



World Wide Technology

# Critical Steps Telcos Can Follow to Deploy an End-to-End Open RAN Solution

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## Abstract

Mobile network operators face an increasingly demanding and competitive business environment, a reality confounded by the fact that technology is changing more rapidly than ever before.

Legacy, single-vendor network solutions are becoming antiquated as service providers find they can stand in the way of innovation and network modernization. To thrive in a 5G world, which is more dynamic and application-centric than previous generations of connectivity, it will be imperative for operators to implement future-proof, end-to-end open network solutions.

While this is true across all aspects of the network, it is particularly true of the radio access network (RAN) and, therefore, Open RAN — a disaggregated and virtualized RAN on general-purpose hardware — has emerged as a key piece of the 5G puzzle.

Open RAN replaces legacy, single-vendor RAN solutions with a **stable, scalable and 5G-ready solution that allows for a more efficient network** that optimizes performance, enables more agile service delivery to end customers and reduces operational expenditures.

This white paper details key steps operators must take to deploy an end-to-end solution and ensure a smooth transition between old RAN systems and innovative new Open RAN solutions.

## Open RAN: Not as Easy as it Sounds

The virtualized, software-driven nature of Open RAN brings its own set of challenges, not least of which is ensuring interoperability and optimizing deployment scenarios. Further, most U.S. operators face added complexity as the federal government mandates the exclusion of Chinese manufacturers from 5G network builds.

Whether operators are looking to rip and replace government regulated hardware or simply modernize their networks to stay competitive, they are challenged to:

- Find an end-to-end open network solution that covers RAN, transport, core and operations support systems (OSS).
- Manage the complexity of deploying the solution (contracting, preventing fragmentation, dealing with local municipalities, etc.).
- Maintaining Service Level Agreements (SLAs) during rollout.
- Doing all the above in such a way that is time and cost effective.
- Insure the required post-deployment operational support

## Key Steps to Deploying an End-to-End Open RAN Solution

World Wide Technology is uniquely positioned in the Open RAN ecosystem as the only systems integrator in the Open RAN Policy Coalition and the Competitive Carriers Association, two key organizations working to standardize technical and performance standards.

Given this position, we've outlined a step-by-step process operators can take to deploy Open RAN seamlessly:

## 1. Establish a network blueprint

Speed to market is critical, especially in today's competitive landscape. Having a head start with an Open RAN reference architecture — a blueprint, so to speak — can make a major impact on time to deployment.

Service providers are looking to disaggregate and virtualize their infrastructure to enable agility in delivering new cloud-based services to their enterprise and consumer customers. WWT's Open RAN blueprints include multiple deployment models to support cost-effective builds and upgrades to existing infrastructures.

## 2. Create a network strategy

Before you begin to deploy Open RAN, it is important to consider the requirements and goals of your network, establish baseline performance and network engineering guidelines, and assess which cell sites will need modifications.

Other questions might include:

- What use cases will the network support?
- Is this a rip and replace approach or are you just enhancing your current 4G/LTE network as you prepare for 5G?
- What is your strategy regarding your legacy (2G&3G) data and voice networks?
- What type of transport infrastructure do you currently have in place?
- What spectrum is owned or used?

Answering these questions — along with others that arise — will help guide your network modernization journey from start to finish.

## 3. Identify a deployment model

Taking inventory of your transport infrastructure will be key to determining the type of deployment model you use.

### Deployment models:

- **Model 1: High Density (Centralized vDU at Far Edge DC):** This solution is ideal for areas that may have fiber transport to the sites and can meet the latency requirements to centralize the vDU. This model provides the best pooling gain and inter-site coordination capabilities for an operator. It allows cloud management and automation capabilities for ensuring cloud-scale deployments for customers.
- **Model 2: Low Density (vDU at Cell Site):** This model uses a small-footprint server optimized for deployment to the tower. The server is expected to run a vDU in a compact form factor IP65 unit which can be deployed on a cell tower in an outdoor environment. This solution is ideal for rural solutions where outdoor cabinets are not available or transport may not be easily accessible. Centralized cloud management and automation is available for operational efficiencies.
- **Model 3: High Density (vDU at Cell Site):** The third model uses a high density x86 server and is configured to run the baseband for multiple RRU's at the tower site. The DU will support 12 cells

(sector-carriers) with multiple LTE bands and is ideal for operators that may have multiple bands. This configuration will also support LTE-advanced features like carrier-aggregation. Centralized cloud management and automation is available for operational efficiencies.

#### **4. Engineer your network**

Evaluate spectrum holdings, backhaul resources, etc., at each site and produce site designs, which includes core design and RF planning — remember to match existing coverage.

Finalize your deployment plan by using a platform to maintain all field designs, site survey reports and RF plans as well as assign tasks, track and update statuses per project.

#### **5. Order equipment**

- Core racks
- Site cabinets
  - vDU servers
  - Transport gear (CSR)
  - Electrical equipment
  - Monitoring and alarm equipment
- Antennas
- Cables and RF

Once curated, all parts need to be built, staged and deployed to sites.

#### **6. Build new LTE and IMS core**

Install a second core at each core network location. Operators have many sites in the RAN (hundreds to thousands of cell sites) but very few core sites, perhaps only one or two core locations for smaller carriers. Therefore, it makes sense – simply from a time and effort standpoint – to build out the core first and not the RAN.

#### **7. Site acquisition, structural engineering and construction**

Site acquisition is important to best understand how you will deploy Open RAN. Even smaller carriers can have several hundred towers, each of which may have their own leasing agreements or regulations to follow. In cases where towers can't handle more radios, structural upgrades may be required.

If upgrades to a tower are needed or if a new tower needs to be deployed, permitting, engineering and construction will be required.

#### **8. Install and turn up new RAN equipment**

If no upgrades are needed to existing transport infrastructure, you are ready to install, optimize, migrate traffic from the old solution to the new solution and test for various services. If transport upgrades are needed based on the site design and selected deployment model, these upgrades can be performed concurrent to the installation of new RAN equipment per cell site.

#### **9. Decommission old equipment**

If you're operating with a legacy RAN that needs to be ripped out and replaced with a new Open RAN solution, you'll need to get through all of the above steps before you can begin to think about retiring your old equipment.

Once you've tested, validated and fully optimized the new Open RAN, it's time to start decommissioning the old system.

## Who Will Put This All Together?

The open vRAN approach enables a new ecosystem of vendors to participate in the RAN industry while leveraging the benefits of cloud-based architecture, including web-scale hardware and systems. Such degree of flexibility and vendor choice can greatly improve a service provider's supply chain posture, allowing for faster time to market and accelerated innovation cycles.

Most service providers need help accelerating the integration and adoption of open vRAN to realize these benefits. Systems integrators, such as WWT, help eliminate this gap and enable operators to quickly adopt new, open architectures to increase their competitiveness.

Building the validated blueprint in the ATC will allow operators to move from innovation to validation and deployment more rapidly than in the past, as service providers will be able to see the Open RAN solution in operation, get their hands on it, and test features that they require.

To that end, we've established an Open RAN workshop that helps operators:

- Explore the benefits of Open RAN and how it can be incorporated into their specific network architecture.
- Identify use cases and develop a business case to align people, process and technology.
- Understand existing network topology and review deployment options.
- Frame an Open RAN strategy that articulates a path to success.

## Open RAN FAQ

WWT, along with partners Cisco and AltioStar participated in a Light Reading webinar detailing how Open RAN can drive efficiency, enable agility and enhance 5G adoption. During and after the presentation, WWT's subject matter experts answered a variety of questions from service providers and other attendees of the webinar.

### **Q: How do you envision Open RAN changing the role of the Communications Service Provider (CSP)?**

A: Open RAN is operator driven and enables CSPs to drive their own network, including putting together best-of-breed networks. System integrators play a key role in validating and managing the multi-vendor solutions that will help CSPs optimize cost and shrink the time it takes to bring solutions to market.

### **Q: How *exactly* will Open RAN reduce operating expenses?**

A: Networks are becoming increasingly complex. The self-driving nature of Open RAN will be able to leverage new learning-based technologies that automate operational network functions and reduce operational expenditures (opex).

In combination with Open RAN's open interfaces, AI-optimized closed-loop automation will be achievable and will enable a new era for network operations. Open interfaces are

essential to enabling small vendors or operators to quickly introduce their own services. They also enable operators to customize the network to suit their own unique needs.

All these aspects of O-RAN can reduce operating expenses.

**Q: As the RAN is decomposed and disaggregated, do you foresee a multi-vendor RAN that is unique to the key applications or vertical it serves?**

A: One of the benefits of Open RAN is achieving a best-of-breed multi-vendor network that enables operators to bring innovative solutions specific to different industry verticals from RAN vendors, third parties and their own R&D teams. Yes, Open RAN will usher in unique multi-vendor architectures tailored to meet the needs of specific applications of industries.

**Q: Do you see Open RAN evolving into RAN-as-a-service that utilizes industry-leading cloud platforms?**

A: The RAN is evolving to a RAN-as-a-service model deployed on different kinds of cloud platforms. The Evolved Packet Core (EPC) and IP Multimedia Subsystem (IMS) are already being delivered as a cloud-based service. Different components of the RAN are being developed as cloud-native containerized services, which facilitates RAN-as-a-service deployments.

**Q: How do you see Open RAN evolving for in-building use? How can it enable localized neutral-host networks?**

A: Open RAN is applicable to multiple use cases including in-building solutions. In the case of in-building or venue use cases, open RAN plays a key role in enabling neutral host solutions that are less cumbersome, less expensive and easier to manage. This is because openness makes sharing the multiple layers of the network by multiple operators easier.

**Q: How can we ensure interoperability of the various vendor solutions? Will there be a certification or common labs for mobile operators?**

A: System integrators like WWT provide a lab environment to validate multi-vendor solutions. WWT works with multiple vendors to certify such mix-and-match solutions and makes lab environments available directly for service providers. This enables service providers to validate and test their own custom configurations.

**Q: There are some concerns the shift towards Open RAN with multiple RAN DU, CU, hardware and software vendors could result in higher integration costs. Is this a valid concern?**

A: This is an area where system integrators like WWT can play a significant role. System integrators can drive interoperability testing and validation. Integrators that are experienced and focused on this can help manage integration costs and bring new innovations to market quicker.

**Q: What is the relationship between open vRAN and general processing hardware such as CPU or GPU?**

A: Open RAN aims to bring cloud-scale economics to the RAN. One of the enablers for this is being able to use off-the-shelf hardware with CPU and GPU that result in a network that meets industry reliability and availability standards in a cost-efficient manner.

**Q: Tier 1 operators are evaluating Open RAN in low average revenue per user (ARPU) parts of the network. How does a brownfield operator enter ORAN?**

A: Today's Open RAN networks deliver capacity, reliability and availability that meet industry standards. This means Open RAN can be evaluated and deployed in multiple parts of the network. Different operators will follow different adoption paths based on their business needs.

**Q: How can a service provider closely tied with OEMs and their own engineering take advantage of the reference architecture and adjust to align with their own unique requirements?**

A: New technologies like 5G present a great opportunity for operators to consider and adopt Open RAN solutions that will help them bring new technologies to market faster and reduce capex and open costs.

**Q: What other advantages does Open RAN present to operators?**

Operators can also take advantage of upgrading aging proprietary boxes. Instead of updating a proprietary box that is at end of life with a new proprietary box, operators can opt for an Open RAN solution. Operators can then leverage their own engineers that know the details of their market well with the help of system integrators to facilitate their transition to open RAN.

**Q: Do you believe mobile network operators (MNO) will be willing to take on the risk and responsibility of deploying Open RAN and the operational complexity it could bring?**

A: The traditional monolithic RAN solution approach no longer meets today's quickly evolving network requirements. These requirements are driven by the need to bring solutions to market quickly, cost efficiently and with minimal hardware swaps. MNO decision makers are increasingly looking at Open RAN to address these needs and stay competitive.

**Q: Without fiber transport, what is the base of transport network (MH)? How does it keep transport network throughput and latency?**

A: Alternative transport network options like Microwave can be used. The transport network will have to be dimensioned and configured to meet the end-to-end performance requirements.

**Q: How will the profit pool be shared by players in the Open RAN ecosystem?**

A: The Open RAN ecosystem creates partnerships between system integrators, OEMs and operators with a common goal of getting new technologies to market in a cost-efficient manner. This approach creates business opportunities to all stakeholders including small innovative startup companies.

## **Q: What is the difference in scope and purpose between the Open RAN Policy Coalition and the O-RAN Alliance?**

A: The Open RAN Policy Coalition was formed to advocate for government policies supporting the development and adoption of open and interoperable solutions in the Radio Access Network (RAN). WWT is uniquely positioned as the only system integrator that is part of the coalition. The O-RAN Alliance was founded by operators to clearly define requirements and help build a supply chain eco-system to realize the benefits of open RAN by bringing openness and intelligence to the radio network.

## **Additional Resources on WWT.com:**

The barrage of new technology is overwhelming. To thrive in the new digital world, organizations must view IT as a strategic weapon. But with so much technology coming at decision makers, IT often gets stuck evaluating one-off technology products.

Critical to success is arming IT with a process to digest, evaluate and implement the onslaught of new technology. Only then can next-generation IT focus on building differentiated offerings that grow the business.

WWT's digital platform creates a multiplier effect of knowledge, speed and agility, and provides service providers with the info and resources they need to make informed decisions about the solutions that will drive success moving forward.

- **White papers:**
  - [Accelerating Open RAN Adoption: The Role of the Systems Integrator](#)
- **Workshop:**
  - [Open RAN Workshop: Explore the benefits of Open RAN, identify use cases, develop a business case and frame an Open RAN strategy.](#)
- **Articles:**
  - [Open RAN Leverages Existing Infrastructure to Accelerate 5G Enablement](#)
  - [WWT's Turnkey Open RAN Blueprint a Major Step Toward 5G](#)
  - [Open RAN's Future-Proof Architecture Creates a Streamlined Path to 5G](#)
  - [How Open RAN Drives Efficiency, Enables Agility and Enhances 5G Adoption](#)
  - [What is Open Networking?](#)
- **Video:**
  - [Webinar: Accelerate 4G/5G With Open RAN Deployments](#)
- **News:**
  - [WWT Develops Blueprint to Accelerate Deployment of 4G/5G Open Virtualized RAN Solutions with Cisco and Altiostar](#)
  - [Open RAN Policy Coalition Launches to 'Spur Competition' in 5G](#)
- **Technologies:**
  - [Open RAN](#)
  - [Global Service Provider Solutions](#)
  - [Carrier Networking](#)
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