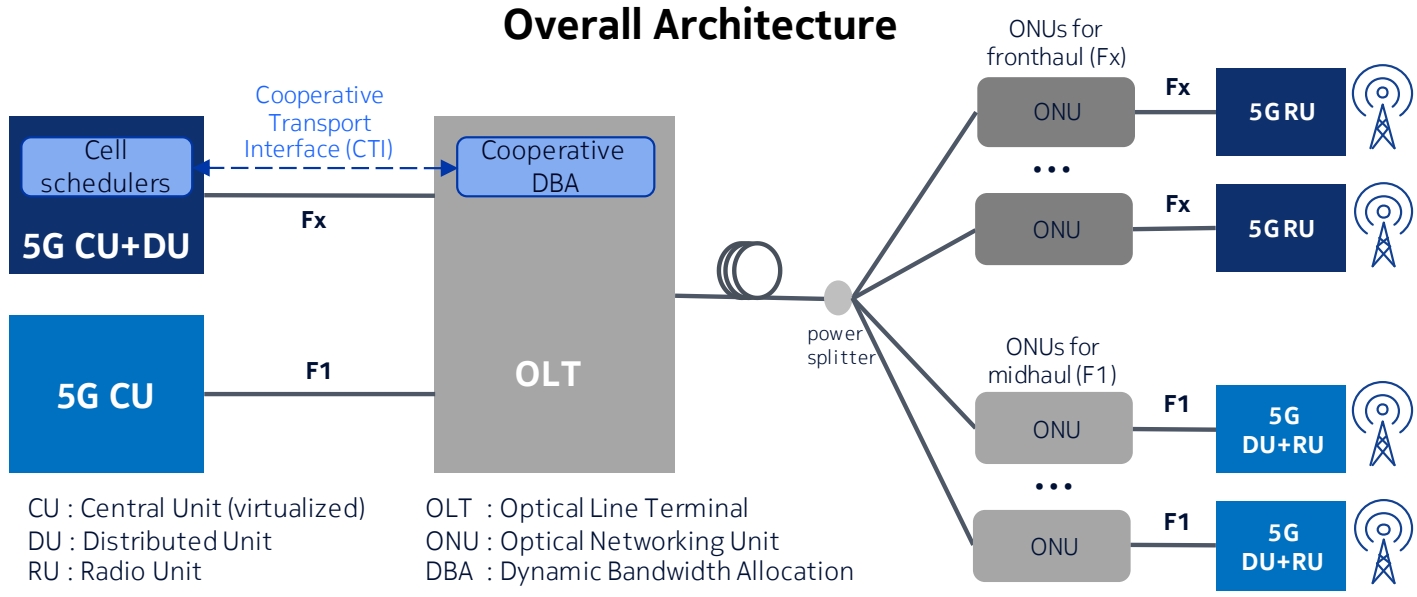
Passive Optical Networks for 5G Anyhaul

Exploiting mobile traffic dynamics with low-latency techniques

We present TDM-PON as a transport solution for the 5G Cloud-RAN deployments with split-processing architectures. We also demonstrate the Cooperative Dynamic Bandwidth Allocation (CO DBA) concept on TDM-PON for a low-latency, bandwidth-efficient transport of mobile fronthaul traffic.

Overall Architecture



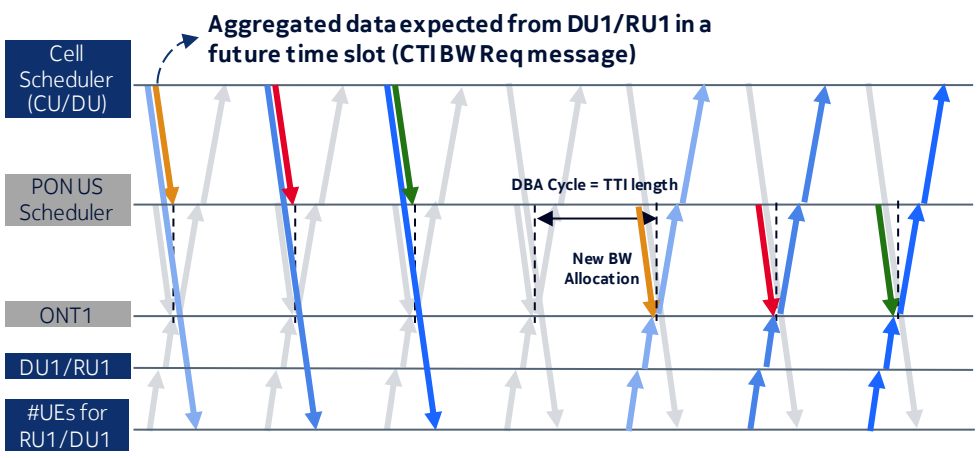
Drivers

- 5G networks based on C-RAN architectures with split-processing base stations
- Statistical nature of fronthaul, midhaul and backhaul traffic –> stat-mux gain
- Low-cost, low-latency, efficient fronthaul aggregation of many radio units

C-RAN interface characteristics

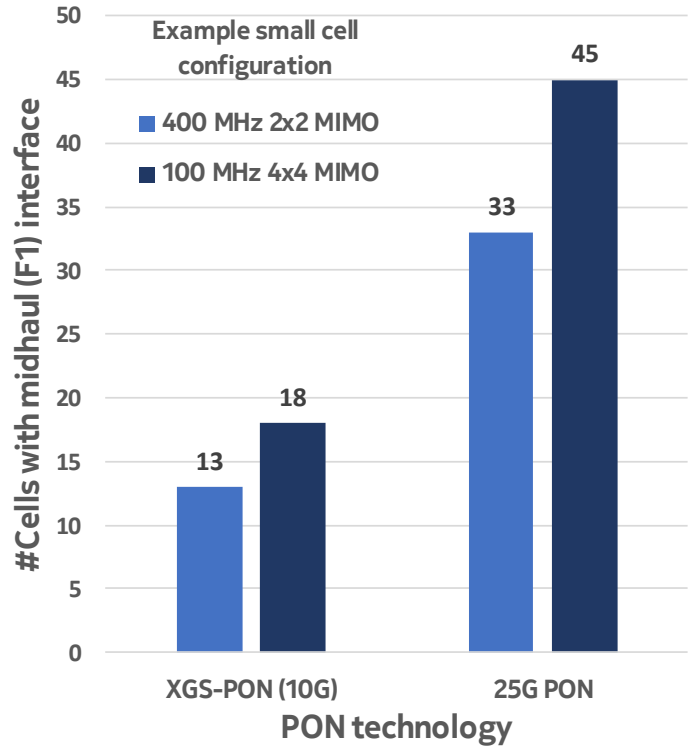
Criteria	F1-Interface	Fx-Interface (eCPRI for transport)
Throughput req.	low (< ~ 8% of CPRI)	high (< ~33% of CPRI)
Latency tolerance (transport)	high (>1 ms)	low (~100s µs)

Cooperative DBA concept



- Synchronized operation of cell scheduler and TDM-PON scheduler
- DBA cycle time = TTI length to match the frequency of traffic changes in the fronthaul traffic
- Cooperative Transport Interface (CTI) being specified in the Open RAN (ORAN) consortium

#Cells with midhaul (F1) interface on PON



average air interface throughput = 20% of peak,
10% transport overhead, 85% effective throughput for PON

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