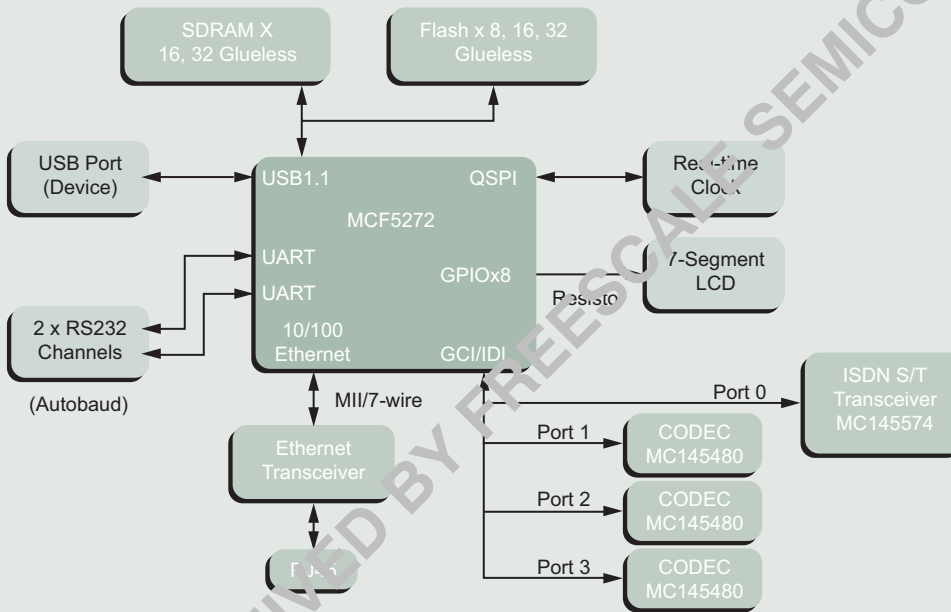# ColdFire-Based ISDN Router

Overview

A virtual private network (VPN) router securely connects a group of computer systems to a private local area network (LAN) communicating over the Internet. To ensure network privacy and data integrity, the router should support user authentication mechanisms, data encryption/decryption, and firewall technologies. A VPN router may be used as a cost-effective network router for small office home office (SOHO) applications, providing a gateway and firewall for dial-up, cable, or asymmetrical digital subscriber line (ADSL) Internet connections.

Key Benefits

> Integrates peripherals widely used in communications applications

> Handles 100Base-T Ethernet, 12 Mbps USB, an ISDN transceiver, 3 CODEC channels and 2 serial ports, leaving more than 50 percent of the CPU bandwidth to run user applications

> The MCF5272 is backed by an unmatched selection of development tools

COLDFIRE-BASED ISDN ROUTER BASED ON FREESCALE SEMICONDUCTOR'S COLDFIRE MCF5272 MICROPROCESSOR

Design Challenges

Embedded network devices perform specific control functions. They also perform additional control functions by interacting over a network. Devices connected to the network, particularly the Internet, take on a range of functionality. For example, they should be capable of handling standard protocols such as TCP/IP and its associated application set, in addition to handling authorization and access issues. In network design, systems adhere to protocols for addressing, identifying hosts, routing, establishing connections, contention on the network, and sending data.

Freescale Semiconductor Solution

Freescale Semiconductor's ColdFire microprocessor family provides the ideal networking solution. The MCF5272 microprocessor, based on a Version 2 ColdFire core, is designed with integrated peripherals widely used in communications applications.

The design, as shown in the Figure on page 1, is centered around the ability of the MCF5272 to handle 100Base-T Ethernet, 12 Mbps USB, an ISDN transceiver, 3 CODEC channels, and 2 serial ports, while leaving more than 50 percent of the CPU bandwidth to run user applications such as router software. In addition to using the communications interfaces on the MCF5272, general purpose input/output (GPIO) is used to drive a seven-segment LCD display. The queued serial peripheral interface (QSPI) module interfaces to a real-time clock to provide time stamping on the data as it is routed. Incoming serial data tends to vary in terms of data rate. The RS232 channels are designed to lock to this data and to automatically track and respond at the incoming data rate. The parameter look up table (LUT) for the soft high-level data link control (HDLC) module is located in the on-chip ROM of the MCF5272. The designer can use the HDLC protocol for virtually any of the communication channels in the router, particularly the CODEC and ISDN interfaces. The Ethernet multiply-accumulate unit (MAC) designed into the MCF5272 requires an external transceiver and magnetics to provide 10Base-T or 100Base-T operation using the media independent interface (MII) interface.

Development Tools

Tool Type	Product Name	Vendor	Description
Hardware	M5206eC3, M5249C3, M5272C3, M5307C3, M5407C3	Freescale Semiconductor	Evaluation Board
Software	IDE-Code Warrior 3.0, Compiler— C/C++, Source Level Debugger	Metrowerks www.metrowerks.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	IDE, RTOS–VxWorks, Compiler–Diab, C/C++, Simulator, Analysis Tool, H/W Debugger–Vision Probe, S/W Debugger–Singlestep/ Vision Click	Wind River Systems www.windriver.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	IDE-Multi, Compiler–C/C++/EC++, RTOS-ThreadX, Simulator, Source Level Debugger	Green Hills Software www.ghs.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	OS–uCLinux, Compiler–C/C++	SnapGear www.snapgear.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	IDE, RTOS-Nucleus+, Compiler–C/C++, Source Level Debugger	Accelerated Technology www.acceleratedtechnology.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	Network Development Kit, IDE, Compiler–C/C++, RTOS	Netburner www.netburner.com	Development and Debugging for MCF5206e, MCF5249, MCF5272
Software	Compiler–C, Simulator, Debugger	Crossware www.crossware.com	Development and Debugging for MCF5206e, MCF5272, MCF5307, MCF5407
Software	GDB (free software), Compiler–C (free software), uCLinux	Gnu Tools www.gnu.org	Development and Debugging for MCF5206e, MCF5249 (GDB and Compiler–C only), MCF5272, MCF5307, MCF5407
Software	Emulator–Flex	Noral	Development for MCF5206e, MCF5307
Software	Emulator Library (free software), Code Translator–PortASM 68K/CF (free software)	MicroAPL www.microapl.co.uk	Development and Debugging for MCF5206e (Code Translator only), MCF5249, MCF5272, MCF5307, MCF5407
Software	Wiggler cable, Hardware Interface	P&E Microcomputer Systems www.pemicro.com	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407

Notes

Learn More: Contact the Technical Information Center at +1-800-521-6247 or +1-480-768-2130.

For more information about Freescale products, please visit **www.freescale.com**.

SG2103
REV 2
12/2004

Launched by Motorola

freescale™
semiconductor

December2004