FTTH/FTTP

ASIA Pacific Deployments

RMIT Presentation 18 February 2020

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A presentation for APRICOT 2020

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Outline

1. FTTH/FTTP
2. Why not 5G?
3. ASIA Pacific Deployments
4. Australia and New Zealand

FTTH/FTTP

Network convergence drives PON deployments

10G PON supports higher bandwidth, symmetrical services and supports the bandwidth, latency and density required for 5G networks

Fast, reliable, resilient, low OPEX, high capacity

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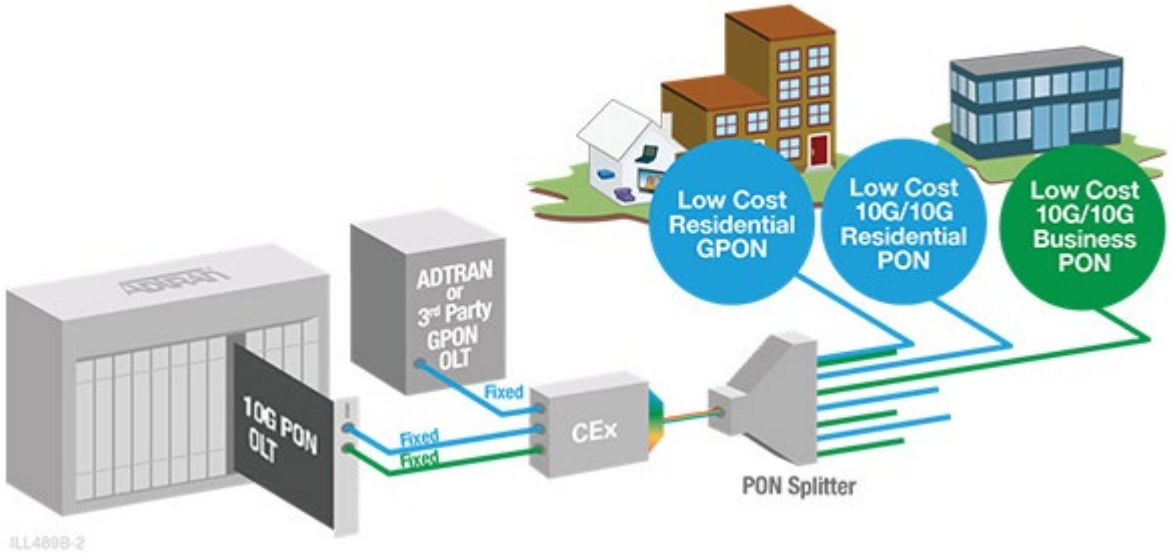
2020 is the year for 10G PON



Source: Adtran

Broadbandtrends operator survey Nov 2019

XGS-PON is the 10G PON technology of choice for both residential and business segments

Coexistence & migration from existing network to new network, was the overwhelming concern for operators followed by costs to deploy 10G PON

The ability to have a converged architecture supporting multiple applications and support for multi-gigabit residential broadband are the key drivers for implementation of 10G technologies.

Business services will be the primary initial applications for 10G PON deployments, followed by residential triple-play, with mobile network support in the future

Deployment of 10G PON for residential applications is not expected until 2020 for the majority of operators

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Broadbandtrends operator survey Nov 2019

Although 10G PON can offer very high bandwidth – the majority of operators only plan to offer 2-5Gbps to the residential market segment

The majority of operators are expected to move from GPON–>XGS PON for their evolution to 10G PON

Migration to NG-PON2 is not expected to occur for the majority of operators until 2022 or later

The ability to bond multiple 10G wavelengths together ranked very important for the majority of survey participants, however, it was not rated by any operators as a key driver

The need for even higher bandwidth PONs (greater than 10G PON) is not expected until 2024 or later

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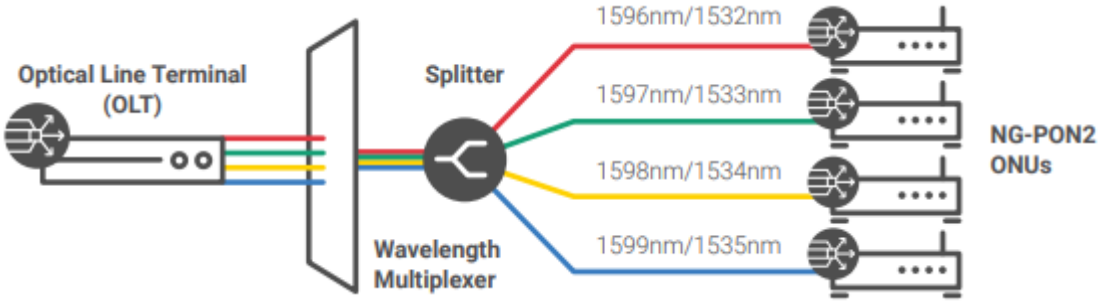
XGS-PON versus NG-PON2

XGS-PON (10G down / 10G up) – ITU G.9807.1, 2016. XGS-PON is a higher bandwidth, symmetric version of GPON. Again, the same capabilities of GPON and can co-exist on the same fiber with GPON. XGS-PON deployments are just beginning.

NG-PON2 (10G down / 10G up, 10G down / 2.5G up) – ITU G.989, 2015. Not only is NG-PON2 a higher bandwidth version of GPON, it also enables new capabilities like wavelength mobility and channel bonding. NG-PON2 co-exists well with GPON, XG-PON, and XGS-PON. Service delivery up to 80 Gbps possible.

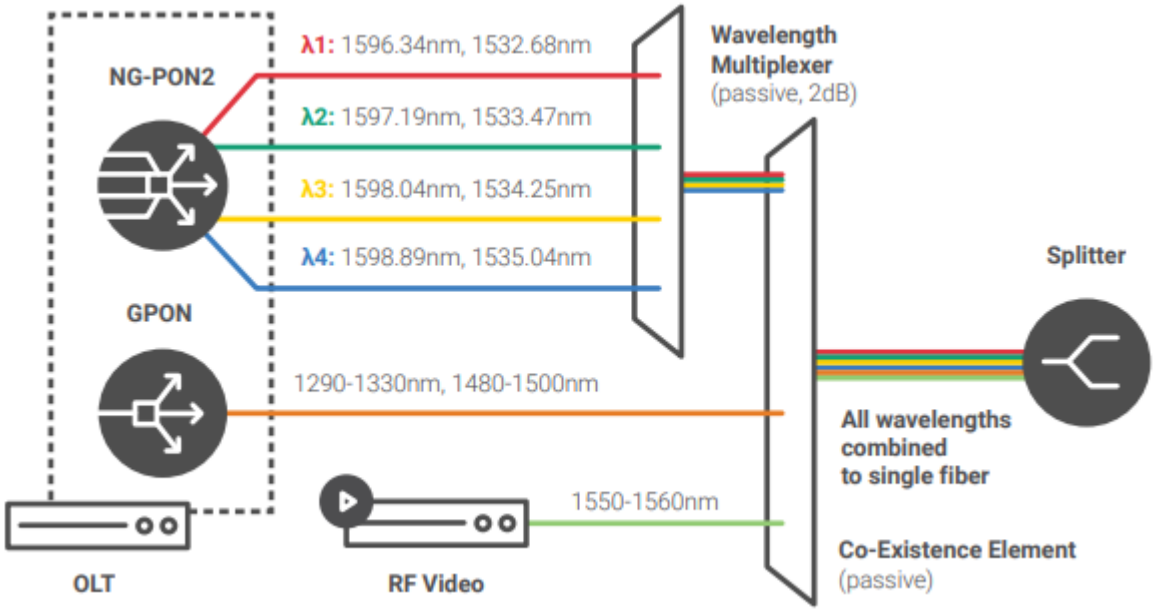
Source: Calix

NG-PON2



Source: Calix

GPON co-existence with NG-PON2



Source: Calix

A few statistics

Australia 30 June 2019

Fixed 7.7 million : NBN 4.9 million : non-NBN 2.8 million

Fixed wireless + satellite 1% : FTTP 5% : HFC 27% : DSL 66%

12 Mbps 15% : 25 Mbps 18% : 50 Mbps 60% : 100 Mbps 7%

Mobile 27 million

Post-paid 17.3 million 63% : Pre-paid 10.1 million 37%

Source: ACCC

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Data usage

For three months ended 30 June 2019

Retail NBN + retail non-NBN fixed services 5.3 million Terabytes

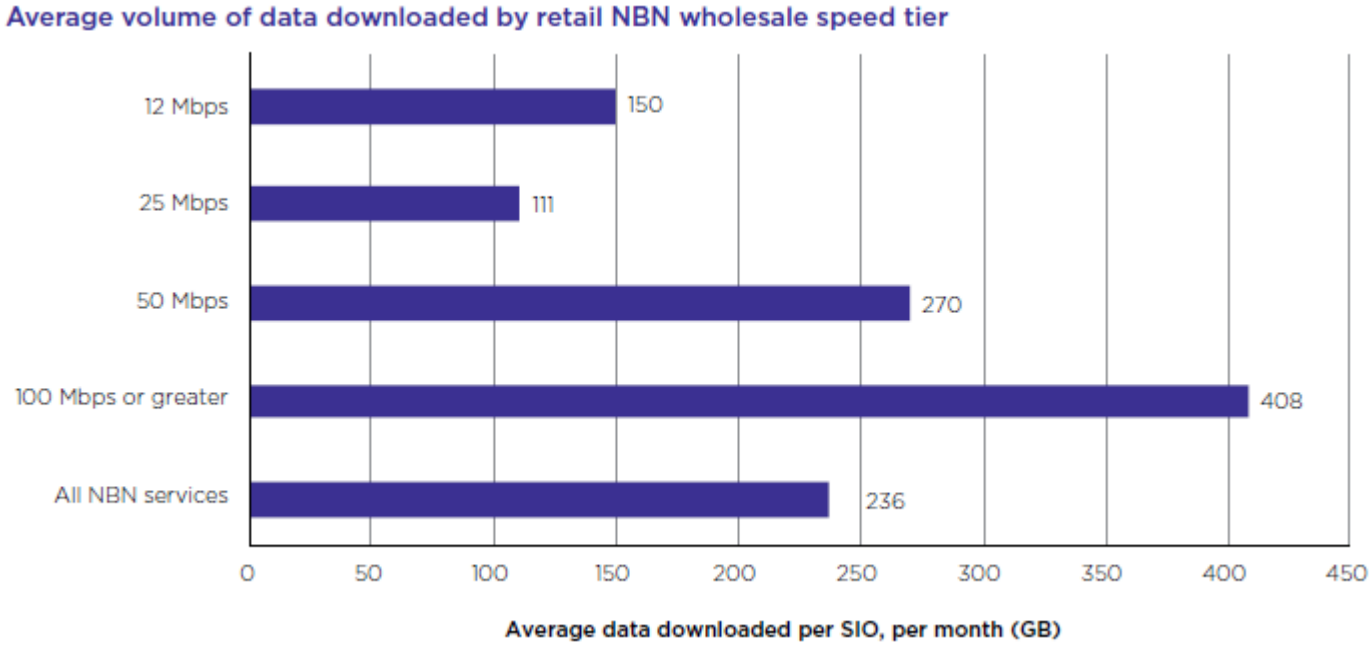
Retail NBN 66% : retail non-NBN 34%

Mobile 0.72 million Terabytes

NBN + non-NBN fixed 88% : Mobile 12%

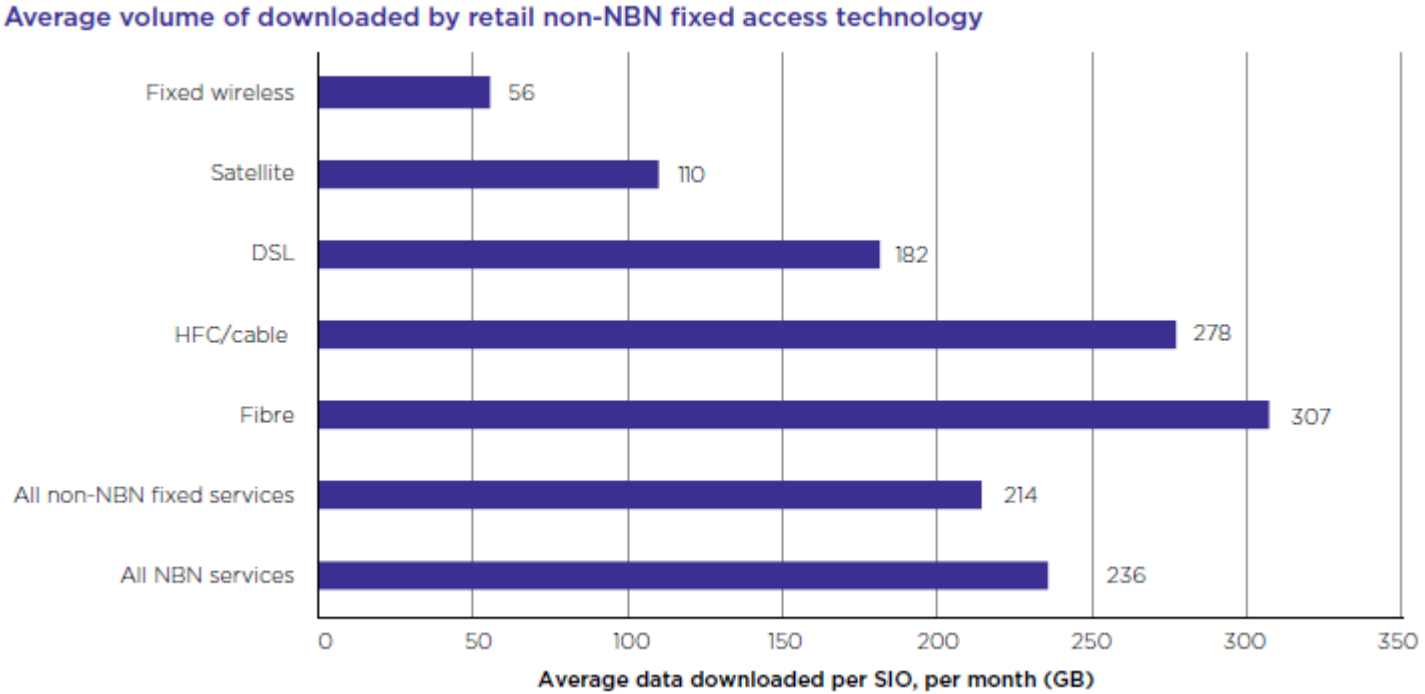
Source: ACCC

NBN Monthly average data volume



Source: ACCC

Non-NBN monthly average data volume



Source: ACCC

Why not 5G?

5G use cases compliment fixed access

5G is focused on mobility and IoT

5G offers faster maximum connection speeds than the NBN but coverage is limited

Without FTTP telecom market could take an unwanted path

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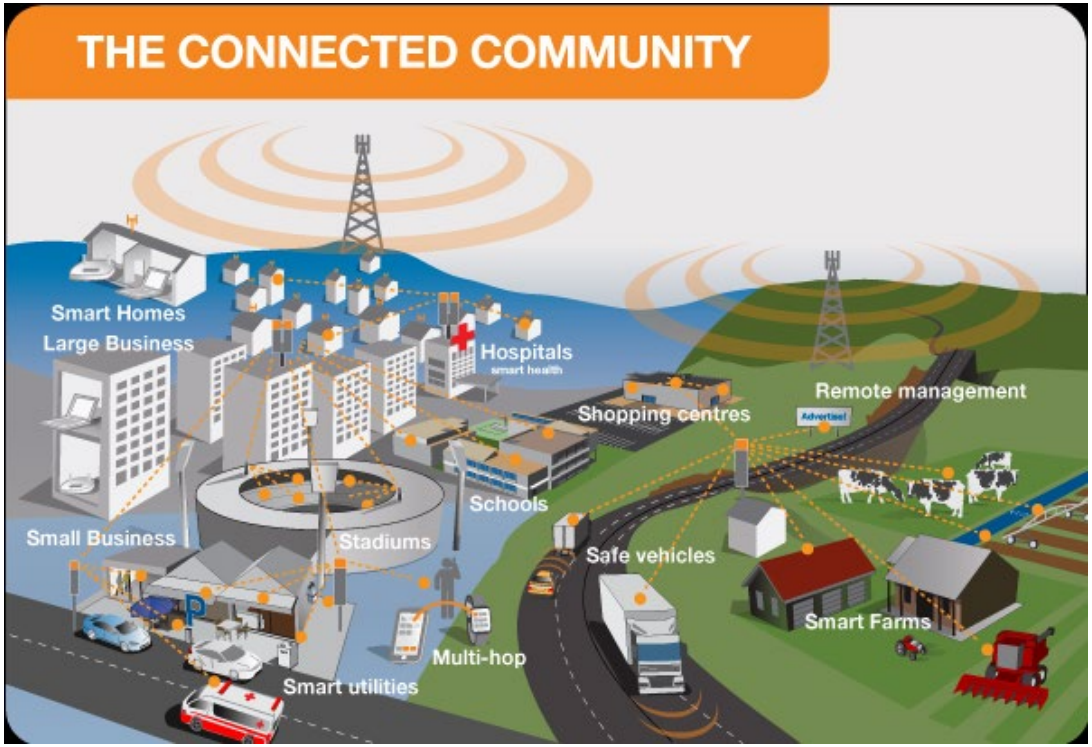
5G The Connected Community

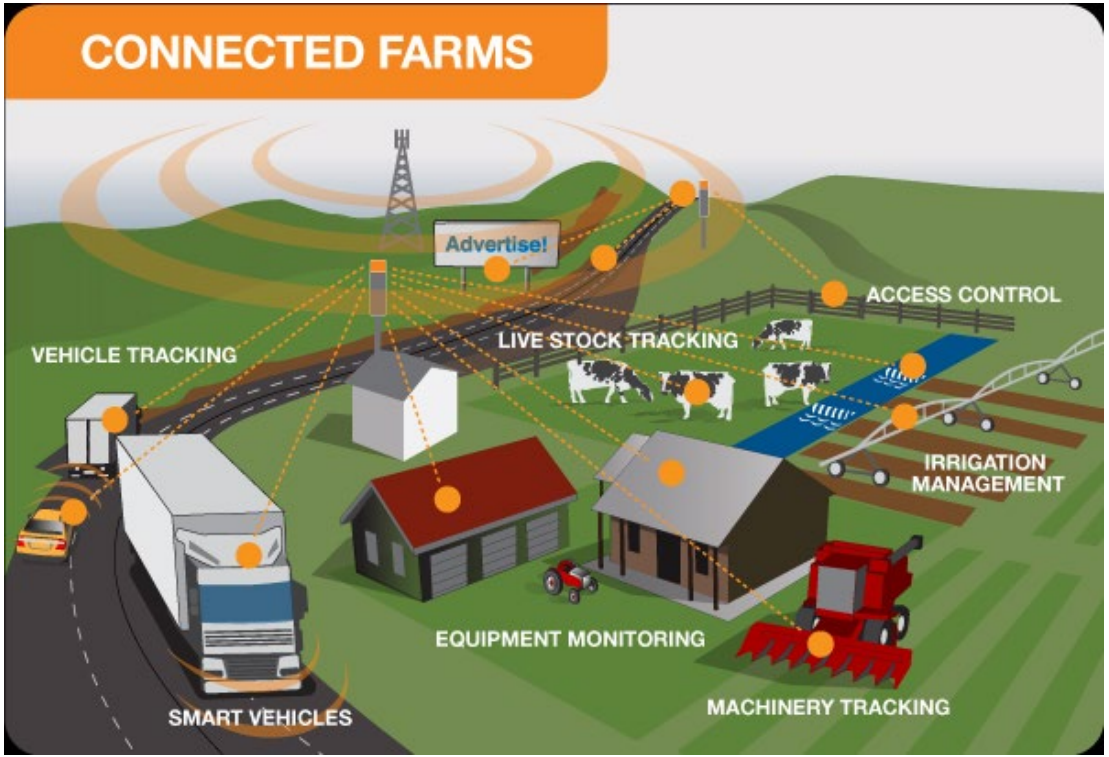


Source: emfexplained.info

5G The Connected Community

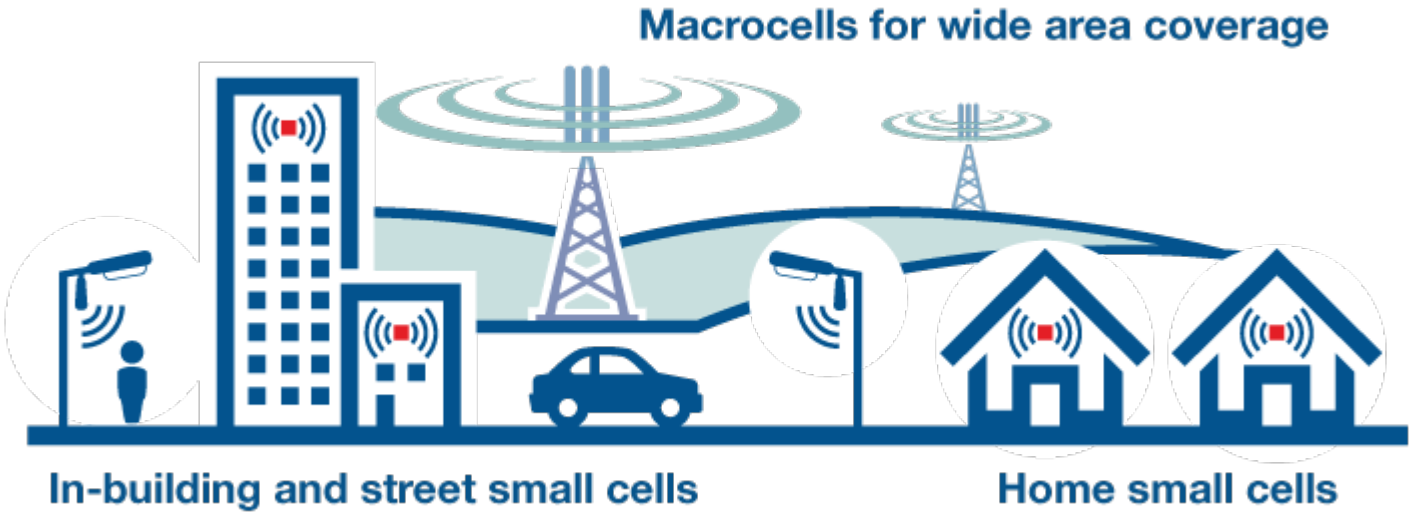
Source: emfexplained.info

5G The Connected Farm



Source: emfexplained.info

5G Small Cells



Source: emfexplained.info

5G small cells - city

200 to 400 metre coverage

High speed broadband

Inside shopping centres, outside in car parks, sporting grounds, along busy streets

5G Small Cells using Satellite links

200 to 400 metres of coverage

Connected to the core network using satellite link

Great for small outback towns or remote tourist spots

Source: Murray Valley Standard and Optus

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5G small cells - homes

5G small cell integrated into NBN modem

coexist with Wi-Fi

Improve mobile cellular coverage in homes

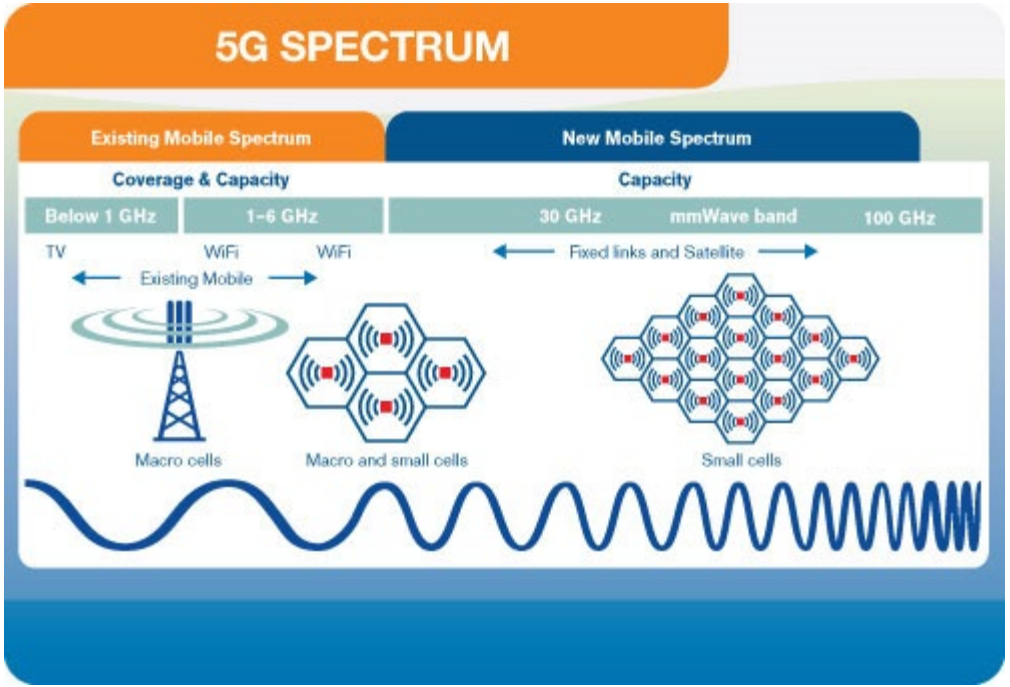
Connect IoT devices into the network

5G Use Case

Massive machine to machine communications

Ultra-reliable low latency communications

Enhanced mobile broadband



APAC Deployments

FTTH Council Asia-Pacific

As of December 2018

APAC 21 countries : Australia, Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Japan, Kazakhstan, Laos, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam

APAC 21 population 2019 4.1 billion

APAC population 2019 4.25 billion

Source: FTTH APAC Market Panorama 2019 & 5G APAC Mini Panorama 2019

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Key Figures

427.7 million FTTH/B subscribers : Australia 0.38 million

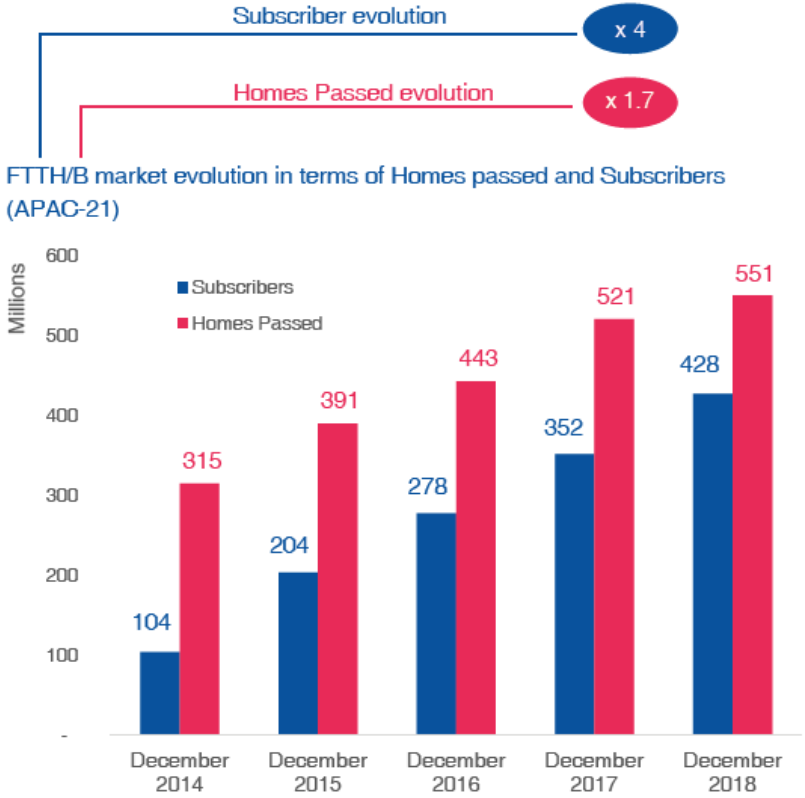
More than 550 million FTTH/B premises passed : Aust 0.45 million

China represents 74% of premises passed

Analysis of about 112 FTTH/B projects

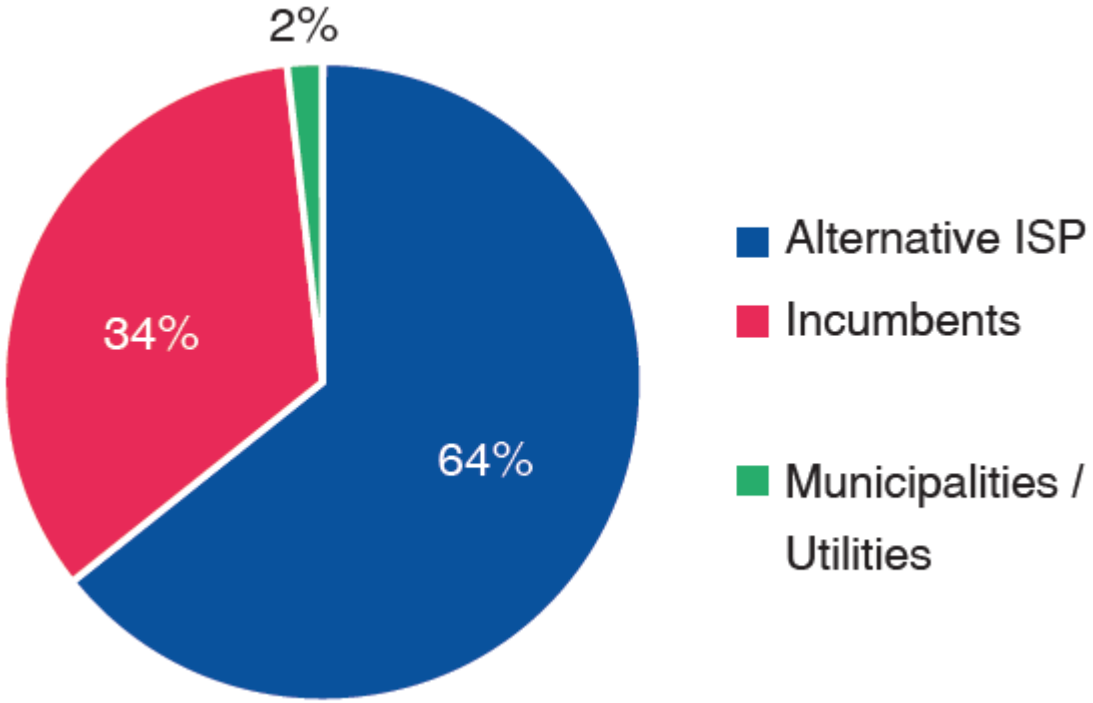
Source: FTTH APAC Market Panorama 2019

FTTH Trends



Source: FTTH APAC Market Panorama 2019

FTTH/B sockets deployed



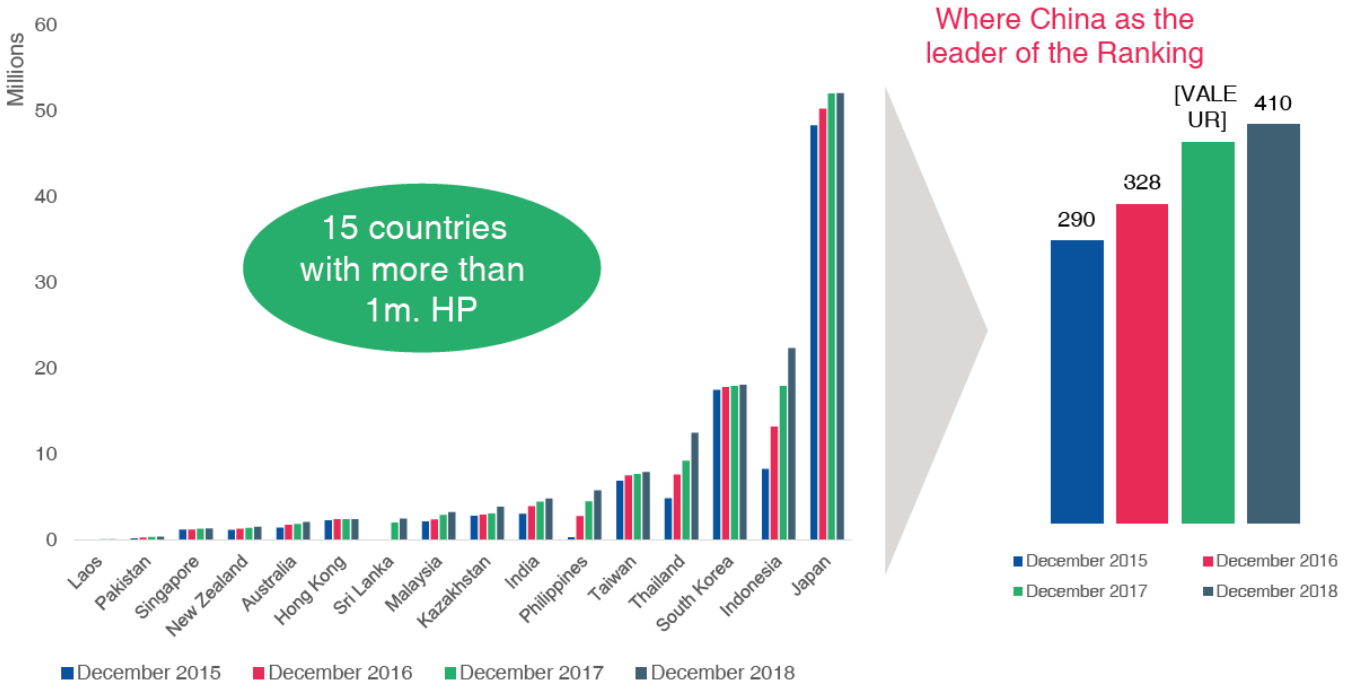
Source: FTTH APAC Market Panorama 2019

FTTH/B Premises Passed Ranking

1. China 410 million
2. Japan 52.08 million
3. Indonesia 22.36 million
4. South Korea 18.1 million
5. Thailand 12.5 million

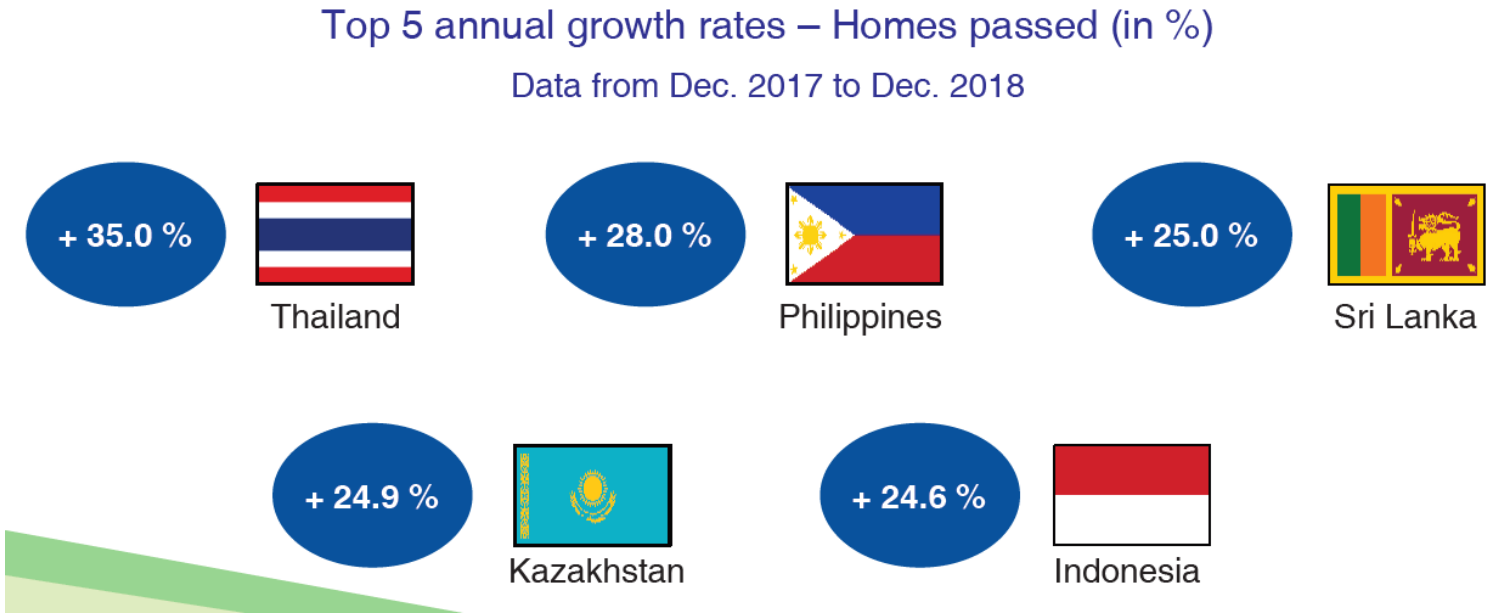
Source: FTTH APAC Market Panorama 2019

Premises passed



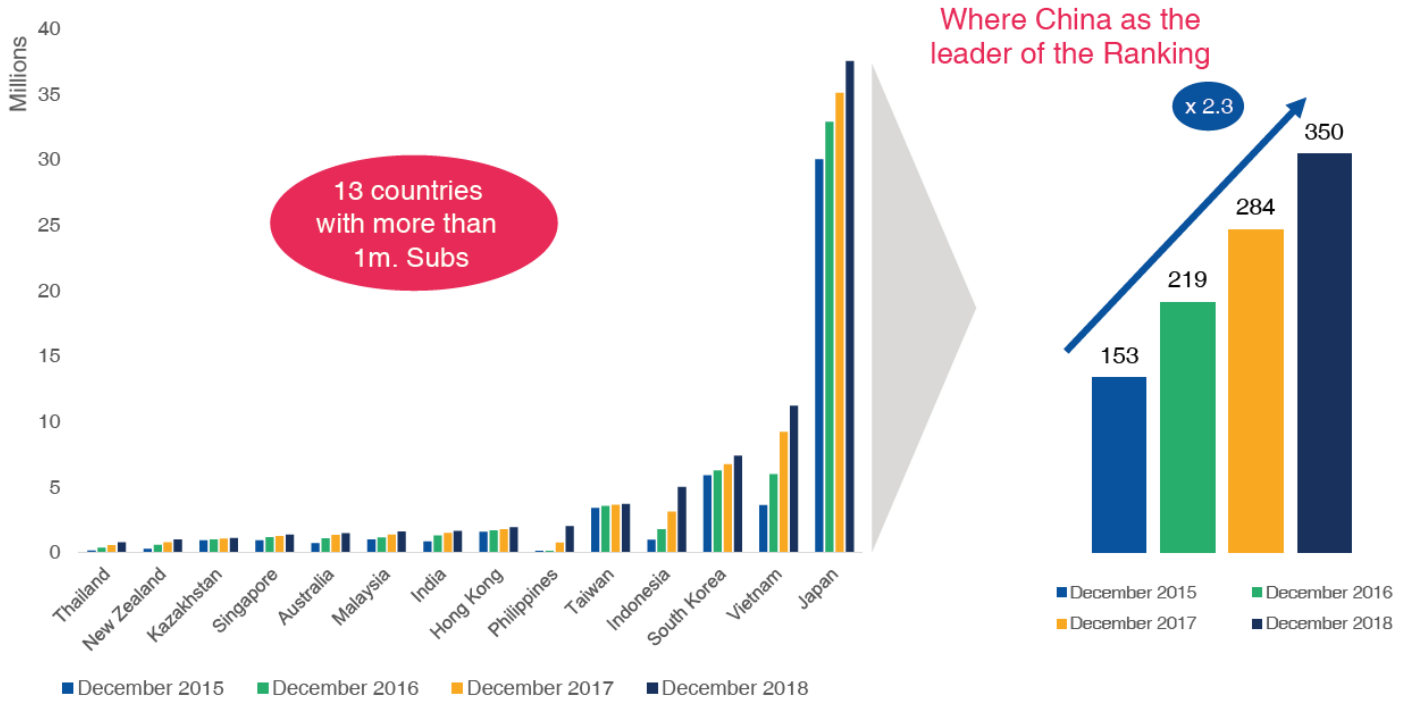
Source: FTTH APAC Market Panorama 2019

Growth rate



Source: FTTH APAC Market Panorama 2019

Subscribers

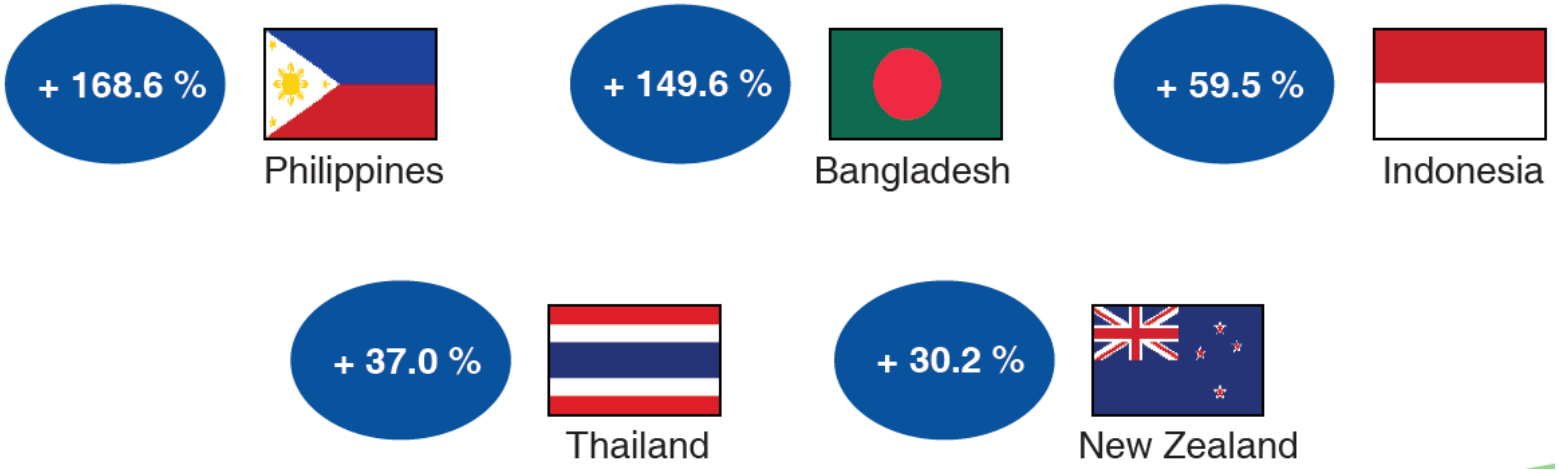


Source: FTTH APAC Market Panorama 2019

Subscriber growth

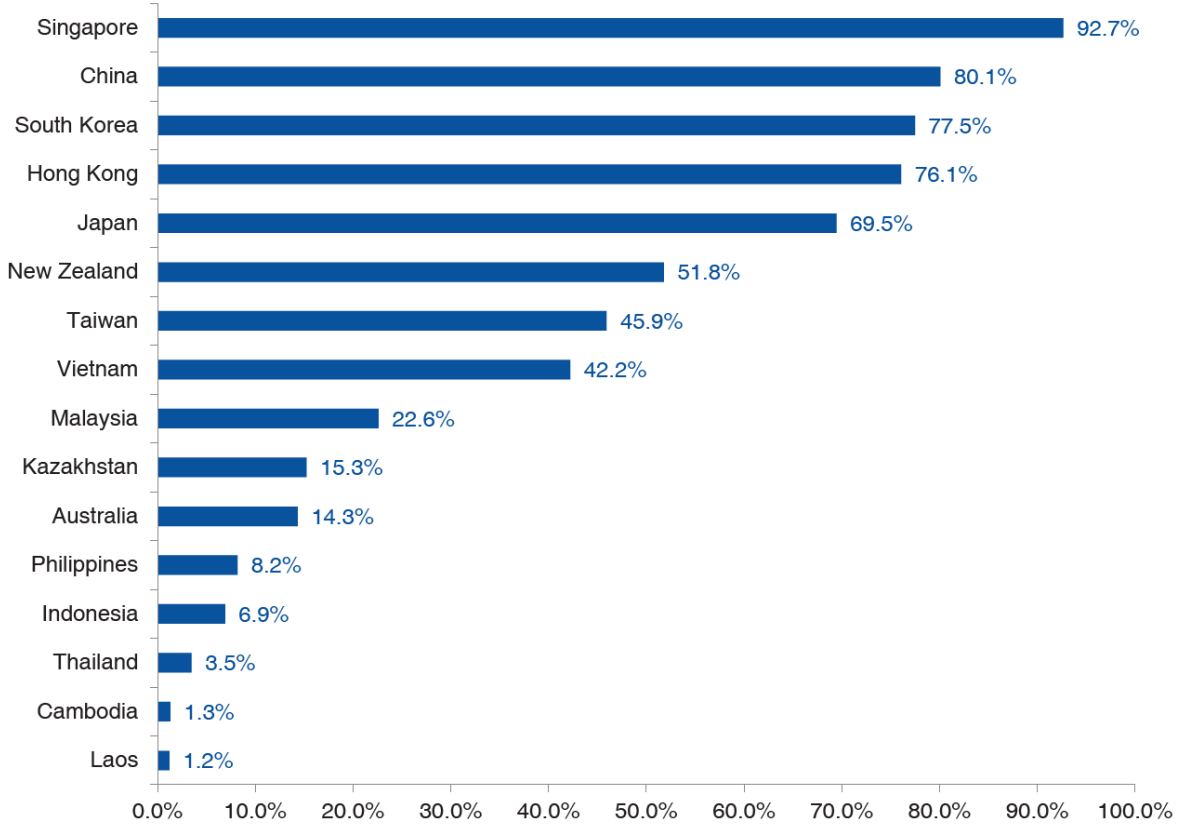
Top 5 annual growth rates –Subscribers (in %)

Data from Dec. 2017 to Dec. 2018



Source: FTTH APAC Market Panorama 2019

FTTH/B Penetration rate



Source: FTTH APAC Market Panorama 2019

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FTTH/B Predictions

- By 2023, Homes passed by FTTH networks are expected to increase by 18% (~649 million homes), while FTTH Subscribers will grow by 35% (~576 million subscriptions)
- Growth will be mainly supported by most densely populated countries (India, China)
- A majority of countries are successfully deploying fiber networks nationwide (Japan, South Korea, etc.), hence operators will be highly focused on fiber adoption

Source: FTTH APAC Market Panorama 2019

Australia versus New Zealand

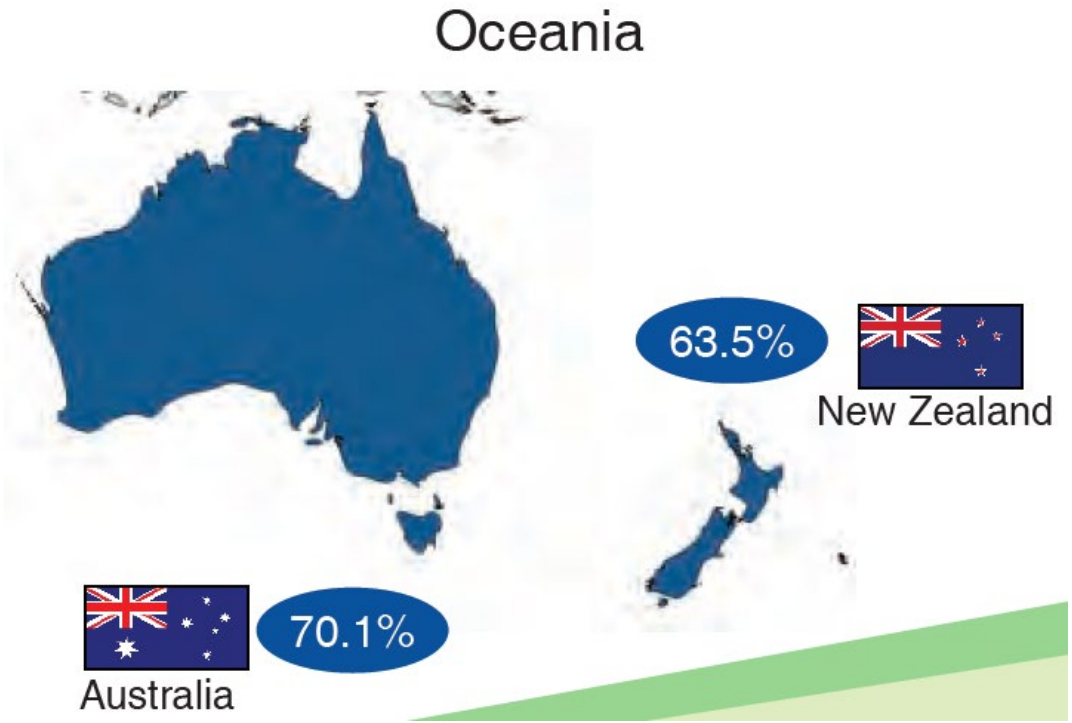
Dec 2019

China 35% premises passed

Australia 5% premises passed – started 2010

New Zealand 80% premises passed – 87% by 2022 – started 2012

FTTH/B Take up rate



Source: FTTH APAC Market Panorama 2019

NBN Key Quarterly Indicators

Total services

6.19 million

↑ 8.89 %

Total CVC capacity acquired

11.16 Tbps

↑ 12.40 %

Average CVC per user

1.80 Mbps

↑ 3.22 %

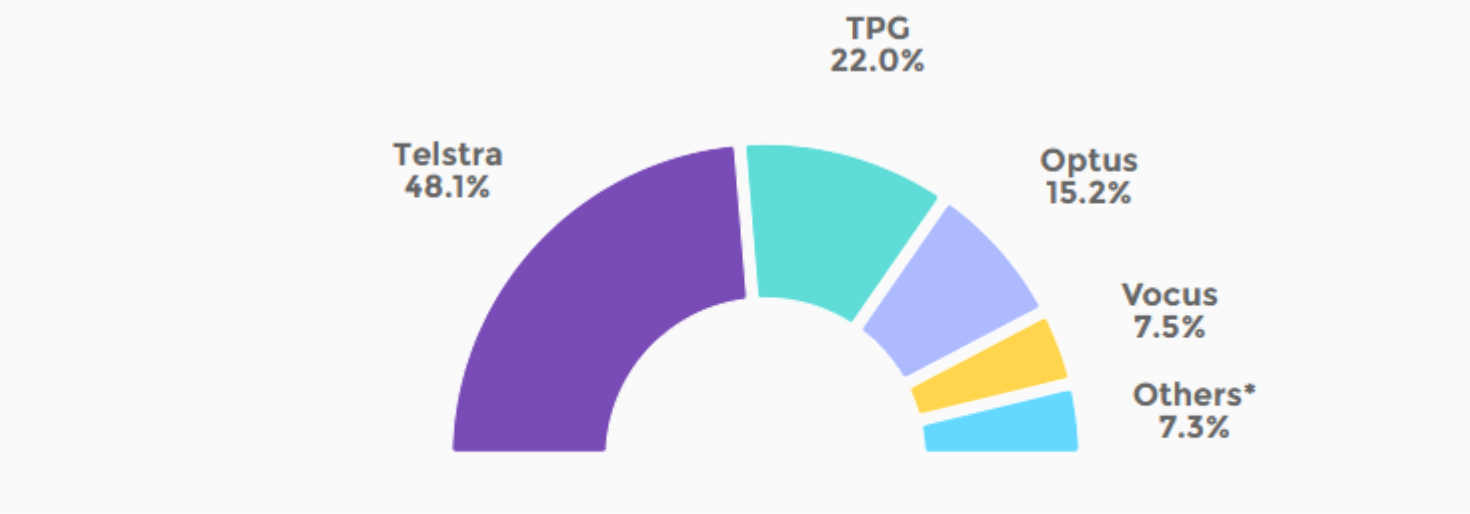
Number of >50Mbps services

4.06 million

↑ 11.76 %

Source: ACCC

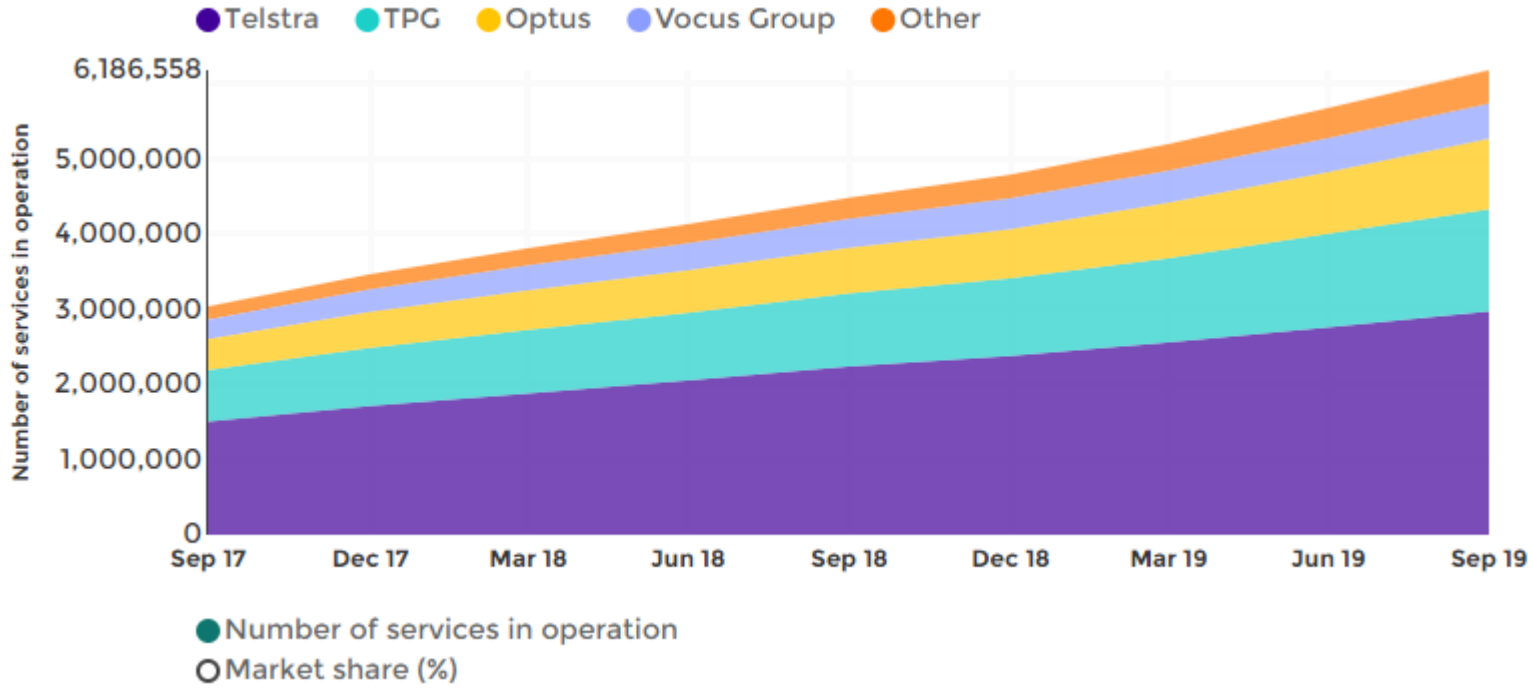
NBN wholesale access seeker



* RSPs classified in the Others category may also acquire NBN services from an aggregation provider in addition to wholesale services directly acquired from NBN Co. As such, the retail market share of the Others group will be higher.

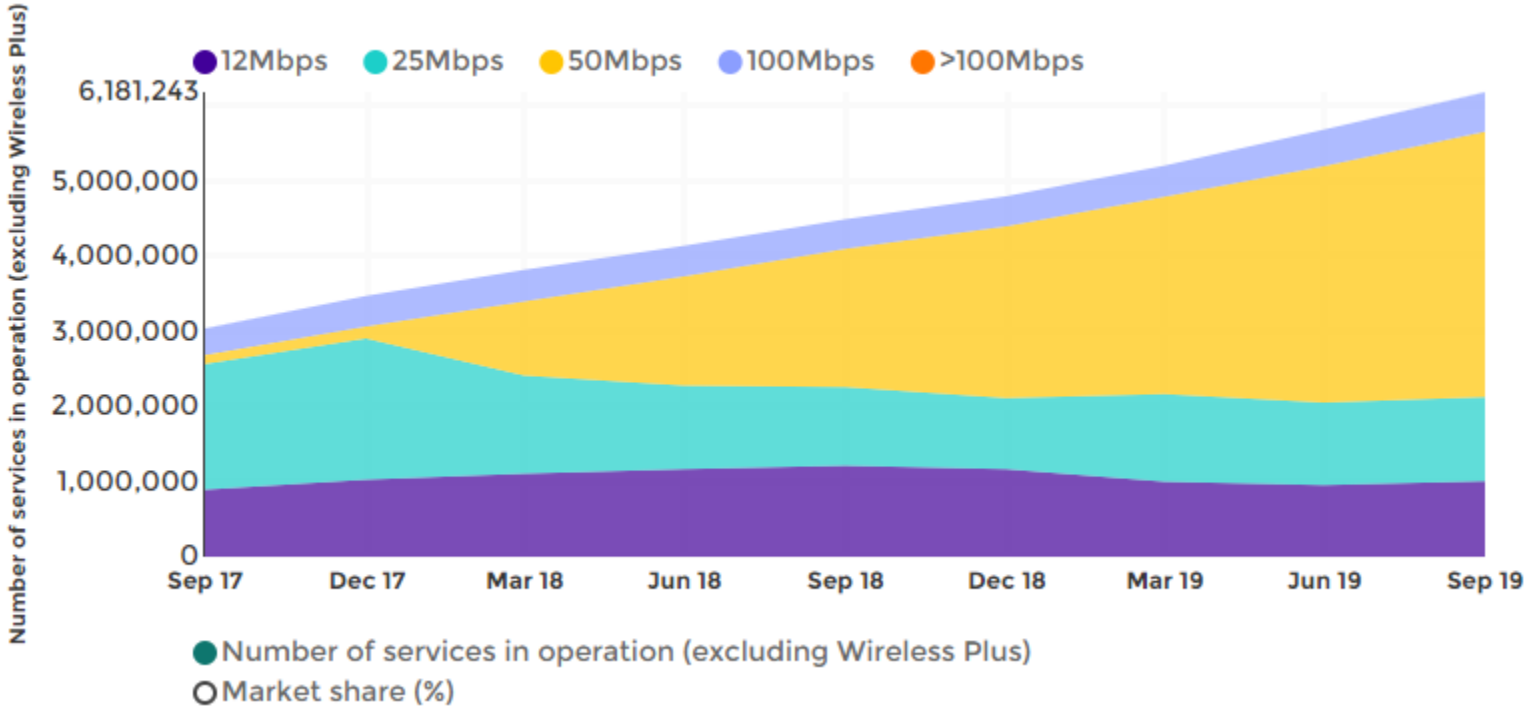
Source: ACCC

NBN wholesale access seeker timeline



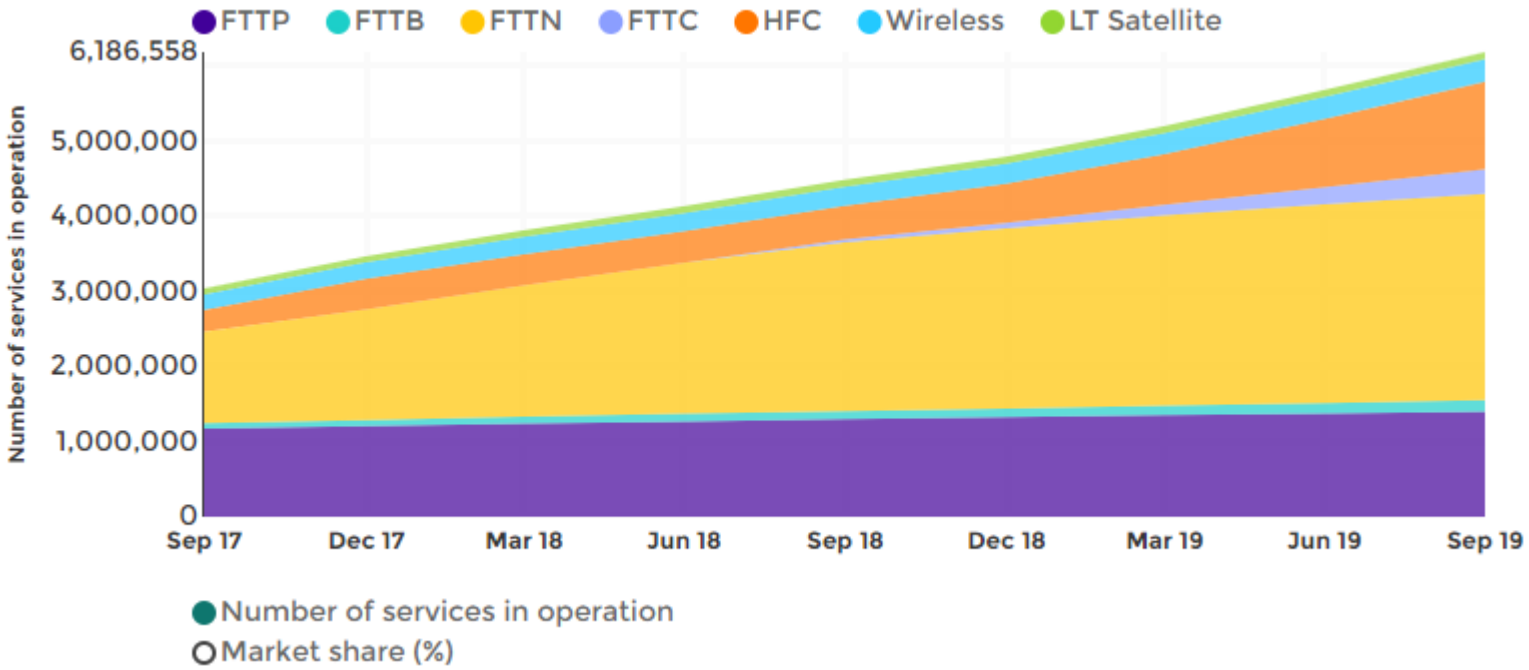
Source: ACCC

NBN data rate



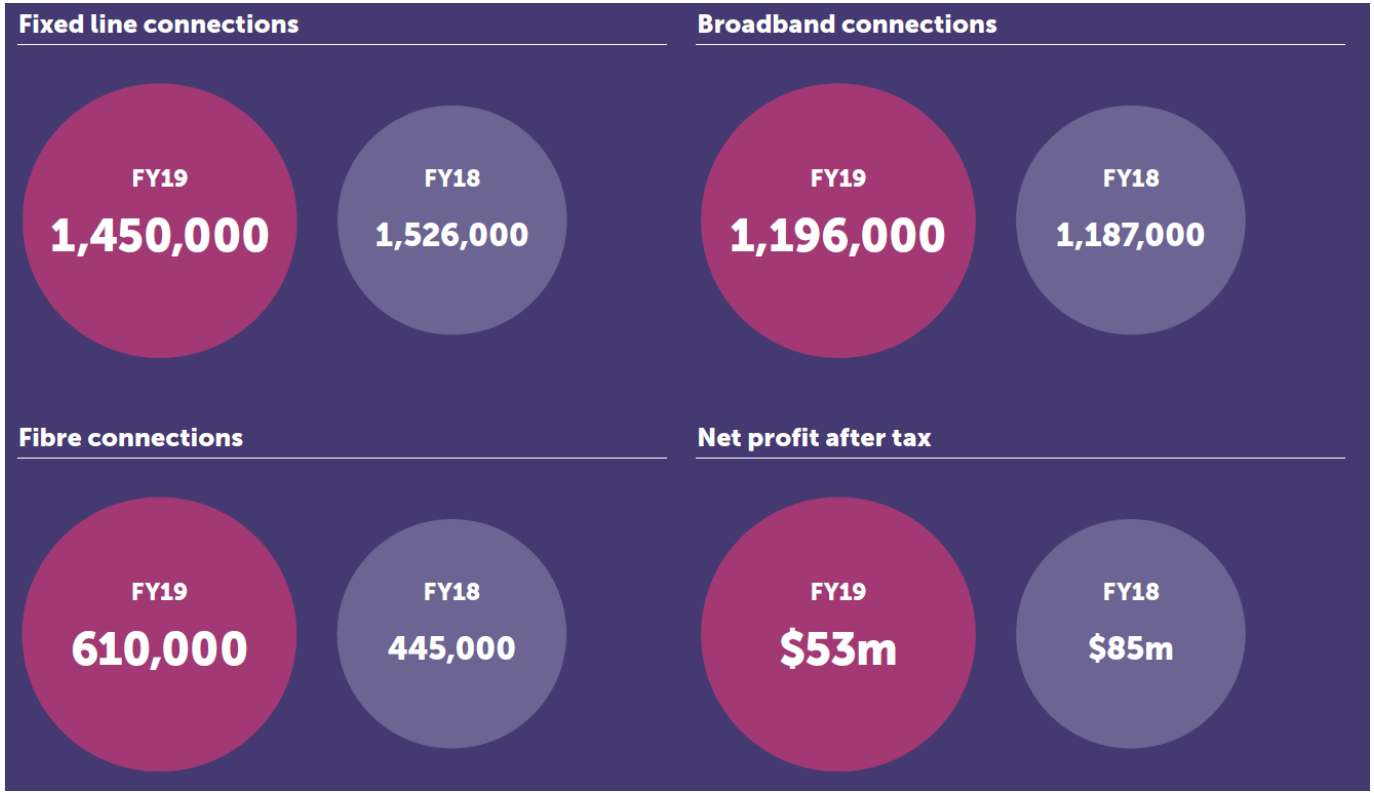
Source: ACCC

NBN technology type



Source: ACCC

Chorus key indicators FY2019



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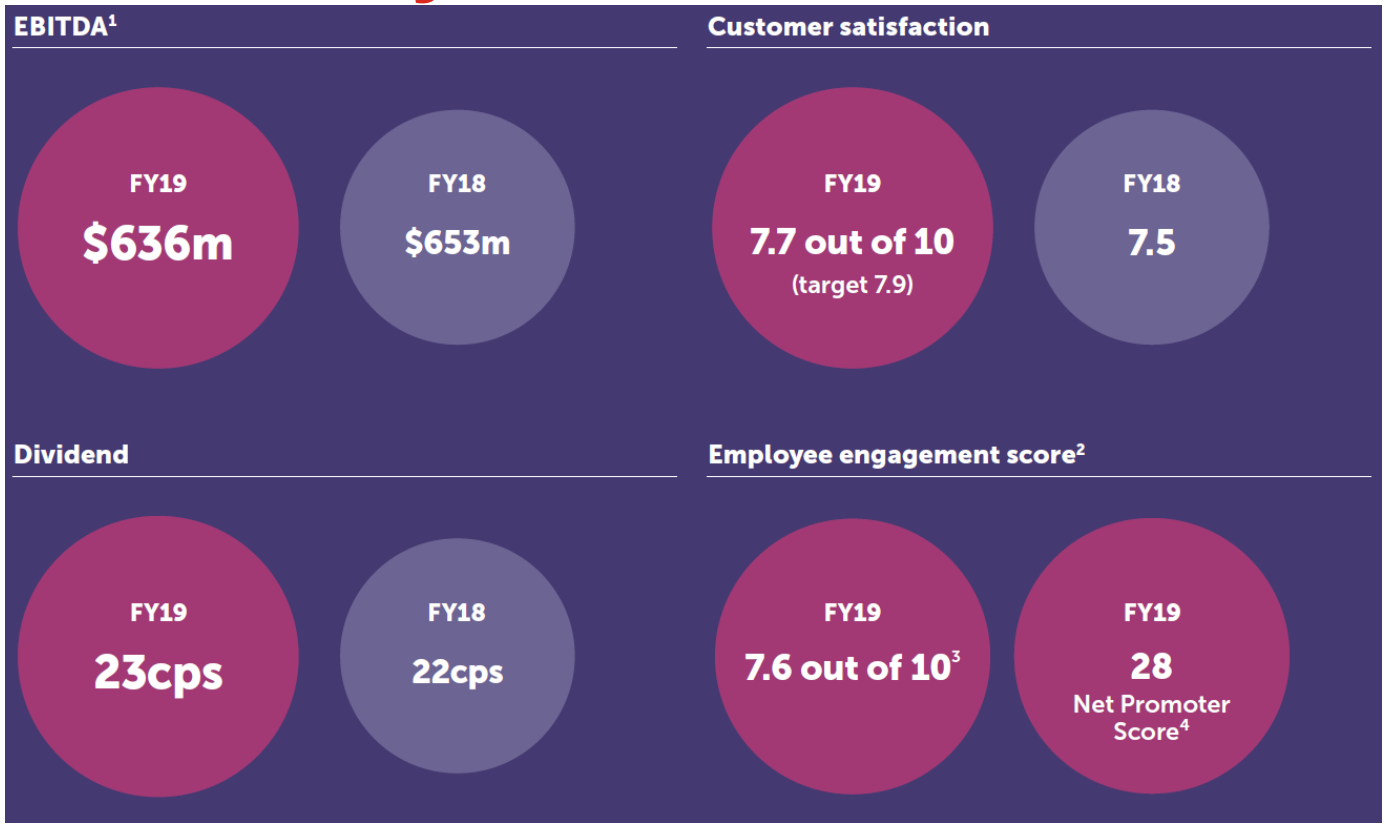
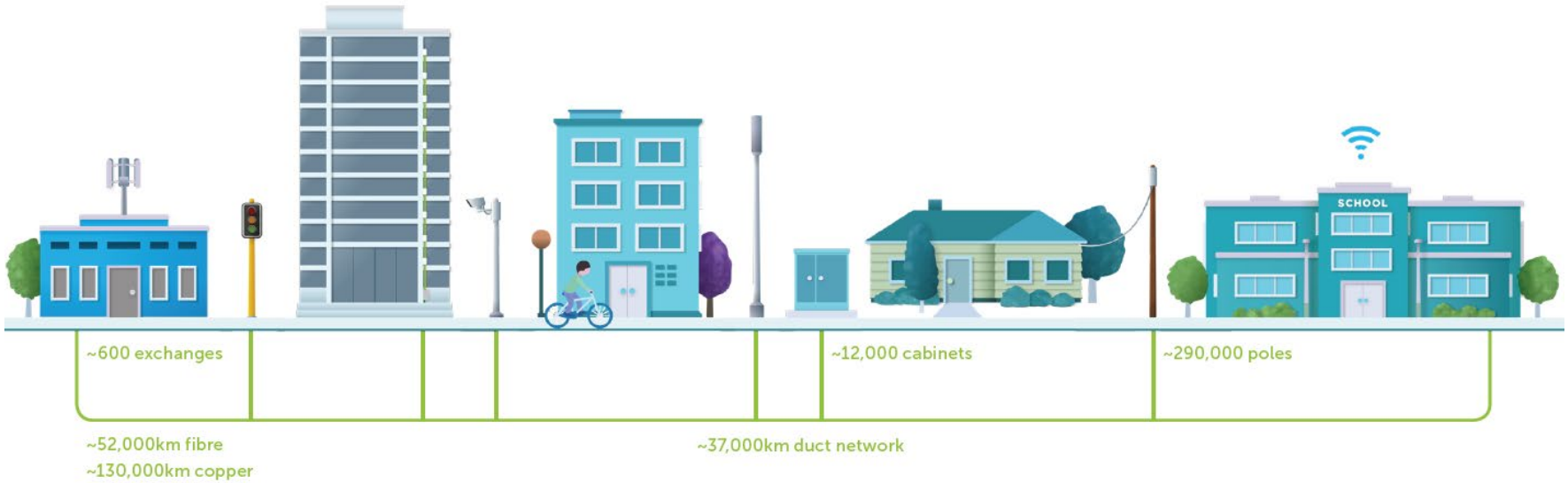
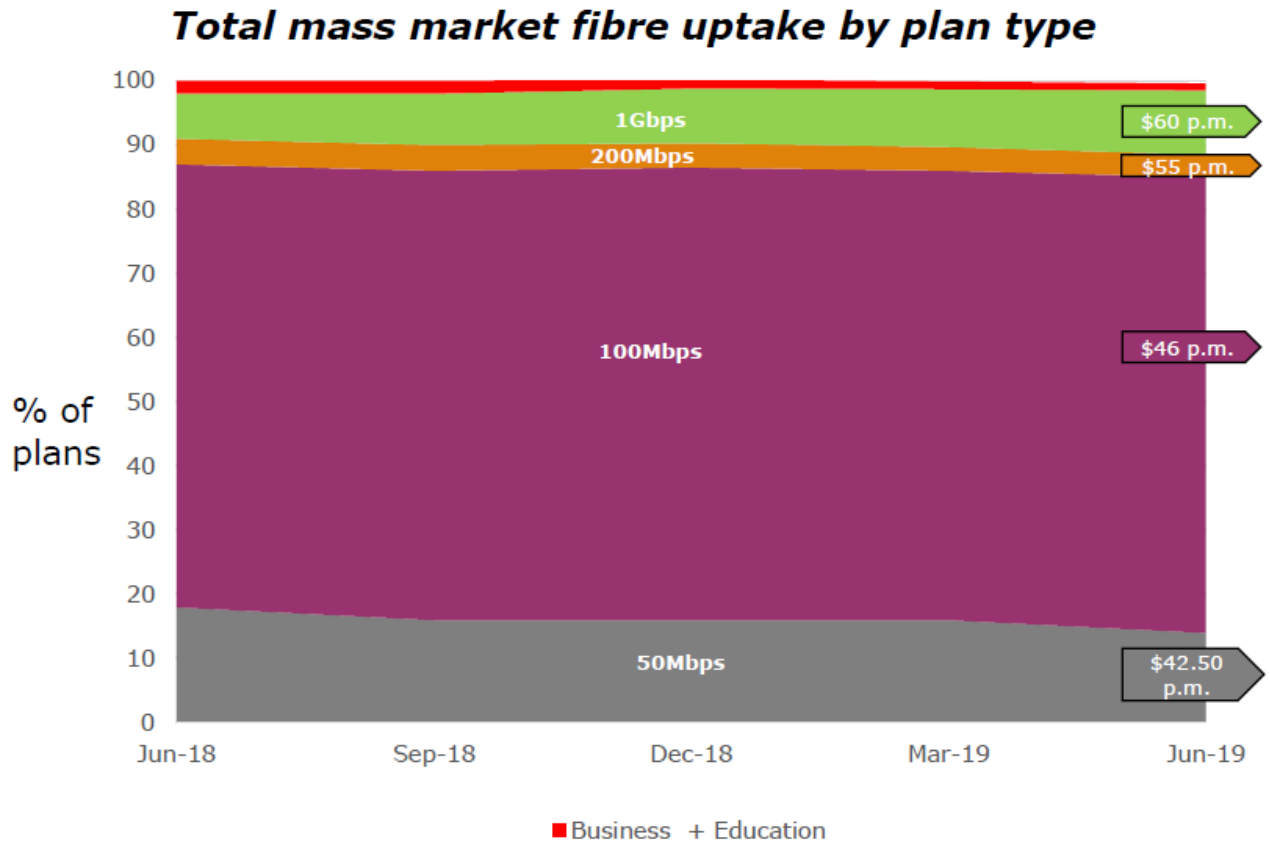
Chorus key indicators FY2019



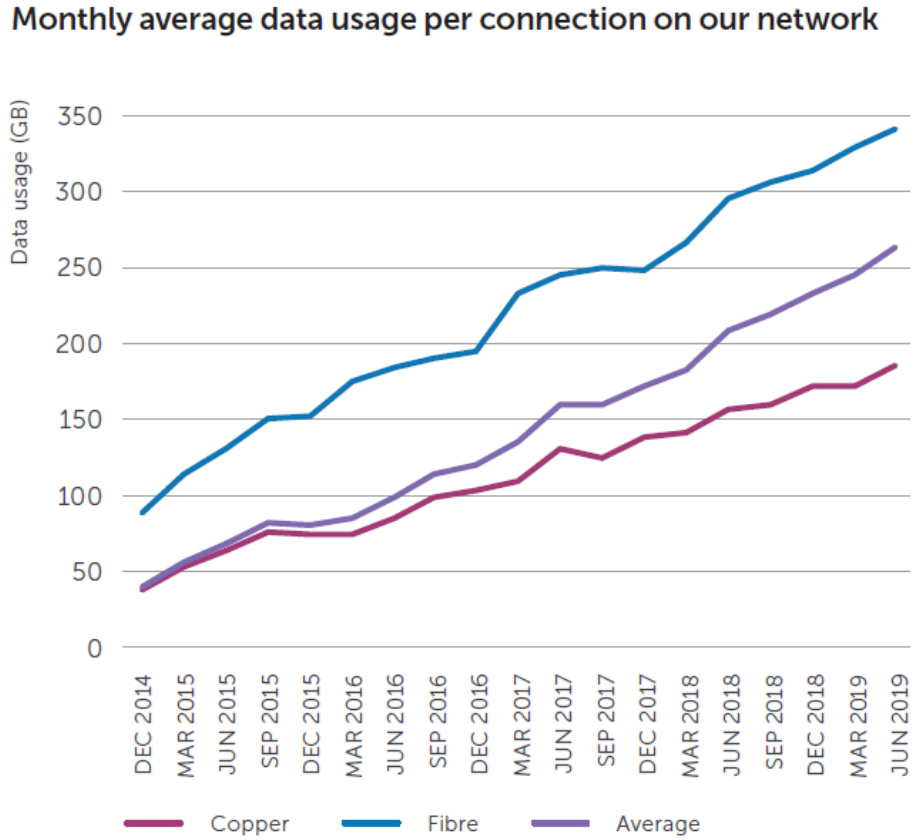
Chorus deployment



Chorus fibre uptake



Chorus data usage



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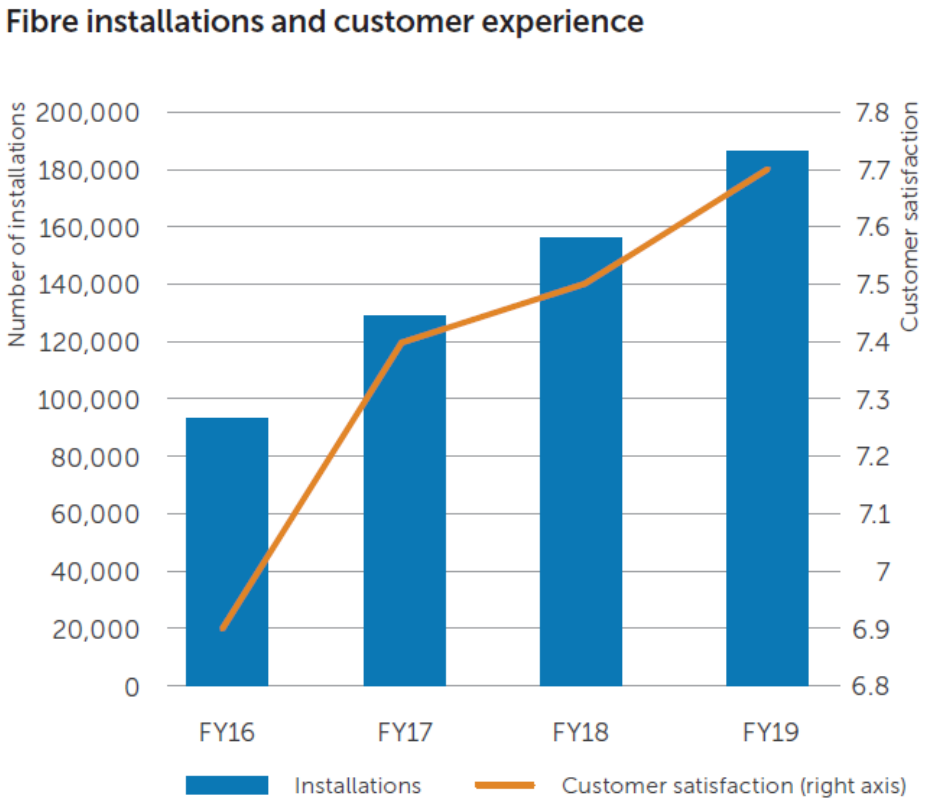
Chorus customer satisfaction



Chorus deploys XGS-PON

"Hyperfibre" – 2 Gbps and 4 Gbps initially with 8 Gbps coming later

Launch February 2020

Anticipated usage of 1000GB per month by 2024

100/20 Mbps Retail

Rough comparison – evening speeds

MyRepublic NZD$65 per month unlimited data

iinet AUD$100 per month unlimited data (about 81 Mbps)

Spark NZD$110 per month unlimited data plus one phone

Telstra AUD$120 per month unlimited data plus one phone (about 88 Mbps)

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200/20 Mbps Retail

Vodafone NZD$110 per month unlimited data

Australia – don’t bother asking

FTTP comparison

NBN Co AUD$4398 – almost no change since 2011

Chorus NZD$2700 – over 40% decrease since 2012

Note: NBN Co FTTC AUD$3129

NBN Co 100 Mbps takeup 17%

Chorus 100 Mbps or higher takeup 80%

NBN Co OPEX increasing due to copper

Chorus OPEX decreasing as copper retired

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Comparison 2020

New Zealand – future proof, do it once, reasonably priced, 10Gbps

Australia – already obsolete, do it many times, expensive, 50 Mbps (if you're lucky)

Most nations are going to FTTH/B, not multi-technology mix and not FTTC

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Questions?