

# 5G SBP 5G and 5G Advanced Capabilities

*Ike Alisson* This section includes some of Ike Alisson's questions and remarks expressed during his presentation on 3GPP 5G and 5G Advanced releases selected Capabilities on June 7<sup>th</sup>, 2022 to the LFN 5G Super Blueprint Project meeting (Ref.: [06-07-22 - 5G SBP Off-Week Working Group Meeting](#)).

The remarks made during the presentation were expressed in form of "questions" to enable the recipients to judge the relevance to and/or importance for the 5G Super Blueprint and therein determine whether to consider to further pursue to find an answer or have a discussion to determine whether the raised questions and remark are worthwhile to be pursued.

**Question/Remark 1:** With respect to Project Magma and its support to EPC, which 5G Option definition (as defined by 3GPP and GSM attached below) the 5G Super Blueprint follows/implements so that the "Super Blueprint Project" derives its reference to be denoted as "5G"?



Figure 1: 3GPP defined options for 5G deployment

It is widely expected that Mobile Operators will initially deploy 5G using **Option 3** allowing the re-use of existing EPC Core functionality. **Option 3** has been fully specified in an early drop of 3GPP Release 15.

In case that there is any member Project that can supply NR Solution to 5G Super Blueprint Project (as specified by 3GPP and O-RAN Alliance utilizing the IAB (Integrated and Access Backhaul solution)), with reference to current Member Magma project involvement for supply of CN functionality and recent media press release on MNOs launch of voice over NR (with indications a year ago that voice over NR would have a fall back to EPC), could the 5G Super Blueprint Project consider as an option to utilize/explore within 5G Super Blueprint the Solution "Voice over NR" as an UC?

Please see below some reference information related to the remark's content above:

The IAB-node can access the network using either SA mode or EN-DC. In EN-DC, the IAB-node connects via E-UTRA to a MeNB, and the IAB-donor terminates X2-C as SgNB.

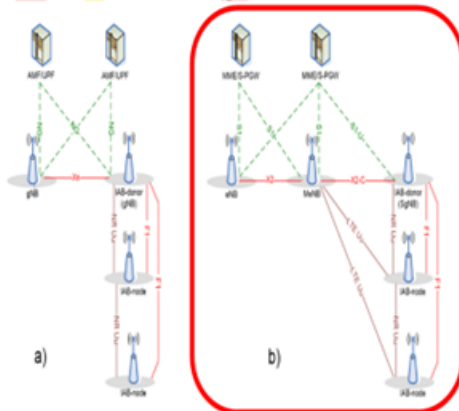


Figure 1: IAB architecture; a) IAB-node using SA mode with NGC; b) IAB-node using EN-DC

## T-Mobile Launches Voice Over 5G NR using 5G SA Core Network

Posted on June 4, 2022 by Alan Weissberger

T-Mobile has deployed commercial Voice over 5G (VoNR, or Voice Over 5G New Radio) service in limited areas of Portland, Oregon and Salt Lake City, Utah. The US carrier plans to expand VoNR to many more areas this year. Now that Standalone 5G (5G SA) is beginning to carry voice traffic with the launch of VoNR, other real 5G services, such as network slicing and security are likely to be deployed. T-Mobile customers with Samsung Galaxy S21 5G smartphones can take advantage of VoNR today in select areas.

"We don't just have the leading 5G network in the country. T-Mobile is setting the pace for providers around the globe as we push the industry forward - now starting to roll out another critical service over 5G," said Neville Ray, President of Technology at T-Mobile. "5G is already driving new levels of engagement, transforming how our customers use their smartphones and bringing unprecedented connectivity to areas that desperately need it. And it's just going to get better thanks to the incredible T-Mobile team and our partners who are tirelessly innovating and advancing the capabilities of 5G every day."

Standalone 5G removes the need for an underlying 4G LTE network and 4G core, so 5G can reach its true potential. In other words, it's "pure 5G," and T-Mobile was the first in the world to deliver it nationwide nearly two years ago.

The addition of VoNR takes T-Mobile's standalone 5G network to the next level by enabling it to carry voice calls, keeping customers seamlessly connected to 5G. In the near-term, customers connected to VoNR will notice slightly faster call set-up times, meaning less delay between the time they dial a number and when the phone starts ringing. But VoNR is not just about a better calling experience. Most importantly, VoNR brings T-Mobile one step closer to truly unleashing its standalone 5G network because it enables advanced capabilities like network slicing that rely on a continuous connection to a 5G core.

Is it worthwhile to check with LF ONAP Enterprise Task Force about AT&T's current plans, interest and/or availability of resources of VoLTE to be involved with Voice over NR?

## 2G/3G Decommission Drives Need for VoLTE Roaming

### Drive VoLTE Adoption and Innovative Solutions

#### Drive to VoLTE!!!

##### AT&T Actions:

- > Prioritize resources
- > Roam Ops. Carrier Relations
- > Prioritize 'inbound'
- > Remove Bilateral Req
- > Educate
- > Use AT&T's VoLTE roaming SME to assist partners new to VoLTE
- > Optimize test solutions –
- > Solve UE Exchange
- > Remote Testing Solutions
- > Default UE Settings



887 MNO's in the world, 736 have LTE, 238 have VoLTE, ~30 with VoLTE roaming

#### New Inbound Option

- Hosted IMS Core solution supporting VoLTE-only VPMN to inbound non-VoLTE partner roamers →
- Service support for Voice/SMS MO & MT
- Operates as VoLTE roaming towards VPMN
- Operates as HPMN 3G (or 4G-CSFB)
- Service would have little/no req on VPMN
- Solution for HPMN operators:
  - Interim to IMS/roaming deployment
    - (maximizing existing 3G)
  - and for HPMN with no intent to implement IMS
  - (operators moving directly from 3G to 5G)

**Question-Remark 2:** Is there available a **written input from** the circled in red circle in the below LFN 5G Super Blueprint infographic participating LF Mmember Projects:

1. How are the respective Projects "related"/connected" to "5G" in terms of providing information about the respective 3GPP Releases, Architecture /Applications/ Services Requirements/Security/Management etc, that they support/implement?

The **Purpose** with this "inventory requirement" and outcome, could be twofold:

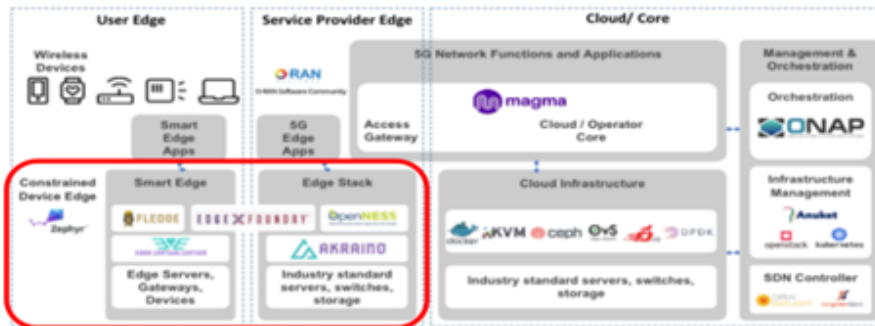
First, to verify the respective project relevance with 3GPP Specifications for 5G and therein prevent/avoid ground for undermining not only credibility of the 5G Super Blueprint as a Project pursuing 5G evolution within LFN, but also, in case that the respective Projects are not involved with 5G, to contain and prevent the risk from that "disconnection/lack of relevance" to cause any mistrust and doubt to be spread/shift/spill over to the rest of the Member Projects participating at the 5G Super Blueprint Project as shown on the infographic below.

LFNETWORKING

ABOUT - PROJECTS - 5G SUPER BLUEPRINT - RESOURCES - NEWSROOM - WIKI

### Introducing the Linux Foundation Networking 5G Super Blueprint

#### LF Open Source Component Projects for 5G



Second, when being able to identify with which 3GPP Release Specifications, related to 5G and/or 5G Advanced (TRs), the respective LF Member Project (s) is/are involved with, the LFN 5G Super Blueprint prepare a plan about assist with providing information about the relevant specifications evolution within 3GPP (as e.g. related to 3GPP "5G Advanced" Release) and in this way assist and contribute to the respective Member project Roadmap evolution related to 5G & 5G Advanced.

Example info attached below on 3GPP decision in 2019 for "full wired Ethernet replacement (with Wireless connections) in factories and latest evolution by 2021 related to that (as part of the 3GPP Specifications for Verticals and FoF (Factory of the Future)).

**Question - Remark 3 on the 5G Super Blueprint intended discussion on identifying "relevant" UCs for 5G".**

The 5G Super Blueprint Project had initiated discussion on "identifying the relevant UCs for 5G.

Question 1: Is the purpose/objective of the 5G Super Blueprint Project to identify, then outline, categorize and group the Member Projects selection of specified by 3GPP WG SA1 Service Requirements and afterwards to assist with information on the specifications from the rest of the 3GPP WGs (SA2-SA6) as well as 3GPP Specifications for TN and RAN specifications? (please see attached below info on 3GPP WGs SA1- SA6)? or



### Specifications Groups

Click on any TSG or WG - in the chart below - to go to that Group's home page to find information on its elected officers, its meeting schedule, the Work Items and Specifications for which it is responsible, etc.

#### TSG Structure

Project Co-ordination Group (PCG)		
<b>TSG RAN</b> Radio Access Network	<b>TSG SA</b> Service & System Aspects	<b>TSG CT</b> Core Network & Terminals
<b>RAN WG1</b> Radio Layer 1 (Physical Layer)	<b>SA WG1</b> Services	<b>CT WG1</b> User Equipment - Core Network protocols
<b>RAN WG2</b> Radio Layer 2 and Radio Layer 3 Radio Resource Control	<b>SA WG2</b> System Architecture and Services	<b>CT WG3</b> Interworking with External Networks & Policy and Charging Control
<b>RAN WG3</b> 4G/5G/LTE/LTE-A/LTE-Advanced architecture and related network interfaces	<b>SA WG3</b> Security and Privacy	<b>CT WG4</b> Core Network Protocols
<b>RAN WG4</b> Radio Performance and Protocol Aspects	<b>SA WG4</b> Multimedia Context, Systems and Services	<b>CT WG6</b> Smart Card Application Aspects
<b>RAN WG5</b> Mobile Terminal Performance Testing	<b>SA WG5</b> Management, Orchestration and Charging	
	<b>SA WG6</b> Application Enablement and Critical Communication Applications	
<b>RAN WG7</b> RAN test group on 3GPP R		

SA1 - Services - updated 2021-11-10 by [Mr. Xu Xia \(China Telecom/CCSA\)](#) re-elected Vice Chair by acclamation and [Mr. Yusuke NAKANO \(KDDI Corporation/ARIB\)](#) elected new Vice Chair of SA WG1.

Within the 3GPP Technical Specification Group Service and System Aspects (TSG SA), **the main objective of 3GPP TSG SA WG1 (SA1) is to consider and study New and Enhanced Services, Features, and Capabilities and Identify any corresponding Stage 1 Requirements to be met by 3GPP specifications.**

**These Service Requirements are documented in Normative Specifications under SA1 responsibility.**

In addition, SA1 considers the Requirements for Different Services and their Interworking as the System continues to evolve. Interworking aspects include both the Interworking of Services offered by 3GPP Standards and the Interworking with Networks and Standards external to 3GPP. SA WG1 also considers Service Operation, Charging and Accounting aspects. 3GPP Organizational Partners' individual members who are stakeholders in market sectors (also termed 'vertical markets') participate in the work of SA1 to investigate opportunities for their market through use of 3GPP services. SA1 identifies specific requirements on the 3GPP System to support these vertical markets' justified objectives.

**SA1 is currently responsible for Service Requirements for the 5G System, with emphasis on the following: Diverse New and Evolved 5G Services and their Enablers including support for New 5G Access related Services, Mission Critical Service aspects, Regulatory aspects, and Support for Vertical markets.**

Question 2: Is the 5G Super Blueprint intends to discuss the "preliminary/tentative" interest in potential 5G Use Cases (UCs) and once the respective UCs are identified to undertake within the 5G Super Blueprint build-up of small groups that can undertake the Functional role, similar to 3GPP WGs SA1-to-SA6 to identify e.g. Requirements, Architecture, Security, Multimedia, Management, Applications and apply the Open Source SW Dev Ops Business Model (please see below) to promote the use of Cloud-native Mechanisms? (please see further below on the difference between use of SW Telco Business Model ("aaP") and Open Source DevOps Business Model "SaaS" (SW as a Service")):

With respect to the above, it might be worthwhile to take into account the following:

Difference in Business Models between Telcos in terms of "aaP" (as a Product implementing 3GPP specifications) and Open Source SW DevOps Business Model "SaaS" (SW as a Service). Below attached an infographic on that:

## 5G Architecture for Hybrid and Multi-Cloud Environments

A Unified Approach to Developing, Deploying & Operating 5G Services - including 5G RAN, Core, OSS & BSS Applications - in Public & Private Cloud Environments is a Key Enabler for Communication Service Providers (CSPs) to successfully adopt a Hybrid & Multi-Cloud Strategy. The "main benefits" are "Faster Time to Market" (TTM) & "Lower Total Cost of Ownership" (TCO).

As Figure 2 illustrates, this approach could lead to a lot of Diversity & Heterogeneity in the Deployment Targets for Network SW Vendors. Designing & Operating an application that is capable of utilizing such a Diverse Set of HCP Managed Services also creates Several Challenges for Network SW Vendors & CSPs alike.

The Main Challenges to overcome in a Hybrid & Multi-Cloud Strategy are:

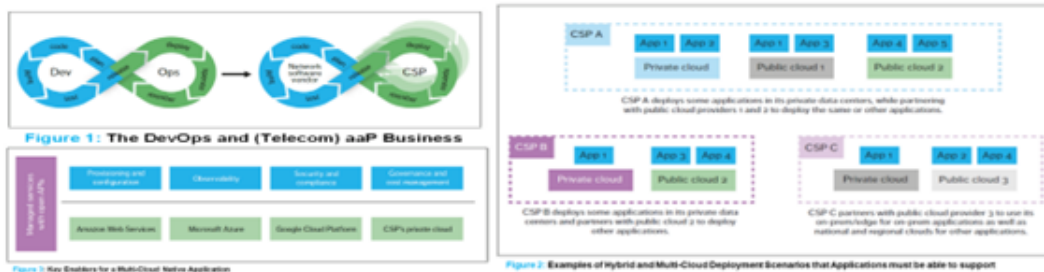
1. Maintaining Portability;
2. Controlling the Total Cost of Ownership (TCO);
3. Optimizing Productivity & Time to Market (TTM).

DevOps - a Set of Practices that brings together SW Development & IT operations with the Goal of Shortening the Development & Delivery Cycle & increasing SW Quality - is often thought of and discussed in the Context of a Single Company or Organization. The Company usually Develops the SW, Operates it & Provides it as a Service to Customers, according to the SW-as-a-Service (SaaS) Model.

Within this context, it is easier to have Full Control over the Entire Flow, including Full Knowledge of the Target Deployment Environment. In the Telecom Space, by contrast, we typically follow the "as-a-Product (aaP) Business model, in which SW is developed by Network SW Vendors such as Ericsson (Nokia, Huawei, ZTE) & provided to Communication Service Providers (CSPs) that Deploy & Operate it within their Network. This Business Model requires the consideration of additional aspects.

As shown in Figure 1, the most important contrasts between the Standard DevOps SaaS Model & the Telecom aaP Model are the Multiplicity of Deployment Environments & the fact the Network SW Vendor Development Teams cannot know upfront exactly what the Target Environment looks like.

Although a SaaS Company is likely to Deploy & Manage its SW on two (2) or more different Cloud Environments, this is inevitable within Telco, as each CSP creates &/or selects its own Cloud infrastructure.



## Diminishing importance of using Open Source SW as a mean to lower TCO (Total Cost of Ownership).

The above made remark about the use of Open Source SW use as a mean to lower TCO needs to be updated. It might be worthwhile to get aware about the change and shift in the priority related to use of Open Source SW in this context.

Please see below from Red Hat's reports from 2021 and 2022 about the outcome related to use of Open Source SW as a mean to lower TCO.

## Enterprise open source for innovation

Consider the following findings from our survey:

Two years ago, lower cost of ownership was cited as the top benefit of enterprise open source. This year it's fallen to the sixth spot, well below "access to the latest innovations" in second. This year, 82% of IT leaders also agreed with the statement that "enterprise open source is used by the most innovative companies." About the same number, 81%, said that it "provides flexibility to customize solutions to meet company needs."

We see specific examples of enterprise open source adoption in emerging technology areas. 79% of respondents expect that over the next two years, their organization will increase use of enterprise open source software for emerging technologies. In the two most prevalent emerging tech areas, edge computing/IoT and artificial intelligence/machine learning (AI/ML), use of enterprise open source is expected to significantly outpace proprietary software over the same period. In edge computing/IoT, enterprise open source is expected to increase from 55% of cases to 72% two years from now. And, for AI/ML, our survey found that proprietary software use is actually expected to decrease, while enterprise open source use shoots up from 48% to 65%.

## The benefits are broad and strategic

When we began running this survey four years ago, the top benefit of enterprise open source was clear: lower total cost of ownership (TCO). This result was likely a surprise to no one. Linux, along with enterprise open source more generally, was adopted by companies in no small part because it was a less expensive alternative to proprietary UNIX and proprietary networking-related applications. Even if this view of enterprise open source began to increasingly diverge from reality, it remained a stereotype. However, we have seen a steady shift away from enterprise open source being defined as cheaper software rather than better software. Of course, this is not to say that enterprise open source can't be less expensive to acquire and operate than proprietary software. But price is not how IT leaders generally frame their thinking about enterprise open source today.

This year's top two benefits? Better security and higher quality software. By contrast, lower TCO has declined dramatically in importance. It is now near the bottom of the benefits list in ninth place.



Question - Remark: With respect to the 3GPP EDGEAPP Architecture (evolvment) related to enabling Applications on "the Edge", aligned evolvment with ETSI MEC Architecture for supply and commissioning of E2E Applications, as foreseen by GSMA OPG (please see further information on that below), would 5G Super Blueprint undertake any activity?

Please see below some general information on the subject:





The OPG believes that, for Operators to develop a Federated Edge Computing Platform such as the OP, *Requirements must be enforceable in Contracts by a Published Set of Standards.*

To this end, the OPG proposes selecting ETSI ISG MEC and 3GPP to provide a Standard Reference for an Edge Service End to End (E2E) definition.

We note that 3GPP EDGEAPP Architecture and ETSI ISG MEC Architecture could complement each other in a way that is acceptable to OPG.

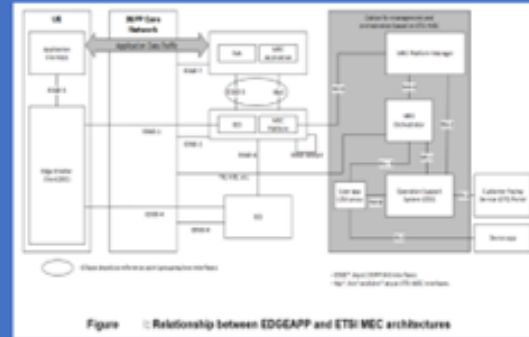


Figure 1: Relationship between EDGEAPP and ETSI MEC architectures

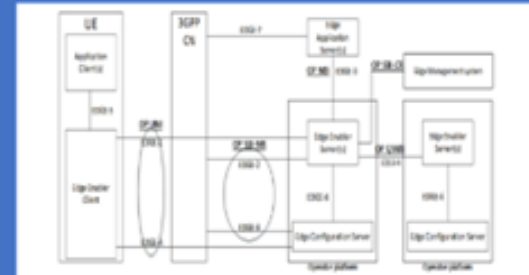


Figure 2: Relationship between EDGEAPP architecture and GSMA OPG reference architecture

## Enhanced EDGEAPP Architecture for enabling Edge Applications E2E

As illustrated in the Figs 1 & 2 below related to Edge Services in e.g. V2X and AR/VR Use Cases (as part of the ongoing discussions for enhancements in EDGEAPP Architecture foreseen in "5G Advanced" release (Ref. 3GPP, 5G Advanced, March 2022), an **Edge Service or an EAS (Edge Application Server, e.g. V2X Server)** can be provided via different **EDNs (Edge Data Networks)** deployed by different **EES (Edge Enabling Server) ECSPs (Edge Computing Service Providers)**.

Each ECSP may not have the required Infrastructure to install the EAS in every EDN due to Financial, Regulatory and Operation constraints.

A User can access the same Edge Service served by different EASs, which are registered to different EESs (Edge Enabling Servers) and deployed by different ECSPs, which have a Service Level Agreement (SLA) to share Edge Services.

These ECSPs can deploy EESs to serve different Mobile Networks (PLMNs) or different Coverages of the same Mobile Network (PLMN).

Furthermore, the Target EDN (T-EDN) and Source EDN (S-EDN) are operated by different ECSP which may not have SLA with each other, then the S-EES may not be able to communicate with a T-EES (discovered from ECS) due to lack of SLA.

Unfortunately, in Rel.17 this failure may only be detect upon EDGE-9 interaction.

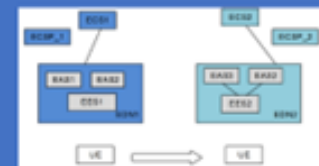


Fig. 1: EAS (Edge Application Server) deployed by different ECSPs (Edge Computing Service Providers)

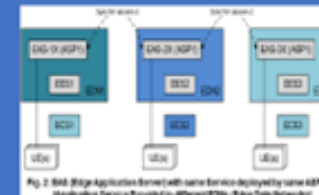


Fig. 2: EAS (Edge Application Server) with same service deployed by same ECSP (Application Service Provider) in different EDNs (Edge Data Networks)



Fig. 3: Several EAS (Edge Application Server) with same service deployed in different locations in the same EDN (Edge Data Network)

## Enablement of Service APIs exposed by EAS

EAS Service API enablement in the EDGEAPP Architecture for KI#2 specific requirements in this clause, the Solution #X:

"EAS Service API enablement using CAPIF" is further specified.

This solution is based on Architectural requirements to support EAS Service APIs in the EDGEAPP Rel. 18 (5G Advanced) Architecture.

### 1) EAS Capability Exposure

- The Application Layer Architecture shall support Exposure of EAS's Capabilities to the other EASs.

### 2) EAS Service API publication

- The Application Layer Architecture shall support EAS to publish its exposing Service API information to EES
- The application layer architecture shall support EAS to update the published EAS Service API information on the EES.

### 3) EAS Service API discovery

- The Application Layer Architecture shall provide Mechanisms for an EAS to discover Available EAS Service APIs.

### 4) Subscription service

- The Application Layer Architecture shall provide Subscription and Notification Mechanisms enabling an EAS to receive changes in dynamic information of EAS Service APIs from an EES.
- The application layer architecture shall provide subscription and notification mechanisms enabling an EAS to receive changes in availability of EAS Service APIs from an EES.

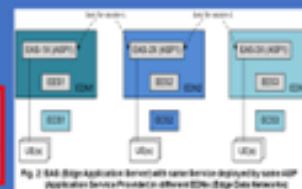


Fig. 2 EAS-3 Application Service Provider (AS-3) deployed by EAS-3 (Application Service Provider (AS-3) deployed by EAS-3)

## Deployment and Evolution options of EDGEAPP and ETSI MEC Platforms (Informative):

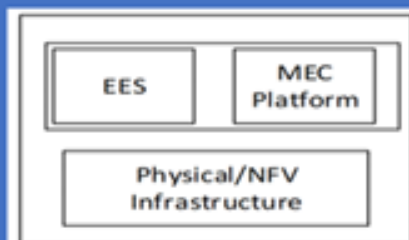


Figure: EES and MEC Platform as two different AFs on a single Physical/NFV Infrastructure

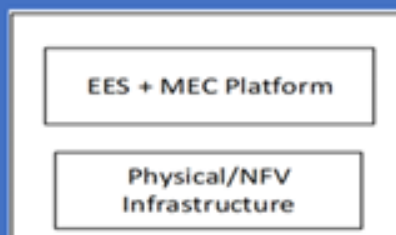


Fig.: EES and MEC Platform as a single AF on a single NFV Infrastructure

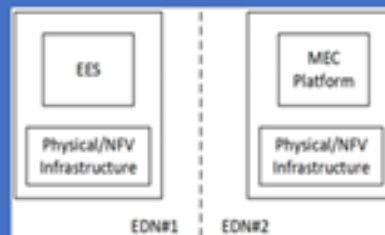


Fig.: EES and MEC Platform as two different AFs on two different EDNs

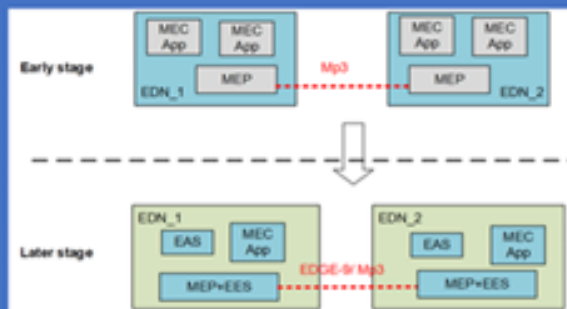


Fig.: Evolution Option #1 - An early stage deployed MEP is enhanced to support the functionality of EES in a later stage

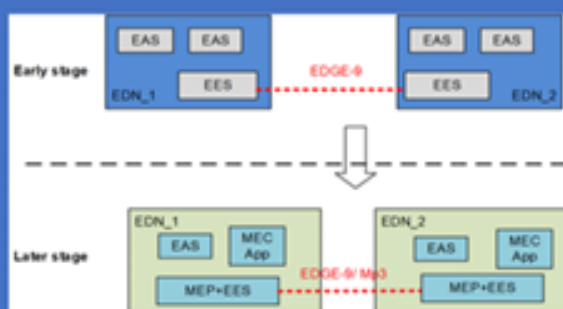


Fig.: Evolution Option #2 - Enhancement of a deployed EES to support functionality of MEP

Dependent on the Use Case (UC), the EEL (*Edge Enabling Layer*) may apply different additional criteria to determine this common EAS.

E.g., it could be desirable to determine the EAS so that the **Latency** for all the ACs in the session is approximately the same or that the **Latency** for a specific AC is minimized.

There is further utilization of Capabilities related to EEL (*Edge Enabling Layer*) and AEF (*API Exposing Function*) and 5G NDL (*Network Data Layer*) specified and stored NF's **Application Context** (ACR/ACT, *Application Context Relocation/Application Context Transfer*) for assuring Service Continuity between S-EAS and T-EAS) as well as *Data Traffic split rendering* between EASs and CAS (*Cloud Application Server*).

Table: KPI Table for Additional High Data Rate and Low Latency Service

Use Cases	Max allowed end-to-end latency	Service bit rate user-experienced data rate	Reliability	# of UEs	Influence quantity	Service Area (SRV 2)
CloudEdgeSplit Rendering (note 1)	5 ms (i.e. UL+DL between UE and the interface to data network) (note 4)	0.1 to [1] Gbit/s supporting visual content (e.g. VR based or high definition video) with 4K, 8K resolution and up to 120 frames per second content	99.99 % in uplink and 99.9 % in downlink (note 4)	-	Stationary or Pedestrian	Countrywide
Gaming or Interactive Data Exchanging (note 3)	10ms (note 4)	0.1 to [1] Gbit/s supporting visual content (e.g. VR based or high definition video) with 4K, 8K resolution and up to 120 frames per second content	99.99 % (note 4)	s [10]	Stationary or Pedestrian	20 m x 10 m in one vehicle (up to 120 km/h) and in one train (up to 500 km/h)
Consumption of VR content via tethered VR headset (note 6)	5 to 10 ms (note 5)	0.1 to [10] Gbit/s (note 5)	99.99 %	-	Stationary or Pedestrian	-

NOTE 1: Unless otherwise specified, all communication via wireless link is between UEs and network node (UE to network node and/or network node to UE) rather than direct wireless links (UE to UE).

NOTE 2: Length x width (x height).

NOTE 3: Communication includes direct wireless links (UE to UE).

NOTE 4: Latency and reliability KPIs can vary based on specific use case/architecture, e.g. for cloud/edge split rendering, and may be represented by a range of values.

NOTE 5: The decoding capability in the VR headset and the encoding/decoding complexity/time of the stream will set the required bit rate and latency over the direct wireless link between the tethered VR headset and its connected UE. bit rate from 100 Mbit/s to [10] Gbit/s and latency from 5 ms to 10 ms.

NOTE 6: The performance requirement is valid for the direct wireless link between the tethered VR headset and its connected UE.

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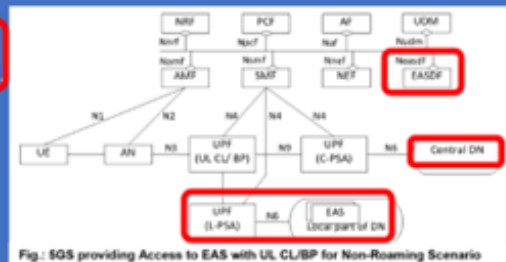
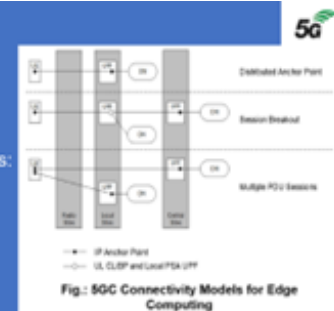
## Functional Description for Supporting Edge Computing

### EASDF - Edge Application Server Discovery Function

#### Functional Description

The Edge Application Server Discovery Function (EASDF) includes one (1) or more of the following Functionalities:

- Registering to NRF for EASDF Discovery and Selection.
- Handling the **DNS messages** according to the instruction from the SMF, including:
  - Receiving **DNS message** handling Rules and/or **BaselineDNSPattern** from the SMF.
  - Exchanging **DNS messages** from the UE.
  - **Forwarding DNS messages to C-DNS or L-DNS for DNS Query.**
  - Adding **EDNS Client Subnet (ECS) option into DNS Query for an FQDN.**
- Reporting to the SMF the information related to the received DNS messages.
- Buffering/Discarding **DNS response messages from the UE or DNS Server.**
- Terminates the **DNS security**, if used.



The EASDF has **direct User Plane Connectivity** (i.e. without any NAT) with the **PSA UPF over N6** for the transmission of **DNS signalling** exchanged with the UE. **The deployment of a NAT between EASDF and PSA UPF is not supported.**

Multiple EASDF instances may be deployed within a PLMN.

The interactions between 5GC NF(s) and the EASDF take place within a PLMN.

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## 5G ACT & ACR (Application Context Transfer & Application Context relocation)

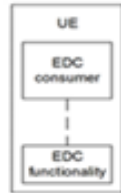


Fig. EDC Funct. in the UE

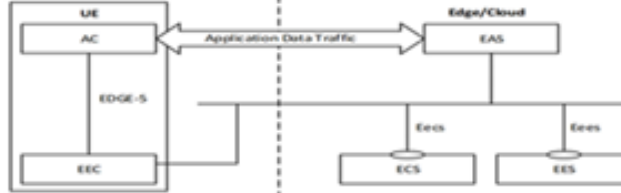


Fig. Archit. For Enabling Edge Applic. - Service-based Represent



Fig. High level overview of ACR (Application Context Relocation)

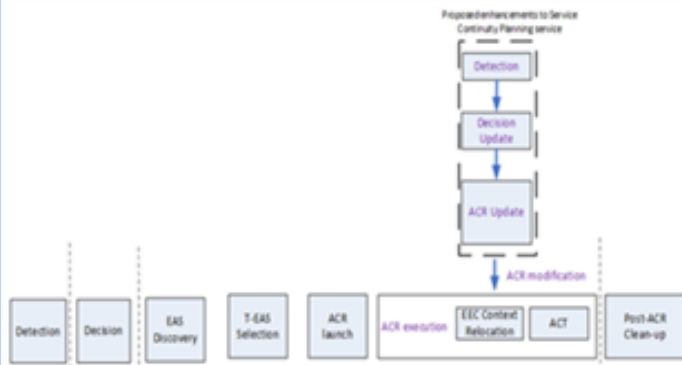


Fig. High-level of proposed ACR update in Service Continuity Planning Enhancement



Fig. ACR initiated by the EEC & AC

Table : 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.
UE identifier (NOTE 4)	O	The identifier of the UE (i.e. GPSI).
ACR type	M	Indicates whether the ACR is for normal ACR or service continuity planning.
Predicted/Expected UE location or EAS service area (NOTE 5)	O	The predicted/expected location information of the UE. The UE location is described in clause 7.3.2 or the predicted/expected EAS service area as described in clause 7.3.3.3
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 shall be present if the ACR type indicates the ACR procedure is for service continuity planning.

Table : Session with QoS create request

Information element	Status	Description
EASID	M	The identifier of the EAS.
Security credentials	M	Security credentials of the EAS.
UE IP address (NOTE 1)	O	The UE IP address.
UE ID (NOTE 1)	O	The identifier of the UE (i.e. GPSI).
UE Group ID (NOTE 1)	O	Identifies a group of UEs (i.e. internal group ID or external group ID).
IP flow description	M	The IP flow description for the application traffic.
Requested QoS reference (NOTE 2)	O	Refers to pre-defined QoS information for the data session between AC and EAS (NOTE 3).



### Enhanced EDGEAPP Architecture for enabling Edge Applications in "5G Advanced"

Table 1 Mapping of solutions to key issues

[illegible]