

6QM

IPv6 Quality of Service Measurement

Abstract:

The project 6QM is devoted to research and development of measurement technologies for Quality of Service in IPv6 networks. It will create a comprehensive system integrating the various required functions for QoS measurement, such as packet capturing, precise time-stamping, data collection, QoS metrics derivation (delay, loss, jitter etc.) and result presentation. In order to achieve this goal, requirements for QoS measurements in the future IPv6 networks are analyzed and a flexible architecture is proposed including local components for non-intrusive capturing of measurement data and server components collecting the relevant information for further processing. Interfaces and suitable protocols are identified. The project will align with existing standard approaches, and will propose extensions and input to standardization in problem areas, where enhancements are still required. The developed components will be integrated and locally tested. For gaining wider usage experiences and feedback, the 6QM project will set up cooperation with other IST projects working on IPv6 issues. In particular, there will be liaisons with the two pan-European native IPv6 networks (Euro6IX and 6NET), to serve as major test-beds for the validation of the 6QM system. The liaison and the cooperation between 6QM and these projects will allow the study of the impact of the characteristics of the IPv6 networks on the design of measurement tools (probes) and on the specification of the measures (metrics, collection techniques, processing methods). As part of the expected result from the 6QM project, a knowledge base and a set of guidelines will be created, which may be exploited by operators and ISPs to meet the client demand in IPv6 advanced services with guaranteed and differentiated QoS.

Objectives:

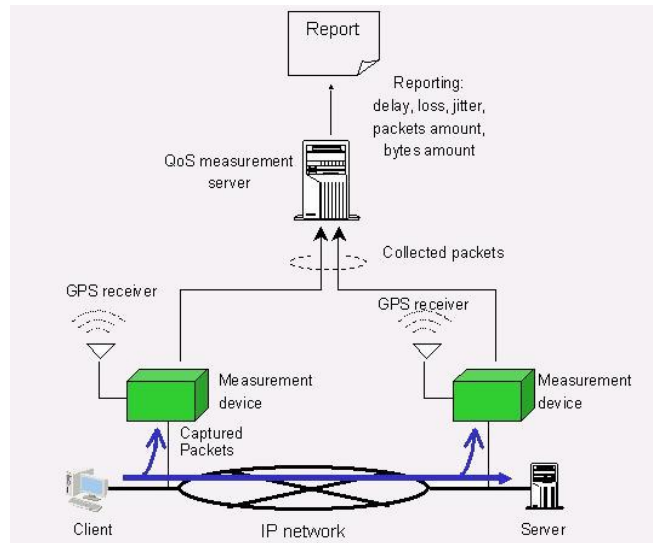
The project will develop a comprehensive approach towards IPv6 QoS measurement. In order to achieve this goal, the project has defined the following objectives:

1. Development of a measurement device for IPv6. The measurement device inserts precise (micro second order) timestamp information when it captures the IPv6 packet. Each device has a time synchronization functionality, by GPS, or any other equivalent mechanism, if widely available.
2. Development of a measurement server. The measurement server collects the captured IPv6 packet. It thereby provides not only usage data but also QoS metrics (delay, loss, jitter, etc.) for IPv6 traffic by analyzing the collected information through the measurement device.
3. Integration and local test of the developed components, for the further trial and evaluation of the developed system, at least in European IPv6 infrastructures.
4. Generation of a set of guidelines for the possible application and further research of the IPv6 QoS Measurement in different scenarios.
5. Dissemination and liaison with other related Fora and Projects, in order to publicize the project results.

Technical Approach:

In order to meet the objectives of the project, the following work packages have been defined:

- WP1 (Management and Coordination).
- WP2 (Requirement Study for IPv6 QoS Measurement) as a pre-requisite for achieving the project objectives in real large-scale scenarios, and outputs for guidelines.
- WP3 (Development of IPv6 Measurement Technology) to address the development of the measurement device and server, and generation of final guidelines.
- WP4 (System Integration, Testing, and Evaluation).
- WP5 (Dissemination, Liaison and Interconnection).



Structure of IP Measurement

Innovation:

The number of experimental projects for IPv6 networks is radically increasing with worldwide scale. These projects have been proving the effectiveness of the IPv6 protocol. Moreover, several kinds of applications using IPv6 network have been proposed, and major applications using IPv6 networks are video conferencing and game-on-the-net using real-time and peer-to-peer communication. These applications require high throughput, low delay and less data loss. Therefore, the guarantee of QoS will be quite important issue for IPv6 Operations Support System (OSS).

By relating the measured data and network configuration, the network manager can identify the specific network device that should be intensively monitored to avoid network problems. By relating the data from configuration system with the data from IP measurement server, the basic information for identifying the rest of network capacity can be expected. Based on this information, the configuration system can find the best route for establishing new end-to-end paths. Moreover, based on this data, the network operator can forecast the time when the network capacity should be increased. The major applications of IPv6 networks will require the QoS to each end-to-end path.

Therefore, to complete technologies for QoS guaranteeing network operation and management, not only the QoS control technique but also the measurement technologies for IPv6 should be developed.

Results:

During the 56th IETF (March 2003) 6QM partners participated actively in the relevant working group sessions. During the RMON session, 6QM partners presented the need of protocol identifiers for configuring measures in active and passive IPv6 and SUB IP points of measures. 6QM partners will propose a draft on this topic.

6QM partners have two other potential inputs into IETF that are inter-related. The first proposes that the definition of spatial metrics become an IPPM WG item, and the second is a solution for measuring the delay per segment in IPFIX.

The role of 6QM is to promote the dissemination of what is lacking in this area.

The ability to build a shared IPv6 QoS measurement system providing the basis for peering European agreement should be a good point to leverage the proposals made in 6QM.

Success Stories:

The project will have a significant impact on operators' networks (such as France Telecom, partner of the project) as it will ensure that the services provided to the end-users will match the subscribed contract (SLA).

Also, this project will create a synergy between operators (such as France Telecom) and telecommunication infrastructure equipments manufacturers (such as Hitachi, also partner of the project) in order to ensure that end-users needs will be taken as an input for equipment design.

Finally, through the standardization activities, the project outputs will profit the whole telecommunication community.

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6QM

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143

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Project participants:

CONSULINTEL	ES
FHG	D
FT	F
HEL	F
HIT	JAP

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IPv6, QoS, Traffic measurement

Collaboration with other EC funded projects:
6NET, Euro6IX, 6LINK

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