

The tactical warfighter's
network-centric modem of choice



ViaSat continues to offer the most innovative satellite networking products with the introduction of its most advanced full-mesh MF-TDMA LinkWay_{S2}™ system to date. Battlefield-proven LinkWay_{S2} modems provide secure at the halt (ATH) and on the move (OTM) satellite communications between users in a single full-mesh MF-TDMA (multi-frequency time division multiple access) network.

Delivering true network-centric connectivity, the LinkWay_{S2} system seamlessly integrates voice, video, and data applications, automatically routing mission-critical information over a mesh single satellite hop network via unicast or multicast.

Expanding on the capabilities of the successful LINKWAY® 2100 current force modem, LinkWay_{S2} modems are more efficient than ever before. DVB-RCS turbo coding and minimally short burst preambles provide quasi-error free communications with minimal carrier power requirements and maximum efficiency. Added 8PSK modulation provides dramatically improved spectral efficiency, while the included BPSK modulation and low $r = 1/3$ error correction coding offers support for ultra-small, sub 1-meter antennas for ATH or OTM communications. LinkWay_{S2} modems offer an extended carrier rate range, from 312.5 ksps up to an industry-leading 10 Msps. This allows greater flexibility for both high-throughput applications, such as video, or low-throughput applications, such as voice, enabling system operators to select the optimal carrier rate(s) for their particular network traffic profile.

Unique in the industry, the full-mesh LinkWay_{S2} modem has completely independent fast-hopping transmit and receive paths. The transmit modulator and receive demodulator can each tune to different carriers on a burst-to-burst basis, independently and automatically, across a 1.1 GHz frequency range spanning multiple transponders, carrier rates, carrier coding rates, and carrier modulations. This allows the most efficient allocation of bandwidth, regardless of the burst timeslot or carrier frequency, for the most flexible and frequency-agile system available. LinkWay_{S2} modems are currently operating on Wideband Global Satcom (WGS) satellites and can be used over any commercial or military satellite on C, X, Ku, or Ka-band using loop-back, split-beam or cross-strapped transponders.

LINKWAY_{S2} AT-A-GLANCE

- » MF-TDMA architecture supports any network topology
 - Full-Mesh
 - Star (hub/spoke)
 - Hybrid (combination of mesh and star)
- » Transmission Security (TRANSEC)
 - Encryption of Traffic Channel
 - Encryption of Control Channel
 - Concealment of Channel Activity
 - FIPS 140-2, Level 2, NIST Certified
 - Over-the-air authentication, rekeying, and zeroization
- » No large, costly VSAT central hub required
- » Spread spectrum waveform technology allows mixed-node networks using ultra-small antennas and on the move (OTM) terminals coexisting with larger fixed location terminals
- » DVB-S2 Integrated Receiver/Decoder (IRD) provides an additional, independent high-speed download capability from any data broadcast site
- » Supports MILSATCOM Wideband Global Satcom (WGS) with extended IF ranges of 950 to 2050 MHz and 20 dB MF-TDMA receive power burst-to-burst dynamic range
- » Operates on loop-back, split-beam or cross-strapped (C, X, Ku, Ka-band) transponders
- » Capable of mesh full-duplex IP throughput speeds over 15 Mbps
- » Advanced QoS and traffic prioritization options
- » New, improved Network Management System (NMS) provides enhanced MF-TDMA burst time plan allocation and map displays
- » Supports both local and geographic redundancy of the network controller

SPECIFICATIONS
NETWORK CONFIGURATION

Topology	Full-Mesh, Star, and Hybrid
Carrier Symbol Rates	
» MF-TDMA	0.3125, 0.625, 1.25, 2.50, 5.00, 10.00 Msps
» TDM (DVB-S2)	1.0 to 30.0 Msps
Spectral Confinement	
» MF-TDMA & TDM (DVB-S2)	$\alpha = 0.20$
Modulation	
» MF-TDMA	BPSK, QPSK, 8PSK
» TDM (DVB-S2)	QPSK, 8PSK
FEC	
» MF-TDMA (DVB-RCS)	1/3, 1/2, 2/3, 3/4, 4/5, 6/7
» TDM (DVB-S2)	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Spread Spectrum	
» Spread Factors	1, 2, 4
» Chip Rates	1.25, 2.50, 5.00, 10.00 Mcps

INTERFACES

Mesh TX IF	950 to 2050 MHz, 0 to -30 dBm, Type-F
Mesh RX IF	950 to 2050 MHz, -35 to -75 dBm, Type-F
DVB-S2 RX IF	950 to 2150 MHz, -90 to -140 dBm/Hz
Reference & Power	Software controllable DC power and 10 MHz reference on each IFL interface
User Data Ethernet Port	10/100BASE-TX, RJ-45
Management Console	RS-232, RJ-12
ACU I/O or GPS Input	RS-232, RJ-12
External Reference	10 MHz, BNC
External Media Access	USB 2.0, USB-A, Female
Summary Alarm	Form C Contact Closure, DB9

TRANSMISSION SECURITY

Link Encryption	AES 256-bit bulk encryption of the user data plane and the network control data plane
NIST Certification	FIPS 140-2, Level 2
Traffic Load Masking	Generation of MF-TDMA fill bursts
Key Fill Interface	DS-101

TRAFFIC ENGINEERING

QoS Queuing Type	Priority Queuing or CBWFQ
Number of QoS Queues	16
QoS Queuing Mapping	Configurable by IP DSCP
Priority Burst Types	CIR (Static & Dynamic) bursts
Traffic Burst Types	Unicast or Multicast

ENVIRONMENTAL AND PHYSICAL

Temperature Range	
» Operational	0° to +50° C
» Storage	-40° to +70° C
Relative Humidity	
» Operational	0 to 95% (NC) at 50° C
» Storage	0 to 95% (NC) at 70° C
» Shock/Vibration	Remains operational when subjected to the operational shock/vibration profiles as specified in MIL STD 810F
Dimensions (WxHxD)	17.0 x 1.75 x 15.7 in.
Weight	7.5 lb
ELECTRICAL	
AC Prime Power	100 to 240 VAC, 47 to 63 Hz
Power Consumption	55 W (excluding external ODU)

BACKWARDS COMPATIBILITY

Through a software configuration, a LINKWAY® 2100 compatible operational mode can be enabled, providing full interoperability with fielded LINKWAY 2100 series networks. Changing configuration from the legacy operational LINKWAY 2100 mode to the more efficient LinkWay_{S2} mode requires only an over-the-air software download to remote modems and can be done from a centrally-managed location.

FIPS 140-2, LEVEL 2 SECURITY

With an embedded FIPS 140-2, Level 2, AES 256-bit based transmission security (TRANSEC) module, the system ensures secure connectivity and protects sensitive communications. Using transportable and mobile satcom platforms equipped with LinkWay_{S2} modems, deployed warfighters can communicate securely with other LinkWay_{S2} fixed, ATH, or OTM equipped terminals.

MESH MOBILITY (ON THE MOVE)

LinkWay mesh networks support both ATH and OTM terminals. When combined with GPS, terminal acquisition, synchronization and timing are automatic even when the terminal is in motion. The new LinkWay waveform enables FCC/ITU compliant operation of the LinkWay_{S2} modems, using ultra-small antennas typically used in OTM platforms.

INTEGRATED DVB-S2 RECEIVER/DECODER

A DVB-S2 Integrated Receiver/Decoder (IRD), with EN 302 307 compliant coding, provides bandwidth-efficient broadband download capability simultaneous with MF-TDMA operation. Higher throughputs at lower Eb/No enable broadband connections into reduced size terminals. Additionally LinkWay_{S2} modems can use this capability with any standard EN 302 307 DVB-S2 modulator and IP encapsulator.

NETWORK MANAGEMENT

LinkWay_{S2}-based terminals are controlled by a full-featured network control center (NCC) management station. The one-rack-unit NCC server connects to any standard LinkWay_{S2} modem and manages TDMA network timing, synchronization, terminal acquisition, network configuration, and bandwidth management. The NCC also acts as the network management system (NMS) server, a client-server system with a https-based graphical interface. With this approach, a PC-based remote NMS client can securely access the NCC server from anywhere in the world (with appropriate security restrictions). NMS user windows provide network status, network station maps, system configuration, alarm status, connection set-up, accounting, link performance, and diagnostic commands. Furthermore, local and geographic redundancy ensures reliable network operation and provides automatic network recovery.



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