# VOIPFUTURE
# Smart RTP Monitoring Probe
## Functionality & Performance Tests

## Introduction

The European Advanced Networking Test Center (EANTC) tested the Advanced RTP Monitoring solution developed by VOIPFUTURE. According to VOIPFUTURE the Smart RTP Monitoring Probe should be able to analyze VoIP streams in real-time at Gigabit Ethernet full line rate.

This solution is aimed to give customer using VoIP services the ability to measure and effectively optimize the quality of all VoIP sessions running through the network in real-time. In our test the VOIPFUTURE Smart RTP Monitoring Probe achieved VoIP analysis in real-time at Gigabit Ethernet line rate. The solution recognized the quality degradations we introduced and provided accurate reporting.

**VOIPFUTURE**
**Smart RTP Monitoring Probe**

- ☑ Live Traffic Monitoring
  of Voice Services at Gbit Line Rate
- ☑ Service Assurance
  Voice Quality Assessment
- ☑ Performance Analysis
  Optimize & Troubleshoot Networks

Test Period: September 2009
Smart RTP Monitoring Probe 1.9


Tested by EANTC 2009

**Test Highlights**

- ➜ **Gigabit Line Rate RTP Monitoring**
- ➜ **Real-time VoIP Quality Assessment**
- ➜ **Individual Stream Monitoring**
- ➜ **No SIP Signaling Needed**

## Tested Device & Test Equipment

The VOIPFUTURE Smart RTP Monitoring Probe is based on an IBM server platform x3550. The VOIPFUTURE Smart RTP Monitoring Probe implementation is optimized to take full advantage of the multithreading capabilities of multi-core server processor architectures.

The optimized system architecture of the probe is able to process and evaluate IP packets at line rate to provide in-call quality information for every RTP session. VOIPFUTURE's innovative metric generated in 5 seconds intervals is the key to identify the impairments and time of quality degradation within streams.

The test system on which we achieved the results written in this report had the following hardware specifications: 1x Intel Xeon E5440 2,83Ghz; 4x 1GB Ram; 2x 147GB SAS 15k; high performance packet monitoring card with 4x1 GBit/s interfaces providing full line-rate processing with zero packet loss.

VOIPFUTURE is a high-tech company providing RTP monitoring as a standard network element to carriers, enterprises and system integrators.

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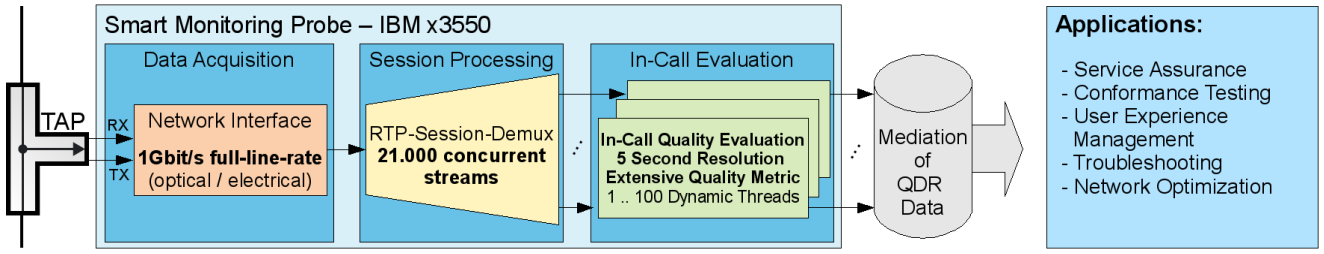



VOIPFUTURE utilizes a Test Access Port (TAP) device which splits the wire that needs to be analyzed. This TAP box delivers two Gigabit Ethernet links towards the network interface card of the VOIPFUTURE Smart RTP Monitoring Probe, one for each direction.

Our test bed was based on an Ixia Optixia XM2 and Optixia X16 load generator to generate stateful application layer traffic. In addition we used the Calnex Paragon impairment emulator to simulate several network conditions like packet loss and IP packet delay variation (IPDV).

## Analyzing Performance

**Test Highlights**

- ➜ VoIP Analyzing at Gigabit Ethernet Full Line Rate
- ➜ Real World Performance

In this set of tests we verified the monitoring and analyzing performance of the VOIPFUTURE Smart RTP Monitoring Probe. We evaluated two test scenarios. In one scenario we tested the analysis performance for 1Gbit/s RTP traffic. The second scenario was based on a typical protocol mix of HTTP, FTP and RTP traffic. While receiving the packets from the network interface card, the VOIPFUTURE Smart RTP Monitoring Probe is checking whether the packet includes an RTP header. If no RTP header is present, the packet will not be processed by the system at all.

### RTP Traffic Monitoring

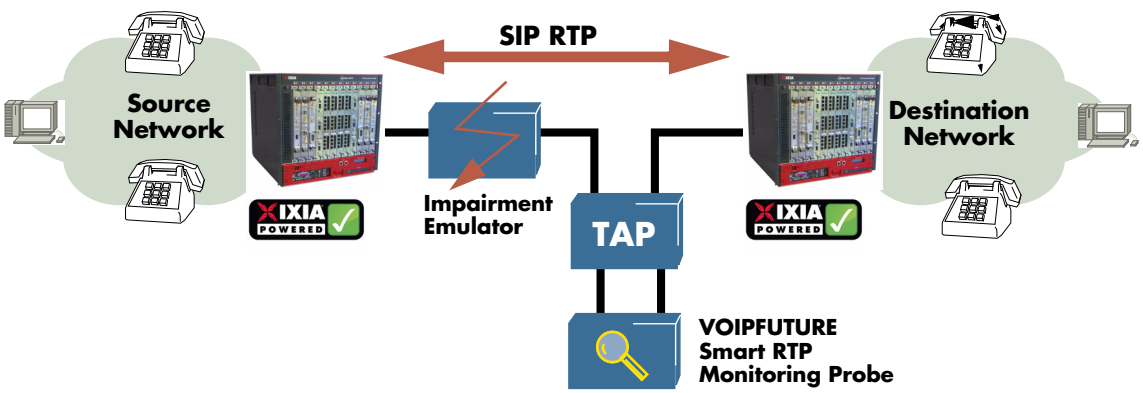
This test scenario covered the worst case where all packets needed to be analyzed by the VOIPFUTURE Smart RTP Monitoring Probe. We emulated 21,000 unique IP hosts and two IP subnetworks -10,500 hosts in each subnetwork. First we established 10,500 SIP session between the hosts of the two subnetworks. These sessions were used to establish 21.000 RTP based audio streams at Gigabit Ethernet full line rate utilization.

The monitoring probe was able to detect all 10,500 bidirectional RTP sessions (in total 21,000 sessions) and analyzed the quality for each session separately.

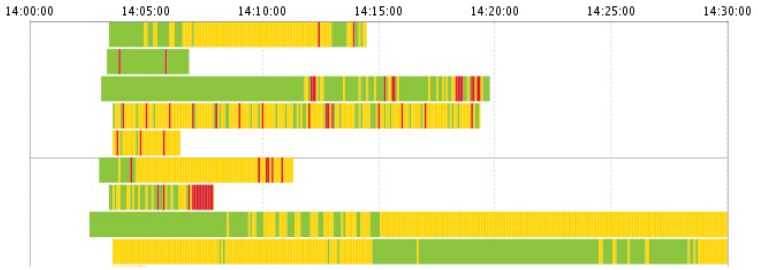
### Monitoring of Realistic Application Mix

To prove the reliability and the performance of the monitoring probe for operation in realistic customer environments we emulated a mix of application layer protocols like HTTP, FTP and RTP. The header of each incoming packet is analyzed by the monitoring probe. If the packet contains an RTP header it is processed further by the CPU unit. If no RTP header is found in the packet, it will not be analyzed at all.

Our mix contained 300 Mbit/s HTTP, 200 Mbit/s FTP and 500 Mbit/s RTP stateful traffic. The probe successfully identified all RTP sessions and analyzed each sessions separately.



| ID | Duration | Source IP | Monitor |
|---|---|---|---|
| 3852 | 00:11:05 | 10.107.55.64:7086 | 00:15:17:7f:26:4e |
| 3392 | 00:03:32 | 10.80.207.73:10000 | 00:15:17:7f:26:4e |
| 5940 | 00:16:43 | 10.66.3.246:10000 | 00:15:17:7f:26:4e |
| 2756 | 00:15:49 | 10.70.53.171:10000 | 00:15:17:7f:26:4e |
| 3378 | 00:02:54 | 10.80.81.180:7078 | 00:15:17:7f:26:4e |
| 3249 | 00:08:21 | 10.78.46.60:7082 | 00:15:17:7f:26:4e |
| 2441 | 00:04:31 | 10.67.4.42:10000 | 00:15:17:7f:26:4e |
| 4244 | 00:59:38 | 10.121.79.32:7082 | 00:15:17:7f:26:4e |
| 2213 | 00:40:10 | 10.64.172.22:7078 | 00:15:17:7f:26:4e |




## Detecting Network Failures

In order to verify the ability of the device to detect several network failures like packet loss or anomalies like packet delay variation, we used an impairment emulator to simulate such network conditions in our test network. The ITU-T describes, in its recommendation G.1050, a network model for evaluating multimedia transmission performance which includes typical impairment ranges for several kind of networks. We chose our impairment values according to this recommendation and tested the accuracy of detecting those network conditions by the monitoring probe.

### Failure Detection - Packet Loss

According to VOIPFUTURE the monitoring probe is able to detect lost packets for each RTP stream independently. We emulated 10,000 SIP sessions and added packet loss impairment for 4,545 of these sessions, defined by the subnet IP address.

The monitoring probe detected all RTP sessions and showed the impaired sessions with packet loss.

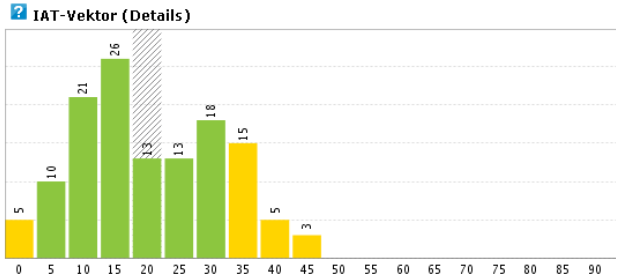
The post processing user interface provides the customer the ability to have a time based overview of critical events and provides built-in functions to identify the source of the problem easily.

### Failure Detection - IP Packet Delay Variation

The VOIPFUTURE Smart RTP Monitoring Probe is able to detect IP packet delay variation (IPDV) for each RTP stream separately. Doing so, the monitoring probe is measuring the packet inter arrival time for each packet within a stream and collects the results accordingly.

As voice transmission requires low packet delay variation, such monitoring probe is expected to indicate the quality of the observed voice sessions.

We measured the detection of packet delay variation for each single RTP session. The monitoring probe showed the inter arrival time (IAT) vector and rated the measured values in three levels: normal (green), tolerable variation (yellow), critical variation (red).




## Summary

The VOIPFUTURE Smart RTP Monitoring Probe showed excellent analyzing performance at full Gigabit Ethernet line rate. It detected network service quality impairments like packet loss or IPDV for each stream individually.

Looking at all implemented features and the very intuitive user interface this monitoring probe provides the customer a very helpful tool to identify network related problems of its VoIP service and at the same time it provides tools to find the source of the problem and shows details and statistics about such events.

## About EANTC

The European Advanced Networking Test Center (EANTC) offers vendor-neutral network test services for manufacturers, service providers and enterprise customers. Primary business areas include interoperability, conformance and performance testing for IP, MPLS, Mobile Backhaul, VoIP, Carrier Ethernet, Triple Play, and all kind of IP applications.

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