

# Enabling CPRI on BSC9132QDS

## 1 Introduction

This document explains how to enable Common Public Radio Interface (CPRI) ports on BSC9132QDS and establish communication with radio equipment (RE) or radio equipment control (REC) devices by sending sample data (such as IQ samples, Ethernet, and VSS) over CPRI ports in loopback mode using the Code Warrior CPRI demo project.

## 2 Prerequisites

The example in this document uses the following software and hardware:

- Code Warrior for Starcore v10 or above
- Code Warrior USB TAP (COP)
- BSC9132QDS femto reference platform
- Optical loopback cable
- Serial cable (to configure U-Boot settings) and associated serial console software.

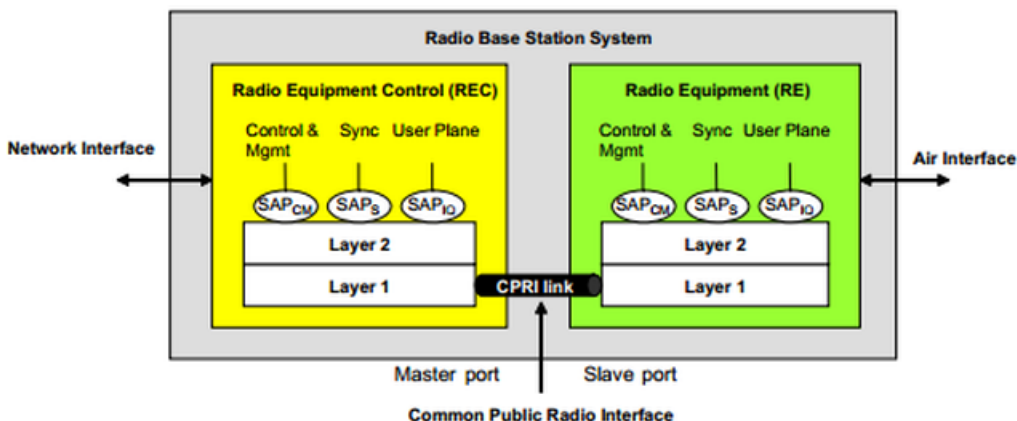
To successfully run this example, you should be well versed in using the listed software and hardware.

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### 3 About Common Public Radio Interface (CPRI)

The Common Public Radio Interface (CPRI) is an industry cooperation aimed at defining a publicly available specification for the key internal interface of radio base stations between the radio equipment control (REC) and the radio equipment (RE).



**Figure 1. CPRI system overview**

The CPRI complex on BSC9132 enables communication among radio devices (REC or RE) over a CPRI bus. The CPRI complex is designed to support the CPRI version v.4.0 specification and can be configured to support several air interface standards, including WiMAX, LTE, and WCDMA. Each complex supports up to two CPRI links with each link configurable as a master or slave port.

Each CPRI link supports the following types of service access points (SAP):

- IQ samples for antenna transferred through the SAP IQ Interface
- CPRI frames synchronized by the SAP synchronization interface
- CPRI link control and management (C&M) data transferred between SAPs in both CPRI master and slave ports. The fast C&M channel follows the same Ethernet standards as a slow C&M channel (HDLC).

The following figure shows the CPRI complex block diagram and external interfaces. The CPRI Framer modules construct CPRI frame structures and manage transmission of CPRI frames to a serial link (TBI interface). The CPRI Framer also extracts the data fields from the received CPRI frames, and the C&M data is transferred to the system memory via the Ethernet HDLC integrated engines. The receive and transmit IQ data is transferred by the CPRI DMA to/from antenna carrier buffers in the main memory. The VSS, HDLC, and fast Ethernet also transfer the data to buffers in the system memory using DMA. Auxiliary interfaces are required to support chain topologies.

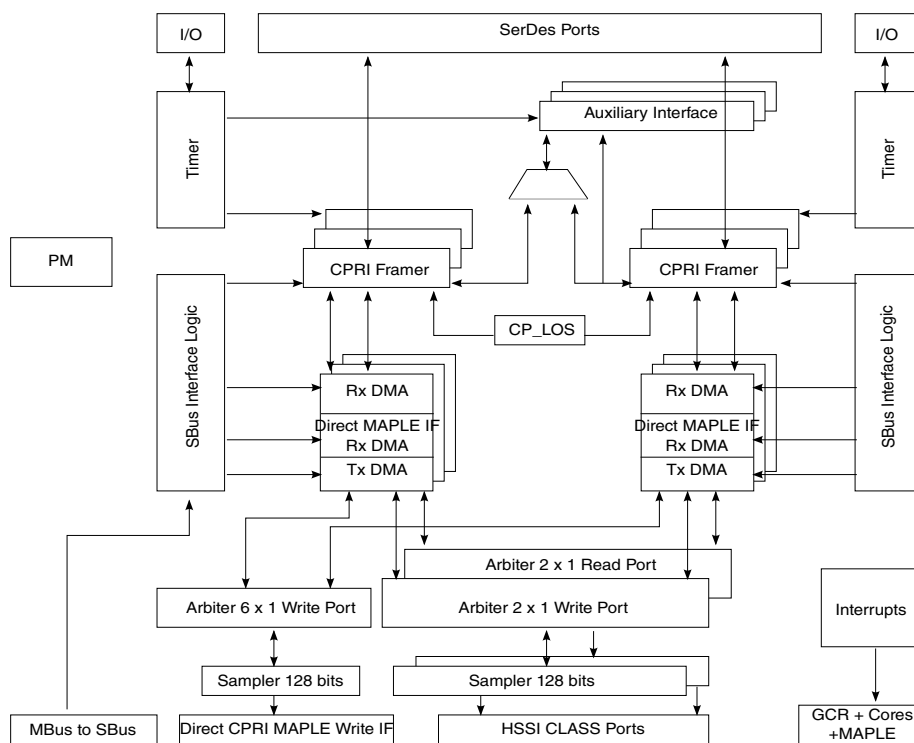


Figure 2. CPRI block diagram

## 4 CPRI hardware setup

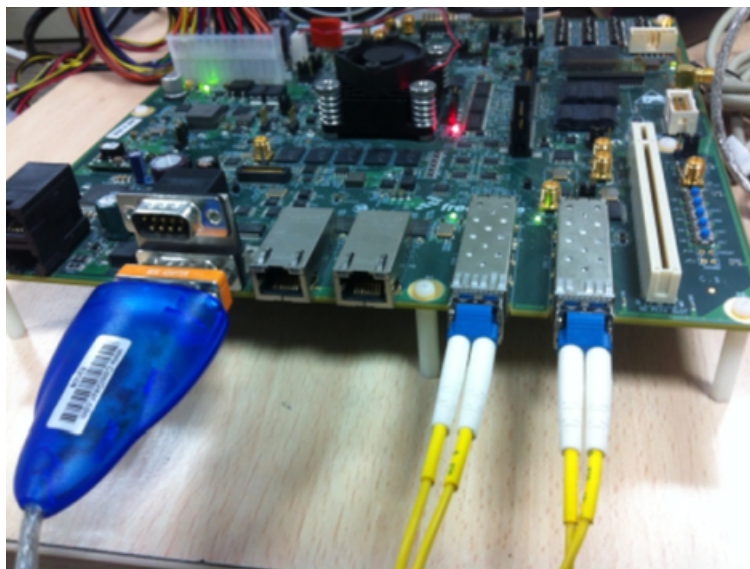


Figure 3. BSC9132QDS CPRI hardware setup

## 5 SerDes settings on BSC9132QDS

Switch SW5 should have the value 01000011. This enables 1 PCIe, SGMII2, CPRI2, CPR1. Other SerDes switch settings can also be used provided CPRI is enabled. The following figure illustrates the switch settings that need to be changed on the BSC9132QDS to support CPRI operation.

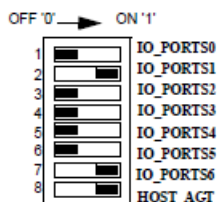


Figure 4. Configuring the BSC9132QDS for CPRI

## 6 Enabling CPRI ports via U-Boot

From the U-Boot, use the following I<sup>2</sup>C command to enable CPRI ports:

```
i2c mw 0x66 0x54 0xF3 && i2c mw 0x66 0x64 0x57 && i2c mw 0x66 0x10 0x60 && i2c mw 0x66 0x10 0x30
```

If RHH is used then, switch SW5 should have the value 01001101 and the I<sup>2</sup>C command for U-Boot is:

```
i2c mw 0x66 0x54 0x52 && i2c mw 0x66 0x64 0x4D && i2c mw 0x66 0x10 0x60 && i2c mw 0x66 0x10 0x30
```

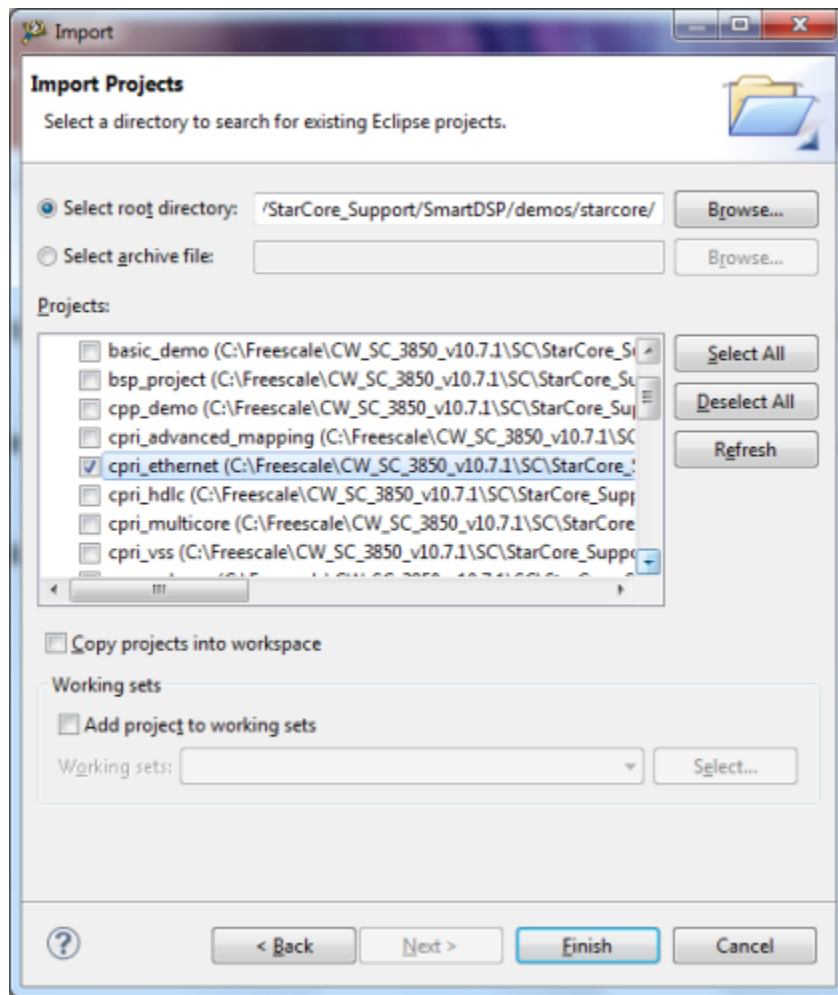
If R&S is used then, switch SW5 should have the value 01010001 and the I<sup>2</sup>C command for U-Boot is:

```
i2c mw 0x66 0x54 0x52 && i2c mw 0x66 0x64 0x51 && i2c mw 0x66 0x10 0x60 && i2c mw 0x66 0x10 0x30
```

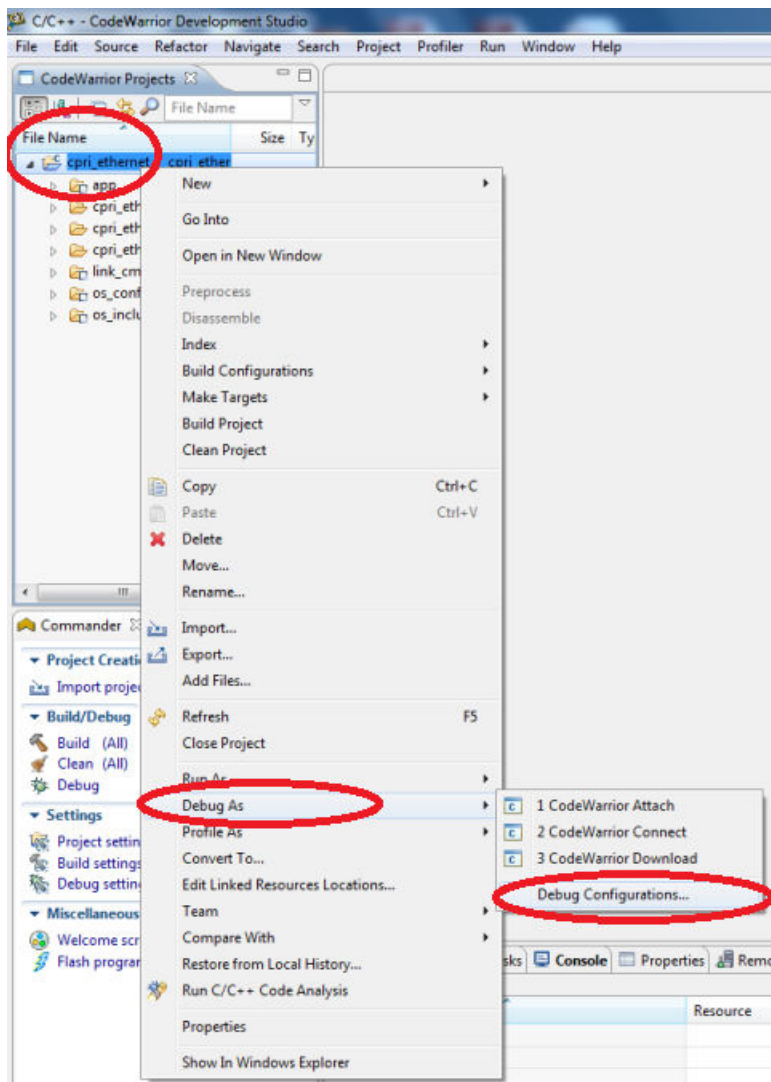
## 7 Creating Code Warrior CPRI project

The following sequence provides details on creating a Code Warrior demo project to enable CPRI and transfer sample data via the CPRI ports.

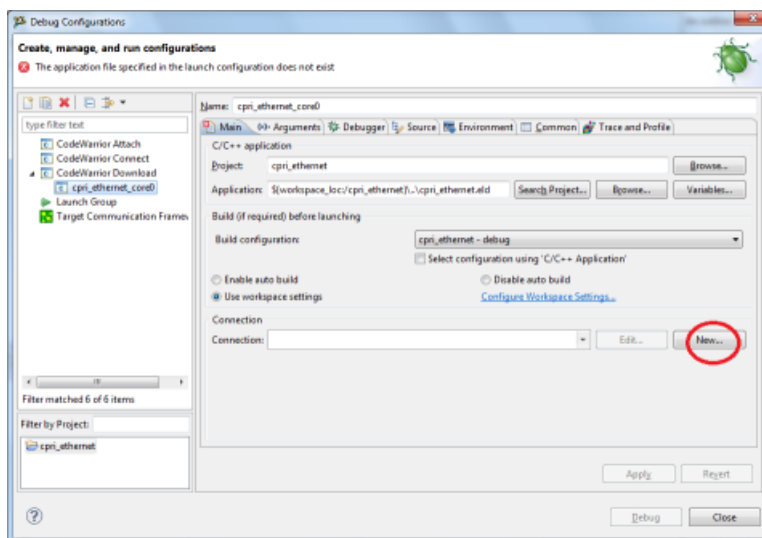
1. Open Code Warrior IDE for StarCore and select a valid workspace.
  - For example: C:\Users\user\_name\workspace
2. Select **File > Import** to open the Import menu and begin importing the CPRI Ethernet project
3. Select **CodeWarrior > Example Project** from the Import menu and then click **Next**.
  - The Import window opens.
4. **Browse** to the following path, C:/Freescale/CW\_SC\_3850\_v10.7.1/SC/StarCore\_Support/SmartDSP/demos/starcore/psc9x3x and click **OK**.
  - A list of available demo projects in the psc9x3x folder appears in the Projects section of the Import window.
5. Place a check mark next to **cpri\_ethernet** (as shown below) and then click **Finish**.



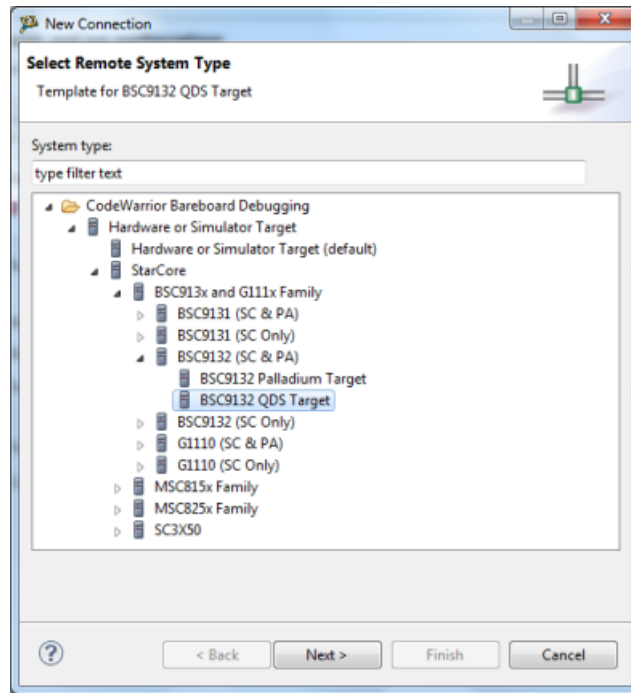
- The demo project, cpri\_ethernet, is imported into Code Warrior IDE. You are now ready to create a USB TAP configuration for BSC9132QDS.
6. Right click on cpri\_ethernet project and then select **Debug As>Debug Configuration**



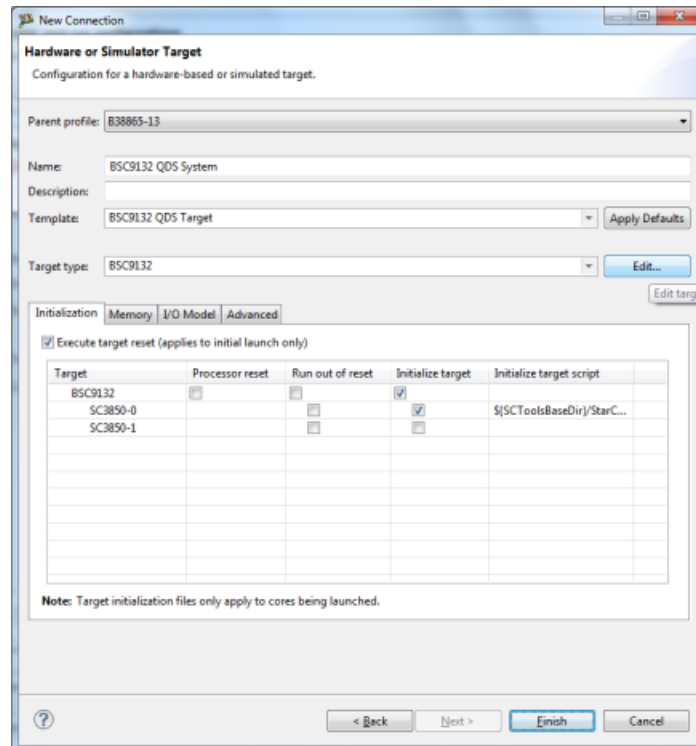
7. Select **New** in the Debug Configurations window under **Connection** to create a new target connection type.



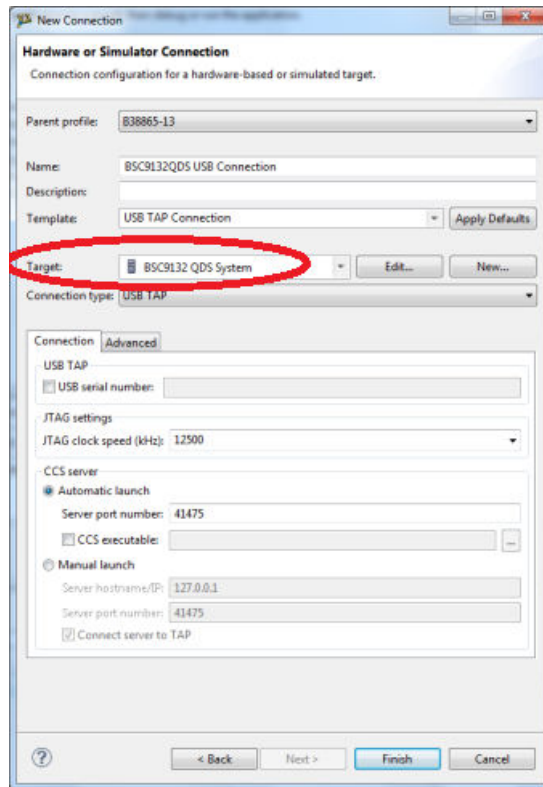
- A New Connection window opens allowing you to select the remote system type.
8. Select BSC9132 QDS Target as the Remote System Type and click **Next**.



- The target configuration scripts files are intialized as shown below.
9. Select **Finish** from this screen.



10. Select the Connection Target as shown below and click **Finish**.



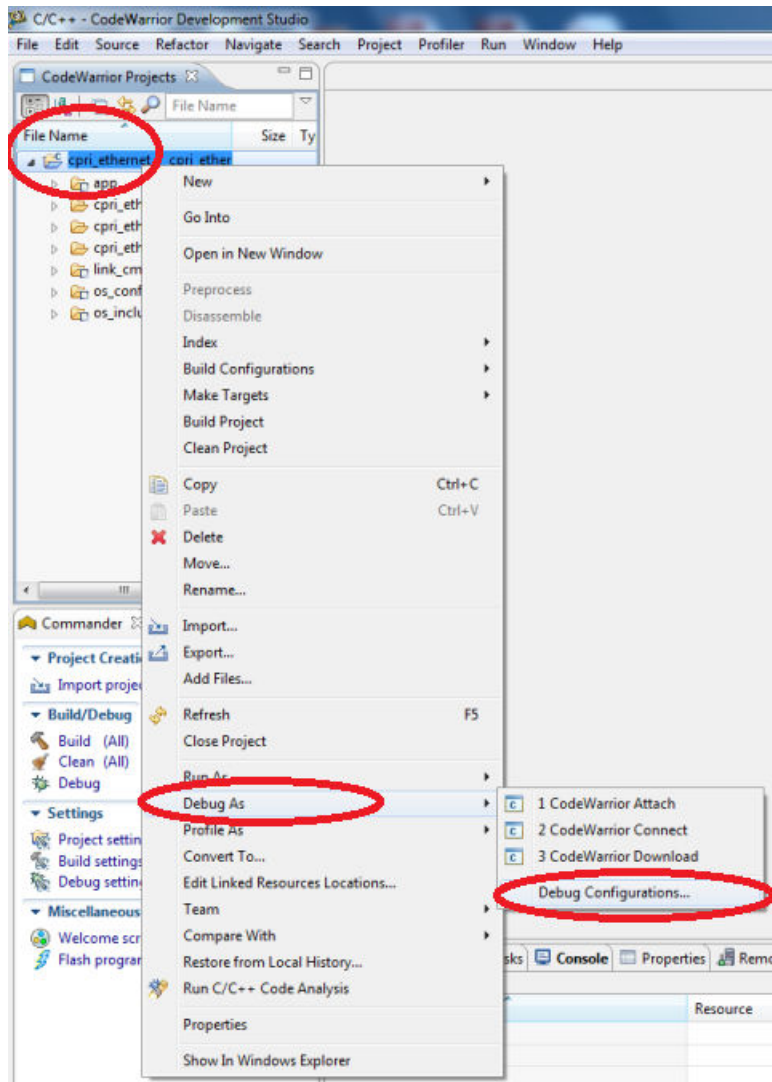
11. Select **Apply** from the Debug Configurations screen to confirm the changes made so far.
12. Lastly, select **Project > Build Project** to compile the project.
  - The progress bar appears.

## 8 Running the CPRI demo

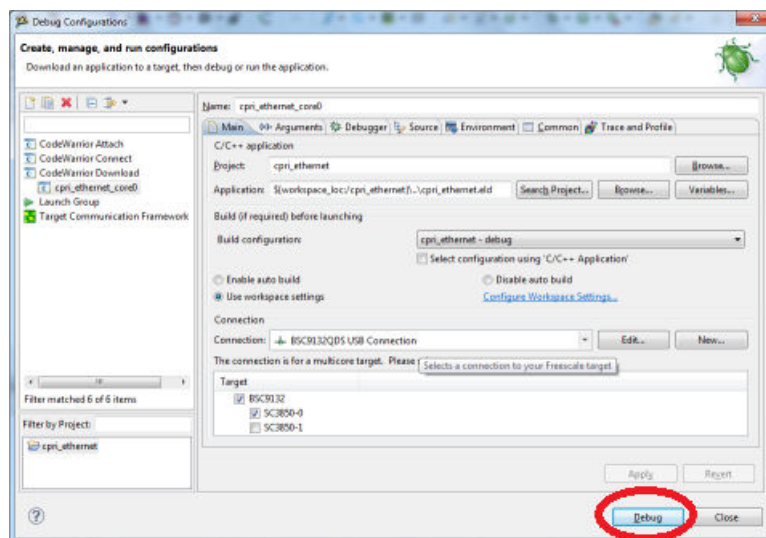
To run the demo:

1. Right click on cpri\_ethernet project and then select **Debug As>Debug Configuration**.



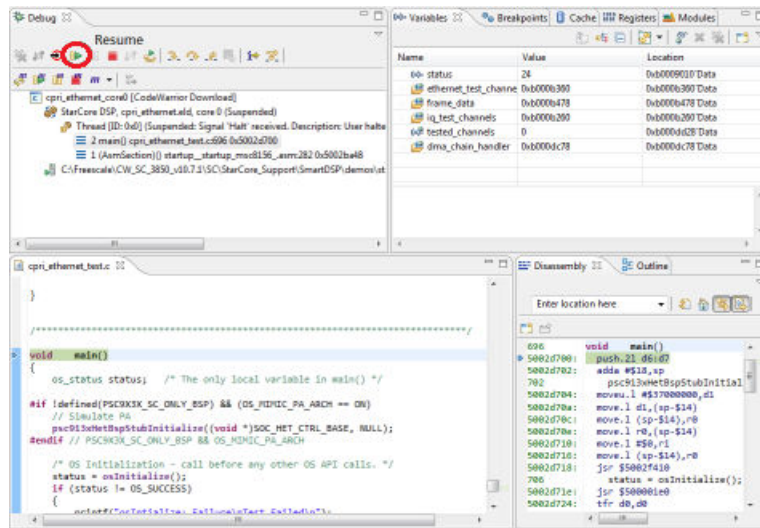


2. Select **Debug** from the Debug Configurations window.

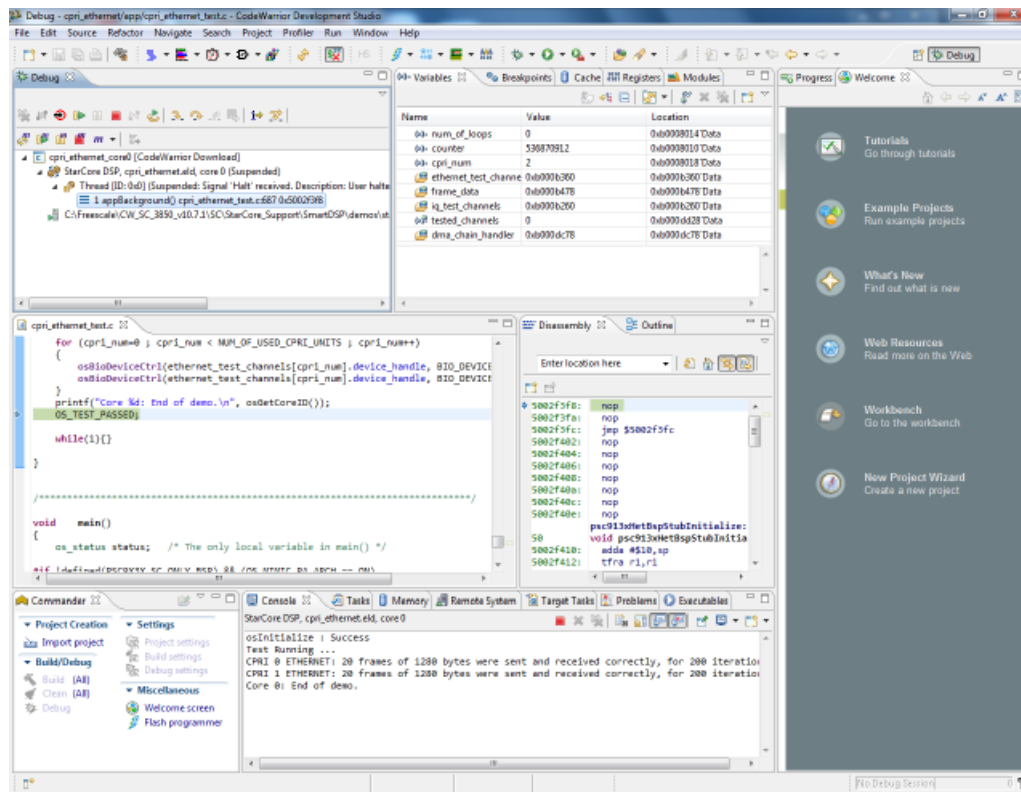


- The project starts loading and breaks in **main**.
3. From here, select **Resume** (or type **F8**) to run the cpri\_ethernet project.

**Enabling CPRI on BSC9132QDS, Rev 0, 09/2014**



- The console window displays data sent in loopback via CPRI ports 0 and 1



## 9 References

Ericsson AB, Huawei Technologies Co. Ltd., NEC Corporation, Nortel Networks Ltd., Alcatel Lucent, and Nokia Siemens & Co. KG. *Common Public Radio Interface (CPRI) Specification V4.0 (2008-06-30)*. CPRI Specification V4.0 (2008-06-30). June 30, 2008. [http://www.cpri.info/downloads/CPRI\\_v\\_4\\_0\\_2008-06-30.pdf](http://www.cpri.info/downloads/CPRI_v_4_0_2008-06-30.pdf).

## 10 Revision history

This table summarizes revisions to this document.

**Table 1. Revision history**

Revision	Date	Description
0	09/2014	Initial public release.

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