Abacus1 Bulk Call Generator & Switch Simulator

Abacus1 V5.1 and V5.2

Overview

The Abacus system provides emulation of V5.1 and V5.2 systems. The E1 circuits are provided by one or more PCM Circuit Generator (PCG) subsystems, which include support for PSTN. ISDN BRA is supported by the addition of one or more Basic Rate U-interface (BCG) subsystems, or Basic Rate S/T-interface (SCG) subsystems. ISDN PRA (on V5.2) is supported by the addition of one or more PCGs.

When performing call generation, the channels execute call sequences (scripts). When performing switching, Abacus routes calls from one channel to another channel, based on the number dialled by the SUT.

When testing an AN, a single Abacus system can act as the LE (using PCGs) and generate traffic at the subscriber side (using other subsystems).

Features

- V5.1, V5.2 first and second editions
- Supports G.964, G.965, ETS 300-324-1, and ETS 300-347-1
- Emulates Local Exchange (LE) or Access Network (AN)
- Built-in protocol analyzers
- Generates and switches traffic for PSTN and ISDN
- Supports ISDN BRA and ISDN PRA
- Supports 1 to 6 interface groups
- Programmable PSTN profile for national variances
- For call generation, generate signalling and verify that speech path is established and retained for duration of call
- For switching, route calls among channels on same group, to other groups, or to different interfaces
- Startup routine is completely programmable
- Shipped with V5 protocols that support different country variants
- Programmable call progress tones
- Protocol analyzers show messages on all data links
- Generate 263k calls or switch 206k calls per hour per system
- Results are automatically and continuously gathered and presented in tables and graphs
- End-to-end testing with other interfaces on Abacus1

Applications

Switches, central offices, LEs

- Create PSTN and ISDN traffic
- Verify correct routing
- Determine capacity

Satellite, WLL, HFC

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

Transmission equipment, ANs

- End-to-end tests
- Verify transmission quality

Switching

- Switch PSTN and ISDN traffic
- Emulate switches worldwide
- Support multiple interface groups

Voice over Packet

- Verify functionality of media and voice gateways
- Check dial-up connectivity of voice, fax, and modem traffic
- Assess Quality of Service

Rack Mountable System

Portable System

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Physical Connection

Additional Components for ISDN BRA

- BCG (or CG) front card with active components
- Each BCG (or SCG) supports 5 circuits (10 channels)

Additional Components for ISDN PRA

- PCG front card with active components
- Each PCG supports one circuit (30 channels)

Capacity

- **V5.1:** 1 to 34 circuits (1020 channels) per system
- **V5.2:** 1 to 6 interface groups (each group having 1 to 16 circuits, 1 to 1023 channels with concentration); maximum per system is 1023 channels or 34 circuits
- Concentration on V5.2 is from 1:1 to 34:1

LEDs

- Tricolor LEDs indicate status of the channels
- Tricolor LEDs indicate status of layers 1 and 2
- Tricolor LEDs indicate status of the subsystems

Electrical for E1

See Abacus1 data sheet: (P/N 360-3003-001), *PCG Subsystem for CAS*.

Protocols

General

- **Frame format:** 16 Frame with or without CRC
- **Line code:** HDB3
- **Standard protocols:** all supplied to support many countries and many switches
- **Variant & Interface ID:** programmable, stop if incompatible or continue
- **PSTN & ISDN ports:** programmable; sequential addresses; unblock individually or globally (accelerated alignment)
- **BCC:** Abacus manages when emulating LE; eight-level BCC audit
- **Protection:** none (single circuit), group 1, or group 2 with programmable C-path map
- **Links:** Link ID supported with stop on error or continue; programmable addresses; blocking and unblocking
- **Startup:** programmable sequence of actions; programmable L2 timers
- **ISDN BRA over V5:** supports L1 and L2 removal and restoration; protocols that can be used are those available on the BCG and SCG
- **ISDN PRA over V5.2:** protocols that can be used are those available on the PCG for ISDN
- **Timeslot allocation (when LE):** nailed, last in queue, or spiral (Lucent and Nortel)
- **Protocol analysis:** trace and decode messages for 2 channels simultaneously (BCC and PSTN); trace and decode messages in same window for link, control, and protection; trace and decode ISDN messages on BCG, SCG, or PCG (for ISDN over V5); save traces to files

PSTN Profile

- Build any message for use as part of call processing
- Select the message type (for example ESTABLISH and DISCONNECT)
- Include any IE that can be steady signal, cadenced, or pulsed
- Select IE value and parameters
- Create state machine to represent call processing using defined messages
- Supports transmission of caller ID (FSK and DTMF) and meter pulses

Making and Receiving Calls

Sending and Receiving Digits

- DTMF and pulse (auto detect if LE; pulse 0 sent as 0 or 10)
- Programmable times for tone on and tone off
- Number of digits is fixed or automatically detected (2 to 20 digits)
- Send caller ID (with date and time)

Call Progress Tones

- Send and detect dial tone, ringback, busy, and congestion
- Programmable frequencies and cadences

Audio Monitor

- Listen to any 4 channels (transmit or receive)
- Inject tones into any 2 channels

Call Generation

Tones

- Send any two frequencies with accuracy to ±0.05% or ±1 Hz
- Send noise or silence
- Send with resolution of 100 ms ±3 ms
- Detect any 2 frequencies with programmable bandwidth
- Detect energy or silence
- Detect signals for minimum of 75 ms at various thresholds
- Use with VRG1 subsystems to send WAV files

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 $2^{11}-1$ or $2^{15}-1$, and perform full duplex BERT
- **PSQM:** use with VRG1 subsystems to test Quality of Service
- **PESQ:** use with VRG1 subsystem to test Quality of Service
- **Fax:** use with VRG1 to generate and receive fax calls
- **Data modem:** use with VRG1 to generate and receive data
- Programmable cut through time

Switching

Call can be switched to any channel on the same V5 group or to any other subsystem within the same Abacus shelf.

Results Reported

Measurements

- **Delays:** dial tone, single or dual tone, call acknowledgment, round trip
- **Hits and clips** (interruptions of speech path)
- **Bit Error Rate** (with PRBS path confirmation)
- **Quality of Service:** PSQM, PESQ, and MOS
- **Graphs:** any delay as histogram
- **Modem Connection:** connection speed, throughput, bit error rate

Statistics

- **Calls:** attempts, completions, attempts per hour (BHCA)
- **Scripts:** attempts, completions

Timeouts and Errors

- **Check for missing:** dial tone, answer, tone, noise, silence, digit
- **Check for unexpected:** busy, congestion
- **Graphs:** errors vs time, errors vs channels
- **Dialling:** check for invalid dialled number

Ordering

90-01583 – PCG with call generation on E1, CAS, V5.1, and V5.2 firmware
90-01582 – PCG with switching on E1, CAS, V5.1, and V5.2 firmware
90-01714 – Option to add V5.1 and V5.2 on PCG
90-01574 – BCG to support ISDN BRA over V5
90-01576 – SCG to support ISDN BRA over V5
90-01589 – PCG to support ISDN PRA over V5
90-01720 – Option to add ISDN BRA over V5 on BCG
90-01763 – Option to add ISDN BRA over V5 on SCG
90-01725 – Option to add ISDN PRA over V5 on PCG

About Abacus

Abacus is a modular and expandable test system that generates telephone traffic (bulk call generator) or switches telephone traffic (central office emulator).

Abacus can perform the functions of a call generator and a call switch simultaneously in the same system. The user interface software that controls the Abacus hardware is a 32-bit application that runs under Windows on an external PC.

See data sheet Abacus1 Test System (P/N 360-3000-001) for other subsystems that are available.

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