

3GPP TSG RAN Rel-18 workshop
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Further enhancement of Private Network for Rel-18

China Telecom

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Non-Public Network was introduced in Rel-16 with basic functions, and further enhancement in Rel-17 to enable wider cooperation between different networks/different entities to support use cases for NPN to provide access for UE that has third party credentials or no subscriptions beforehand, as well as IMS and VIAPA related use cases.

Rel-17 FS_eNPN study has concluded in total 4 key issues and progressed to the normative phase. But according to TR 23.700-07, there are yet two key issues not addressed in Rel-17 time frame, namely:

- Support for equivalent SNPNs
- Support of non-3GPP access for SNPN services

Vertical have strong requirement to monitor the service performance for industrial applications as below. This can be supported in both PNI-NPN and SNPN, which serve the vertical.

- Service Performance monitoring (e.g. delay, PLR for service) on a flow level can enable operator/vertical to perform an accurate troubleshooting if problem or low efficiency happens in the network for specific service, e.g. remote controlling, video camera.
- Operator/Vertical can analysis and even forecast the service performance based on the Service Performance monitoring. Further actions can be done based on analysis and forecasting.

In addition, due to time constraints, there may be some unresolved issues left in Rel-17 eNPN, which need to be further addressed in Rel-18, such as:

- A PDU session anchored at the SNPN cannot be maintained during mobility when the UE accesses the SNPN using credentials owned by a Credentials Holder separate from the original SNPN, which implies a lack of service continuity.
- The control plane provisioning enables 3GPP network to have control of the full onboarding process, without relying on mechanism outside 3GPP and making the deployment of onboarding function more efficient.

Therefore, further investigations and studies may be required to complete the aspects that cannot be solved within the Rel-17 time frame.

Meanwhile, SA1 is progressing on new use cases and requirements which can be related to NPN e.g. in the study item 5G networks Providing Access to Localized Services (FS_PALS). Normative SA1 work may generate new stage 1 requirements on NPN. Once the SA1 work stabilizes, the SA2 work should be aligned with the outcome of the SA1 work (referring to requirements from e.g. TS 22.261), e.g. to enable NPN as the hosting network providing the localized services.

As discussion above, RAN could take the work of the possible SA2 FeNPN study item in Rel-18 and its corresponding RAN impact into consideration and specify the exact RAN functionality if any.

From RAN points of view, there are also several aspects which need further work in Rel-18 as follows:

- In Rel-16, the NB-IoT/eMTC connected to 5GC has been supported. However, the NPN support for NB-IoT/eMTC is not. As many operators have deployed the NB-IoT networks and China Telecom has operated the largest NB-IoT network in the world, it is envisioned that the NPN for NB-IoT/eMTC can provide operators more comprehensive support of IoT use cases.
- NG-RAN is not aware of the UE serving (selected) CAG ID in case of initial access and handover. However, RAN awareness of the serving CAG ID usage is much beneficial for operator's network optimization and showing the efficiency of PNI-NPN to the vertical and/or enterprise customers who are willing to pay for the private network. Also, the operators need to have full knowledge of CAG cell usage condition and determine whether any adjustment for CAG cell setting (such as the coverage, direction and location of cells) is needed.

Potential Scope of Work Item

- Check the RAN impact of SA2 study on further enhanced support of NPN, and specify the corresponding RAN functionality where necessary:
 - Support for enhanced mobility when involving SNPN;
 - Support for non-3GPP access for SNPN;
 - Support for enhanced onboarding functionality;
 - Enable more efficient SNPN support for voice services;
 - Address new SA1 requirements (e.g. from PALS work) related to NPN.
- Specify the RAN functionality of the following Further enhanced NPN in NG-RAN:
 - The support of SNPN and PNI-NPN for eMTC/NB-IoT connected to 5GC;
 - For PNI-NPN, support RAN awareness of serving (selected) CAG ID usage including initial access and handover, if justified;

Thank you!