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.

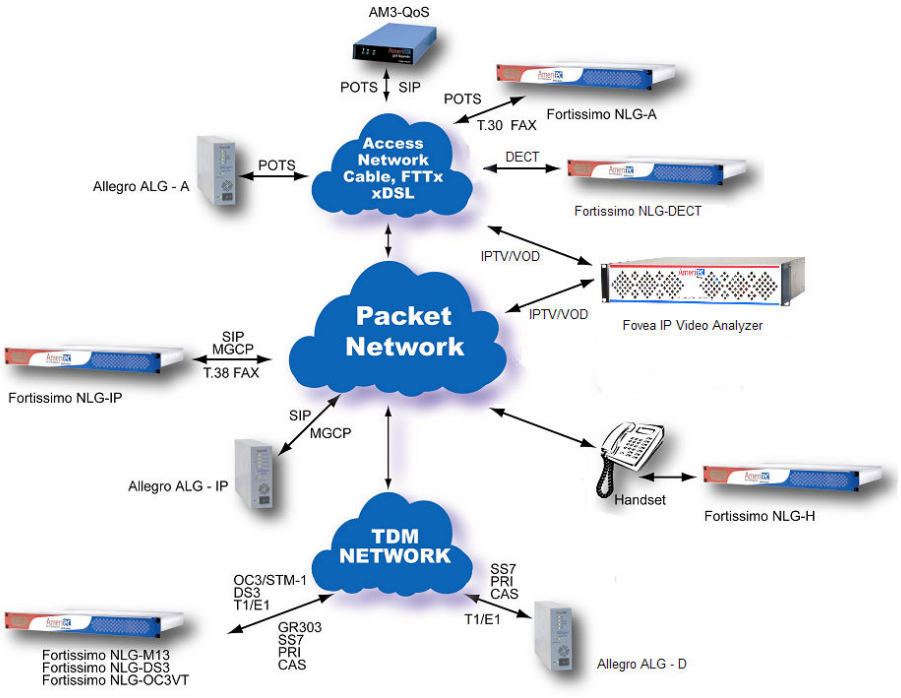
♦ Fortissimo speeds up your system integration, functional and performance testing at an unbeatable price/performance ratio.

♦ 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

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

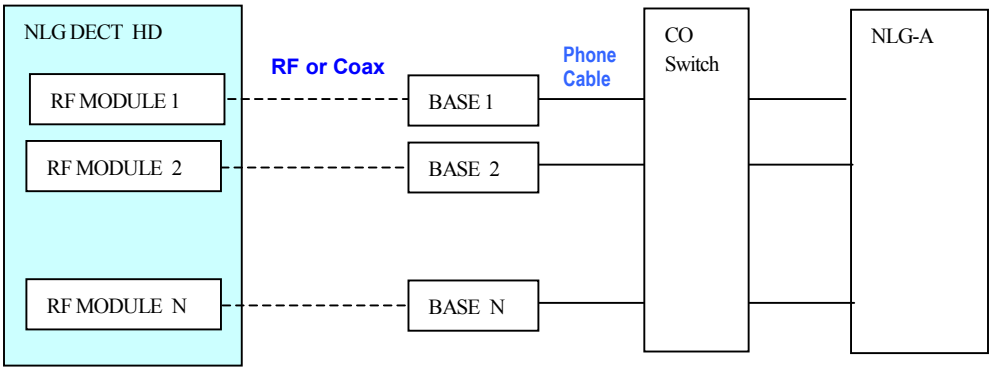
RF Module idle or on-hook is being paged (flashing module icon and dark gray)

Hovering the cursor over a Module shows the current operational state (if no errors) or the last error

Typical DECT Call Flow Diagrams

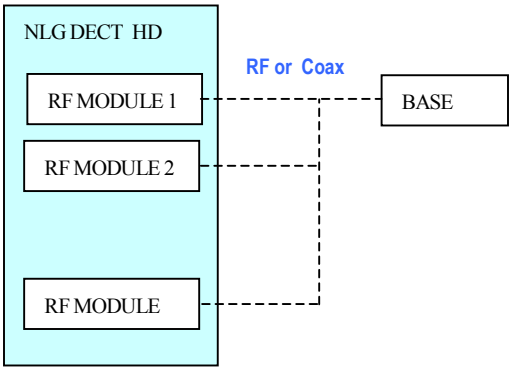
Single extension per base

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:



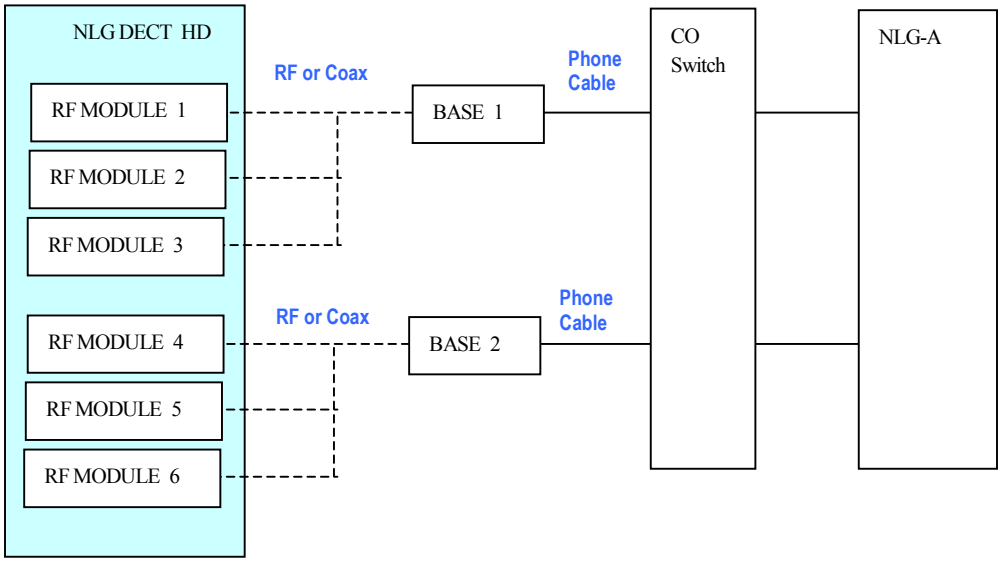
Intercom

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 answers the call. An example test setup is shown below:



General Characteristics

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

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 BER less than 0.0001	Less than or equal to –88 dBm
Jitter	0 +/- 1us
Drift	-15 kHz to 15 kHz/slot
Time Accuracy	< 5ppm
Radio Regulation	EN 301 406; FCC15

Printout and Reports – Call Statistics

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

Printout and Reports – VoP Statistics

Signal Analysis Tests	Average and maximum dropout duration (ms) Average and maximum front clip duration (ms) Average and maximum back clip duration (ms) Average and maximum jitter duration (ms)
Dropout Tests	Average and maximum dropout duration (ms) No tone detected Tone lost
One Way Delay Tests	Average, minimum and maximum one-way delay (ms)
Round trip Delay Tests	Average, minimum and maximum round trip delay (ms)
GoldenVoice Tests	Minimum and maximum total energy Minimum and maximum SNR Minimum and maximum GoldenVoice energy Maximum spurious energy overflow Spurious energy overflow Low SNR
GMOS tests	Average and maximum percent drop Drop packet size (ms) Drop test time (s) Average and maximum one-way delay (ms) Average and minimum circuit noise Minimum and maximum receive level Average and maximum round trip delay (ms) Average and maximum SNR

Ordering Information

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

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