VIAVI Solutions

Brochure

VIAVI

PathTrak HCU200 Family

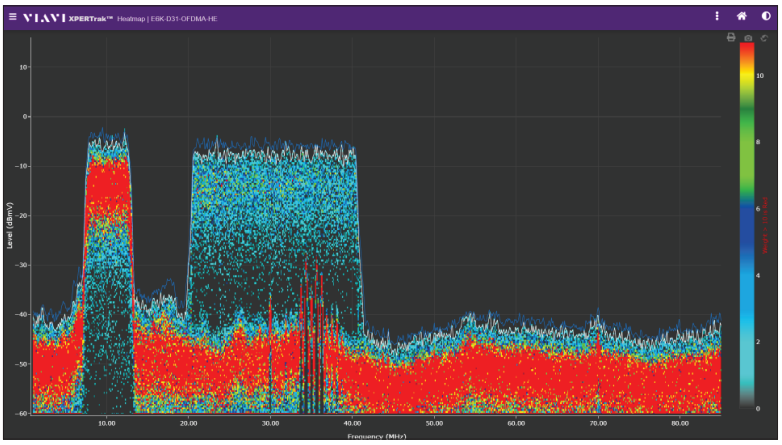
Integrated Return-Path Monitoring Modules

Superior Live Analyzers

In addition to the best live spectrum analysis capabilities available anywhere, HCU200 modules can demodulate and monitor live bursty SC-QAM DOCSIS® upstreams to expose linear and nonlinear impairments. The Impairment Dashboard lets you see the issues affecting RF and data performance at a glance. You can pause measurements to review results packet by packet to identify those with codeword errors and to determine the impacted MAC addresses. MACTrak lets you see if problems are truly service-impacting so you can fix the problems that matter most first.

Spectral Heatmap Display

As upstreams fill up including the addition of OFDM-A carriers, it becomes much more difficult to detect and troubleshoot ingress using traditional techniques. To address this VIAVI has leveraged the spectral capture and computing power of the HCU200 platform to generate a heatmap view of the upstream. The resulting heatmap display illuminates both constant ingressors and intermittent sources like impulse noise even beneath the active carrier frequency range.



Key Benefits

- Combines essential spectrum and cable modem upstream analysis and monitoring
- Real-time RF and data metrics based on the subscribers' DOCSIS® packets
- Supports ONX and DSAM Field View for one-person upstream troubleshooting
- Heatmap spectrum and 210 MHz coverage available for DOCSIS 3.1 support
- Small footprint, requires only 1 RU

Applications

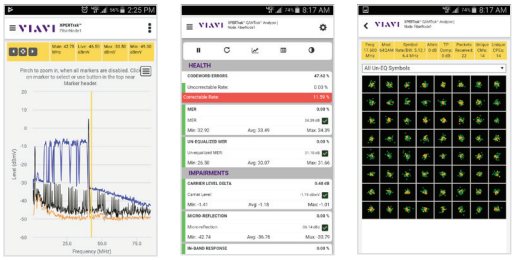
- Detect even the fastest impulse noise with superior spectrum analysis capabilities
- View in-band and in-service faults that standard spectrum analysis tools miss
- Monitor and troubleshoot upstreams up to 201 MHz
- Reveal linear and nonlinear impairments such as group delay and laser clipping in addition to simple ingress and CPD
- Identify modems experiencing codeword errors in real time to verify (or fix) faults

MACTrak Performance Monitoring (MTPM)

MACTrak Node Ranking calculates a Node Performance Index for each node, assessing overall node performance according to that of the individual SC-QAM DOCSIS upstream carriers. Once scored, node performance is ranked and reported to dramatically improve maintenance targeting.

MACTrak Performance History shows the node's history and individual upstream carriers to find the cause for a poor node ranking. Metrics such as carrier level, equalized and un-equalized MER, impulse noise and codeword errors, as well as MAC address help MACTrak node ranking assess both RF and data health.

Live MACTrak display showing micro-reflections



All displays mobile-friendly in XPERTrak

Supports the Field Tech

Field View delivers hub view of combined spectrum to ONX and DSAM field meters eliminating the need for additional technicians, test equipment, or NOC staff support. Field View capabilities are licensed per field meter and require either a standalone HSM transmitter or an HCU200 with the integrated HSM option per 8 co-located HCU200's.

Measurement Plans Adapt to User Preferences

Users gain ultimate flexibility in configuring the HCU200. For spectrum monitoring, users can implement a simple, yet effective, monitoring plan for node certification or they can choose to set up multiple alarming levels. Upstream carrier monitoring requires minimal configuration because DOCSIS defaults are pre-configured and adjustable as desired.

Expands and Scales Without Performance Degradation

Each HCU200 is independent so adding units will not adversely affect overall system performance. The HCU200 quickly and easily integrates with current PathTrak and XPERTrak systems and is fully compatible with existing HCUs and other components. A simple field upgrade solution is available for units deployed without MACTrak software options.

Feature Name	Description
Spectral Analysis	Live upstream spectrum analyzer including mobile access, spectral monitoring/alarming, spectral performance history
MACTrak	Live SC-QAM packet demodulation, Impairment Dashboard, MACTrak Node Ranking, MACTrak Performance Monitoring/Alarming. Improved impulse noise detection.
Heatmap Analysis	Heatmap spectral display with variable persistence, supported for full frequency range of selected HCU200 module type. Functionality only available on systems under active SW Maintenance and Support Contract
HSM	Headend Stealth Modem transmitter functionality required for Field View support. Separate license required per ONX/DSAM field meter to enable.

Ordering Information

HCU200 Modules					
Part Number	**Freq Range**	**Spectral**	**MACTrak**	**Heatmap**	**HSM**
HCU200-FULL-F	0.5-85MHz	■	■	■*	-
HCU200-FULL-BNC	0.5-85MHz	■	■	■*	-
HCU200-LITE-F	0.5-85MHz	■	-	-	-
HCU200-LITE-BNC	0.5-85MHz	■	-	-	-
HCU200-HSM-FULL-F	0.5-85MHz	■	■	■*	■
HCU200-HSM-FULL-BNC	0.5-85MHz	■	■	■*	■
HCU200-HSM-LITE-F	0.5-85MHz	■	-	-	■
HCU200-HSM-LITE-BNC	0.5-85MHz	■	-	-	■
HCU204-FULL-F	0.5-204MHz	■	■	■*	-
HCU204-FULL-BNC	0.5-204MHz	■	■	■*	-
HCU204-LITE-F	0.5-204MHz	■	-	-	-
HCU204-LITE-BNC	0.5-204MHz	■	-	-	-
HCU204-HSM-FULL-F	0.5-204MHz	■	■	■*	■
HCU204-HSM-FULL-BNC	0.5-204MHz	■	■	■*	■
HCU204-HSM-LITE-F	0.5-204MHz	■	-	-	■
HCU204-HSM-LITE-BNC	0.5-204MHz	■	-	-	■

HCU200 Upgrades	
Part Number	**Description**
HCU200-LITE-UPG	• Field upgrade HCU200 or HCU200-LITE modules to full MACTrak capability. • Adds QAMTrak analyzer plus MAC address decode capability, codeword error detection, and improved impulse-noise detection capabilities. Also includes MACTrak Performance Monitoring.
HCU200MCMON-UPG	• Field upgrade for legacy HCU200MACPACK modules to enable MACTrak Performance • Monitoring capability. Base HCU200 modules must use HCU200-LITE-UPG to achieve full capabilities including MACTrak Performance Monitoring.
HCU200 Options	
HCU200-OPT	SFP adapter and support shelf for enabling optical interface for HCU200. SFP adapter specifications: 1-port 100BASE-FX Small Form-Factor Pluggable (SFP) Optics Module, Single Mode Fiber (SMF), 40 km, 1310 nm, LC Connector, Digital Diagnostic Monitor (DDM), RoHS 6/6 compliant, Extended Temperature -40/85C. SFP transceiver not included.

* Requires active SW Maintenance and Support Contract

Note: Field upgrade available enable MACTrak and Heatmap capabilities for LITE units

Specifications

General	Description
Enclosure	19-inch (48.3 cm) 1-RU rack mount
Width	19 Inches (48.3 cm)
Depth	14.6 Inches (37.1 cm)
Height	1 RU, 1.74 Inches (4.4 cm)
Weight	7.85 pounds (3.56 kg)
Power	Dual –48 V DC (–46 to –50 V DC) - AC adapter included (28W Average)
Display	2x16 character backlit
Ethernet	10/100 Mbps
USB	1 USB 2.0
Data storage	1 GB flash memory
Environmental	
For indoor use	
Temp range	
Operating	5 to 45°C
Storage temp	–20 to 60°C
Drop and Vibration	Bench Handling - MIL-STD-810F
Humidity	10 – 90% RH non-condensing
RF immunity	8.5 V/m
Maximum altitude	4000 m (13,123 ft)
Pollution	2°
RF Measurements	
Input ports	16 (F-type connector or BNC) with activity indicator
Input port impedance	75 Ω
Frequency range	500 kHz to 85 MHz (HCU200-xxx) 500 kHz to 210 MHz (HCU204-xxx)
Total measurement range	-50 to 60 dBmV
Operational temperature range and accuracy	±2 dB at room temperature; ±3 dB drift, 0 to 50°C
Spur-free dynamic range	50 dB typical with 0 dBmV input1
Port-to-port isolation	>65 dB
Resolution bandwidths	Standard: 30, 300, 1000 kHz
DOCSIS bandwidths	160, 320, 640, 1280, 2560, and 5120 kHz
Video bandwidths	Programmable to 10, 30, 100, 300, 1000 kHz
Attenuator	0 to 50 dB in 1 dB steps
Level accuracy	±2 dB on signal pulses >10 µs; ±4 dB on signal pulses >1 µs
Minimum measurable noise burst	<1 µs

Specifications continued

RF Measurements	
Dwell time	Programmable from 1 µs to 100 ms
Monitoring mode	250 max points frequency resolution for HCU200 variants, 550 max points for HCU204 variants. Scan rate depends on measurement settings.
Interactive spectrum analyzer mode	500 points frequency resolution
Heatmap analyzer mode	Up to 2 simultaneous Heatmap analyzers per HCU200
Interactive monitoring view mode	Up to 250 points frequency resolution for HCU200 variants, 550 points for HCU204 variants
Interactive QAM Analyzer mode with MACTrak	64QAM, 32QAM, 16QAM, SC-QAM demodulation, level, MER, unequalized MER, codeword error rate, in-band channel response, group delay, ingress under the carrier, spectrum, micro- reflections, impulse noise, live strip chart over time, MAC address extraction
MACTrak node ranking and history	64QAM, 32QAM, 16QAM, SC-QAM demodulation supported, level, MER, unequalized MER, codeword error rate, spectrum, impulse noise, live strip charts over time, MAC address, one-week rolling history
Recommended active signal input level	-68 dBmV/Hz (so -6 dBmV peak for 6.4 MHz carrier*)
Maximum input levels	-23 dBmV/Hz (so 39 dBmV peak for 6.4 MHz carrier*) *0dBmV on a 6.4MHz Channel shows -6dBmV when 300kHz RBW and 100kHz VBW and 100uSec dwell time *0dBmV on a 3.2MHz Channel shows -3dBmV when 300kHz RBW and 100kHz VBW and 100uSec dwell time *0dBmV on a 1.6MHz Channel shows 0dBmV when 300kHz RBW and 100kHz VBW and 100uSec dwell time
HSM Modem Transmitter Specification	
Frequency range	42 to 1,218 MHz
Frequency resolution	10 kHz
Level range	+20 to +50 dBmV
Level resolution	1 dB
Level accuracy	0.5 dB accuracy typical, 1 dB accuracy over temp
Spectral Purity	50 dBc harmonics and spurious; recommend 1 MHz space from SC QAM edge
Modulation	Proprietary FSK, 100 kHz deviation
Spectrum required	Recommend 1 MHz space from SC QAM edge

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