**3GPP TSG-SA3 Meeting #105-e *S3-214449 rev of S3-214250***

e-meeting, 8 - 19 November 2021

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| *CR-Form-v12.1* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **33.220** | **CR** | **<CR#>** | **rev** | **<Rev#>** | **Current version:** | **17.1.0** |  |
|  | | | | | | | | |
| *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** |

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|  | | | | | | | | | | |
| ***Title:*** | Living document for GBA\_5G: draftCR to TS 33.220: SBA support for Zh and Zn interfaces | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | S3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | GBA\_5G | | | | |  | ***Date:*** | | | 2021-11-01 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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:*** | | SBI capable BSF, HSS, NAF do not exist in 5G. Therefore the Generic Boostrapping Architecture (GBA) cannot operate in 5G core networks.  For supporting GBA in the Service Based Archtiecture, the legacy interfaces Zn and Zh need to be specified for a SBI capable BSF and an SBI capable HSS respectively. An interface for the UDM is also needed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The CR includes the following changes  - Service Based Architecture for GBA  - Reference point architecture for GBA  - Specification of a service based interface for an SBI capable NAF towards an SBI capable BSF corresponding to the Zn interface in legacy GBA  - Specification of a service based interface for an SBI capable BSF towards an SBI capable HSS corresponding to the Zh interface in legacy GBA  - Specification of a UDM service operation for an SBI capable BSF to retrieve authentication vectors from UDM  - Relevant selection and discovery clauses for an SBI capable BSF, SBI capable HSS and UDM.  - Roaming considerations | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No support for GBA in 5G | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, Annex X (new), X.1 (new), X.1.0 (new), X.1.1 (new), X.1.2 (new), X.1.3 (new), X.2 (new), X.2.1 (new), X.2.1.1 (new), X.2.1.2 (new), X.2.1.2.1 (new), X.2.1.2.2 (new), X.2.1.2.3 (new), X.2.1.2.4 (new), X.2.1.2.5 (new), X.2.1.3 (new), X.2.1.3.1 (new), X.2.2 (new), X.2.2.1 (new), X.2.2.2 (new), X.2.2.2.1 (new), X.2.3 (new), X.2.3.1(new), X.2.3.2 (new), X.2.3.2.1 (new), X.2.3.2.2 (new), X.2.4 (new), X.2.4.1 (new), X.2.4.2 (new),` X.2.4.3 (new), X.2.4.4 (new), X.3 (new), X.3.1 (new), X.3.2 (new), X.3.3 (new), X.3.4 (new). | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

**\*\*\*\*** 1st 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 TS 31.102: "Characteristics of the USIM application".

[2] 3GPP TS 33.102: "3G Security; Security architecture".

[3] Void

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

[5] 3GPP TS 33.221: "Generic Authentication Architecture (GAA); Support for Subscriber Certificates".

[6] Void

[7] Void

[8] Void

[9] Void.

[10] 3GPP TS 31.103: "Characteristics of the IP Multimedia Services Identity Module (ISIM) application".

[11] 3GPP TS 23.003: "Numbering, addressing and identification".

[12] Void

[13] 3GPP TS 33.210: "3G Security; Network domain security; IP network layer security".

[14] Void.

[15] 3GPP TS 31.101: "UICC-terminal interface; Physical and logical characteristics".

[16] 3GPP TS 33.203: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3G security; Access security for IP-based services".

[17] Void.

[18] IETF RFC 2818: "HTTP over TLS".

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

[20] Void.

[21] Void.

[22] IETF RFC 2104: "HMAC: Keyed-Hashing for Message Authentication".

[23] ISO/IEC 10118-3:2004: "Information Technology – Security techniques – Hash-functions – Part 3: Dedicated hash-functions".

[24] IETF RFC 3629: "UTF-8, a transformation format of ISO 10646".

[25] 3GPP TS 33.222: "Generic Authentication Architecture (GAA); Access to network application functions using Hypertext Transfer Protocol over Transport Layer Security (HTTPS)".

[26] 3GPP TS 33.246: "3G Security; Security of Multimedia Broadcast/Multicast Service (MBMS)".

[27] Void.

[28] Void

[29] 3GPP TS 24.109: "Bootstrapping interface (Ub) and network application function interface (Ua); Protocol details".

[30] (void)

[31] (void)

[32] 3GPP TS 29.109: "Generic Authentication Architecture (GAA); Zh and Zn Interfaces based on the Diameter protocol; Stage 3".

[33] Void

[34] 3GPP TS 23.002: “Network architecture “.

[35] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security Architecture".

[36] 3GPP TS 33.402: "3GPP System Architecture Evolution (SAE); Security aspects of non-3GPP accesses".

[37] "Unicode Standard Annex #15; Unicode Normalization Forms", Unicode 5.1.0, March 2008. [http://www.unicode.org](http://www.unicode.org/)

[38] 3GPP TS 26.237: "IP Multimedia Subsystem (IMS) based Packet Switch Streaming (PSS) and Multimedia Broadcast/Multicast Service (MBMS) User Service; Protocols".

[39] 3GPP TS 33.224: "Generic Authentication Architecture (GAA); Generic Bootstrapping Architecture (GBA) Push Layer".

[40] 3GPP TS 33.328: "IMS Media plane security".

[41] Void

[42] (void)

[43] Void.

[44] IETF RFC 5705: "Keying Material Exporters for Transport Layer Security (TLS)".

[45] 3GPP TS 33.223: "Generic Authentication Architecture (GAA); Generic Bootstrapping Architecture (GBA) Push function".

[46] 3GPP TS 44.006 "Technical Specification Group GSM/EDGE Radio Access Network; Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification".

[47] 3GPP TS 43.020 "Technical Specification Group Services and system Aspects; Security related network functions".

[48] IETF RFC 5929 "Channel Bindings for TLS".

[49] 3GPP TS 33.303: "Proximity-based Services; Security Aspects".

[50] 3GPP TS 33.179: "Security of Mission Critical Push-To-Talk (MCPTT)".

[51] 3GPP TS 33.203: "3G security; Access security for IP-based services".

[52] 3GPP TS 33.163: " Battery Efficient Security for very low Throughput Machine Type Communication (MTC) devices (BEST)".

[53] 3GPP TS 33.501: " Security architecture and procedures for 5G system".

[54] 3GPP TS 33.180: "Technical Specification Group Services and System Aspects; Security of the mission critical service".

[55] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[56] 3GPP TS 33.536: "Security Aspect of 3GPP Support for Advanced V2X Services".

[57] Void

[58] 3GPP TS 33.535: "Authentication and Key Management for Applications (AKMA) based on 3GPP credentials in the 5G System (5GS)".

[59] IETF RFC 8446 "The Transport Layer Security (TLS) Protocol Version 1.3".

[60] IETF RFC 4648: "The Base16, Base32, and Base64 Data Encodings".

[61] IETF RFC 7235: "Hypertext Transfer Protocol (HTTP/1.1): Authentication".

[62] IETF RFC 7616: "HTTP Digest Access Authentication".

[63] IETF RFC 7230: " Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing".

[XY] 3GPP TS 23.502: "Procedures for the 5G System (5GS)"

[XX] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[XZ] 3GPP TS 23.501: " System architecture for the 5G System (5GS)"

**\*\*\*\*** 2nd CHANGE **\*\*\*\***

# Annex X (normative): Support of SBA in GBA

## X.1 General

### X.1.1 Overview

This Annex X describes support for SBA for GBA.

### X.1.2 Architectural Support

Figure X.1.2-1 shows the non-roaming architecture to support SBA interactions in GBA. An SBI capable BSF, HSS and NAF shall implement the SBA interfaces specified in this Annex. An SBI capable NF can invoke SBA services provided by SBI capable NFs and may expose services itself. For this Annex an SBI capable BSF uses and provides SBA services, an SBI capable HSS provides SBA services, a UDM provides SBA service, while an SBI capable NAF only uses SBA services. The BSF, HSS, UDM and NAF reside in the home network.

If there is no HSS or if the HSS does not support the N65 and Zh reference points within the GBA architecture, then the BSF shall be configured to use the N68 reference point with the UDM. If the N65 or Zh reference point is available in the HSS, then it shall be used between the BSF and the HSS.

NOTE: GBA User Security Settings (GUSS) information is not sent over N68 reference point with UDM. If support of GUSS is desired in combination with the use of N68 reference point with UDM, then this can be achieved, for instance by storing the GUSS information in a BSF database (external and/or external to the node itself), or in any other network database which is deemed as appropriate for a specific deployment.

UDM

Nudm

HSS

Nhss

BSF

NAF

UE

Nbsp

Ua

Ub

Figure X.1.2-1: System Architecture to support SBA in GBA

Figure X.1.2-2 shows the architecture using the reference point representation. It should be observed that this annex addresses only the specification of the N65 (between the BSF and HSS) , N68 (between the BSF and UDM) and N66 (between the NAF and BSF) reference point interfaces as SBA interfaces. The specification of Ua and Ub is not impacted by the introduction of the SBA interfaces between the NAF, BSF, UDM and HSS. Therefore, the UE interacts with the BSF and NAF as defined in the main body of this specification.

BSF

NAF

UE

Ua

Ub

HSS

N65

UDM

N68

N66

Figure X.1.2-2: System Architecture to support SBA in reference point representation

With respect to roaming, the roaming requirements in clause 4.4.3 and the Zn-Proxy architecture in clause 4.1 are applicable for the case of SBA GBA.

In addition, the following requirements shall be followed in roaming scenarios:

- The SBI capable NAF shall support the legacy Zn interface towards the Zn-Proxy.

- An SBI capable BSF shall support the legacy Zn' interface.

### X.1.3 Reference point to support SBA in GBA

The following reference points are realized by service-based interfaces in GBA:

**N65**: Reference point between an SBI capable BSF and an SBI capable HSS.

**N66**: Reference point between an SBI capable BSF and an SBI capable NAF.

**N68**: Reference point between an SBI capable BSF and UDM

### X.1.4 Service based interface to support SBA in GBA

The following service-based interfaces are defined:

**Nhss**: Service-based interface exhibited by an SBI capable HSS.

**Nbsp**: Service-based interface exhibited by an SBI capable BSF.

**Nudm**: Service-based interface exhibited by UDM.

These SBI services provide equivalent functionality to the Diameter Zh and Zn reference points.

To support co-existence of GBA nodes supporting SBA services and GBA nodes not supporting SBA services SBI capable GBA nodes may support both SBI and non-SBI interfaces.

## X.2 GAA/GBA SBA Services

### X.2.1 HSS Services

#### X.2.1.1 General

An SBI capable HSS supports providing the authentication vectors and the subscription profile, i.e. GUSS, to an SBI capable BSF via service-based interfaces.

The following table shows the GBA services exposed by an SBI capable HSS.

Table X.2.1.1-1: GBA Services provided by an SBI capable HSS

|  |  |  |  |
| --- | --- | --- | --- |
| Service | Service Operations | Operation Semantics | Example Consumer(s) |
| Nhss\_GbaSubscriber Data | Get | Request/Response | BSF |
| Management (\_GbaSDM) | Subscribe | Subscribe/Notify | BSF |
|  | Unsubscribe | Subscribe/Notify | BSF |
|  | Notification | Subscribe/Notify | BSF |
| Nhss\_GbaUE Authentication | Get | Request/Response | BSF |

#### X.2.1.2 Nhss\_GbaSubscriberDataManagement (GbaSDM) service

##### X.2.1.2.1 General

GBA Subscriber data types e.g. GUSS used in the Nhss\_GbaSDM Service are defined in Table X.2.1.2.1-1 below.

Table X.2.1.2.1-1: GBA Subscriber data types

|  |  |
| --- | --- |
| GBA Subscriber data | Description |
| GUSS | This includes GBA User Security Settings.  GUSS is consumed by BSF. |

At least a mandatory data key is required for each GBA Subscriber Data Type to identify the corresponding data as defined in Table X.2.1.2.1-2 below.

Table X.2.1.2.1-2: GBA Subscriber data types keys

|  |  |  |
| --- | --- | --- |
| GBA Subscriber Data Types | Data Key | Data Sub Key |
| GUSS | User Identity |  |
| NOTE: User Identity shall be one of IMSI, MSISDN, IMPI, IMPU. | | |

##### X.2.1.2.2 Nhss\_GbaSDM\_Get service operation

**Service operation name:** Nhss\_GbaSDM\_Get

**Description:** This service operation enables the NF consumer to fetch the GBA User Security for the end user.

The HSS shall check that the requested NF consumer is authorized to fetch the requested data.

**Inputs, Required:** NF Type, GBA Subscriber data type(s), Key for GBA Subscriber data type(s).

**Inputs, Optional:** None.

**Outputs, Required:** Result indication.

**Outputs, Optional:** Requested Data.

##### X.2.1.2.3 Nhss\_GbaSDM\_Subscribe service operation

**Service operation name:** Nhss\_GbaSDM\_Subscribe

**Description:** The NF consumer subscribes for updates to requested data. HSS shall check that the requested NF consumer is authorized to subscribe to requested updates.

**Inputs, Required:** NF Type, GBA Subscriber data type(s), Key for GBA Subscriber data type(s).

**Inputs, Optional:** None.

**Outputs, Required:** Result indication.

**Outputs, Optional:** Subscription Data.

##### X.2.1.2.4 Nhss\_GbaSDM\_Unsubscribe service operation

**Service operation name:** Nhss\_GbaSDM\_Unsubscribe

**Description:** The NF consumer unsubscribes for updates to Requested data.

**Inputs, Required:** GBA Subscriber data type(s), Key for GBA Subscriber data type(s).

**Inputs, Optional:** None.

**Outputs, Required:** Result indication.

**Outputs, Optional:** None.

##### X.2.1.2.5 Nhss\_GbaSDM\_Notification service operation

**Service operation name:** Nhss\_GbaSDM\_Notification

**Description:** This service operation enables HSS to notify a NF of any changes to what the NF subscribed to.

**Inputs, Required:** GBA Subscriber data type(s), Key for each GBA Subscriber data type(s).

**Inputs, Optional:** None.

**Outputs, Required:** Result indication.

**Outputs, Optional:** None.

#### X.2.1.3 Nhss\_GbaUEAuthentication service

##### X.2.1.3.1 Nhss\_GbaUEAuthentication\_Get service operation

**Service operation name:** Nhss\_GbaUEAuthentication\_Get

**Description:** This service operation is used between the BSF and the HSS to request the authentication data of the end user.

**Inputs, Required:** User Identity(-ies), Authentication Data (Authentication Scheme).

User Identity shall be one of IMSI, MSISDN, IMPI, IMPU. At least one of User Identities shall be presented.

**Inputs, Optional:** None.

**Outputs, Required:** Result Indication.

**Outputs, Optional:** User Identity, Authentication Data (e.g. AV).

In case only MSISDN or IMPU is present in the request, the HSS returns IMSI or IMPI in the response.

### X.2.2 UDM Services

#### X.2.2.1 General

A UDM supports providing the GBA-AKA authentication vectors via the Nudm\_UEAuthentication\_GetGbaAv service operation.

The following table shows the services exposed by UDM supporting GBA.

Table X.2.2.1-1: GBA Services provided by UDM

|  |  |  |  |
| --- | --- | --- | --- |
| Service | Service Operations | Operation Semantics | Example Consumer(s) |
| Nudm\_UEAuthentication | GetGbaAv | Request/Response | BSF |

#### X.2.2.2 Nudm\_UEAuthentication Service

##### X.2.2.2.1 Nudm\_UEAuthentication\_GetGbaAv service operation

**Service operation name:** Nudm\_UEAuthentication\_GetGbaAv

**Description:** This service operation is used by the BSF to fetch the authentication data for UE.

**Inputs, Required:** SUPI.

**Inputs, Optional:**

**Outputs, Required:** GBA authentication vector

**Outputs, Optional:**

BSF needs to convert IMSI based IMPI to SUPI before invoking the Nudm\_UEAuthentication\_GetGbaAv service.

### X.2.3 BSF Services

#### X.2.3.1 General

The following table shows the services exposed by an SBI capable BSF.

Table X.2.3.1-1: GBA Services provided by an SBI capable BSF

|  |  |  |  |
| --- | --- | --- | --- |
| Service | Service Operations | Operation Semantics | Example Consumer(s) |
| Nbsp\_Gba | BootStrapInfo | Request/Response | NAF |

#### X.2.3.2 Nbsp\_Gba service

##### X.2.3.2.1 General

This clause describes the SBA interfaces exposed by the BSF for the purpose of providing the bootstrap information to the NAF for the derivation of the application key material (e.g. Ks\_(ext/int)\_NAF).

##### X.2.3.2.2 Nbsp\_Gba\_BootstrapInfo service operation

**Service operation name:** Nbsp\_Gba\_BootstrapInfo

**Description:** This service operation is used between the BSF and the NAF to request the key material key material agreed during bootstrapping from the UE to the BSF. It is also used to fetch application-specific user security settings from the BSF, if requested by the NAF.

**Inputs, Required:** B-TID, NAF-Id.

**Inputs, Optional:** Flag to indicate that the NAF is GBA\_U aware, identifier of the application-specific USS.

**Outputs, Required:** Key material, bootstrapping time, key lifetime. The key material consists of Ks\_NAF in case of GBA\_ME and Ks\_ext\_NAF in case of GBA\_U. The key lifetime is the lifetime associated to the key material.

**Outputs, Optional:** Key material, Application-specific USS, Private Identity.

NOTE X: Depending on the value of the GBA\_U aware flag, more key material (i.e. Ks\_int\_NAF) may be returned as optional output.

### X.2.4 Mapping of Zh, Zn operations and terminology to SBI services

#### X.2.4.1 General

This clause gives mappings from Zh, Zn operations to SBI services and service operations.

#### X.2.4.2 Mapping of Zh messages to HSS SBI services

The following table defines the mapping between Zh messages and HSS SBI services and service operations:

Table X.2.4.2-1: Zh messages to HSS SBI services and service operations mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Zh message | Source | Destination | HSS SBI service operation name |
| Zh interface: BSF retrieves AV and user profile | BSF | HSS | Nhss\_GbaUEAuthentication\_Get  Nhss\_GbaSDM\_Get (see NOTE 1)  Nhss\_GbaSDM\_Subscribe (see NOTE 1)  Nhss\_GbaSDM\_Unsubscribe (see NOTE 1) |
| HSS | BSF | Nhss\_GbaSDM\_Notification (see NOTE 1) |
| NOTE 1: Corresponds to the GUSS retrieval during execution of the authentication of the end user. | | | |

#### X.2.4.3 Mapping of Zn messages to BSF SBI services

The following table defines the mapping between Zn messages and BSF SBI services and service operations:

Table X.2.4.3-1: Zn messages to BSF SBI services and service operations mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Zn message | Source | Destination | BSF SBI service operation name |
| Zn interface: NAF requests the bootstrapping information from the BSF | NAF | BSF | Nbsp\_Gba\_BootstrapInfo |

#### X.2.4.4 Mapping of Zh messages to UDM SBI services

The following table defines the mapping between Zh messages and UDM SBI services and service operations:

Table X.2.4.4 -1: Zh messages to UDM SBI services and service operations mapping

|  |  |  |  |
| --- | --- | --- | --- |
| Zh message | Source | Destination | UDM SBI service operation name |
| Zh interface: BSF retrieves GBA authentication vector | BSF | UDM | Nudm\_UEAuthentication\_GetGbaAv |

## X.3 SBI Capable NF Discovery and Selection

### X.3.1 General

During the GBA procedures SBI capable network functions such as the BSF and NAF need to discover and select other SBI capable network functions such as the HSS or the UDM and the BSF respectively.

If there is no HSS or if the HSS does not support the N65 and Zh reference points within the GBA architecture, then the BSF shall be configured to discover and use SBA services of a UDM.

### X.3.2 SBI Capable HSS Discovery and Selection

An SBI capable BSF performs discovery and selection of an SBI capable HSS. The SBI capable BSF shall utilize the NRF to discover an SBI capable HSS unless the information about SBI capable HSS instance(s) is available by other means, e.g. locally configured on the SBI capable BSF. The HSS selection function in SBI capable BSF entities selects an SBI capable HSS instance based on the available SBI capable HSS instances (obtained from the NRF or locally configured).

An SBI capable BSF always selects an SBI capable HSS within its own PLMN. The HSS selection should consider one of the following factors when available to the SBI capable BSF:

1. HSS Group ID of the UE's user identity (IMSI/IMPI or MSISDN/IMPU).

2. IMSI/IMPI; e.g. the SBI capable BSF selects an SBI capable HSS instance based on the IMSI/IMPI range the UE's IMSI/IMPI belongs to, configured locally or based on the results of a discovery procedure with NRF using the UE's IMSI/IMPI as input for HSS discovery.

3. MSISDN/IMPU; e.g. the SBI capable BSF selects an SBI capable HSS instance based on the MSISDN/IMPU range the UE's IMSI/IMPU belongs to, configured locally or based on the results of a discovery procedure with NRF using the UE's MSISDN/IMPU as input for HSS discovery.

Unless the information about the interface type to be used towards HSS is locally configured on the SBI capable BSF, an SBI capable BSF can also use the NRF to decide the type of interface (SBI vs diameter) to be used towards HSS similarly as defined for SBI capable IMS entities in TS 23.228 [XX]. For this purpose, an SBI capable BSF can send a Nnrf\_NFDiscovery\_Request to NRF as defined in TS 23.502 [XY] to discover SBI capable HSS instances within a given PLMN. The SBI capable BSF may store all returned SBI capable HSS instances and their NF profiles for subsequent use, including, if applicable, supported IMSI/IMPI and/or MSISDN/IMPU ranges, and/or HSS Group IDs. If no SBI capable HSS instance is available in the PLMN, then the NRF replies to the SBI capable BSF with no information. In this case, the SBI capable BSF may then attempt to communicate with the HSS using legacy GBA protocols.

### X.3.3 SBI Capable BSF Discovery and Selection

An SBI capable NAF performs discovery and selection of an SBI capable BSF. The SBI capable NAF shall utilize the NRF to discover an SBI capable BSF unless the information about SBI capable BSF instance(s) is available by other means, e.g. locally configured on the SBI capable NAF. The BSF selection function in SBI capable NAF entities selects an SBI capable BSF instance based on the available SBI capable BSF instances (obtained from the NRF or locally configured).

The BSF selection in an SBI capable NAF shall consider the BSF server name included in the B-TID provided by the UE.

Unless the information about the interface type to be used towards the BSF is locally configured on the SBI capable NAF, an SBI capable NAF can also use the NRF to decide the type of interface (SBI vs diameter) to be used towards BSF. For this purpose, an SBI capable NAF can send a Nnrf\_NFDiscovery\_Request to NRF as defined in TS 23.502 [XY] to discover SBI capable BSF instances within a given PLMN. The SBI capable NAF may store all returned SBI capable BSF instances and their NF profiles for subsequent use. If no SBI capable BSF instance is available in the PLMN, then the NRF replies to the SBI capable NAF with no information. In this case, the SBI capable NAF may then attempt to communicate with the BSF using legacy GBA protocols.

An SBI capable NAF in a PLMN can serve both as an HPLMN NAF for non-roaming UEs or a VPLMN NAF for roaming UEs.

Unless the information about the network function (BSF or Zn-Proxy) to be used is locally configured on the SBI capable NAF, the SBI capable NAF shall use the BSF server name in the B-TID to determine if the requested BSF is in the same PLMN or a different one. If the requested BSF is in a different PLMN the SBI capable NAF shall use the legacy Zn interface towards the Zn-Proxy. Otherwise the SBI capable NAF uses the procedures specified earlier in this clause.

### X.3.4 UDM Discovery and Selection

See 3GPP TS 23.501 [XZ] clause 6.3.8.

**\*\*\*\*** END OF CHANGES **\*\*\*\***