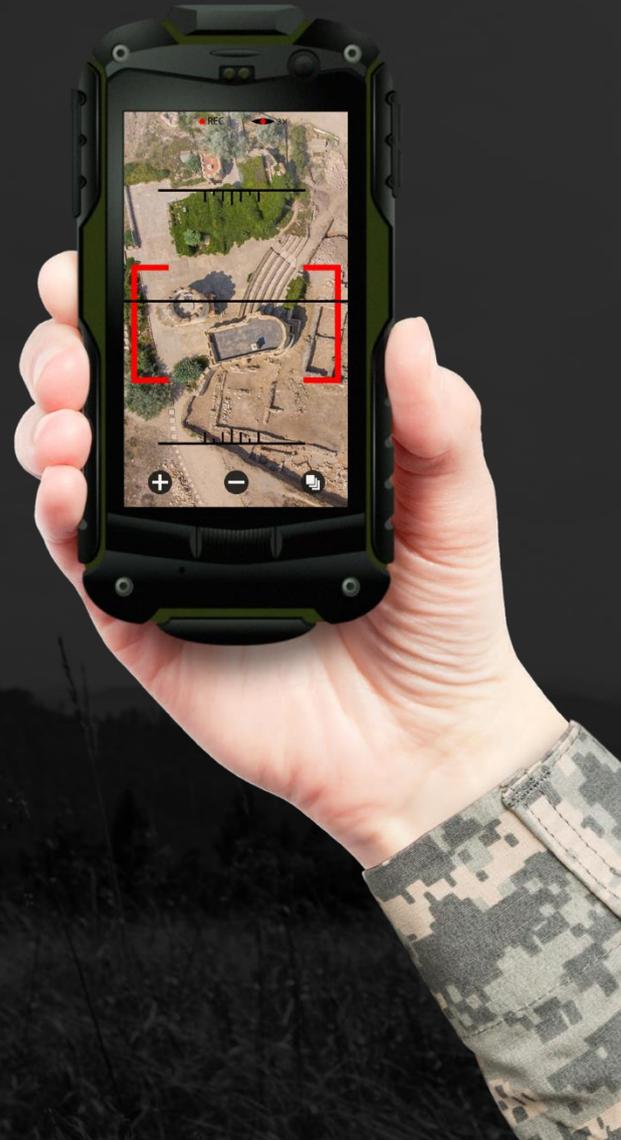


Empowering  
**MISSION  
CRITICAL**  
Communications



**WHITE PAPER**

Aviv Ronai | April 2020

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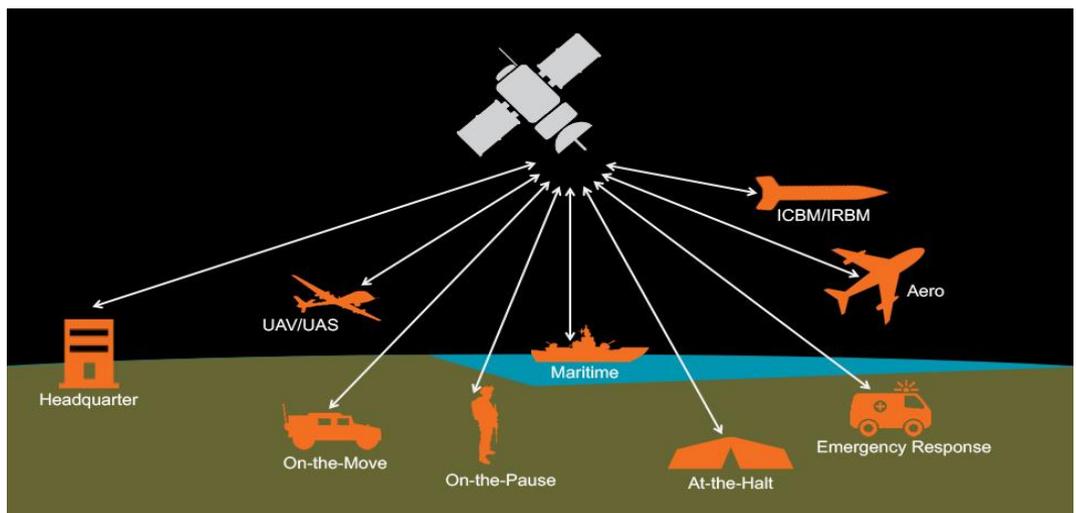
## INTRODUCTION

Governmental organizations such as military, defense, security and emergency organizations relies on satellite communications (SATCOM) for their operations. Mission critical data and video connectivity is in use for fixed communications, communications-at-the-halt (CATH), communications-on-the-pause (COTP), communications-on-the-move (COTM), aero (manned and unmanned), maritime, intelligence, earth observation, weapon control, emergency and public safety applications.

Cyber threats against satellite communication have rapidly escalated in the last few years and will continue to advance in the foreseeable future as adversaries are working to intercept, exploit, degrade and deny communications capabilities. With the growing cybersecurity concerns, government organizations, agencies and bodies, as well as commercial integrators and contractors serving the government sector, require comprehensive SATCOM capabilities that can effectively mitigate threats and operate in contested, degraded and operationally-limited (CDO) environments.

NOVELSAT empowers mission critical satellite communications with the solutions and technologies necessary to face the future with confidence. Our comprehensive systems capabilities provide an operationally secure, resilient, and effective satellite connectivity to support all forces and responders in carrying out their missions.

Designed to deliver highest levels of transmission security, robustness and resiliency, NOVELSAT presents comprehensive solution to meet the growing applications and requirements of mission critical satellite communications. Securing the content, protecting the transmission and preventing interception, our comprehensive solution provides a wide-ranging security suite that encompasses functionalities and capabilities for communication security (COMSEC), transmission security (TRANSEC) and interference/jamming mitigation.



## LEVERAGING INNOVATIVE TECHNOLOGY

NOVELSAT has been at the forefront of satellite content connectivity technology and services for over a decade and continues to be an innovator and developer of new satellite content connectivity technologies. Our leadership foundations are built around our proprietary waveform and premier receiver architecture that enable us to provide very high-performance satellite transmission and space segment efficiency as well as greater resiliency and robustness. Pioneering, expanding and enhancing end-to-end capabilities, we present best-in industry transmission and content security as well as unique integration of cutting-edge video capabilities.

### KEY PERFORMANCE AREAS



World's Highest  
Performance Transmission



Highest Transmission  
Security & Robustness



Cutting-Edge  
Integrated Video Capabilities

### HIGHEST PERFORMANCE TRANSMISSION

The most bandwidth-efficient waveform, NOVELSAT NS4™, boosts satellite transmission throughput and delivers more bits per MHz compared with any standard available:

- Up to 60% higher data rate than DVB-S2 systems
- Up to 30% higher data rate than DVB-S2X systems
- Highest spectral efficiency: >10 bit/Hz

Best-in-class receiver architecture enhances transmission robustness and resiliency and delivers:

- Highest Phase-Noise resiliency
- Highest Doppler shift and rate resiliency
- Industry leading receiver sensitivity

Higher availability and coverage enable seamless connectivity everywhere, under any condition:

- Poles
- Harsh weather
- Mobility - airborne, maritime, vehicles
- GEO, LEO and inclined orbits

Full bandwidth reuse offers full data rate doubling with lossless uplink and downlink on the same frequency band.

Fastest satellite or station handover with frequency lock time of about 1 mSec.

## HEIGHTENING SECURITY & RESILIENCY

### HIGHEST TRANSMISSION SECURITY & ROBUSTNESS

NOVELSAT secured communications uses COMSEC, TRANSEC and interference/jamming mitigation technologies to provide cyber, link and operational security for satellite connectivity.

Most advanced multi-layer encryption assures data security:

- AES 256-bit encryption
- Full traffic encryption of payload, header and signaling
- Double GPG (RSA-2048) encryption of AES keys
- Automatic dynamic key generation, over the-air (OTA) distribution and management tool
- Sites authentication, service validation and content entitlement

Extensive secured management sessions restrict system access and protect remote and on-prem management connectivity:

- Encrypted HTTPS for web UI
- Encrypted SSH (Secure Shell) for Command Line Interface
- Encrypted SNMPv3

High interference and jamming resiliency with a set of advanced detection mechanisms and mitigation algorithms:

- Built-in resiliency to interference as well as to other signal-disrupting impediment
- Narrowband, wideband and radar interferences excision
- Proprietary waveform elevates technical and operational barriers to adversaries
- High resiliency to satellite blinding with dynamic saturation elimination

Low Probability of Detection/Interception (LPD/LPI) are key capabilities required to protect against adversaries who try to obtain information through monitoring and analysis of the satellite transmission. To mask any communications activity, NOVELSAT has implemented the following solutions:

- Advanced carrier concealment against hostile interception enabled by carrier echo cancellation and below noise level transmission
- Advanced traffic concealment against hostile traffic variation analysis enabled by masking channel activity with dummy/idle data
- Ensuring traffic reception only at paired sites (uplink-downlink) by employing active, all digital, cancellation of locally-generated echo

## BOOSTING VIDEO TRANSMISSION

### INTEGRATED HIGH EFFICIENCY VIDEO ENCODING/DECODING/TRANSCODING

NOVELSAT boosts video transmission for mission critical applications with unique integration of cutting-edge video capabilities. Converting any video format or delivery standard to higher efficiency video coding enables to deliver more video streams and higher quality over a satellite channel.

Unparallel video data rates and efficiency:

- Highest efficiency video encoding/transcoding – HEVC
- Up to 4 times more video content using HEVC with NOVELSAT NS4™ versus MPEG4 with DVB-S2

Optimized all-in-one integration:

- Video encoding/decoding/transcoding
- Satellite transmission

Comprehensive video security:

- Most advanced multi-layer encryption based on AES-256 and GPG encryption (described above)
- Content entitlement, scheduling and blanking for multi-user / multi-privilege environments
- Watermarking support for identifying leakage/breach

## ENABLING CUSTOM SOLUTIONS

### CREATE YOUR OWN PROPRIETARY SYSTEM

NOVELSAT designed unique capabilities, enabling customers to introduce their own proprietary functionality.

Dedicated customer programmable System on Module (SOM) provides second CPU, fully controlled by customer, for user defined SW / API / GUI / functionality.

Unique transparent mode enables customers to work with their proprietary satellite transmission and uniquely define:

- ACM algorithm
- Baseband payload structure (mapping to air frames)
- Baseband header information

## NOVELSAT WIDE-RANGING SECURITY SOLUTION

### SECURE



**Full AES-256 Encryption** (Payload & Control)  
**Automatic Key Management** (Generation & Distribution)  
**Secured Management Sessions** (SSH, HTTPS, SNMP v3)

### PROTECT



**Interference & Jamming Resiliency**  
**Reception Only by Paired Sites**  
**Satellite Blinding Resiliency**  
**Video Watermarking Support**

### PREVENT



**Carrier Concealment**  
**Traffic Concealment**  
**Proprietary Waveform**

## ADDRESSING A WIDE RANGE OF USE CASES



### **QUADRUPLED VIDEO RATES FOR VISINT GATHERING (ISR) AND DISTRIBUTION VIA SATELLITE**

The improvements in sensor quality, the growing number of sensors on-board ISR platforms, and the need to distribute these live video feeds to multiple forces and authorities, mandates much higher transmission rates for video content. To meet the required transmission rates without increasing satellite bandwidth, NOVELSAT provides an innovative all-in-one solution to delivers unparalleled video transmission capacity.

Integrating high efficiency video coding (HEVC) and high efficiency transmission waveforms (NS4 or DVB-S2X) enables to deliver up to 4 times more video content for mission critical operations.



### **ADAPTIVE EARTH OBSERVATION CONNECTIVITY FOR GREATER DOWNLOAD SPEEDS**

The evolution of earth observation resolution and capabilities results in growing information collection which requires greater download speeds. Working with leading earth observation satellites, NOVELSAT high performance terminals delivers higher download volume per satellite pass coupled with high transmission robustness.

Employing adaptive return channel for earth observation satellites, NOVELSAT terminals enables ACM operation and improved link margin to deliver higher data rates.



### **TRANSPARENT CLOUD CONNECTIVITY SOLUTION FOR IOT AND DATA OPERATIONS**

More and more data from satellites is being sent to big cloud networks including imagery, sensing, monitoring, IoT and data transfer, making satellite data easier to access and process. Addressing data cloud connectivity, NOVELSAT pioneers open and flexible NFV-based cloud connectivity solution.

Employing unique transparent mode, NOVELSAT solution enable virtualized connectivity agnostic to satellite transmission standards and proprietary implementations, streamlining data cloud satellite connectivity.



### **SIGINT RECEIVERS ON A CARD FOR INTELLIGENCE GATHERING**

In an era of growing threats, intercepting satellite communications allow governments to enhance their national security. Enabling information interception and gathering, NOVELSAT offers high sensitivity PCIe-based SIGINT receiver cards, enabling easy integration into any PC-based platform.

Agnostic to system vendor, air frame mapping method, payload encryption and ACM mechanism, NOVELSAT's SIGINT receiver cards capture DVB-S2 and DVB-S2X satellite communications and stream raw data for traffic analysis.



## SUMMARY

NOVELSAT comprehensive set of capabilities and features enhance and protect mission critical communications from intentional or unintentional interferences and threats. Our high-performance solutions improve security, resiliency and robustness, as well as increase data rates, availability and coverage, enabling government customers to deliver on their mission. Already in deployment by leading governmental organizations and contractors, our unparalleled technology helps our customers to meet their current and future challenges and makes their networks safe.

NOVELSAT is a leading provider of next-generation content connectivity solutions for satellite communications. Powered by our innovative technology, our solutions are setting the industry standards in spectral efficiency, transmission performance, and content security. Our high- performance products include satellite modems, modulators and demodulators, integrated video transmission/coding and content security solutions, transforming delivery of data and video over satellite. Delivering more capacity with greater availability, coverage and protection, our solutions empower mission-critical and demanding applications for the broadcast, cellular, government, and mobility markets.

## ABOUT NOVELSAT