RWS-230391

R19 RAN Workshop
Views on Wireless Access Backhaul Evolution

3GPP TSG RAN Rel-19 Workshop

Taipei, 15th ~ 16th, June 2023

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Outline

Wireless Access Backhaul in Mission Critical (MC) Verticals

Work in Rel. 18 with mobile IAB

Gaps in Rel. 18 Progress

Rel 19 Courses of Action: Phased Approach

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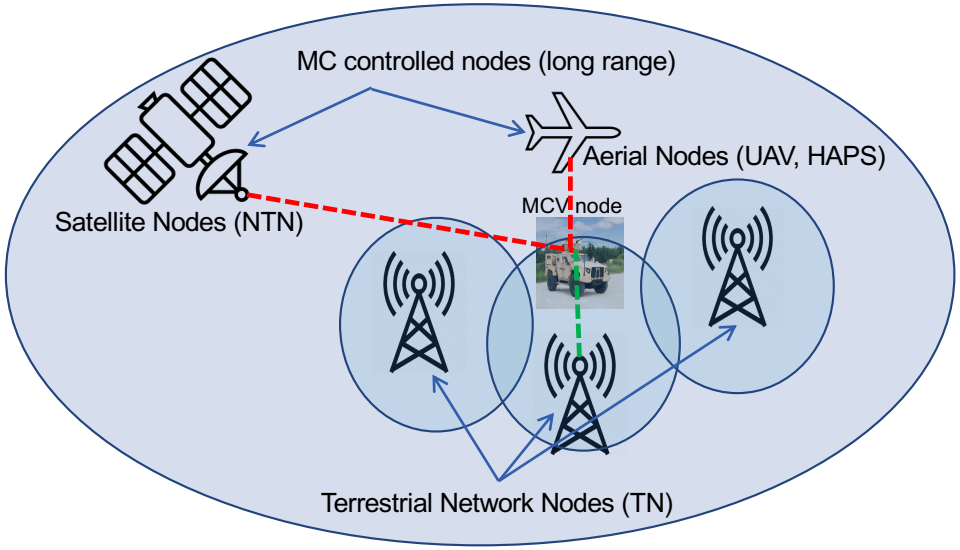
Wireless Access Backhaul in Mission Critical (MC) Verticals

- MC Verticals like disaster recovery, humanitarian aid support, secure communications and such need additional reliability and availability for wireless access and backhaul.

- MC scenarios are diverse from ”RAN” perspective
  - Single, dual, multi-connected nodes
  - Terrestrial (TN), Satellite (NTN), and Aerial (UAV, HAPS) network nodes
  - Heterogeneous access and backhaul links --Sidelink, Uu, IAB, mIAB, VMR, etc.

- QoS/QoE requirements in MC
  - “long-range” links can be MC **controlled**
    - Fits NTN, HAPS, UAV nodes
    - Mobility-wise can be master or secondary nodes
    - Provides direct control of terrestrial MC vehicles (MCV) node for tracking and resiliency. MCV (Mission Critical Vehicle) in turn provides service to its local UEs/IoTs
  - “short range” links can be local or provided by regional **operators**
    - Maintain high throughput in FR1/FR2 coverage
    - Provide network resiliency, traffic off-load



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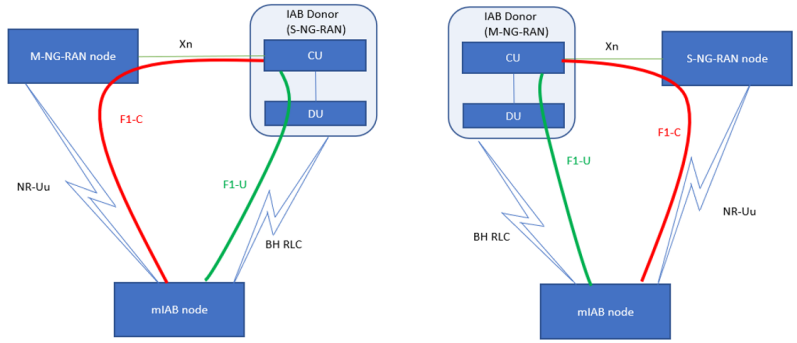
Work in Rel. 18 with mobile IAB

- In Rel 18 we proposed dual-connected mIAB (NTN-TN, PLMN1-PLMN2)
  - In the context of mIAB WIDs
  - Provide additional reliability and availability for some MC scenarios
  - Included CP-UP separation
    - Flexible configuration options in the CP
    - Leverage capacity/availability of public mobile networks



Scenario 1 Scenario 2

Source: R3-230493

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Gaps in Rel. 18 Progress

- Progress gaps:
  - Dual connected architecture adoption is lagging --only EN (LTE + NR) DC is deployment-ready
  - NR-NR DC is complex and has many “corner cases”
- IAB is at early-stage adoption, and mIAB has design challenges
  - More progress in RAN2/RAN3 needed: MT handovers and DU migrations across donor CUs, MCG/SCG, etc. have open design issues
  - Not supported in NTN QoS/QoE capability
- Dual-Connected mIAB was de-prioritized i.e, no solution at RAN/SA/CT level

mIAB has no mobility, no IAB support in RAN, local traffic switching unknowns, etc.
consider alternative solutions built on VMR, NCR

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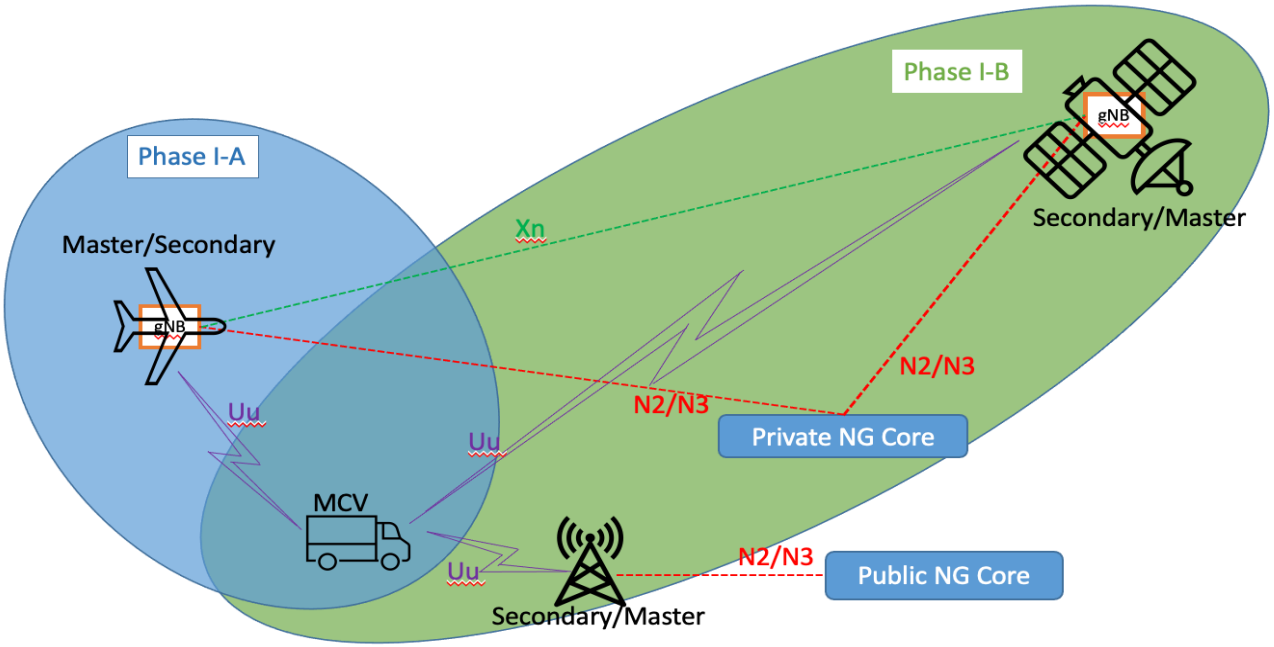
Rel-19 Courses of Action: Phased Approach



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Rel 19 Courses of Action (cont…/…)

- Phase I
  - Phase I-A: Full gNB resident on MC node acting as VMR
    - gNB+UPF provide local onboard services [UAV, onboard UEs]
  - Phase I-B: Full gNB resident on regenerative NTN node(s)
    - Inter-satellite load balancing and handovers via Xn gNB
    - NTN-TN DC feasible, but latency and coverage details need study
- Phase II: Merge Phase I-A and Phase I-B
  - The MCV can have full gNB+UPF for its local UEs. This achieves the same goal as dual-connected mIAB
    - Local breakout for onboard services to optimize backhaul, workloads requirements
  - NR-NR DC (legacy) to bridge the gap in MCVs

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