

Discussions on Integrating AN and UPF

draft-zzhang-dmm-mup-evolution-08

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Recaptures of IETF-114, 115, 116 & 117: Technical Discussions

- Simplified & Reduced signaling w/ optimized data plane
- ULCL I-UPF for MEC case : local breakout (LBO)
- Increased burden on more complicated AN; QoS handling
- Routing, VPN PE in ANUP
- Mobility Management (or MM) Features: Mobility Handover, Paging (e.g. PSM, eDRX, MICO, etc.).
- Microservice architecture: discussed the pros and cons along with the justification to champion ANUP (UP vs. CP)
- Existing similar work in 4G/LTE: Local IP Access (LIPA) – an ‘ANUP-like’ feature
- Use case discussion: Satellite scenarios will benefit from the ANUP-like scheme.
- And more

Recaptures of IETF-118: Adoption Discussion

- Technical-wise, the I.D. was ready for an adoption call.
- Also for 6G: The 3GPP Rel-20 ([6G](#) roadmap) targets toward the beginning of Y-2025, a perfect timing for exploration and even adoption of the ANUP-like work
 - Investigating the possible distributed CN, which bodes well for the ANUP-like UP work in 6G*

*3GPP SA1 Rel-20 SID Proposal: s1-233120 (distributed & autonomous networks), [Nov. 2023](#) – new progress since IETF-118

Adoption-call Comment #1: User-plane(UP) vs. Control-plane(CP)


Issue	Corresponding Text or Author's reply
<p><i>"ANUP solely addresses user plane convergence and tries to liaise with 3GPP, but I'm afraid this is a half-baked attempt." (Link)</i></p> <p><i>"the ANUP concept arises from the state in which the (R)AN(-UP) retains MM and SM data through Control Plane Convergence. Hence, in alignment with Miya's perspective, we believed that limiting discussions solely to the User Plane would make collaboration with 3GPP quite challenging." (Link)</i></p>	<p><i>I should say that ANUP does not limit the discussion solely to User Plane. As mentioned in the draft and another email, integration of AN and UPF in the user plane allows for convergence/optimization of control plane (now that there is no need to signal the unnecessary N3 tunnel in the targeted use case), and the whole proposal is more valuable with the convergence/optimization of control plane (otherwise it's just an implementation choice of eliminating the N3 tunnel but still use separate N2/N4 signaling). (Link)</i></p>
Chair's Review	
The current draft seems to include inconsistent C-Plane discussions compared to what the authors argued. See the next issue.	

Our arguments:

- We agree with the comment: CP does play a pivotal role in realizing the original DMM principles. The genuine potential of ANUP can be fully excavated upon the consideration of both CP & UP.
- In the I.D., our discussions on CP & UP centred around the MUP/ANUP, i.e., the potential advantages with the integration of gNB & UPF.
- The discussions on 'CP' in the draft are not on the *broader-sense* aspects of 5G CP (e.g., RM, MM, SM, Paging, QoS settings, etc.). Nor do we intend to do so. Please see our replies to [#2](#).

Adoption-call Comment #2: Regarding 'SMF/N4, AMF/N2, Paging/PNA-AMF etc

Issue	Corresponding Text or Author's reply
<p><i>"C-Plane for Mobility Handover (6.3) and Paging (6.4) are particularly important elements in considering them, but this document does not attempt to analyze or solve the problem and just claims that they are "the same as 3GPP's current behavior"."</i> (Link)</p>	<p><u><i>In 6.3 of draft-zzhang-dmm-mup-evolution:</i></u> <i>"UEs may have persistent IP addresses even when they re-anchor from one ANUP to another, as described in Section 2 of [I-D.zzhang-dmm-5g-distributed-upf]"</i></p> <p>...</p> <p><u><i>In 6.4 of draft-zzhang-dmm-mup-evolution:</i></u> <i>Again, notice that because ANUP is just the integration of previously separate but co-located AN and UPF functions, the above paging procedures are not different from when AN and UPF are separate.</i></p>
Chair's Review	
<p><u><i>Sec.2 of "draft-zzhang-dmm-5g-distributed-upf"</i></u> assumed SMF exists, which could contradict with the ANUP proposal for simplifying signaling (N4 still required).</p> <p>In terms of paging, RNA paging over Xn has no IP addr info. If it has, it is different from the current. And it also assumes AMF exists after paging. It seems to contradict with ANUP concept (N2 still required too). If AMF doesn't exist, it is different from the current.</p>	

See next page (Cont.) 

Adoption-call Comment #2: Regarding 'SMF/N4, AMF/N2, Paging/RNA-AMF, etc. (cont.)

Our arguments:

- As set forth at the beginning of the draft, we don't intend to do the 3GPP 5G/6G work in IETF. So, while we do list some critical 5GS CP features that might be related to this I.D., e.g., paging, CP signalling, etc., we have acknowledged that the complete studies must be done in the 3GPP SDO.
- Without doubt, 5GS is extremely complicated. While the MUP/ANUP might have certain advantageous impacts to the current 5GS CP, more will be explored along the time once the draft is adopted. E.g., having no intention to merge N1/N2 & N4 signalling, etc.
- In summary: Not intend to cross into the 3GPP territory. Just, if we do come up with some novel thoughts during the investigation of the ANUP, we will liaise to 3GPP for possible suggestions.

The Changes:

- **Remove** more 3GPP CP-centric sections: 2.1 (O-RAN), 6.3 (Mobility HO), 6.4 (Paging)
- **Revise** 6.11 (satellite), move to section #4 and merge with the previous bullet.
 - In section 4: Rel-19 SID (FS_5GSAT_Ph3) whose solution proposals suggest the integrations of (a) CP registration/session establishment; (b) UP gNB/UPF (eNB/MME). This is a good use case to justify the adoption of ANUP.
- **Revise & Move** the LIPA section (was section #5) to be a new sub-section (#4.4 now), to demonstrate it's being an ANUP-like feature already in 4G.
- **Modify** the names of some sections to make the draft more readable and easier to follow: Subjects of section#3, #4, #4.3, #4.4.

Note: The .xdiff will be shown in a later slide

Adoption-call Comment #3: Implementation & realization

Issue

*“Unless the focus is on a very specific case of single PDN with no mobility private MEC” or “satellite to satellite” only), it seems ANUP like function is unnecessary at this point and crossing over into 3GPP territory. Proposing to merge N1/N2 and N4 signaling will be an overkill to solve a very niche use-case.
[\(Link\)](#)*

Corresponding Text or Author’s reply

*ANUP does not change that and it does not avoid mobility handling.
...
Even if the proposal eventually does not get adopted in 3GPP, it is desired for DMM to adopt it based on rough consensus as a proposal/base for further study in 3GPP.
[\(Link\)](#)*

Chair’s Review

When it comes to rough consensus, should it be proved by the running code?
Similar comment can be seen:
["the focus of the draft should be changed to address details of realizing "ANUP""](#)

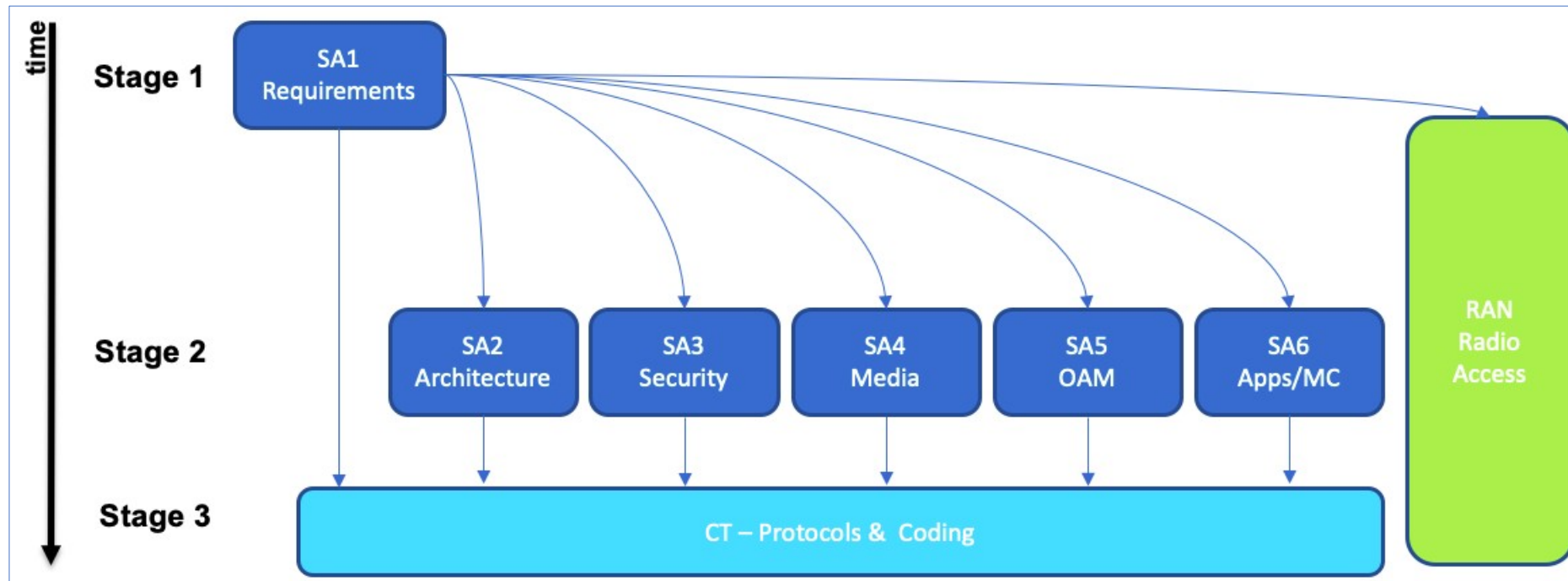
See next page (Cont.)



Adoption-call Comment #3: Implementation & realization (Cont.)

Our arguments:

- 3GPP workflow: stage-1 (use cases & CPR), stage-2 (standardization: study & normative), and stage-3 (protocols & coding).
- This draft revolves around the sharing of a high-level architectural evolution. It falls in-between the stage-1 & stage-2, i.e., from CPRs (stage-1) to study-phase (stage-2). Actually, it is more toward the stage-1, and possibly earlier than the stage-2.
 - It is far from the stage-3 protocol implementation & coding realization. (so no running codes)



Final replies to adoption comments:

In summary:

- This draft makes it clear that it represents some thoughts from the IETF/wireline background on the MUP/ANUP topic, but the actual specification work needs to happen in 3GPP. Right, we're not trying to boil the ocean. Additional study (of 5G CP) can be done, but it's outside the scope of this document.

Suggestions from comments (and also Als after adoption):

- More information on realizing ANUP in wireline/IP and mobility aspects;
- Aspects on addressing, mobility, performance, measurement, manageability of entities and services, scalability

All-in-one changes (.xdiff) of the I.D. (ver. #06 -----> #08)

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In conclusion:

- Technical-wise, the I.D. was **more ready** now, with new changes.
- The imminent approaching of 6G: 3GPP Rel-20 toward Y-2025 (e.g., distributed & autonomous CN SID)

So, can we try the WG adoption-call again?