Leveraging PON for MOPA

OFC Floor show

Thursday, 09 March, 13:30 – 15:00

Theater III

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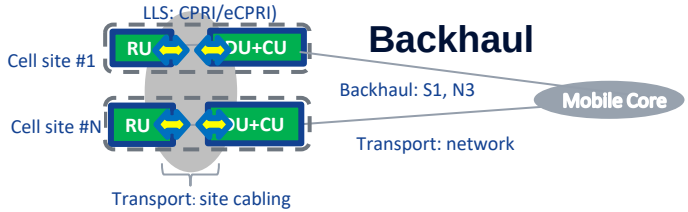
Nokia, Canada

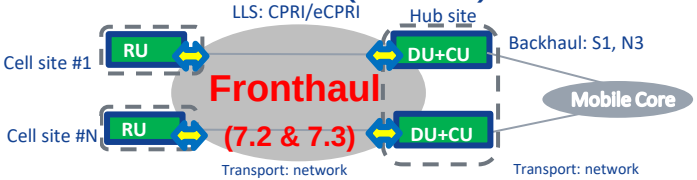
Name, department name, etc.

MOPA Blueprints and associated Pluggables

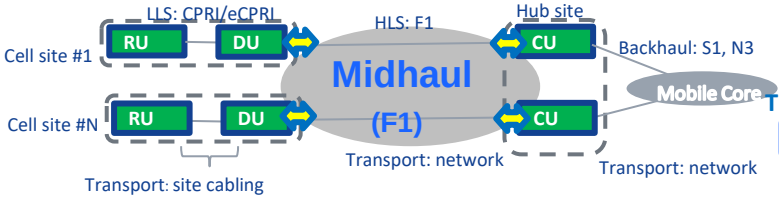
Distributed RAN (DRAN)



Centralized RAN (CRAN)



Virtual RAN (VRAN)



Blueprints included:

P2P fiber

P2P fiber
P2P active
Tunable WDM
TDM-PON*

P2P fiber
P2P active
Tunable WDM
TDM-PON

- A total of 19 blueprints defined
- Latest version includes
  - Mapping of MOPA pluggables to standards
  - Framework for assessing synchronization error (asymmetry) introduced by optics
  - Proposal for 48 channel DWDM
  - Auto-tuning methodology for DWDM

This presentation focuses on 4 of the blueprints related to PON:

1. HLS with separate ONU
2. HLS with pluggable ONU

MH

3. LLS with separate ONU*
4. LLS with pluggable ONU*

FH

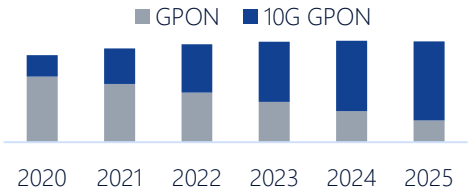
* = future solution

Future PON will be determined by new use cases and cost efficiency

Long term research

Addressing **5G** era and **IND 4.0**

Driven primarily by residential



Today: >80% of deployed PONs are GPON

Coherent PON

50G TWDM

50-100G PON

25G WDM-PON
(WR & WS)

50G G.HSP

25G PON

NGPON2

XGS PON

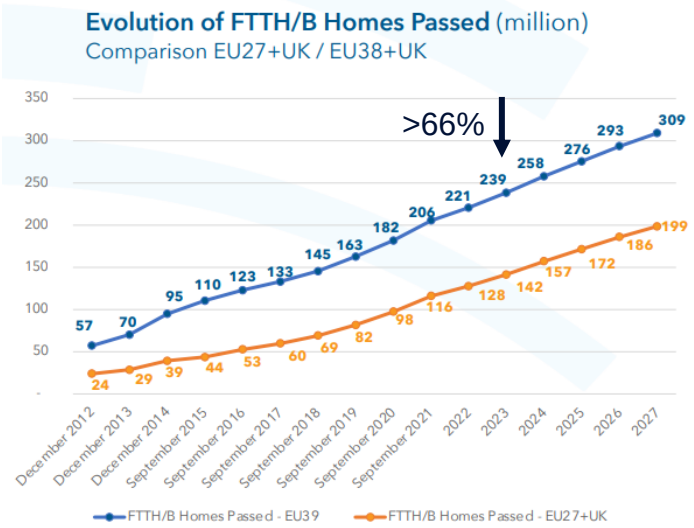
GPON

Current focus for mobile xhaul within MOPA

Why use PON for mobile transport?

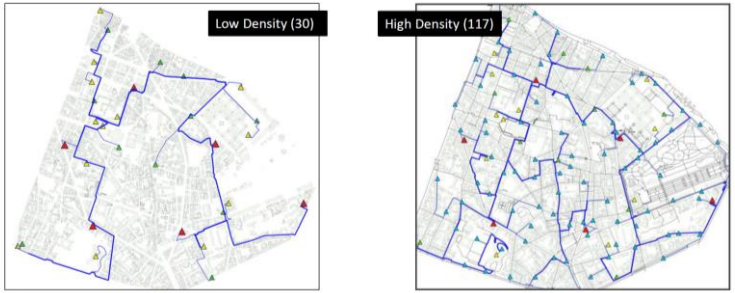
Fiber is widely deployed:

>66% of European homes passed, and increasing.



FTTH Council Europe, “Forecast for Europe” 2022

Fiber infrastructure sharing greatly reduces Total Cost of Ownership (TCO) for the Mobile Network Operator (MNO)



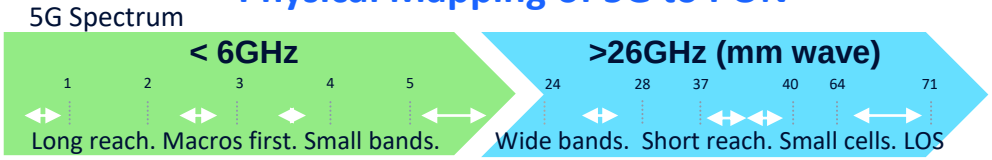
	High Dense Cells	Medium Dense Cells	Low Dense Cells
High Dense Area	74% -- 5,6%	75% -- 3,8%	96% -- 0,4%
Medium Dense Area	75% -- 7,2%	83% -- 3,2%	93% -- 0,8%
Low Dense Area	65% -- 6,6%	81% -- 2,7%	85% -- 1,9%

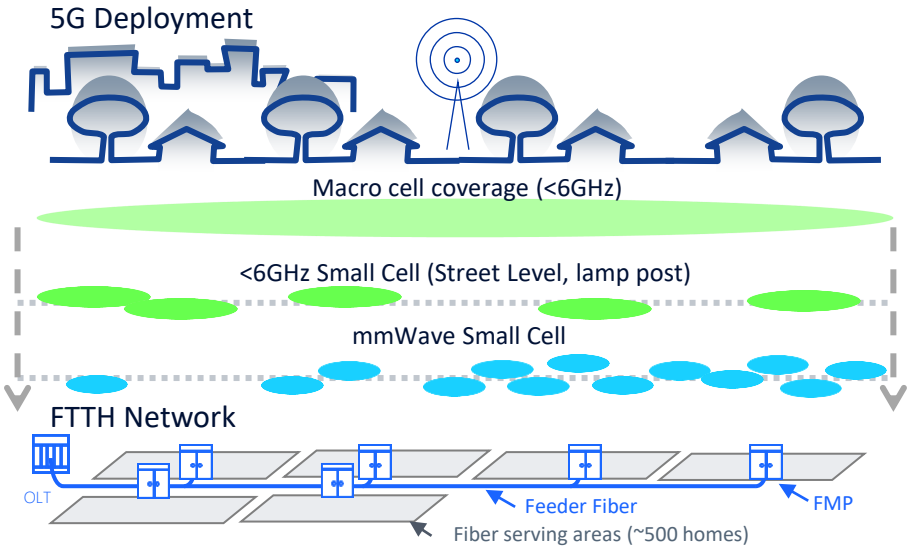
% of FTT5G saved by convergence -- % of extra investment to make FTTH 5G-ready

Comsof, presented at FTTH Council Europe

Addressing mobile x-haul with PON Technology

Physical Mapping of 5G to PON

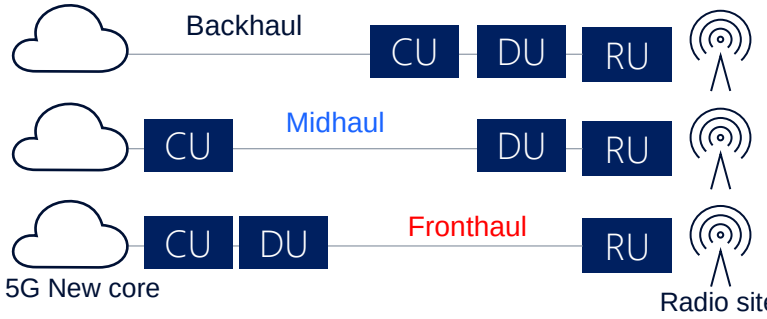


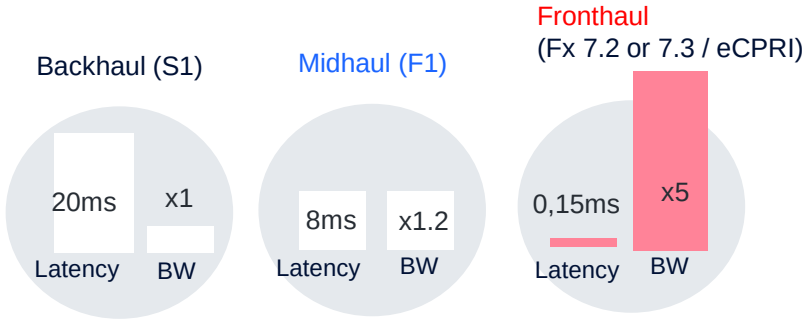


The opportunity:

Small cells map nicely to PON deployment

5G Architectures to be supported

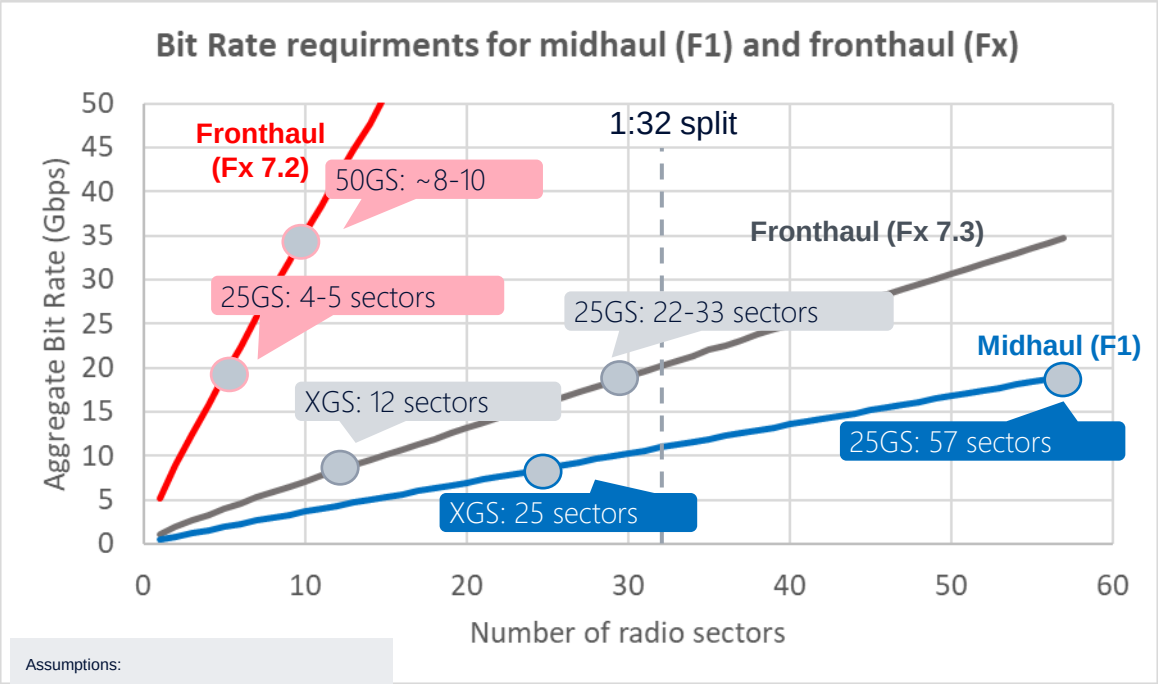




The challenge:

FH demands high BW and low latency

Addressing the mobile x-haul **bandwidth** challenge



Assumptions:
- Simulations using 3GPP modelling tool
- 100MHz band with 4x4 mimo
- F1 simulated load @ 80-100% (95%ile)
- Fx simulated load @ 60% (100%ile)

Observations

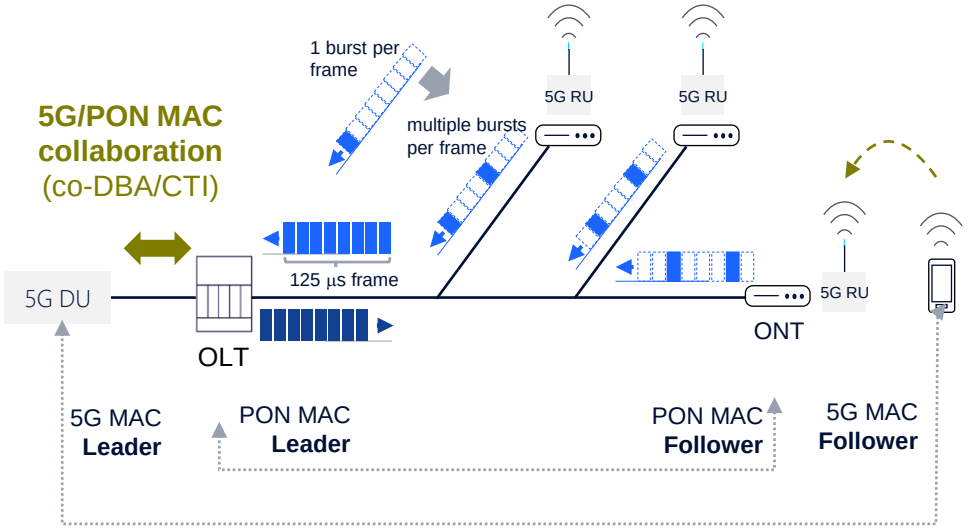
- XGS and 25G PON are well suited for Midhaul (F1) and Fronthaul (7.3).
- 50GS could play a complementary role to support Fronthaul (7.2) ...but requires symmetrical (i.e. 50G upstream), low latency and SFP-ONU, etc

XGS and 25G PON are well suited (BW-wise) for most 5G small cell cases

Addressing the mobile fronthaul **latency** challenge

Mitigation techniques

- Multi burst packet
- Collaboration between 5G/PON MAC (i.e. Cooperative-DBA / CTI)
- Alt. wavelength for ranging or Whisper ranging



Sample latency requirement for FH: 150µs
(to cover faming, BW allocation, ranging …and time for light to travel)

- Latency of PON can be reduced to <50µs allowing **>10km** of fiber (for the speed of light)

There are solutions to reduce latency for fronthaul on PON

Summary

- PON is one of the technologies supported by MOPA
- It is especially well suited
  - for small cell deployment
  - for converged operators
- XGS and 25GS PONs can nicely support the bandwidth for Backhaul, midhaul and fronthaul 7.2
  - FH 7.3 requires more bandwidth and could take advantage of 50G …but would need symmetric
- Latency challenges for fronthaul are being addressed by standards collaboration
  - Cooperative DBA / CTI

Thank you

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