



# T1 and E1 Traffic Generator

## Abacus 50 T1/E1



### Overview

The Abacus 50 T1/E1 test system has the features of an Abacus 5000, but in a smaller form factor and supporting four T1/E1 ports. It 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 IP-based voice, video and data services, while assuring they meet the quality requirements as perceived by users.

The Abacus 50 T1/E1 test system provides PCM circuits that can emulate a telephone exchange (central office) or a terminal in a cost-efficient stand-alone platform designed for laboratory testing as well as distributed testing 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).

The Abacus 50 T1/E1 system provides TDM call generation functionality to test PCM T1/E1 circuits with 24 or 30 channels per circuit. Each channel can be configured as an originating or terminating channel (calling or called party).

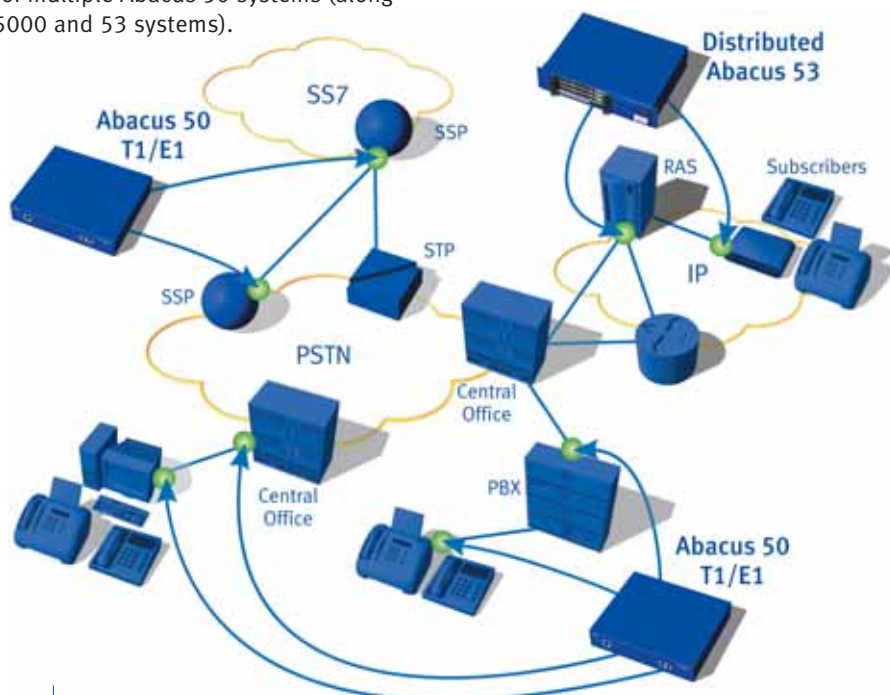
When generating calls, the Abacus 50 T1/E1 system executes a call setup/teardown for each channel and executes a media script that includes transmission and reception of audio signals and files.

The Abacus 50 T1/E1 system supports four T1 or E1 circuits with Channel Associated Signaling (CAS). See Firmware Options below for additional supported signaling.

**Spirent Communications**  
26750 Agoura Road  
Calabasas, CA  
91302 USA  
E-mail: [productinfo@spirentcom.com](mailto:productinfo@spirentcom.com)

**Sales Contacts:**  
**North America**  
+1 800-927-2660  
**Europe, Middle East, Africa**  
+33-1-6137-2250  
**Asia Pacific**  
+852-2511-3822  
E-mail: [salesasia@spirentcom.com](mailto:salesasia@spirentcom.com)  
**All Other Regions**  
+1 818-676-2683

[www.spirentcom.com](http://www.spirentcom.com)



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## Applications

### PBXs, Switches, Central Offices

- Create traffic
- Determine capacity

### Satellite, WLL

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

### Transmission Equipment, Channel Banks, Multiplexers

- End-to-end tests
- Verify transmission quality

### Voicemail, IVR

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

### Voice over Packet

- Verify functionality of media and voice gateways
- Check dial-up connectivity of voice traffic
- Assess voice quality
- Generate calls to an IP network

## Features

- 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
- Supports SS7 (ANSI, ETSI/ITU-T, Chinese and Japanese SS7 Options), CAS, MF R1/R1.5/R2, ISDN
- PRI, GR-303 and 5.1/V5.2, SLC-96/TR08 (Mode 1)
- 4 full-duplex T1 with 24 channels per circuit at the T1 rate (1.544 Mbps)
- 4 full-duplex E1 with 30 channels per circuit at the E1 rate (2.048 Mbps)
- 96 channels (T1), or 120 channels (E1)
- Call generation
- Built-in protocol analyzers
- Custom protocols
- Sends and receives tones, PRBS, speech
- Perform voice quality measurements on each call using PSQM, PSQM+, and up to 112 channels
- PSQM, PSQM+ to MOS conversion
- PESQ-LQ, R-factor, J-MOS calculations from PESQ measurements
- Performs fax measurements on 96 channels
- Programmable call progress tones
- Detects and forwards DTMF, MF R1/R1.5/R2 pulse dialing
- Flexible call sequences
- Program test duration to be random or fixed from 1 second to indefinite
- Verifies speech path is established and retained for duration of call

- Results are automatically and continuously gathered and presented in tables and graphs
- SS7 event analyzer
- T.30 fax up to V.17
- Up to V.90 server data modem (14 channels max)
- Echo measurements
- QSIG basic call support on ISDN PRI
- BRI over V5
- SS7 COT CCR and advanced
- Clear channel
- Voice quality measurements and fax within one script

## 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 °C at 20%-80% non-condensing humidity
- CE marked

### Tones

- Send any two frequencies with 1 Hz resolution
- Send noise or silence
- Send with a resolution of 8 ms and an accuracy of  $\pm 20$  ms
- Detect two frequencies with a minimum difference of 10 Hz for no noise.
- Detect energy or silence
- Detect signals with a minimum duration of 40 ms at various thresholds, with an accuracy of  $\pm 20$  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
- PRBS: send and receive 211-1 or 215-1, and perform full-duplex BERT
- Programmable cut through time

### Voice Quality

- PSQM, PSQM+ and PESQ measurements
- 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, MF R1/R1.5/R2, pulse, and custom digits; transmit level, receive level, and digit timing can be configured

#### Caller ID

- DTMF or FSK; send and receive with date and time
- 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

**Call Progress Tones**

- Send and detect dial tone, ring back, busy, and congestion
- Programmable frequencies and cadences  
Audio Monitor
- Listen to any 2 channels from the controlling PC

**TDM Measurements**

Perform measurements on each channel:

**Delays**

- Dial tone
- Single tone
- Dual tone
- Call acknowledgement
- Call setup
- Round trip
- One way delay

**Hits and Clips**

- Measure up to 1 second of interruptions in speech path (with resilient path confirmation)
- Bit error rate (with PRBS path confirmation)  
Protocols
- CAS, MF R1/R1.5/R2, and pulse dialing
- Primary rate ISDN (US, ETSI, Lucent, Nortel Japan)
- GR-303 (IDT and RDT)
- V5.1 and V5.2
- SS7 (ANSI, ETSI, ITU-T, China, Japan)
- SLC-96/TR08 (Mode 1)
- QSIG basic call support on ISDN PRI

**Standard TDM Protocols**

- T1 frame format: D4 and ESF
- E1 frame format: 2 Frame, 16 Frame, or 16 Frame with CRC
- T1 line code: AMI, B8ZS
- E1 line code: AMI, HDB3
- Standard T1 protocols: loop start, ground start, E and M
- Standard E1 protocols: R2, China R1, T1097, T0466

**Custom TDM Protocols**

- Create protocols for T1 and E1
- Create any CAS state machine with unlimited number of states
- Each state sends any signaling bit
- Each state has 16 exit conditions
- Incorporate MF R2 state machine
- Send and detect caller ID and meter pulses

**Echo Measurements**

- Echo cancellation on/off
- Echo delay
- ERL (Echo Return Loss)
- ERLE measurement (Echo Return Loss Enhancement)

- TELR measurements (Talk Echo Loudness Rating) Components
- Stand alone 1U high 19" rack mountable with included brackets

**Capacity**

- Four T1 or E1 circuits

**Connection**

- Front panel with four RJ-48 connectors for T1 or E1 and one RJ-45 10/100 Ethernet connector
- Back panel with one -48VDC blocking power connector, grounding post, DB15 connector for future GPS/CDMA time synchronization (currently Ethernet support), and one DB9 connector communication 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
- T1 transmit level: 3 Vb-p
- E1 transmit level: 2.4 Vb-p for E1 75 ohms; 3 Vb-p for 120 ohms
- Transmit timing: recovered (loop) or derived from internal system clock
- Receive level: 0 to -6 dB from transmit level
- T1 line impedance: 100 ohms
- E1 line impedance: software selectable between 75 ohms and 120 ohms
- Isolation: 500 Vac rms between line and electronics

**LEDs**

- Dual LEDs indicate status of channels and one status LED

**Ordering Information****Abacus 50 T1/E1**

- A-50-002-Abacus 50 - T1 with 4 ports, call generation
- A-50-004-Abacus 50 - E1 with 4 ports, call generation

**Distributed Abacus 50 Bundles**

Includes PESQ, CAS, PRI, SS7, call generation, distributed testing.

- DA-50-002-Distributed Abacus 50 - T1 bundle with 4 ports
- DA-50-004-Distributed Abacus 50 - E1 bundle with 4 ports

## Firmware Options

- SWF-3522 - Echo measurements
- SWF-3532 - E1
- SWF-3533 - T1
- SWF-3534 - PRI (NI, Lucent, Nortel, ETSI),
- SWF-3535 - GR-303 (TMC only), for T1
- SWF-3536 - V5.1 and V5.2, for E1
- SWF-3537 - ANSI SS7
- SWF-3538 - ETSI + ITU-T SS7
- SWF-3539 - Chinese SS7
- SWF-3540 - Japanese SS7
- SWF-3541 - SS7 virtual trunks
- SWF-3542 - PSQM/PSQM+
- SWF-3543 - PESQ
- SWF-3544 - T.30 fax, UP V.17
- SWF-3546 - V.90 server data modem
- SWF-3549 - T.30 FAX/V.90 analog data modem combo
- SWF-3551 - BRI over V5, (requires SWF - 3536)
- SWF-3553 - SS7 COT CCR and Advanced
- SWF-3554 - MF R1.5 signaling,
- SWF-3555 - SLC - 96/TR - 08 (Mode 1)
- SWF-3590 - clear channel

## For More Information

Access Abacus 50 information at Spirent Communications' Web site [www.spirentcom.com/voice](http://www.spirentcom.com/voice) to learn more about Spirent IP Telephony test systems and services, download product literature, white papers and test methodologies. Contact your local sales representative for more details.

## Spirent Global Services

Spirent Global Services provides a variety of professional services, support services and education services - all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at [www.spirentcom.com/gs](http://www.spirentcom.com/gs) or contact your Spirent sales representative.

### Spirent

#### Communications

26750 Agoura Road  
Calabasas, CA  
91302 USA  
E-mail: [productinfo@spirentcom.com](mailto:productinfo@spirentcom.com)

#### Sales Contacts:

##### North America

+1 800-927-2660

##### Europe,

##### Middle East, Africa

+33-1-6137-2250

##### Asia Pacific

+852-2511-3822

E-mail: [salesasia@spirentcom.com](mailto:salesasia@spirentcom.com)

@spirentcom.com

##### All Other Regions

+1 818-676-2683

[www.spirentcom.com](http://www.spirentcom.com)

