

## 1 Introduction

This document describes the optional service Performance monitoring for the GTS Ethernet Line service.

## 2 Description of Performance monitoring application

The Performance monitoring is the optional service to the GTS Ethernet Line service. The performance monitoring application is operated on a BaseN solution which is primarily intended for the sphere of the telco services performance management. The BaseN application collects data from network equipments which are being monitored and assures a presentation of the collected data in real time through On-line WEB based portal.

The information provided by this optional service cannot serve as the basis for the calculation of credits for non-compliance with SLA due to the fact that all types of outages are recorded in the application. This includes, for instance, planned service outages, excluded events, outages caused by the customer, etc., which are not included in the total unavailability of the service.

### 2.1 Data collection

The application collects data from GTS managed equipments in the GTS network, especially from PE switches and Customer Edge (CE) equipments located at the End User Sites. The data collection is carried out every 4 minutes periodically. The collected data are stored in Database (DB) and are available for 24 months. Various types of reports can be generated via online web interface.

#### 2.1.1 SNMP protocol (protocol for supervision and management)

The SNMP is an "Internet-standard protocol" which enables supervision and management of devices in IP networks. The typical devices with SNMP supports are routers, switches, servers, workstations, printers, modem track. The SNMP enables network administrators to manage and monitor devices connected to the IP Network. The SNMP is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects.

#### 2.1.2 Y.1731

Recommendation ITU-T Y.1731 specifies mechanisms required to operate and maintain the network and service aspects of the ETH layer. It also specifies the Ethernet OAM frame formats, and syntax and semantics of OAM frame fields. The OAM mechanisms as described in this Recommendation apply to both point-to-point ETH connections and multipoint ETH connectivity. The OAM mechanisms as described in this Recommendation are applicable to any environment independently of how the ETH layer is managed (e.g., using network management systems and/or operational support systems).

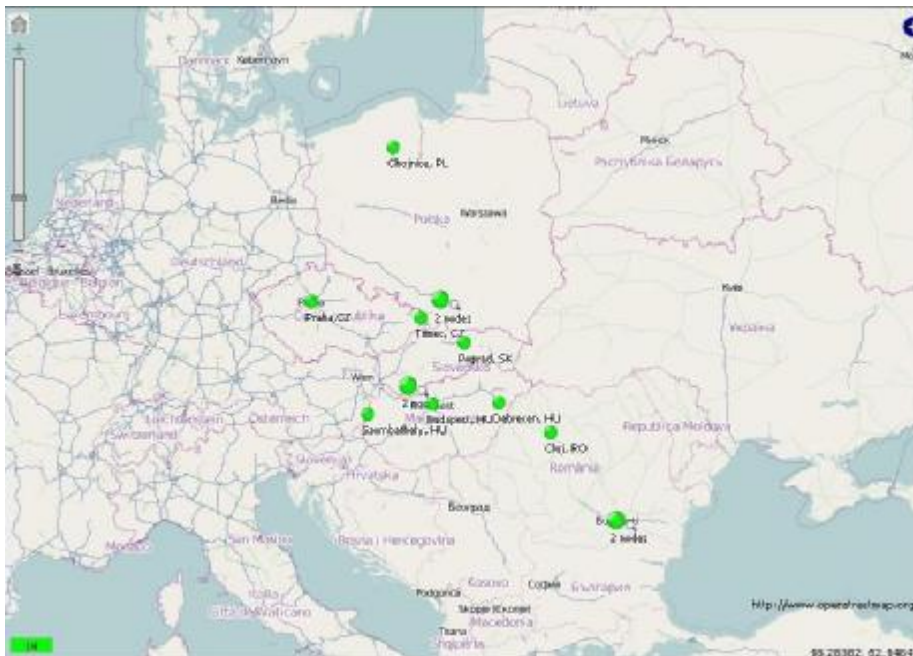
## 2.2 Configured reports

### Status Summary

Summarizing overview of all of the monitored services the participant, their current availability and graphical illustration of the location on the map.














### Network Map

A graphic illustration of the location of monitored services on a map. The colour illustration of the locality indicates current service availability. The colour of the dot is a function of the summary status (colour) of the recent actual metering in the colour stripe of the Status Table. Clicking on the service displays the statistics of the locality selected.






### Status Table

An overview of monitored services and their current accessibility on the basis of an ICMP protocol. The coloured status indicator is divided into 5-minute intervals. The last minute monitored is the coloured strip on the very right, the status 2-3 minutes previously is in the centre, and the oldest measurement is on the very left. The status is automatically updated every minute.

Overview (last 5 min)			
Availability based on ICMP Echo status (for managed CPE services)			
Status	Location	ServiceLine	Page
	PL, Bytom, Chorzowska 33	823090	GTS Test 823090 ServiceEntityId
	PL, Chojnice, Sukienników 65	823091	GTS Test 823091 ServiceEntityId
	PL, Chrzanów, Trzebińska 73	823092	GTS Test 823092 ServiceEntityId
	CZ, Třinec, Dostojevského 45	GN61176	GTS Test GN61176 ServiceEntityId
	HU, Szombathely, Hefele Menyhert utca 43.	GSTGPLM9401	GTS Test GSTGPLM9401 ServiceEntityId
	HU, Budapest, Lechner Odon Fasor	GTSGPLM1103	GTS Test GTSGPLM1103 ServiceEntityId
	HU, Debrecen, Vagohid u. 58	GTSGPLM5201	GTS Test GTSGPLM5201 ServiceEntityId
	RO, Bucuresti, St Vidin, Nr. 54A	GTSRO-S-135458	GTS Test GTSRO-S-135458 ServiceEntityId
	RO, Bucuresti, St Turnu Magurele, Nr. 501E	GTSRO-S-135461	GTS Test GTSRO-S-135461 ServiceEntityId
	RO, Cluj, St Coastei, Nr. 94	GTSRO-S-135470	GTS Test GTSRO-S-135470 ServiceEntityId
	SK, Nitra, Farská 27	SL20950SK	GTS Test SL20950SK ServiceEntityId
	SK, Nové Zámky, Podzámska 104	SL20951SK	GTS Test SL20951SK ServiceEntityId
	SK, Poprad, Hviezdoslavova 91a	SL20952SK	GTS Test SL20952SK ServiceEntityId

13 items shown.

-  - Managed service, CPE is available.
-  - Managed service, CPE is unavailable.
-  - Unmanaged service.

The status view is split into 5 one minute areas. The last minute is on the rightmost side of the area. The status of 2-3 minutes ago is in the middle and the oldest measurement is in the leftmost.

This page refreshes itself once a minute.

## 2.2.1 Basic Measurement

Basic Measurement of GTS Ethernet Line includes:

§ Site A measurement of interface of PE Switch:

- Traffic of whole circuit in the direction to the customer (egress) [kbit/s, Mbit/s];
- Traffic of whole circuit in the direction from the customer (ingress) [kbit/s, Mbit/s].

§ Site B measurement of interface of PE Switch:

- Traffic of whole circuit in the direction to the customer (egress) [kbit/s, Mbit/s];
- Traffic of whole circuit in the direction from the customer (ingress) [kbit/s, Mbit/s].

## 2.2.2 Advance measurement

Advance Measurement of GTS Ethernet Line includes:

- Reports of traffic of whole circuit

§ Site A measurement of WAN interface of CPE Switch:

- Traffic in the direction to the customer (egress) [kbit/s, Mbit/s];
- Traffic in the direction from the customer (ingress) [kbit/s, Mbit/s].

- § Site B measurement of WAN interface of CPE Switch:
  - Traffic in the direction to the customer (egress) [kbit/s, Mbit/s];
  - Traffic in the direction from the customer (ingress) [kbit/s, Mbit/s].
  
- Reports of traffic per service class
  - § Site A measurement of WAN interface of CPE Switch:
    - Traffic in the direction to the customer (egress) [kbit/s, Mbit/s];
    - Traffic in the direction from the customer (ingress) [kbit/s, Mbit/s].
  - § Site B measurement of WAN interface of CPE Switch:
    - Traffic in the direction to the customer (egress) [kbit/s, Mbit/s];
    - Traffic in the direction from the customer (ingress) [kbit/s, Mbit/s].
  
- § Reports of One-Way Frame Delay per service class
  - § Site A - measurement of One-Way Frame Delay from Side A to Site B [ms];
  - § Site B - measurement of One-Way Frame Delay from Side B to Site A [ms].
  
- § Reports of Frame Delay Variation per service class
  - § Site A - measurement of Frame Delay Variation from Side A to Site B [ms];
  - § Site B - measurement of Frame Delay Variation from Side B to Site A [ms].
  
- § Reports of Frame Loss for Real-Time class
  - § Site A - measurement of Frame Loss from Side A to Site B [%];
  - § Site B - measurement of Frame Loss from Side B to Site A [%].

## 2.3 Measured magnitudes

### Traffic

The traffic displays the transferred data in Kbps or Mbps in and out of the interface of the measured equipment.

The traffic on the interface of the measured equipment, it displays the transferred data in and out of the equipment, displayed in Kbps or Mbps.

### Frame Delay

The Frame delay parameter shows the time in a given class which the provider's network needs to deliver the frame to target equipment. The Frame delay in a network is calculated as the time difference between moment of sending a frame from an ethernet port of the originating equipment and the moment of acceptance of the entire frame on an ethernet port of the terminating equipment. The statistic shown on the graph Side A charting the time delay from the source (Site A) to the target equipment (Site B) and the statistic shown on the graph Site B recording the time delay in the opposite direction.

### Frame Delay Variation

Frame Delay Variation statistic shows a variation of frame delay in the time segment and in the given class.

### Frame Loss

The Frame loss is a parameter which shows the percentage of frames in a given class which are not delivered to the target equipment. This loss might be caused, for instance, by the non-availability of service, by a high failure ratio of the End User Access Line, by an overloading of the End User Access Line (e.g. caused by viruses, SPAM, DoS attacks, etc.), etc.

## 3 Benefits for customer

The customer gains the same service statistics as employees of the GTS Network Operation Centre. This no differentiation helps during diagnosing of service faults because there is not difference in a data source.

### Basic measurement

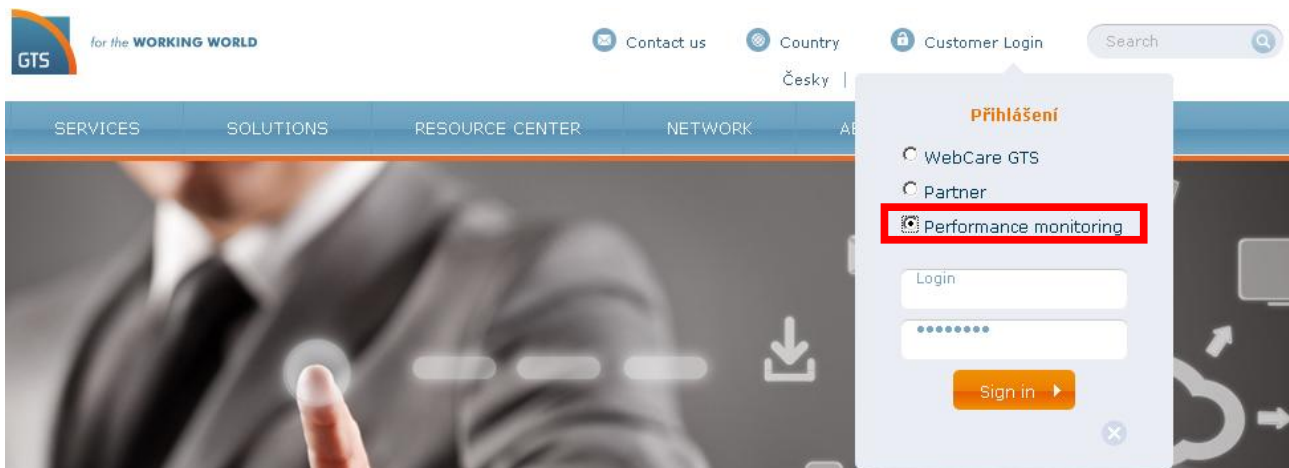
This type of reports is beneficial for monitoring of the most utilized branches. It helps identify which End User Sites need to be paid more attention and which can cause problems with high utilization. Traffic reports per CoS make it possible to monitor the utilization of the individual classes, and on this basis decide on the introduction of a new class or the reconfiguration of an existing class.

### Frame Delay, Frame Loss and Frame Delay Variation measurement

These reports are very beneficial for customers who want to monitor performance parameters especially for real-time application e.g. IP telephony.

## 4 Description of the customer interface

The customer has access to the interface of the application Performance monitoring by means of an internet browser from the website [www.gts.cz](http://www.gts.cz), the section "Customer Login"



For authorisation and identification of a user a name and password are used which the customer receives when establishing the additional service Performance monitoring. After entering the name and password the Performance monitoring customer interface is displayed.

Valid through 20. 05. 2013

**Performance Monitoring**

Services

- Status Summary
- GTS IP VPN
  - Network Map
  - Status Table
- C2
  - Třinec
    - Dostojevského 45 (GH61176)
  - HJ
    - PL
    - RO
    - SK
  - GTS Internet
    - Network Map
    - Status Table
    - C2
      - Praha
        - GH135145 - Připojení 2210/95C (GH0071)

**Overview (last 5 min)**

Availability based on IOMP Echo status (for managed CPE services)

Status	Location	Service line	Page
■	PL, Bytom, Chorzowska 33	023090	GTS Test-023090-ServiceEntryId
■	PL, Chępcze, Sułkiewska 65	023091	GTS Test-023091-ServiceEntryId
■	PL, Chorzów, Trzebnicka 75	023092	GTS Test-023092-ServiceEntryId
■	CZ, Třinec, Dostojevského 45	GH61176	GTS Test-GH61176-ServiceEntryId
■	HU, Szombathely, J. Kálmán király utca 40.	GTSPLM9401	GTS Test-GTSPLM9401-ServiceEntryId
■	HU, Budapest, Lechner Ödön fasza	GTSPLM1103	GTS Test-GTSPLM1103-ServiceEntryId
■	HU, Debrecen, Vajkai u. 58	GTSPLM201	GTS Test-GTSPLM201-ServiceEntryId
■	RO, Bucuresti, Str. Vidin, Nr. 54A	GTSRO-S-135458	GTS Test-GTSRO-S-135458-ServiceEntryId
■	RO, Bucuresti, Str. Tamaș Inăgules, Nr. 50A	GTSRO-S-135461	GTS Test-GTSRO-S-135461-ServiceEntryId
■	RO, Cluj, Str. Coasta, Nr. 04	GTSRO-S-135470	GTS Test-GTSRO-S-135470-ServiceEntryId
■	SK, Nitra, Hviezdoslav	SL209528	GTS Test-SL209528-ServiceEntryId
■	SK, Nové Zámky, Podzánska 04	SL209515K	GTS Test-SL209515K-ServiceEntryId
■	SK, Poprad, Hviezdoslavova 91a	SL209525K	GTS Test-SL209525K-ServiceEntryId

13 items shown.

- - Managed service, CPE is available.
- - Managed service, CPE is unavailable.
- - Unmanaged service.

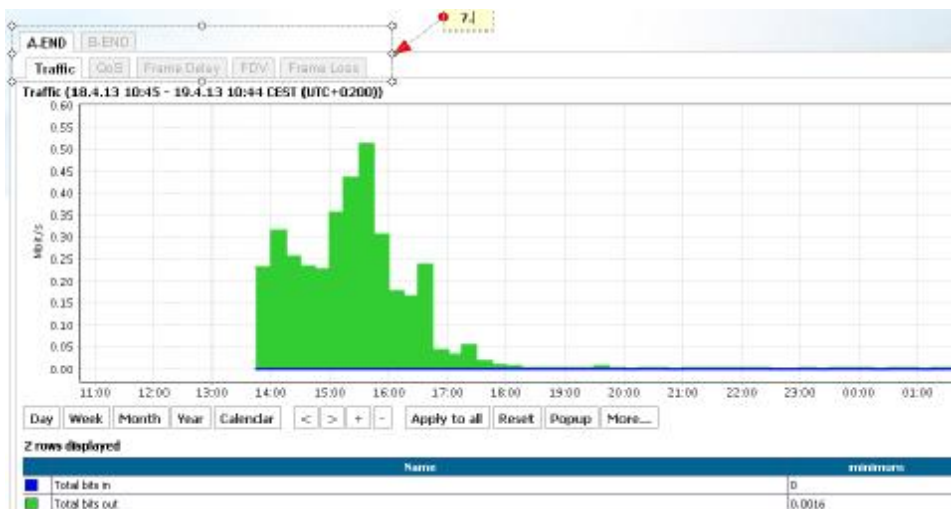
The status view is split into 5 one-minute areas. The last minute is on the rightmost side of the area. The status of 2-3 minutes ago is in the middle and the oldest measurement is in the leftmost. The page refreshes itself once a minute.

6. Sign out

The customer interface is displayed above.

1. Overview of all services included in the Performance monitoring
2. Specific product included in the Performance monitoring
3. Displaying a list of all connections of a particular product in a geographic map
4. Displaying a list of all connections of a particular product in the table
5. Select individual services in a chosen location (region)
6. Sign out

Upon clicking on a specific service in the location (see item 5 in the above picture), further selection is offered in the form of tables. It is possible to select visualisation of specific metering (see item 7 in the above picture).

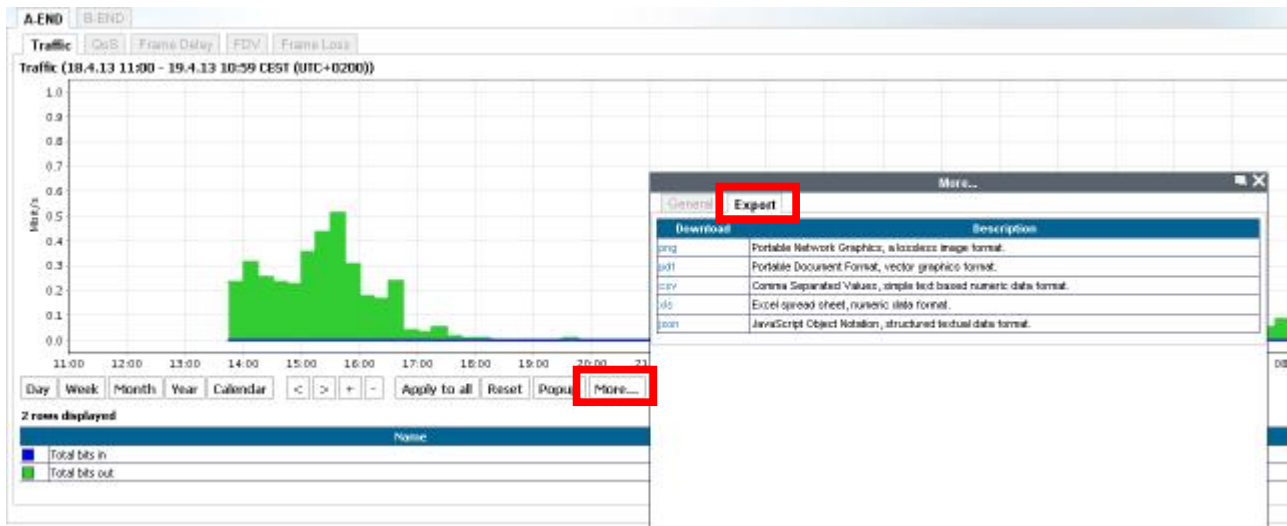




## 5 Control of the WEB interface for the creation of graphs

### 5.1 Export of the measured values and graphs

In the customer interface it is possible to export any graph (or data used) into Excel (e.g. as data for further processing) or a PDF document. Click on “More...”, select “Export” bookmark and chose the required data format.



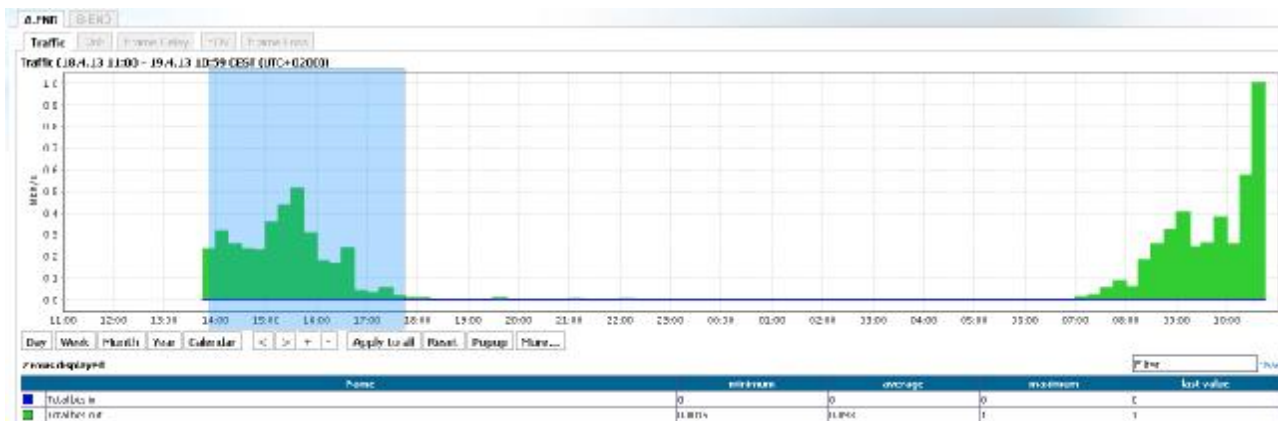
### 5.2 Display filter

In order to filter the interface displayed (or QoS classes) simply write the requisite interface (or QoS class) in the appropriate field “Filter...”. If the filtration of more than one interface is required, simply divide the individual interfaces with a comma in the appropriate field “Filter...”. Alternatively you can simply click on the row representing the measured interface.



### 5.3 Zoom

In order to zoom-in of the particular part of the graph simply selected the required area by mouse simultaneously with the left button pressed.

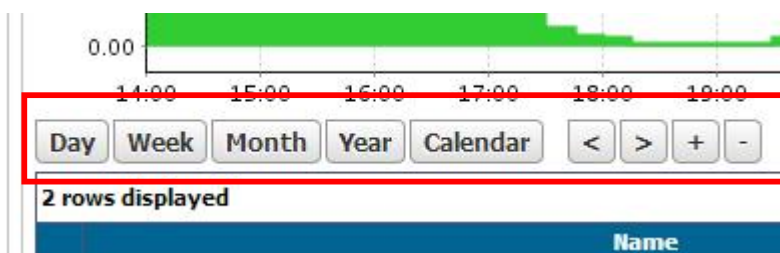


### 5.4 Change of criteria

Following criteria can be changed for chart display:

- DAY is a view of 1 day with 15-minute measurements interval (1d/15m)
- WEEK is a view of 7 days with 2-hours measurements interval (7d/2h)
- MONTH is a view of 30 days with 12-hours measurements interval (30d/12h)
- YEAR is a view of 12months with 7-days measurements interval (12m/7d)

Moving between the displayed periods can be done by using the buttons << a >>.





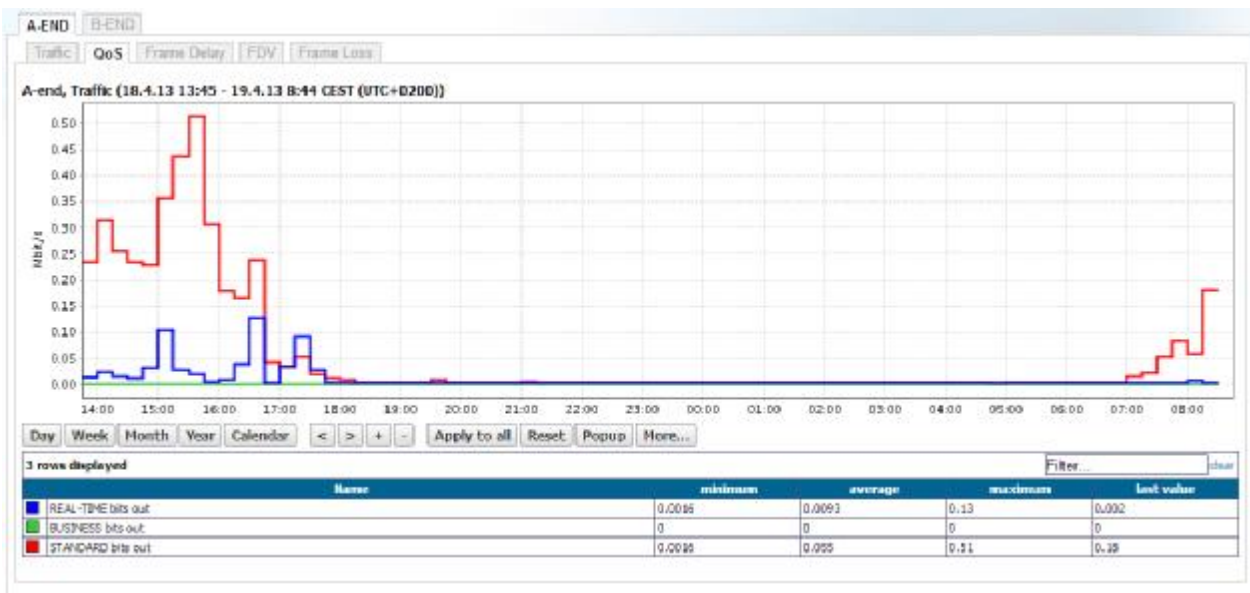
## 6 Examples of graphs

### 6.1 Interface Traffic



The graph shows Traffic on individual interfaces.

### 6.2 Traffic per CoS



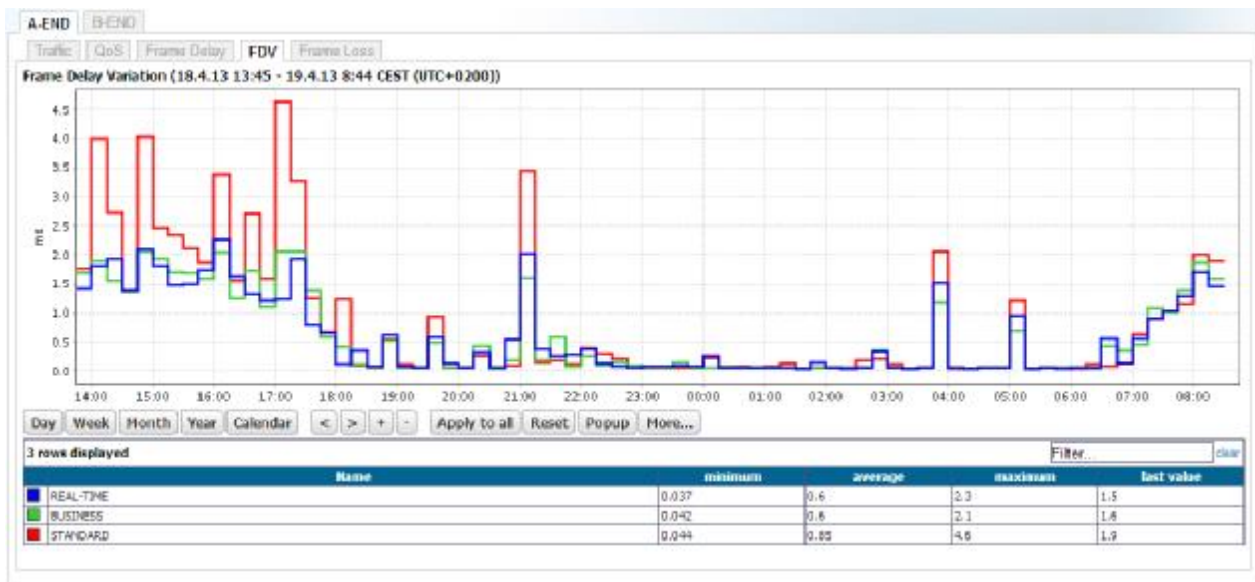
The graph shows Traffic per individual CoS.

### 6.3 Frame Delay



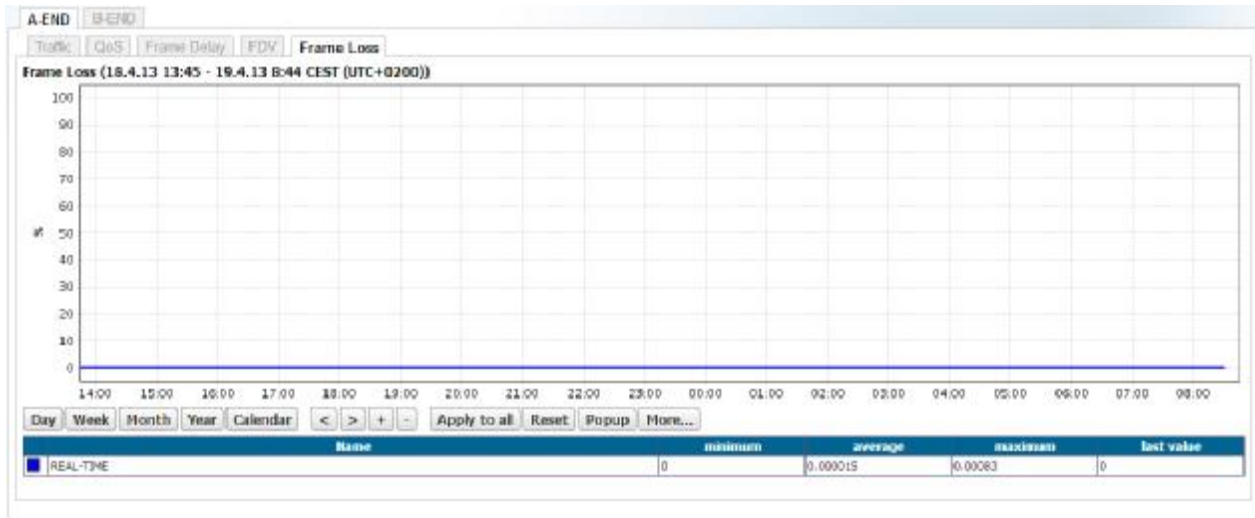
The graph shows the one way Frame Delay per individual CoS.

### 6.4 Frame Delay Variation



The graph shows the average Frame Delay Variation per individual CoS.

## 6.5 Frame Loss



The graph shows the values of Frame Loss for Real-Time class.