

ACCESS

2.5G/3G WIRELESS BASE
STATION CONTROLLER
NETWORK INTERFACE

KEY BENEFITS

- *Single “platform” architecture for low-end to high-end wireless infrastructure devices*
- *Comprehensive Wireless Network Interface (WNI) reference applications available for a big jump-start on development*
- *Minimize risk as standards evolve due to software programmable nature*
- *Software reuse enables greater reliability of software and greater development productivity for OEMs*
- *True, fine-grained multiservice support for high numbers of users*

OVERVIEW

Telecommunications is undergoing extensive change as media convergence, industry consolidation, Internet and IP technologies, and mobile communications come together. As data transmission in cellular systems has become more important, the push for future systems that are more data ready (that is, packet-capable) has led to the establishment of third generation (3G) standards. However, the cost and delay of deploying the full 3G standards, such as UMTS and CDMA2000, has spurred the development of more incremental standards for data transmission over legacy systems. These are generally referred to as 2.5G. This technology is expected to precede widespread deployment of the 3G systems.

With the convergence and evolution of the wireless infrastructure market, vendors are seeking solutions that will enable them to support increased interworking and evolution of protocols to minimize market risks.

DESIGN CHALLENGES

The wireless infrastructure is rapidly trying to adapt to a data-oriented world, and consequently 2.5G/3G system design embodies the following issues:

- Rapidly emerging standards combined with shortened time-to-market requirements.
- Terminating and converting multiple protocols and interworking among protocols
- Large cost of deployment, driving strategies for risk abatement around upgrades and extensions
- Need for common communications technology at widely disparate bandwidths (T1 to OC-48c)
- Difficulty of upgrading existing products designed using ASICs or ASSPs with microprocessors (costly and long development cycle)

FREESCALE® SOLUTION

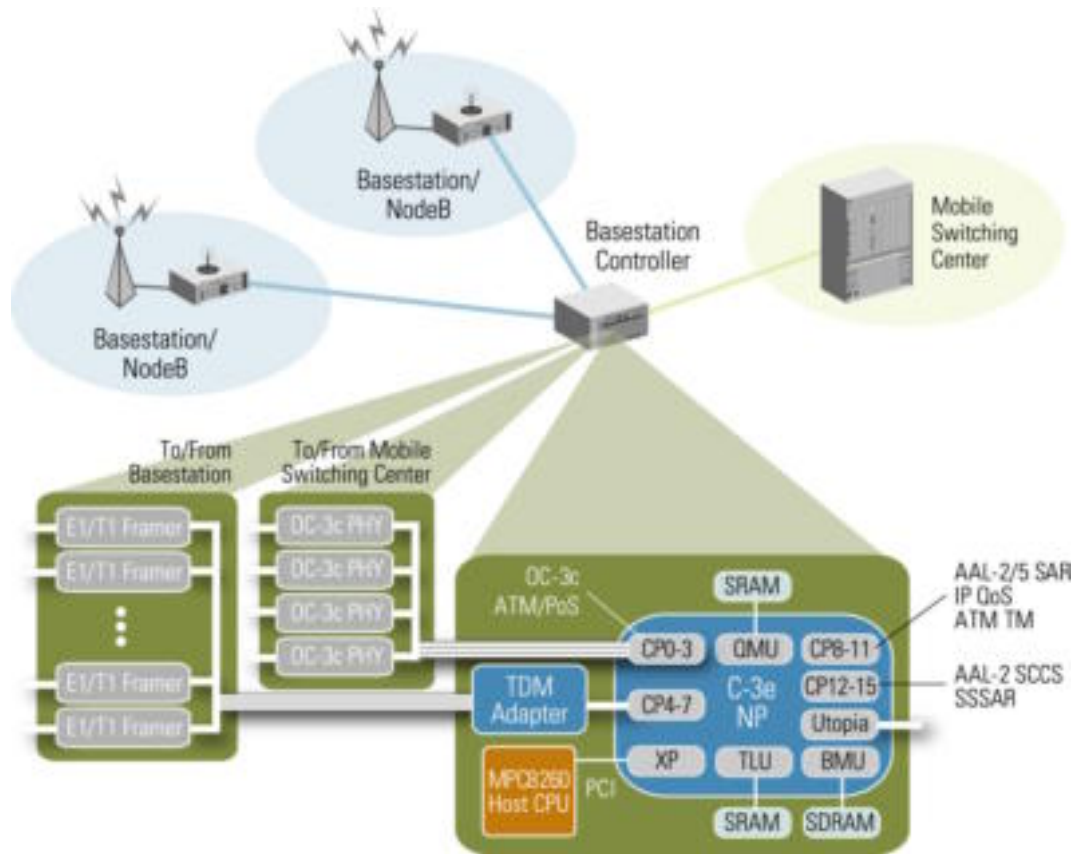
Freescale's C-Port™ network processor (NP) family is well suited to serve as a base architectural platform for wireless infrastructure devices, such as base transceiver stations (BTSs), base station controllers (BSCs), and mobile switching centers. The C-Port family provides the programming flexibility to adapt to changing wireless standards and offers various options to address functional, cost, power, environmental, and density requirements for a range of devices. In addition, the software is scalable across the C-Port network processors so that you can reuse your software base in all levels of systems, whether downstream at the BTS or upstream to switching centers — building software reliability along the way. This Application Fact Sheet specifically addresses BSC design.

Both Motorola's C-3e™ NP and C-5e™ NP are ideal for BSCs, as they are programmable for virtually any network interface and protocol, and they provide high-functional integration including built-in classification and traffic management capabilities. A key difference is that the C-3e NP supports up to 3Gbps bandwidth and the C-5e NP supports up to 5Gbps bandwidth.

Both NPs provide comprehensive protocol support for the wireless infrastructure, including:

- ATM: AAL-2, AAL-2 SSSAR, AAL-5 MPE, IMA
- PPP: Multi-Class, Multi-Link, PPP-Mux
- QoS: ATM TM 4.1 and DiffServ in software
- IP: IPv4, IPv6, UDP, RTP, header compression, L4 port classification
- T1/E1 framer connection, Ethernet, and OC-3/STM-1

Wireless Base Station Controller solution performing protocol encapsulations, classification, and QoS functions between downstream BTS/NodeB devices and upstream mobile switching centers



Further, as protocols evolve, the NPs can be reprogrammed in software to address new requirements. C-Port NPs support higher-level programming in C-language with Applications Programming Interfaces (APIs), enabling fast development of advanced features by which you may differentiate your products.

With the extensive architectural flexibility of the C-Port family, a single line card can be designed to interface to numerous types of PHY modules supporting a vast range of application requirements. This greatly simplifies system architecture because nearly every interface that a Radio Access Network (RAN) needs to support can be based on a common hardware platform.

An example of a line card using a C-3e NP in a BSC is shown in the diagram. This example shows T1/E1 lines from a BTS connecting to the C-3e NP through Freescale TDM adapter technology. The C-3e NP line card then connects to a mobile switching center through OC-3c/STM-1. The only components that change for different interface configurations would be the line interface logic itself. For example, the C-3e NP could also support uplinks of Ethernet.

Eight of the C-3e NP's Channel Processors (CPs) are available for implementing more advanced networking functionality. In the example, they are performing AAL-2/AAL-5 Segmentation and Reassembly (SARing), as well as IP and ATM traffic management on traffic moving upstream and downstream through the BSC. For applications that may require more extensive Quality of Service (QoS) capabilities, you can add one of Motorola's Traffic Management Coprocessors (TMCs), which provides policing, shaping, and scheduling for up to 128k individual flows.

To enable a dramatic jump-start on software development for C-Port family-based wireless infrastructure applications, Freescale is providing a comprehensive set of reference software called the Wireless Network Interface (WNI). This software provides full data plane support for network interface functions needed to implement a 2.5G/3G wireless BTS/Node B and a 2.5G/3G wireless BSC/Radio Network Controller (RNC). WNI software also incorporates host drivers, APIs (modeled after those under development by the Network Processor Forum), and control stack code to streamline data plane and control plane software integration.

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. WNI applications are included in the CAL.
- 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 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**

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 W @ 266 MHz freescale.com/networkprocessors
PCQ500RX000WA0A	Q-5 TMC	5Gbps throughput freescale.com/networkprocessors
MPC8260	PowerQUICC™	freescale.com/PowerQUICC
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.cportcorp.com/support

† 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
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

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