

Delivering the Fronthaul Performance Required for Virtualized RAN

What's the challenge?

- In many cases, networks are becoming less centralized and more complex. For example: small cell deployments are being used in popular venues and offices.
- CoSPs are looking at virtualizing the Radio Access Network (RAN) to meet the performance and flexibility requirements of 5G.
- The network complexity and increased virtualization put more demand on the fronthaul network, between the cell site antenna and the baseband unit (BBU).

What's the solution?

Intel® Silicon Photonics

- Intel® Silicon Photonics optical transceivers can be used to provide fronthaul transmission rates of up to 100 Gbps, with a transmission distance of up to 10km.
- They integrate the laser with silicon at the wafer level, enabling high-volume production with significant performance, cost and scale benefits.
- Intel Silicon Photonics can also be used in 4G networks where fiber optic connections have replaced copper wire.

Carving up the RAN

- How much of the RAN can be virtualized, and how much intelligence should stay at the Remote Radio Heads (RRHs)? There is no single answer.
- 3GPP identifies eight ways to split Layer 1 and 2 network functions between the BBU and the RRU (see Figure 1).
- In a Distributed RAN model using option 2, for example, Layer 2 functions would be divided between the distributed BBU and the RRH.
- Alternatively, using option 7 all Layer 2 and some Layer 1 functions could be carried out at the BBU. In that case, the fronthaul capacity would need to be around 67 Gbps¹, making it an ideal candidate for Intel Silicon Photonics.

- With a fully centralized virtual RAN (vRAN) using option 7, Level 1 functions are split between the BBU and RRH.
- Multiple antenna sites are connected to the centralized BBU using a switching point in the network.
- Intel Silicon Photonics can handle the high bandwidth required for this connection using multiple lanes of 100 Gbps.

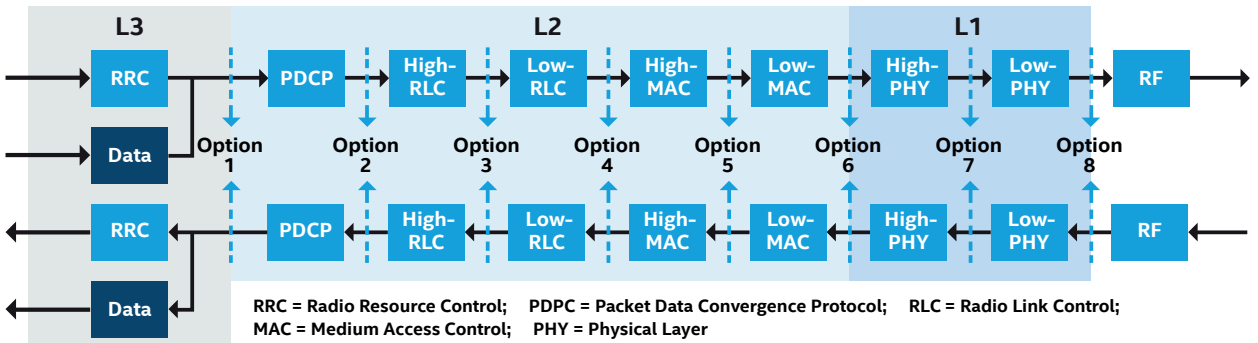


Figure 1. 3GPP Split Options. Functions to the left of the split are handled by the BBU. Functions to the right are in the RRH.

Learn More

- [White paper: Exploring 5G Fronthaul Network Architecture Intelligence Splits and Connectivity](#)
- [Intel® Silicon Photonics](#)

¹ Bandwidth of 100MHz using sub-carrier spacing (SCS) of 60 kHz assumed; 3-sector antenna using a single carrier with a 4x4 antenna arrangement. See "Exploring 5G Fronthaul Network Architecture Intelligence Splits and Connectivity"

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