

# DSL Modem

## Overview

Digital subscriber line—or DSL—technologies significantly increase the bandwidth over the “last mile” in the public network while providing basic plain old telephone services (POTS) and supplying POTS power, over the same wire. DSL technology eliminates the need for the public switched telephone network (PSTN) to handle high-speed data calls. With DSL, data calls are routed directly to the ISP or corporate network.

A DSL circuit connects a DSL modem on each end of a twisted-pair telephone line, which creates three information channels:

- > High-speed downstream channel from the central office to the user (8 Mbps or higher)

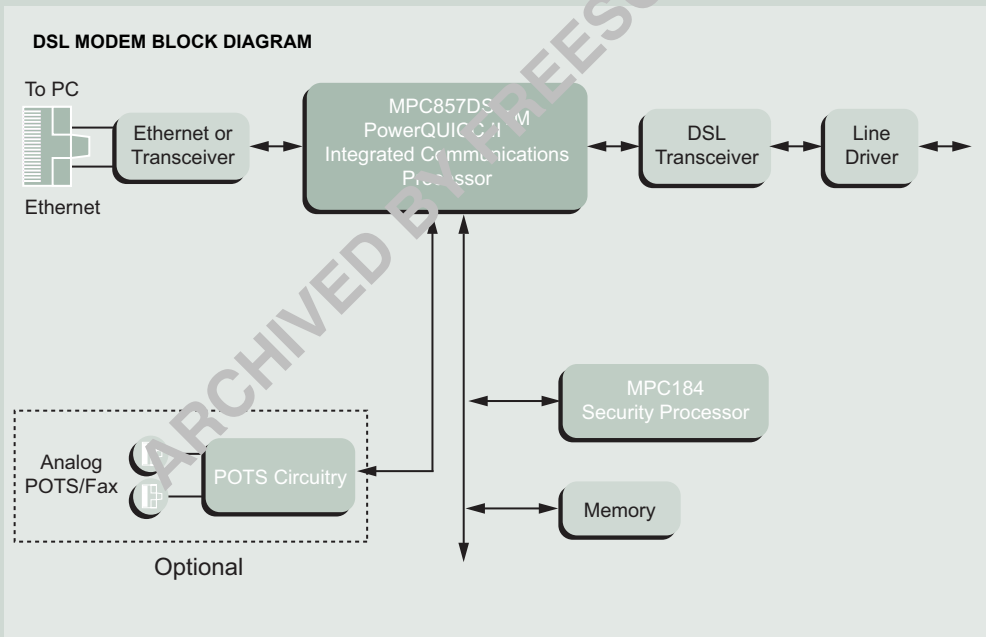
- > Medium-speed duplex channel (up to 1 Mbps)

- > POTS channel

The POTS channel is usually separated from the digital modem by filters which guarantee uninterrupted POTS service regardless of the other services that are utilized through the line. Each channel can be submultiplexed to form multiple low-rate channels.

## Key Benefits

- > Provides broadband service over normal twisted-pair telephone lines without interrupting POTS services
- > Eliminates the need for the PSTN to handle high-speed data calls



## Freescale Ordering Information

Part Number	Product Highlights	Additional Information
MPC857DSL	<ul style="list-style-type: none"> <li>&gt; Embedded MPC8xx core</li> <li>&gt; Single-issue, 32-bit version of the core (compatible with the PowerPC architecture definition) with 32, 32-bit general-purpose registers (GPRs)</li> <li>&gt; Enhanced ATM functionality over that of the MPC860SAR</li> <li>&gt; Multiple APC priority levels available to support a range of traffic pace requirements</li> <li>&gt; Port-to-port switching capability without the need for RAM-based microcode</li> <li>&gt; Simultaneous MII (100Base-T) and UTOPIA (half-duplex) capability</li> <li>&gt; Parameter RAM for both SPI and I2C can be relocated without RAM-based microcode</li> <li>&gt; Supports full-duplex UTOPIA master (ATM side) operation using a "split" bus</li> <li>&gt; Up to 32-bit data bus (dynamic bus sizing for 8, 16, and 32 bits)</li> <li>&gt; UTOPIA port supports up to 4 PHY addresses</li> <li>&gt; Communications processor module (CPM)</li> <li>&gt; On-chip 16x16 multiply accumulate controller (MAC)</li> <li>&gt; One serial communication controller (SCC) for Ethernet (SCC1)</li> <li>&gt; One serial management channel (SMC) for UART (SMC1)</li> <li>&gt; One serial peripheral interface (SPI)</li> <li>&gt; One inter-integrated circuit (I<sup>2</sup>C) port</li> <li>&gt; Parallel interface port (PIP)</li> <li>&gt; One PCMCIA socket (Port B)</li> <li>&gt; 3.3 V core, 3.3 V I/O</li> </ul>	<a href="http://www.freescale.com/smartnetworks">www.freescale.com/smartnetworks</a>
MPC184	<ul style="list-style-type: none"> <li>&gt; One public key execution unit (PKEU) that supports RSA and Diffie-Hellman, programmable field size up to 2048-bits, elliptic curve cryptography, F2m and F(p) modes, and programmable field size up to 511-bits</li> <li>&gt; One data encryption standard execution units (DEUs)</li> <li>&gt; One advanced encryption standard unit (AESU)</li> <li>&gt; One ARC four execution unit (AFEU)</li> <li>&gt; One message digest execution units (MDEUs)</li> <li>&gt; One random number generator (RNG)</li> <li>&gt; 8x compliant external bus interface, with master/slave logic</li> <li>&gt; PCI 2.2 compliant external bus interface, with master/slave logic</li> <li>&gt; Four crypto-channels, each supporting multi-command descriptor chains</li> <li>&gt; 8KB of internal scratchpad memory for key, IV and context storage</li> <li>&gt; 1.0 W power dissipation</li> <li>&gt; Software and development support available</li> </ul>	<a href="http://www.freescale.com/smartnetworks">www.freescale.com/smartnetworks</a>

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### Design Challenges

As with most CPE applications, DSL modem designs face significant cost pressures which place severe constraints on the optimization of cost/performance trade-offs. The common use of ATM as the transport technology over the DSL link burdens the design with complex data stream and control requirements. In addition, the designer faces the challenges of simplifying the manufacturing process and maintaining a high level of flexibility to accommodate system compatibility issues and facilitate smooth upgrades and enhancements.

### Freescal Semiconductor Solution

Freescal Semiconductor's MPC85x PowerQUICC™ family moves the entire price/performance curve for DSL

modems to a new level with the new MPC857DSL, which integrates ATM, Ethernet, and USB functionality with a high-performance PowerPC ISA core in a very cost-effective package. The proven family architecture includes a versatile memory controller and a separate on-chip communications processor module that off loads peripheral tasks from the core, such as the traffic handling of ATM via the UTOPIA port, Ethernet, and USB. In addition, the established code base and broad third-party support from Freescal Semiconductor's Smart Network Alliance Program members further enable cost-efficient solutions and accelerated time-to-market for DSL equipment suppliers.

Of course, the designer can select the MPC857DSL or any other MPC85x family member, each with an attractive set of functional capabilities to meet specific performance goals without sacrificing flexibility and cost targets.

Network security protocols involve processing sophisticated, computational-intensive algorithms that can reduce system performance by monopolizing the host processor. The MPC184 security processor is easily integrated into systems already using Freescal Semiconductor's processors, and because it utilizes existing system memory, the result is significant savings of both board space and system cost.

### Development Tools <sup>Note</sup>

Tool Type	Product Name	Vendor	Description
Hardware	MPC857TIBIS	Freescal Semiconductor	MPC857T IBIS Model Please download the README file (MPC8XXIBIS).
Hardware	MPC8XXIBIS	Freescal Semiconductor	README File for MPC8XX IBIS Models Please read before using the IBIS models for the MPC8xx products.
Hardware	PPCEVAL-SP3-7400	Freescal Semiconductor	Altimus X3 MPC7400 PMC Module for the Sandpoint X3 Motherboard
Hardware	PPCEVAL-SP3-750	Freescal Semiconductor	Altimus X3 MPC750 PMC Module for the Sandpoint X3 Motherboard (discontinued)
Hardware	SANDPOINTX3	Freescal Semiconductor	Sandpoint X3 Evaluation System - Motherboard
Software	DINK32	Freescal Semiconductor	ROM-Based Debug Monitor, R13.0

Note: For detailed information, go to [www.freescal.com](http://www.freescal.com) and click on Tools. Search for tools by product or technology, family or function, and product number.

## Notes

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