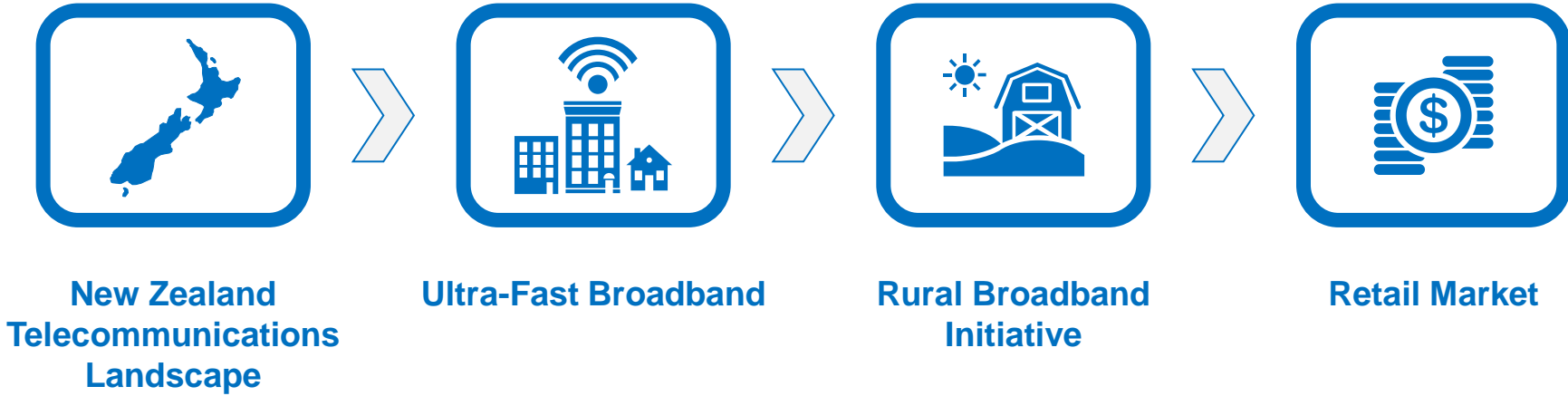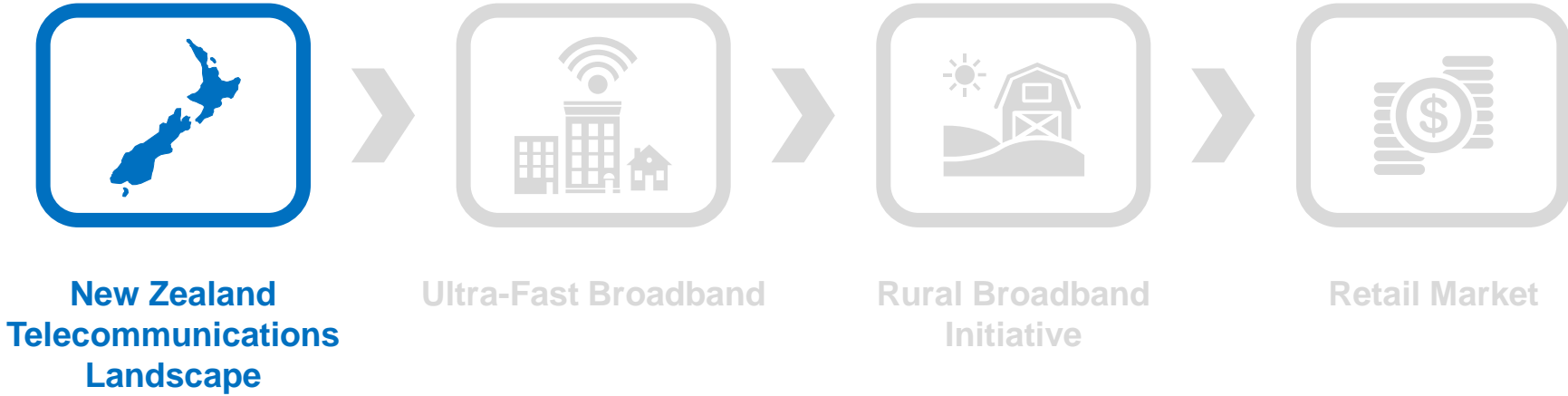# GREX
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Product & Pricing Working Group

New Zealand Broadband Market & Regulatory Landscape Presentation

12 October 2021

Updated for 4 November 2021 Working Group session

GREX CONSULTING

New Zealand Telecommunications Landscape → **Ultra-Fast Broadband** → **Rural Broadband Initiative** → **Retail Market**

New Zealand Telecommunications Landscape

Ultra-Fast Broadband

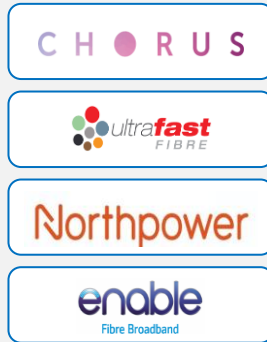Rural Broadband Initiative

Retail Market

NZ Telco Landscape: Overview[1,2,3]

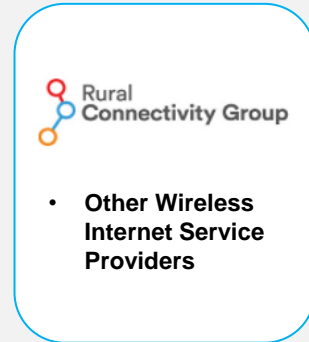## Requirements and level of Government intervention vary significantly between Australia & New Zealand

New Zealand	Australia

Government-Backed Broadband Wholesale Providers

Ultra-Fast Broadband

- CHORUS
- ultrafast FIBRE
- Northpower
- enable Fibre Broadband

Rural Broadband Initiative

Rural Connectivity Group

- **Other Wireless Internet Service Providers**

Government-Backed Broadband Wholesale Providers[4]

nbn™

Coverage & Technology[5]

1.76m	**1.15m**	**48**	**FttP**
Premises ready to connect to UFB network (97% complete)	Premises connected to UFB	Specified Points of Interconnect[6]	Network connections for UFB & FWA for RBI

Coverage & Technology[5]

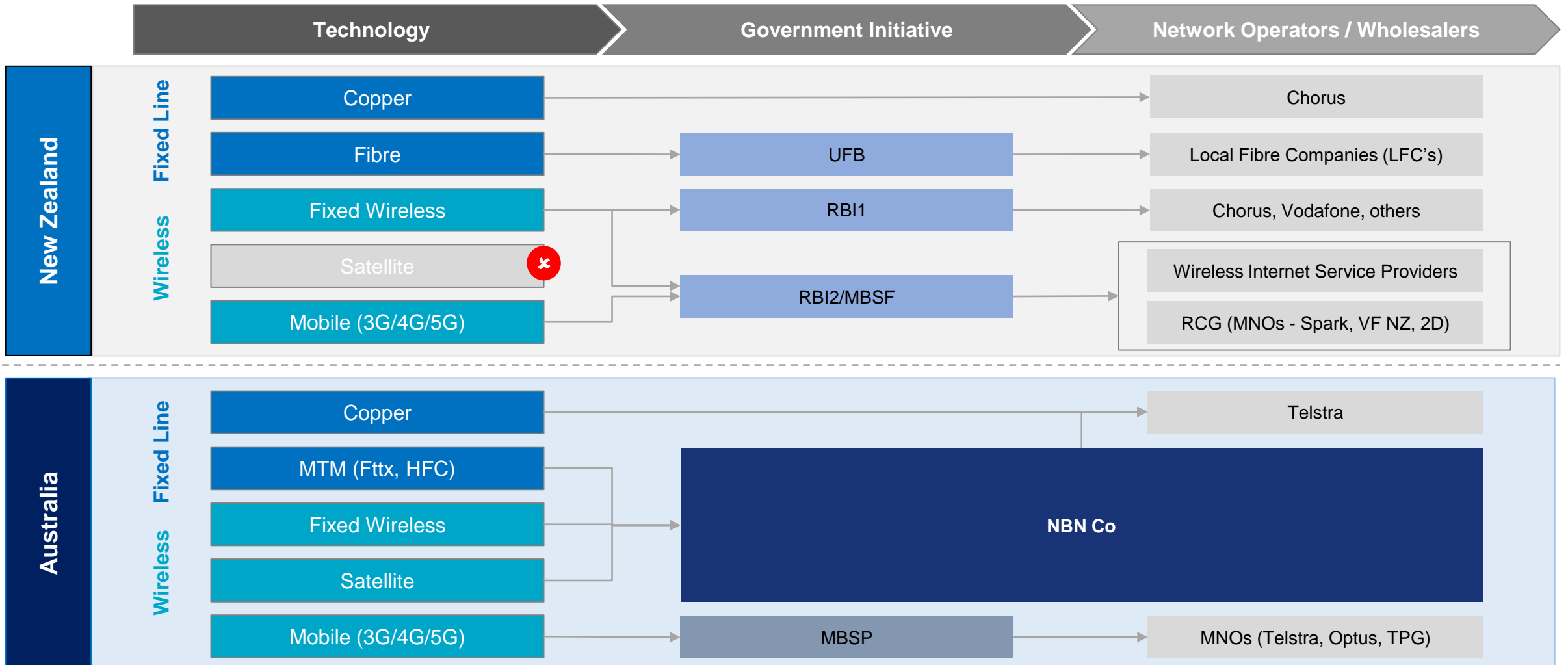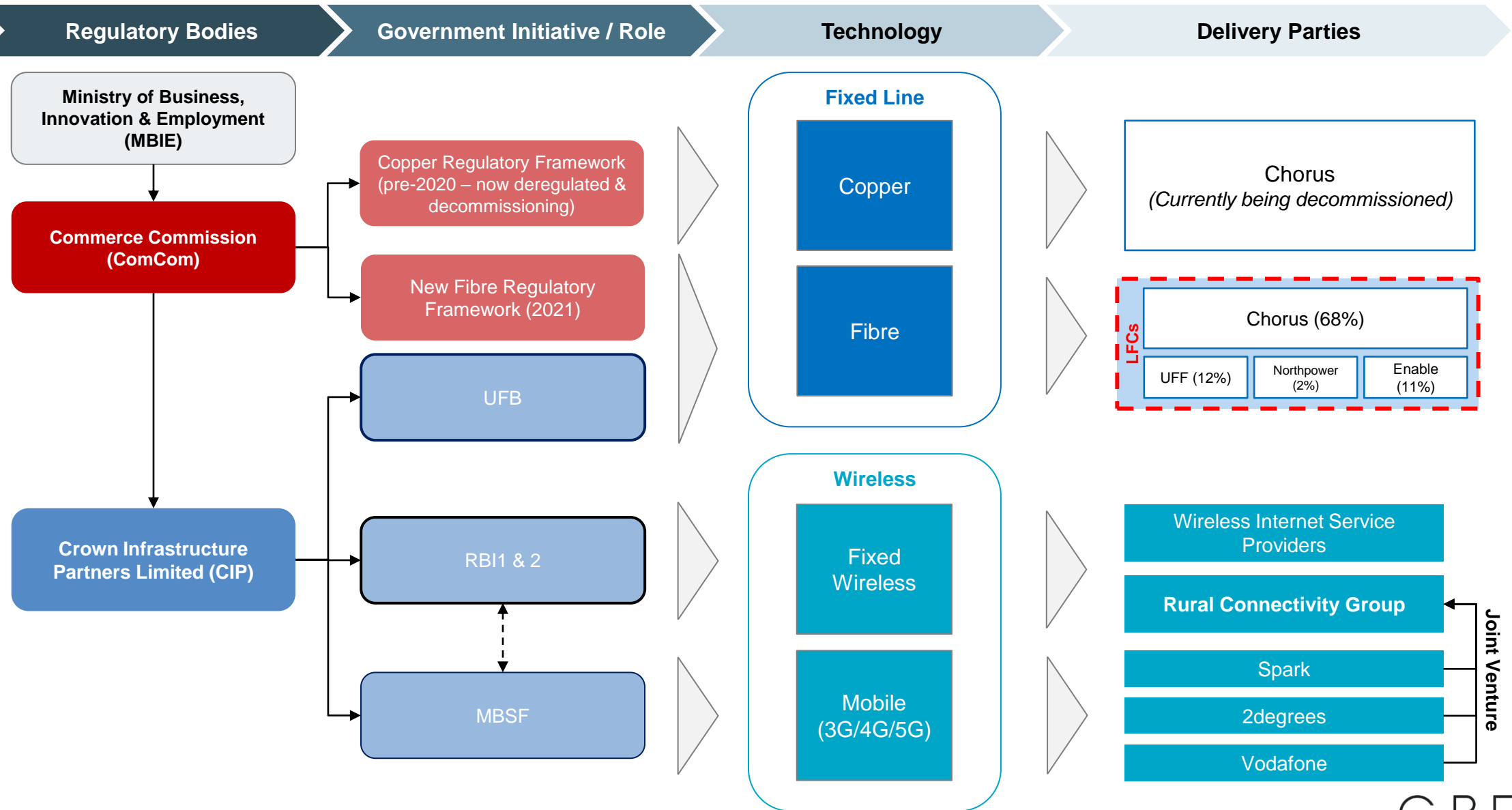| **12m**	**8.3m**	**121**	**MTM**
Premises ready to connect to nbn network	Premises connected to nbn network	Points of Interconnect	Multi-technology mix of products across network

1. www.crowninfrastructure.govt.nz
2. NBN Co Corporate Plan 2022
3. www.nbnco.com.au
4. Competitive broadband network providers do exist but this presentation focusses on nbn as a Government-funded initiative.
5. Based on latest available information
6. www.comcom.govt.nz

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NZ Telco Landscape: Structural Comparison

NZ Government initiatives are split into differently managed and funded initiatives depending on their technology type, whilst nbn covers a mix of technologies

Technology	Government Initiative	Network Operators / Wholesalers

New Zealand

Fixed Line:
- Copper → Chorus
- Fibre → UFB → Local Fibre Companies (LFC's)

Wireless:
- Fixed Wireless → RBI1 → Chorus, Vodafone, others
- Satellite ✖
- Mobile (3G/4G/5G) → RBI2/MBSF → Wireless Internet Service Providers / RCG (MNOs - Spark, VF NZ, 2D)

Australia

Fixed Line:
- Copper → Telstra
- MTM (Fttx, HFC)

Wireless:
- Fixed Wireless
- Satellite

→ NBN Co

- Mobile (3G/4G/5G) → MBSP → MNOs (Telstra, Optus, TPG)

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NZ Telco Landscape: Government Role

Ministry of Business, Innovation & Employment (MBIE)

Commerce Commission (ComCom)

Crown Infrastructure Partners Limited (CIP)

Copper Regulatory Framework (pre-2020 – now deregulated & decommissioning)

New Fibre Regulatory Framework (2021)

UFB

RBI1 & 2

MBSF

Fixed Line

Copper

Fibre

Wireless

Fixed Wireless

Mobile (3G/4G/5G)

Chorus *(Currently being decommissioned)*

LFCs

Chorus (68%)

UFF (12%) | Northpower (2%) | Enable (11%)

Wireless Internet Service Providers

Rural Connectivity Group

Spark

2degrees

Vodafone

Joint Venture

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NZ Telco Landscape: Fast Broadband Environment

UFB and RBI/MBSF are managed by Crown Infrastructure Partners (CIP)

**MBIE**

- **Ministry of Business, Innovation & Employment (MBIE)**
- Telco Act 2001, Telco Act 2013, Radiocomms Act 1989

ComCom

- The **Commerce Commission (ComCom)**
- Responsible for enforcing telco legislation
- Set price and/or access terms
- Monitor and report on telco markets

CIP

- **Crown Infrastructure Partners Limited (CIP)**
- Crown-owned company
- Responsible for the management of Government investment in **UFB, RBI (ph. 1 and2) & MBSF**

Regulatory Map

Key
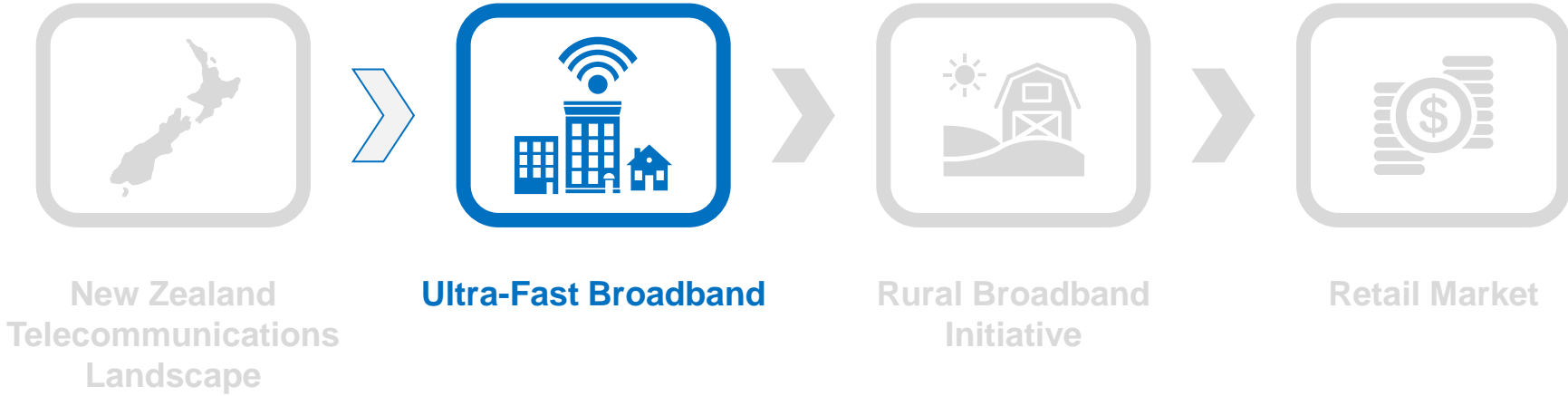- Legislation
- Regulation
- Program
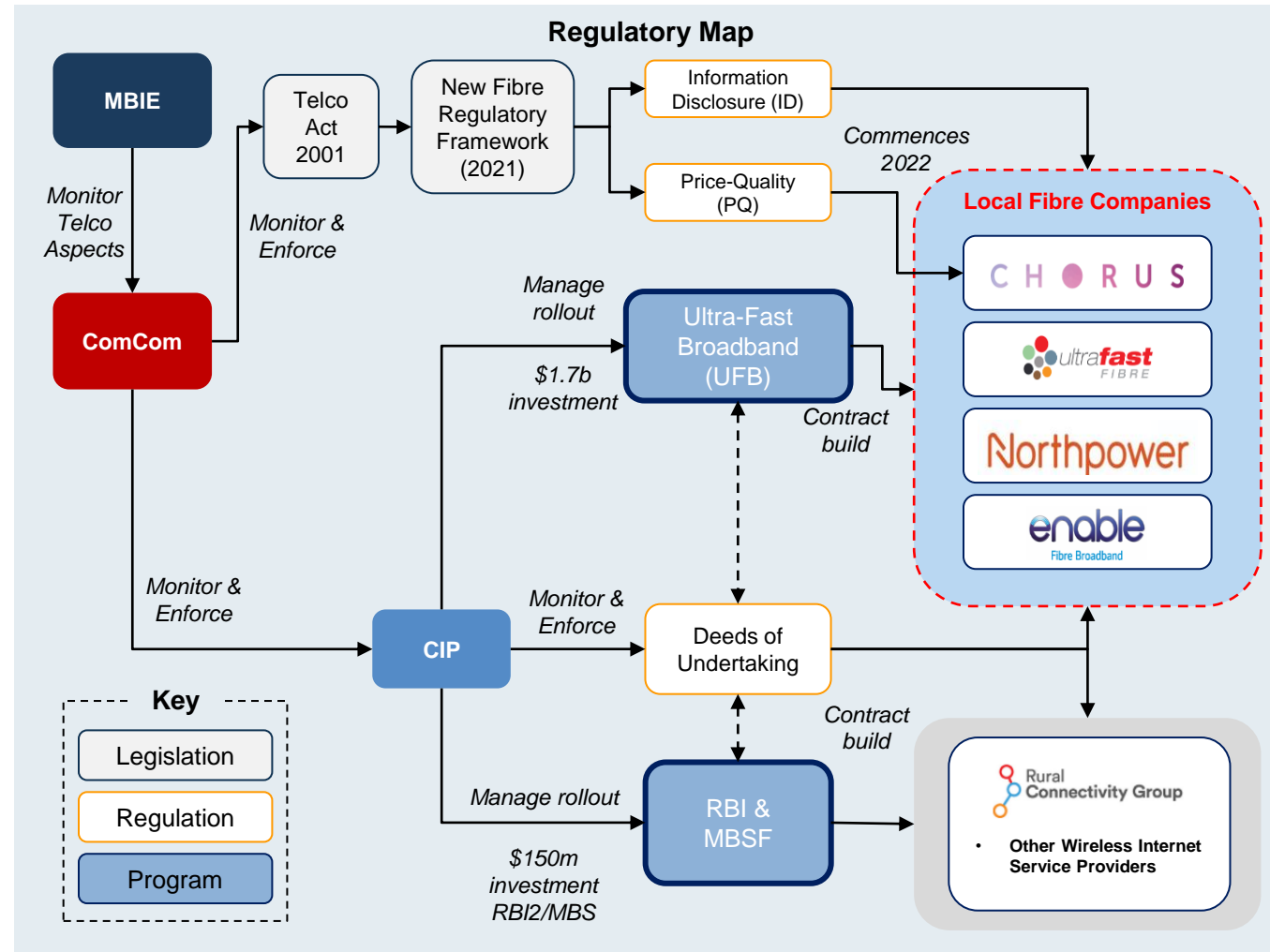
Programs

- **UFB** is a partially funded PPP with Government investment of **NZ$1.7 billion**. The network will cover **87%** of the population by the end of 2022
- **RBI** aims to extend broadband to rural areas
- **MBSF** aims to extend mobile coverage
- **RBI2 and MBSF** are combined and aim to extend broadband coverage to **99.8%** of the population by end of 2022

### Regulatory mechanisms

- **Initial contracts** set a wholesale price cap for LFCs, minimum service requirements, and require Information Disclosure (ID) from all LFCs
- **New regulatory framework** is currently being finalised and is expected to come into effect in January 2022: **ID regulation** for all LFCs, additional **PQ regulation** for Chorus

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New Zealand
Telecommunications
Landscape

Ultra-Fast Broadband

Rural Broadband
Initiative

Retail Market

The initial goal of the Ultra-Fast Broadband (UFB) was to cover 75% of the NZ population. This was expanded to include additional areas, with a new coverage goal of 87% by 2022

Local Fibre Companies

Pie chart:
- Chorus, 68%
- UFF, 12%
- Enable, 11%
- Northpower, 2%
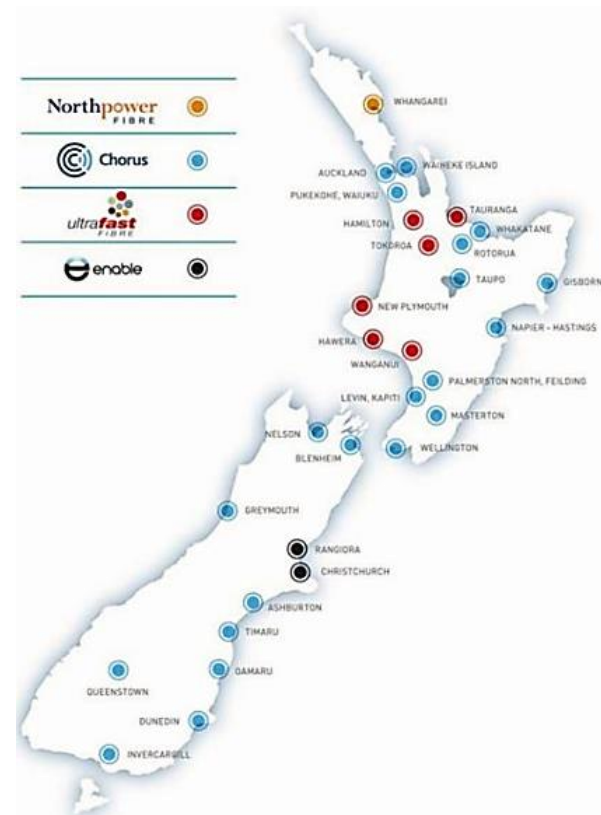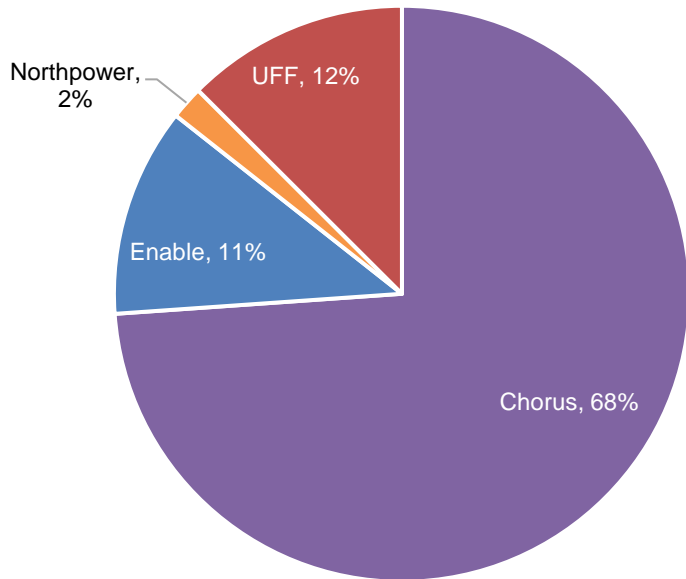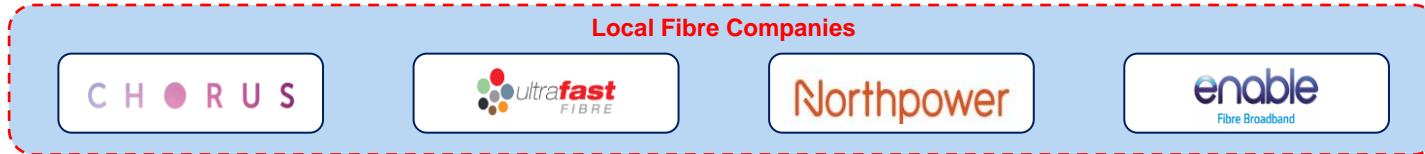
UFB Program

- The UFB Project is a partially funded public-private partnership government initiative to build a **nationwide fiber network** to meet current and future broadband demand

- Crown Fibre Holdings is responsible for overseeing the project

- **NZ$1.7 billion** Government investment into UFB, and the network will cover 87% of the population by the end of 2022

- **Uptake** of UFB connections is 65% as at June 2021

Local Fibre Companies (LFCs) & Points of interconnect (PoI)

- **There are 48 Specified Layer 2 PoIs**

- LFCs tendered to build the network and were chosen based on geographic areas:

  - Chorus – 39 PoI's

  - Enable Networks – 2 PoI's

  - Ultrafast Fibre – 6 PoI's

  - Northpower Fibre – 1 PoI
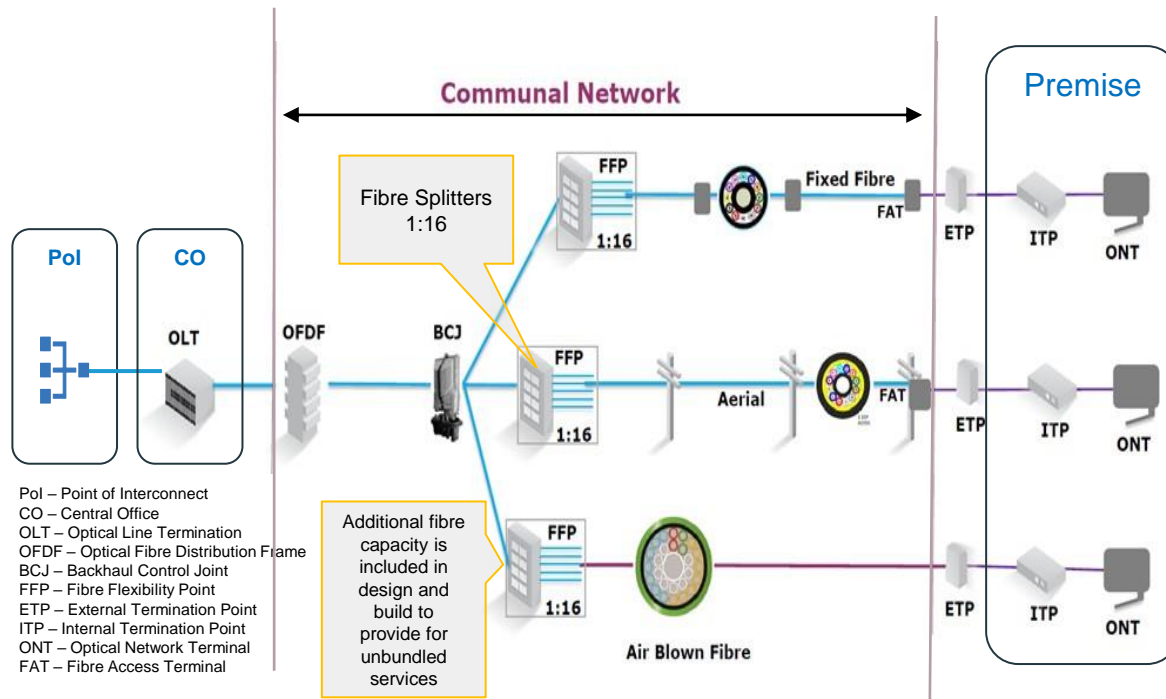
- Networks are wholesale only and open access

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UFB: NZ FTTP Deployment Architecture

The UFB network is an Access Network which provides Layer 1 and Layer 2 services. There are architecture similarities between NZ and Australian nbn FTTP deployments.

RSP | **UFB Network** | **End-User Connection**

Voice
Internet & Peering
Applications & Content
Storage
Security
Education
Health
Smart Metering
Network(s)

Communal Network

Premise

Fibre Splitters 1:16

Additional fibre capacity is included in design and build to provide for unbundled services

PoI – Point of Interconnect
CO – Central Office
OLT – Optical Line Termination
OFDF – Optical Fibre Distribution Frame
BCJ – Backhaul Control Joint
FFP – Fibre Flexibility Point
ETP – External Termination Point
ITP – Internal Termination Point
ONT – Optical Network Terminal
FAT – Fibre Access Terminal

PoI | CO
OLT
OFDF | BCJ

FFP 1:16 — Fixed Fibre — FAT — ETP — ITP — ONT
FFP 1:16 — Aerial — FAT — ETP — ITP — ONT
FFP 1:16 — Air Blown Fibre — ETP — ITP — ONT

Residential
Business
Small Cells / Poles
IoT & Non-Premises

- The **network provides the Retail Service Providers (RSPs) with access to the End Users**. The RSP connects to the access network at Point of Interconnect (**PoI**). The RSP must dimension and purchase the link capacity they require at the relevant PoI.

- Point to multipoint architecture with GPON technology – which forms the majority of the UFB network. A point-to-point architecture employed to provide high-capacity dedicated services to the larger end-users (commercial).

- The OLT has a number of GPON ports each of which is connected to a passive splitter located in the Fibre Distribution Hub (**FDH**).

- A single fibre within the Feeder Network mostly utilises splitters, i.e. a single feeder fibre can serve number of end users. Initially parties configured their GPON networks[1] to 24:1 ratio and some have reduced it to 16:1. The typical configuration for the split ratio can be 32:1, 24:1 16:1 etc.

- There is an additional fibre capacity allocation to enable unbundling via ether **DFAS** or **PONFAS**. The UFB was built to enable unbundling, which allows RSPs to install their own equipment and connect directly to 'dark fibre'.

Layer 1 fibre services

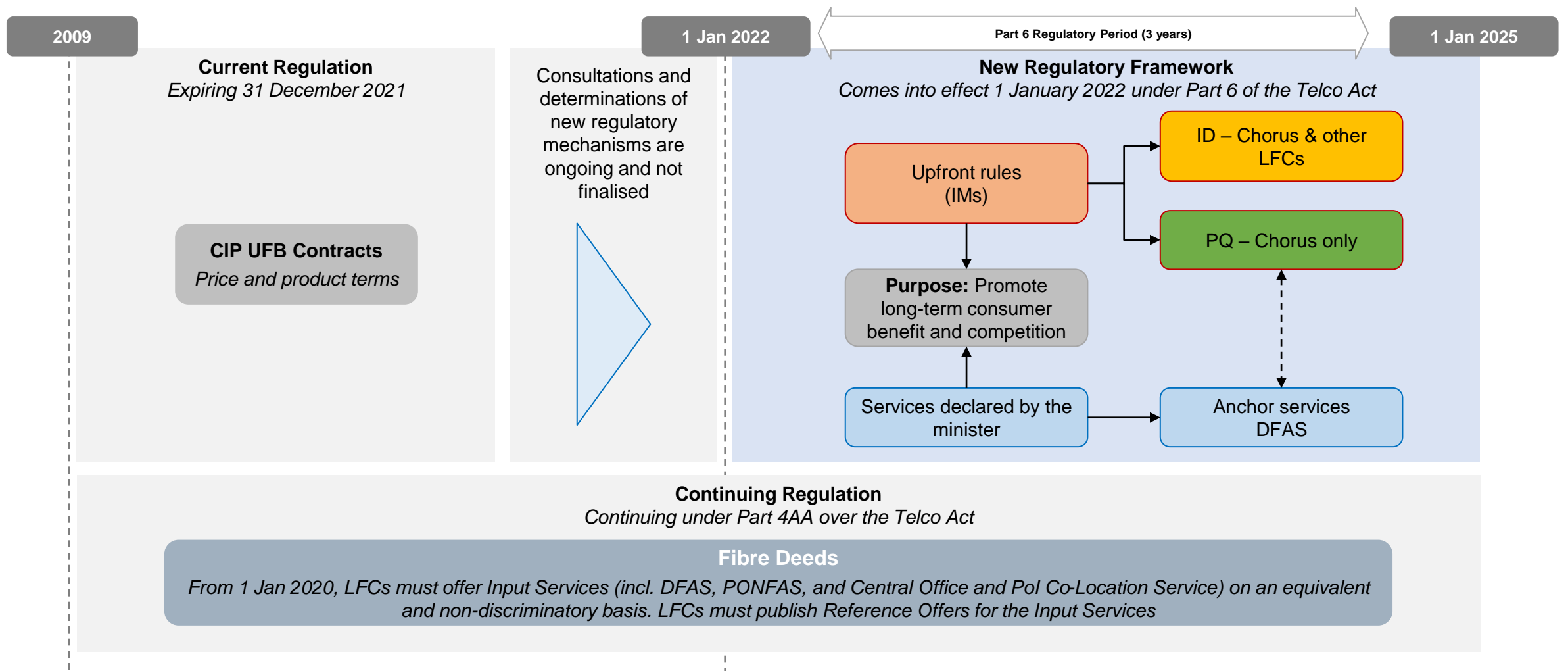| Chorus Connection cost (CPPC) [3]	2019	2020	2021
UFB1	$1,025	$1,022	$1,055
UFB2			$1,217
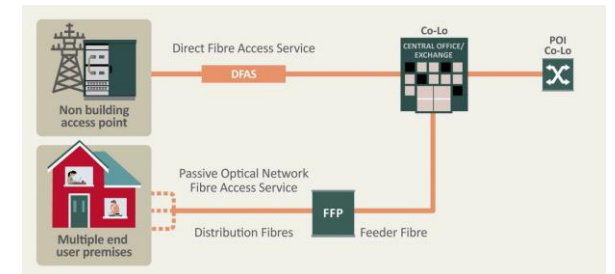
1. Ultra-fast Broadband The New Zealand Experience Journal of Telecommunication s and the Digital Economy , ISSN 2203-1693 Volume 8 Number 2
2. Chorus-Our-Fibre-Assets-10-February-2021
3. Chorus FY21 Annual Results Presentation, Chorus FY20 Annual Results Presentation, Chorus FY19 Annual Results Presentation

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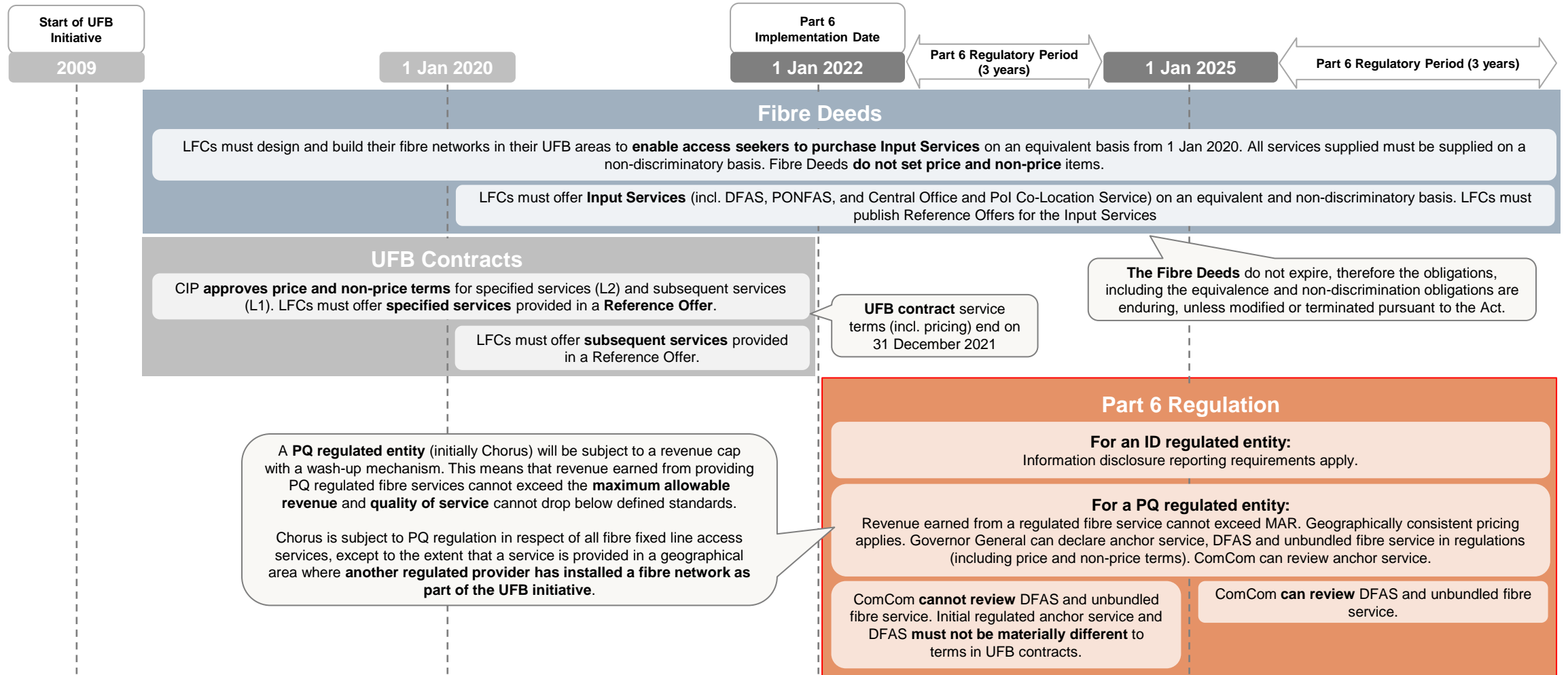
UFB: Regulatory Overview[1]

The Commerce Commission is currently developing a new regulatory regime for fibre fixed line access services (FFLAS) under Part 6 of the Telco Act, expected to commence in January 2022

| 2009 | | 1 Jan 2022 | Part 6 Regulatory Period (3 years) | 1 Jan 2025 |

Current Regulation
Expiring 31 December 2021

CIP UFB Contracts
Price and product terms

Consultations and determinations of new regulatory mechanisms are ongoing and not finalised

New Regulatory Framework
Comes into effect 1 January 2022 under Part 6 of the Telco Act

Upfront rules (IMs)

ID – Chorus & other LFCs

PQ – Chorus only

Purpose: Promote long-term consumer benefit and competition

Services declared by the minister

Anchor services DFAS

Continuing Regulation
Continuing under Part 4AA over the Telco Act

Fibre Deeds

From 1 Jan 2020, LFCs must offer Input Services (incl. DFAS, PONFAS, and Central Office and PoI Co-Location Service) on an equivalent and non-discriminatory basis. LFCs must publish Reference Offers for the Input Services

1. Commerce Commission

GREX
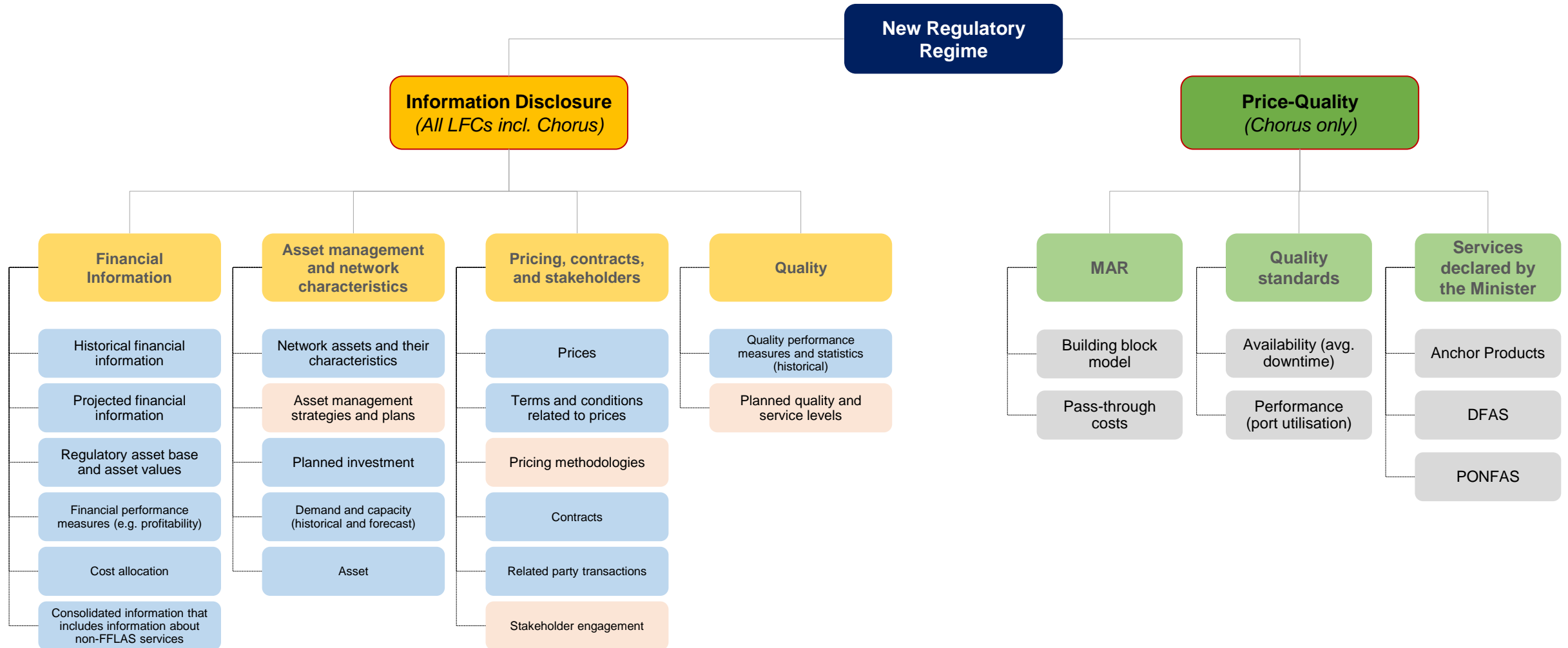CONSULTING

UFB: Regulatory Timeline[1]

LFCs provide certain fibre services under the UFB contracts. From 1 January 2022 those fibre services will no longer be regulated by the UFB contracts. Fibre services will be regulated by the fibre regulatory regime under Telco Act Part 6 and continue to be regulated by the Fibre Deeds under Telco Act Part 4AA.

Start of UFB Initiative	1 Jan 2020	Part 6 Implementation Date	Part 6 Regulatory Period (3 years)	1 Jan 2025	Part 6 Regulatory Period (3 years)
2009		**1 Jan 2022**			

Fibre Deeds

LFCs must design and build their fibre networks in their UFB areas to **enable access seekers to purchase Input Services** on an equivalent basis from 1 Jan 2020. All services supplied must be supplied on a non-discriminatory basis. Fibre Deeds **do not set price and non-price** items.

LFCs must offer **Input Services** (incl. DFAS, PONFAS, and Central Office and PoI Co-Location Service) on an equivalent and non-discriminatory basis. LFCs must publish Reference Offers for the Input Services

UFB Contracts

CIP **approves price and non-price terms** for specified services (L2) and subsequent services (L1). LFCs must offer **specified services** provided in a **Reference Offer**.

LFCs must offer **subsequent services** provided in a Reference Offer.

UFB contract service terms (incl. pricing) end on 31 December 2021

The Fibre Deeds do not expire, therefore the obligations, including the equivalence and non-discrimination obligations are enduring, unless modified or terminated pursuant to the Act.

A **PQ regulated entity** (initially Chorus) will be subject to a revenue cap with a wash-up mechanism. This means that revenue earned from providing PQ regulated fibre services cannot exceed the **maximum allowable revenue** and **quality of service** cannot drop below defined standards.

Chorus is subject to PQ regulation in respect of all fibre fixed line access services, except to the extent that a service is provided in a geographical area where **another regulated provider has installed a fibre network as part of the UFB initiative**.

Part 6 Regulation

For an ID regulated entity:
Information disclosure reporting requirements apply.

For a PQ regulated entity:
Revenue earned from a regulated fibre service cannot exceed MAR. Geographically consistent pricing applies. Governor General can declare anchor service, DFAS and unbundled fibre service in regulations (including price and non-price terms). ComCom can review anchor service.

ComCom **cannot review** DFAS and unbundled fibre service. Initial regulated anchor service and DFAS **must not be materially different** to terms in UFB contracts.

ComCom **can review** DFAS and unbundled fibre service.

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UFB: New Regulatory Regime Requirements[1]

The Commerce Commission is currently developing a new regulatory regime for fibre fixed line access services (FFLAS) under Part 6 of the Telco Act, expected to commence in January 2022
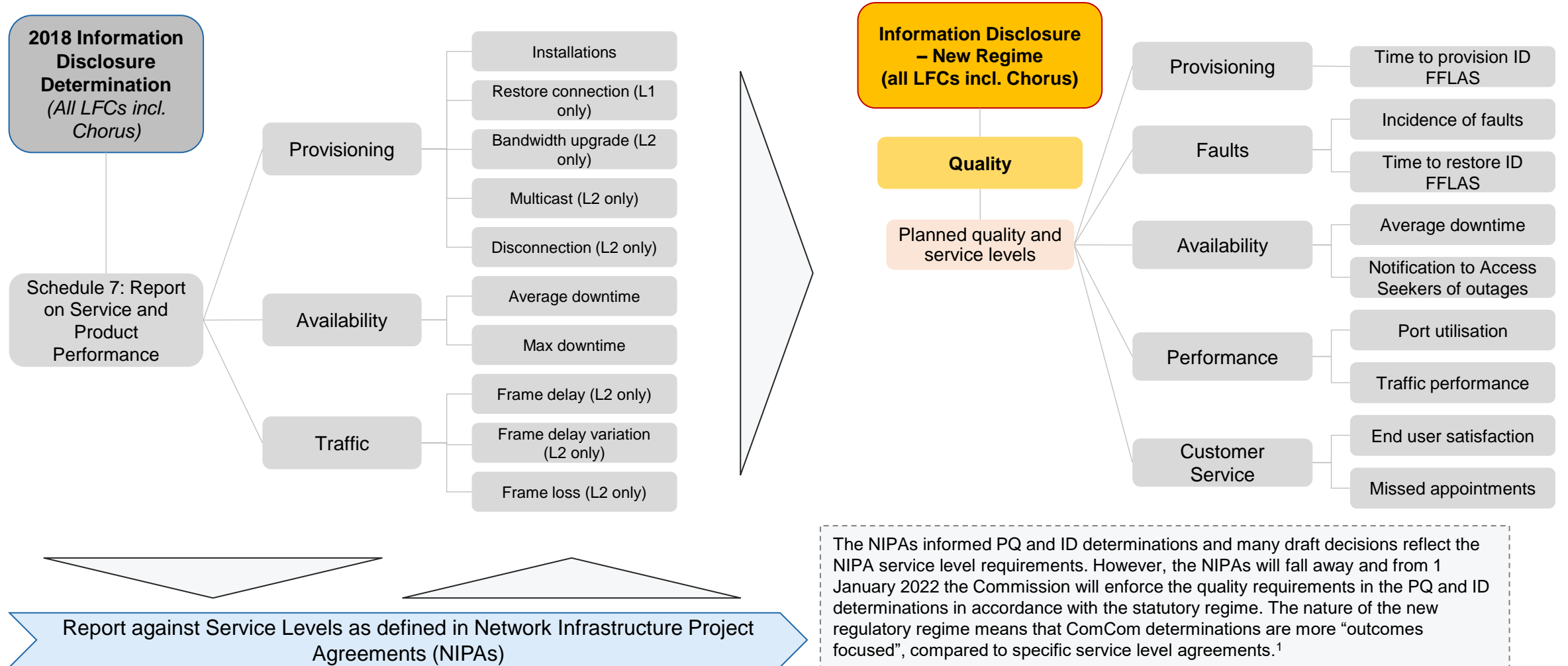
New Regulatory Regime

Information Disclosure
(All LFCs incl. Chorus)

Price-Quality
(Chorus only)

Financial Information

- Historical financial information
- Projected financial information
- Regulatory asset base and asset values
- Financial performance measures (e.g. profitability)
- Cost allocation
- Consolidated information that includes information about non-FFLAS services

Asset management and network characteristics

- Network assets and their characteristics
- Asset management strategies and plans
- Planned investment
- Demand and capacity (historical and forecast)
- Asset

Pricing, contracts, and stakeholders

- Prices
- Terms and conditions related to prices
- Pricing methodologies
- Contracts
- Related party transactions
- Stakeholder engagement

Quality

- Quality performance measures and statistics (historical)
- Planned quality and service levels

MAR

- Building block model
- Pass-through costs

Quality standards

- Availability (avg. downtime)
- Performance (port utilisation)

Services declared by the Minister

- Anchor Products
- DFAS
- PONFAS

Information not currently incorporated into draft ID requirements

1. Commerce Commission

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Performance & operational requirements under ID are currently being finalised by ComCom under 'Planned quality and service levels' of the Quality component of ID regulation

2018 Information Disclosure Determination *(All LFCs incl. Chorus)*

Schedule 7: Report on Service and Product Performance

Provisioning
- Installations
- Restore connection (L1 only)
- Bandwidth upgrade (L2 only)
- Multicast (L2 only)
- Disconnection (L2 only)

Availability
- Average downtime
- Max downtime

Traffic
- Frame delay (L2 only)
- Frame delay variation (L2 only)
- Frame loss (L2 only)

Information Disclosure – New Regime (all LFCs incl. Chorus)

Quality

Planned quality and service levels

Provisioning
- Time to provision ID FFLAS

Faults
- Incidence of faults
- Time to restore ID FFLAS

Availability
- Average downtime
- Notification to Access Seekers of outages

Performance
- Port utilisation
- Traffic performance

Customer Service
- End user satisfaction
- Missed appointments

Report against Service Levels as defined in Network Infrastructure Project Agreements (NIPAs)

The NIPAs informed PQ and ID determinations and many draft decisions reflect the NIPA service level requirements. However, the NIPAs will fall away and from 1 January 2022 the Commission will enforce the quality requirements in the PQ and ID determinations in accordance with the statutory regime. The nature of the new regulatory regime means that ComCom determinations are more "outcomes focused", compared to specific service level agreements.[1]

1. Commerce Commission
2. Crown Infrastructure Partners

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UFB: Regulated Product Map[1,2]

All LFCs will continue to offer Input Services under the Fibre Deeds, however only Chorus will be required to maintain two anchor products under the new regulatory regime.

1 Jan 2022

Current Regulation - CIP Product & Price Regulation
All LFCs (incl. Chorus)

New Regulatory Regime
Chorus Only

All Products (sample shown)

Residential
- Voice 128 Kbps
- 30/10
- 50/10
- 100/20
- 200/20
- 1000/500

Business
- 100/100
- 1000/500

Enterprise
- 100/100
- 1000/1000
- 10000/10000

Anchor Products
→ Voice Service 128 Kbps symmetric – High priority CIR
→ Broadband Service 100/20 Mbps – 2.5 CIR symmetric

Set using 2019 prices + CPI
- Max price $26.02
- Max price $47.87

Maximum Allowable Revenue → As determined by PQ regulatory process → To be completed in Nov 2021

Fibre Deed Services
All LFCs (incl. Chorus)

Input Services
- DFAS
- PONFAS
- Central Office Co-location
- PoI Co-Location

The Fibre Deeds do not expire, therefore the obligations, including the equivalence and non-discrimination obligations are enduring, unless modified or terminated pursuant to the Act.

1. Commerce Commission
2. Crown Infrastructure Partners

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Service policing by the RSP and summary Service Levels provided by LFC's

- External Network to Network interface (E-NNI) is the connection/interface between the RSP and the UFB networks. This provides the physical connection between the two networks and enables the multiple logical connections on the link through to the end-user (UNI).

- RSP's are responsible for ensuring that the profile of the services are delivered to the LFC's access network in appropriate format – otherwise frames/packets will be discarded e.g. if the service profile is 100/20 service, the line speed in the downlink provided at the ingress (E-NNI) for the service should not exceed 100Mbps.

- Where the RSP traffic/services are appropriately presented to the UFB networks at the E-NNI there are service obligations/levels to deliver the traffic to the end-user

- The UFB networks have a service level obligation and are required to report and manage capacity / utilisation of interfaces within/across their network to less than 95%

- **Peak Information Rate (PIR)** – is the maximum or peak (line) speed (throughput) that may be delivered by the LFC's. It is the RSP's responsibility to ensure that the service is 'shaped' to meet the requirement before it enters the UFB network(s) – otherwise additional traffic will be discarded e.g. 100Mbps for a 100/20 service.

- **Committed Information rate (CIR)** – is the component of the service traffic (throughput) that is prioritised with a service level obligation to ensure very low delay and (frame) loss e.g. 2.5Mbps allocated CIR high priority for the 100/20 service.

- **Excess Information Rate (EIR)** - is the remainder of the traffic (EIR=PIR–CIR) with a 'low' level of prioritisation and lower level of service level obligation allowing some (frame) loss, e.g. 97.5Mbps allocated EIR low priority for the 100/20 service.
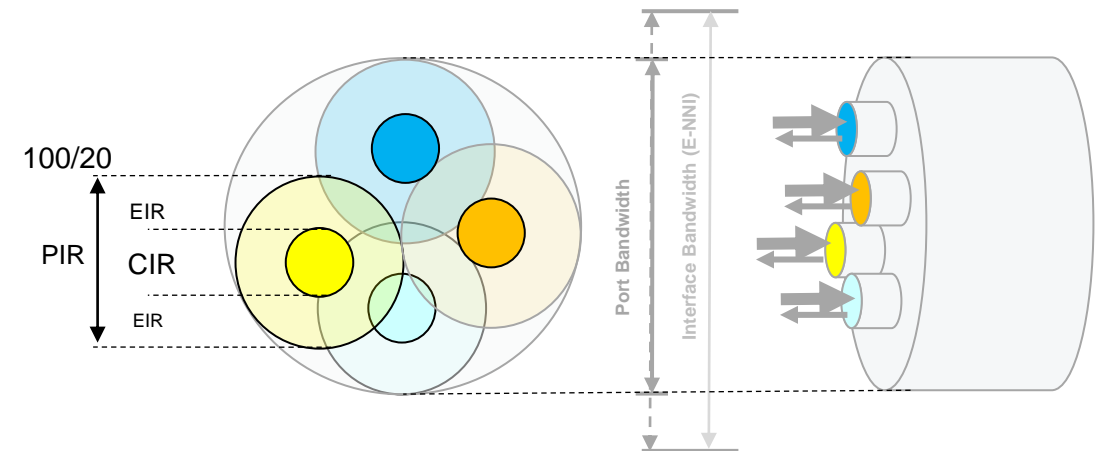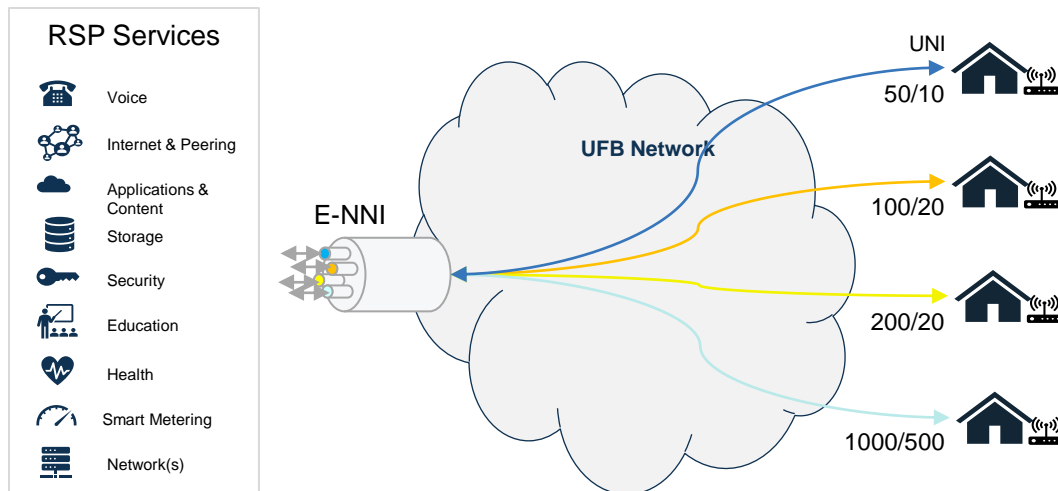
Traffic Type	CIR	EIR
High Priority	2.5Mbps	n/a
Low Priority	n/a	97.5

Layer 2 Service Levels	Frame Delay	Frame Delay Variation	Frame Loss
CIR	≦5 ms	≦5 ms	≦0.01%
EIR	n/a	n/a	≦2%

1. UFB-Performance-Management-and-Reporting
2. Chorus UFB Services Agreement Bitstream 2 Accelerate Service Description
3. Telecommunications Regulated Fibre Services Regulations 2021

During the CIP, the contract(s) sets the product descriptions and price caps for all LFCs. Examples of Chorus products and pricing are shown which have some similarities to nbn products

Example of Residential Products

Proposed Anchor Products under New PQ Regulation

Bar chart values:
- Voice: $26
- 50/10: $44
- 30/10: $44
- 100/20: $48
- 200/20: $57
- 1000/500: $68
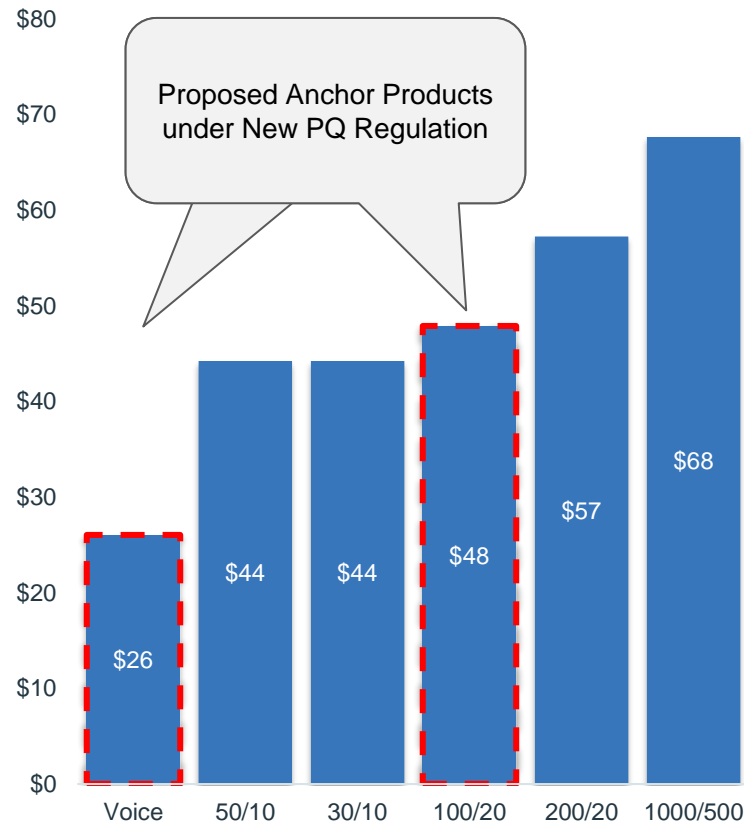
Committed Information Rate (CIR)

CIR is the guaranteed rate at which Frame Relay network will transfer information under normal line conditions.
CIR can be purchased in increments @ $1.30 for DL and $2.60 for UL (both per month)

EIR (Excess Information Rate)

EIR is the maximum sustained rate by which a user can exceed its CIR , with the expectation that the excess traffic may not be carried across the network due to traffic policing.

Bitstream	Bitstream type	Service	Service Bandwidth	High Priority	Low Priority
2	E-AVPL	Mass Market service	From 30/10 Mbps up to 100/50 Mbps	Yes	Yes
3	E-VPL	Business service	From 2.5 Mbps up and downstream to 100/100 Mbps	Yes	No
3a	E-APL	Business service with Low Priority options	100/100 Mbps with High Priority from 2.5 Mbps	Yes	Yes
4	E-APL	Business Premium	From 1Mbps up to 10 GigE	Yes	No

Service Template

Access Speed	Bitstream Type	Low Priority		High Priority	
		Upstream	Downstream	Upstream	Downstream
30M/10M	E-AVPL	10M	30M	2.5M	2.5M
		10M	30M	2.5M	10M
		10M	30M	5M	5M
100M/50M	E-AVPL	50M	100M	2.5M	10M
100M/100M	E-APL	2.5 M CIR (upstream & downstream), EIR to Access Speed		CIR options (symmetrical) are incremental, starting at 2.5M and 10M; from 10M there are additional increments of 10M up to 100M, e.g. 20M, 30M, etc.	
100M/100M	E-APL	N/A			
Education 30M/30M	E-AVPL	30M	30M	10M	10M

1. Chorus-UFB-Price-Caps-1-July-2021.pdf
2. Chorus-ufb-services-agreement-bitstream-operations-manual-3.pdf
3. Chorus-UFB-Services-Agreement-Service-Description-for-Bitstream-2 (002)

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UFB: Chorus & nbn Pricing Comparison[1]

The main UFB product offerings generally have a comparable nbn product. Chorus' products and pricing have been used to compare against nbn products

Residential Products

Product	nbn product[2]	Chorus product[3]
A	B25 on fixed-line and FW	30/10Mbps
B	B50	50/10Mbps
C	Home Fast (100/20)	100/20Mbps
D	Home Superfast (250/25)	200/20Mbps
E	Home Ultrafast (up to ~1000/50)	1000 / 500Mbps

Network-Network Interface (NNI) Products

Product	nbn products[3]	Chorus Products[2]
A	1000BaseLX	E-NNI port 1 Gbps Handover connection
B	10GBaseLR	E-NNI port 10 Gbps Handover connection

Residential Products – Price / Month

	A	B	C	D	E
nbn	$37	$45	$58	$68	$80
Chorus	$44	$44	$48	$57	$68

■ nbn   ■ Chorus
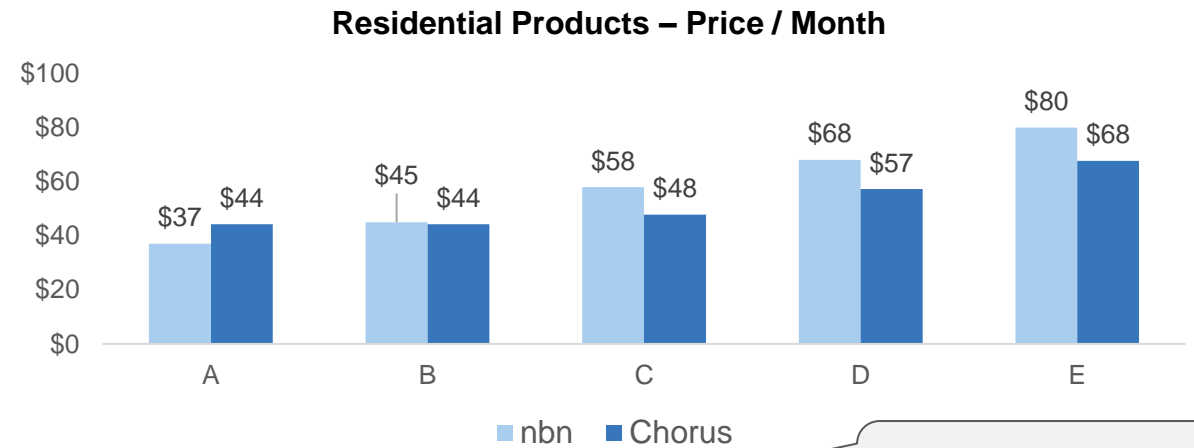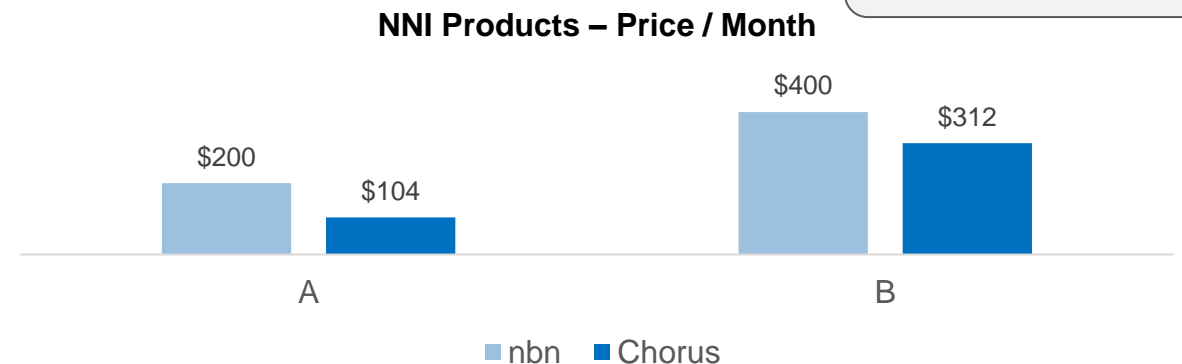
> nbn pricing is estimated only, see note 1 below.

NNI Products – Price / Month

	A	B
nbn	$200	$400
Chorus	$104	$312

■ nbn   ■ Chorus

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UFB: Product Mix[1,2]

100 Mbps downlink comprises the majority of UFB connections, and 1 Gbps connections are increasing rapidly

- Quarterly released data from MBIE and CIP portrays the trend towards faster speeds

- <100 Mbps services have decreased significantly, whilst 1 Gbps connections have doubled in the past 2 years

- 100 Mbps remains stable as the largest number of connections

- In Sep 21, Chorus announced plans to replace 100/20 Mbps products with 300/100 Mbps products by Dec 2021, expected to impact 600k premises[3]

- Overall average speeds are increasing rapidly:

  – **2019: 179 Mbps**

  – **2020: 229 Mbps**

  – **2021: 263 Mbps**
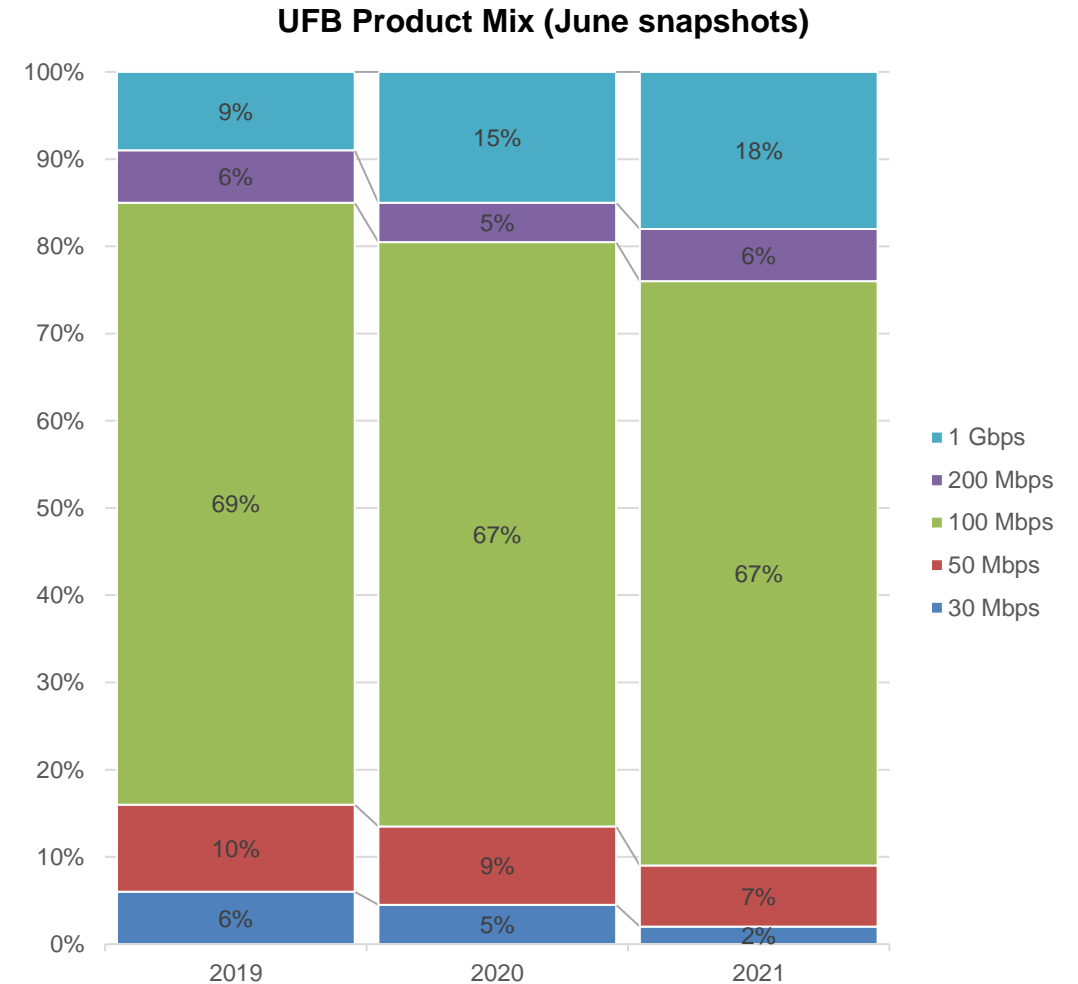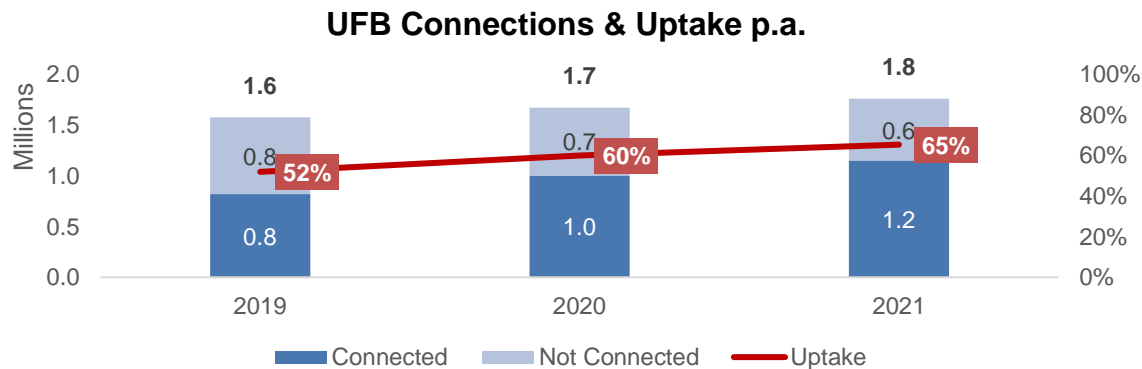
UFB Product Mix (June snapshots)

UFB Connections & Uptake p.a.

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Chorus has provided an outline of average speed and throughput across the network – whilst these values are approximate and theoretical, they provide a guide to average usage.

Measure	Description	Chorus
# of connections	Total number of active connections on the Chorusfibre network (GPON only)	740,000
∑ connection speeds	Theoretical demand on the network if every connection downloaded at its maximum plan speed at the same time	164 Tbps
Average speed	Sum of connection speeds divided by number of connections	221 Mbps
∑ of peaks	Theoretical network demand if each connection's peak throughput for the day had occurred at the same time	20.9 Tbps
Average peak	Sum of peaks divided by the number of connections	28.3 Mbps
System peak	Actual peak throughput observed on the network (day)	1.99 Tbps
Average throughput per user (ATPU)	**System peak throughput divided by the number of connections**	**2.69 Mbps**

Measure	Description	nbn
# of connections	Total number of active connections on the nbn fixed network (Class 4 services only)	8,288,440
∑ connection speeds	Theoretical demand on the network if every connection downloaded at its maximum plan speed at the same time	469.7 Tbps
Average speed	Sum of connection speeds divided by number of connections	56.7 Mbps
∑ of CVC	Sum of contracted CVC bandwidth (throughput) providing Class 4 services	22.9 Tbps
Average peak	Sum of peaks divided by the number of connections	TBC
System peak	Actual peak throughput observed on the network (day)	TBC
Average throughput per user (ATPU)	**Sum of contracted CVC throughput divided by the number of connections**	**2.77 Mbps**

Chorus description of capacity planning

- Objective to avoid congestion and provide 'congestion-free network'

- Forward capacity planning – approx. 9 months (50% headroom) between network capacity and forecast estimated demand

- Ensure sufficient buffer for surges in demand – e.g. major gaming releases, the 2019 Rugby World Cup and the early 2020 COVID-19 lockdown.

Forecast and historical fibre ATPU
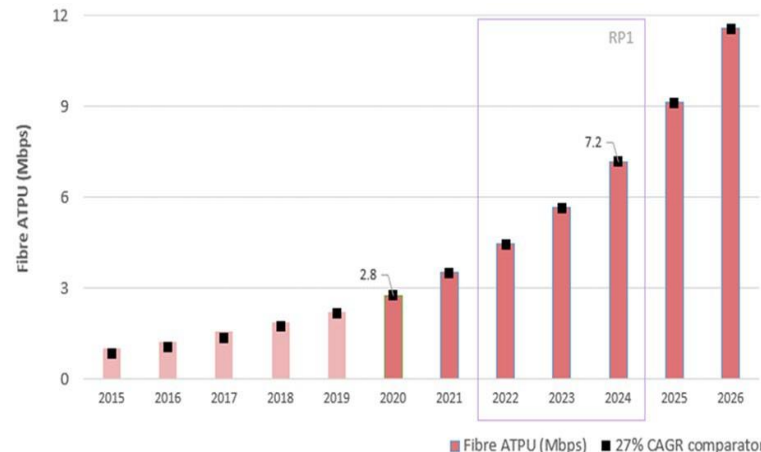
NBN SIO RKR - 30 June 2021
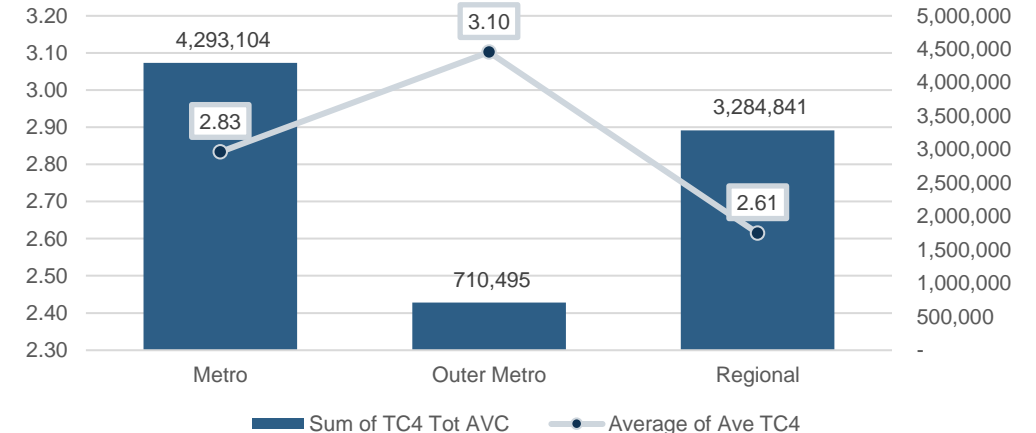
1. Chorus-Our-Fibre-Plans-12-February-2021
2. NBN SIO RKR - Disclosure Tables - 30 June 2021

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New Zealand Telecommunications Landscape

Ultra-Fast Broadband
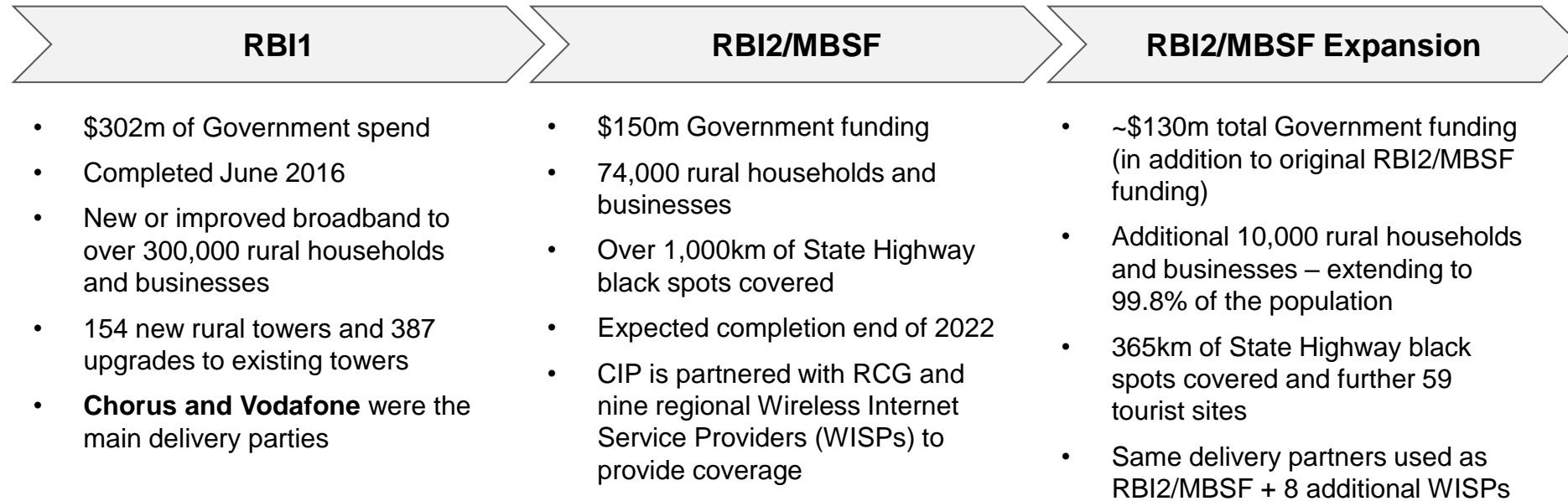
Rural Broadband Initiative

Retail Market
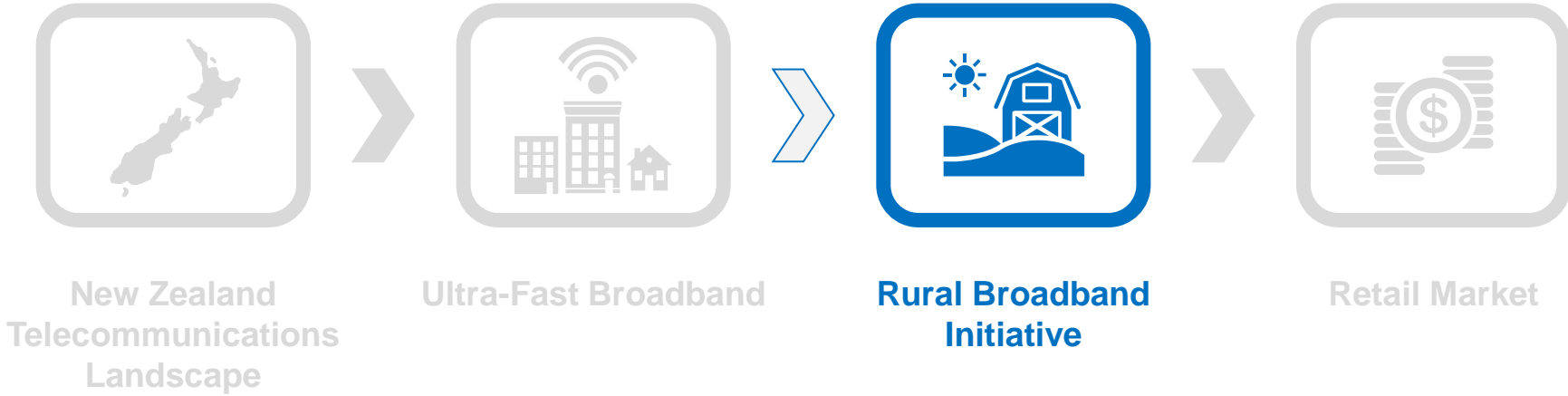
RBI: Overview[1,2,3]

RBI began as an initiative to spread broadband to rural areas not covered under UFB. RBI1 was completed in June 2016, and RBI2/MBSF is expected to be completed by the end of 2022

New Zealand's telecommunications networks are generally owned and operated by private network operators. In rural and remote areas where the network operators have not previously invested in coverage, grant funding from an industry levy has been used – the Telecommunications Development Levy.

The levy recognised that intervention was required to ensure rural and remote areas of New Zealand have access to fast broadband and mobile services. Over $430 million in grant funding from the Telecommunications Development Levy has been allocated to RBI, to ensure that more New Zealanders can experience the benefits of improved connectivity.

RBI1	RBI2/MBSF	RBI2/MBSF Expansion
• $302m of Government spend	• $150m Government funding	• ~$130m total Government funding (in addition to original RBI2/MBSF funding)
• Completed June 2016	• 74,000 rural households and businesses	• Additional 10,000 rural households and businesses – extending to 99.8% of the population
• New or improved broadband to over 300,000 rural households and businesses	• Over 1,000km of State Highway black spots covered	• 365km of State Highway black spots covered and further 59 tourist sites
• 154 new rural towers and 387 upgrades to existing towers	• Expected completion end of 2022	• Same delivery partners used as RBI2/MBSF + 8 additional WISPs
• **Chorus and Vodafone** were the main delivery parties	• CIP is partnered with RCG and nine regional Wireless Internet Service Providers (WISPs) to provide coverage	

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RBI: Regional Mobile Network Architecture[1,2]

Depending on the location, mobile network architecture is either passive or active

Network (Owned / leased)

CHORUS

Rural Connectivity Group Single-RAN (RCG Managed)

Rural Connectivity Group

RBI 1 (3G/4G) – Passive Sharing	RBI 2 – Active Sharing (3G/4G)

Passive Tower sharing

- Sharing only mast & site facilities

Core network — Core network

RNC — RNC

Tower

BS active equipment — BS active equipment
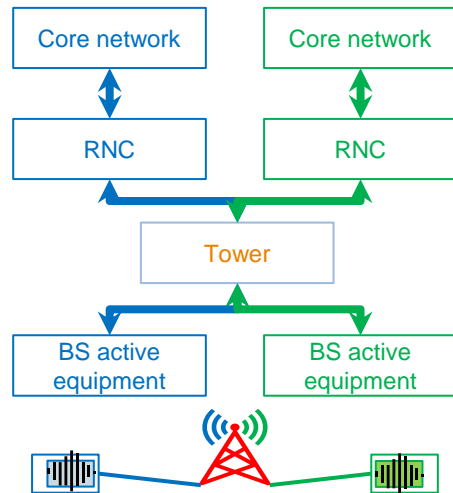
Generally only passive infrastructure is shared

MOCN (multi-operator core network)

- Sharing sites, Node, relevant backhaul, and spectrum

Core network — Core network

RNC

Tower

BS active equipment
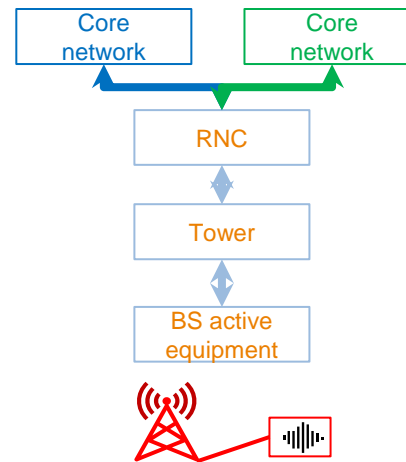
Separate Core, site active equipment shared and shared / pooled spectrum

RCG Sites

- 265 sites (Regional / Rural)
- Government subsidy of $150M
- Each of the three MNO contributing $25M
- 3 MNOs are the owners of the network
- 40% of the annual OPEX is shared equally, balance 60% based capacity committed.

1. https://www.crowninfrastructure.govt.nz/rural/what/
2. www.thercg.co.nz/

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RBI: RBI1 Product & Pricing Requirements[1]

Key products and pricing defined for wholesale services in RBI1. Vodafone and Chorus the two key delivery parties of RBI1

Vodafone

- Vodafone has a **prescribed wholesale service**:
  - **Peak speed** of 21/5Mbps
  - **Minimum speed** of 5/0.5Mbps

- **Co-location** Service – co-location costs to be shared between all relevant Access Seekers.

- **Annual** product **review** for wholesale services

- Vodafone has **three product variants** of the prescribed wholesale service:

Product	Maximum Price	Data cap per month	Overage rate
RBI Broadband Service	$44.35	10 GB on-peak 50 GB off-peak	$1.50 per Gigabyte
RBI Broadband plus Voice Service	$52.17	10 GB on-peak 50 GB off-peak	$1.50 per Gigabyte
Enhanced RBI Broadband Service	$64.40	Not applicable	Not applicable

- Maximum prices Vodafone may charge for the Wholesale Services subject to any direction of the Telecommunications Commissioner or the Commerce Commission pursuant to the Act.

Chorus

- Chorus has **prescribed Rural Telecommunications Services**:
  - Backhaul Service (telephone exchange to interconnect point)
  - Sub-loop backhaul (unbundled copper loop network backhaul)
  - RBI layer 1 Inter-exchange Backhaul Service
  - RBI Co-location Service (unbundled copper local loop colocation)
  - RBI Sub-loop Co-location Service (cabinet co-location)
  - RBI DFAS (Dark fibre access)
  - RBI Fibre Bitstream for Priority Users (Bitstream 3a equivalent)
  - Premium RBI Fibre Bitstream for Priority Users (Bitstream 4 equivalent)
  - RBI Community Fibre Bitstream Service (Bitstream 2 equivalent)
  - UBA (unbundled bitstream access)
  - Wholesale VDSL2

- **Pricing** for these services is set either as Standard Terms Determination, lower of Telecom's standard wholesale price list and agreement price level, or the lower of a set price level and Chorus UFB service (when launched).

Both parties have signed a Deed of Undertaking to achieve non-discrimination in supplying relevant services

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1. Rural Broadband Initiative Phase 1 August 2016 MBIE

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RBI: RBI2 Product & Pricing Requirements[1]

Focused on enabling access to infrastructure and capability enabled through RBI2 funding via RCG and enabling service coverage via WISPs

- RBI2 requirements are focused on creating access to enabling infrastructure through wholesale co-location and wholesale backhaul services, rather than products

- **Agreements entered with RCG** (Vodafone, Spark and 2degrees) and **Wireless Internet Service Providers** (WISPs)
  - RCG **required to commit** (via Deed of Undertaking) to provide non-discriminatory access to RBI2 funded sites/infrastructure:
    - **Wholesale co-location**
      - WISP or Access Seeker co-location. One WISP dimensioned to be accommodated on each RBI2 site.
      - Fees
        - » Establishment Fee (<$500 +GST)
        - » Reasonable installation charges
        - » Additional land costs
        - » Reasonable contribution to the on-going operational fees to cover power and maintenance.
      - Rental Costs will not form part of the Charges for RBI 2 Sites for a period of ten (10) years from the date of the signed Relevant Occupation
    - **Wholesale backhaul services**
      - Backhaul Service Fees determined on a case-by-case basis.
    - RCG required to **publicly disclose** the Backhaul and Co-location Standard Terms and disclose the terms on which RCG has agreed that differ from the standard terms
  - WISPs **not required to give undertakings**

Rural Connectivity Group

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1. ComCom's Equivalence-and-non-discrimination-guidance-30-September-2020.pdf

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New Zealand Telecommunications Landscape

Ultra-Fast Broadband

Rural Broadband Initiative
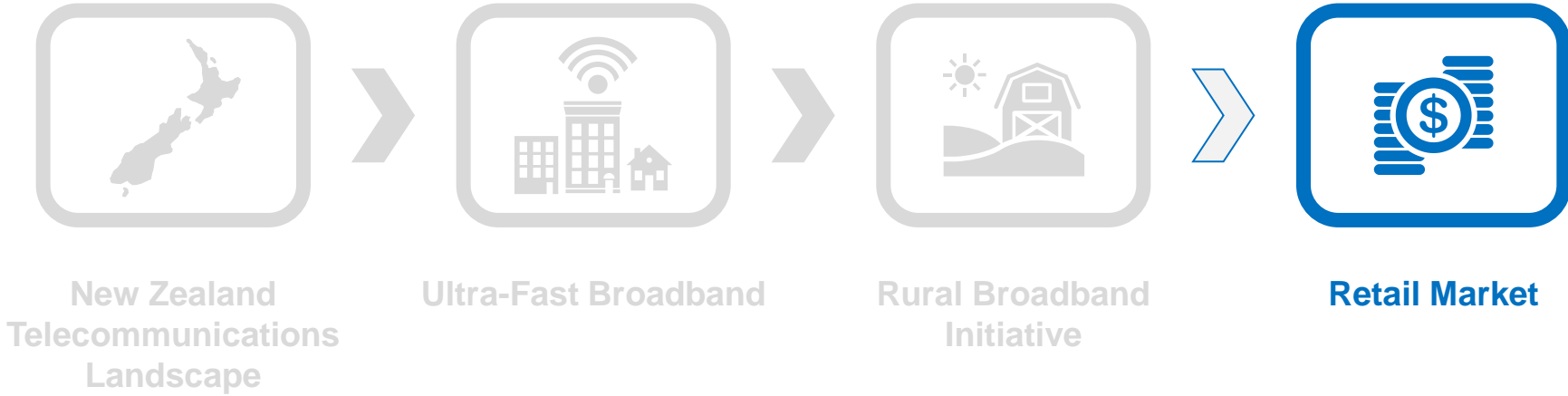
Retail Market

Retail Market: NZ Fixed Broadband RSP Market[1]

Spark, Vodafone NZ, Vocus NZ and 2degrees are the largest broadband RSPs

Market Share

- ComCom released its 2020 Annual Telecommunications Monitoring Report (revised version) in March 2021. Its results were based on data from Chorus, CIP, and industry questionnaires

- NZ's retail fixed broadband market is dominated by 4 key players, who together hold 81% of the market in total:

  – Spark (incl. Skinny)

  – Vodafone NZ

  – Vocus (incl. Slingshot, Orcon, & 2Talk)

  – 2degrees

- 'Other' smaller RSPs that responded to ComCom's industry questionnaire:

  – Compass, Gravity, InspireNet, Kordia, Lightwire, MyRepublic, Nova Energy, Now NZ, Vector, Vital, and Wireless Nation

Est. Fixed Broadband RSP Market Share by Connections

Spark, 40% | Vodafone, 21% | Vocus, 13% | Other, 13% | 2degrees, 7% | Trustpower, 6%

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UFB products offer significantly greater speeds and lower pricing than RBI products

Residential Fixed Pricing

- Fixed pricing was measured using advertised pricing for Spark, Vodafone, 2degrees, Compass, InspireNet, MyRepublic, Now NZ, and Wireless Nation unlimited broadband products

- Pricing trends from major market players (Spark, Vodafone, NZ) indicate a shift towards removing entry level products (30-50 download speed) from their offering

- Chorus wholesale price caps are shown to provide a reference point for the average industry retail markup. Note that Chorus can charge a lower wholesale rate than the price cap

Residential Fixed Wireless Pricing

- Fixed Wireless pricing was measured using advertised pricing for Spark, 2degrees, Wireless Nation, Farmside, and Netspeed

- Data caps vary significantly between provider (e.g. 120GB, 160GB, 170GB). Broad data cap categories have been used for the purpose of this presentation (100-200GB & 200GB+)

- Other fees include connection fees for additional equipment if required (~$99-250), router delivery fees (~$15), and termination fees (~$99-399 depending on how long into contract term)

Retail Pricing $ p.m.[2]
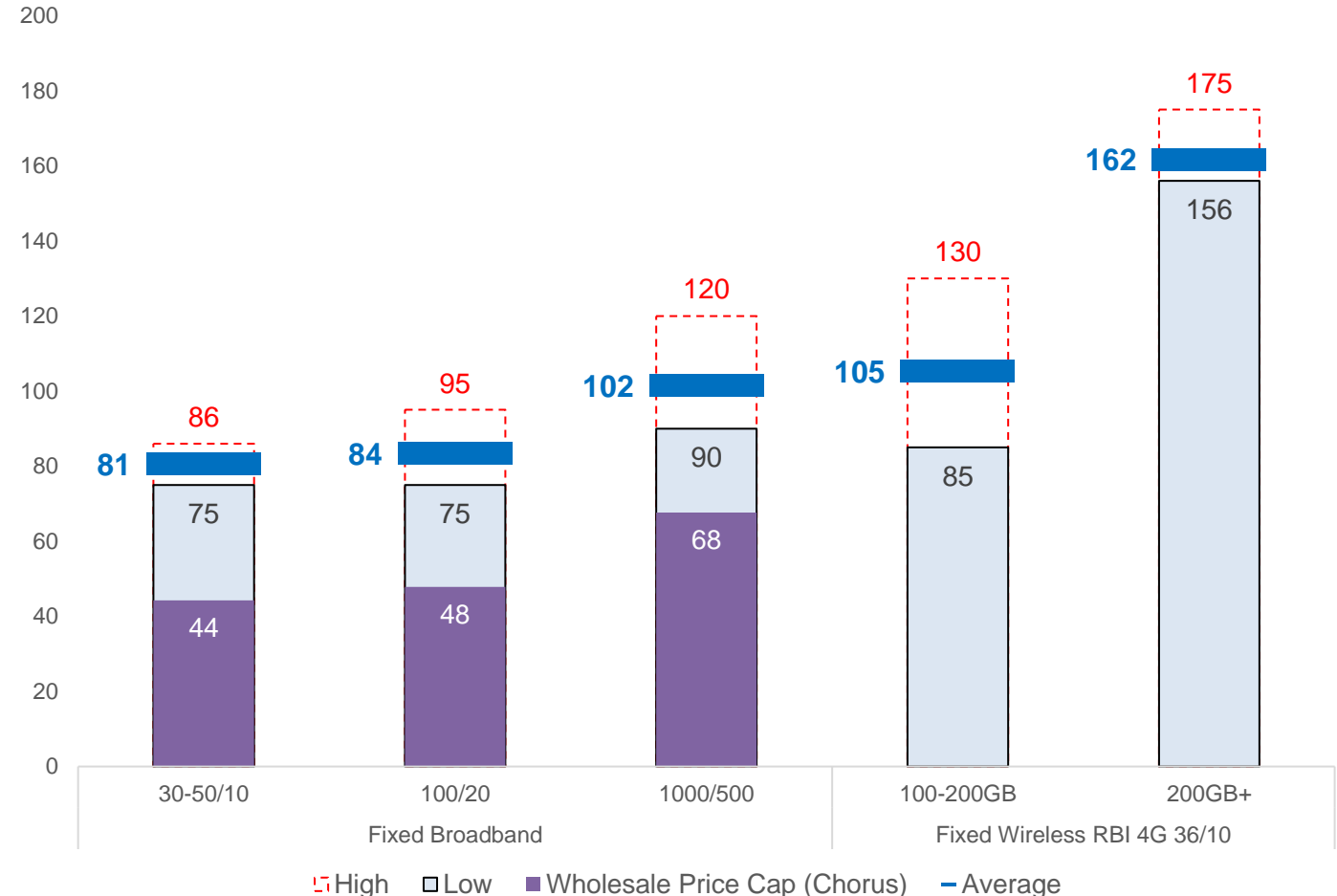
Chart: Retail Pricing $ p.m. across product categories

	Fixed Broadband			Fixed Wireless RBI 4G 36/10	
	30-50/10	100/20	1000/500	100-200GB	200GB+
High	86	95	120	130	175
Low	75	75	90	85	156
Wholesale Price Cap (Chorus)	44	48	68		
Average	81	84	102	105	162

Legend: High | Low | Wholesale Price Cap (Chorus) | Average

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New Zealand Telecommunications Landscape

Ultra-Fast Broadband

Rural Broadband Initiative

Retail Market

Questions

Addendum
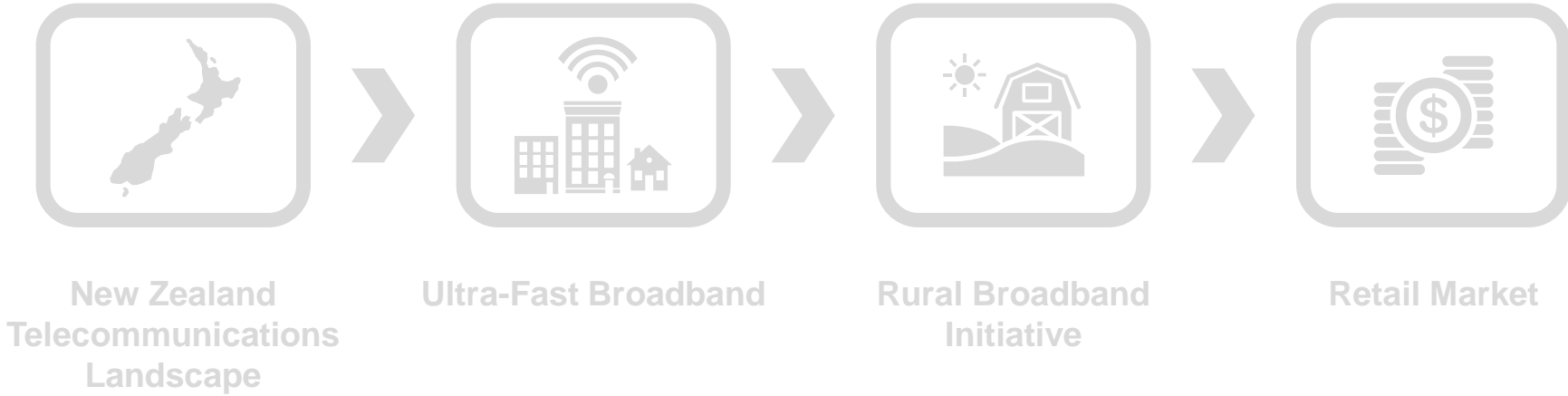
- **Questions and answers from session 12 October, including further detail on Performance Measurement & Reporting Regime in New Zealand**

- **UK and Canada overview**
    - **Brief market and regulatory background, together with**
    - **insights into the price-quality reporting regulatory mechanisms in these jurisdictions**

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Product and Pricing Working Group

Copper Disconnection

Copper is in the process of being decommissioned by Chorus under the Copper Withdrawal Code which came into effect on 1 March 2021 but under which Chorus can only stop supplying from 1 September 2021.

Chorus is required to give consumers a minimum of 6 months' notice of any change from copper to fibre-based technology. Chorus is also required to provide consumers with the necessary information to understand any move from copper to other technologies and where a consumer orders a fibre service, Chorus must have it installed at a consumer's home before copper service is terminated.

Loss correction regime

Please refer to the following slide showing a summary comparison on loss correction in NZ.

Responsibility for capacity constraints and how this fits in with contractual and commercial model in NZ compared to Australia (2 questions during session from Luke and Lay Na)

Further detail is set out in the subsequent slides entitled "Performance Management & Reporting Regime" and "Quality ID Working Group Observations (2021)" to further illustrate mechanisms in NZ.

Further questions answered during the Working Group session

- 2022 – 2025 is the expected fixed period for the new regulatory regime for fibre fixed line access services (FFLAS) under Part 6 of the Telco Act, currently being finalised by the Commerce Commission. It is expected to commence in January 2022. There is no set period beyond the initial 3 years.

- Although Chorus has claimed an ATPU increase by 2028 to approximately 7Mbps, there is no certainty around this large increase so the comparisons made in slide 20 of similar ATPUs for NZ and Australia should form the basis of the comparisons at this stage.

- Similarly, the recent announcement (in September 2021) by Chorus of its plans to replace 100/20 Mbps products with 300/100 Mbps products by December this year is seen as a promotional tool used by Chorus to discount price increases in product speed over the shorter term for the purposes of increasing ARPU across consumers over time. Whether this will result in such ARPU increases is not yet known.

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Cost Recovery[1,2]

Financial Loss Asset (FLA)

- If investments are made ahead of demand, demand and subsequent revenue will generally not cover fixed and/or variable costs incurred during that period. The FLA captures the accumulated unrecovered returns in order to capitalise these losses.

  - Accumulated unrecovered returns are the sum of revenue shortfalls for each disclosure year (or part disclosure year) of the loss period, with each revenue shortfall adjusted to its present value as at the implementation date

- The financial loss asset can be added to the RAB and treated as an asset, including depreciation

NZ – Financial Loss Asset (FLA)

- Chorus' FLA is calculated through the following 5 steps, as at 01/01/22:

Step	Method	Chorus Value
1. Revenue	Calculate yearly present values of UFB revenue since inception using annual WACC	$2.6bn
2. Costs	Calculate yearly present values of UFB capex, opex and tax (if any – may be 0 due to existing tax losses) since inception using annual WACC	-$8.3bn
3. Net Cash Flows	Sum the difference between PV revenue and PV costs	-$5.7bn
4. UFB Asset Value	Add back UFB closing asset base value	$3.8bn
5. Crown Financing	Add back PV of Crown Financing benefit	$0.4bn
		-$1.5bn

- These 5 steps equate to the FLA (**-$1.5bn**), which is added to the Regulatory Asset Base (RAB) (bringing the $4bn RAB to $5.5bn), which increases the Maximum Allowable Revenue for the regulated entity.
- The FLA depreciates based on the weighed average useful remaining life of UFB assets immediately before implementation date.
- The WACC currently set out in the IMs is specified as a post-tax WACC, however the ComCom is currently considering using a vanilla WACC, which increases the WACC through the use of the cost of debt in the WACC equation pre-tax
  - Vanilla WACC = cost of debt x leverage + cost of equity x (1 – leverage).

NBN Co – Initial Cost Recovery Account (ICRA)

- NBN Co's ICRA is calculated through the following 5 summarised steps:

Step	Method	NBN Co Value (2019)
1. ABBRR	Calculate Annual Building Block Revenue Requirement (ABBRR) using BBM method	$7.7bn
2. Revenue	Calculate annual nominal revenue	$2.8bn
3. Unrecovered Cost	ABBRR less nominal revenue	$4.9bn
4. Nominal ICRA	Add unrecovered cost value to ICRA start period value, equating to ICRA end period value	$25.5bn (end)
5. Real ICRA	Adjust ICRA end period value for inflation using Cumulative Inflation Factor	**$23.5bn** (end)

- Once NBN Co earns revenue greater than its ABBRR, the ICRA reduces proportionately in value. When the ICRA is extinguished, NBN Co will have recovered its efficiently incurred capex and opex.
- NBN Co's ICRA is based on the same concept of cost recovery as NZ's FLA, with the **key difference** being:
  - Chorus' FLA is treated as an asset and is added to the RAB, whilst NBN Co's ICRA is treated as an 'offset account' that depletes with any revenue earned over the ABBRR revenue cap. Once depleted, the revenue cap comes into effect.

1. Chorus Initial Asset value Model Overview
2. Commerce Commission: Chorus' initial regulatory asset base as at 1 January 2022 – Draft Decisions

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Background

- The UFB Performance Management Report describes the LFC performance measurement and reporting regime for Layer 2 traffic. It was part of the consultation process with RSPs and the LFCs, with CFH expecting all probes monitored and reported by **June 2017**.

- CFH has contracts with each of the four LFCs, which include commitments to meet Service Levels for Layer 2 traffic performance and service availability **(Layer 2 Traffic Service Levels).**

- Any failure to meet the Layer 2 traffic service levels means affected services are marked as unavailable for the period of the failure, and thus contribute to the availability service levels

- The Chorus and Enable contracts specify that a suitable Layer 2 traffic service level and measurement regime is to be developed by CFH in consultation with LFC and the industry

Overarching Requirement

- The measurement must provide an accurate representation of the actual performance of the Network. Any probe configuration and routing/switching of test traffic through the Network must take this requirement into account.

- Any inconsistencies – Network Infrastructure Project Agreement (NIPA) takes precedence.

Minimum Reporting Requirement for the LFC

- The LFC is to develop an SLA report and give this to RSPs (unless otherwise agreed by the RSPs) and CFH (or its successor) on a monthly basis. The report will include the following information:

  - *Port Utilisation*: all ports utilisation for all Network ports *(threshold to be set to 95% initially but can be changed in 5% increments under certain conditions)*

  - *Service Level Breach*: any End User Services where the LFC has failed to meet the Layer 2 Traffic Service Levels

  - *Reference and OAM Probes:* the results from any reference probes (FD, FDV & FL). The reference probes are in place to confirm that the Network is capable of meeting L2 traffic service levels at the Port Utilisation Threshold) & performance monitoring

  - *Other:* any additional reporting req. agreed between the RSP and LFCs [2]

Layer 2 Traffic Service Levels

- Each End User's traffic must be delivered to the Point of Interconnect to meet the following Service Levels, each measured over five-minute intervals (24 hours per day):

  - At least 99% of the frames within the five-minute measurement interval must be within the service levels, otherwise considered unavailable

  - Parameters that need to be measure are FL, FD and FDV

  - All traffic LFC accepts into the Network must be carried in accordance with the Layer 2 traffic service levels [3]

- The LFC may either police traffic to the service profiles on ingress, allowing for a reasonable Committed Burst Size (CBS) / Excess Burst Size (EBS) as per the Bitstream Service Descriptions in the WSA, or carry all offered traffic according to the Layer 2 Traffic Service Levels. [4]

- The LFC may police any out-of-profile traffic (being the traffic that exceeds either the committed or excess information rate (CIR and EIR), or the burst size (EBS and CBS) specified in the WSA) that an RSP offers to the Network, and this may impact on End User performance. RSPs may therefore want to consider shaping their traffic prior to offering it to an LFC. [5]

	Frame Delay must be:	Frame Delay Variation must be:	Frame Loss must be:
CIR	≤5 mS	≤1 mS	≤0.1%
EIR	n/a	n/a	≤2%

- CFH has approved a change in FDV metric from 1ms to 3ms for GPON traffic only, but the change only becomes effective once the WSAs are updated and approved by the RSPs. [6]

1. https://www.crowninfrastructure.govt.nz/wp-content/uploads/2011/12/UFB-Performance-Management-and-Reporting-17-Nov.pdf (which we refer to as the "UFB Performance Management Report")
2. Page 6 & 7 of the UFB Performance Management Report (Section 5.1)
3. Page 5 of the UFB Performance Management Report. (Section 3.1, 3.2 & 3.3(c))
4. Page 6 of the UFB Performance Management Report.(Section 4.2)
5. Page 6 of the UFB Performance Management Report. (Section 4.3)
6. Page 5 of the UFB Performance Management Report. (Section 3.3(a))

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Probes & Measurement Intervals[2]

- **OAM Probe** means a device that is built-in, or connects, to an End User ONT or ONU that is used to measure the Layer 2 Traffic Service Levels between the POI Probe and OAM Probe by means of Synthetic Test Traffic;

- **OLT Probe** means a device connected to an OLT by the LFC that measures the Layer 2 Traffic Service Levels between the POI Probe and the OLT Probe and provides the Y.1731 reflector. An OLT Probe must be connected to each OLT via a Test ONT;

- **Pol Probe** means an industry standard device (for example ITU standard G.8013/Y.1731 compliant) located by the LFC at a POI that measures the Layer 2 Traffic Service Levels, and generates Synthetic Test Traffic, between the POI Probe and an OLT Probe or a OAM Probe. The POI Probe must measure traffic to/from each EAS within a POI;

- **Reference Probe** means an OLT reference probe and/or a POI reference probe;

- **Measurement Interval Number** means the specific Measurement Interval in a month. A 30-day month will consist of 8,640 Probe Measurement Intervals and a 31-day month will consist of 8,928 Probe Measurement Intervals, a 30-day month will consist of 2,880 Port Measurement Intervals and a 31-day month will consist of 2,976 Port Measurement Intervals. Measurement Interval Number 0 is the first Measurement Interval of a month;

- **Port Measurement Intervals** means a five-minute interval used for Port Utilisation measurements;

- **Probe Measurement Intervals** means a five-minute interval which consists of a minimum of 3,000 sample measurements. The LFC may discard the worst 1% of the sample measurements;

- **Synthetic Test Traffic** means test traffic generated by the POI Probe. This traffic must be marked as drop ineligible (as per ITU standards G.8013/Y.1731 08/2015) and injected continuously at a minimum rate of 10 frames per second and delivered over traffic bearing Ports. Synthetic Test Traffic may be sent over a test-only service tag, and is to be treated by the Network elements in the same way that service frames are treated;

- **Test ONT** means the ONT to which the ONT test probe is connected or within which it is housed. The Test ONT must connect to the OLT through a production splitter.

1. https://www.crowninfrastructure.govt.nz/wp-content/uploads/2011/12/UFB-Performance-Management-and-Reporting-17-Nov.pdf
   (which we refer to as the "UFB Performance Management Report")
2. As defined on pages 1 to 3 of the UFB Performance Management Report.

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Quality ID Working Group Discussions (2021)

Commission is considering a change to the Layer 2 performance measurements, with Chorus response objecting to the implementation of an EIR performance target and seeking further industry consultation

- The Commission issued a draft decision in May 2021 that included differentiated reporting requirements for the port utilisation performance measure based on POI area. (see table).[1]

- In September 2021, the establishment of an EIR performance target was discussed at industry workshop level, with a proposed performance target for EIR of **>=99% of EIR traffic has a Frame Loss ratio <2%**.[2]

- In response, Chorus's submission[3] on the quality information disclosure (ID) described this concept as imposing two separate traffic performance measurement and performance obligations.

- The Chorus response opposes a new introduction of measurement as the existing layer 2 performance measurement and reporting framework was established after significant industry work.

- Chorus also stated in its response that if there is a view that the framework is deficient then there should be a further industry-wide process to identify areas for improvement.

National	
Measure	**Target**
Number of exceedances of Frame delay	≥7ms
Number of exceedances of Frame delay variation	≥3ms
Frame loss ratio: CIR	≥0.1%
Frame loss ratio: EIR	≥2%

1. https://comcom.govt.nz/__data/assets/pdf_file/0026/255761/Fibre-Information-Disclosures-Draft-decisions-Reasons-Paper-27-May-2021.pdf
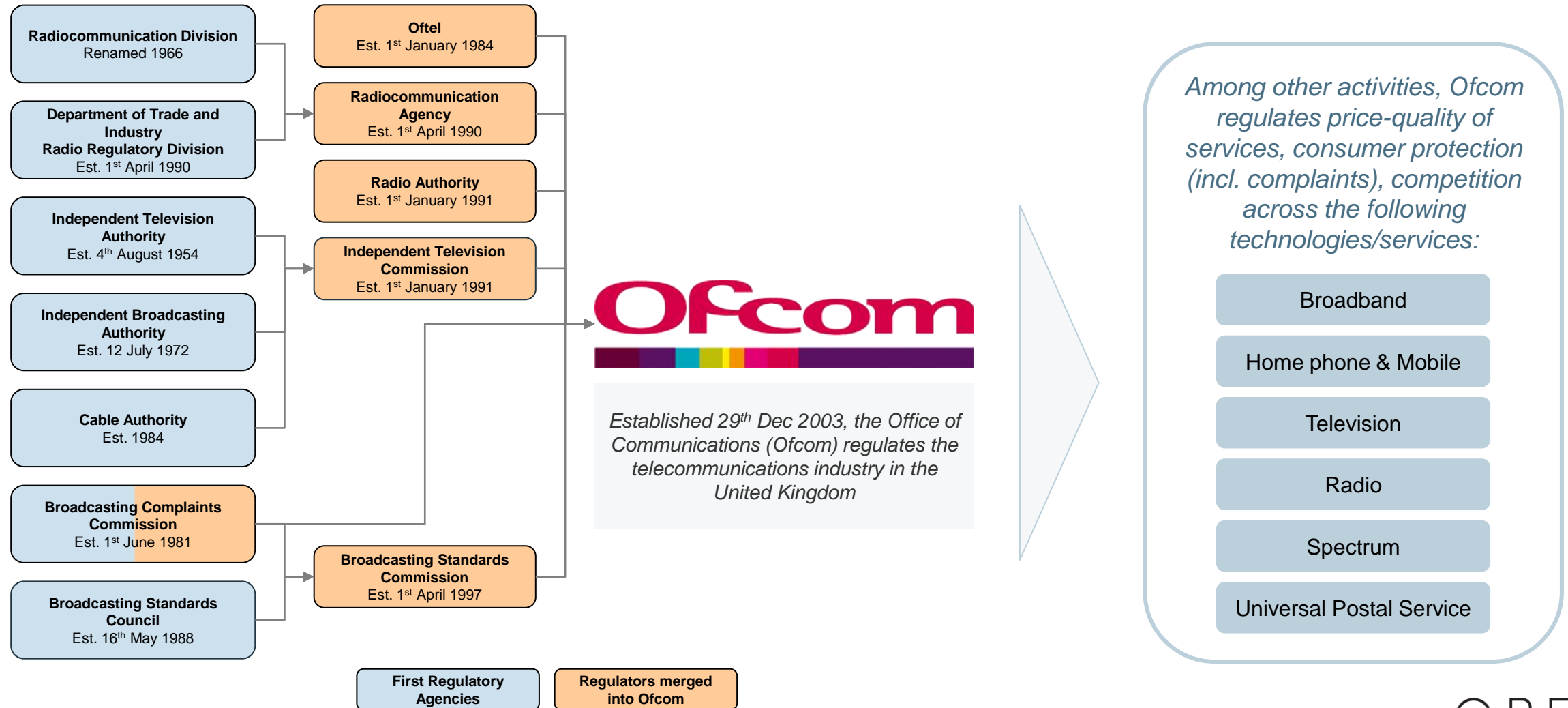2. https://comcom.govt.nz/__data/assets/pdf_file/0021/265206/Commerce-Commission-Fibre-PQID-Quality-ID-working-group-session-slides-9-Sept-2021.pdf
3. Chorus Limited Submission on Fibre Quality ID 23 September 2021

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UK Overview

UK Regulatory Market Overview[1,2]

The Office of Communications (Ofcom) is the UK's communications regulator, who regulate price & quality, consumer protection, and promote competition across a range of services
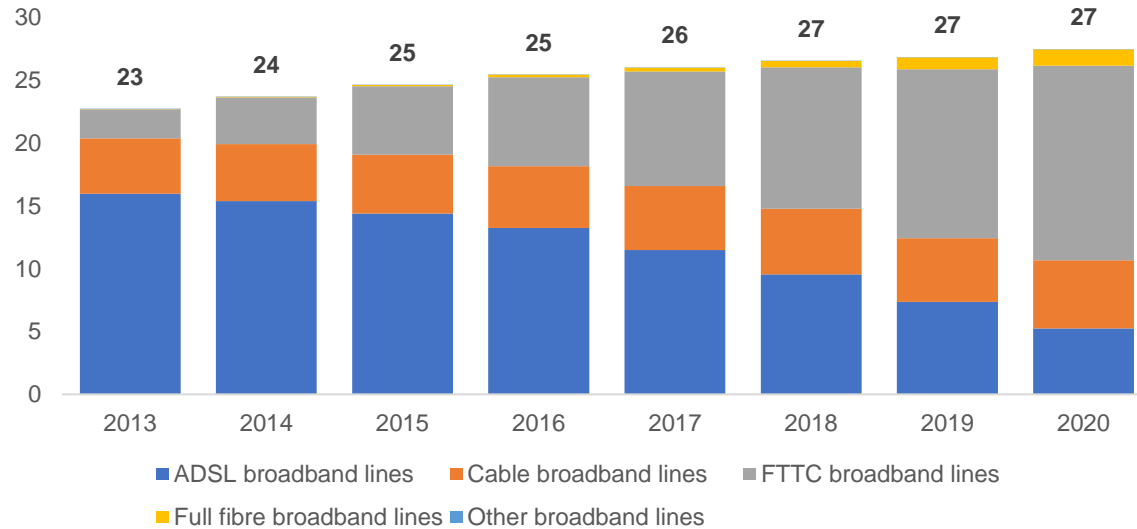

Radiocommunication Division
Renamed 1966

Department of Trade and Industry
Radio Regulatory Division
Est. 1st April 1990

Independent Television Authority
Est. 4th August 1954

Independent Broadcasting Authority
Est. 12 July 1972

Cable Authority
Est. 1984

Broadcasting Complaints Commission
Est. 1st June 1981

Broadcasting Standards Council
Est. 16th May 1988

Oftel
Est. 1st January 1984

Radiocommunication Agency
Est. 1st April 1990

Radio Authority
Est. 1st January 1991

Independent Television Commission
Est. 1st January 1991

Broadcasting Standards Commission
Est. 1st April 1997

Ofcom

Established 29th Dec 2003, the Office of Communications (Ofcom) regulates the telecommunications industry in the United Kingdom

Among other activities, Ofcom regulates price-quality of services, consumer protection (incl. complaints), competition across the following technologies/services:

Broadband

Home phone & Mobile

Television

Radio

Spectrum

Universal Postal Service

First Regulatory Agencies

Regulators merged into Ofcom

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Fixed Market Overview[1]

UK's fixed telco market has approx. 27 million connections, and is dominated by BT with a 33% share of connections

Fixed Broadband Connections by Technology (millions)

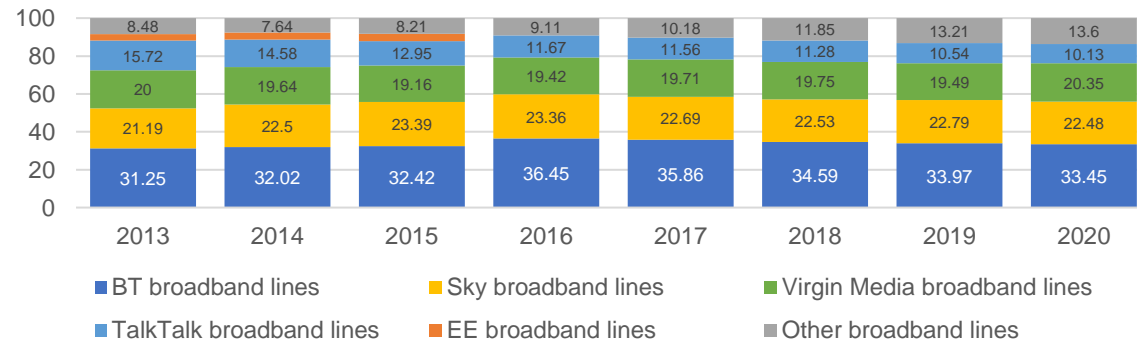Legend: ADSL broadband lines · Cable broadband lines · FTTC broadband lines · Full fibre broadband lines · Other broadband lines

Fixed Broadband Connections Share by ISP (%)

Legend: BT broadband lines · Sky broadband lines · Virgin Media broadband lines · TalkTalk broadband lines · EE broadband lines · Other broadband lines

The Market

UK's fixed telco market currently consists of 4 main players based on share of connections:

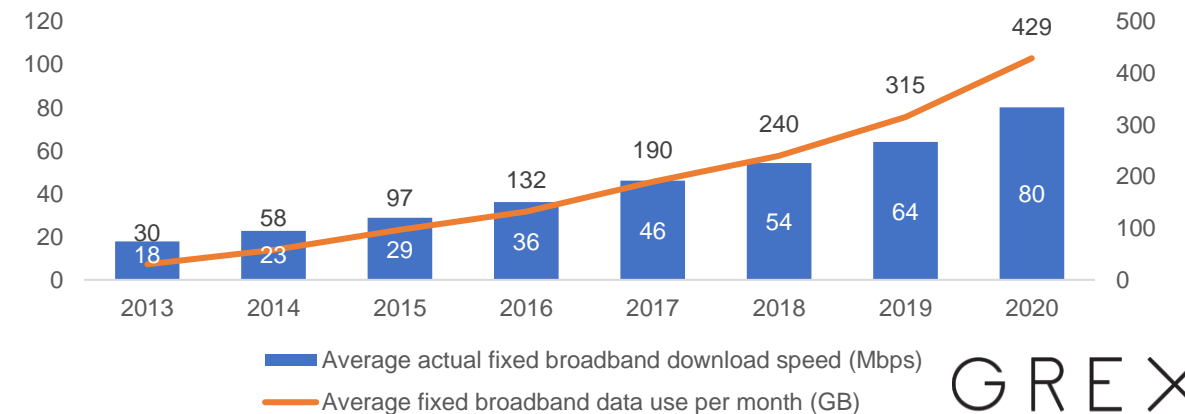- BT
- Sky
- Virgin Media
- TalkTalk

FTTC is defined in the UK as fibre to the cabinet[2], very similar to FTTN in Australia. It is the dominant technology type, largely replacing ADSL technology. Full fibre (FTTP) only had 1.28m connections in 2020 (with growth rate of 15% since 2019).

Average usage and speeds are increasing rapidly (as illustration in below table).

Download Speed & Data Use per person

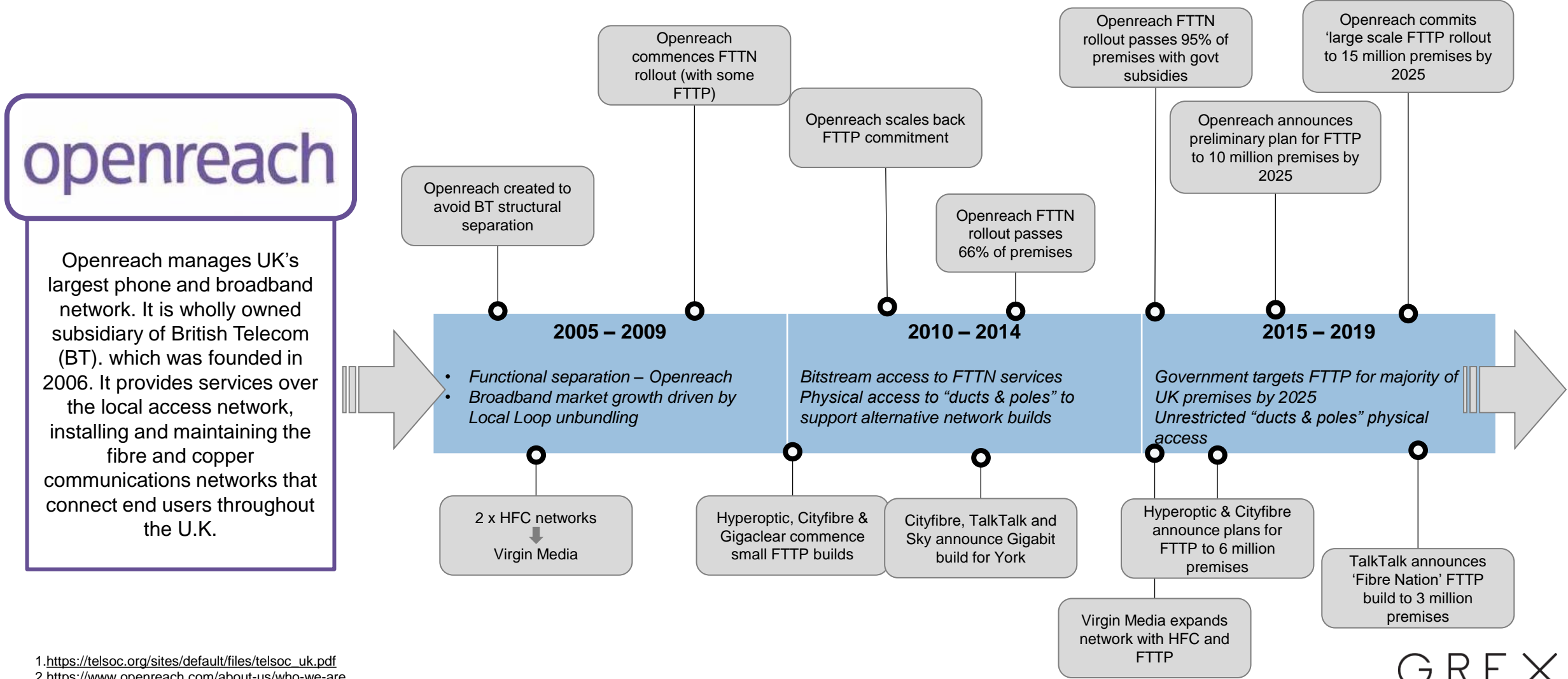Legend: Average actual fixed broadband download speed (Mbps) · Average fixed broadband data use per month (GB)

1. https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr/cmr-2021/interactive-data
2. https://www.cable.co.uk/broadband/guides/fttc-vs-fttp/

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Openreach is a wholly owned subsidiary of BT that that maintains the physical network of rollout of UK's national broadband and telephone network

openreach

Openreach manages UK's largest phone and broadband network. It is wholly owned subsidiary of British Telecom (BT). which was founded in 2006. It provides services over the local access network, installing and maintaining the fibre and copper communications networks that connect end users throughout the U.K.

Openreach commences FTTN rollout (with some FTTP)

Openreach scales back FTTP commitment

Openreach FTTN rollout passes 95% of premises with govt subsidies

Openreach commits 'large scale FTTP rollout to 15 million premises by 2025

Openreach created to avoid BT structural separation

Openreach announces preliminary plan for FTTP to 10 million premises by 2025

Openreach FTTN rollout passes 66% of premises

2005 – 2009

- *Functional separation – Openreach*
- *Broadband market growth driven by Local Loop unbundling*

2010 – 2014

Bitstream access to FTTN services Physical access to "ducts & poles" to support alternative network builds

2015 – 2019

Government targets FTTP for majority of UK premises by 2025 Unrestricted "ducts & poles" physical access

2 x HFC networks

Virgin Media

Hyperoptic, Cityfibre & Gigaclear commence small FTTP builds

Cityfibre, TalkTalk and Sky announce Gigabit build for York

Hyperoptic & Cityfibre announce plans for FTTP to 6 million premises

Virgin Media expands network with HFC and FTTP

TalkTalk announces 'Fibre Nation' FTTP build to 3 million premises

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New Key Regulatory Measures

Promoting competition and investment in fibre networks: Wholesale Fixed Telecoms Market Review 2021 - 2026[1]

- With a focus on encouraging competition **between different networks** (and not at access network level) where viable, Ofcom has introduced numerous measures as part of its recent review to encourage the provision of high-quality services, choice and affordable broadband for UK consumers.

- The regulatory measures are designed to **complement significant government investment to subsidise network rollout** in the hardest to reach areas of the UK (£1.2bn through to 2024/5).

- **Different approaches are taken to regulating products in different parts on the UK**, based on the level of deemed competition in those areas, i.e.

  - **Competitive areas** *(no areas yet identified but Ofcom expects this in future)* – no regulation of Openreach's broadband products as customers will benefit from the choice of multiple networks

  - **Areas with potential for material competition** *(70% of UK at 2021)* – flat, inflation-adjusted, regulated prices for Openreach's entry-level products (defined by Ofcom as 40Mbps) and no regulation of higher-speed products to provide investment certainty and encourage new network rollout

  - **Remaining 30% of UK** – where Openreach is the only operator with large-scale network, cost-based charge control to allow recovery of costs for Openreach's existing copper network and its investment in new full fibre network.[2]

- Additional measures are summarized in the table and are underpinned by Ofcom seeking to set a long-term path for approaching future decisions (with no expected introduction of price controls until at least 2031 and uniform wholesale pricing expected in all areas of the UK due to network investments made with and without government subsidies).

Measure	Rationale	Description
Access to Openreach's ducts and poles	Reduce cost of physical infrastructure construction	Quicker deployment of new networks and 50% reduction in up-front cost building
Openreach's wholesale services: *Above 40mbps – continue price flexibility* *Less 40mbps – introduce a price control*	Depending on location and level of competition in area – seek to reduce regulation of pricing for products above 40Mbps to encourage network investment by Openreach and its network competitors	BT's competitors will only invest in their networks if it is more attractive than buying from Openreach (as they currently do)
		New network investment by Openreach will be influenced by the return achieved from investment ((i.e., the prices it can charge for services delivered over the network).
Maintain access and pricing controls on BT's copper network	Protect consumer during transition to greater network competition	
Improved service quality *Regulatory measures to ensure repair & installations carried out rapidly*		
Support Openreach in retiring its old Copper network	No unnecessary costs for parallel networks	
Promoting network competition	Prohibit Openreach geographic discounts	
Allowing Openreach to charge more for full-fibre broadband	Improve investment	Openreach can charge more (£1.70 per month extra) for the 40 Mbps service if it is delivered over full fibre
Clarity on future regulation of fibre		No cost-based price control until 2031

1. https://www.ofcom.org.uk/__data/assets/pdf_file/0022/216085/wftmr-statement-volume-1-overview.pdf
2. Ofcom has aligned these areas to the areas with potential for material competition (the 70% of UK) due to BT's commitment to deploy full fibre to 3.2m premises by 2026.

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New Key Regulatory Measures

Pricing remedies: Wholesale Fixed Telecoms Market Review 2021 – 2026[1]

- As described previously, different approaches are taken to regulating products in different parts of the UK, based on the level of deemed competition in those areas.

- For *areas with potential for material competition (Area 2)* *(70% of UK at 2021)* – taking a "price continuity" approach, Ofcom has decided that for services in Area 2 currently subject to charge controls, price caps will remain constant in real terms, and that there will be no new charge controls on services currently subject to a fair and reasonable pricing requirement with the introduction of a charge control on 40/10 rental charges (inflation-adjusted from 2021 levels) and pricing flexibility (subject to a requirement for prices to be fair and reasonable) on rental charges for higher bandwidths.

  - Building on the approach it took from 2018, Ofcom is seeking to support competitive network deployment during the review period, with pricing flexibility on higher speeds progressively increasing the benefits of investment in competing networks as demand for higher speeds increases.

  - Ofcom states that it is starting to see the benefits of this initial approach with competition emerging from a number of network operators and is seeking to support future investments/partnerships in broadband as well as 5G networks, whilst maintaining pressure on Openreach to build gigabit speed networks where viable.

- For the *remaining 30% of UK (Area 3)* – cost-based charge controls are imposed in these areas by Ofcom using a RAB approach to allow recovery of costs for Openreach's existing copper network and its investment in new full fibre network[2]

  - Ofcom decided to adopt a RAB approach under which the asset base is comprised of Wholesale Local Access services (i.e. MPF (metallic path facility), FTTC, G.fast, FTTP) and cost recovery is viewed across all Wholesale Local Access services in aggregate in Area 3.[3]

- A five year (longer than previous periods) has been set for price controls as Ofcom seeks to provide greater regulatory certainty and create a stable environment for network investment.

Selected Openreach products	Pricing (rental per annum)[4]
40/10 Mbps	£167.11
55/10 Mbps	£203.40
100/15Mbps	£209.28
220/20 Mbps	£257.76
1000/220 Mbps	£969

1. https://www.ofcom.org.uk/__data/assets/pdf_file/0025/216088/wftmr-statement-volume-4-pricing-remedies.pdf
2. Volume 4 – pages 42 onwards.
3. Further details on Ofcom's cost recovery approach is set out in following slide.
4. https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=M80QNeH46o4g6JKGD604vTypQOKfNn%2Beo6vmoVh AOBZZ6rNZujnCs99NblKJZPD9hXYmiijxH6wrCQm97GZMyQ%3D%3D

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Ofcom's Costing approach

Ofcom uses hybrid HCA/CCA FAC approach for unbundled local loops

- In 2005, Ofcom moved from using a long run incremental cost (LRIC) approach for setting rates for unbundled local loops to a hybrid Historical cost accounting (HCA)/Current cost accounting (CCA) Fully allocated Cost (FAC) approach.

  - This approach aimed to take into consideration BT's pre-1997 copper access network assets in a manner that did not over-recover the costs of those assets.

  - Regulatory asset value (RAV) was established to represent the remaining value of the pre-1997 copper access network assets. RAV gradually disappears over time as the older assets are replaced with newer ones.

  - Assets that were developed post-1997 continued to be valued on a CCA FAC basis throughout their lives.

  - In 2009, Ofcom made a similar decision for call origination and termination services, while the LRIC pricing approach remained for support structures.

- Ofcom did not regulate prices for services such as virtual unbundled local access (VULA); in other words, services that provide access to the fibre network through a virtual connection. Rather, Ofcom allowed flexibility to price these services according to emerging trends in the market demand and supply.

Summary of Ofcom's costing methodologies

Service	Asset cost base	Costing methodology
LLU	Hybrid HCA/CCA RAV model	FAC model (top down)
Interconnection (originating and terminating access)	CCA (next-generation network-based)	FAC model (top down)
Support structure services (cost orientation)	CCA	LRIC (risk adjusted)

1. https://crtc.gc.ca/eng/archive/2020/2020-131.htm

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Appendix 2

Canada overview

Overview of Regulatory Bodies[1,2,3]

CRTC and Competition Bureau are the main regulators for telecommunication industry in Canada

Canadian Radio-television and Telecommunications Commission

- Canadian Radio-television and Telecommunications Commission (CRTC) regulates Canada's telecommunications and broadcasting systems[1]

- It mandates to ensure that both the telecommunications and broadcasting systems serve the interests of Canadians[1]

- The CRTC develop, implement and enforce regulatory policies on the Canadian communications system[3]

- Administers Telecommunication act

Competition Bureau Canada

- The Competition Bureau investigates complaints and has the power to impose penalties regarding competitive practices of companies in the telecommunications sector[3]

- It also has the authority to review mergers and acquisitions[3]

- The Competition Bureau has invoked its role as "an advocate for the benefits of competition" to intervene in CRTC consultations on fixed and mobile wholesale markets, the development of the Wireless Code of Conduct , and differential pricing of Internet services[3]

- Administers Competition act

1. https://www.ccts-cprst.ca/for-consumers/resources/government-and-regulatory/
2. https://crtc.gc.ca/eng/internet/role.htm
3. https://telsoc.org/sites/default/files/tja/pdf/129-article_text-1167-3-10-20180131.pdf

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Regulations Overview[1,2]

CRTC set regulatory measures that aim to facilitate greater competition between Internet service providers and to promote innovative broadband services and affordable prices

Facilities-Based Competition	• CRTC's general approach towards wholesale service regulation has been to promote **facilities-based competition** wherever possible. Facilities-based competition, in which competitors primarily use their **own telecommunications facilities and networks** to compete instead of leasing them from other carriers, is typically regarded as the most sustainable form of competition.[2]
Specified Access Rates and Terms & Conditions	• To foster greater competition, the **CRTC requires that large companies sell access to their networks under specific rates, terms and conditions**. Service providers use this access, with their own networks, to offer Internet and other services to their own retail customers. In other words, independent service providers are wholesale customers of large cable and telephone companies.
Set Wholesale Rates	• CRTC set the rates telephone and cable companies may charge their wholesale clients. **The rates are based on the costs the large cable and telephone companies incur to provide the wholesale service and include a reasonable mark up.**
	• CRTC has set the final rates for one type of wholesale service available to independent service providers known as the **aggregated wholesale high-speed access service.**
Disaggregated Wholesale High-Speed Access Service	• CRTC is now working to implement a new regime known as the **disaggregated wholesale high-speed access service that will enable competitors to access the large companies' fibre-to-the-home facilities and offer their customers faster Internet speeds.** In turn, this new wholesale model will better support sustainable competition and will provide benefits to Canadians, such as better prices and innovative broadband services. Moving to a disaggregated wholesale HSA service framework will also lessen competitor dependence on price regulation and give competitors more control over their cost structure.[2]

1. https://crtc.gc.ca/eng/internet/facbill.htm
2. https://crtc.gc.ca/eng/archive/2021/2021-181.htm

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Types of Wholesale Broadband Services[1]

Canada is in process of transitioning from aggregated high-speed access (HSA) service to Disaggregated high-speed access (HSA) service

Aggregated Service	Disaggregated Service
Available across Canada.	Currently available only in Ontario and Quebec.
Provides access FTTN but not FTTH.	Provides access to both FTTN & FTTH.
Competitors connect their network to a smaller number of points in the large companies' networks.	Competitors connect to many network points.
Competitors have to rely almost entirely on the large companies' networks.	Competitors have more flexibility in how they access the large companies' networks, and therefore more control over the services they offer.
Generally higher costs to transport large amounts of traffic over the large companies' networks.	Competitors can choose how they want to transport traffic (lease facilities from large companies, purchase their own facilities, etc.).
Service is no longer mandated by the CRTC from 2015.	Service is mandated by the CRTC.

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Aggregated Wholesale HSA Service Rates 2021[1]

The CRTC published aggregated wholesale rate 2021 based on two billing models: CBB model and Flat rate model

Capacity-based Billing (CBB)	Flat rate
• Competitors (the term used by CRTC to refer to RSPs) determine in advance the amount of capacity they will require to offer retail services • Should demand exceed this capacity, they will have to manage their network capacity until they purchase more. • Competitors can change their capacity requirements on a monthly basis • This model includes three components: (i) a monthly access rate for each of the competitor's retail customers; (ii) a monthly capacity charge, offered in increments of 100 Mbps; and (iii) ancillary charges.	• Competitors pay a flat fee per month, regardless of usage. • The flat-rate model provides competitors with unlimited usage and combines the monthly access rate and the monthly capacity charge into one monthly charge. In addition, ancillary charges are set separately for various service charges and interface rates.

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Shaw Pricing

CRTC has published aggregated wholesale HSA service rates in 2021 – there is large variability between networks across provinces in Canada

Selected Shaw products pricing[1]	
Shaw product[2]	Price per month
29/5 Mbps	C$20.11
49/8 Mbps	C$23.79
129/15 Mbps	C$37.05

- Pricing for products is based on a build up of charges across 2 elements:

  (i) Final monthly capacity rate, which as an example in Shaw's case is C$296.10 per 100 Mbps (or C$2.96 per 1 Mbps)
  (ii) Final monthly access rate (per end user), which in Shaw's case is C$11.23 (at the 11-29Mbps speed tiers) [2]

1. Pricing estimated are based on an average throughput of 3Mbps per end user per month (similar to NZ and Australia ATPUs).
2. Shaw's pricing is very different from pricing models used by other carriers in Canada (driven by different legacy networks, initial costs and ongoing costs)

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End