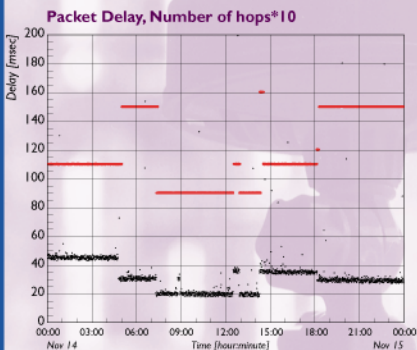




- **What do you really know about the quality of your connectivity to the rest of the Internet?**
- **Can you effectively diagnose problems involving other networks?**
- **Can you detect long-term trends in your external connectivity?**
- **The Test Traffic Measurements Service, or TTM, will provide the answers for you!**



*Example plot showing the network delay between 2 sites for a 24-hour period as well as, in red and multiplied by 10, the number of hops seen by the traffic between those sites.*

TTM allows you to comprehensively and continuously monitor the connectivity of your network to other parts of the Internet. TTM provides your NOC (Network Operations Centre) with information to investigate problems and avoid that they will reoccur. TTM provides you with trend analysis, making it possible to address problems pre-emptively.

TTM is offered as a full service by the RIPE NCC. All measurements are done automatically; all you have to do is to look at the results.

# What are Test Traffic Measurements?

Test Traffic Measurements Service (TTM) measures key parameters of the connectivity between your site and other points on the Internet; in particular, delay and packet-loss, with additional measurements being developed. TTM allows you to comprehensively and continuously monitor the connectivity of your network to other parts of the Internet.

TTM uses dedicated measurement devices (test-boxes) that generate a small amount of traffic. TTM will not put a significant load on your network infrastructure. Also, TTM will not look at any data on your network, ensuring your privacy.

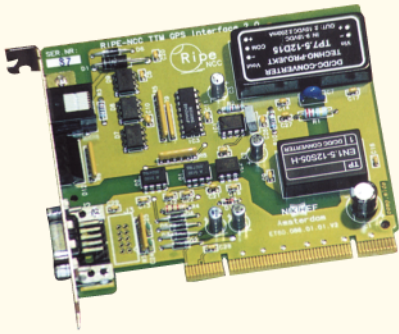
TTM is a full service offering. The test-box measurement devices are operated as black boxes by the RIPE NCC staff. Once a test-box is installed, support from the customer's staff is limited to operations requiring physical access to the equipment.

TTM has been proven by more than 4 years of operational experience. A dedicated team at the RIPE NCC is working full time to continually improve the product and to adapt it to the user's needs. TTM users and other experts can make their future requirements known by participating in the open process of the RIPE TT Working Group.

## ***Installing a test-box***

TTM test-boxes consist of a measurement computer and a GPS antenna. They are easy to install. All you need is rack space, a connection to your network near a border router, and a suitable place for a GPS antenna. The GPS antenna can be connected to the computer using up to 250m of standard CAT5 cable, which can be routed via existing patch panels if necessary. No special cables are needed. Test-boxes are pre-configured. All you have to do is to switch the machine on and measurements will start.

# Unique features



- Other than techniques based on echoing probes such as “ping”, TTM measurements are one-way and can analyse asymmetric effects.
- TTM metrics are those developed by the IETF in an open process.
- TTM measurements are on the network level and therefore independent from applications.
- TTM measurements are independent of the underlying network; we do not use active network elements to monitor themselves.
- TTM allows you to comprehensively and continuously monitor the connectivity of your network to other parts of the Internet.
- TTM provides trend analysis that makes it possible to address problems pre-emptively.
- TTM will allow your NOC staff to trouble shoot problems after the fact and take action to prevent them from reappearing.
- To date, more than 70 test-boxes have been installed at network sites globally. This number is expected to grow to 100 in early 2002 and up to 200 in late 2002. Therefore, installing a test-box at your site immediately provides you with performance data to sites all over the world.
- TTM is provided by the RIPE NCC, a neutral and impartial organisation. All results will reflect true network performance without being biased by commercial interests.

## ***The test-boxes offer these functionalities***

- Access, for you and your customers, to a protected website on the test-box, with plots showing delay and losses between sites. These plots are updated continuously, allowing you to investigate network problems as soon as they occur.
- Email notification of unexpected changes in the network, warning you before your customers complain.
- Access, for you and your customers, to a protected website with plots showing the following activity between sites:
  - Delay measurements
  - IP Delay Variations (a.k.a. Jitter) measurements.
  - Packet loss analysis
  - Bandwidth (to be released early 2002).Plots are updated daily. A full statistical analysis of the data is also available.
- Access to a database with routing information.
- Trend analysis of the data, allowing you to predict future demands for network connectivity.
- Access, for you and your customers, to summary pages indicating which connections caused problems in the last 24 hours.
- Access to “plots on demand”, a service that generates plots and analyses data on demand, based on user parameters.
- Access to the raw data, allowing your NOC staff to analyse problems in detail.

A white paper describing the technical details of these measurements is available from our website.

## ***Functions to be added include***

- Network performance scores.
- Course material to show your NOC staff how to troubleshoot operational problems with TTM data.
- Provision of more data in real-time and other delivery methods for alarms.
- The RIPE NCC is collaborating with several university groups on modelling the TTM data. More network analysis tools will be developed based on this research.

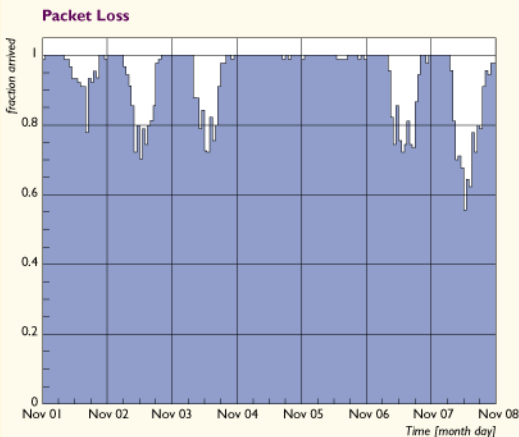
## **NTP server**

- A test-box can be used as reference clock for the computers on your network. They are stratum-1 NTP servers, providing time-stamps with accuracy of the order of 10 $\mu$ s.

## **Applications of the data**

- Verification of the performance of the network operated by the host site or its upstream providers, with the possibility to react to problems before the host's customers complain.
- Find current as well as future bottlenecks in your networks.
- As these devices are operated by a neutral organisation, the data can be used as an independent verification of Service Level Agreements (SLAs) between your organisation and a third party.

The RIPE NCC offers various ways to integrate the output of the test-boxes with existing monitoring systems and is always interested in collaborating with customers to develop interfaces to other monitoring systems.



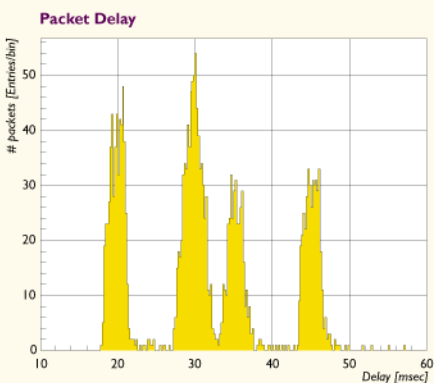
*Plot showing the packet loss between 2 test-boxes.*

In 1997, an apparent need for metrics to measure network performance became clear and the Internet Engineering Task Force IP Performance Metrics Working Group (IETF IPPM WG) was established for this reason. The Working Group has published standards for measuring one-way and round-trip network delays, packet loss rates, and connectivity. These standards are published in RFCs 2330 and 2678-2681. Other metrics, such as delay variation and throughput, are currently under discussion and will be implemented in due course. For more information on the work of the IPPM WG, see:

<http://www.ietf.org/html.charters/ippm-charter.html>

The RIPE NCC has been involved in the IPPM WG since its establishment. In parallel, it has implemented the standards in the test-boxes.

The RIPE NCC now also offers the Test Traffic Measurements Service to the Internet industry. The goal of the TTM Service is to install and operate test-boxes at the sites of interested parties, collect and analyse data, and present the collected information in a useful format for the customers.



*Plot showing the distribution of network delays between the two sites shown in the plot on the front page of this brochure.*

Test-boxes are available in 2 models: a 1u high model (shown on the front of this brochure) and a 4u high model. Prices vary from € 2100 to € 2500, excluding installation, shipping, and applicable taxes. The service fee is € 3000 per year.

The RIPE NCC offers volume discounts for organisations hosting more than one test-box. The technology can also be licensed for other network performance measurements. More information is available on request.

## **How to order**

More details about the purchase of a test-box and the TTM services can be found in the RIPE document **Providing Test Traffic Measurements (TTM) as a Membership Service** (ripe-209), available at:

- <http://www.ripe.net/ripe/docs/ttm-memberservice.html>

Test-boxes can be ordered online through a webform at:

- [http://www.ripe.net/test-traffic/Host\\_testbox/host\\_textbox.html](http://www.ripe.net/test-traffic/Host_testbox/host_textbox.html)

After you have completed the webform, you will receive a customised version of the sales and service contract. The template text of the purchase and service agreement can be found in the RIPE document **RIPE NCC Test Traffic Measurements Service and Test-Box Purchase Agreement** (ripe-214), available at:

- <http://www.ripe.net/ripe/docs/tt-purchase.html>

The RIPE Network Coordination Centre is a not-for-profit membership association with more than 3000 members comprised mainly of Internet Service Providers (ISP), telecommunications organisations, and large corporations representing 109 countries in Europe, the Middle East, Central Asia, and African countries north of the equator. Since 1992, the RIPE NCC has been providing services to support the operation of the Internet infrastructure in a neutral and professional manner.

## Contact Information

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### Further information

Technical information about the project is available at:

<http://www.ripe.net/test-traffic/>

For more information about the RIPE NCC in general, visit:

<http://www.ripe.net/>

