# ACCC Description of Wholesale ADSL Service


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## *ACCC Description of Wholesale ADSL Service*

The wholesale asymmetric digital subscriber line service (wholesale ADSL service) is an internet-grade, best efforts point to point service for the carriage of communications in digital form between a point of interconnection and an end-user network boundary that:

(a) is supplied by means of Asymmetric Digital Subscriber Line (ADSL) technology over a twisted metallic pair that runs from the end-user network boundary to the nearest upstream exchange or RIM or CMUX; and

(b) uses a static layer 2 tunnelling protocol (L2TP) over a transport layer to aggregate communications to the point of interconnection.

## *Comprehending the Description*

Being an experienced telecommunications engineer, having read through this description several times, I found it extremely confusing to the point of this description being incomprehensive. To me, this description appears to have been written by a legal team that has no comprehension of the telecomms infrastructure in Australia. Compounding this, there are phrases in my professional opinion that seem factually inconsistent and/or simply incorrect and/or not at all relevant.

The Wholesale ADSL Service description omits the fundamental imperative inclusion of the (high capacity) link between the Point of Interconnect (POI) and the other end of the POI that connects to the main carrier's Competitive Switch. The Competitive Switch itself and the high capacity Inter-Exchange mesh network structure between these Competitive Switches provide through connectivity for "Internet".

The **Wholesale ADSL Service** actually consists of three consecutive network components - not one simplistic network component as described in the current Wholesale ADSL Service description. These three network infrastructure components must be concurrently connected end-on-end (i.e. in "series") to provide a through connection between the Customer Premises and the "Internet".

### Premises to the "Internet"

The first part of the **Wholesale ADSL Service** connection is from the ADSL modem in the Customer Premises to the Digital Line Services Access Multiplexer (DSLAM).

> *This connection (or link) is typically over insulated (0.40 mm diameter) twisted pair copper cable and the maximum length is nominally 4100 m. The DSLAM is usually located in a (local) telecomms exchange building site, or in a footpath cabinet (commonly called a remote "Node").*

The second part of the **Wholesale ADSL Service** connection is from the DSLAM to the Point of Interconnect (POI), and/or a Peer connection into the Inter-Exchange Network (IEN).

*This connection (or link) is typically over Single Mode Optical Fibre (SMOF) and is usually transported as Internet Protocol (IP) through switching Routers and long-haul transmission systems using Synchronous Digital Hierarchy (SDH) and Multi Protocol Language Switching (MPLS), usually as dedicated channels (virtual containers) in pre-existing Inter-Exchange Network infrastructure. These links can exceed 1000 km in length and (because of competition) congest otherwise available Inter-Exchange Network capacity / throughput.*

The third part of the **Wholesale ADSL Service** connection is from the Point of Interconnect (PIO) / Peer Switch to the Competitive IP Switch / Internet Backbone.

*This connection (or link) is typically over Single Mode Optical Fibre (SMOF) and is transported as Internet Protocol (IP) through switching Routers and long-haul transmission systems using Synchronous Digital Hierarchy (SDH) and Multi Protocol Language Switching (MPLS), usually as dedicated channels (virtual containers) in pre-existing Inter-Exchange Network infrastructure. These links can also exceed 1000 km in length and (because of competition) congest otherwise available Inter-Exchange Network capacity / throughput.*

## *The Telecomm Network Infrastructure*

As alluded to above, there are basically two very different and very big network infrastructures (the Customer Access Network and the Inter-Exchange Network) that interface each other and through-connect to effect an end-to-end connection.

### The Customer Access Network

The Customer Access Network (CAN) is the connection between the Customer Premises and the Local Telecomms Exchange sites / buildings. This network is structurally a "Star" that - in the case of pair copper as used in telephony / ADSL services - connects from many premises to a common "Local Exchange" site.

In Australia, this "telephony / ADSL" pair copper constructed CAN infrastructure consists of about 5012 "Exchange Switching Areas (ESAs) connecting well over 7,000,000 premises.

The end-user network boundary is at the first connection point into the Customer Premises. Usually this is a telephony wall socket. In the case of businesses, the network boundary point is in the building Main Distribution Frame (MDF) which is usually a Connection box, usually mounted in the Communications room.

From this network end-user boundary (connection) within the Customer Premises, the ADSL service usually passes through an ADSL line filter then to the ADSL Modem / Router - all of which are in the Customer Premises Network (CPN) - not the CAN.

At the telecomms end of the CAN (for ADSL) the network boundary is in the middle of the Digital Services Line Access Multiplexer (DSLAM). So the CAN connection passes through the pair copper cable(s) into the telecomms site, through the Main Distribution Frame and through into the DSLAM. At this physical point in the DSLAM, where the ADSL transmission is converted to Internet Protocol (IP) transmission, is the outer boundary of the Inter-Exchange Network (IEN).

## The Inter-Exchange Network

Because of heavy USA influence in the past 20 years, the Inter-Exchange Network (IEN) is also known as the Backhaul Network (BN) and/or the Core Network (CN) - depending on the technology and corporation selling the equipment.

The IEN is diametrically different than the CAN because the IEN is a long-distance mesh with considerable alternate routes. The very important criterion is that there are no end-users directly connected to the IEN / BN / CN. The End Users exclusively connect through the CAN to connect with the IEN.

An analogy of the IEN is that of roads between suburbs, towns, villages and cities. In most cases driving between two suburbs or cities there is alternate road, and with the IEN this is usually the case.

The IEN is (usually) structured in four levels[1].

1. At the first level within a District - connecting several nearby suburbs or towns to a couple of major suburbs or cities.
2. At the second level within a Region - cross-connecting several Districts within a Region to one or two major cities in that Region.
3. At the third level within Australia - cross connecting the major Metropolitan (State Capital) Cities from the second level switches.
4. At the fourth level - providing Competitive / International switching from the third level.

This IEN infrastructure is the massive missing component of the NBN Co. and the prime reason why the NBN Co. is fast destined to be a massively monumental financial disaster - all caused by totally inappropriate use of competition.

> *In my professional opinion, Australia would dramatically reduce its Balance of Payments (BoP) and significantly increase its Gross Domestic Product (GDP) by physically separating Telstra / Optus / Vodafone / TPG / Vocus / NBN etc., and put all this telecommunications into one sub-Government Commission.*
>
> *This micro-economic reform would maximise the optimum use of the (expensive) telecommunications infrastructure, provide a very competitive retail reselling base, and provide a one-stop-shop for Australia to purchase of telecomms infrastructure with the biggest discount at the front of the manufacturing queue and with maximum after-sales service.*
>
> *This sensible dynamic change in micro economic structure will reposition businesses to put Australia first, not put Australia last (as it currently is).*

## *Layer 2 Tunnelling*

This (Layer 2 Tunnelling) has the same meaning as in the OSI Reference (5 layer) model for data exchange, but as far as I can tell has absolutely nil to do with the Wholesale ADSL Service connectivity because Layer Two Tunnel Protocol (L2TP) is one of many communications protocols[2] that can be used.

[1] http://www.moore.org.au/comms/06/20070820%20The%20Six%20Network%20Structural%20Levels.pdf
[2] http://www.howtogeek.com/211329/which-is-the-best-vpn-protocol-pptp-vs.-openvpn-vs.-l2tpipsec-vs.-sstp/

So as far as I can tell this inclusion of L2TP is totally useless, expensive and unnecessary, and it only applies to the ADSL component of the three section connection. This L2TP protocol may be used by some competing businesses to "tunnel" their traffic in a common transmission link above the ADSL, but I believe it is very uneconomical use of infrastructure and this situation is caused by the inappropriate introduction of competition.

## *Point of Interconnection*

Again this is yet another very unnecessarily expensive and totally avoidable infrastructure bandage created to allow the owners of competing infrastructures (the most uneconomic possible situation) to connect their "competing" infrastructure into the mainstream Inter-Exchange Network (IEN) that through connects to the main "Internet" network infrastructure.

In these cases it is common for smaller "competing" Wholesale ADSL service providers to "peer connect" their IEN side of their DSLAM equipment to minimise operational costs and then back-connect this common link to the POI.

So, these "competing" Wholesale ADSL Service providers are not actually "competing" against each other, but "co-operating" with each other to minimise their overheads and "competing against" the prime infrastructure provider - and compromising their network capacity in the process.

So this is really a "lose - lose" situation for Australia and the competing companies (and Telstra / Optus) caused entirely by "bloody-minded" ACCC's extremely irrational "increased competition for competition's sake", in total ignorance of the rather simple rational economic thinking that competing infrastructure is a fundamentally flawed theory.

Competition has its place in retail and only with discretionary items - certainly not for wholesale and particularly not for Infrastructure.

## *Bypassing the POI Mindset*

In 2005/2006 I was the Supervising Engineer contracted by the then Silcar (now Thiess Services) to coordinate the rebuild of Telstra's Broadband Cable network infrastructure in Sydney. This part of the national ($2.5 Bn) project involved the construction, installation, commissioning and socialisation of about 310 Cable Broadband Routers ($70,000 each) and associated equipment (racks, power equipment, IP routers, channel mixing equipment, service control equipment and about 2500 km of strand optical fibre systems) in 124 exchange sites in the Sydney Basin within about 9 months.

This extensive and expensive build was rushed through for two reasons. In the first case, the previous build was central located and had severely outgrown its single site in every capital city. Secondly, Telstra was under pressure to show that it had Broadband capability and (I believe) to avoid physical separation, this infrastructure was rushed in to provide apparent "full metropolitan coverage". This equipment was deliberately about 30% provisioned with (expensive) Cable Broadband Routers but the racks and associated wiring and IP routers were fully provisioned.

I cannot remember Telstra (nor Optus) advertising the availability of Cable Internet.

At the Customer Premises, a Cable Modem connects with the customer end of the Hybrid Fibre Coaxial (HFC) Customer Access Network infrastructure (the thin coax with an "F" Connector).

When the Cable Modem logs on to the network, MAC address (a unique equipment-based number assigned to the cable interface) is relayed to a national database. This national database then checks off the MAC address against its reference table.

If the MAC address is recognised, then the Cable Modem is granted Internet Access.

Using this simple and very reliable method, Internet Access can very readily (and extremely inexpensively) be assigned to a wide number of Retail Resellers.

So - using this very simple and straightforward MAC assignment process, retail competition can be very inexpensively implemented; totally without any requirement for any POI infrastructure. The savings are immense - worth many $Bn.

The end user can change locations and re-connect their modem - and presto - they are connected. Fail to pay their bill and the end user can be disconnected or throttled in seconds, without negatively affecting any other end users.

Competition has its place in retail reselling - certainly not in infrastructure. This MAC addressed database controlled technology facilitates competition the retail reselling process and facilitates the optimum use of (expensive) infrastructure that is currently very crippled by using the old infrastructure-hungry POI connect and control process.

## More Flaws in the Service Description

Having read the Wholesale Service Description, as below and skimmed through the “Declaration Instrument” – it seems to me to be written in “legal jibberish” that really misses the critical point in that the "Wholesale ADSL service" connection is by no means the full Internet connection but merely the part of the connection between the Customer Premises and the nearest telecomms site. This "ADSL" is certainly not a full connection to the Internet.

Looking further into this document there is a blatant mistake of terminology where the telecomms end of the Customer Access Network (CAN) – also not included - refers to the "to the nearest upstream exchange or RIM or CMUX".

An "Upstream Exchange" ??? "Upstream" refers to the direction of data transport through the Customer Access Network from the Customer Premises towards the Inter-Exchange Network (IEN). "Exchange" loosely refers to a telecomms building site that includes a switch to cross-connect call paths. There are four levels of Exchange Switches (Local, District, Regional, National/Competitive) - much like other means of transport (airports, trams, trains, roads)...

The "RIM" is a "Remote Integrated Multiplexer" which is a piece of telecommunications transmission equipment (located in a remote Local Telecomms site within a Local Exchanges', Exchange Switching Area (ESA)) used to connect telephony (not ADSL) from the nearby Customer Premises through physical pair copper CAN component to the RIM site. Then, from the RIM, usually Single Mode Optical Fibre is used to connect to the Local Exchange site (as part of the CAN),

where this SMOF connects into the Local Switch from the RIM in the Local Exchange.

A RIM is a telephony interface - not an ADSL interface. Most RIMs are located in Small Country Automatic Exchanges (SCAXs) - some RIMs are located in street cabinets in metropolitan areas.

Some RIMs have a Digital Services Line Access Multiplexer (DSLAM) attached to them to provide ADSL connectivity.

The "CMUX" is a "Complex (Remote) Integrated Multiplexer" that includes a Digital Service Line Access Multiplexer" which is a piece of telecommunications transmission equipment (located in a Local Telecomms sites) used to connect telephony (not ADSL) from the physical pair copper CAN to the Inter-Exchange Network (IEN).

The back-end of the CMUX (usually) connects through Single Mode Optical Fibre (SMOF) to the Local Exchange in the same Exchange Switching Area (ESA) where the fibre connects into the Local Switch / or an Edge Router that back connects into the Inter-Exchange Network (IEN).

The wholesale Asymmetric Digital Subscriber Line service (wholesale ADSL service) is a subset of bi-directional digital Internet connectivity, exclusively between ADSL modems in Customer Premises and a common Digital Services Line Access Multiplexer (DSLAM) in a Local Telecomms site, utilising the physical connection of (insulated) twisted pair metallic wire component in Exchange Switching Areas (ESAs) as part of the national Customer Access Network (CAN) as the transport medium.

*(99.999+% of this part of the CAN is (insulated) pair copper - so "metallic wire component" is for all practical intents and purposes "insulated, twisted pair copper")*

At these Local Telecomms sites, the DSLAM equipment is back-connected through an "Edge Router" into the Inter-Exchange / Backhaul / Core Network (IEN); which is the next subset of "competitive" Internet connectivity.

The IEN is a four-level (Local - District - Regional - International / Competitive) national switching matrix that is internally connected by long-haul (very) high capacity Single Mode Optical Fibre (SMOF) transmission systems.

*(The NBN is a CAN without an IEN - like a head without a body.)*

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