

Promoting competition in the market for broadband services

Purpose of Report

1 To provide advice on the amendments to Schedule 1 of the Act most likely to promote competition in the market for broadband services for the long-term benefit of end-users.

Analysis

Introduction

2 The Telecommunications Act 2001 sets out a number of sector specific regulatory remedies and the framework for applying these regulatory tools. The Telecommunications Commissioner was established within the Commerce Commission to regulate the telecommunications industry. Sector specific regulation of telecommunications is regulatory best practice in developed countries, with an increasing consensus around the regulatory tools that are most appropriate for the sector.

3 This paper examines the regulatory interventions used in developed countries to correct market failures in the telecommunications sectors. The rationales supporting the typical interventions, and the forms of market failure they seek to address, are considered and then applied to the New Zealand context. The appropriate regulatory tools for the New Zealand regime are developed from these conclusions.

International regulatory best practice

4 Among developed countries, there is a growing consensus on International regulatory best practice for telecommunications regulation. This consensus is recognised and promoted by the OECD which encourages the regulation by its member states of wholesale access products, even where there is a significant alternative operator utilising technology other than Digital Subscriber Line ('DSL') connections (e.g. cable modems).¹

5 DSL connections are broadband services offered using the high frequency portion of traditional copper telephone wires. The services utilise DSLAMs (Digital Subscriber Line Access Multiplexers), which are network devices usually located at a telephone company exchange, that receive signals from multiple customer DSL connections and aggregate the signals on a high-speed backhaul line.

Access to the local loop

6 The local loop is generally considered to be the least easily replicable of the incumbent's assets in jurisdictions with limited cable modem build-outs. In OECD countries the vast majority of broadband connections are provided by DSL or cable modems. Only a small proportion of connections are provided by an alternative

¹ Treasury, *Regulation of Broadband Access: OECD Perspectives*, 20 March 2006.

technology.² As noted above, even in countries where extensive competing cable networks operate, regulators in developed countries have adopted measures to encourage intra-platform DSL competition as a fundamental element in their regulatory strategies. In New Zealand, with our limited cable modem footprint, intra-platform DSL competition is likely to be even more important for increasing broadband take-up and the utilisation of advanced broadband services.

7 While academic studies suggest that inter-modal competition is more effective at driving take-up³, regulators have asserted strongly the benefits of intra-modal DSL competition.⁴ The European Regulators Group (ERG) states that “competition is (mainly) driven by access regulation and is access based (intra-modal/platforms) rather than inter-modal (facility-based/alternative infrastructures)”⁵, noting that in 2004, DSL connections grew six times faster than cable modem connections.⁶

8 Intra-modal regulatory strategies are regulatory best practice in developed countries, with all OECD member states adopting measures to encourage DSL competition. No developed states have chosen to rely solely on alternative technologies to provide competition in local loop and broadband services. The question is not whether regulatory focus should be on either wholesale or alternative infrastructure, but rather what extent of regulated wholesale access reflects both international best practice, and the market and other characteristics particular to New Zealand.

Typical regulatory approaches

9 Among OECD states, local loop unbundling or LLU has developed as a significant regulatory intervention to create competition in the broadband market. LLU allows an access seeker to rent individual copper local loops to provide telephony and data services to consumers by utilising their own DSLAM and network equipment. It has now been adopted by 27 of the 30 OECD member states.

10 Resale has been the longest used regulatory tool in OECD jurisdictions, and the most used by access seekers until recently. The ERG notes that, in Europe, bitstream access has taken over from resale as the preferred form of access, and is now the most utilised wholesale access product in those jurisdictions in which it is available.⁷ The ERG goes on to note that bitstream access is the one typical access product missing in

² *OECD Broadband Statistics*, June 2005. Available at:

http://www.oecd.org/document/16/0,2340,en_2649_201185_35526608_1_1_1_1,00.html

³ For example, Distaso et al suggest tentatively that inter-modal competition more effectively creates competition, while noting that stimulating entry into the DSL segment of the market through appropriate regulatory policies, such as LLU, is generally less problematic than enticing entry into alternative platforms. Distaso, Lupi and Manenti, *Platform Competition and Broadband Uptake: Theory and Empirical Evidence from the European Union*, 2005.

⁴ Treasury, *Regulation of Broadband Access: OECD Perspectives*, 20 March 2006, and ERG, *Broadband Market Competition Report*, 25 May 2005.

⁵ The ERG notes that there is competition from cable operators in some countries, but that does not necessarily indicate that they are competing.

⁶ ERG, *Broadband market competition report*, 25 May 2005, pp. 2-3.

⁷ ERG, *Broadband market competition report*, 25 May 2005. The increasing use of bitstream by new entrants is graphed at page 5 of the report.

several of its member states and provides data suggesting the lack of bitstream may have affected the take-up of LLU in those jurisdictions.⁸

11 There is, therefore, a clear trend towards a suite of wholesale DSL access products that have been or are being adopted by regulators in developed countries. These access products have also been identified by the OECD and the ERG as the appropriate regulatory tools for use in the telecommunications sectors of their member states.

12 These typical wholesale access products are: resale, bitstream, shared access or line sharing, and local loop unbundling.

Correction of market failure

13 The purpose of these wholesale access products is to correct market failure caused by the incumbent's control of the ubiquitous local loop, which is an asset that is prohibitively expensive for an entrant to replicate nationally. As an example, even the most extensive cable modem networks have smaller footprints than the incumbent's local loop. By allowing new entrants to gain access to the local loop or to the incumbent's local loop services, regulators seek to generate competitive entry and investment.

14 As noted above, even in developed countries with strong competition from cable modem networks, as well as growing competition from other technologies,⁹ the need for intra-modal DSL competition has been recognised, and addressed by regulation.

Ladder of investment

15 These regulatory interventions, now typical in developed countries, have been described as forming a so-called 'ladder of investment approach'. The concept is increasingly well documented in the literature¹⁰, and is gaining support from regulators as a general theory to understand the interrelationship and relative impacts of the typical regulatory tools.¹¹

16 The ladder of investment (LOI) approach is articulated as a means of obtaining enhanced competitive outcomes and infrastructure investment by ensuring that a new entrant is able to climb a scalable ladder of investment which culminates in provision by the entrant of competitive infrastructure. The aim of the concept is to ensure that the natural monopoly characteristics of the telecommunications sector are not perpetuated into the next generation of telecommunications technology and markets. Regulatory intervention would support entrants moving up the wholesale value chain to the point where they are in a position to make infrastructure investment.

⁸ ERG, *Broadband market competition report*, 25 May 2005, p. 23

⁹ For example, Sweden, which had 11.3 DSL, 2.7 cable and 2.5 other, and Denmark 13.2 DSL, 6.1 cable and 2.4 other broadband subscribers per 100 inhabitants. New Zealand, by comparison, in the same report had 6.4 DSL, 0.3 cable and 0.3 other broadband subscribers per 100 inhabitants. *OECD Broadband Statistics*, June 2005.

¹⁰ Cave M, *Encouraging infrastructure investment via the ladder of investment*, Telecommunications Policy, 2006.

¹¹ For example, the ERG noted that all 13 of the member state regulators examined in its 2005 broadband market competition report followed the ladder of investment concept.

17 The LOI concept is closely tied to the idea of replicability, which may likewise be constructed in the form of a ladder, with the most easily replicable assets at the bottom and the least at the top. As entrants climb the LOI, and progressively replicate the assets controlled by the incumbent, regulated access to those, now replicated, assets would fall away. Therefore, LOI is a forward looking deregulatory process.

18 The logic of the LOI process requires that the lower rung products be made available first. Also, the more complete the ladder, the more scalable. The ERG, for example, has correlated the completeness of the ladder with greater competition in DSL markets.¹² The success of the ladder further depends on frictionless migration from a lower rung product to the next. The ERG also notes that rungs on the ladder may partially overlap; for example, UBS might complement LLU to provide a national offering, or LLU might be combined with competitive backhaul.

19 The theoretical model sets up a number of steps for creating the LOI.¹³ The model suggests that the upward movement of access seekers should be signalled through either dynamic pricing or the expiry of the lower rung services through sunset clauses. However, ERG considers that it is too early to anticipate when and how the later element can be introduced in practice without risking disruption or causing entrants to tumble down the ladder.¹⁴

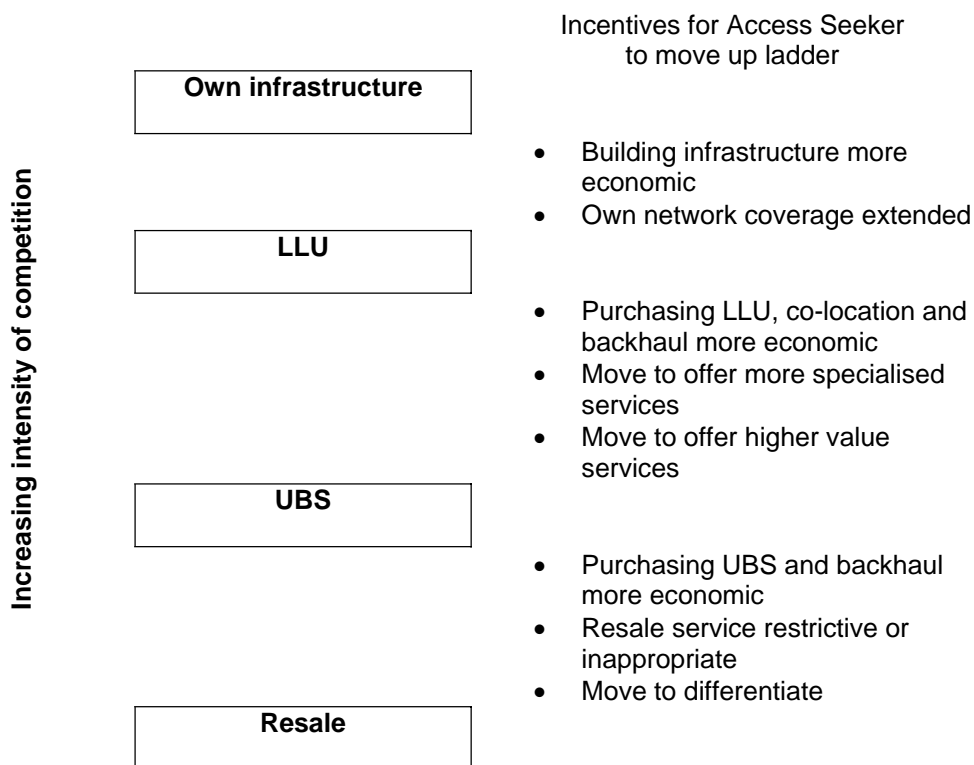
20 The typical elements of an LOI, with examples of incentives on an access seeker to climb, are depicted in the figure below.

¹² ERG, *Broadband Market Competition Report*, 25 May 2005, p. 17.

¹³ See, for example, Cave M, *Encouraging infrastructure investment via the ladder of investment*, December 2003. Available at: www.sciencedirect.com.

¹⁴ ERG, *Broadband Market Competition Report*, 25 May 2005, p. 24.

Ladder of Investment



21 A number of submitters during the Ministry’s stocktake process drew attention to the LOI concept. Ihug, for example, suggested that the ladder matched the business plan it would adopt if the access products forming the ladder were made available in the New Zealand market.

22 The theory may also help explain activity in the broadband market in recent years. For example, a few years ago new entrants were situated on what may be described as a sub-wholesaling rung, selling Telecom’s Jetstream product on a commission basis. These customers were subsequently migrated onto the regulated resale rung¹⁵, and there are indications that entrants, such as TelstraClear¹⁶, Quicksilver and Orcon¹⁷, are in the process of migrating wholesale customers to the UBS service. Further, a number of entrants have indicated plans to invest in LLU were it to become available.

23 The LOI theory is, therefore, a useful tool for understanding the interrelationship of access products, the possible responses of market players were these access

¹⁵ The Jetstream partnering Plan ceased on 26 July 2004. All customers on the plan were migrated to wholesale.

¹⁶ “Mr O’Brien says TelstraClear has more than 100,000 ISP customers outside its Wellington and Christchurch network area that will benefit from the UBS agreement, which will see broadband services delivered sooner.” TelstraClear Media Release, January 2006. Available at: http://www.telstraclear.co.nz/companyinfo/media_release_detail.cfm?newsid=207

¹⁷ <http://www.computerworld.co.nz/news.nsf/0/1D33694A73119C1CCC256F56000F1A13?OpenDocument&pub=Computerworld>

products to be made available, as well as articulating the ultimately deregulatory purpose of the regulatory process. The first is a particularly valuable insight, encouraging regulators to set terms of supply for access products holistically so as progressively to encourage new entrants to invest further, and differentiate their products from those of the incumbent.

24 As noted, the LOI is useful, but like all academic theory should be used to inform rather than form policy. For example, new entrant business plans will not necessarily match theory, and even entrants with conforming business strategies are likely to view access products as complementary even within single exchange service areas.¹⁸ An average entrant might unbundled loops in the exchange and several cabinets, utilise UBS to supply customers off other fibred cabinets, and be investigating rolling out competitive backhaul. Inevitably migrations will be lumpy, with groups or classes of customers, or even traffic, being pushed up the ladder at differing rates.

The New Zealand telecommunications market

25 As in other OECD countries, the only ubiquitous local loop in New Zealand is owned and operated by the incumbent. However, New Zealand differs from many other developed countries in having only a limited cable modem footprint. This tends to suggest that policies encouraging intra-modal DSL competition may be more important in New Zealand than in most other developed countries.

26 The Ministry's analysis of the broadband market has indicated that there are significant concerns with present and likely future developments in this market. Previous regulatory interventions have been only partially effective, and subject to considerable gaming and delay in implementation.

27 The analysis has also indicated that the long-term benefit of end-users is best achieved by ensuring infrastructure competition in the provision of next generation broadband services. However, forward-looking market analysis has demonstrated that direct next generation infrastructure competition cannot be expected in sufficient quantity or geographical extent to ensure the long-term benefit of end-users without further regulatory intervention. The Ministry's analysis has also concluded that robust competition, across all customer segments, in advanced broadband services, cannot be expected from the alternative platforms already deployed.

28 While policy should encourage new and further investment in alternative technology, it would be unwise to base policy decisions concerning a critical enabler for economic growth solely on technologies that have not yet shown indications of replicating the local loop in comparable countries with more advanced broadband markets. Notably also, the deployment of these alternative technologies has not moved regulatory policies in any developed country away from a significant focus on intra-modal DSL competition.¹⁹ It is important to remember that new technologies are promoted strongly by the interest groups involved with them. Consequently, assessments of these technologies' present and future capabilities should be sought from independent credible sources.

¹⁸ This is confirmed by the ERG which notes the complementary use of access products. ERG, Broadband market competition report, 25 May 2005, p. 19.

¹⁹ By June 2005, only 7% of broadband subscriptions in the OECD were provided by means other than DSL and cable modem. *OECD Broadband Statistics*, June 2005.

29 Therefore, while direct investment in alternative technologies such as fixed wireless access (FWA) and fibre to the home (FTTH) should be encouraged and supported, a second policy stream is considered necessary to develop intra-modal DSL competition to align with international best practice in developed states.

Recommended approach

30 The telecommunications regime currently includes a number of regulated access products. Regulated resale, expanding considerably on commercially offered resale products, became available following the TelstraClear Wholesale Determination of 12 May 2003, and was later supplemented by the addition of residential resale products. After UBS was added to Schedule 1 following a Schedule 3 investigation into LLU, Telecom offered commercially a version of the service.

31 As noted above, there has been a noticeable migration up the 'ladder' of existing access products. That process has been accompanied by increased market activity: the speed of broadband take-up has increased, prices have fallen, a greater range of products has become available to consumers, and Telecom has signalled it will introduce new, higher speed, ADSL2+ technology.

32 Almost all OECD member states have now regulated LLU in some form; its adoption can be regarded as regulatory international best practice among developed states²⁰ and a necessary bridge for access seekers to the roll out of independent backhaul and the eventual rolling out of an alternative local loop. As it would be at least two years before the first investment under regulated terms for LLU could be expected, it is important from a policy perspective to ensure that the regulatory framework will be available to access seekers when they are ready to move on from UBS. If anything, indications are that two years may be beyond the ideal horizon for current access seekers' migration plans.

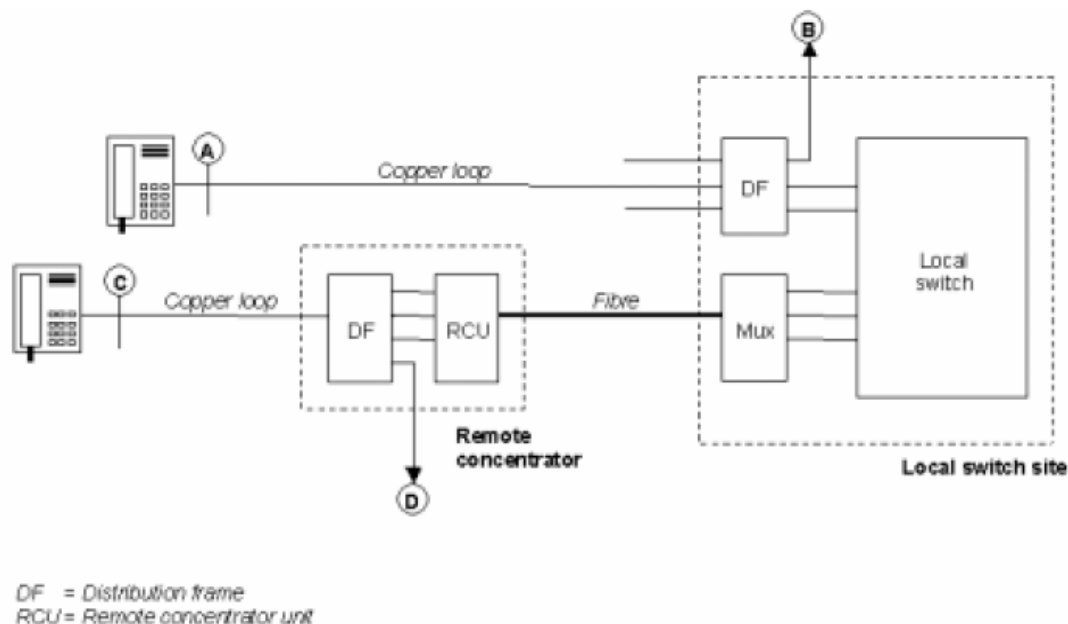
33 UBS is portrayed as a complementary measure to LLU. The Ministry estimates that LLU, if adopted, would not be fully implemented until 2008, while the amended UBS should be operational from mid to late 2007, better meeting the government's shorter term goal of rapidly improving broadband results. UBS acts as an intermediate access product, enabling access seekers to achieve the market concentrations to justify investing in their own equipment and connecting to Telecom's unbundled local loops in exchange or cabinet service areas. As noted above, the relative pricing of UBS and LLU would encourage competitors to invest once their customer concentrations became economically viable to do so. In the longer term, the availability of UBS could perhaps be reduced to ensure competition in low density areas only.

34 The present UBS service may not permit Quality of Service VoIP which could require 128 kbps or greater speed symmetrically. In an environment moving towards VoIP, entrants may be unable to provide competitive services without access to both a UBS product that is able to reflect prevailing market conditions and an LLU wholesale product. The Ministry understands that Telecom will be ready to launch its VoIP product commercially in mid 2007. This is likely to have considerable implications for competitors were they to be limited to the existing regulated services.

²⁰ Among OECD countries, only New Zealand, Switzerland and Mexico have not implemented LLU. However, Switzerland is expected to change its law this year.

Local Loop Unbundling

35 LLU allows an access seeker to rent individual copper local loops to provide telephony and data services to consumers by utilising their own DSLAM and network equipment. A diagram depicting an unbundled local loop (A-B) and an unbundled local sub-loop (C-D) is shown below, and a broad explanatory note on LLU is provided at Appendix 1.



(Taken from Ovum: The Economics of Local Loop Unbundling in New Zealand: A report to the NZ Ministry of Commerce, 1 March 2000)

36 The Commerce Commission completed an investigation into the regulation of LLU and UBS in 2003. It concluded that access to UBS should be a designated service but that access to LLU should not be regulated. The Commission's reasoning was set out in its report. A peer review undertaken by Dr John Small at the time concluded that LLU should be regulated.

37 In accepting the recommendation of the Commission at that time, the government predicated its response on the fact that:

- The provision of regulated UBS rather than a fully unbundled local loop would see more rapid deployment of broadband technology in Telecom's access network, in particular through to its exchanges and cabinets; and
- That by constraining the upstream UBS bit rate that Telecom had to offer its competitors to 128 kbps, the Commission believed it would provide Telecom sufficient incentive to quickly deploy its Next Generation Network.²¹

²¹ The incentive for Telecom was that it could commence building its NGN in the certainty that only it could offer certain advanced services over that network (e.g. Voice over Internet Protocol or video conferencing) while its competitors were constrained to offering lower bandwidth services.

38 It is necessary to consider what has changed since that time. The costs to the industry of implementing LLU were assessed by the Commission in 2003 and the Ministry considers that these costs are likely to be lower because of the reducing equipment and OSS prices. Also, emerging evidence from other OECD countries is indicating that uptake of broadband services is strongly impacted by the availability of LLU now that price and non-price terms have been concluded for LLU, co-location and backhaul.²² The effects on investment are, if anything, positive rather than negative.

39 In many jurisdictions, LLU has taken a long time to implement, even after terms of supply have been determined, and even longer to impact broadband uptake. This is partly because it is a complicated service, partly because of incumbents delay, and partly because new entrants did not have a UBS as an intermediate option. However, New Zealand could benefit from being a 'late mover' by learning from experience in comparable jurisdictions and compressing timeframes by adopting international best practice.

40 Telecom has put the view strongly that LLU is chilling their investment incentives. Again, New Zealand is well placed to learn from experience in comparable jurisdictions. There is a clear pattern of incumbents claiming LLU will chill their investment, only to invest more after LLU has been regulated in order to compete with more innovative retail packages being offered by new entrants.²³ While it is important to take Telecom's statements on this issue into account, policy should also be informed by this pattern in comparable jurisdictions. In particular, weight should only be given to detailed public statements made by Telecom as to the exact areas in which it would cease or limit investment in response to specific forms of regulation.

41 The fact that LLU is identified by the OECD as regulatory international best practice adopted in almost all jurisdictions comparable to New Zealand, as well as the wealth of international evidence as to the investment behaviour of incumbents following such regulation²⁴, suggest that the burden should be upon Telecom to demonstrate why New Zealand is an exception among its international peers in both of these respects. In response Telecom has provided evidence of general retrenchments in capital expenditure in the expectation of further regulation, and stated that it is not committed to considerable future expenditure despite, in their view, a significant threat from inter-modal competition.²⁵ The Ministry's view is that Telecom's statements to date are not sufficiently detailed or robust to overturn the evidence from comparable jurisdictions in this respect.

42 It is also not clear from information provided by Telecom, and from service delivery in the market, that the existing constraints placed on the UBS regime aimed at providing investment incentive to quickly deploy its Next Generation Network, have led to acceleration of deployment in this important access part of their network.

43 A major initiative required to deliver NGN services, is the laying of fibre from the exchange towards the customer. Various scenarios are possible such as, fibre to the node, fibre to the curb, and fibre to the home. As Telecom gradually extends the reach

²² Treasury, *Regulation of Broadband Access: OECD Perspectives*, 20 March 2006 (Confidential) and ERG, *Broadband market competition report*, 25 May 2005.

²³ *ibid.*

²⁴ *ibid.*

²⁵ Telecom presentation to the Minister of Communications, 23 March 2006.

of its fibre network towards the home, the point at which the new entrant gains access to the LLU service will change from the exchange to a street cabinet, forcing them to move or replace their DSLAM equipment to maintain service to their customers. To assist with this development, the LLU service includes a sub-loop unbundling option where the new entrant is able to co-locate their equipment in a cabinet and lease backhaul capacity from the cabinet to the exchange.

44 Finally, the Ministry’s analysis indicates that new entrants are unlikely to be effective in providing a nationwide competitive alternative to Telecom’s copper network. While alternative networks may be viable in densely populated areas, the Ministry’s consultants concluded that “there will need to be a technology/price breakthrough for alternative providers to deliver cost effective innovative NGN business and residential services to customers outside Auckland and other metropolitan areas”. In many respects, this means that LLU may be more important for New Zealand than many other countries, as New Zealand does not enjoy a legacy of cable TV assets that are prevalent in other countries, to provide alternative network competition.

45 The Ministry also recommends that LLU be mandated nationally. The proposed regulated service would not contain a condition requiring the Commission to undertake an assessment of the competition in the market for the relevant service, as was recommended in the Commission’s draft LLU report. This condition was originally included as an incentive for local network providers to invest in their own infrastructure. However, the Ministry’s analysis suggests that this condition may have little utility as an incentive because the outcome will be uncertain until the Commission completes its assessment. Further, that assessment could change over time depending on changes in markets, infrastructure deployment and technology. The Ministry considers that the better option is to remove the uncertainty and signal to infrastructure investors that LLU will be available nationwide.

46 The Commission has also indicated that there are likely to be substantial difficulties with implementing geographical carve-outs for LLU, while uncertainty surrounding the scope of carve-outs over time may disincentivise access seekers.

47 Further, and perhaps most significantly, competition created by UBS (where the Commission has found a national market) could result in competitive areas being found for LLU. This would prevent access seekers from moving up the ladder of access products, and would be contrary to one of the most significant purposes of the regulation.

48 A summary of the LLU service options and the Ministry’s view is shown below:

Form of regulation	View on regulation	MED Reasoning
All copper local loop unbundling	Yes	The unbundling of copper loops at the exchange is justified by the supporting evidence. The service description has been tested with industry and is likely to be implementable and robust.
Line sharing	No	The Commission found there was little interest from industry and

(using access seeker equipment)		this was supported by overseas experience. It is less relevant in a VoIP environment. Further, a line sharing service description has not been tested with industry.
All fibre local loop unbundling	No	Regulating fibre unbundling would have implications for new entrants and is not recommended. Further, a fibre unbundling description of service has not been tested with industry.
Hybrid copper/fibre local loop unbundling	No	Where Telecom has laid a fibre feeder to a cabinet, the Commission found that unbundling both the fibre feeder and the copper distribution cable was not a useful option. A better option is to unbundle the copper distribution cable only (the sub-loop) in conjunction with backhaul from the cabinet.
Sub-loop unbundling	Yes	This ensures continuing competition for customers off fibre fed cabinets, to complete the ladder of investment and to ensure that the natural monopoly characteristics of telecommunications are not perpetuated into the next generation of technology and markets.
Co-location in the exchange	Yes	This is necessary in order to support LLU.
Co-location in the cabinet	Yes	This is necessary in order to support SLU.
Co-location in cable ducts and manholes, etc	No	The service description has not yet been tested with industry, and the wider implications of such a policy are unclear. However, this may form part of a natural evolution of the regime if Telecom's roll out of FTTN proves insufficient to ensure the long-term benefit of end-users.
Backhaul from the exchange to the POI	Yes	Backhaul from the data switch was regulated for UBS and similar provisions should flow through to LLU.
Backhaul from the cabinet to the exchange	Yes	Necessary in order to support SLU. Needs to be consistent with the existing backhaul service for UBS and backhaul from the exchange.
Retention of copper feeder	No	The Commission found that this was not a useful option.
Loop should be DSL suitable	Yes	Telecom should remove bridge taps, filters and other devices as they would for their own DSL installations, if requested by the access seeker.
Service level agreements	Yes	This should be a term of any determination or reference offer.
Access to Telecom's OSS	No	The Commission found that this was a useful option but should be made available as an associated function for all services rather than as a standalone service.

Line-sharing

49 In a form of unbundling referred to above as line-sharing, the incumbent and the access seeker share the line, with the access seeker utilising its own equipment.²⁶ The Commission examined line-sharing in its draft LLU Schedule 3 report and sought submissions on its proposed definition for the service. The Commission found there was little interest from industry in the option, noting in its final report:²⁷

The Commission does not recommend the specification or designation of a line sharing service. Though the cost-benefit analysis conducted for the Commission shows potentially significant benefits in the form of consumer surplus arising from such a service, there appears to be little or

²⁶ Not contemplated here is the form of line sharing using UBS, where the access seeker provides a DSL and the incumbent an analogue voice service.

²⁷ Commerce Commission, *Section 64 Review and Schedule 3 Investigation into Unbundling the Local Loop Network and the Fixed Public Data Network*, Final Report, December 2003, p. ii.

no interest on the part of the industry to use the service. The lack of demand for the service is consistent with overseas experience where similar services have been regulated.

50 The Ministry considers nothing has changed since December 2003 that would alter the Commission's conclusion on the appeal of line-sharing. The option was not raised by submitters during the Ministry's stocktake process, and is likely to be less relevant in the voice over IP environment. Consequently, the Ministry does not recommend that line sharing be regulated.

Co-location in cable ducts and man-holes

51 The regulation of a co-location service for cable ducts and man-holes is not recommended at this time. This service has not previously been tested with industry, and the wider implications of such regulation are not yet clear. However, the benefits of regulating a ducts and man-holes co-location service should be kept under continuous review in the light of Telecom's investment in FTTN.

Hybrid fibre/copper local loop unbundling

52 This is an alternative to sub-loop unbundling. The Ministry considers that a better approach is to unbundle the sub-loops at the cabinet only, and allow for regulated access to backhaul to the exchange. Using this approach would allow the services to be defined more clearly. It also allows the access seeker the opportunity to build competing backhaul from the cabinet where it is economically viable to do so.

Unbundled Bitstream

53 The historical process and reasoning that led to regulation of the existing UBS designated service is summarised in Appendix 2.

54 UBS gives entrants increased access to the high frequency spectrum portion of the local loop, while the incumbent retains responsibility for maintaining the copper wires for all line services, including analogue telephone service (the low frequency spectrum portion). UBS is already a regulated service with an unconstrained downstream speed, and an upstream speed constrained to 128kbps.

55 The main changes proposed are to remove the 128kbps upstream limit and the prohibition on supporting any function that relies on real-time network capability. These restrictions reduce the effectiveness of the current regulated service making the provision of some advanced services impractical. The original reason for the restrictions was to preserve Telecom's incentive to invest in upgrading its network. This is no longer considered a valid reason. Similar to the situation with LLU, incumbents in other countries are investing in NGNs at a faster rate to Telecom despite operating under harsher regulatory regimes. Moreover, the Commission recommended a retail minus rather than a cost based pricing principle for UBS to protect Telecom's incentive to invest in broadband services.

56 A little more than 2 years on from the release of the Commission's report, wholesale and retail residential DSL plans with 512kbps upstream speeds are available in the market. Faster upstream speeds are required to allow ongoing service improvements. Constraining the upstream speed in legislation prevents future proofing,

and makes it likely that the regulated service will quickly lose its relevance as an intermediate or complementary access product between resale and LLU, both of which move with changes in market and technology

57 Experience has demonstrated that it is not possible, even in a fully consultative process such as the Commission's Schedule 3 LLU investigation, to regulate adequately forward-looking service characteristics. Dimensioning of the regulated service should, therefore, be determined by the Commission, as the specialist telecommunications tribunal, taking into account the market and technological conditions prevailing at the time of determination rather than set by legislation.

58 The implication of the removal of these restrictions on UBS is that competitors will be able to offer real time applications.

59 UBS is seen as a complementary measure to LLU. The Ministry estimates that LLU, if adopted, would not be fully implemented until 2008 while the amended UBS would be operational from mid to late 2007, better meeting the Government's shorter term goal of rapidly improving broadband results. UBS acts as an intermediate access product, enabling competitors to achieve the market concentrations to justify investing in their own equipment and connecting to Telecom's unbundled local loops in exchange or cabinet service areas. The relative pricing of UBS and LLU should encourage competitors to invest once these customer concentrations become economically viable to do so. As noted above, this is referred to in the literature as a "ladder approach", and has the long term aim of achieving competing access infrastructure.

60 In the longer term, the availability of UBS may be reduced to ensure competition in low density areas only.

Naked DSL

61 The existing regulated UBS is 'naked DSL', which is a DSL service that is not tied to the provision of analogue telephone service. The Commission would only have jurisdiction to determine a UBS tied to the provision of an analogue telephone service if the parties to the determination agreed to such a term of supply.²⁸ This contrasts with Telecom's commercial UBS which is tied to provision, by Telecom or a wholesaler, of an analogue telephone service to the retail customer. An amendment clarifying that regulated UBS is naked DSL should be included in the draft legislation.

62 The pricing principle for UBS should remain "retail minus". Currently a "comparable" service can be considered as a bundle of services that includes, for example, line rental and a DSL product. To ensure that an appropriate retail price is used for UBS, the designated service would need to be clarified to ensure that the Commission could continue to take account of a price in a bundle should Telecom chose to offer DSL at retail as a single product.

63 The Act should also be amended to ensure that when applying the retail minus pricing principle the Commission considers the price of the LLU service, if determined, and the relativity between the UBS and LLU prices. This would provide for a graduated approach enabling access seekers to migrate customers from UBS to LLU.

²⁸ The figure in Annex 3 demonstrates the current Wholesale DSL Offerings.

64 The application of the retail minus pricing principle should be monitored and reviewed to assess whether the price set for UBS appropriately balances ensuring Telecom recovers its efficient costs of providing the service with facilitating efficient competition. If it were determined that the Commission was restricted in its ability to do this using the current retail minus pricing principle, the review would assess whether a different form of pricing principle was warranted.

65 Unconstrained naked DSL is likely to spur competitive provision of Quality of Service Voice over Internet Protocol (VoIP) based telephone calling as a competitor to analogue telephone calling. If naked DSL services utilising VoIP were taken up extensively then Telecom would be expected to have significantly less revenue for the cross subsidisation of unprofitable analogue telephone service. This could potentially increase the net cost for the local residential telephone service TSO. Competition in broadband services fostered by naked DSL could also lead to pressures to geographically de-average prices for broadband services, with consequent price increases in some areas and price decreases in some other areas as prices are aligned with costs. The review of the TSO should take these factors into consideration.

66 The proposed amendments would also enable the regulated UBS to operate more effectively in combination with the other existing and proposed access products. The relative limitations of the existing UBS in this respect are highlighted in the table below:

Service	Upstream PIR (max.)	Downstream PIR (max.)	Downstream SIR (max.)	Notes
Telecom's retail Jetstream service	512kbps	3.5Mbps	24kbps	Based on Telecom's plans to be introduced in early April.
Telecom's resale service	512kbps	3.5Mbps	24kbps	As above.
Determined unbundled bitstream access service	128kbps	Unconstrained but limited to maximum line rate that Telecom's DSLAM can support	24kbps	Downstream PIR would be about 7.6Mbps based on Telecom's current DSLAM technology. Downstream SIR is weighted average of Telecom's retail/wholesale services.
Services provided by access seeker on an unbundled local loop	Unconstrained	Unconstrained	Unconstrained	Speeds determined by access seeker
Services	Unconstrained	Unconstrained	Unconstrained	Speeds determined

provided by access seeker on their own network				by access seeker
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Designated services - implementation

67 The Ministry has included in this report an analysis of the possible form of the designated services that are considered necessary to implement the proposed amendments.

Proposed form for the LLU designated services

68 In determining the form of the designated services, the Ministry considers the best approach is to use as a basis the text of the designated services recommended by the Commission in its draft Schedule 3 LLU report of October 2003. The designated services in the Commission’s draft report were developed by consulting international best practice at the time, and tested with the industry, following release of the draft, through the Commission’s consultation process.

69 The Ministry has considered all comments made by industry during the Commission’s consultative process, as well as the Ministry’s own analysis, in amending the text in the Commission’s draft report. In summary, the amendments proposed to the LLU text in the draft report, to give effect to the form of LLU recommended above, are:

- Title of service amended to better describe service and for consistency with the UBS description
- Description of service expanded to clarify the physical extent of service
- Condition regarding market assessment deleted (see discussion in Risk section).
- Initial pricing principle clarified
- Additional matter regarding application of s18 added to ensure relativity of terms with UBS

70 Proposed amendments to the LLU co-location text in the draft report are:

- Title of service amended to better describe service;
- Description of service clarified to incorporate co-location at both Telecom’s exchanges and cabinets;
- Market assessment deleted as Telecom is the only provider of co-location services in Telecom premises;
- Condition added to ensure that LLU co-location services are associated with LLU;

- Limits on access principles added to cover forecasting and third party interests. The limits included in the existing radio co-location service in the Act, regarding compliance with RMA and Health and Safety requirements are considered self evident and the limit relating to Telecom’s existing contractual arrangements is not considered to be necessary for LLU co-location or for the benefit of end-users; and
- Initial pricing principle expanded to include forward-looking cost-based pricing methodology.

71 Proposed amendments to the LLU backhaul text in the draft report are:

- Title of service amended to better describe service and distinguish between backhaul from the cabinet and backhaul from the exchange;
- Description of service expanded to better describe the service;
- Conditions added to ensure that LLU backhaul services are associated with LLU;
- Limit on access principles added to cover forecasting for backhaul from the cabinet;
- Initial pricing principle expanded to include forward-looking cost-based pricing methodology; and
- Additional matter regarding application of s18 added to the backhaul from the cabinet to ensure that the terms incentivise Telecom to continue to roll out FTTN.

Proposed amendments to the UBS designated services

72 The table below summarises the Ministry’s analysis of the specific matters of concern with the current UBS service, with the proposed amendments and justification for them summarised.

Issue	Upstream speed	Peak downstream speed	Contention	Data caps	Dynamic efficiency		ADSL	Relevant Market
Current service description	Fixed at 128kbps	Set at a minimum average	Fixed at 32kbps minimum	Not specified	Service is not required to support any function that relies on real time capability		The current service description refers to ADSL	The designated service refers to a market for “that service” or “the service”
Problem	Too slow and now lower than Telecom's comparable retail/wholesale services	Service characteristics should be set by the Commission rather than in legislation	Only satisfactory for low speed services. More appropriate to link to peak speed by using contention ratio	Contentious issue during Commission's determination process	Must be an internet grade service intended to address the residential and SME market but Telecom is introducing retail/wholesale non-internet grade services for these markets	Must not incorporate features and functions of Telecom's NGN but not sure what these features and functions are	The reference to ADSL is inconsistent with the theoretical possibility of a symmetrical speed service	The reference directs the Commission to examine only the wholesale market
Solution	Unconstrained	Unconstrained	Leave for Commission to decide	Leave to Commission to decide	Do not include a specific requirement to this effect	Delete the prohibition on supporting any function that relies on real time network capability	Refer to DSL	Refer to “in a broadband market” rather than “in a market for the [that] service”
Justification	Upstream speeds will continue to increase. Will bring it into line with LLU and infrastructure options.	Will bring it into line with LLU and infrastructure options.	Standard access principle 2 which requires international best practice	Standard access principle 2 which requires international best practice	The proposed designated UBS service is suited to the residential and SME market, and not suited to the corporate market	Telecom will continue to invest anyway for cost reduction, competitive and other reasons	Reference to ADSL would limit the proposed service unnecessarily to asymmetrical speeds	The Commission should be able to examine the state of competition in all broadband markets

UBS pricing principles

- 73 The proposed pricing principles for the amended UBS service would require the Commission to have regard to any comparable service including the unbundled copper local loop network service and comparable services within a bundle of services. The Commission would then impute a retail price have regard to those comparable services. The pricing principles do not require the Commission to have regard only to Telecom’s comparable services, so services provided by other operators may be considered.
- 74 The UBS determination issued by the Commission in December 2005 considered Telecom’s Jetstream service as a comparable service and made allowances for the fact that the Jetstream service price included calling and ISP charges. No allowance was made for the analogue telephone service (Homeline) which Telecom always supplies along with the Jetstream service.²⁹ This may be because the parties had agreed separately that the DSL service would be bundled with analogue telephone line.
- 75 The Ministry considers that the availability of naked DSL is important as it enables access seekers to efficiently offer IP services such as VoIP. The recommendations in the OECD policy paper³⁰ “Policy considerations of VoIP” include:
- Ensuring that broadband Internet access operators allow consumers unrestricted access to and use of Internet applications and services including VoIP. Where broadband markets are competitive, market forces should produce this result without the need for regulation.
- 76 In calculating the price for a naked DSL service, the Commission would take into account the common cost of the copper pair attributed to the homeline telephone service, as well as any residual benefit to Telecom from retaining control of the low frequency portion of the local loop.

Proposed amended UBS designated services

- 77 The Ministry has considered all comments made by industry during the Commission’s consultative process, as well as its own analysis, in proposing the following amendments to the text in the Act. In summary, amendments that could be made to the UBS text in the Act to give effect to the form of UBS recommended above are:
- Description of service changed to make it more technology neutral;
 - Limits on access principles amended to delete speed and function constraints;

²⁹ Commission’s decision 568, 20 December 2005, para 379

³⁰ OECD Working Party on Telecommunications and Information Services Policies, 20 March 2006

- Pricing principles amended to ensure that LLU is considered as a comparable service; and
- Pricing principles amended to ensure that the “comparable” retail service can be a comparable service included as an element in a bundle of services
- An additional matter regarding application of s18 added to ensure relativity of terms with LLU.

78 Proposed amendments to the UBS backhaul text in the Act are:

- Description of service changed throughout text to make it more technology neutral.

Ladder of Investment Pricing

79 As shown in the table below, the price of each service reduces as the access seeker moves up the LOI. This is a consequence of the pricing principle applicable at each rung and recognises the increasing additional value that the access seeker is required to add. It is important, that the application of the pricing principles is monitored to ensure that the existing pricing principles produce appropriate pricing relativities.

	Pricing principle applicable to the service	Indicative estimate of price for the service (for illustrative purposes only)	Pricing principle applicable to the migration of customers up to the next rung
Own infrastructure	Based on access seeker's costs	Not applicable	Based on access seeker's costs
LLU	Based on Telecom's costs as determined by the Commission	\$19 ³¹ \$22 ³²	Determined by Commission if requested
UBS	Based on retail price (imputed by Commission) minus avoided costs	\$28 ³³	Migration charge currently \$36 (commercial UBS) and \$21 (UBS determination)
Resale	Based on retail price (modal average of Telecom's retail prices) minus avoided costs	\$49 ³⁴	Reassignment charge currently set by Telecom
Retail	Set by Telecom	\$60 ³⁵	

³¹ Based on the EU average price at Oct 2005 of 11.3 euros. This would be equal to NZ\$19.10 using the PPP measure (based on 2005 OECD data) of 1euro=NZ\$1.69.

³² Based on the EU average price at Oct 2005 of 11.3 euros. This would be equal to NZ\$22.45 using the average exchange rate over the ten years to March 2006 of 1euro=NZ\$1.9875.

³³ Based on the Commission's determined price which assumed Homeline service was included (i.e. not naked DSL)

³⁴ Based on Telecom's Adventure plan (3.5M/128k plus calling service) to be introduced in April, less 18%

- 80 The differential between the price and non-price terms for these services and the incentives for an access seeker to move up the LOI on the basis of this differential, would be considered by the Commission at the time of a determination.
- 81 In setting the price and non-price terms for UBS or LLU, the Commission would have regard to the additional matters regarding the application of section 18 listed in the LLU service description, namely, any comparable service including UBS for a LLU determination, or LLU for a UBS determination.

Rural broadband

- 82 Rural local exchange service areas are generally larger, and the local loops within them generally longer, (often costing more to establish and maintain) than the urban equivalents. Rural local loops can contain long sections of overhead lines and sources of interference, such as electric fences and power lines, making the provision of DSL-based broadband challenging. In some instances, the use of DSL equipment is impossible because the local loop is provided by a radio system rather than copper cable. Where economic, it is likely that Telecom will install fibre cable and remote cabinets to overcome these length and noise problems.
- 83 Telecom has announced³⁶ that it had broadband available to 80% of rural customers via Xtra Jetstream and Xtra Wireless and intended to achieve 90% coverage of rural customers by June 2005. Coverage is understood to mean that customers are connected to a DSL-capable exchange but may not necessarily be able to receive a broadband service because of local loop problems. As the nationwide average coverage (both urban and rural) is currently at around 93%, rural customers do not appear to be overly disadvantaged although it is acknowledged that the 7% non-coverage will likely be the smaller exchanges in rural areas.
- 84 In addition, several other operators offer radio based services which improve the coverage of broadband in rural areas. These include, but are not limited to, Woosh's broadband wireless service, BCL's Extend broadband wireless service³⁷, and ihug Ultra, ICONZ X-Terrestrial, BayCity/IPStar and other satellite services. Further, the development of WiMax technologies may contribute to the improvement of the economic and service viability of wireless rural service.
- 85 Telecom's retail and wholesale broadband services are not geographically de-averaged despite Telecom's indication that the cost

³⁵ Based on Telecom's Adventure plan to be introduced in April.

³⁶ Telecom announcement at the 2004 National Agriculture Field day in Hamilton

³⁷ BCL claim that Extend Lite will soon deliver fixed line capability to rural customers at similar prices to urban customers, excluding equipment costs.

of serving rural areas is higher. It is assumed that there are benefits to Telecom in having a national price. However, these benefits may not be sufficient to ensure a national price in the future.

- 86 Operators of satellite broadband services claim 100% coverage of New Zealand and that their monthly and usage prices are similar to Telecom's DSL prices but acknowledge that equipment and setup costs are higher.
- 87 Where rural exchanges are DSL-capable, new entrants can resell Telecom's Jetstream service or utilise UBS. It is unlikely that a new entrant would use LLU to serve rural customers in the medium term because of the costs of establishing co-located DSL equipment and backhaul for a small number of customers. This might change if retail prices in rural areas rose and/or government subsidised the roll out of equipment.

APPENDIX 1

Local loop unbundling

In its 2003 Schedule 3 investigation into Unbundling of the Local Loop, the Commission concluded that:³⁸

- Historically copper cable has been used to provide the local loop;
- Telecom is not actively replacing copper in the feeder network on any scale;³⁹
- Replacement of copper with fibre cable in the feeder network forms part of Telecom's NGN plans;
- Telecom is likely to extend the reach of its optical fibre cable into the customer access network over time;
- Where copper is being replaced with fibre, the fibre may extend up to a remote line unit or cabinet;
- Hybrid copper/fibre local loops are likely to be the preferred infrastructure strategy for new housing or business parks and residential areas where distance from the exchange is increasing or costly to maintain;
- Many larger businesses and organisations in the CBD areas are directly connected using fibre only.

Local loop

The 'local loop network' is defined in the Telecommunications Act as:

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.

³⁸ Page 29

³⁹ On 5 August 2004, Telecom announced a \$120 million investment in fibre network over 5 years, rolling out fibre to 1000 roadside cabinets, in addition to the 1100 cabinets already fibred at that date.

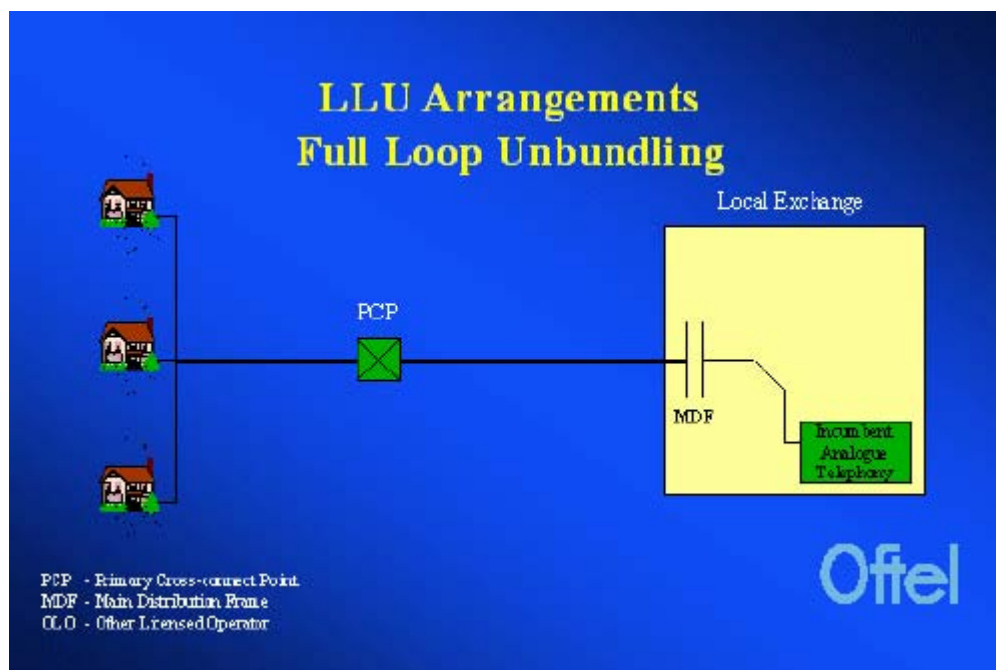


Diagram 1: The local loop (Source: OfTel, LLU Facts.)

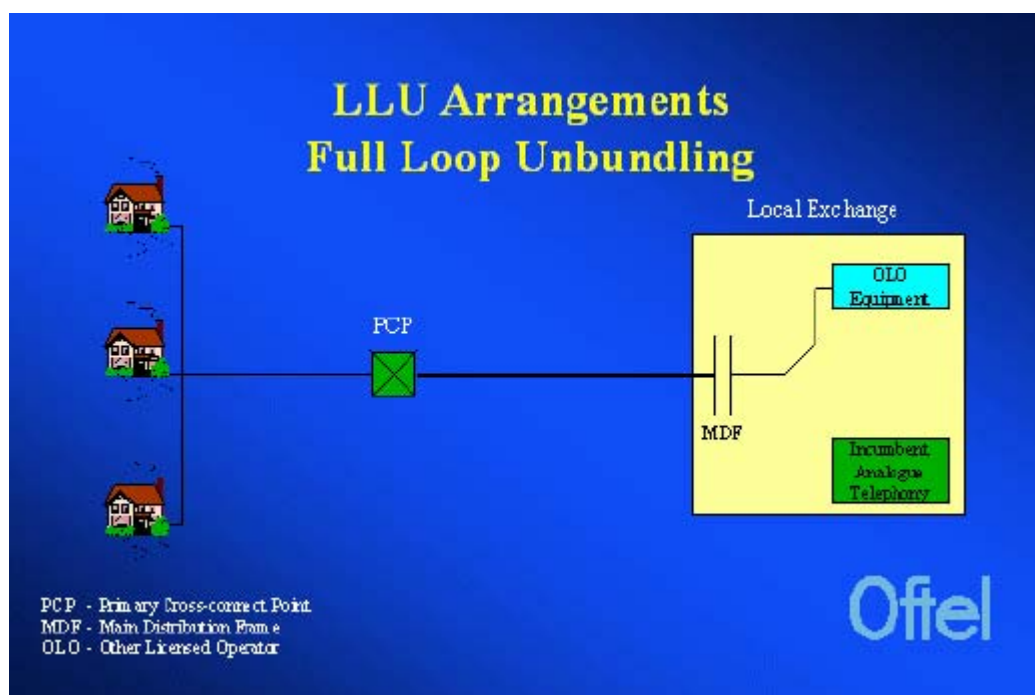


Diagram 2: An unbundled local loop

Hybrid copper/fibre local loop

Hybrid copper/fibre local loops are those which comprise fibre cable between the local exchange and a distribution cabinet, and copper cable between that distribution cabinet and the end-users building.

The Commission concluded that this type of local loop was consistent with the definition of a local loop network in the Act and that hybrid loops are part of the local loop network.

Backhaul transmission service

The backhaul transmission service refers to the transmission capacity between Telecom's local telephone exchange or distribution cabinet, and the nearest interconnect point with the access seeker's network. The Commission defined backhaul transmission as follows:

Data transmission from the access provider's exchange to the nearest available point of interconnection in a Local Interconnect calling Area (LICA)

There is little justification for constraining the nearest point at which an access seeker must interconnect to be a LICA. Accordingly, the backhaul transmission service should extend to the access seekers nearest available interconnection point.

Similarly, there is little justification for specifying the bandwidth of the backhaul transmission (e.g. Nx2Mbit/s up to a maximum of 155Mbit/s). The data transmission should be provided at standard bit rates and formats as defined by international standards. The bandwidth should be sufficient to carry the traffic required.

The existing "Telecom fixed PDN backhaul" service in the Act provides transmission capacity for the bitstream access service between Telecom's first ATM switch and the access seeker's nearest available point of interconnection. A similar backhaul service capable of supporting the LLU service would be required.

The extent of the LLU backhaul service should be between the line side of the distribution frame in the local exchange or distribution cabinet, and the access seeker's nearest available interconnection point.

Co-location service

The co-location service allows an access seeker to install equipment into the access providers building or cabinet. As Telecom's local loop network terminates inside Telecom buildings, access seekers would be required to house their equipment in or near those buildings. The Commission defined the following three different methods:

Hostel or segregated co-location, where the access seeker's equipment is housed in a separate room or area at the access provider's facilities, including in an area adjacent to the access provider's facilities, including in an area adjacent to the access provider's building, but still on the access provider's property.

Co-mingling, where the access seeker's equipment is housed at the access provider's facilities but is either mixed in with the access provider's equipment, or is within the same area, and not in a separate room or area.

Distant co-location, where the access seeker's equipment is housed at a distant location and an external tie-cable is used to connect the access provider's exchange with the remote site.

The Commission also provided further detail on what facilities would be provided as part of the co-location service as follows:

The access seeker's co-location equipment space would include:

- a) access to DC and AC power, access to the exchange earth and suitable lighting;
- b) air conditioning;
- c) suitability for the installation and operation (including maintenance) of electronic equipment;
- d) secure access;
- e) fire detection and protection equipment which is compliant with the relevant local standards; and
- f) suitable cable access, which would enable the access seeker to provide cables between equipment racks within the co-location equipment space.

Cables would be installed between the MDF and a local distribution frame (LDF) located in the access seeker's co-location equipment space. These cables would be terminated on both frames and allow connection between the access provider's equipment and the access seeker's equipment. The connection of local loop cable pairs to an access seeker's equipment would be facilitated through cross-connect jumpers installed on both frames.

The LLU co-location service does not cover the distant co-location option above, as this option only requires cable access to the Telecom distribution frame and does not require the use of Telecom's building and facilities.

Line sharing service

Line sharing is a service which separates the non-voice band frequency spectrum on a copper cable pair from the voice band frequency spectrum. Typically an access seeker of LLU is able to offer the non-voice frequency services such as DSL over the unbundled local loop while the access provider retains the voice services.

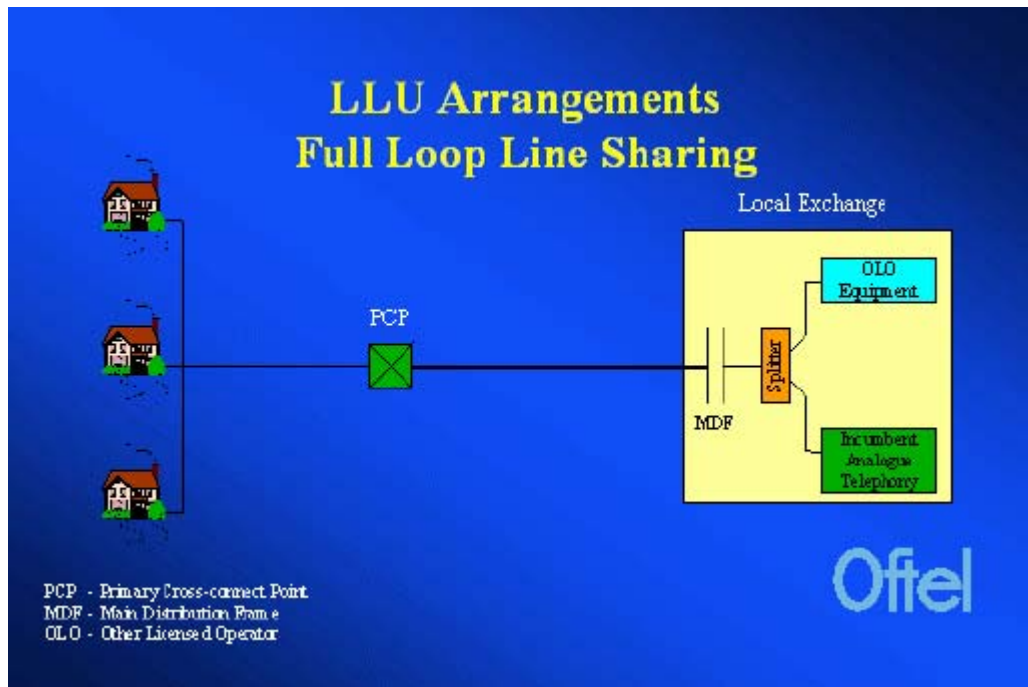


Diagram 3: Line Sharing (Source: Ofel, *LLU Facts*.)

The Commission considered that there were insufficient benefits to consider the regulation of a line sharing service.

All-fibre local loop unbundling

The Commission concluded that the definition of the local loop network could include the possibility of a fibre cable extending from the local telephone exchange to the end-user's building. In this case, there would be no copper cable in the local loop.

The prime purpose for the unbundling of the local loop is to allow an access seeker to install their own DSL equipment and provide DSL-based services. As such equipment requires a copper rather than a fibre cable, all-fibre cable local loops are not considered to be relevant in the context of this unbundling service, and has been excluded in the service description by referring explicitly to copper cable.

Operational support systems

The FCC defines OSS to consist of:

pre-ordering, ordering, provisioning, maintenance and repair, and billing function supported by an incumbent LEC's databases and information. The OSS element also includes access to all loop qualification information contained in any of the incumbent LEC's databases or other records.

The unbundled services being considered all require access to Telecom's OSS. This would be dealt with as a term of any determination for the LLU designated service or through the access code regime.

Distribution frames

Distribution frames allow for the termination of cables and the flexible interconnection between cables. Distribution frames are generally located at any point in a network where cross connection of cable pairs or fibres is required.

The extremities of the local loop network are defined in the Act as being the building distribution frame and the main distribution frame as described below.

Building distribution frame (BDF)

A BDF is typically provided in buildings which require more than a few cable pairs. A BDF is not required in most residential premises but is common in a commercial building.

Main distribution frame (MDF)

Telecom has a main distribution frame in its local exchanges and distribution cabinets. The Commission defined Telecom's MDF as:

The interface point between the local loop and the local switching equipment.
The MDF provides a network termination point for cables connected to the local switching equipment and the local loop network.
The MDF provides flexible cross connection between cable pairs which are terminated on the MDF.

For the purposes of LLU, access seekers only require access to the local loop side (line side or customer facing side) of an MDF. Access seekers would not require access to the switching side (equipment or exchange side).

Optical fibre distribution frame (OFDF)

Where a local loop contains a fibre feeder cable between the local exchange and a cabinet, Telecom would generally provide an OFDF at the local exchange and at the cabinet.

Access to the OFDF at either location would be required by the access seeker if they wished to utilise the LLU backhaul service.

Unconditioned local loop

Copper local loop networks have traditionally been designed to carry voice frequency signals and to provide maximum flexibility. Consequently these networks have been "conditioned" by using such techniques as low pass

filters (loading coils) and multiple feeds (bridge taps) which reduce the performance of higher frequency DSL services.

Before an access seeker is provided with an unbundled copper local loop, Telecom would be required, at the access seeker's request, to take all conditioning off the loop and hand it over in its unconditioned state. This was a requirement, for example, in Australia.

The cost of unconditioning a local loop, where necessary, would be recovered by the access provider as a component of the provisioning charge.

DSL reach on copper cable

Conventional DSL equipment is able to operate over copper cable at distances of about 5km although there are many factors which can influence this reach, such as, cross talk on the cable and external noise.

With the introduction of new technology DSL equipment providing higher speeds (such as ADSL2+), the copper cable distance is typically reduced to about 2km reducing the number of customers that can be served from a cable. To overcome this reach constraint, Telecom has indicated that it will overlay the copper feeder cable in certain circumstances, between the exchange and the remote line unit or cabinet. This is commonly referred to a fibre to the node (FTTN).

This decision to overlay will be based on Telecom's business plans to move to higher speeds to deliver enhanced services to its customers or perhaps to provide more transmission capacity. Telecom's decision to overlay may not bear any relationship to the business plans of the access seeker and, in fact, may be contrary to their plans depending on the customer type and the services being offered. The access seeker's business should not be disadvantaged by a network investment decision made independently by Telecom.

Also, when Telecom makes a decision to overlay the copper feeder cable, some or all of the access seeker's DSL equipment previously installed in the local exchange will either have to be moved to the cabinet or, if not suitable, would be have to be redeployed elsewhere or disposed of. When making a decision to install DSL equipment, the access seeker will have to take account of the future possibility that Telecom may overlay one or more local copper loops with fibre.

Sub-local loop unbundling

Telecom's decision to overlay a copper feeder cable with fibre cable could be made after an access seeker has already installed their DSL equipment in a Telecom local exchange and on an unbundled copper cable local loop. In this situation, the customers served by the access seeker on the copper cable

would be stranded unless the access seeker transferred these customers to either:

- the Telecom resale or unbundled bitstream access service; or
- an Telecom unbundled local loop service between the distribution cabinet and the end user's building; or
- their own network where available.

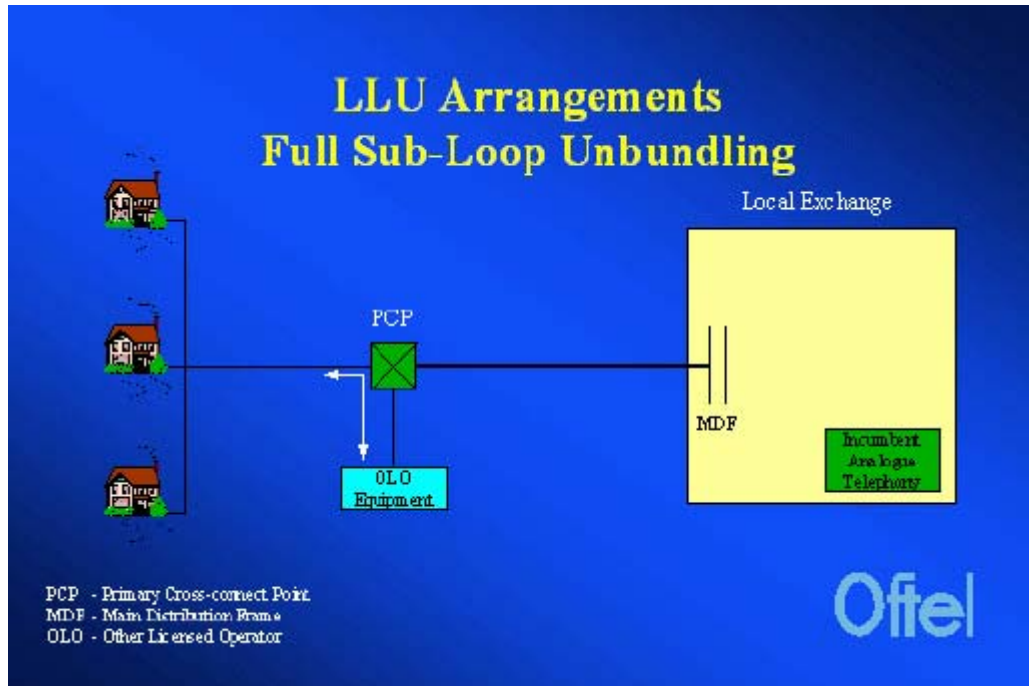


Diagram 4: Sub-loop unbundling (Source: OfTel, *LLU Facts*.)

If the access seeker does not have suitable infrastructure to serve these customers on their own network, then transferring customers from LLU to the bitstream access service in order to maintain services to these customers would be forcing the access seeker down the 'investment ladder'. Also the service being provided by the access seeker using LLU may not have a bitstream access service equivalent.

Therefore, there would be a need for a sub-loop unbundling option which allows access seekers to continue to serve their existing customers in situations where Telecom has independently chosen to overlay a copper feeder cable or to serve new customers where Telecom has already overlaid a copper feeder cable.

Co-location

Access seekers would require space in Telecom local exchanges and distribution cabinets to install their DSL equipment. This could include access to the building services, distribution frames, cable ducts and trunking, or any other facility required by the access seeker to support its equipment.

It is envisaged that the access seeker would provide its own equipment racks and would not necessarily require a secure environment physically separated from the Telecom equipment room. However in a cabinet, sharing of Telecom's rack space may be necessary and appropriate.

When an access seeker chooses to co-locate in Telecom's local exchange or distribution cabinet, it might be found that there is insufficient space to accommodate the access seekers equipment. In these cases, Telecom could either extend the building or cabinet or, alternatively, the access seeker might choose to install their equipment in their own building or install their own cabinet adjacent to the Telecom premises. The Commission would need to determine how such circumstances would be dealt with.

Relevant access codes

Access codes, prepared in accordance with schedule 2 of the Act, which would assist with the implementation of LLU could include:

- Equipment mounting and cabling arrangements in local exchanges and distribution cabinets
- Demand forecasting guidelines for the supply of co-location facilities, such as power and air conditioning
- Demand forecasting guidelines for the supply of backhaul transmission facilities
- Access arrangements for premises providing co-location

APPENDIX 2

Current UBS designated service

In December 2003, the Commission completed a schedule 3 investigation which recommended the designation of an unbundled fixed PDN service in the form of access to an internet grade ADSL bitstream access service⁴⁰.

The Commission found that⁴¹:

International experience indicates that the availability of xDSL bitstream services can increase the pace of take-up of broadband services. Although this is not directly synonymous with the promotion of competition under 18, the Commission considers that there is a linkage between the two. Increased availability of broadband is likely to lead to the promotion of both price and product competition for the long-term benefit of end-users of telecommunications services and to stimulate increased broadband take-up.

Also as part of their investigation, the Commission's provided the following details regarding the bitstream access service description:

1. User level specification

This service supports a set of applications intended for home and small enterprise use. In general, it is a high speed IP access service which provides good performance, but could not typically support extensive use of mission critical applications which require excellent real-time network performance or availability. Typically, the service will provide network capability to serve customers with between 1 and 5 PCs.

The functionality typically includes the following:

- 'always on' network connection;
- static or dynamic IP addressing;
- web browsing with occasional large file download, web based e-mail and gaming;
- client/server e-mail functionality;
- File Transfer Protocol (FTP), newsgroup server access etc;
- peer to peer file sharing applications, *subject to speed limitations at peak times*;
- Virtual Private Network (VPN) access, remote Local Area Network, Citrix and terminal services, remote desktop applications, *subject to speed limitations at peak times*;
- audio and video streaming, *subject to speed limitations at peak times*.

Typically, the functionality explicitly excludes the following:

- video conferencing;
- VoIP clients and services; and
- other real time multimedia services, including TV, Video on Demand etc.

2. Technical description

⁴⁰ Commission's final report, December 2003, para 777

⁴¹ Ibid, para 807

The following table summarises the expected traffic handling capability (throughput). At peak times it is assumed the user traffic contends for network resources with traffic from a number of other users.

Upstream Rate	128kbit/s maximum
Downstream Rate	256kbit/s minimum

The DSL service provider would commonly guarantee a number of network service level parameters, including:

- service availability;
- latency or average network response time;
- mean and maximum time to repair; and
- provisioning, maintenance and repair reporting.

3. Service Handover

Interconnect is provided through aggregation at an ATM Network Node Interface (NNI), utilising the appropriate ATM bearer service category (likely to be Variable Bit Rate – non real time).

Service description

The Commission recommended that the bitstream access service should be capable of supporting:

- web browsing with occasional large file download, web based e-mail and gaming;
- client/server e-mail functionality;
- File Transfer Protocol (FTP), newsgroup server access etc;
- peer to peer file sharing applications, *subject to speed limitations at peak times*;
- Virtual Private Network (VPN) access, remote Local Area Network, Citrix and terminal services, remote desktop applications, *subject to speed limitations at peak times*;
- audio and video streaming, *subject to speed limitations at peak times*.

and should not be capable of providing:

- video conferencing;
- VoIP clients and services; and
- other real time multimedia services, including TV, video on demand etc.

Also included in the service description was a limit on the access principles that “the service is not required to support any function that relies on real time network capability”.

“Real time” broadband applications typically require a high, and in some cases similar, upstream and downstream speeds to function satisfactorily. Examples are VoIP, gaming and videoconferencing. However, TV and video

on demand services only require a high downstream speed and could readily be provided on the designated service.

Therefore, there is an apparent conflict in the service description between the technical limits (which allow real time applications albeit only in the downstream direction) and the functional limits (which do not allow real time applications).

Elsewhere in the Commission's recommendation⁴², it states that the bitstream access service is a service "which does not incorporate the future features and functionality of Telecom's NGN network, such as video over DSL services". Apart from this example, it is unclear what types of NGN features and functionality were being referred to.

Commission's bitstream access service determination

In December 2005, the Commission issued a final determination for the ADSL bitstream access service. Submissions received by the Commission during their determination process highlighted that the following technical characteristics of the service were contentious:

- The downstream speed for data sent to the end-user
 - The peak information rate (PIR)
 - The sustained information rate (SIR)
 - Spectrum management rules
 - Line qualification database
- The upstream speed
- Whether usage limits should apply to the uploading and downloading of data
- How the single virtual path (between the DSLAM and the first ATM switch) should be shared based on equivalence
- Whether interleaving should be switched on or may be optionally switched off
- Whether both static or dynamic IP addresses should be available

The downstream speed

Data speeds are normally specified in terms of the PIR (the highest speed possible) and the SIR (the lowest speed guaranteed). The ratio of PIR to SIR is the contention ratio. International best practice contention ratios are generally of the order of 50:1 and Telecom utilised the ratio until their new plans were introduced in April 2006.

The service description in the Act requires that the downstream speed have an average of not less than 256kbps and not be less than 32kbps. Therefore, this description does not specify a PIR but does specify a minimum SIR of 32kbps.

⁴² Para 804

The Commission concluded in its determination that the PIR should be unconstrained, that is, it will be the maximum theoretical line rate that the DSLAM can support allowing for standard DSL overheads. It reached this decision on the basis that the service description does not specify a PIR and the standard access principle 3 (Telecom were offering unconstrained PIR services to their own customers).

The Commission also concluded that the SIR should be the weighted average of the SIRs of Telecom's retail best efforts services across its whole network on the basis of standard access principle 3.

The upstream speed

The upstream speed determined by the Commission was 128kbps as specified in the Act. The Commission did not feel compelled to change this bit rate on the basis of standard access principle 3 as Telecom's services were generally 128kbps upstream.

Limits on the uploading and downloading of data

Although not specified in the Act, limits on the downloading and uploading of data was a contentious issue which had to be considered by the Commission. The Commission determined that no limits should be applied to the service.

Changes in the broadband market since 2003

Since the Commission issued its bitstream access service recommendation in 2003, there have been several significant developments in the broadband market.

Changing broadband markets

The nature of the residential and SME market for which the bitstream access service was designed has changed such that the technical characteristics of the services they require mirror those of the business market. For example, applications such as home office and gaming require similar upstream and downstream speeds to those enjoyed by businesses.

This is supported by Telecom's recent announcement that they intend to replace all of their existing broadband plans with new plans which:

- do not differentiate between market segments based on price or speed;
- increase the maximum upstream speed from 128kbps to 512kbps;
- retain uniform nationwide pricing; and
- retain price or speed caps on the downloading of data.

In their media release, Telecom state that "the three new [highest speed] Xtra Pro plans will be very attractive to small businesses and customers at home

who require higher speeds in both directions as well as larger data amounts each month”. The new Xtra Pro plans are 512kbps upstream and 3.5Mbps downstream with data caps of between 10GB and 40GB per month.

Next Generation Network (NGN) implementation

Since 2003, most incumbents have announced plans to introduce their NGNs. BT will begin the migration of customers to its new NGN (21st century network) in Cardiff during the second half of 2006.⁴³

Telstra, which has been accelerating its DSLAM rollout program, has proposed a large-scale deployment of FTTN and announced that it will begin building its NGN during 2006. However, Telstra have now declared this is now on hold and dependent on the ACCC agreeing to protect Telstra from regulations which allow competitors to ‘piggyback’ on its investment.⁴⁴

In Europe, there has been a call by the incumbents for a regulatory “holiday” to give them the necessary incentives to undertake major new NGN infrastructure investments. In their response to the EU Commission call for input on this idea, the European Regulatory Group has stated that it does not accept that investment incentives are undermined in the absence of a guaranteed right to monopoly access to new infrastructure. Such investment is driven by other factors such as efficiencies and cost savings. Regulatory holidays do not promote competition for long term the benefit of end-users and if a period of monopoly use was introduced, there could be a regulatory problem in dealing with the entrenched market power after the expiry of the holiday.

Telecom announced on 30 August 2005 that it intended to roll out an IP voice platform for its NGN and that customers would begin migrating onto this network in early 2007 with the transition being completed by 2012. On 9 February 2006, Telecom announced that it had completed its NGN voice trial and that the next step would be to trial fibre to the home in May 2006. The introduction of NGN services to the market covering communications, information and entertainment is to start later in 2006.

Based on Telecom’s announcements, it is apparent that their new NGN services, particularly for residential and SME customers, are still in the early stages of development and may initially just be the current services delivered by a different access technology. Telecom has also recently announced a slippage in their residential NGN rollout which, along with the mass PSTN replacement, has been postponed from the beginning of 2007 to the beginning of 2008.

The Commission notes⁴⁵ that Telecom has stated that investment in its NGN will proceed to a certain degree, whether unbundling is undertaken or not. The Commission is not satisfied that the enhanced features of an NGN which

⁴³ Media release DC06-109 dated 6 March 2006

⁴⁴ Media release 337/2005 dated 1 Dec 2006

⁴⁵ Para 714

Telecom claims would be forgone as a consequence of unbundling would necessarily be forgone. It is possible that, were it profitable to do so, entrants, or Telecom itself, would proceed with these investments, at least in a modified form. The NGN is partly justified on the basis of the lower costs and increased revenues that it would generate.

Commission's conclusion on dynamic efficiency effects

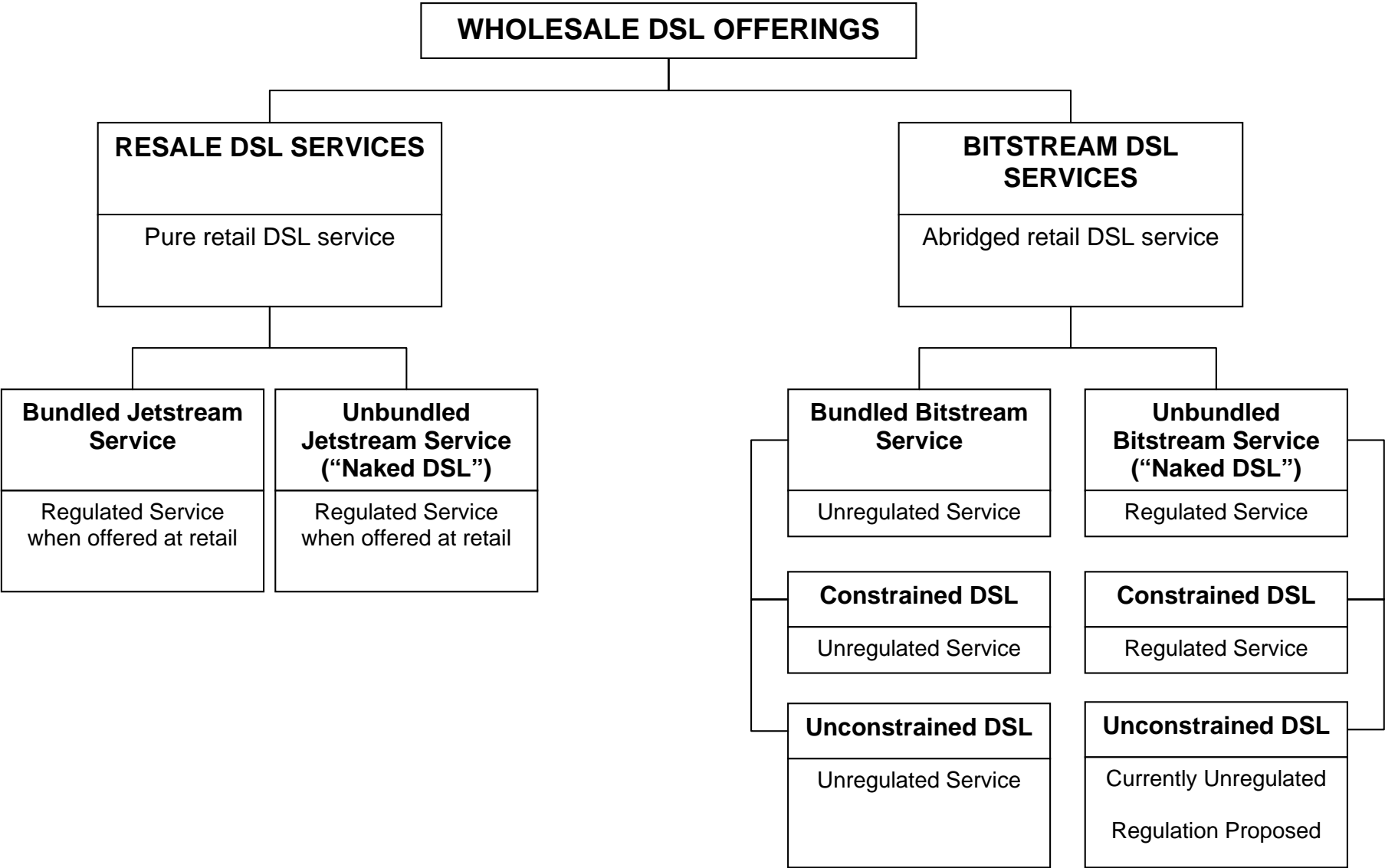
For dynamic efficiency reasons, the Commission considered in their investigation that the bitstream access service should distinguish between:

- A service which does not incorporate the future features and functionality of Telecom's NGN, such as video over DSL services; and
- A service with business grade quality of service that would enable access seekers to share the benefits of the future features of Telecom's NGN.

The key reasons why the Commission recommended a limited form of bitstream access were:

- There is an access bottleneck in residential and SME broadband markets;
- Telecom's UPC service has the potential to address the access bottleneck in the corporate and multi-site business market; and
- Limiting the parameters of the service would minimise the potential for negative impacts on Telecom's investment incentives.

Annex 3: Wholesale DSL Offerings



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Bundled Jetstream Service = Purchase of Jetstream DSL service together with other services such as homeline service

Unbundled Jetstream Service = Purchase of Jetstream DSL service standalone without other services such as homeline service

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