

Tellabs® 3100 Voice Quality Enhancement (VQE)

High-Density Echo Canceller Improves Voice Quality and Enhances Network Performance

Overview

Tellabs echo cancellation and VQE solutions help more than 300 customers in 70 countries deliver superior voice quality in long-distance and wireless networks. Tellabs has the world's largest installed base of echo cancellation circuits. Our customers rely on our products to eliminate echo and enhance call quality. Tellabs VQE solutions enable service providers around the world to meet the high call quality standards their customers expect.

The Tellabs 3100 VQE system is a high-density T1 or E1 echo control and VQE solution that improves voice quality and enhances network performance for digital wireless and long-distance service providers. The Tellabs 3100 VQE system provides optimal call quality and dependable data and facsimile transmission within a small footprint, which helps carriers improve network efficiency, installation time and operating costs. The Tellabs 3100 VQE system is available in unidirectional and bidirectional configurations for both wireline and wireless applications to address the full range of echo control and voice quality enhancement needs.

Features and Benefits

High-Performance Voice Processor (HPVP) technology provides superior voice quality throughout all customer locations — large and small — while minimizing ongoing support costs

The Tellabs 3100 VQE system incorporates Tellabs' revolutionary HPVP technology. HPVP technology combines the features of a custom application-specific integrated circuit (ASIC) with a fully programmable digital signal processor (DSP) and integrated firmware. The unique combination of hardware and firmware enables Tellabs to devote more processing power to our echo cancellation and VQE algorithms than is possible with a general-purpose device, while preserving the flexibility to accommodate new algorithm advances via downloadable firmware.

Tellabs' suite of VQE features maximizes speech clarity and intelligibility, and contains the following features:

Tellabs Hybrid Echo Control (THC) — Provides fast and stable hybrid echo cancellation performance across a wide range of environmental conditions including clean speech, unbalanced speech levels, and tandem echo canceller and doubletalk (simultaneous conversation) situations. THC's superior performance ensures excellent voice quality right from the very start of a call, during a call transfer and wireless hand-over, and after abrupt changes in network routing. As you would expect from Tellabs, the supplier with the highest number of installed echo cancellation circuits, the Tellabs 3100 VQE system exceeds the ITU-T G.165 and G.168 (2002) recommendations for superior echo canceller performance.

Tellabs Acoustic Control (TAC) — Provides protection from acoustic echo generated from wireless handsets and hands-free kits, while simultaneously minimizing clipping and enhancing performance in doubletalk situations. Echo, whether hybrid or acoustic, is an unwanted impairment in telephone conversation. As handsets have become smaller with many more features and hands-free alternatives, Tellabs has seen the prevalence of acoustic echo in wireless networks increase, with a corresponding increase in the demand for a network-based acoustic echo solution.

Tellabs Noise Reduction (TNR) — Automatically reduces background noise typically found in wireless environments, further improving call intelligibility. Recent enhancements to TNR improve subjective performance by quickly and dynamically adjusting the degree of noise reduction in various background noise environments without introducing significant delay (< 7 ms), which could compromise overall performance. In high background noise environments, TNR intelligently turns on background noise reduction capabilities to reduce noise. In low background noise environments, TNR dynamically limits the amount of background noise reduction that is performed. The dynamic capability of TNR helps prevent a subscriber's conversation from being cut off or muted, which can happen when background noise conditions are constantly changing.

Tellabs Adaptive Gain (TAG) — Automatically adjusts speech levels heard by mobile subscribers in noisy environments, making it unnecessary to raise the volume level on the mobile phone or block out the noise by putting your hand over your ear. TAG also enhances the spectral content of the signal, emphasizing speech over any background noise that is embedded in the speech path and enabling mobile subscribers to more clearly hear the person on the other end of the call.

Tellabs Level Control (TLC) — Adjusts speech levels to the optimal level for the network, lowering levels that are too high to prevent further distortion and compensating for levels that are too low while preserving conversational dynamics. As a result, speech clarity and intelligibility are substantially improved by maintaining consistent levels during the entire call. The problem of voice level variations has increased because of more multi-vendor interconnected networks, making Tellabs TLC an essential part of your VQE solution.

Higher density helps improve network efficiency and reduces operating costs.

The Tellabs 3100 VQE system can accommodate up to 480 T1 or E1 trunks in a seven-foot bay, allowing carriers to support a higher density of trunks in a smaller footprint.

The 23-inch ANSI shelf has the capacity for 80 T1 or E1 trunks (480 per rack). The 19-inch ANSI shelf and the front connector ETSI shelf have the capacity for 64 trunks per shelf. A seven-foot bay holds 6 ANSI shelves (384 E1s) or 4 ETSI shelves (256 E1s). This higher density configuration helps improve network efficiency and installation time and reduces operating costs, making it the right solution in today's competitive marketplace. The Tellabs 3100M VQE system provides a cost-effective means for supporting smaller applications.

Configuration and alarm management and control can be handled remotely to minimize operations support costs.

The Tellabs 3100 VQE can be easily monitored and provisioned, locally or remotely, with the Tellabs® 3105 Craft Station, a user-friendly, graphical user interface (GUI) based software application that can control individual T1/E1s or an entire shelf. The Tellabs 3105 Craft Station enables network operators to quickly and accurately configure or view echo canceller parameters and alarm status information remotely for all customer locations, saving time and resources. The network-based Tellabs® 3190 manager (formerly Tel/mor® EMS) is available as an option to support centralized configuration and monitoring of a distributed network of Tellabs 3100 VQE systems. Another option available on the Tellabs 3100 VQE system is the ability to send alarm traps to a customer's network management system using a simple network management protocol (SNMP) format for ease of integration with a customer's existing alarm management system.

Specifications

Echo Cancellation

- Echo Return Loss Enhancement (ERLE)
- 35 dB minimum with an input level of -10 dBm0 and 6 dB ERL (NLP disabled) when tested with white noise
- Endpath Delay Processing
- Hybrid echo: User selectable 64 ms or 128 ms. Extendable via Tellabs® NetReach®, which moves the processing window by as much as 992 ms
- Acoustic echo: 150–300 ms

Physical Characteristics

Footprint Dimensions

19-inch ANSI (w/o mounting ears)

- Height: 266 mm (10.5 in.) (6 RU)
- Width: 432 mm (17 in.)
- Depth: 279 mm (11 in.)

23-inch ANSI (w/o mounting ears)

- Height: 266 mm (10.5 in.) (6 RU)
- Width: 533 mm (21 in.)
- Depth: 279 mm (11 in.)

Minimum Echo Return Loss (ERL)

- 0 dB, automatically set

Weighted Acoustic Echo Path Loss (WAEPL)

- 25 or 35 dB, user selectable

Convergence Time

- <50 ms for combined ERL and ERLE of 35 dB

Input Dynamic Range

- +3 dBm0 to -65 dBm0 in compliance with revised ITU-T G.165 and G.168 (2002)

Data Tone Disable

- 2,100 Hz per ITU-T G.164 or 2,100 Hz with two-phase reversals per ITU-T G.165 and G.168 (2000)

Signaling System Support

- T1: Supports all common idle codes as well as GSM data format; compatible with all forms of signaling, including CCIS, FXO, FXS and E&M selectable
- E1: Supports all common idle codes as well as GSM data, HSCSD up to 4:4 and TFO message format. Timeslot 16 may be configured for channel-associated signaling (A, B, C or D bit detection), clear 64 kbps data/common channel signaling or the 31st voice channel (with echo cancellation).

Signal-Processing Delay

- Send channel:
 - Basic echo cancellation: <500 μs
 - Echo cancellation with TLC: <550 μs
- Receive channel (bi-directional wireline):
 - Basic echo cancellation: <500 μs
 - Echo cancellation with TLC: <550 μs
- Receive channel (wireless applications):
 - Without noise reduction: _250 μs
 - With Tellabs Noise Reduction: <7 ms

Maintenance and Administration

Configuration Management

- Tellabs 3105 Craft Station software
- Tellabs 3190 manager software (optional)
- Alarm Indication and Management
 - Normally open and normally closed relay contacts are available for critical, major and minor alarms
 - Alarm status is available via the Tellabs 3105 Craft Station
 - Alarm status is available via Tellabs 3190 manager (optional)

- Alarm notification via SNMP alarm traps (optional)
- Alarm synchronization via network timing protocol (NTP — optional)
- ETSI Shelf (w/o Mounting Ears)
- Height: 437 mm (17.5 in.) (10 RU)
- Width: 432 mm (17 in.)
- Depth: 266 mm (9.75 in.)

BNC Adapter Panel

- Height: 265 mm (10.4 in)
- Width: 447.5 mm (17.6 in)
- Depth: Extends 105.7 mm (4.6 in) beyond Tellabs chassis
- Mounting ears available for installation into 19- and 23-inch equipment racks

Weight (without NCM and ECMs)

- 19-inch ANSI shelf: 8.9 kg (19.6 lb)
- 23-inch ANSI shelf: 11.1 kg (23.9 lb)
- ETSI shelf: 9.9 kg (21.9 lb)
- BNC adapter panel: 6.8 kg (15.1 lb)

Capacity

- 19-inch shelf: 64 bi-directional trunks per shelf (384 per rack)
- 23-inch shelf: 80 bi-directional trunks per shelf (480 per rack)
- ETSI shelf: 64 bi-directional trunks per shelf (256 per rack)

Connection

- ANSI shelves: Rear access 50-pin telco connectors, 100/120 Ohm balanced; BNC, 75 Ohm unbalanced adapter panel available for 19-inch shelf
- ETSI shelf: Front access 25-pin D-sub connectors

Power Input

- -36 to -75 V DC, positive ground referenced

Network Interfaces

Interfaces

- T1: Complies with Bell Pubs. 43802, CB119 and 62411
- E1: Complies with ITU-T G.703, G.711 and G.712 for PCM transmissions; ITU-T G.732 for PCM alarm conditions and consequent actions; G.823 and TBR13 for input jitter tolerance and transfer

Message Signal Format

- T1: 1.544 Mbps for 24 channels with 8-bit μ -law PCM encoding
- E1: 2.048 Mbps for 30/31 64 kbps voice channels with 8-bit A-law or μ -law (selectable) PCM encoding per ITU-T G.711

Bit Rate

- T1: 1.544 Mbps \pm 130 ppm
- E1: 2.048 Mbps \pm 50 ppm per ITU-T G.703

Alarm Supervision

- Most critical, major, minor and warning alarms are user-programmable via the Tellabs 3105 Craft Station and the optional Tellabs 3190 manager

Performance Management

- Tellabs® 3150 Performance Probe (optional)

Control and Communication

- Local access via serial craft port interface and remote access via Ethernet LAN using the Tellabs 3105 Craft Station software and/or Tellabs 3190 manager

Impedance

- T1: 100 Ohm balanced
- E1: Switch-selectable 120 Ohm balanced or 75 Ohm unbalanced

Ordering and Availability

For more information, please contact your local Tellabs sales representative, local Tellabs sales office or see www.tellabs.com.

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