

# DEFINING A BROADBAND ASPIRATION: HOW MUCH DOES BROADBAND MATTER AND WHAT DOES NEW ZEALAND NEED?

September 2007

[www.nzinstitute.org](http://www.nzinstitute.org)

This document is being released in draft form to stimulate discussion of these issues and in order to solicit feedback before the Institute's final report is released. We welcome feedback or comments on the analysis and arguments to [broadband@nzinstitute.org](mailto:broadband@nzinstitute.org)

# THE NEW ZEALAND INSTITUTE HAS COMMENCED A TWO-PART PROJECT TO DEVELOP A BROADBAND STRATEGY FOR NEW ZEALAND

	Questions	Outputs
<p><b>Setting the context</b> <i>(Complete)</i></p>	<p><i>How can New Zealand most effectively compete in global markets?</i></p>	<ul style="list-style-type: none"> <li>• ‘So far yet so close’, New Zealand Institute discussion paper released in March 2007</li> <li>• ‘Creating a weightless economy: Positioning New Zealand to compete in the global economy’, presentation released in September 2007</li> </ul>
<p><b>Part One</b> <b>(Focus of this presentation)</b></p>	<p>Does world-class communications matter to New Zealand?</p> <p>Do we need to get there sooner rather than later?</p>	<p>Define a national aspiration for broadband</p>
<p><b>Part Two</b></p>	<p>What does the sequence of rollout look like?</p> <p>How much would it cost?</p> <p>How do we pay for it?</p>	<p>Determine the preferred pathway to achieving this aspiration</p>

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Note: A more detailed outline of the Institute’s broadband project is contained in a presentation entitled, ‘A Broadband Strategy for New Zealand’. This presentation and the documents mentioned above are available on the Institute’s website at [www.nzinstitute.org](http://www.nzinstitute.org).

## EXECUTIVE SUMMARY

**The New Zealand Institute has identified national economic benefits from broadband in the range of \$2.7-4.4 billion per year with further upside potential possible.**

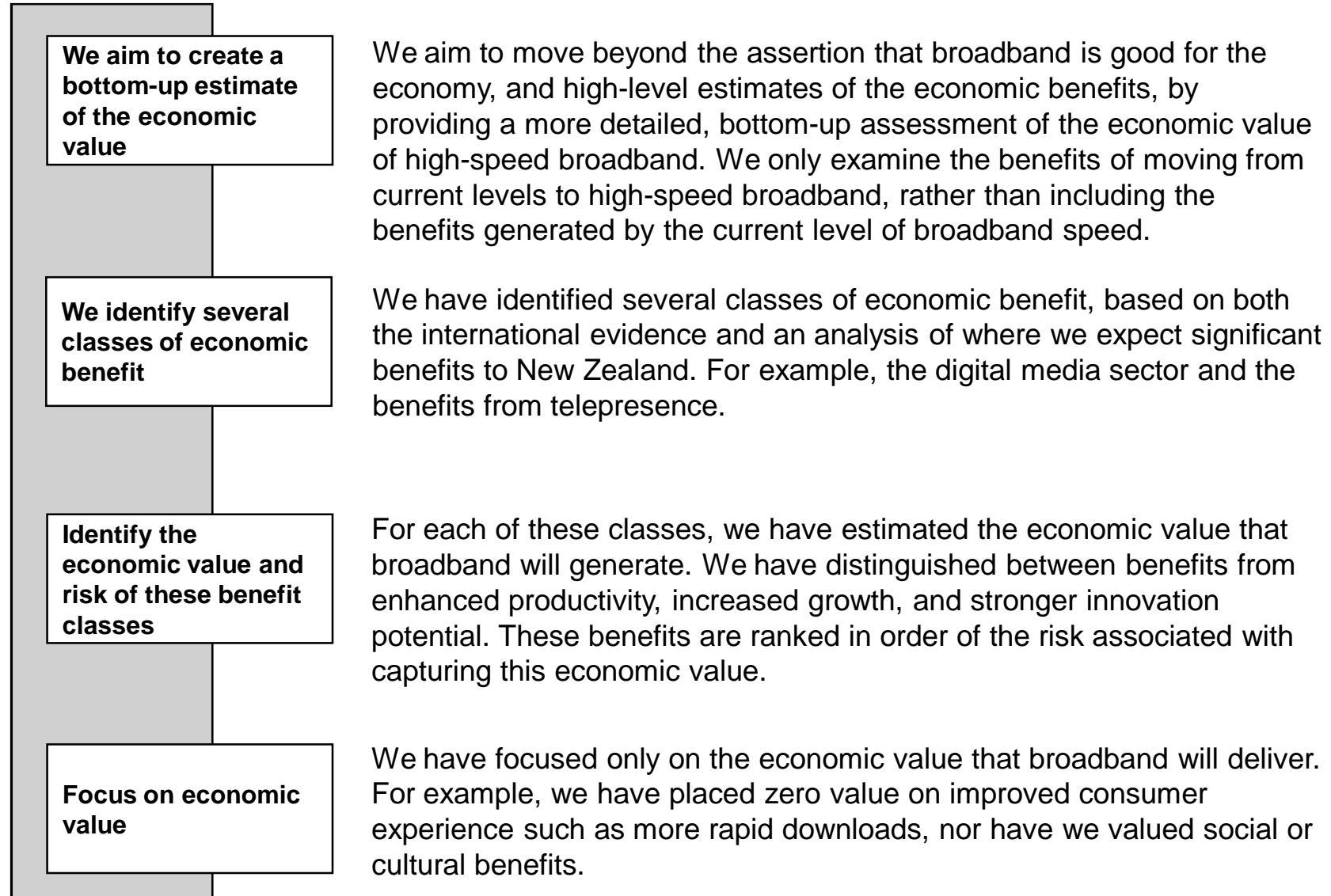
Capturing many of these economic benefits increasingly requires high speeds and so New Zealand's policy focus should shift from encouraging penetration to increasing the speed of the network. This means investing in a fibre network.

There is a significant cost to waiting. The longer that New Zealand waits, the more economic value it will forego and so New Zealand should approach the investment in fibre with urgency.

New Zealand should develop an efficient pathway to the rapid rollout of fibre with an initial focus on investing in high-value segments from which benefits can be realised rapidly.

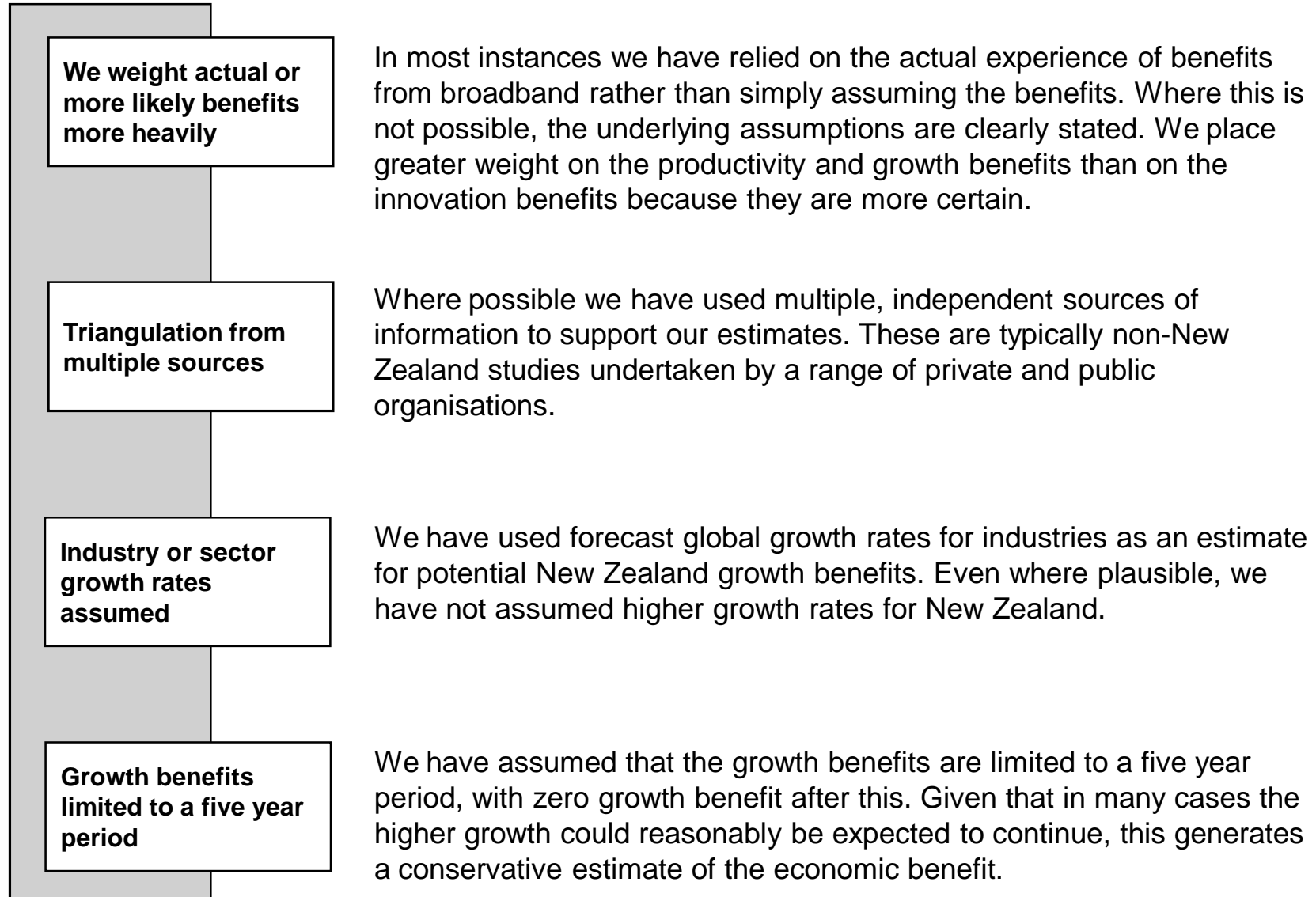
The next stage of the Institute's project will focus on defining a specific pathway to fibre.

## THE INSTITUTE'S APPROACH TO ESTIMATING THE ECONOMIC VALUE FROM BROADBAND IS BASED ON A DETAILED, BOTTOM-UP ASSESSMENT



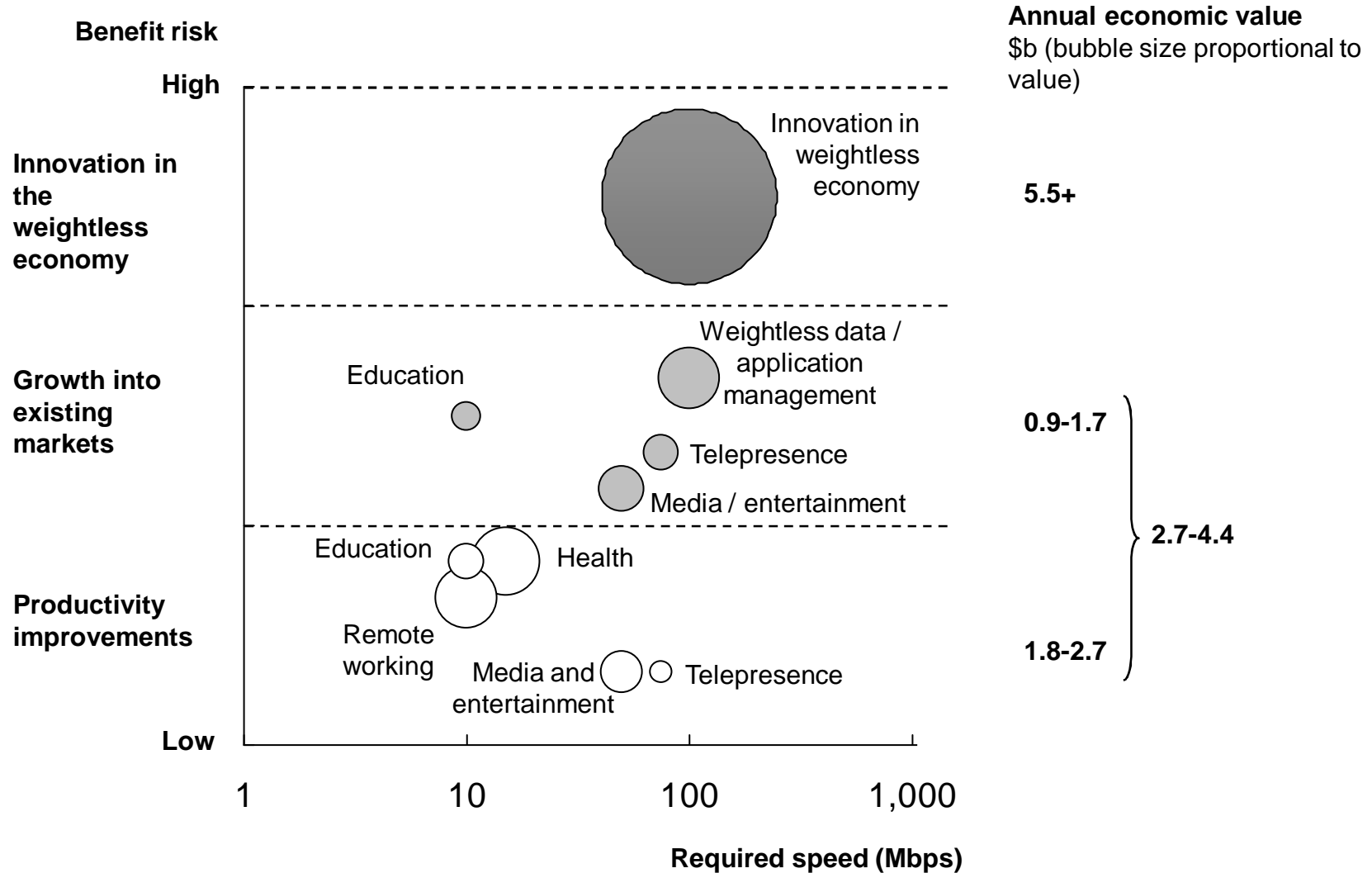
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## WE HAVE DELIBERATELY MADE CONSERVATIVE ASSUMPTIONS THAT LEAD TO A SMALLER ESTIMATE OF THE POTENTIAL ECONOMIC BENEFITS



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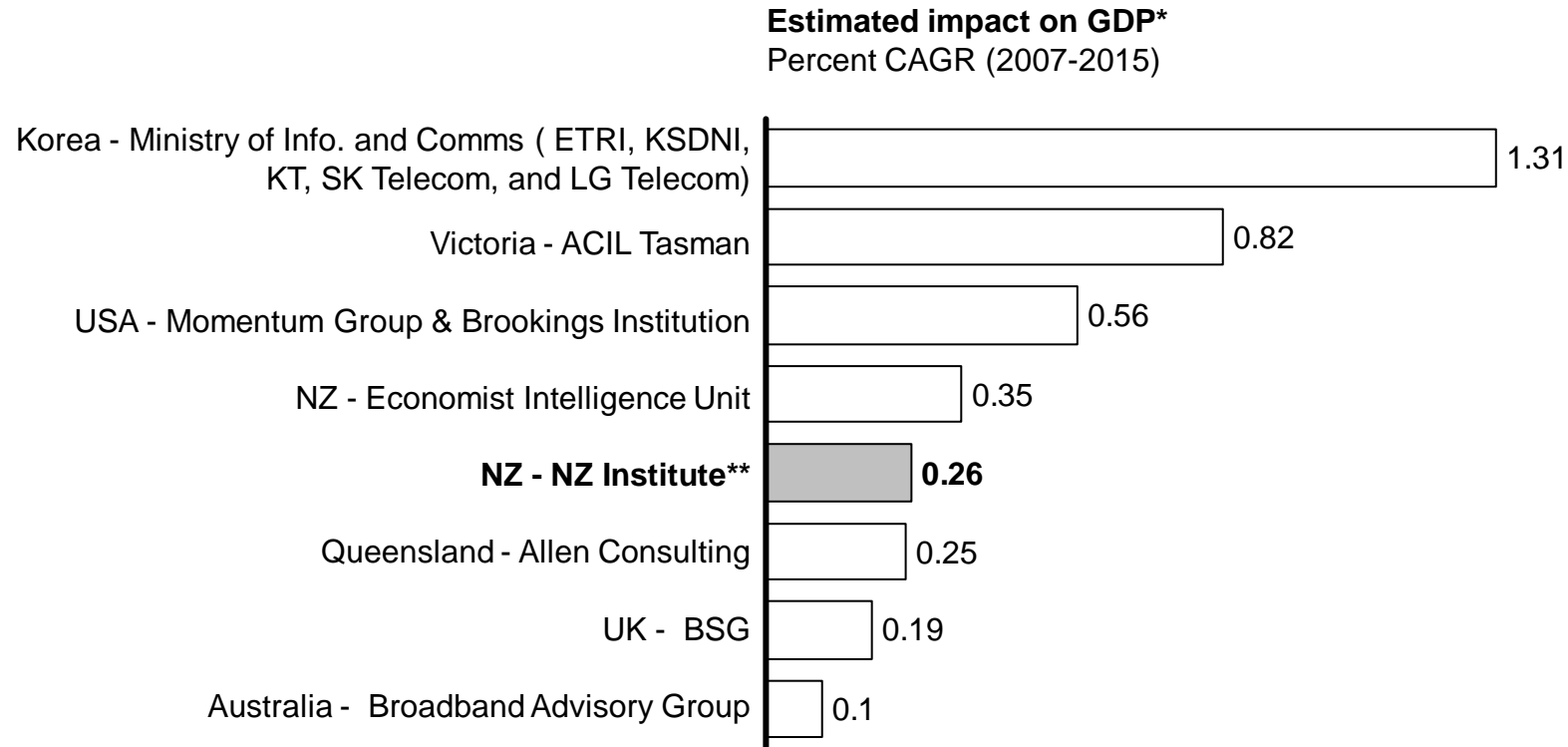
# WE ESTIMATE THAT FAST BROADBAND ENABLES ANNUAL PRODUCTIVITY AND GROWTH BENEFITS OF \$2.7 – 4.4 BILLION



Note: The topline estimate of the national economic benefit excludes the estimated innovation benefits because they are less certain than the growth and productivity benefits, and we are making conservative assumptions.

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## THE NEW ZEALAND INSTITUTE'S ESTIMATES ARE MID-RANGE COMPARED TO OTHER ESTIMATES OF THE ECONOMIC BENEFITS



**The New Zealand Institute's bottom-up estimates are in line with other studies into the economic benefits of fast broadband**

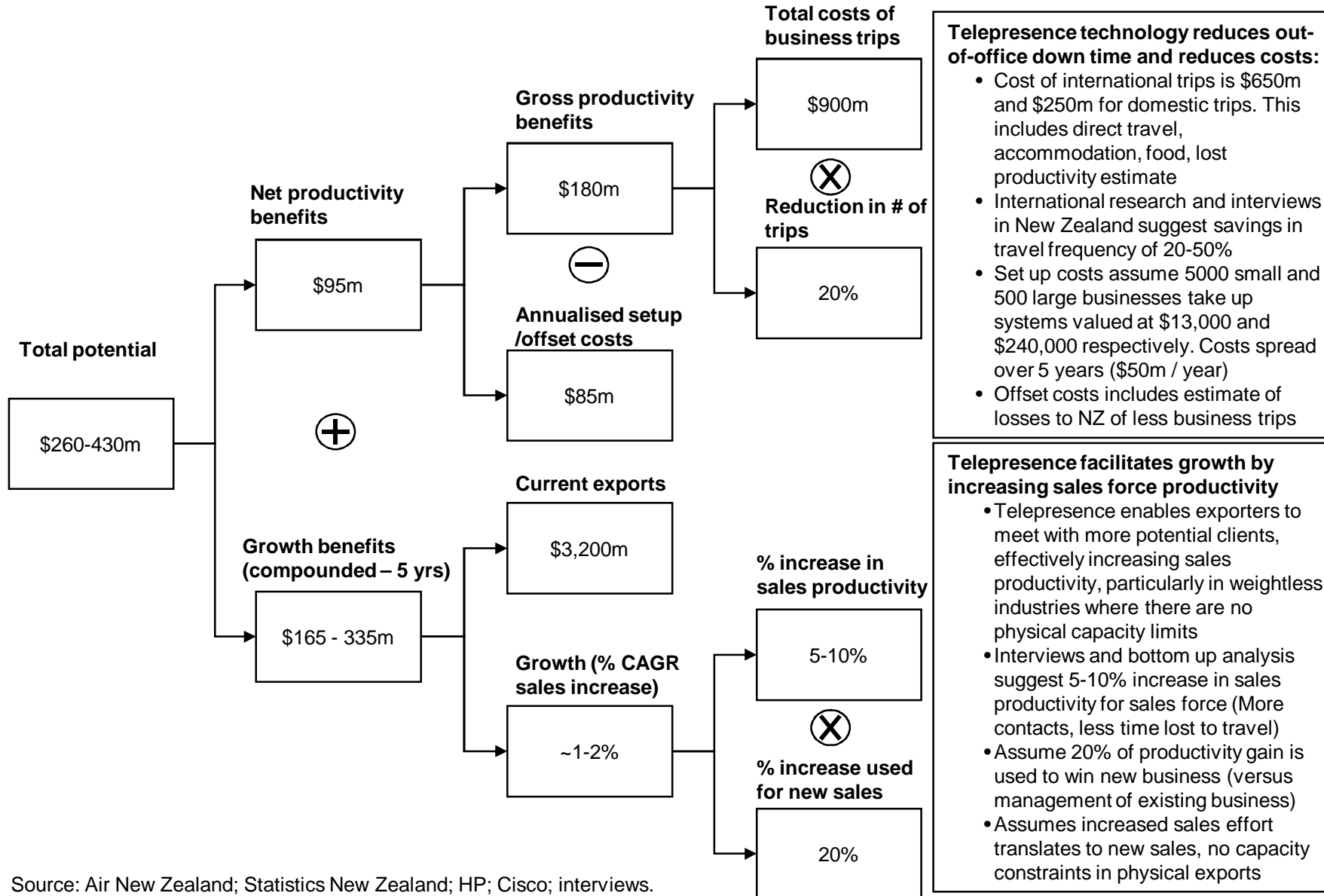
\* Synthesis of results converted to common measure over the period 2007-2015

\*\* Mid range estimate.

Source: Company sites; press clippings.

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# TELEPRESENCE: REDUCTION IN TRAVEL COSTS AND INCREASED SALES PRODUCTIVITY DELIVER BENEFITS OF OVER \$260 MILLION PER ANNUM

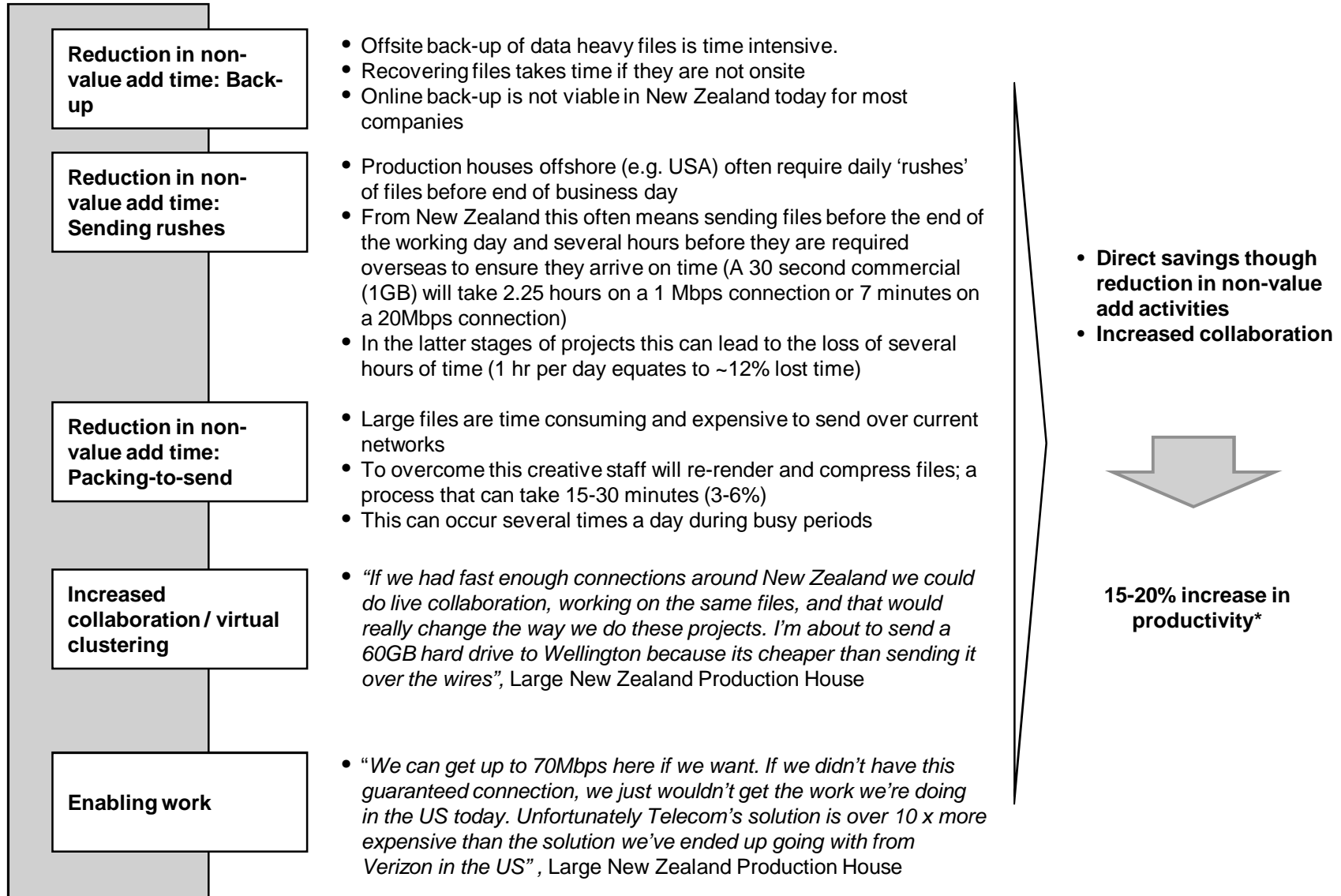


Source: Air New Zealand; Statistics New Zealand; HP; Cisco; interviews.

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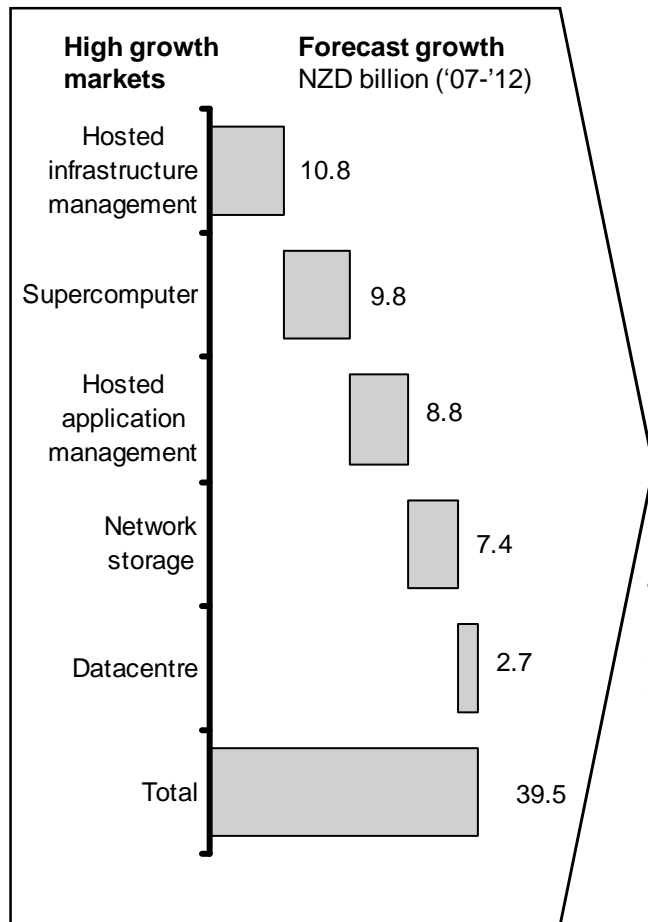
# THE BENEFITS OF FASTER BROADBAND ACCESS AT LOWER COST LEAD TO 15-20% IMPROVEMENTS IN PRODUCTIVITY IN DIGITAL MEDIA



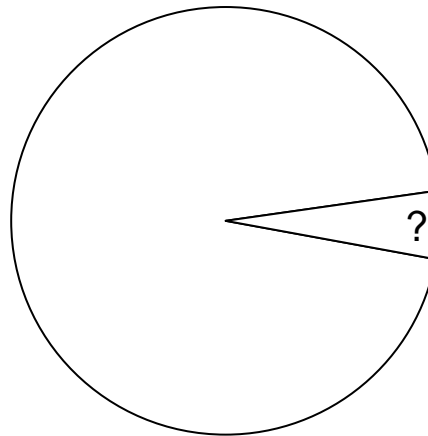
\* Based on estimated time savings and top down estimates from industry experts.

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# NEW ZEALAND COULD REASONABLY CAPTURE \$0.2-0.5 BILLION PER ANNUM IN THE STORAGE AND MANIPULATION OF DATA

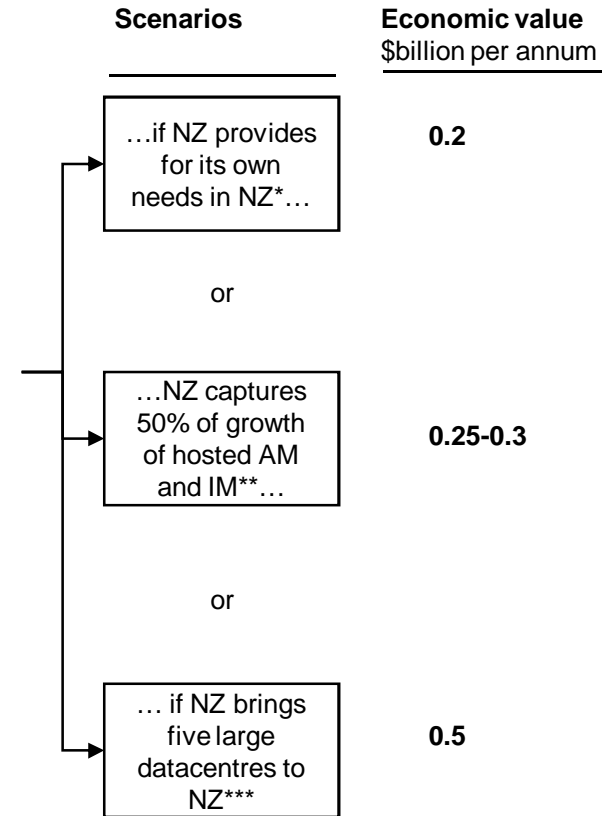


**Global growth (to 2012)**  
100% = ~ NZ 40billion



The market for the storage and manipulation of data will grow by over \$40b to 2012. New Zealand's distinctiveness in this space is driven by :

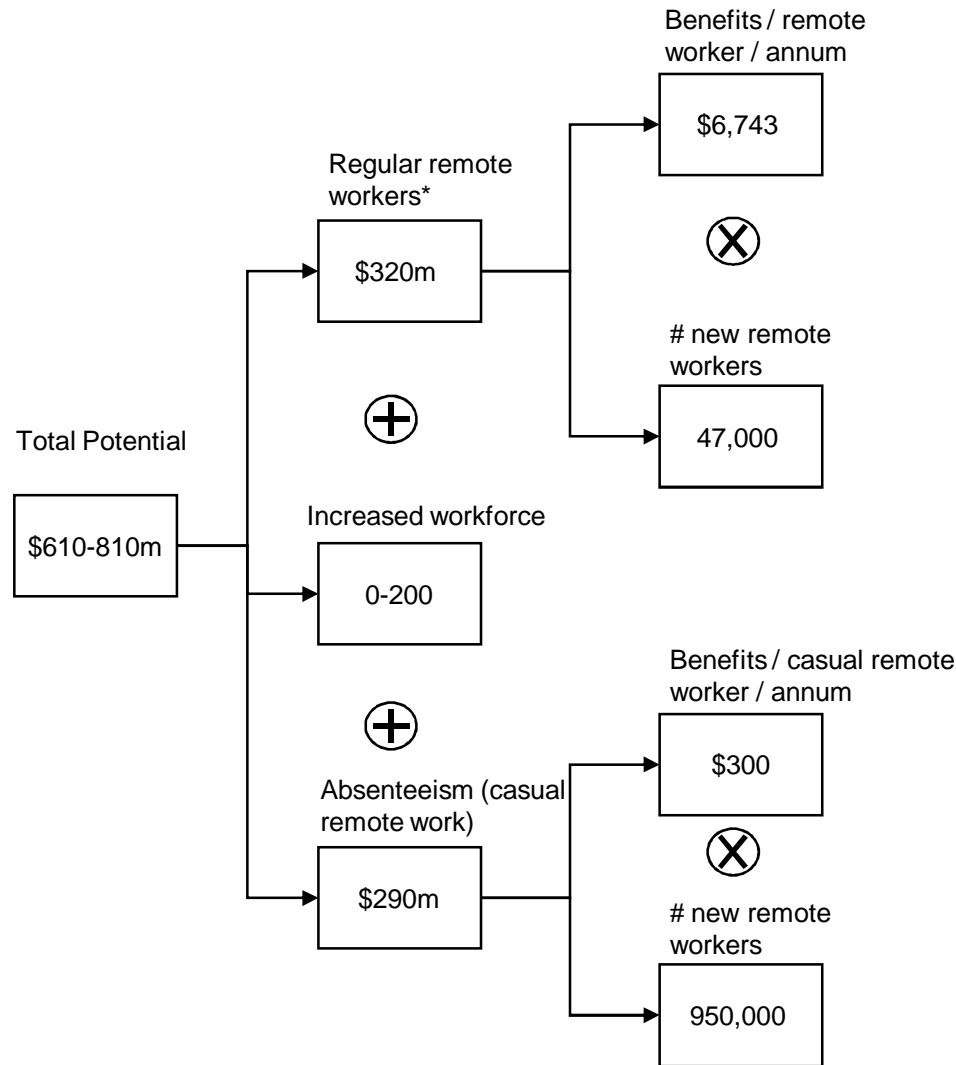
- One of the lowest electricity costs in the OECD
- Geographically remote, politically stable environment
- Highly skilled labour force
- Time zone benefits



\*Assumes ~0.8-1 billion (USA/WEU/NE Asia) population drives demand and New Zealand gains its population weighted share, \*\* AM: Hosted Application Management and IM: Hosted Infrastructure Management. Energy costs are a significant factor in datacentre location decisions. Industrial energy costs are 43% higher in Australia than New Zealand, \*\*\* Assumes 5 datacentres, ~35,000m<sup>2</sup>, \$300/m<sup>2</sup> revenues  
Source: Interviews; Gartner; IDC.

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# BENEFITS TO NEW ZEALAND FROM REMOTE WORKING WILL CONTRIBUTE OVER \$600 MILLION PER ANNUM



## Description of benefits drivers

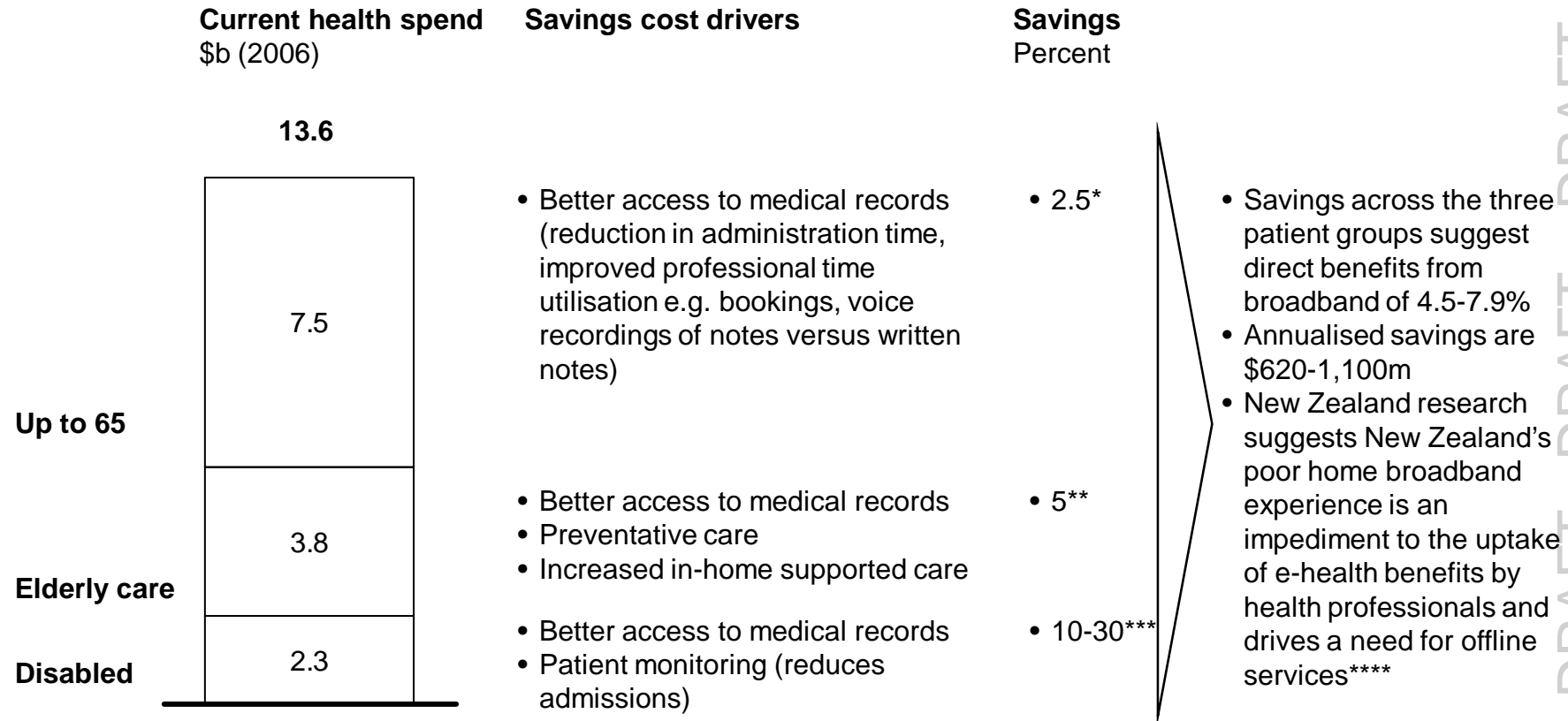
- Reduced travel costs (average trip length: 10km, cost per km: \$0.7). Estimated at \$3,080 per person per annum
- Reduced congestion costs (e.g. additional road costs) and carbon costs: Estimated at \$363 per person per annum
- Reduced time wasted in transit (time lost per day: 30 minutes, number of remote white collar workers: 140,000). Estimated at \$3,300 per person per annum
- The benefit per employee is more conservative than estimates made in other international studies
- Assumes the equivalent of 5% of white collar work force remote work at 100% (in line with leading remote working nations) and that one third are already doing so
- Increased participation of older, chronically ill or physically disabled people in the workforce (assumes 1% of ~350,000 white collar workers 65+ choose to work)
- Partial days rather than whole days used for non-work activities e.g. doctor's visits, day care. An ITAC (2001) study shows 20% reduction in absenteeism when remote working is employed.
- ~1.4m white collar workers of whom ~33% are currently remote working

\* Rounded to two significant figures

Source: New Zealand Herald; Edward Potter, Journal of Labor Research (2007); Resources for the Future

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# HEALTHCARE COULD BENEFIT FROM SAVINGS OF \$620-1,100 MILLION PER YEAR FROM FAST BROADBAND

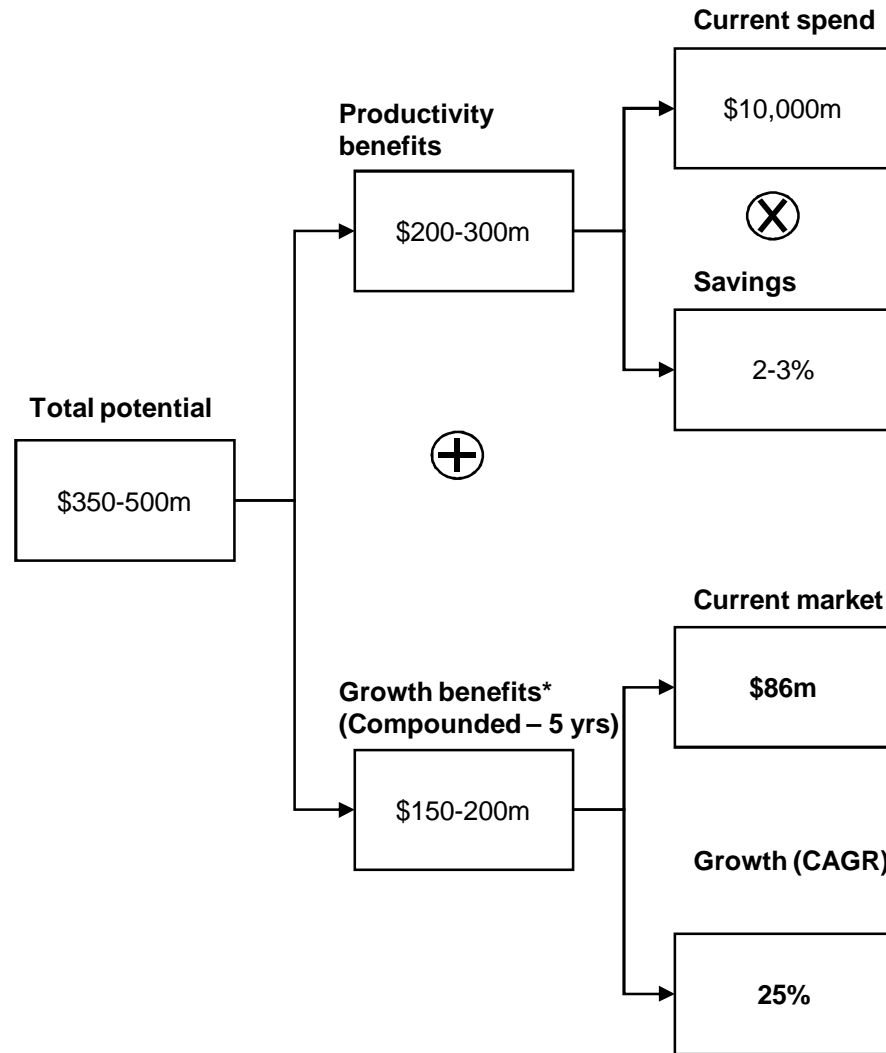


\*RAND study estimates 2.5% savings from paperless sector, supported by expert interviews in healthcare in New Zealand, \*\* Benefits of paperless office plus 2.5 % estimate of additional savings (interviews, international studies) through reduced in-facility care\*\*\*US studies of actual benefits estimate savings of 10-30% across chronically ill of which disabled is a subset, \*\*\*\*Professor Jim Warren, National Institute for Health Innovation citing reluctance of health professionals to depend on broadband infrastructure that is not capable of meeting home use expectations for professional use

Source: Ministry of Health; Government Estimates; Litan (2006); McKinsey.

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# POTENTIAL BENEFITS TO THE EDUCATION SECTOR EXCEED \$350 MILLION PER ANNUM



**Fast, cost effective broadband would cut operating costs and increase classroom productivity:**

- Improved communications (50%) and office efficiency, improved labour productivity (3%), lower overheads and reduced travel costs (20% reduction)
- Reduced professional training costs (50-70% reduction)
- Improved classroom efficiency, less downtime in classes (no estimate made)

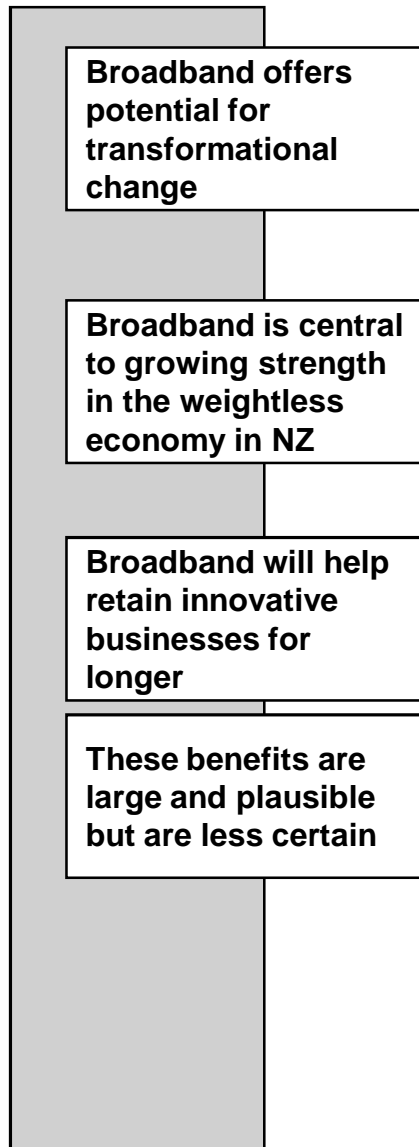
**New Zealand is well positioned to capture growth in Asia:**

- Globally online education services is the fastest growing sector in absolute dollar terms. Several sources estimate online learning is growing at faster than 25% CAGR
- China is experiencing strong growth in demand for online education, with the amount of people using it doubling in the last year alone
- Unmet demand and the high cost of supporting a student offshore is likely to increase the number of students taking international courses while staying in their own country
- The New Zealand education sector is growing much faster than the rest of the economy.

\* Assumes current growth rate in international online education holds (25%), considers online education only  
Source: NZTE; Ministry of Education; New Zealand Budget.

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## HIGH-SPEED BROADBAND ALSO GENERATES SIGNIFICANT POTENTIAL FOR INNOVATION AND BUSINESS RETENTION IN THE WEIGHTLESS ECONOMY



The productivity and growth benefits estimated above are large, but amount to only about 2-3% of New Zealand's GDP. Obtaining these benefits is clearly desirable, but it doesn't amount to economic transformation. But in addition to these benefits, broadband also offers the potential for more transformational changes to the New Zealand economy.

As documented in previous Institute releases, high-speed broadband has a big role to play in creating significant new areas of economic strength in New Zealand – the weightless economy. Weightless economic activity plays to New Zealand's strengths and helps to overcome the disadvantages of small scale and physical remoteness.

Innovative businesses can more easily serve global markets from New Zealand, keeping talent and profits in country; *"If we had low cost, reliable VOIP access to the US we could have exited later and achieved a much higher valuation"*, Rod Drury.

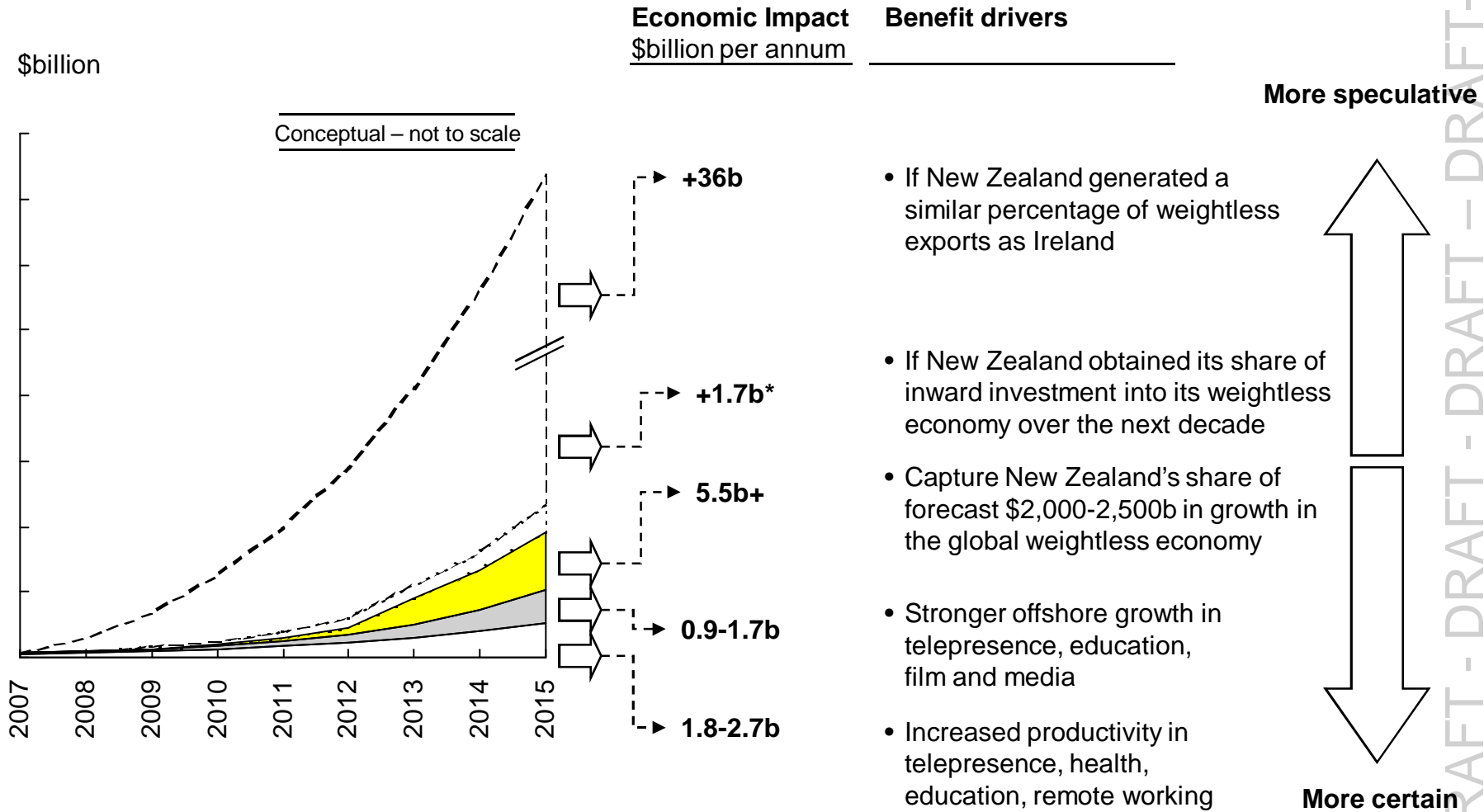
Consider the following classes of benefits:

- Growing Kiwi global champion firms e.g. a New Zealand Skype
- Positioning New Zealand to attract foreign investment and migrants
- Developing new strengths in the weightless economy, such as back-office financial services
- Helping small New Zealand firms exploit the 'long tail'

The size of these benefits are less certain and generally require complementary investment in areas like tertiary education and R&D, but they are plausible.

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# HOW LARGE COULD THE TOTAL ECONOMIC BENEFITS BE FOR NEW ZEALAND?



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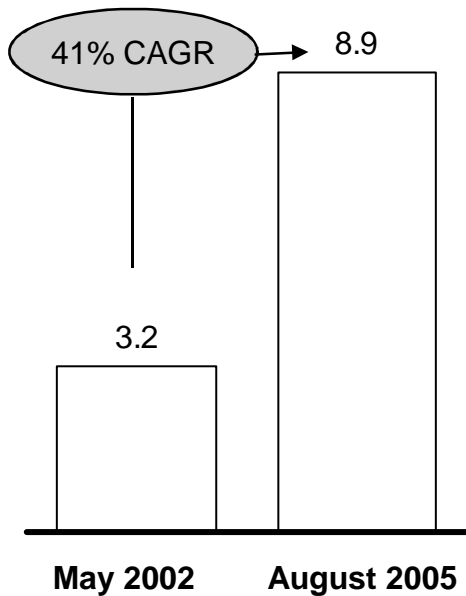
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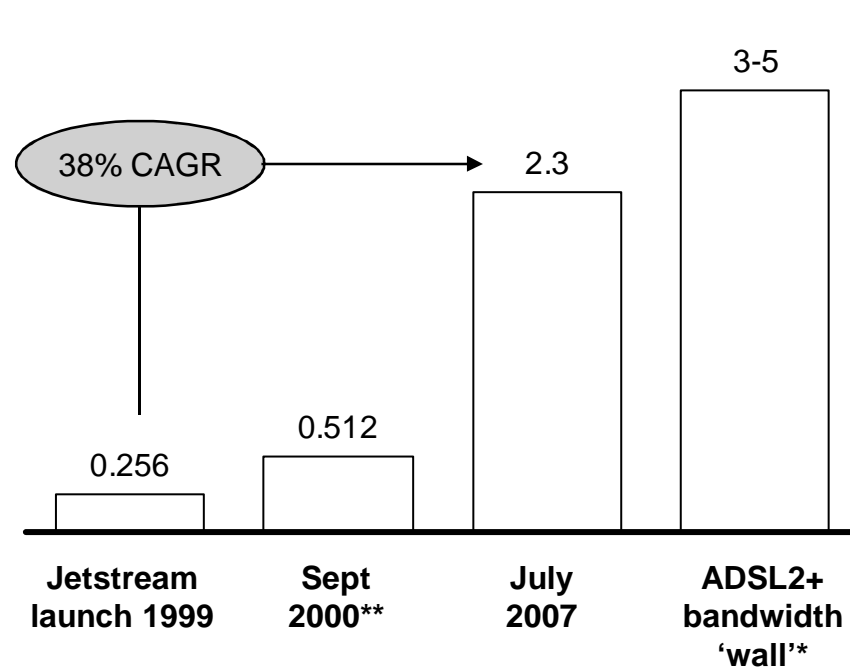
# FILE SIZES SHARED OVER THE INTERNET HAVE INCREASED SIGNIFICANTLY AND NEW ZEALAND WILL SOON HIT THE BANDWIDTH WALL

**P2P file size shared over the internet**  
MB



Increases in embedded graphics and video coupled with reduced costs of data storage are driving increases in the size of files being moved around the internet

**Realisable average speeds**  
MB



Maximum available speeds are rapidly approaching the bandwidth 'wall'

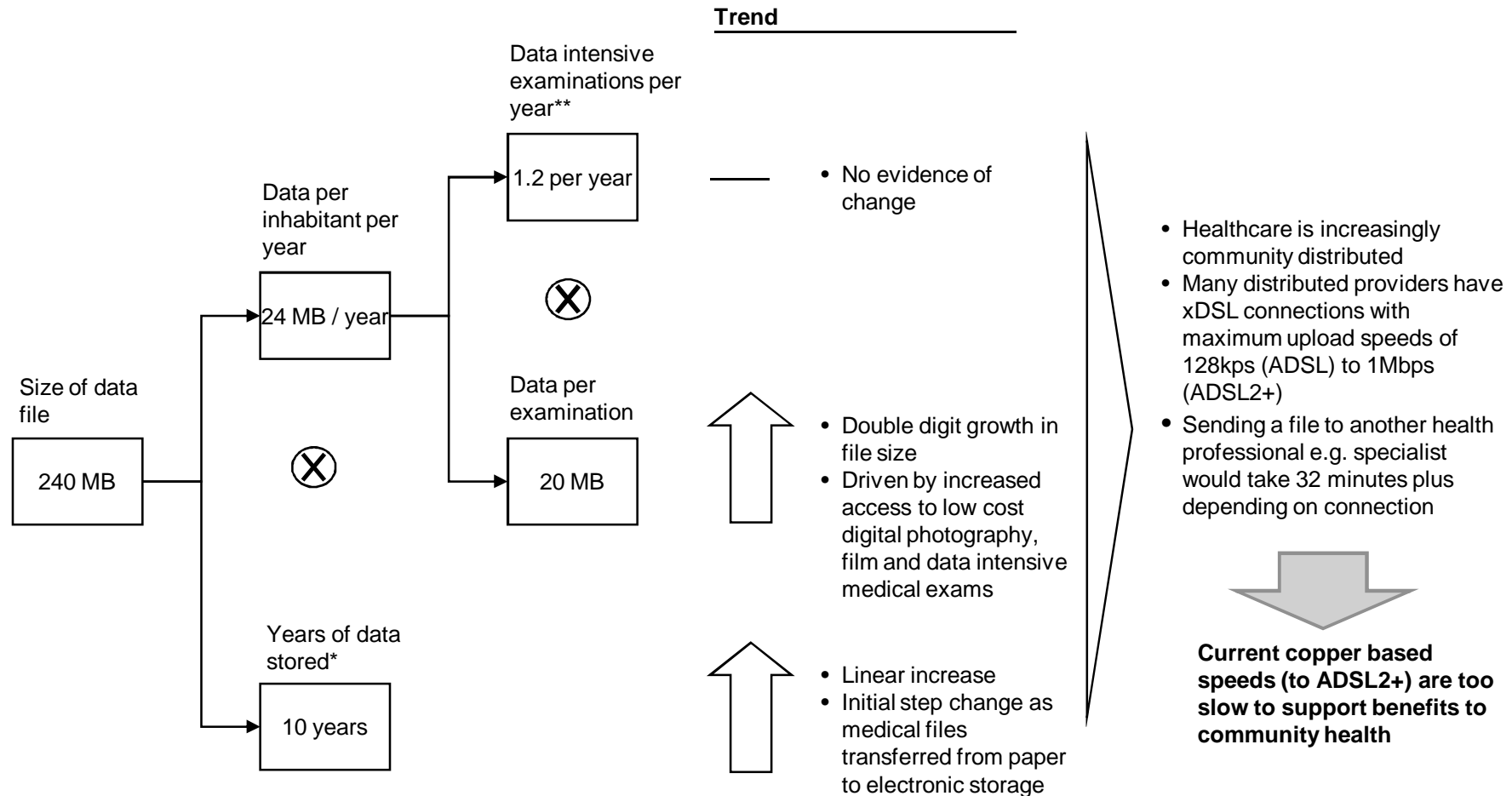
\*Practical limit to download speeds on current network using ADSL 2+ and existing backhaul and offshore capacity.

\*\*75 times greater than dialup, reduced by Citigroup's estimate of the max:average ratio.

Source: Forbes [citing Big Champagne]; Citigroup; NBR; Telecom; www.speedtest.net.

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# FOR EXAMPLE, FAST BROADBAND IS NEEDED TO CAPTURE THE ECONOMIC VALUE FROM THE HEALTH CARE SECTOR



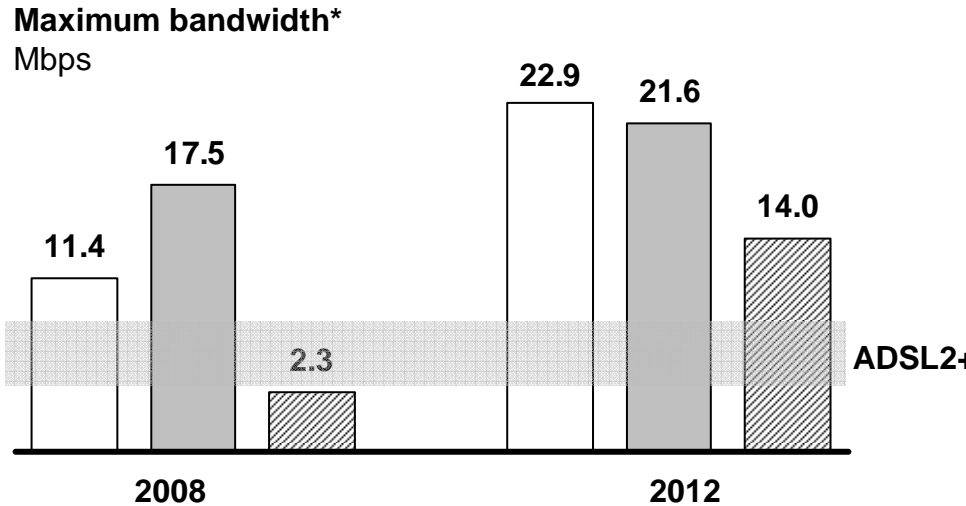
\* Assumes 10 years of historical data transferred to electronic storage. This is conservative as scanned documents generate large files.

\*\* On average New Zealanders see a GP 3.2 times per year.

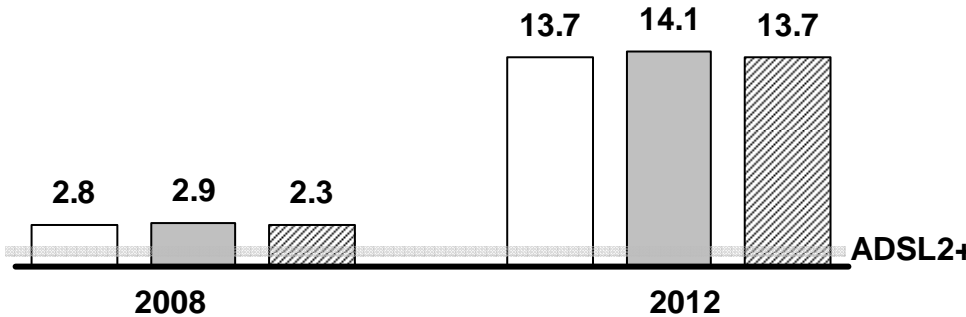
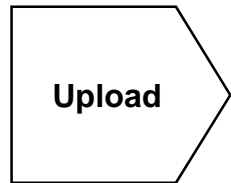
Source: Raymont (2004); Nagata and Tanaka (2002); Assumes data is driven by Xrays, CI and MRI scans and endoscopy photos.

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# RESIDENTIAL BANDWIDTH DEMAND WILL CONTINUE TO GROW STRONGLY AND WILL SOON EXCEED THE CAPACITY OF NEW ZEALAND'S NETWORK



- By 2012 most homes will demand more downstream bandwidth than ADSL or ADSL2+ will be able to provide
- By 2008 all three groups will demand more bandwidth upstream than ADSL2+ will be able to provide



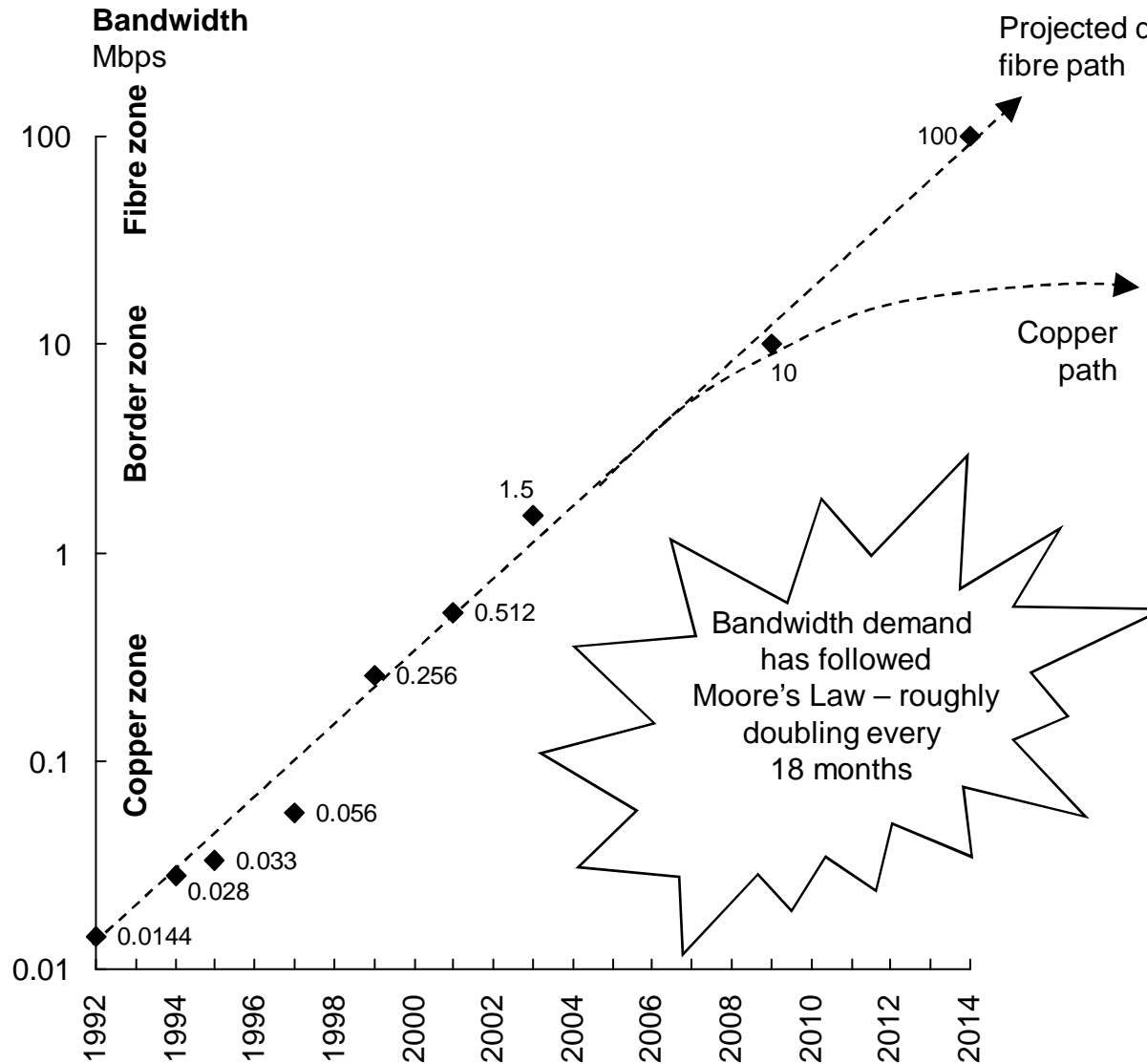
Copper will soon be unable to provide for the demand expectations of high bandwidth homes in the UK. The same will be true in New Zealand.\*\*

- Young couple, with children
- Young couple, no children
- Single male, remote worker

\* Based on bottom up analysis of expected applications and their bandwidth requirements, \*\* While it is reasonable to expect increased speeds from xDSL technology this will require loop shortening and increased fibre investment  
Source: Broadband Stakeholder Group (UK); Interviews.

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# TO FULLY CAPTURE THE ECONOMIC BENEFITS, NEW ZEALAND NEEDS TO FUTURE-PROOF ITSELF BY INVESTING IN A FIBRE NETWORK



- To capture much of the economic value described earlier requires higher speeds than can be delivered through copper.
- The need for speed will increase. There is no reason to expect growth in bandwidth demand to slow. Within a decade, it is likely that speeds of 50-100Mbps will be demanded in many parts of the market.
- New Zealand needs to invest for the future, not simply for today's demand. This means a fibre-based network.

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Source: NZCID/HiGrowth Project.



## HIGH-SPEED BROADBAND REPRESENTS AN OPPORTUNITY TO POSITION NEW ZEALAND AS AN ATTRACTIVE LOCATION FOR INVESTMENT



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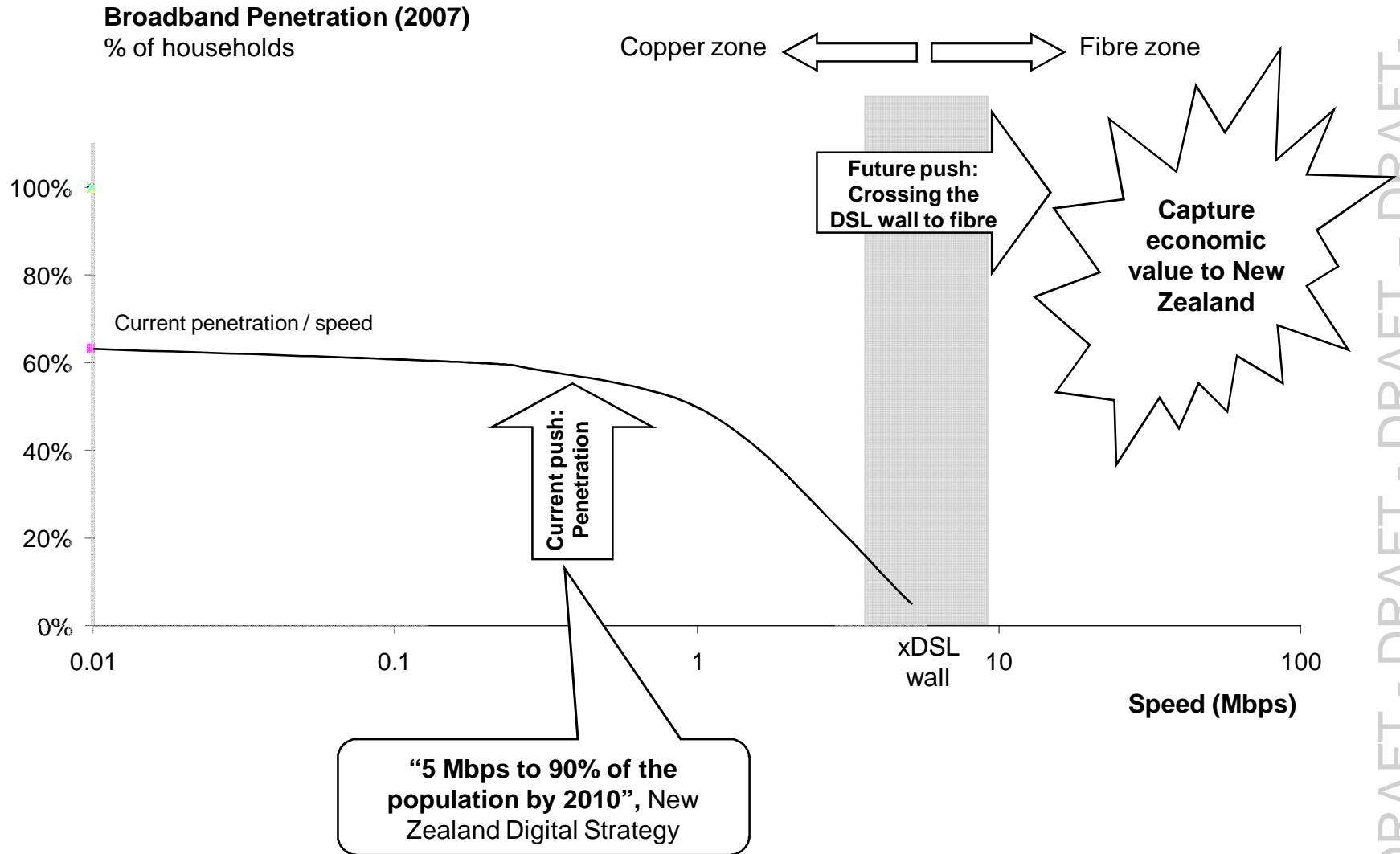
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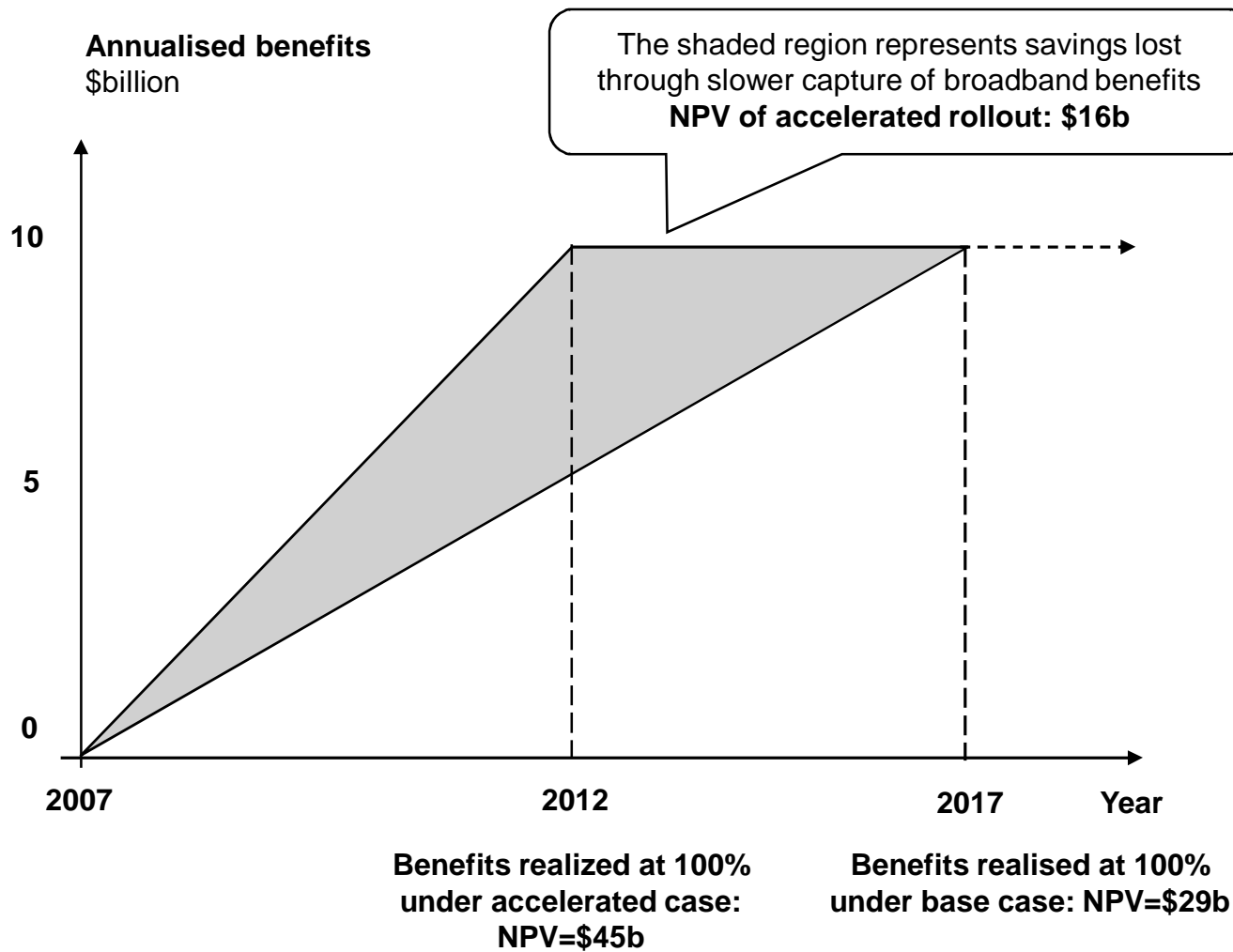
# NEW ZEALAND POLICY SHOULD SHIFT FROM A FOCUS ON PENETRATION TO A FOCUS ON SPEED



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Source: NZ Herald; Alcatel-Lucent.

# EACH YEAR OF INACTION LEADS TO LOST BENEFITS: A FIVE YEAR DELAY WILL COST NEW ZEALAND ABOUT \$16 BILLION







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Note: Assumes \$5b investment total, 8% discount rate, pretax NPV, costs expensed.

# THE LONGER THAT NEW ZEALAND WAITS, THE FEWER GROWTH OPPORTUNITIES WILL BE AVAILABLE TO NEW ZEALAND

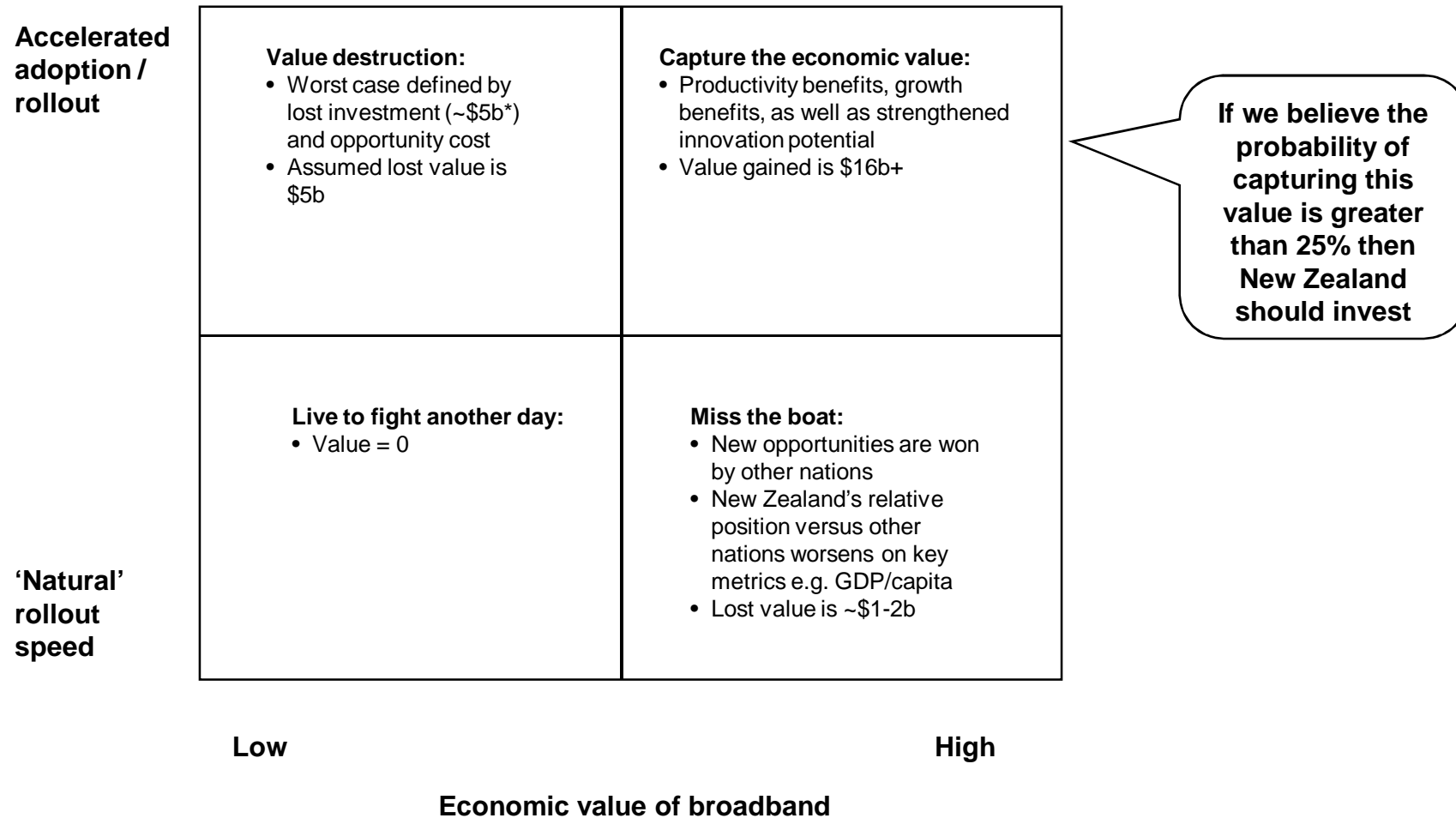
Selected examples

	<u>Education</u>	<u>Digital media</u>	<u>Data centres</u>
 Korea	In 2006 the number of firms engaged in online education jumped 63% to 621	The government will be investing over USD20b into IT infrastructure over the next five years with a goal of becoming a global IT leader. Has already achieved a significant presence in video gaming	N/A
 Singapore	Universitas 21, a coalition of international universities (including Auckland), has set up a global online university based out of Singapore	Government sponsored Asia Film Market and Conference hosted in Singapore, exposing the country to foreign attention and drawing investment from US production house Lucasfilm and Australian Southern Star	Submarine cable infrastructure with capacity of 21Tbps (compared to Southern Cross capacity of 1.2Tbs). Directly connected to 30 key regional markets and internationally to over 100 countries. Allows Singaporean firms to land big data storage deals with EU and US companies
 Australia	The World Bank and the Australian government are engaged in a USD750m joint programme to develop online education for African and Asian countries to combat poverty	Australian digital media companies, and the Ministry of Innovation, are exploring commercial relations with China's Cyber Recreation District, the biggest digital media industry development project in China	Already hosted one of four MSN data centres for Tier 1 markets
 China	China has put 150 of its university courses online in 2003, plans to have 1500 in five years	China took over from the US as the world's leading ICT exporter in 2004	N/A

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Source: Government websites.

# BOTH ACTION AND INACTION CARRY RISKS BUT THE RISK FROM INACTION IS GREATER FOR NEW ZEALAND



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Note: Initial cost estimate based on interviews with industry experts on the cost of fibre to the home (FTTH) to 75% of the population. More detail on cost will be provided in the New Zealand Institute's next report.

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## NEW ZEALAND SHOULD DEVELOP A FAST, EFFICIENT PATH TO FIBRE WITH A FOCUS ON HIGH-VALUE SEGMENTS THAT CAN BENEFIT IMMEDIATELY

### Summary of findings

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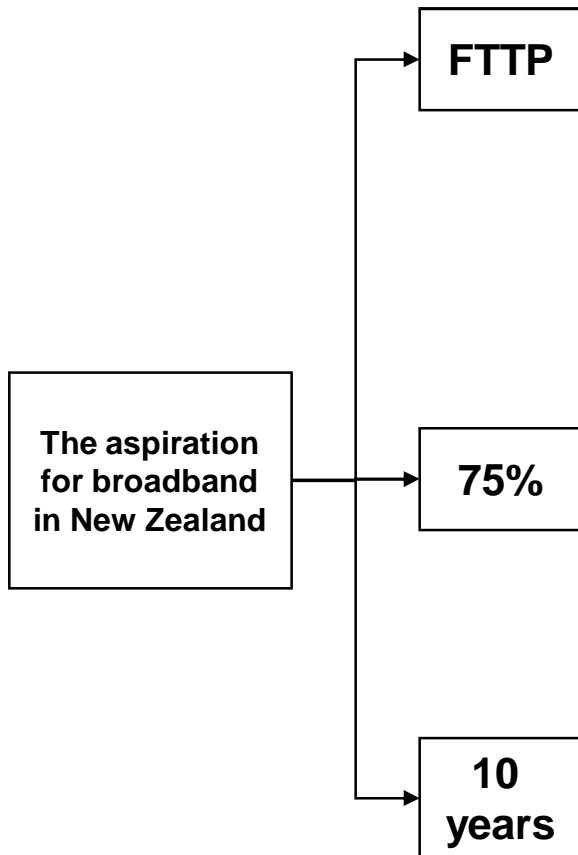
There is a significant cost to waiting. The longer that New Zealand waits, the more economic value it will forego and so New Zealand should approach the investment in fibre with urgency.

### Conclusion

The New Zealand Institute recommends:

- New Zealand should develop a fast and efficient national path to the rollout of fibre
- The high cost of delay means New Zealand should focus on a path that supports rapid progress in high-value segments from which benefits can be realised rapidly

## DEFINING A BROADBAND ASPIRATION FOR NEW ZEALAND



### Justification / comments

#### Speed: there is a need for FTTP (fibre to the premises)

- Capturing the economic value requires speeds in excess of those achievable with copper. Fibre has greater capacity than copper, cable, wireless or satellite and is future-proof.
- The speeds generated by FTTP allow the full potential economic value to be captured.
- Backhaul and offshore links also need to be upgraded as part of this process.

#### Reach: at least 75% of the population

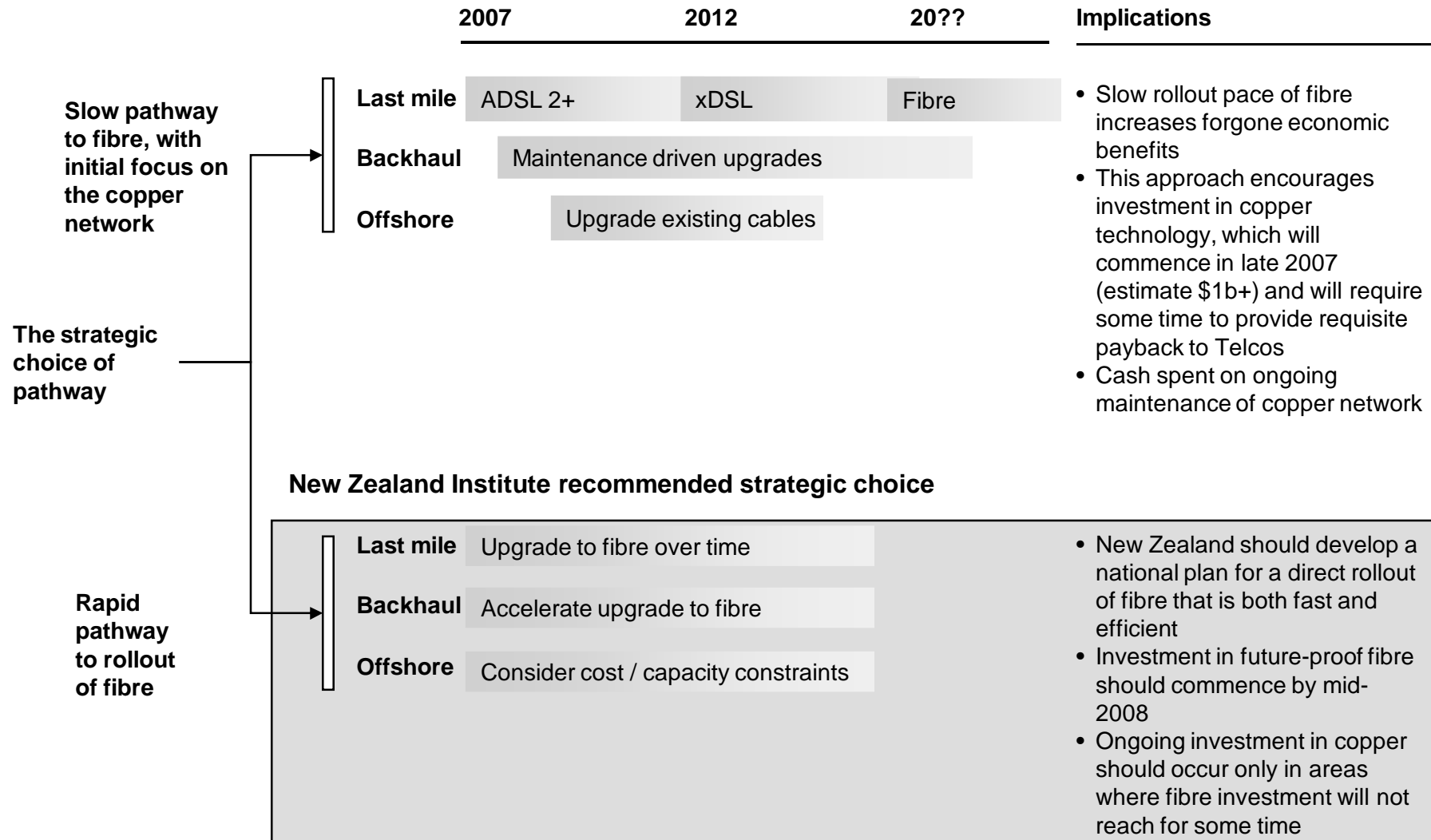
- A rollout to 75% of the population will reach towns with populations greater than about 20,000.
- Some parts of New Zealand are disproportionately expensive to serve.

#### Timing: achieve this within 10 years, by 2018

- This investment in fibre must commence with urgency. The aim should be to front-load the investments so as to capture economic value quickly.
- New Zealand must move quickly or much of the economic value will be foregone
- This full aspiration should be achieved by 2018 at the latest.

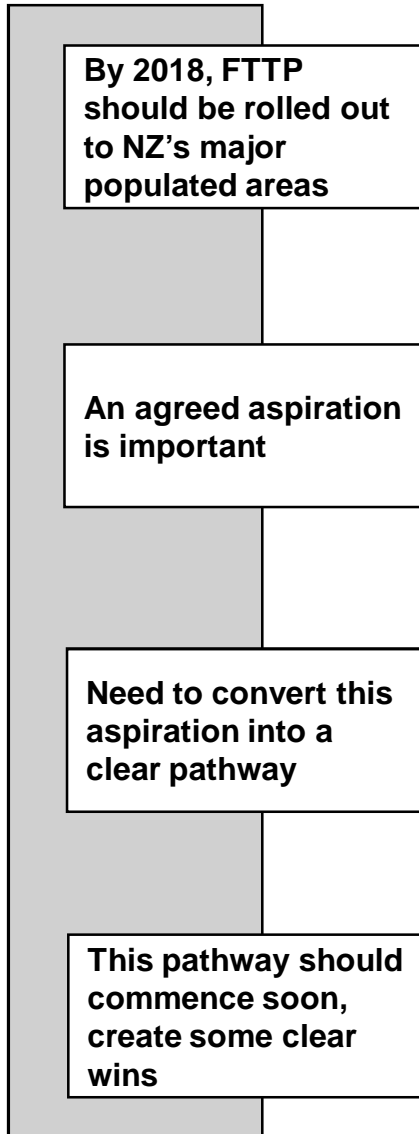
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# NEW ZEALAND SHOULD MAKE A STRATEGIC DECISION TO SHIFT INVESTMENT AWAY FROM COPPER TECHNOLOGY TOWARDS BUILDING A FIBRE NETWORK



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## NEW ZEALAND NEEDS TO CONVERT THIS ASPIRATION INTO A CLEAR PATHWAY FOR THE ROLLOUT OF FIBRE



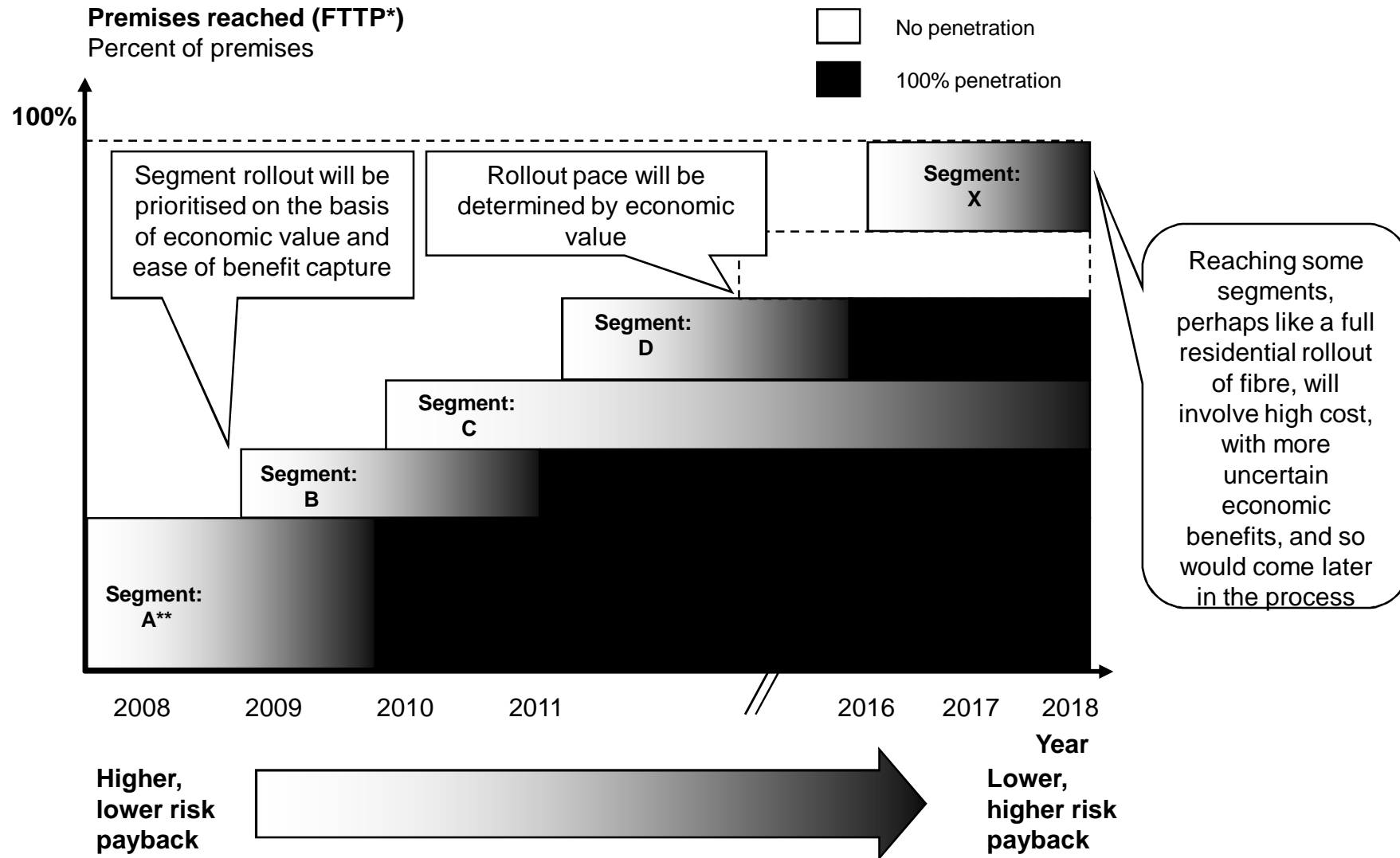
The appropriate aspiration is for New Zealand to commit to delivering high speed broadband through FTTP to at least 75% of the population within a decade.

An agreed aspiration is important to provide a sense of direction, to anchor expectations, and to allow progress to be measured. But even more important than a focus on a long-term aspiration is having a clear pathway to reach this goal. What are the priorities over the next few years?

A key goal is therefore to convert this 10 year aspiration into a specific pathway, with timelines for deployment of fibre to different market segments. The real focus of the debate should be the actions that should be taken over the next few years, rather than on whether this aspiration is defined in exactly the right way.

New Zealand should commence this investment process as a matter of urgency. The rollout of fibre should commence by mid-2008. The pathway should focus on the high-priority, high-value areas that are the immediate areas for action. This should deliver some early benefits and create momentum for ongoing investments.

# THE PATHWAY TO FIBRE SHOULD FOCUS ON PRIORITISING SEGMENTS BY ECONOMIC BENEFITS AND EASE OF REACH



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\* FTTP: Fibre to the premises.

\*\* A segment could be a homogeneous group of users e.g. digital media or healthcare, a geographic area, or several other grouping filters.

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The New Zealand Institute has identified national economic benefits from broadband in the range of \$2.7-4.4 billion per year with further upside potential possible.

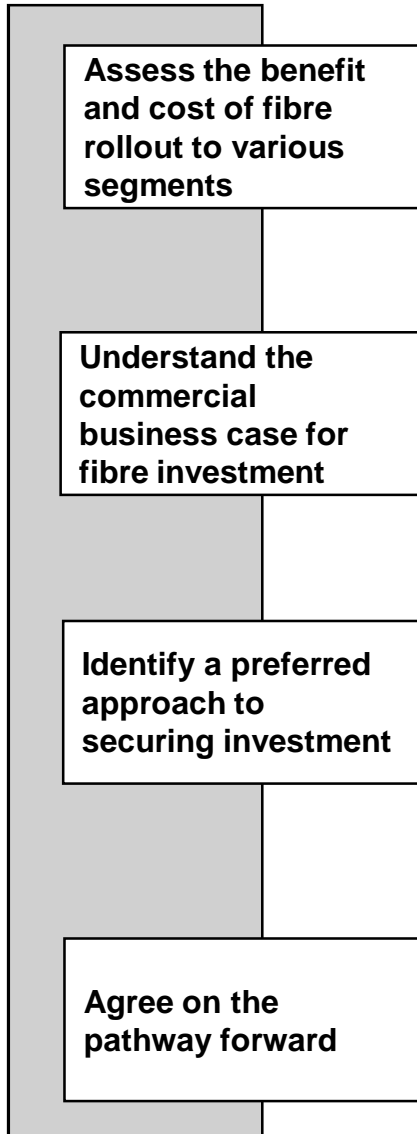
Capturing many of these economic benefits increasingly requires high speeds and so New Zealand's policy focus should shift from encouraging penetration to increasing the speed of the network. This means investing in a fibre network.

There is a significant cost to waiting. The longer that New Zealand waits, the more economic value it will forego and so New Zealand should approach the investment in fibre with urgency.

New Zealand should develop an efficient pathway to the rapid rollout of fibre with an initial focus on investing in high-value segments from which benefits can be realised rapidly.

**The next stage of the Institute's project will focus on defining a specific pathway to fibre.**

## NEXT STEPS FOR THE NEW ZEALAND INSTITUTE: DEVELOP A ROBUST PATHWAY TO ACHIEVE THE ASPIRATION



The pace and sequencing of the rollout of FTTP will depend on the value to cost ratio of the investments in different market segments. We will identify the benefit, cost, and risk profile of fibre rollout to various market segments, and construct a pathway to fibre on this basis.

What proportion of the national economic value can likely be captured by private firms making the investments in infrastructure? To what extent does the aspiration level and pace of rollout make commercial sense for private firms?

What can be done to make the commercial business case stronger by making the market for fibre work better, on both the demand and supply sides of the market? What options are available to bridge the gap between private and public value, including government funding and PPP's? What is the most appropriate mix of options for New Zealand to achieve the aspiration?

What is the pathway for action over the next several years? What is the sequence of investment and action, and how will this investment be funded? The aim is to provide an agreed pathway on the way forward, so that New Zealand can move forward quickly on broadband.

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