

# ● PRODUCT GUIDE

## Access for a Converging World



## The Zhone Solution

Zhone's Single Line Multi-Service architecture (SLMS™), allows carriers to concurrently deliver voice, data and video services over copper or fiber access lines. Zhone provides carriers with an elegant migration from legacy circuit-based technology to packet based networks while substantially reducing operating costs. Zhone's SLMS solution provides an evolutionary path for service providers to deploy cost-effective, multi-service networks that can support voice, data and video.

### Packet Migration

The SLMS architecture allows service providers to deliver next generation services today while they migrate to pure packet delivery with minimal service disruption. This allows service providers to cost-effectively deliver carrier class performance and functionality without abandoning existing subscribers. SLMS protects the investments made by residential and commercial subscribers in equipment, inside wiring and applications, thereby minimizing transition impact and subscriber attrition.

### Triple Play Services with Converged Voice, Data and Video

SLMS simplifies the access network by consolidating multiple services onto a single access line. This convergence of services and networks simplifies provisioning and operations, ensures quality of service and reliability, and reduces the time required to deliver services. SLMS combines access, transport, customer premises equipment, and management functions in a standards based system. The result is a complete network solution for integrated voice, data and video services.

## Multi-Service Access



### MALC BLC Multi-Access Line Concentrator

The MALC is a full-featured Broadband Loop Carrier (BLC) optimized for delivering voice, data, and video services over a pure packet access network. MALC is available in a broad range of form factors and port densities.

- Universal Broadband for Triple Play
- Circuit to Packet Migration
- Integrated Access + Transport
- Integrated Emergency Stand-Alone (ESA)
- Proven Management System
- Scalable Deployment Options



### MALC-OLT FTTP Optical Line Terminal

MALC-OLT delivers the next generation of high-performance business and residential FTTP services. With MALC-OLT, service providers can offer digital or RF video, high-bandwidth Internet access, voice and cell relay services from a single OLT.

- Carrier-Class OLT with Ultra Flexibility Supporting G-PON, B-PON and Active Ethernet
- Delivers Universal Broadband for Triple Play Services
- Integrated Access + Transport
- End-to-End Management System
- Scalable Deployment Options



## MALC 100 BLC Multi-Access Line Concentrator

The Zhone MALC 100 provides next-generation BLC features in a compact format that makes it easy and cost-effective to extend the range of triple play service deployments.

- Voice, Data, and Video Services in a Compact 1U Broadband Loop Carrier (BLC)
- Integrated IP DSLAM, VoIP Line Access Gateway, and IP Video Delivery Platform
- 48 Port ADSL2+ with Lifeline POTS
- Integrated Emergency Stand-Alone (ESA) Capability
- Full-Featured VoIP: MGCP, SIP, SIP-PLAR, H.248



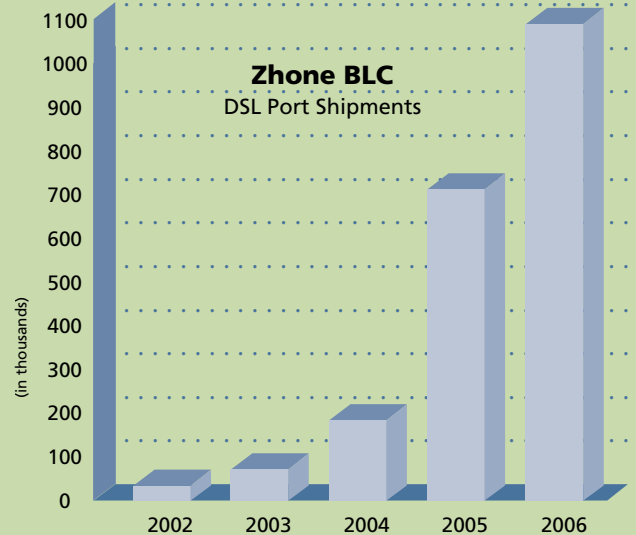
## OPX Outside Plant Exchange

The OPX Remote Terminal Cabinet Family was specifically designed to provide outdoor housing solutions for the Zhone family of broadband loop carriers.

- Specifically Designed for Zhone's MALC 100, 319 and MALC 723 Chassis
- Range of Battery Backup and Protection Options
- Sealed, Environmentally Hardened Design
- Enhanced Cooling System
- Range of Chassis Sizes for Every Application

## Zhone #1 Market Leader in BLC Access

### Zhone BLC - DSL Port Shipments



[broadbandtrends.com](http://broadbandtrends.com)  
the voice of broadband

### In a Recent Report by Independent Analyst Firm Current Analysis

Zhone's MALC received the highest ranking of all products reviewed with a composite score of twenty-four out of a possible score of twenty-five.

In addition to top marks in numerical scoring, Zhone's MALC was distinguished by Current Analysis in this recent report as **the only platform deemed "very threatening"** to competitors.

**Current Analysis**

## DSLAMs for Every Application



### 1U DSLAMs

From in-building & campus applications to environmentally hardened deployments for installation anywhere, Zhone's 12, 24 & 48 port 1U Mini DSLAMs meet any access requirement. From video over ADSL2+ to SHDSL for business-class services, Zhone provides the solutions needed for every application.



### 8000 Series DSLAMs

The 8000 series Broadband Loop Carrier (BLC) is a standards-based, scalable, high-capacity BLC that utilizes the latest switching fabric. The 8000 series has been deployed by service providers worldwide to offer voice, video, and data services from a single platform.



### IPD 12000 Series DSLAM

Zhone's 12000 Series DSLAM provides a high capacity IP Ethernet foundation for the feature-rich multi-service access multiplexer modules in the 12000 family.

The IPD 12000 is engineered for efficient, high-speed IP data transport in a compact, fully fault-tolerant chassis. Supporting high-density ADSL, ADSL2+, SHDSL, and T1/E1 access technologies, the Ethernet-based IPD12000 is the ideal line aggregation platform for today's advanced IP-based access networks.



### RAPTOR 100 / 300 / 700 ATM/IP DSLAM

Raptor DSLAM delivers the next generation of high-performance business and residential DSL services. With Raptor, carriers can offer digital video, high bandwidth Internet access and cell relay services from a single platform.

- Universal Broadband for Triple Play Services
- Integrated Access + Transport
- End-to-End Management System
- Scalable Deployment Options
- Proven. Approved. Deployed.

# EFM/Ethernet over Copper



## MALC-EFM Aggregation Line Cards and CPE

Zhone's market-leading Ethernet over Copper technology is available across the broadest range of platforms in the industry to provide the benefits of standards-based Ethernet First Mile (EFM) 802.3ah and Ethernet over Copper over ordinary T1/E1 or DSL copper loops.

- Up to 5.7mbps SHDSL.bis Symmetrical Data over Ordinary Copper Loops
- Data Rates over 45 Mbps over Bonded Copper Loops
- Unlimited Distance since T1/E1 Can Be Repeated
- Automatic Loop Bonding with Hitless Adds/Drops for Maximum Reliability
- Integrated Testing and Diagnostics Comparable to Today's SONET / SDH Networks
- Seamless LAN-to-WAN IP Connectivity over Native Ethernet

## EtherXtend Ethernet over Copper

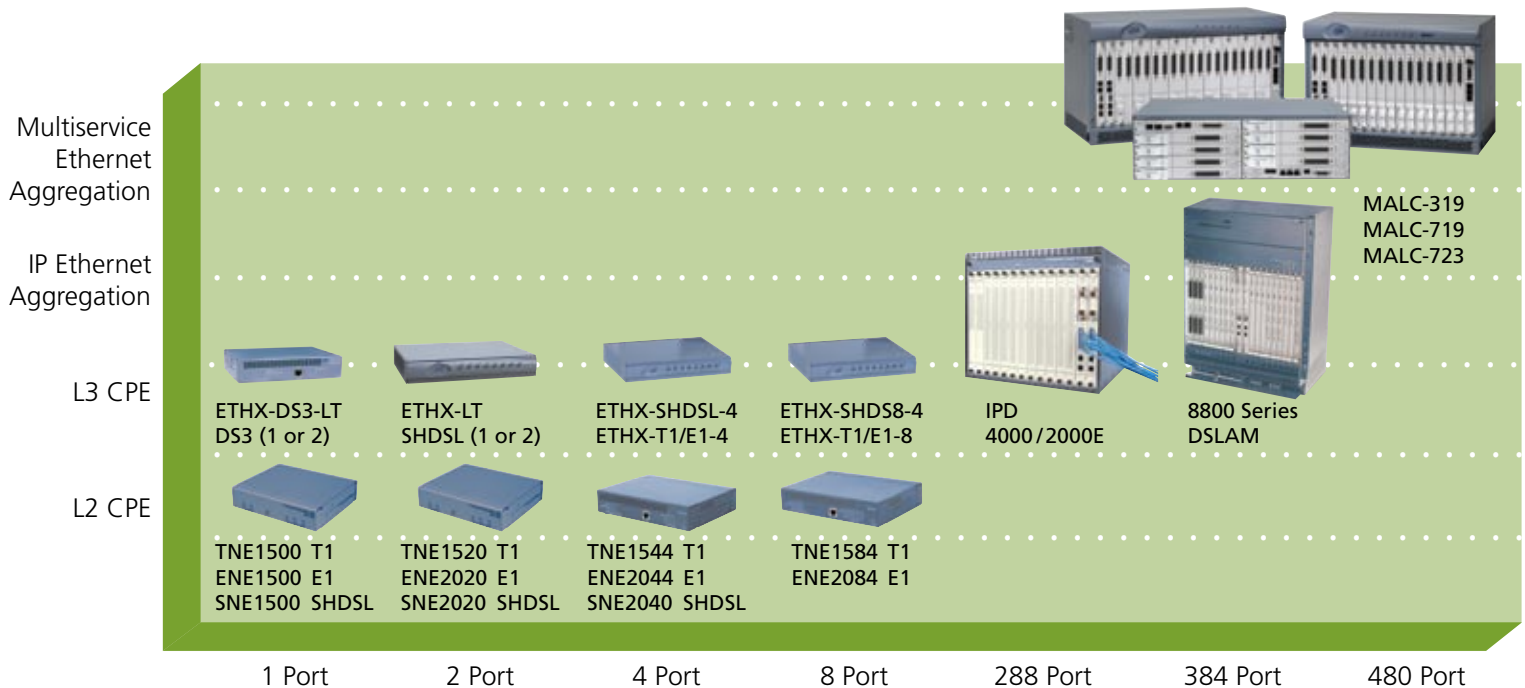
Zhone's market leading Ethernet First Mile (EFM) solutions deliver scalable Ethernet services over existing copper loops. Zhone was the first vendor to deliver products in the fast-growing bonded Ethernet over copper market and Zhone still leads the market today.

Ethernet is both easy to provision and the ideal technology for today's most popular IP applications, providing significant cost savings over SONET, ATM, or Frame Relay circuits.

Zhone offers the broadest range of scalable EFM and Ethernet over Copper solutions in the industry with support for T1, E1 or DSL connections, providing up to 5.7 Mbps per copper pair using SHDSL.bis Technology. By combining multiple copper pairs using Zhone's copper bonding technology, carriers can deliver data rates over 45 Mbps over existing copper loops.

Zhone's Ethernet bonded copper solutions can be managed as a single link, inclusive of multiple copper pairs. Loop bonding requires no extra configuration, and is an easy way to increase line speeds where extra copper is available. Testing and diagnostics can be accomplished at the same level as today's SONET/SDH networks.

## Zhone's Ethernet over Copper Product Family Ethernet First Mile



# BLC

1U

Chassis

1U Remote



**MALC  
100**

**MALC  
319**

**MALC  
719**

**MALC  
723**

**Raptor  
100**

**1U  
DSLAMs**

	MALC 100	MALC 319	MALC 719	MALC 723	Raptor 100	1U DSLAMs
<b>Voice Line Interfaces (Ports per Chassis)</b>						
POTS		384	720	912		
POTS / ADSL2+ Combo	48	192	360	456		
ULC (ISDN-BRI, P-Phone, Coin)		192	360	456		
T1 / E1 CES		✓	✓	✓		
T1 / E1 Voice Gateway		✓	✓	✓		
<b>Data Line Interfaces (Ports per Chassis)</b>						
ADSL, ADSL2+, Annex A, Annex B, Annex M		432	768	960	48	24
REACHDSL		432	768	960		24
SHDSL (2 / 4W)		432	768	960		24
VDSL2		216	384	480		
T1 / E1 ATM		288	512	640		
T1 / E1 IP		216	384	480		
<b>Ethernet Services (Ports per Chassis)</b>						
T1 / E1 EtherXtend Line Card		216	384	480		
SHDSL EtherXtend Line Card		216	384	480		
Integrated Layer 2-4 switching	✓	✓	✓	✓	✓	
<b>OLT Line Interfaces (Ports per Chassis)</b>						
B-PON		288	512	640		
G-PON		576	1024	1280		
Active Ethernet		90	160	200		
<b>Voice Services</b>						
GR-303 / V5.2	✓	✓	✓	✓		
MGCP	✓	✓	✓	✓		
SIP	✓	✓	✓	✓		
H.248	✓	✓	✓	✓		
Emergency Stand-Alone	✓	✓	✓	✓		
<b>Video Services</b>						
IGMPv2 w/ Fast Leave & Proxy	✓	✓	✓	✓	✓	
Multicast Content Control	✓	✓	✓	✓	✓	
STB Access Control	✓	✓	✓	✓	✓	
Intelligent IGMP Queries	✓	✓	✓	✓	✓	
<b>Management Services</b>						
MTM - 802.1Q / p, w/ CoS	✓	✓	✓	✓	✓	
SELT / DELT Line Testing	✓	✓	✓	✓	✓	
<b>Uplinks</b>						
T1 / E1 IMA		✓	✓	✓		✓
DS-3 / E-3		✓	✓	✓		
OC-3 / STM-1		✓	✓	✓		
OC-12 / STM-4 + T1 / E1 + Ethernet		✓	✓	✓		
T1 / E1 Ethernet						
T1 / E1 / MLPPP						
10 / 100 Base-T Ethernet	✓	✓	✓	✓	✓	✓
Gigabit Ethernet	✓	✓	✓	✓	✓	
Resilient Packet Ring	✓	✓	✓	✓	✓	
EAPS						
<b>Physical</b>						
Height (Rack Units)	1	3	7	7	1	1
Slots (Includes Uplink)		10	17	21		
Outside Plant Enclosure					✓	
Line Powered						

# IP DSLAM

# ATM DSLAM

Chassis

1U Remote

Chassis



**Raptor 319**   **Raptor 719**   **Raptor 723**   **8620 / 8820**   **12000**   **Raptor 100**   **1U DSLAMs**   **Raptor 319**   **Raptor 719**   **Raptor 723**   **8620 / 8820**

72 / 432

72 / 432

24 / 144

24 / 144  
✓

432	768	960	144 / 864	576	24	24	432	768	960	144 / 864
432	768	960	72 / 432			24	432	768	960	72 / 432
432	768	960	72 / 432	288		24	432	768	960	72 / 432
216	384	480					216	384	480	
			24 / 144				288	512	640	24 / 144
216	384	480								

288  
288

✓   ✓   ✓

288   512   640  
576   1024   1280  
90   160   200

✓

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3   7   7   3 / 14   9   1   1   3   7   7   3 / 14  
10   17   21   4 / 20   14   ✓   ✓   10   17   21   4 / 20

✓  
✓

## Optical Transport

Zhone's GigaMux® optical transport system offers carriers unmatched flexibility and control, providing the full range of transport interfaces and capabilities. The GigaMux supports a variety of simultaneous single-wavelength and WDM architectures, including point-to-point, OADM linear, and OADM ring configurations; supporting access, metro and regional distances.

GigaMux supports both CWDM and DWDM in the same chassis, on the same fiber, utilizing the same form factor for all modules. This maximizes service flexibility and greatly reduces sparing and inventory costs.

GigaMux Optical Service Level Management provides comprehensive management of optical WDM topologies including ring and mesh, as well as graphical presentation of both the physical and logical network topologies.

Zhone's ColorValve technology enables one module to transport OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, GbE, and FC services and choose between any of these via point-and-click commands. This not only reduces truck rolls and related operational costs, but also allow GigaMux simpler sparing and inventory schemes.

Zhone's In-Wavelength Management technology provides superior management communications among network elements without the need for costly optical supervisory channels, and overkill for the types of services being considered.

With Zhone's extensive single-service and multi-service transponder options, the GigaMux provides the required interface flexibility for whatever network expansions a carrier faces in the future. In addition, Zhone's flexible filter architecture supports both fixed wavelengths assignments and ROADMs for software-provisioned light-path pass-through and termination.



Award-winning Product



## FiberSLAM 100 WDM Hybrid Access

FiberSLAM is a fiber-based line access multiplexer with integrated Ethernet and TDM aggregation. Winner of Frost & Sullivan's 2007 Award for Product Innovation, FiberSLAM provides up to 12.5 Gigabits (Gbps) of capacity via dedicated wavelength channels, making it ideal for multi-service delivery.

- Wide Range of Connectivity Options
- Support for 40 Channel DWDM Networks
- Ring, Point to Point, 1310 Overlay and Protected Service Support
- Integrated TDM Muxing Support for T1/E1 and DS3/E3 Interfaces
- Optical Fast Ethernet, 1.25/2.5 Gbps Gig-E, ESCON, 1.0/2.1 Gbps Fibre Channel, FICON, and OC-3/12/48 (STM-1/4/16)
- Easy to Install, Easy to Manage





## GigaMux 1600 / 3200 Series xWDM Transport

Zhone's 3200/1600 transport platform offers carriers a full-range of access interfaces and a flexible architecture both for small point-to-point networks and larger ringed access networks. Simultaneous support for CWDM and DWDM allows carriers to meet current needs with lower-cost CWDM optics, while enabling DWDM network expansion in the same chassis.

- Up to 8 Channels of CWDM, 40 Channels of DWDM
- ★ Simultaneous CWDM / DWDM Support
- ★ Protocol Support for T1/E1, ESCON, 100BT Ethernet, OC3-192 / STM1-64, 1 and 2G Fibre Channel, Gigabit and 10 Gigabit Ethernet

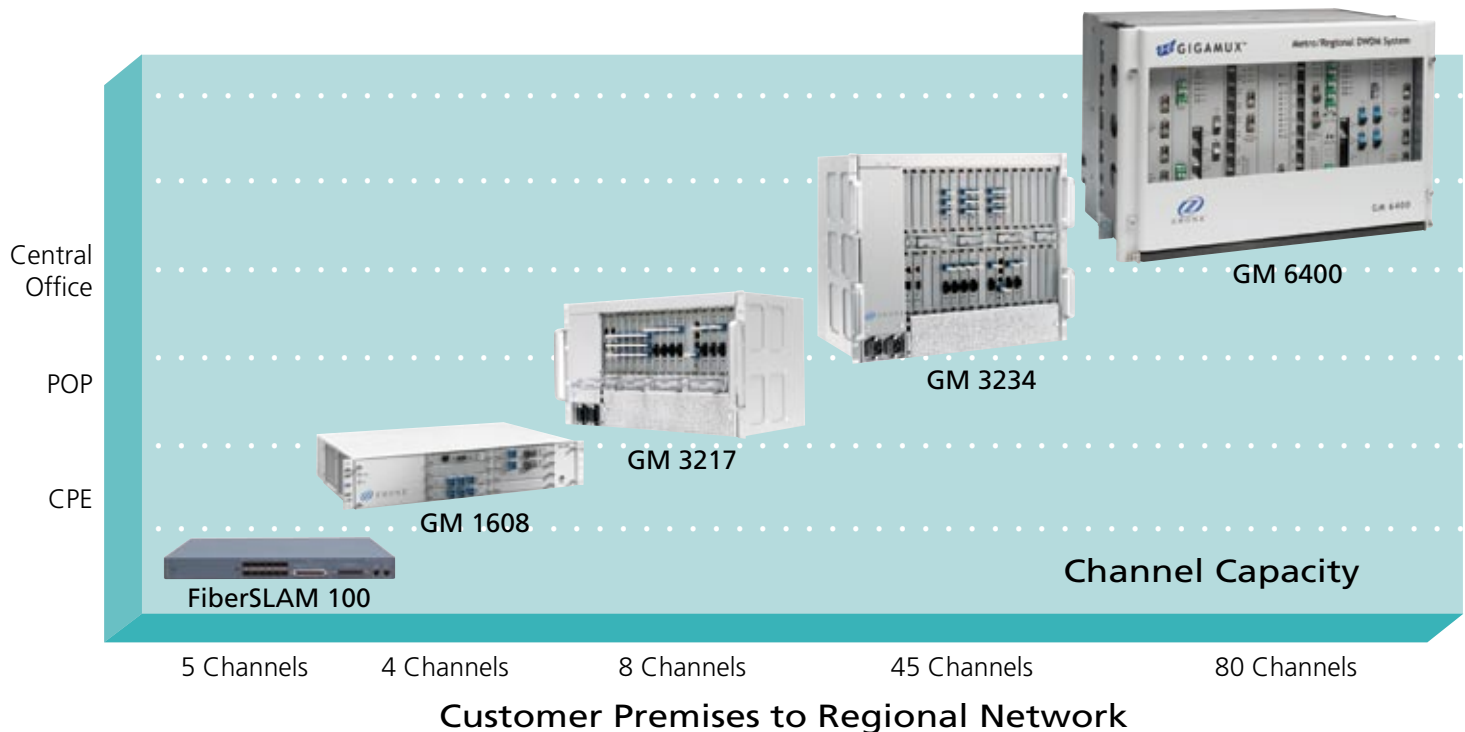


## GigaMux 6400 Series DWDM Transport

Zhone's award-winning GigaMux 6400 is the industry's premier metro and regional transport solution. The 6400 provides high-density muxing for maximum wavelength utilization of both 2.5G and 10G wavelengths. The 6400's scalable architecture allows the network to grow dynamically as bandwidth and customer requirements dictate. 100 Ghz-spaced channel plans and filters support alien-wavelengths and the 6400's monitoring supports visibility and monitoring from their equipment.

- Integrated Amplifiers, Channel Monitors, Filters, and Power Balancing
- Flexible Support for Single Service/Mux Transponders

## Zhone's GigaMux Product Family Advanced CWDM / DWDM Transport





## Customer Premises Equipment

Zhone's full line of residential IADs and ADSL2+ modems include everything that you need for home or small office connectivity, including built-in WiFi, firewalls, routing and voice ports. When in combination with Zhone's marketing leading BLCs, Dual End Line Test (DELT) delivers optimal bandwidth with simplified deployment and enhanced trouble shooting.



## zNID GPON ONT

zNID is an intelligent NID supporting GPON termination with full-featured gateway functionality providing an ideal solution for FTTH deployments.

- Triple Play Services—RF Video or IP Video, VoIP, High Speed Internet Access
- No New Home Wiring - HPAv3 Supported Simultaneously on Coax and Phone Line and Power over Phone Line Eliminates the Need to Run New Wires
- Two Step Easy Installation—Install Fiber Enclosure Without the Need for Electronics. Electronics Can Be Installed after Services are Ordered
- Remote Management—TR-069, SNMP, and Telnet Support

DSL Type	Model Number	Description	DSL Chipset	Bridge/Router	Ethernet Ports	USB Ports	Voice Ports	WiFi	DSL Annex Support					Special Features
									A	B	L	M	F	
<b>ADSL</b>														
	6205-A2	ADSL USB Modem	ADI	Bridge		1							Powered via USB Port	
	6211-A3	ADSL2+ Bridge / Router	TI	Router	1	1			✓	✓	✓			
	6211-I1	ADSL2+ Bridge / Router	BRCM	Router	1	1			✓	✓	✓	✓		
	6212-I2	ADSL2+ 4 Port Bridge/Router	BRCM	Router	4				✓	✓	✓			
	6218-I2	ADSL2+ 4 Port Bridge / Router + WiFi	BRCM	Router	4			✓	✓	✓	✓	✓	802.11 b / g	
	6228-I2	ADSL2+ Bonded	BRCM	Router	4			✓	✓	✓	✓		WiFi 802.11 b / g, Bonding	
	6381-A3	ADSL2+ Bridge/Router	TI	Router	1	1			✓	✓	✓		Reach DSL Support	
	6382-A1	ADSL2+ 4 Port Bridge/Router	TI	Router	4				✓	✓	✓		Reach DSL Support	
	6388-A1	ReachDSL ADSL2+ 4 Port Bridge / Router + WiFi	TI	Router	4			✓	✓	✓	✓		802.11 b / g	
<b>ADSL IAD</b>														
	6238-I2	ADSL2+ Router + WiFi + 2 POTS	BRCM	Router	4	1	1 FXO, 2 FXS	✓	✓	✓	✓	✓	SIP Support	
<b>SHDSL</b>														
	1740-A1	G.SHDSL Router 2 / 4 Wire	Infineon	Router	4								SHDSL Support One Pair (2 or 4 wire)	
	1752-A1	G.SHDSL.bis Router 2 Pair	Infineon	Router	4							✓	SHDSL.bis Support, Up to Two Pair	
	1754-A1	G.SHDSL.bis Router 4 Pair	Infineon	Router	4							✓	SHDSL.bis Support, Up to Four Pair	
	8300-A1	T1 / E1 Circuit Emulation over SHDSL							✓	✓			T1 / E1 Port, Serial Port	
<b>TDM SHDSL</b>														
	7995-A2	TDM SHDSL-Serial NTU	CXNT										V.35 Port	
	7996-A2	TDM SHDSL-G.703 NTU	CXNT										G.703 Port	
<b>VDSL2</b>														
	6511-A1	VDSL2 Bridge	CXNT	Bridge	1				✓					



## IMACS Channel Bank

The concept of Integrated Access began with the introduction of the IMACS. Initially, the IMACS was a vision that brought bandwidth savings for voice and data access. IMACS has not strayed from its vision and has remained the most flexible, robust, and scalable integrated access solution in the telecommunications market today.

- Over 50 Plug-In Solutions for Voice, Data and IP
- Integrated Processing Features
- Optical HSU Interface to Protection Relays
- Complete System Management
- Powerful Diagnostic and Fault Isolation
- Proven. Approved. Deployed.



## IMACS 200 Channel Bank with Built-in Cross Connect

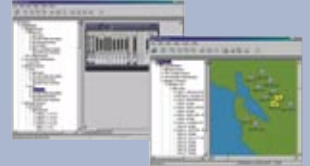
Optimized for the unique needs of electric utilities, the IMACS 200 system supports a wide range of specialty traffic, including tele-protection (EIA-232 and IEEE C37.94 optical interface to protection relays), SCADA, surveillance video, substation automation and alarms, radio, Ethernet and telephony.

- Voice, Data, Control and Monitoring Interfaces in a Single, 2U High Device
- IEEE 1613 Certified with Optional IEEE C37.94 Optical Interfaces for Deployment in Harsh Environments
- Optimized for Electrical Utility Sub-station Applications

## Zhone Management System (ZMS)

ZMS is a standards-based, carrier-class element management solution that provides management support for Zhone multi-service networks. The ZMS client-server architecture uses proven industry standard components such as an application server framework and a relational database to provide a robust platform.

ZMS automates a number of complex, tedious, and error-prone tasks, thereby raising productivity, improving accuracy and reducing costs for operators.



## Multimedia Traffic Management (MTM)

MTM™ (Multimedia Traffic Management) is a suite of powerful application and service management features, enabling Carriers and PTTs to support new revenue-generating services on their broadband access network. By enabling voice, video, data, online gaming, and other services in all areas of the network, service providers can offer new bundled services that will increase the income potential from each broadband access line.

MTM is much more than "Quality of Service" — because it allows full control over an application or service. MTM allows a network administrator to classify whether a packet is broadcast video, VOD, IP voice, or virtually any IP data service such as OAM traffic or a Set Top Box boot-file download. Once identified, MTM goes a step beyond its eight levels of prioritization with dynamic buffers and dedicated queues — it also provides the ability to assign asynchronous rate limits, and can even steer traffic throughout the IP backbone. With full support of industry standards, MTM fully interoperates with other Layer-3 and Layer-4 traffic management systems, such as those found on core routers.



# Access for a Converging World

## North America

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