

IPv6 – TESTING AND SIMULATION OF NETWORK ARCHITECTURES

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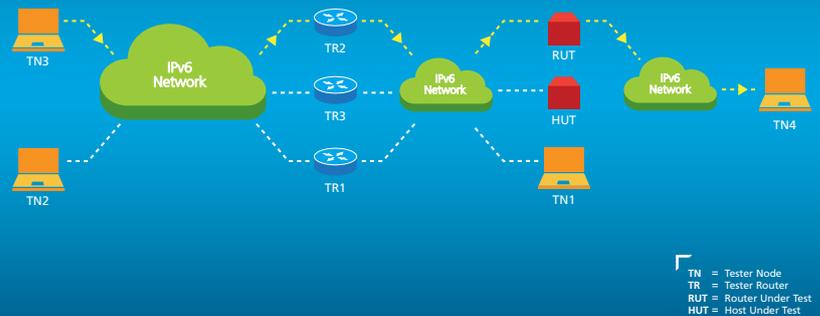
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Similarly to real life, the Internet uses a sort of „postal codes“. For the purpose of enabling communication between devices, so-called IP (Internet Protocol) addresses are in place. Hitherto, the addresses were managed based on the principles of the Internet Protocol Version 4 (IPv4). This protocol was established in 1981 and facilitates the usage of 4,3 billion IP-addresses. By that time it was unthinkable that a larger address space might ever be required in the scope of the Internet. The last available subset of IPv4 addresses was allocated in 2011. In parallel, the Internet Protocol Version 6 (IPv6) is being developed. It enables the allocation of 340 sextillion IPv6 addresses. Furthermore, IPv6 improves key network functions as well as the performance of routers and the security regarding the communication over Internet. For instance, based on IPv6 it is possible to automatically setup networks, i.e. Address Auto-Configuration based on stateless or state full Address Auto-Configuration principles, such as DHCP (Dynamic Host Configuration Protocol).

Simulation und Testing of Network Concepts and Components

Fraunhofer FOKUS has developed different IPv6 test beds to enable the testing of single network components, network architectures, data centers and Internet based services. Additionally, the Fraunhofer FOKUS researchers provide simulation and emulation environments for IPv6 based network architectures. These test and simulation/emulation environments make it possible to investigate the compliance of networks and devices to the IPv6 standards and to evaluate aspects such as the feasibility, security, management complexity and availability of emerging IPv6 based network infrastructures.

Reference test environment
for IPv6 conformance tests



IPv6 Test Bed

The IPv6 test bed of Fraunhofer FOKUS enables the execution of conformance and interoperability tests for network devices (e.g. routers, servers, end systems etc.). Standardized test suites of the IPv6 Ready Logo program (of the IPv6 Forum) are used to verify the conformance and interoperability of IPv6 components according to the belonging standards. With these tests, the correctness of the IPv6 functionalities implemented in network devices, e. g. a router, can be verified. The results of the test execution constitute the basis for a follow-up IPv6 Ready Logo certification of the device/component in question.

In addition, the Fraunhofer FOKUS IPv6 test bed enables the execution of conformance tests for the following protocols: IPv6 Core Protocols – RFC 2460 (IPv6 Specification), RFC 4861 (Neighbor Discovery for IPv6), RFC 4862 (IPv6 Stateless Address Auto-Configuration), RFC 1981 (Path MTU Discovery for IPv6) and RFC 4443 (ICMPv6). If required, it can be expanded to DHCPv6, MLD, IPsec, SNMP and MIPv6 protocols. These protocols offer various innovative network functionalities (e. g. multicast, mobility) based on IPv6. Fraunhofer FOKUS researchers also support their clients with setting up and commissioning individual test beds, e. g. for continuous outside IPv6 Ready Logo certification tests.

Simulation and Emulation of IPv6 based Network Architectures

Before implementing large IPv6 based networks, it is necessary to evaluate the required configuration effort, feasibility, management complexity and network security in advance. This is the only way to estimate the expected effort and potential costs of a complex infrastructure. Fraunhofer FOKUS researchers offer the service of supporting their clients during the planning and operational phase with simulation and emulation tooling for data centers and complex IPv6 based network infrastructures. Especially security aspects, e. g. general availability or confidentiality of traffic paths, are taken into account. That way it can be guaranteed that data remains within confidential network segments. Furthermore, by using simulation/emulation to evaluate networks in advance, the probability for infrastructures increases to remain available even during potential breakdowns.

What we offer

- IPv6 conformance tests for the following protocols:
 - RFC 2460 (IPv6 Specification)
 - RFC 4861 (Neighbor Discovery for IPv6)
 - RFC 4862 (IPv6 Stateless Address Autoconfiguration)
 - RFC 1981 (Path MTU Discovery for IPv6)
 - RFC 4443 (ICMPv6)
- IPv6 interoperability tests
- Support for setting up and implementing test beds
- Realistic simulation for IPv6 based network architectures and configurations

