

# 2.5/3G Wireless BSC Network Interface

## 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.

## 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
- > Minimizes risk as standards evolve due to software-programmable nature
- > Software reuse enables greater reliability of software and greater development productivity for OEMs (Original Equipment Manufacturers)
- > Fine-grained multiservice support for high numbers of users

## FREESCALE ORDERING INFORMATION

Part Number	Product Highlights	Additional Information
PCC3E0RX180WB0B	C-3e™ Network Processor	5.5W @ 180 MHz <a href="http://www.motorola.com/networkprocessors">www.motorola.com/networkprocessors</a>
PCC5E0RX266WB0B	C-5e™ Network Processor	5.5W @ 266 MHz <a href="http://www.motorola.com/networkprocessors">www.motorola.com/networkprocessors</a>
MPC8280	PowerQUICC™ Processor	<a href="http://www.motorola.com/powerquicc">www.motorola.com/powerquicc</a>
CSTC501W <sup>NOTE 1</sup>	C-Ware™ Software Toolset	Web site download of current CST release (Windows or UNIX)
CDEV101A <sup>NOTE 2</sup>	C-Ware Development System	CDS base unit (chassis, power supply, single board computer)

### Notes:

1. The CST can be downloaded from [motorola.cportcorp.com/support](http://motorola.cportcorp.com/support).
2. Ask your sales representative or distributor for details and availability of system modules, which you order separately.



### Freescale Semiconductor's Solution

Freescale's C-Port™ network processor family is well suited to serve as a base architectural platform for wireless infrastructure devices, such as base transceiver stations (BTSs), basestation 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 in switching centers—building software reliability along the way. This document specifically addresses BSC design.

Both Freescale's C-3e™ network processor and C-5e™ network processor are ideal for

BSCs, because 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 network processor supports up to 3 Gbps bandwidth and the C-5e network processor supports up to 5 Gbps bandwidth.

Both network processors 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, OC-3/STM-1

As protocols evolve, the network processors can be reprogrammed in software to address new requirements. C-Port network processors support higher-level programming in C language with applications programming interfaces (APIs), enabling fast development of advanced features by which you can 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 in a Radio Access Network (RAN) need to support can be based on a common hardware platform.

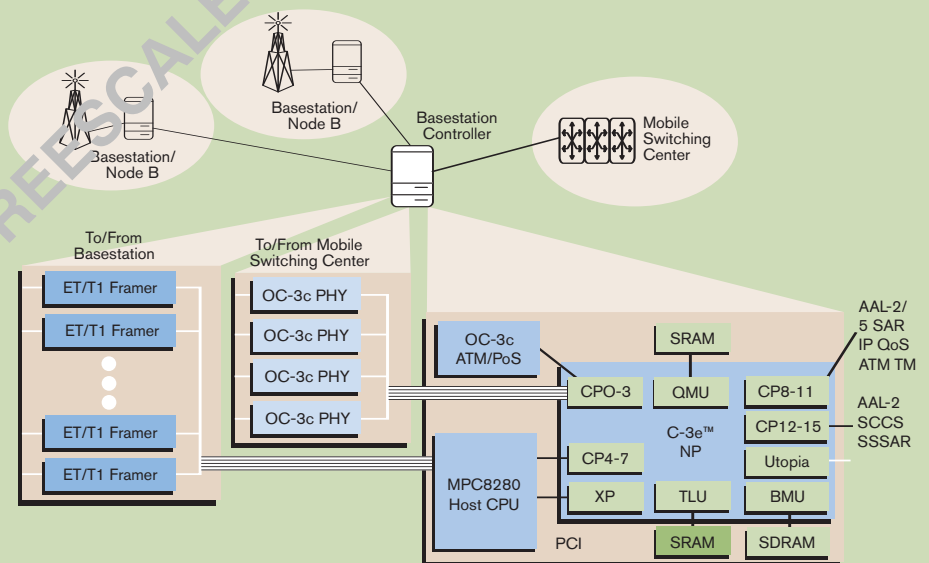
An example of a line card using a C-3e network processor in a BSC is shown in the diagram below. This example shows T1/E1 lines from a

### Design Challenges

The wireless infrastructure is rapidly trying to adapt to a data-oriented world; 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 application-specific integrated circuits (ASICs) or application-specific standard products (ASSPs) with microprocessors (costly and long development cycle)

### WIRELESS BSC SOLUTION





By connecting to the C-3e network processor through the MPC8280. The C-3e network processor line card then connects to a mobile switching center through OC-3c/STM-1. The only component that changes for different interface configurations would be the line interface logic itself. For example, the C-3e network processor could also support uplinks of Ethernet.

Eight of the C-3e network processor'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.

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 node 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 Freescale'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 network processor switch modules and various physical interface modules (PIMs). Complete hardware reference designs also available.

#### DEVELOPMENT TOOLS

Tool Type	Product Name	Vendor	Description
Software Kit	C-Ware™ Software Toolset (CST)	Freescale	Provides a comprehensive software development environment for building networking systems based on Freescale's C-Port network processor family. By providing a simple programming model, standard tools, a robust simulation environment and a host application environment, the CST can significantly accelerate your software development effort.
Reference Applications	C-Ware Applications Library (CAL)	Freescale	Offers a comprehensive set of reference applications for building networking systems based on Freescale's C-Port network processor family. The CAL significantly accelerates customer software development by providing extensive reference source code that is instrumented for and tested with the C-Ware Software Toolset.
Development Kit	C-Ware Development System (CDS)	Freescale	Provides an environment for you to prototype an entire product that leverages C-Port network processors. This chassis-based system allows you to develop your unique software and then integrate and test it in an actual hardware environment, well before your target product is available.





**THIRD-PARTY SUPPORT**

Vendor	Description	Product Information
Corrent	For high-performance security processing	Tel: 1 (480) 648-2300 sales@corrent.com
IDT	For advanced classification	Tel: 1 (613) 724-6004 Fax: 1 (613) 724-6008
Wind River Systems	For real-time operating system Control plane software	Tel: 1 (800) 545-9463 Fax: 1 (510) 814-2010

**Learn More:** For more information about Freescale products, please visit [www.freescale.com](http://www.freescale.com).