3GPP TSG RAN#102

Edinburgh , GB, December 11th - 15th, 2023

RP-233553

Views on R19 Additional Topological Enhancements

Agenda Item: 9.1.3.3

Source: Xiaomi

Document for: Discussion

RAN chair suggestion (RP-232745)

- References: RWS-230488, RP-231540, RP-232625
- Potential objectives:
  - 6 months SI + 12 months WI
    - Study enhancements for the support of WAB including (RAN3-led, RAN2):
      - Study impact of gNB mobility within a stationary RAN and in proximity to other mobile gNBs:
        - Identify the issues of dynamic inter-gNB neighbor relations resulting from gNB mobility, e.g., ANR, inter-gNB HO/DC and SON.
        - Identify potential RAN-related issues when collocating a UPF with the gNB for MEC, local services and/or local inter-UE communications.
        - Identify necessary inter-gNB- and gNB-to-CN signaling to address these issues.
      - Study the signaling enhancements for the authorization of WAB nodes.
      - Study signaling enhancements to extend the IAB resource multiplexing framework to WAB, as necessary.
      - Study enhancements to QoS support on WAB backhaul, as necessary (subject to interaction w/ SA2)
    - Study enhancements for the support of single-donor IAB topology, including (RAN2-led, RAN3):
      - Study enhancements to the robustness of multi-hop routing within the IAB topology in presence of local IAB-node mobility.

    Note: Access link for WAB backhaul can be TN or NTN.

Femto

- Study the overall RAN architecture and required functional and procedural impacts for supporting 5G Femto deployments.
- Study how to define the 5G access control mechanism by (re-)using the existing CAG functionality and identify needed enhancements (if any).
- Study how to enable access to local services from the 5G Femto via collocated local UPF.

Note: The study involves a gap analysis of existing 5G functionality with HomeNB functionality.

WAB/VMR(1)

Motivation

- Intelligent vehicles equipped with advanced technologies can provide local services, information exchange and sharing within the vehicle.
- Intelligent vehicles can have greater communication and processing capabilities than smart phones, the devices (e.g. smart phones of the passengers) can leverage more powerful capabilities in the vehicles to have better user experience and enjoy the services in the vehicles.

WAB/VMR

- A WAB/VMR can provide gNB functions and limited CN functions if needed to support local service and local switch between UEs.
- A WAB/VMR can access NTN for better communication coverage and more usage scenarios.

Coordination with SA2/SA5

- SA2 is considering PDU session for the wireless backhauling of the N2/N3 interfaces, which can be one candidate solution for WAB/VMR.
- Some solutions may involve OAM, then the coordination with SA5 may be needed.

WAB/VMR(2)

The following works may need to be done to support the requirements for WAB/VMR:

- Study the relay mechanism when a full gNB is onboard, e.g. PDU session-based wireless backhauling.
- The backhauling can be TN or NTN.
- Study the potential authorization procedures for R19 WAB/VMR.
- Study the potential enhancements on the cell identify handling and the neighbor relations handling considering the gNB is moving, R18 mobile IAB can be a baseline.
- Study the potential solutions to support WAB/VMR mobility.

Proposal 1, WAB/VMR with full gNB and limited CN functions is supported in R19.

Proposal 2, the following aspects can be studied and specified if necessary in R19 WAB/VMR

- **PDU session-based wireless backhauling**
- **Authorization**
- **Cell relation handling**
- **Support of local services and local switch between UEs**
- **QoS support**
- **Mobility**

Note: coordination with SA2/SA5 as needed.

IAB Multi-hop routing and Femto

IAB Multi-hop routing:

- Multi-hop IAB is proposed to support emergency services in public safety.
- However, currently, there are many mechanisms for emergency services in public safety, e.g. satellite communication, UAV or HAPS, we don't see the clear benefits to use IAB multi-hop.
- If needed, the scope should be in single donor IAB topology and no UE impacts to reduce the complex.

5G Femto:

- Femto had been supported since LTE, but it's not clear for us whether the potential works on Femto address the real issues in commercial deployment, more justifications are needed.
- If needed, the scope of the 5G Femto should have no UE impact at late state of 5G.

Observation 1, more justifications are needed for the support of IAB multi-hop routing and 5G Femto.
Proposal 3, it's suggested the scope of IAB Multi-hop routing should be in single donor IAB topology and both IAB Multi-hop routing and 5G Femto should have no UE impacts.

Summary of R19 Additional Topological Enhancements

The following proposals are provided in with regard for R19 Additional Topological Enhancements:

Proposal 1, WAB/VMR with full gNB and limited CN functions is supported in R19.

Proposal 2, the following aspects can be studied and specified if necessary in R19 WAB/VMR

- **PDU session-based wireless backhauling**
- **Authorization**
- **Cell relation handling**
- **Support of local services and local switch between UEs**
- **QoS support**
- **Mobility**

Note: coordination with SA2/SA5 as needed.

Observation 1, more justifications are needed for the support of IAB multi-hop routing and 5G Femto.

Proposal 3, it's suggested the scope of IAB Multi-hop routing should be in single donor IAB topology and both IAB Multi-hop routing and 5G Femto should have no UE impacts.

Thanks