**3GPP TSG-CT WG3 Meeting #134 *C3-24xxxx***

**Changsha, China, 15 - 19 April, 2024** *(revision of C3-242061)*

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **120** | **rev** | **7** | **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 |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | ECS Discovery | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated, Samsung, Ericsson, Convida, NTT Docomo, InterDigital | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | EDGEAPP\_Ph2 | | | | |  | ***Date:*** | | | 2024-04-08 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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:*** | | As part of federation and roaming feature, TS 23.558 specifies a procedure for an ECS to discover partner ECS information. This procedure needs to be specified as new service API of ECS. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | ECS discovery : Service description clauses and API data model. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incomplete stage-3 work. Stage-2 requirements of ECS discovery service will not be supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1, (new) 6.6 and sub-clauses, (new) 9.5 and sub-clauses | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | This CR does not impact any Open API specification file. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev 2: There are no open Editor Note’s related to this API in stage-2 and stable. Hence the stage-3 aspects of the API are proposed.  Rev3: Updated the coversheet and added the Editor’s Note in the clause 6.6.  Rev4: Resolved some Editor’s Notes and added details related to the service operations and added the OpenAPI description.  Rev 6: CR is transposed to the latest verison of the TS and added new cosigners.  Rev 7: added new data types and removed the Open API file. | | | | | | | | |

\* \* \* First Change \* \* \* \*

## 6.1 Introduction

The table 6.1-1 lists the Edge Configuration Server APIs below the service name. A service description clause for each API gives a general description of the related API.

Table 6.1-1: List of ECS Service APIs

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | Operation Semantics | Consumer(s) |
| Eecs\_EESRegistration | Request | Request/Response | e.g., EES |
| Update | Request/Response | e.g., EES |
| Deregister | Request/Response | e.g., EES |
| Eecs\_TargetEESDiscovery  (NOTE) | Request | Request/Response | e.g., EES, CES |
| Eecs\_EASInfoManagement | Get | Request/Response | EES |
| Store | Request/Response | EES |
| Eecs\_ECSDiscovery | Request | Request/Response | ECS |
| NOTE: In this release of the specification, this API is extended to enable to discover the target Enabler Server, which can be either the target EES or the target CES, not only the target EES, in order to support cloud enabler services. | | | |

Table 6.1-2 summarizes the corresponding Edge Configuration Server APIs defined in this specification.

Table 6.1-2: API Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Service Name** | **Clause** | **Description** | **OpenAPI Specification File** | **apiName** | **Annex** |
| Eecs\_EESRegistration | 9.1 | ECS EES registration service. | TS29558\_Eecs\_EESRegistration.yaml | eecs-eesregistration | A.11 |
| Eecs\_TargetEESDiscovery | 9.2 | ECS Service to discover the target EES information. | TS29558\_Eecs\_TargetEESDiscovery.yaml | eecs-targeteesdiscovery | A.12 |
| Eecs\_EASInfoManagement | 9.3 | ECS EAS Information Management Service. | TS29558\_Eecs\_EASInfoManagement.yaml | eecs-eim | A.16 |

\* \* \* Next Change \* \* \* \*

## 6.6 Eecs\_ECSDiscovery Service

### 6.6.1 Service Description

The Eecs\_ECSDiscovery API, as defined in 3GPP TS 23.558 [2], allows a service consumer (e.g., partner ECS) to:

- retrieve partner ECS information from the ECS; and

- (un)subscribe to the partner ECS information notifications of an ECS.

### 6.6.2 Service Operations

#### 6.6.2.1 Introduction

The service operation defined for Eecs\_ECSDiscovery API is shown in the table 6.6.2.1-1.

Table 6.6.2.1-1: Operations of the Eecs\_ECSDiscovery API

|  |  |  |
| --- | --- | --- |
| Service operation name | Description | Initiated by |
| Eecs\_ECSDiscovery\_Request | This service operation is used by the service consumer to retrieve partner ECS information. | e.g., ECS |

#### 6.6.2.2 Eecs\_ECSDiscovery\_Request

##### 6.6.2.2.1 General

This service operation is used by the service consumer to retrieve partner ECS information from the ECS.

##### 6.6.2.2.2 Service consumer fetching partner ECS information from the ECS using the Eecs\_ECSDiscovery\_Request operation

To retrieve partner ECS information, the service consumer shall send an HTTP POST request message to the ECS targeting the "ECS Information" collection resource, with the request body including the ECSInfoDiscoveryReq data structure.

Upon reception of the HTTP POST message from the service consumer, the ECS shall:

1. verify the identity of the service consumer and check if it is authorized to trigger this request;

2. if the service consumer ECS is authorized, the ECS shall;

a. determine the ECS information that may be shared with the service consumer based on the federation information and the ECSP policies; and

b. return an HTTP "200 OK" status code with the response body including the ECSInfoDiscoveryResp data structure requested ECS information.

On failure, the ECS shall take proper error handling actions, as specified in clause 9.5.6, and respond to the service consumer with an appropriate error status code.

\* \* \* Next Change \* \* \* \*

## 9.5 Eecs\_ECSDiscovery API

### 9.5.1 Introduction

The Eecs\_ECSDiscovery service shall use the Eecs\_ECSDiscovery API.

The API URI of the Eecs\_ECSDiscovery API shall be:

**{apiRoot}/<apiName>/<apiVersion>**

The request URIs used in HTTP requests shall have the Resource URI structure as defined in clause 5.2.4 of 3GPP TS 29.122 [6], i.e.:

**{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>**

with the following components:

- The {apiRoot} shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [6].

- The <apiName>shall be "eecs-ecsdiscovery".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 5.2.4 of 3GPP TS 29.122 [6].

### 9.5.2 Resources

#### 9.5.2.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 9.5.2.1-1 depicts the resource URIs structure for the Eecs\_ECSDiscovery API.



Figure 9.5.2.1-1: Resource URI structure of the Eecs\_ECSDiscovery API

Table 9.5.2.1-1 provides an overview of the resources and applicable HTTP methods.

Table 9.5.2.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method or custom operation | Description |
| ECS Information | /ecs-info | Discover | Retrieve partner ECS information. |

#### 9.5.2.2 Resource: ECS Information

##### 9.5.2.2.1 Description

This resource represents the collection of ECS Information managed by the ECS.

##### 9.5.2.2.2 Resource Definition

Resource URI: **{apiRoot}/eecs-ecsdiscovery/<apiVersion>/ecs-info**

This resource shall support the resource URI variables defined in the table 9.5.2.2.2-1.

Table 9.5.2.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data Type | Definition |
| apiRoot | string | See clause 9.5.1. |

##### 9.5.2.2.3 Resource Standard Methods

There are no resource standard methods defined for this resource in this release of the specification.

##### 9.5.2.2.4 Resource Custom Operations

###### 9.5.2.2.4.1 Overview

Table 9.5.2.4.4.1-1 specifies the custom operations defined on this resource.

Table 9.5.2.2.4.1-1: Custom operations

|  |  |  |  |
| --- | --- | --- | --- |
| Operation name | Custom operaration URI | Mapped HTTP method | Description |
| Discover | /ecs-info/discover | POST | Request partner ECS information |

###### 9.5.2.2.4.2 Operation: Discover

9.5.2.2.4.2.1 Description

The custom operation allows a service consumer to request ECS information from the ECS.

9.5.2.2.4.2.2 Operation Definition

This operation shall support the request of data structures specified in table 9.5.2.2.4.2.2-1 and the response data structure and response codes specified in table 9.5.2.2.4.2.2-2.

Table 9.5.2.2.4.2.2-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| ECSInfoDiscoveryReq | M | 1 | Contains the necessary information to request ECS information. |

Table 9.5.2.2.4.2.2-2: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| ECSInfoDiscoveryResp | M | 1 | 200 OK | The requested ECS discovery information was successfully returned. |
| n/a |  |  | 204 No Content | The processing of the request is successful but no matching ECS was found. |
| n/a |  |  | 307 Temporary Redirect | Temporary redirection.  The response shall include a Location header field containing an alternative URI of the resource custom operation located in an alternative ECS.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3]. |
| n/a |  |  | 308 Permanent Redirect | Permanent redirection.  The response shall include a Location header field containing an alternative URI of the resource custom operation located in an alternative ECS.  Redirection handling is described in clause 5.2.10 of 3GPP TS 29.122 [3]. |
| NOTE: The mandatory HTTP error status code for the POST method listed in Table 5.2.6-1 of 3GPP TS 29.122 [3] also apply. | | | | |

Table 9.5.2.2.4.2.2-3: Headers supported by the 307 Response Code on this resource custom operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource custom operation located in an alternative ECS. |

Table 9.5.2.2.4.2.2-4: Headers supported by the 308 Response Code on this resource custom operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | Contains an alternative URI of the resource custom operation located in an alternative ECS. |

### 9.5.3 Custom Operations without associated resources

There are no custom Operations without associated resources defined for this API in this release of the specification.

### 9.5.4 Notifications

#### 9.5.4.1 General

Table 9.5.4.1-1: Notifications overview

|  |  |  |  |
| --- | --- | --- | --- |
| Notification | Callback URI | HTTP method or custom operation | Description  (service operation) |
|  |  |  |  |

### 9.5.5 Data Model

#### 9.5.5.1 General

This clause specifies the application data model supported by the API. Data types listed in clause 7.2 apply to this API.

Table 9.5.5.1-1 specifies the data types defined specifically for the Eecs\_ECSDiscovery API.

Table 9.5.5.1-1: Eecs\_ECSDiscovery API specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Section defined | Description | Applicability |
| EcsInfo | 9.5.5.2.4 | To represent the discovered ECS information. |  |
| EcsInfoDiscoveryReq | 9.5.5.2.2 | To represent the ECS Discovery request information. |  |
| EcsInfoDiscoveryResp | 9.5.5.2.3 | To represent the ECS Discovery response information. |  |
| ECSProfile | 9.4.5.2.5 | The profile information related to the ECS in the ECSRegistration data type. |  |
| PduConfiguration | 9.4.5.2.6 | Information to establish PDU session with ECS. |  |
| SupportedEcsp | 9.4.5.2.7 | The ECSP Information associated to PLMN. |  |
| SupportedPlmn | 9.4.5.2.8 | The PLMN information. |  |

Table 9.5.5.1-2 specifies data types re-used by the Eecs\_ECSDiscovery API service.

Table 9.5.5.1-2: Re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| ACProfile | 3GPP TS 24.558 [14] | The AC profiles filter information. |  |
| ConnectivityInfo | 3GPP TS 24.558 [14] | To represent the connectivity information of the UE. |  |
| DateTime | 3GPP TS 29.122 [6] | Represents a date and a time. |  |
| DateTimeRm | 3GPP TS 29.571 [8] | Used to capture the expiration time in ECS registration patch. |  |
| Dnn | 3GPP TS 29.571 [8] | Represents the Dnn information |  |
| EndPoint | 8.1.5.2.5 | The end point information of the ECS in the ECS profile. |  |
| LocationInfo | 3GPP TS 29.122 [6] | Used to indicate the location information of the UE in the ECS discovery request and subscriptions. |  |
| PlmnIdNid | 3GPP TS 29. 571 [8] | Identifies the network: PLMN Identifier or the SNPN Identifier (the PLMN Identifier and the NID). Used to indicate the PLMN supporting information in ECS profile. |  |
| Snssai | 3GPP TS 29.571 [8] | Represents the Snssai information. |  |
| SpatialValidityCond | 3GPP TS 29.571 [8] | Represents the spatial validity conditions. |  |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of optional features defined in table 9.4.7-1. |  |

#### 9.5.5.2 Structured data types

##### 9.5.5.2.1 Introduction

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

##### 9.5.5.2.2 Type: EcsInfoDiscoveryReq

Table 9.5.5.2.2-1: Definition of type EcsInfoDiscoveryReq

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ecsAddr | EndPoint | M | 1 | Represents end point information (e.g. URI, FQDN, IP address) of the requesting ECS. |  |
| acProfs | array(ACProfile) | O | 1..N | AC Profiles filter information about the required services. |  |
| connInf | array(ConnectivityInfo) | O | 1..N | List of connectivity information for the UE. |  |
| ueLoc | LocationInfo | O | 0..1 | Location information of the UE for which the services are required. |  |
| suppFeat | SupportedFeatures | C | 0..1 | Represents a list of Supported features used as described in clause 9.5.7.  This attribute shall be present only when feature negotiation needs to take place. |  |

##### 9.5.5.2.3 Type: EcsInfoDiscoveryResp

Table 9.5.5.2.3-1: Definition of type EcsInfoDiscoveryResp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| EcsInfo | array(EcsInfo) | M | 1..N | List of ECS information. |  |

##### 9.5.5.2.4 Type: EcsInfo

Table 9.5.5.2.4-1: Definition of type EcsInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| Ecs | ECSProfile | M | 1 | Contains the ECS profile information. |  |
| lifeTime | DateTime | O | 0..1 | Indicates the time duration for which the provided ECS information is valid. |  |

##### 9.4.5.2.5 Type: ECSProfile

Table 9.4.5.2.5-1: Definition of type ECSProfile

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| endPt | EndPoint | M | 1 | Endpoint information (e.g. URI, FQDN, IP address) used to communicate with the ECS. |  |
| ecspId | string | O | 0..1 | The identifier of the ECSP (e.g. the mobile network operator or 3rd party service provider) that provides the ECS. |  |
| splVal | SpatialValidityCond | O | 0..1 | The spatial validity conditions. |  |
| suppPlmns | array(SupportedPlmn) | O | 1..N | List of PLMNs and the associated ECSPs for which the ECS can provide the EDN configuration information. |  |

##### 9.4.5.2.6 Type: SupportedPlmn

Table 9.4.5.2.6-1: Definition of type SupportedPlmn

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| plmnId | PlmnIdNid | O | 0..1 | The identifier of the PLMN for which EDN configuration information can be provided by ECS. |  |
| suppEcsps | array(SupportedEcsp) | O | 1..N | The information of ECSP(s) associated to the PLMN identified by "plmnId" attribute. |  |
| pduConf | PduConfiguration | O | 0..1 | DNN and S-NSSAI information for roaming UEs to establish PDU sessions with the ECS. |  |

##### 9.4.5.2.7 Type: SupportedEcsp

Table 9.4.5.2.7-1: Definition of type SupportedEcsp

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ecspId | String | M | 1 | The identifier of an ECSP |  |
| easIds | array(string) | M | 1..N | The list of EAS IDs available or expected to be available through the ECSP identified by "ecspId" attribute. |  |

##### 9.4.5.2.8 Type: PduConfiguration

Table 9.4.5.2.8-1: Definition of type PduConfiguration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| snssai | Snssai | M | 1 | Indicates the S-NSSAI information to establish PDU sessions with the ECS. |  |
| dnn | Dnn | M | 1 | Indicates the DNN information to establish PDU sessions with the ECS. |  |

#### 9.5.5.3 Simple data types and enumerations

None.

### 9.5.6 Error Handling

#### 9.5.6.1 General

For the Eecs\_ECSDiscovery API, HTTP error responses shall be supported as specified in clause 5.2.6 of 3GPP TS 29.122 [3]. Protocol errors and application errors specified in clause 5.2.6 of 3GPP TS 29.122 [3] shall be supported for the HTTP status codes specified in table 5.2.6-1 of 3GPP TS 29.122 [3].

In addition, the requirements in the following clauses are applicable for the Eecs\_ECSDiscovery API.

#### 9.5.6.2 Protocol Errors

No specific protocol errors for the Eecs\_ECSDiscovery API are specified.

#### 9.5.6.3 Application Errors

The application errors defined for the Eecs\_ECSDiscovery service are listed in Table 9.5.6.3-1.

Table 9.5.6.1-1: Application errors

|  |  |  |
| --- | --- | --- |
| Application Error | HTTP status code | Description |
|  |  |  |

### 9.5.7 Feature negotiation

General feature negotiation procedures are defined in clause 7.8. Table 9.5.7-1 lists the supported features for Eecs\_ECSDiscovery API.

Table 9.5.7-1: Supported Features

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

\* \* \* End of Changes \* \* \* \*