ITSF 2021

Time Accuracy With COTS Network Adapter

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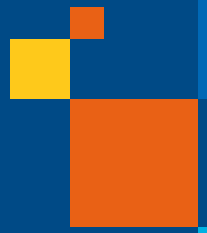

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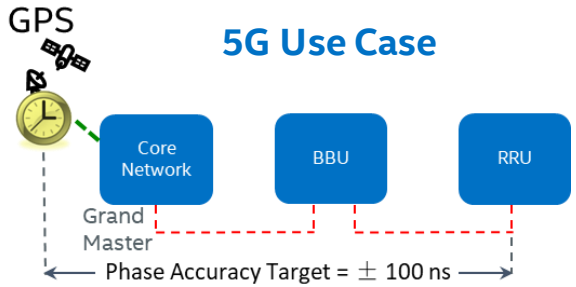
Meeting 5G Network Timing Requirements

Challenge

5G deployments demand high timing synchronization across the network and affordable infrastructure costs



Insufficient timing accuracy can lead to service disruptions – dropped calls, less accurate location services, loss of advanced network capabilities

Strong growth in 5G RAN will demand cost-effective deployment options

Solution

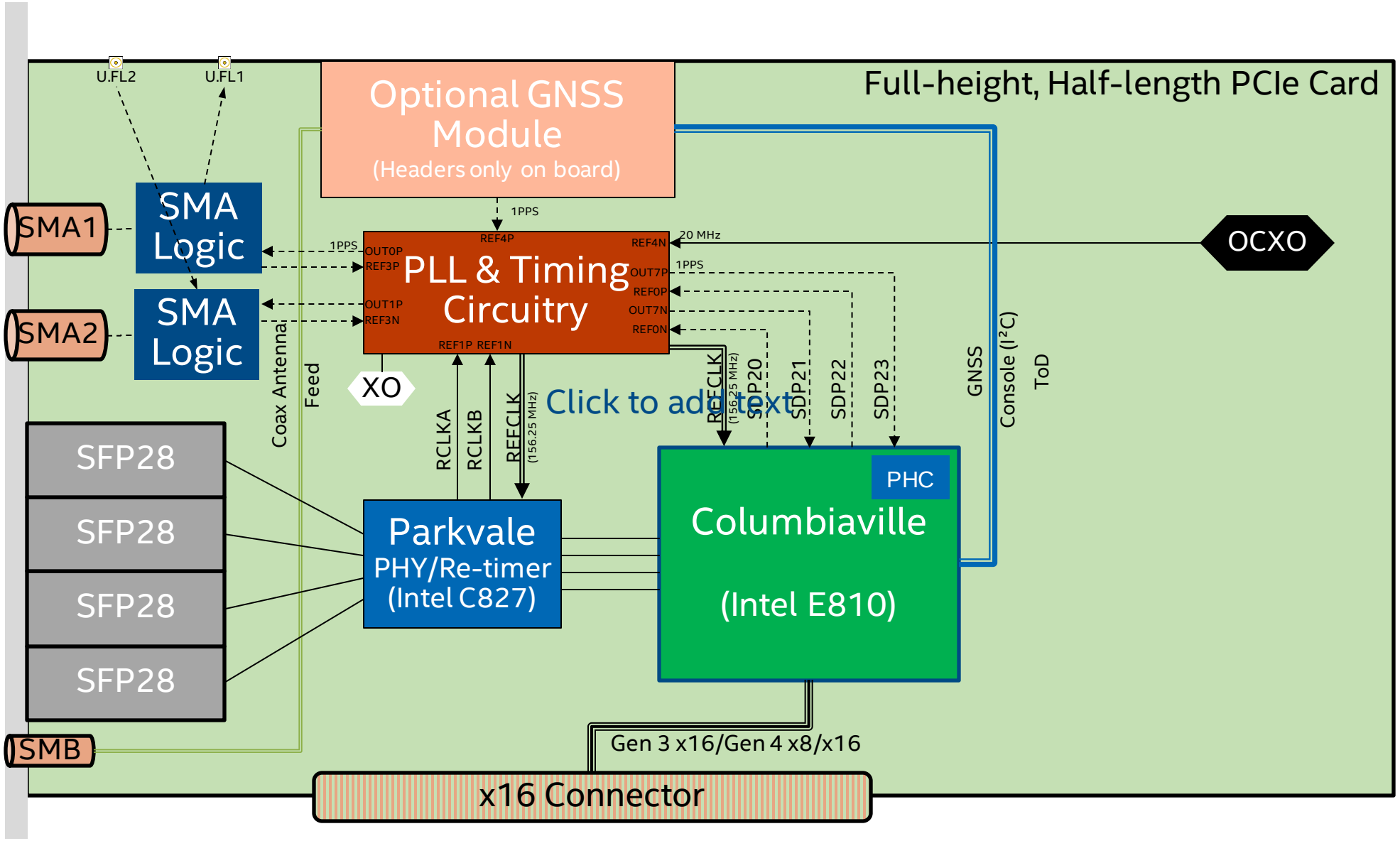
Intel Ethernet 800 Series Network Adapter with hardware-enhanced IEEE 1588 PTP and SyncE and IA servers deliver high-accuracy network synchronization

Cost Savings via Hardware Consolidation

Multiple Market Appeal

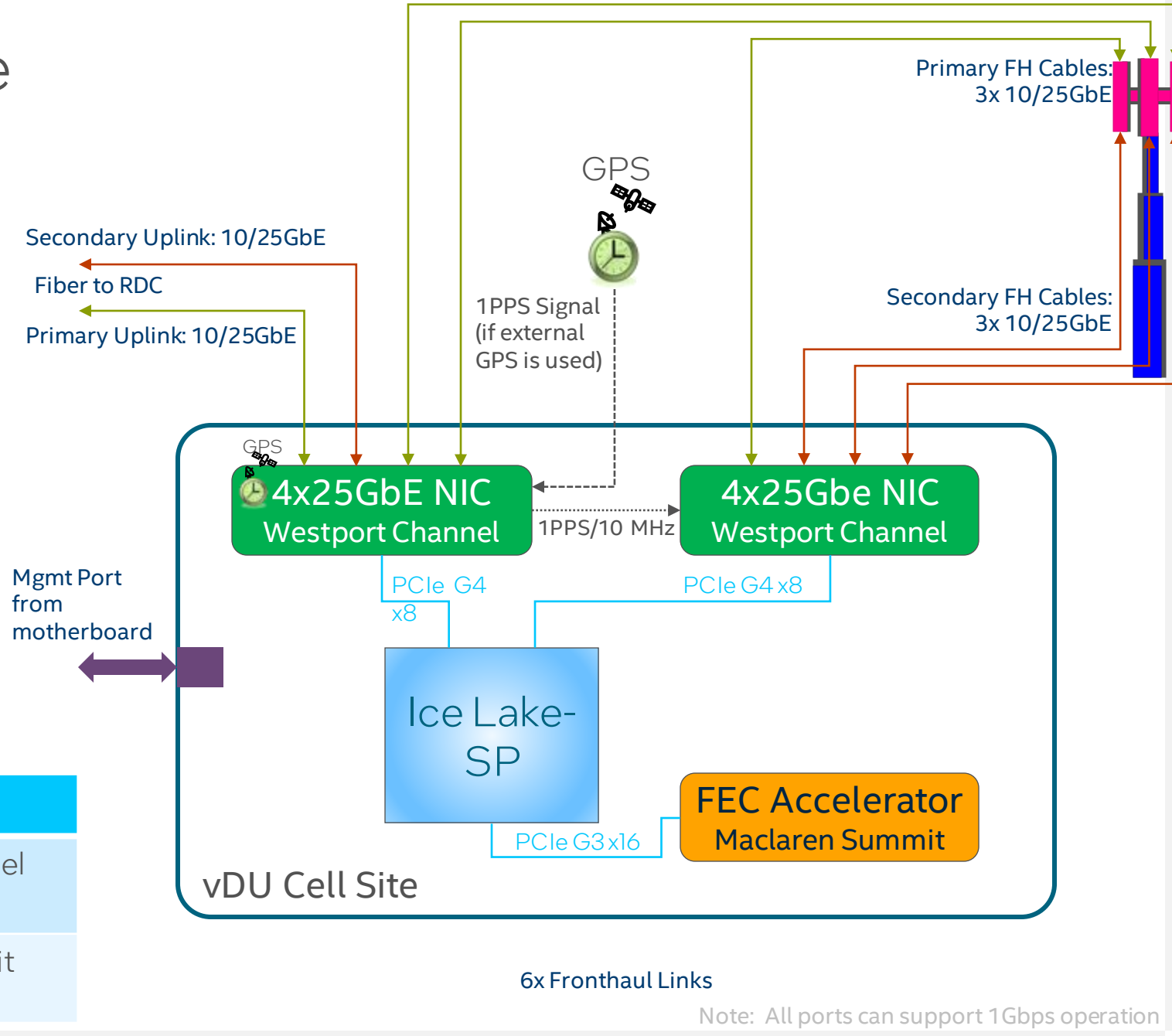
Westport Channel delivers synchronization capabilities across workloads and markets

Westport Channel: 4x25GbE SFP28 + SyncE + GPS Headers



Cell Site – 2021 Example

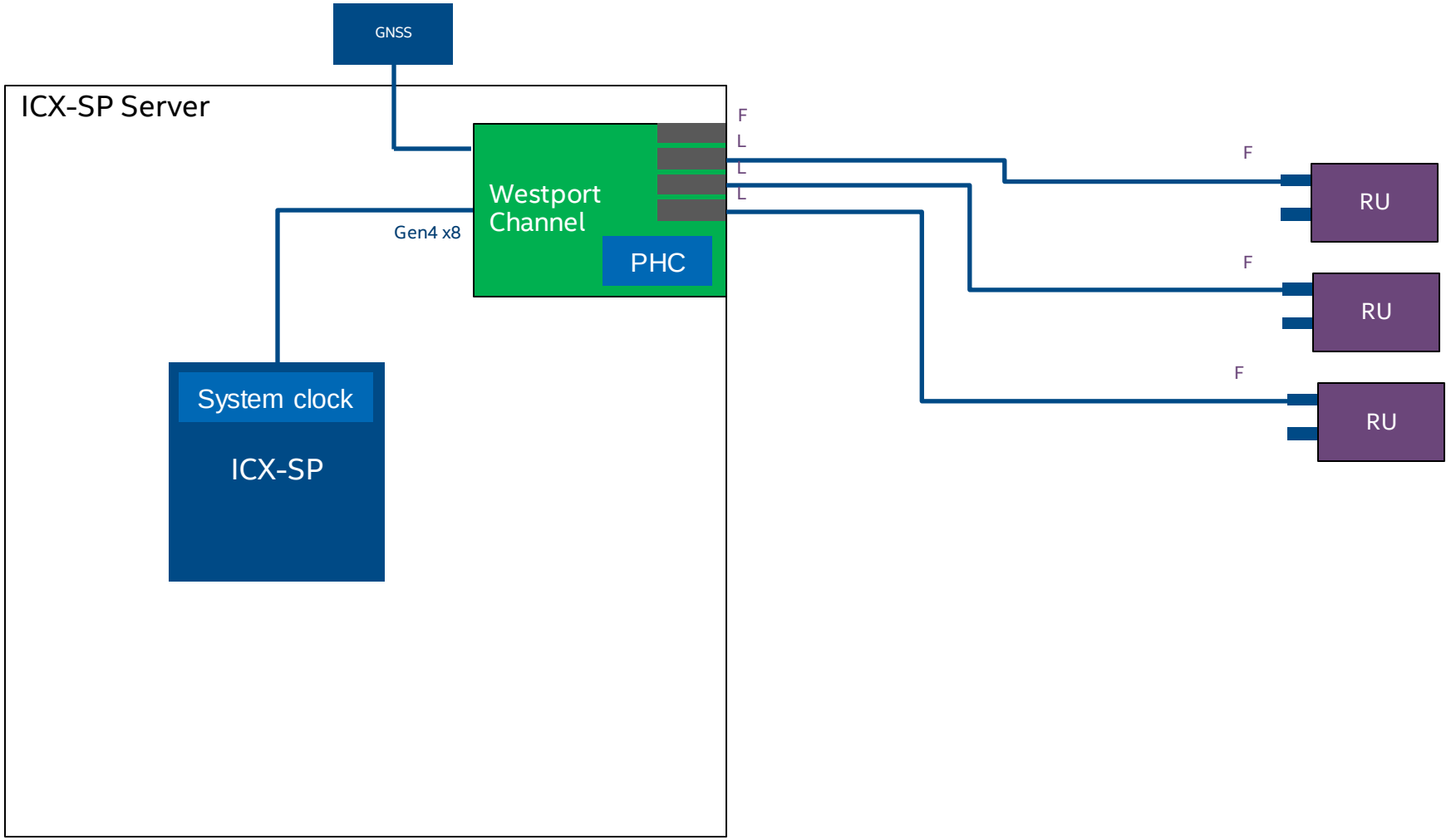
- Notes:
- 6x single-mode cables go up mast: 2x from one NIC and 4x from the other
- 2x single-mode cables to backhaul
- All cables have their own SFP+ connections
- GPS signal could come from external or internal GPS to Westport Channel
- External GPS provides 1PPS to Westport Channel SMA connector
- Backhaul link can recover SyncE if backhaul supports
- Backhaul and Fronthaul connections synchronized via 10MHz/1PPS



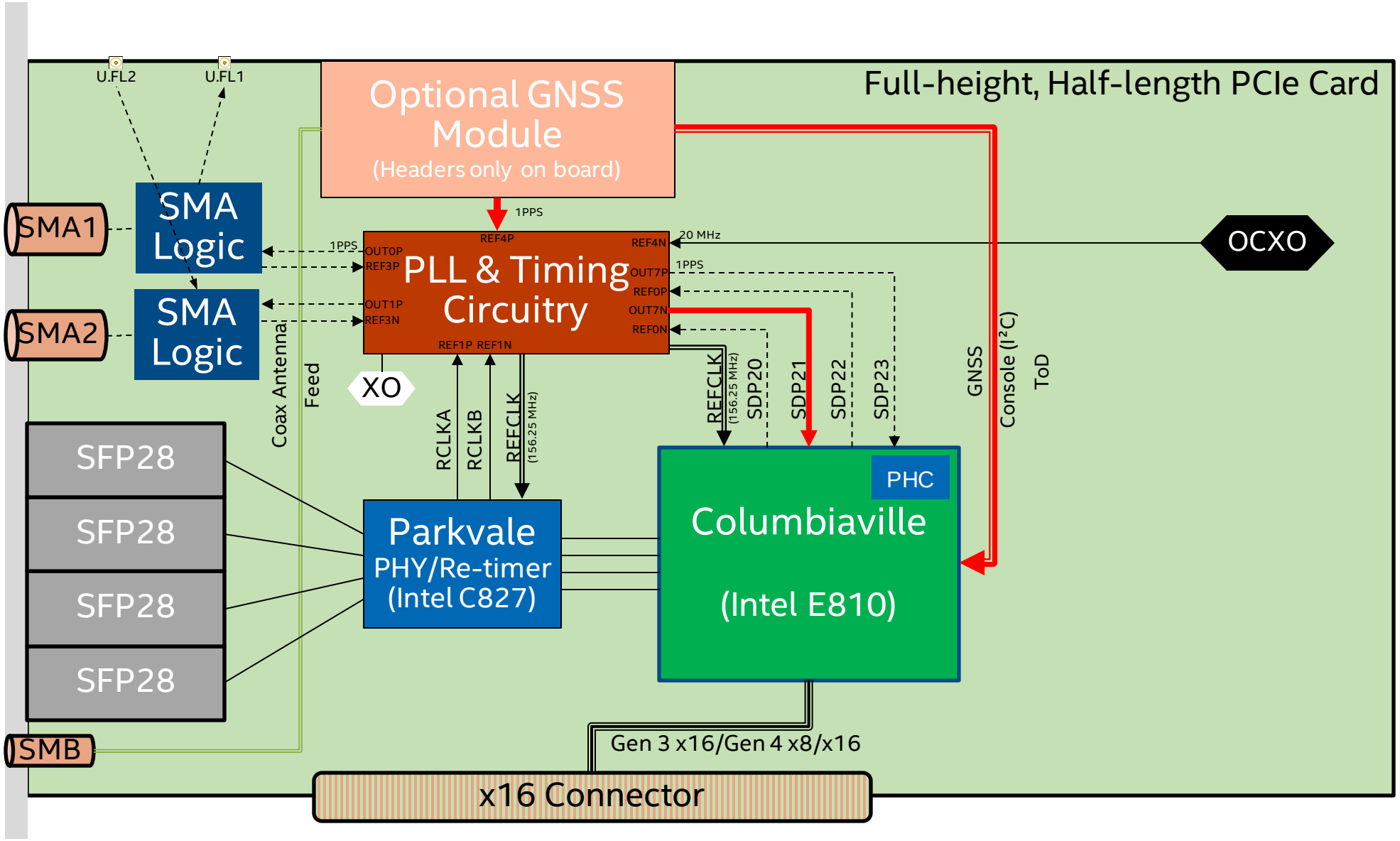
Note: All ports can support 1Gbps operation

Component	Product
100GbE CVL NIC 4x25GbE NIC	Westport Channel
FEC accelerator (Mt. Bryce)	Maclaren Summit

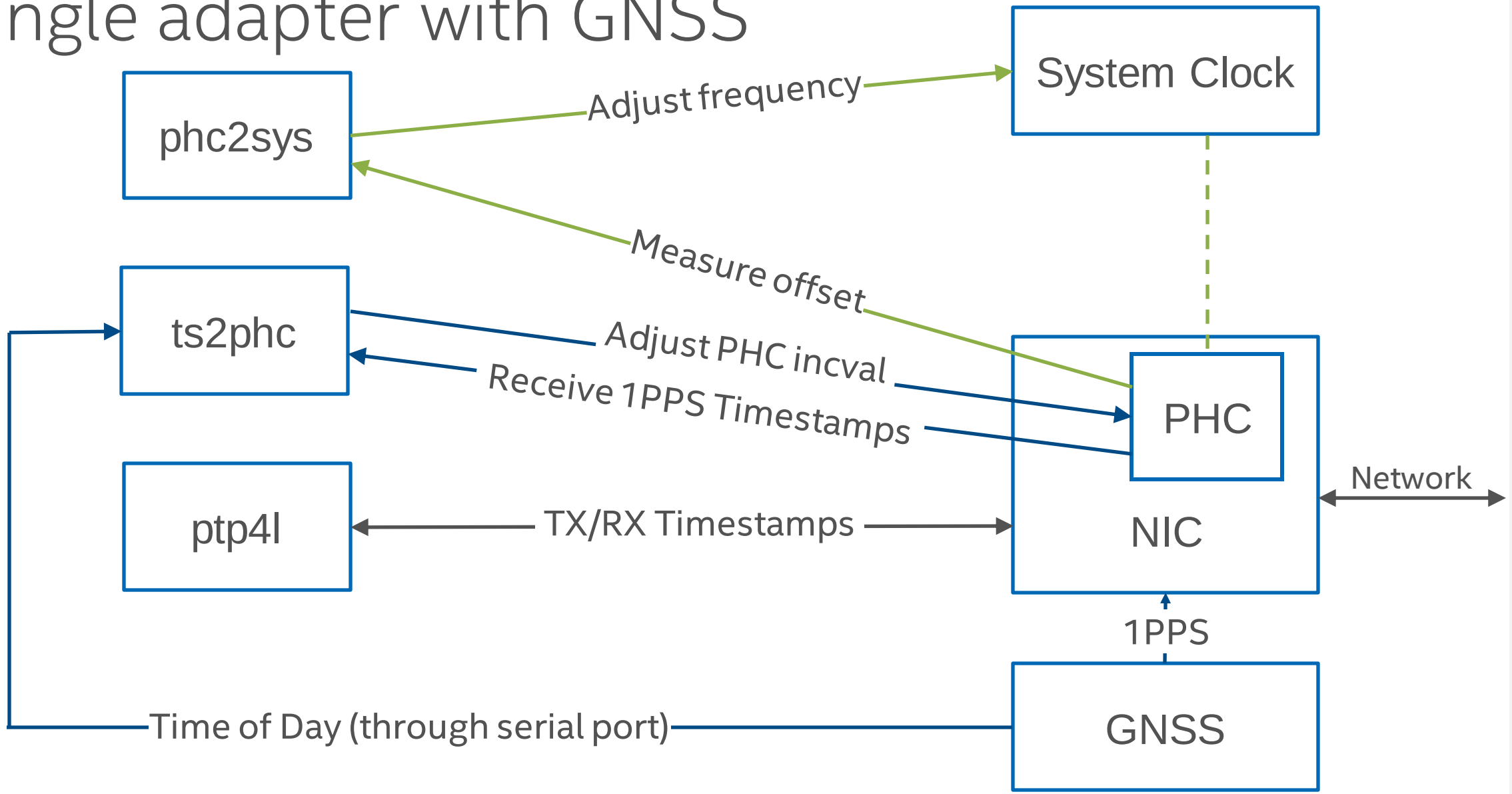
Single adapter with GNSS



Westport Channel: 4x25GbE SFP28 + SyncE + GPS Headers



Single adapter with GNSS



Single adapter with GNSS

- Run ts2phc to get time from the GNSS
  - `ts2phc -f config.cfg -s nmea -c ens1f0`
- Run ptp4l
  - `ptp4l -m -f config.cfg -i ens1f0 -i ens1f1  -i ens1f2 -i ens1f3`
- Run phc2sys to synchronize system time to the PHC time
  - `phc2sys -s ens1f0 -c CLOCK_REALTIME -w -m`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3GPP Requirements

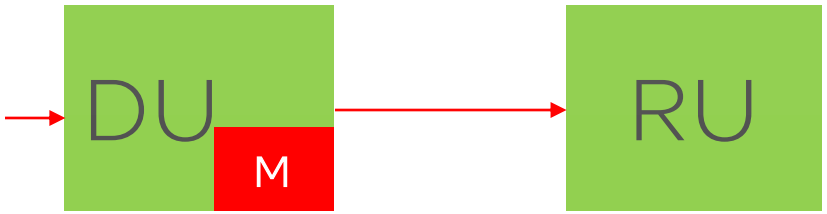
Feature	Timing accuracy	Source
UTRA-FDD Tx Diversity UTRA-FDD MIMO	+/- 32.5 ns	3GPP TS 25.104
E-UTRA TDD	+/- 1.5us	3GPP TS 36.133
E-UTRA Tx Diversity E-UTRA MIMO	+/- 32.5 ns	3GPP TS 36.104
E-UTRA Intra-band contiguous Carrier Aggregation	+/- 65 ns	3GPP TS 36.104
UTRA RTT	+/- 130 ns	3GPP TS 25.133
Frequency Stability	+/-50ppb	3GPP TS 36.104

M =PTP Master

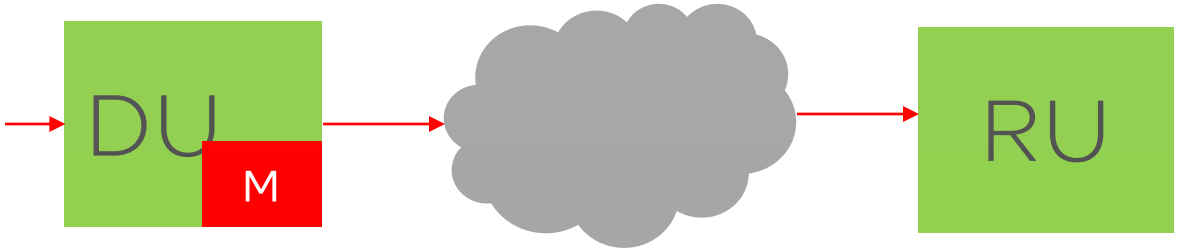
sync →

O-RAN Synchronization Configs

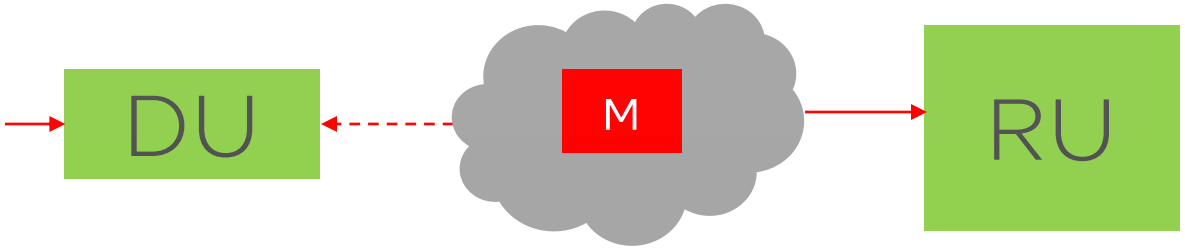
Config C1: DU acts as master point-to-point



Config C2: DU acts as master through network



Config C3: Network contains master in Fronthaul network



Config C4: RU sync is local / independent of network