

Optimize Return Spectrum with the Cisco uBR-MC16S Spectrum Management Line Card

THE CISCO uBR-MC16S SPECTRUM MANAGEMENT LINE CARD INTEGRATES A DOCSIS-QUALIFIED CABLE INTERFACE WITH AN ONBOARD SPECTRUM ANALYZER TO PROVIDE ADVANCED SPECTRUM MANAGEMENT. THE CARD SUPPORTS ONE DOWNSTREAM AND SIX UPSTREAM PORTS TO EFFECTIVELY ALLOCATE BANDWIDTH IN AN HFC NETWORK. THE CISCO uBR-MC16S IMPROVES CABLE PLANT RELIABILITY, SUPPORTS TRANSPARENT UPSTREAM INGRESS NOISE AVOIDANCE, AND PROVIDES AN IDEAL NOISE MANAGEMENT SOLUTION FOR DENSE OR QUALITY-CRITICAL IP DATA AND VOICE CABLE SERVICE DEPLOYMENTS.

The Cisco uBR-MC16S Spectrum Management Line Card is the first DOCSIS-qualified line card to offer an integrated spectrum analyzer that maximizes spectrum utilization, improves response time to ingress and noise impairments, provides intelligent “look ahead” capability to hop to a new center frequency in clear spectrum, and increases cable plant availability. The card reduces reliance on costly spectrum analyzers at headends or hubs. It quickly provides spectrum views through an intuitive interface, without the complicated setup time of a spectrum analyzer. Figure 1 depicts the card which can be installed in any Cisco uBR7200 Series or Cisco uBR10012 Universal Broadband Router. The card supports synchronization with the Cisco uBR7246VXR clock card.

The Cisco uBR-MC16S meets all DOCSIS Annex B RF data rates, channel widths, and modulation schemes through the use of Digital Signal Processing (DSP) technology. The card continuously analyzes upstream spectrum quality in the DOCSIS frequency range of 5 to 42 MHz, records carrier-to-noise (C/N) information on each upstream port, and can dynamically shift the upstream channel frequency within a band, reduce upstream channel width, or change modulation mode when necessary based on user-configurable specifications.

Applications

- Extends high-speed IP data and voice services to modems and set top boxes, even in noise-impaired environments
- Improves plant reliability

Figure 1 Cisco uBR-MC16S Spectrum Management Line Card



Key Features	Benefits
Intelligent frequency hopping including C/N-based hopping to initiate changes based on physical plant and ingress characteristics	<ul style="list-style-type: none"> • Improves responsiveness to impairments by mating the hopping criteria to fluctuating plant conditions • Sustains or improves subscriber online percentages through configurable channel management techniques
Flexible configuration choices	<ul style="list-style-type: none"> • Allows hopping decision criteria to be tailored to the individual cable plant • Supports proactive channel management based on modulation profiles, channel widths, and frequency selection

Key Features	Benefits
DSP-assisted C/N calculations on a per-interface and per-modem basis	<ul style="list-style-type: none"> Provides a view of the noise floor under the carrier to quickly and easily view the effects of node combining Pinpoints C/N variations with per-modem accuracy to isolate problematic modems
Dynamic upstream modulation using accurate C/N calculations based on DSP hardware	<ul style="list-style-type: none"> Guarantees the highest upstream throughput allowed by cable plant characteristics at any given time Provides assurance that subscribers remain online and connected during periods of return path impairments Reduces the reliance on costly spectrum analyzers at each headend or hub
Simple Network Management Protocol (SNMP) support for transferring spectrum fluctuations of an interface or a cable modem to graphical display via the CISCO-CABLE-SPECTRUM-MIB	<ul style="list-style-type: none"> Offers an easy-to-use, distributed method to gather real-time display of upstream spectrum for individual cable modems Quickly provides spectrum views through an intuitive interface without the complicated setup time of a spectrum analyzer
Hot-swappable via Online Insertion and Removal (OIR); rapid initialization during OIR	<ul style="list-style-type: none"> Promotes ease of maintenance Minimizes impact to the rest of the system

Technical Specifications

Downstream Physical Layer

- Enhanced ITU J.83 Annex B convolutional Reed-Solomon FEC; downstream frequency range of 54 to 860 MHz
- Modulation: 64 and 256 QAM
- 6 MHz channel width

- Baud rate*: 5.056941 for 64 QAM; 5.360537 for 256 QAM
- Line bit rate*: 30.34 Mbps for 64 QAM; 42.88 Mbps for 256 QAM
- Actual throughput (bit rate minus overhead)*: 27 Mbps for 64 QAM; 38 Mbps for 256 QAM
- Output power range: 42 dBmV +/- 2 dB
- Connector: F-connector per [IPS-SP-406]

Upstream Physical Layer

- FEC length (T = 0 to 10); upstream frequency range of 5 to 42 MHz edge-to-edge
- Modulation: QPSK and 16 QAM
- Channel widths of 0.2, 0.4, 0.8, 1.6, and 3.2 MHz
- Baud rates* from 0.16 MSym/sec to 2.56 MSym/sec
- Line bit rates* from 0.32 to 5.12 Mbps for QPSK; 0.64 to 10.24 Mbps for 16 QAM
- Actual throughput (bit rate minus overhead)* from 0.3 to 4.5 Mbps for QPSK; 0.6 to 9.0 Mbps for 16 QAM

* Actual values differ based on your setup; e.g., modulation profiles and other physical layer parameters affect this

Regulatory and Standards Compliance

- Safety: UL 1950, CSA 22.2 No.950, EN60950
- EMI: FCC Class A, CSA Class A, EN60555-2, EN55022 Class B, VCCI Class 2, AS/NRZ 3548 Class A
- Immunity: IEC-1000-4-2, IEC-1000-4-3, IEC-1000-4-4, IEC-1000-4-5, IEC-1000-4-6, IEC-1000-4-11, IEC-1000-3-2



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