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## Introduction

The Commerce Commission has asked for submissions on the Fibre Regulation Emerging Views paper from interested parties. As an independent fund manager with investments in New Zealand media, telecommunications and retail companies and as a substantial shareholder in Chorus since 2014, L1 Capital has followed the new telecommunications legislation closely and is thankful for the opportunity to present our views.

L1 Capital believes that the framework developed by the Commission for fibre regulation is highly robust and capable of establishing a stable and predictable regulatory regime, promoting the interest of end users and incentivising further investment.

We have attempted to respond to several sections of the paper but the majority of our comments are focused on WACC, given it is the most developed area and where L1 believes it can add insight as global investors.

## Key Economic Principles, Asset Valuation and Cost Allocation (Q5-Q23)

**Key Economic Principles (Q5-Q7):** Strongly support Financial Capital Management principal given it is highly transparent and well used understood in other regulatory contexts (Q5). We have no views on other principles.

**Asset Valuation (Q8-Q15):** L1 generally supports the approach, subject to implementation but is awaiting further details. We believe being too prescriptive in the IM in relation to all parameters could limit flexibility of implementation.

**Cost Allocation (Q16-Q23):** As above we await further implementation details but again, we believe being too prescriptive in IM could limit flexibility.

On Q21 and Q22 and Q23 L1 strongly favours using real costs rather than allocators where possible, given the potential for allocators to set an impossibly high efficiency standard on operators. For example, proxy allocators such as revenue or number of connections will significantly understate the costs of a start-up fibre business. This is because while variable costs can often be linked to incremental revenues, the largest portion of costs for a start-up are fixed costs related to head office, operations, IT and business development. Hiring for these functions needs to happen early in a business life to ensure the business can build processes to scale up effectively over time to handle large volumes of future connections and typically means a start-up business has heavy losses early in its life.

L1 therefore believes that the Commission needs to carefully model start-up cost on a whole of firm basis for each of the LFC's and Chorus, modelling each cost centre by functional area and aggregating up to a firm wide view of the fibre provider. Importantly there should no difference in approach between a small LFC operator who does not have an existing line of business and a larger operator like Chorus – all fibre operators undertook the same risks in launching fibre business and profitability in an existing line of business should not be used to stop them from recovering their standalone fibre costs.

## Cost of Capital and Risk (Q24 -Q34).

**L1 believes that the Commerce Commission’s approach to cost of capital and risk was a shock to the market as evidenced by the market reaction and commentary from the investment community.**

Chorus’s share price fell by 11% from \$6.24 to \$5.56 in the week following the May 21<sup>st</sup> announcement despite most global infrastructure stocks rising in the period.

Phil Campbell from UBS , commenting on the CEPA paper, made the observation that the WACC assumptions were below UBS expectations and if the low WACC returns were carried through to the final decision they would create a “a negative value impact if the regulatory WACC is below the return a normal investor would demand for this type of asset (i.e. a negative regulatory arbitrage).”

Forsyth Barr, in downgrading the investment rating for Chorus commented that “the low WACC inputs” was “below our assumptions and international benchmarks” and do not include “any mechanism for recognising the added risks for a new fibre network, e.g. uptake uncertainty, competing technologies, long-dated investment.”

Chorus Share Price (15 May 2019- 10 Jul 2019)



**L1 believes the Commerce Commission's initial assessment significantly understates WACC for Chorus and other LFC providers. We have broken down our assessment into 6 key points as detailed below:**

- (a) CEPA comparators are inappropriate and include satellite and wireless towers which have significantly different risk profiles relative to Chorus's fibre network.
- (b) Cost of CFH equity and debt instruments are not zero cost due to embedded warrants, requirement for an investment grade rating and penalty clauses under CFH contract. CFH obligations have an impact on the implied equity beta and credit rating of Chorus.
- (c) Chorus's operating risk, financial leverage and cost of equity in the 2012-2022 build period are significantly different to the first regulatory period (2022-2025) and should be modelled separately.
- (d) CEPA fails to recognise systematic risk with Chorus's business which have been acknowledged by a wide variety of other regulators. Depressing returns for Chorus and other LFCs relative to other global fibre networks will have a chilling effect on future investment.
- (e) Chorus's fibre infrastructure supports critical mobile communication assets and next generation fixed telemedicine and tele education and edge computing applications and there is a significant cost of fibre underinvestment to the NZ economy. It should therefore be treated consistently to other critical infrastructure where a WACC uplift is applied
- (f) Stranding and technology obsolescence risk cannot be effectively be handled through ex-post mechanisms as suggested by the Commission and should be considered ex-ante through WACC uplift.

**(A) CEPA comparators are inappropriate**

CEPA comparators are inappropriate and include satellite and wireless towers which have significantly different risk profiles relative to Chorus’s fibre network.

Next Generation fibre assets are typically the product of structural separation of integrated telecom networks and very few are listed today. This makes comparables far more difficult relative to traditional companies regulated under Part IV.

CEPA’s approach to identify a sample of relevant comparator firms is composed of 4 steps which are reproduced below with L1 Comments.

	CEPA Approach	L1 Capital Comments
Step 1	Identify New Zealand firms providing the service in question	No comparable firms
Step 2	New Zealand firms from industries with a similar risk profile	Spark is the only comparable but is a reseller of fibre and a mobile operator
Step 3	Overseas firms providing a similar service; and	Netlink in Singapore is the only listed fibre access network currently listed
Step 4	Overseas firms from industries with a similar risk profile	Very difficult to identify similar firms given unique set of risks. Chorus revenues are subject to fluctuating demand for fibre services but with operating leverage dictated by revenue cap and anchor product pricing and service obligations under CFH contract (see discussion below)

**Source: Note 446 Page 100 of Technical paper**

Given the lack of comparables identified in Steps 1,2,3 of the process CEPA must rely on a high degree of subjective judgement to identify overseas firms from related industries with similar risk profiles. In doing so CEPA identified 59 comparable firms relative to 18 identified in the 2015 copper pricing review. Crucially these include satellite and tower companies not used as comparables for Chorus in the copper pricing review, in addition to more traditional integrated telecom companies.

In the tables below we have attempted to compare the risks of Chorus versus (a) satellite companies and (b) tower companies. We have compared risks using both the CEPA relative risk framework (pg 22 of CEPA report) and the risk assessment framework used by the European Commission (Appendix C – pg 74 of CEPA report)

**Table 1: Tower Companies vs Chorus Risk Assessment**

Description	Wireless towers	Chorus
<b>CEPA Framework for assessing relative risk</b>		
Nature of Demand	<p><b>Less variable than Chorus:</b> Long term wholesale contracts with mobile network operators. “Contracts are typically non-cancellable and include an initial term of 5 to 10 years with multiple renewal terms. Annual lease escalators in the U.S. are typically fixed at an average of approximately 3%. Escalations in international markets are typically based on local inflation rates which tend to be higher than US. Low historical annual churn rate of approximately 1-2%<sup>1</sup>. The churn rate implies average customer tenor of close to 50 years. Global nature of tower footprint provides further demand diversification (26.5% of CY18 revenue across the three operators was generated internationally)</p>	<p><b>More variable:</b> Demand is linked to short term month by month or 12 months contracts by consumers and is subject to competition from lower cost wireless internet, satellite services and cable networks</p>
Demand Growth	<p><b>Stronger than Chorus</b> due to higher ability to monetise increasing data usage. The revenue model is linked to higher mobile data usage which is growing faster than demand for Chorus fibre services. The rollout of 5G services will require densification of tower networks and an acceleration of demand for mobile data which will further accelerate revenue growth relative to Chorus. The significantly stronger historical demand profile can be seen from the higher five-year compound annual revenue growth rate for all the operators in Figure 1.</p>	<p>Linked to population growth and growth in demand for higher data speeds</p>
Operating leverage	<p><b>Operating leverage higher than Chorus</b> Wireless towers have significant leverage as mobile tower density increases and more tenants require space on existing tower infrastructure. Without a revenue cap these incremental users and towers lead to significant operating leverage<sup>2</sup> with a much</p>	<p><b>Limit on Operating Leverage:</b> Leverage restricted by revenue caps and quality dimensions under the Chorus fibre legislation</p> <p>Revenue Restrictions:</p>

<sup>1</sup> These are direct quotes from an American Tower presentation (Introduction to the Tower Industry and American Tower), quotes are from page 11

<sup>2</sup> “Adding additional tenants, equipment and upgrades yields additional revenue, while costs remain flat. The tower model demonstrates significant operating leverage as tenancy increases.” These are direct quotes from an American Tower presentation (American Tower Corporation: An Overview), quotes are from page 6 and 7 respectively.

	<p>lower historical average capital intensity than Chorus as seen in Figure 1</p> <p>The weighted average gross margin for the tower operators' core US business was 74.5% in CY18, which compares to Chorus at 66.7%<sup>3</sup></p>	<p>revenue cap, anchor pricing and geographically averaged pricing all restrict revenue</p> <p>Operating Costs: Service quality requirements and high cost of maintaining rural fibre network leads to higher cost structure</p>
Asset stranding risk	<p><b>Lower than Chorus:</b></p> <p>While towers are exposed to stranding risk from competing tower overbuilds, towers "typically have significant zoning restrictions"<sup>4</sup>, making overbuilding economically and logistically very difficult. This is reflected in tower operator's ability to structure highly advantageous leases with a concentrated set of customers as well as very low customer churn which implies contract length of close to 50 years.</p>	<p><b>Higher than towers:</b></p> <p>Exposed to stranding risk from new wireless and satellite and other competition. Geographic averaging of prices exposes Chorus to being overbuilt in dense urban areas. Revenue cap will not protect investors against large fall in demand (death spiral effect)</p>
Company Size	<p><b>Average market cap ~\$58 Bln USD.</b> According to historical data taken from NYU Stern (for US firms), firms with over 10 Bln USD market cap have a lower beta (0.86 beta) and risk profile than firms in the 1-2.5 Bln USD range (1.15 beta)<sup>5</sup></p>	<p><b>Market cap \$1.65 Bln USD.</b> According to historical data taken from NYU Stern (for US firms), firms with over 10 Bln USD market cap have a lower beta (0.86 beta) and risk profile than firms in the 1-2.5 Bln USD range (1.15 beta)<sup>5</sup></p>
Long Lived investment	<p><b>Similar period to recover investment</b></p> <p>Tower operators own long life assets with a significant portion of their estimated value expected in outer years. An advantage the tower operators do have is that their tower assets are already tenanted and generating a strong ROIC (with incremental tenants and growth coming at higher margins and ROIC) while Chorus still needs to contend with initial take-up risk of their asset</p>	<p><b>Similar period to recover investment:</b></p> <p>Expectation that Chorus can achieve its regulated rate of return over life of the asset but subject to long term macroeconomic risks around demand and take-up. Legislation specifically specifies smoothing of price path which may mean achieving regulated rate of return is not possible in initial regulatory periods</p>

<sup>3</sup> See Figure 1 for individual gross margins

<sup>4</sup> This is a direct quote from an American Tower presentation (Introduction to the Tower Industry and American Tower), quote is from page 20

<sup>5</sup> Risk Measures by Market Cap Class (US) as of January 2019, accessed 11 July 2019

<[http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/mktcaprisk.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/mktcaprisk.html)>

European Commission risk factors for Fibre Networks		
Retail/Wholesale Demand	See Nature of Demand section above	
Cost of Deployment	<p><b>Lower than Fibre:</b> Towers are the cheapest method for network operators to provide broad based wireless capacity to customers.</p> <p>The lower cost of deployment and the ability to onboard incremental customers results in significantly lower capital intensity of the tower operators relative to Chorus as seen in Figure 1</p>	<p><b>Higher than wireless towers:</b> Fibre investment has a very high upfront cost under CFH contract where it must be deployed fully to entire rural and urban footprint within a regulated period</p>
Technology Obsolescence risk	<p><b>Lower than Chorus:</b> Critical and non-substitutable component of mobile networks. There are very limited technological alternatives to building a macro tower based wireless network. While towers may be overbuilt with small cells, this is only economic in dense urban areas – with the tower operators already operating significant small cell networks. Current macro tower infrastructure provides mobile network operators with core infrastructure to provide broad and low-cost population coverage - this is not offered by any competing technology.</p>	<p><b>Higher than wireless towers:</b> Fibre assets once built are exposed for economic life to competition from satellite, mobile and other emerging technologies</p>
Market Dynamics and evolving competitive situation	<p><b>Stronger than Chorus</b> due to zoning hurdles and technology barriers minimising competition. The absence of any revenue or pricing caps allows the towers to take advantage of high growth in demand for mobile internet data</p>	<p><b>Weaker than wireless towers</b> due to higher number of competitors offering fixed wireless, cable and satellite internet alternatives</p>
Macroeconomic uncertainty	<p><b>Low:</b> Essential wholesale service – lowest cost of delivery for wireless connectivity – long term contracts mitigate risk</p>	<p><b>Medium:</b> End consumer subject to copper and wireless substitution as cheaper inputs</p>

Figure 1

L1 Summary Financials			
	5 Year Revenue CAGR CY14- CY18	Gross Margin (US) CY18	Average capital intensity (capex to sales) CY14-CY18
American Tower	17.2%	79.8%	15.0%
SBA	7.4%	81.0%	10.3%
Crown Castle	13.6%	66.7%	25.8%
Chorus	-1.7%	66.7%	67.4%



**Table 2: Satellite companies vs Chorus Risk Assessment**

Description	Eutelsat	SES	Chorus
<b>CEPA Framework for assessing relative risk</b>			
Nature of Demand	<p><b>Less variable:</b> Long term wholesale contracts with Pay TV providers, data providers and governments. Contracts with Pay TV providers have 8-year lengths, while contracts with mobility data providers are between 5-15 years long<sup>6</sup></p> <p>Spectrum licence holdings in the C band are an additional significant source of strategic value that is independent of internet demand and linked to upcoming US 5G spectrum auctions</p>	<p><b>Less variable:</b> Long term wholesale contracts with Pay TV providers, data providers and governments. Contracts with Pay TV providers have 10 year lengths, contracts with airlines for data capacity can be up to 10 years and contracts with maritime customers are 3-5 years long<sup>6</sup>.</p> <p>Spectrum licence holdings in the C band are an additional significant source of strategic value as for Eutelsat</p>	<p><b>More variable:</b> Demand is linked to short term month by month or 12 month contracts by end consumers for fibre and business services and is subject to competition from lower cost wireless internet, satellite services and cable networks</p>
Demand Growth	<p><b>Similar to Chorus</b> although higher ability to monetise increasing data usage (revenue model explicitly linked to higher data usage). The stronger demand profile can be seen from the higher five-year compound annual revenue growth rate in Figure 2</p>	<p><b>Similar to Chorus</b> although higher ability to monetise increasing data usage (revenue model explicitly linked to higher data). The stronger demand profile can be seen from the higher five-year compound annual revenue growth rate in Figure 2</p>	<p>Linked to population growth and growth in demand for higher data speeds</p>
Operating leverage	<p><b>Higher than Chorus</b></p> <ul style="list-style-type: none"> <li>no constraint on revenue growth through anchor product prices or revenue cap</li> <li>Gross margin in CY18 of 93.20%<sup>7</sup></li> <li>Satellite services have capacity to serve incremental customers at lower</li> </ul>	<p><b>Higher than Chorus:</b></p> <ul style="list-style-type: none"> <li>no constraint on revenue growth through anchor product prices or revenue cap</li> <li>Gross margin in CY18 of 75.00%<sup>7</sup></li> <li>Satellite services have capacity to serve incremental customers at lower</li> </ul>	<p>Operating leverage restricted by revenue caps and quality dimensions under the Chorus fibre legislation</p> <p>Revenue Restrictions: revenue cap, anchor pricing and geographically averaged pricing all restrict revenue</p> <p>Gross margin in CY18 of 66.70%<sup>7</sup>. Operating Costs:</p>

<sup>6</sup> L1 Capital company research

<sup>7</sup> See Figure 2

	cost than fibre services. This can be seen in Figure 2 by their lower capital intensity for a higher growth profile	cost than fibre services. This can be seen in Figure 2 by their lower capital intensity for a higher growth profile	Service quality requirements and high cost of maintaining rural fibre network leads to higher cost structure
Asset stranding risk	<b>Lower than Chorus:</b> Physical satellite assets at stranding risk from new generation of satellites delivering more bandwidth but key value of business is in C band satellite spectrum and perpetual right to launch new satellites into orbital slots. Both US spectrum holdings and orbital slots have indefinite lives	<b>Lower than Chorus:</b> Physical satellite assets at stranding risk from new generation of satellites delivering more bandwidth but key value of business is in C band satellite spectrum and perpetual right to launch new satellites into orbital slots. Both US spectrum holdings and orbital slots have indefinite lives	<b>Higher than Chorus:</b> Exposed to stranding risk from new wireless and satellite and other competition. Geographic averaging of prices exposes Chorus to being overbuilt in dense urban areas. Revenue cap will not protect investors against a large fall in demand (death spiral effect)
Company Size	<b>Market cap \$4.5 Bln USD.</b> According to historical data taken from NYU Stern (for US firms) <sup>8</sup> , firms within the 2.5-10 Bln USD market cap range have a lower beta (1.02 beta) and risk profile than firms in the 1-2.5 Bln USD range (1.15 beta)	<b>Market cap \$7.0 Bln USD.</b> According to historical data taken from NYU Stern (for US firms) <sup>8</sup> , firms within the 2.5-10 Bln USD market cap range have a lower beta (1.02 beta) and risk profile than firms in the 1-2.5 Bln USD range (1.15 beta)	<b>Market cap \$1.65 Bln USD.</b> According to historical data taken from NYU Stern (for US firms) <sup>8</sup> , firms within the 2.5-10 Bln USD market cap range have a lower beta (1.02 beta) and risk profile than firms in the 1-2.5 Bln USD range (1.15 beta)
Long Lived investment	<b>Shorter period to recover investment:</b> Large holding of US C band spectrum with ability to monetise as early as 2021 subject to FCC approval means that a large amount of shareholder value can be monetised in the near term. Research firm <sup>9</sup> estimate that 13% of current market capitalisation is attributable to C band spectrum holding	<b>Shorter period to recover investment:</b> Large holding of US C band spectrum with ability to monetise as early as 2021 subject to FCC approval means that a large amount of shareholder value can be monetised in the near term. Research firm <sup>10</sup> estimate that up to 100% of current market capitalisation can be attributed US spectrum holding	<b>Longer period to recover investment:</b> Expectation that Chorus can achieve its regulated rate of return over the life of the asset but subject to long term macroeconomic risks around demand and take-up. Legislation specifically specifies smoothing of price path which may mean achieving regulated rate of return is not possible in initial regulatory periods

<sup>8</sup> Risk Measures by Market Cap Class (US) as of January 2019, accessed 11 July 2019  
<[http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/mktcaprisk.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/mktcaprisk.html)>

<sup>9</sup> Wellington, P., Sheikh, O., & Matoschuk, J. (15 May 2019) Eutelsat Communications: Inclined

<sup>10</sup> Wellington, P., Sheikh, O., & Matoschuk, J. (18 June 2019) SES: C band – all systems go

<b>European Commission risk factors for Fibre Networks</b>			
Retail/Wholesale Demand	See Nature of Demand section above		
Cost of Deployment	<b>Lower than fibre:</b> Ability to scale with multiple satellite launches as demand increases. The lower cost of deployment is reflected in the significantly lower capital intensity of the satellite operators <sup>11</sup>	<b>Lower than fibre:</b> Ability to scale with multiple satellite launches as demand increases. The lower cost of deployment is reflected in the significantly lower capital intensity of the satellite operators <sup>11</sup>	<b>Higher than satellite:</b> Fibre investment has a very high upfront cost under CFH contract where it has to be deployed fully to entire rural and urban footprint within a regulated period
Technology Obsolescence risk	<b>Lower than fibre:</b> Satellite spectrum capacity and right to launch into designated orbit are indefinite life assets. C band spectrum is the key piece of spectrum required for rolling out high capacity, wide coverage 5G services, thereby linking its value to 5G network demand. Current satellites in orbit compete with fibre and wireless in some applications	<b>Lower than fibre:</b> Satellite spectrum capacity and right to launch into designated orbit are indefinite life assets. C band spectrum is the key piece of spectrum required for rolling out high capacity, wide coverage 5G services, thereby linking its value to 5G network demand. Current satellites in orbit compete with fibre and wireless in some applications	<b>Higher than satellite:</b> Fibre assets once built are exposed for economic life to competition from satellite, mobile and other emerging technologies
Market Dynamics and evolving competitive situation	Similar to fibre for satellite data demand. Competitive position for C band spectrum improving as 5G spectrum becomes more valuable	Similar to fibre for satellite data demand. Competitive position for C band spectrum improving as 5G spectrum becomes more valuable	Similar to satellite but without benefit of C band spectrum
Macroeconomic uncertainty	Low: Essential wholesale service – lowest cost of delivery for video and data in rural areas – long term contracts mitigate risk	Low: Essential wholesale service – lowest cost of delivery for video and data in rural areas – long term contracts mitigate risk	Medium: End consumer subject to copper and wireless substitution as cheaper inputs

<sup>11</sup> See Figure 2

Figure 2

L1 Summary Financials			
	Revenue CAGR CY14-CY18	Gross Margin CY18	Average capital intensity (capex to sales) CY14-CY18
Eutelsat	1.20%	93.20%	27.70%
SES	1.50%	75.00%	21.50%
Chorus	-1.70%	66.70%	67.40%

**Some key observations from the above tables illustrate key differences between Chorus**

- Satellite and Tower companies have higher growth rates than Chorus:** Satellite and mobile tower companies have significantly higher revenue growth rates, as a result of favourable demand dynamics (linked to growth in data demand) and lack of anchor pricing and revenue caps
- Satellite and Tower companies have highly certain revenue streams whereas Chorus is exposed to monthly or yearly fibre demand. Crucially the revenue cap does not ensure security of revenues for Chorus.**

Satellite operators have multiyear contracts with Pay TV providers and data retailers that give high levels of certainty over income. Mobile tower companies have a combination of multiyear non-cancellable leases and a lack of competitive substitutes, which drives very long customer tenure (average churn of 1% to 2% per annum). Chorus by contrast derives the majority of its revenue from consumer fibre contracts which are cancellable by the end customer at either a 1-month notice period or within a 12 month contract period.

Crucially a revenue cap, while capping operating leverage and revenue growth for Chorus does not significantly add to the security of its revenues for the following reasons:

- Revenue cap does not protect against large demand destruction:** The wash up mechanism does not protect Chorus from a large deterioration in demand if enough users substituted to fixed wireless products. In that event remaining users would not be able to bear the new higher cost of fibre services under the revenue cap, leading to further demand destruction (the death spiral effect referred to by the Commission previously). This risk is exacerbated because of the requirement for geographically averaged fibre pricing in all Chorus UFB areas means that fixed wireless providers can underprice Chorus in dense metropolitan areas, while leaving Chorus with the cost of servicing regional fibre networks where Chorus's costs cannot be recovered.
- Smoothing of anchor products means returns under revenue cap may not be achievable for multiple periods:** Even in a scenario where a macroeconomic shock leads to slower take-up of fibre services and under recovery under the revenue cap, Chorus is not protected. Part 6 of the Telecommunications Act stipulates that anchor prices must not be adjusted in a manner that causes a price shock to consumers and must be smoothed over multiple regulatory periods. In practice this means that it would take multiple regulatory periods for Chorus to be able to earn its regulated return and only if higher prices did not lead to further demand destruction

- **Potential to Deregulate fibre assets further undermines effectiveness of revenue cap:** Part 6 of the Telecommunications Act retains the option of taking fibre assets out of the RAB if that area is seen as becoming workably competitive. Since densely populated urban areas are more likely to become competitive there is an additional risk of Chorus not being able to achieve regulated returns over multiple periods as price shocks on regulated products are smoothed (see point above) and then additionally not being able to earn a regulated return as that geographic area is declared as competitive.
- 3. Satellite and tower companies have higher operating leverage than Chorus:** Chorus margins are constrained by revenue caps, anchor prices and high costs due to service quality standards under the fibre legislation. Satellite and wireless companies are unconstrained on revenues and have a lower cost of deploying the service to the incremental user, thus generating higher gross margins and a higher incremental return on capital.
- 4. Macroeconomic uncertainty is higher for Chorus than satellite and tower companies.** Wireless towers and satellite systems are essential wholesale services – there is no substitute for mobile communication and macro cell networks for delivery of mobile data. Satellite networks often provide the only data and video connectivity to remote regions and hold valuable wireless spectrum that is essential for next generation 5G networks. By contrast Chorus demand is linked to demand for faster fibre internet services, which although growing can be substituted by consumers for cheaper inputs including wireless internet and copper services.
- 5. Asset stranding risk significantly higher for Chorus than satellite and tower companies.** Wireless towers are critical to mobile networks and the provision of mobile data. Zoning and licensing restrictions on new tower construction together with strong network effects strongly entrench existing operators. Satellite companies do face stranding risks from newer satellites, but the majority of their asset value lies in orbital launch slots and their large holding of spectrum. Chorus, on the other hand is exposed to risk from mobile substitution and new emerging technologies, exacerbated by the need to have geographically averaged pricing.

**The preceding risk assessment clearly highlights that satellite and mobile tower companies are not appropriate as comparables for Chorus**

L1's views appear to be shared by other market participants, including UBS research which noted that "Interestingly CEPA has included fixed Satellite companies and Tower companies in the estimate of wholesale only operators... arguing "that that the long term contracting arrangements provides similar revenue stability to a regulatory cap". "We would disagree given CNU and LFC's have no long term contracts with their residential or commercial wholesale customers and face competition from 5G."

**L1 believes that the appropriate comparables for Chorus fibre networks are those that**

- (a) Sell directly to consumers and businesses and face price competition from substitutes
- (b) Have a similar cost of deploying and operating their network to Chorus, recognising that fixed networks have different cost profiles to mobile networks, including a significantly higher cost to connect and service a customer
- (c) Do not derive a significant portion of their value from wireless spectrum holdings or other long term intangible assets

**In assessing these factors, it becomes clear that the closest comparables to Chorus are integrated telecom operators selling to retail customers that derive the majority of their earnings from fixed networks and this should form the set of comparables used to calculate asset beta.**

## (B) Cost of CFH equity and debt instruments are not zero

Cost of CFH equity and debt instruments are not zero cost due to embedded warrants, requirement for an investment grade rating and penalty clauses under CFH contract. CFH obligations have an impact on the implied equity beta and credit rating of Chorus.

As part of the building blocks approach there is a requirement under the Act to determine the actual cost of Crown finance. The initial approach in the Emerging view paper is that the cost of government financing is zero for both Crown equity and debt instruments.

L1 strongly believes that the cost of Crown financing is not costless due to the highly conditional nature of the Crown funding. We set out our thinking below

The Crown funding under the UFB1 and UFB2 was subject to the following set of conditions

Condition	Detail	Impact on Chorus/LFC's (where appropriate)
<b>Chorus issuance of warrants to CFH</b>	New Chorus will also issue CFH Warrants to CFH for nil consideration along with each tranche of CFH Equity Securities and CFH Debt Securities. Each CFH Warrant gives the holder the right to purchase a New Chorus Share at a specified date between 30 June 2025 and 30 June 2036, with the price of the New Chorus Share based on a total shareholder return of 16% per annum. (Chorus demerger document)	Explicit cost to Chorus equity holders. Limits upside for Chorus investors while fully exposing them to downside. Value of warrants can be estimated using binomial approach. (See Section A below)
<b>Financial Penalties and step in rights for failure to achieve delivery plans</b>	If New Chorus does not perform its obligations under the UFB Agreements and is unable to rectify breaches within agreed timeframes, there is a range of remedies available to CFH, including various levels of liquidated damages, specific damages claims capped at NZ\$350 million, and, for periods of prolonged or significant performance failure and in certain other limited circumstances, CFH has termination rights. (Chorus demerger documents)	Penalties increase risk to Chorus equity holders. Conceptually Chorus investors have to estimate % chance of penalties being triggered and the penalty amount to derive expected loss (See Section B)
<b>Requirement to maintain investment grade credit metrics through build period</b>	Achieving an investment grade credit rating is also a condition precedent to New Chorus' access to the Government's UFB investment through CFH and in the event that New Chorus' credit rating falls below investment grade while CFH Debt Securities remain outstanding, New Chorus is prohibited from paying distributions on New Chorus Shares without CFH's approval. (Chorus demerger document). In order for CFH to provide funding: Chorus must not be in breach of the financial covenants in its banking facilities; from 2020 (or earlier if it does not have financial covenants in its bank facilities) Chorus must not have a sub-investment grade rating from both S&P and Moody's (or only one entity if that is the only rating entity) for a continuous period of four months; (UFB2 CFH Agreement)	Requirement to maintain investment grade credit to draw down of CFH communal funding or pay dividends has the effect of raising equity beta by raising implied financial leverage. This is due to the fact that any cost overrun during the build period would have had to be met through equity issuance. (See Section B)
<b>Fees and additional costs of CFH</b>	Draw down of CFH funding comes with various fees	Agree with Dr Lally - costs can be added to operating expenditure allowance.

## **Section A: Warrants issued to CFH are a cost to Chorus equity holders**

Warrants are issued to the Crown alongside every drawdown of CFH equity during the UFB1 and UFB2 build process. There is a well-established body of literature for valuing warrants.

For example, NYU Stern assesses the value of a firm with warrants in place by deducting the market value of warrants from the equity value of the shares if the warrants were not in place. The following simplified equation holds:

**Equity Value of firm with Warrants = Equity value of firm with no warrants – Estimated value of warrants**

Since in a simplified model the equity value of a firm with no growth is simply defined as:

**Equity Value = NPAT/Cost of Equity( $K_e$ )**

And given

**Equity Value of firm with Warrants < Equity value with no warrants (where warrant value > 0)**

It holds that

**Cost of Equity ( $K_e$ ) for a firm with warrants > Cost of Equity ( $K_e$ ) for a firm without warrants**

**Therefore, L1 believes the best approaches to estimating the cost of warrants is to:**

- (a) assess cost of equity without warrants in line with the current CEPA approach
- (b) derive the value of warrants using Black Scholes or similar approach
- (c) gross up the cost of equity in (a) using a simplified DCF approach as suggested above

## **Section B: Requirement to maintain investment grade credit metrics during UFB1 and UFB2 together with step in rights and penalties for non-completion raised equity risk for Chorus holders, resulting in a higher required cost of equity during the build period.**

Crown Fibre Holdings requires Chorus to maintain an investment grade rating through the build period to (a) draw down on incremental CFH funding and (b) pay dividends to shareholders. The CFH contract transfers the risk of cost overruns in building the UFB fibre network to Chorus with a fixed total commitment of \$929m for UFB1, \$291 m for UFB2 and \$109m for UFB2+, regardless of the actual cost of building the network. Chorus's UFB build contract was subject to significant risk with significant cost overruns possible during the period.

In a typical company undertaking a large capital project the risk of a cost overrun is borne by both:

- (a) **debt holders** who are subject to risk of (i) a downgrade in credit rating for the debt (b) the issuance of new senior debt which subordinates their claim (c) risk of missed interest payment and non-payment of principal
- (b) **equity holders** who are at risk of needing to contribute additional capital (in the form of a capital raise) to complete the project

The requirement for an investment grade credit metric, dividend stopper, financial penalties and step in rights effectively means that during the construction period debt holders enjoyed extra protections and the risk for equity holders rose

Below we compare the implications of a **downgrade in credit rating to sub-investment grade** for **Chorus equity holders** with and without CFH restrictions to highlight the additional risks

Impact of Credit Downgrade - Normal Capital structure	Impact of Credit downgrade - With CFH restrictions
Additional cost of debt on refinancing of debt at maturity	<b>High Risk of Equity Raise or suspension of dividends:</b> No ability to draw down on CFH funding means communal build must be funded by equity holders and/or dividends payments must stop, raising cost of equity
Additional cost of working capital if tied to credit rating	<b>High risk of penalties:</b> In the event of a loss of credit ratings that resulted in an ability to draw down funding there is a high risk of delayed completion of communal build and penalties of up to \$350m
	<b>High risk of government intervention:</b> Step in rights by CFH on missing completion milestones would result in not receiving (a) fibre revenues and (b) loss of control by equity holders as CFH prioritises continuance of fibre projects over preservation of equity value
	Additional cost of debt on refinancing of debt at maturity
	Additional cost of working capital if tied to credit rating

One way to consider the additional risk for equity holders is to examine Chorus's actual and implied levels of leverage during the 2012-2018 period.

Selected Financials	2013	2014	2015	2016	2017	2018
EBITDA(1)	663	649	602	594	652	653
Net bank debt (incl. derivatives)	1,716	1,596	1,639	1,652	1,715	1,909
Net snr debt for S&P rating (incl CFH snr debt)	1,953	1,827	1,842	1,848	1,945	2,239
<b>S&amp;P net debt/EBITDA</b>	<b>2.95x</b>	<b>2.82x</b>	<b>3.06x</b>	<b>3.11x</b>	<b>2.98x</b>	<b>3.43x</b>
Add CFH sub debt and equity at face value	103	225	335	454	541	651
Total funding obligations	2,056	2,052	2,177	2,302	2,486	2,890
Fibre Growth	579	566	504	486	503	607
Other Opex	102	113	93	107	131	143
Total Capex	681	679	597	593	634	750
Cumulative Capex	681	1360	1957	2550	3184	3934
Implied gearing (inclusive of CFH debt and equity at face value)	3.10x	3.16x	3.62x	3.88x	3.81x	4.43x
Impact of cumulative of \$600m cost overrun on credit metrics	4.01x	4.09x	4.61x	4.89x	4.73x	5.34x
(1) EBITDA impacted in 2017 and 2018 year by change in accounting standard						

As can be seen above Chorus's leverage was much higher than just those implied by looking at credit metrics alone. For example, in 2015 Net Debt/EBITDA was 3.06x under S&P definition but total implied gearing was 3.62x inclusive of CFH instruments. In the event of a cumulative \$600m cost overrun in the project by 2015, total leverage would have reached 4.6x. Given the need to maintain investment grade metrics, this would have likely resulted in a capital raise. **CFH instruments raised the effective amount of leverage Chorus was exposed to during the period.**



There is a significant amount of empirical evidence that higher levels of leverage are associated with higher equity beta for telecommunications companies. To illustrate this, L1 has examined the MSCI ACWI Telco index comprised of 80 global telecommunication companies and run a regression comparing leverage to equity beta. As can be seen below there is a clear correlation between higher leverage and higher equity beta, with companies with high leverage relative to the telecom peer group also exhibiting higher beta. We have also provided three case studies of telecom companies that have recently experienced significantly higher cost of equity as leverage rose. L1 calculations are available in Appendix 1.

<b>MSCI Barra Beta calculations</b>			
<b>Grouping</b>	<b>(%) of Telco Index</b>	<b>Leverage (Std dev vs. MSCI)</b>	<b>Historical Beta</b>
Overall	100.00%	0.48	0.62
Low leverage	7.54%	-1.07	0.46
Med/Low leverage	14.93%	-0.50	0.47
Med/High leverage	43.78%	0.47	0.64
High leverage	33.75%	1.26	0.68



Given the evidence that CFH instruments increased asset leverage for equity holders and the clear link between asset leverage and equity beta, L1 believes the appropriate treatment is for the Commission to use a higher gearing level in its calculation of equity beta for Chorus during the build period.

### (C) Chorus's risks are significantly higher during the build period

Chorus's operating risk, financial leverage and cost of equity in the 2012-2022 build period are significantly different to the first regulatory period (2022-2025) and should be modelled separately. This should be reflected in its cost of equity, credit rating and term of debt

#### 1. Chorus faces a larger number of risks during the UFB1 and UFB2 period which are not reflected in the Commission's current view on cost of equity

Risk	UFB build period (2012-2022)	Regulatory period beginning 2023	L1 Comment
Construction risk -Risk of cost overruns during build phase	<b>High:</b> Very large financial obligation related to build with all risk borne by equity holders	<b>Low:</b> Communal build largely complete and large section of premises connection complete by 2023	Construction risk is higher than set of comparable companies given extreme capital intensity of rolling out UFB network and should be reflected in a higher asset beta.
Risk of insufficient demand for fibre services	<b>Very high:</b> Unclear demand for fibre services at inception of projection. Penalties from CFH for insufficient take-up of fibre services in form of accelerating CFH equity repayments	<b>High:</b> Fibre take up to 2019 is running in line with projections	Clearly higher than during first regulatory period: Demand risk has been viewed as a systematic risk by other regulators and reflected through uplift in allowable WACC.
Risk of financial penalties for non-completion of build milestones	<b>High:</b> Financial penalties for non-completion and step in rights(see previous section on CFH instruments)	<b>Low:</b> Communal build should be largely complete by 2023	Clearly higher than risk in first regulatory period
Balance Sheet Risks:	<b>High:</b> Cost of not maintaining investment grade rating during build period is very high for equity holders (see section on CFH instruments)	<b>Medium:</b> End of build period should allow stronger cashflow generation, supporting credit metrics	As covered in section on CFH instruments we believe this greatly increased risk to equity holders by increasing effective leverage and therefore the notional gearing derived by CEPA for the comparator set is no appropriate for the build period and the equity beta derived is too low.
Regulatory risk	<b>High:</b> No regulatory certainty, significant doubt about whether fibre investment would	<b>Medium:</b> Regulatory regime aims to recover modest infrastructure return on investment	Clearly higher than during regulatory period

	be undermined by regulatory regime	subject to implementation risk	
Interest rate risk	High: High amount of financial leverage, higher interest rates and negative cash flow profile make Chorus sensitive to rates	Medium: Ability to match interest rate to regulatory period and cashflow generation mitigates risks	Clearly higher than during regulatory period

As can be seen above all the key risks are higher during the build period.

For balance sheet risks, the restrictions relating to CFH instruments should be reflected in a higher equity beta (covered in detail in the section above). Higher interest rate sensitivity during the build period also supports a higher equity beta. For other risk factors we believe a combination of higher asset beta (construction risk, regulatory risk) and a WACC uplift may be more appropriate.

**2. Commission’s current view on interest rates and credit rating do not reflect the real costs of financing during the build period for Chorus**

**High interest rate and refinancing risk for Chorus during the build period is inconsistent with the use of single period refinancing assumption by the Commission.**

Chorus has high exposure to interest rate risk given (a) high leverage (b) a negative cashflow profile with weakening credit metrics over build period, and (c) need to keep an investment grade credit rating. An investment grade credit rating is inconsistent with short term one year rolling financing as implied in the Commission’s calculation of the risk-free rate, given high interest rate sensitivity and refinance risk. Given these constraints, Chorus elected to term out a lot of its debt to coincide with the end of the UFB build program. For example, Chorus’s Euro Medium Term Notes were issued at 6.75 per cent and are due on 6 April 2020.

**L1 believes the Commission needs to consider linking interest rate during the build period to the term of debt required for Chorus to maintain investment grade metrics, which was a requirement of UFB funding.**

**Chorus’s investment metrics did not support a BBB+ credit rating during the build period.**

As we’ve reflected earlier in the paper, Chorus during the build period faced a significant number of unique risks including construction risk, uncertain demand for fibre services, significant financial penalties and an uncertain regulatory regime. This has resulted in an investment grade rating below BBB+ for the entire build period. Chorus was rated BBB by S&P during build period and continues to have an S&P rating of BBB today. Assuming a BBB+ credit spread for Chorus underestimates the real cost of financing and runs counter to Commissions’ attempt to use real costs, where practicable in determining the value of losses incurred during the build period.

## (D) Implications of no WACC uplift

Not applying a WACC uplift is inconsistent with public market expectations, previous government NZ policy and international regulatory practice and will have a chilling effect on future investment in NZ.

L1 believes the emerging papers view on WACC uplift is inconsistent with investor expectations, previous policy direction at the time of the commencement of the UFB project and international precedents. We highlight these below

### **Investors expected a WACC uplift to account for the high risk nature of the UFB project**

This is reflected in investment commentary by Forsyth Barr, which, in downgrading the investment rating for Chorus commented that the “key takeaway from the Commerce Commission’s (CC) “emerging views” on the ultrafast fibre broadband (UFB) regulatory regime are the low WACC inputs (asset beta, WACC percentile) do not factor in any added risk for a new, unestablished network.”

### **NZ government policy direction set expectations that incentives for investors would include an allowance for new technology risk:**

A Government Policy Statement in 2011 stated that the “government’s economic objective is that businesses have incentive to invest in new or upgraded fibre infrastructure” and “ensuring any price regulation...takes into account the start-up risks associated with the introduction of new technology”.

The emerging view paper does not take into account start up risk either through its calculation of asset and equity beta, or through an uplift to WACC.

### **Global regulation of wholesale fibre networks has consistently acknowledged need to apply WACC uplifts to next generation fibre networks:**

- A 2016 European Commission report recommended higher WACCs be applied to Next Generation Access networks to reflect different characteristics from legacy networks, including systematic demand risks, intensive capital leverage and long-term pay-offs. As we have noted in this paper these risks are all present for Chorus’s fibre investment and are not captured through WACC uplift or higher equity beta.
- In the 2017 wholesale local access (WLA) review, Ofcom stated that “fibre access services ... were likely to face higher systematic risks than copper services and applied an asset beta of 0.73 for other BT UK telecoms services (including fibre access). This is far higher than the mid-range of asset beta estimates in the emerging view paper
- Dutch national regulatory authority ACM in 2015 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:
  - 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.

L1 notes that Chorus also has a lack of specific comparators, high levels of operating leverage relative to the set of comparable suggested by CEPA and demand uncertainty related to the fibre build.

- AGCOM (the Italian communications authority) applied a risk premium of 3.2% to the WACC for FTTH fibre services for the 2015-2017 period. The premium was intended to compensate fibre investments for 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. Again, L1 notes all of these risk are features of the Chorus investment.

**Not allowing for a WACC uplift will will have a chilling effect on future investment.**

A rate of return that does not acknowledge risks undertaken by early investors in fibre network means that the NZ government has effectively reneged on commitments made to the capital markets at the time of the UFB investment.

Importantly, it has chosen to renege at a time when investment is already significantly sunk in the network. This will have a chilling effect on any new infrastructure PPP project undertaken by the government in the future by raising sovereign risk.

Secondly, the low allowed rate of return means that NZ fibre networks offer lower returns than an investment in comparable fibre networks globally. Given Chorus and other LFC's compete for global capital to fund incremental investment this will result in a lack of funding for future NZ fibre investments, with a follow on effect to NZ productivity and GDP growth.

## (E) Chorus’s fibre infrastructure is critical

Chorus’s fibre infrastructure supports critical mobile communication assets, next generation telemedicine, tele education and edge computing applications which are crucial for the NZ economy. It should therefore be treated consistently to other critical infrastructure where a WACC uplift is applied to ensure underinvestment does not occur

**Mobile networks are highly dependant on fixed networks and therefore a mobile network does not significantly mitigate the cost of an outage of fibre services.** Chorus’s DFAS already supplies critical fibre components to the wireless industry and are likely to become more important as mobile networks densify, dramatically accelerating the need for fibre. Chorus also supplies backhaul and intercity connection services to several wireless operators.

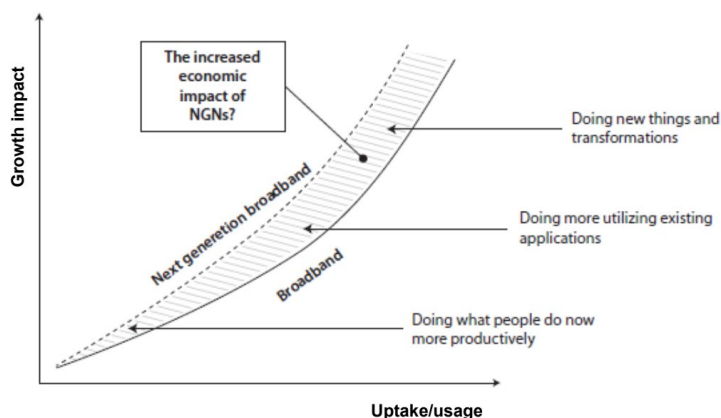
**Fixed line networks will be essential to a new generation of internet services that require low latency and high reliability, and these cannot be supplied effectively by mobile networks.**

Chorus’s fibre network is currently used to support a range of activities include consumer internet services, enterprise data connections and e commerce applications. Some of these activities can be carried using mobile or internet satellite connections as highlighted by the Commission. However, a number of new applications that are critical for increasing productivity and consumer welfare in NZ such as telework, virtual learning, remote diagnosis and e-health are dependant on fixed line connections that require very low latency and always on availability.

A Sapere research group from 2017 identified that a large portion of the UFB’s beneficial impact is in “doing new things and transformations”, estimating that without the requisite investment, the NZ economy stands to lose some of the \$32.8 billion surplus the UFB will provide the economy over 20 years<sup>12</sup>. Just the health and education surplus are considered to be worth \$9.5 billion over 20 years<sup>13</sup>.

L1 believes that the combination of high consumer benefit from fibre investment and the high cost of failure of fixed fibre networks means they should be treated identically to other critical infrastructure regulated under Part IV regime where a WACC uplift is applied.

Figure 1 Beneficial impact categories schematic<sup>5</sup>



<sup>12</sup> Comendant, C., Davies, P., & Murray, Kieran. (2007) Estimating the Wider Scio-economic Impacts of Ultra Fast Broadband for New Zealand. *Sapere Research Group*

<sup>13</sup> Comendant, C., Davies, P., & Murray, Kieran. (2007) Estimating the Wider Scio-economic Impacts of Ultra Fast Broadband for New Zealand. *Sapere Research Group*

(F) Stranding and technology obsolescence risk cannot be effectively handled through ex-post mechanisms and should be considered ex-ante through a WACC uplift.

The Commission has suggested that stranding risk could be mitigated through a range of measures including

- (a) the ability to shorten asset lives
- (b) ex ante cashflow allowance through increment to the WACC
- (c) ring fenced compensation allowance
- (d) Retaining assets in the RAB (not covered below since this is an approach not favoured by the Commission)

We discuss each of these mechanisms below

**The ability to shorten asset lives:** L1 believes this is a problematic mechanism to implement given that

- (a) It is ex-post in the sense that accelerated depreciation will only be available once significant stranding risk has occurred. In this case there will be significant doubt in the minds of investors whether a very aggressive depreciation schedule will be approved by the Commission. This raises cost of capital for Chorus holders given they bear the risk of any ex-post adjustment being insufficient to recover investment.
- (b) Given the impact of anchor prices and the requirement to smooth adjustments over multiple regulatory periods, shortening asset lives may have a limited benefit in recovering investment if the smoothing period is longer than the amount of time over which the asset becomes obsolete.
- (c) Shortening asset lives can lead to a period of over recovery if assets that are assumed to be stranded end up being repurposed for some future use

**Ex ante cashflow allowance through increment to the WACC:** This is the approach L1 favours as it is consistent with international treatment of stranding risk by other regulators and is flexible enough to be adjusted between regulatory period as the stranding risk is reassessed.

**Ring fenced compensation allowance: L1 believes this approach is problematic as:**

- (a) it requires a worst-case estimate of stranding risk to be held in escrow otherwise the guarantee is not credible to Chorus investors and raises the cost of capital
- (b) The accumulation of escrow funds would raise the cost of fibre services to end consumers which may retard the takeup of fibre service

## Concluding Remarks


L1 is supportive of most of the approaches adopted in the emerging view paper but believe that the initial approach to cost of capital and risk significantly understates the true cost of capital for Chorus and other LFC's.

**Commission's assessment of WACC fails to take into account the very significant increases in risk for Chorus and LFC's during the UFB build period.** Chorus and LFC's faced uncertain demand, construction risks, regulatory and interest rate risks which, together, with CFH instruments which imposed significant penalties for delays in completion and loss of credit rating, greatly increased risk to equity holders. This should be reflected in higher asset beta (given presented comparators bear little relation to the business risks facing a high capital intensity, loss making fibre business), and higher asset leverage allowance (CFH instruments, lower interest coverage) than during the post build period.

**Commission's assessment of WACC in the post build period also understates true cost of capital.** It uses comparators with significantly lower levels of business risk than Chorus, which depresses the true asset beta. It also uses a credit rating which is not attainable for Chorus or any other entity undertaking a risky new fibre project, thus imposing an impossibly high efficiency standard on Chorus. It fails to consider the cost of CFH warrants which raise the cost of equity. It subsequently fails to apply a WACC uplift to reflect any of the systematic risk that have been acknowledged by other regulators and were signalled by government policy as likely to be incorporated into cost of capital when the UFB project began. Lastly it fails to acknowledge the critical nature of Chorus's fibre network in enhancing productivity in NZ and been an essential input to mobile services, and thus does not apply a similar WACC uplift as it does other critical infrastructure services.

L1 Capital thanks the Commission for its open and transparent approach in formulating fibre regulation and look forward to the opportunity to engage further on the key inputs as the regulatory regime is developed.

Signed:



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Lev Margolin  
Portfolio Manager



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Raphael Lamm  
Joint Managing Director



## Appendix A

### Beta's dependency on leverage for telecommunication firms

We have taken the MSCI ACWI Telco index comprised of 80 global telecommunication companies. From there each constituent has been given a standardised leverage exposure (called leverage exposure in the Table 1 below). This standardised leverage exposure is calculated by taking the MSCI Barra GEMLT leverage exposure factor (primarily driven by the debt to assets, book leverage and market leverage of the firm) and then standardising this exposure across the MSCI universe and ranking within the Telco sector. For example, a standardised leverage ranking of 0.22 (e.g SK Telecom) indicates the firm is 0.22 standard deviations higher than MSCI ACWI's mean leverage factor.

Once the ranking was completed, we grouped firms into four buckets and calculated the average historical beta (calculation based on the last 252 trading days) for the bucket. The buckets are created as follows:

- Low – less than 1 standard deviations lower than the mean
- Med Low – between 1 to 0 standard deviations lower than the mean
- Med High – between 0 to 1 standard deviation higher than the mean
- High – higher than 1 standard deviation higher than the mean

As can be seen in Table 1 below **there is a clear trend where, as leverage exposure increases (firms move into higher buckets) historical beta increases.**

**Table 1 (analysis as of 10 July 2019)**

<b>MSCI Barra Beta calculations</b>			
<b>Grouping</b>	<b>(%) of Telco Index</b>	<b>Leverage (Std dev vs. MSCI)</b>	<b>Historical Beta</b>
Overall	100.00%	0.48	0.62
Low leverage	7.54%	-1.07	0.46
Med/Low leverage	14.93%	-0.50	0.47
Med/High leverage	43.78%	0.47	0.64
High leverage	33.75%	1.26	0.68

Table 2 (analysis as of 10 July 2019)

MSCI Barra Beta calculations (full set)				
Asset ID	Asset Name	(%) of Telco Index	Leverage (Std dev vs. MSCI)	Historical Beta
		<b>100.00%</b>	<b>0.48</b>	<b>0.62</b>
<b>Low</b>		7.54%	-1.07	0.46
GERATI1	1&1 DRILLISCH AG	0.14%	-1.58	0.92
BRAA2Y2	TELEFONICA BRASIL SA	0.45%	-1.32	0.29
INDHHL1	BHARTI INFRATEL LTD	0.09%	-1.31	0.15
THAAJB1	INTOUCH HOLDINGS PCL	0.31%	-1.22	0.33
BRAA261	TIM PARTICIPACOES SA	0.20%	-1.12	0.76
JPNFNP1	NTT DOCOMO INC	2.31%	-1.05	0.40
HKGBFT1	CHINA MOBILE LTD	4.03%	-1.01	0.50
<b>Med Low</b>		14.93%	-0.50	0.47
USAS381	TELECOM ARGENTINA SA	0.11%	-0.84	0.78
TAIBHW1	CHUNGHWA TELECOM CO LTD	1.01%	-0.80	0.26
HKGBKX1	CHINA UNICOM HONG KONG LTD	0.48%	-0.76	0.80
SINAOH1	SINGAPORE TELECOMMUNICATIONS	1.54%	-0.73	0.46
SAUACF1	SAUDI TELECOM CO	0.41%	-0.71	0.46
CHNCBX2	CHINA UNITED NETWORK COMMUNICATIONS	0.06%	-0.70	0.69
GERWU1	TELEFONICA DEUTSCHLAND HOLDING AG	0.18%	-0.68	0.35
HKGIFR1	CHINA TOWER CORP LTD	0.84%	-0.65	0.82
UAEAAQ1	EMIRATES TELECOMM. GROUP CO PJSC	0.58%	-0.60	0.33
GERASW1	UNITED INTERNET AG	0.29%	-0.57	0.96
AUSDND1	TPG TELECOM LTD	0.12%	-0.54	0.53
JPNEIS1	KDDI CORP	3.41%	-0.54	0.37
HKGBUK1	CHINA TELECOM CORP LTD	0.50%	-0.45	0.32
IDNAIK1	TELEKOMUNIKASI INDONESIA(PERSERO)	1.10%	-0.37	0.41
BELARK1	PROXIMUS SA	0.32%	-0.29	0.31
SAFCOV1	VODACOM GROUP LTD	0.39%	-0.29	0.75
JPNDLU1	NIPPON TELEGRAPH AND TELEPHONE CORP	2.24%	-0.26	0.50
SWEANH2	TELE2 AB	0.51%	-0.25	0.54
SAFCIQ1	TELKOM SA SOC LTD	0.13%	-0.24	0.35
GREAJ1	HELLENIC TELECOMM ORGANIZATION SA	0.25%	-0.15	0.77
TURANO1	TURKCELL ILETISIM HIZMETLERI AS	0.18%	-0.11	0.55
TAIBNH1	FAR EASTONE TELECOMMUNICATIONS CO LTD	0.29%	-0.07	0.08
<b>Med High</b>		43.78%	0.47	0.64
POLAHK1	ORANGE POLSKA SA	0.08%	0.04	0.49
AUSCUY1	TELSTRA CORPORATION LTD	0.82%	0.07	0.28
KORBUY1	LG UPLUS CORP	0.09%	0.14	0.29
SWEAXZ1	TELIA COMPANY AB	0.95%	0.15	0.45
KORAVF1	SK TELECOM CO LTD	0.32%	0.22	0.06
NORAUE1	TELENOR ASA	1.14%	0.22	0.23
CHIACE1	ENTEL TELECOMUNICATION(EMPRESA NAC)	0.11%	0.25	0.66
NZEACV1	SPARK NEW ZEALAND LTD	0.35%	0.27	0.13
THAAPK1	TRUE CORPORATION PCL	0.16%	0.27	0.71
UKIAJX1	VODAFONE GROUP PLC	3.23%	0.28	0.64
MALCCW1	MAXIS BHD	0.23%	0.28	0.33
TAIBHL1	TAIWAN MOBILE CO LTD	0.43%	0.30	0.25
SWIAOV1	SWISSCOM AG	0.92%	0.30	0.33
FINAGI1	ELISA OYJ	0.50%	0.31	0.16
USAMT11	AT&T INC	17.98%	0.36	0.87

USA97W1	T-MOBILE US INC	1.95%	0.37	0.86
CANADJ1	BCE INC	0.51%	0.39	0.30
MALCCA1	AXIATA GROUP BHD	0.25%	0.41	0.90
CANITX1	TELUS CORP	0.54%	0.43	0.26
FRAFJQ1	ILIAD SA	0.21%	0.58	0.70
ITAACY1	TELECOM ITALIA SPA	0.37%	0.62	0.98
ITAACY2	TELECOM ITALIA SPA	0.23%	0.62	0.97
SAFAY1	MTN GROUP LTD	0.91%	0.63	0.69
CANAII2	ROGERS COMMUNICATIONS INC	1.42%	0.66	0.28
SAUACT1	ETIHAD ETISALAT CO	0.10%	0.69	0.64
SPACVH1	CELLNEX TELECOM SA	0.54%	0.72	0.68
MALAKK1	TELEKOM MALAYSIA BHD	0.09%	0.73	0.79
PHIAAL1	PLDT INC	0.15%	0.77	0.04
INDDMX1	BHARTI AIRTEL LTD	0.69%	0.80	0.41
JPNIO81	SOFTBANK CORP	1.62%	0.81	0.85
THAALW1	ADVANCED INFO SERVICE PCL	0.61%	0.82	0.19
HKGHLZ1	HKT TRUST AND HKT LTD	0.45%	0.83	0.02
UKIACG1	BT GROUP PLC	1.48%	0.90	0.51
PHIAAH1	GLOBE TELECOM INC	0.10%	0.93	0.11
GERAPA1	DEUTSCHE TELEKOM AG	4.22%	0.93	0.35
<b>High</b>		<b>33.75%</b>	<b>1.26</b>	<b>0.68</b>
SWECAL1	MILLICOM INTERNATIONAL CELLULAR SA	0.28%	1.03	0.52
USABND1	VERIZON COMMUNICATIONS INC	17.22%	1.08	0.38
FRAEDB1	ORANGE	2.25%	1.09	0.43
THABCZ1	TOTAL ACCESS COMMUNICATION PCL	0.09%	1.12	0.67
SPAACN1	TELEFONICA SA	2.84%	1.14	0.65
NETAKA1	KONINKLIJKE KPN NV	0.79%	1.21	0.52
USAOB21	SPRINT CORP	0.43%	1.23	0.71
QATAAN1	OOREDOO QSC	0.01%	1.24	0.49
MALBIR1	DIGI.COM BHD	0.28%	1.24	0.47
MEXAQL3	AMERICA MOVIL SAB DE CV	1.80%	1.41	0.65
USBCTS1	ZAYO GROUP HLDGS INC	0.57%	1.44	0.98
USACPQ1	CENTURYLINK INC	0.85%	1.60	1.15
JPNEMW1	SOFTBANK GROUP CORP	5.76%	1.76	1.69
INDEAB1	VODAFONE IDEA LTD	0.09%	2.11	-0.11
USA3U51	MTS	0.32%	2.14	0.65
HKGZAN1	PCCW LIMITED	0.18%	2.48	0.36

### Real world examples

In Table 4, we have taken four historical examples of increasing leverage leading to an increase in the risk profile and cost of equity for telecommunications firms.

To calculate the implied cost of equity, we have made certain, market-based assumptions for inputs to a DCF that would isolate the leverage and cost of equity factors. These assumptions were standardised across all the firms at different points in time to compare the change in cost of equity with changes in leverage.

**It can be seen from these examples that as these companies have increased their leverage (on a Net Debt to EBITDA basis) their implied cost of equity has risen (in some cases quite dramatically).** Across the range of leveraging events, even reasonably modest increases in leverage led to an increase in cost of equity, while substantial leverage increases led to significant cost of equity increases.

**Table 3**

<b>L1 DCF assumptions</b>	
Share price	Actual at date
Revenue	Consensus expectations at relevant date
EBITDA	Consensus expectations at relevant date
EBIT	Consensus expectations at relevant date
Capex	Consensus expectations at relevant date
Net Debt	Actual at date
Shares outstanding	Actual at date
Tax rate	Statutory
Terminal growth rate	2.50%
Cost of debt	One year forward consensus estimate
Debt to equity	Actual debt as per filings, equity as per market capitalisation
ND/EBITDA	One year forward consensus estimate
Cost of equity	Implied from DCF

# L1 CAPITAL

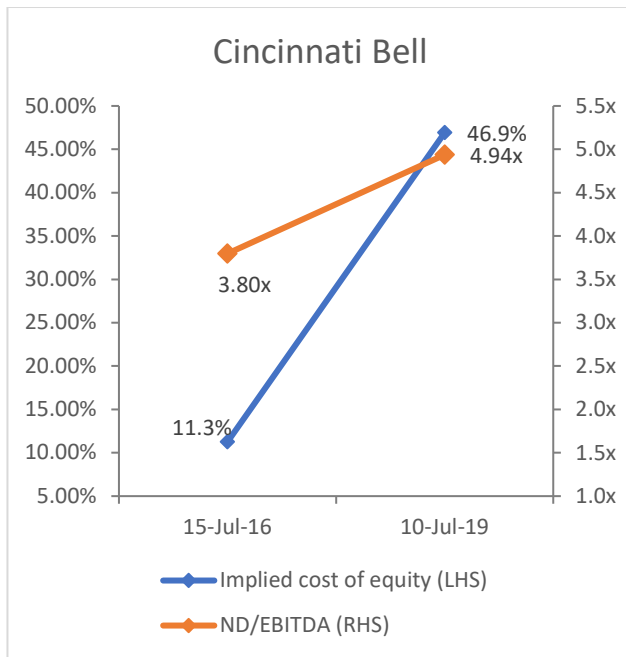
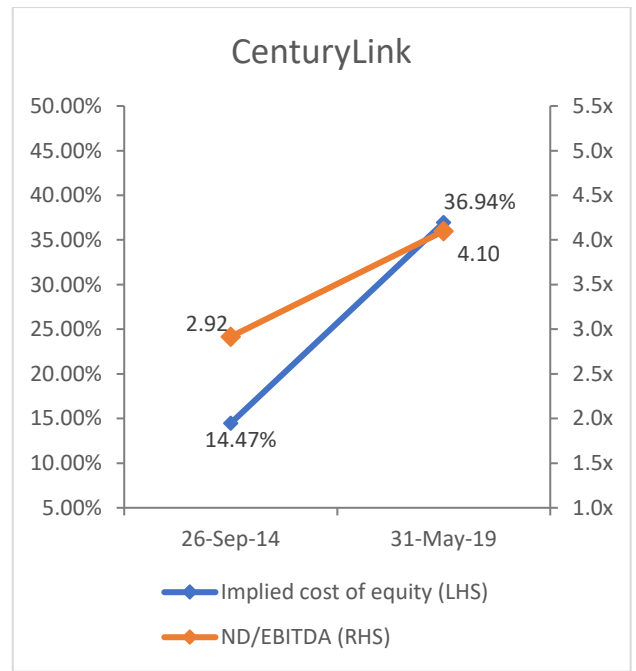
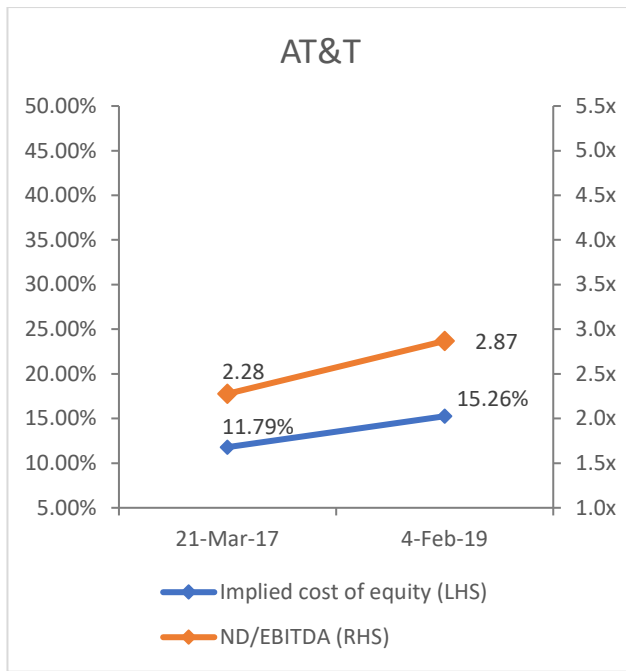


Table 4

L1 Summary Financials						
Company	AT&T	AT&T	CenturyLink	CenturyLink	Cincinnati Bell	Cincinnati Bell
Date	21-Mar-17	4-Feb-19	26-Sep-14	31-May-19	15-Jul-16	10-Jul-19
Price	42.08	29.61	40.31	10.45	25.10	4.70
<b>ND/EBITDA</b>	<b>2.28</b>	<b>2.87</b>	<b>2.92</b>	<b>4.10</b>	<b>3.80</b>	<b>4.94</b>
Cost of Debt	4.10%	4.60%	6.30%	5.60%	6.90%	6.90%
WACC	8.94%	10.07%	9.69%	12.06%	7.93%	9.89%
<b>Implied CoE</b>	<b>11.79%</b>	<b>15.26%</b>	<b>14.47%</b>	<b>36.94%</b>	<b>11.26%</b>	<b>46.91%</b>