FOREST OF BOWLAND
Area of Outstanding Natural Beauty

BROADBAND FOR THE RURAL NORTH B4RN

Broadband for the last 5%

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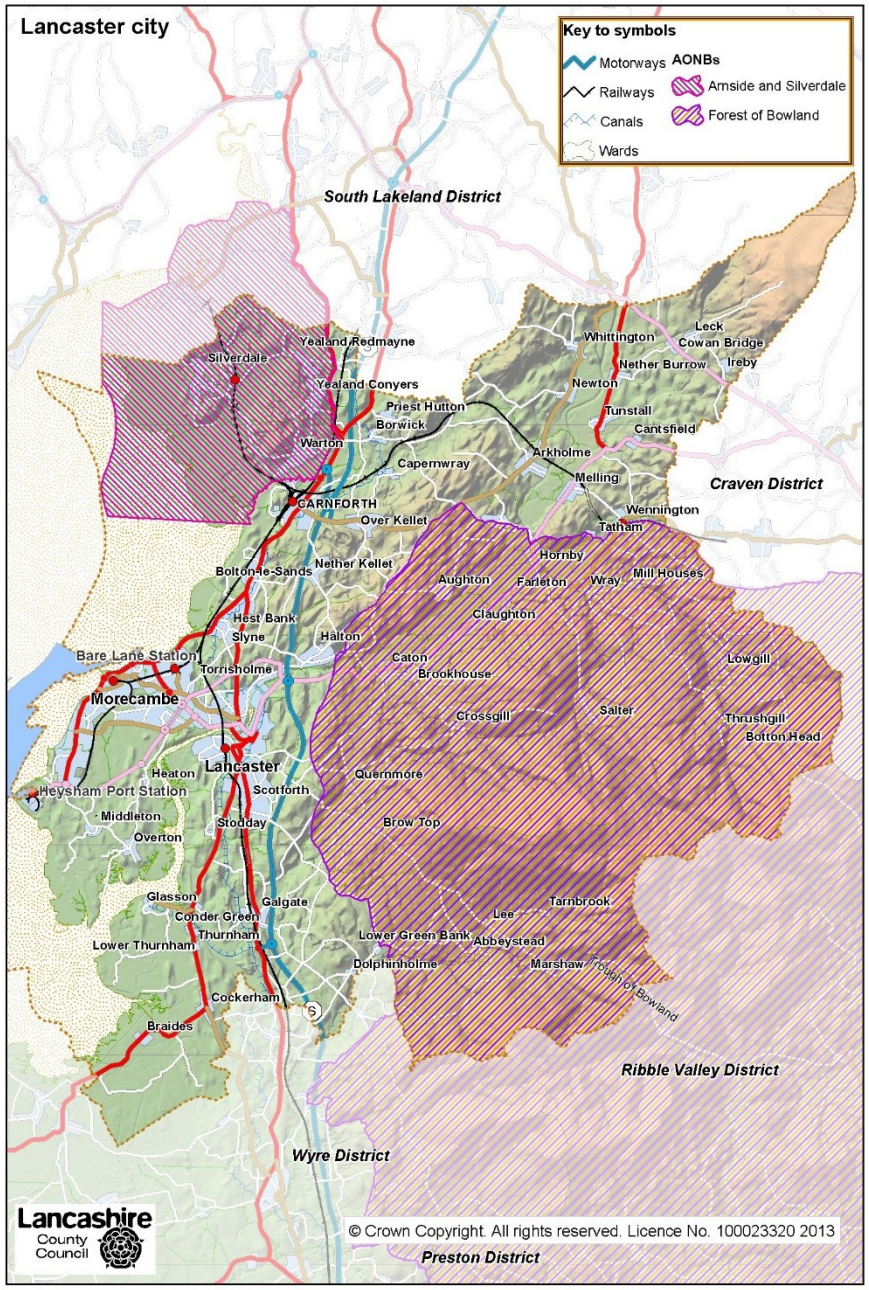
Lancaster District

Area = 576Km2
Population = 139,700
Pop Density = 243/Km2
Properties = 60,761
Prop Density = 105/Km2



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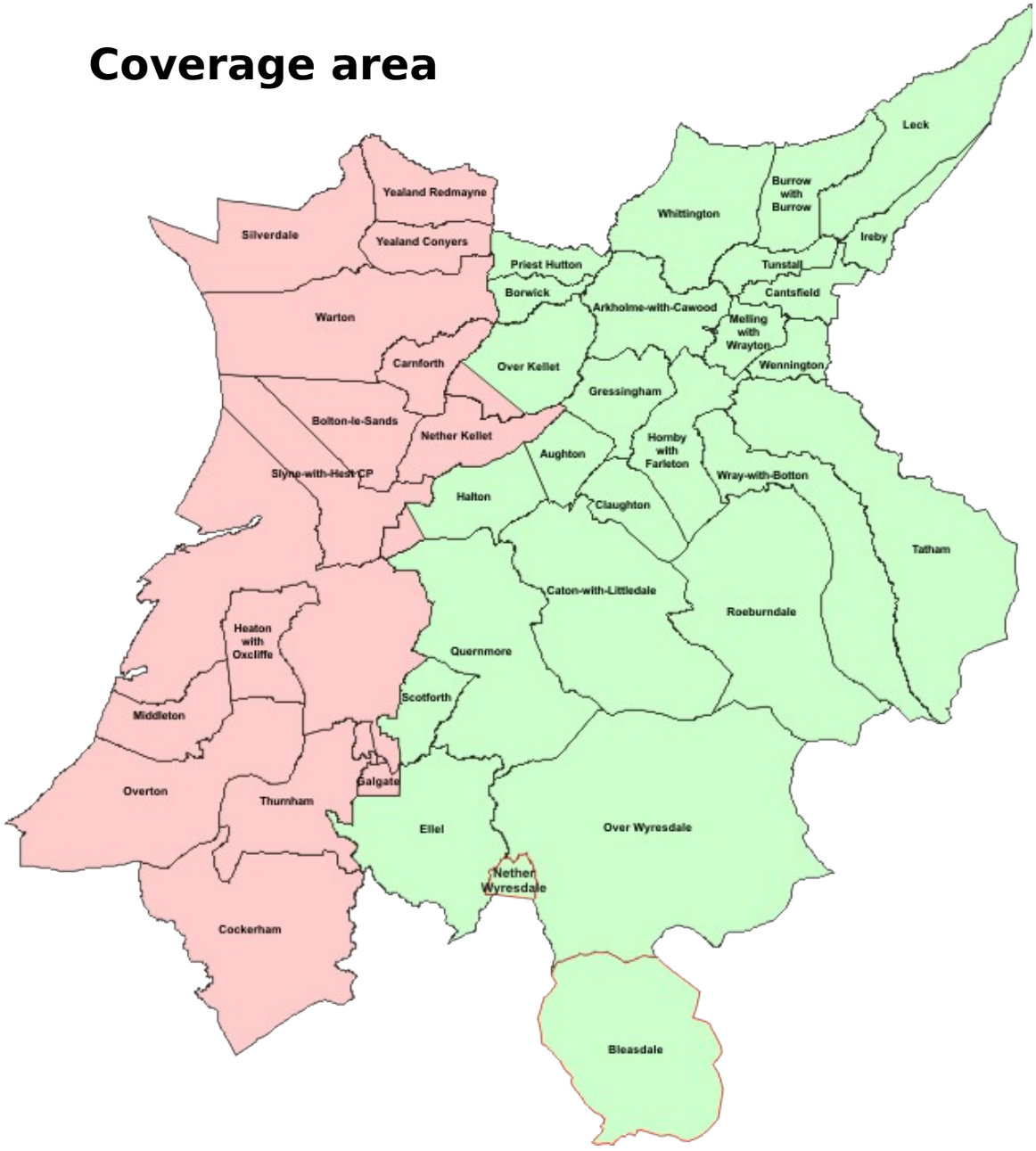
B4RN Coverage Area

Area bounded by M6 on the west, Cumbria to the north and NYCC to the east

B4RN area = 425Km2
Properties = 3520
Prop Density = ~8/Km2

For comparison
Gt Manchester area = 1156Km2
Properties = 213529
Prop Density = ~184/Km2

Coverage area



2013-2014/5
425K
211 full parishes
5 partial
3539 properties

No timescale

The Trigger

- Few BT exchanges
  - Virtually all lines are EO
  - Only three PCP cabinets in whole area
- Line lengths out to >12Km
  - Even dial up problematic and making a call often impossible if its rained recently!
- Current ADSL provision mainly <512Kbs
- Very few above 2Mbs

The ambition

- Deliver at least EU DA 2020 targets
  - 50% to have 100Mbs or better
  - and B4RN to be in that 50%
  - Rest to have floor of 30Mbs (leave that to urban areas)
- Coverage to be 100% of properties in area
  - No exclusions due to line lengths, copper quality etc.
  - If you are in one of the 21 B4RN parishes then you WILL get full speed service
- Future proofed
  - 1Gbs and upwards without new infrastructure
- Affordable
  - £150 connections fee, £30/month for service?

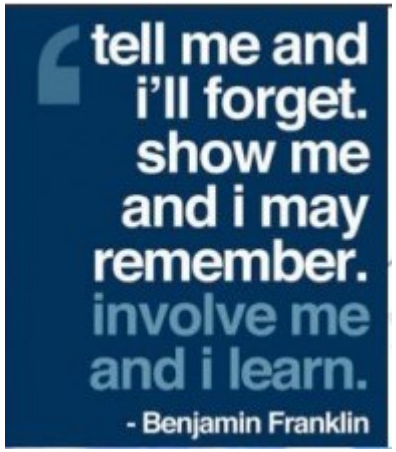
Decision time!

- Fibre based
  - How else can we achieve at least 1Gbs symmetrical to at least 10Km ranges reliably? (G657d/G657a mixed)
- FTTH
  - PtP delivery not GPON - (want symmetrical)
  - 2 fibres per property – 1000BaseBX on one, other spare
- Blown fibre technology
- Narrow bore (16/12mm) HDPE duct, 500mm deep
- Cross county routes with landowners giving us **free wayleaves**!
- Get **farmers and landowners to dig in the duct**

Design

- Mapped all properties in all the parishes
- Selected locations for village nodes
  - Each serves one or more parishes
  - Min property count 136, max count 530
  - Keep max line length <=10Km where possible
  - 16 nodes needed
- Planned cross country routes radiating out from each node to optimally pass all properties in the parish.
  - Trunk routes = 278Km of duct
  - Spurs to properties = 242Km

Construction



Active kit

- Hubs
  - Need fibre SFP based switches with layer 3
  - Need 10GbE ports for backhaul
  - Need low initial CAPEX
  - Pizza stacking boxes fit the bill
  - But forces us outside of telco market place into the enterprise/business one.
  - Not many around, using Netgear M5300-28GF3
  - 24x1GbE SFP ports + 2x10GbE SFP+ ports
  - Stackable 8 deep to give 192 ports.

Costs

- Duct and fibre
  - 520Km
  - £2.440M for materials (need cash to buy)
  - £1.121M for labour (but can be sweat equity)
  - Cost per metre = £6.86
- Village nodes and active equipment
  - £250K
- Total Project cost =£3.811M @ 100%
- Where do we get it?

Broadband for the Rural North Ltd

- Mutual/Coop, Not for profit
- Industrial and Provident Society Act 1965
- Community Benefit Society
  - Similar to coop but answerable to community rather than our shareholders, more like a charity in some ways
- One member one vote, not related to number of shares member holds
- Free cash flow to be returned into the community

Why?

- If landowners are to give free wayleaves
  - Must be certain it's a community project not standard commercial one
  - If any money is to be made then it's the community who benefits not remote investors
- If farmers and landowners going to dig it too
  - Must be certain its for the communities benefit
  - Be prepared to accept shares in lieu of cash for the work done

Funding

- Opened shares issue in Dec 2011
- Eligible for EIS tax relief (30%)
- Investors of £1500 or more get free connection and 12 months free service
- Buy shares for cash or effort (sweat equity) such as digging trenches and installing ducts.
- 1m dug = £1.50 of shares
- 1000m dug = £1500 of shares = free connection and 12 months service
- ~£1M of shares subscribed mix of cash/sweat
- Bid for £900K from RCBF, still not got anything but fingers X
- Now negotiating commercial loans to fill gap.

Financial Targets - 1

- Need 300 customers to cover OPEX
  - Assumes all labour is freely donated by volunteers
- At 535 customers can service loans too
- Then we start taking on staff and reducing load on unpaid volunteers.
- At 1200 customers we are fully staffed (6-7 posts)
- Then free cash goes into sinking fund to allow investors to withdraw shares

Financial Targets - 2

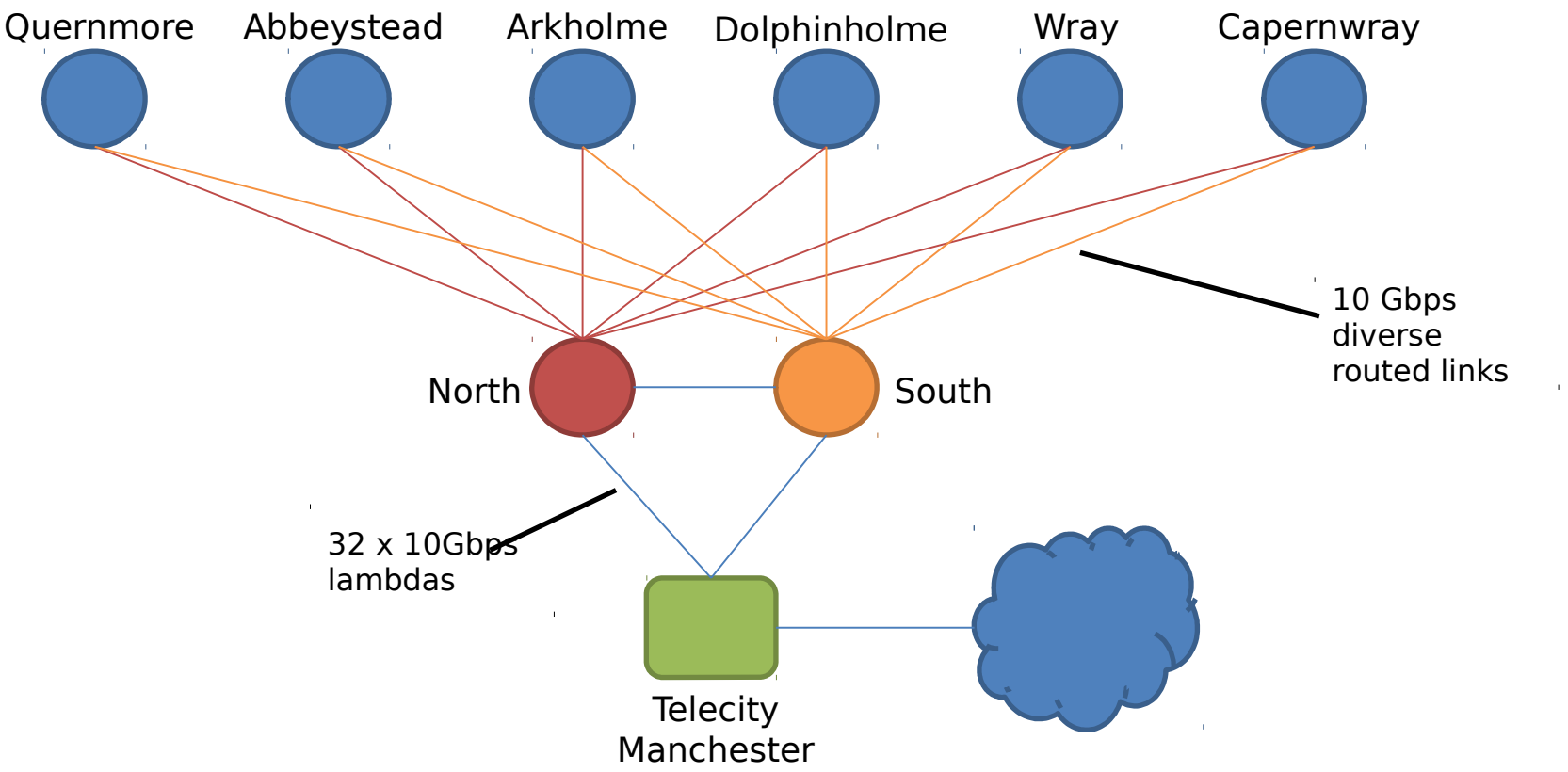
- Coverage/properties passed is ~3500
- Business plan calls for 50% take up by the end of Year 1 a route is completed = 1750
- Increasing to 80% take up by end of year 4.
- Based on 6.5% interest on loans and 5% divi on shares can payback investment by about year 12.
- Then have free cashflow between £500K and £1M
- As a community benefit society this has to go back to the community not flow to share holders

Backhaul/External

- Must match external bandwidth to internal
- 1Gbs per property
  - But of course no one can use this!
- Need ? External to cope
- Go with dark fibre to peering centre
  - Telecity Manchester is our nearest
- Peer at Manchester (EDGE-IX, IX-Manchester)
- IP transit from layer 1 provider
- Need to be able to add capacity without large incremental costs for managed bandwidth
- Must utilise dark fibre with our own DWDM
- Then can add 10Gbs channels as needed with just CAPEX

Core and External links

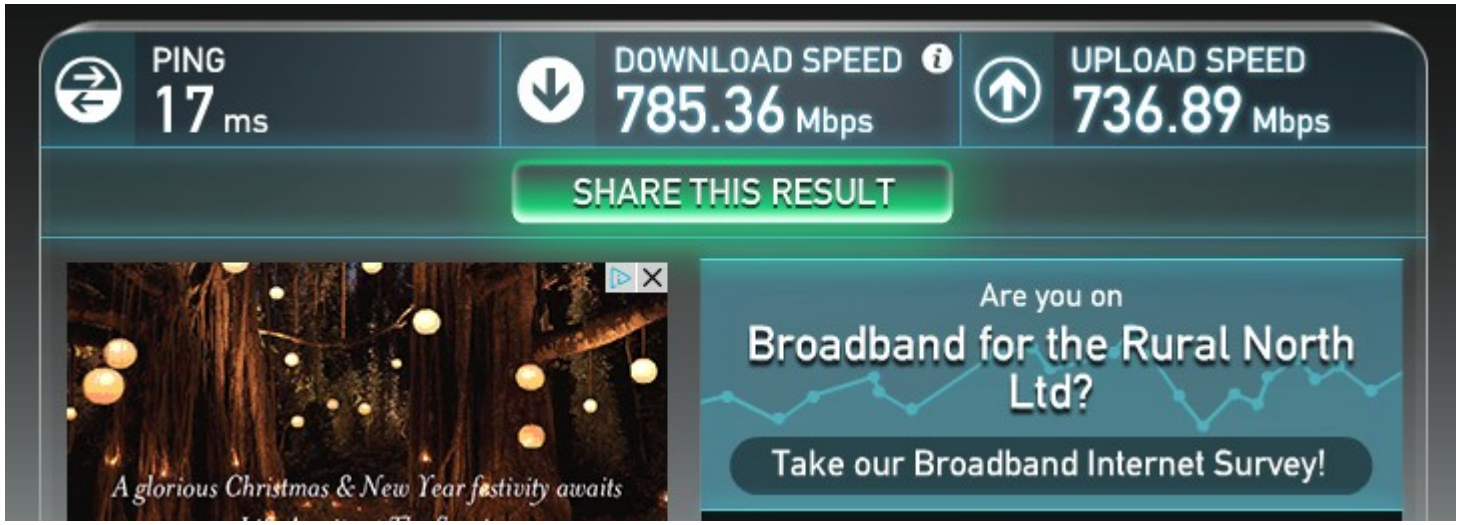
- 2 Core 10GbE switching nodes, north and south of area
  - Each village node gets 2 diversely routed 10Gbs fibre links one to each core node
  - Core nodes also connected with private dark fibre
- Leased single Dark Fibre from GEO between Quernmore and Telecity, 128Km
- Smartoptics DWDM installed with EDFAs supporting 32 wavelengths (16 bi/di ch)
- Created node in Kilburn house with Juniper MX240 in full redundant mode
- Registered with RIPE and allocated AS: 58273
- Established peering
- Many thanks to TNP Ltd who have handled all the BGP4 stuff for us on the MX240 at Manchester as well as OSPF configurations etc.


Quernmore
Abbeystead
Arkholme
Dolphinholme
Wray
Capernwray
10 Gbps
diverse
routed links
North
South
32 x 10Gbps
lambdas
Telecity
Manchester

Status

- 20 routes now completed.
- 150Km of duct operational
- 787 properties passed
- 462 properties either live or about to become live.
- Average % takeup across 20 routes is 57%
- Worst is 45%, best is 95%
- On target for 1500 passed and 750 connected by early summer.

Lessons Learnt



- Access circuit runs at 1Gbs, but not end kit
  - We have to explain that putting a bicycle on a motorway will not make it run at 70MPH!
- Streaming video over wifi -?

Next?

- Broadband ok
- Streaming video ok, (15Mbs for 4K)
- VoIP ok
- Cellular ?
  - Need to deploy femtocells but operators wont support multi operator kit
- Ability to teleport septic tank contents away via fibre would be welcomed by community
  - Still working on this one……..

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