

AN-100 Application Note

ConnTech 2000-ESC Test Generator

Objective

This application note has been written as a result of inquiries from telecommunication carriers and communication support groups responsible for transporting ESCON™ data over DWDM equipment. These service providers have been kindly informed by their customers they do not wish to be a test case when their ESCON™ data is to be transported over metropolitan DWDM networks. This application note describes the process of testing DWDM installations and explains how the ConnTech 2000-ESC is ideally suited for this application.

ConnTech 2000-ESC

The ConnTech 2000-ESC is a test and analysis tool developed by Connecticut Technology Products supporting the ESCON™ S channel protocol. The ConnTech 2000-ESC is both an ESCON™ *Analyzer* and an ESCON™ *Test Generator*. This discussion will focus on the ESCON™ *Test Generator* portion of the ConnTech 2000-ESC. The ConnTech 2000-ESC Test Generator is driven by a common internal transmitter running at a rate of 200Mbs using ESCON™ protocol. Two independent receiver ports allow the monitoring of the ESCON™ links under test. The status of the two links is continuously displayed by the Windows application within an Event Log field. The status reporting includes Code Violation detected, CRC error detected, Start of Frame/End of Frame Delimiter error detected, Loss of Light detected, and Loss of Data detected. All errors/status detected are time and date stamped within the Event Log by the Windows application. The Event Log may be saved as a text file to provide the user and or customer a final record of the link testing results. A Test Information field is provided to allow the user the means to enter the specifics of the testing. ESCON™ Ordered Sequences can be generated and the response captured by the test generator. The ConnTech 2000-ESC also has a Bit Error Rate Generator/Receiver used during link testing. Standard PRBS patterns and up to four byte user-defined data patterns are supported.

Testing a DWDM installation

Once the DWDM equipment has been installed and it's POST test has been completed two events normally follow.

First, the equipment is connected and the end to end configuration is verified as correct.

Second, using the DWDM equipment, the link is tested end to end for proper power levels at the received end. It's important here that 8B/10B encoding be used as the source to ensure the same "1" / "0" pattern and power density distribution used is the same as the ESCON™ data frame. Power level measurements taken under these conditions will provide valid power level readings for the link.¹

The ConnTech 2000-ESC generates 8B/10B encoded ESCON™ frames with start of frame, end of frame and CRC delimiters. Idle patterns are generated automatically and inserted in between valid frames to create a real time ESCON™ environment while these measurements are being made. If desired any of the five ESCON™ Ordered Sequences can be generated and used as the pattern for the optical power measurement. User selectable test patterns provided within the ConnTech 2000 are readily available for use (point and click) by the test operator. Test patterns are automatically placed within the ESCON™ frame delimiters.

Once power levels measurements have been made and are within the acceptable limits, a BERT test should be run over the same circuits for a minimum of 24 hours using a stressful PRBS pattern. Our experience in this testing has shown in many cases that the $2^{15}-1$ or $2^{23}-1$ PRBS patterns have a tendency to stress PLL's within receiver modules. If there is a weak link in the system you want to know about it now rather than after it has been turned over to the customer.

As the test is being set up with the far end in a loop back configuration, it is useful to be able to insert one error into the system to verify the equipment and cabling are configured as planned. Inserting a single error is accomplished from the BERT Test Window. With confirmation that an error was sent and detected you are ready to start the 24-hour test cycle. Using the ConnTech 2000-ESC, select the data rate typically 19.6 Mbytes, frame size typically 1K, select the PRBS pattern typically $2^{23}-1$, enter test information model #, serial #, Customer's name, location, etc. Clear the error counter and select the Test Control button, which starts the test. The test is now running!

¹ The average optical power output of the DWDM equipment connecting to the ESCON™ equipment should be between -14.5dBm and -31dBm.

Compliance

The ConnTech2000-ESC meets or exceeds the IBM ESCON™ optical physical layer specifications as defined in the IBM Enterprise Systems Architecture/390, ESCON™ I/O Interface, Physical Layer Document SA23-0394-00. Also the ConnTech2000-ESC generates ESCON™ Data Frames and ESCON™ Ordered Sequences that comply with the Link Level Transmission and Reception of Characters as defined in the IBM Enterprise Systems Architecture/390, ESCON™ I/O Interface Document, SA22-7202.

ConnTech2000 Physical Layer Interface

ESCON™ Multimode Transmit Interface Specification:

Optical Output Power = Min -21dBm, Typical -17.7dBm, Max -14.5dBm
Rise Time = Typical 1.2ns, Max 1.7ns
Fall Time = Typical 1.2ns, Max 1.7ns
Center Wavelength = Min 1285nm, Typical 1325nm, Max 1355nm

ConnTech2000 Transmitter Performance:

Data Rate = 200Mb Typical to 220Mb Max
Optical Output Power = Min -19.5dBm, Typical -16.0dBm, Max -14.0dBm
Rise Time = Min 0.6ns, Max 1.7ns
Fall Time = Min 0.6ns, Max 1.7ns
Center Wavelength = Min 1285nm, Typical 1320nm, Max 1355nm

ESCON™ Multimode Receiver Interface Specification:

Optical Saturation Level = Max -14.5dBm
Optical Sensitivity = Min -31dBm, Max -14.5dBm

ConnTech2000 Receiver Performance:

Data Rate = Min 10Mb, Max 200Mb
Optical Saturation Level = Max -14.0dBm
Optical Sensitivity = Min -32dBm, Max -14.0dBm
Optical Wavelength = Min 1270nm, Max 1380nm

Summary

Why is the ConnTech 2000-ESC being used in metropolitan areas to support ESCON™ environments?

1. Carriers and communications support groups have been kindly informed by their customers that they do not want their ESCON™ data to be the test case when ESCON™ transport is required and DWDM equipment will be used within the communications circuit. Recent customers include brokerage houses in metropolitan areas and large network carriers.
2. The communication support groups and carriers want to eliminate the issue of "finger pointing" when the communications circuits are not functional or are experiencing intermittent errors. Validating the transmission equipment with a 24 hour test using data that is identical to the ESCON™ rates and format removes doubt that the transmission system is the error generating candidate.
3. The customer wants a guarantee that the communications circuits have been tested using ESCON™ protocol at the 200Mbps rate. The circuit should be tested for an error free environment for 24 to 48 hours before placing the customer's ESCON™ data onto the circuit.
4. Customers would like to have a record that a test has been performed which shows the equipment being used, the start and end times, plus any record of errors logged during the test period.
5. Selected tests with the ConnTech 2000-ESC can provide very stressful test patterns within the ESCON™ data frame. Specific PRBS patterns have identified problems at repeaters when other test equipment has determined that the end to end communication circuits is functioning properly.

For a copy of the data sheet please visit our website at www.c2p.com.

For pricing and availability contact: Connecticut Technology Products, LLC at mktg@c2p.com