PSTN/ISDN services.

- IMS Multimedia Messaging, Presence and Conferencing services.

- Personal and Corporate Directory.

- Unified Voice mail.

- Operator assisted communications.

- Hot Line Calling.

- Abbreviate dialling.

- Line Hunting.

- Attended Communication Transfer.

- Blind Communication Transfer.

- Communication Pickup.

- Manager/Secretary filtering.

- Click to Dial.

Colour Ring Back Tone.

The sole purpose of the above list of services is to illustrate the type of services that are enabled by the architecture described in the present document. This list is not intended to be exhaustive nor is it expected that all implementations will support all of these services. The list actual of enterprise services hosted in a network is a matter for each operator to decide.

NOTE: The present document provides a number of examples where domain names are used. It should be noted that these are for information only and are not intended to place any constraint on the structure and management of domain names as long as they are globally routable.

5   Architecture

5.1   Functional Architecture

5.1.1   Overview

The functional architecture for supporting access to Hosted Enterprise Services is illustrated in figure 1. This functional architecture supports access from both SIP based endpoints and legacy endpoints.

The functional architecture for supporting access to Hosted Enterprise Services from both types of endpoints is obtained by a combination of the Core IMS Architecture defined in ETSI ES 282 007 [2] with the addition of an AGCF as defined in ETSI TS 182 012 [3] and ETSI ES 282 002 [12]. This should not be understood as an integration of an AGCF into the functional architecture defined in ETSI ES 282 007 [2]. The AGCF only applies to configurations where an H.248-controlled media gateway is required in support of legacy endpoints.
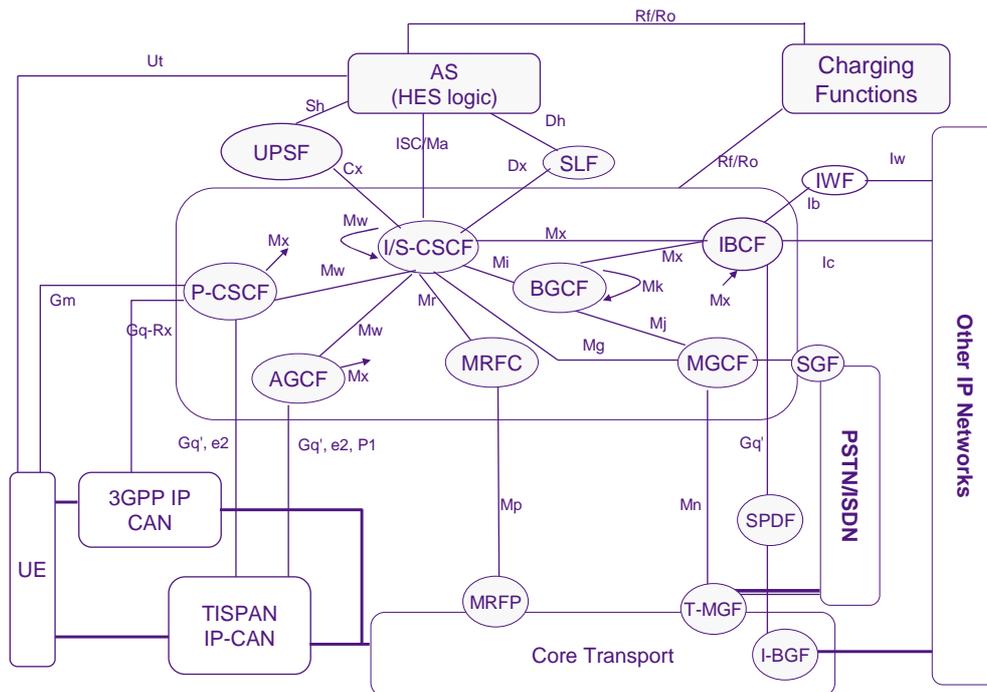
Figure 1: Functional architecture overview

All functional entities behave as defined in ETSI ES 282 007 [2], ETSI TS 182 012 [3] and/or ETSI ES 282 002 [12].

The service logic of the HES resides in one or more application servers. All sessions to/from a member of a HES shall be handled by at least one application server.

The service logic of the HES can be provided by the home network operator, or can be provided by a third party service provider. It is also possible that the enterprise itself provides the services, by providing equipment that acts as an application server beyond an ISC gateway function.

SIP-based endpoints may be connected to the IMS via any IP¨CAN valid for the current specification release. A HES may serve endpoints connected through both types of IP-CANs.

Legacy endpoints may be connected via a media gateway or a SIP-based Voice over IP Gateway (VGW). Both types of gateways may be part of the User Equipment (UE) or reside in the TISPAN IP-CAN. A SIP-based Voice over IP Gateway (VGW) plays the role of a UE with regards to the P-CSCF. A media gateway is controlled by the AGCF, which plays the combined role of a UE and a P-CSCF with regards to other CSCFs of the IMS.

ETSI TS 182 012 [3] provides a more detailed specification of the procedures that a VGW and AGCF shall support for enabling access to IMS-supported services from legacy endpoints.

NOTE: The concepts of "Media Gateway" and AGCF are defined in both ETSI TS 182 012 [3] and ETSI ES 282 002 [12]. A Media Gateway implements the R-MGF or A-MGF functional entities defined in ETSI ES 282 001 [1]. ETSI ES 282 002 [12] uses different names to refer to a Media Gateway depending on its location: a media gateway located in the customer premises is referred to as a Residential Gateway (RG) while a media gateway located in the IP-CAN is referred to as an Analogue Gateway Function (AGF).

5.1.2 Involved functional entities - originating session

Figure 2 shows the functional entities involved in an originating session.
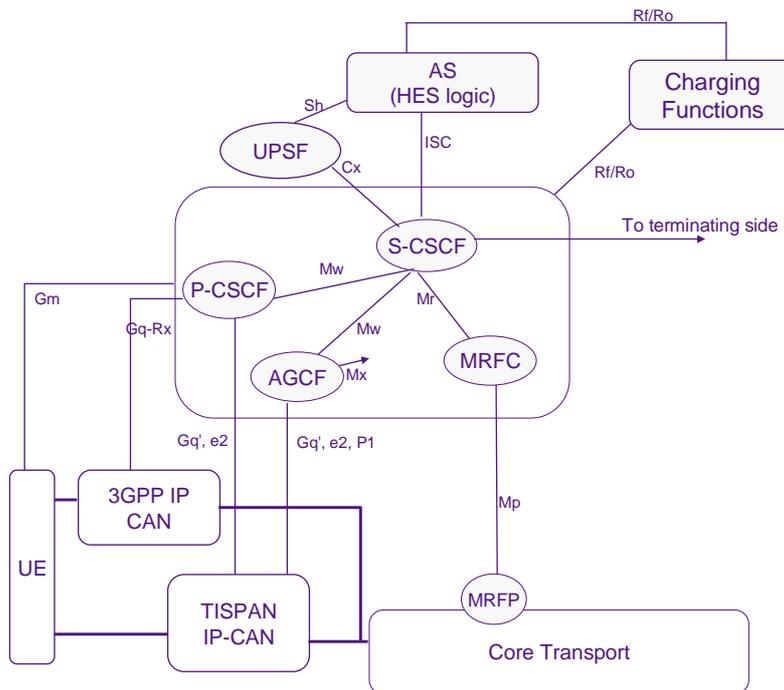
Figure 2: Functional entities involved in originating sessions

NOTE: Figure 2 does not show the intermediate functions between the P-CSCF and the S-CSCF, or those between the S-CSCF and the terminating side.

The originating side can interoperate with any other terminating side scenario.

5.1.3 Involved functional entities - terminating session

Figure 3 shows the functional entities involved in a terminating session.
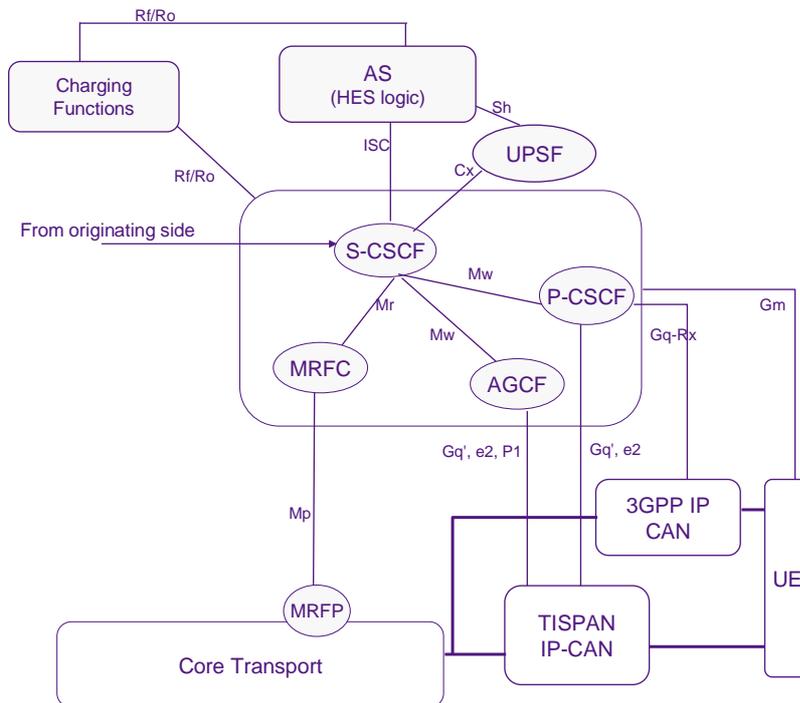

Figure 3: Functional entities involved in terminating sessions

NOTE: Figure 3 does not show the intermediate functions between the P-CSCF and the S-CSCF, or those between the S-CSCF and the originating side.

The terminating side can interoperate with any other originating side scenario.

5.2 Architecture involving heterogeneous core networks

A HES can serve a set of endpoints some of which being connected to the IMS and some others being connected to Circuit-Switched (CS) networks. Example scenarios are shown in annex B.

6 Procedures

6.1 Registration

Registration procedures comply with 3GPP TS 23.228 [5] or ETSI TS 182 012 [3] depending on the type of endpoint.

NOTE: Registration procedures for endpoints not connected directly to a 3GPP or TISPAN IP CAN are outside the scope of the present document.

The IMS public user identity used at registration is in the form of a SIP URI. This SIP URI can include a user name in the form of a telephone number with a user=phone parameter where the telephone number is either a public e.164 or a private number; if private numbers are used, the private numbering plan shall be uniquely identifiable by the NGN.

6.2 Originating session procedures

Originating communication setup procedures shall comply with 3GPP TS 23.228 [5] or ETSI TS 182 012 [3] depending on the type of endpoint.

In addition to the procedures specified in this subclause, the UE shall comply with the requirements identified in 3GPP TS 24.229 [15], subclause 4.1.

In addition to the procedures specified in the following subclauses, the AGCF shall comply with the procedures specified in ETSI TS 183 043 [16] appropriate to this entity.

In addition to the procedures specified in the following subclauses, each IMS functional entity shall comply with the procedures specified in the clauses of 3GPP TS 24.229 [15] and 3GPP TS 24.628 [17] appropriate to this entity.

An AS providing the logic of an originating HES may provide communication admission control in terms of number of simultaneous communications to/from this particular HES.

Support of private numbering is described in subclause 6.5.

Certain services require that the UE or an AGCF can be configured to insert a default session destination in the Request URI when a dialstring is not entered by the end user. In the case of the UE, the default session destination may be manually configured by the user or received from the CNGCF. This configured default session destination can either point to the terminating end point for the session or a value independent from the actual destination. In the latter case, the AS acting as the originating HES determines the actual session destination from local configuration data and/or the user profile and rewrites the Request URI.

The AS procedures for modification of the P-Asserted-Identity headers fields for originating requests typically depend on:

- operator and enterprise domain policies;

- privacy settings as specified in IETF RFC 3323 [9] and IETF RFC 3325 [10];

- whether the destination belongs to the same enterprise domain than the session initiator.

with the following restrictions:

- when the terminating endpoint is outside the HES's domain (i.e. public domain or business trunking services see note) and no privacy restrictions apply, the identity in the P-Asserted-Identity representing the HES user shall be a globally routable SIP or tel URI.

NOTE: The originating side hosted enterprise services scenario can interoperate with any other terminating scenario.

As an example, an AS providing the logic of an originating HES, based on enterprise policies, can perform the following changes with regards to the identities it receives in INVITE messages:

- override the P-Asserted-Identity to an identity derived from the received value. This identity is in the form of a telephone number representing for example an attendant or in the form of a URI of type user@domain, where the user part represents the HES or a partition of this HES (e.g. site-based partitions) and the domain part represents the enterprise;

- override the URI part of the From header field with the value received in the P-Asserted-Id header field, with the exception that an anonymous value in the From header field must not be modified.

Depending on the type of changes made, the AS will act as a SIP Proxy as defined in 3GPP TS 24.229 [15], subclause 5.7.4, as a Routing B2BUA or an Initiating B2BUA, as defined in 3GPP TS 24.229 [15], subclause 5.7.5.

6.3 Terminating session procedures

Terminating communication setup procedures shall comply with 3GPP TS 23.228 [5] or ETSI TS 182 012 [3] depending on the type of endpoint.

In addition to the procedures specified in this subclause, the UE shall comply with the requirements identified in 3GPP TS 24.229 [15], subclause 4.1.

In addition to the procedures specified in the following clauses, the AGCF shall comply with the procedures specified in ETSI TS 183 043 [16] appropriate to this entity.

In addition to the procedures specified in the following clauses, each IMS functional entity shall comply with the procedures specified in the clauses of 3GPP TS 24.229 [15] and 3GPP TS 24.628 [17] appropriate to this entity. An AS providing the logic of an terminating HES may provide communication admission control in terms of number of simultaneous communications sent to/from this particular HES.

Terminating communications to a group is described in subclause 6.6.

6.4 Emergency communications

The AGCF procedures for emergency communication are specified in ETSI TS 183 043 [16].

Processing of emergency communications by other network entities shall conform to 3GPP TS 23.167 [6], except where the enterprise requires a special arrangement whereby emergency communications are delivered to a destination within the enterprise (hosted or supported by an NGCN). Such an arrangement may also involve enterprise specific emergency numbers.

NOTE: Procedures for supporting the above special arrangement are outside the scope of the present document.

6.5 Capabilities provided to an enterprise

6.5.1 General

Hosted enterprise services (HES) are deployed on one or more applications servers. HES may provide enterprise level capabilities. When such capabilities are offered to a specific enterprise the initial filter criteria of the service profile of a connected HES user needs to be configured so that the S-CSCF that serves the HES user invokes the AS that hosts the HES.

The intent of this subclause is not to specify the detail of the individual services, but only to indicate some specific impacts on the protocol.

3GPP TS 22.519 [14] defines the enterprise capabilities that HES shall support, this subclause specifies protocol impact of the different applications.

6.5.2 Routeing capabilities

6.5.2.1 Overview

6.5.2.2 Break-in

No specific protocol action is required for a HES providing break-in.

6.5.2.3 Break-out

When break-out is enabled for a specific enterprise, a HES converts incoming private network traffic to public network traffic if the conditions agreed between the enterprise and the NGN operator indicate this.

To convert private network traffic to public network traffic the break-out service shall remove Private-Network-Indicator header field if present as specified in draft-vanelburg-sipping-private-network-indication [24], from the initial request for a dialog or standalone request for a transaction.

To allow this service to be provided it needs to be ensured that the HES logic offering this service will be inserted in the signalling path of sessions originating from and terminating to the served HES user.

6.5.3 Communication admission control

When communication admission control is enabled a HES serving an enterprise executes the NGN operator defined set of rules or policies under which communication admission control applies, and the enterprise should be able to configure the capability within those rules and policies.

To allow this service to be provided it needs to be ensured that the HES logic offering this service will be inserted in the signalling path of sessions originating from and terminating to the served HES user.

6.5.4 Anonymous communication rejection

When anonymous communication rejection is enabled a terminating HES serving a HES user providing this service shall implement the procedure as specified in 3GPP TS 24.611 [20], subclause 4.5.2.6.2.

To allow this service to be provided it needs to be ensured that the HES logic offering this service will be inserted in the signalling path of sessions terminating to the served HES user.

6.6 Private numbering

6.6.1 General

Sessions from endpoints served by a HES can be established using private numbering to any type of destination, including the PSTN, another endpoint served by the same or different HES, an endpoint served by an NGCN belonging to the same or a different enterprise as well as any other IMS user.

The following subclauses provide further details on the handling of private numbering by the UE and the network.

NOTE: In case of legacy endpoints the UE procedures required in support of private numbering are performed by the functional entity providing the UE role with regards to the IMS (i.e. AGCF or VGW).

6.6.2 UE behaviour

6.6.2.1 General

Private numbering information is sent in the Request-URI of the originating SIP requests, using one of the following formats:

1) A TEL URI, complying with IETF RFC 3966 [21], with a local number followed by a phone-context value.

2) A SIP URI, complying with IETF RFC 3261 [22], with the user =phone parameter.

3) A SIP URI, complying with IETF RFC 3261 [22] and IETF RFC 4967 [23], with the user=dialstring parameter.

NOTE: A UE can use a SIP URI complying with IETF RFC 3261 [22], where the user part contains a string of digits corresponding to a private number and the domain name is specific enough to enable the network to understand that the user part contains private numbering information and the context in which it has to be interpreted.

The actual value of the URI depends on whether the user equipment performs an analysis of the dial string input by the end user.

6.6.2.2 UE without dial string processing capabilities

In this case the UE does not perform any analysis of the dial string. This requires that the dialling plan be designed so as to enable the AS acting as an originating HES to differentiate private numbers from other numbers.

The dial string may be sent to the network, in the Request URI of SIP requests, using one of the following formats:

1) A TEL URI, syntactically complying with IETF RFC 3966 [21], with the dial string encoded as a local number followed by a pre-configured fixed phone-context value.

EXAMPLE: tel:<input dial string>;phone-context=unprocesseddialstring.example.com.

2) A SIP URI, syntactically complying with IETF RFC 3261 [22], with the user =phone parameter, embedding a TEL-URI with a pre-configured fixed phone-context value.

EXAMPLE: sip:<input dial string>;
phone-context=unprocesseddialstringexample.com@operator.com;user=phone.

3) A SIP URI, complying with IETF RFC 3261 [22] and IETF RFC 4967 [23], with the user=dialstring parameter and a with a pre-configured fixed phone-context value in the user part.

EXAMPLE: sip:<input dial string>;
phone-context=unprocesseddialstringexample.com@operator.com;user=dialstring.

4) A SIP URI syntactically complying with IETF RFC 3261 [22], where the user part contains the dial string and the domain name is specific enough to enable to network to understand that the user part contains a dial string.

EXAMPLE: sip:<input dial string>@dialstrings.entreprise.com.

6.6.2.3 UE with dial string processing capabilities

In this case the UE performs sufficient dial string analysis (or receives an explicit indication from the user) to identify whether private numbering is used and processes the dial string accordingly before building the Request-URI.

If the UE detects that a public dialling plan or a private dialling plan is being used, where the terminal is able to identify a global telephone number, the procedures described in 3GPP TS 24.229 [15] apply after removing all dial string elements used for public numbering detection purposes (e.g. escape codes).

If the UE detects that a private dialling plan is being used, it may decide to send the dial string unchanged to the network or to alter it to comply with the private numbering plan (e.g. remove all dial string elements used for private numbering detection).

Annex A provides examples of UE processing options and of population rules for the Request-URI fields and parameters. As a general rule, recognition of special service numbers takes priority over other dialling plan issues. If the dial string equates to a pre-configured service URN (see IETF RFC 5031 [19]) then the service URN should be sent.

6.6.3 Network behaviour

The use of numbers in PNPs and in user specific dial plans shall be provided in the following manner:

1) The P-CSCF or AGCF routes the session towards the S-CSCF as per the session origination procedures.

   Processing the Request URI (e.g. address analysis and potential modification such as translation into globally routable format) shall be performed by an AS providing the logic of an originating HES in the user's Home Network. The S-CSCF routes the SIP request towards this AS based upon filter criteria.

   The translation procedure relies on data stored in the AS or in an external database, separated from the AS using e.g. a LDAP interface. If user-specific dialling plans are supported, translation data may also be stored in the UPSF, in which case the AS accesses this data using the Sh reference point.

2) This AS passes the session request back to the S-CSCF with a Request URI that contains either a globally routable SIP URI or a Tel URI with a number in international format. The SIP request shall contain enough information to route to the terminating network and allow the terminating network to identify the intended end point.

3) After processing the Request URI the S-CSCF shall route the SIP request, via normal IMS routing principles, towards its destination.

6.7 Group Management

One or more IMS groups (as defined in 3GPP TS 23.228 [5]) may be associated with one or more HESs. Each group shall be addressable by a globally unique group identifier. The group identifier shall take the form of a Public Service Identifier.

6.8 Supplementary service control

It shall be possible to configure all services (e.g. communication forwarding conditions, selective communication filtering criteria, etc.) using the Ut reference point, a Web portal or using service code commands.

Users shall be able to control supplementary services using service code commands sent in session initiation requests. One possible syntax for such commands is defined in ETSI ETS 300 738 [4], in which case the actual values used in the different fields of the commands may differ from those specified in ETSI ETS 300 738 [4] (and service code commands (excluding the START and FINISH fields) shall be encoded as a local-number using and appropriate "phone-context" value.

7 Void

8 Security issues

The security requirements for the support of HES are specified in 3GPP TS 33.203 [7].

9 Management Issues

9.1 Configuration/provisioning issues

9.1.1 UPSF

Appropriate Initiate Filter Criteria have to be configured in the UPSF for each of the public user identities associated to HES usage. Within a user profile, one of the IFCs shall lead to the AS providing the HES logic for the user.

Shared IFCs may be used to ease provisioning and minimize the amount of signalling information over the Cx reference point.

9.1.2 User Equipment

SIP-based User Equipment can be configured with the following pieces of information:

- Rules the UE must apply to dialled numbers in order to detect the use of private numbering plans and determine which private numbering plan is being used.

  NOTE: It is expected that these rules do not require a complete number to be available to derive a private numbering plane.

- Phone-context identifiers or domain names associated to each numbering plan supported inside their HES domain.

9.1.3 AGCF

The AGCF shall be configured with the same pieces of information than a SIP-based User Equipment.

9.1.4 Charging issues

The charging architecture and functions defined in 3GPP TS 32.260 [13] are applicable.

Charging Information on operator-assisted communications shall be collected and recorded for the public user identity of the actual calling user rather than the public user identity of the operator, even though this operator may be connected to the network as a normal user. The collected information shall enable creating a consolidated charging record

including the information related to the segment between the user and the operator and between the operator and the destination.

Charging records shall keep track of the services invoked during each communication.

Charging records shall contain sufficient information to enable generating consolidated reports based on:

- the distribution of communications during a day, a week, a month or a year;

- the distribution between internal and external communications;

- the number of incoming/outgoing communications;

- the number of nationals/internationals sessions;

- the number of forwarded communications per forwarding condition;

- the use of voice mail and conferencing services;

- the number of successful/unsuccessful communications.

Annex A (informative):
Processing of dial strings by the UE

Processing of a dial string by a UE depends on whether one or more private numbering plans are supported.

A.1 Single private numbering plan

If the UE detects that a private dialling plan is being used, it may decide to send the dial string unchanged to the network or to alter it to comply with the private numbering plan (e.g. remove all dial string elements used for private numbering detection). The resulting dial string may be sent, in the Request URI of SIP requests, using one of the following formats:

    1) A TEL URI, complying with IETF RFC 3966 [21], with local number and a pre-configured fixed phone-context value.

        tel:<output dial string>;phone-context=pnp.entreprise.com.

    2) A SIP URI, complying with IETF RFC 3261 [22], with the user =phone parameter.

        sip:<output dial string>;phone-context=pnp.entreprise.com@operator.com;user=phone.

    3) A SIP URI, complying with IETF RFC 3261 [22] and IETF RFC 4967 [23], with the user =dialstring parameter (see note).

        sip:<output dial string>;phone-context=pnp.entreprise.com@operator.com;user=dialstring.

    NOTE: This option only applies if the dial string was not completely processed into a private number string.

    4) A SIP URI complying with IETF RFC 3261 [22], where the user part contains the dialled string (possibly modified) and the domain name is specific enough to enable to network to understand that the user part contains a dialstring according to a private numbering plan or private dialling plan.

        sip:<output dialstring>@pnp.entreprise.com.

In the first three cases, the phone-context value indicates that a private number is being used that belongs to the single private numbering plan.

A.2 Multiple private numbering plans

If the end user is entitled to use more than one private numbering plan, the UE will either proceed as above, providing that the remaining dial string contains sufficient information for the network to identify the private numbering plan being used, or determine the private numbering plan being used and send the dial string in the Request URI of SIP requests, using one of the following formats:

    1) A TEL URI, complying with IETF RFC 3966 [21], with local number and a pre-configured phone-context value corresponding to the private numbering plan used.

        tel:<output dial string>;phone-context=pnp-value.entreprise.com.

    2) A SIP URI, complying with IETF RFC 3261 [22], with the user =phone parameter.

        sip:<output dial string>;phone-context=pnp-value.entreprise.com@operator.com;user=phone.

    3) A SIP URI, complying with IETF RFC 3261 [22] and IETF RFC 4967 [23], with the user =dialstring parameter (see note).

        sip:<output dial string>;phone-context=pnp-value.entreprise.com@operator.com;user=dialstring.

    NOTE: This option only applies if the dial string was not completely processed into a private number string.

4) A SIP URI complying with IETF RFC 3261 [22], where the user part contains the dialled string (possibly modified) and the domain name is specific enough to enable to network to understand that the user part contains a dial string according to a particular private numbering plan or private dialling plan.

> sip:<output dialstring>@pnp-value.entreprise.com.

In the first three cases, the phone-context value indicates the private numbering plan the dial string belongs to.

Annex B (informative):
Scenarios for HES extension to CS users

Figure B.1 provides an overview of a functional architecture that can support a number of deployment scenarios for extending HES to CS endpoints. Functions within the dotted box in figure B.1 represent functions that may physically reside in one or more IMS application servers. For a given deployment scenario not all of the functions may be needed however to provide HES to a CS endpoint at least one AS will contain HES logic.

NOTE: A multimode UE is included in the set of endpoints a HES can serve. An example of a multimode UE is one that can assume the UE role and the Legacy Endpoint role (see figure B.1). Simultaneous connectivity to IP-CAN and CS is subject to the constraints of the access network and the UE.
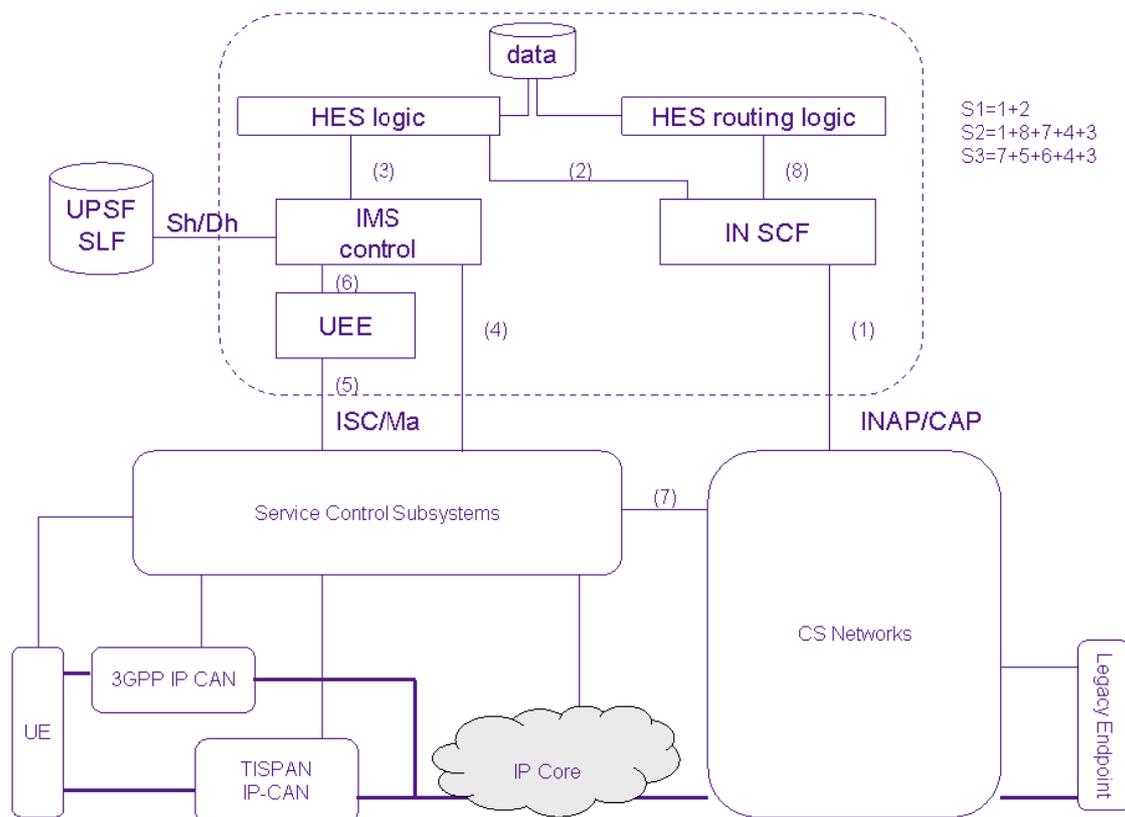

Figure B.1: Functional Architecture for supporting hybrid accesses

The functional architecture shown in figure B.1 allows the following deployment scenarios:

- **Scenario 1 (S1):** In this scenario IN triggers in the CS network route the call to an IN SCF interacts with the HES logic. The IN SCF controls the call in the CS network as per the HES logic. For this approach both the IN SCF and HES logic are co-located in the same IMS AS.

- **Scenario 2 (S2):** In this scenario IN triggers in the CS network route the call to an IN SCF which has access to HES routing data. The IN SCF redirects the call to the IMS. HES are applied to the session using the ISC reference point to access the IMS logic which in turn accesses the HES logic.

- **Scenario 3 (S3):** In this scenario the CS network routes calls from CS users to the IMS. The mechanism by which this re-routing is achieved is out of scope of the present document. Upon entering the IMS PSI routing is used to route the call to the IMS User Equipment Emulation (UEE). The UEE is used to anchor the call in the IMS. The UEE uses IMS logic to initiate a session into the IMS on behalf of the CS endpoint. To apply HES the filter criteria for this pseudo user will include the HES. HES are invoked using the ISC reference point to access

the IMS logic which in turn accesses the HES logic. For calls to the CS user, the UEE will be configured in the terminating filter criteria to be the last application in the chain.

Annex C (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
24/03/2014					Version for input to 3GPP CT1#86bis		0.0.0
02/04/2014					Version collecting comments from 3GPP CT1#86bis	0.0.0	0.1.0
06/2014	CT-64	CP-140283			Version 1.0.0 created for presentation for information and approval	0.1.0	1.0.0
06/2014	Post CT-64				Version 12.0.0 created after approval at CT64	1.0.0	12.0.0
09/2014	CT-65	CP-140653	0001		Recognition of VINE functional in business trunking scenarios	12.0.0	12.1.0
09/2014	CT-65	CP-140653	0002		Fixing non-specific versions of references	12.0.0	12.1.0
12/2014	CT-66	CP-140848	0003		Use of transport functions	12.1.0	12.2.0
12/2015	CT-70				Upgrade to Rel-13	12.2.0	13.0.0

History

Document history		
V13.0.0	January 2016	Publication