Home Networks Unchained with IPv6

Connectivity-To-The-Wall…than what?

“Broadband” is not the goal

The goal is Services

‘Broadband’ is just a means to achieve them

Outline

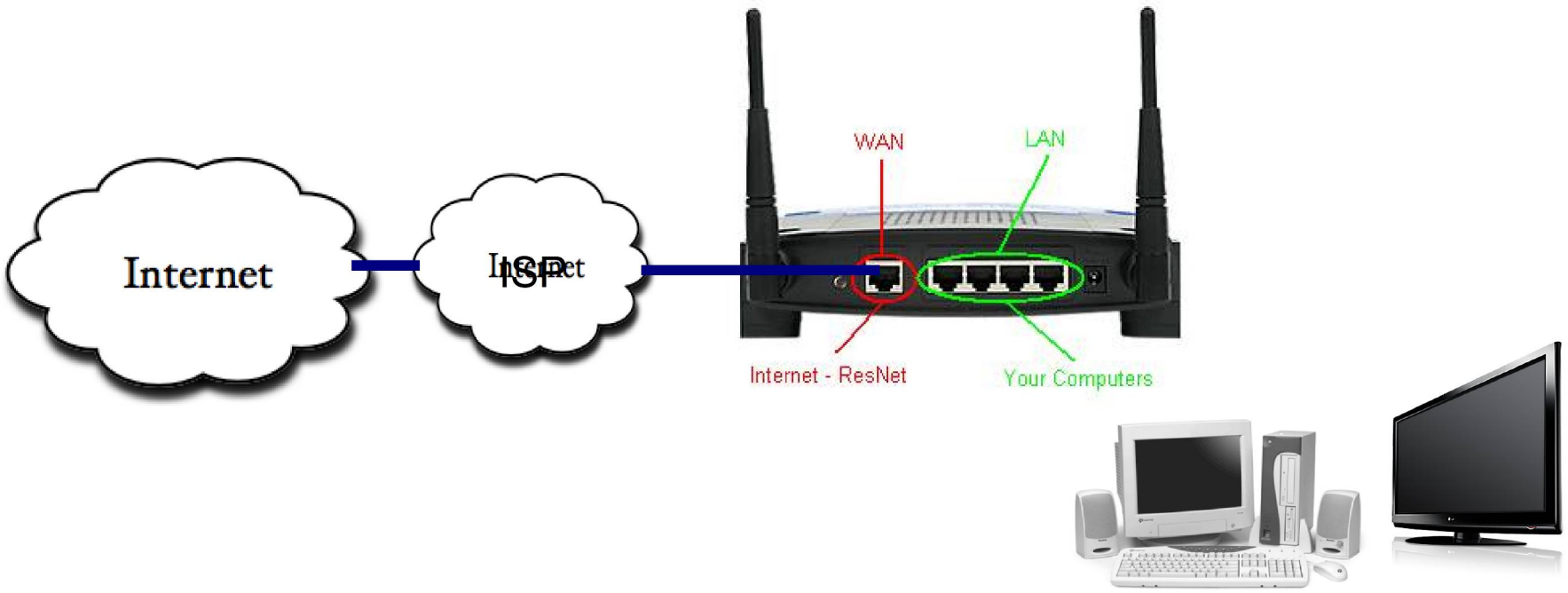
- In-home environment
- Broadband's Third Age
- Multiple Networks, Multiple Providers
- Multihoming the Home
- IPv6 to the rescue

In-home Distribution

- With the “first mile” solved, the problem moves to the “first 5 metres”
- How to get the broadband signal from the modem, located usually in the study or the garage, to the:
  - home office
  - kids laptops
  - television(s)
  - PVRs under the TVs
  - telephone points
  - alarm system
  - security camera(s)
  - smart meter
  - smart meter display

Typical Home Network

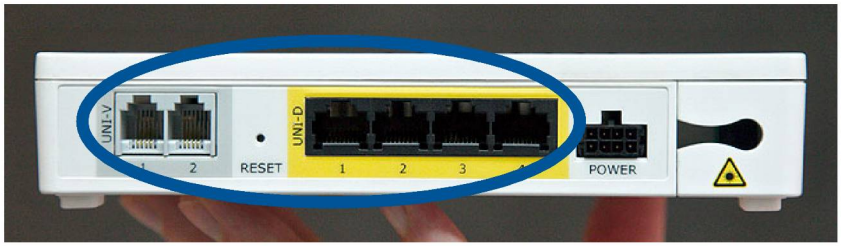
IPv4 home networks are fairly simple...



Third Age of Broadband

Ultimate Competition and Choice

- First Era (– ~1990) **No Choice**
  - Monopoly network, services and Service Provider
- Second Era – (1990 – 2010) **Choose One from Many**
  - Multiple possible service providers
  - Issues with Churn, Migration, Portability
- Third Era – (2010-) **Choose Several from Many**
  - Trial alternative providers without disconnecting
  - Use Best-fit-for-purpose service depending on time of day?
  - No ‘gatekeeper effect’ capturing – better network neutrality



Multiple Networks
Multiple Providers

Issue – Multihomed Home









Multihomed – connected to more than one network simultaneously.

Who has a multihomed Home today?

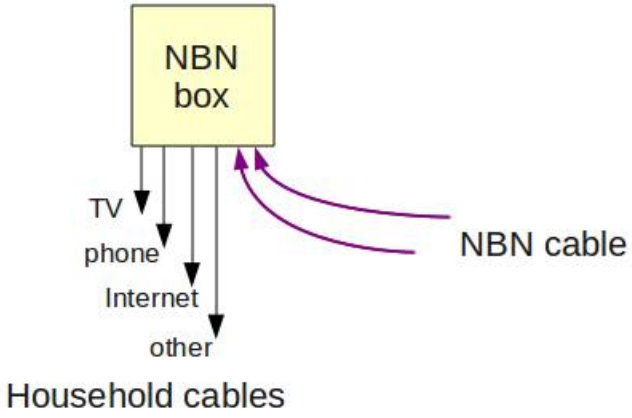
Multiple parallel separated networks

Issue – Converged Multiple Secured Networks

Multiple parallel secured networks
The home owner has no access or control over

Services and Service Providers

- "Superfast" Broadband Networks are required to be wholesale-only open-access with multiple providers
- you can choose different providers for each service if you wish – like a freeway with multiple lanes



Issue – Keeping Services Separated

What service & content providers want…

Issue – Keeping Services Separated

What consumers want…

Issue – Keeping Services Separated

What consumers will do (1)

Issue – Keeping Services Separated

What consumers will do (2)

IPv4 (and NAT) is the problem

- Each SP assigns an IPv4 address
- "The World" sees the devices in different address ranges

IPv6 a solution?

IPv4 each SP assigns a single IP address

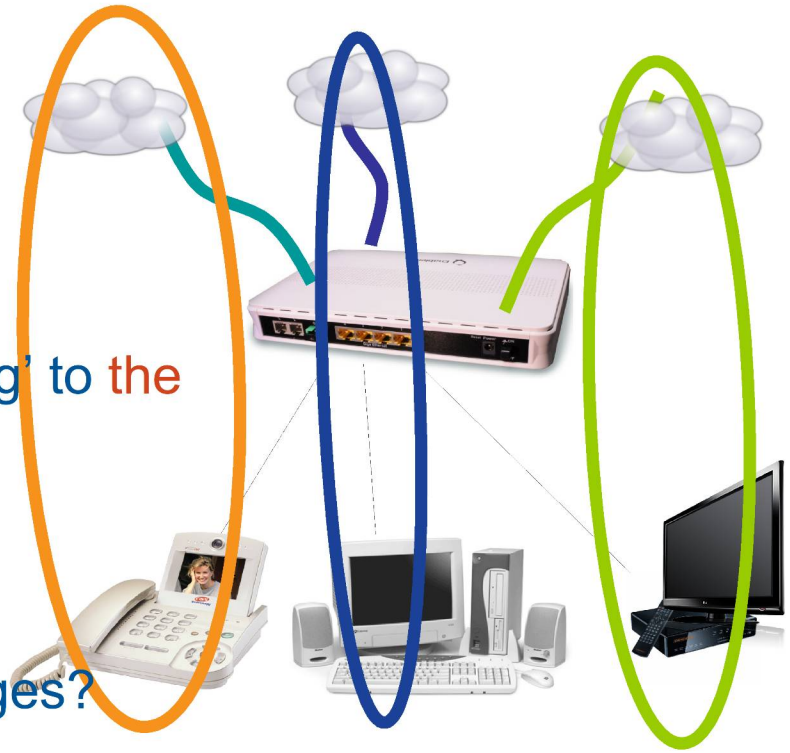
IPv6 the home has globally routable subnet

Keeping Services Separated with IPv4

Devices are not schitzo -
- 1 IP address
- 1 Netmask
- 1 Default Gateway IP

Residential IPv4 Routers do not multi-home

- Broadband gateways work by 'default routing' to the WAN port – singular
- And then they NAT
- How to handle multiple upstream paths?
- How to handle different IP address ranges?
- How to handle the same overlapping IP ranges? (CG-NAT private addresses)
- Have every device dual-homed to SP and home LAN?



IPv6 provides multiple addresses

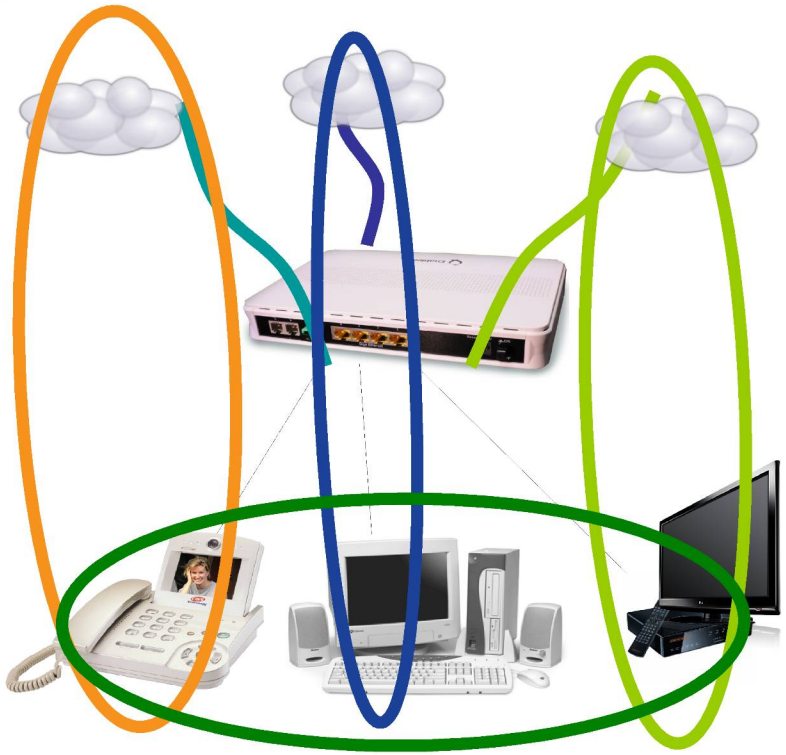
In IPv6, Devices ***are*** schitzo -
1 or more Link Local Addresses
1 or more Public Addresses
Netmask for each
Default Gateway IP for each

Service Provider IP space is guaranteed non-overlapping

Local Devices use link-local addresses to chat amongst themselves

Every device can be multi-homed to:

- Service provider prefix
- Public ISP prefix
- Link-local prefix



Link-local network

Perversely....

IPv6 fixes one of the problems with IPv4 that drove excessive IP address allocations

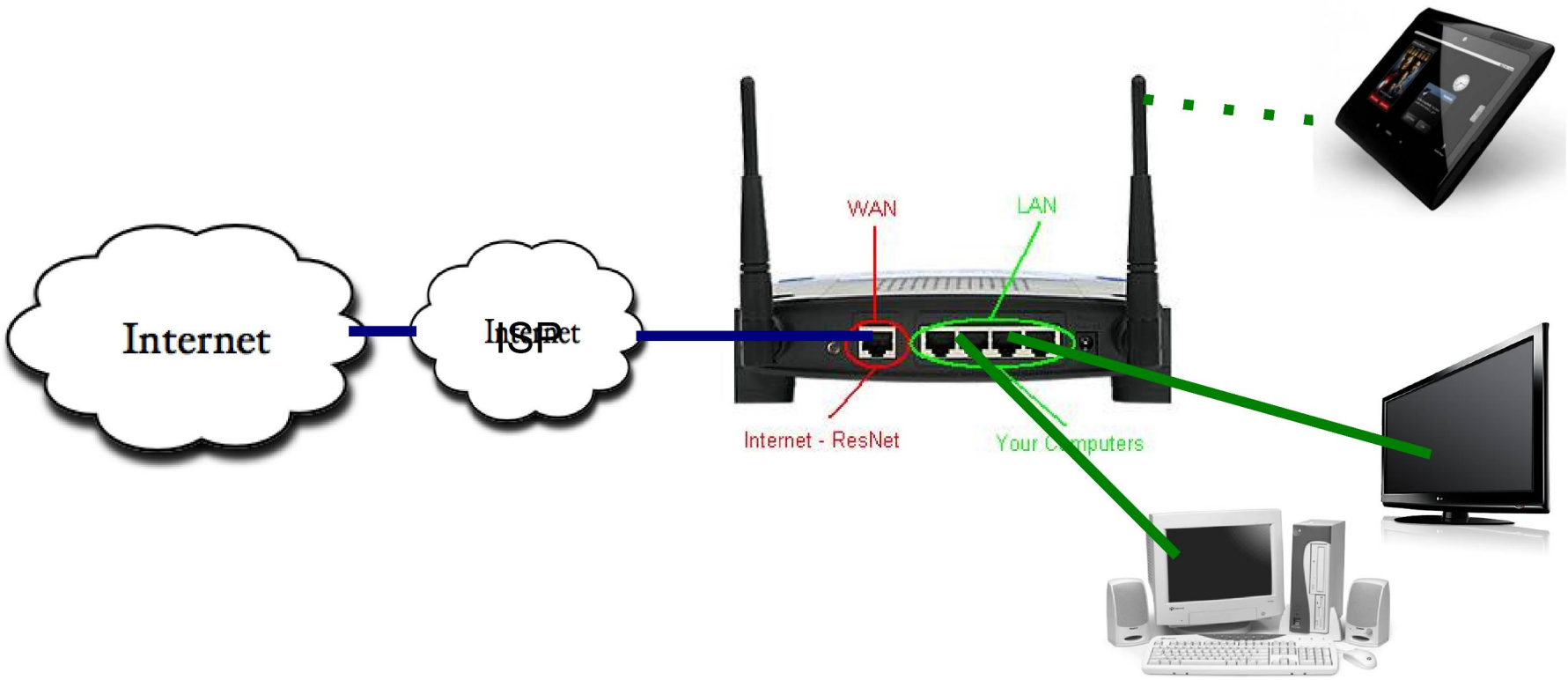
In IPv4 – there is a distinct penalty for making subnets too small. Hosts on different logical subnets, on the same physical infrastructure, can't talk to each other directly

In IPv6 – they can! - so there is no longer any penalty for reaching the end of a subnet

Just when we're allocating 5.4 billion addresses per subnet

Remember this?

IPv4 home networks are fairly simple...



Thankyou

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