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

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-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:



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eASAddress | One or more URLs and/or IP Address(es) of EAS(s) (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| eASREquirementsRef | This is the DN of EASRequirements.  allowedValues: Not applicable | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eESFunctionRef | This is the DN of EESFunction.  allowedValues: DN of the EESFunction MOI. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: RegistrationInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| registrationID | This identifies particular EAS and EES registration. (see clause 8.4.3 and 8.4.4 in TS 23.558 [2]). | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| edgeDataNetworkRef | This holds a list of DN of EdgeDataNetwork. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: ServingLocation  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: GeoLoc  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| latitude | This defines the single latitude coordinate. | type: Float  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| longitude | This defines the single longitude coordinate. | type: Float  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: TopologicalServiceArea  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: GeographicalCoordinates  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: SoftwareImageInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: 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: Integer  multiplicity: \*  isOrdered: False  isUnique: Yes  defaultValue: None  isNullable: False |
| trackingAreaIdList | It represents the list of tracking areas within a PLMN. | type: TAI  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| servingPLMN | It specifies the PLMN to be served. | type: PLMNId  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: True |
| ecsAddress | One or more URLs and/or IP Address(es) of ECS(s) (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| providerIdentifier | The identifier of the ECSP that provides the ECS (See TS 23.558 [2]).  allowedValues: N/A | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eDNConnectionInfo | It defines the set of information needed to connect to an EDN. | type: EDNConnectionInfo  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| eDNServiceArea | This parameter defines the service location for the EDN (see clause 7.3.3.4 in TS 23.558 [2]). | type: ServingLocation  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| ednIdentifier | The identifier of the edge data network (See TS 23.558 [2]).  allowedValues: N/A | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| affinityAntiAffinity | This parameter defines the affinity and anti-requirements of the EAS with other EAS on the same EDN. | type: AffinityAntiAffinity  multiplicity: 1  isOrdered: N/A  isUnique:  defaultValue: None  isNullable: False |
| affinityEAS | This parameter defines the EAS identifier with which the affinity is required. | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| antiAffinityEAS | This parameter defines the EAS identifier with which the anti-affinity is required. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Boolean  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: False  isNullable: False |
| virtualResource | This parameter defines the virtual resource requirements of an EAS. | type: VirtualResource  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eESAddress | One or more URLs and/or IP Address(es) of EES(s) (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| eESIdentifier | It identifies the EES, see 3GPP TS 23.558. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eASFunctionRef | This is the DN of EASFunction.  allowedValues: DN of the EASFunction MOI. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| serviceContinuitySupport | This parameter defines whether the EES supports service continuity, see 3GPP TS 23.558 | type: Boolen  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eESservingLocation | It defines the serving location for an EES. | type: ServingLocation  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| eESFunctionRef | This is the DN of EESFunction.  allowedValues: DN of the EESFunction MOI. | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| aCID | Identifies the AC(s) that can be served by the EAS (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| eASProvider | The identifier of the ASP that provides the EAS (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eASdescription | Human-readable description of the EAS (See TS 23.558 [2]).  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eASSchedule | The availability schedule of the EAS (e.g. time windows) (See TS 23.558 [2]).  allowedValues: N/A | type: Duration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| startTime | It defines the start time of the duration for which the EAS is available.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| endTime | It defines the send time of the duration for which the EAS is available.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: GeoLoc  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: TopologicalServiceArea  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: StringENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: FALSE  allowedValues: FALSE, TRUE | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: False  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eASStatus | The status of the EAS (e.g. enabled, disabled, etc.) (See TS 23.558 [2]).  Allowed values: ENABLED, DISABLED | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| reservationLocation | This parameter defines the location where the resource needs to be reserved | type: ServingLocation  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| resourceReservationRequirement | This parameter defines the resource requirements that needs to be reserved. | type: ResourceReservationRequirement  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| requestedReservationExpiration | This parameter defines the MnS consumer's requirememts for the validity period of the resource reservation.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| resourceReservationStatus | This parameter defines the status for the reserved resources. | type: ResourceReservationStatus  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| resourceId | It identifies a reserved resource. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: RelocationTriggerInfo  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: LOCKED  isNullable: 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: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: Not isNullable: False |
| futuristicTriggerTime | This attribute defines a time stamp in future at which the EAS relocation will be initiated.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: FALSE  isNullable: False |
| relocationPolicy | This attribute described the EAS relocation policies from the ASP.  YES: This dictates that an EAS can be relocated as and when required  NO: This dictates an EAS cannot be relocated at all  YESwNOTIFY: This indicates that an EAS can be relocated with a prior notification  allowedValues: "YES", "NO", “YESwNOTIFY”  Editors Note: The notification mechanism in FFS. | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: String  multiplicity: 1  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
| participatingOPiD | This identifies the PO.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| leadingOPiD | This identifies the LO.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| federationID | This identifies the particular federation created.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| FederationExpiry | This defines the time post which the federation relationship shall expire.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| initiationTime | Date and time of the federation initiated by the Leading operator.  allowedValues: N/A | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| acceptedEDNList | It provides the list of EDN that are accepted by the LO.  allowedValues: N/A | type: DN  multiplicity: 1…\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: VirtualResource  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| availableEASResource | This defines the available EAS in the shared EDN. This will be the DN of EASProfile.  allowedValues: N/A | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| avaibleEDNList | This defines information related with offered EDN available with PO.  allowedValues: N/A | type: AvailableEDNList  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| federationID | This defines the federation ID provided by the PO to LO at the time of federation establishment.  allowedValues: N/A | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| reservationID | This identifies the reserved block of resources. This will be the DN of EASResourceReservationJob.  allowedValues: N/A | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| federatedPOPIdentifier | The identifier of the participating operator | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| federatedECSProfile | The information related with ECS Profile. See clause 8.2.12 of [2]. | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| servedEASList | This defines the list of EAS(s) available with the partner ECS. This specifies the will a DN of EASFunction instance. | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| servedEESList | This defines the list of EES(s) available with the partner ECS. This specifies the will a DN of EESFunction instance. | type: DN  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| sharedECSInfo | This defines the ECS(s) belonging to P-OP that can be used in case of roaming and federation | type: FederatedECSInfo  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| federatedECSInfo | This defines the information related with shared ECS | type: FederatedECSInfo  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| availableEDN | This defines the available EDN. | type: DN  multiplicity: 1  isOrdered: False  isUnique: True  defaultValue: None  isNullable: 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: ProcessMonitor  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: 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 Instance  Edge Application | EAS VNF Instance  EAS | 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***