Fortissimo
DECT HD Load Generator
Fortissimo is the world’s smallest, high-capacity network load generation product designed to test and qualify the voice and packet network.

Fortissimo speeds up your system integration, functional and performance testing at an unbeatable price/performance ratio.

Fortissimo is designed to place calls to or receive calls from other Allegro, Fortissimo or AM3-QoS units to provide a complete test system of call generation and Quality of Service (QoS) measurements.

The Fortissimo family of network load generators represents a significant technological advancement in high-capacity call generation. Designed to meet the requirements of today’s developer of both legacy and new generation switches including hardware and software modules. Operators focusing on system integration or revenue and quality assurance will also enjoy the functionality, ergonomics and costs of this solution. The Fortissimo packs the power of 192 simultaneous SIP/MGCP calls, up to 28 x T1/E1 spans, 1 DS3, 1 OC3/STM-1 or 100 x analog POTS (loop/ground) circuits in a unit that takes up 1 rack unit of space.

The Fortissimo comes in multiple versions, each with the ability to support Ameritec’s industry leading QoS measurement package:

- Up to 100 2-wire analog loop/ground lines
- 1 DS3 circuit supporting CAS, PRI, SS7, GR303 signaling
- Up to 28 T1/E1 circuits
- Up to 192 SIP/MGCP circuits
- 1 OC3/STM-1 circuit
- Up to 50 4-wire handset/headset circuits
- Up to 32 FAX circuits
- Up to 20 DECT HD circuits
DECT HD Load Generator

- Ameritec’s latest addition to the Fortissimo product family is the Fortissimo DECT HD Load Generator. DECT is Digital Enhanced Cordless Technology and represents the latest in cordless telephone capabilities. These telephones are paired with a base station and offer superior call quality as calls can be configured for high definition functionality. DECT also supports a number of features not found in wired telephones such as the ability to perform intercom calling.

DECT HD Applications

- Load Generation
- Cable Telephony
- Automated Testing
- Quality of Service Testing
- Calling Feature Testing
- Network Testing
- Wideband vs. Voiceband Testing

High Definition (Wideband) Testing

- A unique feature of the Fortissimo DECT HD Load Generator is its ability to test wideband voice, or High Definition (HD) Voice. Testing is no longer limited to the narrow-band of 300 Hz to 3400 Hz as this product can test the full wideband range up to 7000 Hz.

Supports World-wide DECT Standards

- Europe 1880 – 1900 MHz
- LATAM 1910 – 1930 MHz
- N. America 1920 – 1930 MHz
- Taiwan 1880 – 1895 MHz

DECT Features Supported (Base Station Dependent)

- Paging
- Caller ID (Name and Number)
- Registration
- Intercom Calling
- External Calling
- Wideband (G.722)
- Narrowband (G.726)
- DTMF Dialing
- Hook Flash / Recall
- Distinctive Ringing Using Ring Pattern

Operation

The Fortissimo products allow the developer to simulate various types of network traffic on a large number of spans or lines without having to consume a large amount of rack space. Maintaining full testing flexibility on a large line count is the premise behind Fortissimo. Each Fortissimo is controlled via a PC workstation over a 10/100 MB Ethernet port and utilizes a Conductor graphical user interface (GUI) that is intuitive and easy to use. Alternately, a command set option allows the user to remotely control units via a Telnet session for test automation applications. Full scripting of call scenarios is accommodated and manipulation of signaling protocols is provided to allow the user to fully test and debug equipment under test before releasing product to the next stage of development. Audio output is provided on the Fortissimo to complete the testing phase so that a developer can further verify the integrity of any call scenario.

Measurements

Long known for providing the most comprehensive set of measurements in the call generation industry, Ameritec has incorporated into every Fortissimo product the ability to simultaneously measure traditional call statistics such as calls originated and completed as well as a comprehensive set of QoS measurements designed to provide packet quality and voice quality scoring. This complete set of measurements provides the developer with PSTN to packet network correlation scores. The ability to utilize our GoldenVoice technology to measure packet loss, jitter, signal to noise ratio, clipping and delay while simultaneously providing R-factor, GMOS, G-PSQM, G-PESQ, and G-PESQ-LQ scoring on all lines makes this product an invaluable development tool.

Enhanced Features

Synchronized call scripts provide the ability to test complex call scenarios such as A->B, A->B;B->A, conference calling, call waiting, etc. Full wideband audio testing allows the Fortissimo to ensure that High Definition (HD) voice quality is operational. Additionally, the Fortissimo DECT HD Load Generator allows the user to control the transmit power to simulate distance from the base station.

Configuration

Upon power up, each Fortissimo prompts the user to recall previously stored test configurations from the PC. This includes the type of call programs that the user desires to run and any parameter settings that are required for a specific test. At the completion of any test, the user is prompted to store the unit’s configuration so that it may later be retrieved to verify test integrity or re-run a previous test. Virtually, an unlimited number of these configurations can be stored on the workstation for easy recall.

Performance

With the Fortissimo the user gets both high capacity call generation and high performance. Utilizing independent resources, each Fortissimo can generate as many calls as your equipment can support. The Fortissimo can configure nearly every parameter associated with the generation or answering of a call and therefore it is possible to test for load related issues as well as fundamental integrity issues. Additionally, multiple Fortissimo units can be used in a rack to increase call volumes without significantly increasing your investment.
Conductor View of DECT Line Status

<table>
<thead>
<tr>
<th>Unit Status</th>
<th>Line 9</th>
<th>Total errors: 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>External outgoing talk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **RF Module is not configured in the script**
- **RF Module is not registered with a base**
- **RF Module is registered with a base but the unit is not activated**
- **RF Module is searching for its base (flashing dark blue and white)**
- **RF Module is idle (synchronized with its base, but not running a test)**
- **RF Module is on-hook while running a test**
- **RF Module is off-hook originating a call**
- **RF Module is off-hook terminating a call**
- **Current call on RF module has had an error**
- **Current originating call on RF module is running without error, a previous call had an error**
- **Current terminating call on RF module is running without error, a previous call had an error**
- **RF Module is on-hook, a previous call had an error**
- **RF Module idle or on-hook is being paged (flashing module icon and dark gray)**

 Hovering the cursor over a Module shows the current operational state (if no errors) or the last error.
Typical DECT Call Flow Diagrams

Single extension per base
This is the case where each Line (RF Module) is registered to a different base station. This is the simplest case because no script synchronization is required. An example test setup is shown below:

Intercom
This is the case where Lines (RF Module) are registered with the same base station and will call each other using intercom mode. On the origination side lines must be synchronized so only one line can originate at a time. The originating line can specify which extension to call so only a single terminating line will be alerted. An example test setup is shown below:

Multiple extensions per base
This is the case where more than one Line (RF Module) is registered to a base station. If more than one line in the group is running an originating script they must be synchronized so only one line will originate at a time. For an incoming call, the base station will alert all lines in the group (originators and terminators). If the group has multiple terminators then the scripts must be synchronized so only one line will answer the call. An example test setup is shown below:
### General Characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User Interface</strong></td>
<td>Windows XP, Vista based GUI</td>
</tr>
<tr>
<td><strong>Ethernet Port</strong></td>
<td>One RJ45 connector and two LED indicators per network interface</td>
</tr>
<tr>
<td></td>
<td>10/100 BaseT interface Complies with IEEE 802.3</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>17” Wide x 1.75” High x 15” Deep</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>90 – 264 VAC, 47 to 65 Hz</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>12 Pounds (5.4kg)</td>
</tr>
</tbody>
</table>

### Call Programs and Scripts

**Features**
- Commonly used scripts supplied with unit
- Scripts created and downloaded from workstation or PC

### System

**Capacity**
20 lines per unit, SMA connections

**Call Volume**
Typically 500 confirmed calls per hour per line (DTMF dialing, tone ID confirmation, 2 unpaired lines)

**Line Types**
DECT HD

**Frequency Bands Supported**
- Europe: 1880 – 1900 MHz
- LATAM: 1910 – 1930 MHz
- North America (UPCS): 1920 – 1930 MHz
- Taiwan: 1880 – 1896 MHz

**Codecs Supported**
G.722 Wideband, G.726

**DECT Specification**
GAP ETSI EN 300 444 compliant

### Voice Channel Functions

**Detectors**
Tone detectors are based on digital signal processors (DSP) 1 per channel

**Call Progress Detectors**
One detector per line
- Detects dial tone, busy, reorder, ring, ringback, supervision

**Path Confirmation**
One receiver per line
- Accuracy: 1%, +/- 10 Hz

**Single Frequency Tone Generator**
64 Selectable tones

### Voice over Packet

**Voice Path Confirmation**
GoldenVoice signal designed to pass through vocoder

**Packet Drop Out Count**
Count lost packets for frame sizes of 5, 10, 15, 20, 30, 40 and 100 ms

**Measure Delay**
Round trip delay +/- 10 ms resolution
- One way delay +/- 5 ms resolution

**Measure Clipping**
Peak and average clipping of standard reference with +/- 5 ms accuracy

**Jitter**
Peak and average jitter of standard reference with +/- 5 ms accuracy

**SNR**
Average and maximum SNR received from 0 to 39 dB

**Signal Energy**
Average and maximum GoldenVoice energy received (0 to –50 dBm)

**Spurious Energy**
Maximum non-GoldenVoice energy (0 to –50 dBm)

**Total Energy**
Average and maximum GoldenVoice energy plus extraneous noise received (0 to –50 dBm)

**GoldenVoice**
Noise received from 0 to –50 dBm
- Ten programmed GoldenVoice tone signals used to send the ID from each side encoded as three tone sequences

**QoS**
Calculation of R-Factor, GMOS, G-PSQM, G-PESQ
- R-factor is based upon E-Model in ITU-T G.107, Amendment 1, June 2006

### Radio Specifications

**Frequency Range**
- Europe 1880 MHz – 1900 MHz
- No. Amer. 1920 MHz – 1930 MHz
- Latin Amer. 1910 MHz – 1930 MHz
- Taiwan 1880 MHz – 1896 MHz

**Number of Channels**
- Europe 10 channels, 12 time slots
- No. Amer. 5 channels, 12 time slots
- Latin Amer. 10 channels, 12 time slots
- Taiwan 8 channels, 12 time slots

**Frequency Stability**
- fc +/- 50 kHz (Europe)
- fc +/- 19kHz (US)

**Modulation**
GFSK

**Freq Dev. B Field Max**
+259 to +403 kHz

**Freq Dev. B Field Min**
-259 to –403 kHz

**Freq Dev. S Field Max**
+202 to +403 kHz

**Freq Dev. S Field Min**
-202 to –403 kHz

**NTP Power**
- Europe –20 +4/-1 dBm
- No. Amer. –20 +1/-3 dBm
- Latin Amer. –20 +4/-1 dBm
- Taiwan -20 +4/-1 dBm

**Receiver Sensitivity**
- Less than or equal to –88 dBm

**BER**
- Less than or equal to 0.0001

**Jitter**
- 0 +/- 1us

**Drift**
- -15 kHz to 15 kHz/slot

**Time Accuracy**
- < 5ppm

**Radio Regulation**
- EN 301 406; FCC15
**Printout and Reports – Call Statistics**

<table>
<thead>
<tr>
<th>Manual Reports</th>
<th>Call Statistics for each line</th>
<th>Totals for all lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Reports</td>
<td>Prints automatically on the hour or every half or quarter hour</td>
<td>Contents of each column in the printout are user selectable</td>
</tr>
<tr>
<td>Call Statistics for each Originate Line</td>
<td>Call Attempt Count</td>
<td>Call Completion Count</td>
</tr>
<tr>
<td></td>
<td>Delayed Start Signal Count</td>
<td>No Start Signal Count</td>
</tr>
<tr>
<td></td>
<td>No Alert Signal Count</td>
<td>No Voice Path Count</td>
</tr>
<tr>
<td></td>
<td>Busy Signal Count</td>
<td>No Answer Count</td>
</tr>
<tr>
<td></td>
<td>Average Dial Tone Delay</td>
<td>Average Post Dial Delay</td>
</tr>
<tr>
<td></td>
<td>Custom Code Report Count</td>
<td></td>
</tr>
<tr>
<td>Call Statistics for each Terminate Line</td>
<td>Attempted Calls Count</td>
<td>Completed Calls Count</td>
</tr>
<tr>
<td></td>
<td>Custom Code Report Count</td>
<td></td>
</tr>
</tbody>
</table>

**Printout and Reports – VoP Statistics**

| Signal Analysis Tests | Average and maximum dropout duration (ms) |
| Dropout Tests | Average and maximum dropout duration (ms) |
| One Way Delay Tests | Average, minimum and maximum one-way delay (ms) |

**Ordering Information**

- **NLG-DECT HD**: DECT HD Load Generator
  - 250532: Command Set Feature
  - 250538: Extended Feature Set

**Ordering Information**

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