

ColdFire-Based Ethernet Router

Overview

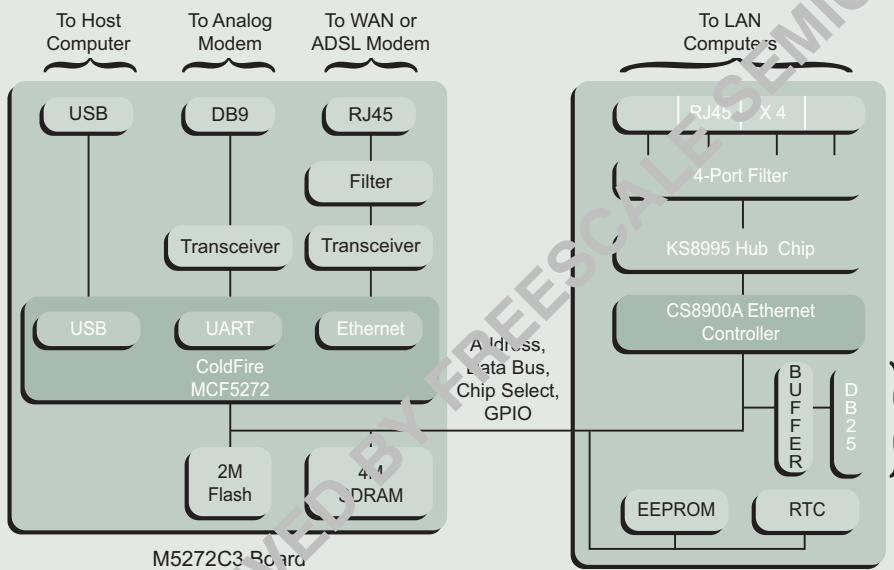
In today's highly competitive router market, a router for home or small office home office (SOHO) use must be cost-effective, feature-rich, and perform in multiple modalities. Freescale Semiconductor's ColdFire MCF5272 microprocessor router design meets this rigorous networking challenge with a 32-bit microcontroller with its

integrated Ethernet controller that supports cable, broadband, analog modem, and LAN requirements. In addition to reducing external component count, the MCF5272 router runs on Internet-available open software, saving users the cost of license fees for operating system and router application software.

Key Benefits

- > 32-bit ColdFire[®] microprocessor and integrated Ethernet controller offer high performance at low cost
- > Four Ethernet ports support cable, ADSL and WAN, and LAN connections
- > Total cost reduced by employing open software, available without license fees
- > Controls and monitors Internet access

COLDFIRE-BASED ETHERNET ROUTER BLOCK DIAGRAM



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Freescale Ordering Information

Part Number	Product Highlights	Additional Information
MCF5272 ColdFire	<ul style="list-style-type: none"> > 10/100 Ethernet controller with USB module > Version 2 (V2) ColdFire core > 63 (Dhrystone 2.1) MIPS at 66 MHz performance > 1K-byte I-cache > 4K-byte SRAM > Multiply-Accumulate Unit (MAC/HW) > Debug module—background, real time, and instruction trace 	www.freescale.com ^{Note}

Note: Search on the listed part number.

Design Challenges

For a Small Office Home Office (SOHO) environment the same requirements exist as in the home environment, but extra features are needed such as a firewall and the ability to monitor traffic.

The features of a typical home/SOHO router may include connectivity with the ability to share cable, an asymmetric digital subscriber line (ADSL) broadband modem, and an Internet protocol (IP) address. The router generally supports an analog modem dial-up connection and is designed with an internal 10/100Base-T, 4-port hub with an autosensing Ethernet switch for 10/100Base-T autodetect. It may also support protocol connections such as:

- > Dynamic Host Configuration Protocol (DHCP) client and server for dynamic IP address assignment. The DHCP client is necessary because the IP address is usually assigned by an Internet service provider (ISP)
- > Point-to-Point Protocol over Ethernet (PPPoE) is also required by most ISPs. Without PPPoE support, the router cannot be connected to most ISPs.
- > Dial-on-demand for outgoing Internet connection helps to connect to an ISP automatically when access to the Internet begins.

Packet filtering for discarding unwanted network traffic is important in helping to prevent unauthorized network access and Web site visits. There are also several forms of system authorization: Password Authentication Protocol (PAP), Challenge-Handshake Authentication Protocol (CHAP), and Microsoft's CHAP authentication.

Miscellaneous features may include:

- > Flash upgradable firmware
- > Configure using browser
- > Remote management
- > Printer sharing
- > Traffic monitoring

For Internet access control, the home/SOHO router is designed to allow control of Internet use during specific periods.

Internet access monitoring is another feature to assist network administrators in monitoring Internet users.

Freescale Semiconductor Solution

A cost-effective 32-bit ColdFire microcontroller unit (MCU) is an ideal networking solution to develop a home/SOHO router with four Ethernet ports for cable, ADSL, and LAN networks. To minimize total cost, uCLinux Open Source (OS) is employed together with other OS subroutines such as a TCP/IP stack and network address translation (NAT) firewall. Most of these routines are available for download from various Web sites.

Development Tools

Tool Type	Product Name	Vendor	Description
Hardware	MCF5206e, MCF5249, MCF5272, MCF5307, and MCF5407	Freescale Semiconductor	Evaluation Board
Software	IDE-Code Warrior 3.0, Compiler-C/C++ Source Level Debugger	Metrowerks	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, and 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	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	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	OS-uCLinux, Compiler-C/C++, Source Level Debugger	SnapGear	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	IDE, RTOS-Nucleus+, Source Level Debugger	Accelerated Technology	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407
Software	Network Development Kit, IDE, Compiler-C/C++, Source Level Debugger, RTOS	Netburner	Development and Debugging for MCF5206e, MCF5249, MCF5272
Software	IDE, Simulator, Compiler-C/C++, Debugger-X-Ray, RTOS-VRTX	Mentor Graphics	Development and Debugging for MCF5206e, MCF5249 (RTOS-VxWorks only), MCF5272 (Compilers and RTOS), MCF5307 (Compilers, Debugger, RTOS)
Software	Compiler-C, Simulator, Debugger	Crossware	Development and Debugging for MCF5206e, MCF5272, MCF5307, MCF5407
Software	GDB (free software), Compiler-C (free software), uCLinux	Gnu Tools	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	Development and Debugging for MCF5206e (Code Translator only), MCF5249, MCF5272, MCF5307, MCF5407
Software	Wiggler cable, hardware interface	P&E Microcomputer Systems	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407

Third Party Support

Vendor	Description	Contact Information
Metrowerks	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, and MCF5407	800-377-5416 www.metrowerks.com
Wind River Systems	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407	800-872-4977 www.windriver.com
Green Hills	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407	805-965-6044 www.ghs.com
SnapGear	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407	801-282-8492 www.snapgear.com
Accelerated Technology	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407	800-468-6853 www.acceleratedtechnology.com
Netburner	Development and Debugging for MCF5206e, MCF5249, MCF5272	858-558-0293 www.netburner.com
Gnu	Development and Debugging for MCF5206e, MCF5249 (GDB and Compiler-C only), MCF5272, MCF5307, MCF5407	617-542-5942 www.gnu.com
Noral	Development for MCF5206e, MCF5307	888-88-DEBUG www.noral.com
Crossware	Development and Debugging for MCF5206e, MCF5272, MCF5307, MCF5407	(+44) 1763 853500 www.crossware.com
MicroAPL	Development and Debugging for MCF5206e (Code Translator only), MCF5249, MCF5272, MCF5307, MCF5407	(+44) 1825 768050 www.microapl.co.uk
P&E Microcomputer Systems	Development and Debugging for MCF5206e, MCF5249, MCF5272, MCF5307, MCF5407	617-353-9206 www.pemicro.com

Notes

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