FINAL REPORT - PUBLIC

Prepared For:

Mallesons Stephen Jaques

Level 60, Governor Phillip Tower

1 Farrer Place

Sydney, NSW

Statement by Dr Paul Paterson of CRA International for Mallesons Stephen Jaques on the Economic Considerations for a PSTN Originating Access Exemption

Prepared By:

Paul Paterson

CRA International

Level 7, 107 Pitt Street

Sydney NSW 2000, Australia

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12 October 2007

Mallesons Stephen Jaques
Level 60, Governor Phillip Tower
1 Farrer Place
SYDNEY NSW 2000

RE: STATEMENT BY DR PAUL PATERSON OF CRA INTERNATIONAL FOR MALLESONS STEPHEN JAQUES ON THE ECONOMIC CONSIDERATIONS FOR A PSTN ORIGINATING ACCESS EXEMPTION

Please find enclosed the final Statement on the Economic Considerations for a PSTN Originating Exemption.

Yours sincerely
CRA INTERNATIONAL PTY LTD

Paul Paterson
Vice President

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1 The key point I make in this report is that, due to the availability of ULLS and other alternatives to the Telstra-operated access network, in many areas there is not a local loop bottleneck in the provision of telephony (or broadband) services. This means that, in these areas, PSTN Originating Access ('OA') regulation is not needed to achieve competitive conditions in the downstream telephony market or any-to-any connectivity. Further, as regulation inevitably causes inefficient distortions, and PSTN OA regulation is no exception in this regard, efficient competition, and efficient investment in and use of infrastructure, would be fostered by the removal of this regulation through the granting of an exemption order.

2 This is demonstrated in the report as follows:

- I first use economic reasoning and factual evidence to show that technically and commercially viable substitutes for PSTN OA exist in many areas, in particular fibre and microwave access networks (and ULLS) in CBD areas and ULLS in metropolitan areas. That is, I demonstrate that a bottleneck situation does not exist. This is done in *Section 3: Are there Alternatives to PSTN OA for Providing Downstream Services?*
- I then demonstrate that downstream competition would not be compromised by a PSTN OA Exemption Order. This is done by considering the situation in downstream markets with, and without, PSTN OA regulation. I conclude that upstream circumstances conducive to retail competition would continue to exist in a 'without' world and hence downstream competition would not be adversely disturbed. I recognise there are some operators using PSTN OA to provide a limited range of telephony services by pre-selection or over-ride, and that these operators might exit the market if PSTN OA is no longer provided on a regulated basis.
- However I argue that it is quite possible that an equivalent service or bundle of services (depending on what the market determines is efficient) will be offered on a commercial basis, presenting the option of migrating to a different resale business model if these operators did not wish to embrace ULLS-based supply. Moreover, even if some operators using PSTN OA do exit, I do not see this as negatively impacting downstream competition as those most likely to exit have at best a *de minimus* presence in the market. These points are addressed in *Section 5: Would Competition in Downstream Market(s) be Compromised by a PSTN OA Exemption Order?*
- I also demonstrate that efficient competition and efficient infrastructure investment and use would be promoted by a PSTN OA exemption order. I do this by identifying the significant distortions that come from regulation, which by simple deduction would not exist if this regulation was removed. This is done in *Section 6: Would a PSTN OA Exemption Promote Competition and Efficient Infrastructure Investment and Use?*
- Finally, I conclude that, due to the alternatives available for originating calls from a customer, any-to-any connectivity would not be disturbed by exemption. This is done in *Section 7: Would an Exemption Order Compromise Any-to-any Connectivity?*

3 To make these principles operational, I propose that a PSTN OA exemption order be granted in all CBDs, and in metropolitan areas where at least one competitor DSLAM has been deployed, as this demonstrates in concrete terms that there are no material entry barriers. This is done in *Section 4: Scope of the PSTN OA exemption order.*

EXECUTIVE SUMMARY

1 I have been asked by Mallesons Stephen Jaques ('MSJ') whether, in my opinion as an expert economist, an Exemption Order for the PSTN Originating Access ('PSTN OA') service in the CBD and metropolitan areas of Australia would be in the long-term interests of end-users ('LTIE'). Specifically, I have considered in detail the following four criteria to ULLS-based entry:

- First, whether competition would be diminished by this Exemption Order;
- Second, whether this Exemption Order would promote competition;
- Third, whether this Exemption Order would facilitate efficient use of, and investment in, infrastructure; and
- Fourth, would any-to-any connectivity be compromised by this Exemption Order.

2 In my view, granting a PSTN OA Exemption Order in all CBD exchange service areas ('ESAs'), and metropolitan ESAs with current competitor DSLAM build ('Exemption Area'), would not diminish competition but rather would promote competition and facilitate the efficient use of and investment in infrastructure, for the following reasons:

- Currently the unconditioned local loop service ('ULLS'), the Optus hybrid fibre coaxial (HFC) network and other competing fixed line networks enable the replication of the downstream services which PSTN OA is used to provide (as well as other retail service offerings such as broadband) in the Exemption Area. Furthermore, there are no apparent material impediments to retailers commencing to use, or increasing their use of, these alternative means of service provision.
- The PSTN OA Exemption Order would not impact the ready availability of these alternative means of providing the relevant downstream services. Therefore, retailers would be able to substitute away from Telstra-supplied PSTN OA service if Telstra attempted to price PSTN OA supra-competitively (or not supply PSTN OA). While this is demonstrably so for supplying retail customers that purchase voice and broadband service bundles, my analysis leads me to conclude that this is also the case for supplying the majority of voice-only retail customers. Furthermore, those customers that are too small to contest using ULLS are likely to be unattractive at regulated PSTN OA prices anyway.

- It is recognised that there are some operators using PSTN OA to provide a limited range of telephony services by pre-selection or over-ride, and that these operators might exit the market if PSTN OA is no longer provided on a regulated basis. However, it is quite possible that an equivalent service or bundle of services (depending on what the market determines is efficient) will be offered on a commercial basis, presenting the option of migrating to a different resale business model if these operators did not wish to embrace ULLS-based supply. Moreover, even if some operators using PSTN OA do exit, I do not see this as negatively impacting downstream competition as those most likely to exit at best have a *de minimus* presence in the market.
- Further, an Exemption Order for PSTN OA in the Exemption Area would have the following benefits:
    - An Exemption Order would facilitate efficient facilities-based competition, stimulating innovation and allowing for more robust price competition. Further, to the extent that removing PSTN OA regulation results in a shift to ULLS-based or full facilities-based competition, competitors would be more deeply vertically integrated. This would be likely to intensify competition in retail markets and result in direct benefits for customers as vertical efficiencies are realised and passed through to consumers.
    - Access regulation distorts incentives for efficient infrastructure investment and use, including by truncating investment returns and creating the potential for arbitrage and regulatory dependence. An Exemption Order would remove the distorting effects caused by PSTN OA regulation in the Exemption Area and promote efficient investment.

3 I am also of the view that a PSTN OA Exemption Order would not compromise any-to-any connectivity.

4 I have also been asked to consider the particular scope of a PSTN OA Exemption Order that would be justified on economic grounds. I propose that the exemption be granted for all CBD areas due to the preponderance of competing infrastructure. In metropolitan areas, my analysis indicates that, for the current purpose, the ESA is the relevant geographic scope of the wholesale market.[1] I further come to the conclusion that exemptions are justified on economic grounds for those metropolitan ESAs where at least one competitor has deployed a DSLAM. In my opinion, the deployment of at least one competitor DSLAM provides concrete support for my finding that there are not material barriers to DSLAM-based entry and consequently that, absent PSTN OA regulation, competition in downstream markets would not be reduced. The list of ESAs to which the proposed Exemption applies is provided in Appendix A.

1 This is consistent with the view proposed by the Australian Competition and Consumer Commission ('the Commission') in its recent Fixed Services Review report: ACCC, 'Fixed Services Review: A second position paper', April 2007 (Second Position Paper), p. iv

1. INTRODUCTION

5 My name is Dr Paul Paterson. I am a Vice President with CRA International, a major US-based economic consulting firm. My curriculum vitae, including qualifications, experience in the telecommunications and economics field and publications, is included in Appendix G.

6 On 21 December 2005, the Australian Competition and Consumer Commission ('the Commission') commenced an inquiry into the regulation of fixed network services. The review considered a number of key fixed wholesale products which Telstra supplies over its customer access network ('CAN'), including PSTN Originating Access ('PSTN OA') and PSTN Termination access ('PSTN TA'). In July 2006, the Commission re-declared PSTN OA and PSTN TA under Part XIC of the Trade Practices Act 1974 ('the Act').[2]

7 Telstra has indicated that it proposes to apply for an Exemption Order ('Exemption Order') under Part XIC of the Act with respect to PSTN OA. I have been asked by Mallesons Stephen Jaques ('MSJ') to consider whether a PSTN OA exemption for the provision of international, national long distance and fixed-to-mobile ('FTM') calls originating in CBD and metropolitan areas of Australia would be in the long term interest of end users ('LTIE') under the economic criteria set out in the Act.[3] I have also been asked to give my view on the appropriate specific geographic scope of the exemption.

8 I have read the Federal Court's 'Guidelines for Expert Witnesses and Proceedings in the Federal Court of Australia'. I have prepared this report accordingly, making all inquiries I consider to be appropriate, having regard to the instructions from MSJ.

9 The report is structured as follows:

- In **Section 2** I define the service in question, PSTN OA, and consider the relevant retail and wholesale markets for assessing the competition implications of the Exemption Order for this service;
- In **Section 3** I determine whether there are alternative means to Telstra-supplied PSTN OA that allow the provision of downstream services currently supplied by use of PSTN OA;

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2 ACCC, 'Declaration inquiry for the ULLS, PSTN OTA and CLLS: Final Determination', July 2006 ('Final Decision')

3 A copy of Mallesons Stephen Jaques Exemption Instructions is provided in Appendix F. These instructions direct me not to consider exemption of PSTN OA when used for calls to "special services" numbers (eg 13/1300 and 1800). I also understand from these instructions that I am not to consider the use of the PSTN OA service for the provision of what is generally known as local call override. Finally, these instructions direct me to take CBD to mean the high line density areas described by ULLS Band 1 areas, and metropolitan to mean the medium line density areas described by ULLS Band 2 areas. Accordingly the terms CBD and Band 1 areas, and metropolitan and Band 2 areas, are taken to have the same meaning in this report.

- In **Section 4** I consider the appropriate geographic scope of the Exemption Order ('the Exemption Area');
- In **Section 5** I consider whether a PSTN OA Exemption Order would compromise competition in the relevant retail market(s);
- In **Section 6** I consider whether a PSTN OA Exemption Order would promote competition and the economically efficient use of, and investment in, infrastructure; and
- In **Section 7** I consider whether a PSTN OA Exemption Order would compromise any-to-any connectivity.
- In **Section 8** I present my conclusions.

10 At various points in the report, references are made to the following appendices, which contain the more detailed data and/or analyses summarised in the main body of the report:

- **Appendix A** contains a list of the ESAs for which I conclude a PSTN OA exemption should apply, and details the specific competitor DSLAM build activities evidenced in each of these ESAs;
- **Appendix B** contains a review of the current state of competition in the retail fixed voice services and broadband market(s);
- **Appendix C** contains details on local switching and gateway infrastructure for the provision of telephony services over ULLS;
- **Appendix D** provides the evidence supporting my view that there are no material costs in switching from line sharing service ('LSS') to ULLS;
- **Appendix E** lays out the assumptions underpinning my voice-only contestability modelling;
- **Appendix F** contains the instructions provided by MSJ; and
- **Appendix G** presents my curriculum vitae, including qualifications, publications and relevant experience.

2. SERVICE DESCRIPTION AND MARKET DEFINITIONS

11 In this section I first describe the PSTN OA service and its uses by access seekers, then address the retail and wholesale markets relevant for assessing the economic implications of a PSTN OA Exemption Order.

2.1. SERVICE DESCRIPTION AND USES OF THE PSTN OA SERVICE

12 PSTN OA is used by access seekers to supply a range of voice grade call types, including international, national long distance and FTM calls. There are three main components of a voice grade call: call origination, conveyance (the switching and transmission of calls) and call termination. PSTN OA provides to access seekers the origination component. This comprises the carriage of voice grade calls from the calling party to a point of interconnection ('POI') with an access seeker's network.

13 The Commission describes PSTN OA as:

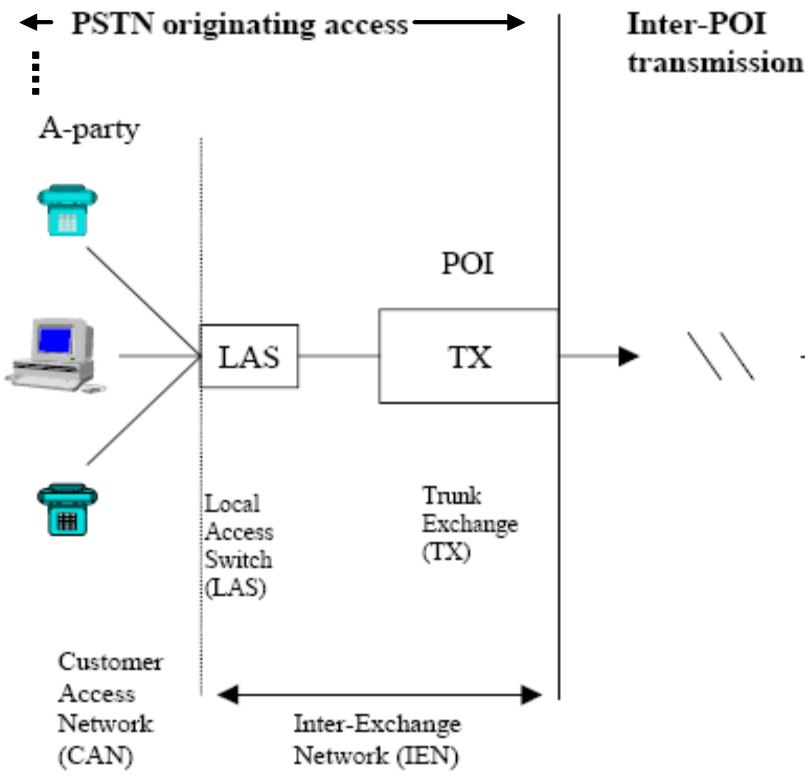
> *An access service for the carriage of telephone (i.e. PSTN and PSTN equivalent such as voice from ISDN) calls (i.e. voice, data over the voice band) to a Point of Interconnect ('**POI**') from end-customers assigned numbers from the geographic number ranges of the Australian Numbering Plan and directly connected to the Access Providers network.*[4]

14 In order to make and receive PSTN calls, a customer must be connected to the customer access network. Such a connection allows calls to be 'originated' on the network. The connection service is generally referred to as 'basic access'. This connection is provided either over Telstra's customer access network (either by Telstra, a reseller or a ULLS-based provider) or over alternative networks (e.g. fibre loops or Optus' HFC network). PSTN OA is carried over this connection, and over the inter-exchange network ('IEN'), to the access seeker's POI which is usually located in a trunk exchange. Once a call has reached the POI it is routed onto other networks, generally operated by another carrier. These might be long-distance networks between cities or countries, or a mobile network.

4 Final Decision, p. 67.

15 Figure 1 shows the network architecture underlying PSTN OA:

Figure 1: Network structure – PSTN OA service



Source: Figure adapted from ACCC, 'Assessment of Telstra's PSTN and LCS Undertaking: Final Decision', 29 November 2006, Figure 2.2.1.

16 In line with my instructions, I consider three different types of operators that use PSTN OA to provide international, domestic long distance and FTM calls to end customers:[5]

- **Pure preselection providers** use PSTN OA to supply international, national long distance and FTM calls to end-consumers who buy local services (basic access and local calls) from another provider (e.g. Telstra). This is one of the simpler uses of the PSTN OA service, where end customers 'preselect' their supplier and national long distance, international and FTM calls are automatically routed to the POI of this supplier. Pre-selected carriers either use their own long-distance transmission network or acquire capacity on third party networks. Pre-selected carriers generally need to acquire PSTN TA to provide national long distance calls, make arrangements for call termination in other countries for international calls and acquire mobile termination access ('MTA') to provide FTM calls.[6]

- **Over-ride operators** also provide national long distance, international and FTM calls to end customers, in this case by end customers dialling an over-ride code. For example, business customers may program their PABX to route international calls to a particular destination to a supplier with a competitive rate for calls to that country.

- **Voice resellers** use PSTN OA and other wholesale services to supply the full range of PSTN services. Voice resellers use PSTN OA (plus PSTN TA and MTA) in the same way as pure pre-selection providers, but also purchase LCS and WLR to provide the full set of retail telephony services. Voice resellers may also provide broadband services using wholesale ADSL ('WADSL') or the line sharing service ('LSS').

17 In the remainder of this section I consider the bounds of relevant retail and wholesale markets. For the purpose of this report, I assume that there are distinct functional markets for the supply of wholesale and retail services. I delineate the relevant retail market(s) first, as this obviously has implications for wholesale purchasing requirements of those servicing retail customers.

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5 The proposed exemption will not affect calling card operators. Calling card operators provide international, domestic long distance and FTM calls to end customers through the sale of prepaid calling cards, usually at discounted rates. Calling card operators are not automatically selected to provide long distance and FTM calls to the end customer. Instead, the customer dials a local phone number or a special service number (such as a 13 or 1800 call), and then enters a pass code and the number they desire to call. This allows customers to choose the call provider on a call-by-call basis. OA is not used when customers dial a local number to access a calling card operator. When a customer accesses a calling card operator by using a special service (e.g. a 13 call), then special service PSTN OA is used, which is not subject to this exemption.

6 I note that the Commission has stated that 'all of these [pure preselection] carriers offer broadband ADSL products in addition to long-distance calls' (Final determination p19).

2.2. RELEVANT RETAIL MARKET(S)

18 For reasons outlined in this section, I conclude that the relevant retail market includes the full bundle of fixed voice services, these being basic access, local calls, national long distance, international and FTM calls. The market potentially also includes broadband services.

2.2.1. Fixed voice services

19 I conclude that the retail product market includes the full bundle of retail fixed voice services for the following (interrelated) reasons, on which I expand below:

- First, there is likely to be a cluster market for the full bundle of retail fixed voice services;
- Second, on commercial reality grounds – retailers face commercial incentives to supply the full bundle of retail fixed voice services to any given customer; and
- Third, there is scope for supply side substitution in the retailing function between the various retail fixed voice services.

Cluster market

20 A cluster market for two (or more) products exists when there are strong demand and/or supply side unbundling costs within the group of products, with the result that unbundled supply is not a close substitute for, and competitive constraint on, bundled supply. The Commission describes a cluster market as follows:[7]

> *In some cases it may be appropriate to define 'cluster' markets, comprising a bundle of related products, where the costs of unbundling mean that suppliers of the component products are unable to defeat a SSNIP by a hypothetical monopolist supplying the whole bundle of products. These unbundling costs could be costs incurred directly by the consumer of unbundled products, e.g. additional transaction costs, or additional costs incurred by the suppliers of single products, e.g. diseconomies of scope, which are then reflected in the relative prices of bundled and unbundled products.*

21 In the context of considering whether there is a cluster market for retail fixed voice services, unbundling costs may arise in a number of ways. For customers, such costs may entail the inconvenience of receiving multiple bills from splitting voice services between multiple providers and, more generally, the costs of having to deal with multiple providers. On the supply side, unbundling costs may, for instance, relate to the customer-specific economies of scope associated with billing, as well as customer acquisition and retention costs. There are also important network costs, notably in the provision of access, that provide substantial economies of scope in supply (see the discussion in paragraph 28 below).

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7 ACCC, Merger Guidelines, June 1999, 5.60

22 In my opinion, the evidence on actual patterns of customer purchasing behaviour is consistent with the existence of a cluster market. In particular, almost all customers purchasing local telephony services from Telstra's competitors (basic access and local calls) also purchase national long distance services from the same supplier. Of the [c-i-c] PSTN lines preselected to a non-Telstra carrier for long distance and FTM services, just [c-i-c] of these are Telstra retail lines.[8] The remaining [c-i-c] are Telstra wholesale lines, indicating that the majority of preselection providers are in fact bundling long distance (using PSTN OA) with other voice services (using LCS/WLR) and very few are providing long distance alone using PSTN OA. Turning to the broader retail market, just [c-i-c] of customers use Telstra for their local services and preselect an alternative carrier for their long distance and FTM services. That is, [c-i-c] of Telstra local services customers bundle in other fixed voice call services.[9]

23 The trend towards bundling of fixed voice services has been noticeable in recent years. In 2003/04, the share of Telstra's retail customers taking Home Line Part or Business Line Part (the products which allow customers to use Telstra for basic access and local calls while using an alternative operator for long distance) was around [c-i-c].[10] However, by 2006/07, this share had dropped to [c-i-c]. This is consistent with observations made by the Commission in relation to the benefits of bundling, including this statement in early 2005: [11]

> *The benefits of preselection may be decreasing due to the increasing popularity of bundling – that is, where consumers acquire two or more services as a single package.*

Commercial reality

24 Defining a retail market for the full bundle of fixed voice services is also warranted on commercial reality grounds.

25 The Commission recognises the role of commercial reality in defining markets in its Merger Guidelines. It notes that commercial realities are a relevant consideration in defining functional markets, in addition to other formal tests:[12]

> *Delineation of the relevant functional market requires identification of the vertical stages of production and/or distribution which comprise the relevant arena of competition. This involves consideration of both the efficiencies of vertical integration, commercial reality and substitution possibilities at adjacent vertical stages.*

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8 [c-i-c]

9 ACMA recently estimated 11.26 million PSTN fixed voice SIOs (Source: ACMA, 'Communications Infrastructure and Services Availability in Australia 2006-2007', 2007, p. 27).

10 This data has been provided by Telstra and I have been asked to assume that it is correct

11 ACCC, 'Review of Telstra's price control arrangements', February 2005, p. 23

12 ACCC, Merger Guidelines, June 1999, 5.64

26 Although the Commission has discussed the role of commercial reality in the context of specific examples and market dimensions, I believe that it is relevant to consider commercial reality more generally, including in the current context of defining the downstream retail product market.

27 The commercial reality grounds for concluding a broad market that includes all fixed voice services are as follows. Telstra and all of its closest competitors sell and market the full range of fixed voice services. For example Optus, Primus and AAPT include local, national and international calls as well as fixed to mobile calls as part of their standard home phone package.[13] Moreover, I am not aware that Telstra and its closest competitors seek only to market and sell particular voice services to customers. Rather, the objective appears to be to market and sell as many retail voice services to customers as possible. The data on observed bundled purchasing behaviour (i.e. that almost all customers purchase the full bundle of retail fixed voice services) noted above is consistent with this.

28 Such an approach makes sense when one considers retailers' incentives to minimise per unit costs. A significant portion of voice retailing costs are likely to be fixed and common to the supply of all retail voice services (e.g. advertising, front-of house services and billing and collection). These costs can be shared at the customer level across different voice services, creating a potential economy of scope. Similarly, many underlying network costs are shared across many customers, or at least a single customer, and do not change with call types and volumes. There is a commercial incentive therefore to sell as many fixed voice products to customers as possible, rather than limiting the range of products sold, in order to achieve economies of scope in retailing costs at the customer level.

Supply side substitution

29 Defining a retail market for the full bundle of retail fixed voice services is further warranted on the basis of scope for supply side substitution.

30 In particular, once a retailer has made the investments in retailing functions (e.g. customer support, billing, marketing, etc.) to supply a particular subset of retail fixed voice products, that same retailing function can in general be readily used for the purpose of supplying an additional retail fixed voice service. Similarly, substantial network costs are incurred to supply any customer any type of calling or broadband service, and these are shared over many customers (for example, the DSLAM at an exchange) or over the customer (for example, the cost of obtaining access). Consequently, any additional costs associated with moving into the supply of the additional retail fixed voice service are likely to be low. Thus, it is unlikely that such a move would require substantial duplication of retailing investments.

13 Company websites (accessed 4th June 2007)

2.2.2. Broadband services

31 There are reasons for including broadband services in the relevant retail market, on grounds of supply side substitution and commercial reality.

32 For example, even if one believes, for the sake of argument, that the primary objective of those retailers that have established ULLS-based supply at an exchange is to target supply to the significant fraction of customers that purchase bundled retail broadband and fixed voice services,[14] such retailers will have the technical capability to supply either retail voice-only or retail data-only customers i.e. supply side substitution is technically feasible.

33 Moreover, ULLS-based retailers will have commercial incentives to supply voice-only customers, provided that the incremental revenues associated with doing so exceed the costs of supply. Analysis presented in section 5 suggests this is likely to be the case for the majority of voice customers.

2.2.3. Current state of retail market competition

34 Although the current level of competitiveness of this market is not directly germane to the central economic question for the exemption application being considered (rather, what is important is whether competition, and efficient investment in and use of infrastructure, is enhanced), I am of the view that this market is workably competitive. The basis of this view is described in Appendix B.

2.3. RELEVANT MARKET(S) FOR WHOLESALE INPUTS

35 Patterns of retail demand, and the implied scope of the relevant retail market, inform the delineation of the relevant wholesale market from which retailers can purchase wholesale inputs.

36 Retailers that do not have their own network need to access relevant wholesale inputs that enable them to supply the full suite of fixed telephony services. Moreover, as just noted, to compete effectively it appears retailers increasingly require the means to supply broadband services.

37 Currently, retailers can use a wide range of underlying wholesale inputs to source their retailing needs. In order of increasing sophistication, retailers can supply retail fixed voice services to end consumers by using any one of the following means:

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14 In this report I use the term 'ULLS-based' to cover competitor DSLAMs used for both ULLS- and LSS-based entry. I do this for two reasons. First, at the practical level, for confidentiality reasons information available to me does not allow me to differentiate between DSLAMS used to activate ULLS and those used to activate LSS. Second, I am of the view that the viability of ULLS-based and LSS-based service provision is similar, given their very similar technical capabilities, underlying economics and the absence of material barriers to LSS-based operators switching to ULLS-based supply. These matters are addressed in detail in Section 3.2 and Appendix D of the report.

- A full range of resale and 'network element' telephony products (including WLR, LCS, PSTN OA and PSTN TA) from Telstra, or by using third party equivalents;
- Resale broadband access, in the form of wholesale ADSL ('WADSL'), to provide voice over internet protocol ('VoIP') services;
- LSS or ULLS, in combination with other wholesale inputs (e.g. backhaul) and/or their own facilities, to provide VoIP;
- ULLS, in combination with other wholesale inputs (e.g. backhaul) and/or their own facilities, to provide a standard telephony service; and
- Their own network facilities (i.e. self-supply of all upstream inputs).

38 In order of increasing sophistication, the retailers can additionally supply retail broadband products using any one of the following means:

- A wholesale ADSL service via Telstra or a third party;
- LSS or ULLS, in combination with other wholesale inputs and/or their own network facilities; and
- Their own network facilities.

39 This *prima facie* suggests PSTN OA sits in a relatively broad wholesale market. However, taking a purposive perspective, the key market definition issue to be resolved is whether there are available alternatives for PSTN OA, so that in the event of an Exemption Order for these services, retail competition would be promoted (and certainly not harmed).

40 These issues are addressed in section 3, where I show that in fact there exist alternatives for PSTN OA, and that there appear to be few impediments to effective use of these alternatives. It follows from this that the relevant market for wholesale inputs for the purpose of analysing the exemption application is broad, and includes at least ULLS, the Optus HFC network and other competing fixed line networks.

41 Before embarking on this discussion, however, the following sub-section outlines my views on the relevant geographic markets for wholesale inputs for assessing the appropriateness of a PSTN OA Exemption Order.

2.4. GEOGRAPHIC SCOPE OF WHOLESALE INPUT MARKETS

42 I first consider the geographic scope of wholesale input markets for metropolitan areas, then for CBD areas. I proceed in this order because, while the geographic market considerations pertinent for metropolitan areas are also relevant for CBDs, there are some additional considerations for CBD areas.

2.4.1. Metropolitan areas

43 I consider that the geographic scope of wholesale input markets is exchange based in metropolitan areas.

44 As shall be explained below, I believe the relevant scope might in fact be (significantly) broader than this, encompassing groups of exchange service areas exhibiting similar competitive characteristics. However, I adopt exchange based markets, on the basis of practical considerations, given the purpose this market definition analysis is to serve.

45 I start by noting that strict application of substitution (that is, hypothetical monopolist) tests might lead to the delineation of unduly narrow markets. In particular, defining markets on the basis of demand side substitution alone might lead to a conclusion that markets are as narrow as the level of the customer premise.

46 Supply side substitution might, however, broaden the relevant market. Strictly applied, the hypothetical monopolist 'small but significant non-transitory increase in price' ('SSNIP') test often used in identifying markets requires that supply side substitution be achieved without significant new investment. Given the presence of a ULLS-based retailer at any particular exchange, an additional new customer at that exchange would not require significant new investment.[15] Hence, there is substantial scope for supply side substitution within any given ESA.

47 In any case, even if (for the sake of argument only) supply side substitution were not possible, it does not seem relevant to consider a market scope that is narrower than the local exchange in the current context. Basing an Exemption Order at a finer division, such as the customer premise level, would be impractical.

48 If either supply-side substitution, or mere practicality, implies geographic markets that are no smaller than the ESA, then the question becomes whether supply side substitution from one exchange to another is possible.

49 Applying the hypothetical monopolist test strictly, it might be argued that supply side substitution from one exchange to another could entail significant new investments, implying that markets should not be broadened beyond exchange based markets. I do not agree with this position (see section 3.3.1 for discussion of barriers to ULLS-based entry and expansion).

15 [c-i-c] Connection of an additional customer at an exchange where the ULLS-based competitor is already present involves disconnection of the jumper connecting the local loop to Telstra's network and installation of a new jumper connecting the loop to the access seeker's interconnect cable. This issue is also addressed in section 3 of this report.

50 However, even if (for the sake of argument) one believes that the strict application of a SSNIP test might be failed on the basis of exchange-specific investment requirements, in my view a more pragmatic assessment of the commercial context suggests that the relevant markets might be broader than exchange based, and perhaps significantly so. For example, regard should be had to the nature of costs in telecommunications. In particular, in this industry – as for network industries more generally – a significant fraction of costs are common, so incremental investments associated with expansion from one exchange to another are likely to be low, at least relative to costs already incurred.

51 The important point here is that once a competitor begins to provide service in a particular location, that competitor will have secured a 'beach-head' from which it can readily expand at relatively low incremental cost – low enough to weigh on the incumbent's pricing decisions. The question then is how to assess the extent or reach of that area within which the ready threat of competitive expansion imposes a material degree of competitive constraint.

52 The approach I in general prefer is one that has been widely used by regulators, which is to assess the extent and reach of the constraint associated with supply at one exchange on other exchanges – and, hence, delineate relevant geographic markets – by considering those other exchanges in the general area that exhibit broadly similar competitive conditions.[16] I recognise that this method has an element of circularity to it (as the assessment of competitive conditions informs the market definition, as well as *vice versa*), although I note that the Commission itself has adopted this approach.[17]

53 Analytically, this approach rests on the assumption that the observed differences in competitive conditions between areas reflect or signal those underlying factors – such as the demography, service cost or revenue potential of each area – which, in a complete analysis, could properly be used as a basis for geographical market definition. In that sense, the method is a shortcut that relies on the observed fact of difference in competitive conditions as a proxy for the underlying elements that define the geographical scope of the relevant markets. Where those conditions differ, the inference may be drawn that the underlying factors, properly observed, would lead to different geographical markets being defined.

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16 For example Ofcom has taken this approach. In Ofcom 'Review of Wholesale Broadband Access Markets 2006/07', 21 November 2006, 4.149, the UK authority states: "Ofcom has considered whether the availability of LLU allows supply-side substitution by an operator present in one (exchange) area into another (neighbouring) area in the event of a SSNIP in the price of wholesale broadband access in this latter area… Ofcom believes that the availability of LLU maybe relevant to the issue of whether two (adjacent) areas form part of a single geographic market. However because the economics of LLU vary by geographic area this can only be decided through an analysis of each of the areas in question."

17 The ACCC adopted a similar position in ACCC, 'Information Paper on Anti-Competitive Conduct in Telecommunications Markets', 1999: "Substitutability tests tend to be of limited relevance when delineating the geographic dimensions of telecommunications markets. For example, a local call in one capital city is unlikely to be substitutable for one made in another capital city. Accordingly, in delineating the geographic dimension of telecommunications markets, the Commission looks to factors such as the area over which major suppliers operate to ensure that it describes the relevant arena of competition."

54 Properly implemented, such an approach would also recognise that the area entrants contest tends to grow over time, as the initial beachhead is secured. This appears to be the case in the current context, as reflected in the rate of actual and forecast deployment of DSLAMs. Hence, currently observed similarities and differences in competitive conditions between exchanges might not reflect future competitive similarities and differences.

55 To summarise, the analytical approach I have outlined might well imply that geographic markets are broader than exchange based, and in fact encompass clusters of exchanges within bands that exhibit similar competitive conditions (even if these clusters are not as broad as, say, ULLS bands).

56 I nonetheless believe that, for the purpose of this Exemption Order application, an exchange based approach is more suitable, for the following reasons:

- It is consistent with the context of the current enquiry in the sense that an Exemption Order would not reasonably be capable of implementation in an area defined any more narrowly;
- It reflects the topology of the network being regulated;
- It minimises the risk that a too-broad geographical market definition will inappropriately lead to a decision not to forbear, when forbearance would have been desirable;
- The possibility that a larger geographical market definition is relevant is likely to be captured even if ESAs are used, since when aggregated the ESAs identified for exemption would be the larger market; and
- Data on DSLAM deployment – which is used to proxy the extent of actual and forecast ULLS-based activity – is available at no finer granularity than the exchange.

2.4.2. CBD areas

57 Essentially the same demand side considerations apply for metropolitan areas and CBDs. However, there are some additional supply side factors that need to be considered for CBD areas.

58 In particular, whereas one way for Telstra and its competitors to access CBD customers is through Telstra's exchange-based copper network (as in metropolitan areas), business customers are also widely accessed via alternative ubiquitous full facilities-based means of supply, most notably through entrant fibre-based access networks, and microwave links direct to customers. The existence of these alternative access networks raises the question of whether the exchange based approach to defining the geographical dimension of the wholesale market that I conclude is appropriate for Band 2 areas is appropriate for CBD areas.

59 For example, if it were the case that for Telstra's competitors these alternative means of accessing customers do not rely on the geographic configuration of Telstra's exchange-based PSTN, but rather their operation tends to be run centrally for each of the five major CBD areas being considered, it may be appropriate to use a CBD-wide geographical market definition. However, I am not aware of evidence that indicates that this is in fact the case, and accordingly believe it is prudent to also take an exchange based approach for CBD areas.

60 I see this as a prudent approach for the some of reasons that I list in support of this approach in Band 2 in section 2.4.1 above, namely:

- It is consistent with the context of the current enquiry in that it would not be practical to implement an Exemption Order in an area defined any more narrowly;
- It reflects the topology of the particular network being regulated (Telstra's PSTN);
- It minimises the risk that a too-broad geographical market definition will inappropriately lead to a decision not to forbear, when forbearance would have been desirable;
- The possibility that a larger geographical market definition is relevant is likely to be captured even if ESAs are used, since when aggregated the ESAs identified for exemption would be the larger market; and
- Data on DSLAM deployment, which is one of the relevant considerations in examining possible substitutes for LCS/WLR in CBD areas, is available at no finer granularity than the exchange.

61 Having established the relevant geographic bounds of the market for wholesale inputs, the following section focuses on issues relevant to delineating the product dimension of that market, in particular, whether there are alternatives to PSTN OA for providing downstream services.

3. ARE THERE ALTERNATIVES TO PSTN OA FOR PROVIDING DOWNSTREAM SERVICES?

62 As explained in the previous section, PSTN OA consists of carrying voice grade calls from the calling party to a POI with an access seeker's own network, with POIs generally located at a trunk exchange. I am of the view that this service (or an equivalent) can be viably provided by other operators, not just by Telstra, as there are a number of different infrastructure-based networks, regulated services and technologies which allow an access seeker to use alternatives to PSTN OA.

63 This view is based on my analysis of the following considerations:

- First, there are alternative means of providing the relevant downstream services;
- Second, these alternative means of providing the relevant downstream services have been demonstrated – by their continued use - to be viable (at prevailing wholesale and retail prices) in ESAs where they have been deployed. In my view, this demonstrates these alternative means are good substitutes for (that is, are in the same markets as) PSTN OA;[18] and
- Third, there are no impediments to effectively utilising these alternatives beyond their current deployment/usage.

64 In the following sub-sections I describe the analysis that leads me to conclude that ULLS and wholesale inputs supplied on alternative fixed line networks are alternative means for providing downstream services supplied using PSTN OA. Moreover, mobile voice and broadband networks, and fixed wireless broadband networks, if they are not at present fully substitutable alternative means for providing downstream services supplied on PSTN OA, are, at the least, likely to become increasingly available as a means for providing relevant downstream services.[19]

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18 The typical approach to examining demand and supply side substitution is through the application of the 'SSNIP' test. This involves the thought experiment of considering whether a hypothetical monopolist could, for the service(s) in question (here PSTN OA), successfully implement a small but significant non-transitory increase in price. In practice, the SSNIP test is difficult to implement over a market with several regulated products since the prevailing prices may not reflect underlying market realities. Given this, the next best approach is to consider whether there are available alternative possible means of providing services identical or similar to those in question (PSTN OA) and whether they appear, in their own right, to be viable. If viable substitutes do exist then one can reasonably conclude that the SSNIP test would have been defeated.

19 This is important because such alternative means, if competitively available, would ensure downstream competition, even in the absence of PSTN OA and direct substitutes for the same.

65 In Section 3.1, I identify the technically possible alternatives to PSTN OA for providing the relevant retail services. In section 3.2, I look at the extent to which the contending alternatives for providing the relevant retail services are actually in place and being used for this purpose at this time. Finally, in section 3.3, I consider whether it is likely that any entry or expansion barriers for the most compelling of these alternatives to PSTN OA are material.

3.1. FUNCTIONAL SUBSTITUTES TO PSTN OA

3.1.1. ULLS

66 ULLS is defined as:[20]

> *The unconditioned local loop service is the use of unconditioned communications wire between the boundary of a telecommunications network at an end-user's premises and a point on a telecommunications network that is a potential point of interconnection located at or associated with a customer access module and located on the end user side of the customer access module.*

67 ULLS provides an access seeker with the full capacity of the copper wire between Telstra's local exchange (or another point of interconnection associated with a customer access module) and the end user. This means that while PSTN OA (in combination with other upstream inputs e.g. LCS, WLR and PSTN TA for long distance and fixed-to-mobile calls) only enables an access seeker to provide retail fixed voice services, a ULLS-based provider can offer both a standard telephone service (STS)-equivalent voice service and broadband services.[21] These can either be directly sold to end users, or wholesaled to resellers who will then retail the product(s) to end users

68 Access seekers are engaging in ongoing purchases of ULLS from Telstra and in extensive DSLAM deployment to provide voice and broadband services to end customers. This demonstrates that, in the locations where such investments are observed, market participants perceive ULLS-based supply as being viable. In short, competing services are in place which act (or could readily act) as an alternative to the PSTN OA service.[22]

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20 ACCC, 'Declaration of local telecommunications services: A report on the declaration of an unconditioned local loop service, local PSTN originating and terminating services, and a local carriage service under Part XIC of the Trade Practices Act 1974, July 1999, Appendix 1

21 [c-i-c]

22 If supply requires incurring sunk costs that are not incurred when PSTN OA is used, then although this may create a barrier to *de novo* entry, providers that have already sunk those costs are all the more likely to be fierce competitors.

69 In measuring the extent of ULLS-based entry, commercial confidentiality considerations have forced me to rely on DSLAM deployment at the ESA level that does not differentiate between DSLAMs used for ULLS and DSLAMs used for LSS. That is, I use the terms ULLS-based entry and ULLS-based supply to cover any circumstances where an access seeker has deployed a DSLAM. This might be seen as potentially over-stating the extent of ULLS-based activity, as some DSLAM deployment will relate to LSS-based entrants. However, I am of the view that LSS-based DSLAM entry strongly suggests ULLS-based entry would also be profitable, due to: (a) the technical and commercial similarity of LSS- and ULLS-based supply;[23] and (b) the ease of moving from LSS- to ULLS-based operations.[24]

70 In support of this view I note that prevailing market conditions strongly suggest that the economic rationale for either LSS- or ULLS-based entry is to supply end users with both voice and broadband services. Table 1 demonstrates that the majority of LSS-based entrants for which we have information, like ULLS-based entrants, retail both voice and broadband services through either Telstra fixed line wholesale services or VoIP.

71 Furthermore, [c-i-c], voice services provided using ULLS or LSS can be indistinguishable from STS:[25]

> *"At present, a telecommunications service provider wishing to provide a standard telephone service ("STS") quality voice services using a ULLS-based network can adopt one of three technologies choices. An acquirer of ULLS or LSS may supply voice services on the line using standard switching technology (ULLS only), POTS emulation (ULLS only) or VoIP (ULLS or LSS)."*
>
> *"The voice service supplied by the access seeker using ULLS network and POTs emulation is the same, from an end-user's perspective, as a voice service supplied using standard switching, The quality of the voice service is equivalent to that provided using standard switching."*
>
> *The carriage of a call by POTS emulation or VOIP does not necessarily result in an inferior quality service to an end-user as compared with a call which is carried using standard switching. In circumstances where an Internet Protocol path is congested, the packets of information carrying the voice call may be afforded priority over the packets of information carrying other data, with the result that the quality of the call will not be deteriorated by any congestion on the network and will therefore be equivalent to that of a call carried by a traditional switching technology."*

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23 The minimum number of SIOs necessary to make entry viable is low for both ULLS (see section 3.3.1) and LSS (see Appendix D). Note the ULLS minimum efficient scale ('MES') modelling is based on both voice and broadband revenues, while the MES analysis for LSS only considers viability in the supply of ADSL only.

24 The reasons for this are presented in Appendix C and Appendix D. Appendix C demonstrates that there are no material constraints to LSS operators acquiring the switching capacity to provide voice services, while Appendix D looks at the issues relevant to movement from LSS to ULLS-based supply.

25 [c-i-c]

72 Finally, an existing LSS-based VoIP entrant wishing to switch to a ULLS-based POTS emulation voice service would simply require disconnection of "*the second jumper*" and the installation of voice cards in an existing DSLAM.[26] Thus, for the LSS-based VoIP providers listed in Table 1, there are no material barriers to switching from LSS to ULLS.[27]

Table 1 : Selected voice service offerings of current LSS-based providers

LSS-based provider	Does it provide retail voice services?	Are voice services provided over PSTN, as VOBB/VoIP, or Both[1]
Adam Internet	Yes[1]	VoIP (launching 4 Oct)
Agile/Internode	Yes[1]	VoIP
Amcom	Yes[1]	VoIP
iiNet	Yes[1]	Both
Netspace	Yes[1]	Both
Nextep	No[1]	-
OnTheNet	No[1]	-
PowerTel	Yes[1]	ISDN and PSTN
Soul	Yes[1]	Both
TPG	Yes[1]	VoIP

Source: Carriers' websites (accessed 26th September 2007)

Note: Table 1 is not intended to be an exhaustive list of LSS-based market participants. All companies listed above are reported to have DSLAM infrastructure by ACMA 'Communications Infrastructure and Services Availability in Australia 2006-2007'

73 The Commission has acknowledged VoIP's potential to act as a constraint to existing fixed line telephony services: [28]

26 [c-i-c]

27 Switching costs are discussed further in Appendix D.

28 Final Decision, pp. 34-35.

> *VoIP service offerings (through low cost or zero cost calls and value-added data services) have the potential to provide a competitive alternative to traditional fixed-line (circuit-switched) voice and data services and more access-based competition because they can be provided over existing broadband services without duplicating extensive access infrastructure networks. […]*

74 The above demonstrates that LSS-based operators have the technical capability to provide, are familiar with retailing, and face no substantive barriers to providing, voice services. Of particular note, iiNet reported that it has 45,000 VoIP customers, with growth estimated at 4-5 percent per month.[29]

3.1.2. Alternative fixed networks

75 It appears uncontroversial that alternative fixed line access networks (such as fibre and microwave networks in CBD areas and the Optus HFC network in metropolitan areas) enable network providers to offer voice and broadband services which potentially act as a constraint to Telstra's retail and wholesale fixed line service offers. Alternative fixed line networks are also well suited to the provision of STS quality VoIP services.[30]

3.1.3. Wireless networks

Mobile Wireless Networks

76 Mobile voice and broadband networks provide an alternative network for the provision of services similar to those provided using PSTN OA. I have not considered whether fixed voice telephony services and mobile voice services are in the same market; rather, for the sake of avoiding controversy, I have simply assumed fixed line and mobile communications are in separate markets. Consequently, I do not contend that mobile services are fully substitutable alternative means of providing downstream services supplied on PSTN OA. I nevertheless consider it uncontroversial that mobile services place some constraint on the price of fixed voice telephony services.

29 iiNet, 'Presentation to Euroz Small Caps Conference', 6 March 2007, slide 6

30 I understand that a connection of 256/64Kbps download/upload is the minimum requirement for a quality VoIP service; http://www.cnet.com.au/broadband/voip/0,239035972,240056481-3,00.htm (Accessed on 29 June 2007). Fixed line networks can partner with VoIP service providers and third party interconnection arrangements (or supply their own) to deliver STS equivalent service to customers. [c-i-c]

Fixed Wireless Networks

77 Fixed wireless networks operating on a broadcast basis (such as that operated by Unwired) can be used to provide STS quality VoIP services which potentially act as a constraint to Telstra's retail and wholesale fixed line service offers.[31] As with mobile voice services, I do not argue that VoIP provided over fixed wireless networks is a fully substitutable alternative means of providing downstream services supplied using PSTN OA. I nevertheless believe that the scope to supply VoIP over fixed wireless networks provides some constraint on Telstra's pricing practices.

Microwave links

78 In CBD areas a number of operators provide microwave links to major clients, over which the full range of telecommunications services (voice, broadband and data more generally) can be provided. These are a means a providing a direct alternative to PSTN OA.

3.2. CURRENT DEPLOYMENT AND USE OF ALTERNATIVES TO PSTN OA

79 In this section I analyse the extent to which ULLS and competing alternative networks are currently being rolled out and used as alternative means of providing relevant downstream services. By way of introduction, Figure 2 depicts the downward trend in use of Telstra's wholesale PSTN OA service. In the three-year period to February 2007, PSTN OA volumes declined by around [c-i-c]. While this decline is being driven by a number of factors – including falling long distance call volumes – I believe it in part reflects the fact that alternative means of providing competing retail telephony services are not only available, but are becoming increasingly popular. Indeed my analysis indicates that the declines in Figure 2 cannot be entirely attributed to falling overall long distance volumes – not only have PSTN OA volumes fallen in absolute terms in recent years, but they have also fallen as a share of total long distance and FTM usage.[32] In the first half of 2004, PSTN OA use accounted for [c-i-c] of long distance and FTM volumes, however by the first half of 2006, this share had fallen to [c-i-c].

Figure 2: [c-i-c]

31 Fixed wireless carriers can partner with VoIP service providers and make third party interconnection arrangements (or supply their own) to deliver STS equivalent services to customers. [c-i-c]

32 Total long distance (STD, IDD) and FTM volumes are taken from ACCC, 'Telecommunications Market Indicator Report 2005-06', August 2007, p. 18; and ACCC, 'Telecommunications Market Indicator Report 2003-04', June 2005, p. 21

80 Analysis of Telstra's PSTN TA out-payments is also instructive in this regard. In recent years, out-payments by Telstra for termination of calls on competitor networks have increased substantially, despite overall declines in fixed call volumes. Between February 2004 and February 2007, for example, local TA out-payments increased by over [c-i-c].[33] This suggests that in this period there has been significant substitution by competitors towards alternative means of providing retail voice services.

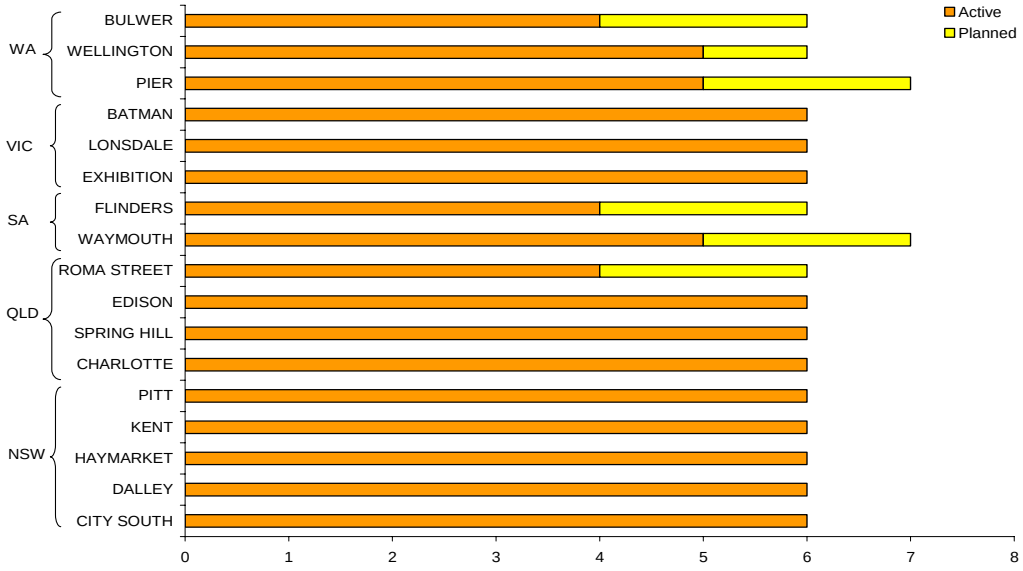
3.2.1. Deployment of alternatives to PSTN OA in Band 1

ULLS Deployment

81 I now show that access seeker deployment of DSLAMs is substantial and widespread in Band 1, demonstrating the viability of ULLS and LSS entry at current (and, *a fortiori*, higher) retail prices.

82 Figure 3 shows that there is substantial DSLAM deployment in **all** Band 1 ESAs. As of August 2007 at least four access seekers had deployed DSLAMs in all Band 1 exchanges, and if competitors' plans are realised then there will soon be at least six access seeker DSLAMs deployed in every Band 1 exchange.

Figure 3: DSLAM based competitors present in Band 1 exchanges (August 2007)



Source; [c-i-c]

33 There are two PSTN TA out-payment traffic types – local call interconnect ('LCI') TA and TA Local. While both relate to calls within a call charging area, LCI TA typically only includes calls to the same or an adjacent charge zone (TA local includes calls to another non-adjacent charge zone). Only TA Local is considered here since trends in LCI TA have been heavily influenced by changes in internet usage. Traffic minutes for LCI were quite large in the early days because of dial-up internet traffic - the majority if this traffic has since shifted across to the DIAS system. [c-i-c].

83 The deep and widespread deployment of ULLS infrastructure in Band 1 demonstrates that competition at the wholesale layer in the means of providing OA-type services is strong across all ESAs in this geographic area. Further, it suggests that barriers to additional ULLS-based entrants are unlikely to be insurmountable. It is important to note that these observations hold for all ESAs in Band 1 without exception. This shows that, in these areas, competitive conditions are uniformly advanced, supporting the proposition that the scope of the market is indeed each major CBD in its entirety.

Alternative fixed line network deployment

84 Another key feature of Band 1 ESAs is the presence of competing fixed line access networks. In this section I present evidence of the extent of alternative network deployment in CBD areas and argue that the presence of such networks provides an alternative to PSTN OA.

85 Over the past decade a number of Telstra's competitors have deployed optical fibre loops in CBD areas. Such loops allow the transmission of all types of telecommunications traffic including very high speed broadband.[34] Table 2 shows that, in CBD (and some metropolitan) areas, there has been substantial deployment of fibre loops, with eight or more operators in every CBD. This information [c-i-c] [35] aligns with the position taken by the Commission in 2002 discussed earlier in this report, that there is a preponderance of alternative local access networks in all CBD areas.[36]

Table 2: Optical fibre loop deployment in CBD/Metropolitan areas

	Sydney	Melbourne	Brisbane	Adelaide	Perth
AAPT	✓	✓	✓	✓	✓
Agile				✓	
Amcom				✓	✓
CITEC			✓		
Digital River	✓	✓	✓		
Macquarie	✓	✓			
NextGen Networks	✓	✓	✓	✓	✓
Optus	✓	✓	✓	✓	✓
PIPE Networks	✓	✓	✓	✓	
Pivit			✓		

34 ACCC, 'Telecommunications Infrastructure in Australia 2004', June 2005, p. 5

35 [c-i-c]

36 ACCC, 'Future Scope of the Local Carriage Service: Final Decision', July 2002, pp. 20-23

	Sydney	Melbourne	Brisbane	Adelaide	Perth
PowerTel	✓	✓	✓	✓	✓
Primus	✓	✓	✓	✓	✓
QR Telecommunications	✓		✓		
SABRENet				✓	
Silk Telecom		✓		✓	✓
SPI PowerNet		✓			
Telstra	✓	✓	✓	✓	✓
Uecomm	✓	✓	✓		
Verizon	✓	✓			
VicTrack		✓			
Total fibre access networks	**12**	**14**	**12**	**11**	**8**

Source: [c-i-c]

Wireless Networks

86 As well as widespread alternative fixed network coverage, there are also a number of wireless networks covering Band 1 ESAs. The increasing coverage and quality of mobile networks means greater substitutability between fixed and mobile technologies and rising mobile take-up (see Table 7 and Figure 9 in the following section).

87 Moreover, in recent years there has been significant deployment of wireless broadband networks, particularly in CBD and metropolitan areas. These networks use both mobile and fixed (point-to-point) wireless technologies to provide broadband and voice services to major centres.[37] For example, Chilli reports that its mobile wireless network now covers key areas of Sydney, Melbourne, Adelaide, Perth, Canberra, Brisbane and the Gold Coast, while its point-to-point wireless network is available in Sydney, Melbourne and Brisbane. Table 3 shows that wireless operators such as iBurst (Chilli) and Unwired now cover a large number of Band 1 ESAs.

37 Wireless network operators have indicated that their infrastructure has the capability to deliver VoIP services. See for example: ASX Announcement, 'MyNetFone and BigAir deliver true convergence of voice and broadband data services', 5 December 2006.

Table 3: Band 1 ESAs covered by competitor wireless networks

Carrier	Number of Band 1 ESAs in Network Footprint
iBurst	12
BigAir Wireless	5
Unwired	8
Access providers (now Clever Communications)	14
Total ESAs covered	**14**

Source: [c-i-c]

Note: This measure of wireless broadband networks does not include 3G networks operated by Optus, Vodafone and Hutchinson. Telsyte reported on all 17 Band 1 ESAs.

Conclusion on Band 1

88 The evidence cited above convincingly demonstrates that there is very substantial full-facilities access network infrastructure overbuild across the five Band 1 CBD areas being considered. There is also very substantial entrant DSLAM deployment in every ESA within these CBD areas. These networks provide a feasible alternative to Telstra's access network for the provision of the downstream services currently supplied using PSTN OA.

89 I note that the Commission has taken a parallel view in considering CBD customer access network infrastructure in CBD areas in its final decision to exempt LCS in CBD areas in 2002. Here the Commission noted the preponderance and technical substitutability of alternative local access networks in all CBD areas.[38] In making this assessment, the Commission relied upon a report by BIS Shrapnel documenting the extent of alternative network deployment.[39] In its final decision the Commission concluded:[40]

38 ACCC, 'Future Scope of the Local Carriage Service: Final Decision', July 2002 pp. 20-23

39 BIS Shrapnel, 'Telecommunications Infrastructures in Australia', A research report prepared for the ACCC, December 2001

40 ACCC, 'Future Scope of the Local Carriage Service: Final Decision', July 2002, p. 64. As will become apparent later in my report, I do not consider the availability of PSTN OA on a regulated basis as necessary for the competitive provision of telephony services to CBD customers.

…there is sufficient alternative infrastructure (such as fibre loops) and declared services (local PSTN originating access and ULLS) for originating local calls in CBD areas either being used or can readily be used by alternative carriers and carriage service providers. The presence of such alternative infrastructure and services is believed to be adequate to serve as substitutes to the Local Carriage Service and act as a constraint on the Local Carriage Service price that Telstra would be able to charge in the absence of the Commission's power to determine a Local Carriage Service price upon the granting of an exemption.

90 This same conclusion was reached in 2006 in the Commission's final report on its review of LCS and WLR declaration,[41] which relied on its own infrastructure audit conducted in 2004.[42]

3.2.2. Deployment of alternatives to PSTN OA in Band 2

ULLS

91 Table 4 indicates that out of the [c-i-c] Band 2 ESAs around Australia, 387 (accounting for over [c-i-c] of SIOs) can be reached by ULLS-based competitor infrastructure.[43] Further, 324 (84 percent) of these 387 ESAs have two or more ULLS-based competitors (Figure 4). In addition, 241 of these ESAs (62 percent) have three or more ULLS-based competitors, and 148 (38 percent) have four or more competitors.

Table 4: Band 2 ESAs with at least one ULLS-based competitor, by State (August 2007)

	ESAs with at least one ULLS-based competitor	[c-i-c]	Band 2 SIOs covered by ULLS-based competitor build	[c-i-c]	[c-i-c]
SA	32	[c-i-c]	529,017	[c-i-c]	[c-i-c]
WA	54	[c-i-c]	675,196	[c-i-c]	[c-i-c]
ACT	11	[c-i-c]	129,518	[c-i-c]	[c-i-c]
NSW	124	[c-i-c]	1,934,133	[c-i-c]	[c-i-c]
VIC	92	[c-i-c]	1,326,310	[c-i-c]	[c-i-c]
QLD	69	[c-i-c]	932,009	[c-i-c]	[c-i-c]
TAS	4	[c-i-c]	48,807	[c-i-c]	[c-i-c]

41 ACCC 'Local Services Review", July 2006, p. 9.

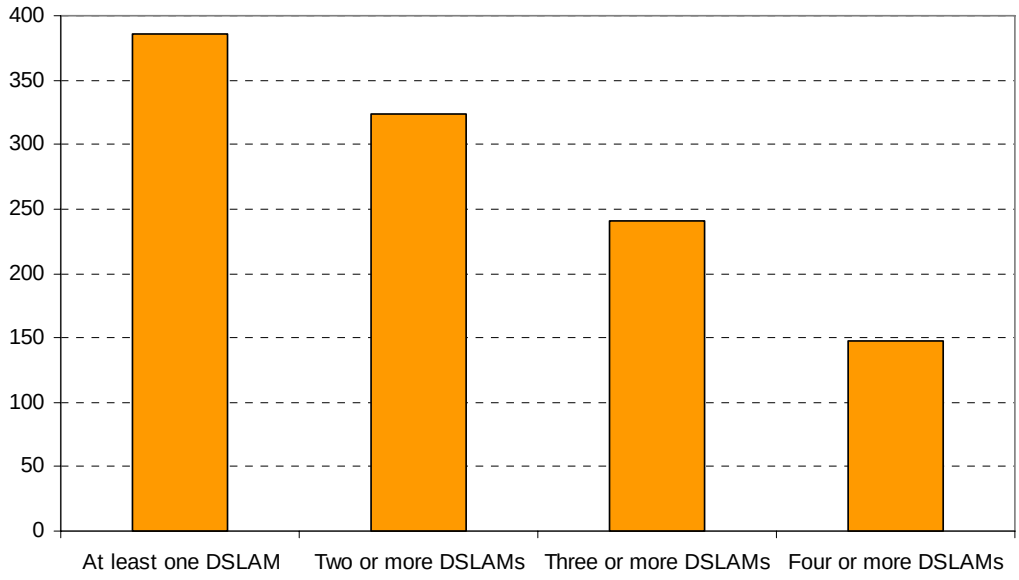
42 ACCC (June 2005), 'Telecommunications Infrastructure in Australia 2004'

43 The information on DSLAM deployment on an ESA-by-ESA basis for Band 2 on which I rely can be found in Appendix A.

	ESAs with at least one ULLS-based competitor	[c-i-c]	Band 2 SIOs covered by ULLS-based competitor build	[c-i-c]	[c-i-c]
NT	1	[c-i-c]	14,247	[c-i-c]	[c-i-c]
Total	387	[c-i-c]	5,589,237	[c-i-c]	[c-i-c]

Source: [c-i-c]

Figure 4: Number of Band 2 ESAs with ULLS-based competitors present (August 2007)

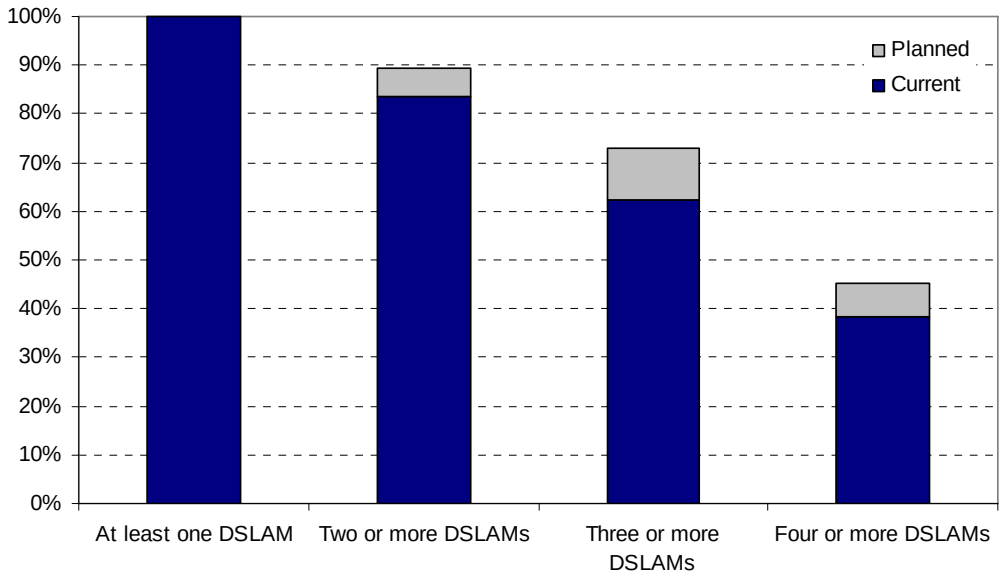


Notes: To avoid double counting of ULLS-based infrastructure, I grouped (Optus/XYZ), (AAPT/Powertel/iiNet) and (Nextstep/people telecom) as single commercial entities with common infrastructure. I did not consider TSN, NetSpace, NCable, Bendigo Community Telecom, Tastel or RAI.

Source: [c-i-c]

92 Evidence on planned ULLS-based infrastructure deployment indicates that the 'competitive build' landscape presented above is likely to intensify in the immediate future – see Figure 5. In addition to the 1,213 DSLAMs in place in August 2007, an additional 117 are planned by the end of the year (equating to a 10 percent increase in the number of DSLAMs). This increases the share of competitor DSLAM ESAs with two or more competitors present to nearly 90 percent and the share of ESAs with three or more competitors to over 72 percent.

Figure 5: Number of current and planned ULLS-based competitors in Band 2 exemption area ESAs, (August 2007)

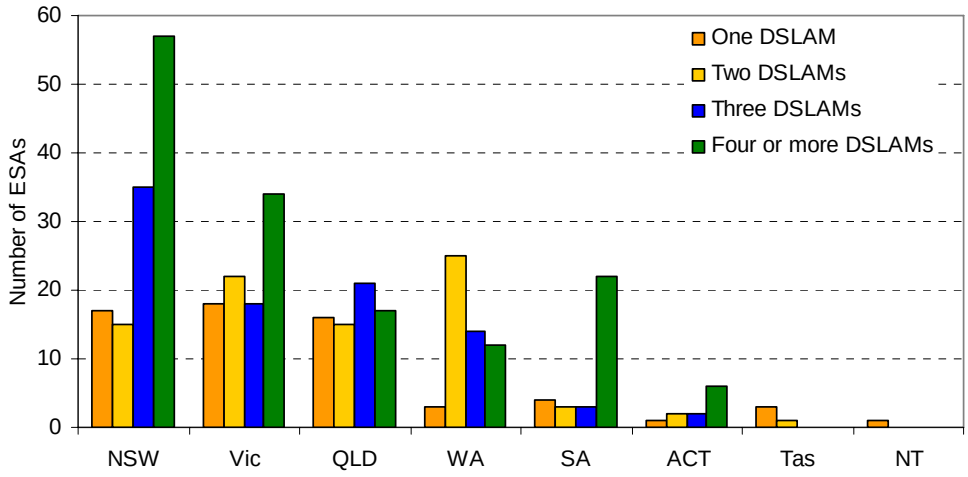


Source: [c-i-c]

93 Turning to ULLS-based infrastructure build at a state level, I observe that, except for Tasmania and the Northern Territory, the majority of Band 2 ESAs with competing DSLAMs deployed have two or more ULLS-based competitors (see Figure 6).[44]

44 Both Tasmania and the Northern Territory have a limited number of Band 2 ESAs with ULLS-based infrastructure. iiNet/PowerTel, Internode and iPrimus have all deployed DSLAMs in Tasmania, but not in a majority of Band 2 ESAs. iiNet/PowerTel is the only competitor to have rolled out DSLAMs in the Northern Territory.

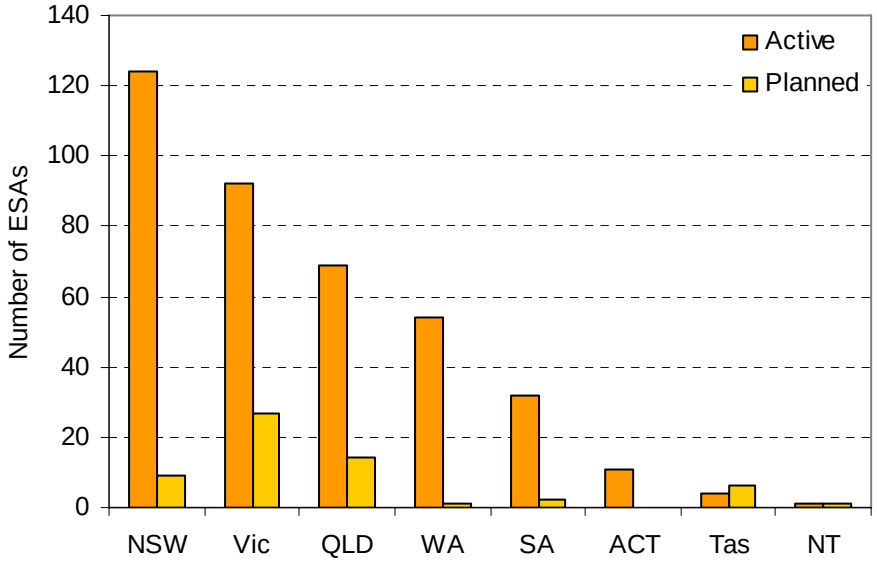
Figure 6: Number of ESAs with more than one ULLS-based competitor in the Band 2 Exemption Area, (August 2007)



Source: [c-i-c]

94 Furthermore, the number of planned ESAs relative to the number of ESAs actually active is fairly even across states (see Figure 7).

Figure 7: Current and planned ULLS-based deployment in the Band 2 Exemption Area, by State and Territory (August 2007)



Source: [c-i-c]

95 Telstra's forecast of SIOs served by ULLS-based infrastructure to the year 2011-12 is presented in Figure 8. These estimates indicate the Telstra anticipates continued growth in ULLS-based SIOs.

Figure 8: [c-i-c]

96 To conclude, in this sub-section I have shown that substantial ULLS-based infrastructure, which is used to provide voice as well as and broadband services, is in place in many Band 2 ESAs at August 2007. Furthermore, information on planned build indicates that ULLS-based infrastructure competition is likely to increase during the balance of calendar 2007.

Alternative fixed line network deployment

97 Competing fixed line networks complement extensive competition from DSLAM infrastructure. Here I present and analyse evidence on the extent of alternative fixed line networks in Band 2 ESAs. The most important alternative network is Optus' extensive HFC network which operates in NSW, Victoria and Queensland. Within these states, Optus' HFC network can reach [c-i-c] ESAs in the Exemption Area (see Table 5).

Table 5: [c-i-c]

98 There are several other HFC networks also in operation capable of providing alternative voice services to end users:

- TransACT operates an extensive fibre-optic network providing voice, broadband and television services to over 90,000 end-users in Canberra and Queanbeyan (NSW), covering over 50 suburbs.[45]
- Neighbourhood Cable has an HFC network offering voice, broadband and television service to end users in a number of important regional centres in Victoria, as shown in Table 6.
- PowerTel operates a fibre communications network covering metropolitan areas, connecting Brisbane, Gold Coast, Newcastle, Sydney, Canberra, Melbourne, Adelaide and Perth providing business and wholesale voice and switched data services over a single connection.[46]
- Soul Pattison Telecommunications offers business and wholesale voice, broadband, television and video services over a CISCO powered network throughout Queensland, N.S.W and VIC.[47]

45 www.transact.com.au/about/ourcompany.aspx (accessed 28th June 2007)

46 PowerTel's Network is available to business customers and on a wholesale basis to carries and service providers. www.powertel.com.au (accessed 28th June 2007)

47 http://soulaustralia.com.au/network/SPT_Map_Sun.jpg (accessed 28th June 2007)

- E-wire operates a HFC network throughout Perth and outlying areas; e-wire is continuing to expand and increase service offerings.[48]

Table 6: Extent of the Neighbourhood Cable HFC Network

City	Homes passed	Population passed
Mildura	8,500	24,000
Ballarat	32,000	70,000
Geelong	50,000	180,000

Source: http://www.ncable.net.au (accessed 15 May 2007).

99 These networks, most especially those recently rolled out (such as TransAct's and e-wire's network), strongly suggest that, in Bands 1 and 2, full facility-based entry is generally viable.

100 In short, a number of fixed line operators provide voice services either on a standalone basis or as part of a bundle with other broadband services. However, this understates the full extent of voice service offerings available to Australian consumers. End users with a broadband connection can also purchase a VoIP service from one of four Australian stand-alone VoIP service providers (Engin, MyNetPhone, Ace Communications and Freshtel). As the call quality of these VoIP services may not be comparable to that of POTS calls, I make no claim that they are in the same market as STS. Nonetheless, I consider that these services place some competitive discipline on Telstra's pricing for voice services.

Wireless Networks

1. Mobile Networks

101 With the widespread adoption of mobile technology and the increasing affordability of the service, mobile calls increasingly act as a substitute for fixed voice telephony services.

102 Table 7 demonstrates that in comparison to the 11.3 million fixed voice services, there are now 19.7 million mobile telephone services in operation. Wireless networks presently cover over 96 percent of Australia.[49]

Table 7: Mobile take-up

Type of Network	Mobile services at 30 June 2006
GSM	15.5 million

48 www.e-wire.net.au/ (accessed 28th June 2007)

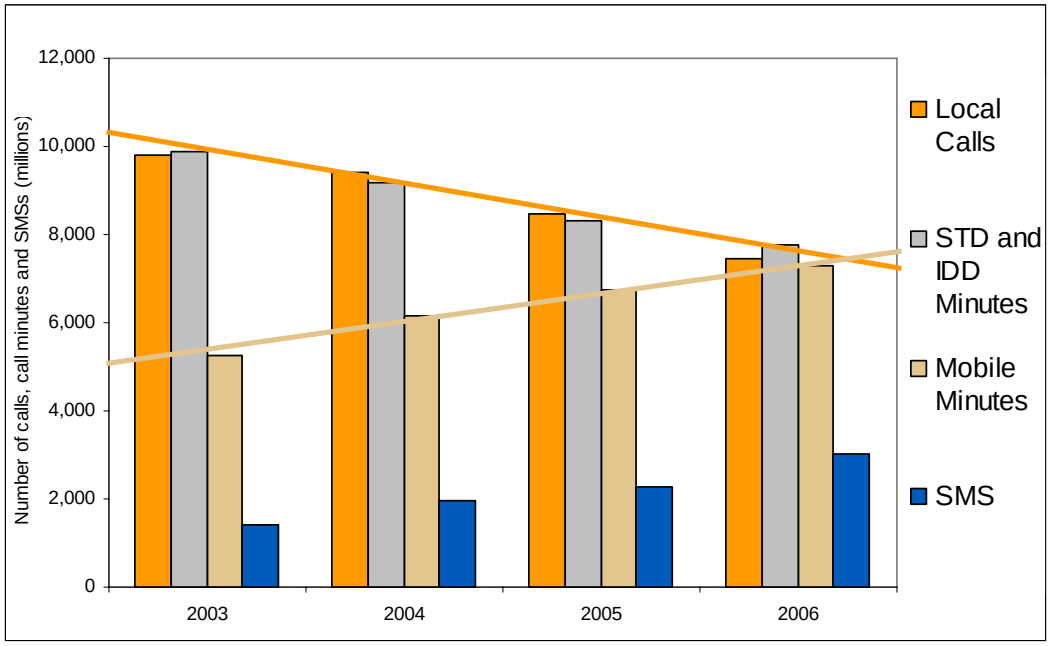
49 ACMA, 'Communications Infrastructure and Services Availability in Australia 2006-2007', 2007, pp. 22.

Type of Network	Mobile services at 30 June 2006
CDMA	1.8 million
3G	1.6 million
Total Retail	18.9 million
Wholesale (combined GSM, CDMA, 3G)	0.8 million
Total mobile service	19.7 million

Source: ACMA, 'Communications Infrastructure and Services Availability in Australia 2006-2007', 2007, p. 22

103 One can also observe (see Figure 9) parallel declines in the number of local calls, STD and IDD minutes over Telstra's fixed line network and increases in the number of minutes spent on mobile phone calls and the number of SMSs sent, consistent with fixed voice to mobile substitution. Similarly, the decline in the number of fixed-line SIOs and the increase in mobile SIOs supports fixed-mobile substitution.[50]

Figure 9: Telstra Mobile and Fixed call volumes: 2003-2006



Source: Telstra Annual Reports (2004-2006)

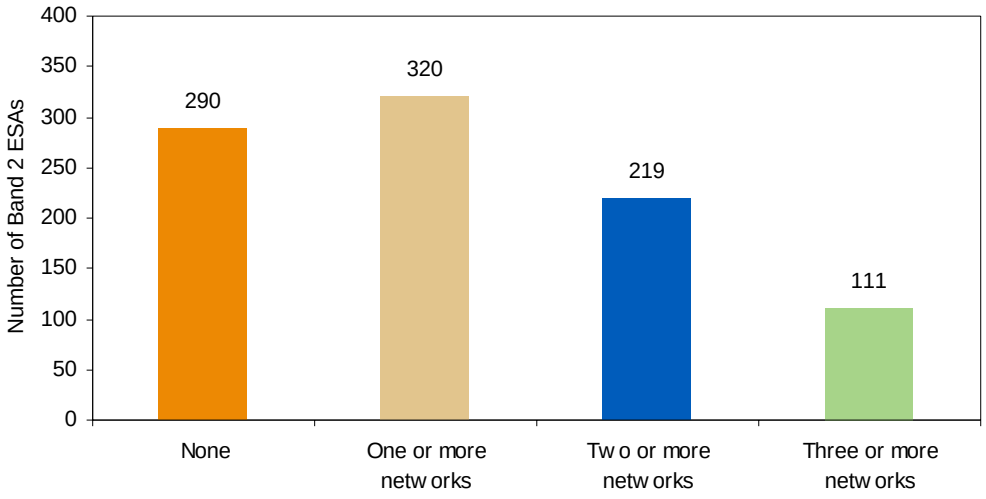
50 [c-i-c] I have assumed that over the period July 2003 to May 2007 the number of fixed SIOs in Australia declined by approximately 5.7%. A certain proportion of this decline is due to the migration from dial-up internet to broadband (including the cancellation of second lines). Over the period 2001-02 to 2004-05, the number of mobile SIOs reported by carriers has increased by 3.7 million or 32.6 percent (ACCC, 'Telecommunications Market Indicator Report 2004-05', July 2006, p. 17).

2. Wireless Broadband Networks

104 Wireless broadband networks have now achieved wide coverage in metropolitan Australia. In many metropolitan areas, an end customer can be reached by at least one, and often two, three and sometimes four, different wireless networks (see Figure 10 and Table 8 below). These networks are being used to provide both voice and broadband services.

105 BigAir and Unwired have respectively partnered with VoIP service providers MyNetPhone and Freshtel to offer VoIP as part of a voice-broadband bundle.[51] BigAir has indicated that "BigAir's symmetrical high speed broadband services are very suitable for business-grade VoIP delivery."[52] In addition, any end user with a wireless broadband connection can purchase VoIP from a VoIP service provider. As such, all of the networks listed below are either currently used or could potentially be used to provide VoIP in partnership with VoIP service providers.

Figure 10: Number of competitor broadband wireless networks in Band 2 ESAs (October 2006) [53]



Source: [c-i-c]

Note: This measure of wireless broadband networks does not include 3G networks operated by Telstra, Optus, Vodafone and Hutchinson.

51 Freshtel Media Release, 'Unwired and Freshtel announce wireless VoIP partnership', 10 August 2005, from http://www.freshtelholdings.com; and ASX Announcement, 'MyNetFone and BigAir deliver true convergence of voice and broadband data services', 5 December 2006.

52 ASX Announcement, 'MyNetFone and BigAir deliver true convergence of voice and broadband data services', 5 December 2006.

53 [c-i-c]

Table 8: Band 2 ESAs covered by competitor wireless networks

Carrier	Number of Band 2 ESAs in Network Footprint
iBurst	200
BigAir Wireless	54
Unwired	143
Access providers (now Clever Communications)	200
Total ESAs covered	**320**

Note: Table does not include 3G networks operated by Optus, Vodafone and Hutchinson.

Source: [c-i-c]

3.3. BARRIERS TO ENTRY AND EXPANSION FOR ULLS AND ALTERNATIVE NETWORKS

106 My analysis so far is undertaken conservatively by focusing on observed ULLS and alternative network deployment. It has not considered the extent to which DLAMS/ULLS or alternative networks could be deployed beyond their current footprints or used more intensively within existing footprints. Here I address this question by consideration of barriers to entry and expansion.

107 This section shows that there are no apparent impediments to retailers commencing to use, or expanding their use of, ULLS. At the very least, any such impediments appear no greater than those to firms seeking use of PSTN OA. These conclusions are consistent with recent industry practice, including widespread deployment of ULLS infrastructure (see section 3.2). Moreover I note that in recent times, ULLS deployment has been made with a view to both bundled (voice and broadband) and single-service provision.[54] This suggests that, despite the economies of scope associated with bundled service provision, ULLS-based entry is still likely to be viable even where the provision of just one type of retail service (e.g. voice or data) is contemplated. While impediments are likely to be greater in respect of further deployment of alternative networks, such impediments do not appear to be insurmountable.

3.3.1. Barriers to ULLS entry and expansion

108 Retailers currently using PSTN OA appear to face few material barriers in switching to use of ULLS. Retailers already using ULLS face even lower barriers to expansion. In what follows I discuss the following potential entry and/or expansion barriers:

- Sunk costs of ULLS supply;
- Minimum efficient scale considerations;

54 For example TPG has announced that it is considering the use of ULLS to provide 'naked DSL' (see Phil Sweeney, 'ISPs offer line rental escape', *Whirlpool* article, 27 July 2007).

- Technical constraints to providing an STS voice service;
- Backhaul costs; and
- Non price impediments.

Sunk costs of ULLS supply

109 The Commission's Merger Guidelines defines:[55]

> *Sunk costs are costs which are unrecoverable on exit, creating a risk from entry.*

110 Costs that appear to potentially constitute the most significant sunk costs in respect of ULLS supply include the following:

- **DSLAMs**. I have been advised of the following points. DSLAMs can be relocated or resold. The DSLAM shelf, voice and ADSL cards can be reinstalled in another exchange. While the cables connecting the DSLAM to Telstra's equipment need to be purchased afresh as they are pre-cut to the appropriate length, the costs of cables are a negligible component of the overall DSLAM cost. [56] To this extent DSLAM investment cannot be considered a sunk cost. DSLAMs have a relatively short life.[57] By definition, over any period longer than this life span, DSLAM expenses are not sunk costs.

55 ACCC, 'Merger Guidelines', June 1999, 5.117.

56 [c-i-c]

57 [c-i-c]

- **Switching infrastructure**. Switching infrastructure used to provide the voice component of a voice-broadband bundle, could, if self-provided, include sunk costs.[58] However, as it is technically feasible for ULLS-based access seekers to purchase traditional switched technology from existing network operators (such as Optus, Primus, AAPT, Soul and Telstra),[59] [60] access seekers can avoid sinking such investments. Telstra's PSTN currently interconnects with [c-i-c] network operators who will have at least some switching infrastructure, including [c-i-c] network operators who interconnect with Telstra in all 66 CCAs.[61] Furthermore, a ULLS access seeker could use ULLS-based POTS emulation to provide an equivalent standard telephone service. This technology relies on the same soft switches and PSTN Gateway infrastructure as LSS-based VoIP. Hence current LSS-based VoIP service providers not presently using POTS emulation could switch to POTS emulation without acquiring additional switching equipment. Finally, Optus currently provides a wholesale switched VoIP Interconnection service for those LSS service providers who wish to provide ULLS emulation but do not want to invest in soft switching infrastructure.[62]

- **Retailing costs for both voice and broadband**. There are no obvious differences in the extent to which competitive carriers must sink retail costs when they enter using ULLS as compared with PSTN OA or PSTN OA and LSS. Further, it is unlikely there will be any material addition to retail sunk costs in moving from an 'LSS and Wholesale PSTN' arrangement to use of ULLS to provide voice-only or bundled retail services. Finally, in-so-far as voice retailing costs are sunk, they will likely be largely sunk with respect to an entrant's overall network, rather than sunk with respect to entry at a particular exchange.

111 Therefore, I conclude that sunk costs of ULLS-based supply are unlikely give rise to material barriers for ULLS-based entrants.

58 Sunk costs of local voice switching and gateway infrastructure are considered in greater detail in Appendix C.

59 [c-i-c]

60 Companies' websites (accessed 16th June 2007)

61 [c-i-c]

62 www.optus.com.au (accessed 5th July 2007)

Minimum efficient scale considerations

112 In my view minimum efficient scale (MES) is not a valid barrier to entry, so long as entrants have adequate access to financing. I further consider that there are no reasons to believe that firms such as Optus and AAPT would have difficulty in gaining access to the required financing to enter at efficient scales, especially given the evidence below that the necessary SIO numbers for viable ULLS-based operations at current prices are relatively low. Furthermore, even if it was considered that there is likely to be a barrier created by MES, there is no competitive asymmetry in such impediments between Telstra and prospective entrants.

113 I have been provided with the results of analysis undertaken by Telstra staff that allows me to examine MES for ULLS-based (and LSS-based – see Appendix D) suppliers.[63]

114 The outputs of the Telstra analysis include estimates of monthly per SIO revenues for customers purchasing the bundle of ADSL and voice services. In addition, the outputs include estimates of the monthly per SIO costs of supplying this bundle, by band, for three levels of SIOs, these being [c-i-c]. These outputs are summarised in Table 9. I can infer from these outputs that, in Band 2, the minimum number of retail ADSL SIOs at which ULLS entry becomes viable is less than [c-i-c] SIOs, given current retail prices.[64]

115 This threshold would increase if there were retail price reductions post exemptions from the increased competition expected to ensue. However, this would be of no concern if it was due to increased competition resulting in lower prices (this clearly being in the LTIE). In any case, the Band 2 SIO threshold at current prices identified by the model is very low and in my view affords substantial leeway for retail price reductions for voice services without raising MES concerns. In short, I conclude that MES issues are unlikely to prevent *de novo* ULLS entry at present (or lower) retail prices, especially for existing retailers currently using PSTN OA who could be expected to already have significant customer numbers in Band 2 ESAs.

Table 9: [c-i-c]

116 Although I have not seen modelling of the customer SIO viability thresholds for ULLS for voice-only customers, in Appendix E I present modelling that demonstrates that in most instances the incremental cost of an additional voice only customer for a ULLS-based operator is low with respect to incremental revenue.

63 [c-i-c]

64 The efficient, rather than break-even, scale may require a greater number of SIOs, but entry would occur at present prices so long as it was expected to be viable/profitable. Of course, if entry required substantial sunk costs, and if prices were expected to fall post entry, then *new* entry might not occur. However, as just shown, sunk costs appear to be small, and even if such costs could prevent new entry, they would not prevent existing entrants from competing. Indeed, sunk costs already incurred would rather be expected to ensure vigorous competition among existing entrants.

117 On the basis of the above evidence I conclude that MES issues are not likely to be a barrier to ULLS-based entry.

Technical constraints to providing an STS voice service

118 I have been advised that there are no technical constraints to ULLS-based operators providing a STS of an equivalent quality to Telstra's STS. I have been further advised that this absence of technical constraints is true for both legacy PSTN switching equipment (TDM) and in general for the current generation of soft switches, which are readily available in the marketplace.[65] Furthermore, the provision of business grade VoIP is commercially feasible across a number of different networks and is currently provided by MyNetFone, Engin and Optus.[66]

119 In my view, the ability of competitors to provide equivalent voice service offerings to Telstra addresses any concern that Telstra may be able to leverage any competitive advantage from superior quality voice services into the wholesale market.

120 In short, as technical constraints to providing an STS voice service do not exist, they do not pose a material barrier to ULLS-based supply.

Backhaul costs

121 I do not believe backhaul costs pose a material entry barrier to using ULLS. The backhaul transmission market is mature and ULLS-based operators in Band 2 ESAs are able to purchase call charge area transmission services from a number of carriers.[67] Further, as the transmission service used for backhaul is either a declared service or provided in a competitive market, access seekers can request the Commission to arbitrate any dispute about prices for backhaul services (if declared) or shop around for a competitive price. On this basis, it is difficult to conceive that access to these services creates a barrier to ULLS entry.

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65 [c-i-c]

66 ASX Announcement, Engin, 'Engin uniquely positioned to deliver broadband services to the digital home', 12th June 2007: ASX Announcement MyNetFone, 'MyNetFone and BigAir deliver true convergence of voice and broadband data services', December 5th 2006: http://www.optus.com.au/portal/site/aboutoptus/menuitem.813c6f701cee5a14f0419f108c8ac7a0/?vgnextoid=89731fcd0e5e2110VgnVCM10000029867c0aRCRD&vgnextchannel=daf6d7ef03820110VgnVCM10000029867c0aRCRD&vgnextfmt=default (accessed 28th June 2007)

67 Telstra, Optus, Nextgen, PIPE Networks, Powertel, Silk Telecom and Soul operate backhaul networks in metropolitan and regional areas across Australia. Source: ACMA, 'Communications Infrastructure and Services Availability in Australia 2006-2007', 2007, p. 11

'Non-price' impediments

122 It might be argued that the use of ULLS might be impeded due to non-price conduct on the part of Telstra - for example that Telstra might engage in quality degradation or delays in respect of supply of ULLS - adversely impacting the viability of ULLS competitors.

123 I do not believe this to be a barrier to entry, since allegations of any such practice could – and I anticipate would - be addressed through the anti-competitive conduct provisions of the Act, and damages recovered if Telstra was found to be in breach.[68] Putting that aside, I also note that:

- Telstra is required under the standard access obligation provisions of Part XIC of the Act to take all reasonable steps to ensure the operational quality of the service,[69] and that the standard access obligations are judicially enforceable.[70]
- Telstra has obligations under its Operational Separation Requirements to ensure that it provides equivalent notice of network upgrades to access seekers as it does to itself.[71]
- In any case, quality degradation may not be profitable for Telstra to undertake (because while it may reduce competitive supply in retail markets, it also reduces access seeker demand in wholesale markets).[72] Indeed, the particular characteristics of telecommunications make it especially unlikely that sabotaging the quality of access seekers' services would raise Telstra's profits.[73]

68 Telstra is constrained by Part XIB of the Act which restrains a telecommunications firm from engaging in anticompetitive conduct (per s 151A).

69 The Act, s 152AR.

70 The Act, s 152BB.

71 Specifically see clause 3.8 and 5.15 of the Operational Separation Plan which Telstra was required to prepare under the provisions of the *Telecommunications Act* 1997 (Cth).

72 Mandy, D. and D.E.M. Sappington, 'Incentives for sabotage in vertically related industries', 2007, *Journal of Regulatory Economics* 31(3): 235-260.

73 Telecommunications firms typically compete through price and product differentiation. In such markets, harming the quality of rivals' retail services is likely to lower retail prices, possibly lowering the vertically integrated firm's retail profits. It may also lower wholesale demand, again lowering the vertically integrated firm's profits (Mandy and Sappington, *ibid*.)

3.3.2. Barriers to alternative network entry and expansion

124 I recognise that there are very substantial costs involved in rolling out new networks (particularly for fixed line networks, less so for wireless), and that for most market participants network rollout may not, in the short term, be a realistic alternative to use of PSTN OA. However, a number of fixed and wireless alternative networks are already in place. The operators of these networks have the option of using and expanding their own network rather than relying on access services (such as PSTN OA) for expanding their customer numbers.

125 For servicing additional customers with an alternative network's existing footprint, economies of scale and scope characteristic of network industries can be realised within the existing network footprint. Given the generally low incremental costs of expanding utilisation of a fixed line network within its existing footprint, I am of the view that there would not be substantial barriers to exercising this alternative.

126 Moreover, in expanding their own network rather than using PSTN OA, carriers can use market information and demand forecasts to tailor their proposed expansion to the most lucrative areas, maximising the scope to recover their expansion costs.

Fixed line networks

127 I have suggested above that barriers to expansion of fixed line networks, particularly within a carrier's existing footprint, are unlikely to be prohibitive. Indeed, E-wire has demonstrated the viability of extending a network beyond its footprint. E-wire is currently expanding its HFC network to new estates in Perth and surrounding areas. Similarly, Telstra has recently demonstrated that expansion within a network footprint can occur. Telstra has begun to roll out Wideband, a new network which links end users with either an optical fibre or copper wire connection.[74]

128 Wideband allows the end user to control its data network by having the ability to dynamically change the data access capacity of the network from 2Mbps to 1000Mbps via the internet.[75] The network is analogous to deploying a new fixed line network and as such Telstra does not have an historical advantage derived from incumbency. This new network deployment demonstrates that any barriers to entry that might exist are surmountable. Further, Figure 11 indicates that in many situations the cost of Wideband deployment in metropolitan areas (Band 2) is not substantially different from deployment in CBD areas (Band 1).[76] In fact, in over [c-i-c] of Band 2 ESAs, the cost of Wideband deployment is within the Band 1 Wideband cost range.

Figure 11: [c-i-c]

74 [c-i-c]

75 www.telstra.com.au/widebandip/index.htm (accessed on 28th June 2007)

76 [c-i-c]

Wireless networks

129 In my conclusions on the economic issues pertaining to the proposed Exemption Order I do not rely on wireless networks being a good substitute for PSTN OA (although noting it is likely they do provide some competitive discipline on Telstra). Nonetheless, it is instructive to note that patterns of recent wireless network footprint expansion suggest that any barriers to entry and expansion in the case of this type network are indeed surmountable. For example iBurst, since obtaining a carrier licence and starting its operations in Sydney in 2003, has already expanded its network coverage to include Brisbane, Melbourne, Canberra and the Gold Coast. In May 2006, iBurst also announced that it would further expand its network to cover the Perth and Adelaide areas. Recent additions to coverage have also been observed in Burleigh Heads (Gold Coast), Hawthorn (Melbourne), Manly (Sydney) and Red Hill (Canberra).[77] Similarly, Unwired has recently expanded its operations from Sydney to build a new network in Melbourne.[78]

3.4. CONCLUSIONS

130 In this section I have shown that in the locations where ULLS-based operations and alternative fixed line networks exist, there are available alternatives to PSTN OA.

131 Furthermore, I have demonstrated there are no material impediments to retailers commencing to use, or increasing their use of, ULLS. Any such impediments appear no greater than are faced by those firms seeking to use PSTN OA. Impediments are likely to be relatively greater in respect of further deployment of alternative networks, although such impediments do not appear insurmountable.

132 In the next section I rely on these conclusions in addressing the appropriate scope of Exemption Order for PSTN OA.

77 Press releases downloaded at www.pba.com.au on 18 December 2006.

78 'Unwired expands to reach a quarter of a million Melbourne homes', Unwired media release, 22 August 2006 (www.navini.com/assets/pdfs/Press_Releases/2006_08_22_Unwired_Melbourne_Network_Expansion.pdf)

4. SCOPE OF THE PSTN OA EXEMPTION ORDER

133 Based on the preceding analysis of alternatives to PSTN OA for the provision of relevant retail services, in this section I outline what I consider to be the appropriate geographic scope of an Exemption Order for PSTN OA.[79]

134 For Band 1, I am of the view that, due to the substantial amount of competing access infrastructure in place, comprising both a number of alternative access networks in each major capital city and multiple competitor DSLAMS in all of the major capital city ESAs, all of Band 1 should be exempted.[80]

135 In this respect, I am of the view that Band 1 should be treated differently to Band 2 for which I conclude that a decision rule operating at the ESA level should be applied. There are a relatively small number of ESAs in Band 1. In all of these ESAs there is evidence of fierce facilities-based competition (see section 3.2.1), obviating the need for an ESA-level decision rule for the CBD areas.

136 Having established in Section 2 that for Band 2 the ESA is the appropriate geographic level to consider the existence of alternatives to PSTN OA for the purpose of considering an Exemption Order application, I have developed a decision rule which identifies those Band 2 ESAs for which PSTN OA exemption is justified. I am of the view that such a decision rule is of greater utility in the regulatory process than, for example, an analytical approach applied on a case-by-case basis, for the following reasons. First, from a practical perspective, it is unrealistic to apply a full blown economic analysis of market characteristics for individual ESAs. Second, I do not believe the decision rule involves any significant compromise in the quality of regulatory decision-making as compared to analysis on an ESA-by-ESA basis, as the decision rule I propose reflects in an indirect way the underlying characteristics of each ESA.

137 Specifically, for Band 2 I consider that a decision rule relating to the number of active alternatives to PSTN OA in an ESA would provide economically justified and practical guidance on the appropriate footprint for an Exemption Order for this service. That is, the observed presence of active alternatives to PSTN in an ESA is itself a concrete proxy for examination of the underlying market characteristics, as it reflects the industry's judgement that the characteristics of an ESA justify the deployment of alternative access arrangements.

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79 Of course the case for an application for an Exemption Order depends not only on the scope for substitution, but also on competition and efficient use of and investment in infrastructure being enhanced. These considerations are addressed in subsequent sections. That said, it is analytically convenient to determine the geographic scope of the Exemption Order prior to undertaking this analysis.

80 Most Band 1 ESAs have at least [c-i-c] competitor DSLAMS and there are no Band 1 ESAs with less than [c-i-c] competitor DSLAMs present. Source: [c-i-c]

138 Such a decision rule is necessary to determine the appropriate geographic scope of the Exemption Order in Band 2 because there are differences in demonstrated competitive conditions among ESAs in this area. A blanket exemption similar to that proposed for Band 1 would not be appropriate since it would not account for these potentially relevant differences.

139 Furthermore, I am of the view that, given the primacy of ULLS as an alternative to PSTN OA in Band 2, a Band 2 decision rule with a key focus on competitor DSLAM deployment (i.e. the presence of a ULLS-based competitor) is the most useful manner in which to proceed.

140 I posit that there are strong economic and practical grounds for the Band 2 exemption footprint decision rule of one ULLS-based competitor (i.e. the presence of one competitor DSLAM) qualifying an ESA for PSTN OA exemption.

141 The reason for taking this position is not that I believe that the presence of one active competitor *per se* would necessarily provide sufficient competitive discipline on Telstra absent PSTN OA regulation. Rather, it is a clear indication of the validity of the conclusion reached in the previous section that barriers to entry and expansion for ULLS-based operators are low. In short, the market has already been entered by at least one ULLS-based operator and, given the low SIO viability threshold identified, can clearly be entered by others.

142 Hence it is my view that the presence of one in-place competitor, having access to ULLS at cost-based prices, and having already demonstrated a capacity to serve the market, demonstrates the inevitability of constraint on Telstra's retail pricing behaviour at least binding as the availability of PSTN OA. The basis for this conclusion is considered I detail in section 4.1.

143 However, I am mindful of the propensity of regulators and review tribunals to act conservatively in this respect. Accordingly, I also examine some more demanding alternative Band 2 thresholds, based on greater amounts of existing alterative infrastructure (section 4.2). These alternative rules represent a significantly more (and in my view unnecessarily) conservative approach to determining the PSTN exemption footprint.

4.1. BAND 2 EXEMPTION DECISION RULE OF ONE ULLS-BASED COMPETITOR IN AN ESA

144 Based on the analysis in Section 3 of this report, I am of the view that there are strong economic grounds for a Band 2 exemption threshold of one ULLS-based competitor in an ESA. That is, if one or more ULLS-based access seekers have installed a DSLAM at an exchange, then PSTN OA should be exempt in that ESA. The ESAs meeting this criterion are listed in Appendix A.

145 I come to this conclusion for two reasons:

- The existence of at least one ULLS-based competitor clearly demonstrates that there are not material barriers to competitive entry by ULLS-based operators; and

- Economic analysis leads me to the reasoned conclusion that there are no material barriers to further ULLS-based entry/expansion (consistent with the empirical observation that entry has actually occurred).

146 Furthermore, I believe this would be a low risk decision rule for the ACCC to adopt, for the following reasons:

147 First, if any particular ULLS-based competitors fail to adequately achieve their business plans and are forced to exit the market, it is likely a competing ULLS-based presence would be maintained in the ESAs the failing entity covered. This is because another ULLS-based operator or some other firm would be likely to purchase the assets (and possibly customer base) of the firm going out of business. In all, there are currently at least 11 competitors that have deployed DSLAMs.[81]

148 Second, there are no material barriers to ULLS-based expansion for these competitors, nor indeed do entry barriers appear material for potential new entrants currently relying upon resale products. Telstra cannot reasonably make supra-competitive pricing and output decisions at an ESA level, not only due to pressure from existing ULLS-based competitors, but also the *entry threat* posed by the large number of ULLS-based competitors operating in the market.

149 Third, there exist alternative fixed line networks that provide an effective alternative to the PSTN OA service, including the Optus and other HFC networks. For example, in NSW, Queensland and Victoria around 70 percent of ESAs in the Band 2 Exemption Area defined by this decision rule are covered by Optus' HFC network.[82]

150 Fourth, wireless networks (voice and data, with the latter capable of providing VoIP over wireless) currently offer some competitive constraint and will become increasingly close substitutes for fixed line services (as current trends - increasing network coverage, rising service up-take (penetration), falling prices and rising customer acceptance of wireless – can be expected to continue).

151 Fifth, there are only a relatively small number of ESAs in the Band 2 exemption footprint determined by this decision rule with only one ULLS-based competitor to Telstra - in the Band 2 exemption footprint, over 84 percent percent of ESAs have two or more ULLS-based competitors to Telstra (see Figure 4).

152 Finally, if planned DSLAM build during 2007 is taken into account, the proportion of ESAs in the proposed Band 2 exemption footprint that will have two or more competitors by the end of 2007 increases to almost 90 percent (see Figure 5), conservatively ignoring the deployment of any unannounced DSLAMS.

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81 Note that there are more than 11 downstream retail providers operating through wholesale agreements. Source: [c-i-c]

82 Of the 285 Band 2 ESAs in NSW, QLD and VIC with DSLAM build Optus HFC cable reaches 200. Source:[c-i-c]

4.2. ALTERNATIVE BAND 2 EXEMPTION DECISION RULES

153 A possible alternative rule for Band 2 is at least two ULLS-based competitors in an ESA. However, even if there was a desire to be even more conservative than my preferred threshold of one ULLS-based competitor in an ESA, I believe this to be an unduly restrictive decision rule. This is because the presence of two ULLS-based competitors tells little more about scope for viable ULLS-based entry and operations than the presence of just one ULLS-based competitor.

154 Rather, given: (a) the signals to the market that additional DSLAM deployment is imminent (planned ULLS-based services); and (b) the presence of alternative fixed line networks, if an alternative, more conservative approach is sought, my preference is for a decision rule requiring at a minimum just one of the following conditions:

- at least two ULLS-based competitors in an ESA; or;
- at least one current ULLS-based competitor plus at least one planned ULLS-based competitor; or
- at least one ULLS-based competitor plus at least one HFC network deployed in the majority of the ESA.

155 However, as indicated earlier, I do not believe the economic case for a PSTN OA exemption is materially enhanced by adopting these alterative thresholds rather than that which I propose (at least one ULLS-based competitor in an ESA).

156 In the following section I examine whether, in the presence of close substitutes to PSTN OA, downstream markets would be compromised following an Exemption Order in ESAs with ULLS-based competitor build.

5. WOULD COMPETITION IN THE DOWNSTREAM MARKET/S BE COMPROMISED BY A PSTN OA EXEMPTION ORDER?

157 Perhaps the most serious potential regulatory concern associated with granting an Exemption Order would be that Telstra could, through the pricing freedom gained by the exemption, raise or hold retail prices above cost in a manner it could not do absent the exemption. The argument would be that Telstra could achieve this by: (1) raising PSTN OA prices, forcing higher prices for calls in retail markets; or by (2) actually or constructively (through very high prices) withdrawing PSTN OA altogether, thereby reducing retail competition.

158 In this section, I first discuss the theoretical considerations relevant to such behaviour, reaching the view that it would not occur following a PSTN OA exemption. I next present some recent empirical evidence that is consistent with this view. I then go on to examine the range of possible outcomes for current PSTN OA users following the various business models described in section 2 (pure preselection, voice resale and override operators) and demonstrate that, due to the presence of upstream competition, none of these outcomes would be likely to result in a diminution of downstream competition. In short, efficient supply side substitution in the upstream input market would effectively negate any ability Telstra might have otherwise had to raise retail prices above cost-reflective levels.

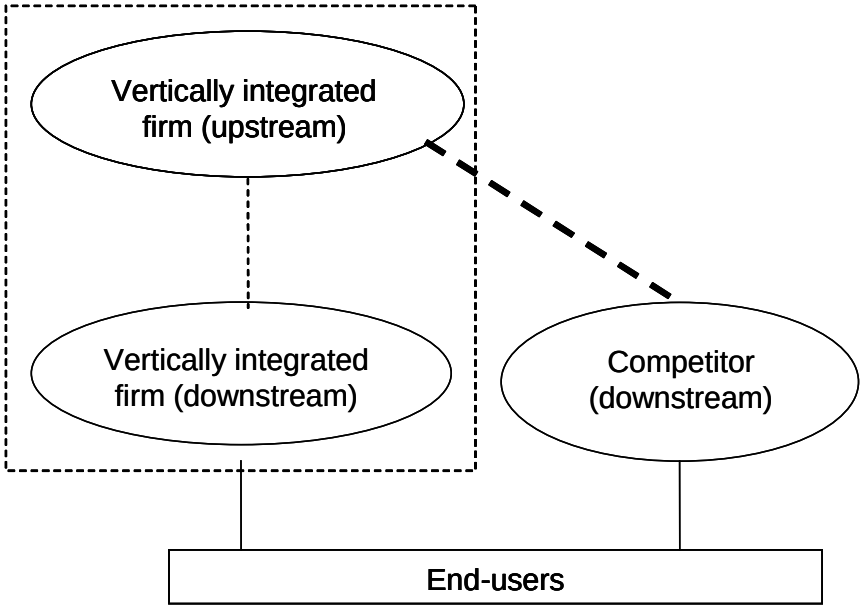
159 These considerations lead me to conclude that competition in downstream markets would not be compromised by a PSTN OA exemption order for the proposed Exemption Area.

5.1. THE USE OF WHOLESALE MARKET POWER TO INFLUENCE RETAIL PRICES

160 The question of whether an incumbent firm can affect downstream prices arises when it is active in both upstream and downstream markets and supplies critical inputs to downstream competitors. In such cases, an incumbent may have an incentive to “exploit” its position by either charging high input prices, thereby raising rivals’ costs, or by foreclosing entry by downstream competitors. Foreclosure can be achieved directly by refusing to supply inputs critical to downstream competition, or constructively, by charging prohibitively expensive prices for the critical inputs. ‘Successful’ behaviour of this kind would ultimately allow the incumbent to extract above normal returns in downstream markets.

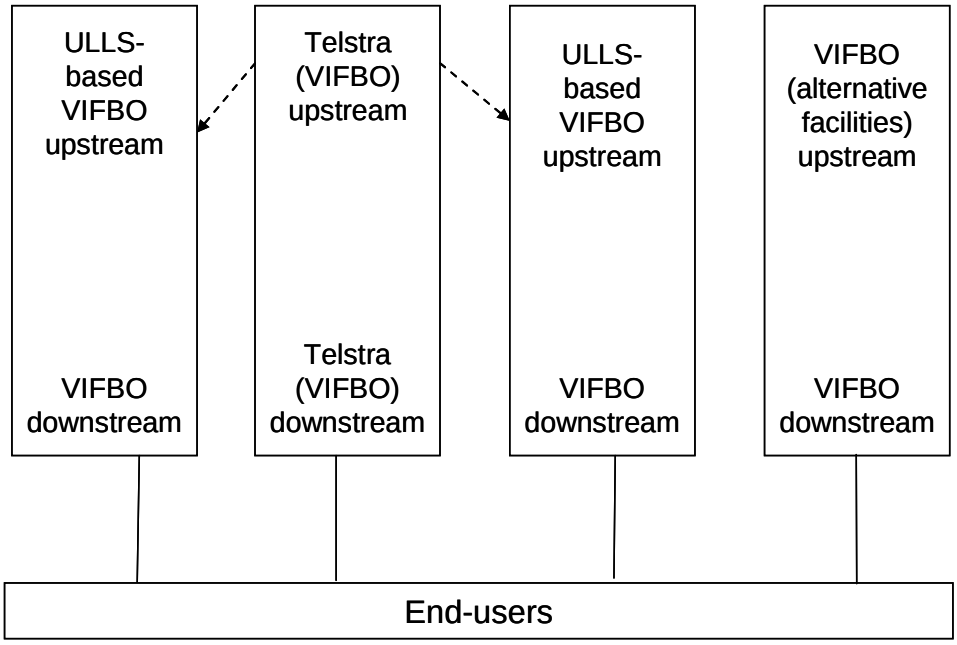
161 A vertically integrated firm can only behave in this way if it has substantial market power over the supply of inputs necessary for downstream rivals to compete. This is illustrated in Figure 12 below, where downstream rivals’ only source of certain inputs is the vertically integrated firm.

Figure 12: Industry structure likely to be conducive to foreclosure



162 However, where the upstream market is competitive, the vertically integrated firm will not be able to engage in such behaviour. Consider for example the industry structure depicted in Figure 13. This is likely to yield a competitive outcome because there is competition in both the upstream and downstream markets. If any one of the upstream firms attempt to foreclose, the downstream operators are likely to migrate to an alternative supplier. Such a migration will deprive the foreclosing firm of wholesale revenue, removing any incentive to foreclose.

Figure 13: Industry structure not conducive to foreclosure



Notes: (1) VIFBO refers to a vertically integrated facilities based operator; (2) Dashed arrows represent the provision of regulated ULLS; (3) I note that it is possible that there will be continued supply of wholesale fixed line services such as (but not limited to) LCS and PSTN OA in the absence of declaration. This would mean the continued existence of non-integrated operators in the downstream market. However, for the purposes of diagrammatic simplicity, this situation is not represented above.

163 Clearly the industry structure has important implications for competitive conditions and outcomes for end-users. If the industry structure is akin to the one depicted in Figure 12 then there may (but not necessarily) be cause for concern post-exemption. However, if the industry is structured as inFigure 13, then competition in the downstream market is likely to be healthy, even in the absence of upstream regulation.

164 It is my belief that in the proposed Exemption Area, the structure of the fixed telephony industry is akin to that depicted in Figure 13, and does not resemble that in Figure 12. It is clear from the discussion in section 3.2 that facilities-based competition is strong in the Exemption Area and that barriers to facilities-based entry are low. The substantial and widespread deployment of DSLAMs by Telstra's competitors and the associated uptake of the regulated ULLS, combined with significant deployment of alternative local access networks, means that competition exists in both upstream and downstream markets. This implies that any attempt by Telstra to raise the price of PSTN OA post-exemption, or to foreclose that supply, so as to raise retail prices above costs, would be defeated by competitive supply from ULLS or full facilities based suppliers.

165 Similarly, downstream competitors that rely on PSTN OA could claim the customer's entire business by purchasing ULLS, and continue to supply at cost-reflective prices. Finally, to the extent that the supply of PSTN OA or other wholesale services that enable the provision of downstream services by non-infrastructure retailers is efficient, there would be competitive pressure on Telstra from ULLS or full facilities based suppliers to provide such services (just as its rivals would).

166 The situation revealed in Figure 14 is consistent with supply-side substitution at play in the proposed Exemption Area, even with current regulation in place. In comparison to rural and regional areas, where the volume of PSTN OA calls has declined more moderately, metropolitan and CBD ESAs have experienced significant declines in PSTN OA use since mid-2002. This indicates that in areas where alternative means of providing retail telephony are viable, these are increasingly being used in preference to PSTN OA. This suggests to me that, post exemption, Telstra would be constrained by supply side substitutes in the proposed exemption area.

Figure 14: [c-i-c]

167 In coming to this view I am aware that, while ULLS-based supply is most lucrative when used for the provision of both voice and broadband services, there are a significant number of customers that still purchase voice only services. I am also aware that it might be argued (incorrectly in my view) that some suppliers still rely on pre-selection and voice service resale to target these customers and that the possible exit of these business models from the market may harm downstream competition. To demonstrate that concerns that might be held in these areas are ill-founded, I address these issues in some detail in the following section.

5.2. POSSIBLE POST-EXEMPTION OUTCOMES FOR SPECIFIC TYPES OF OPERATORS

168 It may be that the stand-alone preselection, over-ride and voice resale business models are artificially created by regulation. If so, given the possibility of full service supply using, among other means, ULLS, such business models might disappear.

169 Equally, it might be that competitive forces would lead to the unregulated supply of new wholesale services that would be effective (or better) substitutes for PSTN OA and other current regulated upstream services. An example might be a voice resale bundle that includes basic access and all forms of calling.

5.2.1. Pure pre-selection operators

170 In the absence of a regulated PSTN OA service, and alternative commercially supplied resale services, pre-selection carriers may either:

- **Seek an equivalent wholesale service** from a vertically integrated operator such as Telstra, a ULLS-based operator or an alternative network operator. As I showed in section 5.1 above, there will be competitive pressures on Telstra and other facilities-based providers to supply such a service in the exemption area to the extent that such supply is efficient;

- **Change their business model** to provide a bundle of voice (and potentially broadband) services using regulated ULLS. Migration to ULLS-based supply would allow pre-selection carriers to effectively self-supply an originating access product (as well as inputs for other products). As outlined in section 3.3, barriers to *de novo* ULLS based entry have been demonstrated to be low in the proposed Exemption Area, and pre-selection operators would have a walk-up start in migrating to ULLS-based supply through already having some customer relationships. Moreover, such ULLS-based entry is likely to increase the depth of competition as operators move to a wider supply of services and a more vertically integrated model, ultimately improving outcomes for end-users;

- **Exit the market**. If an equivalent wholesale service is not provided on a commercial basis and pre-selection carriers choose not to migrate to ULLS-based provision, they will ultimately exit the market post-exemption. However I believe that even in this 'worst-case scenario', downstream competition will be unaffected. This is because positive downstream market outcomes will be ensured by already strong upstream competition. The presence of ULLS-based providers and alternative network operators in the exemption area means that even in the absence of pre-selection carriers, the prices of voice bundles and stand-alone long distance products will continue to be determined by competitive pressures no less strong, and possibly stronger (see Section 6 below), than those of the present.

171 More broadly, pure pre-selection, though it may have once served a useful purpose, is no longer necessary.

172 In any case, pure pre-selection supply is a very small and diminishing part of the voice telephony market. Customers pre-selecting an alternative carrier for long distance while maintaining Telstra for basic access and local calls comprise just [c-i-c] of Telstra's basic access SIOs and account for a similarly small proportion of long distance call volumes.[83] Moreover, it is important to note that not all carriers providing pure pre-selection services are exclusively pre-selection carriers. On the contrary, the vast majority of pre-selection carriers also take WLR and LCS and provide retail voice bundles. The class of carriers that use PSTN OA but not LCS/WLR is very small indeed, and these carriers only account for around [c-i-c] of PSTN OA traffic.[84] With this *de minimus* presence in the market, it is very unlikely that the fate of pure pre-selection operators post exemption will impact the state of competition.

83 For calculation, refer to paragraph 22.

84 [c-i-c]

173 As pure pre-selection declines, the increasing bulk of voice supply is being bundled across basic access and all calling services. Between 2003/04 and 2006/07, the share of Telstra's retail customers taking Home Line Part or Business Line Part (the Telstra retail products not requiring customers to take a full bundle of voice services) fell from [c-i-c] to [c-i-c]. Data provided by Telstra indicates that around 97 percent of basic access lines now take a bundle of voice services.[85] Moreover, the underlying economies of scope in both supply and consumption strongly support such bundling, as discussed in section 2.2. As the Commission has previously noted:[86]

> *Bundling can be beneficial for both consumers and the carrier or CSP supplying the bundled services if it results in significant efficiencies and pro-competitive benefits. Bundling can allow carriers or CSPs to exploit economies of scope between bundled goods, and economies of scale if the bundling conduct has significant impacts on consumer demand. Consumers can gain when these benefits are passed on in the form of lower retail prices or quality improvements.*

5.2.2. Override operators

174 Some operators use PSTN OA to provide override services for domestic long distance, international and/or FTM calls. However, the use of such services has declined markedly in recent years, particularly in the proposed exemption area – between February 2004 and February 2007, the volume override calls fell by almost [c-i-c].[87] Moreover, as the Commission recently noted in relation to competition from these operators, 'it… relies on the current access pricing regime and is not sustainably competitive in the long-run'.[88] Nonetheless for completeness, I briefly consider the prospects for this class of operator in the event of exemption.

175 This class of operator differs from pre-selection providers in that they allow customers to select their carrier on a call-by-call basis instead of pre-selecting for all domestic long distance, international and FTM calls. However, their circumstances in the event of an exemption are materially the same as for pre-selection providers, meaning they face the same set of alternatives outlined above. Further, their *de minimus* presence in the market – override calls using PSTN OA now account for less than [c-i-c] of all long distance calls by volume – indicates that the end of override could not have a material impact on competition.

176 In short, as with pure pre-selection providers, I believe that any effect exemption may have on this class of operator will not substantially lessen competition in the downstream market.

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85 [c-i-c]

86 ACCC, 'Bundling in telecommunications markets: An ACCC Information Paper', August 2003, p. 5

87 [c-i-c]

88 ACCC, 'Declaration inquiry for the ULLS, PSTN OTA and CLLS: Final determination', July 2006, p. 20

5.2.3. Voice resellers

177 Voice resellers are the largest body of PSTN OA users and hence the impact of exemption on this class of user requires careful consideration. Nonetheless I believe that voice resellers are in no different a position to pre-selection or override operators. That is, in the event of a PSTN OA exemption order being granted, these resellers may either seek a wholesale service (or bundle of services) from an existing facilities based operator that would allow them to continue as a reseller if this proves to be an efficient model, they may become a facilities based operator themselves and self-supply, or they may exit.

178 However, the key point with respect to voice resellers is that, since their business model already contemplates supply of a retail voice bundle, they are likely to be in a stronger position than pure preselection or override operators to self-supply using ULLS. As was discussed in section 3, barriers to ULLS entry and expansion are low in the exemption area, making both self-supply and wholesale supply likely. Moreover, as I show below, ULLS is likely to be a viable alternative for existing voice resellers wishing to continue voice-only supply. For these reasons, viable alternatives to exiting the market exist.

179 Putting aside the issue of whether resellers are (or will continue to be) an efficient and effective form of competition, to address any potential concerns I have examined the viability of servicing voice-only customers using ULLS. I conclude that, *prima facie,* it is likely an exemption would have no material effect on competition in respect of the voice-only customer segment, for the following reasons. First, in the proposed Exemption Area Telstra will be constrained by at least one other service provider with the technology base to provide resellers with a wholesale voice-only service – that is competitive constraints exist at the wholesale level. I note that PowerTel is a ULLS-based service provider supplying unbundled wholesale voice and data products as well as self-supplying these services.[89] Second, existing ULLS-based operators can viably supply voice-only services to the majority of this customer segment. In this respect Telstra will be constrained by competitive pressure at the retail level in the proposed PSTN OA Exemption Area.

180 Whether or not it is profitable for existing ULLS-based operators to target voice-only customers depends upon the incremental revenues and costs of supplying voice only over ULLS. Provided incremental margins are positive, firms should be both willing and able to supply these customers, as such margins would assist in the recovery of any fixed costs associated with ULLS-based supply. That is, with the Exemption Area defined by the presence of at least one competitor with all or most of the necessary infrastructure in place to provide ULLS-based services, incremental costs will be low (primarily ULLS monthly charges) relative to anticipated voice-only revenue.

89 See: http://www.powertel.com.au/html4/business_line.htm (accessed 6th July 2007). Wholesale supply of both voice and broadband services is now being offered by a number of ULLS-based operators. For example, intermediary M2 has stated that it offers over 200 ISPs services from ULLS-based providers such as Soul, AAPT and Powertel (see 'M2 to take Optus ADSL2+ to small-time ISPs', *Communications Day,* 17 August 2007).

181 To substantiate this point, I have had some modelling undertaken of the viability of supplying voice services only over ULLS based on average retail expenditure on voice services. This modelling is described in detail in Appendix E**.** The modelling suggests that the supply of voice-only services over ULLS is viable for the majority (72 percent) of SIOs in Band 2.[90]

182 I acknowledge above that if retail prices were to fall, this would reduce the percentage of ULLS viable voice-only customers available to Telstra's competitors. It would be perverse, however, to conclude that this lower percentage indicates that Telstra somehow faces reduced competitive constraints. The very reduction in viability arises as a result of increased competitive pressures forcing down retail prices. Rather, the reduction in viability would reflect an increase in competitive constraints.

183 While it may be the case that not every voice-only customer will be profitable for a ULLS operator, in my view this does not diminish the competitive constraint imposed by ULLS. Telstra's competitors can be rationally expected to target the higher-revenue customers and accordingly enjoy a viable business model using ULLS for the vast bulk of customers. It may be true that a small group of customers - those taking low volumes of voice-only services - are not attractive to ULLS entrants, but that implies the prices faced by these customers do not recover the costs of the services they purchase. Consequently, while Telstra may not be prevented by the threat of entry from raising prices to such customers towards cost-recovering levels, it would be prevented from raising prices to these customers above cost-recovering levels. This, of course, is consistent with effective competition. Besides, if Telstra was able to charge higher prices that more than reflected costs, the viability analysis would change (substantial price increases would push at least some of the previously unattractive customers over the ULLS viability threshold), and entry could defeat such price rises.

184 For these reasons, I conclude that competition in the retail market for fixed voice telephony or bundled voice and broadband services would not be compromised by the effective withdrawal of PSTN OA regulation in the proposed exemption area through a PSTN OA Exemption Order.

90 This conclusion is consistent with recent announcements by ISPs stating that they are considering provision of a 'naked DSL' (broadband-only) service over ULLS – for example TPG has announced that it is considering this (see Phil Sweeney, 'ISPs offer line rental escape', *Whirlpool* article, 27 July 2007). While the costs and revenues associated with broadband-only provision are clearly not the same as those associated with voice-only provision, these announcements indicate that, despite the economies of scope from multi-service provision, single-service provision over ULLS can still be profitable (though the viability of a voice only carrier, rather than a carrier that both bundles and offers voice or broadband only service, is less clear).

6. WOULD A PSTN OA EXEMPTION PROMOTE COMPETITION AND EFFICIENT INFRASTRUCTURE INVESTMENT AND USE?

185 In the preceding section I concluded that a PSTN OA exemption would not lessen downstream competition within the Exemption Area. In this section I demonstrate that the granting of an Exemption Order would in fact promote efficient competition and the efficient use of, and investment in, infrastructure in the Exemption Area. This is because regulation of PSTN OA distorts efficient competition and efficient infrastructure investment and use. Consequently, regulatory forbearance would eliminate these distortions without harming competition.

186 Against this backdrop, I consider in turn the promotion of competition, and the promotion of efficient use of and investment in infrastructure. I maintain that:

- Exemption would facilitate (and not hinder) a movement away from access based competition, towards facilities-based competition where this is efficient.[91] The form of competition which best promotes efficiency is facilities-based competition, since it allows for greater innovation and more robust price competition. Hence more efficient competition would be promoted by the exemption. (section 6.1)

- Access regulation dampens efficient levels of infrastructure investment by truncating investment returns and creating the potential for arbitrage and regulatory dependence. Exemption would reduce these dampening effects and thus promote efficient infrastructure investment and use. (section 6.2)

- Competition is a better stimulant for efficient infrastructure investment and use than access regulation. In a market where there is robust competition across the supply chain, investment and innovation gives a player a competitive edge, providing an effective incentive for efficient infrastructure investment and use. That is, exemption would also stimulate efficient infrastructure investment and use by facilitating competition. (section 6.3)

6.1. EXEMPTION WILL PROMOTE ECONOMICALLY EFFICIENT COMPETITION

187 It is widely accepted that competition will best promote economic efficiency where that competition penetrates up the value-chain beyond the resale (service) layer. It creates greater scope for both cost savings through efficient operations, and product differentiation and innovation. The Commission expressed this view in its recent fixed services review:

91 Telstra may still offer a PSTN OA, and/or other upstream services that enable downstream supply, if OA was exempted. In particular, it faces efficient incentives to do if this will prevent inefficient bypass, either on full-facilities infrastructure or over ULLS. That being said, I expect that there would be a shift toward increased use of ULLS in an exempt ESA.

> *The Commission's approach is based on the principle that where it is economically efficient, facilities-based competition is more likely to promote the LTIE. This is because this form of competition allows rivals to differentiate their services and compete more vigorously across greater elements of the supply chain.*[92]

188 Facilities-based competition can lead to greater price competition as entrants have more control over costs and face incentives to develop and deploy more efficient technologies in order to compete with incumbent operators.[93] By contrast, access-based competition limits the degree of price competition since access seekers' costs are closely connected with regulated access prices and in turn, the incumbent's costs (where access prices are cost-based).

189 Facilities-based competition also enables greater service innovation since entrants are no longer tied to the functionality of the incumbent's network.[94] Where access-seekers are vertically integrated and have control over more points of the supply chain, their ability to compete on non-price dimensions of the product (e.g. service quality or service functionality) is enhanced.

190 Robust facilities based competition can also overcome a 'chicken and egg' problem that can arise with new technologies. Consumers are often unwilling to adopt new technologies without some assurance of value-for-money or risk-sharing from suppliers, for example in the form postponed payments. In this case the supplier guarantees the service is valuable to customers by recovering costs in ways that allow users to bear less risk. This might take the form of usage fees (set at a level to reflect the risk borne by the service provider) rather than upfront charges: the consumer, if it finds the service is not valuable, simply can stop using it, and will not have foregone substantial upfront charges.

191 However, when control over technologies and services is decentralized, and usage charges set at cost, as occurs under access regulation, suppliers may be unwilling to risk new developments. They recognise that while they must share the benefits that might be generated, they will be the sole bearer of any costs and risks that are incurred, including those of failure. In that environment, network operators are likely to take few risks in promoting new technologies, while consumers will likely delay adoption of a technology until services or content operating on that technology are widely available and assured. The net effect will be substantial delays in service deployment.

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92 Second Position Paper, p. iii

93 See e.g. Brito D. and P. Pereira, 'Ownership Structure of Cable Networks and Competition in Local Access', April 2005, *Mimeo*.

94 Cave M., 'Encouraging infrastructure competition via the ladder of investment', 2006 *Telecommunications Policy* 30: 223-237.

192 A more appropriate alignment of incentives for service introduction and network development can exist when owners of the technology (here, the network infrastructure) vertically integrate into service provision.[95] These network owners have an incentive to introduce innovative new services in an effort to spur adoption and use of their network platform. They are the direct beneficiaries of consumer gains generated by innovative services, and can ensure that network development proceeds in a fashion that is supportive of services demanded by consumers.

193 Exemption of PSTN OA where facilities-based alternatives are available would promote facilities-based competition where it is efficient for this to occur, reducing reliance on access products at lower points in the supply chain and bringing with it consumer benefits of greater scope for product differentiation and stronger price competition. In the following section I indicate that, for a number of reasons, regulation of PSTN OA where competitive alternatives exist is likely to result in less-than-efficient levels of facilities-based competition. This includes supply based on ULLS, as reflected in the proposed Band 2 exemption decision rule presented in section 4 of this report.

6.2. EXEMPTION WOULD PROMOTE ECONOMICALLY EFFICIENT USE OF AND INVESTMENT IN INFRASTRUCTURE

194 Connected to the promotion of efficient competition is the efficient use of and investment in infrastructure. In this section, I show that the presence of access regulation where workable competition exists is likely to discourage efficient infrastructure investment and use and that consequently, its removal will promote efficient investment and use. Moreover, I reason that it is competition – not regulation – that drives efficient investment and that the post-exemption improvement in competition will improve the incentives for efficient investment.

6.2.1. Incentives to Invest

195 Access regulation, particularly downstream access regulation (including declaration of PSTN OA), can distort 'build' and 'buy' decisions. Most often, this distortion comes with a bias towards under-investment by both entrants and incumbent operators. This in turn is associated with less-than-efficient levels of innovation and competitive activity at different points on the production value chain.

95 Crandall R.W., 'Competition and Chaos: U.S. Telecommunications since the 1996 Telecommunications Act', *Brookings Institution Press*, p. 122-123.

196 In particular, access regulation has a number of potential risks that include:

- **The inherent truncation of returns** by cost-based access pricing: To the extent that access prices are binding, they truncate the rewards from a successful investment but do not reduce the losses from unsuccessful ventures. This reduces the extent to which the regulated firm can undertake efficient, but risky, investments. The effect is to reduce investment incentives. An access provider may be reluctant to expand or modernise its network, lest successful investments are subject to an access claim at cost (truncating upside returns) but no recompense if the investment is unsuccessful (loss-making). In short, the rewards from regulation are socialised (shared with access seekers) or quickly bid way while losses are internalised (only borne by the investor). Further, the loss of expected returns, and hence the reduction in efficient investments, is likely to be large in a rapidly developing and changing environment such as telecommunications.

- **Potential for regulatory dependence**. Access regulation can distort access seekers investment to build upstream infrastructure if inputs further down the supply chain are priced below the competitive level. For example, if a resale service is set at its competitive price, access seekers may find it profitable to supply the input by investing in infrastructure. However, if the regulated resale input is priced artificially low, an access seeker may find it profitable to use the reseller's infrastructure. In this manner, regulation can create regulatory dependence, distorting access seekers' incentives to invest and delaying the progression to facility-based competition. Evidence of this occurring is presented below. Where workable competition exists, however, the risk of underpricing and the consequent investment distortions can be avoided, and efficient outcomes more reliably achieved, by reducing regulated access.

- **Arbitrage**: In efficient markets, arbitrage opportunities quickly disappear, typically due to price adjustments. However, inefficient arbitrage opportunities can be perpetuated by access regimes that offer substitute levels of access. Where access prices are set by regulators, and especially where prices are set for a number of access services that are close substitutes, the relativities of those prices determine their relative attractiveness. Where those relativities do not mirror those that would occur in an efficient, competitive market, inefficient arbitrage opportunities are created and maintained by regulation – some services are over-used and others are under-used relative to an efficient outcome.

- **Asymmetric impacts** from over-pricing and under-pricing regulated access services: Given that regulated access prices carry a significant risk of error, then even if the risk of over-pricing is the same as the risk of under-pricing, this can impose a significant economic welfare cost in the form of below-optimal investment levels by both access seekers and the access provider. While over-pricing access by the regulator is unlikely to result in inefficient over-investment (as such investment by the access provider does not increase its profits, and the access provider has good incentives to price below the regulated price if this will avoid inefficient by-pass investment by access seekers), under-pricing will tend to cause under-investment by both access seekers and the incumbent. Specifically, access seekers will have an incentive to use the incumbent's network to an inefficient extent rather than build themselves, while the incumbent will be reluctant to invest up to an efficient level as its returns do not justify this.

Regulatory dependence in Australian fixed voice Markets

197 The distorting effect of resale regulation is particularly evident where competitors who already own networks have shifted their focus from self-supply to regulated products.[96] In particular, SingTel Optus has experienced negative growth in the number of telephony SIOs on its HFC network yet has seen dramatic growth in its use of resale services.[97] This is shown in Figure 10 below.

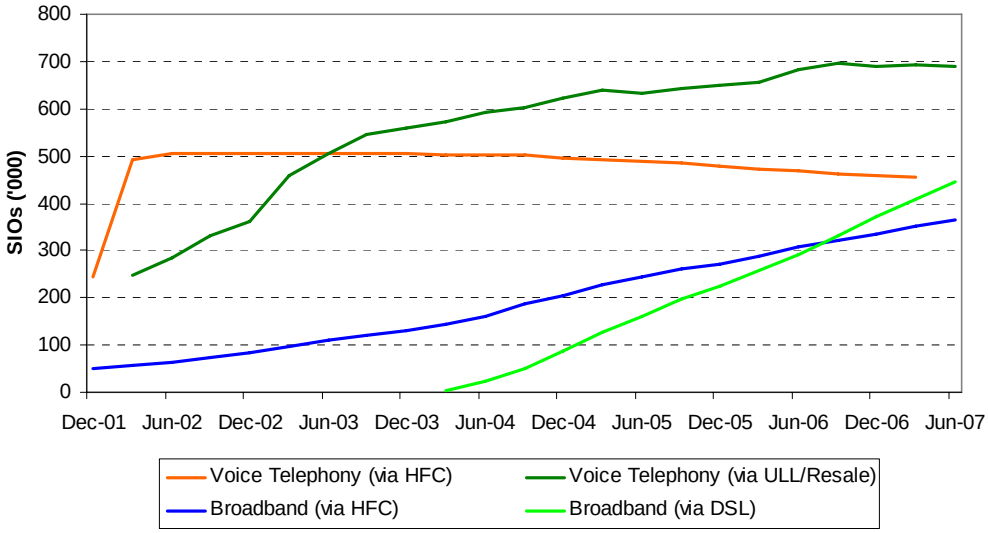
198 At its maximum, Optus has provided slightly more than [c-i-c] voice services on its HFC network. Earlier in the report (Table 5, section 3.2.2), I estimate that Optus can reach [c-i-c] metropolitan ESAs in the exemption area, in which there is a total [c-i-c] SIOs,[98] using its HFC network. As a result, there does not appear to be a network constraint preventing Optus serving substantially more than [c-i-c] voice SIOs on the HFC network.

96 I have assumed the true incremental cost of resale is greater than the costs of the access seeker using their own platform. I believe that the decision by an access seeker to build and make operational such a platform substantiates this assumption.

97 A certain proportion of this could be related to Optus' shedding of its Pay TV customers. See: SingTel, 'Management Discussion and Analysis of Financial Condition', March 2006, p. 48. Note that while, for confidentially reasons, I do not have access to Optus PSTN OA volumes, the use of OA is likely to parallel the use of LCS and WLR.

98 [c-i-c]

Figure 15: Demand for SingTel Optus' Voice and Broadband Services, by platform, Mar-02 to Jun-07



Source: Singtel, 'Management discussion and analysis of financial condition, results of operations and cash flows', for periods 2002-2007.

199 The number of voice SIOs on the Optus network has declined to close to 450,000 in recent years. In this regard, I would expect that Optus would use its own network to supply voice in households where it supplies cable broadband. Between 2002 and 2007, Optus increased its number of cable internet customers from 50,000 to over 350,000. Yet over this same period, the number of voice subscribers on the HFC network has fallen. Not all broadband customers purchase voice, but given that relatively new players can achieve high levels of voice/broadband bundling, with for example rates of 80 percent for iiNet,[99] Optus' failure to secure *any* increase in the provision of telephony services on its HFC network is striking. Unless *all* of Optus' new cable broadband customers are existing voice customers, it would appear that Optus is substituting resale voice services for HFC voice services.

200 In short, the regulatory environment appears to have, perversely, encouraged Optus to increase its consumption of a product designed to act as a 'stepping-stone' to network investment even where Optus has already made such investments. That is, PSTN OA regulation (as well as that of other access services e.g. LCS/WLR) is apparently leading to inefficient use of infrastructure and creating obstacles to the form of competition that is most likely to promote the LTIE – that is, facilities-based competition.

99 iiNet, iiNet Limited Annual Report 2006, p. 3, available at: http://www.iinet.net.au/about/investor/20061002_iinet_annual_report_2006.pdf (accessed 25 May 2007).

6.3. COMPETITION IS THE BEST DRIVER OF EFFICIENT INFRASTRUCTURE USE AND INVESTMENT

201 Efficient use of infrastructure will best be promoted by the operation of competitive markets. Where workable competition exists, firms face incentives to maximise efficient use of their existing infrastructure.

202 Moreover, in a competitive market, the discipline of rivalry provides the best incentives for carriers to invest efficiently in new infrastructure and use their existing infrastructure more efficiently. In a competitive facilities-based market, the process of investment and innovation gives a carrier a competitive edge.

203 Regulation cannot provide the same incentives for efficient use of and investment in infrastructure as a workably competitive market, as it imposes two classes of costs. First, regulation *per se,* even if perfectly executed, imposes transaction, compliance and administrative costs. Second, with the best intent and skilful execution possible, there is inevitably an element of regulatory error which itself imposes costs. Consequently, regulation always has distorting effects on investment incentives, which will be to the detriment of economic efficiency.

204 It follows that if an Exemption Order will not harm competition then, by removing sources of regulatory error, it will additionally promote it. Further, this in turn will promote efficient investment in infrastructure.

205 I note that the Commission, in its Final Decision paper, discussed Telstra's ongoing plans to invest in a new core and access network as evidence that declaration was not impeding investment. It stated:[100]

> *There is no information to suggest that Telstra has been unwilling to invest in infrastructure as a result of this declaration. Further, the Commission notes that Telstra has recently announced plans to significantly modernise its core network and considers that there is no evidence to suggest that the continued declaration of this service is likely to negatively impact on Telstra incentives to undertake investment in this, or any other new infrastructure … In addition, any likely increase in wholesale-based and facilities based-competition as a result of this declaration will provide further incentives for either Telstra and [sic] other providers to innovate and invest in alternative technologies (such as wireless), and next generation networks (such as fibre to the node).*

100 Final decision, p. 45

206 The problems inherent in this logic are, with the benefit of hindsight, remarkably clear. Not long after the Commission wrote this statement, Telstra decided not to proceed with the proposed fibre to the node aspect of its modernisation of the fixed-network.[101] In making this decision, Telstra identified regulatory practices as impeding its incentives to invest. Further, it is not a question of whether *any* investment will take place in the presence of unnecessary access regulation (for example, Telstra has an ongoing regulatory requirement to meet certain quality of service standards or face severe penalties and hence invests to meet this need), but rather whether an *efficient level of investment* will occur.

207 Hence while Customer Service Guarantee (CSG) and more recently Network Reliability requirements have created *de facto* requirements on Telstra to invest,[102] particularly given the substantial age of much of the network, there is no reason to believe that the resulting levels and patterns of investment are efficient, relative to those that would emerge in an environment less distorted by regulation. The imperative Telstra faces to continue to invest in its network, even though this is not remunerative, is demonstrated in the following paragraphs.

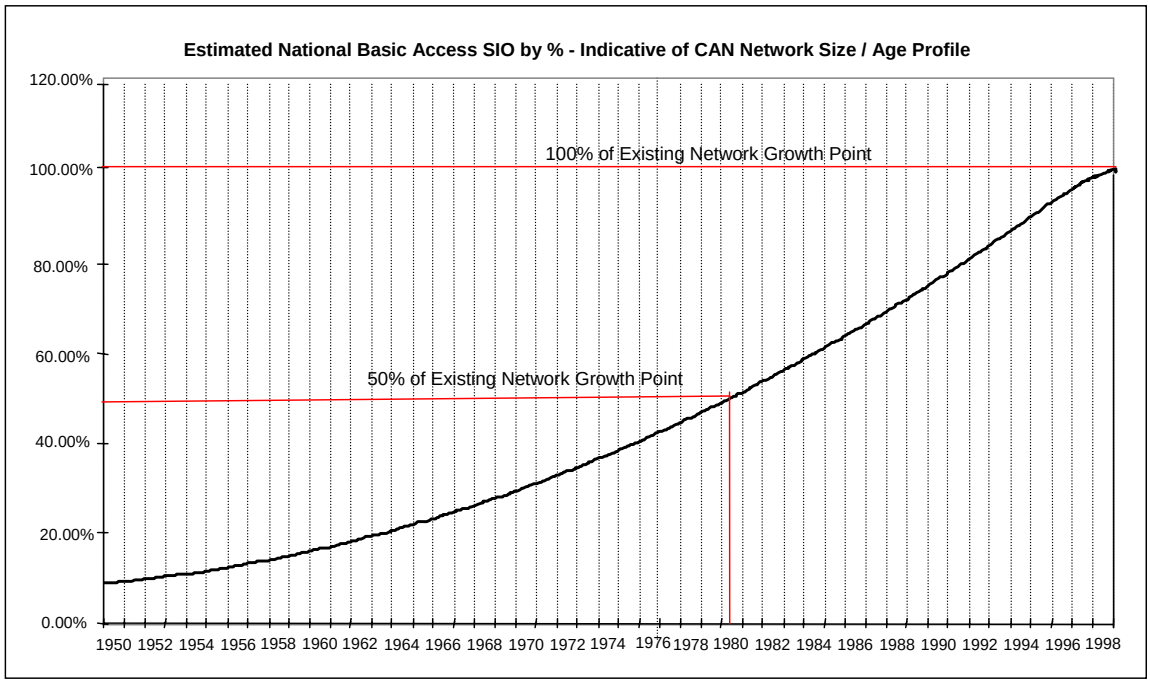
208 Rising demand has placed a substantial strain on the copper pair network, where in 1999 (the latest data accessed) 50 percent of the pairs were more than 20 years old and 30 percent were more than 30 years old.[103] The age profile of the copper access network in 1999 is shown in Figure 16.

101 Telstra, 'Fibre to the Node Talks discontinued', ASX Announcement, 7 August 2006. Modernisation focussed on the core network, and in particular moving to a full IP environment for the core network, has typically been done by telcos to reduce costs and is unlikely to be influenced by access price decisions.

102 The standard sets minimum service requirements for carriage service providers about (a) the making of arrangement with customers for connection and fault rectification or service difficulty and (b) the keeping of appointments to make such connections and rectifications. Source: Australian Communications Authority, 'Guide to the Telecommunications (Customer Service Guarantee) Standard 2000 (No. 2)', Issue No.1 of 2004

103 If anything, I expect that the age profile of Telstra's copper network is even more skewed towards old assets today.

Figure 16: Age of the Copper Pair Structure of Telstra's Network



Source: Telstra, 'CAN Access Strategy and the Link to Improving CSG Performance', 1999.

209 At the same time, network utilisation was becoming unacceptably high, with some 20 to 25 percent of the network having occupancy rates in excess of the 95 percent mark, meaning that at times there has been effectively no spare capacity to provide for redundancy or cater for growth. These trends combined in a tendency for the underlying fault rate in the network to rise by about one percentage point a year.[104] While the international benchmark for the fault rate in a copper pair network is in the order of 5 to 7 faults per annum for each 100 Services in Operation ("SIOs"), by the close of the 1990s nearly half Telstra's Distribution Areas (the basic geographical unit in the reticulation network) had an annual fault rate in excess of 10 faults per 100 SIOs, and a significant number were far higher than that.[105]

104 Telstra, 'CAN Access Strategy and the Link to Improving CSG Performance', 1999

105 Telstra, 'CAN Access Strategy and the Link to Improving CSG Performance', 1999

210 Accordingly, it is more valuable to look at investment by Telstra's competitors to see if investment patterns are consistent with regulation holding back investment. In this regard, communications investment by Telstra competitors has been declining in both real and nominal terms over the past 5 years. According to ABS data, the level of annual communications investment by private firms (i.e. other than Telstra) declined by around 17 percent in real terms between 2001 and 2006.[106]

106 Data from ABS Cat no. 5204, Table 64 (deflated using an implied communications deflator from Tables 90 and 91). Since Telstra was a public corporation during the data collection period, investment by Telstra was not included. This decline in private investment is therefore indicative of diminished investment incentives for Telstra's competitors.

7. WOULD AN EXEMPTION ORDER COMPROMISE ANY-TO-ANY CONNECTIVITY?

211 In its recent inquiry into PSTN OA declaration, the Commission has stated that it regards meeting the any-to-any connectivity criteria to be of continuing importance. In particular it has said:

> *One key reason for the declaration of PSTN OTA in 1997 was that such declaration was likely to promote any-to-any connectivity. This is because at the time there were no alternative means of obtaining access to directly connected end-users on Telstra's PSTN. The Commission concluded that in the absence of an access obligation, a carrier may have an incentive to restrict access to its core network to inhibit the ability of other carriers to compete.*
>
> *The Commission considers that any-to any connectivity is still a key consideration in assessing the need for declaration of the PSTN OTA service. As the Commission has noted in the past, access to customers is necessary both for successful entry and for continued competition.*[107]

212 To my mind the Commission is in error in considering PSTN OA and PSTN TA together. While there arguably may be a p*rima facie* case for declaration of PSTN TA on the basis that use of a termination service from the called party's access provider is the only way to access that party,[108] this is not the case for PSTN OA. In the absence of a PSTN OA declaration, a service provider will still have an incentive to originate calls on its network since doing so generates revenue. Moreover, the price charged for this origination will be constrained by market forces and the level of competition between access providers.[109]

213 It follows that a customer on any network will still be able to reach a customer on any other following an Exemption Order. If an access provider fails to originate calls on their network they will not only lose the revenue from that call, but also jeopardize retention of the customer. The customer will be able to simply move to an access provider that is willing to originate their call either using a ULLS-based connection or an alternative local access network.

214 In sum, I believe that the level of competition in the Exemption Area and the incentives that this creates are sufficient to ensure any-to-any connectivity in the event of a PSTN OA Exemption Order.

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107 ACCC, 'Declaration inquiry for the ULLS, PSTN OTA and CLLS: Final Determination', July 2006, p. 45

108 It could be argued that even regulation of TA is unnecessary if one accepts that competition for end customers will promote market discipline in this respect. That is, TA is likely to be provided by operators on a voluntary basis to ensure that customers on their network can be contacted. Any operator that fails to provide TA will suffer from a significant loss of customers.

109 This may be an explicit price for a wholesale service, or an implicit price in the case of self-supply.

8. CONCLUSIONS

215 In this report I have concluded that granting a PSTN OA Exemption Order in all of Band 1 ESAs, and Band 2 ESAs with current ULLS-based competitor build, would not diminish competition but rather would promote competition and facilitate the efficient use of and investment in infrastructure. I arrive at this conclusion for the following reasons:

- In Band 1, there is a preponderance of competing access infrastructure, including fibre loops, wireless links and extensive competitor DSLAM deployment.
- In Band 2, currently ULLS, and to a lesser extent HFC and other competing networks, enable the replication of the downstream services which PSTN OA is used to provide in the Exemption Area. Furthermore, there are no apparent material impediments to retailers commencing to use, or increasing their use of, these close substitutes.
- The PSTN OA Exemption Order would not impact the ready availability of these alternative means of providing the relevant downstream services. Therefore, retailers would be able to substitute away from the Telstra-supplied PSTN services (as well as other voice and broadband wholesale services) if Telstra attempted to price supra-competitively (or not supply PSTN OA). While this is demonstrably so for customers that bundle voice and broadband services, my analysis leads me to the conclusion that this is also the case for the majority of voice-only customers. Those customers too small to contest using ULLS are likely to be unattractive to suppliers relying on a regulated PSTN OA price. Consequently, competition in retail markets would not be compromised by the Exemption Order.
- Further, an Exemption Order for PSTN OA in the Exemption Area would have the following benefits:
  - The Exemption Order would facilitate efficient facilities-based competition, stimulating innovation and allowing for more robust price competition. Further, to the extent that removing PSTN OA regulation results in competitors moving to ULLS and full facilities based competition, existing competitors would be more deeply vertically integrated, which would be likely to intensify competition in retail markets and result in direct benefits for customers as vertical efficiencies are realised and passed through to consumers.
  - Access regulation distorts incentives for efficient infrastructure investment and use, including by truncating investment returns and creating the potential for arbitrage and regulatory dependence. Exemption Order would remove the distorting effects caused by PSTN OA regulation in the Exemption Area and promote efficient investment.
- Finally, due to the alternatives available for originating a call from a customer, the proposed Exemption Order would not compromise any-to-any connectivity.

APPENDIX A: THE EXEMPTION AREA

In this Appendix I list the all the Band 1 (CBD) ESAs, and the metropolitan (Band 2) ESAs with at least on competitor DSLAM present, which accords with my view on the appropriate exemption area. I also show ESA-by-ESA detail of current competitor activity in the Exemption Area. This information, current in August 2007, is based on the source listed below and is used as the basis for my analysis of ULLS-based competitor build.

A.1 BAND 1 ESAS

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BATM	VIC	BATMAN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BWER	WA	BULWER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CHLT	QLD	CHARLOTTE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CYSH	NSW	CITY SOUTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DALL	NSW	DALLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EDSN	QLD	EDISON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EXHN	VIC	EXHIBITION	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**
FLNF	SA	FLINDERS	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**
HMKT	NSW	HAYMARKET	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**	**[c-i-c]**

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KNST	NSW	KENT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LONS	VIC	LONSDALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PIER	WA	PIER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PITT	NSW	PITT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RASH	QLD	ROMA STREET	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SGHL	QLD	SPRING HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WAYM	SA	WAYMOUTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WLTE	WA	WELLINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

Source: [c-i-c]

A.2 BAND 2 ESAS

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
AARE	QLD	ACACIA RIDGE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
AASS	SA	BROOKLYN PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ABCH	NSW	AVOCA BEACH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ABCK	QLD	ALBANY CREEK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ABON	QLD	ALBION	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ACOT	QLD	ASCOT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ALBY	NSW	ALBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ALFN	VIC	ALFREDTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ALXH	QLD	ALEXANDRA HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
APLY	QLD	ASPLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
APPX	WA	APPLECROSS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ARMD	WA	ARMADALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ASCT	VIC	ASCOT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ASHF	NSW	ASHFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ASHM	QLD	ASHMORE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ASOT	WA	ASCOT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ATTA	WA	ATTADALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
AVAL	NSW	AVALON BEACH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BALC	VIC	BALACLAVA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BALG	NSW	BALGOWLAH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BALM	NSW	BALMAIN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BANK	NSW	BANKSTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BATA	WA	BATEMAN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BAUL	NSW	BAULKHAM HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BAYR	VIC	BAYSWATER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BBCH	WA	BURNS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BBEG	QLD	BUNDABERG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BCHS	WA	BEECHBORO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BDWS	VIC	BROADMEADOWS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BEEL	QLD	BEENLEIGH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BELG	VIC	BELGRAVE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BELM	VIC	BELMONT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BELT	NSW	BELMONT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BEND	VIC	BENDIGO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BGON	VIC	BRIGHTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BKLN	VIC	BROOKLYN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BKWD	SA	BLACKWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLAC	NSW	BLACKTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLAK	NSW	BLAKEHURST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLBN	VIC	BLACKBURN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLCN	ACT	BELCONNEN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLCT	WA	BALCATTA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLJA	WA	BALLAJURA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BLRO	NSW	BOOLAROO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BMBA	QLD	BULIMBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BNDL	QLD	BUNDALL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BOND	NSW	BONDI	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BOTA	NSW	BOTANY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BOXL	VIC	BOX HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BRAT	VIC	BALLARAT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BRIH	SA	BRIGHTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BRUK	VIC	BRUNSWICK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BSDN	WA	BASSENDEAN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BTST	TAS	BATHURST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BURD	NSW	BURWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
BURL	QLD	BURLEIGH HEADS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CABO	QLD	CABOOLTURE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CAMP	NSW	CAMPSIE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CANN	WA	CANNINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CARL	NSW	CARLINGFORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CARR	NSW	CARRAMAR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CAST	NSW	CASTLE HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CAUL	VIC	CAULFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CBRG	VIC	COBURG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CBTN	NSW	CAMPBELLTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CFSH	NSW	COFFS HARBOUR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CHAT	NSW	CHATSWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CHDE	QLD	CHERMSIDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CHLS	NSW	CHARLESTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CHPL	QLD	CHAPEL HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CLAY	VIC	CLAYTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CLVL	QLD	CLEVELAND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CLVY	SA	COROMANDEL VALLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CMLL	VIC	CAMBERWELL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CNVL	WA	CANNING VALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CONC	NSW	CONCORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
COOG	NSW	COOGEE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CORI	VIC	CORIO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CPBA	QLD	CAPALABA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CPHL	QLD	CAMP HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CPRO	QLD	COORPAROO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRBN	VIC	CRAIGIEBURN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRBY	VIC	CANTERBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRCF	ACT	CRACE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRDF	NSW	CARDIFF	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CREM	NSW	CREMORNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRMS	WA	CURRAMBINE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CROH	VIC	CROYDON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRON	NSW	CRONULLA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRSX	QLD	CAIRNS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CRYD	SA	CROYDON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CSEA	VIC	CHELSEA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CTAM	VIC	CHELTENHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CTOE	WA	COTTESLOE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CTON	VIC	CARLTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CVIC	ACT	CIVIC	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CWOD	VIC	COLLINGWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
CYTB	WA	CITY BEACH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DAEY	TAS	DAVEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DAND	VIC	DANDENONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DANN	VIC	DANDENONG NORTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DBLV	WA	DOUBLEVIEW	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DEEW	NSW	DEE WHY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DKIN	ACT	DEAKIN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DNCT	VIC	DONCASTER EAST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DONC	VIC	DONCASTER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DRRA	QLD	DARRA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DRUM	NSW	DRUMMOYNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DRWN	NT	DARWIN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
DURA	NSW	DURAL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EAST	NSW	EAST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EDGE	NSW	EDGECLIFF	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EDWN	SA	EDWARDSTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ELSK	VIC	ELSTERNWICK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ELTM	VIC	ELTHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EMPS	QLD	EIGHT MILE PLAINS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ENDS	VIC	ENDEAVOUR HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ENGA	NSW	ENGADINE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ENPK	QLD	EVERTON PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EPPG	VIC	EPPING	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EPPI	NSW	EPPING	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ERPK	NSW	EDENSOR PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ESPK	NSW	ERSKINE PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EWOO	NSW	EASTWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
EZBH	SA	ELIZABETH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FHLS	QLD	FERNY HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FIVE	NSW	FIVE DOCK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FMTL	WA	FREMANTLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FREN	NSW	FRENCHS FOREST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FRFD	WA	FORRESTFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FRTN	VIC	FRANKSTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FSRY	VIC	FOOTSCRAY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
FTON	VIC	FLEMINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GBRH	VIC	GREENSBOROUGH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GEEM	VIC	GEELONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GIRR	WA	GIRRAWHEEN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GLEB	NSW	GLEBE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GLIS	VIC	GLEN IRIS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GLLG	SA	GLENELG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GNGE	SA	GOLDEN GROVE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GNRY	VIC	GLENROY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GOSN	WA	GOSNELLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GPCS	SA	GEPPS CROSS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GRAN	NSW	GRANVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GRMT	WA	GREENMOUNT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GSFD	NSW	GOSFORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GUGA	SA	GLENUNGA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
GULL	QLD	GULLIVER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HAMN	NSW	HAMILTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HAMS	WA	HAMERSLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HARB	NSW	HARBORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HAWN	VIC	HAWTHORN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HDBG	VIC	HEIDELBERG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HGTT	VIC	HIGHETT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HILN	WA	HILTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HNLY	SA	HENLEY BEACH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HOLS	NSW	HOLSWORTHY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HOME	NSW	HOMEBUSH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HORN	NSW	HORNSBY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HPSD	SA	HAMPSTEAD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HTLL	VIC	HARTWELL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HUHL	NSW	HUNTERS HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
HURS	NSW	HURSTVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
IALA	QLD	INALA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
INGL	NSW	INGLEBURN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
IPSW	QLD	IPSWICH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
JDLP	WA	JOONDALUP	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
JKOT	WA	JANDAKOT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
JREE	QLD	JAMBOREE HEIGHTS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
JTSX	WA	JANDAKOT SOUTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KALG	VIC	KARINGAL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KBAH	ACT	KAMBAH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KEDL	WA	KEWDALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KELL	NSW	KELLYVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KELM	WA	KELMSCOTT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KENS	NSW	KENSINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KEWE	VIC	KEW	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KGRO	VIC	KANGAROO FLAT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KILL	NSW	KILLARA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KING	NSW	KINGSGROVE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KLGR	QLD	KALLANGUR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KOGA	NSW	KOGARAH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KSLY	WA	KINGSLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
KYNG	VIC	KOOYONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LAKE	NSW	LAKEMBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LANE	NSW	LANE COVE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LAVN	NSW	LAVINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LCHE	QLD	LUTWYCHE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LDLE	WA	LANDSDALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LESM	WA	LESMURDIE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LIDC	NSW	LIDCOMBE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LIND	NSW	LINDFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LISM	NSW	LISMORE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LIVE	NSW	LIVERPOOL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LNHE	QLD	LOGANHOLME	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LNYN	ACT	LANYON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LSDE	SA	LONSDALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
LYNH	VIC	LYNDHURST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MADD	WA	MADDINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MAIT	NSW	MAITLAND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MALV	VIC	MALVERN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MANL	NSW	MANLY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MARO	NSW	MAROUBRA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MASC	NSW	MASCOT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MATR	NSW	MATRAVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MAYF	NSW	MAYFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MAYM	WA	MAYLANDS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MCHN	QLD	MITCHELTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MDBY	SA	MODBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MDLD	WA	MIDLAND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MDLE	WA	MAIDA VALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MDNA	WA	MEDINA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MENA	NSW	MENAI	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MGAT	QLD	MOUNT GRAVATT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MHAW	WA	MOUNT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
		HAWTHORN					
MILD	VIC	MILDURA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MILL	NSW	MILLER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MINT	NSW	MINTO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MIRA	NSW	MIRANDA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MITM	VIC	MITCHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MKAY	QLD	MACKAY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MLBA	ACT	MELBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MLEY	WA	MORLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MLND	VIC	MORELAND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MLOC	VIC	MORDIALLOC	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MLOO	WA	MULLALOO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MNDE	WA	MINDARIE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MNKA	ACT	MANUKA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MNNG	WA	MANNING	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MNSH	ACT	MONASH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MOLP	VIC	MOOLAP	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MONA	NSW	MONA VALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MOSM	NSW	MOSMAN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MRAC	QLD	MERRIMAC	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MTEA	VIC	MOUNT ELIZA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MWSN	ACT	MAWSON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
MYDE	QLD	MAROOCHYDORE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NALE	SA	NORTH ADELAIDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NAWN	VIC	NARRE WARREN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NBRI	NSW	NORTHBRIDGE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NCOE	VIC	NORTHCOTE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NDAH	QLD	NUNDAH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NDGE	QLD	NUDGEE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NDLN	WA	NEDLANDS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NERG	QLD	NERANG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NESS	VIC	NORTH ESSENDON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NEWT	NSW	NEWTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NGLG	VIC	NORTH GEELONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NHRD	NSW	NORTH RICHMOND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NLTN	NSW	NEW LAMBTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NMEL	VIC	NORTH MELBOURNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NMKT	QLD	NEWMARKET	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NOOS	QLD	NOOSA HEADS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NPAR	NSW	NORTH PARRAMATTA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NPRT	VIC	NEWPORT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NRBA	QLD	NARANGBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NRWD	SA	NORWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NRYD	NSW	NORTH RYDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NSYD	NSW	NORTH SYDNEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
NWFM	QLD	NEW FARM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
OAKL	VIC	OAKLEIGH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ORGF	NSW	ORANGE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ORMD	VIC	ORMOND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
OSBN	SA	OSBORNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PARR	NSW	PARRAMATTA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PDTN	QLD	PADDINGTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PEAK	NSW	PEAKHURST	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PEND	NSW	PENDLE HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PENN	NSW	PENNANT HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PETE	NSW	PETERSHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PETR	QLD	PETRIE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PKEM	NSW	PORT KEMBLA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PMEL	VIC	PORT MELBOURNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PMYA	WA	PALMYRA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PNTH	NSW	PENRITH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PRDS	SA	PARADISE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PROT	SA	PROSPECT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PRTN	VIC	PRESTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PTAD	SA	PORT ADELAIDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
PYMB	NSW	PYMBLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
QINS	WA	QUINNS ROCKS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
QUAK	NSW	QUAKERS HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RAMS	NSW	RAMSGATE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RAND	NSW	RANDWICK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RBNA	QLD	ROBINA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RCMD	VIC	RICHMOND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
REDC	QLD	REDCLIFFE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
REDF	NSW	REDFERN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RELA	SA	REYNELLA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
REVE	NSW	REVESBY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RIVT	WA	RIVERTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RKHM	WA	ROCKINGHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ROCK	NSW	ROCKDALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ROOT	NSW	ROOTY HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ROSE	NSW	ROSE BAY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RSVR	VIC	RESERVOIR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RTWL	QLD	ROTHWELL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RWOD	VIC	RINGWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RYDA	NSW	RYDALMERE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
RYDE	NSW	RYDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SALA	SA	SALISBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SALB	VIC	ST ALBANS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SCBH	WA	SCARBOROUGH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SCLN	ACT	SCULLIN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SCOY	VIC	SCORESBY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SEAF	VIC	SEAFORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SEFD	SA	SEAFORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SEFT	NSW	SEFTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SEMC	SA	SEMAPHORE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SEVE	NSW	SEVEN HILLS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SHAL	NSW	SHALVEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SHLN	TAS	LAUNCESTON SOUTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SHPN	VIC	SHEPPARTON	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SILV	NSW	SILVERWATER	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SLAC	QLD	SLACKS CREEK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SMEL	VIC	SOUTH MELBOURNE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SMRN	VIC	SOUTH MORANG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SNDM	VIC	SANDRINGHAM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SOAK	VIC	SOUTH OAKLEIGH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SOPT	QLD	SOUTHPORT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SOTH	QLD	SOUTH BRISBANE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SPLE	VIC	SPRINGVALE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SPNE	QLD	STRATHPINE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SPOL	VIC	SEBASTOPOL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SPRD	WA	SPEARWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SPTH	WA	SOUTH PERTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SRTA	NSW	SARATOGA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SRWD	QLD	SHERWOOD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SSBY	QLD	SALISBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SSTR	NSW	SOUTH STRATHFIELD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STIC	SA	STIRLING	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STJN	TAS	ST JOHN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STKA	VIC	ST KILDA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STLE	NSW	ST LEONARDS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STMA	NSW	ST MARYS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STMF	SA	ST MARYS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
STPE	SA	ST PETERS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SUBT	WA	SUBIACO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SURF	QLD	SURFERS PARADISE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SUTH	NSW	SUTHERLAND	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SYBK	QLD	SUNNYBANK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
SYRA	VIC	SOUTH YARRA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TAMH	NSW	TAMWORTH	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TGPA	QLD	TINGALPA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
THGP	QLD	THE GAP	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
THTN	VIC	THOMASTOWN	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TMNE	VIC	TULLAMARINE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TNBY	VIC	THORNBURY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TNIT	VIC	TARNEIT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TNSF	QLD	TOWNSVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TOBF	QLD	TOOWOOMBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TRAK	VIC	TOORAK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TRTO	NSW	TORONTO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TUTT	WA	TUART HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TWOG	QLD	TOOWONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
TYHO	VIC	TALLY HO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
UNDE	NSW	UNDERCLIFFE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
UNLY	SA	UNLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
VAUC	NSW	VAUCLUSE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
VICP	WA	VICTORIA PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
VLLY	QLD	VALLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WACL	QLD	WACOL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WAGA	NSW	WAGGA WAGGA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WAHR	NSW	WAHROONGA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WANO	WA	WANNEROO	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WAVE	NSW	WAVERLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WDVL	SA	WOODVILLE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WEND	VIC	WENDOUREE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WEPN	QLD	WELLINGTON POINT	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WESA	SA	WEST ADELAIDE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WETH	NSW	WETHERILL PARK	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WHJS	SA	WHYALLA JENKINS	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WHLL	VIC	WHEELERS HILL	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WILL	NSW	WILLOUGHBY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WIRC	VIC	WINDSOR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WLGG	NSW	WOLLONGONG	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WMBY	WA	WEMBLEY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WOBB	QLD	WOOLLOONGABBA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WOLF	NSW	WOLFE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

ESA	State	Name	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
			[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WOYY	NSW	WOY WOY	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WRLA	NSW	WARILLA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WRNA	VIC	WANTIRNA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WSOR	NSW	WINDSOR	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WTFD	QLD	WATERFORD	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
WYNM	QLD	WYNNUM	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
YRGA	QLD	YERONGA	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]
ZMRE	QLD	ZILLMERE	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]	[c-i-c]

Source: [c-i-c]

APPENDIX B: THE CURRENT STATE OF RETAIL COMPETITION

216 In the main body of this report I have investigated whether there are alternatives to PSTN OA for providing the relevant downstream services and conclude there are a range of declared and competitively-supplied upstream inputs that can be used to supply the downstream markets. Given that a lack of access to competitively priced and viable upstream inputs to PSTN OA would be the most likely factor to impede workable competition in the associated retail market, this immediately suggests that the retail market is likely to be workably competitive.

217 There are potentially other factors that might, at least in theory, undermine workable competition in downstream markets (e.g. brand loyalty, switching costs, etc.). However, even a high level analysis of competition in the retail market – in particular, of trends in market shares and observed rates of customer churn – makes it readily apparent that such factors are not of practical effect in terms of impeding competition. Rather, I am of the view that the retail market is indeed currently competitive.

B.1 TRENDS IN RETAIL MARKET SHARES

218 Market share analysis is commonly used as a high level litmus test for determining whether markets are competitive. In particular, such analysis is often used to determine whether *prima facie* a firm is unlikely to have substantial market power. In this instance, the significant erosion of Telstra's market share for both voice and broadband services strongly suggests that Telstra does not have substantial market power, and that the market is workably competitive.

B.1.1 Fixed voice telephony services

219 Table 10 below indicates that approximately 20 percent of customers now purchase retail line rental from a firm other than Telstra, and by 2004-05 Telstra had lost approximately 25 percent market share over all PSTN retail services. Given this market share loss, it is evident that consumers are not only aware of alternative providers of fixed-telephony, but they are also quite prepared to switch from Telstra to its competitors.

220 Considered in more detail, Table 10 demonstrates that since the introduction of competition in the telecommunications markets, Telstra's revenue share in the supply of retail local calls has declined by 25 percentage points, and its revenue share for international and STD calls has declined by 30 and 40 percentage points, respectively. In fact, since 2001 Telstra has continued to see market share decline (measured by revenue) across all if its core PSTN products.

Table 10: Retail Revenue Share by fixed line service, 2001-02 to 2004-05

	Retail Revenue Share 2001-02	Retail Revenue Share 2004-05	Change in market share
Basic Access			
Telstra	89.6%	80.1%	-9.5%
Other	10.4%	19.9%	9.5%
Local Calls*			
Telstra	78.2%	75.30%	-2.9%
Other	21.7%	24.70%	3.0%
IDD			
Telstra	71.4%	69.4%	-2.0%
Other	28.6%	30.6%	2.0%
STD			
Telstra	62.9%	61.4%	-1.5%
Other	37.1%	38.6%	1.5%
Fixed To Mobile			
Telstra	74.9%	74.2%	-0.7%
Other	25%	25.8%	0.8%
Total Fixed Line			
Telstra	78.7%	75.3%	-3.4%
Other	21.3%	24.7%	3.4%

Note: * for 2001-02 data in source does not sum to 100 percent. Total fixed line includes other call types, such as STD and IDD.

Source: ACCC, 'Telecommunications Market Indicator Report', July 2006, p. 6.

221 Figure 17 demonstrates an increasing degree of facilities based competition in the telephony market. Over the twelve month period from May 2007, the demand for Telstra's WLR declined by over [c-i-c] while demand for Telstra's retail line rental remained relatively flat. At the same time, ULLS-based infrastructure increased by more than 100 percent. The substitution away from Telstra's services is, to my mind, a clear indication that entrants are aware of, and are utilising, alternative means of providing competitive downstream telephony services.

222 Further, the [c-i-c] decrease in the number of wholesale LCS services shown in Figure 17 is indicative of consumers taking advantage of alternative communication technologies - such as mobile wireless services, VoIP, SMS or email - where previously they used voice telephony, as well as a shift to alternative fixed networks.

Figure 17: [c-i-c]

223 To summarise, in my opinion, the decline in Telstra's fixed voice telephony market shares *prima facie* indicates that Telstra is subject to competitive discipline in the supply of retail fixed voice services.

B.1.2 Broadband services

224 As of September 2006, broadband take-up in Australia was 3,639,700 - a 51 percent increase on a year earlier.[110] Around 80 percent of the 2005-2006 growth came from ADSL (or 81 percent if also including other DSL technologies).[111] Overall, broadband subscribers now account for 67 percent all internet subscribers in Australia.[112]

225 Telstra faces a large number of competitors in the retail market for broadband and voice services. These fall into various categories:

- ULLS-based and LSS-based carriers: carriers that have either a ULLS or an LSS arrangement with Telstra provide broadband services to end users. Some of these companies are also resellers of wholesale ADSL.
- Competitors with own fixed wire networks (typically fibre): e.g. Optus, TransACT. I discussed the geographic coverage of these players in 3.3.2.
- ISP resellers: further competition to Telstra comes from a large number of ISPs who resell wholesale ADSL. As of March 2007 there were 32 ISPs with over 10,000 subscribers and 9 with more than 100,000 subscribers.[113]
- Wireless broadband networks: Many metropolitan areas across Australia have wireless network coverage (see section 3.2). The number of wireless broadband subscribers almost tripled over the past year to 139,500 September 2006.[114] The main players in this segment include iBurst and Unwired (see Table 8).

110 ACCC, 'Snapshot of Broadband Deployment as at 30 September 2006'.

111 CRA calculations based on ACCC, 'Snapshot of Broadband Deployment as at 30 September 2006'.

112 ABS, Cat. Number 8153.0 – Internet Activity Australia March 2007.

113 ABS, Cat. Number 8153.0 – Internet Activity Australia March 2007.

114 ACCC, 'Snapshot of Broadband Deployment as at 30 September 2006'.

226 The growth in number and size of Telstra's competitors has had an impact on Telstra's (and Optus') retail broadband market share. In the broadband market, Telstra's market share has fallen from over 50 percent in 2002 to 40 percent in 2006, while Optus' market share has fallen from 29 percent to less than 20 percent in the same period (see Table 11).

Table 11: Australian broadband market, market shares by retail subscribers, 2002-2006

Carrier	2002	2003	2004	2005	2006 (est.)
Telstra	52.5%	50.4%	48.3%	40.3%	40.0%
Optus	28.8%	20.7%	13.8%	15.6%	17.5%
DSL resellers	15.3%	25.6%	34.5%	40.7%	34.2%
Others	3.4%	3.3%	3.4%	3.4%	8.3%
CR2[115]	***81.3%***	***71.1%***	***62.1%***	***55.9%***	***57.5%***

Source: ACMA, 'Communications Report 2005-2006', 2006, p. 64.

227 In my opinion, the large number of market participants and trends in retail broadband market shares indicates that Telstra is subject to competitive discipline at the retail layer - consistent with a competitive retail broadband market.

B.2 SWITCHING COSTS AND CHURN BEHAVIOUR

228 Switching costs refer to the costs incurred by customers when changing retail supplier. They can be monetary or non-monetary. For example, a customer choosing to 'switch' supplier for their local services may have to incur an immediate monetary cost to connect to a new provider, or they many be required to buy out a 'lock-in' contract. Such a consumer would also incur a non-monetary cost, for example, the time taken to contact a provider and purchase a new product.

229 Whilst low churn rates are potentially consistent with competitive market outcomes, high churn rates are almost always incompatible with an uncompetitive market. High churn rates imply that consumers are not only aware of available alternatives to their current supplier, but also willing and able to switch.

230 The following shows that there has been significant churn away from Telstra in retail fixed voice and broadband services. It implies that Telstra is not insulated from competitive pressure in the relevant retail market, and reinforces the conclusion I have drawn based on analysis of market share trends.

115 Concentration ratio: sum of the market shares of the two largest market players.

B.2.1 Fixed voice telephony services

231 The telephony market has seen nearly a decade of reforms and market developments aimed at reducing customer switching costs. These reforms have been successful at reducing the barriers to entry posed by switching costs and incumbency advantage:

- Number portability has been in place since 1997.[116] Retail customers are now able to switch carriers without having to change their telephone number;
- The wide availability and use of internet-based search (with all significant service providers advertising their rates on their website) and price comparison services allow consumers to quickly and effectively investigate the availability of cheaper plans, keeping to a minimum their time cost;[117] and
- The existence of "truth in advertising" consumer protection measures and the Commission's active involvement in misleading and deceptive conduct claims in the area of telecommunications services advertising.

232 Observed high churn rates are likely to be at least partly explained by the factors just described. Figure 18 shows the monthly 'churn-in' and 'churn-out' for wholesale line rental services from July 2001 to April 2007.

- 'Churn out' occurs in two circumstances. First, where a customer shifts from being a Telstra retail customer to being supplied by a reseller using PSTN access products as inputs. Second, where the customer switches to an alternative network such as Optus or TransACT's HFC networks, or to ULLS.
- 'Churn in' occurs when a customer shifts from either a reseller or an alternative network to Telstra's retail service.[118]

233 Collectively these two measures indicate the level of churn in the downstream market. Any such measure will understate the true churn, as it will not account for customers who switch between resellers or from a reseller to an alternative facilities-based provider.

234 During the period, on average [c-i-c] SIOs churned into Telstra per month, while [c-i-c] churned out. In aggregate there were [c-i-c] churn-in SIOs and [c-i-c] churn-out SIOs over the period.

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116 ACCC, 'Directions to the Australian Communications Authority on Number Portability', September 1997.

117 While information on call-quality and other non-price factors is less readily available than price comparisons, there seems little reason to think that this would make fixed-telecommunication customers any more sticky than other utility customers. Because the product market (fixed telephony) is relatively homogenous there are less non-price considerations than in other markets where product differentiation is greater (i.e. in mobile telephony where network providers offer content and other 'premium' features).

118 We recognise that this analysis only considers existing SIOs and that alternative operators may have scope for expansion by providing their services to new SIOs (e.g. new houses being built).

Figure 18: [c-i-c]

235 During the 12 month period to April 2007, churn-out of customers equalled approximately [c-i-c] of the total SIO base. To this, I add the 'churn-in' in order to obtain an estimate of total market churn. Using this method, I can show that the number of churns over a 12 month period (i.e. a customer switching from one option to another) was approximately [c-i-c] of the total SIO base.[119]

B.2.2 Broadband services

236 In my opinion the costs associated with retail broadband customers switching between retailers are low. I have reached this conclusion for two reasons. First, a brief review of the main retail broadband offers made available by the key industry players that shows very low switching costs (see Table 13).[120]

237 Second, there is evidence that Telstra has experienced high level of retail customer churn.

238 I am not aware of reliable estimates of broadband market-wide churn estimates in the public domain. However, I have sought and been provided with confidential (commercial) Telstra data on BigPond customer churn over time. The churn level over the past 5 years has been high, in the range of [c-i-c] per annum, as shown in Table 12 below. For instance, [c-i-c] of Big Pond's ADSL customers at 30 June 2005 had left BigPond by June 2006.

Table 12: [c-i-c]

239 These customers leaving Telstra's ADSL Big Pond could go in three broad directions.

240 It might reflect withdrawal by a customer from the broadband market altogether. In my view this category is unlikely to involve a significant proportion of broadband customers leaving BigPond. Rather, I believe it more likely reflects either:

- Movement to one of Telstra's competitor that has a wholesale arrangement with Telstra, via ULLS, LSS or wholesale ADSL (resellers); or

119 [c-i-c] I have used the 'churn-in' figures, as well as the churn-out figures, as the sum of these gives the best indication of the number of times customers switch providers in the year. An efficient competitor is able to capture any of the customers who 'switch' regardless of their existing carrier. It is possible that some of the churn were customers changing providers twice (or more) in the year. This is immaterial to the case at hand, which concerns the ability of entrants to capture customers when they are 'churning'. Whether customers churn regularly or irregularly is not relevant to this point.

120 Several providers waive connection costs to consumers who already have a broadband modem from their previous supplier.

- Movement to an alternative network, either fixed (e.g. Optus, TransACT) or wireless (e.g. Unwired, iBurst).[121]

If this is the correct interpretation, then Telstra's retail ADSL churn data implies that Telstra's retail customers have switched to retail competitors in substantial numbers.

121 Switching levels from broadband to narrowband are immaterial in today's market.

Table 13: Comparative switching costs for broadband

	Telstra	Optus	Adam Internet	Netspace	iiNet	Primus
Minimum contract Terms	12 months	12 months	1 month	1 month	6 months	1 month
Upfront costs[122]	$99 connection fee, $90 for a modem (where required)	$89 connection fee, $99 for a modem (where required)	$125 connection fee, $125 for modem	$149 connection fee, $50 for a basic modem	$79.95 connection fee, $109 for a basic modem.	$118 connection fee, $40 for a basic modem
Discounts available	Discounts available on higher plans for customers with a Telstra fixed line ($10/month). Connection fee waived for customers who sign on for 24 months.	Connection and modem fees waived for customers who sign on for 24 months. $10/month discount for Optus home phone or mobile customers. First 2 months free when combined with an Optus mobile or home phone.	$25 discount on both modem and connection charges for customers signing on for 6 months. $50 discount for customers signing on for 12 months, $75 for 18 months, $100 for 24 months.	$50 discount on connection for customers signing on for 6 months, $90 off connection for customers signing on for 12 months, free connection for customers signing on for 24 months. $10/month discount for bundling with Netspace Home phone on higher plans.	$40 discount on modem for customers who sign on for 24 months. $10/month discount if bundled with telephony	$59 off the connection fee and $50 off modem charge if the customer signs for 12 months. Connection is free and the modem is further discounted if the customer signs for 24 months. $10/month discount for customers who bundle with fixed line or mobile telephony.
Other price incentives	For Telstra fixed-line	2 months free broad-			Customers bundling	

122 Includes installation, connection charges, modems.

	Telstra	Optus	Adam Internet	Netspace	iiNet	Primus
	and mobile customers, the first 12 months of a 24 month plans are at half price. Connection and modem costs are also waived for these customers.	band when combined with an Optus home phone or eligible mobile on a 24 month plan.			with telephony or VoIP receive discounts on these services	
Benefits from disconnecting from another carrier	Rapid Transfer available – free if transferring to a BigPond 24 month plan, $99 if transferring to a 12 month plan.	Rapid Transfer available - $49 for customers transferring to an Optus 24 month plan, $89 for customers transferring to a 12 month plan	Rapid Transfer available - free if signing up for a 12 or 24 month plan, $35 if signing up for a 1 month plan.	Rapid Transfer available - free for customers signing up to a 6, 12 or 24 month plan, $39 for customers signing up to a 1 month plan.	Rapid Transfer available - $39 for all plans	Rapid Transfer available – free for customers signing up to a 12 or 24 month plan, $59 for customers signing up to a 1 month plan

Source: Providers' websites (accessed on 15 May 2007).

Notes: Latest information (based on 256kbps download speed and download limits of 200-500 MB)

APPENDIX C: LOCAL SWITCHING AND GATEWAY INFRASTRUCTURE

241 I have been advised that an entrant that does not own a circuit switched PSTN network (or at least not one of national scope) has two technology choices for using ULLS to provide STS-quality voice and broadband services today.

242 The first option involves seeking commercial access to an existing circuit-switched PSTN network. I have been advised that this is technically feasible.[123]

243 The second option involves an entrant self-supplying switching using ULLS emulation (i.e. a POTS card in a DSLAM/MSAN) and the current generation of soft-switching. It would also need to acquire access to media gateways in order to convert IP based voice packets to circuit-switched TDM format, and PSTN interconnection with Telstra and other carriers (in the 66 Telstra interconnection calling areas around Australia).[124]

244 Market evidence indicates that soft switching and gateway infrastructure are indeed commercially viable. Optus has introduced an STS VoIP offering which targets SMEs using this technology.[125] Engin has partnered with Optus and introduced a broadband telephony services which is considered a true PSTN replacement allowing customers to forego line rental charges while continuing to use their existing handset.[126] Similarly, BigAir and MyNetFone have partnered, offering wholesale broadband and business grade quality VoIP.[127]

245 Furthermore, as indicated by Table 1, many LSS based entrants currently provide VoIP services, indicating either they have invested in or have access to soft switching and gateway infrastructure. Finally, for LSS-based service providers who do not want to invest in soft switched technology Optus has introduced a VoIP IP Gateway product which offers wholesale voice switched interconnectivity on an IP platform.[128]

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123 [c-i-c]

124 [c-i-c]

125 www.optus.com.au (accessed 5th July 2007)

126 Engin Limited, 'Engin uniquely positioned to deliver broadband services to the digital home', ASX Announcement, 12 June 2007

127 MyNetFone and BigAir Group, 'MyNetFone and BigAir deliver true convergence of voice and broadband data service', ASX Announcement, 5 December 2006

128 www.optus.com.au (accessed 5th July 2007)

246 In my view such an offering obviates the need for a circuit-switched PSTN network to provide STS-quality voice services via ULLS, reducing switching infrastructure as a potential barrier to ULLS entry. Moreover, Optus' experience highlights that this technology is not only technically feasible, but is being introduced by an existing ULLS-based operator.

247 On this basis I conclude that access to switching infrastructure should not be viewed as a barrier to ULLS-based entry.

248 It might be argued that the current state of the 'technology cycle' for switching infrastructure creates barriers to ULLS entry, [129] as commercial or business imperatives may lead potential entrants to delay entry until the emergence of commercially available next generation soft switches.[130] However, for the following reasons it is my view that the current state of the soft switching technology cycle does not present a material barrier to ULLS entry:

- First, an entrant that does not operate a PSTN network (or at least not one of national scope) at present has two technology choices, as well as a range of commercial options, in using ULLS to provide broadband and STS-quality voice services today. This degree of choice allows for costs to be minimised.

- Second, I am aware that, for some vendors, upgrading to IMS will simply involve a software upgrade to current generation soft switches and IP interconnection.[131] This suggests an entrant is unlikely to face material *additional costs* in ULLS-based entry using current generation soft switches and migrating to next generation soft switches, as compared to entry via a next generation soft switch platform.

129 By "technology cycle" we refer to the evolution of technology which, for cost related or other reasons, forces firms to integrate new technologies, making previous infrastructure redundant.

130 Although market-based experience indicates entrants are looking to use POTS emulation and the current generation of soft switches to provide voice services, we have been advised that the next generation of soft switches (on the IMS protocol) will have attractive features (e.g. the ability to handle advanced voice and data flows such as multimedia and video conferencing) when compared with current generation soft switches.

131 http://www.ericsson.com/winningpropositions/docs/efficient_evolution_to_allip_ericsson.pdf (accessed 5th July 2007) and http://market.huawei.com/hwgg/itu2006/en/ip/fmc.html (accessed 5th July 2007)

- Third, the presence of telecommunications technology cycles is not restricted to soft switching infrastructure and, as in other instances, I would expect any negotiated terms for purchase or lease of current switching infrastructure to reflect the anticipated availability of (the more desirable) next generation soft switches. [132] For example, an entrant may agree to pay the market price for the current version of soft switches in return for a vendor discount on upgrading to next generation switches.

- Finally, ULLS-based entry is proceeding apace in other countries, despite any issues associated with soft-switching technology. The growth of ULLS entrants in the EU over the 2003 to 2006 period is presented in Table 14.

132 For example, entry into the mobile phone market provides a close analogy. At a given point in time, a potential mobile entrant is likely to face risks in its choice of 'mobile platform generation'; however the presence of these risks does not necessitate regulatory intervention. Rather, when left to the market we see competition occurring both within and across different mobile platform generations as providers seek to best match products and services with end customer demands, resulting in a diverse range of innovate product and services offerings.

Table 14: ULLS entrants in Europe, 2003 to 2006[1]

Country	2003	2004	2005	2006
Belgium	8	8	8	9
Czech Republic	n/a	2	4	5
Denmark	13	17	17	21
Germany	74	86	99	101
Estonia	n/a	7	n/a	7
Greece	7	7	12	13
Spain	9	9	13	16
France	9	13	21	n/a
Ireland	1	3	3	5
Italy	31	27	26	27
Luxembourg	2	3	3	5
Hungary	n/a	n/a	6	6
Netherlands	12	12	10	10
Austria	17	20	26	n/a
Portugal	4	2	2	4
Finland	n/a	n/a	n/a	n/a
Sweden	63	110	122	n/a
United Kingdom	57	59	52	55

Notes: ULLS entry is inferred from the number of ULLS arrangements as at July 2003, July 2004, October 2005 and October 2006 in each EU country. n/a is not available.

Source: European Commission, 'European Electronic Communications Regulation and Markets', 2003-2006 9th- 12th implementation reports.

APPENDIX D: LSS TO ULLS SWITCHING

249 Here I consider the following factors that arguably would be most likely to give rise to barriers to *existing* LSS entrants switching to ULLS supply:

- Sunk costs of ULLS supply;
- Minimum efficient scale (MES) considerations;
- Technical constraints to providing an STS voice service;
- LSS disconnection charges; and
- Non-price impediments.

Sunk costs of ULLS-based supply

250 I have been advised that there are no material technical barriers to an existing LSS VoIP entrant switching to ULLS emulation.[133] As demonstrated in section 3.1.1 this would simply require the disconnection of '*the second jumper'* and the installation of voice cards into the DSLAM shelf. While a non-VoIP LSS service provider may require access or investment in soft switching infrastructure, market evidence strongly demonstrates that these investments are not insurmountable.

251 On this basis it is my opinion ULLS sunk costs do not amount to a material barrier for existing competitors switching from LSS to ULLS.

Minimum efficient scale considerations

252 MES is unlikely to pose an entry barrier for competitors switching from LSS to ULLS.

253 I have been provided with the results of analysis undertaken by Telstra staff that enables me to undertake a comparison of the minimum viable scale of entry for LSS versus ULLS.[134] A proper comparison is somewhat limited because, while the analysis of minimum viable scale for ULLS compares the per SIO revenues and costs associated with supplying the bundle of ADSL and voice services, the equivalent analysis of LSS does not consider revenues and costs associated with the supply of voice services. Nonetheless, it does provide a broad indication as to whether scale considerations are likely to materially differ between ULLS versus LSS.

133 [c-i-c]

134 [c-i-c]

254 I have presented modelling outputs that are relevant to assessing ULLS minimum viable scale in sub-section 3.3.1. I inferred from those outputs that, at current retail prices, the minimum number of retail ADSL SIOs at which ULLS entry becomes viable is less than [c-i-c] SIOs in Band 2.

255 Table 15 presents outputs that are relevant to assessing LSS minimum viable scale. In particular, it presents estimates of monthly per SIO revenues for customers purchasing ADSL services only, as well as estimates of the monthly per SIO costs of supplying ADSL only, by band, for three levels of SIOs, these being [c-i-c]. I can infer from these outputs that, at current retail prices, the minimum number of retail ADSL SIOs at which LSS entry becomes viable is [c-i-c] in Band 2.

Table 15: [c-i-c]

256 Subject to the aforementioned caveat, the results of this modelling suggest that MES is unlikely to pose an entry barrier for existing competitors switching from LSS to ULLS.

Technical constraints to providing an STS voice service

257 On the basis of material presented in Section 3.3.1 I conclude technical constraints to providing an STS voice service do not exist and therefore do not pose a material barrier for existing competitors switching from LSS to ULLS.

LSS disconnection charges

258 I have been advised that an existing LSS entrant *may* incur certain costs in disconnecting from an LSS arrangement and connecting to a ULLS arrangement.[135] I have been advised that the terms and conditions of LSS to ULLS migration are the subject of ongoing arbitration proceedings. Due to confidentiality restrictions I do not have access to relevant materials relating to these arbitration proceedings that would likely enable us to make a conclusive view on this matter. That said, assuming these costs are once-off costs that vary with the number of migrating services in operation (SIOs), unless these costs are in total very substantial, then such costs are likely to be low on a per customer basis when amortised over the expected tenure of the customer.

Non price impediments

259 On the basis of material presented in Section 3.3.1 I conclude non price impediments do not pose a material barrier for competitors switching from LSS to ULLS.

135 Recently a Determination between Telstra and LSS access seekers has ruled that no LSS disconnection charge is to be imposed where the LSS is being migrated to a ULLS. See Access Dispute between Chime Communications Pty Ltd (Access Seeker) and Telstra Corporation Limited (Access Provider), Line Sharing Service (LSS), 'Publication of Final Determination and associated statement of reasons under Section 152CRA of the Trade Practices Act 1974.' While this may change as a result of subsequent proceedings, it is relatively clear that because such charges are subject to arbitration, any increase in the disconnection charge is unlikely to create a material barrier to migration.

Summary of barriers to LSS-ULLS switching

260 I conclude *existing* LSS entrants face no material barriers to exit or expansion associated with switching to ULLS.

APPENDIX E: CONTESTIBILITY OF VOICE-ONLY CUSTOMERS - MODELLING ASSUMPTIONS

[c-i-c]

APPENDIX F: ENGAGEMENT INSTRUCTIONS FROM MALLESONS STEPHEN JAQUES

[c-i-c]

APPENDIX G: CURRICULUM VITAE

DR PAUL PATERSON

Vice President

Bachelor of Agricultural Economics
(First Class Honours)
University of New England

Master of Economics
Australian National University

Ph D (Economics)
Australian National University

Paul Paterson is a Vice President at CRA International. Paul joined CRA from NECG and brings with him commercial and government experience in industry analysis, corporate strategies, regulation and policy development. Paul has senior executive experience in the telecommunications industry. Prior to joining NECG, he was with Telstra Corporation Ltd as Director Regulatory from 2001 to 2004.

As a founding member of the Regulated Industries Forum in 2003, and convener since then, Paul also has extensive insight into regulatory issues in the utilities and transport sectors.

Prior to his appointment as Director Regulatory at Telstra, Paul was the Group Manager Competition, Regulatory and External Affairs for Telstra from 1998 to 2001. Until leaving Telstra he was on the Board of the Australian Communications Industry Forum. Paul has authored numerous economic reports and publications since 1978.

EXPERIENCE

Advice on regulatory, competition, commercial, strategic and government policy matters to major corporations and government agencies in telecommunications and other network industries. Jurisdictional experience spans Australia, New Zealand, Singapore, Hong Kong, Japan, United Kingdom, Ireland, Italy and the USA.

PROFESSIONAL HISTORY

Nov 04 – Present	Vice President, CRAI, Australia
2004	Principal, NECG, Australia
2001 – 2004	Director Regulatory, Telstra
1998 – 2001	Group Manager Competition, Regulatory and External Affairs, Telstra

1992 – 1998	Executive Director, Policy & Resources, Department of State and Regional Development (previously Chief Business Economist, Office of Economic Development, New South Wales Premier's Department), Sydney
1988 – 1992	Chief Economist, OTC Limited (now Telstra), Sydney
1987	Visiting Economist, Department of the Treasury, Canberra
1986	Special Advisor, Department of Trade, Canberra
1985 – 1986	Assistant Director, Bureau of Labour Market Research, Canberra
1983 – 1984	Administrator, Organisation for Economic Co-Operation and Development, Paris
1980 – 1983	Senior Project Manager, Bureau of Labour Market Research
1977 – 1980	Project Manager, Bureau of Agricultural Economics

SELECTED PUBLICATIONS, PRESENTATIONS AND REPORTS

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D Shiff & P Paterson (1990) **Regulatory Issues for International Telecommunications in the New Environment: How do Overseas Arrangements Inform the Australian Situation?** Paper presented to the International Telecommunications Law and Policy Conference, Sydney, December 1990.

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