

## Edging Closer to Open Telecom Networks with Open RAN

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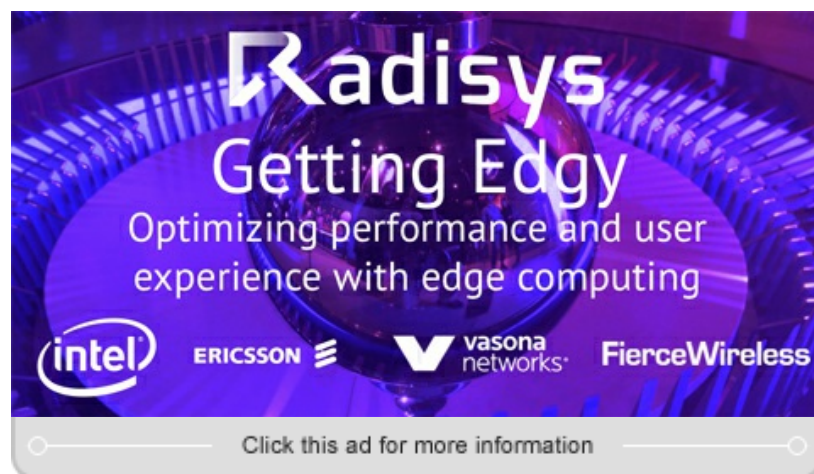
The telecom industry is undergoing a significant transition as service providers and infrastructure vendors are turning to open source and multi-access edge computing (MEC) solutions to meet the demands of 5G—and to reduce costs and accelerate service innovation. Open RAN solutions are gaining traction with service providers that are driving disruption in their networks.



## 5G in the Driver's Seat

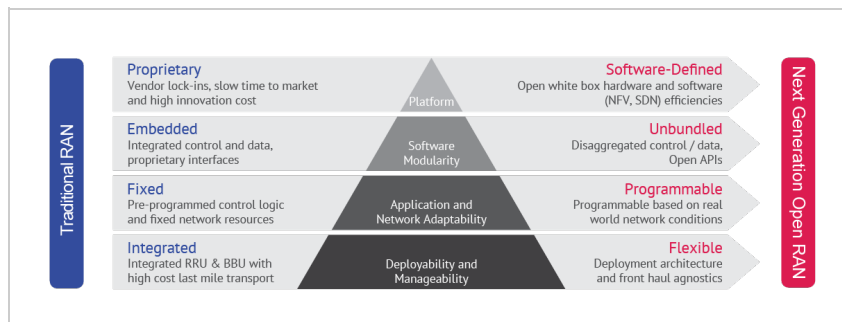
The fourth Industrial Revolution provides a roadmap for the evolution of technology—moving from connected hardware in the 2G/3G era to connected people with LTE/4G, to connected *everything* with the advent of 5G.

For service providers, 5G services and applications will put unprecedented pressure on their networks to meet demands to support 50B connected devices, 1000x mobile data volumes, 5x lower latency, and 10x to 100x end-user data rates. As such, the transition to 5G is one of the key market drivers for Open RAN solutions. Because the transition to 5G will bring a lot more traffic onto the network, service providers need an access technology that will be able to keep up with bandwidth demand. By their very nature, open technologies are more cost-effective than single-sourced proprietary solutions. By leveraging Open RAN technology, service providers will be better able to manage explosive traffic growth and channel resources toward new services and innovation.



## Disaggregation is the Key

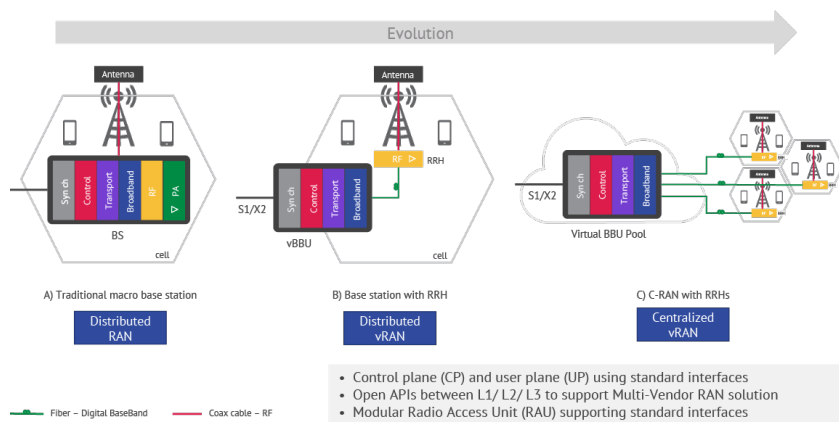
When it comes to enabling the evolution to 5G and meeting service providers' cost and innovation goals, the traditional RAN architecture is problematic. It is proprietary, embedded, fixed or pre-programmed, and integrated, resulting in high-cost last-mile transport. All of these characteristics make traditional RAN architecture difficult to change and are reasons that the RAN is the last area of the network to become open.



**Figure 1. RAN Re-Architecture: A Must to Evolve to 4G and 5G Networks**  
(click to enlarge)

However, next-generation Open RAN solutions are gaining ground. By disaggregating the RAN components and leveraging open solutions, service providers can utilize a flexible solution that can address real-world network conditions.

The RAN is also evolving from distributed and integrated to virtual and centralized, where baseband units (BBUs) are pooled outside of the traditional macro base station—enabling the evolution that moves workloads towards the edge.



**Figure 2. RAN Evolution**  
(click to enlarge)

Some workloads—such as cloud-assisted car driving (autonomous vehicles), VR gaming, and high-frequency trading—have significantly reduced latency requirements, meaning that they can only be deployed at the edge. At the same time that latency is going down, mobile bandwidth requirements are increasing. Open virtualized RAN and edge architectures for 5G networks deliver key capabilities, including:

- Virtualized mobile core for 4G and 5G networks with end-to-end network slicing
- Programmable RAN control plan using open reference architectures
- Centralization and virtualization of RAN eNodeB functions plus mobile edge apps
- Unbundled RAN (CU/DU) using standard APIs, and
- Modular Remote Radio Unit (RRU) software functions, supporting multiple RAT co-existence.

There are a number of standards organizations and open source communities that have emerged to advance open and disaggregated RAN architectures.

- **3GPP** is included in this list as it is the standards-setting body for 5G driven by the service providers, and it is committed to meeting service provider requirements and enabling successful commercial 5G deployments. New open architecture ideas often first percolate in 3GPP.
- **Open Networking Foundation (ONF)** – under the CORD (Central Office Re-architected as a Datacenter) umbrella, it has integrated multiple open source projects that focus on service providers' needs for its mobile, residential, and enterprise customers. At the access level, it has delivered open reference architectures for M-CORD (Mobile CORD) and R-CORD (Residential CORD), as well as enabling access-technology-agnostic open solutions with Multi-Access CORD.

- **Telecom Infra Project (TIP)** was founded to initially focus on simplifying and disaggregating the RAN. It delivers open hardware for telecom network infrastructure.
- **xRAN** delivers another approach to disaggregating the RAN by delivering an eXtensible software-based solution that can rapidly respond to real-time user needs. It extends the RAN with specific north and southbound SDN interfaces.
- **ORAN Alliance** is the newest addition to this list. Launched in February 2018 by global tier-one service providers, the Alliance is focused on driving openness into the RAN for next-gen networks, thereby making the networks smarter. ORAN extends the efforts of the C-RAN Alliance and the xRAN Forum.

Open and disaggregation are critical to this RAN evolution. By disaggregating the RAN into separate components, service providers will be able to swap components in and out from multiple vendors, reducing vendor lock-in and allowing them to choose from best-of-breed solutions to meet their specific network requirements.

## But Integration Roadblocks Lie Ahead

Open architectures equate to open + third-party. To bring together all of the components—open and proprietary, depending on service providers' requirements—from a multi-vendor ecosystem brings a new set of challenges. Service providers don't have the in-house integration expertise needed to deliver an end-to-end solution, as they have traditionally relied on proprietary, single-sourced solutions from massive vendors (that have them locked in).

This shift to open is enabling a new class of systems integrators to emerge to fill the gap left by single-solution vendors.

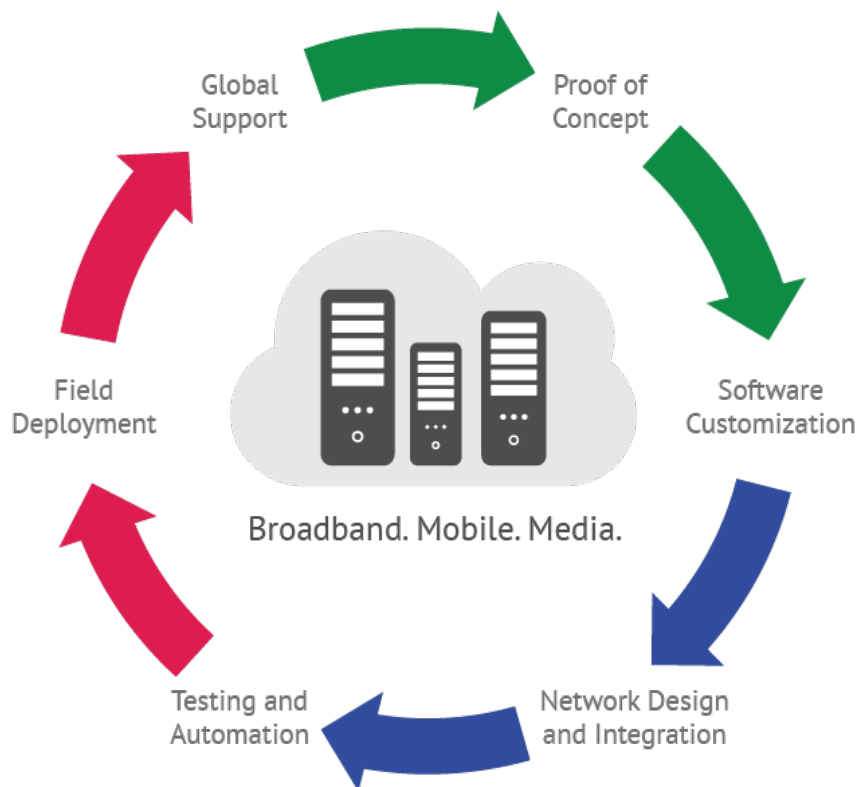


Figure 3. Taking the Pain out of Open Integration

Service providers will require a trusted systems integration partner that fully understands the technology and the network end-to-end, from the RAN/radio side of the network to the software. Systems integrators should also be neutral, leveraging components from multiple vendors to meet each service provider specific customer requirements, rather than favoring specific companies' offerings. Systems integrators that are also actively engaged in the open source efforts outlined above will have a stake in seeing Open RAN succeed.

# The Road Ahead

The future network is being built today. It will be open. It will be disaggregated. It will combine components from multiple vendors. And it will require flexible Radio Access Network (RAN) solutions. With the emergence of 5G, the network is moving closer to the edge in order to support new use cases that are extremely latency-sensitive. To support these latency requirements, the RAN will need to be software-defined, unbundled, programmable and flexible.

Open RAN fits the bill. It decouples system components and uses open interfaces to create network solutions from independently developed software and hardware components. And it allows for service providers to create programmable RANs that can be optimized for their unique use cases and requirements. Open RAN deployments are happening today for 4G networks, with large-scale deployments planned to align with the timescale for 5G deployments. By leveraging Open RAN and open solutions, service providers can accelerate their 4G/5G RAN initiatives.