LinkWay$_{S2}$ Broadband VSAT System

LinkWay$_{S2}$™ At-A-Glance

- Full-mesh, multi-frequency TDMA architecture supports any network architecture – mesh, star, or hybrid – on one platform.
- Multi-transponder, multi-beam, even cross-strap operation, with *LinkWay* advanced network architecture.
- Advanced turbo codes and modulation schemes make *LinkWay*$_{S2}$ the world's most advanced, most efficient mesh TDMA modem.
- Integrated DVB-S2 receiver provides high-speed download capability from a central site, as well as interoperability with ViaSat's *LinkStar*$_{S2}$ system.
- Bandwidth-On-Demand – Real-time, dynamically-assigned bandwidth allocation based on actual traffic requirements.
- Integrated satellite router for IP networking with advanced features such as IP QoS, IP header compression, IP multicast, TCP acceleration, and application-triggered bandwidth allocation.
- Integrated frame relay switch for connecting peripheral frame relay access devices supporting voice, packet data, serial data, or legacy protocols.
- Mobile networking, at sea or on land, with automatic system acquisition and timing.
- Network management system with graphical (GUI) web-based PC clients allows secure network control from any location.

LinkWay$_{S2}$ Applications At-A-Glance

- Corporate and government offices, extensions of public switched networks, videoconferencing – Any full-mesh, peer-to-peer network.
- Banks, telemedicine, GSM backhaul, in-theater military networks – Any multi-star, hierarchical network.
- Gateway sites, teleports, and tactical entry points – Any star network, where each site connects back to a central hub site.
- Broadband access network – Any network needing the high-speed connectivity of DVB-S2.
- Maritime networks – Cruise ships, ferries, icebreakers, resource mapping ships, naval vessels.
- Ground-mobile networks – Flyaway terminals, oil exploration sites, disaster recovery teams, interim communication sites, military units.

LinkWay$_{S2}$™ Multi-Protocol TDMA Satellite Networking System

LinkWay$_{S2}$ is a hubless MF-TDMA VSAT system that enables you to cost-effectively integrate a variety of applications into a single platform in any network topology – mesh, star, or multi-star. Adaptive on-demand bandwidth allocation and bandwidth-efficient coding and modulation engineered into the *LinkWay*$_{S2}$ system gives you cost-effective broadband connections between any *LinkWay*®-equipped sites. Features such as turbo coding and 8PSK modulation provide substantial bandwidth savings, reducing your transponder costs compared with other solutions.

The system provides true network-centric connectivity, integrating seamlessly with your networking applications using IP or frame relay, automatically routing your network data via satellite. IP and frame relay are supported natively on the same platform and in the same network simultaneously, maximizing your networking options.

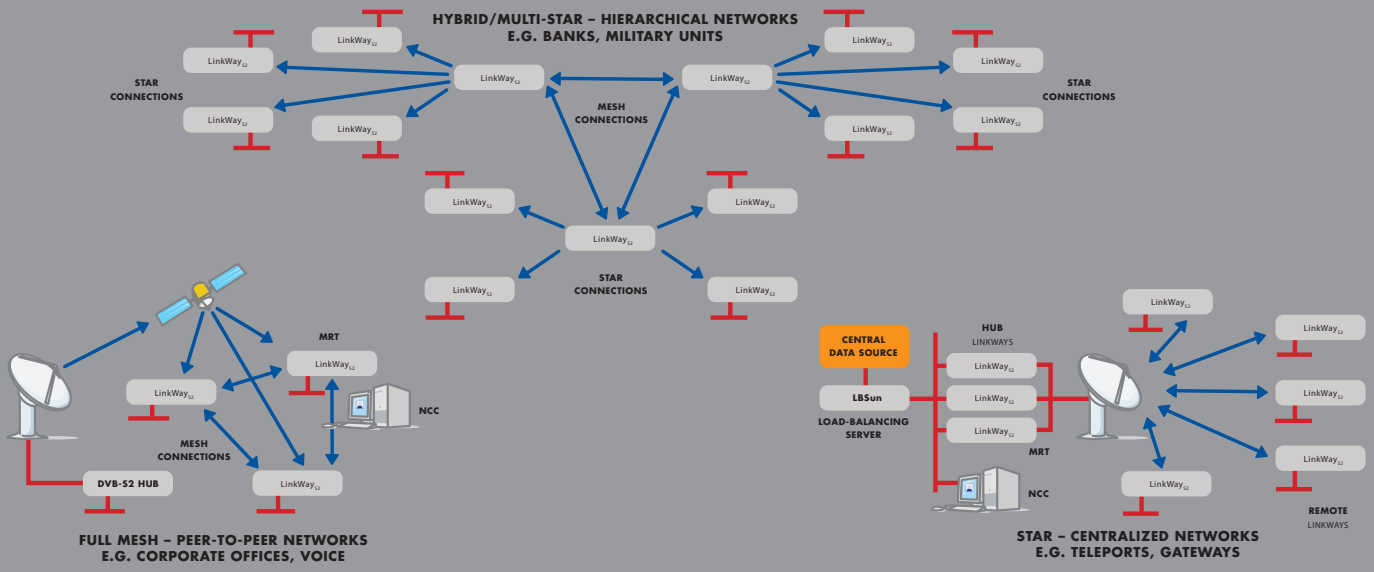
The *LinkWay*$_{S2}$ terminal includes an integrated DVB-S2 receiver/decoder which can receive a broadband IP data stream from a DVB-S2 hub, providing efficient broadband star connectivity to a central data source while simultaneously providing full-mesh capability. The *LinkWay*$_{S2}$ system, for example, can support bandwidth-intensive IP applications such as streaming video over the DVB-S2 link while supporting intrinsically mesh applications such as VoIP over mesh TDMA. Also, the terminal is now interoperable with ViaSat's *LinkStar*$_{S2}$ system, providing a universal, flexible networking solution.

The *LinkWay*$_{S2}$ system can be used over any fixed satellite on any satellite radio frequency band. Combined with the appropriate RF equipment, the *LinkWay*$_{S2}$ terminal can operate on C-band, Ku-band, Ka-band, or X-band – on loop-back, split-beam, or cross-strapped transponders. *LinkWay*$_{S2}$ can operate on up to 64 non-contiguous satellite carriers, allowing access to any available bandwidth on any transponder on the satellite, for optimal use of costly satellite resources.

The Most Advanced VSAT Networking Technology

ViaSat continues to offer the most innovative satellite networking products with its *LinkWay*$_{S2}$ system. The *LinkWay*$_{S2}$ terminal builds upon and expands the capabilities of the successful LINKWAY 2100, assuming the LINKWAY 2100's place as the world's most advanced mesh TDMA system.

ONE SYSTEM : ANY NETWORK ARCHITECTURE!



LinkWay$_{S2}$ uses a revolutionary new mesh TDMA modem design. Turbo coding provides quasi-error-free connections with minimal carrier power requirements. 8PSK modulation provides dramatically improved spectral efficiency. Combined with an improved, shorter TDMA preamble, *LinkWay*$_{S2}$ is up to 40% more efficient than convolutional-encoded Reed-Solomon systems, increasing throughput, reducing station size, and reducing satellite bandwidth requirements.

The *LinkWay*$_{S2}$ terminal provides more choices of carrier rate than the LINKWAY 2100, with any rate from 156Ksps to 5Msps in 156Ksps steps, enabling system operators to select the optimum carrier rate for their particular network traffic profile. With efficient TDMA operation at lower symbol rates, this terminal provides an excellent solution for low-throughput applications, such as voice. With carrier rates up to 5Msps, the *LinkWay*$_{S2}$ also handles high-throughput applications, such as video or large media file transfers.

Unique in the industry, the *LinkWay*$_{S2}$ is a mesh MF-TDMA modem with completely independent fast-hopping transmit and receive sections. The transmit modulator and receive demodulator can each tune on a burst-to-burst basis, independently and automatically, to any of 64 carriers across an 800 MHz frequency range spanning multiple transponders, multiple carrier rates, multiple carrier coding rates, and multiple carrier modulations. This allows the most efficient allocation of bandwidth on the network carriers, on any available timeslot on any available carrier frequency, for the most flexible and frequency-agile system available.

LinkWay$_{S2}$'s DVB-S2 receiver, with EN 302 307-compliant coding, provides bandwidth-efficient broadband download capability to the LINKWAY system. The DVB-S2 coding scheme is so advanced, it may represent the last major development in high-speed satellite modem design. With higher throughput at lower Eb/No than other systems, it enables broadband connections into reduced size stations. Operators may use *LinkWay*$_{S2}$ with a standard EN 302 307 DVB-S2 modulator and IP encapsulator or with ViaSat's *LinkStar*$_{S2}$ hub.

LinkWay$_{S2}$ Terminal Description

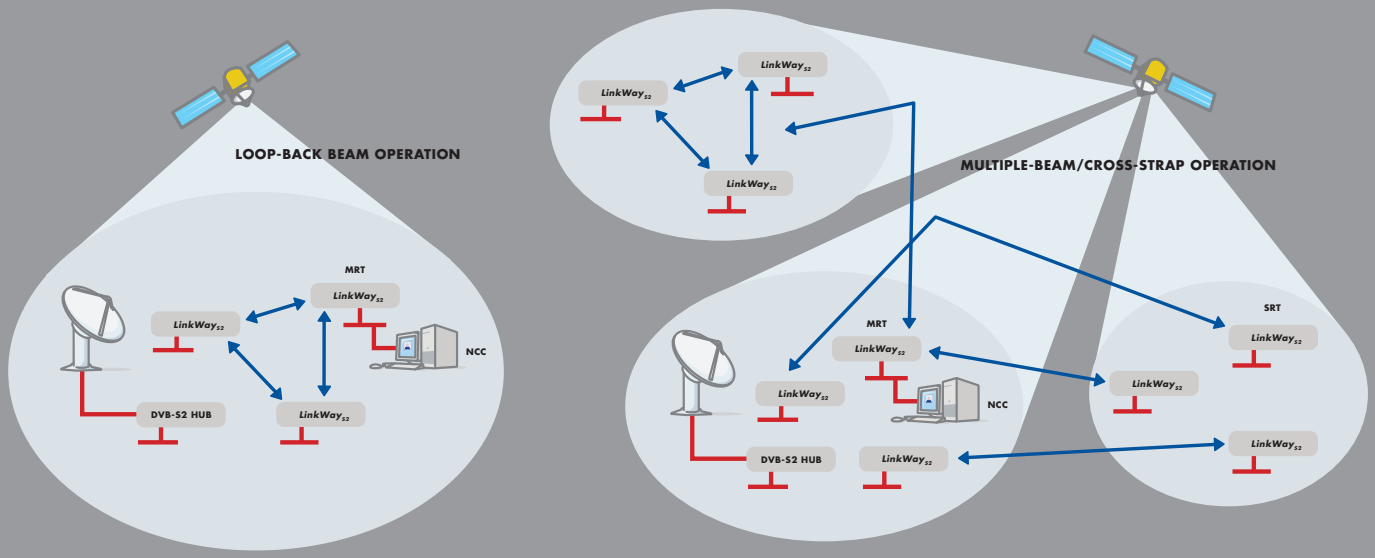
The IDU (Indoor Unit) contains one integrated IP port and one integrated frame relay serial port. Additional IP and frame relay ports may be added using the two expansion slots available on the IDU. Frame relay capability may also be expanded via an attached peripheral frame relay access device. IP ports and capabilities may also be expanded via a peripheral ethernet switch or router.

The terminal is designed for stand-alone operation, requiring no local operator control. Configuration and monitoring of remote sites is done over-the-air via the LINKWAY Network Management System (NMS), or via telnet. The IDU also includes a console interface port for unit installation.

The IDU features an extended 950-1750 MHz L-band interface to the radio frequency transceiver (RFT), for operation across multiple RF bands limited only by the capability of RFT. The built-in DVB-S2 receiver uses the same L-band receive interface as the TDMA mesh modem for a simple, clean design.

The complete *LinkWay*$_{S2}$ VSAT terminal includes an RFT consisting of C- or Ku-band radio equipment and an antenna. Typical radio transmit powers are 2, 4, 8, and 16 Watts in Ku-band, and 5, 10, and 20 Watts in C-band.

ONE SYSTEM : ANY TRANSPONDER CONFIGURATION!



Typical antenna sizes are 1.2, 1.8, and 2.4 meter for Ku-band, with 1.8, 2.4, and 3.8 meter in C-band. The terminal can be deployed with a variety of RFT sizes throughout the network, with size based on the satellite parameters, station traffic requirements, and geographic location of network stations.

LinkWay$_{S2}$ can also be used in a maritime or ground-mobile environment on a stabilized platform. When combined with GPS, terminal acquisition, synchronization and timing are automatic even when the terminal is in motion.

The *LinkWay*$_{S2}$ terminal may be operated in a LINKWAY 2100-compatible mode, for adding or replacing sites in an existing LINKWAY 2100 network, ensuring an operator's investment in LINKWAY 2100 remains solid for years to come.

Network Control and Management

LinkWay$_{S2}$ terminals are controlled by a full-featured Network Control Center (NCC) workstation that manages TDMA network timing, synchronization, terminal acquisition, network configuration, and bandwidth management. The NCC also acts as the NMS server. The NMS is a client-server system with an easy-to-use Web-based graphical interface. With this approach, a PC-based remote NMS client can securely access the NCC server from anywhere in the world.

The NMS user windows make it simple to access key information. Network status, network station maps, system configuration, alarm status, circuit set-up, accounting, link performance, and diagnostic commands are available with the click of a mouse.

The NCC database files can be shared with other operational tools such as billing systems, and the network may also be monitored via SNMP. Multiple levels of access control ensure that security is maintained.

Satellite Network Architecture

The NCC is collocated with the Master Reference terminal (MRT). The MRT acts as a conduit for the NCC network control messages to the remote terminals, providing timing and signaling which enable over-the-satellite control of the network from the NCC and NMS. Any *LinkWay*$_{S2}$ terminal can be configured to be the MRT – no special hub hardware is needed, reducing expense and improving logistics.

Local and geographic redundancy is provided for the NCC and MRT to ensure reliable network operation and provide automatic network recovery.

Unique among TDMA systems, LINKWAY terminals do not all have to be in the same satellite beam-i.e., the MRT does not require direct loop-back connectivity with itself or the remote terminals. Advanced control algorithms allow multi-beam or even cross-strapped network architectures using a Supporting Reference Terminal (SRT).

Multi-beam operation allows a single *LinkWay*$_{S2}$ network to span across the entire footprint of all transponders' single satellite – enabling transoceanic, transcontinental, and hemispheric networks. This makes *LinkWay*$_{S2}$ ideal for large, multinational networks, such as embassy networks, international organization networks, air traffic control networks, and military networks.

Advanced Internet Protocol Networking

The IP port of a *LinkWay*$_{S2}$ terminal acts as an interface of a virtual satellite-based router. IP packets entering one *LinkWay*$_{S2}$ terminal IP interface are automatically routed by IP address and transported to the destination *LinkWay*$_{S2}$ terminal IP interface.

Quality of service is maintained via differential services-compatible prioritization with six transmit queues. Application-triggered bandwidth allocation ensures bandwidth is allocated to match specific customer applications, such as voice or video.

Onboard TCP acceleration removes satellite delay-induced throughput limits. Built-in IP header compression reduces bandwidth required for VoIP.

The IP multicast feature enables one *LinkWay*$_{S2}$ site to simultaneously communicate with multiple other *LinkWay*$_{S2}$ sites – perfect for multi-party videoconferencing or distance learning.

IPSec transparent, the *LinkWay*$_{S2}$ terminal can be used with peripheral IP encryption devices.

Advance Frame Relay Networking

The frame relay interface of a *LinkWay*$_{S2}$ terminal acts as an interface of a virtual satellite-based frame relay switch. Frame relay frames entering one *LinkWay*$_{S2}$ terminal interface are automatically switched by DLCI and transported to the destination *LinkWay*$_{S2}$ terminal interface.

LinkWay$_{S2}$ supports both frame relay PVCs and SVCs.

LinkWay S2

THE NEXT-GENERATION LINKWAY IS HERE

LinkWay$_{S2}$ *Specifications*

MF-TDMA MODEM
Modulation: QPSK, 8PSK
Symbol Rates: 156Ksps to 5Msps
Forward Error Correction: Turbo Coding
FEC Rates: 1/2, 2/3, 3/4, 7/8

DVB-S2 RECEIVER
Modulation: QPSK, 8PSK
Symbol Rates: 2.5Msps to 30Msps
Forward Error Correction: LDPC Turbo Coding per EN 302 307
FEC Rates:
QPSK: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10

L-BAND INTERFACE
Tx: F-type, 75 Ohm; 950-1750 MHz range
Rx: F-type, 75 Ohm; 950-1750 MHz range

PHYSICAL INTERFACES: IP and Frame Relay
Expansion: 2 PMC interface slots
Console Port: RS-232 electrical, RJ-11 physical

NETWORK INTERFACES
IP: 10/100BT IEEE 802.2 Ethernet (RJ45)
Frame Relay: SCSI-26pin synchronous serial interface, with transition cables to RS-449, RS-530, and V.35

ENVIRONMENTAL
Temperature Range:
Operational: 0°C to +50°C; Storage: 0°C to +70°C
Relative Humidity:
Operational: 0 to 95%; Storage: 0 to 95% (non-condensing)

ELECTRICAL
Power Supply: 50/60 Hz, Autorange 100-240VAC

MECHANICAL
Dimensions: (H x W x D)
1.75 X 17 X 15 in. (4.45 x 43.2 x 38.1 cm)
Weight: ~6 lb (~2.8 kg)

OUTDOOR UNITS
Ku-Band Antennas: 1.2, 1.8, or 2.4 meter
Ku-Band RFTs: 2, 4, or 16 Watt
C-Band Antennas: 1.8, 2.4, 3.8 meter
C-Band RFTs: 5,10, or 20 Watt
Interfacility Link: L-band
Certification: CE, FCC, R&TTE, ANATEL

*Specifications subject to change without notice.

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