

Mercury 14K

Broadband Echo Cancellation and Voice Quality System with Studio Sound

The NMS Communications Mercury™ 14K voice quality system with Studio Sound® dramatically improves the voice quality of long distance and wireless (CDMA, TDMA, and GSM) calls. Mercury 14K accommodates up to 21 STS-1/DS3 or 7 OC-3/STM-1 broadband facility terminations per shelf (incremental growth on a per STS-1/DS3 or OC-3/STM-1 facility termination basis). Furthermore, up to 5 shelves can be mounted in a seismic bay for a total of 105 STS-1/DS3 or 35 OC-3/STM-1 facility terminations. In addition, Mercury 14K also supports trans-multiplexing, which converts electrical STS-1/DS3 signals to OC-3 optical format. And our state-of-the-art Studio Sound technology delivers noise compensation, noise reduction, and automatic gain control for consistently clear calls, even in the noisiest environments. Mercury 14K provides all the features required for seamless, distortion-free transmission, including:



Mercury 14K High-Density Broadband Voice Quality System

- **High capacity:** Accommodates up to 14,112 equivalent DS0/E0 channels per shelf
- **Echo cancellation:** Eliminates both electrical and acoustic echo in any long distance or wireless network application
- **Noise reduction and noise compensation:** Dynamically adapts to changing noise in the environment to improve call quality using Studio Sound features
- **User-friendly management:** Provides a graphical user interface (GUI) for ease in performing maintenance, monitoring, and provisioning tasks

Mercury 14K with Studio Sound has the world's most comprehensive suite of voice quality enhancing features for mobile communications. It's the only technology that pairs noise reduction and noise compensation for crystal clear phone calls — providing superior voice quality for your most demanding network needs.

Technical Features and Specifications

Echo Cancellation Features

- **Convergence Speed:** Industry's fastest; revolutionary algorithm employing Continuously Adaptive Gain, accommodating >25 dB ERLE in less than 1 second with G.168 composite source signal; Mercury 14K exceeds G.168 minimum requirement (20 dB of ERLE in 1 second) by a notable margin
- **Convergence Time:** Less than 50 ms on white noise for combined ERL and ERLE of 35 dB
- **Convergence Stability:** Most stable performance in the industry; does not diverge under low ERL and wide dispersion hybrids; no divergence during double-talk
- **Echo Return Loss Enhancement (ERLE):** >35 dB with non-linear processor (NLP) disabled with G.168 composite source signal; >65 dB with NLP enabled
- **Residual Echo Control:** Soft non-linear processing via gradual loss insertion for minimizing clipping of speech
- **Comfort Noise:** Spectrum noise matching
- **Near End Speech Detection:** Patented intelligent double talk detector for optimal performance under varying speech power levels
- **Audio Transparency:** Prevents clipping of background music and music-on-hold during speech pauses
- **Hybrid Echo Tail Length Capacity:** Up to 128 ms standard with the provisional addition of an up to 8-second flat delay window

- **Adaptive Flat Delay (AFD):** Automatically adapts to changes in the echo path delay for echo removal over extreme distances; extends the standard tail window up to an additional 8 seconds
- **Echo Cancellation (EC) Signal Processing Delay:** Transmit channel <0.6 ms; receive channel <0.25 ms
- **Acoustic Echo Control (AEC):** Better than 18 dB of non-linear elimination of echo introduced by acoustic feedback

Studio Sound Features

- **Noise Reduction (NR):** Up to 20 dB, provisionable; noise reduced consistently throughout speech and speech pauses with negligible voice degradation; Mercury 14K NR performance exceeds the emerging ITU-T G.160 recommended thresholds by a notable margin
- **Noise Compensation (NC):** Up to 12 dB of listening comfort (dynamic adaptive gain to background noise)

- **Automatic Gain Control (AGC):** Bi-directional; either positive or negative smooth speech level adjustments for optimal listening
- **Dynamic Speech Restoration (DSR):** Enhances the voice quality of mobile-to-mobile calls by compensating for voice degradation encountered during the coding/decoding process; DSR is a less expensive solution than Tandem Free Operation (TFO) because it does not require the network provider to install new equipment
- **Improved Discontinuous Transmission (DTX):** Customized Noise Reduction voice quality enhancements for networks that use GSM DTX-enabled handsets
- **Improved Enhanced Variable Rate Codec (EVRC):** Special algorithms provide additional Noise Compensation voice quality enhancements for networks that use EVRC-enabled handsets

Network Interfaces

| | SONET/DS3 | | | SDH |
|--------------------|--|--|--|--|
| | STS-1 | DS3 | OC-3 | STM-1 (optical) |
| Interface | Software selectable Line rate: 51.844 Mbps | Software selectable Line rate: 44.736 Mbps | Software selectable Line rate: 155.52 Mbps | Software selectable Line rate: 155.52 Mbps |
| Line Coding | B3ZS | B3ZS | NRZ | B3ZS |
| Impedance | 75 Ω coaxial cable (electrical) | 75 Ω coaxial cable (electrical) | LC connector (optical) | LC connector (optical) |

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Management Features

- **Network Analysis System™:** Gives telecom operators the ability to monitor and analyze the performance of their network via interaction with NMS echo cancellation and voice quality enhancement systems; network performance parameters are collected, processed, and can be displayed in a variety of report formats that allow operators to tune their network for optimum performance and identify potential problems
- **Remote Management System:** Remote OS 10BASE-T Ethernet interface uses standard TL1 messages over TCP/IP
- **Software Upgrade:** Software upgrades and feature enhancements are installed via a user friendly GUI

Maintenance and Administration

- **Timing:** Software selectable; external T1/E1 BITS or Line Facility signal sources
- **Equipment Alarm Indications:** Audible and visual critical, major, and minor
- **Diagnostics:** In-service and out-of-service
- **Control and Communications:** EIA/TIA-561 serial interface for external PC COM port; Ethernet (10Base-T) interface for remote OS
- **Fault Recovery:** Automatic Protection Switching (APS) preserves service and functionality; provides 1:n APS for STS-1/DS3 facility terminations, 1+1 APS for OC-3/STM-1 facility terminations, and 1+1 APS for shelf synchronization functions

Network and Standards Capability

- **Standards Compliance:** Full compliance with ITU-T G.164, G.165, G.167, G.168 (2000), G.169; ETSI 101 504; TIA/EIA IS-839
- **Signaling:** Common Channel Signaling (SS7); Channel Associated Signaling (CAS); C5 Signaling

Disabling Tones:

- ITU-T No. 6 and No. 7 signaling (2,000 Hz voice path assurance [VPA] tone)
- ITU-T No. 5 signaling (2,400 Hz and 2,600 Hz tone sequence)
- G.164 and G.165 modem/fax (2,100 Hz tone with and without phase reversal)
- User configurable tones for special network applications (e.g., 2,225 Hz, etc.)

Tandem Free Operation a.k.a Vocoder

Bypass Compatible: TFO allows the transported speech signal to eliminate unnecessary transcoding steps, thereby removing voice quality degradation

Data Communications Compatibility:

CDMA and GSM data transparency including V.110, High Speed Circuit Switched Data (HSCSD), modems, and Inter System Link Protocol (ISLP)

Physical, Electrical, and Environmental Characteristics

Shelf dimensions

| | |
|--|--|
| Height | 250 mm (9.84 in) |
| Width | 593 mm (23.33 in) including mounting brackets |
| Depth | 537 mm (21.1 in) without cables |
| Weight (fully loaded shelf) | 34.1 kg (75 lb) |
| Capacity | Up to 21 STS-1/DS3s or 7 OC-3s per shelf (588 equivalent DS1s) Up to 7 STM-10s per shelf (441 equivalent E1s) |
| Power consumption per timeslot/channel (typical) | 37mW (note: cooling fans required) |
| Power supply input voltage | -36 to -72 VDC |
| Fusing | 15 A at 36 V (low line level) |
| Operating ambient temperature | +1 °C to +40 °C continuous; -5 °C to +50 °C short-term |
| Operating relative humidity | 5% to 85% non-condensing continuous; 5% to 90% short-term |
| Mean Time Between Failures (MTBF) | 42 years |
| Service availability | Greater than 99.999% |

Seismic network bay dimensions

| | |
|---------------------------|---|
| Height | 2,133 mm (84 in) |
| Width | 660 mm (25.9 in) |
| Depth | 565 mm (22.3 in) including shelf, with cables |
| Weight (fully loaded bay) | 251 kg (552 lb) |
| Shelves per bay | Up to 5 |



NMS Communications

100 Crossing Boulevard
Framingham, MA 01702
Tel: +1 508 271 1000
Tel: +1 800 533 6120
Fax: +1 508 271 1300
Email: info@nmss.com

Immeuble Péricle's
144, avenue Roger Salengro
92370 Chaville, France
Tel: 33 (0) 1 41 15 35 00
Tel: 33 (0) 1 41 15 35 99
Fax: 33 (0) 1 41 15 35 99
Email: info@nmss.com

1815-16 Concordia Plaza
1 Science Museum Road
Tsim Sha Tsui East
Kowloon, Hong Kong
Tel: +852 2926 1820
Fax: +852 2620 5600
Email: info@nmss.com

NMS also has offices throughout North America, Europe, and Asia.

Visit the NMS web site for a complete listing: www.nmscommunications.com

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A Complete Line of Voice Quality Systems

NMS voice quality systems are complete, ready-to-install solutions deployed in central offices and mobile switching centers (MSCs) to achieve consistently clear voice quality. These offerings, deployed by over 100 of the world's leading service providers in today's telecom and packet-based networks, include market-leading voice quality systems acquired from Lucent Technologies. Many of these systems were designed by the engineers who invented echo cancellation technology at Bell Labs, the predecessor to Lucent. These leading-edge products connect to the widest variety of network interfaces, embed custom ASIC technology, offer the highest density at the lowest cost, ensure the highest quality voice in the noisiest settings through the patented Studio Sound feature, and are available with comprehensive support and services. In addition to Mercury 14K, offerings in this product family include:

- **Sonata III** narrow bay (19" rack mount) E1 voice quality system
- **Sonata 100** high-density T1 or E1 voice quality system
- **Mercury** broadband SONET/DS3, SDH voice quality system