

3GPP TSG RAN Rel-18 workshop  
Electronic Meeting, June 28 - July 2, 2021  
Agenda Item: 4.2

RWS-210020

Qualcomm

# Rel-18 IAB - New use cases to enhance RAN topology

Qualcomm

# Topology - IAB

## Extension of RAN topology

- Rel-16 and 17 have been defining the groundwork for IAB & assume a planned deployment in licensed spectrum
- Rel-18 should support new IAB use cases that extend the RAN topology

### Mobile and nomadic IAB

- **Scenarios**

- In-vehicle IAB-access\*
- Moving cell site\*
- Nomadic IAB-node deployment

*\*) See Rel-18 SA1 Study on Vehicle-mounted Relays*

- **Functionality**

- Power and interference management
- PCI & RACH collision avoidance
- Node-mobility-aware cell selection and handover for UEs
- Autonomous alignment of feature support between migrating IAB-node and RAN
- Support for local services at migrating IAB-node

### Operation in unlicensed spectrum

- **Motivation**

- Large amount of spectrum available

- **Functionality**

- Standalone and licensed-assisted operation
- Alignment of IAB resource management with unlicensed medium access
- Intra- and inter-IAB-node coordination of medium access
- Optimization of channel sensing by collocated IAB-MT & IAB-DU

### Multi PLMN/NPN-shared IAB-network

- **Functionality**

- IAB serves multiple PLMNs/NPNs with separate gNB-CUs
- RAN integration of IAB-nodes from different PLMNs/NPNs

# Rel-18 IAB: Mobile and nomadic IAB - Scenarios

- In-vehicle IAB-access\*

Onboard IAB-node enhances in-vehicle coverage in presence of high penetration loss through (tinted) windows and metal frame, and/or in rural environments with sparse cell towers.

- Moving cell site\*

Real estate on, e.g., on taxis and busses, can be used as moving cell site to enhance outdoor access capacity, leveraging the high temporal and spatial correlation between traffic density and wireless demand.

- Nomadic IAB-node deployment

Flexible and dynamic deployment of IAB-nodes, e.g., mounted on trailers, drones or balloons, provide additional coverage/capacity for special events, temporary traffic hot-spots, or to recover from outage after natural disasters. Support for NTN-based backhauling.

\*) Use cases are discussed in Rel-18 SA1 SI on Vehicle-mounted Relays.

# Rel-18 IAB: Mobile and nomadic IAB - Functionality (1)

- Power & interference management to cope with close inter-node proximity
  - Avoids mutual overpowering in case a mobile node comes into close proximity with another node or cell site.
  - Provides robustness to suboptimal placement of nomadically deployed nodes.
- Mechanism for PCI and RACH conflict avoidance
  - Avoids outage and failed access attempts for non-stationary IAB-nodes and ad-hoc deployments.
- Node-mobility-aware cell selection and handover for UEs
  - Cell selection and handover is based on the relative speed between IAB-node and UE. This might use node-mobility state reporting and/or consideration of node-mobility history.

# Rel-18 IAB: Mobile and nomadic IAB - Functionality (2)

- Autonomous alignment of feature support between migrating IAB-node and RAN.
  - OAM-based feature match up between IAB-node and RAN becomes uneconomical and/or too slow when IAB-nodes migrate over extended area or are deployed in ad-hoc manner.
  - RAN and migrating IAB-nodes need to mutually agree on the features used.
- Support for local services at migrating IAB-node
  - On-vehicle RAN may support local break out to provide on-board services.
  - Nomadic deployment at special event provides event-specific information.

# Rel-18 IAB: Operation in unlicensed bands (1)

- Motivation

- Large amount of spectrum available for unlicensed band:
  - Up to 14GHz, 1.2GHz and 625MHz bandwidth in respective 60GHz, 6GHz and 5GHz bands

- Support for standalone and licensed-assisted operation

- Alignment of IAB resource management with unlicensed medium access

- Enhance resource management for increased opportunity for successful medium access
- Allow for adaptive resource management based on medium access results

- Intra- and inter-IAB-node coordination of medium access

- Coordinated intra- and inter-IAB-node medium access procedure, e.g., via COT sharing, leads to more efficient resource utilization.

# Rel-18 IAB: Operation in unlicensed bands (2)

- Optimization of channel sensing by collocated IAB-MT and IAB-DU
  - Allow for separate channel sensing procedures with partially shared components, e.g., contention window updates.
  - Support dynamic parameter adjustments, e.g., energy detection threshold, sensing window, sensing timing etc., depending on multiplexing capability of DU/MT operation.

# Rel-18 IAB: Multi-PLMN/NPN-shared IAB network

- IAB serves multiple PLMNs/NPNs using separate gNB-CUs
  - IAB-donor-CU needs to manage backhaul for UE bearers configured by other PLMN/NPN-CUs.
  - Inter-PLMN/NPN-CU information exchange via Xn may not be supported.
- RAN integration of IAB-nodes from different PLMNs/NPNs
  - Example: An NPN network may extend PLMN coverage by appending IAB-nodes to the PLMN's IAB topology.
  - Third party IAB-node needs to be authenticated and managed by PLMN RAN.

