



eircom NGA

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We work: as one company for our customers together as one team

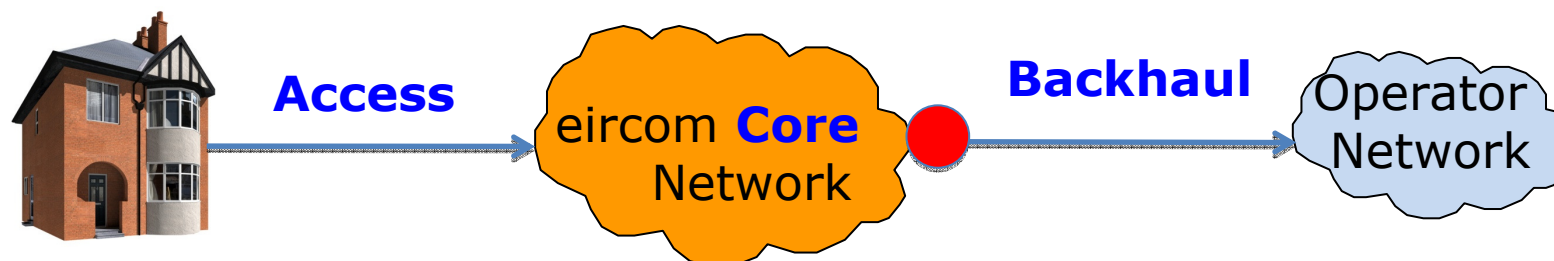
We are: ambitious, inventive, accountable and cost effective

We do: this with integrity spirit and pride

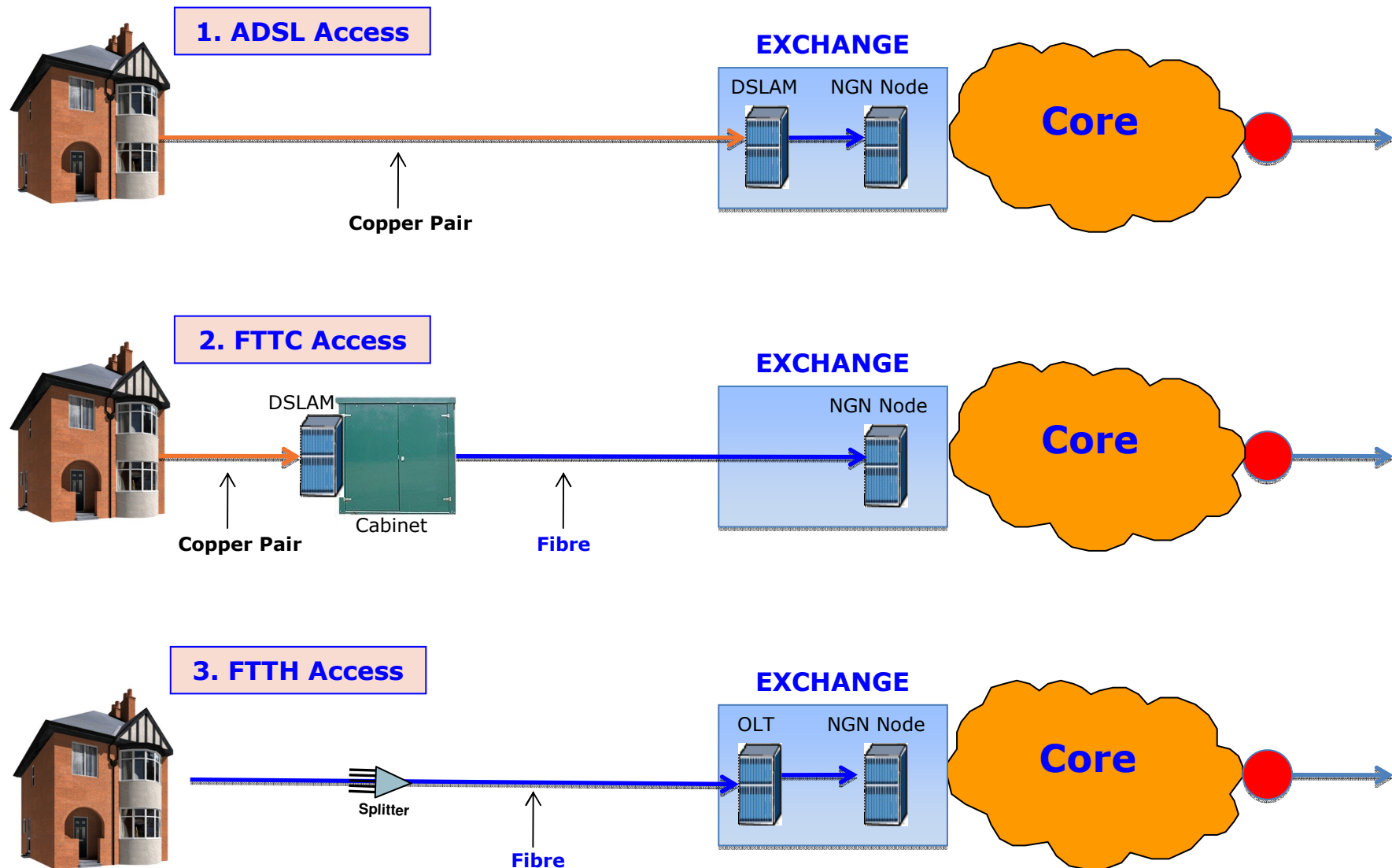


There are 3 main network components for facilitating NGA

- **Access:** House to Exchange (NTU to DSLAM Port)
 - NTU (Network Termination Unit) in the house is the Demarcation point for Bitstream
 - Eircom Wholesale does not supply Modems
- **Core:** Uncongested Broadband (eircom NGN Network)
- **Backhaul:** Handover Point to Operator



Next Generation Access (NGA) – FTTC & FTTH

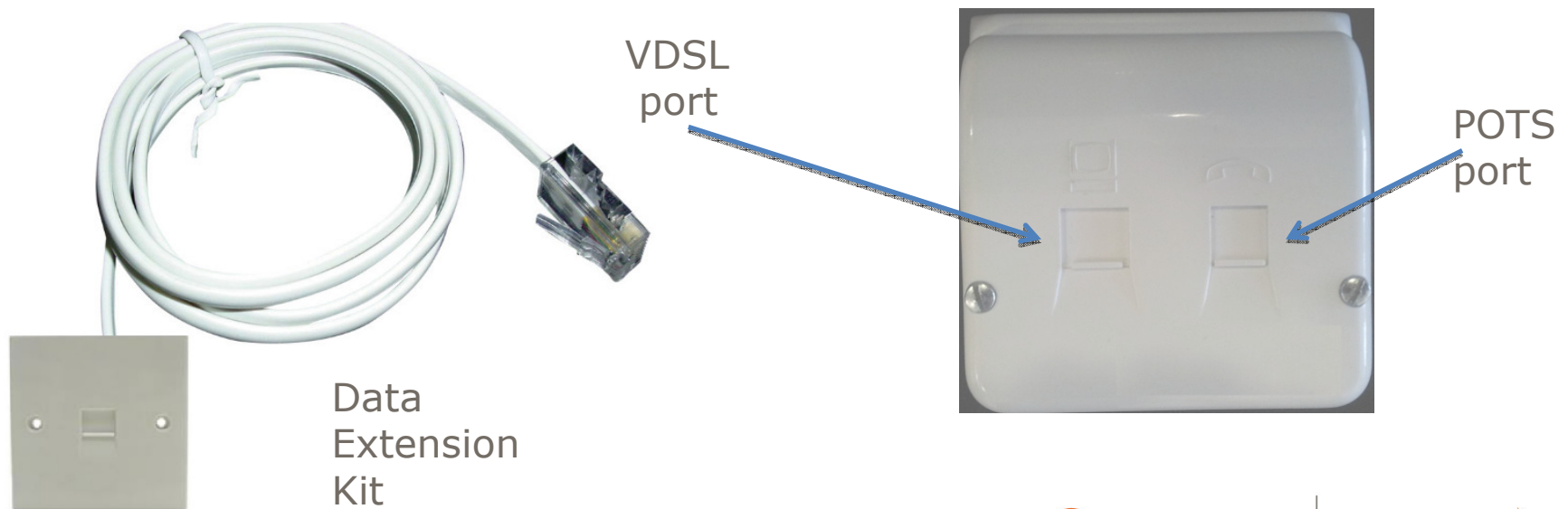


- Copper distance from house to DSLAM is much shorter
- VDSL port not ADSL port in DSLAM
- The VDSL type DSLAMs are being installed in the cabinets
- The technology being deployed allows for up to 70Mb
 - Distance from house to cabinet decides speed
 - In the near future - higher speeds and range with Vectoring
- A new NTU has to be installed in the house to cater for FTTC technology. Looks very similar to existing NTU for ADSL.
- Operators can install NTU themselves

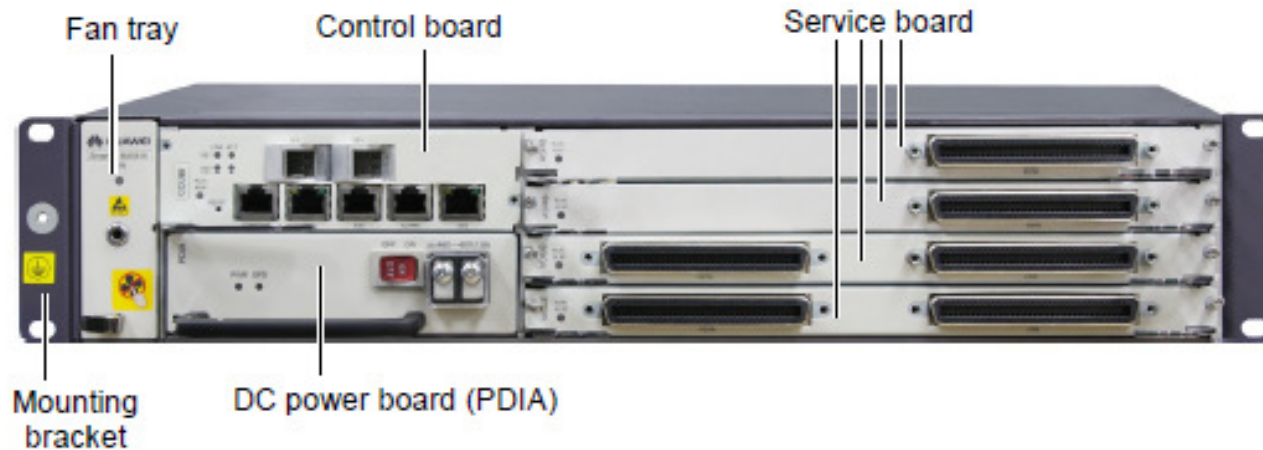
High Speed Profiles – FTTC NGA Table

Line Lenth (Max)	DS RA Mbps	US RA Mbps
300m	70M	20M
300m	60M	20M
500m	50M	20M
600m	50M	15M
750m	40M	10M
850m	30M	8M
1000m	25M	7M
1000m	18M	5M

- Eircom master socket replaced with dual interface copper NTU
- It has an internal splitter support both a VDSL2 connection and POTS on the same copper pair from the cabinet.
- Data Extension kit option extends the VDSL port up to 30m



- Control board
 - 2 x GE uplinks
- 4 x service boards
 - 4 x 48-port = 192 VDSL ports



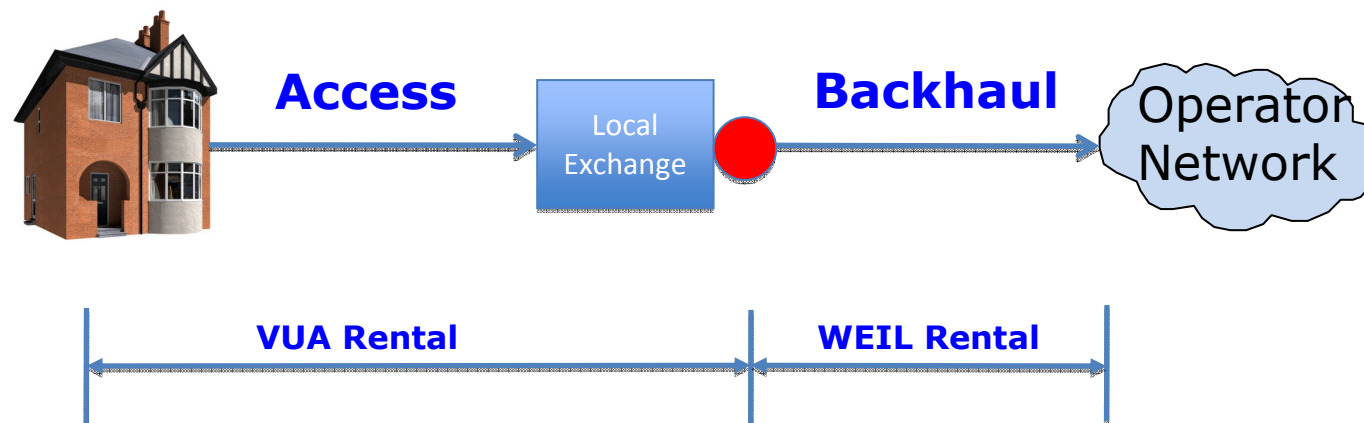
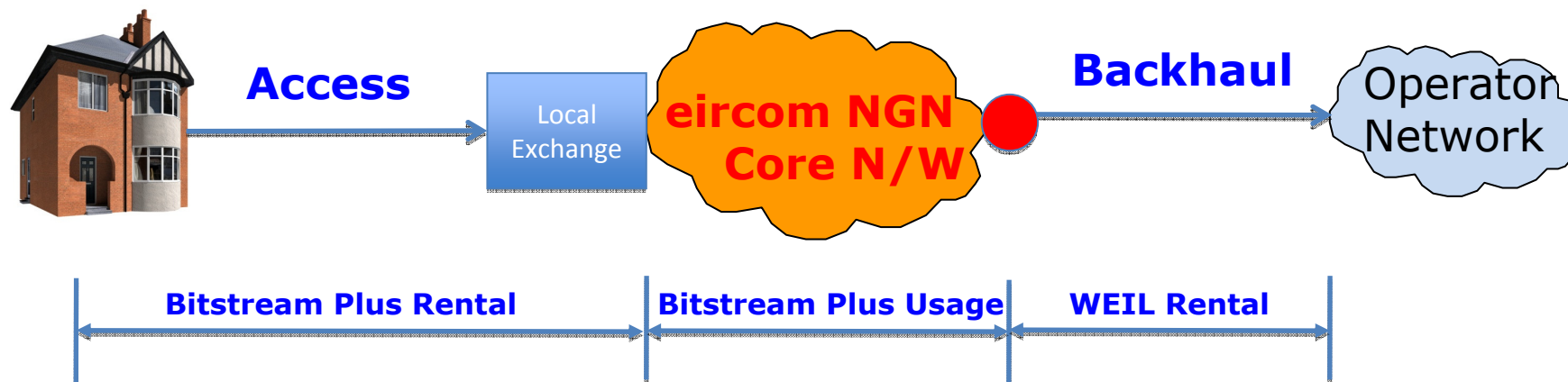
- Directly fed fibre from house to exchange – challenge to run fibre all the way to the house.
- Instead of DSLAM there is a fibre splitter
- The initial speeds are 150Mb
- Instead of an NTU in the house an ONT used (Optical Termination Unit) for connecting to fibre.
- ONT requires power so more difficult to install.
- FTTH will only be available in Wexford and Sandyford

Profiles – FTTH NGA Summary Table

DS Mbps	US Mbps
150M	30M

- New Type of Bitstream called “Bitstream Plus” being developed to compliment FTTC/FTTH Access
- Bitstream Plus is similar to Bitstream MB - the "Plus" means 2 Key New Features added
 - A) Multicast (Broadcast TV)
 - B) QoS (VOIP)
- Bitstream Plus on FTTC and FTTH are the exact same except FTTH capable of higher speeds
- Bitstream Plus will also be made available on Current Generation Access (ADSL) within NGA footprint
- Operators decide which exchanges they want to connect to and sell services

NGA Bitstream Plus versus VUA

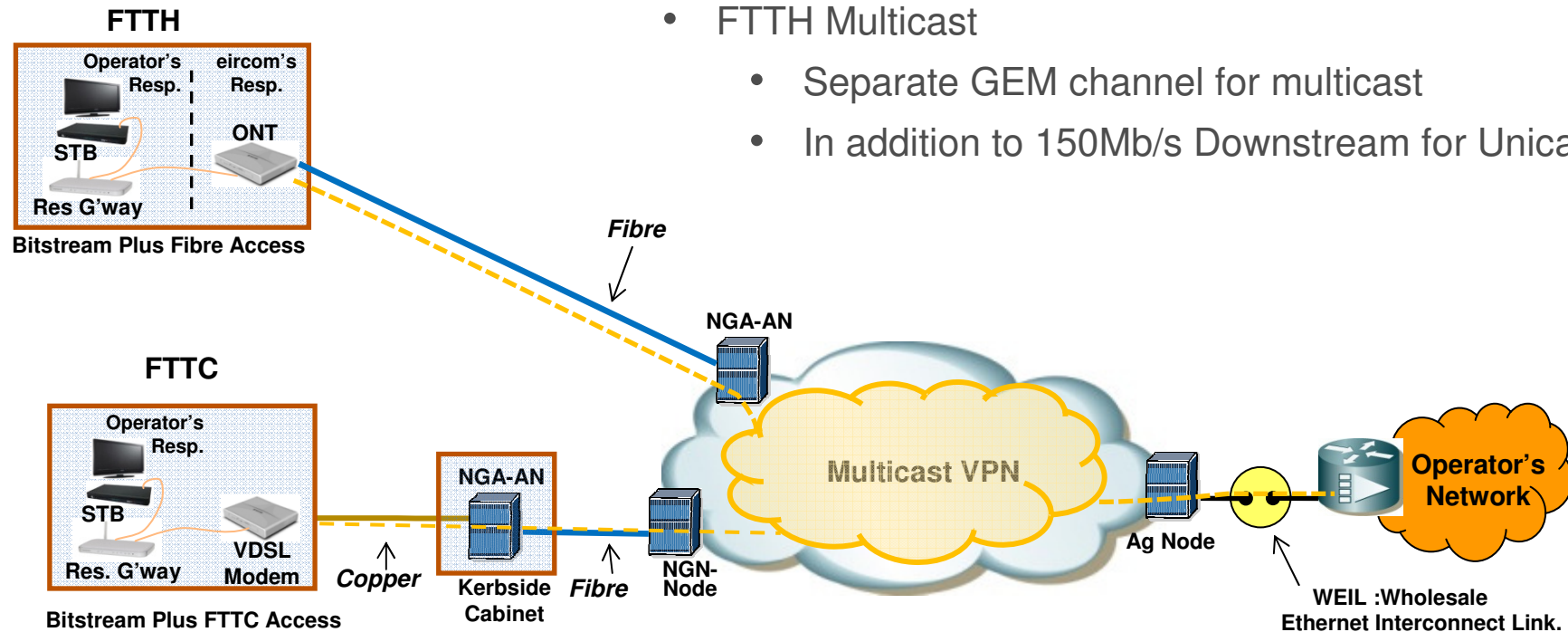


- All Current Generation Products require a PSTN line
- In NGA we will have POTS-Based and Standalone Services
- POTS-Based inventory managed by Telephone Number
- Standalone products available for first time – complex processes
- A CRN (Customer Reference Number) is being used instead – the format will be Std and Tel Number i.e. 88XX-1234567
 - » 8881 = Standalone FTTC
 - » 8882 = Standalone FTTH
 - » 8883 = Standalone ADSL

- End-to-end network is QoS enabled
 - p-bits in VLAN tag used to mark packets
 - RGW must tag packets with VID=10
- Three QoS levels
 - p-bit 0 = BE = Standard
 - p-bit 2 = AF = Business
 - p-bit 4 = EF = Real-time
- No limits on traffic to/from Wholesale customers
- Per-CoS traffic accounting allows Usage Billing

Wholesale multicast

- Allows efficient distribution of Broadcast TV
 - Each TV Channel sent once from 'Head-end'
- FTTC Multicast
 - Shares Unicast Downstream Bandwidth.
- FTTH Multicast
 - Separate GEM channel for multicast
 - In addition to 150Mb/s Downstream for Unicast

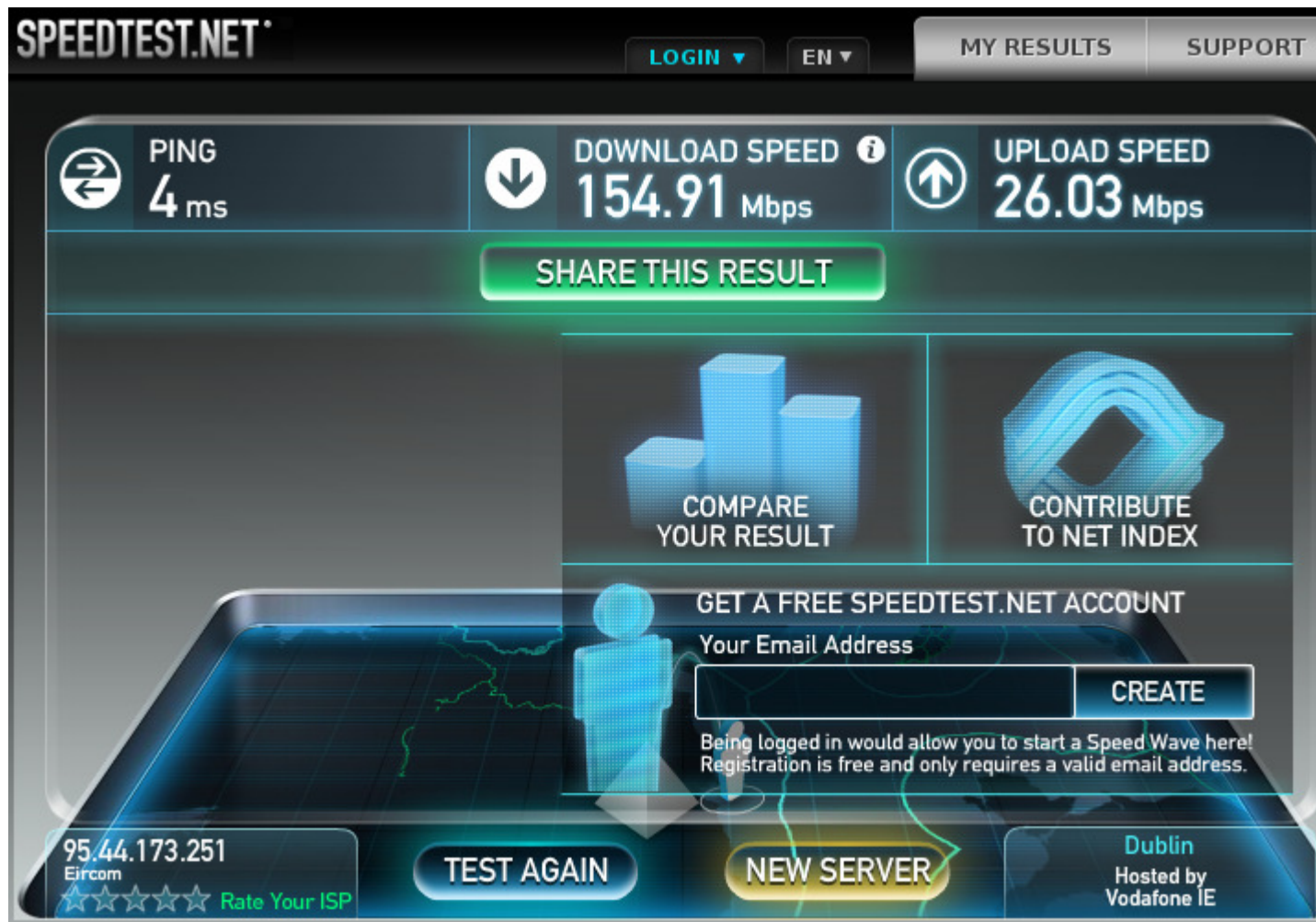


- Existing dial-up and broadband products use PPPoE
 - PPPoE session between RGW and BRAS
- BRAS is not used in NGA – replaced by BNG
- Retail NGA products use IPoE i.e. DHCP
 - IPoE session between RGW and BNG
- L2TP is replaced by Bitstream Plus ethernet-based products

- Dual-stack provides both IPv4 and IPv6 addresses
- CPE requires:
 - Stateful DHCPv6 client on WAN interface
 - Stateless Address Auto Configuration (SLAAC) on LAN
 - Stateless DHCPv6 to learn DNS server on LAN
- DSLAM requires:
 - Insertion of Option 18/37 in DHCP for CSID

- 4 Pilot Exchange Completed December 2011
(16,000 Homes Passed)
- 500,000 Homes Passed due mid 2013
- 700,000 Homes Passed due December 2013
- 1 million Homes passed December 2014

Speedtest



- Pilot operational; first production sites April 2013
- Headline speed of 70Mb/s on VDSL
- Move from PPPoE to IPoE
- QoS enabled and IPv6 ready
- Supports Multicast for IPTV service