IPv6 to the End User

A report on progress of delivering IPv6 to the end user and SME by Andrews & Arnold Ltd (AAISP) and FireBrick Ltd

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Taking its time!

- Started offering IPv6 around 9 years ago.
- Basically turned it on and added to ordering
- Left end users to fend for themselves
    - Expensive CISCO native IPv6 DSL routers
    - PPPoE bridges to linux
    - PCI cards in linux
    - Tunnelled over IPv4
- Around 10% have an allocation
- No idea how many are using it
- Far too technical!
- Needs to be easy, business as usual...

Connectivity

- Some transit providers doing native IPv6
  - We have level 3 this year – not many routes
- Peering essential
  - LINX
  - LONAP
  - Etc
- HE still the people to talk to! ...

Network

- Routers
    - CISCO, Juniper, Quagga, etc
- Firewalls
- Servers
    - Linux, Mac, Windows
    - Even some management on network switches
- LNS (e.g. FireBrick FB6000)
- Getting your network and customer facing services on IPv6 is the easy bit...

Gotchas

- Management/customer databases
- RADIUS
- Reverse DNS
- Diagnostics and logs
- Access control lists, including 2002::
- Anti spoofing IPv6, 2002::, protocol 41
- DEA, RIPA, Data retention, etc.
- Staff training
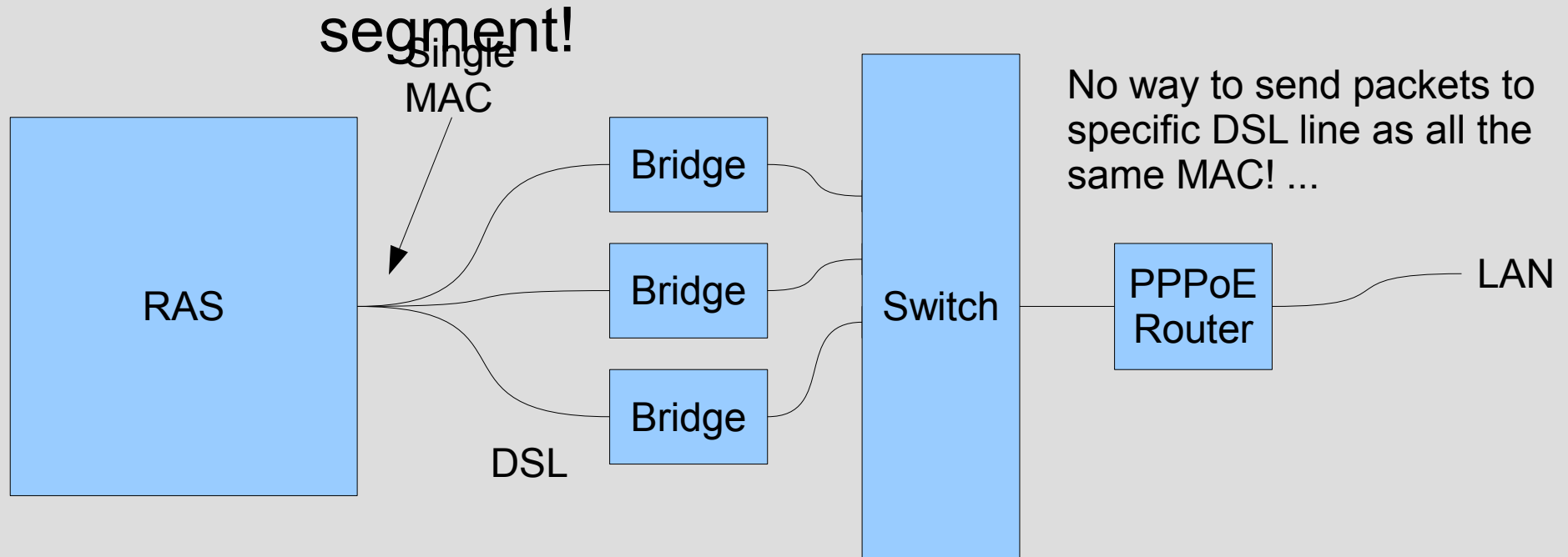- Customer training! ...

End user equipment

- Cheap IPv6 DSL routers?
    - Fritz – not cheap – NATs Ipv4?
    - Billion – WiFi model – works – tricky to set up
    - Zyxel – WiFi and then single port – meetings!
    - CISCO – not cheap! Do work. CISCO config!
    - Others? See XS4ALL list
    -

- Is this the only way to do it?

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- ISPs need answers if World IPv6 day is to create the questions from end users that we expect...

Going down the PPPoE route

- PPPoE is fun :-)
    - Nice small RFC
    - Bridges or modems?
    - PPPoA or PPPoE on the wire
        - BE fixed PPPoA or PPPoE, BT does both
    - FTTC and FTTP are always PPPoE
    - 1492 byte or 1500 byte MTU?
    - Multiple lines can be an issue
    - Bugs (BT!)
- New FireBrick FB2700 works on PPPoE.
    - IPv6 just works and is an absolute doddle to set up...

PPPoE bridge

- Typical cheap router, e.g. Zyxel P660R
  - May be limited MTU (e.g. Zyxel 1504)
  - Bridges Ethernet to PPPoE on the wire
  - Bridge does not need to understand Ipv6
 - Can't use multiple bridges on same LAN segment!

Single MAC

RAS

Bridge

Bridge

Bridge

DSL

Switch

No way to send packets to specific DSL line as all the same MAC! ...

PPPoE Router

LAN

PPPoE modem

- PPPoA / PPPoE, e.g Vigor V120
    - May be limited MTU still
    - PPPoA on the wire, and often only PPPoA
    - Can be used on same LAN segment
    - Does not need to understand IPv6 ...
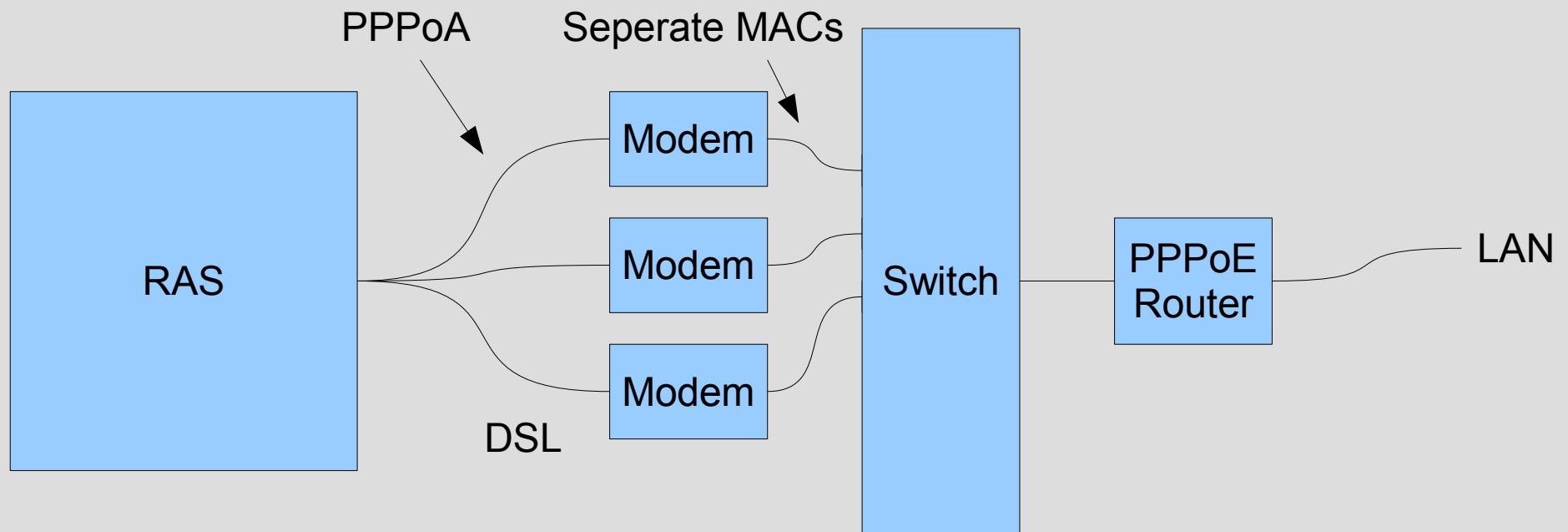
Multiple ports on PPPoE router

- Using separate ports on PPPoE router
  - Avoids MAC issues for multiple lines
  - Allows use of modems or routers
  - Could also be done using VLAN switch...
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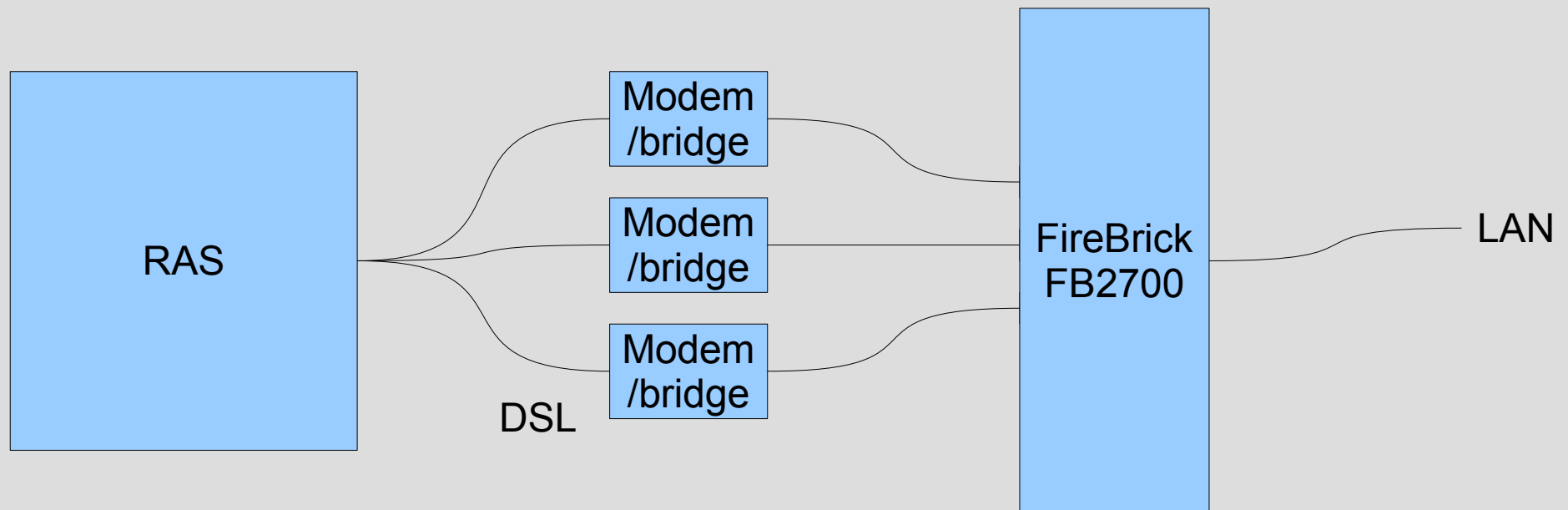
Why use PPPoE?

- Separates modem and router
  - Allows independent choice of modem & router
  - DSL routers not usually good as routers (IPv4!)
  - DSL routers not usually good as firewalls
  - Separate router can handle IPv6, bonding, etc.
  - Out of the box modem/bridge no config
    - Makes easy to have spares
  - Better control/logging for managed services
  - Easier to configure in one place
- FTTC and FTTP are PPPoE anyway...

Why not use PPPoE?

- Single box does the job, single power socket
  - Not such an issue if using separate firewall anyway
  - Not such an issue if multiple lines
  - FTTC and FTTP always separate box anyway
- Reduced MTU 1492
  - Easy to work around, TCP fixup at LNS, etc.
  - Some modems handle larger MTU
  - FTTC and FTTP handle full 1500 anyway
- Less efficient on the wire than PPPoA
  - FTTC and FTTP are PPPoE anyway
  - Can use a PPPoA/PPPoE modem...

Address assignment

- Seems to be some debate over best way to get
- Link global IPv6 address
- IPv6 Prefix delegation to LAN
- IPv6 DNS server addresses

Some propose a mix of PPP, IPV6CP, RA and DHCPv6 to do this – seems crazy to me

There is a proposal for IPV6CP which is simple for LNS and router alike – not yet an RFC.

We want to get that to RFC ASAP and encourage router manufacturers to use it.

To be implemented in FB6202 and FB2700...

Customer acceptance?

- No customer demand?
    - Starting to see some enquires
    - Expect news of impending doom to help
    - Will World IPv6 day help?
    - When PHBs start asking questions?
- Customers getting scared?
    - Reports of people worried by public IPs
    - How do we sell the idea to the end user?
    - How do we sell to the technical people at SMEs?
    - How do we sell to the management at SMEs?
- A dual stack message, not "replacing IPv4"

Where are we now?

- Still waiting for cheap (give-away) DSL modem/router with IPv6 support!
  - Concerns over usability of firewall
  - Concerns over how well it will be implemented
  - Concerns over when!
  - It is happening – new models are IPv6
  - Once it does – will make IPv6 + NAT IPv4 default
- Alternative PPPoE approach
  - Ideal for SME where selling firewall anyway
  - Just works, so business as usual for SME install
  - FireBrick FB2700 available now!