CX380C
Advanced Plant Maintenance

Powerful, Budget Friendly Tools
Features fast 1.8 GHz Spectrum Analysis and Sweep, DOCSIS 3.1 OFDM, Full SLM, V-Test Speedtest, OPM and TDR/DMM.

Platform Highlights

- Robust, lightweight chassis packed with powerful features for demanding environments and test conditions
- High resolution color 7" touch-screen with graphical user interface
- Ethernet LAN management port for remote control, back office applications and workforce management
- Fast and efficient test result transfer to USB memory stick or FTP upload via LAN, DOCSIS, USB WiFi, USB data modem or USB Bluetooth
- Maintain instrument software, manage test setups and channel tables, process measurement results and generate customer test reports using included ReVeal™ PC software
- Extend field testing time using interchangeable Li-ion battery pack(s)
- Ability to lock user interface to prevent unwanted human interference during long-term testing
- WiFi Wiz with InSSiDer SSID Analysis*
- Digital Fiber Inspection Scope USB accessory*
- OPX-BOXe OTDR USB accessory*

Key Features

- Fast 1.8 GHz Spectrum Analyzer
- Full compatibility with CaLan 3010H+ Sweep System, for Forward Path to 1.8 GHz and Return Path to 204 MHz*
- Comprehensive SLM measurements including fast VeCheck Full Band Scan, Tilt and Single Channel
- In Service Sweep
- Advanced Digital measurements (MER, BER, Equalizer, HUM, Center Frequency Error, Symbol Rate Error, Frequency Response, Group Delay)
- DOCSIS 3.1 Cable Modem with true OFDM Analysis
- V-Test Throughput tests for both RF and Layer 4+ interfaces
- V-Perf Layer 4+ TCP Test*
- Physical layer cable testing with TDR* and DMM*
- Optical Power Meter*

*Optional features

Sweep

DOCSIS 3.1/4.0 deployments utilize previously unused and untested frequency spectrum exposing potential trouble for operators. Initial Downstream expansions go to 1.2 GHz, evolving later to 1.8 GHz, while the Return Path will extend to 85 MHz or 204 MHz depending on market or MSO service delivery objectives.

Forward Path Sweep

Utilize the tried and true practice of verifying the frequency response of amplifiers to ensure proper tilt and balancing. CX380C is fully compatible with the CaLan 3010H+ Headend Sweep Transmitter, which injects active sweep points, enabling a forward path sweep up to 1.8 GHz. Even with an all-digital HFC system, tone insertion between QAM channels is made possible by the CaLan 3010H+'s ability to transmit lower level sweep tones that do not impair live QAM channels.

The simultaneous display of the sweep trace, along with low and high pilot signals and pass/fail limits, enable fast and simple network setup and balancing. Sweep Trace smoothing and averaging help make display interpretation simple and foolproof along with direct Tilt and Peak-to-Valley measurements.
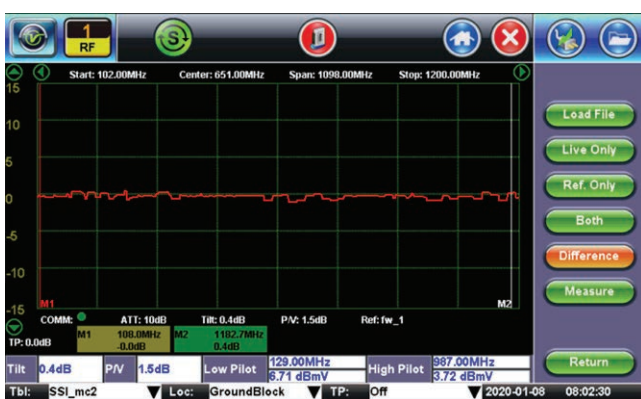

In Service Sweep

This is a non-service interrupting forward path sweep feature. In Service Sweep measures existing channels based on the user configured Channel Table. The sweep trace is displayed by plotting a line between points. The points are based on channel measurements, in place of sweep measurements. The start and stop points are the lowest and highest channels.

Return Path Sweep

CX380C works in conjunction with the CaLan 3010H+ Sweep System installed at the Headend, enabling a return path sweep up to 204 MHz. CX380C operates as a return path transmitter, injecting active sweep points. This function verifies the frequency response, tilt and proper operation of the amplifiers.
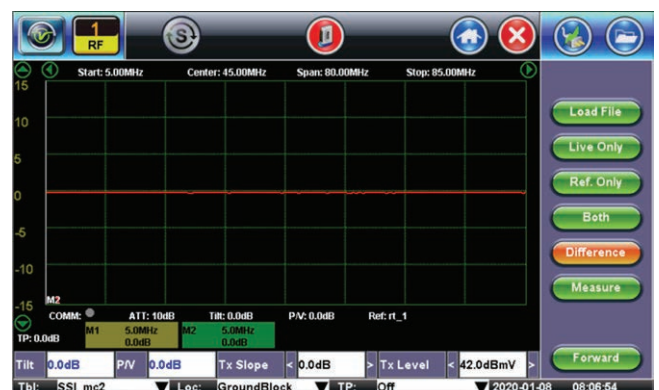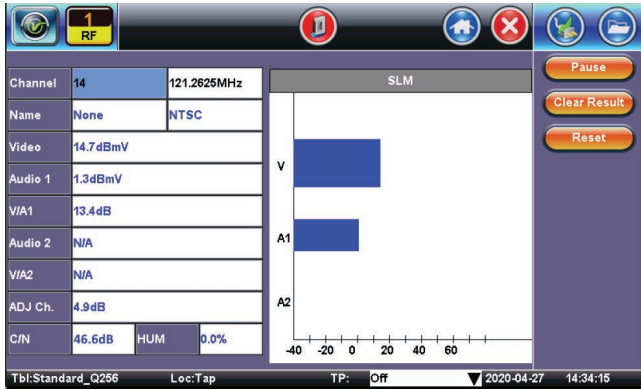
SLM Features

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 CX380C.

In **analog** mode, video and audio levels, V/A, Adjacent Channel, C/N, and HUM are measured.

In **digital** mode, average power, MER, Pre-BER, Post-BER, Error seconds and constellation diagram are displayed. User programmable location thresholds and test point compensation are useful utilities enabling fast, simple and automated testing of carrier signals.
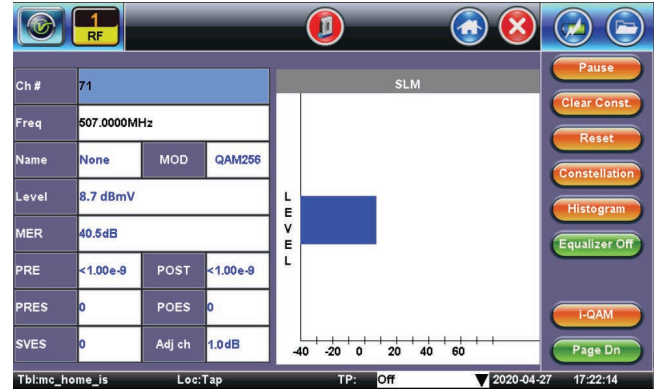

Advanced Digital Channel Analysis

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 – A valuable tool to help detect the presence of noise, phase jitter, interference, gain compression, laser clipping and ingress, all of which impact overall signal quality and thus reduces Modulation Error Ratio (MER).

Adaptive Equalization – The built-in equalizer does a great job of improving MER of a QAM signal, but it is also important for technicians to know how hard the system is working to ensure adequate margin for system degradation. The active equalizer taps are displayed graphically providing an insightful view of which taps are working harder to overcome impairments.

Frequency Response and Group Delay provides powerful diagnostic capability. Poor frequency response and group delay affect QAM signal integrity. Typical culprits are marginally balanced amplifiers.

The equalizer can also be turned off to enable further troubleshooting of marginal amplifiers.
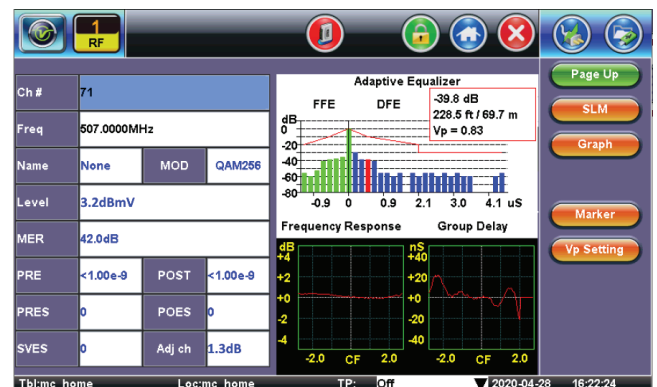
SLM Features *cont'd*

Histogram Analysis

Noise impulses can suddenly disrupt a digital carrier but it's difficult to detect without monitoring the carrier over a period time.

The histogram feature records level, MER, Pre-BER, Post-BER and Error Seconds on a per second or per minute time bucket, for up to 60 minutes. The results are shown in graphical format that allows easy correlation of measured parameters down to one-second resolution.

VeCheck

VeCheck is a fast and powerful Full Band Scan for the Forward Path, covering up to 1218 MHz. It is a 'One-Button Test' for verifying QAM, Single-Carrier DOCSIS QAM, and D3.1 OFDM. Key metrics include Level, Modulation Type, MER and BER, presented in easy to view graphical and tabular formats.
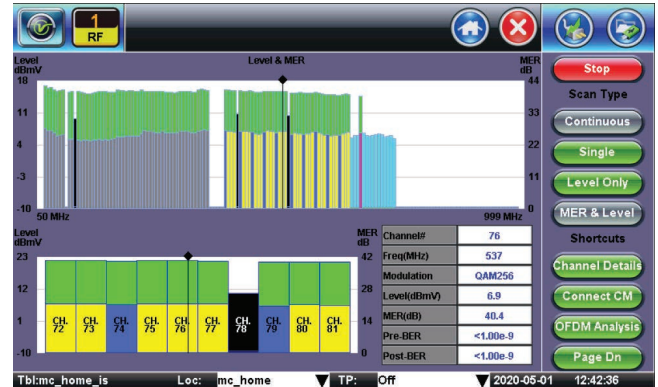
Tilt

Tilt measurements identify distortion over the frequency range allowing technicians to apply correct equalization or compensation to the HFC network. Up to eight analog signals and digital carriers including DOCSIS channels can be predefined on a channel table and selected to perform the tilt measurement. The measurement can be performed between the lowest and highest channel or any user selectable channel by tapping the applicable bar on screen.
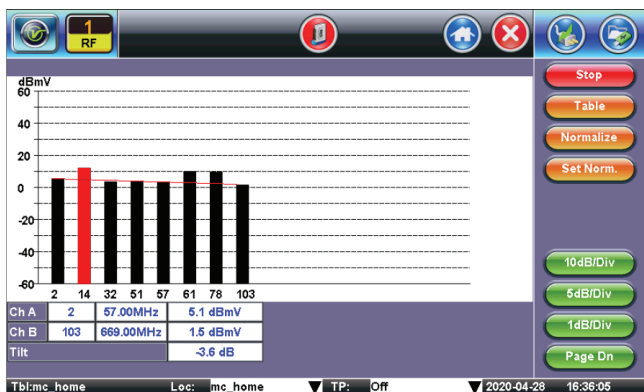
FCC POP

Proof of Performance tests are required by the FCC for MSOs to periodically prove their analog networks are within specified guidelines for performance. Carriers' networks evolving to all-digital necessitates Digital POP tests.

The optional FCC POP Feature consists of various Auto Tests, including Digital POP. Test Channels are based on a user configurable Channel Table. Standard test results are supported in both CSV and PDF Formats.

True Spectrum Analyzer

The CX380C offers a fast and powerful Spectrum Analyzer that incorporates advanced technology to capture transient ingress across a wide frequency range with 70 dB display range. Adjustable RBW, Signal Type, and Sweep settings optimize signal representation and noise floor performance. The frequency range is 5 MHz to 1.8 GHz, fully supporting the DOCSIS 3.1/4.0 specification.

The large 7" high resolution TFT LCD features a fast refresh rate, preserving and displaying the finest spectrum details. Touch-screen control allows rapid on-the-fly changing of test parameters and simplifies measurements while horizontal and vertical markers and min/max hold displays signal values instantly and varying signal parameters over time.

Test profiles consisting of user-settable parameters such as CF, Span, RBW, and Marker positions can be saved and recalled for repeated testing. Waveform storage enables a user to compare and contrast a captured signal versus a current measurement, in both superimposed or split screen views.

Laser Clipping

Ingress and impulse noise can cause signal clipping when upstream fiber amplifier inputs are presented with excessive power levels. As more carriers are added to the return path using channel bonding, composite power to the laser will increase.

Common Path Intermodulation Distortion (CPID/CPIM)

Spurious signals appearing in the upstream composed of distortion products of the downstream signals. Lower frequency components are passed through the diplex filter and amplified by the return amplifier. Common Path Distortions are intermittent by nature and are directly related to poor connections, corrosion, kinks and radial cracks in the cable.

Upstream Ingress

The return path is more susceptible to RF impairments because this frequency spectrum is heavily used for Ham and Citizen Band radio transmissions. Interference is not only limited to RF transmissions; Impulse noise generated by electric motors, switches, lightning strikes, high voltage power lines, vehicle ignitions, or household electrical appliances at the subscriber premise are particularly damaging to data transmissions where short bursts of interference can seriously reduce data throughput.

The return path is also very vulnerable to a phenomenon known as Noise funneling. The summation of all unwanted noise (Gaussian, ingress and impulse noise) coming from both subscribers and the cable plant itself affects the return transmission system and needs to be monitored.
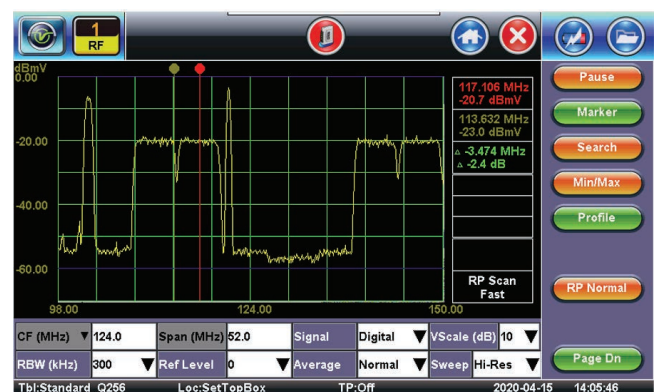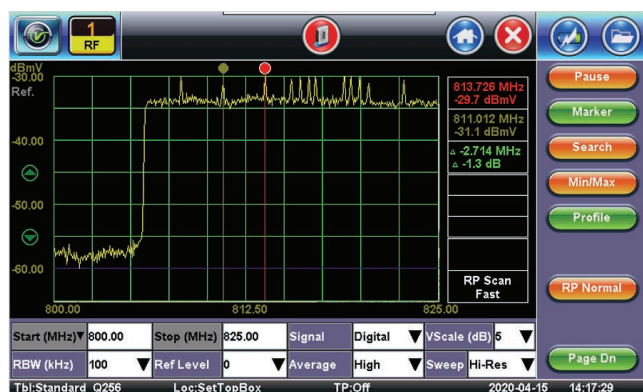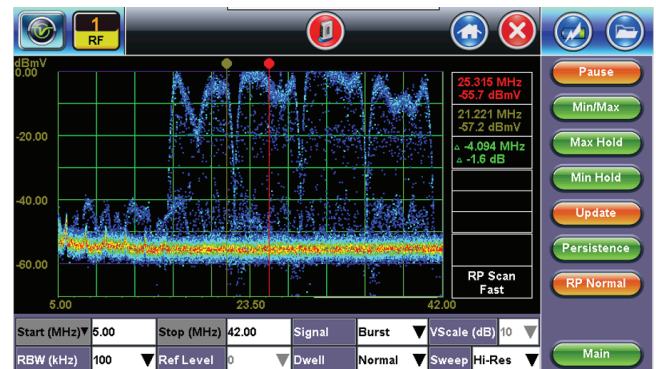
DOCSIS© 3.1/3.0

DOCSIS 3.1/3.0 Modem Emulation

Equipped with a 32x8 DOCSIS 3.0/3.1 Cable Modem, the CX380C enables technicians to perform actual modem connection tests, without having to carry a separate modem on service calls.

Intuitive Ranging Results

At a glance, the technician is able to view a summary of the ranging and registration process, check Baseline Privacy (BPI+) encryption status and identify which connection parameters have passed or failed.
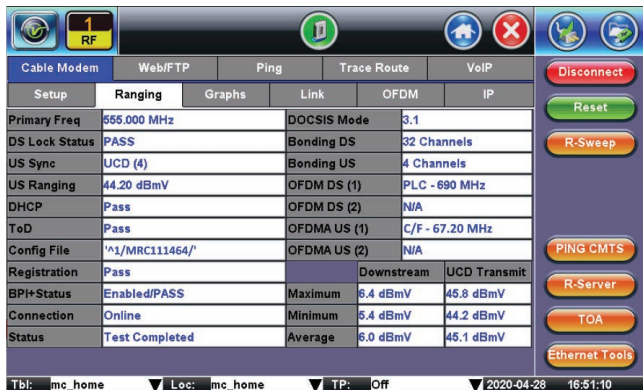
Channel Power Graphs

Provides a single screen graphical overview of all DOCSIS Downstream carriers and active UCDs. Perform Tilt analysis.
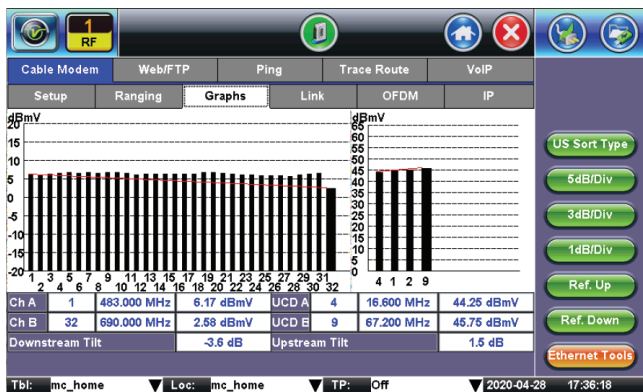
Link Statistics

A range of live link connection parameters for all bonded DOCSIS downstream and upstream channels. Measurements include power level, SNR, and Pre and Post BER.


Additional DOCSIS Modem Features

• Enhanced Security – Advanced Encryption Standard (AES)
• Pass-Through testing – modem emulation to verify high bandwidth data transfer between PC and Network

Verifying Upstream Channel Bonding

DOCSIS 3.0/3.1 channel bonding provides cable operators a flexible way to increase bandwidth to customers. Upstream speeds in particular have come under a lot of pressure due to a sharp increase in user generated content such as video and photo uploads, driven by the proliferation of social and networking sites.

Checking RF Levels - Significant consideration must be given to the cumulative RF power loading that is realized with upstream channel bonding. Up to eight upstream DOCSIS channels, plus optional OFDMA, transmitting simultaneously can result in a large contiguous channel loading. To avoid excess power hitting the return path fiber-optic transmitter and to reduce the possibility of laser clipping, the power levels of each channel can be carefully monitored in the link measurement tab.
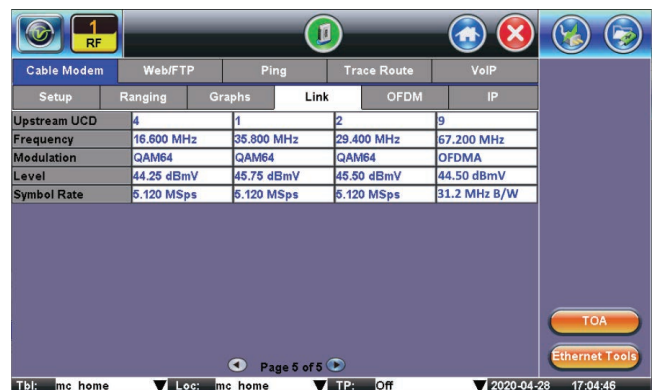
For advanced troubleshooting, Upstream Pre-Equalization Adaptive EQ parameters and In Channel Frequency Response can be viewed by tapping on the desired UCD number.
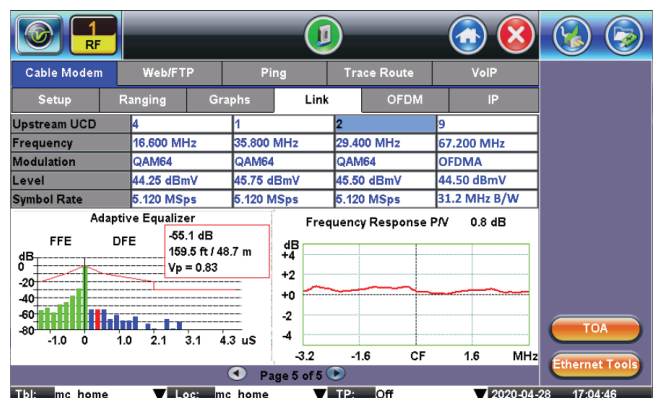
DOCSIS 3.1 OFDM Testing

OFDM, combined with Low Density Parity Check (LDPC) advanced FEC technology, are the basis for DOCSIS 3.1 transmission. Key DOCSIS 3.1 measurements are derived from its OFDM/LDPC building blocks, which consist of the PHY Link Channel (PLC), Next Codeword Pointer Channel (NCP) and Modulation Profiles.

The Phy Link Channel is used as a message channel for bringing new Cable Modems online. The PLC contains critical information on how to decode the OFDM signal.

An OFDM Phy Channel consists of numerous multiplexed subcarriers. Each subcarrier can be either 25 kHz or 50 kHz wide. As an example, a single 192 MHz OFDM Channel can contain up to 3840 50 kHz wide subcarriers.

When Codewords (CW) are mapped to OFDM subcarriers within a symbol, a pointer is needed to identify where a data CW starts. This is known as the Next Codeword Pointer (NCP).

A Modulation Profile is a list of modulations that are used for the subcarriers within an OFDM channel.

- Profile A is the boot profile that cable modems first receive when they initialize and register with the CMTS. All DOCSIS 3.1 Cable Modems must support the base Profile A, as it is a prerequisite for D3.1 transmission
- Profiles B, C, D: line conditions are continuously monitored and when a sufficiently high SNR threshold is achieved for a given OFDM subcarrier, higher modulation schemes can be used for greater spectral efficiency. The Profiles can be tailored to the line conditions of each subcarrier

Powerful Built-in OFDM Analyzer

- The fundamental D3.1 test pertains to locking to the PLC. Key PLC measurements include Level, MER performance, Corrected CW and Uncorrected CW
- NCP based tests include verification for lock status, MER, Corrected and Uncorrected CW
- Modulation Profile analysis, for the Boot Profile A and higher modulation profiles, are done to check for Lock status, MER, and Corrected/Uncorrected CW
- OFDM Channel status for actual bandwidth, subcarrier bandwidth, and the active number of subcarriers
- An overall OFDM channel performance assessment, including average overall MER, and the worst performing subcarriers based on a user settable MER Percentile setting

OFDM Check

The OFDM Check feature allows for true OFDM Signal Analysis without having to go online in Cable Modem mode. This is extremely valuable if the DOCSIS signal is impaired or is not available, which can be the case at some test points. OFDM Check only requires locking on the downstream PLC signal and provides a wealth of OFDM measurements.
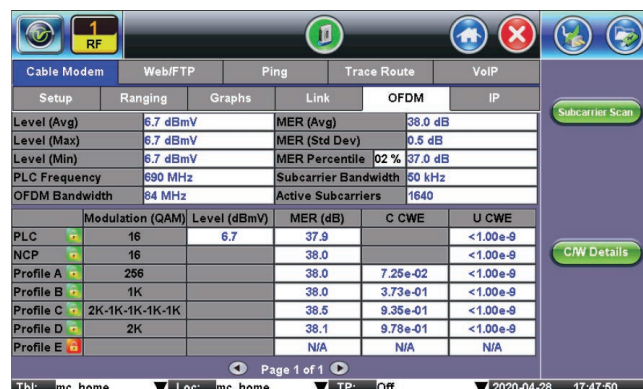
Another valuable tool is the OFDM PLC Search, which removes the guesswork for the PHY Link Channel frequency, if it is not known.


OFDM Subcarrier Scans *(Patent Pending)*

In depth OFDM analysis is made possible with detailed subcarrier scans, which are presented in intuitive, graphical format.
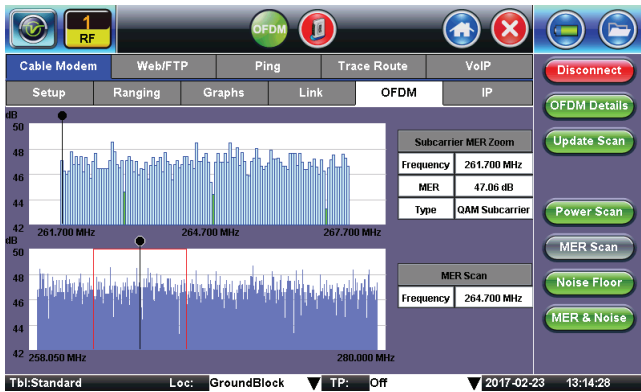
Subcarrier Power Scan

More precise OFDM power levels can be measured using the Power Scan. The OFDM channel is sectionalized to provide 6 MHz power measurements. Color coding clearly identifies the QAM modulated subcarriers, PLC subcarriers, and continuous pilots.
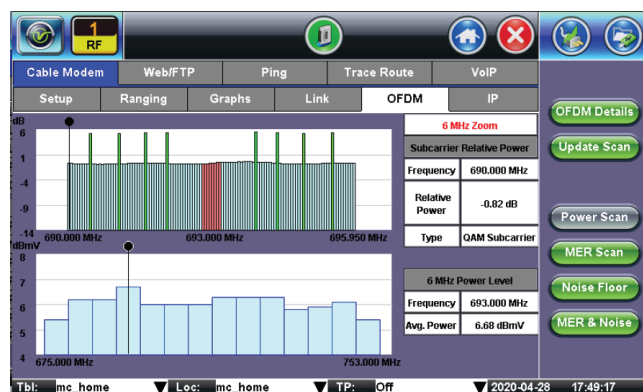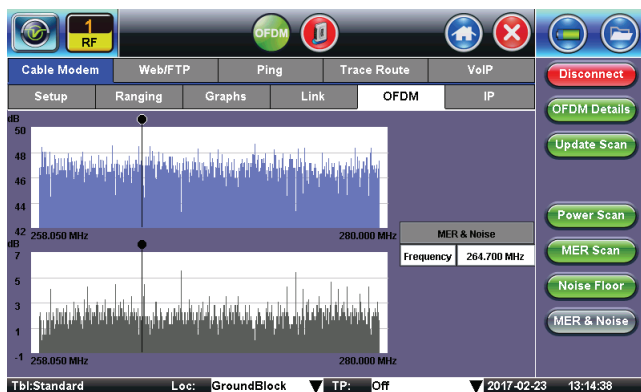
Subcarrier MER Scan

The full MER scan is presented on a per subcarrier basis.

Subcarrier Noise Scan

A full OFDM noise floor scan provides insightful indications of disturbers that may be present.

Detect Noise Under the OFDM Channel

The MER and Noise subcarrier scans can be overlaid in a MER and Noise graphical view, which ultimately can help identify service impacting plant impairment issues, namely hidden noise under the OFDM Channel.
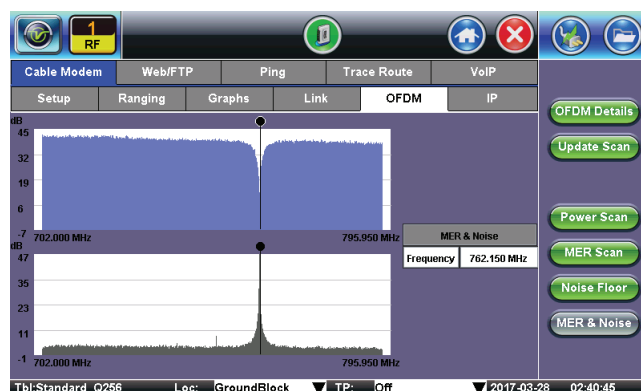
IPv6 Support and Network Server Verification

Once successful upranging is complete, the DOCSIS modem registers with the Cable Modem Termination System (CMTS) and checks for an IPv6 address before looking for an IPv4 address. IP addresses from the network servers (DHCP, TFTP, TOD and DNS) are discovered and clearly displayed.

V-TEST Throughput

V-TEST Throughput Test supports VeEX Mode and Speedtest Powered™ Mode based on Ookla® technology.

The V-TEST feature qualifies network HTTP protocol performance by testing against a V-TEST HTTP server, up to the full line rate depending on the server specifications and limitations. V-TEST is supported for both the RF and Ethernet test interfaces.

Connection time to the server, data transfer time, line rate and data rate are reported during the tests.

The V-TEST application is flexible enough to operate in different modes depending on user preference; VeEX Managed mode, Speedtest Powered mode based on Ookla technology, and User Managed mode.

In VeEX Managed mode, the customer's servers are added to a customer server list that is maintained and managed by VeEX for the end-user's ease of use and convenience. The full list of server IP addresses or URLs are provided to VeEX. Once added, all the user has to do is select the server from their company list and initiate the test to the selected server.

In Speedtest Powered mode, the test follows Ookla's methodology and tests to the Speedtest® Server Network. In this mode, the test is compatible with Ookla's protocol/methodology; it will scan nearby servers in the local market and test to the server with the fastest (lowest latency) response.

In User Managed mode, the user is allowed to enter the server IP/URL and save it to a server list that they can maintain and manage on their own.

V-PERF TCP Test

A common source of customer complaints come from file transfer speeds not matching the throughput rates guaranteed in the SLA. While many factors affect TCP applications performance, including customer's operating system hardware performance and settings (TCP window size), carriers need to prove SLA with a test tool that can show TCP performance independent of Operating System or Server limitations and present repeatable reliable results.

The V-PERF feature uses RFC6349 test methodology and metrics for qualifying network TCP performance. It offers a full line rate stateful TCP test with configurable window sizes, client and server modes as well as compatibility with iPerf servers.

TDR and DMM

### Cable Fault Identification and Fault Location

- Digital multimeter is used to verify proper amplifier power and identify faults such as shorts.
- Time Domain Reflectometer (TDR) for precise fault location and verify drop cable length.

Verify Fundamental Cable Requirements

The optional TDR applies advanced signal processing techniques to detect opens, short circuits, splices, taps, water ingress and other elusive impedance mismatches on coaxial cables up to distances of 5000 ft (1.5 km). The cable under test is scanned within seconds, allowing the user to view the full run and to identify faults quickly.

All major operating and setting parameters can be easily accessed using only 4 tabs located at the bottom of the screen.

Experienced technicians will benefit from selectable impedance settings and adjustable Velocity Propagation (VP) factors to perform various tests on different cables.
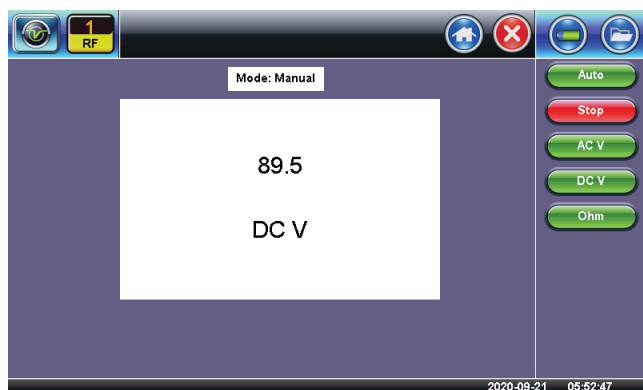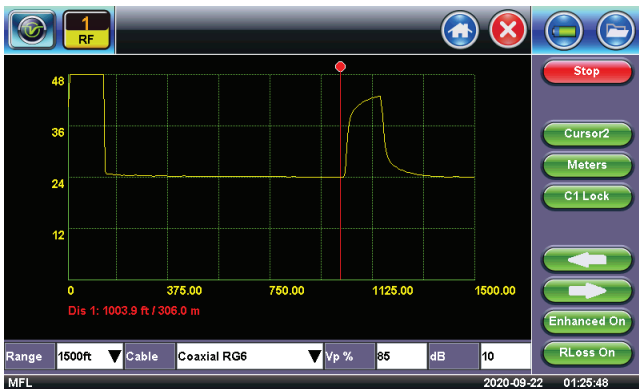
WiFi InSSIDer

The WiFi InSSIDer provides the best tools for WiFi networks discovery and performance troubleshooting. With compatible USB WiFi adapter for 802.11 a/b/g/n/ac wireless in 2.4 GHz and 5 GHz bands the InSSIDer provides a clear picture of the environment. It helps identify poor channel placement, low signal strength and interferences in easy to understand graphs and tables.

Network scan results in Graphical or table format
Lists: Network names, BSSID, encryption type, channel allocation, signal strength, co-channels and overlapping channels
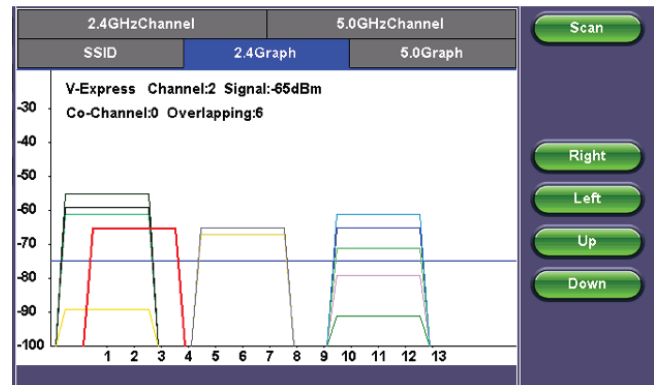
WiFi Wiz

The WiFi Wiz function with USB WiFi adapter for 802.11 a/b/g/n/ac wireless in 2.4 GHz and 5 GHz bands makes troubleshooting WiFi connectivity issues a simple task. Scan for available networks and view all access points detailed information along with SSID, signal strength and channel allocation. Connect to Access Points with WEP/WPA or WPA2 encryption and verify IP capabilities to ensure the wireless network is properly installed and configured. A full suite of IP testing features is supported (ping, trace, web browser, etc.).

Requires compatible USB WiFi adapter for a/b/g/n/ac networks in 2.4 GHz and 5 GHz bands
Access Points scan with signal level and link quality measurement WEP/WPA1/WPA2 encryption
IP Connectivity test (Ping, trace route, ARPWiz, Web browser)
Provides WiFi LAN access to the test set (e.g. VeExpress, R-Server, Remote Control, ReVeal)

Optical Power Meter

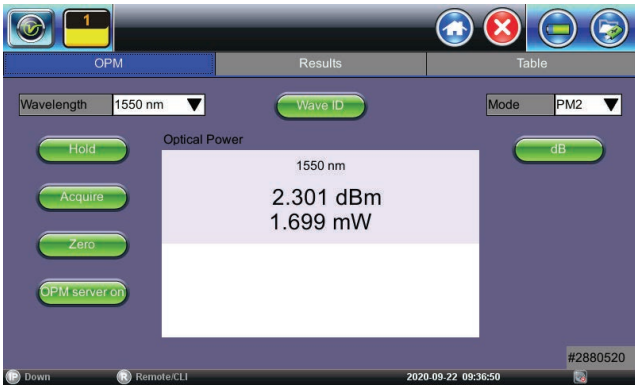An optional OPM measures optical power levels prior to making an optical connection or running a test.

- Numerical readout
- Hold and Save result functions
- Measurement Units: dB, dBm, mW, µW & nW
- WaveID when paired with compatible VeEX light source
- Relative Loss function with zeroing function
- Nulling to eliminate any dark currents

Fiber Optic Tools

Digital Fiber Inspection Scope

Dirty connectors can damage or degrade the performance of expensive optical modules, or produce inaccurate results. Inspecting and cleaning patch cords and pluggable optics connectors before mating them is always recommended.

This option allows digital video microscope probes* to be connected directly to the test set through a USB port. Featuring live video feed on the screen for visual analysis. It offers image capture, compare (before and after), IEC 61300-3-3 Sect 5.4 Pass/Fail templates for SMF and MMF, save, export and generate report to USB flash drives.

Visual Inspection
- Visual file selector
- Image comparison for before-after reports

Auto-Focus Detection and Analysis option

Test set automatically detects when image is in-focus, captures the image and analyzes it. This process is faster than complex mechanically-driven auto-focus systems as it uses human fast reaction and finesse.

- Analysis per IEC 61300-3-3
- SMF and MMF templates (Core, Cladding, Adhesive and Contact areas)
- Dots or square to highlight contamination, debris and scratches
- Report Generation

USB Fiber Scope sold separately. Check its datasheet for details.

OPX-BOXe Optical Time Domain Reflectometer (OTDR)

The VeEX OPX-BOXe is an ultra-compact OTDR that can be controlled using a WiFi, Bluetooth, or USB connection. Once connected or paired to an OPX-BOXe OTDR, the test set displays a virtual OTDR user interface that is used to remote control the unit and perform measurements. Since fibers are common place in CATV networks, having a companion add-on OTDR reduces truck rolls since there is less dependence to call on specialized fiber construction crews to verify or troubleshoot fiber related problems.

ReVeal CX300 PC Software
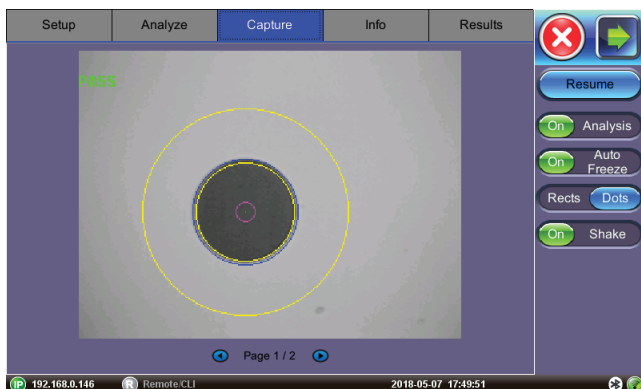
A software package shipped standard with each CX test set. Channel tables, location thresholds and other installation data can be created and edited on a PC for upload to the test set via USB, LAN or DOCSIS connection. Test results can be downloaded and saved to a PC, where test data management and report generation can be performed. Users are able to check and upgrade their test sets without having to return the unit to the supplier, thus reducing downtime.
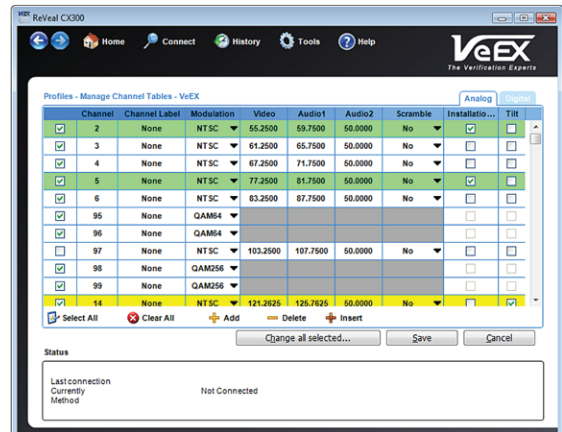
VeSion R-Server

A software application specifically designed for medium-to-large CATV operators facing the enormous challenge of coordinating hundreds of installations per day, collecting the field test results for billing/record purposes and having to maintain a large inventory of test sets in parallel. When used in conjunction with the Home Installation Process (HIP) and Signature Pad features, the application becomes a powerful tool to reduce customer call-backs and associated truck rolls, maximizing workforce efficiency and lowering operational costs.

Cloud-Based One System Platform

Results from anywhere, anytime, at any location

Advanced Management

Authorized test sets register with specific VeSion R300 Server/s to download new channel tables, test profiles, measurement thresholds and job cards. Test results can be uploaded via LAN interface or DOCSIS connection running over the existing RF network. Signature Pad electronically captures the customer signature which is automatically appended to the test results upon work order completion.

Benefits

- Centralized storage of test profiles, software versions and measurement thresholds
- Registered test sets are informed of new test profiles, software versions and channel tables
- Test set software versions are maintained and synchronized
- Results are collected electronically while technician is on site, thus billing transactions can be processed sooner
- Operates with Operator and Contractor owned test sets giving operational statistics for both activities
- Provides theft prevention, test set lockout, time lock and other security features

Specifications

General

Input Impedance: 75Ω
Input supports 90 VAC
Maximum Input Level: +65 dBmV total integrated power

Spectrum Analysis

Frequency Range: 5 MHz to 1.8 GHz
Resolution Bandwidth: 3 MHz, 1 MHz, 300 kHz, 100 kHz
Noise level (sensitivity): -59 dBmV @ 300 kHz RBW @ 500 MHz
Attenuation: 0 to 50 dB in 10 dB steps
Dynamic Range: 60 dB
Display Range: 70 dB
Vertical Scale: 1, 2, 5, 7, 10 dB
Frequency Reference: ± 10 ppm typical @ 25 Celsius
Forward Band Minimum Sweep Time: 250 ms (Normal resolution sweep)
Return Band Minimum Sweep Time: 35 ms

Analog Channel Measurement

Level Range: -50 dBmV to +60 dBmV
Level Accuracy: ±1.5 dB
Level Resolution: 0.1 dB
Standards: NTSC, PAL, SECAM
Channels: Video, Audio 1 and Audio 2, and FM V/A1, V/A2
Adjacent Advanced Analog Measurements: C/N, HUM

Digital Channel Measurement

Level Range: -50 dBmV to +60 dBmV
Level Accuracy: ± 1.5 dB
Level Resolution: 0.1 dB
Modulation: QAM 64/256, Annex A/B/C
Symbol Rate: 1 to 7 MHz programmable
Constellation Display: QAM 64/256 with zoom
Minimum QAM Locking Level: -27 dBmV (QAM256), -22 dBmV (QAM64)
Adaptive Equalizer Display
Group Delay
In Channel Frequency Response (ICFR)
HUM
Symbol Error
Center Frequency Error
MER Range: 22 dB to 45 dB*
Adjacent Channel
Pre & Post BER Range: 0 to 9×10^{-3}
Errored and Severely Errored Seconds
Histogram Analysis: Up to 60 min per minute and per second

Other Measurements

Tilt: Up to 8 Analog plus 8 Digital channels
Programmable Pass/Fail Threshold: 20 sets
Programmable Channel Table: 36 sets
Test Point Compensation: 10 sets

Options

Cable Modem DOCSIS 3.0/3.1

Downstream/Receiver
- Frequency Range
  – 108 to 1218 MHz (with 85 MHz Diplexer option)
  – 258 to 1218 MHz (with 204 MHz Diplexer option)
- Bandwidth
  – 6 or 8 MHz DOCSIS carriers and 25 or 50 kHz OFDM Sub-carriers
- Channel Bonding: Up to 32 Single Channel QAM and Dual 192 MHz OFDM Channels (with DOCSIS 3.1 option)
- Maximum Speed: Up to 4 Gbps
- Input Power Level: -15 dBmV to +15 dBmV per digital channel, typical

Upstream/Transmitter
- Frequency Range
  – 5 to 85 MHz (with 85 MHz Diplexer option)
  – 5 to 204 MHz (with 204 MHz Diplexer option)
- Channel Bonding: Up to 8 Single Channel QAM and Dual 96 MHz OFDMA Channels (with DOCSIS 3.1 option)
- Maximum Speed: Up to 1 Gbps
- Output Signal Level: Up to + 68 dBmV

OFDM
- OFDM input range: -20 dBmV to +30 dBmV
- OFDM MER range: 20 dB to > 45 dB
- Bandwidths: 24 MHz to 192 MHz
- FFT size
  – FFT size = 4k (50 kHz carrier spacing)
  – FFT size = 8k (25 kHz carrier spacing)
- Profiles: Supports up to 5

TDR

Range: 5000 ft/1.5 km
Accuracy: 1% of selected range or 1m
Minimum resolution: 0.08 ft / 2.5 cm
Velocity Factor: Adjustable to 99%
Pulse Width: 10 ns to 10 us (automatic with range); Accuracy: 1 ns
Impedance: 75 ohms

DMM

DC Voltage Range: 300 V; Accuracy 2%, +/- 1V
AC Voltage Range: 250 V; Accuracy 2%, +/- 1V
Resistance: 0Ω to 999 MΩ; Accuracy 3%, +/- 1Ω

OPM

Power Range: -50 to +25 dBm
Calibrated wavelengths: 850/1300/1310/1490/1550/1625/1650 nm

General

IPv4 and IPV6 support
DHCP client obtains IP and DNS server address from DHCP server automatically
Time of Day (ToD) support for local & MSO time synchronization
TFTP Client support for cable modem configuration file download
Security: BPI+ and AES support
Pass-Through testing (1000BaseT port): Verify high bandwidth data transfer between PC and Network

General Specifications

Size	290 x 140 x 66 mm (W x H x D)
	11.40 x 5.50 x 2.60 in
Weight	Less than 2.5 kg (less than 5.5 lb)
Battery	Li-ion smart battery (field replaceable)
	Standard 10.8 VDC, 56 Wh
	Extended 10.8 VDC, 84 Wh (optional)
Battery Operating Time	>4 hours continuous measurement
	>9 hours idle
AC Adaptor	Input: 100-240 VAC, 50-60 Hz
	Output: 16 VDC, 5.5A
Operating Temperature	0˚C to 45˚C (32˚F to 113˚F)
Storage Temperature	-20˚C to 70˚C (-4˚F to 158˚F)
Humidity	5% to 95% non-condensing
Display	7" full color touch-screen display
Ruggedness	Survives 1m (3 ft) drop to concrete
Interfaces	USB 2.0, RJ45, 10/100-T Ethernet, Bluetooth 2.0 (optional)
Languages	Multiple languages support