

If At First You Don't Succeed, ...

Charles Todd Oration 2024

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Abstract: This is the Charles Todd Oration 2024, delivered by Will Irving on 17 October 2024 in Sydney. It outlines, from a Telstra-internal viewpoint, the various proposed network enhancements that eventually led to Australia's National Broadband Network. It then draws lessons for the future from this history and the current state of telecommunications in Australia. The question-and-answer session after the Oration is also summarised.

Keywords: nbn, National Broadband Network, History of Australian Telecommunications, Charles Todd Oration

Introduction

This is a near-verbatim record of the Oration. It has been edited for clarity.

Well, good afternoon. Thank you, Rob, for your very kind introduction and for acknowledging the traditional owners of the country on which we are meeting. Just as Sir Charles Todd's era has had books written about it, so **nbn**'s Chair, Kate McKenzie, has sometimes mused: "Will, you should write a book about this". But, to borrow one of Clint Eastwood's lines: "A man's got to know his limitations". So, you will be relieved to know there will be no book.

Speaking of limitations, I should stress that I am not here in any official capacity. This story and these reflections are mine, and mine alone — to aid informed debate, based on imperfect memory — and are inherently subjective. Some of the quotes you will hear I remember verbatim. Others are 'words to that effect', so I hope those whom I misquote or misunderstood will forgive me.

Today, I will take you to a few pivotal moments in the evolution of the National Broadband Network (NBN) — to help explain why things panned out the way they did — and then I will draw out some lessons for Universal Service reform.

Speaking of lessons, as a teenager, I was given a cartoon of Garfield the Cat saying: “If you’re supposed to learn from your mistakes, then I should be a genius by now”. In other words, it is easy to make mistakes, but often hard to learn from them. On that basis, the path to an NBN created a few geniuses — me included!

There were four failed attempts at a National Broadband Network — an ‘NBN’ — before today’s **nbn** Co Limited came into being. Hence today’s subject:

“If at first you don’t succeed, try, try again”.

This phrase was popularised in Edward Hickson’s *Moral Song*, republished in 1857. This was the year after Charles Todd — at age 30, South Australia’s Observer and Superintendent of the Electric Telegraph — and his Victorian counterpart had jointly proposed constructing a single Overland Telegraph line from Darwin to Adelaide (and hence to Melbourne and Sydney), with Darwin connected by sub-sea cable to Singapore and the Empire.

This transformative project brought Australia a step-change in connectedness. Completed in 1872, it cost £480,000. Using comparative average weekly earnings, that is \$950 million today. When you consider that Australia’s European population back then was 1.8 million — 1/15th of today — that is the equivalent of \$14 billion in relative national income terms. It was indeed the **nbn** of its day!

The NBN and Attempt Number 1

Sol Trujillo had had 17 different jobs at US West — the US telco most like Telstra — before becoming Telstra’s CEO on Friday, 1 July 2005. He had started as a graduate and overcame significant prejudice along the way. He had also been CEO at Orange Mobile in Europe and on boards including PepsiCo and Bank of America. He remained on the board of US retailer Target.

Welcome to the Telstra Boardroom on Wednesday evening, 6 July 2005. Phil Burgess, Sol’s incoming head of Public Policy & Communications, has come straight from the airport. He has been reading up on Australia. Phil reads a lot.

Sol’s Transformation plans — to be announced in November — are Big. Really Big. We are already working round the clock on them.

I am Telstra’s General Counsel. I had briefed Sol on regulation two days prior. He is keenly interested in Access Regulation: and incensed that Telstra’s merits appeal rights have been removed.

We turn to Access Regulation. Sol looks over at me:

“So, Will, there’s no Bill of Rights in Australia, is there?”. “No, Sol”, I reply.

“So that’s how come they could take our appeal rights away.”

“Well Sol, there isn’t a Bill of Rights, but we have a constitution modelled on the US and it contains some similar protections but is less prescriptive than the Bill of Rights.”

Phil jumps in:

“Sol, ya gotta understand — the Minister here is a dictator — she can do what she likes.”

[The Minister at the time was Senator Helen Coonan.]

Sue Cato — also a new face to me that evening and there to help Sol navigate Australian media — bristles, as do I.

“Well Sol, it’s not quite that simple. The Minister sits in parliament and has Ministerial accountability. Unlike the President’s cabinet, she is elected. Phil is right that the government can do a lot — especially as this government has control of the Senate — but the will of the people in a democracy means it’s fair enough that elected officials can govern.”

I get a glare from Sol.

“And there are rules about due process and implied constitutional protections too and there’s a free press, so governments get scrutinised.”

Sol is not convinced:

“But, Will, the Minister can issue licence conditions and the ACCC has driven wholesale pricing below cost, and it seems like there’s nothing we can do about it.”

I reply:

“Kind of, but not entirely — we have a takings clause in the Constitution, just like the US, and it’s famous here as ‘the vibe’ clause, thanks to a movie called *The Castle*. But it’s not that useful given the access regime is legislated and in theory we choose to hold our licence.

“Also, telecoms is a really big political issue in a country as big as the US with a fraction of the population. Telecoms is the fifth Federal Power — it’s right up the front between funding government and defence.”

“Go Will!”, says Sue.

Sol concludes:

“Well, Will, we have to find a way to change things. I’m going to need your plan to help save this company.”

So, some observations:

1. Telstra subsequently ran and lost a ‘vibe’ case in the High Court. It was later cited as one reason the 2009 NBN fibre plan bypassed Telstra.
2. I had to chuckle about Phil’s “dictator” comment in 2012 when Communications Minister Conroy publicly noted that his powers meant: “If I say... ‘you better wear red underpants on your head’...[then] you’ll be wearing them on your head”! ([ABC News, 2012](#)).
3. Sol’s depth of thought – in this case to go to the foundations of Australia’s democracy – and his passion for a ‘fair go’ were under-appreciated, but core to him. To this day, he is a champion for diversity and inclusion – based always on hard work, ability and results.

Next, to late July 2005: Sol is four weeks into his tenure. Sol and Greg Winn – Telstra’s new Chief Operations Officer – go to Blackall in Queensland and visit a small school at the start of the day. One student turns on the computer, connects the modem, and then the class goes outside because their first lesson download takes 45 minutes.

Greg, who had fought in Vietnam and put himself through higher education, was shocked. After telling the Telstra Leadership Team what he had seen, he added: “We’re giving rural kids a third-world education with barely working dial-up internet. We have to fix this.”

Scroll forward two weeks to 11 August 2005. Sol and Donald McGauchie, Telstra’s Chair, head to Canberra to meet with the Prime Minister, Treasurer, Communications Minister and Leader of the Nationals to propose the first NBN: a 6 Mbps network (100x faster than dial-up); \$2.6B from the government for rural Australia; and \$3.1 billion from Telstra. The catch: Telstra wants an access holiday to avoid Unconditioned Local Loop pricing. There is also a \$4.7B option that we will return to later.

The Government quickly says no, but suggests talking to the Australian Competition and Consumer Commission (ACCC).

Forward to November’s Investor Day. Telstra’s 5-year Transformation is announced: a national 3G mobile network – to be the world’s fastest; an MPLS core network; Marketing and IT Transformations; and Bigpond will start movie downloads. But no NBN. In December 2005, Telstra holds a more detailed briefing to urge regulatory reform.

NBN Attempt Number 2

In March 2006, Phil Burgess and ACCC chair, Graeme Samuel, start discussing an access deal. Much progress is made but pricing is the problem, especially the rural cross-subsidy required. Discussions end in early August ([Herald Sun, 2006](#)). There is disappointment, but no real surprise.

In parallel, preparations for T3 [the third tranche of Telstra shares; [ANAO, 2008](#)] are in full swing, but they are very tense. Negotiating how to accurately portray the regulatory risks to investors — when the vendor shareholder controls those risks and also has to sign off — is a delicate balancing act. There is external pressure on some of us to be ‘good Australians’. We resist. Finally, in late August, T3 is announced.

Then, in October 2006, way ahead of what anyone outside Telstra thought possible, the world’s fastest *national* 3G network, NextG, is launched. It is a measure of Telstra’s heightened competitive instincts that, when sprinklers malfunction inside Sydney’s Overseas Passenger Terminal Auditorium during the launch, it is only half-jokingly suggested that Optus might have been behind our drenching.

Into 2007 and Attempt Number 3

Telstra hopes a new version of an NBN might be a signature win ahead of the upcoming election. So too does Communications Minister Helen Coonan and her ‘we can get things done’ Chief of Staff, Peta Credlin. We go to work on a Telstra-Government deal. At one point, Sol and Helen meet to nut out remaining details. The advisers wait outside. Out they come and Helen’s first words are: “It’s a boy”.

This will be superfast FTTN/VDSL, up to 50Mbps; \$5 billion plus — all Telstra’s money; the major cities; and, in Sol’s back pocket, Telstra will fund 100 regional towns as the deal sweetener.

All it needs is an access price that guarantees a risk-based return. An NBN is risky. Will enough people buy broadband? Remember that the iPhone has not been launched. Nokia has half the mobile market. Blockbuster DVD rental shops are in every suburb.

By ANZAC Day 2007 [25 April 2007], we have a Heads of Agreement almost done, just awaiting a final price. Multiple rounds with the ACCC have us close. It is lower than Sol wants, but Telstra can live with it. There is a narrow legislative drafting window with the Office of Parliamentary Counsel for necessary enabling legislation, but they need instructions quickly.

But the ACCC just keeps asking for lower pricing. Maybe the Prime Minister will save the day and step in? Hours, days tick by and then: no deal. After yet another request to cut the price, Sol has had more than enough and decides they are not serious ([Sainsbury, 2007](#); [O’Sullivan et al., 2007](#)).

Things then go from bad to worse for Telstra in Canberra.

By the time of the Merrill Lynch Australia Investor Conference in New York in September 2007, Sol does not even dodge the election question when asked. He says:

“Well, as an American, I don’t get to vote, but if I did and I was voting on the basis of broadband policy, then I’d vote for Kevin Rudd” ([“Trujillo praises Labor”, 2007](#)).

November 2007’s ‘Rudd-slide’ Occurs and Ushers in Attempt Number 4

With the new government implementing its election policy, Telstra’s August 2005, \$4.7 billion option is opened to all-comers. As new Communications Minister Conroy wryly notes: “Telstra’s never underquoted on the cost of anything before”! ([Australian Senate, 2008](#), p. 202). The Request-For-Proposals (RFP) process begins in April 2008, with a November closing date.

A month later, the Telstra ‘Brains Trust’ goes to Bowral to war-game what could happen. (The GFC [Global Financial Crisis] is rumbling. A prescient Telstra Chief Financial Officer, John Stanhope, has just modelled a major US bank going broke.) Our conclusion: it will be either Telstra or the Government building the NBN. Everyone else will fall by the wayside.

Now if we are right, this presents a real problem. Buried in the RFP are two troublesome requirements. Firstly, to win, proponents will likely need to provide detailed engineering plans. Secondly, the Intellectual Property in the bid becomes government property.

Whilst Telstra prepares a full bid, those requirements mean that Telstra is unlikely to lodge it. Telstra handing over crucial intellectual property for free? No fiduciary could sensibly volunteer for that.

Then there are the political rumblings through 2008 about forcibly separating Telstra. This further reduces Telstra’s confidence that its intellectual property would be safe. Telstra boycotts the final RFP briefing in protest.

By the time bids are due in November, there is a bigger issue than the RFP: the GFC. A former bank CEO tells us: “If we don’t end up in a great depression, it will be the closest we come to it in our lifetimes”.

On the day of submission, all 5000 pages of bid materials are put in his car boot and driven to Canberra by Telstra’s Bid team head. After much debate, Telstra lodges only a summary proposal and, to show good faith, puts the full bid into escrow at a law firm.

Telstra is hoping, but not expecting, that the government might be flexible. It is not to be. Telstra is quickly kicked out of the RFP process, but, having boycotted the final RFP briefing, is surprised by the reason given ([Stevens, 2008](#)).

It makes little difference to the outcome.

I have mentioned the threats of separation. In parallel to the RFP, Telstra, like Telecom New Zealand, is considering demerging its regulated and retail businesses. The regulated business would then have clear, wholesale-only incentives and could negotiate to build an NBN. Or, if extreme regulation continues, the regulated company might go broke and the regulatory failure would be obvious. Telecom NZ did choose demerger — and, whilst a regulated Chorus had a very bumpy regulatory patch a few years later, New Zealand now provides an insightful counter-factual to Australia.

In Telstra's case, the proposed demerger companies have the working names of 'Copper Loop Co' and 'EEFRA' — Everything Except the Fixed Regulated Assets (aka 'Telstra Retail').

At the Consumer Electronics Show in Las Vegas in January 2009, the Telstra Board seriously considers a demerger. Now, you will appreciate that 'What happens in Vegas, stays in Vegas'. So, whilst Telstra never proceeds, that is not for want of a full and frank discussion.

Sol's departure is announced in February 2009, with a June exit. Meanwhile, as Telstra's war game had predicted, it seems like there are no other bankable bids. Should Telstra go back to the Government with a fresh proposal? Offer to demerge? Some of us think so.

Sol is still in charge:

“Will, there's a time to hold 'em, a time to fold 'em and a time to run away. Right now, they need the copper. We own it, and we're holding.”

Then, at the start of April, there are rumours that the government is going to build an all-fibre network, so they would not need Telstra's copper. But a fibre network will cost at least \$40 billion. Telstra's market capitalisation is well lower than that. With that kind of money, they could nationalise Telstra if they wanted!

You can imagine sitting in Sol's office watching *Sky News* on 7 April 2009 as the Prime Minister and Senator Conroy announce a \$43 billion plan for an NBN co. to bypass Telstra — along with the accompanying “gun to Telstra's head to encourage co-operation” ([Rodgers, 2009](#)). You may think Sol's reaction would have been very predictable. It is more one of lost opportunity than I expect.

My current employer, nbn Co Limited, is incorporated two days later.

Solomon Trujillo and Donald McGauchie

Sol and Donald McGauchie both leave Telstra in early May. Before I move on, this Oration is the appropriate place to note two people and a partnership that has had a profound influence on our industry: Telstra Chair, Donald McGauchie, and Solomon Trujillo.

Sol's energy, intellect and force of will have arguably shaped our industry in Australia more than anyone in recent times. Before Sol arrived, Telstra had two-and-a-half sub-scale mobile networks, Australia was not really on the global telco map, and an NBN was not a political issue.

Telstra's prior CEO, Ziggy Switkowski, had fought hard too. He had even faced down a notional billion dollars in ACCC fines for creating a rational broadband market. But, when Sol arrived, there was a feeling at Telstra that only so much was possible.

Whilst the importance of communications was understood, what was possible was not understood. When Telstra launched NextG in 2006, it ran ads with a school classroom saying a mobile phone was a map, a phone book, a TV, even a bank. People laughed.

Today, Australia has three of the world's best mobile networks. Led by Telstra, the others invested to compete. We have a generation of telco leaders who learned how to work and compete with an intensity they had not needed before. And we have an **nbn** that, in terms of national availability and customer choice, is world leading.

I mention Donald McGauchie — and it took the Board too, of course — but the CEO-Chair relationship was the key. Sol could not have persevered without Donald's staunch backing and willingness to put his reputation and old friendships at risk in pursuit of a dramatic improvement in Australia's digital infrastructure.

Lessons to be Learnt

So, 20 years on, what are the lessons from that era? In my view, the mistakes to be avoided are:

1. Poor communication, made far worse when the media is used to convey messages.
2. Misunderstood motivations and suspicion.
3. Lack of technical understanding and/or great engineering advice.
4. Lack of economic understanding: companies cannot act expecting to hurt shareholders.
5. Populist thinking, but equally, ignoring political reality.
6. A desire to overly shift risk, or to overreach when regulating.
7. Rigid processes that do not allow iteration or learning.

To borrow the primary message of the Harvard Negotiating School: Focus on interests and not positions, and work for a deal that lets the other side have it your way ([Shonk, 2024](#)).

So, to the Future

As we think about Universal Service Obligation (USO) reform, we need to start with the world today, not the legacy regulation we are used to.

Historically, we have separated voice and data regulation. But today, voice — and I include Triple Zero [emergency service number] — is just another app needing high reliability. Treating voice separately to data is an anachronism.

In terms of volume, the average household uses 500 GB a month compared to 15 GB for a mobile. Capacity really matters.

Consistent speed is also important. Waiting hours to download a new game on a 50 Mbps service does not make for a great family Christmas. Likewise, speed is valuable if you learn or work on video, in the cloud, with digital media or, increasingly, with AI.

We should not be put off by some views that we are reaching peak demand for data. Whilst video watching will peak, screen sizes and definitions, localised AI models, 3D virtualisation, co-bots (robots working with humans) and pretty much every other technology under development right now is connected and needs data. I think in 20 years' time, by 2044, we will look back at 50 Mbps in 2024 the same way that we now look back 20 years at the standard speed in Australia of 256 Kbps in 2004 — it is hard to imagine that the standard speed in Australian homes was so slow.

So, for reliability, consistency, capacity, latency and speed, here are the primary 'go-to' on-premises technologies we should prioritise, based on population density:

1. FTTP — or multi-Gigabit-capable precursors like HFC — to around 91%.
2. Terrestrial dedicated Fixed Wireless for capacity — for the 91-98% areas.
3. Low Earth Orbit Satellites (LEOs) for the last 2%.

The **nbn** today carries close to 85% of all data in Australia, so these three networks need to carry that load.

Mobile capacity is, of course, very important too and is continually growing, but so too is mobile usage. In terms of future capacity, it seems wise to keep mobile capacity for mobile uses. For example, if ever car cameras are networked for self-driving, mobile capacity will be fully used. Conversely, all the better to keep dedicated stationary networks for high-capacity fixed uses.

Then, rather than overlapping retail voice and wholesale data obligations, to me, an option worthy of consideration is a single Statutory Communications Provider (SCP) in each location where there is locally owned high-capacity fixed services infrastructure.

This would mean **nbn** or its vibrant greenfields competitors are the SCPs. Today, such an SCP footprint would cover all of Australia, given **nbn** currently has two geostationary satellites (which are running better than ever, by the way). However, those GEOs will be decommissioned within the next decade, so **nbn** will not have infrastructure for the last 2% forever. This is where LEOs come to the fore.

Starlink covers everyone today and it is likely that at least Amazon's LEO service will too in coming years, with others possible as well. Starlink is expensive, but that will likely not always be so — at least not everywhere.

You then add in Telstra's 99.6% mobile population coverage, Optus at close to 99%, and TPG expanding too. Layer in an **nbn** with huge capacity, by comparison, out to 98%+, maybe more, and the redundancy issue is not the hurdle it may seem.

Sitting underneath all that capacity is Telstra's rural copper. If it did not exist today, there is no way we would build it, let alone spend \$270 m+ per year maintaining it. It is even more outdated now that the dramatic speed and capacity upgrade to **nbn**'s Fixed Wireless network is almost complete.

So, the only logical question to me is: How fast can we exit USO copper and the disproportionately expensive service obligations attached to it, and save a chunk of that \$270+ million annual spend in the long term?

Remote twisted-pair copper is one of the least reliable technologies in my opinion — especially in a hot and wet climate. And, when remote copper lines are washed away, they can take months to repair.

Exchange-based power is the only reason I can see left for keeping copper, but mobile phone battery recharging packs are now cheap. Solar-powered LEOs do not run out of sunlight in orbit.

So, in the 2% or so beyond **nbn**'s terrestrial networks: mobile coverage mostly, plus LEOs everywhere, will be the answer for emergency voice.

So then, provided LEOs are available and priced competitively, do we need to regulate more?

Telstra is no longer required to deliver telephone directories to every doorstep in Australia, thanks to global-scale players like Google, Facebook and LinkedIn. So too, in the case of LEOs, we should seek the benefits of global scale and competition, and be careful not to regulate simply because we are used to 'having a throat to choke'.

Having said that, for professional installs and service, or to enable more retail choices, there may be roles for a wholesaler to play. The key then is that the reasons for adding regulation

and funding are clear, well-articulated, fill gaps not otherwise filled, and are done in the most efficient way possible.

As an aside, I do not see LEOs displacing modern terrestrial networks. They will compete — and vigorously in less dense areas — but, given short lifecycles of 5-7 years and associated costs, plus the amount of actual overhead capacity growth versus demand growth, it is hard to see major substitution. If anything, genuinely ‘always on’ 100% coverage may encourage digitisation and more usage of all networks.

How to pay for it

Finally, support of rural and remote communities is important for Australia’s wellbeing. Funding — for past investments, for network augmentation, for service quality, and for customer choice — is rightly all our responsibility.

Firstly, we need to reduce costs where we can. Exiting copper particularly, and **nbn**’s GEOs when prudent, will save money in the long term.

Today’s technology and functionally-specific levies create distortions. The challenge with continuing current approaches is that we will have fixed, fixed wireless, handheld mobile and fixed LEO, portable LEO, handheld LEO, plus non-**nbn** GEO services too. To me, there is a simple solution, but, to borrow another phrase I first heard from Phil Burgess, that topic is “above my pay grade”.

I do think Telstra will need to give up its TUSOPA [Telstra Universal Service Obligation Performance Agreement] entitlements, but equally, it avoids worsening copper economics and various down-side scenarios. Hopefully, it has learned a lesson about not over-playing its hand.

Conclusion

So, in conclusion:

1. Listening — especially to customers, this industry, stakeholder groups and all decision makers — is vital. Clear, consistent, balanced but suitably optimistic communication to assist change is then essential. There is much to be optimistic about. To quote a former Telstra colleague: “Sell hope, but paint reality”.
2. Every day of delay means wasted money and people missing out on better outcomes. We in this industry need to show what is possible and engage widely.

In words Sol might find familiar and Sir Charles would also have understood: ‘You can’t fight city hall, but sometimes they can be persuaded with a very good idea’.

Question-and-Answer Session

This section was taken from the video of the Oration. It has been edited, mainly for brevity and to remove repetition.

Q: In the industry in 2007, there were a large number of ISPs [Internet Service Providers], who were later consolidated into larger entities. Could the NBN have come about from this, despite Telstra?

An interesting question. Before Sol, with Ziggy back in 2004, we looked at broadband pricing and the state of competition. There were more than 600 ISPs in Australia. That was more globally than in any other country, by a mile, even though we have a fraction of the population of much larger countries. And, from Telstra's perspective, it was just driving a whole lot of inefficiency. It was suggestive of regulatory arbitrage, not businesses with capital.

To give one example: After complaints about one ISP, which had gone offline, the Telstra Wholesale service people called to ask: "Why are you offline?" And the lady on the line said: "I told him to clean his room and I turned off the box [the ISP server], and it's not going on until he does". I am not making that up — that was an ISP.

The focus at Telstra was to create a rational broadband market. Without consolidation, we were not going to see, in my view, the quality of service that was needed to give customers the confidence to move, in those days, from dial-up to broadband. Remember there was a discussion at the time with Graeme Samuel about "fraudband": whether 128 kbps was broadband or not? We needed to get industrial scale and quality to get to facilities-based competition, which was the holy grail of the regime in the 90s. That wasn't going to happen with 600 ISPs.

Then you think about content. In November 2005, Bigpond spent a huge amount of Telstra money on launching downloads of content (i.e., movies), but that also triggered the rest of the industry to invest. For example, think about Optus's strategy in the last five years with the English Premier League. Think about the arrival of Fetch (and amazing that that has ended up as a Telstra product given that for a long time it was a prime competitor to Telstra), but that's again global scale and everybody (Netflix, Disney etc.) coming in.

So back to your question. No, we had to go through that consolidation in those days. Then you think about the next wave of competition now with a lot of the infrastructure build and you look at this week's announcements around Vocus. If you thought back to 2005/6, all those names that ultimately went into TPG — into iiNet — and then into Amcom and M2 and Vocus and Commander and so on — we've now got industrial scale and we've got a measure of facilities competition that was undreamed of in 2004. So, I think we had to go through the

consolidation because, effectively, if one of the goals of regulation is efficient competition, then you have to create the grounds for efficiency.

Q: Please comment on the 121 Points of Interconnect (PoIs) for **nbn**. They create a problem of scale for a small RSP [Retail Service Provider] to reach all of them. Is this necessary?

Lots in that question! It is fair to say that, if you go back originally, there were two things driving the number of PoIs. One was the concept that you would need data caching close to customers for a bunch of reasons, so 121 PoIs put you close to customers. Secondly, back to consolidation, it was also going to drive, at the core network level, a degree of consolidation — think about Telstra, Optus, TPG, Vocus and Aussie Broadband — and it took us pretty much until 2017/18 before you got those core 121 PoIs all connected to those kind of larger wholesale infrastructure players.

There is still a question again: if you think about most parts of the Australian economy, what kind of number of material suppliers do you get to, and have a level of efficiency with, given 7.2 million square kilometres and 27 million people? It's not my place at **nbn** to comment right now, because the 121 is set. I think it is fair to say that if you were to arrive from Mars today, you would do a lot less than that, but, again, like so many things, we are in the world we are in. It is that old Irish joke that you may not want to start from here to get to Dublin — but this is where we've got to start from.

Q: Please comment on serving the last 2% of customers by LEOs vs GEOs, noting that satellites are expensive.

Again, **nbn** has quite publicly run a request for information from LEO providers. As I mentioned, we are now more than halfway through the life of our geostationary satellites, so it's a very clear and present issue; **nbn** has a statutory obligation to provide service to 100% of Australians, so, as we don't have LEOs right now, we should be working on what other alternatives there are, in an economically rational and sensible way, to provide that service. As I said in the speech, there's a question in fact whether that will be needed.

Today, there is only the one LEO provider, Starlink. If you look in the Australian market, Telstra resells that service, and you can also buy it from Starlink — but it's expensive, about \$125-odd at retail for the Telstra service, about \$140 if you buy the full product direct from Starlink. You compare that to the offers from Sky Muster Plus that are below \$100 in an unconstrained data context today. But that has a limited lifetime because of the lifetime of the GEO satellites.

The technology is definitely there. In New Zealand, Starlink has a product it is selling for NZ\$79 (about AUD 70). It's not available everywhere and it's slower speed, but it's perfectly good for many people if you read the Commerce Commission reports on it. Amazon — not a

small company, very well resourced, very technically capable — is, I think, and I think we all hope, going to get into the LEO business in the not-too-distant future. And, at that point, I think we will see pricing broadly comparable to what we see today in Australia for non Starlink services.

Remember today, if you buy Sky Muster, you don't pay for the installation of the dish; if you go to Starlink, you've got to do it yourself; and Telstra has blended an offer in between. There's going to be a lot more competition. If you look at the other businesses owned by Elon Musk, Space X's ultimate owner, you see a lot of competitive activity, price differentiation, and in different markets depending on different contexts, so, in that sense, I am an optimist.

Why? Firstly: global scale — as with the directories business — will end up replacing the need for local initiatives. Note though that when you think about the billions spent on **nbn** and a billion plus spent on the geostationary satellites, there was a phenomenal expenditure and we are paying for it today in the context of the regional broadband levy. We will need to pay that off — and that's a legacy that's sitting there.

Secondly, as I kind of mentioned, where the USO funding goes in the future should logically enable, even if its underlying price is higher than today's GEO-based offers, people in the bush to receive something at a broadly similar price to today. The service conditions, though, may be a bit different.

Q: What would have happened to **nbn** if the (previous) government had not mandated a multi-technology mix?

The analogy I have often used is that it is like a young couple, they're thinking about buying a house, and they've sort of got two choices. They're planning a family: do they buy a bigger house now? It is going to cost more, but it's all there. They don't need to move later. And it's going to be a lot more convenient. Or do they buy the smaller house, but with some land with room at the back, and then later on do the extension. They'll spend a little bit less now. They're going to spend maybe a bit more later. It's going to be more disruptive.

The first version of the NBN was to buy the big house early. The second version (multi-technology-mix) was not to buy the big house and to add the extension later. Nobody at the time had the benefit of hindsight, but with the knowledge now of what happened with COVID, I actually think that what was done was the right plan for Australia to get through a pandemic, because the NBN was, you know, declared built and fully operational during the first year of the pandemic. Certainly, when I was sitting at Telstra in 2010/11 negotiating the NBN deal, had someone suggested the idea that the NBN — and it was pure fibre at that point — would be finished by 2020, well, we would have fallen around laughing. In fact, a bunch of guarantees

were slated to run to 2027, which gives you an indication that Telstra was thinking that it might well take the NBN until 2027 to get finished.

It is a purely hypothetical question. You can look at other markets. I mentioned New Zealand, where things played out very differently. The key point is now, as I said, let's make the best of where we are from here. Sure, learn lessons, but, ultimately, the world ends up with multi-Gigabit service in my opinion. Now, is there an ideology around fibre? No, there's no ideology around what is going to deliver a reliable service at the capacity that is needed.

Q: Please comment on William Webb's thesis, in his recent book, *The End of Telecoms History*, that we have reached the speeds ultimately required for broadband.

I didn't mention the issue of speed in the speech. I don't think humans are going to watch a lot more TV; if the core thesis says we're not going to watch a lot more TV, well, I frankly agree, and having at least one teenager left in the house, I kind of hope that's true. But in the world of what we used to call, 10 or 20 years ago, machine-to-machine communications, the amount of data you need to download and continue to update things is large — like a large language model for what I'll call onboard AI.

Why does **nbn** carry close to 90% of the traffic in the country? Because most of the devices you are carrying will wait until they can get to a fixed network to do any communicating at scale. And it's not about: can you do it over however many hours it takes? It's about: can I do it now?

Now, to return to that example I was using earlier. You get on the freeway and, all right, it has a speed limit of 100 kph —and at 2 am or 4 am or even 6 am, you can travel at 100 kph. But, get on there at 5:45 pm at night, you're crawling along at 20 kph. The average speed is probably 90 kph — sounds great — but, when you need it, it's 20. And that's when that high speed — i.e., capacity at a point in time —becomes so important. And that's why I *do* think, you know, we will use higher capacity.

Finally, if you look at all the technology companies, you think about what at **nbn** we call "cobots" — this is robots working with humans which suddenly need LIDAR and spatial understanding. The robot in a factory doesn't need to know that, for example, my microphone is here [waving to touch the microphone]. A robot I'm working with needs to know where I am. And that then brings LIDAR; it brings multi-Gigabit needs.

We saw on the news last night that Australia is well below replacement rate for our population. China is getting to that point; Japan is already well at that point. Some of us when we're a lot older are going to likely have more than the robot vacuum cleaner floating around — and they're going to need, and we are going to need, a level of connectedness and data capability that we can only dream of. I meant it when I said 256 kbps 20 years ago: some of us wondered:

Yeah, why would you need more? Only fifteen percent of Telstra's customers were on Telstra's top speed of 1.5 Mbps back then. Why would you spend the money on 1.5 Mbps?

If you look at all of the investment in new technology globally, it is hard to think of a technology which does not rely on connected data to deliver it. Back in 2004, a guy called Reed Hastings just started dropping DVDs in satchels with the word 'Netflix' written on the side. When Netflix arrived in Australia, data use per Netflix customer went up 80% in one month. I don't know what the next Netflix will be, but I'm reasonably convinced — after 30 years this year since I first started working with Telstra — that data growth is not going to suddenly disappear.

Sell a lot of books, make a great debate for sure, but I'm not in the Webb camp.

Q: If Telstra had built the 2007 FTTN network, would we have been in a better position or, given the aging of the copper, would we effectively be in a worse position?

It's always interesting with any new technology. If you go early, you have that leading edge, early adopter problem; if you go late, you get the benefit of seeing what others have done, but you miss out for a period on whatever gains there are. I think what would have happened was essentially what has kind of happened in the context of the multi-technology mix. Telstra would've started on ADSL and then FTTN. With its \$5 billion, by about 2010/11, it would have got the cities done. And — back to our earlier conversation — we might well be sitting here today and you're saying: "you know what, 50 Mbps is not really enough".

We would have seen, I think, the HFC as it is today, but, rather than having it as, you know, either/or HFC or fibre, we would've seen a competitive layer in between the service and the HFC. At some point, Telstra would have had to separate some parts of its business. It might have been the HFC network. In North America, you know, that was the separation point. So, I think we would've ended up with those split up, rather than **nbn** controlling a single network.

We certainly would've got things done a lot quicker. The fact is that Chorus started with all of the incumbent assets of Telecom New Zealand and was finished earlier at a much, much smaller cost by comparison. I should note that Chorus received some government money as interest-free loans; it didn't receive the kind of capital of **nbn**.

But, like all these things, again, we are where we are. The job now for all of us, whether we are part of the **nbn** ecosystem or competing against the NBN, is: what do customers need? How can we most efficiently deliver that? If this industry focuses on customers, it will be OK. If we focus on ourselves, we'll continue to go around in circles.

Q: What is the impediment to USO reform?

It's a complex one, and some of it is probably — to borrow a phrase — "above my pay grade", but there is always a resistance to change. And, if you think about copper services, a lot of

people feel, for good reason, a measure of safety. They know it's powered from the exchange and they think if the power goes down — and, you know, in the middle of a natural disaster power is often the first thing that goes — well, I've still got my landline. And, yes, today we have power cubes; and the mobile operators, compared to a few years ago, have done a huge amount more on redundancy power at base stations and so on. But it is far from perfect. So, there's been a reluctance to say, well, I'm going to take something you've relied on for a long time — it has a measure of safety, it has one attribute that is different to its alternatives — and for the customers to say, gee, I don't want to let that go.

I didn't get into it in the speech, but I mentioned things going from bad to worse. In 2007, Telstra was pushing to switch off its 2G CDMA rural network to take the 850 MHz spectrum and refarm it to NextG. It proposed that, it had blue-ticked phones and a whole bunch of things, and there was a huge amount of resistance, so that the Minister of the day said no. Telstra, for a bunch of reasons that probably no telco would do today, decided to sue the Minister. The change of government happened. The new Minister made a different decision.

The day before that network got switched off — and, again, I am not particularly exaggerating — Telstra was getting some pretty serious threats about very nasty things being done to some of its staff, if it went ahead with the switch-off, because we were 'going to kill people'. And the day after, people were going: "Wow, this is so good. It's so much faster, it's so much better".

And, early on, there were some gaps in coverage. The old network had gone to a few places that the 3G network did not. But, over time, that network went far further. We are now out to 99.6%-odd of the population, compared to give-or-take 99% at that point. So, sometimes, yes, there is a short period of loss, but it's always that resistance to change.

That, to me, is the big issue. That then feeds into: well, do I want to be, as somebody who represents people, the person who is going to tell people I'm taking a "definite" away with a "maybe" to follow? Back to my point about the listening, and then the understanding, and then the explaining: maybe there's a case for doing it in different places first. We already do that internationally, but whether we do that domestically is a question that I think will get asked.

Q: What about sovereign risk with regard to foreign-owned LEO satellites?

It doesn't just apply in a LEO context, there are very many things where Australia, as less than 1% of the global economy, is dependent on others. There are kind of two layers to it, I think. One is: what potentially happens in a competitive market? Is there a dysfunctional market that therefore would cause a rational player to do something that otherwise might be irrational? I'm going to exit the market because something's happened here and there's sort of, you know, a risk that I choose to do so. So, I'm having a bad day and throwing a tantrum because X or Y

or Z happened and I just feel like having a go at someone. What's going on in Brazil at the moment, where you've got a bit of a power struggle going on, might be an example.

In my experience of these things, people ultimately are rational if you give them a chance to be rational. If you publicly box people into a corner — and this can be businesses trying to box governments into a corner or, you know, business to business or whatever it is — people pushed into a corner will come out with something you don't expect. It happened with the \$43 billion. Telstra did not expect it. The government was boxed into a corner and it came out, absolutely, in a way that, you know, triggered things.

I do think we will end up in a competitive market. I don't think it will be in any LEO operator's interest to decide that they want to depart. It is five-eyes based, which is a huge advantage. So I am relatively — you'll note my words, relatively — cautiously confident. There's a whole political sovereign risk: we watch Canada and India right now and see that things can happen totally outside what people expect. None of us can know what may happen. But you'd say: what's the relative cost for relative benefit? I would suggest that actually being confident enough about a future market for LEOs, in the context that we're in, makes sense.

And then, as I said, what's the worst case in the short term? There's about a half percent of the population who would not have coverage at that point. The question then becomes: what quickly would happen to fill in that coverage? Cells on wheels and all sorts of things. And, even if the LEOs go, there are still GEOs and there are a bunch of global providers of GEOs. At **nbn**, looking from the outside, the GEOs are going to finish, but there are plenty of people — Singtel Optus is a great example — who have a lot of GEO capacity and you can buy from them. So, the idea that all the satellites will, you know, proverbially fall out of orbit, I don't think so. I think there will be options for that last piece of coverage if the LEO market doesn't evolve.

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