Study on enhancement of Upper Layer Traffic Steering and Switching over two 3GPP Access Networks

S1-241162

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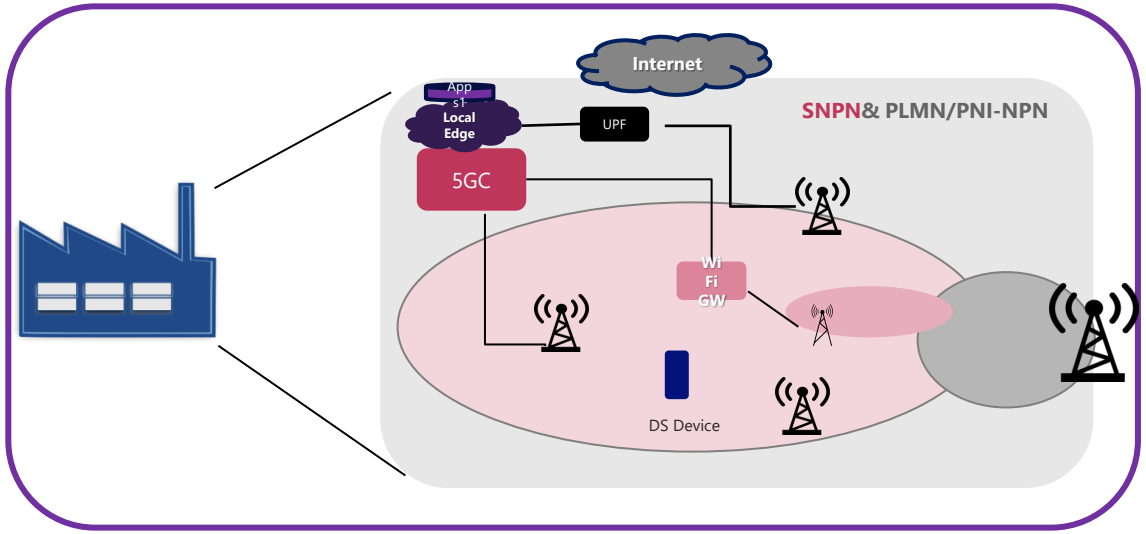
Study topic

Target study area: SNPNs

- Traffic steering and/or switching between SNPNs and PLMNs/PNI-NPNs to increase reliability, minimize service interruption and improve QoS generally using 3GPP as well as non-3GPP accesses

Addressing the constraints

- DualSteer of Rel-19 does not extend to SNPN networks
- No explicit requirements on interworking between SNPNs & PNI-NPNs



> Only DualSteer devices (with a single subscription profile with a home operator) and appropriate radio capabilities to be considered

> Proposal limited to SNPNs devices using SIMs with globally unique IMSIs

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SoTA on DualSteer & Multi-Access (TS 22.161)

1. Traffic steering and switching over two 3GPP access networks (TS 22.261, Section 6.50) does not apply to SNPN networks.

2. Multiple access technologies (TS 22.261, Section 6.3)
The 5G system will support both 3GPP and non-3GPP access technologies, to enhance coverage and availability. The system will intelligently select the most suitable access technology for each service, allowing for simultaneous use of multiple technologies on a single UE.
The system will also enable UE selection, management, and provisioning of services based on operator policy, support steering of UE to specific 3GPP access networks, and dynamically offload traffic between 3GPP RAT and non-3GPP access based on traffic load and type. Additionally, simultaneous data transmission via different access technologies for one or more 3GPP services will be supported. When multiple access technologies are used concurrently, the system will optimally distribute user traffic, considering factors like service, traffic characteristics, radio conditions, and UE movement speed.

3. Traffic steering and switching over two 3GPP access networks (TS 22.26, Section 6.50)
Subject to HPLMN policy and network control, for traffic steering and/or switching of user data across two 3GPP access networks, the 5G system may be able to support mechanisms to change one 3GPP access network to the non-3GPP access network of the same subscription (and vice versa).

Observations

1. **The normative requirements of Rel-19 Traffic steering and switching over two 3GPP access networks do not apply to SNPN networks. The requirements arising from SNPN being a home network should be addressed.**
2. **Non-3GPP access can be used simultaneously or separately with <u>a single</u> 3GPP access for offloading and traffic distribution of traffic.**
3. **Current DualSteer supports changing one 3GPP access to non-3GPP access (and vice versa). All available accesses (both 3GPP accesses and non-3GPP access) for the DualSteer devices should be considered. The objective should be to provide service continuity/minimize service interruption and enhance the overall QoS by considering availability and the conditions of all access networks.**

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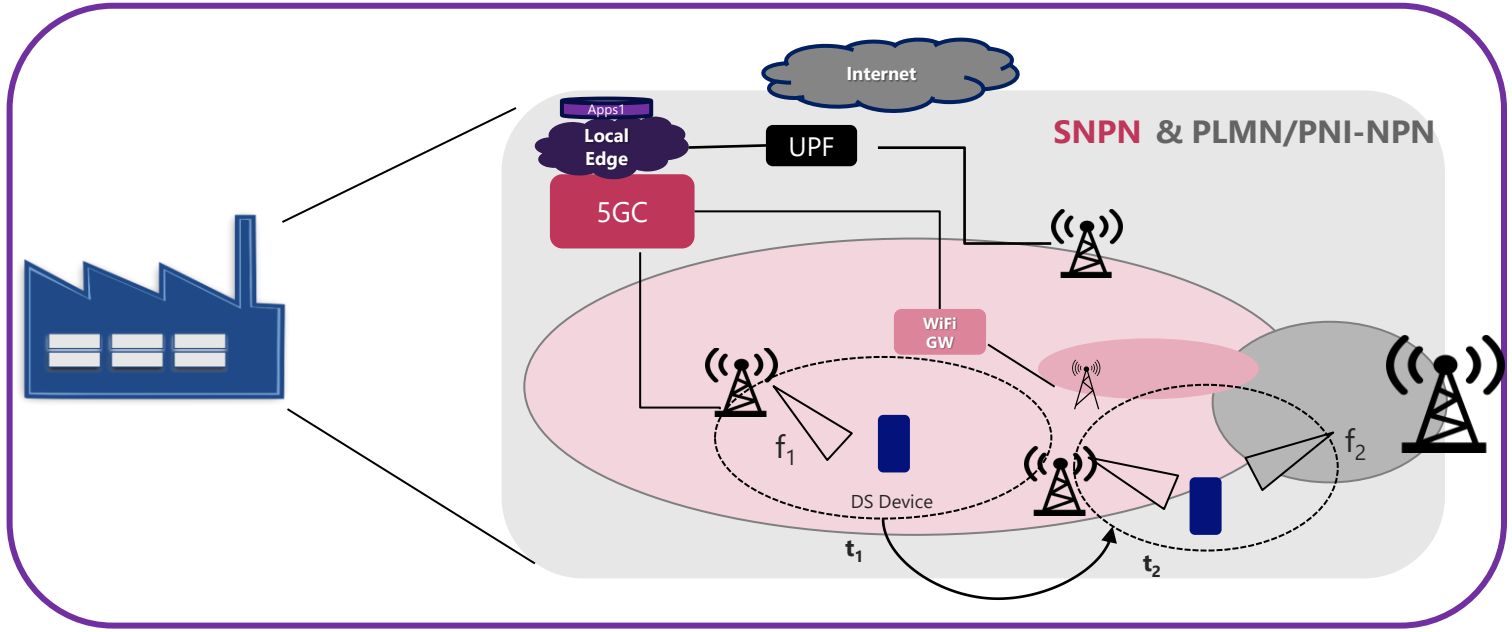
Example use case (1)

- **Extension of DualSteer of Rel-19 where SNPN is home network**
  - SNPN network augmented with 3GPP PLMN access for coverage, resilience and better use of radio access networks



- DualSteer device is moving across the plant area, connected to SNPN 5G RAN/CN and local edge server.
- Based on operator's policy and the observed network conditions, the device can, e.g., switch ongoing data flow (to tackle poor radio conditions/coverage) or steer new data flow to PLMN 3GPP RAN (for, e.g., better quality of service or better utilization of radio resources).

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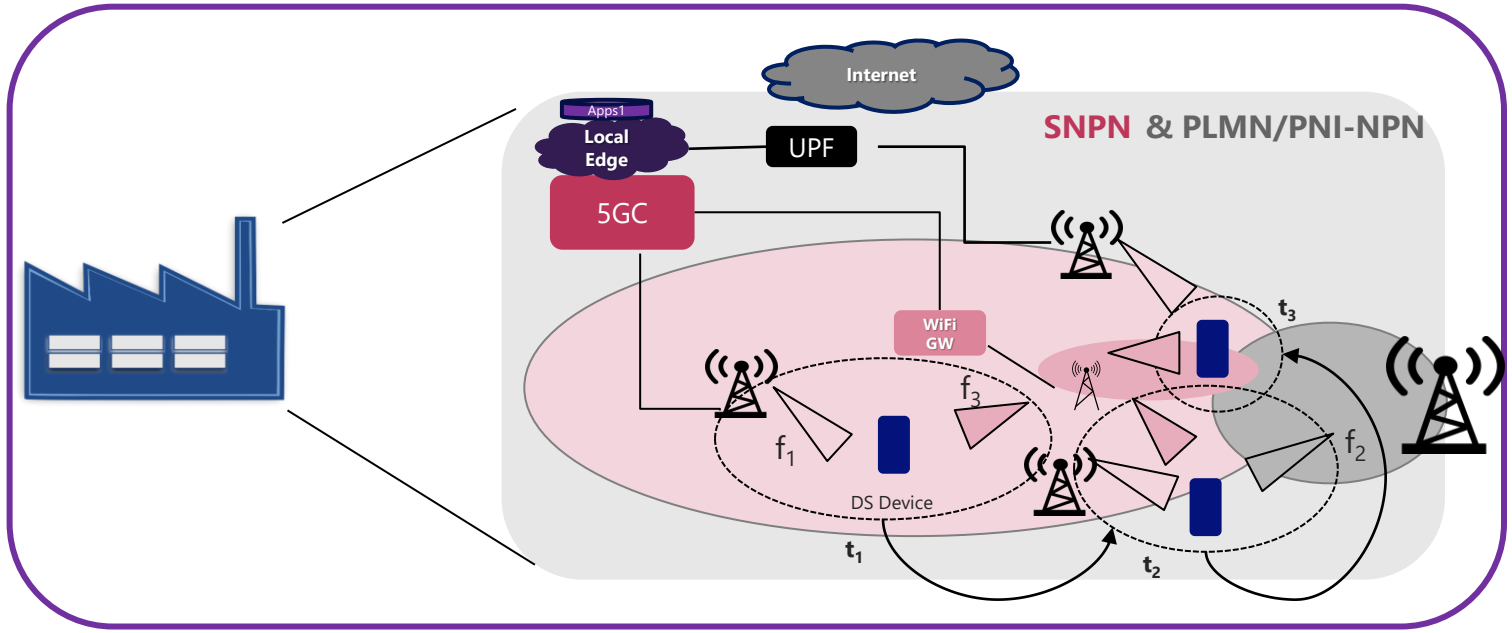
Example use case (2)

- **Extension of DualSteer with SNPN as home network and non-3GPP access interworking**
  - All available accesses considered to enhance the overall QoS by considering availability/conditions of all access networks



- Wi-Fi APs and NR base stations provide wireless connectivity in a vast plant area. Mobile robots with onboard DualSteer devices move through the plant.
- As the robot moves through the plant, it is connected through SNPN's NR base station and the plant's Wi-Fi (via, e.g. trusted Wi-Fi gateway and 5GC) to the local edge
- At t_2 point in time, a new data flow is steered through PLMN's 3GPP access. The robot now accesses services at the local edge using three different wireless accesses.
- At t_3 point in time, the radio conditions of SNPN RAN are excellent and the data flow from PLMN RAN is switched to the SNPN RAN, also for energy saving purposes. The robot is again connected via SNPN RAN and Wi-Fi to the local edge services.

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Objectives

- **Study use cases and requirements to enable traffic steering and/or switching between SNPNs and PLMNs/PNI-NPNs to improve reliability and overall QoS using 3GPP and non-3GPP access**
  - Capabilities and policies for the second network selection and traffic switching/steering
    - Cases with one or two 3GPP accesses, combined with non-3GPP access will also be included
    - Identify any delta when PLMN is PNI-NPN

  NOTE 1: Only DualSteer devices (with a single subscription profile with a home operator) and appropriate radio capabilities will be considered.

  NOTE 2: Both cases - SNPN and PLMN as home network will be studied.

  NOTE 3: The study is limited to SNPN devices using SIMs with globally unique IMSIs.

  NOTE 4: The use cases from TR 22.841 should also be considered.

- **Identify the resulting Stage 1 impact on Traffic steering and switching over two 3GPP access networks, NPNs, multiple access technologies, security and charging**

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Thank you

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