Open vRAN Ecosystem
Overview and Current Activities
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Agenda

1. Why Open vRAN?
2. What is the Open vRAN Ecosystem?
3. Introduction to RAN and vRAN Architectures
4. Demos and Production Ready Systems
5. Wrap-up, Q&A
Software is Eating the World
The Modern CSP has a Software Personality

- Disaggregation simplifies scaling of h/w and s/w instances
- Rapidly deploy new capabilities and services
- Infrastructure and location agnostic
- Easier to stich together complex service chains
- Simpler to standardize ops tooling
Software Defined Mobile Network

**From:**
- Monolithic, Proprietary Systems
- Closed interfaces, limited options
- Network defined (and constrained) by RAN

**To:**
- Flexible, Agile Software-Based Solutions
- Open, modular solutions
- Network defined by the services, and desired operational model
Ecosystem Overview
Open vRAN Ecosystem Overview

Accelerate the viability and adoption of open virtualized RAN (vRAN) solutions and ensure their extension into a broader software-defined network architecture.
Open vRAN Ecosystem Overview

Current Vendor Members

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Why Open vRAN End-to-End Solution?

**Open**
- Modular solutions
- Cloud infrastructure flexibility
- IP transport

**Multi-vendor**
- Leading innovators
- Ecosystem = Choice and Scale

**Ready to Deploy**
- Pre-validated
- Pre-integrated

**Use Cases**
- Densification
- Reach
- Small Cell
- 5G NR
- Private Mobile Networks

**Synergies**
- Better end-to-end
- Network Slicing
- MEC
- Automation / Orchestration

**Flexible**
- New and existing environments
- Adapts to business req’ts

**Net Benefits**
- Flexible architecture
- Agile service delivery environment
- Lower TCO
RAN and vRAN Architecture Overview
Traditional Distributed RAN Architecture

RRH = Remote Radio Head
RU = Radio Unit
BBU = Baseband Unit
eNB = Evolved Node B (LTE)
Transition to C-RAN Architecture
Centralized RAN Architecture

CPRI (Common Public Radio Interface) Fiber Fronthaul:
- Constant Bit Rate - transmits even when no user traffic, no multiplexing
- Highly inefficient - scales with number of antennas, not data rate
  i.e. 150Mbps data = ~2.5Gbps CPRI traffic
- Requires very low latency - 200µs
- Optical transport; RAN vendor proprietary format

Remote BBU - typically proprietary closed platform
Virtualized/Cloud RAN Architecture

Fronthaul Options

- RRH/RU

VBBU

Backhaul

- CPRI or eCPRI (enhanced CPRI, moving to more open splits - i.e. xRAN/ORAN)

Virtualized Baseband - typically clusters running on COTS H/W

Agg/Core

- MME
- SGW
- PGW

Internet, Enterprise, etc
Transition to Split Architecture

Further disaggregate vBBU real-time and non-real-time functions into DU – Distributed Unit and CU – Centralized Unit.
Split vRAN Architecture

Fronthaul and Midhaul splits discussed more later. One key goal is driving away from vendor proprietary solutions, towards open IP/Ethernet based technologies.
Split vRAN Architecture, cont.

Split architecture flexibility:
Each CU can support multiple DU’s
Each DU can support multiple RRH’s
Some operators looking to split RAN control plane and user plane to allow them to scale independently and architect their network in more granular manner.
Split Architecture – Where to Split?

RAN protocol stack splits are not clear cut...how to determine what goes where?
There are a lot of Split Options

We’ll focus on 2 Initially

Greater bandwidth requirements
High Latency sensitivity
Increased radio co-ordination
Split Architecture – Where to Split?

General thinking is option 7-2x for DU-RU, option 2 for CU-DU. Can vary based on deployment model, service types i.e. Fixed Wireless could do option 2 split to RU with integrated DU, etc. More work to come here + deeper dive presentation on splits coming soon.
Open vRAN Ecosystem
Flexible Architecture Options

- NGC
- EPC
- Agg/Core
- Backhaul
- HLS Option 2
- Packet Midhaul
- DU
- CU
- MEC
- RU
- HLS (7-2x)
- Fronthaul
- UPF
- MEC
- Packet Midhaul
- CU-CP
- CU-UP
- UPF
- MEC

Automation and Orchestration
Security, Management, and Support

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Open vRAN Demos
Pre-5G: Let’s Deploy Now
5G: It’s Real
Pre-5G Open vRAN End-to-End Solution

E2E Converged Multi-vendor Pre-5G
‘Network-in-a-box’

- Pre-certified
- Pre-integrated
- Ready to deploy

Efficiently Delivering High-Quality Video

- CUPS-enabled MEC App → Edge Cache
- Network Slicing → Differentiated Services
Pre-5G Open vRAN End-to-End Solution: Flows
5G Open vRAN End-to-End PoC

**E2E Multi-vendor 5G SA PoC**
- OTA 5G SA Data Call
- Cloud-native 5G SA Core
- 5G SA Core Deployable on Any Platform

**High-bandwidth OTA Video Streaming**
- CUPS-enabled MEC App → Edge Cache
- Automation → Google Cloud Deployment

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![Diagram of 5G Open vRAN End-to-End PoC with vendors and components]

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5G Open vRAN End-to-End PoC: Flows
Enabling New Services

**Connected Car / RC Drones**
- Vehicle updates, telematics, and infotainment
- Warehouse logistics, automated delivery services

**Network Slicing e.g. Public Sector Private Networks**
- Police, fire, hospitals with strict SLAs and security

**Smart City Enablement**
- Smart-sensor enabled
- Waste and recycling, parking, smart grid, homes

**Augmented / Virtual Reality Delivery**
- Augmented, virtual, and mixed reality for learning, gaming, 4K/8K

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<tr>
<th>Enhanced Mobile Broadband</th>
<th>Ultra Reliable Low Latency Communication</th>
<th>Massive Machine-type Communications</th>
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<tbody>
<tr>
<td>1000x BW, 10~100x End User Speed</td>
<td>~1ms Latency</td>
<td>1000x Density</td>
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Open vRAN Ecosystem – Wrap Up

- Accelerating to a truly software-defined mobile network
- Enabling open, flexible architectures
- Technology + Business + Operational + Consumption
- Real solutions are possible now
Questions?

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https://blogs.cisco.com/sp/open-vran-ecosystem-enabling-a-better-mobile-architecture