

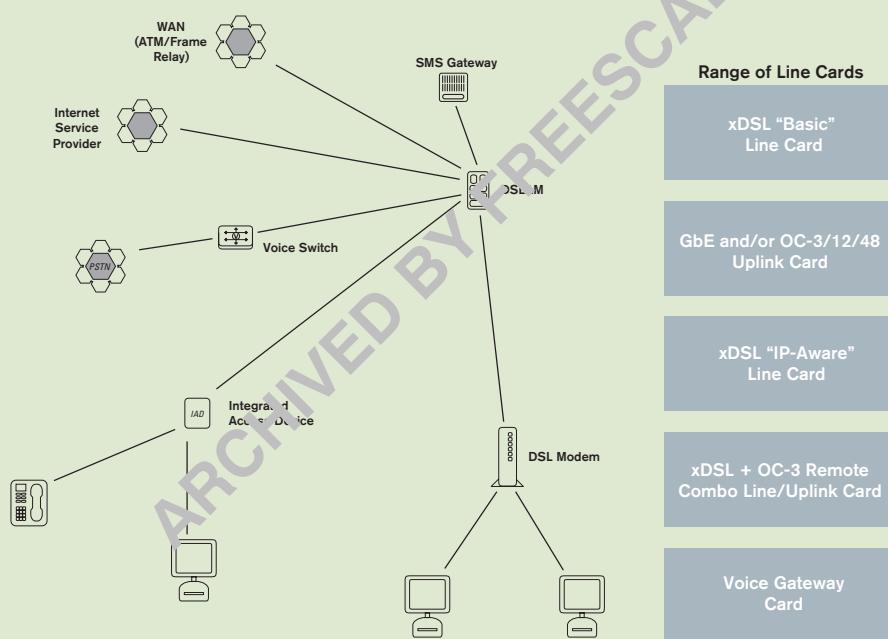
Multiservice DSLAM

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. Freescale Semiconductor 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.

DSL NETWORK BLOCK DIAGRAM



KEY BENEFITS

- > Universal line card design for multiple DSLAM line card instantiations, lowering costs and speeding development
- > High-density aggregation of subscriber line xDSL ports using a single C-3e™ network processor, and even higher density with a C-5e™ network processor
- > 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
- > Broad range of DSLAM value-added services, such as Quality of Service (QoS) and VPN security, available from Freescale and its alliance program members

Part Number	Product Highlights	Additional Information
PCC3E0RX180WB0B	C-3e™ Network Processor	5.5 W @ 180 MHz www.freescale.com/networkprocessors
PCC5E0RX266WB0B	C-5e™ Network Processor	9 W @ 266 MHz www.freescale.com/networkprocessors
MPC82xx	PowerPC® Host Processor or PowerQUICC™ Processor	www.freescale.com/powerquicc
MPC185	Security Processors	www.freescale.com/securityprocessors
MPC190		
CSTC501W <small>NOTE 1</small>	C-Ware™ Software Toolset	Web site download of current CST release (Windows® & UNIX®)
CDEV101A <small>NOTE 2</small>	C-Ware Development System	CDS base unit (chassis, power supply, single board computer)

Notes:

1. Download the CST from motorola.cportcorp.com/support.
2. Ask your Freescale sales representative or authorized distributor for details and availability of system modules, which are ordered separately.

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 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 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.

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.
- > 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).

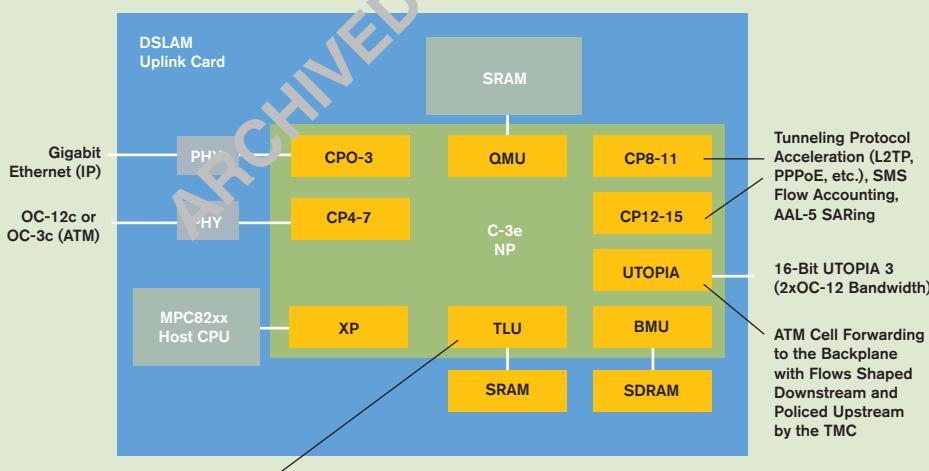
DSLAM ARCHITECTURE

Table Support for Ethernet MAC, VLANs, IPv4, L2TP, ATM VPI/VCI, and Subscriber Management System (SMS) Flow Accounting

Freescale Solution

Freescale offers a comprehensive line of communications processors and reference software for solving your DSLAM design challenges. Freescale's communications processors include the C-Port family of network processors (C-3e network processor and C-5e network processor) and interface adapters. Plus, you can leverage Freescale's PowerPC® processors, PowerQUICC™ processors as host processors and security processors (MPC185 and MPC190) as needed by your design.

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

The C-3e network processor handles high-density DSL aggregation ranging from 64 lines or greater densities with the C-5e network processor. The flexibility and features of the C-3e and C-5e network processors 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, videoconferencing, 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 network processors also enable the interworking of multiple network services, including AAL-5 and AAL-2. C-Port network processors 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, C-Port network processors can be easily reprogrammed to address new requirements because C-Port network processors are programmed in C language using application programming interfaces (APIs).

In addition, you can leverage the offerings of Freescale'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 GUI-based compiler and debugger, GUI performance analysis tool, traffic scripting tools and C-Ware APIs.

> **C-Ware Applications Library (CAL).** An extensive library of reference applications that contains key protocols for supporting popular DSLAM-oriented applications such as 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 that includes AAL-2 and AAL-5.

> **C-Ware Development System (CDS).** Compact PCI chassis with MPC750 host application module that can include network processor switch modules and various physical interface modules (PIMs). Complete hardware reference designs are available.

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

- > Comprehensive host-side API
- > Integration with signaling protocols in shipped software

Development Tools

Tool Type	Product Name	Vendor	Description
Software Kit	C-Ware™ Software Toolset (CST)	Freescale	Provides a comprehensive software development environment for building networking systems based on Freescale's C-Port network processor family. By providing a simple programming model, standard tools, a robust simulation environment and a host application environment, the CST can significantly accelerate your software development effort.
Reference Applications	C-Ware Applications Library (CAL)	Freescale	Offers a comprehensive set of reference applications for building networking systems based on Freescale's C-Port network processor family. The CAL significantly accelerates customer software development by providing extensive reference source code that is instrumented for analysis with the C-Ware Software Toolset.
Development Kit	C-Ware Development System (CDS)	Freescale	Provides an environment for you to prototype an entire product that leverages C-Port network processors. This chassis-based system allows you to develop your unique software and then integrate and test it in an actual hardware environment, well before your target product is available.

Third-Party Support

Vendor	Description	Contact Information
Corrent Corporation	For high-performance security processing	Tel: 1 (480) 648-2300 sales@corrent.com
IDT	For advanced classification	Tel: 1 (613) 724-6004 Fax: 1 (613) 724-6008
Wind River Systems, Inc.	Real-time operating system Control plane software	Tel: (800) 545-9463 Fax: 1 (510) 814-2010

Learn More: For more information about Freescale products, please visit www.freescale.com.