**3GPP TSG-SA WG6 Meeting #44 S6-211646**

**e-meeting, 12th – 20th July 2021 (revision of S6-21xxxx)**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.558** | **CR** | **0008** | **rev** | **-** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *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 | **X** | Radio Access Network |  | Core Network | **X** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | EEC context relocation | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung, Convida | | | | | | | | | |
| ***Source to TSG:*** | S6 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | EDGEAPP | | | | |  | ***Date:*** | | | 07-07-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Multiple pieces are missing for EEC context relocation to function correctly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Handling of EEC context relocation during EEC registration is completed. 2. It is clarified that if EEC registration is being done as part of ACR, the EEC does not include the EEC context details to avoid unnecessary relocation of EEC context to multiple candidate T-EAS. 3. In ACR scenarios #1 to #4 the S-EES relocates the EEC context to the selected T-EES using the EEC Context Push procedures. 4. In ACR scenario #5, the T-EES pulls the context from the S-EES. 5. EEC uses the 'ACR request' to provide the EEC context details to the T-EES. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | EEC context relocation remains incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.5.10, 8.4.2.2.2, 8.4.2.3.2, 8.4.2.3.3, 8.8.2, 8.8.2.1, 8.8.2.2, 8.8.2.3, 8.8.2.4, 8.8.2.5, 8.8.2.6, 8.8.4.4, 8.8.4.10, 8.8.3.x (NEW), 8.8.4.y (NEW), 8.8.4.z (NEW), 8.8.3.5.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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's revision history:*** | |  | | | | | | | | |

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

### 6.5.10 EDGE-9

EDGE-9 reference point enables interactions between two EESs. EDGE-9 reference point may be provided between EES within different EDN (Figure 6.5.10-1) and within the same EDN (Figure 6.5.10-2).



Figure 6.5.10-1: Inter-EDN EDGE-9



Figure 6.5.10-2: Intra-EDN EDGE-9

EDGE-9 supports:

a) discovery of T-EAS information to support ACR; and

b) EEC context relocation procedures.

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

##### 8.4.2.2.2 EEC registration

Figure 8.4.2.2.2-1 illustrates EEC registration procedure.

Pre-conditions:

1. The EEC is authorized to access the EES for the purpose of performing registration and has received relevant security credentials as specified in clause 8.11; and

2. The EEC has received service provisioning information from the ECS, including information for accessing the EES.



Figure 8.4.2.2.2-1: EEC registration procedure

1. The EEC sends EEC registration request to the EES. The request from the client includes the security credentials received after successful authorization for edge computing services and may include a proposed expiration time. The request also optionally includes information indicating to the EES how the EEC expects to use the services of the EES.

If the EEC is moving to this EES from the purview of another EES, called source EES, the request from the EEC may include the identity and endpoint of the source EES and an EEC context ID that was provided by the source EES to maintain continuity of the EEC context and to authorize EEC context relocation.

2. Upon receiving the request from the EEC, the EES validates the registration request and verifies the security credentials. The EES further determines whether the requirements that were indicated in the AC Profile(s) can be fulfilled and reserves corresponding resources.

3. Upon successful validation of the request, if the received EEC registration request contains an EEC context ID and a source EES Endpoint, the EES performs a EEC Context Pull relocation (clause 8.9.2.2) from the source EES. The source and target EES perform EEC Context handling as detailed in clause 8.9.1.

NOTE 1: Only a single EEC Context ID may be provided in the EEC registration request.

NOTE 2: In this version of specification, each registration procedure relocates a single EEC context.

If the EEC registration request fails after the EEC Context Pull relocation, e.g., the EES cannot reserve the necessary resources while meeting the capability requirements of the existing registered EECs, the EES shall determine the EEC Context information stale and send a failure response with a corresponding cause.

4. The EES sends a successful EEC registration response, which includes the registration ID and may include a newly assigned EEC context ID. If step 3 was executed, the EEC registration response also includes EEC context retrieval result. The EEC stores the new EEC context ID and uses it if and when it registers with another EES. The EES may also provide an expiration time to indicate to the EEC when the registration will automatically expire. To maintain the registration, the EEC shall send a registration update request prior to the expiration. If a registration update request is not received prior to the expiration time, the EES shall treat the EEC as implicitly de-registered.

If the EEC context retrieval status indicates that the EEC context relocation was not successful, then the EEC performs the required EDGE-1 subscriptions at the T-EES.

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

##### 8.4.2.3.2 EEC registration request

Table 8.4.2.3.2-1 describes information elements in the EEC registration request from the EEC to the EES.

Table 8.4.2.3.2-1: EEC registration request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| EECID | M | Unique identifier of the EEC. |
| UE Identifier | O | The identifier of the hosting UE (i.e. GPSI or identity token) |
| Security credentials | M | Security credentials resulting from a successful authorization for the edge computing service. |
| AC Profile(s) | O | Profiles of ACs for which the EEC provides edge enabling services. AC Profiles are further described in Table 8.2.2-1. |
| EEC Service Continuity Support | O | Indicates if the EEC supports service continuity or not. The IE also indicates which ACR scenarios are supported by the EEC. |
| Proposed expiration time | O | Proposed expiration time for the registration. |
| EEC context ID (NOTE) | O | Identifier of the EEC context obtained from a previous registration. |
| Source EESID (NOTE) | O | Identifier of the EES that provided EEC context ID. |
| Source EES Endpoint (NOTE) | O | The endpoint address (e.g. URI, IP address) of the EES that provided EEC context ID. |
| NOTE: This IE shall not be present when EEC registration is performed as part of ACR. | | |

##### 8.4.2.3.3 EEC registration response

Table 8.4.2.3.3-1 describes information elements in the EEC registration response from the EES to the EEC.

Table 8.4.2.3.3-1: EEC registration response

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Successful response | O | Indicates that the registration request was successful. |
| > Registration ID | M | Identifier of the EEC registration. |
| > Expiration time | M | Indicates the expiration time of the registration. To maintain an active registration status, a registration update is required before the expiration time. |
| > EEC context ID | O | Identifier of the EEC Context information available at the EES that performed the registration. |
| > EEC Context Relocation status | O | Indicates whether the EEC context retrieval from the S-EES was successful or not. |
| Failure response | O | Indicates that the registration request failed. |
| > Cause | M | Provides the cause for registration request failure. |

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

### 8.8.2 Scenarios

#### 8.8.2.1 General

The scenarios in the following clauses are different with regards to

a) whether the EEC is involved in the detection phase and decision phase;

b) whether T-EAS discovery is performed between ECC and T-EES or between S-EES and T-EES;

c) whether the EEC sends an Application Context Relocation Request towards the S-EES, the T-EES or none at all; and

d) whether the Application Context is pushed from the S-EAS to the T-EAS or pulled by the T-EAS from S-EAS.

Generally, AC, EEC, EES and EAS implementations will support only a subset of these scenarios; therefore, during EAS discovery and T-EAS discovery the S-EES and T-EES shall take the ACR scenarios supported by the AC and EEC and any preferences indicated by the EEC for specific ACR scenarios into account when identifying the EAS(s) for the EAS discovery response, as specified in clause 8.5.2.2 and clause 8.8.3.2, or for the EAS discovery notification, as specified in clause 8.5.2.3.3.

Furthermore, when the EEC performs EAS discovery or T-EAS discovery, the EES or T-EES shall inform the EEC about the ACR scenarios which are supported by the EAS or T-EAS, respectively.

The EEC shall take the information about supported ACR scenarios provided by the ECS, S-EES and T-EES into account when selecting an EES for EAS discovery or T-EAS discovery, respectively, and when selecting an EAS for edge services.

For each of the scenarios in clauses 8.8.2.2, 8.8.2.3, 8.8.2.4, 8.8.2.5 and 8.8.2.6, performing the ACR procedure for one or more ACs can result in the same EEC receiving services from more than one EES, which have the registration for the required EASs that can serve the ACs. In scenarios described in 8.8.2.4 and 8.8.2.5, a successful EEC context relocation procedure enables the EEC to become implicitly registered to the target EES without the EEC sending an explicit EEC registration request.

Editor's note: whether the scenarios are overlapping and how to solve any co-existence issues are FFS.

#### 8.8.2.2 Initiation by EEC using regular EAS Discovery

This procedure handles ACR as a result of the UE moving to, or the UE expecting to move to, a new location which is outside the service area of the serving EAS. It further relies on the EEC being triggered as a result of the UE's movement.

This procedure is based on Service Provisioning (as specified in clause 8.3) and EAS Discovery (as specified in clause 8.5) procedures to discover the T-EESs and EASs that shall serve the ACs as a result of the UE's new location, and that shall receive the Application Context from the serving EASs.

The procedure in the following clause describes the relocation of a single application context to a new EAS. It should be repeated for each active AC in the UE.

This procedure relies on an interface between the EEC and ACs over EDGE-5, which is out of the scope of this specification.

Pre-conditions:

1. The AC in the UE already has a connection to a corresponding S-EAS;

2. The preconditions listed in clause 8.3.3.2.2 with regards to the EEC are fulfilled; and

3. The EEC is triggered when it obtains the UE's new location or is triggered by another entity such as an ECS notification.

NOTE 1: This procedure is applicable only for Edge-aware ACs and EASs.



Figure 8.8.2.2-1: ACR initiated by the EEC and ACs

Phase I: ACR Detection

1. The EEC detects the UE location update as a result of a UE mobility event and is provided with the UE's new location as described in clause 8.8.1. The EEC can also detect an expected or predicted UE location in the future as described in clause 8.8.1.

NOTE 2: If the EEC is triggered by an external entity such as by a notification from the ECS, a list of new EESs (to be used as T-EESs) is provided by that notification and step 3 below is skipped.

Phase II: ACR Decision

2. Either the AC or the EEC makes the decision to perform the ACR.

NOTE 3: Which applications require ACR can be decided based on the application profile, e.g. requirement of service continuity of the application.

Phase III: ACR Execution

3. The EEC performs Service Provisioning (as specified in clause 8.3) for all active applications that require ACR. Since the location of the UE has changed, this procedure results in a list of T-EESs that are relevant to the supplied applications and the new location of the UE. When in step 1 the ACR for service continuity planning is triggered, then the Connectivity information and UE Location in the Service Provisioning (as specified in clause 8.3) procedure contains the expected Connectivity information and expected UE Location.

NOTE 4: If the change in UE's location does not trigger a need to change the serving EAS, the subsequent steps will not take place. The EEC remains connected to the serving EESs and the ACs remain connected to their corresponding serving EASs.

4. The EEC performs EAS discovery (as specified in clause 8.5) for the desired T-EASs by querying the T-EESs that were established in step 2 (or provided in the notification from the ECS – if it was the trigger). If EEC registration configuration for the EESs established in step 2 indicates that EEC registration is required, the EEC performs EEC registration with the EESs (as specified in clause 8.4.2.2.2) before sending the EAS discovery request.

5. The AC and EEC select the T-EAS to be used for the application traffic, as described in clause 8.5.1 EAS discovery. Step 5 is skipped if EEC selects only one T-EAS.

NOTE 5: Several EEC registrations with different EESs may result from T-EAS discovery process during a single ACR operation. How EEC registrations may be optimized in this case is out of scope of this release.

6. The EEC performs ACR launching procedure (as described in clause 8.8.3.4) to the S-EES with the ACR action indicating ACR initiation and the corresponding ACR initiation data (without the need to notify the EAS). The S-EES may apply the AF traffic influence with the N6 routing information of the T-EAS in the 3GPP Core Network (if applicable), as described in clause 8.8.3.4.

7. If the T-EES is different than the S-EES and the EEC Context at the S-EES is not stale, the S-EES initiates EEC Context Push relocation with the T-EES as described in clause 8.9.2.3. Otherwise, if the T-EES is the same as the S-EES, EEC Context Push relocation is skipped.

8. The AC is triggered by the EEC to start ACT. The AC decides to initiate the transfer of application context from the S-EAS to the T-EAS. There may be different ways of transferring context and they are all outside the scope of this specification.

When in step 1 the ACR for service continuity planning has been triggered, the AC connects to the T-EAS when the UE moves to the predicted location. Otherwise, the rest of this step is skipped.

After the ACT is completed, the AC remains connected to the T-EAS and disconnects from the S-EAS; the EEC is informed of the completion.

NOTE 6: Whether and how the AC initiates the ACT is out of scope of the present document

When in step 1 the ACR has been triggered for service continuity planning, if the UE does not move to the expected/predicted the EEC does not connect to T-EES, the AC does not connect to the T-EAS. Step 8 is skipped.

NOTE 7: The S-EAS or T-EAS can further decide to terminate the ACR, and the T-EAS can discard the application context based on information received from EEL and/or other methods (e.g. monitoring the location of the UE). It is up to the implementation of the S-EAS and T-EAS whether and how to make such a decision.

NOTE 8: It is out of scope of this specification how the AC informs the source and T-EAS that state transfer was part of service continuity planning. When in step 1 the ACR for service continuity planning is triggered, step 8 is performed after the UE moves to the predicted location.

Phase IV: Post-ACR Clean up

9. The S-EAS sends the ACT status update message to the S-EES as specified in clause 8.8.3.x.

10. The T-EAS sends the ACT status update message to the T-EES as specified in clause 8.8.3.x. If the status indicates a successful ACT, and that the EEC Context relocation procedure was attempted but failed, then the T-EES indicates the failure to the T-EAS with the ACT status update response.

11. If the status in step 9 indicates a successful ACT, the S-EES sends the ACR information notification (ACR complete) message to the EEC to confirm that the ACR has completed as specified in clause 8.8.3.5.3. If the EEC Context relocation procedure was attempted, then the notification includes EEC context relocation status IE, indicating the result of the EEC context relocation procedure.

#### 8.8.2.3 EEC executed ACR via S-EES

Figure 8.8.2.3-1 illustrates the procedure for the EEC to execute the ACR via S-EES.

Pre-condition:

1. The AC at the UE already has a connection to the S-EAS; and

2. The EEC is able to communicate with the S-EES.

Figure 8.8.2.3-1: EEC executed ACR procedure

Phase I: ACR Detection

1. The EEC detects that ACR may be required as described in clause 8.8.1. The EEC may detect that ACR may be required for an expected or predicted UE location in the future as described in clause 8.8.1.

Phase II: ACR Decision

2. The EEC decides to proceed required procedures for triggering ACR.

Phase III: ACR Execution

3. The EEC determines the T-EES by using the provisioned information or performing service provisioning procedure per clause 8.3 of the present document. When in step 1 the ACR for service continuity planning is triggered, then the Connectivity information and UE Location in the Service Provisioning (as specified in clause 8.3) procedure contains the expected Connectivity information and expected UE Location. If the UE is within the service area of the T-EES, upon selecting T-EES the UE may need to establish a new PDU connection to the target EDN. If EEC registration configuration for the T-EES indicates that EEC registration is required, the EEC performs EEC registration with the selected T-EES as specified in clause 8.4.2.2.2. The EEC can then discover and select T-EAS by performing EAS Discovery with the T-EES per clause 8.5.2 of the present document.

4. The EEC performs ACR launching procedure (as described in clause 8.8.3.4) to the S-EES with the ACR action indicating ACR initiation and the corresponding ACR initiation data (with the need to notify the EAS). The S-EES authorises the request from the EEC. The S-EES decides to execute ACR based on the information received from the EEC, EEC context and/or EAS profile. The S-EES may apply the AF traffic influence with the N6 routing information of the T-EAS in the 3GPP Core Network (if applicable) and sends the ACR Notify message to the S-EAS to initiate ACT between the S-EAS and the T-EAS. The EEC also subscribes to receive ACR information notifications for ACR complete events from the S-EES, as described in clause 8.8.3.5.2.

5. If the T-EES is different than the S-EES and the EEC Context at the S-EES is not stale, the S-EES initiates EEC Context Push relocation with the T-EES as described in clause 8.9.2.3. Otherwise, if the T-EES is the same as the S-EES, EEC Context Push relocation is skipped.

6. The S-EAS transfers the application context to the T-EAS at implementation specific time. This process is out of scope of the present specification.

When in step 1 the ACR has been triggered for service continuity planning, if the UE does not move to the predicted location, the EEC does not connect to T-EES, the AC does not connect to the T-EAS. Steps 6 and 7 are skipped.

NOTE 1: The S-EAS or T-EAS can further decide to terminate the ACR, and the T-EAS can discard the application context based on information received from EEL and/or other methods (e.g. monitoring the location of the UE). It is up to the implementation of the S-EAS and T-EAS whether and how to make such a decision.

NOTE 2: When in step 1 the ACR for service continuity planning is triggered, steps 6 and 7 are performed after the UE moves to the predicted location.

Phase IV: Post-ACR Clean up

7. The S-EAS sends the ACT status update message to the S-EES as specified in clause 8.8.3.x.

8. The T-EAS sends the ACT status update message to the T-EES as specified in clause 8.8.3.x. If the status indicates a successful ACT, and that the EEC Context relocation procedure was attempted but failed, then the T-EES indicates the failure to the T-EAS with the ACT status update response.

9. If the status in step 7 indicates a successful ACT, the S-EES sends the ACR information notification (ACR complete) message to the EEC to confirm that the ACR has completed as specified in clause 8.8.3.5.3. If the EEC Context relocation procedure was attempted, then the notification includes EEC context relocation status IE, indicating the result of the EEC context relocation procedure.

#### 8.8.2.4 S-EAS decided ACR scenario

The procedure in this clause illustrates the scenario for S-EAS decided ACR.

In this procedure, the S-EAS may detect the need of ACR locally or is notified by the S-EES via ACR management notifications for "ACR monitoring" events. The S-EAS make the decision about whether to perform the ACR, and starts the ACR at a proper time.

Pre-conditions:

1. The S-EAS may depend on the receipt of certain User plane path management events from the S-EES, e.g. "user plane path change" events or "ACR monitoring" events, to detect the need for an ACR. For the following procedure it is assumed that the S-EAS has subscribed to continuously receive the respective events from the S-EES; and

2. The EEC has subscribed to receive ACR information notifications for target information notification events and ACR complete events from the S-EES, as described in clause 8.8.3.5.2.

Figure 8.8.2.4-1: S-EAS decided ACR scenario

The S-EAS decided ACR scenario is outlined with four main phases: detection, decision, execution and clean up.

Phase I: ACR Detection

1. The S-EAS either receives ACR management notifications from source Edge Enabler Sever indicating that ACR may be required ("ACR monitoring" event), or self detects the need for ACR (e.g. upon receipt of a "user plane path change" event). If the ACR management notification indicates "ACR monitoring" event, then the notification will also contain the T-EAS information (see clause 8.6.3.2.3). The S-EAS may detect that ACR may be required for an expected or predicted UE location in the future as described in clause 8.8.1.

NOTE 1: How the S-EAS self detects the local need for ACR is outside the scope of this specification.

Phase II: ACR Decision

2. The S-EAS makes the decision to perform the ACR

NOTE 2: How the S-EAS determines when to start the ACR is outside the scope of this specification.

Phase III: ACR Execution

3. The S-EAS discovers the T-EAS as described in clause 8.8.3.2. When in step 1 the ACR has been triggered for service continuity planning, then UE Location and Target DNAI values in the Retrieve T-EES procedure contain the expected UE Location and expected Target DNAI. After S-EAS determines the T-EAS to use, the S-EAS may apply the AF traffic influence with the N6 routing information of the T-EAS in the 3GPP Core Network (if applicable).

4. The S-EAS sends selected T-EAS declaration message to S-EES, to inform S-EES the determined T-EAS to use as described in clause 8.8.3.7.

5. If the T-EES is different than the S-EES and the EEC Context at the S-EES is not stale, the S-EES initiates EEC Context Push relocation with the T-EES as described in clause 8.9.2.3. Otherwise, if the T-EES is the same as the S-EES, EEC Context Push relocation is skipped.

6. Based on the T-EAS selection information received from the S-EAS, the S-EES sends the target information notification to the EEC as described in clause 8.8.3.5.3.

7. The S-EAS transfers the application context to the T-EAS selected in step 3. This process is out of scope of the present specification.

When in step 1 the ACR has been triggered for service continuity planning, if the UE does not move to the predicted location, the EEC does not connect to T-EES, the AC does not connect to the T-EAS. Step 6 is skipped.

NOTE 3: The S-EAS or T-EAS can further decide to terminate the ACR, and the T-EAS can discard the application context based on information received from EEL and/or other methods (e.g. monitoring the location of the UE). It is up to the implementation of the S-EAS and T-EAS whether and how to make such a decision.

NOTE 4: When in step 1 the ACR has been triggered for service continuity planning, step 6 would only be performed after the UE moves to the expected location.

Phase IV: Post-ACR clean up

8. The S-EAS sends the ACT status update message to the S-EES as specified in clause 8.8.3.x.

9. The T-EAS sends the ACT status update message to the T-EES as specified in clause 8.8.3.x. If the status indicates a successful ACT, and that the EEC Context relocation procedure was attempted but failed, then the T-EES indicates the failure to the T-EAS with the ACT status update response.

10. If the status in step 8 indicates a successful ACT, the S-EES sends the ACR information notification (ACR complete) message to the EEC to confirm that the ACR has completed as specified in clause 8.8.3.5.3. If the EEC Context relocation procedure was attempted, then the notification includes EEC context relocation status IE, indicating the result of the EEC context relocation procedure.

#### 8.8.2.5 S-EES executed ACR

Figure 8.8.2.5-1 illustrates the procedure for the S-EES to detect, decide and execute the ACR from the S-EAS to the T-EAS. This procedure may support automated ACR by S-EES when initiated by S-EAS as per clause 8.8.3.6.

Editor's note: Usage of network path information for the scenarios in clause 8.8.2.5 is FFS.

Pre-condition:

1. The AC at the UE already has a connection to the S-EAS;

2. The EEC is able to communicate with the S-EES;

3. The EEC has subscribed to receive ACR information notifications for target information notification events and ACR complete events from the S-EES, as described in clause 8.8.3.5.2; and

4. The S-EAS optionally subscribed to receive ACR management notifications for "ACR facilitation" events to the S-EES, in order to enable detection at S-EAS.



Figure 8.8.2.5-1: S-EES executed ACR procedure

1. The S-EAS may initiate Automated ACR with S-EES as specified in clause 8.8.3.6. In this step, the S-EAS and S-EES negotiate an address of the Application Context storage to S-EES. The S-EAS puts the Application Context at this address which can be further accessed by the S-EES when the ACT is required.

In this case, the S-EES executes steps 2 (i.e., S-EES detection), 4, 5, 6, 7, 8, 9, 10 and 13. Rest of steps are skipped.

Phase I: ACR Detection

2. Detection entities (S-EAS, S-EES, EEC) detects that ACR may be required as described in clause 8.8.1. The detection by the S-EES may be triggered by the User Plane path change notification received from the 3GPP Core Network due to S-EAS request for "ACR facilitation" event (see clause 8.6.3) or due to step 1.

The detection entity may detect that ACR may be required for an expected or predicted UE location in the future as described in clause 8.8.1.

Phase II: ACR Decision

3. The detection entity performs ACR launching procedure (as described in clause 8.8.3.4) with the ACR action indicating ACR determination and the corresponding ACR determination data.

4. The S-EES authorises the message if received. The S-EES decides to execute ACR based on the information received or local detection, and the information of EEC context or EAS profile, and then proceed the below steps.

Phase III: ACR Execution

5. The S-EES determines T-EES and T-EAS via the Discover T-EAS procedure in clause 8.8.3.2 of the present document. When in step 2 the ACR has been triggered for service continuity planning, then UE Location and Target DNAI values provided in the Retrieve T-EES procedure contain the expected UE Location and expected Target DNAI. The S-EES may decide not to perform ACR if T-EAS is not available.

5. If the T-EES is different than the S-EES and the EEC Context at the S-EES is not stale, the S-EES initiates EEC Context Push relocation with the T-EES as described in clause 8.9.2.3. Otherwise, if the T-EES is the same as the S-EES, EEC Context Push relocation is skipped.

7. The S-EES sends the target information notification to the EEC as described in clause 8.8.3.5.3.

8. The S-EES may apply the AF traffic influence with the N6 routing information of the T-EAS in the 3GPP Core Network (if applicable).

9. The S-EES sends the ACR Notify message (e.g. as notification for "ACR facilitation" event or due to step 1) to the S-EAS to initiate ACT between the S-EAS and the T-EAS.

10. The Application Context is transferred from S-EAS to the T-EAS at implementation specific time. In the case of automated ACR, the S-EES accesses the Application Context from the address as per step 1 and the S-EES and T-EES engage in the ACT from S-EAS to the T-EAS (obtained as per step 5) in a secure way. Further the T-EAS accesses the Application Context made available by the T-EES. If S-EAS performs the ACT directly with T-EAS, the specification of such process is out of scope of the present document.

NOTE 1: The Application Context is encrypted and protected by the application layer. The S-EES and the T-EES engage in the packet level transport of the Application Context and they have no visibility to the content of the Application Context.

When in step 2 the ACR has been triggered for service continuity planning, if the UE does not move to the predicted location, the EEC does not connect to T-EES, the AC does not connect to the T-EAS. Steps 10 and 11 are skipped.

NOTE 2: The S-EAS or T-EAS can further decide to terminate the ACR, and the T-EAS can discard the application context based on information received from EEL and/or other methods (e.g. monitoring the location of the UE). It is up to the implementation of the S-EAS and T-EAS whether and how to make such a decision.

NOTE 3: When in step 2 the ACR has been triggered for service continuity planning, steps 10 and 11 would only be performed after the UE moves to the expected location.

Phase IV: Post-ACR Clean up

11. The S-EAS sends the ACT status update message to the S-EES as specified in clause 8.8.3.x.

12. The T-EAS sends the ACT status update message to the T-EES as specified in clause 8.8.3.x. If the status indicates a successful ACT, and that the EEC Context relocation procedure was attempted but failed, then the T-EES indicates the failure to the T-EAS with the ACT status update response.

13. If the status in step 11 indicates a successful ACT, The S-EES sends the ACR information notification (ACR complete) message to the EEC to confirm that the ACR has completed as specified in clause 8.8.3.5.3. If the EEC Context relocation procedure was attempted, then the notification includes EEC context relocation status IE, indicating the result of the EEC context relocation procedure.

NOTE 4: The Application Client mechanism to support switchover of the application traffic to T-EAS is out of scope of the specification.

#### 8.8.2.6 EEC executed ACR via T-EES

Figure 8.8.2.6-1 illustrates the procedure for the EEC to execute the ACR via T-EES.

Pre-condition:

1. The EEC has the S-EAS information that serves the AC.



Figure 8.8.2.6-1: EEC executed ACR via T-EES

Phase I: ACR Detection

1. The EEC detects that ACR may be required as described in clause 8.8.1. The EEC may detect that ACR may be required for an expected or predicted UE location in the future as described in clause 8.8.1.

Phase II: ACR Decision

2. The EEC decides to proceed with required procedures for ACR.

NOTE 1: If supported, the AC can be involved in the decision. It is out of scope of the present document how the AC is involved.

Phase III: ACR Execution

3. The EEC determines the T-EES by using the provisioned information or performing service provisioning procedure per clause 8.3. When in step 1 the ACR for service continuity planning is triggered, then the Connectivity information and UE Location used in the service provisioning procedure contain the expected Connectivity information and expected UE Location. If the UE is within the service area of the T-EES, upon selecting the T-EES the UE may need to establish a new PDU connection to the target EDN. If EEC registration configuration for the T-EES indicates that EEC registration is required, the EEC performs registration with the selected T-EES as specified in clause 8.4.2.2.2. The EEC performs EAS Discovery with the T-EES per clause 8.5.2.

4. The EEC performs ACR launching procedure (as described in clause 8.8.3.4) to the T-EES with the ACR action indicating ACR initiation and the corresponding ACR initiation data (with the need to notify the EAS). If the received ACR initiation request contains an EEC context ID and a S-EES Endpoint, the T-EES performs a EEC Context Pull relocation (clause 8.9.2.2). The T-EES may apply the AF traffic influence with the N6 routing information of the T-EAS in the 3GPP Core Network (if applicable). Then the T-EES sends the ACR Notify message to the T-EAS. The EEC also subscribes to receive ACR information notifications for ACR complete events from the T-EES, as described in clause 8.8.3.5.2.

5. The T-EAS initiates ACT between the S-EAS and the T-EAS. This process is out of scope of the present specification.

When in step 1 the ACR has been triggered for service continuity planning, if the UE does not move to the predicted location the EEC does not connect to T-EES, the AC does not connect to the T-EAS. Steps 6 and 7 are skipped.

NOTE 2: The S-EAS or T-EAS can further decide to terminate the ACR, and the T-EAS can discard the application context based on information received from EEL and/or other methods (e.g. monitoring the location of the UE). It is up to the implementation of the S-EAS and T-EAS whether and how to make such a decision.

NOTE 3: When in step 1 the ACR has been triggered for service continuity planning, steps 6 and 7 would only be performed after the UE moves to the expected location.

Phase IV: Post-ACR clean up

6. The T-EAS sends the ACT status update message to the T-EES as specified in clause 8.8.3.x. If the status indicates a successful ACT, and that the EEC Context relocation procedure was attempted but failed, then the T-EES indicates the failure to the T-EAS with the ACT status update response.

7. The T-EES sends the ACR information notification (ACR complete) message to the EEC as described in clause 8.8.3.5.3. If the EEC Context relocation procedure was attempted, then the notification includes EEC context relocation status IE, indicating the result of the EEC context relocation procedure.

If the procedure fails after step 4, it will be terminated with an appropriate cause in the ACR Response message to the EEC in step 7. The EEC may then proceed attempting to obtain services from the T-EAS discovered in step 3 without service continuity support. Alternatively, the EEC may resume the present procedure starting with step 3 and selecting a different T-EES.

NOTE 4: The support of ACR between EDNs operated by different ECSPs is dependent on business agreement between the ECSPs.

Editor's note: When the procedure fails, the use of other mechanisms to alleviate this failure is FFS.

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

#### 8.8.4.4 ACR request

Table 8.8.4.4-1 describes information elements for the ACR request sent from the EEC either to the S-EES or T-EES.

Table 8.8.4.4-1: ACR request

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Requestor Identifier | M | Unique identifier of the requestor (i.e. EECID or EASID). |
| Security credentials | M | Security credentials resulting from a successful authorization for the edge computing service. |
| Source EESID (NOTE 5) | O | Identifier of the EES that provided EEC context ID. |
| Source EES Endpoint (NOTE 5) | O | The endpoint address (e.g. URI, IP address) of the EES that provided EEC context ID. |
| EEC Context ID (NOTE 5) | O | Identifier of the EEC Context |
| EAS ID | O | Identifier of the EAS |
| UE identifier (NOTE 4) | O | The identifier of the UE (i.e. GPSI). |
| ACR action (NOTE 3) | M | Indicates the ACR action (ACR initiation or ACR determination) |
| ACR initiation data (NOTE 2) | O | ACR initiation IEs to be included in an ACR request message when ACR action indicates it is ACR initiation request. |
| > T-EAS Endpoint | M | Endpoint information (e.g. URI, FQDN, IP 3-tuple) of the T-EAS. |
| > DNAI of the T-EAS | O | DNAI information associated with the T-EAS. |
| > N6 Traffic Routing requirements | O | The N6 traffic routing information and/or routing profile ID corresponding to the T-EAS DNAI. |
| > EAS notification indication | M | Indicates whether to notify the EAS about the need of ACR. |
| > S-EAS endpoint (NOTE 1) | O | Endpoint information of the S-EAS |
| ACR determination data (NOTE 2) | O | ACR determination IEs to be included in an ACR request message when ACR action indicates it is ACR determination request. |
| > S-EAS endpoint | M | Endpoint information of the S-EAS |
| NOTE 1: This IE shall be present if the EAS notification indication indicates that the EAS needs to be informed.  NOTE 2: Either ACR initiation or ACR determination shall be included corresponding to the ACR action.  NOTE 3: This IE shall indicate ACR determination if the request originates from the S‑EAS.  NOTE 4: This IE shall be present if the request originates from the EEC.  NOTE 5: This IE may be present only if the request originates from the EEC towards the T-EES. | | |

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

#### 8.8.4.10 ACR information notification

Table 8.8.4.10-1 describes the information elements for ACR information notification from the EES to the EEC.

Table 8.8.4.10-1: ACR information notification

|  |  |  |
| --- | --- | --- |
| Information element | Status | Description |
| Subscription ID | M | Subscription identifier corresponding to the subscription stored in the EES for the request |
| EASID | M | The identifier of the EAS |
| Event ID | M | Either Target information notification or ACR complete |
| Target information (NOTE 1) | O | Details of the selected T-EAS and the T-EES. |
| > T-EAS information | M | Details of the selected T-EAS as described in 'Discovered EAS' IE of Table 8.5.3.3-1. |
| > T-EES information (NOTE 4) | O | Details of the selected T-EES as described in 'EDN configuration information' IE of Table 8.3.3.3.3-1. |
| Result of ACR (NOTE 2) | O | Indicates whether the ACR is successful or failure |
| EEC Context Relocation status (NOTE 5) | O | Indicates whether the EEC context relocation was successful or not. |
| Cause information (NOTE 3) | O | Indicates the cause information for the failure |
| NOTE 1: This IE shall be included when Event ID indicates 'Target information notification' event  NOTE 2: This IE shall be included when Event ID indicates 'ACR complete' event  NOTE 3: This IE shall be included when the Result of ACR indicates failure.  NOTE 4: This IE shall be included if the selected T-EES is different from the S-EES. Otherwise, it may be skipped.  NOTE 5: This IE shall be included when Event ID indicates 'ACR complete' event and EEC context relocation was attempted. | | |

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

##### 8.8.3.5.3 Notify

Figure 8.8.3.5.3-1 illustrates the ACR information notification procedure between the EEC and the EES, which can be used by the EES to notify the EEC of the following:

- target information, i.e. the details of the selected T-EAS and, if required, the selected T-EES, during the ACR procedures;

NOTE: The T-EAS and T-EES information can be used to determine the PDU session(s) to provide connectivity to the T-EAS and the T-EES. If the ACR does not require change in EES, i.e. T-EES is same as S-EES, then the T-EES information can be skipped.

- ACR complete events.

Pre-conditions:

1. The EEC has subscribed with the EES for the ACR information as specified in clause 8.8.3.5.2.



Figure 8.8.3.5.3-1: ACR information notification

1. An event (e.g. ACR complete, or Target information notification) occurs at the EES that satisfies trigger conditions for providing ACR information to a subscribed EEC.

2. The EES sends an ACR information notification to the EEC with the ACR information determined in step 1.

NOTE y: For ACR complete, if the EEC context relocation status indicates that the EEC context relocation was not successful, then the EEC may perform the required EDGE-1 subscriptions at the T-EES.