



FEATURES

- Multi-Application Services Platform
- High Density Bridge Router
- Data Compression and Encryption Engines
- Internal PBX w/ Full IP Telephony Support
- Satellite Modem Interfacing and Control
- Integrated SCAN™ Satellite Bandwidth Manager
- Full Featured Internal Spectrum Analyzer

LinkIP is a highly integrated, bandwidth efficient solution for a wide variety of IP data satellite networking applications. The LinkIP solution is based on the LinkXX™ core platform that employs a building block architecture, allowing each network node to be adapted for specific applications such as data, video, and voice by adding hardware and software plug-in modules. This modular architecture provides a high degree of application flexibility and scalability, making the LinkIP easy to upgrade and virtually future-proof.

INTEGRATED BANDWIDTH MANAGER

Scanned Channel Assigned Networking (SCAN™) is LinkSat's patented bandwidth manager. SCAN employs Carrier Sense-Frequency Division Multiple Access-Collision Detection (CS-FDMA-CD) for hubless bandwidth-on-demand services.

Each SCAN remote site has an integrated spectrum analyzer that monitors spectral activity in real time. The LinkIP uses the SCAN spectral activity data to make decisions on when and where to transmit carriers and which carriers to receive within a defined segment of satellite bandwidth. Satellite modulators and demodulators are controlled by the LinkIP for the transmission and acquisition / reception of carriers.

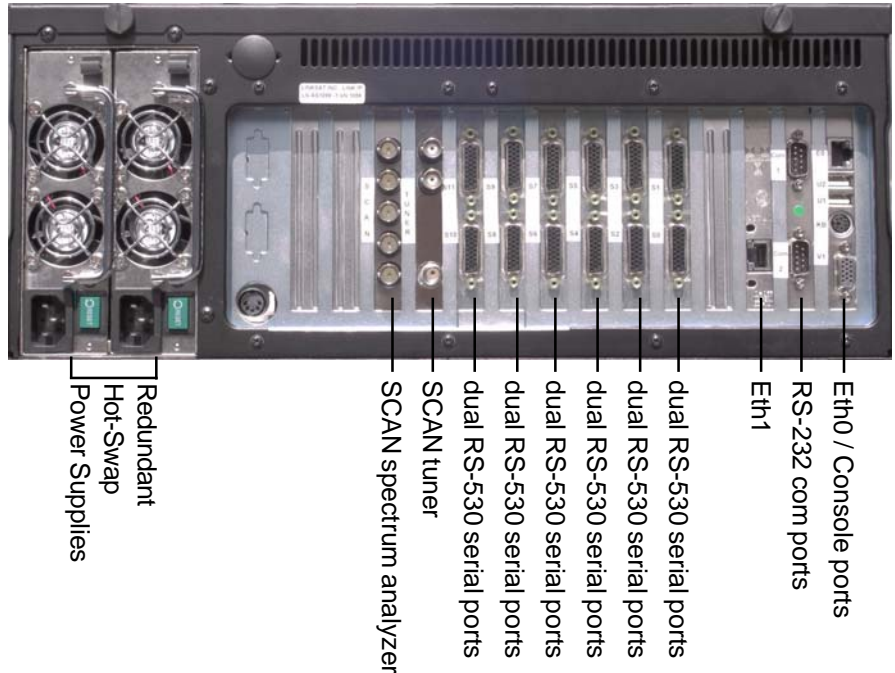
This unique technology offers high bandwidth efficiency in multi-application environments, and supports virtually any type of network architecture, including multi-destination, star, partial mesh, and full mesh.

APPLICATIONS

WIDE AREA NETWORKS	LAN / WAN interconnection for private networks, including file transfers, partial and full mesh voice, email, intranet, videoconferencing, database sharing
CELLULAR BACKHAUL	Broadband and narrowband mesh interconnection of cellular switches and base stations via satellite for GSM, CDMA, TDMA and 3G network operators
CIRCUIT RESTORATION	Provides fully automated backup and restoration of circuits over satellite when main service is interrupted or network congestion occurs on terrestrial circuits
BANDWIDTH DEFRAGMENTATION	Aggregates multiple small, stranded bandwidth segments on a satellite by splitting up a large data circuit, transmitting it as multiple small circuits over the bandwidth fragments, and re-assembling the data streams at the distant end

MODULAR ARCHITECTURE

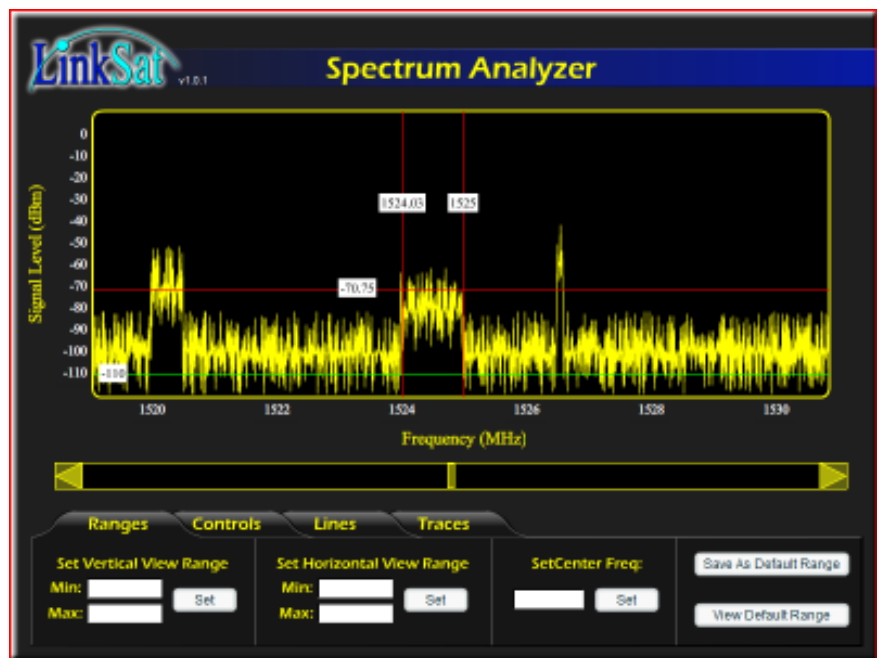
The standard LinkIP chassis has 12 PCI-based plug-in slots for addition of the SCAN spectrum analyzer and optional LAN or WAN interfaces. Software plug-in drivers and applications are typically installed with each hardware plug-in. The software can be customized to accommodate specific needs or applications. A wide variety of interface plug-ins are available, in fact, virtually any currently available off-the-shelf PCI based interface can be integrated into the LinkIP. See specifications for a list of interfaces currently supported. This modular, software-driven design allows the LinkIPs at each site to be configured and individually tailored for a wide variety of network applications



LinkIP configuration example

SCAN SPECTRUM ANALYZER

LinkSat's SCAN bandwidth manager utilizes an internal state-of-the-art digital FFT spectrum analyzer for bandwidth management. Each remote site's LinkIP is capable of autonomously making data circuit transmission and reception decisions based on monitored spectral activity. The analyzer has an optional graphical user interface that runs on a standard web browser, on an external PC or laptop, connected to the LinkIP's Ethernet port. The GUI has many unique features, such as click-and-drag zoom, click-and-type range control, vertical and horizontal line draw tools, and sample rate control for remote viewing via satellite or terrestrial connection. In addition to functioning as a bandwidth manager, the SCAN spectrum analyzer can be used for antenna alignment, level adjustments, carrier monitoring, and network troubleshooting.

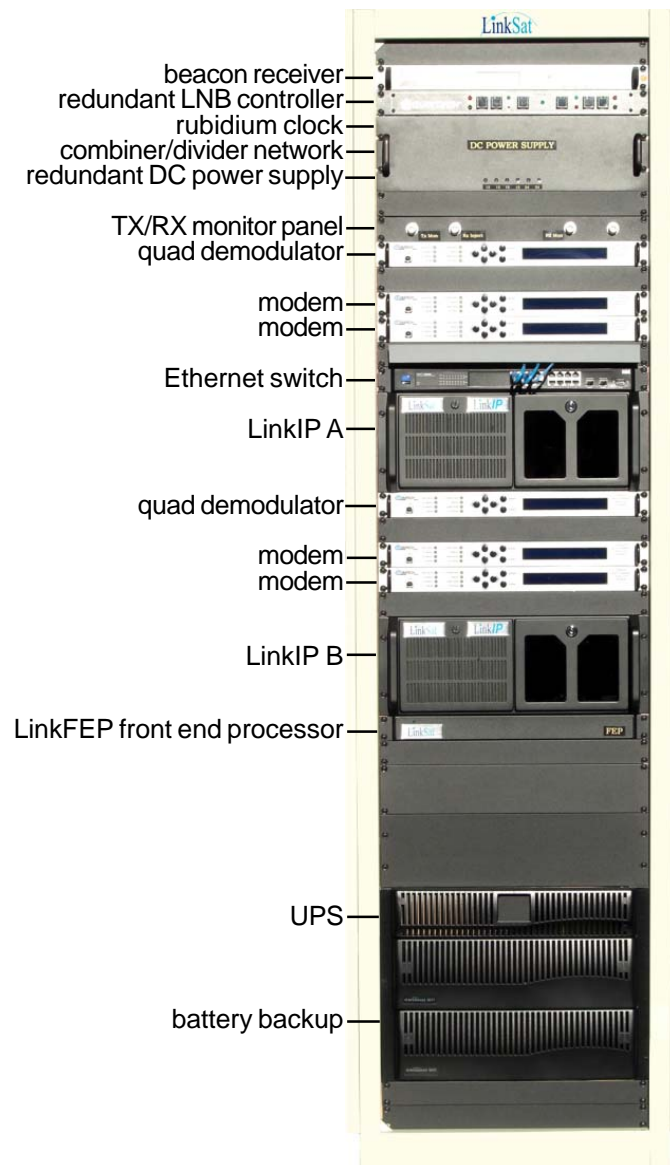


Spectrum Analyzer GUI Screen Shot

Telephony

- FXS / FXO Port Connector: RJ11 (4 and 8 port configurations), RJ21X (24 port configuration)
- T-1 / E-1 Port Connector: RJ-45
- VoIP Propocols: SIP, IAX, H.323, MGCP
- Codecs: G.711 (PCM), G.726 (ADPCM), G.729A, GSM
- Features (not complete list):

automated attendant	caller ID	overhead paging
call detail record	caller ID blocking	protocol conversion
call forward / busy	caller ID on call waiting	remote call pickup
call forward / no answer	conference bridging	remote office support
call monitoring	dial by name	route by caller ID
call parking	direct inward system access	transcoding
call queuing	distinctive ring	SMS messaging
call recording	do not disturb	three-way calling
call retrieval	fax transmit and receive	trunking
call routing	interactive voice response	VoIP gateways
call transfer	music on hold	voicemail



Network Management System

- Remote monitor and control of LinkIP and peripheral equipment over satellite link (WAN)
- Command-line interface (SSH, Telnet, Console)
- Customized GUIs available for NMS
- SNMP MIBs supported
- Optional LinkPS Proxy Server acts as database server and centralized network manager
- Optional LinkFEP Front End Processor allows peripheral earth station equipment (power amplifiers, LNBS, antenna controllers, etc) to be connected to LinkIP for centralized network M&C
- Remote uploading of software upgrades over satellite or via terrestrial connection

Custom Integrated Rack Systems

- Custom tailored, application specific subsystems
- Assembled, wired, and fully tested at LinkSat factory
- Optional Rubidium / GPS earth station precision (1×10^{-12}) frequency standard / network clock
- Custom combiner / divider shelves for RF and reference signals
- LinkDiversity™ uses tandem LinkIPs for data route diversity and equipment redundancy management
- Multiple modulator / demodulator support provides partial and full mesh remote connectivity
- LinkFEP™ front end processor provides peripheral earth station equipment connection (antenna control, tracking, power amplifier, LNB subsystems) to LinkIP for remote network monitor and control

Routing Protocols

- Static Routing
- Dynamic Routing: RIP, OSPF, BGP, IS-IS
- Multicast: IGMP, PIM, DVB-MPE

Encapsulations

- PPP, PPPoE, PPPoA Client & Server
- HDLC
- Frame Relay
- SoftCell ATM & IMA
- Serial: RS-232, RS-422, EIA-449, EIA-530
- Tunnelling: GRE, IPIP, CIPE, & L2TP

Security

- Data Encryption: 256-bit AES, DES, 3DES
- IPsec & SSL VPNs
- Secure Telnet (ssh v.2)
- NAT Firewall (1:1 & 1:many)

Traffic Monitor & Control

- QoS, ToS
- DiffServ
- Bandwidth Limiting
- Packet Filtering
- Port Forwarding
- Packet Processing by PVC
- Peer-to-peer Traffic Control
- Real Time Monitoring
- Local and Remote Monitoring

Server Services

- DHCP Client and Server
- NTP Clock Synchronization
- POP3 and SMTP

Physical Interface

- 1 On-board 10/100/1000 Ethernet Interface on CSA Bus
- Up to 12 LAN/WAN Plug-in Interfaces on PCI Bus
- Management Ports: Serial Console, Telnet, SSH

Dimensions

- 19" (17.8 cm) Wide
- 19.8" (48.3 cm) Deep
- 7" (17.8 cm) High (4 RU)

Power

- Dual Redundant, Hot Swappable
- 90 to 264 VAC, Autosensing
- Max Power Consumption: 300 Watts

Plug-in Interface Options

- 1 to 24 Port FXS/ FXO Interface (RJ11, RJ21X)
- 2-Port RS-422/EIA-530 - up to 10 mbps (HD-26)
- 1, 4, or 8 Port T-1/E-1 Interface (RJ45)
- ATM (E3/DS3 or OC3)
- E3/DS3 - up to 34/45 mbps (75 Ohm BNC)
- OC3 - up to 155 mbps (single or multimode fiber)
- ASI - up to 270 mbps (75 Ohm BNC)
- HSSI - up to 52 mbps (HD-50)
- 1 & 4 port 10/100 Ethernet Interfaces (RJ45)
- 1 & 2 port Gigabit Ethernet Interfaces (RJ45)

Satellite Modem Interface

- Standard Serial Data Interface Type: RS-422/449, EIA-530
- High Speed Data Interface Type: ASI
- Modem M&C Interface Type: RS-232, RS-485
- Modem M&C Interface Connector: DB-9 Male
- Modem Compatibility: LinkIP will interface with any current, standard modulator / demodulator (Advantech, Comtech EFData, Datum, Paradise)

Spectrum Analyzer

- Frequency Range: 950 to 2150 MHz
- RF Connector: Type F Female
- Instantaneous Bandwidth: 20 MHz per channel
- Response Time: 5 ms per 20 MHz segment
- Channels per card: 2
- Resolution Bandwidth: 4 kHz
- Display Access: RJ45 Ethernet port
- Display Type: Web Browser-based GUI

Data Compression

- Proprietary, in-line software compression engine
- Compresses headers, sub-headers, and payload
- Configurable per WAN port connection

Data Encryption

- On-board software and /or hardware engines
- 256-bit AES encryption standard
- DES, 3DES and others available
- Supports proprietary encryption engines
- Configurable per WAN port connection

Network Architectures Supported

- STAR (Hub-and-spoke)
- Partial and full mesh
- Multi-destination Full Duplex

note: specifications are subject to change without notice Rev. C_04/09