Getting your routers future-proof

What about Homenet on BSD ?

Massimiliano Stucchi - BSDCan 2018

6 June 2012

6 Years later…

6 June 2018

IPv6 is happening

- India and Belgium **over 50%**
- Germany, Uruguay, US, Greece **around 40%**
- Many other countries **around 30%**

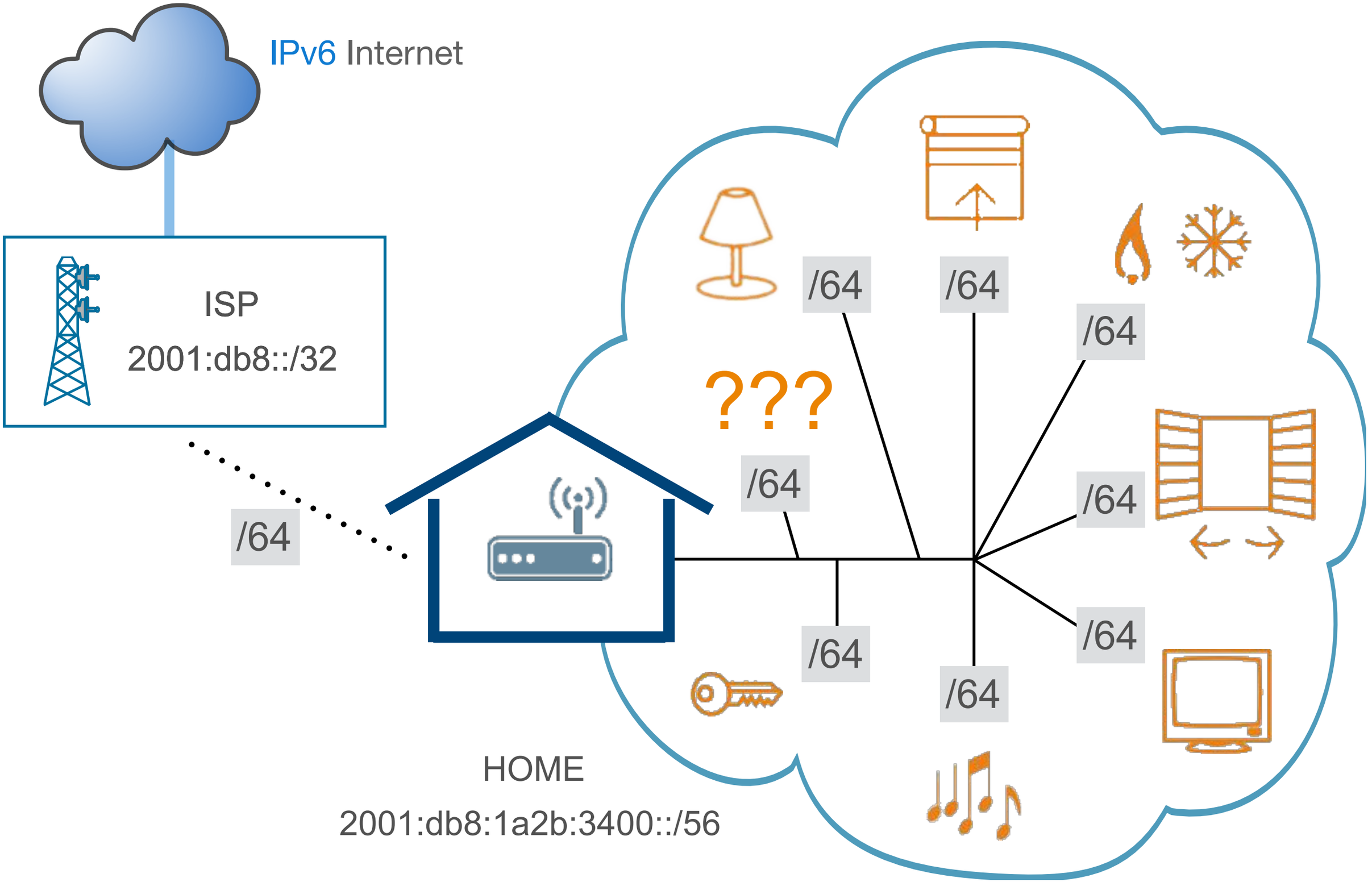
New technology and functions

- Around 3,739 billion Internet users now
  - around 49,6 % of all people in the world

- Mobile phones are Internet devices

- The Internet of Things
  - How will the Internet look like in 5 - 10 years?

Future Casa


IPv6 Internet
ISP
2001:db8::/32
/64
HOME
2001:db8:1a2b:3400::/56
???
/64
/64
/64
/64
/64
/64
/64

Assigning IPv6

- ISPs should assign between a /56 and a /48
- /64 for each subnet
  - Otherwise SLAAC will not work
- Number of hosts in a /64 is irrelevant

Homenet

- Multiple RFCs:
  - RFC7368
  - RFC7787
  - RFC7788

- A series of protocols and functions to be used for Home Networks to fully enable IPv6
  - … and _maybe_ offer IPv4

Homenet enables

- Zero-configuration networks
- Multiple subnets
- Multiple routers
- Multiple upstreams
  - With multiple prefixes
- Internal, external name resolution

Translates into…

- **Babel**
  - Internal routing protocol
- **DHCPv6**
  - Client, Server, Prefix-Delegation Client, Prefix-Delegation Server
- **DHCPv4**
  - Client, Server
- **DNCP** (Distributed Node Consensus Protocol)
  - Home Networking Control Protocol is a profile of DNCP
- **DNS**
  - Multicast DNS Proxy, Resolver, Authoritative
- **SLAAC**

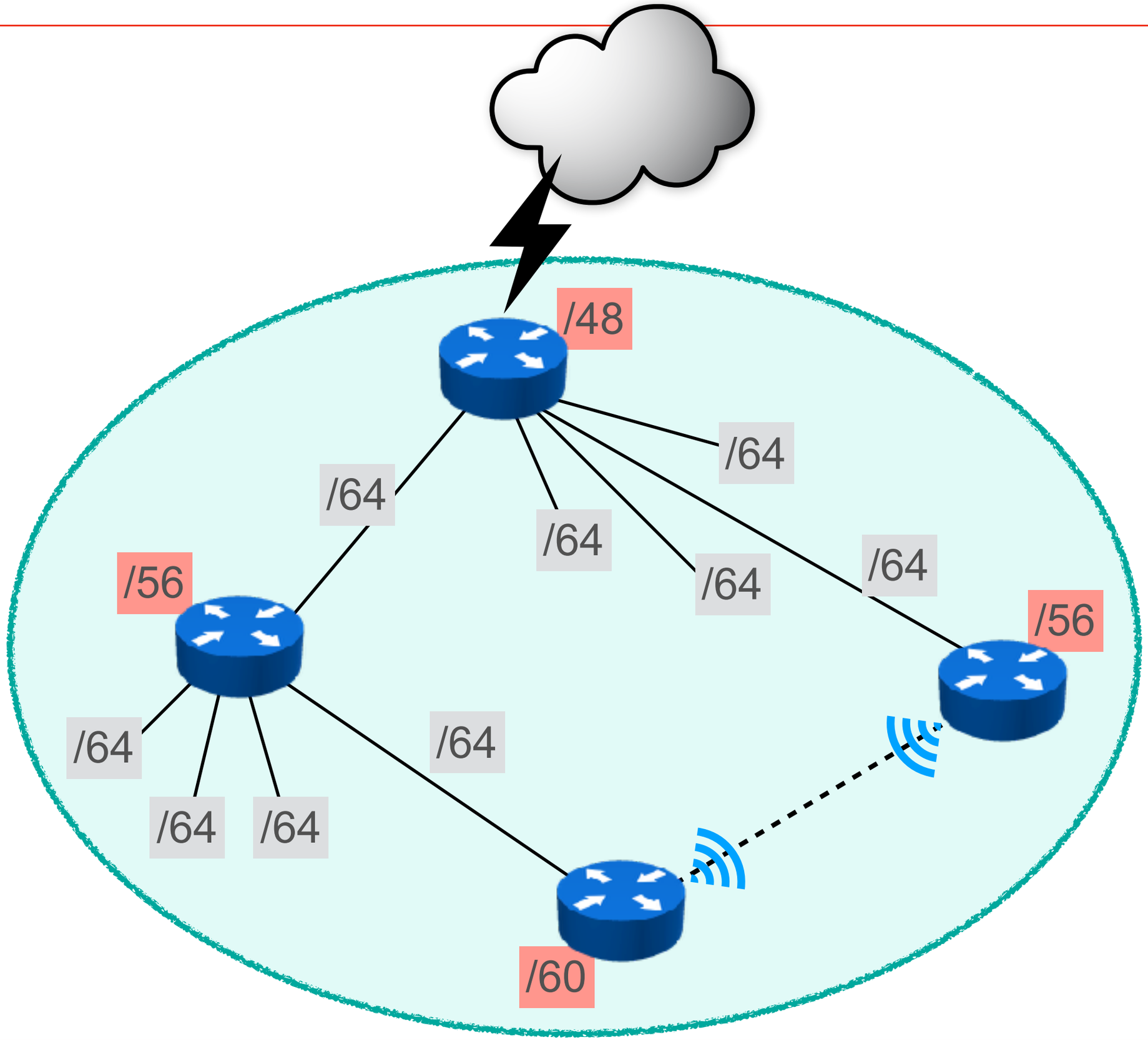
Selling points

- Auto-discovery of upstream
- Internal naming for devices
- Dual-stack, Fully routed network (only layer 3)
  - With natted IPv4
- Loop avoidance
- Router "daisy-chaining" possible
  - Consider "range extenders"

Interface categories

- **Internal**
  - Exchange DNCP information
- **External**
  - Does not participate in DNCP
- **Leaf**
  - only for clients
- **Guest**
  - Untrusted client devices
- Auto-detection based on DHCPv6, DHCPv6-PD, DHCPv4

Homenet scheme



Networking

- A router has:
  - The IPv6 Prefix(es) from external connectivity
  - Auto-assigned Unique-Local IPv6
  - An IPv4 network
    - Out of 10/8
    - NAT is applied on the border

Implementations

- Only Full implementation: OpenWRT
  - Not in base, via hnet-full package

- No other known full implementation
  - Not even in commercial CPEs

- There is sparse software

Idea!

FreeBSD, OpenBSD, pfSense

- BSD Routers are widespread

- Especially in SOHO environments

- Why not leverage this ?

- I underestimated the effort…

I have a plan

	FreeBSD	OpenBSD
Babeld	✓	✓
Wide-DHCP	✓	✓
SLAAC daemon	✓	✓
HNCP	✗	✗
DNS Server/Proxy	✓	✓

Work

- The pieces of the puzzle are there

- We're missing the glue (HNCP)

- Full of linux-isms

- Very OpenWRT-oriented

Questions ?

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