GIBSON QUAI

PRIMUS TELECOMMUNICATIONS

INDEPENDENT TECHNICAL EXPERT REPORT

ON TELSTRA'S LSS UNDERTAKING

(The Commercial – In - Confidence information of Primus and Telstra has been removed from this report)

Prepared by

GIBSON QUAI PTY LTD

Level 2, 30 Richardson Street
West Perth WA 6005

Tel: +61 8 9321 3166
Fax: +61 8 9321 3226
Email: perth@gibsonquai.com.au

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ABSTRACT: Primus has requested Gibson Quai to develop this document which is an independent expert report on Telstra's LSS Undertakings to the ACCC. Primus intends to use this report to support its submissions to the ACCC in relation to those undertakings. Primus also requested Gibson Quai to advise on ULLS connection charges. Therefore this report also deals with that matter

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1. INTRODUCTION

In August 2002 the Australian Competition and Consumer Commission (ACCC) handed down its final decision on the declaration of the Line Sharing Service (LSS). The ACCC decided to declare the service and hence in accordance with Part XIC of the *Trade Practices Act 1974* (Cth) those carriers who provide the service to themselves or other persons are required to supply the service to other service providers upon request.

In its declaration the ACCC defines the LSS as follows:

"The High Frequency Unconditioned Local Loop Service is the use of the non-voice band frequency spectrum of an unconditioned communications wire (over which wire an underlying voice band PSTN service is operating) 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"[1].

This means that for example if Telstra was the access provider for this service it could retain the customer who obtains a PSTN voice service from it whilst simultaneously providing access to the high frequency component of the same line to an access seeker. This would enable the access seeker to provide high-speed data services through the use of its own xDSL technology.

In September 2003 Telstra submitted an undertaking to the ACCC in relation to the terms and conditions, including price under which it would supply the LSS. Under Part XIC of the Act the ACCC must accept or reject the undertaking as proposed by Telstra. If the ACCC accepts Telstra's undertaking then the terms and conditions as proposed by Telstra are likely to form the basis for the future provision of the service by Telstra to access seekers.

To assist the ACCC with its considerations in relation to the undertaking the ACCC issued a discussion paper in December 2003, which seeks Industry comment on the LSS undertaking.

In response to the ACCC discussion paper Primus Telecommunications (Primus) has commissioned Gibson Quai PTY LTD (Gibson Quai) to provide an expert opinion on a number of related technical matters. These matters are summarised as follows:

- Review of Telstra's LSS cost model,
- Review of major drivers for Telstra's LSS cost model including estimated number on customers,
- Potential impact of the price of LSS on the number of existing ADSL customers and,
- Telstra's proposed connection and disconnection charges for LSS and ULLS.

This document is Gibson Quai's expert report to Primus in relation to the above matters.

To assist Primus with its response to the ACCC we have reproduced a number of technical-related questions raised by the ACCC in boxed italics and provided our response to each question immediately following the question.

[1] Reproduced from the ACCC Final Decision on whether or not a Line Sharing Service should be declared under Part XIC of the Trade Practise Act 1974 (August 2002).

2. IS WHOLESALE SPECTRUM SHARING THE SAME AS LINE SHARING?

"The Commission seeks the views of interested parties on the appropriateness of Telstra's proposed service description in clause 2 of Attachment A to the Undertaking. Is the Telstra Wholesale Spectrum Sharing Service a form of the declared service?"

In its LSS undertaking, Telstra defines its Wholesale Spectrum Sharing Service (SSS) as follows:

"*…a service for the provision of access to the non-voice ADSL frequency spectrum (in accordance with the Telstra Splitter Specification) of a continuous metallic twisted pair between the SSS Boundary at the SSS End Customer Premises and a SSS POI associated with the TCAM serving that SSS End Customer that Telstra is currently using to provide an active PSTS voice service."*

This service description has been translated by the ACCC into a physical configuration for the purpose of understanding the interface responsibilities between Telstra and the access seeker.

This physical configuration is illustrated by the following diagram, which has been reproduced from the ACCC final decision paper on the LSS[1].

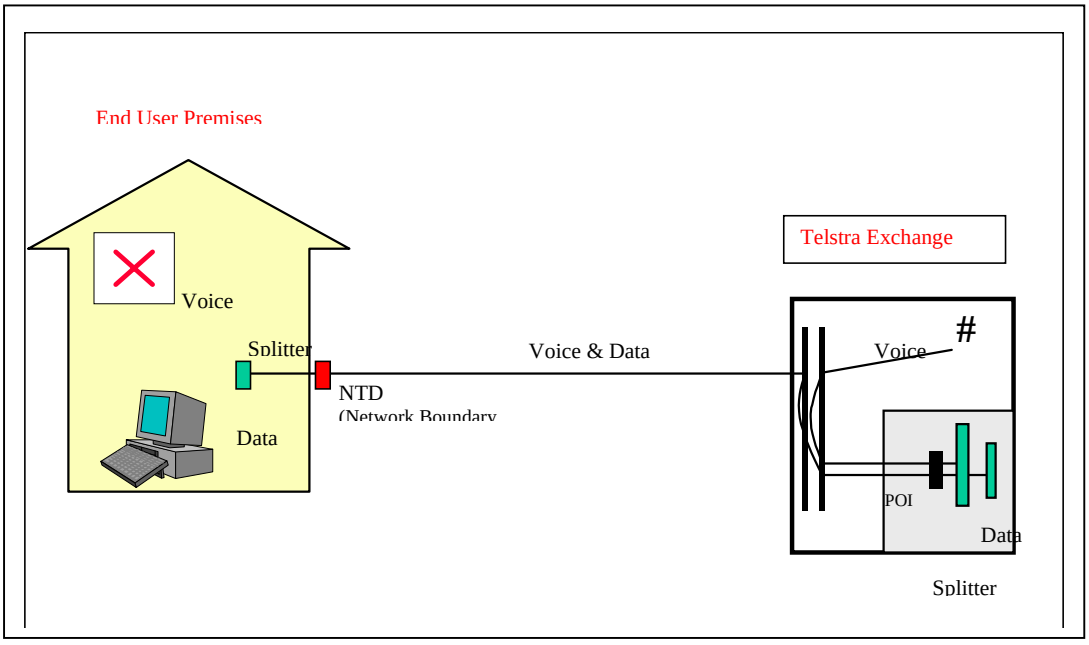

Figure1: Telstra's Commercial Spectrum Sharing Service

With reference to this physical configuration, it can be seen that the access seeker would be responsible for the provision of the splitter in the end users premises and the POI, splitter and data equipment (DSLAM) in the local Telstra exchange.

[1] Reproduced from ACCC - Line Sharing Service, Final decision on whether or not a Line Sharing Service should be declared under Part XIC of the Trade Practices Act 1974 (August 2002).

In addition the access seeker would rent space in the local exchange referred to as Telstra Exchange Building Access (TEBA) space for its equipment in accordance with facilities access arrangements with Telstra and would have to make arrangements for transmission between the Telstra exchange and the access seeker's network.

SSS specific equipment provided by Telstra would include:

a. The cable between the access seekers POI and the local exchange MDF (tie cable),

b. Extra MDF space and terminal blocks on which to terminate the tie cable.

c. Jumpers on the MDF, which connect the exchange line to the tie cable.

The cost of this equipment appears to be recovered by Telstra through charges levied by the Telstra Facilities Access Agreement.

Telstra's SSS can be compared with the declared service description, developed by the ACCC for LSS, which is as follows:

'*The High Frequency Unconditioned Local Loop Service is the use of the non-voice band frequency spectrum of an unconditioned communications wire (over which an underlying voice band PSTN service is operating) 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'*.

The major difference between the Telstra service description for SSS and the declared service description for LSS is as follows:

Telstra refers to a service that involves access to the non-voice ADSL frequency spectrum whilst the declared service description refers to a service, which utilises the non-voice band frequency spectrum. From this perspective the Telstra service description is more prescriptive because the frequency spectrum of the line may extend well above that required for the provision of ADSL services and may in fact support other (xDSL or ADSL2) services which require frequency spectrum well above that required by ADSL.

Furthermore some other services like Telstra Securitel service use frequencies that are below the voice band frequencies and hence would also be excluded by Telstra's definition but included by the declared service description.

In relation to other matters that are incorporated in both service descriptions we find that from a technical perspective the service descriptions are equivalent.

In conclusion we find that the Telstra SSS service definition is a slightly different service from the declared service description because it refers to a service that uses the non-voice ADSL frequency spectrum, which may be a subset of the total non-voice frequency spectrum available from a line. Whilst the declared service refers to a service that could utilise all available frequencies outside the voice frequency spectrum. Hence we consider the Telstra SSS to be a more restrictive service. However, from a practical perspective we think that the declared service will be used by access seekers to provide broadband services to their customers via ADSL in the vast majority of cases. In that case the two service descriptions are practically equivalent.

3. ESTIMATED DEMAND FOR LSS

"The Commission seeks the views of interested parties on the appropriateness of Telstra's demand estimates."

"What are the main factors for the poor take up of LSS so far? What method should be utilised for forecasting ULLS demand?"

The Commission is interested in the views of industry on their demand estimates with respect to the LSS.

What approach should the Commission use for addressing the problem of circularity in estimated and realised demand discussed above?

The provision of LSS involves access providers incurring certain expenses, which according to the ACCC in its final decision on the declaration of the LSS should be able to be recovered through the pricing of the service. This pricing should have due consideration to the potential market for the service because according to the ACCC pricing principals the cost of the service to an access seeker should be that cost incurred by an access provider in order to supply the service divided by the number of services provided. This equation is reflected in the TSLRIC model provided by Telstra in support of its LSS undertaking.

Gibson Quai are advised by Primus that access seekers have had difficulties obtaining timely supply of splitters that meet Telstra's specifications (an international standard). In addition access seekers have concerns about the terms and conditions under which Telstra would be prepared to provide the service. The lack of agreement on a suitable access price is one such important concern.

The effect of these issues has been to delay the take up of LSS by access seekers. Consequently the current forecasts presented by Telstra, which are based on past demand for the service, do not in our opinion adequately reflect the likely take up once the current road blocks are removed.

Therefore the demand estimates which are applied to the cost model should ignore the historical take up of the service and have regard to the likely effects of significantly reduced pricing, be based on sound forward looking reasoning, appropriate research and careful analysis of the likely trade offs that access seekers will make in their investment decisions when considering the alternatives at their disposal.

We believe that the future demand for LSS will be driven by two factors as follows:

1. In our experience access seekers will chose LSS to replace existing wholesale ADSL services where it becomes economically feasible to do so. This will result in an increase in facilities-based competition and the extent to which this occurs will be very sensitive to the price of the declared service. This trend has been a common feature of the deregulation of the Australian Telecommunications market in the past, for example when the PSTN access terms and conditions were resolved the market experienced a significant uptake of the services coupled with a proportional investment by access seekers in infrastructure resulting in a growth in facilities based competition.

2. Natural growth in demand for broadband services within Australia. The growth in demand for LSS driven by this factor will be less influenced by price however in our opinion a lower price for the declared service will encourage earlier uptake for the LSS service. This can be seen in countries like the USA where the cost of broadband services is less than Australia and this in turn has stimulated early demand resulting in a significantly larger percentage of the population connected.

In view of these drivers for the demand of LSS we provide the following analysis, which is based on our research and information obtained from a number of relevant sources. We have applied that information and formed a view on the estimated future demand for LSS. Our analysis is outlined below.

3.1 Demand derived from wholesale ADSL to LSS churn.

The ACA's Telecommunications Performance Report 2002-03 indicates that at the 30th June 2003 there were 193,500 ADSL services in use in Australia[2]. At that time Primus had approximately **[C-I-C]** customers connected to its network by Flexstream, which is Telstra's wholesale ADSL service, i.e. Primus customers represented about **[C-I-C]** of the market share. Since then the number of Primus ADSL customers serviced by Telstra's Flexstream product has grown to approximately **[C-I-C]**. Primus has a further **[C-I-C]** ADSL customers connected to its DSLAM infrastructure using ULLS.

All Primus customers serviced by Telstra's Flexstream product are connected to various Telstra exchanges. Some of these exchanges service large numbers of customers whilst others service only one. In fact Primus advise us that the number of customers connected to individual Telstra exchanges vary from 1 up to 128.

Primus advise that as soon as LSS becomes available at reasonable terms and conditions, and it becomes economically viable then it will acquire TEBA space in certain Telstra exchanges and install its own ADSL equipment to use LSS in preference to Flexstream to provide broadband service to its customers.

Gibson Quai has developed a model to calculate the number of customers per exchange that will deliver an economically viable changeover point from the use of Flexstream to LSS. Details of this model and related assumptions are included in Appendix B.

This model takes into consideration all costs associated with installation and operation of LSS equipment within the Telstra Exchange.

The model assumes a four year payback for investment in LSS equipment which in our experience is appropriate for Telecommunications equipment and a simple interest rate of 12% which is well above the current 10 year Bond rate of approximately 5.8% and therefore would attract investment in network equipment. The model also assumes LSS rental costs of $2.50 per month, $5 per month and $15 per month.

The following curve illustrates the results from our model.

[2] ACA Telecommunications Performance Report 2002-03 Table 7.1 "Number of broadband subscribers 2002 and 2003.

[C-I-C]

From this curve the economically viable changeover point can be deduced in terms of the number of Primus customers per exchange for which it would be more economical for Primus to use LSS rather than Flexstream.

The following table illustrates the number of Primus customers that would be economically changed over to LSS based on the number of Primus broadband customers connected at each Telstra Exchange by Telstra Flexstream ADSL as of 1 January 2004.

Cost of LSS per Month	Economic changeover point customers per exchange	Total number of Primus customers that could be economically changed over to LSS
$ 2.50	**[C-I-C]**	**[C-I-C]**
$ 5.00	**[C-I-C]**	**[C-I-C]**
$15.00	**[C-I-C]**	**[C-I-C]**

The above table also provides an indication of the total number of Primus customers that are above the economic changeover point for 3 different LSS monthly cost options and hence would be migrated onto LSS by Primus in order to obtain economic benefit.

If as calculated previously Primus enjoys about **[C-I-C]** of market share for ADSL customers and the model used for calculation of its economic changeover point is the same for all ADSL carriers and service providers in the market, then it can be seen that there will be an economic justification for a considerable number of customers to be moved from the existing Flexstream ADSL services to LSS.

On that basis we have calculated the total number of customers of all carriers and service providers that would fall into this category. The following table provides the results of this calculation.

Cost of LSS per Month	Economic changeover point customers per exchange	Total number of customers from all carriers
$ 2.50	**[C-I-C]**	**[C-I-C]**
$ 5.00	**[C-I-C]**	**[C-I-C]**
$15.00	**[C-I-C]**	**[C-I-C]**

It should be noted that in view of the fact that the numbers of ADSL customers used to derive these figures are based on the ACA's Telecommunications Performance Report 2002-03 for the total Australian market then they also include Telstra customers.

Currently Telstra BigPond has approximately 40% of the Internet market and the remainder is shared amongst a significant number of ISP's[3].

If it is assumed that Telstra does not use LSS for the provision of ADSL service to itself then the table above should be modified as follows to represent only those other ISP's and carriers that would acquire LSS to provide services to their customers.

Cost of LSS per Month	Number of LSS required by non Telstra ISP's
$2.50	**[C-I-C]**
$5.00	**[C-I-C]**
$15.00	**[C-I-C]**

Based on this analysis it can be seen that within a short period (possibly as short as 6 Months) after reaching agreement on the terms and conditions for LSS a substantial number of customers would be connected via LSS. At worst if it is assumed that the monthly cost of LSS is $15 then more than **[C-I-C]** customers might be churned to LSS. However we anticipate that the monthly charge will be much less and consequently the number of customers that will be churned from Telstra's Flexstream ADSL service in the short term will be many more possibly in the region of **[C-I-C]** to **[C-I-C]**.

[3] Telstra Media release of 18 July 2003 "BigPond ignites broadband growth".

3.2 Demand estimates based on independent research.

As indicated previously the ACA's Telecommunications Performance Report 2002-03 indicated that at the 30th June 2003 there were 193,500 ADSL services in use in Australia[4]. Since then Primus has seen an increase of about **[C-I-C]** (till beginning of January 2004) in the number of customers connected by ADSL to its network. If we use Primus as an indicator of the total market demand then it can be shown that the total number of ADSL services in Australia at the beginning of 2004 was approximately **[C-I-C]**.

In December 2002 the ACCC chairman Professor Allan Fels commented on the growth of broadband services in Australia in a press release. A portion of the press release is reproduced as follows:

ACCC Chairman, Professor Alan Fels, said yesterday that recent statistics were showing broadband take-up in Australia had risen 23 per cent in the July-September quarter, over the previous quarter, and that DSL take up had surged to within seven thousand connections of cable by September 2002.

By September 2002, DSL had almost surpassed cable as the pre-eminent broadband technology, with 151,300 DSL services connected – of which 128,100 were asymmetric digital subscriber line (ADSL) connections – compared to 158,200 cable services'.

Based on this press release, it can be seen there were approximately 310,000 non-ISDN broadband services in Australia in September 2002. Furthermore if we compare the ACA ADSL estimates with those in Professor Fels press release it can be seen that ADSL services grew by about 65,400 in 10 months.

In addition to these services according to Paul Budde there were approximately 9,000 broadband satellite services in Australia at the same time.

These figures were roughly in line with Paul Budde's estimates for the same year[5]. However, in addition Paul Budde has predicted that there will be substantial future growth in the Australian Broadband market.

The following table indicates Paul Budde's predicted demand for non-ISDN broadband services through to 2005.

Table 3-1 Paul Budde Predicted Demand For Non-ISDN Broadband Services 2000-2005

Years	Customers
2000	70k
2001	140k
2002	350k
2003	750k
2004	1.5m
2005	2.5m

[4] ACA Telecommunications Performance Report 2002-03 Table 7.1 "Number of broadband subscribers 2002 and 2003.

[5] Paul Budde. Telecommunications and Information Highways, Australia – Broadband Market Statistics and Forecasts 2003.

Telstra has also estimated in a recent press release (July 18 2003)[6] that 20% of households will be connected to the Internet by broadband in the Year 2006. If you assume that there are approximately 8 Million households then this represents about 1.6M Broadband services.

More recently Telstra has indicated publicly in a briefing paper to investors (18 July 2003) that it has a target of 1M Broadband services by 2005 which we assume will represent approximately 40% of the market.

These estimates are conservative when compared with other research organisations for example, Ovum have estimated that there will be 5 million services in Australia by 2005 and IDC have estimated that by the same year there will be 3.6 million DSL customers[7].

After 2005, we anticipate that the number of DSL customers will continue to grow but perhaps not at the same rate as predicted by Paul Budde prior to 2005.

This prediction is based on our observation that the uptake of computers in Australian households is slowing and so is the Internet connection rate. With approximately 8 million households in Australia we estimate the absolute upper limit of broadband connections would be of the order of 8 -10 million. However, as the unmet and future demand is met it is unlikely that this theoretical absolute maximum demand will be approached. In view of the range of assumptions around estimating future demand and in the interest of taking a very conservative approach we have chosen to use an estimate of the number of broadband services that will be required by 2010 of 4 million.

3.2.1 Satellite Broadband

We expect that the download cost of satellite services will limit the number to less than 50,000 by 2010. There are currently 9,000 in use and the greatest demand is coming from remote areas where cable access and suitable fixed line PSTN infrastructure capable of supporting ADSL services are not available.

3.2.2 Cable Modem

Paul Budde estimates that the maximum number of broadband services that will be provided by cable modem in Australia will grow from the current number of approximately 160,000 to 250,000. This is consistent with the fact that cable modems were an early source of broadband but their growth rate has slowed considerably when compared with DSL. For example in June 2001 there were 92,500 cable modems in the Australian market and 28,000 DSL services. By September 2002 the number of cable modems had grown by approximately 71% whilst DSL services had grown by 440%.

3.2.3 Optical Fibre and Wireless Broadband Services

In recent years we have seen some development of other broadband services derived from optical fibre or wireless bearers. However to date this development has been minimal and substantially based around new housing developments. In the future we expect the potential for optical fibre based services will grow substantially but not in the next couple of years; we anticipate that the major growth will occur after 2010.

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[6] Telstra Media release of 18 July 2003 “BigPond ignites broadband growth”.

[7] Reported by Paul Budde in section 5.3.4 of his report on the “Broadband Market Australia 2002/2003 1ST Edition.

As for wireless, broadband limitation in available spectrum will constrain growth. We have relied on estimates provided by Paul Budde and linear extrapolation to estimate broadband services, which might be provided over wireless, optical fibre and other mediums.

Based on Paul Budde's predictions, our assessment of future broadband services in Australia as indicated above and the ACCC press release we were able to develop the following table of estimated broadband demand.

Table 3-2 Future Estimated Broadband Demand

Year	2003 ('000)	2004 ('000)	2005 ('000)	2010 ('000)
Satellite Services	10	12	15	50
Cable Modems	160	180	200	250
Optical Fibre and Wireless	15	52	125	400
Total DSL services	565	1,256	2,160	3,300
Total No. of Broadband Services	750	1,500	2,500	4,000

3.2.4 Future ADSL demand

The preceding analysis provides some visibility of demand for broadband services however LSS is just one means of providing broadband and hence we need to further consider how these future broadband services might be delivered to assess future demand for LSS.

As previously indicated broadband will be substantially provided via satellite, cable modems, optical fibre and wireless technologies and DSL over copper cables.

DSL is the technology of interest when considering the demand for LSS because DSL broadband consists of a range of specific technologies; the majority of applications will in the near future be ADSL. For example as indicated previously by Professor Fels' press release, the number of ADSL connections in 2002 was 128,100 in a total of 151,300 DSL connections.

Hence ADSL represented about 85% of these DSL connections and DSL connections are approximately 75% of all broadband services.

We see no evidence to suggest that this ratio of ADSL services as a proportion of DSL services will change significantly in the near future and hence we have adopted this ratio in developing a view on the future demand for LSS.

Telstra provides a retail and wholesale ADSL service and other service providers could use either ULLS or LSS to provide ADSL broadband to their customers.

In the short term we anticipate that Telstra will provide most of the ADSL services but as access seekers reach agreement with Telstra on the the terms and conditions for LSS, and they develop their own products and invest in appropriate infrastructure we believe that LSS will become a major platform for ADSL broadband.

3.2.5 Impact of Telstra Market Share

In order to calculate the cost for Telstra to supply the LSS to the market we have to not only calculate the market size but also the share of the market which is not captured by Telstra.

In its undertaking, Telstra claims that less than 50 LSS are currently being supplied to the market. Furthermore the uptake of ULLS is small and the vast majority of ADSL services are being provided by Telstra on a retail basis to Telstra end user customers or a wholesale basis to other carriers and access seekers. However in the future as access to LSS and ULLS becomes both technically and commercially acceptable then Telstra's market share for the provision of ADSL services is expected to move toward the sort of market share split up which is experienced in the dial-up ISP services market.

As previously indicated Telstra BigPond currently has approximately 40% of the Internet market and the remainder is shared amongst a significant number of ISPs. As the broadband market starts to mature and ISPs start to provide their broadband services via the use of LSS, ULLS and other means rather than employ resale of Telstra's wholesale ADSL services we expect the demand for LSS to grow.

For the purpose of this model we have assumed that by the year 2010 the ADSL market will have become reasonably mature and at that time Telstra will provide approximately 50% of the ADSL services for their own purposes (BigPond) and as resale of Telstra's wholesale services for smaller ISPs. The remaining 50% will be provided by the other ISPs using LSS, ULLS, Cable, Satellite, Wireless, and other means. However between now and 2010 there will be a linear ramping up in the number of ADSL services provided by non Telstra ISPs. This is reflected in table 3.3 below.

3.2.6 Future demand for LSS

When access seekers reach agreement with Telstra on the terms and conditions for LSS and assuming other commercial and technical conditions are met they will have an option of using LSS or ULLS to provide ADSL broadband to their customers. If they choose ULLS, they will if current pricing parity continues into the future pay more for the service than LSS. However they will have the option of providing not only an ADSL service but also a voice service. Some access seekers may find this attractive because it provides a greater range of services however will involve considerable expenditure in provision of voice related equipment and support services. Other service providers will be primarily interested in focusing on data services and hence LSS will be the access service that they will choose to acquire from Telstra.

Based on the current market share split up for voice where Telstra provides approximately 85% of the services in Australia compared with data services where Telstra provides approximately 40% of the services we consider it to be reasonable to assume that the demand for LSS would be greater than that for ULLS. However in the interest of adopting a conservative approach we have assumed that in the future demand for LSS will be approximately equal to that for ULLS.

Based on this assumption we will for the purpose of this model assume that 50% of the ADSL broadband services in the future will be provided by the LSS an the remaining 50 % provided by ULLS.

Hence based on these assumptions we estimate the demand for non-Telstra LSS in Australia as follows:

Table 3-3 Estimate of Future Demand for LSS

Year	2003 (000)	2004 (000)	2005 (000)	2010 (000)
DSL service (From table 3.2)	580	1,256	2,160	3,300
ADSL service (85% of DSL)	493	1,068	1,836	2,805
Non Telstra ADSL (50% of total ADSL)	1	150	300	1,402
LSS	0	10	150	701

As can be seen from the preceding table our estimated demand for LSS is expected to grow from 40 in 2003 (actual installed) to around 700,000 over the next seven years.

3.3 Conclusion on future LSS demand

As can be seen from the discussion in section 3.1 above it would become commercially viable for a number of access seekers to migrate a significant number of non-Telstra customers who are currently utilising Telstra Flexstream ADSL services onto ADSL over LSS. We have estimated previously in section 3.1 that the total number of Telstra services that fall into this category might range from 7,400 to 29,000 depending on the cost of the LSS. We expect that this number of services will be taken up almost immediately after technical and commercial issues associated with LSS are sorted out and we estimate that this take up could occur in 2004 and 2005.

In addition we have indicated in section 3.3 above the demand for LSS over the next 7 years could be expected to grow from the current number of less than 50 to over 700,000 by 2010. The initial burst of growth in LSS is likely to be driven by Carriers and ISPs seeking to migrate from Telstra Flexstream ADSL to LSS in those exchanges where it becomes economically viable to do so.

For the purpose of comparing our estimates of future demand for LSS with those produced by Telstra we have produced the following table by extrapolating the estimated LSS growth as indicates above between 2005 and 2010.

Year	2002/03	2003/04	2004/05	2005/06	2006/07
Telstra's estimated demand for LSS	6	1,426	4,757	9,597	17,412
Gibson Quai estimated LSS demand	0	10,000	150,000	240,000	350,000

Table 3.4 – Comparison of estimated demand for future LSS services.

We note that even though the assumptions made by Gibson Quai in estimating the potential market for LSS are conservative the Telstra estimates are considerably smaller than ours.

We believe that this large difference is because Telstra by its own admission has extrapolated from the experience of the recent past. In our view the Telstra forecast by doing so assumes continuation of the adverse conditions that lead to that experience. In our opinion it would be entirely inappropriate to accept that the circumstances of the recent past would apply once the pricing and technical/ supply issues are resolved.

4. TELSTRA'S LINE SHARING COST MODEL

In order to form a view on each of the issues identified by the Commission in relation to whether Telstra's Line Sharing Cost Model is appropriate we need to compare the inputs and operation of the model against the pricing principles outlined by the ACCC in its December 2003 Discussion Paper. The following is an excerpt from that paper:

"The Commission will consider whether the prices are based on the efficient forward-looking costs of the undertaking service.

In determining whether terms and conditions are reasonable, the following matters must be considered:

- *Whether the terms and conditions promote the LTIE of carriage services or of services supplied by means of carriage services;*
- *The legitimate business interests of the carrier or carriage service provider concerned, and the carrier's or providers investment in facilities used to supply the declared service concerned;*
- *The interests of persons who have rights to use the declared services concerned;*
- *The direct costs of providing access to the declared service concerned;*
- *The operational and technical requirements necessary for the safe and reliable operation of a carriage service, a telecommunications network or a facility; and*
- *The economically efficient operation of a carriage service, a telecommunications network or a facility.*

The ACCC is not limited to these considerations.

Broadly the Commission's pricing principles can be characterised as cost-based, and reliant on the TSLRIC principle. The Commission's principles consider two types of cost relevant to the price of a LSS – incremental LSS specific cost and some allocation of the costs of a line over which a LSS is provided. The latter is eliminated as a consideration as the Commission takes the position Telstra already fully recovers these costs.

LSS specific costs are the costs the access provider incurs in wholesaling the service to an access seeker. The costs are similar in nature to ULLS-specific costs and include IT system development and operational costs, connection costs, wholesale management costs as well as indirect costs.

The Commission believes it would be inappropriate to include any allocation of line costs in the price of Telstra's LSS."

The following sections address each of the specific issues on which the Commission sought comment from of interested parties in relation to the Telstra LSS cost model.

4.1 Appropriateness of Telstra's Cost Model

"The Commission seeks the views of interested parties on the appropriateness of Telstra cost model for the purpose of calculating its claimed LSS-specific costs."

In order to form an opinion on whether the Telstra cost model is appropriate for the purpose of calculating Telstra's claimed LSS-specific costs we have examined the function and operation of the model and compared that with the Commission's pricing principles. We leave until later our opinion on the appropriateness of inputs to the model.

Gibson Quai's analysis of Telstra's Line Sharing model identified the fact that it is cost based. We also identified that Telstra has not attempted to include costs that could be attributed to the line over which the LSS is provided. The costs that are included are claimed by Telstra to be attributable to the IT system development, operational, connection and wholesale product management costs directly attributable to the LSS.

The Telstra model seeks to annualise the once off capital costs associated with the development of the IT systems over a five-year period. Operational expenditure and wholesale product management costs are used as inputs for each year and added to the annualised capital costs. The cost per service is calculated by a calculation which involves an assessment of the total annual cost to provide the service, divided by the average number of SIOs during that year and repeated for each year.

Gibson Quai is not expert on economic matters, however we have undertaken extensive TSLRIC modelling in collaboration with economists in the regulatory environment.

We have examined the operation of the model, and concluded that its operation, given appropriate inputs, calculates an annualised value for the capital investment in keeping with a tilted annuity formula that has historically been accepted by the ACCC.

Telstra has employed a method of levelising the results for a number of years to remove the worst effects of low numbers of SIO's to which costs can be allocated in the earlier years. Gibson Quai is of the opinion that the method used by Telstra is acceptable.

We therefore have formed the opinion that the model is functionally sound, and given appropriate inputs offers a reasonable basis for calculating the TSLRIC for LSS.

4.2 Appropriateness of Telstra's Methodology

"The Commission seeks the views of interested parties on the appropriateness of Telstra's methodology for the calculation of capital, operational and maintenance, and indirect costs."

In order to form a view in relation to whether the methodology employed by Telstra for the calculation of inputs to the model i.e. capital, operating and maintenance, and indirect costs is appropriate we need to compare the derivation of Telstra's costs with the abovementioned pricing principles.

The Commission in its Discussion Paper outlines how Telstra calculates the model inputs. Relevant excerpts of the ACCC's Discussion Paper are reproduced as follows:

Telstra's methodology for determining the undertaking price involves:[8]

- *The estimation of the capital expenditure required to provide the LSS comprising the costs associated with the development of software for network and front of house systems, which is initially allocated across time using the tilted annuity formula;*
- *The estimation of the O&M expenditure required to provide the LSS comprising of labour for front of house service operations and wholesale product management, which is initially allocated to the year in which the expenses are incurred;*
- *The application of indirect O&M percentages based on an internal 2001 study of indirect costs to estimate a contribution to indirect costs; and*
- *The unitisation of annual costs and the reallocation of costs across time with any unrecovered LSS specific costs being moved forward to be recovered in future periods with the allocation to any one period capped to avoid rate shock.*

We address each element of the Telstra methodology as follows:

4.2.1 Telstra's estimation of capital costs

For the purpose of formulating our opinion about the capital costs used by Telstra as an input to its model we pay particular attention to the ACCC's reference to "efficient forward looking cost". We take "efficient" to mean the lowest cost to generate an economically efficient outcome commensurate with the market requirements. The reference to "forward looking" costs is in our experience normally interpreted as costs that would apply in a "greenfield" environment and not requiring consideration of historical investments in plant and equipment.

Telstra claims:

"*The only direct capital expenditure included …..is the cost associated with the development of software for network and front of house systems*."

Also Telstra claims:

"*This cost is estimated from actual expenditure as this work was undertaken by contractors.*"

We understand this to mean Telstra is seeking to pass on the costs it incurred to update network and front of house systems it has currently in operation. We understand these to be systems associated with order taking, and network record keeping.

Telstra has used in its model a capital cost of **[C-I-C]** to update the software and record keeping systems associated with the provision of the LSS.

[8] ACCC Discussion Paper – Telstra's Undertaking for the Line Sharing Service

Telstra's record systems would need to identify that spectrum sharing was being deployed on a copper pair that would otherwise only be used for a retail or wholesale PSTN service. Secondly the record system would need to identify if the LSS was a Telstra retail service or a wholesale service and the carrier that is acquiring the service.

Conceivably there is potential that the need to record the necessary details of two services, where only one was required previously, and link these to the same copper pair, could have some serious ramifications for the system design. In these circumstances it may be that a fully integrated update to Telstra's record systems to cater for LSS may cost as much as **[C-I-C]**.

However we are of the opinion that it does appear to be an expensive modification in the circumstances. Telstra would have been aware LSS could reasonably have been required when they developed their record system for ULLS and hence should have made the necessary modifications at that time resulting in a lower cost to incorporate the requirements for LSS.

Further, at the time of the decision on the system development Telstra would have been aware of the effect of its proposed LSS pricing would have on demand. In our view a more prudent and efficient investment would reasonably have been a less expensive work around commensurate with the likely demand associated with the declaration of LSS.

Consideration of what would be an appropriate "forward looking" cost must, in our opinion, have regard to the costs that Telstra would incur for the redevelopment of new systems that would include the functionality to support LSS. We are of the opinion that subsequent redevelopment of the record systems would have these needs catered for at a fraction of the cost suggested by Telstra on this occasion as a retrofit.

For these reasons we are of the opinion that the capital costs proposed by Telstra are excessive being neither efficient nor forward looking. In our opinion the cost of including these functions in a new system development at a time when Telstra was upgrading its systems would cost 50% or less than the cost that would be incurred as a retrofit of an existing system.

4.2.2 Factors used in the treatment of capital costs

As indicated earlier Gibson Quai does not provide economic opinion however we have extensive experience associated with the calculation of inputs to TSLRIC models of telecommunications networks.

Telstra's model employs an inflation rate of **[C-I-C]**.

The WACC of **[C-I-C]** (post–tax vanilla) used by Telstra is addressed later in this paper. Based on experience with other similar models this WACC appears to be high.

Telstra employs a technology factor of **[C-I-C]** indicating the price increasing for development in future years.

For the purpose of forming our opinion on the appropriateness of these factors we have given consideration to the following references from the ACCC's Pricing Principles:

"In determining whether terms and conditions are reasonable, the following matters must be considered:

- *Whether the terms and conditions promote the LTIE of carriage services or of services supplied by means of carriage services;*

- *The legitimate business interests of the carrier or carriage service provider concerned, and the carrier's or providers investment in facilities used to supply the declared service concerned;*
- *The interests of persons who have rights to use the declared services concerned;*
- *The direct costs of providing access to the declared service concerned;*
- *The operational and technical requirements necessary for the safe and reliable operation of a carriage service, a telecommunications network or a facility; and*
- *The economically efficient operation of a carriage service, a telecommunications network or a facility."*

In summary the key aspects of these pricing principles that have a bearing on the above model inputs are that the model should consider the legitimate business interests of the investor to achieve a reasonable return, weighed against the long term interests of end users, which are normally characterised as lower costs, higher quality of service and greater choice.

Having regard to what is a reasonable return we have considered the values to be employed for the inflation rate, WACC and technology factor.

Gibson Quai notes that the inflation rate employed is at a level commonly accepted as prevailing today. We do not in the present circumstances dispute this figure.

Later in this paper we separately address the matter of whether the WACC employed by Telstra is appropriate. At this point we make the observation that a WACC of 9% employed in Telstra's model results in a relatively small variation to the annualised result of **[C-I-C]** to the monthly levelised cost per SIO calculated by Telstra.

The capital costs used by Telstra are claimed to be IT system development costs. The technology factor employed by Telstra should be consistent with costs it is experiencing in the market place for IT developments. We are aware from recent press reports that Telstra is forcing cost reductions on its IT suppliers. We note that the technology factor employed in the spreadsheet is expressed as **[C-I-C]**. However we identified that the formula is adjusted to reflect a value of **[C-I-C]** as a cost increase, which is as per Telstra's claimed value. Consequently we are satisfied that the operation of the spreadsheet in respect of Telstra's intended technology factor is correct. The effect of the inflation plus Telstra's technology factor is to tilt the annuity calculation to reduce the annualised costs in the earlier years with resulting higher costs in later years.

In our opinion Telstra is achieving cost reductions on its IT developments. A further consideration is that a future efficient redevelopment of their record systems is likely to result in significant reductions in the cost of making these facilities available.

Consequently the more likely scenario is that the technology factor should be in excess of **[C-I-C]** reflecting an actual cost reduction to Telstra after considering the combined impact of inflation and technology factors. The net result for the annuity stream would be either flat or a higher starting point and subsequent reductions in later years. These effects however have a relatively minor impact on the net result. For example using a **[C-I-C]** reduction in technology costs offsetting the effects of inflation increases the net result by **[C-I-C]**. Consequently Gibson Quai is of the opinion that further pursuing the value of the technology factor would not make a material change to the outcome.

A 5-year period is used to amortise the capital costs. This is normally acceptable for software systems however Telstra's record systems have undergone a constant evolution for a lengthy period of time and that situation is likely to continue for some considerable period. This has the effect of considerably extending the life of the investment on those systems. By way of example, **[C-I-C]**.

We are of the opinion that a period of 7 to 10 years is more appropriate for Telstra's operational systems. For the purpose of demonstrating the sensitivity of the model we examined the impact of assuming a 7-year period in Telstra's model. Using a 7-year period of amortisation resulted in a **[C-I-C]** reduction in the net annualised cost.

Based on our above review of the sensitivity of the Telstra's spreadsheet model to variations in the values selected for Asset Life, WACC, and Technology Factor we have formed the view that the most important factors to examine are the Asset Life followed by the value of the WACC. We examine suitable values later in this report, however we conclude that the use of an Asset Life of 7 years and a WACC of 9% would result in a calculated LSS cost of the order of **[C-I-C]** less than would be the case should Telstra's values be accepted.

4.2.3 Telstra's estimate of direct operational and maintenance costs

For the purpose of forming an opinion on whether the methodology employed by Telstra to calculate its operating and maintenance costs are appropriate we have considered whether the workload estimates and staffing costs are consistent with the abovementioned pricing principles. In particular we have considered whether the estimates assume "*efficient"* processes, and that only "*direct costs of providing access to the declared service*" are employed. We also give further consideration to whether the estimated costs are consistent with an "economically efficient operation".

Telstra indicated that direct operating and maintenance costs are comprised of two components being:

- Labour for front of house service operations;
- Wholesale product management.

Addressing firstly the front of house cost, Telstra indicated the front of house service operations expenses are limited to the labour costs associated with:

- Handling enquiries from access seekers;
- Processing orders for the LSS service; and
- Undertaking related tasks.

Telstra proposed an annual estimated cost per staff member of **[C-I-C]** and the number of staff required is estimated pro-rata on the basis of 11 connections per day increasing to 20 connections per day in 2006/7. However, we are of the opinion that the direct efficient employment costs for a person performing the functions described would be considerably less than that proposed by Telstra. In our opinion a gross employment cost of the order of $70,000 is reasonable.

Further, Telstra's statement indicates these costs are relevant to connections and not access charges. **[C-I-C]**

[C-I-C] Therefore we are of the opinion that these costs should be recovered from connection charges and should not be included in the assessment of access rental charges as the way they are formulated they have no bearing on the cost of maintaining the service.

In respect of wholesale product management costs, Telstra estimates the equivalent of one staff member will be required to undertake wholesale product management and sales tasks at an annual cost of **[C-I-C]**. In our opinion this is a gross over estimate of the resource required to manage a product such as this. In our experience the direct cost of employment for a capable person suitable for the task would be of the order of $120,000.

We are of the opinion that in the long term Telstra would devolve the management of this wholesale product management function to less skilled staff as the processes are bedded down. In our opinion a suitable gross employment cost for such a person for the longer term would be approximately $100,000 per annum.

We are of the further opinion that given the synergies, similarities and relationships between ULLS and LSS it is likely that Telstra would task a single person to undertake the wholesale product management for both products. This would have the effect of significantly reducing the costs attributable to both services. We are for these reasons of the opinion that Telstra's claimed wholesale product management costs are significantly over stated for the purpose of modelling efficient and forward looking costs for LSS.

In our opinion a reasonable employment cost for a suitable person in the early stages of the product introduction is $120,000 reducing to $50,000 when the task settles down in the longer term and can be undertaken along with other products. Consequently, our opinion is that an efficient forward-looking cost would be $50,000.

4.2.4 Telstra's estimate of indirect O&M costs

In order to form a view about whether the factors employed by Telstra to mark-up direct operations and maintenance costs are appropriate we consider whether they would apply to an "economically efficient carriage service business". Telstra has assumed it is an efficient operator and we note that Telstra claims that the factors that it used in the model have been derived from its own costs. Gibson Quai rejects the notion that Telstra's costs are those of an efficient forward-looking operation. Gibson Quai is of the opinion that international benchmarks are appropriate for this purpose.

4.3 Appropriateness of Telstra's proposed LSS Access Charge

"The Commission seeks the views of interested parties on the appropriateness of Telstra proposed LSS access charge only comprising the incremental or LSS-specific costs of providing the LSS to access seekers."

In order for us to form an opinion on the appropriateness of the proposed LSS access charge only comprising the incremental costs associated with the provision of LSS to access seekers Gibson Quai has had regard to the long-term interests of end-users ("**LTIE**") with particular consideration of the "*encouragement of the economically efficient use of, and investment in telecommunications infrastructure*".

As the LSS supports the separate supply of two services (PSTN and ADSL) to a customer's premises on a single copper pair Gibson Quai is of the opinion that extensive use of LSS is an efficient use of Telstra's access network because it would allow the provision of broadband and telephony services over the same line and consequently should be encouraged for the purpose of achieving more efficient use of Telstra's copper CAN.

In respect of whether the access charge should only comprise the incremental costs of providing the service we observe Telstra's "*legitimate business interests"* in obtaining adequate recompense for its investment in the copper pair is served via its returns from the PSTN service that is a precondition for the customer being able to have both a PSTN and ADSL service on the single copper pair. Gibson Quai is of the opinion that no further cost recovery for the line should therefore be attributable to the LSS charge.

We are of the further opinion that maintaining the LSS access charge as low as possible will make a significant contribution to stimulating "*competition in markets for telecommunications services".* In our opinion a low LSS access charge will encourage firms to invest in the competitive provision of ADSL services. Firms will also have the appropriate incentives to produce services at the least cost.

4.4 Model Sensitivity to SIO

[C-I-C]

[C-I-C]

4.5 Conclusion

Having given consideration to the above findings we have identified that the number of SIOs used in Telstra's cost model is the most significant input in terms of its impact on the calculated access charge for LSS. In our opinion the current market for LSS is seriously constrained due to several factors associated with it being in the early phase of its introduction. These factors being the lack of a suitable agreed price for access rental and other terms such as connection charges, and also the lack of supply of splitters that meet Telstra's chosen standard.

We are of the further opinion that the price that is set will have a significant bearing on its attractiveness to competing carriers seeking to invest and therefore will have consequences for the rate of take up. In our view, to ensure access seekers can enjoy comparable benefits to Telstra in respect of its ability to deploy ADSL services, a strategic view should be taken in respect to setting the price for LSS at a level that will ensure high levels of take up.

Based on our analysis of the potential market size and the economic break even point at which a competitive ISP would seek to invest in its own assets to utilise LSS we are of the opinion that setting a monthly access rental charge of approximately $2.00 will significantly stimulate the interest of competitive carriers and their ability to offer a commercially viable ADSL broadband service using LSS, particularly to residential customers. We are of the opinion that priced at this level Telstra would receive adequate recompense over time to obtain sufficient return on its investment. Also given the effects of considering further years beyond 2005-2006 we are of the opinion the monthly access charge can be further reduced in later years.

Gibson Quai is of the opinion that to ensure efficient use of Telstra's access infrastructure and to encourage the development of a competitive market in broadband services it is in the long term interest of end users, and also in the interest of ensuring an efficient allocation of resources, to set a LSS access charge at approximately $2.00 per month.

5. GIBSON QUAI LSS COST MODEL

"The Commission seeks interested parties' views on how Telstra's proposed price meets each of the reasonableness criteria under Section 152AH of the Act. Does the proposed LSS access charge promote competitive neutrality with regard to an efficient access seekers' ability to compete with Telstra in dependent downstream markets?

The Commission seeks comment on the appropriate pricing principles relevant to assessing Telstra's pricing proposal.

The Commission seeks the views of interested parties on the appropriateness of using TSLRIC to calculate the efficient costs of supplying the LSS access service."

In order to test the cost of LSS as proposed by Telstra in their undertaking we have independently developed a cost model to calculate the cost of the LSS. Our model is based on the ACCC pricing principles and is similar to the Telstra model in many respects. However, we consider that an alternative model based on the same pricing principles, which produces different results, should be of interest to the ACCC in its consideration of Telstra's undertaking.

The following sections describe the Gibson Quai LSS cost model.

5.1 ACCC Pricing Principles

5.1.1 Introduction

In accordance with Section 152AQA of the Trade Practices Act the ACCC is required to determine principles relating to the price of access to a declared service.

In the case of LSS the ACCC published the pricing principles that it considers to be appropriate in its final decision on the declaration of that service.

The ACCC did not however provide an indication of what it considered the price for the service should be except to say that it could be as low as $2.50 per month.

In respect to this paper and the price modelling undertaken by Gibson Quai we have adopted pricing principles as set out by the ACCC in its final decision on the declaration of the LSS.

5.1.2 Legislative Criteria

When the ACCC is required to assess the terms and conditions for the supply of the LSS it must consider whether those terms and conditions are reasonable. In doing so it must have regard for the following matters:

- Whether the terms and conditions promote the LTIE of carriage services or of services supplied using carriage services e.g. LSS, this involves consideration of the following objectives:
    - promoting competition in markets for telecommunications services;
    - achieving any-to-any connectivity in relation to carriage services that involve communication between end users; and
    - encouraging the economically efficient use of, and the economically efficient investment in, the infrastructure by which telecommunications services are supplied.[9]

[9] Sub-section 152AB(2) of the Act.

- The legitimate business interests of the carrier or carriage service provider concerned, and the carrier's or providers investment in facilities used to supply the declared service concerned;
- The interests of persons who have rights to use the declared service concerned;
- The direct costs of providing access to the declared service concerned;
- The operational and technical requirements necessary for the safe and reliable operation of a carriage service, a telecommunications network or a facility; and
- The economically efficient operation of a carriage service, a telecommunications network or a facility[10].

These matters do not, by implication, limit the matters to which regard must be had.[11]

5.1.3 Generic Form of the Pricing Principles

In determining the pricing principles for LSS the ACCC considered that from a technical perspective the ULLS is the service most closely related to the LSS. In fact, some respondents to the related ACCC discussion paper made the observation that LSS is an element or spectral portion of the full ULLS. Hence the ACCC concluded that in determining the pricing principles for LSS it should consider the pricing principles, which were recommended for ULLS.

This led the ACCC to conclude that similar to ULLS the Total Service Long Run Incremental Cost (TSLRIC) pricing methodology is most appropriate for LSS.

TSLRIC is a cost based methodology, which calculates the cost of providing the specific service[12].

TSLRIC is the incremental or additional costs the firm incurs in the long term in providing the service, assuming all of its other production activities remain unchanged. It is the cost the firm would avoid in the long term if it ceased to provide the service. As such, TSLRIC represents the costs the firm necessarily incurs in providing the service and captures the value of society's resources used in its production.

TSLRIC consists of the operating and maintenance costs the firm incurs in providing the service, as well as a normal commercial return on capital. TSLRIC also includes common costs that are causally related to the access service. Some of the measurement issues that must be addressed, in implementing TSLRIC, include the inclusion and allocation of common costs.

TSLRIC is based on forward-looking costs. These are the ongoing costs of providing the service in the future using the most efficient means possible and commercially available. In practice this often means basing costs on the best-in-use technology and production practices and valuing inputs using current prices.

An access price based on TSLRIC is consistent with the price that would prevail if the access provider faced effective competition, and usually best promotes the long-term interests of end-users.

[10] Sub-section 152AH(1) of the Act.

[11] Sub-section 152AH(2) of the Act.

[12] ACCC, *Access Pricing Principles – Telecommunications, aguide*, July 1997.

These are the principles that are recommended by the ACCC for the calculation of the cost of providing a telecommunications service and hence they have been applied by Gibson Quai in determining the cost of providing the LSS.

5.1.4 Application of TSLRIC to LSS

In its final decision on the declaration of LSS the ACCC states that the price of the LSS should be made up of two components.

1. The incremental (or LSS specific) costs of providing LSS, and
2. The cost of a line over which LSS is provided.

The ACCC also states that this pricing principle is consistent with the approach adopted by it in setting the pricing principles for ULLS.

The ACCC concludes that to the extent that the access provider recovers all of its line-related costs from other revenue sources then the ACCC believes that it would be inappropriate for the access provider to recover an additional amount of its line cost in the price of a LSS.

Furthermore, in its final decision on LSS the ACCC indicates that it considers that Telstra recovers its line related costs through other revenue sources and hence it would be inappropriate to include any allocation of line costs in the LSS. It does say however, that if Telstra were to alter its pricing structure such that not all of its line related costs were recovered through other revenue sources then it would consider that it may be appropriate for the cost of LSS to contribute to line costs.

However, in view of the fact the ACCC is obviously satisfied that Telstra recovers all of its line costs through revenues from other sources, it has concluded that the price of Telstra's LSS should be equal to its LSS specific costs.

Gibson Quai has relied on this important conclusion in our assessment of the cost of provision of LSS.

In order, to determine the TSLRIC of LSS Gibson Quai has formed a view on each of the following contributing LSS specific costs:

a. Operating costs including operation and maintenance of all relevant network elements
b. LSS specific costs such as IT system and management costs.
c. Annualised Capital costs, which include all capital expenditure, related to the provision of the LSS converted to an annual cost through the application of a weighted average cost of capital multiplier and estimated life of each capital item.

The development of these specific costs is further discussed in the following sections.

5.2 Incremental or LSS Specific Costs.

According to the ACCC, LSS is effectively a spectral portion of the full ULLS. In view of this we have followed the same approach adopted by the ACCC in relation to its cost model of the incremental costs of ULLS and applied the relevant parts to development of the TSLRIC of LSS.

For the purpose of applying TSLRIC to LSS we have relied on the following definition, which was produced by the ACCC in its final decision on the declaration of ULLS:

'*The TSLRIC of supplying a service can also be expressed as the sum of operating and maintenance costs, and the capital costs that the firm incurs in providing the service, including the labour and materials costs that are causally related to the provision of the service. Capital costs comprise the cost of capital (i.e. the opportunity cost of debt and equity used to finance the firm) and depreciation (i.e. the decline in economic value of assets) of capital that is specific to the production of the service'.*

From this we can see that the assessment of TSLRIC of LSS will require the assessment of the following contributing costs:

5.2.1 Operating and Maintenance Costs

In view of the fact that the ACCC has formed the view that Telstra is already recovering its line related costs through other sources, any operating and maintenance costs as applied to the LSS would be attributable to the specific provision of the LSS. Another way of considering this matter is to estimate the total reduction in operating and maintenance costs that Telstra would incur if LSS were not supplied.

Based on Gibson Quai's experience we estimate that operating and maintenance costs for the LSS would be made up of the following related items:

- LSS fault resolution and related maintenance activities
- IT system management costs
- Operation of the IT reporting system
- Record keeping
- Billing operations
- Bad debt provision/recovery
- Indirect or overhead costs

5.2.2 Annualised Capital Costs

Similar to the operating costs the capital costs associated with the LSS are only those costs specifically associated with the provision of the service. The capital costs associated with the line over which the LSS service is provided, are fully recovered through other services, which are provided over the same line. Hence the capital costs can be broken down into the following categories:

a. Service specific charges, which include installation charges like jumpering, record preparation, billing system entry and line testing.

b. System costs, which include all costs, associated with the establishment of the IT and billing systems, which are required to manage the provision of the LSS. In order to convert these system costs to a suitable annualised per service cost it is necessary to estimate the demand for the service, the asset life, weighted average cost of capital and the future price trend for all of the assets involved.

c. Other service specific capital costs like MDF and link cables. These should be dealt with in a similar manner to (b) above.

d. Indirect costs associated with capital expenditure and operating and maintenance.

5.3 Analysis of LSS Specific Costs

To assist with the development of a cost for LSS, which is based on the pricing principles discussed in the preceding chapters Gibson Quai, has developed a spreadsheet-based model to calculate the cost of LSS. Printouts of the model input, output and calculation sheets are included in Appendix A.

This chapter discusses the analysis and assumptions associated with the development of specific input variables, which will feed into the LSS cost model.

5.3.1 LSS Cost Model

The annualised cost of providing the LSS has been calculated from the sum of the annual operating costs including related indirect costs and the annual return on capital investment including related indirect costs.

The annual return on invested capital has been calculated based on the following formula developed by The Allen Consulting Group in its report to the ACA on the Year 1 Cost Problem[13]

$$A_t = \frac{100 * (WACC - INF + TECH) * (1 + INF - TECH)^{T-1}}{(1 - (1 + INF - TECH)^n / (1 + WACC)^n)}$$

Where:

A_t	=	The Annualised return on a Capital Investment
WACC	=	Weighted Average Cost of Capital
INF	=	Inflation
TECH	=	Tech Factor
n	=	Life of the Capital Investment
T	=	the year of operation (T = 1 in the application for the calculation of the LSS)

5.3.2 Input Data Variables

The following input variables are used in the model.

- WACC
- Inflation
- Tech Factor
- Indirect Costs
- Demand for LSS

These are further discussed in the following sections.

WACC

"The Commission seeks the views of interested parties on the appropriateness of the WACC (including WACC parameters) used by Telstra for the calculation of LSS-specific costs".

[13] Final Report to the Australian Communications Authority'. The Year 1 Cost Problem Application to the USO and Proposed Solution. 29th April 1999.

There is considerable debate in the telecommunications industry relating to what may be an appropriate WACC. In view of this debate, coupled with the fact that Gibson Quai is not qualified to provide economic opinion, we have relied on previous analyses undertaken by the ACCC in relation to this matter. In their report on the assessment of Telstra's PSTN undertakings[14] the ACCC formed a view that a reasonable WACC, which should be applied to Telstra, would be 9.71%. We note that this WACC was based on analysis, which was undertaken in June 2000.

The major contributing component to the WACC, which has changed since the ACCC Report (July 2000), is the ten (10) year government bond rate. We note that for the purpose of their report the ACCC used 6.4%. By comparison the current (April 2004) ten (10) year bond rate is about 5.8%.

We have not recalculated the WACC using the current ten (10) year bond rate because to make the calculation rigorous there are a number of other input variables that should be reassessed by someone with economic expertise.

However, assuming the impact of the reduced 10-year government bond rate on the WACC it would in our opinion be safe to assume that the current WACC is less than that used by the ACCC previously. However for the purpose of our calculation we have chosen to utilise the same WACC as that used by the ACCC previously ie 9.71%.

For the purpose of calculation of the inflation we have considered the Australian Bureau of Statistics weighted average consumer price index (CPI) for all capital cities for the four preceding years as follows:

Table 5-1 Australian CPI for the Years 1999-2003

Year	CPI
1999-2000	2.4%
2000-2001	6.0%
2001-2002	2.9%
2002-2003	3.1%

If we ignore the impact of the introduction of GST in the 2000-2001 year it can be shown that the CPI has been running at between 2.4% and 3.1% hence for the purpose of this calculation we have chosen to use a CPI of 2.8% because it is the average of the three relevant years and it is comparable with the inflation figures used by the ACCC in the assessment of Telstra's PSTN undertaking[15] as follows:

Table 5-2 ACCC Inflation Figures Used For Assessment Of The PSTN Undertaking

Year	Lower Bound	Upper Bound
1999-2000	2%	3.2%
2000-2001	2%	2.5%

[14] ACCC Report on the Assessment of Telstra's Undertaking for the Domestic PSTN Originating and Terminating Access Services July 2000. (Appendices 4).

[15] ACCC – A Report on the Assessment of Telstra's Undertaking for the Domestic PSTN Originating and Terminating Access.

Tech Factor

The tech factor is a number which relates to the increase or decrease in the price of technology over time. A negative tech factor will mean that the price of a piece of technology is expected to increase next year and a positive tech factor suggests that the price can be expected to decrease next year. The combination of the tech factor and the anticipated inflation can provide some indication of the future cost of infrastructure which is used in the tilted annuity calculation as discussed above.

The tech factor can be expected to vary according to the type of equipment that it is applied to, for example, in recent years the cost of computer hardware has decreased and hence it can be expected to have a positive tech factor whilst other capital items which might be labour intensive like trenching can be expected to be linked to the escalating cost of labour and hence might have a negative tech factor.

The following table provides our assessment of relevant tech factors that have been applied to the various capital items, which form part of the LSS.

In forming a view on the relevant tech factors we have relied on assessment of the tech factors, which have recently been developed by the ACCC, N/e/r/a, and Gibson Quai for the ACA.

These tech factors are also included in the following table:

Table 5-3 Recent Tech Factors

Capital Item	N/e/r/a[16]	ACCC/Telstra[17]	Gibson Quai
MDF	-3	-3	-2 Note 1
Cable	0	N/A	0 Note 1
IT Systems	N/A	N/A	2

Note 1
Since MDF and link cables are combined into a single cost item we have assumed an average tech factor of –1.

Indirect Costs

These costs are also often referred to as common costs and can be defined as those costs which are incurred by the company in running the business but cannot be directly linked to specific items of equipment or provision of specific services.

Typical examples of common costs are the company's headquarters and the CEO's salary.

These are normally handled in the calculation of the TSLRIC of a particular service by some level of mark up of the cost of capital investments or annual operations and maintenance costs.

N/e/r/a/ has performed a calculation to determine indirect capital costs as a percentage of direct network capital costs and direct network operating costs[18].

[16] ACCC – A Report on the Assessment of Telstra's Undertaking for the Domestic PSTN Originating and Terminating Access. (Table B.1)
[17] ACCC – A Report on the Assessment of Telstra's Undertaking for the Domestic PSTN Originating and Terminating Access. (Table B.1)

N/e/r/a found that the indirect costs expressed, as a percentage of network capital costs was 4.8% - 5.4%.

And it found that the indirect costs expressed as a percentage of operating and maintenance costs was 24.8% - 43.5%.

Hence for the purpose of this analysis we propose to rely on the results obtained by N/e/r/a and use 5.1% for indirect costs associated with capital, and 34.2% for indirect costs associated with operating and maintenance costs because they are the mathematical average of the ranges proposed by N/e/r/a.

5.3.3 Capital Costs

Apart from the line costs, which as discussed in Section 5.1.4 have been fully recovered through charges for other services, there is some specific capital expenditure, which would be required by Telstra in order to supply the LSS.

This capital expenditure includes the development of suitable IT systems and possibly some additional MDF and exchange cabling systems.

IT Systems

We have formed a view on the IT costs through consideration of several perspectives. However the most important consideration has been Telstra's claim that they have invested **[C-I-C]** in system upgrades for LSS. We concluded that given the Telstra forecast, the expenditure was not an efficient use of its capital. However, given Gibson Quai's forecast, we take the view that an investment of **[C-I-C]** is not unreasonable, therefore, we have used Telstra's figure as the capital cost of the IT development in our model.

In forming a view on the quantum of the operating and maintenance costs and asset life for the IT systems we have relied on work done by the ACCC and its consultants when it developed an access cost for ULLS.

We have used this analysis because in our opinion the operating and maintenance costs and asset life for the IT systems required for ULLS and LSS should be the same or very similar.

In forming its view on ULLS costs the ACCC relied on work undertaken by its consultants, the Communications and Media Policy Institute, University of Canberra and AAS Consulting Pty Ltd (CMPI). These consultants prepared a report[19], which estimates (Table 5) the maximum five year demand for ULLS to be 400,000 services.

Table 6 of the CMPI report provides some visibility of the ULLS specific costs.

[18] Estimating the Long Run Incremental Cost of PSTN Access – Final Report for ACCC January 1999 - Reference Table B.1 and B.2.

[19] Review of Telstra's ULLS – Specific Costs (Draft Report).

Table 5-4 Results – Once-Off Charge (per service) [*Table 6 of the CMPI Report]*

Cost Element	Capital Charge $	O&M Cost $	Once Off Costs
ULLS specific costs			
Wholesale Management		3.32	3.32
System Costs	22.06	11.14	33.20
ULL Connection Group		7.83	7.83
Indirect Costs		2.14	2.14
Total	22.06	24.43	46.49

Furthermore we can use the results of Table 7 of CMPI report to form a view about the operating and maintenance costs associated with each service.

This data tells us that the operating and maintenance costs associated with the IT systems might be as high as $15.94 per LSS per annum (see Table 8 of the CMPI report). However, this figure is based on the assumption that the IT system is required to support 400,000 ULLS per year. In the case of LSS we have estimated an average number of services of approximately 350,000 and hence the operating and maintenance costs are calculated as follows:

$$\frac{400{,}000}{350{,}000} \text{ X } \$15.94 = \$18.22 \text{ per LSS per year}$$

In relation to asset life we note that N/e/r/a[20] generally attributes asset life of nine and 10 years to network equipment, which has a significant IT component e.g. core network management centre nine years, signal transfer point nine years, LAS processor 10 years, TS processor 10 years etc.

We also note that the ACCC has accepted Telstra's proposition that the IT systems associated with ULLS should have an asset life of five years. In reality as the CMPI consultants point out system development would be ongoing.

Gibson Quai believes that an appropriate asset life for LSS is somewhere between the five years as proposed by Telstra for ULLS and the IT equipment life as proposed by N/e/r/a hence for this model we have chosen seven (7) years.

MDF and Link Cables

The provision of LSS will require Telstra to provide additional termination blocks on the Main Distribution Frames (MDF) and a link cable between the MDF equipment and the access seeker equipment, located in the Telstra Exchange.

We have examined a Facilities Access Agreement between Telstra and a Carrier and have formed the view that the charges that Telstra levies on access seekers that acquire TEBA space in accordance with the Facilities Access Agreement fully recompense Telstra for any costs associated with expenditure associated with upgrades to the MDF and provision of link cables. Hence we have not included any costs associated with these in our LSS cost model.

[20] A Report on the Assessment of Telstra's Undertaking for the Domestic PSTN Originating and Termination Access Services, July 2000.

5.4 Model Inputs to the Gibson Quai LSS Cost Model

The preceding sections deal with the development of a range of data variables which form inputs to the Gibson Quai LSS model.

The following table summarises all of the inputs as discussed.

Table 5-5 Results – Input Data variables for the Gibson Quai LSS cost model

Input Data Variables	Value
WACC	9.71%
Inflation	2.8%
Indirect costs as a % of capital costs	5.1%
Average number of services	350,000
Indirect costs as a % of O&M costs	34.2%
Tech Factor IT systems	2%
Capital costs for IT systems	**[C-I-C]**
Annual O&M costs for IT systems	$18.22
IT system life	7 Years

5.5 Model Results

The application of the inputs as described above to the TSLRIC LSS cost model developed by Gibson Quai resulted in a levelised cost per SIO of $2.19 per month. Details of this model are provided on the spreadsheet worksheet, which are included in Appendix C.

6. CONNECTION AND DISCONNECTION COSTS FOR LSS AND ULLS

C-I-C

C-I-C

C-I-C

7. CONCLUSION

"The Commission seeks the views of interested parties on the issue of whether there is any commonality in the efficient provision of the LSS and Unconditioned local loop service (ULLS) to access seekers, and any implications this commonality may have for the calculation of efficient LSS-specific costs."

"The Commission seeks the views of interested parties on the appropriateness of Telstra proposed LSS access charge relative to the ULLS access prices that the Telstra has proposed in context of its core services undertakings."

The preceding analysis comments in some areas on the technical aspects and inputs used by Telstra in the LSS cost model used to justify their undertaking. In addition Gibson Quai has independently developed alternative inputs to the Telstra LSS cost model, which we believe are more appropriate than the ones proposed by Telstra. Furthermore in order to test the outcome from the Telstra LSS cost model we have developed our own TSLRIC LSS cost model and associated input parameters which are based on the ACCC pricing principals.

The following sections compare the two alternative models.

7.1 Telstra's Model with Gibson Quai Recommended Inputs

We have taken Telstra's LSS cost model and modified the inputs as follows:

Table 7.1 – Comparison of inputs to the Telstra LSS cost model.

Year	2002/03	2003/04	2004/05	2005/06	2006/07
Telstra's estimated demand for LSS	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**
Gibson Quai estimated LSS demand	0	10,000	150,000	240,000	350,000
Telstra's estimated product manager costs	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**
Gibson Quai estimated product manager costs	$120,000	$120,000	$120,000	$50,000	$50,000
Telstra's estimated front of house staff costs	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**	**[C-I-C]**
Gibson Quai estimated front of house staff costs[21]	$70,000	$70,000	$70,000	$70,000	$70,000

[21] Gibson Quai is of the opinion this cost should not be included in the access charge as it is relevant the connection. We have included it in our consideration of rental costs.

[C-I-C]

The work sheets associated with this model are provided in Appendix B.

7.2 Gibson Quai Model

We ran the Gibson Quai TSLRIC LSS model with the inputs as indicated in Table 5.5, which resulted in the calculation of the levelised cost per SIO of $2.19 per month.

The work sheets associated with this model are provided in Appendix C.

7.3 Conclusions

We have examined Telstra's LSS undertaking and associated cost model and have found some areas where we are concerned that the terms and conditions and in particular the proposed cost of the service is unjustified and excessive. We have identified major areas of concern and derived alternative input variables based on our own research and analysis. These alternative input variables have been applied to Telstra's TSLRIC model and a levelised cost per SIO of **[C-I-C]** per month was obtained (**[C-I-C]** per month using Gibson Quai's preferred WACC and Asset Life).

We then developed a similar TSLRIC model based on the same pricing principles as used by Telstra and separately developed a set of input variables which are largely derived from alternative data and assumptions. These alternative input variables were fed into our model and a levelised cost per SIO of $2.19 per month was calculated.

Based on our analysis and reasoned assumptions we find that the terms and conditions and in particular the price for the declared LSS as proposed by Telstra in its undertaking is excessive and unreasonable. We therefore recommend that the ACCC reject Telstra's undertaking.

In our opinion, a reasonable monthly access rental charge for LSS is approximately $2.00 in the short term. We are of the further view the price should be reduced to approximately $1.50 in the 2006/07 period.

APPENDIX A
MODEL OF ECONOMIC PAYBACK FROM FLEXSTREAM ADSL TO LSS

LSS

[C-I-C]

FLEXSTREAM COSTS

[C-I-C]

SUMMARISED COSTS

[C-I-C]

APPENDIX B
TELSTRA LSS COST MODEL WITH MODIFIED INPUTS

[C-I-C]

[C-I-C]

[C-I-C]

APPENDIX C
GIBSON QUAI LSS COST MODEL

[C-I-C]

[C-I-C]

[C-I-C]