Application Fact Sheet

ACCESS/EDGE

MULTISERVICE PLATFORM ATM/IP/FR LINE CARD

KEY BENEFITS

- *Realize great efficiencies of design with a single "platform" architecture for virtually any flavor of MSP line card*
- *Software upgradeable line cards can easily address evolving standards and new services — and minimize OEM and service provider risk*
- *True, fine-grained, multiservice support for high numbers of users*
- *Get to market faster with streamlined development and C-programmable solutions*

OVERVIEW

One of the greatest challenges of OEMs building multi-service platforms (MSPs) is maximizing their return on investment (ROI). With the massive network build-outs of the past few years and falling bandwidth prices putting pressure on margins, achieving better ROI can be challenging, especially for the access and edge multi-service platform market.

The market is diverse with single MSPs accommodating a mixture of ATM, Frame Relay, IP, MPLS, and PoS, with port speeds ranging from subT1/E1 to OC-3 to full duplex OC-48c/STM-16 links. Emerging applications including packetized voice (VoIP) and 2.5G/3G wireless backbone networks add further to the demands of scalability and adaptability. And with converging applications (data/voice/video) come issues of Quality of Service (QoS).

DESIGN CHALLENGES

A common architecture of a multiservice system today is a rack or shelf with multiple flavors of line cards with a common backplane bus and control processor card. The backplane is often ATM-based. These line cards can be dedicated to a specific function such as IP, ATM, or Frame Relay or combine functions, such as ATM and Frame Relay on a single line card. Interworking among the cards is provided by routing to other cards within the shelf across the switch fabric.

Typically, these solutions are not easily scalable in terms of increasing bandwidths, implementing new interfaces, or adding new services. Any solution for the access and edge markets needs to offer a range of speeds and physical interfaces for today's applications and an easy migration path for future applications — including a more IP-centric network. In addition, today's MSPs cannot easily adapt to new and evolving standards. The ability to upgrade software versus forklift upgrades is paramount.

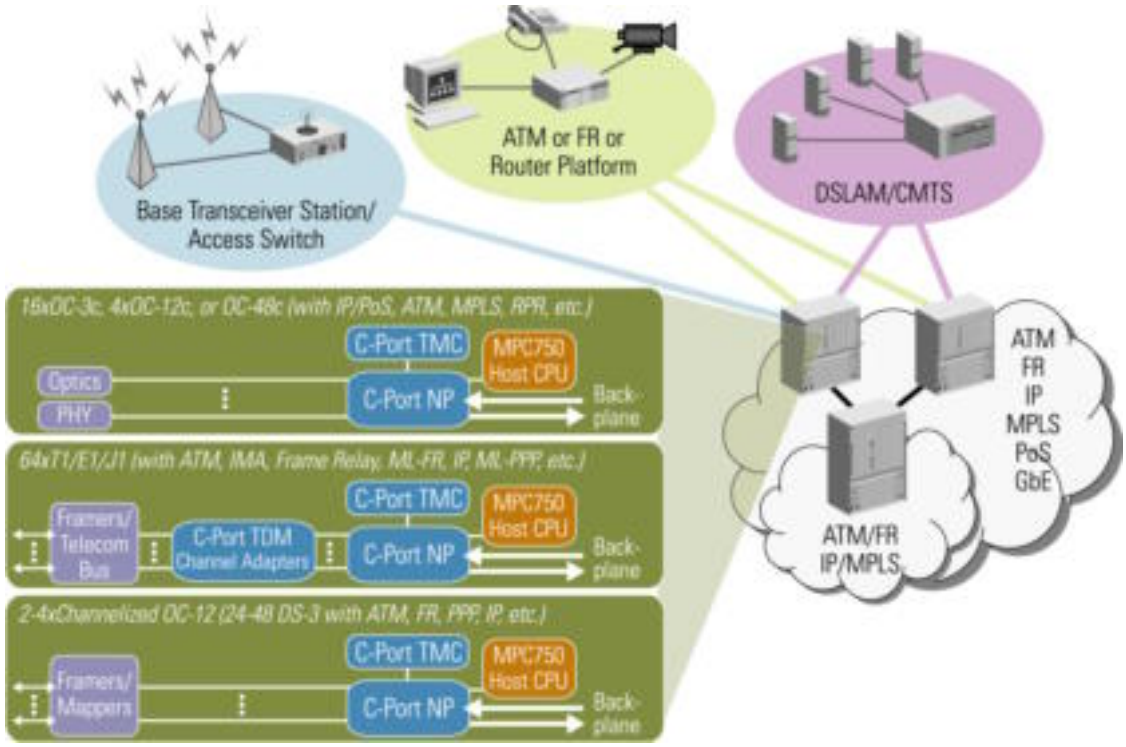
By implementing greater hardware integration and 'soft' implementation of functionality in an MSP product design, vendors will see a significant increase in ROI. For example, to be able to take a previous solution consisting of two cards and replace it by a single line card, vendors will automatically see ROI gains — and increasing port density per card creates even better financial performance. And within that one line card, vendors need to support both ATM/Frame Relay technologies and IP/MPLS services, plus be able to upgrade functionality in software. Both OEMs and their customers will benefit from this type of solution.

FREESCALE ***SOLUTION***

Freescale's C-Port™ network processor family enables a new approach to MSP design that delivers a broad solution set within a highly integrated hardware and software platform providing flexibility and adaptability. With C-Port family network processors, traffic management coprocessors, and channel adapters, vendors can create a hybrid line card capable of incorporating multiprotocol capabilities and standards on a cost-efficient platform, which can be easily integrated into existing and new multiservice switches.

The C-5e™ network processor (NP) consists of sixteen programmable, full duplex CPs (Channel Processors). Each CP can be programmed for a particular service/application (ATM, Frame Relay, Ethernet, SONET, and so on), and CPs can be aggregated for a wide spectrum of data streams such as Fast Ethernet to OC-12c to OC-48c on a single C-5e NP. To increase your bandwidth and

MSP line card solution providing interworking of ATM, IP, and Frame Relay and supporting a diversity of interfaces and channelization — same software base can be used with multiple line cards



computing power, two C-5e NPs can used to scale your system up to 10Gbps aggregate bandwidth. Multiple C-5e NPs, used with a switch fabric, can achieve Terabits per second bandwidth.

A single C-5e NP-based interface card design can be built with a variety of different PHY interface types. For example, the C-5e NP architecture can support up to:

- 16 10/100 Ethernet interfaces
- 4 Gigabit Ethernet interfaces
- 16 OC-3c/STM-1 interfaces
- 4 OC-12c/STM-4 interfaces
- 1 OC-48c/STM-16 interface (with assistance of the M-5 Channel Adapter)
- 1 OC-48 interface connecting up to 48 logical interfaces

Cost efficiencies can be realized through integrated functions on the C-5e NP, including Ethernet MACs and SONET framers, which speed system development, simplify device design, and lower total system costs. With Motorola's Smart Networks Alliance program, industry-standard interfaces enable system designers to glueless integrate additional hardware. For example, the C-5e NP has a glueless interface to the IBM™ Packet Routing Switch Fabric, in addition to conforming to standard CSIX-L1, Utopia 2, and Utopia 3 interfaces.

With the addition of Motorola's tightly integrated Traffic Management Coprocessors (TMCs), advanced QoS configurations can be implemented such as active queue management, policing and shaping, and scheduling of flows — all programmed using the C-Port family QoS APIs.

Software for ATM, Frame Relay, MPLS, SARing and SONET can be implemented in the C-5e NP, which handles all the forwarding plane software. Through a tight coupling to a host processor, such as Motorola's MPC750, which runs control/management plane software, even more advanced services can be achieved. Further adaptability via a stable, standard API ensures that system design investments can be carried forward.

Thus, one basic hardware design, matched with many different PHY interfaces, combined with applications that are fully software programmable yields a vast range of different solutions leveraging a common platform. By using the C-Port family in an MSP line card design, a multi-year phased product delivery can be radically condensed, offering a massive time-to-market competitive advantage.

DEVELOPMENT ENVIRONMENT

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

- **C-Ware™ Applications Library (CAL)** — Comprehensive set of reference applications for building networking systems based on Motorola's C-Port family. The CAL significantly accelerates customer software development by providing extensive reference source code that is instrumented for and tested with the CST.
- **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 comprehensive C-Ware APIs.
- **C-Ware Development System (CDS)** — Compact PCI chassis with Freescale 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.

Vendors may also select Wind River® Tornado® for Managed Switches (TMS) to program the host processor/control plane software. Freescale has established an alliance with Wind River to provide integration of the 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.

FREESCALE ***ORDERING INFORMATION***

PART NUMBER	NAME	ADDITIONAL INFORMATION
PCC3E0RX180WB0B	C-3e NP	5.5 W @ 180 MHz freescale.com/networkprocessors
PCC5E0RX266WB0B	C-5e NP	9.0 W @ 266 MHz freescale.com/networkprocessors
PCQ500RX000WA0A	Q-5 TMC	5Gbps throughput freescale.com/networkprocessors
PCM500ZUTA0A	M-5 Channel Adapter	3.0 W @ 104 MHz freescale.com/networkprocessors
MPC750	PowerPC	freescale.com/PowerPC
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 freescale.com

† 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
IBM	For switch fabric solutions	Tel: 33 4 92 11 56 40 Fax: 33 4 92 11 00 23 garciag@fr.ibm.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

How to Reach Us:

Home Page:
www.freescale.com

E-mail:
support@freescale.com

USA/Europe or Locations Not Listed:
Freescale Semiconductor
Technical Information Center, CH370
1300 N. Alma School Road
Chandler, Arizona 85224
+1-800-521-6274 or +1-480-768-2130
support@freescale.com

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
support@freescale.com

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor Hong Kong Ltd.
Technical Information Center
2 Dai King Street
Tai Po Industrial Estate
Tai Po, N.T., Hong Kong
+800 2666 8080
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or 303-675-2140
Fax: 303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Freescale Semiconductor, Inc.