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11 March 2003

Douglas Webb
Telecommunications Commissioner
Commerce Commission
PO Box 2351
WELLINGTON

Dear Douglas

Section 64 Unbundling Review

Please find attached a paper prepared by Professor Neil Quigley of Charles River Associates (Asia Pacific) Limited, outlining the policy issues the Commission must address in its forthcoming investigation into local loop unbundling.

The paper raises some interesting issues which Telecom believes will assist the Commission in determining the course of its investigation. Principal amongst the points Professor Quigley raises are:

- The exact scope of the unbundling review is unclear from the words of section 64. However, the designation or specification of any form of unbundling would represent a more intrusive form of regulation than those forms currently provided for under the Act;
- The objectives and purpose of the Act differentiate New Zealand's approach to the regulation of telecommunications services from that taken elsewhere. More specifically, as compared with other jurisdictions where the entry of competitors into telecommunications markets is a goal, New Zealand's approach is to focus on the long-term benefits to end-users, with efficiency a required consideration; and
- In the context of unbundling, dynamic efficiency is of central importance to the long-term benefits of end-users of telecommunications services.

I trust you will find Professor Quigley's paper of help, and hope that you will consider the issues raised in it useful in formulating the Commission's issues paper. Please contact me if you wish to discuss this paper, or any of the issues raised in it, further.

Yours sincerely

A handwritten signature in blue ink, appearing to be "B. Parkes".

Bruce Parkes
General Manager
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FINAL REPORT

The Public Policy Framework for the Consideration of Local Loop Unbundling

Submitted to

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7 March 2003

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1. INTRODUCTION

1.1. BACKGROUND

1. Under the Telecommunications Act 2001 (“the Act”) the Commerce Commission is required to report to the Minister by December 2003 on whether:
 - Access to the unbundled elements of Telecom’s local loop network; and/or
 - Access to the unbundled elements of, and interconnection with, Telecom’s fixed PDN (Public Data Network)should be a designated service or a specified service.
2. Consideration of the introduction of local loop unbundling (LLU) is a major public policy issue. LLU has the potential to have a major impact on the nature of competition, the efficiency of the telecommunications industry, and the long-term interests of end-users of telecommunications services. The importance of the public policy decision is amplified by the fact that LLU represents a more intrusive form of regulation than those currently provided under the Telecommunications Act. In particular, some forms of LLU go much further in abrogating existing private property rights and in providing for regulatory determination of market structure than any existing provisions in the Act.

1.2. PUBLIC POLICY FRAMEWORK

3. Telecom NZ Ltd has requested that I prepare this paper setting out the public policy perspective within which the potential adoption of LLU should be assessed. I consider that there are four broad public policy issues that must be considered in assessing the potential adoption of LLU, and these may be framed as questions for consideration.
 - What form of LLU is to be considered?
 - Is LLU consistent with the regulatory structures already established in the Act and with the objectives of telecommunications regulation as they are set out in the Act?
 - What are the costs of LLU, and what are the relevant benchmarks for considering whether LLU will provide long-term net benefits to end users of Telecommunications services?
 - Does LLU provide net benefits over and above those provided by less intrusive approaches to regulation?

1.3. STRUCTURE OF THE PAPER

4. Consistent with the approach to the public policy issues set out above, this paper is structured as follows:
 - Section 2 considers the definition of LLU contained in section 64 of the Act and places this in the context of the alternative definitions of LLU that have been adopted in other jurisdictions;
 - Section 3 considers the consistency of LLU with the existing Telecommunications Act, particularly:
 - The Purpose Statement of the Act;
 - The wholesaling regime that is already provided in the Act; and
 - The implications for decisions (particularly pricing determinations) that have already been made under the Act;
 - Sections 4 and 5 provide a framework for considering the costs and benefits of LLU. This task is made more complicated by the fact that the words of the Act do not provide a clear indication of the types of unbundling that might be considered. My examination of the issues to be considered in weighing up the costs and benefits of LLU therefore concentrates on network element unbundling which provides entrants with the right to obtain exclusive access to network elements. I do not explicitly consider service component unbundling or shared access to the network, though the framework that I provide is applicable (with different weighting) to these alternative definitions of LLU. Using this approach:
 - Section 4 sets out the investment and regulatory context within which the potential benefits of LLU are expected to be derived by end users;
 - Section 5 examines the potential costs of LLU, particularly:
 - The impact of LLU on existing property rights and the implications of regulatory abrogation of private property rights;
 - The costs of introducing a regime in which rental rates need to be determined by the Commission;
 - The transaction costs associated with an LLU regime; and
 - The potential for arbitrage around regulated prices; and
 - Section 6 contains my conclusions.

2. DEFINING UNBUNDLING

2.1. INTRODUCTION

5. Unbundling introduces mandatory obligations on the incumbent telecommunications network owner to share with or lease to its competitors individual elements of its network. Within the scope of this definition of LLU lie a very wide range of alternative approaches which may be defined in four different dimensions:
- The boundaries defining the portion of the physical network to which unbundling will be applied;
 - The inclusion or exclusion of services in the definition of the network elements available for unbundling;
 - The rights and obligations imposed on the user of any unbundled element of the network; and
 - The choice between regulated and commercially negotiated prices for the unbundled network elements.
6. In this section, I describe unbundling, the definitional issues raised by the words relating to unbundling in section 64 of the Act, and the key choices that the Commission must make in deciding exactly what definition of unbundling it will adopt.

2.2. DEFINING LLU

7. LLU may oblige an incumbent carrier to make individual “unbundled” elements of its network available for lease by competing service providers and/or carriers, or require that the elements be shared with these competitors. The unbundled elements may be physical or logical network components, or operational processes.
8. LLU may make it possible for an entrant to utilise on a shared basis or lease for exclusive use the access distribution technology of an incumbent operator. The entrant uses these network elements to deliver services using the entrant’s own technology located on the ends of the incumbent’s distribution network (such as a line card).
9. LLU may be viewed as part of the broader spectrum of access regimes, of which resale of products purchased on a wholesale basis is at one end and unbundling of networks is at the other.

2.3. THE DEFINITION OF UNBUNDLING IN THE TELECOMMUNICATIONS ACT

10. The definition of the type of unbundling that the Commission is required to report is contained in section 64 of the Telecommunications Act. The relevant parts of section 64 are:

- *The Commission must, within 24 months after the commencement of this Act, deliver to the Minister a final report under clause 4 of Schedule 3 on whether or not each of the following services should be a designated service or a specified service:*

- a. *access to the unbundled elements of Telecom's local loop network;*
- b. *access to the unbundled elements of, and interconnection with, Telecom's fixed PDN.*

11. The relevant terms are defined in the Act, as follows:

***local loop network** means all lines, including cables and aerial lines, between a residential or business telecommunications services user's distribution point where it enters the user's building (or, in the case of commercial buildings, the building distribution frames) and the local telephone exchange distribution frame or optical fibre distribution frame or equivalent facility.*

fixed PDN:

- (a) *means a PDN, or that part of a PDN, that connects an end-user's building (or, in the case of commercial buildings, the building distribution frames) to a data switch or equivalent facility; and*
- (b) *includes the data switch or equivalent facility and that part of the overall telecommunications link within the building that connects to the end-user's equipment.*

(PDN, or public data network is in turn defined as "a data network used, or intended for use, in whole or in part, by the public.")

12. I note that:

- The definition of the local loop network that may be unbundled appears to include only the lines and cables connecting the exchange with the end-user's premises, and thus to exclude all other aspects of the local access network. In contrast, the PDN is defined to include some switches and other equipment, but apparently only those located within the end-user's premises;
- The Commission is required to investigate PDN interconnection, but not local loop interconnection;

- The Commission is required to consider whether there should be access to the unbundled "elements" of the local loop network but it is not clear what is meant by the word "element", given that the local loop network is just a line between two places; and
 - Section 64(1) refers to "services" that may be unbundled, but there is nothing in the definition of the local loop and the PDN which suggests that it was intended that the Commission consider service component unbundling as well as network element unbundling.
13. The issues noted in paragraph 12 above suggest that there is considerable ambiguity in the wording of section 64. Before commencing its investigation, the Commission must therefore interpret the meaning of section 64. In making this interpretation the Commission must make a number of choices that will have significant implications for the conclusions of the report and the commercial implications of any recommendations.

2.4. THE CHOICES FOR THE COMMISSION

14. A broad range of interpretations may, and in other jurisdictions have, been given to the term "local loop unbundling". When this fact is combined with the lack of clarity in the exact nature of the review that is required under Section 64, it is evident that the Commission has a wide range of choices to consider as part of its review. The principal choices to be made appear to be as follows:
- The sections of the network to which unbundling may be applied. Here the choices include not just the inclusion or exclusion of individual elements of the network, but the potential to exclude mandatory unbundling of:
 - Network elements where effective competition already exists or emerges in the relevant market after the introduction of unbundling;
 - Network elements where mandatory unbundling may provide a disincentive for new investment and thus reduce the diversity of technologies and platforms available to provide services to consumers in the long run; and
 - Network elements which are upgraded where continuation of mandatory unbundling of the existing (prior to upgrading) element, or bundling of the new element, would be a serious disincentive for upgrading investment.
 - The nature of the service that is to be designated or specified, and in particular:
 - Whether unbundling means the requirement to grant a lease for exclusive use of a physical network element or a requirement to share the use of a physical network element; and

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- Whether “service” includes the services provided by the incumbent over its network or just the physical network infrastructure;
 - The determination of the price for the unbundled service. If the service is specified, then the price is not regulated and will be determined by commercial negotiation, but if the service is designated then the Commission must determine the pricing principle that will be used in setting the price; and
 - The terms of use and the allocation of maintenance costs between the lessee of the network element and the lessor, or between the parties sharing use of the network element.
15. In making these choices the Commission will (in terms of section 19 of the Act) consider the Purpose Statement (section 18) of the Act and make the choices that give or are likely to give best effect to the purpose statement. In the next section of this paper I consider both the application of section 18 to unbundling and implications of unbundling for the existing regulatory mechanisms provided in the Telecommunications Act.

3. CONSISTENCY WITH THE TELECOMMUNICATIONS ACT

3.1. INTRODUCTION

16. If LLU were introduced in New Zealand in the future, it would be introduced into an environment in which there would be an existing framework for telecommunications regulation, an existing body of procedures, decisions and regulatory price determinations under the Telecommunications Act 2001. The costs and benefits of introducing LLU will therefore be affected by the consistency of LLU with the existing framework of and approach to regulation. If LLU represents a major departure from the existing regulatory framework (in the sense that it would require large scale reconsideration of that framework or the decisions made under it) then this certainly raises the costs of LLU from the point of view of the Telecommunications Commissioner, industry participants and society as a whole. Below I consider issues bearing on the consistency of LLU with the regulatory framework established by the Telecommunications Act (2001).

3.2. THE PURPOSE STATEMENT

17. Section 18 of the Telecommunications Act (2001) states that:

(1) *The purpose of this Part and Schedules 1 to 3 is to promote competition in Telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand by regulating, and providing for the regulation of, the supply of certain telecommunications services between service providers.*

And that:

(2) *In determining whether or not, or the extent to which, any act of omission will result, or will be likely to result, in competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand, the efficiencies that will result, or will be likely to result, from that act or omission must be considered.*

18. In its guide to making access determinations under the Act the Commission has identified three parts to section 18:
- The promotion of competition;
 - The long-term benefit of end users; and
 - Efficiency.

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19. These three components of the Act's purpose statement are interpreted jointly rather than separately. For example, competition is not to be promoted as an end in itself, but only in so far as it provides for benefits to end-users and is efficient. Similarly, policies that provide benefits to end users but that do not result in efficiency would also be ruled out.
20. The objectives for which the Act promotes competition and the link back to efficiency differentiate the New Zealand approach from that in other jurisdictions. In particular, in the US the promotion of competition is:

... in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.¹

21. In contrast, the promotion of competition in New Zealand is:

... for the long term benefit of end users of telecommunications services ...

with efficiency being a required consideration. Thus, the US test results in considerable weight being placed on the promotion of entry to telecommunications markets,² whereas a test of long term benefits to end users, with an efficiency focus, does not promote that entry, for its own sake.

22. The promotion of the long-term interests of end-users effectively requires the creation of a dynamically efficient environment within which carriers and service providers are provided with the incentives to make efficient investment decisions. In the context of LLU this raises questions about the dynamic efficiency of the incentives provided for the incumbent if its infrastructure is subject to a regulatory requirement for sharing with or leasing to its competitors. That is, the assessment should consider explicitly the effect of mandatory unbundling on innovation, investment, the introduction of new technologies, and the phasing-out of old technologies. While static concepts of price and market share are also relevant, the focus should be on incentivising innovation and investment, since long-term consumer benefits are derived primarily from investment in, development of, and ultimately deployment of new technologies.

¹ Preamble to the Telecommunications Act of 1996, Pub. LA. No. 104-104, 110 Stat. 56 (1996).

² For example, Jerry Hausman ("Competition and Regulation for Internet-Related Services: Competition and 3G in the Future" 2001:17) has noted that in the US the FCC operates under a "public interest" rule rather than a consumer welfare rule.² One particularly important distinction between "public interest" and "consumer welfare" tests is that the former (at least as applied by the FCC) may result in weight being placed on the promotion of entry to telecommunications markets and the benefits that entrants obtain from policies such as LLU, whereas a consumer welfare test allows no such considerations unless benefits to end-users of telecommunications services can be demonstrated.

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23. A focus on dynamic efficiency also raises questions about whether it is in the long-term interests of end-users to provide *de facto* full coverage of the local loop without the commitment that is associated with fixed capital investment in network infrastructure? Crandall and Hausman (2000) argue that the ability of entrants in the US telecommunications industry to rent unbundled network elements at prices below market rates rather than make fixed capital investments of their own encouraged rapid expansion: the more they expanded the larger the dollar value of the subsidy that they obtained by renting network from the incumbents.³ Subsidies are normally difficult to justify on grounds of economic efficiency, and the more so in cases where the regulatory determination of prices set at subsidy levels will drive (and distort from the efficient level) business strategy and investment decisions for entrants and incumbents.

3.3. IMPLICATIONS FOR THE EXISTING WHOLESALE REGIME

24. LLU would have implications for the wholesale regime established by the current Telecommunications Act because unbundling and resale have, from the point of view of entrants, elements of substitutability. For example, under an LLU regime it is possible to obtain the use of all of the network elements required to deliver products of the incumbent: that is, leasing or sharing unbundled elements may provide a perfect technical substitute for wholesale purchase.
25. It is not clear what pricing principal would be used to set the rates for use of unbundled network elements if the Commission was to recommend that the elements of the local loop should become a designated service. Most jurisdictions using LLU have adopted a form of cost-based pricing. However, that form of pricing may be required by the particular form of LLU they have used. Until the decisions on the type of LLU appropriate for New Zealand have been taken, some form of “retail-minus” pricing cannot be ruled out.
26. Wholesale prices are determined by a discount from observed retail prices. So long as the margin is set at the correct level and retail prices are correctly observed, then competition can emerge even if retail prices are above or below the efficient level.
27. Where LLU and wholesale purchase are technical substitutes but priced using different pricing principles, the potential for arbitrage looms large. Regulators are, of course, cognisant of the problems created by arbitrage between regulatory prices, but in practice the problems are very difficult to resolve.

³ R. Crandall and J. Hausman (2000), “Competition in U.S. Telecommunications Services Four Years After the 1996 Act, in S. Peltzman and C. Winston, eds., *Deregulation of Network Industries*, 2000.

28. If LLU is introduced, and if the type of LLU adopted provides entrants with the option of leasing the elements required on the basis of prices calculated on a bottom-up basis, arbitrage options will be created. Entrants will certainly make detailed comparisons of the relative costs of obtaining wholesale products directly or by leasing the facilities,⁴ and even relatively small errors in regulatory prices may drive the market entirely to wholesale purchase or entirely to LLU.⁵

3.4. IMPLICATIONS FOR PRICING DECISIONS UNDER THE TELECOMMUNICATIONS ACT

29. If LLU were introduced in New Zealand, it would likely occur at a point in time when a substantial number of interpretations of and determinations under the Telecommunications Act (2001) had been provided by the Commission. We could also expect that that body of interpretation and decision would be reflected in the behaviour of telecommunications firms operating in New Zealand. If LLU were introduced, the value of those precedents of interpretation and determination might be undermined where the efficient price is endogenous to the presence or absence of LLU and the rental rates established for unbundled network elements.
30. The ability to lease or obtain shared access to unbundled network elements provides entrant telecommunications carriers with de facto full coverage of local access facilities to end-users of telecommunications services. Entrants who sign up customers on this basis must pay two prices: the rental payments for the network and the interconnection charges applicable when calls of their customers terminate on the incumbent's network. As Laffont and Tirole (2000: 209–10) point out what matters from an efficiency perspective is the network rental price because:

By setting the local loop rental charge equal to the full fixed cost per customer (marginal cost of connecting a consumer plus the per line common cost), the regulator guarantees that the incumbent and the entrant face the same fixed cost per customer they enrol (not only at the margin, but also on average). This policy defines a level playing field that is a prerequisite for an efficient allocation of resources.

31. The above analysis provides one example of the extent to which determinations made under the Telecommunications Act (2001) might need to be revisited if LLU was added to the bundle of regulatory impositions on the telecommunications market in New Zealand.

⁴ The price of the lease will take account not only of the cost of the equipment leased but also the terms of the lease and the value of the options created by it – see section 4.2 below.

⁵ The general incentive problem here is one of 'adverse selection' – retail market competition may not deliver the full benefits simply because of opportunistic market entry caused by regulatory pricing errors.

4. BENEFITS OF LLU

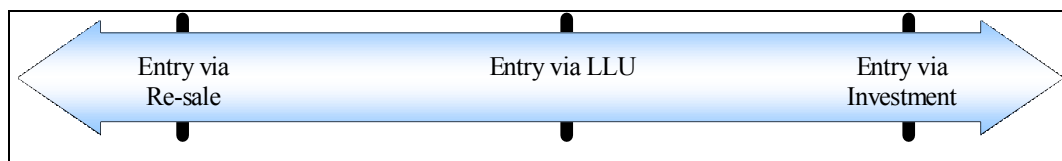
4.1. LLU IN THE CONTEXT OF ALTERNATIVE INVESTMENT AND REGULATORY STRATEGIES

32. The delivery of telecommunications services to consumers requires a telecommunications network infrastructure. Where an incumbent has already invested in a network, potential entrants may adopt one of three strategies:
- Entry as a reseller, purchasing on a wholesale basis the services produced by the incumbent on their existing network;
 - Entry as a full service provider, utilising leased elements of the incumbent's network but with the potential to create different services from those of the incumbent through selective investment in network elements that can allow the delivery of new services over the existing infrastructure; and
 - Entry through investment in a competing network, and interconnection with the existing network.

Regulatory intervention to promote entry can be given effect through mandatory wholesale of network services and/or LLU.

33. Each of these forms of entry may be thought of as being on a continuum of entry options defined by the intensity of investment required by the entrant (Figure 1). At one end of the continuum, entry through resale of existing services requires no investment in network infrastructure.

Figure 1: Forms of Open Access and Investment Intensity



34. LLU provides the potential for some new investment by the entrant, though this is restricted to value-added services which can technically interface with the incumbent's network. While this seriously constrains the variety of products able to be delivered to the end user, product competition may occur between rival services, such as Smartphone and data applications.
35. Entry via investment in a new network provides the entrant with the full range of competitive options for the offer of alternative services and the use of alternative technologies to those available to the incumbent. The rollout of the TelstraClear network in Wellington and Christchurch is an example of this form of entry.

4.2. EXPECTED BENEFITS OF LLU

36. The public policy rationale for network unbundling in the US, UK and other jurisdictions that have introduced it is to facilitate the transition to a telecommunications industry structure that features competitors offering services and using infrastructure that are at least in part distinct from those of the incumbent.
37. There are two primary types of benefits that can be expected from the introduction of LLU:
- Promotion of the entry of rivals into the market and the rollout of new (particularly broadband) services using the existing network; and
 - Increased competition between rival *applications* providers (though not necessarily between *infrastructure* providers).

4.2.1. Ease of Entry

38. According to the OECD (2001:15)⁶:

Initiatives to open the local loop are viewed by most OECD governments as being fundamental to promoting a fast roll out of broadband services.

39. LLU may permit competitive entry to occur in circumstances where it is not economically feasible to build a competing network (even assuming that the competing networks would not employ identical technology). In addition to the normal concerns about the density of consumers and the value of services purchased that are required to create the expectation that a competing network will be feasible, entry may be inhibited by factors such as:
- Space limitations in commercial buildings where there is space for only one or two telecommunications companies in the wiring room. This provides the incumbent with a first mover advantage;⁷ and
 - Environmental and local government regulation of the rollout of new wireline network.⁸

⁶ OECD (2001), "The Development of Broadband Access in OECD Countries", OECD, Paris, DSTI/ICCP/TISP(2001)2/FINAL.

⁷ This disadvantage to competitive providers is limited to *late* entrants. See R. W. Crandall, "An Assessment of the Competitive Local Exchange Carriers Five Years After the Passage of the Telecommunications Act", June 2001 (revised January 2002); <http://www.criterioneconomics.com/documents/Crandall%20CLEC.pdf>

⁸ It should be noted that where such impediments exist, there are essentially legislated impediments that have nothing to do with market conditions or other structural barriers.

40. An additional benefit of LLU may be the reduced time to market for firms that do not have to roll out new network prior to delivering new services.
41. An extension of unbundling to service components in addition to physical network elements cannot be justified by these arguments because the large fixed costs are in the construction of the physical network not in the investments required to offer services over that network.

4.2.2. Applications Rivalry

42. LLU provides competitive entrants with another channel for the delivery of services to end-users. Under LLU, competitive entrants purchase access to the incumbent's distribution network and deliver services to end users in competition with the incumbent service provider. This provides a degree of static competition between the incumbent and competitive entrants that may have the effect of lowering market prices. In addition, some diversification of services may be possible under LLU. I am unaware, however, of any evidence that this has actually occurred overseas.
43. The diversity of services, and the degree of rivalry that ensues, is inherently constrained by the requirement to deliver services either using technology that is the same as or compatible with the incumbent's technology. LLU will not deliver services that require either a new technology or an enhancement to existing local loop distribution technology.

4.2.3. Value as a Transitional Regulatory Policy

44. It is sometimes suggested that LLU is intended to establish a transitional regime that stimulates and promotes competition, but that can be dismantled or wound back once *real and sustainable* local network competition is deemed to have emerged.
45. The key issue with transitional regulation is one of credible regulatory commitment. The commitment to make the regime transitional is only credible if the regulator can establish rules for winding back the regulation that are clearly based on observable indicators of dynamic efficiency, e.g. proliferation of new products and services, emergence of intense non-price competition.
46. The difficulties in winding back an LLU regime once it is in place are illustrated by the fact that in the US some CLEC's have argued that even in areas where facilities deployment can be justified, they still need access to unbundled network elements because:
 - Entrants will not risk deploying their own networks without assurance of having customers to pay for them; and
 - Customers are not willing to commit to service and then wait for facilities to be deployed.

4.3. SUMMARY

47. LLU enables an entrant to match or nearly match the incumbent on issues such as reach, scope, value and customer relationship.
48. LLU may provide increased competition in telecommunications markets in situations in which it is not economically feasible to duplicate the existing distribution network. Some limited competition and service differentiation can occur where an entrant can invest in technologies that deliver different services to those of the incumbent over the incumbent's distribution network⁹. If an entrant believes that they can create a market for such services, LLU may give them the right to lease or share network elements at a regulated price in order to deliver the services to consumers without investment in an alternative distribution network.
49. LLU may provide for entry earlier than would be possible without regulation, since the ability to lease specific network elements removes from entrants the cost associated with using up very valuable real options (to delay) by investing in a full competing network.

⁹ It should be noted that the (dynamic efficiency) benefits of telecommunications competition *do not* include regulated transfers of income from the private owners (and shareholders) of an incumbent to end-users and especially the incumbent's competitors.

5. COSTS OF LLU

5.1. INTRODUCTION

50. The potential costs of LLU arise mainly from its relative intrusiveness as a form of regulation. In practice, “intrusive” means that LLU has relatively more important implications for the property rights of the incumbent and the transaction costs incurred by incumbent. It also means that it creates a complex regulatory framework with the potential for competition to be shaped largely by arbitrage between imperfectly-set regulated prices.
51. Below I provide a framework for considering the costs that arise when LLU is introduced. Because it would be extremely cumbersome to assess the application of each type of cost to all possible forms of LLU, my framework is developed with reference to the requirement that the incumbent lease individual elements of its network. The framework provided will, however, be applicable to other types of LLU (with different weightings on each factor).

5.2. LEASING

52. If LLU is designated and thus provides entrants with the ability to lease assets of the incumbent at predetermined regulatory prices, the Commission would be required to determine efficient rental rates for individual network elements. The Telecommunications Act requires the Commission to make a number of pricing determinations based on forward-looking costs. The determination of rental rates for unbundled network elements will require detailed data on costs of individual network elements, the expected rate of depreciation in capital value, and the cost of capital associated with ownership of the asset consistent with the cost methodologies that the Commission is currently establishing in other contexts. The requirements for the calculation of efficient rental rates, however, go well beyond these issues.
53. The complexity associated with the calculation of an efficient rental payment comes from the fact that a lease both transfers property rights associated with the exclusive use of network elements and transfers risks associated with the ownership and use of the network element. The allocation of risk-bearing between the lessee and lessor will depend on the provisions in the lease and on particular circumstances specific to the firm (such as the probability of bankruptcy) and specific to the asset (such as the expected path of the market price of the asset over time). Thus, the calculation of the efficient price for a lease goes well beyond calculations based simply on cost.

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54. The most important risk borne by the lessor is the risk of changes in asset value. So long as the lessee has the option to quit the lease at any time, then the lessee does not share any of the risk of unanticipated changes in asset value unless these are reflected in the rental payments. In the case of telecommunications network elements, the risk of bypass by a new technology is a particularly important cost that would be priced into the market rental payments required of a lessee. Entrants to the telecommunications industry may place a very high value on the ability to lease network elements because they substantially reduce their risk of bankruptcy by avoiding the risk of marked changes in the value of the assets that they require to offer their services.
55. The different terms associated with lease contracts may be thought of as complex combinations of real options provided to or by the parties to the lease agreement. For example, leasing preserves the real option of the entrant to wait to invest, and a lease that may be cancelled by the lessee at short notice preserves the lessee's option to adopt a new technology as soon as an alternative network is available. These options are costly for the incumbent (the lessor) to provide, and valuable to the lessee, and thus should be reflected in the rental payments for network elements that are set by the regulator.
56. The calculation of an efficient rental payment requires a fundamentally different methodology and approach to the calculation of price than those currently being used by the Commission under the Telecommunications Act. More importantly, there is in the economics and finance literature no well-established methodology for the valuation of the terms of lease contracts, and recent developments in the application of the theory of real options means that our understanding of how to value the bundle of options embodied in lease contracts is still being developed.

57. The dynamic framework is especially relevant to LLU because of the stream of new access technologies that is becoming available. Some of these technologies have only recently been adopted and introduced into the local market, while others are nearing commercialisation in other countries. In my view, the main risk associated with LLU is its potential to stifle incentives for investment in and hence introduction of new access technologies. It is clear that the long term benefits to end users will not be maximised if the private incentives for telecommunications companies to maintain existing equipment and to invest in new technology are reduced or eliminated.¹⁰ Therefore, any assessment of the expected benefits and costs of LLU should carefully consider the impact on investment, as well as price.¹¹

5.3. PRIVATE PROPERTY AND INVESTMENT INCENTIVES

58. One of the most fundamental preconditions for the organisation of a modern market economy is the creation of a legal framework that provides for clear specification and enforcement of property rights. Property rights are also essential for production because companies (and shareholders) who invest in productive assets need assurances that they can appropriate the rewards from their investment. Without property rights there is no incentive for anyone to invest in or own productive assets as there would be no assured rewards for incurring the costs of investment and ownership.
59. Ownership of a property right should mean that a person or group of persons controls a three-element bundle of property rights in which each of the rights can be, in principle, separated from the others. The rights are:
- To use the resource (to realise income or otherwise);
 - To exclude others from using the resource; and
 - To transfer control of this bundle of rights to others.

In other words, ownership provides exclusive, alienable rights to use. Ownership of a right to use a resource implies an ability, simply by withholding permission, to exclude others from exercising the same right.

¹⁰ In their work conducted on behalf of members of the High Tech Broadband Coalition (comprising of suppliers of high technology products), Haring and Rohlfs (2002) argue that unbundling has the potential to expropriate the real value option of ILECs and bestow it upon CLECs. This will in turn create severe disincentives for ILEC infrastructure investments to support mass DSL deployment. See J. Haring and J. H. Rohlfs, "The Disincentives for ILEC Broadband Investment Afforded by Unbundling Requirements", Strategic Policy Research, Bethesda, MD, July 16 2002.

¹¹ The Productivity Commission in Australia has, following its twin public inquiry into open access to significant infrastructure facilities, highlighted the potential and undesirable 'chilling effect' of such regulation on investment. Productivity Commission (2001), *Telecommunications Competition Regulation*, Report No. 16, APGS, Canberra; and *Review of the National Access Regime*, Report No. 17, AGPS, Canberra.

60. Economists have long recognised that property rights may be undermined by regulation. Thus, while regulation may have its origins in a desire to address perceived problems in the functioning of a market economy, it also has the potential to reduce efficiency. If the threat of regulation is present, and the history of regulatory enforcement suggests that confiscation of existing property rights is a likely outcome if regulation is imposed, then investment in new technologies, services and infrastructure assets will be impaired. If property rights get undermined, such as through legislation mandating open access to a privately-owned network facility, there may be substantial efficiency and welfare losses (with little or no countervailing benefits) in the long run.¹²
61. Furthermore, economists have argued (especially in the context of the so-called ‘takings’ clause of the US Constitution) that regulatory or partial takings occur where government or its agent limits the nature of a property right by means of legislation and regulation. A similar view is slowly emerging in New Zealand, which includes the possibility of regulatory taking through planning processes, permits or other regulatory means. While there is a public policy rationale for limiting the exercise of property rights, the possibility of regulatory takings should be acknowledged and even compensated (when warranted by the circumstances) if only to improve quality of regulation.¹³
62. Where the rights associated with an asset or resource are dispersed, so that some subset of the rights is owned by different persons, it is not clear who, if anyone, controls that asset itself. This may have adverse implications for its use and its maintenance.
63. The property rights providing for use, and providing the right to exclude use by others, are abrogated by the introduction of LLU. The requirement to lease to an entrant at a regulated rental rate removes from the incumbent a major component of the property rights associated with its network assets. To justify such a major breach of the sanctity of property rights requires that LLU meet a very high net benefit test.

¹² The Hilmer Report recognises the “fundamental principle based on notions of private property and freedom to contract” and notes that it is “one not to be disturbed lightly” when introducing open access to ‘bottleneck facilities’ as a component of competition law in Australia. See the *National Competition Policy: Report by the Independent Committee of Inquiry*, 1993, AGPS, Canberra, p.24.

¹³ For a New Zealand view on the issue of regulation takings, see K. Guerin, “Protection Against Government Takings: Compensation for Regulation?” *New Zealand Treasury Working Paper 02/18*, September 2002.

64. LLU not only requires the incumbent to give up use rights in its property but also requires the incumbent to become a lessor. There is nothing in theory to say that the incumbent should be indifferent between ownership of an asset for its own use and ownership of an asset for lease. The incumbent will have the option of a wide variety of investment projects. It is entirely plausible that an asset that was attractive to own when it could be used is unattractive to own when the property right associated with use is removed. If there are synergies between ownership and use, then removal of the right to use may mean that an alternative use of the capital is more attractive.
65. The requirement to lease to entrants in fact amounts to requiring the incumbent to invest its capital in facilities provided to its competitors. The incumbent no longer has the option to redeploy that capital into areas where it may have a higher expected return, and in a world in which capital is scarce this will have substantial costs for the incumbent. LLU thus amounts to direction of the capital investment policy of the incumbent as well as the confiscation of its property rights.

5.4. LLU AND TRANSACTION COSTS

66. The theory of transaction costs provides the analytical tools for analysing the organisation of transactions (i.e. productive activities involving commercial and technical relationships) within and among formal hierarchical structures. According to Coase¹⁴, there are costs to carrying out transactions and these transaction costs differ depending on both the nature of the transaction and on the way that the transaction is undertaken. Transactions tend to occur in a market (i.e. between two or more firms) when doing so is efficient, and they are undertaken internally (within a firm) when doing so minimises the costs of carrying them out.
67. Subsequent development of the transaction costs approach by Williamson (1985)¹⁵ identified that transactions costs vary with particular attributes of the transaction. The attributes of relevance include:¹⁶
- The specificity of the investments required by the transaction;
 - The frequency of the transactions and the duration over which they are repeated; and
 - The complexity of the transaction.

14 R. Coase (1937), "The Nature of the Firm" *Economica N.S.*, Vol. 4, pp. 386-405.

15 O. Williamson (1985) *The Economic Institutions of Capitalism*, Free Press, London.

16 Other attributes include the difficulty of measuring performance in the transaction, and the connectedness of the transactions to other parties. For the purpose of this paper, these attributes are not crucial for the analysis and they have been ignored purely for reasons of parsimony.

68. The theory predicts that the market (as an organising structure) will fail to reflect the full economic value of transactions when such transactions involve specific and long-lived assets, have complex informational requirements and ongoing and close coordination between parties. In other words, such transactions are best undertaken internally within a firm. Conversely, transactions which do not involve specific or dedicated assets, have simple informational requirements (e.g. price and product description), and do not require ongoing coordination are best mediated at arms-length between firms acting through the market.
69. In commenting on the US early experience with local loop unbundling, Faulhaber (2001) offers the following transaction costs explanation for the limited success of LLU in bringing about enhanced competition¹⁷:

Congress and the FCC acted to insert a market boundary deep within the RBOC local exchange networks ... This market boundary involved extremely rich information flows across it, resulting in very high transaction costs. ... to ensure equality of treatment of CLECs, a highly detailed regulatory scheme ... flourished, complete with extensive complaint procedures and appeals as market participants tested the FCC and the courts' willingness to enforce the new regulation. It is the complexity of the market boundary which forces a complex regulatory regime to manage that market, and uncertainty and vagueness that encourages the legal and political gaming that results in very high political transaction cost. (my emphasis)

In other words, the prescribed points of interconnection have created untenable market boundaries with prohibitive transaction costs.¹⁸

70. The level of transaction costs may also be shaped by the terms and conditions under which an access seeker obtains access to the incumbent's facilities. These conditions can range from a regime with minimal 'reasonable access' obligations whereby the incumbent largely retains control of the assets and has minimal cost impositions, to a regime in which the local loop is considered a common resource to which all operators have equal rights of access, and the incumbent, as owner of the asset, is obliged to undertake any development of the assets to facilitate equal access.
71. Where LLU increases transaction costs it may result in an increase in prices as the network owner attempts to recover the additional costs imposed on it by the LLU regime. In this case, any analysis of LLU would need to consider the trade-off between the increase in prices paid by consumers and any long-run benefits that they might receive from LLU.

¹⁷ G. F. Faulhaber (2001) "Policy-Induced Competition: The Telecommunications Experiments", unpublished, http://bpp.wharton.upenn.edu/Acrobat/Faulhaber_AEW_10_3_01.pdf.

¹⁸ In another sense, LLU is a form of regulated interconnection applied at the extensive margins of an incumbent's PSTN. That is, the purported regulatory objective of LLU is to facilitate integration of an increasingly disparate network environment by making it possible for all carriers to interconnect to one another's network component.

5.5. REGULATORY ARBITRAGE

72. Arbitrage is a feature of all markets. The unique aspect of arbitrage around regulated prices is the fact that market participants are not free to respond to arbitrage by changing prices and the regulatory processes for responding may be relatively slow.
73. Since any regulatory process for determining prices may set prices at levels that are lower or higher than the efficient price, and since regulated prices cannot quickly be changed in response to market conditions, all regulatory prices create the opportunity for arbitrage. LLU both creates opportunities for regulatory arbitrage and extends those that exist as a result of other regulated prices.
74. The arbitrage opportunities created by LLU flow from the entrants' incentives to lease undervalued facilities and supply the overvalued facilities themselves. Arbitrage around imperfect regulatory prices will result in entrants adopting more diverse and complex strategies for the lease of the incumbent's facilities than would occur if all prices were negotiated on a commercial basis.
75. Thus LLU extends the potential for market structure, competition and the profitability of individual telecommunications companies to be determined by the regulatory prices that they face. It greatly increases the potential distortions from inaccurate regulatory price setting on other fronts (such as wholesale and interconnection).

5.6. SUMMARY

76. The principal costs associated with LLU appear to be its potential to abrogate property rights of the incumbent, and the implications of this abrogation of property rights for the incentives to undertake investment. LLU may also be associated with very high transactions costs, and its efficiency may be affected both by the magnitude of these transactions costs and the way in which they are allocated in regulatory price determinations. The transactions costs associated with LLU may result in consumers paying higher prices for telecommunications services. Finally, if LLU is provided at a regulated price, and that price is based on an assessment of the costs of individual network elements, it may create opportunities for arbitrage between this price and those set in other regulatory mechanisms provided under the Act.

6. CONCLUSION

77. LLU is designed to facilitate competitive strategies that lie between reselling of wholesale services and network bypass resulting from infrastructure investment. Under LLU, entrants may share or lease individual elements of the incumbent's network.
78. The form of unbundling to be considered by the Commission is not clear from the words used in section 64 of the Act, and a wide variety of approaches to unbundling can be found in the other jurisdictions that have adopted it. The Commission's analysis must begin by making a range of choices about the types of unbundling to be considered, and those choices must be consistent with the purpose of the Act: competition, efficiency, and long-term benefit to end-users.
79. LLU is a different and more intrusive form of regulation of telecommunications than any of those approaches to regulation currently embodied within the Telecommunications Act. The greater intrusion of LLU follows from:
- Its removal of property rights normally associated with ownership in respect of its requirement that the incumbent give up rights of use of its private property on demand from entrants and at a price determined by the regulator;
 - Its requirement that the incumbent become a lessor, even though there need be no presumption that it is efficient for the incumbent to invest its capital in network elements that are operated by its competitors;
 - The high transactions costs associated with network management, interface compatibility and security when different parties operate different types of equipment on the same network;
 - Higher regulatory costs resulting from the complexity of the calculation of an efficient rental rate for the lease of network elements and the fact that the efficient level of other regulated prices may be endogenous to the existence of an LLU regime; and
 - The greater potential for regulatory arbitrage that arises from the need to price the rental of individual network elements, and ensure the consistency of the prices set with those established for wholesaling of services.
80. The magnitude of the transactions costs associated with unbundling, and the potential for unbundling to abrogate existing property rights, suggest that a high standard of proof should be applied to any claim that LLU will further the purpose of the Act if introduced.

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81. Local loop unbundling may provide short-term benefits to consumers where entrants to the telecommunications industry wish to provide consumers with services that are different from those provided by the incumbent, and available on a wholesale basis, but for which some part of the network infrastructure of the incumbent may be utilised. To support the introduction of LLU it must be clear that:
- A material level of competition based on the delivery of new services to consumers using some existing infrastructure elements owned by the incumbent will develop if LLU is introduced; and thus
 - The introduction of LLU will provide for a materially increased level of competition over and above that facilitated by the existence of the wholesale supply of services under the provisions of the existing Telecommunications Act.
82. LLU may have substantial long-term costs for end-users of telecommunications services. These long-term costs may in particular flow from the increase in prices required to cover the costs of LLU, the reduction in the incentives for the incumbent to invest in new network infrastructure resulting from the removal of key property rights normally associated with ownership, and the consequent reduction in the diversity of technologies available to provide new services to consumers.
83. The policy framework for the assessment of whether New Zealand should introduce local loop unbundling should therefore be focussed on an assessment of the marginal benefits from LLU (those benefits that are in excess of those provided by the wholesale regime) net of the marginal costs resulting from the abrogation of property rights, higher transactions costs and other reductions in efficiency resulting from the higher level of regulatory intrusion.