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Topic 1: Identifying Hosts in Home Networks

Current Internet architecture need to be improved. IPv4 addresses are a scarse resource and IPv6 is not here yet. As a workaround, we have have Network Address Translators. However, the NATs come with a drawback, because it is difficult to address hosts in private address realms. New namespaces, operating on between transport and network layers, have been proposed as a remedy for this. Alternatively, this could be handled also in higher layers. Compare different alternatives from different viewpoints: architectural, security, deployment, usability, performance, etc. What alternative would fit the best for home consumers and why?

This topic requires understanding the architecture of the networking stack, basic knowledge of transport and network layer protocols (TCP, UDP, IPsec, TLS) and application layer protocols (SIP) is required. Understanding of NAT and firewall architecture is necessary.

http://www.brynosaurus.com/pub/net/uia-osdi.pdf
http://saikat.guha.cc/pub/cucs06-nutss.pdf
http://www.iki.fi/miika/docs/f17-komu.pdf

Topic 2: Applying Host Identity Protocol in Home Networks

Host Identity Protocol provides cryptographic end-host authentication and data encryption. It also provides mobility and multihoming capabilities to end-hosts, and makes possible to traverse Network Address Translators. Your task is to chart different use cases and perhaps discover new ones that would benefit from the new properties. Did you find any problems? Did you find a new killer application? You may also try one of the existing implementations describe your experiences.

This topic requires a student with a crisp and imaginative mind, but requires also understanding of networking stack, IPsec and NAT architecture.

http://infrahip.hiit.fi/papers/hip_applications.pdf
http://www.iki.fi/miika/docs/f17-komu.pdf