



Kratos Introduces OpenSpace™ Platform Supporting Dynamic, Software-Defined Satellite Ground Systems

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Enables Satellite Operators and Ground Station-aaS Providers to Implement Flexible, Virtualized Ground Networks for EO and Sensing Missions

SAN DIEGO, Oct. 20, 2020 (GLOBE NEWSWIRE) -- Kratos Defense & Security Solutions, Inc. (Nasdaq: KTOS), a leading National Security Solutions provider, announced today the release of OpenSpace™, a software platform and family of virtual products that enable satellite operators, Ground-as-a-Service (GSaaS) providers and others in the space services supply chain to create fully software-defined, dynamic ground systems.

OpenSpace is a leap forward in ground network technologies that allows operators to apply advances in Software-Defined Networking (SDN) to the special needs of the space industry. SDN technology is already common in the broader communications and IT worlds, however adoption of SDN has been slower in the space industry, in large part because of the unique challenges of virtualizing Radio Frequency (RF) equipment and reliably digitizing the RF waves that are the staple of satellite operations. Kratos has solved these challenges by virtualizing hardware components in its quantum™ line and by reliably digitizing RF signals for processing in digital environments.

Now, with OpenSpace, Kratos moves beyond virtualization to add the orchestration, control and management capabilities that can create truly dynamic ground systems in which practically every element of the network potentially can become software-defined—almost all except the satellite and antenna. By actively coordinating Virtual Network Functions (VNF) as service chains instead of purpose-built hardware components, operators can enhance the adaptability, resiliency, security and reliability of their ground systems. Ground functions that once took weeks to implement manually are now orchestrated as service chains with OpenSpace, making systems dramatically more responsive to real time changes in network resources, user demand and threats.

About OpenSpace

OpenSpace disrupts the decades-long paradigm of ground networks based upon purpose-built, often proprietary hardware and stove-piped software applications in favor of standards-based, fully integrated, end-to-end service delivery running on COTS servers or in the cloud. OpenSpace's comprehensive SDN framework means operators can leap ahead in the transformation of their ground systems, employing accepted techniques from the broader communications industry.

The OpenSpace platform architecture incorporates four operating areas:

- **OpenSpace VNFs** are software applications that replace dedicated satellite hardware technology, such as receivers and recorders. Every OpenSpace VNF is built for cloud-native deployment on generic x86 compute resources without the need for Field Programmable Gate Arrays (FPGA) or Graphics Processing Units (GPU). OpenSpace VNFs can be purchased standalone or together as service chains.
- **The OpenSpace Controller** is the brain center that coordinates the deployment of VNFs as service chains to support a specific Service Level Agreement (SLA) or mission. Using industry-standard interfaces such as MEF LSO, the OpenSpace Controller can orchestrate OpenSpace and third-party VNFs and interface directly with third-party service and resource orchestration frameworks, enabling truly dynamic network operation and vendor-independence.
- **OpenSpace OpsCenter™** is OpenSpace's unified manager which administers the service chain life cycle and bridges management functions across legacy analog components. Today, OpsCenter manages both physical and virtual network components and will soon add carrier management and ultimately satellite Command & Control (C2), all within a common API set, user interface and data model.
- **OpenSpace Digitizers** reliably convert RF signals at any frequency band into a VITA49 Digital IF format that can be easily transported globally over a standard Ethernet/IP network. It preserves both frequency and timing characteristics, even over impaired Ethernet/IP network links when working with OpenSpace's VNF for WAN Transport Protection.

Today, along with the release of the OpenSpace Controller, Kratos separately announced two new VNFs for EO and Sensing service chains, the OpenSpace WAN Transport Protector (OWTP) and the OpenSpace Stream Processor/Recorder (OSPR). Kratos debuted its first VNF, the OpenSpace Wideband Receiver, in August of this year.

According to Yves Pitsch, Principal Product Manager, Azure Networking at Microsoft of Microsoft's [recently announced Azure Orbital](#) Ground Station-as-a-Service offering which employs OpenSpace products in its service architecture, "An SDN-based architecture like OpenSpace's is critical to our ability to provide our customers with a platform that is complete, economical and easy to use. Virtualized operations provide us with the flexibility and scalability we need to optimally support many different customers, missions, satellites and other specialized needs without specialized hardware."

Evolving Ground System Needs

"Going back to the very early days of space missions, satellites and their ground systems were designed from scratch to work together in tandem using custom hardware and software," explained Phil Carrai, President of Kratos' Space, Training & Cybersecurity division. "Over time those ties have

loosened as both satellite and network technologies have evolved—in fact, for decades Kratos has been a leader in developing standards-based signal processing and ground management products that work with multiple satellites in multiple mission frameworks—however the ground and the satellite have not been able to operate fully independently until now with OpenSpace.”

Meanwhile, communications networks in other industries have increasingly adopted virtualization and, more recently, SDN as their new paradigm. Where virtualization converts functions that once were hardware into software, an SDN-based model like OpenSpace goes much further by adding a standards-based platform logic coordinating these virtual components.

“SDN technology makes communications and IT networks faster and more automated, resilient and flexible so that they can change and adapt rapidly to changes in network supply, demand and threats,” commented Greg Quiggle, VP of Product Management for Kratos Space. “Ground systems must keep pace with these innovations. Otherwise, today’s purpose-built, hardware-intensive ground systems will increasingly be the static bottleneck between two dynamic, software-defined endpoints.”

OpenSpace removes that bottleneck, bringing ground systems to par with their surrounding technologies and advancing the movement to disaggregate space systems from ground systems. Numerous, high-value advantages result, including:

- Virtual functions can run on generic, inexpensive computers or in the cloud instead of expensive, purpose-built equipment.
- Intelligence can be built into the network to implement new services quickly, shifting resources to where they are needed; a process that can take weeks in today’s static ground systems.
- Ground systems can potentially support not just satellites from multiple manufacturers, but multiple orbits simultaneously.
- The network achieves far greater levels of security, self-healing and resiliency to changing conditions such as hacking or interference.
- It becomes possible to bridge the data, transport and management aspects of satellite systems to provide a unified interface that describes service chains across network components, enables automation of those service chains, and delivers a common operating picture across all resources.

For more information about the OpenSpace platform and the products introduced in the OpenSpace family, visit: <https://www.KratosDefense.com/OpenSpace>

About Kratos Defense & Security Solutions

Kratos Defense & Security Solutions, Inc. (NASDAQ:KTOS) develops and fields transformative, affordable technology, platforms and systems for United States National Security related customers, allies and commercial enterprises. Kratos is changing the way breakthrough technology for these industries are rapidly brought to market through proven commercial and venture capital backed approaches, including proactive research and streamlined development processes. At Kratos, affordability is a technology and we specialize in unmanned systems, satellite communications, cyber security/warfare, microwave electronics, missile defense, hypersonic systems, training, combat systems and next generation turbo jet and turbo fan engine development. For more information go to www.KratosDefense.com.

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