










# A Private 5G Network for Today and Tomorrow

## WHY PRIVATE 5G MOBILE NETWORKS

- Reducing latency from 50ms–70ms in 4G to below 10ms in 5G
- Increase speed above 1Gbps
- 5G networks can support a million devices per square kilometer, making them perfect for heavily connected wireless environments
- Control and manage security and QoS policies across your private company network.

The proliferation of connected devices in enterprise markets is driving requirements for mobility, reliability, latency and security that traditional Wi-Fi networks cannot address. As enterprises progress on their digital journeys, the transformation and automation of their operational processes require secure, high-performance communications that also accommodate the continuous expansion of applications, devices, and users.

It is in this context that private 5G mobile networks are becoming the leading consideration for coverage, capacity, security, reliability and guaranteed quality. Private mobile networks offer a scalable solution suitable for several enterprise verticals:

 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

Private mobile network solutions are also suitable for telco edge cloud micro data centers, which can provide sliced connectivity to a smart city or a stadium hosting thousands of concurrent connections.

## PRIVATE 5G NETWORK IN-A-BOX

BY ASOCS



Private 5G network in-a-box with curated ASOCS CYRUS Open RAN and Metaswitch 5G Fusion Core on VMware virtual infrastructure.

- 5G-ready superior connectivity
- Programmability with differentiated application SLAs
- Best-of-breed 5G RAN and core
- Highly secure networking
- Private networking installation as easy as Wi-Fi
- Fully virtualized solution over COTS hardware
- Extensibility to edge cloud applications
- Adaptive operating model with centralized or distributed management

## ASOCS, Metaswitch, and VMware's Private 5G Solution

The private 5G mobile network solution delivered by combining ASOCS, Metaswitch, and VMware meets the key enterprise requirements for 5G device density, low latency, and reliability. The solution, as depicted in Figure 1 below, can be deployed on-premises with a fully packaged ASOCS CYRUS Open Radio Access and Metaswitch Fusion Core 5G mobile packet core. These provide reliable 5G cellular connectivity as a single tenant solution.

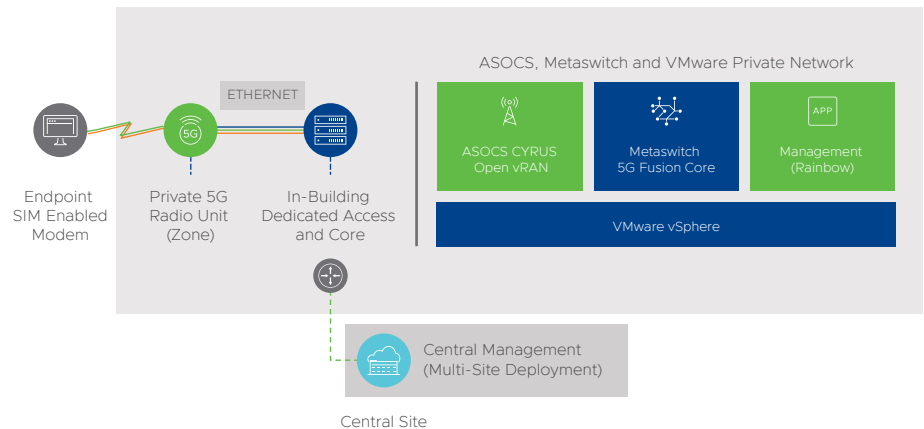


FIGURE 1: The private 5G mobile network solution delivered by combining ASOCS, Metaswitch, and VMware.

For enterprises with a distributed topology, the 5G radio unit can be placed on-premises with low-latency connections to the data center. The data center hosts the mobile packet core functions, virtualized RAN (CU, DU) and, optionally, an edge computing infrastructure for applications and content. ASOCS CYRUS RAN and Metaswitch Fusion Core components are virtualized and hosted over VMware virtual infrastructure. The use of a hypervisor disaggregates software and hardware. This approach simplifies management and enhances security through better isolation across workloads. With VMware virtual infrastructure, the private mobile networks solution can also be extended to host additional edge software.

## Superior Connectivity

5G new radio (NR) is the latest generation of mobile networks that delivers uniquely superior characteristics in the realm of speed, density, reliability and latency.

ASOCS capabilities enable unique programmability features to design and enforce specific classes of services based on quality of service (QoS) indicators, allowing enterprises to segment and prioritize traffic to ensure specific service-level agreements (SLAs).

## Ease of Installation and Management

5G is a complex technology. By combining ASOCS, Metaswitch and VMware the process of deploying a private 5G network can be as straightforward as that of a traditional Wi-Fi. ASOCS CYRUS is a single 5G software stack, fully virtualized across all layers. The management is further simplified through centralized and highly automated cloud orchestration that enables streamlined management of software provisioning, configuration, and lifecycle operations.

The solution, as exemplified in Figure 2, can be supplied through multiple channels:

- End-to-end software solution—“Bring your own hardware”
  - Software provided by ASOCS; hardware provided by integrator.
  - Ideal for original equipment manufacturers (OEMs) / system integrators (SIs) in the wireless/IT space.
- Customized partitioning
  - Servers and switches, for example, provided by SIs, with RAN software and radios provided by ASOCS.

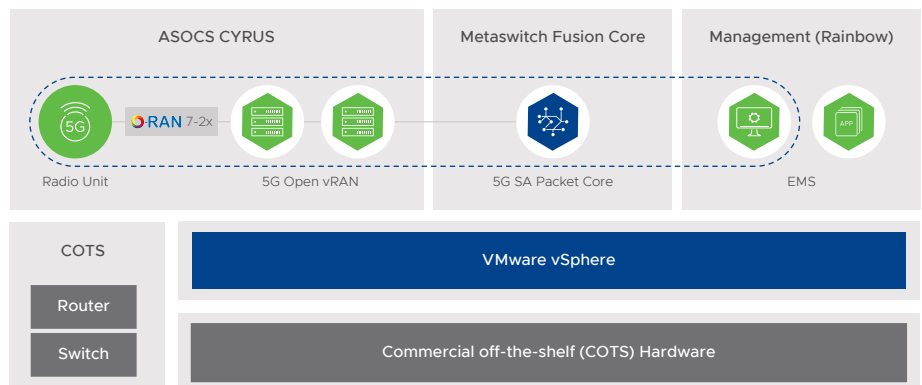


FIGURE 2: Deployment reference architecture for the private 5G mobile network solution

## 5G Radio Access Network

The CYRUS solution for private 5G networks can support a facility’s full range of Internet of Things (IoT) devices while providing higher 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 5G private networks with time-sensitive networking (TSN), high network reliability, low latency and high speed—making it ideal for innovative industrial IoT (IIoT) applications.

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

One of the unique features of CYRUS software is its virtualized nature, which covers the layers from L1 to L3. This feature enables support of various functions, including support for several topologies and split options, from a central unit / distributed unit (CU/DU) split to an Ethernet-based distributed unit / radio unit (DU/RU) split.

More importantly, this architecture allows for virtual machine (VM) or container-based implementation, making it native to run on cloud infrastructure that's either on-premises or in the public cloud. CYRUS is fully interoperable with a wide range of low and mid-power, indoor and outdoor remote radio heads that are compliant with open radio access network (O-RAN) 7.2 fronthaul interface. The radio powered by PoE (Power over Ethernet) interfaces with the DU via a 10G Ethernet interface utilizing O-RAN's 7.2 fronthaul interface.

## 5G Packet Core

Built for multiaccess edge compute (MEC), Metaswitch Fusion Core is a cloud-native implementation of the 3rd Generation Partnership Project (3GPP) standards-defined 5G NGC. It comprises a defined set of network functions that allow 5G network operators to aggregate data traffic from all end devices connected over wireless 4G or 5G. Its access gateway function also enables support for wireless wireline convergence.

Fusion Core is integrated with the Metaswitch Service Assurance Server (SAS), providing proactive, real-time analysis of all message traffic, including NG application protocol (NGAP) / non-access stratum (NAS) messages and HTTP requests and responses.

Fusion Core is also integrated with Metaswitch ServiceIQ Monitoring, which provides industry-standard cloud-native monitoring tools, such as Prometheus and Grafana. This approach allows for real-time analysis of system performance, fault identification and troubleshooting.

Fusion Core is delivered on a VM known as the Fusion Core VM. The Fusion Core VM is designed to be installed on a commercial off-the-shelf (COTS) server running VMware vSphere®. The network functions and infrastructure components required to deliver Fusion Core are deployed as containers on the Fusion Core VM and orchestrated by Kubernetes.

## Virtual Infrastructure

VMware vSphere is the industry-leading virtualization and cloud platform that delivers essential services for the modern cloud. It supports both legacy and cloud-native applications through simple and efficient management at scale with comprehensive built-in security.

vSphere offers the common operating environment for both ASOCS RAN and Metaswitch Packet Core network workloads over COTS hardware.

VMware ESXi™ is optimized to meet or exceed stringent real-time performance and latency requirements of the virtualized RAN workloads. The resulting consistent runtime environment proves crucial to process and transfer massive amounts of 5G traffic. Bypassing the VMkernel for networking makes latency more predictable, improves CPU efficiency, and reduces scheduling jitter. The solution also uses VMware vCenter® to offer the centralized management of distributed virtual deployment that is essential to support the different operational models.

## Your Fastest Path to 5G

Whether you're in manufacturing, smart spaces, energy, healthcare, transportation, public safety or retail, the private 5G solution delivered by combining ASOCS, Metaswitch and VMware is your fastest path to 5G. It delivers superior connectivity, highly secure networking, easy installation, and extensibility to other edge cloud applications. And this network in-a-box solution can lower costs, reduce management demands, and increase long-term adaptability.

SOLUTION PARTNERS



## About ASOCS

ASOCS is disrupting the industrial network connectivity market with an open and virtualized software solution that delivers 5G private mobile network solutions in a single software stack. Our on-premises mobile cloud is a truly open solution that allows industrial enterprises to run their networks on their own terms using standard hardware, just as they do with their IT infrastructure. It enables industrial enterprises to easily implement 5G private networks with time-sensitive networking (TSN), high network reliability, low latency, and speed, making it ideal for Industry 4.0 applications.

## About Metaswitch

Metaswitch, a Microsoft company, develops ultra-high-performance, cloud-native networking software for communications service providers, governments and enterprises. Metaswitch specializes in the areas of network packet core, voice core and unified communications and collaboration. Designed to run on premises, or in private, public and hybrid clouds, our award-winning solutions power more than 750 fixed, mobile, and converged service providers worldwide. Metaswitch was acquired by Microsoft in July 2020 and is now part of the Azure for Operators group.

## 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](https://telco.vmware.com) or contact your VMware representative.

