



Cost of capital for regulated fibre
telecommunication services in New Zealand:
Asset beta, leverage, and credit rating

20 May 2019

New Zealand Commerce Commission

FINAL REPORT



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EXECUTIVE SUMMARY

Following a statutory review of fibre regulation, the New Zealand Government has decided to implement a new incentive-based regulatory framework for fibre services. The new framework has been established through an amendment to the Telecommunications Act 2001 (the Telecommunications Act). This requires the Commerce Commission (Commission) to develop upfront Input Methodologies (IMs) that will set the rules and processes that apply to the regulation of fibre services.

To inform the Commission's development of the Cost of Capital IM, the Commission has asked CEPA to provide analysis and advice on the following two components of the weighted average cost of capital (WACC):

- An appropriate **asset beta** for fibre services that are regulated by the Commission. This includes consideration of whether it would be appropriate to estimate a different beta for Chorus and the Local Fibre Companies (LFCs).
- The long-term **credit rating** that would be appropriate for a fibre services provider.

Asset beta

The starting point for our analysis has been the methodology set out in the Commission's 2016 IM decision for the industries regulated under Part 4 of the Commerce Act 1986 (the Commerce Act). We have generally maintained this methodology, with the exception of adopting a shorter sample period for estimating the asset beta and leverage of the fibre providers. Specifically, our estimates are based on market evidence over the preceding 10 years, rather than 20 years as applied under the Part 4 IM.

Comparator selection

We have identified a broad range of comparators from the telecommunications sector. Within this broad range are two sub-groups: **wholesale-only** communication service providers (8 comparators) and **vertically integrated** service providers (51 comparators).

Wholesale-only communication service providers own communications network infrastructure, deploying these assets to provide wholesale services to third parties, who in turn serve end users. A key characteristic shared by this group is their lower degree of exposure to fluctuations in end-user (i.e., retail) demand relative to vertically integrated service providers. As summarised below, this group includes:

- **Fibre service providers:** Chorus is the sole wholesale-only fibre service provider included in our sample. Chorus also provides services over its legacy copper network and other unregulated services (for example, commercial backhaul).
- **Telecommunication tower companies:** Our sample includes five telecommunication tower companies. Similar to Chorus and the LFCs, these companies own communications network infrastructure and deploy this to provide wholesale services to telecommunication service providers, broadcasters and other clients. Typically, these companies have long-term contracts in place with their customers and demand for their services is seen as stable, linked to the rapidly growing use of wireless services.
- **Satellite operators:** Similar to the tower companies, these firms provide services to wholesale clients that include telecommunication service providers and broadcasters. Business models vary more than is the case for the tower companies, and as a result investor views of these companies



may differ significantly. Our sample includes two satellite operators, Eutelsat and SES, who we consider are likely to be viewed as having characteristics similar to other utility infrastructure – long-term contracting arrangements, relatively stable demand, and customer base.

We have also considered evidence from a large number of **vertically integrated service providers** who own and operate differing combinations of copper, fibre, mobile, and other telecommunications network assets. While many of these companies provide wholesale access to parts of their networks, they also provide data and voice services directly to government, business, and residential end-users.

It is common for the integrated companies to offer additional services, including streaming, business information and communications technology (ICT) services and streaming. In some cases, they derive revenues from alternative business lines, including the development of media content and provision of energy services. While some companies serve only their local area, others have a global scope, with operations across a wide range of countries. As a result, while they all fall within the telecommunications sector, the risk profiles of the integrated companies vary significantly.

Relative risk assessment

We consider that in many respects, the wholesale-only comparators provide a reasonable reflection of the systematic risk faced by the fibre providers. In particular, we note that:

- The tower companies, and fixed satellite operators Eutelsat and SES, have long-term contracting arrangements and wholesale customers. This provides similar revenue stability and predictability as for Chorus operating under a revenue cap.
- The integrated telecommunications comparators reflect a variety of business models. We consider that the degree of systematic risk faced by these comparators may be higher than for a wholesale-only fibre services provider, given the nature of demand for their services.¹

These factors could support placing greater weight on evidence from the wholesale-only comparators, relative to the vertically integrated comparators. However, we also note that:

- There may be reasons to think that the LFCs – who are not regulated under a revenue cap – could face a higher degree of systematic risk relative to the wholesale-only comparators, relating to their shorter-term contracting arrangements and correspondingly higher exposure to fluctuations in end-user demand.
- The wholesale-only comparator set is relatively small, comprising six companies for the two most recent five-year periods, and eight companies in the most recent two-year period.
- The Commission adopted a broad comparator sample that included vertically integrated utilities in its 2016 decision on the asset beta for electricity distribution business (EDBs) and gas pipeline businesses (GPBs) as there were few ‘pure play’ energy network comparators available.

On balance, we consider that an asset beta that falls between the wholesale-only and integrated comparator groups would represent a reasonable estimate for the fibre providers.

¹ We have considered whether the integrated group can be refined to better reflect relevant characteristics of the fibre providers, including the proportion of revenues derived from fibre services and wholesale services. However, we have not been able to establish a dataset that allows for consistent categorisation of the integrated companies on this basis.

**Estimation results**

Our estimated asset beta ranges for these comparators are outlined in the table below.

Table E.1: Asset beta estimates

Comparator sample	Four-weekly beta	Weekly beta	Daily beta
Five-year asset beta (2014-2019)			
Wholesale service providers	0.38	0.41	0.41
Integrated service providers	0.46	0.52	0.52
Five-year asset beta (2009-2014)			
Wholesale service providers	0.38	0.45	0.47
Integrated service providers	0.55	0.51	0.52
Two-year asset beta (2017-2019)			
Wholesale service providers	n/a	0.37	0.36
Integrated service providers	n/a	0.44	0.46

Source: Bloomberg, CEPA analysis. These results are based on local market indices; the impact of selecting different indices is considered in Section 2.6. Four-weekly estimates for the two-year period 2017 to 2019 are not reported, due to the limited number of observations and high standard errors.

For the **wholesale-only** service providers, the four-weekly and weekly estimates from the two most recent five-year periods (2014-2019 and 2009-2014) indicate a range for the asset beta of 0.38 – 0.45 (0.42 on average). At 0.37, the weekly asset beta estimate for the most recent two-year period (2017-2019) is broadly consistent with the lower end of the five-year range. The two-year and five-year daily asset beta estimates support a slightly wider range of 0.36 – 0.47.

The asset betas for the **vertically integrated** comparators are higher than for the wholesale-only service providers, consistent with our relative risk assessment. For the integrated companies, the estimated range indicated by four-weekly and weekly data over the two most recent five-year periods is 0.46 – 0.55 (0.51 on average). The five-year daily estimates and results from the most recent two-year period are also broadly consistent with this range.

Combining the estimates from the two samples suggests a range of 0.42 – 0.51, and midpoint of 0.46.² The lower value of this range is set by the wholesale-only comparators and the upper value is set by the integrated comparators, based on the average asset beta for the two most recent five-year periods. Basing this range on the five-year beta estimates is consistent with the Commission's 2016 Part 4 IM decision for EDBs, GPBs and airports, which placed greater weight on the weekly and four-weekly estimates from the two most recent five-year periods.³

We consider that this represents a reasonable range, and is supported by the following factors:

- In the 2016 Part 4 IM decision, the Commission set asset betas of 0.35 for the EDBs, 0.40 for the GPBs and 0.60 for airports. An asset beta of 0.46 for the fibre providers (within a range of 0.42 –

² Our ranges for the asset beta appear to be robust to the sensitivities we have tested, including in relation to the choice of relative index, the inclusion of companies with geographically diverse revenues, and the size of the comparators (measured by market capitalisation).

³ Commerce Commission (2016), paragraphs 303 and 473.



0.51) appears sensible in the context of these decisions, as it reflects that cyclicalities in the profits of telecommunications companies is likely to be higher relative to the energy networks, and lower relative to that of airports.

- The Commission set an asset beta of 0.43 for the unbundled copper local loop (UCLL) and unbundled bitstream access (UBA) services offered by Chorus through its copper network.⁴

The Commission has asked us to consider whether it would be appropriate to set a different asset beta for Chorus and the LFCs. As noted above, there may be reasons to think that the systematic risk exposure of the LFCs could be above that of Chorus. However, we have not identified a robust basis to estimate a different asset beta for the LFCs.

Beyond the question of whether systematic risk is likely to be different for the LFCs, we have also considered the use of the asset beta within the regulatory framework. Under the information disclosure regime, the WACC will be used to monitor the profitability of the LFCs, rather than to set a cap on revenues or prices. For this purpose, setting a common asset beta across all fibre providers may be preferable to attempting to establish a differential asset beta for Chorus and the LFCs on the basis of limited evidence.⁵

Leverage and long-term credit rating

In assessing the appropriate leverage and long-term credit rating for the fibre providers, we have had regard to the analysis previously undertaken by the Commission in relation to the Part 4 IM. In particular, we have considered the counterintuitive characteristic of the simplified Brennan-Lally capital asset pricing model (CAPM), that the WACC increases with increasing leverage (referred to as the 'leverage anomaly').⁶ In its previous decisions under the Part 4 IM, the Commission set a notional leverage value to mitigate concerns that if the actual gearing of regulated service providers was used to set the WACC, the leverage anomaly could provide an incentive to increase their leverage above an appropriate level.

Under the Part 4 IM, the notional leverage set by the Commission has been based on the average of the comparator sample used to estimate the asset beta. This was in response to analysis presented during the 2010 Part 4 IM decision indicating that, in the presence of a nil debt beta (as assumed by the Commission), applying a leverage assumption that is different from that of the comparators used to derive the asset beta results in biased WACC estimates.⁷ The Commission's approach to estimating notional leverage was upheld in the High Court's 2013 merits appeal judgement⁸, and the Commission adopted the same approach in its 2015 pricing determination for Chorus' UCLL and UBA services.

⁴ We have considered the merits of a disaggregation approach to Chorus' beta to test what an asset beta of 0.46 for fibre services would imply for the asset beta of copper-based services. However, we consider that this type of analysis is likely to be inconclusive in this case, as the ongoing roll-out of the Ultra-Fast Broadband (UFB) network and the rapidly evolving uptake of fibre services by end-users presents challenges in estimating an appropriate weighting for fibre and copper activities.

⁵ We note that Ofcom applies the same asset beta estimate to monitor the profitability of KCOM and BT in the UK, noting that "[t]he role of the WACC in profitability analysis differs to that in charge controls. Our conclusion on profitability is not dependent on a very precise estimate of the WACC". Ofcom (2016), page 87.

⁶ As described in Lally (2009).

⁷ PwC (2010), page 8-9.

⁸ High Court of New Zealand (2013).



Based on the Commission's approach under the Part 4 IM, leverage estimates from our comparator sample are outlined in the table below.

Table E.2: Comparator set - Actual leverage

Comparator sample	Notional leverage
Five-year asset beta (2014-2019)	
Wholesale service providers	35%
Integrated service providers	29%
Five-year asset beta (2009-2014)	
Wholesale service providers	31%
Integrated service providers	30%
Two-year asset beta (2017-2019)	
Wholesale service providers	26%
Integrated service providers	30%

Source: Bloomberg, CEPA analysis. Leverage is based on net debt and market capitalisation. Averages are simple unweighted averages.

Applying the Commission's Part 4 IM approach to our comparator sample, i.e., focusing on the two most recent five-year periods, suggests that the appropriate notional leverage is between 29% - 35%. The point estimate would depend on the weight placed on the evidence from wholesale-only and integrated service providers in determining the asset beta estimate.

Based on the comparator sample, the most common S&P long-term credit ratings are BBB- (wholesale-only providers) and BBB+ (integrated providers). We note that adopting a notional long-term rating of BBB/BBB+ would be consistent with the Commission's previous approach of ensuring a buffer above the minimum investment grade rating.



I. INTRODUCTION

Following a statutory review of fibre regulation, the New Zealand Government has decided to implement a new incentive-based regulatory framework for fibre services. The new framework has been established through an amendment to the Telecommunications Act 2001 (the Telecommunications Act). This requires the Commerce Commission (Commission) to develop upfront Input Methodologies (IMs) that will set the rules and processes that apply to the regulation of fibre services.

The Commission has engaged CEPA to provide advice on certain components of the weighted average cost of capital (WACC) for an efficient provider of regulated fibre fixed line access telecommunications services (fibre services) in New Zealand. This advice will inform the Commission's development of the Cost of Capital IM. To assist with this undertaking, the Commission has asked CEPA to provide analysis and advice on:

- An appropriate asset beta for fibre services that are regulated by the Commission. This includes consideration of whether it would be appropriate to estimate a different beta for Chorus and the Local Fibre Companies (LFCs).
- The long-term credit rating that would be appropriate for a fibre services provider.

Our advice on these issues is set out in Sections 2 and 3 of this report. To provide context for this analysis, in the remainder of this section we set out our understanding of the provision of fibre services in New Zealand, the main features of the new regulatory framework and the characteristics of the fibre providers.

I.1. FIBRE SERVICES IN NEW ZEALAND

Through the New Zealand Government's Ultra-Fast Broadband (UFB) Initiative, the existing copper network is progressively being replaced by a fibre network. The network is financed on a concessional basis. Upon the launch of the UFB Initiative in 2009, the Government established Crown Infrastructure Partners (CIP)⁹ as a Crown-owned investment company to manage the Government's investment in the new fibre network. Among other responsibilities, CIP's role has included the negotiation of commercial agreements with the private-sector partners who are constructing the new network, namely Chorus and the Local Fibre Companies - Northpower Limited (Northpower), Ultrafast Fibre Limited and Enable Services Limited (Enable).

Wholesale and retail providers of fibre services are structurally separated. The Telecommunications Act sets out 'line of business restrictions' for Chorus, including a prohibition of providing retail services and restrictions on providing wholesale services beyond layer 2.¹⁰ We understand that the LFCs face similar restrictions through their contractual arrangements with CIP. The Telecommunications Act will maintain these restrictions but allow the Commission to make case-by-case exemptions from the implementation date onwards.

The services supplied by fibre providers are purchased by retail service providers (RSPs) as inputs to their provision of fixed line voice and broadband services to end users. The largest RSPs are Spark (44% market

⁹ Formerly Crown Fibre Holdings.

¹⁰ The Telecommunications Act 2001, Subpart 3.



share in 2017), Vodafone (27%) and Vocus (13%).¹¹ The Commission's 2017 Telecommunications Monitoring Report notes that the market share of smaller RSPs has been increasing.

Substitutes for fibre services exist where the coverage of alternative access technologies overlaps with the fibre network. Alternative technologies include: the existing copper network owned by Chorus; a hybrid coaxial fibre (HFC) network operated by Vodafone in Christchurch, Wellington and Kapiti; and - increasingly - mobile networks. Mobile networks are operated by several RSPs, namely Spark, Vodafone and 2degrees. The Commission has observed that “[d]espite the ever increasing use of mobile devices, fibre gives consistent delivery of high-speed data which cannot currently be matched by mobile.”¹² In relation to voice services however, consumers have been increasingly adopting mobile rather than fixed-line calls; the Commission notes that mobile calls are often more convenient and that many mobile plans include large (or unlimited) volumes of call minutes.¹³

1.2. REGULATORY CONTEXT

At present, fibre services are provided by the fibre providers on terms negotiated with CIP. Following a period of consultation, in February 2017 the Government released its final proposals on the new regulatory framework for fibre services.¹⁴ This provides for an information disclosure (ID) regime that will apply to all fibre providers (including Chorus) and a price-quality (PQ) regime for Chorus only. The framework will need to be in place by 2022.

The PQ and ID regimes will initially apply for a three-year period from 2022 to 2025 (‘the first regulatory period’). Subsequent regulatory periods may be between three and five years. LFCs will only be subject to an ID regime during the first regulatory period, due to the competitive constraint provided by the Chorus copper network and Vodafone’s HFC network in Christchurch. However, the Commission will be able to impose PQ regulation in the event that the ID framework does not provide effective constraints on monopolistic behaviour. As Chorus does not currently face the same degree of competitive constraint, it will be subject to both the ID and PQ regimes.¹⁵

The price-quality regime

The Telecommunications Act describes the purpose of the PQ regime as to “*regulate the price and quality of fibre fixed line access services provided by regulated fibre providers.*”¹⁶

The Telecommunications Act sets out that a PQ path must specify the maximum price(s) that may be charged by a regulated fibre services provider and/or the maximum revenues that may be recovered by a

¹¹ Commerce Commission (2017), page 16. These market share numbers reflect the entire fixed-network broadband market, including fixed wireless subscribers.

¹² Ibid., page 10.

¹³ Ibid., page 23.

¹⁴ MBIE (2017).

¹⁵ MBIE (2017).

¹⁶ Telecommunications Act 2001, Section 191.



regulated fibre services provider.¹⁷ The Government has specified that for the first regulatory period, the PQ regime will set both:¹⁸

- The maximum allowable revenue that Chorus may recover for its UFB business, as calculated under a 'building blocks' model. This is similar to the approach to the economic regulation of other utilities under Part 4 of the Commerce Act. In setting the revenue cap, the Commission will be required to 'smooth' any changes in revenue, in order to avoid price shocks.
- The maximum prices that Chorus can charge for two regulated 'anchor services' and a direct fibre access service (discussed further below). Prices will initially be set at the 2019 levels specified in the UFB contracts between the fibre providers and CIP, increasing at the rate of inflation until the first price review in 2025.

Subject to the revenue cap and any quality requirements that the Commission may impose, Chorus will be able to offer other fibre services in response to market developments. The Commission will be able to review the terms of anchor products prior to the implementation date. From the second regulatory period (commencing in 2026), the Commission may also review the terms for other price-regulated services (see below) and the form of the PQ regime, subject to certain statutory criteria.

Many elements of the building blocks methodology are yet to be defined. In Box I, we note the following key aspects referenced in the Commission's consultation paper.

¹⁷ Ibid., Section 193 (2).

¹⁸ MBIE (2017).

**Box I: Key aspects of the building blocks model for fibre services****Wash-up mechanism**

Under Section 195 of the Telecommunications Act, a wash-up mechanism will apply for any over- or under-recovery of revenue during the previous regulatory period. The wash-up mechanism may apply over one or more future regulatory periods. We note that the wash-up mechanism for electricity distribution businesses (EDBs) includes: (i) a cap on the value of voluntary under-recovery that can be accumulated; (ii) a cap on the wash-up amount if there is a significant reduction in revenue (e.g., 20%), based on the principle that consumers and suppliers should share the risks of catastrophic events. It is not yet clear whether similar restrictions will apply to the mechanism for fibre providers.

Regulated Asset Base (RAB)

The RAB valuation methodology will be determined by the Commission, subject to guidance set out in the Telecommunications Act (Section 176). This guidance includes:

- Under Section 176(2), the Commission must capitalise suppliers' financial losses at the implementation date, and treat them as an additional asset for inclusion in the RAB. These losses are expected to arise during the initial period of operation of the UFB network. In this period, initial end-user uptake of UFB services and the associated revenues recovered in accordance with the CIP contracts are expected to be insufficient to cover the fibre providers' fixed and variable costs.
- As part of the UFB initiative the New Zealand government provided debt and equity financing on a concessional basis to the UFB providers or related parties. Section 176(2AA) of the Telecommunications Act provides that the actual costs of the Crown financing should be taken into account in calculating the financial losses up until the implementation date.

The Commission is currently consulting on these and other aspects of setting the RAB.

Risk allocation

The Commission has previously considered the issue of risk allocation under Part 4, including in relation to economic stranding of assets. In the context of fibre services, the Commission has identified that allocation of asset stranding risk may be a particular issue, due to the greater threat of competition faced by the fibre providers relative to the industries regulated under Part 4. The Commission's consultation paper notes that potential approaches to allow for the risk of economic stranding include adding a margin to the rate of return, reducing asset lives or using a front-loaded depreciation profile.

Incentives

Under Section 193(3), the PQ path may include incentives to maintain or improve the quality of supply through penalties, rewards, compensation schemes or reporting.

Source: Telecommunications Act (2001), Commerce Commission (2018).

The information disclosure regime

The Telecommunications Act describes the purpose of the ID regime as to “ensure that sufficient information is readily available to interested persons to assess whether the purpose of [the regulatory framework] is being met”.¹⁹ In this context, we understand that WACC estimates may provide a benchmark for assessing the profitability of fibre providers under the ID regime.

¹⁹ Telecommunications Act 2001, Section 185.



The regulated services

Under the new regulatory framework, fibre services that are subject to the PQ regime are divided into individually price-regulated services ('anchor services', 'direct fibre access services' (DFAS) and 'unbundled fibre services') and other fibre fixed line services provided by Chorus.²⁰

Anchor services

The Commission will set both price and quality terms for the anchor services. Two regulated anchor services are currently envisaged for the first regulatory period, namely a voice service and a basic broadband service. The Telecommunications Act describes the purpose of the anchor services as “(a) to ensure that baseband equivalent voice and basic broadband services are available to end-users at reasonable prices; and (b) to act as an appropriate constraint on the price and quality of other fibre fixed line access services.”²¹ It is expected that the anchor services for the first regulatory period will consist of a 100/20Mbps UFB broadband service and a voice-only UFB service. However, the Commission will be able to review the anchor services before the start of each regulatory period, including the first regulatory period.

Other individually price regulated services

In addition to the layer 2 anchor services described above, the Telecommunications Act also specifies that fibre providers who are subject to PQ regulation must also provide certain layer 1 services (i.e., 'dark fibre'). In particular, the Telecommunications Act refers to DFAS and 'unbundled fibre services':

- DFAS refers to a layer 1 point-to-point access service, used as an input to the services offered to large business by the RSPs, as well as for backhaul for mobile services. We understand that this service is already offered by Chorus and the LFCs. A price cap for DFAS will apply from the first regulatory period.
- The unbundled fibre service refers to a layer 1 point-to-multipoint access service, that could be used by the RSPs to serve residential and small and medium-sized enterprises (SMEs), in combination with their own active electronic equipment. The fibre providers will be required to offer this unbundled product from 1 January 2020. As product development is still ongoing, the service is not yet fully defined. We understand that there will not be a regulated price cap set for the unbundled fibre service for the first regulatory period. However, from the second regulatory period onwards, the Commission will have the ability to set a price cap if certain statutory requirements are met.

Other regulated services

The MBIE's February 2017 discussion paper notes that fibre providers will have the flexibility to develop other wholesale products, that the Commission will not set price and quality terms for. However, the revenue that Chorus can recover from these products is subject to the revenue cap, and all fibre providers will be required to meet certain minimum requirements.²²

²⁰ Telecommunications Act 2001, Subpart 5.

²¹ Telecommunications Act 2001, Section 208 (7).

²² MBIE (2017), page 17.



1.3. THE FIBRE PROVIDERS

In the table below, we summarise the key characteristics of Chorus and the LFCs (collectively, the “fibre providers”), noting points of difference.

Table 1.1: Key characteristics of Chorus and the LFCs

Characteristic	Chorus	LFCs
Business activities	<ul style="list-style-type: none"> Deployment of the UFB network. Operation and maintenance of UFB network to provide the regulated services. Wholesale only (business line restrictions apply). No presence in mobile telecommunications services. Operations in New Zealand only. 	<ul style="list-style-type: none"> The LFCs are part of corporate groupings with existing investments in electricity distribution business in their UFB areas.
	<ul style="list-style-type: none"> Owns and operates the legacy copper network, through which it provides regulated copper services (UCLL/UBA, under a price-cap). Provides unregulated services, including commercial backhaul. 	
Form of regulation (fibre services)	<ul style="list-style-type: none"> Price-quality (PQ) regulation will apply to Chorus from the first regulatory period. This takes the form of a revenue cap, with price caps for specific services (as set out in Section 1.2). 	<ul style="list-style-type: none"> LFCs will initially be subject to an information disclosure (ID) regime (see Section 1.2). LFCs could become subject to PQ regulation if the ID regime does not provide effective constraints on monopolistic behaviour.
	<ul style="list-style-type: none"> The Commission is able to de-regulate fibre services if sufficient competition develops. 	
Pricing	<ul style="list-style-type: none"> As noted above, Chorus will be subject to price caps for certain services and overall revenue recovery is subject to the cap. Chorus will be required to price its fibre services on a geographically consistent basis. 	
	<ul style="list-style-type: none"> We understand that fibre providers will be required to conduct industry consultation on price and material non-price terms for commercial services and give at least 6 months’ notice for changes.²³ 	
	<ul style="list-style-type: none"> The fibre providers’ Reference Offers provide for a minimum service term of at least 12 months, or longer if agreed between the parties.²⁴ 	
Fibre area ²⁵	<ul style="list-style-type: none"> Chorus will account for 69.4% of total UFB coverage, taking in the major centres of Auckland (~520k end users) and Wellington (~90k end users). 	<ul style="list-style-type: none"> Enable – 15.3% of UFB coverage, including Christchurch (~190k end users). Ultrafast Fibre and Northpower respectively account for 13.7% and 1.6% of total UFB coverage.

²³ MBIE (2017), page 17.

²⁴ For example, Northpower Reference Offer, page 6.

²⁵ CIP (2018).



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Characteristic	Chorus	LFCs
Status of fibre network deployment	<ul style="list-style-type: none"> The entire UFB programme is anticipated to complete in 2022. Therefore, the investment in the communal infrastructure will be largely completed by the date from which the new regulatory framework will apply. CIP report that the overall programme is currently 77% complete, 7% ahead of schedule.²⁶ 	
Financing of the fibre investment	<ul style="list-style-type: none"> There are two components to the UFB build: (i) communal infrastructure that brings the fibre network past premises; and (ii) the connection of premises to the communal infrastructure. Crown funding relates only the communal infrastructure, with Chorus and the LFCs funding connections to premises. 	
	<ul style="list-style-type: none"> Chorus accesses Crown funding via a different mechanism to the LFCs. The Crown invests directly in Chorus as the network is constructed, via an equal combination of debt and equity securities, issued by Chorus in tranches aligned with build milestones. No dividend payments on equity securities will occur prior to 2025. Debt securities are non-interest bearing and will be redeemed in tranches between 2025 and 2036. 	<ul style="list-style-type: none"> CIP and private fibre partners jointly invest through the LFC. Under this model, Crown funds are used to build the communal network infrastructure. As customers connect, the private partner funds the connection and also reimburses the Crown for a proportion of the communal network cost. Over time, the balance of ownership of the network gradually shifts from CIP to the private partner. Ultrafast and Enable have both taken full ownership of their respective LFCs (September 2016 and June 2016 respectively), while Northpower expects to achieve full ownership by 2020.²⁷

²⁶ Ibid.

²⁷ WEL Networks (2018), Enable (2018), Northpower (2018).

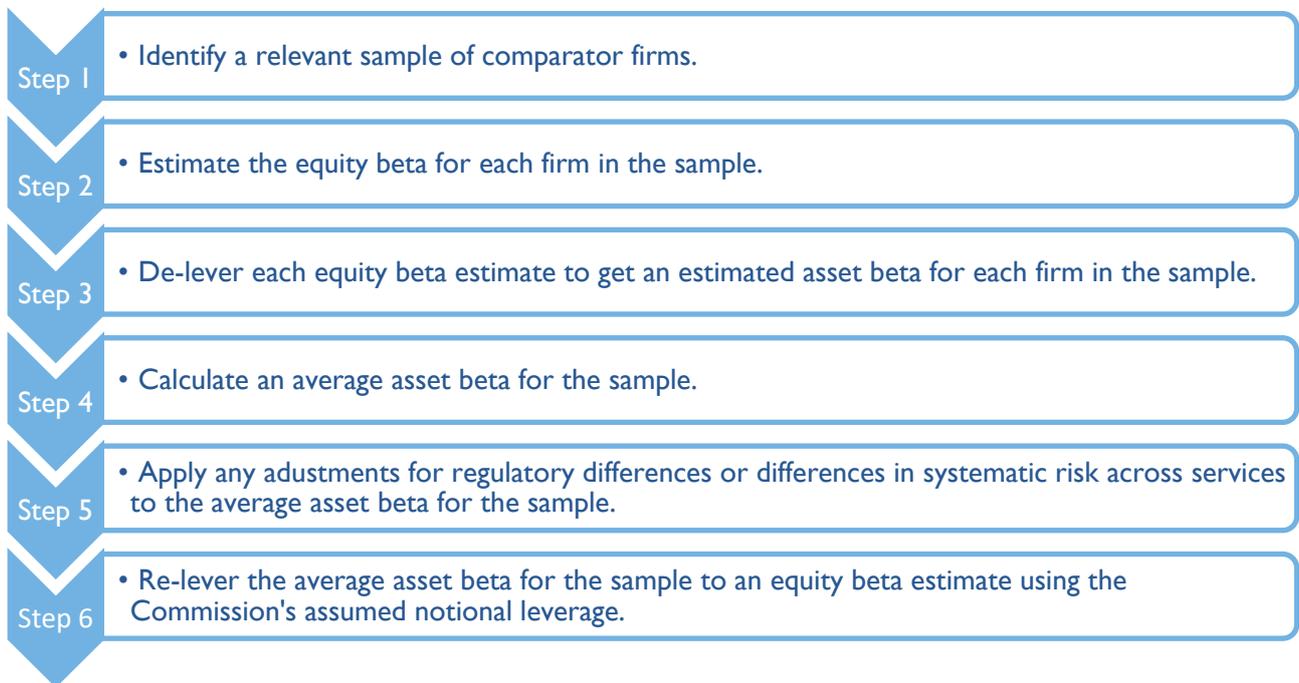


2. ASSET BETA

The equity beta indicates how volatile the returns on an investment are, relative to the equity returns on the stock market as a whole. The term is intended to cover systematic or non-diversifiable risk; that is, risk that investors cannot mitigate through diversifying into a broader portfolio of companies. The asset (or unlevered) beta translates empirical equity beta estimates into the equivalent beta for a company with zero gearing. A higher equity/ asset beta leads to a higher overall WACC.

We have estimated the asset beta for the fibre providers in line with the process followed by the Commission in the Part 4 Cost of Capital IM. The six-step process followed by the Commission for estimating the equity beta is set out below. As this section of this report relates only to the asset beta, we have followed the first five steps of this process.

Figure 2.1: Steps in estimating beta



Source: Commerce Commission (2016), page 60-61.



2.1. COMPARATOR SELECTION PROCESS

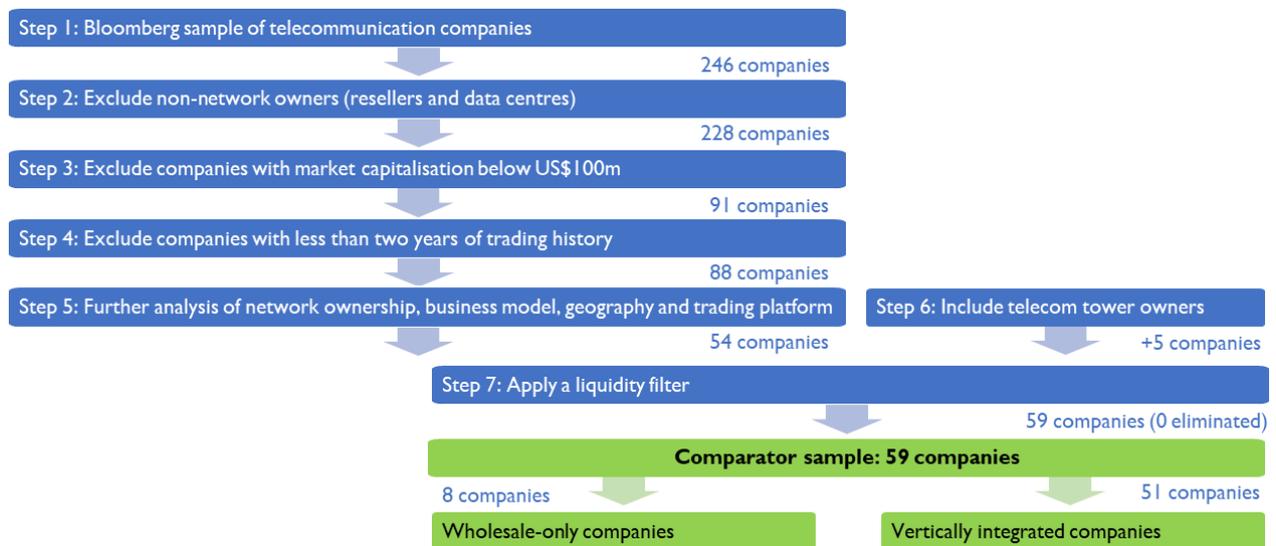
Betas are not directly observable and are instead estimated from historical data on company and market returns. Appropriate comparator companies for estimating the asset beta are those that are likely to have similar systematic risk. This means that the impact of changes in the value of economic and other variables affecting average company valuations in the stock market will influence the value of comparator companies in a similar way to the company for which the asset beta is being estimated.

Regulators will typically look at a range of comparable companies to estimate the asset beta. In order to select comparators with similar systematic risk, ‘comparability’ typically extends to the same broad sector and whether the companies are subject to broadly similar regulatory regimes. For example, the Commission’s Part 4 Cost of Capital IM, for EDBs and GPBs, starts with the average asset beta calculated for a sample of energy sector companies in New Zealand, Australia, the UK and the USA. The comparators in this sample range from pure play electricity and gas networks to fully integrated utilities.

We consider that the best approach to identify companies that are likely to have similar systematic risk is to choose those that have similar characteristics to the fibre providers. It is possible that companies with different characteristics will have the same systematic risk as Chorus and the LFCs, but that will be coincidental, and it would be difficult to identify such companies in advance of estimation. Therefore, our approach has been to identify an appropriate set of comparators from the telecommunications sector, then assess the extent to which their characteristics might result in different systematic risk exposure, relative to the fibre providers.

Our starting point has been to identify the broadest possible set of telecommunications sector comparators, then exclude firms that are less likely to be appropriate. The process we have followed is summarised in Figure 2.2, with further explanation in the text below.

Figure 2.2: Comparator selection process



Under **Step 1**, we have identified a large sample of potential telecommunication sector comparators, based on Bloomberg categorisations. This includes firms from New Zealand, Australia, the UK, US, and continental Europe. The geographic focus of the sample reflects the Commission’s decisions in other



sectors.²⁸ There are wholesale-only providers of telecommunications services in other jurisdictions. However, we consider that differences in operating conditions are likely to make these firms less comparable to a wholesale fibre provider in New Zealand.^{29,30}

In relation to **Step 3**, we note that excluding comparators with market capitalisation below US\$100 million is consistent with the approach taken by the Commission under the 2010 and 2016 Part 4 IM decisions. We concur with the Commission's previous observation that "*small firms may affect the empirical estimates of the asset beta due to the potential effect from thin trading volumes*".³¹ While we have not undertaken a detailed examination of the 'micro-cap' companies excluded by this criterion, cross checks indicate that most would be excluded on the basis of other criteria (in particular, many do not appear to own physical network assets). We do note that the LFCs are themselves relatively small companies and that for Northpower in particular, the value of equity associated with their fibre investments could be below the US\$100m threshold.³² However, as discussed in more detail in Section 2.3.5, we do not consider that company size is a relevant factor in determining the asset beta. Therefore, we are of the view that the application of this step is not likely to result in a bias to the beta estimates.

Regarding **Step 4**, the Commission's previous decisions have tended to place more weight on betas estimated over sample periods of five years or more. Excluding companies with a trading history of less than five years would remove a further seven comparators from the sample. We have however maintained these companies within the sample, in order to consider the additional evidence that they provide.

At **Step 5**, we conducted further assessment of the remaining comparators. Based on Bloomberg descriptions and high-level desktop research, we exclude a number of additional companies that: did not appear to own at least some kind of physical network assets; appeared to operate mainly in markets outside of our target geographical sample; or were listed on over-the-counter trading platforms, rather than exchanges (these were excluded due to liquidity concerns).

The remaining sample included a number of satellite operators, that provide wholesale communication services over their satellite networks. As the satellite operators provided a potential set of wholesale-only comparators, we conducted further analysis of these companies in order to assess their comparability with the fibre providers.

Our research indicated the satellite operators can be divided into fixed and mobile satellite service providers. Fixed satellite service providers – including Eutelsat, SES and Intelsat – operate large, typically stationary or fixed ground terminals that transmit voice, data and video for (primarily) commercial

²⁸ For example, Commerce Commission (2016), paragraph 279 and Oxera (2014), page 23.

²⁹ For example, other international wholesale-only providers include Tower Bersama in Indonesia and Bharti Infratel in India. However, the beta of these companies reflects rapidly changing perceptions of the outlook for growth in these markets, and is therefore not likely to be comparable to a wholesale service provider in New Zealand.

³⁰ We also identified NetLink Trust – who owns and operates the passive infrastructure for Singapore's national broadband network – as another listed, wholesale, fibre-only comparator. We understand that NetLink Trust operates under a RAB-based framework and investors may view operating conditions as being more comparable to New Zealand. However, as NetLink Trust was only listed in July 2017 it has a relatively short trading history. Therefore, we consider that at this stage there is limited weight that could be placed on this comparator.

³¹ Commerce Commission (2010), paragraph H8.44.

³² For FY2018, total equity for the LFCs was: Northpower - NZ \$265m; Enable – NZ \$213m; Ultrafast – NZ \$531m. However, the LFCs' investments are not all fibre-related. The net carrying value of fibre assets accounted for approximately 1%, 97% and 40% of total property, plant and equipment (PPE) for FY2018, respectively.



customers and international telephone markets. Mobile satellite service providers – including Inmarsat and Iridium – primarily provide voice and data services in regions where terrestrial services are not available and in circumstances where mobility and smaller terminals are required (for example, serving remote regions, the maritime industry and aircraft). As a result, the characteristics of end-user demand may be quite different for the mobile satellite operators as compared to the fibre providers.³³ Some mobile satellite operators – such as EchoStar – appeared to serve both wholesale clients and retail end-users.

Further analysis of Intelsat and Loral Space & Communications indicated that company-specific factors may have distorted the asset betas of these companies. Intelsat has a chequered trading history. Originally an international government organisation it was privatised in 2001, bought by private equity investors in 2005, and then relisted in 2013, with significant share price volatility in part due to its heavy debt burden. On average over 2014-2019, Intelsat's leverage has been 93%, well above the next highest comparator in our sample. Loral is a holding company whose main asset is Telesat Holdings, a Canadian satellite communications company. In an unusual arrangement, Loral holds a 63% economic interest in Telesat, but another shareholder controls the majority of voting rights. Loral has also engaged in multiple attempts to divest its share of Telesat over the past decade, with resulting share price volatility.

Given these factors, we have excluded the mobile satellite operators, along with Intelsat and Loral, from the comparator set. This results in two satellite operators – Eutelsat and SES – remaining in the sample.

At **Step 6**, we identified that mobile tower companies were not captured within our sample, as they are not included in the Bloomberg telecommunications category. Nonetheless, these companies own communications network infrastructure and on-sell services provided over this infrastructure to telecommunications service providers. In this sense, we consider the nature of their business to be similar to the fibre providers, which makes them appropriate for inclusion within the comparator set.

Finally, under **Step 7** a liquidity filter was applied to all remaining comparators. This filter excludes companies with zero trading volumes on more than 20% of available trading days. No further companies were excluded on this basis. This liquidity metric is in line with that previously applied by the Commission in the UCLL/UBA and Part 4 IM decisions. However, we note that other metrics could also be considered.

This process results in the comparator set shown in the table below.

³³ For example, Moody's highlighted Speedcast International's "exposure to cyclicity in its key customer verticals, such as the upstream oil and gas, shipping and cruise industries" as a material factor in its credit assessment of the company. Moody's (2018b).



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Table 2.1: Comparator set

Wholesale-only service providers			Vertically integrated service providers		
Fibre providers	Telecommunications tower companies	Satellite operators			
<ul style="list-style-type: none"> ▪ Chorus 	<ul style="list-style-type: none"> ▪ American Tower Corporation ▪ Crown Castle ▪ INWIT (two-year beta only) ▪ Rai Way (two-year beta only) ▪ SBAC 	<ul style="list-style-type: none"> ▪ Eutelsat ▪ SES 	<ul style="list-style-type: none"> ▪ AT&T ▪ BT Group ▪ CenturyLink ▪ Cincinnati Bell ▪ Cogent Communications Holdings ▪ Consolidated Communications Holdings ▪ DNA Oyj (two-year beta only) ▪ Deutsche Telekom ▪ Elisa Oyj ▪ Frontier Communications ▪ Gamma (two-year beta only) ▪ Go ▪ Hellenic Telecommunications Organisation ▪ Hutchison Telecommunications ▪ Iliad ▪ KCOM Group 	<ul style="list-style-type: none"> ▪ Koninklijke KPN ▪ Manx Telecom ▪ Masmovil Ibercom ▪ MNF Group ▪ Orange ▪ Orange Belgium ▪ Proximus ▪ QSC ▪ Retelit ▪ Shenandoah Telecommunications Company ▪ Siminn ▪ Sonaecom ▪ Spark ▪ Sprint Corporation ▪ Sunrise (two-year beta only) ▪ Swisscom ▪ TalkTalk ▪ TDC ▪ Telefonica ▪ Tele2 ▪ Telecom Italia 	<ul style="list-style-type: none"> ▪ Telefonica Deutschland Holdings ▪ Telekom Austria ▪ Telephone and Data Systems ▪ Telia Company ▪ Telenor ▪ Telstra ▪ T-Mobile US ▪ TPG Telecom ▪ Trilogy International Partners (two-year beta only) ▪ US Cellular Corporation ▪ Verizon Communications ▪ Vocus ▪ Vodafone ▪ Zayo Group Holdings (two-year beta only)



2.2. OVERVIEW OF THE COMPARATORS

The selection process described above results in a relatively broad set of 59 comparator firms. This is a larger sample than that considered by the Commission for the 2015 UCLL/UBA determination.³⁴ However, aside from Chorus, we have not identified other listed, wholesale-only providers of fibre services. We consider that this absence of directly comparable firms favours maintaining a relatively wide set of international comparators, in order to ensure that the market evidence captures the experience of the sector as a whole rather than one company. This is also consistent with established regulatory practice under the Part 4 IM.

Within this broad range are two clear sub-groups: **wholesale-only** communication service providers (8 comparators) and **vertically integrated** service providers (51 comparators). In this section, we provide an overview of the types of companies included in these groups. A more detailed description of each comparator is included in Appendix A.

2.2.1. Wholesale-only service providers

These companies own communications network infrastructure, deploying these assets to provide wholesale services to third parties, who in turn serve end users. A key characteristic shared by this group is their lower degree of exposure to fluctuations in end-user (i.e., retail) demand, relative to the vertically integrated service providers discussed in the following section. This group includes:

- **Fibre service providers:** Chorus is the sole wholesale-only fibre provider included in our sample. Chorus also provides services over its legacy copper network and other unregulated services (for example, commercial backhaul).
- **Telecommunication tower companies:** Our sample includes five telecommunication tower companies. Similar to Chorus and the LFCs, these companies own communications network infrastructure and deploy this to provide wholesale services to telecommunication service providers, broadcasters and other clients. Their customers (tenants) generally own, operate and maintain their antenna, backhaul and base station equipment, while the tower company provides the real estate and tower structure to support this. While, the tower companies do not face revenue or price regulation, typically they have long-term contracts in place with their customers. Demand for their services is seen as stable and is linked to the rapidly growing use of wireless services. These companies tend to enjoy high rates of lease renewal, in part because their tenants may lack of suitable alternative sites, and because repositioning sites within their network could risk incurring high costs and reductions in the quality of service they on-sell to end-users.
- **Satellite operators:** Similar to the tower companies, these firms provide services to wholesale clients including telecommunication service providers and broadcasters. Business models vary more than is the case for the tower companies, and as a result investor views of these companies may differ significantly. Our view is that the two satellite operators included in our sample – Eutelsat and SES – are likely to be viewed as having characteristics similar to other utility infrastructure, related to their long-term contracting arrangements, relatively stable demand and the nature of the wholesale customers that they serve.

³⁴ Commerce Commission (2015). Regulators in other jurisdictions have also considered smaller samples in their WACC determinations for telecommunication services. See for example Ofcom (2018a) and BEREC (2017).



2.2.2. Vertically integrated service providers

Our sample includes a large number of vertically integrated service providers who own and operate differing combinations of copper, fibre, mobile and other telecommunications network assets. While many of these companies provide wholesale access to parts of their networks (in some cases at regulated prices), they also provide data and voice services directly to government, business and residential end-users. In most cases, wholesale services do not appear to account for the majority of their revenues.³⁵

It is common for the integrated companies to offer additional services, including sales of equipment, streaming and business ICT services. In some cases, they derive revenues from alternative business lines, including the development of media content (e.g., AT&T) and provision of energy services (e.g., Vocus). While some companies serve only their local area, others have a global scope, with operations across a wide range of countries. As a result, the risk profiles of these companies are likely to vary significantly.

We have undertaken further analysis of the activities undertaken by the integrated companies, in order to identify whether robust sub-groups – that are more comparable to the fibre providers – can be determined. As discussed further in Section 2.6, we consider that the available data does not support further categorisation of the integrated companies on this basis.

2.3. RELATIVE RISK ASSESSMENT

As outlined above, aside from Chorus (who also provides copper-based services), we have not identified ‘pure play’ providers of wholesale fibre services. As a result, determining the appropriate asset beta will need to partly rely on a judgement as to whether the comparator set (or particular sub-groups) offers a reasonable approximation of the systematic risk faced by the New Zealand fibre providers. Our relative risk assessment is structured around the following key factors:

- Demand.
- Growth opportunities.
- Operating leverage.
- Asset stranding.
- Company size.
- Long-lived investments.
- Other risk factors, including counterparty risk, market weight and monopoly power.

In the discussion below, we have attempted to set out how the degree of systematic risk faced by Chorus, the LFCs and the comparator groups varies, for each risk factor. We first establish whether there are reasons to expect differences in systematic risk exposure, then consider whether there is robust evidence to support a judgement on the direction and magnitude of the difference. In many cases, while a qualitative

³⁵ We note that Zayo Group Holdings and Retelit provide examples of companies with higher proportions of wholesale revenues. However, the business models for both comparators are broader than those of the fibre providers. For example, Zayo operates data centres and provides cloud services directly to enterprise customers, while Retelit offers a range of business services to corporate and public sector clients.



a priori case for differential risk exposure can be established, there is limited empirical evidence available to support a robust quantitative assessment. We also note that perceptions of risk may be subjective, and the impact on asset betas will therefore depend on investors' long-term view of the companies.

2.3.1. Income elasticity of demand

Services with relatively higher income elasticity of demand could be expected to have higher asset betas, as demand for their services and products will be more sensitive to fluctuations in economic conditions. The extent of a firm's exposure to systematic demand risk may also be determined by the regulatory framework they operate within (if any) and/or contracts with their customers. We first discuss the extent to which income elasticity of demand may differ for the services offered by the fibre providers and the comparator groups, before considering any offsetting effects resulting from regulatory and contractual arrangements.

Income elasticity of demand

Wholesale / retail demand

A clear difference between the wholesale-only comparators and the integrated telecommunications companies is the extent to which they face end-user (i.e., retail) demand. In particular, wholesale services relate to the underlying physical connection to the communications network, which is typically provided for a recurring monthly charge.³⁶ At the retail level, there is greater product differentiation, for example around data allowances or bundling with other service offerings. This means that at the retail level, there are more options for end-users to adjust their choice of plan in response to changes in income. We suggest that this is likely to result in greater variability in the demand for retail products, relative to wholesale products, and that this variability may be partly systematic in nature.

The wholesale products offered by the fibre providers are not purely 'access' in nature, as there is a degree of product differentiation (for example, recurring monthly charges for bitstream services vary according to upload/download speeds). Although there is a degree of stability provided by the minimum service term specified in the Reference Offer, the fibre providers' customers may have more scope to change their monthly access fee, relative to the other wholesale-only comparators. The telecommunication tower companies and satellite operators may therefore face more stable demand than the fibre providers, as their services are closer to an undifferentiated access product. In this respect, investors may tend to view systematic demand risk for the fibre providers' services as falling between that of the wholesale-only service providers and the vertically integrated companies.

Regional demand

To the extent that Chorus and the LFCs are exposed to fluctuations in end-user demand, different levels of systematic risk could potentially result from the characteristics of the end-users in their respective regions. As its fibre footprint takes in Auckland and Wellington, Chorus may have a higher proportion of business end-users relative to the other LFCs.³⁷

³⁶ For example, the tower companies tend to provide tenants with access to their infrastructure on the basis of a fixed monthly fee.

³⁷ The exception to this is possibly Enable, whose fibre area covers Christchurch.



Ofcom's 2005 disaggregation of BT's asset beta cited evidence that income elasticity of demand was likely to be greater for business users relative to residential users.³⁸ However, these studies are now over 20 years old and may not reflect current business requirements. OECD data indicates that an increasing proportion of businesses use broadband services, suggesting that more companies may be reliant on high-speed broadband to conduct their business than was previously the case.

An additional consideration is whether there could be geographic variations in the extent to which growth in connections is linked to economic conditions. Auckland and Wellington are projected to account for over 50% of population growth to 2043,³⁹ which could suggest that demand for services on Chorus' fibre network could face greater exposure to fluctuations in net migration and/or premises construction over the economic cycle, relative to the LFCs.

Fibre services and other telecommunication services

Some commentators have suggested that fibre services may have a higher income elasticity of demand relative to alternative telecommunications services. For example, in their recent study for the European Commission, the Brattle Group suggest that as high-speed broadband provided over a next generation access (NGA) network is a luxury product:

[...] an economic downturn would reduce switching rates [from the legacy network to the NGA network] and the value of the NGA network. From this we can conclude that the systematic risk, and hence the asset beta, should be higher for an NGA network than for a legacy network.⁴⁰

We are not aware of empirical research demonstrating that income elasticity for fibre services is indeed more elastic than for other telecommunications services. Available studies that we are aware of relate to broadband services generally, rather than distinguishing between fibre and alternatives. Further, end-user requirements and preferences may evolve rapidly, with products formerly considered luxuries becoming seen as necessities. Information published by Consumer NZ indicates that the cost of entry-level fibre plans in New Zealand may not be materially higher than copper-based services, suggesting an increasing degree of convergence.⁴¹

Nonetheless, regulators in other jurisdictions have set a higher beta (or WACC allowance more broadly) for fibre services, to account for perceived variability of demand (see Appendix C). For example, in Ofcom's recent Wholesale Local Access (WLA) review, Ofcom expressed the view that while demand for fibre access services was likely to stabilise with increasing uptake, systematic risk for fibre access was still likely to be higher than for copper access. However, consumer research conducted by Ofcom also indicated that "there is less propensity for consumers to downgrade than to upgrade in terms of the headline speed of their fixed line broadband package"⁴². This suggests that once fibre services are adopted, demand could be relatively 'sticky'. Dutch regulator ACM cited similar evidence in its review of the relevant product market

³⁸ Lester (1994) and Loomis and Lester (1999). We are not aware of more recent studies.

³⁹ Statistics NZ (2017).

⁴⁰ Brattle (2016).

⁴¹ We have not undertaken a comprehensive comparison of service plans, and note that relative costs may change over time depending on RSP decisions.

⁴² Ofcom (2018a), paragraph A20.230.



for wholesale high-quality access services in the Netherlands, indicating that business end-users rarely switched from fibre to copper-based services.⁴³

Summary

Our analysis suggests the income elasticity of demand for the fibre providers may fall between that of the wholesale-only comparators (tower companies and satellite operators) and the vertically integrated service providers. There is however limited evidence available to support an assessment of the magnitude of the difference. We note that regulators in other jurisdictions have cited greater variability of demand as a reason for a higher WACC allowance for fibre networks, compared to legacy copper networks. However, our observation is that these judgements appear to be based primarily on an intuition that demand for fibre services is generally 'riskier' than for legacy networks, rather than conclusive evidence.

Offsetting factors

Chorus' exposure to systematic demand risk may be affected by the nature of the regulatory framework. Under a revenue cap, Chorus will recover its allowed revenue if demand is lower or higher than expected. Chorus may face exposure within a regulatory period if it is unable to charge up to the revenue cap; this risk may be heightened by the presence of price caps for the anchor services and DFAS, and the requirement to price on a geographically consistent basis. However, this exposure will be short-term, as in the next regulatory period prices may be adjusted and the wash-up mechanism allows Chorus to recoup any under-recovery against the revenue cap. We note that the first regulatory period will be three years, with subsequent regulatory periods of between three and five years (i.e., potentially more frequent than for the utilities regulated under Part 4 of the Commerce Act).

The LFCs will not be subject to a revenue cap. As a result, their revenues may be more subject to systematic fluctuations in demand, relative to Chorus. The extent of the difference will depend on the contractual agreements with their wholesale customers – that is, to what extent their customers are able to scale their expenditure in response to changes in macroeconomic conditions. We understand that the Reference Offers provide for a minimum service term of at least 12 months, or longer if agreed between the parties.⁴⁴ If a wholesale customer wishes to end supply of the service before the minimum term, the LFC may require payment of early termination charges (although these may be less than the expected revenue had the service been provided over the full term).⁴⁵

In relation to the wholesale-only comparators, we note that many of the mobile tower companies have long-term contracts in place with their clients, with fixed monthly site lease payments subject to escalation. These companies report initial contract terms of between 5 and 15 years, with renewal periods of 5-10 years. The business models of the satellite operators have historically also been based on long-term wholesale contracts, although there appears to be a shift to somewhat shorter terms.⁴⁶ In some respects, these contracting arrangements could be viewed as providing a similar degree of long-term revenue stability and resilience to systematic demand fluctuations as Chorus' revenue cap. Overall, this means that investors

⁴³ European Commission (2017a), page 6.

⁴⁴ For example, Northpower Reference Offer, page 6.

⁴⁵ For example, Northpower Price List, page 3.

⁴⁶ See for example Henry (2018).



may consider Chorus’ fibre services as closer in nature to those of the tower companies and satellite operators, rather than the integrated telecommunication companies included in our comparator set.

In terms of contracting arrangements, the integrated companies may however be more similar to the LFCs. While some of the integrated companies’ wholesale services are regulated, this tends to be under price rather than revenue caps.⁴⁷ These companies also derive value from unregulated products and we would expect their contractual arrangements with retail customers to be generally on a shorter-term basis.

Summary

Our overall assessment of the systematic demand risk faced by Chorus, the LFCs and the comparator set is summarised in the table below.

Table 2.2: Relative systematic risk exposure – Income elasticity of demand

Chorus	LFCs		Integrated service providers		Other wholesale-only providers	
<ul style="list-style-type: none"> Consistent demand for fibre wholesale services. Revenue cap with wash-up mechanism provides buffer from demand fluctuations. Potential for short-term volatility linked to price caps and potential under-recovery. 	<ul style="list-style-type: none"> Underlying income elasticity of demand similar to Chorus. However, do not have the same buffer provided by Chorus’ revenue cap. 	▲	<ul style="list-style-type: none"> Exposure to more variable end-user demand. Mix of regulatory arrangements, but predominantly price caps for regulated services (greater exposure to demand fluctuations relative to revenue cap). Presence of non-telecommunications services. 	▲ or ◄►	<ul style="list-style-type: none"> Underlying income elasticity of demand potentially lower than Chorus and the LFCs. Tower companies and some satellite operators have long-term contracts, providing revenue certainty similar to revenue cap. 	■
Degree of systematic risk, relative to Chorus: ▼ = Lower ▲ = Higher ◄► = Different ■ = Similar						

2.3.2. Growth opportunities

Companies invest to create value for their shareholders. Changes in investment expectations therefore lead to changes in the value of companies. The way in which the investment profile changes in response to cyclical factors is therefore an important aspect in determining the asset beta.

For the fibre providers, investment in the communal UFB infrastructure is predetermined by the agreements with CIP, and is expected to be completed by the time the new regulatory framework is in place. Further investments will be required to connect end-users, as they migrate from the copper network.⁴⁸ At the time the new regulatory framework comes into effect in 2022, the value of the future growth opportunities from new connections will depend on the prevailing level of uptake and growth in new premises. This may have a cyclical element. For example, economic conditions may impact net inwards

⁴⁷ Or alternative forms of price restraint, for example cost orientation in the case of European service providers.

⁴⁸ Our understanding is that currently the fibre providers fund the cost of residential connections up to 200 meters from the communal network (i.e., there is no one-off connection charge for these residential customers). These costs – but not those of other connections, funded by the end-user – would therefore be included in the RAB.



migration (and therefore population) or dwelling construction. As shown in the table below, levels of uptake were between 40 – 50% as at 2018.

Table 2.3: Current % UFB uptake by provider (premises able to connect)

Chorus	Northpower	Enable	Ultrafast
50% (30 September 2018)	48% (31 March 2018)	40% (31 March 2018)	48% (31 March 2018)

Sources: Chorus (2018b), Northpower (2018), Enable (2018), Ultrafast (2018)

Chorus may have greater scope for future growth in connections (and greater variability in this growth) relative to the LFCs, given that its fibre footprint takes in larger urban centres that are projected to have a greater share of New Zealand’s future population growth. Based on our analysis of the UFB roll-out plans and Statistics New Zealand population projections, the Chorus fibre area captures over 60% of projected population growth to 2043.⁴⁹

Fibre may be able support a variety of new applications, providing future growth opportunities based on alternative uses of the network. For example, Chorus’ 2018 annual report references the scope for partnership with wholesale customers beyond RSPs, such as broadcasters.⁵⁰ However, the presence of a revenue cap would tend to dampen the value of opportunities for revenue growth that are not based on additions to the RAB.

Overall, given that current levels of uptake are relatively high and that the communal infrastructure investment will be completed by the time the new regulatory framework comes into effect in 2022, the value of future growth opportunities for Chorus and the LFCs could be lower than for the other companies in our comparator set, although the investment plans of the comparator set appear to be diverse.⁵¹ Further, the value of growth opportunities that may arise from new uses of the network (rather than new investments in the network) may be dampened for Chorus, given the effects of the revenue cap.

Table 2.4: Relative systematic risk exposure - Growth

Chorus	LFCs	Integrated service providers	Other wholesale-only providers
<ul style="list-style-type: none"> Potentially limited growth opportunities from the time the new regulatory framework comes into effect. Value of opportunities may be partly dampened by revenue cap. 	<ul style="list-style-type: none"> Potentially lower than Chorus, given location of fibre areas. Partly offset as growth opportunities unaffected by revenue cap. 	<ul style="list-style-type: none"> A range of investment plans / growth opportunities exists across the comparator sample. Unlike Chorus and the LFCs, this is generally not pre-determined. Growth opportunities unaffected by revenue cap. 	<ul style="list-style-type: none"> Similar to the integrated services providers.
Degree of systematic risk, relative to Chorus: ▼ = Lower ▲ = Higher ◀▶ = Different ■ = Similar			

⁴⁹ CIP (2019), Statistics New Zealand (2017).

⁵⁰ Chorus (2018b).

⁵¹ Some comparators – including Telecom Italia and BT – have indicated continued investment in fibre network assets. However, for other comparators projected investments may be more modest.



2.3.3. Operating leverage

Operating leverage represents the ratio of fixed costs to variable costs – the higher the proportion of fixed costs, the higher the operating leverage. Typically, if a company operating in a competitive market has a higher proportion of variable costs to fixed costs, then it will be able to increase (decrease) its variable costs as economic conditions change to a greater extent than a company with higher operating leverage. As a result, volatility in profits (and thus the asset beta) would be relatively lower.

Consistent reporting of costs as fixed or variable is generally not available. As a result, assessments of operating leverage typically rely on proxy measures, including those based on accounting costs and revenues (e.g., EBIT growth / revenue growth) and on cash flows (for example, capital expenditure (capex)/RAB, operating cashflow/revenue, free cash flow/revenue). The proxy measures all suffer from some limitations. For example, EBIT-based measures may be subject to volatility associated with accounting adjustments that are unrelated to the business' underlying fixed and variable costs. Capex/RAB ratios rely on an assumption that increases in capex relative to historical levels increases the ratio of fixed to variable costs, but do not in themselves provide evidence of this. Measures that include capex as a fixed cost (e.g., free cash flow / revenue) imply an increase in operating leverage only over the period that the capex is actually incurred.⁵² However, this measure would not capture potential changes in the ratio of ongoing fixed and variable costs once the investment has been made.

At this stage, we have not attempted to calculate operating leverage for the fibre providers and the comparator set, as the measures for the fibre providers may change substantially between now and when the regulatory framework comes into effect. However, regardless of the measure adopted, we are not persuaded that operational leverage is likely to be a determinative factor in estimating the asset beta for the fibre providers:

- **EBIT-based measures:** Both the fibre providers and the telecommunication network operators included in our sample incur large upfront investments in constructing their network, with relatively lower ongoing costs to maintain and operate the network. There are likely to be some differences between the companies, that may be linked to the type of technology deployed.⁵³ Many of the integrated telecommunications companies provide retail services, which could also impact operating leverage.⁵⁴ However, the financial data reported by the comparator set does not allow us to disaggregate the degree of operating leverage for their different business activities.
- **Cashflow-based measures:** The cash-flow based measures outlined above are impacted to a substantial degree by levels of capex, relative to historical capex and/or revenues. We note that by the time the regulatory framework comes into effect in 2022, a large portion of the investment

⁵² For example, Brattle (2016) note that the construction phase of deploying an NGA network involves large capital investment commitments. The presence of these high fixed costs results in greater volatility of net cash flows in the event of an economic shock, increasing the correlation between the value of the network and economic conditions. While Brattle refer to this factor as capital leverage, in other contexts this has been termed operating leverage.

⁵³ For example, mobile networks may have somewhat different cost structures compared to fixed-line networks, which could mean that they have a lower degree of operating leverage - GSMA/PWC (2012). However, previous studies have indicated that in practice, asset betas do not appear to vary significantly with the portion of company value derived from mobile services. See for example Schmitt et al (2017), NERA (2017).

⁵⁴ For example, in its 2009 Leased Lines Charge Control (LLCC), Ofcom noted that BT's retail services may incur more variable costs and less fixed infrastructure costs relative to Openreach. See Competition Commission (2010).



associated with the UFB network will already have taken place. This suggests that cashflow-based measures would be unlikely to indicate a higher level of operating leverage to the comparator set, some of whom are also planning substantial future capital investments.

For Chorus, the effect of operating leverage on the asset beta will also be impacted by the nature of its revenue cap, based on a building blocks model. Under this model, the revenue that Chorus is able to recover is linked to its allowed RAB and projected efficient operating costs, regardless of fluctuations in demand.⁵⁵ As a result, even if Chorus’ operating leverage were higher than that of the LFCs or the comparator sample, the effect of this on earnings volatility would be reduced.⁵⁶ For this reason, we consider Chorus’ submission that “the contractual commitment to investment in FFLAS assets limits our ability to adjust our investment to reflect changes in demand and increases the risk” is not a relevant consideration for the purpose of the asset beta.⁵⁷ While Chorus’ investment in communal UFB infrastructure may be committed through the contractual arrangements with CIP, this will be included in the RAB and therefore is recoverable, regardless of changes in demand. Investments to connect new customers will only be required to the extent that demand actually eventuates.

Table 2.5: Relative systematic risk exposure - Operating leverage

Chorus	LFCs		Integrated service providers		Other wholesale-only providers	
<ul style="list-style-type: none"> Relatively high degree of operating leverage, which is associated with large upfront cost of deploying the UFB network infrastructure. Impact of operating leverage of earnings volatility dampened by the revenue cap. 	<ul style="list-style-type: none"> Likely a similar degree of operating leverage to Chorus, but without the offsetting effect of the revenue cap. 	■ or ▲	<ul style="list-style-type: none"> Similar to the LFCs, although noting the possible effect of retail activities with potentially lower operating leverage. 	■ or ▲	<ul style="list-style-type: none"> Similar to the LFCs. 	■ or ▲
Degree of systematic risk, relative to Chorus: ▼ = Lower ▲ = Higher ◀▶ = Different ■ = Similar						

2.3.4. Asset stranding

Asset stranding refers to the risk that a sustained downturn in demand may result in the UFB network (or parts of the network) becoming economically unviable.

This is put forward as a particular risk for the fibre providers in a number of submissions. For example, Chorus refer to “comparatively low penetration levels, and the risks associated with greenfield deployments” and “technology risk and demand uncertainty and risks of economic stranding of network assets”.⁵⁸ The LFCs also cite the impact of technological evolution and uncertainty as contributors to asset stranding risk. In addition,

⁵⁵ As noted above, there may still be short-term exposure to demand fluctuations, to the extent that Chorus is unable to recover its full revenue cap within a regulatory period.

⁵⁶ We note that this is similar to the position advanced by the Commission in its November 2018 review of Auckland Airport’s pricing decision, with which we concur.

⁵⁷ Chorus (2018a), page 45.

⁵⁸ Chorus (2018), page 45.



they propose that investors in LFCs face a higher risk of stranding relative to investors in Chorus, due to the competitive threats they face from Chorus' copper network, mobile networks (4G and in future 5G), and unbundling of the fibre network. The LFCs also propose that they face greater risk compared with the EDBs regulated under Part 4.

Stranding risk should only be captured in the asset beta to the extent that it is systematic. Not all fluctuations in demand will be linked to economic cycles, including some of the factors noted by Chorus and the LFCs. In particular, we do not consider stranding risk related to competition from alternative services to be systematic in nature. For example, the extent and speed of fibre up-take could be influenced primarily by the fibre providers' ability to connect new customers in a timely manner and perceptions regarding the quality of service offered over the fibre network, which are not influenced by the economic cycle. Further, an investor with a diversified portfolio would be able to mitigate the risk of switching by investing across a range of alternative providers. For similar reasons, we would also not consider obsolescence due to technological developments to constitute a systematic source of stranding risk.

In its 2016 decision on the GPBs regulated under Part 4, the Commission recognised the potential for systematic stranding risk arising from the relatively small proportion of households in New Zealand that are connected to the gas network, relative to other countries reflected in the Commission's comparator sample. In this context, the Commission accepted that stranding risk was at least partly systematic, because gas networks have relatively low penetration in New Zealand, and thus depend on increasing (or at least not losing) connections to remain viable.⁵⁹ Connections may be correlated with growth in the housing stock, which is linked to the economic cycle. As gas networks have a relatively small customer base, it is more likely that adverse economic conditions could prompt a 'death spiral' scenario that threatens their viability, relative to a mature electricity network.

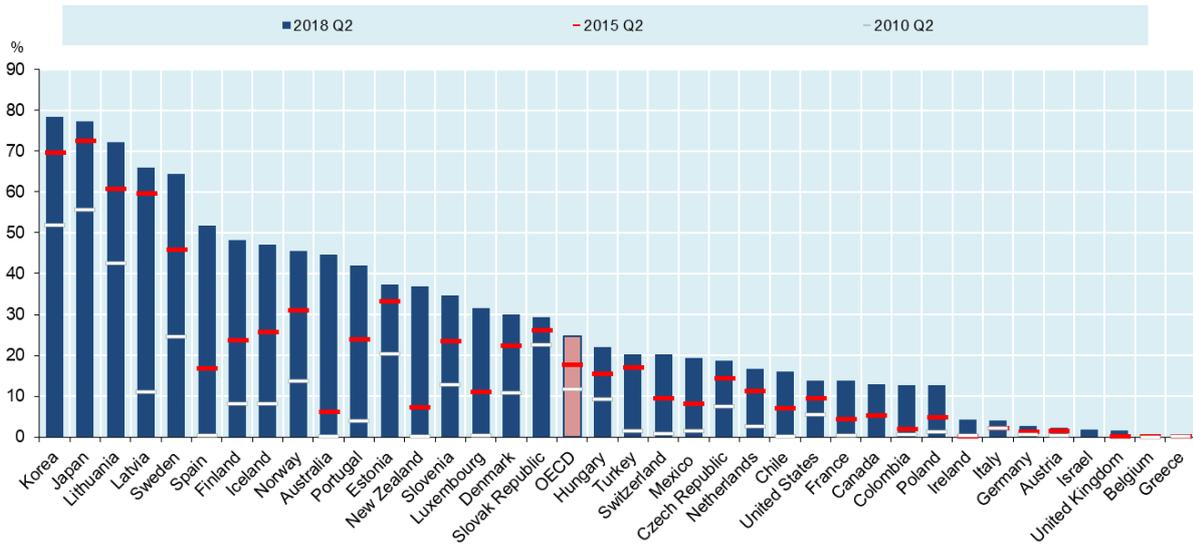
At the time of the 2016 decision, evidence was presented that 21% of households in the North Island of New Zealand were connected to the gas network, compared to 56% in the US, 56% of households in Australia and 86% of households in the UK.⁶⁰ Comparing fibre uptake in New Zealand and the countries represented in our comparator sample is not straightforward. The OECD (2018) reports that as of June 2018, fibre connections represented 36.9% of fixed-line broadband subscriptions in New Zealand, above the OECD average. However, while this data includes both fibre and broadband products, it appears to exclude fibre-to-the-cabinet (FTTC) subscriptions. Therefore, this may be an imperfect representation of the maturity of demand for high-speed services. For example, Ofcom (2018c) reports that 58% of residential connections are 'superfast' products (which would include FTTC and cable), while the OECD data indicates that only 1.5% of UK broadband connections are fibre-based. Nonetheless, the data indicates that demand for fibre services in New Zealand may not be significantly lower than the average of the countries included in our comparator set.

⁵⁹ The Commission also noted that the asset beta should only account for stranding risk to the extent that it is correlated with market returns, observing that in practice it is difficult to separate systematic and non-systematic stranding risk.

⁶⁰ Commerce Commission (2016).



Figure 2.3: OECD - Percentage of fibre connections in total fixed broadband, June 2018



Source: OECD (2018).

The companies in our comparator set deploy a range of voice, data and TV/video services over established copper, mobile and satellite networks. It may be the case that maturity of demand for these services is greater than for high-speed fibre-based services, in which case systematic stranding risk could potentially be higher for the fibre providers relative to the comparator set. Further, while the data above captures uptake at a country level, there may be also differences across the specific locations served by the comparators. We have not identified data to permit an analysis of these factors. However, the fibre providers have observed that at present, fibre uptake is well ahead of expectations.⁶¹ As noted in Section 2.3.2, uptake of UFB services is currently between 40-50%, suggesting that demand for fibre services in New Zealand may already be at a more mature stage relative to gas. This may indicate that the case for an uplift to the asset beta to account for systematic stranding risk is weaker than for the GPBs.

As noted in Section 1.2, the regulatory arrangements in relation to the fibre providers' RAB and risk allocation are still to be determined. Further development of the Commission's approach to these issues may impact the extent the degree of systematic stranding risk faced by the fibre providers.

Table 2.6: Relative systematic risk exposure - Asset stranding

Chorus	LFCs	Integrated service providers	Other wholesale-only providers
<ul style="list-style-type: none"> Potential exposure to systematic stranding risk, linked to the relatively early stage of deployment of the fibre network. 	<ul style="list-style-type: none"> Similar to Chorus (competition faced by the LFCs in their fibre areas is not a source of systematic stranding risk). 	<ul style="list-style-type: none"> Similar, although potentially lower to the extent that demand for the comparators' services is more established. 	<ul style="list-style-type: none"> Similar to the integrated providers.
Degree of systematic risk, relative to Chorus: ▼ = Lower ▲ = Higher ◀▶ = Different ■ = Similar			

⁶¹ Chorus (2018c), page 4.



2.3.5. Company size

A clear difference between Chorus and the LFCs is the size of their UFB network. The Commission has previously considered the question of a small company premium in the context of the 2010 Part 4 IM decision for EDBs and GPBs. The Commission noted that:⁶²

- It has not been conclusively established that smaller companies do have a higher cost of capital than is implied by the CAPM.
- Further, even if a small company premium existed, this may not be relevant in the context of Part 4 of the Commerce Act. In particular, the focus on Part 4 is on outcomes in workably competitive markets. The Commission observed that in a competitive market context, firms that incur a higher cost of capital as a result of their smaller size could not expect to recover this cost from their customers.

We consider that these points are also valid in the context of fibre services:

- We agree that the academic literature does not provide a clear consensus on the presence of differences in systematic risk based on company size, however we note that a number of recent papers tend to argue against size being a material contributing factor.⁶³
- The observation in relation to competitive market outcomes is also relevant, given that the overarching purpose of the new regulatory framework is to “... *promote the long-term benefit of end-users in markets for fibre fixed line access services by promoting outcomes that are consistent with outcomes produced in workably competitive markets*”.⁶⁴

However, there have been cases in which regulators *have* considered differences in scale when estimating the cost of capital. In the telecommunications sector, we are aware of three recent examples of a size premium being applied:

- In January 2018, the Slovakian regulatory authority, RÚ, notified the European Commission of its decision in relation to telephone network termination rates. RÚ’s determination provided for a size premium of between 1-2%, added to the cost of equity. This was intended to compensate the Slovakian telecommunication operators for higher risk relative to the European operators included in the comparator sample, arising from the Slovakian companies’ smaller size.⁶⁵
- In January 2018, the European Commission also received notification from the Slovenian regulatory authority (AKOS), in which it proposed to impose a LRIC-based price setting mechanism in the market for wholesale high-quality access. The WACC estimated by AKOS included a size premium of 3.67% that was added to the cost of equity. AKOS defended the premium on the basis that Slovenian telecom companies are smaller than other European telecoms comparators (for example, in terms of revenue and market capitalisation) and have a lower credit rating.⁶⁶

⁶² Commerce Commission (2010), paragraph 6.4.27 – 6.4.29.

⁶³ See for example Alquist et al (2018).

⁶⁴ The Telecommunications Act 2001, Section 162.

⁶⁵ BEREC (2018b).

⁶⁶ BEREC (2018a).



- In August 2018, the Hungarian regulatory authority (NMHH) notified the Commission of its proposal to impose access remedies on Magyar Telekom in the market for wholesale high quality access. NMHH proposed to apply a size premium that increased the cost of equity by 0.8%.⁶⁷

We understand that RÚ, AKOS and NMHH based their size premiums on the Duff & Phelps 2017 Valuation Handbook (Guide to the Cost of Capital), which sets out a table of estimated size premia for US listed companies.

However, we note that both the European Commission and BEREC (Body of European Regulators for Economic Communications) have expressed serious concerns regarding the application of a size premium in these decisions, in particular:⁶⁸

- Size premia are not commonly applied by other regulatory authorities in the EU.
- AKOS, RÚ and NMHH did not explain why the size of the Slovenian, Slovakian and Hungarian operators meant that they would face higher systematic risk relative to other EU comparators, nor why the CAPM was not able to fully account for differences in systematic risk.
- There was inadequate justification of the premia applied, including why values based on US stocks were likely to be relevant.

In the water sector, Ofwat (the England and Wales water regulator) has previously applied a premium for smaller water only companies (WoCs) relative to the larger water and sewerage companies (WaSCs). In the PR09 price control (set in 2009), Ofwat found that while the smaller companies might face higher levels of *specific* risk, there was limited evidence that the level of systematic risk faced by WoCs was in fact different from the WaSCs.⁶⁹

Overall, we consider that there is limited evidence in favour of the asset beta being different between the fibre providers on the basis of size. The academic literature on this topic does not strongly support an adjustment to the asset beta based on this basis. There is also limited regulatory precedent to support making an adjustment to the asset beta, or the cost of equity more broadly, to account for size as a standalone factor. Our analysis has not identified specific reasons why the LFCs' size should increase their exposure to the well-accepted systematic risk factors discussed in the preceding sections. For these reasons, we do not propose an adjustment to our asset beta estimate on the basis of size.

2.3.6. Long-lived investments

The Brattle Group's 2016 report for the European Commission on a harmonised approach to estimating telecommunications asset betas proposed three factors that may contribute to higher systematic risk, namely income elasticity of demand, capital leverage and a long-lived investment

⁶⁷ BEREC (2018c).

⁶⁸ See BEREC (2018a), (2018b) and (2018c).

⁶⁹ Ofwat (2009). Ofwat concluded that as a result of higher levels of specific risk, ratings agencies would likely require the smaller companies to demonstrate better financial ratios to achieve a given credit rating. On this basis, Ofwat applied a lower gearing assumption in estimating the WACC for the WoCs. However, Ofwat maintained the same cost of equity for the WoCs and WaSCs (i.e., the equity beta was estimated using the same gearing for WoCs and WaSCs).



horizon. The first two factors have been covered in Sections 2.3.1 and 2.3.3 respectively. In this section we consider the third factor.

The Brattle report observes that the value of new NGA networks is based on cashflows that extend further into the future, relative to an existing legacy network with a shorter remaining useful life. Brattle propose that “[t]his means that the value of the investment will vary more strongly with macroeconomic conditions, as the investment will be affected by uncertain macroeconomic risks over a longer period of time, in a manner analogous to a long-term bond.”⁷⁰

While a new asset may have a longer remaining useful life than an old one (if they start with the same expected useful life), our view is that this will not necessarily be a conclusive factor contributing to a higher asset beta for fibre networks. This is because while the copper wires in a legacy network may themselves have a shorter remaining useful life compared to a fibre network, the assets of legacy network owners also include ducts, rights of way and operating knowledge that will also contribute to the value of their company. Legacy network owners may deploy these assets beyond the useful life of the physical copper cabling itself and may also invest in other new assets.

Satellite networks provide another example. The physical assets may themselves last up to 15 years, before becoming obsolete when they run out of fuel and can no longer be controlled to be in their correct orbital position. However, the satellite operator that owns the slot has a right under international law to put a new satellite into that position into perpetuity. To make a like-for-like comparison to a new fibre network, it would be necessary to value the option to make future investments, in addition to considering only the existing physical assets.

For these reasons, we are of the view that the long-lived nature of new fibre network assets is unlikely to be a determinative factor contributing to a higher asset beta relative to the other firms in our comparator sample.

2.3.7. Other risk factors

We note the following other factors that could impact the degree of systematic risk faced by the fibre providers:

- **Counterparty risk.** Potentially greater for the comparators with retail operations, to the extent that retail customers present greater risks of bad debt relative to larger wholesale customers. Overall, we would not expect this to be a determinative factor for the asset beta.
- **Market weight.** To the best of our knowledge, the comparators have limited weight in their market indices. Therefore, we do not consider this factor to be significant and do not discuss it further.
- **Monopoly power.** We note that while Lally (2008) recognises the potential impact of monopoly power, the evidence on the extent and direction of the effect appears to be inconclusive. Therefore, we do not consider this factor further.

⁷⁰ Brattle (2016), page 12.



2.3.8. Summary

A summary of our relative risk assessment is presented in the table below. Overall, this indicates that systematic risk could potentially be lower for Chorus, relative to the LFCs and the comparator set, primarily linked to the impact of the revenue cap. It is important to note that we cannot establish a weighting for each of the risk factors. Some will have a relatively small impact on the asset beta – for example, we assume that counterparty risk will be a minor factor – while others will be more significant.

Table 2.7: Relative systematic risk exposure - Summary

Risk Factor	Degree of systematic risk (relative to Chorus)		
	LFCs	Integrated service providers	Other wholesale-only providers
Demand	▲	▲ or ◄►	■
Growth opportunities	■	■ or ▲	■ or ▲
Operating leverage	■ or ▲	■ or ▲	■ or ▲
Asset stranding	■	■ or ▼	■ or ▼
Company size	■	■	■
Other risk factors	■	■	■

Degree of systematic risk, relative to Chorus: ▼ = Lower ▲ = Higher ◄► = Different ■ = Similar

2.4. ESTIMATION APPROACH

Key aspects of our methodology and assumptions in estimating the asset betas are set out below.

Returns frequency

The returns frequency determines the period over which returns are calculated. Conventional options include daily, weekly, monthly, and annual returns, although theoretically, return frequency can be any discrete period over which prices are recorded. Using a higher return frequency (e.g., daily) increases the number of observations in the OLS regression, however this may introduce a non-trading bias. A non-



trading bias is when the equity stock in question does not trade every day but the market does, systematically reducing correlation with the market index for reasons that do not represent market risk.

In line with the 2016 Part 4 IM methodology, we have calculated the raw equity betas on the basis of four-weekly, weekly, and daily observations. The four-weekly results were calculated by estimating raw equity betas for each of the 20 possible reference days in a four-weekly period and then averaging the results. Similarly, the weekly results were estimated for each of the five possible reference days, with the results averaged. This approach is intended to reduce the small risk of estimation error resulting from the choice of reference day.

The Commission has previously placed most weight on four-weekly and weekly estimates, rather than daily estimates. We note that there are advantages and disadvantages associated with different frequencies, and have not identified additional issues to those considered by the Commission in its previous assessment of the appropriate frequency.

Returns horizon

In order to calculate beta, we must decide on the horizon for which we wish to calculate returns. There are trade-offs involved in this selection; a longer horizon provides more observations in the OLS regression, but assumes that characteristics of the firm such as business risk and leverage have remained constant for the period. Since the beta should estimate forward looking risk, a longer return horizon may capture information that is weighted too heavily on older evidence. On the other hand, shorter horizons may be less statistically robust, especially depending on the selected returns frequency, but may better represent the future operations of the business.

In its 2016 IM decision, the Commission considered market evidence over a 20-year time horizon, calculating asset betas for each five-year period over 1996 to 2016. While having regard to the evidence provided by all estimates, the Commission placed greater weight on the two most recent five-year periods.⁷¹ In its 2015 UCLL/UBA decision, the Commission focussed on five-year beta estimates over the most recent 10-year period, noting that this achieved a balance between recent data that reflected current market conditions and historic information that addressed the potential for 'noisy' beta data.⁷²

We have focussed on a time horizon that takes in the past 10 years (1 March 2009 to 28 February 2019). Within this horizon, we have calculated asset beta estimates for the two most recent five-year periods (2009-2014 and 2014-2019) and the most recent two-year period (2017-2019).⁷³ We consider that this approach provides a sufficiently long period to allow for 'noisy' fluctuations in the beta over time, while also considering more recent evidence that reflects current market conditions and investor perceptions. The sector has seen a number of changes over the past decade, including deployment and uptake of high-speed fibre networks (see Figure 2.3 in Section 2.3.4). We note that due to the pace of innovation in the telecommunications sector, a longer returns horizon of 20 years may be less appropriate than for energy networks.⁷⁴ There is also some precedent for shorter sample periods in the sector. For example, in

⁷¹ Commerce Commission (2016), paragraphs 303 and 473.

⁷² Commerce Commission (2015), paragraph 159.

⁷³ Our beta estimates are based on spot evidence, rather than trailing averages.

⁷⁴ This point was also raised by Oxera in its report for the Commission on the UCLL/UBA asset beta. Oxera (2014), page 34-35.



considering the asset beta for BT, Ofcom has tended to focus on market evidence from the most recent two-year and five-year periods.⁷⁵

We also note the practical issue of stability in the comparator sample over time. For example, several firms included in the comparator sample adopted by the Commission in the 2015 UCLL/UBA decision have been acquired by other companies and a number of new firms have since emerged. Even within our 10-year sample, trading data is not available for all firms over both five-year periods; the issue of changing composition of the sample would be exacerbated if the asset beta were to be estimated over a longer time horizon.

Other factors

Other aspects of our estimation approach are outlined in the table below.

Table 2.8: Estimation approach

Methodology	Description
Reference indices	For the purposes of this analysis, we have estimated the raw equity betas based on broad local indices, which we understand to be aligned with the Commission’s approach under the Part 4 IM decision. To assess the impact of the choice of reference indices, we have also considered the impact of broader regional indices (for example, the Eurostoxx 600 for the European comparators). As reported in Section 2.6.2, this did not have a material impact on the asset beta ranges. The reference indices applied are listed in Appendix B.
Estimation adjustments	We have based our asset beta estimates of raw equity betas, avoiding Blume and Vasicek adjustments.
Leverage	<p>In calculating an ‘unlevered’ asset beta, the raw equity beta calculated for an individual company must be ‘de-levered’ based on the company’s leverage. We have calculated leverage on the basis of net debt and market capitalisation from Bloomberg.</p> <p>A small number of companies in our sample have negative net debt – that is, debt less cash and cash equivalents is below zero. Where net debt is negative, the company’s gearing will also be negative, since net debt is the numerator in the gearing calculation. For moderately negative levels of net debt, this may not indicate a particular problem. There is no reason to expect the implied relationship between asset beta and cash reserves (for a given equity beta, gross debt and market capitalisation) to break down specifically at the point where cash reserves are equal to gross debt. However, for more extreme values of negative net debt, there may be more fundamental issues.</p> <p>Our approach is to apply a lower bound value of zero for the leverage assumption used to calculate the asset betas. We understand that this is consistent with the approach taken by the Commission in its 2016 Part IM decision. For companies with negative net debt, this approach results in lower asset betas than if the lower bound were not applied. There are arguably drawbacks to this approach, as it assumes the de-levering relationship breaks down entirely once net debt is even slightly negative. However, the results are not particularly sensitive to the approach chosen.</p>
De-levering approach	<p>We have de-levered the raw equity betas by using the tax neutral formula applied by the Commission:</p> $\beta_a = \beta_e(1 - L) + \beta_d L$ <p>Where β_a is the company’s asset beta, β_e is the company’s equity beta, β_d is the company’s debt beta (which we assume to be zero), and L is the company’s leverage (as defined above).</p> <p>The raw equity betas are de-levered on the basis of average leverage over the estimation period.</p>

⁷⁵ See for example, Ofcom (2018a), page 106 and Ofcom (2018b), page 225.



Methodology	Description
Debt beta	We have assumed a zero debt beta for the purposes of this report, in line with the previous approach adopted by the Commission under the Part 4 IM decision and the 2015 UCLL / UBA decision. We note that there is precedent in the sector for both zero and non-zero debt betas. The implications of this assumption for the estimation of notional leverage are discussed further in Section 3.1.

2.5. RESULTS

The average results for the wholesale-only (Chorus, tower companies, satellites) and integrated comparator groups are presented in the table below. Estimates for each individual comparator are included in Appendix B, along with the standard errors for the estimates. For the two-year horizon, we report only betas estimated at a weekly and daily frequency. While four-weekly betas were also estimated, over a two-year period the number of data points is limited, and the standard errors were materially higher.

Table 2.9: Asset beta estimates (local market indices)

Comparators	Four-weekly beta	Weekly beta	Daily beta
Five-year asset beta (2014-2019)			
Chorus	0.49	0.41	0.37
Tower companies	0.35	0.45	0.46
Satellite operators	0.36	0.35	0.36
Wholesale service providers	0.38	0.41	0.41
Integrated service providers	0.46	0.52	0.52
Five-year asset beta (2009-2014)			
Chorus	n/a	n/a	n/a
Tower companies	0.49	0.58	0.62
Satellite operators	0.22	0.26	0.24
Wholesale service providers	0.38	0.45	0.47
Integrated service providers	0.55	0.51	0.52
Two-year asset beta (2017-2019)			
Chorus	n/a	0.29	0.34
Tower companies	n/a	0.43	0.40
Satellite operators	n/a	0.25	0.29
Wholesale service providers	n/a	0.37	0.36
Integrated service providers	n/a	0.44	0.46

Source: Bloomberg, CEPA analysis

For the **wholesale-only** service providers four-weekly and weekly estimates from the two most recent five-year periods (2014-2019 and 2009-2014) indicate a range for the asset beta of 0.38 – 0.45 (0.42 on average). We note that at 0.37, the weekly asset beta estimate for the most recent two-year period (2017-2019) is broadly consistent with the lower end of the five-year range. The two-year and five-year daily asset beta estimates support a slightly wider range of 0.36 – 0.47.



The asset betas for the **vertically integrated** comparators are higher than for the wholesale-only service providers, consistent with our relative risk assessment. For the integrated companies, the estimated range indicated by four-weekly and weekly data over the two most recent five-year periods is 0.46 – 0.55 (0.51 on average). The five-year daily estimates and results from the most recent two-year period are also broadly consistent with this range.

2.6. SENSITIVITY TESTING

In this section, we have considered a number of options for differentiating between the companies to test whether a more focussed sample could be identified, or whether an alternative estimation methodology would yield materially different results. Considering each individual test on its merits, we conclude that none provide a strong reason to alter the proposed range set out in Section 2.5. The sensitivities do tend to produce slightly higher estimation results, relative to the methodology set out in Section 2.4. It could be argued that this provides a cumulative case for a slightly higher range. However, we consider that if an individual test cannot be justified in isolation, it also should not be considered in a cumulative assessment.

2.6.1. Vertically integrated service providers – alternative sub-groups

The integrated service provider group includes a diverse range of companies. Where no single perfect comparator exists, drawing from a range of broadly comparable companies helps to ensure that the evidence reflects the experience of the sector as a whole, rather than any one company. This favours drawing from a relatively wide group of comparators. However, we note that the spread of beta estimates within this group indicates that investors may not view these companies as substitutes (both within the group and for the New Zealand fibre providers). We have therefore considered several options to further differentiate between these comparators.

Sources of revenue

We have reviewed the integrated companies' most recent annual results to assess whether this group can be further refined based on the proportion revenues that relate to activities similar to those of the fibre providers.⁷⁶ In particular, we have considered:

- **The proportion of revenues derived from fibre network investments.** Many of the comparators have or currently are undertaking new fibre network investments. However, we have not been able to reliably identify revenues that are specifically fibre-related on a consistent basis across the sample.
- **The proportion of revenues derived from wholesale access services.** A number of the comparators included in the sample appear to derive a relatively large portion of their revenues from wholesale services. However, for many the contribution of wholesale services to revenue does not appear to be available. Therefore, we have concluded that there is insufficient data to assess this in a consistent way across the integrated comparator group.
- **The proportion of revenues derived from fixed-network assets.** For most companies in the comparator group, we have been able to identify the percentage of revenues derived from services

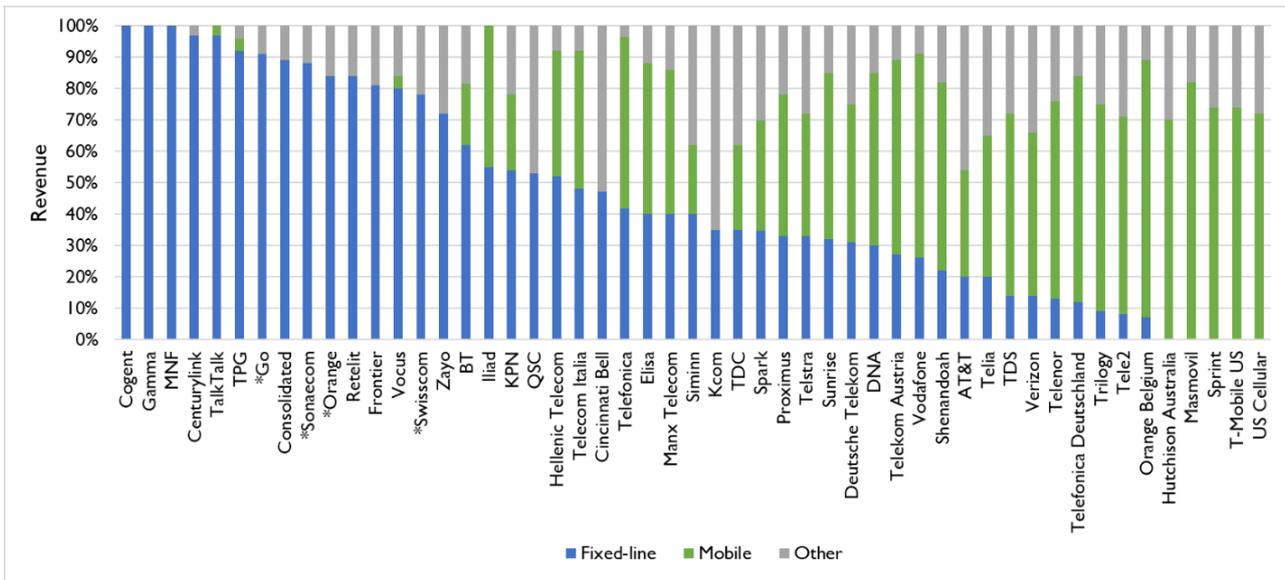
⁷⁶ EBITDA was considered as an alternative to revenue; however, this was not consistently available on a segmented basis across the comparator set.



offered over fixed network assets, as opposed to other technologies (e.g., mobile or satellite networks) or other activities (e.g., business ICT services, media). This is shown in Figure 2.4 below.

We consider that the revenue data we have obtained provides a reasonably robust indication of whether the comparators derive the majority of their revenues from a fixed-line network, although the precise proportions are hard to pin down given differences in reporting. Based on this categorisation, we have tested the impact of including only integrated service providers with at least 50% of revenues derived from a fixed-line network. As indicated below, this does result in a higher average beta across the remaining integrated sample. It is important to note the limitations of this categorisation. In particular, revenues may not be a suitable proxy for the value of the network assets, and will typically include value derived from associated customer service activities (as distinct from the underlying network service). Further, our categorisation focuses on the most recent annual accounts, which may have been materially different over the full period of the beta estimates. Noting that previous studies have not identified a material difference between the asset betas of mobile and fixed-line networks, we are not persuaded that these estimates justify an adjustment to the integrated comparator sample or the asset beta estimates.

Figure 2.4: Integrated telecommunications comparators - Sources of revenues



Source: Bloomberg, company accounts, CEPA analysis. Note that companies marked with a * do not provide a clear breakdown of revenue by type of service. In the chart, their share of fixed-line revenue includes both fixed-line and mobile services.

Size

The sample includes a mixture of large, global firms and smaller local companies. As discussed in Section 2.3.5, we do not consider that company size is a relevant factor in estimating the asset beta. However, as a cross check, we have tested the impact of including only companies with a market cap above US \$1bn in the sample. As indicated below, this generally results in a slight uplift to the integrated service provider beta.

Other

We have considered whether there is data to support other categorisations, including: type of regulation and proportion of regulated revenues; customer split (business/residential, rural/urban, private/public sector). Overall, we have not found sufficiently complete data to group the sample along these lines.



The results of our sensitivity testing in relation to the proportion of fixed-line revenues and company size are shown in the table below.

Table 2.10: Asset beta estimates – sensitivity testing

	Five-year beta (2014-2019)			Five-year beta (2009-2014)		
	Four-weekly	Weekly	Daily	Four-weekly	Weekly	Daily
Integrated service providers – Base	0.46	0.52	0.52	0.55	0.51	0.52
Integrated service providers – Excluding firms with <50% revenues derived from fixed-line network	0.51	0.57	0.55	0.63	0.50	0.49
Integrated service providers – Excluding firms with market cap < US \$1 bn	0.46	0.53	0.55	0.53	0.52	0.55

2.6.2. Other adjustments

Revenues derived from multiple jurisdictions

We have considered the impact of excluding companies with more than 50% of revenues sourced outside the main country of operation. An argument could be made for excluding these companies, on the basis that this could result in distortions to the beta analysis.⁷⁷ This would involve excluding a number of the satellite operators, as well as Deutsche Telekom, Telefonica and Telenor. On the other hand, these companies typically operate similar services in other geographies. The difference appears to be minimal over the most recent five-year period.

Table 2.11: Asset beta estimates – sensitivity testing

	Five-year beta (2014-2019)			Five-year beta (2009-2014)		
	Four-weekly	Weekly	Daily	Four-weekly	Weekly	Daily
Wholesale service providers – Base	0.38	0.41	0.41	0.38	0.45	0.47
Wholesale service providers – Excluding firms with >50% revenues outside main country of operation	0.38	0.42	0.42	0.43	0.51	0.53
Integrated service providers – Base	0.46	0.52	0.52	0.55	0.51	0.52
Integrated service providers – Excluding firms with >50% revenues outside main country of operation	0.46	0.52	0.52	0.56	0.51	0.52

Choice of reference index

The estimates presented above are based on local market indices (see Appendix B for a complete list). We have also considered the impact of adopting broader market indices. In particular, for the European comparators we have tested the impact of estimating asset betas on the basis of the Eurostoxx 600 index.

⁷⁷ For example, this argument was put forward by Oxera (2014) in its report for the Commission in relation to the asset beta for UCLL/UBA services.



As illustrated in the table below, this does not substantially impact the overall estimate, as it includes a number of US comparators, for whom the S&P 500 is used as both the local and regional index.

Table 2.12: Asset beta estimates – sensitivity testing

	Five-year beta (2014-2019)			Five-year beta (2009-2014)		
	Four-weekly	Weekly	Daily	Four-weekly	Weekly	Daily
Wholesale service providers – Base	0.38	0.41	0.41	0.38	0.45	0.47
Wholesale service providers – With regional index	0.39	0.42	0.43	0.41	0.48	0.50
Integrated service providers – Base	0.46	0.52	0.52	0.55	0.51	0.52
Integrated service providers – With regional index	0.47	0.52	0.51	0.56	0.52	0.54

2.7. CONCLUSIONS AND RECOMMENDATIONS

Based on our relative risk assessment, we consider that in many respects the wholesale-only comparators provide a reasonable reflection of the systematic risk faced by the fibre providers. In particular, we note that:

- The tower companies, and fixed satellite operators Eutelsat and SES, have long-term contracting arrangements and wholesale customers. This provides similar revenue stability and predictability as for Chorus operating under a revenue cap.
- The integrated telecommunications comparators reflect a variety of business models. We consider that the degree of systematic risk faced by these comparators may be higher than for a wholesale-only fibre services provider, given the nature of demand for their services.⁷⁸

These factors could support placing greater weight on evidence from the wholesale-only comparators, relative to the vertically integrated comparators. However, we also note that:

- There may be reasons to think that the LFCs – who are not regulated under a revenue cap – could face a higher degree of systematic risk relative to the wholesale-only comparators, relating to their shorter-term contracting arrangements and correspondingly higher exposure to fluctuations in end-user demand.
- The wholesale-only comparator set is relatively small, comprising six companies for the two most recent five-year periods, and eight companies in the most recent two-year period.
- The Commission adopted a broad comparator sample that included vertically integrated utilities in its 2016 decision on the asset beta for electricity distribution business (EDBs) and gas pipeline businesses (GPBs) as there were few ‘pure play’ electricity lines and gas pipelines comparators available.

⁷⁸ We have considered whether the integrated group can be refined to better reflect relevant characteristics of the fibre providers, including the proportion of revenues derived from fibre services and wholesale services. However, we have not been able to establish a dataset that allows for consistent categorisation of the integrated companies on this basis.



On balance, we consider that an asset beta that falls between the wholesale-only and integrated comparator groups would represent a reasonable estimate for the fibre providers. Combining the asset beta estimates from these two groups suggests a range of 0.42 – 0.51, and midpoint of 0.46.⁷⁹ The lower value of this range is set by the wholesale-only comparators and the upper value is set by the integrated comparators, based on the average asset beta for the two most recent five-year periods. Basing this range on the five-year beta estimates is consistent with the Commission’s 2016 Part 4 IM decision for EDBs, GPBs and airports, which placed greater weight on the weekly and four-weekly estimates from the two most recent five-year periods.⁸⁰

We consider that this represents a reasonable range, and is supported by the following factors:

- In the 2016 Part 4 IM decision, the Commission set asset betas of 0.35 for the EDBs, 0.40 for the GPBs and 0.60 for airports. An asset beta of 0.46 for the fibre providers (within a range of 0.42 – 0.51) appears sensible in the context of these decisions, as it reflects that cyclicalities in the profits of telecommunications companies is likely to be higher relative to the energy networks, and lower relative to that of airports.
- The Commission set an asset beta of 0.43 for the unbundled copper local loop (UCLL) and unbundled bitstream access (UBA) services offered by Chorus through its copper network.⁸¹

The Commission has asked us to consider whether it would be appropriate to set a different asset beta for Chorus and the LFCs. As noted above, there may be reasons to think that the systematic risk exposure of the LFCs could be above that of Chorus. However, we have not identified a robust basis to estimate a different asset beta for the LFCs.

Beyond the question of whether systematic risk is likely to be different for the LFCs, we have also considered the use of the asset beta within the regulatory framework. Under the information disclosure regime, the WACC will be used to monitor the profitability of the LFCs, rather than to set a cap on revenues or prices. For this purpose, setting a common asset beta across all fibre providers may be preferable to attempting to establish a differential asset beta for Chorus and the LFCs on the basis of limited evidence.⁸²

⁷⁹ Our ranges for the asset beta appear to be robust to the sensitivities we have tested, including in relation to the choice of relative index, the inclusion of companies with geographically diverse revenues, and the size of the comparators (measured by market capitalisation).

⁸⁰ Commerce Commission (2016), paragraphs 303 and 473.

⁸¹ We have considered the merits of a disaggregation approach to Chorus’ beta to test what an asset beta of 0.46 for fibre services would imply for the asset beta of copper-based services. However, we consider that this type of analysis is likely to be inconclusive in this case, as the ongoing roll-out of the Ultra-Fast Broadband (UFB) network and the rapidly evolving uptake of fibre services by end users presents challenges in estimating an appropriate weighting for fibre and copper activities.

⁸² We note that Ofcom applies the same asset beta estimate to monitor the profitability of KCOM and BT in the UK, noting that “[t]he role of the WACC in profitability analysis differs to that in charge controls. Our conclusion on profitability is not dependent on a very precise estimate of the WACC”. Ofcom (2016), page 87.



3. LEVERAGE AND CREDIT RATING

The Commission has asked us to consider the leverage and appropriate long-term credit rating for a fibre services provider.

3.1. BACKGROUND

3.1.1. Leverage

Within the cost of capital framework, the leverage parameter is used to:

- (i) derive the WACC by weighting the estimated cost of debt and equity;
- (ii) de-lever the estimated equity betas of the comparator firms used to calculate the asset beta; and
- (iii) re-lever the estimated asset beta to derive the estimated equity beta for the regulated services.

In the 2016 Part 4 IM review, for all three purposes the Commission applied a leverage estimate based on the sample of comparator firms used to estimate the asset beta.

This approach was in response to the counterintuitive characteristic of the simplified Brennan-Lally CAPM that the WACC increases with increasing leverage (referred to as the 'leverage anomaly').⁸³ The Commission was concerned that if the actual gearing of regulated service providers was used to set the WACC, the leverage anomaly would provide an incentive to increase their leverage. The Commission considered three options to address this issue:

- (i) setting the leverage to zero;
- (ii) setting leverage at a notional level; and
- (iii) using a non-zero debt beta.

The Commission ruled out option (i) on the basis that this would likely misrepresent the true cost of capital, did not reflect the observed behaviour of firms, was inconsistent with regulatory practice, and would impact other WACC parameters such as the equity beta. Given the methodological uncertainty and complexity associated with option (iii), the Commission decided to adopt option (ii).

In response to a report prepared by PwC on behalf of the ENA, the Commission determined that the notional leverage should be based on the average of the comparator sample used to estimate the asset beta. PwC had presented analysis indicating that, in the presence of a nil debt beta assumption, applying a leverage assumption that is different from that of the comparators used to derive the asset beta results in biased WACC estimates.⁸⁴ The Commission presented analysis demonstrating that under certain conditions, the same WACC estimate would be reached by applying notional leverage based on the comparator sample average or applying non-zero debt betas.

3.1.2. Long-term credit rating

Credit ratings are an indication of a borrower's creditworthiness. The higher the rating, the less the likelihood of default. The approach taken by credit rating agencies tends to consider the following factors:

⁸³ As described in Lally (2009).

⁸⁴ PwC (2010), page 8-9.



- **Business risk.** Firms that face a more moderate level of business risk achieve higher credit ratings, relative to those who operate in higher-risk environments.
- **Financial metrics.** Firms with sounder financial metrics achieve a higher credit rating, other factors held constant.

Rating agencies’ consideration of risk is broader than systematic risk, which is the focus of the beta estimate. However, a higher degree of systematic risk would, other factors held equal, tend to imply a higher level of overall business risk. To achieve a given credit rating, service providers with a lower asset beta would therefore be able to support a higher level of leverage relative to those with a high asset beta, other factors held constant. This implies that if we consider the average asset beta and average leverage of the comparator sample to be appropriate for the fibre providers, the average long-term credit rating of the sample would be consistent with this.

The Commission has previously adopted notional S&P long-term credit ratings of A- for airports and BBB+ for energy networks, which it considered to provide an adequate safety margin above the minimum investment grade of BBB-. In its 2016 Part 4 IM decision, the Commission also noted that BBB+ was also the most common long-term credit rating of companies in the comparator sample for the energy networks.⁸⁵

The Commission’s approach to estimating the notional leverage and credit rating was upheld in the High Court’s 2013 merits appeal judgement.⁸⁶

3.2. ESTIMATES BASED ON THE PART 4 IM APPROACH

The average leverage estimates from our comparator sample are outlined in the table below.

Table 3.1: Comparator set - Actual leverage

Comparator sample	Notional leverage
Five-year asset beta (2014-2019)	
Wholesale service providers	35%
Integrated service providers	29%
Five-year asset beta (2009-2014)	
Wholesale service providers	31%
Integrated service providers	30%
Two-year asset beta (2017-2019)	
Wholesale service providers	26%
Integrated service providers	30%

Source: Bloomberg, CEPA analysis. Leverage is based on net debt and market capitalisation. Averages are simple unweighted averages.

Applying the Commission’s Part 4 IM approach to our comparator sample, i.e., focusing on the two most recent five-year periods, suggests that the appropriate notional leverage is between 29% - 35%. The point

⁸⁵ Commerce Commission (2016), paragraphs 254 – 256.

⁸⁶ High Court of New Zealand (2013).



estimate would depend on the weight placed on the evidence from wholesale-only and integrated service providers in determining the asset beta estimate.

The S&P long-term credit ratings of the comparator sample (for companies that have a current credit rating) are shown below. Ratings for each comparator are included in Appendix B.

Table 3.2: Long-term credit ratings - Comparator group summary

Company	S&P Long-term Ratings	Most common rating	Average rating
Wholesale service providers	BBB- (4 companies) BBB, BB (1 company each)	BBB-	BBB- / BB+
Integrated service providers	BBB+ (6 companies) BBB (5 companies) A, BB+, BB, B (3 companies each) A-, B+ (2 companies each) BBB-, BB-, CCC+ (1 company each)	BBB+	BBB- / BB+

Source: Bloomberg data, CEPA analysis. Average ratings are determined by allocating each rating category a sequential ordinal value (i.e., A=1, A=2 etc), averaging these values, then converting the average to the closest rating category.

This indicates that the most common ratings are BBB+ (integrated service providers) and BBB- (wholesale-only service providers). For the 2015 UCLL/UBA decision, the Commission adopted a notional long-term rating of BBB. We note that adopting a notional long-term rating of BBB/BBB+ would be consistent with the Commission’s Part 4 IM approach of ensuring a buffer of above the minimum investment grade rating.

3.3. CROSS CHECKS

We note that the Commission’s Part 4 IM approach to estimating the notional leverage is consistent with the approach of assuming a nil debt beta. However, there are some potential disadvantages associated with this approach. In particular, the comparator sample includes a number of companies with either no credit rating, or a credit rating that falls below (in some case, multiple notches below) the minimum investment grade. We consider that an efficient fibre services provider would seek to maintain an appropriate investment grade credit rating to ensure adequate access to debt at reasonable cost. However, applying the average leverage of the comparator sample could be inconsistent with this position, as the sample average reflects leverage of comparators with a below-investment grade rating.

Therefore, as a cross-check to the estimates derived from applying the Part 4 IM approach, we have undertaken further analysis of the observed leverage and credit ratings across the comparator set. The table below reports average leverage for all comparators that have achieved a particular credit rating. This excludes comparators for whom a credit rating is not available and comparators with a credit rating that is below investment grade (i.e., below an S&P rating of BBB-). The data in the table reflects leverage over the most recent five-year period (2014 – 2019) and current credit ratings.

The table below also provides a comparison to the utilities regulated under Part 4 of the Commerce Act. For ease of reference, the data is from the same period as applied in the Commission’s 2016 IM decision (i.e., average leverage over 2011 – 2016 and credit ratings as at 2016).



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Table 3.3: Credit ratings and leverage

Average Gearing		Sector								
		Chorus	Tower Companies	Satellite Operators	Wholesale-only service providers	Integrated service providers	Telecoms - Wholesale + Integrated	Gas / Electricity	Airports	Average
Credit Rating	AA-							21%		21%
	A+							28%	26%	26%
	A					20%	20%	40%		28%
	A-					17%	17%	41%	23%	38%
	BBB+					32%	32%	43%		41%
	BBB	56%			56%	34%	38%	42%		40%
	BBB-		27%	32%	29%	39%	31%	35%		34%
	Average	56%	27%	32%	35%	29%	30%	40%	25%	

Source: Bloomberg data, CEPA analysis. Average leverage is based on a simple, unweighted average.



This analysis indicates that if we were to adopt BBB/BBB+ as an appropriate range for the long-term notional credit rating, this would be consistent with leverage of 32% - 38%, based on the average of all telecommunication sector comparators with a credit rating in this range. This suggests that the notional leverage of 29% - 35% derived from applying the Commission's approach under the Part 4 IM is broadly in line with a notional long-term credit rating of BBB/BBB+. This supports maintaining the Commission's approach under the Part 4 IM, in which the average leverage of the sample was adopted as the notional leverage of the regulated service providers.

The leverage of the telecommunications comparators in our sample with a BBB/BBB+ rating is less than that of the energy networks with an equivalent rating (42% - 43%). We consider that this is appropriate, given that the profitability of the energy networks is likely to be less volatile than the fibre providers. This is also consistent with a lower asset beta for the EDBs and GPBs, relative to the fibre providers.

We note that while Chorus had a leverage ratio of 56% on average over the most recent five-year period, its credit rating is BBB (Baa2 for Moody's). There may be a range of factors influencing both the rating and the leverage value. For example, Moody's cite the influences of the support offered by NZ government through UFB funding and note that Chorus could potentially support a higher leverage ratio at the Baa2 rating, as the UFB services move to a utility-like regulatory framework with predictable and stable revenues.⁸⁷ However, we consider that there is limited evidence that leverage for Chorus should be above the 29% - 35% derived from an analysis of the comparator sample. In particular:

- Other telecommunications service providers are regulated under RAB models.
- A range of factors may influence leverage based on market capitalisation. For example, it is possible that at the current market capitalisation of Chorus is under-valued, reflecting uncertainty over how the new regulatory framework is to be applied (in particular, the valuation of the RAB). As the RAB and valuation methodology is still to be finalised, we are unable to test this theory.
- We also note the Commission's previous views that adopting a regulated service provider's actual leverage is not appropriate because:⁸⁸
 - Provided that leverage remains within prudent levels, variations in a supplier's actual gearing do not significantly alter their actual cost of capital (and should not therefore alter the regulatory cost of capital).
 - This would be inconsistent with the approach to estimating other cost of capital parameters.
 - Placing greater weight on the actual leverage of regulated companies may create perverse incentives.

3.4. CONCLUSIONS AND RECOMMENDATIONS

In line with the reasoning set out above, we consider that notional gearing of 29-35% and an associated long-term credit rating of BBB/BBB+ would be appropriate for the fibre providers.

⁸⁷ Moody's (2018a).

⁸⁸ Commerce Commission (2012), paragraph 1.1.12.



Appendix A DETAILED OVERVIEW OF COMPARATORS

Further details on the comparators are set out in the following tables.

Table A.1: Comparator set: Wholesale-only

Company	Description	Market Cap US\$b	Main country of operation	Revenue split
Fibre providers				
Chorus	Chorus Limited is a wholesale telecommunications company. The company maintains and build the Chorus local access network which is made up of local telephone exchanges, cabinets and copper and fibre cables that connect New Zealand homes and businesses throughout the country. Chorus is the largest fibre partner in the deployment of New Zealand's UFB network.	1.5	New Zealand	2018 revenue: <ul style="list-style-type: none"> 90% connections 7% field services 2% storage and site-sharing 1% other
Tower companies				
American Tower Corporation	American Tower is a leading independent owner and operator of mobile telecommunications towers. Its main source of revenue is from leasing space on towers under long term contracts from mobile carriers. The company is active in 17 markets worldwide, but derives the bulk of its profit from its activities in the USA. While it is structured as a Real Estate Investment Trust for tax reasons, its key business drivers relate to the evolution of the mobile telecommunications market.	77.6	USA	2018 revenue: <ul style="list-style-type: none"> 98% leasing towers 2% other services
Crown Castle	Crown Castle is a leading independent owner and operator of mobile telecommunications towers. Its main source of revenue is from leasing space on towers under long term contracts from mobile carriers. While it is structured as a Real Estate Investment Trust for tax reasons, its key business drivers relate to the evolution of the mobile telecommunications market.	49.3	USA	2018 revenue: <ul style="list-style-type: none"> 87% leasing towers 13% other services
INWIT	INWIT (Infrastrutture Wireless Italiane) was spun out from Telecom Italia in March 2015, and operates 11,000 radio and telecommunications towers across Italy. In February 2019, it announced that it had signed an MOU with Vodafone to discuss integration of its towers business with that of INWIT.	4.6	Italy	2017 revenue: <ul style="list-style-type: none"> 100% leasing towers



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
	Telecom Italia retains a 60% stake in the business, with the remainder listed on the Italian stock exchange.			
Rai Way	Rai Way is a listed Italian company operating TV and radio broadcasting and transmission infrastructure in Italy. Italian television company RAI owns 64.9%, with the remainder listed on the Italian stock exchange.	1.3	Italy	2017 revenue: <ul style="list-style-type: none"> 99% leasing towers, broadcasting and network services 1% other
SBAC	SBAC is a leading independent owner and operator of mobile telecommunications towers. Its main source of revenue is from leasing space on towers under long term contracts from mobile carriers. While it is structured as a Real Estate Investment Trust for tax reasons, its key business drivers relate to the evolution of the mobile telecommunications market.	20.5	USA	2017 revenue: <ul style="list-style-type: none"> 99% leasing towers 1% site development
Satellite operators				
Eutelsat	Eutelsat is a global satellite operator with over 35 geostationary satellites. Its main business is distribution broadcast video, delivered to broadcasters under long term contracts, but is also provides a number of other communications infrastructure services. Its headquarters are in France.	5.0	Global	2018 revenue: <ul style="list-style-type: none"> 66% satellite TV 34% satellite communications
SES	SES is a leading satellite operator, with a network of over 70 mainly geostationary satellites, with global coverage. Its largest business is video, under which it distributes video under long term contracts with broadcasters. It also offers other communications infrastructure services. It is headquartered in Luxembourg.	9.7	Global	2018 revenue: <ul style="list-style-type: none"> 68% TV 32% satellite communications



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Table A.2: Comparator set - Integrated communications companies (predominantly fixed-line)

Company	Description	Market Cap US\$b	Main country of operation	Revenue split
BT Group	BT provides broadband (copper and fibre), fixed-line voice, TV and mobile services to customers in the UK. The group also offers business networked IT services (e.g., LAN and wifi infrastructure, cloud and data centres, security, IT software and hardware products). The Global Services division provides business communications services outside the UK (network services, security, collaboration services, contact centres, IT services, consulting, financial-services specific offering). Through Openreach, BT provides regulated wholesale access services to other telecommunication services providers.	29.9	UK	2018 revenue: <ul style="list-style-type: none"> ▪ 81% communications ▪ 19% managed network and IT infrastructure services
CenturyLink	CenturyLink Inc. is an integrated communications company that provides local and long-distance calls, network access, private line (including special access), public access, broadband, data, managed hosting and cloud hosting, co-location, wireless and video services.	14.4	USA	2017 revenue: <ul style="list-style-type: none"> ▪ 97% communications (includes TV, data centres, equipment, business services) ▪ 3% IT and managed services
Cogent Communications Holdings	Cogent Communications Holdings, Inc. operates as a next generation optical internet service provider focused on delivering ultra-high speed internet access and transport services. The company serves businesses in the multi-tenant marketplace and service providers located in major metropolitan areas across the United States.	2.3	USA	2017 revenue: <ul style="list-style-type: none"> ▪ 100% communications
Consolidated Communications Holdings	Consolidated Communications Holdings, Inc. offers local and long-distance telephone, digital telephone, high-speed internet access, and digital television services to individuals and businesses in Illinois, Pennsylvania, and Texas. Acquired FairPoint in 2017.	0.7	USA	2018 revenue: <ul style="list-style-type: none"> ▪ 89% communications ▪ 6% TV ▪ 5% other
Frontier Communications Corporation	Frontier Communications Corporation provides communications services to residential and business customers in urban, suburban, and rural communities in the United States. The company offers a variety of communications solutions services through its fibre-optic and copper networks, including video, high-speed internet, advanced voice, and frontier secure digital protection.	0.3	USA	2018 revenue: <ul style="list-style-type: none"> ▪ 81% communications ▪ 13% TV ▪ 6% other
Go	Go PLC offers telecommunications services to businesses and individuals in Malta. The company offers fixed-line telephone, broadband internet, and digital	0.5	Malta	2017 revenue:



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
	television services to businesses; business and personal mobile services; and hosting and co-location services.			<ul style="list-style-type: none"> 89% communications (includes TV) 11% data centres
Hellenic Telecommunications Organisation	Hellenic Telecommunications Organisation S.A. (OTE S.A.) offers fixed-line and mobile telecommunication services, including voice, broadband, data, and leased lines, as well as television. OTE S.A. serves the audio-visual, communications, industrial, and residential industries, as well as public customers.	5.8	Greece	2017 revenue: <ul style="list-style-type: none"> 92% communications (includes TV) 8% other
Iliad	Iliad S.A. provides a wide range of telecommunications services which include national telecommunication and dial-up, and high-speed DSL and TV internet access.	5.9	France	2017 revenue: <ul style="list-style-type: none"> 100% communications (includes TV)
Koninklijke KPN	Koninklijke KPN N.V. provides telecommunications services throughout the Netherlands. The company provides local, long distance, international, and other mobile telecommunications services. KPN also offers voice-mail, call forwarding, ISDN internet service, and communication services for businesses and individuals.	13.1	Netherlands	2018 revenue: <ul style="list-style-type: none"> 78% communications 14% IT services and consulting 8% equipment and software
MNF Group	MNF Group Limited operates as an integrated telecommunications software and service provider. The Company specializes in internet protocol based voice services. MNF Group serves customers worldwide.	0.2	Australia	2018 revenue: <ul style="list-style-type: none"> 100% communications (including fixed line, mobile and software sales)
QSC	QSC AG offers small and mid-size enterprises a range of ICT services from telephony, data transfer, housing and hosting through to IT outsourcing and IT consulting. The company offers its services on the basis of its own Next Generation Networks (NGN) and operates an open access platform, which unites a range of broadband technologies.	0.2	Germany	2017 revenue: <ul style="list-style-type: none"> 53% communications 28% IT outsourcing 11% consulting 8% cloud
Retelit	Retelit is an Italian provider of data and infrastructure services to the telecommunications market. The company serves both domestic and international wholesale customers, as well as providing services directly to business customers. The Retelit fibre network extends beyond Italy through a pan-European ring. Retelit is also a member of AAE-I (Asia- Africa-Europe-I),	0.3	Italy	2017 revenue: <ul style="list-style-type: none"> 84% communications 16% consulting



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
	the submarine cable system connecting Europe to Asia through the Middle East.			
TalkTalk	TalkTalk Telecom Group PLC provides telecommunications services to residential and business-to-business customers in the United Kingdom. To date, the company has predominately provided services over the BT network and the Vodafone/O2 networks. More recently, TalkTalk has participated in new fibre network investment in York and has announced its intention to take a minority stake in the roll-out of an alternative FTTP network in partnership with Infracapital.	1.5	UK	2018 revenue: <ul style="list-style-type: none"> 100% communications (includes TV)
Telecom Italia	Telecom Italia S.p.A. offers fixed line and mobile telephone and data transmission services in Italy and abroad.	12.2	Italy	2017 revenue: <ul style="list-style-type: none"> 92% communications 8% equipment
TPG Telecom	TPG Telecom Limited wholesales bandwidth and other telecommunications services. The company also delivers a full range of telecommunications products and services to home and business consumers through its retail operations.	4.4	Australia	2018 revenue <ul style="list-style-type: none"> 96% communications 4% other
Vocus	Vocus Group Limited owns and operates independent voice and data networks. The company offers a range of products encompassing both voice and data to clients in the Australia and New Zealand.	1.6	Australia	2018 revenue: <ul style="list-style-type: none"> 84% communications 15% energy 1% other
Zayo	Zayo Group Holdings, Inc. provides bandwidth infrastructure in the United States, Canada and Europe. Key products include leased dark fibre, fibre to cellular towers and small cell sites, transport services over its metropolitan, regional and long-haul fibre networks, and business services. Zayo's customer base includes large and sophisticated users of bandwidth infrastructure, including: wireless service providers; telecommunications service providers; financial services companies; social networking, media, and web content companies; education, research, and healthcare institutions; and governmental agencies. Zayo report that they typically provide bandwidth infrastructure	6.0	USA	2018 revenue: <ul style="list-style-type: none"> 72% network access 18% cloud and data solutions 9% data centres 1% professional services



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
	service for fixed monthly recurring access fees under contracts that vary between one and twenty years in length.			

Table A.3: Comparator set - integrated telecommunication companies (predominantly mobile or highly diversified)

Company	Description	Market Cap US\$b	Main country of operation	Revenue split
AT&T	AT&T Inc. is a communications holding company. The company, through its subsidiaries and affiliates, provides local and long-distance phone service, wireless and data communications, internet access and messaging, IP-based and satellite television, security services, telecommunications equipment, and directory advertising and publishing.	224.6	USA	2018 revenue: <ul style="list-style-type: none"> 54% communications 22% TV 13% equipment 12% media and advertising
Cincinnati Bell	Cincinnati Bell Inc. is a local exchange and wireless provider serving residential and business customers. The company provides a range of telecommunications products and services to customers in Ohio, Kentucky, and Indiana. Acquired Hawaiian Telecom in 2018.	0.5	USA	2018 revenue: <ul style="list-style-type: none"> 47% communications 40% IT services and hardware 13% TV
Deutsche Telekom	Deutsche Telekom AG offers telecommunications services in the United States, Germany and the rest of Europe. The company offers a full range of fixed-line telephone services, mobile communications services, Internet access, and combined information technology and telecommunications services for businesses. Deutsche Telekom controls T-Mobile US.	78.8	USA and Germany	2018 revenue: <ul style="list-style-type: none"> 75% communications⁸⁹ 13% equipment 7% ICT services 5% other
DNA Oyj	DNA Oyj provides telecommunications services. The company offers voice, data, mobile communications, and cable TV services. DNA serves customers in Finland.	2.6	Finland	2018 revenue: <ul style="list-style-type: none"> 85% communications 15% equipment

⁸⁹ Includes revenue from Europe (excluding Germany), for which a breakdown by segment is unavailable. Revenue from Europe accounts for 15% of the group's total revenue.



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
Elisa Oyj	Elisa Oyj provides telecommunication solutions. The company provides local, long distance, mobile telephone, and data transmission services. Elisa also operates as a service integrator by connecting customers' telecom solutions and related IT (information technology) applications. The company sells to private individuals and businesses in Finland.	7.0	Finland	2018 revenue: <ul style="list-style-type: none"> 87% communications 13% equipment
Gamma Communications	Gamma Communications PLC supplies voice, data and mobile products and services in the United Kingdom. The company provides fixed telephony, IP telephony, hosted phone systems, broadband and data connections, mobile services, security and unified communications solutions.	1.1	UK	2017 revenue: <ul style="list-style-type: none"> 100% communications (includes cloud services)
Hutchison Telecommunications	Hutchison Telecommunications Australia Limited controls a 50% stake in Vodafone Hutchison Australia Pty Limited, which offers mobile telephone and internet services.	1.3	Australia	2017 revenue: <ul style="list-style-type: none"> 70% communications 30% equipment
KCOM Group	KCOM Group PLC provides information and communications technology (ICT) and telecommunications services to businesses regionally in the UK. The company also works with selected UK consumer markets with internet and telecommunications services.	0.5	UK	2018 revenue: <ul style="list-style-type: none"> 35% communications 65% consulting, managed services and network connectivity
Manx Telecom	Manx Telecom PLC provides communication solutions. The company offers a range of fixed line, broadband, mobile and data centre services to businesses and consumers.	0.3	Isle of Man	2017 revenue: <ul style="list-style-type: none"> 86% communications 6% data centres 8% other
Masmovil Ibercom	Masmovil Ibercom SA provides telecommunications services. The company offers fixed line, mobile, and internet services. Masmovil Ibercom serves residential customers, businesses, and operators in Spain.	2.5	Spain	2018 revenue: <ul style="list-style-type: none"> 82% communications 18% equipment and wholesale
Orange	Orange SA provides telecommunications services to residential, professional, and large business customers. The company offers public fixed-line telephone, leased lines and data transmission, mobile telecommunications, cable television, internet and wireless applications, and broadcasting services, as well as telecommunications equipment sales and rentals.	41.1	France	2018 revenue: <ul style="list-style-type: none"> 84% communications (includes TV) 8% equipment 6% IT and integration



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
				<ul style="list-style-type: none"> 2% other
Orange Belgium	Orange Belgium offers mobile telephone services in Belgium through a GSM network, as well as fixed-line services for international calls.	1.3	Belgium	2017 revenue: <ul style="list-style-type: none"> 89% communications 9% equipment 2% other
Proximus (formerly Belgacom)	Proximus SA provides communication services and products to residential, business and corporate customers both in Belgium and internationally. The Group offers fixed-line voice and internet and mobile services.	8.9	Belgium	2017 revenue: <ul style="list-style-type: none"> 76% communications 10% ICT 7% TV 4% hardware 2% other
Shenandoah Telecommunications Company	Shenandoah Telecommunications Company provides telecommunications services through its subsidiaries. The company offers integrated, full service telecommunications products and services in the Northern Shenandoah Valley and surrounding areas.	2.5	USA	2018 revenue: <ul style="list-style-type: none"> 82% communications (includes TV) 11% equipment 7% other
Siminn HF	Siminn HF is a telecom company providing telecommunication and information technology services. The company handles a variety of services including regular telephone and mobile phone services and internet connections and multimedia through broadband.	0.3	Iceland	2018Q1 revenue: <ul style="list-style-type: none"> 63% communications 17% TV 10% IT services 6% equipment 4% other
Sonaecom	Sonaecom, SGPS, S.A. through its 50% stake in ZOPT, controls a majority interest in Portuguese communications company NOS. NOS offers mobile and fixed-line telephone, internet access services, and television, as well as operating cinemas. Sonaecom also owns a portfolio of technology businesses and media assets.	0.9	Portugal	2017 NOS revenue: <ul style="list-style-type: none"> 88% communications 5% audiovisuals 4% cinema 3% equipment



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
Spark	Spark New Zealand Limited (formerly Telecom Corporation of New Zealand Limited) is a digital services provider for communications, entertainment and IT services over its networks and the Cloud to New Zealanders and businesses.	4.7	New Zealand	2018 revenue: <ul style="list-style-type: none"> 70% communications 10% cloud, security and service management 10% hardware, software and IT services 5% managed data and networks 5% other
Sprint Corporation	Sprint Corporation offers a comprehensive range of wireless communications products and services to consumers, businesses, government subscribers, and resellers.	26.4	USA	2018 revenue: <ul style="list-style-type: none"> 74% communications 26% equipment
Sunrise	Sunrise is an integrated communications provider. The company provides mobile voice and data, landline voice, landline internet and IPTV services to residential customers, business customers and other carriers across Switzerland.	3.7	Switzerland	2018 revenue: <ul style="list-style-type: none"> 70% communications 15% internet and TV 15% equipment
Swisscom	Swisscom AG operates public telecommunications networks and offers network application services. The company provides local, long-distance, and mobile telephone, as well as integrated voice and data digital services. Swisscom also provides network solutions to national and international telecommunications operators.	23.7	Switzerland	2018 revenue: <ul style="list-style-type: none"> 79% communications (including TV) 9% consulting 6% hardware 6% other
TDC	TDC A/S provides telecommunications solutions. The company offers fixed and mobile telephone service, data communications, systems integration, website hosting, broadband internet access, and cable television services. TDC serves customers and clients in Denmark and throughout Europe.	6.2	Denmark	2018 revenue: <ul style="list-style-type: none"> 62% communications 23% TV 14% other services
Tele2	Tele2 AB offers mobile services, fixed broadband and telephony, data networking, and content services. Tele2 serves customers in Sweden and throughout Europe.	8.9	Sweden	2017 revenue: <ul style="list-style-type: none"> 71% communications 20% equipment



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
				<ul style="list-style-type: none"> 9% wholesale and business solutions
Telefonica	Telefonica S.A. provides telecommunications services mainly in Europe and Latin America. The company offers fixed-line and mobile telephone, Internet, and data transmission services to residential and corporate customers.	45.7	Global	2018 revenue: <ul style="list-style-type: none"> 88% communications 9% equipment 3% other
Telefonica Deutschland Holdings	Telefonica Deutschland Holding AG provides telecommunications services in Germany. The company offers fixed-line and mobile telephone, internet, and data transmission services to residential and corporate customers.	10.1	Germany	2017 revenue: <ul style="list-style-type: none"> 85% communications 15% equipment
Telekom Austria	Telekom Austria AG offers telecommunications services in Central and Eastern Europe to residential and corporate customers. The company provides products and services in the areas of voice telephony, broadband internet, multimedia services, data and IT solutions, wholesale and digital services.	5.0	Austria	2017 revenue: <ul style="list-style-type: none"> 89% communications (includes TV) 11% equipment
Telenor	Telenor ASA is an international provider of telecommunication, data and media services, with mobile operations in 13 markets across the Nordic region, Central and Eastern Europe and Asia.	28.4	Global	2017 revenue: <ul style="list-style-type: none"> 76% communications (including TV) 16% wholesale and broadcasting 8% equipment
Telephone and Data Systems	Telephone and Data Systems, Inc. is a diversified telecommunications company. The company, and its subsidiary US Cellular, operate primarily in the mobile, local telephone, and personal communications services markets. Telephone and Data Systems provides telecommunications services throughout the United States.	4.2	USA	2018 revenue: <ul style="list-style-type: none"> 72% communications 20% equipment 5% cable 3% other
Telia Company	Telia Company AB offers telecommunication services. The company offers mobile communications services as well as operates fixed networks in Sweden and throughout Eurasia.	18.7	Sweden	2017 net sales: <ul style="list-style-type: none"> 65% communications 15% equipment 7% business solutions



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
				<ul style="list-style-type: none"> ▪ 4% TV ▪ 9% other
Telstra	Telstra Corporation Limited is a full service domestic and international telecommunications provider for Australia. The company provides telephone exchange lines to homes and businesses, supplying local, long distance and international telephone calls and supplying mobile telecommunications services. Telstra also provides data, internet, on-line services and directory services.	27.1	Australia	2018 product sales revenue: <ul style="list-style-type: none"> ▪ 72% communications ▪ 14% network applications and services ▪ 6% international connectivity ▪ 4% media ▪ 4% other
T-Mobile US	T-Mobile US, Inc. operates as a nationwide wireless carrier in the US. The company was created as the combination of T-Mobile USA and MetroPCS and is controlled by Deutsche Telekom.	62.4	USA	2018 revenue: <ul style="list-style-type: none"> ▪ 74% communications ▪ 23% equipment ▪ 3% other
Trilogy International Partners	Trilogy International Partners Inc. provides wireless communication services. The company offers voice, wireless broadband, and other communication services. Trilogy International Partners serves customers in New Zealand and Bolivia, through its subsidiaries 2degrees and NuevaTel.	0.2	New Zealand	2017 revenue: <ul style="list-style-type: none"> ▪ 75% communications ▪ 23% equipment ▪ 2% other
US Cellular Corporation	United States Cellular Corporation provides wireless telecommunications services to customers throughout the United States. The company offers its customers various national plans with voice, messaging, and data usage options, along with an array of smartphones, tablets, and other wireless devices. The company is controlled by Telephone and Data Systems.	4.8	USA	2018 revenue <ul style="list-style-type: none"> ▪ 72% communications ▪ 22% equipment ▪ 5% other
Verizon Communications	Verizon Communications Inc. is an integrated telecommunications company that provides wireline voice and data services, wireless services and internet services to consumers, businesses and governmental agencies.	232.0	USA	2018 revenue: <ul style="list-style-type: none"> ▪ 66% communications ▪ 18% equipment ▪ 10% TV ▪ 6% other



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Company	Description	Market Cap US\$b	Main country of operation	Revenue split
Vodafone	Vodafone Group PLC is a mobile telecommunications company providing a range of services, including voice and data communications. The Company operates in Continental Europe, the United Kingdom, Asia Pacific, Africa, and the Middle East through its subsidiaries, associates, and investments.	49.2	Europe and UK	2018 revenue: <ul style="list-style-type: none">▪ 88% communications and other services (including fixed, mobile, TV, payment services, IoT, cloud)▪ 12% from equipment sales and connection fees



Appendix B BETA ESTIMATES, LEVERAGE AND CREDIT RATING, BY COMPARATOR

Table B.1: Five-year asset beta (2014-2019) - Local market indices⁹⁰

Company	Four-weekly results	Standard error	Weekly results	Standard error	Daily results	Standard error
Chorus	0.49	0.15	0.41	0.08	0.37	0.03
American Tower Corporation	0.41	0.13	0.45	0.06	0.48	0.03
Crown Castle	0.25	0.12	0.38	0.06	0.40	0.02
INWIT						
Rai Way						
SBAC	0.40	0.13	0.51	0.06	0.51	0.03
Tower Companies - Average	0.35	0.12	0.45	0.06	0.46	0.03
Eutelsat	0.35	0.14	0.33	0.06	0.32	0.03
SES	0.37	0.18	0.38	0.08	0.40	0.03
Satellite Operators - Average	0.36	0.16	0.35	0.07	0.36	0.03
Wholesale-only Providers - Average	0.38	0.14	0.41	0.07	0.41	0.03
AT&T	0.33	0.11	0.41	0.05	0.41	0.02
BT Group	0.38	0.17	0.52	0.08	0.65	0.03
CenturyLink	0.40	0.14	0.45	0.06	0.41	0.03
Cincinnati Bell	0.53	0.13	0.51	0.06	0.42	0.03
Cogent Communications Holdings	0.77	0.20	0.77	0.10	0.70	0.04
Consolidated Communications Holdings	0.38	0.13	0.44	0.06	0.40	0.03
DNA Oyj						
Deutsche Telekom	0.50	0.07	0.49	0.03	0.45	0.01
Elisa Oyj	0.40	0.13	0.58	0.06	0.65	0.03
Frontier Communications Corporation	0.32	0.13	0.40	0.06	0.29	0.03
Gamma						
Go	0.63	0.22	0.57	0.11	0.72	0.07
Hellenic Telecommunications Organisation	0.58	0.06	0.65	0.04	0.70	0.02
Hutchison Telecommunications	0.36	0.86	0.06	0.34	0.15	0.19
Iliad	0.38	0.21	0.57	0.10	0.64	0.04
KCOM Group	0.05	0.25	0.33	0.11	0.30	0.05
Koninklijke KPN	0.43	0.10	0.47	0.05	0.53	0.02
Manx Telecom	0.28	0.12	0.20	0.06	0.19	0.03

⁹⁰ Blank values indicate that the comparator was not traded over the full period.



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Company	Four-weekly results	Standard error	Weekly results	Standard error	Daily results	Standard error
Masmovil Ibercom	0.48	0.30	0.31	0.10	0.23	0.04
MNF Group	0.50	0.36	0.59	0.18	0.40	0.08
Orange	0.43	0.09	0.50	0.04	0.55	0.02
Orange Belgium	0.31	0.18	0.43	0.08	0.41	0.03
Proximus	0.46	0.13	0.58	0.06	0.61	0.03
QSC	0.63	0.21	0.66	0.09	0.54	0.05
Retelit	1.05	0.22	0.88	0.10	0.63	0.04
Shenandoah Telecommunications Company	0.44	0.31	0.68	0.13	0.77	0.05
Siminn	0.23	0.11	0.38	0.05	0.46	0.02
Sonaecom	0.54	0.17	0.49	0.09	0.37	0.05
Spark	0.73	0.20	0.93	0.12	1.06	0.06
Sprint Corporation	0.30	0.22	0.49	0.10	0.54	0.04
Sunrise						
Swisscom	0.44	0.10	0.45	0.04	0.50	0.02
TalkTalk	0.49	0.26	0.53	0.11	0.50	0.05
TDC	0.31	0.14	0.29	0.06	0.25	0.03
Telefonica	0.51	0.06	0.51	0.02	0.52	0.01
Tele2	0.54	0.15	0.60	0.07	0.67	0.03
Telecom Italia	0.41	0.05	0.36	0.03	0.37	0.01
Telefonica Deutschland Holdings	0.58	0.15	0.62	0.07	0.56	0.03
Telekom Austria	0.32	0.08	0.24	0.04	0.24	0.02
Telephone and Data Systems	0.68	0.18	0.75	0.09	0.66	0.04
Telia Company	0.40	0.10	0.49	0.05	0.57	0.02
Telenor	0.49	0.12	0.62	0.05	0.64	0.02
Telstra	0.56	0.15	0.49	0.07	0.53	0.03
T-Mobile US	0.35	0.14	0.52	0.07	0.56	0.03
TPG Telecom	0.58	0.36	0.65	0.15	0.72	0.06
Trilogy International Partners						
US Cellular Corporation	0.63	0.24	0.72	0.11	0.63	0.05
Verizon Communications	0.27	0.12	0.36	0.05	0.38	0.02
Vocus	0.32	0.38	0.66	0.17	0.70	0.07
Vodafone	0.64	0.13	0.67	0.05	0.68	0.02
Zayo Group Holdings						
Integrated Providers - Average	0.46	0.18	0.52	0.08	0.52	0.04



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Table B.2: Five-year asset beta (2009-2014) - Local market indices

Company	Four-weekly results	Standard error	Weekly results	Standard error	Daily results	Standard error
Chorus						
American Tower Corporation	0.41	0.10	0.56	0.05	0.66	0.02
Crown Castle	0.60	0.11	0.64	0.05	0.64	0.02
INWIT						
Rai Way						
SBAC	0.47	0.09	0.53	0.04	0.57	0.02
Tower Companies - Average	0.49	0.10	0.58	0.05	0.62	0.02
Eutelsat	0.25	0.08	0.30	0.04	0.26	0.02
SES	0.19	0.06	0.22	0.03	0.22	0.02
Satellite Operators - Average	0.22	0.07	0.26	0.03	0.24	0.02
Wholesale-only Providers - Average	0.38	0.09	0.45	0.04	0.47	0.02
AT&T	0.38	0.08	0.43	0.03	0.46	0.01
BT Group	0.51	0.10	0.53	0.05	0.57	0.02
CenturyLink	0.38	0.08	0.36	0.04	0.36	0.02
Cincinnati Bell	0.30	0.06	0.29	0.03	0.26	0.01
Cogent Communications Holdings	0.88	0.21	1.04	0.11	1.05	0.04
Consolidated Communications Holdings	0.40	0.07	0.28	0.03	0.32	0.01
DNA Oyj						
Deutsche Telekom	0.24	0.06	0.26	0.03	0.29	0.01
Elisa Oyj	0.36	0.08	0.38	0.04	0.39	0.02
Frontier Communications Corporation	0.33	0.08	0.35	0.04	0.31	0.02
Gamma						
Go	0.82	0.21	0.27	0.10	0.32	0.09
Hellenic Telecommunications Organisation	0.42	0.06	0.40	0.03	0.35	0.01
Hutchison Telecommunications	0.68	0.41	0.47	0.20	0.30	0.12
Iliad	0.39	0.11	0.37	0.05	0.34	0.02
KCOM Group	0.45	0.18	0.38	0.08	0.30	0.04
Koninklijke KPN	0.20	0.11	0.25	0.05	0.24	0.02
Manx Telecom						
Masmovil Ibercom						
MNF Group	0.62	0.46	0.49	0.24	0.67	0.18
Orange	0.34	0.06	0.35	0.03	0.37	0.01
Orange Belgium	0.36	0.16	0.44	0.07	0.43	0.03
Proximus	0.42	0.10	0.40	0.05	0.40	0.02



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Company	Four-weekly results	Standard error	Weekly results	Standard error	Daily results	Standard error
QSC	1.15	0.26	0.86	0.11	0.79	0.05
Retelit	0.87	0.20	0.65	0.11	0.53	0.05
Shenandoah Telecommunications Company	0.86	0.23	0.93	0.10	1.35	0.05
Siminn						
Sonaecom	0.69	0.12	0.66	0.06	0.61	0.03
Spark	0.77	0.17	1.04	0.09	1.28	0.05
Sprint Corporation						
Sunrise						
Swisscom	0.32	0.07	0.33	0.03	0.32	0.02
TalkTalk						
TDC						
Telefonica	0.46	0.04	0.46	0.02	0.48	0.01
Tele2	0.63	0.15	0.58	0.07	0.63	0.03
Telecom Italia	0.25	0.04	0.28	0.02	0.29	0.01
Telefonica Deutschland Holdings						
Telekom Austria	0.27	0.07	0.31	0.03	0.34	0.02
Telephone and Data Systems	0.92	0.16	0.92	0.07	0.91	0.03
Telia Company	0.42	0.08	0.50	0.04	0.55	0.02
Telenor	0.74	0.09	0.62	0.04	0.66	0.02
Telstra	0.22	0.11	0.29	0.05	0.32	0.02
T-Mobile US	0.60	0.23	0.68	0.10	0.72	0.04
TPG Telecom	2.23	0.41	1.08	0.17	0.67	0.07
Trilogy International Partners						
US Cellular Corporation	0.82	0.17	0.88	0.08	0.88	0.03
Verizon Communications	0.37	0.09	0.35	0.04	0.40	0.02
Vocus	0.16	0.32	0.24	0.13	0.51	0.07
Vodafone	0.42	0.09	0.41	0.05	0.49	0.02
Zayo Group Holdings						
Integrated Providers - Average	0.55	0.15	0.51	0.07	0.52	0.03



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Table B.3: Two-year asset beta (2017-2019) - Local market indices

Company	Weekly results	Standard error	Daily results	Standard error
Chorus	0.29	0.11	0.34	0.05
American Tower Corporation	0.26	0.09	0.30	0.04
Crown Castle	0.32	0.09	0.30	0.04
INWIT	0.57	0.14	0.49	0.07
Rai Way	0.65	0.17	0.57	0.08
SBAC	0.34	0.09	0.31	0.04
Tower Companies - Average	0.43	0.12	0.40	0.05
Eutelsat	0.24	0.14	0.27	0.07
SES	0.26	0.20	0.30	0.09
Satellite Operators - Average	0.25	0.17	0.29	0.08
Wholesale-only Providers - Average	0.37	0.13	0.36	0.06
AT&T	0.45	0.09	0.42	0.04
BT Group	0.27	0.14	0.46	0.06
CenturyLink	0.37	0.09	0.37	0.04
Cincinnati Bell	0.55	0.13	0.39	0.06
Cogent Communications Holdings	0.71	0.14	0.67	0.07
Consolidated Communications Holdings	0.42	0.09	0.36	0.04
DNA Oyj	0.44	0.18	0.58	0.08
Deutsche Telekom	0.30	0.06	0.30	0.03
Elisa Oyj	0.39	0.13	0.56	0.06
Frontier Communications Corporation	0.13	0.03	0.08	0.01
Gamma	0.50	0.27	0.35	0.12
Go	0.53	0.16	0.67	0.11
Hellenic Telecommunications Organisation	0.77	0.08	0.71	0.04



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Company	Weekly results	Standard error	Daily results	Standard error
Hutchison Telecommunications	-0.05	0.92	0.13	0.50
Iliad	0.51	0.21	0.61	0.09
KCOM Group	0.30	0.27	0.35	0.12
Koninklijke KPN	0.44	0.09	0.48	0.04
Manx Telecom	0.37	0.13	0.19	0.05
Masmovil Ibercom	0.31	0.20	0.52	0.09
MNF Group	0.54	0.34	0.11	0.15
Orange	0.35	0.06	0.39	0.03
Orange Belgium	0.24	0.14	0.38	0.07
Proximus	0.32	0.11	0.55	0.06
QSC	0.59	0.17	0.43	0.09
Retelit	1.28	0.20	0.94	0.09
Shenandoah Telecommunications Company	0.51	0.18	0.62	0.07
Siminn	0.58	0.08	0.56	0.04
Sonaecom	0.25	0.16	0.15	0.12
Spark	0.68	0.15	0.83	0.08
Sprint Corporation	0.30	0.10	0.46	0.05
Sunrise	0.33	0.11	0.43	0.05
Swisscom	0.41	0.08	0.54	0.03
TalkTalk	0.27	0.22	0.38	0.10
TDC	0.02	0.13	0.08	0.05
Telefonica	0.47	0.04	0.47	0.02
Tele2	0.52	0.13	0.63	0.06
Telecom Italia	0.40	0.06	0.33	0.02
Telefonica Deutschland Holdings	0.35	0.14	0.42	0.06
Telekom Austria	0.30	0.08	0.28	0.04
Telephone and Data Systems	0.55	0.15	0.53	0.07
Telia Company	0.38	0.09	0.45	0.04
Telenor	0.41	0.11	0.54	0.05
Telstra	0.40	0.17	0.45	0.07
T-Mobile US	0.51	0.09	0.56	0.04



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Company	Weekly results	Standard error	Daily results	Standard error
TPG Telecom	0.76	0.28	0.69	0.13
Trilogy International Partners	0.45	0.18	0.25	0.08
US Cellular Corporation	0.45	0.20	0.54	0.09
Verizon Communications	0.26	0.09	0.31	0.04
Vocus	0.73	0.33	0.86	0.13
Vodafone	0.64	0.11	0.68	0.05
Zayo Group Holdings	0.52	0.12	0.46	0.06
Integrated Providers - Average	0.44	0.16	0.46	0.07



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Table B.4: Reference indices

Company	Local market indices	Regional market indices
Chorus	NZSE Index	NZSE Index
American Tower Corporation	SPX Index	SPX Index
Crown Castle	SPX Index	SPX Index
INWIT	FTSEMIB Index	SXXP Index
Rai Way	FTSEMIB Index	SXXP Index
SBAC	SPX Index	SPX Index
Eutelsat	CAC Index	SXXP Index
SES	CAC Index	SXXP Index
AT&T	SPX Index	SPX Index
BT Group	UKX Index	ASX Index
CenturyLink	SPX Index	SPX Index
Cincinnati Bell	SPX Index	SPX Index
Cogent Communications Holdings	SPX Index	SPX Index
Consolidated Communications Holdings	SPX Index	SPX Index
DNA Oyj	HEXP Index	SXXP Index
Deutsche Telekom	DAX Index	SXXP Index
Elisa Oyj	HEXP Index	SXXP Index
Frontier Communications Corporation	SPX Index	SPX Index
Gamma	UKX Index	ASX Index
Go	MALTEX Index	SXXP Index
Hellenic Telecommunications Organisation	FTASE Index	SXXP Index
Hutchison Telecommunications	AS5I Index	AS30 Index
Iliad	CAC Index	SXXP Index
KCOM Group	UKX Index	ASX Index
Koninklijke KPN	AEX Index	SXXP Index
Manx Telecom	UKX Index	ASX Index
Masmovil Ibercom	IBEX Index	SXXP Index
MNF Group	AS5I Index	AS30 Index
Orange	CAC Index	SXXP Index
Orange Belgium	BEL20 Index	SXXP Index
Proximus	BEL20 Index	SXXP Index
QSC	DAX Index	SXXP Index
Retelit	FTSEMIB Index	SXXP Index



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Company	Local market indices	Regional market indices
Shenandoah Telecommunications Company	SPX Index	SPX Index
Siminn	OMX18ISK Index	SXXP Index
Sonaecom	PSI20 Index	SXXP Index
Spark	NZSE Index	NZSE Index
Sprint Corporation	SPX Index	SPX Index
Sunrise	SMI Index	SXXP Index
Swisscom	SMI Index	SXXP Index
TalkTalk	UKX Index	ASX Index
TDC	UKX Index	SXXP Index
Telefonica	IBEX Index	SXXP Index
Tele2	OMX Index	SXXP Index
Telecom Italia	FTSEMIB Index	SXXP Index
Telefonica Deutschland Holdings	DAX Index	SXXP Index
Telekom Austria	ATX Index	SXXP Index
Telephone and Data Systems	SPX Index	SPX Index
Telia Company	OMX Index	SXXP Index
Telenor	OBX Index	SXXP Index
Telstra	AS51 Index	AS30 Index
T-Mobile US	SPX Index	SPX Index
TPG Telecom	AS51 Index	AS30 Index
Trilogy International Partners	SPTSX Index	SPTSX Index
US Cellular Corporation	SPX Index	SPX Index
Verizon Communications	SPX Index	SPX Index
Vocus	AS51 Index	AS30 Index
Vodafone	UKX Index	ASX Index
Zayo Group Holdings	SPX Index	SPX Index



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Table B.5: Average leverage – 2014-2019, 2009-2014 and 2017-2019

Company	2014-2019	2009-2014	2017-2019
Chorus	56%		50%
American Tower Corporation	27%	21%	24%
Crown Castle	28%	32%	25%
INWIT			1%
Rai Way			1%
SBAC	36%	39%	34%
Tower Companies - Average	30%	30%	17%
Eutelsat	39%	31%	40%
SES	24%	32%	28%
Satellite Operators - Average	32%	32%	34%
Wholesale-only Providers - Average	35%	31%	26%
AT&T	34%	28%	36%
BT Group	23%	43%	30%
CenturyLink	58%	45%	65%
Cincinnati Bell	67%	77%	65%
Cogent Communications Holdings	18%	18%	18%
Consolidated Communications Holdings	60%	63%	67%
DNA Oyj			16%
Deutsche Telekom	42%	51%	43%
Elisa Oyj	18%	25%	16%
Frontier Communications Corporation	77%	61%	94%
Gamma			0%
Go	15%	27%	15%
Hellenic Telecommunications Organisation	16%	55%	12%
Hutchison Telecommunications	0%	5%	0%
Iliad	14%	14%	20%
KCOM Group	12%	28%	12%
Koninklijke KPN	39%	48%	37%
Manx Telecom	21%		22%
Masmovil Ibercom	30%		30%
MNF Group	0%	0%	0%
Orange	42%	49%	38%
Orange Belgium	28%	16%	23%
Proximus	18%	18%	20%



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Company	2014-2019	2009-2014	2017-2019
QSC	26%	3%	28%
Retelit	0%	0%	0%
Shenandoah Telecommunications Company	24%	22%	31%
Siminn	31%		27%
Sonaecom	0%	28%	0%
Spark	12%	25%	14%
Sprint Corporation	57%		55%
Sunrise			26%
Swisscom	24%	31%	25%
TalkTalk	25%		34%
TDC	43%		41%
Telefonica	51%	45%	54%
Tele2	20%	14%	21%
Telecom Italia	63%	66%	64%
Telefonica Deutschland Holdings	8%		12%
Telekom Austria	41%	47%	35%
Telephone and Data Systems	32%	20%	34%
Telia Company	28%	22%	29%
Telenor	19%	16%	17%
Telstra	21%	23%	28%
T-Mobile US	39%	42%	36%
TPG Telecom	11%	12%	18%
Trilogy International Partners			64%
US Cellular Corporation	21%	11%	24%
Verizon Communications	34%	32%	35%
Vocus	21%	24%	35%
Vodafone	31%	27%	33%
Zayo Group Holdings			40%
Integrated Providers - Average	29%	30%	30%



Table B.6: Long-term S&P credit ratings (current) - Comparator group⁹¹

Company	Rating
Chorus	BBB
American Tower Corporation	BBB-
Crown Castle	BBB-
INWIT	
Rai Way	
SBAC	BB
Eutelsat	BBB-
SES	BBB-
AT&T	BBB
BT Group	BBB
CenturyLink	BB
Cincinnati Bell	B
Cogent Communications Holdings	B+
Consolidated Communications Holdings	B
DNA Oyj	
Deutsche Telekom	BBB+
Elisa Oyj	BBB+
Frontier Communications Corporation	CCC+
Gamma	
Go	
Hellenic Telecommunications Organisation	BB+
Hutchison Telecommunications	
Iliad	
KCOM Group	
Koninklijke KPN	BBB-
Manx Telecom	
Masmovil Ibercom	
MNF Group	
Orange	BBB+
Orange Belgium	
Proximus	A
QSC	

⁹¹ Blank values indicate that no rating was available.



Company	Rating
Retelit	
Shenandoah Telecommunications Company	
Siminn	
Sonaecom	
Spark	A-
Sprint Corporation	B
Sunrise	
Swisscom	A
TalkTalk	BB-
TDC	B+
Telefonica	BBB
Tele2	BBB
Telecom Italia	BB+
Telefonica Deutschland Holdings	
Telekom Austria	BBB
Telephone and Data Systems	BB
Telia Company	BBB+
Telenor	A
Telstra	A-
T-Mobile US	BB+
TPG Telecom	
Trilogy International Partners	
US Cellular Corporation	BB
Verizon Communications	BBB+
Vocus	
Vodafone	BBB+
Zayo Group Holdings	



Appendix C INTERNATIONAL REGULATORY PRECEDENT

C.1. OFCOM

Since 2005, as an input to its price reviews for BT's regulated services, Ofcom has estimated individual betas for different parts of BT's business. Ofcom initially applied a two-way disaggregation, but since 2015 has estimated three separate asset betas for (i) the regulated services provided by Openreach over the copper asset network, (ii) other BT telecoms services provided in the UK (including wholesale and retail leased lines, mobile, fixed voice, fibre broadband) and (iii) the rest of BT (including BT's Global Services division, which offers business ICT services among other activities).

In the 2017 wholesale local access (WLA) review, Ofcom stated that *"fibre access services ... were likely to face higher systematic risks than copper access services but were likely to share similar risk characteristics to other telecoms usage services."*⁹² Ofcom cited data from BT, indicating that fibre demand was more variable and harder to predict. However, Ofcom also noted that this could also be due to fibre being in a growth phase, observing that variability appeared to have reduced over time.

Ofcom also observed that demand for fibre access services was likely to stabilise with increasing uptake. Consumer research conducted by Ofcom also indicated that *"there is less propensity for consumers to downgrade than to upgrade in terms of the headline speed of their fixed line broadband package"*,⁹³ suggesting that once fibre services are adopted, demand could be relatively 'sticky'.

On this basis, Ofcom proposed to apply the asset beta for Other UK telecoms to fibre access services. Ofcom noted that BT's fibre access services might differ from its other UK activities, however, it found that there was insufficient information to support a more detailed disaggregation (including a lack of pure play fibre providers). This approach resulted in asset betas of 0.59 for Openreach copper access services, 0.73 for other BT UK telecoms services (including fibre access) and 1.25 for the rest of BT.

C.2. OTHER EU PRECEDENT

In 2010, the European Commission (EC) recommended that the access pricing decisions of the National Regulatory Authorities (NRAs) should take into account the additional risk of investment in next generation access networks (NGA) compared to legacy copper networks. The EC suggested that uncertainty around the following factors could be considered in estimating a premium for the cost of capital of an NGA network:

- (i) retail and wholesale demand;
- (ii) the costs of deployment;
- (iii) uncertainty relating to technological progress;
- (iv) market dynamics and the evolving competitive situation; and
- (v) macroeconomic uncertainty.

The EC also indicated the existence of economies of scale (especially if the investment is undertaken in urban areas only), high retail market shares, control of essential infrastructures, opex savings, proceeds

⁹² Ofcom (2018a), paragraph A20.218.

⁹³ Ibid., paragraph A20.230.



from the sale of real estate as well as privileged access to equity and debt markets as factors that are likely to mitigate the risk of NGA investment.⁹⁴

The EC’s 2010 recommendation proposed including an NGA risk premium based on a combination of systematic and non-systematic risks. In a 2016 report for the Commission on a harmonised approach across the NRAs, the Brattle Group argued in favour of introducing an NGA risk premium specifically linked to systematic risk, based on:⁹⁵

- **Higher capital leverage.** The construction phase of deploying an NGA network involves large capital investment commitments. The presence of these high fixed costs results in greater volatility of net cash flows in the event of an economic shock, increasing the correlation between the value of the network and economic conditions. Brattle suggest that the degree of capital leverage will vary depending on how much flexibility the network operator has to adapt their capital investment to changes in demand. They also propose that capital leverage may vary with the location of the network. For example, capital leverage might be greater for networks deployed in rural areas for which the cost per household passed is higher, relatively to a denser urban network.
- **Long-lived investments:** The value of new NGA networks is based on cashflows that extend further into the future, relative to an existing legacy network with a shorter remaining useful life. Brattle propose that “[t]his means that the value of the investment will vary more strongly with macroeconomic conditions, as the investment will be affected by uncertain macroeconomic risks over a longer period of time, in a manner analogous to a long-term bond.”⁹⁶
- **Income elasticity of demand:** Brattle suggest that demand for the faster ‘premium’ services offered by an NGA network is more sensitive to changes in income, relative to legacy network services. They expect that in the event of an economic downturn, rates of switching from legacy services to the NGA network would fall as end-users seek to reduce their expenditure.

The EC’s 2010 recommendation has been applied by the NRAs in a number of access decisions for NGA network operators found to have significant market power (SMP). As set out in the table below, a number of these decisions resulted in a higher WACC for the NGA network, relative to the legacy network.⁹⁷ Our understanding is the uplifts noted below were not applied directly to the asset beta.

Table C.1: EU - NGA WACC premia

Decision	Overview
ACM (Netherlands) ⁹⁸	In 2015, the Dutch national regulatory authority ACM applied a 2% uplift to the WACC to account for systematic risks faced by FTTH investments, that were not captured through the estimated beta due to a lack of fibre-specific comparators. The uplift included:

⁹⁴ European Commission (2010).

⁹⁵ Brattle (2016).

⁹⁶ Ibid., page 12.

⁹⁷ Not all NRAs have reflected non-systematic risks through adjustments to the WACC. For example, Belgium initially applied an uplift on certain costs of providing FTTC services. See WIK Consult (2016).

⁹⁸ Brattle (2015), WIK Consult (2016).



Decision	Overview
	<ul style="list-style-type: none"> ▪ A 1% adjustment to account for higher operating leverage relative to the comparator sample, given the high levels of investment required relative to a mature copper network. ▪ A 1% adjustment to reflect additional systematic demand uncertainty. This was estimated through a discounted cash flow model of an FTTH investment, which assessed the difference in investment's IRR resulting from an economic shock that delayed take-up reaching the forecast long-term level by three years. The delayed demand scenario was assigned a 50% probability of occurrence.
AGCOM (Italy) ⁹⁹	In 2015, AGCOM (the Italian communications authority) applied a risk premium of 3.2% to the WACC for FTTH and 1.2% for FTTC for the 2015-2017 period. The premium was intended to compensate NGA investments due to additional uncertainty in relation to demand, future market dynamics and sunk costs, with AGCOM noting that these risks would not be captured through the beta. AGCOM used a real options theory approach to estimate the risk premium. A consultation on the new access undertaking for NGA in Italy is ongoing.
AKOS (Slovenia) ¹⁰⁰	In 2017, AKOS set a WACC of 9.02% for legacy networks and 11.52% for NGA networks. This included the small company premium noted in Section 2.3.5. At this stage, we have not been able to access the details on how the NGA premium was established.
Czech Telecommunications Office ¹⁰¹	In 2016, the Czech Telecommunications Office applied two risk premia to the WACC for NGA networks. This includes a systematic risk premium of 2.38% and a further 2% premium to account for non-systematic risk factors. At this stage, we have not been able to access the details on how the NGA premium was established.
CNMC (Spain) ¹⁰²	In 2013, the CNMC applied a mark up to the WACC for a FTTH bitstream wholesale product. The premium was based on a discounted cash flow model that assessed the difference in the IRR of an FTTH network investment and an alternative ADSL broadband service. This resulted in a 4.81% uplift to the WACC for FTTH services.
DBA (Denmark) ¹⁰³	In 2017, the DBA notified the European Commission of its updated pricing model for the fixed network, including the 7.04% WACC set for NGA (relative to 5.04% for legacy network assets).
ILR (Luxembourg) ¹⁰⁴	In 2014, the ILR set an NGA risk premium of 2.5%, applied to the (real, pre-tax) WACC for fixed network activities. It is unclear on what basis the premium was estimated, although the ILR refers to other EU precedent in justifying the magnitude. In reassessing this decision in 2016, the ILR noted that while demand for higher speed services was picking up, it was still marginal relative to overall broadband demand. The ILR concluded that applying the premium remained appropriate.

Note: WACC and premia values are in nominal, pre-tax terms unless otherwise stated.

The main factors contributing to the WACC premiums noted above appear to have been demand uncertainty (which may have both systematic and unsystematic elements) and competitive market dynamics (which we would not consider systematic in nature). Based on the publicly available documentation, it

⁹⁹ AGCOM (2018), page 7 and Brattle (2016).

¹⁰⁰ BEREC (2018a)

¹⁰¹ European Commission (2018), page 7.

¹⁰² Brattle (2016), WIK Consult (2016).

¹⁰³ European Commission (2017b).

¹⁰⁴ ILR (2016)



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appears that the case for an uplift to the beta for NGA networks is largely based on an intuitive assumption that demand for NGA services will be more subject to systematic variances than is the case for services offered over legacy networks. We have not identified specific evidence applied in these decisions to demonstrate that this is indeed the case, nor whether this would be applicable in the New Zealand context.



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