Government, Defense, and Home Land Security - White Paper

Government, Defense, and Homeland Security networks are critical and can have special requirements that go above and beyond commercial systems – from Government-grade security features, to support for military standards, multiple radio and legacy telecoms interfaces, to stringent technical specifications, training and support needs.

As a designer and manufacturer of advanced satellite ground networking technologies for government and defense customers over three decades, SpaceBridge is committed to exceeding government customer requirements with technology that helps organizations better fulfill their diverse missions.

SpaceBridge is an ISO9001 registered vendor and provides equipment and services for deployment with satellite communications networks. These include Advanced VSAT terminals and HUBs for Point-to-Point / Point-to-Multipoint / Mesh topologies, as well as SCPC and broadcast modems for GEO and NGSO satellite constellations.

Our products can provide specialized solutions for diverse Government, Defense and Homeland Security applications including:

Defense

- BLOS (Battlefield Tactical Communications and Beyond Line of Sight)
- Special Operations – special forces in stationary and deployed arena
- SoTM (SATCOM-On-The-Move)
- Naval communications
- UAV communications
- Intelligence, Surveillance and Reconnaissance (ISR)

Home Land Security (HLS)

- Blue forces, Police, Fire Fighters
- Air Traffic Control
- Border Security and control
- First Responder/ Emergency Communications
- Embassy Communications
- Remote Office / Natural Resource Management / Environmental agencies
- Space Agencies

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Military Land Mobile Satellite Communications

Military land-mobile SATCOMs On-the-Move (**OTM**), On-the-Pause (OTP), communications networks, serve a wide range of missions where rapidly deployable, transportable and movable high capacity BLoS (Beyond Line of Sight) communications are needed. Applications include:

- Secure bandwidth for Command, Control and Communications (C3) beyond enemy lines, from in- theatre to a rear HQ, or to a Home country command
- Vehicular-Mounted communications
- Command posts and deployed battlefield battalions
- Security and surveillance
- Tactical communication from Special-forces, elite units, or field troops using small satellite Manpacks for quick-deploy On-the-Pause (**OTP**) links.

SATCOM On-the-Move / On-the-Pause Military-Grade Outdoor VSAT router

For Military land **OTM** and **OTP** requirements, the **U7800** – Standalone / ASAT™ System Dual Waveform Satellite Modem is an unique solution designed to meet intense demands in the field. As an Ultimate Series VSAT, it supports point-to-point SCPC connectivity as well as hub-spoke RCS MF-TDMA, ASCPC™ and SCPC including optional mesh overlay connectivity. Offering Government-grade encryption, VLAN and IPSec VPN, wide range transmit and receive range Direct Sequence Spread Spectrum (DSSS), and built-in OpenAMIP for SOTM antenna interoperability are just some of the features of this unit.

Mobile bandwidth requirements can dramatically surge, and vary from moment to moment, and locations to location. SpaceBridge WaveSwitch™ technology offers unique advantages for Military SOTM networks. With WaveSwitch™, satellite modems to dynamically adjust bandwidth and waveform selection to meet changing traffic priorities and tactical environments – so organizations can optimize and maximize their available satellite resources and efficiency according to changing requirements. Real-time waveform switching provides real savings on a per-site, and network-wide basis for applications seeing drastic traffic density changes such as video contribution and trunks.

Depending on terrain and other factors, earth-to-space Satellite links can be less subject to enemy interference than portable terrestrial radio/wireless links. WaveSwitch™ on-the-fly switching adds additional potential to mitigate jamming and interception risk.

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UAV Communication On The Move

The use of military UAVs has increased exponentially in the recent years, as has civilian government use of autonomous aerial systems, or drones, in areas such as Border Patrol, Emergency Response, Environmental and Asset Monitoring, and even law enforcement. Not only has demand grown for Military UAVs to perform ISR (Intelligence, Surveillance and Reconnaissance) as well as live battlefield situational awareness for war-fighters and commands. At the same time, mission requirements continue to push for ever bigger and faster pipes. Users want ever higher resolution real-time transmission of video, imaging and sensing data, and faster non-real-time data relays over satellite links in order to give war-fighters an edge.

But in many cases, UAV performance can be limited due to satellite network bandwidth limitations when a UAV is flying Beyond Line of Sight (BLoS), for example outside home territory. Military Unmanned Aerial Vehicles (UAVs) use satellite communications for continuous Beyond Line of Sight (BLoS) communications. The SpaceBridge Tactical SATCOM Network architecture for UAVs enables higher data throughput rates for UAV links. The SpaceBridge ASAT™ VSAT system provides unique capabilities designed to meet emerging requirements for UAV missions:

- The system allows remote UAVs to access large pools of bandwidth, while achieving low latency, and high network efficiencies. It can enable whole new opportunities to better leverage available advanced satellites' bandwidth.
- Built-in Automatic Beam Switching technology, very low latency, multiple uplink carriers and perfectly synchronized forward and return links, the SpaceBridge solution enables UAVs to use High Throughput Satellite (HTS) systems – and gain access to drastically increased bandwidth potential. Narrow satellite beams on HTS satellites can also reduce the potential footprint visible to enemy jamming.
- Synchronized Forward and Return Frequency Assignment provide resilience against jamming and reduce the probability of intercept for large tactical UAVs.
- Fast data switching, and very short data frames also enable the Drone Swarm Concept of Operations.

Space Segment Efficiency

During a mission, UAV bandwidth requirements can rapidly throttle up and down. At one instant, an SCPC (Single Carrier per Channel) channel may be required to deliver required throughput for streaming live ultra-high-resolution video or rich sensing data. At other times, a UAV's data link speed can be reduced, where it can return space segment capacity to a shared pool with other user and still meet mission requirements. For example, using an MF-TDMA bandwidth pool, SpaceBridge's award-winning WaveSwitch™ technology seamlessly optimizes the system's satellite access method to suit varying traffic requirements in real time. This industry-first VSAT system with "on-the-fly" waveform switching, can allocate bandwidth to UAVs or groups in real-time from a common space segment. Star or Mesh network topologies can all be supported in the same system, which comes with IP satellite link acceleration, optimization, Network Management and QOS tools, and options for embedded and network military-grade security. The SpaceBridge solution is built to address the most demanding military and security applications, is available in a variety of suitable form factors, and supports OpenAMIP for smooth mission-critical satcom-on-the-move terminal integration.

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Navy Arena – SOTM

Unforgiving conditions at sea make reliable communications essential to survivability and mission success. Satellite communications continue to play a critical role in naval communications. To meet mission requirements, today's navies need more bandwidth than in the past to connect node, sensors, platforms, war-fighters, and weapons distributed across vessels. The SpaceBridge family of maritime SATCOM terminals and WaveSwitch™ technology provide reliable, secure and flexible high-speed communications for deployed naval war-fighters and vessels.

MESH Networks

For highly-meshed networks, the SpaceBridge **U7400-M Mesh VSAT** and **HUB** gateway products for military use have been designed to ensure minimum latency, the highest Quality of Service (QoS) and the adaptability to meet requirements for protected, rapid and real-time access to the information war fighters need in the field. Embedded solutions for Transmission Security (TRANSEC) and Advanced Encryption Standards (AES) protect data/voice/video traffic in our Military products.

Powered By WaveSwitch™

WaveSwitch /Hub /Technology Advantages

With WaveSwitch™ technology, the ASAT™ Advanced VSAT system can serve both fixed VSAT terminal sites and On-the-Move/Mobile terminal sites – simultaneously in the same network and very efficiently, unlike some other systems.

- Link and satellite IP optimization technology deliver minimum latency in the delivery of voice, data, and video, protected by embedded and network security features.
- Leverage the ability to seamlessly switch between Star, Mesh, and SCPC two-way solutions using the same platform, and enjoy extensive networking flexibility.
- ASAT™ technology and WaveSwitch™ provides flexibility and control, with the ability to dynamically reconfigure networks to respond immediately to changing traffic priorities, including surge capacity.
- WaveSwitch™ can allocate Bandwidth-on-Demand for a wide range of use scenarios, from low bit rate "surge-able standby" connections, to always-on blazing fast broadband between to connected vessels – and virtually everything in between. This gives naval teams and organizations complete flexibility to maximize their bandwidth allocation to when and where they need it.

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Automatic Beam Switching for Maritime

Deployed vessels can navigate across satellite beam coverage, which requires that traffic to be switched from one beam to another seamlessly. The SpaceBridge system naturally supports Automatic Beam Switching (ABS) to allow the transfer of traffic from one satellite beam to the next, or between two different satellites' coverage as a ship passes through multiple footprints.

New opportunities to exploit Ka-Band High Throughput Satellite (HTS) low-latency Medium Earth Orbit (MEO) and Low Earth Orbit satellite (LEO) systems promise much greater bandwidth links to seaborne war-fighters and naval information warfare systems in the future, and at much lower cost per megabit. As Ku-Band and Ka-Band satellite resources, with narrower beams are leveraged on HTS systems, Automatic Beam Switching may grow significantly.

Deployed Arena and BLOS

Satellite Communications can be critical for direct and constant Beyond Line-of-Sight (BLoS) tactical communications between troops on battlefield and Command and Control Centers. SATCOMs terminal types can range from fixed VSATs that move with a command post, to vehicle-mounted SATCOMS On-the-Move (SOTM) terminals, to light-weight mobile satellite terminals and "Manpacks" that can be easily and automatically set up in minutes on-the-pause (OTP) to support advancing troops.

Satellite links for on-the move troops and warfighter networks must be reliable, resilient, robust and rugged, whether the requirement is to deliver high-quality voice/data/video communications, send intelligence and target list, update situational awareness maps in real-time to avoid friendly fire, or all of the above.

The SpaceBridge **U7800 modem** is an ideal solution for diverse operational mission requirements, working in both in Hub-and-Spoke MF-TDMA, as well as SCPC network configurations. SpaceBridge technology powers Star and Mesh two-way communication through the same platform – giving organizations the flexibility to maximize bandwidth where and when it is needed. SpaceBridge solutions have been designed to provide minimum latency, the highest Quality of Service (QoS) and the adaptability to meet requirements for protected, rapid and real-time access to the information war-fighters need in the field. Embedded solutions for Transmission Security (TRANSEC) and Advanced Encryption Standards (AES) protect data/voice/video traffic in our Military products.

Using WaveSwitch™ technology, the ASAT™ Advanced VSAT system can serve both fixed VSAT terminal sites and On-the- Move/Mobile terminal sites – simultaneously in the same network and very efficiently, unlike some other systems. WaveSwitch™ can allocate Bandwidth-on-Demand for a wide range of use scenarios. Go from "maintenance-only" connections to "always-on" blazing fast broadband to "bursty" or continuously-connected mobile sites, and everything in between.

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Our Verticals

Our products can provide specialized solutions for diverse Government, Defense and Homeland Security applications including:

- Battlefield Communications & of Sight (BLoS)
- Special Operations stationary and deployed arena
- SATCOMS-On-the-Move(SOTM)
- Naval communications
- UAV communications
- ISR (Intelligence, Surveillance and Reconnaissance) HLS
- Blue forces, Police, Fire Fighters
- Air Traffic Control
- Border Security
- First Responders
- Emergency Communications

Air Traffic Control

Ensuring the highest level of passenger safety is essential for Air Traffic Control ("**ATC**") authorities. Reliable voice and data communications between air traffic controllers and pilots is one of the crucial elements for ensuring passengers safety. SpaceBridge offers a unique solution powered by our award-winning WaveSwitch™ technology that efficiently provisions satellite-based communications and air navigation services, according to the Standards and Recommended Practices with the concept of Operational Safety of the CNS/ATM (Communications, Navigation, Surveillance / Air Traffic Management) established and recommended by ICAO (International Civil Aeronautical Organization). Not only does our solution meet safety-critical application standards required for air traffic management, unlike others, SpaceBridge's flexible WaveSwitch™ technology also allows operators to implement Star and Mesh networks within the same platform – in combination with traffic prioritization in order to increase performance and efficiency.

The SpaceBridge solution is designed to provide minimum latency and the highest Quality of Service (QoS) in order to fulfill the requirements for safe transmission of operational Voice over IP backbone. Existing **ATC** interfaces can be interconnected through a network over Ethernet/ IP-based backbones while maintaining reliable and stable operation of the **ATC** protocol stacks.

As part of a highly resilient network and Disaster Recovery Plans, SpaceBridge **U7400-M Mesh** modems can be deployed in redundant configurations connected with geographically diverse and redundant VSAT HUB gateways to deliver 99.99999% availability for **ATC** authorities. This kind of solution employs Local Terminal Redundancy (LTR) in connection with **U7400-M Mesh** modems and is integrated with external VHF mediation devices that convert VHF and HF to Ethernet frames.