**3GPP TSG-SA5 Meeting #157 *S5-246040d2***

Hyderabad, India, 14 - 18 October 2024 Revision of S5-245829

**Source: Ericsson España S.A.**

**Title: pCR TR 28.879 pCR TR 28.879 Publishing UC – updates on solution and evaluation**

**Document for: Approval**

**Agenda Item: 6.19.21**

# 1 Decision/action requested

***The group is asked to discuss and approve the proposal.***

# 2 References

[1] 3GPP TR 28.879: " Study on OAM for service management and exposure to external consumers".

# 3 Rationale

This pCR aims to provide solutions along with evaluations for the publishing UC. The actual changes are:

- Update the table that illustrates the mapping of MnSInfo IOC attributes into ServiceAPIDescription data type

- Adding a new solution that clarify the relationship between the URI of service API resources and MnS resources.

# 4 Detailed proposal

It is proposed to make the following changes in the latest version of TR 28.879 [1].

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| --- |
| **Begin Change** |

#### 5.1.2.3 Potential solutions

##### 5.1.2.3.1 Potential solution #1: Populating ServiceAPIDescription with MnS related information

5.1.2.3.1.1 Introduction

This potential solution shows how ServiceAPIDescription data type can be populated using MnS related information. This information is available in the MnSInfo IOC, which is name-contained by MnSRegistry IOC.

5.1.2.3.y.2 Description

Table 5.1.2.3.y.2-1 shows how the data type attributes (see Table 8.2.4.2.2-1 in 3GPP TS 29.222 [13]) can be populated using MnS related information**.**

Table 5.1.2.3.1.2-1: Mapping of MnSInfo information attributes to
the serviceAPIDescription information elements
(Source: Table 8.2.4.2.2-1 in 3GPP TS 29.222 [13])

| Attribute name | Data type | P | Cardinality | Description | Correspondence |
| --- | --- | --- | --- | --- | --- |
| apiName | string | M | 1 | API name, it is set as {apiName} part of the URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [33]. | Corresponds to the following z IOC attribute: mnsType  |
| apiId | string | O | 0..1 | API identifier assigned by the CAPIF core function to the published service API. Shall not be present in the HTTP POST request from the API publishing function to the CAPIF core function. Shall be present in the HTTP POST response from the CAPIF core function to the API publishing function and in the HTTP GET response from the CAPIF core function to the API invoker (discovery API). |  |
| aefProfiles | array(AefProfile) | C | 1..N | AEF profile information, which includes the exposed API details (e.g. protocol). For CAPIF-4/4e interface, API publishing function shall provide this attribute to the CAPIF core function in service API publishing. For CAPIF-1/1e interface, the CAPIF core function shall provide this attribute to the API Invoker during service API discovery (see note 2) | See Table 5.1.2.3.1.2-2 |
| description | string | O | 0..1 | Text description of the API |  |
| supportedFeatures | SupportedFeatures | O | 0..1 | The supported optional features of the CAPIF API (see note 1). | Not applicable in the context of SA5 MnS. |
| shareableInfo | ShareableInformation | O | 0..1 | Represents whether the service API and/or the service API category can be published to other CCFs. | Not applicable in the context of SA5 MnS.  |
| serviceAPICategory | string | C | 0..1 | The service API category to which the service API belongs to. This attribute is only applicable for CAPIF-6/6e interface (see note 2). |  |
| ccfId | string | C | 0..1 | CAPIF core function identifier which can be contacted further for discovering the details of service API information. This attribute is only applicable for CAPIF-6/6e interface and shall be provided with serviceAPICategory (see note 2). | Not applicable in the context of SA5 MnS. |
| apiSuppFeats | SupportedFeatures | O | 0..1 | Provided by the consumer to indicate the features supported by the service API. | Not applicable in the context of SA5 MnS. |
| pubApiPath | PublishedApiPath | C | 0..1 | It contains the published API path within the same CAPIF provider domain. it shall be provided by the CCF when publishing the service API to other CCF via the CAPIF-6 reference point. | Not applicable in the context of SA5 MnS. |
| NOTE 1: For CAPIF\_Publish\_Service\_API, the supported features attribute shall be provided in the HTTP POST request and in the response of successful resource creation. In addition, the supportedFeatures attribute may include one or more the supported features as defined in clause 8.2.6.NOTE 2: For CAPIF-6/6e interface, at least one of aefProfiles or serviceAPICategory and the corresponding ccfId shall be provided. |

Table 5.1.2.3.1.2-2: Transformation of MnSInfo IOC attributes to AefProfile data type attributes (Source: Table 8.2.4.2.4-1 in 3GPP TS 29.222 [13])

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Correpondence |
| aefId | string | M | 1 | AEF identifier. | Corresponds to the AEF identifier provided by the CCF upon MnS producer registration (use case 5.1.1).  |
| versions | array(Version) | M | 1..N | API version. | See Table 5.1.2.3.1.2-3  |
| protocol | Protocol | O | 0..1 | Protocol used by the API. | Only “HTTP\_1\_1” and “HTTP\_1\_2” are applicable in the context of SA5 MnS. |
| dataFormat | DataFormat | O | 0..1 | Data format used by the API. | Only “JSON” value is applicable in the context of SA5 MnS.  |
| securityMethods | array(SecurityMethod) | O | 1..N | Security methods supported by the AEF for all interfaces. Certain interfaces may have different security methods supported in the attribute interfaceDescriptions. | Only “OAUTH” value (i.e. TLS with OAuth token) is applicable in the context of SA5 MnS. |
| domainName | string | O | 0..1 | Domain to which API belongs to.(See note 1.) |  |
| interfaceDescriptions | array(InterfaceDescription) | O | 1..N | Interface details(See note 1.) | See Table 5.1.2.3.1.2-5  |
| aefLocation | AefLocation | O | 0..1 | The location information (e.g. civic address, GPS coordinates, data center ID) where the AEF providing the service API is located. |  |
| NOTE 1: Only one of the attributes "domainName" or "interfaceDescriptions" shall be included.NOTE 2: Notification or callback type of resource is not included. |

Table 5.1.2.3.1.2-3: Mapping of MnSInfo IOC attributes to Version datatype
(Source: Table 8.2.4.2.5-1 in 3GPP TS 29.222 [13])

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Correspondence |
| apiVersion | string | M | 1 | API major version in URI (e.g. v1). | Corresponds to the following MnSInfo IOC attribute: mnsVersion  |
| expiry | DateTime | O | 0..1 | Expiry date and time of the AEF service. This represents the planned retirement date as specified in clause 4.3.1.5 of 3GPP TS 29.501 [34]. | Not applicable in the context of SA5 MnS. |
| resources | array(Resource) | O | 1..N | Resources supported by the API. It may include the custom operations with resource association. | See Table 5.1.2.3.1.2-4. Each resource corresponds to a service API endpoint.  |
| custOperations | array(CustomOperation) | O | 1..N | Custom operations without resource association. |  |

Table 5.1.2.3.1.2-4: Mapping of MnSInfo IOC attributes to Resource data type
(Source: Table 8.2.4.2.6-1 in 3GPP TS 29.222 [13])

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Correspondences |
| resourceName | string | M | 1 | Resource name. | {className}. |
| commType | CommunicationType | M | 1 | Communication type used by the API resource (see note 1). |  Only “REQUEST\_RESPONSE” value is applicable for SA5 MnS of type Provisioning.  |
| uri | string | M | 1 | Relative URI of the API resource, it is set as {apiSpecificSuffixes} part of the URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [33]. | Corresponds to the following URI component in a MnS endpoint: {URI-LDN-first-part}/{className} = {id}.  |
| custOpName | string | O | 0..1 | it is set as {custOpName} part of the URI structure for the case where there is only a single custom operation associated with this resource as defined in clause 5.2.4 of 3GPP TS 29.122 [33] (see note 2). |  |
| custOperations | array(CustomOperation) | O | 1..N | List of custom operations associated to this resource (see note 2). | . |
| operations | array(Operation) | C | 1..N | Supported HTTP methods for the API resource. Only applicable when the protocol in AefProfile indicates HTTP. | HTTP methods specified under {URI-LDN-first-part}/{className} = {id}.  |
| description | string | O | 0..1 | Text description of the API resource. |  |
| NOTE 1: The communication type refers to the semantics of the resource or custom operation and is independent of the HTTP methods that are supported (e.g. if a resource is used for subscriptions then its CommunicationType shall be SUBSCRIBE\_NOTIFY even if it supports also the GET method for retrieving the subscriptions).NOTE 2: The attributes "custOpName" and "custOperations" are mutually exclusive. |

Table 5.1.2.3.1.2-5: Mapping of MnSInfo IOC attributes to InterfaceDescription datatype
(Source: Table 8.2.4.2.3-1 in 3GPP TS 29.222 [13])

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Equivalent MnS Info IOC attribute/comments |
| ipv4Addr | Ipv4Addr | C | 0..1 | String identifying an IPv4 address (see note 1). | Not applicable in the context of SA5 MnS |
| ipv6Addr | Ipv6Addr | C | 0..1 | String identifying an IPv6 address (see note 1). | Not applicable in the context of SA5 MnS |
| fqdn | Fqdn | C | 0..1 | String containing a Fully Qualified Domain Name (see note 1). | Corresponds to the following URI component in a MnS: {URI-DN-prefix}This FQDN can be constructed from the DN prefix as detailed in clause 4.2.3, 3GPP TS 32.158 [30]. |
| port | Port | O | 0..1 | Port. |  |
| apiPrefix | string | O | 0..1 | A string representing an optional deployment-specific string (API prefix) in the form of a sequence of path segments that starts with a "/" character. | Corresponds to the following URI component in a MnS: “/” + {root}  |
| securityMethods | array(SecurityMethod) | M | 1..N | Security methods supported by the interface. It takes precedence over the security methods provided in AefProfile, for this specific interface. | Only “OAUTH” value (i.e. TLS with OAuth token) is applicable in the context of SA5 MnS. |
| NOTE 1: Exactly one of the attributes "ipv4Addr", "ipv6Addr" and "fqdn" shall be included.NOTE 2: When the contents of this data type are used to construct the apiRoot of an API, they are used as described in clause 4.4.1 of 3GPP TS 29.501 [34]. |

The mapping described in these tables allow describing how ServiceAPIDescription data type can be defined with MnS related information available in the 3GPP management system. To publish a service API on the CCF, the APF sends an HTTP POST operation carrying this data type over the CAPIF-4 interface (see clause 8.2 in 3GPP TS 29.222 [13]).

##### 5.1.2.3.x Potential solution #<x>: Mapping MnS API endpoints into service API endpoints.

5.1.2.3.x.1 Introduction

When publishing on the CCF, MnS API endpoints need to be mapped service API endpoints, so that the latter can be accessed by external MnS consumers. This potential solution compares the URI structure of both endpoints, to help understand how this mapping looks like.

5.1.2.3.x.2 Description

The table below compares the URI structure for Service API and MnS API.

Table 5.1.2.3.x.2-1: URI structure for Service API and MnS API

| Service API  | MnS API (see 3GPP TS 32.158) |
| --- | --- |
| URI: = <apiRoot>/<apiName>/<apiVersion>/<APISpecificSuffixes>See NOTE 1 | URI: = {MnSRoot}/{MnSName}/{MnSVersion}/{URI-LDN-first-part}/{className} = {id}See NOTE 2 |
| NOTE 1: <apiRoot>:= [https://<authority>/<API-prefix](https://<authority>/%3CAPI-prefix)>, with <API-prefix> being optional.NOTE 2: {MnSRoot} = https://{URI-to-DN-prefix}/{root}, with {root} being optional. |

It is needed that the URI structure for endpoints of MnS APIs follow the same format as defined for service APIs. This means:

* {MnSRoot} corresponds to the <apiRoot>. The {apiRoot} variable of the URI structure for the service API can be constructed by the API invoker based on the "interfaceDescriptions" attribute of the AefProfile data type (Table 5.1.2.3.1.2-2). For further information, see clause 5.2.2.2.2 in 3GPP TS 29.222 [13].
* {URI-to-DN-prefix} corresponds to the <authority> (host and optional TCP port). The host name is constructed from the DN prefix as detailed in clause 4.2.3, 3GPP TS 32.158 [30].
* {root} corresponds to <API-prefix>.
* {MnSName} corresponds to <apiName>. For example, when <MnSName> := ProvMnS, then the apiName in the service API URI shall be ProvMnS.
* {MnSVersion} corresponds to <apiVersion>.
* {URI-LDN-first-part}/{className} = {id} corresponds to <apiSpecificSuffixes>

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##### 5.1.2.4 Evaluation of potential solutions

##### 5.1.2.4.1 Evaluation of potential solution #1

The potential solution #1 shows that it is feasible to populate ServiceAPIDescription data type attributes using MnS related information available in the MnSInfo IOC.

As part of the evaluation of the solution, the following can be noted for the “ServiceAPICategory” attribute in Table 5.1.2.3.1.1-1. The current usage of this attribute is limited to CAPIF-6/6e interface, though SA6 plans to remove this limitation during Rel-19.

The ServiceAPIDescription data type will be used by external MnS consumers to discover and invoke the endpoints of published service API(s). For discovery purposes, the external MnS consumer can read the following attributes:

* “resources” (see Table 5.1.2.3.1.1-4). This attribute provides information on the scope of a service API, i.e. constituent service API endpoints. Unlike SA5 solution, which is based on identifying MOIs accessible through the MnS (see mnsScope in the MnSInfo IOC), the solution here is based on the resource (along with supported operations) accessible through each endpoint. This solution requires that the external MnS consumer understand the schema representing the resources, and therefore IOCs in the NRM tree.
* “ServiceAPICategory” (see Table 5.1.2.3.1.1-1). This attribute provides additional information for a specific API, e.g. optional MnSInfo IOC attributes based on the MnSType. When the usage limitation to CAPIF-6/6e information is removed, this attribute can be used by the API invoker to get this additional information. If present, this attribute complements “resource” attribute.

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| **End Change** |