



WS09- Moving from optical components in RAN to optical components for RAN

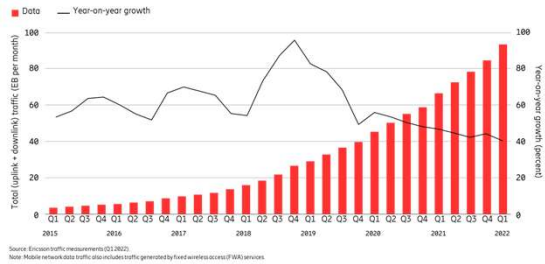
Capacity expansion in fronthaul networks Opportunities and challenges

Antonio Tartaglia

Main opportunity: the relentless mobile traffic growth



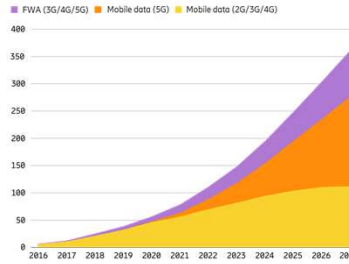
Global mobile network data traffic and year-on-year growth (EB per month)



Global mobile traffic growth Q1/22:

+40% YoY

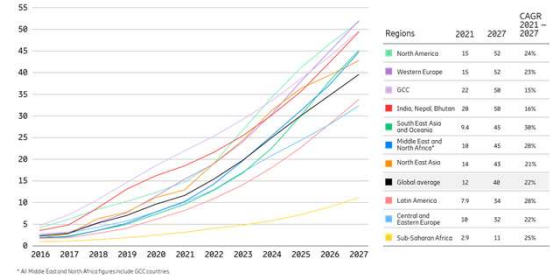
Global mobile data traffic (EB per month)



Global mobile network data traffic, Exabytes/month:

67-84 in 2021
282-368 in 2027

Mobile data traffic per smartphone (GB per month)



Data per month per subscriber in 2027:

40GB global average
11-52 depending on the region

Source: [Ericsson Mobility Report June 2022](#)

Main challenge: the impact of high bit rates on cost and power



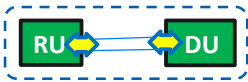
0.1-2km duplex fiber



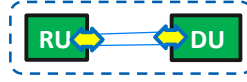
10km-20km BiDi single fiber



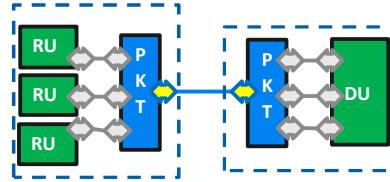
10km-20km WDM single fiber



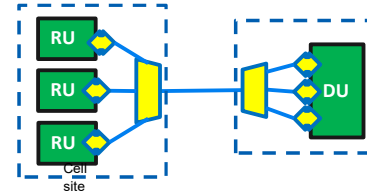
SFP28 → SFP56 → SFP112?



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QSFP28 → QSFP56 → QSFP112?
→ QSFP-DD?

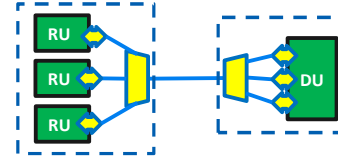


SFP28 → SFP56 → SFP112?

- Serdes speed: 25G, evolving to 50G, 100G is the next step
- Interface bit rates follow the serdes speed, with "1x" and "4x" flavors
- More dissipated power in the same envelope
→ more thermal challenges for an already challenging environment

Open opportunities and challenges

50G/100G per wavelength WDM fronthaul

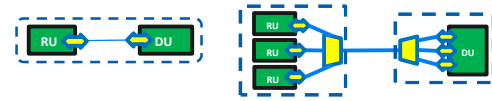


Taming chromatic dispersion at high baud rates

	Opportunity	Challenge
Embracing the O-band, moving the challenge to attenuation/nonlinearities	12 λ LWDM a "low hanging fruit"	Supporting a dual track: C-band and O-band
C-band with link-level dispersion compensation (EDFAs+ DCF/gratings)	Continue with C-band	OpEx model not compatible with the fronthaul segment
Transceiver-level dispersion compensation (either optical or electrical)	Continue with C-band	Cost/power for transceivers Ecosystem creation

Open opportunities and challenges

"next gen" 100G solutions

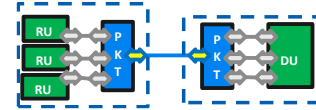


Navigating complexity of the 100G ser-des era

	Opportunity	Challenge
SFP112	"Business as usual": consolidated ecosystem and WoW	Power consumption of electrical retimers(VSR) "Thermal" feasibility of complex variants (e.g. WDM) in an SFP-sized transceiver
Co-Packaged Optics ("adapted" from datacom)	Save >50% power consumption at optical transceiver level Optics out of the thermal critical path (external lasers) enables dense node designs	Ecosystem and WoW disruption Short reach/DRAN only – longer reach optics/CRAN to be solved with external "transport" boxes
Impact of transceivers on constant time error (cTE) in PTP-based networks	Making sure 1x100G retimers are designed for Tx/Rx latency "symmetry" and determinism	Hyperscalers leading the way with Nx100G retimers: for their use cases "low average latency" is enough

Open opportunities and challenges

Packet+optical fronthaul



High capacity fiber efficient optics

	Opportunity	Challenge
100G+ BiDi	Standardization has started @ 802.3 Technology palette already available (e.g. LWDM / CWDM 50Gbaud optics)	Making sure mobile transport requirements are part of the standardization discourse
"Coherent lite"	Synergies with OIF's "800G LR" Thoughts about coherent for 1.6T fabric (2km) interconnects	"Adaptation" to mobile transport requirements: temperature, synchronization, etc. ... Single fiber operation

MOPA can help with challenges and opportunities



- Continuing to **drive** the requirements to ensure the industry develops the necessary technologies for mobile networks
- Exposing challenges of this process early on , turning them into explicit **requirements** for the mobile transport industry
- Increasing **involvement** with the worldwide standardization community



Discover more at <http://mopa-alliance.org> , online from 19/09/2022



