Trunk Management Software System ITU Y.1564 Implementation

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Introduction

The ITU standard Y.1564 defines an Ethernet service activation test methodology. As a methodology document, Y.1564 does not define a protocol to use for Ethernet service activation testing so some other method needs to be used to meet these requirements.

Y.1564 defines two phases for test methodology. The first step is to validate that the Ethernet base service is correctly configured and the second is to validate the quality of the connection. This document describes a method that uses the features of Ethernet OA&M, specifically Y.1731, to perform these two steps.

Service Configuration Validation

Y.1564 defines a two-step process for doing service configuration validation. The first step is Service Configuration Validation and the second step is Service Performance testing.

Since Y.1564 does not define a protocol to perform the service configuration validation, a protocol needs to be selected to implement the test requirements defined in Y.1564. The Y.1564 tests require the ability to measure packet loss and packet delay. Ethernet OA&M has the ability to make these measurements. Thus, the protocol that NComm has selected for Y.1564 testing is Y.1731.

Service Configuration Validation must measure the following parameters at the same time:

1) IR – Information Rate

2) FTD – Frame Transfer Delay

3) FDV – Frame Delay variation

4) FLR – Frame Loss ratio

In order to measure these parameters, the Y.1731 will use the DMM/DMR messages to measure the FTD and FDV parameters. The SLM/SLR messages will measure the FLR parameter. The DMM and SLM messages will be transmitted at the same time. This methodology requires that the far-end piece of equipment conforms to the Y.1731-7/2011 specification.

Y.1564 specifies that the Packet sizes required for service configuration validation as shown below:

Table 1 – Ethernet frame sizes and size designations

a	b	c	d	e	f	g	h	u
64	128	256	512	1024	1280	1518	MTU	User defined

Figure 1 – Frame sizes - ITU Y.1564-3/2011, page 13

The DMM/DMR and SLM/SLR packets, without optional TLVs, are smaller than the minimum packet size of 64 octets. Thus, the optional DATA TLV will be used to pad these messages to the different frame sizes type a through g as specified in Figure 1 – Frame sizes - ITU Y.1564-3/2011,

page 13.

For testing, a stepping procedure is required that increases the bandwidth load from low rates to high rates as defined in Y.1564. As such, the following steps of bandwidth are required:

1) 25% of the CIR (Committed information rate)

2) 50% of the CIR

3) 75% of the CIR

4) The CIR

5) The CIR plus the EIR (Excess Information Rate)

6) The CIR plus 125% of the EIR

These levels of information rate are used to perform the service configuration test. The lowest level is used first then the levels are used in increasing order to perform the tests. Each test is applied for a "time step" amount of time. However, before the test results are used, a "policing time" is used. The Information rate is applied for the policing time first and then the information rate is applied for the step time. The test results are taken after the policing time and during the step time.

To support this testing, the Y.1564 module will need to be configured with the following information:

1) Time Step – The amount of time testing each level

2) Policing Time – The time the data rate is applied at each level before the testing occurs

3) CIR – The Committed Information Rate used for measurements

4) EIR – The Excess information Rete used for measurements

5) SES – Severe Errored Seconds in percent (0 to 100)

6) COS – Class of Service

7) Total Testing Time – The total testing defines how long the tests are run. The service configuration tests will be repeated until the total testing time has expired

Once configured, the Y.1564 module will perform the test and store the test results for each step as follows:

1) IR – Information Rate used

2) FTD – Frame Transfer Delay

3) FDV – Frame Delay variation

4) FLR – Frame Loss ratio

5) Number of unavailable Seconds

6) Step Time

7) Policing Time

8) Total Test Time

The results for each step that are accumulated over the total test time will be combined into the final report. The final report will allow the data to be accumulated for implementing the service performance tests. The determination of pass/fail of the test will be made by the application.

Service Performance Test

The service performance testing validates the quality of the service over a long period of time. The Y.1564 module implements the Service Performance Test with the total test time parameter of the configuration. The total test time can be set to 15 minutes, 2 hours, 24 hours or other desired test time as required by Y.1564.

Limitations

The Y.1564 implementation is implemented in software. Thus, the maximum bandwidth that can be tested is limited by the memory and execution speed of the processor that TMS is operating on.

The Y.1564 TMS module uses the features of Y.1731-7/2011. This requires that the far-end equipment supports the Y.1731-7/2011 protocols.

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