Industry Leading Multiservice and Multi-Waveform VSAT Platform

SpaceBridge understand the challenges of running complex SATCOM operations, especially providing links of highly varied speeds and SLAs. We’ve designed ASAT™ System to as a multiservice solution to ease these pains. ASAT™ System manages entry-level links such as consumer satellite terminals alongside high-end trunking and SOTM terminals, allowing both common management as well as complete bandwidth sharing that provides operators with optimal network-wide bandwidth utilization.

Features and Benefits

- High spectral efficiency supporting DVB-S2X Forward Link and wide range of Return Link MODCODs.
- Extensible to support hundreds of thousands terminals. Virtual Network Operation (VNO) ecosystem support.
- 3D BoD™ bandwidth-on-demand Return Link technology encompassing MF-TDMA and SCPC – all within a single shared dynamic bandwidth pool.
- WaveSwitch™ 3D BoD™ capacity assignment (SLA, real time demand and on-the-fly waveform optimization) delivers optimum efficiency and network-utilization and provides true multi-service and multi-application operation.
- Embedded PEP and QoS.

Multi-Application Platform

- Consumer Internet.
- Small office / home office (SOHO), small/medium enterprise (SME) and remote branch office connectivity.
- Industrial IoT and M2M applications.
- Enterprise networks.
- Trunk and cellular backhaul.
- Mobile maritime, land and airborne applications.
- Tactical military, defense and homeland security (HLS) applications.
Future Proof
The ASAT™ VSAT System has been developed to satisfy the most demanding operators’ needs. Built with flexibility and scalability in mind allowing operators running multi-service applications.

Flexible to Perfectly Meet Operators’ Markets & Applications
Driven by demand for broadband consumer, IIoT/M2M, enterprise, trunk and backhaul and mobile services for always higher throughputs with optimum efficiency, the SpaceBridge ASAT™ system was designed as a scalable multi-service platform configurable to support tens to hundreds of thousands broadband terminals. ASAT™ System supports both High-Throughput-Satellites (HTS) and wide-beam satellites.

Why Choose the ASAT™ System
Unlike single waveform platforms, ASAT™ combines the power of different waveforms for maximum adaptation to dynamic application requirements. ASAT™ dynamically allocates BW from a single shared BW pool for highest efficiency. Platforms that partition waveform to separate pools suffer from reduced efficiency and require additional management efforts.
In contrast to other platforms, ASAT™ 3D BoD™ and WaveSwitch™ provide multi-dimensional on-demand capacity assignment (SLA, demand and on-the-fly waveform optimization) delivering optimum efficiency and network-utilization.

Performance to Rely On
- Faster Forward Link and Return Link channels combined with unique 3D BoD™ and WaveSwitch™ adaptive waveform technologies ensure all applications are served seamlessly.
- Higher Forward Link efficiency with DVB-S2X at 5% roll-off.
- Wideband forward link for high-capacity satellite services.
- High Return Link spectral efficiency with 8PSK and 16APSK modulations.
- Rich protocol support - ASAT™ System fully supports voice, multimedia and video-conferencing applications, multicast services from both Forward Link and Return Links including VSAT-to-VSAT as well as Layer 2 transport. ASAT™ System provides fully integrated Protocol Enhancing Proxy (PEP), Quality of Service (QoS) and Adaptive Coding and Modulation (ACM) at both Forward Link and Return Link - a complete stack of optimization improving user experience, minimizes satellite space segment and allows for true multi-service satellite operation.
### 3D BoD™ and WaveSwitch™ - On-the-Fly Waveform and Access Method Switching Technology

Is your VSAT platform really efficient? As VSAT platforms support ever higher efficiency modulations-coding the industry is getting closer to reaching the absolute maximum efficiency - the Shannon capacity limit. On the other hand, network utilization seem to be lagging behind. Satellite service providers must make hard decisions between spectrum-efficient SCPC and high network utilization with bandwidth agility provided by MF-TDMA. Even platforms that offer multi-waveforms require the selection of a single waveform at link provisioning, forcing you to make a choice.

With the ASAT™ System there is no need for service providers to compromise. Traditional BW managers are able to take into account only user SLA profile and the terminal real-time demand. ASAT™ System 3D BoD™ is an intelligent multi-dimensional bandwidth on demand radio resource BW manager / scheduler automatically taking into account SLA, real-time terminal demand as well as terminal traffic density, to allocate optimum waveform and seamlessly switch terminals between waveforms for optimal service and space-segment utilization:

- MF-TDMA – lean reservation based high network-utilization multi-frequency time-division multiple-access.
- Bandwidth-on-demand, dynamic SCPC – best spectral efficiency provided for those terminals of high and sustainable traffic density - while required.

ASAT™ system 3D BoD™ and WaveSwitch™ manages terminals’ traffic across these waveforms in real-time, managing the entire Return Link as a single shared resource - eliminating any bandwidth fragmentation and utilization losses that typically traded off for meeting peak capacity demands.
ASAT™ System VSAT Modems and Families

Compact Series VSAT Modems and Terminals VSAT modems and terminals for broadband Internet and IIoT / M2M mass markets.

C7700
- **Features**
  - Desktop unit.
  - 100/10Mbps.
  - Standard dual-coax installation with any COTS BUC/LNB.
  - MF-TDMA Return Link.
- **Typical Application**
  - Consumer Internet.
  - Small Office Home Office (SOHO) / Small-Medium Business (SMB).

C8000
- **Features**
  - Complete outdoor terminal with integrated BUC/LNB.
  - 100/10Mbps.
  - Single-cable installation.
  - MF-TDMA Return Link.
- **Typical Application**
  - Consumer Internet.
  - IIoT / M2M connectivity.

Enterprise Series VSAT Modems Network appliance VSAT modems covering enterprise business connectivity needs.

E7000
- **Features**
  - Desktop unit.
  - 100/25Mbps.
  - Standard dual-coax installation with any COTS BUC/LNB.
  - Supports remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- **Typical Application**
  - Small Medium Enterprise (SME) connectivity.
  - Enterprise branch office connectivity.
  - “Satellite as backup” solutions.
Ultimate Series VSAT Modems Telco-grade multifunction SATCOM modems for professional applications.

**Features**
- Indoor rack mount.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- Standard dual-coax installation with any COTS BUC/LNB.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- OpenAMIP antenna support.

**Typical Application**
- Broadband trunks.
- Mass-population Internet access.
- Dynamic video-stream contribution applications such as homeland security (HLS) and smart cities.
- Mission-critical backup links.
- Dynamic-throughput high-capacity links.

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**Features**
- Indoor rack mount.
- MF-TDMA Mesh Return Link overlay support.
- 100/100Mbps.
- Hub-spoke operation.
- Standard dual-coax installation with any COTS BUC/LNB.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- OpenAMIP antenna support.

**Typical Application**
- Enterprise voice-centric networks.
- Air-traffic-control applications.
Features
- Weatherized, all outdoor version of the U7400.
- Commercial-grade all outdoor installation.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- Standard dual-coax installation with any COTS BUC/LNB.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- OpenAMIP antenna support.

Typical Application
- All-outdoor rural broadband all outdoor installations / solar-powered installations.
- Commercial maritime all above-deck installations.
- Dynamic video-stream contribution applications such as homeland security (HLS) and smart cities, providing links to outdoor facilities or equipment.
- Mission-critical backup links.

Features
- Military-grade hardened all outdoor version of the U7400.
- All-outdoor use.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- Standard dual-coax installation with any COTS BUC/LNB.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- OpenAMIP antenna support.

Typical Application
- MIL land SATCOM on the Move (SOTM) – land hand carried (“man pack”) and vehicular
- MIL maritime SATCOM above-deck installations.
Features
- Cellular-backhaul-optimized version of the U7400.
- IP 3G/4G/LTE cellular backhaul optimization.
- Indoor rack mount.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.

Typical Application
- 3G/4G/LTE cellular backhaul links.
- Rural cellular sites.
- Cellular delivery on tourism sites and cruise ships.

WU7400-C4

Features
- Commercial-grade weatherized, all outdoor version of the U7400-C4 for all outdoor installation.
- Built-in cellular-backhaul-optimization.
- IP 3G/4G/LTE cellular backhaul optimization.
- Indoor rack mount.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- Standard dual-coax installation with any COTS BUC/LNB.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- OpenAMIP antenna support.

Typical Application
- All-outdoor 3G/4G/LTE cellular backhaul links, all outdoor installations / solar-powered installations.
- Rural cellular sites.
- Cellular small-cells.
- Cellular delivery on mass-populated industrial maritime facilities.
Features
- Open computing platform for LTE/5G MEC, NFV/SDN applications.
- Indoor rack mount.
- 100/100Mbps.
- Flexible deployment – support hub-less point-to-point links as well as hub-spoke operation.
- MF-TDMA and SCPC Return Link.
- WaveSwitch™ dynamic on-the-fly and scheduled Return Link waveform switching and SCPC speed adaptation.
- OpenAMIP antenna support.
- Remote-terminal full redundancy solution, user-traffic encryption and Layer 2 connectivity.
- Standard dual-coax installation with any COTS BUC/LNB.

Typical Application
- Edge computing applications including 5G / LTE cellular backhaul and
- Rural internet delivery and distribution including access control, firewall, caching and localized ads.
- Remote CDN end-points.
- IIoT local gateway and traffic processing.
## System High-Level Specification

### Architecture

| Topologies | ![Multi-gateway.](image)  
| ![Multi-satellite / multi-beam support.](image) |

### Forward Link

| Technology | TDM Forward Link. |
| Channel Rate | Up to 500MHz Forward Link carriers per cluster. |
| Waveform | DVB-S2/S2X ACM, GSE encapsulation, QPSK up to 256APSK LDPC/BCH, annex M (Time Slicing) up to 32 TSNs. |
| Channel Spacing | 5%, 10%, 20%, 25% or 35% channel spacing (roll-off factor). |
| Forward Link Capacity | Up to 2.5Gbps per carrier. |

### Return Link

| Technology | 3D BoD™ Return Link multi-waveform technology:  
| MF-TDMA – lean reservation based high network-utilization, RLE encapsulation.  
| SCPC – bandwidth-on-demand, high spectral-efficient dynamic DVB-S2X Return Links – for terminals of high and sustainable traffic density.  
| Terminal built-in Uplink Power Control (ULPC) and network-wide PowerACM™ link variability mitigation providing support for Ka, Ku and C-band.  
| PowerACM™ provides QoS-driven ACM support and Return Link BW assignment.  
| Up to 500MHz Return Link BW capacity per cluster.  
| MF-TDMA mesh overlay option with supported VSAT modem models (wide-beam satellite coverage). |

| MF-TDMA Channel Rate | 64Ksps and up to 8Msp. |
| MF-TDMA Waveform | BPSK, QPSK, 8PSK, 16APSK. |
| MF-TDMA Channel Spacing | 10%, 15%, 20% or 25% channel spacing (roll-off factor). |
| MF-TDMA Channel Capacity | Up to 25Mbps per MF-TDMA Return Link channel. |
| SCPC RTN Channel Rate | 500Ksps up to 25Msp. |
| SCPC RTN Waveform | DVB-S2 QPSK up to 32APSK. |
| SCPC RTN Channel Spacing | 5%, 10%, 20%, 25% or 35% channel spacing (roll-off factor). |
| SCPC RTN Channel Capacity | Up to 100Mbps each SCPC Return Link channel. |
## Applications, PEP and QoS

| Connectivity                  | - Wireline transparent Layer 2 connectivity (supported models only).  
|                              | - VLAN and VRF (Virtual Routing and Forwarding) (supported models only).  
|                              | - Layer-3 NAT and DHCP server / DHCP relay. RIP routing protocol. VRRP support. (Protocol and feature set is model dependant).  
|                              | - Full multicast support from hub and from behind remote.  
| Application Optimization      | - TCP/IP, HTTP acceleration.  
|                              | - Cellular backhaul acceleration (supported satellite modem models only).  
| QoS                          | Built in embedded QoS support integrated with Forward and Return Link ACM mechanisms.  
| Multimedia Support           | - VoIP, video-over-IP and video-conferencing support.  
|                              | - Multimedia QoS support and bandwidth assurance for VoIP QoE.  
| Security                     | IPSec VPN tunnel strong encryption (availability in certain models and limited by export control regulations).  

## Operations and Management

| Deployment                    | - Baseband RF modulation and demodulation separated from network-processing and management - for flexibility and large-scale deployment supporting remote unmanned teleports.  
|                              | - RF gateway diversity and distant data center, network over fiber  
|                              | - RF-over-fiber support  
|                              | - Flexible and scalable growth capability.  
|                              | - Hub / teleport geographical capabilities.  
|                              | - Remote-terminal full redundancy configuration options for mission-critical links.  
| Management System            | Graphical role-based multi-service web-application NMS (Network Management System).  
|                              | VNO support.  
| Business Integration         | Integration with customer OSS and BSS systems using SOAP and REST API NBI.  
|                              | Traffic accounting NBI to external billing systems.  

Specifications are subject to change without notice