



PathTrak™ HCU200

Integrated Return-Path Monitoring Module

Superior Live Analyzers

In addition to the best live spectrum analysis capabilities available anywhere, the HCU200 can demodulate and monitor live bursty 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 problem rather than just fix a problem.

MACTrak Performance Monitoring

MACTrak Node Ranking calculates a Node Performance Index for each node, assessing overall node performance according to that of the individual 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.

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 DSAM Field View QAM™ for one-person upstream troubleshooting
- Eliminates the need for dedicated spectrum and QAM analyzers to troubleshoot return-path problems
- Small footprint, requires only 1 RU
- 50 dB dynamic range across 0.5-85MHz frequency range

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
- Highlight worst-performing nodes to prioritize repairs with MACTrak node ranking
- 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



Live MACTrak display showing micro-reflections

MAC Address	Packets from this MAC	Percent of All Packets (%)	Percent of Packets with Codeword Errors (%)	Min. MER (dB)	Min. ULL EG MER (dB)	Min. Carrier Level (dBmV)	Min. Micro-reflection (dB)	Min. In-band Response (dB)	Min. Group Delay (ns)	Min. Ingress Carrier (dBm)	Min. Impulse Noise (dBm)
08:00:00:00:00:00	688	59.46	0.00	27.71	26.99	5.27	-33.05	0.97	346.99	-28.22	10.96
08:00:00:00:00:01	4	0.26	0.00	27.51	26.93	5.46	-24.04	0.98	149.94	-28.00	6.94
08:00:00:00:00:02	86	7.61	0.00	27.95	25.51	4.92	-31.61	1.00	283.66	-27.93	5.16
08:00:00:00:00:03	15	1.30	0.00	28.08	26.85	5.46	-35.99	1.07	200.68	-28.82	5.24
08:00:00:00:00:04	0	0.00	0.00	28.30	26.69	5.07	-34.01	0.84	104.25	-29.87	5.11
08:00:00:00:00:05	74	6.40	0.00	28.24	27.07	6.42	-32.97	1.11	273.38	-28.14	6.83
08:00:00:00:00:06	5	0.43	0.00	28.52	28.10	5.90	-36.92	0.54	159.22	-29.41	6.29

MACTrak impairments table with MAC address display

Supports the Field Tech

Field View QAM™ delivers PathTrak QAMTrak™ and MACTrak capability to the DSAM in this latest interactive development between PathTrak and the DSAM. Delivering live measurements from hub sites to the field eliminates the need for additional technicians, test equipment, or NOC staff support.

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 3.0 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.

Ordering Information

HCU200 Modules	
Part Number	Description
HCU200-FULL-BNC	HCU200 with BNC connectors and full QAMTrak/MACTrak capabilities including MACTrak Performance Monitoring.
HCU200-FULL-F	HCU200 with F-type connectors and full QAMTrak/MACTrak capabilities including MACTrak Performance Monitoring.
HCU200-LITE-BNC	HCU200 with BNC connectors supporting spectral capabilities only. The module does not ship with any MACTrak (carrier-based) capabilities but can be field upgraded to full MACTrak capabilities.
HCU200-LITE-F	HCU200 with F-type connectors supporting spectral capabilities only. The module does not ship with any MACTrak (carrier-based) capabilities but can be field upgraded to full MACTrak capabilities.
HCU200 Upgrades	
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.



Individual upstream carrier performance history

Specifications

RF Measurements	
Input ports	16 (F-type connector or BNC) with activity indicator
Input port impedance	75 Ω
Frequency range	500 kHz to MHz
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 input ¹
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 μ s; ± 4 dB on signal pulses >1 μ s
Minimum measurable noise burst	<1 μ s
Dwell time	Programmable from 1 μ s to 100 ms
Monitoring mode	250 max points frequency resolution, scan rate depends on measurement settings
Interactive spectrum analyzer mode	500 points frequency resolution, up to 6 full-spectrum scans per second with 20 μ s dwell time
Interactive monitoring view mode	Up to 250 points frequency resolution
Interactive QAM Analyzer mode with MACTrak2	64QAM, 32QAM, 16QAM, and QPSK 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, and QPSK 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	0 to +50 dBmV (over range indicator to prevent invalid measurement results)



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