FIXED WIRELESS BROADBAND

PROJECT PROPOSAL FOR

CONNECT8

Prepared by
Village Networks Ltd

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VILLAGENETWORKS
Network House
Ball Moor
Buckingham Industrial Park
MKK18 1RQ

www.villagenetworks.co.uk
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1 Background

Connect8 is seeking broadband internet access for communities in the parishes of Britwell Salome, Swyncombe, Pishill with Stonor and (parts of) Watlington, namely:

- Britwell Hill
- Cookley Green
- Greenfield
- Howe Hill
- Maidensgrove
- Park Corner
- Pishill with Stonor
- Russells Water
- Swyncombe

Broadband internet access delivered via the BT/Openreach network will provide only partial coverage of the Connect8 territory, will not provide a uniformly acceptable service in terms of speed, and will arrive on long and/or uncertain timescales.

Connect8 has approached Village Networks for a proposal to build a fixed broadband network covering as much of the territory as possible, as rapidly as possible.

This proposal is based on information gathered in community meetings, and through considerable fieldwork, all underpinned by previous experience of building similar networks in other territories.
2 Proposed network Phase I

In telecoms terms, terrain and topography are the limiting factors. The distance between small communities argues against investment by such as BT and Openreach. It is not good territory for mobile coverage. It is challenging, also, for the builders of wireless networks.

In terms of technology available today, fibre to the premises (FTTP) if the best of all possible solutions. But providing FTTP coverage across the Connect8 map is simply out of the question in terms of cost.

Wireless has the ability to go where fibre can’t. There are two kinds of fixed wireless network: Wimax, which is equivalent to broadcast radio, where a single central transmitter radiates blanket coverage across a very large area, and point-to-point wireless.

A Wimax network is easy to build, quite costly and, so far, not very effective. There can be significant gaps in coverage, which can’t easily be filled. Speeds tend to be at basic broadband (2Mbps) or less, and performance can fluctuate very significantly.

A point-to-point wireless network cost less to build and provides faster connections. But it takes longer to build.

Point-to-point wireless networks require clear lines of sight between relay points (nodes). In the early stages of a network’s growth, such lines of sight can be hard to establish. But as the networks grows, so too does the ease with which one can add connections. Network growth is best described as organic, but with the potential to be exponential. Visualise the development of a snowflake, and you have an idea of the way a point-to-point fixed wireless network grows.

There are cases where no lines of sight are possible or foreseeable. In which case, fibre can go where wireless can’t.

Our long-term strategy for the Connect8 network assumes it will be a hybrid network, with wireless providing backbone links across the greater distances and complicated terrain, wherever possible, and fibre being laid over any shorter distance where there is no useable line of sight.

We have set the BDUK definition of Superfast broadband, up to 24Mbps download, as the standard to be achieved across the network. Wireless technology continues to develop at a rapid rate, and we
would expect to be replacing equipment on (approximately) a 3-year cycle, which will increase the capacity and speed of the network as it grows.

There may be cases where speeds of up to 10Mbps must be the initial expectation – we believe it is better to grow the network as quickly as possible, rather than to inflexibly pursue higher speeds at the cost of connectivity.

The work outlined in this proposal is for a first stage, Phase I, of the network build. That will include establishment of the critical backbone link to the internet of the outside world, and securing of a contract for enough backhaul to meet demand (rather like a utility contract specified and negotiated in advance), and connection to as many primary nodes as possible.

Sourcing and securing backhaul is the starting point for building any wireless network. At this stage of research and planning, we’ve had to make two assumptions, on which much of the remainder of the proposal depends.

1) We have assumed we will be granted permission to install suitable wireless equipment on the TVP masts at Britwell Hill. Informal indications so far suggest that our application to do that will be successful. TVP has an obligation to be supportive of community initiatives (and there is an argument that better broadband can be aid an aid to the reduction of crime), but we have not yet received any formal response, in terms of actual permission, or any indication of the costs involved.
2) We have assumed that we can access backhaul via a fibre connection at RAF Benson. At that site, they too have an interest, if not an obligation, in terms of being good neighbours. Early indications are that they are willing to help, and they are currently investigating what connections they have at that site, which we could use. If they have a suitable connection, our next step is to visit the site, to identify the best point with a line of sight to the Britwell Hill masts.

Phase I does not require fibre connections, except for those relatively short links which may be required at source (RAF Benson), or at Britwell Hill.
### Timescales

The key tasks, in order, are these:

<table>
<thead>
<tr>
<th></th>
<th>Task Description</th>
<th>Estimated Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Establish backhaul at RAF Benson</td>
<td>By December 31 2015</td>
</tr>
<tr>
<td>2</td>
<td>Negotiate contract for backhaul with wholesaler</td>
<td>By Feb 1 2016</td>
</tr>
<tr>
<td>3</td>
<td>Install wireless link at RAF Benson</td>
<td>By March 1 2016</td>
</tr>
<tr>
<td>4</td>
<td>Install equipment at Britwell Hall masts</td>
<td>By March 1 2016</td>
</tr>
<tr>
<td>5</td>
<td>Go live with backhaul</td>
<td>By March 7th 2016</td>
</tr>
<tr>
<td>6</td>
<td>Install</td>
<td>From March 8 2016 onwards</td>
</tr>
</tbody>
</table>
Coverage maps
## Backhaul Link Budget

<table>
<thead>
<tr>
<th>Site</th>
<th>Distance (m)</th>
<th>Antenna Gain (dBi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>B2</td>
<td>17</td>
<td>20</td>
</tr>
</tbody>
</table>

### Link Design
- **Flythrough**: Yes
- **Line of Sight**: Yes
- **SNR**: 32.28 dB
- **PHY Rate**: 390 Mbps
- **Aggregate Rate**: 312 Mbps

### Link Summary
- **Fresnel Obstructions**: 0%
- **Link Distance**: 5.83 km
- **Altitude**: 0 to 5 (m)

The image shows a map with marked sites and a line representing the link budget analysis. The link design and summary are presented in a table format alongside the graphical representation of the link's performance.
## 6 Project costs

### CAPITAL COSTS

**RAF Benson**
- **Manpower**: 4 man days, £1,000.00
- **Hardware**:
  - 1/2 Mimosa
  - Backhaul
  - Ubiquiti toughswitch
  - APC UPS
  - Cabinet
  - Misc/ Cables
  - Total: £2,419.00
- **Method statements/risk assessments/etc**: £500.00

**Britwell Hill**
- **Manpower**: £500.00
- **Hardware**:
  - 1/2 Mimosa
  - Backhaul
  - Ubiquiti toughswitch
  - APC UPS
  - Cabinet
  - UB Rocket AC
  - UB Sector Antenna
  - UB Rocket AC
  - UB Sector Antenna
  - Misc/ Cables
  - Total: £2,178.00
- **Method statements/risk assessments/etc**: £500.00

**Back office**
- **Project planning and management**
- **Network planning and management**
- **Licenses, permits, etc**
  - 10 man days
  - Total: £2,500.00

**Phase I Nodes (per node)**
- **Manpower**: £500.00
- **Hardware**:
  - UB Powerbeam
  - 5 Port Toughswitch
  - UB Rocket
  - APC UPS
  - Cabinet
  - UB Omni Aerial
  - Total: £3,576.00

**TOTAL**: £13,673.00

**Typical subscriber installation**
- CPE, configuration, installation and connection: £185.00
- Optional wireless router: £75.00
OPERATING COSTS

Backhaul c.£11k-£18k pa
Aerial rents £2400?
Insurances £500

Network Management
Customer support Included in subscription

All costs are estimates, and may vary according to final network specifications

Subscription costs

The Village Networks 2015 tariff is as follows:

<table>
<thead>
<tr>
<th>Service</th>
<th>Price (inc VAT)</th>
<th>Download</th>
<th>Upload</th>
<th>Data cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>£20.00</td>
<td>6Mb/s</td>
<td>1Mb/s</td>
<td>10GB*</td>
</tr>
<tr>
<td>Superfast</td>
<td>£30.00</td>
<td>24Mb/s</td>
<td>2Mb/s</td>
<td>No cap</td>
</tr>
<tr>
<td>Business**</td>
<td>£48.00</td>
<td>24Mb/s</td>
<td>10Mb/s</td>
<td>No cap</td>
</tr>
</tbody>
</table>

* Download speed reduction to 2Mb/s once cap is reached, until end of month, or purchase more at £5.00/5GB
** Business package available to residential customers. Enhanced response times, lower contention.

In areas where Superfast speeds are not available, the tariff is:

<table>
<thead>
<tr>
<th></th>
<th>Economy</th>
<th>Home</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly subscription</td>
<td>£20</td>
<td>£30</td>
<td>£48*</td>
</tr>
<tr>
<td>Speed (Mb/s)</td>
<td>3 Mb/s down/0.5Mb/s up</td>
<td>6 Mb/s down/0.5Mb/s up</td>
<td></td>
</tr>
<tr>
<td>Monthly allowance</td>
<td>2GB</td>
<td>60GB</td>
<td>90GB</td>
</tr>
<tr>
<td>Installation</td>
<td>£222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra 60GB allowance (up to a maximum of 120GB)</td>
<td>£30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra 0.5Mb/s upload speed (up to a maximum of 1.5Mb/s)</td>
<td>£30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upgrade to 10Mb/s download (where available)</td>
<td>£30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes on-site support within 24 hrs Mon-Fri for internet connectivity issues
7 Business models

There's a choice of business models to consider.

1: The capital costs are funded by the community.

   Village Networks provides backhaul, connections, network management and back office and customer support, and charges normal rates for installation and subscriptions.

   The community subsidises the cost of the backhaul contract on a sliding scale, related to the number of connected subscribers, up to an agreed threshold.

2: The community funds capital costs, and contracts for backhaul.

   Village Networks purchases backhaul from the community at an agreed rate, and provides connections, network management, back office and customer support, and charges normal rates for installation and subscriptions.

3: The community funds capital costs and contracts for backhaul, and provides backhaul at no charge to Village Networks.

   Village Networks provides connections, network management, back office and customer support, and charges discounted rates for subscriptions.

An option which can be included in any of the above: the community contributes to installation costs, allowing them to be discounted or subsidised.

The merits of the formation of a community interest organisation are several:

- It can act as a repository and conduit for funds
- It can act as an agent on behalf of the community
- It can act as a single business partner with Village Networks
- It can act as a contract holder
- It can become the owner of physical infrastructure assets such as ducts and fibre, or masts.
Next actions

Source and secure backhaul
Reach agreement with TVP at Britwell Hill.