



«Higher speed» optics for RAN: what, where and when ?

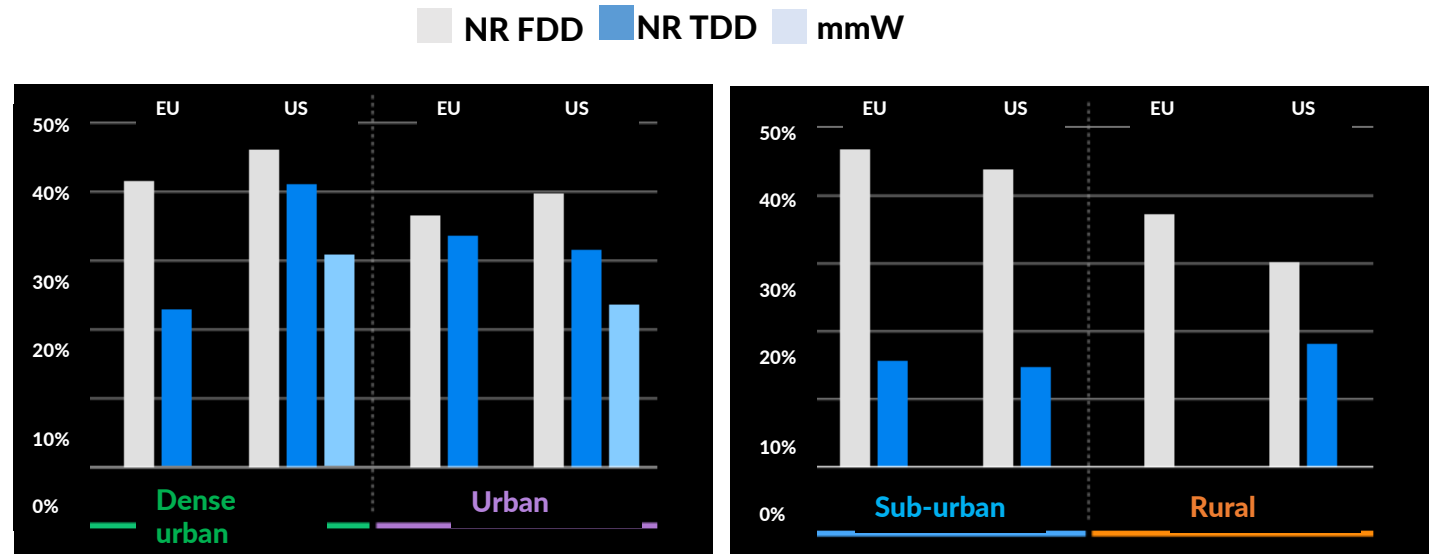
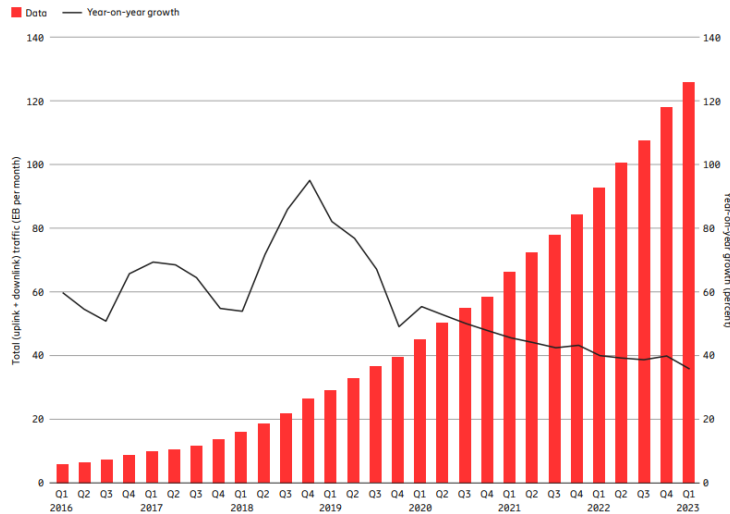
ECOC 2023 – MOPA, Optics for Wireless Networks (Su.B.2)

Antonio Tartaglia

The journey so far...

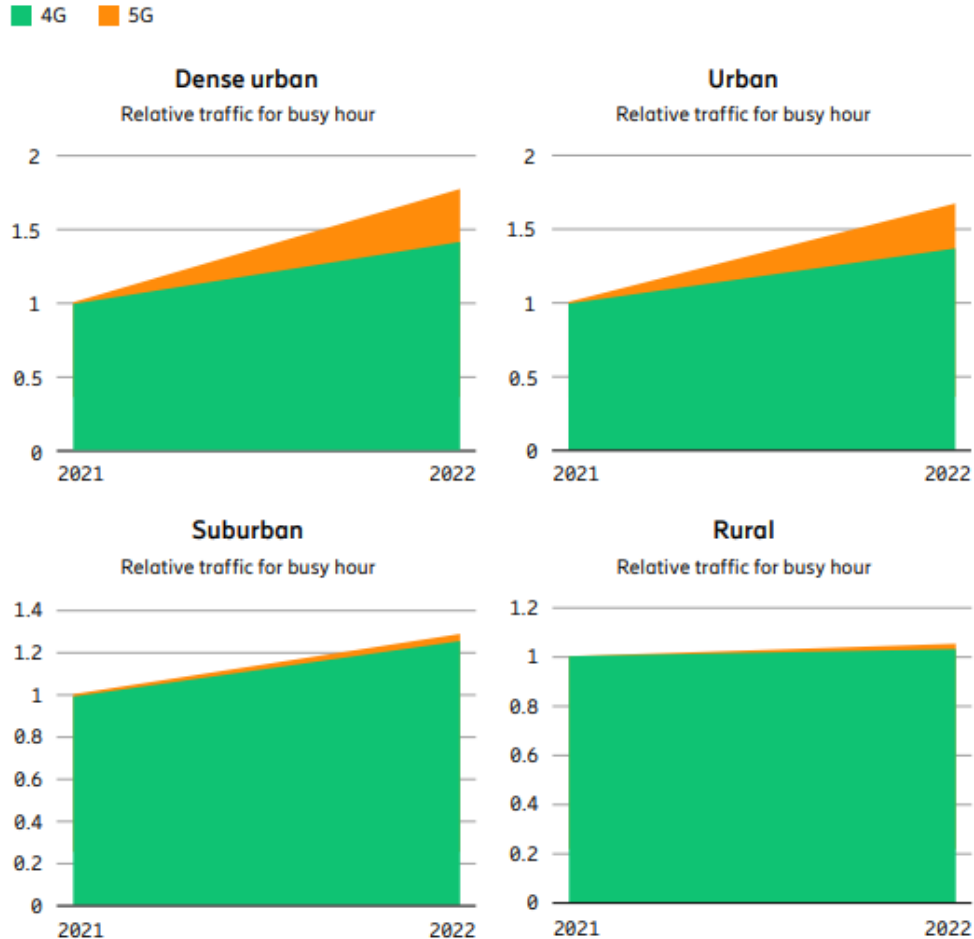
36% YoY mobile traffic growth
1.5bn 5G subscribers in 2023

The journey is far from being complete:
only 35% of the world population has 5G



More coverage and capacity needed to provide the world with full 5G experience

Figure 23: Relative traffic growth for peak period by location type in Western Europe



Quality, capacity and “capillarity” of the mobile transport network are the enabling factors to extend RAN capacity and coverage

While using resources effectively, especially in dense urban and urban areas where traffic grows faster and resources are scarcer

Optical + microwave + packet transport

Advanced use cases, “beyond eMBB”, will accelerate growth

Mobile networks to be re-dimensioned to handle the traffic and performance requirements of new real-time services

Augmented reality: stringent delay requirements, bounded latency, limited packet loss, more conservative operating parameters in the RAN, high quality mobile transport

Even more coverage, even more capacity...

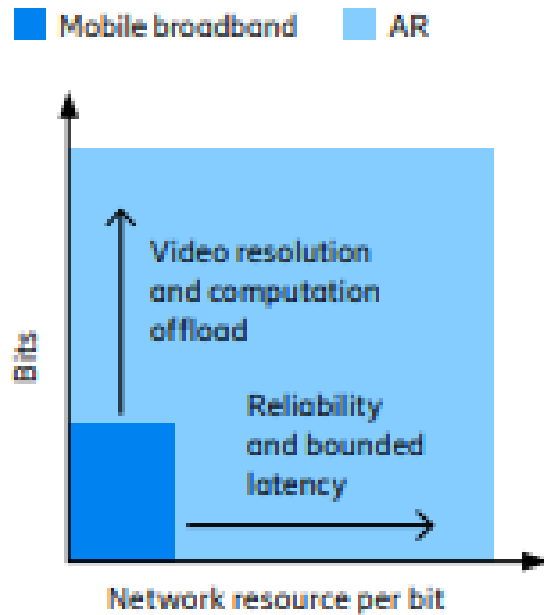
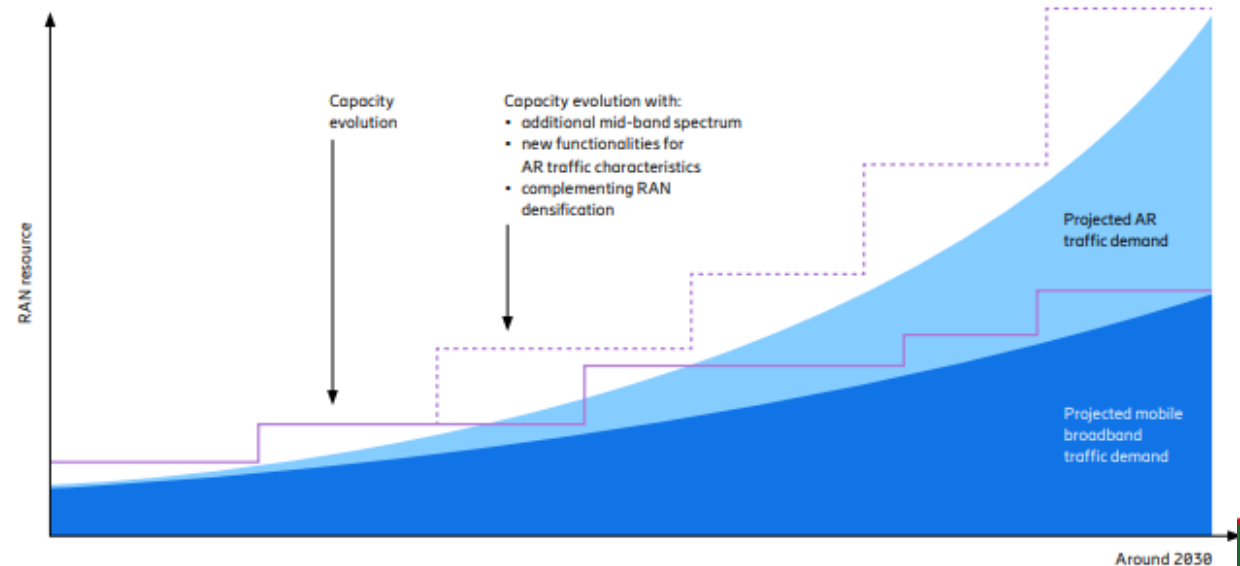


Figure 30: AR and mobile broadband traffic and capacity evolution



“Higher speed” definition: Datacom and RAN

Electrical serdes
speed on host boards



Optical solutions “follow the serdes”

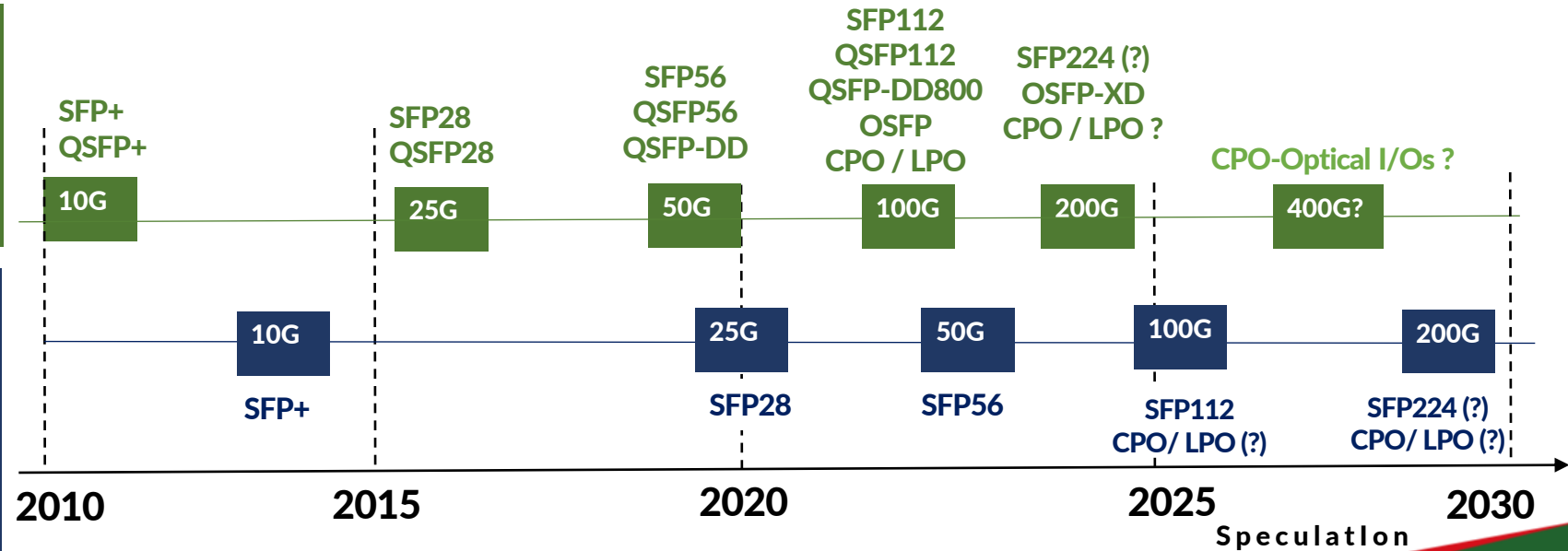
Optical solutions
“replace the serdes”?

Fat pipes with few endpoints
Indoor benign environment
Low-medium availability
Low latency

Datacom
(DC)

Smaller pipes with many endpoints
Outdoor harsh environment
High availability
Latency determinism
High quality sync

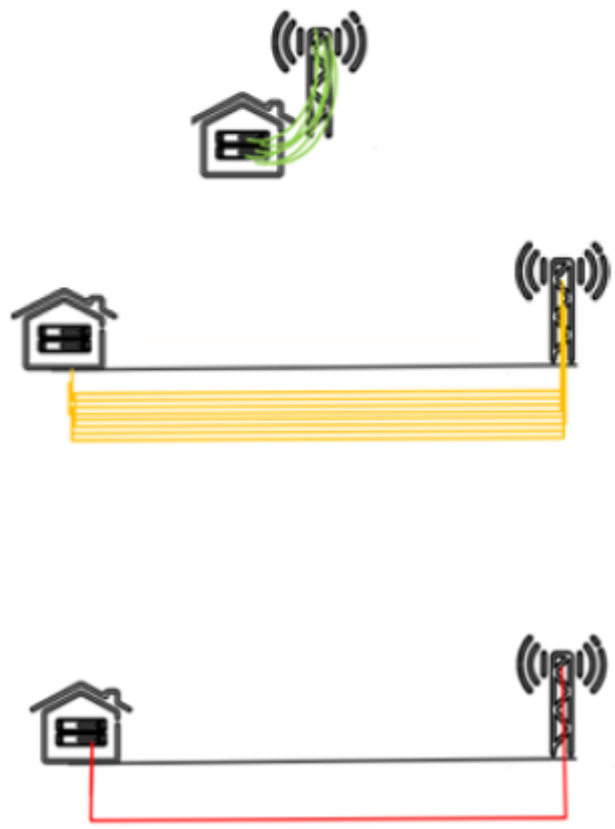
Telecom
(RAN)



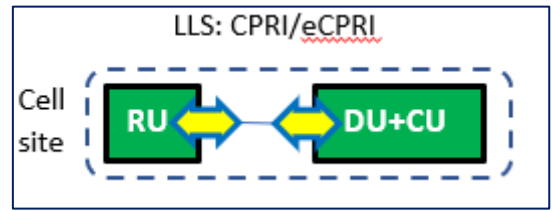
Optical solutions for mobile networks



“Perfect storm” on the horizon:
 RAN equipment optimized for short reach/DRAN with CPO/LPO
 Transport equipment to cover CRAN transport scenarios with QSFP-sized optics.

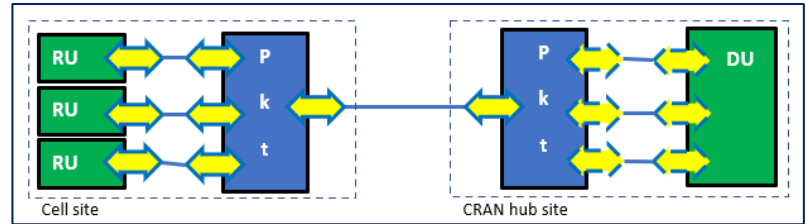


Site cabling / duplex fiber
 SFP28 SFP56 SFP112 CPO?



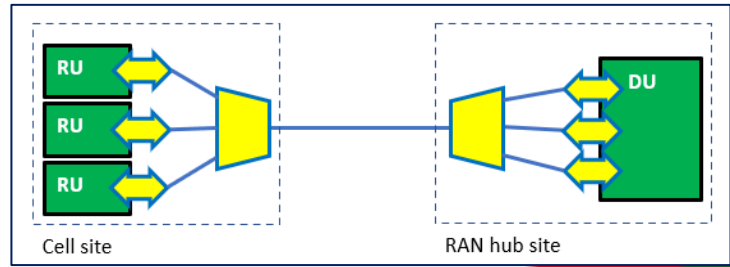
“Direct fiber”, short reach and BiDi: a path to 100G exists

Abundant dark fiber / BiDi
 SFP28 SFP56 SFP112 QSFPx?



Use of transport boxes, capable of hosting more complex optics, will relieve this pain point

Scarce dark fiber / WDM
 SFP28 SFP56 SFP112 QSFPx



Increasingly difficult to maintain the SFPx form factor for complex optics, as the bit rate increases

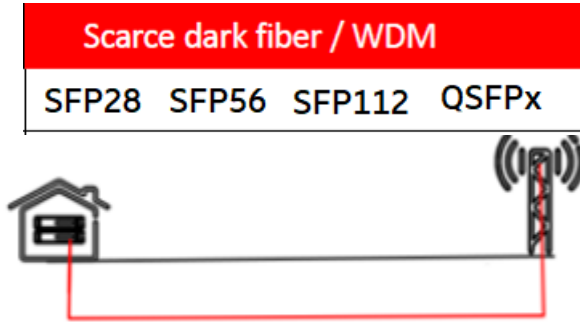
The mobile transport palette for fiber scarce scenarios



LWDM
O-band WDM
C-band WDM

PAM-4
Coherent lite
Integrated EDC / ODC

Packet
aggregation



Low hanging fruits:

50G PAM-4 LWDM up to 15-20km
100G BiDi / LWDM (QSFP28 + packet → SFP112)

Emerging trends:

Denser O-band grids becoming fashionable in datacom (CW-WDM MSA), to reduce cabling complexity

“Coherent lite” now in MOPA scope, 40km target

Long term:

Equipment re-partitioning: Radio/Transport
“separation of concerns”, enabled by CPO/LPO

Thank you!

Check out the MOPA multi-lateral technical paper and presentations of past conferences here :

[Papers and Presentations | MOPA Alliance \(mopa-alliance.org\)](https://mopa-alliance.org)

Version 2.2 available now!



Also, have a look at Ericsson's white paper:

<https://www.ericsson.com/en/reports-and-papers/white-papers/optimized-optical-solutions-for-mobile-transport-networks>

