Proposal for Annex XX

(Informative)

Frame Based Testing

The use of the frame based test patterns described in Clauses 58, 59 and 60 provides for the most general testing of the external interfaces. They combine patterns appropriate for testing the desired parameters with a flexible frame structure that allows the test pattern to be routed through a compliant system. However, the frame based nature of the patterns may cause difficulties with some conventional bit oriented test system if care is not taken.

The concern is that streams of data that are routed through a system under test may have their inter-frame gap altered by rate adaptation mechanisms. This changes the bit sequence, even in the presence of no errors, and causes difficulties with bit sequence oriented test systems. There are several methods of addressing this issue. The solutions fall roughly into three categories:

1. Error detection internal to the equipment under test
2. Use of frame based test equipment
3. Synchronized systems

An example of the first type of test where the internal error detection would be used is a receiver sensitivity test. The input the pattern may be generated by any convenient method, including a bit oriented serial pattern generator or a conventional frame based pattern generator. Errored frames would be rejected internal to the system under test based of FCS errors. This type of test has the advantage of testing all of the components of an input interface. The error count may be made by accessing the error counters internal to the system under test.

The number of bit errors may be assumed to be the same as the number of frame errors to a 90% confidence level as long as frame error rate is less than 0.2. The bit error rate may be determined by dividing the frame error rate by the number of bits in the test frame that are used in the computation of the FCS.

If the internal error counters are not accessible, the test frames may be routed to an output port and the number of received frames may the counted. Any missing frames may be assumed to have had errors. The frame count may be made by conventional frame based test equipment. The missing frames render the use of bit stream oriented test equipment inappropriate.

When testing transmitter outputs frames may be routed to the port under test from another port in the system under test. In this case, loss of frames within the system is not expected and testing may be done using a bit oriented test system by making the system synchronous. This may be done by recovering the clock from the output under test and using this as a clock source for the input. If there are no variable delays in the system under test, such as variable queuing delays, the input data stream will be reproduced in the output and conventional Bit Error Rate Test (BERT) systems may be used.

Two frame based alternatives avoid the need for synchronization. The first is to use a frame based tester for both the pattern generation and the error detection. The optical signal will need to be received by an optical receiver with the proper characteristics for the specific test. The processed data stream would then be sent to the frame based receiver to determine possible frame errors.

Another method would be to use a bit oriented test system suitable for burst mode operation. This type of tester will examine only the frame contents for errors. Two methods are used for determining the frame contents. An external gating signal may be used. This must be triggered by the data source and include any latency associated with the system under test. Alternately, the test set may recognized the frame boundaries in the incoming data stream.