**3GPP TSG- Meeting #S5-244933**

**Maastricht, The Netherlands, 19 - 23 August 2024 Revision of S5-244165**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  **0080** | **rev** | **1** | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Rel-18 CR TS 28.538 Correct RegistrationInfo and add stage 3 |
|  |  |
| ***Source to WG:*** | Ericsson-LG Co., LTD |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | eECM |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Stage 3 YAML does not include RegistrationInfo. Wrong syntax and duplication of attribute in Attribute Properties table. Incorrect references. DN is defined as Data NW |
|  |  |
| ***Summary of change:*** | Add RegistrationInfo to YAML code. Correct Attribute property table. Correct references. Remove wrong abbreviaton  |
|  |  |
| ***Consequences if not approved:*** | Stage 3 is not complete, error remains in table. |
|  |  |
| ***Clauses affected:*** | 2, 3.3, 6.3.21.2, 5.4.4, 6.4.1, Annex A.1, Annex B.1, Annex C |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Forge MR link: Forge MR link: <https://forge.3gpp.org/rep/sa5/MnS/-/merge_requests/1218> at commit e7443a28565034600906401e66cb47fb0694a5e2 |
|  |  |
| ***This CR's revision history:*** |  |

***First change***

# 2 References

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

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

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

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

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

[2] 3GPP TS 23.558: "Architecture for enabling Edge Applications".

[3] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[4] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[5] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[6] ETSI GS NFV-IFA 013 V3.4.1 "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Os-Ma-nfvo reference point -Interface and Information Model Specification".

[7] ETSI GS NFV-IFA 011 (V3.3.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification".

[8] 3GPP TS 28.550: "Management and orchestration; Performance assurance".

[9] Void

[10] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[11] 3GPP TS 23.501: "System architecture for the 5G System (5GS); Stage 2".

[12] 3GPP TS 28.658: "Telecommunications management; Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".

[13] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[14] GSMA OPG: "Operator Platform Telco Edge Requirements; Version 2.0".

[15] ETSI GS MEC 010-2 (v 2.2.1) (2022-02): " Multi-access Edge Computing (MEC); MEC Management; Part 2: Application lifecycle, rules and requirements management".

[16] 3GPP TS 23.548: "5G System Enhancements for Edge Computing".

[17]ETSI GS NFV-SOL 005 V4.4.1: "Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point".

[18]3GPP TS 32.160: " Management service template".

[19] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

***Next change***

## 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].

ASP Application Service Provider

DNAI Data Network Access Identifier

DNN Data Network Name

EAS Edge Application Server

ECS Edge Configuration Server

ECSP Edge Computing Service Provider

EDN Edge Data Network

FQDN Fully Qualified Domain Name

GSMA GSM Association

LO Leading Operator

PO Participating Operator

MEO MEC Orchestrator

MEAO MEC Application Orchestrator

***Next change***

### 5.4.4 EAS to connect with UPF

The goal is to enable ECSP management system to connect a newly deployed EAS to a UPF. Figure 5.4.4-1 shows that EASs are deployed in the local part of the Data Network that is connected to UPF to carry the user traffic via the N6 interface (see clause 6.3.3 in TS 23.501 [11]). ECSP management system requests PLMN management system to connect a newly deployed EAS to a UPF with EAS IP address, EAS service area requirements (see clause 7.3.3.6 in TS 23.558 [2])), and list of DNAI and N6 traffic routing requirements ((see Table 8.2.4.1 in TS 23.558 [2])). PLMN management system finds a UPF among the UPF(s) being deployed that meets the service area requirements (e.g. UPF #2 is found to connect to EAS #2). In the case that no UPF can be found (e.g. EAS #3), PLMN management system will deploy a new UPF (e.g. UPF #3) and then configure the SMF to add the UPF to the list of available UPF(s) (see clause 6.3.3.2 in TS 23.501 [11]). PLMN management system connects the UPF to the EAS and return the UPF information (e.g. IP addresses and DN of the UPF) to the ECSP management system.

***Next change***

#### 6.3.21.2 Attributes

The EdgeFederation IOC includes attributes inherited from ManagedFunction IOC (defined in TS 28.622 [4]) and the following attributes:

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| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| participatingOPiD | CM | T | T | F | T |
| leadingOPiD | CM | T | T | F | T |
| federatedECSInfo | M | T | T | F | T |

***Next change***

### 6.4.1 Attribute Properties

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
| eASIdentifier | It refers to EASID that identifies a particular application (e.g. SA6Video, SA6Game, … etc.) (see clause 7.2.4 in TS 23.558 [2]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASAddress | One or more URLs and/or IP Address(es) of EAS(s) (See TS 23.558 [2]). allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eASREquirementsRef | This is the DN of EASRequirements. allowedValues: Not applicable | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eESFunctionRef | This is the DN of EESFunction. allowedValues: DN of the EESFunction MOI. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| registrationInfo | This refers to the registration information (see clause see clause 8.4.3 and 8.4.4 in TS 23.558 [2]). allowedValues: N/A | type: RegistrationInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| registrationExpiry | This specifies the expiration time of the EAS and EES Registration (see clause 8.4.3 and 8.4.4 in TS 23.558 [2]). | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| registrationID | This identifies particular EAS and EES registration. (see clause 8.4.3 and 8.4.4 in TS 23.558 [2]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| secCredential | This specifies the security credentials of the EAS and EES Registration (see clause 8.4.3 and 8.4.4 in TS 23.558 [2]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| edgeDataNetworkRef | This holds a list of DN of EdgeDataNetwork. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| requiredEASservingLocation | It defines the location where the EAS service should be available (see clause 7.3.3.6 in TS 23.558 [2]). | type: ServingLocationmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| geographicalLocation | This refers to the Geographical Service Area, (see clause 7.3.3.3 in TS 23.558 [2] that is defined as a datatype (see clause 6.3.4).allowedValues: N/A | type: GeoLocmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| latitude | This defines the single latitude coordinate. | type: Floatmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| longitude | This defines the single longitude coordinate. | type: Floatmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| civicLocation | This defines the civic locations, such as: a well-known buildings, parks, arenas, civic addresses, or ZIP code etc (see clause 7.3.3.3 in TS 23.558 [2]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| topologicalLocation | This refers to the Topological Service Area, (see clause 7.3.3.2 in TS 23.558 [2]) that is defined as a datatype (see clause 6.3.7). allowedValues: N/A | type: TopologicalServiceAreamultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| geographicalCoordinates | This refers to the Topological Service Area, (see clause 7.3.3.2 in TS 23.558 [2]) that is defined as a datatype (see clause 6.3.8). allowedValues: N/A | type: GeographicalCoordinatesmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| softwareImageInfo | This refers to the software image information (e.g. software image location, minimum RAM, disk requirements) (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]). It is defined as a datatype (see clause 6.3.9).allowedValues: N/A | type: SoftwareImageInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| swImageRef | It indicates the reference to the actual software image that is represented by URL (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| minimumDisk | It indicates the minimum disk size requirement for the EAS software (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]).The unit is Megabyte. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| minimumRAM | It indicates the minimum RAM size requirement for the EAS software (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]).The unit is Megabyte. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| diskFormat | It indicates the disk format requirement for the EAS software (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| operatingSystem | It indicates the operating system requirement for the EAS software (see clause 7.1.6.5 in ETSI NFV IFA-011 [7]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| cellIDList | It represents the list of NR cells. The cell ID, together with the gNB Identifier (using gNBId of the parent GNBCUCPFunction or GNBDUFunction or ExternalCUCPFunction), identifies a NR cell within a PLMN. This is the NR Cell Identity (NCI). See subclause 8.2 of TS 38.300 [13]. AllowedValues: Not applicable | type: Integermultiplicity: \*isOrdered: FalseisUnique: YesdefaultValue: NoneisNullable: False |
| trackingAreaIdList | It represents the list of tracking areas within a PLMN.  | type: TAImultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| servingPLMN | It specifies the PLMN to be served. | type: PLMNIdmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: True |
| ecsAddress | One or more URLs and/or IP Address(es) of ECS(s) (See TS 23.558 [2]). allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| providerIdentifier | The identifier of the ECSP that provides the ECS (See TS 23.558 [2]).allowedValues: N/A | type: stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eDNConnectionInfo | It defines the set of information needed to connect to an EDN. | type: EDNConnectionInfomultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eDNServiceArea | This parameter defines the service location for the EDN (see clause 7.3.3.4 in TS 23.558 [2]). | type: ServingLocationmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| ednIdentifier | The identifier of the edge data network (See TS 23.558 [2]).allowedValues: N/A | type: stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| affinityAntiAffinity | This parameter defines the affinity and anti-requirements of the EAS with other EAS on the same EDN. | type: AffinityAntiAffinitymultiplicity: 1isOrdered: N/AisUnique: defaultValue: NoneisNullable: False |
| affinityEAS | This parameter defines the EAS identifier with which the affinity is required. | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| antiAffinityEAS | This parameter defines the EAS identifier with which the anti-affinity is required. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| serviceContinuity | This parameter defines if the service continuity is required by the EAS. If the value is TRUE, the EAS will be deployed with an EES supporting service continuity. | type: Booleanmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: FalseisNullable: False |
| virtualResource | This parameter defines the virtual resource requirements of an EAS. | type: VirtualResourcemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| virtualMemory | It indicates the minimum virtual memory size requirements for EAS in megabytes. (see clause 7.1.9.3.2.2 in ETSI NFV IFA-011 [7]). | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| virtualDisk | It indicates the minimum virtual disk storage requirement for the EAS (see clause 7.1.9.4.3.2 in ETSI NFV IFA-011 [7]). | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| virtualCPU | It indicates the virtual CPU requirement for the EAS (see clause 7.1.9.2.3.2 in ETSI NFV IFA-011 [7]).  | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eESAddress | One or more URLs and/or IP Address(es) of EES(s) (See TS 23.558 [2]). allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eESIdentifier | It identifies the EES, see 3GPP TS 23.558. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASFunctionRef | This is the DN of EASFunction. allowedValues: DN of the EASFunction MOI. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| serviceContinuitySupport | This parameter defines whether the EES supports service continuity, see 3GPP TS 23.558 | type: Boolenmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eESservingLocation | It defines the serving location for an EES. | type: ServingLocationmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
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| eESFunctionRef | This is the DN of EESFunction. allowedValues: DN of the EESFunction MOI. | type: DNmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| aCID | Identifies the AC(s) that can be served by the EAS (See TS 23.558 [2]).allowedValues: N/A | type: Stringmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eASProvider | The identifier of the ASP that provides the EAS (See TS 23.558 [2]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASdescription | Human-readable description of the EAS (See TS 23.558 [2]).allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASSchedule | The availability schedule of the EAS (e.g. time windows) (See TS 23.558 [2]).allowedValues: N/A | type: Durationmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| startTime | It defines the start time of the duration for which the EAS is available.allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| endTime | It defines the send time of the duration for which the EAS is available.allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASGeographicalServiceArea | The geographical service area that the EAS serves. ACs in UEs that are located outside that area shall not be served (See TS 23.558 [2]).allowedValues: N/A | type: GeoLocmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eASTopologicalServiceArea | The EAS serves UEs that are connected to the Core Network from one of the cells included in this service area. ACs in UEs that are located outside this area shall not be served. (See TS 23.558 [2]).allowedValues: N/A | type: TopologicalServiceAreamultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eASServicePermissionLevel | Level of service permissions e.g. trial, gold-class supported by the EAS (See TS 23.558 [2]).Allowed Values: TRIAL, SILVER, GOLD | type: StringENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASFeature | Service features e.g. single vs. multi-player gaming service supported by the EAS (See TS 23.558 [2]).Allowed Value: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASServiceContinuitySupport | Indicates if the EAS supports service continuity or not. This IE also indicates which ACR scenarios are supported by the EAS (See TS 23.558 [2]).Default value: FALSEallowedValues: FALSE, TRUE | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FalseisNullable: False |
| eASDNAI | DNAI(s) associated with the EAS. This IE is used as Potential Locations of Applications. It is a subset of the DNAI(s) associated with the EDN where the EAS resides.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASAvailabilityReportingPeriod | The availability reporting period (i.e. heartbeat period) that indicates to the EES how often it needs to check the EAS's availability after a successful registration (See TS 23.558 [2]).allowedValues: N/A | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| eASStatus | The status of the EAS (e.g. enabled, disabled, etc.) (See TS 23.558 [2]). Allowed values: ENABLED, DISABLED | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| reservationLocation | This parameter defines the location where the resource needs to be reserved | type: ServingLocationmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| resourceReservationRequirement | This parameter defines the resource requirements that needs to be reserved.  | type: ResourceReservationRequirementmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| computeRequirement | This parameter defines the compute requirement for reservation (see VirtualComputeDesc in clause 7.1.9.2.2 in ETSI NFV IFA-011 [7]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| storageRequirement | This parameter defines the storaget requirement for reservation (see VirtualStorageDesc in clause 7.1.9.2.2 in ETSI NFV IFA-011 [7]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| networtkingRequirement | This parameter defines the networking requirement for reservation. It is described as the connection bandwidth in Kbit/s reserved for EAS to use. | type: Integermultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| requestedReservationExpiration | This parameter defines the MnS consumer's requirememts for the validity period of the resource reservation. allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| resourceReservationStatus | This parameter defines the status for the reserved resources.  | type: ResourceReservationStatusmultiplicity: 1..\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| resourceId | It identifies a reserved resource.  | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| reservationStatus | This parameter defines the status for a reserved resource. This attribute is configured by MnS producer and can be read by MnS consumer.Allowed Value: RESERVED: which means the specified resources is reserved and available to be used by the ASP.USED: which means the reserved resource is used by ASP. | type: Enummultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| relocationTriggerInfo | This attributes dictates the relocation trigger for the EAS. It is a complex type which include the following attributes.allowedValues: N/A | type: RelocationTriggerInfomultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: LOCKEDisNullable: False |
| relocationType | This attribute defines if the EAS is to be relocated immediately or at a future point of time.AllowedValue: “IMMEDIATE”, “FUTURE”, “NO-RELOCATION” | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: Not isNullable: False |
| futuristicTriggerTime | This attribute defines a time stamp in future at which the EAS relocation will be initiated.allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| relocationRejectByASP | A Boolean attribute which can be updated by the ASP to indicate its disagreement with the relocation. The value TRUE indicate that the ASP do not agree with the relocation. Allowed Values: NA | type: Booleanmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: FALSEisNullable: False |
| relocationPolicy | This attribute described the EAS relocation policies from the ASP.YES: This dictates that an EAS can be relocated as and when requiredNO: This dictates an EAS cannot be relocated at allYESwNOTIFY: This indicates that an EAS can be relocated with a prior notification allowedValues: "YES", "NO", “YESwNOTIFY”Editors Note: The notification mechanism in FFS. | type: ENUMmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| availableEdgeVirtualResources | This parameter defines the available edge virtual resources managed by an EDN (see NfviCapacityInfo in clause 10.5.2.3 of ETS NFV SOL-005 [17]). | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| vnfdId | It indicates the identifier of the VNFD which contains the virtual resource requirements of an EAS. (see clause 7.1 in ETSI NFV IFA-011 [7]).  | type: Stringmultiplicity: 1isOrdered: N/AisUnique: TruedefaultValue: NoneisNullable: False |
| participatingOPiD | This identifies the PO.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| leadingOPiD | This identifies the LO.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| federationID | This identifies the particular federation created.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| FederationExpiry | This defines the time post which the federation relationship shall expire.allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| initiationTime | Date and time of the federation initiated by the Leading operator.allowedValues: N/A | type: DateTimemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| acceptedEDNList | It provides the list of EDN that are accepted by the LO.allowedValues: N/A | type: DNmultiplicity: 1…\*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| resourceQuota | This defines the virtual resource quota assigned to the LO by the PO as per the federation relationship. This may be the subset of available virtual resource (indicate with attribute availableVirtualResource) in the EDN. The LO will only be authorized to reserve and use this amount of resources.allowedValues: N/A | type: VirtualResourcemultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| availableEASResource | This defines the available EAS in the shared EDN. This will be the DN of EASProfile.allowedValues: N/A | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| avaibleEDNList | This defines information related with offered EDN available with PO.allowedValues: N/A | type: AvailableEDNListmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| federationID | This defines the federation ID provided by the PO to LO at the time of federation establishment.allowedValues: N/A | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| reservationID | This identifies the reserved block of resources. This will be the DN of EASResourceReservationJob.allowedValues: N/A | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| federateECSIdentifier | This defines the ECS that is to be shared as part of edge federation. This will be a DN of the ECS deployed in the participating operator domain for edge services. | type: DNmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| federatedPOPIdentifier | The identifier of the participating operator | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| federatedECSProfile | The information related with ECS Profile. See clause 8.2.12 of [2]. | type: Stringmultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |
| servedEASList | This defines the list of EAS(s) available with the partner ECS. This specifies the will a DN of EASFunction instance. | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| servedEESList | This defines the list of EES(s) available with the partner ECS. This specifies the will a DN of EESFunction instance. | type: DNmultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| sharedECSInfo | This defines the ECS(s) belonging to P-OP that can be used in case of roaming and federation | type: FederatedECSInfomultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| federatedECSInfo | This defines the information related with shared ECS | type: FederatedECSInfomultiplicity: \*isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| availableEDN | This defines the available EDN. | type: DNmultiplicity: 1isOrdered: FalseisUnique: TruedefaultValue: NoneisNullable: False |
| eASDeploymentMonitor | Provides monitoring for the process of deployment of EAS(s). The data type of this attribute is the "ProcessMonitor" as defined in TS 28.622[4].allowedValues: N/A | type: ProcessMonitormultiplicity: 1isOrdered: N/AisUnique: N/AdefaultValue: NoneisNullable: False |

***Next change***

Annex A (normative):
OpenAPI definition of edge NRM

## A.1 General

This annex contains the OpenAPI definition of the Edge NRM in YAML format.

The Information Service (IS) of the Edge NRM is defined in clause 6.

Mapping rules to produce the OpenAPI definition based on the IS are defined in TS 32.160 [18].

***Next change***

Annex B (normative):
Availability Zone

# B.1 General

An Availability Zone defined in GSMA OPG [14] is the lowest level of abstraction exposed to a developer who wants to deploy an application on the edge network. It is defined in terms of a geographical area. A Cloudlet defined in GSMA OPG [14] is a point of presence for the edge cloud. It is the point where edge applications are deployed. The ECSP do not expose physical location of the cloudlets to the application service providers. The application service provider is not allowed to request deployment of its application on a specific edge cloud. There can be multiple Cloudlet in an Availability Zone. The application service provider can query for the QoS (latency, jitter etc.) available in a particular Availability Zone. The OP requires application service provider to specify target Availability Zone, when requesting for an application deployment. The virtual resources can be reserved in a particular Availability Zone on request from the application service provider.

***Next change***

Annex C (Informative):
GSMA OP introduction and concept mapping

The Operator Platform (OP) is defined by GSMA OPG [14], it facilitates access to the Edge Cloud capability of an Operator or federation of operators and their partners.

The architecture scope under definition is shown below,



Figure C-1: OP Roles and Interfaces Reference Architecture

The NBI is the interface between the application provider and the Capabilities Exposure Role in the Operator Platform, it allows an OP to advertise the above cloud capabilities that it can provide to application providers. In addition, the NBI allows an application provider to reserve a set of resources or request an Edge Cloud service with the resources and features that they require and for the OP to accept or reject the request.

The following table provides the mapping of concepts (not exhaustive) defined in this specification with the concepts defined in GSMA OPG [14].

Table C-1: Mapping of concepts of this specification with GSMA OPG [14]

|  |  |  |
| --- | --- | --- |
| GSMA OPG [14] | ECM (TS 28.538) | Comment/Observations |
| Application InstanceEdge Application | EAS VNF InstanceEAS | Application Instance and EAS VNF Instance are both referring to the application instances running in the edge.Edge Application and EAS are both referring to the application running in the edge. |
| Application Provider | Application Service Provider | Application Provider and Application Service Provider both referring to the application providers producing and requesting for the deployment of the applications. |
|  |  |  |
| Availability Zone | Edge Data Network | An Availability Zone is the lowest level of abstraction exposed to a developer who wants to deploy an application on the edge network. It is mapped with one or multiple Edge Data Network. |
|  |  |  |
| Capabilities Exposure Role in OP | ECSP Management System | Both Capabilities Exposure Role in Operator Platform and the ECSP Management System are the entities which exposes interface and management service towards ASP. |
| Northbound Interface | Management services for Edge Computing lifecycle management | NBI maps to management service, enabling LCM for EAS, exposed towards ASP. |

***Next change***

\*\*\* START OF CHANGE 1 \*\*\*

\*\*\* OpenAPI/TS28538\_EdgeNrm.yaml \*\*\*

<CODE BEGINS>

openapi: 3.0.1

info:

 title: 3GPP Edge NRM

 version: 18.7.0

 description: >-

 OAS 3.0.1 specification of the Edge NRM

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externalDocs:

 description: 3GPP TS 28.538; Edge NRM

 url: http://www.3gpp.org/ftp/Specs/archive/28\_series/28.538/

paths: {}

components:

 schemas:

#-------- Definition of types-----------------------------------------------------

 ServingLocation:

 type: object

 properties:

 geographicalLocation:

 $ref: '#/components/schemas/GeoLoc'

 topologicalLocation:

 $ref: '#/components/schemas/TopologicalServiceArea'

 TopologicalServiceArea:

 type: object

 properties:

 cellIdList:

 type: array

 items:

 type: integer

 trackingAreaIdList:

 $ref: 'TS28541\_NrNrm.yaml#/components/schemas/TaiList'

 servingPLMN:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/PlmnId'

 GeoLoc:

 type: object

 properties:

 geographicalCoordinates:

 $ref: '#/components/schemas/GeographicalCoordinates'

 civicLocation:

 type: string

 GeographicalCoordinates:

 type: object

 properties:

 latitude:

 type: integer

 longitude:

 type: integer

 EDNConnectionInfo:

 type: object

 properties:

 dNN:

 type: string

 eDNServiceArea:

 $ref: '#/components/schemas/ServingLocation'

 AffinityAntiAffinity:

 type: object

 properties:

 affinityEAS:

 type: array

 items:

 type: string

 antiAffinityEAS:

 type: array

 items:

 type: string

 VirtualResource:

 type: object

 properties:

 virtualMemory:

 type: integer

 virtualDisk:

 type: integer

 virtualCPU:

 type: string

 vnfdId:

 type: string

 SoftwareImageInfo:

 type: object

 properties:

 minimumDisk:

 type: integer

 minimumRAM:

 type: integer

 discFormat:

 type: string

 operatingSystem:

 type: string

 swImageRef:

 type: string

 RegistrationInfo:

 type: object

 properties:

 registrationExpiry:

 type: string

 readOnly: true

 registrationID:

 type: string

 readOnly: true

 secCredential:

 type: string

 Duration:

 type: object

 properties:

 startTime:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

 endTime:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

 EASServicePermission:

 type: string

 description: any of enumerated value

 enum:

 - TRIAL

 - SILVER

 - GOLD

 EASFeature:

 type: string

 EASStatus:

 type: string

 description: any of enumerated value

 enum:

 - ENABLED

 - DISABLED

 ResourceReservationRequirement:

 type: object

 properties:

 computeRequirement:

 type: string

 storageRequirement:

 type: string

 networkingRequirement:

 type: integer

 ResourceReservationStatus:

 type: object

 properties:

 resourceId:

 type: string

 reservationStatus:

 type: string

 description: any of enumrated value

 enum:

 - RESERVED

 - USEd

 RelocationTriggerInfo:

 type: object

 properties:

 triggerType:

 type: string

 description: any of enumrated value

 enum:

 - IMMEDIATE

 - FUTURE

 futuristicTriggerTime:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

 AvailableEDNList:

 type: object

 properties:

 resourceQuota:

 $ref: '#/components/schemas/VirtualResource'

 FederatedECSInfo:

 type: object

 properties:

 federateECSIdentifier:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 federatedECSProfile:

 type: integer

 servedEASList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 servedEESList:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

#-------- Definition of types for name-containments ------

 SubNetwork-ncO-EdgeNrm:

 type: object

 properties:

 ECSFunction:

 $ref: '#/components/schemas/ECSFunction-Multiple'

 EdgeDataNetwork:

 $ref: '#/components/schemas/EdgeDataNetwork-Multiple'

#-------- Definition of concrete IOCs --------------------------------------------

 EdgeDataNetwork-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 ednIdentifier:

 type: string

 eDNConnectionInfo:

 $ref: '#/components/schemas/EDNConnectionInfo'

 - type: object

 properties:

 EASFunction:

 $ref: '#/components/schemas/EASFunction-Multiple'

 EESFunction:

 $ref: '#/components/schemas/EESFunction-Multiple'

 availableEdgeVirtualResources:

 type: string

 EASFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 eASIdentifier:

 type: string

 eESAddress:

 type: array

 items:

 type: string

 registrationInfo:

 $ref: '#/components/schemas/RegistrationInfo'

 eASRequirementsRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 eASAddress:

 type: array

 items:

 type: string

 relocationTriggerInfo:

 $ref: '#/components/schemas/RelocationTriggerInfo'

 relocationRejectByASP:

 type: boolean

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 EASProfile-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 aCID:

 type: string

 eASProvider:

 type: string

 eASdescription:

 type: string

 eASSchedule:

 $ref: '#/components/schemas/Duration'

 eASGeographicalServiceArea:

 $ref: '#/components/schemas/GeoLoc'

 eASTopologicalServiceArea:

 $ref: '#/components/schemas/TopologicalServiceArea'

 eASServicePermissionLevel:

 $ref: '#/components/schemas/EASServicePermission'

 eASFeature:

 $ref: '#/components/schemas/EASFeature'

 eASServiceContinuitySupport:

 type: boolean

 eASDNAI:

 type: string

 eASAvailabilityReportingPeriod:

 type: integer

 eASStatus:

 $ref: '#/components/schemas/EASStatus'

 EESFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 eESIdentifier:

 type: string

 eESServingLocation:

 type: array

 items:

 $ref: '#/components/schemas/ServingLocation'

 eESAddress:

 type: array

 items:

 type: string

 softwareImageInfo:

 $ref: '#/components/schemas/SoftwareImageInfo'

 serviceContinuitySupport:

 type: boolean

 eASFunctionRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

 registrationInfo:

 $ref: '#/components/schemas/RegistrationInfo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 ECSFunction-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 attributes:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-Attr'

 - type: object

 properties:

 eCSAddress:

 type: string

 providerIdentifier:

 type: string

 edgeDataNetworkRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

 eESFuncitonRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

 softwareImageInfo:

 $ref: '#/components/schemas/SoftwareImageInfo'

 sharedECSInfo:

 $ref: '#/components/schemas/FederatedECSInfo'

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ManagedFunction-ncO'

 EASRequirements-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 requiredEASservingLocation:

 $ref: '#/components/schemas/ServingLocation'

 affinityAntiAffinity:

 $ref: '#/components/schemas/AffinityAntiAffinity'

 serviceContinuity:

 type: boolean

 virtualResource:

 $ref: '#/components/schemas/VirtualResource'

 softwareImageInfo:

 $ref: '#/components/schemas/SoftwareImageInfo'

 eASSchedule:

 $ref: '#/components/schemas/Duration'

 eASFeature:

 $ref: '#/components/schemas/EASFeature'

 relocationPolicy:

 type: string

 description: any of enumrated value

 enum:

 - YES

 - NO

 - YESwNOTIFY

 federationID:

 type: string

 eASDeploymentMonitor:

 $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/ProcessMonitor'

 reservationJobRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/Dn'

 EASResourceReservationJob-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 reservationLocation:

 $ref: '#/components/schemas/ServingLocation'

 resourceReservationRequirement:

 type: array

 items:

 $ref: '#/components/schemas/ResourceReservationRequirement'

 requestedReservationExpiration:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

 resourceReservationStatus:

 type: array

 items:

 $ref: '#/components/schemas/ResourceReservationStatus'

 EdgeFederation-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 participatingOPiD:

 type: string

 leadingOPiD:

 type: string

 federatedECSInfo:

 $ref: '#/components/schemas/FederatedECSInfo'

 OperatorEdgeFederation-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 federationID:

 type: string

 FederationExpiry:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DateTime'

 leadingOPiD:

 type: string

 avaibleEDNList:

 $ref: '#/components/schemas/AvailableEDNList'

 acceptedEDN:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

 OperatorEdgeDataNetwork-Single:

 allOf:

 - $ref: 'TS28623\_GenericNrm.yaml#/components/schemas/Top'

 - type: object

 properties:

 availableEASResource:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

 edgeDataNetworkRef:

 $ref: 'TS28623\_ComDefs.yaml#/components/schemas/DnList'

#-------- Definition of JSON arrays for name-contained IOCs ----------------------

 EASFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EASFunction-Single'

 ECSFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/ECSFunction-Single'

 EESFunction-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EESFunction-Single'

 EdgeDataNetwork-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EdgeDataNetwork-Single'

 EASProfile-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EASProfile-Single'

 EdgeFederation-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/EASProfile-Single'

 OperatorEdgeFederation-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/OperatorEdgeFederation-Single'

 OperatorEdgeDataNetwork-Multiple:

 type: array

 items:

 $ref: '#/components/schemas/OperatorEdgeDataNetwork-Single'

#--------------------------------- Definition ------------------------------------

 resources-edgeNrm:

 oneOf:

 - $ref: '#/components/schemas/EASFunction-Single'

 - $ref: '#/components/schemas/ECSFunction-Single'

 - $ref: '#/components/schemas/EESFunction-Single'

 - $ref: '#/components/schemas/EdgeDataNetwork-Single'

 - $ref: '#/components/schemas/EASRequirements-Single'

 - $ref: '#/components/schemas/EASProfile-Single'

 - $ref: '#/components/schemas/EdgeFederation-Single'

 - $ref: '#/components/schemas/OperatorEdgeFederation-Single'

 - $ref: '#/components/schemas/OperatorEdgeDataNetwork-Single'

 - $ref: '#/components/schemas/EASResourceReservationJob-Single'

<CODE ENDS>

\*\*\* END OF CHANGE 1 \*\*\*

***End of changes***