

Interoperability for Long Reach and Extended Reach 10 Gb/s Transponders and Transceivers

Jerry Wood	Harris Corporation
Karl Gass	Sandia National Laboratories

Introduction

There is currently an issue whereby a vendor can build a specification compliant, 10 Gb/s long reach (80km) part, that when plugged into another vendor's compliant part would not interoperate while remaining compliant to the specification. There are several reasons for this. Application codes published by ITU specify link parameters not physical interfaces between source transmitters and receivers. Additionally, tuning a 10 Gb/s long reach module to meet path penalty and sensitivity can be done in more than one way and the alternate techniques do not necessarily interoperate. The final issue identified as a source of interoperability problems was test methodology. Many of the manufacturers of 10Gb/s modules would test their products in loopback mode. This allowed good transmitter performance to compensate for poor receiver performance and vice-versa.

The OIF's "Interoperability for Long Reach and Extended Reach 10 Gb/s Transponders and Transceivers Implementation Agreement", [OIF-LRI-01.0](#), was developed to address these issues and is now available at www.oiforum.com/public/impagreements.html.

Overview

The long reach (LR) interoperability document provides a manufacturing setup and testing methodology for the suppliers of transponders and transceivers. This setup and

methodology will help to ensure multivendor compatibility when installed in network equipment that is compliant to a particular application code. This is achieved by defining a golden transmitter, a golden receiver and an optical path that is developed from the various application codes referenced in approved ITU-T recommendations and using them for module setup and testing. Vendors would then use a golden transmitter to setup and test their receiver and use a golden receiver to setup and test their transmitter. The tests are done for both back-to-back and over-fiber configurations. A module that meets the performance requirements against the golden transmitter and the golden receiver is then presumed to be interoperable with modules from other vendors. The golden transmitter and golden receiver defined in this document are not meant to define a vendor's module implementation.

Long reach applications at 10Gb/s can be implemented in several ways: modifying the characteristics of the transmitter and/or receiver, optical accommodation, electronic dispersion compensation, etc. How well modules from multiple vendors interoperate depends on the approach(es) used by a manufacturer. This document uses ITU application codes to define families of modules that will interoperate when compliant with this document.

The interoperability document was developed as a template for implementation agreements addressing families of optical modules and of applications. The first family of modules, which is included in this document, is for long reach (80 km) TDM applications. Subsequent versions of interoperability implementation agreements are forward looking to include OC-48 upgrades to OC-192 and next generation optical networks. An example would be an implementation agreement for interoperability of 10Gb/s very long reach (VR) TDM applications that use EDC as part or all of the accommodation method. In addition, future document versions will consider the standardization of long haul (LH) and ultra long haul (ULH) transmitters and receivers. These applications have the implied issue of low OSNR as a major parameter for interoperability. Applications that would include FEC to enhance performance and extend reach are also being considered by OIF for interoperability at the optical physical layer.