Ciena Open RAN Solutions

FCC Open RAN Solutions Showcase

Joe Marsella
Vice President PLM - Routing & Switching
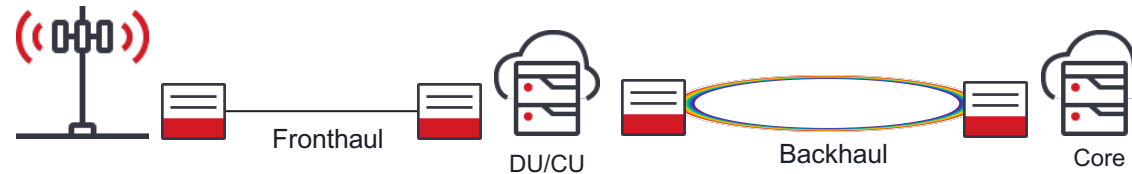
July 14th, 2021

Ciena Wireless Networking

Leadership & Experience

Mobile Transport Deployment Experience

- Over 15 Years of Mobile Investment & Experience
  - **Connecting over 50% of US mobile towers**
- Solutions covering CSR, CSG, FHG, Wholesale & Edge Cloud

Fronthaul — DU/CU — Backhaul — Core

Industry Forums & Standards

- Industry participation - alliances & standards bodies
- O-RAN Working groups 1/4/5/6/10, ITU SG15, IWPC, IETF
- Participated in global O-RAN plugfest (hosted by Telefonica)

O-RAN ALLIANCE

ITU

IETF

IWPC
The International Wireless Industry Consortium™

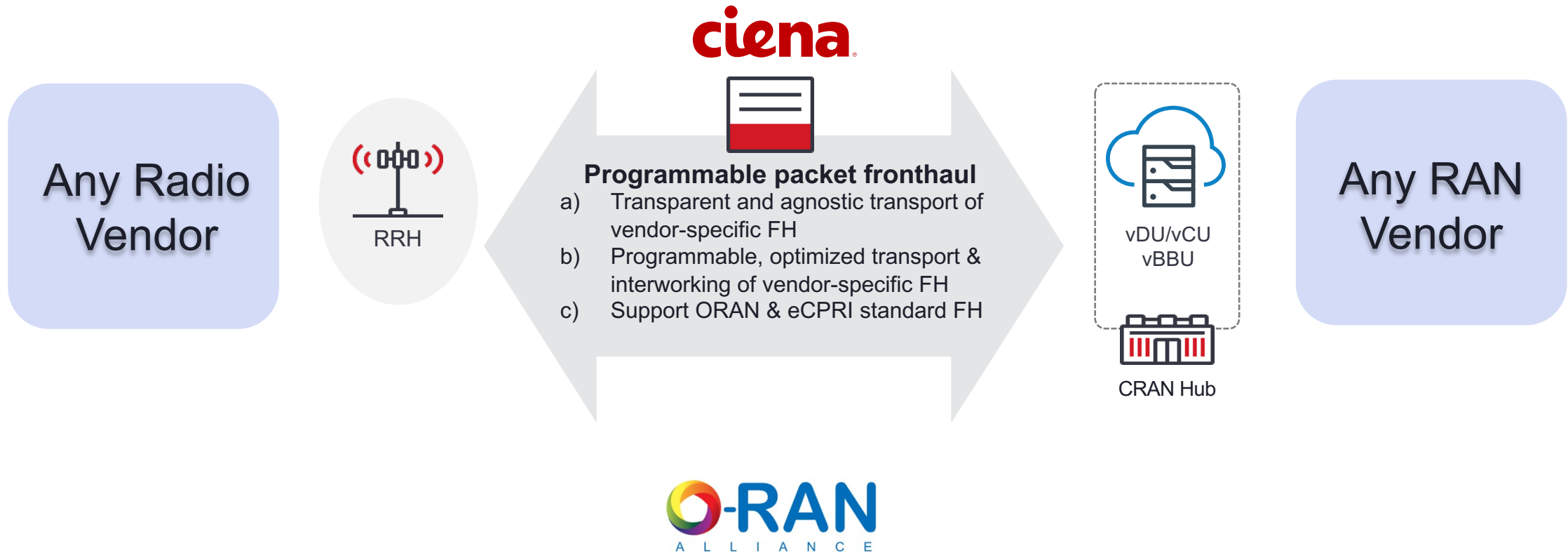## 5G Innovation & Industry Proof Points

- ENCQOR Gov't Funded 5G Research & Innovation Network (Canada)
- 5G PoCs for xHaul network slicing & v5GC with Radisys
- Ciena Sponsored Multi-Vendor 5G Innovation LAB

ENCQOR

MWC Barcelona
GSMA

VECTORS

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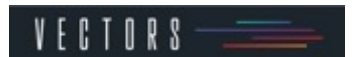
Mobile Network Operators Desire for Open RAN Systems

Driving Innovation & Cost Efficiencies

Transition from Proprietary to Open

(CPRI to O-RAN or eCPRI)*

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Any Radio Vendor

RRH

Programmable packet fronthaul
a) Transparent and agnostic transport of vendor-specific FH
b) Programmable, optimized transport & interworking of vendor-specific FH
c) Support ORAN & eCPRI standard FH

vDU/vCU vBBU

CRAN Hub

Any RAN Vendor

O-RAN
ALLIANCE

O-RAN Alliance defining open interfaces between disaggregated RAN elements to enable broad community of suppliers and drive innovation

* eCPRI 2.0 defines CPRI to eCPRI interworking function (IWF) – but not fully open

O-RAN Solution Summary

5G

Reference Architecture

RU	DU		CU	Core

Fronthaul — CPRI, eCPRI, ROE

Midhaul — F1

Backhaul
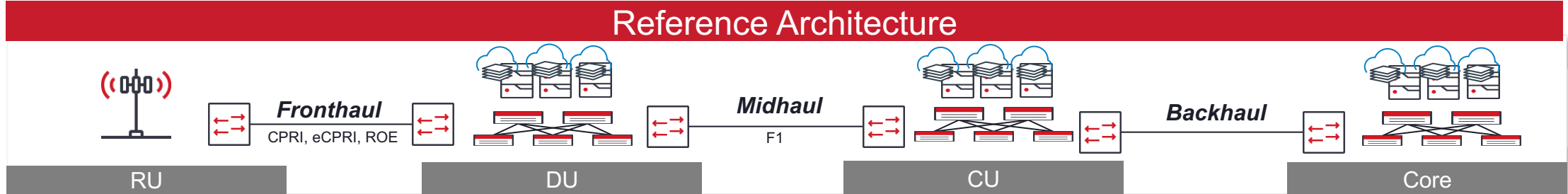
Fully packetized for best economics

Both hard & soft Network Slicing

Complete Timing/Sync for precision

Lowest latency/jitter with FlexE

Indoor

5130

5164

5166

5168

Outdoor

3985

5131

Mix 3/4G with 5G on same fiber

Proven multi-vendor interop **O-RAN** ALLIANCE

Mobility optimized routing

Adv. FH options to optimize Bandwidth
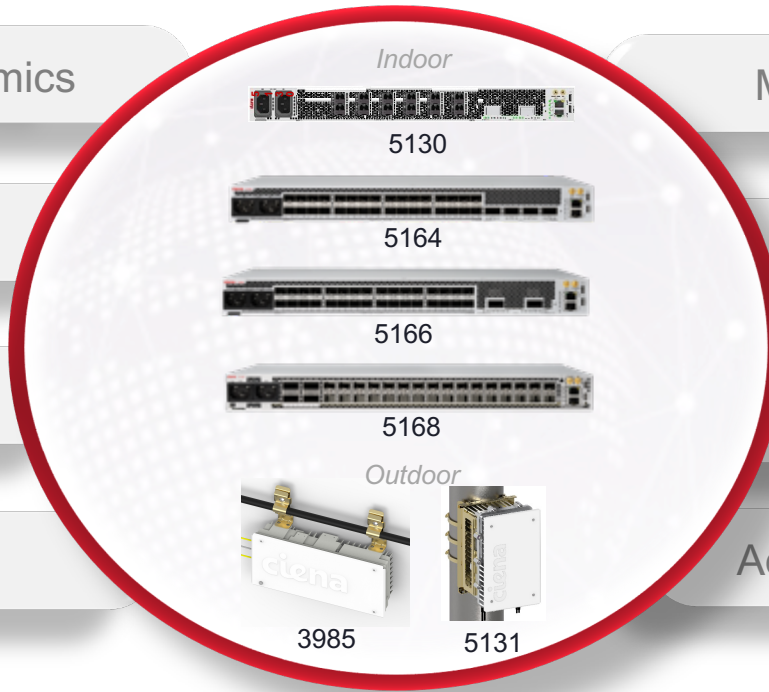
A comprehensive multi-generational solution for both D-RAN & C-RAN architectures, all available today.

FH=Fronthaul
RU=Radio Unit
DU=Distributed Unit

CU=Centralized Unit
MCP = Manage/Control/Plan

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5G xHaul Router Family

Platform		Use Cases				Key Value
		5G Fronthaul (eCPRI/O-RAN)	4G/5G Fronthaul (CPRI/RoE/L1offload)	Mid/Backhaul w/ **Adaptive IP**	Wireline Services	
5168 800G	(14) 25G/10G/1G SFP28 (18) CPRI/25G/10G/1G SFP28 (4) 100/200G QSFP56	✓	✓	✓	✓	**Broadest use case support**
5164 800G	(32) 25G/10G/1G SFP28 (4) 100G/200G QSFP56	✓		✓	✓	**Price Performance Leaders**
5130 360G	(12) 25G/10G/1G SFP28 (2) 100G QSFP56					
5166 800G	(32) 25G/10G/1G SFP28 (2) 100/200/400G QSFPDD	✓		✓	✓	**400GbE Coherent**

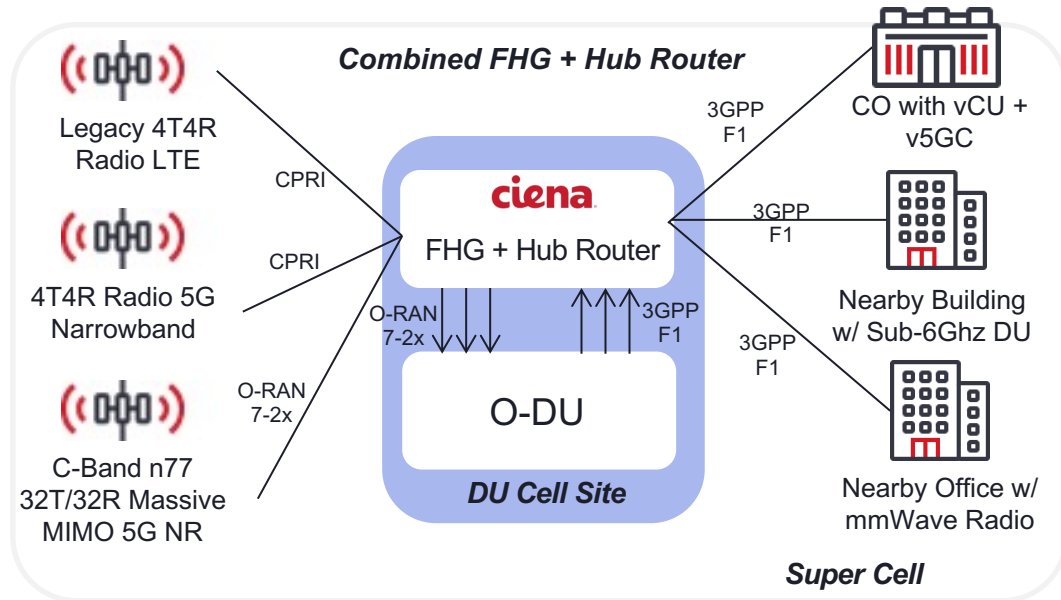## Capabilities – 5130, 5164, 5166 & 5168

- ❖ L3/IP VPN
- ❖ L2 VPN/EVPN
- ❖ IPv4/IPv6
- ❖ SR-MPLS SRv6
- ❖ eCPRI / O-RAN
- ❖ Dense 10/25GbE
- ❖ FlexE / SPN
- ❖ 802.1Q / TSN
- ❖ GNSS/T-GM
- ❖ SyncE/1588v2
- ❖ H-QoS

Additional Capabilities - 5168

- ❖ CPRI 3-8
- ❖ RoE (IEEE1914.3)
- ❖ L1 Offload / O-RAN 7.2x
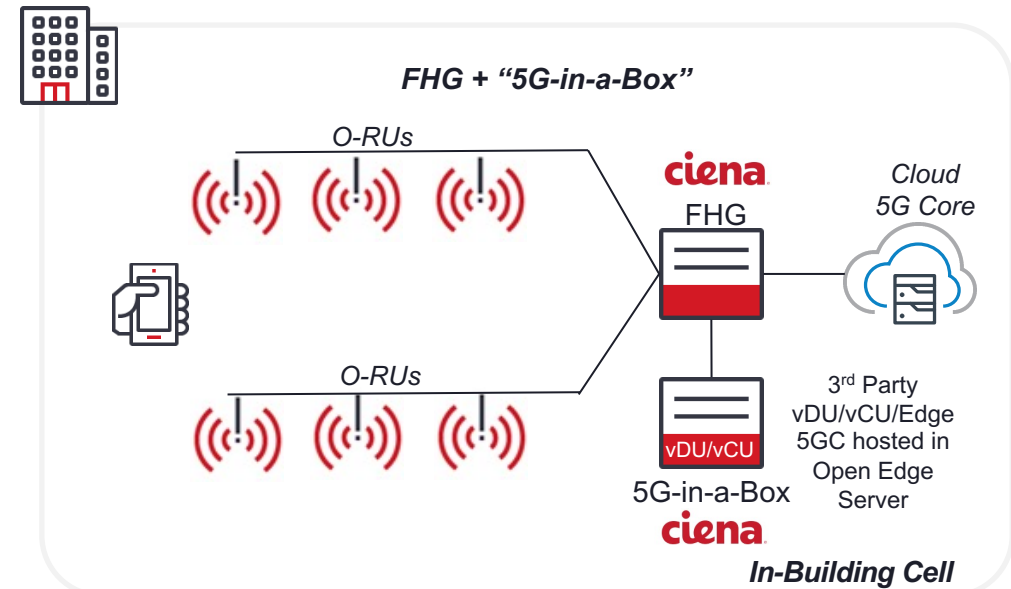- ❖ CPRI-eCPRI IWF
- ❖ Programmable RAN Interop

Solutions can work in any RAN market and are agnostic to a RAN vendors radio system

Common Deployment Models

Macro Site Model

Combined FHG + Hub Router

Legacy 4T4R Radio LTE

4T4R Radio 5G Narrowband

C-Band n77 32T/32R Massive MIMO 5G NR

CPRI

CPRI

O-RAN 7-2x

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FHG + Hub Router

O-RAN 7-2x

3GPP F1

O-DU

DU Cell Site

3GPP F1

CO with vCU + v5GC

3GPP F1

Nearby Building w/ Sub-6Ghz DU

3GPP F1

Nearby Office w/ mmWave Radio

Super Cell

Localized O-DU w/ Remote O-CU/5G Core

In-Building Site Model

FHG + "5G-in-a-Box"

O-RUs

O-RUs

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FHG

Cloud 5G Core

vDU/vCU

5G-in-a-Box

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3rd Party vDU/vCU/Edge 5GC hosted in Open Edge Server

In-Building Cell

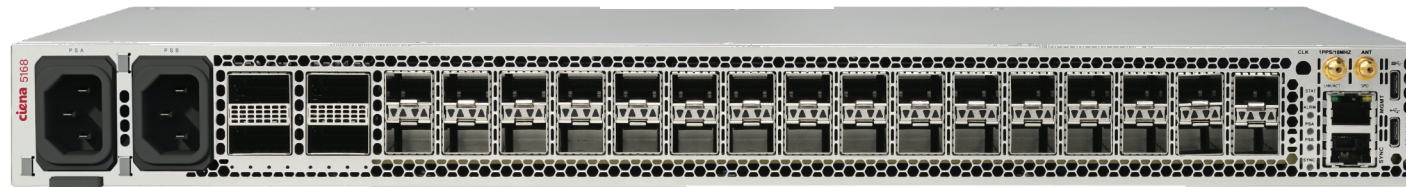**Leveraging O-RAN Compression & Shared Cell**

Solutions built to interoperate across a wide range of applications and deployment models

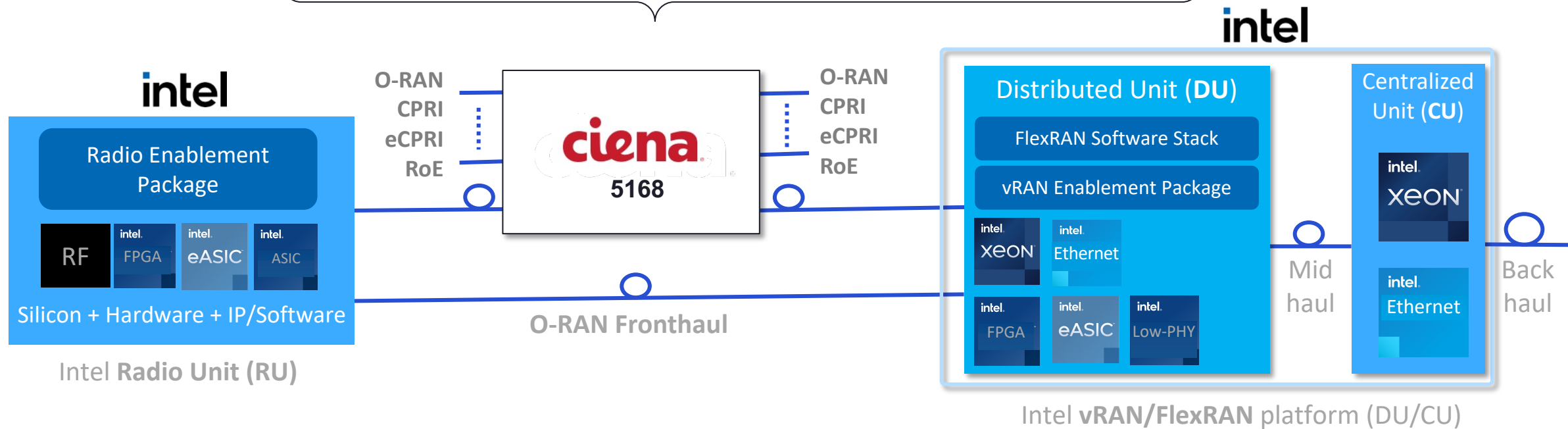**ciena**

Joint Intel/Ciena MWC 2021 Virtual Event Demo

Showcasing the Ciena 5168 xHaul Router Fronthaul solution

Gateway supporting both O-RAN for New Radios & CPRI for legacy radios

Ciena 5168 xHaul Router w/ Fronthaul Gateway (FHGW)

Compliant to O-RAN WG7 Hardware Reference Design Specification for Fronthaul Gateway 1.0

Summary of How Ciena is Enabling Open RAN

Experience	Active in industry forums and deployed across mobile ecosystem with MNOs, wholesalers, cloud providers
Open & Programmable	Compliant to O-RAN specifications for transport and standardized interfaces for orchestration
Flexible	Best-of-breed transport for evolving mobile architectures (CRAN/DRAN) with any RAN or mobile core vendor
Proven	Live deployments and industry proof-points including multi-vendor O-RAN plugfests and MWC demonstrations

Delivering next-generation solutions that are enabling Open RAN deployments today

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Thank You

IP Delivered Differently

Automated, open, lean. Because you asked.

Ciena's Adaptive IP™

Adapt now