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Stage 3

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do somethingshall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possiblecannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency

the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an

agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the

behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency

the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the stage 3 protocol, including message flows and API specification details, for the Nhss services, as part of the 5G Service-Based Architecture, offered by the HSS for interworking with the IP Multimedia Subsystem (IMS).

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3].

The IP Multimedia Subsystem (IMS) stage 2 architecture and procedures are specified in 3GPP TS 23.228 [6].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

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". |
|------|---|
| [2] | 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2". |
| [3] | 3GPP TS 23.502: "Procedures for the 5G System; Stage 2". |
| [4] | 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3". |
| [5] | 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3". |
| [6] | 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2". |
| [7] | 3GPP TS 29.335: "User Data Repository Access Protocol over the Ud interface; Stage 3". |
| [8] | IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)". |
| [9] | OpenAPI Initiative, "OpenAPI 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md |
| [10] | IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format". |
| [11] | IETF RFC 7807: "Problem Details for HTTP APIs". |
| [12] | IETF RFC 6902: "JavaScript Object Notation (JSON) Patch". |
| [13] | 3GPP TS 23.003: "Numbering, addressing and identification". |
| [14] | 3GPP TS 33.203: "Access security for IP-based services". |
| [15] | 3GPP TS 29.503: "Unified Data Management Services; Stage 3". |
| [16] | 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3". |
| [17] | IETF RFC 4740: "Diameter Session Initiation Protocol (SIP) Application". |
| [18] | 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3". |

| [19] | IETF RFC 4412: "Communications Resource Priority for the Session Initiation Protocol". |
|------|--|
| [20] | 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx interfaces; Signalling flows and message contents". |
| [21] | 3GPP TS 29.218: "IP Multimedia (IM) session handling; IM call model; Stage 2". |
| [22] | IETF RFC 3261: "SIP: Session Initiation Protocol". |
| [23] | IETF RFC 8497: "Marking SIP messages to be logged". |
| [24] | 3GPP TS 24.323: "3GPP IP Multimedia Subsystem (IMS) service level tracing Management Object (MO)". |
| [25] | 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2". |
| [26] | 3GPP TS 29.273: "Evolved Packet System (EPS); 3GPP EPS AAA interfaces". |
| [27] | IETF RFC 4776: "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information". |
| [28] | IETF RFC 2045: "Multipurpose Internet Mail Extensions(MIME) Part One: Format of Internet Message Bodies". |
| [29] | ETSI ES 283 034: "Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol". |
| [30] | 3GPP TS 29.002: "Mobile Application Part (MAP) specification". |
| [31] | 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2". |
| [32] | 3GPP TS 29.272: "Evolved Packet System; MME and SGSN Related Interfaces Based on Diameter Protocol". |
| [33] | 3GPP TS 29.518: 5G System; Access and Mobility Management Services; Stage 3". |
| [34] | 3GPP TR 21.900: "Technical Specification Group working methods". |
| [35] | IETF RFC 6749: "The OAuth 2.0 Authorization Framework". |
| [36] | 3GPP TS 29.510: "Network Function Repository Services; Stage 3". |
| [37] | 3GPP TS 23.380: "IP Multimedia Subsystem (IMS); IMS Restoration Procedures". |
| [38] | 3GPP TS 29.328: "IP Multimedia (IM) Subsystem Sh interface; Signalling flows and message contents". |
| | |

3 Definitions of terms, symbols and abbreviations

3.1 Terms

The following terms and definitions given in TS 23.003 [13] apply:

Distinct Public Service Identity

Distinct Public User Identity

Public Service Identity

Public User Identity

Wildcarded Public Service Identity

Wildcarded Public User Identity

In the present document, the following terms and definitions apply.

Common Part (of a user profile): Contains Initial Filter Criteria instances that should be evaluated both for registered and unregistered Public User Identities, or for unregistered Public Service Identities in the S-CSCF.

Complete user profile: Contains the Initial Filter Criteria instances of all three different user profile parts; registered part, unregistered part and common part.

IP Multimedia session: IP Multimedia session and IP Multimedia call are treated as equivalent in this specification.

Authentication pending flag: A flag that indicates that the authentication of a Public User Identity - Private User Identity pair is pending and waiting for confirmation.

Implicitly registered Public User Identity set: A set of Public User Identities, which are registered and de-registered simultaneously when any of the Public User Identities belonging to that set is registered or de-registered.

Not Registered State: Public Identity is not Registered and has no S-CSCF assigned.

Private Identity: Either a Private User Identity or a Private Service Identity.

Public Identity: Either a Public User Identity or a Public Service Identity.

Registered State: Public User Identity is Registered at the request of the user and has an S-CSCF assigned.

Unregistered State: Public Identity is not Registered but has a serving S-CSCF assigned to execute Unregistered state services as a consequence of a terminating request, or an originating request from an AS on behalf of a user, or there is an S-CSCF keeping the user profile stored.

User information: The user related data that the S-CSCF requests from the HSS or HSS pushes to the S-CSCF, e.g. user profile, charging information, allowed WAF and/or WWSF identities and authentication information.

User profile: Data that is sent in the resource associated to the complete user's subscription data.

IP Multimedia session: IP Multimedia session and IP Multimedia call are treated as equivalent in this specification.

Transparent data: Data that is understood syntactically but not semantically by the HSS. It is data that an AS may store in the HSS to support its service logic. One example is data that an AS stores in the HSS, using it as a repository.

Non-transparent data: Data that is understood both syntactically and semantically by the HSS.

AS (**Application Server**): a term used to denote either of a SIP Application Server or an OSA Service Capability Server.

3.2 Symbols

Void

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GC 5G Core Network **Application Server** AS **AMF** Access and Mobility Management Function **CSCF** Call Session Control Function Closed Subscriber Group CSG **FQDN** Fully Qualified Domain Name **GIBA** GPRS-IMS-Bundled-Authentication **GPSI** Generic Public Subscription Identifier Home Subscriber Server **HSS**

| IMS | IP Multimedia Subsystem |
|--------|-------------------------------|
| I-CSCF | Interrogating CSCF |
| JSON | Javascript Object Notation |
| MPS | Multimedia Priority Service |
| NAI | Network Access Identifier |
| NRF | Network Repository Function |
| NSSAI | Network Slice Selection Assis |
| | |

istance Information

NWDAF Network Data Analytics Function

P-CSCF Proxy CSCF

SBI Service Based Interface SIP Session Initiation Protocol Service Point Trigger SPT Serving CSCF S-CSCF

UDR Unified Data Repository

4 Overview

Introduction 4.1

Within the 5GC, the HSS offers services to the S-CSCF, I-CSCF and IMS-AS via the Nhss service based interface (see 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]).

Figure 4.1-1 provides the reference model in service-based interface representation with focus on the HSS.

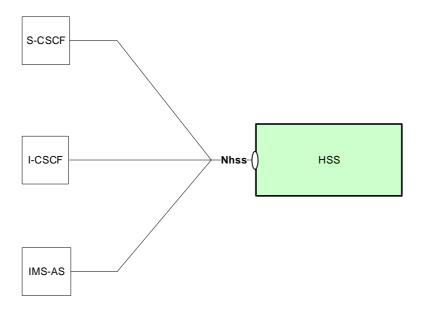


Figure 4.1-1: Reference model - HSS

Services offered by the HSS

5.1 Introduction

The SBI capable HSS offers the following services via the Nhss_ims interface:

- Nhss_imsUEContextManagement Service
- Nhss_imsSubscriberDataManagement Service

Nhss_imsUEAuthentication Service

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

| Service Name | Clause | Description | OpenAPI Specification File | apiName | Annex |
|--------------------------------------|--------|---|----------------------------|-------------------|-------|
| Nhss_imsUEContextMana gement | 6.1 | Nhss UE Context Management Service for IMS | TS29562_Nhss_imsUECM.yaml | nhss-ims- uecm | A.2 |
| Nhss_imsSubscriberData Management | 6.2 | Nhss Subscriber Data Management Service for IMS | TS29562_Nhss_imsSDM.yaml | nhss-ims- sdm | A.3 |
| Nhss_imsUEAuthentication | 6.3 | Nhss UE Authentication Service for IMS | TS29562_Nhss_imsUEAU.yaml | nhss-ims- ueau | A.4 |

All scenarios shown in the following clauses assume that the SBI capable HSS is stateful and stores information in local memory. However, the SBI capable HSS may be stateless and store information externally in the UDR. If so, the stateless SBI capable HSS may use Ud interface as specified in 3GPP TS 29.335 [7] to retrieve required data from the UDR and store them locally before processing an incoming request. Processing the incoming request may then include updating data in the UDR. After processing the incoming request, the SBI capable HSS may delete the locally stored data. When data stored in UDR is then shared among the different SBI capable HSS instances of the same group, as identified by HSS Group ID (see 3GPP TS 23.501 [2], clause 6.2.6), bulk subscriptions, as described in clause 4.15.3.2.4 of 3GPP TS 23.502 [3], are not applicable, i.e. an NF consumer (e.g. IMS-AS) only subscribes towards one of the SBI capable HSS instances within the group.

Editor's Note: It is FFS if an informative Annex needs to be included to show how an IMS-AS/I-CSCF/S-CSCF can interact with a group of stateless SBI capable HSS instances.

5.2 Nhss_imsUEContextManagement Service

5.2.1 Service Description

See 3GPP TS 23.228 [6], clause AA.2.1.2.

5.2.2 Service Operations

5.2.2.1 Introduction

For the Nhss imsUEContextManagement service the following service operations are defined:

- Registration
- DeregistrationNotification
- Deregistration
- Authorize
- Update
- RestorationInfoGet
- RestorationInfoUpdate

IMS restoration procedures are specified in 3GPP TS 23.380 [37].

The Nhss imsUEContextManagement Service is used by Consumer NFs (I-CSCF/S-CSCF) to:

- register at the HSS by means of the Registration service operation (S-CSCF)
- get notified by means of the DeregistrationNotification service operation when HSS decides to deregister the registered consumer NF (S-CSCF)
- deregister from the HSS by means of the Deregistration service operation (S-CSCF)
- request registration authorization from HSS by means of the Authorize service operation (I-CSCF)
- update registration information stored at the HSS by means of the Update service operation (S-CSCF)
- retrieve Restoration Information stored at the HSS by means of the RestorationInfoGet service operation (S-CSCF)
- update Restoration Information stored at the HSS by means of the RestorationInfoUpdate service operation (S-CSCF)

5.2.2.2 Registration

5.2.2.2.1 General

The Registration service operation is invoked by a NF that has been selected to provide service to the UE to store related IMS UE Context Management information in HSS.

NF Consumer is S-CSCF.

As part of this procedure, the HSS updates the registration state of the requested IMS Public Identity and IMS Private Identity. The state of the IMS Public Identities in the same Implicit Registration Set is also updated.

The following procedures using the Registration service operation are supported:

S-CSCF registration

5.2.2.2.2 S-CSCF Registration

Figure 5.2.2.2.2-1 shows a scenario where the S-CSCF sends a request to register at the HSS (see also 3GPP TS 23.228 [6] clause 5.2). The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPU, the S-CSCF Registration Information and the Registration Type.

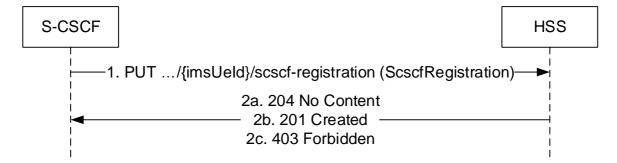


Figure 5.2.2.2-1: S-CSCF registration

- 1. The S-CSCF sends a PUT request to the resource representing the UE's S-CSCF registration to update or create S-CSCF registration information. The S-CSCF shall check whether there is a reg-id parameter in the Contact header in the SIP REGISTER message. If a reg-id parameter exists, the S-CSCF shall indicate to the HSS that the registration is related to a multiple registration as specified in clause 4.2.3 of 3GPP TS 23.380 [37].
- 2a. If the resource already exists, and if the S-CSCF registered is the same or if another S-CSCF is registered and S-CSCF Reassignment was previously authorized, the HSS updates the scscfRegistration resource by replacing it with the received resource information (e.g. S-CSCF name, state of the related IMS public identity based on the imsRegistrationType received) and responds with "204 No Content" or "200 OK" with the updated resource information and HSS supported features.

Additionally, if the S-CSCF reassignment pending flag was set, the HSS shall invoke the Deregistration Notification service operation towards the old S-CSCF using the callback URI provided by the old S-CSCF.

When receiving the "200 OK" response and if a multiple registration indicator has indicated to the HSS, the S-CSCF shall retrieve and update the restoration information as specified in clause 5.2.2.6 and clause 5.2.2.7.

- 2b. If the resource does not exist (there is no previous S-CSCF information stored in HSS), HSS stores the received S-CSCF registration data and responds with HTTP Status Code "201 created". A response body is included with the created resource and the features supported by HSS.
- 2c. If the operation is not authorized due to e.g. received IMS identities do not exist or do not match, or a different S-CSCF is registered and S-CSCF reassignment is not authorized, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PUT response body.

5.2.2.3 DeregistrationNotification

5.2.2.3.1 General

The following procedure using the DeregistrationNotification service operation is supported:

- HSS initiated Deregistration

5.2.2.3.2 HSS initiated Deregistration

Figure 5.2.2.3.2-1 shows a scenario where the HSS notifies the registered NF about the deregistration of one or more IMS Public Identities (see also 3GPP TS 23.228 [6] clause 5.3.2.2.1). The request contains the callback URI for deregistration notification as received by the HSS during registration, and Deregistration Data.

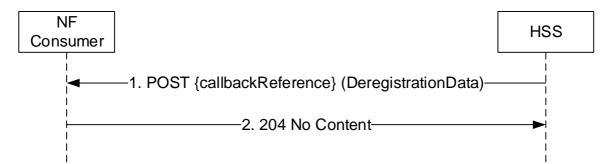


Figure 5.2.2.3.2-1: HSS initiated NF Deregistration

1. The HSS determines the need to deregister one or more public identities and sends a POST request to the callbackReference as provided by the NF service consumer (S-CSCF) during the registration.

NOTE: The callbackReference identifies a public identity or an IRS or a Wildcarded PSI that shall be deregistered.

HSS includes DeregistrationData with the Deregistration Reason that triggered the notification and additional information about the public identities that shall be deregistered such as:

- Private Identity of the public identity to be deregistered,
- if several Private Identities with all associated Public Identities need to be deregistered, the Associated Private Identities.
- 2. On success, the NF service consumer responds with "204 No Content" or with "200 OK" including additional information about the deregistration result such as:
 - Associated Private Identities: it contains all Private Identities that have been deregistered together with the one in the Private User Identity received in the request,

- Identities with Emergency Registration: This information element indicates a list of pairs of private and public user identities which have not been de-registered due to emergency registration.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.2.2.4 Deregistration

5.2.2.4.1 General

The following procedures using the Deregistration service operation are supported:

- S-CSCF deregistration

5.2.2.4.2 S-CSCF deregistration

Figure 5.2.2.4.2-1 shows a scenario where the S-CSCF sends a request to the HSS to deregister a user (see also 3GPP TS 23.228 [6] clause 5.3.1). The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPI or an IMPU and the deregistration information.

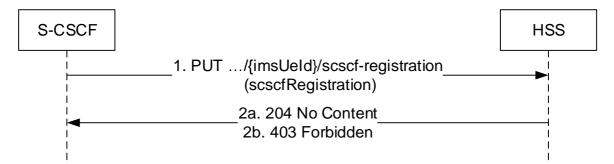


Figure 5.2.2.4.2-1: S-CSCF deregistering

- 1. The S-CSCF sends a PUT request to the resource representing the UE's CSCF registration.
- 2a. The HSS shall check whether the received S-CSCF name matches the stored S-CSCF. If the S-CSCF name is different, the HSS shall check whether the S-CSCF reassignment is allowed (i.e. S-CSCF reassignment pending flag is set).

If an IMPI is received as ImsUeId, HSS shall deregister all IMPUs associated to that IMPI.

If an IMPU is received as ImsUeId, HSS shall deregister the IMPU and related IMPUs in the Implicit Registration Set for the related IMPI.

On success, HSS shall respond "204 No Content" or "200 OK".

2b. Otherwise the HSS responds with "403 Forbidden" (e.g. S-CSCF is not the current S-CSCF assigned) or "404 Not Found" (e.g. IMPU or IMPI do not exist).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PUT response body.

5.2.2.5 Authorize

5.2.2.5.1 General

The Authorize service operation is invoked by a NF to request UE authorization to register or establish terminating /originating sessions in the IMS network.

NF Consumer is I-CSCF for IMS service.

As part of this procedure, the HSS authorizes or rejects the subscriber to use the IMS service based on the authorization information provided in the request and subscription data (e.g. roaming restrictions, barrings).

The following procedures using the Authorize service operation are supported:

- Authorization request

5.2.2.5.2 Authorization request

Figure 5.2.2.5.2-1 shows a scenario where the I-CSCF sends a request to the HSS to authorize the UE to register in a given PLMN's P-CSCF or initiate a session for unregistered services (see also 3GPP TS 23.228 [6] clause 5.2.2.3 or 5.12.2). The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPU and the authorizationInformation.

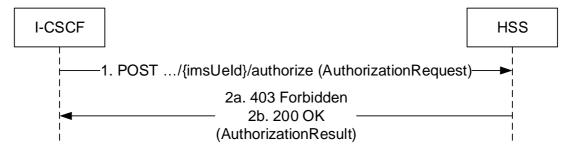


Figure 5.2.2.5.2-1: Authorization

- 1. The I-CSCF sends a POST request (custom method: authorize) to request for UE's authorization to register or establish an originating/terminating session.
- 2a. If the operation cannot be authorized due to e.g. UE does not have required subscription data, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).
- 2b. If successful, HSS responds with HTTP Status Code "200 OK" and may provide the S-CSCF identity which is serving the user, if any.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.2.2.6 RestorationInfoGet

5.2.2.6.1 General

The RestorationInfoGet service operation is invoked by a NF to retrieve restoration information in HSS.

NF Consumer is S-CSCF.

The following procedures using the RestorationInfoGet service operation are supported:

- Restoration Information Retrieval

5.2.2.6.2 Restoration Information Retrieval

Figure 5.2.2.6.2-1 shows a scenario where the NF service consumer (S-CSCF) sends a request to the HSS to retrieve the information related to a specific registration for a registered user (e.g. during a registration procedure, or during a terminating request procedure). The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPU.



Figure 5.2.2.6.2-1: Restoration Information Retrieval

- The NF service consumer (S-CSCF) sends a GET request to the resource representing the UE's S-CSCF restoration information.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's S-CSCF restoration information. The S-CSCF shall send a request to the HSS to retrieve the UE's IMS profile as specified in clause 5.3.2.2.4.
- 2b. If there is no valid restoration data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.2.2.7 RestorationInfoUpdate

5.2.2.7.1 General

The RestorationInfoUpdate service operation is invoked by a NF to update restoration information in HSS.

NF Consumer is S-CSCF.

The following procedures using the RestorationInfoUpdate service operation are supported:

- Restoration Information Update

5.2.2.7.2 Restoration Information Update

S-CSCF backup and update of S-CSCF restoration information in HSS is specified in clause 4.6 of 3GPP TS 23.380 [37].

Figure 5.2.2.7.2-1 shows a scenario where the S-CSCF sends a request to update restoration information at the HSS (see also 3GPP TS 23.228 [6] clause 4.24). The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPU.



Figure 5.2.2.7.2-1: Restoration Information Update

1. The S-CSCF sends a PUT request to the resource representing the UE's S-CSCF restoration information to update or create S-CSCF restoration information.

- 2a. If there are S-CSCF restoration information related to the IMS Public Identity stored in the HSS, the HSS updates the Scscf Restoration Information resource by replacing it with the received restoration information and responds with "200 OK" or "204 No Content".
- 2b. If the resource does not exist (there is no previous S-CSCF restoration information stored in HSS for that user), HSS stores the received S-CSCF restoration data and responds with HTTP Status Code "201 created".
- 2c. If the request can't be accepted (e.g. the S-CSCF is not allowed to create/update the restoration information), HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in the "ProblemDetails" element).

5.2.2.8 RestorationInfoDelete

5.2.2.8.1 General

The RestorationInfoDelete service operation is invoked by a NF to delete restoration information in HSS.

NF Consumer is S-CSCF.

The following procedures using the RestorationInfoDelete service operation are supported:

- Restoration Information Delete

5.2.2.8.2 Restoration Information Delete

Figure 5.2.2.Z.2-1 shows a scenario where the S-CSCF sends a request to delete restoration information at the HSS. The request contains the IMS UE's identity (/{imsUeId}) which shall be an IMPU.

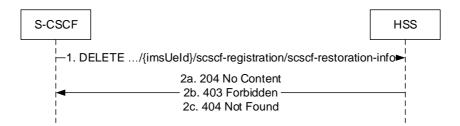


Figure 5.2.2.8.2-1: Restoration Information Delete

- 1. The S-CSCF sends a DELETE request to the resource representing the UE's S-CSCF restoration information to delete S-CSCF restoration information.
- 2a. If there are S-CSCF restoration information related to the IMS Public Identity stored in the HSS, the HSS deletes the Scscf Restoration Information resource by replacing it with the received restoration information and responds with "204 No Content".
- 2b. If the request can't be accepted (e.g. the S-CSCF is not allowed to delete the restoration information), HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If there is no valid S-CSCF restoration information, HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3 Nhss_imsSubscriberDataManagement Service

5.3.1 Service Description

See 3GPP TS 23.228 [6], clause AA.2.1.3.

5.3.2 Service Operations

5.3.2.1 Introduction

For the Nhss imsSubscriberDataManagement service the following service operations are defined:

- Get
- Subscribe to notification of data changes and UE reachability for IP
- Unsubscribe to notification of data changes and UE reachability for IP
- Notification of data changes and UE reachability for IP
- Update

The Nhss_imsSubscriberDataManagement Service is used by Consumer NFs (S-CSCF, IMS-AS) to retrieve the UE's individual subscription data relevant to the consumer NF, or by I-CSCF to retrieve S-CSCF capabilities or the assigned S-CSCF, from the SBI capable HSS by means of the Get service operation. If the consumer NF supports the feature "sharedData", the retrieved individual subscription data for the UE may contain shared data identifier identifying additional parts of subscription data shared by several UEs. If so, the Nhss_imsSubscriberDataManagement Service is also used by Consumer NFs to:

- retrieve shared subscription data from the HSS by means of the Get service operation.

The Nhss_imsSubscriberDataManagement Service is also used by Consumer NFs to:

- subscribe to notifications of data change by means of the Subscribe service operation. If the consumer NF supports the feature "sharedData", the consumer NF may also subscribe to notifications of shared data change by means of the Subscribe service operation.
- to unsubscribe from notifications of data changes by means of the Unsubscribe service operation. If the feature "sharedData" is supported, it may also be used to unsubscribe from notifications of shared data changes by means of the Unsubscribe service operation.
- get notified by means of the Notification service operation when HSS decides to modify the subscribed data. If the feature "sharedData" is supported by the consumer NF and the consumer NF has previously subscribed to notifications of shared data change, it is also used by the consumer NF to get notified by means of the Notification service operation when the HSS decides to modify the subscribed shared data.

It is also used by Consumer NFs to:

- provide the information about the status of the subscription data management procedures.
- update information (e.g. transparent data) associated to the subscription data management.

5.3.2.2 Get

5.3.2.2.1 General

The following procedures using the Get service operation are supported:

- Repository Data Retrieval
- IMS Identity Data (e.g. IMS associated identities including Implicit Registration Set and Alias Group) Retrieval
- IMS Profile Data (e.g. IFCs) Retrieval

- IMS Location Data Retrieval
- IMS Registration Status Data Retrieval
- Access Data (e.g. T-ADS) Retrieval
- SRVCC Data (e.g. STN-SR) Retrieval
- Service Data (e.g. DSAI) Retrieval
- Retrieval Of Multiple Data Sets
- Shared Subscription Data Retrieval
- Trace Data Retrieval
- PSI Activation State Retrieval
- DSAI information Retrieval

When the feature SharedData is supported and the retrieved UE-individual data (i.e. data other than Shared Subscription Data) contain SharedDataIds, the NF service consumer shall also retrieve the shared data identified by the received shared data Ids unless the identified shared data are already available at the NF service consumer. The order of sequence of sharedDataIds within UE-individual data is significant: Individual data take precedence over shared data; shared data "SharedDataX" identified by a sharedDataId X takes precedence over shared data "SharedDataY" identified by a sharedDataId Y if X appears before Y within the list of SharedDataIds in the UE-individual data.

5.3.2.2.2 Identity Data

5.3.2.2.2.1 IMS Identity Data Retrieval

Figure 5.3.2.2.2.1-1 shows a scenario where the NF service consumer (IMS-AS) sends a request to the HSS to receive the UE's IMS Identity Data for the IMS associated Identities (IRS and Alias group information). The request contains the UE's identity (/{imsUeId}), the type of the requested information (/identities/ims-associated-identities) and query parameters (e.g. supported-features).



Figure 5.3.2.2.2.1-1: IMS Identity Data Retrieval

- 1. The NF service consumer (IMS-AS) sends a GET request to the resource representing the UE's Identity Data for the IMS associated identities with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's Implicit Registration Set (if any) and the Alias Group information (if any) which the UE's identity belongs to as relevant for the requesting NF service consumer. Additional information (e.g. distinct or wildcarded type of identity, registration state of the IRS) is also included in the response.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.2.2 MSISDN(s) Retrieval

Figure 5.3.2.2.2-1 shows a scenario where the NF service consumer (IMS-AS) sends a request to the HSS to receive the UE's MSISDN(s). The request contains the UE's identity (/{imsUeId}), the type of the requested information (/identities/msisdns) and query parameters (e.g. supported-features).



Figure 5.3.2.2.2.1: MSISDN(s) Retrieval

- 1. The NF service consumer (IMS-AS) sends a GET request to the resource representing the UE's MSISDN(s) with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's MSISDN(s) as relevant for the requesting NF service consumer. The type of MSISDN (basic/C-MSISDN or additional MSISDN) is included in the response.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.3 Private Identities Retrieval

Figure 5.3.2.2.3-1 shows a scenario where the NF service consumer (IMS-AS) sends a request to the HSS to receive the UE's Private Identities (IMS Private User Identity, IMSI). The request contains the UE's identity (/{imsUeId}), the type of the requested information (/identities/private-identities) and query parameters (e.g. supported-features).



Figure 5.3.2.2.3-1: Private Identities Retrieval

- 1. The NF service consumer (IMS-AS) sends a GET request to the resource representing the UE's Private Identities with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's Private Identities as relevant for the requesting NF service consumer. The type of Private Identity (e.g. IMPI, IMSI) is included in the response.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.2.4 IMEI(SV) Retrieval

Figure 5.3.2.2.4-1 shows a scenario where the NF service consumer (e.g. IMS AS) sends a request to the HSS to receive the IMEI(SV) for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/identities/imeisv) and query parameters (e.g. supported-features).

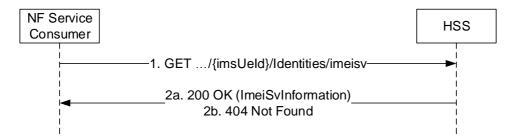


Figure 5.3.2.2.4-1: IMEI(SV) Retrieval

- 1. The NF service consumer (e.g. IMS AS) sends a GET request to the resource representing the UE's IMEI(SV) information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the last known IMEI(SV) associated to the UE.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.3 IMS Location Data and Status

5.3.2.2.3.1 S-CSCF Capabilities Retrieval

Figure 5.3.2.2.3.1-1 shows a scenario where the NF service consumer (I-CSCF), after authorization information has been performed without obtaining an S-CSCF name, sends a request to the HSS to receive the UE's S-CSCF capabilities (mandatory and/or optional). The request contains the UE's identity (/{imsUeId}), the type of the requested information (/ims-data/location-data/scscf-capabilities) and query parameters (e.g. supported-features).



Figure 5.3.2.2.3.1-1: S-CSCF Capabilities Retrieval

- 1. The NF service consumer (I-CSCF) sends a GET request to the resource representing the UE's S-CSCF capabilities with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's S-CSCF capabilities relevant for the requesting NF service consumer. The type of S-CSCF capabilities (mandatory and/or optional) is included in the response.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.3.2 Server Name Retrieval

Figure 5.3.2.2.3.2-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to receive the Server Name (S-CSCF name) associated to the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (ims-data/location-data/server-name) and query parameters (e.g. supported-features).



Figure 5.3.2.2.3.2-1: Server Name Retrieval

- 1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's IMS location information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the IMS location information (S-CSCF name) as relevant for the service consumer.
- 2b. If there is no valid data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.3.3 IMS Registration Status Retrieval

Figure 5.3.2.2.3.3-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to IMS registration status of a user. The request contains the UE's identity (/{imsUeId}), the type of the requested information (ims-data/registration-status) and query parameters (e.g. supported-features).



Figure 5.3.2.2.3.3-1: IMS Registration Status Retrieval

- 1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's IMS registration status with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the IMS registration status (e.g. unregistered) as relevant for the service consumer.
- 2b. If there is no valid data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.4 IMS Profile Data

5.3.2.2.4.1 IMS User Profile Retrieval

Figure 5.3.2.2.4.1-1 shows a scenario where the NF service consumer (S-CSCF) sends a request to the HSS to receive the UE's IMS profile data. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/ims-data/profile-data) and query parameters (e.g. supported-features).

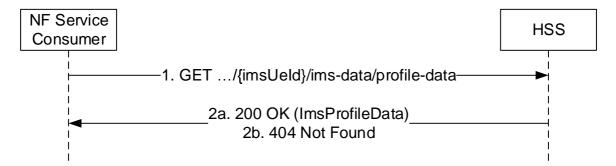


Figure 5.3.2.2.4.1-1: IMS User Profile Retrieval

- 1. The NF service consumer (S-CSCF) sends a GET request to the resource representing the UE's IMS profile with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's Profile Data as relevant for the requesting NF service consumer. The Initial Filter Criteria (IFC) is included in the response. Additional information (e.g. service priority information), if any, may also be included.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.4.2 Service Priority Level Information Retrieval

Figure 5.3.2.2.4.2-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to receive the Service Priority levels allowed for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (ims-data/profile-data/priority-levels) and query parameters (e.g. supported-features).

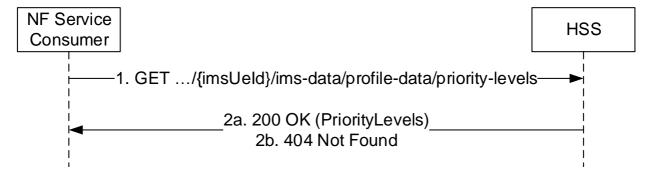


Figure 5.3.2.2.4.2-1: Service Priority Level Information Retrieval

- 1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's Service Priority Level with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the Namespaces and priority levels allowed for the user.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.4.3 Initial Filter Criteria Retrieval

Figure 5.3.2.2.4.3-1 shows a scenario where the NF service consumer (e.g. AS, S-CSCF) sends a request to the HSS to receive the UE's Initial Filter Criteria. The request contains the UE's identity (/{imsUeId}), the type of the requested information (ims-data/profile-data/ifcs) and query parameters (e.g. supported-features).

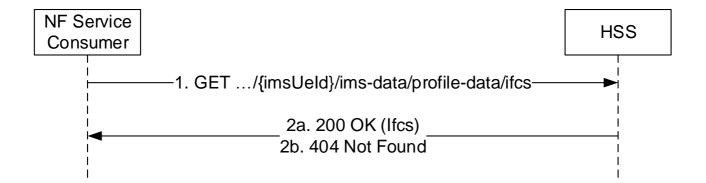


Figure 5.3.2.2.4.3-1: Initial Filter Criteria Retrieval

- 1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's IMS profile with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's Initial Filter Criteria (possibly containing S-CSCF-Specific IFC Set Identifiers, if supported and configured in S-CSCF) as relevant for the requesting NF service consumer.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.4.4 Service Trace Level Information Retrieval

Figure 5.3.2.2.4.4-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to receive the UE's IMS service level trace information associated to the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (ims-data/profile-data/ service-level-trace-info) and query parameters (e.g. supported-features).

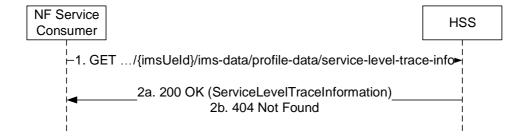


Figure 5.3.2.2.4.4-1: Service Trace Level Information Retrieval

1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's IMS service level trace information with query parameters indicating the supported-features.

- 2a. On success, the HSS responds with "200 OK" with the message body containing the IMS service level trace information (see 3GPP TS 24.323 [24]) so that the service consumer performs logging at IMS service level as described in IETF RFC 8497 [23].
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.5 Access Data

5.3.2.2.5.1 Location Information Retrieval for CS/PS Domains

Figure 5.3.2.2.5.1-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to receive the Location Information associated to the UE The request contains the UE's identity (/{imsUeId}), the type of the requested information, the domain (cs-domain or ps-domain) requested (e.g. ims-data/access-data/ps-domain/location-data) and query parameters (e.g. supported-features, requested-nodes).

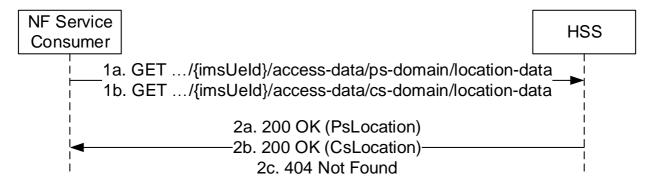


Figure 5.3.2.2.5.1-1: Location Information Retrieval for CS/PS Domains

- 1a. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's location information at PS domain with query parameters indicating the supported-features and optionally the requested nodes (e.g. MME, AMF)
- 1b. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's location information at CS domain with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the location information for the requested domain (PS) and the requested nodes or all nodes (if no requested nodes were present in the request)
- 2b. On success, the HSS responds with "200 OK" with the message body containing the location information for the requested domain (CS).
- 2c. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.5.2 IP Address Information Retrieval

Figure 5.3.2.2.5.2-1 shows a scenario where the NF service consumer (e.g. SCC-AS) sends a request to the HSS to receive the IP Address of the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/access-data/ps-domain/ip-address) and query parameters (e.g. supported-features).



Figure 5.3.2.2.5.2-1: IP Address Information Retrieval

- 1. The NF service consumer (e.g. SCC-AS) sends a GET request to the resource representing the UE's IP address information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing either an IPv4 address, IPv6 address or IPv6 prefix and/or IPv6 interface identifier.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.5.3 T-ADS Information Retrieval

Figure 5.3.2.2.5.3-1 shows a scenario where the NF service consumer (e.g. SCC-AS) sends a request to the HSS to receive the T-ADS information for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/access-data/ps-domain/tads-info) and query parameters (e.g. supported-features).



Figure 5.3.2.2.5.3-1: T-ADS Information Retrieval

- 1. The NF service consumer (e.g. SCC-AS) sends a GET request to the resource representing the UE's T-ADS information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the most recent IMS Voice over PS Sessions support indication as indicated by the serving nodes for the user.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.5.4 User State Retrieval for CS/PS Domains

Figure 5.3.2.2.5.4-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to receive the User State associated to the UE The request contains the UE's identity (/{imsUeId}), the type of the requested information, the domain (cs-domain or ps-domain) requested (e.g. ims-data/access-data/ps-domain/user-state) and query parameters (e.g. supported-features, requested-nodes).

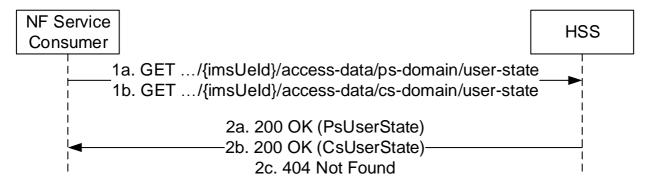


Figure 5.3.2.2.5.4-1: User State Retrieval for CS/PS Domains

- 1a. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's user state information at PS domain with query parameters indicating the supported-features and optionally the requested nodes (e.g. MME, AMF)
- 1b. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's User State information at CS domain with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the User State information for the requested domain (PS) and the requested nodes or all nodes (if no requested nodes were present in the request)
- 2b. On success, the HSS responds with "200 OK" with the message body containing the User State information for the requested domain (CS).
- 2c. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.5.5 CSRN Retrieval

Figure 5.3.2.2.5.5-1 shows a scenario where the NF service consumer (e.g. SCC-AS) sends a request to the HSS to receive a CS Domain Routeing Number (CSRN, see 3GPP TS 23.003 [13]) for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/access-data/cs-domain/csrn) and query parameters (e.g. supported-features, pre-paging).

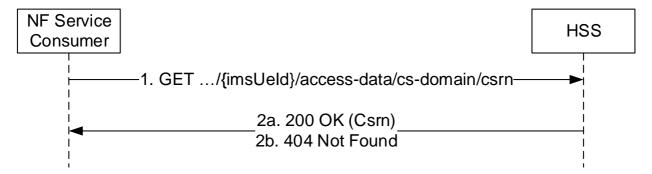


Figure 5.3.2.2.5.5-1: T-ADS Information Retrieval

- 1. The NF service consumer (e.g. SCC-AS) sends a GET request to the resource representing the UE's CSRN information with query parameters indicating the supported-features and/or pre-paging indication.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the CSRN as provided by the MSC/VLR.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.5.6 Reference Location Information Retrieval

Figure 5.3.2.2.5.6-1 shows a scenario where the NF service consumer (e.g. IMS-AS) sends a request to the HSS to receive the reference location information for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/access-data/wireline-domain/reference-location) and query parameters (e.g. supported-features).

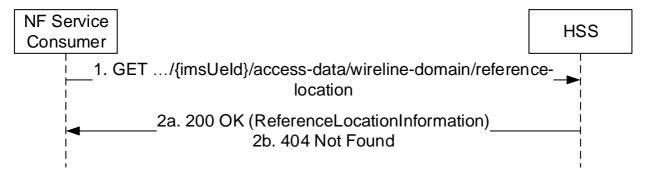


Figure 5.3.2.2.5.6-1: Reference Location Information Retrieval

- 1. The NF service consumer (e.g. IMS-AS) sends a GET request to the resource representing the UE's reference location information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the access type and/or the access info and associated value (line identifier in fixed access networks).
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.6 SRVCC Data

5.3.2.2.6.1 SRVCC Data Retrieval

Figure 5.3.2.2.6.1-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to retrieve the SRVCC data for the UE. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/srvcc-data) and query parameters (e.g. supported-features).

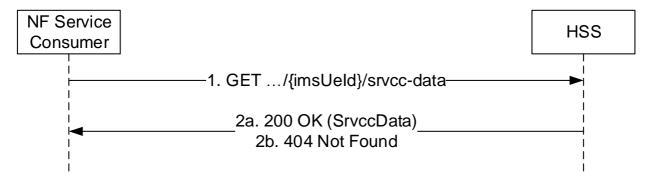


Figure 5.3.2.2.6.2-1: SRVCC Data Retrieval

1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the UE's SRVCC data information with query parameters indicating the supported-features.

- 2a. On success, the HSS responds with "200 OK" with the message body containing the STN-SR and the UE SRVCC capability for the user.
- 2b. If there is no valid SRVCC data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

5.3.2.2.7 Service Data

5.3.2.2.7.1 PSI Activation State Retrieval

Figure 5.3.2.2.7.1-1 shows a scenario where the NF service consumer (e.g. AS) sends a request to the HSS to retrieve the PSI activation state. The request contains the Public Service Identity (/{imsUeId}), the type of the requested information (/service-data/psi-state) and query parameters (e.g. supported-features).

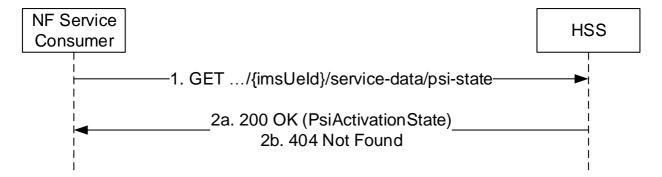


Figure 5.3.2.2.7.1-1: PSI Activation State Retrieval

- 1. The NF service consumer (e.g. AS) sends a GET request to the resource representing the PSI activation state with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the PSI activation state (active or inactive).
- 2b. If there is no valid activation state for the PSI, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.7.2 SMS Registration Information retrieval

Figure 5.3.2.2.7.2-1 shows a scenario where the NF service consumer (e.g. IP-SM-GW) sends a request to the HSS to retrieve the SMS registration information associated to a UE. The request contains the UE identity ($/\{imsUeId\}$), the type of the requested information (/service-data/sms-registration-info) and query parameters (e.g. supported-features).

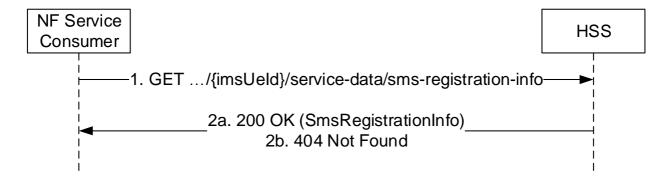


Figure 5.3.2.2.7.2-1: SMS Registration Information Retrieval

- 1. The NF service consumer (e.g. IP-SM-GW) sends a GET request to the resource representing the SMS registration information with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the IP-SM-GW number and optionally the SC address.
- 2b. If there is no valid SMS registration information, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.7.3 DSAI Information retrieval

Figure 5.3.2.2.7.3-1 shows a scenario where the NF service consumer (e.g. IMS-AS) sends a request to the HSS to retrieve the DSAI information associated to an Application Server. The request contains the UE identity (/{imsUeId}), the type of the requested information (/service-data/dsai) and query parameters (e.g. Application Server Name).



Figure 5.3.2.2.7.3-1: DSAI Information Retrieval

- 1. The NF service consumer (e.g. IMS-AS) sends a GET request to the resource representing the DSAI information with query parameter indicating the Application Server Name. Additional query parameters (e.g. supported features) may be included.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the DSAI tags and their respective status associated to the received Application Server Name.
- 2b. If there are no DSAI tags for the Application Server, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.8 Repository Data

5.3.2.2.8.1 Repository Data Retrieval

Figure 5.3.2.2.8.1-1 shows a scenario where the NF service consumer (IMS-AS) sends a request to the HSS to receive the UE's Repository Data for a given Service Indication. The request contains the UE's identity (/{imsUeId}), the type of the requested information (/repository-data/{serviceIndication}) and query parameters (e.g. supported-features).

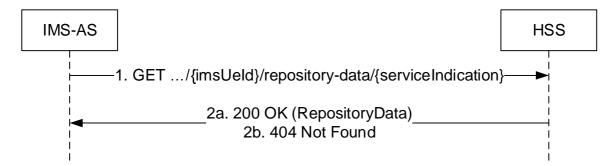


Figure 5.3.2.2.8.1-1: Repository Data Retrieval

- 1. The NF service consumer (IMS-AS) sends a GET request to the resource representing the UE's Repository Data for a given Service Indication, with query parameters indicating the supported-features.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the UE's Repository Data for the requested Service Indication as relevant for the requesting NF service consumer.
- 2b. If there is no valid subscription data or Repository Data for the UE, HTTP status code "404 Not Found" shall be returned and it should include additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.2.9 Shared Subscription Data

5.3.2.2.9.1 Shared Subscription Data Retrieval

Figure 5.3.2.2.9.1-1 shows a scenario where the NF service consumer (e.g.S-CSCF) sends a request to the HSS to receive the shared subscription data. The request contains the type of the requested information (/shared-data) and query parameters (supportedFeatures, shared-data-id).

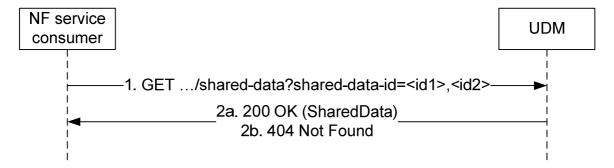


Figure 5.3.2.2.9.1-1: Shared Subscription Data Retrieval

- 1. The NF service consumer (e.g. S-CSCF) sends a GET request to the resource representing the SharedData, with query parameters indicating the supportedFeatures and shared-data-id.
- 2a. On success, the HSS responds with "200 OK" with the message body containing the SharedData.
- 2b. If there is no valid shared data for one or more of the shared-data-ids, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the GET response body.

5.3.2.3 Subscribe

5.3.2.3.1 General

The following procedures using the Subscribe service operation are supported:

- Subscription to notification of data change
- Subscription to notification of UE reachability for IP

5.3.2.3.2 Subscription to notifications of data change

Figure 5.3.2.3.2-1 shows a scenario where the NF service consumer (e.g. S-CSCF) sends a request to the HSS to subscribe to notifications of data change. The request contains a callback URI and the URI of the monitored resource.

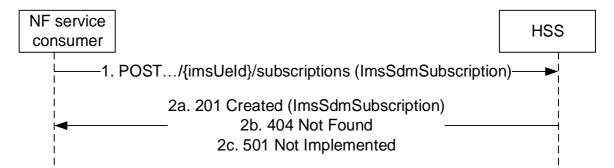


Figure 5.3.2.3.2-1: NF service consumer subscribes to notifications

- 1. The NF service consumer sends a POST request to the parent resource (collection of subscriptions) (.../{imsUeId}/sdm-subscriptions), to create a subscription as present in message body.
- 2a. On success, the HSS responds with "201 Created" with the message body containing a representation of the created subscription. The Location HTTP header shall contain the URI of the created subscription.
- 2b. If there is no valid subscription data for the UE, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the UE subscription data exist, but the requested subscription to data change notification cannot be created (e.g. due to an invalid/unsupported data reference to be monitored, contained in the ImsSdmSubscription parameter), HTTP status code "501 Not Implemented" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.3.2.3.3 Subscription to notifications of shared data change

Figure 5.3.2.3.3-1 shows a scenario where the NF service consumer sends a request to the HSS to subscribe to notifications of shared data change. The request contains a callback URI and the URI of the monitored resource.

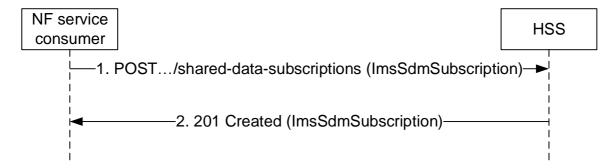


Figure 5.3.2.3.3-1: NF service consumer subscribes to notifications of shared data change

- 1. The NF service consumer sends a POST request to the parent resource (collection of subscriptions) (.../shared-data-subscriptions), to create a subscription as present in message body.
- 2. On success, the HSS responds with "201 Created" with the message body containing a representation of the created subscription. The Location HTTP header shall contain the URI of the created subscription.

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.3.2.3.4 Subscriptions to notification of UE Reachability for IP

Figure 5.3.2.3.4-1 shows a scenario where the NF service consumer (e.g. IP-SM-GW) sends a request to the HSS to subscribe to UE reachability for IP. The request contains the UE's identity (/{imsUeId}), the resource to be monitored (/access-data/ps-domain/ue-reach-subscriptions), an expiry time, a callback URI and query parameters (e.g. supported-features).

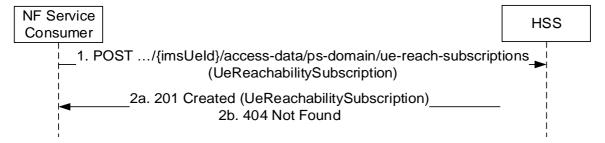


Figure 5.3.2.3.4-1: Subscription to notification of UE reachability for IP

1. The NF service consumer (e.g. IP-SM-GW) sends a POST request to the parent resource (collection of UE reachability subscriptions) (.../{ueIdentity}/ue-reach-subscriptions), to create a subscription to UE reachability for IP. The request contains an expiry time, suggested by the NF Service Consumer, representing the time upto which the subscription is desired to be kept active and the time after which the UE reachability event shall not generate a notification.

2a. On success, the HSS sets the URRP flag for the relevant serving nodes and may contact UDM (see 3GPP TS 23.632, clause 5.4.5). The HSS responds with "201 Created" with the message body containing a representation of the created subscription. The Location HTTP header shall contain the URI of the created subscription.

The response contains the expiry time, as determined by the HSS (possible based on operator policy) after which the subscription becomes invalid. Once the subscription expires, if the NF Service Consumer wants to keep receiving notifications, it shall create a new subscription in the HSS. The NF Service Producer shall not provide the same expiry time for many subscriptions in order to avoid all of them expiring and recreating the subscription at the same time.

2b. If the user does not exist, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.3.2.4 Unsubscribe

5.3.2.4.1 General

The following procedures using the Unsubscribe service operation are supported:

- Unsubscribe to notification of data change
- Unsubscribe to notification of UE reachability for IP

5.3.2.4.2 Unsubscribe to notifications of data change

Figure 5.3.2.4.2-1 shows a scenario where the NF service consumer (e.g. S-CSCF) sends a request to the HSS to unsubscribe from notifications of data changes. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

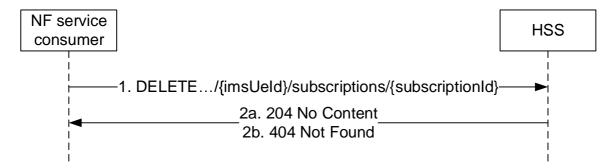


Figure 5.3.2.4.2-1: NF service consumer unsubscribes to notifications

- 1. The NF service consumer sends a DELETE request to the resource identified by the URI previously received during subscription creation.
- 2a. On success, the HSS responds with "204 No Content".
- 2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3.2.4.3 Unsubscribe to notifications of shared data change

Figure 5.3.2.4.3-1 shows a scenario where the NF service consumer sends a request to the HSS to unsubscribe from notifications of shared data changes. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

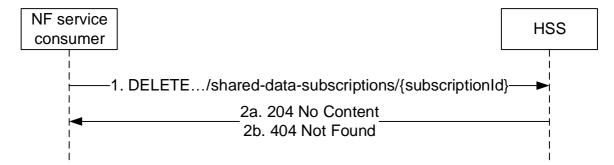


Figure 5.3.2.4.3-1: NF service consumer unsubscribes to notifications for shared data

1. The NF service consumer sends a DELETE request to the resource identified by the URI previously received during subscription creation.

- 2a. On success, the HSS responds with "204 No Content".
- 2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3.2.4.4 Unsubscribe to notification of UE Reachability for IP

Figure 5.3.2.4.4-1 shows a scenario where the NF service consumer (e.g. IP-SM-GW) sends a request to the HSS to unsubscribe from notifications of UE Reachability for IP. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

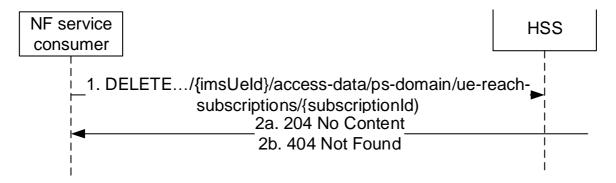


Figure 5.3.2.4.4-1: Unsubscription to notification of UE reachability for IP

- 1. The NF service consumer sends a DELETE request to the resource identified by the URI previously received during subscription creation.
- 2a. On success, the HSS responds with "204 No Content".
- 2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3.2.5 ModifySubscription

5.3.2.5.1 General

The following procedures using the ModifySubscription service operation are supported:

- Modification of a Subscription to notification of data change (for UE individual data)
- Modification of a Subscription to notification of shared data change
- Modification of a Subscription to notification of UE Reachability for IP

The ModifySubscription service operation can be used for the following purpose:

- Extend the expiry time of ImsSdmSubscription;
- Extend the expiry time of UeReachabilitySubscription;
- Modify the resource URIs to be monitored, e.g. add/remove resource URIs to/from the monitored resource URI list.

5.3.2.5.2 Modification of a subscription to notifications of data change

Figure 5.3.2.5.2-1 shows a scenario where the NF service consumer sends a request to the HSS to modify a subscription to notifications of data changes. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

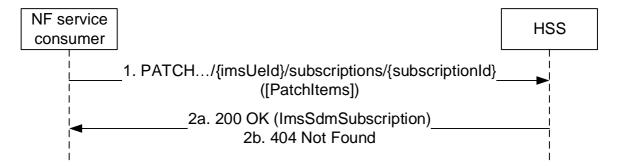


Figure 5.3.2.5.2-1: NF service consumer modifies a subscription to notifications

1. The NF service consumer sends a PATCH request to the resource identified by the URI previously received during subscription creation.

The NF service consumer may include "monitoredResourceUris" to replace the existing monitored resource URIs, e.g. to add/remove specific resource URIs from the monitored resource URI list.

- 2a. On success, the HSS responds with "200 OK".
- 2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.3.2.5.3 Modification of a subscription to notifications of shared data change

Figure 5.3.2.z.3-1 shows a scenario where the NF service consumer sends a request to the HSS to modify a subscription to notifications of shared data changes. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

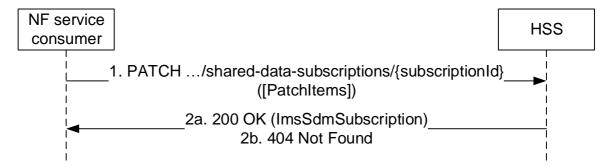


Figure 5.3.2.5.3-1: NF service consumer modifies a subscription to notifications for shared data

1. The NF service consumer sends a PATCH request to the resource identified by the URI previously received during subscription creation.

The NF service consumer may include "monitoredResourceUris" to replace the existing monitored resource URIs, e.g. for the purposes to add/remove specific resource URIs from the monitored resource URI list.

2a. On success, the HSS responds with "200 OK".

2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.3.2.5.4 Modification of a subscription to notifications of data change

Figure 5.3.2.5.4-1 shows a scenario where the NF service consumer sends a request to the HSS to modify a subscription to notifications of data changes. The request contains the URI previously received in the Location HTTP header of the response to the subscription.

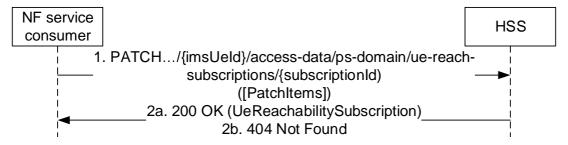


Figure 5.3.2.5.4-1: NF service consumer modifies a subscription to notifications

1. The NF service consumer sends a PATCH request to the resource identified by the URI previously received during subscription creation.

The NF service consumer includes a new expiry time, e.g. to extend the monitoring time of the event.

- 2a. On success, the HSS responds with "200 OK".
- 2b. If there is no valid subscription available (e.g. due to an unknown subscriptionId value), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.3.2.6 Notification

5.3.2.6.1 General

The following procedures using the Notification service operation are supported:

- Data change notification to NF;
- UE Reachability for IP notification to NF.

5.3.2.6.2 Data Change Notification To NF

Figure 5.3.2.6.2-1 shows a scenario where the HSS notifies the NF service consumer (that has subscribed to receive such notification) about subscription data change. The request contains the callbackReference URI as previously received in the ImsSdmSubscription.

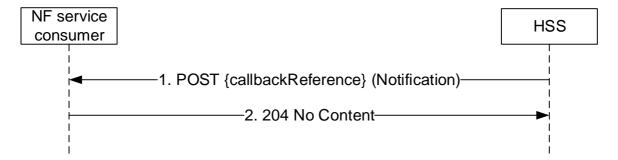


Figure 5.3.2.6.2-1: Subscription Data Change Notification

- 1. The HSS sends a POST request to the callbackReference as provided by the NF service consumer during the subscription.
- 2. The NF service consumer responds with "204 No Content".

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.3.2.6.3 UE Reachability for IP Notification to NF

Figure 5.3.2.6.3-1 shows a scenario where the HSS notifies the NF service consumer (that has subscribed to receive such notification) about subscription data change. The request contains the callbackReference URI as previously received in the UeReachabilitySubscription.

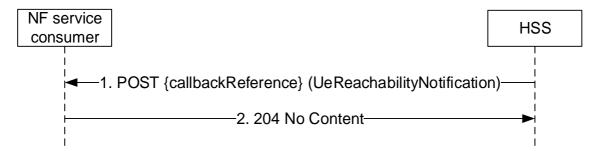


Figure 5.3.2.6.3-1: UE Reachability for IP Notification

- 1. The HSS sends a POST request to the callbackReference as provided by the NF service consumer during the subscription. The notification includes information about UE reachability for IP event detected.
- 2. The NF service consumer responds with "204 No Content".

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

5.3.2.7 Update

5.3.2.7.1 General

The following procedures using the Update service operation are supported:

- Repository Data Create/Update/Delete
- STN-SR update
- SMS registration information Create/Update/Delete
- PSI activation state Update
- DSAI-tag activation state Update

5.3.2.7.2 Repository Data Creation or Update

Figure 5.3.2.7.2-1 shows a scenario where the IMS-AS sends a request to the HSS to create or update the repository data for a given service indication. The request contains the UE's identity (/{imsUeId}) which shall be an IMS Public Identity, the service indication and repository data with the associated version (sequence number).

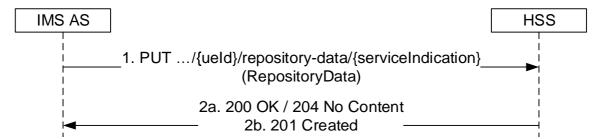


Figure 5.3.2.7.2-1: IMS AS creating or updating repository data

 The IMS AS sends a PUT request to the resource representing the UE's Repository Data for a requested Service Indication.

The IMS AS may request the creation of the Repository Data (sequence number equal to zero) or may request the update of the Repository Data (sequence number greater than zero)

- 2a. On success, the HSS updates the RepositoryData resource by replacing it with the received resource information, and responds with "200 OK" or "204 No Content".
- 2b. If the resource does not exist (there is no repository data associated to the requested service indication), HSS stores the received Repository Data and responds with HTTP Status Code "201 created". A response body may be included to convey additional information to the NF consumer (e.g., features supported by HSS).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions for the service indication and the operation requested, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PUT response body.

5.3.2.7.3 Repository Data Deletion

Figure 5.3.2.7.3-1 shows a scenario where the IMS-AS sends a request to the HSS to delete the repository data for a given service indication. The request contains the UE's identity (/{imsUeId}) which shall be an IMS Public Identity and the service indication.

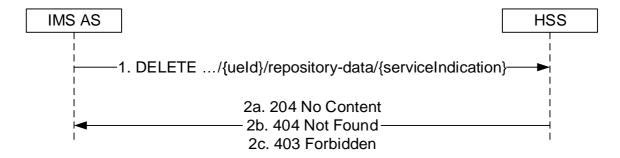


Figure 5.3.2.7.3-1: IMS AS deleting repository data

- 1. The IMS AS sends a DELETE request to the resource representing the UE's Repository Data for a requested Service Indication.
- 2a. On success, the HSS deletes the resource and responds with "204 No Content".
- 2b. If the repository data does not exist in the HSS, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions for the service indication and operation requested, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3.2.7.4 STN-SR update

Figure 5.3.2.7.4-1 shows a scenario where the IMS-AS sends a request to the HSS to update the STN-SR. The request contains the UE's identity (/{imsUeId}) which shall be an IMS Public Identity or a Private Identity and an instruction to modify the STN-SR.

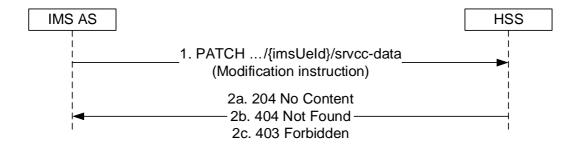


Figure 5.3.2.7.4-1: IMS AS updating STN-SR

- 1. The IMS AS sends a PATCH request to the resource representing the UE's SRVCC Data.
- 2a. On success, the HSS responds with "204 No Content".
- 2b. If the resource does not exist (i.e. the user is not subscribed to SRVCC), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions for the operation requested, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.3.2.7.5 PSI activation state update

Figure 5.3.2.7.5-1 shows a scenario where the IMS-AS sends a request to the HSS to update the PSI activation state. The request contains the Public Service Identity (/{imsUeId}) and an instruction to modify the activation state.

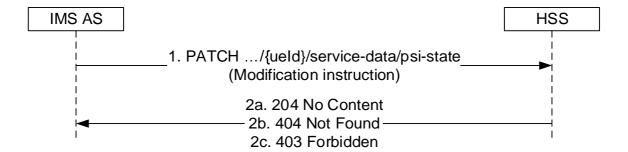


Figure 5.3.2.7.5-1: IMS AS updating a PSI activation state

- 1. The IMS AS sends a PATCH request to the resource representing the PSI activation state.
- 2a. On success, the HSS responds with "204 No Content".
- 2b. If the resource does not exist (i.e. the service does not exist), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions for the operation requested, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.3.2.7.6 SMS Registration Information Creation or Update

Figure 5.3.2.7.6-1 shows a scenario where the IMS-AS sends a request to the HSS to create or update the SMS registration information. The request contains the UE's identity (/{imsUeId}) which shall be an IMS Public Identity and the SMS registration information (IP-SM-GW number).

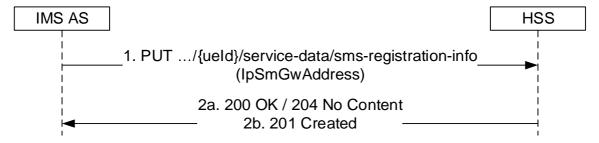


Figure 5.3.2.7.6-1: IMS AS creating or updating the SMS registration information

- 1. The IMS AS sends a PUT request to the resource representing the UE's SMS registration information. The request contains the IP-SM-GW number and, if s6c is supported, the Diameter Identity and Diameter Realm of the IP-SM-GW.
- 2a. On success, the HSS updates the SMS registration information resource by replacing it with the received resource information and responds with "200 OK" or "204 No Content".
- 2b. If the resource does not exist (there is no IP-SM-GW number associated to the user), HSS stores the received SMS registration information and responds with HTTP Status Code "201 created". A response body may be included to convey additional information to the NF consumer (e.g., features supported by HSS).

2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions or the IP-SM-GW number is pre-configured and cannot be overwritten, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PUT response body.

5.3.2.7.7 SMS Registration Information Deletion

Figure 5.3.2.7.7-1 shows a scenario where the IMS-AS sends a request to the HSS to delete the SMS registration information. The request contains the UE's identity ($/\{imsUeId\}$) which shall be an IMS Public Identity.

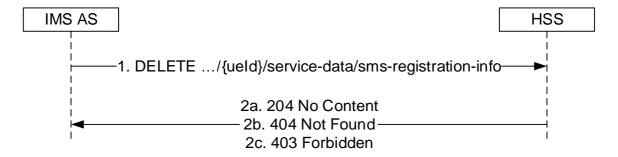


Figure 5.3.2.7.7-1: IMS AS deleting SMS registration information

- 1. The IMS AS sends a DELETE request to the resource representing the UE's SMS registration information.
- 2a. On success, the HSS deletes the resource and responds with "204 No Content".
- 2b. If the SMS registration information does not exist in the HSS, HTTP status code "404 Not Found" shall be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions or the IP-SM-GW number is pre-configured and cannot be deleted, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the DELETE response body.

5.3.2.7.8 DSAI tag activation state update

Figure 5.3.2.7.8-1 shows a scenario where the IMS-AS sends a request to the HSS to update the DSAI tag activation state. The request contains the Public Service Identity (/{imsUeId}) and an instruction to modify the activation state of DSAI tag.

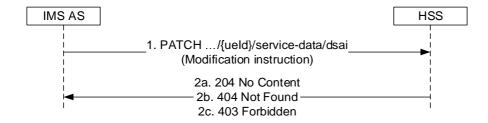


Figure 5.3.2.7.8-1: IMS AS updating DSAI tag activation state

- 1. The IMS AS sends a PATCH request to the resource representing the DSAI tag activation state.
- 2a. On success, the HSS responds with "204 No Content".
- 2b. If the resource does not exist (i.e. the service does not exist), HTTP status code "404 Not Found" should be returned including additional error information in the response body (in the "ProblemDetails" element).
- 2c. If the operation is not authorized due to e.g IMS AS does not have the required permissions for the operation requested, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the PATCH response body.

5.4 Nhss_imsUEAuthentication Service

5.4.1 Service Description

See 3GPP TS 23.228 [6], clause AA.2.1.4.

5.4.2 Service Operations

5.4.2.1 Introduction

For the Nhss_imsUEAuthentication service the following service operation is defined:

Get

The Nhss_ imsUEAuthentication Service is used by the S-CSCF to request the SBI capable HSS to select an authentication method, calculate a fresh authentication vector (AV) if required for the selected method, and provide it to the S-CSCF by means of the Get service operation.

5.4.2.2 Get

5.4.2.2.1 General

The following procedures using the Get service operation are supported:

Authentication Information Retrieval

5.4.2.2.2 Authentication Information Retrieval

Figure 5.4.2.2.1 shows a scenario where the NF service consumer (S-CSCF) retrieves authentication information for the UE from the HSS. The request contains the UE's identity (IMS Private Identity) and the SIP authentication scheme and may contain resynchronization info.



Figure 5.4.2.2.1: NF service consumer requesting authentication information

- 1. The NF service consumer sends a POST request (custom method: generate-sip-auth-data) to the resource representing the UE's security information. The payload shall contain the SIP authentication scheme and the resynchronization info.
- 2a. The HSS responds with "200 OK" with the message body containing the authentication data information.
- 2b. If the operation cannot be authorized due to e.g UE does not have required subcription data, HTTP status code "403 Forbidden" should be returned including additional error information in the response body (in "ProblemDetails" element).

On failure, the appropriate HTTP status code indicating the error shall be returned and appropriate additional error information should be returned in the POST response body.

6 API Definitions

6.1 Nhss_imsUEContextManagement Service API

6.1.1 Introduction

URIs of this API shall have the following root:

{apiRoot}/{apiName}/{apiVersion}/

where "apiRoot" is defined in clause 4.4.1 of 3GPP TS 29.501 [5], the "apiName" shall be set to "nhss-ims-uecm" and the "apiVersion" shall be set to "v1" for the current version of this specification.

6.1.2 Usage of HTTP

6.1.2.1 General

HTTP/2, as defined in IETF RFC 7540 [8], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nhss_imsUECM service shall comply with the OpenAPI [9] specification contained in Annex A.2.

6.1.2.2 HTTP standard headers

6.1.2.2.1 General

The usage of HTTP standard headers shall be supported as specified in clause 5.2.2 of 3GPP TS 29.500 [4].

6.1.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [10], signalled by the content type "application/json".
- The Problem Details JSON Object (IETF RFC 7807 [11] signalled by the content type "application/problem+json".
- JSON Patch, as defined in IETF RFC 6902 [12], signalled by the content type "application/json-patch+json".

6.1.2.3 HTTP custom headers

6.1.2.3.1 General

The usage of HTTP custom headers shall be supported as specified in clause 5.2.3 of 3GPP TS 29.500 [4].

6.1.3 Resources

6.1.3.1 Overview

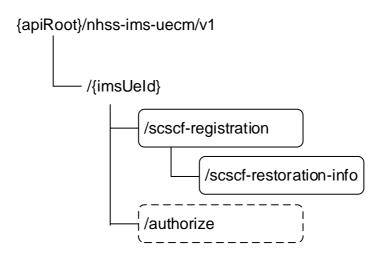


Figure 6.1.3.1-1: Resource URI structure of the Nhss_imsUECM API

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

| Resource name (Archetype) | Resource URI | HTTP method or custom operation | Description |
|--|--|---------------------------------|--|
| ScscfRegistration (Document) | /{imsUeId}/scscf-registration | PUT | Create or update the S-CSCF registration state of the UE |
| Authorize (Custom operation) | /{imsUeId}/authorize | authorize (POST) | Authorize the requested operation for the UE |
| Coorf Doctoration | //: | ĞET | Retrieve the S-CSCF restoration information. |
| Scscf Restoration Information (Document) | /{imsUeId}/scscf- registration/scscf-restoration- info | PUT | Update the S-CSCF restoration information. |
| | IIIIO | DELETE | Delete the S-CSCF restoration information. |

6.1.3.2 Resource: Scscf Registration

6.1.3.2.1 Description

This resource represents the registered S-CSCF.

6.1.3.2.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-uecm/{apiVersion}/{imsUeId}/scscf-registration

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

| Definition |
|---|
| See clause 6.1.1 |
| See clause 6.1.1 |
| Represents the IMS Subscription Identifier, either the IMS Public Identity (i.e. IMPU or Public PSI) or the Private Identity (i.e. IMPI or PSI). See 3GPP TS 23.228 [6] clause 4.3). IMS Public Identity is used with the PUT method; IMS Public Identity or IMS Private Identity is used with the PATCH methods. |
| Pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |
| |

6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 PUT

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

Table 6.1.3.2.3.1-1: URI query parameters supported by the PUT method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|------|-----------|---|-------------|-------------|---------------|
| n/a | | | | | |

This method shall support the request data structures specified in table 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.1-3.

Table 6.1.3.2.3.1-2: Data structures supported by the PUT Request Body on this resource

| Data type | Р | Cardinality | Description |
|-------------------|---|-------------|---|
| ScscfRegistration | М | 1 | S-CSCF registration for indicated IMS Public Identity is updated with the |
| | | | received information. |

Table 6.1.3.2.3.1-3: Data structures supported by the PUT Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|----------------------------|---|-------------|-------------------|---|
| | | | codes | |
| ScscfRegistration | М | 1 | 201 Created | A response body containing a representation of the created individual scscfRegistration resource for the received IMS |
| | | | | Public Identity shall be returned. |
| ScscfRegistration | M | 1 | 200 OK | A response body containing a representation of the updated individual scscfRegistration resource for the received IMS Public Identity shall be returned. |
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | M | 1 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| ExtendedProblem Details | M | 1 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - IDENTITY_ALREADY_REGISTERED In this case include invalidParams with cscfServerName as param and with value of the currently assigned S-CSCF name in the AdditionalInfo - IDENTITIES_DO_NOT_MATCH - ERROR_IN_REGISTRATION_TYPE |

6.1.3.2.4 Resource Custom Operations

There are no custom operations associated to resources.

6.1.3.3 Resource: Scscf Restoration Information

6.1.3.3.1 Description

This resource represents the IMS restoration information. It is queried by the service consumer (S-CSCF) to retrieve the information required for an S-CSCF to handle the requests for a user.

6.1.3.3.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-uecm/{apiVersion}/{imsUeId}/scscf-registration/scscf-restoration-info

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.1.1 |
| apiVersion | See clause 6.1.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.1.3.3.3 Resource Standard Methods

6.1.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.1.3.3.3.1-1.

Table 6.1.3.3.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|------|-----------|---|-------------|-------------|---------------|
| n/a | | | | | |

This method shall support the request data structures specified in table 6.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.3.3.3.1-3.

Table 6.1.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.1.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|-------------------|---|-------------|------------------|---|
| | | | codes | |
| ScscfRestorationI | М | 1 | 200 OK | A response body containing information for the S-CSCF to |
| nfoResponse | | | | handle the requests for a user. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - DATA_NOT_FOUND |
| | | | | NOTE: DATA_NOT_FOUND indicates that there is no restoration info stored under the scscf-registration resource |

6.1.3.3.3.2 PUT

This method shall support the URI query parameters specified in table 6.1.3.3.3.2-1.

Table 6.1.3.3.3.2-1: URI query parameters supported by the PUT method on this resource

| | Name | Data type | Р | Cardinality | Description | Applicability |
|---|------|-----------|---|-------------|-------------|---------------|
| r | n/a | | | | | |

This method shall support the request data structures specified in table 6.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.3.3.3.2-3.

Table 6.1.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | Р | Cardinality | Description |
|-------------------|---|-------------|---|
| ScscfRestorationI | М | 1 | S-CSCF restoration information for indicated IMS Public Identity is updated |
| nfoRequest | | | with the received information. |

Table 6.1.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------------------------|---|-------------|-------------------|---|
| ScscfRestorationI nfoResponse | M | 1 | 201 Created | Upon success, a response body containing a representation of the created individual ScscfRestorationInfo resource for the received IMS Public Identity shall be returned. |
| ScscfRestorationI nfoResponse | M | 1 | 200 OK | Upon success, a response body containing a representation of the updated individual ScscfRestorationInfo resource shall be returned. |
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED NOTE: OPERATION_NOT_ALLOWED indicates the S-CSCF is |
| | | | | not allowed to create/update the restoration information. |

6.1.3.3.3.3 DELETE

This method shall support the URI query parameters specified in table 6.1.3.3.3.3-1.

Table 6.1.3.3.3.3-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|------|-----------|---|-------------|-------------|---------------|
| n/a | | | | | |

This method shall support the request data structures specified in table 6.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.3.3.3.3-3.

Table 6.1.3.3.3.2: Data structures supported by the DELETE Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | М | 1 | The request body shall be empty. |

Table 6.1.3.3.3.3-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|-----------|---|-------------|----------------|---|
| n/a | | | 204 No | Upon success, an empty response body shall be returned. |
| | | | Content | |

| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED NOTE: OPERATION_NOT_ALLOWED indicates the S-CSCF is not allowed to delete the restoration information stored in the HSS. |
|----------------|---|----|------------------|--|
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - DATA_NOT_FOUND NOTE: DATA_NOT_FOUND indicates that there is no restoration info stored under the scscf-registration resource. |

6.1.4 Custom Operations without associated resources

6.1.4.1 Overview

Table 6.1.4.1-1: Custom operations without associated resources

| Custom operation URI | Mapped HTTP method | Description |
|----------------------|--------------------|--|
| /{imsUeId}/authorize | POST | Authorize the requested operation for the UE |

6.1.4.2 Operation: Authorize

6.1.4.2.1 Description

This resource represents the information that is needed to authorize a UE to register or establish sessions in the IMS domain. See 3GPP TS 23.228 [6].

6.1.4.2.2 Operation Definition

This resource shall support the resource URI variables defined in table 6.1.4.2.2-1.

Table 6.1.4.2.2-1: URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.1.1 |
| apiVersion | See clause 6.1.1 |
| imsUeld | Represents the IMS Subscription Identifier, either the IMS Public Identity (i.e. IMPU or Public PSI) or the Private Identity (i.e. IMPI or PSI). See 3GPP TS 23.228 [6] clause 4.3). IMS Public Identity is used with the PUT method; IMS Public Identity or IMS Private Identity is used with the PATCH methods. |
| | Pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

This operation shall support the request data structures specified in table 6.1.4.2.2-1 and the response data structure and response codes specified in table 6.1.4.2.2-2.

Table 6.1.4.2.2-1: Data structures supported by the POST Request Body on this resource

| Data type | Р | Cardinality | Description |
|--------------------|---|-------------|---|
| AuthorizationInfor | M | 1 | Contains input for authorization, such as the authorization type or the visited |
| mation | | | network identifier. |

Table 6.1.4.2.2-2: Data structures supported by the POST Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|-----------------------------|---|-------------|------------------|---|
| AuthorizationInfo Result | М | 1 | 200 OK | A response body containing result information or the registered S-CSCF shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - IDENTITY_NOT_REGISTERED |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - AUTHORIZATION_REJECTED - IDENTITIES_DONT_MATCH |

6.1.5 Notifications

6.1.5.1 General

6.1.5.2 Deregistration Notification

The POST method shall be used for Deregistration Notifications and the URI shall be as provided during the registration procedure.

Resource URI: {callbackReference}

Support of URI query parameters is specified in table 6.1.5.2-1.

Table 6.1.5.2-1: URI query parameters supported by the POST method

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

Support of request data structures is specified in table 6.1.5.2-2 and of response data structures and response codes is specified in table 6.1.5.2-3.

Table 6.1.5.2-2: Data structures supported by the POST Request Body

| Data type | Р | Cardinalit y | Description |
|--------------------|---|-----------------|--|
| DeregistrationData | М | 1 | Includes Deregistration Reason and identities to be deregistered |

Table 6.1.5.2-3: Data structures supported by the POST Response Body

| Data type | Р | Cardinality | Response codes | Description |
|------------------------|---|-------------|-------------------|---|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| DeregistrationDat a | | | 200 OK | Upon success or partial success, DeregistrationData shall be returned including additional information about the result of the procedure. |
| ProblemDetails | М | 1 | 404 Not Found | The "cause" attribute shall be set to the following application error: - CONTEXT_NOT_FOUND |

6.1.6 Data Model

6.1.6.1 General

This clause specifies the application data model supported by the API.

Table 6.1.6.1-1 specifies the data types defined for the Nhss_imsUECM service-based interface protocol.

Table 6.1.6.1-1: Nhss_imsUECM specific Data Types

| Data type | Clause defined | Description | Applicability |
|------------------------------|-------------------|--|---------------|
| AuthorizationRequest | 6.1.6.2.2 | Information for the type of authorization requested and the visited PLMN-ID | |
| AuthorizationResponse | 6.1.6.2.3 | Result of the authorization requested for registration. | |
| ScscfRestorationInfo | 6.1.6.2.4 | Information required for an S-CSCF to handle the requests for a user. | |
| ScscfRestorationInfoRequest | 6.1.6.2.5 | Scscf restoration information request. | |
| ScscfRestorationInfoResponse | 6.1.6.2.6 | Result of the scscf restoration information request. | |
| RestorationInfo | 6.1.6.2.7 | Information related to a specific registration required for an S-CSCF to handle the requests for a user. | |
| UeSubscriptionInfo | 6.1.6.2.8 | UE's subscription information. | |
| PcscfSubscriptionInfo | 6.1.6.2.9 | P-CSCF's subscription information. | |
| ScscfRegistration | 6.1.6.2.10 | Registration information of the S-CSCF for the registered UE. | |
| ExtendedProblemDetails | 6.1.6.2.11 | | |
| AdditionalInfo | 6.1.6.2.12 | | |
| DeregistrationData | 6.1.6.2.13 | | |
| DeregistrationReason | 6.1.6.2.14 | | |
| EmergencyRegisteredIdentity | 6.1.6.2.15 | | |

Table 6.1.6.1-2 specifies data types re-used by the Nhss_imsUECM service-based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nhss_imsUECM service-based interface.

Table 6.1.6.1-2: $N_{\mbox{\scriptsize NF>}}$ re-used Data Types

| Data type | Reference | Comments | Applicability |
|-------------------|---------------------|--|---------------|
| Uri | 3GPP TS 29.571 [16] | Uniform Resource Identifier | |
| SupportedFeatures | 3GPP TS 29.571 [16] | see 3GPP TS 29.500 [4] clause 6.6 | |
| DateTime | 3GPP TS 29.571 [16] | String with format "date-time" as defined in | |
| | | OpenAPI Specification [9] | |

6.1.6.2 Structured data types

6.1.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

6.1.6.2.2 Type: AuthorizationRequest

Table 6.1.6.2.2-1: Definition of type AuthorizationRequest

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|--|---------------|
| authorizationType | AuthorizationType | M | 1 | Contains the type of the authorization | |
| | | | | requested | |
| impi | Impi | 0 | 1 | Contains an IMS Private User Identity. | |
| | | | | It shall be present when the | |
| | | | | authorization requested is for a | |
| | | | | registration or de-registration. | |
| visitedNetworkIden | string | 0 | 1 | Contains the identifier of the visited | |
| tifier | | | | network where the P-CSCF is located. | |
| | | | | It shall be present when the | |
| | | | | authorization requested is for a | |
| | | | | registration or de-registration. | |

6.1.6.2.3 Type: AuthorizationResponse

Table 6.1.6.2.3-1: Definition of type AuthorizationResponse

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|--|---------------|
| authorizationResult | AuthorizationResult | М | 1 | Contains the details of the granted authorization. | |
| cscfServerName | string | 0 | | Contains the stored S-CSCF name in SIP URI format. It shall be present if there is a S-CSCF name stored for the associated IMS subscription. | |

6.1.6.2.4 Type: ScscfRestorationInfo

Table 6.1.6.2.4-1: Definition of type ScscfRestorationInfo

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|-----------------------------|-----------------------------|---|-------------|--|---------------|
| userName | Uri | Ο | 01 | Registered Private Identity of the user for whom the data is required. If the userName is NULL, it means that an S-CSCF request all registrations for all the private identities registered in the | |
| restorationInfo | array(RestorationInf o) | 0 | 0N | S-CSCF. This IE shall contain the information related to a specific registration required for an S-CSCF to handle the requests for a user. | |
| registrationTimeOut | DateTime | 0 | 1 | This IE indicates the point of time at which the UE's registration expires. | |
| sipAuthenticationSc heme | SipAuthenticationSc heme | 0 | 1 | This IE indicates the authentication scheme to be used in the authentication of SIP requests. | |

6.1.6.2.5 Type: ScscfRestorationInfoRequest

Table 6.1.6.2.5-1: Definition of type ScscfRestorationInfoRequest

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|---|---------------|
| scscfRestorationInf | ScscfRestorationInf | М | 1 | This IE shall contain the information | |
| oRequest | 0 | | | related to a specific registration required | |
| | | | | for an S-CSCF to handle the requests | |
| | | | | for the users. | |

6.1.6.2.6 Type: ScscfRestorationInfoResponse

Table 6.1.6.2.6-1: Definition of type ScscfRestorationInfoResponse

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|---------------------|---------------------|---|-------------|--|---------------|
| scscfRestorationInf | array(ScscfRestorat | М | 1N | This IE shall contain the response | |
| oResponse | ionInfo) | | | information related to a specific or all | |
| | | | | registrations required for an S-CSCF. | |

6.1.6.2.7 Type: RestorationInfo

Table 6.1.6.2.7-1: Definition of type RestorationInfo

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|-------------------------------|------------------------|---|-------------|---|---------------|
| path | string | M | 1 | This IE shall contain a comma separated list of SIP proxies in the Path header. | |
| contact | string | М | 1 | This IE shall contain the Contact Addresses and Parameters in the Contact header. | |
| initialCSeqSequenc eNumber | Uint32 | 0 | 1 | This IE contains the sequence number of the CSeq header field contained in the initial successful REGISTER request. | |
| callIdSipHeader | string | 0 | 1 | This IE contains the information in the Call-ID header. | |
| uesubscriptionInfo | UeSubscriptionInfo | 0 | 1 | This IE contains the UE's subscription information. | |
| pcscfSubscriptionInf o | PcscfSubscriptionIn fo | 0 | 1 | This IE contains the P-CSCF's subscription information. | |

6.1.6.2.8 Type: UeSubscriptionInfo

Table 6.1.6.2.8-1: Definition of type UeSubscriptionInfo

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|-----------------|-----------|---|-------------|--|---------------|
| callIdSipHeader | string | М | 1 | This IE contains the information in the | |
| | | | | Call-ID header. | |
| fromSipHeader | string | М | 1 | This IE shall contain the information in | |
| | | | | the From header. | |
| toSipHeader | string | M | 1 | This IE shall contain the information in | |
| | | | | the To header. | |
| recordRoute | string | М | 1 | This IE shall contain a comma separated | |
| | | | | list of Record Route header(s). | |
| contact | string | M | 1 | This IE shall contain the Contact | |
| | | | | Addresses and Parameters in the | |
| | | | | Contact header. | |

6.1.6.2.9 Type: PcscfSubscriptionInfo

Table 6.1.6.2.9-1: Definition of type PcscfSubscriptionInfo

| Attribute name | Data type | P | Cardinality | Description | Applicability |
|-----------------|-----------|---|-------------|--|---------------|
| callIdSipHeader | string | М | 1 | This IE contains the information in the | |
| | | | | Call-ID header. | |
| fromSipHeader | string | М | 1 | This IE shall contain the information in | |
| | | | | the From header. | |
| toSipHeader | string | М | 1 | This IE shall contain the information in | |
| | | | | the To header. | |
| contact | string | М | 1 | This IE shall contain the Contact | |
| | | | | Addresses and Parameters in the | |
| | | | | Contact header. | |

6.1.6.2.10 Type: ScscfRegistration

Table 6.1.6.2.10-1: Definition of type ScscfRegistration

| Attribute name | Data type | Р | Cardinality | Description | Applicabilit v |
|----------------------------|----------------------|---|-------------|--|----------------|
| imsRegistrationTyp e | ImsRegistrationType | М | 1 | Contains the type of the registration/deregistration requested. | |
| impi | Impi | С | 1 | Contains an IMS Private Identity. It may be absent during the originating or terminating request to an unregistered Public Identity (imsRegistrationType shall contain | |
| cscfServerName | String | М | 1 | the value UNREGISTERED_USER) Contains the S-CSCF name in SIP URI format. | |
| scscfInstanceId | NfInstanceId | М | 1 | The NF instance id of the S-CSCF. | |
| deregCallbackUri | Uri | C | 1 | A URI provided by the S-CSCF to receive (implicitly subscribed) notifications on deregistration. The deregistration callback URI shall have unique information within S-CSCF set to identify the IMS Public Identity to be deregistered. If there are implicitly identities registered (i.e. the identity belongs to an IRS) in the response, the deregistration callback URI identifies the IRS to be deregistered. If there is a wildcarded PSI unregistered received in the response, the deregistration callback URI identifies the wildcarded PSI to be deregistered. | |
| associatedImpis | array(Impi) | 0 | 1N | Associated IMS private Identities in the subscription. If the IMS subscription contains only single Private Identity this attribute shall not be present. (NOTE) | |
| associatedRegistere dImpis | array(Impi) | 0 | 1N | Associated registered IMS private Identities in the subscription. (NOTE) | |
| irsImpus | array(Impu) | 0 | 1N | List of non barred IMS Public User Identities (distinct or wildcarded) which are in the Implicit Registration Set. This attribute shall be present when the received public identity belongs to an IRS. (NOTE) | |
| wildcardedPui | Impu | 0 | 1 | It shall be present when the Public Identity in the request fell within the range of a Wildcarded Public User Identity present in the IRS. (NOTE) | |
| wildcardedPsi | Impu | | 1 | It shall be present if the Public Identity in the request fell within the range of a Wildcarded Public Service Identity in the HSS whose state is unregistered. If this element is present, it shall be used by the S-CSCF to identify the identity affected by the request. (NOTE) | |
| looseRouteIndicator | LooseRouteIndication | 0 | 0 1 | Loose Routing Indicator (NOTE) See clause 6.2.8 | |
| supportedFeatures | SupportedFeatures | 0 | 01 | See Clause 0.2.0 | |

| multipleRegistrationI ndicator | boolean | С | 1 | Contains the multiple registration indication. If included, when it is set to true it indicates multiple registration. |
|-----------------------------------|-----------------------------|------|-------------|---|
| pcscfRestorationIndi cator | | | 01 | true: indicates that the P-CSCF- Restoration-mechanism shall be executed by the HSS. false or absent: P-CSCF-Restoration is not requested. May be present if imsRegistrationType is "UNREGISTERED_USER" or "ADMINISTRATIVE_DEREGISTRAT ION"; otherwise shall be absent. |
| NOTE: Optional at | tribute applicable in respo | onse | messages or | nly. |

6.1.6.2.11 Type: ExtendedProblemDetails

Table 6.1.6.2.11-1: Definition of type ExtendedProblemDetails

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|----------------|---|-------------|--|
| problemDetails | ProblemDetails | M | 1 | More information on the error shall be |
| | | | | provided in the "cause" attribute of the |
| | | | | "ProblemDetails" structure. |
| additionalInfo | AdditionalInfo | 0 | 1 | Contains the currently assigned S-CSCF |
| | | | | name in SIP URI format. |

6.1.6.2.12 Type: AdditionalInfo

Table 6.1.6.2.12-1: Definition of type AdditionalInfo

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|---|
| cscfServerName | String | 0 | 1 | Current S-CSCF assigned to the user (in SIP |
| | | | | URI format). This attribute shall be included |
| | | | | when "cause" is |
| | | | | IDENTITY_ALREADY_REGISTERED. |

6.1.6.2.13 Type: DeregistrationData

Table 6.1.6.2.13-1: Definition of type DeregistrationData

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|-------------------|--------------------|----------|-------------|--|---------------|
| deregReason | DeregistrationReas | М | 1 | Indicates the reason for the | |
| | on | | | deregistration. | |
| impi | Impi | М | 1 | Contains the IMS Private User Identity | |
| | | | | known by the SCSCF. | |
| associatedImpis | Array(Impi) | 0 | 0N | Associated IMS private Identities in the | |
| | | | | subscription that are deregistered. | |
| | | | | | |
| | | | | This attribute may be present in | |
| | | | | responses, otherwise, it shall be absent. | |
| emergencyRegister | array(EmergencyRe | 0 | 1N | A list of pairs of private and public user | |
| edIdentities | gisteredIdentity) | | | identities which have not been de- | |
| | | | | registered due to emergency | |
| | | | | registration. | |
| | | | | This attribute may be present in | |
| | | | | responses, otherwise, it shall be absent. | |
| | | <u> </u> | | responses, emerwise, it shall be absent. | |

6.1.6.2.14 Type: DeregistrationReason

Table 6.1.6.2.14-1: Definition of type DeregistrationReason

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|----------------|--------------------|---|-------------|--|---------------|
| reasonCode | DeregistrationReas | M | 1 | Defines the reason for the network | |
| | onCode | | | initiated de-registration | |
| reasonText | string | 0 | 01 | Contains textual information to inform | |
| | | | | the user about the reason for a de- | |
| | | | | registration | |

6.1.6.2.15 Type: EmergencyRegisteredIdentity

Table 6.1.6.2.15-1: Definition of type EmergencyRegisteredIdentity

| Attribute name | Data type | Р | Cardinality | Description | Applicability |
|----------------|-----------|---|-------------|---------------------------|---------------|
| impi | Impi | М | 1 | IMS Private User Identity | |
| impu | Impu | М | 1 | IMS Public User Identity | |

6.1.6.3 Simple data types and enumerations

6.1.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

Table 6.1.6.3.2-1: Simple data types

| Type Name | Type Definition | Description | Applicability |
|-----------|-----------------|---------------------------------------|---------------|
| Impu | string | Contains an IMS Public Identity | |
| Impi | string | Contains an IMS Private User Identity | |

6.1.6.3.3 Enumeration: AuthorizationType

The enumeration AuthorizationType represents the type of authorization requested. It shall comply with the provisions defined in table 6.1.6.3.3-1.

Table 6.1.6.3.3-1: Enumeration AuthorizationType

| Enumeration value | Description | Applicability |
|-------------------|--|---------------|
| "REGISTRATION" | The authorization requested if for a user's IMS registration or re-registration. | |
| "DEREGISTRATION" | The authorization requested if for a user's IMS deregistration. | |

6.1.6.3.4 Enumeration: AuthorizationResult

The enumeration AuthorizationResult represents the details of the granted authorization. It shall comply with the provisions defined in table 6.1.6.3.4-1.

Table 6.1.6.3.4-1: AuthorizationResult

| Enumeration value | Description |
|---------------------------|---|
| "FIRST_REGISTRATION" | The registration is an initial registration for the IMS Public User Identity |
| "SUBSEQUENT_REGISTRATION" | The registration is an subsequent registration for the IMS Public User Identity |

6.1.6.3.5 Enumeration: ImsRegistrationType

The enumeration ImsRegistrationType represents the type of registration associated to the REGISTER request.

Table 6.1.6.3.5-1: Enumeration ImsRegistrationType

| Enumeration value | Description | Applicability |
|---------------------------------|---|---------------|
| "INITIAL_REGISTRATION" | The request is related to an initial | |
| | registration | |
| "RE_REGISTRATION" | The request is related to a re- | |
| | registration | |
| "TIMEOUT_DEREGISTRATION" | The registration timer of an identity has | |
| | expired. | |
| "USER_DEREGISTRATION" | The S-CSCF has received a user | |
| | initiated de-registration request | |
| "ADMINISTRATIVE_DEREGISTRATION" | The S-CSCF, due to administrative | |
| | reasons or network issues, has | |
| | performed the de-registration of an | |
| | identity. | |
| "AUTHENTICATION_FAILURE" | The authentication of a user has failed. | |
| "AUTHENTICATION_TIMEOUT" | Authentication timeout has occurred. | |
| "UNREGISTERED_USER" | The request is related to a request for | |
| | a Public Identity that is not registered. | |

6.1.6.3.6 Enumeration: LooseRouteIndication

The enumeration LooseRouteIndication represents the type of registration associated to the REGISTER request.

Table 6.1.6.3.6-1: Enumeration LooseRouteIndication

| Enumeration value | Description | Applicability |
|----------------------------|---|---------------|
| "LOOSE_ROUTE_NOT_REQUIRED" | indicates whether loose route mechanism is not required to serve the user. | |
| "LOOSE_ROUTE_REQUIRED " | indicates the S-CSCF whether loose route mechanism is required to serve the user. | |

6.1.6.3.7 Enumeration: DeregistrationReasonCode

The enumeration DeregistrationReasonCode indicates the reason for the network initiated de-registration.

Table 6.1.6.3.7-1: Enumeration DeregistrationReasonCode

| Enumeration value | Description | Applicability |
|-------------------------|--|---------------|
| "PERMANENT_TERMINATION" | The HSS indicates to the S-CSCF that the S-CSCF will no longer be assigned to the Public Identity and associated implicitly registered/unregistered Public Identities (if any) for the Private Identity(ies) indicated in the request (e.g. due to an IMS subscription cancellation, or modification, or a removal of IP-address secure binding information when GIBA is used). | |
| "NEW_SERVER_ASSIGNED" | The HSS indicates to the S-CSCF that a new S-CSCF has been allocated to the IMS Subscription e.g. because the previous assigned S-CSCF was unavailable during a registration procedure. The S-CSCF shall remove all information for all of the Public Identities indicated in the request. | |
| "SERVER_CHANGE" | The HSS indicates to the S-CSCF that the deregistration is requested to force the selection of new S-CSCF to assign to the IMS Subscription (e.g. when the S-CSCF capabilities are changed in the HSS or when the S-CSCF indicates that it has not enough memory for the updated User Profile). If the S-CSCF does not indicate in the response all the associated Private Identities, the HSS shall repeat this request for each of the remaining Private Identities in the IMS Subscription that are known to the S-CSCF. The S-CSCF should start the network initiated de-registration towards the user, i.e. all registrations within the IMS Subscription are de-registered and the user is asked to re-register to all existing registrations. | |
| "REMOVE_S-CSCF" | The HSS indicates to the S-CSCF that the S-CSCF will no longer be assigned to an unregistered Public Identity(ies) (i.e registered as a consequence of an originating or terminating request or there is a S-CSCF keeping the user profile stored) for a given IMS Subscription. | |

6.1.6.4 Data types describing alternative data types or combinations of data types

There are no alternative data types, neither combinations of data types

6.1.7 Error Handling

6.1.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [4].

6.1.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4].

6.1.7.3 Application Errors

The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [4] may also be used for the Nhss_imsUECM service. The following application errors listed in Table 6.1.7.3-1 are specific for the Nhss_imsUECM service.

Table 6.1.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|-----------------------------|------------------|--|
| USER_NOT_FOUND | 404 Not Found | The received IMS UE identity is unknown. |
| CONTEXT_NOT_FOUND | 404 Not Found | The context identified by the callback reference is not found |
| IDENTITIES_DO_NOT_MATCH | 403 Forbidden | A message was received with a public identity and a private identity for a user, and the server determines that the public identity does not correspond to the private identity. |
| ERROR_IN_REGISTRATION_TYPE | 403 Forbidden | The requested registrationType is not allowed or the Public Identity type received in the request is not allowed for the requested registrationType. |
| IDENTITY_ALREADY_REGISTERED | 403 Forbidden | The identity has already a server assigned, and the registration information cannot be overwritten. |

6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the XXX API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.1.8-1: Supported Features

| Feature number | Feature Name | Description |
|----------------|--------------|-------------|
| | | |

6.1.9 Security

As indicated in 3GPP TS 33.501 [5], the access to the Nhss_imsUECM API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [35]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [36]) plays the role of the authorization server.

If Oauth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nhss_imsUECM API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [36], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nhss_imsUECM service.

The Nhss_imsUECM API defines the following scopes for OAuth2 authorization:

Table 6.1.9-1: Oauth2 scopes defined in Nhss_imsUECM API

| Scope | Description | | |
|-------------------------------------|--|--|--|
| "nhss-ims-uecm" | Access to the Nhss IMS UE Context Management API | | |
| "nhss-ims-uecm:authorize:invoke" | Access to invoke the Authorize custom operation | | |
| "nhss-ims-uecm:registration:create" | Access to create S-CSCF Registration resources | | |
| "nhss-ims-uecm:restoration:read" | Access to read the S-CSCF Restoration resource | | |
| "nhss-ims-uecm:restoration:modify" | Access to create/update/delete the S-CSCF Restoration resource | | |

6.2 Nhss_imsSubscriberDataManagement Service API

6.2.1 API URI

URIs of this API shall have the following root:

{apiRoot}/{apiName}/{apiVersion}/

where "apiRoot" is defined in clause 4.4.1 of 3GPP TS 29.501 [5], the "apiName" shall be set to "nhss-ims-sdm" and the "apiVersion" shall be set to "v1" for the current version of this specification.

6.2.2 Usage of HTTP

6.2.2.1 General

HTTP/2, as defined in IETF RFC 7540 [8], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nhss_imsSubscriberDataManagement service shall comply with the OpenAPI [9] specification contained in Annex A.3.

6.2.2.2 HTTP standard headers

6.2.2.2.1 General

The usage of HTTP standard headers shall be supported as specified in clause 5.2.2 of 3GPP TS 29.500 [4].

6.2.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [10], signalled by the content type "application/json".
- The Problem Details JSON Object (IETF RFC 7807 [11] signalled by the content type "application/problem+json"
- JSON Patch, as defined in IETF RFC 6902 [12], signalled by the content type "application/json-patch+json"

6.2.2.3 HTTP custom headers

6.2.2.3.1 General

The usage of HTTP custom headers shall be supported as specified in clause 5.2.3 of 3GPP TS 29.500 [4].

6.2.3 Resources

6.2.3.1 Overview

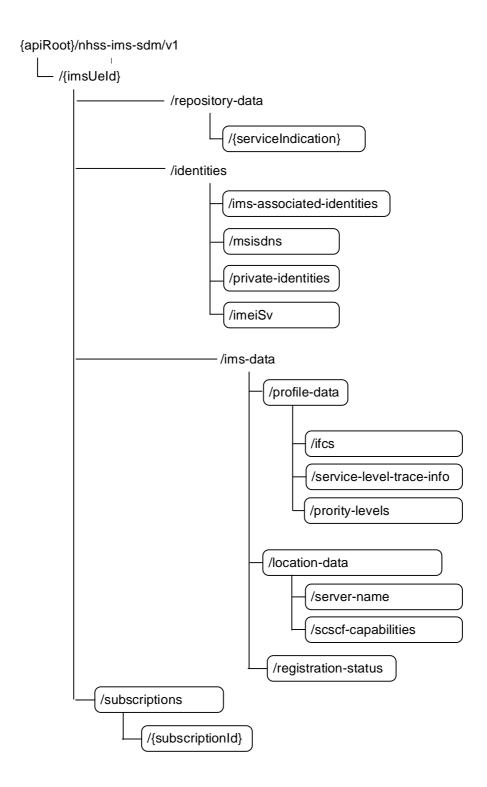


Figure 6.2.3.1-1: Resource URI structure of the Nhss_imsSDM API

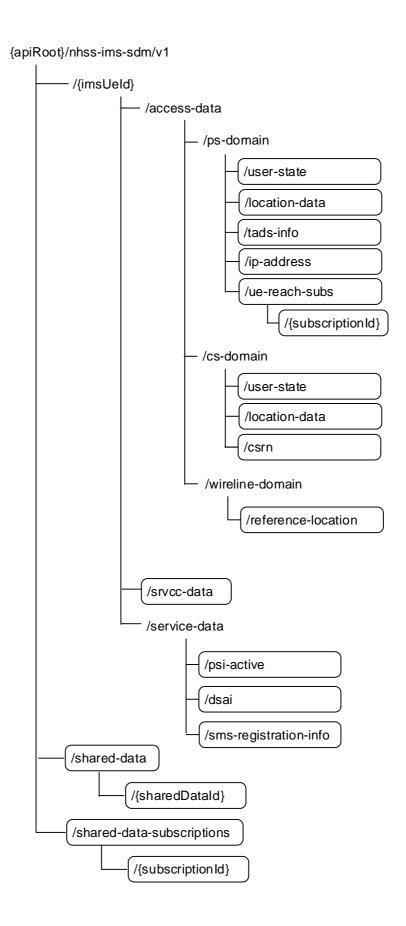


Figure 6.2.3.1-2: Resource URI structure of the Nhss_imsSDM API

Table 6.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.3.1-1: Resources and methods overview

| Resource name (Archetype) | Resource URI | HTTP method or custom operation | Description |
|--|---|---------------------------------|--|
| Repository Data (Document) | /{imsUeId}/repository- data/{serviceIndication} | GET | Retrieve repository data for a service indication |
| | | DELETE | Delete repository data for a service indication |
| | | PUT | Update repository data for a service indication |
| IMS Associated Identities (Document) | /{imsUeld}/identities/ims- associated-identities | GET | Retrieve the UE's IMS associated identities (implicit and alias) |
| MSISDNs (Document) | /{imsUeId}/identities/msisdns | GET | Retrieve the UE's MSISDNs (basic and additional) |
| PrivateIdentities (Document) | /{imsUeId}/identities/private-identities | GET | Retrieve the UE's Private Identities (IMPI and IMSI) |
| ImeiSvInformation (Document) | /{imsUeId}/identities/imeisv | GET | Retrieve the UE's IMEISV |
| IMS Profile Data (Document) | /{imsUeId}/ims-data/profile-data | GET | Retrieve the UE's subscribed Profile |
| Initial Filter Criteria (Document) | /{imsUeId}/ims-data/ profile-data/ifcs | GET | Retrieve the UE's subscribed Initial Filter Criteria |
| Service Level Trace Information (Document) | /{imsUeld}/ims-data/profile- data/service-level-trace-info | GET | Retrieve the UE's subscribed Service Level Trace Information |
| Service Priority Information (Document) | /{imsUeId}/ims-data/ profile-data/priority-levels | GET | Retrieve the UE's subscribed Service Priority Levels |
| ImsServerNameAndCaps (Document) | /{imsUeld}/ims-data/location- data | GET | Retrieve the UE's S-CSCF name and the server capabilities in IMS |
| IMS Location Data (Document) | /{imsUeId}/ims-data/location- data/server-name | GET | Retrieve the UE's S-CSCF name |
| S-CSCF Capabilities (Document) | /{imsUeId}/ims-data/location- data/scscf-capabilities | GET | Retrieve the UE's S-CSCF capabilities (mandatory and/or optional) |
| IMS Registration Status (Document) | /{imsUeId}/ims-data/ registration-status | GET | Retrieve the UE's IMS registration status. |
| Subscriptions (Collection) | /{imsUeld}/subscriptions | POST | Create a subscription |
| Individual subscription (Document) | /{imsUeld}/subscriptions/ {subscriptionId} | DELETE | Delete the subscription identified by {subscriptionId}, i.e. unsubscribe |
| | | PATCH | Modify the sdm-subscription identified by {subscriptionId} |

| | | | 1 |
|-------------------------------|----------------------------------|----------|---------------------------------|
| PS Location | /{imsUeId}/access-data/ | GET | Retrieve the UE's location in |
| Information(Document) | ps-domain/location-data | 057 | PS domain |
| CS Location | /{imsUeId}/access-data/ | GET | Retrieve the UE's location in |
| Information(Document) | cs-domain/location-data | | CS domain |
| PsUserState | /{imsUeId}/access-data/ | GET | Retrieve the UE's state in PS |
| (Document) | ps-domain/user-state | | domain |
| CsUserState | /{imsUeId}/access-data/ | GET | Retrieve the UE's state in CS |
| (Document) | cs-domain/user-state | | domain |
| TadsInfo | /{imsUeId}/access-data/ | GET | Retrieve the UE's T-ADS |
| (Document) | ps-domain/tads-info | | information |
| UeReachabilityIpSubscriptions | /{imsUeId}/access-data/ | POST | Create a subscription to UE |
| (Collection) | ps-domain/ue-reach- | | Reachability for IP |
| | subscriptions | | |
| UE reachability individual | /{imsUeId}/access-data/ | DELETE | Delete the subscription to UE |
| subscription | ps-domain/ue-reach- | | reachability for IP identified |
| (Document) | subscriptions/ | | by {subscriptionId}, i.e. |
| | {subscriptionId} | | unsubscribe |
| | | PATCH | Modify the subscription to UE |
| | | | reachability for IP identified |
| | | | by {subscriptionId} |
| IpAddress | /{imsUeId}/access-data/ | GET | Retrieve the UE's stored IP |
| (Document) | ps-domain/ip-address | | Address Secure Binding |
| | | | Information |
| Csrn | /{imsUeId}/access-data/ | GET | Retrieve a CSRN for the UE |
| (Document) | cs-domain/csrn | | |
| ReferenceAccessLocation | /{imsUeId}/access-data/wireline- | GET | Retrieve the UE's subscribed |
| (Document) | domain/reference-location | | Reference Access Location |
| SRVCC Data | /{imsUeld}/srvcc-data | GET | Retrieve the UE's STN-SR |
| (Document) | | | and SRVCC capability |
| | | PATCH | Update the UE's STN-SR. |
| PSI Activation State | /{imsUeId}/service-data/ | GET | Retrieve a PSI activation |
| (Document) | psi-state | | status |
| , | i e | PATCH | Update a PSI activation |
| | | | status |
| Dsai | /{imsUeld}/service-data/dsai | GET | Retrieve DSAI data (i.e. DSAI |
| (Document) | | | tags and status) associated to |
| , | | | an Application Server |
| | | PATCH | Update DSAI data associated |
| | | | to an Application Server |
| SMSRegistrationInfo | /{imsUeId}/service-data/ | GET | Retrieve the SMS |
| (Document) | sms-registration-info | | Registration Information (e.g. |
| , | | | IP-SM-GW address) |
| | | PUT | Creates or updates the SMS |
| | | | Registration Information (e.g. |
| | | | IP-SM-GW address) |
| | | DELETE | Deletes the SMS Registration |
| | | | Information (e.g. IP-SM-GW |
| | | | address) |
| SharedData | /shared-data | GET | Retrieve shared data |
| (Collection) | | | |
| SharedDataSubscriptions | /shared-data-subscriptions | POST | Create a subscription |
| (Collection) | | | |
| Shared Data Individual | /shared-data- | DELETE | Delete the subscription |
| Subscription | subscriptions/{subscriptionId} | | identified by {subscriptionId}, |
| (Document) | | | i.e. unsubscribe |
| | | PATCH | Modify the subscription |
| | | 1.7.1011 | identified by {subscriptionId} |
| | 1 | | identified by (addadriptionid) |

6.2.3.2 Resource: IMS Associated Identities

6.2.3.2.1 Description

This resource represents the IMS associated identities. It is queried by the service consumer (IMS-AS) to retrieve the list of identities in the same Implicit Registration Set, together with the Alias Group Information and additional information (e.g. identity type)

6.2.3.2.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/identities/ims-associated-identities

This resource shall support the resource URI variables defined in table 6.2.3.2.2-1.

Table 6.2.3.2.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.2.3 Resource Standard Methods

6.2.3.2.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.2.3.1-1.

Table 6.2.3.2.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|------|-----------|---|-------------|-------------|---------------|
| n/a | | | | | |

This method shall support the request data structures specified in table 6.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.3.2.3.1-3.

Table 6.2.3.2.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.2.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|--------------------------|---|-------------|------------------|---|
| ImsAssociatedIde ntities | M | 1 | 200 OK | A response body containing the list of identities belonging to the same Implicit Registration Set shall be returned, together with the related information (Alias Group, if any, identity type, IRS default identity, registration state of the IRS). |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |

6.2.3.3 Resource: MSISDNS

6.2.3.3.1 Description

This resource represents the MSISDNs associated to the UE. It is queried by the service consumer (IMS-AS) to retrieve the list of MSISDNs (basic and additional). If the UE is shared among multiple IMS Private Identities and the consumer queries for the basic MSISDN (C-MSISDN), the URI query parameter Private Identity (IMPI) shall be included.

6.2.3.3.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/identities/msisdns

This resource shall support the resource URI variables defined in table 6.2.3.3.2-1.

Table 6.1.3.2.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.3.3 Resource Standard Methods

6.2.3.3.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.3.3.1-1.

Table 6.2.3.3.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|------------|-----------|---|-------------|---|
| private-id | PrivateId | 0 | | IMS Private Identity (IMPI) of the UE. It shall be included if the are multiple Private Identities associated to the Public Identity received and the basic MSISDN (C-MSISDN) is requested. |

This method shall support the request data structures specified in table 6.2.3.3.3.1-2 and the response data structures and response codes specified in table 6.2.3.3.3.1-3.

Table 6.2.3.3.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.3.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|------------------|---|
| MsisdnList | M | 1 | 200 OK | A response body containing the list of MSISDNs associated to the UE and all Private Identities shall be returned. If the response is for a basic MSISDN (C-MSISDN) query (query parameter IMPI was present), only one MSISDN shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.4 Resource: S-CSCF Capabilities

6.2.3.4.1 Description

This resource represents the S-CSCF capabilities. It is queried by the service consumer (I-CSCF) to retrieve S-CSCF capabilities associated to the UE (mandatory capabilities and/or optional capabilities).

6.2.3.4.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/location-data/scscf-capabilities

This resource shall support the resource URI variables defined in table 6.2.3.4.2-1.

Table 6.2.3.4.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.4.3 Resource Standard Methods

6.2.3.4.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.4.3.1-1.

Table 6.2.3.4.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|------|-----------|---|-------------|-------------|---------------|
| n/a | | | | | |

This method shall support the request data structures specified in table 6.2.3.4.3.1-2 and the response data structures and response codes specified in table 6.2.3.4.3.1-3.

Table 6.2.3.4.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.4.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|---------------------|---|-------------|------------------|--|
| ScscfCapabilityList | М | 1 | 200 OK | A response body containing the list mandatory and/or optional capabilities shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND NOTE: DATA_NOT_FOUND indicates that any S-CSCF can be selected, e.g. based on I-CSCF local policy. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.5 Resource: IMS Profile Data

6.2.3.5.1 Description

This resource represents the IMS Profile Data. It is queried by the service consumer (S-CSCF) to retrieve the user's IMS profile data, containing the required information to handle the multimedia sessions (e.g. Initial Filter Criteria)

6.2.3.5.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/profile-data

This resource shall support the resource URI variables defined in table 6.2.3.5.2-1.

Table 6.2.3.5.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.5.3 Resource Standard Methods

6.2.3.5.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.5.3.1-1.

NOTE: The retrieval of these data sets can also be achieved by sending individual GET requests to the corresponding sub-resources under the {imsUeId} resource. When multiple data sets need to be retrieved by the NF Service consumer, it is recommended to use a single GET request with query parameters rather than issuing multiple GET requests.

Table 6.2.3.5.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | |
|---------------|----------------|---|-------------|-----------------------------------|--|
| dataset-names | array(DataSetN | 0 | 1N | Datasets to be retrieved | |
| | ame) | | | Datasets to be retrieved | |
| supported- | SupportedFeat | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |
| features | ures | | | See 3GFF 13 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.5.3.1-2 and the response data structures and response codes specified in table 6.2.3.5.3.1-3.

Table 6.2.3.5.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.5.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|----------------|---|-------------|------------------|---|
| | | | codes | |
| ImsProfileData | М | 1 | 200 OK | Upon success, a response body containing the User's Profile Data shall be included. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application errors: - OPERATION_NOT_ALLOWED |

6.2.3.6 Resource: Subscriptions

6.2.3.6.1 Description

This resource is used to represent subscriptions to notifications of data change.

6.2.3.6.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/subscriptions

This resource shall support the resource URI variables defined in table 6.2.3.6.2-1.

Table 6.2.3.6.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.6.3 Resource Standard Methods

6.2.3.6.3.1 POST

This method shall support the URI query parameters specified in table 6.2.3.6.3.1-1.

Table 6.2.3.6.3.1-1: URI query parameters supported by the POST method on this resource

| Name | Data type | P | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.6.3.1-2 and the response data structures and response codes specified in table 6.2.3.6.3.1-3.

Table 6.2.3.6.3.1-2: Data structures supported by the POST Request Body on this resource

| Data type | Р | Cardinality | Description |
|-------------------------|---|-------------|---|
| ImsSdmSubscripti | М | 1 | The subscription that is to be created. |
| on | | | |

Table 6.2.3.6.3.1-3: Data structures supported by the POST Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|---------------------|---|-------------|----------------------------|---|
| ImsSdmSubscript ion | М | 1 | 201 Created | Upon success, a response body containing a representation of the created Individual subscription resource shall be returned. |
| | | | | The HTTP response shall include a "Location" HTTP header that contains the resource URI of the created resource. |
| ProblemDetails | М | 1 | 404 Not Found | The "cause" attribute shall be set to the following application error: - USER_NOT_FOUND |
| ProblemDetails | М | 1 | 501 Not Implemente d | The "cause" attribute shall be set to the following application error: - UNSUPPORTED_RESOURCE_URI This response shall not be cached. |

6.2.3.7 Resource: Individual subscription

6.2.3.7.1 Description

This resource is used to represent an individual subscription to notifications of data change.

6.2.3.7.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.2.3.7.2-1.

Table 6.2.3.7.2-1: Resource URI variables for this resource

| Name | Definition |
|----------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |
| subscriptionId | The subscriptionId identifies an individual subscription to notifications. |

6.2.3.7.3 Resource Standard Methods

6.2.3.7.3.1 DELETE

This method shall support the URI query parameters specified in table 6.2.3.7.3.1-1.

Table 6.2.3.7.3.1-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.7.3.1-2 and the response data structures and response codes specified in table 6.2.3.7.3.1-3.

Table 6.2.3.7.3.1-2: Data structures supported by the Delete Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | | | The request body shall be empty. |

Table 6.2.3.7.3.1-3: Data structures supported by the DELETE Response Body on this resource

| Data type | Р | Cardinality | Respons | Description |
|----------------|---|-------------|---------|--|
| | | | е | |
| | | | codes | |
| n/a | | | 204 No | Upon success, an empty response body shall be returned. |
| | | | Content | |
| ProblemDetails | M | 1 | 404 Not | The "cause" attribute shall be set to one of the following |
| | | | Found | application errors: |
| | | | | - USER_NOT_FOUND |
| | | | | - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] |
| | | | | table 5.2.7.2-1. |

6.2.3.7.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.7.3.2-1.

Table 6.2.3.7.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.7.3.2-2 and the response data structures and response codes specified in table 6.2.3.7.3.2-3.

Table 6.2.3.7.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|--|
| array(PatchItem) | М | | It contains the list of changes to be made to the resource representing the individual subscription, according to the JSON PATCH format specified in IETF RFC 6902 [12]. |

Table 6.2.3.7.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, a response with no content is returned. |
| ProblemDetails | M | 1 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - USER_NOT_FOUND - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |
| ProblemDetails | M | 1 | 403 Forbidden | One or more attributes are not allowed to be modified. The "cause" attribute shall be set to: - MODIFICATION_NOT_ALLOWED, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

6.2.3.8 Resource: SharedDataSubscriptions

6.2.3.8.1 Description

This resource is used to represent subscriptions to notifications for shared data.

6.2.3.8.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/shared-data-subscriptions

This resource shall support the resource URI variables defined in table 6.2.3.8.2-1.

Table 6.2.3.8.2-1: Resource URI variables for this resource

| Name | | Definition | |
|------------|------------------|------------|--|
| apiRoot | See clause 6.2.1 | | |
| apiVersion | See clause 6.2.1 | | |

6.2.3.8.3 Resource Standard Methods

6.2.3.8.3.1 POST

This method shall support the URI query parameters specified in table 6.2.3.8.3.1-1.

Table 6.2.3.8.3.1-1: URI query parameters supported by the POST method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.8.3.1-2 and the response data structures and response codes specified in table 6.2.3.8.3.1-3.

Table 6.2.3.8.3.1-2: Data structures supported by the POST Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|---|
| ImsSdmSubscripti | M | 1 | The subscription that is to be created. |
| on | | | |

Table 6.2.3.8.3.1-3: Data structures supported by the POST Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|-----------------|---|-------------|----------------------------|--|
| | | | codes | |
| ImsSdmSubscript | M | 1 | 201 | Upon success, a response body containing a representation of |
| ion | | | Created | the created Individual subscription resource shall be returned. |
| | | | | The HTTP response shall include a "Location" HTTP header that contains the resource URI of the created resource. |
| ProblemDetails | М | 1 | 501 Not Implemente d | The "cause" attribute shall be set to the following application error: - UNSUPPORTED_RESOURCE_URI |
| | | | | This response shall not be cached. |

6.2.3.9 Resource: Shared Data Individual subscription

6.2.3.9.1 Description

This resource is used to represent an individual subscription to notifications for shared data.

6.2.3.9.2 Resource Definition

Resource URI: {apiRoot}/nhss-sdm/{apiVersion}/shared-data-subscriptions/{subscriptionId}

This resource shall support the resource URI variables defined in table 6.2.3.9.2-1.

Table 6.2.3.9.2-1: Resource URI variables for this resource

| Name | Definition |
|----------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| subscriptionId | The subscriptionId identifies an individual subscription to notifications. |

6.2.3.9.3 Resource Standard Methods

6.2.3.9.3.1 DELETE

This method shall support the URI query parameters specified in table 6.2.3.9.3.1-1.

Table 6.2.3.9.3.1-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.zz.3.1-2 and the response data structures and response codes specified in table 6.2.3.zz.3.1-3.

Table 6.2.3.9.3.1-2: Data structures supported by the Delete Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | | | The request body shall be empty. |

Table 6.2.3.9.3.1-3: Data structures supported by the DELETE Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | М | 1 | 404 Not Found | The resource corresponding to the SubscriptionId can't be found. |
| | | | | The "cause" attribute shall be set to: - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

6.2.3.9.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.9.3.2-1.

Table 6.2.3.9.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Ρ | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.9.3.2-2 and the response data structures and response codes specified in table 6.2.3.9.3.2-3.

Table 6.2.3.9.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|--|
| array(PatchItem) | М | | It contains the list of changes to be made to the resource representing the individual subscription, according to the JSON PATCH format specified in IETF RFC 6902 [12]. |

Table 6.2.3.9.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|------------------|---|-------------|-----------|---|
| | | | codes | |
| ImsSdmSubscripti | M | 1 | 200 OK | Upon success, the modified ImsSdmSubscription shall be |
| on | | | | returned. |
| ProblemDetails | M | 1 | 404 Not | The resource corresponding to the SubscriptionId can't be |
| | | | Found | found. |
| | | | | |
| | | | | The "cause" attribute shall be set to: |
| | | | | - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] |
| | | | | table 5.2.7.2-1. |
| ProblemDetails | M | 1 | 403 | One or more attributes are not allowed to be modified. |
| | | | Forbidden | |
| | | | | The "cause" attribute shall be set to: |
| | | | | - MODIFICATION_NOT_ALLOWED, see 3GPP TS 29.500 [4] |
| | | | | table 5.2.7.2-1. |

6.2.3.10 Resource: IMS Registration Status

6.2.3.10.1 Description

This resource represents the IMS Registration Status. It is queried by the service consumer (e.g. AS) to retrieve the IMS registration status of the user.

6.2.3.10.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/registration-status

This resource shall support the resource URI variables defined in table 6.2.3.10.2-1.

Table 6.2.3.10.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.10.3 Resource Standard Methods

6.2.3.10.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.10.3.1-1.

Table 6.2.3.10.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.10.3.1-2 and the response data structure and response codes specified in table 6.2.3.10.3.1-3.

Table 6.2.3.10.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.10.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|-----------------------|---|-------------|----------------|---|
| ImsRegistrationStatus | М | 1 | 200 OK | A response body containing the IMS registration status of the user. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates the user has not performed yet any IMS registration. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION NOT ALLOWED |

6.2.3.11 Resource: Service Priority Information

6.2.3.11.1 Description

This resource represents the Service Priority Levels. It is queried by the service consumer (e.g. AS) to retrieve the Namespaces and priority levels allowed for the user.

6.2.3.11.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/profile-data/priority-levels

This resource shall support the resource URI variables defined in table 6.2.3.11.2-1.

Table 6.2.3.11.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.11.3 Resource Standard Methods

6.2.3.11.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.11.3.1-1.

Table 6.2.3.11.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP 1 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.11.3.1-2 and the response data structures and response codes specified in table 6.2.3.11.3.1-3.

Table 6.2.3.11.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.11.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|--|
| PriorityLevels | M | 1 | 200 OK | A response body containing the service priority information (priority namespaces and associated levels) allowed for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the user |
| ProblemDetails | 0 | 01 | 403 Forbidden | does not have priority service. The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.12 Resource: Initial Filter Criteria

6.2.3.12.1 Description

This resource represents the Initial Filter Criteria (IFCs). It is queried by the service consumer (e.g. S-CSCF) to retrieve the list of IFCs associated to the UE (including Shared IFC Set Identifiers, if provisioned).

6.2.3.12.2 Resource Definition

 $Resource\ URI:\ \{apiRoot\}/nhss-ims-sdm/\{apiVersion\}/\{imsUeId\}/ims-data/profile-data/ifcs\}/(imsUeId)/(ims$

This resource shall support the resource URI variables defined in table 6.2.3.12.2-1.

Table 6.2.3.12.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.12.3 Resource Standard Methods

6.2.3.12.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.12.3.1-1.

Table 6.2.3.12.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.12.3.1-2 and the response data structures and response codes specified in table 6.2.3.12.3.1-3.

Table 6.2.3.12.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | P | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.12.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|------------------|---|
| Ifcs | М | 1 | 200 OK | A response body containing the list of complete IFCs and/or shared IFC set identifiers shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that there is no Initial Filter Criteria associated to the user (i.e. no AS is triggered by S-CSCF for the user) |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.13 Resource: IMS Location Data

6.2.3.13.1 Description

This resource represents the IMS location data. It is queried by the service consumer (e.g. AS) to retrieve the S-CSCF name stored for the user.

6.2.3.13.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/location-data/server-name

This resource shall support the resource URI variables defined in table 6.2.3.13.2-1.

Table 6.2.3.13.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.13.3 Resource Standard Methods

6.2.3.13.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.13.3.1-1.

Table 6.2.3.13.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.13.3.1-2 and the response data structure and response codes specified in table 6.2.3.13.3.1-3.

Table 6.2.3.13.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.13.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|-----------------|---|-------------|----------------|---|
| ImsLocationData | М | 1 | 200 OK | A response body containing the S-CSCF name stored for the user. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates the user has not |
| | | | | performed yet any IMS registration. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.14 Resource: Service Level Trace Information

6.2.3.14.1 Description

This resource represents the Service Level Trace Information. It is queried by the service consumer (e.g. AS) to retrieve the Trace Level information so that the consumer can perform logging for the user as described in IETF RFC 8497 [23].

6.2.3.14.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/ims-data/profile-data/service-trace-level-information

This resource shall support the resource URI variables defined in table 6.2.3.14.2-1.

Table 6.2.3.14.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.14.3 Resource Standard Methods

6.2.3.14.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.14.3.1-1.

Table 6.2.3.14.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.14.3.1-2 and the response data structures and response codes specified in table 6.2.3.14.3.1-3.

Table 6.2.3.14.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.14.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|------------------------------|---|-------------|----------------|---|
| ServiceLevelTraceInformation | М | 1 | 200 OK | A response body containing the IMS service level trace information shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the service |
| ProblemDetails | 0 | 01 | 403 Forbidden | level tracing is disabled for the user. The "cause" attribute may be used to indicate the |
| FIODICITIDEtails | | 01 | 403 FOIDIQUEIT | following application error: - OPERATION_NOT_ALLOWED |

6.2.3.15 Resource: PS location Information

6.2.3.15.1 Description

This resource represents the Location Information in PS domain. It is queried by the service consumer (e.g. AS) to retrieve the location information in PS domain as retrieved from the serving node(s). The service consumer may indicate the requested nodes for which the request is applicable (e.g. AMF only)

6.2.3.15.2 Resource Definition

 $Resource\ URI:\ \{apiRoot\}/nhss-ims-sdm/\{apiVersion\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data\}/\{imsUeId\}/access-data/ps-domain/location-data$

This resource shall support the resource URI variables defined in table 6.2.3.15.2-1.

Table 6.2.3.15.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity or Public Service Identity) or the IMS private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.15.3 Resource Standard Methods

6.2.3.15.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.15.3.1-1.

Table 6.2.3.15.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|------------------------|----------------------|---|-------------|--|
| requested-nodes | array(RequestedNode) | 0 | 0N | Indicates the serving node(s) for which the request is applicable. |
| serving-node | boolean | 0 | 01 | Indicates that only the stored NF id/address of the serving node(s) requested and PLMN identity are required, that is, other location data (e.g. Global Cell ID) is not required. It shall be absent if current-location is present with value true. |
| | | | | true: only the requested node(s) address(es) are requested false or absent: location data as retrieved from the requested node(s) is requested. |
| local-time | boolean | 0 | 01 | Indicates that only the Local Time Zone information (Time Zone and Daylight Saving Time) and the PLMN identity of the location in the visited network where the UE is attached is requested, that is, other location data (e.g. Global Cell ID) is not required. |
| | | | | true: only the local time is requested false or absent: location data as retrieved from the requested node(s) is requested. |
| current-location | boolean | 0 | 01 | Indicates whether an active location retrieval has to be initiated by the requested node(s). true: active location retrieval is requested |
| | | | | false or absent: active location retrieval is not requested |
| supported- features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

If "requested-nodes" is not included, HSS shall return location information as retrieved from all the nodes (AMF, MME and SGSN)

This method shall support the request data structures specified in table 6.2.3.15.3.1-2 and the response data structures and response codes specified in table 6.2.3.15.3.1-3.

Table 6.2.3.15.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.15.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|---|
| PsLocation | М | 1 | 200 OK | A response body containing the PS location information as requested shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the location information is unknown or unavailable. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.16 Resource: CS location Information

6.2.3.16.1 Description

This resource represents the Location Information in CS domain. It is queried by the service consumer (e.g. AS) to retrieve the location information in CS domain as retrieved from the MSC/VLR.

6.2.3.16.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/cs-domain/location-data

This resource shall support the resource URI variables defined in table 6.2.3.16.2-1.

Table 6.2.3.16.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity or Public Service Identity) or the IMS private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.16.3 Resource Standard Methods

6.2.3.16.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.16.3.1-1.

Table 6.2.3.16.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|------------------------|-------------------|---|-------------|---|
| serving-node | boolean | 0 | 01 | Indicates that only the MSC/VLR address and PLMN identity are required, that is, other location data (e.g. Global Cell ID) is not required. It shall be absent if current-location is |
| | | | | present. true: only the MSC/VLR number requested false or absent: location data as retrieved from the MSC/VLR is requested. |
| local-time | boolean | 0 | 01 | Indicates that only the Local Time Zone information (Time Zone and Daylight Saving Time) and the PLMN identity of the location in the visited network where the UE is attached is requested, that is, other location data (e.g. Global Cell ID) is not required. It shall be absent if current-location is |
| current-location | boolean | 0 | 01 | Indicates whether an active location retrieval has to be initiated by the MSC/VLR. |
| supported- features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

If "serving-node" is not included, HSS shall return the location data as retrieved from the MSC/VLR.

If "local-time" is not included, HSS shall return the location data as retrieved from the MSC/VLR.

This method shall support the request data structures specified in table 6.2.3.16.3.1-2 and the response data structures and response codes specified in table 6.2.3.16.3.1-3.

Table 6.2.3.16.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.16.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|---|
| CsLocation | М | 1 | 200 OK | A response body containing the CS location information as requested shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the location information is unknown or unavailable. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.17 Resource: SRVCC data

6.2.3.17.1 Description

This resource represents the SRVCC data. It is queried by the service consumer (e.g. AS) to retrieve the UE SRVCC capability and the STN-SR for the user.

6.2.3.17.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/srvcc-data

This resource shall support the resource URI variables defined in table 6.2.3.17.2-1.

Table 6.2.3.17.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity or Public Service Identity) or the IMS private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.17.3 Resource Standard Methods

6.2.3.17.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.17.3.1-1.

Table 6.2.3.17.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.17.3.1-2 and the response data structures and response codes specified in table 6.2.3.17.3.1-3.

Table 6.2.3.17.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.17.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|--|
| SrvccData | M | 1 | 200 OK | A response body containing the STN-SR and the UE SRVCC capabilities for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the user is not subscribed to SRVCC. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.17.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.17.3.2-1.

Table 6.2.3.17.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| Supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.17.3.2-2 and the response data structures and response codes specified in table 6.2.3.17.3.2-3.

Table 6.2.3.17.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|---|
| array(PatchItem) | М | 1N | Items describe the modifications to the SRVCC data. |
| | | | Modification are not applicable to UE SRVCC capabilities. |

Table 6.2.3.17.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. (NOTE 1) |
| PatchResult | М | 1 | 200 OK | Upon success, the execution report is returned. (NOTE 1) |
| ProblemDetails | M | 1 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that the user is not subscribed to SRVCC. |
| | M | 1 | 403 Forbidden | One or more attributes are not allowed to be modified. The "cause" attribute shall be set to: - MODIFICATION_NOT_ALLOWED, see GPP TS 29.500 [4] table 5.2.7.2-1 OPERATION_NOT_ALLOWED |

NOTE 1: If all the modification instructions in the PATCH request have been implemented, the HSS shall respond with 204 No Content response; if some of the modification instructions in the PATCH request have been discarded, and the NF service consumer has included in the supported-feature query parameter the "PatchReport" feature number, the HSS shall respond with PatchResult.

6.2.3.18 Resource: PSI activation state

6.2.3.18.1 Description

This resource represents the PSI activation state. It is queried by the service consumer (e.g. AS) to retrieve the activation state for the IMS Public Service Identity.

6.2.3.18.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/psi-state

This resource shall support the resource URI variables defined in table 6.2.3.18.2-1.

Table 6.2.3.18.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Service Identity |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.18.3 Resource Standard Methods

6.2.3.18.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.18.3.1-1.

Table 6.2.3.18.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.18.3.1-2 and the response data structures and response codes specified in table 6.2.3.18.3.1-3.

Table 6.2.3.18.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.18.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|--------------------|---|-------------|----------------|--|
| PsiActivationState | М | 1 | 200 OK | A response body containing the PSI activation state shall be returned. |
| ProblemDetails | 0 | 01 | | The "cause" attribute may be used to indicate one of the following application errors: - SERVICE_NOT_FOUND |
| ProblemDetails | 0 | 01 | | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.18.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.18.3.2-1.

Table 6.2.3.18.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| Supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.18.3.2-2 and the response data structures and response codes specified in table 6.2.3.18.3.2-3.

Table 6.2.3.18.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|---|
| array(PatchItem) | М | 1N | Items describe the modifications to the PSI activation state. |

Table 6.2.3.18.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. (NOTE 1) |
| PatchResult | М | 1 | 200 OK | Upon success, the execution report is returned. (NOTE 1) |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - SERVICE_NOT_FOUND |
| | 0 | 01 | 403 Forbidden | One or more attributes are not allowed to be modified. The "cause" attribute may be used to convey the following application errors: - MODIFICATION_NOT_ALLOWED, see GPP TS 29.500 [4] table 5.2.7.2-1. - OPERATION_NOT_ALLOWED |

NOTE 1: If all the modification instructions in the PATCH request have been implemented, the HSS shall respond with 204 No Content response; if some of the modification instructions in the PATCH request have been discarded, and the NF service consumer has included in the supported-feature query parameter the "PatchReport" feature number, the HSS shall respond with PatchResult.

6.2.3.19 Resource: Repository Data

6.2.3.19.1 Description

This resource represents the Repository Data. It is used by the service consumer (e.g. IMS-AS) to create, retrieve, update or delete the repository data for a given service indication.

6.2.3.19.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/repository-data/{serviceIndication}

This resource shall support the resource URI variables defined in table 6.2.3.19.2-1.

Table 6.2.3.19.2-1: Resource URI variables for this resource

| Name | Definition |
|-------------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |
| serviceIndication | Represents the identifier of a service related data. |

6.2.3.19.3 Resource Standard Methods

6.2.3.19.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.19.3.1-1.

Table 6.2.3.19.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.19.3.1-2 and the response data structures and response codes specified in table 6.2.3.19.3.1-3.

Table 6.2.3.19.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.19.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|----------------|---|-------------|------------------|--|
| | | | codes | |
| RepositoryData | М | 1 | 200 OK | A response body containing the Repository Data for the requested Service Indication. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND - DATA_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |

6.2.3.19.3.2 PUT

This method shall support the URI query parameters specified in table 6.2.3.19.3.2-1.

Table 6.2.3.19.3.2-1: URI query parameters supported by the PUT method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.19.3.2-2 and the response data structures and response codes specified in table 6.2.3.19.3.2-3.

Table 6.2.3.19.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | Р | Cardinality | Description |
|----------------|---|-------------|--|
| RepositoryData | М | 1 | The Repository Data to be created or replaced. |

Table 6.2.3.19.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-----------------------------|--|
| RepositoryData | M | 1 | 201 Created | Upon success, a response body containing a representation of the created Individual RepositoryData resource shall be returned. |
| RepositoryData | M | 1 | 200 OK | Upon success, a response body containing a representation of the updated Individual RepositoryData resource shall be returned. |
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |
| ProblemDetails | 0 | 01 | 409 Conflict | The "cause" attribute may be used to indicate one of the following application errors: - OUT_OF_SYNC |
| ProblemDetails | 0 | 01 | 413 Payload Too Large | The "cause" attribute may be used to indicate one of the following application errors: - TOO_MUCH_DATA |

6.2.3.19.3.3 DELETE

This method shall support the URI query parameters specified in table 6.2.3.19.3.3-1.

Table 6.2.3.19.3.3-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.19.3.3-2 and the response data structures and response codes specified in table 6.2.3.19.3.3-3.

Table 6.2.3.19.3.2-2: Data structures supported by the DELETE Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | | | The request body shall be empty. |

Table 6.2.3.19.3.2-3: Data structures supported by the DELETE Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|---|
| | | | | |
| n/a | | | 204 No | Upon success, an empty response body shall be returned |
| | | | Content | |
| ProblemDetails | М | 01 | 404 Not | The "cause" attribute may be used to indicate the following |
| | | | Found | application error: |
| | | | | - USER NOT FOUND |
| | | | | - DATA_NOT_FOUND |
| | | | | DATA_NOT_FOUND indicates that no repository data exists for |
| | | | | the requested service indication. |
| ProblemDetails | 0 | 01 | 403 | The "cause" attribute may be used to indicate one of the |
| | | | Forbidden | following application errors: |
| | | | | - OPERĂTION_NOT_ALLOWED |

6.2.3.20 Resource: SharedData

6.2.3.20.1 Description

This resource represents the collection of data that can be shared by multiple UEs.

6.2.3.20.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/<apiVersion>/shared-data

This resource shall support the resource URI variables defined in table 6.2.3.20.2-1.

Table 6.2.3.20.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|------------------|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |

6.2.3.20.3 Resource Standard Methods

6.2.3.20.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.20.3.1-1.

Table 6.2.3.20.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|-----------------|---------------|---|-------------|-------------|
| shared-data-ids | array(SharedD | М | 1N | |
| | atald) | | | |

This method shall support the request data structures specified in table 6.2.3.20.3.1-2 and the response data structures and response codes specified in table 6.2.3.20.3.1-3.

Table 6.2.3.20.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.20.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|-----------------|---|-------------|----------|---|
| | | | codes | |
| array(SharedDat | М | 1N | 200 OK | Upon success, a response body containing a list of |
| a) | | | | SharedData shall be returned. |
| ProblemDetails | М | 1 | 404 Not | The "cause" attribute shall be set to the following application |
| | | | Found | error: |
| | | | | - DATA_NOT_FOUND |

6.2.3.21 Resource: ImeiSvInformation

6.2.3.21.1 Description

This resource represents the IMEI(SV) information. It is queried by the service consumer (e.g. IMS AS) to retrieve the IMEI(SV) for the user.

6.2.3.21.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/identities/imeisv

This resource shall support the resource URI variables defined in table 6.2.3.21.2-1.

Table 6.2.3.21.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS Private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.21.3 Resource Standard Methods

6.2.3.21.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.21.3.1-1.

Table 6.2.3.21.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.21.3.1-2 and the response data structures and response codes specified in table 6.2.3.21.3.1-3.

Table 6.2.3.21.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.21.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|-------------------|---|-------------|----------------|--|
| ImeiSvInformation | М | 1 | 200 OK | A response body containing the IMEI(SV) information for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.22 Resource: IP Address Information

6.2.3.22.1 Description

This resource represents the IP Address Information. It is queried by the service consumer (e.g. SCC-AS) to retrieve the IP Address Information for the user.

6.2.3.22.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/ps-domain/ip-address

This resource shall support the resource URI variables defined in table 6.2.3.22.2-1.

Table 6.2.3.22.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS Private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.22.3 Resource Standard Methods

6.2.3.22.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.22.3.1-1.

Table 6.2.3.22.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.22.3.1-2 and the response data structures and response codes specified in table 6.2.3.22.3.1-3.

Table 6.2.3.22.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.22.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|--|
| IpAddress | M | 1 | 200 OK | A response body containing the IP address (IPv4, Ipv6, Ipv6 prefix and/or IPv6 interface identifier) for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that no IP Address is currently allocated for the user. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.23 Resource: T-ADS Information

6.2.3.23.1 Description

This resource represents the T-ADS Information. It is queried by the service consumer (e.g. SCC-AS) to retrieve the T-ADS Information for the user.

6.2.3.23.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/ps-domain/tads-info

This resource shall support the resource URI variables defined in table 6.2.3.23.2-1.

Table 6.2.3.23.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS Private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.23.3 Resource Standard Methods

6.2.3.23.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.23.3.1-1.

Table 6.2.3.23.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.23.3.1-2 and the response data structures and response codes specified in table 6.2.3.23.3.1-3.

Table 6.2.3.23.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.23.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|-----------------|---|-------------|----------------|---|
| TadsInformation | M | 1 | 200 OK | A response body containing the T-ADS information (most recent VoPS support) for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.24 Resource: UeReachabilitySubscriptions

6.2.3.24 Description

This resource is used to represent subscriptions to notifications of UE Reachability for IP.

6.2.3.24.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/ps-domain/ue-reach-subscriptions

This resource shall support the resource URI variables defined in table 6.2.3.24.2-1.

Table 6.2.3.24.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeId | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |

6.2.3.24.3 Resource Standard Methods

6.2.3.24.3.1 POST

This method shall support the URI query parameters specified in table 6.2.3.24.3.1-1.

Table 6.2.3.24.3.1-1: URI query parameters supported by the POST method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.24.3.1-2 and the response data structures and response codes specified in table 6.2.3.24.3.1-3.

Table 6.2.3.24.3.1-2: Data structures supported by the POST Request Body on this resource

| Data type | Р | Cardinality | Description |
|----------------------------|---|-------------|---|
| UeReachabilitySubscription | M | 1 | The subscription to UE reachability for IP that is to be created. |

Table 6.2.3.24.3.1-3: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|----------------------------|---|-------------|------------------|--|
| UeReachabilitySubscription | М | 1 | 201 Created | Upon success, a response body containing a representation of the created Individual subscription resource shall be returned. The HTTP response shall include a "Location" HTTP header that contains the resource URI of the created resource. |
| ProblemDetails | М | 1 | 404 Not Found | The "cause" attribute shall be set to the following application error: - USER_NOT_FOUND |

6.2.3.25 Resource: Individual subscription

6.2.3.25.1 Description

This resource is used to represent an individual subscription to notification of UE reachability for IP.

6.2.3.25.2 Resource Definition

 $Resource\ URI:\ \{apiRoot\}/nhss-ims-sdm/\{apiVersion\}/\{imsUeId\}/access-data/ps-domain/ue-reachsubscriptions/\{subscriptionId\}$

This resource shall support the resource URI variables defined in table 6.2.3.25.2-1.

Table 6.2.3.25.2-1: Resource URI variables for this resource

| Name | Definition |
|----------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. IMS Public User identity or Public Service Identity) |
| | pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |
| subscriptionId | The subscriptionId identifies an individual subscription to notification of UE reachability for IP. |

6.2.3.25.3 Resource Standard Methods

6.2.3.25.3.1 DELETE

This method shall support the URI query parameters specified in table 6.2.3.25.3.1-1.

Table 6.2.3.25.3.1-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.7.3.1-2 and the response data structures and response codes specified in table 6.2.3.7.3.1-3.

Table 6.2.3.25.3.1-2: Data structures supported by the Delete Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | | | The request body shall be empty. |

Table 6.2.3.25.3.1-3: Data structures supported by the DELETE Response Body on this resource

| Data type | P | Cardinality | Respons e codes | Description |
|----------------|---|-------------|-----------------------|---|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | М | 1 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - USER_NOT_FOUND - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

6.2.3.25.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.25.3.2-1.

Table 6.2.3.25.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.25.3.2-2 and the response data structures and response codes specified in table 6.2.3.25.3.2-3.

Table 6.2.3.25.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|--|
| array(PatchItem) | M | | It contains the list of changes to be made to the resource representing the individual subscription, according to the JSON PATCH format specified in IETF RFC 6902 [12]. |

Table 6.2.3.25.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|----------------|---|-------------|------------------|--|
| n/a | | | 204 No | Upon success, a response with no content is returned. |
| | | | Content | |
| ProblemDetails | M | 1 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - USER_NOT_FOUND - SUBSCRIPTION_NOT_FOUND, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |
| ProblemDetails | M | 1 | 403 Forbidden | One or more attributes are not allowed to be modified. The "cause" attribute shall be set to: - MODIFICATION_NOT_ALLOWED, see 3GPP TS 29.500 [4] table 5.2.7.2-1. |

6.2.3.26 Resource: PS User State Information

6.2.3.26.1 Description

This resource represents the User State information in PS domain. It is queried by the service consumer (e.g. AS) to retrieve the User State information in PS domain as retrieved from the serving node(s). The service consumer may indicate the requested nodes for which the request is applicable (e.g. AMF only)

6.2.3.26.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/ps-domain/user-state

This resource shall support the resource URI variables defined in table 6.2.3.26.2-1.

Table 6.2.3.15.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity or Public Service Identity) or the IMS private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.26.3 Resource Standard Methods

6.2.3.26.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.26.3.1-1.

Table 6.2.3.26.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|------------------------|----------------------|---|-------------|--|
| requested-nodes | array(RequestedNode) | 0 | | Indicates the serving node(s) for which the request is applicable. |
| supported- features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

If "requested-nodes" is not included, HSS shall return the user state as retrieved from all the nodes (AMF, MME and SGSN)

This method shall support the request data structures specified in table 6.2.3.26.3.1-2 and the response data structures and response codes specified in table 6.2.3.26.3.1-3.

Table 6.2.3.26.3.1-2: Data structures supported by the GET Request Body on this resource

| | Data type | Р | Cardinality | Description |
|---|-----------|---|-------------|-------------|
| r | n/a | | | |

Table 6.2.3.26.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|----------------|-------------|----------------|--|
| PsUserState | М | 1 | 200 OK | A response body containing the PS user state |
| rsosersiale | IVI | I | 200 OK | information as requested shall be returned. |
| ProblemDetails | emDetails O 01 | | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND |
| | | | | DATA_NOT_FOUND indicates that the user state information is unknown or unavailable. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.27 Resource: CS User State Information

6.2.3.27.1 Description

This resource represents the User State information in CS domain. It is queried by the service consumer (e.g. AS) to retrieve the User State information in CS domain as retrieved from the MSC/VLR.

6.2.3.27.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/cs-domain/user-state

This resource shall support the resource URI variables defined in table 6.2.3.27.2-1.

Table 6.2.3.15.2-1: Resource URI variables for this resource

| Name | Definition | | | | |
|------------|---|--|--|--|--|
| apiRoot | See clause 6.2.1 | | | | |
| apiVersion | See clause 6.2.1 | | | | |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity or Public Service Identity) or the IMS private Identity. | | | | |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" | | | | |

6.2.3.27.3 Resource Standard Methods

6.2.3.27.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.27.3.1-1.

Table 6.2.3.27.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|------------------------|-------------------|---|-------------|-----------------------------------|
| supported- features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.27.3.1-2 and the response data structures and response codes specified in table 6.2.3.27.3.1-3.

Table 6.2.3.27.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.27.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|---|
| CsUserState | М | 1 | 200 OK | A response body containing the CS user state information as requested shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.28 Resource: CSRN

6.2.3.28.1 Description

This resource represents the CSRN. It is queried by the service consumer (e.g. SCC-AS) to retrieve a CSRN for the user.

6.2.3.28.2 Resource Definition

 $Resource\ URI:\ \{apiRoot\}/nhss-ims-sdm/\{apiVersion\}/\{imsUeId\}/access-data/cs-domain/csrn$

This resource shall support the resource URI variables defined in table 6.2.3.28.2-1.

Table 6.2.3.28.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS Private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.28.3 Resource Standard Methods

6.2.3.28.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.28.3.1-1.

Table 6.2.3.28.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|--|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |
| pre-paging | PrePaging | 0 | 01 | Indicates if pre-paging is supported | |
| | | | | true: pre-paging is supported false or absent: pre-paging is not supported | |

This method shall support the request data structures specified in table 6.2.3.28.3.1-2 and the response data structures and response codes specified in table 6.2.3.28.3.1-3.

Table 6.2.3.28.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.28.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|----------------|---|
| Csrn | М | 1 | 200 OK | A response body containing the CSRN for the user shall be returned. |
| ProblemDetails | 0 | 01 | | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that CSRN retrieval from MSC/VLR failed. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.29 Resource: Reference Location Information

6.2.3.29.1 Description

This resource represents the Reference Location Information. It is queried by the service consumer (e.g. IMS-AS) to retrieve the reference location information for the user (e.g. line identifier in fixed access networks).

6.2.3.29.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/access-data/wireline-domain/reference-location

This resource shall support the resource URI variables defined in table 6.2.3.29.2-1.

Table 6.2.3.29.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|---|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS Private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.29.3 Resource Standard Methods

6.2.3.29.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.29.3.1-1.

Table 6.2.3.29.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description | Applicability |
|--------------------|-------------------|---|-------------|-----------------------------------|---------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 | |

This method shall support the request data structures specified in table 6.2.3.29.3.1-2 and the response data structures and response codes specified in table 6.2.3.29.3.1-3.

Table 6.2.3.29.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.29.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|------------------------------|---|-------------|----------------|---|
| ReferenceLocationInformation | М | 1 | 200 OK | A response body containing the reference location information (e.g. access type, line identifier) for the user shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate one of the following application errors: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that no reference location information exist for the user. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate the following application error: - OPERATION_NOT_ALLOWED |

6.2.3.30 Resource: SMS Registration Information

6.2.3.30.1 Description

This resource represents the SMS registration information. It is used by the service consumer (e.g. IP-SM-GW) to create, retrieve, update or delete the SMS registration information.

6.2.3.30.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/service-data/sms-registration-info

This resource shall support the resource URI variables defined in table 6.2.3.30.2-1.

Table 6.2.3.30.2-1: Resource URI variables for this resource

| Name | Definition | | | | |
|------------|--|--|--|--|--|
| apiRoot | See clause 6.2.1 | | | | |
| apiVersion | See clause 6.2.1 | | | | |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS private Identity. | | | | |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2.}limpu-te \:\+[0-9]{5.15} impi+ .+)\$" | | | | |

6.2.3.30.3 Resource Standard Methods

6.2.3.30.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.30.3.1-1.

Table 6.2.3.30.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.30.3.1-2 and the response data structures and response codes specified in table 6.2.3.30.3.1-3.

Table 6.2.3.30.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.30.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|---------------------|---|-------------|------------------|---|
| | | | codes | |
| SmsRegistrationInfo | М | 1 | 200 OK | A response body containing the SMS registration information. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| | | | | - DATA_NOT_FOUND DATA_NOT_FOUND indicates that no IP-SM-GW number is preconfigured or created previously for the user. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |

6.2.3.30.3.2 PUT

This method shall support the URI query parameters specified in table 6.2.3.30.3.2-1.

Table 6.2.3.30.3.2-1: URI query parameters supported by the PUT method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.30.3.2-2 and the response data structures and response codes specified in table 6.2.3.30.3.2-3.

Table 6.2.3.30.3.2-2: Data structures supported by the PUT Request Body on this resource

| Data type | Р | Cardinality | Description |
|----------------------|---|-------------|---|
| IpSmGwAddress | М | 1 | The SMS Registration Information to be created or replaced. |

Table 6.2.3.30.3.2-3: Data structures supported by the PUT Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|---------------------|---|-------------|-------------------|--|
| SmsRegistrationInfo | М | 1 | 201 Created | Upon success, a response body containing a representation of the created Individual RepositoryData resource shall be returned. |
| SmsRegistrationInfo | М | 1 | 200 OK | Upon success, a response body containing a representation of the updated Individual RepositoryData resource shall be returned. |
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |
| ProblemDetails | Ο | 01 | 409 Conflict | The "cause" attribute may be used to indicate one of the following application errors: - IP_SM_GW_CANNOT_BE_MODIFIED |

6.2.3.30.3.3 DELETE

This method shall support the URI query parameters specified in table 6.2.3.30.3.3-1.

Table 6.2.3.30.3.3-1: URI query parameters supported by the DELETE method on this resource

| Name | Data type | Р | Cardinality | Description |
|------|-----------|---|-------------|-------------|
| n/a | | | | |

This method shall support the request data structures specified in table 6.2.3.30.3.3-2 and the response data structures and response codes specified in table 6.2.3.30.3.3-3.

Table 6.2.3.30.3.2-2: Data structures supported by the DELETE Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|----------------------------------|
| n/a | | | The request body shall be empty. |

Table 6.2.3.30.3.2-3: Data structures supported by the DELETE Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|---|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned |
| ProblemDetails | M | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that no SMS registration |
| ProblemDetails | 0 | 01 | 403 Forbidden | information exists for the user. The "cause" attribute may be used to indicate one of the following application errors: |
| ProblemDetails | 0 | 01 | 409 Conflict | - OPERATION_NOT_ALLOWED The "cause" attribute may be used to indicate one of the following application errors: - IP_SM_GW_CANNOT_BE_MODIFIED |

6.2.3.31 Resource: Dsai

6.2.3.31.1 Description

This resource represents the DSAI Tag Information for the requested Application Server Name. It is used by the service consumer (e.g. IMS-AS) to retrieve or update the DSAI Tag Status.

6.2.3.31.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-sdm/{apiVersion}/{imsUeId}/service-data/dsai

This resource shall support the resource URI variables defined in table 6.2.3.31.2-1.

Table 6.2.3.31.2-1: Resource URI variables for this resource

| Name | Definition |
|------------|--|
| apiRoot | See clause 6.2.1 |
| apiVersion | See clause 6.2.1 |
| imsUeld | Represents the IMS Public Identity (i.e. non-shared IMS Public User identity) or the IMS private Identity. |
| | pattern: "^(impu-sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,} impu-tel\:\+[0-9]{5,15} impi+ .+)\$" |

6.2.3.31.3 Resource Standard Methods

6.2.3.31.3.1 GET

This method shall support the URI query parameters specified in table 6.2.3.31.3.1-1.

Table 6.2.3.31.3.1-1: URI query parameters supported by the GET method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.31.3.1-2 and the response data structures and response codes specified in table 6.2.3.31.3.1-3.

Table 6.2.3.31.3.1-2: Data structures supported by the GET Request Body on this resource

| Data type | Р | Cardinality | Description |
|-----------|---|-------------|-------------|
| n/a | | | |

Table 6.2.3.31.3.1-3: Data structures supported by the GET Response Body on this resource

| Data type | Р | Cardinality | Response codes | Description |
|--------------------|---|-------------|------------------|---|
| DsaiTagInformation | М | 1 | 200 OK | A response body containing the DSAI information for the requested Application Server. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND - DATA_NOT_FOUND DATA_NOT_FOUND indicates that no DSAI Tag was found for the requested Application Server. |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - OPERATION_NOT_ALLOWED |

6.2.3.31.3.2 PATCH

This method shall support the URI query parameters specified in table 6.2.3.31.3.2-1.

Table 6.2.3.31.3.2-1: URI query parameters supported by the PATCH method on this resource

| Name | Data type | Р | Cardinality | Description |
|--------------------|-------------------|---|-------------|-----------------------------------|
| Supported-features | SupportedFeatures | 0 | 01 | see 3GPP TS 29.500 [4] clause 6.6 |

This method shall support the request data structures specified in table 6.2.3.31.3.2-2 and the response data structures and response codes specified in table 6.2.3.31.3.2-3.

Table 6.2.3.31.3.2-2: Data structures supported by the PATCH Request Body on this resource

| Data type | Р | Cardinality | Description |
|------------------|---|-------------|---|
| array(PatchItem) | М | 1N | Items describe the modifications to the DSAI tag(s) activation state. |

Table 6.2.3.31.3.2-3: Data structures supported by the PATCH Response Body on this resource

| Data type | Р | Cardinality | Response | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. (NOTE 1) |
| PatchResult | М | 1 | 200 OK | Upon success, the execution report is returned. (NOTE 1) |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute shall be set to one of the following application errors: - DSAI_TAG_NOT_FOUND |
| | 0 | 01 | 403 Forbidden | One or more attributes are not allowed to be modified. The "cause" attribute may be used to convey the following application errors: - MODIFICATION_NOT_ALLOWED, see GPP TS 29.500 [4] table 5.2.7.2-1. - OPERATION_NOT_ALLOWED |

NOTE 1: If all the modification instructions in the PATCH request have been implemented, the HSS shall respond with 204 No Content response; if some of the modification instructions in the PATCH request have been discarded, and the NF service consumer has included in the supported-feature query parameter the "PatchReport" feature number, the HSS shall respond with PatchResult.

6.2.5 Notifications

6.2.5.1 General

This clause specifies the use of notifications and corresponding protocol details.

6.2.5.2 Data Change Notification

The POST method shall be used for Data Change Notifications and the URI shall be as provided during the subscription procedure.

Resource URI: {callbackReference}

Support of URI query parameters is specified in table 6.2.5.2-1.

Table 6.2.5.2-1: URI query parameters supported by the POST method

| | Name | Data type | Р | Cardinality | Description |
|----|------|-----------|---|-------------|-------------|
| n/ | /a | | | | |

Support of request data structures is specified in table 6.2.5.2-2 and of response data structures and response codes is specified in table 6.2.5.2-3.

Table 6.2.5.2-2: Data structures supported by the POST Request Body

| Data type | Р | Cardinality | Description |
|------------------------|---|-------------|-------------|
| ModificationNotificati | М | 1 | |
| on | | | |

Table 6.2.5.2-3: Data structures supported by the POST Response Body

| Data type | Р | Cardinality | Response codes | Description |
|----------------|---|-------------|-------------------|--|
| n/a | | | 204 No Content | Upon success, an empty response body shall be returned. |
| ProblemDetails | M | 1 | 404 Not Found | The "cause" attribute shall be set to the following application error: - CONTEXT_NOT_FOUND See table 6.2.7.3-1 for the description of this error. |

6.2.6 Data Model

6.2.6.1 General

This clause specifies the application data model supported by the API.

Table 6.2.6.1-1 specifies the data types defined for the Nhss_imsSDM service API.

Table 6.2.6.1-1: Nhss_imsSDM specific Data Types

| Data type | Clause defined | Description |
|------------------------------|----------------|---|
| ScscfCapabilityList | 6.2.6.2.2 | Information about mandatory and optional S-CSCF |
| | | capabilities |
| ImsProfileData | 6.2.6.2.4 | User's IMS profile data |
| RepositoryData | 6.2.6.2.7 | Repository Data for the requested Service Indication |
| MsisdnList | 6.2.6.2.8 | List of MSISDNs associated to the IMS public Identity |
| PublicIdentities | 6.2.6.2.9 | IMS Public Identities which belong to the same |
| | | Implicit Registration Set (if any) than the requested |
| | | IMS Public Identity |
| PublicIdentity | 6.2.6.2.10 | IMS Public Identity and the related data (Alias Group |
| | 0.000.44 | Id, IRS default indication, Identity Type) |
| ImsSdmSubscription | 6.2.6.2.11 | A subscription to notifications of data change |
| ImsRegistrationStatus | 6.2.6.2.12 | Registration status of the user. |
| PriorityLevels | 6.2.6.2.13 | Namespaces and priority levels allowed for the IMS public Identity. |
| Ifcs | 6.2.6.2.14 | List of IFCs associated to the IMS public Identity |
| Ifc | 6.2.6.2.15 | |
| TriggerPoint | 6.2.6.2.16 | |
| Spt | 6.2.6.2.17 | |
| HeaderSipRequest | 6.2.6.2.18 | |
| SdpDescription | 6.2.6.2.19 | |
| ApplicationServer | 6.2.6.2.20 | |
| ImsLocationData | 6.2.6.2.21 | IMS Location Data (S_CSCF name) |
| ServiceLevelTraceInformation | 6.2.6.2.22 | IMS Service Level Trace Information |
| PsLocation | 6.2.6.2.23 | Location data in PS domain. |
| SgsnLocationData | 6.2.6.2.24 | |
| MmeLocationData | 6.2.6.2.25 | |
| AmfLocationData | 6.2.6.2.26 | |
| TwanLocationData | 6.2.6.2.27 | |
| CsLocation | 6.2.6.2.28 | Location data in CS domain. |
| CsgInformation | 6.2.6.2.29 | |
| SrvccData | 6.2.6.2.30 | UE SRVCC capability (if available) and STN-SR (if subscribed) |
| PsiActivationState | 6.2.6.2.31 | Public Service Identity activation state |
| ImeiSvInformation | 6.2.6.2.34 | IMEI(SV) information |
| IpAddress | 6.2.6.2.35 | IPv4 address, IPv6 address or IPv6 prefix and/or IPv6 interface identifier |
| TadsInformation | 6.2.6.2.36 | T-ADS Information |
| UeReachabilitySubscription | 6.2.6.2.37 | A subscription to notifications of UE reachability for IP. |
| UeReachabilityNotification | 6.2.6.2.38 | A notification of UE reachability for IP. |
| PsUserState | 6.2.6.2.39 | User state in PS domain |
| CsUserState | 6.2.6.2.40 | User state in CS domain |
| Csrn | 6.2.6.2.41 | CS domain routeing number |
| ReferenceLocationInformation | 6.2.6.2.42 | Reference Location Information for the user in fixed |
| ReferenceLocationimormation | 0.2.0.2.42 | access networks. |
| SmsRegistrationInfo | 6.2.6.2.43 | SMS Registration Information (IP-SM-GW number |
| | | and SC address) |
| IpSmGwAddress | 6.2.6.2.44 | IP-SM-GW number and diameter URI/realm |
| ImsAssociatedIdentities | 6.2.6.2.45 | |
| DsaiTagInformation | 6.2.6.2.46 | DSAI tag information (list of DSAI tags activation state for an Application Server) |
| DsaiTagStatus | 6.2.6.2.47 | DSAI tag status (DSAI tag and activation state) |
| - ca. ragolalao | J.Z.U.Z. TI | por il lag otatao (por il lag alla dottvation stato) |

Table 6.2.6.1-2 specifies data types re-used by the Nhss_imsSDM service API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nhss_imsSDM.

Table 6.2.6.1-2: Nhss_imsSDM re-used Data Types

| Data type | Reference | Comments |
|--------------------------|---------------------|---|
| Uri | 3GPP TS 29.571 [16] | Uniform Resource Identifier |
| SupportedFeatures | 3GPP TS 29.571 [16] | see 3GPP TS 29.500 [4] clause 6.6 |
| ModificationNotification | 3GPP TS 29.503 [15] | Payload of the notification after a data change |
| EutraLocation | 3GPP TS 29.571 [16] | E-UTRAN user location |
| NrLocation | 3GPP TS 29.571 [16] | NR user location |
| Plmnld | 3GPP TS 29.571 [16] | PLMN Identity |
| TimeZone | 3GPP TS 29.571 [16] | Time Zone and Daylight Saving Time |
| UtraLocation | 3GPP TS 29.571 [16] | UTRAN user location |
| GeraLocation | 3GPP TS 29.571 [16] | GERAN user location |
| DiameterIdentity | 3GPP TS 29.571 [16] | Diameter URI |
| NfInstanceId | 3GPP TS 29.571 [16] | String uniquely identifying a NF instance |
| RatType | 3GPP TS 29.571 [16] | RAT type |
| StnSr | 3GPP TS 29.571 [16] | Session Transfer Number for SRVCC |
| PatchItem | 3GPP TS 29.571 [16] | Patch Item |
| PatchResult | 3GPP TS 29.571 [16] | Patch Result |
| lpv4Addr | 3GPP TS 29.571 [16] | IPv4 address |
| lpv6Addr | 3GPP TS 29.571 [16] | IPv6 address |
| Ipv6Prefix | 3GPP TS 29.571 [16] | IPv6 address prefix |
| DateTime | 3GPP TS 29.571 [16] | UTC time |
| AccessType | 3GPP TS 29.571 [16] | Type of access |

6.2.6.2 Structured data types

6.2.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

6.2.6.2.2 Type: ScscfCapabilityList

Table 6.2.6.2.2-1: Definition of type ScscfCapabilityList

| Attribute name | Data type | Р | Cardinality | Description |
|---------------------------|--------------------|--------|------------------|--|
| mandatoryCapabilityList | Capabilities | 0 | 1 | List of S-CSCF capabilities which are mandatory to |
| | | | | be supported by the S-CSCF allocated to the |
| | | | | subscription the user belongs to. |
| optionalCapabilityList | Capabilities | 0 | 1 | List of S-CSCF capabilities which are optional or |
| | | | | preferred (but not mandatory) to be supported by the |
| | | | | S-CSCF allocated to the subscription the user |
| | | | | belongs to. |
| NOTE 1: At least one of m | andatory or option | nal ca | pabilities shall | be present. |

6.2.6.2.3 Type: Capabilities

Table 6.2.6.2.3-1: Definition of type Capabilities

| Type Name | Type Definition | Description |
|--------------|-------------------|---|
| Capabilities | array(Capability) | This IE contains a list of capabilities |

6.2.6.2.4 Type: ImsProfileData

Table 6.2.6.2.4-1: Definition of type ImsProfileData

| Attribute name | Data type | Р | Cardinality | Description |
|--------------------|------------------|---|-------------|--|
| supportedFeatures | SupportedFeatur | 0 | 01 | See clause 6.1.8 |
| | es | | | |
| imsServiceProfiles | array(ImsService | М | 1N | IMS service profile shared by several public |
| | Profile) | | | identities when they belong to an IRS. |
| maxAllowedSimulReg | integer | 0 | 01 | Maximum number of allowed simultaneous |
| | | | | registrations for the Public User Identity. |

6.2.6.2.5 Type: SharedData

Table 6.2.6.2.5-1: SharedData

| Attribute name | Data type | Р | Cardinality | Description | |
|---|--------------|---|-------------|-------------------------------|--|
| sharedDataId | SharedDataId | М | 1 | Identifier of the shared data | |
| sharedImsIfcData | Ifcs | 0 | 01 | Shared IFC Subscription Data | |
| NOTE 1: The attribute sharedImsIfcData shall not contain sharedDataIds. | | | | | |
| NOTE 2: When shared data clash with individual data, individual data shall take precedence. | | | | | |

6.2.6.2.6 Type: ImsDataSets

Table 6.2.6.2.6-1: ImsDataSets

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|-------------|
| ifcData | IfcData | 0 | 01 | IFC Data |

6.2.6.2.7 Type: RepositoryData

Table 6.2.6.2.7-1: Definition of type RepositoryData

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-------------|---|-------------|---|
| serviceData | string | М | 1 | The Repository Data for the requested Service |
| | | | | Indication. Base64 encoded. |
| sequenceNumber | SequenceNum | М | 1 | The sequence number associated to the current |
| - | ber | | | version of Repository Data. |

6.2.6.2.8 Type: MsisdnList

Table 6.2.6.2.8-1: Definition of type MsisdnList

| Attribute name | Data type | Р | Cardinality | Description |
|-------------------|---------------|---|-------------|---|
| basicMsisdn | Msisdn | M | | The basic (or correlation) MSISDN associated to the IMS Public Identity for the IMS Private Identity indicated (if any) |
| additionalMsisdns | array(Msisdn) | 0 | 1N | Additional MSISDNs |

6.2.6.2.9 Type: PublicIdentities

Table 6.2.6.2.9-1: Definition of type PublicIdentities

| Attribute name | Data type | Р | Cardinality | Description |
|------------------|-----------------|---|-------------|--|
| publicIdentities | array(PublicIde | М | 1N | List of IMS Public Identities associated |
| | ntity) | | | |

6.2.6.2.10 Type: PublicIdentity

Table 6.2.6.2.10-1: Definition of type PublicIdentity

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|--------------|---|-------------|--|
| imsPublicId | ImsPublicId | М | 1 | IMS Public Identity (distinct or wildcarded) |
| identityType | IdentityType | М | 1 | Type of IMS Public Identity (e.g. Wildcarded Public Service Identity type) |
| irsIsDefault | boolean | 0 | 01 | Indicates whether the IMS Public Identity is the default within the Implicit Registration Set. Absence and false indicates "non-default". Only one identity in SIP URI format and one identity in TEL URI format (if any) shall have value True for this attribute. |
| aliasGroupId | integer | 0 | 01 | Unsigned integer indicating the Alias Group Identifier. Absence indicates that the identity does not belong to any Alias Group |

6.2.6.2.11 Type: ImsSdmSubscription

Table 6.2.6.2.11-1: ImsSdmSubscription

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------------|--------------|---|-------------|--|
| nfInstanceId | NfInstanceId | M | 1 | Identity of the NF Instance creating the |
| | | | | subscription. |
| callbackReference | Uri | M | 1 | URI provided by the NF service consumer to |
| | | | | receive notifications |
| monitoredResourceUris | array(Uri) | M | 1N | A set of URIs that identify the resources for |
| | | | | which a change triggers a notification. |
| | | | | The URI shall take the form of either an |
| | | | | absolute URI or an absolute-path reference as |
| | | | | defined in IETF RFC 3986 [31]. |
| expires | DateTime | С | 01 | If present, indicates the point in time at which |
| | | | | the subscription expires. |
| | | | | Within a POST request the proposed expiry |
| | | | | time is conveyed whereas in a POST response |
| | | | | or PATCH response the confirmed expiry time |
| | | | | is returned. |

6.2.6.2.12 Type: ImsRegistrationStatus

Table 6.2.6.2.12-1: Definition of type ImsRegistrationStatus

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|----------------------|---|-------------|---|
| imsUserStatus | ImsRegistrationState | M | | It contains the registration state of the user or the IRS, as described in 3GPP TS 29.328 [38], clause 7.6.3. |

6.2.6.2.13 Type: PriorityLevels

Table 6.2.6.2.13-1: Definition of type PriorityLevels

| Attribute name | Data type | Р | Cardinality | Description |
|--------------------------|--------------------------|---|-------------|---|
| servicePriorityLevelList | array(NameSpacePriority) | М | 1N | List of namespaces and their associated |
| _ | | | | priorities allowed for the user. |

6.2.6.2.14 Type: Ifcs

Table 6.2.6.2.14-1: Definition of type Ifcs

| Attribute name | Data type | Р | Cardinality | Description | |
|--|------------------------|---|-------------|---|--|
| ifcList | array(lfc) | С | 1N | List of complete IFCs which are associated to | |
| | | | | the user. | |
| cscfFilterSetIdList | array(cscfFilterSetId) | С | 1N | List of S-CSCF specific filter set identifiers. | |
| NOTE: At least one of IfcList or cscfFilterSetIdList shall be present. | | | | | |

6.2.6.2.15 Type: Ifc

Table 6.2.6.2.15-1: Definition of type Ifc

| Attribute nam | ne Data type | Р | Cardinality | Description | | |
|---|---|---|-------------|--|--|--|
| priority | integer | М | 1 | Contains the priority of the IFC. The higher the Priority Number the lower the priority of the Filter Criteria is. Minimum: 1 | | |
| trigger | TriggerPoint | 0 | 1 | Contains the conditions that should be checked in order to find out if the indicated Application Server should be contacted or not. The absence of this attribute will indicate an unconditional triggering to Application Server. | | |
| appServer | ApplicationServer | М | 1 | Contains the Application Server which shall be triggered if the conditions are met and its associated data (e.g. default handling) | | |
| NOTE: See 3GPP TS 29.228 [20], Annex B.2.2 for more details on the terms and concepts associated to Initial | | | | | | |
| | Criteria. The ProfilePartInd the SessionCase attribute of | | | bed in Annex B.2.2 is removed and it shall be derived 2.3. | | |

6.2.6.2.16 Type: TriggerPoint

Table 6.2.6.2.16-1: Definition of type TriggerPoint

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------------|---|-------------|---|
| conditionType | TypeOfCondition | М | | Indicates how the set of SPTs are expressed, i.e. either an Ored set of ANDed sets of SPT |
| | | | | statements or an ANDed set of Ored sets of statements. These combinations are termed, respectively, Disjunctive Normal Form (DNF) and |
| | | | | Conjunctive Normal Form (CNF) for the SPT (see 3GPP TS 29.228 [20], Annex C). |
| sptList | array(Spt) | М | 1N | Contains the list of Service Point Triggers |

6.2.6.2.17 Type: Spt

Table 6.2.6.2.17-1: Definition of type Spt

| Attribute name | Data type | Р | Cardinality | Description | | | |
|--|-------------------------|---|-------------|---|--|--|--|
| conditionNegated | boolean | М | 1 | Indicates if the Service Point Trigger instance is | | | |
| | | | | negated (i.e. NOT logical expression) | | | |
| sptGroup | array(SptGroupId) | M | 1N | Contains the SPT group or list of SPT groups assigned to the SPT. | | | |
| regType | array(RegistrationType) | 0 | 12 | Indicates the type of registration. If included, it shall contain the values that define whether the SPT matches to REGISTER messages that are related to initial registrations, re-registrations, and/or deregistrations. This attribute shall be included only if the SPT is for SIP method with a value "REGISTER" and only if it does not apply to all types of registration; otherwise, it shall be absent (i.e. the SIP Method SPT matches to all REGISTER messages). | | | |
| | | | | The attribute regType shall be discarded if it is present in an SPT other than SIP Method with value "REGISTER". | | | |
| requestURI | string | С | 1 | Contains the request-URI of the SIP request (NOTE 2) | | | |
| sipMethod | string | С | 1 | Contains the method of the SIP request (NOTE 2) | | | |
| sipHeader | HeaderSipRequest | С | 1 | Contains a header (and optionally value of the header) in the SIP request (NOTE 2) | | | |
| sessionCase | RequestDirection | 0 | 1 | Contains the direction of the SIP request as evaluated by the S-CSCF. | | | |
| sessionDescription | SdpDescription | С | 1 | Contains a SDP line (and optionally the valuein the line) within the body (if any) of a SIP request (NOTE 2) | | | |
| NOTE 1: See 3GPP TS 29.228 [20], Annex B.2.3 for more details on the terms and concepts associated to Service Point Trigger. The ProfilePartIndicator attribute described in Annex B.2.2 is removed and it shall be derived from the SessionCase attribute described in Annex B.2.3. | | | | | | | |

NOTE 2: Exactly one of requestURI, method, header and sessionDescription shall be present. See TS 29.228 [20], Annex F for the definition of these attributes.

6.2.6.2.18 Type: HeaderSipRequest

Table 6.2.6.2.18-1: Definition of type HeaderSipRequest

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| header | string | М | 1 | Contains a SIP header |
| content | string | 0 | | Contains the content of the SIP header. If this attribute is absent, it shall indicate that the SPT is the presence (if conditionNegated="FALSE") or absence (if conditionNegated="TRUE") of the SIP header. |

6.2.6.2.19 Type: SdpDescription

Table 6.2.6.2.19-1: Definition of type SdpDescription

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| line | string | М | 1 | Contains a line in the session description |
| content | string | 0 | | Contains the content of the SDP line. If this attribute is absent, it shall indicate that the SPT is the presence (if conditionNegated="FALSE") or absence (if conditionNegated="TRUE") of the SDP line. |

6.2.6.2.20 Type: ApplicationServer

Table 6.2.6.2.20-1: Definition of type ApplicationServer

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------|---------------------------|---|-------------|---|
| asUri | string | М | 1 | Contains the Application Server SIP URI, as described in IETF RFC 3261 [22] or 3GPP TS 23.003 [13]. |
| sessionContinue | boolean | 0 | 1 | This IE indicates whether the SIP dialog shall be continued or released if the Application Server could not be reached. |
| | | | | true: indicates that the session shall be continued |
| | | | | false or absent: indicates that the session shall be released |
| serviceInfoList | array(ServiceInformation) | 0 | 1N | Indicates a list of service information that shall be sent to the Application Server. |

6.2.6.2.21 Type: ImsLocationData

Table 6.2.6.2.21-1: Definition of type ImsLocationData

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| scscfName | string | М | 1 | S-CSCF name assigned to the IMS subscription |
| | | | | the UE belongs to in the form of a SIP URI, as |
| | | | | defined in IETF RFC 3261 [22]. |

6.2.6.2.22 Type: ServiceLevelTraceInformation

Table 6.2.6.2.22-1: Definition of type ServiceLevelTraceInformation

| Attribute name | Data type | P | Cardinality | Description |
|-----------------------|-----------|---|-------------|---|
| serviceLevelTraceInfo | string | M | 1 | IMS Service Level Trace information. Syntax |
| | | | | described in 3GPP TS 24.323 [24] |

6.2.6.2.23 Type: PsLocation

Table 6.2.6.2.23-1: Definition of type PsLocation

| Attribute name | Data type | Р | Cardinality | Description | | |
|---|--|---|-------------|---|--|--|
| sgsnLocation | SgsnLocationData | 0 | 01 | Location information as retrieved from SGSN | | |
| mmeLocation | MmeLocationData | 0 | 01 | Location information as retrieved from MME | | |
| amfLocation | AmfLocationData | 0 | 01 | Location information as retrieved from AMF | | |
| twanLocation | twanLocation TwanLocationData O 01 3GPP AAA Server for TWAN Location | | | | | |
| information. | | | | | | |
| NOTE: At least one of the "sgsnLocation", "mmeLocation", "amfLocation" or "twanLocation" shall be included. | | | | | | |

6.2.6.2.24 Type: SgsnLocationData

Table 6.2.6.2.24-1: Definition of type SgsnLocationData

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|----------------|---|-------------|--|
| sgsnNumber | string | М | 1 | SGSN number. See 3GPP TS 23.003 [13] |
| | | | | clause 5.1. |
| plmnld | PlmnId | М | 1 | PLMN identity |
| sgsnLocation | UtraLocation | 0 | 01 | User location as retrieved from SGSN. |
| csgInformation | CsgInformation | 0 | 01 | Closed Subscriber Group Information. See |
| | | | | 3GPP TS 23.060 [25]. |
| timeZone | TimeZone | 0 | 01 | Local Time Zone information (Time Zone and |
| | | | | Daylight Saving Time) of the location in the |
| | | | | visited network where the UE is located. |
| ratType | RatType | 0 | 01 | RAT type |

6.2.6.2.25 Type: MmeLocationData

Table 6.2.6.2.25-1: Definition of type MmeLocationData

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|------------------|---|-------------|--|
| mmeAddress | DiameterIdentity | M | 1 | MME diameter identity |
| plmnld | Plmnld | М | 1 | PLMN identity |
| mmeLocation | EutraLocation | 0 | 01 | User location as retrieved from MME. |
| csgInformation | CsgInformation | 0 | 01 | Closed Subscriber Group Information. See 3GPP TS 23.060 [25]. |
| timeZone | TimeZone | 0 | 01 | Local Time Zone information (Time Zone and Daylight Saving Time) of the location in the visited network where the UE is located. |
| ratType | RatType | 0 | 01 | RAT type |

6.2.6.2.26 Type: AmfLocationData

Table 6.2.6.2.26-1: Definition of type AmfLocationData

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|--------------|---|-------------|--|
| amfAddress | NfInstanceId | М | 1 | AMF identity. |
| plmnld | Plmnld | М | 1 | PLMN identity |
| amfLocation | NrLocation | 0 | 01 | User location as retrieved from AMF. |
| SMSFAddress | NfInstanceId | 0 | 01 | SMSF identity |
| timeZone | TimeZone | 0 | 01 | Local Time Zone information (Time Zone and Daylight Saving Time) of the location in the visited network where the UE is located. |
| ratType | RatType | Ο | 01 | RAT type |

6.2.6.2.27 Type: TwanLocationData

Table 6.2.6.2.27-1: Definition of type TwanLocationData

| Attribute name | Data type | Р | Cardinality | Description |
|------------------|-----------|---|-------------|--|
| twanSsid | string | M | 1 | TWAN SSID, as defined in |
| | | | | 3GPP TS 29.273 [26]. |
| plmnld | Plmnld | M | 1 | PLMN identity of the TWAN |
| twanBssid | string | 0 | 01 | TWAN BSSID, as defined in |
| | | | | 3GPP TS 29.273 [26]. |
| civicAddress | string | 0 | 01 | Defined in clause 3.4 of IETF RFC 4776 [27] |
| | | | | excluding the first 3 octets. |
| | | | | Base64 encoded, according to |
| | | | | IETF RFC 2045 [28]). |
| twanOperatorName | string | 0 | 01 | TWAN Operator Name, as defined in clause |
| | | | | 19.8 of 3GPP TS 23.003 [13]. |
| timeZone | TimeZone | 0 | 01 | Local Time Zone information (Time Zone and |
| | | | | Daylight Saving Time) of the location in the |
| | | | | visited network where the UE is located. |
| logicalAccessId | string | 0 | 01 | Logical Access ID, as defined in |
| | | | | ETSI ES 283 034 [29]. |

6.2.6.2.28 Type: CsLocation

Table 6.2.6.2.28-1: Definition of type CsLocation

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|----------------|---|-------------|--|
| mscNumber | string | М | 01 | MSC number. See 3GPP TS 23.003 [13] |
| | | | | clause 5.1. |
| vlrNumber | string | М | 01 | VLR number. See 3GPP TS 23.003 [13] |
| | _ | | | clause 5.1. |
| plmnld | PlmnId | М | 01 | PLMN identity |
| vlrLocation | GeraLocation | 0 | 01 | User location as retrieved from MSC/VLR. |
| csgInformation | CsgInformation | 0 | 01 | Closed Subscriber Group Information. See |
| | | | | 3GPP TS 23.060 [25]. |
| timeZone | TimeZone | 0 | 01 | Local Time Zone information (Time Zone and |
| | | | | Daylight Saving Time) of the location in the |
| | | | | visited network where the UE is located. |
| ratType | RatType | 0 | 01 | RAT type |

6.2.6.2.29 Type: CsgInformation

Table 6.2.6.2.29-1: Definition of type CsgInformation

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| csgld | string | M | 1 | CSG Identity. Syntax described in 3GPP TS 29.002 [30] i.e. 5 octets BER encoded value of 27-bit BIT STRING (Base64 encoded according to IETF RFC 2045 [28]). Length = 8. |
| accessMode | string | 0 | 01 | CSG Access Mode. Syntax described in 3GPP TS 29.002 [30] (Base64 encoded according to IETF RFC 2045 [28]). Length = 4. |
| сМі | boolean | 0 | 01 | CSG Membership Indication 0: CSG membership 1: non CSG membership |

6.2.6.2.30 Type: SrvccData

Table 6.2.6.2.30-1: Definition of type SrvccData

| Attribute name | Data type | Р | Cardinality | Description |
|---------------------|-----------------------|---|-------------|--|
| stnSr | StnSr | M | 1 | lindicates the STN-SR (Session Transfer |
| | | | | Number for SRVCC) of the UE. |
| ueSrvccCapabilities | array(SrvccCapabilty) | 0 | | List of accesses supported by UE SRVCC capability (e.g. 4G, 5G). Absence of this attribute indicates that UE is not SRVCC capable. |

6.2.6.2.31 Type: PsiActivationState

Table 6.2.6.2.31-1: Definition of type PsiActivationState

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------|-----------------|---|-------------|---|
| activationState | ActivationState | М | 1 | Indicates whether the PSI is active or inactive |

6.2.6.2.32 Type: ImsServiceProfile

Table 6.2.6.2.32-1: Definition of type ImsServiceProfile

| Attribute name | Data type | Р | Cardinality | Description |
|----------------------|-------------------------|---|-------------|--|
| publicIdentifierList | array(PublicIdentifier) | М | 1N | List of public identities sharing the same service |
| | | | | profile and its individual data |
| ifcs | Ifcs | 0 | 1 | List of IFCs and/or shared IFC set identifiers |

6.2.6.2.33 Type: PublicIdentifier

Table 6.2.6.2.33-1: Definition of type PublicIdentifier

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------------|-------------------------------|---|-------------|--|
| publicIdentity | PublicIdentity | М | 1 | Public identity information |
| displayName | string | 0 | 1 | Name associated with the public identity |
| imsServicePriority | PriorityLevels | 0 | 1 | Multimedia service priority |
| serviceLevelTraceInfo | ServiceLevelTraceInfo rmation | 0 | 1 | Service Level Tracing Information |
| barringIndicator | boolean | 0 | 1 | Indicates whether the identity is barred, i.e. it can not be used in any IMS communication except registrations, re-registrations and deregistrations. true: identity is barred false or absent: identity is not barred |
| wildcardedImpu | String | 0 | 1 | When identityType is wildcarded IMPU it contains the wildcard id as stored by HSS |

6.2.6.2.34 Type: ImeiSvInformation

Table 6.2.6.2.34-1: Definition of type ImeiSvInformation

| Attribu | te name | Data type | Р | Cardinality | Description |
|---------|----------------|-------------------------|----|-------------|----------------------|
| imei | | string | С | 1 | Indicates the IMEI |
| imeiSv | | string | С | 1 | Indicates the IMEISV |
| NOTE: | Either imei or | imeiSv shall be present | t. | • | |

6.2.6.2.35 Type: IpAddress

Table 6.2.6.2.35-1: Definition of type lpAddressInformation

| Attribute name | Data type | Р | Cardinality | Description | |
|---|------------|---|-------------|---------------------|--|
| ipv4Addr | lpv4Addr | С | 01 | IPv4 address | |
| ipv6Addr | lpv6Addr | С | 01 | IPv6 address | |
| ipv6Prefix | Ipv6Prefix | С | 01 | IPv6 address prefix | |
| NOTE: Either ipv4Addr, or ipv6Addr, or ipv6Prefix shall be present. | | | | | |

6.2.6.2.36 Type: TadsInformation

Table 6.2.6.2.36-1: Definition of type TadsInformation

| Attribute name | Data type | Р | Cardinality | Description |
|---------------------|------------------------|---|-------------|--|
| voiceOverPsSessionS | ImsVoiceOverPsSessionS | M | 1 | Indicates the support for Voice over PS |
| upport | upport | | | |
| accessType | AccessType | 0 | 01 | Indicates the type of access |
| ratType | RatType | 0 | 01 | Indicates the RAT Type |
| lastUeActivityTime | DateTime | 0 | 01 | Indicates the time of the last radio contact |
| - | | | | with the UE. |

6.2.6.2.37 Type: UeReachabilitySubscription

Table 6.2.6.2.37-1: Definition of type UeReachabilitySubscription

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--|
| expiry | DateTime | М | | Indicates the suggested time at which monitoring should cease and the subscription |
| | | | | should become invalid. |

6.2.6.2.38 Type: UeReachabilityNotification

Table 6.2.6.2.38-1: Definition of type UeReachabilityNotification

| Attribute name | Data type | Р | Cardinality | Description | | |
|--|---------------|---|-------------|---|--|--|
| reachabilityIndicator | boolean | М | 1 | Indicates that the UE has been detected reachable for IP. | | |
| detectingNode | RequestedNode | М | 1 | Indicates the serving node which detected the UE reachabilty for IP (NOTE 1) | | |
| accessType | AccessType | С | 1 | Indicates the access type (e.g. non 3GPP) where the reachabilty was detected. It shall be present when the serving node is AMF. | | |
| NOTE 1: Value "3GPP_AAA_SERVER_TWAN" is not applicable | | | | | | |

6.2.6.2.39 Type: PsUserState

Table 6.2.6.2.39-1: Definition of type PsUserState

| Attribute name | Data type | Р | Cardinality | Description | |
|--|-------------|---|-------------|-----------------------------------|--|
| sgsnUserState | UserStatePs | С | 01 | User state as retrieved from SGSN | |
| mmeUserState | UserStatePs | С | 01 | User state as retrieved from MME | |
| amfUserState | UserStatePs | С | 01 | User state as retrieved from AMF | |
| NOTE: At least one of the "sgsnl IserState" "mmel IserState" or "amfl IserState" shall be included | | | | | |

6.2.6.2.40 Type: CsUserState

Table 6.2.6.2.40-1: Definition of type PsUserState

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------|-------------|---|-------------|--------------------------------------|
| mscVlrUserState | UserStateCs | М | 1 | User state as retrieved from MSC/VLR |

6.2.6.2.41 Type: Csrn

Table 6.2.6.2.41-1: Definition of type CsrnInformation

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|---|
| csrn | Msisdn | М | 1 | Contains a CS domain routeing number as |
| | | | | retrieved from MSC/VLR |

6.2.6.2.42 Type: ReferenceLocationInformation

Table 6.2.6.2.42-1: Definition of type ReferenceLocationInformation

| Attribute name | Data type | Р | Cardinality | Description |
|---|-----------|---|-------------|---|
| accessType | string | С | 1 | Indicates the type of access for which the reference location of the user is defined (e.g. ADSL). |
| accessInfo | string | С | 1 | Indicates the type of the access information defined for the reference location of the user (e.g. dsl-location). |
| accessValue | string | С | 1 | It contains the location information (e.g. line identifier in fixed access networks) as configured by the operator. |
| NOTE 1: At least one of accessType or accessInfo or accessValue shall be present. NOTE 2: The syntax of accessType, accessInfo and accessValue is as described in 3GPP TS 24.229 [18] for P- | | | | |

NOTE 2: The syntax of accessType, accessInfo and accessValue is as described in 3GPP TS 24.229 [18] for P-Access-Network-Info header fields: accessType corresponds to the "access-type" field whereas accessInfo and accessValue correspond to the type and associated value defined for the "access-info" field.

6.2.6.2.43 Type: SmsRegistrationInfo

Table 6.2.6.2.43-1: Definition of type SmsRegistrationInfo

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|--------------------------------------|
| ipSmGwNumber | Msisdn | М | 1 | IP-SM-GW number |
| scAddress | Msisdn | 0 | 01 | Short Message Service Centre Address |

6.2.6.2.44 Type: IpSmGwAddress

Table 6.2.6.2.44-1: Definition of type IpSmGwAddress

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|------------------|---|-------------|---|
| ipSmGwNumber | Msisdn | М | 1 | IP-SM-GW number |
| ipSmGwDiaUri | DiameterIdentity | 0 | | IP-SM-GW Diameter Uri. It shall be present if s6c is supported. |
| ipSmGwDiaRealm | DiameterIdentity | 0 | | IP-SM-GW Diameter Realm. It shall be present if s6c is supported. |

6.2.6.2.45 Type: ImsAssociatedIdentities

Table 6.2.6.2.45-1: Definition of type ImsAssociatedIdentities

| Attribute name | Data type | Р | Cardinality | Description |
|------------------|----------------------|---|-------------|--|
| irsState | ImsRegistrationState | М | | It contains the registration state of the Implicit |
| | | | | Registration Set. |
| publicIdentities | PublicIdentities | М | 1 | List of IMS Public Identities associated. |

6.2.6.2.46 Type: DsaiTagInformation

Table 6.2.6.2.46-1: Definition of type DsaiTagInformation

| Attribute name | Data type | Р | Cardinality | Description |
|-------------------|----------------------|---|-------------|-------------------------------------|
| dsaiTagStatusList | array(DsaiTagStatus) | М | 1N | List of DSAI Tags associated to the |
| | | | | Application Server Name. |

6.2.6.2.47 Type: DsaiTagStatus

Table 6.2.6.2.47-1: Definition of type DsaiTagStatus

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------------|---|-------------|---|
| dsaiTag | string | M | | DSAI tag associated to the Application Server Name. |
| dsaiStatus | ActivationState | М | 1 | Status of DSAI tag |

6.2.6.3 Simple data types and enumerations

6.2.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

6.2.6.3.2 Simple data types

The simple data types defined in table 6.2.6.3.2-1 shall be supported.

Table 6.2.6.3.2-1: Simple data types

| Type Name | Type Definition | Description |
|-------------------|-----------------|--|
| Capability | integer | S-CSCF capability |
| SequenceNumber | integer | Unsigned integer containing the sequence number associated to |
| | | the current version of Repository Data |
| ServiceIndication | string | String containing the Service Indication or Service Identifier |
| Msisdn | string | String containing an additional or basic MSISDN |
| | | Pattern: "[0-9]{5,15}\$" |
| Privateld | string | String containing a Private User Identity or a Private Service Identity. |
| ImsPublicId | string | String containing an IMS Public Identity in SIP URI format or TEL URI format, as specified 3GPP TS 23.003 [13] |
| | | Pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?\/]+)\@([A-Za-z0-9]+([- A-Za-z0-9]+)\.)+[a-z]{2,} tel\:\+[0-9]{5,15})\$" |
| NameSpacePriority | string | String containing the namespace and priority. It shall be formatted as "r-value" parameter described in IETF RFC 4412 [19]. See also 3GPP TS 24.229 [18]. |
| | | Pattern: "^[0-9a-zA-Z-\!%*_\+`\'~]+.[0-9a-zA-Z-\!%*_\+`\'~]+\$" |
| CscfFilterSetId | integer | Contains the identifier of a specific filter set in the S-CSCF. Minimum=0 |
| SptGroupId | integer | Contains the identifier of the Group of SPTs. Minimum=0 |
| SharedDataId | string | Identifies globally and uniquely a piece of subscription data shared by multiple UEs. The value shall start with the HPLMN id (MCC/MNC) followed by a hyphen followed by a local Id as allocated by the home network operator. |
| | | Pattern: "[0-9]{5,6}+" |
| PrePaging | boolean | Inidicates the support of pre-paging. |
| SipServerName | string | Server Name (e.g. AS name, CSCF name) in SIP URI format |
| | | Pattern: "^(sip\:([a-zA-Z0-9_\!~*()&=+\$,;?V]+)\@([A-Za-z0-9]+([-A-Za-z0-9]+)\.)+[a-z]{2,})\$" |

6.2.6.3.3 Enumeration: DataSetName

The enumeration DataSetName represents a Set of Data within the IMS User Profile. It shall comply with the provisions defined in table 6.2.6.3.3-1.

Table 6.2.6.3.3-1: Enumeration DataSetName

| Enumeration value | Description |
|-------------------|------------------------------|
| "CHARGING_DATA" | Charging Information Data |
| "IFC_DATA" | Initial Filter Criteria Data |

6.2.6.3.4 Enumeration: IdentityType

The enumeration IdentityType represents the type of IMS Public Identity. It shall comply with the provisions defined in table 6.2.6.3.4-1.

Table 6.2.6.3.4-1: Enumeration IdentityType

| Enumeration value | Description |
|-------------------|---|
| "DISTINCT_IMPU" | The identity is an IMS Public User Identity |
| "DISTINCT_PSI" | The identity is an IMS Public Service Identity |
| "WILDCARDED_IMPU" | The identity is an IMS Wildcarded Public User Identity |
| "WILDCARDED_PSI" | The identity is an IMS Wildcarded Public Service Identity |

6.2.6.3.5 Enumeration: ImsRegistrationState

The enumeration ImsRegistrationState represents the IMS status of the user or Public Identity or the IRS. It shall comply with the provisions defined in table 6.2.6.3.5-1

Table 6.2.6.3.5-1: Enumeration ImsRegistrationState

| Enumeration value | Description | | |
|--|---|--|--|
| "REGISTERED" | The identity is explicitly registered by the user. | | |
| "NOT_REGISTERED" | The identity is not registered. | | |
| "AUTHENTICATION_PENDING" | The identity initiated a registration and its authentication is ongoing (authentication pending flag is set). | | |
| "REGISTERED_UNREG_SERVICES" The identity is not registered but has an S-CSCF assigned. | | | |
| NOTE: See clause 3.1 for more details on the IMS registration states and terms. | | | |

6.2.6.3.6 Enumeration: TypeOfCondition

The enumeration TypeOfCondition represents the type of condition to be applied to the logical expression of SPT groups and SPTs. See 3GPP TS 29.228 [20], Annex C.

Table 6.2.6.3.6-1: Enumeration TypeOfCondition

| Enumeration value | Description | Applicability |
|-------------------|------------------|---------------|
| "CNF" | Conjunctive form | |
| "DNF" | Disjunctive form | |

6.2.6.3.7 Enumeration: RegistrationType

The enumeration RegistrationType represents the type of registration associated to the REGISTER request.

Table 6.2.6.3.7-1: Enumeration RegistrationType

| Enumeration value | Description | Applicability |
|------------------------|---|---------------|
| "INITIAL_REGISTRATION" | The request is related to an initial registration | |
| "RE_REGISTRATION" | The request is related to a re-registration | |
| "DE_REGISTRATION" | The request is related to a de-registration | |

6.2.6.3.8 Enumeration: RequestDirection

The enumeration RequestDirection represents the direction of the request in combination with the registration status of the user as evaluated in the S-CSCF.

Table 6.2.6.3.8-1: Enumeration RequestDirection

| Enumeration value | Description | Applicability |
|-----------------------------|--|---------------|
| "ORIGINATING_REGISTERED" | The request is originated by an explicitly registered user. | |
| "ORIGINATING_UNREGISTERED" | The request is originated by a non-registered user. | |
| "ORIGINATING_CDIV " | The REGISTER request is related to an originating request after call diversion service (regardless of the registration state). | |
| "TERMINATING_REGISTERED" | The request is targeted to an explicitly registered user. | |
| "TERMINATING _UNREGISTERED" | The request is targeted to a non-registered user. | |

6.2.6.3.9 Enumeration: ServiceInformation

The enumeration ServiceInformation indicates the type of additional information to be included in the body of the SIP request towards the Application Server.

Table 6.2.6.3.9-1: Enumeration ServiceInformation

| Enumeration value | Description | Applicability |
|--|--|---------------|
| "INCLUDE_REGISTER_REQUEST" | Indicates to the S-CSCF that the incoming SIP REGISTER request is to be transferred to the Application Server. | |
| "INCLUDE_REGISTER_RESPONSE" | Indicates to the S-CSCF that the final SIP response to the incoming SIP REGISTER request is to be transferred to the Application Server. | |
| NOTE: See 3GPP TS 23.218 [xy] for the use of this information. | | |

6.2.6.3.10 Enumeration: RequestedNode

The enumeration RequestedNode represents serving node requested. It shall comply with the provisions defined in table 6.2.6.3.10-1.

Table 6.2.6.3.10-1: Enumeration RequestedNode

| Enumeration value | Description | Applicability |
|------------------------|--|---------------|
| "SGSN" | The requested node is SGSN. | |
| "MME" | The requested node is MME. | |
| "AMF" | The requested node is AMF. | |
| "3GPP_AAA_SERVER_TWAN" | The requested node is 3GPP-AAA-SERVER-TWAN | |

6.2.6.3.11 Enumeration: SrvccCapability

The enumeration SrvccCapability represents the type of UE support for SRVCC. It shall comply with the provisions defined in table 6.2.6.3.11-1.

Table 6.2.6.3.11-1: Enumeration IdentityType

| Enumeration value | Description |
|-----------------------|------------------------|
| "UE_4G_SRVCC_CAPABLE" | UE is 4G SRVCC capable |
| "UE_5G_SRVCC_CAPABLE" | UE is 5G SRVCC capable |

6.2.6.3.12 Enumeration: ActivationState

The enumeration ActivationState represents the activation state of a PSI or DSAI tag. It shall comply with the provisions defined in table 6.2.6.3.12-1.

Table 6.2.6.3.12-1: Enumeration ActivationState

| Enumeration value | Description |
|-------------------|-------------|
| "ACTIVE" | |
| "INACTIVE" | |

6.2.6.3.13 Enumeration: ImsVoiceOverPsSessionSupport

The enumeration ImsVoiceOverPsSessionSupport represents the support for Voice over PS associated to the UE.

Table 6.2.6.3.13-1: Enumeration ImsVoiceOverPsSessionSupport

| Enumeration value | Description | Applicability |
|-------------------------------------|---|---------------|
| "IMS_VOICE_OVER_PS_NOT_SUPPORTED" | Voice over PS is supported for the UE | |
| "IMS_VOICE_OVER_PS_SUPPORTED" | Voice over PS is not supported for the UE | |
| "IMS_VOICE_OVER_PS_SUPPORT_UNKNOWN" | Voice over PS support for the UE is | |
| | unknown | |

6.2.6.3.14 Enumeration: AccessType

The enumeration AccessType represents the type of access. It shall comply with the provisions defined in table 6.2.6.3.14-1.

Table 6.2.6.3.14-1: Enumeration AccessType

| Enumeration value | Description | Applicability |
|-------------------|-------------|---------------|
| "3GPP_ACCESS" | | |
| "NON_3GPP_ACCESS" | | |

6.2.6.3.15 Enumeration: UserStatePs

The enumeration UserStatePs represents the user state in PS domain.

Table 6.2.6.3.15-1: Enumeration ImsVoiceOverPsSessionSupport

| Enumeration value | Description | Applicability |
|--|-------------|---------------|
| "DETACHED" | | |
| "ATTACHED_NOT_REACHABLE_FOR_PAGING" | | |
| "ATTACHED_REACHABLE_FOR_PAGING" | | |
| "CONNECTED_NOT_REACHABLE_FOR_PAGING" | | |
| "CONNECTED_REACHABLE_FOR_PAGING" | | |
| "NOT_PROVIDED_FROM_SGSN_OR_MME_OR_AMF" | | |
| "NETWORK_DETERMINED_NOT_REACHABLE" | | |
| NOTE: See 3GPP TS 29.272 [32] for PS/EPS User State and 3GPP TS 29.518 [33] for the 5GS User State | | |

6.2.6.3.16 Enumeration: UserStateCs

The enumeration UserStateCs represents the user state in CS domain.

Table 6.2.6.3.16-1: Enumeration ImsVoiceOverPsSessionSupport

| Enumeration value | Description | Applicability |
|---|-------------|---------------|
| "CAMEL_BUSY" | | |
| "NETWORK_DETERMINED_NOT_REACHABLE" | | |
| "ASSUMED_IDLE" | | |
| "NOT_PROVIDED_FROM_VLR" | | |
| NOTE: See 3GPP TS 23.078 [31] for CS Subscriber State | | |

6.2.7 Error Handling

6.2.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [4].

6.2.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4].

6.2.7.3 Application Errors

The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [4] may also be used for the Nhss_imsSDM service. The following application errors listed in Table 6.2.7.3-1 are specific for the Nhss_imsSDM service.

Application Error HTTP status code Description USER NOT FOUND 404 Not Found The user does not exist in the HPLMN The service (PSI) does not exist in the HPLMN SERVICE_NOT_FOUND 404 Not Found DATA_NOT_FOUND 404 Not Found The requested data is not found/does not exist. Additional information (if any) about this application error is indicated for each specific resource. CONTEXT NOT FOUND 404 Not Found It is used during the modification of an existing subscription when no corresponding context exists OPERATION NOT ALLOWED 403 Forbidden The requested data is not allowed to be accessed by the service consumer, e.g. the IMS-AS does not have permissions for the requested resource and/or HTTP method. OUT_OF_SYNC 409 Conflict The request could not be completed due to a conflict with the current state of the target resource (wrong version or sequence number) The request could not be completed due to large TOO MUCH DATA 413 Payload Too Large amount of data (e.g. size of repository data is too large). This response may be due to constraints applied by the service producer, e.g. based on local policy.

Table 6.2.7.3-1: Application errors

6.2.8 Feature negotiation

The optional features in table 6.2.8-1 are defined for the Nhss_imsSDM API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

| Table | 6.2.8-1: | Supported | Features |
|-------|----------|-----------|----------|
|-------|----------|-----------|----------|

| Feature number | Feature Name | Description |
|----------------|--------------|--|
| 1 | SharedData | When receiving a Nhss_ismSDM_Get service operation request to retrieve a UE's IMS profile data, and the request does not contain a supported-features query parameter indicating support of this feature, the HSS shall not include Shared Data Ids in the response. Instead the HSS may – based on operator policy – take no further action (i.e. allow the UE to get services based on only the UE's individual IMS profile data), or send the shared data as individual data (this may result in notifications of individual subscription data change – if so subscribed – when shared data, which are sent as individual data, are modified, and/or when the UE's Shared Data IDs are modified). |
| 2 | PatchReport | If some of the modifications included in the PATCH request are not successfully implemented, the HSS reports the result of PATCH request execution to the consumer. See clause 5.2.7.2 of 3GPP TS 29.500 [4]. |

6.2.9 Security

As indicated in 3GPP TS 33.501 [5], the access to the Nhss_imsSDM API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [35]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [36]) plays the role of the authorization server.

If Oauth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nhss_imsSDM API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [36], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nhss_imsSDM service.

The Nhss_imsSDM API defines the following scopes for OAuth2 authorization:

Table 6.2.9-1: Oauth2 scopes defined in Nhss_imsSDM API

| Scope | Description |
|--|--|
| "nhss-ims-sdm" | Access to the Nhss IMS Subscription Data Management API |
| "nhss-ims-sdm:registration-status:read" | Access to read the Registration Status resource |
| "nhss-ims-sdm:profile-data:read" | Access to read the Profile Data resource |
| "nhss-ims-sdm:priority-levels:read" | Access to read the Priority Levels resource |
| "nhss-ims-sdm:ifcs:read" | Access to read the Initial Filter Criteria resource |
| "nhss-ims-sdm:service-level-trace- | Access to read the Service Level Trace Information resource |
| information:read" | |
| "nhss-ims-sdm:server-name:read" | Access to read the Server Name resource |
| "nhss-ims-sdm:scscf-capabilities:read" | Access to read the S-CSCF Capabilities resource |
| "nhss-ims-sdm:ps-domain:location-data:read" | Access to read the PS-Domain Location Data resource |
| "nhss-ims-sdm:ps-domain:ip- address:read" | Access to read the PS-Domain IP Address resource |
| "nhss-ims-sdm:ps-domain:tads- info:read" | Access to read the PS-Domain TADS Info resource |
| "nhss-ims-sdm:ps-domain:ue-reach- subscriptions:create" | Access to create PS-Domain UE Reachability Subscriptions resources |
| "nhss-ims-sdm:ps-domain:ue-reach- | Access to update/delete a PS-Domain UE Reachability |
| subscriptions:modify" | Subscription resource |
| "nhss-ims-sdm:ps-domain:user- state:read" | Access to read the PS-Domain User State resource |
| "nhss-ims-sdm:cs-domain:location-data:read" | Access to read the CS-Domain Location Data resource |
| "nhss-ims-sdm:cs-domain:user- state:read" | Access to read the CS-Domain User State resource |
| "nhss-ims-sdm:cs-domain:csrn:read" | Access to read the CS-Domain CSRN resource |
| "nshh-ims-sdm:wireline- | Access to read the Wireline-Domain Reference Location resource |
| domain:reference-location:read" | |
| "nhss-ims-sdm:repository-data:modify" | Access to create/update/delete the Repository Data resource |
| "nhss-ims-sdm:repository-data:read" | Access to read the Repository Data resource |
| "nhss-ims-sdm:identities:read" | Access to read the Identities resource |
| "nhss-ims-sdm:srvcc:read" | Access to read the SRVCC resource |
| "nhss-ims-sdm:srvcc:modify" | Acess to update the SRVCC resource |
| "nhss-ims-sdm:psi-status:read" | Access to read the PSI Status resource |
| "nhss-ims-sdm:psi-status:modify" | Acess to update the PSI Status resource |
| "nhss-ims-sdm:dsai:read" | Access to read the DSAI resource |
| "nhss-ims-sdm:dsai:modify" | Access to update the DSAI resource |
| "nhss-ims-sdm:sms-registration- info:read" | Access to read the SMS Registration Info resource |
| "nhss-ims-sdm:sms-registration- | Access to create/update/delete the SMS Registration Info |
| info:modify" | resource |
| "nhss-ims-sdm:subscriptions:create" | Access to create Subscriptions resources |
| "nhss-ims-sdm:subscriptions:modify" | Access to update/delete a Subscription resource |
| "nhss-ims-sdm:shared- subscriptions:create" | Access to create a Shared-Data Subscriptions resource |
| "nhss-ims-sdm:shared- subscriptions:modify" | Access to update/delete a Shared-Data Subscription resource |
| "nhss-ims-sdm:shared- subscriptions:read" | Access to read the Shared-Data resource |

6.3 Nhss_imsUEAuthentication Service API

6.3.1 API URI

URIs of this API shall have the following root:

{apiRoot}/{apiName}/{apiVersion}/

where "apiRoot" is defined in clause 4.4.1 of 3GPP TS 29.501 [5], the "apiName" shall be set to "nhss-ims-ueau" and the "apiVersion" shall be set to "v1" for the current version of this specification.

6.3.2 Usage of HTTP

6.3.2.1 General

HTTP/2, as defined in IETF RFC 7540 [8], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

HTTP messages and bodies for the Nhss_imsUEAU service shall comply with the OpenAPI [9] specification contained in Annex A.3.

6.3.2.2 HTTP standard headers

6.3.2.2.1 General

The usage of HTTP standard headers shall be supported as specified in clause 5.2.2 of 3GPP TS 29.500 [4].

6.3.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in IETF RFC 8259 [10], signalled by the content type "application/json".
- The Problem Details JSON Object (IETF RFC 7807 [11] signalled by the content type "application/problem+json"
- JSON Patch, as defined in IETF RFC 6902 [12], signalled by the content type "application/json-patch+json"

6.3.2.3 HTTP custom headers

6.3.2.3.1 General

The usage of HTTP custom headers shall be supported as specified in clause 5.2.3 of 3GPP TS 29.500 [4].

6.3.3 Resources

6.3.3.1 Overview

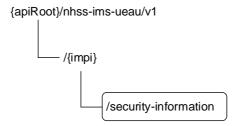


Figure 6.3.3.1-1: Resource URI structure of the Nhss_imsUEAU API

Table 6.3.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.3.3.1-1: Resources and methods overview

| Resource name (Archetype) | Resource URI | HTTP method or custom operation | Description |
|---|---|---|---|
| SecurityInformation (Custom operation) | /{impi}/security- information/generate-sip-auth- data | generate- sip-auth- data (POST) | The HSS takes the variable {impi} and, if applicable, fetches the corresponding SUPI. The HSS calculates a fresh authentication vector based on the received information and the stored security information, if IMS-AKA is selected. Otherwise, the HSS provides the corresponding authentication information. |

6.3.3.2 Resource: SecurityInformation

6.3.3.2.1 Description

This resource represents the information that is needed together with the SIP authenticacion scheme to calculate a fresh authentication vector.

6.3.3.2.2 Resource Definition

Resource URI: {apiRoot}/nhss-ims-ueau/v1/{impi}/security-information

This resource shall support the resource URI variables defined in table 6.3.3.2.2-1.

Table 6.3.3.2.2-1: Resource URI variables for this resource

| Name | Definition | | | | | | |
|---------|---|--|--|--|--|--|--|
| apiRoot | See clause 6.3.1 | | | | | | |
| impi | Represents the IMS Private Identity (see 3GPP TS 23.003 [13] clause 13.3. | | | | | | |
| | Pattern: "^(impi+ .+)\$" | | | | | | |

6.3.3.2.3 Resource Standard Methods

No Standard Methods are supported for this resource.

6.3.3.2.4 Resource Custom Operations

6.3.3.2.4.1 Overview

Table 6.3.3.2.4.1-1: Custom operations

| Custom operaration URI | Mapped HTTP method | Description |
|-------------------------|--------------------|--|
| /generate-sip-auth-data | POST | Select the authentication method and calculate |
| | | a fresh AV if IMS-AKA is selected or provides |
| | | corresponding authentication information. |

6.3.3.2.4.2 Operation: generate-sip-auth-data

6.3.3.2.4.2.1 Description

This custom operation is used by the NF service consumer (S-CSCF) to request authentication information data for the IMPI from the HSS. The HSS calculates an authentication vector taking into account the information received from the NF service consumer (S-CSCF) and the current representation of this resource if IMS AKA is selected. For details see 3GPP TS 33.203 [14].

6.3.3.2.4.2.2 Operation Definition

This operation shall support the request data structures specified in table 6.3.3.2.4.2.2-1 and the response data structure and response codes specified in table 6.3.3.2.4.2.2-2.

Table 6.3.3.2.4.2.2-1: Data structures supported by the POST Request Body on this resource

| Data type | Р | Cardinality | Description |
|--------------------|---|-------------|--|
| SipAuthenticationI | М | 1 | Contains the SIP Authentication Scheme, the number of authentication items |
| nfoRequest | | | and Resynchronization Information |

Table 6.3.3.2.4.2.2-2: Data structures supported by the POST Response Body on this resource

| Data type | P | Cardinality | Response codes | Description |
|------------------------------|---|-------------|------------------|--|
| SipAuthenticatio nInfoResult | М | 1 | 200 OK | Upon success, a response body containing the selected authentication method and an authentication vector if IMS AKA has been selected shall be returned. |
| ProblemDetails | 0 | 01 | 404 Not Found | The "cause" attribute may be used to indicate the following application error: - USER_NOT_FOUND |
| ProblemDetails | 0 | 01 | 403 Forbidden | The "cause" attribute may be used to indicate one of the following application errors: - AUTHENTICATION_REJECTED - UNSUPPORTED_SIP_AUTH_SCHEME |

6.3.4 Custom Operations without associated resources

In this release of this specification, no custom operations without associated resources are defined for the Nhss_imsUEAuthentication Service.

6.3.5 Notifications

In this release of this specification, no notifications are defined for the Nhss_imsUEAuthentication Service.

6.3.6 Data Model

6.3.6.1 General

This clause specifies the application data model supported by the API.

Table 6.3.6.1-1 specifies the structured data types defined for the Nhss_imsUEAU service API.

Table 6.3.6.1-1: Nhss_imsUEAU specific Data Types

| Data type | Clause defined | Description |
|------------------------------|----------------|--|
| SipAuthenticationInfoRequest | 6.3.6.2.2 | Contains SIP Authentication Schema, Authentication Items and Resynchronization Information |
| SipAuthenticationInfoResult | 6.3.6.2.3 | Contains authentication information (e.g. authentication vectors, line id) |
| ResynchronizationInfo | 6.3.6.2.4 | Contains RAND and AUTS |
| 3GAkaAv | 6.3.6.2.5 | Contains RAND, XRES, AUTN, CK, and IK |

Table 6.3.6.1-2 specifies data types re-used by the Nhss_imsUEAU service API from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Nhss_imsUEAU.

Table 6.3.6.1-2: Nhss_imsUEAU re-used Data Types

| Data type | Reference | Comments |
|----------------|---------------------|--|
| ProblemDetails | 3GPP TS 29.571 [16] | Common data type used in response bodies |
| Autn | 3GPP TS 29.503 [15] | |
| Auts | 3GPP TS 29.503 [15] | |
| Rand | 3GPP TS 29.503 [15] | |
| Xres | 3GPP TS 29.503 [15] | |

6.3.6.2 Structured data types

6.3.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

6.3.6.2.2 Type: SipAuthenticationInfoRequest

Table 6.3.6.2.3-1: Definition of type AuthenticationInfoRequest

| Attribute name | Data type | Р | Cardinality | Description |
|-------------------------|-----------------|---|-------------|--|
| sipAuthenticationScheme | SipAuthenticati | M | 1 | SIP Authentication Scheme requested by service |
| | onScheme | | | consumer (S-CSCF) |
| sipNumberAuthItems | SipNumberAuth | 0 | 1 | Number of authentication items (AVs). |
| | Items | | | Absence indicates that only one AV is requested. |
| | | | | This attribute shall be absent for authentication |
| | | | | schemes other than IMS AKA. |
| resynchronizationInfo | Resynchronizati | 0 | 1 | Contains RAND and AUTS; see |
| | onInfo | | | 3GPP TS 33.203 [14]. |
| | | | | This attribute shall be included only if a |
| | | | | resynchronization procedure needs to be triggered. |
| | | | | This attribute shall be absent for authentication |
| | | | | schemes other than IMS AKA. |

6.3.6.2.3 Type: SipAuthenticationInfoResult

Table 6.3.6.2.3-1: Definition of type AuthenticationInfoResult

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------------|-----------------------|---|-------------|---|
| sipAuthenticationSche | SipAuthenticationSc | М | 1 | SIP Authentication Scheme used by service |
| me | heme | | | producer (HSS) |
| 3gAkaAvs | array(3GAkaAv) | 0 | 1N | If IMS AKA is requested, it shall be present and will contains Authentication Vectors. |
| digestAuth | DigestAuthentication | 0 | 01 | If SIP Digest is used, it shall be present and shall contain the digest realm, algorithm, QoP and HA1. |
| lineIdentifierList | array(LineIdentifier) | 0 | 0N | If NBA is used, it shall be present and shall contain a list of fixed broadband access line identifiers associated to the user. |
| ipAddress | IpAddress | 0 | 01 | If GIBA is used, it shall be present and shall contain an IP address (IPv4, or IPv6, or IPv6 prefix) |

6.3.6.2.4 Type: ResynchronizationInfo

Table 6.3.6.2.4-1: Definition of type ResynchronizationInfo

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|-------------|
| rand | Rand | М | 1 | |
| auts | Auts | М | 1 | |

6.3.6.2.5 Type: 3GAkaAv

Table 6.3.6.2.5-1: Definition of type 3gAkaAv

| Attribute name | Data type | Р | Cardinality | Description |
|----------------|-----------|---|-------------|-------------|
| rand | Rand | М | 1 | |
| xres | Xres | М | 1 | |
| autn | Autn | М | 1 | |
| ck | Ck | М | 1 | |
| ik | lk | М | 1 | |

6.3.6.2.6 Type: DigestAuthentication

Table 6.3.6.2.6-1: Definition of type DigestAuthentication

| Attribute name | Data type | Р | Cardinality | Description |
|-----------------|--------------------|---|-------------|--|
| digestRealm | string | M | 1 | Digest realm. See IETF RFC 4740 [17]. |
| digestAlgorithm | SipDigestAlgorithm | M | 1 | Digest Algorithm. See IETF RFC 4740 [17]. |
| digestQop | SipDigestQop | M | 1 | Quality of Protection. See IETF RFC 4740 [17]. |
| ha1 | string | М | 1 | Hash H(A1). See IETF RFC 4740 [17]. |

6.3.6.2.7 Type: IpAddress

The type IpAddress represents the IP address for GIBA scheme. It shall comply with the provisions defined in table 6.3.6.2.7-1.

Table 6.3.6.2.7-1: Definition of type IpAddress

| Attribute name | Data type | Р | Cardinality | Description |
|---|------------|---|-------------|-------------|
| ipv4Addr | Ipv4Addr | С | 01 | |
| ipv6Addr | lpv6Addr | С | 01 | |
| ipv6Prefix | Ipv6Prefix | С | 01 | |
| NOTE: Either ipv4Addr, or ipv6Addr, or ipv6Prefix shall be present. | | | | |

6.3.6.3 Simple data types and enumerations

6.3.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

6.3.6.3.2 Simple data types

The simple data types defined in table 6.3.6.3.2-1 shall be supported.

Table 6.3.6.3.2-1: Simple data types

| Type Name | Type Definition | Description |
|--------------------|-----------------|---|
| SipNumberAuthItems | integer | Number of authentication items |
| | | Minimum: 1 |
| Impi | string | IMS Private User Identity |
| Ck | string | pattern: "^[A-Fa-f0-9]{32}\$" |
| lk | string | pattern: "^[A-Fa-f0-9]{32}\$" |
| Lineldentifier | string | Line Identifier for the wireline access |

6.3.6.3.3 Enumeration: SipAuthenticationScheme

The enumeration SipAuthenticationScheme represents an IMS authentication scheme. It shall comply with the provisions defined in table 6.3.6.3.3-1.

Table 6.3.6.3.3-1: Enumeration SipAuthenticationScheme

| Enumeration value | Description |
|--------------------|--|
| "DIGEST-AKAV1-MD5" | IMS-AKA authentication scheme |
| "DIGEST-HTTP" | SIP Digest authentication scheme |
| "NBA" | NASS Bundled authentication scheme |
| "GIBA" | GPRS-IMS-Bundled authentication scheme |
| "UNKNOWN" | Authentication scheme to be used is unknown by the service |
| | consumer |

6.3.6.3.4 Enumeration: SipDigestAlgorithm

The enumeration SipDigestAlgorithm represents the algorithm for SIP Digest scheme. It shall comply with the provisions defined in table 6.3.6.3.4-1.

Table 6.3.6.3.4-1: Enumeration SipDigestAlgorithm

| Enumeration value | Description |
|-------------------|-------------|
| "MD5" | |
| "MD5_SESS" | |

6.3.6.3.5 Enumeration: SipDigestQop

The enumeration SipDigestQop represents the quality of protection for SIP Digest scheme. It shall comply with the provisions defined in table 6.3.6.3.5-1.

Table 6.3.6.3.5-1: Enumeration SipDigestQop

| Enumeration value | Description |
|-------------------|--|
| "AUTH" | Indicates authentication |
| "AUTH_INT" | Indicates authentication with integrity protection |

6.3.7 Error Handling

6.3.7.1 General

HTTP error handling shall be supported as specified in clause 5.2.4 of 3GPP TS 29.500 [4].

6.3.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4].

6.3.7.3 Application Errors

The common application errors defined in the Table 5.2.7.2-1 in 3GPP TS 29.500 [4] may also be used for the Nhss_imsUEAuthentication service. The following application errors listed in Table 6.3.7.3-1 are specific for the Nhss_imsUEAuthentication service.

Table 6.3.7.3-1: Application errors

| Application Error | HTTP status code | Description |
|---------------------------------------|------------------|--|
| · · · · · · · · · · · · · · · · · · · | | The user cannot be authenticated with this authentication method |
| | 404 Not Found | The user does not exist in the HPLMN |
| | | The received SIP authentication scheme is not supported by HPLMN |

6.3.8 Feature Negotiation

6.3.9 Security

As indicated in 3GPP TS 33.501 [5], the access to the Nhss_imsUEAU API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [35]), using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [36]) plays the role of the authorization server.

If Oauth2 authorization is used, an NF Service Consumer, prior to consuming services offered by the Nhss_imsUEAU API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [36], clause 5.4.2.2.

NOTE: When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Nhss_imsUEAU service.

The Nhss_imsUEAU API defines the following scopes for OAuth2 authorization:

Table 6.3.9-1: Oauth2 scopes defined in Nhss_imsUEAU API

| Scope | Description |
|---|---|
| "nhss-ims-ueau" | Access to the Nhss IMS UE Context Management API |
| "nhss-ims-ueau:generate-sip-auth-data:invoke" | Access to invoke the Generate SIP Auth Data custom method |

Annex A (normative): OpenAPI specification

A.1 General

This Annex specifies the formal definition of the <Service Name> API(s). It consists of OpenAPI 3.0.0 specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

NOTE: The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository hosted in ETSI Forge, that uses the GitLab software version control system (see 3GPP TS 29.501 [5] clause 5.3.1 and 3GPP TR 21.900 [34] clause 5B).

A.2 Nhss_imsUECM API

```
openapi: 3.0.0
info:
  version: '1.0.1'
  title: 'Nhss_imsUECM'
  description: |
   Nhss UE Context Management Service for IMS.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
externalDocs:
  description: 3GPP TS 29.562 HSS Services for interworking with IMS, version 16.2.0
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.562/'
  - url: '{apiRoot}/nhss-ims-uecm/v1'
   variables:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
security:
  - {}
   oAuth2ClientCredentials:
    - nhss-ims-uecm
  /{impu}/authorize:
      summary: Authorize IMS Identities to register in the network or establish multimedia sessions
and return CSCF location if it is stored
      operationId: Authorize
        - Authorize Ims identities
      security:
        - {}
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
          - nhss-ims-uecm:authorize:invoke
      parameters:
         - name: impu
          in: path
          description: Public identity of the user.
          required: true
```

```
schema:
            $ref: '#/components/schemas/Impu'
   requestBody:
      content:
       application/json:
          schema:
            $ref: '#/components/schemas/AuthorizationRequest'
     required: true
    responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
            schema:
              $ref: '#/components/schemas/AuthorizationResponse'
      '400':
       description: Bad Request
       content:
          application/problem+json:
            schema:
             $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '403':
        description: Forbidden
       content:
         application/problem+json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      '404':
       description: Not found
        content:
          application/problem+json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
       description: Internal Server Error
        content:
         application/problem+json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      default:
        description: Unexpected error
    callbacks:
      deregistrationeNotification:
        '{request.body#/deregCallbackUri}':
         post:
            requestBody:
             required: true
             content:
                application/json:
                    $ref: '#/components/schemas/DeregistrationData'
            responses:
              '204':
                description: Successful Notification response
                $ref: 'TS29571_CommonData.yaml#/components/responses/400'
              '404':
                $ref: 'TS29571_CommonData.yaml#/components/responses/404'
              '500':
                $ref: 'TS29571_CommonData.yaml#/components/responses/500'
              '503':
                $ref: 'TS29571_CommonData.yaml#/components/responses/503'
              default:
                description: Unexpected error
/{imsUeId}/scscf-registration:
 put:
   summary: SCSCF registration information
    operationId: SCSCF registration
      - SCSCF registration and deregistration
    security:
     - {}
     - oAuth2ClientCredentials:
        - nhss-ims-uecm
      - oAuth2ClientCredentials:
       - nhss-ims-uecm
        - nhss-ims-uecm:registration:create
```

```
parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
         $ref: '#/components/schemas/ImsUeId'
   requestBody:
      content:
       application/json:
         schema:
           $ref: '#/components/schemas/ScscfRegistration'
     required: true
   responses:
      '201':
       description: Created
       content:
          application/json:
           schema:
             $ref: '#/components/schemas/ScscfRegistration'
      '200':
       description: Expected response to a valid request
         application/json:
           schema:
             $ref: '#/components/schemas/ScscfRegistration'
      '204':
       description: No content
       description: Forbidden
       content:
         application/problem+json:
              $ref: '#/components/schemas/ExtendedProblemDetails'
      '404':
       description: Not found
       content:
         application/problem+json:
           schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      default:
       description: Unexpected error
/{impu}/scscf-registration/scscf-restoration-info:
   summary: Update the S-CSCF restoration information of the UE
   operationId: UpdateScscfRestorationInfo
      - Update the S-CSCF restoration information of the UE
   security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-uecm
      - oAuth2ClientCredentials:
       - nhss-ims-uecm
       - nhss-ims-uecm:restoration:modify
   parameters:
       name: impu
        in: path
       description: Public identity of the user.
       required: true
       schema:
         $ref: '#/components/schemas/Impu'
   requestBody:
     content:
       application/json:
           $ref: '#/components/schemas/ScscfRestorationInfoRequest'
     required: true
   responses:
      '201':
       description: Created
       content:
         application/json:
            schema:
             $ref: '#/components/schemas/ScscfRestorationInfoResponse'
       headers:
         Location:
```

```
description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss_imsUECM/v1/{impu}/scscf-registration/scscf-restoration-info
              required: true
              schema:
                type: string
        '200':
          description: OK
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ScscfRestorationInfoResponse'
        '204':
          description: No content
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    aet:
      summary: Retrieve the S-CSCF restoration
      operationId: GetScscfRestorationInfo
      tags:
       - S-CSCF Restoration Info Retrieval
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
          - nhss-ims-uecm:restoration:read
      parameters:
        - name: impu
          in: path
          description: Public identity of the user.
          required: true
          schema:
            $ref: '#/components/schemas/Impu'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ScscfRestorationInfoResponse'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    delete:
      summary: Delete the S-CSCF restoration
      operationId: DeleteScscfRestorationInfo
      tags:
       - S-CSCF Restoration Info Delete
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
        - oAuth2ClientCredentials:
          - nhss-ims-uecm
          - nhss-ims-uecm:restoration:modify
      parameters:
         name: impu
          in: path
          description: Public identity of the user.
          required: true
          schema:
            $ref: '#/components/schemas/Impu'
      responses:
        '204':
          description: No content
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
```

```
clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            nhss-ims-uecm: Access to the Nhss IMS UE Context Management API
            nhss-ims-uecm:authorize:invoke: Access to invoke the Authorize custom operation
            nhss-ims-uecm:registration:create: Access to create S-CSCF Registration resources
            nhss-ims-uecm:restoration:read: Access to read the S-CSCF Restoration resource
            nhss-ims-uecm:restoration:modify: Access to create/update/delete the S-CSCF Restoration
resource
  schemas:
# COMPLEX TYPES:
    AuthorizationRequest:
      description: Ims authorization request data
      type: object
      required:
        - authorizationType
      properties:
        impi:
          $ref: '#/components/schemas/Impi'
        authorizationType:
          description: authorization type
          $ref: '#/components/schemas/AuthorizationType'
        visitedNetworkIdentifier:
         type: string
        emergencyIndicator:
         type: boolean
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    AuthorizationResponse:
      description: Ims Registration authorization information result
      type: object
      properties:
       authorizationResult:
          $ref: '#/components/schemas/AuthorizationResult'
        cscfServerName:
          type: string
    ScscfRegistration:
      description: Scscf Registration
      type: object
      required:
        - imsRegistrationType
        - cscfServerName
      properties:
        impi:
         $ref: '#/components/schemas/Impi'
        imsRegistrationType:
          description: Ims registration type
          $ref: '#/components/schemas/ImsRegistrationType'
        cscfServerName:
         type: string
        scscfInstanceId:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
        deregCallbackUri:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
        associatedImpis:
          type: array
          items:
           $ref: '#/components/schemas/Impi'
        associatedRegisteredImpis:
          type: array
          items:
            $ref: '#/components/schemas/Impi'
        irsImpus:
          type: array
          items:
            $ref: '#/components/schemas/Impu'
          minItems: 1
          uniqueItems: true
        wildcardedPui:
          $ref: '#/components/schemas/Impu'
        looseRouteIndicator:
          $ref: '#/components/schemas/LooseRouteIndication'
        wildcardedPsi:
```

```
$ref: '#/components/schemas/Impu'
        supportedFeatures:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
        multipleRegistrationIndicator:
          type: boolean
        pcscfRestorationIndicator:
          type: boolean
          default: false
    ExtendedProblemDetails:
      allOf:
      - $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
      - $ref: '#/components/schemas/AdditionalInfo'
    AdditionalInfo:
      type: object
      properties:
        scscfServerName:
          type: string
    ScscfRestorationInfo:
      description: S-CSCF restoration information
      type: object
      properties:
        userName:
         $ref: '#/components/schemas/Impi'
        restorationInfo:
          type: array
          items:
            $ref: '#/components/schemas/RestorationInfo'
        registrationTimeOut:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
        sipAuthenticationScheme:
            $ref: '#/components/schemas/SipAuthenticationScheme'
    ScscfRestorationInfoRequest:
      description: S-CSCF restoration information request
      type: object
      properties:
        scscfRestorationInfoRequest:
          $ref: '#/components/schemas/ScscfRestorationInfo'
    ScscfRestorationInfoResponse:
      description: S-CSCF restoration information response
      type: object
      properties:
        scscfRestorationInfoResponse:
          type: array
          items:
            $ref: '#/components/schemas/ScscfRestorationInfo'
    RestorationInfo:
      description: The information relevant to a specific registration required for an S-CSCF to
handle the requests for a user
      type: object
      required:
        - path
        - contact
      properties:
       path:
         type: string
        contact:
         type: string
        initialCSeqSequenceNumber:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Uint32'
        callIdSipHeader:
         type: string
        uesubscriptionInfo:
          $ref: '#/components/schemas/UeSubscriptionInfo'
        pcscfSubscriptionInfo:
          $ref: '#/components/schemas/PcscfSubscriptionInfo'
    UeSubscriptionInfo:
      type: object
      required:
       - callIdSipHeader
        - fromSipHeader
        - toSipHeader
```

```
- recordRoute
        - contact
      properties:
       callIdSipHeader:
         type: string
        fromSipHeader:
         type: string
        toSipHeader:
         type: string
        recordRoute:
         type: string
        contact:
          type: string
    PcscfSubscriptionInfo:
      type: object
      required:
       - callIdSipHeader
- fromSipHeader
        - toSipHeader
        - contact
      properties:
       callIdSipHeader:
         type: string
        fromSipHeader:
         type: string
        toSipHeader:
         type: string
       contact:
          type: string
    DeregistrationData:
      type: object
      required:
        - deregReason
        - impi
      properties:
       deregReason:
         $ref: '#/components/schemas/DeregistrationReason'
        impi:
          $ref: '#/components/schemas/Impi'
        associatedImpis:
          type: array
          items:
            $ref: '#/components/schemas/Impi'
        emergencyRegisteredIdentities:
          type: array
          items:
            $ref: '#/components/schemas/EmergencyRegisteredIdentity'
    EmergencyRegisteredIdentity:
      type: object
      required:
       - impi
       - impu
      properties:
        impi:
          $ref: '#/components/schemas/Impi'
        impu:
          $ref: '#/components/schemas/Impu'
    DeregistrationReason:
      type: object
      required:
        - reasonCode
        - reasonText
      properties:
        reasonCode:
          $ref: '#/components/schemas/DeregistrationReasonCode'
        reasonText:
          type: string
# SIMPLE TYPES
    ImsUeId:
      type: string
```

```
pattern: '^(impu-sip^:([a-zA-Z0-9_{-.!}^*()\&=+\$\,,;?^/]+)\\) @([A-Za-z0-9]+([-A-Za-z0-9]+)^.)+[a-za-z0-9]+([-A-za-z0-9]+)^.)
z]{2,}|impu-tel\:\+[0-9]{5,15}|impi-.+|.+)$'
    Impu:
      type: string
    Impi:
      type: string
# ENUMS:
    AuthorizationType:
      anyOf:
        - type: string
          enum:
          - REGISTRATION
          - DEREGISTRATION
        - type: string
    AuthorizationResult:
      anyOf:
        - type: string
          enum:
          - FIRST_REGISTRATION
          - SUBSEQUENT_REGISTRATION
        - type: string
    SipAuthenticationScheme:
      anyOf:
        - type: string
          enum:
          - DIGEST-AKAV1-MD5
          - DIGEST-HTTP
          - NBA
          - GIBA
          - UNKNOWN
        - type: string
    ImsRegistrationType:
      anyOf:
        - type: string
          enum:
          - INITIAL_REGISTRATION
          - RE REGISTRATION
          - TIMEOUT_DEREGISTRATION
          - USER_DEREGISTRATION
          - ADMINISTRATIVE_DEREGISTRATION
          - AUTHENTICATION FAILURE
          - AUTHENTICATION TIMEOUT
          - UNREGISTERED_USER
        - type: string
    LooseRouteIndication:
      anyOf:
         type: string
          enum:
          - LOOSE_ROUTE_NOT_REQUIRED
          - LOOSE_ROUTE_REQUIRED
        - type: string
    DeregistrationReasonCode:
      anyOf:
        - type: string
          enum:
          - PERMANENT_TERMINATION
          - NEW_SERVER_ASSIGNED
          - REMOVE_S-CSCF
          - SERVER_CHANGE
        - type: string
```

A.3 Nhss_imsSDM API

```
openapi: 3.0.0
info:
  version: '1.0.1'
  title: 'Nhss_imsSDM'
```

```
description: |
   Nhss Subscriber Data Management Service for IMS.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.562 HSS Services for interworking with IMS, version 16.2.0
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.562/'
  - url: '{apiRoot}/nhss-ims-sdm/v1'
   variables:
      apiRoot:
        default: https://example.com
       description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
security:
  - {}
  - oAuth2ClientCredentials:
    - nhss-ims-sdm
paths:
  /{imsUeId}/ims-data/registration-status:
      summary: Retrieve the registration status of a user
      operationId: GetRegistrationStatus
        - Registration Status retrieval
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:registration-status:read
      parameters:
        - name: imsUeId
          in: path
          description: IMS Identity
          required: true
          schema:
           $ref: '#/components/schemas/ImsUeId'
        - name: supported-features
          in: query
          description: Supported Features
          schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ImsRegistrationStatus'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '405':
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
          $ref: 'TS29571_CommonData.yaml#/components/responses/504'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/ims-data/profile-data/profile-data:
      summary: Retrieve the complete IMS profile for a given IMS public identity (and public
identities in the same IRS)
      operationId: GetProfileData
      tags:
       - IMS Profile Data Retrieval
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
```

```
- oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:profile-data:read
   parameters:
       - name: imsUeId
       in: path
       description: IMS Identity. In this case it shall be an IMS public identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
   responses:
      200:
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/ImsProfileData'
      14041:
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571 CommonData.vaml#/components/responses/503'
      504:
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/ims-data/profile-data/priority-levels:
   summary: Retrieve the service priority levels associated to the user
   operationId: GetPriorityInfo
    tags:
      - Priority Info Retrieval
   security:
     - {}
     - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:priority-levels:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
       in: query
       description: Supported Features
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/PriorityLevels'
      '404':
       $ref: 'TS29571 CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      '504':
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/ims-data/profile-data/ifcs:
 get:
   summary: Retrieve the Initial Filter Criteria for the associated IMS subscription
```

```
operationId: GetIfcs
   tags:
     - IFCs Retrieval
    security:
      - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:ifcs:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
          $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
       in: query
       description: Supported Features
       schema:
           $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
           schema:
              $ref: '#/components/schemas/Ifcs'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      '504':
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/ims-data/profile-data/service-level-trace-information:
   summary: Retrieve the IMS service level trace information for the associated user
   operationId: GetServiceTraceInfo
    tags:
      - Service Trace Info Retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:service-level-trace-information:read
   parameters:
       name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
       in: query
       description: Supported Features
       schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/ServiceLevelTraceInformation'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
```

```
500:
        $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      5041:
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/ims-data/location-data/server-name:
    summary: Retrieve the server name for the associated user
    operationId: GetSserverName
    tags:
      - Server Name retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
       - nhss-ims-sdm:server-name:read
    parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
        in: query
       description: Supported Features
        schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
           schema:
             $ref: '#/components/schemas/ImsLocationData'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      503:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/ims-data/location-data/scscf-capabilities:
    summary: Retrieve the S-CSCF capabilities for the associated IMS subscription
    operationId: GetScscfCapabilities
    tags:
     - Retrieval of the S-CSCF capabilities for the IMS subscription
    security:
      - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:scscf-capabilities:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
          $ref: '#/components/schemas/ImsUeId'
    responses:
       description: Expected response to a valid request
       content:
```

```
application/json:
              schema:
                $ref: '#/components/schemas/ScscfCapabilityList'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
        500:
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        '504':
          $ref: 'TS29571_CommonData.yaml#/components/responses/504'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/access-data/ps-domain/location-data:
      summary: Retrieve the location data in PS domain
      operationId: GetLocPsDomain
      tags:
        - PS location retrieval
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:ps-domain:location-data:read
      parameters:
         name: imsUeId
          in: path
          description: IMS Public Identity
          required: true
          schema:
            $ref: '#/components/schemas/ImsUeId'
        - name: requestedNodes
          in: query
          description: Indicates the serving node(s) for which the request is applicable.
         schema:
           $ref: '#/components/schemas/RequestedNodes'
        - name: servingNode
          in: query
          description: Indicates that only the stored NF id/address of the serving node(s) is
required
          schema:
           $ref: '#/components/schemas/ServingNode'
        - name: localTime
          in: query
         description: Indicates that only the Local Time Zone information of the location in the
visited network where the UE is attached is requested
          schema:
            $ref: '#/components/schemas/LocalTime'
        - name: currentLocation
          in: query
          description: Indicates whether an active location retrieval has to be initiated by the
requested node
            $ref: '#/components/schemas/CurrentLocation'
        - name: supported-features
          in: query
          description: Supported Features
             $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/PsLocation'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
        '500':
```

```
$ref: 'TS29571_CommonData.yaml#/components/responses/500'
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/access-data/cs-domain/location-data:
      summary: Retrieve the location data in CS domain
      operationId: GetLocCsDomain
      taqs:
        - CS location retrieval
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:cs-domain:location-data:read
      parameters:
         - name: imsUeId
          in: path
          description: IMS Public Identity
          required: true
          schema:
           $ref: '#/components/schemas/ImsUeId'
        - name: servingNode
          in: query
          description: Indicates that only the stored NF id/address of the serving node(s) is
required
           $ref: '#/components/schemas/ServingNode'
        - name: localTime
          in: querv
          description: Indicates that only the Local Time Zone information of the location in the
visited network where the UE is attached is requested
         schema:
            $ref: '#/components/schemas/LocalTime'
        - name: currentLocation
          in: query
          description: Indicates whether an active location retrieval has to be initiated by the
requested node
          schema:
            $ref: '#/components/schemas/CurrentLocation'
        - name: supported-features
          in: query
          description: Supported Features
          schema:
             $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
             schema:
                $ref: '#/components/schemas/CsLocation'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '405':
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        503:
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/repository-data/{serviceIndication}:
      summary: Update the repository data associated to an IMPU and service indication
      operationId: UpdateRepositoryDataServInd
      tags:
        - Update repository data
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
```

```
- oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:repository-data:modify
      parameters:
         name: imsUeId
          in: path
          description: IMS Identity
          required: true
          schema:
           $ref: '#/components/schemas/ImsUeId'
        - name: serviceIndication
          in: path
          description: Identifier of a service related data
          required: true
          schema:
           $ref: '#/components/schemas/ServiceIndication'
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/RepositoryData'
        required: true
      responses:
        '201':
          description: Created
          content:
            application/json:
                $ref: '#/components/schemas/RepositoryData'
          headers:
            Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss-ims-sdm/v1/{imsUeId}/repository-data/{serviceIndication}
              required: true
              schema:
                type: string
        '200':
          description: OK
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/RepositoryData'
        '204':
          description: No content
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '403':
          $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '409':
          $ref: 'TS29571_CommonData.yaml#/components/responses/409'
        '413':
          $ref: 'TS29571_CommonData.yaml#/components/responses/413'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
         503:
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
         description: Unexpected error
    delete:
      summary: delete the Repository Data for a Service Indication
      operationId: DeleteRepositoryDataServInd
      tags:
        - Delete repository data
      security:
        - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:repository-data:modify
      parameters:
        - name: imsUeId
          in: path
          description: Identifier of the UE
          required: true
          schema:
```

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```
$ref: '#/components/schemas/ImsUeId'
      - name: serviceIndication
       in: path
       description: Identifier of a service related data
       required: true
         $ref: '#/components/schemas/ServiceIndication'
   responses:
      '204':
       description: Expected response to a valid request
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '403':
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      15031:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       description: Unexpected error
   summary: Retrieve the repository data associated to an IMPU and service indication
   operationId: GetRepositoryDataServInd
   tags:
      - Repository data
   security:
     - {}
     - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:repository-data:read
   parameters:
       name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: serviceIndication
       in: path
       description: Identifier of a service related data
       required: true
       schema:
         $ref: '#/components/schemas/ServiceIndication'
    responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/RepositoryData'
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/identities/msisdns:
 get:
   summary: retrieve the Msisdns associated to requested identity
    operationId: GetMsisdns
    tags:
     - Retrieval of the associated Msisdns
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
```

```
- nhss-ims-sdm
          - nhss-ims-sdm:identities:read
      parameters:
        - name: imsUeId
          in: path
          description: IMS Identity
          required: true
          schema:
            $ref: '#/components/schemas/ImsUeId'
        - name: privateId
          in: query
          description: Private identity
          schema:
            $ref: '#/components/schemas/PrivateId'
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
             schema:
               $ref: '#/components/schemas/MsisdnList'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
          $ref: 'TS29571 CommonData.yaml#/components/responses/404'
        '405':
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        503:
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/identities/ims-associated-identities:
     summary: Retrieve the associated identities to the IMS public identity included in the service
request
      operationId: GetImsAssocIds
        - Retrieval of associated IMS public identities
      security:
       - {}
        - oAuth2ClientCredentials:
         - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:identities:read
      parameters:
        - name: imsUeId
          in: path
          description: IMS Public Identity
          required: true
          schema:
           $ref: '#/components/schemas/ImsUeId'
      responses:
        '200':
          description: Expected response to a valid request
          content:
           application/json:
              schema:
                $ref: '#/components/schemas/ImsAssociatedIdentities'
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '405':
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/srvcc-data:
    get:
      summary: Retrieve the srvcc data
```

```
operationId: GetSrvccData
  tags:
   - Retrieval of UE SRVCC capability and STN-SR
  security:
   - {}
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
     - nhss-ims-sdm:srvcc:read
 parameters:
    - name: imsUeId
     in: path
     description: IMS Public Identity or IMS Private Identity
     required: true
     schema:
        $ref: '#/components/schemas/ImsUeId'
    - name: supported-features
     in: query
     description: Supported Features
     schema:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  responses:
    '200':
     description: Expected response to a valid request
     content:
       application/json:
          schema:
           $ref: '#/components/schemas/SrvccData'
    '400':
     $ref: 'TS29571_CommonData.yaml#/components/responses/400'
     $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '405':
     $ref: 'TS29571_CommonData.yaml#/components/responses/405'
    '500':
     $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
     $ref: 'TS29571_CommonData.yaml#/components/responses/503'
   default:
     $ref: 'TS29571_CommonData.yaml#/components/responses/default'
patch:
  summary: Patch
  operationId: UpdateSrvccData
  tags:
   - Update SRVCC data
  security:
   - {}
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
      - nhss-ims-sdm:srvcc:modify
 parameters:
    - name: imsUeId
     in: path
     description: IMS Public Identity or IMS Private Identity
     required: true
     schema:
       $ref: '#/components/schemas/ImsUeId'
    - name: supported-features
     in: query
     description: Supported Features
      schema:
         $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  requestBody:
   content:
     application/json-patch+json:
        schema:
          type: array
            $ref: 'TS29571_CommonData.yam1#/components/schemas/PatchItem'
          minItems: 1
   required: true
  responses:
    '200':
     description: Expected response to a valid request
```

```
content:
         application/json:
           schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchResult'
      '204':
       description: Successful response
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      default:
       description: Unexpected error
/{imsUeId}/service-data/psi-status:
 get:
   summary: Retrieve the PSI activation state data
   operationId: GetPsiState
   tags:
     - Retrieval of PSI activation state
   security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:psi-status:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Private Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
       in: query
       description: Supported Features
       schema:
           $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/PsiActivationState'
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      5001:
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      15031:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
     default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
 patch:
   summary: Patch
    operationId: UpdatePsiState
    tags:
     - Update PSI state data
   security:
     - {}
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:psi-status:modify
   parameters:
       name: imsUeId
       in: path
       description: IMS Public Service Identity
       required: true
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
```

```
in: query
       description: Supported Features
       schema:
           $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    requestBody:
       application/json-patch+json:
          schema:
            type: array
            items:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
           minItems: 1
     required: true
   responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
           schema:
             $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchResult'
      '204':
       description: Successful response
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      default:
       description: Unexpected error
/{imsUeId}/service-data/dsai:
   summary: Retrieve the DSAI information associated to an Application Server
   operationId: GetDsaiInfo
   tags:
      - DSAI registration information
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
        - nhss-ims-sdm:dsai:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
          $ref: '#/components/schemas/ImsUeId'
      - name: application-server-name
       in: query
       description: SIP URI of the Application Server Name
       required: true
          $ref: '#/components/schemas/SipServerName'
      - name: supported-features
       in: query
       description: Supported Features
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/DsaiTagInformation'
        $ref: 'TS29571 CommonData.yaml#/components/responses/400'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      5001:
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
```

```
$ref: 'TS29571_CommonData.yaml#/components/responses/default'
 patch:
    summary: Patch
    operationId: UpdateDsaiState
    tags:
      - Update Dsai State
    security:
     - {}
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:dsai:modify
   parameters:
      - name: imsUeId
        in: path
       description: IMS Public Service Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: supported-features
        in: query
       description: Supported Features
       schema:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    requestBody:
       application/json-patch+json:
          schema:
            type: array
              $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
            minItems: 1
     required: true
    responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
            schema:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchResult'
      '204':
       description: Successful response
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      default:
       description: Unexpected error
/{imsUeId}/service-data/sms-registration-info:
    summary: Update the SMS registration information associated to a user
    operationId: UpdateSmsRegistrationInfo
    tags:
      - Update SMS registration info
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
        - nhss-ims-sdm:sms-registration-info:modify
   parameters:
      - name: imsUeId
        in: path
       description: IMS Identity
       required: true
       schema:
          $ref: '#/components/schemas/ImsUeId'
    requestBody:
     content:
        application/json:
          schema:
            $ref: '#/components/schemas/IpSmGwAddress'
     required: true
    responses:
```

```
'201':
         description: Created
         content:
           application/json:
              schema:
               $ref: '#/components/schemas/SmsRegistrationInfo'
         headers:
            Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss-ims-sdm/v1/{imsUeId}/service-data/sms-registration-info
             required: true
              schema:
                type: string
        '200':
         description: OK
         content:
           application/json:
              schema:
                $ref: '#/components/schemas/SmsRegistrationInfo'
        '204':
         description: No content
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
         $ref: 'TS29571 CommonData.yaml#/components/responses/403'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '409':
         $ref: 'TS29571_CommonData.yaml#/components/responses/409'
        '413':
         $ref: 'TS29571_CommonData.yaml#/components/responses/413'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
         $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
         description: Unexpected error
   delete:
      summary: delete the SMS registration information
      operationId: DeleteSmsRegistrationInfo
      tags:
       - Delete SMS registration information
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:sms-registration-info:modify
     parameters:
        - name: imsUeId
         in: path
         description: Identifier of the UE
          required: true
         schema:
           $ref: '#/components/schemas/ImsUeId'
      responses:
        '204':
         description: Expected response to a valid request
         $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '403':
         $ref: 'TS29571_CommonData.yaml#/components/responses/403'
        '404':
         $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        '500':
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
         description: Unexpected error
      summary: Retrieve the SMS registration information associated to a user
      operationId: GetSmsRegistrationInfo
       - SMS registration information
     security:
        - {}
```

```
- oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:sms-registration-info:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
   responses:
      '200':
       description: Expected response to a valid request
       content:
          application/json:
           schema:
              $ref: '#/components/schemas/SmsRegistrationInfo'
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571 CommonData.yaml#/components/responses/405'
      5001:
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/identities/imeisv:
 aet:
   summary: Retrieve the IMEISV information
    operationId: GetIMEISVInfo
   tags:
      - IMEISV Retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:identities:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/ImeiSvInformation'
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/ps-domain/ip-address:
   summary: Retrieve the IP address information
   operationId: GetIpAddressInfo
   tags:
      - IP address Info Retrieval
```

```
security:
      - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
        - nhss-ims-sdm:ps-domain:ip-address:read
   parameters:
      - name: imsUeId
        in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
             $ref: '#/components/schemas/IpAddress'
      '404':
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571 CommonData.yaml#/components/responses/405'
      500:
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      504:
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/ps-domain/tads-info:
   summary: Retrieve the T-ADS information
   operationId: GetTadsInfo
   tags:
      - TADS Info Retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:ps-domain:tads-info:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
          $ref: '#/components/schemas/ImsUeId'
   responses:
      '200':
       description: Expected response to a valid request
         application/json:
           schema:
              $ref: '#/components/schemas/TadsInformation'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      '504':
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
        $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/ps-domain/ue-reach-subscriptions:
   summary: subscribe to notifications of UE reachability
   operationId: UeReachIpSubscribe
```

```
tags:
        - UE IP reachability Subscription Creation
      security:
        - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:ps-domain:ue-reach-subscriptions:create
      parameters:
         name: imsUeId
          in: path
          description: IMS Identity
          required: true
          schema:
           $ref: '#/components/schemas/ImsUeId'
      requestBody:
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/UeReachabilitySubscription'
        required: true
      responses:
        '201':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/CreatedUeReachabilitySubscription'
          headers:
            Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss-ims-sdm/<apiVersion>/{imsUeId}/access-data/ps-domain/ue-reach-
subscriptions/{subscriptionId}'
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '501':
          $ref: 'TS29571_CommonData.yaml#/components/responses/501'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          description: Unexpected error
      callbacks:
        ueReachabilityNotification:
          '{request.body#/callbackReference}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                      $ref: '#/components/schemas/UeReachabilityNotification'
              responses:
                '204':
                  description: Successful Notification response
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '404':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
                '500':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                '503':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  description: Unexpected error
  /{imsUeId}/access-data/ps-domain/ue-reach-subscriptions/{subscriptionId}:
    delete:
      summary: unsubscribe from notifications to UE reachability
      operationId: UeReachUnsubscribe
      tags:
```

```
- Reachability Subscription Deletion
  security:
   - {}
    - oAuth2ClientCredentials:
      - nhss-ims-sdm
    - oAuth2ClientCredentials:
      - nhss-ims-sdm
     - nhss-ims-sdm:ps-domain:ue-reach-subscriptions:modify
  parameters:
    - name: imsUeId
     in: path
     description: IMS Identity
     required: true
     schema:
       $ref: '#/components/schemas/ImsUeId'
    - name: subscriptionId
     in: path
     description: Id of the Subscription
     required: true
     schema:
       type: string
  responses:
    '204':
     description: Successful response
    '400':
     $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
     $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '503':
     $ref: 'TS29571_CommonData.yaml#/components/responses/503'
    default:
     description: Unexpected error
patch:
  summary: modify the subscription
  operationId: UeReachSubsModify
 tags:
   - Reachability Subscription Modification
  security:
   - {}
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
    - oAuth2ClientCredentials:
     - nhss-ims-sdm
     - nhss-ims-sdm:ps-domain:ue-reach-subscriptions:modify
 parameters:
    - name: imsUeId
      in: path
     description: IMS Identity
     required: true
     schema:
        $ref: '#/components/schemas/ImsUeId'
    - name: subscriptionId
     in: path
     description: Id of the Subscription
      required: true
      schema:
        type: string
 request.Body:
    content:
     application/json-patch+json:
        schema:
          type: array
          items:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
          minItems: 1
   required: true
  responses:
    '200':
     description: Expected response to a valid request
     content:
       application/json:
            $ref: '#/components/schemas/UpdatedUeReachabilitySubscription'
    12041:
     description: Successful modification
    '400':
```

```
$ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '403':
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      503:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       description: Unexpected error
/{imsUeId}/access-data/ps-domain/user-state:
   summary: Retrieve the user state information in PS domain
   operationId: GetPsUserStateInfo
   tags:
      - PS User State Info Retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:ps-domain:user-state:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: requestedNodes
       in: querv
       description: Indicates the serving node(s) for which the request is applicable.
         $ref: '#/components/schemas/RequestedNodes'
   responses:
      '200':
       description: Expected response to a valid request
         application/json:
           schema:
              $ref: '#/components/schemas/PsUserState'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      504:
        $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/cs-domain/user-state:
   summary: Retrieve the user state information in CS domain
   operationId: GetCsUserStateInfo
    tags:
     - CS User State Info Retrieval
   security:
     - {}
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:cs-domain:user-state:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
   responses:
```

```
'200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
             $ref: '#/components/schemas/CsUserState'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      15031:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
       $ref: 'TS29571_CommonData.yaml#/components/responses/504'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/cs-domain/csrn:
 get:
   summary: Retrieve the routeing number in CS domain
    operationId: GetCsrn
   tags:
      - CSRN retrieval
   security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
       - nhss-ims-sdm:cs-domain:csrn:read
   parameters:
      - name: imsUeId
       in: path
       description: IMS Public Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: pre-paging
        in: query
       description: Indicates pre-paging support
       schema:
          $ref: '#/components/schemas/PrePaging'
      - name: supported-features
       in: query
       description: Supported Features
       schema:
           $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
   responses:
      '200':
       description: Expected response to a valid request
       content:
         application/json:
           schema:
              $ref: '#/components/schemas/Csrn'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '405':
       $ref: 'TS29571_CommonData.yaml#/components/responses/405'
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      15031:
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       $ref: 'TS29571_CommonData.yaml#/components/responses/default'
/{imsUeId}/access-data/wireline-domain/reference-location:
   summary: Retrieve the reference location information
   operationId: GetReferenceLocationInfo
   tags:
      - Reference Location Info Retrieval
    security:
     - {}
      - oAuth2ClientCredentials:
```

```
- nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
         - nhss-ims-sdm:wireline-domain:reference-location:read
      parameters:
        - name: imsUeId
          in: path
         description: IMS Identity
          required: true
         schema:
           $ref: '#/components/schemas/ImsUeId'
        - name: supported-features
          in: query
          description: Supported Features
         schema:
            $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
      responses:
        '200':
         description: Expected response to a valid request
         content:
           application/json:
             schema:
                $ref: '#/components/schemas/ReferenceLocationInformation'
        '404':
         $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        4051:
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
        '500':
         $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        503:
         $ref: 'TS29571_CommonData.yaml#/components/responses/503'
          $ref: 'TS29571_CommonData.yaml#/components/responses/504'
        default:
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  /{imsUeId}/subscriptions:
   post:
      summary: subscribe to notifications
      operationId: ImdSdmSubscribe
      tags:
       - SDM Subscription Creation
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
         - nhss-ims-sdm:subscriptions:create
     parameters:
        - name: imsUeId
         in: path
         description: IMS Public Identity
         required: true
         schema:
           $ref: '#/components/schemas/ImsUeId'
      requestBody:
       content:
         application/json:
            schema:
              $ref: '#/components/schemas/ImsSdmSubscription'
       required: true
      responses:
         description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/ImsSdmSubscription'
         headers:
            Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss-ims-sdm/<apiVersion>/{imsUeId}/subscriptions/{subscriptionId}'
              required: true
              schema:
               type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
```

'404':

```
$ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '501':
        $ref: 'TS29571_CommonData.yaml#/components/responses/501'
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       description: Unexpected error
   callbacks:
      datachangeNotification:
        '{request.body#/callbackReference}':
         post:
           requestBody:
             required: true
              content:
                application/json:
                 schema:
                   $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ModificationNotification'
            responses:
              '204':
               description: Successful Notification response
                $ref: 'TS29571 CommonData.yaml#/components/responses/400'
              '404':
                $ref: 'TS29571_CommonData.yaml#/components/responses/404'
              '500':
                $ref: 'TS29571_CommonData.yaml#/components/responses/500'
              503:
                $ref: 'TS29571_CommonData.yaml#/components/responses/503'
              default:
               description: Unexpected error
/{imsUeId}/subscriptions/{subscriptionId}:
 delete:
   summary: unsubscribe from notifications
   operationId: ImsSdmUnsubscribe
   tags:
      - SDM Subscription Deletion
    security:
     - {}
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:subscription:modify
   parameters:
      - name: imsUeId
       in: path
       description: IMS Public Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: subscriptionId
       in: path
       description: Id of the Subscription
       required: true
       schema:
         type: string
   responses:
      '204':
       description: Successful response
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
     default:
       description: Unexpected error
 patch:
   summary: modify the subscription
    operationId: ImsSdmSubsModify
   tags:
      - SDM Subscription Modification
```

```
security:
     - {}
     - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
        - nhss-ims-sdm:subscription:modify
   parameters:
      - name: imsUeId
        in: path
       description: IMS Public Identity
       required: true
       schema:
         $ref: '#/components/schemas/ImsUeId'
      - name: subscriptionId
       in: path
       description: Id of the Subscription
       required: true
       schema:
         type: string
   requestBody:
     content:
       application/json-patch+json:
         schema:
            type: array
            items:
             $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
           minItems: 1
     required: true
   responses:
      '200':
       description: Expected response to a valid request
         application/json:
           schema:
             $ref: '#/components/schemas/ImsSdmSubscription'
      '204':
       description: Successful modification
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '403':
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
       $ref: 'TS29571_CommonData.yaml#/components/responses/503'
     default:
       description: Unexpected error
/shared-data-subscriptions:
   summary: subscribe to notifications for shared data
   operationId: SubscribeToSharedData
   tags:
     - Subscription Creation for shared data
    security:
     - {}
     - oAuth2ClientCredentials:
       - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
        - nhss-ims-sdm:shared-subscriptions:create
   requestBody:
     content:
       application/json:
         schema:
            $ref: '#/components/schemas/ImsSdmSubscription'
     required: true
   responses:
       description: Expected response to a valid request
       content:
         application/json:
            schema:
             $ref: '#/components/schemas/ImsSdmSubscription'
       headers:
```

```
Location:
              description: 'Contains the URI of the newly created resource, according to the
structure: {apiRoot}/nhss-ims-dm/<apiVersion>/shared-data-subscriptions/{subscriptionId}'
              required: true
              schema:
                type: string
        '400':
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
        default:
          description: Unexpected error
      callbacks:
        datachangeNotification:
          '{request.body#/callbackReference}':
            post:
              requestBody:
                required: true
                content:
                  application/json:
                    schema:
                      $ref: 'TS29503_Nudm_SDM.yaml#/components/schemas/ModificationNotification'
              responses:
                  description: Successful Notification response
                  $ref: 'TS29571_CommonData.yaml#/components/responses/400'
                '404':
                  $ref: 'TS29571_CommonData.yaml#/components/responses/404'
                500:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/500'
                503:
                  $ref: 'TS29571_CommonData.yaml#/components/responses/503'
                default:
                  description: Unexpected error
  /shared-data-subscriptions/{subscriptionId}:
      summary: unsubscribe from notifications for shared data
      operationId: UnsubscribeForSharedData
      tags:
       - Subscription Deletion for shared data
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
          - nhss-ims-sdm:shared-subscription:modify
      parameters:
        - name: subscriptionId
          in: path
          description: Id of the Shared data Subscription
          required: true
         schema:
           type: string
      responses:
        '204':
          description: Successful response
          $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        '404':
          $ref: 'TS29571_CommonData.yaml#/components/responses/404'
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '503':
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
         description: Unexpected error
      summary: modify the subscription
      operationId: ModifySharedDataSubs
      tags:
        - Subscription Modification
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-sdm
```

```
- oAuth2ClientCredentials:
        - nhss-ims-sdm
        - nhss-ims-sdm:shared-subscription:modify
    parameters:
       - name: subscriptionId
       in: path
       description: Id of the SDM Subscription
       required: true
        schema:
         type: string
   requestBody:
      content:
       application/json-patch+json:
          schema:
            type: array
            items:
              $ref: 'TS29571_CommonData.yaml#/components/schemas/PatchItem'
            minItems: 1
     required: true
    responses:
      '200':
       description: Expected response to a valid request
         application/json:
            schema:
             $ref: '#/components/schemas/ImsSdmSubscription'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
       $ref: 'TS29571_CommonData.yaml#/components/responses/403'
      '404':
       $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '500':
       $ref: 'TS29571_CommonData.yaml#/components/responses/500'
      '503':
        $ref: 'TS29571_CommonData.yaml#/components/responses/503'
      default:
       description: Unexpected error
/shared-data:
 get:
   summary: retrieve shared data
    operationId: GetSharedData
    tags:
     - Retrieval of shared data
    security:
     - {}
      - oAuth2ClientCredentials:
        - nhss-ims-sdm
      - oAuth2ClientCredentials:
       - nhss-ims-sdm
       - nhss-ims-sdm:shared-data:read
    parameters:
      - name: shared-data-ids
       in: query
       description: List of shared data ids
       required: true
       style: form
       explode: false
       schema:
          type: array
          items:
            $ref: '#/components/schemas/SharedDataId'
    responses:
      '200':
       description: Expected response to a valid request
        content:
         application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/SharedData'
              minItems: 1
      '400':
       $ref: 'TS29571_CommonData.yaml#/components/responses/400'
        $ref: 'TS29571_CommonData.yaml#/components/responses/404'
      '500':
```

```
$ref: 'TS29571_CommonData.yaml#/components/responses/500'
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        default:
          description: Unexpected error
components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
           nhss-ims-sdm: Access to the Nhss IMS Subscription Data Management API
            nhss-ims-sdm:registration-status:read: Access to read the Registration Status resource
            nhss-ims-sdm:profile-data:read: Access to read the Profile Data resource
            nhss-ims-sdm:priority-levels:read: Access to read the Priority Levels resource
            nhss-ims-sdm:ifcs:read: Access to read the Initial Filter Criteria resource
           nhss-ims-sdm:service-level-trace-information:read: Access to read the Service Level
Trace Information resource
            nhss-ims-sdm:server-name:read: Access to read the Server Name resource
           nhss-ims-sdm:scscf-capabilities:read: Access to read the S-CSCF Capabilities resource
           nhss-ims-sdm:ps-domain:location-data:read: Access to read the PS-Domain Location Data
resource
           nhss-ims-sdm:ps-domain:ip-address:read: Access to read the PS-Domain IP Address resource
            nhss-ims-sdm:ps-domain:tads-info:read: Access to read the PS-Domain TADS Info resource
           nhss-ims-sdm:ps-domain:ue-reach-subscriptions:create: Access to create PS-Domain UE
Reachability Subscriptions resources
            nhss-ims-sdm:ps-domain:ue-reach-subscriptions:modify: Access to update/delete a PS-
Domain UE Reachability Subscription resource
           nhss-ims-sdm:ps-domain:user-state:read: Access to read the PS-Domain User State resource
            nhss-ims-sdm:cs-domain:location-data:read: Access to read the CS-Domain Location Data
resource
            nhss-ims-sdm:cs-domain:user-state:read: Access to read the CS-Domain User State resource
           nhss-ims-sdm:cs-domain:csrn:read: Access to read the CS-Domain CSRN resource
            nhss-ims-sdm:wireline-domain:reference-location:read: Access to read the Wireline-Domain
Reference Location resource
           nhss-ims-sdm:repository-data:modify: Access to create/update/delete the Repository Data
resource
           nhss-ims-sdm:repository-data:read: Access to read the Repository Data resource
            nhss-ims-sdm:identities:read: Access to read the Identities resource
            nhss-ims-sdm:srvcc:read: Access to read the SRVCC resource
            nhss-ims-sdm:srvcc:modify: Acess to update the SRVCC resource
            nhss-ims-sdm:psi-status:read: Access to read the PSI Status resource
            nhss-ims-sdm:psi-status:modify: Acess to update the PSI Status resource
            nhss-ims-sdm:dsai:read: Acess to read the DSAI resource
            nhss-ims-sdm:dsai:modify: Acess to update the DSAI resource
           nhss-ims-sdm:sms-registration-info:read: Acess to read the SMS Registration Info
resource
           nhss-ims-sdm:sms-registration-info:modify: Acess to create/update/delete the SMS
Registration Info resource
           nhss-ims-sdm:subscriptions:create: Access to create Subscriptions resources
            nhss-ims-sdm:subscription:modify: Access to update/delete a Subscription resource
           nhss-ims-sdm:shared-subscriptions:create: Access to create a Shared-Data Subscriptions
resource
           nhss-ims-sdm:shared-subscription:modify: Access to update/delete a Shared-Data
Subscription resource
            nhss-ims-sdm:shared-data:read: Access to read the Shared-Data resource
  schemas:
# COMPLEX TYPES:
    ScscfCapabilityList:
     type: object
     properties:
        mandatoryCapabilityList:
          $ref: '#/components/schemas/Capabilities'
        optionalCapabilityList:
         $ref: '#/components/schemas/Capabilities'
      anyOf:
       - required: [mandatoryCapabilityList]
       - required: [optionalCapabilityList]
    Capabilities:
      type: array
```

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```
$ref: '#/components/schemas/Capability'
 minItems: 1
 uniqueItems: true
RepositoryData:
 type: object
  required:
    - serviceData
    - sequenceNumber
 properties:
   sequenceNumber:
       $ref: '#/components/schemas/SequenceNumber'
    serviceData:
      type: string
      format: byte
MsisdnList:
 type: object
 required:
   - basicMsisdn
 properties:
   basicMsisdn:
        $ref: '#/components/schemas/Msisdn'
   additionalMsisdns:
      type: array
      minItems: 1
      items:
        $ref: '#/components/schemas/Msisdn'
PublicIdentities:
 type: object
 required:
  - publicIdentities
 properties:
   publicIdentities:
      type: array
      items:
        $ref: '#/components/schemas/PublicIdentity'
      minItems: 1
      uniqueItems: true
PublicIdentity:
  type: object
  required:
    - imsPublicId
    - identityType
 properties:
    imsPublicId:
     $ref: '#/components/schemas/ImsPublicId'
    identityType:
   $ref: '#/components/schemas/IdentityType'
    irsIsDefault:
      type: boolean
    aliasGroupId:
      type: integer
ImsAssociatedIdentities:
  type: object
  required:
    - irsState
    - publicIdentities
 properties:
    irsState:
      $ref: '#/components/schemas/ImsRegistrationState'
    publicIdentities:
      $ref: '#/components/schemas/PublicIdentities'
{\tt ImsSdmSubscription:}
  type: object
  required:
    - nfInstanceId
    - callbackReference
    - monitoredResourceUris
 properties:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    callbackReference:
```

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```
$ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    monitoredResourceUris:
     type: array
     items:
        $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
     minItems: 1
    expires:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
ImsRegistrationStatus:
  type: object
  required:
    - imsUserStatus
 properties:
    imsUserStatus:
     $ref: '#/components/schemas/ImsRegistrationState'
PriorityLevels:
  type: object
 required:
    - servicePriorityLevelList
 properties:
    servicePriorityLevelList:
     type: array
     items:
       $ref: '#/components/schemas/NameSpacePriority'
     minItems: 1
     uniqueItems: true
Ifcs:
  type: object
 properties:
    ifcList:
      type: array
      items:
        $ref: '#/components/schemas/Ifc'
     minItems: 1
    cscfFilterSetIdList:
     type: array
      items:
        $ref: '#/components/schemas/CscfFilterSetId'
     minItems: 1
  anyOf:
    - required: [ ifcList ]
    - required: [ cscfFilterSetIdList ]
Ifc:
  type: object
  required:
    - priority
    - appServer
 properties:
   priority:
     type: integer
     minimum: 1
    trigger:
     $ref: '#/components/schemas/TriggerPoint'
    appServer:
     $ref: '#/components/schemas/ApplicationServer'
TriggerPoint:
  type: object
  required:
    conditionTypesptList
  properties:
    conditionType:
     $ref: '#/components/schemas/TypeOfCondition'
    sptList:
      type: array
      items:
        $ref: '#/components/schemas/Spt'
     minItems: 1
Spt:
  type: object
 required:
    - conditionNegated
```

```
- sptGroup
 properties:
    conditionNegated:
     type: boolean
    sptGroup:
     type: array
      items:
        $ref: '#/components/schemas/SptGroupId'
     minItems: 1
    regType:
     items:
        $ref: '#/components/schemas/RegistrationType'
     minItems: 1
     maxItems: 2
    requestUri:
     type: string
    sipMethod:
     type: string
    sipHeader:
     $ref: '#/components/schemas/HeaderSipRequest'
    sessionCase:
     $ref: '#/components/schemas/RequestDirection'
    sessionDescription:
     $ref: '#/components/schemas/SdpDescription'
HeaderSipRequest:
  type: object
  required:
   - header
 properties:
   header:
     type: string
    content:
     type: string
SdpDescription:
 type: object
 required:
   - line
 properties:
   line:
     type: string
    content:
     type: string
ApplicationServer:
 type: object
  required:
    - asUri
 properties:
   asUri:
     type: string
    sessionContinue:
     type: boolean
    serviceInfoList:
     type: array
      items:
        $ref: '#/components/schemas/ServiceInformation'
     minItems: 1
ImsLocationData:
 type: object
  required:
    - scscfName
 properties:
   scscfName:
     type: string
RequestedNodes:
  type: array
  minItems: 1
 uniqueItems: true
 properties:
    {\tt requestedNode:}
     $ref: '#/components/schemas/RequestedNode'
PsLocation:
  type: object
```

```
oneOf:
    - required:
     - sgsnLocationData
    - required:
      - mmeLocationData
    - required:
      - amfLocationData
    - required:
     - twanLocationData
  properties:
    sgsnLocationData:
     $ref: '#/components/schemas/SgsnLocationData'
    mmeLocationData:
     $ref: '#/components/schemas/MmeLocationData'
    amfLocationData:
     $ref: '#/components/schemas/AmfLocationData'
    twanLocationData:
      $ref: '#/components/schemas/TwanLocationData'
SqsnLocationData:
  type: object
  required:
    - sgsnNumber
    - plmnId
 properties:
    sgsnNumber:
     type: string
    plmnId:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    sgsnLocation:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/UtraLocation'
    csgInformation:
      $ref: '#/components/schemas/CsgInformation'
    timeZone:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
    ratType:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
MmeLocationData:
 type: object
  required:
    - mmeAddress
    - plmnId
  properties:
    mmeAddress:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
    plmnId:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    mmeLocation:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/EutraLocation'
    csqInformation:
     $ref: '#/components/schemas/CsgInformation'
    timeZone:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
    ratType:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
AmfLocationData:
  type: object
  required:
    - amfAddress
    - plmnId
 properties:
    amfAddress:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    plmnId:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    amfLocation:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/NrLocation'
    SmsfAddress:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/NfInstanceId'
    timeZone:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
    ratType:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
TwanLocationData:
  type: object
```

```
required:
    - twanSsid
    - plmnId
 properties:
   twanSsid:
     type: string
   plmnId:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    twanBssid:
     type: string
    civicAddress:
     type: string
     format: byte
    twanOperatorName:
     type: string
    timeZone:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
    logicalAccessId:
     type: string
CsLocation:
  type: object
  required:
   - mscNumber
    - vlrNumber
    - plmnId
 properties:
   mscNumber:
     type: string
    vlrNumber:
     type: string
    plmnId:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/PlmnId'
    vlrLocation:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/GeraLocation'
    csgInformation:
     $ref: '#/components/schemas/CsgInformation'
    timeZone:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/TimeZone'
     $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
CsgInformation:
  type: object
 required:
    - csgId
 properties:
   csqId:
     type: string
     format: byte
    accessMode:
     type: string
     format: byte
    cMi:
     type: boolean
SrvccData:
  type: object
 required:
   - stnSr
 properties:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/StnSr'
    ueSrvccCapabilities:
     type: array
     items:
        $ref: '#/components/schemas/SrvccCapability'
     minItems: 1
     uniqueItems: true
PsiActivationState:
 type: object
 required:
    - activationState
 properties:
   activationState:
     $ref: '#/components/schemas/ActivationState'
```

```
SharedData:
 type: object
 required:
    - sharedDataId
 properties:
   sharedDataId:
     $ref: '#/components/schemas/SharedDataId'
    sharedImsIfcData:
     $ref: '#/components/schemas/Ifcs'
 minProperties: 1
ImsProfileData:
  type: object
  required:
   - imsServiceProfiles
 properties:
    imsServiceProfiles:
     type: array
     items:
       $ref: '#/components/schemas/ImsServiceProfile'
    supportedFeatures:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
    maxAllowedSimulReg:
     type: integer
ImsServiceProfile:
  type: object
  required:
  - publicIdentifierList
 properties:
   publicIdentifierList:
     type: array
      items:
        $ref: '#/components/schemas/PublicIdentifier'
    ifcs:
      $ref: '#/components/schemas/Ifcs'
PublicIdentifier:
  type: object
  required:
    - publicIdentity
 properties:
   publicIdentity:
     $ref: '#/components/schemas/PublicIdentity'
    displayName:
     type: string
    \verb|imsServicePriority|:
     $ref: '#/components/schemas/PriorityLevels'
    serviceLevelTraceInfo:
     $ref: '#/components/schemas/ServiceLevelTraceInformation'
   barringIndicator:
     type: boolean
    wildcardedImpu:
     type: string
ServiceLevelTraceInformation:
 type: object
 properties:
   serviceLevelTraceInfo:
     type: string
ImeiSvInformation:
 type: object
 oneOf:
    - required:
     - imei
    - required:
     - imeiSv
 properties:
    imei:
     $ref: '#/components/schemas/Imei'
     $ref: '#/components/schemas/ImeiSv'
IpAddress:
  type: object
 oneOf:
    - required:
```

```
- ipv4Addr
    - required:
      - ipv6Addr
    - required:

    ipv6Prefix

 properties:
    ipv4Addr:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
    ipv6Addr:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
    ipv6Prefix:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
TadsInformation:
 type: object
 required:
   - voiceOverPsSessionSupport
 properties:
    voiceOverPsSessionSupport:
     $ref: '#/components/schemas/ImsVoiceOverPsSessionSupport'
    accessType:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/AccessType'
    ratType:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/RatType'
    lastUeActivityTime:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
UeReachabilitySubscription:
  type: object
 required:
   expiry
  properties:
    expiry:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
CreatedUeReachabilitySubscription:
 type: object
 required:
   - expiry
 properties:
   expiry:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
UpdatedUeReachabilitySubscription:
 type: object
 required:

    expiry

 properties:
     $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
UeReachabilityNotification:
  type: object
  required:
  - reachabilityIndicator
  - detectingNode
  - accessType
 properties:
   reachabilityIndicator:
     type: boolean
    detectingNode:
     $ref: '#/components/schemas/DetectingNode'
    accessType:
     $ref: '#/components/schemas/AccessType'
PsUserState:
 type: object
 oneOf:
    - required:
     - sgsnUserState
    - required:
       mmeUserState
    - required:
      - amfUserState
  properties:
    sgsnUserState:
     $ref: '#/components/schemas/UserStatePs'
   mmeUserState:
```

```
$ref: '#/components/schemas/UserStatePs'
    amfUserState:
      $ref: '#/components/schemas/UserStatePs'
CsUserState:
 type: object
 required:
    - mscVlrUserState
 properties:
   mscVlrUserState:
     $ref: '#/components/schemas/UserStateCs'
Csrn:
  type: object
 required:
   - csrn
 properties:
   csrn:
     $ref: '#/components/schemas/Msisdn'
ReferenceLocationInformation:
  type: object
 properties:
   accessType:
     type: string
   accessInfo:
     type: string
    accessValue:
     type: string
  anyOf:
   - required: [accessType]
   - required: [accessInfo]
   - required: [accessValue]
SmsRegistrationInfo:
  type: object
  required:
   - ipSmGwNumber
 properties:
    \verb"ipSmGwNumber":
     $ref: '#/components/schemas/Msisdn'
    scAddress:
     $ref: '#/components/schemas/Msisdn'
IpSmGwAddress:
  type: object
  required:
   - ipSmGwNumber
 properties:
    ipSmGwNumber:
     $ref: '#/components/schemas/Msisdn'
    ipSmGwDiaUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
    ipSmGwDiaRealm:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DiameterIdentity'
DsaiTagInformation:
  type: object
  required:
   - dsaiTagStatusList
  properties:
   dsaiTagStatusList:
     type: array
      items:
        $ref: '#/components/schemas/DsaiTagStatus'
     minItems: 1
     uniqueItems: true
DsaiTagStatus:
  type: object
  required:
    - dsaiTag
    - dsaiState
 properties:
    dsaiTag:
     type: string
    dsaiState:
     $ref: '#/components/schemas/ActivationState'
```

```
# SIMPLE TYPES:
   Capability:
     type: integer
   ImsUeId:
     type: string
     z]{2,}|impu-tel\:|-[0-9]{5,15}|impi-.+|.+)$'
   SequenceNumber:
     type: integer
     minimum: 0
   ServiceIndication:
     type: string
   Msisdn:
     type: string
     pattern: '[0-9]{5,15}$'
   PrivateId:
     type: string
   ImsPublicId:
     type: string
     pattern: \ '^(sip):([a-zA-Z0-9_\-.!^*()&=+\$,;?^/]+)\\ @([A-Za-z0-9]+([-A-Za-z0-9]+)).)+[a-zA-z0-9]+([-A-Za-z0-9]+)]
z]{2,}|tel\:\+[0-9]{5,15})$'
   NameSpacePriority:
     type: string
     pattern: '^[0-9a-zA-Z-\!\%\*_+\''-]+.[0-9a-zA-Z-\!\%\*_+\''-]+$'
   CscfFilterSetId:
     type: integer
     minimum: 0
   SptGroupId:
     type: integer
     minimum: 0
   ServingNode:
     type: boolean
   LocalTime:
     type: boolean
   CurrentLocation:
     type: boolean
   SharedDataId:
     type: string
     pattern: '^[0-9]{5,6}-.+$'
   Imei:
     type: string
     pattern: '^[0-9]{15}$'
   ImeiSv:
     type: string
     pattern: '^[0-9]{16}$'
   PrePaging:
     type: boolean
   SipServerName:
     type: string
      pattern: \ '^(sip):([a-zA-z0-9]-.!^*()\&=+\$,;?^/]+)\\ ([A-Za-z0-9]+([-A-Za-z0-9]+)^.)+[a-za-z0-9]+)^.
z]{2,})$'
# ENUMS:
   IdentityType:
     anyOf:
       - type: string
         enum:
         - DISTINCT_IMPU
```

```
- DISTINCT_PSI
      - WILDCARDED_IMPU
      - WILDCARDED_PSI
    - type: string
ImsRegistrationState:
  anyOf:
    - type: string
      enum:
      - REGISTERED
      - NOT_REGISTERED
      - AUTHENTICATION_PENDING
      - REGISTERED_UNREG_SERVICES
    - type: string
TypeOfCondition:
  anyOf:
    - type: string
      enum:
        - CNF
        - DNF
    - type: string
RegistrationType:
  anyOf:
    - type: string
      enum:
        - INITIAL_REGISTRATION
        - RE_REGISTRATION
        - DE_REGISTRATION
    - type: string
RequestDirection:
  anyOf:
    - type: string
      enum:
        - ORIGINATING_REGISTERED
        - ORIGINATING_UNREGISTERED
- ORIGINATING_CDIV
        - TERMINATING_REGISTERED
        - TERMINATING_UNREGISTERED
    - type: string
{\tt ServiceInformation:}
  anyOf:
    - type: string
      enum:
        - INCLUDE_REGISTER_REQUEST
- INCLUDE_REGISTER_RESPONSE
    - type: string
RequestedNode:
  anyOf:
    - type: string
      enum:
      - SGSN
      - MME
      - AMF
      - 3GPP_AAA_SERVER_TWAN
    - type: string
SrvccCapability:
  anyOf:
    - type: string
      enum:
      - UE_4G_SRVCC_CAPABLE
      - UE_5G_SRVCC_CAPABLE
    - type: string
ActivationState:
  anyOf:
    - type: string
      enum:
      - ACTIVE
      - INACTIVE
    - type: string
```

ImsVoiceOverPsSessionSupport:

```
anyOf:
    - type: string
      enum:
      - IMS_VOICE_OVER_PS_NOT_SUPPORTED
      - IMS_VOICE_OVER_PS_SUPPORTED
      - IMS_VOICE_OVER_PS_SUPPORT_UNKNOWN
    - type: string
DetectingNode:
  anyOf:
   - type: string
     enum:
     - SGSN
     - MME
      - AMF
    - type: string
AccessType:
  anyOf:
    - type: string
     enum:
      - 3GPP_ACCESS
      - NON_3GPP_ACCESS
    - type: string
UserStatePs:
  anyOf:
    - type: string
     enum:
      - DETACHED
      - ATTACHED_NOT_REACHABLE_FOR_PAGING
      - ATTACHED_REACHABLE_FOR_PAGING
      - CONNECTED_NOT_REACHABLE_FOR_PAGING
      - CONNECTED_REACHABLE_FOR_PAGING
      - NOT_PROVIDED_FROM_SGSN_OR_MME_OR_AMF
      - NETWORK_DETERMINED_NOT_REACHABLE
    - type: string
UserStateCs:
  anyOf:
    - type: string
     enum:
      - CAMEL_BUSY
     - NETWORK_DETERMINED_NOT_REACHABLE
      - ASSUMED_IDLE
      - NOT_PROVIDED_FROM_VLR
    - type: string
```

A.4 Nhss imsUEAU API

```
openapi: 3.0.0
info:
 version: '1.0.0'
  title: 'Nhss_imsUEAU'
  description:
   Nhss UE Authentication Service for IMS.
    © 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
   All rights reserved.
externalDocs:
  description: 3GPP TS 29.562 HSS Services for Interworking with IMS, version 16.1.0
  url: 'http://www.3gpp.org/ftp/Specs/archive/29_series/29.562/'
  - url: '{apiRoot}/nhss-ims-ueau/v1'
   variables:
        default: https://example.com
        description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
security:
 - {}
  - oAuth2ClientCredentials:
    - nhss-ims-ueau
```

components:

```
paths:
  /{impi}/security-information/generate-sip-auth-data:
     summary: Generate authentication data for the UE based on the Auth-Scheme provided
      operationId: GenerateSipAuthData
      tags:
        - Generate Auth Data
      security:
       - {}
        - oAuth2ClientCredentials:
          - nhss-ims-ueau
        - oAuth2ClientCredentials:
          - nhss-ims-ueau
          - nhss-ims-ueau:generate-sip-auth-data:invoke
      parameters:
         name: impi
          in: path
          description: IMS Private Identity for the UE (IMPI)
          required: true
          schema:
            $ref: '#/components/schemas/Impi'
      requestBody:
        content:
          application/json:
              $ref: '#/components/schemas/SipAuthenticationInfoRequest'
       required: true
      responses:
        '200':
          description: Expected response to a valid request
          content:
            application/json:
              schema:
                $ref: '#/components/schemas/SipAuthenticationInfoResult'
        '400':
          description: Bad Request
          content:
            application/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '403':
          description: Forbidden
            application/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        '404':
          description: Not found
          content:
            application/problem+json:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
          $ref: 'TS29571_CommonData.yaml#/components/responses/405'
        500:
          $ref: 'TS29571_CommonData.yaml#/components/responses/500'
        '501':
          description: Not implemented
          content:
            application/problem+json:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
        15031:
          $ref: 'TS29571_CommonData.yaml#/components/responses/503'
        '504':
          description: Gateway timeout
          content:
            application/problem+json:
              schema:
                $ref: 'TS29571_CommonData.yaml#/components/schemas/ProblemDetails'
          $ref: 'TS29571_CommonData.yaml#/components/responses/default'
```

```
securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
            nhss-ims-ueau: Access to the Nhss IMS UE Authentication API
            nhss-ims-ueau:generate-sip-auth-data:invoke: Access to invoke the Generate SIP Auth Data
custom operation
  schemas:
# COMPLEX TYPES:
    SipAuthenticationInfoRequest:
      type: object
      required:
        - sipAuthenticationScheme
      properties:
        sipAuthenticationScheme:
          $ref: '#/components/schemas/SipAuthenticationScheme'
        sipNumberAuthItems:
          $ref: '#/components/schemas/SipNumberAuthItems'
        resynchronizationInfo:
          $ref: '#/components/schemas/ResynchronizationInfo'
    ResynchronizationInfo:
      type: object
      required:
        - rand
        - auts
      properties:
        rand:
          $ref: 'TS29503_Nudm_UEAU.yaml#/components/schemas/Rand'
        auts:
          $ref: 'TS29503_Nudm_UEAU.yaml#/components/schemas/Auts'
    SipAuthenticationInfoResult:
      type: object
      required:
        - impi
      properties:
        impi:
          $ref: '#/components/schemas/Impi'
        3gAkaAvs:
          type: array
          items:
            $ref: '#/components/schemas/3GAkaAv'
          minItems: 1
        digestAuth:
          $ref: '#/components/schemas/DigestAuthentication'
        lineIdentifierList:
          type: array
          items:
            $ref: '#/components/schemas/LineIdentifier'
          minItems: 1
        ipAddress:
          $ref: '#/components/schemas/IpAddress'
    3GAkaAv:
      type: object
      required:
        - rand
- xres
        - autn
        - ck
        - ik
      properties:
        rand:
          $ref: 'TS29503_Nudm_UEAU.yaml#/components/schemas/Rand'
        xres:
         $ref: 'TS29503_Nudm_UEAU.yaml#/components/schemas/Xres'
        autn:
          $ref: 'TS29503_Nudm_UEAU.yaml#/components/schemas/Autn'
          $ref: '#/components/schemas/Ck'
        ik:
```

```
$ref: '#/components/schemas/Ik'
    DigestAuthentication:
      type: object
      required:
       - digestRealm
        - digestAlgorithm
        - digestQop
        - ha1
      properties:
       digestRealm:
          type: string
        {\tt digestAlgorithm:}
          $ref: '#/components/schemas/SipDigestAlgorithm'
        digestQop:
         $ref: '#/components/schemas/SipDigestQop'
        hal:
          type: string
    IpAddress:
      type: object
      oneOf:
        - required:
          - ipv4Addr
        - required:
          - ipv6Addr
        - required:
          - ipv6Prefix
      properties:
        ipv4Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv4Addr'
        ipv6Addr:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Addr'
        ipv6Prefix:
          $ref: 'TS29571_CommonData.yaml#/components/schemas/Ipv6Prefix'
# SIMPLE TYPES:
    SipNumberAuthItems:
      type: integer
      minimum: 1
    Impi:
      type: string
    Ck:
     type: string
      pattern: '^[A-Fa-f0-9]{32}$'
      type: string
      pattern: '^[A-Fa-f0-9]{32}$'
    LineIdentifier:
      type: string
# ENUMS:
    SipAuthenticationScheme:
      anyOf:
        - type: string
          enum:
          - DIGEST-AKAV1-MD5
          - DIGEST-HTTP
          - NBA
          - GIBA
          - UNKNOWN
        - type: string
    SipDigestAlgorithm:
      anyOf:
        - type: string
         enum:
          - MD5
          - MD5_SESS
        - type: string
    SipDigestQop:
```

anyOf:

- type: string enum:

- AUTH - AUTH_INT

Annex B (informative): Withdrawn API versions

B.1 General

This Annex lists withdrawn API versions of the APIs defined in the present specification. 3GPP TS 29.501 [5] clause 4.3.1.6 describes the withdrawal of API versions.

Annex C (informative): Change history

| Change history | | | | | | | | |
|----------------|---------|-----------|------|----------------|-----|--|----------------|--|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version | |
| 2019-09 | CT4#93 | C4-193851 | | | | Initial Draft (C4-193264) and incorporation of agreed pCRs at CT4#93: C4-193576, C4-193272, C4-193273, C4-193579, C4-193706, C4-193838. | 0.1.0 | |
| 2019-10 | CT4#94 | C4-194525 | | | | Incorporation of agreed pCRs at CT4#94: C4-194361, C4-194362, C4-194364, C4-194365, C4-194556 | 0.2.0 | |
| 2019-11 | CT4#95 | C4-195640 | | | | Incorporation of agreed pCRs at CT4#95: C4-195468, C4-195469, C4-195475, C4-195478, C4-195583, C4-195650 | 0.3.0 | |
| 2020-03 | CT4#96e | C4-201270 | | | | Incorporation of agreed pCRs at CT4#96e: C4-200572, C4-200578, C4-200582, C4-200803, C4-200804, C4-200927, C4-200929, C4-200963, C4-200977, C4-201098, C4-201104, C4-201105, C4-201106, C4-201107, C4-201108, C4-201109, C4-201110, C4-201111, C4-201112, C4-201113, C4-201114, C4-201115, C4-201116 | 0.4.0 | |
| 2020-03 | CT#87e | CP-200064 | | | | TS presented for information and approval | 1.0.0 | |
| 2020-03 | CT#87e | | | | | Approved at CT#87e | 16.0.0 | |
| 2020-07 | CT#88 | CP-201038 | 0001 | - | В | IMEISV retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0002 | - | В | IP address retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0003 | - | В | T-ADS info retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0004 | - | В | UE Reachability subscription | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0005 | - | В | User State retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0006 | - | В | Storage of YAML files in ETSI Forge | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0007 | - | В | Resource-Level Authorization | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0008 | - | F | Common data structures in the response body | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0009 | - | В | CSRN retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0010 | 1 | В | Wireline domain info retrieval | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0011 | - | В | SDM SMS Registration Info | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0012 | 1 | F | Miscellaneous corrections | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0013 | 1 | F | IMS restoration amendments | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0014 | 1 | F | Support of Multiple Registration | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0015 | 2 | F | IMS Identity Data Retrieval amendments | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0016 | - | F | SDM Wireline-domain Line-Id Removal | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0017 | 1 | В | SDM - DSAI handling | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0018 | 1 | F | Cleanup of TS | 16.1.0 | |
| 2020-07 | CT#88 | CP-201038 | 0019 | † <u>-</u> | F | Miscellaneous Corrections | 16.1.0 | |
| 2020-07 | CT#88 | CP-201073 | 0020 | - | F | 29.562 Rel-16 API version and External doc update | 16.1.0 | |
| 2020-09 | CT#89 | CP-202118 | 0021 | - | F | P-CSCF Restoration | 16.2.0 | |
| 2020-09 | CT#89 | CP-202118 | 0022 | + - | F | Missing Resource Scopes | 16.2.0 | |
| 2020-09 | CT#89 | CP-202118 | 0023 | 1 | F | IMS restoration amendments II | 16.2.0 | |
| 2020-09 | CT#89 | CP-202118 | 0023 | ' | F | Miscellaneous Corrections | 16.2.0 | |
| 2020-09 | CT#89 | CP-202096 | 0025 | + | F | 29.562 Rel-16 API version and External doc update | 16.2.0 | |

History

| Document history | | | | | | | |
|------------------|---------------|-------------|--|--|--|--|--|
| V16.1.0 | July 2020 | Publication | | | | | |
| V16.2.0 | November 2020 | Publication | | | | | |
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