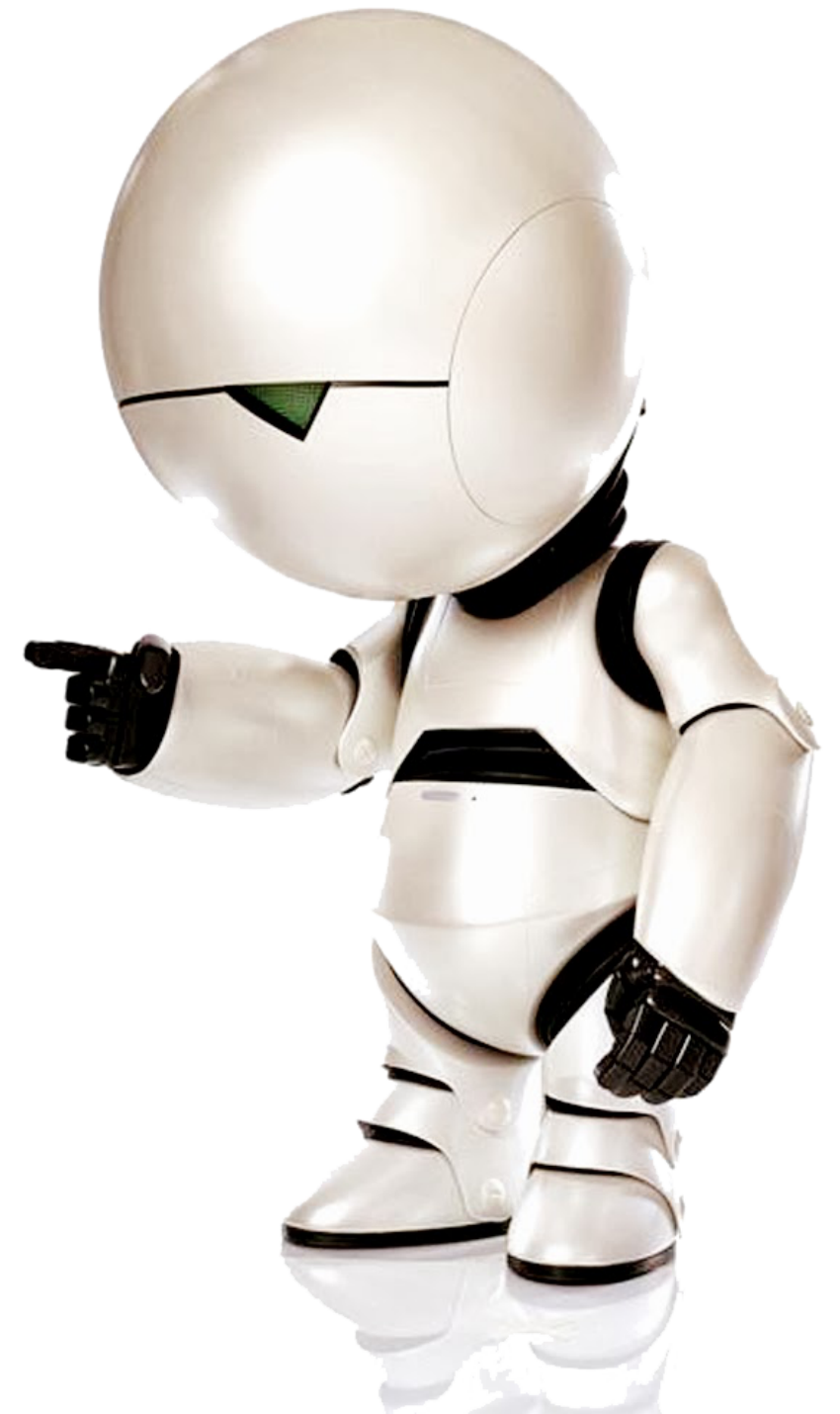


**The hitchhiker's  
guide to...**

**Ducts and poles,  
networks**

**and 30 years of  
acquisitions**

Charlie Boisseau  
@charlieboisseau



## Disclaimer:

Information in this slide deck is entirely based on hearsay. Some of it might be wrong (I've tried hard to make sure it's not). Please don't sue me.

# Dirty Talk

- Surprisingly few network engineers understand Layer 0 (the ‘dirty layer’)
- Manhole spotter’s guide to ducts and poles
- History lesson (who’s who and who shares with who)
- How to build your own





# Manhole spotter's guide

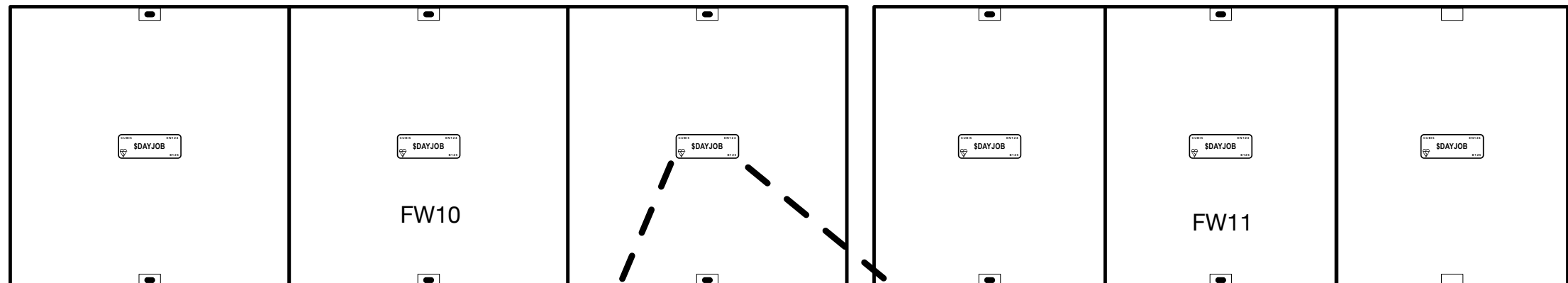
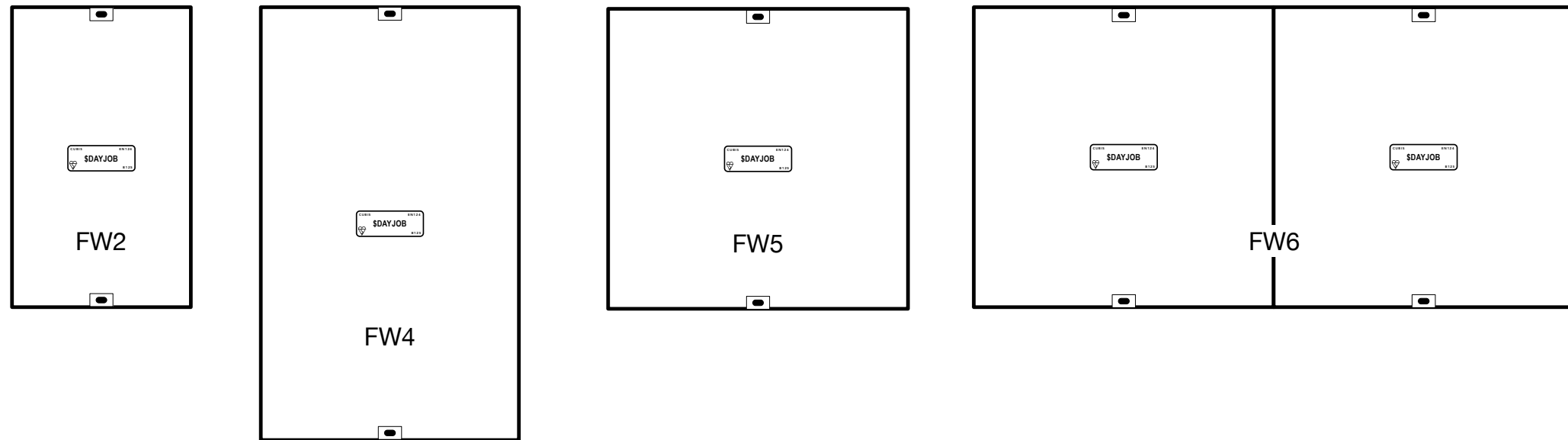
- Two main types of access chamber:
  - **Footway** - usually HDPE or PP plastic with steel frame / concrete infill covers (high density polyethylene) or PP (polypropylene)
  - **Carriageway** - usually GRP (glass reinforced plastic) with solid iron covers
- All conforming to European Standard EN124.
  - Group 2 (B125) for footway - 25 tonnes
  - Group 4 (D400) for carriageway - 60 tonnes



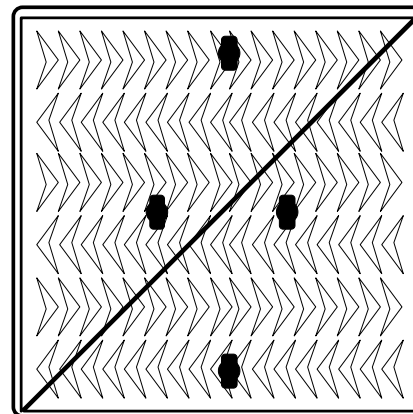
**CREDIT: Cubis**



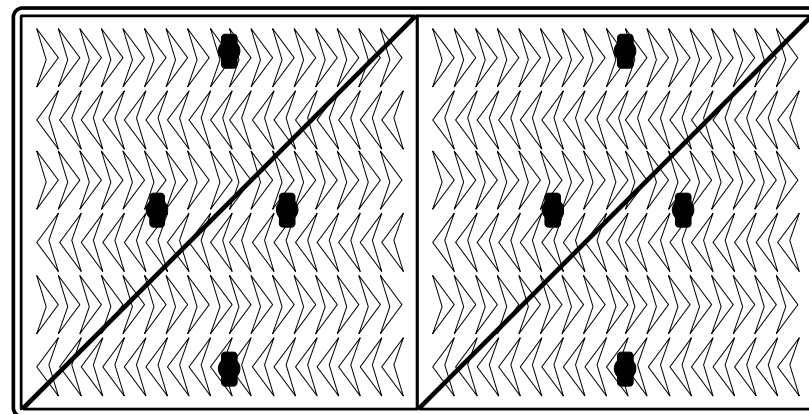
# Manhole spotter's guide



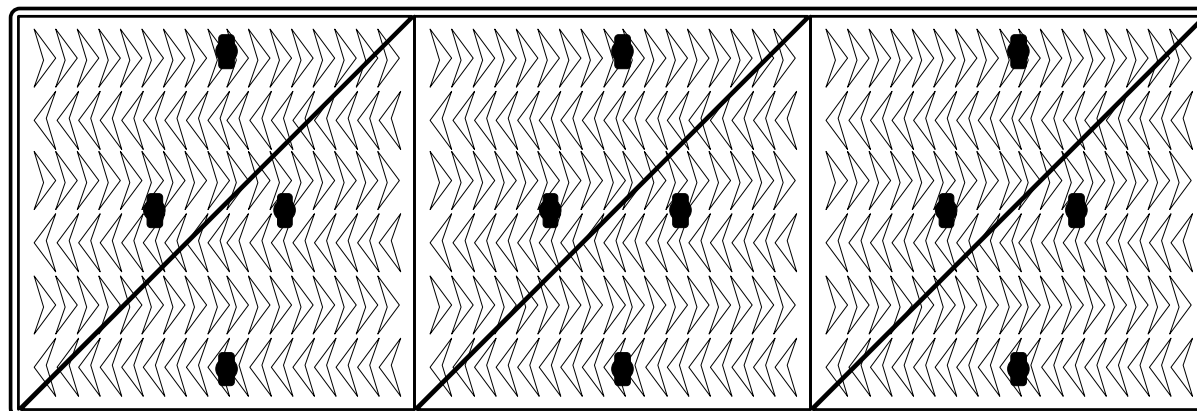
# Manhole spotter's guide



CW1



CW2



CW3





SCOTTISH  
TELECOM

CUBIS EN124  
FLUENCY  
B125

WORLD COM

MERCURY  
COMMUNICATIONS

CableTel

C A T V

Who's who?

NORWL TELECOM

ATLANTIC  
TELECOM

186K  
1981

CUBIS EN124  
City Fibre  
B125



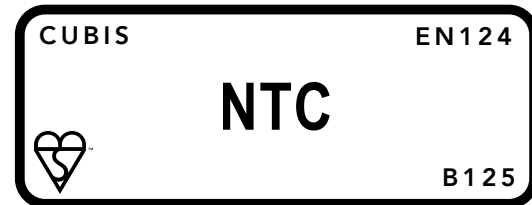
# Who's who?

- Lots of street furniture with defunct brands
- ~2000 telecoms / tech market crash (.com boom)
- Lots of consolidation



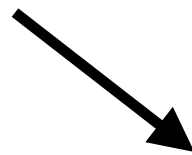
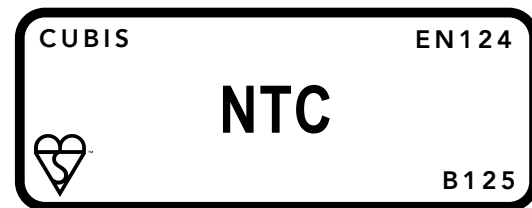
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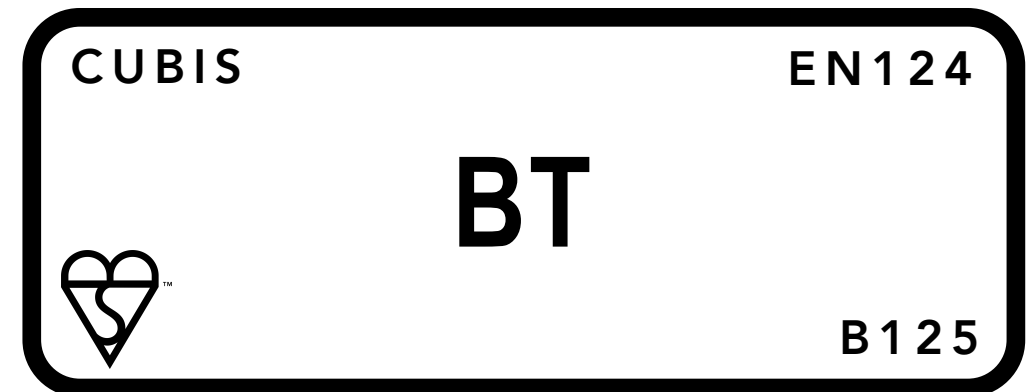
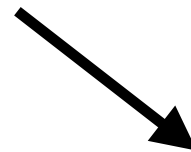
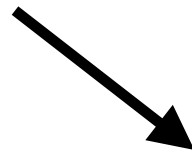
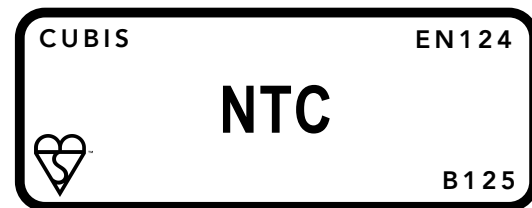




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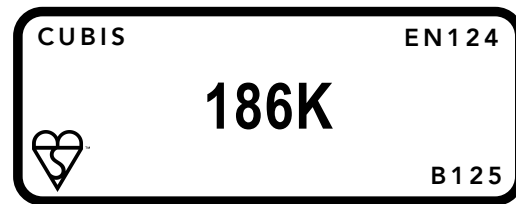
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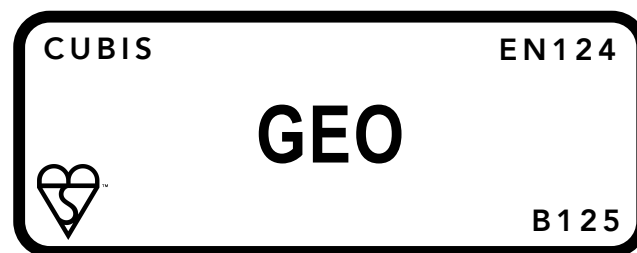
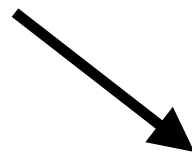
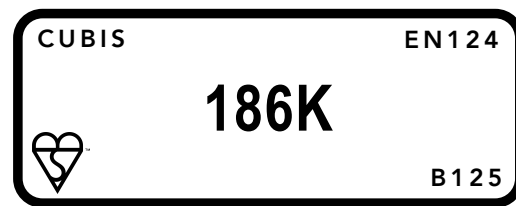


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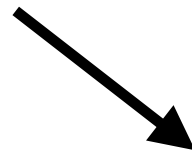
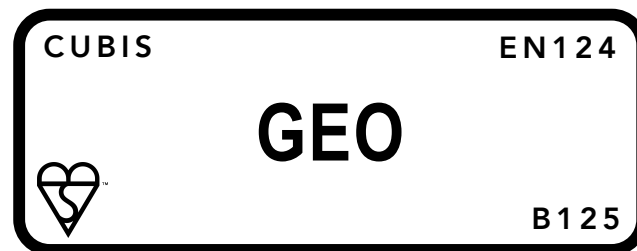
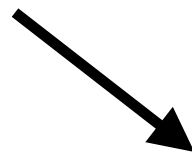
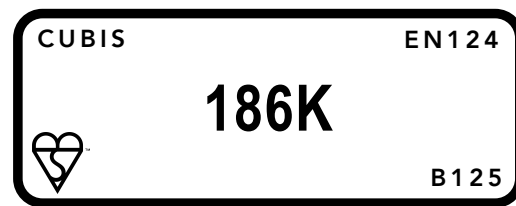
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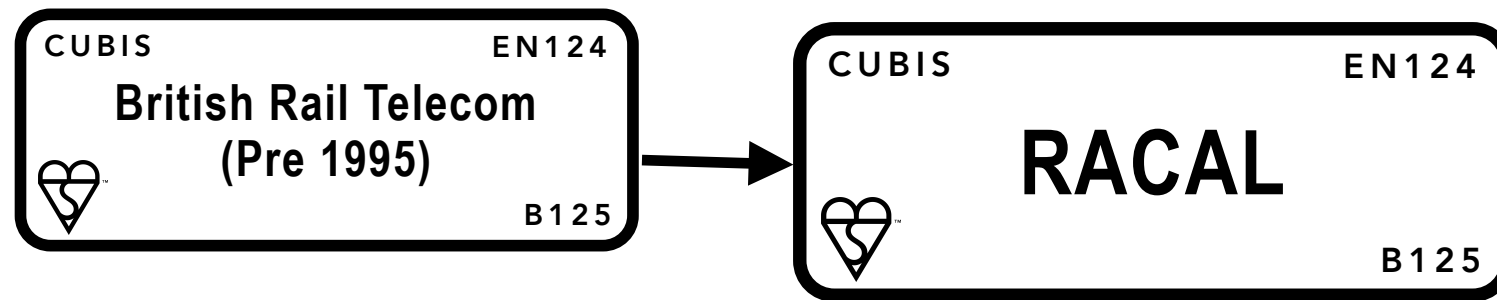


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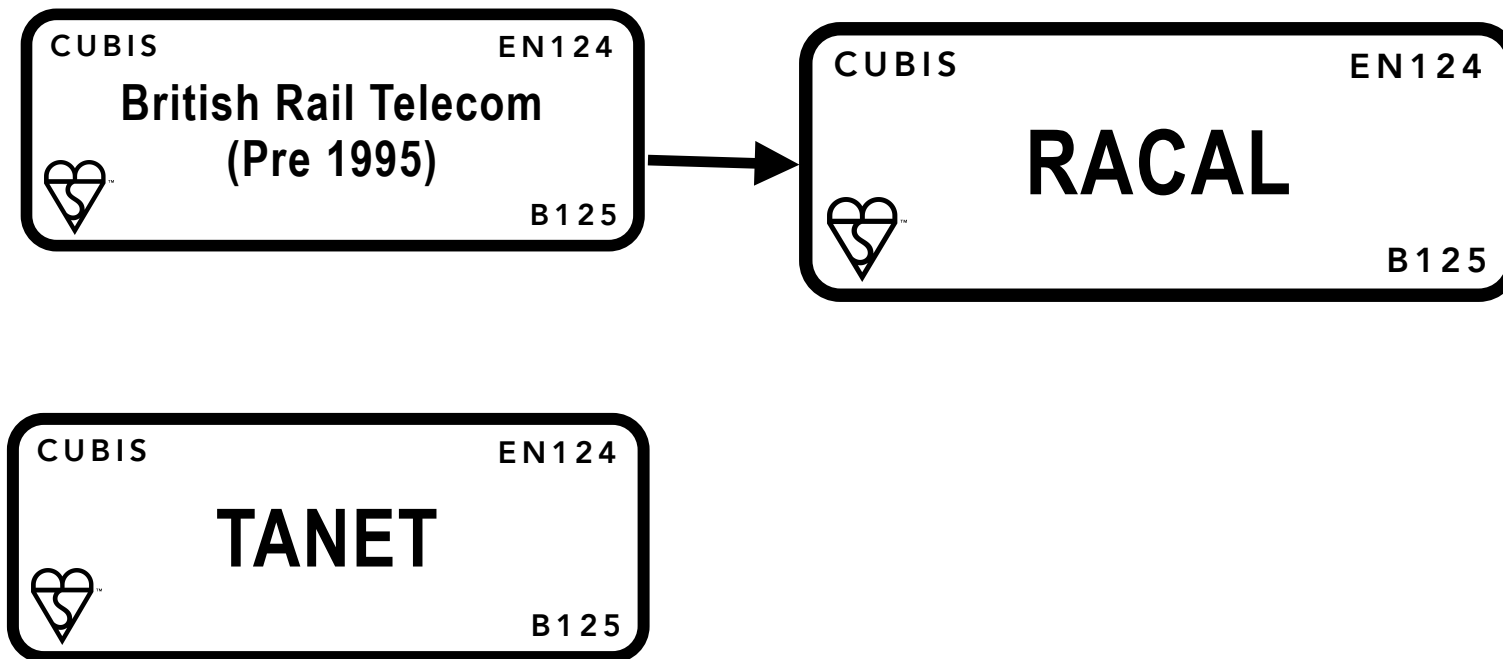
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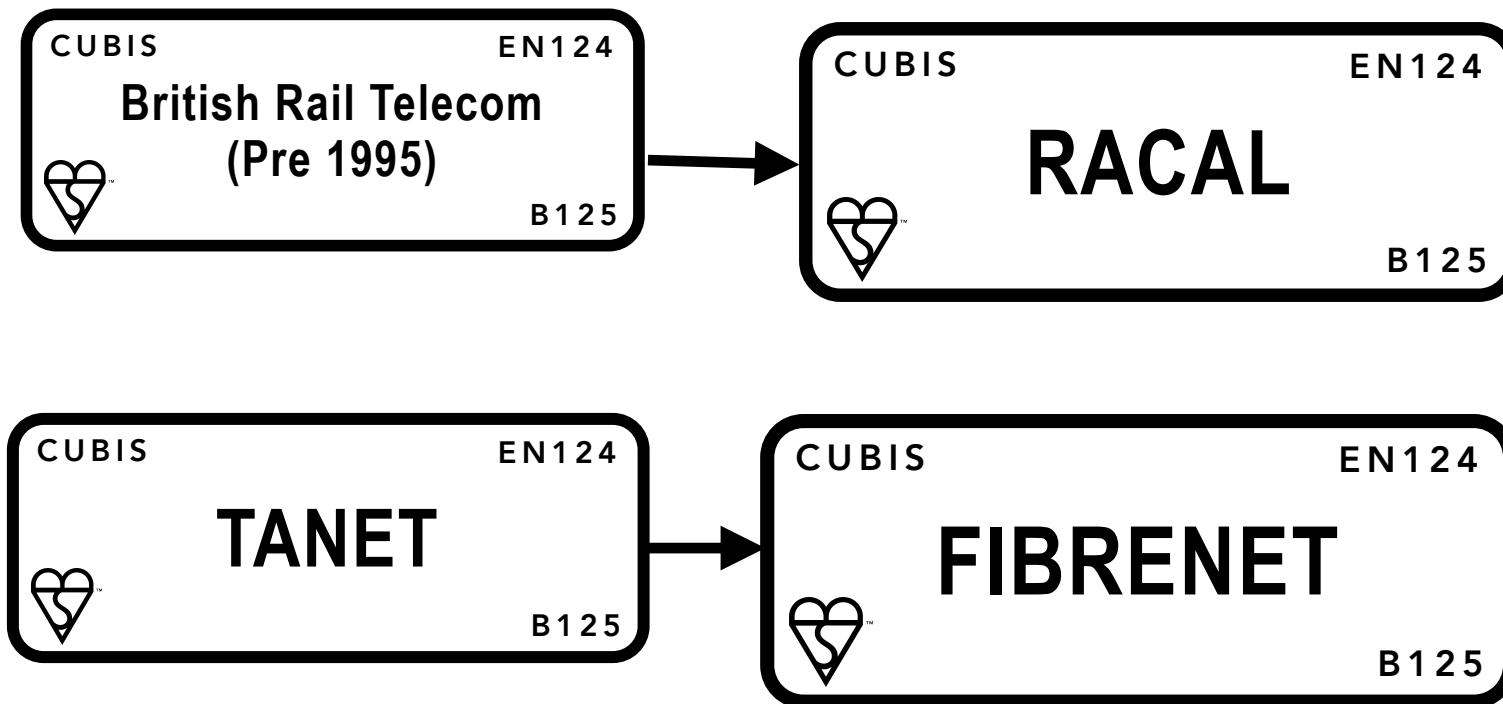
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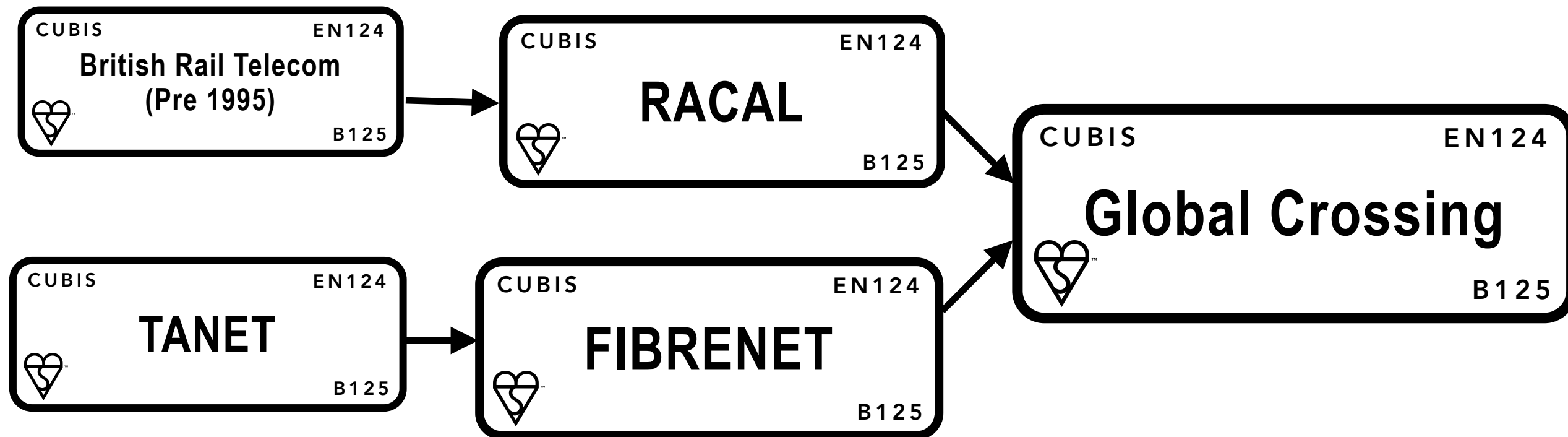
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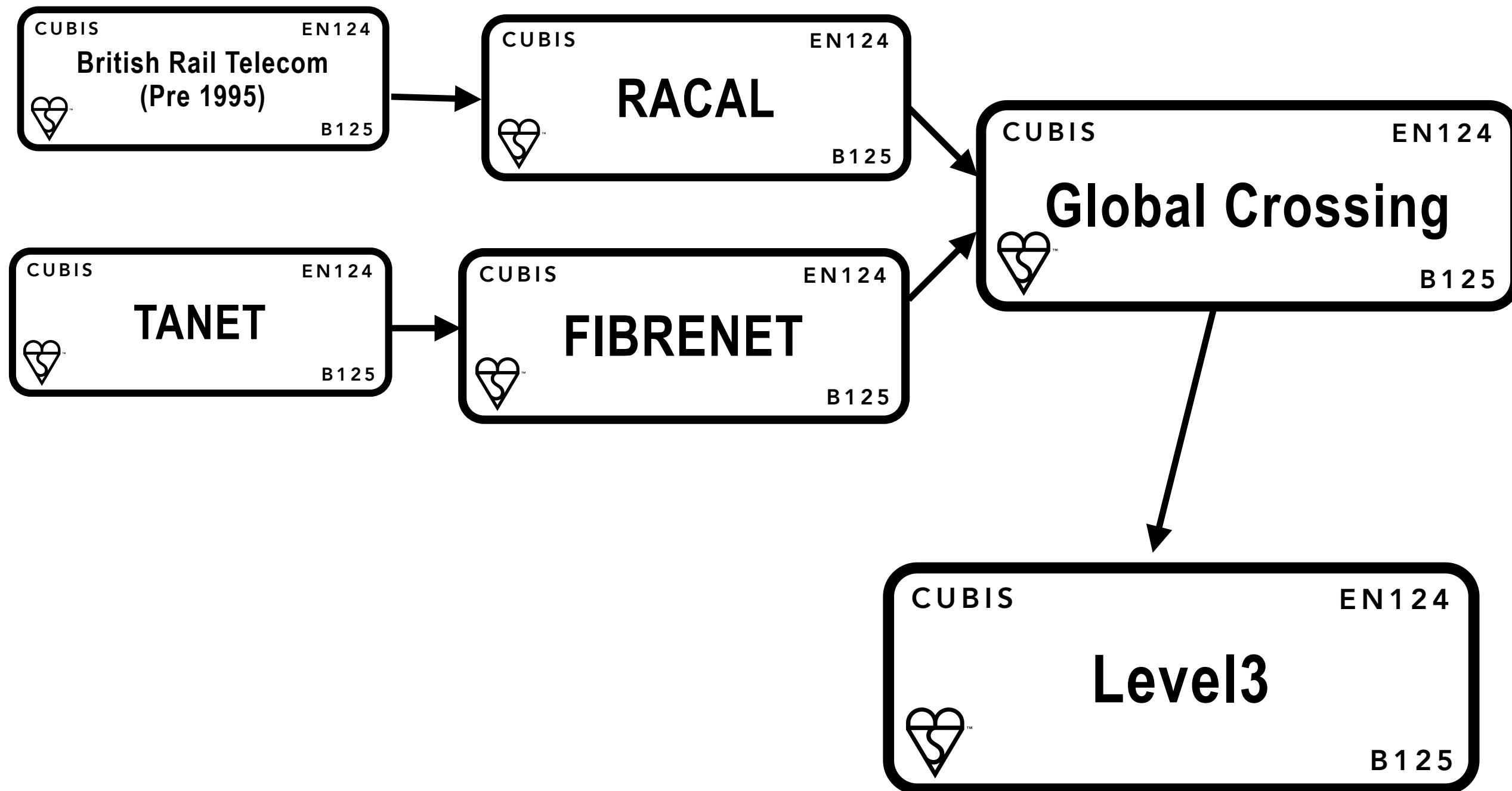


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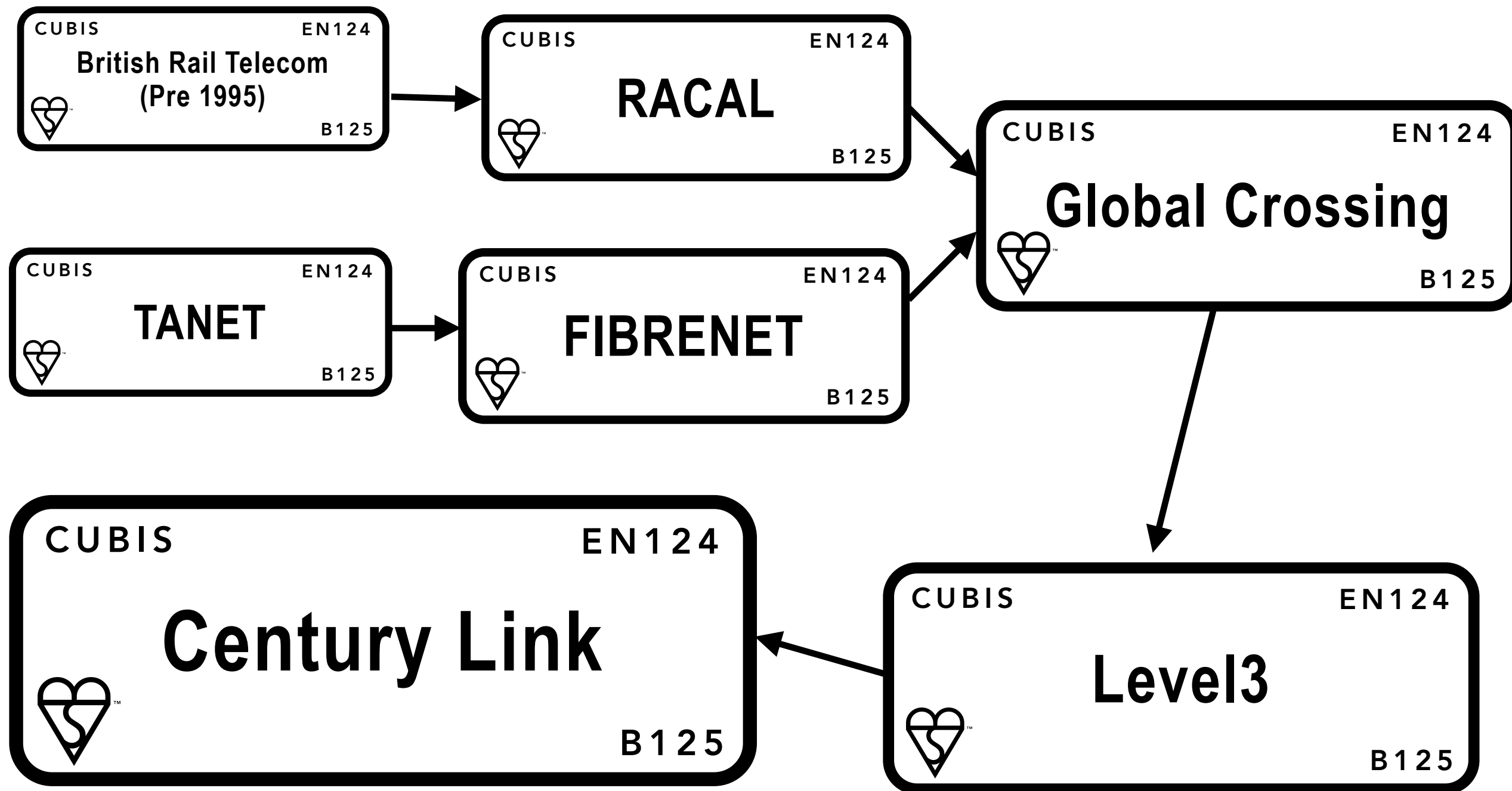




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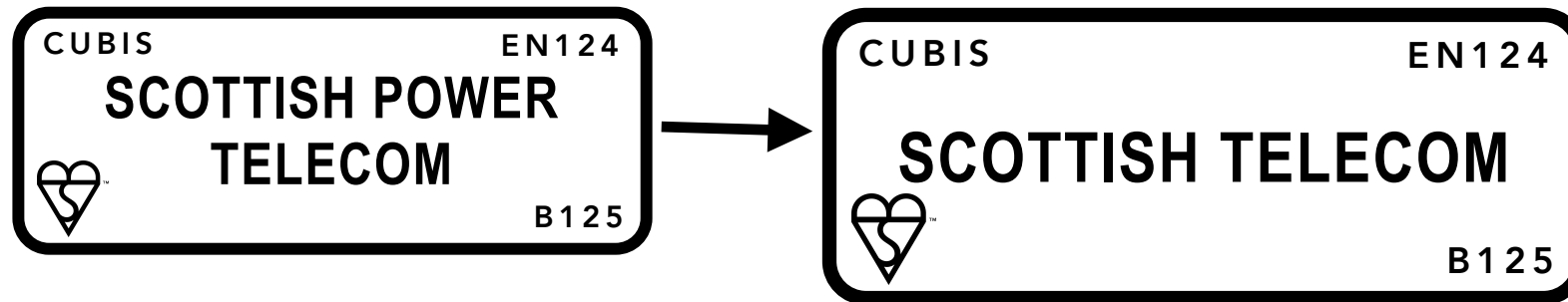


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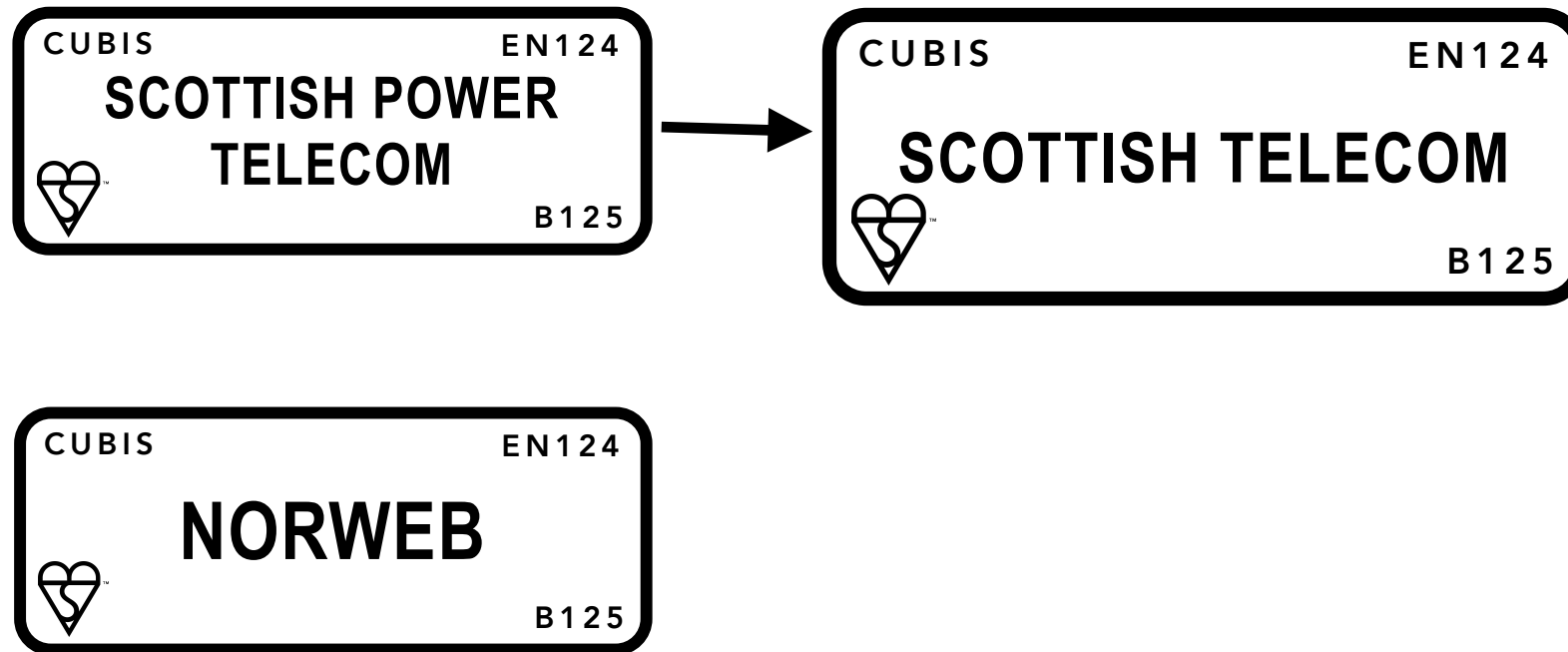
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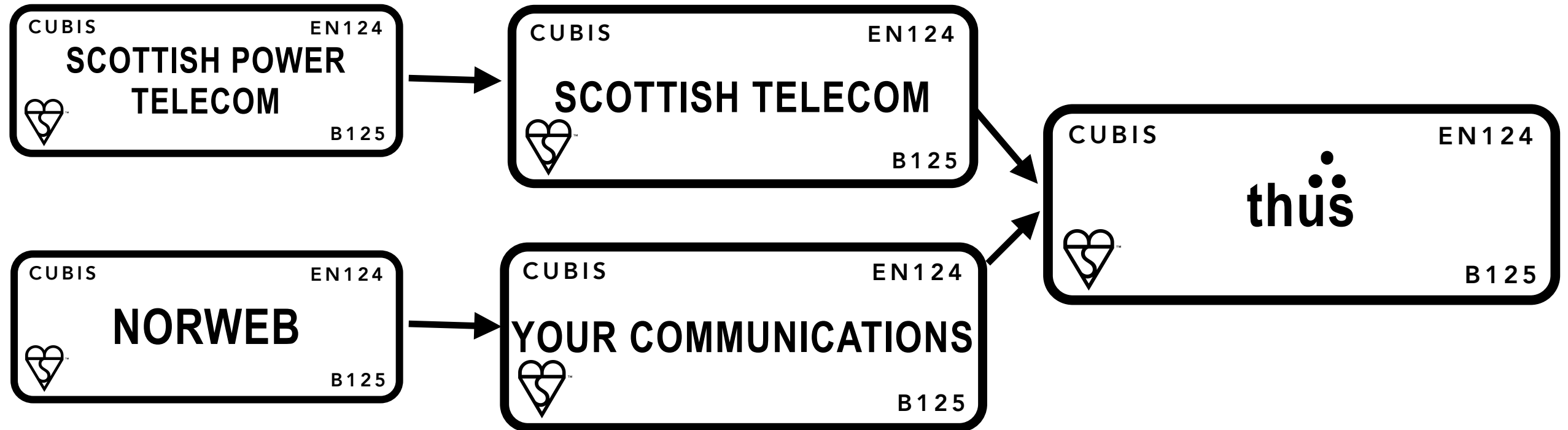




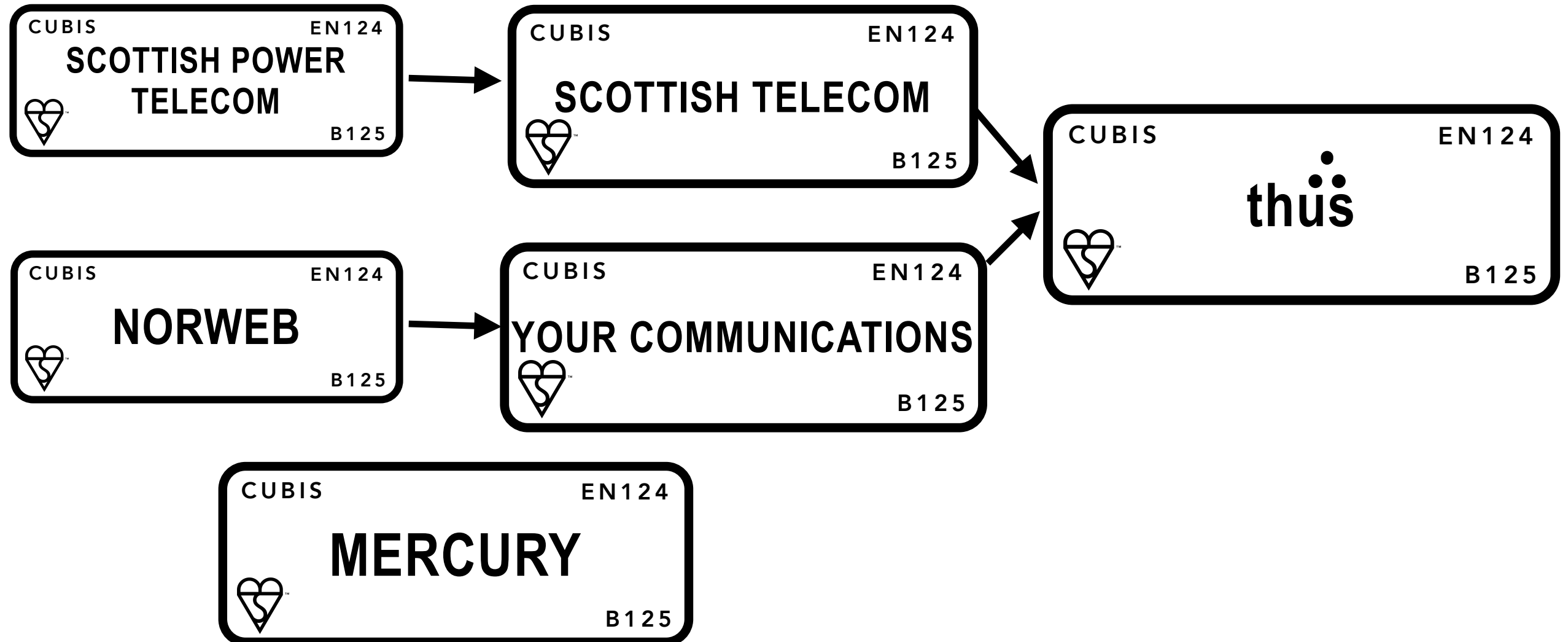
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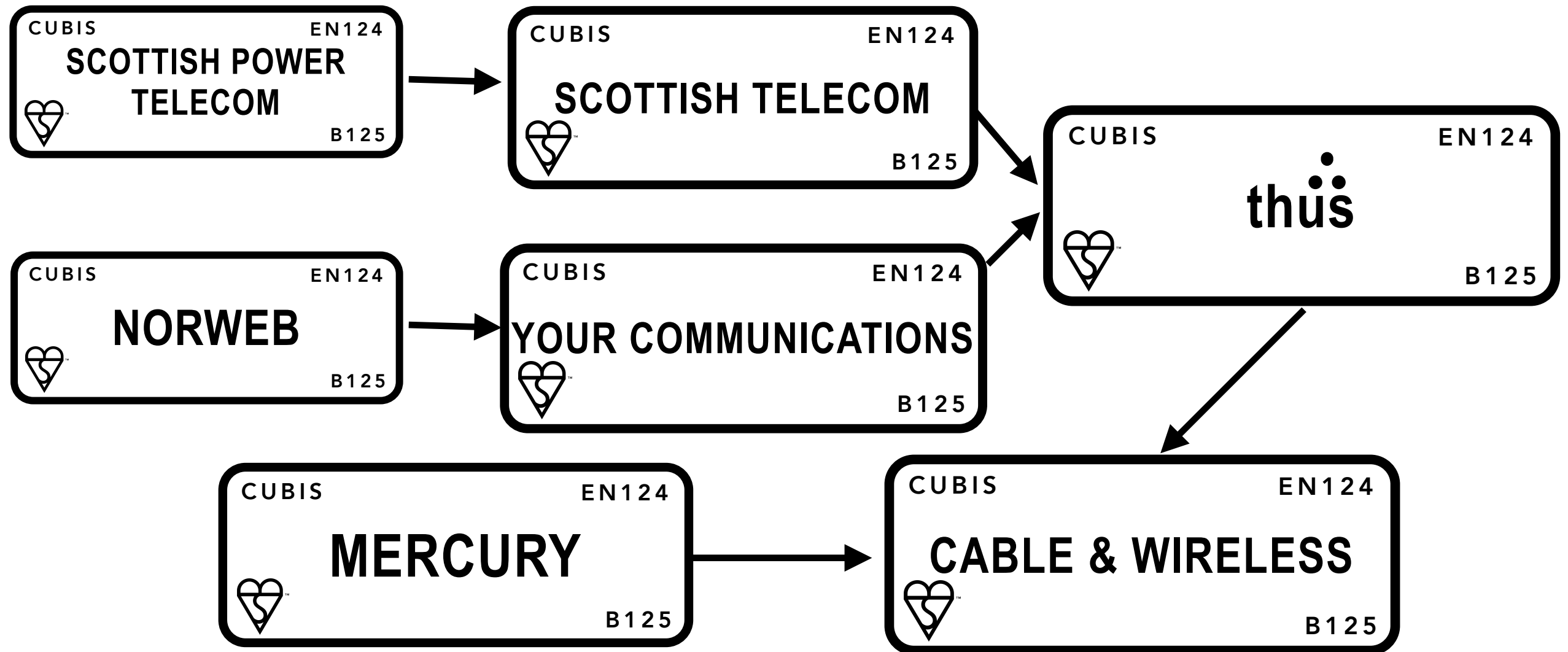
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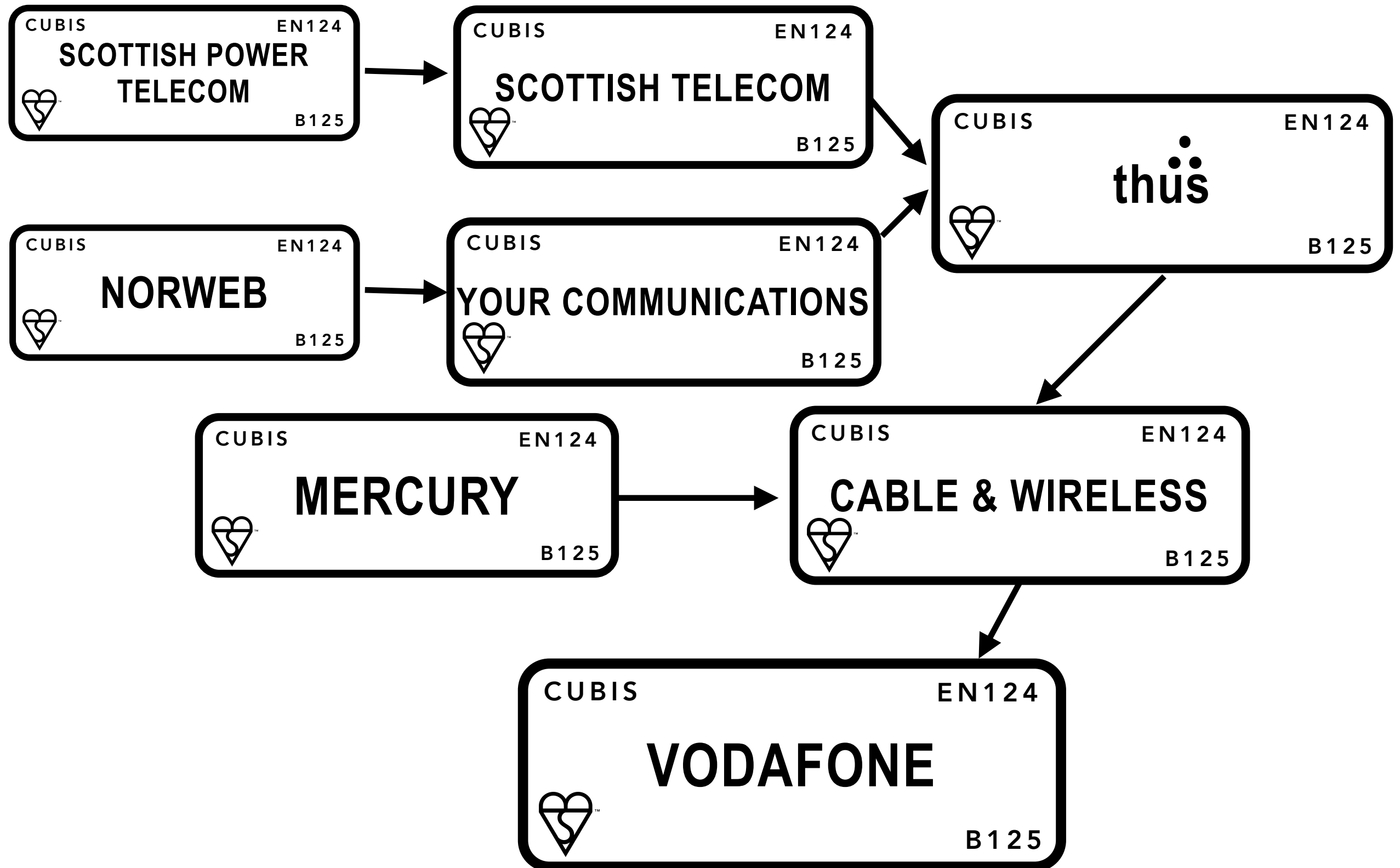
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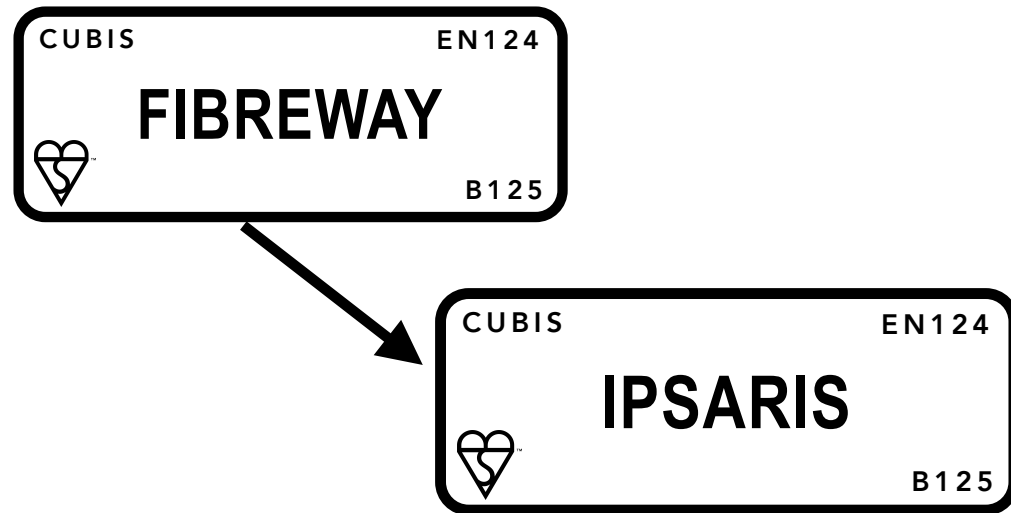


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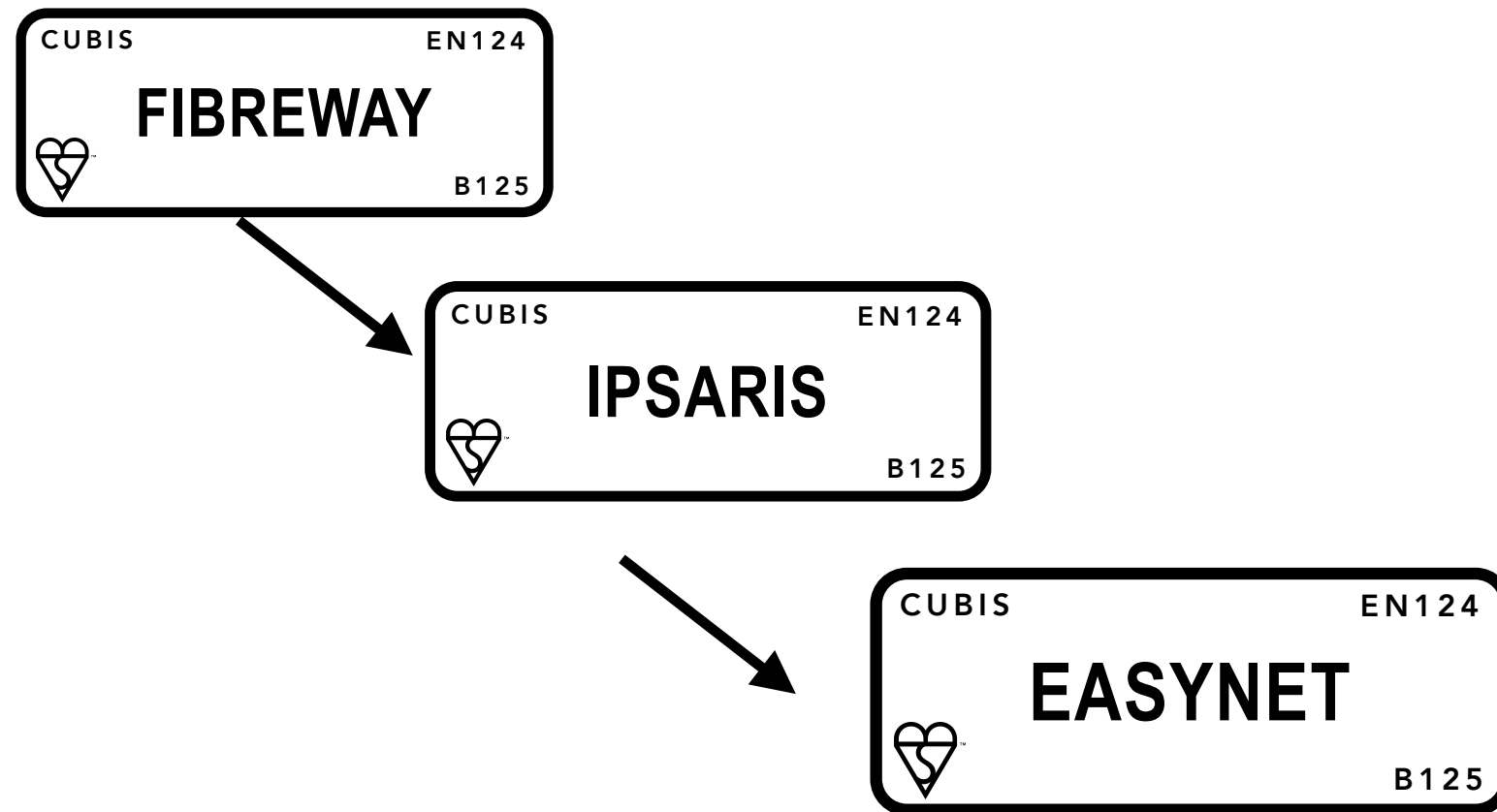


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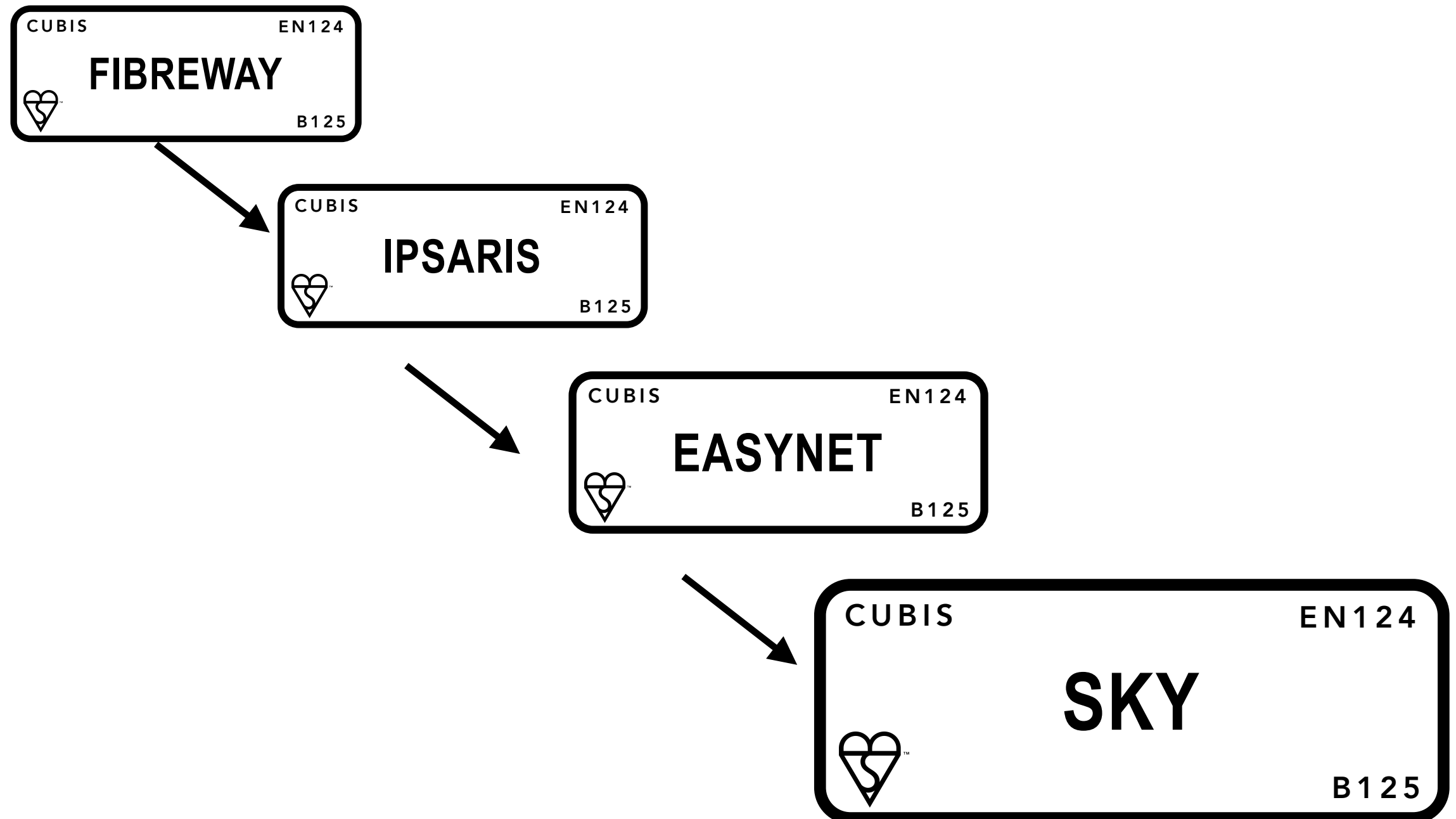




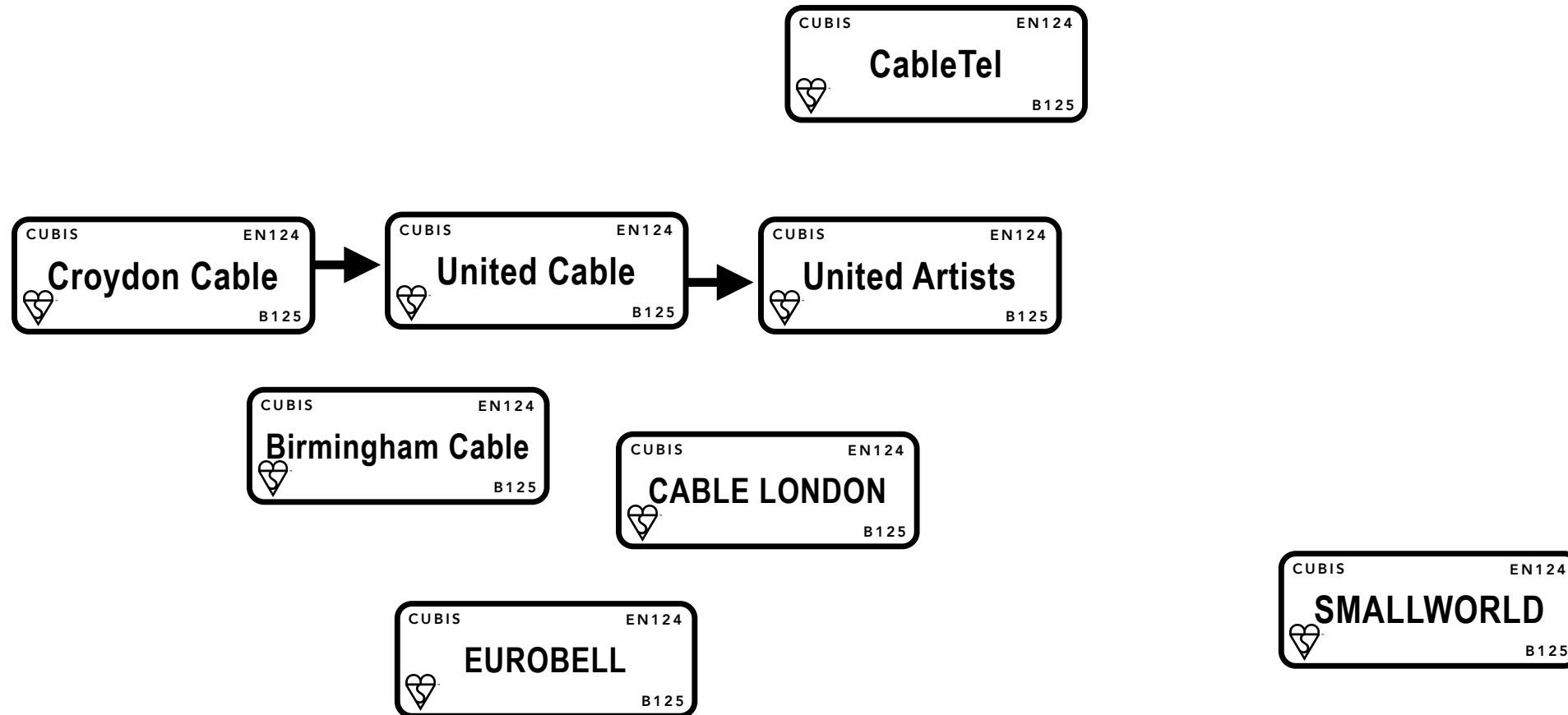
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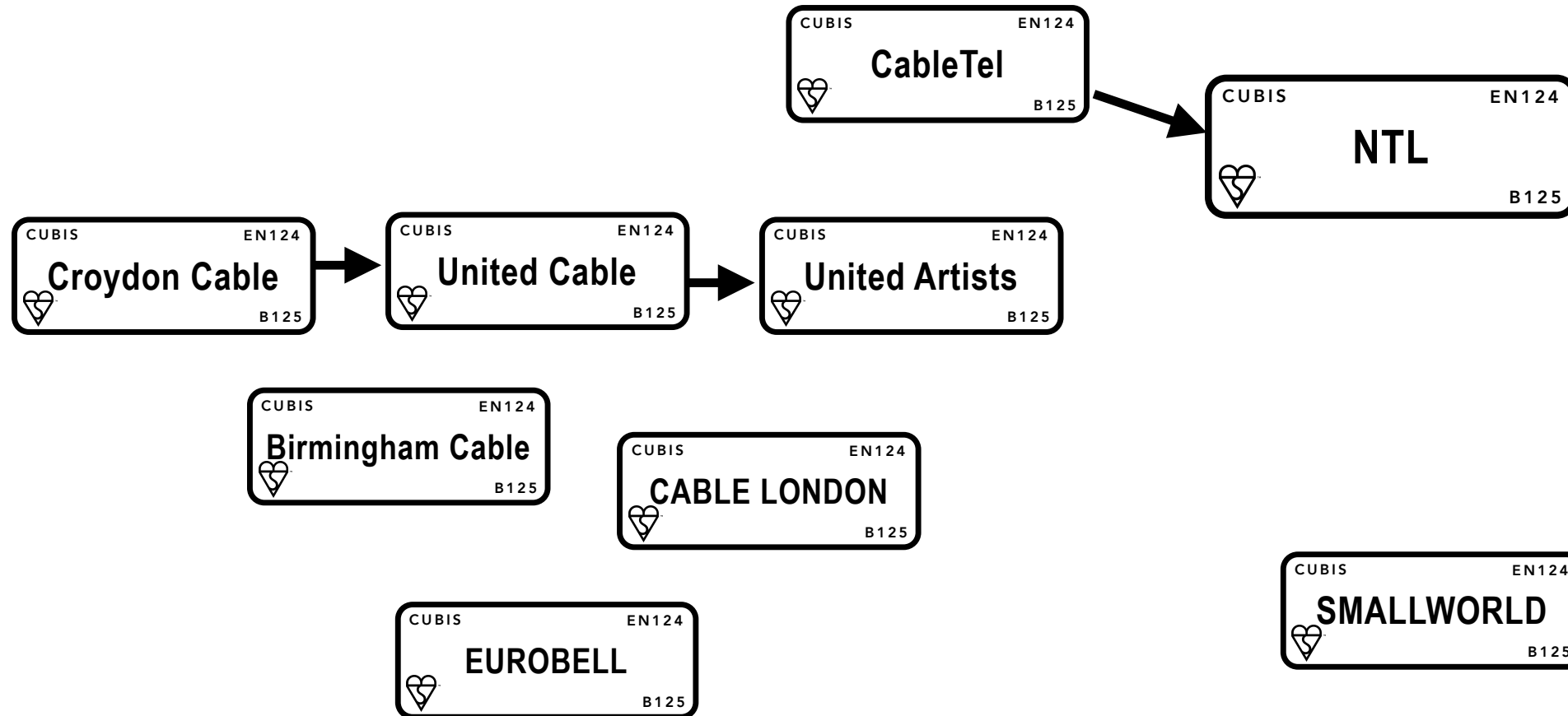
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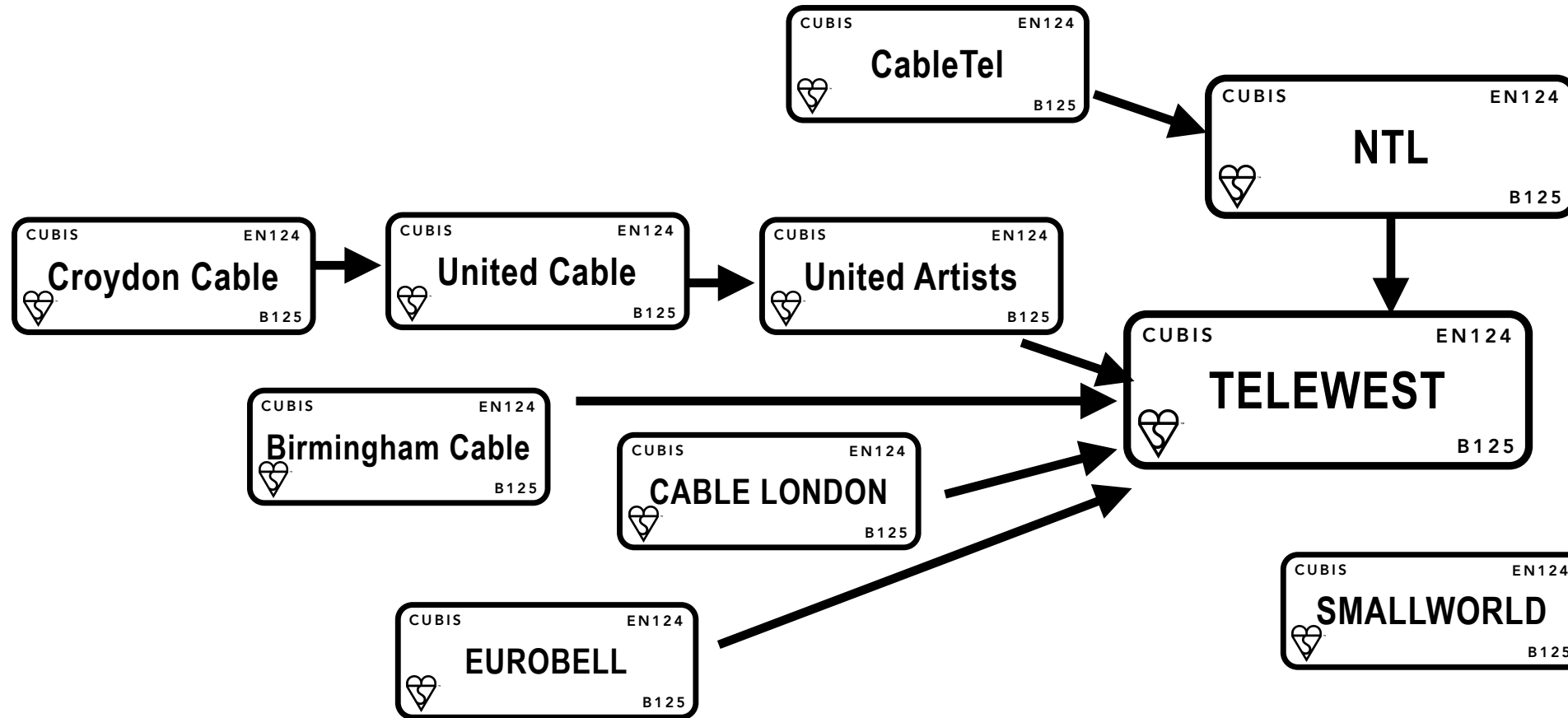


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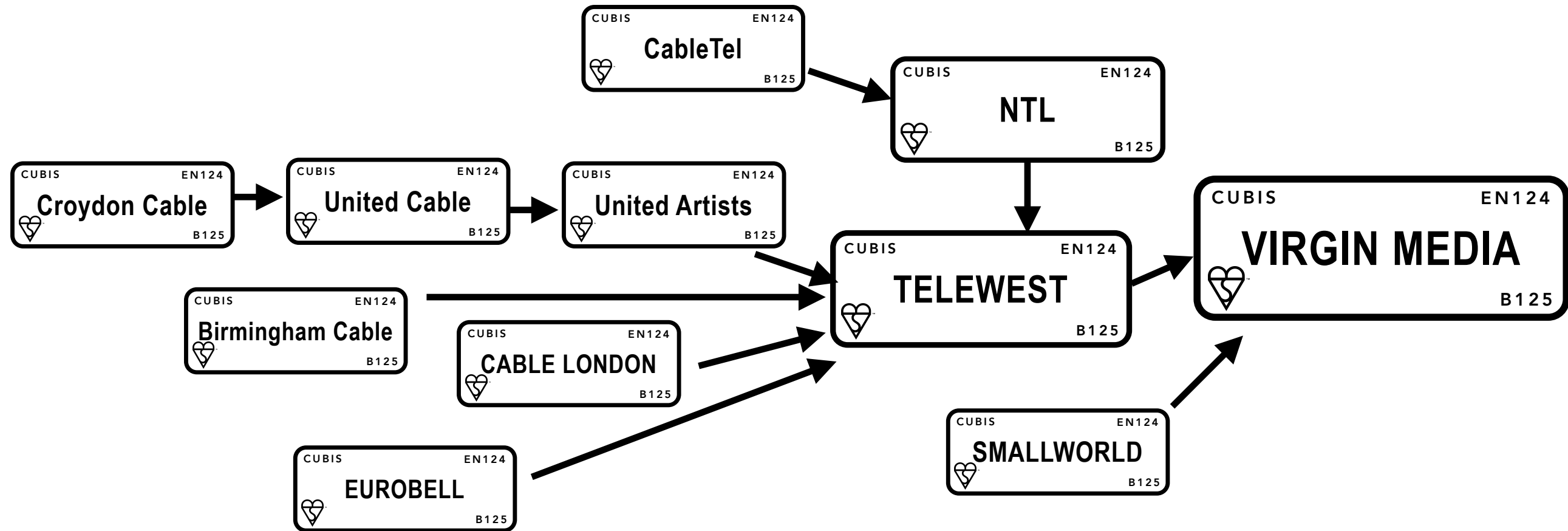




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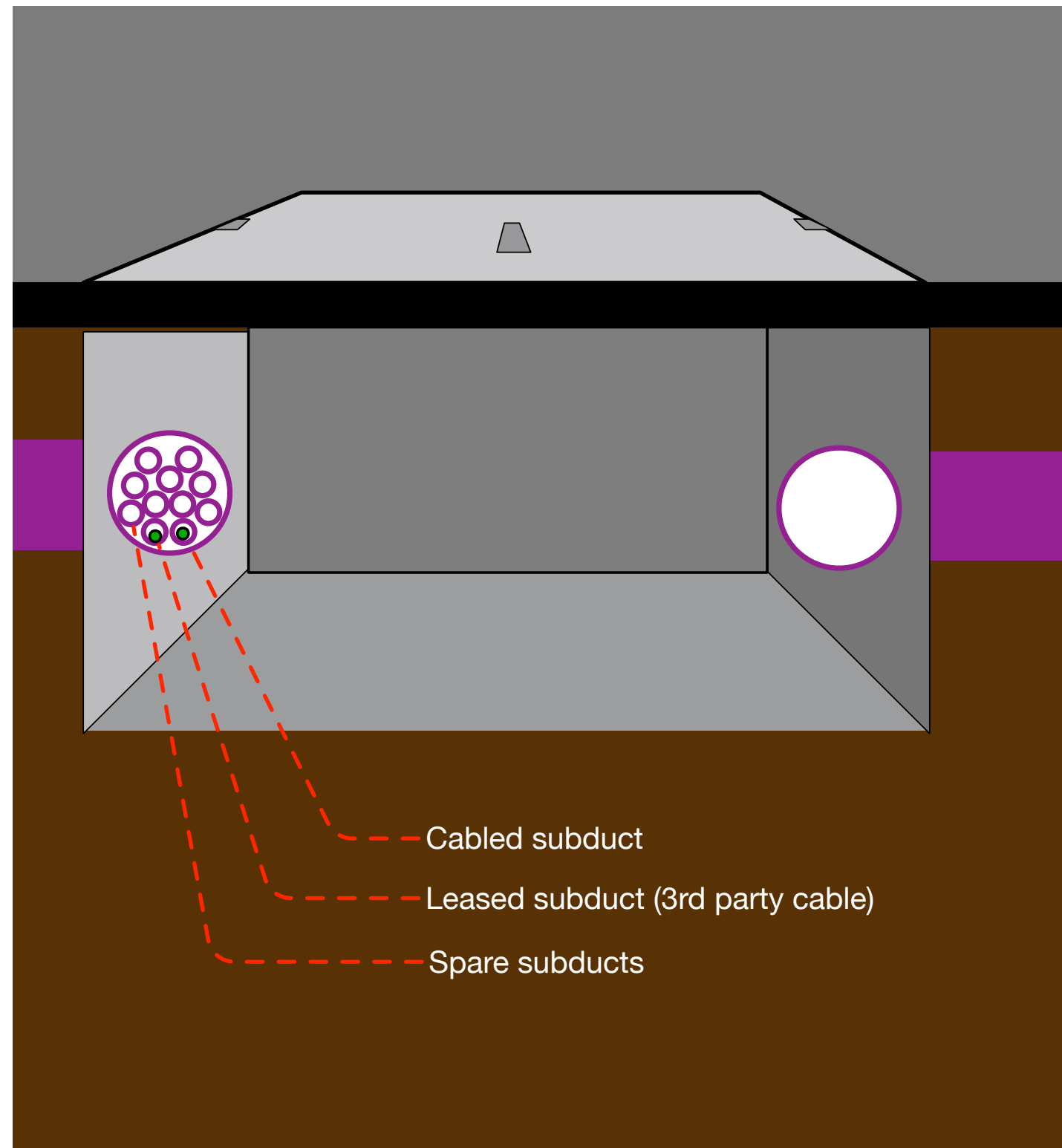


# PoP Quiz / History Lesson



# Who shares with who?

- Very few genuinely national networks (who own duct everywhere)
- Many large operators have leases or IRUs in other networks
- UK is not as resilient as you'd think
- Big impact on assumed diversity/resilience between carriers









# Who shares with who?

- BT - owns almost all of the underlying asset in its network, except:
  - Access to some railway fibre (NRT?)
  - SHEFA subsea cable from Banff to Shetland!
  - Places it has 'assumed' it owns the asset

# Who shares with who?

- Virgin Media is entirely owned in metro areas, but leases subduct/fibre for large stretches of its Long Distance Network
- Evidence of assets within CenturyLink's networks (railways)

# Who shares with who?

- Sky's network is largely Long Distance only (they don't own much metro footprint)
  - Built in conjunction with British Waterways
  - Any routes that pass canals are Sky-owned ducts
  - The rest looks to be largely leased from CenturyLink (railways)

# Who shares with who?

- SSE is majority in 3rd party networks, but owns a lot too
  - Owns its own cables on transmission lines
  - Has some metro and small sections of long distance duct network
  - Most long distance fibre in a subduct lease from Zayo
  - Significant dark fibre leases from Sky, CenturyLink, Virgin Media and Vodafone



# Who shares with who?

- Surf Telecom similar to SSE. Power lines on Western Power, largely leases elsewhere
- euNetworks has metro in London/Slough. Zayo elsewhere
- KCOM's national ring was a build-share with Colt. KCOM sold ducts (except Hull) to CityFibre, now leases fibres
- GTT bought Interoute. Interoute bought Easynet v2 (MBO of Easynet v1 B2B base). Easynet v2 had IRU from Easynet v1 (now Sky). Interoute now has large DF leases within Sky's network
- Various Vodafone entities shared with one another, now they're all the same company, so doesn't matter anymore ヽ\_(ツ)\_/
- Enormous amount of overlap on Vodafone networks
- Norweb was a build-share alongside Fibreway (Sky) in the canals



BANKHEAD  
TERRACE



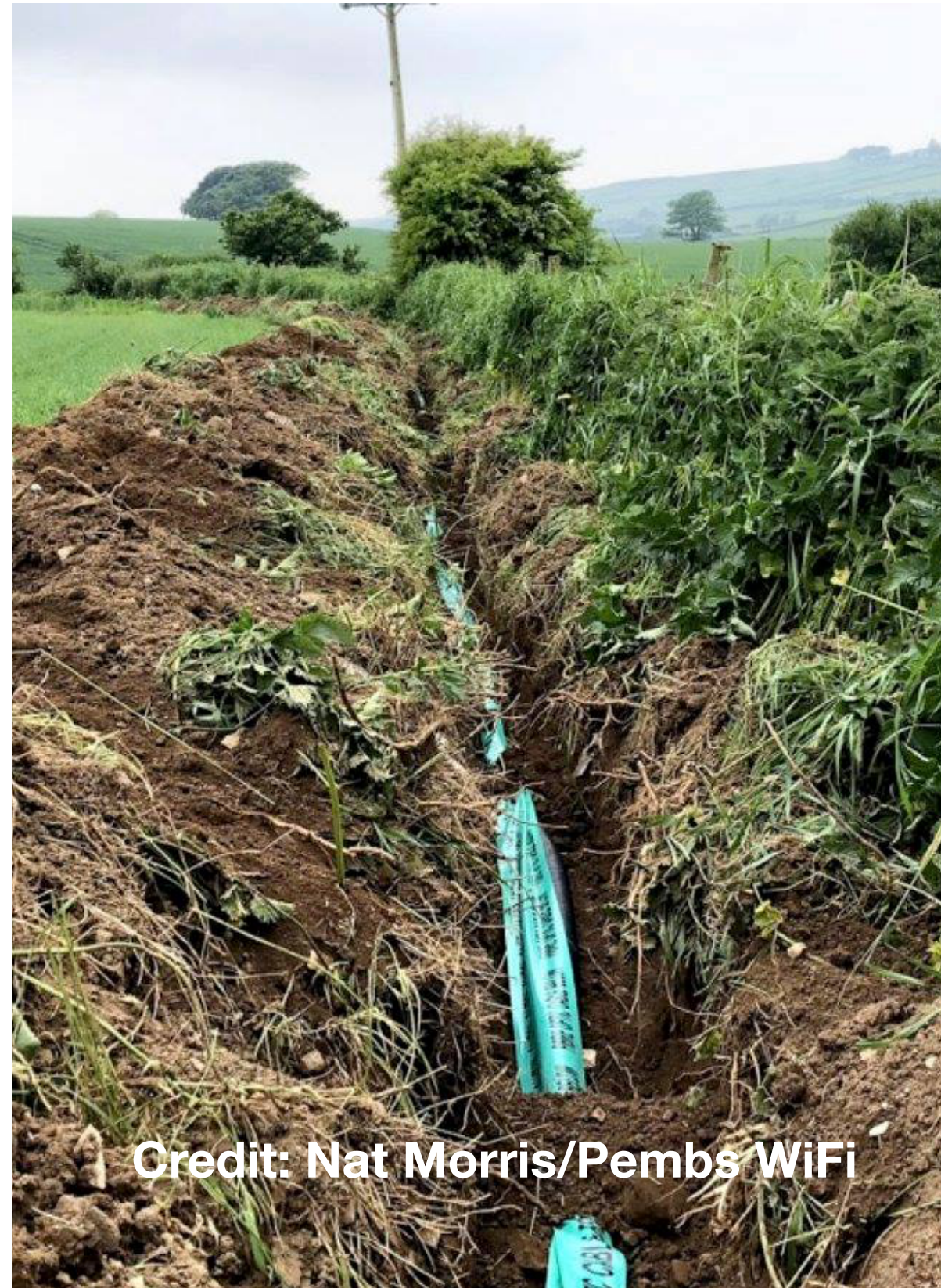


# How to build your own

- Permission to dig
  - Private land: wayleave or easement
  - Public land: notice or permit from roads authority
  - Authority notices & easements require Powers under the Electronic Communications Code (Code Powers)
  - Permits - not guaranteed. Maintenance work difficult

# How to build your own

- Means to dig:
  - DIY
    - NRSWA Streetworks Cards (Supervisor & Operative)
    - Machine Plant & associated HSE approved certificates
    - Traffic management (can contract out separately)
    - Insurance
    - If with Code Powers; access to roads authority systems for submitting notices
    - Be aware of roads authority reinstatement warranties etc.



Credit: Nat Morris/Pembs WiFi



# How to build your own

- Means to dig:
  - Contractor
    - Usually able to provide 'turn key' - civils, cabling, noticing, liability etc.
  - Approx costs:
    - Carriageway: £120/metre
    - Footway: £60/metre
    - Soft Verge: £20/metre
    - Carriageway 1 chamber: £2k+  
Carriageway 2 chamber £3k+
    - Footway 4 chamber: £1k  
Footway 6 chamber: £2k



# How to build your own

- Liabilities:
  - Most authorities expect 2 year warranty on reinstatement  
(they'll do a coredrill test on a percentage of reinstatements to verify)
  - Health & Safety - large fines for violations
  - Code Powers - lodge a bond in case you go bust



# How to build your own

- You may also need a tent...



# Questions