B4RN®

Building & Operating A Next-Gen Access Full-Fibre Network

Tom Rigg

COO

t.rigg@b4rn.org.uk

https://www.linkedin.com/in/tsrigg/

https://b4rn.org.uk/

Introduction

Launched in 2011 by local volunteers

Registered as a Community Benefit Society

Our mission remains at the heart of what we do:

To deliver the best internet service in the country to the areas that are hardest to reach, working shoulder to shoulder with, and for, rural communities, to realise the enduring benefits of greater resilience and connectivity.

2,300 km² FULL FIBRE NETWORK LARGER THAN GREATER LONDON (AND THE M25!)

5,000,000 m OF RESILIENT UNDERGROUND FIBRE CABLE LAID & CONNECTED

5,000 INDIVIDUAL COMMUNITY INVESTORS

1,000 MBPS GIGABIT SYMMETRICAL UPLOAD & DOWNLOAD TO EVERY CUSTOMER

12,000 CUSTOMERS ONLINE ENJOYING FULL-FIBRE BROADBAND

220 COMMUNITY ASSETS WITH FREE SERVICE INCLUDING 44 PRIMARY SCHOOLS

Multi-Award Winning Rural ISP

BEST RURAL ISP 2021 & 2022
BROADBAND PROVIDER OF THE YEAR 2022
COMMUNITY IMPROVEMENT AWARD 2022

'Working shoulder to shoulder with, and for, rural communities'

Technology choices

- Full-Fibre – <u>All the way</u>
- Simplistic (by design)
- Built & operated as a single entity
- Future-proof long-term asset
- Proactive approach

Planning the network

- Create project boundaries with the Community
  - Geography/Geology
  - Existing Infrastructure
  - Local Parish area(s)
  - Best Engineering choices
- Create network plans that allow 100% connectivity
- Liaise with landowners to find suitable paths for installation, make their lives easy, and bring them onboard as part of the build!
- Make provisions to allow for a bottom-up design using local knowledge, not top-down using automation and mapping tools.

B4RN Offices!

Building the network - Core

- 16mm & 7mm Duct Systems
- Vibratory Mole Plough
- Blown Fibre
- 99.9% underground

Building the network - Customers

- 2 Fibres per property
- Bidirectional single fibre working
- Symmetrical 1Gbps service
- 99.9% underground

Operating the network

- We are our own ISP
- AS58273 present in major UK Datacentres
- Ownership & Control from Transit/Peering through to customer CPE
- Built in capacity for current burst events and future expansion
- Controlled (symmetric) paths for all traffic, including sensitive data such as VOIP and Live Video

Public Peering Exchange Points

Filter

Exchange IPv4	ASN IPv6	Speed	RS Peer
IXLeeds 91.217.231.48	58273 2001:7f8:67::e3a1:1	10G	○
LINX LON1 195.66.226.126	58273 2001:7f8:4::e3a1:1	100G	✓
LINX Manchester 195.66.244.60	58273 2001:7f8:4:2::e3a1:1	100G	✓
LINX Scotland 195.66.246.26	58273 2001:7f8:4:3::e3a1:1	10G	✓
NCL-IX 185.1.195.19	58273 2001:7f8:34::19	10G	✓

Interconnection Facilities

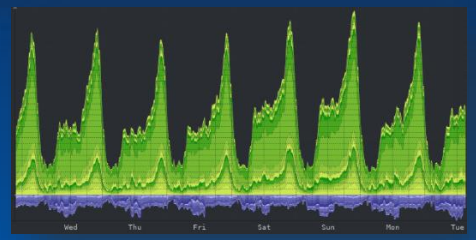
Filter

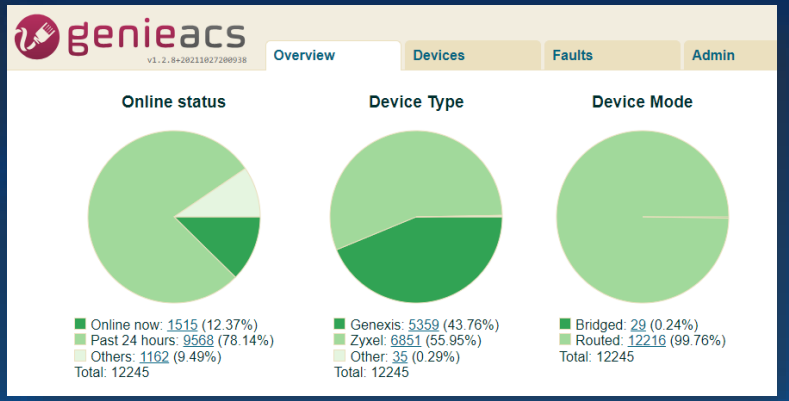
Facility ASN	Country City
aql DC5 58273	United Kingdom Leeds
Equinix MA1 - Manchester, Williams/Kilburn 58273	United Kingdom Manchester
Pulsant Edinburgh South Gyle 58273	United Kingdom Edinburgh
Stellium 1 58273	United Kingdom Newcastle
Telehouse - London (Docklands North) 58273	United Kingdom London

Monitoring & Telemetry

- Opensource software & systems
- In-house development team (cannot reiterate how important this is!)
- Proactive monitoring and telemetry management – build in resilience and redundancy

	Total	Up	Down	Ignore tag	Alert disabled
Devices	347	340	0	5	2
Ports	23995	17280	4882	55	NA
Services	0	0	0	0	NA





LibreNMS {php} IPAM Grafana influxdb Stork

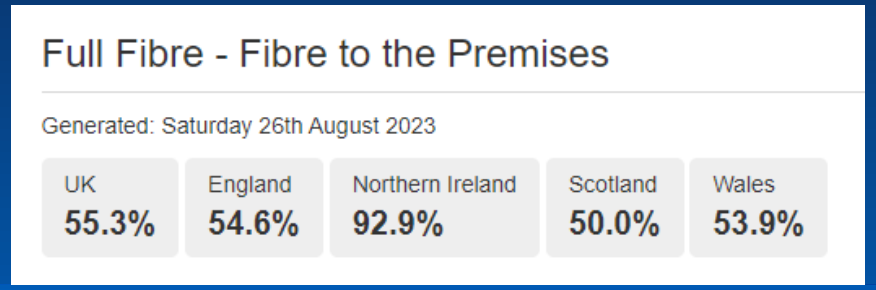
The Copper Switch Off

Why?

- Full-Fibre is the way (has been for a long time) and now that UK industry is fully engaged with FTTP/FTTH the development of copper technologies has drastically decreased.

What?

- Since 2021 Openreach has been ceasing the sale of copper products in areas that can receive 75% Full-Fibre coverage (2,900+ locations Aug 2022)
- In September 2023 Openreach will only provide digital phones
- The target to turn off the Openreach Public Switched Telephone Network (PSTN) and Integrated Services Digital Network (ISDN) is 31st December 2025
- Essential services and areas that cannot receive alternate technologies will remain active (for the time being)



References:

https://www.openreach.com/fibre-broadband/retiring-the-copper-network

https://labs.thinkbroadband.com/local/uk

The Copper Switch Off

Impact?

- Telephony traffic paths are changing
- Equipment requirements are different
- The industry as a whole, including network operators, equipment manufacturers, software developers, technical specification writers, you name it, need to embrace this change as the entire world moves to Full Fibre
- What goes unseen? Care & welfare, burglar, building lift alarm systems, equipment/plant/machinery monitoring and control (We have local Community Hydro power plants on-net with Full Fibre)

Abbeystead Hydro - 2019

References:

https://haltonlunehydro.org/

https://www.ellergreen.com/hydro/portfolio-item/abbeystead/

HALO Project

- 654km of Dark Fibre lit with 400Gb of capacity
- Two long distance 100Gb Wavelengths
- Resilient & diverse regional network for all distribution nodes & B2B customers
- Automatic failover with enough capacity to send all traffic either way
- Ability to gracefully shutdown one leg for maintenance and repair

Dark Fibre: Zayo

Fibre Drivers: smartoptics

Routers & Switches: Juniper Networks

HALO Project

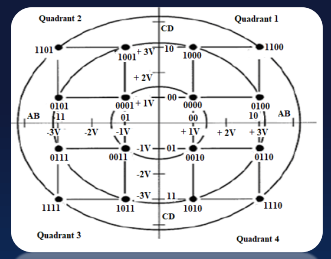
- Clean + Test, clean again, test again, clean some more… You get the point
- Plan the deployment, stress test the plan, update the plan, be prepared for the unknown
- Manage teething issues as they are presented to you in a proactive and responsive way
- Build systems in a test environment tackling the configuration challenges before equipment deployment
- Audit everything – track the changes, track the equipment, label it all physically and logically

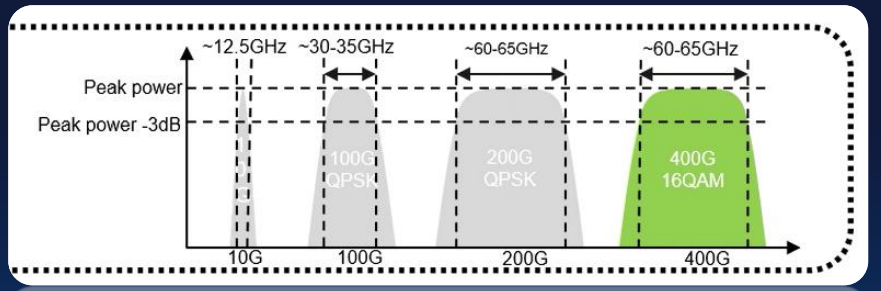
HALO Project

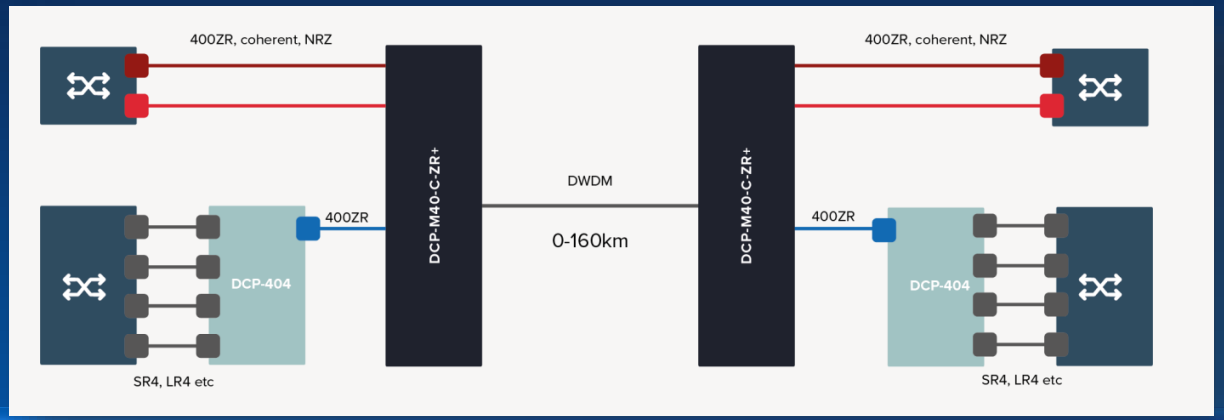
- Platforms & their rotation:
  - To retire: MX80, MX240, MX480, EX4550
  - To retain: QFX5100, QFX5110, QFX5120
  - To install: MX304, ACX7100-32C, ACX7100-48L
- Border network operation
  - healthy IP Transit/Peering/PNI configuration
- P/PE/CE network operation
  - Interlink & meshing over controlled paths
  - Ability to handle link failures with no customer impact
- Build in the resilience from day one!

400Gb Low Latency

- IP over DWDM utilising OpenZR 400G 16QAM CFEC
- Direct relationship between physical fibre, optical drivers, and networking equipment
- Understand the fibre G.652/G.655/G.657.A1
- 10G 40ch Mux/Demux vs 400G 40ch Mux/Demux







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Questions?

Tom Rigg
COO
t.rigg@b4rn.org.uk
https://www.linkedin.com/in/tsrigg/
https://b4rn.org.uk/