



CX380X

Advanced Spectrum and Burst QAM Analyzer

Preventative Network Monitoring

With VeEX's VeSion system, the CX380X advanced Spectrum Analyzer and Bursty Demodulator captures rogue cable modems and provides proactive identification of potential network-affecting issues.

Platform Highlights

- Complete web-based solution compatible with any web browser
- With VeSpec iOS and Android applications, access your return path nodes with your mobile devices
- 3U Rackmount unit with 16 RF inputs ports
- CX380X connects to the back of the CX180R for Return Path signal access and to AT1702 series switches for Forward Path signal access
- Factory calibration - eliminates unexpected insertion loss introduced by external matrix switches
- Flexible distributed architecture for easy expansion, increased reliability, and reduced system down time
- Secured IP connection for access from any location with Internet connection via remote terminals or VeEX portable test sets
- Interfaces with VeEX portable test sets to enable Sweep, Ingress and Digital Signal measurements for complete single person Return Path troubleshooting
- Built-in switch with low noise and 10 dB insertion gain, ideal for Forward Path Performance monitoring

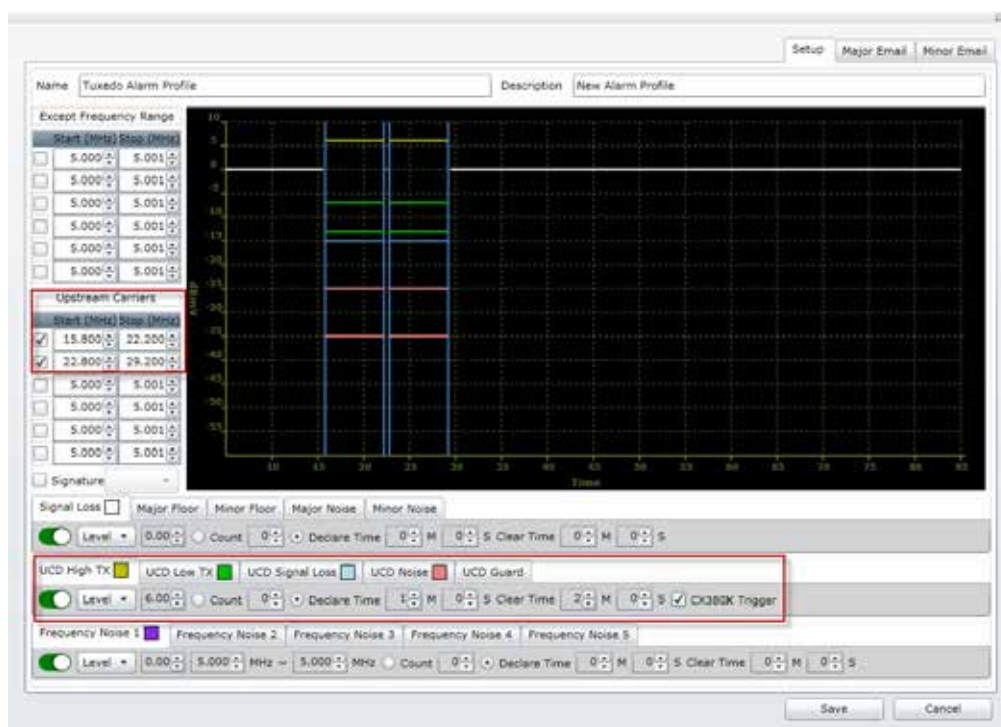
Key Features

- Advanced Spectrum Analysis
- DOCSIS Burst Demodulator to capture rogue cable modems
- Extracts MAC address of any traffic cable modem at any given time
- Advanced upstream QAM analysis capabilities (Levels, MER, Un-Equalized MER, Codeword Errors, Group Delay)
- Completely integrates with an MSO's billing system to pinpoint the physical location of the faulty (rogue) cable modems
- Allows packet capture at the DOCSIS level
- Works as an Ethernet probe and responder for testing Business Class Service Level Agreements
- Checks the performance of Analog and Digital channels being transmitted downstream or toward customers across a CATV HFC network
- Non-blocking On Demand test for both Return and Forward Path monitoring applications
- MPEG ETR 101 290 Priority 1 and 2 monitoring with encryption detection

Introduction

In a DOCSIS 3.0 (Data Over Cable Service Interface Specification) environment, the upstream bandwidth becomes crowded with wider and higher order QAM modulation carriers and channel bonding, leading to increased impairment sensitivity. In addition, the increasing ubiquity of DOCSIS cable modems actually represents one of the significant challenges for maintaining good plant health. The modems themselves can be serious interferers. In order to take a truly 'proactive' vs. 'reactive' approach in network monitoring, it is important to first detect the plant issues before it becomes significant enough to impact subscribers; then correlate the identified issue(s) to the physical location(s) of the modems contributing harm to the cable plant.

Under the VeSion system umbrella, VeEX's CX380X advanced Spectrum Analyzer and Burst Demodulator is an add-on to existing CX180R and RealWORX 24x7 preventive network monitoring systems. Specific triggered alarms associated with Upstream parameters of subscriber's cable modems, such as high transmit levels, can automatically engage deeper dive measurements of the Upstream signal quality. This helps identify the rogue cable modems in the network that contribute harm to the plant.



CX380X engaged automatically with triggered alarms

The basic process is as follows:

- Capture all available Upstream Channel Descriptors (UCD) provided by the CMTS from a specific downstream DOCSIS channel
- Triggered alarms automatically initiate a test on the relevant Upstream channel; captures and decodes burst cable modem signals
- Report key metrics for the Upstream channel: Upstream MER, Burst Constellations, Codeword Errors and list of associated cable modem MAC addresses
- Ultimately identify rogue cable modems

VeSion and CX380X system can also be integrated with an MSO's billing system, enabling the system to pinpoint the physical location of the rogue cable modems. Ultimately, the operator is presented with system maps showing the exact location of the modem(s) contributing harm to the plant. A field technician can be dispatched within minutes to deal with the problem.

Features

UCD Auto Capture

CX380X connects to the back of the CX180R for Return Path signals and to AT1702 Series switches for Forward Path signals. Every 24 hours, the CX380X checks the downstream DOCSIS primary channel and provides updated Upstream Channel Descriptor (UCD) information, including their parameters to the system for Bursty Demodulation. In addition, UCD auto capture occurs with each Forward Path, Return Path or VeEX IGM.

Channel UCD Information

Port No	UCD#	Freq(MHz)	QAM	Symbol(MS/s)	Channel Type
Port 4	8	37	QPSK	2.56	TDMA
Port 4	2	22.5	QAM16	5.12	A-TDMA
Port 4	4	37	QPSK	2.56	TDMA
Port 4	7	32	QAM16	5.12	A-TDMA
Port 4	3	32	QAM16	5.12	A-TDMA
Port 4	6	22.5	QAM16	5.12	A-TDMA

Search completed

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Burst QAM Demodulation

With the CX380X's Burst QAM Demodulation, the VeSion system captures all of the UCD's from the downstream DOCSIS channels and extracts and stores the information into a database as per the schedule. The user can then select an upstream DOCSIS carrier on the return port where burst cable modem signals can be captured and displayed. All of the signal's associated parameters, measurements and MAC addresses on all upstream channels can be seen as a full display on the Web User Interface. Here the spectrum analysis, MER, Constellation, measurement statistics and associated MAC address have been condensed to one information display.



Port No	UCD#	Freq(MHz)	QAM	Symbol(MS/s)	Channel Type
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Port 4	4	37	QPSK	2.56	TDMA
Port 4	7	32	QAM16	5.12	A-TDMA
Port 4	3	32	QAM16	5.12	A-TDMA
Port 4	6	22.5	QAM16	5.12	A-TDMA

Features *cont'd*



The Full Display condenses important parameters to one information display

Advanced MAC Analysis

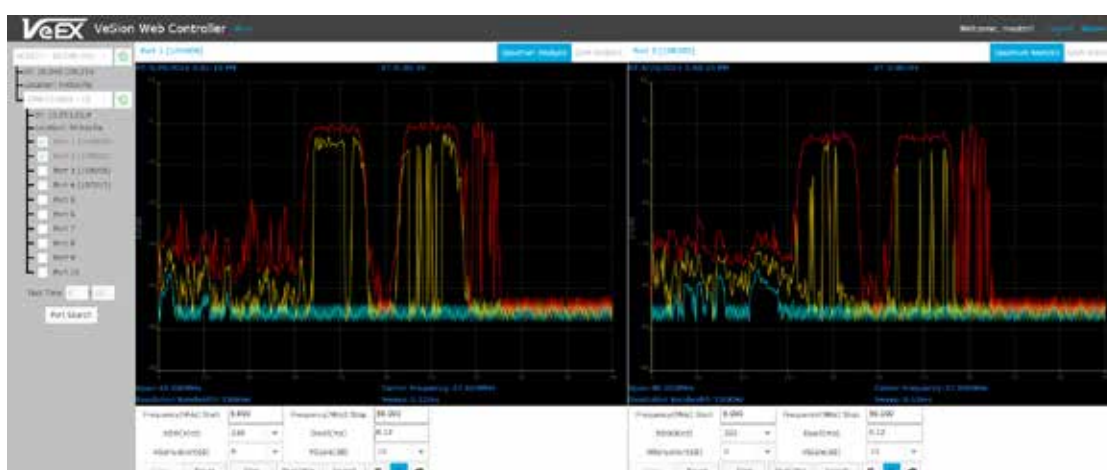
From the MAC address display, select the MAC address of the cable modem to drill down further for impairments analysis. With the compact full display view user interface, view the constellation, MER, Levels, Equalizer, upstream frequency response, overall statistics and spectrum analysis easy and efficiently.



Return Path Spectrum Analysis

Advanced DSP technology captures fast transient signals with millisecond resolution. Dynamic changes in system noise level and short bursty pulses typical of cable modem upstream transmission can easily be captured to identify potential problems in operational upstream DOCSIS channels.

Under the VeSion System, each CX380X as an add-on can perform spectrum analysis on two nodes simultaneously. Spectrum analysis can be controlled by two separate CX180R-Controller stations or by a VeEX handheld unit via internet connection in the field.

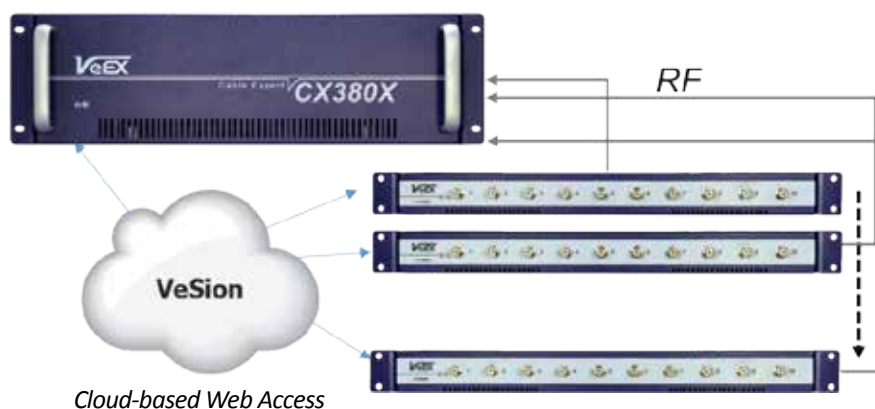


Applications

Using CX380X Return Path Application with CX180R Probes

CX380X adds advanced monitoring and burst demodulation capabilities to VeEX CX180R probes. Under the VeSion umbrella, up to 10 CX180R probes can be configured to each CX380X, giving the user the ability to locally control up to 100 return path nodes. With CX180R Return Path monitoring probes, UCD alarms can be configured on the regular preventive RF Monitoring profiles. If the UCD parameters exceed the user configured limits, CX380X is engaged automatically with the triggered alarms for advanced analysis. With its modular, scalable and distributed architecture, together they offer unparalleled test and measurement performance and flexibility..

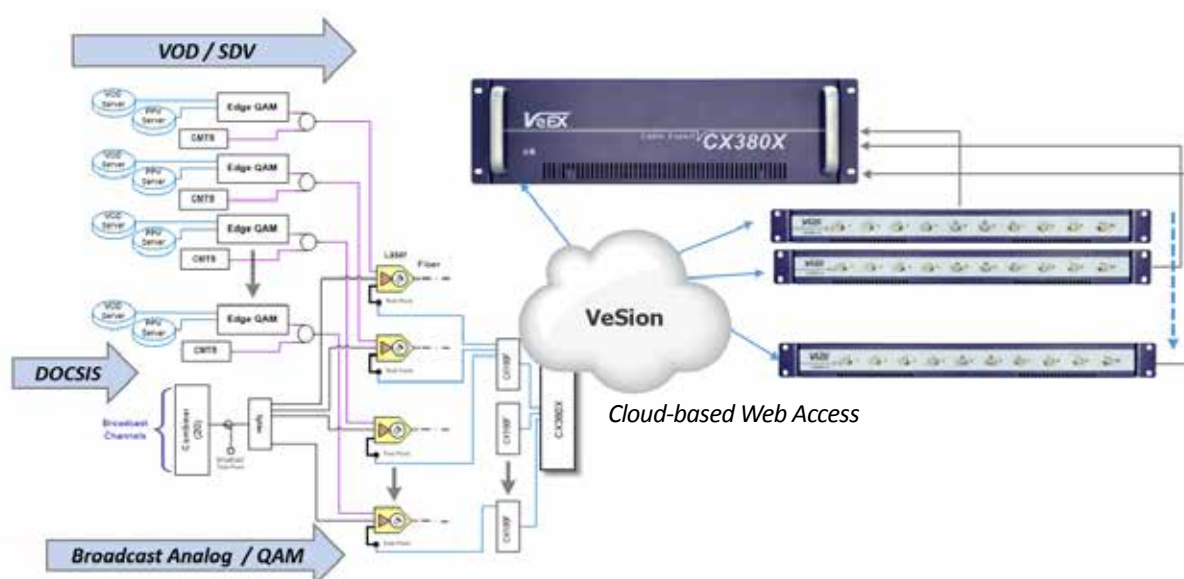
CX380X Add-on to VeEX Return Path Probes



Using CX380X Forward Path Monitoring Application with CX180F Probes*

CX380X can be added to VeEX CX180F probes to extend its capabilities for advanced Forward Path monitoring, troubleshooting and auditing the performance of analog and digital channels being transmitted downstream across CATV HFC network. Therefore, ensure the quality of content with full confidence after modulation and combining at the cable edge, before the handoff to the HFC network. Together with VeSion and CX180, the CX380X offers modular, scalable and distributed architecture. Test point can be added any time for remote troubleshooting and segmentation, without reducing the monitoring speed. The system offers unparalleled test and measurement performance and flexibility to monitor Analog and Digital Broadcast, VoD / SDV, MPEG Analysis and FM Services. With built-in low noise 10 dB switch gain RF input ports, it is an ideal solution to deploy for common laser test points.

CX380X-CX180F Forward Path Monitoring Application



*Each CX380X can support multiple CX180F probes to support Forward Path monitoring applications

MPEG Explorer

Cable Operators nowadays have to ensure that both the RF characteristics and digital payload of their QAM carriers are within defined limits, and simply viewing the QAM carrier “hay stack” is not enough to evaluate the protocol layer. The CX380X MPEG Explorer option extracts MPEG Transport Stream payloads from the QAM carrier and decodes them to check transport and programming content.



MPEG-TS Analysis

Detects the number of MPEG programs per channel. Provides PID MAP and streams information. Per program video, audio, and data streams rates and received packets count. Per stream PID numbers and Codec information.

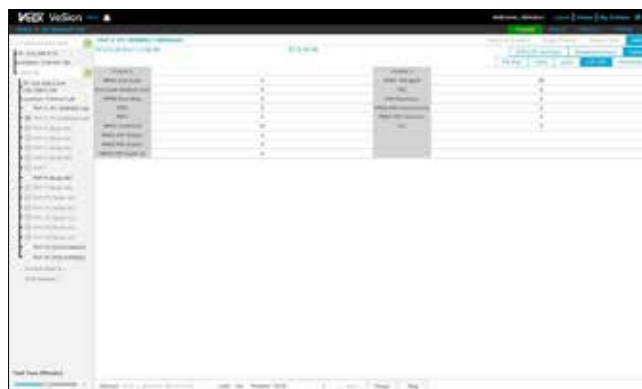
Encryption Detection

Detects the encryption status of each stream (video and audio)



TR 101 290 Support

The ETSI TR 101 290 recommendation is a very good indicator of when a MPEG Transport Stream has been transported error-free across a network. The MPEG Explorer option features a dedicated measurement tab displaying Priority 1 alarms which are key indications of synchronization, continuity errors and major table errors while Priority 2 impairments which include transport error indicators, Cyclic Redundancy Check (CRC), errors in elementary streams and PCR timing impairments are also displayed.



MPEG Transport System Analysis Summary

Test Result	Definition and Description
PMT PID	Represents PID for the PMT inside the MPEG stream
#PIDs	Number of PIDs inside the MPEG stream
Video Packet Statistics	Includes video bandwidth and video packet statistics inside the program
Audio Packet Statistics	Includes audio bandwidth and audio packet statistics inside the program
TR 101 290	Includes result parameters per TR 101 290, such as Sync loss and Sync byte, PAT, CC, PMT, PCR and CRC errors, etc.
PID Map	Detail description for each PID inside the MPEG TS
Encryption Status	Detection of scrambling status for each Video and Audio stream

Applications *cont'd*

Using CX380X as a Stand Alone Solution for Forward and Return Path Monitoring

CX380X is fully compatible with AT1600E/AT1700M series high performance, cost-effective broadband RF switching solution for Return and Forward Path monitoring needs respectively. The AT1600E offers a switch gain of 0 dB and 10 dB with AT1700M series, making them ideal for Return and Forward Path monitoring environments. With 16 built-in RF input ports, CX380X can be deployed as a direct stand alone, or combined with AT160xE/AT170x series switches to any Forward and Return Path system for monitoring, troubleshooting, non-blocking on demand test and auditing needs.



Specifications

CX380X Probe

True 5M to 1 GHz Spectrum analyzer with zero span and Burst Demodulator

Input Level Range: -50 dBmV to +10 dBmV

Dynamic Range: 60 dB

Optimum RF Input Level Range for Monitoring applications:

- Forward monitoring: -10 dBmV to +10 dBmV
- Return monitoring: 0 dBmV ideal to ± 10 dBmV

Comes with 16 RF input ports

FCC Proof

Headend Check

MPEG Analysis

Ethernet Responder

Return Path Spectrum Analysis (CX180R System)

Frequency range: 5 to 65 MHz

Dynamic range: 60 dB

Resolution Bandwidth: 1 MHz, 300 kHz, 125 kHz

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

Range with attenuation: -50 dBmV to +60 dBmV Dwell time: 0.1 ms to 100 ms, adjustable

Return Path QAM-16/64/128 Analysis

Frequency range: 5 to 65 MHz

QAM Locking range: -10 to +50 dBm

Supports Annex A, B, and C

QAM level, MER, pre/post BER, Errored seconds, Severely Errored seconds

Constellation diagram

Requires CX field meter with USG+FEC option

Return Path Ingress System

Frequency range: 5 to 65 MHz Dynamic range: 60 dB

Resolution Bandwidth: 1 MHz, 300 kHz, 30 kHz, 10 kHz

Forward Path Measured Parameters

System Scan – Analog

Video and Audio channel power level, V/A ratio, peak-to-valley, min/max audio and video level, tilt, V/A Modulation check

System Scan – Digital

QAM level, min/max QAM level, tilt, peak-to-valley

System – FM channel

Channel power level and Modulation check

On demand single channel – Analog/Video. Audio Modulation check

Video/Audio power level, V/A ratio, adjacent channel, C/N ratio

On demand single channel – Digital

QAM power level, MER, Pre/Post BER, Constellation, adjacent channel

On demand FM (Power level and Modulation check)

General Specifications

Size	12.59 x 4.47 x 16 in (W x H x D)
Weight	Less than 7 kg (less than 14 lb)
AC Adaptor	Input: 100-240 VAC, 50-60 Hz Output: 15 VDC, 3.5A
-48 VDC Power Option	DC Input range: -40 VDC to -60 VDC Max current: 2A @ -48 VDC
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	5% to 95% non-condensing



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