

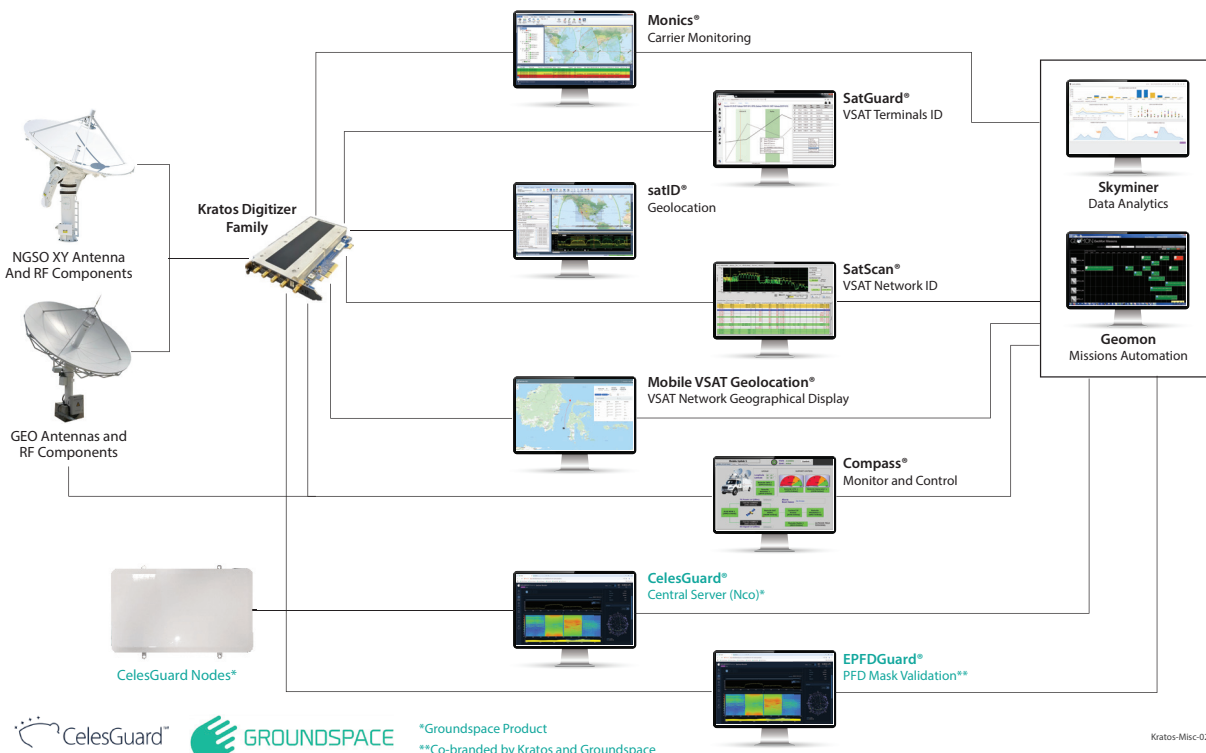
NGSO Real-Time Monitoring for Reliable and Adaptive Spectrum Management



The RF spectrum is facing unprecedented pressure from increasing downlink interference and spatial co-channel interference caused by non-geostationary (NGSO) satellites. Alignment events that disrupt transmission and degrade communication quality can be fleeting and difficult to detect with traditional systems. To stay ahead in this evolving landscape, organizations need smarter, more adaptive monitoring solutions. With deep expertise in radio frequency monitoring, Kratos has partnered with global regulators, government agencies and commercial operators to design and implement advanced systems that proactively identify and mitigate interference - ensuring seamless and reliable communications.

Kratos delivers integrated spectrum monitoring systems for customers and leverages the CelesGuard® product from Groundspace to address the challenges caused by NGSO spectrum interference.

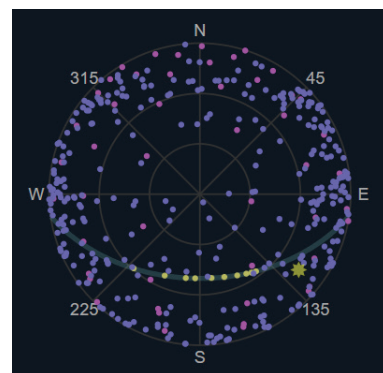
CelesGuard® Integrates Within Kratos Advanced Satellite RF Monitoring System Architecture



Constellation Satellite Monitoring

Traditional approaches struggle to keep up with the complexity of modern satellite constellations. Here's why:

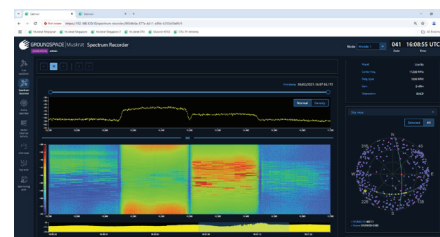
- **Scaling Challenges** - Large constellations with hundreds of satellites transmitting to the same ground spot make real-time monitoring difficult, especially with unpredictable scheduling.
- **Missed Signals** - Advanced constellations use phased array antennas to generate dynamic, narrow beams aimed at users, meaning typical monitoring station detect only a fraction of transmissions.



Sky view of large LEO constellations (purple, pink) with GEO satellites in yellow.

Interference Detection

Operating within significant technical and regulatory constraints, LEO and MEO constellations face a critical limitation: the scarcity of available radio spectrum. This scarcity necessitates the sharing of frequency allocations among LEO, MEO, and GEO satellites. CelesGuard aids satellite operators in identifying interference issues that arise from the coexistence of multiple satellite constellations.



Interference between two major LEO constellations revealed.

Regulatory Compliance Verification

LEO and MEO satellite operations are governed by complex rules. Celesguard assists in monitoring satellite operators' adherence to licensing agreements and international regulations, functioning in both cooperative and non-cooperative modes.

Intelligence Gathering

As large satellite constellations prepare for launch, they bring the ability to enable covert, high-speed communications from anywhere on Earth - potentially evading detection.

Celesguard's technology empowers the defense and intelligence community with a clearer, more comprehensive view of RF activity in LEO, MEO and GEO in Ku and Ka downlink, ensuring enhanced situational awareness in an increasingly complex signal environment.

CelesGuard Sensor Nodes

- Each Node scan all visible satellites In full Ku-Band or full Ka-Band
- One Node local processing
 - Confirmed List of transmitting satellites
 - Confirmed List of detected channels
 - Spectrum measurements:
 - Channel Center Frequency
 - Channel Bandwidth
 - Spectrogram



Deploy strategically and tactically across land, sea and various platforms - including fly-away kits - positioning nodes to create a resilient, interconnected network that ensures comprehensive territorial coverage.