

Qubit GPON KPI Kit

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Abstract-Gigabyte passive optical network (GPON) is a point-to-multipoint, fiber to the premises network architecture in which unpowered optical splitters are used to enable a single optical fiber to serve multiple premises, typically 16-128. A GPON consists of an optical line terminal (OLT) at the Network Operation Center and a number of optical network units (ONUs) near end users. Performance of FTTH GPON network can be measured by using KPI of the OLT and the ONT of the network. Qubit GPON KPI Kit provides features to display and analyze the various KPI associated with ONT and OLT.

Keywords- OLT, ONT, GPON, FTTH, KPI.

INTRODUCTION

A passive optical network (PON) is a point-to-multipoint, fiber to the premises network architecture in which unpowered optical splitters are used to enable a single optical fiber to serve multiple premises, typically 16-128. A PON consists of an optical line terminal (OLT) at the service provider's central office and a number of optical network units (ONUs) near end users. First of all PON was, ATM PON (APON) which evolved in Broadband PON (BPON). BPON is backward compatible with APON. Ethernet PON (EPON and newer GePON) is alternate solution for PON networks. It is IEEE standard not compatible with A/BPON. It is PON exclusively for Ethernet and IP traffic. Gigabit Passive Optical Network (GPON) is defined by ITU-T recommendation series G.984.1 through G.984.4.

GPON has enhanced capability in comparison to APON and BPON and is backward compatible. G.984 standard series define general characteristics of GPON (G.984.1) as well as physical layer specification (G.984.2), transmission layer specification (G.984.3) and ONU (Optical Network Unit) management and control specification (G.984.4). GPON can transport not only Ethernet, but ATM and TDM (including PSTN, ISDN, E1 and E3) traffic by using GPON encapsulating method (GEM).

Qubit GPON KPI Kit

Qubit GPON KPI kit developed by Savitar Research Group brings together FTTH business performance management in one integrated package. Role based reporting, personalization, alerting and communication integrated on one unified database brings up to date information to entire organization. Qubit kit encapsulates industry's 'Best Practice' key performance indicators. The KPI set is a holistic and comprehensive measure of business performance. Other KPIs specific to one's business can be easily created within the pre-built BI cubes.

KPI Kit - Network

Qubit kit can display all network element level KPI'S associated with OLT/ONT on the map, grid or graph. These KPI's can be seen on selecting a network element and clicking on report. A collection of these reports can be aggregated into a custom Dashboard. Based on these graphs, up to minute performance of the GPON

network can be monitored. The Network reports are organized hierarchical fashion – Physical reports, NW performance and service performance plus customer experience.

Reports associated with KPI Kit are described here.

OLT and ONT KPI

KPI's associated with OLT and ONT which gives performance specification about these network elements are:

- Down Average Throughput
- Down Frames
- Down Discard Frames
- Downstream BIP Error Frames
- Frames Loss
- Uplink Average Throughput
- Received Blocks
- Received Ethernet Frames
- Received Frames
- Received PLOAM Frames
- Received Packets
- Bit error rate
- Discarded packets
- Network delay, Jitter
- Packet delay
- Packet loss
- Resource availability
- Resource utilization
- Severely errored seconds
- Received broadcast frame
- Received broadcast packet
- Received multicast frame
- Received multicast packet
- Received OMCI Frames.

Splice report

Splice report shows the details of all the splices within a splice enclosure including their location fibers which are spliced, type of splice and their losses.

Fiber report

Fiber report shows details of all the fibers , micro-duct, sub-duct , duct, tube , trench with all the details about connectivity of fiber between which network elements they are connected, what is their status whether lit or unlit, what path it follows, what is the type of fiber, whether fiber is leased, length of the optical fiber etc.

Fiber capacity report

Fiber capacity report shows all the capacity of fiber, tube, trench, duct, micro-duct, sub-duct, their occupancy and maximum capacity.

Port capacity report

Port capacity report shows the number of ports with their type for each network element. Fiber capacity report shows capacity of each fiber hierarchy capacity occupied and vacant.

Copper Report

It shows details of all the copper cable their connectivity, type of cable, whether connected or not, length of the copper wire, customer's details to which it is assigned.

Link Margin

Link margin shows the losses that will come in the path of GPON network from any element to end .It shows both uplink and downlink link margin.

Connectivity

It shows traversal path from any network element for both uplink and downlink for each path

Operations

Many day to day functions of the organization are captured as operational activities. These set of activities tend to supersede individual department's functions and create inter-dependencies with peer functions. CTTS,

Planning, Work order management, Resource and Inventory management, Financial management etc., fall into operational activities.

User friendly Web based graphical user interface that enables you to work from anywhere within the domain of your enterprise network.

Role based access to data is naturally inherited within the security and administration of the enterprise.

Context based communication is done in a few clicks. Entire organization shares the same view of integrated & updated data. Therefore attaching rich context view, for example a map report with associated comments, to communication channels such as email eliminates confusion.

Calendar, scheduling of meetings and Email are built-in apps within the kit.

Marketing

An important function of the kit is to provide intelligence on usage trends across dimensions. Identification of such trends leads to better prediction of revenue opportunities. SLAs and Service plans can be tuned for maximization of revenue potential.

Customer experience being the watchword, besides the usage trends and Mean Opinion Scores (MOS) for each session, visibility into 'cause and effect' relationships is important. For example, high usage of an application in a location at a particular time of day causing MOS scores to deteriorate.

Qubit kit provides multiple ways to provide this analytical visibility. Information can be accumulated across any number of dimensions, gets filtered, dimensional hierarchy helps in tracing to root causes and then the association

of sets of reports as a 'collective set' gives the whole picture.

Alerting mechanisms through subscription services pull, format and present this information in a personalized way as and when the information gets updated.

Many of industry observed Marketing KPIs are pre-configured in the Qubit kit.

- Customer Experience reports in n-dimensions
- Customer usage trends in n-dimensions
- Revenue reports
- Customer trouble ticket status reports
- Customer fulfillment reports

Finance

Finance departments ultimate aim is to protect the bottom line and improve it. Qubit KPI kit has a series of financial reports that help the department keep on top of the organization's financial performance.

In day to day operations following financial reports come readily in the kit.

- Bill of quantities and Material in work order execution
- Operational expenditure in each department's activities such as work order execution
- Revenue losses due to down time of equipment
- Utilization rate of existing resources
- Inventory management
- Many common financial statements such as Free Cash flow analysis, Balance sheets, NPV
- Performance reports such as lifetime value of a subscriber, revenue per subscriber, expenses per subscriber etc.