Introduction

The Cisco 3200 Series Mobile Access Routers deliver *always on* IP connectivity for networks in motion. These routers are intended to be mounted on a vehicle. They support Cisco IOS Mobile Networks, and allows them to *hide* the IP roaming from the local IP nodes. This allows IP hosts on a mobile network to connect transparently to the parent network while a router is in motion.

For example, an airplane equipped with Cisco 3200 Series Mobile Access Router can fly around the world while passengers stay connected to the Internet. The client computers do not need any specialized software to maintain the connections. This transparent communication is accomplished by Mobile IP devices that tunnel packets to the mobile access router.

The Cisco 3200 Series Mobile Access Router includes a third-party power source, cables, and an enclosure, that are assembled and installed by your system integrator. This document provides the information that you need to configure a completed Cisco 3200 Series Mobile Access Router.

Caveats

The following caveat applies to the Cisco 3200 Series Mobile Access Router.

Fast Ethernet Support

The FastEthernet 0/0 port on the MARC is a 10/100 Fast Ethernet *router* port. The FastEthernet 1/0 through 1/3 or 2/0 through 2/3 or 3/0 through 3/3 ports (as determined by the position of the rotary switch) on the 4-port FESMIC and the FastEthernet 1/0 and 1/1 or 2/0 and 2/1 or 3/0 and 3/1 ports on the 2-port FESMIC are 10/100 Fast Ethernet *switch* ports. The switch ports support all layer 2 features. The routing features supported on the MARC cannot be configured on the FESMIC ports.

Secure MAC Address

Network security is implemented by providing the user with option to make a port secure by allowing only well known MAC addresses to send in data traffic. Secure MAC addresses can be provisioned to allow forwarding of only secure addresses on a FESMIC 10/100 Fast Ethernet port.

IOS Switching Features that are Not Supported

The switching features described in this section are not supported on the Cisco 3200 Series router.

Fast Ether Channel

Fast Ether Channel (FEC), which allows multiple physical Fast Ethernet links to be combined into one logical channel.

SPAN

The Switched Port Analyzer (SPAN), sometimes called port mirroring or port monitoring, selects network traffic for analysis by a network analyzer such as a SwitchProbe device or other Remote Monitoring (RMON) probe.

Voice VLAN

Voice VLAN allows a switch access port to receive an 802.1Q tagged voice packet and native data packet from IP phones with a local switch port that connects to data network. VLAN–capable IP phones are powered directly from the switch port. The FESMIC does not provide in–line power.

Hardware Flow Control

Flow control is not available on the 10/100 Fast Ethernet interfaces of the FESMIC.

CGMP

Cisco Group Management Protocol (CGMP) was implemented by Cisco to restrain multicast traffic in a Layer 2 network. CGMP is not supported due to the lack of common code support.

Sub-interface Support

The **sub-interface** command is not supported for the virtual layer 3 interface and layer 2 interface on the FESMIC.

Switch Virtual Interface (SVI) is a virtual interface, and Cisco Discovery Protocol (CDP) cannot be enabled on the SVI interface. The IP address can only be configured on the virtual layer 3 interface on the FESMIC.

The **class-map** command is used to define a traffic class. The **match cos traffic** command is not available for the SVI interface. Use the **mls qos map** global configuration command to define the class of service (CoS)-to-Differentiated Services Code Point (DSCP) map.

We recommend that you use a different VLAN identifier for the **interface vlan xx** and **vlan dot1q encap** commands when configuring the MARC 10/100 Fast Ethernet port.

Currently, the bridge-group functionality for the IP traffic on the SVI interface is not supported.

IOS Support

Cisco IOS software is packaged in feature sets consisting of software images that support specific platforms. The feature sets available for a specific platform depend on which Cisco IOS software images are included in a release. To identify the set of software images available in a specific release or to find out whether a feature is available in a given Cisco IOS software image, use Feature Navigator or the IOS Software Release Notes.

Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which version of the IOS software images support a particular set of features and which features are supported in a particular IOS image.

Feature Navigator is available 24 hours a day, 7 days a week. To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you do not have an account on Cisco.com, go to http://www.cisco.com/register and follow the directions to establish an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. You can access Feature Navigator at http://www.cisco.com/go/fn.

IOS Software Release Notes

Cisco IOS software releases include release notes that provide the following information:

- Platform support information
- Memory recommendations
- Microcode support information
- Feature set tables and descriptions
- Open and resolved severity 1 and 2 caveats for all platforms

Release notes are intended to be release-specific for the most current release.

Mobile IOS Features

Table 1-1 compares mobile IOS features and stationary IOS features.

Table 1-1   Comparison of Mobile IOS Features and Stationary IOS Features

Feature	Stationary	Mobile
IP Addressing IPv4	X	X
IP Addressing IPv6	X	
IP Switching (Process, Cisco Express Forwarding (CEF), Fast)	X	X

Table 1-1   Comparison of Mobile IOS Features and Stationary IOS Features (continued)

Feature	Stationary	Mobile
IP Routing IPv4 (Routing Information Protocol (RIP) version 2, Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP))	X	X
IP Routing IPv6 (RIPv2)	X	
Encapsulation on serial interface (High-Level Data Link Control (HDLC)), Point-to-Point Protocol (PPP), Frame Relay, X.25, X.25 over TCP (XOT)	X	X
Bridging (transparent, integrated routing and bridging)	X	
DHCP Client	X	
DHCP Relay	X	X
DHCP Server	X	X
Domain Name System (DNS) Proxy and Spoofing	X	
Network Address Translation (NAT) and Port Address Translation (PAT)	X	
Network Time Protocol (NTP) Client	X	X
Generic Routing Encapsulation (GRE) Tunneling	X	X
Stacker (STAC) data compression	X	X
IP Security	X	X
IP Multicast Protocol Independent Multicast (PIM) sparse mode	X	
quality of service (QoS), Resource Reservation Protocol (RSVP)	X	
quality of service (QoS), Weighted Random Early Detection (WRED), Committed Access Rate (CAR), Link Fragmentation and Interleaving (LFI), Low Latency Queuing (LLQ), Differentiated Services Code Point (DSCP), Class-based Weighted Fair Queueing (CBWFQ), Network Based Application Recognition (NBAR), Class Based Packet Marking, Class Based Policer for the DSCP, Class Based Ethernet COS Matching and Marking (802.1p COS), Priority Queueing (PQ), Traffic Policing, Class Based Policer for the DiffServ Assured Forwarding (AF) PHB, DiffServ Compliant WRED, Flow Based WRED, Random Early Detection (RED), LLQ for Frame Relay, Custom Queueing (CQ), and General Traffic Shaping (GTS)	X	X
Authentication (Password Authentication Protocol (PAP), Challenge Handshake Authentication Protocol (CHAP), and MS-CHAP	X	X
Asynchronous Tunneling	X	X
CHAT Dialing Scripts, DDR	X	X
Cisco Firewall Phase I and Phase II	X	X
Cisco Secure Intrusion Detection	X	X
Service Assurance Agent	X	X
IP Named/Numbered Access-lists	X	X

Table 1-1   Comparison of Mobile IOS Features and Stationary IOS Features (continued)

Feature	Stationary	Mobile
Secure Shell Version 1	X	X
RADIUS and TACACS+	X	X
Simple Network Management Protocol (SNMP)	X	X
IPSEC VPN/ Internet Key Exchange (IKE) AES	X	X
Syslog	X	
Cisco Discovery Protocol (CDP)	X	
Packet Assembler/Disassembler (PAD)	X	

RFCs Supported

The following RFCs are supported:

- RFC 2002, *IP Mobility Support*
- RFC 2281, *Cisco Hot Standby Router Protocol*

Network Management Support (Cisco View)

CiscoView is a web-based, graphical device management application that provides monitoring and configuration features for Cisco internetworking products (switches, routers, hubs, concentrators, and access servers). CiscoView aides network management by displaying a physical view of a Cisco device, allowing users to easily interact with device components to change configuration parameters or monitor statistics.

Software Features

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features

Feature	Supported[1]	Image	Comments
AAA Server, RADIUS, TACACS			
AAA Broadcast Accounting	I	IP, IP+	Allows accounting information to be spanned to more than one authentication, authorization, and accounting (AAA) server server. AAA server subsystem is required for RADIUS and TACACS support.
AAA DNIS Map for Authorization	I	IP, IP+	Obsoleted by the AAA Server Groups based on Dialed Number Information Service (DNIS).
AAA Server Group	I	IP, IP+	Servers are grouped based on services configured on the AAA servers.

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
AAA Server Group Dead Timer	I	IP, IP+	Allows each AAA server to be fully configured in server group. Only works with RADIUS.
AAA Server Group Enhancements	I	IP, IP+	Allows each AAA server to be fully configured in server group. Only works with RADIUS.
AAA Server Groups Based on DNIS	I	IP, IP+	Router can use the DNIS to select a particular AAA server group.
Message Banners for AAA Authentication	I	IP, IP+	Displays custom success and failure login message.
Named Method Lists for AAA Authorization and Accounting	I	IP, IP+	Defines the way authorization is performed and the sequence.
RADIUS	Yes	IP, IP+	
TACACS+	Yes	IP, IP+	
Additional Vendor-Proprietary RADIUS Attributes	I	IP, IP+	Adds vendor specific extensions. Part of the RADIUS subsystem.
Authentication Proxy Accounting for HTTP	No		Accounting records for billing and security auditing. Service provider image only.
QoS Features			
Generic Traffic Shaping (GTS)	Yes	IP, IP+	
Class Based Ethernet CoS Matching & Marking (ISL CoS)	Yes	IP, IP+	ISL encapsulation is not supported. Class-based Packet Marking supports all packet marking CoS features.
Class Based Ethernet CoS Matching & Marking (802.1p CoS)	Yes	IP, IP+	
Class Based Policer for the DiffServ AF PHB	Yes	IP, IP+	
Class Based Weighted Fair Queuing (CBWFQ)	Yes	IP, IP+	
Class-Based Packet Marking - Differentiated Services Codepoint (DSCP)	Yes	IP, IP+	
Class-Based Packet Marking – Setting IP Precedence bits	Yes	IP, IP+	
Class-Based Packet Marking – QoS Group Value	Yes	IP, IP+	Class-based Packet Marking supports all packet marking CoS features.

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
Class-Based Policer for the DSCP	Yes	IP, IP+	
Class-Based Policer for the DiffServ Assured Forwarding (AF) PHB	Yes	IP, IP+	
Class-Based Ethernet COS Matching and Marking (802.1p COS)	Yes	IP, IP+	
Class-Based Packet Marking – ATM CLP	Yes	IP, IP+	Class-based Packet Marking supports all packet marking CoS features.
Custom Queueing (CQ)	Yes	IP, IP+	
Committed Access Rate (CAR)	Yes	IP+	
Diffserv Compliant WRED	Yes	IP, IP+	
Flow-Based WRED	Yes	IP, IP+	
General Traffic Shaping (GTS)	Yes	IP, IP+	
Low Latency Queueing (LLQ)	Yes	IP, IP+	
Low Latency Queueing (LLQ) for Frame Relay	Yes	IP, IP+	
Network Based Application Recognition (NBAR)	Yes	IP+	
Priority Queueing (PQ)	Yes	IP, IP+	
QoS Packet Marking	Yes	IP, IP+	Same as Class-Based Marking (DSCP, IP precedence).
QoS Policy Propagation by using Border Gateway Protocol (QPPB)	Yes	IP, IP+	
Random Early Detection (RED)	Yes	IP, IP+	
RSVP support for LLQ	No	IP, IP+	
RSVP support for Frame Relay	No	IP, IP+	Part of the Frame Relay Traffic shaping subsystem.
Traffic Policing	Yes	IP+	
Weighted Fair Queueing (WFQ)	Yes	IP, IP+	
Weighted RED (WRED)	Yes	IP, IP+	
LFI	Yes	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
RSVP	No	IP+	
COPS for RSVP	I	IP, IP+	RSVP subsystem has dependencies on COPS.
PPP and Related Protocols			
PPP	Yes	IP, IP+	
Multilink PPP	Yes	IP, IP+	
PPP Over Fast Ethernet 802.1Q	No	IP, IP+	Part of the VPN subsystem.
PPP over Frame Relay	Yes	IP, IP+	
PPPoE on Ethernet	I	IP, IP+	Part of the VPN subsystem
Compression Control Protocol	SB	IP, IP+	
Challenge Handshake Authentication Protocol (CHAP)	Yes	IP, IP+	
Bandwidth Allocation Control Protocol (BACP)	SB	IP, IP+	
MS Callback	I	IP, IP+	Part of Dialer subsystem.
MS-CHAP Support	Yes	IP, IP+	
Password Authentication Protocol (PAP)	Yes	IP, IP+	
Double Authentication	No	IP, IP+	This feature is on the NAS or Network Access Server side to work with a AAA server to authenticate a remote user in addition to CHAP/PAP authentication on the PPP session. This does not seem applicable to Hercules-A.
Easy IP, DHCP, Auto Install			
Easy IP (Phase 1)	Yes	IP, IP+	
DHCP Client	Yes	IP, IP+	
DHCP Proxy Client	I		Part of DHCP client subsystem
DHCP relay	Yes	IP, IP+	
DHCP Relay Agent Support for Unnumbered Interfaces	Yes	IP, IP+	The Cisco IOS DHCP Relay Agent Support for Unnumbered Interfaces reduces configuration tasks and costs. Whenever an unnumbered interface is configured, a static route for any host beyond the unnumbered interface must be manually configured. For DHCP relay, this static route is automatically maintained.

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
DHCP Server	Yes	IP, IP+	
Import and Auto Configuration	Yes	IP, IP+	
Easy IP Phase 2	Yes	IP, IP+	
Auto Install Using DHCP for LAN Interfaces	Yes	IP, IP+	
HTTP Security	Yes	IP, IP+	
NAT			
NAT-Support for NetMeeting Directory [Internet Locator Service (ILS)]	Yes	IP, IP+	
Dialer			
Dial backup	Yes	IP, IP+	
Dial on Demand Authentication Enhancements	No	IP, IP+	Large scale dial out eliminates the need to configure dialer maps on every network access server for every destination. Instead, you can create remote site profiles that contain outgoing call attributes (telephone number, service type, and so forth) on the AAA server. The profile is downloaded by the network access server (NAS) when packet traffic requires a call to be placed to a remote site.
Dial Peer Enhancements	No	IP, IP+	
Dial-on-demand	Yes	IP, IP+	
Dialer Idle Timer Inbound Traffic Configuration	Yes	IP, IP+	
Dialer profiles	Yes	IP, IP+	
Dialer Watch	No	IP, IP+	HSRP functionality on the dial area is needed for the disaster recovery. The current implementation of HSRP has limited advantage in the dial world. The backup router and backup links are not immediately available if the primary routers and links go down.
Firewall			
Firewall Feature Set	Yes	IP+	
Firewall Intrusion Detection System	Yes	IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
Context-Based Access Control (CBAC)	Yes	IP+	
Port to Application Mapping (PAM)	Yes	IP+	
Frame Relay			
Frame Relay	Yes	IP, IP+	
Frame Relay ELMI Address Registration	I	IP, IP+	Enables automated exchange of Frame Relay QoS parameter information between the Cisco router and the Cisco switch.
Frame Relay Encapsulation	Yes	IP, IP+	
Frame Relay End-to-End Keepalive	Yes	IP, IP+	
Frame Relay Fragmentation (FRF.12)	Yes	IP, IP+	
Frame Relay Fragmentation with Hardware Compression	No	IP, IP+	
Frame Relay FRF.9 Payload Compression	I	IP, IP+	A stream-oriented, multi-vendor-compatible compression scheme.
Frame Relay IP RTP Priority	No	IP, IP+	The Frame Relay IP RTP Priority feature provides a strict priority queueing scheme on a Frame Relay permanent virtual circuits (PVCs) for delay-sensitive data, such as voice. Voice traffic can be identified by the Real-Time Transport Protocol (RTP) port numbers and classified into a priority queue configured by the **frame-relay ip rtp priority** command. As a result, voice is serviced as strict priority in preference to other nonvoice traffic.
Frame Relay PVC Interface Priority Queueing	I	IP, IP+	Provides an interface-level priority queueing scheme where prioritization is based on destination PVC rather than packet contents. For example, Frame Relay PIPQ allows you to configure a PVC transporting voice traffic to have priority over a PVC transporting signalling traffic, and a PVC transporting signalling traffic to have priority over a PVC transporting data.
Frame Relay Router ForeSight	No	IP, IP+	Extends the Stratacom ForeSight traffic management to the router and allows end-to-end ForeSight traffic management on service provider and enterprise frame relay networks.

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
Frame Relay Switching Diagnostics and Troubleshooting	Yes	IP, IP+	
Frame Relay Traffic Shaping (FRTS)	Yes	IP, IP+	
Frame Relay Rate Enforcement	SB	IP, IP+	
Frame Relay Priority/Custom Queueing	SB	IP, IP+	
Frame Relay TCP header compression	SB	IP, IP+	
Frame Relay Inverse-ARP	SB	IP, IP+	
Frame Relay Switching	SB	IP, IP+	
Frame Relay LMI	SB	IP, IP+	
Frame Relay Tunneling	SB	IP, IP+	
Frame Relay with IPv6	SB	IP+	
IP and Other Routing Protocols			
IPv4	Yes	IP, IP+	
IPv6	Yes	IP+	
IP Named Access Control List	Yes	IP, IP+	
IP RTP Priority	I	IP, IP+	
IP Summary Address for RIPv2	Yes	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
IP Precedence for GRE Tunnels	Yes	IP, IP+	Copies the Type of Service (TOS) bits to the tunnel header and is used in Mobile IP tunnels. Even with static nodes, with the advent of virtual private network (VPN) and QoS applications, it is also desirable to copy the TOS bits when the router encapsulates the packets using GRE. Routers between tunnel endpoints can take advantage of the QoS features such as weighted fair queuing (WFQ) and weighted random early detection (WRED). Prior to this feature, at generic route encapsulation-based tunnel endpoints the TOS bits (including the precedence bits) were not copied to the tunnel or GRE IP header that encapsulates the inner packet. Instead, those bits were set to zero.
Next Hop Resolution Protocol	I	IP, IP+	Routers, access servers, and hosts can use Next Hop Resolution Protocol (NHRP) to discover the addresses of other routers and hosts connected to a non-broadcast, multi-access (NBMA) network. With NHRP, systems attached to an NBMA network dynamically learn the NBMA address of the other systems that are part of that network, allowing these systems to directly communicate without requiring traffic to use an intermediate hop.
Cisco Discovery Protocol (CDP)	Yes	IP, IP+	
On Demand Routing (ODR)	SB	IP, IP+	On-Demand Routing (ODR) uses Cisco Discovery Protocol (CDP) to propagate the IP prefix.
OSPF	Yes	IP, IP+	
OSPF Flooding Reduction	SB (**M**)	IP, IP+	Reduces unnecessary refreshing and flooding of already known and unchanged information. To achieve this reduction, the LSAs are flooded with the higher bit set, thus making them Do Not Age (DNA) LSAs.
OSPF Not-So-Stubby Areas (NSSA)	Yes	IP, IP+	
OSPF On Demand Circuit (RFC 1793)	I		
OSPF Packet Pacing	Yes	IP, IP+	Allows OSPF update packets paced automatically by 33 milliseconds to avoid update packets lost.

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
RIP	Yes	IP, IP+	
Triggered RIP	I	IP, IP+	
Enhanced IGRP (EIGRP)	Yes	IP, IP+	
Enhanced IGRP Stub Routing	Yes	IP, IP+	
Express RTP and TCP Header Compression	SB	IP, IP+	
Fast-Switched Compressed RTP	SB	IP, IP+	
Fast-Switched Policy Routing	SB	IP, IP+	
Fast-Switched SRTLB	No	IP, IP+	
Snapshot routing	SB	IP, IP+	A single router interface can call other routers during periods when the line protocol for the interface is up (active periods). The router dials to all configured locations during such active periods to get routes from all remote locations.
Generic Routing Encapsulation (GRE)	Yes	IP, IP+	
Hot Standby Router Protocol (HSRP)	SB	IP, IP+	
HSRP support for ICMP redirects	SB	IP, IP+	
Integrated Routing and Bridging (IRB)	Yes	IP, IP+	
Subnetwork Bandwidth Manager (SBM)	I	IP, IP+	Part of RSVP subsystem.
Internet Protocol Control Protocol (IPCP) address negotiation	Yes	IP, IP+	Part of Easy-IP functionality.
Policy-Based Routing (PBR)	Yes	IP, IP+	
RTP Header Compression	Yes	IP, IP+	
STAC Compression	Yes	IP, IP+	
Source-Route Bridging (SRB)	No	IP, IP+	
Transparent Bridging	Yes	IP, IP+	
BGP	Yes	IP, IP+	
BGP 4	Yes	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
BGP 4 Multipath Support	Yes	IP, IP+	
BGP 4 Prefix Filter and In-bound Route Maps	Yes	IP, IP+	
BGP 4 Soft Config	Yes	IP, IP+	
BGP Soft Reset	Yes	IP, IP+	
UDLR Tunnel ARP and IGMP Proxy	Yes	IP, IP+	Supports Mobile IP on asymmetric links. Part of the Tunnel subsystem.
Uni-Directional Link Routing (UDLR)	Yes	IP, IP+	Supports Mobile IP on asymmetric links.
IP CEF			
CEF Support for IP Routing between IEEE 802.1Q vLANs	Yes	IP, IP+	
CEF Switching for Routed Bridge Encapsulation	I	IP, IP+	Part of IPFIB subsystem.
CEF/dCEF - Cisco Express Forwarding	Yes	IP, IP+	
Virtual Profile CEF Switched	I	IP, IP+	
Virtual Profiles	I	IP, IP+	
Virtual Interface Template Service	I	IP, IP+	
VLANS & Layer2 Protocols			
Spanning Tree Protocol (STP)	Yes	IP, IP+	
Spanning Tree Protocol (STP) Extension	No	IP, IP+	Broadens the STP implementation with increased port identification capability, improved path cost determination, and support for a new VLAN bridge STP.
Turbo Flooding of UDP Datagrams	No	IP, IP+	Speeds up flooding of UDP datagrams using spanning-tree algorithm
IEEE 802.1Q VLAN Support	Yes	IP, IP+	
Layer 2 Forwarding-Fast Switching	No	IP, IP+	For NAS servers and part of the VPN subsystem.
IP Multicast			
PIM Version 1	Yes	IP, IP+	
PIM Version 2	Yes	IP, IP+	
Multicast BGP (MBGP)	No	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
Multicast NAT	SB	IP, IP+	
Multicast Routing Monitor (MRM)	I	IP, IP+	Part of IP Multicast subsystem.
Multicast Source Discovery Protocol (MSDP)	No	IP, IP+	Requires BGP configured.
IGMP Version 1	Yes	IP, IP+	
IGMP Version 2	Yes	IP, IP+	
IGMP Version 3	I	IP, IP+	Part of IP Multicast subsystem
IP Multicast Load Splitting across Equal-Cost Paths	I	IP, IP+	IP multicast load splitting is accomplished indirectly by consolidating the available bandwidth of all the physical links into a single tunnel interface. The underlying physical connections use existing unicast load-splitting mechanisms for the tunnel (multicast) traffic. Part of IP Multicast subsystem.
Source Specific Multicast (SSM)	I	IP, IP+	Part of IP Multicast subsystem
Source Specific Multicast (SSM) - IGMPv3, IGMP v3lite, and URD	I	IP, IP+	Part of IP Multicast subsystem.
Stub IP Multicast Routing	I	IP, IP+	Supports dense mode only. Part of IP Multicast subsystem.
Bidirectional PIM	I	IP, IP+	Part of IP Multicast subsystem.
CGMP	SB	IP, IP+	
VPN			
Virtual Private Dial-up Network (VPDN)	Yes	IP, IP+	.
VPN Tunnel Management	Yes	IP, IP+	
L2TP Dial-Out	Yes	IP, IP+	
L2TP Layer 2 Tunneling Protocol	Yes	IP, IP+	
L2TP Tunnel Preservation of IP TOS	Yes	IP, IP+	
IPSec			
IP Sec Network Security	Yes	IP+	
IP Sec Triple DES Encryption (3DES)	Yes	IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
IPSEC VPN/ Internet Key Exchange (IKE) AES	Yes	IP+	
IKE Extended Authentication (Xauth)	Yes	IP+	
IKE Mode Configuration	Yes	IP+	
IKE Security Protocol	Yes	IP+	
IKE Shared Secret Using AAA Server	Yes	IP+	
Certification Authority Interoperability (CA)	Yes	IP+	
Wildcard Pre-Shared Key	Yes	IP+	
Dynamic Crypto Map	Yes	IP+	
Tunnel Endpoint Discovery	Yes	IP+	
Manual Security Association	Yes	IP+	
Secure Shell Version 1			
Secure Shell SSH Version 1 Integrated Client	Yes	IP+	
Secure Shell SSH Version 1 Server Support	Yes	IP+	
Mobile IP			
Mobile IP	Yes	IP, IP+	
Mobile Networks	Yes	IP, IP+	
Home Agent/Mobile Router Redundancy	Yes	IP, IP+	
Mobile Router Preferred Interfaces	Yes	IP, IP+	
Mobile Router Reverse Tunneling	Yes	IP, IP+	
Mobile Router Asymmetric Links	Yes	IP, IP+	
Mobile Router Static and Dynamic Networks	Yes	IP, IP+	
Static CCOA	Yes	IP, IP+	
Dynamic CCOA	Yes	IP, IP+	Only through IPCP; DHCP is not supported.
Priority HA Assignment (Dynamic HA)	Yes	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
AAA Server and Mobile IP	Yes	IP, IP+	
X.25			
X.25	Yes	IP, IP+	
X.25 Closed User Group	Yes	IP, IP+	
X.25 Failover	Yes	IP, IP+	
X.25 Load Balancing	Yes	IP, IP+	
X.25 over Frame Relay (Annex G)	Yes	IP, IP+	
X.25 over TCP (XOT)	Yes	IP, IP+	
X.25 Remote Failure Detection	Yes	IP, IP+	
X.25 Switch Local Acknowledgement	Yes	IP, IP+	
X.28 Emulation	Yes	IP, IP+	
PAD Subaddressing	Yes	IP, IP+	
Protocol Translation (PT)	No	IP, IP+	
Virtual Templates for Protocol Translation	No	IP, IP+	
CUG Selection Facility Suppress Option	Yes	IP, IP+	
DNS based X.25 routing	SB	IP, IP+	
X.25 address insertion	SB	IP, IP+	
X.25 to X.121 address / PVC mapping	SB	IP, IP+	
X.25 switch function (routing/pvc)	Yes	IP, IP+	
SA Agent			
Service Assurance (SA) Agent	Yes	IP, IP+	
Service Assurance (SA) Agent Enhancements	No	IP, IP+	Provides tools for measuring network performance using FTP, which is one of the most popular traffic types in Internet service provider (ISP) networks, and jitter (one-way delay), which is important for applications such as Voice over IP (VoIP).

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
RMON Events and Alarms	SB	IP, IP+	A standard monitoring specification that enables various network monitors and console systems to exchange network-monitoring data. RMON provides network administrators with more freedom in selecting network-monitoring probes and consoles with features that meet their particular networking needs. RMON MIB agent can be used in conjunction with SNMP to monitor traffic using alarms and events.
Response Time Reporter (RTR)	Yes	IP, IP+	
Response Time Reporter (RTR) enhancements	Yes	IP, IP+	
SNMP			
SNMP	Yes	IP, IP+	
SNMP Support for IOS vLAN Subinterfaces	Yes	IP, IP+	
SNMP Version 3	Yes	IP, IP+	
SNMPv2C	Yes	IP, IP+	
Interface Index Persistence	Yes	IP, IP+	Allows interfaces to be identified with unique values which remain constant even when a device is rebooted.
Miscellaneous Features			
Asynchronous Rotary Line Queuing	No	IP, IP+	For demand circuit only. It depends on the rotary-group.
Network Time Protocol (NTP)	Yes	IP, IP+	
Lock-and-Key	Yes	IP, IP+	
Reflexive Access Lists	I		Part of the core IP subsystem.
Standard IP Access List Logging	Yes	IP, IP+	
Time-Based Access Lists	I	IP, IP+	Part of the core IP subsystem.
Time-Based Access Lists Using Time Ranges	I	IP, IP+	Part of the core IP subsystem.
Automatic modem configuration	I	IP, IP+	Part of the modemcap subsystem. Required for AUX port modem support.
CLI String Search	Yes	IP, IP+	

Table 1-2   Cisco 3200 Series Mobile Access Router Supported Software Features (continued)

Feature	Supported[1]	Image	Comments
Commented IP Access List Entries	Yes	IP, IP+	Allows remarks to be included in any IP access list. The remarks make the access list easier for the network administrator to understand.
Line Printer Daemon (LPD)	No	IP+	
Parse Bookmarks	SB	IP, IP+	Parser optimization feature.
Parser Cache	Yes	IP, IP+	Optimizes the parsing (translation and execution) of Cisco IOS software configuration command lines by remembering how to parse recently encountered command lines.
Per-User Configuration	No	IP, IP+	Provides a flexible, scalable and easily maintained solution for customers with a large number of dial-in users, such as CiscoSecure TACACS user entry.
Selective Virtual-Access Interface Creation	No	IP, IP+	
Manual Certificate Enrollment	Yes	IP+	Generates a certificate request, and accepts Certificate Authority (CA) certificates and the routers certificate using TFTP server or manual cut-and-paste operations.

1. Yes: Included in Image and tested.
   No: Not included in Image
   SB: Included in image, but may not be tested.
   I: Included in the image due to features dependent on these subsystems.