Operators want to see Open RAN flourish – but vendors are likely to move slowly. There will be claims that an open RIC architecture won't scale or be performant. Industry heavyweights have formed SD-RAN to help the industry move through this inflection point. History has shown that demonstrable open solutions can move an industry when incumbents resist change. ONF is the ideal place to build an open solution. ONF has done it before, has great engineering team, great foundation of software & track record building solutions for tier-1 operators. Ecosystem with critical mass has formed that together will help advance the Open RAN movement. Embargo Until: Tuesday Aug 25th, 8am EST.

Summary

O-RAN ARCHITECTURE CONSISTENT μONOS-BASED CLOUD-NATIVE nRT-RIC AND xAPPS PLATFORM
RAN Market is Poised for Disaggregation

- O-RAN Alliance is defining architecture and APIs for Open RAN
  - Formed by operators to help advance Open RAN agenda

- But - Vendors have been slow to embrace opening control to RIC and xApps

- Operators are advocating for RIC-based solutions via partnership with ONF
  - Operators want powerful RIC, xApps and multi-vendor interoperability
  - History has shown that an implementation is necessary in order to help the market transform
  - SD-RAN project is filling this void with a cloud-native open source implementation
SD-RAN Overview and Goals

- The SD-RAN project is building:
  - nRT-RIC based on ONOS (µONOS-RIC)
  - Exemplar xApps (starting with handover and load balancing)

- SD-RAN Goals:
  - Prove what is possible with nRT-RIC xApps
  - Accelerate the adoption of the O-RAN architecture
  - Accelerate availability of interoperable O-RAN components
  - Catalyze creation of an xApp ecosystem and industry

- Will follow O-RAN and 3GPP standards
  - Only where necessary, will extend beyond standards to achieve goals
  - Any extensions will be contributed back to O-RAN in partnership with operators

xApps will be responsible for advanced functions (like handover) that historically have been opaque vendor proprietary functions embedded in the base stations.
Aether has been operational since December 2019.

Aether Connected Edge

ONF Menlo Park
ONF Tucson
Intel Labs Hillsboro

More ACE Sites coming online:
Multi-Connected Edge
CBRS & Licensed Spectrum

Google, Turk Telekom, Telefonica, Tech Mahindra, Ciena, Radisys, Accelleran, GSLab, …

Aether Connected Edge

NTT Osaka
AT&T Atlanta

Operational in a few weeks

Google Cloud
4G/5G Control
Aether Management Platform
CI/CD

Aether is being run as a live pilot network. Development takes place on the live network, with a CI/CD pipeline pushing change while the network remains in use.

RAN Disaggregation
Step I: Horizontal Disaggregation

O-RAN ARCHITECTURE CONSISTENT
µONOS-BASED CLOUD - NATIVE
nRT - RIC AND xAPPS PLATFORM

RAN Disaggregation
Step I: Horizontal Disaggregation

DU
CU

RU

N2

N3

Mobile Core CP
Mobile Core UP

PHY-LO
PHY-HI
MAC
RLC
PDCP
RRC

RRC
PDCP
RLC
MAC
PHY

Scheduling

Dotted lines indicate the separation between DU and CU in the disaggregated architecture.
RAN Disaggregation
Step II: Vertical Disaggregation: CUPS
RAN Disaggregation

Step III: Vertical Disaggregation with SDN
μONOS-based SD-RAN Controller Platform
μONOS RIC xApp Performance Monitoring / Alerts
Initial Performance Results with the Highly Available µONOS nRT RIC

Handover xApp running on 2 µONOS nRT RIC instances with distributed stores providing scaling and HA

Cloud Native, Instances running on Aether Connected Edge (ACE)
K8 with Flannel CNI on 2 servers
CPU: X5650 @ 2.67GHz (Westmere), Physical cores: 24 cores (* 2 thread), Memory: 48G

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<th>Latency</th>
<th>Number of UEs</th>
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<tr>
<td></td>
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<td>1.3 ms</td>
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<td>1.9 ms</td>
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Multi Cluster Performance

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Network experiencing 200-300 handovers/sec
SD-RAN Ecosystem

Operators
Pushing for open transparent RAN solutions

Technology Providers

Ecosystem of Organizations
Pushing for open RAN

SD-RAN Project is open to working with additional RAN Vendors