

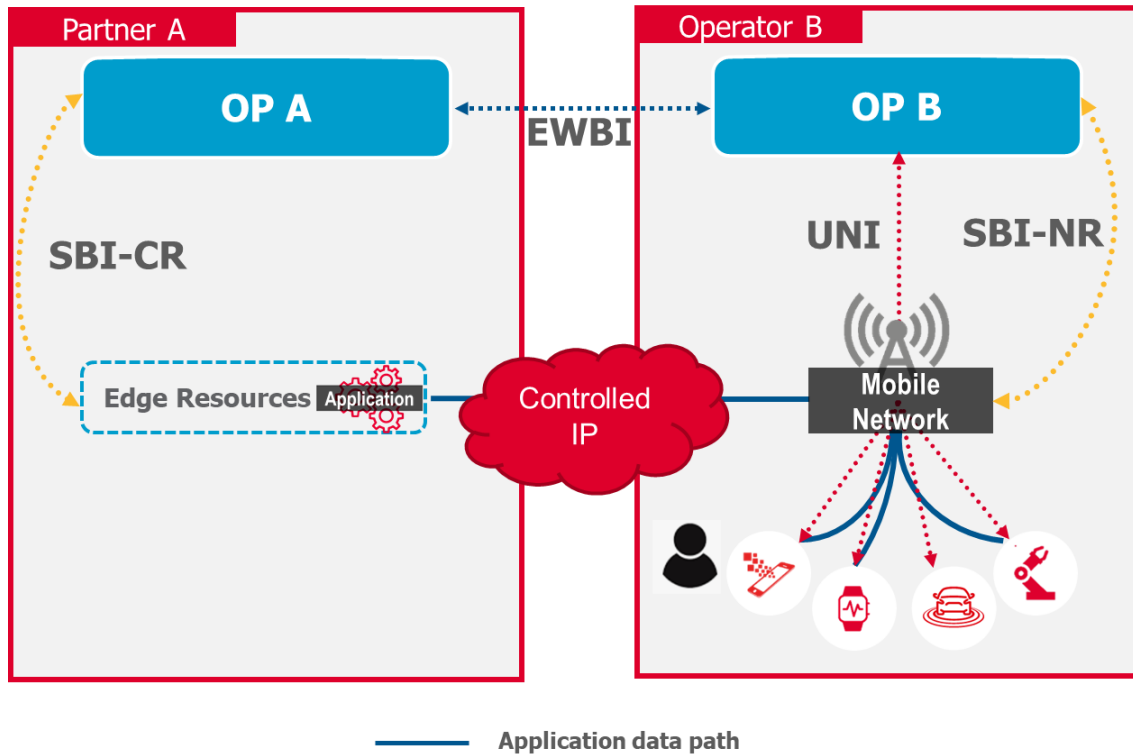
Analysis of 3GPP SA6 Scenarios and GSMA OPG Edge Node Sharing

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GSMA OPG – Edge Node Sharing

OPA and OPB have an agreement where the Edge Node of OP A is shared with OP B



1. OP B deploys application in the OP A (partner OP). OP B wants to scale its services for the region covered by OP A by using OP A's edge infrastructure.
2. User belongs to the OP B.
3. If OP B finds that the most suitable application that can serve the user is available in OP A (partner OP), then OP B requests the edge computing service from OP A (partner OP).

Edge Node: A resource in a physical data centre. The term Edge Node used in context with the Edge Node Sharing refers to the compute resources offered by the Partner OP to the Leading OP. The Leading OP may use such resources to serve its own end users in scenarios such as not having the edge clouds footprint in locations where the end users requesting access to edge services but a Partner OP is offering edge cloud resources in those locations.

GSMA Edge node sharing case – Compute Resource sharing

1. In GSMA OPG document (clause 3.3.5):

- The OP A only share the **resource** to OP B, **OP B will deploy the application** by it self,
- **It is the compute resource sharing instead of the application sharing**

3.3.5 Edge Node Sharing

Two operators may decide to share edge nodes to maximise their edge presence. Using the figure below as an example, the mobile network of both operators covers the whole country. However, Partner A deploys edge sites in the country's North Region and operator B in the South Region. In this case, **Operator B might deploy an application** on Partner A's edge node while providing connectivity to the end-user over their own radio network.

The CER enables an Application Provider whose Leading OP is OP B to perform lifecycle management for their application instances without regard to whether the resources are controlled by OP B or OP A.

The CER enables an Application Provider whose Leading OP is OP B to inventory resources available to their application instances, without regard to whether the resources are controlled by OP B or OP A, **for resources controlled by OP A that are shared with OP B** and to the Application Provider.

Figure 3: Edge Node Sharing

Figure 3 above shows an end-user who **is a subscriber of Operator B's OP** services and is currently **connected to Operator B's network** in the country's north. Edge node sharing enables **this end-user** to access the Edge Cloud service, even though Operator B does not have their own edge resources in this Region; **the Operator B Edge Cloud service is hosted on Partner A's edge node**. The connectivity between the two OPs is over the E/WBI interface.]

2. In GSMA LS paper (S6-222618):

- **The application deployed in OP A's shared node by OP B only provide service to the OP B's subscriber.**
- The application deployed in OP A by OP A will not provide service to OP B's user in edge node sharing case

- Q9: Clarification is required on the following service consumption for edge node sharing scenarios:

- **Is it possible that OP B will set certain limitation to allow only application clients serviced by its own UC(s) to consume the application deployed in its partner OP A?**

GSMA OPG:

Yes, this is possible. Only application clients serviced by UC(s) authorised by OP B can consume the application deployed on the shared edge node of Partner OP A.

- **Can the application deployed by OP B in the partner OP A be consumed by application clients serviced by UCs from OP A?**

GSMA OPG:

No, is not allowed by edge node sharing scenario.

- **Can application clients serviced by UCs of OP B consume only application deployed by OP B in OP A?**

GSMA OPG:

Yes, this is the case in an edge node sharing scenario.

- **Can application clients serviced by UCs of OP B consume application services from OP A?**

GSMA OPG:

No, not in the edge node sharing scenario. Application client serviced by UCs of OP B consumes application service from the edge resources provided by Operator A from the moment that these services have been deployed and are managed by OP B.

3GPP SA6 Scenarios for Edge Software Sharing

Scenario#1 for Solutions#43 and #44:

- a. Assumption is that OP-B's EESs are deployed everywhere in a region (possibly utilizing/leasing the IaaS offered by partners) and the EAS can be shared to both OP A and OP B.
- b. EESs from Leading OP are available in the region where the required EAS is deployed in a shared Edge Node
- c. EES of OP-B is available in the region however the required application is not available/registered with OP-B. The EES (OP-B) interacts with EES (OP-A) where the application is deployed and shared. The EAS can be shared to both OP A and OP B.
- ***The scenario assumption in this solution needs to be verified with GSMA.***

Scenario#2 for Solution#45:

- a. EES service (OP A) can be shared to the Operator B. The Operator B can rent the edge resource from the Operator A for the EAS deployment and also rent the EES service from the Partner A.
- ***The scenario assumption in this solution needs to be verified with GSMA.***

3GPP SA6 - Solution#43 and Solution#44

1. SA6 TR 23700-98 V 18.0.0 (Solution#43 and Solution #44):

- The application (EAS) in the OP A can be shared to OP B, which means the application can be shared to both OP A and OP B

7.43 Solution #43: EAS discovery for Edge node sharing

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7.43.2.1 General

As specified in clause 3.5.4.3.3 of GSMA OPG.02 [4], Edge node sharing is a scenario wherein an OP, when serving the UNI requests originating from (its own) UCs (i.e. EEC in EDGEAPP term), decides to provide the application from the Edge nodes of a partner OP.

Scenario is that the EEC in UE does not have access directly to enabler/configuration server in the OP-A (e.g. the EEC is not authorized to access ECS and EES in OP-A, or there is no connectivity between the EEC and OP-A), the OP-B has SLA with OP-A and servers in OP-B can serve the EEC directly (e.g. the EEC has connectivity with OP-B and is authorized to access ECS and EES in OP-B). For the AC in UE, it can access EAS(s) deployed in OP-A.

Assumption is that OP-B's EESs are deployed everywhere in a region (possibly utilizing/leasing the IaaS offered by partners) and the EAS can be shared to both OP A and OP B.

Editor's note: The scenario assumption in this solution needs to be verified with GSMA before considering this solution in conclusion.

For the case where there are several partner EDNs coverage for the current UE location and the contracted OP for the EEC cannot provide a desired EAS in its EDN, this solution offers an option so that the EEC contracted OP can use its partner's OP to discover the desired EAS in the partner's EDN for the UE.

7.43.2.2 Publish/unpublish and fetch application

It is assumed that EAS deployed in OP-A is shared with OP-B (i.e. ECS-ER of OP-A can share EAS information and associated EES information with ECS-ER of OP-B) in this clause.

7.44 Solution #44: EAS discovery for Edge node sharing

7.44.1 Architecture enhancements

This solution uses the architecture option specified in clause 6.12.

7.44.2 Solution description

7.44.2.1 General

This procedure works for a solution assumption, where EES of OP-B is available in the region however the required application is not available/registered with OP-B. In such case, the EES (OP-B) interacts with EES (OP-A) where the application is deployed and shared. The EES (OP-B) provides EASID and EAS Geographical Service) of the discovered EAS to EEC. The EAS can be shared to both OP A and OP B.

Editor's note: The scenario assumption in this solution needs to be verified with GSMA before considering this solution in conclusion.

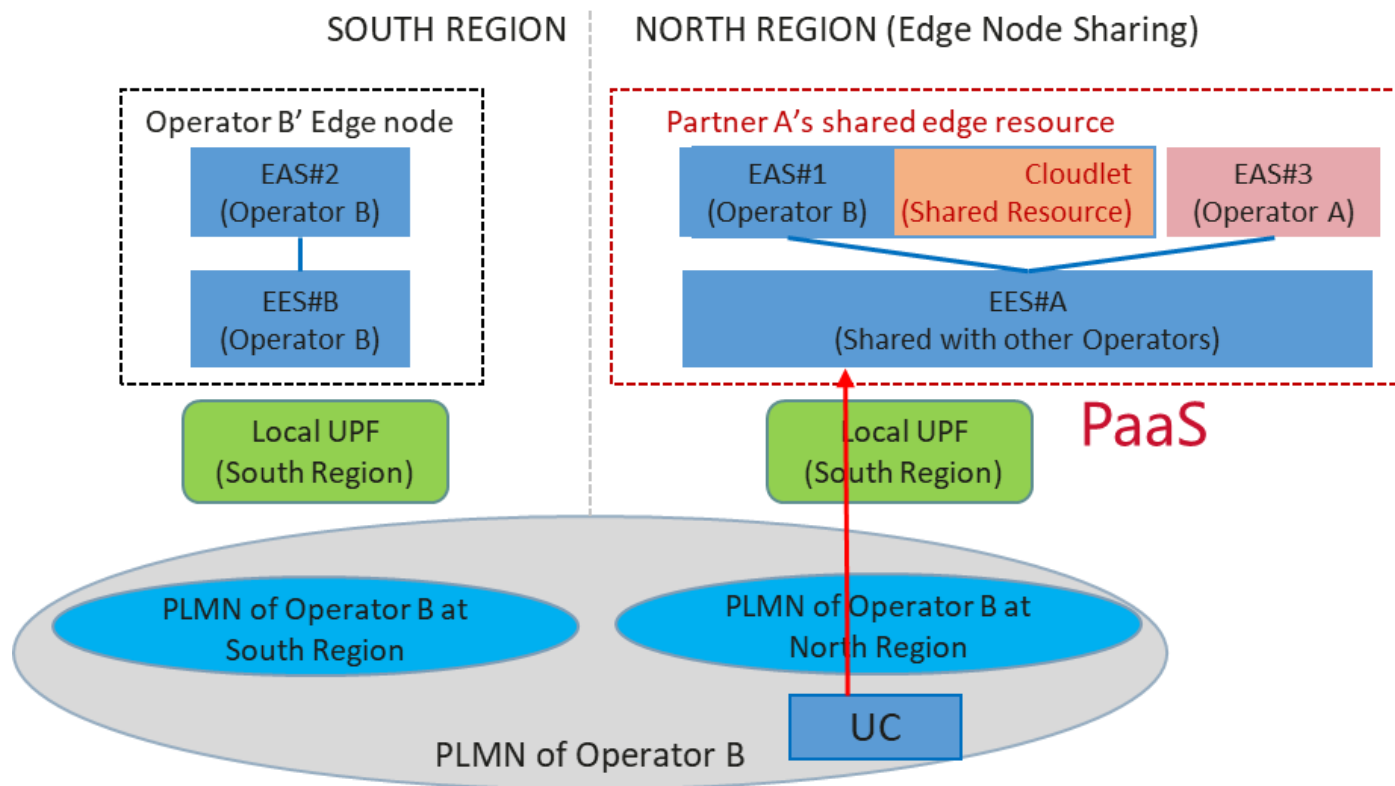
7.44.2.2 Publish/unpublish and fetch application

Since the application instance is deployed in the partner's data network, when the leading OP (OP-B) receives a request from the UC, the leading OP (OP-B) needs to contact the partner OP (OP-A) to discover the application. In EDGEAPP architecture, the EES and ECS are entities within the OP. This clause provides ways for the leading OP to discover EAS of the partner OP for subsequent communication.

3GPP SA6 - Solution#45

1. SA6 TR 23700-98 V 18.0.0 (Solution#5):

- The EES service (OP A) can be shared to the Operator B. The Operator B can rent the edge resource from the Operator A for the EAS deployment and also rent the EES service from the Partner A.



Summary

1. GSMA's edge node sharing

- The OP A only share the **compute resource** to OP B, **OP B will deploy its application on the shared edge node** via OP A exposed EWBI,
- **The application deployed in OP A's shared edge node by OP B only provide service to the OP B's subscriber.**

2. SA6's scenarios (defined in Solution#43, Solution#44 and Solution#45)

- The edge software owned by OP A (Application (EAS) or Platform (EES) can be shared with OP B, which means the **Edge Software (EAS and/or EES) can be shared with both OP A and OP B**

3. Analysis summary:

- **GSMA's edge node sharing is about compute resource sharing** between the OPs. 3GPP has confirmed this understanding to GSMA in their LS (SP-221321) presented during OPG#118.
- SA6's scenarios (defined in Solution#43, Solution#44 and Solution#45) are related to **Edge Software Sharing**.
- Edge Software Sharing (Workload/Application and Platform) is yet to be studied in GSMA OPG.

4. Way Forward for LS reply to SA6. In order to enable 3GPP to make progress, GSMA OPG can clarify to 3GPP SA6 as follows:

- **GSMA OPG's Edge Node Sharing and 3GPP SA6 scenarios are different.**
- **SA6 can progress the work on the SA6 identified scenarios.**
- **Edge Software Sharing (Platform as a Service and Application Instance Sharing) may be studied in GSMA OPG for future releases.**

Thanks