SPIRENT Communications Inspired Innovation

Abacus™ 5000 – XCG3 Subsystem
ANALOG EXCHANGE

The Abacus 5000 XCG3 subsystem provides analog circuits to emulate an analog exchange. The XCG3 subsystem provides analog exchange call generation and switching functionality to emulate the Central Office (CO) side of an analog 2-wire circuit with 14 analog lines per interface (FXS ports).

APPLICATIONS

VoIP Convergence

- Verify functionality of media and voice gateways (in combination with ICG3)
- Check dial-up connectivity of voice, traffic
- Assess voice quality

FTTP, PON and VoIP

- Analog exchange call generation for ONT-FXS port testing
- Measure ONT-OLT end-to-end one way delay with XCG3 and ICG3

PBXs, Switches and Central Offices

- Generate traffic
- Verify correct routing
- True traffic modeling

Transmission Equipment, Channel Banks and 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 messages

Switching

- Switch XCG3 interface to PCG3 and TCG3 interfaces
- Emulate analog switches

Each of the analog lines on XCG3 subsystem carries one communication channel. Any channel can be configured to be an originating (calling party) or a terminating (called party) channel.

The XCG3 subsystem gives the user flexibility to simulate a wide range of applications for analog testing, including North American, European and international analog 2-wire interfaces.

Spirent has the most complete TDM, VoIP and analog solution in one platform using the same GUI. For TDM: OCG3, TCG3, PCG3, Abacus 50 T1/E1. For VoIP: ICG3, Abacus 50 Ethernet Test System. For analog: XCG3, ECG3, Abacus 50 Analog and Abacus 100 Analog.

BENEFITS

- Simplify the testing of converged IP telephony and PSTN/analog networks and services with functional and performance testing for analog, T.30 fax and V.34 analog data modem
- Achieve overall cost savings by giving the user full flexibility in convergence testing with synchronized IP, TDM and analog measurements with the same user interface

XCG3 front card

XCI3 rear card

XCI3RJ rear card

FEATURES

- Analog FXS
- 14 two-wire circuits
- Programmable protocol state machine
- Selectable impedances and analog gains
- 32-bit processor, DSP and flash memory to ensure full computing and upgrading capabilities
- Programmable call progress tones
- Pulse dialing detection
- DTMF, MFR1, MFR2 dialing/detection
- Generate caller ID
- Generate metering pulses
- Provide ring voltage, -48 VDC and dial tone
- Ring generator on XCI3 or XCI3RJ rear cards
- Programmable Ring ON/OFF cadence
- Battery reversal and denial
- Generate over 20,000 calls per hour per subsystem
- Switch over 8,800 calls per hour per subsystem
- 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
- Performs voice quality measurements using PSQM, PSQM+ or PESQ
- PSQM, PSQM+ to MOS conversion
- MOS-LQO, R-factor (P.834) and J-MOS calculations from PESQ measurements
- T.30 fax up to V.17 (up to 14.4 kbps)
- V.34 analog data modem (up to 26.4 kbps)
- Echo measurements
- Call Tracer (ladder diagram for Analog)
- Interface by country
- Load Profiling (Saw Tooth, Rectangle, Trapezoid and Poisson)
- Graphical display of Measurements-over-Time
- TCL API for analog PhoneBook
- Perform QoS validation using the Scripting for Voice Pattern Matching

CALL GENERATION SPECIFICATIONS

Tones

- Send any two frequencies with 1 Hz resolution
- 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 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 ±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
- PSQM, PSQM+ to MOS conversion
- MOS-LQO, R-factor (P.834) and J-MOS calculations from PESQ measurements

Switching

- Number dialed into Abacus can comprise called and calling party numbers
- Number forwarded from Abacus can comprise called and calling party numbers
- Called and calling party numbers can be received and forwarded with prefix and suffix

SPECIFICATIONS FOR MAKING AND RECEIVING CALLS

Sending and Receiving Digits

- Signaling: DTMF, MFR1, MFR2 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
- Send caller ID
- Programmable tone transmission and detection

Call Progress Tones

- Send dial tone, ring back, busy, howler and congestion tone
- Programmable frequencies and cadences

Audio Monitor

- Listen to 2 channels simultaneously

ANALOG MEASUREMENT SPECIFICATIONS

Delay

- Single tone
- Dual tone
- Call acknowledgement
- Round trip
- User timer

Hits and Clips

- Measure up to 1 second of interruptions in speech path

PROTOCOL SPECIFICATIONS

- Loop start
- Ground start

FAX AND MODEM MEASUREMENT SPECIFICATIONS

- Support T.30 (G3) fax (up to V.17) on 14 channels
- Support V.34 analog data modem (up to V.34) on 14 channels

ECHO MEASUREMENT SPECIFICATIONS

- 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 2 channels

COMPONENT INTERFACES

- XCG3 front card
- XCI3 and XCI3RJ rear card with ring generator and connectors

CAPACITY

14 two-wire circuits per subsystem

- Generation: 182 circuits per Abacus 5000 chassis (13 subsystems x 14 circuits) unless mixed with other circuit types in the same system
- Switching: Maximum of 70 analog channels: 5 subsystems x 14 channels per subsystem that stand in the left most slots
- In current implementation Voice Quality and Fax functionality are mutually exclusive. Up to 14 channels may run on either Voice Quality or Fax.

CONNECTIONS

- XCI3 rear card provides 25-pair Telco connector and grooming connector to combine 2 XCG3s
- XCI3RJ rear card with 14 RJ-12 connectors
- Grooming cable for ECG3 and XCG3 connects two XCG3 subsystems to combine 25 pairs (circuits) for 50 pin connector

ELECTRICAL

- Power draw: Max 15W per subsystem
- No special cooling required

LED SPECIFICATIONS

- 14 bicolor LEDs indicate status of channels
- 1 bicolor LED indicates status of the subsystem
- 1 bicolor LED indicates status of the system clock
- 1 bicolor LED indicates presence of battery and ring voltages

AC IMPEDANCES SUPPORTED

- 600 ohm
- 600 ohm + 1uF
- 600 ohm + 2.16uF
- 900 ohm
- 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||115nF)

- 120 ohm + (820 ohm||110nF)
- 350 ohm + (1000 ohm||210nF)
- 200 ohm + (680 ohm||100nF)

LINE CAPABILITIES

- Bandwidth: 300 Hz to 3400 Hz, ±2 dB
- AC impedance: software selectable
- Load: 0.7 REN to 3 REN per circuit depending on selected ring voltage
- -48 Vdc: supplied externally to XCG3 subsystem
- Meter pulses: send 12 kHz or 16 kHz, programmable duration and period

LINE SIGNALING SPECIFICATIONS

- Loop start: current limited to 25 mA
- Ground start: current limited to 25 mA
- Battery reversal: with loop start or ground start
- Battery denial: with loop start or ground start
- Selection: programmable

RING GENERATION SPECIFICATIONS

- Frequency range: 16.7 Hz, 20 Hz, 25 Hz and 50 Hz. Frequencies selectable with switch on XCI3 or XCI3RJ rear card
- Ring Voltage: 45V, 75V, 86V and 100V. The voltages are selectable with another switch on the on XCI3 or XCI3RJ rear card
- The XCG3 finishes the Ringing Process when the Terminate Subscriber goes off hook

ORDERING INFORMATION

- XCG3 subsystem for call generation: 14 circuits analog with XCI3 (P/N XCG-3000)
- XCG3 subsystem with switching: 14 circuits analog with XCI3 (P/N XCG-3001)
- XCG3 subsystem for call generation: 14 circuits analog with XCI3RJ (P/N XCG-3002)
- XCG3 subsystem with switching: 14 circuits analog with XCI3RJ (P/N XCG-3003)

Firmware options

- Call generation (P/N SWF-3160)
- Switching (P/N SWF-3161)
- PSQM, PSQM+ (P/N SWF-3162)
- PESQ (P/N SWF-3163)
- T.30 fax up to V.17 (P/N SWF-3164)
- V.34 analog data modem (P/N SWF-3166)
- Meter pulsing (12 kHz or 16 kHz) (P/N SWF-3170)
- Scripting for Voice Pattern Matching (P/N SWF-3173)
- Echo measurements (P/N SWF-3221)

FOR MORE INFORMATION

Visit Spirent Communications' Website at www.spirent.com/go/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

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.spirent.com/gs or contact your Spirent sales representative.

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