

VSATPlus 3



Full Mesh IP Network Solution Hubless Enterprise Grade Satellite Solution

The VSATPlus 3 terminal provides a full mesh communications solution, optimized for IP traffic, supporting multi service traffic for service providers, governments and corporations.

VSATPlus 3 is PolarSat's fourth-generation advanced satellite communications terminal. Building upon PolarSat's proven track record of field-deployed, reliable communications products, this latest product introduces many new features and enhancements to address the seamless integration to terrestrial IP based networks.

VSATPlus 3 networks enable customers to easily and quickly deploy advanced communications networks that are economical to own and operate and are highly scalable to accommodate growth. As well, the architecture is robust and upgradeable, thus providing a future-proof solution for the customer.

The VSATPlus 3 provides full mesh, single hop connectivity within a satellite network leveraging PolarSat's recognized expertise in MF-TDMA systems now combined with dynamic Adaptive Coding and Modulations (Mesh-ACM™). This platform enables a robust mix of user services, ranging from toll-quality voice, email and file transfers to broadband applications such as Internet/Intranet access, IP video, LAN Interconnect, and Client Server applications.

PolarSat's VSATPlus 3 terminal incorporates state-of-the-art features to provide the customer with the most powerful product on the market today in terms of data throughput, connectivity, flexibility and satellite efficiency. The terminal provides a direct Ethernet port to a users LAN and hosts an IP router which includes vital IP enhancements for satellite transport.

With its ability to support data, video, voice and facsimile, the VSATPlus 3 is the ideal low-cost system. It supports a full complement of Internet Protocol (IP) transport applications, all in a single, integrated, fully digital network.

PolarSat's VSATPlus 3 operates in a full mesh network for single-hop terminal-to-terminal connectivity. IP traffic is carried directly from one remote site to another, eliminating the need for a central hub.

Features

- ▶ Direct IP interface supports transport of Toll-quality voice, data, client/server, video and facsimile services combined on a single, low-cost platform
- ▶ Built in IP enhancements to optimize traffic performance over satellite
- ▶ Hubless, full mesh Bandwidth on Demand (BoD) operation with single satellite hop
- ▶ Maximum use of satellite bandwidth by combining Dynamic Mesh Adaptive Coding and Modulation (Mesh-ACM™) with Time Divisional Multiple Access (TDMA) and frequency hopping (FHOP) techniques
- ▶ Easily installed and expandable terminal for low-cost network growth
- ▶ Network Management System (NMS) offers sophisticated network control for dynamic Bandwidth-on-Demand (BoD) services
- ▶ Fourth Generation TDMA terminal leverages proven technology in a state of the art modem



Markets Served

- Aviation
- Government agencies
- Petroleum and oil exploration
- Mining and natural resources
- Disaster Relief
- Satellite Testbeds

PTTs & telcos

Private carriers

Corporations including:

- Banking and financial institutions
- Manufacturing
- Construction
- Aerospace
- Retail
- Service industries

Services Supported

Data

- IP packet services
- Local area networks
- Batch file transfer
- Client server
- High-speed computer data transfer
- High-resolution image transfer

Telephony (packet services)

- VoIP,
- Cellular Backhaul

Compressed digital videoconferencing

Mobility

Applications

Corporate Private Networks

Public Switched Telephone Networks (PSTN)

Backbone telephony, data, and videoconferencing networks

Telephony service

Extended or supplemental services

Temporary, emergency, or backup communication services

Cellular extension

Distance learning

Telemedicine

Client Server



Network Features

Fully integrated services in a single platform, the *VSATPlus 3* terminal is based on TDMA with frequency hopping (FHOP). Taking advantage of both time domain and frequency domain access methods, the *VSATPlus 3* allows users to support multiple services such as data, voice, and videoconferencing in one simple, integrated IP transport platform.

Mesh-ACM™ provides optimized bandwidth utilization combined with high availability. The *VSATPlus 3* modem adjusts the modulation and coding to any other node in the network dynamically to support changing channel characteristics.

Hubless, full mesh operation with a single satellite hop. The *VSATPlus 3* is based on a flexible architecture that supports various network topologies including star, full mesh, hybrid, or any combination of these.

The *VSATPlus 3* architecture eliminates the need for costly central hub equipment and improves call quality by transferring information over single satellite hops. Transponder bandwidth and power requirements are greatly reduced.

IP Packet Services

PolarSat's IP support provides a powerful and cost-effective solution to corporations, governments, and service providers who need to interconnect locations via a satellite-based backbone. The Ethernet Interface supports industry-standard IP. Corporate users are provided a single transport mechanism that carries all user traffic such as TCP/IP, UDP/IP, while providing mesh communications among all sites within the network.

Bandwidth on Demand (BoD)

Satellite bandwidth is allocated through committed information rate (CIR), excess information rate (EIR), and Quality of Service (QoS) definitions, and optimized using dynamic bandwidth allocation (BoD) techniques, thereby minimizing recurring communications network costs. This approach provides user traffic with guaranteed bandwidth and the ability to request additional bandwidth from the network. *VSATPlus 3* provides the virtual LAN in the sky with the satellite bandwidth resource shared among all users.

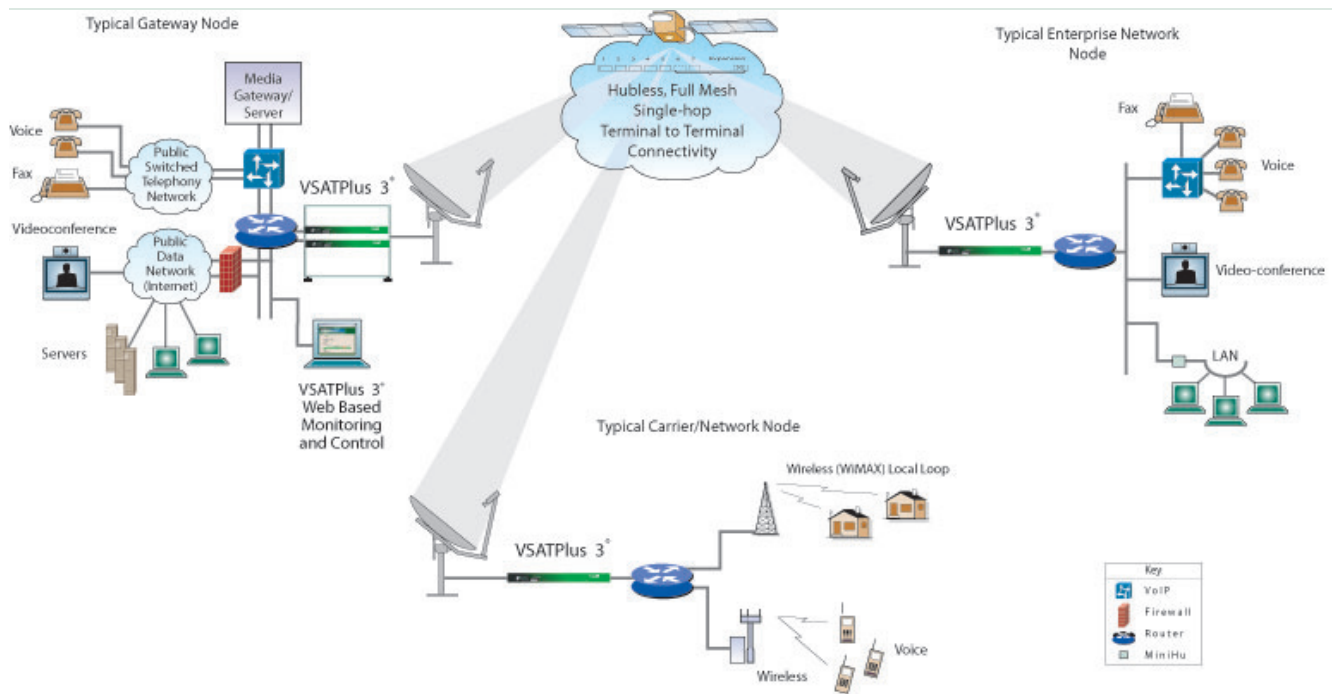


Figure 2 Typical VSATPlus 3 network configuration.

Centralized network management

The Network Manager is a key component of the overall NMS and also allows monitoring and controlling of network elements from one central location. This function provides:

- ▶ Web-based interface to allow ubiquitous access to network information with Multi language support for ease of use and training
- ▶ MIB-based monitoring of the VSATPlus 3 terminals from a SNMP based manager.

State Of The Art Satellite Modem

The VSATPlus 3 terminal is based on a software defined modem architecture which provides a flexible variable rate, high speed modem utilizing advanced digital signal processing and advanced time-domain-filtering techniques. The burst modem can be software configured for rates from 338 Kbps up to 8 Mbps. Turbo codes provide maximum coding gain with minimum overhead. The RF interface is optionally 70 MHz or L-Band which allows for cost-efficient integration with RF BUCs for typical remote station configurations. The L-band interface provides 10MHz output and 24VDC power for the LNB up the IF cable. The 48VDC power supply can be provided for powering Block Up Converters (BUCs) up to 16 Watts.

Carrier (frequency) hopping on up to 32 carriers

The VSATPlus 3 allows network operators to increase transmission capacity up to 32 times, without costly RF and antenna upgrades.

Mesh-ACM™

Mesh-ACM™ allows the modem to switch to the most efficient MODCOD for each burst it sends to each destination in the network delivering bandwidth efficiency gains of greater than 40-50% as compared to other mesh systems without Mesh-ACM™. The performance improvement is achieved by allowing each individual station to operate at the most efficient Coding and Modulation dependent on the antenna size, satellite contour and weather conditions.

Advanced IP Functionality

The VSATPlus 3 terminal has combined key IP enhancements to overcome the latency effects of satellite communications on TCP/IP protocols. Engineered together these key features work together to deliver superior performance and reduce space segment usage

- ▶ Quality of Service (QoS) supports multiple application class settings.
- ▶ Performance Enhancement Proxy (PeP) ensures wire-line performance of TCP applications over satellite.
- ▶ TCP Compression improves throughput performance over the satellite link.
- ▶ Dynamic Routing Protocol Support using OSPF while providing minimizing the traffic over the satellite though protocol spoofing and enhancements

Every VSATPlus 3 is backed by over 20 years of experience in manufacturing, installing, and maintaining mesh TDMA networks worldwide. Through constant quality improvement, the VSATPlus 3 reaches new levels of reliability, flexibility, operating efficiency, and growth capability. The result is a network solution that meets the most demanding communications requirements now, and well into the future.



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VSATPlus 3® Summary Of Specifications

BASIC FEATURES

- ▶ Satellite IP platform with integrated IP protocol enhancements
- ▶ Hubless with NO per site licence fee or special Network Control Computer
- ▶ Full mesh BoD operation with single satellite hop
- ▶ Software-controlled adjustable rate satellite modem
- ▶ Mesh-ACM™ dynamically switches Turbo FEC rates and Modulations
- ▶ L-band or 70MHz IF interface options
- ▶ Carrier (frequency) hopping on up to 32 carriers
- ▶ Easy terminal installation and low-cost network expansion
- ▶ Fully automatic acquisition and synchronization operation
- ▶ Web based and/or SNMP based Network Management
- ▶ Operates with C- or Ku-band radio frequency (RF) systems (other bands optional)

NETWORK SERVICES

- ▶ Voice
- ▶ Data
- ▶ Videoconferencing
- ▶ Terrestrial Backup
- ▶ Facsimile
- ▶ LAN interconnect
- ▶ High speed imaging
- ▶ Client-Server connectivity
- ▶ E-mail
- ▶ WAN services
- ▶ ERP services
- ▶ Mobility

OPERATING MODES

- ▶ Preassigned (full period)
- ▶ MultiCast
- ▶ Bandwidth on demand

CUSTOMER (TERRESTRIAL) INTERFACES

- ▶ RJ-45 Ethernet user interface, 10/100BaseT
- ▶ IP multiservice features:
 - ▶ OSPF, TCP PeP, TCP payload compression, IP ToS and DiffServ QoS, UDP, ICMP
 - ▶ DHCP relay, IGMP multicast, IPsec Tunneling, ARP, RARP

MODEM CHARACTERISTICS

- ▶ Satellite Access : Multi Frequency Time Division Multiple Access (MF-TDMA)
- ▶ Information Data Rate Range: 338 kbps to 10 Mbps
- ▶ Modulation Type: Quadrature phase shift keying (QPSK) and optional 8-PSK
- ▶ IF Interface

Frequency:	70 MHz	L-Band
	50 to 90 MHz	950-1525 (optional 1750) MHz
Interface:	BNC connector, 75 Ohm	F type , 75 Ohm
Demod Input Level:	-50 dBm to -26 dBm	-75 dBm to -45 dBm
Mod Output Level:	-26 dBm to -10 dBm	-30 dBm to -5 dBm

WEIGHTS/DIMENSIONS/POWER

Input Power (VAC/Hz) 85 to 265 (autoranging)/47-63
Power Consumption (Watts) 80 (Does not include BUC Power requirements)

Weight (kg/lb)	Height (cm/in)	Width (cm/in)	Depth (cm/in)
3.5/8	4.6/1.8	43/16.9	43/16.9

ENVIRONMENTAL CONDITIONS

	Operating	Non-operating
Temperature	0 to 50°C	-40 to 70°C
Relative Humidity (noncondensing)	0 to 95%	0 to 95%

Bit error rate performance (IF back-to-back modem)

Bit Error Rate	E_b/N_0 (dB)		
	QPSK		8-PSK
	R=0.724	R=0.835	R=0.724
1×10^{-6}	3.8 dB	5.5 dB	7.3 dB
1×10^{-7}	4.1 dB	5.9 dB	7.7 dB
1×10^{-8}	4.4 dB	6.3 dB	8.0 dB

