



2008 Global Test & Measurement
Emerging Company of the Year Award

VePAL CX180 CATV Signal Analyzer

CATV network testing simplified

VeEX™ VePAL CX180 is a next generation test solution designed for analog and digital cable TV networks with enhanced return path QAM analysis and rich triple play features.

Platform Highlights

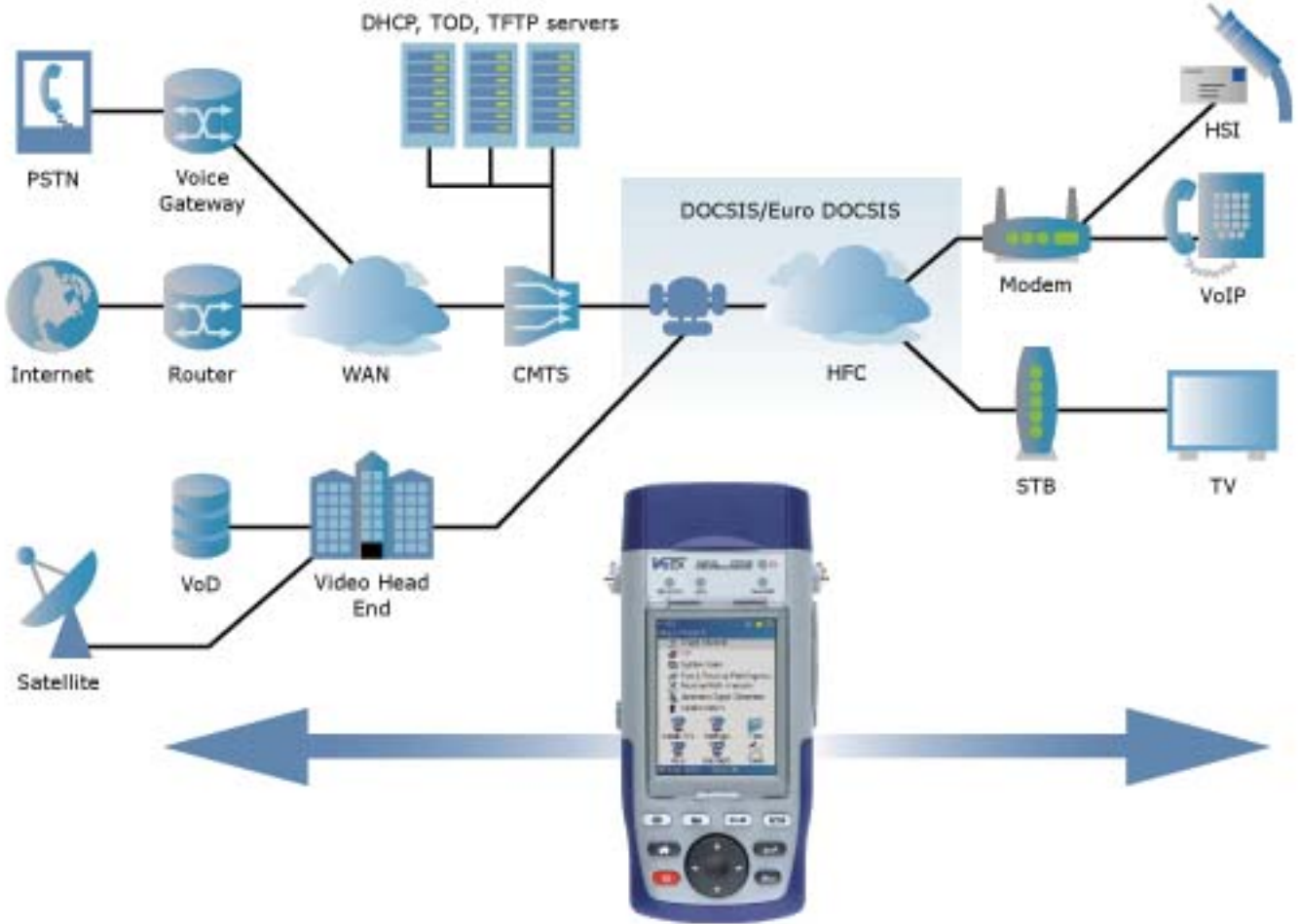
- High resolution color touch-screen viewable in any lighting conditions fitted with protective cover when not in use
- Robust, handheld chassis packed with powerful and flexible features for demanding environments and test conditions
- Optimized for field engineers or technicians installing and maintaining CATV networks enabling triple play services
- Ethernet connection for remote control, back office applications, workforce management and triple play service verification
- USB memory stick and FTP upload support for test result storage/file transfer
- Maintain instrument software, manage test configurations, process measurement results and generate customer test reports using included ReVeal™ PC software
- Extend field testing time using interchangeable LiIon battery pack/s. Greater battery autonomy provided in standby mode
- Advanced IP connection tests; Ping, trace route, ARP Wiz, web browser, and FTP upload/download
- Optional NetWiz Cat 5e cable diagnosis with network statistics
- Optional VoIP call emulation and MOS performance analysis
- Optional WiFi Wiz site survey with internet connection test

Key Features

- Frequency range support and analysis from 4 to 1000 MHz
- Carrier to Noise (C/N) and adjacent channel measurement ratio
- Annex A and B support in one unit
- Measurement of QAM 64/256 digital signals including deep interleaved modulation
- MER and Pre/Post BER measurements of QAM carriers with Constellation diagram
- Fast system scan mode of the entire active channel plan
- Installation test procedures with location specific limits
- Tilt measurements to indicate distortion over the frequency spectrum allowing technicians to apply correct equalization
- Forward and Reverse path ingress scan indicate the presence of noise and/or CSO/CTB interference
- Reverse path QAM, QPSK and CW spectrum analysis
- Optional Reverse Path QAM 16/64/128 MER, Pre/Post BER measurement with Constellation diagram
- Remote CX120/150/180 USG control for one-person reverse path sweep analysis
- optional TDR for coaxial cable fault locating
- optional Upstream QAM 16/64/128, CW, QPSK signal generation with FEC
- optional DOCSIS 2.0 cable modem with USG capability

Cable Expert

Applications

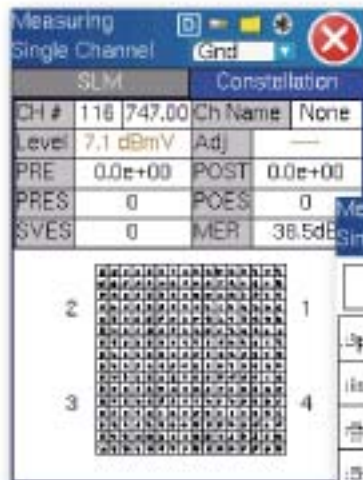
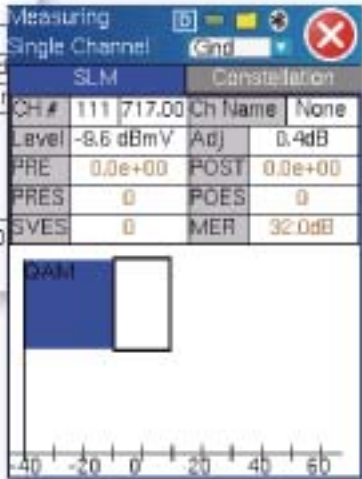


Single channel measurement

Analog and digital carriers are very different in terms of signal content and power distribution and thus require the advanced SLM techniques supported in the CX series. In analog mode, both video and audio levels including the V/A and Carrier to Noise (C/N) ratios are indicated. In digital mode, the average power of the QAM channel is measured and MER and BER performance is displayed. One button test, user programmable thresholds and test point compensation are value added utilities enabling fast, simple and automatic testing of carrier signals.

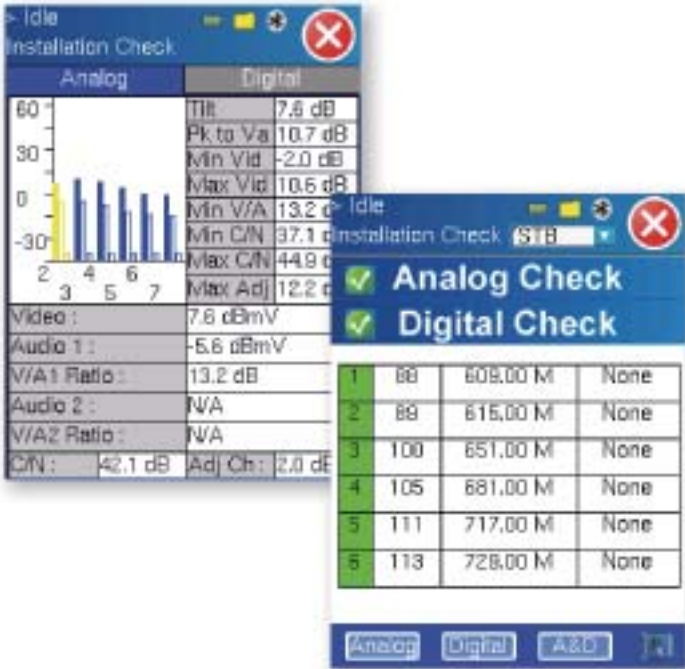
Constellation Mode

Digital pictures do not show signal impairment until it is too late because the margin between acceptable quality and failure is quite small. Constellation diagrams are a visual aid and tool to help detect the presence of noise, coherent interference, phase noise, and gain compression, all of which impact overall signal quality and Modulation Error Ratio (MER). Ideally, each of the 64 or 256 symbols should display a clean dot indicating a perfect QAM signal, therefore the size and shape build up of dots is indicative of problems which contribute to bit errors and even service disruption.



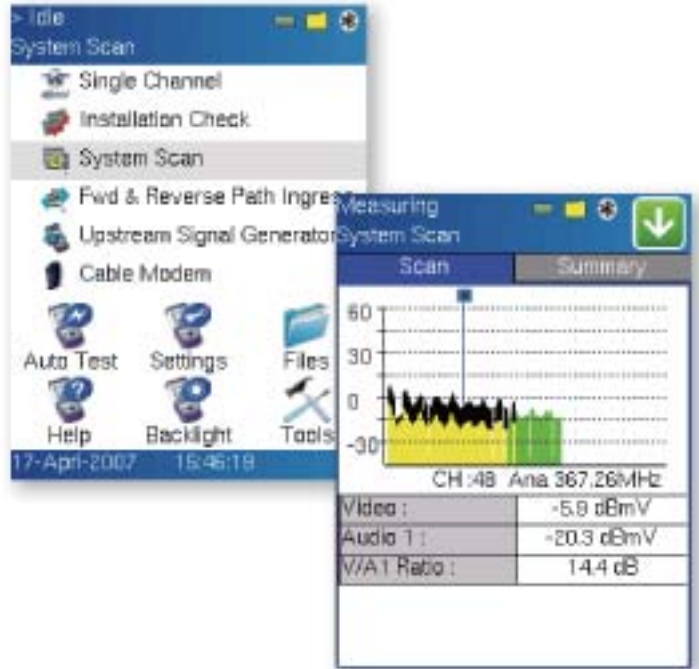
Installation Check

For new installations, up to six analog and six digital channels are checked against preset thresholds. Pass and fail conditions are color coded for easy interpretation and test results are clearly shown. A zoom function provides data measurement in greater detail.



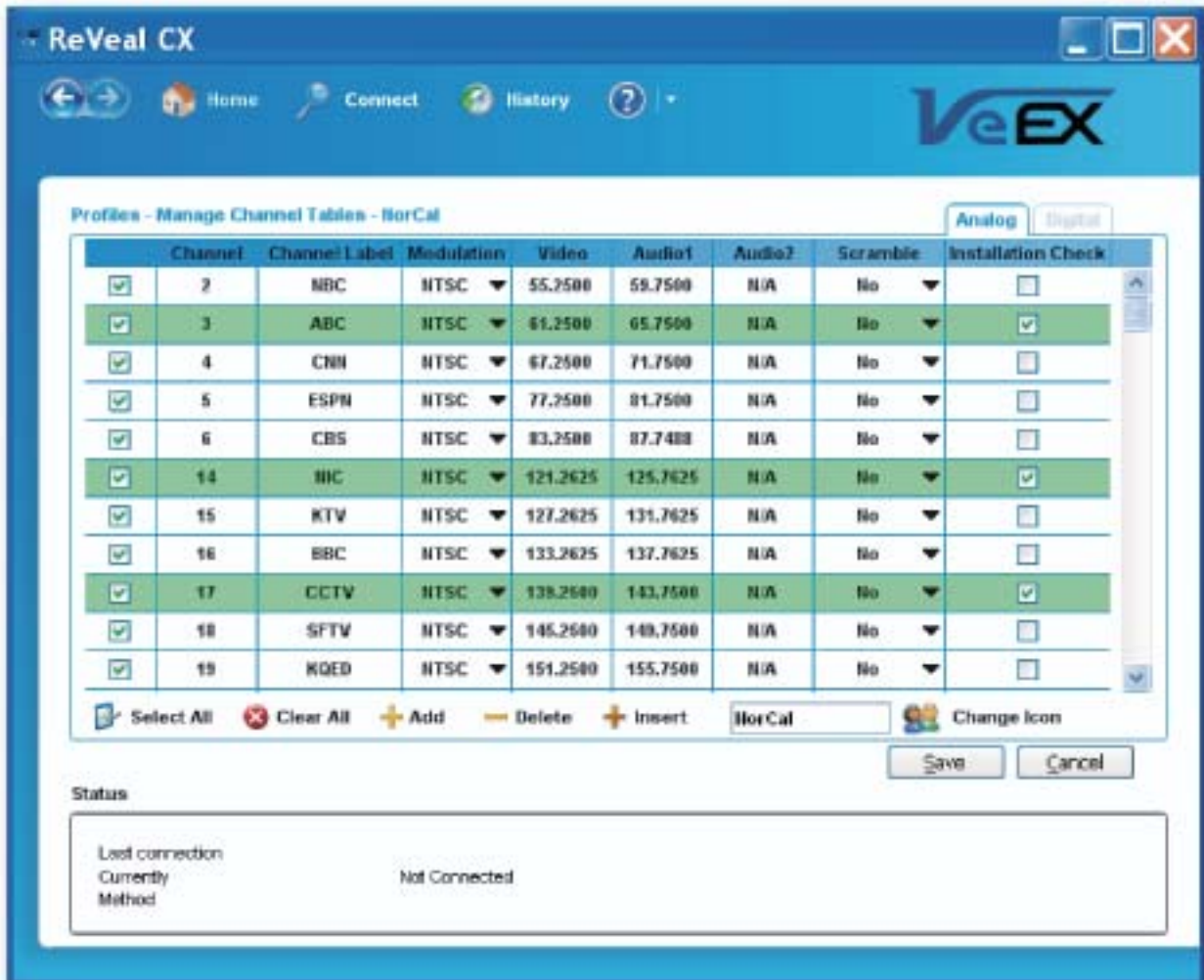
System Scan

In under a minute, all analog and digital channels at the service location are measured. Channel, frequency, modulation and power level measurements and associated signal degradations like tilt can be easily pin pointed using on screen markers. Results are displayed in either graphical or tabular formats.



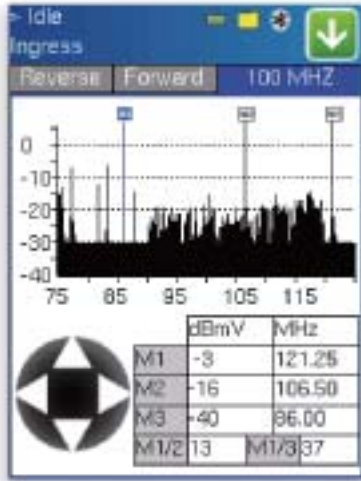
Manage Channel Tables

Up to twenty channel tables can be programmed by using the ReVeal CX software utility. Each channel table has a custom set of channels which is used for the installation check routine. Multiple CX100s can be pre-programmed with the same set of channel tables using ReVeal CX.



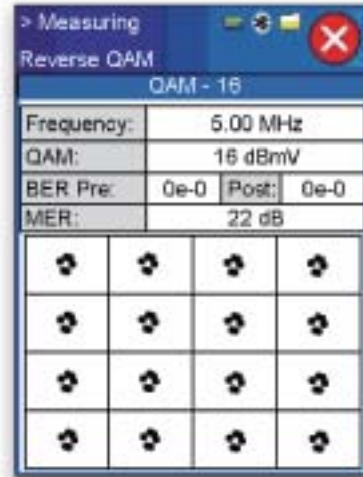
Forward and Reverse Path Scan

Poorly shielded coaxial cable and faulty terminations (CPD) are sources and causes of ingress noise. Ingress is very troublesome for return path communications in CATV networks due to the large number of subscriber generated signals being funneled towards the headend. The combined and amplified interference is quite often responsible for service disruption, therefore the ingress test function is a valuable tool to check the forward and reverse paths for interference and related problems.



Reverse Path QAM-16/64/128 signal analysis

Reverse Path digital QAM signal is carefully analyzed for the QAM level, MER, pre and post BER, and error seconds. The Upstream Signal Generator in CX120/E and CX180 can be used to generate the QAM-16/64/128 signal from a distant location for detailed analysis.

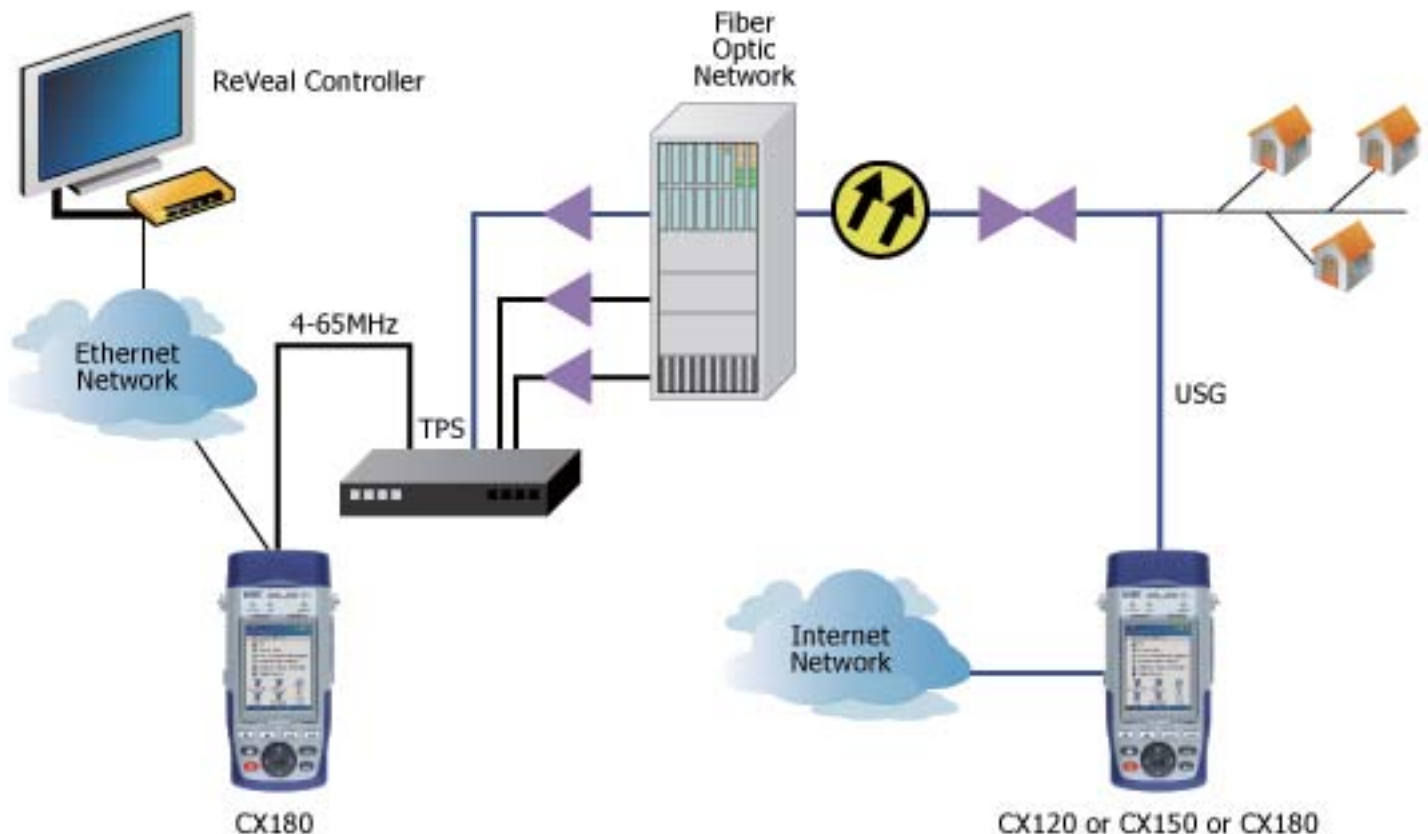


Remote CX180/150/120 control for Reverse Path Sweep

Remote control of a CX120/150/180 unit via Internet enables the reverse path sweep from a head-end location by a single person. The reverse path sweep ensures the reverse path is properly constructed and provisioned to support the high speed cable modem connection.

ReVeal CX180R-Controller Software option

CX180 can be controlled remotely via internet connection by a ReVeal CX180R-controller. This allows a centralized control of CX180s installed in various locations. Measurement results are saved in the ReVeal CX180 database. Test results can be viewed by a CX180/150/120/100 at any location of the network with an internet connection via the built-in 10/100-T Ethernet port or internal cable modem (CX150/E model).



Advanced IP testing

Complete IP verification is possible using either the DOCSIS or Ethernet test ports. Considering that all Triple Play services are IP centric, a powerful and comprehensive set of IP test capabilities is no longer considered a luxury or a "nice to have" feature. Technicians need to verify network connection during installation and/or service restoration, and thus rely on features such as Ping test, Trace Route, ARP, Web browser, and FTP upload/download to get the system "up and running".



IPTV service verification

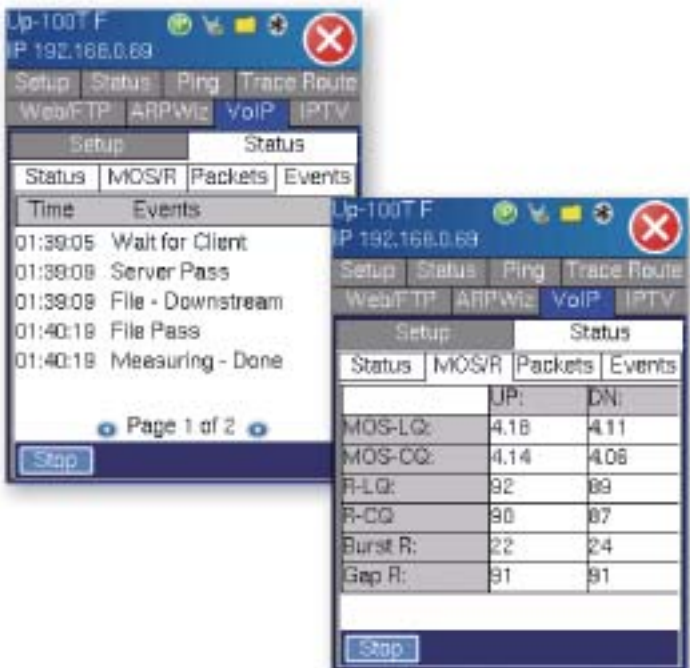
Designed and optimized for technicians turning up IP video service. Set Top Box emulation (STB) includes registration, IGMP and RTSP signaling for Broadcast and Video on Demand (VOD) applications. Transport stream analysis encompasses data/video/audio bit rates and Program Identification (PID) mapping. Packet jitter and loss, IGMP latency (channel zapping), PCR statistics and Viewer function complete the Video Quality of Service (QoS) application suite.



Voice over IP testing

Take advantage of the two separate software options offering different test methods to verify and provision your VoIP network. Testing can be performed over the Ethernet and/or DOCSIS test interface depending on the CX model type.

The VoIP Expert generates industry standard wave files to verify MOS and R-Factor values of upstream and downstream paths and includes QoS measurements like packet jitter, packet loss, and delay.

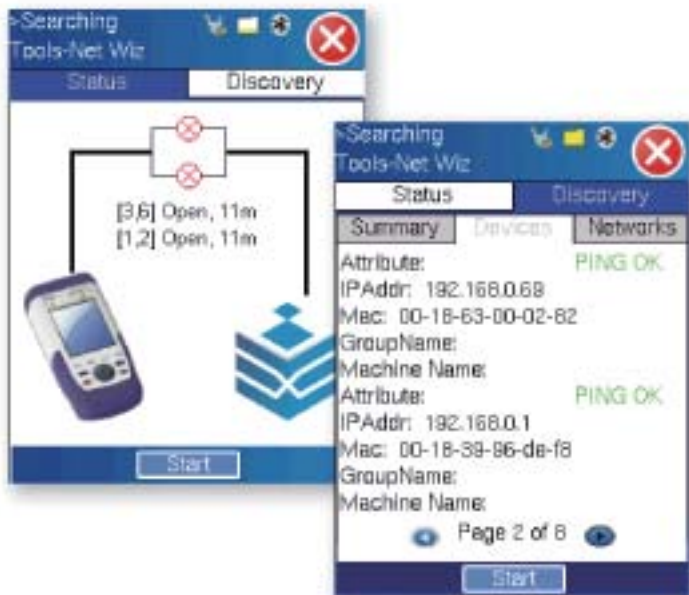


The VoIP Call Expert emulates an IP phone and can place and receive calls using SIP or H.323 protocols. Comprehensive Codec support and call destination options verify voice encoding and translation provisioning. Real time evaluation of subjective voice quality (MOS and R-factor) is made possible using the patented Telchemy test method which has been integrated into all VPAL test sets.



Net Wiz

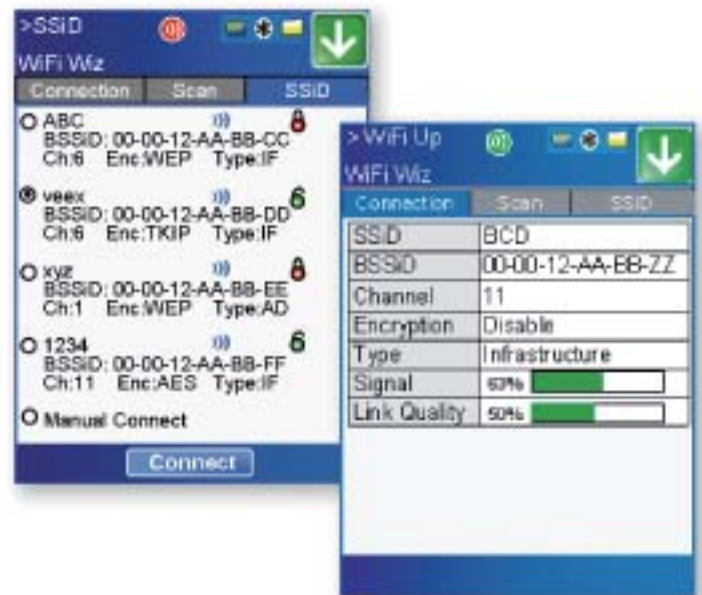
Ethernet network installation simplified using this basic, yet powerful feature. A built-in TDR identifies distance to short, distance to open, wire cross, and other anomalies associated with CAT-5 structured cabling. "Sniff" the network using the one-touch discovery feature - Identify routers, gateways, printers, PCs and other devices connected to the network within seconds.



WiFi Wiz

All VPAL products adopt an USB WiFi adaptor to make 802.11 b/g Wireless installations a simple task. Scan for existing and available networks or perform signal strength and quality measurements to determine the best location for a new Wireless Access Point.

The IP Ping capability finally ensures the wireless network is properly installed and configured.



CX100/CX120/CX150/CX180 Feature Comparison

Cable Expert Features	CX100/E	CX120/E	CX150/E	CX180
Analog Channel Measurement	✓	✓	✓	✓
Digital Channel Measurement	✓	✓	✓	✓
Digital Channel Constellation	✓	✓	✓	✓
Installation Check	✓	✓	✓	✓
Full System Scan	✓	✓	✓	✓
Forward/Reverse Ingress Scan	✓	✓	✓	✓
Upstream Signal Generator	✗	⊕	✓	⊕
Upstream Signal Generator with FEC	✗	⊕	✗	⊕
Cable Modem Emulation	✗	✗	✓	⊕
reVeal CX Software Management Tool	✓	✓	✓	✓
Reverse Path QAM Analysis	✗	✗	✗	⊕
TDR	✗	⊕	✗	⊕
IP Test Suit via Cable Modem Port				
Basic Ping Test	✗	✗	⊕	⊕
VoIP Expert	✗	✗	⊕	⊕
VoIP Call Expert	✗	✗	⊕	⊕
Trace Route, ARP, Web/FTP, Web Browser	✗	✗	⊕	⊕
IP Test Suit via Chassis ports (10/100-T or USB)				
Basic Ping Test	✓	✓	✓	✓
VoIP Expert	⊕	⊕	⊕	⊕
VoIP Call Expert	⊕	⊕	⊕	⊕
Trace Route, ARP, Web/FTP, Web Browser	⊕	⊕	⊕	⊕
WiFi Wiz	⊕	⊕	⊕	⊕
Net Wiz	⊕	⊕	⊕	⊕
File Transfer				
USB Memory Stick	✓	✓	✓	✓
Remote FTP File Transfer	✓	✓	✓	✓
via 10/100-T Chassis Port	✓	✓	✓	✓
via Cable Modem Port	✗	✗	✓	⊕

Legend: ✓ Standard feature ⊕ Optional feature ✗ Not supported

Specifications

Measurements

Frequency Range: 4 to 1000MHz

Level Input Range: -40dBmV to +55dBmV

Level Accuracy: ±2.0dB typical

Amplitude Resolution: 0.1dB

Downstream Modulation: 64/256 QAM Annex A¹/B/C

Digital Lock Range²: -15dBmV to +50dBmV

C/N Accuracy: ±2.0dB typical

MER: 21 to 40 dB (±2.0dB typical)

Downstream BER Range: 1.0×10^{-9} to 9.0×10^{-3}

Input Impedance: 75 Ohms

Single Channel Measurements

Analog signal measurements: Video and audio power level, video to Audio ratio, adjacent channel ratio, C/N ratios

Digital signal measurements: QAM power level, MER, Pre/Post BER, Constellation, Deep Interleave, Adjacent channel ratio

Installation Check

Measurement locations: Tap, ground block, Set-Top Box.

Analog Measurements: up to 6 channels per channel table including tilt, peak-to-valley, min/max video level, min/max video to audio ratio, min/max C/N ratio, max adjacent channel ratio

Digital Measurements: up to 6 channels per channel table including tilt, peak-to-valley values, min/max QAM level, min/max MER, max adjacent channel ratio

System Scan

Scan on all channels in the active channel plan

Analog Measurements: Video and audio power levels, video to audio ratio, adjacent channel ratio, C/N ratio, tilt, peak-to-valley, min/max video level, min/max video to audio ratio, min/max C/N ratio, max adjacent channel ratio

Digital Measurements: QAM power level, Adjacent channel ratio, tilt, peak-to-valley values, min/max QAM level, max adjacent channel ratio

Forward Path Ingress Scan

Forward scan range: 54 / 108¹ to 1000MHz

Resolution Bandwidth: 125KHz, 330 KHz, 1 MHz

Attenuation range: 0 to 50dB, 10dB/step

Range with attenuation: -40dBmV to +50dBmV

Resolution: minimum 62.5KHz

Reverse Path Ingress Scan

Reverse scan range: 4 to 42MHz / 65MHz¹

Resolution Bandwidth: 125KHz, 330KHz, 1MHz

Attenuation range: 0 to 50dB, 10dB/step

Range with attenuation: -40dBmV to +50dBmV

Resolution: minimum 125KHz

Reverse Path QAM-16/64/128 analysis

Reverse scan range: 4 to 42MHz / 65MHz¹

Minimum Lock Level: -5dBmV

QAM level, MER, pre/post BER

Constellation diagram

Requires CX120 or CX180 with USG+FEC option

Advance IP test suit

Ping, trace route, ARP wiz, FTP/Web tests. These tests are done via the chassis 10/100-T port

VoIP Expert

Provides VoIP Metrics

- MOS and R-factor measurement
- Packet Statistics: packet loss, jitter, delay

VoIP Call Expert

VoIP Call setup with VoIP USB adaptor

Supports SIP and H.323 Protocol

Codec: G.711U, G.711A, Auto

IPTV

Provides true STB emulation

Supports IGMP/RTSP signaling, MPEG2/4, H.264 encoding, RTP/VC1/MPEG-TS transport streams

Packet Statistics: packet loss, jitter, delay, PID mapping,

Video/Audio rates

Channel zapping for quick and complete installation check

WiFi Wiz

Supports 802.11 b/g

SSID detection, Infrastructure, Ad-hoc, and encryption

Signal strength and qualify site survey

IP connection verification

Net Wiz

Available on 10/100-T chassis port

Detect distance to open/short, wire cross, impedance mismatch

Network device discovery

Auto ping verification

Cable Expert

General Specifications

Size	210 x 100 x 55 mm (H x W x D) (8.25 x 3.75 x 2.25 in)
Weight	Less than 1 kg (less than 2.2 lbs)
Battery	Lilon smart battery 2400 mAh 10.8VDC
AC Adapter	Input: 100-240 VAC, 50-60 Hz Output: 15VDC, 3.5A
Operating time (typ)	4 hours

Note:

- 1 Annex A
- 2 Typical range with QAM-64 modulation.

Ordering Information

Z02-01-008P	VePAL CX180 Handheld SLM Test Set, Annex A+B
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Interfaces/Test Options

499-05-039	Reverse Path QAM Signal Analysis (CX180 only)
499-05-054	CX180/CX120 Remote Sweep and View
499-05-072	Advanced Management
499-05-073	Home Installation Process
499-05-074	ReVeal CX Server Package (Software only)
499-05-075	ReVeal CX Server Maintenance Contract (require per year after the first year)

Additional Options

499-05-001	Web Browser (require advanced IP option)
499-05-002	NetWiz
499-05-003	Remote Control
499-05-007	VoIP Expert
499-05-008	IPTV Expert
Z88-00-001G	WiFi Wiz, incl. USB WiFi Adaptor
Z88-00-001P	VoIP Call Expert, incl. VoIP USB Adaptor & Earplug
Z88-00-005G	Advanced IP, incl. Ethernet Cable

Recommended Accessories

407-0833-001G	Coaxial Connector Female to Female F Type
407-0834-001G	Coaxial Connector Female to Male F Type
F01-00-001G	Coaxial Cable Male to Male F Type 2 m (6 ft)

Replacement Items

405-02-001G	Screen Protector
A01-00-001G	AC Adaptor
A02-00-001G	Car Adaptor
B02-03-001G	Battery Pack
C01-00-001G	Carrying Case (Basic)
C02-00-002G	Carrying Pouch
C03-00-001G	Shoulder Strap
F02-00-001G	Ethernet Cable RJ45 to RJ45 2 m (6 ft)
F04-00-001G	Power Cord - US 2 m (6 ft)
F04-00-002G	Power Cord - EU 2 m (6 ft)
F04-00-003G	Power Cord - UK 2 m (6 ft)
Z77-00-001G	Stylus (pack of 5)



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