Preface

Purpose of this Manual

This manual is the complete reference to the configuration, management and operation of all AR400 Series routers, and includes detailed descriptions of all management commands.

AR400 Series routers provide efficient and cost-effective multiprotocol routing, terminal serving and integrated network management over wide area networks and LANs. The router can provide multiple functions simultaneously. AR410, AR440S, AR441S and AR450S models run different software suites, and the available functionality depends on the model and hardware configuration:

■ Wide area networking via Point-to-Point Protocol.

■ Wide area networking via Frame Relay, and X.25, operating over synchronous links up to 2Mb/s (routers with PIC bay only).

■ Basic Rate and Primary Rate access to Integrated Services Digital Network (ISDN) services, with dial-on-demand and channel aggregation (routers with PIC bay only).

■ TCP/IP routing.

■ Novell® IPX routing.

■ DECnet™ routing (Phase IV+ and area) (routers with PIC bay only).

■ AppleTalk routing.

■ Generic Routing Encapsulation (GRE) protocols.

■ IP multicast routing support, including Internet Group Management Protocol (IGMP), Distance Vector Multicast Routing Protocol (DVMRP) and Protocol Independent Multicast (PIM) Sparse and Dense Modes.

■ Ping Polling for determining device reachability and responding when a device or link goes up or down.

■ IPv6 routing support, including stateless address autoconfiguration, RIPv6 and ICMPv6.

■ IPv6 multicast routing support, including Multicast Listener Discovery (MLDv2) and Protocol Independent Multicast (PIM) Sparse and Dense Modes.

■ OSPF, RIP (IP and Novell®), SAP (Novell®), EGP and BGP routing protocols.

- ARP, Proxy ARP, and Inverse ARP address resolution protocols.

- Sophisticated packet filtering.

- Quality of service to prioritise packets and manage bandwidth.

- Bridging.

- Van Jacobson's header compression, STAC LZS and Predictor compression, and hardware-based AES (AR440S, AR441S, AR450S only) and DES encryption.

- Create secure Virtual Private Networks (VPNs) across the Internet or any other public or shared IP network, using AT-VPNet.

- Tunnelling of synchronous (HDLC) data through TCP/IP (routers with PIC bay only).

- Terminal serving using Telnet with local host nicknames.

- Access to network printers via LPD or TCP streams (routers with PIC bay only).

- Sophisticated, configurable event logging facility for network monitoring and alarm notification to single or multiple management centres.

- Triggers for automatic and timed execution of commands in response to events.

- Scripting for automated configuration of routers and centralised management of configurations.

- Dynamic Host Configuration Protocol (DHCP) for automatically assigning IP addresses and other configuration information to PCs and other hosts on TCP/IP networks.

- Dynamic Host Configuration Protocol for IPv6 (DHCP6).

- Support for the Simple Network Management Protocol (SNMP), standard MIBs and the Allied Telesyn Enterprise MIB, enabling the router to be managed by a separate SNMP management station.

- Secure remote management using the Secure Shell protocol.

- Resource Reservation Protocol (RSVP) for delivering quality of service to application data streams.

- TPAD support for fast credit card authorisation transactions (routers with PIC bay only).

- A fully featured, stateful inspection firewall.

- IPsec-compliant IP security services.

- Integration with a Public Key Infrastructure (PKI).

- Virtual Router Redundancy Protocol (VRRP).

- Open Systems Interconnection (OSI) Connectionless Network Service (CLNS).

- Border Gateway Protocol version 4 (BGP-4).

- Load Balancing for distributing traffic among multiple resources.

- Software Secure Sockets Layer (SSL).

- Voice over IP (VoIP).

- 802.1x port authentication.

Intended Audience

This manual is intended for the system administrator, network manager, or communications technician who configure and maintain the AR400 router, or who manages a network of routers.

It is assumed that the reader is familiar with:

■ The topology of the network in which the AR400 router is to be used.

■ Basic principles of computer networking, protocols and routing, and interfaces.

■ Administration and operation of a computer network.

This manual is not intended for users who use the computer network to access network services from their terminal, personal computer, or workstation. Most of the commands require Manager privilege and can be entered only from a terminal or port that has been assigned Manager privilege.

Structure of this Manual

This manual is organised into the following chapters:

■ *Command Summary* is an alphabetical list of all router commands and their syntax.

■ Chapter 1, Operation describes general operation, management and support features, including user authentication, down-line loading and installing software releases.

■ Chapter 2, Switching on the AR410 describes how to configure the Layer 2 switch ports on the AR410 router, their VLAN membership, and their Quality of Service mapping.

■ Chapter 3, Switching on the AR440S, AR441S and AR450S describes how to configure the Layer 2 switch ports on the router, their VLAN membership, and their Quality of Service mapping.

■ Chapter 4, Port Authentication describes how to configure 802.1x port authentication on the router.

■ Chapter 5, Generic Packet Classifier describes how the router performs packet classification.

■ Chapter 6, Software Quality of Service (QoS) describes how the router performs policy-based priority, queuing and bandwidth management operations on packets egressing and ingressing WAN links.

■ Chapter 7, Interfaces describes the Ethernet, synchronous (routers with PIC bay only) and asynchronous network interfaces on the router.

■ Chapter 8, ATM over ADSL describes the Asymmetric Digital Subscriber Line (ADSL) and Asymmetric Transfer Mode (ATM) on the router.

■ Chapter 9, Point-to-Point Protocol (PPP) describes the router's implementation of the Point-to-Point Protocol (PPP).

■ Chapter 10, Frame Relay (FR) describes the router's implementation of Frame Relay, and how to configure the router's Frame Relay interfaces (routers with PIC bay only).

■ Chapter 11, Integrated Services Digital Network (ISDN) describes the
   ISDN service provided by the router, and how to configure ISDN
   interfaces (routers with PIC bay only).

■ Chapter 12, X.25 describes how to configure the router's implementation of
   the ITU-T Recommendation X.25 protocol, and how to build an X.25 Packet
   Switched Network (routers with PIC bay only).

■ Chapter 13, Synchronous Tunnelling describes the router's mechanism for
   tunnelling synchronous data through a TCP/IP network (routers with PIC
   bay only).

■ Chapter 14, Internet Protocol (IP) describes the router's implementation of
   the Internet Protocol (IP).

■ Chapter 15, Internet Protocol Version 6 (IPv6) describes the router's
   implementation of IPv6, the next generation of the Internet Protocol.

■ Chapter 16, Ping Polling of Device Reachability describes how to configure
   the router to regularly check whether it can reach a device.

■ Chapter 17, IP Multicasting describes IP multicasting, including IGMP for
   group management, and DVMRP and PIM Sparse and Dense Mode for
   multicast routing.

■ Chapter 18, IPv6 Multicasting describes IPv6 multicasting, including
   MLDv2 for group management, and PIM Sparse and Dense Mode for
   multicast routing.

■ Chapter 19, Novell IPX describes the router's implementation of Novell's
   IPX protocol.

■ Chapter 20, DECnet describes the router's implementation of Digital
   Equipment Corporation's DECnet Phase IV+ protocol.

■ Chapter 21, Terminal Server describes the terminal services provided by
   the router, and the router's implementation of the Internet Telnet protocol.

■ Chapter 22, Printer Server describes the network printing services
   provided by the router, including LPD, permanent assignments and
   stream printing. (routers with PIC bay only)

■ Chapter 23, Open Shortest Path First (OSPF) describes the router
   implementation of the Open Shortest Path First (OSPF) routing protocol.

■ Chapter 24, Bridging describes the router's implementation of the IEEE
   802.1D–1990 standard for MAC bridges and remote bridging.

■ Chapter 25, Compression and Encryption Services describes the data
   compression and encryption services provided by the router.

■ Chapter 26, Test Facility describes the facilities built into the router for
   testing the router's interfaces, and how to execute and interpret the tests.

■ Chapter 27, Network Time Protocol (NTP) describes the router
   implementation of the Network Time Protocol (NTP).

■ Chapter 28, Asynchronous Call Control describes the router's facilities for
   managing dial-in connections or interconnecting routers using the
   asynchronous ports.

■ Chapter 29, Generic Routing Encapsulation (GRE) describes the router
   implementation of the Generic Routing Encapsulation (GRE) protocol to
   connect private IP networks via public internets.

■ Chapter 30, Trigger Facility describes the router's trigger facility for
   automated and timed execution of management commands in response to
   events.

- Chapter 31, AppleTalk describes the router's implementation of Apple Computer Inc.'s AppleTalk protocol.

- Chapter 32, Time Division Multiplexing (TDM) describes the router's implementation of time division multiplexing over G.703 links (routers with PIC bay only).

- Chapter 33, Logging Facility describes the router's advanced logging facility and how to configure the logging facility to provide flexible monitoring of the router's activities.

- Chapter 34, Scripting describes the router's scripting facility for creating, storing and executing sequences of commands.

- Chapter 35, Dynamic Host Configuration Protocol (DHCP) describes the router's implementation of the Dynamic Host Configuration Protocol.

- Chapter 36, Dynamic Host Configuration Protocol for IPv6 (DHCP6) describes the router's implementation of Dynamic Host Configuration Protocol for IPv6 and the support provided by the router.

- Chapter 37, Layer Two Tunnelling Protocol (L2TP) describes the router's implementation of the Layer Two Tunnelling Protocol.

- Chapter 38, Simple Network Management Protocol (SNMP) describes the router's implementation of the Simple Network Management Protocol.

- Chapter 39, Transaction Packet Assembler Disassembler (TPAD) describes the router's method of exchanging credit card transaction information between a transaction terminal or back office server and a credit card authorisation service (routers with PIC bay only).

- Chapter 40, Resource Reservation Protocol (RSVP) describes the router's implementation of the Resource Reservation Protocol, which allows receivers of traffic flow to reserve resources for the flow.

- Chapter 41, Firewall describes the router's packet filtering firewall using stateful inspection.

- Chapter 42, UPnP describes the router's implementation of UPnP that supports the Internet Gateway Device (IGD) Standard. UPnP works in conjunction with the firewall.

- Chapter 43, Secure Shell describes the router's implementation of the Secure Shell protocol for secure remote management.

- Chapter 44, Link Compression and Encryption describes the link compression and encryption facilities provided by the router for Point-to-Point Protocol (PPP), Frame Relay and X.25 links.

- Chapter 45, IP Security (IPsec) describes the router's implementation of the *Internet Protocol Security Facility* (IPsec), the *Internet Security Association Key Management Protocol* (ISAKMP) and the *Internet Key Exchange* (IKE) protocol.

- Chapter 46, Public Key Infrastructure (PKI) describes the configuration of the router for interaction with a Public Key Infrastructure (PKI).

- Chapter 47, Virtual Router Redundancy Protocol (VRRP) describes the router's implementation of the Virtual Router Redundancy Protocol (VRRP), a mechanism for combining backup routers into a single logical gateway.

- Chapter 48, Open Systems Interconnection (OSI) describes the router's implementation of the Connectionless Network Service (CLNS), End System to Intermediate System routing exchange protocol (ESIS), and

Intermediate System to Intermediate System routing exchange protocol (ISIS), from the Open Systems Interconnection (OSI) protocol suite.

■ Chapter 49, Border Gateway Protocol version 4 (BGP-4) describes the router's implementation of BGP-4 and how to configure it on the router.

■ Chapter 50, Load Balancer describes how to configure load balancing on the router.

■ Chapter 51, Secure Sockets Layer (SSL) describes the router's implementation of SSL and how to configure it on the router.

■ Chapter 52, Voice over IP (VoIP) describes how to configure Voice over IP on the router.

■ Appendix A, Messages provides a complete listing of all the informational, warning and error messages generated by the router.

■ Appendix C, Reference Tables provides reference tables of identifiers and return codes for a range of router functions and network services.

■ Chapter B, SNMP MIBs describes the *Management Information Bases (MIBs)* and managed objects supported by the router's SNMP agent, including the Allied Telesyn Enterprise MIB.

■ *Glossary* contains definitions of terms and concepts used in this manual.

■ *Index* is a master index to topics and commands covered in this manual.

Where To Find More Information

The Documentation and Tools CD-ROM bundled with each router contains the complete Document Set for your router and, where applicable, its expansion options. The CD-ROM also includes tools for managing your router.

The Document Set includes:

■ The *Installation and Safety Guide* for your router, which outlines the procedure for installing the router, and provides safety and statutory information.

■ The *User Guide* for your router, which provides introductory information on configuring, managing and troubleshooting your router.

■ The *Hardware Reference* for your router, which provides detailed information on the hardware features of AR400 Series routers.

■ The *Port Interface Card Quick Install Guide*, which outlines the procedure for installing PICs; and the *Port Interface Card Hardware Reference*, which provides detailed information on PICs (routers with PIC bay only).

■ This *Software Reference*, which provides detailed information on configuring the router and its software.

■ AT-TFTP Server for Windows, for downloading software releases.

■ Adobe Acrobat Reader, for viewing online documentation.

■ Microsoft Internet Explorer.

These documents can also be downloaded from http://*www.alliedtelesyn.co.nz/documentation/documentation.html*.

Standards and Protocols

Supported Standards and Protocols

The protocols and standards supported by the AR400 router, and the references where these protocols and standards are defined are listed in Table I on page -xci.

Table I: Protocols and standards supported by the AR400 Series router

Protocol/standard	Reference
AppleTalk	"*Inside AppleTalk*", Second Edition, 1990; Gursharan S. Sidhu, Richard F. Andrews, Alan B. Oppenheimer; Apple Computer Inc., Addison-Wesley Publishing Company, Reading, Massachusetts. ISBN 0-201-55021-0.
ARP	RFCs 826, 925.
Assigned Numbers	RFC 1700.
Bridging	IEEE 802.1D -1990.
BGP-4	RFCs 1771, 3065, 1657, 1997, 1998.
CHAP	RFC 1994
DHCP	RFCs 1541, 1542.
EGP	RFCs 827, 888, 904.
Encryption	FIPS PUB 46; ISO DEA-1; ANSI X3.92.
ESIS	ISO 9542
GRE	RFCs 1701, 1702.
Frame Relay (routers with PIC bay only)	ANSI T1S1; RFCs 1294, 1490.
ICMP	RFCs 792, 950.
IEEE 802.1x	ANSI/IEEE Std 802.1x-2001
IEEE 802.2	ANSI/IEEE Std 802.2-1985.
IEEE 802.3	ANSI/IEEE Std 802.3-1985, 802.3a, b, c, e-1988, 802.3ad (static)
HTTP	RFCs 1521, 1945.
Finger	RFC 1288.
Inverse ARP	RFC 1293.
IP	RFCs 791, 821, 950, 951, 1009, 1055, 1122, 1144, 1349, 1542, 1812, 1858.
IP addressing	RFC 1597.
IP multicasting	RFC 2236, draft-ietf-pim-sm-v2-new-00, draft-ietf-idmr-dvmrp-v3-09.
IP Security (IPsec)	RFCs 2104, 2393, 2395, 2401–2412.
IP Security Associations	RFCs 1825, 1827, 1829.
IPv6	RFCs 1981, 2080, 2373, 2460–2464, 2472, 2526, 2711, 3056.
IPv6 Multicasting	RFC 2375, draft-vida-mld-v2-01, draft-ietf-pim-sm-v2-new-05

Table I: Protocols and standards supported by the AR400 Series router (continued)

Protocol/standard	Reference
DHCP for IPv6	draft-ietf-dhc-dhcpv6-28
IPX	"*IPX Router Specification*", v1.2, Novell, Inc., Part Number 107-000029-001. RFC 1582.
ISDN (routers with PIC bay only)	ANSI T1.231-1997, ANSI T1.403-1995, ANSI T1.408-1990, AT&T TR 54016-1989, Austel TS 013.1:1990, Bellcore SR-3887 1997, TS 013.2:1990, TS 014.1:1990, TS 014.2:1990; ITU G.703, ITU G.704, ITU G.706, ITU-T Recommendations G.703 (1972), ITU-T Recommendation Q.922, G.794 (1988), G.706 (1988), I.120 (1988), I.121 (1988), I.411 (1988), I.430 (1988), I.431 (1988), Q.920 (1988), Q.921 (1988), Q.930 (1988), Q.931 (1988); ETSI Specifications ETS 300 011:1991, ETS 300 012:1992, ETS 300 102-1:1990, ETS 300 1022:1990, ETS 300 125:1991, ETS 300 153:1992, ETS 300 156:1992; New Zealand Telecom TNA 134; German Monopol (BAPT 221); Japan NTT I.430-a, Rockwell Bt8370 Fully Intergrated T1/E1 Framer and Line Interface data sheet, Technical Reference of Frame Relay Interface, Ver. 1, November 1993, Nippon Telegraph and Telephone Corporation.
ISIS	ISO 10589, ISO 10589 Technical Corrigendums 1, 2, 3, ISO 10589 Amendment 1.
L2TP	RFC 2661.
LB	The Load Balancer supports HTTP versions 1.0 and 1.1 as described in RFCs 1945 and 2068 respectively.
LPD	RFC 1179.
MAIL	RFCs 821, 822 and 1985.
MIOX (routers with PIC bay only)	RFC 1356.
NAT	RFC 1631.
NTP	RFCs 958, 1305, 1510.
OSI	ISO 8473, relevant parts of ISO 8348(X.213), ISO 8343/Add2, ISO 8648, ISO 8648, ISO TR 9577
OSPF	RFCs 1245–1247, 1583, 1586.
PKI	RFCs 1779, 2459, 2511, 2559, 2587, PKCS #10, draft-ietf-pkix-roadmap-05, draft-ietf-pkix-cmp-transport-protocols-01, relevant parts of RFCs 2510, 2585.
Point-to-Point Protocol	RFCs 1331–1334, 1376, 1378, 1548, 1549, 1552, 1570, 1638, 1661, 1662, 1762, 1877, 1962, 1968, 1974, 1978, 1990, 2125.
PPPoE	RFC 2516
Reverse ARP	RFC 903.
Proxy ARP	RFC 1027.
RADIUS	RFCs 2138, 2139.
RIP	RFCs 1058, 1388.
RSVP	RFCs 1112, 1812, 2205, 2211.
SNMP, MIBs	RFCs 1155, 1157, 1213, 1239, 1315, 1398, 1493, 1514, 1573, 2233.

Table I: Protocols and standards supported by the AR400 Series router (continued)

Protocol/standard	Reference
SSH	The SSH (Secure Shell) Remote Login Protocol, T. Ylonen, 15 November 1995.
SSL	RFC 2246 (except DSS encryption), SSLv2 client hello, SSLv3.
TACACS	RFC 1492.
TCP	RFC 793.
Telnet	RFCs 854–858, 932 1091.
TFTP	RFC 1350.
UDP	RFC 768.
UPnP	"Internet Gateway Device:1 Device Template Version 1.01 Standardized DCP." Although every effort has been made to comply with this standard, the implementation of UPnP has not been certified by the UPnP Implementers Corporation.
Van Jacobson's compression	RFC 1144.
VoIP	ITU-T Recommendation H.323, "Packet-Based Multimedia Communications Systems", November 2000
VRRP	RFC 2338.
X.25 (routers with PIC bay only)	ITU-T Recommendations X.25 (1988), X.121 (1988).

Obtaining Copies of Internet Protocols and Standards

The Internet Protocols are defined in *Requests For Comments* (RFCs). RFCs are developed and published under the auspices of the *Internet Engineering Steering Group* (IESG) of the *Internet Engineering Task Force* (IETF). For more information about the IESG and IETF, visit the IETF web site at *http://www.ietf.org/*. For more information about RFCs and Internet-Drafts (the starting point for RFCs), visit the RFC Editor web site at *http://www.rfc-editor.org/*. This site has information about the RFC standards process, archives of RFCs and current Internet Drafts, links to RFC indexes and search engines, and a list of other RFC repositories.

RFCs can be obtained electronically from many RFC repositories, mail servers, World Wide Web (WWW), Gopher or WAIS sites. A good starting point for finding the nearest RFC repository is to point your Web browser at *http://www.isi.edu/in-notes/rfc-retrieval.txt*.

To obtain a copy of an RFC using FTP, FTP to the host and login as user `anonymous`, and a password of either `guest` or your email address. The FTP server usually prompts you for one or the other. Use the `get` command to retrieve the desired RFC. Most sites have a file, usually `rfc-index.txt`, which lists the titles and file names of all available RFCs. Most sites have a file, usually `rfc-retrieval.txt`, which gives detailed information about RFC repositories and how to retrieve RFCs via FTP, mail servers, WWW, Gopher, and WAIS.

To learn how to obtain a copy of an RFC via email from a mail server, point your browser at *http://www.isi.edu/in-notes/rfc-editor/rfc-info.help*.

To obtain a copy of an RFC from a Web site, or to search RFC repositories for a specific RFC or all RFCs relating to a topic, point your Web browser at *http://www.rfc-editor.org/rfc.html*.

Background Reading

For an introduction to the Internet Protocols refer to:

DDN Protocol Handbook, Elizabeth J. Feinler, 1991, DDN Network Information Center, SRI International, 333 Ravenswood Avenue, Menlo Park, CA 94025, USA. Email: nic@nic.ddn.mil.

Internetworking with TCP/IP — Volume I: Principles, protocols and architecture (2nd Edition), Douglas E. Comer, 1991, Prentice-Hall International, Inc., New Jersey. ISBN 0-13-474321-0.

Internetworking with TCP/IP — Volume II: Design, implementation, and internals, Douglas E. Comer and David L. Stevens, 1991, Prentice-Hall International, Inc., New Jersey. ISBN 0-13-472242-6.

Internetworking with TCP/IP — Volume III: Client-server programming and applications, Douglas E. Comer and David L. Stevens, 1993, Prentice-Hall International, Inc., New Jersey. ISBN 0-13-474222-2.

For a description of layered protocols refer to:

Computer networks (2nd Edition), Andrew S. Tanenbaum, 1989, Prentice-Hall International, Inc., New Jersey. ISBN 0-13-162959-0.

For a guide to Novell®'s IPX and SPX protocols, refer to:

IPX Router Specification, Document Version 1.2, Part Number 107000029001.

Novell's Guide to NetWare LAN Analysis (Second Edition), L. A. Chappell and D. E. Hakes, 1994. Novell Press. ISBN 0-7821-1362-1.

For a guide to Digital Equipment Corporation's DECnet protocol, refer to:

DEC networks and architectures, Carl Malamud, 1989, McGraw Hill, New York. ISBN 0-07-039822-4.

For a description of Apple Computer Inc's AppleTalk protocols, refer to:

AppleTalk® Network System Overview, Apple Computer, Inc., 1989, Addison-Wesley Publishing Company, Reading, Massachusetts. ISBN 0201517604.

Inside AppleTalk®, Second Edition, 1990. Gursharan S. Sidhu, Richard F. Andrews, Alan B. Oppenheimer, Apple Computer, Inc. Addison-Wesley Publishing Company, Reading, Massachusetts. ISBN 0-201-55021-0.

For an introduction to network management refer to:

The simple book — An introduction to management of TCP/IP-based Internets, Marshall T. Rose, 1991, Prentice-Hall International, Inc. ISBN 013812611-9.

For an introduction to firewalls and internet security refer to:

Firewalls and Internet Security — Repelling the Wily Hacker, William R. Cheswick and Steven M. Bellovin, Addison-Wesley Publishing Company, Reading, Massachusetts. ISBN 0-201-63357-4.

These books are listed as a convenience. Allied Telesyn does not endorse or recommend them over others on the same subject.

Publicly Accessible Documents

Allied Telesyn maintains an online archive of documents and files that customers can access via the World Wide Web or via anonymous FTP. For WWW access, point your Web browser at *http://www.alliedtelesyn.com* or *http://www.alliedtelesyn.co.nz*. For access via anonymous FTP, FTP to host *ftp.alliedtelesyn.co.nz*, login as user `anonymous` and enter your email address (e.g. `username@host.org`) when prompted for a password.

Conventions

A number of symbols, typographic, and stylistic conventions are used throughout this manual to aid learning and make information easier to find (Table II).

Table II: Typographic conventions used in this manual.

This typeface	Is used for
Italic	Referring to another section in this manual or another manual, or to introduce and emphasise new terms. For example, "See *Chapter 2, Configuration*".
`Monospace`	Text as it appears on-screen, or anything you must type.
0xFF	Numbers starting with the 0x prefix are hexadecimal values.
[Key]	A key on your keyboard. For example, "at the prompt, type a command and press [Enter]. Example key names include [Shift], [Alt], [Ctrl] and [Backspace].
[Key/Key]	A pair of keys on your keyboard that should be pressed together. For example, [Ctrl/P] means "press and hold down the [Ctrl] key, and while holding down the [Ctrl] key, press and release the [P] key, then release the [Ctrl] key".
[Key,Key]	A sequence of keys that should be pressed in sequence. For example, [Break,T] means "press and release the [Break] key, then press and release the [T] key".
	The [Key/Key] and [Key,Key] symbols may be combined, as in [Ctrl/P,T], which means "press and hold down the [Ctrl] key, and while holding down the [Ctrl] key, press and release the [P] key, release the [Ctrl] key, then press and release the [T] key".
Attention	A special keystroke known as the attention character, which is either [Break] or [Ctrl/P].

Note. A note like this presents additional information or interesting sidelights.

Warning. A warning alerts you to situations in which you could do something that might result in a loss of data, or cause damage to the equipment.

Screen views show examples of the output resulting from particular
commands or what the screen should look like at a particular time, for instance:

```
Configuration for ETH instance 0:

  Module          Protocol         Format    Discrim     MAC address
  -------------------------------------------------------------------
  IPG             IP               Ethernet  0800        0000cd000027
  IPG             ARP              Ethernet  0806        0000cd000027
  IPX             Novell           Novell    -           0000cd000027
  DNT             DECnet           Ethernet  6003        aa0004003908
  Bridging        LAT              Ethernet  6004        -
  Bridging        EtherTalk        SNAP      00000080f3  -
  -------------------------------------------------------------------
```

Commands are described under *Command Reference* within the section to which
they apply. Each command is described in the format as shown in Figure I.

Figure I:Command format.

Command name	**add ip host**
The syntax of the command	**Syntax** `ADD IP HOst=name IPaddress=ipadd`

where:

■ *name* is a character string up to 60 characters in length. If the string contains spaces it must be enclosed in double quotes.

■ *ipadd* is an IP address in dotted decimal notation.

What the command does, and what each of the parameters mean

Description This command adds a user-defined name for an IP host to the host name table. The host name table makes it easier to Telnet to commonly accessed hosts by enabling the user to enter a shorter, easier to remember name for the host rather than the host's full IP address or domain name. The name can also be used with the **ping** command on page 12-116.

The **host** parameter specifies the user-defined name for the IP host. A host with the same name must not already exist in the host name table. When a host name is specified in the Telnet command, the entire name will be used to match a name in the host name table. All characters are used in the comparison, including nonalphabetic characters if they are present.

The **ipaddress** parameter specifies the IP address of the host.

Examples show how the command is used

Examples To add the host name "zaphod" to the host name table for an IP host with an IP address of 172.16.1.5 and the domain name "zaphod.company.com", use:

```
add ip host=zaphod ip=172.16.1.5
```

To Telnet to the host, use any of the following commands:

```
telnet zaphod
telnet zaphod.company.com
telnet 172.16.1.5
```

References to related commands

Related Commands delete ip host
set ip host
set ip nameserver
set ip secondary nameserver
show ip host

PREFACE1

Command syntax is defined using these conventions:

Element	Description
`Keywords in CAPS and lower case (mixed case)`	The command that should be typed. The shortest valid command is denoted by capital letters. Exceptions are commands with profound effects such as *restart immediately*, which must be typed in full.
italic	A variable placeholder to be replaced by an actual value in a command.
`[]`	Square brackets enclose optional items. Enter the item or items but do **not** type the brackets.
`|`	Vertical bars separate choices in a list — choose **one** of the items.
`...`	Ellipses indicate that the preceding element may be repeated any number of times.
`{}`	Braces surround a choice of options that is required; you must choose one of the options listed.
`n..m`	Defines a range of values from n to m inclusive; **n** and **m** are decimal numbers.
interface	An interface type and one of the following: `ETHn` for Ethernet interfaces `SYNn` for Synchronous interfaces (PIC bay only) `ASYNn` for Asynchronous interfaces (also PORTn) `BRIn` for Basic Rate ISDN interfaces (PIC bay only) `PRIn` for Primary Rate ISDN interfaces (PIC bay only) `PPPn` for Point-to-Point interfaces `FRn` for Frame Relay interfaces (PIC bay only) `LAPBn` for LAPB interfaces (PIC bay only) `LAPDn` for LAPD interfaces (PIC bay only) `X25Tn` for X.25 DTE interfaces (PIC bay only) `SLIPn` for SLIP interfaces `VLANn` for Virtual LAN interfaces `n` when defining one of the above interface types. n is a non-negative, zero-based decimal number.
ipadd	An IP address in dotted decimal form (e.g. `131.203.9.197`). In some situations, an address in domain name format.
macadd	A hardware address (such as an Ethernet address) of the form `XXXXXXXXXXXX`, where `XX` is a two-digit hexadecimal number with leading zeros if necessary.
dntadd	A DECnet address of the form `area.node`, where `area` is a decimal number from 1 to 63 and `node` is a decimal number from 1 to 1023.

Special Feature Licences

You need a special feature licence and password to activate some special features over and above the standard software release. Typically, these features are covered by government security regulations. Special feature licences and passwords are separate from standard software release licences and passwords. The features that are available and that require special feature licences depend on region and router model. Some of the software features that require a special feature licence are:

■   Triple DES S/W

■   Firewall SW (enabled on the AR410S, AR440S, AR441S and AR450S)

■   Firewall SMTP Application Gateway (enabled on the AR410S, AR440S, AR441S and AR450S)

■   Firewall HTTP Application Gateway (enabled on the AR410S, AR440S, AR441S and AR450S)

■   Firewall SW

■   Firewall SMTP Application Gateway

■   Firewall HTTP Application Gateway

■   DES encryption

■   IPv6

■   Resource Reservation Protocol (RSVP)

■   BGP-4

■   Load balancer

Most software features that require a special feature licence are bundled into one of the following special feature licence packs:

■   Advanced Layer 3 Feature Licence

■   Security Pack Feature Licence

For more information about purchasing special feature licences, contact your Allied Telesyn authorised distributor or reseller. For information about enabling your special feature licences, see "Special Feature Licences" on page 1-59 of Chapter 1, Operation.

Allied Telesyn Offices and Locations

With locations covering all of the established markets in North America, Latin America and Europe, Allied Telesyn provides localized sales and technical support worldwide. To find our representative nearest you, visit Allied Telesyn on the web at: http://www.alliedtelesyn.com.