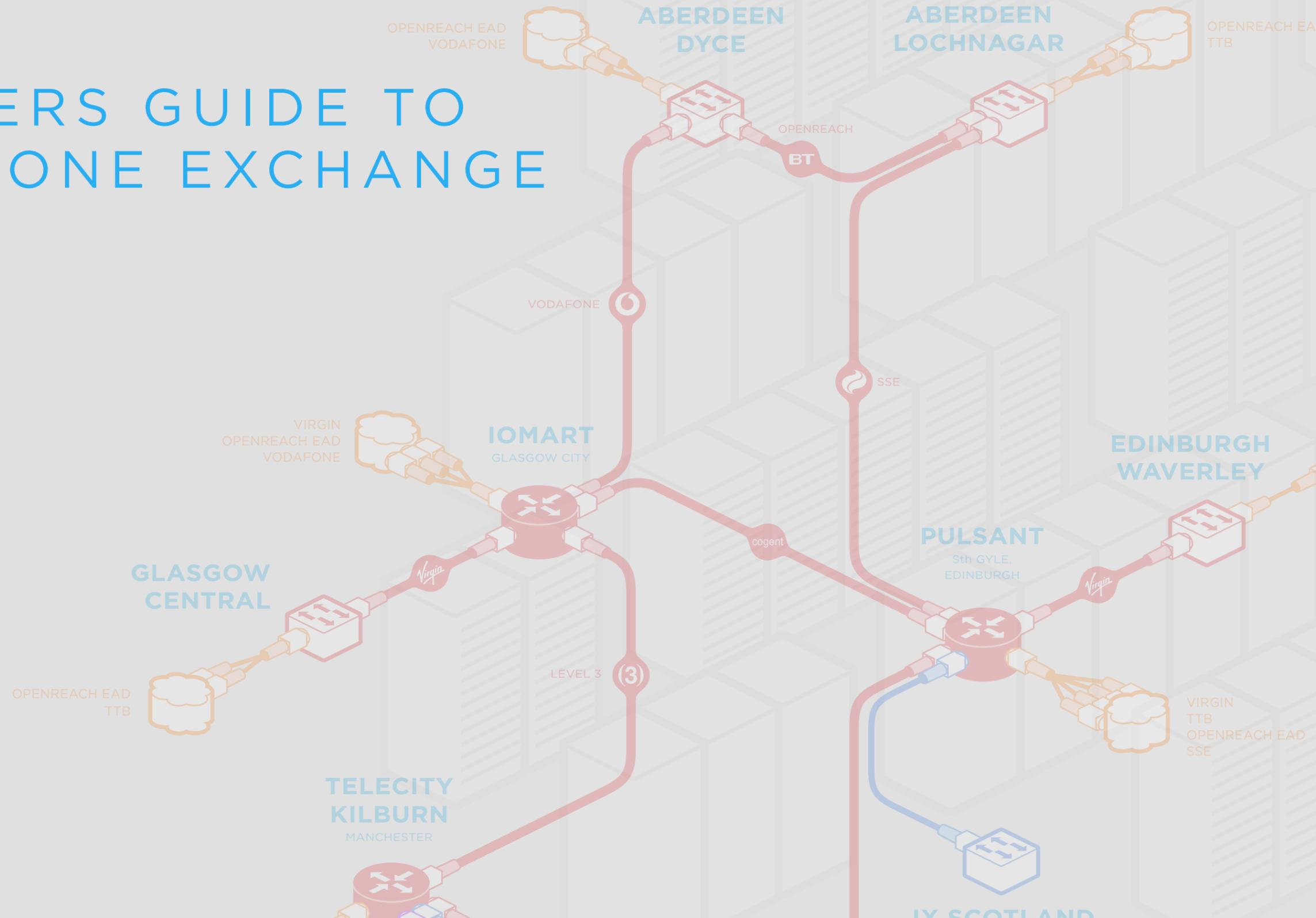


# A HITCHHIKERS GUIDE TO THE TELEPHONE EXCHANGE

Charlie Boisseau  
Fluency

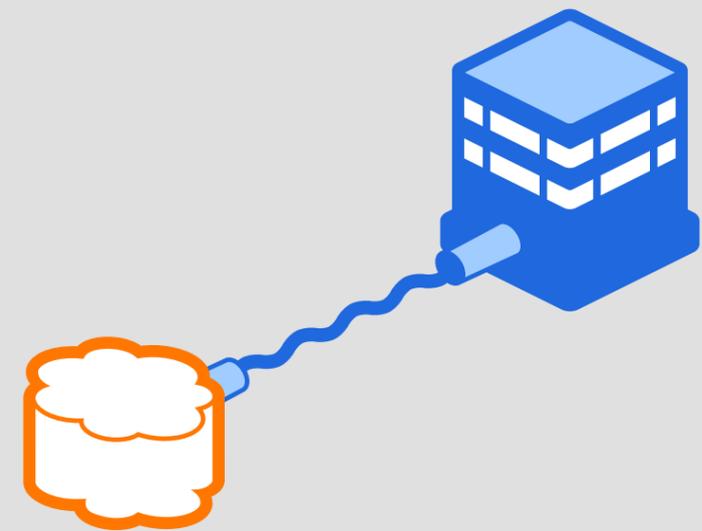


**COMMSWORLD**  
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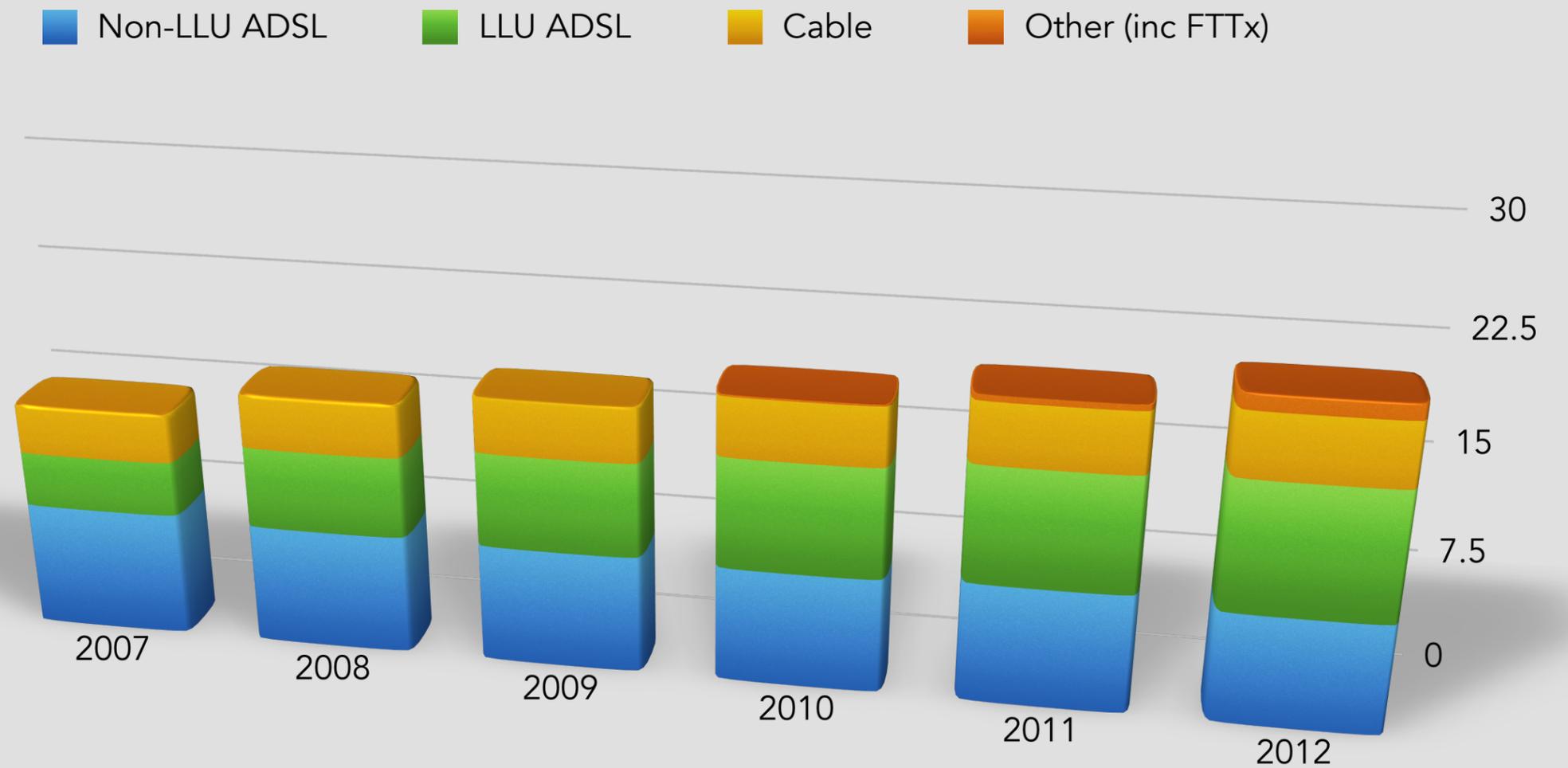
Fluency Communications Limited is registered in Scotland No. SC390685.  
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# WHAT IS LLU?

- Colocation in a Telephone Exchange building
- Direct access to local copper and fibre last-mile 'loops'
- NEW: Sub Loop Unbundling (SLU) - Unbundling the last-quarter-mile loop from the street cabinet



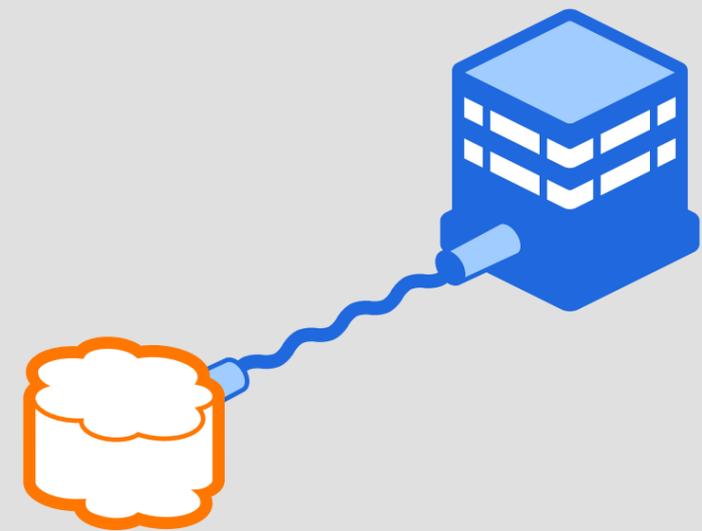
# HOW MUCH LLU IS OUT THERE?



Broadband connections (millions)  
Source: Ofcom Market Data Research 2013

# WHY UNBUNDLE?

- Creates competition between CPs
- Better control of the network
- Broadband/voice access product innovation
- Strategic PoPs - interconnect locations





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18:9

TAY'S  
SHAL







# OPENREACH ACRONYM BINGO

- Colocation - Access Locate (replaces BT Wholesale 'BT Locate' etc.)
- Copper LLU - MPF, SMPF, LLUT/L/X/Y
- Fibre LLU - EADLA, GEA, Street Access
- Backhaul - EBD, EAD, OSA, WES
- Internal/external x-connect - CableLink
- Long reach external x-connect - BTL

# COLOCATION

- 'Access Locate' introduced by Openreach to replace original BT Wholesale products
- Recently updated with rack/power equipment from Eltek
- Consists of PowerBase + x HDF racks + y Customer racks (CRSUs)
- License fee based on floorspace required
- AC+DC Power options (where available)
- Depending on genset capacity, AC may be available as a semi-protected feed

# COLOCATION

- Legacy BT Wholesale installation example:
- Separate rack spaces for Power Base, HDF + CRSUs
- Lots of wasted space for smaller operators
- Not flexible enough for larger operators
- Operator must provide & maintain UPSs & DC inverters

Legacy BT wholesale  
style installation



# COLOCATION

- New Eltek-equipped 'Access Locate' product:
- Power Base, HDFs and Customer kit combined
- Small enough for single-rack operators (like us)
- Flexible enough for larger dozen-rack operators (TT)
- Power Base includes ironwork, DC inverter, batteries, HDFs & (some) space for customer kit
- Usable customer space depends on power requirements (number of batteries) and HDF capacity.

New Access Locate  
style installation



# COLOCATION

- Power distribution / inverters
- Customer space
- HDF
- Batteries

New Access Locate  
style installation



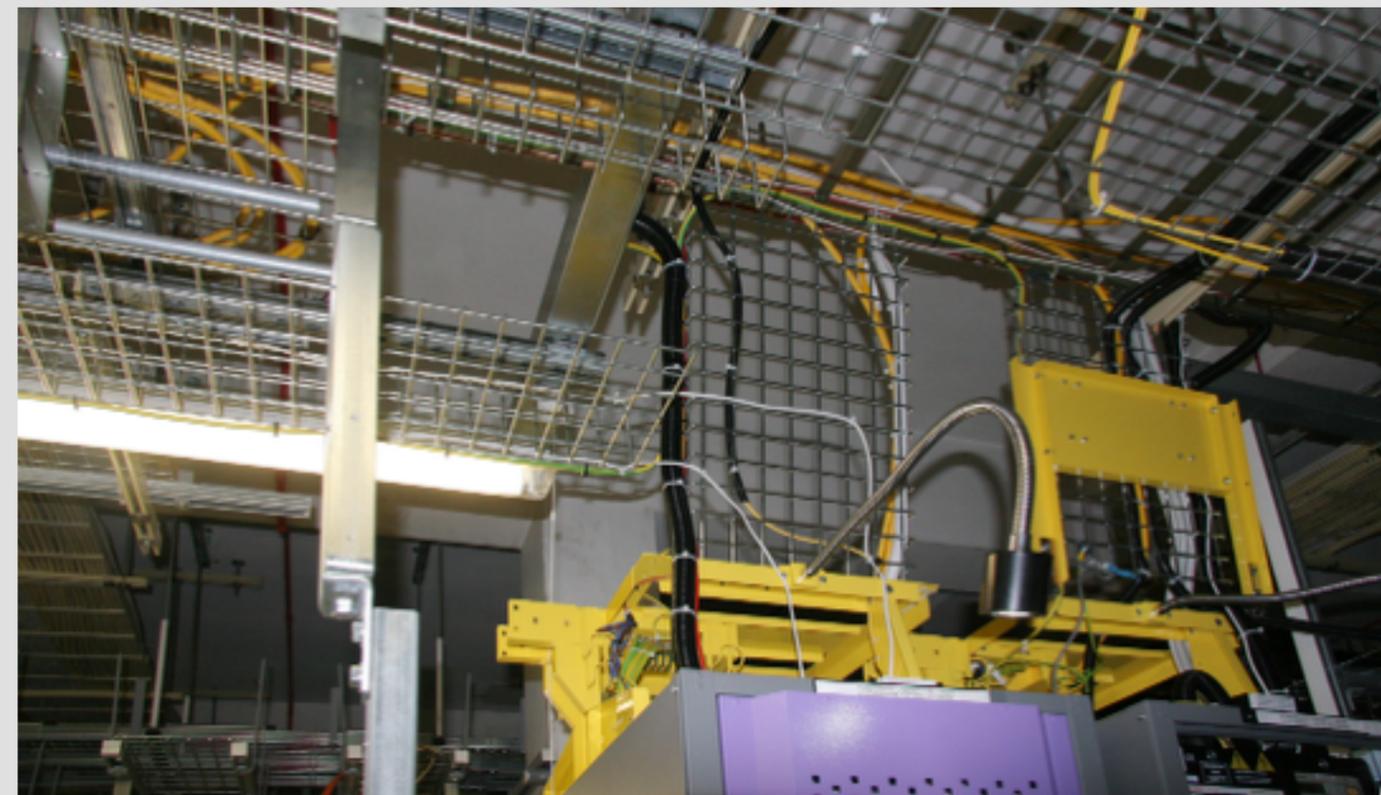
# COLOCATION

- If doors are ordered, power usage visible externally
- Power also monitored remotely via phone line
- Ironwork on Power Base connects rack to cable runways, providing access to MDF and ODFs
- Ironwork includes work-light at each RSU



Front door power monitor

Ironwork and runways



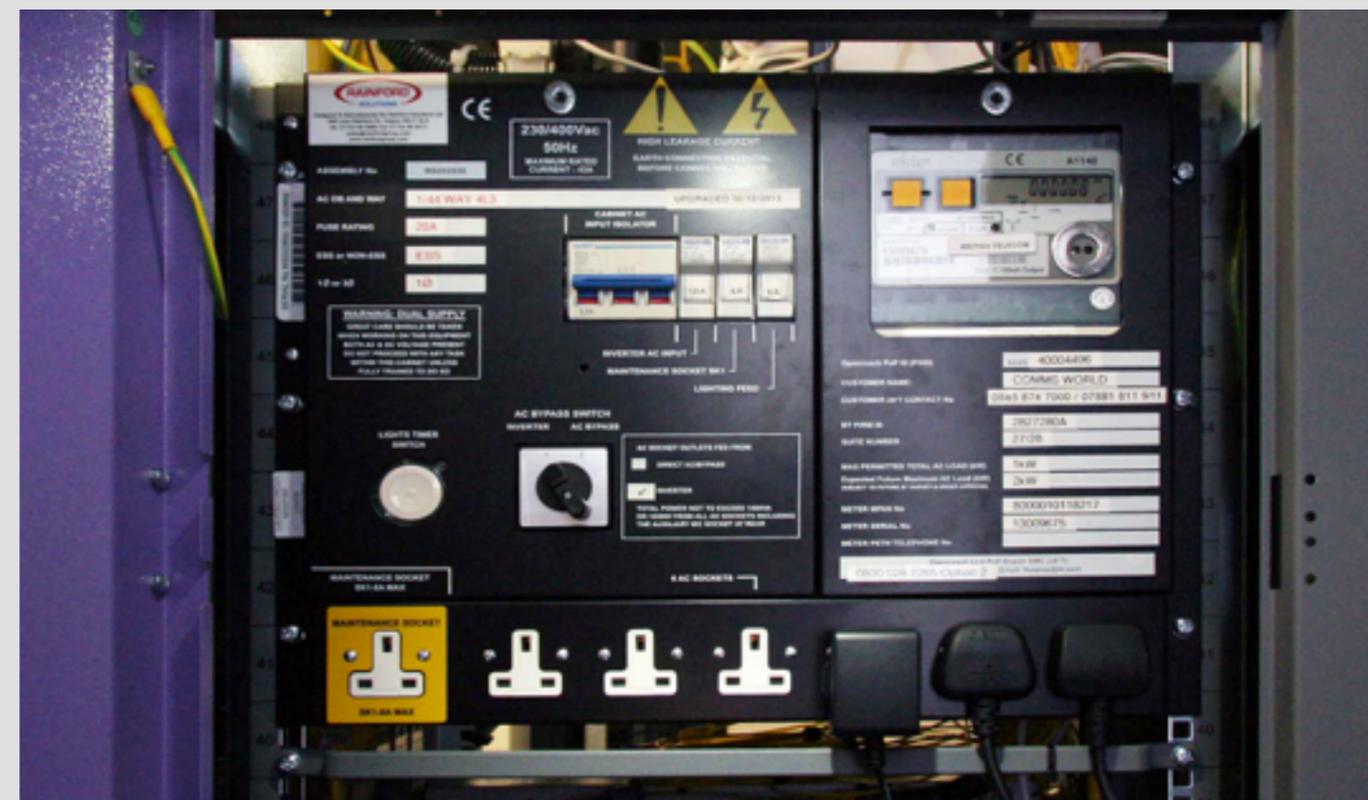
# COLOCATION

- Power distribution uses top 8U of Power Base
- 6-Way PDU AC supply as standard - required for EAD monitoring router
- DC distribution on separate A & B inverters fed to individually fused 16-way moxex-style PDU
- Openreach supply a 'DC kit' with 2-core + earth moxex-flexes and spare fuses.



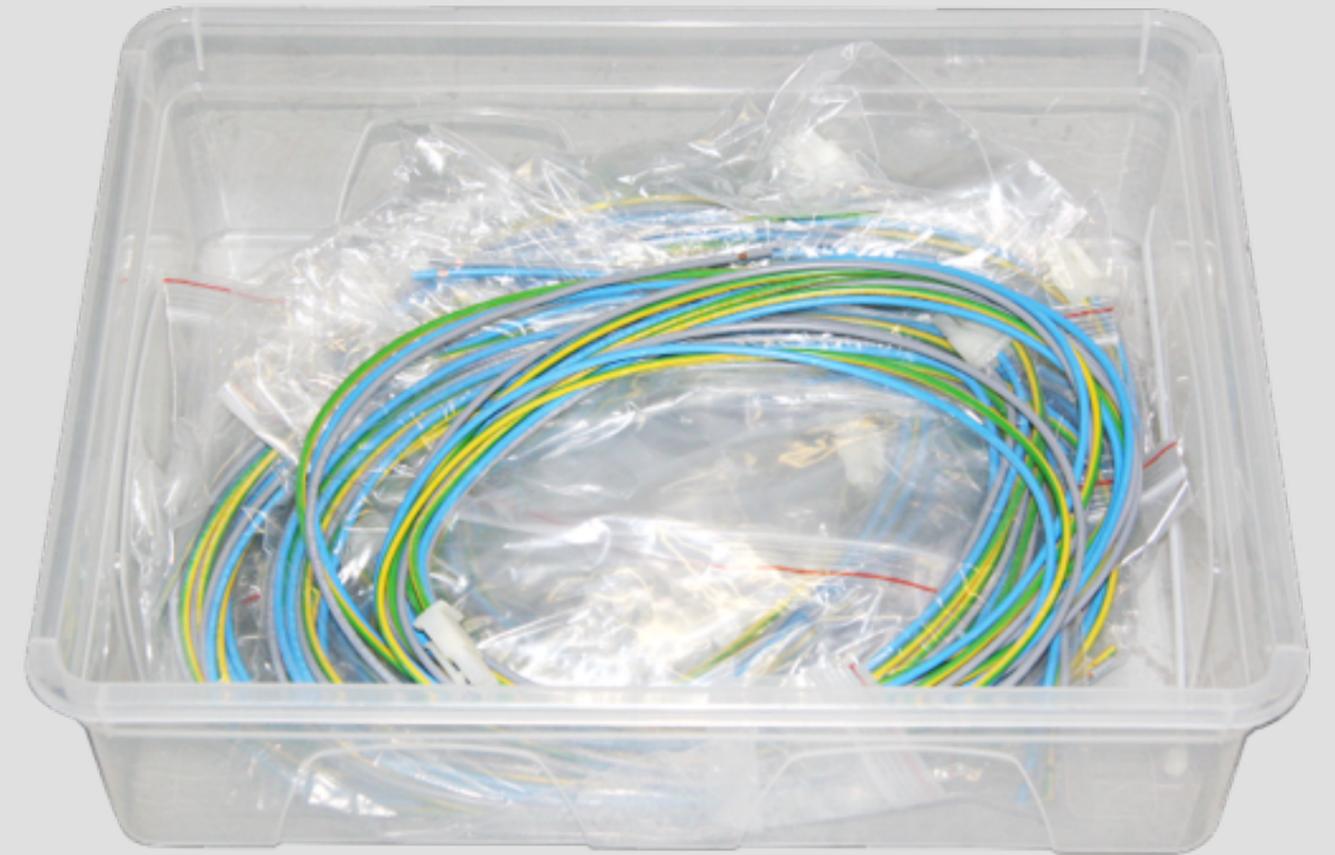
Front

Back



# COLOCATION

- DC Power Tips:
  - Buy yourself an inverter for your lab
  - Don't touch it - DC is sticky!
  - Terminology: Not IEEE 'live' and 'neutral' standard, DC is 'positive' (+/- 48v supply) and 'negative' (return).
  - GREY IS POSITIVE, BLUE IS NEGATIVE



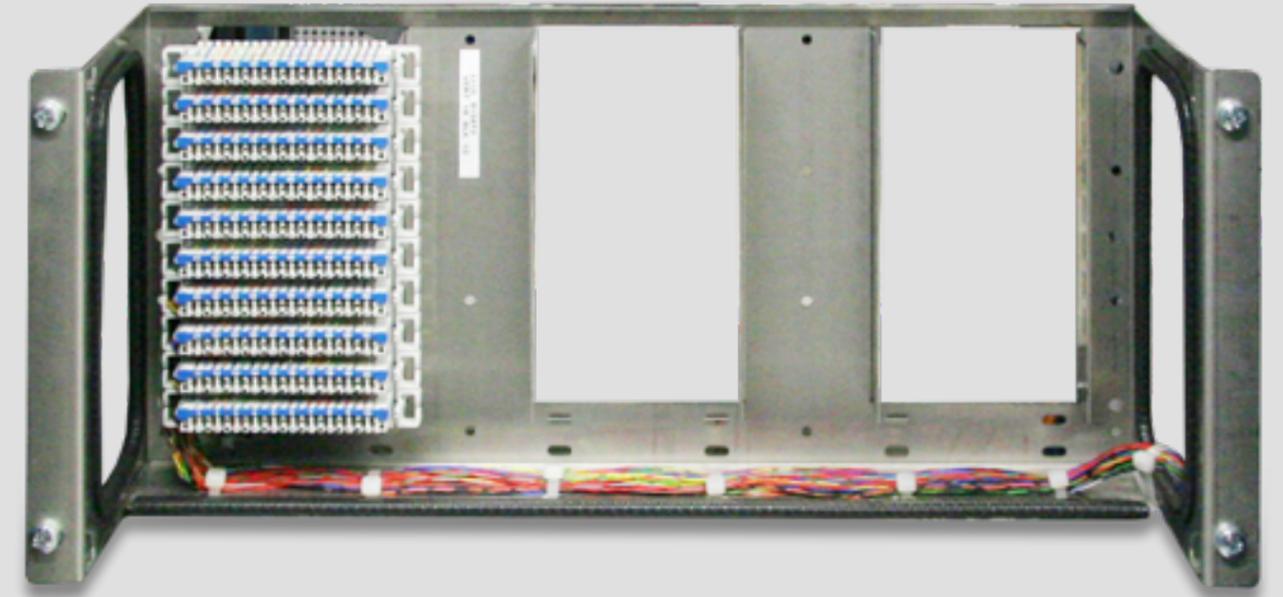
DC power goodie-bag

Eltek DC inverter



# COPPER LLU

- Copper tie-pairs are presented in 100-pair blocks
- Ties are routed on runways to MDF (Main Distribution Frame), usually in a large room elsewhere in the building
- Ties use 3M Quante 'SID' type. Normal Krone tools don't work!
- Two main types of LLU Tie-pair:
  - MPF - Metallic Path Facility. Direct copper from your rack to customer socket (via TAM - Test Access Matrix)
  - SMPF - Shared Metallic Path Facility. Normal BT WLR Phone line with ADSL filtered.
  - Corresponding type of tie pair block must be ordered: LLUT/L/X/Y



HDF, 100 pair tie-block



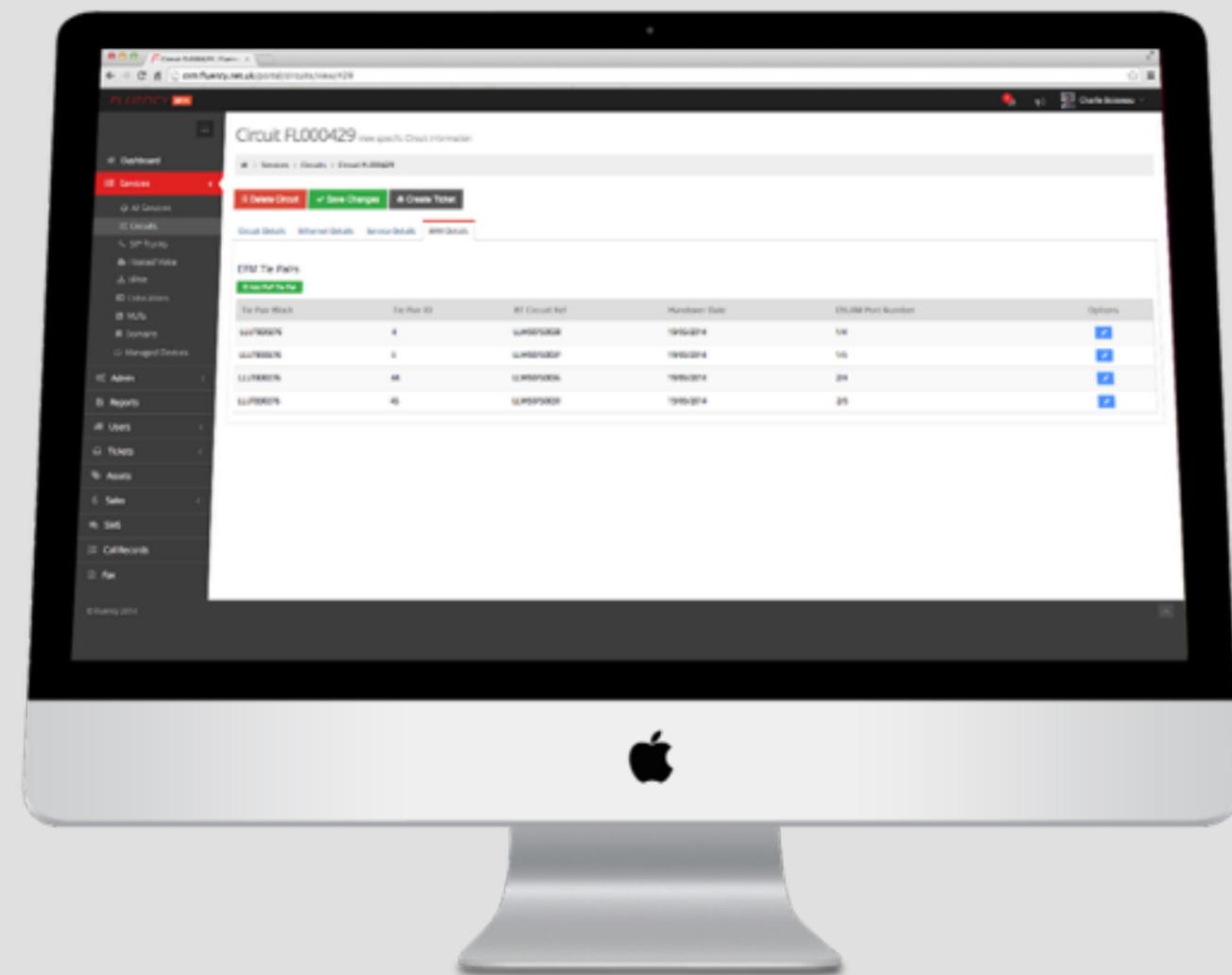
# COPPER LLU

- Copper LLU Tips:
  - Keep track of your tie pair blocks at each exchange, and be careful about your mappings from tie pair number to DSLAM port.
  - Automate wherever possible, it's very easy to get confused.
  - Plan capacity in advance. Several week lead times for new tie pair blocks.



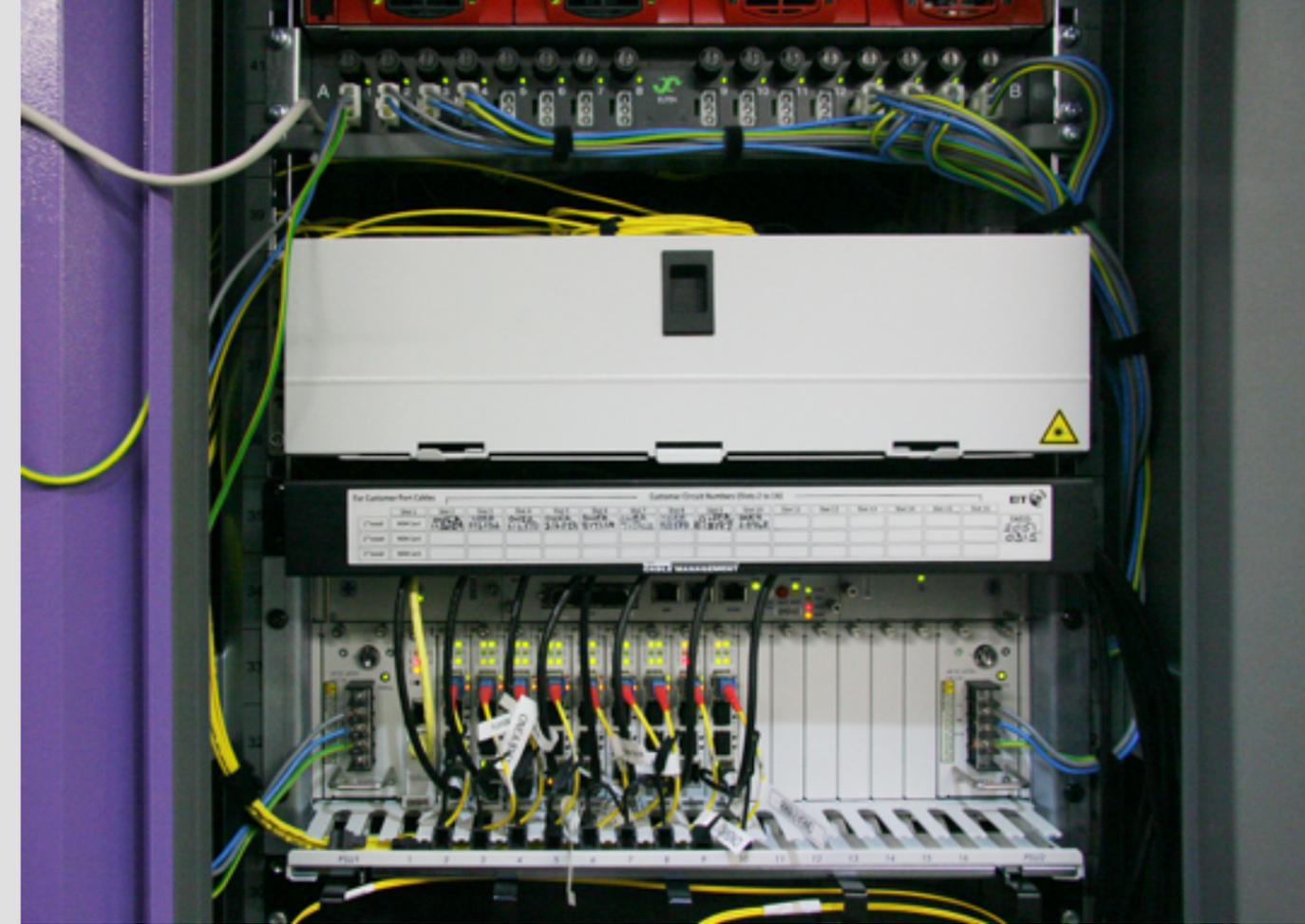
Overture EFM DSLAMs

Fluency EFM tie pair database



# FIBRE LLU

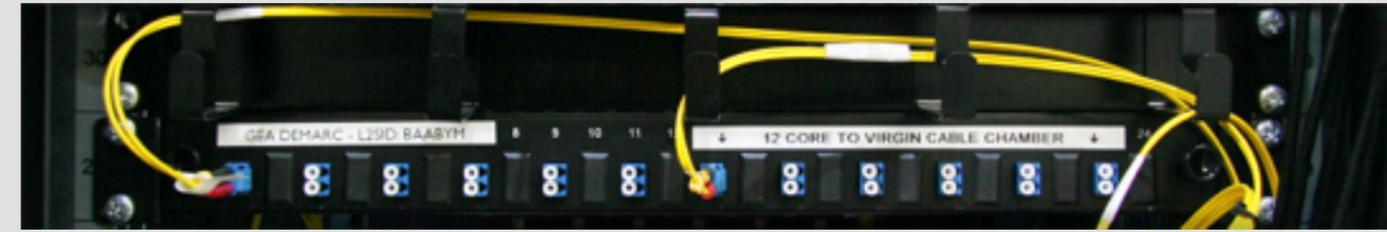
- EAD LA - Ethernet Access Direct, Local Access
  - Dedicated Ethernet 'Leased Line' type delivery
  - Uses ADVA FSP150 NTE. 4U chassis at the A-end, 1U chassis at the B-end
  - 100M and 1G variants, 25KM reach (35KM extended)
- OSA - Optical Spectrum Access
  - ADVA FSP3000 based WDM product
  - 2.5G - 10G wavelengths, 25KM reach (35KM extended)
  - Both EAD and OSA are available with Resiliency, RO1 or 2
- Street Access - 100M or 1G street side access. Events, broadcast etc.



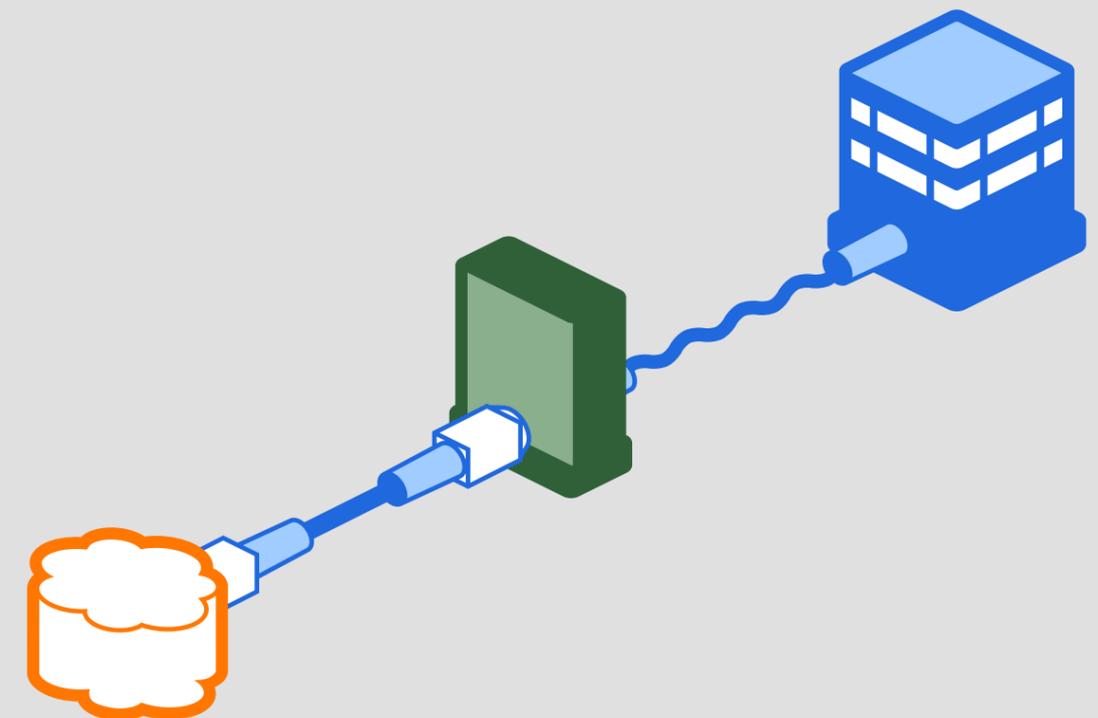
EAD chassis, splice-tray

# FIBRE LLU

- GEA - Generic Ethernet Access
  - Known at a strategic level within BT as NGA (Next Generation Access)
  - Fibre To The Cabinet (FTTC) and Fibre To The Premises (FTTP)
  - 1G interconnect to Openreach L2S (Layer 2 Switch) with per-customer VLAN presentation
  - L2S and Cabinet DSLAMs are ECI or Huawei
  - Despite most ISPs selling FTTx with PPP/L2TP presentation, GEA is presented as pure Ethernet at the exchange

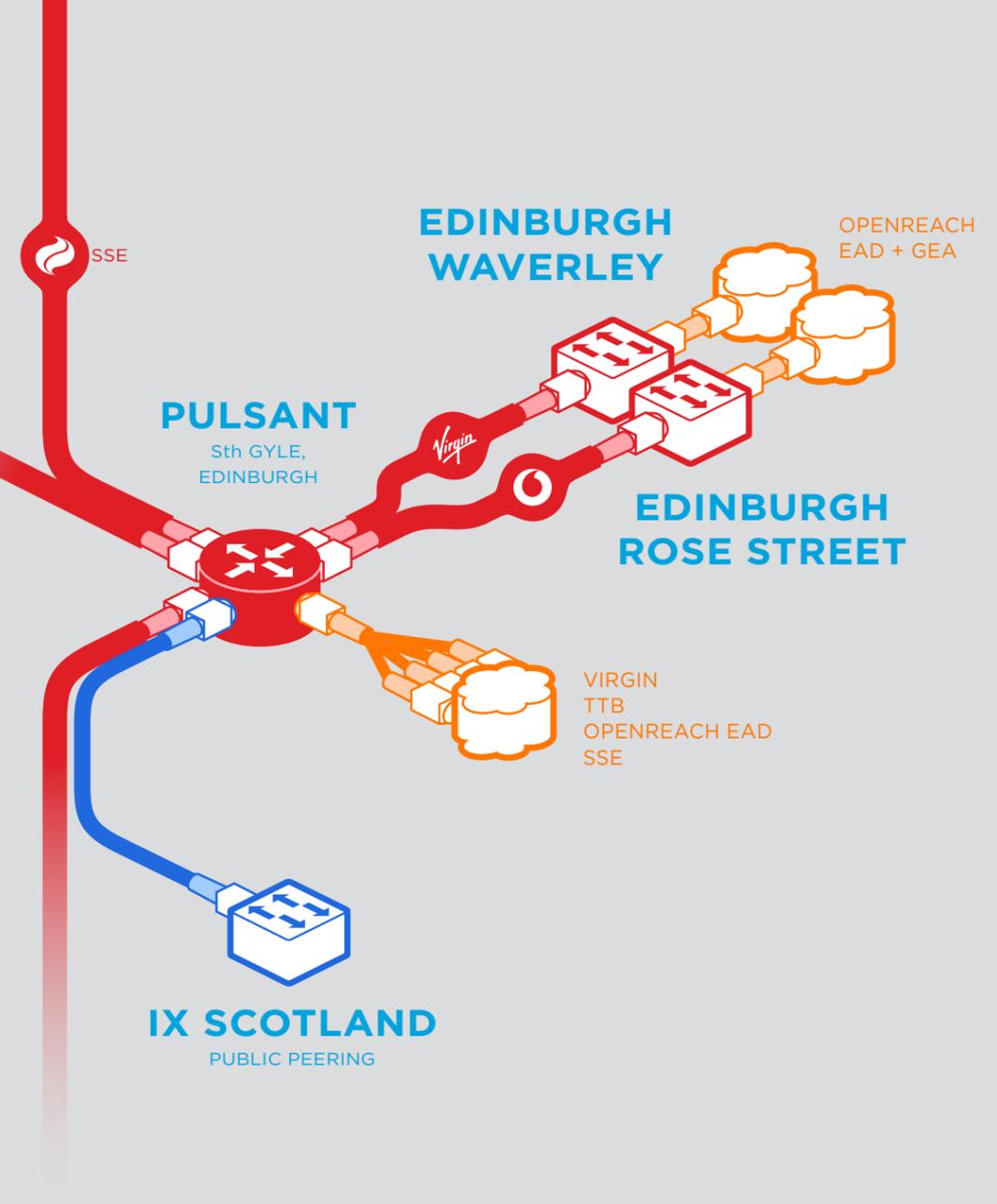


GEA cable-link handover point



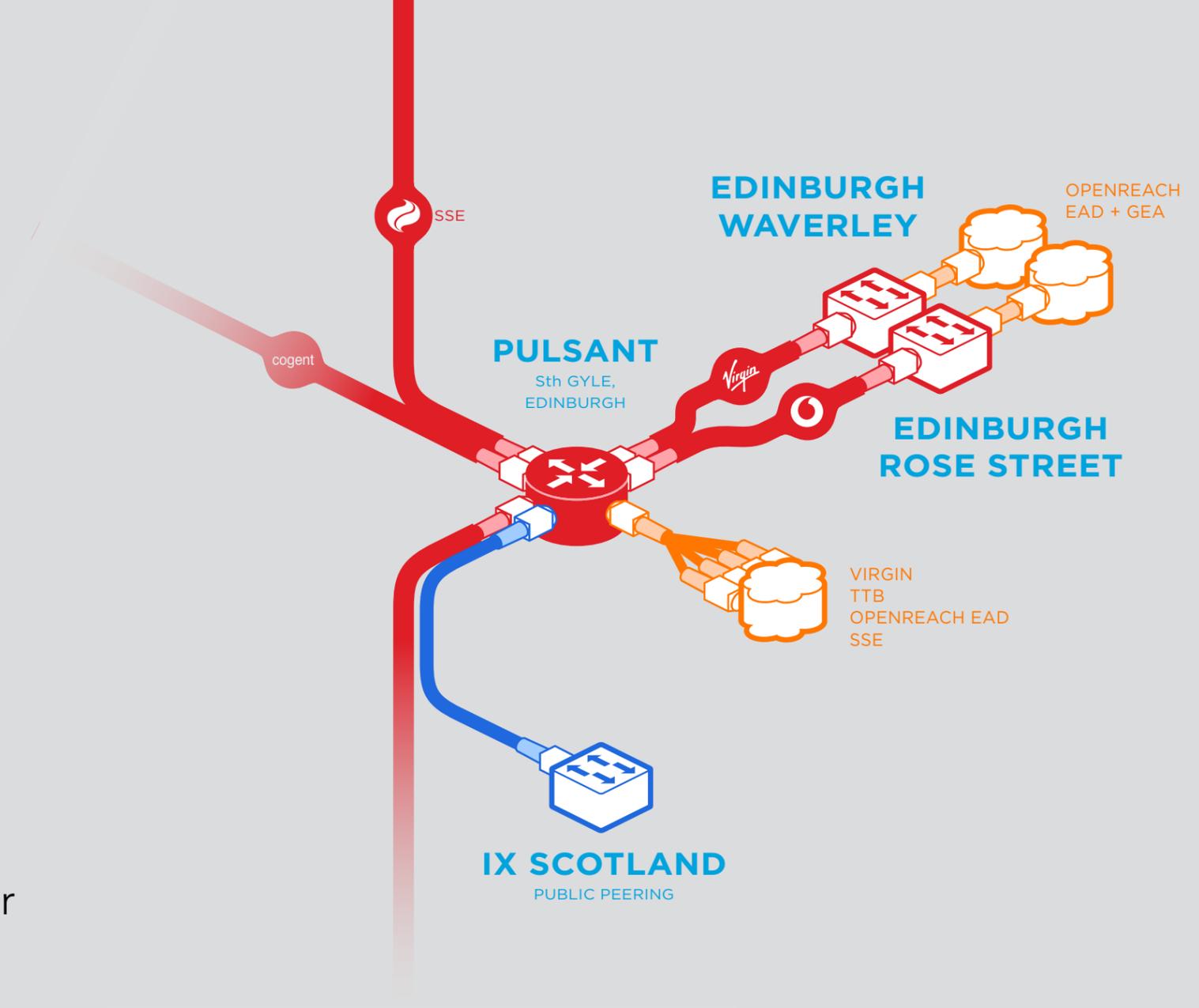
# BACKHAUL

- EBD - Ethernet Backhaul Direct
  - WDM based 1G or 10G Ethernet from selected OHPs to ASNs (Openreach Handover Points to Access Serving Nodes)
  - Usually 1 or 2 OHPs per city/area. Not every exchange is an ASN
  - Can be extended 35KM from OHP to external location via BTL (Bulk Transport Link)
- EAD & OSA - You can use normal access products between exchanges and to external sites (e.g. data centres).
- Legacy products - 10G WES and WEES still available (until 10G EAD product is launched)



# BACKHAUL

- 3rd Party Providers:
  - SSE, Geo, Virgin, Level3, Vodafone, etc.
- CableLink - Openreach's x-connect product
  - Internal - from room to room or rack to rack
  - External - from your rack to meet me cable chamber (manhole in the street)
  - Openreach can supply Tyco SC panels internally, or leave bare cable for customer splicing. Minimum 12 core.
- BTL - Bulk Transport Link
  - Extend up to 16 services from OHP exchange to external location (e.g. data centre). Useful for GEA and EBD.
  - Takes a full rack of space at customer site, and is very expensive.



# OTHER GOTCHAS

- Each product requires separate 'on boarding', and each is a lengthy process
- Significant insurance requirements & serious credit checking
- BT's systems are crazy
  - BASOL, I-DESK and OBAS cards for site security
  - OR-Siebel and e-Co for LLU and Ethernet
  - APO/FSP Excel spreadsheets for Access Locate
  - KCI for everything
- Get very very good at Excel or become a DBA. Especially with postcodes.
- Understand the price list. BT don't quote for anything!

# QUESTIONS?

*FLUENCY*

OVERTURE 

IXSCOTLAND

 **ADVA**<sup>™</sup>  
Optical Networking

**LINX**

JUNIPER  
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