

# Fixed Wireless Broadband: A Global Comparison

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## Executive summary

This report examines the performance of the Australian National Broadband Network's ("nbn") wholesale fixed wireless product against similar wireless products from peer operators around the world. The nbn provides a national wholesale access product for telecoms retail service providers. This includes a fixed wireless TD-LTE network under construction that will cover approximately 600,000 premises, and currently reaches in excess of 268,000 premises as of 30 June 2015.

Twenty-one other operators around the world that offer wireless broadband products were examined. Their performance was examined separately for data allowance, download speed, upload speed, and price per GB of data, and was compared to nbn's fixed wireless product characteristics.

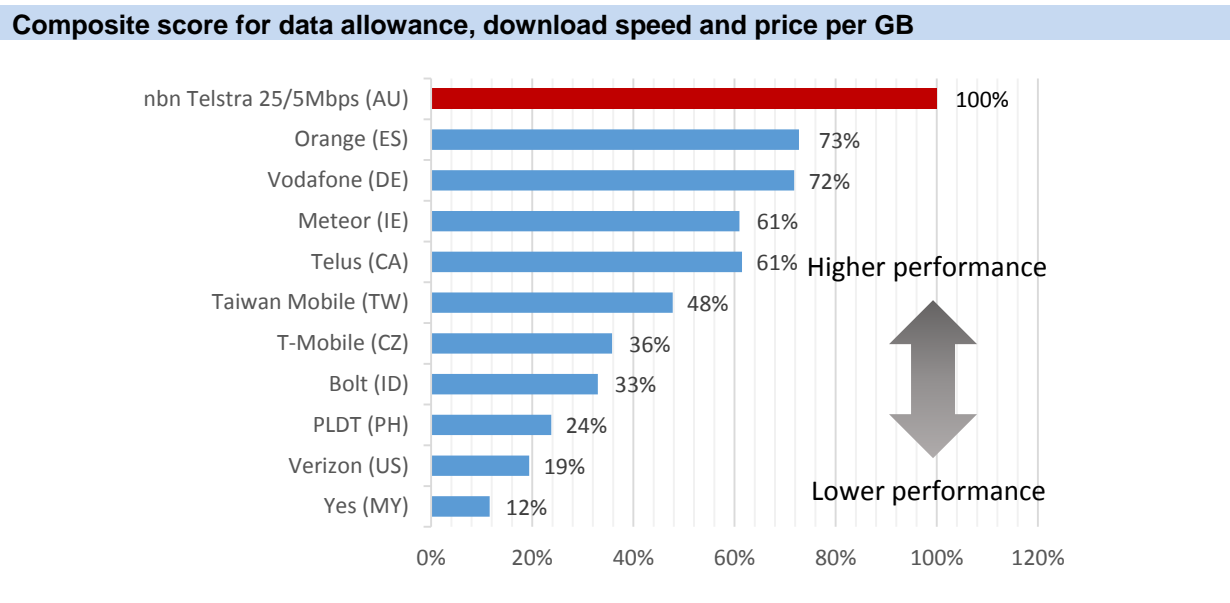
nbn's fixed wireless product performs very strongly against comparable overseas operators. Only one operator was found to match nbn's forthcoming "up-to" 50Mbps download speed. However, nbn was superior to all of its peers on all other indicators of fixed wireless performance by significant margins:

- nbn's data allowance for its existing 25/5Mbps fixed-wireless product (retailed by Telstra) was over seven times higher than its next best international peer, PLDT in the Philippines. Note that nbn data allowances are set by retailers and vary between retail service providers.
- nbn's price per GB for its existing 25/5Mbps product (retailed by Telstra) was more than four times lower than its next best international peer, T-Mobile in the Czech Republic.
- nbn's upload speed performance for its forthcoming "up-to" 50/20Mbps fixed-wireless product was 33% higher than its next best peer, Meteor in Ireland.

This high level of performance shows that the nbn offers very high value to fixed wireless customers:

- nbn's higher data allowances allows nbn to offer customers significantly greater access to high-bandwidth services, particularly video services.
- nbn's high download speed also supports high-bandwidth services such as video. In addition, the greater speed means that multiple applications can be used concurrently by customers in a single household without contention, improving the consistency of application performance.
- nbn's high upload speed will support more symmetric applications such as video conferencing and cloud services, which are important to businesses as well as consumers.
- nbn's affordability makes broadband services a realistic proposition for a wide range of residential and business customers, helping to close the digital divide.

A composite index of data allowance, download speed and price performance was also calculated for nbn and ten other operators. nbn's fixed wireless product clearly outperformed its peers, underlining its technical superiority and affordability.



## Report approach and methodology

The purpose of this report is to examine the performance of wireless broadband solutions around the world, and in particular to compare the performance of the nbn's fixed wireless solutions to global peers.

The report compares nbn's fixed wireless performance to twenty-one other providers of wireless broadband services around the world. A mix of developed and developing countries was examined. The countries and wireless broadband service providers covered were:

- Argentina (SKYMAX)
- Brazil (Vivo)
- Canada (Bell, Telus)
- Czech Republic (T-Mobile)
- Germany (Vodafone)
- Indonesia (Bolt)
- Ireland (3, Meteor)
- Japan (Softbank, UQ Communications)
- Malaysia (P1, Yes)
- New Zealand (Woosh)
- Philippines (PLDT)
- South Africa (Telekom)
- Spain (Orange)
- Taiwan (TWM)
- USA (AT&T, Skybeam, Verizon).

These twenty-one providers are all providing either fixed wireless solutions or providing mobile wireless solutions marketed as substitutes for fixed services in these countries, on a commercial basis. General mobile broadband services that are not marketed as fixed services were excluded because these are not offered as a service like nbn's fixed wireless products.

Since nbn only offers a wholesale product, we have picked two of nbn's retail operators to provide a basis for product and pricing comparison where necessary, Telstra and iiNet.

A variety of access technologies were represented amongst the twenty-one operators. Apart from the TD-LTE technology used by nbn, many operators used FDD-LTE (simply another flavour of LTE). In addition, the two Malaysian and one Argentinean operators used WiMAX, while the New Zealand operator Woosh used TDD-CDMA. In one case, Skybeam in the US, the wireless technology was not disclosed.

The variables chosen for comparison were data allowance, download speed, upload speed and price per GB. These variables were chosen because they have a direct impact on the utility of the broadband service, and are reasonably likely to be reported by operators.

Other variables such as latency were generally not reported and so are not included in the analysis. We chose the highest performance plans from each operator for the purposes of comparison, which also usually offer the lowest price per GB. The data was collected by desk research.

There were some complications in comparing different operators. In cases where a data allowance was clearly stated, those claims were included without further examination. But in cases where the product was claimed to have an “unlimited” data allowance, terms of use and fair use agreements were scrutinised to find limits to data usage; where this was the case, we have assumed that these limits are effectively a data allowance and recorded them as such. Some operators impose no explicit limits or fair use provisions at all (though these operators typically offer low access speeds that limit usage); in such cases, we recorded no data allowance.

Advertising practice for wireless data speeds varies from country to country, with regulators taking a harder line in some places than others. In markets where they are allowed, theoretical claims for download and upload speeds were excluded since they are unlikely to be representative of actual performance. Few products provide the committed capacity that the nbn 25Mbps product does, but where operators quoted “actual” or “average” speeds or something similar, they were recorded. It is likely that this will overstate the performance of nbn’s peers in at least some cases.

All operators reported an advertised price. Price per GB was calculated for those operators for whom we also recorded a data allowance.

As a result of these restrictions, not every variable was reported against each operator. Consequently, when we separately compare nbn’s fixed wireless services to these twenty-one operators for all variables, not every operator is included in each comparison. In each comparison, we note which operators are excluded and why.

For some operators, it was possible to find information on data allowance, download speed and price per GB variables. In these cases, we created a composite index for a comprehensive comparison of the performance of nbn’s fixed wireless service. Upload speeds, being fairly rarely quoted by operators, were excluded from the composite index.

## Fixed wireless benchmarks and nbn performance

### Data allowance

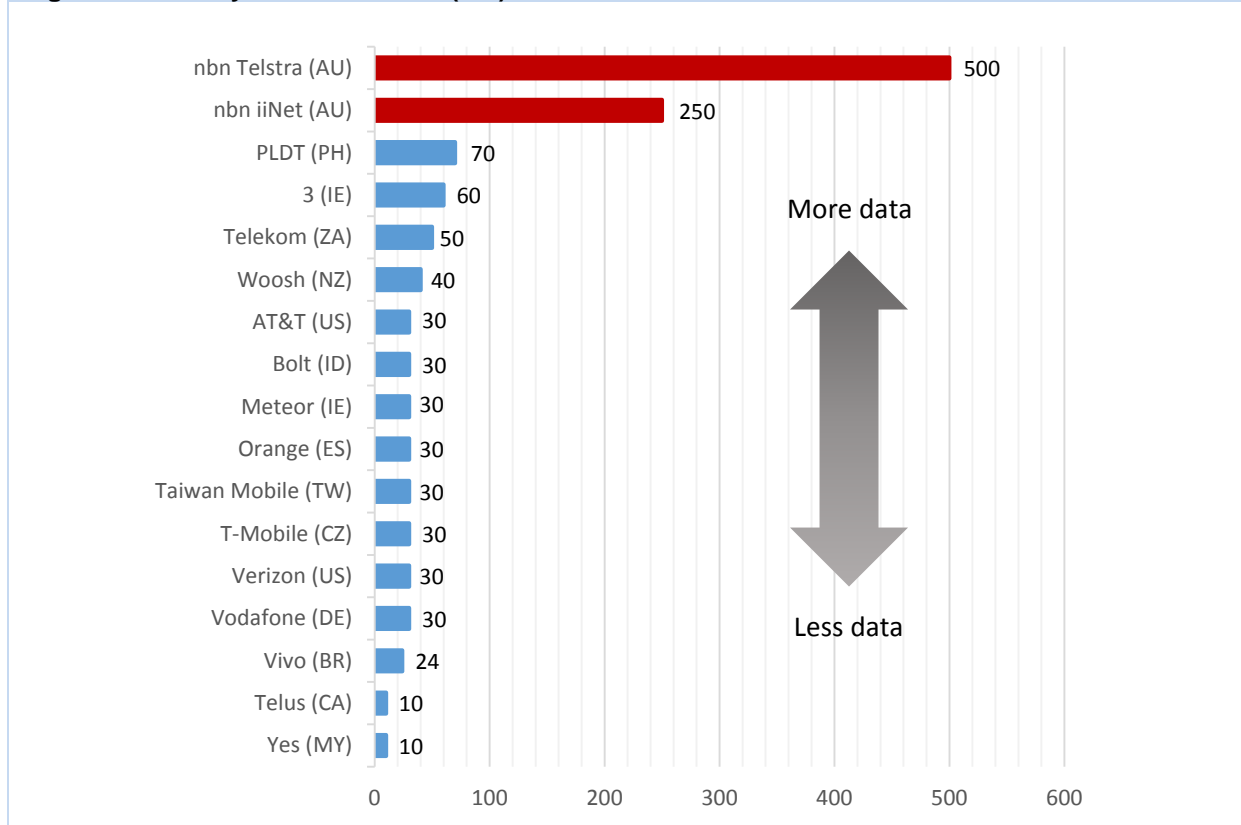
Of the twenty-one operators we examined, thirteen published an unambiguous data allowance. In contrast, Bolt in Indonesia and Telkom in South Africa advertise their respective products as unlimited, but impose fair use limits at 30GB (Telkom imposes this only for “bandwidth-intensive” applications, presumably video). Bolt and Telkom were therefore included at 30GB. A further six operators provided no useful information on data allowances:

- P1 in Malaysia offered unlimited products, but only at 1Mbps and 2Mbps download speed, effectively limiting data usage.
- Skymax in Argentina offers three products all unlimited, but at download speeds of only 1Mbps, 2Mbps and 3Mbps, also limiting usage.
- Bell in Canada does not quote a data allowance, but restricts download speed to only 5Mbps.
- Softbank and UQ Communications in Japan offer an unlimited product, but we did not find a fair use limit. In these cases, no assessment of realistic data allowance could be made, so the operators were excluded.
- Skybeam in the US does not quote a data allowance on its 5Mbps, 10Mbps and 20Mbps download products. When the network is uncongested, the products are effectively unlimited. However, when network congestion occurs, data speeds are throttled once customer data

usage thresholds of 500MB and again at 6GB are passed. In this case, no clear fixed allowance could be identified, so the operator was excluded.

The data allowances for these operators, along with the results for nbn, are displayed in Figure 1. This shows that nbn's 25Mbps download fixed wireless product outperformed the benchmarked operators by a significant margin for data allowance. The data allowance for nbn services reached 500GB per month (Telstra), while its nearest competitor was only 70GB per month. Most of the benchmarked operators were well below this; the majority were under 50GB per month. We were unable to compare nbn's 50/20Mbps product because data allowances have not been announced yet for this product.

**Figure 1: Monthly data allowance (GB)**



The large nbn data allowance makes the nbn fixed wireless product a genuine substitute for many fixed broadband products in the market. nbn's superior result in this benchmark is important because it allows significantly greater access to high-bandwidth services, particularly video services, than most of its international peers.

## Download and upload speed

Unlike the peer operators examined in this report, nbn offers committed capacity to support reliable download and upload speed, based on its purpose-built network optimised for fixed communications. While we have excluded obviously theoretical speed claims, even the more solid claims are often not achieved in reality, or achieved consistently. Nevertheless, we accepted such claims for the purposes of comparison. Effectively, nbn's peers were benchmarked less rigorously than nbn itself.

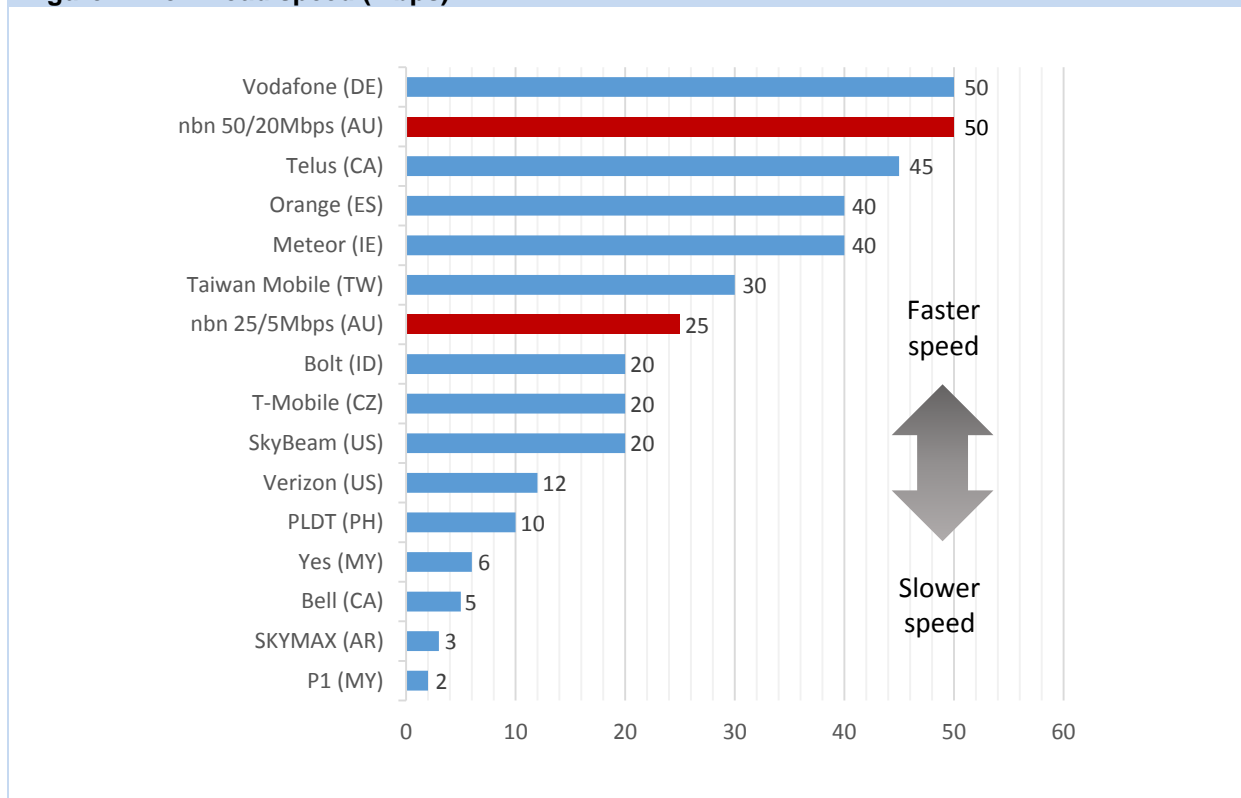
Of the twenty-one operators we examined, thirteen published a clear download speed. In addition, Meteor in Ireland quotes download speeds of 20Mbps to 40Mbps. For the purposes of comparison, we included Meteor at a speed of 40Mbps, to avoid understating their performance. A further seven operators provided no useable information on speed:

- Vivo in Brazil, Woosh in New Zealand, AT&T in the US, and 3 in Ireland all quote data allowances, but no download speeds; it appears that they offer a best effort service. It was impossible to assess speeds in this case, so these operators were excluded.
- Softbank in Japan quotes a speed of “up to 110Mbps”, which is unrealistic and was excluded from the benchmark. UQ Communications was similar, claiming 220Mbps, and was similarly excluded. Telekom South Africa’s service quotes only “theoretical” download speeds of 90Mbps, and was also excluded.

The download speeds for these operators, along with the results for nbn, are displayed in Figure 2. nbn’s fixed wireless download speed is set by nbn, so there was no need to check retail offers. Instead, we used nbn’s forthcoming 50Mbps/20Mbps wholesale product for comparison. This product will exceed the performance of most ADSL products currently in the Australian market.

Figure 2 shows that nbn’s 50/20Mbps product outperforms all of the benchmarked operators except Vodafone in Germany. nbn’s existing 25Mbps product is also included for comparison. The download speed differences between operators were generally less than for data allowances; this is probably because high data speeds are less expensive for operators to deliver than large data allowances.

**Figure 2: Download speed (Mbps)**



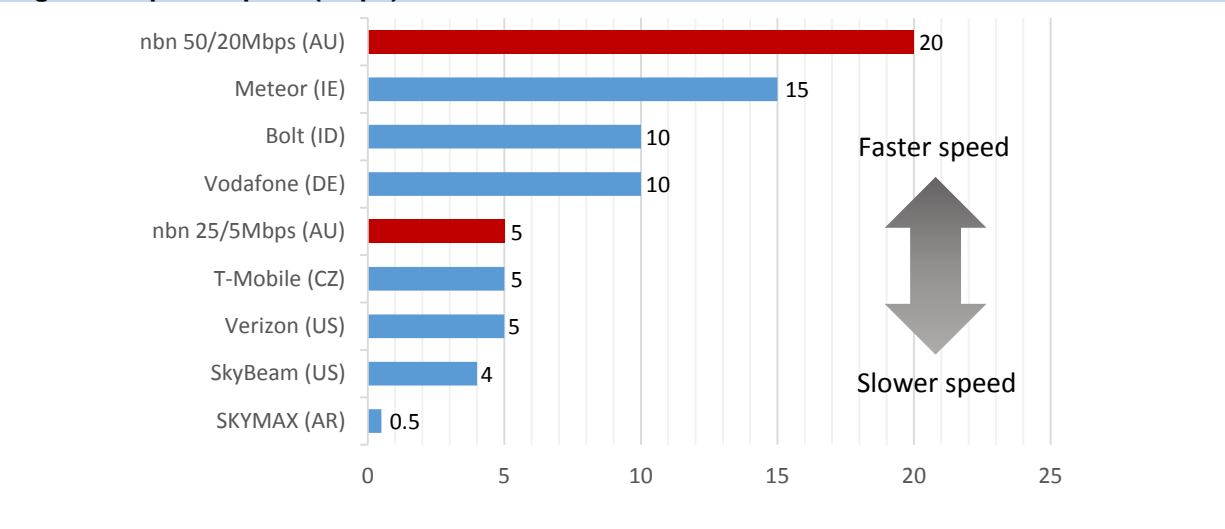
Again, the nbn fixed wireless products perform at a level that makes them genuine substitutes for fixed broadband products. nbn’s speed performance is important because, like nbn’s large download

allowance, it supports high-bandwidth services such as video. In addition, the greater speed means that multiple applications can be used by customers without contention, improving the consistency of application performance.

We also looked at reported upload speeds. Only seven of nbn's peers reported an upload speed at all. In addition, Meteor in Ireland quotes upload speeds of 10Mbps to 15Mbps. For the purposes of comparison, we included Meteor at a speed of 15Mbps, to avoid understating their performance. Telekom in South Africa reports a 25Mbps upload speed, but this is described as theoretical and was excluded from the comparison.

nbn's fixed wireless product download speed is set at the wholesale level, so there was no need to check retail offers. Again, we used nbn's forthcoming 50Mbps/20Mbps wholesale product for comparison, as well as the existing 25/5Mbps product. The results for upload speed are displayed in Figure 3. In this case, the 25/5Mbps nbn product is in the middle of the field, while the 50/20Mbps nbn product ranks as a clear leader.

**Figure 3: Upload speed (Mbps)**

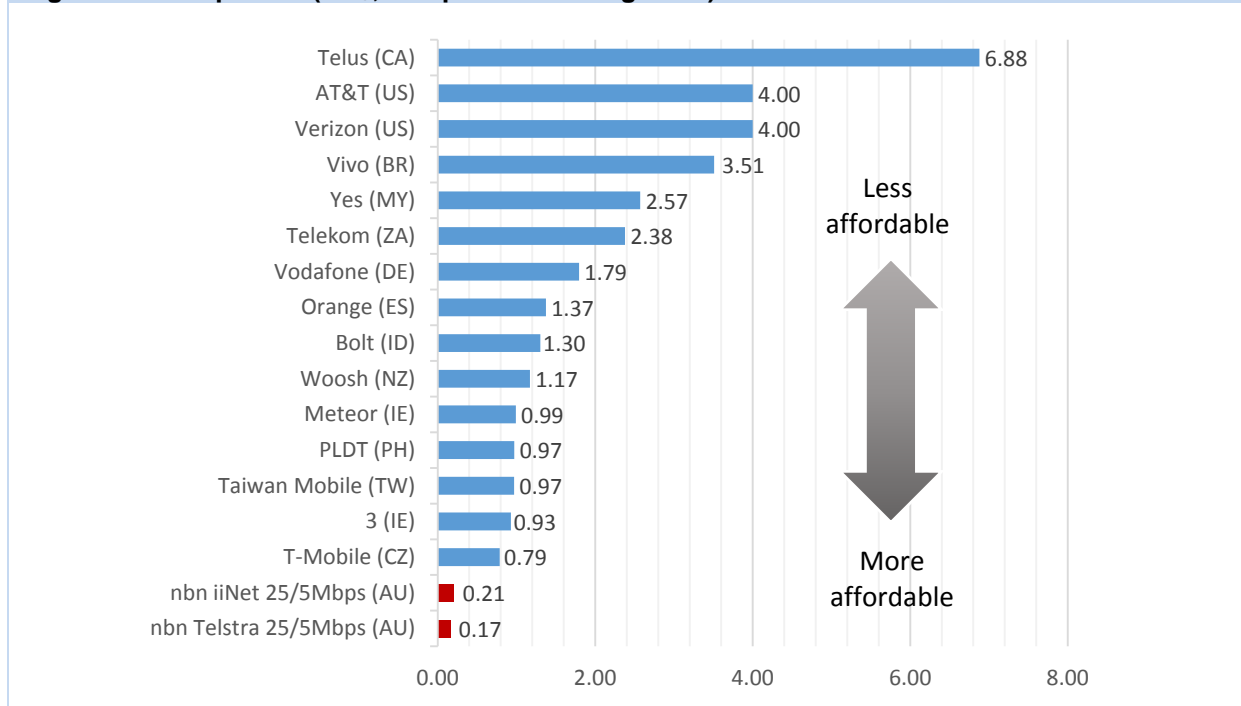


nbn's fixed wireless upload speed will allow the use of more symmetric applications such as voice conferencing and cloud services which are important to businesses. After the 50/20Mbps product is launched in the coming months, nbn plans to strengthen performance by offering service level agreements for business in the future.

## Price per GB

As noted above, of the twenty-one operators we examined, thirteen published data allowances, while Bolt in Indonesia and Telekom in South Africa advertise a fair use limit. These fifteen operators all report retail prices, as do nbn retailers Telstra and iiNet for the current 25/5Mbps product. In all cases, we used the highest data allowance product to make the comparison. Using a Composite Exchange Rate, we calculated price per GB for data, to benchmark the affordability of different operators. The results are in Figure 4.

**Figure 4: Price per GB (US\$, composite exchange rate)**



nbn was the lowest-cost service provider on a per GB basis. There was significant variation in the prices per GB reported, ranging from US\$6.88 from Telus down to US\$0.17 for nbn (Telstra 500GB data allowance). Both Telstra and iiNet also included a voice service in their offer price, so this measure overstates their price per GB for the underlying data connection.

This benchmark is important because it is an indicator of the affordability of broadband services for a wide range of household and business customers.

## Composite performance

Ten of nbn’s peer operators gave usable information about all three of data allowance, download speed, and price per GB. In these cases, we were able to form a composite index of their technical and affordability performance compared to nbn’s fixed wireless product.

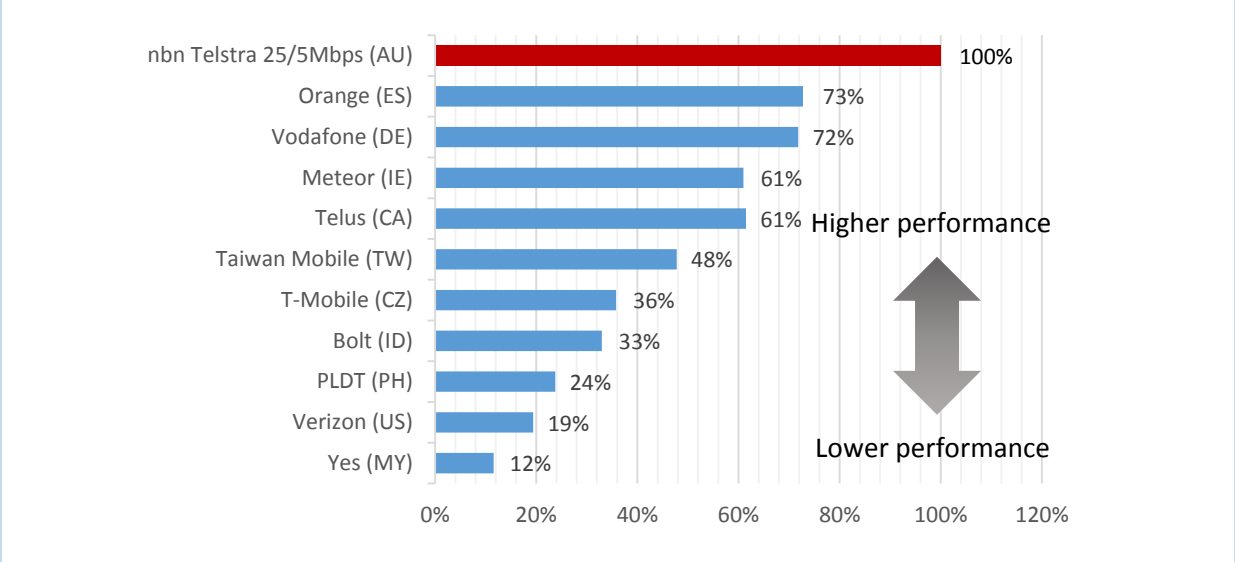
nbn’s technical performance was measured based on its 25/5Mbps fixed wireless product with a 500GB download allowance. To measure nbn’s affordability, we used the price per GB of Telstra’s 500GB allowance product. The forthcoming 50/20Mbps fixed wireless product was not used because data allowances and retail prices for this product have not been announced.

We calculated the performance of all of the other operators as a percentage of these three benchmarks:

- Data allowance was calculated as a percentage of iiNet’s nbn 250GB data allowance.
- Download speed was calculated as a percentage of nbn current 25Mbps offer.
- Price per GB was calculated as a percentage of the inverse of nbn’s average price per GB of US\$0.19, so that higher prices scored lower.

These three percentages were then added to give a composite score for that operator, and divided by three to normalise nbn’s performance to 100%. The results are displayed in Figure 5.

**Figure 5: Composite score for data allowance, download speed and price per GB**



This analysis demonstrates the very strong overall performance of nbn’s fixed wireless solution, which combines high technical performance with high levels of affordability. This performance will be strengthened when nbn launches its 50/20Mbps fixed wireless product in the coming months.

## Conclusion

In conclusion, this benchmarking and comparative performance exercise demonstrates that nbn's fixed wireless product outperforms international peers across a range of metrics.

The nbn product is technically superior to its peers, offering high download allowances and high speeds compared to other wireless products. This allows nbn fixed wireless products to support a range of applications, particularly bandwidth-intensive video applications, which would not be possible on many peer networks. This superiority will be entrenched as new LTE products are developed and launched in the future. The LTE standard provides for services over 100Mbps, so there is headroom for further development in the future.

In addition, nbn's fixed wireless products are made available at affordable prices. The current 25/5 Mbps product is offered at very competitive prices, and if normal industry practice is adopted, the new and more capable products due to be launched in 2015 (such as the 50/20Mbps product) will offer even lower prices per GB than the current ones. nbn's TD-LTE technology can support future download speeds well in excess of 100Mbps, and the TD flavour of LTE can support higher and more symmetric upload speeds than other wireless technologies.

This will position rural Australia to gain new access to a host of applications at affordable prices, closing the gap between urban and rural Australia.