Finisar CPRI (Common Public Radio Interface) Reference Guide

Introduction

The Common Public Radio Interface (CPRI) initiative was formed in June of 2003 and defined a new standardized interface for the interconnect point between the radio equipment (RE) and radio equipment controller (REC) within the base station. Finisar has several modules in the SFP form factor that are ideal for CPRI and other wireless base station applications ranging from short reach to 80km or greater in link length and from 614.4 Mbit/s to 9830.4 Mbit/s or greater in transmission rate.

System Architecture

To provide mobile network operators better deployment flexibility, the specification breaks down the traditional radio base station into two separate building blocks: the radio equipment control (REC) and the radio equipment (RE). This allows the RE to be located close to the antenna and the REC at a location that can be easily accessed. The concept is illustrated in Figure 1. Additionally, the CPRI system architecture features the flexibility to have multiple remote head ends feed into one controller.
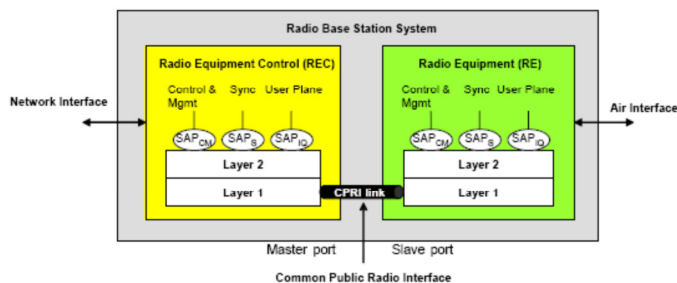

Figure 1. Illustration of the basic building blocks in a radio base station using CPRI.

Radio Standards Supported

The CPRI standard supports transmission of data between the REC and RE in both directions for a radio base station consisting of one REC and one or more RE compliant to the following radio standards:
- 3rd Generation Partnership Project (3GPP) Universal Terrestrial Radio Access (UTRA) Frequency division duplex (FDD). Release 9 March 2010;
- 3GPP E-UTRA Release 9 March 2010;
- Universal Mobile telecommunication system (UMTS) and Evolved UMTS (E-UMTS);
- 3GPP GSM/EDGE RAN Release 9 December 2009;
- WiMAX Forum Mobile System Profile v1.5 (2009-08).

The interface supports a mix of different radio standards on a link and the support of future standards is not precluded.

Physical Layer Specification (Layer 1)

Time division multiplexing (TDM) is used to multiplex the information from different antenna carriers onto the data stream. The CPRI standard defines seven different options for line bit-rate on either electrical or optical links:

614.4, 1228.8, 2457.6, 3072.0, 4915.2, 6144.0, & 9830.4 Mbit/s.

The interface supports a continuous range of distances between a master and slave port as illustrated in the Finisar **CPRI Compatibility Product Guide** (see reverse). There is the option to use either multi-mode or single-mode fiber for the uplink or downlink, using the same optical connectors and building practices as for SFP transceivers.

No protocol is specified in the interface standard and vendors are free to use any technique that is proven to reach the specified clock stability, and bit error ratio (BER) of 10^{-12} required to avoid the need for forward error correction (FEC). The data format uses standard 8/10B line coding according to the IEEE Standard.

The CPRI document recommends the re-use of optical transceivers from the following high-speed serial link standards:
- Gbit Ethernet: Standard IEEE 802.3-2002 clause 38 (1000BASE-SX/LX);
- 10 Gbit Ethernet: Standard IEEE 802.3-2005 clause 53 (10GBASE-LX4);
- Fiber Channel (FC-PI-4) –INCITS Rev 8;
- InfiniBand Volume 2 Rel 1.1 (November 2002); and
- 10 Gbit Ethernet: Standard IEEE 802.3-2008 clause 52 (10GBASE-S/L/E)

The latest version of the CPRI specification is V 5.0 2011-09-21 and is available at the CPRI website using the following link: www.cpri.info.

Interconnecting With Optical Links

REC to RE links typically reside outside of temperature-controlled environments and therefore require equipment capable of withstanding extreme temperatures. Finisar has a broad portfolio of products that are extended and industrial temperature capable.

Although the CPRI standard allows either electrical or optical links between the REC and RE, optical links are the most proficient method of connecting REC and RE at distances greater than several meters. Readily available in the Finisar portfolio are CPRI-compatible products that fulfill links anywhere from <10m all the way up to 80km or greater.

Finisar Product Compatibility

In addition to SFP form factor modules, Finisar now offers products in the SFP+ form factor which are backward compatible with SFP and allow for applications up to 16x the base CPRI rate and higher.

Please refer to the Finisar **CPRI Compatibility Product Guide** (see reverse) and the Finisar website for product recommendations and to find more detailed product information.

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Finisar CPRI Compatibility Product Reference Guide

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	Data Rate (Gb/s)	300m	2km	10/15km[3]	40km
-40 to 85℃	**2.458**	FTLF8519P3BTL	FTLF1321P1BTL	FTLF1421P1BTL-3G	FTLF1721P2BTL
	3.072	FTLF8519P3BTL	FTLF1321P1BTL	FTLF1421P1BTL-3G	FTLF1721P2BTL
	4.915	FTLF8526P3BNL[1]	FTLF1326P3BTL	FTLF1426P2BTL	FWLF1625P2V51[4]
	6.144	FTLF8526P3BNL[1]	FTLF1326P3BTL	FTLF1426P2BTL	FTLX1672D3BTL
	9.830	FTLX8573D3BTL[2]	FTLX1370W3BTL	FTLX1471D3BTL	FTLX1672D3BTL

[1] Requires OM-3 fiber

[2] Requires OM-4 fiber

[3] For 15km, please contact your Finisar sales representative

[4] C-Temp only

Subject to change without notice

For data rates or distances not listed, please contact your Finisar sales representative