HOW TO REALIZE ALL THE BENEFITS
OF 5G USING VRAN AND O-RAN

WHAT ARE THE PROMISES OF 5G TECHNOLOGY?

5G is designed to support stringent requirements for ultra-high volumes of billions of IoT devices, streaming media transmissions, self-operating vehicles, critical emergency services, air and defense operations, and other mission-critical technologies. Major expectations include delivery of massive volumes of data at high speeds over numerous connections, with high reliability and low latency.

5G technology, as it is today and as it moves toward 6G, offers a realm of opportunities for communications service providers (CSPs) to provide advanced services and new billing models. Use cases include medical testing, virtual reality learning, connected cars, and much more.

Table 1: 5G Use Cases with Revenue Potential

Use Case	Application
Agriculture/Farming	Wireless monitoring of field conditions, cattle, and data can be analyzed to predict agriculture yields.
Augmented Reality	Real-time gaming, virtual tours.
Autonomous Cars	Self-driving cars will be supported by 5G for better steering and navigation.
Connected Cars	C-V2X (Cellular Vehicle-to-Everything) will see an exchange of information between infrastructure, traffic signals, pedestrians, and all vehicles.
Drones	Healthcare, retail, emergencies, entertainment.
Education	Used to stimulate immersive learning environments that call for dispersed learners to collaborate.
Medicine	Remote surgery, virtual consultation, remote health monitoring.
Modern Factories	Huge machines are connected to the cloud, and devices are connected through Wi-Fi within the factory.
Smart Cities	Energy, utilities, and transportation will enable government agencies to drive smart cities.

More than 80% of global operator-billed revenue will be attributable to 5G connections by 2027.

— Juniper Research

80%

Stand-alone 5G networks that offer network slicing will be ideal platforms for the growth of private network revenue.

— Juniper Research

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WHAT HELPS TELCO OPERATORS DURING 5G TRANSFORMATION?

As CSPs move into 5G, virtualized radio access networks (vRANs) play a critical role, as they have traditionally done in the advancement of mobile networks. Rapid business growth and innovation are at the core of vRAN transformation. vRAN simplifies network management and allows operators to introduce innovative new services at a velocity not available with traditional RAN.

How vRAN Differs from Traditional RAN

Traditional RAN, which has been essential to connecting devices to the core network, relies heavily on hardware infrastructure. vRAN is based on software virtualization and is decoupled from the hardware. This disaggregation of software and hardware offers vendor agility, adaptability, and interoperability. These capabilities enable new use cases and revenue streams.

vRAN uses Network Functions Virtualization (NFV) for controlling and routing cellular resources. This software-defined function is critical for 5G core networks. vRAN shifts the functions controlling hardware from the cell site to cloud servers, bringing them closer to the edge. This helps operators fine-tune resource allocation based on changing network traffic. It also helps rapid network scaling without extra hardware expenditures.

5G Business Model Evaluation

Key insights into the future of 5G development offer strategic recommendations for network vendors and operators. Areas assessed include:

- 5G pricing strategies
- AI-based 5G network services
- Key 5G partnerships
- Network-slicing functions
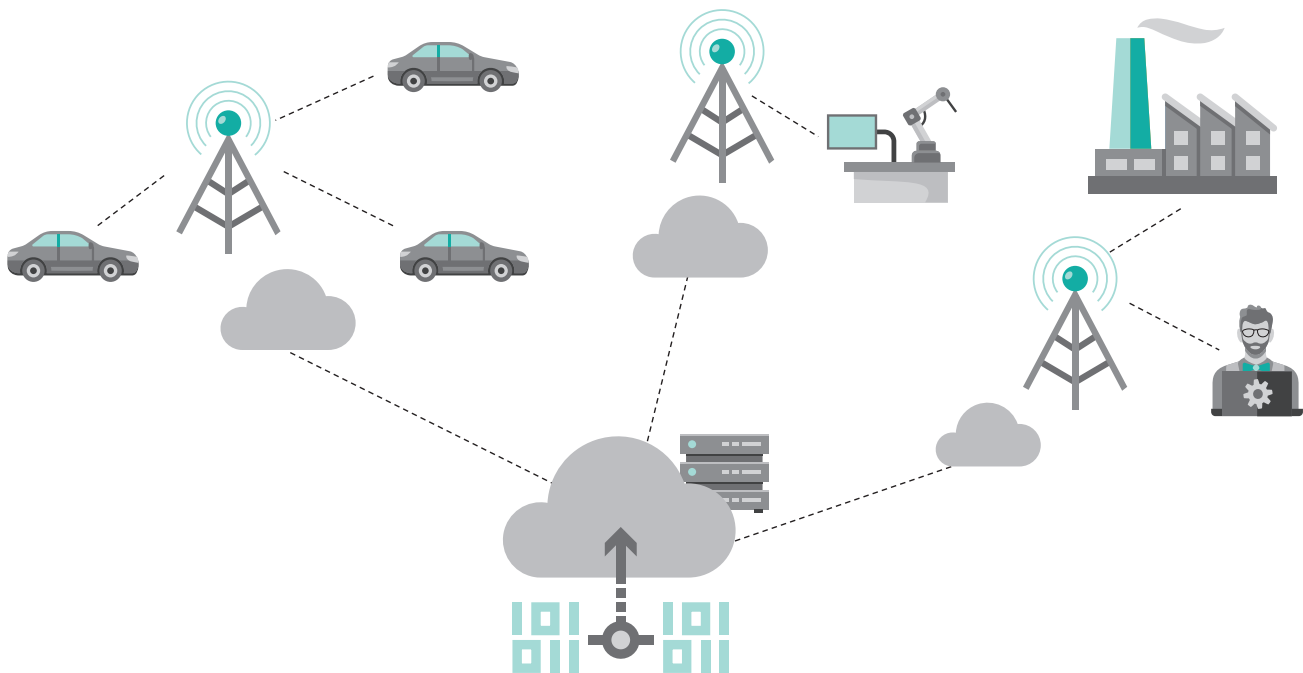- Stand-alone and aggregated rollouts

— **Juniper Research**

Figure 1. 5G services at the edge

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THE TOP 5 BUSINESS BENEFITS OF VRAN

Based on the software-defined cloud, vRAN will help generate more revenue and faster innovation, with benefits including:

- **Minimized dependence on proprietary hardware vendors:** The traditional RAN market was dominated by a few players providing proprietary hardware and software solutions, locking operators into one-vendor solutions. The emergence of vRAN has challenged traditional constraints and opened the door to greater flexibility in hardware, software, and system integrations. Operators can use commercial off-the-shelf (COTS) hardware, which helps improve network resiliency and utilization while offering agility and flexibility.

- **Increased flexibility and simplified maintenance:** Baseband functions that were part of traditional RAN now reside in centralized data centers in the cloud. vRAN offers CSPs their choice of hardware platforms to support the 5G network from the core to the edge. It also allows multiple vendors to run network functions on the same hardware, completely independent of each other. This simplifies network management, reducing operation and maintenance costs.

- **Cost efficiency and high scalability:** vRAN enables network resources to be scaled up or down based on ever-changing network utilization. Artificial intelligence and machine learning (AI/ML) algorithms monitoring the system direct resource shifting to support highly efficient ways to save energy and optimize operations, based on traffic patterns. Operators do not have to pay for unused resources and can leverage vRAN's cost efficiencies to improve resource utilization and network performance.

- **Lowered barriers for implementing new services:** vRAN adapts quickly to change. Remote upgrades and updates can roll out new services and patches to an entire network within a matter of hours. With this flexibility and velocity, vRAN helps future-proof the network.

- **Increased opportunity for innovation:** The advanced features and capabilities of vRAN will reduce CapEx and OpEx. But this is just the beginning; vRAN's software-defined cloud-native functions, which do not require changes to underlying hardware, will also allow CSPs to innovate within the 5G ecosystem, unlocking new revenue-generating opportunities both from existing services and from those we haven't yet imagined.
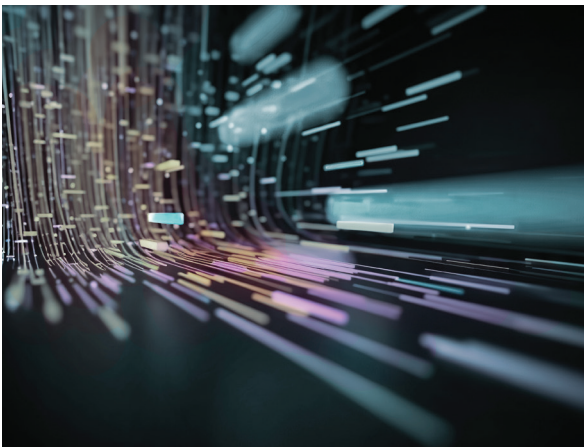
KEY TAKEAWAY

vRAN, based on the software-defined cloud, will generate more revenue and speed innovation.

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Decades of History in No-Fail Infrastructure

For 40 years, Wind River® has built software to the highest standards required for safety-critical applications in avionics, industrial, automotive, defense, and medical. It provides six-nines availability and scalability for next-generation cloud infrastructure for telecom networks. Wind River Linux has been running solutions from major Tier 1 RAN providers such as Ericsson and Nokia for the last 15 to 20 years.

Field-Proven Components

Wind River is pioneering the transition to vRAN and O-RAN using our extensive experience in building mission-critical applications. As a cofounder of StarlingX, we have helped provide the open source distributed cloud project specifically designed for easy day-zero and day-one deployment and day-two operations. Wind River Studio is commercially supported StarlingX. This communications-as-a-service (CaaS) platform allows scalable deployment with virtual machines, Kubernetes, Docker containers, and microservices — all main components of modern 5G vRAN.

Scale at the Edge

Studio offers new scalability and deployment paradigms that enable remarkable savings in cost of ownership: Instead of commissioning six servers, you can now commission one or two. With a small footprint at the edge, Wind River solutions have reduced server overhead down to a single core, so the rest of the application can achieve much higher vRAN performance.

Entire System Visibility and Management

As you build and grow your system, it is important to have full visibility into your network. Starting with day-two operations, powerful insights can be derived to help tune the system for optimal performance. Studio enables provisioning of new clouds and data analysis across the entire system from a single point.

Reliability

Studio provides configuration redundancy and failover capabilities and fault management. Our deployment options offer configurations across the span, from large data centers with multiple servers to regional data centers to the far edge. Wind River Studio Cloud Platform decouples the software workload from the hardware. A server can failover to another server instantly, and the load is picked up with speed and security.

Security

Since many far edge sites will be located as stand-alone centers, it is critical to assign strict access rules to them. Studio offers stringent security configuration measures to prevent equipment tampering.

Automation

Automating the discovery, audit, and deployment process reduces deployment time and cost and focuses human activity on exception management. Automating the configuration of the CaaS as part of its deployment or as a reconfiguration activity enables it to accept a specific workload with minimal human interaction, reducing cost and time-to-market.

Ultra-low Latency

If you need to run a reliable, ultra-low latency communication, you need to build a far edge infrastructure. Rigorous latency requirements come from the fact that latency increases as your cloud grows. Studio offers deterministic, tunable performance optimized for your specific configuration.

Scalable Deployments

The ability to add more hardware without disrupting current network load is becoming more critical as services expand and more services need to be processed. Studio offers the ability to seamlessly and dynamically increase the capacity of the network.

Upgraded Reduction Time

Wind River Studio Operator allows creation of a separate deployment automation sequence based on the requested target state. Previously separate workflows are combined into a single activity, and individual workflows are then executed against that sequence to perform the required operation. Your team can deploy all components, from hardware to a fully commissioned cell site, during a single maintenance window.

Energy Efficiency

Studio Operator offers many solutions to address energy efficiency, helping CSPs save energy costs and move those savings to other areas. Visualization of energy consumption is part of Studio Operator analytics, providing your team with greater control over performance levels and power consumption.
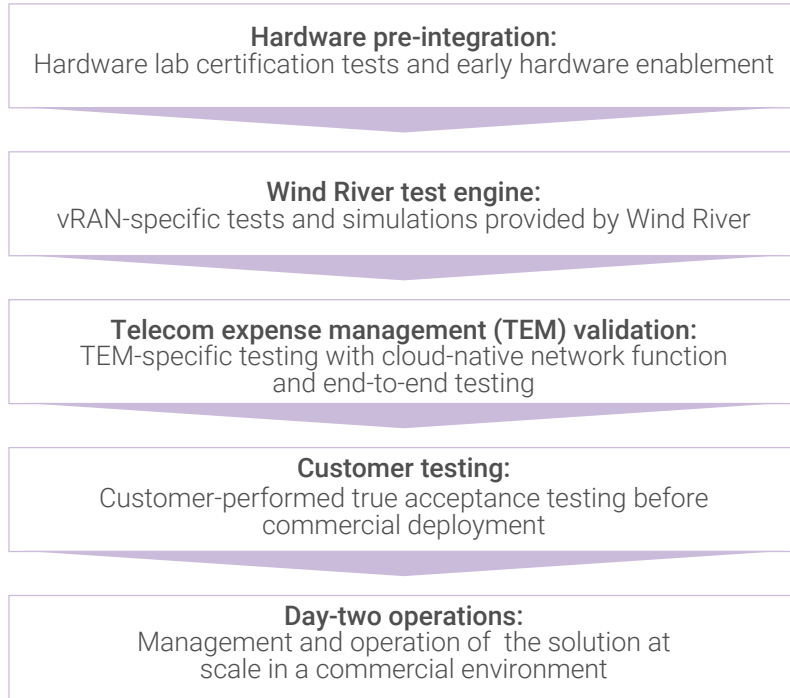
vRAN Deployments at Scale

Wind River is the only company in the world with multi-vendor vRAN deployments at scale. The biggest global carriers, such as Verizon Wireless and Vodafone, are operating on our distributed cloud vRAN.

Verizon has more than 15K sites, and Vodafone has 29K. Multiple vRAN configurations are running on these customers' networks. Vodafone measured the KPIs of Open RAN against traditional RAN and found conclusive data that Open RAN performs the same or better on 90% of the criteria. The company expects the gap to close quickly.

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A Proven Path to Transition

Our extensive and field-proven program allows you a frictionless transition process. It includes:

Hardware pre-integration:
Hardware lab certification tests and early hardware enablement

Wind River test engine:
vRAN-specific tests and simulations provided by Wind River

Telecom expense management (TEM) validation:
TEM-specific testing with cloud-native network function
and end-to-end testing

Customer testing:
Customer-performed true acceptance testing before
commercial deployment

Day-two operations:
Management and operation of the solution at
scale in a commercial environment

YOU DEPLOYED STUDIO — NOW WHAT?

We offer two modules to help you run your day-two operations:

- **Wind River Studio Analytics:** Studio Analytics integrates data collection, monitoring, analysis, and reporting to optimize your distributed network operation.

- **Wind River Studio Conductor:** Studio Conductor orchestrates service deployment across a complex cloud topology with complete end-to-end automation.

Wind River offers the best 5G vRAN software infrastructure technology available today. Our experienced teams can help you design, deploy, and operate your network. Whether you are running mission-critical services or private 5G networks, Wind River will help you build the most resilient network, optimize costs, and achieve the highest potential for growth and innovation.

CARRIER SUPPORT

Wind River Studio is backed by our award-winning global support organization. We offer live help in multiple time zones, with 24/7/365 emergency recovery and service restoration and standard Tier 1 and Tier 2 break/fix support. The online Wind River Support Network, with multifaceted self-help options and optional premium services, provides developers the fastest possible time-to-resolution. For more information, visit support2.windriver.com.

KEY TAKEAWAYS

Wind River is the only infrastructure provider that has live multi-vendor vRAN and O-RAN deployments at scale with the biggest telco carriers.

Wind River can bring experienced people into your network to help you design, deploy, and operate your network.

Wind River Studio can enable your growth, generate more revenue, and allow you to constantly innovate in more verticals.

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