




OpenSpace Platform: Enabling Carrier Ethernet over Satellite

Deliver Services Faster and more Cost-Effectively at Scale

Today's rapidly changing space environment with new emerging players, business models, and standards requires a more agile, scalable and modern approach on the ground.

The OpenSpace Platform is the first digital, fully virtualized, and orchestrated ground system in the satellite industry. It is cloud-native and leverages telecom standards such as Carrier Ethernet to enable highly scalable and zero-touch automated operations. This allows satellite operators and service providers to deploy carrier-grade connectivity services, interoperating seamlessly with terrestrial telecom networks.



OpenSpace is the satellite industry's first MEF 3.0 Carrier Ethernet Certified Platform, a standard widely deployed across the telecom industry for enterprise-scale service delivery.

Digital, Virtualized, and Orchestrated

Within the OpenSpace Platform, all signal processing is performed on generic compute, as opposed to dedicated single-purpose hardware. This allows the OpenSpace Platform to leverage IT-standard tools, best practices, and technologies to deliver a secure and scalable satcom ground system.



Deploy and maintain with mainstream IT tools and training



Deploy services in minutes instead of weeks



Improve security with IT best practices

Carrier Ethernet over Satellite

The OpenSpace Platform leverages Carrier Ethernet to enable the scale and automation required by today's global telecom networks. Standardized service definitions and QoS rules allow for straightforward telecom-interconnect, easy integration of mainstream third-party applications and zero-touch service orchestration.

OpenSpace is the industry's first MEF 3.0 Carrier Ethernet certified solution, supporting core Carrier Ethernet service types and a standardized QoS system. It provides a MEF Presto API for Lifecycle Service Orchestration (LSO), enabling seamless integration into telecom network management tools.



Gain competitive differentiation by offering higher value carrier-grade services



Leverage large 3rd party ecosystem of powerful networking applications



Generate new revenue from on-demand offerings using automated service orchestration

OpenSpace Platform Architecture

The OpenSpace Platform is built on three core capabilities: fully digital and virtualized data processing, end-to-end network management and orchestration, and flexible software-defined terminals.

Fully Digital and Virtual Processing

The OpenSpace Platform's Carrier-Ethernet-over-Satellite connectivity is provided by virtual DVB-S2X modems (vModems) running on standard Intel x86 compute with no additional FPGAs or GPUs required. These vModems are connected to a Kratos SpectralNet Wideband digitizer through a powerful Gateway Feed Service (GWFS).

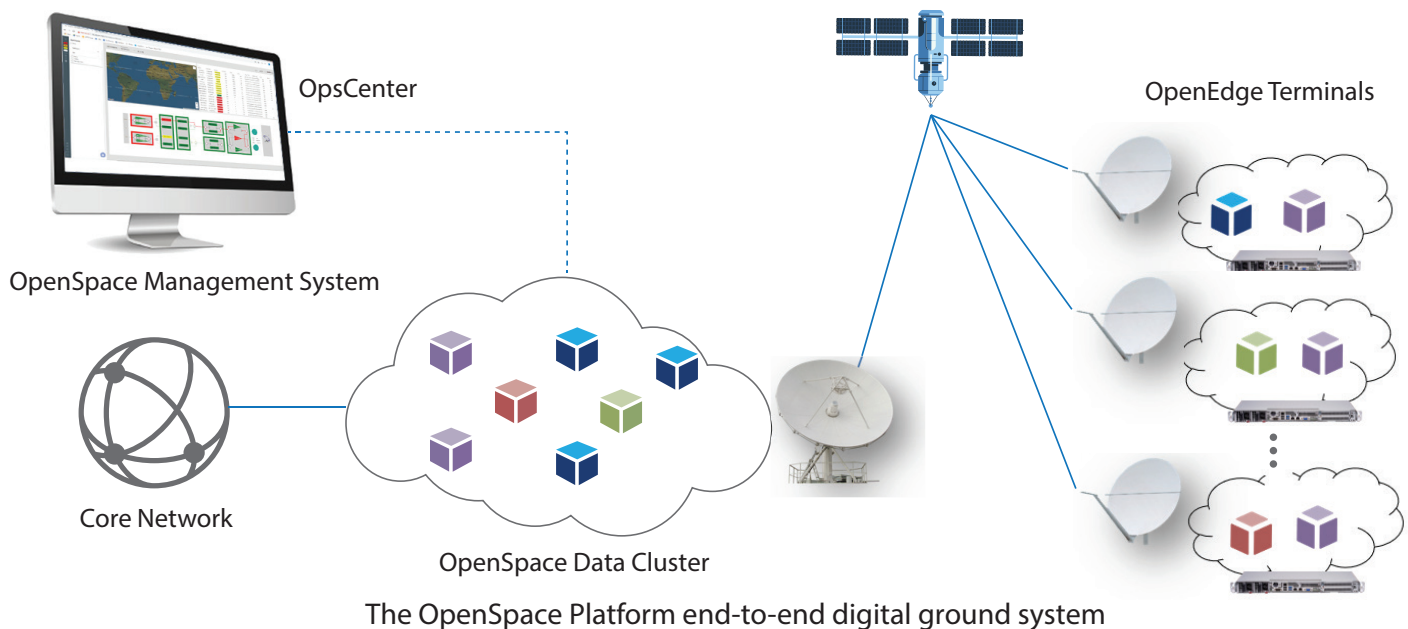
The GWFS includes a virtual channelizer and combiner that replaces much of the traditional analog RF equipment and enables the transmission and distribution of digital IF signals. The GWFS supports 250 MHz bandwidth and up to 25 subchannels with configurable per-channel power control. The vModems, the GWFS, and the SpectralNet digitizer are all fully Digital Intermediate Frequency Interoperability (DIFI) compliant. The digitizer and all software components are managed through OpenSpace's OpsCenter Network Management System (NMS).

Network Management & Orchestration: OpenSpace OpsCenter

In addition to a user-friendly graphical interface for managing network services and remote terminals, OpsCenter offers extensive monitoring options and a rich set of REST-based APIs for integration into OSS/BSS and customer specific workflows. Furthermore, OpenSpace features a MEF Presto based API and a dynamic frequency planning tool to enable automated Lifecycle Service Orchestration.

Software-Defined Terminal: OpenEdge

The OpenSpace Platform integrates seamlessly with OpenEdge, a flexible software-based terminal solution. The OpenEdge brings more power and flexibility to the network's edge by running virtual modems and 3rd-party applications such as SD-WAN, vRouters, encryption, and many others together on a generic uCPE platform. Like the OpenSpace Platform, the OpenEdge uses standard Intel x86 CPUs, with no FPGA or GPU acceleration required. It has an integrated digitizer, converting from L-band to DIFI and vice-versa.



OpenSpace Platform Features and Specifications

The fully digital and software-based approach of the Platform, allow deployments to be on-premise in a teleport or data center, or in a private/hybrid/public cloud environment.

OpenSpace Key Features

- Highly compact – up to 20 virtual modems in a single server
- Integrated OpsCenter NMS
- Software upgradable to 5G-NTN
- Native support for MEF 3.0 Carrier Ethernet and MEF Presto LSO
- Seamlessly extensible with additional servers and digitizers
- Supports redundant and highly-available configurations
- Available as small footprint Starter Kit

Specifications

OpenSpace Management System

- Astro-compliant web-based user interface
- Configurable dashboards, monitoring and alarm systems
- Integrated M&C for common gateway components
- Extensive REST-based APIs for OSS/BSS integration orchestration
- MEF Presto API for Carrier Ethernet Service orchestration

OpenSpace Data Cluster Node

- Up to 20 vModems per node or two 250 MHz gateway feed services in a single node
- Maximum carrier size: 250 MHz
- More than 400 MHz per node
- Up to 2 Gbps per node

Gateway Feed Service

- Virtual channelizer & combiner
- 250 MHz bandwidth
- 25 channels
- Configurable channel power
- Fully DIFI compliant

SpectralNet Wideband

- Up to 500 MHz Instantaneous Bandwidth
- Built-in channelizer supports up to two gateway feed services at 250 MHz each
- Can be extended to 2x500 MHz
- Fully DIFI compliant

OpenSpace vModem - A Native Carrier Ethernet Solution

The OpenSpace virtual DVB-S2X vModem is the industry's first MEF 3.0 certified connectivity solution. The certification validates that the OpenSpace Platform supports the delivery of a broad range of MEF 3.0 portfolio of services including E-Line (point-to-point) and Access E-Line (point-to-point). MEF Carrier Ethernet services connect network interfaces (UNIs and ENNIs). UNIs carry untagged or single-tagged traffic between a service provider and a subscriber. ENNIs carry double-tagged (Q-in-Q) traffic between providers.

MEF differentiates between port-based services which offer service transparency, and VLAN-based services which filter based on VLAN tags. VLAN-based services also allow for optional tag remapping, which can be particularly useful in resolving duplicate VLAN IDs to simplify edge network architectures.

The OpenSpace vModem supports the following interfaces and service types:

Service Type	Service Definition	MEF Standards	Gateway Interface	Remote Interface
E-Line	Ethernet Private Line (EPL)	MEF 6.3 & 10.3	UNI – port based	UNI – port based
	Ethernet Virtual Private Line (EVPL)	MEF 6.3 & 10.3	UNI – C-VLAN based	UNI – C-VLAN based
Access E-Line	Access EPL	MEF 51.1	ENNI - S-VLAN based	UNI – port based
	Access EVPL	MEF 51.1	ENNI - S-VLAN based	UNI – C-VLAN based

Service multiplexing is supported as well, for up to three user-traffic services per vModem, enabling fine grained traffic engineering and multi-tenant services.

The vModem furthermore implements MEF's standard QoS system based on bandwidth profiles (MEF 6.3, 10.3, and 23.2), where each class of service can be configured with individual guaranteed (CIR) and best-effort (EIR) data rates.

RF Features Highly efficient DVB-S2/S2X		Traffic Features Native MEF 3.0 Carrier Ethernet Services	
Supported modcods	All DVB-S2 and DVB-S2X modcods from QPSK to 128 APSK	MEF 3.0 CE Interfaces	<ul style="list-style-type: none"> UNI (At gateway and remote) ENNI (At gateway) Up to 9000 bytes MTU size
Roll-off	<ul style="list-style-type: none"> 10% 20% 	MEF 3.0 CE services	<ul style="list-style-type: none"> Ethernet Private Line (EPL) Ethernet Virtual Private Line (EVPL) Access E-Line
Frame sizes	<ul style="list-style-type: none"> Normal (64,800 bits) Short (16,200 bits) 	Service multiplexing	Supported for up to 3 user services per vModem
Carrier sizes	<ul style="list-style-type: none"> 0.5 MHz - 250 MHz (depending on system configuration) 1 kHz resolution 	Quality of Service	<ul style="list-style-type: none"> MEF 3.0 CE compliant QoS Optionally up to 8 classes of service per service, based on PCP classification Committed and Excess information rate per class of service
Optimal bandwidth utilization	<ul style="list-style-type: none"> Adaptive Coding and Modulation Automatic Uplink Power Control 	Optimization feature	<ul style="list-style-type: none"> ARP acceleration

For More Information

To learn more about the OpenSpace Platform please refer to these additional resources:

Website: www.KratosDefense.com/satcom

Videos: www.youtube.com/@DiscoverVirtualGround

Contact us: www.KratosDefense.com/contact-us