

SA2 R19 FS_eEDGE_5GC_Ph3 second round NWM discussion - Version 0.0.1

SA2

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Pre-SA2#163 NWM Discussion

(The contents below will be posted to NWM. Each Q needs ' Feedback Form'in NWM)

Title: NWM second round discussion to be considered for Rel-19 FS_eEDGE_5GC_Ph3 conclusion

Source: Intel (FS_eEDGE_5GC_Ph3 Rapporteur)

1. Introduction

Based on the first round NWM feedback, we need to ask further questions on the potential way forward for each key issue.

After SA2#162 meeting (April 2024), TR 23.700-49v0.3.0 includes 26 solutions as below.

Table 1: Mapping of Solutions to Key Issues

Table 1:

Solutions	Key Issues		
	1	2	3
#1: Edge computing handling by I-SMF	X		
#2: Edge computing handling by local SMF	X		
#3: Reducing impact of DNS message handling on central SMF for EAS (re)discovery based on offload to L-SMF	X		

#4: Enhanced EC Architecture with SMF selecting local SMF storing EC related information	X		
#5: Enhanced EC architecture with AMF selecting local SMF	X		
#6: Local management of EAS Deployment Information with local SMF	X		
#7: EAS deployment information report from L-UPF	X		
#8: Selecting an EAS server leveraging analytics		X	
#9: Solution of local UPF and EAS (re)selection jointly considering N6 delay and EAS load		X	
#10: L-PSA and EAS (re)selection based on N6 one-way and two-way delay measurement		X	
#11: Provision weight factor of DNAs from AF		X	
#12: NWDAF and SMF-based EAS and local UPF (re)selection		X	
#13: EAS Discovery taking account of EAS load in EASDF		X	
#14: EAS selection considering DNS historical handling records		X	

#15: The local EASDF assist for the EAS and local UPF (re)selection based on the AF provided N6 delay and EAS load information		X	
#16: Local UPF and EAS (re)selection considering access network delay and N6 delay information by 5GC or AF		X	
#17: EC Traffic Routing between local part of DN and central part of DN with IP replacement in EAS			X
#18: Supporting traffic routing between local DN and central DN within a PDU Session			X
#19: Traffic Routing between local DN and central DN over session breakout model			X
#20: EC Traffic Routing between local part of DN and central part of DN via PDU session			X
#21: Solution to traffic routing between local and central part of DN via tunnel(s)			X
#22: Establishment of connectivity between the local DN and central part of DN based on OAM			X
#23: Traffic steering between different parts of a DN			X

#24: Support traffic routing between local-DN and central-DN via the existing UP path of the PDU session and IP replacement			X
#25: EC Traffic Routing between local part of DN and central part of DN with UE IP address within IP header			X
#26: Solution on Enhancements for EAS (re)discovery and UPF (re)selection with reducing impact on central 5GC NFs	X		

2. Collecting companies view to be considered for conclusions

2.0 General

1. Companies should provide clear Yes or No to each question.
2. In order to better understand the position, companies may also provide the reasons for Yes or No and potential compromise.

2.1 KI#1: Enhancements for EAS (re)discovery and UPF (re)selection with reducing impact on central 5GC NFs

2.1.1 Companies Views on solution direction for KI#1 conclusion

Feedback Form 1: KI#1_Q1: For I-SMF based solution, should we proceed with solution #1 for normative work?

1 – China Mobile Com. Corporation

We think the conclusion should be based on principle sentence, not specific solutions. And support I-SMF based solutions for normative work.

<p>2 – Nokia UK</p> <p>Same view as CMCC</p>
<p>3 – LG Electronics France</p> <p>Yes, the I-SMF option can be supported.</p>
<p>4 – Qualcomm Germany</p> <p>Similar view as CMCC: we are OK with an I-SMF based solution, but we should focus on the principles, rather than the specific solution.</p>
<p>5 – Samsung R&D Institute UK</p> <p>Same view as CMCC. Some principles in solution #1 can be captured in the conclusion for the normative work.</p>
<p>6 – CATT</p> <p>Same view as CMCC's. Some principles in solution#1 can be used as principles for normative work, instead of using a specific solution.</p>
<p>7 – HUAWEI TECHNOLOGIES Co. Ltd.</p> <p>some further clarification on this solution is needed,</p> <ol style="list-style-type: none">1) how the DNS message handling rule is configured and updated at the EASDF?2) how the SMF determines the DNAI?

Feedback Form 2: KI#1_Q2: For I-SMF based solution, should we proceed with solution #5 for normative work?

<p>1 – China Mobile Com. Corporation</p> <p>We think the conclusion should be based on principle sentence, not specific solutions. And support I-SMF based solutions for normative work.</p>
<p>2 – Nokia UK</p> <p>Same view as CMCC</p>
<p>3 – LG Electronics France</p> <p>Yes, the I-SMF option can be supported.</p>
<p>4 – Qualcomm Germany</p> <p>No, we shouldn't consider solution 5 because that solution is based on the Local SMF.</p>

5 – Samsung R&D Institute UK

Same view as CMCC.

Principles in solution #5 can be captured in the conclusion for the normative work.

6 – CATT

Some principles in solution#5 can be used as principles for normative work, instead of using a specific solution.

7 – HUAWEI TECHNOLOGIES Co. Ltd.

for this solution how to support the I-SMF can be inserted when it is needed, e.g. during the EAS discovery?

Feedback Form 3: KI#1_Q3: For I-SMF based solution, should we proceed with solution #26 for normative work?

1 – China Mobile Com. Corporation

We think the conclusion should be based on principle sentence, not specific solutions. And support I-SMF based solutions for normative work.

2 – Nokia UK

Same view as CMCC

3 – LG Electronics France

Yes, the I-SMF option can be supported.

4 – Qualcomm Germany

Similar via as CMCC

5 – Samsung R&D Institute UK

Same view as CMCC.

Some principles in solution #26 can be captured in the conclusion for the normative work.

6 – CATT

Some principles in solution#26 can be used as principles for normative work, instead of using a specific solution.

7 – HUAWEI TECHNOLOGIES Co. Ltd.

same as Q2, how to support the I-SMF can be inserted when it is needed, e.g. during the EAS discovery?

Feedback Form 4: KI#1_Q4: For I-SMF based solution, what is the solution principle for normative work in your company view?

1 – LG Electronics France

The I-SMF delegated for the edge related information handling can be supported and can live with details to be discussed in normative.

2 – Qualcomm Germany

In general we should strive to conclude as many details as possible in the Study Item and leave no or a limited set of details for the normative phase.

This principle should be captured in the conclusion:

- SMF sends I-SMF address to PCF and, at traffic offload/EC policy update, PCF sends policy update to I-SMF (i.e., SMF forwards it transparently)
- I-SMF then should handle edge related information

3 – CATT

The following principle should be considered for conclusion:

- I-SMF offloads the EC traffic towards local DN, and handles the EAS Deployment Information and DNS message handling rule.

4 – Nokia UK

The following principles can be considered for conclusion:

- For Distributed Anchor Point and Multiple PDU Session models, the existing mechanisms shall be used.
- For Session Breakout model,
 - o I-SMF based approach shall be considered to reduce impact on central 5GC NFs.
 - o I-SMF selection shall be performed by AMF. I-SMF selection mechanism shall be enhanced to support I-SMF for local offloading management, e.g., I-SMF selection for local offloading management is based on the subscription data.
 - o EASDF configuration and DNS message handling can be performed by I-SMF.
 - o EASDF discovery and selection can be performed by I-SMF.

- I-SMF shall retrieve EDI to configure EASDF. EDI management in the I-SMF shall be supported.
- I-SMF shall receive the local offloading policy which indicates IP range(s) and/or FQDN(s) allowed to be routed to the local part of DN and shall select local UPF(s).

5 – Samsung R&D Institute UK

The following principles should be considered for conclusion:

- I-SMF selection for local offloading management is performed by AMF based on the subscription data and UE location.
- I-SMF for local offloading performs EASDF configuration.
- I-SMF for local offloading retrieves EDI directly from NEF.
- I-SMF for local offloading obtains from PCF via SMF the policy for local offloading control that contains, e.g., IP range(s) and/or FQDN(s) allowed to be offloaded to the local part of DN. I-SMF may also obtain SM policy from PCF via SMF related to the AF traffic influence request related to local offloading traffic.
- I-SMF for local offloading management selects local UPF(s).

6 – HUAWEI TECHNOLOGIES Co. Ltd.

In general, on the I-SMF and L-SMF based two approaches, we still think that L-SMF based approaches should also be considered. We proposed next F2F meeting to discuss this first.

Then for the offloading SMF based approaches, some principle as below can be considered:

- Two insertion model, i.e. inserted before or during the EAS discovery, should all be considered.
- Traffic offloading policy is received from PCF or local configured, and handled at the offloading SMF.
- During the DNS message handling, the ECS option insertion and the DNAI/L-PSA determination is executed at the Offloading SMF.
- Per the result of the EAS discovery, Offloading SMF may select and configure the local PSA-UPF.

2.2 KI#2: Enhancement of EAS and local UPF (re)selection

2.2.1 Companies Views on open aspects for KI#2 conclusion – N6 delay

Feedback Form 5: KI#2_Q1: Based on first round NWM feedback, if we proceed with SMF collecting N6 delay per pair of L-PSA UPF and EAS, what is the solution principle for normative work in your company view?

1 – HuaWei Technologies Co.

SMF may trigger L-PSA UPF for the N6 delay measurement based on the AF request, which includes the measurement method. SMF may indicate the measurement methods to the UPF.

2 – Nokia UK

This question requires clarification on where SMF collects N6 delay, is it from AF or L-PSA UPF? Our view is that 5GS does not need N6 delay. It can assist AF to perform N6 delay measurements. Also, as it is noted by some companies in the first round, N6 delay measurement can be per L-PSA UPF and ingress point of the data center corresponding to DNAI. This should also be considered as part of the conclusion principles for the normative work.

3 – LG Electronics France

The N6 delay information either as per pair of L-PSA UPF and EAS, or per DNAI can be considered for local PSA (re)selection and for candidate DNAI selection.

4 – Samsung R&D Institute UK

SMF may trigger N6 delay measurement toward PSA UPF based on the AF request, which is provided via PCF.

N6 delay measurement may be performed either per pair of (candidate) PSA and EAS, or per (candidate) DNAI for a given EAS.

The measured N6 delay may be used by SMF to perform DNAI and UPF (re) selection.

5 – vivo Mobile Communication Co.

SMF triggers the N6 delay measurement towards the EAS, UPF/PSA.

N6 delay measurement can be used for EAS/DNAI/PSA determination.

6 – CATT

The following principles should be considered for conclusion:

- SMF selects EAS and local PSA UPF considering N6 delay (if available) and EAS load (if available);
- SMF can collect N6 delay measurements from local PSA UPF. Alternatively, SMF may collect N6 delay measurements from AF, which is provided via EAS deployment Information.
- AF may provide the N6 delay requirement or end-to-end delay requirement or Indication for N6 delay based EAS discovery to indicate 5GC to select EAS and L-UPF based on (N6 or end-to-end) delay.
- NWDAF may be involved to assist SMF to determine the N6 delay.

7 – China Telecom Corporation Ltd.

SMF collects the N6 delay measurement and do the selection

2.2.2 Companies Views on open aspects for KI#2 conclusion – EAS load

NOTE for KI#2_Q2: If your company does not want to see a compromised way forward on this aspect, please say NO explicitly.

Feedback Form 6: KI#2_Q2: What is the potential compromised way forward for EAS load aspect in your company view?

1 – HuaWei Technologies Co.

A way forward could be "AF provides the processing delay (which is impacted by EAS load) to the 5GC". N6 delay (based on e.g. ICMP) is only for transport layer. The processing delay can provide the measurement result for upper/application layer. It is beneficial for SMF to do the UPF selection and reselection based on both N6 delay and processing delay.

2 – LG Electronics France

The EAS load information available in the AF can be aware by the SMF/EASDF for EAS and L-PSA UPF (re)selection.

3 – Qualcomm Germany

NO to EAS load: As already expressed in round 1, we are negative about moving description and usage of EAS load information to the normative phase.

4 – vivo Mobile Communication Co.

The EAS load information is available for AF to provision to 5GC.

5 – CATT

The EAS load is related to the EAS processing delay, which should be a component of E2E delay. So we support considering EAS load for EAS and L-UPF (re)selection.

6 – Samsung R&D Institute UK

For EAS load balancing, provisioning EAS load information into 5GC is not essential because fine-level of load balancing is too much, rather imposing overhead to 5GC in maintaining app-level dynamic information. More simplified/light-weight mechanism would be acceptable as a way forward.

7 – Nokia UK

The question is not clear. EAS load aspect in where, 5GC or AF? For EAS load in 5GC, the answer is NO. For EAS load in AF to enhance EAS selection, the answer is YES, and this does not require any normative work.

8 – China Telecom Corporation Ltd.

AF provides the EAS load to 5GC, if available

2.2.3 Companies Views on open aspects for KI#2 conclusion – NWDAF assistance based solutions

NOTE for KI2_Q3: If your company does not want to see a compromised way forward on this aspect, please say NO explicitly.

Feedback Form 7: KI#2_Q3: What is the potential compromised way forward for NWDAF assistance based solution in your company view?

1 – China Mobile Com. Corporation

Seems no need for NWDAF. This UPF/EAS selection no need to involve information analytics.

2 – ZTE Corporation

no need for NWDAF for this key issue

3 – LG Electronics France

The involvement of the NWDAF with new functionality is unlikely needed.

4 – Qualcomm Germany

NO to NWDAF: as already expressed in round 1, we are negative about moving to normative phase an NWDAF based mechanism

5 – vivo Mobile Communication Co.

Can accept this.

6 – CATT

We support using NWDAF assistance to determine the N6 delay and EAS load.

7 – Samsung R&D Institute UK

Samsung supports to capture in the conclusion utilizing NWDAF-provided analytics (the existing analytics or new one) to utilize estimated N6 delay for DNAI/UPF (re)selection.

If introducing a new analytics is not acceptable, then Samsung would like to propose the use of the existing one (e.g., DN performance analytics) for N6 delay as a way forward.

8 – Nokia UK

No need for NWDAF assistance to determine the N6 delay and/or EAS load.

9 – Motorola Mobile Com Technology

From our point of view companies opposing the use of the NWDAF should provide a technical comment on why using analytics via the NWDAF do not solve this key issue. Up to now only preferences have been listed but no technical comments.

Lenovo supports the use the NWDAF and can use existing analytics (without any enhancements to the analytics) to identify an EAS with lowest delay.

2.3 KI#3: EC Traffic Routing between local part of DN and central part of DN

2.3.1 Companies Views on open aspects for KI#3 conclusion

NOTE for KI#3_Q1 and Q2: A company can select one or two solution(s) for Q1 and also vote a Yes for Q2 as a compromised way forward.

Feedback Form 8: KI#3_Q1: For CAT-A solution, which solution (s) (i.e. Sol#17, 18, 19, 20, 23) do you support or prefer as potential way forward?

1 – Qualcomm Germany

We do not see the need to standardize multiple solutions for CAT-A. So, we do not have a clear preference, but only one should be standardized.

2 – HuaWei Technologies Co.

We see different working assumptions are taken for CAT-A solution. It can be further categorized into three type of options for the traffic between L-DN and C-DN:

- Option1(solution#18/23): for the traffic generated by the EAS/AS, a unique port number is used to link the traffic with the UE PDU session. (Solution 23 we assume similar mechanism is used for linkage).
- Option2(solution#17/20): assumption is that for the DL traffic from AS, it is assumed the traffic always need be routed via the EAS first regardless whether it is needed. Also for solution 20, it is assumed that ULCL do the IP address replacement that is different comparing to other solution.
- Option3(solution#19): using a specific EAS IP (different from the EAS IP address used to communicate with UE) as source IP corresponding to the traffic before handling at L-DN.

The final solution to be chosen depending on how we consider those working assumption, e.g. only working assumption is possible or several working assumptions are all possible. From our side, we prefer option 1

as it can cover more scenarios.

3 – CATT

We prefer using sol #20 as a potential way forward based on the following reasons:

- Sol#20 can be applicable for both Session Breakout Connection Model and Distributed Anchor Point Model.
- It supports UE generates traffic using EAS IP address or AS IP address as destination address, which can cover more scenarios.
- No matter the IP replacement is performed by UL CL/BP UPF or PSA UPF, there is no impact on this solution.

4 – Samsung R&D Institute UK

At least, the scenario for (packet from EAS to AS: src address = EAS, dst address = AS / packet from AS to EAS: src address: AS, dst address = EAS) should be supported, because it has less impact on the EAS/AS internal logic on setting their own packet's source/destination address. In other words, it is desirable to provide EAS/AS with a convenient way that does not require a special treatment at EAS/AS (e.g., no need for EAS/AS to replace the actual source address or actual destination address with UE address for communicating each other).

5 – ZTE Corporation

prefer one solution that is sol#17.

6 – Intel Corporation (UK) Ltd

Prefer Sol#17, but can also accept Sol#24

7 – Nokia UK

No, we don't support any of these solutions (CAT-A solutions) based on the concerns raised in the first round of questions/answers.

8 – China Telecom Corporation Ltd.

prefer solution#19, can live with solution #18

Feedback Form 9: KI#3_Q2: For CAT-A solution, should we proceed with Solution #24 for normative work in case you can live with all three options listed in this solution?

1 – Qualcomm Germany

Because of our answer to KI#3_Q1, we are not OK with standardizing solution 24 because it effectively includes multiple solutions (17, 18 and 19)

2 – HuaWei Technologies Co.

Solution 24 include two parts:

- 1) One genral part, i.e. how the message is routed from UE to EAS. For this part, it is unified to all three options.
- 2) How to route the message from local EAS to AS, three options are listed. Differen option depends on the consideration of the working assumption. If group agree that working assumption related with three option are all possible, then we are also ok to pursue with these three options

We suggest to agree the general part and for the 2nd part we can conclude per the discussion.

3 – CATT

We can live with option 2 of sol#24 for normative work.

4 – Samsung R&D Institute UK

Not fine with proceeding with sol#24 as it is. But, some parts can be considered for conclusion. E.g., Generate traffic routing rule and UP configuration based on AF traffic influence, AF to provide QoS requirement.

5 – Intel Corporation (UK) Ltd

Can accept Sol#24 as way forward

6 – Nokia UK

No

7 – China Telecom Corporation Ltd.

live with option1 or option3 in solution#24

Feedback Form 10: KI#3_Q3: Any suggestion on how to conclude KI#3?

1 – HuaWei Technologies Co.

As discussed in Q2 question, we think that some genral part independent of the different option can be discussed and agreed first. Then we can check how to conclude on the different options.

For the general part at least we see following part can be concluded:

1. Information (at least) provided by AF to require traffic routing: Indication for traffic routing, QoS requirement, traffic filter of the traffic between EAS and AS.
2. For the traffic from UE to EAS, the destination IP address of the traffic sent from UE is EAS IP address.
3. If IP replacement is needed, L-PSA UPF performs IP replacement.

2 – CATT

To list, discuss and agree principles that applied to KI#3.

3 – Samsung R&D Institute UK

As commented in KI#3_Q1, at least, the scenario having less impact on EAS/AS (packet from EAS to AS: src address = EAS, dst address = AS / packet from AS to EAS: src address: AS, dst address = EAS) should be supported. The following principles can be considered for conclusion.

- Support AF to provide information for traffic steering between EAS and AS via UPF. Such information includes local consecutive steering indication, target traffic information (e.g., traffic filter for traffic between EAS and AS), QoS requirement such as latency requirement between EAS and AS.
- Support AF-provided info for the traffic steering to be provided to SMF via PCF
- Support SMF be able to check if the EAS IP address notified from EASDF is matched with the traffic filter for the traffic steering and to configure UP path accordingly.

4 – Nokia UK

As noted in the first round of questions/answers, CAT-A solutions cannot address the requirement/goal of KI#3 which focusses on enabling connectivity between local and central parts of a DN where this connectivity is used to carry application traffic. CAT-A solutions cannot work based on the detailed answer in the first round of questions. The conclusion of KI#3 should be:

- there is one traffic flow, e.g. a TCP or QUIC connection, from UE to L-EAS and another one, e.g. another TCP or QUIC connection, from L-EAS to C-AS.
- UE IP address shall not be used in traffic flow 2 that is from L-EAS to C-AS or C-AS to L-EAS.
- There should be two separate end to end security between UE to L-EAS and L-EAS to C-AS.

5 – China Telecom Corporation Ltd.

common part can be listed as principles