

RP-182600

3GPP TSG RAN Meeting #82  
Sorrento, Italy, 10-13 December 2018

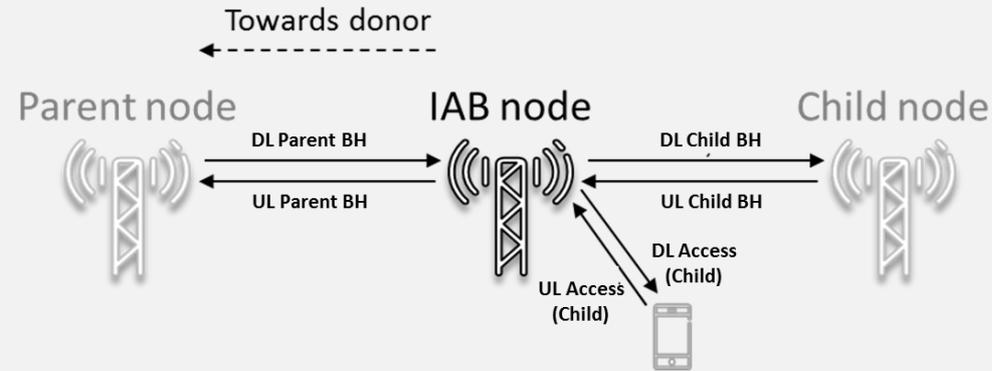
Agenda item: 9.1.2  
Source: Huawei, HiSilicon  
Document for: Discussion



# Unified resource configuration to support TDM/FDM/SDM in IAB

# Background from TR 38.874

- IAB link types:
  - Access link: Between an access UE and an IAB node or IAB donor
  - Backhaul link: Between an IAB node and an IAB child node or an IAB parent node



- An IAB node with half duplex constraint cannot transmit and receive at the same time
- Resource multiplexing between parent link and child link subject to half duplex constraint
  - TDM
    - Resource allocation between the parent link and child link in a TDM manner
  - Transmitter-side SDM/FDM
    - IAB node simultaneously TX in DL (to an access UE and/or child IAB node) and TX in the UL (to a parent IAB node).
  - Receiver-side SDM/FDM
    - IAB node simultaneously RX in DL (from a parent node) and RX in UL (from an access UE and/or child IAB node).

# Performance benefit of SDM

## System capacity gain

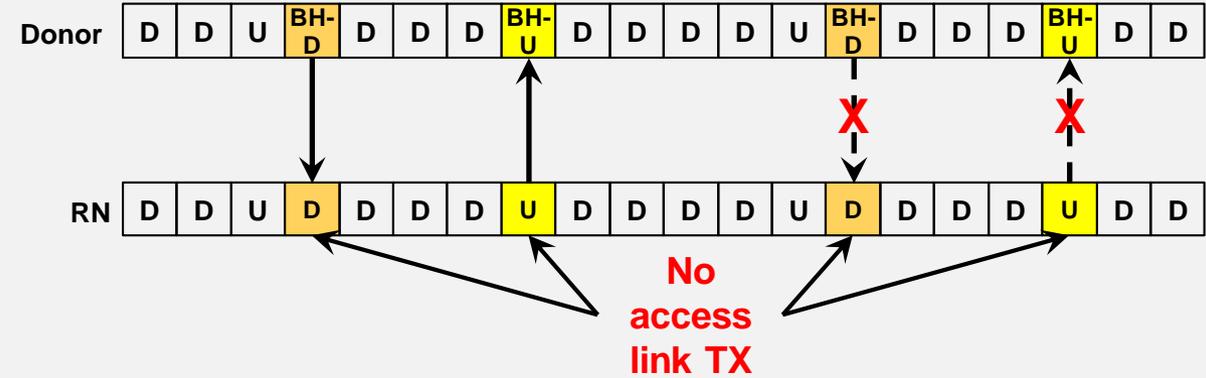
# of IAB nodes	Baseline: Without IAB nodes		
	Static TDM	Dynamic TDM	Dynamic TDM+ SDM
3 per sector	+10.2%	+28.3%	+45.1%

## Performance benefit of dynamic SDM

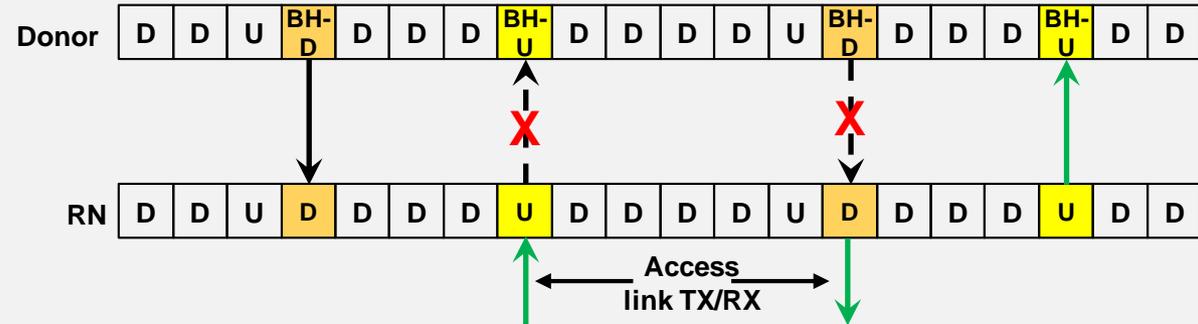
- ~35% system capacity gain compared to semi-static TDM
- ~15% system capacity gain compared to dynamic TDM
- ~10% to ~30% UPT gain compared to dynamic TDM

**Allows exploitation of multi-panel IAB nodes from early mmW deployments**

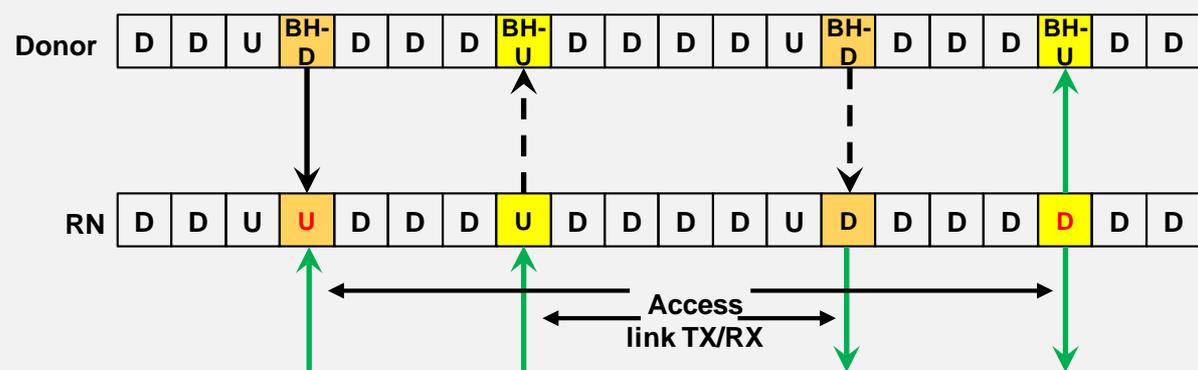
### Static TDM



### Dynamic TDM

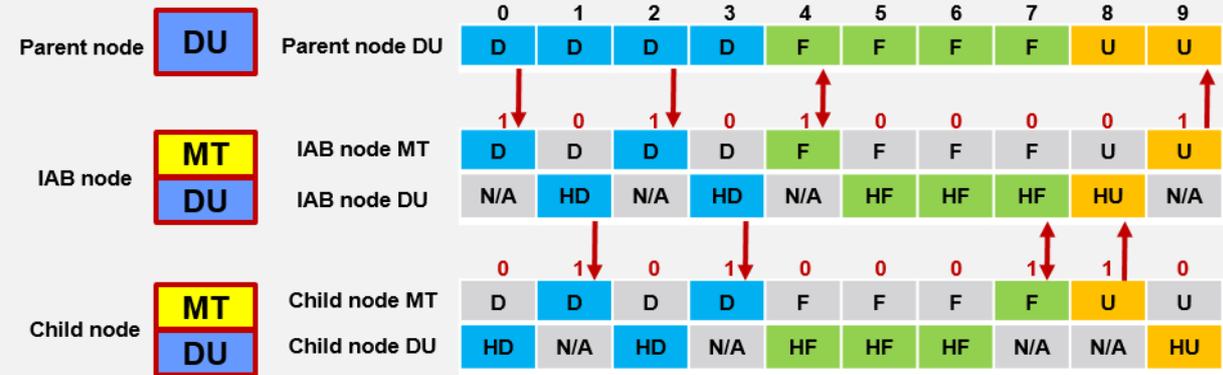


### Dynamic TDM + SDM/FDM

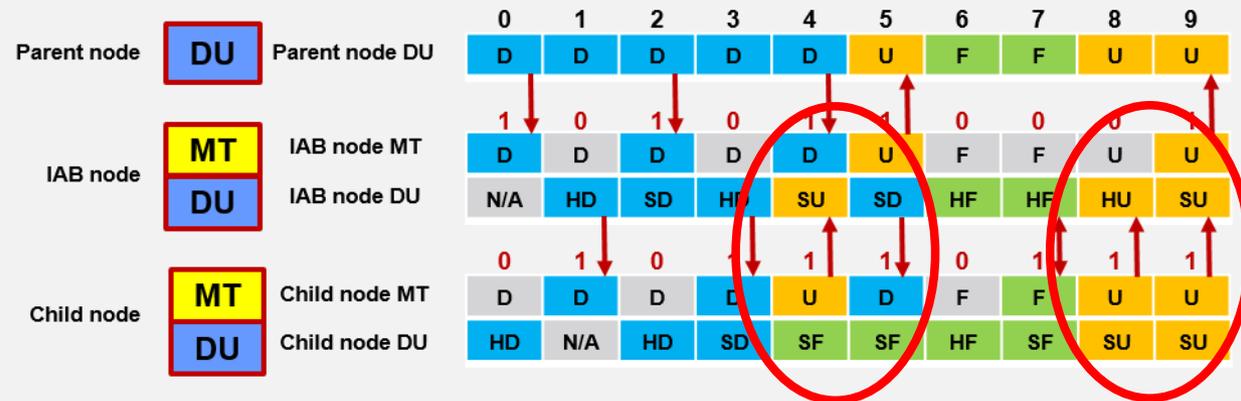


# Resource configuration for TDM/SDM/FDM

- IAB will define “N/A” and “SOFT” symbols for IAB-node DU resources
  - DU cannot use N/A symbols
  - **Parent** node dynamically controls SOFT symbols
- Dynamic TDM will be enabled by parent dynamically allocating SOFT symbols to child node
  - No simultaneous TX/RX for DU and MT of IAB-node
- Same framework** is reported in TR 38.874 for enabling TDM/SDM/FDM
  - Allows simultaneous TX/RX for DU and MT of an IAB-node



Semi-static TDM between MT and DU



Dynamic TDM/FDM/SDM between MT and DU

## Feasibility analysis during SI

- SI analyzed TDM and TDM/FDM/SDM resource coordination to same level of detail, with supportable operations contained in TR 38.874
    - Tables 7.3.3-1 and 7.3.3-2
  - Timing Advance (for SDM) also analyzed in detail in TR, and almost agreed in RAN1#95 – ‘case #6’ and ‘case #7’ in TR 38.874
    - Section 7.4
- The work needed for TDM/SDM/FDM has been identified, and de-risked, in the SI phase

# Observations and proposal

- TR 38.874 shows it is feasible to support TDM/FDM/SDM resource coordination in a common framework
- It is beneficial to have a design from Rel-16 that exploits and motivates multi-panel IAB nodes
  - Capacity gains are significantly higher when SDM/FDM are also supported, which will motivate the business case for early mmWave deployments
  - mmWave deployment may be less attractive if IAB's capacity gain is limited
  - Designing a common framework in one release, with minimal additional work, can save standardization time overall and ensure smooth specification compatibility across releases
- **Proposal**
  - In Rel-16, specify a unified resource coordination scheme to support TDM/SDM/FDM operation for IAB-node DU resources, to provide efficient multiplexing of backhaul and access IAB links