**3GPP TSG-SA5 Meeting #155 *S5-243250d1***

Jeju, South Korea, 27 - 31 May 2024 Revision of S5-242850

**Source: Ericsson España S.A.**

**Title: pCR TR 28.879 Registration of MnS producer into CAPIF**

**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] SP-231728: "New SID: Study on Enhanced OAM for management exposure to external consumers".

[2] 3GPP TR 28.879: " Study on OAM for service management and exposure to external consumers".

[3] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2"

[4] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; stage 3"

# 3 Rationale

Among the study objectives in [1], WT-1 is focused on communication services and the relationship with network provisioning solutions such as network slicing, from concept and modelling viewpoints. The actual sub-objectives defined within WT-1 are detailed below:

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* ***WT-1.1*** *Identify generic requirements for exposure of SA5 management services to external consumers, irrespective of the vertical industry.*
* ***WT-1.2*** *Identify 1) potential mechanisms to discover management service producers and their respective capabilities while leveraging as much as possible the existing solutions and extending where necessary. Compare existing solutions (e.g., CAPIF, EGMF, MnS Registry and/or MSAC) that could be leveraged. 2) procedures for exposure of management services based on CAPIF, EGMF, MnS Registry, MSAC or a combination thereof. Some of the identified gaps for use of CAPIF in SA5 are listed in S5-236381 clause 4.1.2.*
* ***WT-1.3*** *Identify potential requirements that would be provided to the access control (MSAC) work item.*
* ***WT-1.4*** *Study whether and how SA5 defined exposure mechanisms fit within the GSMA Open Gateway framework. This framework includes OPG, CAMARA and TM Forum*

”.

In SA5#154, it was agreed to define the External MnS consumer as “An MnS consumer that has discovered an MnS via a discovery mechanism which is not defined in 3GPP SA5. CAPIF is an example of a framework providing such discovery mechanism”. This definition is in TR 28.879 [2], clause 3.1.

CAPIF is a framework with a lot of built-in capabilities. The figure below provides a non-exhaustive summary of the different procedures relevant in CAPIF. For further details on the stage 2 and 3 of these procedures, see [3]-[4].



This contribution proposes to use CAPIF as exposure framework. For a MnS to be made available for consumption using CAPIF, the first step is to make sure that the MnS producer is allowed to use CAPIF. This requires registering MnS producer as a recognized CAPIF user.

The present pCR aims to focus on the MnS producer registration using CAPIF, which:

* leverages the procedure marked in green in the figure above.
* allows addressing WT-1.1 and WT-1.2 in [1].

# 4 Detailed proposal

It is proposed to make the following changes in the latest version of TR 28.879 [2].

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| **Begin Change** |

# 2 References

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

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

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

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 28.533: “Management and orchestration; Architecture Framework”.

[3] 3GPP TS 28.622: “Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)”

[4] 3GPP TS 28.537: “Management and orchestration; Management capabilities”.

[5] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2"

[6] SP-231669: "LS on collaboration and alignment of 3GPP defined application enablers with GSMA Open Gateway".

[7] 3GPP [TS 23.434](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3587): "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".

[8] 3GPP [TS 23.255](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3843): "Application layer support for Vehicle-to-Everything (V2X) services; Functional architecture and information flows".

[9] 3GPP [TS 23.286](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3562): "Application layer support for Uncrewed Aerial Systems (UAS) services; Functional architecture and information flows".

[10] 3GPP [TS 23.545](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3948): "Application layer support for Factories of the Future (FF) ".

[11] 3GPP [TS 23.542](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=4156): "Application layer support for Personal IoT Networks".

[12] 3GPP [TS 23.554](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3818): "Application architecture for MSGin5G Service; Stage 2".

[13] 3GPP [TS 29.222](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3450): "Common API Framework for 3GPP Northbound APIs; stage 3".

[14] 3GPP [TS 33.122](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3420): "Security aspects of Common API Framework (CAPIF) for 3GPP Northbound APIs".

[15] "The Ecosystem for Open Gateway NaaS API Development", white paper, June 2023 [[link](https://www.gsma.com/solutions-and-impact/gsma-open-gateway/wp-content/uploads/2023/05/The-Ecosystem-for-Open-Gateway-NaaS-API-development.pdf)]

[16] "GSMA Operator Platform Group – Requirements and Architecture", version 5.0, July 2023 [[link](https://www.gsma.com/futurenetworks/wp-content/uploads/2023/07/OPG.02-v5.0-Operator-Platform-Requirements-and-Architecture.pdf)]

[17] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[18] 3GPP [TS 28.531](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3274): "Management and orchestration; Provisioning"

[19] 3GPP [TS 23.435](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=4092): "Procedures for Network Slice Capability Exposure for Application Layer Enablement Service"

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| **Second Change** |

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

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

**External MnS consumer**: An MnS consumer that has discovered an MnS via a discovery mechanism which is not defined in 3GPP SA5. CAPIF [5] is an example of a framework providing such discovery mechanism.

**MnS consumer:** defined in TS 28.533[2].

**MnS producer:** defined in TS 28.533[2].

## 3.2 Symbols

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

<symbol> <Explanation>

## 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

CAPIF Common API Framework

CCF CAPIF Core Function

CSP Communication Service Provider

EAS Edge Application Server

ECS Edge Configuration Server

EDN Edge Data Network

EEC Edge Enabler Client

EES Edge Enabler Server

FF Factories of the Future

GSMA GSM Association

MnS Management Service (see TS28.533[2])

NaaS Network as a Service

NEF Network Exposure Function

NOP Network Operator

NSACF Network Slice Access Control Function

NSCE Network Slice Capability Enablement

NWDAF Network Data Analytics Function

OAM Operation, Administration and Maintenance

OPAG Operator Platform API Group

OPG Operator Platform Group

SEAL Service Enabler Abstraction Layer

UAS Uncrewed Aerial Systems

V2X Vehicle-to-Everything

VAE Vertical App Enabler

WAS Whole Agreement Services

WG Working Group

AEF API Exposing Function

APF API Publishing Function

AMF API Management Function

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| **Third Change** |

## 5.1 Exposure of management services

### 5.1.A Use case A: MnS producer registration into CAPIF

#### 5.1.A.1 Description

For a MnS to be made available for consumption through an exposure framework, it is needed that this MnS producer registers into that exposure framework. Once registered, the MnS producer is able to communicate with the CCF for the subsequent procedures needed to configure accessibility to MnS from external MnS consumers. These procedures include publication, discovery and access control, among others.

In the CAPIF, the scope of registration is limited to API provider domain functions, which include API Exposing Function (AEF), API Publishing Function (APF) and API Management Function (AMF). The registration is a procedure whereby these functions become recognized users of the CCF. This procedure is described in clause 8.28 of TS 23.222 [5], with stage 3 solution set detailed in clause 8.9 of TS 29.222 [13].

To register (and/or update the registration information of) of an API provider domain functions on the CCF, the AMF from this API provider domain communicates with the CCF over CAPIF-5 interface. This means that:

* This API provider domain shall have an AMF.
* The AMF of this API provider domain shall be an authorized user of CCF.
* The AMF security information for CCF to validate the registration request is provisioned by the CAPIF administrator.

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To register a MnS producer on the CCF, it is needed for the MnS producer to support API provider domain functionality. The impact is detailed as follows:

* AEF. If supported, this means that the MnS producer will need to support:
	+ CAPIF-2/2e interface, so that the API invokers acting as external MnS consumers can access service APIs, when required. The API operations that will be implemented in this interface (see TS 29.222 [13], clause 9.1) can be configured later, depending on the intended usage of MnS producer.

NOTE: The service APIs can convey different MnS information for different API invokers. This issue will be discussed as separate use case.

* + CAPIF-3 interface, so that the MnS producer can communicate with CCF to exercise access and policy related control for service API invocations initiated by the API invoker. The API operations that will be implemented in this interface (see TS 29.222 [13], clauses 8.3, 8.5, 8.7, 8.6) can be configured later, depending on the intended usage of MnS producer.
* APF. If supported, this means that the MnS producer will need to support CAPIF-4 interface, so that it can communicate with CCF to publish (and manage the published) MnS information. The API operations that will be implemented in this interface (see TS 29.222 [13], clause 8.2) can be configured later, depending on the intended usage of MnS producer.
* AMF. If supported, this means that MnS producer will need to support CAPIF-5 interface. The API operations that will be implemented in this interface (see TS 29.222 [13], clause 8.3 and 8.9) can be configured later, depending on the intended usage of MnS producer.

The MnS producer shall support one or more API provider domain functions, with at least one of them being AEF; otherwise, the MnS producer is not eligible for integration into the CAPIF.

The AMF communicates the MnS producer details (including supported API provider domain functions) to the CCF using CAPIF\_API\_Provider\_Management\_API (see TS 29.222 [13], clause 8.9). Upon reception of these details, the CCF registers the MnS producer with the supported API provider domain function(s).

#### 5.1.A.2 Potential requirements

**PREQ-FS\_MExpo-01** The 3GPP management system shall provide the capability to register a MnS producer on the CCF.

**PREQ-FS\_MExpo-02** The 3GPP management system shall provide the capability to deregister a MnS producer on the CCF.

**PREQ-FS\_MExpo-03** The 3GPP management system shall provide the capability to update the registration details of MnS producer on the CCF.

#### 5.1.A.3 Potential solutions

##### 5.1.A.3.i Potential solution i: Capturing MnS Producer information with APIProviderEnrolmentDetails

###### 5.1.A.3.i.1 Introduction

In the CAPIF, the registration procedure is executed with the CAPIF\_API\_Provider\_Management API (see TS 29.222 [13], clause 8.3), initiated by the AMF over the CAPIF-5 interface. The AMF sends a HTTP POST message to the CCF with a request body containing the following dataType: “APIProviderEnrolmentDetails” (see clause 8.9.4.2.2 in [13]).

The solution proposes to reuse this API for registering MnS producer.

###### 5.1.A.3.i.2 Description

The attributes of “APIProviderEnrolmentDetails” are captured in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **APIProviderEnrolmentDetails** | **APIProviderFuncDetails attributes** | **RegistrationInformation attributes** | **Data Type** | **S** | **Cardinality** |
| apiProvDomId |  |  | string | O | 1 |
| reqSec |  |  | string | M | 1 |
| apiProvFuncs |  |  | APIProviderFuncDetails | O | 1..N |
|  | apiProvFunc |  | string | C | 0..1 |
|  | regInfo |  | RegistrationInformation | M | 1 |
|  |  | apiProvPubKey | string | M | 1 |
|  |  | apiProvCert | string | O | 0…1 |
|  | apiProvFuncRole |  | Enum (aef, apf, amf) | M | 1 |
|  | apiProvFuncInfo |  | string | O | 0…1 |
| apiProvDomInfo |  |  | string | O | 0…1 |
| suppFeat |  |  | SupportedFeatures | C | 0…1 |
| failReason |  |  | string | C | 0…1 |
| apiProvNames |  |  | string | O | 0…1 |

For registering MnS producer on the CCF using CAPIF\_API\_Provider\_Management API, it is needed to populate the mandatory attributes of “APIProviderEnrolmentDetails” with the information of the MnS producer. The mapping would be as follows:

* The credentials of the MnS producer can be mapped to “/regSec”.
* The different roles played for the MnS producer can be mapped to “/apiProvFuncs”. Note that the MnS producer will always play AEF, with the option to also play APF and/or AMF, if needed.
* The public keys of MnS producers can be mapped to “apiProvFuncs/regInfo/apiProvPubKey”.

#### 5.1.A.4 Evaluation of potential solutions

Editor's Note: This clause provides the evaluation of potential solutions.

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| **End Change** |