SEQUIN

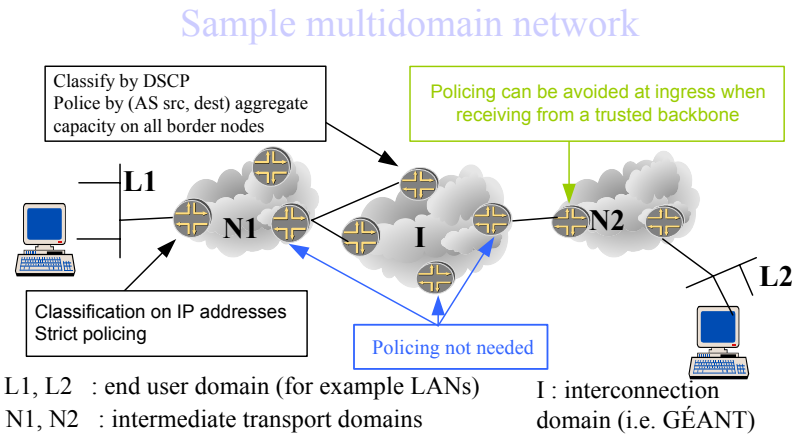
Service Quality across Independently Managed Networks

Abstract:

An end-to-end definition of network QoS to satisfy needs of international user groups is provided. The definition is complemented by an architecture and implementation model in a multi-domain and multi-technology environment, leading to the definition of a Premium IP service. A set of tests, both in laboratory and in live production IP networks has been conducted to validate the implementation model of the Premium IP service. The service is complemented by the definition of an end-to-end Service Level Specification and techniques for the monitoring and validation of an end-to-end SLA for QoS. The project concludes with providing guidelines and recommendations for wide scale implementation of Premium IP.

Objectives:

The objective of SEQUIN is to define and implement and end-to-end approach to network Quality of Service that will operate across multiple management domains and will exploit a variety of networking technologies (IP, ATM). SEQUIN will ensure that researchers across Europe have access to networking facilities that can be tailored to the requirements of the individual groups, and which will offer predictable and stable quality across multiple underlying management domains and networking technologies.



Technical Approach:

To achieve the objectives the workplan has been organised to understand the users qualitative and quantitative requirements and a technological analysis of the available networking equipment features was conducted. The combined user and technological analysis led to the definition of a Premium IP service based on the IETF DiffServ model, with emphasis on the multi-domain and multi-technology environment. The implementation model was then subject to a set of operational validation tests in a controlled environment, to outline the effectiveness of the model.

Testbed:

A set of proof of concept tests using laboratory facilities to test the functionality required by routers to implement the Premium IP service were carried out and have proved successful. The tests focused on router functionality for the classification, marking, policing and scheduling of IP packets. A set of tests with an H.323 video-conferencing international user group has been conducted to verify the multi-domain operation of Premium IP. It made use of an ad-hoc

configuration of production routers to support the service. This test has outlined that Premium IP can operate well in a multi-domain and multi-technology environment and can offer network performance guarantees in terms of the four parameters identified (capacity, packet loss, one way-delay, delay variation).

Innovation:

The main innovations of SEQUIN are related to the definition and implementation of QoS in a multi-domain and multi-technology environment. Although the devised Premium IP model is based on the DiffServ activity of the IETF, there had been no implementation to offer end-to-end QoS in an operational multi-domain environment. The definition of a Service Level Specification and of a Service Level Agreement for QoS in multi-domain scenario are an important contribution to innovation of this project.

Results:

SEQUIN has provided recommendations and procedures for a large scale deployment of Premium IP across a multi-domain environment using variety of networking equipment and networking technologies. It has also highlighted the need of monitoring the Premium IP metrics to verify them against the SLA and to troubleshoot the service.

Contribution to Standards:

SEQUIN and the Internet2 community have agreed to adopt the DSCP 46 for Premium IP destination aware use. This allows the research and education communities in Europe and North America to have an inter-operable marking for the Premium IP.

Success stories:

With the support of the SEQUIN project, Premium IP has successfully been set-up between end-sites of several international groups of users involved in other IST projects: AQUILA, LONG and MOICANE. This implies the Premium IP support on several NRENs networks and on the GÉANT network to provide this end-to-end service. This is one of the very first time a service such as Premium IP has been implemented over several operational networks to offer an end-to-end service to users spread on several networks.

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SEQUIN

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MOICANE

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