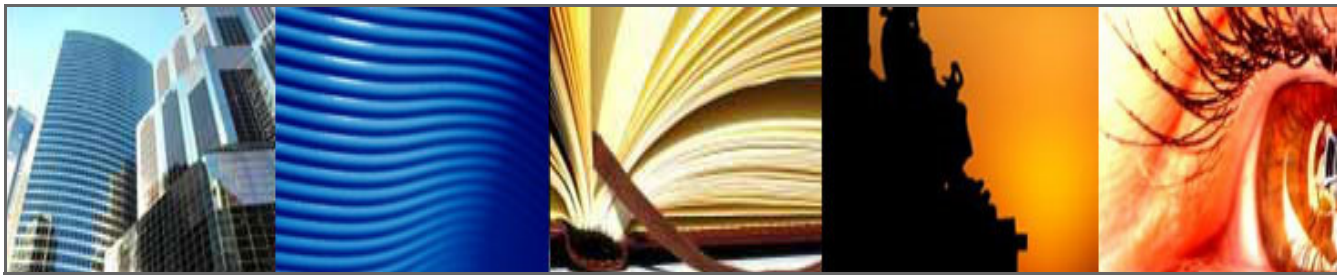
ALBEDO Telecom

the Path to Excellence

Network Audit



Objetives

- Definition of service provider agreement (SLA).
- SLA verification.
- Validation of IP network quality end to end, even in heterogeneous networks.
- Ad hoc or permanent monitoring of the quality and capacity of Metro-Ethernet access, ADSL2 + and FTTH.
- Verification mechanisms interruption restoration time limits in case of falls.

Abstract

Net.Audit service is intended to verify compliance with Telecom services provided by Telecom Carriers and Telecom Operators.

Users of this service generally are responsible for network aimed at wanting to know as an operator or a carrier manages voice, video or data in terms of quality, performance and availability.

1. Network Commissioning

1.1. The Infrastructures

Net.Audit users will review the network directly, identifying strategic points of monitoring and the scope, duration, and frequency of audits. The objective is to review the critical points of access ADSL2 +, VDSL2, FTTH or FTTN, review aggregation nodes Carrier-Ethernet and IP Routers, along with the interfaces provided by the Telecom Carrier / Operator. You can define the most appropriate criteria to verify the network infrastructure and identify critical issues even conflicts between Operators and Carriers.

You will be able to prioritize the most critical points that may affect the network under supervision while creating report that lists traces and findings. The support provided by ALBEDO suggest list of recommendations andpotential solutions.

1.2. Ad hoc Analysis

You do need send experts to analyzing and discuss the issues that concern the service. Net.Audit is a remote monitoring tool with a methodology to verify telecom services remotely in a centralized way by mean of a web server. We've spent years improving the quality and effectiveness of networks in both public and private sectors. We have developed contingency plans and helped optimize critical applications.

1.3. Remote Auditing

Do you know that most of elusive issues in telecommunications networks can be identified and solved remotely? Often they can be detected remotely using prober monitoring a measurement tools connected at the most stantard network interfaces such as Ethernet / IP. ALBEDO Telecom will work with you and using simple tools, sometimes as a telephone or e-mail, and sometimes sophisticated, such as generator / analyzers or probes to monitor traffic. The trace file can be sent and reviewed on site. And if you want an engineer Albedo Telecom.

You can connect remotely to your network analyzer on a secure and execute a remote analysis. This is a fast and comfortable to verify your network and check whether it is behaving correctly.

1.4. Ready for Triple Play?

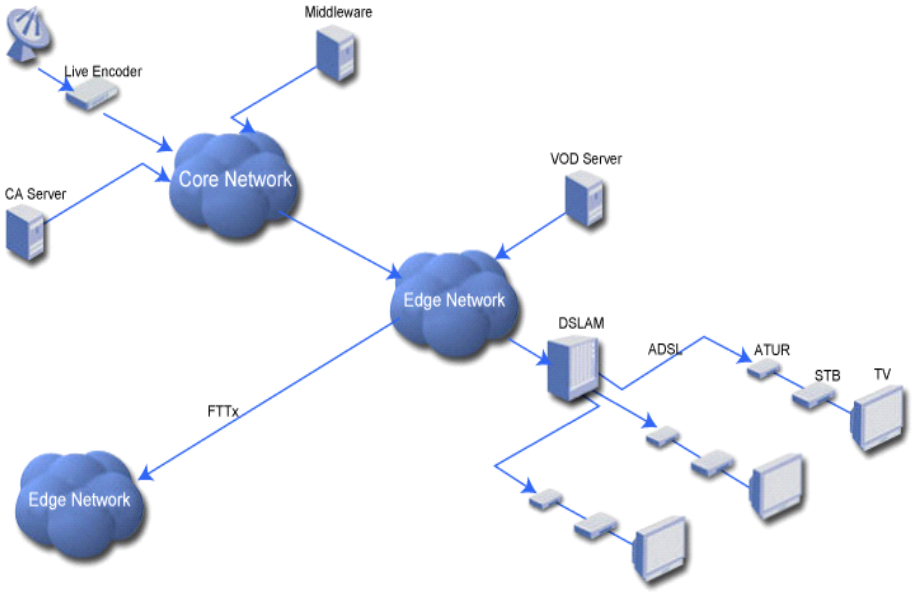
The large-scale deployment of converged services over IP networks such as Voice, Video and Television requires a feasibility study that clearly identifies the levels of quality (QoS), as well as Bandwdth constraints and bottlenecks that could affect their normal use. The effectiveness of a teleapplication is a combination of multiple factors that include network architecture, and transmision media. It do also depends on resource management, serialization of traffic, congestion control and other factors. Therefore the introduction of a new application such as VoIP is never deterministic in terms of sustainability and quality.

In some respects the use of the right tools and a methodology allow the analysis of the capacity, and quality that affect your network. They really determine the success -or failure- in the implementation of new services. It is fundamental to identify those weaknesses of the telecom networks as the first decisition to improve new applications.

1.5. SLA

Today's networks require precise control and proper maintenance to ensure reliable service. It is important that neither party feels aggrieved, then supplier and customer may specify Service Delivery Agreements (SLA) and guarantee that commitments are met.

It is important to evaluate equipment and software meeting the standards of service interface and any problems that may affect the network. Their work confirms that part complies with the commitments defined in the SLA.



1. Telecom SLAs

The provision of telecom services should be subject to a formal agreement to link customer-supplier under a contract that defines the parameters of the service and would serve as reference framework. The SLA should define responsibilities of each party, mechanisms for monitoring, event aspects regarding management and support, and may include a description of fees and penalties.

When telecom was a monopolistic business, and services were based on circuits, SLA played a minor role. It was the arrival of packet networks such as X.25 and Frame Relay when SLAs were moved to more relevant place, but its final takeoff has occurred with the adoption of Ethernet / IP as the unified transport network. We all know that the packet networks are more efficient and cheaper than their predecessors based on circuits, the problem is that native packet networks can't guarantee, or have more difficulties to achieve or a certain levels of quality. This can be a serious drawback to transport audio and video, even to transport data.

1.1. SLA structure

A service level agreement should not be a simple document of generic terms, but must contain explicit content.

Firstly, an SLA should describe the telecom services provided in terms of capacity and quality, for every single access contract. SLA should also describe those mechanisms for remote monitoring and periodic reports about service performance. Nor should they ignored the mechanisms for the resolution of problems and a clear statement of material and human support provided by the supplier.

Finally, the SLA should also apply to the address what operator does and how compensate customer in case of fault of low quality service. This is particularly important when telecommunications is an essential part for the normal operation the operation of the company. We are talking not only about refunds or penalties, but also the mechanisms to enhance the service or the allocation of new resources that eventually may facilitate the SLA compliance.

2. SLA methodologies

Telecom Auditing generally is executed in two modes depending on if it is done during a limited period of time, or permanently when is transformed into a monitoring process.

2.1. SLA verification

The SLA is verified only when required in a timely manner. The process can be conducted in four stages:

1. **Study**. Definition of measuring points.
2. **Online tests**. Includes verification of QoS parameters and traffic characterization.
3. **Offline tests**. Check QoS parameters under controlled traffic conditions.
4. **Reporting**. Consists of a report results and conclusions.

2.2. Permanent Monitoring

SLAN monitoring aims to detect all violations of the SLA for an indefinitely period of time. This makes it possible to detect all the violations of the SLA agreement and provide the customer with evidence to tell network provider about the service.

Monitoring probes would be installed while detailed quality traces and reports about the services are made available for all parties.

pected of suffering a loss in quality.

Traffic Characterization

Poor quality over WAN connections can be caused by many reasons as overloaded network can cause delays or loss of data if the average speed of transmission is above the threshold for admission.

3. Real Measurements

The audit is performed in the points and interfaces identified by the client or those where it is possible to obtain representative information.

In general, the demarcation points that separate supplier network - customer network are prime candidates for in-service-monitoring / out-of-service-measurements. Nevertheless other points should be considered such as neutral point of the operator and point into the customer network is large.

3.1. On-line test

Are long-term tests (recommended minimum one week) made on the fringes of normal network operation. In the form of permanent monitoring, the probes remain connected to the customer during the duration of the contract audit.

QoS Monitoring

QoS measures between two points on the WAN of the operator evaluated parameters such as availability, delay, jitter and packet loss.

Typically one of the key points is to audit the network where the servers are connected, since it is where more traffic is added. Then have to click all those in which it is observed or suspected of suffering a loss in quality.

The traffic characterization is intended to quantify the amount of traffic that accepts the network and its composition.

3.2. Out of Service tests

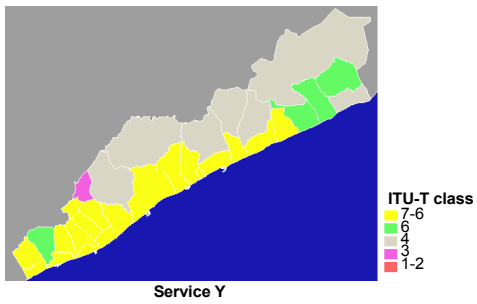
To determine if the operator offers the capability described in the SLA is necessary to inject synthetic traffic and observe the evolution of relevant QoS parameters depending on the load.

This process allows us to observe the behavior of the network at different levels of stress, up to the congestion.

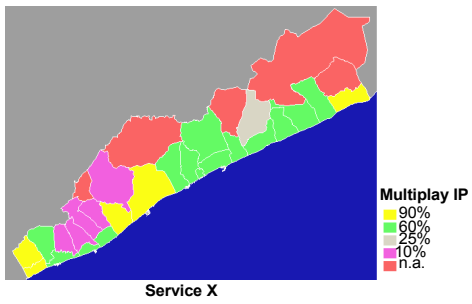
In order to avoid any inference that part of the audit is performed in bands with low occupancy of the network as night time, weekends or holidays.

Equipment and probes used to monitor QoS parameters.

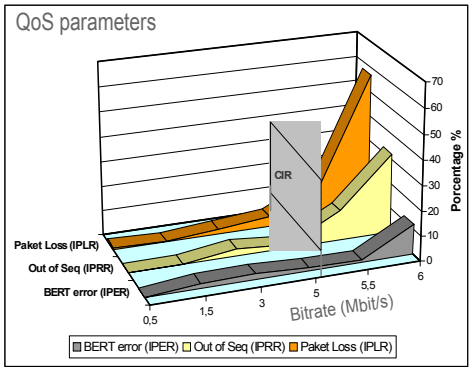
Quality according rec ITU-T Y.1451

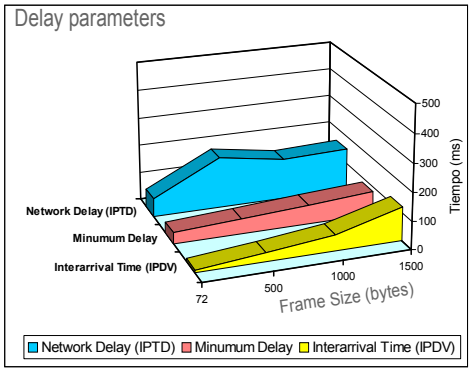


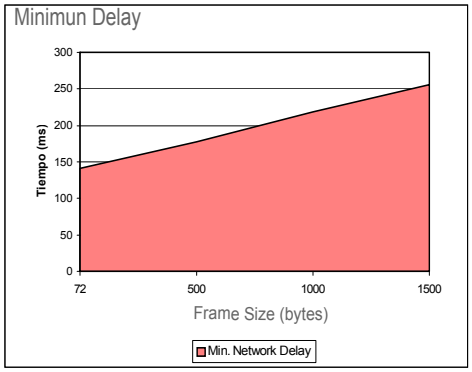
Prediction of Multiplay Service



Sample of results presentation







Constant monitoring of quality, availability and traffic characterization.

4. SLA in Carrier class Ethernet Networks

Ethernet began as a best effort technology for local area networks, ie no ability to provide quality of service. Subsequent adoption in metropolitan networks (MAN) and wide (WAN), has been achieved through the use of other technologies such as MPLS, VPLS, NG-SDH, or WDM, which have improved the native capabilities of Ethernet.

The result has been a new multiservice network effective for implementing data transactions for the transport and distribution of voice and video which is more difficult because they have more demanding requirements in terms of bandwidth profile (PAB) and quality of service (QoS). This is the reason why the Metro Ethernet Forum (MEF) advised that the SLA of Carrier Ethernet networks include both capacity metrics like quality.

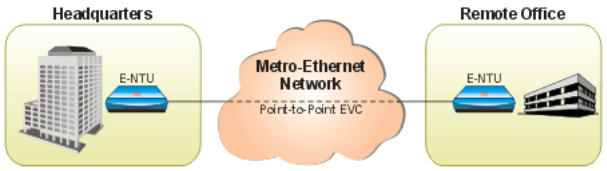
4.1. Performance Metrics

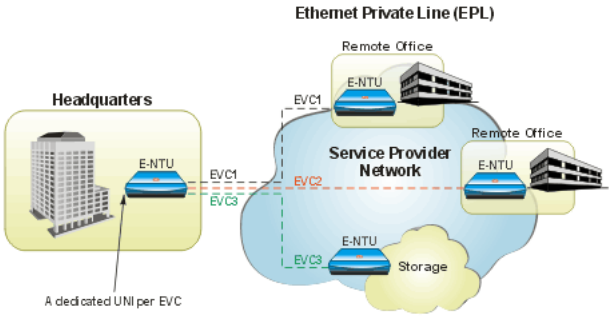
A basic attribute is what defines the bandwidth or speed with which a user can send frames to the provider's network. This is called the bandwidth profile (PAB) which should always be part of the SLA as just protecting both the supplier and the user. The supplier to avoid contention in the network, the user because it knows exactly the service you are paying.

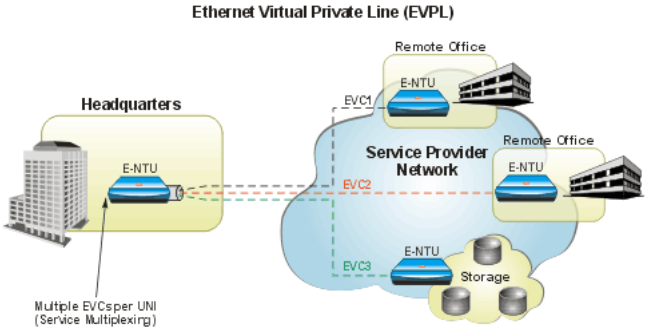
The audit of the PAB at the point of demarcation supplier-customer should verify:

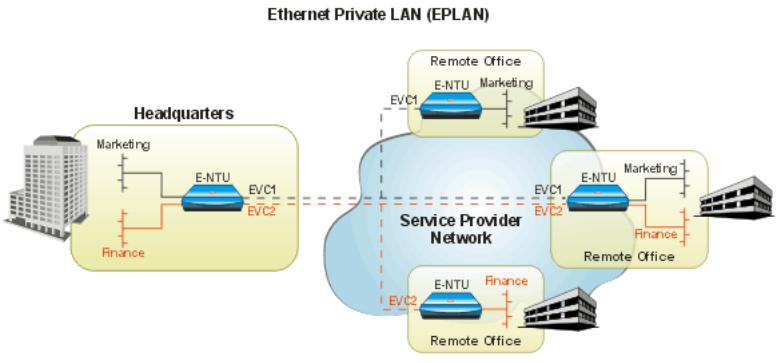
- **Committed Information Rate** (CIR) expressed in bit / s defines the bandwidth involved.
- **Committed Burst Size** (CBS) defines the maximum size of a burst in bytes.
- **Excess Information Rate** (EIR) in bit / s defines the bytes that are admitted to the network but without commitment to quality
- **Excess Burst Size** (EBS) in bytes defines the maximum size of a burst without compromising on quality.

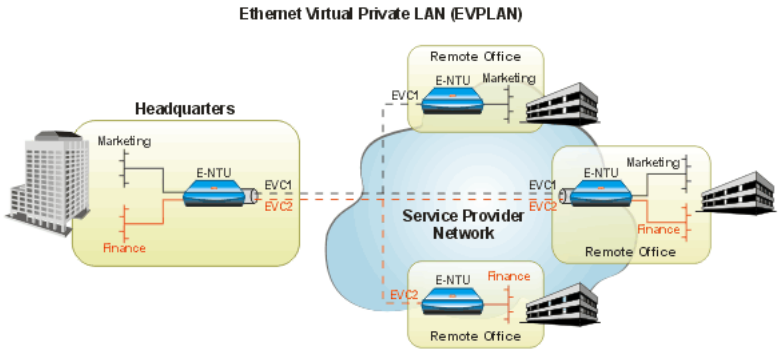
The frames sent by the CIR, is marked as green, they must meet the quality objectives described marked on the SLA. The plots within the EIR, that is marked yellow, must be delivered to the end but without compromising on performance. Finally exceeding the EIR should be discarded.









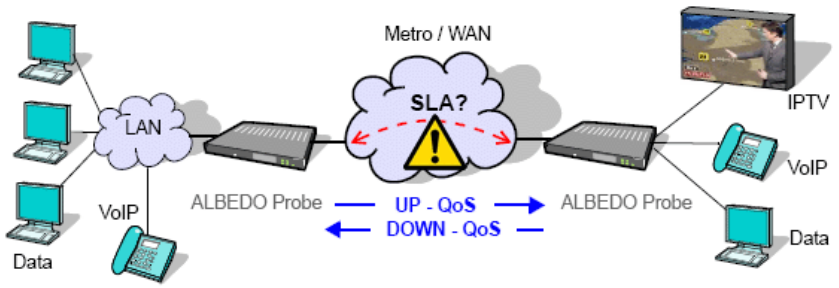


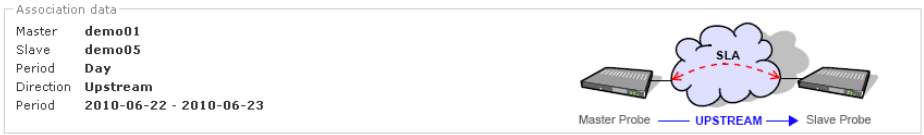
4.2. Quality Metrics

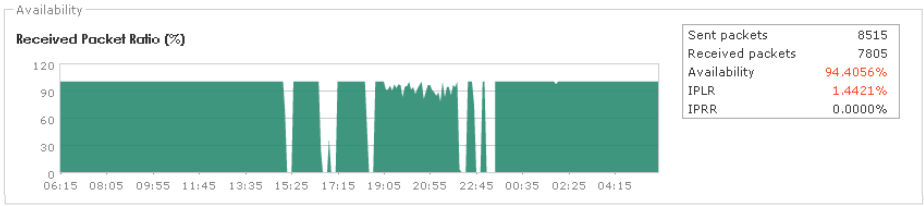
The evidence of quality of service (QoS) are associated with the Ethernet Virtual Circuit and consider the following parameters:

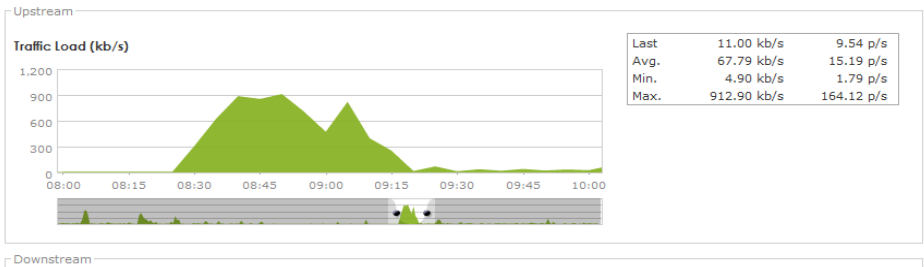
- **Frame delay** time has elapsed since sending the first bit until the arrival of the latter. The delay can be divided into three parts. Two parts are still being related to the profile of bandwidth to rely on the transmission rate and frame size. The third part of the delay is variable depending on the state of the transmission network. Compliant with the delay provided by the IPPM working group in RFC 2679.
- **Delay variation**, also known as packet jitter measures the variation in packet transit through the system because of the queues, containment, processing, policy prioritization and serialization to which are subjected packets to travel on the network. Compatible with jitter specification provided by the IPPM working group in RFC 3393.
- **Packet loss** refers to the percentage of frames which, although consistent with the CIR, they are not delivered for a maximum time interval. Compatible with the specification of packet loss provided by the IPPM working group in RFC 2680.
- **Availability** is the percentage of time the network is operating normally. Carrier networks is expected levels of 99.999% or better, although this level is related to being intimately related to both the network architecture and protection mechanisms employed. For a good evaluation requires continuous monitoring. Compliant with the connectivity provided by the IPPM working group in RFC 2678.

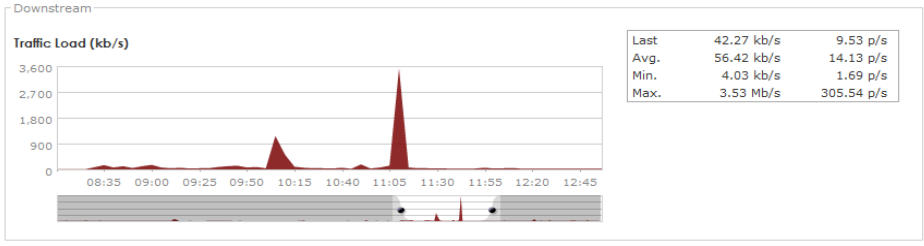
The timing of monitoring probes for the measurement of one-way delay is generally used NTP.











4.3. Other Tests

The audit process and certification of SLA may include other tests depending on the objectives:

- **Scalability testing**, of the services and the available bandwidths
- **Protection tests**, time not available from the network while switching to their protection or back up in case of fall.
- **TDM emulation verification**, or verification of the quality of TDM circuit emulation, and especially focused on the jitter of the carrier signal.

5. Reporting

Once the tests have processed all the data obtained to produce a conclusive report disclosing whether the SLA is fulfilled in its entirety.

In the case of breach made explicit the circumstances in which it is not enforced. where no or not and to what end, taking into account the availability, the profile of bandwidth and quality of service observed during measurement.

ALBEDO Telecom

ALBEDO Telecom designs, manufactures, and delivers solutions that enable Telecom organizations of all sizes to test, measure, troubleshoot, monitor, and migrate mission critical networks and multiplay applications.

On local segments and across distributed networks, ALBEDO enable Organizations, Installers, Operators, Service Providers and Suppliers to quickly check the health of Network Architectures, Service Agreements (SLA), IP Quality (QoS), or fix any issue.

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aims

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+ EXPERIENCE the best quality in unified networking
+ ASSESS different hardware, firmware, and software solutions
+ LEARN from experts by means of professional services and consultancy