Private 5G at the Enterprise Edge

VMware Edge Compute Stack with ASOCS and Druid Validated Design

Today's enterprises are delivering intelligent and immersive experiences that require high-bandwidth, ultra-low-latency networks. For example, manufacturers are using real-time video to drive advanced predictive maintenance, pre-emptively identifying faults, and the retail market is leveraging augmented reality to reinvent personalized shopping.
To deliver these experiences, they're beginning a journey of digital transformation and taking advantage of new technology like 5G to connect everyone and everything.

Legacy connectivity options fall short

Digital transformation is required because the needs of modern edge devices and applications have changed. There are several factors driving the enterprise to adopt new wireless technology to satisfy the new connectivity demands. Traditional Wi-Fi networks are useful for legacy devices and applications, but they have limitations around mobility, coverage, performance and reliability—all of which are core strengths of private mobile network technology. The introduction of these mission-critical, data-rich use cases force IT leaders to review their connectivity strategy and plan accordingly.

Complexity forces compromise

Network transformation brings complexity, and today's solutions for private mobile networks force compromise. The process for selecting the right partners seems daunting with questions around spectrum, unclear roadmaps, and limitations around which hardware and software vendors you can work. The benefits of private 5G are clear, and yet we haven't seen the enterprise take advantage of this technology.

vmware®

Benefits of Private 5G

- Security
- Reliability
- Speed and performance
- Mobility

Seize the private 5G opportunity

A private mobile network enables you to take full control of your business-critical processes. Built with 3GPP protocols, the network takes advantage of encrypted security and protection of data to reduce threats. Inherently mobile, 5G delivers unmatched reliability and coverage with seamless connectivity. Last, but not least, 5G accelerates innovation with next-generation speed and performance that enables use cases beyond today's capabilities.

Private 5G use cases

| Industry	Use case
Manufacturing	Real-time automation, remote/quality control, remote updates, automated guided vehicles (AGVs) on production floors
Smart Spaces	Data-driven actions based on sensor data and video processing
Energy (Oil & Gas)	Global access and coverage
Healthcare	Real-time analytics, remote care, and facility safety
Transportation	Traffic control, improved airplane turnaround times, and passenger counts
Public Safety	Transportation and real-time monitoring of public spaces
Retail	Stock and sales floor management; optimized customer journey

Figure 1: Use cases by industry

Our validated designs are tailored to enterprise IT organizations, simplifying management and removing the many hurdles blocking adoption and innovation.

Private 5G for enterprise

VMware® leadership in enterprise networks and experience in telco networks enables a private 5G solution that makes sense for the enterprise. Our validated design process is tailored to enterprise IT organizations, simplifying management and removing the many hurdles blocking adoption and innovation. More than a platform, VMware delivers a trusted foundation for a secure, robust and flexible private mobile network that runs alongside your other edge-native applications.

vmware®
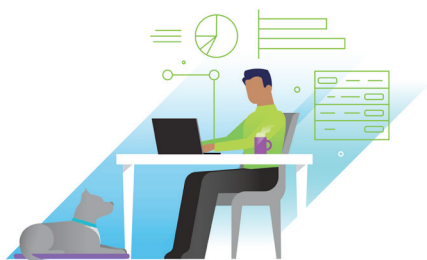
Defining the Edge

Near edge: All the locations between the data center and the customer premises

Far edge: An edge-native workload placed at a remote customer location at the closest proximity to the endpoints

Validated design partners

ASOCS
On-premise mobile clouds

Druid

Introducing VMware Edge Compute Stack

VMware Edge Compute Stack is a purpose-built, integrated virtual machine (VM) and container-based software stack that enables organizations to modernize and secure edge-native apps at the far edge. VMware empowers the enterprise to build, run, manage, connect and protect edge-native applications at the near edge and the far edge while leveraging consistent infrastructure and operations across clouds with the power of edge computing.

VMware Edge Compute Stack for Private 5G

VMware's Edge Compute Stack, enables private 5G solutions running on common off-the-shelf hardware, delivering industry-leading automation, orchestration and computing.

Leveraging our partner ecosystem, the enterprise can choose to accelerate their private mobile network journey and select design-validated radio access network (RAN) and core partners to ensure functional interoperability and easy instantiation.

Private 5G Validated Design—ASOCS and Druid

VMware Edge Compute Stack for Private 5G has validated two network component partners to simplify your path to 5G. ASOCS CYRUS® RAN and Druid Raemis Core have completed validated design testing on VMware Edge Compute Stack. The ASOCS RAN and Druid packet core components, including networking and management, are all deployed in a single server at the far edge.

The use of VMware's hypervisor disaggregates software and hardware, simplifying management and enhancing security through better isolation across workloads. With VMware virtual infrastructure, the private mobile network can also be extended to host additional edge applications, running your other edge-native applications alongside your private 5G solution on a single consistent platform.
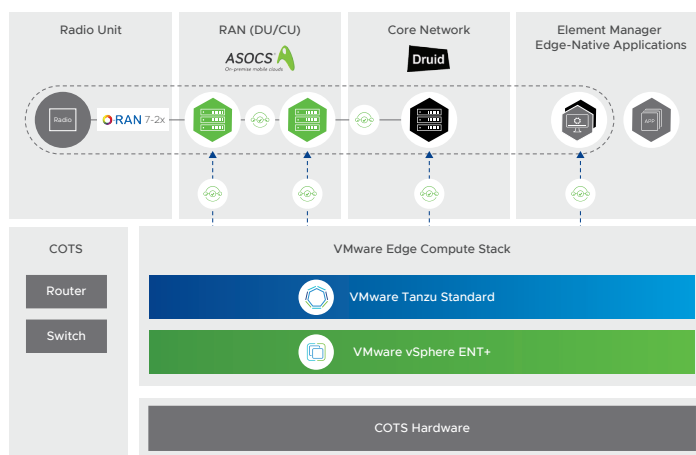

Figure 2: The private 5G validated design delivered by combining ASOCS, Druid, and VMware.

vmware®

About ASOCS

ASOCS is empowering industrial enterprises to connect their production lines to edge applications by providing them with a cloud-based private 5G network and a scalable software-as-a-service (SaaS) model.

CYRUS 5G software by ASOCS enables enterprises to run their networks on their own terms using standard hardware, just as they do with their IT infrastructure. ASOCS enables companies to easily implement private 5G networks and benefit from high network reliability, enhanced security and low latency.

About Druid

Druid Software is a core cellular network software company based in Ireland. Established in 2001, Druid has evolved into one of the world's leaders in private 5G and 4G cellular technology over the last 20 years. Druid's Raemis platform is a mature 3GPP-compliant 5G and 4G core network, with unique features designed specifically for business and mission critical use.

Druid's mature Raemis platform is in use today by ISPs and enterprises for mission-critical environments all over the world. Druid technology enables solutions in different areas including enterprise communications, IoT, mobile edge computing, neutral host and public safety. For more information, please visit druidsoftware.com or stay up to date with everything private networks by following us on Twitter, Facebook, Instagram, LinkedIn and YouTube.

ASOCS 5G RAN

The CYRUS solution for private 5G networks can support a facility's full range of Internet of Things (IoT) and Industrial IoT (IIoT) devices while providing high-capacity bandwidth to process and transfer massive amounts of data from connected devices. Utilizing standard servers, CYRUS is managed like any other IT element. It enables industrial enterprises to easily implement private 5G networks with Time-Sensitive Networking (TSN), high network reliability, low latency and high speed—making it ideal for innovative IIoT, massive IoT and eMBB applications.

The software is fully virtualized, so there is full separation between the general L1/L2/L3 software and the required corresponding hardware (x86 server). CYRUS software can integrate with any third-party NGC via an N2&N3 interface. CYRUS software can also be managed by CYRUS Rainbow Manager—the management, automation, and coordination tool.

One of the unique features of CYRUS software is its virtualized nature, covering all layers from L1 to L3. This feature enables various functions including support for several topologies and split options, from a CU/DU split to an Ethernet-based DU/RU split. More importantly, this architecture allows for VM or container-based implementation, making it native to run on cloud infrastructure either on-premises or in the public cloud. CYRUS is compatible with any radio unit (RU) that complies with ORAN's 7.2 fronthaul interface, including CYRUS radios that are a family of 5G, low-power, indoor Remote Radio Head units. The radio, whose specifications are highlighted in Figure 3 below, interfaces with the DU via a 10G Ethernet interface utilizing ORAN's 7.2 fronthaul interface. The radio is powered by PoE (Power over Ethernet). The CYRUS system furthermore, can be connected to any ORU device (RU supporting ORAN 7.2 specifications) after an interoperability procedure.

Druid 5G Raemis Core

Druid is a global leader of specialized core network software. The cellular technology platform Raemis 5G's unique features are designed to specifically support enterprise critical communications. Druid's 5G cellular solutions are built on our Raemis technology platform, which is made of a 3GPP-compliant 5G core, RestAPI and additional functionality.

Raemis 5G supports distributed architectures, which can be deployed in cloud-native environments with central management of multiple edge sites. This enables your network to benefit from the Raemis MEC distributed edge core and redundancy capabilities.

A Druid 5G Raemis Core includes a private network with private subscribers, private cell network, mobility Xn handover, unknown subscriber rejection, idle mode cell reselection, UE attachment/implicit detach/reattach, and VoNR calls/data service. Raemis supports slicing by enabling easily grouping UEs for prioritization and a guaranteed quality of service. Raemis 5G features are available in the same Raemis software product supporting 4G. No additional software (or hardware) installation is required.

Deployment model—Single server on-premises (far edge)

Radio configuration	Key characteristics	Sizing guidelines
• 3.5 to 3.7GHz • 100MHz bandwidth	• 1Gbps per DU • 10ms latency	Single server deployment option and single switch
• Indoor: 250mW • Outdoor: 5W	Supports subscriber profiles (eMBB, IoT, etc.)	Support up to four radios depending on coverage
Power over Ethernet for radio unit	Unified and virtualized edge compute + private 5G solution	One-site, two-radio-unit deployment requires approx. 36 cores.*

* Additional parameters must be identified for sizing.

Figure 3: Validated design deployment model.

Remove complication and spark innovation

Whether you're in manufacturing, utilities, retail, or healthcare, the VMware validated design for private 5G in collaboration with ASOCS and Druid is your trusted foundation for private connectivity—enabling the enterprise to deliver new immersive data-rich experiences while simplifying management and orchestration. More than a platform, VMware Edge Compute Stack for Private 5G hosts a secure, robust, and flexible private mobile network alongside your other edge-native applications.

About VMware

VMware software powers the world's complex digital infrastructure. The company's cloud, app modernization, networking, security and digital workspace offerings help customers deliver any application on any cloud across any device. Headquartered in Palo Alto, California, VMware is committed to being a force for good, from its breakthrough technology innovations to its global impact.

Learn more?

For more information, visit telco.vmware.com. Contact your VMware representative or email us at private5G@vmware.com.