



Stream Processor/Recorder (OSPR)

Downlink Stream Processing Recording and Routing for Earth Observation and Remote Sensing Missions

Challenge – Assuring QoS for Earth Observation and Remote Sensing Missions

As more and more Earth Observation (EO) and Remote Sensing (RS) data is being beamed from satellites, the infrastructure on the ground has to be more flexible, cost-effective and scalable to meet the demand.

It is critical for an EO provider or Ground Station as a Service Provider (GSaaS) to be able to record, playback and stream data and provide all the downlinked data to the customer whenever needed.

Enabling a More Dynamic Ground - OpenSpace Platform

Kratos' OpenSpace platform is the industry's only fully virtualized, software-defined and orchestrated satellite ground system platform that addresses this need for highly EO/RS dynamic services.

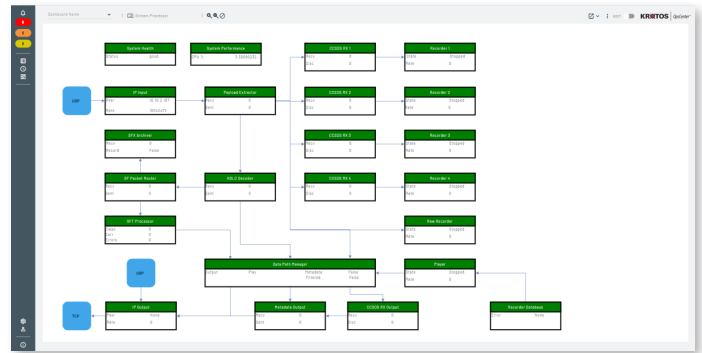
Fully Virtualized EO and Remote Sensing Service Chain

As part of the OpenSpace Platform, Kratos offers a completely virtualized and software controlled service chain that enables a fully automated EO sensing mission downlink from the digitizer all the way to post satellite pass processing.

In the platform, dedicated analog RF hardware devices are turned into software in the form of Virtual Network Functions (VNFs) that run on commodity servers on premise or in the cloud.

These OpenSpace VNFs are service chained together to deliver an EO and RS downlink without having to make changes in hardware.

The process starts by digitizing the RF at the antenna using Kratos' SpectralNet Wideband product, the OpenSpace WAN Transport Protector (OWTP) VNF can then be used to assure the transport of digitized IP



OpsCenter displays system health, performance and status of streaming and recording process.

packets across any potential impaired WAN links. The VITA 49 digital stream is then processed by the OpenSpace Receiver (ORX) VNF and the OpenSpace Stream Processor/Recorder (OSPR) VNF records satellite-based sensor telemetry data during a spacecraft pass and supports real-time streaming of downlink data and routing to other processing chains in real-time.



Kratos' OpenSpace EO and Remote Sensing Service Chain.

Assuring High Quality of Service

The OpenSpace Stream Processor/Recorder (OSPR) is part of OpenSpace platform and operates as a VNF handling the streaming and recording function as part of a completely virtualized EO and RS service chain. The VNF helps assure the QoS for customers.

Key Features of OSPR

- Simulates contact based on telemetry simulation parameters in satellite database
- Supports RAW or CCSDS filtered recording
- Works for five concurrent recordings
- Provides a number of CCSDS filtering capabilities

Recording of EO and RS Mission Data

The OSPR records and archives satellite pass telemetry data at a high rate to disk. The recording application provides highly configurable options for CCSDS VCDU filtering and recording for future use by the mission operations personnel. The recorded files are stored on a server for direct download by users, can be moved in cloud-based storage or passed on to additional processing chains.

Delivering Powerful Data Visibility

OpsCenter is OpenSpace's unified manager that provides a web-based Graphical User Interface (GUI) to view the frame data as it is received or played back.

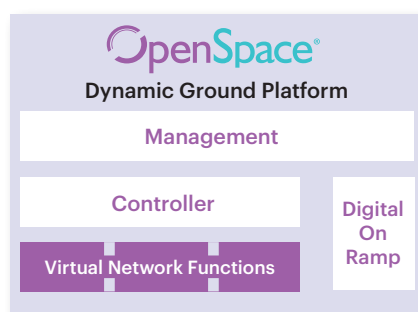
OpsCenter displays Key Performance Indicators (KPIs) including system health and performance and the status of each step in the processing and recording process from the IP input to the output. OSPR also offers a standards-based OpenAPI REST Interface for automated integration.

Key Benefits of OSPR

- Stores data for playback or streaming in real-time
- Provides simultaneous recording and playback capability
- Archive and pass telemetry data at a high rate to storage
- Allow playback at 1X or X-times real-time speed

Technical Specifications

Description	Specification
Number of Receive Channels:	1 per OSPR instance. Multiple instances supported
Rates:	Up to 1 Gbps per channel
Data Input	VITA over UDP
Recording Modes	Support for RAW or CCSDS filtered recording
Recording Features	Supports: - Framed CCSDS data or raw data from the network - Up to 5 concurrent recordings – 4 filtered and one raw
Recording Playback	Supports: - Playback for data recorded with metadata - Playback data rate as recorded or a user selectable rate - 'Live Playback' of an active recording session (play while recording) - 'Looped' or repeated playback of a session - Recording session selection by drop down or name - Playback pause and resume
CCSDS Filtering	Configurable output and statistics filtering: - Output Format (Frame, VCDU, VCA_SDU) - SCID - VCID
HDLC Decode	Bit-wise decoding, 16 Bit CRC Output data - Configurable output data bit reverse for MSB first encoders - Configurable CRC data output Bypass mode
Error Detection and Correction	Reed-Solomon FEC CCITT CRC-16 (for CCSDS Data Link Rx payload)
Network Output Formats:	RAW Frames/CADUs CCSDS Transfer Frames/VCDUs CCSDS VCA_SDUs Filters can be applied to any CCSDS output Supports output with or without metadata headers
Data Source:	Internal BERT, Network, File Player
Network Protocol(s):	TCP, UDP
Monitoring and Control	OpsCenter and OpenAPI



OpenSpace is the industry's first and only fully virtualized, software-defined and orchestrated satellite ground system platform. The OpenSpace platform includes Virtual Network Functions, such as OSPR for stream processing and recording that form a virtual service chain. The OpenSpace Controller to administer how service chains are deployed and OpenSpace OpsCenter to provide unified management across the entire satellite ground system.



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