Application Fact Sheet

ACCESS

MULTISERVICE DSLAM

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Freescale Semiconductor, Inc.

KEY BENEFITS

- *Simplified universal line card design for multiple DSLAM line card instantiations, delivering cost efficiencies and faster development*
- *High density aggregation of subscriber line xDSL ports – from 32 xDSLs to 128 xDSLs – using a single C-3e NP, and even higher density with a C-5e NP*
- *Wide range of networking uplink card interfaces and speeds including GbE, OC-3c, OC-12c, and OC-48c with a supporting library of DSLAM-oriented reference software applications*
- *Supports queuing, shaping, and policing for individual ATM and IP flows for each ADSL line, supporting ATM Traffic Management 4.1, IP DiffServ, IntServ and MPLS QoS*
- *Broad range of DSLAM value-added services, such as advanced QoS and VPN security, available from Motorola and its Alliances*

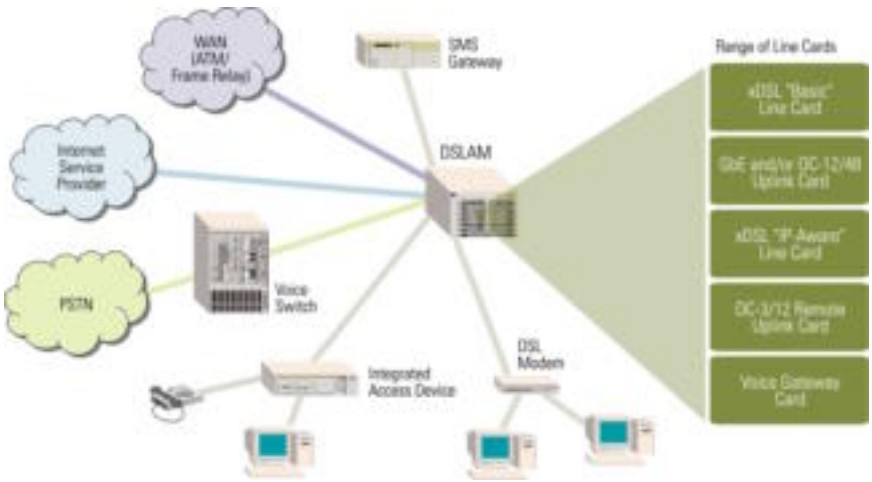
OVERVIEW

Digital Subscriber Line Access Multiplexers (DSLAMs) are a leading broadband access technology, delivering exceptionally high-speed data transmission over existing copper telephone lines. In the process, they are transforming the existing public network to a high-performance, multiservice network. DSLAMs support a wide variety of high-bandwidth applications including voice on demand, high-speed Internet access, and streaming multimedia content. Next-generation DSLAM platforms will offer greater density and lower cost per port along with more diversity in services (such as voice gateways and virtual private networks) using multiple DSL transports such as ADSL, VDSL, HDSL, SHDSL, and so on.

Motorola offers a family of integrated network processors and software that addresses these specific DSLAM requirements, along with high density and scalability, enabling the development of high-performance, multiservice DSLAMs.

DESIGN CHALLENGES

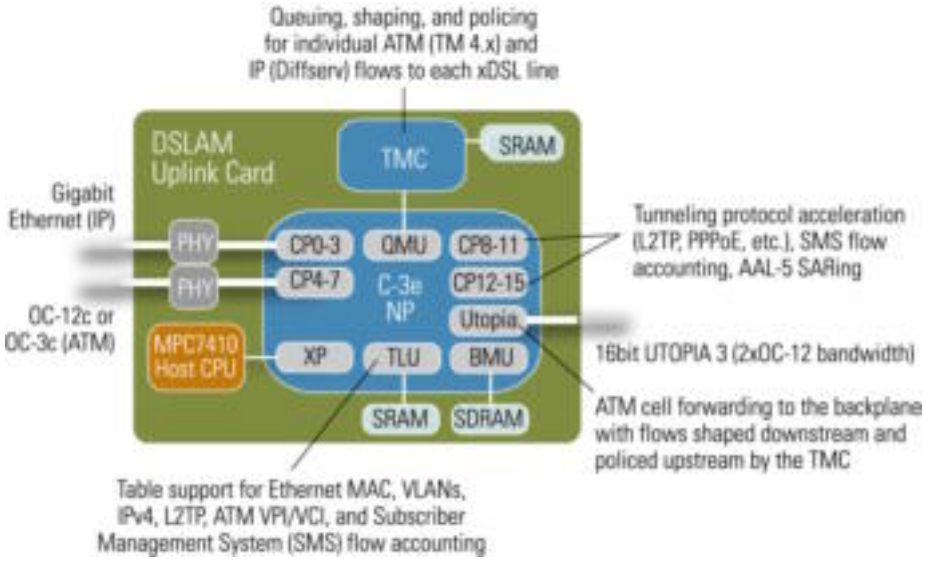
Typical DSLAM systems are ATM based with the primary role of aggregating multiple xDSLs for uplink to the network. The number of subscribers a DSLAM can handle is a key requirement and supporting such high density per platform or card requires a range of interfaces and speeds. On the networking uplink services side, where ATM is prevalent, IP routing is gaining quickly while some systems require support for Frame Relay and TDM traffic. Consequently, any solution must to be able to handle the diversity and interworking of networking technologies such as IP-to-ATM switching and Segmentation and Reassembly (SARing). The trend toward value-added services such as Quality of Service (QoS) capabilities, VPN gateways, and media gateways necessitates a total system approach leveraging a universal line card strategy where software reuse and reuse of previous line card designs can lower overall development costs and bring your product to market faster.



Today's DSL network places demands on a DSLAM system to support high DSL line density for ATM and IP traffic while providing QoS guarantees and other services to individual users

**For More Information On This Product,
Go to: www.freescale.com**

Motorola is your single source for comprehensive, embedded solutions for DSLAM architectures — providing network processing, host processing, and traffic management technologies



Bottom line: a DSLAM design must combine the best of density, speed, functionality, scalability, and cost efficiency.

Additional design challenges include the need for:

- Backhaul services for packet, cell and circuit-based applications through concentration of high density DSL lines onto 10/100 Base-T, T1/E1, T3/E3 and ATM outputs (OC-3/12/48), and scalability so that uplink capacity can be appropriately matched with future demand.
- Inherent multiservice capabilities for ATM, Frame Relay, IP and TDM on a single platform using multiple DSL transports such as ADSL, SDSL, RADSL and G.SHDSL.
- A full suite of QoS service performance guarantees in order to manage the rising demand of new services, network models, and applications, such as packetized voice and video.
- Temperature 'hardened' devices for installation in areas that are not environmentally controlled (such as remote terminals or curbside cabinets) and adhering to network equipment building standards (NEBS).

MOTOROLA® SOLUTION

Motorola offers a complete line of communications processors and reference software for solving your DSLAM design challenges. Motorola's communications processors include the C-Port family of network processors (C-3e NP and C-5e NP), traffic management coprocessors (TMCs), and interface adapters. Plus you can leverage Motorola's host processors (PowerPC®) and security processors (MPC185 and MPC190) as needed by your design.

In addition, you can use Motorola's library of reference software for the C-Port family (called C-Ware Applications Library) that provides data plane code that can be mixed and matched to best address your DSLAM line card requirements for both subscriber line cards, up link cards, and even combinations thereof.

The C-3e NP handles high-density DSL aggregation ranging from 32 to 64 to 196 lines (with an external Utopia 2 interface adapter) or greater densities with the C-5e NPs. The C-Port TMCs provide queuing, shaping, and policing for individual ATM and IP flows for each ADSL line. This ensures that delay-sensitive traffic traversing over congested networks can do so in a timely fashion. The TMCs support ATM Traffic Management 4.1, IP Diff-Serv, IntServ, and MPLS QoS. These features enhance a DSLAM vendor's ability to support new, value-added, revenue generating services for applications requiring guaranteed classes of services, such as voice on demand, video conferencing, and multimedia streaming, all across xDSL lines.

C-Port network processors are well suited for uplink card applications, able to handle a range of network interfaces and speeds, from sub T1, T1/E1, OC-3, OC-12, and up to OC-48c. C-Port NPs also enable the interworking of multiple network services including AAL-5 and AAL-2. C-Port NPs come integrated with a high degree of functionality including queuing and classification coprocessing, and SMS flow accounting capabilities, critical for the management and billing of DSLAM services. As your product functionality evolves, the C-Port NPs can be easily reprogrammed to address new requirements because C-Port NPs are programmed in C-language using Applications Programming Interfaces (APIs).

In addition, you can leverage the offerings of Motorola's Smart Networks Alliance Program to further enhance your DSLAM solutions.

DEVELOPMENT ENVIRONMENT

The C-Port family development environment consists of the following components:

- **C-Ware Software Toolset (CST)** — Functional and performance accurate simulation environment, standard GNU-based compiler and debugger, GUI performance analysis tool, traffic scripting tools, and C-Ware APIs.
- **C-Ware Applications Library (CAL)** — Provides an extensive library of reference applications containing key protocols for supporting popular DSLAM oriented applications including: L2/L3 switching/routing, IPv4, IPv6, tunneling protocols (L2TP, PPPoE, etc.) acceleration, ML-PPP, MC-PPP, IP Multicast, MPLS, VLAN, IMA, ATM VPI/VCI switching along with interworking/SARing including AAL-2 and AAL-5.
- **C-Ware Development System (CDS)** — Compact PCI chassis with Motorola MPC750 Host Application Module, which can also include NP Switch Modules, TMC Daughter Cards, and various Physical Interface Modules (PIMS). Complete hardware reference designs also available.

Additionally, the C-Port family development environment supports host software integration with:

- Comprehensive host side API
- Integration with signaling protocols in shipped software
- Traffic manager APIs for QoS configuration

Vendors may also select Wind River® Tornado® for Managed Switches (TMS) to program the host processor/control plane software. Motorola has established an alliance with Wind River to provide integration of C-Port network processors with TMS 2.0 supporting both Layer 2 and Layer 3 services. In addition, the Host Application Module in the CDS runs VxWorks® on the MPC750.

MOTOROLA ORDERING INFORMATION

PART NUMBER	NAME	ADDITIONAL INFORMATION
PCC3E0RX180WB0B	C-3e NP	5.5 W @ 180 MHz Motorola.com/networkprocessors
PCC5E0RX266WB0B	C-5e NP	9 W @ 266 MHz Motorola.com/networkprocessors
PCQ500RX000WA0A	Q-5 TMC	5Gbps throughput Motorola.com/networkprocessors
MPC750	PowerPC	Motorola.com/powerpc
MPC185 & MPC190	Security Processors	Motorola.com/securityprocessors
CSTC501W*	C-Ware Software Toolset	Web site download of current CST release (Windows or UNIX)
CDEV101A†	C-Ware Development System	CDS Base Unit (Chassis, Power Supply, Single Board Computer)

* The CST can be downloaded from motorola.cportcorp.com/support

† Ask your sales representative or distributor for details and availability of system modules, which you order separately.

SMART NETWORKS ALLIANCES

VENDOR	DESCRIPTION	CONTACT
Corrent™	For high-performance security processing	Tel: 480-648-2300 sales@corrent.com
IDT™	For advanced classification	Tel: 613-724-6004 Fax: 613-724-6008
Wind River Systems	For Tornado for Managed Switches and RTOS	Tel: 800-545-9463 Fax: 510-814-2010

RELATED INFORMATION

For inquiries about Motorola products, please contact the Motorola Customer Care Center at 800-521-6247, or visit us online at Motorola.com/semiconductors.

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CPORTDSLAM-FS/D
Rev 02, March 2003