NX 64 Digital Radio Link

Moseley

The NX 64 Digital Radio Link...

THE MOSELEY NX 64 Digital Link is a spectrum efficient digital modem and radio offering a high performance, reliable and cost-effective alternative to leased lines and conventional analog radios.

Applications:

- *Last-mile tail circuits for VSAT/ISDN/ Fractional T1/CEPT-1*
- *Integrated single or multi-channel voice, fax, and data*
- *Compressed video for teleconference and security*
- *Transmission of high speed graphic data for CAD/CAM and inter-connection of LANs*
- *Rural radio extensions for single and multi-channel access systems*
- *High-speed SCADA, point-to-point and point-to-multipoint networks*
- *Cellular Base Station Interconnection*

Available in 335-512 MHz, 790-960 MHz, 1350-1535 MHz, and 2300-2500 MHz bands, the NX64 is capable of transmitting 16 kbps-512 kbps over distances up to 50 km.

Spectrum Scalability
The NX 64 is the only low speed digital radio of its kind that automatically scales its occupied spectrum according to the operational data rate.

This ability offers operators full network design flexibility and optimal use of limited frequencies.

Programmable Spectral Efficiency
The NX 64 can be configured to occupy 25, 50, or 100 kHz spectrum for every 64 kbps transmission. This allows operators to trade spectral efficiency for system gain.

Digital Transmission Advantages
As the result of the digital modulation schemes used in the NX 64, the radio can tolerate co-channel levels as high as 14 dB below the desired signal.

Additionally, digital modulation eliminates birdies and background chatter, enabling multi-hop transmission without signal degradation or the need for equalization.

The continuous phase modulation used in the NX 64 allows the use of external, non-linear amplifiers thereby extending transmission ranges.

Powerful Error Correction
To overcome industrial and other man-made impulse noise as well as other burst-mode interferences, powerful Reed-Solomon Forward Error Correction is available. Unfaded BER performance in excess of 10^{-11} offers unparalleled error-free performance.

Direct Digital Connectivity
The NX 64 eliminates the need for expensive modems and enables direct connection to Switched 56, fractional T1/E1/CEPT-1, and basic rate ISDN equipment.

Network Management
Extensive NMS features are available for the NX 64. Real-time on-line and off-line control along with analog and digital loopback are possible at both the local and remote terminals. Event and alarm history can be reported over dial-up circuits, the front panel, or the NMS host. EE-PROMs permit remote configuration.

Microprocessor control and menu driven operator panel facilitates user-friendly operation.

Available in 1425-1535, 790-960, and 335-512 MHz bands with 5 or 10 watt output.

Selectable data rate operation from 16 kbps to 512 kbps.

Selectable spectral efficiency of 1 and 2 bps/Hz allows tradeoff between system gain and occupied bandwith.

- *Menu-driven front panel cursor controls for easy operation*
- *Capable of monitoring four channels of external status and four channels of external telemetry inputs*
- *More than 100 test points and diagnostic indicators*
- *Fully rack-mountable (two units shown here with Moseley Transfer Panel)*

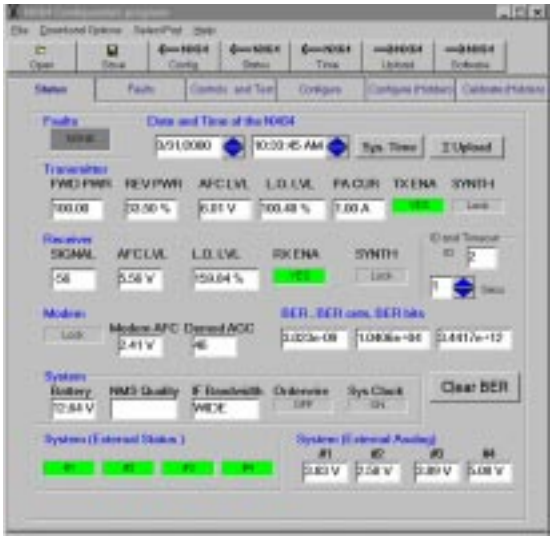
Standby Dimensions
Height 30cm/12.25in.
Width 43cm/17.3in.
Depth 47cm/19.0in.

NX 64 Dimensions
Height 13cm/5.25in.
Width 43cm/17.3in.
Depth 47cm/19.0in.

*The NX 64 equipment can be configured to accomodate **Space** and **Frequency,** as well as **Monitored Hot Standby**, **Warm Standby**, and **Cold Standby** operation.*

Network Management Feature

- *All parameters–frequency, data rate, modulation, clock options, loopback, etc.–are software configurable.*
- *Windows-based Moseley MMI software packages can be used for multi-site network monitoring.*



- *Preset configuration can be stored for later use. Full support for remote configuration via dial-up modem.*
- *Fault Alarm Log with Timestamp for fault diagnostics.*

Rear Panel

- *Available MUX for voice, fax, and data transmission up to 8 channels. Optional available orderwire channel (3.4 kHz)*
- *Compliant to world-wide power standards*

- *NMS port can be used for auxillary data channel*
- *Capable of controlling six external devices through built-in relays*

...The Ultimate Last Mile Connection.

All Digital Down Convertor
The NX 64 employs an all digital down convertor resulting in excellent adjacent channel selectivity and 70 dB of dynamic range.

The digital down convertor takes the 70 MHz IF signal, digitally down converts and FM demodulates the initial partial response data stream.

Up to 5 user-defined linear-phase FIR filters allow the radio to operate in channel bandwith from 12.5 kHz to 400 kHz. Special bandwiths can be downloaded into the NX 64 firmware through the Windows® based configuration program.

Service Channel
An optional built-in service channel that is available simultaneously with the composite data can be used for maintenance and signaling.

Supervisory Control
In addition to the extensive NMS features, as an option, the NX 64 allows for telecontrol of 4 status, 4 telemetry, and 6 command channels on each radio terminal.

Low Power Consumption
The NX 64's low power consumption allows cost-effective solar operation. Typically, the NX 64 consumes less than 45 watts (with standard 5 watt transmitter output and no internal multiplexer module installed).

Access
The NX 64 can transmit over the most difficult terrain: mountains, gulfs, rivers, and jungle areas where cable installation is not practical.

Security
The radio frequency, modulation, coding, and scrambler circuits in the NX 64 make casual interception difficult. Wireline and standard analog FM radios are much more susceptible to interception.

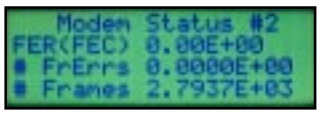
Proven Performance
With over 5,000 terminals in the field, the NX 64 is an industry standard for last-mile connectivity for cellular, utility, and private telecom operators.

Moseley
Based in Santa Barbara, California, Moseley designs, manufactures, and markets digital transmission systems for diversified telecommunication industries, and the radio and television broadcast industry.

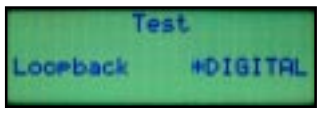
Moseley has more than 20,000 radio links and 5,000 Telecontrol Systems in service in over 120 countries. The company is actively represented in more than 60 countries.

Typical End Users

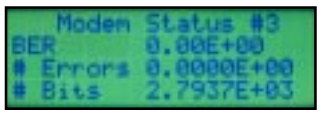
- *Cellular Operators*
- *Utilities*
- *Oil and Gas Pipelines*
- *VSAT-based networks*
- *Private Telecom networks*
- *Public Safety organizations*
- *National PTTs*
- *Internet Providers*
- *Broadcast networks*
- *Transportation organizations*
- *Security Companies*



Built-in Forward Error Correction and Frame Error Rate monitoring.



Extensive NMS capabilities including on-line and off-line control. Analog and Digital Loopback.



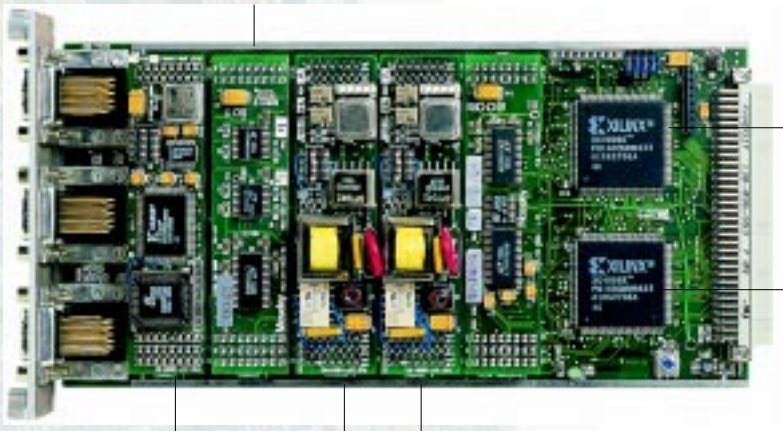
Built-in Bit Error monitor for tracking transmission quality.

Full support for hot and cold standby operation.

4 Port Intelligent Multiplexer

8kbps-2048 kbps high speed
synchronous data card -V.35, RS-449
(up to 512 kbps for use with the NX 64)

Independent Mux and
De-mux functions



300 bps-38.4 kbps low speed
asynchronous data card - RS-232

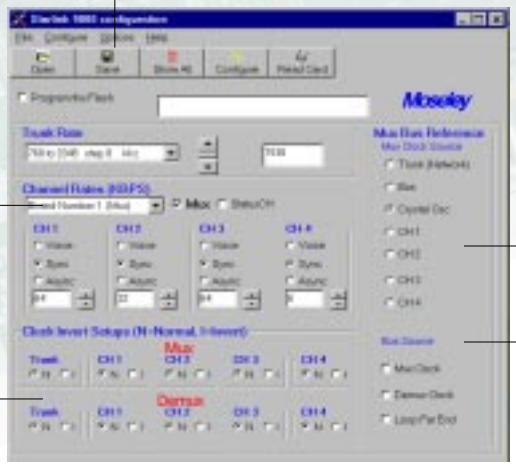
2/4-wire voice card; 16, 32, 64 kbps; E&M
(Consult factory for FXS, FXO)

NX 64 Internal Multiplexer

- *4 Port Multiplexer*
- *8 kbps resolution up to 2.048 Mbps*
- *Voice / Fax / Data / Program / Video*
- *Over / Under Framing*
- *Up to eight cards can deliver 32 channels*
- *Four User Specified Daughter Cards for Voice, Low and High Speed Data*
- *Provides and accepts Clocks*
- *Windows based Network Management*

Ports	*1 to 4 Inputs, Trunk Output*	**NMS Port**	*Used for setup*
Resolution	*200 to 8000 bps, Trunk Rate Dependent*	**Clocks**	*Internal, Derived, External Port*
Low Speed	*RS232 Interface Selectable 300 bps - 38,400 bps*	**Aggregate Rate**	*Up to 2.048 Mbps Radio limited to 512/768 kbps*
High Speed	*Interface V.11, V.35, RS449, EIA 530, G703 Selectable 800 bps to 2048 kbps*	**Voice**	*RJ11 Interface Selectable G711 (64 kbps), G721 (32 kbps), (16 kbps) FXS, FXO or 2W/4W E&M External Ringer Option 0 dBm in/out*

Various network configurations can be stored for later use



Supports up to eight personality modules

Full clock source flexibility

Full duplex configuration

Clock Edge Flexibility

Specifications

System

Frequency	335-512, 790-960, 1425-1525, 2300-2500 MHz, fully synthesized. Consult factory for other frequencies.
Tx-Rx Spacing	Minimum 5 MHz. Duplexer limited. Built-in duplexer, except for spacing. < 9 MHz in 790-960 MHz band. <40 MHz in 1500 MHz band.
Step Size	Programmable 2.5 to 25 kHz.
Data Rates	16 kbps; 19.2 kbps; 32 kbps; 64 kbps; 128 kbps; 192 kbps; 256 kbps; 384 kbps; and 512 kbps. Consult factory for others.
Interface	V.35, RS-422, or V.11, G703 for 64/128 kbps.
Spectral Efficiency	Selectable 1 bps/Hz (Low efficiency) to 2 bps/Hz (High efficiency).
RTS/CTS Delay	1 ms to 255 ms programmable.
Temperature Range	Full performance: 0° to 50° C, Operational: -30° to 65° C.
Power Source	-24 or -48 VDC or 110/220 VAC or 12VDC.
Diagnostics	Local and remote loopback. Local and remote status and control. Monitoring of BER, RSL, Alarms, Status, and Historical information.

Options

Aux Channel	NMS port
Command Outputs	6 channels. Relay 50V -2A
Status Inputs	4 channels. Optically isolated input.
Analog Inputs	4 channels. Resolution: 8 bits.
Network Management System (NMS)	On-line and off-line. Full routing and configuration control. Local or remote via configured data path.
Orderwire	Selective calling with 2-wire DTMF subscriber loop interface.

Transmitter

Power Out at TX Output	5 Watts (37 dBm), 1 Watt at 1500 MHz, +20dBm , 2 GHz. Option 9 Watts (335-512 MHz), 5 Watts (1500 MHz), 1 Watt (2 GHz).
Connector Type	50 ohm type N female.
Frequency Stability	2.5 ppm, 1.5 ppm typical, 1.0 ppm optional.
Spurious	60 dB below carrier at Tx output. 70 dB below carrier after duplexer. Typical -60dBm.
Type of Modulation	Continuous phase digital modulator.

Receiver

Type of Receiver	Digital down conversion (Optional) First IF 70 MHz.
Image Rejection	80 dB minimum.
Connector Type	50 ohm type N female.
Demodulation	Baseband non-coherent discriminator detection. Data coherent clock recovery.
Error Correction	Reed-Solomon T=10 (Optional)
Frequency Stability	2.5 ppm, typical 1.5 ppm, 1.0 ppm optional.
BER Threshold	1×10^{-3} at RX Input. 1×10^{-6} 3 dB less.

Data Rate	32 kbps	64 kbps	128 kbps	256 kbps	384 kbps	512 kbps
Rx Input (dBm) Low Efficency	-104	-101	-98	-95	-93	*Contact Factory*
Channel B.W. Low Efficiency	50kHz	100kHz	200kHz	400kHz	400kHz	
Rx Input (dBm) High Efficiency	-96	-93	-90	-87	-84*	-84
Channel B.W. High Efficiency	25kHz	50kHz	100kHz	200kHz	200kHz	400kHz

**Threshold less for FCC mask*
**Branching losses = 4dB*

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Moseley Associates Incorporated • 111 Castilian Drive • Santa Barbara, CA 93117-3093 • **Phone** (805) 968-9621 • **Fax** (805) 685-9638 • **Web** http://www.moseleysb.com