



ECONOMIC IMPACT ANALYSIS

nbn network investment plan

SEPTEMBER 2020

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This report has been commissioned by nbn co and prepared by AlphaBeta Australia. AlphaBeta Australia is a research firm with offices in Sydney, Canberra and Melbourne. It specialises in combining advanced analytical techniques and innovative data to generate new insights and fresh perspectives on the challenges facing business and government. AlphaBeta Australia is part of Accenture Strategy.

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Executive summary

This report analyses the economic impact of nbn's \$4.5 billion network investment plan, which will bring close-to-gigabit speeds to up to 75% of households and businesses in its fixed-line network by 2023. It uses CGE modelling to estimate the benefits to national productivity.¹

The investment is a significant opportunity for Australia. The build will create a total of 25,000 jobs across the economy in two years, including almost 10,000 in regional Australia. Jobs will be created in a range of industries including construction, professional services, retail and wholesale trade.

In the longer term, the network investment plan will enable productivity gains across the economy, resulting in an additional \$6.4 billion GDP uplift annually by 2024. Up to 12,000 new businesses are expected to be created due to the availability of faster internet across the country. Regional businesses will benefit particularly from cost-effective, business-grade fibre services in new Business Fibre Zones.

Overall, our analysis shows the network investment plan to be a high-impact and timely stimulus measure as Australia recovers from the economic impact of COVID-19. By investing in faster, world leading broadband infrastructure, Australia can improve its global competitiveness, laying the foundations for future economic success.

1. See Appendix for details on methodology

Impacts of the nbn network investment plan



25,000 new jobs

by FY22, including almost **10,000** in regional Australia



\$6.4 billion GDP uplift

annually by FY24, with **\$1.5 billion** from regional Australia



12,000 new businesses

by FY24, including **2,800** in regional Australia



Business Fibre Zones

240 including **85** in regional areas to enable growth and foster local innovation

1

Overall impact on metropolitan and regional economies

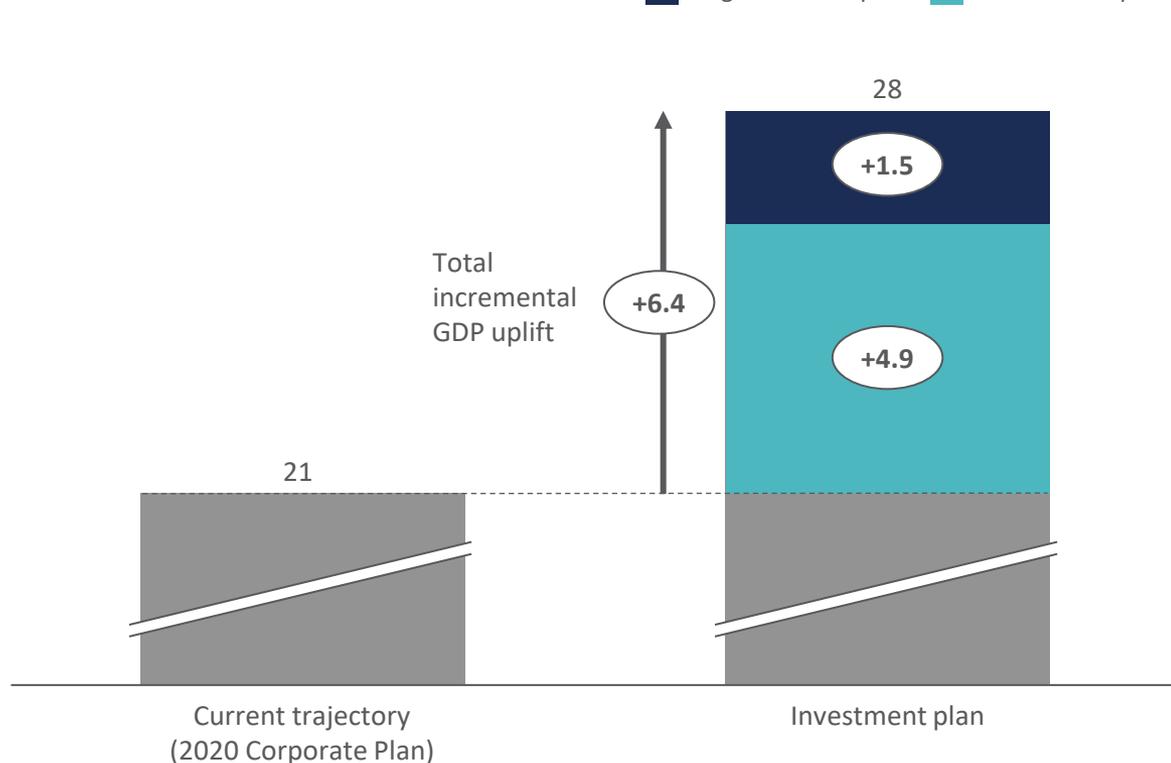
Investment will deliver a \$6.4B GDP annual uplift and 25,000 new jobs

Productivity gains from nbn's network investment plan could enable an additional \$6.4B of GDP, including \$1.5B in regional Australia

Additional GDP estimated to be enabled by the nbn by 2024 with network investment plan

Estimated impact of nbn compared with the 'no nbn' reference case in the stated financial year (\$B p.a.)

■ Regional GDP uplift ■ Metro GDP uplift



- The nbn network investment plan will enable **productivity gains across the economy** and result in a \$6.4B incremental annual GDP uplift. Consumers and businesses will benefit from faster internet and the ability to access a greater range of digital goods and services
- There is a significant benefit for Australia's regional economy with **\$1.5B of the GDP impact attributable to the regions**. The plan will bring the fastest nbn plans to **950,000 regional families** who will benefit from the upgrade and **455,000 regional businesses** who would be able to access close-to-gigabit speeds for no upfront cost

NOTES:

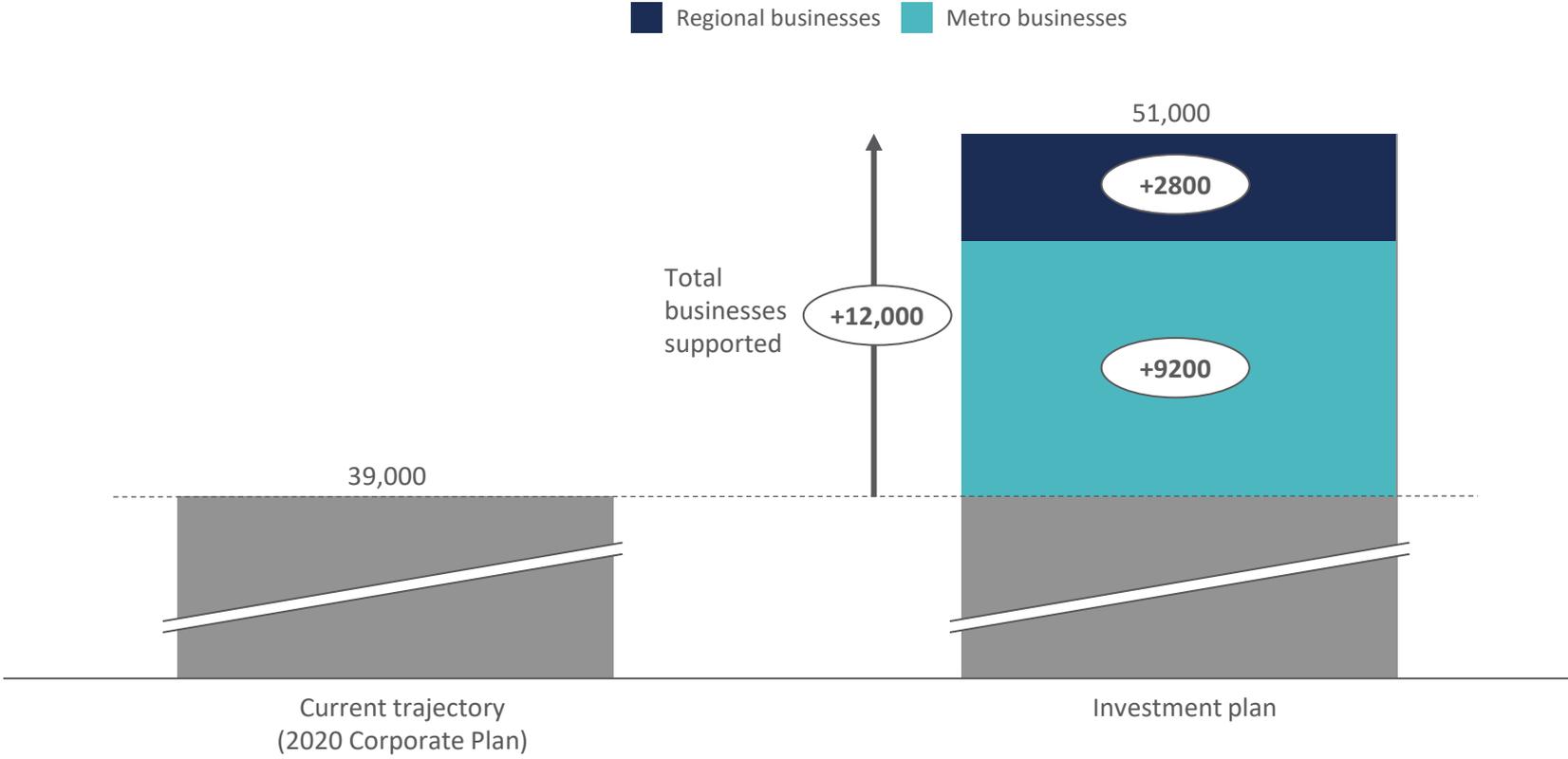
- Numbers are expressed in net terms as additional GDP (relative to a "no-nbn" scenario) and exclude the capital investments and financing associated with the nbn reform itself
- Reflects higher growth due to completion of rollout, and the adoption of higher speeds, and the accumulation of productivity and labour force impacts

SOURCE: Computable general equilibrium (CGE) modelling performed by Cadence Economics & AlphaBeta

Up to 12,000 new businesses could be created as a result of new network investment

Australian businesses supported by the nbn in 2024

Estimated impact of nbn compared with the 'no nbn' reference case in the stated financial year (number of businesses)



Methodology note: The number of businesses supported was estimated with the following method:

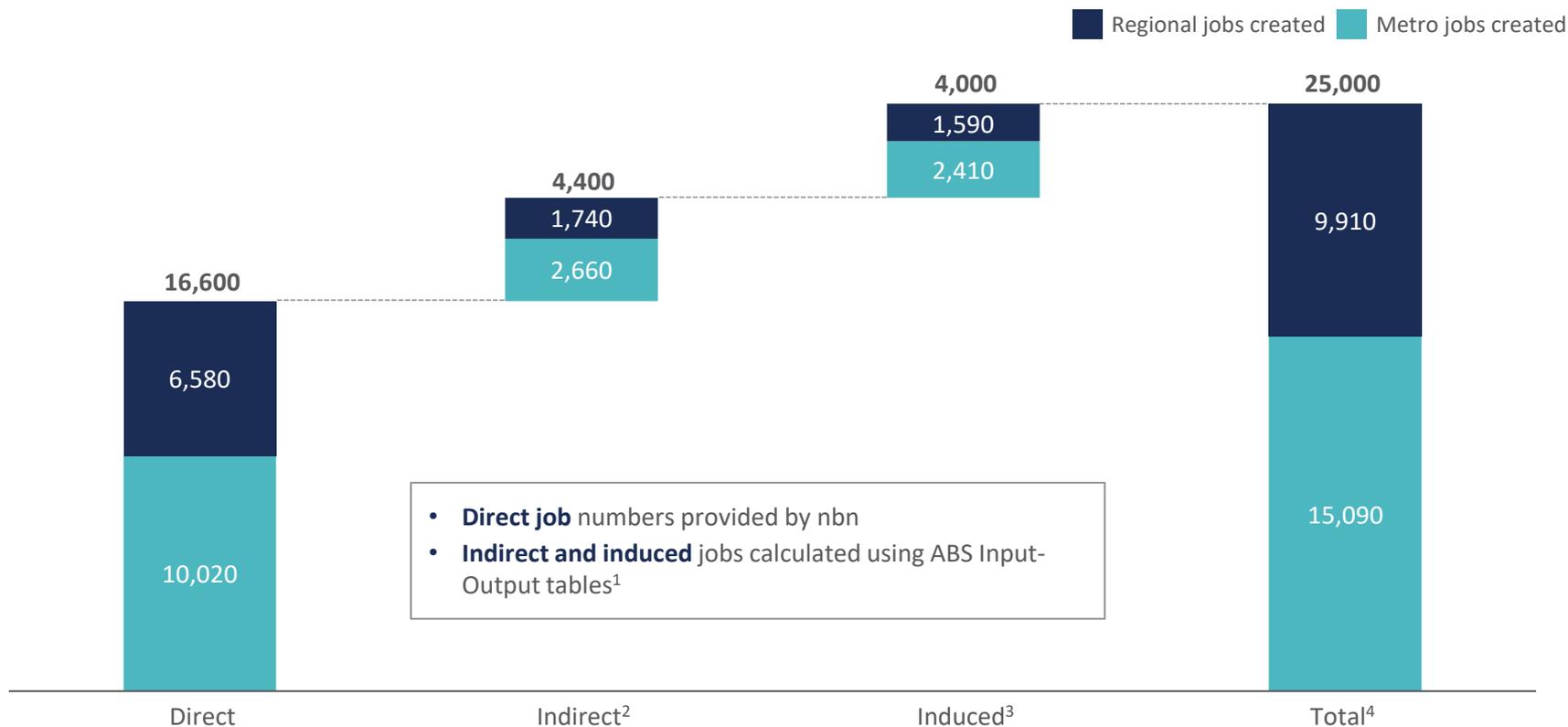
- The number of businesses per \$1m of changed GVA was calculated at regional / metro level using ABS business count data
- GDP uplift figures were taken from the CGE model, split by regional and metro impact
- Businesses supported figure was then weighted for industries where GVA would be most highly concentrated (e.g. ICT, finance)

SOURCE: Computable general equilibrium (CGE) modelling performed by Cadence Economics & AlphaBeta, ABS business counts, ABS Australian industry

The construction effort will provide a short-term economic stimulus, creating 25,000 jobs nationally, including close to 10,000 in regional areas

Direct, indirect and induced jobs created through nbn network investment plan

Peak jobs created by additional nbn investment in FY21-22



NOTES:

1. Jobs created numbers are computed through analysis of ABS Input-Output analysis of the program spending – see Raynor & Bishop (2013). Estimates are based on the assumption that 80% of spend is on labour and 20% materials. Labour split is 80% network construction, 10% telco technicians and 10% other professional services. REMPLAN calculator was used to validate indirect and induced jobs numbers.

2. Indirect jobs are those further in the supply chain e.g. building companies need to hire drillers or excavators from equipment hire companies.

3. Induced jobs are those supported by the increased demand from individuals in newly created direct or indirect jobs.

4. The total direct, indirect and induced jobs reported here are jobs associated with investment upgrade and should be compared separately from the jobs enabled in the economy by faster internet

SOURCE: nbn, AlphaBeta analysis, REMPLAN

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Impact of Business Fibre Zones

Businesses will benefit from availability of business-grade fibre

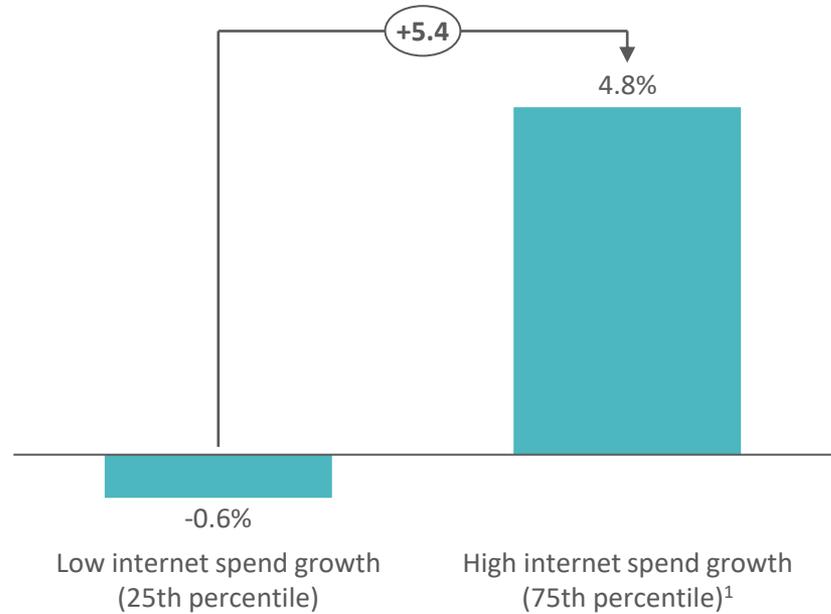
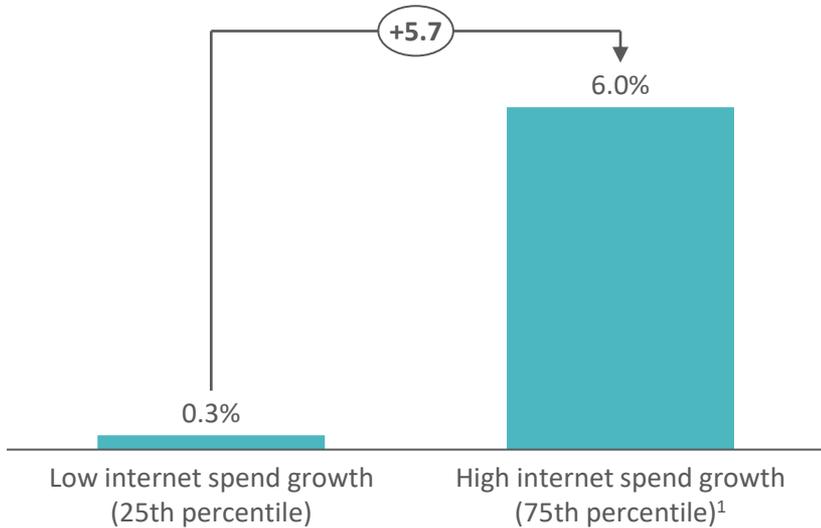
Business Fibre Zones will provide access to business-grade fibre services and will help businesses achieve revenue and jobs growth

Small businesses with higher internet spending have higher revenue growth (analysis of Xero sample)

Revenue growth (%), 2015 -2017

Small businesses with higher internet spending have higher employment (analysis of Xero sample)

Employment growth (%), 2015 -2017



- **Business Fibre Zones are business precincts** that will be established in regional or metropolitan Australia with nbn fibre network installed. They will provide businesses with fast, cost-effective business-grade fibre connections. There will be 240 zones including 85 in regional areas
- AlphaBeta research shows that small businesses in the 75th percentile of technology spend are seen to grow revenue **5.7ppt faster**, and jobs **5.4ppt faster**, than those in the 25th percentile. This result is true of metro and regional businesses.
- By providing **fast, cost-effective business-grade connections**, Business Fibre Zones might replicate the benefits of increased internet spend without increasing costs to business.
- Regional businesses are expected to be the biggest beneficiaries; many will be able to access business-grade broadband at the **same pricing as CBD businesses** for the first time.

NOTE: SOURCE: AlphaBeta, Xero, nbn, Connecting Australia: How technology is levelling the playing field for small business, 2019

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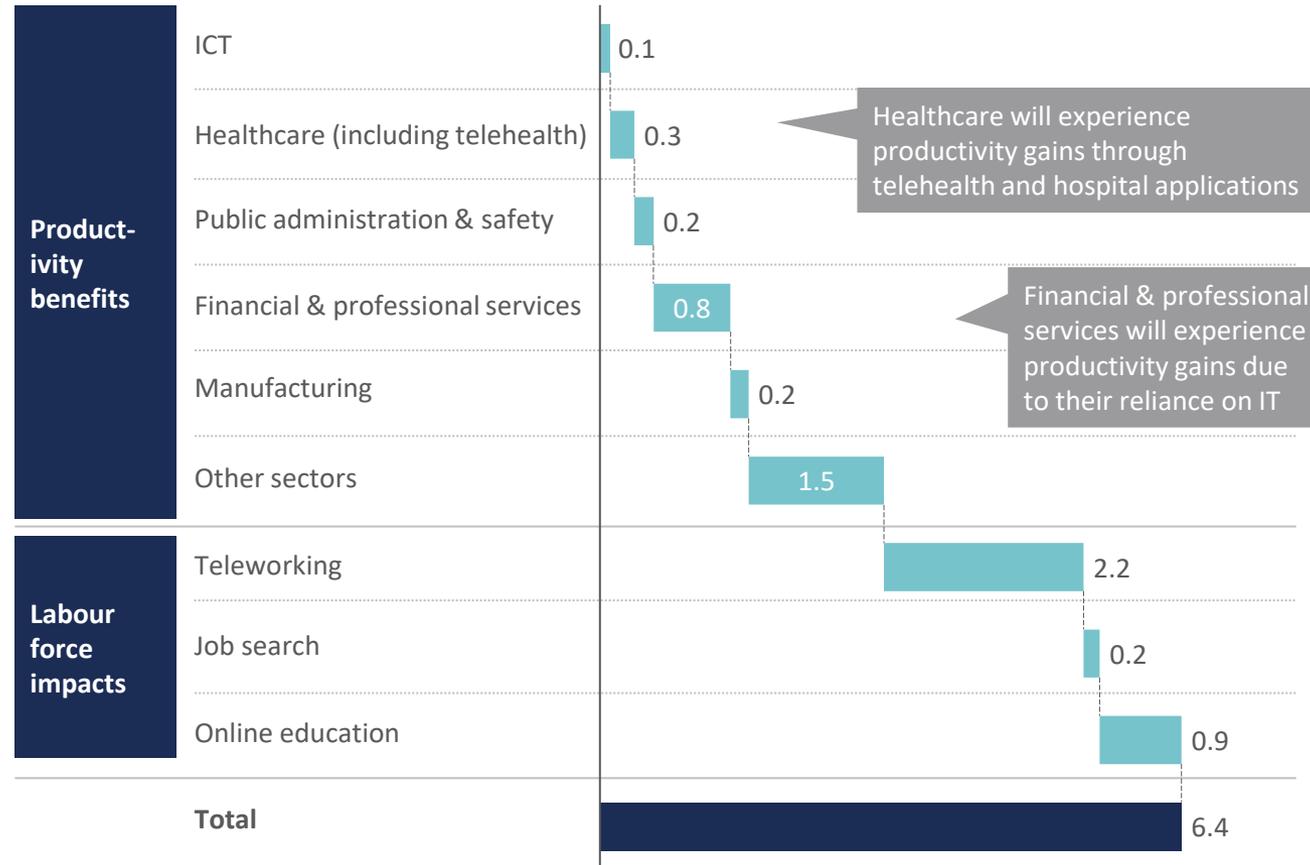
Impact on industries

Industry-level analysis of job creation and productivity gains

Productivity gains will be largest in IT-heavy sectors like finance and professional services

Additional GDP estimated to be enabled by nbn network investment plan

Additional GDP delivered in 2024 by driver (\$B p.a.)



Healthcare will experience productivity gains through telehealth and hospital applications

Financial & professional services will experience productivity gains due to their reliance on IT

Industries benefit from the nbn network by improving productivity through higher internet speeds.

The productivity benefits vary by industry because:

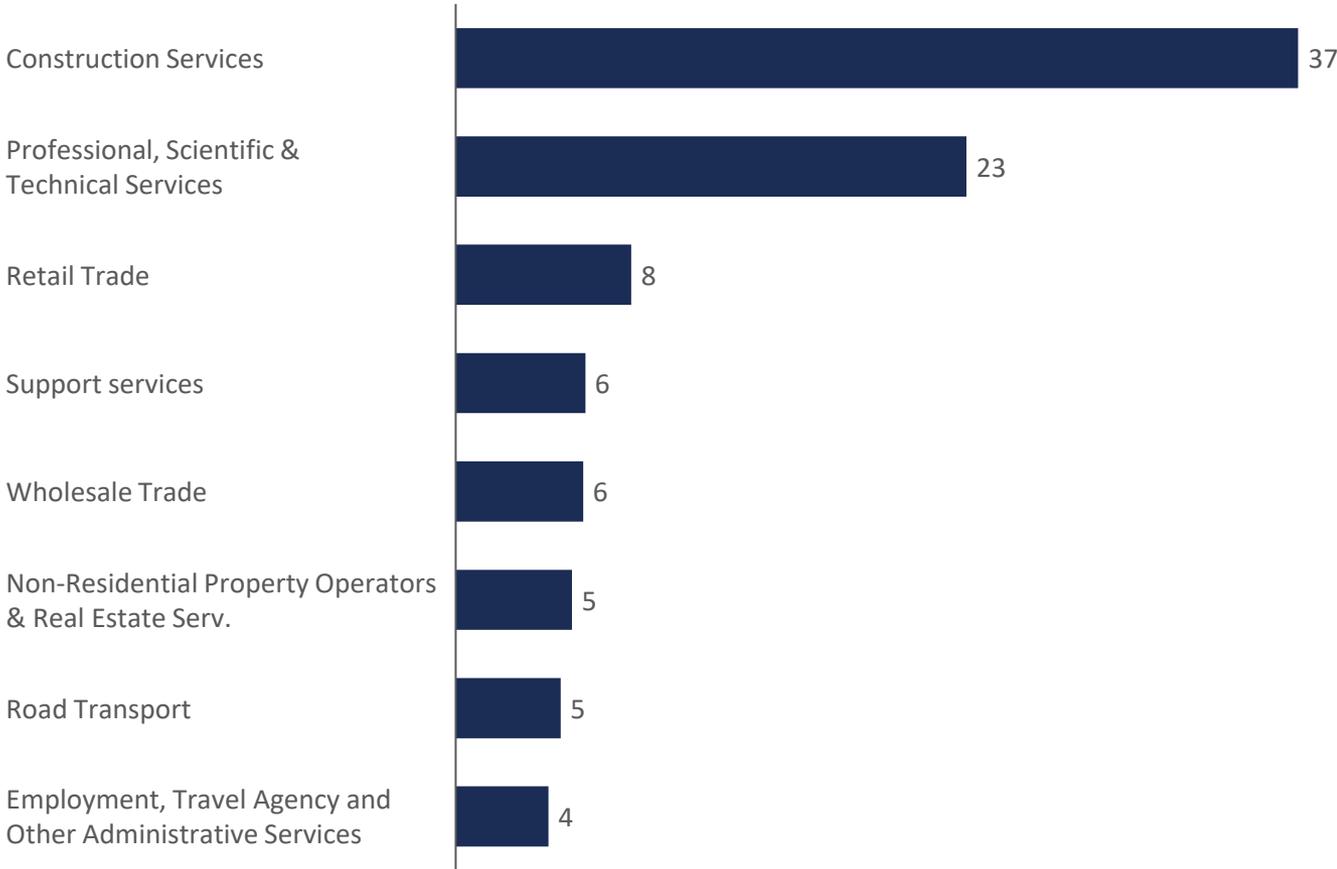
1. Industries have **different levels of reliance** on IT (i.e. share of costs in IT, % of business in an industry using IT).
2. **Some industries were less served than others** by IT than others before the nbn network investment plan: e.g. their workforces are in regions with previously lower average speeds.

NOTES:
 • Numbers are expressed in real, net terms, as additional GDP and exclude the capital investments, financing and employment associated with the nbn rollout itself.
 • While there may be other shocks caused by the nbn, these are treated as endogenous in the model.
 • Productivity shocks to the ICT sector will also flow through to other industries that purchase inputs from ICT (the CGE allows for these interdependencies between industries). See Appendix for methodology.

SOURCE: AlphaBeta analysis

Network construction will indirectly create jobs in a range of industries, including many affected by the economic downturn

Industries with the most indirect jobs created due to nbn network investment plan
Indirect jobs created due to additional investment, FY20-21 to FY23-24 (% of total jobs)



Indirect jobs are those **not directly involved** in construction but that provide inputs – for example, equipment hire workers employed to supply heavy machinery to nbn builders.

The investment will create indirect jobs in a range of industries, **including construction, retail and wholesale trade**, which have struggled as a result of the economic downturn.

SOURCE: nbn, AlphaBeta analysis, REMPLAN

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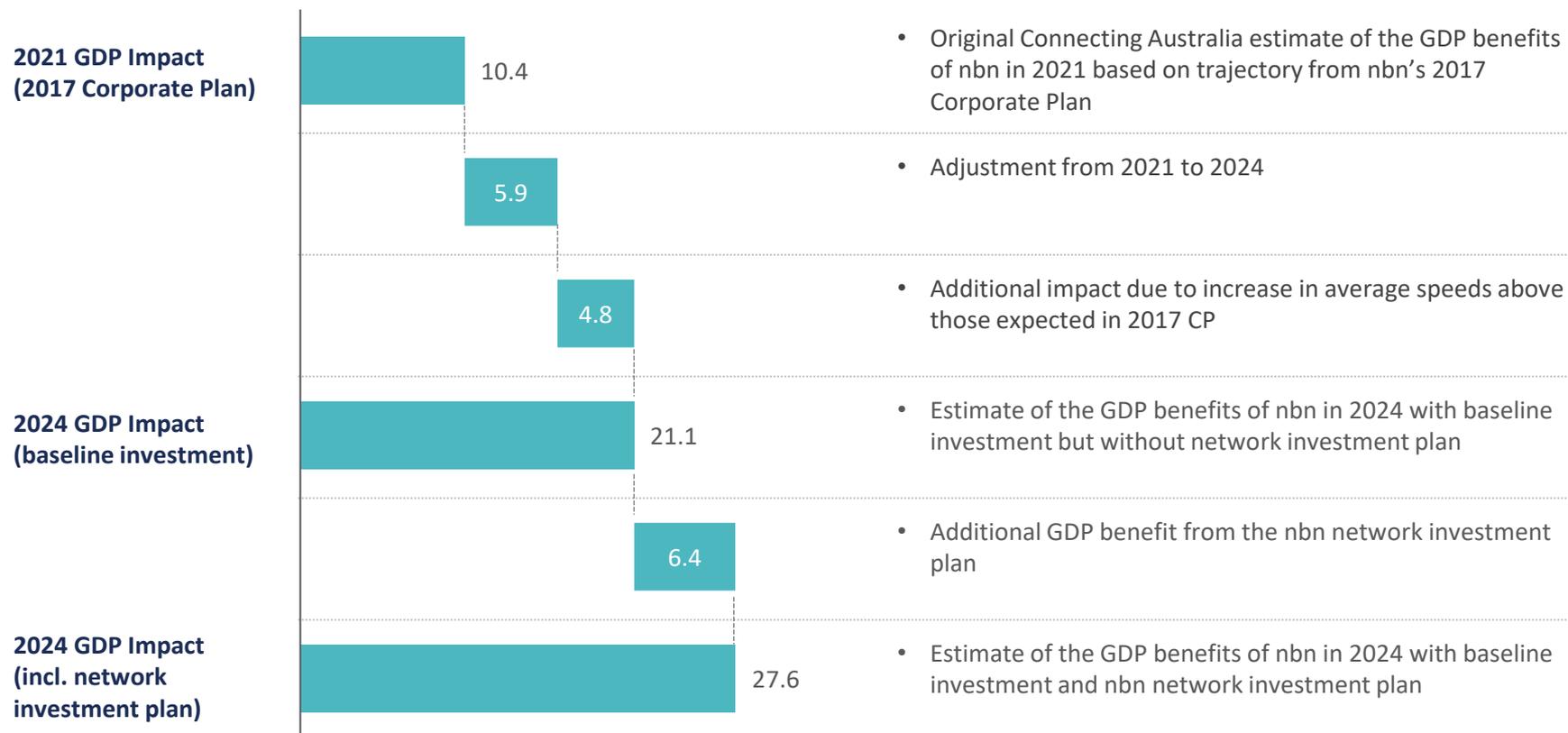
Total impact of the nbn network

New investment will increase total GDP impact to \$27.6 billion a year

nbn's network investment plan will see the network's overall GDP impact reach \$27.6 billion a year by 2024

Additional GDP estimated to be enabled by the nbn

Estimated impact of nbn compared with the 'no nbn' reference case in the stated financial year (\$B p.a.)



NOTES:

- Numbers are expressed in net terms, as additional GDP (relative to a 'no-nbn' scenario) and exclude the capital investments and financing associated with the nbn reform itself
- Reflects higher growth due to completion of rollout, and the adoption of higher speeds, and the accumulation of productivity and labour force impacts

SOURCE: Computable general equilibrium (CGE) modelling performed by Cadence Economics & AlphaBeta

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Appendix

A computable general equilibrium (CGE) model was used to estimate the economic impact of nbn's network investment plan

Type of impact

Type of impact		Outputs	Notes & methodology
Total economic impact 	Macro-economic impact 	General equilibrium impact of nbn: <ul style="list-style-type: none"> • GDP uplift • Employment uplift 	<ul style="list-style-type: none"> • Computable general equilibrium (CGE) model of the Australian economy • Shocks introduced to industry productivity, labour supply and investment • Shock inputs informed by external literature, the survey and analysis of Census data
	Direct Impact 	Partial equilibrium impact of nbn: <ul style="list-style-type: none"> • Direct jobs resulting from nbn's capital spend • Capex during construction phase 	<ul style="list-style-type: none"> • These investments would create 16,600 direct jobs over the next 12-24 months

The model estimates the effect of improved broadband on the productivity of each industry as well as the effect on labour markets

Type of shock	Impact of nbn	Relevant variables ¹	Impact on variables
Productivity uplift by industry	<ul style="list-style-type: none"> Uplift in average broadband speed estimated based on: <ul style="list-style-type: none"> ABS & OECD data on the distribution of broadband users across speed brackets nbnco projections of the wholesale speed tier mix out to 2024 Reduction in the proportion of households without internet access based on: <ul style="list-style-type: none"> Department of Communications estimates of the % of households without access in 2013 nbnco rollout & activation rate projections 	<ul style="list-style-type: none"> Primary factor productivity by industry 	<ul style="list-style-type: none"> For every doubling of speed, GDP increases by 0.3% (Ericsson & Arthur D. Little, 2013)² For every 10 ppt increase in internet penetration, GDP increases by 0.25% (Koutroumpis, 2009)³ These steady-state GDP impacts were converted to productivity shocks via the CGE model using a two-stage estimation approach Impact apportioned across industries based on an index of three components
Labour market effects	Teleworking	<ul style="list-style-type: none"> Additional number of people working primarily from home obtained from Census data analysis (Adjustment made using survey to reflect additional people working from home (but not primarily from home)) 	<ul style="list-style-type: none"> Labour force (in FTE terms) <ul style="list-style-type: none"> Additional hours worked per person as a result of teleworking estimated from survey results Hours worked converted to FTE basis for input to model
	Online education	<ul style="list-style-type: none"> Additional people studying online and the share who would not have studied otherwise obtained from survey results Adjustment made using Department of Education data to isolate qualifications only (as opposed to informal courses or MOOCs) 	<ul style="list-style-type: none"> Labour force (in FTE terms) Economy-wide labour productivity <ul style="list-style-type: none"> ABS data on labour market outcomes (hours worked and earnings) used to determine impact of holding a qualification Hours worked converted to FTE basis for input to model Increased earnings applied as a labour productivity shock
	Online job search	<ul style="list-style-type: none"> Additional number of people engaging in online job search obtained from survey results 	<ul style="list-style-type: none"> Labour force (in FTE terms) <ul style="list-style-type: none"> Using online job search reduces job search time by 25% (Kuhn & Mansour, 2011)⁴ Combined with ABS data on the number of unemployed people and average time spent out of work to arrive at additional hours worked in FTE terms

¹ Refers to the variables impacted exogenously by the introduction of the shock

² Ericsson & Arthur D. Little (2013) "Socioeconomic Effects of Broadband Speed"

³ Koutroumpis (2009) "The economic impact of broadband on growth", as cited in ITU (2012) "Impact of Broadband on the Economy"

⁴ Kuhn & Mansour (2011) "Is Internet Job Search Still Ineffective?", IZA Discussion Paper No. 5955

Industry-specific productivity shocks were introduced into the model to estimate the network investment plan's impact on industry sectors

- **Apportioning the productivity impact of higher speeds across industries:** A top-down approach was taken to allocate the overall impact of firm productivity gains across industries at the ANZSIC 1-digit level. An evenly-weighted index of three components was constructed:
 - **Business use of IT:** Based on ABS data on the share of firms using IT for a range of purposes.
 - **Share of costs attributable to the ICT sector:** Based on the ABS Input-Output tables. The index captured both the current share of costs attributable to the ICT sector and the growth in this share over time.
 - **Degree to which industry was underserved pre-nbn:** Some industries were more underserved by IT than others before the nbn: e.g. their workplaces are in regions with previously low average speeds.
- **Building in a lag:** A lag was applied between the change in speed and internet access and the change in productivity. This reflects that it takes time for businesses to change their processes and/or invest in new equipment after experiencing an improvement in broadband speed or availability.
- **Share of capital stock:** Note that an additional adjustment was made when entering the index into the CGE model to reflect the share of each industry's capital stock that can be affected by an improvement in broadband. The main implication of this is that returns to land and natural resources are not affected, meaning that the productivity gains accruing to certain industries (particularly agriculture and mining) are lowered.
- **Tele-Health:** Specific productivity shocks introduced in health through tele-health including additional take up of tele-health and increased labour productivity in the health sector
- **Deriving primary factor productivity shocks:** The CGE model was used to convert the steady-state industry-specific GDP impacts derived above into a set of primary factor productivity shocks, which can be used in the estimation.

The economic value estimates from this study are within bounds of previous studies of the nbn

Study	Model parameters	Results from study	Comparison from this study ¹	Key reasons for difference
Access Economics (2009) “Impacts of a national high-speed broadband network”	<ul style="list-style-type: none"> Scenario 1 – Carrier Grade Option: speeds of 12 Mbps; completed by 2016; FTTN 	<ul style="list-style-type: none"> NPV in GDP terms of A\$9.5bn from 2008-2020 (Scenario 1) in 2008 dollars 	<ul style="list-style-type: none"> NPV in GDP terms of A\$27bn from 2011-23 under the Corporate Plan projections for speed uptake 	<ul style="list-style-type: none"> The 2009 study assumed nbn speeds of only 12Mbps – below those that are now expected to be delivered Updated literature results used in parameterising the shocks
University of Melbourne, Centre for Energy Efficient Telecomms (2015) “Economic benefit of the NBN”	<ul style="list-style-type: none"> Multi-technology mix as published by nbnco at June 2014 <ul style="list-style-type: none"> For FTTN: assume 25-100 Mbps For fixed wireless: assume 10-25 Mbps 	<ul style="list-style-type: none"> Boost to long-term real GDP (in 2025) of 1.8% p.a. 	<ul style="list-style-type: none"> Boost to 2025 real GDP growth of 1.1% under the Corporate Plan projections for speed uptake 	<ul style="list-style-type: none"> Use of survey provides a more accurate perspective on shock magnitudes (CEET paper based on public sources) Different literature chosen to inform the marginal economic impact of each shock

1. Comparable metric, calculated using figures from this study.

SOURCES: Access Economics, University of Melbourne, AlphaBeta analysis

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