COPPEREDGE

COPPER MOUNTAIN

CopperEdge® 150 DSL Concentrator

The CopperEdge 150 DSL Concentrator enables carriers and other service providers to offer Digital Subscriber Line (DSL)-based services to multi-tenant units (MTUs) such as office buildings, high-rise apartments, commercial business parks, campuses, and hotels, and to space-constrained central offices (COs) or remote installations. DSL uses existing in-building copper telephone wires to deliver profitable, value-added services to tenants, including high-speed Internet access, virtual private networking (VPN), Frame Relay over DSL (FRoDSL), and Voice over DSL (VoDSL).

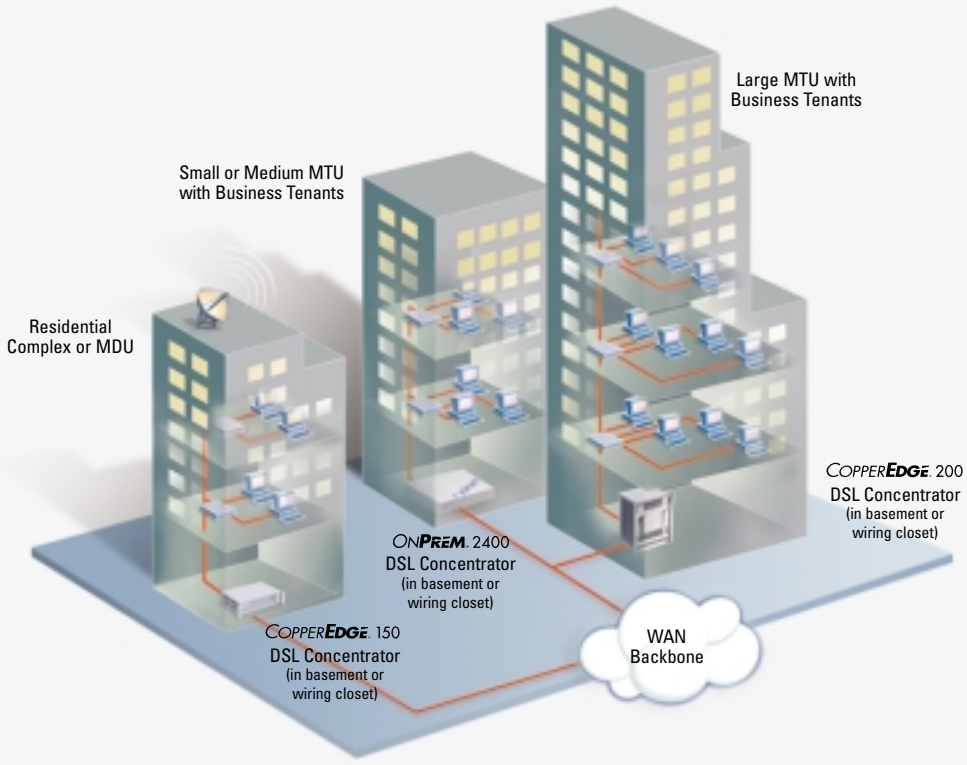
Key Benefits

- **Optimized MTU solution.** Part of Copper Mountain's comprehensive family of solutions for multi-tenant buildings, the CopperEdge 150 is optimized for small- and medium-sized MTU office buildings, multi-dwelling unit (MDU) residential complexes, and multi-hospitality unit (MHU) hotel/motel facilities.
- **Multi-service, full-coverage DSL.** The CopperEdge 150 supports multiple, value-added services—including data, voice, and video—that can be leveraged to attract and retain business and residential tenants and hotel guests. The CopperEdge 150 supports these services from a single chassis, using any two of the DSL variants, including Asymmetric DSL (ADSL), G.lite, G.shdsl, and Symmetric DSL (SDSL).
- **Low entry cost.** By leveraging existing in-building copper wiring, the CopperEdge 150 enables carriers and other service providers to provision DSL service in MTUs without time-consuming and expensive rewiring. Offering up to 48 ports on two 24-port line cards, the CopperEdge 150 scales easily as subscribers increase.
- **Broad compatibility and backhaul options.** The CopperEdge 150 is fully interoperable with a wide range of customer premise equipment (CPE) from leading vendors and supports a variety of backhaul technologies, including electrical interfaces via Ethernet, T1/E1, and DS-3, as well as optical connections via STM-1 and OC-3c.

Copper Mountain Networks is a leading provider of DSL products and solutions for both business and residential users. Several robust, value-added features differentiate Copper Mountain's offerings.

CopperEdge Platform Benefits

- **IP IQ™.** Internet Protocol (IP) has clearly emerged as the primary networking technology for today's leading service providers. As the only major DSL platform architected from the ground up for advanced packet processing, Copper Mountain offers the broadest set of IP-based features to providers building best-in-class networks. Our IP IQ™ capability enables providers to deliver a wide range of differentiated services to millions of users today while ensuring compatibility and strategic alignment with overall network architectures in the future.
- **Proven platform.** With tremendous growth in broadband subscribers, the biggest risk providers face lies in reducing their time to market. Copper Mountain's DSL products and solutions have been successfully and rapidly deployed in the world's largest DSL networks and in MTUs.
- **Full-coverage, multi-service DSL.** Copper Mountain offers a full range of symmetric and asymmetric solutions for businesses and consumers. Coupled with our IP IQ™ for advanced differentiated services from a single concentrator—including Internet access, VPNs, VoDSL, wholesale DSL, and FRoDSL—the Copper Mountain MTU solution maximizes revenue per copper pair.
- **Broad interoperability.** Best-in-class networks are the optimal way to offer differentiated services. The CopperPartner™ family of programs ensures Copper Mountain solutions are compatible with end-to-end DSL networks, including everything from silicon chips and CPE, to VoDSL products, switches and routers in the core.



The CopperEdge 150, optimized for MTU deployment, enables service providers to reach a new and growing market segment—tenant customers—without the expense of a CO collocation.

Industry-Leading Multi-Tenant DSL Concentrator

DSL technology leverages existing in-building copper wiring, enabling broadband providers to move quickly and cost-effectively into the rapidly growing MTU marketplace. Plug-in line cards provide 24 or 48 ports of ADSL, G.lite, G.shdsl, and/or SDSL, or 12 or 24 ports of T1 per chassis, enabling providers to rapidly provision and scale services as their subscriber bases grow, and allowing them to offer profitable services right from the start.

- **ADSL.** A complete consumer solution, ADSL supports speeds of up to 6.1 Mbps downstream to the end user and 640 kbps upstream.
- **G.lite.** Copper Mountain's G.lite line card is a pragmatic technology to address the mass market requirement of lifeline/full-service Plain Old Telephone Service (POTS) and data on a single pair. It enables speeds up to 2.3 Mbps downstream to the end user and up to 512 kbps upstream.
- **G.shdsl.** With the emerging standard for symmetric DSL service, G.shdsl can deliver speeds up to 2.3 Mbps in both downstream and upstream directions with enhanced reach and speed performance. Worldwide business customers can use this service to support interactive video teleconferencing and Web hosting.
- **SDSL.** With full-duplex throughput across all interfaces, the CopperEdge 150 supports SDSL speeds from 128 kbps to 1.5 Mbps on a single pair, and up to 6.0 Mbps with inverse multiplexing (IMUX) technology. The symmetric bandwidth of SDSL is optimal for business users requiring high bandwidth both upstream and downstream.

WAN Backhaul

WAN bandwidth requirements change as building penetration increases. The CopperEdge 150 supports multiple WAN interface options, including:

- 10/100BASE-T
- Quad T1 ports with integral CSU with Frame Relay
- DS-3 Frame Relay
- DS-3 ATM

Centralized Configuration and Management

CopperView™ network management software allows service providers to quickly and easily configure, diagnose, and monitor CopperEdge concentrators at hundreds of MTUs from a central location. CopperView's SNMP-based tools monitor the status of any building, port, or module. Diagnostic tools enable real-time trouble isolation and service restoration. CopperView helps the service provider deliver a reliable, high-quality service to tenants while reducing customer service costs.

Broad Base of Compatible Equipment

The CopperEdge 150 interoperates with Copper Mountain's CopperRocket® line of CPE, plus a broad base of CopperCompatible™ CPE and CopperVIP™ (voice in packets) equipment available through more than 30 leading manufacturers. Copper Mountain's CopperPartner interoperability programs give service providers and their subscribers multiple sources for compatible products.

Optimized MTU Solution

Copper Mountain's CopperEdge 150 DSL Concentrator offers providers an optimized solution for provisioning services in small- and medium-sized MTUs, MDUs, and MHUs.

- **MTU.** The MTU market consists of commercial properties and office buildings with business customers as tenants. Worldwide, the MTU market is an opportunity consisting of hundreds of thousands of commercial buildings which house millions of business tenants.
- **MDU.** MDUs, such as high-rise apartment buildings, are comprised of residential customers. In the United States there are nearly a million residential businesses and residential complexes, which represent nearly ten times as many tenants. In Asia and Europe the density is significantly higher.
- **MHU.** The MHU market, comprised of more than 51,000 hotel and motel properties in the United States alone[1], serves hotel business guests and customers requiring in-room, high-speed access.

[1] The American Hotel and Motel Association, 1998

Increase Penetration and Profits with Multiple Revenue-Generating Services

Maximum tenant penetration in each property is the key to profitable MTU DSL deployment. Service providers transform building tenants into DSL subscribers by offering them a range of value-added services. The CopperEdge 150 supports the wide range of services providers must offer to maximize return on their investment.

Internet Access

The first service traditionally offered to tenants is Internet access. Tenants seeking higher bandwidth than their existing dial-up analog or ISDN connections are excellent prospects, as are T1/E1 customers seeking to reduce costs. Copper Mountain's multi-speed DSL functionality enables service providers to offer the right amount of bandwidth at the right price, and the flexibility to alter DSL service speeds as tenant needs change.

Frame Relay Services

The CopperEdge 150 supports Frame Relay multiplexing using RFC 1490, enabling DSL providers to offer both managed and basic Frame Relay services and increase revenue streams by partnering with Inter-Exchange Carriers (IXCs), such as AT&T, Worldcom, and Sprint, and out-of-region Incumbent Local Exchange Carriers (ILECs). Additionally, the CopperEdge 150 supports both FRF.5 and FRF.8 for internetworking Frame Relay to ATM backhauls.

Virtual Private Networking

Branch offices and teleworkers require secure corporate connectivity, also known as VPN. The CopperEdge 150 supports two different VPN implementations using CopperVPN™ and virtual wide area network (VWAN) models to cost-effectively interconnect teleworkers and remote offices to corporate networks.

Portal Services

Service providers can offer more than just connectivity to their customers. By providing value-added services such as restaurant reservations, local content, and tourist information to their in-building customers, providers are further able to differentiate their service offering. This can be easily done by installing content servers in the basement or wiring closet and connecting them to the CopperEdge 150.

Voice Services

Copper Mountain's VoDSL interoperates with the broadest base of voice equipment from leading manufacturers of Class 5 (packet) switches, GR-303/V5.2 and H.323 voice gateways, and integrated access devices (IADs), as well as with existing PBX and Key systems. With flexible architecture that supports both ATM and IP Quality of Service (QoS), Copper Mountain's solutions enable a wide range of voice applications:

- **T1/E1 replacement.** Voice is packetized for transmission over DSL, enabling high-speed data and toll-quality voice for significantly less cost than traditional T1/E1 lines.
- **PBX extension.** PBX extension provides voice capabilities to teleworkers and remote call-center employees, allowing them to use corporate digital phones for call redirect, voicemail, conferencing, speed dialing, and other CLASS™ features from remote locations.
- **Integrated lifeline POTS and data.** Using industry-standard G.lite technology from Copper Mountain, providers can offer simultaneous POTS voice and DSL data service on a single copper pair, without installing new wiring or a splitter at the customer premise. With ADSL, POTS or ISDN voice can be shared with DSL data service using plug-and-play CPE. This is especially attractive to teleworkers and households that require concurrent Internet access and lifeline/full-service POTS.

CopperEdge 150
DSL Concentrator

Value Proposition

Value to Tenants and DSL Users

DSL service is up to 50 times faster than dial-up analog modems, at a price far less than traditional T1 access. Copper Mountain's DSL solutions make T1 speeds and reliable, always-on connectivity both affordable and easy for building tenants, who can select from Copper Mountain's CopperRocket line of CPE, plus a broad base of CopperCompatible CPE available from dozens of leading manufacturers.

CopperRocket devices operate at multiple transmission speeds to satisfy the price and performance needs of each tenant. ZIP!™ (Zero Installation Procedures) functionality on companion CopperRocket CPE makes DSL turn-on transparent to end users. Tenants simply plug the CPE into the DSL line, and the system configures itself.

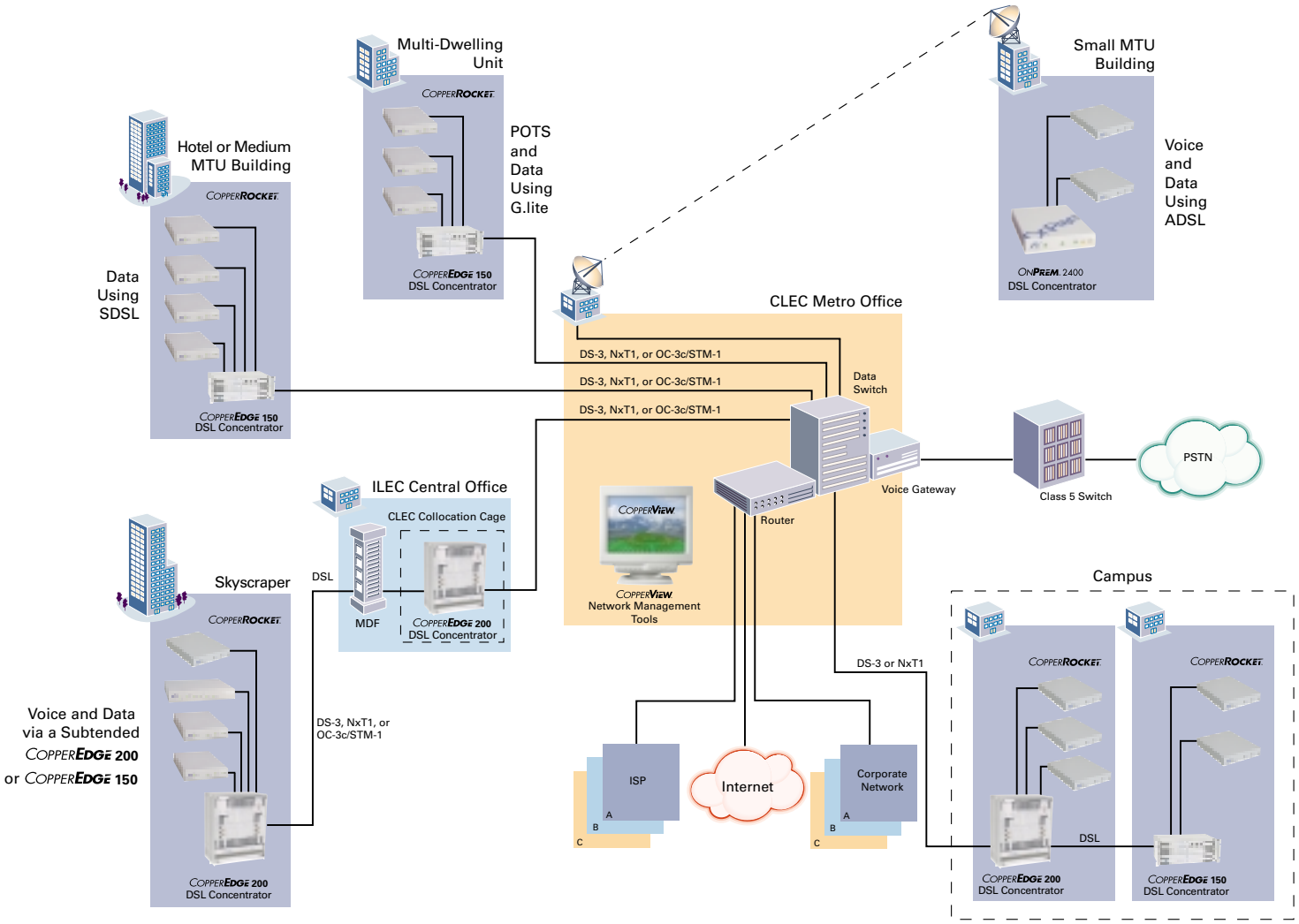
Value to Property Owners and Managers

As commercial real estate competition intensifies, one of the best ways to successfully differentiate properties is to provide in-building Internet service. The CopperEdge 150 allows owners and managers of small- to medium-sized buildings to cost-effectively offer Internet access and more. Services such as Frame Relay, VPN, T1 replacement, PBX extension, and integrated POTS and data services that add further value and help to attract and retain premier tenants. Utilizing existing in-building copper wiring, the CopperEdge 150 enables rapid provisioning and scaling of these value-added services from a single chassis. Thanks to remote management capabilities, the DSL service and tenant equipment do not need to be managed by the property owners but can be easily managed by the provider.

Value to Service Providers

Providers can deliver profitable DSL broadband services to tenants, residents, and guests without the time delays and the high up-front and ongoing costs of collocation in COs. Copper Mountain products allow service providers to select the most cost-effective solution for any size building, and easily provision, scale, and manage multiple services from a central location. Ideally suited for small- to medium-sized buildings, the CopperEdge 150 supports a wide range of backhaul options.

MTU Network



Specifications

Flexible DSL Platform
- Modular design supports current and future DSL and backbone network and transmission technologies
- Single point of management for all services and interfaces
- 6-slot chassis optimized for MTU/MDU/MHU applications
- 24 ADSL, G.lite, G.shdsl, or SDSL ports per line card
- Up to 48 ports per shelf
- 12 T1 ports per line card

Performance
- Sustained, full-rate, non-blocking packet forwarding on each DSL port
- IMUX capability bonds up to 4 lines for up to 6.0 Mbps performance

Networking Models
- Frame Relay and ATM multiplexing
- Frame Relay to ATM interworking (FRF.8 / FRF.5)
- PPP over Frame Relay (RFC 1973)
- PPP over ATM (RFC 2364)
- VWAN
- IP policy
- IP routing

Packet Multiplexing Protocols
- TCP/IP
  -RFC 791 (IP)
  -RFC 792 (ICMP)
  -RFC 826 (ARP)
  -RFC 768 (UDP)
- LAN extension IP multiplexing (for companion CopperRocket CPE)
- Security filtering using source or destination address or port

DSL Link Protocols
- ADSL Forum TR-003 Frame Mode Encapsulation
- RFC 1483 Multi-Protocol Encapsulation over FUNI or ATM
- RFC 1490 Multi-Protocol Encapsulation over Frame Relay
- RFC 1661 PPP
- RFC 1973 PPP over Frame Relay
- RFC 2364 PPP over ATM
- Multilink Frame Relay

Frame Relay Protocols
- ANSI T1.606 Frame Relay Architectural Framework and Addendum 1
- ANSI T1.618 Core Aspects of Frame Protocol for Frame Relay Service
- Supports multiple standards of LMI management protocols, including T1.617 Annex D, Q.933 Annex A and LMI Rev.1.0
- RFC 1490 Multi-Protocol Encapsulation over Frame Relay
- Up to 768 PVCs per network port, 64 PVCs per DSL, and 2,048 PVCs per CopperEdge 150
- Multilink Frame Relay
- Frame Relay Forum UNI FRF.1
- RFC 1315 Frame Relay MIB
- RFC 1973 PPP over Frame Relay

ATM Protocols
- RFC 1483 Multi-Protocol Encapsulation over ATM
- Frame Relay to ATM Internetworking (FRF.8 / FRF.5)
- RFC 2364 PPP over ATM
- rtVBR, nrtVBR, UBR
- AToM MIB
- AAL5
- ATM Forum UNI
- PCR / SCR / MBS
- OAM

Network WAN Interfaces
- 1-port unchannelized DS-3 Frame Relay with integral CSU / DSU
- 1-port unchannelized DS-3 ATM with integral CSU / DSU
- 4-port unchannelized T1 Frame Relay with integral CSU
- 10/100BASE-T Ethernet

Network Management
- CopperView Access Management System (AMS) manages thousands of CopperEdge 150 units from a network management server
- RFC 1157 Simple Network Management Protocol (SNMP) and RFC 1905 SNMP v2c
- RFC 1213 MIB-II and Copper Mountain Networks MIB Extensions
- Full SNMP functionality, including get, set, and trap (RFC 1215)
- Proxy management (for CopperRocket and other CopperCompatible CPE)
- CopperCraft local access
- CopperView AMS runs on Solaris and Linux platforms
- CopperView Element Manager runs on Solaris, Linux, and Windows NT platforms, and can be integrated with HP OpenView or Micromuse Netcool
- Out-of-Band Ethernet port
- In-Band remote management
- Telnet (password protected)
- PING response utility

Reliability and Serviceability
- Software and configuration downloads to CopperEdge 150 from CopperView
- Extensive loopback and line monitoring, including line errors and system-, trunk- and port-level statistics
- Integral analog modem for remote servicing and diagnostics

Certification
Telecom
- Certified to Canadian CS-03 requirements for part 8
- Certified to FCC Title 47, Part 68
- G.Lite Line Card–ITU G.992.2 verified in accordance with R &TTE Directive (CE Mark*)
- SDSL Line Card–ETS TS 101 135 V1.5.1 (1998-11) verified in accordance with R &TTE Directive (CE Mark*)

Product Safety
- Listed to UL/cUL 1950 3rd edition
- Certified to EN60950:1992*
- CB Scheme Certificate to IEC950*

Electromagnetic Compatibility
- FCC Part 15 Class A
- EN55022, EN55024 (CE Mark*)

Physical Dimensions
- Size (inches): 6.97 H x 19 W x 10.75 D (centimeters: 17.7 H x 48.3 W x 27.3 D); width includes 18-inch shelf plus 1-inch rack-mount ears; depth includes safety plexiglass cover
- Rack-mounting options: EIA 19- or 23-inch (centimeters: 48.3 or 58.4)
- Wall-mounting option

Power Requirements
- 120 VAC
- -48 VDC
- 100/240 VAC 50/60 Hz

Operating Environment
- Temperature: 32° to 120° F (0° to 50° C)
- Altitude: to 13,125 feet (4,000 meters)
- Humidity: 5 to 85%, non-condensing

* DC-powered configuration only

COPPER COMPATIBLE

Tested to comply with FCC Standards

COPPER MOUNTAIN
High Performance DSL Networking

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Copper Mountain is ISO 9001 certified by:

TÜV ESSEN TGA-ZO-37-95-00-0

To learn more about Copper Mountain (Nasdaq: CMTN) products and services, visit our World Wide Web site at http://www.coppermountain.com, call your regional headquarters office, or send an email to sales@coppermountain.com. For investor relations information, call +1.858.410.7100 or send an email to IR@coppermountain.com.

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