PON QoS Measurement

MU120131A PON Measurement

MD1230B
Data Quality Analyzer

Fiber To The Home (FTTH) installations are becoming more widespread with the increase in rich-content services over broadband. A Passive Optical Network (PON) uses access network technology for increasing the efficiency of FTTH. This application note introduces some measurement examples for verifying and evaluating PON systems using the MD1230B Data Quality Analyzer, which is an Anritsu measurement solution for maintaining Next Generation Networks (NGNs) that depend heavily on high reliability and Quality of Service (QoS).

1. Introduction

The number of FTTH installations connecting subscribers directly to carriers by optical fibers is increasing rapidly due to the rapid spread of high-definition IPTV and Triple Play services, including data, voice and video. PON technology makes efficient use of FTTH by splitting one fiber into N drop cables (1xN) to subscribers. PON system tests and QoS evaluations are critical to NGNs, which depend on high reliability and QoS.

2. Applications

The MD1230B Data Quality Analyzer is an all-in-one solution for performing efficient QoS measurements of a 32-branch PON system.

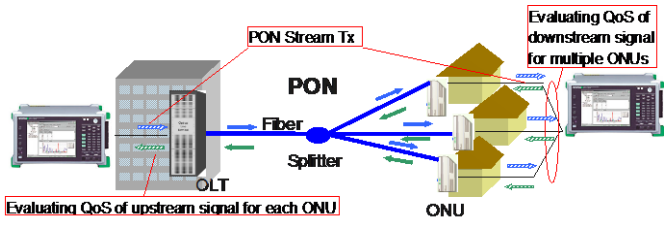

Fig. 1 PON Measurement using MD1230B

➢ Simultaneous Measurement of 32-branch PON

Most PON (B/E/G-PON) systems are split into 32 branches (ONUs). Using the all-in-one MD1230B Data Quality Analyzer, the end-to-end performance of all ONUs and OLT in a 32-branch PON system can be measured simultaneously in both directions. This measurement uses three 12-port MU120131A modules.

Fig. 2 MU120131A 12-port Module Supporting Low Cost Per Port

Measurements

➢ Generating High-Load Conditions Using Emulated Stream

Evaluation of a TDM-controlled PON system requires confirming that the upstream signal from each ONU is sent regularly without any data collisions. This evaluation requires connecting multiple ONUs simultaneously and performing tests under high-load conditions. Using the stream generation function, it is possible to emulate various high-load conditions of an actual network, offering an efficient measurement environment at low capital cost.

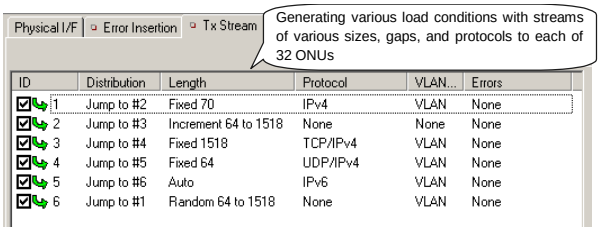

Fig. 3 Stream Generation Function

➢ Simultaneous QoS Measurement of Each ONU

The throughput, latency (delay), and frame loss of traffic flows from all ONUs can be measured simultaneously in real time by using the multi-flow counter. Thus greatly reducing measurement times.

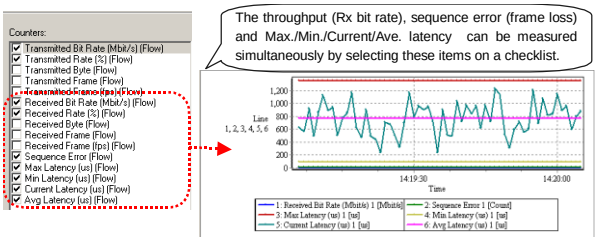

Fig. 4 Multi-flow Counter Function

<Measurement Examples>

QoS evaluation of multiple connected ONUs requires the following measurements.

1. Actual throughput for each user
2. Packet loss for each user
3. Delay time for each user/service

Examples of these measurements are explained below.

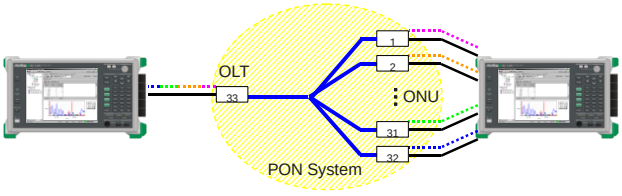

Fig. 5 Measuring All Ports on 32-branch PON System

➢ Throughput for Each User

The maximum bandwidth used by each user can be pre-checked. In addition, it is also possible to verify whether the user/service-specific conditions (bandwidth) are satisfied, helping construction of PON systems and improving reliability.

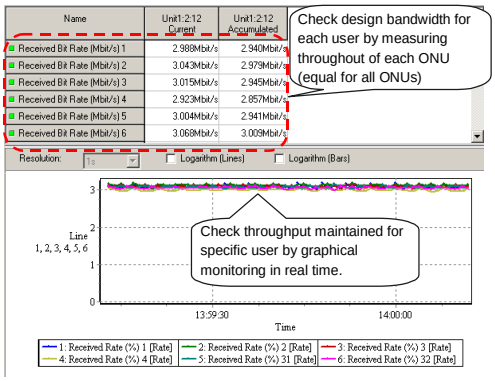

Fig. 6 Checking PON System Construction by Measuring Throughput

➢ Loss Measurement for Each User

No packet loss for high-priority users and QoS can be evaluated by measuring sequence error for each ONU.

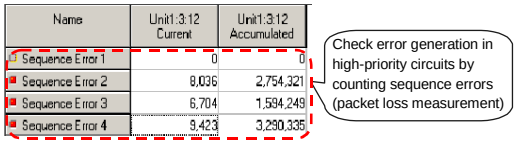

Fig. 7 Evaluating Service Priority by Measuring Packet Loss

➢ Delay Measurement

Severe delays on specific circuits can be checked by measuring the delay for each user in real time. Moreover, the impact on services requiring real-time characteristics can be assessed by confirming random distribution of delays for each service, resulting in overall higher QoS.

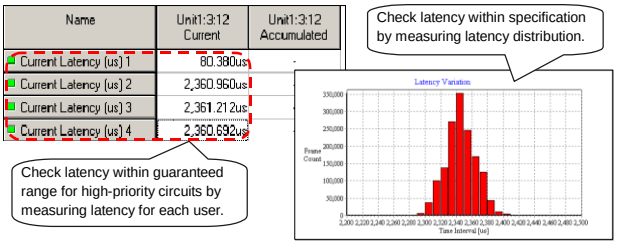

Fig. 8 Evaluating Priority Service by Measuring Latency and Checking PON System Construction by Measuring Latency Distribution

3. Product Features

- All-in-one platform for evaluating performance of all ONUs and OLTs in 32-branch PON systems
- Simultaneous, real-time measurement of throughput, delay, and frame loss for each ONU for evaluating QoS

4. Summary

The Anritsu all-in-one MD1230B Data Quality Analyzer supports verification and evaluation of 32-branch PON systems as well as end-to-end measurements. The QoS of all ONUs can be measured simultaneously by emulating high-load conditions like a real network to increase PON system reliability.

Configuration	Main Frame: MD1230B Plug-in Module: MU120131A x 3* Software version: Version 7.0 or later
Option	MD1230B -11 Packet BER measurement

*When measuring 32-branch PON

5. Ordering Information

➢ MD1230B
MD1230B Data Quality Analyzer
MD1230B-11 Packet BER Measurement
MU120131A 10/100/1000M Ethernet Module *3

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