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Nokia Networks

IEEE802.1CM Terminology Considerations

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Motivation for presentation

- Current IEEE802.1CM PAR terminology:
  - Radio Equipment (RE) and the Radio Equipment Controller (REC).
    - RE is also referred to as Radio Unit (RU) and Remote Radio Head (RRH).
    - The REC is also referred to as Digital Unit (DU) and Base-Band Unit (BBU).
  - Fronthaul defined to be connection between RE and REC
  - Inherited CPRI terminology
- Ethernet fronthaul would require more generic terminology
  - Ethernet allows more options for network topology, nodes and functional splits
    - CPRI is focused on point-to-point connectivity
  - Should start with nomenclature which is not limiting evolution

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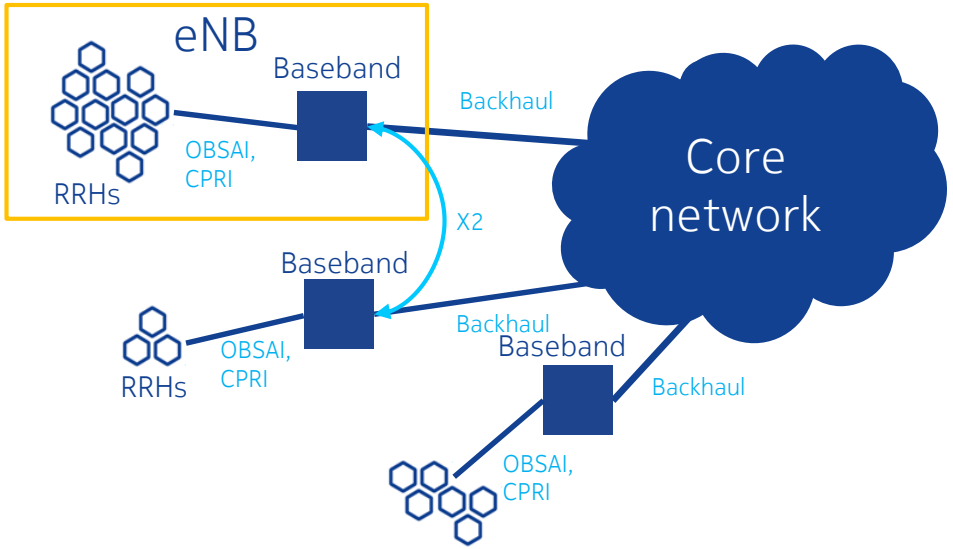
RAN architecture
Basics

- BTS is eNB in 3GPP definitions
  - RRH+Baseband
- Main interfaces are
  - Uu – air interface towards mobiles
  - S1 – backhaul interface towards core network
  - X2 interface to peer BTS
- CPRI/OBSAI based fronthaul is internal interface i.e. not defined by 3GPP



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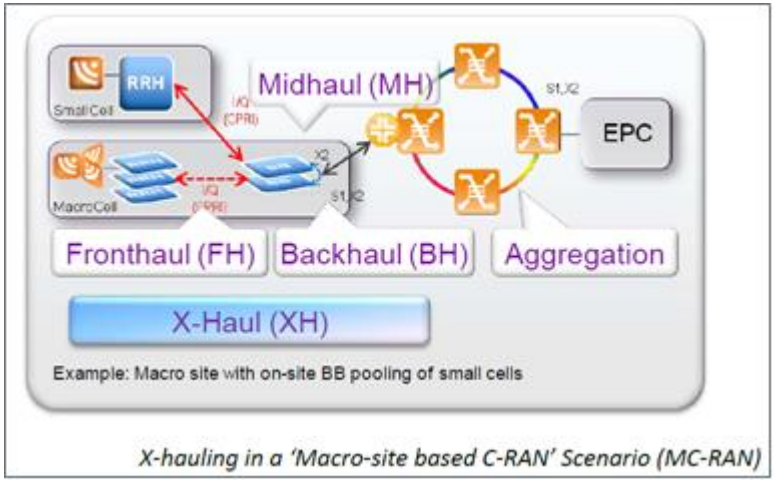
Fronthaul definition
Some definitions for hauls

X-Hauling in Open RAN Environments



X-hauling in a 'Macro-site based C-RAN' Scenario (MC-RAN)

MEF 22.1.1
Backhaul is the Carrier/Metro Ethernet Network between the RAN base station and the RAN network controller.
Midhaul is the Carrier/Metro Ethernet Network between RAN base station sites.

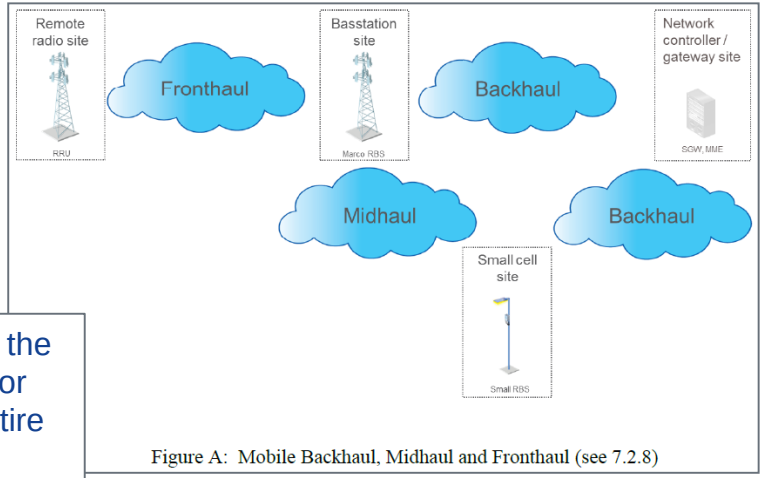


Figure A: Mobile Backhaul, Midhaul and Fronthaul (see 7.2.8)

In a hierarchical telecommunications network the backhaul portion of the network comprises the intermediate links between the core network, or backbone network and the small subnetworks at the "edge" of the entire hierarchical network. (Wikipedia)

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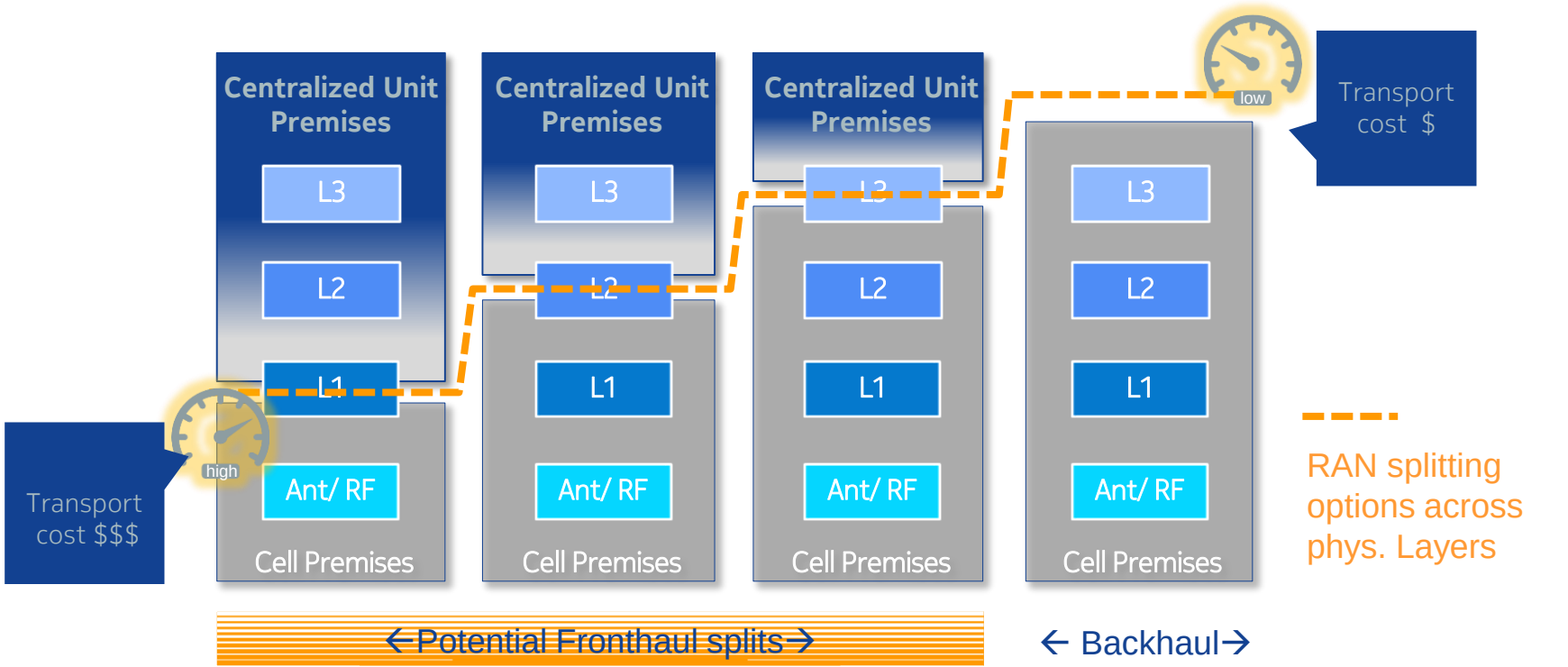
Optimal Functional Split is a Multi-dimensional Tradeoff

There is no one-size-fits-all solution as split may depend on deployment scenario



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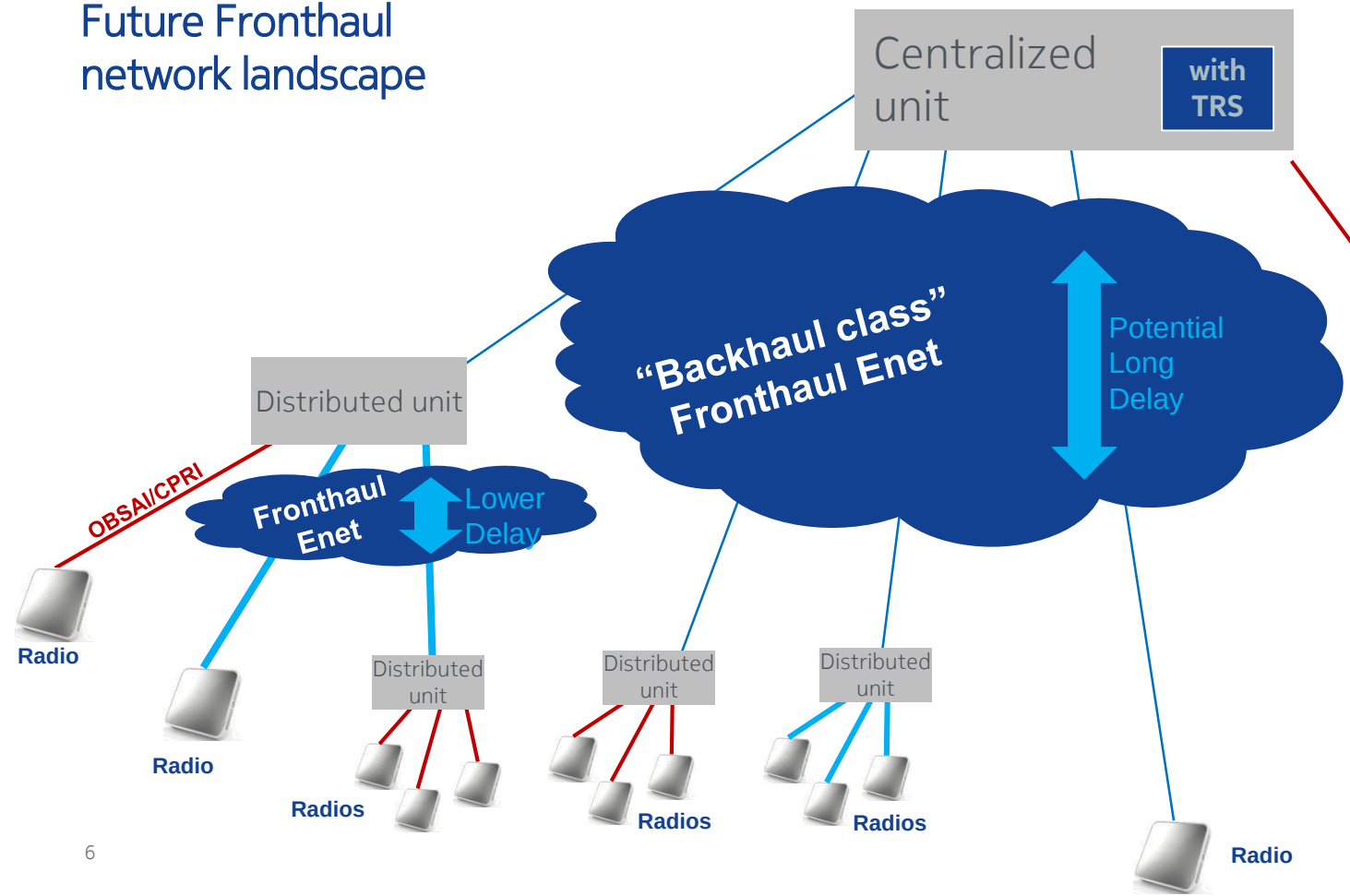
Future Fronthaul network landscape



Enet, Latency Sensitive

Enet, Latency Insensitive

CPRI/OBSAI, Dedicated Fiber

3 different profiles/domains:

- "CPRI" class
- Fronthaul Enet
- "Backhaul class"

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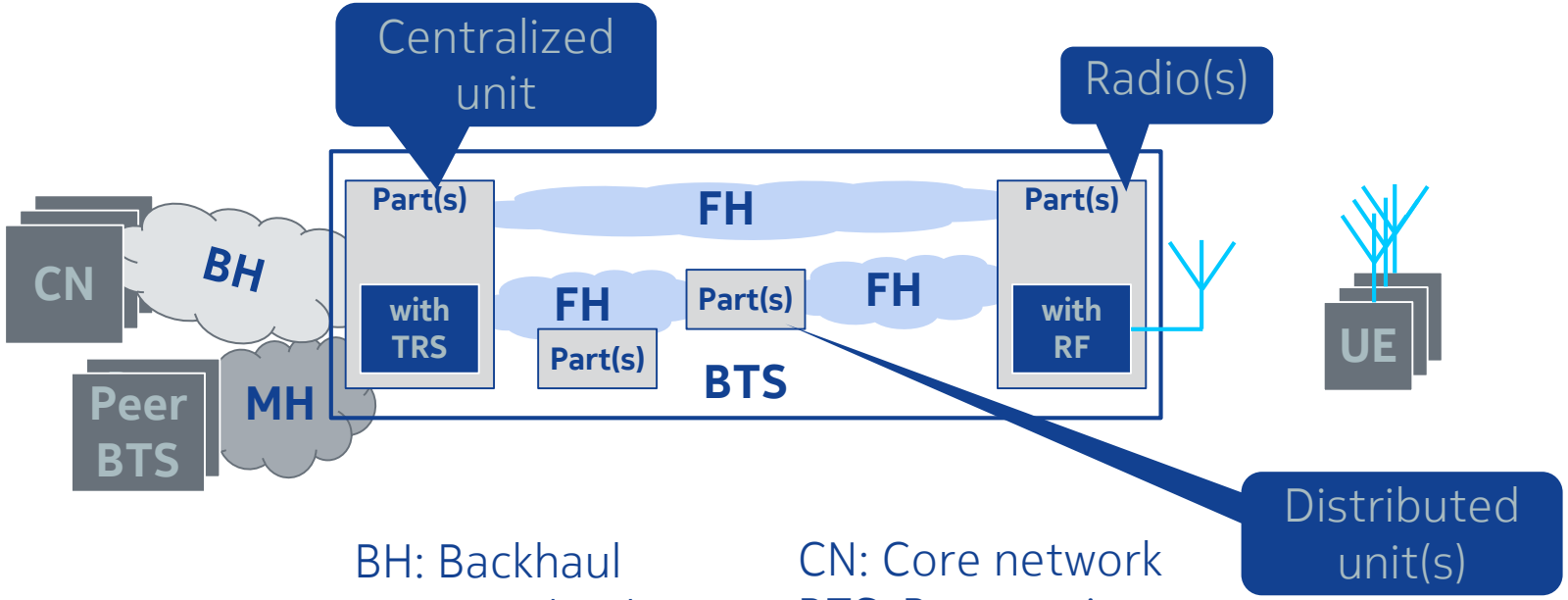
Fronthaul definition that could be used here

From the perspective of a single base station…



BH: Backhaul
FH: Fronthaul
MH: Midhaul

CN: Core network
BTS: Basestation
UE: User Equipment
TRS: Transport

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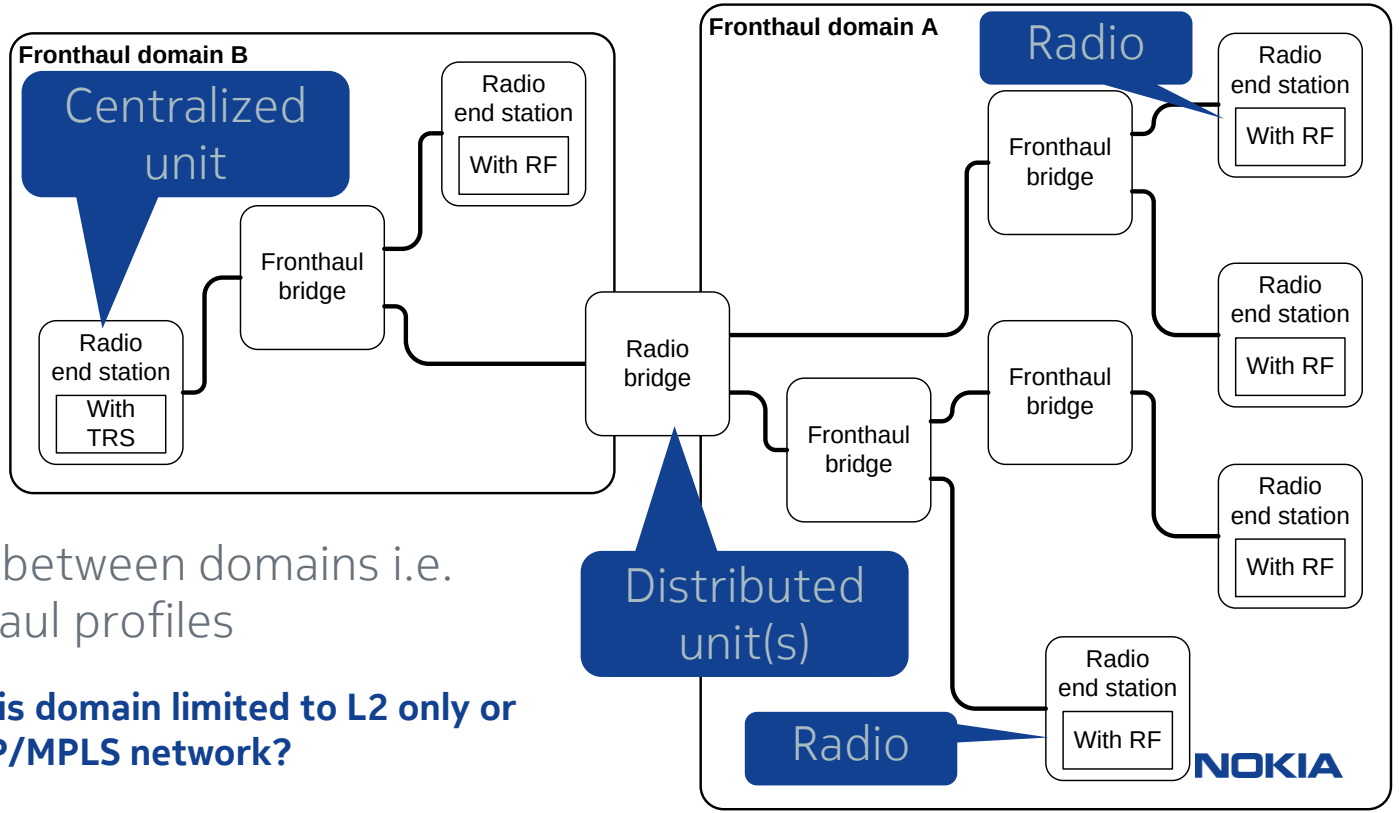
Comparison against 802.1BA

- Compared to AVB standard landscape looks a bit different
- Additional to end stations there is need to have ”radio bridges” to interoperate between domains i.e. different fronthaul profiles



Question: is domain limited to L2 only or can it be IP/MPLS network?

Nomenclature summary

- RE (Radio Equipment) and REC (Radio Equipment Controller) may not be generic enough terms in Ethernet concept
  - As shown there might be need to have equipment (“radio bridges”) that are not RE nor REC
- Options:
  - Declare 2 classes: (Preferred) Centralized unit (CU) and distributed unit (DU)
    - DU includes Radio Equipment and Radio Bridge
    - Fronthaul network can exist between CU and DU and between DU and DU.
  - Declare 3 classes: Radio Unit (RU), Distribute Unit (DU) and Centralized Unit (CU) which control both RU and DU.
- CU to CU connection is X2 (Midhaul) – not in scope