

Innovative Synergies

2014 03 20 Submission 10 Attach A

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Introduction

In reading through all the submissions to date, there are a few fundamental types of submissions that generally contain the same common themes:

- We want a Management Junket.
- We Can't Do Business Without Good Internet
- We Do Not Want FTTN
- Our ADSL is Seriously Underperforming.
- We have HFC and it is not reliable /fast enough for IT business.
- We have a radio tower going up in an area that impinges on us.
- Competing telecomms businesses will fix everything.

These themes are somewhat endemic, because for more than a decade over 14 Select Senate Inquiries into insufficient telecomms infrastructure / performance have been held and none of these Select Senate Inquiries have actually addressed and resolved any of these endemic themes apart from lip service.

How to Solve the Endemic Problems

Management Junkets

Question: Why are there so many submissions from Council executives?

Answer: It seems that somebody in these councils has as part of their duty statement to respond to all requests for submissions.

Question: Who responds to these requests for submissions? **Answer:** It seems that the Chief Executive signs the pre-prepared letter.

Question: What is the content of these submissions? **Answer:** There is very little content at all apart from saying that they represent a certain geographical area and the letters are usually void of any of the businesses or constituents Broadband problems in the council area.

Question: So what could be the content of these letters? **Answer:** If any Council Management had any credibility, then they could very easily draw on at least 20 businesses in their council area that are doing it tough because of poor telecommunications infrastructure. Nuh!

Question: So why are these letters sent as submissions? **Answer:** These letters form the foundation to justify a three-day all expenses paid "Management Junket" (expensive and useless trip) to Canberra or some other meeting destination so they can come and be witnesses for the Select Senate Committee.

We Can't Do Business without Good Internet

Question: What type of businesses are we? **Answer:** We are the classical small / medium / large businesses and pseudo big businesses that are being totally crippled by having far less than satisfactory telecommunications service standards at their geographic location.

Question: How is the lack of excellent Broadband Affecting your business?

Answer: The standard theme with all these businesses is that the download speeds are far too slow / the upload speeds are far too slow / the reliability is far too low / the cost is far too great.

We wanted to initiate / grow business in our (Council) area but we now have insufficient Broadband infrastructure to support this. The glaring problem here is that the associated council has not picked up on this and used it (and many others) for ammunition to have the telecommunications infrastructure raised in priority over other council areas. (Refer to Management Junkets, above!)

We Do Not Want FTTN

Question: If we are given (Fibre to the active Node) FTTN (which is then Copper to the Premises (CTTP)) we know that within a few years this FTTN infrastructure will have to be replaced by FTTP infrastructure and that makes the FTTN proposal a very expensive and very ill-considered strategy, so why do it?

Answer: Active FTTN is very expensive, is high maintenance, is technically unsatisfactory, is a very short-term strategy; but most importantly: it comfortably fits into the re-election time cycle.

Question: Why does this (We Do Not Want FTTN) theme come through time and time again from a range of people / businesses in Australia in many submissions?

Answer: These people have thought through the engineering process and recognise that the active FTTN option is a partial solution on old pair cable that is and has shown considerable operational problems caused by poor work standards supported by contractors working under competitive maintenance practices.

Question: Why are Telstra and Optus both exceedingly quiet about providing ADSL or HFC Internet connectivity? **Answer:** There is a much higher profit available through marketing GSM3 (3G) and GSM4 (4G) Internet connectivity plans, and G3/G4 totally blindsides the NBN infrastructure, crippling the NBN business plan.

Our ADSL is Seriously Underperforming

Another common theme is "We have ADSL and it is seriously underperforming our small business and social community requirements".

Question: What is ADSL? **Answer:** Asymmetrical (data speed) Digital Line Service (ADSL) is a Broadband Access technology that co-uses pair copper customer Access Network (CAN) cables that were engineered for telephony.

Question: How can ADSL and telephony work concurrently? **Answer:** ADSL uses the spectrum space well above that used by telephony for fast data transfer.

The ADSL upload (from you to the Internet) spectrum is positioned above the voice frequency band used for telephony and the much wider ADSL download (from the Internet to you) spectrum sits above the up spectrum.

Question: Why is ADSL speed generally quoted in terms of the Download speed?

Answer: Because the much wider spectrum used for the download direction is far more adversely affected by the engineering of the pair copper cable.

Question: Then why are some ADSL services quite fast, and others so slow?

Answer: The nominal maximum ADSL download speed is 24 Mb/s, and this is only

possible on customer access pair copper cable that is nominally less than about 1000 m from the Digital Services Line Access Multiplexer (DSLAM), located as a “Node” within the local telephone exchange site.

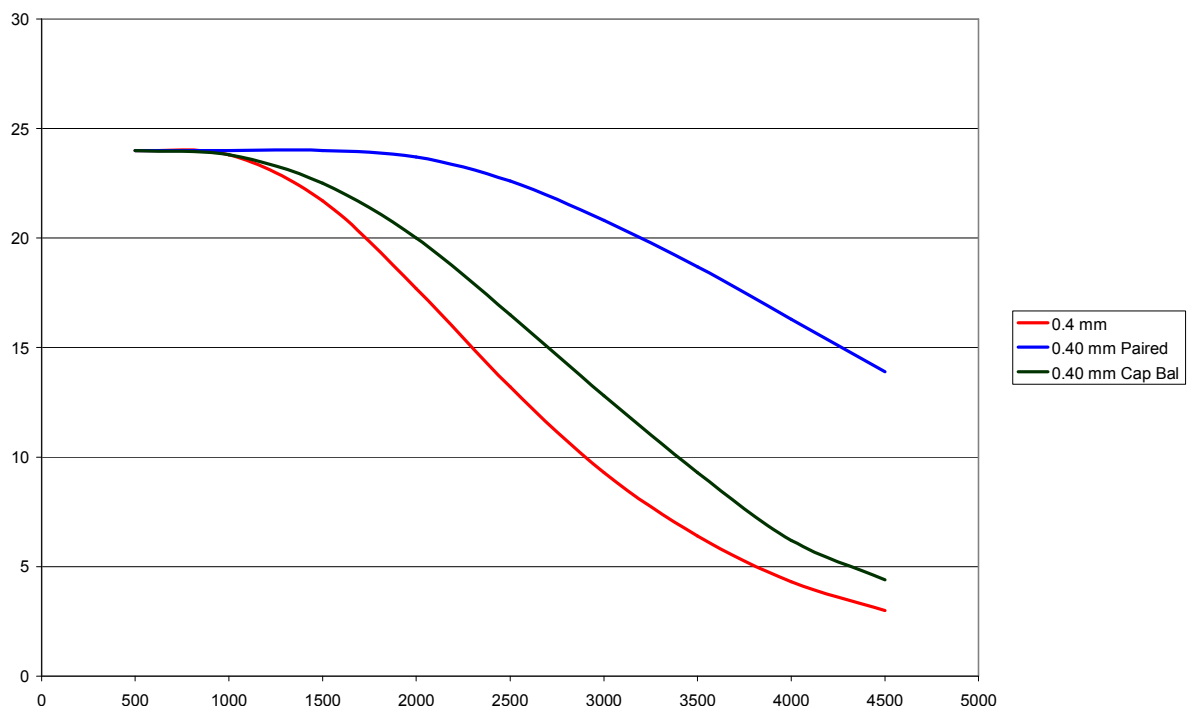
Question: Why is our ADSL download speed so slow? **Answer:** Because the ADSL service is connected on your telephone line that was specifically engineered for telephony and specifically not engineered for ADSL.

Question: Why is Telstra’s customer access network cables now used for ADSL not engineered for ADSL! **Answer:** The prime focus of Telstra (as a privatised competitive business) is for a maximised profit with minimised service standards.

The prime focus for an infrastructure business is to provide maximised service standards and much larger profits will flow through other businesses actively using these infrastructure services.

Even now, the NBN Co is being incorrectly positioned to be a private competitive business, when it should be an Infrastructure business.

Question: How much does the ADSL download speed fall away with distance? **Answer:** The graph below shows how urban ADSL download speeds fall away with distance between the local exchange site (node) and the consumer premises.



The “**Urban ADSL Speed V Length**” chart below shows an immense story that explains why “infrastructure competition” is an abject failed economic policy.

The (lowest) **RED** line depicts the expected ADSL download speed (Y axis) as a function of the line distance (X axis) using standard 0.40 mm pair copper cable as used in virtually all urban situations in Australia.

The maximum line length in the urban area is (nominally) 4100 m. The average urban line distance is about 2900 m so the average download speed is a bit over 10 Mb/s using ADSL2+, but the optimistic worst case is about 4 Mb/s.

Question: Why does cable length (distance) affect ADSL Download performance?

Answer: Pair copper cable has a gradual frequency roll-off where the upper end of the spectrum is far more attenuated, like talking through a pillow, its is muffled. The longer the cable, the more muffled / more limited is the available download spectrum, the slower the ADSL download speed.

If these pair copper cables have any moisture in them, and this is rather common because preventative maintenance is not carried out; then the ADSL download speeds will be considerably slower, and many services will not work at all! So, the red line is really an optimistic estimation of the real ADSL download Speed v Length.

Question: Why is preventative maintenance not systemically carried out on pair copper CAN lines? **Answer:** Because the infrastructure is being managed under a competitive mindset of minimum maintenance and maximised shareholder profits!

The other two lines on this chart are “interesting”, because these show what could be done with even a small amount of long-term engineering knowledge about pair copper cables and analogue cable systems (and ADSL technology is an analogue cable system technology)!

Clearly, maximised shareholder profits come way ahead of maximised service standards – after all, that is what privatisation and competition is all about.

If the Australian telecommunications infrastructure were not privatised and made infrastructure competitive, then the primary focus would be on maximising the service standards, and the lower wholesale prices in a larger market would really maximise the (privatised) competitive resellers’ profits for their shareholders!

Question: What does the term Far End Crosstalk (FEXT) mean? **Answer:** FEXT is analogous to hearing someone calling to you from within a distant noisy crowd. You are at the “far end” and the crowd noise makes it difficult to hear the caller’s articulated wording, especially the sibilances!

Question: How does FEXT degrade ADSL speed performance? **Answer:** Because of FEXT, (generally high frequency) signals from other DSLAM channels appear as added noise in your ADSL modem and severely limit your modem from utilising the full ADSL download spectrum.

Question: How is FEXT minimised? **Answer:** By physically balancing the capacitance of each pair in the upper ADSL download spectrum area to a local sheath / earth.

Question: What improvement in ADSL download speed would be anticipated by physical capacitance balancing? **Answer:** In the chart above, the (middle) **Dark Green** line shows the expected performance if the pairs were capacity balanced. It is about 30% in distances greater than about 1500 m

Question: Why does not Telstra perform physical Capacitance Balancing on Customer pair copper cable? **Answer:** This is an expensive, time consuming process and the contracted field lines staff would have to be specially trained well above their current level of expertise.

Question: How else can the ADSL download speed be inexpensively increased?

Answer: If two pairs in the same layer of a customer access cable are parallel connected at each end, then the insertion loss through this “paired” pair is virtually halved and a typical example of the expected ADSL download speed is shown in the chart above in the (top) **BLUE** line.

Question: Would we need to put in Fibre to the Node (FTTN) technology if we paired longer the longer urban Customer Access Network cable pairs?

Answer: **No!** We could totally eliminate the push for urban FTTN technology; simply by pairing the longer (> 2200 m) urban CAN pair copper cables being used for ADSL.

Question: Then who is pushing for Active FTTN (xDSL) technology?

Answer: The equipment manufacturers, and the decision makers who really don't know or understand telecomms transmission engineering.

Question: But don't the Telecomms Engineers make these decisions?

Answer: **No!** Because Telstra (and other telecomms businesses in Australia) are privatised, the decision power base is in high profit Sales and Marketing area.

Question: Then why is Telstra not physically split so that the Wholesale Infrastructure is totally managed by Engineers as a highly efficient Infrastructure Business and the Retail Sales and Marketing totally managed as a very efficient Competitive Business? **Answer:** Because our politicians are too compromised, too weak and too short-term minded to make these types of decisions that would really benefit Australian business and the Australian community.

Question: Why is urban ADSL run on 0.40 mm pair copper and not on 0.64 mm pair copper CAN lines? **Answer:** Because Telstra is a competitive infrastructure business focussed on maximising the profits for its shareholders. Rolling out proper infrastructure is short-term thinking that impinges on immediate shareholder profits!

Question: Then why do we not “pair” these longer urban pair copper cables and give all the urban consumers greater than 16 Mb/s ADSL download speeds.

Answer: Because Telstra is focussed on maximised selling G3 and G4 Broadband CAN in high preference to ADSL or HFC Broadband solutions as the G3 and G4 infrastructure provides a far greater profit margin.

Question: Is not there a chronic shortage of pair copper cable?

Answer: There was a chronic shortage when there were about 10,000,000 lines in service. There are only about 7,000,000 lines in service, so about 30% should be available for pairing right now.

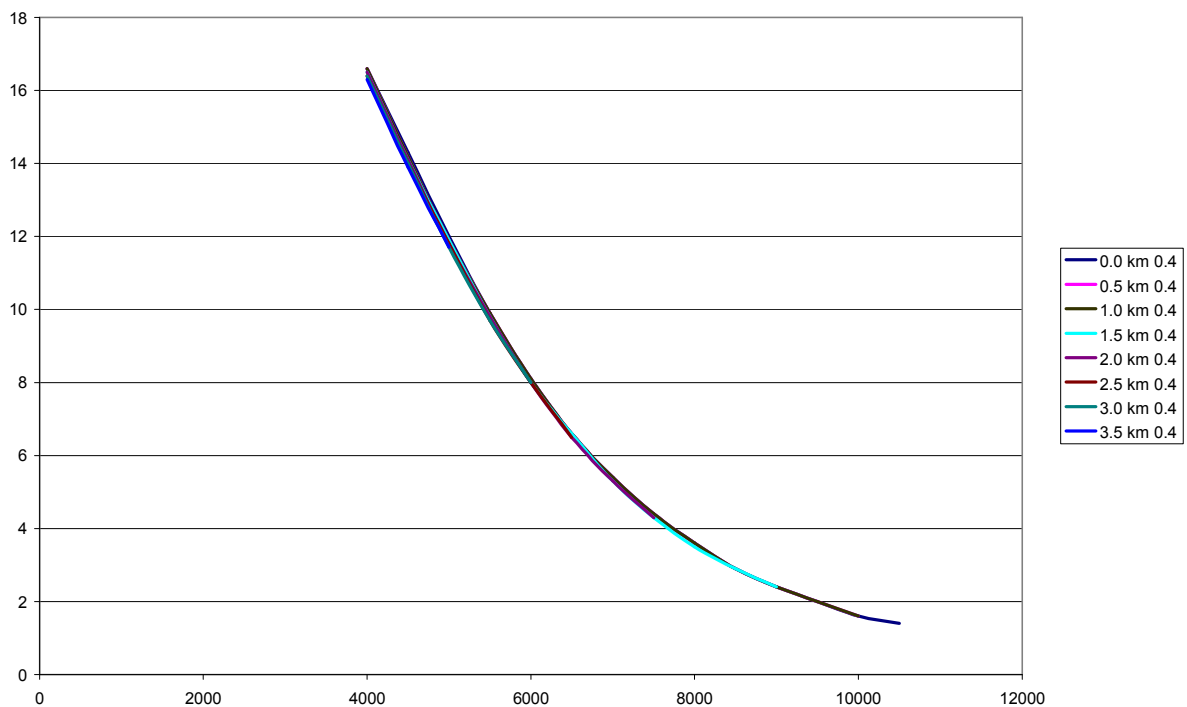
Question: What about Broadband ADSL services to non-urban homesteads?

Answer: Generally these premises were connected with a mixture of 0.40 mm and 0.64 mm pair copper to provide a nominal maximum attenuation (minimum cost) connection to the local exchange site. Only a very low percentage of these homesteads have low enough attenuation to allow ADSL connectivity.

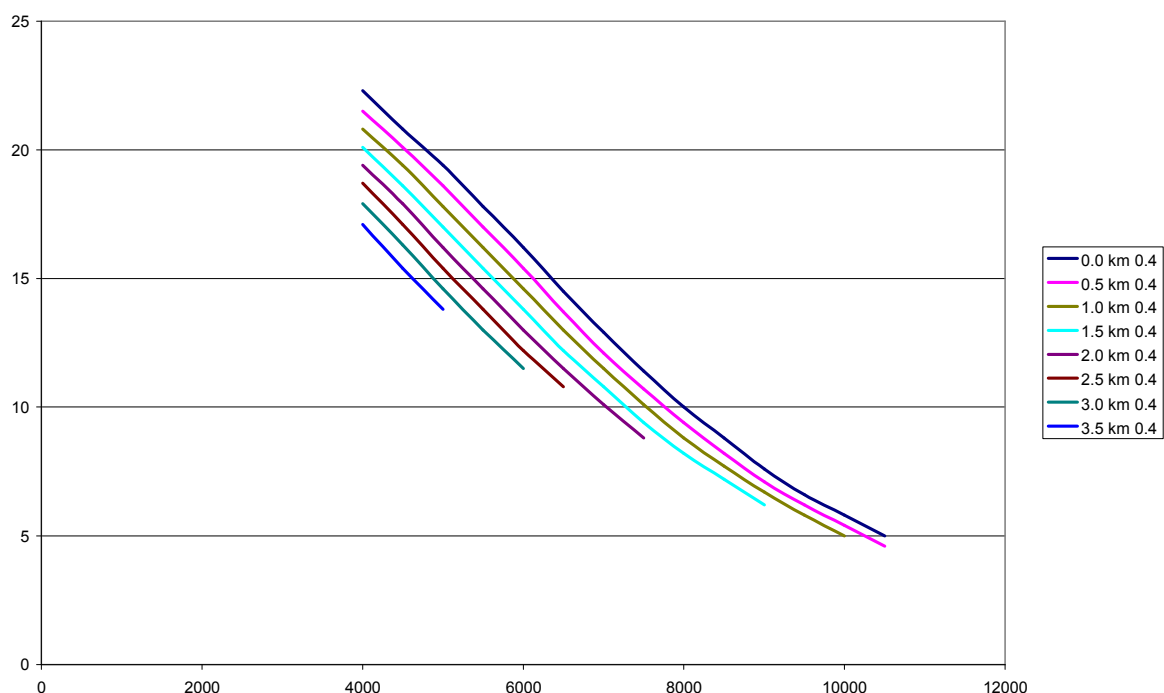
Question: Is there an inexpensive way to connect a high proportion of non-urban consumers to connect with ADSL?

Answer: **Yes!** Simply by “pairing” the relatively short 0.40 mm section of pair copper cable from the exchange site to the pit / pillar where the thicker pair cable takes over.

This technique would allow ADSL download speeds exceeding 5 Mb/s with a range of about 7500 m and averaging about 10 Mb/s with a range of about 6 km from the local exchange (node) site.



Question: Why is Telstra not promoting non-urban ADSL? **Answer:** There is a much higher profit available through marketing GSM3 (3G) and GSM4 (4G) Internet connectivity plans, and G3/G4 totally blindsides the NBN infrastructure.



Question: What about homesteads that are further out than 7.5 km?

Answer: If the 0.64 mm pair copper cable were also “paired” then those further-out (up to almost 10 km) could use ADSL with speeds exceeding 5 Mb/s, and at 7 km distance, their ADSL download speeds would exceed 10 Mb/s. See the above chart.

Question: But what about Wireless connectivity for more remote homesteads?

Answer: Both Telstra and Optus are very actively pushing the sales plans of GSM3 (3G) and GSM (4G) because there are high profit margins with these technologies.

Question: Is there a problem with G3 and/or G4 in non-urban areas?

Answer: The problem is that these G3/G4 technologies have very limited physical ranges (and have considerable “blackspot areas”), particularly in non-urban environments. A high proportion of homesteads are “shaded” by hills.

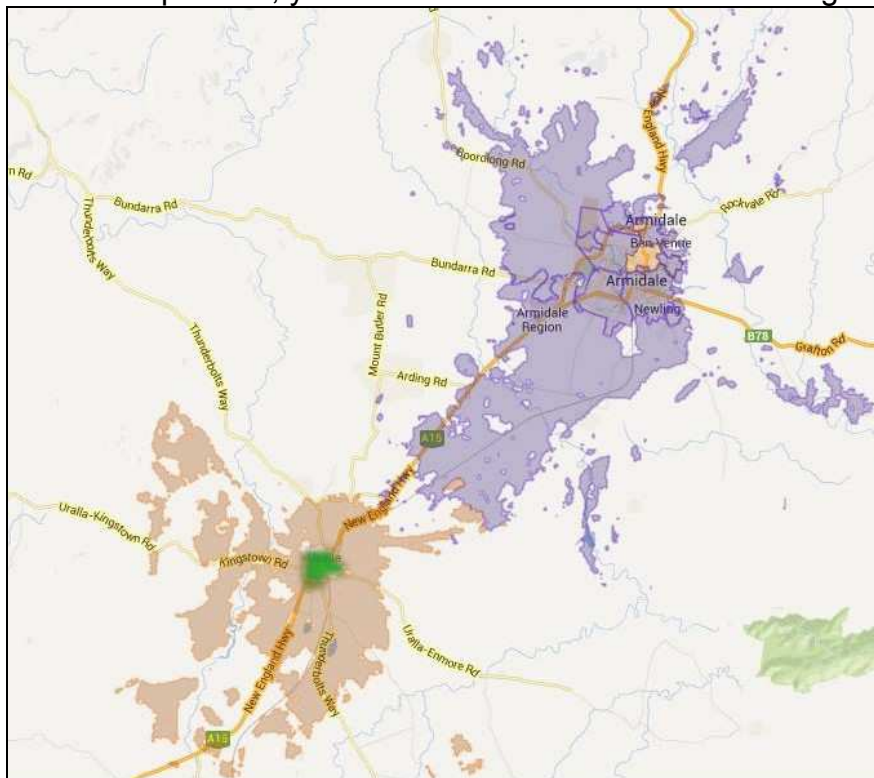
Question: Then what other long-distance CAN radio technologies are available?

Answer: There are three main technologies: Point-to-point Radio, Satellite (point to multi-point radio) and the recent CSIRO Ngara (point to multi-point radio).

Wide bandwidth capability point-to point radio is expensive and relatively high maintenance. Satellite technology is very expensive, has long transmission delays (because the geo-stationary satellite is so far away from earth); is prone to network congestion and is unreliable in cloudy or band weather.

The recent CSIRO-developed Ngara access network technology is very inexpensive, utilises the old/existing VHF TV bands / antenna and has a reliable Broadband range exceeding about 80 km at over 40 Mb/s bi-directional (download and upload).

Question: So how does the Ngara CAN technology compare with G3 / G4 technology for non-urban land mass coverage? **Answer:** If you look at the Armidale / Uralla map below, you can see the G3 / G4 radio coverage.



The comparative Ngara CAN radio coverage would connect and provide high speed Broadband connectivity to every homestead on this map (and far more) from only one TV tower!

Question: So why don't we use the Ngara CAN technology? **Answer:** When the McKinsey's Cost Benefit Analysis came out in 2012, the stipulation was to only use technologies that were readily commercially available before that time.

Question: Surely the McKinsey's people would have known about the Ngara CAN technology being developed? **Answer:** No, I very much doubt that the McKinsey's people had anything other than northern hemisphere telecomms manufacturer sales representatives, associated sales pamphlets, with extremely simple examples.

Question: But would not these Northern Hemisphere-based technology examples be perfectly suitable for Australia? **Answer:** Both the geographic and demographic structures of Australia are extremely different than European and northern USA / Canada; where most of this technology engineering is initiated and based on.

Almost all homesteads (farm houses and sheds) in the northern hemisphere are in towns and villages, and the houses / land are very compact. In Australia, virtually all homesteads in Australia are free standing and several km apart from each other, and the Australian farms are much larger than their northern hemisphere counterparts.

Question: Then what about GPON FTTP technology in Australia, would not that be globally universal in roll-out technique? **Answer:** **No!** The McKinsey Report has FTTP limited to just 10 km (which really suits northern hemisphere demographics)!

The physical limit of GPON FTTP is about 60 km, not 10 km. This means that virtually every homestead (within 40 km of an Optical Line Termination (OLT) at a local exchange site) in Australia could be inexpensively connected with FTTP as the preferred Broadband CAN connection.

Question: But how could the majority of homesteads be inexpensively connected with FTTP when there is no SMOF near these homesteads?

Answer: There is considerable SMOF already in the ground between towns and cities passing through most farms and near many homesteads.

Currently this SMOF is dedicated to Inter-Exchange Network (IEN) use. With some extensive lateral thinking (Engineering) this fibre can be shared for both CAN and IEN use and the fibre bandwidths can be inexpensively extended with newer transmission technologies.

As more new fibre cables are ploughed in, these can be nominally 144 fibre, at a very marginal cost and provide a substantial future-proofing for Australia's economy.

Question: Then what about the existing Hybrid Fibre Coax (HFC) and its continued use for Pay TV and Broadband Internet? **Answer:** This technology was "rush rolled out" in the metropolitan (State capital cities and all suburbs) with a minimum of engineering and a maximum cost scenario due to high competitive pressures.

While HFC in Australia literally covers all the metropolitan areas, it is physically restricted to premises that face onto the streets because the signal loss to connect with "battle axe" premises is too great and would need line amplification to make these (nominally 20%) premises able to also use HFC.

Question: Then why does Telstra and Optus not re-engineer the HFC CAN for these consumers to have Broadband to their premises? **Answer:** Re-engineering this HFC CAN technology is a messy and expensive engineering process and far greater profits for the shareholders can be gained by moving these consumers onto Satellite for Pay TV along with G3 /G4 for Internet connectivity.

Question: Then why is there such a hard a push for HFC Internet to replace ADSL as an interim Broadband step towards FTTP, when parallel “paired” copper pairs on local exchange located DSLAM equipment can provide almost all urban premises with over 16 Mb/s download speeds? **Answer:** Firstly, very inexpensive “paired” (parallel connected CAN pairs) has probably never been considered because this depth of transmission Engineering expertise was progressively lost from Telstra as SMOF digital technologies came to the fore in the early 1990s.

Secondly, I believe that those pushing for extended HFC Internet are really pushing for a time extension and consumer expansion of Pay TV services.

Thirdly, I believe that Telstra is really pushing very hard for G3/G4 sales plans in preference to the NBN FTTP, with full and covert intent that the NBN business plan will fail and that Telstra will then absorb the NBN into itself.

We have HFC and it is not reliable /fast enough for IT business.

Question: Why is HFC Internet not fast and reliable enough for business?

Answer: HFC Internet, like ADSL and G3/G4, and PON FTTP are all consumer products that by design engineering have a much lower expected usage than Telecomms products that are really engineered for the commercial market.

Assuming the NBN engineers get their network structure right, they will include a considerable number of direct FTTP that are suited to IT business purposes. Telstra and Optus already have considerable amounts of direct FTTP CAN for business in place and ready to connect, but only in a few major cities.

We have a radio tower going up in an area that impinges on us.

Question: Why is a radio tower (that we specifically do not want) going up in our back yard? **Answer:** Radio frequencies below about 100 MHz tend to curl around the earth and be picked up fairly easily, but the antenna is big. Radio frequencies above about 500 MHz tend to radiate like light, and this is why there are so many black-spots where transmitter antenna cannot “see” the receiver (personal device).

G3/G4 radio transmission is up around the 1 GHz range (not 2.4 GHz as your microwave cooker, and certainly far, far weaker than that used by a microwave cooker)!

Question: What is an easy fix for the small radioi black spots were mobile devices fall out all the time? **Answer:** The easy fix for G3/G4 “black spots” is to put in several very low power radio “towers” in the “black-spot” valleys.

Question: How else can we get rid of these ugly towers? **Answer:** If the NBN engineers were unshackled from the very narrow engineering minded McKinseys Report, then these NBN engineers would have planned FTTP working out past 40 km from the local exchange sites and this would literally eliminate the unnecessary requirement for these unnecessary radio towers in your area.

Question: How do we maximise the ADSL speed on existing pair cable without resorting to very expensive Fibre to the Node (FTTN) technology? **Answer:** Very inexpensively, parallel connect the existing spare consumer pairs in these cables.

In Australia over the past decade, the number of phone lines has dropped from about 10,000,000 to about 7,000,000 and is falling. Physical phone lines are no longer in critically short supply. So now we have spare copper pairs in the cables in the streets, and plenty of upset consumers on slow ADSL services.

If two sets of copper pairs from the same layer within that a cable are parallel joined, then I believe (through my more than 30 years expertise in this technology) that the insertion loss will literally halve. This engineering initiative has immense implications.

In practical terms; two 0.40 mm copper pairs, when parallel connected at each end to each other will electrically look very much like a single 0.64 mm pair copper cable and have a transmission throughput that would align with the BLUE line above.

In other words, there is absolutely no reason to put in expensive and short term thinking Fibre to the external Node (FTTN) technology, as simply pairing existing urban pair cable pairs will provide all these consumers on longer CAN lengths with ADSL download speeds exceeding 16 Mb/s in all Urban areas!

Question: Why is ADSL not really available outside the 4.1 km urban areas.

Answer: Because Telstra engineered the pair copper cable for minimum cost, maximum-attenuation telephony connections, and ADSL will not work under these maximum attenuation conditions.

Question: Can this maximum loss situation be significantly reduced so ADSL could be inexpensively connected? **Answer:** In many cases yes it can.

Question: How can inexpensive ADSL be enabled for these non-urban customers?

Answer: If two pairs of 0.40 mm pair copper in the same layer of cable are parallel connected then the attenuation in the ADSL range is significantly reduced.

The chart below shows the typical **Non-Urban ADSL download Speed v Length** for physical pairs, where the 0.40 mm length of pair copper has been parallel connected.

In most non-urban situations, the 0.40 mm pair cable is relatively short (ie usually under 1.5 km from the local exchange to the first pit / pillar), but this thin diameter pair copper creates the majority of attenuation that in turn cripples the possibility of ADSL out to non-urban areas.

Question: So, why didn't Telstra use paired cables to provide ADSL to non-urban consumers? **Answer:** Because Telstra is a competitive infrastructure business focussed on maximising the profits for its shareholders. Rolling out proper infrastructure impinges on the shareholder profits!

After all; these are consumer lines and far more profit can be gained by moving the consumers to GSM3 (3G) or GSM4 (4G).

Question: So, why is Telstra not physically split to keep the competitive private sector out of the infrastructure, and really maximise its shareholder profits through retail reselling? **Answer:** USA enforced western economics heavily fosters private

sector competition / greed over the massive “economies of scale” efficiencies that would prevent the need for these Select Senate Inquiries on Telecommunications.

Competing telecomms businesses will fix everything.

Question: Our western economics teachings tell us that increased competition will produce the best economic outcome. The why after more than 20 years of telecomms competition in Australia is the NBN Co set up to provide the infrastructure that should have been provided by Telstra, Optus and a host of other competitive telecomms infrastructure providers several years ago?

Answer: These teachings covertly avoided to mention that as competition is increased, so too does the overhead costs, and that anything but the weakest competition scenario to be extremely inefficient / expensive to operate.

Question: So why do we have the ACCC continually harping on about increased competition will increase business efficiency? **Answer:** In 1953, the Menzies Government signed the ANZUS treaty that locked Australia under USA / WTO / IMF economic rules to enforce competition at every opportunity. This is why we have the ACCC to promote heavier competition and prevent infrastructure business efficiencies in Australia.

Question: In 1991/2 Telecom Australia was poised to advance from pair copper to FTTP, why was this canned? **Answer:** At that time the Telecom Research Labs (TRL) were world leaders in Optical Fibre techniques and FTTP was a very new CAN technology. Concurrently, Telecom Australia was going through a structural change to become far more commercially focussed and far less infrastructure focussed.

With the name change to Telstra, and the heavy focus on far fewer equipment suppliers, FTTP development in TRL was quickly ceased and alternative Broadband CAN technologies of HFC and ADSL were far more favourably considered. GSM2 was becoming popular for mobile devices.

Question: So how did increased competition help improve telecomms in Australia?

Answer: On the retail reselling side of the equation, increased competition brought in a significant number of retail resellers and a few vertically integrated (infrastructure through to retail product) service providers.

This increased number of retail resellers was really the result of a vastly increased number of commercial telecomms products that gradually became available through the advancement from analogue telecomms infrastructure to digitally based telecomms infrastructures including TCP/IP. It was purely digital technologies that created competition and certainly not competition that created digital technologies.

On the infrastructure side of telecomms in Australia, this came at a very dear expense to Telecom Australia / Telstra and covertly to most Australian businesses and the Australian community, particularly in country areas.

As the “competitive” telecomms infrastructures have developed their business models, the focus is closer and closer on short-term gain for maximised financial return on investment the shareholders.

As a direct consequence, the higher density populated areas (ie the capital cities / “metropolitan”) have been grossly oversupplied with telecommunications infrastructure and the remainder had been literally starved of telecommunications infrastructure. So increased competition actually aggravated the bad situation.

Question: What has been done to correct this massive displacement of telecomms infrastructure in Australia? **Answer:** Successive Federal Governments have funded several commercially-based “initiatives” that all failed because these initiatives are commercial business based.

Question: Why did the these commercially business-based telecomms infrastructure initiatives fail and so quickly? **Answer:** The free market (western / USA) economic theory is fundamentally flawed, because of greed to gouge out the ROI as short-term shareholder profits and not long-term invest in areas that have a low ROI.

The underlying problem that the telecomms infrastructure is just that – “infrastructure” and it is being managed by a “competition business” mindset, where it is imperative that the infrastructure be managed by an “infrastructure business” mindset.

Question: I have never heard of an Infrastructure Business mindset, why is that?

Answer: You have deliberately not been taught about Infrastructure Business mindset, because you have incorrectly taught that increased competition would result in increased profitability (now you are beginning to understand why this is so).

Question: What proof do you have that the competitive telecomms businesses are operating under a flawed economic theory? **Answer:** Since about 1994, there have been over 14 Select Senate Inquiries that have looked into this topic and never come up with anything more than lip service, except to introduce another Government funded National Broadband Network (NBN) in competition and also working with the existing vertically integrated telecomms businesses in Australia.

If any of these previous Select Senate Inquiries was really worth their money, and actively used the information provided to them, then they would have immediately:

- Enforced the physical separation of Telstra, Optus and other vertically integrated telecomms competitive businesses; such that the infrastructure is separated from the retail reselling / marketing;
- Merged all the infrastructures into one telecomms infrastructure business together with the existing NBN infrastructure business to provide a larger, far less expensive, far better performing, substantially more robust, complete wholesale telecomms product for competitive resale as retail.
- Fostered competitive business between the telecomms retail resellers with a far larger wholesale base to work with for even greater shareholder profits.

Question: So what it wrong with the current NBN? **Answer:** Now we need to talk!

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