SA2 Rel-19 23Q3 moderated discussion - Edge Computing Enhancement - Version 0.0.3

SA2

https://nwm-trial.etsi.org/#/documents/8571

1 Introduction

The following information has been included to provide background information available as input to SA#100 workshop. They have not been verified for accuracy, agreement or endorsement by the moderator, but rather presented as is to facilitate understanding and discussion.

Certain aspects described in some of the input documents are more solutions than requirements, as such those assumptions/proposals have not been included in the WTs.

2 Scoping

*SWS-230036: Nokia

1. Support local traffic offload in EPC when a combo SMF+PGW-c and UPF+PGW-u are used to support the PDN connection (UE mobility between 5GS and EPS) (while minimizing MME/SGW impacts).

2. Support HPLMN providing a private DNS server IP address for FQDN not eligible to HR SBO (left over from R19).

3. Leverage HR SBO concepts to ensure local control (EDI, traffic influence) of local traffic offload (e.g. when local control and local traffic offload relates to corporate traffic).

*SWS-230014: Intel

Further 5G system enhancement for support of Edge Computing.

Key Work Tasks includes defining –

1. Further support for the case where there is no connectivity between the local DataNetwork and the central Data Network

2. Support for additional EAS (re)discovery criteria (e.g. based on EAS load, EAScomputing capacity, etc.)

3. Support of Edge Computing in the ETSUN scenario (i.e. in presence of IntermediateSMFs)

4. Localized control of Edge access (e.g. EAS (re)discovery/(re)selection, local trafficrouting influence, local exposure, etc.) with less impact to existing 5GC network elements (i.e. AMF, SMF).

*SWS-230045: Huawei, Hisilicon

Key objectives:

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1. To accelerating the EC deployment in large area, support to management the edge network information locally
2. Enhancement of EAS discovery
3. Consecutive traffic steering
4. Enhancements of local traffic routing in non-roaming scenario
5. Enhancements of local traffic routing in roaming scenario

*SWS-230034: ZTE

Key Work Tasks includes defining –

1. New information from the AF to assist the SMF to select a proper DNAI.

2. Mechanism to establish the data path for Edge Computing without AF involvement.

3. Mechanism to reduce the impact on the operator network when the vertical deploys Edge Computing.

*SWS-230025: MediaTek

Enhance 5GS to allow decoupled evolution of MEC deployments.

Key Work Tasks includes defining –

1. Whether (and how) to support localized MEC Management

2. Whether (and how) to enable localized collaboration of edge networks/ MEC services

*SWS-230041: NEC

In case where EASs for the same service are deployed in different local DNs, multiple candidates of EAS or DNAI may be targeted. It is considered that the targets would be selected by considering such as geolocation, geoproximity, latency, bandwidth etc. and distributed to different candidates.

•Investigate the weight factor of the DNAI/EAS provided by AF

*SWS-230033: China Unicom

Supporting enriched edge computing scenarios, such as routing service traffic to MEC located in HPLMN in roaming cases.

*SWS-230015: Futurewei

Support enhanced traffic steering, edge discovery based on server affinity, improved network management and EC service management

*SWS-230035: Samsung

Session management for edge computing can become more efficient to address the following issues: (i) When deploying/configuring edge computing networks, this may impose huge burdens to the centrally deployed NF

such as SMF, (ii) the local traffic routing can be more sophisticated to prevent non-edge traffic from going through the local network. Key Work Tasks includes the following:

1. Reduce the impact on the central NF in operator network (e.g., impact on SMF):localized control of edge computing (EAS discovery/local routing influence, local exposure)

2. Enhance the local traffic routing for edge computing: (i) preventing all the traffic (including non-edge traffic) from travelling the edge network, and (ii)supporting to access multiple edge networks within a single PDU Session

*SWS-230042: CATT

Key objectives:

1. Further support for the case where there is no connectivity between the local Data Network and the central Data Network
2. 2. Support for additional EAS (re)discovery criteria (e.g. based on EAS load, EAS computing capacity, etc.)
3. 3. Support of Edge Computing in the ETSUN scenario (i.e. in presence of Intermediate SMFs)
4. 4. Localized control of Edge access (e.g. EAS (re)discovery/(re)selection, local traffic routing influence, local exposure, etc.) with less impact to existing 5GC network elements (i.e. AMF, SMF).

*SWS-230066: InterDigital

Key objectives:

Support for collaborative use cases, including ACR support for groups.

Edge application enablers for SA1 studied verticals.

Exposure of Edge Services to non-3GPP devices.UE Accessing Edge Services when non-integrated Wi-Fi becomes available.

2.1 Work Tasks based on input to and outcome of the Workshop

The initial set of Work Tasks for discussion, based on the input to the workshop and SP-230759 are as follows:

WT#1: Support of more efficient Edge Hosting Environment information management and related EAS Discovery

- WT#1.1: Manage the edge network and application information locally and more efficiently with less impact to 5GC central NFs (i.e. AMF, SMF), which help to address more flexible EAS (re)discovery/(re)selection, local UPF (re)selection.

- WT#1.2: Supporting under the control of the SMF only the edge related traffic traversing Edge Hosting Environment.

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- WT#1.3: Local UPF and EAS selection taking into account following information: EAS load, EAS Computing resource, Affinity between different EASs, N6 Delay between the local PSA and EAS.

WT#2: Support traffic subject to processing in a remote Edge Hosting Environment located in the home network always traversing the dedicated Edge Hosting Environment in both HR roaming or LBO roaming scenarios.

WT#3: Further support for end-user traffic sent to Anchor PSA after being processed by Edge Hosting Environment and the corresponding downlink traffic :

- WT#3.1: Enhance the case where local DNS server has no connectivity with the central DNS server (i.e. Option C and D defined in TS 23.548)

- WT#3.2: Support the User Plane routing of Application traffic between the local DN and a cloud server located in the central DN

WT#4: Support local traffic offload in EPC when a combo SMF+PGW-C and UPF+PGW-U are used to support the PDN connection while minimizing the impacts to MME and SGW.

Feedback Form 1: Which of the above Work Tasks should be in scope of Rel-19?

1 – DOCOMO Communications Lab.

WT#1, WT#2, and WT#3 are good candidates for Rel-19 studies. Especially, further discussion would be useful to complete the roaming aspects for edge computing (WT#2).

2 – T-Mobile USA

Given the time constraints of Rel-19 and slow rate of commercial deployment of 3GPP Edge Compute, we should defer the advanced features of WT#2 and WT#3 to future releases.

3 – QUALCOMM Europe Inc. - Italy

None of the WTs proposed should be in scope of Rel-19. More in details:

With respect to WT#1, there seems to be missing justification for such architectural requirements leading to enhancements. There does not seem to be supporting studies with respect to the inefficiencies claimed in the WT motivations.

- With respect to WT#1.1, there is an overlap with EDGEAPP since the Edge Enabler Server (EES) is meant to store edge application information locally making EAS (re)discovery/(re)selection more efficient. The EES also works with the CN to influence user plane path. Because of that, WT#1.1 does not seem justified.
- WT#1.2 is unclear, since already now the SMF can control only the Edge Related traffic, e.g., by using an Edge specific PDU Session. Therefore, it is unclear what needs to be added.

- WT#1.3: It is unclear, if such parameters or pieces of information are to be taken into account for EAS selection, how they can be generated in a consistent way among EASs of different vendors. If these values are not consistent among different nodes the EAS selection could lead to suboptimal results (e.g., selecting always the same EAS even if it is not the least loaded).

In addition, EDGEAPP already enables to take into account EAS load, EAS computing resources and affinity between EASs for EAS (re)selection. In that sense, enhancements to the EAS (re)discovery logic to further refine the criteria and use more inputs /parameters should be done in or considered by SA6.

The current description of WT#2 implies (or, at least, can be understood to imply) that the EHE in the HPLMN needs to be reached from a UE while roaming. If that assumption is correct, it is questionable why there should be Edge Computing traffic subject to processing in a remote EHE in the HPLMN. Edge computing support was introduced also to minimize the communication latency between client and server. Therefore it makes little sense to have a EHE in the HPLMN when the UE is roaming (that is why, among other things, in Rel-18 the HR-SBO PDU Session concept was introduced).

We have the following concerns with WT#3. For WT#3.1, we wonder if there are concrete scenarios/deployments with lack of connectivity between local DNS and central DNS. Such scenarios were left out of Rel-18 and our understanding was that it was due to a lack of relevance. In addition, the local DNS server can be configured to forward unresolvable DNS queries to another, publicly reachable DNS server and this should address the scenario of this WT. Finally, there should be some agreement between local and central networks.

With respect to WT#3.2, the UP data routing between local DN and central DN happens beyond N6, therefore it should not be under 3GPP scope. In addition, it is unclear why such aspect should be specific of Edge Computing.

The description of WT#4 is at a too high level and the complete list of needs to be done is not very clear what needs to. Nevertheless, the task seems quite large and would require a high number of TUs (to address, e.g., EAS (re)discovery, EAS (re)selection, etc. applied to EPC) and, consequently, a separate study item. Notice however that a study addressing similar issues was proposed in Rel-16 (see FS_LLC_Mob, TR 23.739), but it was eventually deprioritized and not pursued.

In addition, the impact on UE is a critical aspect for us and we cannot accept Rel-19 UE impacts for this kind of enhancements, since, it case, it would be unclear how this would work with pre-Rel-19 UEs. Finally, and most importantly, it is unclear why the requirements for supporting Edge Computing traffic offload to EPC are proposed only now. Such feature, if important, should have been discussed and introduced in earlier releases of Edge Computing enhancements and Rel-19 effectively seems a bit too late.

4 – Ericsson LM

We don't see a need for **WT#1.1, WT#1.2, WT#3** nor **WT#4**.

WT#1.3 and **WT#2** are too broad and open ended and should be more focused.

We could see a need for:

- A more focused version of **WT#1.3** focusing on the N6 delay
- **WT-interdigital-2**
- **WT-Ericsson-1** or a version of **WT#2** with the same scope

These focused items could be pursued as TEI-19 items or have very small study.

5 – HUAWEI TECHNOLOGIES Co. Ltd.

We also think at least WT#1, WT#2, WT#3 need be included.

Regarding the comment from Qualcomm, it seems some misunderstanding of the related WT.

For WT#1.1, to insert the UL-CL/L-PSA into the PDU session, the SMF need maintain some information, e.g. the mapping information between the UPF and DNAI/IP(to populate ECS option or insert UL-CL/L-PSA), etc. And those information are not stored at the EES. Hence the WT1.1 is related to how to efficient managed these information. So it is different comparing to the information managed by the EES.

For the WT#1.2, what you proposed need be supported by a dedicated PDU session. However the proposed work is to study the case is that the same PDU session PDU session include different type of traffic, i.e. only some traffic to the EC.

For the WT#1.3, for one APPLICATION, no matter EAS in located in which place, it can be harmonizing in the same weight metrics report towards the 5GC. This is independent from whatever an implementation decides. So we do not see issue here.

For the WT#2, it is related to the case where some dedicated traffic to enterprise within the same PDU session need be routed back to the enterprise, which is located at the HPLMN. The HR-SBO is to offload traffic at the VPLMN. So there are different scenario.

For the WT#3, as mentioned by other, this is the agreed WT before. The scenario is that the traffic can be handled at the edge first, then it is sent back to the 5GC. The advantage is to reuse the network capability of the 5GC to guarantee the QoS handling, etc. This can also solve the case if there are no connection between the local DN and central DN.

Per above consideration, we think it is suitable to at least include WT#1, WT#2, WT#3.

6 – MediaTek Inc.

In our view, there are some merits for a small study item based on WT#1 (esp. WT#1.1 and WT#1.2). WT#1.3 requires some rewording as suggested in feedback form 3.

7 – Nokia France

WT#1.2: this is not needed as already supported

8 – Nokia France

WT#2 is not needed: this seems to create yet another kind of roaming deployment beyond LBO, HR and HR SBO and will create un necessary complexity. Furthermore it makes little sense to have a EHE in the HPLMN when the UE is roaming (that is why, among other things, in Rel-18 the HR-SBO PDU Session concept was introduced)

9 – Nokia France

WT#3.1: this scenario was left out of Rel-18 not due to a lack of relevance but due to too much amount of work in R18

10 – Nokia France

WT#1.3: remove "Affinity between different EASs" which would make things too complex: considering "EAS Computing resource" will already lead to LOTS of different solutions and debates and controversy

11 – China Unicom

WT#1 and WT#2 need to be included in Rel-19.

Specifically for WT#2: It needs to be studied for the scenarios which the EHE deployed in HPLMN is the only EHE environment for specific services (e.g. dedicated services of university, research institute, regional government, etc). It aims to provide the access to EHE in HPLMN when the user is under the roaming scenarios, and also ensure the users can use common services at the same time by the same PDU session.

12 – CICT

[From CATT]

WT-1.1, WT-1.3, WT-3.1, WT-3.2, WT-CATT-1 are essential enhancements/can see market interest, so they should be in the scope of Rel-19.

If time permits, it is ok to study WT-1.2 and WT-2, but the rationality of scenarios should be discussed firstly.

13 – vivo Mobile Communication Co.

From vivo

At least WT 1 should be in R19 to be studied.

But for WT 1.3, it needs more discussion of how to define the computing in 3GPP scope, for example the definition and the granularity.

For other WTs, it needs more clarification or description for the cases and requirements.

For WT2, that needs a more clear scenario to clarify why such traffic should be transferred back to the EHE in HPLMN, becuase it seems not edge computing, because we didn't use the computing resource near the UE.

For WT3.2, also needs a more clear description. For the application aspect, that it is reasonable for the 3rd party to know how to route the traffic between local and central AS. So, why the local and central didn't have the connectivity is unclear. Also, if the 3rd party has multiple AS in local and central, the routing information will be pre-configured to communicate each other, and it doesn't seem to have the impact to current network.

For WT4, it seens to impact the 4G system that to have the traffic offload in EPC. But it seems to late to introduce such mechanism, because the 4G is stable. More information should be included to describe the nessasity.

14 – HUAWEI TECHNOLOGIES Co. Ltd.

WT#1.2 is not supported as now all traffic including non EC traffic are routed to the EC network.

WT#3.2 is for the case that EAS do some pre-processing. That is the agreed usecase in Rel-17.

15 – China Telecommunications

We think localized control and management(WT #1.1) should be in R19, with more concern about the scenarios where there are more distributed NFs besides L-PSAs and SMFs□e.g. distributed private networks.

16 – ZTE Corporation.

We support WT#1, WT#2 to be included in the study if they are reworded as following tables. WT#3 was proposed in previous release and this is the time to study this topic. Regarding WT#4, we have no strong view, better to have it if there is any operator support..

17 – Samsung R&D Institute UK

WT#4 needs more clarification as the current description is not sufficient to expect how much impact would be introduced to EPC. Most of all, we are not convinced if the EPC aspects on edge computing needs to be discussed as it seems late to discuss how to support edge traffic offload to EPC.

18 – LG Electronics France

We prefer not to have a SID for this topic in Rel-19 because the work for Edge Computing completed so far (i.e. ~Rel-18) seems enough for commercial deployment.

Regarding WT#1, some of its sub-WTs can be considered as TEI19 item if deemed necessary.

19 – Dish Network

We also prefer not to have a SID for this topic in Rel-19 as similar reason what LG described.

20 – Intel Corporation (UK) Ltd

Intel supports all four WTs in the scope of Rel-19.

21 – China Telecommunications

Besides WT1.1, we also support WT # 1.3 and WT # 2 to be in the scope of Rel-19. WT # 2 comes from the need of our enterprise customers, whose employees hope to securely and efficiently access the corporate intranet while accessing the Internet.

22 – Nokia France

Efficient access to the corporate intranet while accessing the Internet is supported on different PDU sessions in roaming and non roaming from R15 on.

Now let's consider the single PDU Session case.

isn't secure and efficient access to the corporate intranet while accessing the Internet already supported from R15 +R17 in non roaming case and from R18 in roaming case with HR SBO. I do not see the need to create yet another complex new kind of deployment that would be just an alternative to existing solutions that have already MANY variants

23 – vivo Mobile Communication Co.

Also for WT 1.2,

does this mean that the SMF only controls the traffic in a session that towards edge (that this session have edge and non-edge traffic)?

or have a SMF that establish a session, edge session, and this session only have edge traffic?

this is a little bit confused.

24 – Apple AB

WT1.1 - OK

WT1.2 -OK

WT1.3 - Not OK. We think it is difficult to harmonize all parameters listed here to aid in EAS selection. Instead we may look at studying the focussed WT-1 proposal from Ericsson.

WT 2 - OK

WT 3.1 Not OK. Not sure, if this is even a case worth spending effort on.

WT 3.2 is this same as consecutive traffic steering deprioritised in Rel-17?

WT 4 - OK

25 – China Mobile Com. Corporation

WT 1, WT2, and WT3 are supported to be included in R19.

Especially for follow WTs:

For WT1.3, we support this aspect to optimize the UPF/EAS selection with considering the Network status.

WT 3.2 is the same as consecutive traffic steering deprioritised in Rel-17, while there are some new scenario/requirement appears for this mechanism, e.g. distributed processing in edge and central cloud.

26 – InterDigital

InterDigital supports including all 4 WT's in Rel-19.

Additionally, we support including WT-INTERDIGITAL-1, WT-INTERDIGITAL-2, WT-NOKIA-1, and WT-Ericsson-1. Although some of these additional WT's can be merged with the four WT's listed above.

27 – NTT

We think good to have WT#1 (WT#1.1/1.2/1.3).

Feedback Form 2: Can any of the Work Tasks above be combined/merged?

1 – DOCOMO Communications Lab.

WT#1.1 italic parts should be reworded.: Manage the edge network and application information *locally* and *more efficiently.* What kind of information is meant here should be clear.

2 – DOCOMO Communications Lab.

Sorry, the above comment is for *Feedback Form* 3.

Feedback Form 3: Should any of the Work Tasks above be reworded? If so, propose the required rewording.

1 – Nokia France

WT#3: it is proposed to reword (see text in italics) WT#3: as "Further support for end-user traffic sent to Anchor PSA after being processed by Edge Hosting Environment and *for* the corresponding downlink traffic *when there is no communication possibility between the local part of the DN and the central part of the DN (e.g. due to usage of private IP addressing)*" (added text gives a justification)

2 – Nokia France

WT#3.1: it is proposed to reword (see added text in italics and text striken out for deletion) "WT#3.1: Enhance the case where local DNS server or *V-EASDF* has no connectivity with the central DNS server ~~(i.e. Option C and D defined in TS 23.548)~~"; justification is that there is NO reason to limit to Option C and D;

3 – China Mobile Com. Corporation

"Affinity between different EASs" is not clear . It is suggested to rewording this for example, considering the relationship between EASs to complete the same target work task.

4 – ZTE Corporation.

Suggest to reword WT#1.1, WT#1.2, WT#1.3 and WT#2 as follows:

WT#1.1: Manage the edge network and application information locally and more efficiently with less impact to 5GC central NFs (~~i.e.~~ e.g. AMF, SMF), which help to address e.g. more flexible EAS (re)discovery/(re)selection, local UPF (re)selection, traffic routing

WT#1.2: Supporting SMF control of routing the traffic towards the central DN without traversing via the Edge Hosting Environment. ~~under the control of the SMF only the edge related traffic traversing Edge Hosting Environment.~~

WT#1.3: Local UPF and EAS selection taking into account following information: e.g. EAS load, EAS Computing resource, Affinity between different EASs, N6 Delay between the local PSA and EAS.

WT#2: Support routing traffic twoards~~subject to processing~~ in a remote Edge Hosting Environment located in the home network ~~always traversing the dedicated Edge Hosting Environment~~ in both HR roaming and ~~or~~ LBO roaming scenarios.

5 – DOCOMO Communications Lab.

WT#1.1 italic parts should be reworded.: Manage the edge network and application information *locally* and *more efficiently.* What kind of information is meant here should be clear.

6 – China Mobile Com. Corporation

WT#1.3 suggest to be reworded with adding new informations as below: WT#1.3: Local UPF and EAS selection taking into account following information: EAS load, EAS Computing resource, Affinity between different EASs, transmission related information e.g. bandwidth, N6 Delay between the local PSA and EAS.

7 – OPPO

The current description of WT#1.3 is too solution oriented. And it is not clear which criteria can be used for local UPF and EAS selection in current phase. It is recommended to be reworded as below:

WT#1.3: Local UPF and EAS selection taking into account following information: status and capability information of the relevant EASs and local UPFs, relationship information between the EASs and local UPFs.

8 – Ericsson LM

Replace **WT#1, WT#1.1, WT#1.2** and **WT#1.3** with a new **WT#1** based on a focused version of **WT#1.3**:

New **WT#1**: Enhance the Local UPF and EAS selection considering the N6 Delay between the local PSA and EAS

Reword and focus **WT#2**:

New **WT#2**: Study impacts on procedures and interfaces where new HPLMN PSA-UPF may be reselected or added in a PDU session. E.g. after start of a new service. The following cases should be addressed:

- LBO PDU session and part of the traffic need to be handled by an EHE belonging to HPLMN

- HR (or HR-SBO) PDU session and part of the traffic need to be handled by an EHE belonging to HPLMN physically located close to the UE.

9 – MediaTek Inc.

***Revised Wording* -> WT#1.3: We suggest to remove ”computing resource” and ”affinity between EAS”. On ”computing resource”, more holistic analysis is required considering resources from different domains and this requires a much wider study (e.g. in context of Rel-20 for 6G). ”Affinity between EAS” is quite ambiguous.**

10 – HUAWEI TECHNOLOGIES Co. Ltd.

For the commetn from Nokia on WT#3, we suggest as,

WT#3: Further support for end-user traffic sent to Anchor PSA after being processed by Edge Hosting Environment and for the corresponding downlink traffic, e.g. *when there is no communication possibility between the local part of the DN and the central part of the DN (e.g. due to usage of private IP addressing).* The reason is that as this is a justification and not need restrict it can only be used in that case.

For the comment from ZTE on WT#1.3, we suggest as,

WT#1.3: Local UPF and EAS selection taking into account following information including EAS load, EAS Computing resource, Affinity between different EASs, N6 Delay between the local PSA and EAS. This is to make it more clear and precise.

For the comment from DOCOMO, the information can be seen for the following sentence, i.e. to assist EAS discovery and local UPF selection.

For the comment from OPPO, the suggested update is unclear on what information is to taken into account. Hence we suggest to keep the existing wording.

11 – HUAWEI TECHNOLOGIES Co. Ltd.

For the commetn from Nokia on WT#3, we suggest as,

WT#3: Further support for end-user traffic sent to Anchor PSA after being processed by Edge Hosting Environment and for the corresponding downlink traffic, e.g. *when there is no communication possibility between the local part of the DN and the central part of the DN (e.g. due to usage of private IP addressing).* The reason is that as this is a justification and not need restrict it can only be used in that case.

For the comment from ZTE on WT#1.3, we suggest as,

WT#1.3: Local UPF and EAS selection taking into account following information including EAS load, EAS Computing resource, Affinity between different EASs, N6 Delay between the local PSA and EAS. This is to make it more clear and precise.

For the comment from DOCOMO, the information can be seen for the following sentence, i.e. to assist EAS discovery and local UPF selection.

For the comment from OPPO, the suggested update is unclear on what information is to taken into account. Hence we suggest to keep the existing wording.

12 – Nokia France

WT1.1: remove "(i.e. AMF, SMF)" which is solution specific and wrong as the AMF is always local + the end of the sentence is not needed "which help to address more flexible EAS (re)discovery/(re)selection, local UPF (re)selection"

13 – Nokia France

WT#3.1: OK with Huawei rewording into " traffic, e.g. *when there is no communication possibility ...*"

14 – Nokia France

WT#4: it needs to be clarified (and added in the WT#4 description) that "*All edge computing control (EDI, traffic influence, EASDF, UPF actions for edge computing, the control of UPF actions for Edge computing) is to be done per 5GS specifications as the architecture assumes reuse of NEF, PCF, SMF, UPF, EASDF, UDM (as far as SMF is concerned) and of the services of these NF defined in 5GS for the support of Edge computing. This WT has neither UE nor RAN impact*"

15 – Apple AB

OK with new WT#1 suggestion from Ericsson "**WT#1**: Enhance the Local UPF and EAS selection considering the N6 Delay between the local PSA and EAS"

2.2 Additional Work Tasks

As well as the initial set of Work Tasks in section 2.1 companies can request to add additional Work Tasks. The naming of these additional Work Tasks should follow the format: WT-company name-# (eg WT-Samsung-1) so that other participants can reference them.

Feedback Form 4: Are there any additional Work Tasks that should be part of Rel-19?

1 – CICT

Propose to add an additional WT-CATT-1: Support common EAS discovery and common DNAI determination for a set of UE including roaming UE(s) in both HR roaming or LBO roaming scenarios.

The background is:

Based on EDGE_Ph2 KI#4, we support common EAS discovery and common DNAI determination in non-roaming scenario. However, if a roaming UE is belonging to a set of UE, how to support common EAS discovery and common DNAI determination is not investigated and supported, e.g. support establishing a HR-SBO PDU session to access common EAS in VPLMN.

2 – InterDigital

We propose to add 2 additional work tasks (WT-INTERDIGITAL-1 and WT-INTERDIGITAL-2).

WT-INTERDIGITAL-1 would cover consecutive traffic steering. This could be integrated with WT#3.

WT-INTERDIGITAL-2 would deal with the case where application traffic from a PDU Session is routed towards edge services, non-integrated Wi-Fi becomes available to the UE, and it is desirable for the UE to continue accessing the edge services.

These work tasks are further described below.

3 – Nokia France

We propose to add 1 additional work task (WT-NOKIA-1).

WT-NOKIA-1: (for non-roaming/LBO/HR/HR-SBO cases) improvements on ensuring small (requested) end to end delay for Edge Computing cases , also considering N6 delays

4 – Ericsson LM

We propose to add one additional work task:

WT-Ericsson-1: Study impacts on procedures and interfaces where new HPLMN PSA-UPF may be reselected or added in a PDU session. E.g. after start of a new service.

5 – ZTE Corporation.

Comment on WT-Ericsson-1: Is it covered by WT#2? I think the intention of WT#2 is to route the traffic from old HPLMN PSA-UPF towards a new HPLMN PSA-UPF.

6 – QUALCOMM Europe Inc. - Italy

None

7 – HUAWEI TECHNOLOGIES Co. Ltd.

We also think the WT-Ericsson-1 is covered by the WT#2.

8 – Nokia France

WT-INTERDIGITAL-2: this has not concluded in R18, has it better chances to conclude in R19?

9 – Nokia France

WT-Ericsson-1: in which scenario would this WT be useful is this WT meant (Plain HR ? HR SBO?). What real advantage would WT bring?

10 – vivo Mobile Communication Co.

The current WT is enough to study. R19 may not have so much time.

Also, for the WT-INTERDIGITAL-2, it seems that the same as in the R18 KI6? But the KI6 didn't conclude.

11 – Samsung R&D Institute UK

We think that the issue of WT-INTERDIGITAL-2 can be re-visited in Rel-19.

12 – Nokia France

we can agree with ”WT-Ericsson-1 : Study impacts on procedures and interfaces where new HPLMN PSA-UPF may be reselected or added in a PDU session. E.g. after start of a new service” *with following addition*: *”for HR (or HR-SBO) PDU sessions i.e. excluding LBO PDU Sessions”*

13 – Apple AB

INTERDIGITAL-WT#2 - This was studied without conclusion in Rel-18. Do not think we should spend effort on the same topic again.

14 – HUAWEI TECHNOLOGIES Co. Ltd.

WT-NOKIA-1 seems be covered by the WT#1.3 ?

Feedback Form 5: If there are any additional Work Tasks required, describe them

1 – InterDigital

We propose to add the following work task, which can be integrated with WT#3, **WT-INTERDIGITAL-1**: “*Supporting consecutive traffic steering in different N6-LAN as described in KI#4, clause 5.4 in TR 23.748*.”

The text of this work task is copied from S2-2109329 which is an early version of the Rel-18 Edge study and was approved at SA2 #148E. This WT was eventually down-scoped from the Rel-18 SID. Key Issue 4 of TR 23.748 provides a good description of the motivation for this work task. The following text is copied from Key Issue 4 of TR 23.748.

“*For some of edge computing use case scenarios, although Application Servers are deployed in the local N6-LAN, centralized deployed Application Server(s) may still be required for other processing. In such edge computing scenarios:*

- UL traffic related to an application may be first steered over local N6-LAN to Application Server(s) for local-processing, and then further steered to the central Application Server(s).

- DL traffic related to an application may be first routed via Application Server(s) in the central N6-LAN, then steered to Application Server(s) in local N6-LAN for local-processing, and finally provided to the UE.”

We also propose to add the following work task, **WT-INTERDIGITAL-2**: “*Support for the scenario where a PDU Session is making use of edge services, non-integrated Wi-Fi becomes available to the UE, and the non-integrated Wi-Fi cannot be used to access the edge services*.”

This work task is based on Key Issue #6 of the Rel-18 Edge TR (TR 23.700-48). For this key issue, it was concluded that no normative work would take place in Rel-18. However, we believe that it is still important to address this issue and propose it for Rel-19. Specifically, we would like to address the case

where the SMF adds a branching point to a PDU Session so that some application traffic can make use of edge services. Later, when non-integrated Wi-Fi becomes available, the UE will lose connectivity to the edge services if the UE switches all traffic away from the PDU Session.

2 – QUALCOMM Europe Inc. - Italy

None

3 Dependencies

These feedback forms will help define the dependencies between Work Tasks, dependencies of Work Tasks on other Working Groups (SA, RAN or CT), and dependencies on other potential SA2 Rel-19 SIDs and WIDs. The Work Tasks can be from the list in section 2.1, or any additional Work Tasks identified in the feedback in section 2.2.

Feedback Form 6: Describe the dependencies that any of the Work Tasks have on other 3GPP Working Groups

Feedback Form 7: Describe dependencies between the Work Tasks

Feedback Form 8: Describe any dependencies on potential work/study items that might be created as a result of the other Q3 moderated discussions.

1 – ZTE Corporation.

WT#2 may have relationship with the"Subscription-based routing to a particular core network (e.g. in a different country)" in R19 RVAS proposal.

2 – HUAWEI TECHNOLOGIES Co. Ltd.

RVAS is related to the signaling traffic. Here WT#2 is related to user plane data traffic. So they are independent.

4 Partitioning

These questions will help determine whether there is one, or more than one, Study Item, Work Item or TEI-19 item to be created from these Work Tasks.

Feedback Form 9: Should there be more than one SID, WID or TEI-19 item created based on the Work Tasks?

1 – QUALCOMM Europe Inc. - Italy

There should be no SID as an outcome of this moderated email discussion.

2 – HUAWEI TECHNOLOGIES Co. Ltd.

One SID is enough.

3 – Nokia France

One SID is enough.

4 – Samsung R&D Institute UK

One SID is sufficient.

5 – LG Electronics France

We prefer not to have a SID for this topic in Rel-19 because the work for Edge Computing completed so far (i.e. ~Rel-18) seems enough for commercial deployment.

Regarding WT#1, some of its sub-WTs can be considered as TEI19 item if deemed necessary.

6 – CICT

[From CATT]

One SID is fine.

7 – InterDigital

One SID is appropriate.

Feedback Form 10: If the answer to the above question is yes, describe how the Work Tasks should be partitioned into different items.

5 Summary

5.1 Summary on comments for section 2.1 and 2.2

5.1.1 Views on existing WTs

27 Comments were received from 19 companies including multiple comments from single company.

Table 1:

WT#	Supporting companies	Companies with concern	Comments/Questions		
1.1	DOCOMO, MediaTek, China Unicom, CATT, vivo, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, NTT, Apple				

1.2	DOCOMO, MediaTek, China Unicom, vivo, Huawei, ZTE, Intel, China Mobile, InterDigital, NTT, Apple	Nokia			
1.3	DOCOMO, Ericsson, MediaTek, China Unicom, CATT, vivo, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, NTT		Apple is OK with rewording proposal by Ericsson		
2	DOCOMO, China Unicom, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, Apple	Nokia	Ericsson asks to rephrase it as WT-Ericsson-1.		
3		Apple	InterDigital asks to cover consecutive traffic steering as part of WT#3		
3.1	DOCOMO, Nokia, CATT, Huawei, ZTE, Intel, China Mobile, InterDigital				
3.2	DOCOMO, Nokia, CATT, Huawei, ZTE, Intel, China Mobile, InterDigital		Apple asks if this is same with consecutive traffic steering in Rel-17		

4	Nokia, Intel, InterDigital, Apple	Vivo, Samsung			

5 operators (DOCOMO, China Mobile, China Telecom, China Unicom, NTT) and 9 vendors (MediaTek, CATT, vivo, Huawei, ZTE, Intel, InterDigital, Nokia, Apple) support the study item and actively get involved in the moderated discussion.

1 operator (T-Mobile USA) seems OK with WT#1 and 4 but asks whether WT#2 and 3 can be deferred to Rel-20 considering the time constraints for Rel-19.

4 vendors (Qualcomm, Ericsson, LG Electronics, Dish Network) proposed to have TEI19 WID instead of a Rel-19 study item, while Ericsson also actively got involved in the moderated discussion and constructively proposed some reworded text.

5.1.2 Companies suggesting WT rewording proposals

15 comments were received from 9 companies, 8 companies provided rewording proposal. These proposals will be considered for the SID draft submitted to SA2#158.

Table 2:

WT#	Supporting companies	Companies with concern	Comments/Questions
1.1	DOCOMO, MediaTek, China Unicom, CATT, vivo, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, NTT, Apple		
1.2	DOCOMO, MediaTek, China Unicom, vivo, Huawei, ZTE, Intel, China Mobile, InterDigital, NTT, Apple	Nokia	

1.3	DOCOMO, Ericsson, MediaTek, China Unicom, CATT, vivo, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, NTT, Apple		Apple is OK with rewording proposal by Ericsson
2	DOCOMO, China Unicom, Huawei, China Telecom, ZTE, Intel, China Mobile, InterDigital, Apple	Nokia	Ericsson asks to rephrase it as WT-Ericsson-1.
3		Apple	InterDigital asks to cover consecutive traffic steering as part of WT#3
3.1	DOCOMO, Nokia, CATT, Huawei, ZTE, Intel, China Mobile, InterDigital		
3.2	DOCOMO, Nokia, CATT, Huawei, ZTE, Intel, China Mobile, InterDigital		Apple asks if this is same with consecutive traffic steering in Rel-17
4	Nokia, Intel, InterDigital, Apple	Vivo, Samsung	

5.1.3 Additional WT proposals

Five additional WT proposals were received, while WT-InterDigital-1 can be covered by WT#1.3 and WT-Ericsson-1 can be covered by WT#2, WT-Nokia-1 can be covered by WT#1.3. So there are two remaining new WT proposals, one is WT-CATT-1, the other is WT-InterDigital-2.

For WT-CATT-1, no comment was received, this can be studied in Rel-19 if there is no concern.

For WT-InterDigital-2, Nokia, vivo and Apple raised negative comments saying the corresponding KI#6 in Rel-18 was not concluded indicating this most likely will be a waste of time in Rel-19. Proposal from Moderator is not to include this WT in the Rel-19 study considering the vey limited and precious time.

Table 3:

Additional WT#	Content	Supporting companies	Commented by	Companies with concern

WT-CATT-1	Support common EAS discovery and common DNAI determination for a set of UE including roaming UE(s) in both HR roaming or LBO roaming scenarios.			
WT-InterDigital-1	Cover consecutive traffic steering as part of WT#3			
WT-InterDigital-2	deal with the case where application traffic from a PDU Session is routed towards edge services, non-integrated Wi-Fi becomes available to the UE, and it is desirable for the UE to continue accessing the edge services.	Ericsson, Samsung	Similar comments (KI#6 was not concluded in Rel-18)	Nokia, vivo, Apple.
WT-Nokia-1	(for non-roaming/LBO/HR/HR-SBO cases) improvements on ensuring small (requested) end to end delay for Edge Computing cases , also considering N6 delays		Huawei (covered by WT#1.3?)	

WT-Ericsson-1	Study impacts on procedures and interfaces where new HPLMN PSA-UPF may be reselected or added in a PDU session, e.g. after start of a new service.		ZTE, Huawei commented to be covered by WT#2. Nokia asks to exclude LBO scenario.	

5.2 Summary on comments for section 3

No comment was received.

5.3 Summary on comments for section 4

On the question “Should there be more than one SID, WID or TEI-19 item created based on the Work Tasks”, no company thinks more than one SID is needed.