

Thoughts on Home Networking Architecture

draft-arkko-townsley-homenet-arch-00.txt

Jari Arkko
Mark Townsley

Outline

- Trends
 - Basic network architectures
 - Functionality
 - Design principles
-

Trends

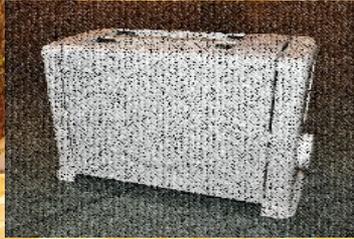
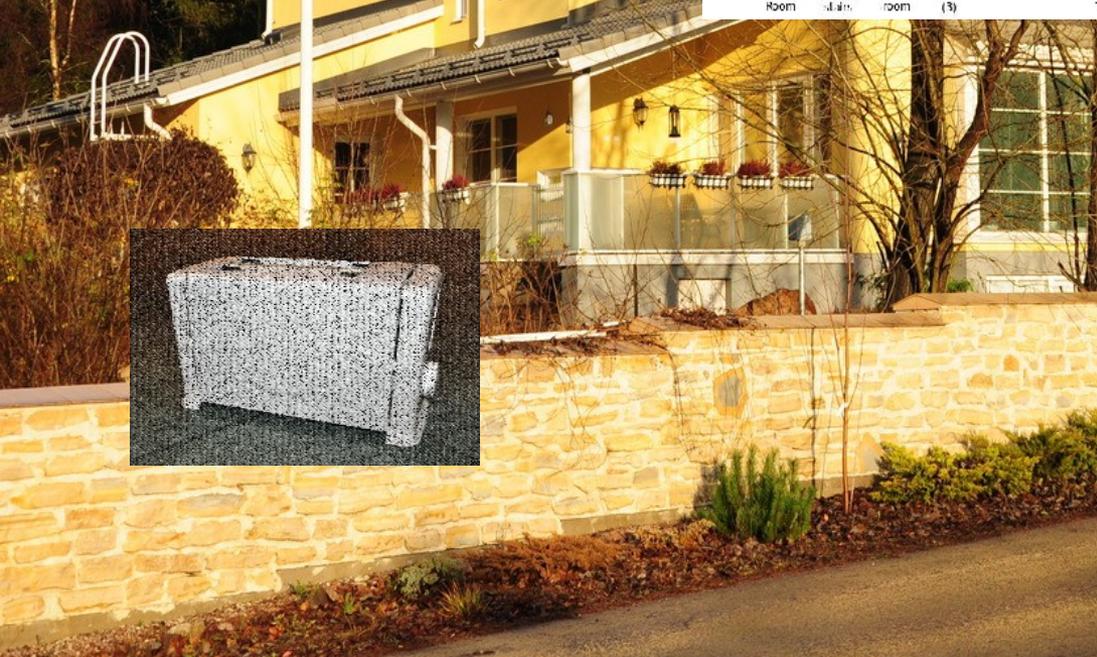
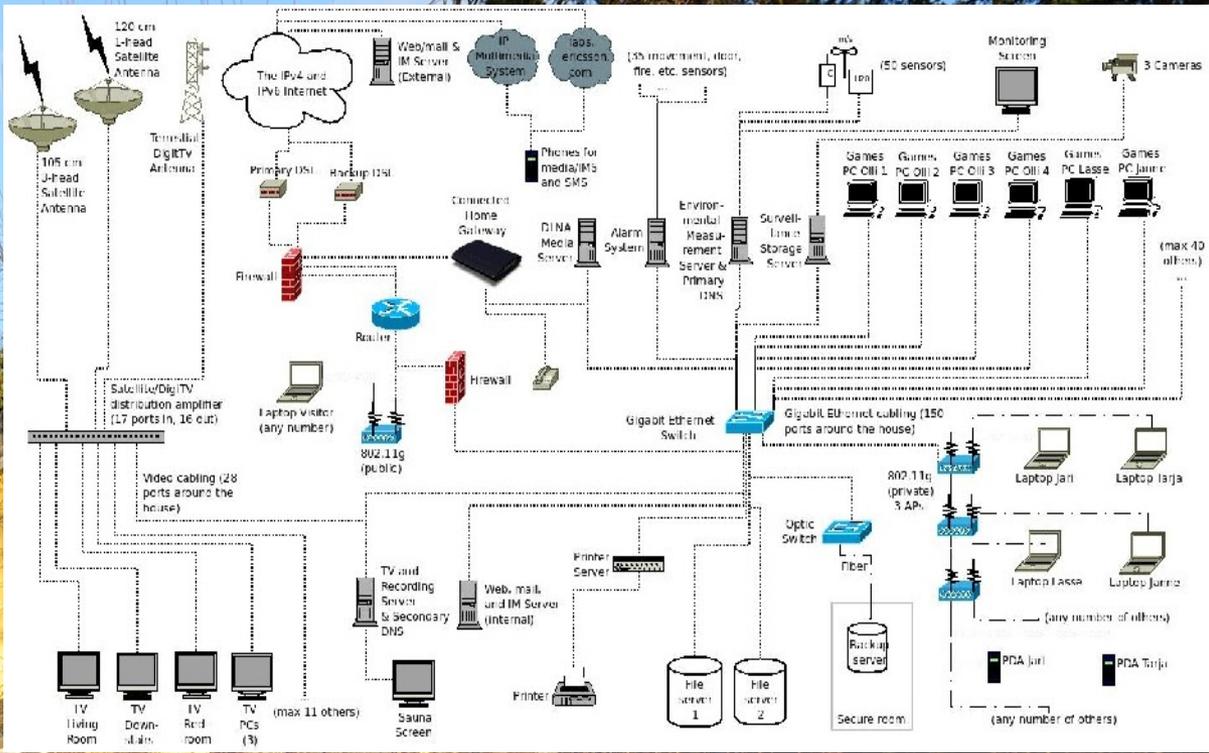
- IPv6 – moving to towards this
 - Separate networks (guest vs. private vs. utility)
 - Explosion in the number of devices
 - Different technologies (Ethernet-like vs. sensor networks)
 - Borders and the elimination of NAT
 - Naming and manual configuration of addresses
-

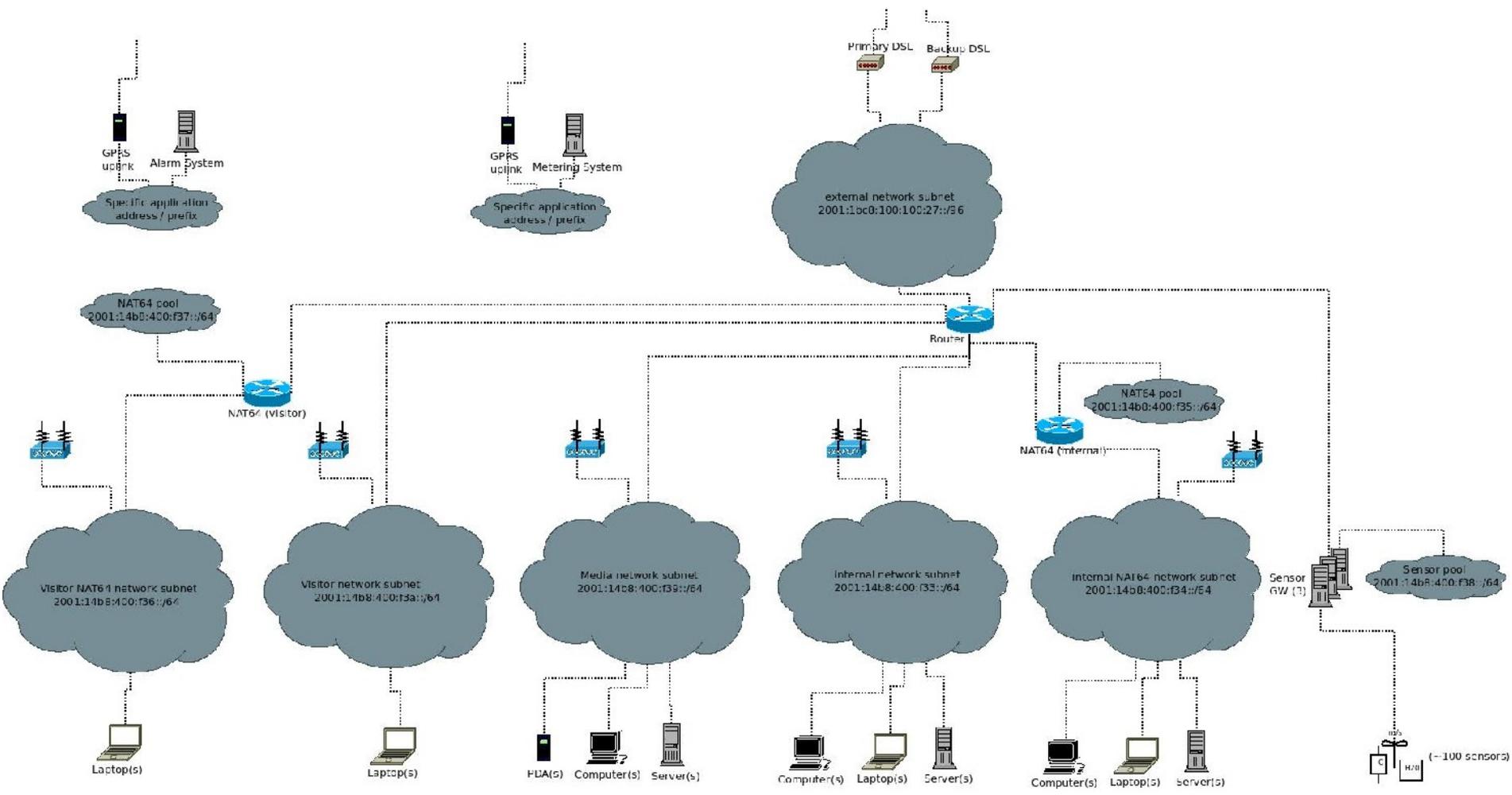
Basic Network Architectures

Basic Network Architectures

- See RFC 6204, v6ops-ipv6-cpe-router-bis, draft-baker-*
 - One router, one subnet on the home side
 - Or multiple subnets
 - Or even multiple routers
 - Heterogeneous link technology, mixture of old and new devices, routers and servers and hosts
-

A Real-World Example...





Some Experiences

Automation is needed (even for us geeks):

- It all started out manually... then I realized that I had to run a routing protocol
- ... and a tool that discovers what devices I have
- ... and now I've lost track of what prefixes I have where

And then I realized I really need automation

- One morning I found that my ISP had renumbered me
 - (That morning was a day before this IETF...)
-

Some Experiences

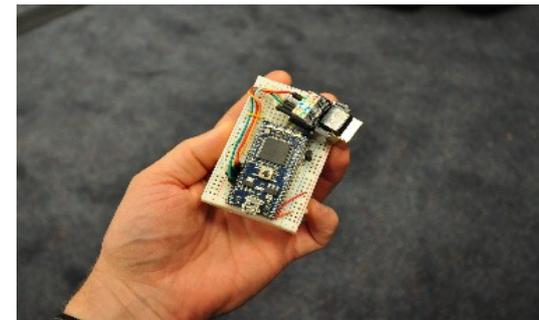
IPv6 service from the ISPs? You are on the bleeding edge:

- They just don't have it
 - "IPv6 security is not defined yet"
 - "We'll give you 5 IPv6 addresses"
 - "You get a /64"
 - "You can get a /56 but only if you have an IPv4 subnet"
 - Overall, many people who do this end up exercising the code and practices for the first time
-

Some Experiences

Internet of Things, M2M, and sensor networks

- Many of these are legacy today; IP nodes act as front-ends to legacy networks
- But migrating to IP; I'm moving from legacy-on-cat6 to IPv6-on-the-same-Ethernet-network model
- Typically consists of server(s) and small devices
- There are significant differences between LAN-based sensor networks and routed, multihop designs (I'm deploying the former)
- Multihop networks may need special, low-power routing protocol designs, LAN networks usually fit the rest of the architecture as-is
- Ownership, legal, safety issues may dictate different networks



Some Experiences

Internet of Things (Continued)

- The key is general-purpose technology
- We need more WLAN/GSM/Ethernet, more HTTP/COAP, more standard switches, routers, servers
- That's why we are migrating legacy solutions to IP
- My cat6 network has been tremendously flexible resource
- Now we will see the same with my Ethernet & IPv6 networks



Some Experiences

Naming and service discovery

- Mandatory beyond running just a router
 - File servers, printers, any home automation involving multiple devices, etc.
-

Functionality

- Prefix configuration (= address assignment is automatic)
 - Managing routing (= automatically on)
 - Naming (across the home)
 - Service discovery (across the home)
 - Security (beyond "simple security" – RFC 6092)
-

Some Design Principles

- Largest possible subnets
 - Transparent e2e communications (avoid NATs etc)
 - Self-organization
 - Avoiding topology assumptions
 - Intelligent policy (not hard coded in RFCs, not burned into the network architecture as NATs)
 - Enable existing code in the box, don't add too much more
-