

# Cisco Broadband Troubleshooter

**Cisco Broadband Troubleshooter is an easy-to-use tool that gives network administrators and technicians a graphical user interface (GUI) that streamlines radio frequency (RF) problem resolution. The tool dynamically monitors RF characteristics on a per modem or per upstream basis, provides a measurement interface for the upstream that looks and feels like a spectrum analyzer, decentralizes RF monitoring and analysis, and automatically sorts and categorizes RF problem conditions. This improves staff effectiveness and ensures a stable return path, thereby increasing service and customer satisfaction.**

## Introduction

Servicing a cable network can be administratively intensive and time-consuming. The shared nature of a cable plant means that potential problems in one area can affect major portions of the network. Technicians, working at a network operations center (NOC) or in the field, need a tool to monitor, analyze, and diagnose problems between the cable plant and connected Data Over Cable Service Interface Specifications (DOCSIS) cable modems (CMs). They need a tool to monitor RF signal quality that is intuitive and easy-to-use to test and troubleshoot common path distortion (CPD), impulse noise, and ingress in the return path. To maintain network performance, NOC personnel and others often spend too much time trying to identify the source of problems and too little time preventing them. This reactive approach is inefficient. Network managers need troubleshooting tools that can either identify potential problems before they seriously affect customers or quickly determine the network devices causing performance disruptions. The ability to determine device availability and analyze network patterns—both on-demand and historical—are high-priority requirements in today's hybrid fiber-coax (HFC) cable networks.

## Product Description

The Cisco Broadband Troubleshooter addresses these needs. The product provides a fault-analysis tool that enables network managers and RF technicians to quickly and easily isolate performance, cable plant, and CM problems. On-demand and scheduled diagnostics can be issued. Cisco Broadband Troubleshooter automates reporting and expert analysis of the measured RF statistics. Diagnostics are available from both customer-account and network-event perspectives.

Cisco Broadband Troubleshooter automates the analysis and interpretation of the Cisco patented “flap list” maintained in Cisco CMTS products: the Cisco uBR10012, Cisco uBR7200 Series, and Cisco uBR7100 Series universal broadband routers. A flap is defined as a cable modem being registered with the CMTS, deregistering, and then immediately reregistering. The flap list helps isolate problems between the cable plant such as ingress noise or incorrect power levels, and specific cable modems. A cable modem is added to the flap list when the device fails the registration process, when upstream communication errors affect messaging between the CMTS and cable modem, and when the cable modem upstream transmit power has been adjusted beyond an administrator-specified threshold. Cisco Broadband Troubleshooter automatically sorts flap list problems into the following categories:

- Provisioning
- Reverse attenuation
- Packet corruption—reporting cyclic redundancy check (CRC) errors
- Reverse noise

With this information, technicians can quickly identify and resolve problems.

Reverse path ingress is considered one of the greatest obstacles to deploying two-way services. Most ingress originates at the home or distribution network. Using Cisco Broadband Troubleshooter, technicians can monitor the network or look at the RF performance of a specific cable modem or upstream port. Technicians can quickly assess the quality of an RF signal, including signal strength, carrier-to-noise ratio, and other characteristics. Cisco Broadband Troubleshooter enriches the capabilities of the Cisco MC16S Universal Broadband Router (uBR) line card by providing a distributed tool that allows visibility into the return path to see the effect of combined ingress in the DOCSIS environment. Because Cisco Broadband Troubleshooter uses Simple Network Management Protocol (SNMP) as the query mechanism, it runs on a PC and can be used anywhere in the network where technicians have IP access to the CMTS.

Using Cisco Broadband Troubleshooter’s integrated upstream spectrum analyzer, technicians can take measurements and diagnose faults quickly. The tool displays return path spectral information for the Cisco MC16S and its related ports. Spectrum data is extracted from the Cisco MC16S using SNMP via spectrum management MIBs and displayed in Cisco Broadband Troubleshooter screens. For systems with these line cards, Cisco Broadband Troubleshooter offers live troubleshooting of an upstream port or individual cable modem. Through menu items and interactive screens, Cisco Broadband Troubleshooter allows technicians to analyze the return path performance in real time. Multiple views provide flexible network analysis to isolate, characterize, and diagnose problems. Providing easy access to this information and putting it in the hands of technicians allows them to make intelligent decisions. This feature is elaborated on in the “Intelligent Spectrum Management for Cisco MC16S Line Cards” on page 5.

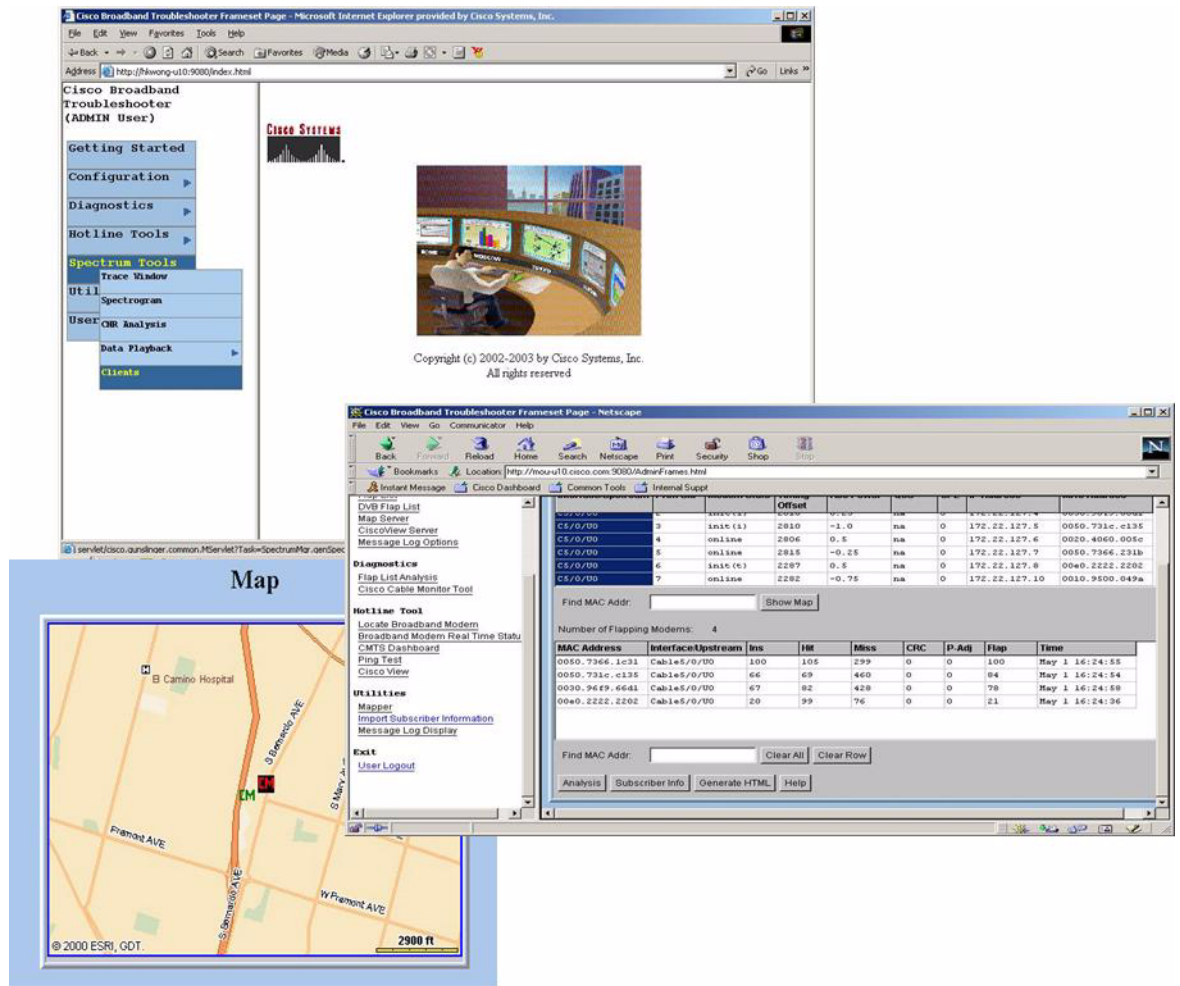
Cisco Broadband Troubleshooter is built on a Web-based, client-server architecture, and provides flexibility and scalability. Cisco Broadband Troubleshooter supports concurrent multiuser access, as well as remote access to the server that hosts the product. Because only a single instance of Cisco Broadband Troubleshooter needs to be administered for installation, support, and upgrade, ease of management is achieved.

Cisco Broadband Troubleshooter provides three levels of security access. Based on the entered password and assigned privilege level, the user will see a different GUI presenting the menu selections and options appropriate to the user's privilege level.

Cisco Broadband Troubleshooter (Figure 1) works with:

- CiscoView (optional)—Users can obtain a real-time graphical representation of the back panel and status of interface ports on any DOCSIS- or EuroDOCSIS-compliant cable modem or set-top box if CiscoView is installed.
- An optional mapping tool, RouteMAP™ IMS from ESRI—Users can view the entire network of cable modems or set-top boxes down to the street level if this third-party tool is purchased and installed. Visualizing the cable modem or set-top box status and location on a map helps identify problem areas faster than reviewing a long table of data.

Figure 1  
Cisco Broadband Troubleshooter



## Features and Benefits

Feature	Benefit
<b>Automated analysis and interpretation of Cisco's patented flap list</b>	<ul style="list-style-type: none"> <li>Streamlines troubleshooting since the system automatically sorts, categorizes, and isolates RF problems to provisioning, noise, attenuation, or CRC errors</li> </ul>
<b>Views of network health, CMTS and CM through CiscoView application</b>	<ul style="list-style-type: none"> <li>Provides increased visibility on the network</li> <li>Promotes "at-a-glance" problem identification</li> </ul>
<b>Scheduled and on-demand query and capture of network health</b>	<ul style="list-style-type: none"> <li>Supports trend analysis to enable better network planning and performance monitoring</li> </ul>
<b>Diagnostics available from both customer account and network-event perspectives</b>	<ul style="list-style-type: none"> <li>Promotes proactive problem isolation</li> </ul>
<b>Pinpointing cable modems experiencing problems to geographic locations through third-party mapping tool (option)</b>	<ul style="list-style-type: none"> <li>Improves staff effectiveness because the system visually depicts and isolates problems to address and street levels</li> </ul>
<b>Advanced upstream spectrum management capabilities including trace window, spectrogram, carrier-to-noise ratio analysis, and data playback for Cisco MC16S line cards</b>	<ul style="list-style-type: none"> <li>Quick identification of what is wrong, where, and why, making it easy to correct upstream RF problems</li> <li>Reduces need and reliance on external spectrum analyzers, promoting increased efficiency and lowered CapEx.</li> <li>Eliminates inefficient use of resources or time</li> </ul>
<b>Client-server architecture that supports concurrent multi-user and remote access</b>	<ul style="list-style-type: none"> <li>Increases maintenance efficiency</li> <li>Offers flexibility, scalability, and ease of management because technicians at the NOC or in the field can distribute troubleshooting workload</li> </ul>
<b>Point-and-click interface and HTML-based online help</b>	<ul style="list-style-type: none"> <li>Reduces training time</li> </ul>
<b>Three account levels</b>	<ul style="list-style-type: none"> <li>Protects access to the system</li> </ul>

## Applications

- **NOC**—Cisco Broadband Troubleshooter is ideal for remote monitoring of the HFC plant and cable modems connected to a Cisco CMTS. The real-time status summary and automatic flap-list interpretation enable NOC personnel to easily identify, prioritize, and resolve problems appropriately. By distinguishing problems that can be remotely solved from those requiring a technician visit, Cisco Broadband Troubleshooter streamlines workflow and technician field dispatch. With remote access to comprehensive information on current plant and equipment problems, NOC personnel are able to improve network reliability, solve problems before they seriously affect customers, and reduce costs for maintenance and operation.
- **Headend or remote site**—Technicians can use Cisco Broadband Troubleshooter on a laptop computer with a network connection. By viewing the same status information as a NOC technician, a field technician can speed problem resolution on-site and solve problems at the physical location. Cisco Broadband Troubleshooter helps RF technicians characterize trouble patterns in the HFC network and plant segment.

## Intelligent Spectrum Management for Cisco MC16S Line Cards

Figure 2 illustrates the Return Path Trace Window. Monitoring the return path is a quick way to verify CPD. Graphical limit indication provides a fast and easy overview. Automatic marker limits indicate which signal parameters to correct. The spectrum analyzer mode of the Cisco Broadband Troubleshooter, in combination with peak-hold, can make it possible to capture the peak power of a bursty cable modem signal. After the peak-hold trace is built, a marker can be used to read the level in dBmV. Specialized software in the Cisco Broadband Troubleshooter ensures that the proper cable modem is measured.

Figure 2  
Cisco Broadband Troubleshooter Return Trace Window Example

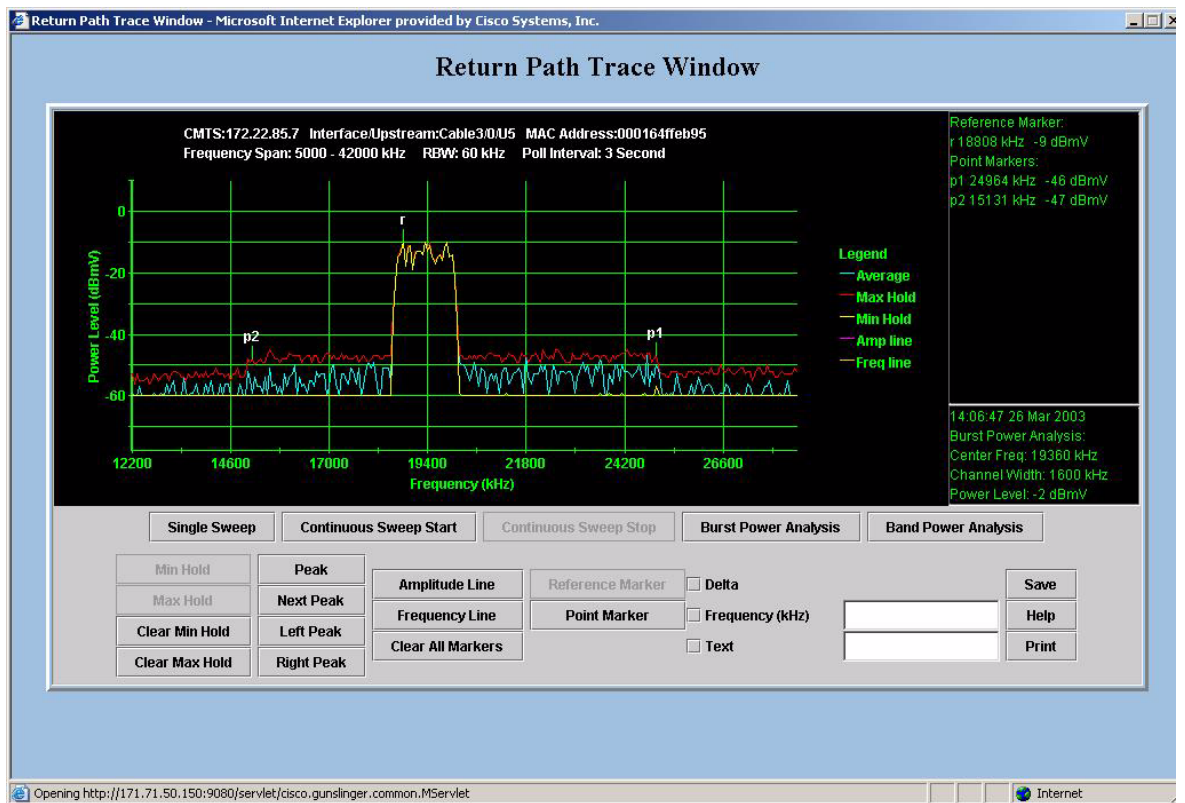
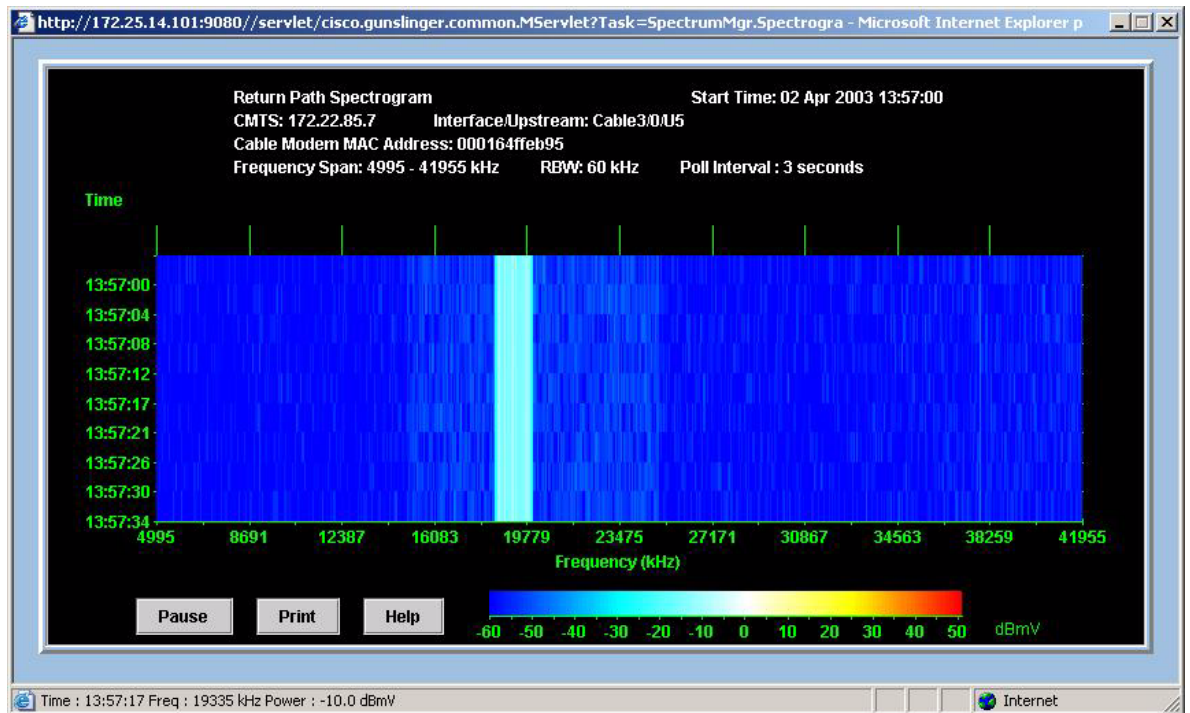


Figure 3 illustrates a return path spectrogram. A spectrogram allows technicians to see trouble in one shot. The spectrogram indicates frequency response, notches, roll-offs, and standing waves. The spectrogram with on-line limit check can save time and provide a quick real-time indication that channel parameters are passing or failing.

Figure 3  
Cisco Broadband Troubleshooter Return Path Spectrogram Example



Each subscriber site's noise and ingress accumulates at the CMTS. It is therefore important to set limits for each subscriber site for individual ingress thresholds. Color coding identifies cable modems that have fallen out of a threshold range. Figure 4 illustrates a return path trace window showing carrier-to-noise (CNR) ratio and play-back intervals.

Figure 4  
Cisco Broadband Troubleshooter CNR Analysis Playback Example

The screenshot displays the Cisco Broadband Troubleshooter interface. On the left is a navigation menu with options: Getting Started, Configuration, Diagnostics, Hotline Tools, Spectrum Tools, Utilities, and User Log Out. The main content area is titled "CNR Analysis Play Back Result" and shows the following details:

CMTS: 1.8.73.1  
Interface/Upstream: Cable8/0/0/0/0

	CM MAC Address	CNR	Collected Time
1	00024bb72719	38	Mon Mar 24 10:07:02 PST 2003
2	00024bb73897	38	Mon Mar 24 10:07:04 PST 2003
3	00024bb738ab	38	Mon Mar 24 10:07:05 PST 2003
4	00024bb738e5	40	Mon Mar 24 13:38:18 PST 2003
5	00024bb7388d	39	Mon Mar 24 13:38:21 PST 2003
6	00024bb73895	40	Mon Mar 24 13:38:24 PST 2003
7	00024bb738e9	40	Mon Mar 24 13:38:27 PST 2003
8	0002b94a1671	41	Mon Mar 24 13:38:28 PST 2003
9	0002b94a16cd	40	Mon Mar 24 13:38:29 PST 2003

At the bottom of the table area, there are two buttons: "Generate HTML" and "Help".

## System Requirements

Server	Client
<b>Recommended Linux server requirements:</b> <ul style="list-style-type: none"><li>• 1 GHz Pentium III workstation</li><li>• RedHat Linux 7.2 OS installed</li><li>• 18 GB of available disk space</li><li>• 2 GB of memory</li><li>• CD-ROM drive</li><li>• SNMP connectivity between the server and the managed CMTSs</li><li>• Connectivity between the server and the location of subscriber and provisioning information</li></ul>	<b>Linux client with</b> <ul style="list-style-type: none"><li>• 128 MB of memory</li><li>• IP connection to the Cisco Cable Diagnostic Manager server</li><li>• Browser for Linux OS — Netscape 4.78</li></ul>
<b>Recommended Solaris server requirements:</b> <ul style="list-style-type: none"><li>• Ultra 5 Solaris workstation</li><li>• Solaris 2.8 OS installed</li><li>• 18 GB of available disk space</li><li>• 2 GB of memory</li><li>• CD-ROM drive</li><li>• SNMP connectivity between the server and the managed CMTSs</li><li>• Connectivity between the server and the location of subscriber and provisioning information</li></ul>	<b>Ultra 5 workstation with Solaris 2.8 with</b> <ul style="list-style-type: none"><li>• 128 MB of memory</li><li>• IP connection to the Cisco Cable Diagnostic Manager server</li><li>• Browser for Solaris</li></ul>
<b>Recommended Windows server requirements:</b> <ul style="list-style-type: none"><li>• 1 GHz Pentium III workstation</li><li>• Windows NT or Windows 2000 OS installed</li><li>• 18 GB of available disk space</li><li>• 2 GB of memory</li><li>• CD-ROM drive</li><li>• SNMP connectivity between the server and the managed CMTSs</li><li>• Connectivity between the server and the location of subscriber and provisioning information</li></ul>	<b>Pentium II with Windows 98, Windows XP, or Windows 2000</b> <ul style="list-style-type: none"><li>• 128 MB of memory</li><li>• IP connection to the Cisco Cable Diagnostic Manager server</li><li>• Browser for Windows OS: Netscape 4.5 or a later release; Internet Explorer 5.0 or a later release</li></ul>

## Supported Network Elements

- Cisco uBR10012, uBR7200 Series, and uBR7100 Series universal broadband routers
- Cisco uBR900 Series Cable Access Router
- DOCSIS-compliant cable modems

## Cisco Service and Support

Service and support for Cisco Broadband Troubleshooter is available through the Cisco Software Application Support program. These services provide 24-hour technical assistance, full access to the information and support resources on the Cisco.com Web site, and software maintenance updates within a single release.

Available as an option are advanced Software Application Support Plus Upgrades (SASU), which include proactive shipment of all minor (update) and major (upgrade) product releases.



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