

Milner Consulting Limited

ITNAC 2017

"Superfast Broadband"

An international case study on how New Zealand is building its superfast broadband network

Presented by
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22 November 2017

Overview

- ❑ Introduction
- ❑ The UFB, RBI and MBS Initiatives
- ❑ Outcome Expected by 2025
- ❑ Current Progress
- ❑ International Comparisons
- ❑ Superfast Broadband
- ❑ Conclusions



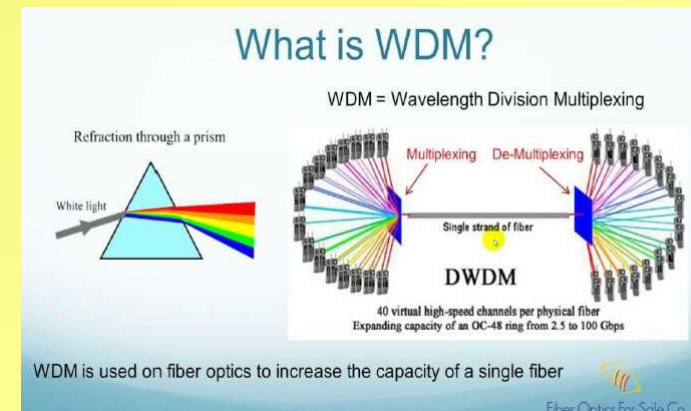
Acknowledgements

- ❑ Much of the material used in this presentation has been supplied by Crown Infrastructure Partners, of which I am a Director
- ❑ I am most grateful for this source of factual material
- ❑ However, I note that any opinions expressed in this presentation are mine alone and should not be attributed to Crown Infrastructure Partners

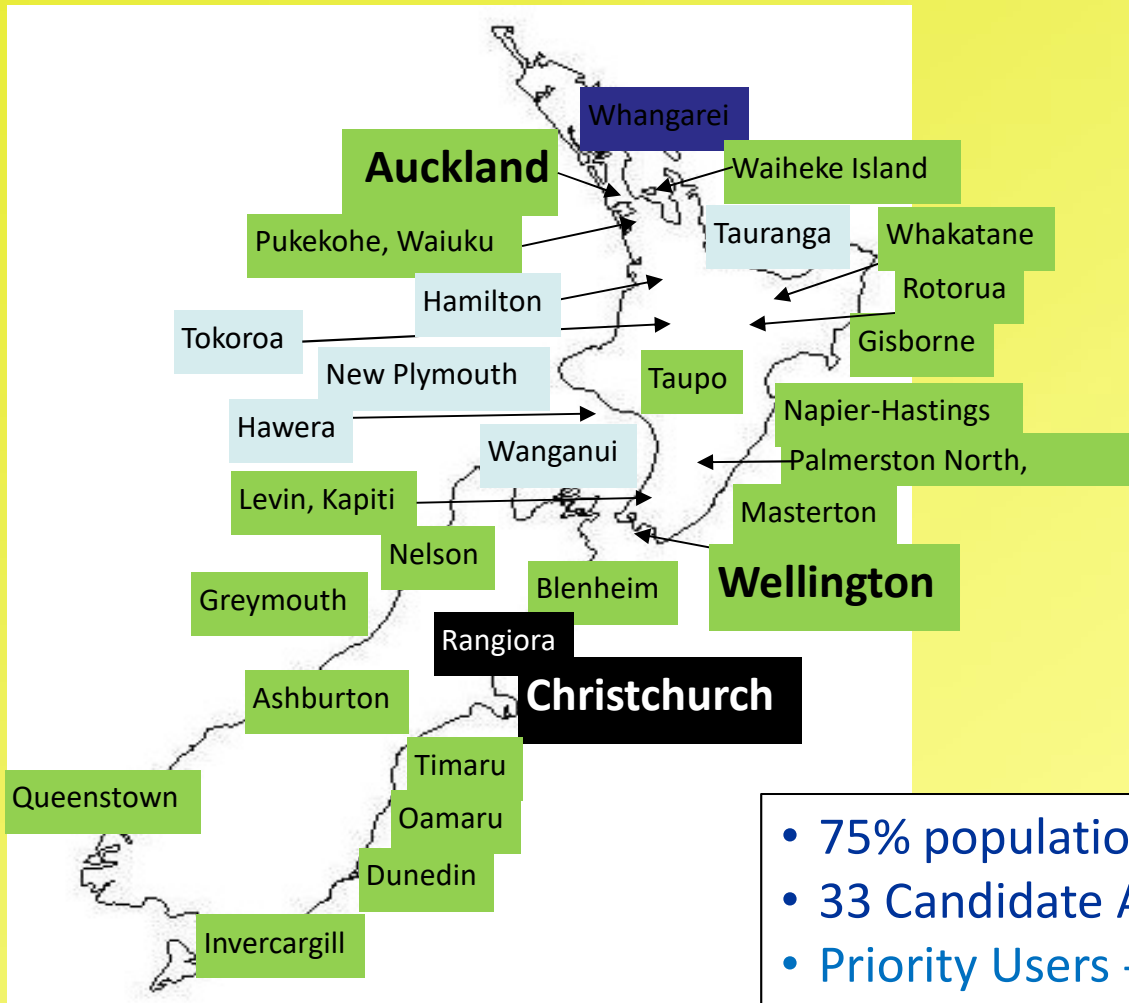


Fibre Optic Transmission in NZ

- ❑ **1983:** First fibre optic cable system installed
- ❑ **1985:** 620Mbps fibre optic cable systems in widespread use
- ❑ **1988:** Large capacity fibre optic systems in CBDs
- ❑ **1996:** Telecom installs First Media Hybrid Fibre and Coaxial Cable
- ❑ **2004:** 10Gbps DWDM systems deployed
- ❑ **2007:** Telecom deploys Fibre to the Node
- ❑ **2011:** UFB deployment commences
- ❑ **2014:** 100Gbps DWDM OTN
- ❑ **2017:** 40% take-up of FTTP



UFB1 Initiative: Launched in 2009



	Candidate Areas	% of UFB
	2	15.3
	1	1.6
	24	69.4
	6	13.7
	33	100.0

- 75% population - end 2019
- 33 Candidate Areas
- Priority Users - end 2015
- ~ 4m pop, 1.3m dwellings/business premises

UFB Contractual Obligations

CIP UFB contract management

- Network build quality
- Network build timing
- Product price caps
- Product specifications national
- Provisioning service levels
- Fault repair service levels
- Network performance
- Network availability

The above functions will move to the Commerce Commission in 2020 as a result of the recent review of the Telecommunications Act 2001

Retailers: Wholesale Services Agreement

- Governs relationships between Retailers and Wholesale Fibre Providers (LFCs and Chorus)
- Agreed by Industry through TCF
- CIP has some limited oversight
- Contains installation standards
- Pricing, rebates, penalties
- General terms
- Product specifications

Expire by 2020, new agreements or extensions to be put in place.

UFB Service Examples

Service	PIR Up (Mbps)	PIR Down (Mbps)	CIR (Mbps)	EIR (Mbps)	Wholesale Data Cap
GPON Res.	10	30	2.5 min/10 max	PIR-CIR	No
GPON Bus & Res	50 or 100	100	2.5 min/10 max	PIR-CIR	No
P2P 100M	100	100	10 min/100 max	PIR-CIR	No
Bitstream 3	2.5 min to 100 max	2.5 min to 100 max	CIR = PIR	EIR = 0	No
P2P 1G	1G	1G	100 min/1G max	PIR-CIR	No
P2P 10G	10G	10G	1G min/10G max	PIR-CIR	No
Bitstream 4	100 min/1G max	100 min/1G max	CIR = PIR	EIR = 0	No
Dark Fibre	User defined	User defined	User defined	User defined	No

Notes:

- Dark fibre POIs can be different to Layer 2 POIs
- Access Diversity available for P2P services upon request

Installing UFB



Aerial build



Cabinet installation CHCH



Trenching Tauranga



Drill site clearing pot-hole

UFB Passive Cabinet

Chorus install multiple Vans



Chorus U/g splitter
16:1 fibre splits x3



NP Install external
termination point



Fence Line Install



Commercial In Confidence

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UFB Layer2: GPON Today



Core aggregation switch in Central Office/POI
Aggregates traffic to pass to Retailers



Optical Line Terminal (OLT)
Optical equipment that "light" the fibre with lasers to carrying internet data



Optical splitter in cabinet
Light from a single fibre is split 24:1 to 24 individual fibres for each house



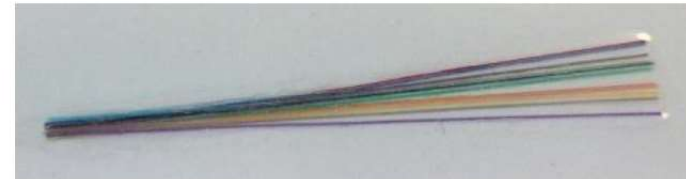
Micro ducts in cabinet
Fibre is blown through micro-ducts to the home



External termination point on house where fibre enters the house



Optical termination unit (ONU)
converts optical light to Ethernet in the home



Individual glass fibre strands the thickness of a human hair



Retailer router connects to ONU with Ethernet cable provides voice, Wi-Fi & internet in the home

Not All Plain Sailing

Ramp-up

Build Costs

Build Quality

Debt
Management

Partner Stress

Health and Safety

Connection
Costs

Connection
Delays

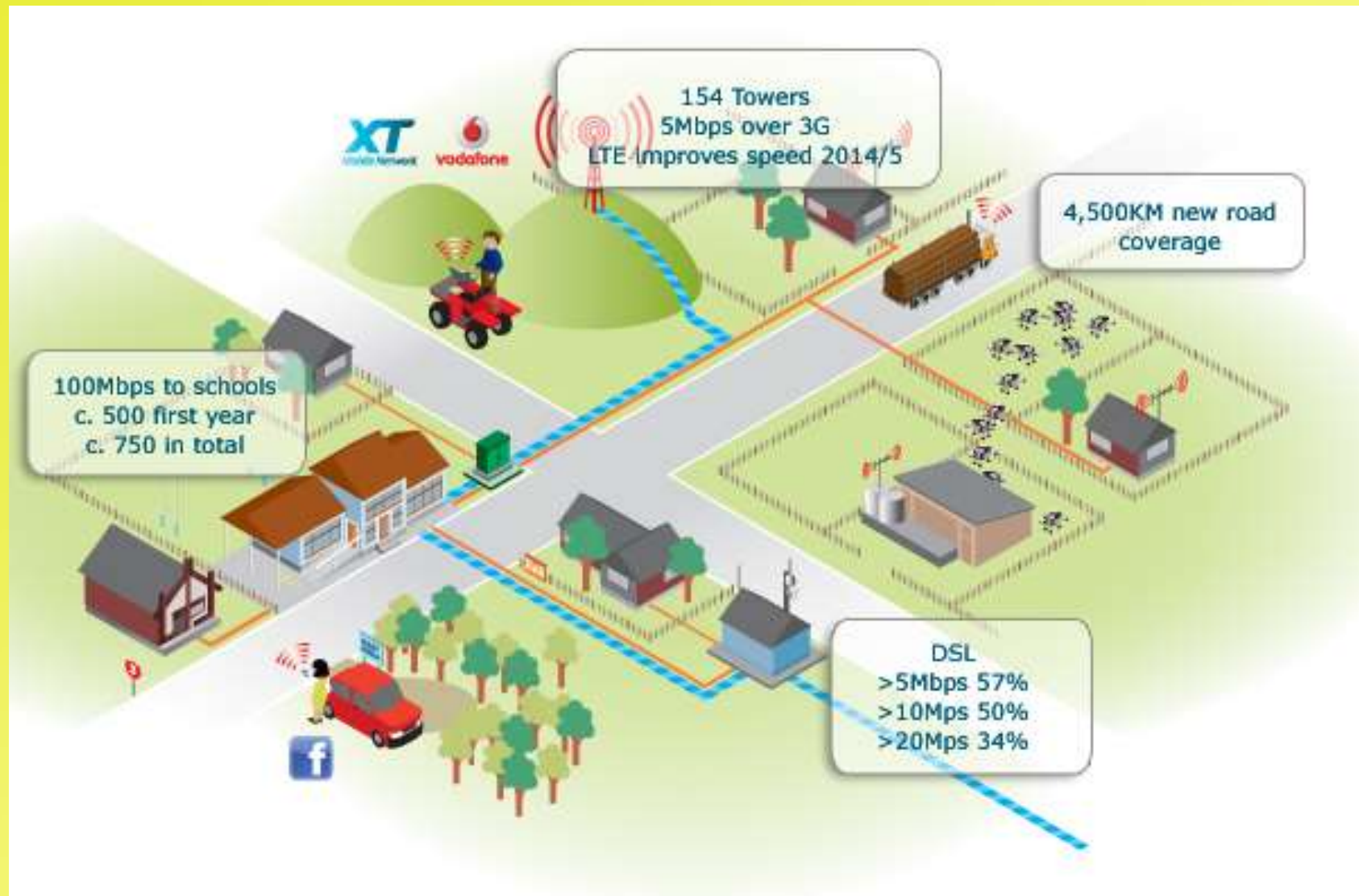
Connection
Quality

Consents for MDUs
and ROWs

Customer
Dissatisfaction

RSP Challenges

Expected RBI1 Outcome At A Glance



Actual RBI1 Wireless Outcomes



75%

of rural New Zealand can access broadband



480 RBI

cell sites have been built and upgraded



200 4G

rural cell sites have been built and upgraded

Fixed Wireless Outcomes Using Cellular Technology



40 MBPS

download speeds achievable with 4G



290K

addresses with broadband access



270%

increase in rural data usage

UFB Extension

Region	Pop. covered by UFB 1 (%)	Pop. covered by UFB expansion (%)	Total pop. covered by all UFB (%)
Northland	30%	28%	58%
Auckland	92%	3%	95%
Waikato	51%	26%	77%
Bay of Plenty	68%	15%	83%
Gisborne	73%	4%	77%
Taranaki	57%	20%	77%
Hawke's Bay	71%	12%	83%
Manawatu-Wanganui	60%	18%	78%
Wellington	92%	4%	95%
Nelson / Tasman	62%	17%	79%
Marlborough	58%	19%	78%
West Coast	22%	43%	65%
Canterbury	76%	8%	83%
Otago	63%	21%	84%
Southland	46%	29%	75%
Total across regions	75%	11%	86%

- Original UFB: 75% population (50 towns/cities)
- UFB expansion: 11% more population (340 towns)
- **UFB overall by 2022: 86% population (390 cities/towns)**
- Private fibre 1% (Chorus, four lines companies) brings total fibre coverage to ~87%.



Rural Broadband Programmes: RBI2 and MBSF

Rural Connectivity Group



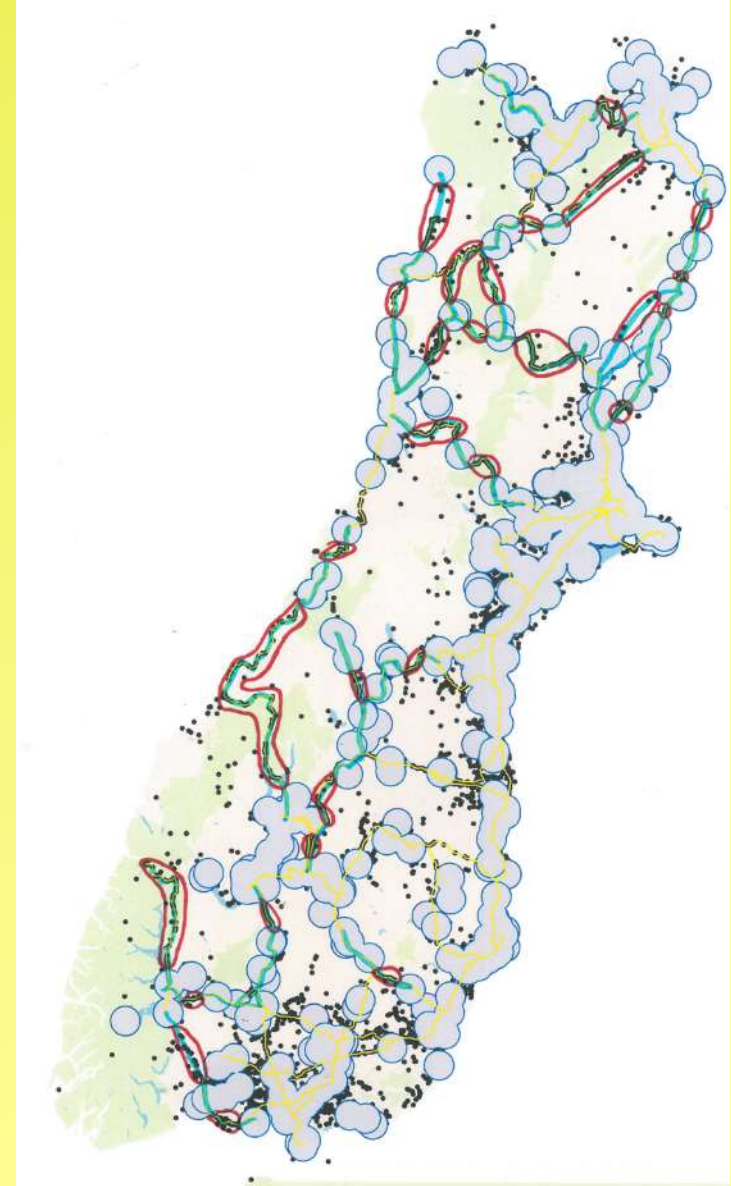
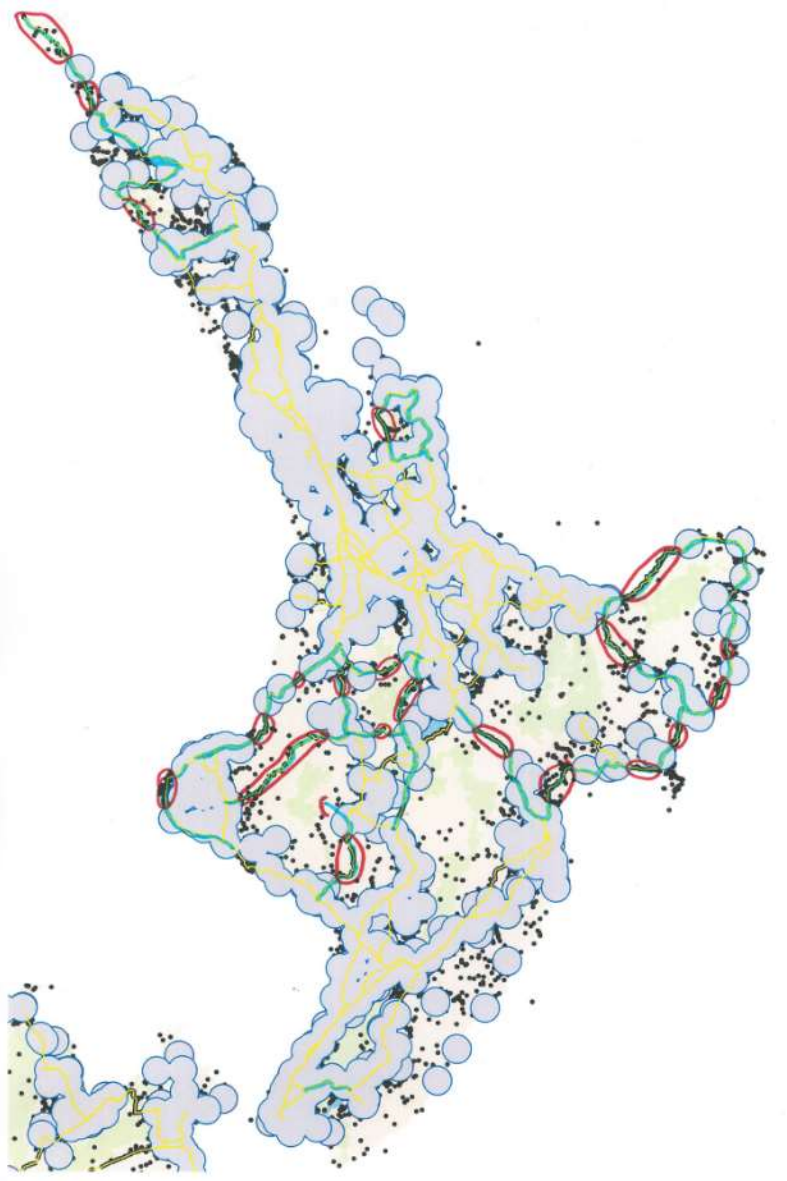
\$150m base contract
 ~35,000 rural end users contracted (~32,000 contracted to be built commercially with no Government funding)
 400 – 454 towers
 1000km state highway MBSF
 100 tourist sites
 \$100m expansion committed funding

Wireless Internet Service Providers (WISPs)



\$8m base contracts
 ~7k End Users
 \$5m expansion committed funding

Rural Broadband 2 and Mobile Black Spots



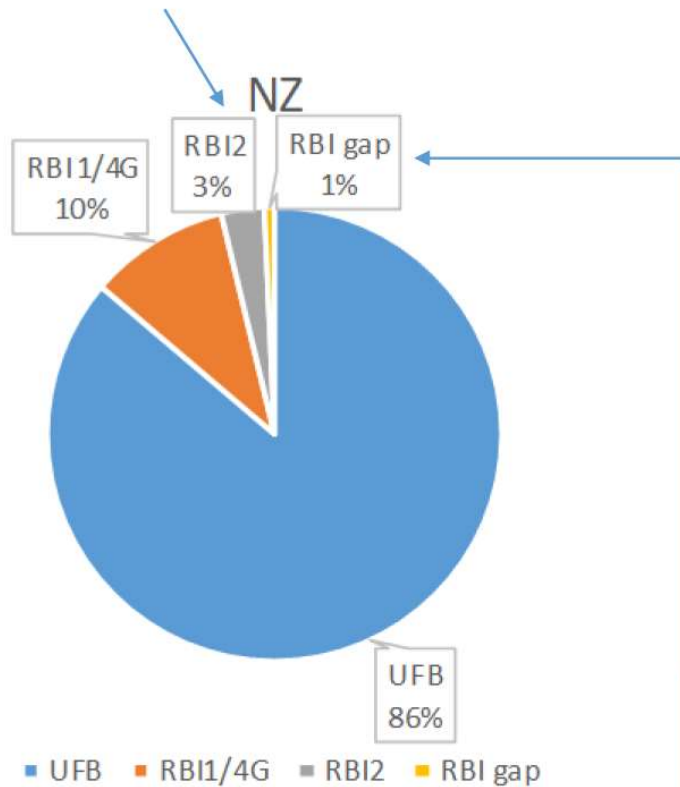
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Rural Broadband Outcomes

New population % coverage under RBI2/MBS programme (base contracts)



RBI gap refers to the % of population that will not have reasonable broadband access after the first round of contracting, expansion focus is to reduce this gap.

Region <i>(NB: This table shows percentage of end-users in scope for RBI2/MBS)</i>	End-users covered (%)	End-users not yet covered (%)
Northland Region	68%	32%
Auckland Region	77%	23%
Waikato Region	82%	18%
Bay of Plenty Region	72%	28%
Gisborne Region	82%	18%
Taranaki Region	82%	18%
Hawke's Bay Region	92%	8%
Manawatu-Wanganui Region	88%	12%
Wellington Region	91%	9%
Nelson Region	68%	32%
Marlborough Region	61%	39%
Tasman Region	70%	30%
West Coast Region	71%	29%
Canterbury Region	94%	6%
Otago Region	86%	14%
Southland Region	83%	17%
Total across regions	81%	19%
Converted to population percentage	3%	1%

MBSF Outcomes



Region	Target Mobile towers	MBSF Tourism Sites	MBSF State Highway KMs
Northland	51	13	96
Auckland	21	1	10
Waikato	51	10	50
Bay of Plenty	30	9	42
Gisborne	11	0	86
Taranaki	15	2	62
Hawke's Bay	41	5	95
Manawatu-Wanganui	34	4	67
Wellington	24	2	0
Nelson	4	1	18
Marlborough	15	2	51
Tasman	28	7	52
West Coast	27	14	154
Canterbury	46	17	100
Otago	26	10	120
Southland	30	11	37
Total across regions	454	108	1041

Expansion Options

- ~1,000km of State Highways with black spots remaining
- 8 State Highways to be prioritised as no coverage
- ~80 tourist sites remaining to be covered, expansion will focus on remaining key sites with highways.

UFB Progress to June 2017

1.2 MILLION HOUSEHOLDS AND BUSINESSES ABLE TO CONNECT

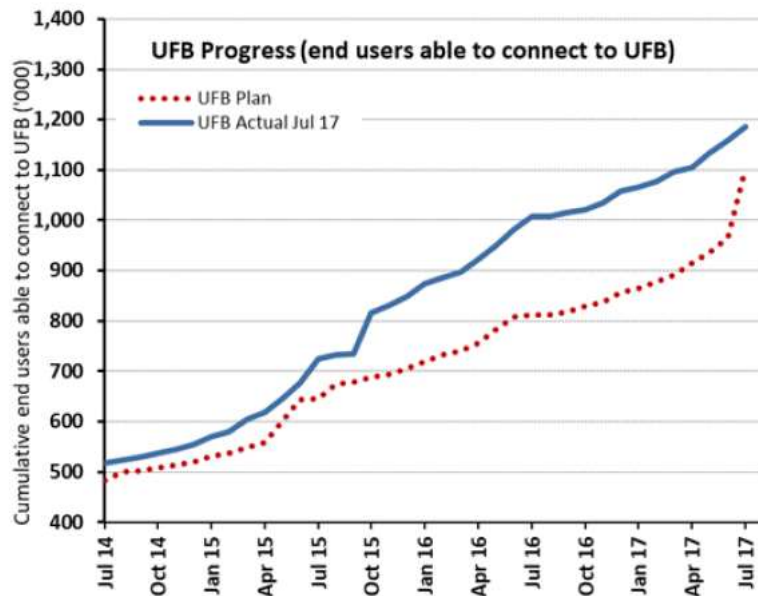
35% UPTAKE

413,047 CUSTOMERS CONNECTED

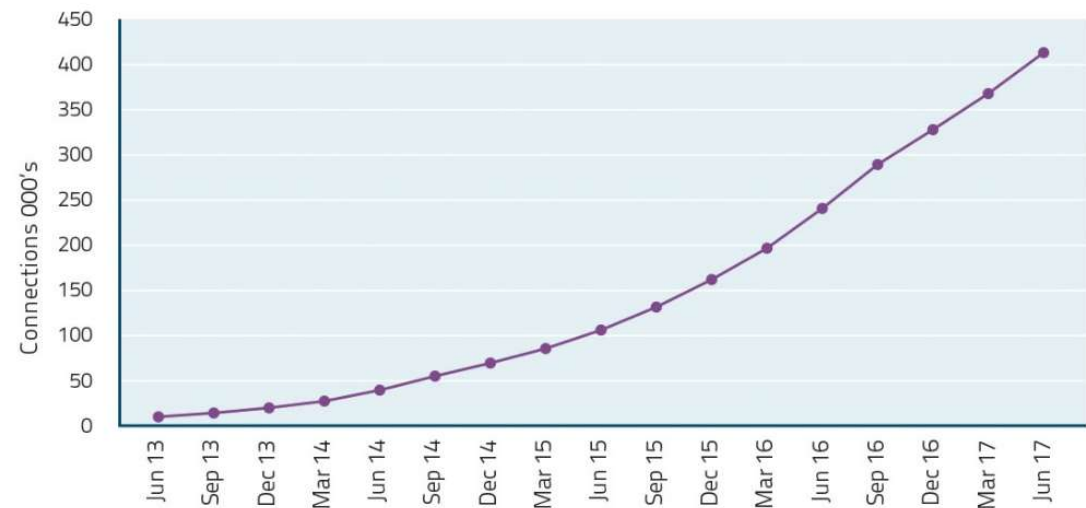
61% OF POPULATION ABLE TO CONNECT

68% OF CONNECTIONS $\geq 100\text{Mbps}+$

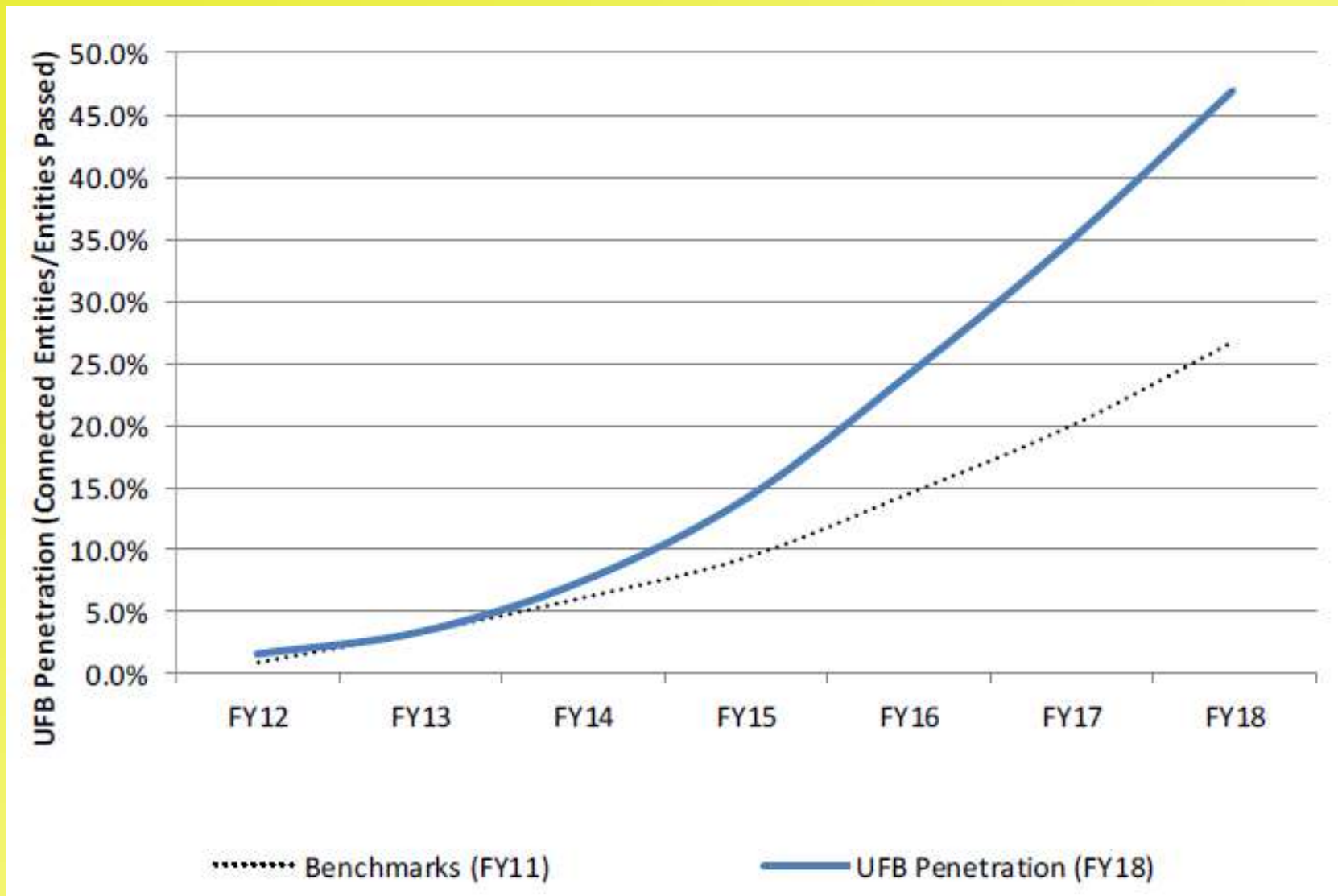
22 TOWNS & CITIES COMPLETED



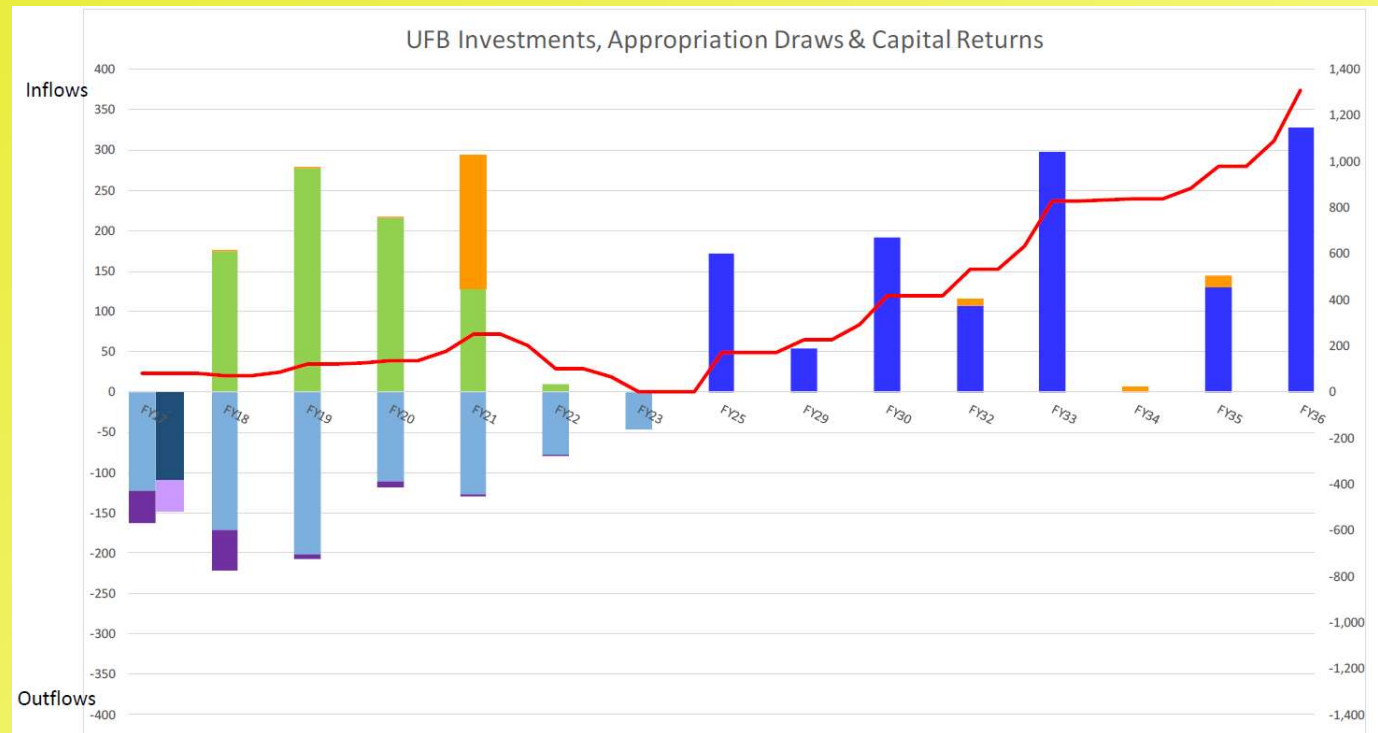
UFB UPTAKE ACCELERATING



Take-up Double Expectations

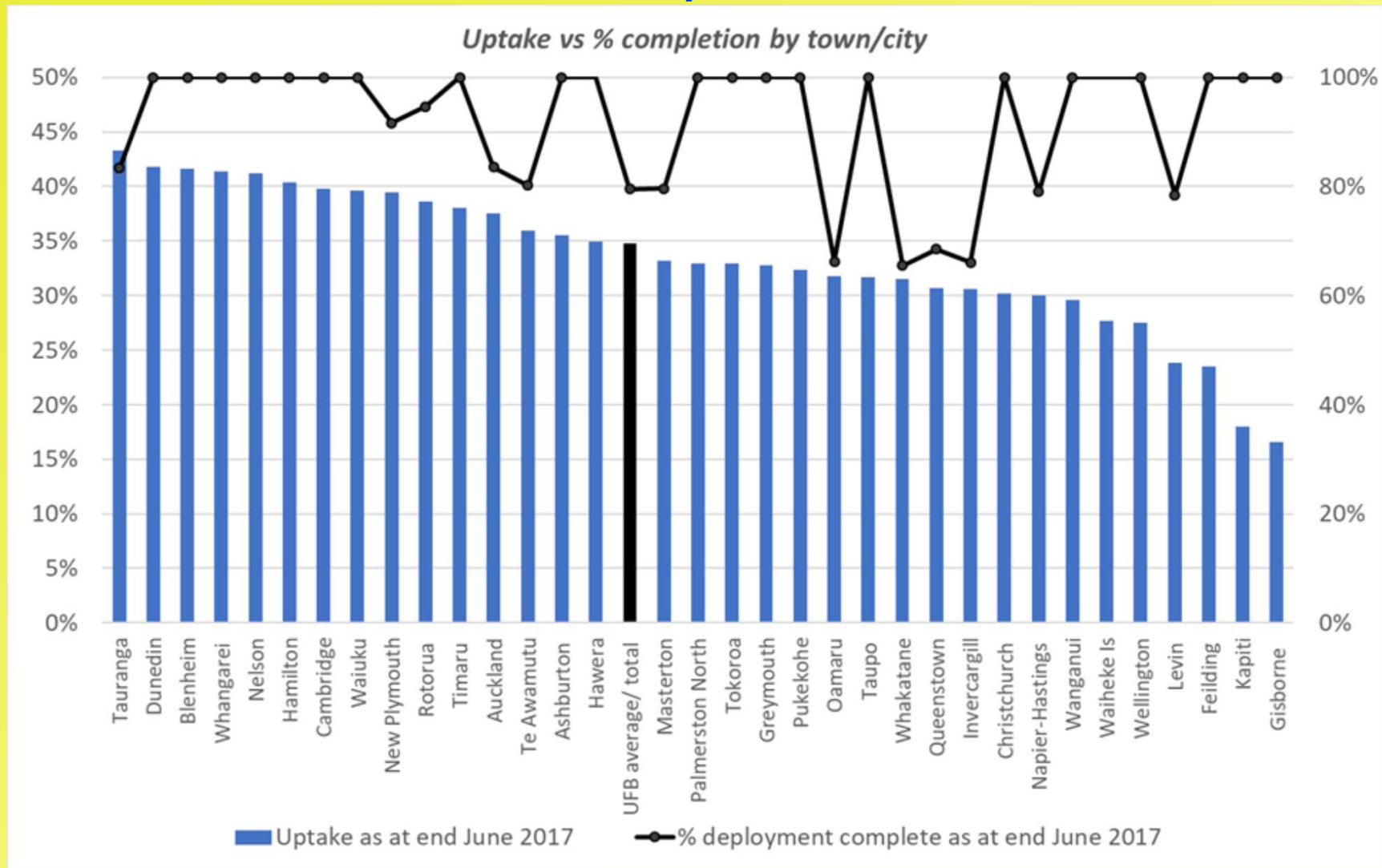


The Bottom Line



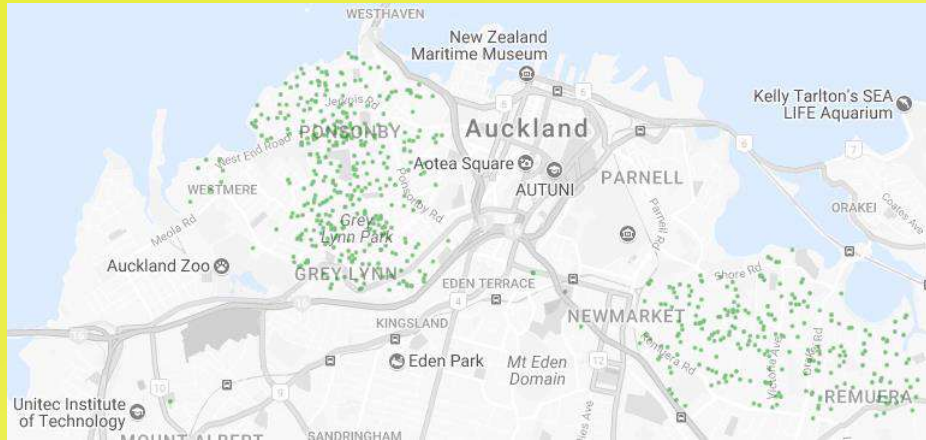
- ❑ \$2.067B committed to date
 - ❑ \$1.55B UFB Appropriations
 - ❑ \$180 million from Telecommunications Development Levy (TDL)
 - ❑ \$337 million internal funded
- ❑ Over \$1.5B of capital to be returned by 2036

Uptake by Percent Completion of Towns/Cities

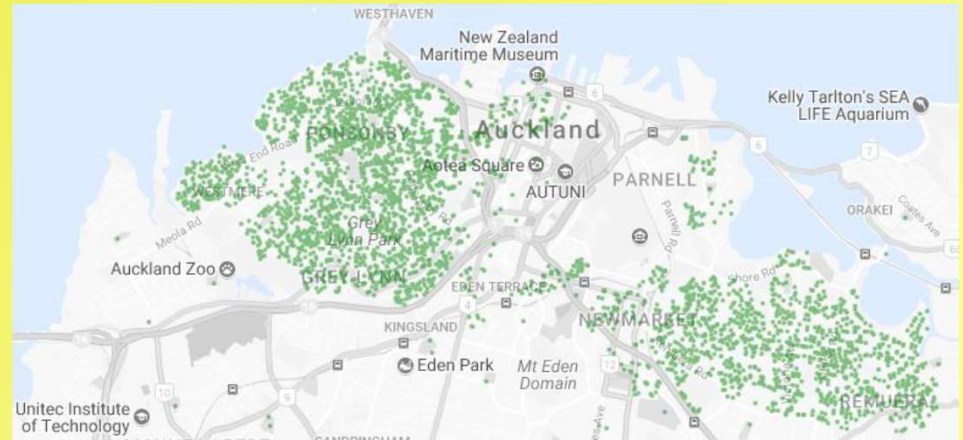


UFB Uptake within Auckland

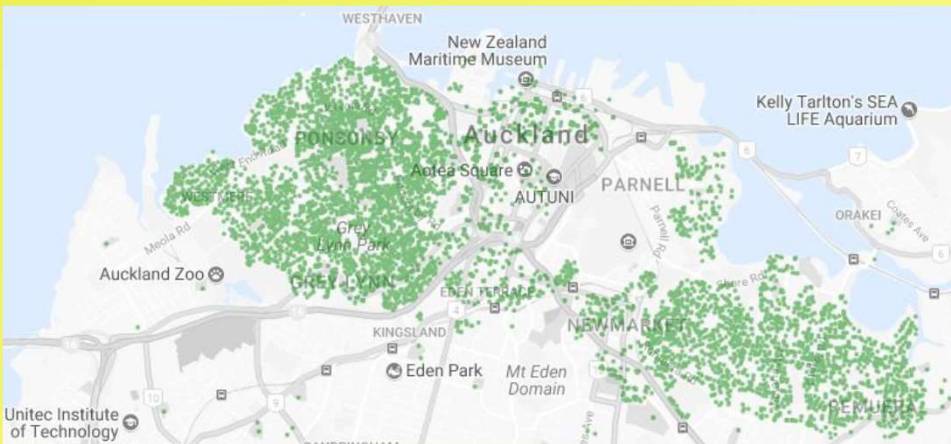
2012



2014



2015



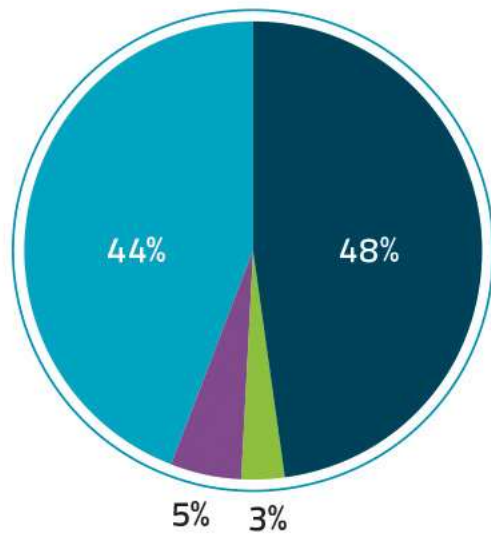
2017



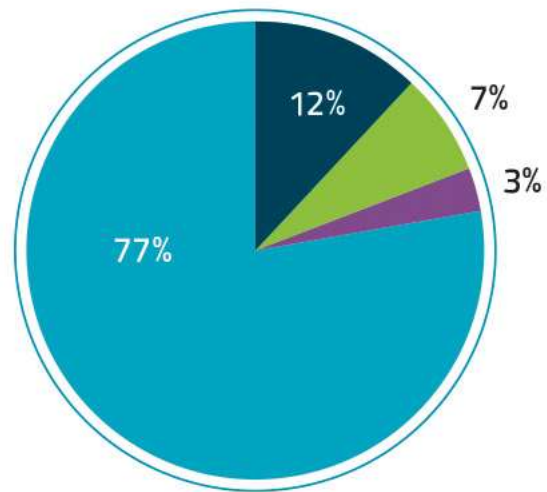
16/11/2017

UFB Take-up Product Mix

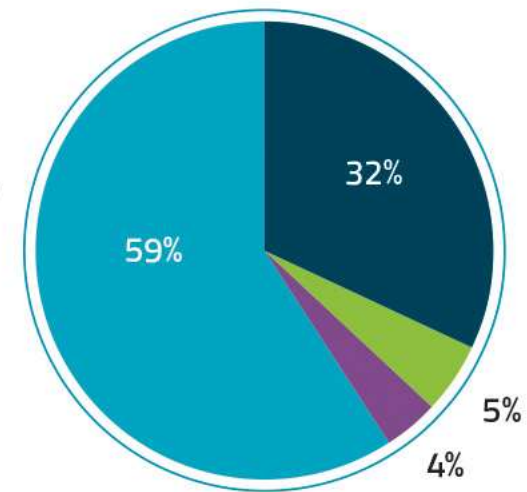
UFB PRODUCT MIX



TOTAL CONNECTIONS
AS AT 30 JUNE 2016



CONNECTIONS ADDED
IN FISCAL 2017



TOTAL CONNECTIONS
AS AT 30 JUNE 2017

Gigabit

200 Mbps

100 Mbps






<100 Mbps

UFB Offers as at July 2017

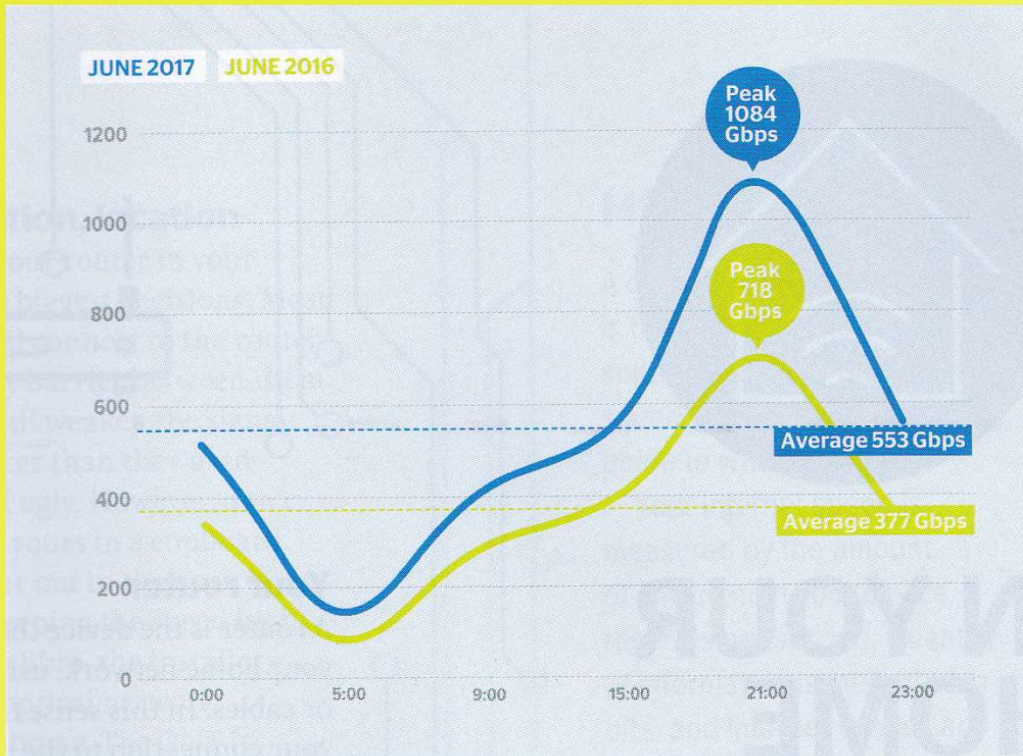
UFB 100/20 Mbps unlimited data product offers

 <p>Spark™</p>	 <p>vodafone</p>	 <p>slingshot</p>	 <p>Trust power.</p>
\$94.99/mth.	\$90.99/mth.	\$84.95/mth.	\$109.00/mth.
Promotion	Promotion	Promotion	Promotion
First 3 Months Free *	\$300 joining credit	\$5 discount included	 <p>43" FHD Smart TV</p>
 <p>Netflix LightBox WiFi</p>	<p>On Account mobile customer** Save \$10 YES</p>	FREE Chromecast	
\$40 bonus			(Free TV if buy Power 24 mth)
\$69.16/mth (incl. value of promotions for 12 months + fees)	\$57.24/mth (incl. value of promotions for 12 months + fees)	\$77.70/mth (incl. value of promotions for 12 months + fees)	\$59.63/mth (incl. value of promotions for 12 months + fees)

UFB up to 1Gbps/500Mbps unlimited data product offers

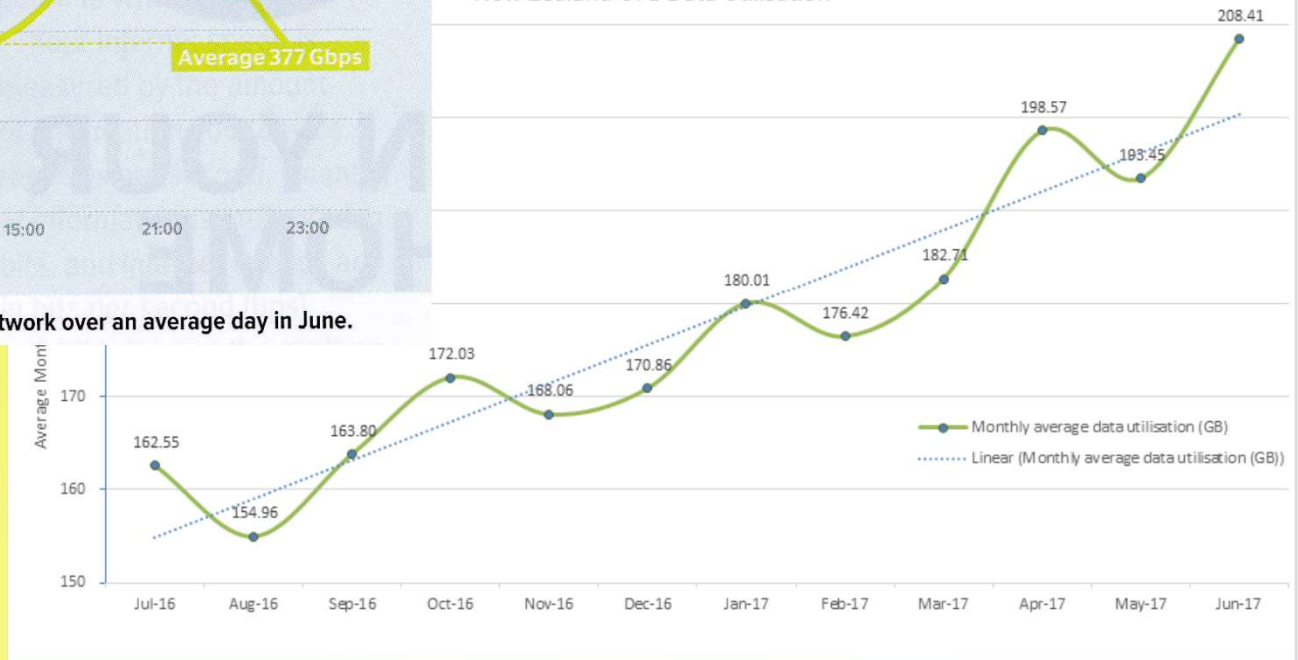
 <p>orcon</p>	 <p>MyRepublic</p>	 <p>Spark™</p>
\$129.00/mth.	\$119.00/mth	\$139.99/mth
Promotion	Promotion	Promotion
 <p>Free Xbox on 24 mth contract</p>	<p>\$59.99 First /mth 6 months</p>	<p>First 3 Months Free *</p>
		 <p>Netflix LightBox WiFi</p>
		<p>PLUS \$40 BUY ONLINE CREDIT</p>
\$110/mth (incl. value of promotions for 24 months + fees)	\$104.12/mth (incl. value of promotions for 24 months + fees)	\$114.16/mth (incl. value of promotions for 24 months + fees)

New Zealand UFB Data Utilisation

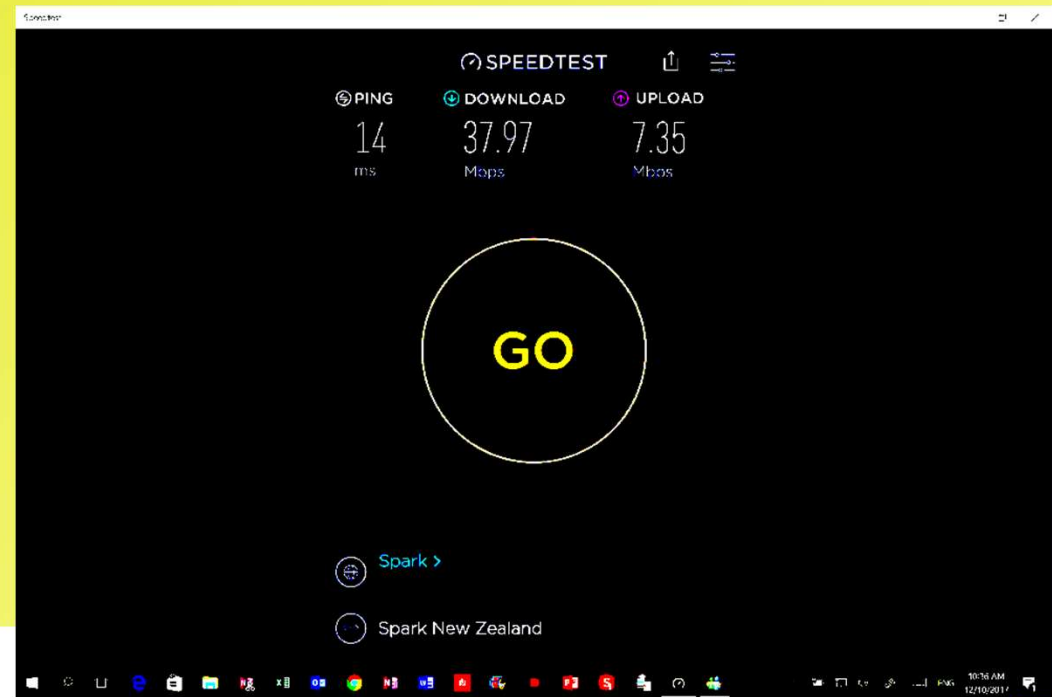


Data: Provided by Chorus. Shows activity on the Chorus network over an average day in June.

New Zealand UFB Data Utilisation

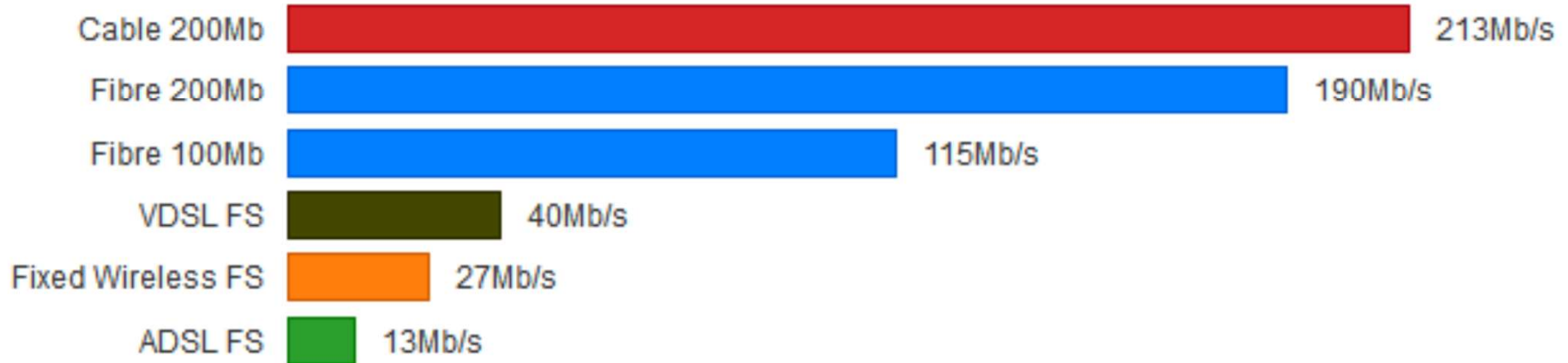


Peak Speed by Technology as at July 2017

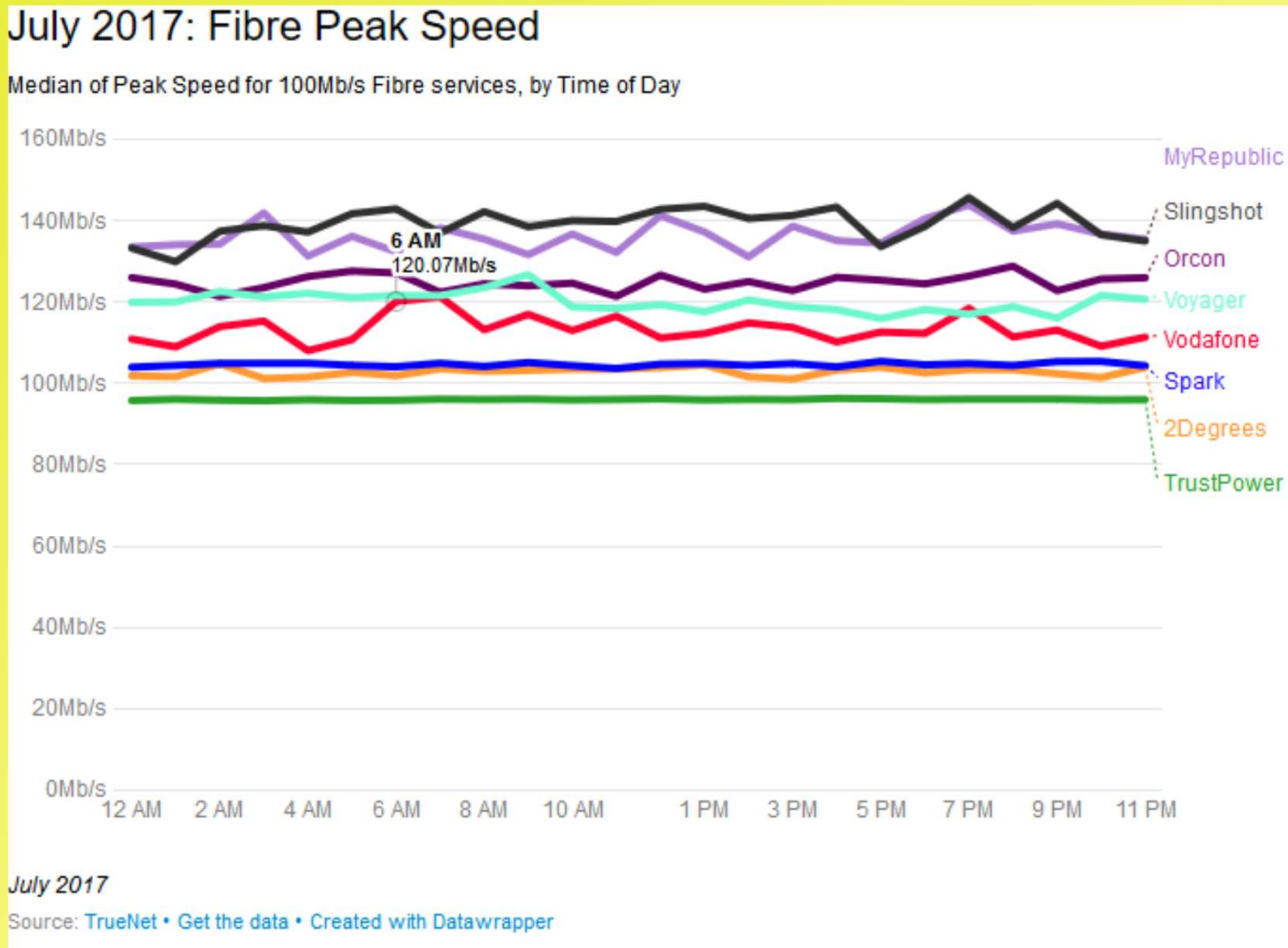


Download Speed Only

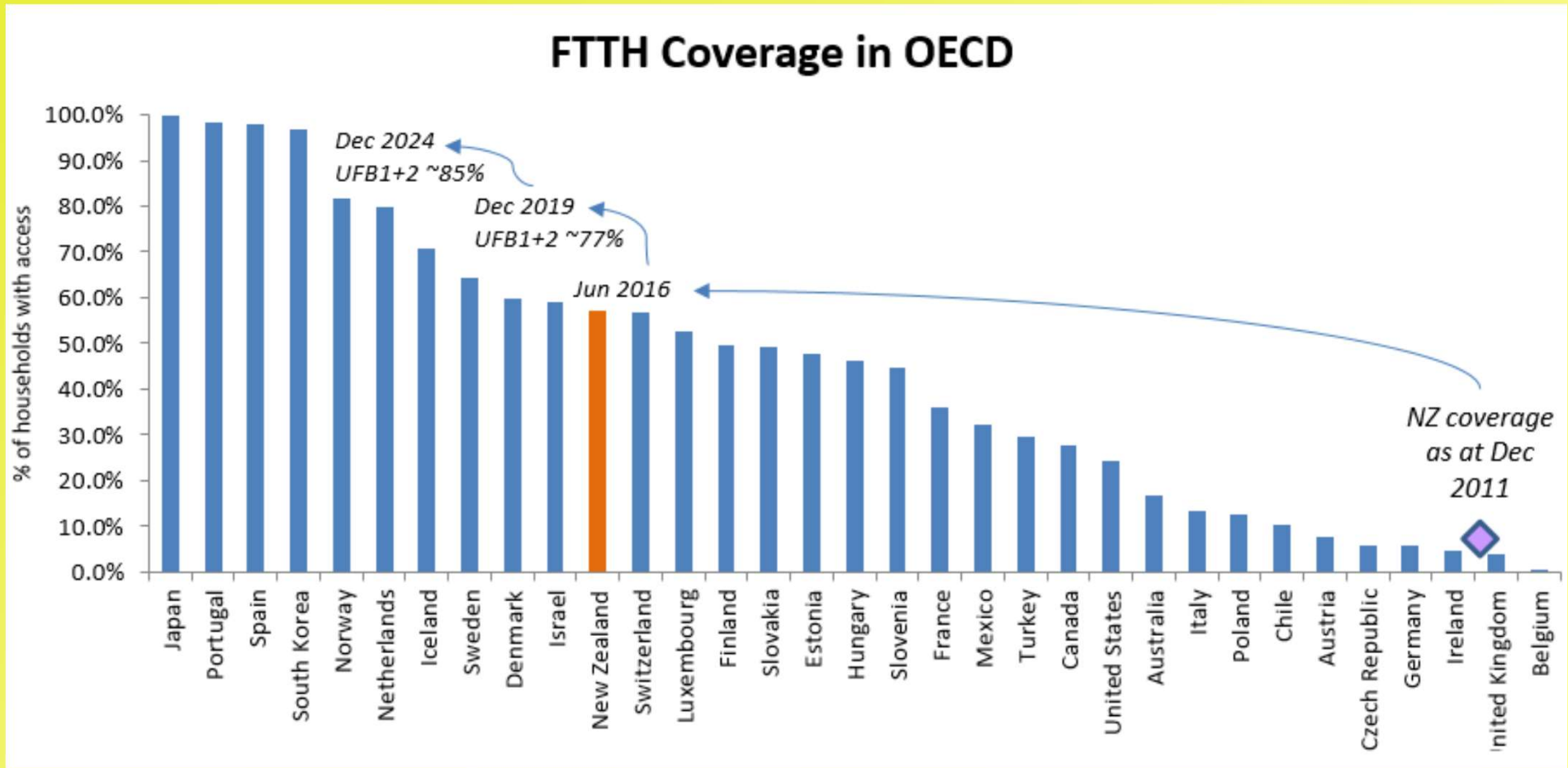
Peak Hours Business Hours Off-Peak Hours



Peak Speed Variation by Time of Day



FTTH Coverage in OECD



UFB vs NBN: Funding vs Outcomes

Funding & costs	UFB NZ	NBN Aust.
Govt. Funding NZ\$Bn #	\$ 1.9	\$ 54.1
Funding/capita NZ\$	\$ 405	\$ 2,193
FTTP cost/End User *	\$ 2,773	\$ 4,854

Note:# NZ excludes CIP recycled funds and includes TDL RBI Funding

*Note *: NZ based on latest Chorus reported results*

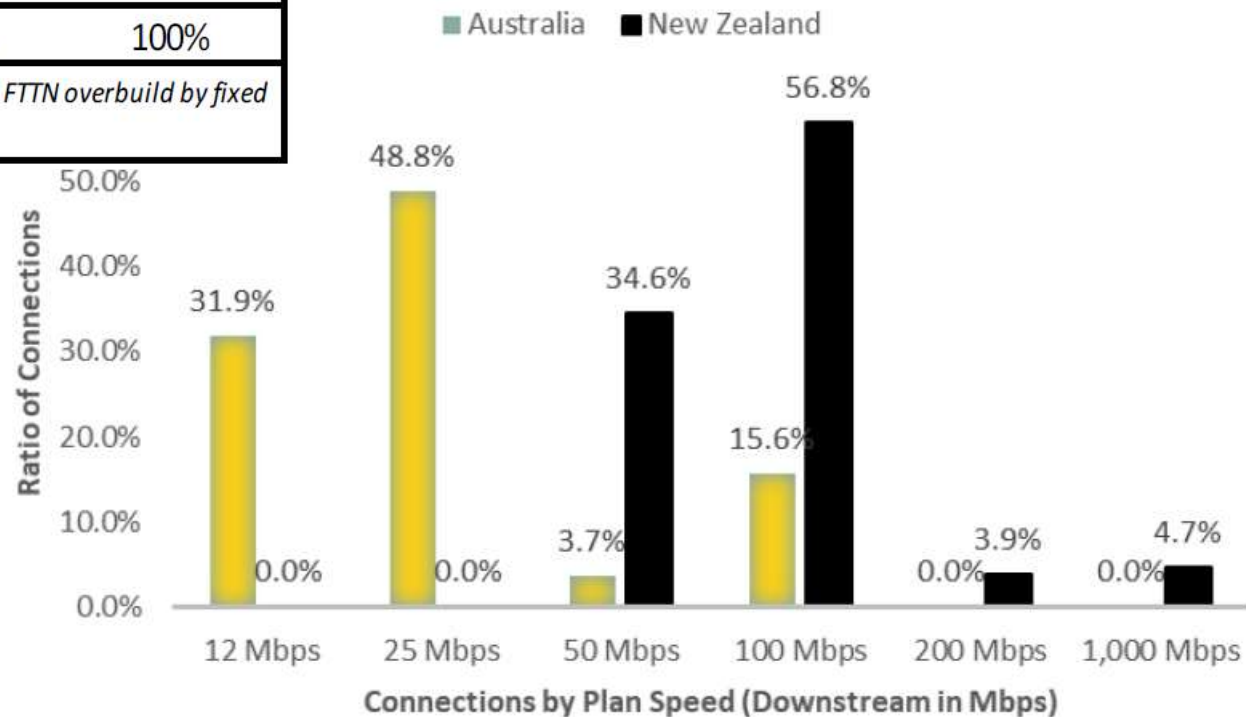
Fibre-to-the-Premises End User passing's	UFB NZ		NBN Aust.	
	Jun-17	2022	Jun-17	2021
FTTP Brownfields	1,162,645	1,729,526	1,100,000	1,200,000
FTTP Greenfields	22,706	71,474	400,000	800,000
FTTP total	1,185,351	1,801,000	1,500,000	2,000,000
pop % FTTP	60%	87%	13%	17%
OECD Ranking	11th	5th	24th	24th
Uptake	35%		72%	

Note: NBN has forced migration whilst UFB is voluntary

UFB vs NBN: Technology and Speed Comparisons

Technology mix 2022	UFB NZ	NBN Aust.
FTTP	87%	17%
FTTN/B/C	#	48%
HFC	#	27%
Fixed wireless & Satellite	13%	8%
Total	100%	100%

Note: NZ has 4% HFC but overbuilt by FTTP and FTTN overbuilt by fixed wireless

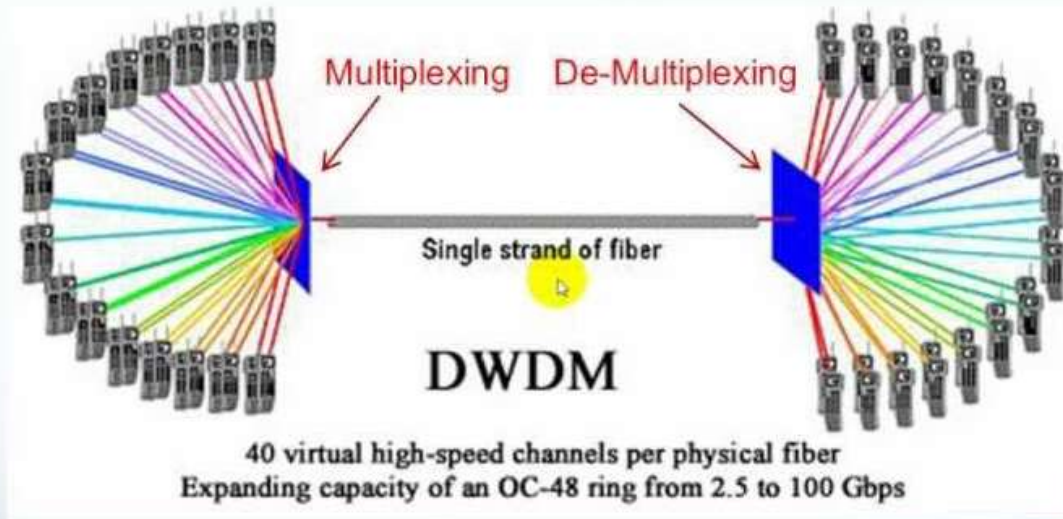
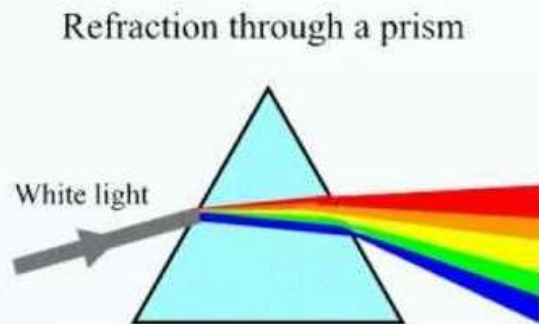


FTTP: NZ weighted average 129 Mbps, Australia 33.5 Mbps

“Superfast Broadband”

What is WDM?

WDM = Wavelength Division Multiplexing



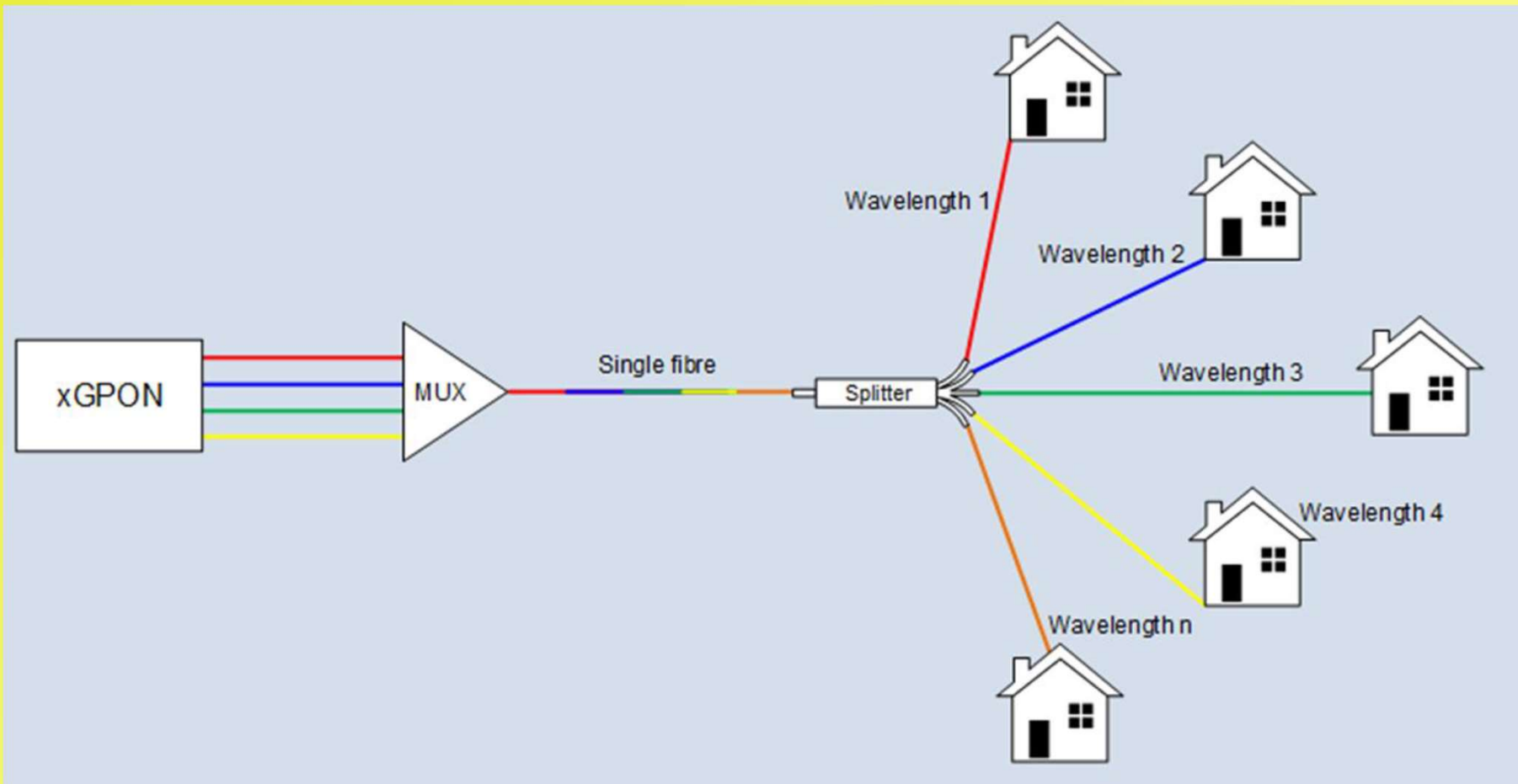
WDM is used on fiber optics to increase the capacity of a single fiber



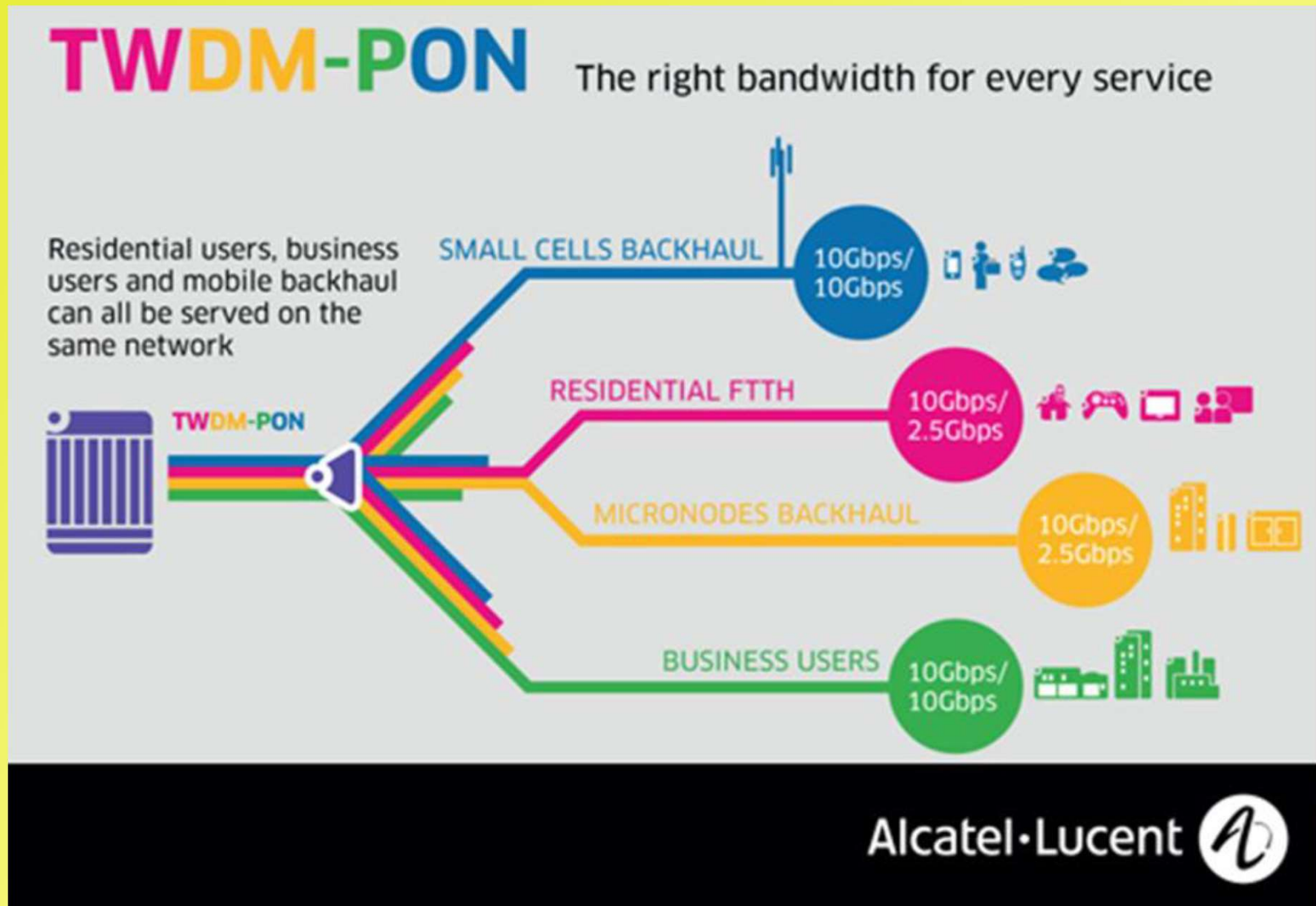
Fiber Optics For Sale Co.
COMPLETE SUPPLY SOLUTIONS

One Wavelength per Home

100Gbps plus per wavelength

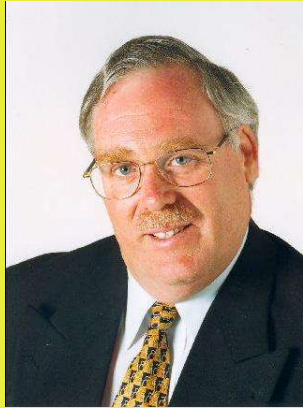


The Right Bandwidth for All Customers



Conclusions

- ❑ FTTP initially designed to pass 75% of premises
 - ❑ Subsequently expanded to 87% by 2022
 - ❑ Delivering up to 1Gbps today and beyond tomorrow
- ❑ Supplemented by RBI1, RBI2 and MBS to cover more than 12% of premises by 2025
 - ❑ Delivering 25Mbps today and >50Mbps by 2025
 - ❑ Solutions for last 1% of premises being pursued
- ❑ Nearly 40% uptake on UFB today
 - ❑ Expected to exceed 80% by 2020
- ❑ Commercial model delivers cost effective outcomes for all New Zealanders – Anywhere!
- ❑ “Superfast Broadband” at Gbps rates available today
 - ❑ 10-100Gbps possible for most by 2025



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Thanks for Your
Attention
Questions?