TREX is dedicated to developing exchange points and the Internet as a whole. TREX will function as a research platform for participating operators and organizations. We also host annual **seminars** where research topics also get some better visibility among the operator community.

TREX is ideally located for this purpose: Several International ICT companies - including Huawei, Intel, Nokia and Qualcomm - have research centres in Tampere. There are also two universities: **University of Tampere**[1] and **Tampere University of Technology**[2].

Funding for the research will come mostly from the industry. Some projects will apply for research and development grants from the Finnish National Technology Agency - **TEKES**[3] or from the **European Union**[4].

Primary areas of research are:

- Services

- Interoperability

- Inter-Operator Cooperation

- Emerging Technologies

- Modelling and Measurement

Please **get in touch**[5] with us in order to join an existing research project or to propose a new one.

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[1] http://www.uta.fi/
[2] http://www.tut.fi/
[3] http://www.tekes.fi/eng/default.asp
[4] http://europa.eu.int/
[5] https://mailman.trex.fi/listinfo/research/

## ⊣⊦　**Current Projects**

Right now we only have small pet projects, such as **DNS64/NAT64 testing**. We are also developing **Reseller Programs** with a handful of operators.

## ⊣⊦　**Past Projects**

TREX was involved with **The Future Internet**[6] cluster of Finnish Strategic Centres for Science, Technology and Innovation in the field of Information and Communications Technologies, also known as ICT SHOK FI. TREX is still one of the test bed providers in the project.

**The IPLU Project**[7], aka Dependability evaluation methods for IP networks, aimed to create a conceptual framework for assessing the complex problem "Can one rely on IP technology?" The project started in November 2005 and TREX was directly involved with it for one year. Since then we have been indirectly involved. The project ended in the year 2012.

IPLU organized a seminar on May 17th 2006 and TREX had a presentation there, titled **Reliability of the Internet, IXP Role**(PDF).

TREX was chosen as one of the research platforms for **The Digital Media Service Innovations Association**[8].

## ⊣⊦　**Services**

The idea is to develop new services that an exchange point can provide to its member networks. These are typically not services that end users could use directly. Rather, the member networks are supposed to refine them further for user consumption.

Typical services adopted by many exchange points world wide are root name service and stratum 1 time service. TREX participates in **The AS112 Project** which is an anycast name service.

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[6]http://www.future-internet.fi/
[7]http://iplu.vtt.fi/
[8]http://www.dimes.fi/

## ⚑ Interoperability

When new protocols are implemented by several different vendors' equipment, it is important to test how well they work together.

## ⚑ Inter-Operator Cooperation

An exchange point is an ideal organization for facilitating WLAN roaming by virtue of neutrality. There is some interest in sharing user information between operators of different types of wireless networks for roaming.

The rate of the global routing table growth is faster than the rate of the hardware advances required. This is also a hot topic for research and will require Inter-Operator Cooperation.

## ⚑ Emerging Technologies

Multicast and IPv6 are both beginning to be quite widely deployed, but there still remain lots of advances to be made in both fields.

Other technologies where some development and deployment is expected include QoS/DiffServ and MPLS.

One longer span research focus will be the use of **DWDM** optical cross connection technology as the core of the exchange instead of a packet switch. We are planning to do some research in using **DWDM** as the core exchange technology.

## ⚑ Modelling and Measurement

An interesting research topic involves measuring how the Internet grows and predicting its future. Some measurement variables of interest are growth patterns, traffic patterns and the routing table.