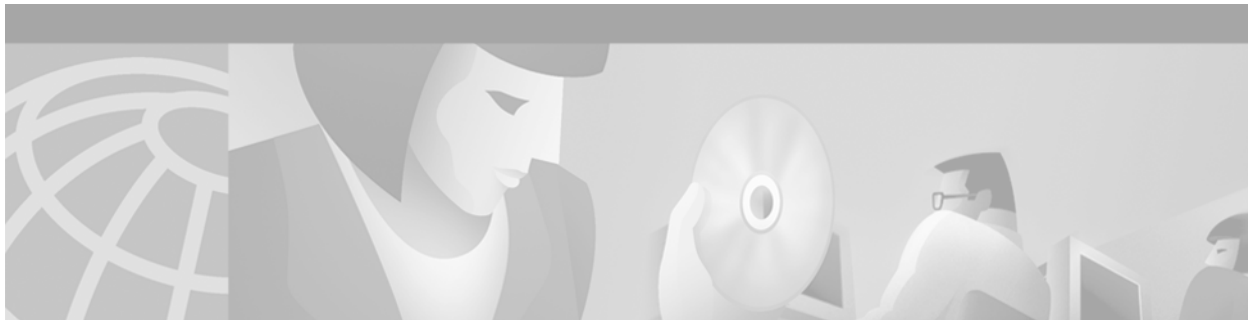




Preface

Purpose

This Internetworking Solutions Guide (ISG) describes how to implement and operate a dial network management system (NMS) that provides management functions for a dial Internet access service (DIAS).

Audience

This guide is intended for network engineers and operators who implement and operate dial NMS systems.

This guide assumes that you have the following level of knowledge and experience:

- An understanding of NMS protocols, such as Simple Network Management Protocol (SNMP), Network Time Protocol (NTP), and syslog.
- Hands-on experience working with Cisco routers, IOS technologies, and UNIX.
- Success configuring a Cisco network access server (NAS) for basic IP modem services.
- A Cisco Certified Network Associate (CCNA) certificate or equivalent level of experience.

Scope

This guide provides guidelines and a case study for:

- Designing a dial NMS.
- Collecting and using data-management streams to operate a dial access network.
- Managing important connection events and alarms for statistical analysis.
- Reporting on the performance of a DIAS.
- Addressing the perception problems that are commonly associated with dial access networks.

This guide describes the following network protocols, functions, and NMS applications:

- **Protocols**—SNMP and NTP.
- **Functions**—Syslog, modem call records, Cisco IOS command-line interface (CLI), Log File Rotator, Device Navigator, web-based management, and War Dialer.
- **NMS applications**—UCD-SNMP, Multi Router Traffic Grapher (MRTG), HP OpenView (HPOV), and CiscoWorks 2000 Resource Manager Essentials (CW2000 RME).

This guide *does not* provide the following information:

- Descriptions about the basics of network management.
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_c/index.htm
- Windows NT-based management of Cisco routers.
<http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/index.htm>
- Detailed authentication, authorization, and accounting (AAA).
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/secur_c/index.htm
- Basic access server configurations.
http://www.cisco.com/cgi-bin/Support/PSP/index.pl?i=Products#Access_Products
- Information about integrating high-end NMS systems in to a dial access environment.
<http://www.cisco.com/univercd/cc/td/doc/cisintwk/intsolns/index.htm>

Conventions

Convention	Description
bold	Command or keyword that you must enter.
<i>italic</i>	File names, directory paths to files, user names, and arguments for which you supply values.
[x]	Optional keyword or argument that you enter.
{x y z}	Required keyword or argument that you must enter.
[x {y z}]	Optional keyword or argument that you enter with a required keyword or argument.
string	Set of characters that you enter. Do not use quotation marks around the character string, or the string will include the quotation marks.
screen	Information that appears on the screen.
^ or Ctrl	Control key—for example, ^D means press the Control and the D keys simultaneously.
< >	Nonprinting characters, such as passwords.
!	Comment line at the beginning of a line of code.



Caution

Means reader be careful. In this situation, you might do something that could result in equipment damage or loss.

**Note**

Means reader take note. Notes contain helpful suggestions or reference to materials not contained in this manual.

**Timesaver**

Means the described action saves time. You can save time by performing the action described in the paragraph.

**Tips**

Means the information might help the reader solve a problem.

Related Documentation and Sites

See the following related documentation and web sites for more information:

- Technical References and Support
- Internetworking Solutions Guides
- Freeware
- Cisco Product Documentation

Technical References and Support

- Center of Excellence Internet Access Engineering—A site dedicated to developing lightweight tools and techniques for supporting the implementation and operation of Internet access services. This site is an educational endeavor of the University of Texas at Austin and Cisco Systems, Inc.
<http://mccain.ots.utexas.edu/index.html>
- Wholesale Dial Resources—Provides links to technical documents related to wholesale dial Internet access services.
<http://mccain.ots.utexas.edu/coe/wholesaledial/index.html>
- Technical Assistance Center—Provides technical support information about Cisco technologies. Locate your technology of interest from a list of available technology pages, which are continually updated by Cisco TAC engineers.
<http://www.cisco.com/cgi-bin/ibld/view.pl?i=support&m=GUEST>
- SNMP Technology Support Pages—Provides an overview of SNMP, network design tips, implementation and operation guidelines, and links to suggested reading.
http://www.cisco.com/cgi-bin/Support/PSP/psp_view.pl?p=Internetworking:SNMP
<http://www.cisco.com/warp/public/535/3.html>
<http://www.faqs.org/faqs/snmp-faq/>
- CiscoWorks 2000 TAC Support Page—Describes how to implement, operate, and troubleshoot Cisco Works 2000.
http://www.cisco.com/cgi-bin/Support/PSP/psp_view.pl?p=Software:CiscoWorks2000

- Access Technology Software Center—Provides the firmware for modem upgrades.
<http://www.cisco.com/kobayashi/sw-center/sw-access.shtml>
- Increasing Security on IP Networks—Addresses network-layer security issues.
<http://www.cisco.com/univercd/cc/td/doc/cisintwk/ics/cs003.htm>
- Carnegie Mellon CERT® Security Improvement Modules—Provides information about security management.
<http://www.cert.org/security-improvement/>

Internetworking Solutions Guides

- *Cisco AS5x00 Case Study for Basic IP Modem Services*—Describes how to configure, verify, and troubleshoot basic IP modem services.
<http://www.cisco.com/univercd/cc/td/doc/cisintwk/intsolns/as5xipmo/index.htm>
- *Cisco AAA Implementation Case Study*—Describes how to design, implement, and operate basic Cisco IOS AAA security and accounting functions.
<http://www.cisco.com/univercd/cc/td/doc/cisintwk/intsolns/aaaisg/index.htm>
- *Access VPN Solutions Using Tunneling Technology*—Describes how to configure, verify, and troubleshoot access VPN solutions. See also *Access VPDN Dial-in Using L2TP*.
<http://www.cisco.com/univercd/cc/td/doc/cisintwk/intsolns/index.htm>

Freeware

- Sunfreeware.com—A repository of freeware programs and news for Solaris.
<http://www.sunfreeware.com/>
- The UCD-SNMP Home Page—Provides an overview of UCD-SNMP, links to the FTP site, recent news, documentation, bug reports, mailing lists, and where to go for more information.
<http://ucd-snmp.ucdavis.edu/>
- Multi Router Traffic Grapher (MRTG) Product Site—Provides an overview of MRTG, links to the FTP site, documentation, frequently asked questions, mailing lists, and contact information.
<http://ee-staff.ethz.ch/~oetiker/webtools/mrtg/mrtg.html>

Cisco Product Documentation

- *Modem Router Connection Guide*—A starting point for understanding basic modem cabling and configuration. To view this guide, you must be a CCO member.
<http://cio.cisco.com/warp/customer/76/9.html>
- *AT Command Sets and Register Summaries*—A list of AT commands for configuring and operating MICA and Microcom modems. Most modems function well with their default settings; however, AT commands are required for special features and troubleshooting modems.
http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/5300/mod_info/at/index.htm

- *Managing Modems* (Cisco IOS 12.1)—Describes configuration and troubleshooting tasks for dial access environments.
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/dialts_c/dtsprt2/dcdm odmg.htm
- *Modem Management Commands* (Cisco IOS 12.1 and 12.0)—Provides two lists of Cisco IOS modem commands used for configuring and troubleshooting modems.
http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/dial_r/drdshom.htm
http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/dial_r/drprt1/drmodmg t.htm
- *CiscoWorks 2000 Documentation Set*—A collection of configuration guides and reference manuals.
<http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/cw2000/index.htm>

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: <http://www.cisco.com>
- WWW: <http://www-europe.cisco.com>
- WWW: <http://www-china.cisco.com>
- Telnet: cco.cisco.com
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.



Note

If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact the Cisco Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package that ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription.

You can also access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar and select Documentation. After you complete the form, click **Submit** to send it to Cisco.

You can also submit feedback on Cisco documentation by sending an e-mail to bug-doc@cisco.com or sending a fax to (408) 527-8089. We appreciate your comments.

Acknowledgements

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