Final Report for the ACCC

Comparative Costing of Wireless Access Technologies in Australia

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Analysys Consulting Limited
St Giles Court, 24 Castle Street
Cambridge CB3 0AJ, UK
Tel: +44 (0)1223 460600
Fax: +44 (0)1223 460866
consulting@analysys.com
www.analysys.com

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0 Executive summary

This report presents the findings of a project conducted by Analysys on behalf of the ACCC to assess the cost of using alternative technologies for local access networks in Australia.

In this study we have conducted an assessment of the costs of deploying wireless access networks, to supply voice and data services. We have primarily focused on ESAs (exchange service areas) classified as ULLS Bands 3 and 4 by Telstra but also include an indicative costing for other ESAs. We have considered the costs that Telstra might face in relying on WiMAX, 3G or satellite technologies as an alternative to existing copper loops or new fibre deployment in these areas. We have also assessed the business case for a new entrant to compete on the basis of these technologies.

It should be noted that the calculations have been carried out at a fairly high level in order to provide indicative costs, averaged across different categories of ESAs. The results are also sensitive to key assumptions concerning technical parameters, unit costs and customer demand.

We draw a number of conclusions concerning Telstra's local access network:

- Where fibre build is viable (i.e. urban centres), we expect this to continue to offer superior potential for very high-speed broadband access than can be achieved by wireless substitutes. Although, in theory, wireless technologies can deliver speeds of 6Mbit/s per user and above, this relies on good radio propagation conditions, and is resource intensive in terms of spectrum.

- For existing ESAs, the wire line network is a largely sunk cost, and is therefore unlikely to be replaced in the short to medium term as a cost-saving measure. However, consideration of lower-cost wireless technologies such as WiMAX may be relevant in assessing the MEA cost of local access networks for economic and regulatory costing purposes.

- In rural areas, WiMAX may provide a lower-cost alternative to wire line access solutions for voice and data services. 3G and later-generation mobile technologies may also be cheaper than wire line solutions in some areas, but lack the range and capacity of WiMAX and are therefore unlikely to be superior for fixed broadband services.

- In remote areas, and to reach customers that are located some distance from the centre of population in an ESA, satellite is likely to remain the best solution to delivering basic broadband services. However, the cost of delivering high-speed broadband services using satellite is likely to remain prohibitive.

We also draw a number of conclusions concerning the business case for a new entrant offering wireless services and considering deployment in additional ESAs:

- The business case for WiMAX and 3G deployment will depend on achieving certain economies of scale and scope, and in many Band 3 and 4 areas, the per unit costs of local access are therefore higher for a new entrant than for Telstra. However, it may be viable to deliver a bundled service of fixed (and possibly mobile) telephony and broadband access using wireless technologies in the larger population centres.

- WiMAX is likely to be the most economically attractive wireless solution for delivering fixed broadband access. However, for mobile operators, there may be advantages in using mobile infrastructure already in place to compete using 3G and later generation mobile technologies, particularly if offered alongside a mobile voice and data service.

- Some form of government subsidy is likely to continue to be necessary to encourage investment in the provision of broadband services in Band 3 and 4 areas. We doubt that Telstra has a significant first mover advantage in rural and remote areas where DSL is not yet deployed and wireless operators may be equally well placed to offer service.

1 Introduction

Analysys has conducted an assessment of the costs of alternative next-generation access networks, to supply voice and data services, in support of the ACCC's current investigation. This report summarises the findings from our work, which assesses the costs of wireless deployment of WiMAX, 3G and satellite.

The results generated by our modelling are based on parameters for unit costs, assumptions concerning how each technology is likely to be deployed, and estimated market share and customer demand for services offered by both Telstra and a hypothetical new entrant operator. The results are intended to provide indicative costs and are outlined in Chapter 3.

The outputs include an assessment of ULLS equivalent costs and the business case for a new entrant using each technology in different areas of the country.

The remainder of this document is structured as follows:

- Chapter 2 provides an overview of the wireless technologies.
- Chapter 3 describes the modelling work undertaken and highlights key assumptions.
- Chapter 4 summarises our results and presents conclusions.

2 Overview of wireless technologies

2.1 Introduction

Wireless technologies work on the principle of sharing capacity between all users in a cell area (or satellite coverage area). Although it is possible to prioritise some users or services (e.g. voice) above others, the total capacity of the cell provides an absolute limit.

Typically, cells are provisioned with either one sector or with three, 120º sectors, although deployments with six or more sectors are occasionally used. The capacity and range of each sector depends on the technology, the spectrum frequency and the quantity of bandwidth available. In particular:

- Technologies that are more spectrally efficient provide higher capacity using the same spectrum. Technologies, such as WiMAX, that incorporate orthogonal frequency division multiplexing (OFDM) are amongst the most spectrally efficient.
- Lower frequency signals have better propagation properties and so the lower the frequency the larger the range of the cell.
- The greater the quantity of spectrum, the greater the capacity that it is possible to deliver.

2.2 Technology overview

Industry standard solutions

We summarise the main industry standard solutions below, noting that the figures provided are estimates only. In particular, the very limited rural deployment of these technologies to date means that the figures are based on theoretical models and field trials rather than on tried and tested implementations.

	W-CDMA	*HSDPA*	*WiMAX (802.16)*
Summary	Being deployed by the mobile operators in Australia.	Enhancement to W-CDMA	802.16a fixed broadband standard using OFDM
Throughput	User speeds of up to 384kbit/s downstream	User speeds of around 1Mbit/s downstream (up to 14Mbit/s in theory, but practice likely to be smaller)	Cell capacity of up to 15Mbit/s in 5MHz carriers or 70Mbit/s in 20MHz carriers. User speeds likely to be smaller but 6Mbit/s per user may be feasible.
Range	Around 10km in rural areas – maybe more with external antennae	Smaller than W-CDMA - typically less than 10km	Similar to W-CDMA
Spectrum requirement	Bands in the 850MHz to 2.5GHz range	Bands in the 850MHz to 2.5GHz range	Bands in the 2–11GHz range for non-line of sight coverage
Latency	250ms	150ms	Low

Exhibit 2.1: *Indicative summary of standards-based wireless technologies [Source: Analysys]*

The HSDPA enhancement to W-CDMA provides higher data rates but suffers from a smaller range. Neither W-CDMA nor HSDPA is capable of competing head-on with a 6Mbit/s fibre solution, but they may be more cost effective for lower-speed services. These technologies also provide the opportunity for operators to capture revenue from mobile services.

WiMAX has a much greater throughput and a similar range to W-CDMA. It is therefore likely to be a more suitable technology to deliver fixed broadband access. It also has lower latency, making it possible to deliver higher quality VoIP services. However, it will not be able to deliver mobile services until the 802.16e standard (still under development) is available.

Proprietary solutions

There are a number of proprietary solutions that are already commercially available. However, these solutions may suffer from higher unit costs in the long run, and will need to perform at least as well as the standards-based solutions. We summarise the main proprietary solutions below.

	Arraycom iBurst	*Flarion Flash-OFDM*	*IPWireless TDD*
Summary	Proprietary, non-line-of-sight system currently deployed by PBA in Australia	Proprietary enhancement to W-CDMA currently being trialled by Telstra	Proprietary enhancement to W-CDMA, currently deployed by Woosh Wireless in New Zealand
Throughput	User speeds of 1Mbit/s downstream and 345kbit/s upstream	User speeds of 1-1.5Mbit/s downstream and 0.5Mbit/s upstream	User speeds of up to 16Mbit/s downstream
Range	Similar to W-CDMA	Similar to W-CDMA	Similar to W-CDMA
Spectrum requirement	Bands in the 1.7GHz–2.3GHz range but customisation possible	For non-line-of-sight 450MHz–3.5GHz	Bands in the 450MHz–3.6GHz range
Latency	Low	Less than 50ms	Lower than W-CDMA

Exhibit 2.2: *Summary of proprietary wireless technologies [Source: Analysys]*

Flarion and IPWireless have the advantage of operating in the 450MHz spectrum band, providing greater range at this lower frequency. All these technologies offer higher data rates than W-CDMA, but only IPWireless could reasonably be used to offer users 6Mbit/s data rates.

2.3 Spectrum overview

Based on information from the ACMA, spectrum currently available for broadband wireless services in Australia includes:

- mobile operator allocations at 800–900MHz and 1.8–2.1GHz
- Unwired and Austar allocations at 2.3GHz and 3.4GHz
- PBA and Vodafone allocations at 1.9GHz.

2.4 Cost structure of wireless and wire line technologies

2.4.1 WiMAX / HSDPA

The major cost elements for these technologies are the cell sites (including site acquisition, preparation and lease, tower construction costs and ancillary services such as power) and cell site equipment (including antennae and other electronics). There is a fixed cost associated with providing coverage, which depends on the cell range. Cell ranges for WiMAX are higher than for HSDPA and this fixed cost is therefore likely to be lower, and it is therefore likely to be cheaper to deploy in areas of low demand.

Once coverage requirements have been met, cost increases with bandwidth demand. It is usually cheaper to deploy additional capacity at a given site than to deploy an additional site provided there is sufficient spectrum available. However, if bandwidth demand is very high then it will be necessary to also deploy additional sites.

WiMAX is slightly more spectrally efficient than HSDPA. Given equal spectrum allocations, this means that WiMAX can deliver more bandwidth without requiring additional cell sites, and it is therefore also likely to be cheaper to deploy in areas of high demand as a stand-alone fixed broadband solution. However, existing mobile operators already have access to sites that can be used for HSDPA solutions and the fact that 3G and HSDPA is able to provide mobile services means that the potential revenues are much higher with this solution. Whilst future WiMAX standards still in development may also be able to provide mobile services, these are not expected to be complete before 2007 or later, and the spectral efficiency of these standards is likely to be lower.

2.4.2 Satellite

The major cost elements for a satellite broadband service are:

- customer premises equipment, the costs of which are extremely variable, depending on the power and antenna size, which determines the data rate
- ground station (plus software)

- satellite transponder lease. Lease of a 36MHz transponder costs in the region of AUD3.5 million per annum, although it is also possible to lease a fraction of a transponder.

Whilst the ground station is mainly a fixed cost, the transponder lease scales fairly linearly with transponder capacity. Therefore, delivering service to twice as many customers or at twice the data rate will cost approximately twice as much, making this an expensive solution for high-bandwidth, mass-market services.

Provided that the customer is within the satellite coverage area, costs are largely independent of location, and satellite is therefore suitable for providing services to very dispersed customers across the whole of Australia.

2.4.3 Fibre

The cost of fibre deployment is dominated by civil works, which is closely related to the average length of fibre per end user (recognising that the cost of ducting may vary significantly between rural and urban areas). Therefore, costs scale with density of demand; it is not much more expensive to serve 100 customers within a given area than it is to serve 50 customers within a given area. Fibre deployment is therefore best suited to urban areas and to operators with high market share.

Once the fibre is laid, the incremental cost of delivering additional bandwidth is small and affects mainly core network costs and IP transit. It feasible to offer up to 24Mbit/s, using ADSL2+ technology provided that the fibre node is within 1–2km of end users. Therefore, in areas with fibre deployment, wireless technologies are unlikely to be able to compete in provide high-speed data rates in the long run.

3 Wireless access cost model

3.1 Introduction

We have assessed the cost of delivering local access using three different wireless technologies:

- **satellite**: This is already available from a number of suppliers
- **WiMAX in the 3.4GHz band using outdoor antennae**: This is similar to Unwired's deployment, and using outdoor antennae will also increase the cell range for rural areas. We have access to reliable data on unit costs for WiMAX in this frequency band
- **HSDPA in the 850MHz band using outdoor antennae**: HSDPA is a standard enhancement to the W-CDMA technology being deployed by all the mobile operators in Australia. Using outdoor antenna and deployment in the lower frequency 850MHz spectrum will increase the cell range in rural areas.

The cost model is structured as illustrated in Exhibit 3.1, below:

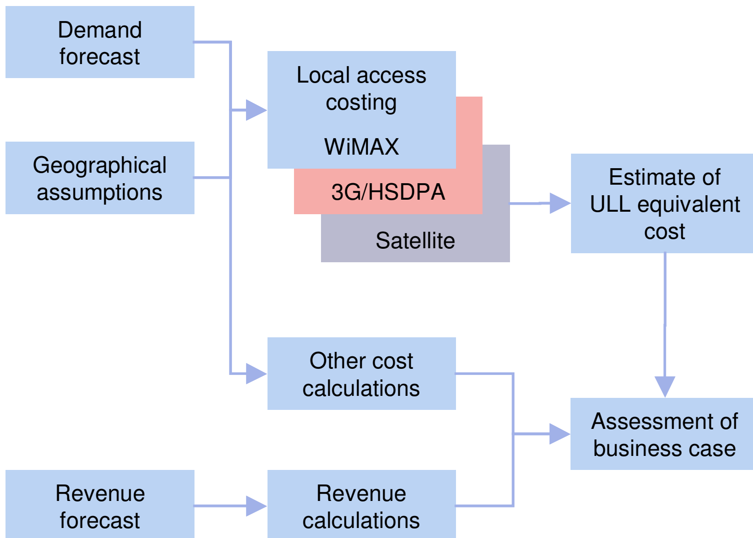

Exhibit 3.1: *Overview of cost model [Source: Analysys]*

We take historic demand and revenue data to develop future forecasts. These are combined with geographic assumptions to define the service parameters on which to base the costing. We separately assess the cost of providing local access and other service costs for WiMAX, 3G and satellite technologies, and potential revenues associated with these services. The output of the model is an assessment of:

- The cost to Telstra, or a new entrant, of providing a service equivalent to ULL using each of the wireless technologies, expressed in an average monthly cost per line.
- The potential business opportunity for investment by a new entrant, expressed in the average monthly return per line and in absolute NPV terms.

The model consists of a base case and several scenarios in which any of the values of input parameters can be modified. Further scenarios can easily be added.

In the rest of this section we describe the modelling assumptions and key parameters relied on at each stage.

3.2 Geographic assumptions

Telstra has assigned a band number between 1 and 4 and a zone, dependent on population of the ESA to each exchange in Australia. The ESA is the area of land within which any buildings will be served by an exchange building located (usually centrally) within that ESA. The ESA is the surrounding area served by a (usually centrally) based exchange building.

The four-zone classifications are

- urban (greater than 10 000 people)
- major rural (between 2501 and 9999 people)
- minor rural (between 201 and 2500 people)
- remote (200 people or less).

The four bands are used by Telstra to differentiate the prices of ULLS, with Band 4 representing the most expensive, usually more rural, ESAs and Band 1 the cheapest. The band and zone classifications are independent of each other.

We have combined the 4 bands with the 4 zones to create 16 distinct geographical types (geotypes) and have focused on the cost of providing wireless access to Band 3 and Band 4 exchanges. We have used a list of 3944 exchange areas (from a total of around 4473 in Bands 3 and 4[1]) provided by the ACMA and scaled up the number of exchange sites and premises to cover the whole of these bands. We have supplemented this with separate data on Band 1 and 2 that provides data on the number of premises but not necessarily on the location of these premises with the ESA. The 16 geotypes are:

- Band 1 – Urban
- Band 1 – Major Rural (no ESAs in this category in practice)
- Band 1 – Minor Rural (no ESAs in this category in practice)
- Band 1 – Remote (no ESAs in this category in practice)
- Band 2 – Urban
- Band 2 – Major Rural

[1] There are around 5070 exchange areas in total across all four bands

- Band 2 – Minor Rural
- Band 2 – Remote
- Band 3 – Urban
- Band 3 – Major Rural
- Band 3 – Minor Rural
- Band 3 – Remote
- Band 4 – Urban
- Band 4 – Major Rural
- Band 4 – Minor Rural
- Band 4 – Remote

The distribution of exchange areas by band is shown in Exhibit 3.2 below.

[redacted]

Exhibit 3.2: *Distribution of exchange areas by band [Source: Analysys]*

The Band 1 and Band 2 areas are all concentrated around the major cities along with the majority of Band 3 areas. Most ESAs fall into Band 4 Remote but most premises are located in Band 1 Urban as shown in Exhibit 3.3 below.

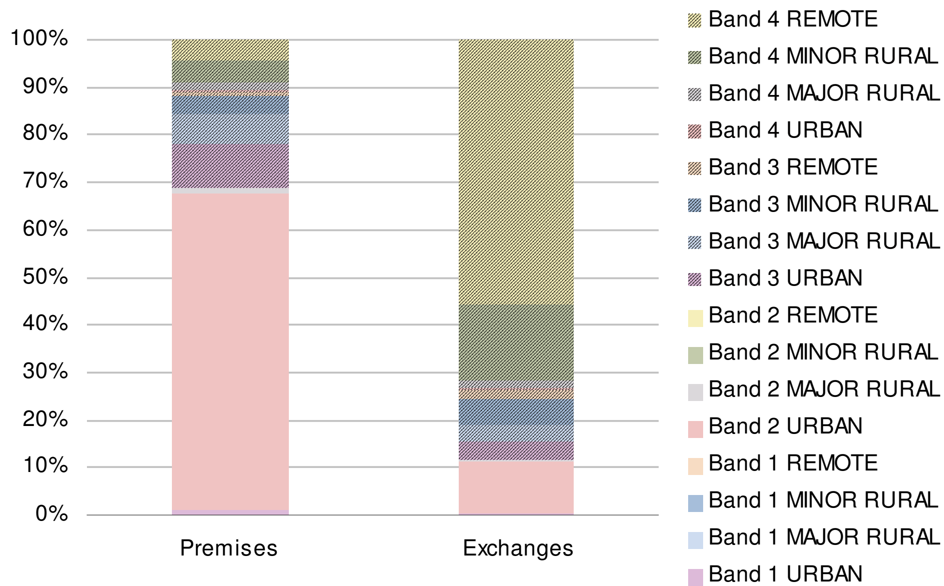

Exhibit 3.3: *The number of ESAs and premises in each geotype [Source: Analysys]*

The picture for the distribution of zones is similar to that for bands, although a number of exchange areas which are located very close to major cities are still classed as remote, while some exchanges not located near a city are urban. Exhibit 3.4 below shows the distribution of exchange areas by zone in the Melbourne area.

[redacted]

Exhibit 3.4: *Distribution of exchange areas by zone around Melbourne [Source: Analysys]*

Attempting to cover the entirety of some of the larger exchange areas in Australia using WiMAX or 3G would be prohibitively expensive due to its low population density. Rather than aiming to completely cover each exchange area using the same technology, we have modelled the provision of access to users within the range of a single base station located at the existing exchange site. We have also considered the cost of satellite provision for those premises out of the reach of WiMAX and 3G.

The exchange areas considered in this study include all of those located in Bands 3 and 4. For the majority of these we have detailed information on the number of premises at different distances from the exchange. However, we have had to scale up figures to include many of the largest exchange areas located in central Australia for which we do not have such detailed information. Exhibit 3.5 shows the set of exchange areas for which we have detailed information, including an estimate of the number of premises within 4km and 8km of the exchange building. These are displayed in red.

[redacted]

Exhibit 3.5: *Exchange areas with detailed information of premises location [Source: Analysys]*

Using the data provided by the ACMA giving the number of premises within 4km and 8km of each studied exchange within both Band 3 and Band 4, we have calculated estimates for the proportion of premises at other distances from each exchange. That is, we have derived estimates for the number of premises within each 'x' km radius from the exchange for x between 1 and 12 averaged by geotype. This allows us to easily see the number of premises within range for each technology in a given geotype (WiMAX and 3G each operate with different effective cell radii). This also allows for variation of the cell radii properties for each technology.

The data for the number of premises within 4km of the exchange, between 4km and 8km from the exchange, and over 8km from the exchange has been summed up over all exchange areas within each geotype. This gives an average percentage of premises over 4km and over 8km from the exchange in each geotype. By using the ratio of the percentage over 8km to the percentage over 4km and multiplying this by the percentage over 8km from the exchange, we have derived an estimate for the small percentage of exchanges over 12km from each exchange. This process gives the following results in the eight different geotypes in Bands 3 and 4:

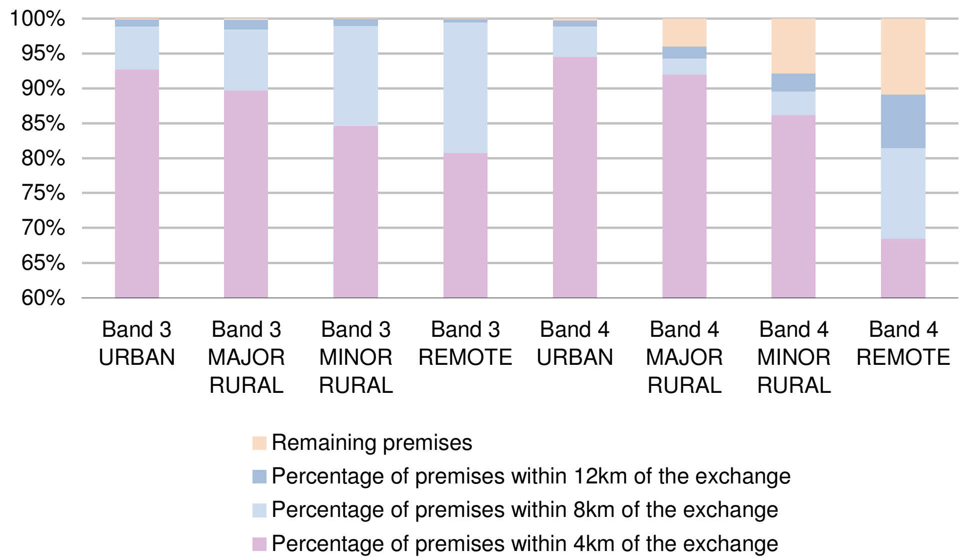

Exhibit 3.6: *Proximity of premises to the exchange in each geotype [Source: Analysys]*

We do not possess such detailed data on ULLS Bands 1 and 2 and have therefore estimated these measures based on simple assumptions.

Knowing the total number of premises in each geotype, the number of households and businesses in each geotype have been derived from the number of premises by assuming a constant ratio across all geotypes, calculated from actual data for the whole country.

3.3 Demand forecast

3.3.1 Service definitions

We have assumed a discrete set of service offerings which would be offered by either Telstra or a new entrant operator investing in an area. This allows forecasting of demand for services to be consistent between Telstra and a new entrant. The service offerings chosen are designed to reflect a variety of users with differing requirements and hence demand is specified separately for each service. The different services are summarised in Exhibit 3.7 below:

Service number	*Service name*	*Data rate downstream (kbit/s)*	*Data rate upstream (kbit/s)*	*Contention ratio used (base case)*
1	Voice (res)	varies	varies	uncontended
2	Low-speed data (res)	256	64	50
3	Mid-speed data (res)	512	128	50
4	High-speed data (res)	1500	128	50
5	Very-high-speed data (res)	6000	1500	50
6	Voice (bus)	varies	varies	uncontended
7	Low-speed data (bus)	256	128	20
8	Mid-speed data (bus)	512	256	20
9	High-speed data (bus)	1500	512	20
10	Very-high-speed data (bus)	6000	3000	20

Exhibit 3.7: *Definition of service offerings [Source: Analysys]*

Services 1–5 are aimed at residential customers, and entail a voice service and four different speeds of broadband access. Services 6–10 provide the same set of services, but are aimed at businesses (although with some variation in upstream bandwidths to reflect the more symmetrical type of broadband service often required by businesses). The contention ratios used are typical of commercial offerings to residential and business customers in other countries, but can easily be varied using a scenario.

The data rates are currently constant for each individual service across all scenarios, however, the contention ratios used do vary, so the values used in the base case are shown above in Exhibit 3.7. The data rate required for voice services is uncontended since data for voice services must be prioritised.

3.3.2 Voice minute forecasting

We have obtained historical data on annual voice minutes to both international and national long distance destinations for Australia from the ITU. However, the same data was not easily available for local calls within Australia in recent years. As a result, we have taken figures for national long distance calls and local calls in New Zealand and used the ratio between these figures in each year to scale the national, long distance call minutes for Australia to obtain annual local call minutes for Australia. Summing these quantities gives the total annual voice minutes for Australia in previous years, and this trend has been projected forward using a linear trend function to forecast annual voice minutes.

Assuming 10% of traffic in the busy hour for residential users and 20% for business users, (which is typical due to higher proportion of calls made during the working day) we have calculated the erlangs required for the residential and business voice services.

3.3.3 Forecasting demand for broadband services

The most basic assumption used in our forecasting of future demand is the forecast of future population in Australia. We have estimated population based on actual data from 1990, together with forecasts up until 2025 (the last year in the model) from the EIU. We have assumed a constant ratio of people per households and people per business in the country throughout the period of the model. To establish these ratios we have used ITU population and household data from 2003 and 1994 census data containing the number of businesses and the population.

We have used data[2] on historic numbers of broadband subscribers to establish the historic residential and business broadband penetration levels in Australia from 2000 onwards. This indicates a residential broadband penetration of around 17% and a business penetration of around 31% in 2005, immediately prior to the starting point of the model.

This total market demand has then been extended forwards to 2025 using an S-curve function, with parameters that vary by scenario. In the base case, we specify a penetration

[2] Source: Informa

of 60% in the residential market and 70% in the business market by 2015 with eventual market saturation values of 65% and 72%, respectively. These figures are in line with other Analysys forecasts for regions we consider to be likely to develop in a similar way to the Australian market.

Data on the current split of take-up between different speeds of broadband service for both residential and business users has been used[3] to help forecast future demand for different speeds of service. This provided data on different speeds of broadband service and their take-ups from September 2003 to March 2005. Based on assumptions about the rate of upgrades for existing customers and the likelihood that new customers opt for higher speed services, we have projected this forward.

The resulting penetration levels are shown in the charts below. The residential case is shown in Exhibit 3.8, while the business case is shown in Exhibit 3.9.

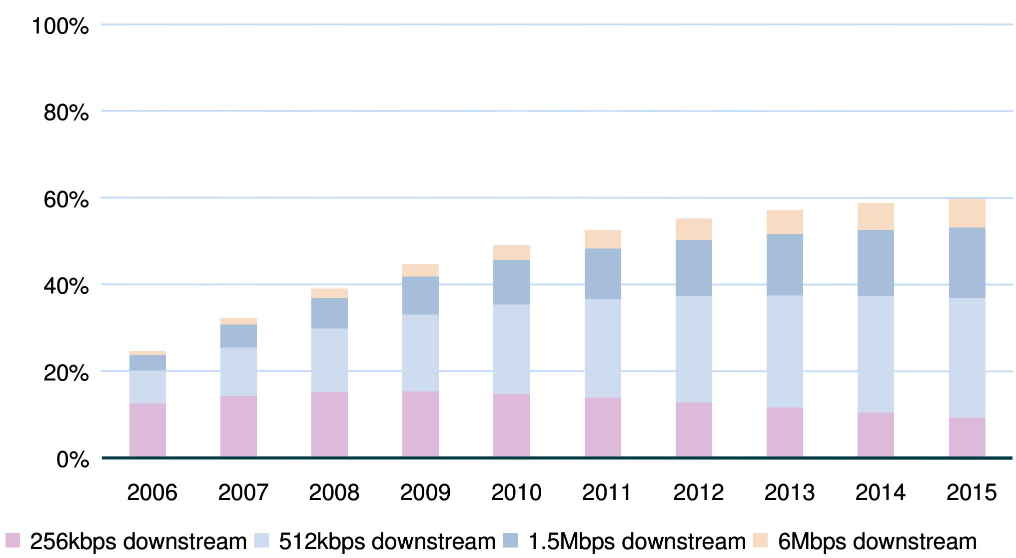

Exhibit 3.8: *Residential broadband penetration by service [Source: Analysys]*

[3] Source: ABS internet activity survey carried out in March 2005

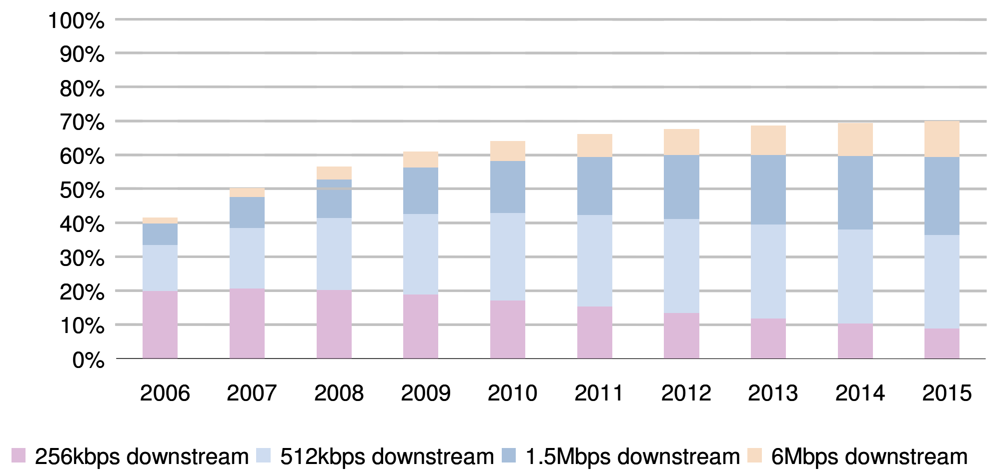

Exhibit 3.9: *Business broadband penetration by service [Source: Analysys]*

The work so far gives a total demand for each service in each geotype region. The final aspect to add to this is the overall market share of the operator. This will provide an actual number of subscribers by service. We have modelled both Telstra and a hypothetical new entrant operator. In the base case, we have assumed that the market share for each operator is constant by geotype, and also between business and residential customers. The overall market share is modelled using S-curves starting in 2005, with 100% market share for Telstra, and 0% for the new entrant operator. In the case of Telstra we assume a 99% market share by 2010 dropping to 97% by 2015. In the new entrant case we assume 20% market share by 2010 rising to 25% by 2015. The market shares over time are shown in Exhibit 3.10, below.

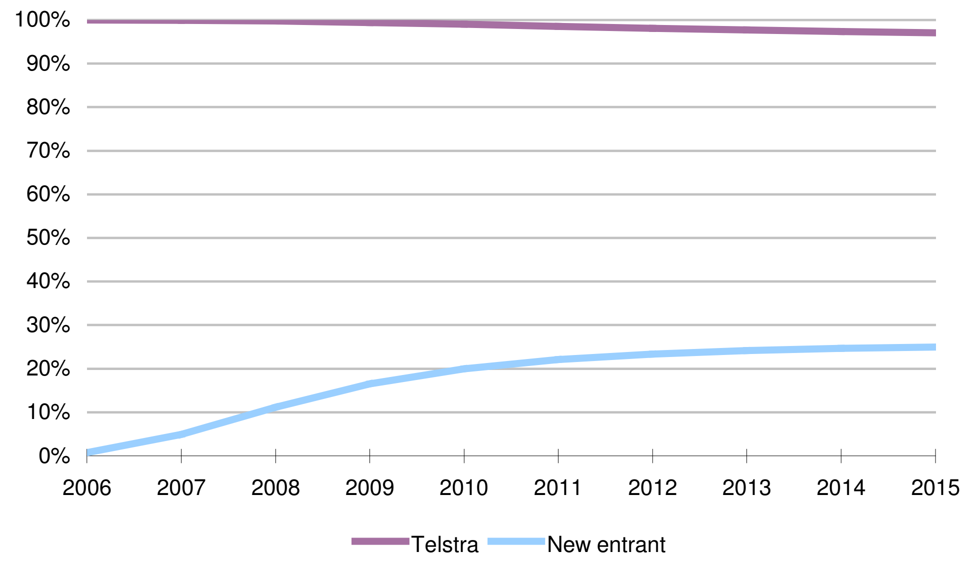

Exhibit 3.10: *Telstra and new entrant operator overall market share [Source: Analysys]*

The combined market share of the two operators is greater than 100%. However, the two scenarios are intended to be distinct rather than complementary.

3.4 Revenue forecast and calculations

3.4.1 Service revenues

These revenues vary by service and can be broken down into subscription revenues and connection revenues

Subscription revenues

Subscription revenues are calculated as the year average subscribers on each service multiplied by the annual ARPU for that service. The ARPU can vary by scenario within the model but does not vary by operator, as it is assumed that either Telstra or a new entrant could charge the same price for an equivalent service. In the cases where similar services are offered, the ARPU assumptions are informed by prices of services currently offered by Unwired in Australia as shown in Exhibit 3.11, below.

Service	*2006 Subscription ARPU*
Residential voice	500
Residential low speed	400
Residential medium speed	750
Residential high speed	1,200
Residential very high speed	1,600
Business voice	2,000
Business low speed	600
Business medium speed	1,100
Business high speed	1,800
Business very high speed	2,400

Exhibit 3.11: *Annual subscription ARPU by service*
[Source: Analysys]

We have assumed a 5% annual decline in subscription ARPU. Prices for business services are around 50% more, partly due to the higher upstream bandwidths for the services and the willingness to pay for of value added services. Voice ARPUs are based on figures held by Analysys for similarly developed markets.

Connection revenues

Connection revenues are calculated as the number of gross adds to a service multiplied by the connection charge for each new subscriber to the service. Connection charges, like service charges, can vary by scenario and geotype within the model. They are designed to cover some of the customer premises equipment (CPE) and installation costs incurred by the operator. In the base case the connection charge is set to zero for both residential and business voice services and is set to a value of AUD50 for all speeds of broadband service reflecting prices in other similarly developed markets. There is also a price trend, meaning that this price is set to decrease by AUD2 each year for the first 5 years of the model in the base case.

3.4.2 Other revenues

We also consider other revenues, including voice termination revenues and subsidy revenues.

Voice termination revenues

Voice termination revenues are those revenues due to calls from other operators' networks terminating on the wireless network of the modelled operator. Two key assumptions used are that termination rates are symmetric between fixed operators (i.e. the termination rate of the modelled operator is equivalent to Telstra's AUD0.01) and that incoming and outgoing traffic are symmetric (i.e. that the total traffic terminating on the network is equivalent to the total originating traffic on the network with equal amounts coming from and going to each alternative operator). Revenues, therefore, are calculated as the total number of terminating voice minutes which did not originate on the wireless network multiplied by the operator's termination rate. The same amount of traffic incurs a cost for terminating on another operator's network. However, the wireless operator will have a net cost rather than a net revenue for voice termination since the costs of termination on a mobile operator's network will be high. These costs are described in Section 3.6.3.

Subsidy revenues

We also include the possibility of a government subsidy being provided to encourage the build-out of a wireless network in rural areas. Annual subsidy revenues are calculated as the number of customers taking a broadband service for the first time in that year multiplied by the subsidy amount. This is intended to model any government subsidies which may help the operator, but the subsidy per new customer is set to 0 in the base case of the model.

3.5 Local access costing

In this section we describe how the ULLS equivalent costs have been modelled. Other costs, which relate to overall cashflow and are relevant to the business case of a new entrant operator, are taken into account in Section 3.6.

We have sought to benchmark the technology parameters used in the model against data from a range of sources, including:

- vendor specifications and price lists
- field experience of operators
- professional bodies such as the WiMAX forum
- Analysys's internal data sources
- link-budget calculations to estimate cell radii.

However, it should be noted that WiMAX and HSDPA deployments are at a very early stage, especially in rural areas, and there is very little data from rural testing.

3.5.1 WiMAX

The WiMAX architecture can be summarised as shown in Exhibit 3.12, below.

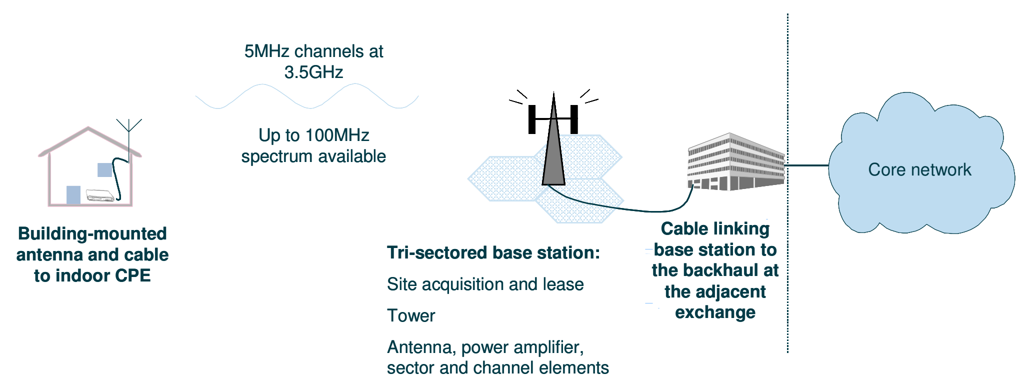

Exhibit 3.12: *Overview of WiMAX architecture [Source: Analysys]*

We have modelled an outdoor WiMAX solution allowing for increased cell radius compared to an in-building solution, although indoor CPE are used within a 1km radius of the base station. We have modelled tri-sectored base stations, with up to 15 carriers per base station. This number of carriers seems reasonable, considering there is up to 100MHz of available spectrum in the 3.5GHz range, and assuming a 5MHz channel bandwidth.

As mentioned in Section 3.2, attempting to cover the entirety of some of the larger exchange areas in Australia using WiMAX or 3G would be prohibitively expensive due to the low density of population. Rather than aiming to completely cover each exchange area using the same technology, we have modelled the provision of access to users within range of a single base station located at the existing exchange site. For the premises out of reach of WiMAX and 3G, we have also considered the cost of satellite provision

Using one base station per exchange area, backhaul costs relevant to ULLS are limited to the cost of cabling from the tower to the neighbouring exchange building.

For each asset modelled we have included installation, capital and operating costs.

Subscriber numbers

The model uses subscriber numbers by service generated by the demand forecast, as described in Section 3.3. A feasibility filter is then applied to obtain an actual number of subscribers for the services (i.e. the number of subscribers who both want the service and to whom it is possible to deliver the required service). For WiMAX, all of the services modelled are technologically feasible, but reachability based on distance from the cell site is still an issue. The number of subscribers is therefore scaled down by the percentage of premises which are unreachable. For each geotype, the number of households and businesses within different distances (at 1km intervals) from the local exchange are calculated as described in Section 3.2. This is compared to the range of the WiMAX technology to determine what percentage of households and businesses in each geotype is feasible for each service. The range of the WiMAX technology is variable, as shown in Exhibit 3.13, below.

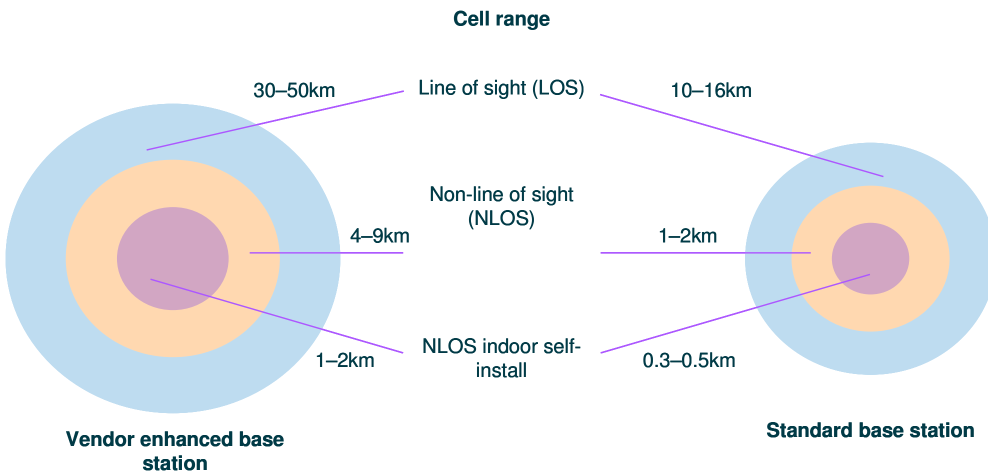

Exhibit 3.13: *Range of the WiMAX technology [Source: Analysys]*

For the outdoor non-line of sight service we have used a range of 9km in urban geotypes, 10km in major rural geotypes, and 12km in minor rural and remote geotypes in the base case for ULLS Bands 3 and 4. These radii are slightly higher than those shown in Exhibit 3.13. This is due to the fact that the figures in the diagram refer to an in-building CPE, whereas we have modelled outdoor antennae at the customer premises. In addition, the range can be higher in rural areas due to the higher chance of achieving a line of sight. We have also used a range of 1km for indoor CPE, which come at a lower cost to any customers within this smaller cell radius. We have halved these cell radii in ULLS Bands 1 and 2 to account for the impact of building clutter.

Capacity demand

From the number of subscribers to each service, we have used the voice minute forecasting described in Section 3.3.2 to calculate the total number of annual voice minutes in the geotype. Using the number of erlangs required and a data rate of 8kbit/s,[4] the total downstream and upstream bandwidth required have also been calculated. Capacity is dimensioned in 5MHz channels, both upstream and downstream.

[4] Based on G.729ab speech codec as supported for example by Alvarion kit http://www.alvarion.com/upload/contents/291/VoiceGateway_Datasheet.pdf

Contention ratios are applied to the bandwidth requirements in order to provide an estimate for the total amount of bandwidth. However, due to the small sector capacity that is in use and limited scope for statistical gains across multiple users, we have made some adjustments so that the actual contention ratio in use is around 50% lower than the headline ratio for sector capacities around 10Mbit/s, falling to 40% for sector capacities around 8Mbit/s.

Assets required

From the capacity demand it is possible to calculate the total number of assets required in the network using the appropriate dimensioning rules.

The number of sites required depends on both capacity and coverage requirements. The number required for coverage is simply one per exchange area, and is therefore limited to the number of exchange areas in the geotype. Calculating the total number of sites for capacity requires calculating the maximum capacity of one site (which is the sector capacity of 10Mbit/s through three sectors on the maximum number of carriers possible at a site). Based on capacity demand, the number of sites required can then be calculated. We add half a carrier's bandwidth (both upstream and downstream) at each site to take account of the non-homogeneity of demand across the geotype. This comes about due to the fact that the exchange areas do not all have an equal number of premises within range of the base station, or within range of each sector. Some will have very few premises, leading to a low-use of capacity on the base station, while others will have higher numbers leading to increased demand. The number of sites required is then the maximum of those required for capacity (taking into account non-homogeneity) and those required for coverage. The average number of carriers on each tower, and hence the number of additional sectors, can then be calculated by referring back to the capacity demand. One power amplifier per carrier is also required.

The number of CPEs required is determined by the number of gross adds of customers within the year. Separate CPE are not required for the voice and broadband services so the number of CPE required is the maximum of the number of voice customers and the number of broadband customers added. The gross adds from premises within a 1km radius of the base station are allocated a cheaper indoor CPE, whilst all other gross adds are allocated an outdoor CPE.

The number of assets required in the year does not quite reflect the number of assets actually deployed, since there is a look-ahead period to take account of the time required to deploy certain assets, such as towers. In later years, replacement assets also become relevant to the number of additional assets deployed in each year. Every asset in the model has a physical lifetime assigned to it ranging between 10 and 25 years.

Costs

The technology dependent costs can be divided between capital and operating costs. The capex cost is simply the unit cost for each asset multiplied by the number deployed in that year.

The opex cost is split into two distinct sub-categories. The first of these is the ongoing opex costs, which are calculated as a percentage of capex (between 10% and 20%, except for CPE, which have no opex costs) paid each year for operating and maintaining the equipment. The second is the one-off opex costs, which are the installation costs of the equipment, and correspond to the amount of an engineer's time required to install the equipment. CPE, additional sectors and power amplifiers incur these costs. It is assumed that a larger amount of an engineer's time is required for remote installations due to greater travelling times, and hence, the cost of these is higher than in urban areas. For towers and sites, the cost is included in the capital cost.

3.5.2 3G/HSDPA

The 3G/HSDPA architecture can be summarised as shown in Exhibit 3.14, below.

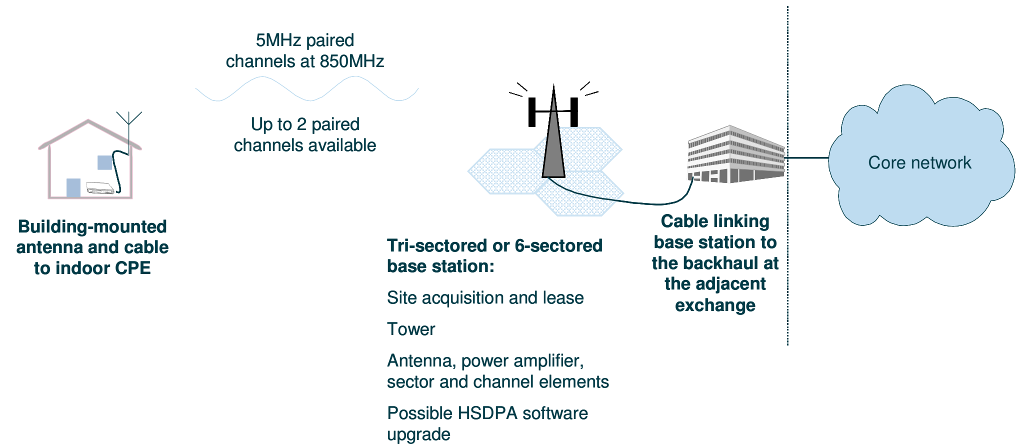

Exhibit 3.14: *Overview of 3G architecture [Source: Analysys]*

We have again modelled an outdoor CPE solution using 5MHz paired channels in the 850Mhz range. Due to spectrum availability, we only allow for two paired channels, and hence two carriers at a base station, which is tri-sectored in the base case, but can have up to six sectors. There is also an optional software upgrade to the base station to allow the use of HSDPA, which is assumed to happen in the base case due to the greater bandwidth achievable using HSDPA.

Again, one base station per exchange area is assumed and the backhaul costs relevant to ULLS costs only consist of the cabling to the nearby exchange building.

Subscriber numbers

The same calculations on subscriber numbers are performed as in the case of WiMAX. This time, however, in addition to the reachability constraint due to distance from the cell site, there is also an issue of technological feasibility. High and very high speed broadband services are not possible using 3G, and so the 512kbit/s service is the fastest that can be offered to customers. Demand for higher speed services is reallocated as demand for the 512kbit/s service.

The maximum cell radius achievable for this technology is 0.5km in urban geotypes, 3km in major rural geotypes, 5km in minor rural and 8km in remote geotypes based on typical link budgets and vendor claims.

Capacity demand has been calculated in the much the same way as for WiMAX, with some small variations. Due to the paired channels, we only consider downstream demand (since it is larger than upstream demand) in this case. Also, the data rate required for voice services varies for different technologies and is 35kbit/s for 3G/HSDPA, as opposed to the 8kbit/s used for WiMAX.

In the 3G case, in order to assess demand for resources from both voice and data traffic the model assumes that voice channels require 35kbit/s of 'data equivalent' radio resource, i.e. about three times higher than the standard nominal channel rate of 12.2kbit/s. This reflects the fact that interference limitations mean that the narrow voice channel requires a higher utilisation of radio network assets than data traffic delivered more efficiently over 144kbit/s or 384kbit/s channels.

Assets required

From the capacity demand it is again possible to calculate the number of each asset required in the 3G network using the appropriate dimensioning rules.

The number of sites required is calculated in the same way as for WiMAX except using the maximum capacity of a 3G tower instead.

The number of CPE required is again driven off the maximum of the number of voice gross adds and broadband gross adds within the year. Indoor CPE are provisioned for premises within a radius of 0.5km from the base station.

Costs

Like in the case of WiMAX, the technology dependent costs can be divided between capital and operating costs. These are dealt with in the same way as in the case of WiMAX.

Only CPE, extra carriers and extra sectors this time carry an installation (one-off opex) cost.

3.5.3 Satellite

The satellite architecture can be summarised as shown in Exhibit 3.15, below.

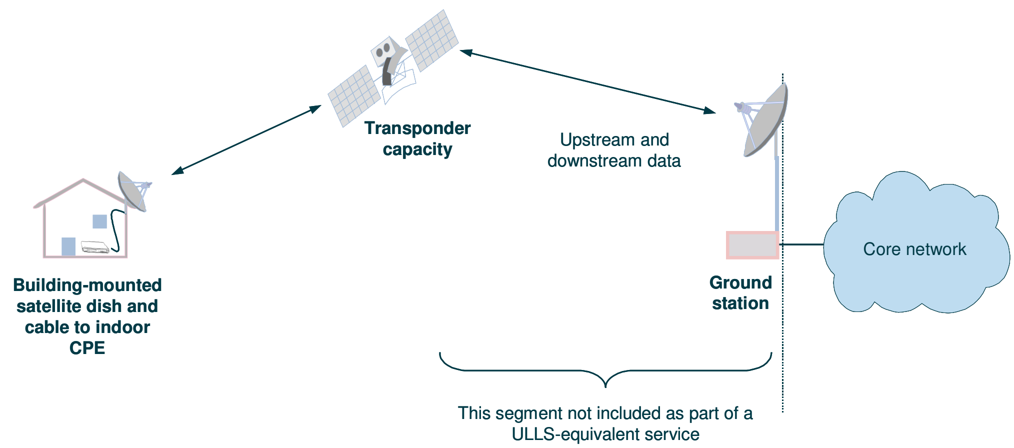

Exhibit 3.15: *Overview of satellite architecture [Source: Analysys]*

The modelling for satellite is more straightforward than in the cases of WiMAX and 3G. In this model to look at ULLS-equivalent costs we only include the cost of CPE and the cost of transponder capacity.

Subscriber numbers

The same calculations on subscriber numbers are performed as in the case of WiMAX and 3G. This time however, reachability is not a constraint, but the issue of technological feasibility is important. High and very high speed broadband services are, although technically possible, not really practical using satellite and so the 512kbit/s service is the fastest that can be offered to customers, as in the case of 3G. Again demand for higher speed services is reallocated as demand for the 512kbit/s service.

The large positive factor supporting the use of this technology is the universal coverage that it provides.

Capacity demand has been calculated in the same way as for WiMAX and 3G.

Assets required

The only assets to consider for this technology are the transponder capacity required, which falls straight out of the total upstream and downstream capacity demand, and the number of CPE required.

The number of CPEs required is again driven off of the number of gross adds of customers within the year. Separate CPE are not required for the voice and broadband services ,so the number of CPEs required is the maximum of the number of voice customers and the number of broadband customers added. CPE have a 10-year lifetime in the base case of the model, and so replacement CPE have also been calculated on this basis.

Costs

The only capex cost to consider is the CPE cost since the transponder cost is captured as pure opex.

3.6 Other cost calculations

The costs considered in this section are not part of the ULLS equivalent costs, and are only used in the assessment of the business case for a new entrant operator, the results of which are shown in Section 4.2

These costs consist of core network and IP router costs, spectrum licence costs, voice termination costs and other opex.

3.6.1 Core network and IP router costs

In the core network, the costs considered are incremental costs that would be incurred by Telstra or a new entrant, and for which the wireless operator would be liable. These costs are not taken into account when considering the costs relevant to ULL.

Based on other data held by Analysys, we have estimated these costs, which cover such things as switches, routers and OSS/BSS, separately for voice and broadband subscribers and model them on a per subscriber basis. Different costs per subscriber are also used for residential and for business customers. These costs are calculated in the model based on year average subscribers.

IP routers are another additional cost which must be taken into account with one required per base station.

IP transit costs are calculated on a per Mbit/s basis and backhaul costs from the exchange to the core network on a per exchange basis. Incremental IP switch capacity costs per voice customer also apply. These figures are based on international benchmarks, and Analysys estimates based on known equipment prices.

3.6.2 Spectrum licence costs

Spectrum licence costs are simply a Year 1 capex cost. For both WiMAX and 3G, we have looked at the prices for past spectrum licences bought in Australia, (whether regional or national, going back to 1999 in the respective frequency bands) and calculated the cost per head of population in the relevant area for each. These costs have then been averaged over all licences bought to have a value of approximately AUD0.03 per head in the 3.4GHz band for WiMAX, and approximately AUD0.96 per head of the population for 3G, based on the amounts of spectrum forecast for usage. For each geotype, these figures have then been multiplied by the population of the geotype to arrive at a cost for a spectrum licence for each technology in each geotype.

3.6.3 Voice termination costs

These costs arise from traffic originating on the wireless network which terminates on other networks. These can either be Telstra's network, with a termination rate of AUD0.01 or a mobile network, with a termination rate of AUD0.15. Initially 5% of traffic (with a 1% increasing trend) terminates on-net and therefore has no termination cost as described in Section 3.4.2. We also assume that an initial 7% of traffic (based on UK figures from Ofcom) terminates on mobile networks also, with a 1% annual increasing trend, and the remainder terminates on Telstra's network. Due to the symmetric termination rate with Telstra, the net cost for wireless operator is the calculated as the difference between the mobile operators termination rates and its own termination rate multiplied by the number of minutes terminating on mobile networks.

3.6.4 Other opex

Other opex costs taken into account in the model are for billing, sales and marketing, bad debt, customer acquisition and general other overheads. Billing, sales and marketing and bad debt are set to 5%, 20% and 3% of revenues, respectively, for both business and residential services based on operator business plans we have worked on in the past. Customer acquisition costs are set to AUD100 for residential customers and AUD125 for business customers. Other overheads make up 3% of direct operating costs, and again are based on operator business plans.

3.7 Output

For each technology in the model we output the total monthly costs relevant to ULL (for comparison with Telstra ULLS prices), average monthly subscriber cashflow and the total NPV of cashflow. These results are available for each geotype and in weighted average form for the four geotypes in each of band 3 and band 4.

For WiMAX and HSDPA, we also output the monthly cost of using satellite to reach the unreachable premises in each geotype. This is done by taking the percentage of premises in the region which are unreachable using the chosen technology and applying the costs of a satellite service to the demand in these areas. If the demand is for higher speed services, then satellite can offer a 512kbit/s service, as in the case of a satellite-only solution.

These sets of results are available for either Telstra or a hypothetical new entrant operator and we have also tested for a variety of scenarios in addition to the base case. These scenarios investigate variations such as changes in market share, unit costs or contention ratios.

Different costs of capital are used for Telstra and the new entrant operator, initially using Telstra's regulated value of 9.95%, and a value of 15% for the new entrant, to represent the higher risk for a new entrant, in all scenarios. For NPV calculations we use a 10-year view, rather than a full, 20-year view, taking into account the full run-length of the model. The results, however, are very similar using either 10 or 20 years.

4 Results

It should be noted that the cost estimates have been carried out at a fairly high level in order to provide indicative costs, averaged across different categories of ESAs. The results are also sensitive to key assumptions concerning technical parameters, unit costs and customer demand.

4.1 Estimate of ULL equivalent cost

4.1.1 ULL equivalent costs for Telstra

In the base case, the weighted average monthly local loop cost using WiMAX is around AUD25, in Band 3 and AUD52 in Band 4 areas for Telstra with an initial 100% market share (falling only very slightly to 97% by 2015). These costs rise slightly, to around AUD27 in Band 3 and AUD53 in Band 4 areas, when considering an HSDPA solution. The costs for satellite are much higher, over AUD160 in both bands.

For Bands 1 and 2 the weighted average monthly local loop cost using WiMAX is around AUD10 and AUD15 respectively. However, we note that the model has not been calibrated in detail for these geotypes and that these figures may not be reliable. The costs rise to around AUD12 in Band 1 and AUD17 in Band 2, when considering an HSDPA solution.

The results for Bands 3 and 4 are shown in Exhibit 4.1 below.

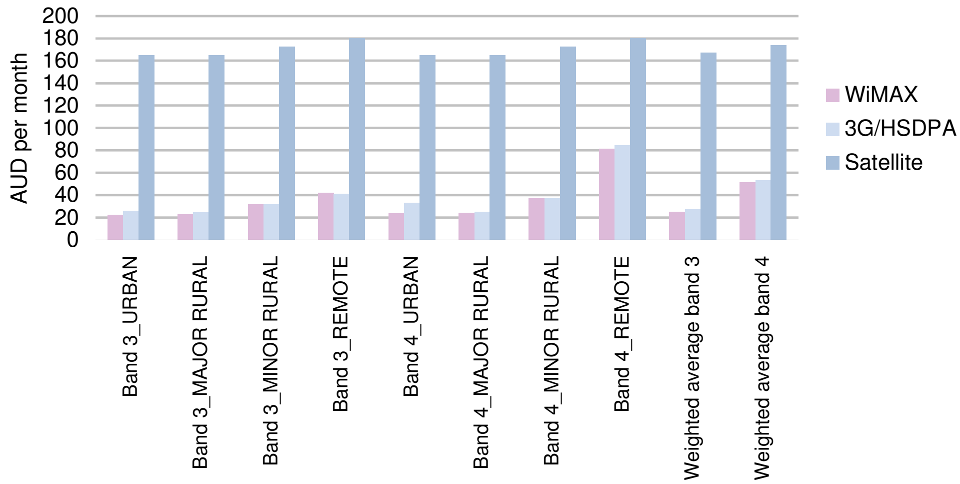

Exhibit 4.1: *ULLS equivalent costs for each technology by geotype [Source: Analysys]*

These results are quite surprising since, while the cost of satellite is very high, the costs of WiMAX and HSDPA are significantly below Telstra's ULLS costs of AUD40 in Band 3, and AUD100 in Band 4. Of course, there is an important difference in the services provided, since WiMAX and HSDPA solutions cannot reach all of the premises within many ESAs, particularly in remote areas, whereas Telstra's prices are influenced by a requirement to take these into account.

However, if satellite is used as an in-fill solution so that all premises can be served, the impact on average costs is very significant for HSDPA in urban and major rural areas, as shown in Exhibit 4.2, below.

Geotype	*Only serving premises within reach of the base station*		*Weighted average using satellite in non-covered areas*	
	WiMAX	*HSDPA*	*WiMAX*	*HSDPA*
Band 3 – Urban	23	26	23	133
Band 3 – Major Rural	23	25	24	71
Band 3 – Minor Rural	32	32	32	41
Band 3 – Remote	42	41	42	42
Band 3 – Weighted average	25	27	26	92
Band 4 – Urban	24	33	25	134
Band 4 – Major Rural	24	25	30	69
Band 4 – Minor Rural	37	37	48	53
Band 4 – Remote	81	85	92	102
Band 4 – Weighted average	52	53	62	76

Exhibit 4.2: *Indicative ULLS equivalent costs for each technology by geotype [Source: Analysys]*

The impact of satellite on the cost of the WiMAX service is not as great due to the greater proportion of premises reached, and therefore, a lower reliance on high-cost satellite in-fill. The lower cell radius for HSDPA results in vastly different percentages of reachable premises for the two technologies, particularly in urban areas, as shown in Exhibit 4.3, below.

Geotype	*Percentage of premises reachable using WiMAX*	*Percentage of premises reachable using 3G/HSDPA*
Band 3 – Urban	99.59%	23.18%
Band 3 – Major Rural	99.57%	67.30%
Band 3 – Minor Rural	99.93%	93.59%
Band 3 – Remote	99.98%	99.43%
Band 4 – Major Rural	99.53%	23.63%
Band 4 – Minor Rural	95.71%	68.97%
Band 4 – Remote	92.16%	88.30%
Band 4 – Weighted average	89.13%	81.50%

Exhibit 4.3*:* *Percentages of premises reachable in each geotype [Source: Analysys]*

Even taking the costs of satellite in-fill into account the costs for WiMAX are still below Telstra's ULLS prices. In Band 4, HSDPA remains less costly than the ULLS charge, but is now substantially higher due to the large number of customers who must be served with satellite in the more urban areas of Band 3 exchanges.

4.1.2 ULL equivalent costs for a new entrant

The situation is different for a new entrant that does not benefit from the economies of scale achievable by Telstra. As described in Section 4.2, we have assumed in the base case that market share of the new entrant reaches 20% by 2010 and increases to 25% by 2015.

In the base case, the weighted average monthly local loop cost to a new entrant using WiMAX rises to over AUD42 in Band 3 from AUD25 compared with the cost to Telstra. In Band 4, the cost changes much more, jumping from AUD52 for Telstra to around AUD211 for the new entrant. When considering an HSDPA solution these costs rise even higher, to around AUD60 in Band 3 and AUD232 in Band 4 areas.

The results for Bands 3 and 4 are shown in Exhibit 4.4 below.

For Bands 1 and 2 the weighted average monthly local loop cost to a new entrant using WiMAX is around AUD16 and AUD20 respectively. However, we note again that the model has not been calibrated in detail for these geotypes and that these figures may not be reliable. The costs rise to around AUD17 in Band 1 and AUD22 in Band 2, when considering an HSDPA solution.

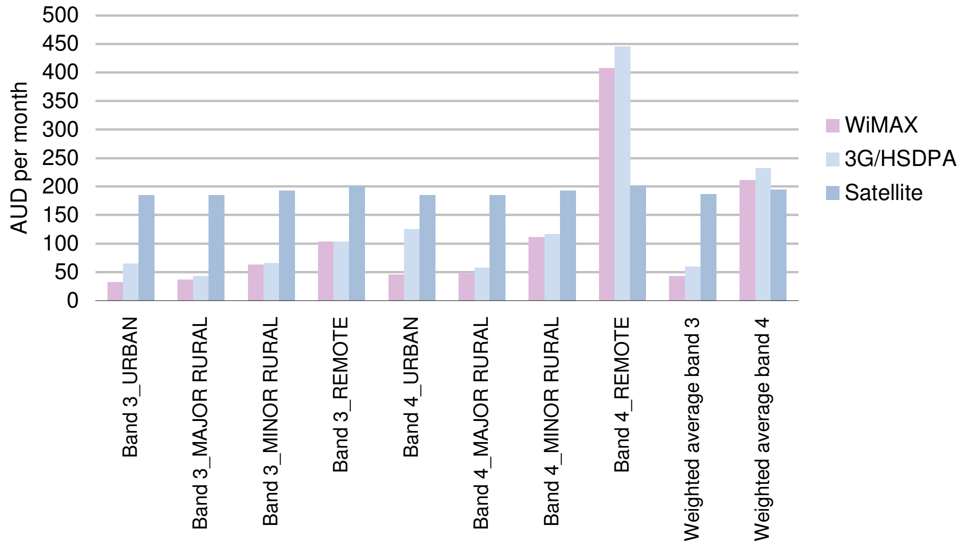

Exhibit 4.4: *ULLS equivalent costs for each technology by geotype for a new entrant operator [Source: Analysys]*

4.1.3 Scenarios

All of the figures in this section refer to costs for Telstra.

The cost of satellite rises particularly fast when attempting to use it for high-speed broadband services. Restricting the service offering to 256kbit/s downstream speed (equivalent to the low speed service, but slower than the medium, high and very high-speed services in this study) greatly reduces the cost per line. This is shown in Exhibit 4.5, below.

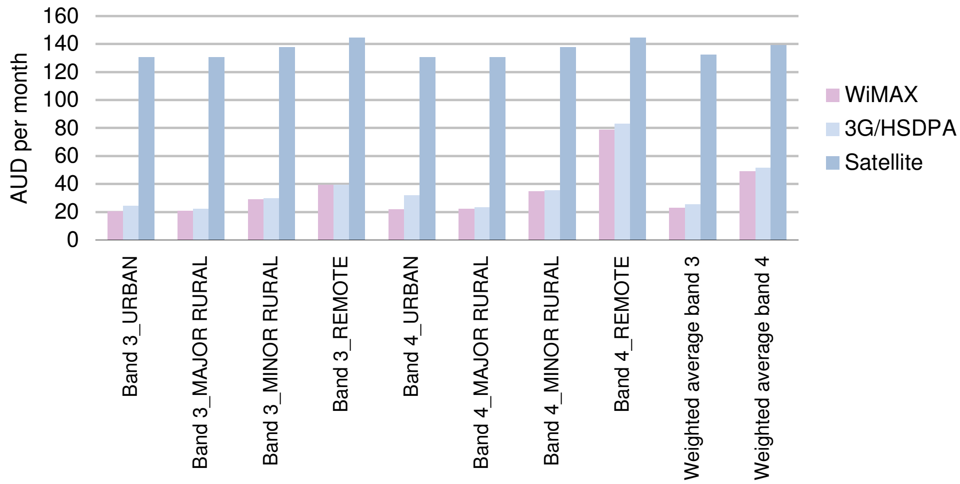

Exhibit 4.5: *ULLS equivalent costs restricting the service to low speed offerings [Source: Analysys]*

The results for WiMAX are quite sensitive to a number of parameters including, in particular, assumptions concerning market share and equipment costs. Decreasing Telstra's market share to 80% by 2015, instead of the 97% assumed in the base case slightly increases the ULLS equivalent cost. There is a more noticeable effect, however, if a change in the unit costs is considered. The results for ULLS equivalent costs for a scenario with capital costs increased by 20%, together with the base case and the market share scenario described above, are shown in Exhibit 4.6, below.

Exhibit 4.6: *ULLS equivalent costs using WiMAX [Source: Analysys]*

Similarly, the results for 3G are sensitive to whether HSDPA is used and the assumptions made regarding cell radius. Exhibit 4.7, below, shows ULLS equivalent costs for the base case and two additional scenarios using 3G. The first excludes the use of HSDPA and consequently increases the cell radii from 5km to 6km in Minor Rural areas and from 8km to 12km in Remote areas. The second just assumes a larger cell radius, increasing to 12km in both Remote and Minor Rural areas and doubling the cell radii of 1km in Urban areas and 3km in Major Rural areas.

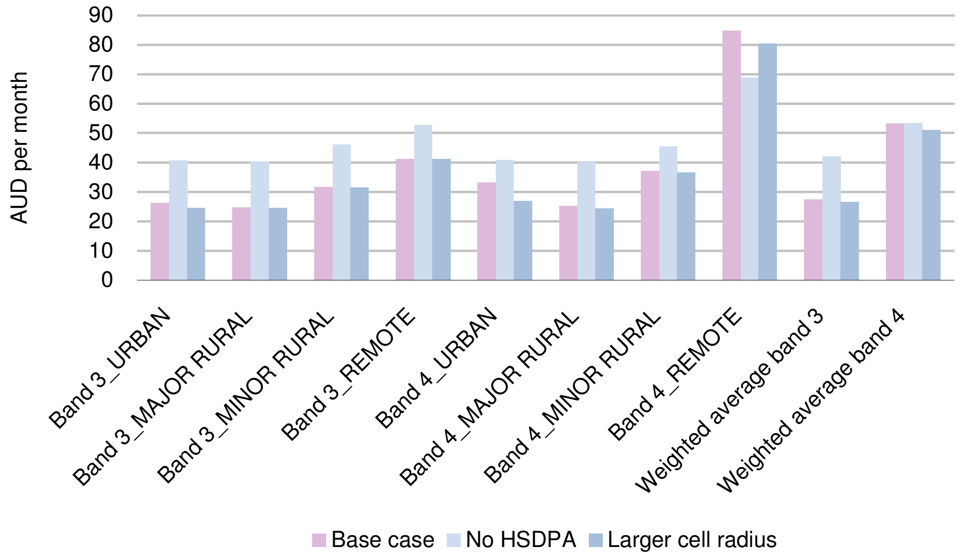

Exhibit 4.7: *ULLS equivalent costs using 3G [Source: Analysys]*

The per-customer ULLS equivalent costs increase significantly without the use of HSDPA, due to the reduced base station capacity and the need to deploy additional sites. However, in Remote areas of Band 4, this is offset by the increased cell radius and actually brings about a drop in costs. The larger cell radius scenario unsurprisingly shows a drop in costs in all geotypes.

4.1.4 Conclusions

Where fibre build is viable (i.e. in urban centres) we expect this to continue to offer vastly superior potential for very high-speed broadband access than can be achieved by wireless substitutes.

Of the wireless technologies studied, WiMAX appears to be the most suitable alternative to wire line solutions in terms of cost and ability to deliver reasonably high-speed services. For rural greenfield sites, WiMAX may be a better option than wire line. Although for existing ESAs, wire line is a largely sunk cost, and so, is unlikely to be replaced. However, consideration of WiMAX as an alternative may be relevant in assessing the modern equivalent asset (MEA) cost for economic and regulatory costing purposes.

3G and later generation mobile technologies such as HSDPA may lack the range and capacity of WiMAX in rural areas. It is likely that satellite will continue to be the best solution for those outside of coverage areas, although the cost of higher bandwidth services is considerable.

4.2 Assessment of business case

In addition to the ULLS equivalent costs considered in the previous section, there are other costs to be considered in the assessment of the business case of a new entrant operator.

In assessing the case for a new entrant, we assume that market share ramps up to 25% fairly quickly, by 2015 having reached 20% by 2010 as shown in Exhibit 4.8, below. In urban areas, a new entrant may need to offer a price discount to achieve these growth levels but in remote areas we expect competition to be very limited.

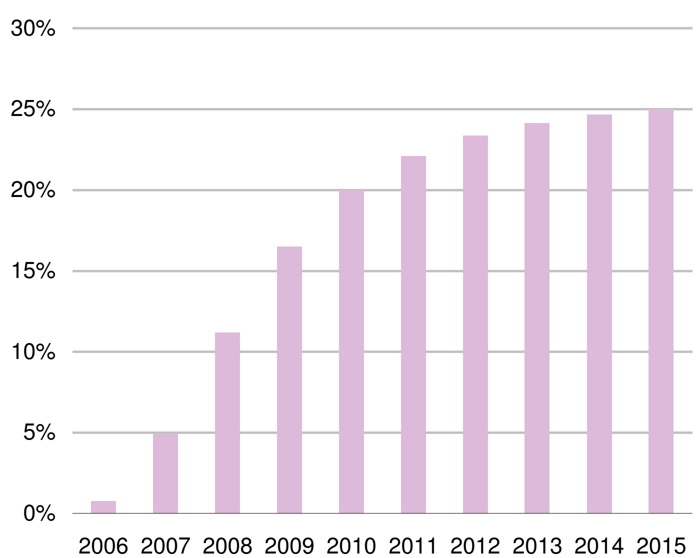

Exhibit 4.8:
Market share of the new entrant operator
[Source: Analysys]

Without any kind of connection subsidy for new subscribers, there is no case for investment in a broadband-only solution. The monthly margin per subscriber is shown in Exhibit 4.9 below for each geotype.

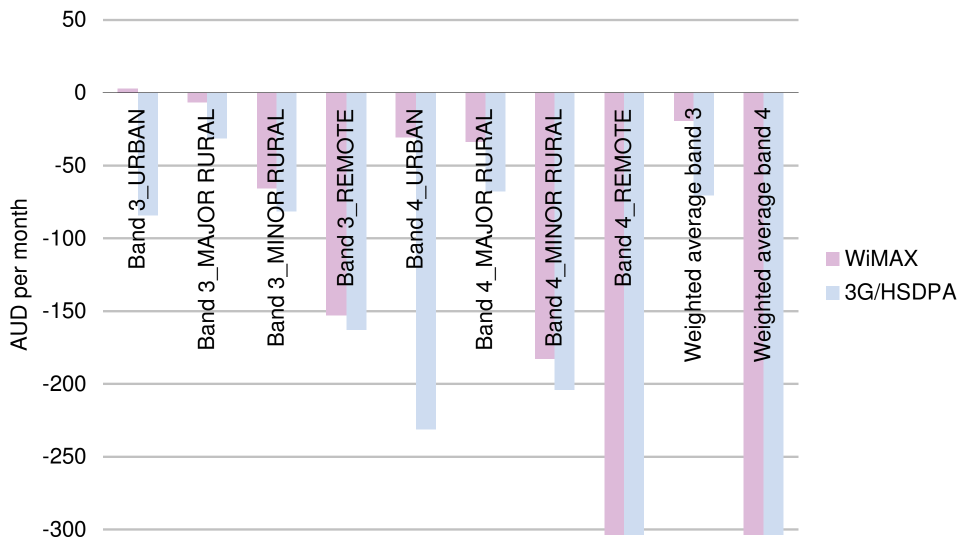

Exhibit 4.9: *Margin per subscriber [Source: Analysys] Note: Band 4 – Remote and Weighted average band 4 are off the scale*

The margin per subscriber is only positive in one geotype, Band 3 – Urban, and then only has a margin of under AUD3 per month using WiMAX. The margin for 3G is still clearly negative in this geotype, as is the margin for WiMAX in Band 3 as a whole. In Band 4 – Remote, and the weighted average for Band 4, the margins are off the scale, as shown in Exhibit 4.9.

However, with a connection subsidy of AUD3300 for all new broadband subscribers, investment becomes feasible in urban and rural areas using a WiMAX solution. The margins are still negative in remote areas of Band 4, and hence in Band 4 as a whole, as shown in Exhibit 4.10, below. The margins for the Band 4 – Remote geotype continue to be off of the scale.

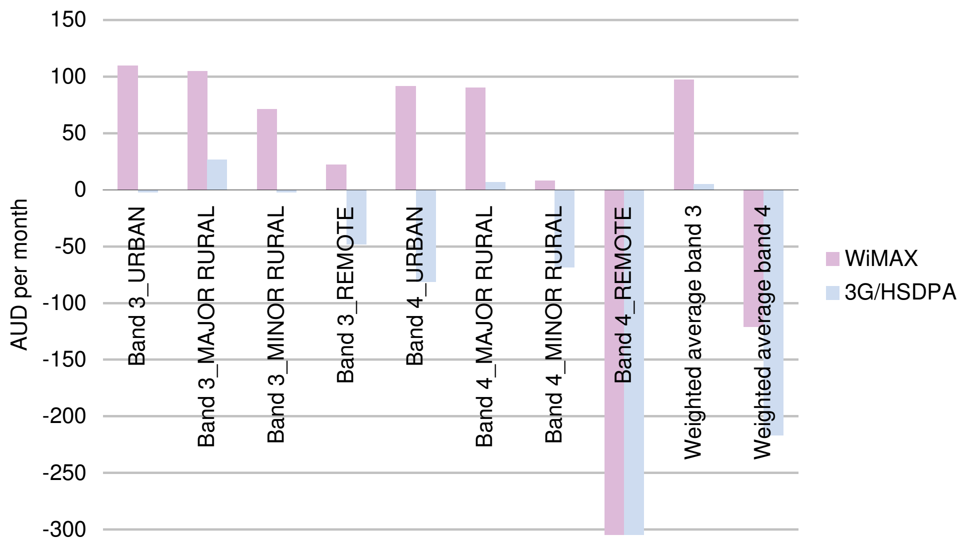

Exhibit 4.10: *Margin per subscriber with a connection subsidy [Source: Analysys] Note: Band 4 – Remote is off the scale*

The margin for 3G, using HSDPA, is just about positive in Band 3, but is negative for the most part in Band 4.

Alternatively, if a voice service is also offered, the business case without subsidy may be positive for WiMAX in Urban and Major Rural areas as well as in Minor Rural areas in Band 3. The margins continue to be negative for Remote areas and in the weighted average case for Band 4. 3G once again has negative margins in most cases although is able to just about break even in Band 3. The results are shown in Exhibit 4.11, below with the results for the Band 4 – Remote geotype once again off the scale.

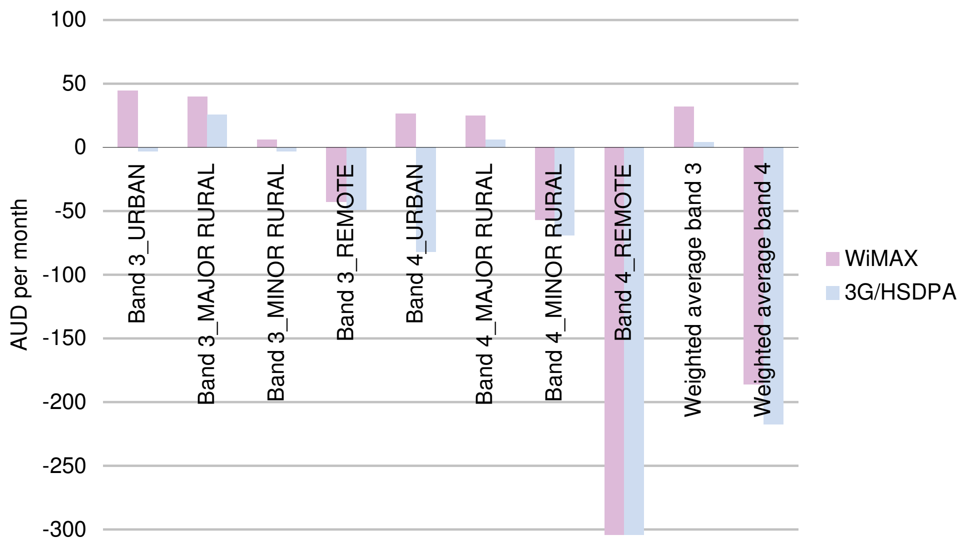

Exhibit 4.11: *Margin per subscriber when a voice service is also offered [Source: Analysys]*

Note: Band 4 – Remote is off the scale

4.2.1 Conclusions

The business case for a new entrant operator is harder to make because it relies on achieving certain economies of scale and scope. However, it may be viable to deliver a bundled service of fixed (and possibly mobile) telephony and broadband access using wireless technologies in the larger population centres in ULLS Bands 3 and 4

WiMAX is again likely to be the most economically attractive solution for broadband access, but for the existing mobile operators there may be advantages in using mobile infrastructure already in place to compete using 3G and later generation mobile technologies, particularly if offered alongside a mobile service.

Some form of subsidy is likely to continue to be necessary to encourage investment. We doubt that Telstra has a significant first-mover advantage in rural and remote areas, and wireless operators may be equally well placed to offer services.