

4.1 Locations

1. priority locations that are lacking an alternative backhaul supply and the reasons for their priority.

There are two possible scenarios – Working with Telstra, and purely competing with Telstra.

If working with Telstra such that they provide affordable prices where they have the monopoly, then the government could build to towns where there is no fibre infrastructure at all. It could be a win-win-win (Australia gets affordable backhaul, Telstra gets backhaul to those remote towns at lower cost than building themselves, and the Government gets an anchor tenant).

If purely competing with Telstra, I would recommend prioritising by the highest ratio of population to build distance. This will give the most “bang for your buck”.

We need to be clear however what a “location” is, and what is “Alternative backhaul supply” is. Remote county towns like Alice Springs and Broome are obvious, but there are outer city suburbs that do not have competitive fibre and hence lack affordable services that I would argue also need to be included.

How large an area is a “location”? It would be larger than a suburb but smaller than a Local Government Area. Most Australian carriers today would define a “location” by Telstra’s Exchanges and Exchange Serving Area (ESA). This seems a reasonable basis as there is a significant amount of statistics available on this basis.

What is “alternative backhaul supply”. My suggestion is that it must have two diverse alternative fibre based links to a mainland capital city. As an example, there are towns in Tasmania that have alternative capacity to Hobart or Launceston, however, there also needs to be alternative capacity to the mainland. There is alternative supply with Basslink, however it is a single cable, so carriers are still forced to use Telstra capacity to ensure at least some service remains in the case of a fault on Basslink. Another example would be Richmond in Sydney. The only alternative to Telstra is a radio network which is not going to be able to meet the projected bandwidth demands of the future.

2. possible routes for the links to the priority locations, including any potential locations where backhaul capacity should be broken out, and

A piece of backhaul does not have much value in isolation. To be able to make a viable business, it needs to be a complete network. Therefore the government needs to either lease capacity from another carrier, or purchase fibre (Either entire cables or fibre pairs under and IRU arrangement).

4.2 Design and operational parameters

1. the type and capacity of services and associated operational arrangements that the network operator should provide to access seekers, including the costs of delivering these services and the charges that should be levied

This is purely a wholesale network and therefore the services should be reflective of that. They also need to align with the Access Network services to be offered under the NBN.

My list of suggested service types:

- 2.5Gbps sub wavelength. This is not STM16 as such. It is any service between 500Mbps and 2.5G. Muxponders can provide this as a protocol and speed independent service.
- 10G wavelength.
- 40G wavelength.
- Telehousing

I recommend against leasing dark fibre for backhaul for the following reasons:

- If the distance is more than 100km, then it will also involve providing repeater site access. This creates a significant amount of operational complexity (network security, site access, power and space management)

- It can't be managed. The backhaul network provider has no visibility of the status of those fibres and is reliant on the user to provide accurate status information.
- It creates the potential for the user to provide wavelength services and undercut the backhaul network provider.

I recommend against lower speed services for the following reasons:

- To provide lower speed services will require another layer of network infrastructure. It also introduces protocol specific products (SDH, GE, FICON, etc). As these are constantly evolving, the service offerings will also need to evolve creating an ever growing list of products to support.
- Lower speed services will mean higher volumes of low revenue/low margin customers.
- Demand for lower speed services is reducing. In an NBN world, just 100 customers with an average busy hour load of 5Mbps, equates to 500Mbps backhaul.

The charges should be a simple model that can apply nationally. A distance based formula would fit this. As an example:

For 10Gbps:

Up front charge (Connection fee) - \$100k (regardless of distance)

Annual charge - \$10,000 x $d^{1/2}$ (d = distance in km)

2. the locations at which points of interconnect should be sited to enable secure and ready access by access seekers

Providing Telehousing services in the same building as the backhaul infrastructure ensures a simple cost effective and robust design. If an access seeker wants to have a separate facility, they still have that option but the interconnect point will be at the backhaul building.

The backhaul building is ideally located close to the centre of town but not necessarily right in the centre of town. As long as it's within a couple of km.

3. the timeframes and costs associated with the planning, construction and commissioning of backhaul infrastructure in various terrains and locations

The longest lead time for almost any fibre build is gaining council approval. Once that hurdle is cleared, it just becomes a question of cost. This can range anywhere from \$10/m to \$200/m and is very dependant on the site and construction type (eg: aerial, direct bury, ducted).

4. the extent to which fibre repeater/regenerator equipment would be required at locations other than population centres, and the approach in regard to the powering and housing of this equipment

With the extent of NBN to deliver terrestrial broadband (FTTP and wireless) to roughly 98% of the population, the proportion of pure repeater sites will be very small (would require towns spaced more than 100km apart). However they will still exist. They will almost certainly be in areas with no mains power so on site power generation will be required. This will be a mix of solar and wind power. As they are regenerator sites only, a hut with room for 3-4 racks will be more than sufficient. These sites could be a showcase for green technology.

5. The relative merits of deploying links that provide an alternate route to existing backhaul infrastructure

The goal is to have high capacity backhaul at reasonable rates to as much of the Australian population as possible.

One way to achieve this is through duplicate infrastructure to provide competition. This however is not cost efficient as it requires double the amount of infrastructure

Another way is to regulate the prices to force the incumbent to offer reasonable rates.

The ideal way, however, is to provide incentive for the incumbent to offer reasonable rates. By the government threatening to build competitive infrastructure, that could be used as the incentive (Drop your prices or else we build). Only a large scale threat, by a government that is not ruled by high returns will provide this incentive

6. The relative merits of completing ring architectures as opposed to constructing spurs.

A spur of a couple of km for a country town is probably considered acceptable but 100km is probably not. 10km is probably a reasonable breakpoint.

The ability to provide an alternative path is not the same as providing protected services. Telstra and Optus have designed their networks to only provide protected services. It is often not possible to purchase unprotected capacity even if that is all that is required. This proposed backhaul network could be designed around providing unprotected services. An access seeker could purchase two unprotected services and manage protection themselves. This would ensure a simple network from the backhaul suppliers perspective, while creating flexibility from the access seekers perspective.

4.3 Operational and ownership arrangements

1. the proposed model including the ownership arrangements and commercial viability

Over long distances, railways corridors, and high voltage power distribution systems enable low cost fibre delivery. However physical access to those fibre cables needs to be carefully controlled for OH&S reasons. A model that has worked effectively in the past, is where the O&M of the cable is managed by the corridor owner, along with providing them with the IRU of some fibres. This is a long term proposition (eg: 20+20yrs)

In some of those corridors, fibre cables already existing. The NBN Company could take out IRUs for fibre pairs instead of building new fibre cables.

In terms of enabling an existing wholesale provider to manage the business, it could work, but since the new fibre routes will be integrated into their existing network from a services perspective, the transition to NBN could get very messy unless the carriers entire fibre network was also transitioned. A company such as NextGen may be a suitable candidate (Backhaul is their core business) and the NBN company could buy NextGen outright (As part of a deal with Leightons for the NBN construction?).