**3GPP TSG-CT WG1 Meeting #133e-bisC1-220616**

**E-meeting, 17-21 Jauary 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **24.229** | **CR** | **6541** | **rev** | **1** | **Current version:** | **17.5.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Transport of HSS-GID in the HPLMN |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | TEI17\_IMSGID |  | ***Date:*** | 2022-01-06 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)...Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | SA2 has in 23.228 CR#1240 specified that the HSS group ID received during the NRF-based discovery procedure should be transported from the I-CSCF towards downstream nodes.It is proposed to use the P-User-Database header field to convey this value as the semantics of the value and the handling is the same as for the Redirect-Host AVP value currently transported in this header field.As the contents of the P-User-Database header field must be a DiameterURI it is proposed to construct an FQDN containing the HSS group ID of the form hss.5gc.gid.<GID>.invalid. The top level domain name indicates this is not a valid address. |
|  |  |
| ***Summary of change:*** | Add the option to include the HSS group ID in the P-User-Database header field. |
|  |  |
| ***Consequences if not approved:*** | The HSS group ID cannot be conveyed from the I-CSCF to the S-CSCF and AS. Stage 2 requirement not implemented. |
|  |  |
| ***Clauses affected:*** | 2, 5.3.1.2, 5.3.2.1, 5.3.2.1A, X.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Rev 1: Inserted // in the diameter URI. |

\* \* \* First Change \* \* \* \*

# 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[1A] 3GPP TS 22.101: "Service aspects; Service principles".

[1B] 3GPP TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)".

[1C] 3GPP TS 22.011: "Service accessibility".

[2] 3GPP TS 23.002: "Network architecture".

[3] 3GPP TS 23.003: "Numbering, addressing and identification".

[4] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[4A] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".

[4B] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[4C] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".

[4D] 3GPP TS 23.140 Release 6: "Multimedia Messaging Service (MMS); Functional description; Stage 2".

[5] 3GPP TS 23.218: "IP Multimedia (IM) Session Handling; IM call model".

[6] 3GPP TS 23.221: "Architectural requirements".

[7] 3GPP TS 23.228: "IP multimedia subsystem; Stage 2".

[7A] 3GPP TS 23.234: "3GPP system to Wireless Local Area Network (WLAN) interworking; System description".

[7B] 3GPP TS 23.401: "GPRS enhancements for E-UTRAN access".

[7C] 3GPP TS 23.292: "IP Multimedia Subsystem (IMS) Centralized Services; Stage 2".

[7D] 3GPP TS 23.380: "IMS Restoration Procedures".

[7E] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

[7F] 3GPP TS 23.334: "IMS Application Level Gateway (IMS-ALG) – IMS Access Gateway (IMS-AGW) interface".

[7G] 3GPP TS 24.103: "Telepresence using the IP Multimedia (IM) Core Network (CN) Subsystem (IMS); Stage 3".

[8] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network protocols; Stage 3".

[8A] 3GPP TS 24.141: "Presence service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[8B] 3GPP TS 24.147: "Conferencing using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[8C] 3GPP TS 24.234: "3GPP System to Wireless Local Area Network (WLAN) interworking; WLAN User Equipment (WLAN UE) to network protocols; Stage 3".

[8D] Void.

[8E] 3GPP TS 24.279: "Combining Circuit Switched (CS) and IP Multimedia Subsystem (IMS) services, stage 3, Release 7".

[8F] 3GPP TS 24.247: "Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".

[8G] 3GPP TS 24.167: "3GPP IMS Management Object (MO); Stage 3".

[8H] 3GPP TS 24.173: "IMS Multimedia telephony communication service and supplementary services; Stage 3".

[8I] 3GPP TS 24.606: "Message Waiting Indication (MWI) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[8J] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[8K] 3GPP TS 24.323: "3GPP IMS service level tracing management object (MO)".

[8L] 3GPP TS 24.341: "Support of SMS over IP networks; Stage 3".

[8M] 3GPP TS 24.237: "IP Multimedia Subsystem (IMS) Service Continuity; Stage 3".

[8N] 3GPP TS 24.647: "Advice Of Charge (AOC) using IP Multimedia (IM) Core Network (CN) subsystem".

[8O] 3GPP TS 24.292: "IP Multimedia (IM) Core Network (CN) subsystem Centralized Services (ICS); Stage 3".

[8P] 3GPP TS 24.623: "Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Supplementary Services".

[8Q] 3GPP TS 24.182: "IP Multimedia Subsystem (IMS) Customized Alerting Tones (CAT); Protocol specification".

[8R] 3GPP TS 24.183: "IP Multimedia Subsystem (IMS) Customized Ringing Signal (CRS); Protocol specification".

[8S] 3GPP TS 24.616: "Malicious Communication Identification (MCID) using IP Multimedia (IM) Core Network (CN) subsystem".

[8T] 3GPP TS 24.305: "Selective Disabling of 3GPP User Equipment Capabilities (SDoUE) Management Object (MO)".

[8U] 3GPP TS 24.302: "Access to the Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3".

[8V] 3GPP TS 24.303: "Mobility management based on Dual-Stack Mobile IPv6".

[8W] 3GPP TS 24.390: "Unstructured Supplementary Service Data (USSD) using IP Multimedia (IM) Core Network (CN) subsystem IMS".

[8X] 3GPP TS 24.139: "3GPP System-Fixed Broadband Access Network Interworking; Stage 3".

[8Y] 3GPP TS 24.322: "UE access to IMS services via restrictive access networks - stage 3".

[8Z] 3GPP TS 24.371: "Web Real Time Communication (WebRTC) Access to IMS".

[8ZA] 3GPP TS 24.525: "Business trunking; Architecture and functional description".

[8ZB] 3GPP TS 24.244: "Wireless LAN control plane protocol for trusted WLAN access to EPC; Stage 3".

[8ZC] 3GPP TS 24.337: "IP Multimedia (IM) Core Network (CN) subsystem IP Multimedia Subsystem (IMS) inter-UE transfer; Stage 3".

[8ZD] 3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to Proximity-services (ProSe) Function Protocol aspects; Stage 3".

[8ZE] 3GPP TS 24.379: "Mission Critical Push To Talk (MCPTT) call control; Stage 3".

[8ZF] 3GPP TS 24.628: "Common Basic Communication procedures using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[8ZG] 3GPP TS 24.604: "Communication Diversion (CDIV) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[8ZH] 3GPP TS 24.174: "Support of multi-device and multi-identity in the IP Multimedia Subsystem (IMS); Stage 3".

[9] 3GPP TS 25.304: "User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".

[9A] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification".

[9B] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[9C] 3GPP TS 26.267: "eCall Data Transfer; In-band modem solution; General description".

[10] Void.

[10A] 3GPP TS 27.060: "Mobile Station (MS) supporting Packet Switched Services".

[11] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based Services and Packet Data Networks (PDN)".

[11A] 3GPP TS 29.162: "Interworking between the IM CN subsystem and IP networks".

[11B] 3GPP TS 29.163: "Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks".

[11C] 3GPP TS 29.161: "Interworking between the Public Land Mobile Network (PLMN) supporting Packet Based Services with Wireless Local Access and Packet Data Networks (PDN)"

[11D] 3GPP TS 29.079: "Optimal Media Routeing within the IP Multimedia Subsystem".

[12] 3GPP TS 29.207 Release 6: "Policy control over Go interface".

[12A] 3GPP TS 29.273: "Evolved Packet System (EPS); 3GPP EPS AAA interfaces".

[13] Void.

[13A] 3GPP TS 29.209 Release 6: "Policy control over Gq interface".

[13B] 3GPP TS 29.212: "Policy and Charging Control (PCC); Reference points".

[13C] 3GPP TS 29.213: "Policy and charging control signalling flows and Quality of Service (QoS) parameter mapping".

[13D] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

[14] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents".

[15] 3GPP TS 29.229: "Cx and Dx Interfaces based on the Diameter protocol, Protocol details".

[15A] 3GPP TS 29.311: "Service Level Interworking for Messaging Services".

[15B] 3GPP TS 31.103: "Characteristics of the IP multimedia services identity module (ISIM) application".

[15C] 3GPP TS 31.102: "Characteristics of the Universal Subscriber Identity Module (USIM) application".

[15D] 3GPP TS 31.111: "Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)".

[16] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[17] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[17A] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[18] 3GPP TS 33.102: "3G Security; Security architecture".

[19] 3GPP TS 33.203: "Access security for IP based services".

[19A] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

[19B] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[19C] 3GPP TS 33.328: "IP Multimedia Subsystem (IMS) media plane security".

[19D] 3GPP TS 33.310: "Network Domain Security (NDS); Authentication Framework (AF)".

[19E] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".

[19F] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[19G] 3GPP TS 38.331: " NR; Radio Resource Control (RRC); Protocol specification".

[20] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".

[20A] RFC 2401 (November 1998): "Security Architecture for the Internet Protocol".

[20B] RFC 1594 (March 1994): "FYI on Questions and Answers to Commonly asked "New Internet User" Questions".

[20C] Void.

[20D] Void.

[20E] RFC 2462 (November 1998): "IPv6 Stateless Address Autoconfiguration".

[20F] RFC 2132 (March 1997): "DHCP Options and BOOTP Vendor Extensions".

[20G] RFC 2234 (November 1997): "Augmented BNF for Syntax Specification: ABNF".

[21] RFC 2617 (June 1999): "HTTP Authentication: Basic and Digest Access Authentication".

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

[23] RFC 4733 (December 2006): "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".

[24] RFC 6116 (March 2011): "The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)".

[25] RFC 6086 (October 2009): "Session Initiation Protocol (SIP) INFO Method and Package Framework".

[25A] RFC 3041 (January 2001): "Privacy Extensions for Stateless Address Autoconfiguration in IPv6".

[26] RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[27] RFC 3262 (June 2002): "Reliability of provisional responses in Session Initiation Protocol (SIP)".

[27A] RFC 3263 (June 2002): "Session Initiation Protocol (SIP): Locating SIP Servers".

[27B] RFC 3264 (June 2002): "An Offer/Answer Model with Session Description Protocol (SDP)".

[28] RFC 6665 (July 2012): "SIP Specific Event Notification".

[28A] Void.

[29] RFC 3311 (September 2002): "The Session Initiation Protocol (SIP) UPDATE method".

[30] RFC 3312 (October 2002): "Integration of resource management and Session Initiation Protocol (SIP)".

[31] RFC 3313 (January 2003): "Private Session Initiation Protocol (SIP) Extensions for Media Authorization".

[32] RFC 3320 (March 2002): "Signaling Compression (SigComp)".

[33] RFC 3323 (November 2002): "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

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

[34A] RFC 3326 (December 2002): "The Reason Header Field for the Session Initiation Protocol (SIP)".

[35] RFC 3327 (December 2002): "Session Initiation Protocol Extension Header Field for Registering Non-Adjacent Contacts".

[35A] RFC 3361 (August 2002): "Dynamic Host Configuration Protocol (DHCP-for-IPv4) Option for Session Initiation Protocol (SIP) Servers".

[36] RFC 3515 (April 2003): "The Session Initiation Protocol (SIP) REFER method".

[37] RFC 3420 (November 2002): "Internet Media Type message/sipfrag".

[37A] RFC 3605 (October 2003): "Real Time Control Protocol (RTCP) attribute in Session Description Protocol (SDP)".

[38] RFC 3608 (October 2003): "Session Initiation Protocol (SIP) Extension Header Field for Service Route Discovery During Registration".

[39] RFC 4566 (June 2006): "SDP: Session Description Protocol".

[40] RFC 3315 (July 2003): "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[40A] RFC 2131 (March 1997): "Dynamic host configuration protocol".

[41] RFC 3319 (July 2003): "Dynamic Host Configuration Protocol (DHCPv6) Options for Session Initiation Protocol (SIP) Servers".

[42] RFC 3485 (February 2003): "The Session Initiation Protocol (SIP) and Session Description Protocol (SDP) static dictionary for Signaling Compression (SigComp)".

[43] RFC 3680 (March 2004): "A Session Initiation Protocol (SIP) Event Package for Registrations".

[44] Void.

[45] Void.

[46] Void.

[47] Void.

[48] RFC 3329 (January 2003): "Security Mechanism Agreement for the Session Initiation Protocol (SIP)".

[49] RFC 3310 (September 2002): "Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)".

[50] RFC 3428 (December 2002): "Session Initiation Protocol (SIP) Extension for Instant Messaging".

[51] Void.

[52] RFC 7315 (July 2014): "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3GPP".

[52A] RFC 7976 (September 2016): "Updates to Private Header (P-Header) Extension Usage in Session Initiation Protocol (SIP) Requests and Responses".

[52B] draft-jesske-update-p-visited-network-01 (March 2019): "Update to Private Header Field P-Visited-Network-ID in Session Initiation Protocol (SIP) Requests and Responses".

Editor's note (WI: IMSProtoc9, CR#5979): The above document cannot be formally referenced until it is published as an RFC.

[53] RFC 3388 (December 2002): "Grouping of Media Lines in Session Description Protocol".

[54] RFC 3524 (April 2003): "Mapping of Media Streams to Resource Reservation Flows".

[55] RFC 3486 (February 2003): "Compressing the Session Initiation Protocol (SIP)".

[55A] RFC 3551 (July 2003): "RTP Profile for Audio and Video Conferences with Minimal Control".

[56] RFC 3556 (July 2003): "Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth".

[56A] RFC 3581 (August 2003): "An Extension to the Session Initiation Protocol (SIP) for Symmetric Response Routing".

[56B] RFC 3841 (August 2004): "Caller Preferences for the Session Initiation Protocol (SIP)".

[56C] RFC 3646 (December 2003): "DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)".

[57] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[58] RFC 4028 (April 2005): "Session Timers in the Session Initiation Protocol (SIP)".

[59] RFC 3892 (September 2004): "The Session Initiation Protocol (SIP) Referred-By Mechanism".

[60] RFC 3891 (September 2004): "The Session Inititation Protocol (SIP) "Replaces" Header".

[61] RFC 3911 (October 2004): "The Session Inititation Protocol (SIP) "Join" Header".

[62] RFC 3840 (August 2004): "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".

[63] RFC 3861 (August 2004): "Address Resolution for Instant Messaging and Presence".

[63A] RFC 3948 (January 2005): "UDP Encapsulation of IPsec ESP Packets".

[64] RFC 4032 (March 2005): "Update to the Session Initiation Protocol (SIP) Preconditions Framework".

[65] RFC 3842 (August 2004) "A Message Summary and Message Waiting Indication Event Package for the Session Initiation Protocol (SIP)"

[65A] RFC 4077 (May 2005): "A Negative Acknowledgement Mechanism for Signaling Compression".

[66] RFC 7044 (February 2014): "An Extension to the Session Initiation Protocol (SIP) for Request History Information".

[67] RFC 5079 (December 2007): "Rejecting Anonymous Requests in the Session Initiation Protocol (SIP)".

[68] RFC 4458 (January 2006): "Session Initiation Protocol (SIP) URIs for Applications such as Voicemail and Interactive Voice Response (IVR)".

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

[70] RFC 3903 (October 2004): "An Event State Publication Extension to the Session Initiation Protocol (SIP)".

[71] Void.

[72] RFC 3857 (August 2004): "A Watcher Information Event Template Package for the Session Initiation Protocol (SIP)".

[74] RFC 3856 (August 2004): "A Presence Event Package for the Session Initiation Protocol (SIP)".

[74A] RFC 3603 (October 2003): "Private Session Initiation Protocol (SIP) Proxy-to-Proxy Extensions for Supporting the PacketCable Distributed Call Signaling Architecture".

[74B] RFC 3959 (December 2004): "The Early Session Disposition Type for the Session Initiation Protocol (SIP)".

[75] RFC 4662 (August 2006): "A Session Initiation Protocol (SIP) Event Notification Extension for Resource Lists".

[77] RFC 5875 (May 2010): "An Extensible Markup Language (XML) Configuration Access Protocol (XCAP) Diff Event Package".

[78] RFC 4575 (August 2006): "A Session Initiation Protocol (SIP) Event Package for Conference State".

[79] RFC 5049 (December 2007): "Applying Signaling Compression (SigComp) to the Session Initiation Protocol (SIP)".

[80] Void.

[81] Void.

[82] RFC 4457 (April 2006): "The Session Initiation Protocol (SIP) P-User-Database Private-Header (P-header)".

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[86B] 3GPP2 X.S0060-0 v1.0: "HRPD Support for Emergency Services".

[86C] 3GPP2 X.S0057-B v2.0: "E-UTRAN - eHRPD Connectivity and Interworking: Core Network Aspects".

[86D] 3GPP2 C.S0014-C v1.0: "Enhanced Variable Rate Codec, Speech Service Options 3, 68, and 70 for Wideband Spread Spectrum Digital Systems".

[86E] 3GPP2 X.S0059-200-A v1.0: "cdma2000 Femtocell Network: 1x and IMS Network Aspects".

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#### 5.3.1.2 Normal procedures

When the I-CSCF receives a REGISTER request, the I-CSCF shall verify whether or not it has arrived from a trusted domain. If the request has not arrived from a trusted domain, the I-CSCF shall complete the processing of the request by responding with 403 (Forbidden) response. Otherwise, the I-CSCF starts the user registration status query procedure to the HSS as specified in 3GPP TS 29.228 [14].

NOTE 1: The I-CSCF can find out whether the request arrived from a trusted domain or not, from the procedures described in 3GPP TS 33.210 [19A].

NOTE 2: Different UEs, each with its own private user identity, can register the same shared public user identity. Registrations of all public user identities belonging to these UEs are directed to the same S-CSCF as described in 3GPP TS 29.228 [14].

If the REGISTER request does not include an Authorization header field and private user identity, the I-CSCF shall derive the private user identity from the public user identity being registered, contained in the To header field, by removing URI scheme and the following parts of the URI if present: port number, URI parameters, and To header field parameters.

Prior to performing the user registration query procedure to the HSS, the I-CSCF decides which HSS to query, possibly as a result of a query to the Subscription Locator Functional (SLF) entity as specified in 3GPP TS 29.228 [14]. As a result of the query the I-CSCF gets the Redirect-Host AVP.

If the user registration status query response from the HSS includes a valid SIP URI, the I-CSCF shall:

1) replace the Request-URI of the received REGISTER request with the SIP URI received from the HSS in the Server-Name AVP;

2) optionally include in the P-User-Database header field defined in RFC 4457 [82]:

a) either the received Redirect-Host AVP value; or

b) the HSS Group ID using the form "aaa:hss.5gc.gid.<GID>.invalid", if the HSS Group ID is received following procedures in clause X.3; and

3) forward the REGISTER request to the indicated S-CSCF.

NOTE 3: The P-User-Database header field can be included only if the I-CSCF can assume (e.g. based on local configuration) that the receiving S-CSCF will be able to process the header field.

If the user registration status query response from the HSS includes a list of capabilities, the I-CSCF shall:

1) select a S-CSCF that fulfils the indicated mandatory capabilities – if more than one S-CSCFs fulfils the indicated mandatory capabilities the S-CSCF which fulfils most of the possibly additionally indicated optional capabilities;

2) replace the Request-URI of the received REGISTER request with the URI of the S-CSCF;

3) optionally include in the P-User-Database header field defined in RFC 4457 [82]:

a) either the received Redirect-Host AVP value; or

b) the HSS Group ID using the form "aaa:hss.5gc.gid.<GID>.invalid", if the HSS Group ID is received following procedures in clause X.3; and

4) forward the REGISTER request to the selected S-CSCF.

NOTE 4: The P-User-Database header field can be included only if the I-CSCF can assume (e.g. based on local configuration) that the receiving S-CSCF will be able to process the header field.

NOTE 5: It is important that the I-CSCF does not alter the Via header field for requests and responses sent in the direction from the UE to the S-CSCF in the case of GPRS-IMS-Bundled authentication

When the I-CSCF receives a 2xx response to a REGISTER request, the I-CSCF shall forward the 2xx response to the P-CSCF.

\* \* \* Next Change \* \* \* \*

#### 5.3.2.1 Normal procedures

The I-CSCF may behave as a stateful proxy for initial requests.

Upon receipt of a request, the I-CSCF shall perform the originating procedures as described in subclause 5.3.2.1A if the topmost Route header field of the request contains the "orig" parameter. Otherwise, the I-CSCF shall continue with the rest of the procedures of this subclause.

When the I-CSCF receives a request, the I-CSCF shall verify whether it has arrived from a trusted domain or not. If the request has arrived from a non trusted domain, then the I-CSCF shall remove all P-Charging-Vector header fields and all P-Charging-Function-Addresses header fields the request may contain.

NOTE 1: The I-CSCF can find out whether the request arrived from a trusted domain or not, from the procedures described in 3GPP TS 33.210 [19A].

For all SIP transactions identified:

- if priority is supported, as containing an authorised Resource-Priority header field, or, if such an option is supported, relating to a dialog which previously contained an authorised Resource-Priority header field;

the I-CSCF shall give priority over other transactions or dialogs. This allows special treatment of such transactions or dialogs. If priority is supported, the I-CSCF shall adjust the priority treatment of transactions or dialogs according to the most recently received authorized Resource-Priority header field or backwards indication value.

NOTE 2: The special treatment can included filtering, higher priority processing, routeing, call gapping. The exact meaning of priority is not defined further in this document, but is left to national regulation and network configuration.

The I-CSCF shall discard the P-Profile-Key header field, if the I-CSCF receives the P-Profile-Key header field in a SIP request or response.

When the I-CSCF receives, destined for a served user or a PSI, an initial request for a dialog or standalone transaction the I-CSCF shall:

1) if the Request-URI includes:

a) a pres: or an im: URI, then translate the pres: or im: URI to a public user identity and replace the Request-URI of the incoming request with that public user identity; or

b) a SIP-URI that is not a GRUU and with the user part starting with a + and the "user" SIP URI parameter equals "phone" then replace the Request-URI with a tel-URI with the user part of the SIP-URI in the telephone-subscriber element in the tel-URI, and carry forward the tel-URI parameters that may be present in the Request-URI; or

c) a SIP URI that is a GRUU, then obtain the public user identity or an identity of the UE that represents the functionality within the UE that performs the role of registrar from the Request-URI and use it for location query procedure to the HSS. When forwarding the request, the I-CSCF shall not modify the Request-URI of the incoming request;

NOTE 3: SRV records have to be advertised in DNS pointing to the I-CSCF for pres: and im: queries.

2) remove its own SIP URI from the topmost Route header field, if present; and

3) check if the domain name of the Request-URI matches with one of the PSI subdomains configured in the I-CSCF. If the match is successful, the I-CSCF resolves the Request-URI by an internal DNS mechanism into the IP address of the AS hosting the PSI and does not start the user location query procedure. Otherwise, the I-CSCF will start the user location query procedure to the HSS as specified in 3GPP TS 29.228 [14] for the called PSI or user, indicated in or derived from the Request-URI. Prior to performing the user location query procedure to the HSS, the I-CSCF decides which HSS to query, possibly as a result of a query to the Subscription Locator Functional (SLF) entity as specified in 3GPP TS 29.228 [14].

When the I-CSCF receives any response to such a request, the I-CSCF shall store the value of the "term-ioi" header field parameter received in the P-Charging-Vector header field, if present.

NOTE 4: A received "term-ioi" header field parameter will be a type 3 IOI if received from an AS hosting a PSI or a type 2 IOI if received from the S-CSCF of the served user. The type 3 IOI identifies the service provider from which the response was sent and the type 2 IOI identifies the network from which the response was sent.

When the I-CSCF receives an INVITE request, the I-CSCF may require the periodic refreshment of the session to avoid hung states in the I-CSCF. If the I-CSCF requires the session to be refreshed, then the I-CSCF shall apply the procedures described in RFC 4028 [58] clause 8.

NOTE 5: Requesting the session to be refreshed requires support by at least one of the UEs. This functionality cannot automatically be granted, i.e. at least one of the involved UEs needs to support it.

In case the I-CSCF is able to resolve the Request-URI into the IP address of the AS hosting the PSI, then the I-CSCF shall:

1) store the value of the "icid-value" header field parameter received in the P-Charging-Vector header field and retain the "icid-value" header field parameter in the P-Charging-Vector header field. If no P-Charging-Vector header field was found, then insert the P-Charging-Vector header field with the "icid-value" header field parameter populated as specified in 3GPP TS 32.260 [17]. The I-CSCF shall insert a type 3 "orig-ioi" header field parameter in place of any received "orig-ioi" header field parameter. The I-CSCF shall set the type 3 "orig-ioi" header field parameter to a value that identifies the sending network of the request. The I-CSCF shall not include the type 3 "term-ioi" header field parameter. Based on local policy, the I-CSCF shall add an "fe-addr" element of the "fe-identifier" header field parameter to the P-Charging-Vector header field with its own address or identifier; and

2) forward the request directly to the AS hosting the PSI.

Upon successful user location query, when the response contains the URI of the assigned S-CSCF, or the URI of an AS hosting the PSI, the I-CSCF shall:

1) insert the URI received from the HSS as the topmost Route header field;

2) store the value of the "icid-value" header field parameter received in the P-Charging-Vector header field and retain the P-Charging-Vector header field in the P-Charging-Vector header field. If no "icid-value" header field parameter was found, then insert the P-Charging-Vector header field with the "icid-value" header field parameter populated as specified in 3GPP TS 32.260 [17];

2A) based on local policy, add an "fe-addr" element of the "fe-identifier" header field parameter to the P-Charging-Vector header field with its own address or identifier;

3) optionally include in the P-User-Database header field defined in RFC 4457 [82]:

a) either the received Redirect-Host AVP value; or

b) the HSS Group ID using the form "aaa:hss.5gc.gid.<GID>.invalid", if the HSS Group ID is received following procedures in clause X.3;

3A) if the Wildcarded Identity value is received from the HSS in the Wildcarded-Identity AVP and the I-CSCF supports the SIP P-Profile-Key private header extension, include the wildcarded identity value in the P-Profile-Key header field defined in RFC 5002 [97]; and

4) forward the request based on the topmost Route header field.

NOTE 6: The P-User-Database header field can be included only if the I-CSCF can assume (e.g. based on local configuration) that the receiving S-CSCF will be able to process the header field.

Upon successful user location query, when the response contains information about the required S-CSCF capabilities, the I-CSCF shall:

1) if overlap signalling using the multiple-INVITEs method is supported as a network option, and if the I-CSCF receives an INVITE request outside an existing dialog with the same Call ID and From header as a previous INVITE request during a certain period of time, route the new INVITE to the same next hop as the previous INVITE request; otherwise

2) select a S-CSCF according to the method described in 3GPP TS 29.228 [14];

3) insert the URI of the selected S-CSCF as the topmost Route header field value;

4) execute the procedure described in step 2 and 3 in the above paragraph (upon successful user location query, when the response contains the URI of the assigned S-CSCF);

5) optionally include in the P-User-Database header field defined in RFC 4457 [82]:

a) either the received Redirect-Host AVP value; or

b) the HSS Group ID using the form "aaa:hss.5gc.gid.<GID>.invalid", if the HSS Group ID is received following procedures in clause X.3;

6) if the Wildcarded Identity value is received from the HSS in the Wildcarded-Identity AVP and the I-CSCF supports the SIP P-Profile-Key private header extension, include the wildcarded identity value in the P-Profile-Key header field as defined in RFC 5002 [97]; and

NOTE 7: A Wildcarded Identity can be either a PSI or a public user identity.

7) forward the request to the selected S-CSCF.

NOTE 8: The P-User-Database header field can be included only if the I-CSCF can assume (e.g. based on local configuration) that the receiving S-CSCF will be able to process the header field.

Upon an unsuccessful user location query when the response from the HSS indicates that the user does not exist, and if the Request-URI is a tel URI containing a public telecommunications number as specified in RFC 3966 [22], the I-CSCF may support a local configuration option that indicates whether or not request routeing is to be attempted. If the local configuration option indicates that request routeing is to be attempted, then the I-CSCF shall perform one of the following procedures based on local operator policy:

1) forward the request to the transit functionality for subsequent routeing; or

2) invoke the portion of the transit functionality that translates the public telecommunications number contained in the Request-URI to a routeable SIP URI, and process the request based on the result, as follows:

a) if the translation fails, the request may be forwarded to a BGCF or any other appropriate entity (e.g. a MRFC to play an announcement) in the home network, or the I-CSCF may send an appropriate SIP response to the originator, such as 404 (Not Found) or 604 (Does not exist anywhere). When forwarding the request to a BGCF or any other appropriate entity, the I-CSCF shall leave the original Request-URI containing the tel URI unmodified:

i) if overlap signalling using the multiple-INVITEs method is supported as a network option, and if the I-CSCF receives an INVITE request outside an existing dialog with the same Call ID and From header as a previous INVITE request during a certain period of time, the I-CSCF shall route the new INVITE to the same next hop as the previous INVITE request; and

ii) additional procedures apply if the I-CSCF supports NP capabilities and these capabilities are enabled by local policy, and the database used for translation from an international public telecommunications number to a SIP URI also provides NP data (for example, based on the PSTN Enumservice as defined by RFC 4769 [114] or other appropriate data bases). If the above translation from an international public telecommunications number to a SIP URI failed, but NP data was obtained from the database, then the I-CSCF shall replace the tel-URI in the Request-URI with the obtained NP data, prior to forwarding the request to the BGCF or other appropriate entity. The URI is updated by the I-CSCF by adding the NP parameters defined by RFC 4694 [112] to the tel-URI in the Request-URI: an "npdi" tel-URI parameter is added to indicate that NP data retrieval has been performed, and if the number is ported, an "rn" tel-URI parameter is added to identify the ported-to routeing number. The I-CSCF shall perform these procedures if the tel-URI in the received Request-URI does not contain an "npdi" tel-URI parameter. In addition, the I-CSCF may, based on local policy, perform these procedures when the tel-URI in the received Request-URI contains an "npdi" tel-URI parameter indicating that the NP data has been previously obtained; or

NOTE 9: The I-CSCF might need to replace NP data added by a previous network if the previous network's NP database did not contain the local ported data for the called number. When the I-CSCF replaces the tel URI in the Request-URI with the obtained NP data, all tel URI parameters in the received Request-URI will be replaced by the obtained NP data.

b) if this translation succeeds, then replace the Request-URI with the routeable SIP URI and process the request as follows:

- determine the destination address (e.g. DNS access) using the URI placed in the topmost Route header field if present, otherwise based on the Request-URI. If the destination requires interconnect functionalities (e.g. the destination address is of an IP address type other than the IP address type used in the IM CN subsystem), the I-CSCF shall:

i) if the I-CSCF supports indicating the traffic leg as specified in RFC 7549 [225] and required by local policy, append the "iotl" SIP URI parameter set to "homeA-homeB" to the Request-URI; and

ii) forward the request to the destination address via an IBCF in the same network;

- if network hiding is needed due to local policy, put the address of the IBCF to the topmost Route header field;

- route the request based on SIP routeing procedures; and

- if overlap signalling using the multiple-INVITE method is supported as a network option, and if the I-CSCF receives an INVITE request outside an existing dialog with the same Call ID and From header as a previous INVITE request during a certain period of time, route the new INVITE to the same next hop as the previous INVITE request.

Upon an unsuccessful user location query when the response from the HSS indicates that the user does not exist, and if local operator policy does not indicate that request routeing is to be attempted, then, the I-CSCF shall return an appropriate unsuccessful SIP response. Upon an unsuccessful user location query when the response from the HSS indicates that the user does not exist, and if if the Request-URI is a SIP URI, the I-CSCF shall also return an appropriate unsuccessful SIP response. This response may be a 404 (Not found) or 604 (Does not exist anywhere) in the case the user is not a user of the home network.

Upon an unsuccessful user location query when the response from the HSS indicates that the user is not registered and no services are provided for such a user, the I-CSCF shall return an appropriate unsuccessful SIP response. This response may be a 480 (Temporarily unavailable) response if the user is recognized as a valid user, but is not registered at the moment and it does not have services for unregistered users.

When the I-CSCF receives an initial request for a dialog or standalone transaction, that contains a single Route header field pointing to itself, the I-CSCF shall determine from the entry in the Route header field whether it needs to do HSS query. In case HSS query not is needed, then the I-CSCF shall:

1) remove its own SIP URI from the topmost Route header field; and

2) route the request based on the Request-URI.

When the I-CSCF receives an initial request for a dialog or standalone transaction containing more than one Route header field, the I-CSCF shall:

1) remove its own SIP URI from the topmost Route header field; and

2) forward the request based on the topmost Route header field.

NOTE 10: In accordance with SIP the I-CSCF can add its own routeable SIP URI to the top of the Record-Route header field to any request, independently of whether it is an initial request. The P-CSCF will ignore any Record-Route header field that is not in the initial request of a dialog.

When the I-CSCF receives a response to an initial request (e.g. 183 (Session Progress) response or 2xx response), the I-CSCF shall store the values from the P-Charging-Function-Addresses header field, if present. If the next hop is outside of the current network, then the I-CSCF shall remove the P-Charging-Function-Addresses header field prior to forwarding the message.

When the I-CSCF receives any response to the initial request for a dialog or standalone transaction containing a "term-ioi" header field parameter in the P-Charging-Vector header field from the AS hosting the PSI, the I-CSCF shall:

1) remove all received "orig-ioi" and "term-ioi" header field parameters from the forwarded response;

2) insert the stored "orig-ioi" header field parameter if received in the request; and

3) insert a type 2 "term-ioi" header field parameter. The "term-ioi" header field parameter is set to a value that identifies the sending network of the response.

When the I-CSCF, upon sending an initial INVITE request to the S-CSCF, receives a 305 (Use Proxy) response from the S-CSCF, the I-CSCF shall forward the initial INVITE request to the SIP URI indicated in the Contact field of the 305 (Use Proxy) response, as specified in RFC 3261 [26].

\* \* \* Next Change \* \* \* \*

#### 5.3.2.1A Originating procedures for requests containing the "orig" parameter

The procedures of this subclause apply for requests received at the I-CSCF when the topmost Route header field of the request contains the "orig" parameter.

The I-CSCF shall verify for all requests whether they arrived from a trusted domain or not. If the request arrived from a non trusted domain, then the I-CSCF shall respond with 403 (Forbidden) response.

If the request arrived from a trusted domain, the I-CSCF shall perform the procedures below.

NOTE 1: The I-CSCF can find out whether the request arrived from a trusted domain or not, from the procedures described in 3GPP TS 33.210 [19A].

For all SIP transactions identified:

- if priority is supported, as containing an authorised Resource-Priority header field, or, if such an option is supported, relating to a dialog which previously contained an authorised Resource-Priority header field;

the I-CSCF shall give priority over other transactions or dialogs. This allows special treatment of such transactions or dialogs. If priority is supported, the I-CSCF shall adjust the priority treatment of transactions or dialogs according to the most recently received authorized Resource-Priority header field or backwards indication value.

NOTE 2 The special treatment can include filtering, higher priority processing, routeing, call gapping. The exact meaning of priority is not defined further in this document, but is left to national regulation and network configuration.

If the I-CSCF receives the P-Profile-Key header field in a SIP request or response the I-CSCF shall discard the P-Profile-Key header field.

When the I-CSCF receives an initial request for a dialog or standalone transaction the I-CSCF will start the user location query procedure to the HSS as specified in 3GPP TS 29.228 [14] for the calling user, indicated in either:

1) the P-Served-User header field, if included in the request; or

2) the P-Asserted-Identity header field, if the P-Served-User header field is not included in the request.

Prior to performing the user location query procedure to the HSS, the I-CSCF decides which HSS to query, possibly as a result of a query to the Subscription Locator Functional (SLF) entity as specified in 3GPP TS 29.228 [14].

When the I-CSCF receives an INVITE request, the I-CSCF may require the periodic refreshment of the session to avoid hung states in the I-CSCF. If the I-CSCF requires the session to be refreshed, the I-CSCF shall apply the procedures described in RFC 4028 [58] clause 8.

NOTE 3: Requesting the session to be refreshed requires support by at least one of the UEs. This functionality cannot automatically be granted, i.e. at least one of the involved UEs needs to support it.

When the response for user location query contains information about the required S-CSCF capabilities, the I-CSCF shall select a S-CSCF according to the method described in 3GPP TS 29.228 [14].

If the user location query was successful, the I-CSCF shall:

1) insert the URI of an AS hosting the PSI, or the URI of the S-CSCF - either received from the HSS, or selected by the I-CSCF based on capabilities - as the topmost Route header field appending the "orig" parameter to the URI of the S-CSCF;

2) store the value of the "icid-value" header field parameter received in the P-Charging-Vector header field and retain the "icid-value" header field parameter in the P-Charging-Vector header field. If no P-Charging-Vector header field was found, then insert the P-Charging-Vector header field with the "icid-value" header field parameter populated as specified in 3GPP TS 32.260 [17];

2A) based on local policy, add an "fe-addr" element of the "fe-identifier" header field parameter to the P-Charging-Vector header field with its own address or identifier;

3) optionally include in the P-User-Database header field defined in RFC 4457 [82]:

a) either the received Redirect-Host AVP value; or

b) the HSS Group ID using the form "aaa://hss.5gc.gid.<GID>.invalid", if the HSS Group ID is received following procedures in clause X.3;

4) if a wildcarded identity value is received from the HSS in the Wildcarded-Identity AVP and the I-CSCF supports the SIP P-Profile-Key private header extension, include the wildcarded public user identity value in the P-Profile-Key header field as defined in RFC 5002 [97]; and

5) forward the request based on the topmost Route header field.

NOTE 4: The P-User-Database header field can be included only if the I-CSCF can assume (e.g. based on local configuration) that the receiving S-CSCF will be able to process the header field.

Upon an unsuccessful user location query, the I-CSCF shall return an appropriate unsuccessful SIP response. This response may be a 404 (Not found) response or 604 (Does not exist anywhere) response in the case the user is not a user of the home network.

When the I-CSCF receives any response to the above request, and forwards it to AS, the I-CSCF shall:

- store the values from the P-Charging-Function-Addresses header field, if present. If the next hop is outside of the current network, then the I-CSCF shall remove the P-Charging-Function-Addresses header field prior to forwarding the message; and

- insert a P-Charging-Vector header field containing the type 3 "orig-ioi" header field parameter, if received in the request, and a type 3 "term-ioi" header field parameter in the response. The I-CSCF shall set the type 3 "term-ioi" header field parameter to a value that identifies the sending network of the response and the type 3 "orig-ioi" header field parameter is set to the previously received value of type 3 "orig-ioi" header field parameter.

\* \* \* Next Change \* \* \* \*

# X.3 Services to support SBA in IMS

If a P-CSCF uses the Npcf\_PolicyAuthorization service, it will apply Npcf\_PolicyAuthorization service operations (defined in 3GPP TS 29.514[273]) instead of Rx procedures (defined in 3GPP TS 29.214[13D]) and will interact with the PCF instead of the PCRF.

**- Npcf\_PolicyAuthorization**: This service is provided by the PCF. This service is to authorise an AF request and to create policies as requested by the authorized AF for the PDU Session to which the AF session is bound. This service also allows the NF service consumer to subscribe/unsubscribe the notification of events.

NOTE 1: The P-CSCF acts as an AF from the PCF point of view. The Npcf\_PolicyAuthorization service is defined in 3GPP TS 23.502 [275] and the related protocol specification is in 3GPP TS 29.514 [273]. It provides equivalent functionality to the Diameter-based Rx reference point.

If an I-CSCF or an S-CSCF uses the Nhss\_ims services, it will apply Nhss\_ims service operations instead of Cx procedures mentioned throughout the present document and will interact with an SBI capable HSS.

**- Nhss\_imsUEContextManagement**: This service is provided by an SBI capable HSS. It enables service operations related to the management of a UE context.

**- Nhss\_imsSubscriberDataManagement**: This service is provided by an SBI capable HSS. It enables service operations related to subscriber data management.

**- Nhss\_imsUEAuthentication**: This service is provided by an SBI capable HSS. It enables a service operation related to the authentication between the end user and the home IMS network.

NOTE 2: The Nhss\_imsUEContextManagement, Nhss\_imsSubscriberDataManagement, and Nhss\_imsUEAuthentication services are defined in annex AA of 3GPP TS 23.228 [7] and the related protocol specification is in 3GPP TS 29.562 [274]. They provide equivalent functionality to the Diameter-based Cx and Sh reference point.

NOTE 3: The Nhss\_imsUEAuthentication service is not consumed by I-CSCF.

NOTE 4: The Nhss\_imsUEAuthentication and Nhss\_imsUEContextManagement services are not consumed by AS.

If an I-CSCF or an S-CSCF uses the Nnrf\_NFDiscovery service, it will apply Nnrf\_NFDiscovery service operations instead of Cx procedures mentioned throughout the present document and will interact with an SBI capable NRF.

NOTE 5: The Nnrf\_NFDiscovery service is defined in 3GPP TS 23.502 [275] and the related protocol specification is in 3GPP TS 29.510 [XX].

\* \* \* End of Changes \* \* \* \*