Goldilocks pricing for broadband

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Abstract:
Billions of dollars will be required to build a fibre-to-the-node (FTTN) network. This will require prices high enough to justify the investment but low enough to make services affordable to end-users. This is the quest for Goldilocks prices.

The focus of this paper is on regulated access prices because the current access pricing regime is clearly broken. A number of possible solutions for the FTTN are examined.

1   Introduction

The government has promised up to $4.7bn to ensure that a national broadband network providing at least 12Mbps to 98 percent of the population is achieved. It has also promised to look at any legislative changes that are deemed necessary to assure the roll-out. Australians have been promised that work on a fibre-to-the-node (FTTN) network will start before Christmas.

Whoever builds the FTTN, the key issue will be wholesale pricing of bitstream access[i] and its impact on affordable broadband access and competition. Just as Goldilock's porridge had to be neither too hot nor too cold, access pricing for the FTTN has to be just right. This is tricky because it has to satisfy a number of objectives simultaneously:

1. It must provide a return on a multi-billion dollar investment
2. It must ensure that broadband access remains affordable to end users
3. It must provide affordable open access for wholesale customers
4. It must not foreclose alternative access investment; including FTTH extensions
5. It must satisfy government social equity objectives (eg USO and uniform pricing)

We start by noting that regulators believe that the current access pricing regime, TSLRIC+, is broken; at least for FTTN investments. Then we consider other pricing models and solutions that meet the five desiderata set out above.

2   TSLRIC+

The ACCC's current paradigm for regulated access pricing is total service long run incremental cost plus a contribution to fixed costs (TSLRIC+)[ii]. In the UK, Ofcom says that while,

> *"This approach is suitable to current generation access networks as they are legacy networks with low demand side risk and substantial sunk costs that have already generated a return on the initial investment.*
>
> *"This approach may be less appropriate for next generation access networks. So far, these networks are characterised by high uncertainty about consumer demand and willingness to pay, with limited clarity on the applications and services they will deliver. In this situation, investors in a free market would seek higher returns from their investment to compensate for the higher degree of risk."* [Ofcom, 2007, paras 5.2 and 5.3]

This willingness to drop TSLRIC+ for the FTTN is shared by our own regulator. The ACCC suggests it is flexible about what access pricing it would approve in relation to FTTN pricing:

> *"In the ACCC's view, the appropriateness of TSLRIC+ as a cost-based pricing methodology depends on a combination of factors…… there is no reason to rule out proposals for different pricing approaches, especially for new networks where efficient and prudently incurred actual costs can be known.*
>
> *"The APP* [Access Pricing Principles] *guide recognises in the introduction that the pricing principles, pricing guides and specific cost-based methodology is not static and that access pricing in telecommunications services is a developing issue. Further, the special access undertaking* [SAU] *provisions of the TPA allow potential investors to propose other approaches. The ACCC is required to assess whether the terms and conditions proposed are reasonable not whether they are optimal or the 'most reasonable' terms and conditions. Nor could the ACCC refuse to accept an SAU which had reasonable terms and conditions on the grounds that it preferred some other access arrangement."* [ACCC, 2007, p85]

In fact, Telstra and the ACCC came close to agreeing the terms for a metro-only FTTN using TSLRIC+. The show-stopper was disagreement over the cross-subsidy that should added into the access price for a metro-only network. The ACCC and Telstra sought $1.77 and $13.69 per month respectively as the contribution to the 1 million rural and remote customers in Band 4[iii].

We are now looking at a national broadband network rather than a metro-only broadband network so the ACCC will have to change its view. This is not just to suit Telstra. Art Price, the CEO of Canada's Axia NetMedia Corporation which was involved in the Alberta SuperNet and which is bidding for Singapore's open access network, says,

> *"you have to do* [broadband access] *on a nationwide basis so you get some critical mass so you have the low cost parts offset the high cost parts"* [Art Price quoted in Communications Day, 13 March 2008]

The ACCC does not yet accept that both access prices and retail prices must be averaged or both de-averaged geographically. Since the bi-partisan policy of governments has been

retail averaging, Telstra argues that the ACCC is a "rogue regulator" in not also applying averaging to the unbundled local loop access price. The Australian Competition Tribunal did not settle this issue[iv] so the best option left is to have Ministerial Direction to the ACCC clarifying policy.

There are many critics of TSLRIC+ even in the non-FTTN environment, but let us focus on regulators' willingness to consider alternative access pricing for the FTTN.

3   TSLRIC+ plus an adjustment for uncertainty

If TSLRIC+ does not take account of uncertainty, one option is to try and rehabilitate it by allowing for an uncertainty premium in the weighted average cost of capital (WACC) which is used to calculate TSLRIC+. The rationale for the adjustment comes from real options theory which says an increase in the cost of capital is appropriate when,

> a.   There is an option to wait and see (ie investments are not "now or never")
> b.   Net returns are uncertain (eg due to demand uncertainty); and
> c.   Investments are irreversible (ie investments cannot be redeployed)

All of these clearly apply to investment in the FTTN and Telstra has reserved an option on a real options adjustment in its submissions to the ACCC without specifying a value. However, Telstra's position seems confused. In the negotiations with the ACCC over its metro-only FTTN,

> *"Telstra's starting point was 11.02 WACC. We agreed to reduce that as part of the discussions down to 10.32"* [Tony Warren in Q&A at FTTN Briefing on 7 August 2006]

But, more recently it has claimed,

> *"We need a return north of 18 percent because that is our average return on other investments. You don't earn a low rate of return on a high-risk project"* [Dr Phil Burgess quoted in The Weekend Australian, 22 March 2008]

A consistent approach would be based on real options. But, it is a difficult and complex task to estimate the real option adjustment to the WACC. Worse, it is likely to make both retail and wholesale prices higher.

4   Access holiday

Ofcom explains why access price regulation chills investment in the FTTN using Figure 1 below. It says

> *" a straight-forward application of the standard cost plus pricing approach may result in lower incentives to invest. This approach would cap the total returns that the firm could make if demand turned out to be high but force the firm to bear all of the losses in the event that there was virtually no demand, as displayed in Figure 7* [Figure 1 below]*"* [Ofcom, 2007, para 5.16]

The same diagram illustrating the problem of the "truncation of returns" can be used to illustrate the case study of delayed PayTV investment used by King and Maddock [1996, pages 120-122]. This example, shown in Table 1, shows that under conditions of demand uncertainty a project might succeed or fail. If demand is good the project will make a profit of $10m but if demand is poor it will make an $8m loss. The expected return with a monopoly is $1m. However, if the project looks like succeeding and access is granted, the returns to the owner might be cut from, say, $10m to $6m so the expected return is negative. So, if there is risk of access being required, the project will not proceed.
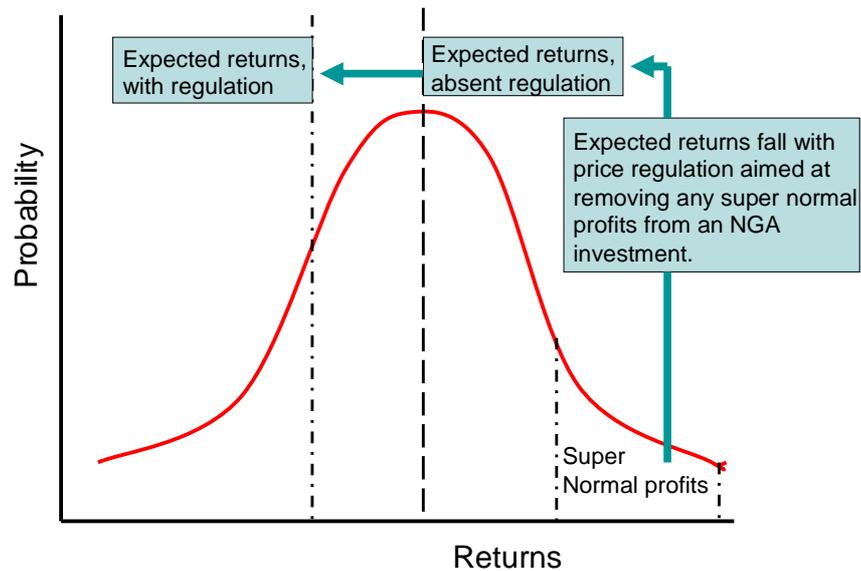

Figure 1: Ofcom's truncation problem

	Demand Uncertainty		Expected Outcome
	Success	Failure	
Probability	50%	50%	
With monopoly	$10m	-$8m	+$1m
With access	$6m	-$8m	-$1m

Table 1: King and Maddock's example of truncation

King and Maddock see a parallel in the protection of research and development by patents. In the context of the FTTN, this would mean an "access holiday" for a fixed period granted under a null special access undertaking (SAU). This is what the German government has done in defiance of the European Union to get its FTTN network. It is close to what Telstra had in mind with the plan it took to the government in August 2005.

An access holiday is an ugly but effective solution. King and Maddock suggest that an equivalent alternative which allows open access is the application over a fixed period of the Efficient Component Pricing Rule (ECPR).

5 ECPR

The ECPR is also known as the Baumol-Willig Rule after its inventors. It is described in Box 1. The key element of the rule is that the marginal costs of access include not only the direct costs (ie as measured by TSLRIC+) but also the "opportunity costs".

ECPR Pricing

The efficient price of access is the marginal cost plus the opportunity cost,

$$(1) \qquad Aec = Ca + (Pr - Cr - Ca)$$

Where Aec is the ECPR access price, Pr is the retail price, Ca is the marginal cost of providing access and Cr is the marginal cost of providing retail service.

The corollary of this rule to ensure that the access provider cannot "price squeeze" its wholesale customers is that the access provider's retail price is,

$$(2) \qquad Pr > Cr + Aec$$

Retail-Minus

The retail-minus access price is almost the same as (2) except that the ACCC subtracts "avoidable" rather than actually avoided costs (ie $Cr < Cr^{AV}$)

$$(3) \qquad Arm = Pr - Cr^{AV}$$

Box 1: The Efficient Component Pricing Rule and Retail-Minus

What King and Maddock were suggesting was that in their example the access provider could price access using the ECPR so that it was indifferent to providing the PayTV service directly or indirectly to customers on the new network.

A problem for the ECPR is that the Explanatory Memorandum to the Trade Practices Act (TPA) explicitly rules out "*consequential costs which the owner/operator may incur as a result of increased competition in an upstream or downstream market*". This is economic illiteracy which should be purged from the TPA when it is next revised.

6 Retail-minus

Note that access prices under the ECPR are defined with reference to retail prices. This could lead to "retail-minus" pricing[v] – but not with the ACCC's application of this principle. As shown in Box 1, the ACCC deducts what it considers the "avoidable cost" from the incumbent's retail price to get the wholesale price. As avoided costs are likely to be less than what the ACCC considers "avoidable cost", the access provider is not

indifferent to the provision of wholesale service – contrary to the intention of the principle.

The ACCC uses its version of retail-minus for resold services (ie the re-badged and re-billed Telstra local calls and line rental services). With the ACCC's preparedness to consider alternatives to TSLRIC+ for the FTTN, it could now consider applying retail-minus to the FTTN. This is also what Ofcom is contemplating, as we shall see below in relation to "anchor products".

Retail-minus has been the basis of bitstream pricing in New Zealand. The carriage service delivered over an FTTN network is similar to the regulated Unbundled Bitstream Service (UBS; migrating to UBA from February 2008) provided in New Zealand. Both are delivered over Layer 2 using the access-provider's DSLAM.

Logically, the application of retail-minus should see the structure of retail prices mirrored in access prices. Telecom NZ expected to see its prices for retail services for different downstream speeds and class of customer (ie business or residential) reflected in access prices for UBS. This did not happen because the legislation governing the Commerce Commission sees retail-minus as a stepping stone towards TSLRIC+ and technically the transport service is the same for all UBS. That is, the ISPs using the UBS service may throttle speeds to make different retail services but this is not allowed for the wholesale UBS service.

Faced with a single access price, it may be difficult for any access-seeker to profitably offer an entry level plan below that price because it would not be able to retain customers on the higher priced plans needed to cross-subsidise this offer. This is what happened in New Zealand. With a single wholesale UBS service and down-stream speed restrictions on the UBS service lifted, Telecom NZ was the first to offer maximum download speed across all its retail broadband plans. Since speed is not a cost driver in any bitstream service (it actually costs more to limit speed), it might seem to be a good thing from a national perspective if download speed restrictions in Australia disappear in the same fashion. However, this would limit pricing options for cost recovery (eg Ramsey Pricing discussed below)

7 Forbearance

As well as considering a real options adjustment to the WACC, Ofcom is canvassing regulatory forbearance as another approach to new investment. That is, it might not mandate FTTN access prices at all. This avoids the regulator having to assess risk and is conditional on the asset owner setting prices that are provided on an equivalent basis.

Naturally, this has delighted British Telecom[vi] and would be welcomed by Telstra too. We know it is practised unconditionally in the USA. There are no strings attached to forbearance in the USA because there is strong inter-platform competition between the TV (cable) and telco (copper and fibre) industries. However, even without inter-platform competition, Ofcom suggests that the dangers of monopoly price and anti-competitive behaviour may not be great as,

> *"the incentives to do so may be relatively weak given that the organisation's goal may be to promote take-up of next generation access services and rapidly increase traffic on the network"* [Ofcom, 2007, para 5.28]

Telstra made a similar point in a submission to the ACCC,

> *"The opportunity for non-discriminatory access will be encoded into the 'DNA' of the NGN and vertically integrated network owners will have powerful incentives to promote high levels of usage and innovation to recover the huge outlays involved."* [Telstra, February 2008]

It is likely that ECPR would be a natural commercial expression of how pricing would exhibit these incentives. For example, if a service provider had, say, an IPTV service that needed access to the FTTN and the access-provider had no such service, it would be happy to provide access at close to marginal cost because its opportunity cost is zero. However, if it already had an IPTV service, it would price-in the opportunity cost of losing its customers to the rival service. If the rival's retail marginal costs of providing the IPTV service are lower than the access-provider's, the rival will succeed, the access-provider is no worse-off and customers have more choice.

8   Ramsey pricing

The text book solution to the efficient recovery of fixed costs is Ramsey pricing. This sets mark-ups based on what retail customers are willing to pay (ie price discrimination). This approach was the basis of the FANOC proposal for FTTN pricing (NERA, 2007). It is illustrated in Figure 2. The sum of the shaded areas shows the extra revenue that can be obtained by pricing along the demand curve instead of setting a single price.
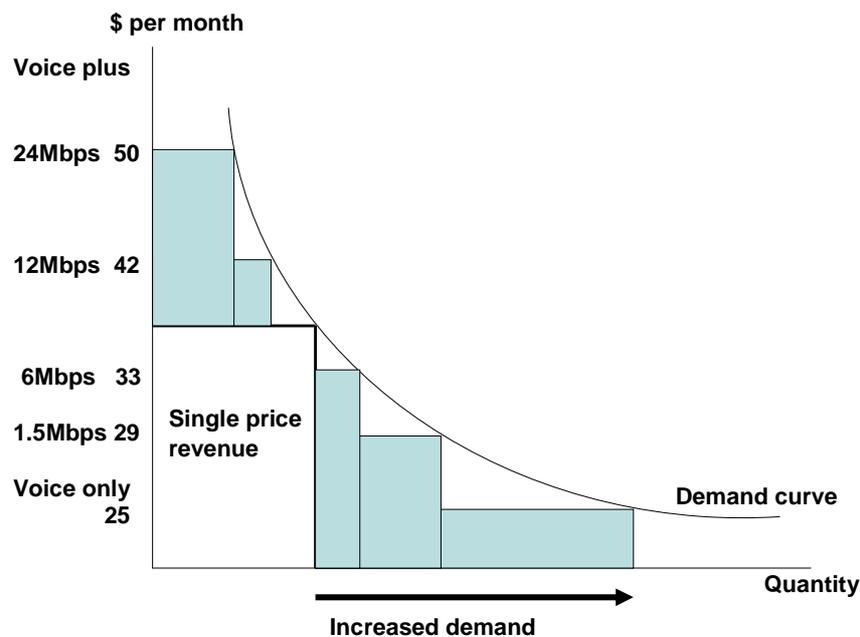

Figure 2: FANOC's Ramsey prices

Ofcom supports such price discrimination and flexibility for vertically integrated NGN access providers:

> *"We consider that it is important to allow a degree of flexibility for investors to price access. The reason for this is that the total value derived from next generation access networks is the sum of different valuations by different end users – some will value next generation access services highly while others may value it only marginally more than services delivered over existing access networks"* [Ofcom, 2007, para 5.24]

The ACCC's Draft Decision on the FANOC SAU (ACCC, 2007) makes no comment on discriminatory (Ramsey) pricing in over 30 pages of comment on pricing. Assuming it is "comfortable" with the suggested pricing structure, should we price discriminate on speed (as FANOC proposed) or data caps (which is the retail price differentiator for some ISPs)? It depends on who access-provider is. The logic of Ramsey prices fits easily for a vertically integrated access provider – price discrimination should be driven by the access provider's retail pricing structure. But, for a wholesale-only access provider like FANOC capacity pricing (see below) may make more sense.

Ramsey pricing is very closely related to ECPR, as shown in Box 2.

Ramsey Pricing
The total cost of providing FTTN broadband access is,

$$(1) \qquad K + (Ca * Q)$$

Where K and Ca are the fixed and marginal costs of access and Q is the total number of lines. Because the mark-up on Ca to recover fixed costs is passed-on to retail prices,

$$(2) \qquad Pr_i > Ca + Cr_i$$

Where Pr_i and Cr_i are the access-seeker's retail prices and own marginal cost of providing the retail service to each customer segment i.

The Ramsey access price in a competitive market recovers both Ca and a contribution to fixed costs reflecting what the market will bear,

$$(3) \qquad Aram_i = Pr_i - Cr_i$$

ECPR
If the access provider is vertically integrated, its total cost is,

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$$(4) \qquad K + (Ca * Q) + \sum Cr_i$$

It sets a retail price Pf, so the ECPR access (opportunity cost) price is,

$$(5) \qquad Aec_i = Ca + (Pf_i - Cr_i - Ca) \quad \text{or}$$

$$(6) \qquad Aec_i = Pf_i - Cr_i$$

Equivalence
In a competitive market $Pf_i = Pr_i$ and Cr_i is the same for equally efficient providers. So, the access prices are the same too:

$$(7) \qquad Aram_i = Aec_i$$

Box 2: Ramsey Pricing and the ECPR

9 Capacity pricing

Regardless of whether the access provider is vertically integrated or structurally separated, another way of dealing with the FTTN pricing issue is capacity pricing. This is two-part wholesale access price where the fixed charge recovers fixed costs and the usage component recovers marginal costs. Schematically it looks like Figure 3.
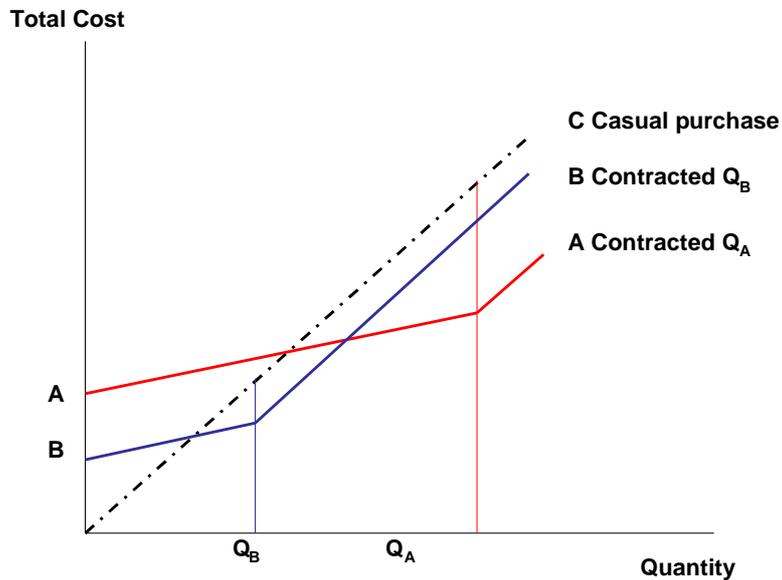

Figure 3: Capacity Pricing

The OECD sees a number of benefits in capacity pricing:

- *"Capacity-based pricing has the effect of dividing up the natural monopoly into a number of smaller parts which may then compete with each other*
- *"One of the principal advantages of capacity-based pricing is that it allows the downstream competitive firms to break away from the* [retail] *tariff structure produced by regulation*
- *"Capacity based pricing allows "downstream firms to, effectively, purchase a share of the essential facility, 'scaled-down', to match the requirements of the downstream firm, but with the same cost drivers as are faced by* the [vertically integrated] *incumbent operator"* (OECD, 2004)

Note also that capacity pricing does not discriminate between access seekers if the fixed charge is proportional to the number of lines (ie the access price confers no advantage on access-seekers with more lines). And, getting the marginal cost of access as low as possible allows more retail pricing flexibility (eg to offer entry-level retail products).

But, what is the marginal cost of an FTTN service? The fixed cost comes from any remedial work required on the copper network (eg removing incompatible technology) and cutting over the copper lines to the node (and enhancing backhaul etc). The marginal cost of providing an FTTN broadband service is close to zero[vii].

10 Anchor products

Ofcom has put forward a novel approach to access pricing for the FTTN which is based on what it calls "anchor products",

> *"This approach would involve offering one or more products on the next generation access network that replicate existing offerings to end users in terms of price and service for a period of time. This would be particularly important where existing services are no longer available e.g. where there is no parallel copper network. The price of these anchor products would be defined by Ofcom. The approach has the following characteristics:*
>
> > *• regulated wholesale anchor products are specified such that end users are expected to face the same price and service that was available over copper, for those services that remain dependent on the new bottleneck;*
> > *• prices are not cost based since those prices that are controlled are set on the basis of prices on the previous platform (with a different cost structure);*
> > *• outside of these regulated anchor products, prices for higher performance or new service offerings would not be subject to price control. However, the asset owner would be required to provide them on the basis of equivalence. In effect, only a few prices in the value chain are fixed by regulation. Prices of other products would be set by the access network owner in negotiation with its customers, including its own downstream divisions. (Ofcom, 2007, para 5.29)*

Telstra offers fixed retail broadband plans up to effectively 24Mbps (ADSL2+). Should the anchor product be 12Mbps or 24Mbps? Ofcom is not sure,

> *"Best of breed current DSL could be used to define the anchor product. However, this could risk specifying the anchor product too highly (e.g. at 24Mbps), limiting options for differentiation through higher quality services"* (Ofcom, Annex 7, Table 6)

But, on the other hand,

> *"If the initial definition of the anchor product is too low compared to other non-anchor products, it may be that this product does not act as an effective substitute for non anchor products, breaking the chain of substitution and increasing the risk of a bottleneck asset owner leveraging market power in these non-anchor products".* (Ofcom, 2007, A7.10)

A key feature of the proposal is that access prices for anchor products should be based on retail-minus principles,

> *"one of the aims of anchor product regulation is to ensure that, in the migration to next generation access networks, no customers are made worse off. It would therefore look to use existing retail prices as the basis for price setting. However, the anchor product price defined would need to be a wholesale price – some consideration of the cost of retail service provision would need to be made. Therefore, prices could be set on retail minus basis, using the prevailing price for today's broadband services, or could be based on existing wholesale prices for today's broadband services (e.g. IPStream).* (Ofcom, 2007, A7.9)

IPStream is a service similar to Telstra's (unregulated) DSL2 wholesale service. Figure 4 shows the price relativities across key broadband access and retail products in Australia.

Telstra does not provide (unregulated) wholesale DSL2 above 8Mbps. But since it switched on ADSL2+ in exchanges where its competitors have no DSLAMs on top of either unbundled local loop (ULL) or line sharing (LSS), access-seekers have asked the ACCC to "declare" (ie provide regulated access) to DSL Bitstream services at the speeds supported by Telstra's own DSLAMs[viii].

Bitstream pricing will be required for access to the FTTN. Following New Zealand practice and noting Ofcom's suggestion, if the ACCC decides to accede to the request to declare xDSL it should employ retail-minus pricing. But, access-seekers would then have to provide resold broadband services at a loss in the country if their retail prices were the same as those charged in metro areas where prices are based on unbundled wholesale inputs (ie ULL or LSS).

The prices for ULL and LSS are intended to be based on TSLRIC+ but they have been lowered in a series of decisions without reference to any costing model. Telstra's new

cost model says that the cost of unbundled local loop in Band 2 (Metro) areas is $30 per month compared with the arbitrated $14.30 and the price of LSS is "less than a cup of coffee" per month. The High Court Challenge by Telstra to these prices was about "unjust terms" but the High Court concluded that no property had been appropriated; so the reasonableness of ULL and LSS prices was never considered.

Wholesale prices exclude GST

Telstra retail = $89.90 + calls

DSL Layer 2 8 Mbps = $52 ($34 at 1.5M)

ADSL2+ (600MB pm) $59.95

$2.50

Band 2 $14.30

Residential Wholesale Line Rental $23.12

Home Line Plus $29.95

ULL   LSS   DSL2   Telstra Retail
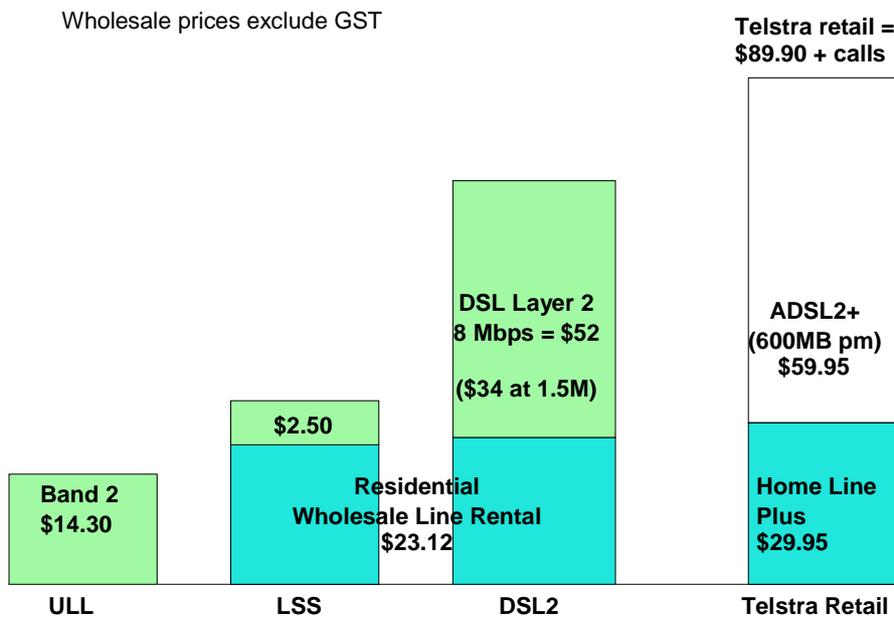
Figure 4: The ladder of investment

11 Conclusions

The good news is that there are alternatives to TSLRIC+ and that regulators are willing to consider them. The summary table in Table 2 below scores the access pricing options against the desiderata we set for Goldilocks pricing. Only four columns are shown as we make no attempt to score them against government social policy objectives.

	Return on investment	Affordable to end users	Affordable to open access	Does not foreclose alternative investment
TSLRIC+	No	Do not know	Do not know	Yes
+ WACC	Yes	Probably not	Probably not	Yes
Holiday	Yes	Yes	No	Yes (but not FANOC)
ECPR	Yes	Yes	Yes	Yes
Retail-Minus	Yes	Yes	Yes	Yes
Forbearance	Yes	Yes	Yes	Yes
Ramsey	Yes	Yes	Yes	Yes
Capacity	Do not know	Do not know	Do not know	Yes
Anchor	Yes	Yes	Yes	Yes

Table 2: Summary table

We know that TSLRIC+ falls at the first hurdle (ie getting an acceptable return) and supplementing the WACC with a real options adjustment would be complex and open to dispute. Both an access holiday and forbearance are used overseas [de Ridder, 2008]. But the first is not consistent with open access. And, the second requires faith in the incentives that Ofcom and Telstra claim for NGN access investments. The Anchor Products approach provides an interesting compromise between open access and an access holiday that meets all the criteria. All of the approaches that reference retail prices (ie ECPR, Retail-Minus and Ramsey) are virtually equivalent and meet all criteria. It would not be correct to describe these as non-cost-based approaches (eg ECPR ranges from marginal cost to opportunity cost). Because of the retail price dimension, they assume a vertically integrated provider of access. They do not make sense for a wholesale-only access provider which must turn to capacity pricing if the traditional narrow cost-based approaches (eg TSLRIC+) do not generate the required returns. But, it is doubtful that a wholesale-only access-provider can invest billions of dollars and also maintain affordable open access.

In my view, a vertically integrated access-provider with a retail-price based access regime, possibly in conjunction with anchor products, provides the best prospect of getting access pricing for the FTTN network that is just right.

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[i] For any FTTN builder apart from Telstra, the sub-loop price is critical. But, any FTTN network will offer a wholesale Bitstream service and that is the focus of this paper.

[ii] The Commission determined in its July 1997 guide to access pricing principles that pricing based on total service long-run incremental cost (TSLRIC) to recover the forward-looking efficient costs of a network will satisfy the broad criteria, including the reasonableness criteria under S152AH of Part XIC of the TPA. This was re-affirmed in September 2002 and again in November 2006.

[iii] Phil Burgess – Fibre to the Node briefing, 7 August 2006

[iv] See my discussion of the ACT decision (de Ridder, 2007) for more details.

[v] They are not the same. Retail-Minus leads to a single price but the ECPR is a range of prices from marginal cost to stand-alone cost. To prevent anti-competitive behaviour, the latter may be capped using Retail-Minus parameters consistent with the application of imputation testing of retail prices.

[vi] See BT response to Ofcom consultation at http://www.ofcom.org.uk/consult/condocs/nga/responses/

[vii] This assumes full-pillar migration so that costs are fixed and sunk.

[viii] Ten ISPs wrote to the ACCC on 15 February 2008 asking it to issue a Competition Notice against Telstra and/or consider the declaration (access price regulation) of wholesale DSL services