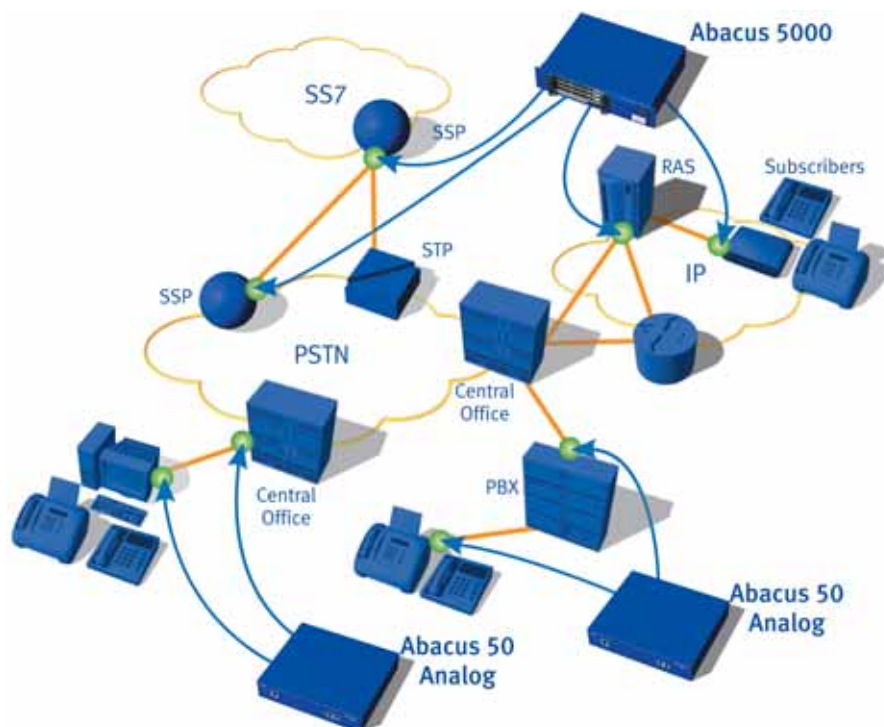## Overview

The Abacus 50 Analog subscriber test system emulates analog telephony functionality. Abacus 50 is an analog call generator that simulates analog telephony subscribers placing and terminating calls. It has all of the features of an Abacus 5000, but in a smaller form factor and supporting two analog ports. The Abacus 50 Analog system is designed for lower port density laboratory test environments or to reduce the cost of deploying a remote testing solution.

This enables service providers and enterprises to reduce time to market of services, while assuring they meet the quality requirements as perceived by users. The Abacus 50 Analog system provides analog

circuits (FXO ports) emulating the subscriber side of an analog two-wire circuit in a cost-efficient stand-alone platform designed for laboratory testing as well as distributed on the network. With the distributed testing firmware option, multiple systems can be viewed as one system for simplified management of multiple Abacus 50 systems (along with Abacus 5000 and 53 systems).

Abacus 50 executes a call setup and teardown for each channel, giving the user flexibility in simulating a wide range of applications associated with switch and network testing. Each of the channels on the Abacus 50 can be configured to be an originating or a terminating channel (calling or called party).

SPIRENT Communications

Analyze | *Assure* | *Accelerate*™

Applications

PBXs, Switches, Central Offices

- Generate traffic
- Verify correct routing
- True traffic modeling

Satellite, WLL

- Determine capacity
- Verify connectivity
- Tolerate and measure duration of interruptions in speech path
- Measure round trip delay

Transmission Equipment, Channel, Banks, Multiplexers

- End-to-end test
- Verify transmission quality

Voicemail and Voice Response Detection (or IVR)

- Transmit and receive account codes
- Generate traffic to leave messages
- Replay and verify messages

Network Equipment Manufacturers

(chips, IP-PBX, gateway, MSs and SSs)
- Characterize system before trial
- Validate system scalability
- Identify capacity limits
- Measure call performance
- Automate regression testing

Service Providers (NSPs, SPs, ITSPs and Enterprises)

- Facilitate vendor selection
- Identify performance ceilings
- Enable accurate capacity planning

Features

- Two analog FXO ports
- Loop or Ground Start with Ground Start protection switch (allows ground start or isolates circuits from ground)
- Globally compliant with FCC, NET4, CTR21, JATE, and country specific PTT specifications
- Programmable protocol state machine
- Compact flash memory to store application programs
- 10/100Base-T Ethernet controlled (RJ-45 front access)
- DSPs provide tone generation, tone recognition, DTMF, PSQM, PESQ, fax and modem functionality
- On board TCXO used for TDM clock and 1 PPS signal generation
- Programmable call progress tones
- Detect caller ID
- Detect battery reversal and battery denial
- Flexible call sequences
- Verify speech path is established and retained for call
- Results automatically and continuously gathered and presented in tables and graphs
- End-to-end testing with other interfaces on Abacus 5000
- Voice quality measurement using PSQM, PSQM+ or PESQ
- PSQM, PSQM+ to MOS conversion

- PESQ-LQ, R-factor, J-MOS calculations from PESQ measurements
- T.30 fax up to V.17
- V.34 analog data modem (up to V.34)
- Echo measurements
- Manage multiple A50 systems from a single user interface

Specifications

Dimensions

- Height: 4.8cm (1.9") with user-installed feet 4.4cm (1.8") without feet
- Width: 24cm (9.5")
- Depth: 20cm (8")

Weight

- 1.4Kg (3 Lbs)

Environment

- Operating temperature range: 0-40 ºC at 20%-80% non-condensing humidity
- CE marked

Tones

- Send any two frequencies with an accuracy of ±0.05% or ±0.5 Hz
- Send noise or silence
- Send with a resolution of 8 ms and an accuracy of ±20 ms
- Detect any two frequencies with a minimum difference of 80 Hz for no noise
- Detect energy or silence
- Detect signals with a minimum duration of 40 ms at various thresholds, with an accuracy of ±20 ms

Path Confirmation

- 3-tone: use series of three single frequencies
- Physical: Use series of dual frequencies to identify unique address of channel
- Resilient: exchange tones with precise voice activation factor (VAF), and measure disturbances in the speech path

Voice Quality

- PSQM, PSQM+ and PESQ voice quality measurements on all channels
- PSQM, PSQM+ to MOS conversion
- PESQ-LQ, R-factor and J-MOS calculations from PESQ measurements

Making and Receiving Calls

Sending and receiving digits
- Signaling: DTMF and pulse
- Programmable times for tone on and tone off
- Programmable make interval, break interval, and inter-digit pause for pulse dialing
- Number of digits is fixed or automatically detected
- Detect caller ID
- Call progress tones
- Detect dial tone, ring back, busy, and congestion
- Programmable frequencies and cadences
- Audio monitor
- Listen to either channel
- Listen to channels from the controlling PC over Ethernet

Analog Measurements

Delays
- Dial tone
- Single tone
- Dual tone
- Call acknowledgement
- Round trip

Hits and clips
- Measure up to 1 second of interruptions in speech path

Protocols
- Ground and loop start

Fax and Modem Measurements
- Support T.30 (G3) fax (up to V.17)
- Support V.34 analog data modem (up to V.34)

Echo Measurements
- Echo cancellation on/off
- Echo delay
- ERL (Echo Return Loss)
- ERLE measurement (Echo Return Loss Enhancement)
- TELR measurements (Talk Echo Loudness Rating)
- Support echo measurements on all channels

Interfaces

Components
- Stand alone 1U high 19" rack mountable, with included brackets

Capacity
- Two FXO circuits

Connection
- Front panel with two RJ-11 FXO and one RJ-45 connector
- Back panel with one -48VDC power connector, grounding post, DB15 connector for future GPS/CDMA time synchronization (currently Ethernet support), and one DB9 connector communications port for configuration

Electrical
- Power supplied through external -48VDC desktop power supply with locking connector or external -48VDC source
- 90 to 264 VAC (47 to 63 Hz) or -36 to -72VDC
- Power draw: maximum of 25W, 15W typical
- Power switch on back panel with fuse
- Ground start/isolated selection switch
- External -48VDC desktop power supply

LEDs

Two tricolor LEDs indicate status of channels and one status LED

AC Impedances Supported
- 600 ohm
- 900 ohm
- 600 ohm + 1uF
- 600 ohm + 2.16uF
- 900 ohm + 1uF
- 900 ohm + 2.16uF
- 270 ohm + (750 ohm||150nF)
- 220 ohm + (820 ohm||120nF)
- 370 ohm + (620 ohm||310nF)
- 320 ohm + (1050 ohm||230nF)
- 370 ohm + (820 ohm||110nF)
- 275 ohm + (780 ohm||150nF)
- 120 ohm + (820 ohm||110nF)
- 350 ohm + (1000 ohm||210nF)
- 0 ohm + (900 ohm||30nF)

Line Capabilities
- Bandwidth: 300 Hz to 3400 Hz, ±2 dB
- AC impedance: software selectable
- Load: 0.2 REN per circuit
- -48 VDC: supplied externally with included power supply or external -48VDC source

Line Signaling
- Loop start: current limited to 60 mA
- Battery reversal: with loop start or ground start

Ring Detect
- Frequency range: 15 to 68 Hz
- Voltage level: 20 to 150 Vrms
- DC component: 0 Vdc to ±105 VDC
- Go off hook: after programmable number of rings

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Ordering

- A-50-001 - Abacus 50 Analog FXO with 2 ports

Firmware options

- SWF-3502 - PSQM, PSQM+
- SWF-3503 - PESQ
- SWF-3504 - T.30 fax up to V.17
- SWF-3505 - V.34 analog data modem
- SWF-3506 - T.30 fax and V.34 analog data modem combo
- SWF-3507 - echo measurements
- SWF-3510 - enable Abacus system for distributed testing

For More Information

Visit Spirent Communications' Web site at www.spirentcom.com/voice where you can learn about Spirent IP Telephony test systems and services, download product literature, white papers and test methodologies. Contact your local sales representative for details.

Spirent Global Services

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