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KNOCKING THE NBN

Who is providing the Federal Opposition with such bad advice on broadband and the NBN?

In 2010, members of the Coalition claimed that the NBN’s optical fibre access technology would be obsolete by the time the NBN was implemented; that it would be superseded by wireless access, given the rapid take-up of mobile phones, laptops and tablets. This claim was debunked by Rod Tucker in his August TJA article ‘Broadband facts, fiction and urban myths’ (the most downloaded TJA article of all time), but in this issue’s Opinion section you will see that a British consultant Robert Kenny has been brave enough (in Sir Humphrey’s parlance) to take on Professor Tucker. We have given Professor Tucker the opportunity to reply in this same issue.

In October 2011, the Shadow Minister declared the NBN to be a dangerous monopoly in Australian telecommunications, “stamping out all competition”. Yet the December 2010 decision by the ACCC to protect the potentially ‘stranded assets’ of the large transit carriers, by shattering the NBN into 121 isolated high-speed access networks, ensured that the NBN would never become the dominant national wholesale network provider – a role almost certain to be resumed by Telstra, given its huge sunk investment in long-distance transit fibre networks. And, as pointed out by Michael Malone, founding CEO of iiNet, in this month’s TJA interview, competition in the telecommunications industry has been greatly enhanced, not diminished, by the current government’s NBN policies. This has been achieved through the restriction of the NBN to a wholesale only role, together with forcing the structural separation of Telstra – ending a 21-year, vertically integrated, de facto monopoly of fixed network services, which has inhibited serious investment in competing broadband fixed access network infrastructure over the past 15 years.

In April 2012 the Opposition again warned that the NBN will force prices up. This claim is disputed by iiNet’s Michael Malone in this issue, where he opines:

“The NBN appears to have back-sold the pricing to meet our existing cost. ... the reason, I think, is that one of the policy objectives of the NBN is that there can't be upward pressure on pricing in the retail market.”

Another line of attack on the NBN’s architecture (and hence cost), by Malcolm Turnbull in November 2011 and by Paul Fletcher in TJA’s February 2012 issue, is that Australia should have followed other countries in choosing FTTN (Fibre to the Node), a.k.a. Fibre to the Cabinet, instead of FTTP (Fibre to the Premises). Now FTTN was a network planning strategy in the 1990s, designed to cut costs (by taking optical fibre as close to the customers as could be cost-justified through traffic aggregation) and to be a staging post towards providing fibre or coaxial cable to the premises in areas where the customers were prepared to pay for broadband access.

In some areas where there was insufficient copper access installed, these nodes became RIMs (Remote Integrated Multiplexors), whose pair-gain implementation barred any possibility of
adding ADSL, by either Telstra or its competitors, in order to provide even entry level broadband to customers in the RIM area.

In other cases, the nodes were used to support coaxial cable in shared loops to the customers – the Hybrid Fibre and coaxial Cable (HFC) solution – in order to provide entry-level broadband to customers. But the economic driver for HFC in the 1990s was not broadband. Telstra’s competitor, Optus, initiated an HFC program to attack Telstra’s profitable monopoly in telephone calls, and Telstra promptly counter-attacked, duplicating Optus’s HFC cables in virtually the same streets – until Optus’s money ran out, whereupon Telstra promptly stopped its HFC installation program also. The inherent weakness of a shared medium such as HFC (or cellular radio) in delivering fast broadband was exposed in Rod Tucker’s above mentioned TJA article.

The Coalition has been talking up BT’s FTTN initiative in the UK to insert DSL units into roadside cabinets (their ‘nodes’) within 300 m of target households, with the promise of ‘up to 80 Mbps’ download speeds. But apart from requiring pre-existing dual copper pairs to each household for each service – standard in the UK, but not in Australia – this proposal would strangle the opportunities for retail competition, and deal Telstra back in the game as a conflicted wholesaler and retailer of DSL. Moreover the cabinets, vulnerable to vandalism, could become critical points of network failure. This ‘advanced’ FTTN solution would limit broadband access to 80 Mbps downstream – hardly future-proof when the FTTP starting point is 1,000 Mbps downstream, able to be upgraded to 10 Gbps, which is where the developed world is heading. Wayne Fitzsimmons has more to say on the weaknesses of the FTTN solution in our Opinion section.

FTTN is essentially a 1990s solution, a ‘Poor Man’s NBN’ (in the words of conservative business commentator Robert Gottliebsen). In modern times, when many Western Governments have adopted austerity cost-cutting policies (unlike the Australian Government’s stimulus spending strategy) to cope with the ongoing Global Financial Crisis, they simply do not have the money to invest in promoting universal high speed broadband infrastructure. (In contrast, the Asian ‘command economies’ have spent heavily in this area, to provide themselves with additional competitive advantage.) In the case of the USA, the Obama Administration, faced with the difficulties in getting any spending bills passed by Congress, has been forced to abandon its 2008 election policy of subsidising a national FTTP solution in favour of leaving it to the market – and hence to a patchwork quilt of high-speed broadband in small, high revenue zones, medium-speed broadband across larger, medium revenue ‘footprints’– and no affordable broadband access at all in large rural areas of the USA.

The strange thing is that our Shadow Minister is using the dismal statistics of other Western governments’ investment in broadband to imply that Australia’s NBN policy is grossly flawed. So, while overseas luminaries such as Vint Cerf (and the World Bank) are praising Australia’s leadership in investing in the NBN, the Federal Opposition is criticising the government for failing to follow … the ‘leave it to the market’ strategies of other, financially crippled, Western governments.

We welcome ongoing debate on NBN policies in this Journal – as can be seen from our Opinion section, and our recent issues highlighting NBN policy gaps.

THE 2012 TELSTRA-TJA CHRISTOPHER NEWELL PRIZE WINNERS

The Christopher Newell Prize recognises and commemorates the ground-breaking work that the late Revd Canon Dr Christopher Newell AM undertook within the telecommunications industry from 1990 to 2008 in representing the needs of people with disability.

TJA is very grateful to Telstra for sponsoring this year’s Christopher Newell Prize competition, which encourages authors to contribute original papers on how telecommunications can be used to assist people with disabilities. The independent Judging Panel (comprising Dr Mark Bagshaw, Barry Dingle, Professor Gerard Goggin, Wayne
Hawkins, Robert Morsillo and the Managing Editor of TJA, as chair) assessed four strong candidate papers submitted to TJA, with a diverse range of thoughtful ideas. All four papers were considered to demonstrate sufficient merit to be awarded Christopher Newell Prizes, and all are published in this issue.

**First prize** (with a cheque for $6,000) was awarded to Rob Garrett and Toan Nguyen from Novita Children’s Services, South Australia, for their article ‘Together we can find telecommunication solutions for people with complex communication needs’.

The authors of three papers were awarded **equal second prizes** ($3,000 each):

- Dr Katie Ellis of Murdoch University for ‘It means inclusion: a creative approach to disability and telecommunications policy in Australia’.
- Darryl Sellwood and Dr Denise Wood (of the University of South Australia) and Dr Parimala Raghavendra (Flinders University) for ‘Perspectives on the telecommunications access methods of people with complex communication needs’.
- Floris Müller and Marlies Klijn (of the University of Amsterdam) and Liesbet Van Zoonen (Loughborough University, UK) for ‘Disability, prejudice and reality TV: Challenging disablism through media representations’.

It is significant that all four papers focus on contemporary solutions that require good quality video services to the residences of people with disabilities, as well as appropriate end-user interfaces. The ubiquity of the NBN and its ability to support high quality, two-way video are needed to provide basic as well as advanced communication services for people with disabilities, who live in all communities across Australia. And the needs of people with disabilities must be projected into deliberations on the upgrading of the Universal Service Obligation.

We are very pleased to announce that Telstra, the foundation sponsor for the Christopher Newell Prize in 2010, 2011 and 2012, has offered to sponsor the Prize competition again in 2013 – underlining its long-term commitment to assisting people with disabilities. Our congratulations and thanks go to all the authors, to our sponsor Telstra, and to the members of the Judging Panel.

**UPDATING THE UNIVERSAL SERVICE OBLIGATION**

The Communication Minister’s decision to delay the publication of the Convergence Committee’s Final Report by one month, to 30 April, has caused TJA to reschedule its planned themes for this issue. The ten expert authors we have lined up to critique different aspects of the wide-ranging Convergence Report are still writing their articles, which are now planned to appear in a special June issue of the Journal.

To take their place, we have been fortunate in sourcing three valuable articles on the timely theme of updating the USO. Stuart Corner’s paper covers the history of the USO and the Standard Telephone Service (STS) it supports – and provides a useful overview of the critical issues arising from the Australian Government’s recent legislation (March 2012) for moving the STS from the Public Switched Telephone Network to the future NBN platform. Peter Darling continues the stream of analysis in his 2011 articles on NBN Policy Gaps to offer creative suggestions on what should form the basis of a Universal Telecommunications Service (UTS) for the 21st Century. And Jonathan Gadir from ACCAN, the Australian Communications Consumer Action Network, presents that peak consumer body’s views on ‘Quality and Availability of the STS’.

All three articles point to the downsides of the speed with which the Government has developed and pushed the USO legislation through Parliament, in the interests of expediting the NBN rollout; another windfall for Telstra ($290 million over the next 20 years, ‘to ensure that services which no-one wants remain available’ in the view of a rival carrier (Macquarie
Telecom, 2011)); and loss of the opportunity to address the many consumer-oriented issues raised by the 2008 Glasson Regional Telecommunications Review.

Here’s a challenge to the telecommunications industry (in the broadest sense, including academic researchers and consumer advocates). Section 123 of the TUSMA Act (2012) says that the Minister must launch a review before 2018, with public consultation, to consider whether there should be any changes to the STS and the other universal services. But 2017 is far too late to look at updating the STS. There’s an opportunity now for us, via industry forums and workshops, to brainstorm ideas for ‘a Universal Telecommunications Service for the 21st Century’ – no doubt with several options, implementation strategies and ballpark costings – and stimulate an earlier triggering of that Ministerial review.

REFERENCE


Michael Malone is the managing director and chief executive officer of iiNet Limited, the third largest Internet service provider of broadband services with approximately 860,000 customers nationwide.

Malone co-founded Western Australia-based iiNet in 1993, steered its transition to a public company in 1999, and acquired a bunch of ISPs to provide the economies of scale needed to offer services through the national broadband network. His most recent purchases in 2011 were South Australian-based Internode Pty Ltd and TransACT Capital Communications Pty Ltd based in Canberra.

Malone has served as president of the Western Australia Internet Association (1996-2002), as chairman and a board member of .au Domain Administration Ltd (1999-2003), and currently sits on the board of Scitech Discovery Centre Ltd. He is a member of the Australian Institute of Management and the Australian Institute of Company Directors, holds a Bachelor of Science and a Diploma of Education from the University of Western Australia, and was one of the founders in 1994 of Electronic Frontiers Association Australia.

Freelance communications journalist, Liz Fell, interviewed Malone for the TJA in late April at iiNet's Sydney office in the CBD. The interview text has been lightly edited.

**TJA:** Can I start by asking you to elaborate on that catchy phrase you have used in interviews with journalists, namely, ‘Get big or get out.’

**Malone:** Yes. This is going back a few years now, but I had seen it happen before with dial-up. We had built up ourselves very nicely in Western Australia, but when we tried expanding interstate the market was pretty much reaching saturation. We couldn't get out, basically, and by 2003 we had about 98 percent of our revenue there. We knew the problem was that if we looked long-term where broadband played out, a lot of this was going to be a scale game, and a lot of things that we wanted to do for our customers needed to be defrayed over a larger base. So if we needed to build a mail service that might cost $5 million, it was going to make a lot more sense to do that over a base of half a million customers than over a base of fifty thousand.

**TJA:** So it was matter of a search for scale?

**Malone:** It was very much about getting scale, yes.

**TJA:** And is it still all about scale?

**Malone:** I believe it is. The top four now are about 88 percent market share. A lot of people put this down to bulking up ahead of the NBN.
TJA: Surely the prospect of a national broadband network must have had something to do with this expansion or 'bulking up'?

Malone: Well, it's largely irrelevant! Don't get me wrong. I'm a big supporter of the NBN, but we're operating on basically a commoditised cost-base already. We have the same equipment in the same exchanges, the same regulated input costs for all of our broadband services as TPG and Optus and Primus and so on. We're already in a commoditised market that has reached near saturation, so how do you compete there? We had to be able to differentiate, and we weren't going to get half a million customers in just WA, so we needed to get into a national footprint.

TJA: And that has led to you buying up a swag of other, usually smaller, ISPs. Have all these purchases become iiNet subsidiaries?

Malone: As we acquired most businesses, we have folded them into iiNet unless they would be a unique differentiator and so we maintain the brand. We've got customers today who are still using the OzEmail address which we bought in 2005 but, in terms of offerings in the marketplace, a big one would be a separate web page and advertising.

TJA: I understand it was a bunch of smaller ISPs in WA that you acquired initially.

Malone: Yes, that really consolidated WA. More than half of those were tiny ISPs like us that had started up as hobbyists in the '90s. They had got to a certain point that they didn't want to manage staff, they didn't want to manage cash flows, they didn't want to deal with customers, and they couldn't capitalise the business. They just wanted to get out. In many cases, they gave us their business as long as we honoured the prepaid income from their customers. If the customer had paid three months in advance, as long as we gave that customer the three months, that was it. The price was basically unearned income. Our first real transaction was buying OIS (Online Information Systems) out of administration in 1998 and then we listed on the Australian Stock Exchange in 1999. From 2003 onwards, we said, 'Let's start expanding.'

TJA: In terms of broadband, I notice that you describe iiNet as 'second in DSL broadband', which appears very carefully worded. Where do you sit in relation to all broadband customers, including wireless?

Malone: Well, Optus has cable customers as well. iiNet sits on about 860,000 DSL broadband customers, Optus has nearly one million in total, and Telstra has two and a half million – way ahead of us. But it's much more fun being number two or three than it is being number one! Telstra has a hard job.

TJA: I saw recent ABS figures showing that there were 11.6 million Internet subscribers, and mobile wireless broadband accounted for 47 per cent of all Internet connections while DSL amounted to 41 percent.

Malone: But, of course, 90 percent may have DSL at home as well as mobile phones that do data or mobile sticks so that would mean double counting. Indeed, I was quite surprised to find out that Telstra had about 800,000 broadband subs that were MTM - machine-to-machine -which I'm putting down to those handheld ATM machines. They have a SIM in there. So in terms of wireless-only homes, the last number I've seen was about 14 percent which means it's still in the minority.

TJA: So iiNet has signed up about 860,000 fixed broadband customers?

Malone: That's pretty much all DSL. But we have now got about 40,000 customers sitting on the TransACT network that we have acquired, which includes cable and fibre-to-the-node and fibre-to-the-premises. All the rest are DSL.

TJA: Are you happy with the NBN's pricing model?

Malone: Yes. The NBN appears to have back-sold the pricing to match our existing cost. Now it may be much more complex than that, but the reason, I think, is that one of the policy objectives of the NBN is that there can't be upward pressure on pricing in the retail market. That's a Government mandate: they didn't want to see the NBN cause prices to go up. I think one of the things they've done is to go back and see what the costs are of iiNet, Optus, and
TPG for their existing customers on their own networks, because the pricing comes in so suspiciously close that it seems a wild coincidence otherwise!

**TJA:** With the NBN offering 120 points of interconnect, will you have a presence at all of them?

**Malone:** Yes, if we want to be national. We can always buy off someone else, and Nextgen, Optus and others have said they're going to offer a wholesale service, but iiNet will be going direct.

**TJA:** So will iiNet be able to cut back on the number and therefore the cost of using Telstra exchanges for its DSL?

**Malone:** Yes. At the moment, we go into 450 Telstra exchanges so the NBN actually reduces the amount of points that we have to reach, and nearly all the components are regulated so Telstra doesn't get to set the pricing! The one that was not regulated was wholesale DSL, so for an exchange for a place like Esperance where we don't have our own equipment, we get wholesale services off Telstra.

**TJA:** Isn't the ACCC planning to regulate that price?

**Malone:** Yes, the ACCC announced just before Christmas that they're going to regulate that, and they've now put in place an interim determination for wholesale DSL. The price that Telstra was charging us was well over $40 a couple of years ago. The ACCC has reduced that to $25-$30 dollars, and that's on the first round. Now they're going to do a further detailed investigation and work out what the price ought to be long-term.

**TJA:** When do you expect that decision?

**Malone:** We're thinking August, but the ACCC have already brought in the interim determination so we're already getting lower prices.

**TJA:** I see that you're smiling when you talk about that decision. Are you pleased with the recent changes to the telecoms environment?

**Malone:** Yes, I think people look at Senator Conroy and the only thing they see is the NBN. The overhaul of the telecommunications industry that he's done in the last five years is extraordinary. Now you might argue that it wasn't the best way to do it. For instance, Paul Fletcher [Liberal MP and former Optus executive], has said words to the effect that the outcome is a good outcome, but it's a very expensive pathway to get there. But forgetting the NBN, what about some of the other things that have been done? We now have all of our input costs – unbundled local loop, wholesale line rental, line sharing, wholesale DSL – locked in for the next five years, whereas looking back over the last few years we were constantly in dispute with Telstra over pricing for everything you can imagine. Worse, it was often in arrears, so that by the time we would get a decision on, say, pricing for 2005-2008, we would be getting that in 2009, and then, of course, we would have to start the entire process over again.

**TJA:** I assume that delay was part of Telstra's strategy?

**Malone:** It's a rational strategy for Telstra. Wrapping those things up bought them time. You pointed me to an interview (Fell 2001) you did with Andrew Milner in 1991 where he commented on how we were in dispute with Telstra way back then. [Milner was managing director of the iiNet subsidiary, Chime Communications]

**TJA:** What about the policy to structurally separate Telstra's wholesale and retail arms which is taking the form of a Telstra undertaking and an ‘independent’ telco adjudicator. Are you happy with this solution?

**Malone:** We're actually pretty happy with the structural separation undertaking. There were a lot of compromises made by Telstra, and the final version that has come out now is looking a lot more sane. But, yes, the question of the 'independent' adjudicator as defined by Telstra is one of the questions that is wide open right now, and we're going to be interested to see who has been put forward.
TJA: Do you think some form of actual structural separation of Telstra will ever occur?

Malone: If the NBN is allowed to continue to completion then, absolutely, because Telstra's network will be literally separated: you've got a different company owning the fibre network and Telstra's network will be switched off.

TJA: Yet the timing of this network switch off remains unknown!

Malone: That's why the undertaking is from now until then and the fact that the ACCC has put regulation over these things for the long term gives us all a lot more certainty. We used to joke that Telstra's legal department was bigger than its marketing team! I don't know if that's absolutely true, but we need to get out of the courtrooms and out of the arbitration areas and be out trying to deal with customer issues. That's where my headspace would be!

TJA: Can I move on to your two most recent acquisitions, starting with Internode that was founded and managed by your friend, Simon Hackett. How does Internode fold into iiNet?

Malone: As a general statement, Internode's network is a sub-set of iiNet's network historically. Internode was quite a lot smaller than iiNet, which is one of the reasons Simon got out. Internode, for instance, is in 200 DSLAMs while iiNet is in 430, and iiNet last year posted $700 million in revenue while Internode did about $180 million in revenue.

TJA: Doesn't Internode use wireless networks in several locations?

Malone: It's got one in Kooyong.

TJA: What about in Armidale?

Malone: In Armidale, the NBN is doing both fibre-to-the-premises and fixed wireless, and Internode is doing both. Like iiNet, every place the NBN lit up, Internode has been in there. iiNet, for instance, is the only one that's now qualified for all three NBN technologies: fibre, wireless, and satellite.

TJA: Do you still remain close friends and discuss your thoughts and business decisions with Hackett?

Malone: Absolutely! Simon's full of ideas: it's almost impossible to stop him sometimes! I get emails every day from him with ideas, things he's come up with. He's a passionate, enthusiastic leader, and I think the people inside Internode, and also the people outside, really admire him.

TJA: Was he the one who decided it didn't make sense for Internode to compete nationally on its own?

Malone: Yes, he believed he was sub-scale. I think that regardless of the NBN, those middle-sized players are getting more and more squeezed because the big guys now have got a lot more money to spend.

TJA: Since TPG is one of the 'big guys' that has shown interest in iiNet, where does it sit in your shareholder line-up?

Malone: Number five. My family is the number one shareholder owning about 12 percent; Simon Hackett is on 7.5 percent; Westoz, Colonial and the Eley Griffith Group are all somewhere around the 7 percent mark; and TPG sits on about 6.8 percent.

TJA: Moving to TransACT, another purchase you made at the end of last year, will you keep the fibre network and VDSL that it has installed in some areas of Canberra?

Malone: TransACT have several networks. Like iiNet, they have ADSL2+ which is basically in the south half of Canberra; in the north they use a fibre-to-the-node network and Cat5 copper into the home and run VDSL over that; they also have fibre-to-the-premises in new estates so they have won the contract to be the sole provider for 14,000 homes as they're being built; and they have an HFC network in Ballarat, Geelong and Mildura.

TJA: Like Telstra, are you allowed to keep those HFC networks?

Malone: Yes.
TJA: I heard that Optus was under pressure to close its network.

Malone: Optus isn't under any pressure. Optus is gagging to be able to take $1000 per customer for shutting down their HFC. This is the deal of the century!

TJA: I thought Telstra had the deal of the century!

Malone: I mean for Optus. Telstra is getting approximately $11 billion when you add up all the benefits to them. But if you look at that as cost per customer connected, Optus is coming in at more than twice the rate!

TJA: It hasn't happened yet!

Malone: No. It has to go before the ACCC which has to rule on whether this is anti-competitive.

TJA: Are you planning to talk to NBN about the TransACT networks?

Malone: We would love to have that conversation with NBN if and when they're interested, particularly in Canberra where we have exclusive access to the power poles of 70,000 homes. Telstra is on the power poles for many of those houses as well.

TJA: How is that exclusive?

Malone: Exclusive fibre. Telstra can keep their copper there and it doesn't breach the agreement we have with ActewAGL, but no-one else can put fibre on those poles. So, in time, if NBN wants to get access to those poles to put in fibre, they need to talk to us.

TJA: When do you expect to have this conversation?

Malone: I would think they're going to await the outcome of the ACCC's decision on Optus because that's going to be a roadmap for what they are allowed to do. For instance, they're overbuilding our network in Ballarat where we have HFC to all the homes.

TJA: And you are allowed to keep that cable network?

Malone: Of course. By default, NBN will come in, build out fibre-to-the-premises to all these homes, and then rip out the copper. And then the default position is that we'll be side-by-side there with NBN in Ballarat on a much lower cost base.

TJA: Competition! What is happening in Gungahlin in the ACT where Telstra installed all those RIMs triggering a campaign led by Senator Lundy and now roll-out plans from the NBN. Does TransACT have a presence there?

Malone: We have fixed wireless. TransACT is a network builder. It has spent $280 million building those assets.

TJA: Impressive. Turning to product differentiation, are you offering triple play as well as 'quad' play, an awkward phrase?

Malone: Yes, we offer quad play, which includes mobile and a mobile phone, so we do SIMs. This [points to his phone] is an iiNet mobile phone though Optus. You're right, though. I find the quad play a little bit less natural. I think the reason it doesn't fit so easily is because broadband telephony and pay TV are both household purchases so each one services the entire house. A mobile phone is an individual purchase that is picked by the individual within the household, and I think the driver for it is quite different. For instance, we now know that about 70 to 80 percent of the decision-makers for broadband these days are women so it has now become a standard household purchase.

TJA: Like buying a fridge?

Malone: Correct. Whereas ten years ago, when it was regarded as more complex and technical, the man pulled on his overalls and went out to his shed to research what the right one was. That has shifted. Now broadband telephony and even pay TV are largely household purchases. And the handsets drive the mobile phone purchases.
TJA: I see that iiNet, among other telcos, has purchased a swag of subscription television broadcast licences from ACMA for what I'm told is about $10,000 each. The ACMA record shows that Telstra has 480 of these licences and you have 30!

Malone: Yes. We didn't know legally whether we needed to have that licence or not, but we thought it was safer. My personal opinion is that it shouldn't be necessary, though we do license content ourselves; customers get access to our freezone which offers the football club channels.

TJA: Are those from the UK?

Malone: Yes. Each of the football clubs such as Chelsea or Barcelona has their own 24 X 7 channel where they have interviews with players and games and so on. That's direct from the UK, but locally we've also done the WA Symphony Orchestra, for instance. We wanted to give customers access to something they couldn't get from other ISPs, so about ten years ago we started building this up and gradually creating a repository of content. It's all about points of differentiation.

TJA: So this free content offering began many years before you partnered with FetchTV to offer pay TV service with its set-top box?

Malone: Yes, funnily enough, we built our own box at that time.

TJA: I see that you have also built BoB which provides broadband and phone access from another sleek black box

Malone: BoB is a modem! The original BoB box was done with Belkin, which is a global company. We pulled that in-house when we created iiNet Labs and now design and manufacture our own equipment.

TJA: And for the pay TV service you now supply a FetchTV box?

Malone: Yes, the FetchTV box is a personal video recorder with a terabyte hard disc space. It has all the free-to-air stations, and that's all I can get at home because I'm on a RIM so I can't get full ADSL2+ which is a bit embarrassing!

TJA: I assume that FetchTV has the benefit of huge economies of scale because it also supplies Ananda Krishnan's Asian TV interests with its box?

Malone: Yes, Fetch is building the interface in Sydney for all the Maxis boxes.

TJA: Turning to Foxtel, what did the ACCC's approval of the Foxtel-Austar merger mean for iiNet?

Malone: Our concern, and the reason we opposed it, was not about retail competition. At the end of the day, they only overlap on the Gold Coast. Other than that you have Austar in the regions and Foxtel in the cities. So adding them all together doesn't actually change the market dynamic: it's not as if you're reducing competition in Sydney by going from two players to one player. The real concern we have is the concentration of power in buying access to and locking up the content.

TJA: I understand that Foxtel has offered undertakings on releasing its exclusive content, but they may take quite a long time to deliver…

Malone: As you say, they will take a long time, and they're weak.

TJA: Isn't there a question relating to how Telstra is positioned after this merger? Can I assess your reaction to this quote from Foxtel’s ACCC Undertaking: 'The ACCC considers that: (i) Telstra's ownership of 50% of FOXTEL is likely to limit the development of competition in markets for the supply of fixed broadband and voice services.' How do you respond to that?

Malone: Yes. Telstra will be able to offer a triple play that includes broadband, phone and Foxtel services. They can do a service over the net at the moment so that you can get a cut-down version of Foxtel lite on your T-Box. We can't offer that over Telstra's infrastructure because they charge us for everything that passes over that connection…
TJA: Do you mean if iiNet buys Telstra’s wholesale DSL service?

Malone: Yes. If I’ve got a customer in the city on my network it might cost, say, $30 to get one gigabyte of data from the United States to that customer, but to get the data to a customer on Telstra wholesale can cost up to three times more.

TJA: It seems extraordinary that the ACCC has allowed the Foxtel merger if Telstra's position is likely to limit fixed broadband and voice markets.

Malone: The ACCC is very aware of this.

TJA: Yet it allowed the merger to go ahead.

Malone: Well, the rules are the wrong tool for the job. The ACCC could push so far on this, but the only real tool they have at their disposal here is 'time'. By agreeing to these undertakings now, Foxtel can expedite the transaction and get it done. If Foxtel wanted to get into a stoush with the ACCC, it will take a lot longer.

TJA: And the ACCC is up against two very powerful companies, Telstra and News Ltd.

Malone: Foxtel’s board operates in the interests of Telstra and we have seen evidence of that. They don’t necessarily act as Telstra’s pawn at all.

TJA: Moving to a quite different issue, you must be pleased with iiNet’s recent High Court win against the Motion Picture Association of America on copyright downloads of TV programs and movies. How many years did this case actually take?


TJA: Courtesy of Wikileaks, it was fascinating to read in a 2008 cable filed by the US Ambassador that the MPAA chose iiNet because it didn't want to tangle with Telstra with its '…demonstrated willingness to fight hard and dirty, in court and out'.

Malone: It’s odd because, traditionally, the rights holders have tackled Telstra as their first target. APRA, (Australian Performing Right Association) which represents all the global distributors, has had several cases against Telstra over the last few years. And in the 1990s it sued OzEmail, the number one ISP at the time, which led to the creation of the Internet Industry Association. So this is where the Wikileaks cable was a surprise. In some respects going after Telstra is better because if we had lost the case, or settled it, worse, it's not binding on Telstra , of course. So iiNet now enters these undertakings and Telstra goes, ‘You know what? Come sue us if you want to because we will win this one.’ Usually, going after Telstra is a better outcome for them.

TJA: According to the cable, the MPAA considered that '…iiNet users had a particularly high copyright download violation rate' and that '… management had been consistently unhelpful on copyright infringements.'

Malone: That was the real question. iiNet, like Internode, was the first to roll out ADSL2+ across Australia, so if you wanted to get a high-speed connection, iiNet was your most likely target. The four ISPs they investigated and started pursuing were: Optus, iiNet, Internode and Exetel.

TJA: The MPAA outsourced the task of investigating and running its case to the Australian Federation Against Copyright Theft (AFACT) and it has always seemed to me that the term 'theft' is not really accurate given that the digital copy is still there after the download!

Malone: I saw an excellent article yesterday saying that in the minds of consumers they see copyright breaches as being more like trespassing than theft. So they see it as going onto their neighbour's lawn to get their ball back rather than stealing a video off-the-shelf. That resonates a bit with me.

TJA: I think at some stage you said that it wasn't so much about requiring customers to pay for a TV program or movie as the fact that they wanted it now and couldn’t get it!
Malone: Yes, you can't get it. It's a fundamental market breakdown. I'm an absolutely mad keen fan of *Game of Thrones* and the episode screened in the US is out there now live on BitTorrent to download free. It's not available to purchase anywhere. A lot of my friends are going to be watching it tonight and they, no doubt, will be talking about it at work tomorrow. And I can't get it! That's a market breakdown: I think customers would be willing to pay for this.

TJA: Do you see 'this market breakdown' as a matter of the US movie and TV studios re-thinking their business case for intellectual property because they appear to fail to take account of the global nature of the market and rely heavily on a sequence of release 'windows'?

Malone: Their view, probably correctly, is that they can maximise the revenue from the product by doing it in 'windows', so they get some revenue from movies, some from video and so on. If they offer it digitally to everyone at the same time on Day One, they'll end up with less revenue. You might say, 'So what?' But then they say that something else has to give, 'Does that mean we make less movies or do we reduce the quality of the movies?'

TJA: So the difference between your world view and that of the MPAA is not going to disappear in the near future!

Malone: I think they start with a world view that every person on this planet is a thief who wants to steal their work if they can. I don't adhere to that view. If they make these TV shows and movies available, most people will pay for it because you want to have convenient, affordable, ready access to it, and you know it’s going to be high quality. And you know what? You also want to know whether you’re doing the right thing. Now there will still be some laggards out there who say, ‘Well, I don’t care about paying for it. I’m just going to get it from BitTorrent anyway.’ But I think there is a moral issue involved in criticising people for using BitTorrent when they have no other choice to get access to the content.

TJA: Finally, what impact has such a high profile and lengthy court battle had on iiNet?

Malone: One of the headlines that I saw was, 'Big guys line up to kick the little guy'. Winning this case has been very on-brand for iiNet because in the marketplace we try to position ourselves as the challenger that's going to go up against the big guys to give you a better result. So I see the case as being very on-brand in that respect. Now it would not have been quite so on-brand if we had lost, but the end result was something we firmly believed in.

TJA: What about the personal impact? Did you consider becoming a lawyer at any stage?

Malone: Oh, way back, for my sins, I studied law at university but I pulled out and ended up finishing a Science degree instead. I did first and second year law units, so it's actually always been a bit of a personal interest area, weirdly enough, particularly intellectual property!

TJA: Thanks a lot for your time.

REFERENCE

Australia’s largest telco, the former Government-owned and former monopoly Telstra, is required to fulfil the Universal Service Obligation. This entails: ensuring that all Australians have access to a basic telephone service at standardised and in some cases subsidised prices; providing payphones throughout Australia: answering calls to the 000 and 112 emergency services numbers and ensuring that these are passed on to the appropriate emergency services. Other telcos contribute to Telstra’s costs in proportion to their ‘eligible revenues’.

The legislative system governing the USO is being changed because of radical changes in the Australian telecommunications network that make the current scheme no longer appropriate. The Australian Labor Government has committed to building a National Broadband Network (NBN) that will connect 93 percent of premises with fibre to the premises (FTTP). The legacy copper pair access network owned by Telstra will be progressively shut down in FTTP areas and services provided over that network by Telstra and others will transition to the NBN. This paper examines the history of universal service in Australia, the new USO regime developed for the NBN era, Telstra’s role in it and the criticisms the Government’s chosen approach has attracted, with a particular focus on the standard telephone service.

INTRODUCTION

The Australian Government has created a new body, the Telecommunications Universal Services Management Authority (TUSMA) to ensure the provision of subsidised telephone services to remote Australians and the provision of other socially necessary services such as payphones, a transcription service for the hearing impaired and the ‘triple zero’ emergency call service. These services are known collectively as the Universal Service Obligation (USO).

The former monopoly telco, Telstra, is presently required as a condition of its carrier licence to provide the USO, except for the transcription service, known as the National Relay Service (NRS), which is contracted out by the Government. The costs incurred by Telstra and the cost of providing the NRS are met by levies on all licensed telecommunications carriers and on service providers in proportion to their share of ‘eligible revenue’. (A carrier licence is required only if a service provider owns transmission infrastructure over which public communications systems are delivered).

Changes to the way these services are delivered, managed and paid for are being made because the government-owned National Broadband Network (NBN) will change the role of Telstra from being the owner of the primary terrestrial customer access network of copper wire pairs to being one of many providers on the wholesale-only NBN.

However many industry participants believe that the new regime has been developed and put in place with minimal consultation and that an opportunity has been missed for a more radical reform of the universal service regime that could have incorporated the potential of the new
NBN, recent technology developments, the popularity and reliance on mobile communications and the experience gained from the 20 year history of the current universal service regime.

This article will briefly review the history of the universal service regime and examine the issues around the new regime for the NBN era, with a particular focus on provision of the standard telephone service (STS).

**HISTORY OF THE USO IN AUSTRALIA**

The concept of a ‘universal’ telephone service in Australia – the idea that the service should be available to people living in the most isolated locations at the same rate as their city-dwelling cousins – is as old as the nation itself.

When the Postmaster General’s Department (PMG) was created in 1901 in the wake of Australia’s transition from separate British colonies to a federation of member states, the PMG’s commissioners “recognised that the country’s communication system should be treated as a complete financial proposition in which those parts of the service that made a profit should sustain and cross-fertilise those that did not” (Moyal 1984, 101).

Under the PMG’s monopoly such a system created relatively few problems: there was no danger of competitors ‘cherry-picking’ low cost areas by undercutting rates that were inflated to subsidise high-cost services in other areas. Nevertheless questions were asked about the costs of the subsidy (Moyal 1984, 223), which were never disclosed, and about just how far the subsidy should extend. For example, whether the full cost of connecting a very distant customer to the nearest telephone exchange should be met by the subsidy (Moyal 1984, 202).

When the PMG’s department was split into the Australian Post Office and The Australian Telecommunications Commission (Telecom Australia) in 1975 Telecom inherited the responsibility for universal service provision – then known as the Community Service Obligation – and in its 1979-80 report made its first public declaration as to the cost: it claimed $200m for the year (Moyal 1984, 375).

With Telecom enjoying a monopoly of all domestic telecommunications services this figure was really only of academic interest. However when in 1988 the Government moved to introduce limited competition to Telecom it was deemed necessary to define precisely what services should be subsidised and the cost of doing so (Evans 1988, 42).

That regime was created by the *Telecommunications Act 1989* and associated legislation, but was short-lived. In 1989-90 the government moved to create full competition to Telecom by selling a second fixed and mobile telecommunications carrier licence and a third mobile carrier licence.

Optus Communications obtained the second fixed and mobile licences in late 1991 and launched services in early 1992. The third mobile licence went to UK-based Vodafone Group. Telecom was merged with the government-owned international carrier, the Overseas Telecommunications Corporation (OTC) and renamed Telstra.

The Government then instituted a regime under which the cost incurred by Telstra in meeting the USO was assessed, and met by a levy on Telstra, Optus and Vodafone in proportion to their share of traffic.

This USO regime persisted until the *Telecommunications Act 1997* that ended the era of limited carrier competition and enabled any organisation to apply for a carrier licence, roll out infrastructure and compete for customers. The 1997 legislation introduced some changes to the USO regime:

- It defined precisely the standard telephone service that had to be provided by a USO carrier, specifying that it must include voice-equivalent services for people with disabilities unable to use voice telephony;
• It made the Minister holding the communications portfolio responsible for selecting USO carriers by either geography or service type (eg payphones, services for the disabled).

Further changes were introduced with two additional pieces of legislation in 1999 and 2000.

**TWO DECADES OF CONTROVERSY**

Throughout its 20 year history the USO regime has been dogged by conflict and controversy: over the cost; over what exactly should be provided; and who should provide it. The regime was described recently by one intimately involved as “a quagmire of confused policy for 20 years.” (Senate Enquiry 2012, 201).

In June 2007 the Minister for Communications in the Liberal/National Party Coalition Government, Senator Helen Coonan, announced a comprehensive review of the USO regime (Coonan 2007), but shortly after the period for submissions had closed on 1 November 2007, the Coalition lost power to the Australian Labor Party in a Federal Election.

The incoming Labor Government’s first initiative on the USO front came in November 2008 when the Minister for Broadband, Communications and the Digital Economy, Senator Stephen Conroy, announced the USO subsidy for 2008-9, setting a figure of $145m similar to the previous year.

In making that announcement he said also:

“In deciding on future USO arrangements, it will be important that we take into account other developments. This includes the National Broadband Network, recommendations of the Glasson Regional Telecommunications Review and submissions to the [former Coalition Government’s] USO review.” (Conroy 2008).

Thus began a process leading to the creation of the Telecommunications Universal Service Management Authority (TUSMA), which is due to commence operation on 1 July 2012, and a new regime for managing the delivery of the USO.

**AUSTRALIA’S NATIONAL BROADBAND NETWORK**

Under the NBN plan, 93 percent of Australian premises will be served by a passive optical network delivering downstream bandwidth of 100 Mbps, initially. Four percent of the remainder will be served by a TD-LTE fixed wireless network delivering 12 Mbps downstream, and the remaining three percent by satellite, also delivering services at 12 Mbps downstream. $600m is being spent on two geostationary satellites for this purpose and ten earth stations will be built around Australia.

The NBN is being built, owned and operated by NBN Co – a company wholly owned by the Federal Government and created for this purpose. The NBN will be a wholesale-only Layer 2 network and capacity on it will be sold to wholesaling intermediaries and retail service providers who will provide services to end user customers.

Telstra will become one of many retail and wholesale providers of NBN services over all three NBN networks: FTTP, fixed wireless and satellite. In the FTTP area Telstra’s copper network will be decommissioned but it will be retained in the wireless and satellite areas for the provision of the basic USO funded telephony service.

In addition to being an NBN service provider and agreeing to decommission its copper network in favour of the NBN, Telstra will have a key role in the NBN: the ducts that carry its copper network to customers will be made available for NBN fibre and its exchange facilities will be made available for NBN infrastructure. Telstra roles in the transition to the NBN and beyond are spelt out in multiple agreements between Telstra and the Government and between Telstra and NBN Co.
In the FTTP areas the customer premises equipment – the optical network termination (ONT) – will have four Ethernet ports enabling the customer to connect to up to four retail service providers and two analogue telephone ports that will provide a service equivalent to the current standard telephone service.

Customers will be able to take VoIP services from many service providers or to retain their PSTN service via these ports. However the traffic will be packetised and carried over the fibre because the copper will be decommissioned. In the event that a customer does not want any service other than basic telephony the provision of this service will be part of the universal service obligation.

AUSTRALIA’S NEW UNIVERSAL SERVICE REGIME

The new USO regime is enshrined in three Acts of Parliament:

- The *Telecommunications Universal Service Management Agency Act 2011*. This establishes the Telecommunications Universal Service Management Agency (TUSMA) as the statutory agency that will have the responsibility for the implementation and administration of service agreements or grants that deliver universal service and other public policy telecommunications outcomes. This Act also sets out TUSMA’s corporate governance structure and reporting and accountability requirements and provides for the minister holding the communications portfolio, subject to the scrutiny of Parliament, to set the standards, rules and minimum benchmarks for TUSMA’s contracts and grants, and sets out arrangements for consolidating the two current Universal Service Obligation (USO) and National Relay Service (NRS) industry levy regimes into a single regime.

- The *Telecommunications Legislation Amendment (Universal Service Reform) Act 2011*. Its main purpose is to make amendments to telecommunications and related legislation (including the *Telecommunications Act 1997*, the *Telecommunications (Consumer Protection and Service Standards) Act 1999*, and the *Australian Communications and Media Authority Act 2005*) needed as a result of the new USO regime.

- The *Telecommunications (Industry Levy) Act 2011*. It imposes the industry levy that will replace the existing USO levy and NRS levy.

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TELSTRA -TUSMA AGREEMENT KEY TO USO

There is also another key document. It is not public and there is no expectation that it will be made public. Telstra’s role in meeting the universal service obligation and in performing certain other public interest services is set out in an agreement between Telstra and TUSMA. It is one of four agreements signed between Telstra and the government relating to the transition to the NBN and Telstra’s role going forward. There are a further four agreements between Telstra and NBN Co. None of these agreements have been made public, and the Government has given no indication that this will change.

The thrust of the new legislation and the Telstra-TUSMA agreement is to progressively shift the legislated responsibility for provision of the USO from Telstra to TUSMA as the NBN rolls out, but to have Telstra continue to provide the USO (except for the NRS) under contract to TUSMA.

THE STANDARD TELEPHONE SERVICE UNDER THE NEW USO REGIME

To develop the new regime the Government held two rounds of public consultation. In October 2010 it issued a discussion paper ‘Implementation of Universal Service Policy for the transition to the National Broadband Network environment’ (*DBCDE 2010*). This was
followed by another, in June 2011 (DBCDE 2011): ‘Universal Service Obligation Legislative Reform for the Transition to the National Broadband Network’. Submissions were received from industry participants to both enquiries.

After the three USO-related bills had passed the lower house of the Federal Parliament and reached the Senate they were referred to a Senate committee of enquiry. It received further submissions and held public hearings. However it recommended passage of the bills with only a few relatively minor amendments (Senate Enquiry Report 2012, 28).

Submissions to these three processes – particularly those from the Australian Communications Consumers Action Network (ACCAN) – raised many concerns about the new USO regime. In its submission to the Senate Enquiry ACCAN said: “We continue to be frustrated that a broader conversation about the nature of universal service has been delayed until 2018 and that matters of public interest, such as the outdated definition of the Standard Telephone Service, have not been addressed in the policy processes that led to the development of these Bills.” (ACCAN 2011, 4).

If the inputs of ACCAN and others were largely ignored and an opportunity missed for a genuine and ‘back-to-basics’ review of the USO, it’s likely that USO reform was subsumed to the Government’s overarching goal of stitching up a deal with Telstra to ensure Telstra’s participation in the NBN. Certainly, without such a deal the $36 billion project would have been far more difficult, costly and uncertain. As regards the standard telephone service, there were two major concerns: that the new regime perpetuated the use of old technology with no immediate prospect of review and that there would be no opportunity for many years for any organisation other than Telstra to provide the service.

The legislation specifically gave TUSMA the option to look to other providers to fulfil the USO contracts, but the Telstra-TUSMA agreement ensured that Telstra would remain the sole provider for the next 20 years.

The Universal Service Reform Act specifically acknowledges the importance of opening the USO to competition in the NBN era, and the possibility of providing the service over the NBN rather than legacy copper.

“In an environment where all retail service providers are able, via the NBN, to offer high quality voice and high speed broadband services nationally, it is appropriate that the model for delivering universal service and other public policy telecommunications outcomes be reformed to facilitate the competitive supply of universal service and other public policy telecommunications outcomes. A regime that enables competitive supply arrangements will be of benefit to consumers and industry as it promotes more innovative, effective and efficient service delivery arrangements.” (Universal Reform Bill Explanatory Memorandum 2011, 3).

However the summary of the agreement between Telstra and TUSMA that Telstra has released makes clear that this contracting will be with Telstra alone:

“From 1 July 2012, for a term of 20 years, Telstra will have a contractual obligation to supply the STS nationwide, as necessary, to fulfil the STS USO such that: in areas where the regulatory obligation has transferred to TUSMA, Telstra has a contractual obligation to fulfil the USO for TUSMA; and in areas where Telstra is the primary universal service provider, Telstra has a contractual commitment to comply with its regulatory obligation.” (Telstra – Definitive Agreements 2011, 18).

Furthermore the new regime has also been developed without canvassing any alternative to using the current technology – largely Telstra copper – to deliver the standard telephone service. The Telstra-TUSMA agreement does make provision for a review, but only 10 years down the track:

“There is a mandatory 10 year review to be undertaken by an independent expert of the technologies and systems used by Telstra to provide the USO STS and payphones services, with a view to determining if the use of alternative technologies or systems (including by an alternative provider of the USO) would result in cost savings to
Telstra (therefore reducing the amount that TUSMA pays to Telstra).” (Telstra—Definitive Agreements 2011, 20).

The outcomes of this review process are binding.

This approach eschews the use of NBN infrastructure and the NBN pricing policy that delivers wholesale Layer 2 connectivity to all premises at averaged prices – which, if were to be used, should greatly reduce the cost of delivering a telephone service.

As Optus argued in its submission to the Senate enquiry:

“As a brand new, world-class network, the NBN will be employing the latest in wireless and satellite technology. There is no doubt that such technologies will be appropriate and reliable for universal service provision and will render any remaining copper connection obsolete.” (Optus 2011, 6)

Furthermore as more customers choose to use these new technologies rather than relying on the PSTN-delivered STS the cost per subscriber of serving the remainder will increase - think maintaining a remote telephone exchange for just one customer!

Only in the areas served by satellite are there likely to be real problems. Geostationary satellites brings with them latency which could be significant if one remote customer wanted to call another remote customer – a very likely scenario. Such a call would require two satellite hops.

However it is hard to make a convincing argument against supporting a USO telephone service with the NBN fixed wireless network that will serve over half the seven percent of premises beyond the reach of NBN’s FTTP network. As Optus pointed out in its submission, Telstra already uses wireless – a fixed terminal operating on its cellular network – to deliver the STS to some remote customers.

Macquarie Telecom’s submission to the Senate Committee was particularly scathing:

“Nowhere in the Policy, the Agreement and the Reform Bills are [to be found] the services that have emerged in the past 20 years which now comprise basic mainstream public communication services, ie mobile services and access to the Internet...Macquarie submits that it is not appropriate...to anchor future universal service arrangements to services which are no longer sought by consumers now let alone in 20 years’ time...There is a very real prospect that the Policy, the Agreement and the Reform Bills will require the Government to pay Telstra $290 million for each of the next 20 years to ensure that services which no-one wants remain available.” (Macquarie Telecom 2011, 4).

**CONCLUSION - THE USO REVIEW WE SHOULD HAVE HAD**

When he announced plans to develop a USO regime for the transition to the NBN and beyond, Minister Conroy said it would also take into account “…the recommendations of the Glasson Regional Telecommunications Review and submissions to the [former Coalition Government’s] USO review.”

The 47 submissions to that review were not made public, but the issues paper (USO Review Issues Paper 2007) raised precisely the questions – 47 in total – that any wide-ranging review of the USO regime should have considered. Those that are particularly germane to the issues discussed in this article were:

“What types of network technologies are suitable for the delivery of basic phone services? For example, could universal service be delivered by mobile networks or over a broadband data network using VoIP?"

“In what ways does the existing regulatory framework constrain technologically feasible options for the delivery of basic phone services?”
“Should the USO continue to operate as an obligation on service providers to serve all customers, or should it be recast as a consumer right or guarantee (in tandem with commercial service delivery)?”

“Is it still appropriate to have a single provider solely responsible for providing all Australians with a safety net voice service?”

“What would make competitive delivery of the universal service regime attractive to service providers?”

None of these questions were addressed in the development of the Labor Government’s new USO regime.

The executive summary of the Glasson Committee’s report (Glasson Report 2008), neatly summed up all the things that could have been looked at in developing the new USO regime, but were not. It concluded:

“With the significant changes likely to occur from the Australian Government’s proposed National Broadband Network (NBN) there is now an opportunity to revolutionise the availability and quality of telecommunications services in this country, including all of regional Australia. Our proposals are based on the belief that competitive markets are best able to deliver telecommunications services. Government interventions should be limited to where this is necessary to ensure service availability.”

The report also recommended that the Federal Government involve all other levels of government – state/territory and local – to help achieve many of its recommendations.

Yet the outcome of the Government’s review is to create another body and another layer of bureaucracy in the form of TUSMA, to lock in for the next ten years the analogue telephone service over copper wire to deliver the standard telephone service to most USO recipients, and to lock in for 20 years the organisation that, in one form or another, has provided this universal service for over a century as the sole USO provider.

In the Government’s defence it has to be said that the USO arrangements are only part of a much bigger picture: Telstra’s role in the transition to the NBN and beyond.

The NBN was conceived without a role for Telstra, in part out of the Government’s frustration at its inability to persuade Telstra to upgrade its copper network to a fibre to the node network and provide access to other players on acceptable terms. Yet it was clear from the outset that the NBN would hardly be viable if it could not rely on Telstra infrastructure and on the NBN being used by Telstra to serve Telstra’s customers.

On 23 June 2011 Telstra signed the Definitive Agreements with NBN Co and with the Government for its role in the transition to the NBN and beyond. The agreements followed two years of intensive negotiations and would, Telstra said, deliver it a net present value of $11 billion over their 30-year life.

Announcing this milestone, Telstra CEO David Thodey said:

“The Government will achieve its desired industry structure and the arrangements for the USO and associated social obligations will be reformed to ensure that funding for these public interest services is secured...The Definitive Agreements are subject to a number of conditions being satisfied, including...arrangements being in place for the appropriate reform of the USO.”

That is ‘appropriate’ from Telstra’s perspective. In other words wider reform of the USO regime was sacrificed for the ‘greater good’ of the overall agreements with Telstra to ensure the success of the NBN.

As Coalition senators put it in their dissenting comments to the Senate Committee’s report on the USO legislation:
“Telstra will receive $2.7 billion over 10 years for delivering the USO for standard telephone services and payphones, significantly more than it would have received in the pre-NBN environment. This windfall assisted in obtaining Telstra’s agreement to the broader NBN deal. It was clearly not in the Government’s interests to permit third party scrutiny or invite industry input as the USO agreement was negotiated and settled.”

And windfall it is almost certain to be. However the figure was calculated, there is little doubt that the necessity for being connected to the Internet will increase. Anyone taking data services over the NBN will be presented with VoIP offerings by multiple providers. These will almost certainly offer more functionality, and at less cost, than the standard telephone service provided under the USO. Thus it is inevitable that demand for the STS will decline and along with it the cost to Telstra of delivering the USO.

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The Australian Parliament passed a suite of legislation in March 2012 dealing with the provision of Universal Service in the transition to the National Broadband Network (NBN). Whilst this legislation addresses the maintenance of the current Standard Telephony Service, it does not define what a Universal Telecommunications Service should be in the era of the NBN.

This article looks at options for the future Universal Service.

INTRODUCTION

On 21st March 2012, the Australian Parliament passed a suite of universal service reform legislation, which was the final legal stage in the Government's transition from the current environment (dominated by Telstra as the major service provider) to the new environment (which is based on the establishment of the NBN or National Broadband Network).

“Socially Important Services”

This legislation, described in the accompanying article by Stuart Corner (Corner 2012) is similar in intention to that of many other countries (for example the USA and UK). Legislators assume that there is one telecommunication service (or a number of services) that is sufficiently socially important that their availability to all users should be guaranteed by legislation. In many cases the delivery of such services to all users may not be profitable for service providers, and some form of subsidy is mandated by appropriate legislation.

UNIVERSAL SERVICE IN THE 20TH CENTURY

Towards National Networks

In most developed countries the telephone network developed from a number of 'island' networks, originating in the major cities in the late 19th century, that were eventually linked to a national network by the middle of the 20th century. Again, in most countries there was a single national network operator, often owned by the national government.

The demand was for a telephone; a telephone that worked; and one that worked all of the time. This was possible (if difficult) in major cities, but presented a real engineering and economic challenge in rural and remote areas. Network operators such as the Australian PMG's Department and its successor Telecom Australia had the provision of universal (telephone) service as a major goal, often without formal direction from the government of the day. Tariffs were set to generate the capital required to meet this goal (and often the non-communication fiscal requirements of the government).
NETWORK COMPETITION

By the last decades of the 20th century universal telephone service was close to a reality in many advanced countries, and technical advances made infrastructure competition feasible. In many countries the economic benefits of competing networks were seen as justifying their introduction, but there was concern that universal service might be lost. The approach frequently adopted was to introduce a universal service obligation (USO) on one or more network operators to ensure that universal service was maintained. In general, the former monopoly operator carried this USO, with financial contributions from all network operators.

THE AUSTRALIAN APPROACH

Network competition was introduced from 1991, with full network competition introduced from 1997. Telstra Corporation was formed from the former monopoly national and international network operators, Telecom Australia and OTC Ltd. Initially Telstra was fully Government owned, but was then privatised in three tranches, from 1997 to 2005. At each stage of this process conditions were imposed to ensure that Telstra met the social obligations agreed by the Parliament.

Telstra was given the role of Primary Universal Service Provider with the regulated obligation to ensure that Standard Telephone Services were reasonably accessible to all people in Australia on an equitable basis, wherever they reside or carry on business. This meant that consumers generally were able expect to receive a voice telephony service on request from Telstra (as the Primary Universal Service Provider) wherever they worked or lived. Telstra also had other obligations such as the requirement to provide payphones.

Telstra also had available for rent certain types of specialised equipment to enable users for whom voice telephony was not practical to access a Standard Telephone Service.

21ST CENTURY COMMUNICATIONS

“NEXT GENERATION NETWORKS”

For most of the past century most emphasis in the telecommunications legislation was placed on the central role of telephony, but during the last two decades other services have grown rapidly. Cellular mobile services initially were developed to provide telephony, but now are used to provide a wide range of applications. The Internet initially used spare capacity in the telephone network, but now it is the main driver of demand for network capacity.

The layered approach developed for data networks has now been accepted as the standard for future network developments. Lower layers provide the physical connections for the network, supporting a Transport Layer that ties together network elements (often using the Internet protocols). Services and applications run over this layer, largely independent of the technique used for transport (DSL over copper, optical fibre, cellular wireless, etc.). This approach has been called Next Generation Networks or NGN. A single network structure is able to carry a variety of information and services (voice, data, and other media such as video) by encapsulating these into packets, similar to those used on the Internet. NGNs are commonly built around the Internet Protocols, and therefore the term all IP is also sometimes used to describe the transformation toward NGN.

AUSTRALIA’S NBN – A UNIQUE IMPLEMENTATION

Almost all network operators are evolving their networks to 'all IP' operation, with packet-based transport replacing the circuit-switched digital previously in use. Optical fibre is the preferred transmission medium for the network core, with optical fibre reaching as far as possible towards the user (for example to the mobile base station or DSLAM). Techniques such as DSL over copper and 3G/4G wireless are being used in the Customer Access Network (or CAN) to enable the IP packets to reach the user. Many network operators have
programs, in place or planned, to provide direct optical fibre connection to the user's premises.

As is well known, the current Australian Government plans a variation on this pattern. A government owned company, **NBN Co Limited**, has been assigned responsibility for the provision of the CAN in the fixed network. This company will have responsibility for providing an optical fibre CAN for 93% of users, and radio-based access (fixed wireless and satellite) for the other 7% of users (covering the much greater geographic area of Australia).

This has been described as the National Broadband Network, but the infrastructure to be provided by the NBN Co will not be a true network, but rather a set of 121 separate 'island' access networks (Gerrand 2011).

![Figure 1 - NBN and Retail Service Providers. (Source: NBN Co.)](image1)

As Figure 1 shows, they will provide a wholesale bitstream service to Retail Service Providers, who will deal directly with users and provide the other facilities necessary to support the services they offer. The NBN Co will only provide a connection between the end-user premises and one of 121 Points of Interconnect being provided by NBN Co. The Retail Service Provider will have to provide or rent backhaul transmission from the Points of Interconnect to its own service control facilities.

![Figure 2 - Simplified Network Overview. (Source: Communications Alliance)](image2)

As Figure 2 shows, NBN Co's decision to restrict their facilities to Layer 2 functionality (and below) means that both IP Network Connectivity and end-user applications and services will be the responsibility of the Retail Service Provider. This has considerable implications for the provision of Universal Service.
RECENT AUSTRALIAN NBN LEGISLATION

As outlined in the accompanying article by Stuart Corner (Corner 2012), the legislation passed by the Australian Parliament in March 2012 was very much intended to continue current arrangements for Universal Service during the transition between the current fixed CAN environment (largely based on Telstra copper) and the future environment (with NBN Co's optical fibre and radio links to the premises). The legislation provides for the establishment of a new agency, the Telecommunications Universal Service Management Agency (TUSMA), which from 1 July 2012 will be responsible for entering into, and managing contracts or grants that will replace current regulations applying to Telstra.

The legislation takes a very limited, last century view of what should be provided as a Universal Service. Quoting from the Department’s website (DBCDE 2012), the TUSMA will have responsibility to ensure that:

- all Australians have reasonable access to a standard telephone service (the USO for voice telephony services)
- payphones are reasonably accessible to all Australians (the USO for payphones)
- the ongoing delivery of the Emergency Call Service by Telstra (calls to Triple Zero '000' and '112')
- the ongoing delivery of the National Relay Service, and
- appropriate safety net arrangements are in place to support the continuity of supply of carriage services during the transition to the NBN.

This says very little about the implications of the 'super fast' broadband that the NBN is intended to support (Conroy 2009).

WHAT WILL BE THE BASIS OF A 21ST CENTURY SERVICE?

A LAYERED APPROACH

As outlined above, the future network architecture will be based on the layered approach now familiar from data networks, in particular the Internet. The following section uses this approach to consider what might be included in a future Universal Service.

LAYER 2 (AND LAYER 1)

NBN Co will provide Layer 2 connections from an end-user’s premises to a Point of Interconnection nominated for that user. The original version of the NBN Co Business Plan provided for a limited number (fourteen) of Points of Interconnection (POI) in the major capital cities. In response to the requirements of the competition regulator, the ACCC, this was changed to 121 POIs at locations where there are two or more providers of backhaul.

Providers of higher layer services (generally Retail Service Providers) will have to use their own networks (or those of other wholesale service providers) to link the NBN Co POI with their service facilities.

Users served by Optical Fibre.

For these users (estimated as being at 93% of premises) the NBN Co will initially offer two traffic classes – TC-1 for Voice (perhaps using the telephone adapter included in the NBN network termination device) and TC-4 for Best Effort Data.

Users served by the Initial terrestrial Wireless Access Service

For these users (those at 4% of premises) similar traffic classes will be offered, but no integral telephone adapter will be provided.
Users served by satellite.

It is likely that users (at the remaining 3% of premises) served by satellite will be offered similar traffic classes, but the inherent time delay in geosynchronous satellite operation will result in much higher latency and telephony echo.

IP network connectivity

The IP Layer (generally Layer 3) is needed for any transport network, and provides support for applications and services. All end-points are identified by a unique IP address (32 bits for IP v4 and 128 bits for IP v6), with the Internet Protocol supporting delivery of packets to a nominated destination address. This protocol provides for 'best endeavours' delivery, but does not guarantee delivery or proper sequencing of packets, or eliminate the possibility of duplicate delivery.

Internet Service Providers (ISPs) currently offer such network connectivity, generally also on a 'best endeavours' basis. They will be able to use the NBN Co's Layer 2 links from end-user premises to the relevant Point of Interconnection, but they then must provide a back-haul connection from the POI to their own facilities that are linked to the global Internet. User equipment is needed for assembling and dis-assembling packets that pass across the Internet to the selected address.

In the current Internet, successful delivery of packets is generally assured by an upper layer transport protocol such as the Transmission Control Protocol (TCP). For some services that involve two-way, interactive communication, this approach cannot be used. For such services, some form of Quality of Service mechanism is needed to ensure correct delivery. Telephony is probably the best example of such a service. A 'carrier grade' telephony connection requires a high level of support at Level 2 (NBN Co's TC-1) with equivalent support at the IP layer. (Current Voice over IP services often have problems at peak traffic times.)

In the future network, all users will require the combination of NBN Co's wholesale, Layer 2 access plus at least one Retail Service Provider providing IP network connectivity and able to support a full range of services, including telephony. Such an 'IP Interconnection Service' should be the minimum Universal (or Standard) Telecommunications Service.

Telephony

Much of the current Australian regulatory regime for Universal Service is based on the Standard Telephone Service or STS, a basic voice telephone service that enables a user to call any other user of the service, regardless of the public network to which the called user connects. Two-way voice (telephony) can be carried over IP. The data speed required is easily within the capacity of the NBN, but as described above, both the underlying Layer 2 and the IP layers need appropriate quality of service defined to ensure packets are delivered correctly.

The recently passed legislation, with its focus on the Standard Telephone Service, endorses the view that telephony remains a socially important service. The Telstra–NBN Co agreement (Minister for DBCDE 2012) makes the future network a transition from the current Telstra copper CAN to the NBN Co optical fibre CAN. It means that, in future, users with optical fibre access will have to use NBN facilities if they want a fixed telephone service, or rely on mobile telephone service where available.

As described in a previous article (Darling 2010) it is likely that users will have their current household telephone wiring moved from Telstra's copper pair NTU to the Analogue Telephone Adaptor on the NBN Co's Optical NTU (ONTU). Telephony becomes an application delivered over an IP network. A telephony service provider with a 'softswitch' situated beyond the POI would be able to provide this service. It would also be possible for an Internet Retail Service Provider to offer telephony from other customer equipment that it provides beyond the network termination unit. Telephony provided in this way would have to interwork and interconnect with the existing telephone network.
There is substantial current regulation of the Standard Telephone Service, as well as specific licence conditions on carriers, in particular Telstra. The requirement for this regulation, and the transition from the current arrangements to the future environment needs considerable work.

**Numbering and Addressing**

This is one of the main areas that need both policy and technical work to manage the transition from the current to the future network.

The current telephony system uses a national numbering system administered by the technical regulator, the Australian Communications and Media Authority (ACMA), consistent with the international system specified by the ITU. The Telecommunications Numbering Plan (ACMA 2012) is service based, with unique numbering ranges for each service.

The Internet uses a different approach. Connection points on the network are allocated an IP address (either dynamically or statically). These addresses are allocated on a (supranational) regional basis rather than a national basis, with each IP address coming from a pool allocated to the chosen Internet Service Provider (or directly to large organisations). For most applications, this IP address is not accessed directly by an end-user but obtained by accessing the Domain Name System with a unique URL (Universal Resource Locater) that is then translated into an IP address.

Telephony services on the NBN will probably have both an IP address and a telephone number, and may also be accessed by a URL.

The issues to be resolved include:

- The continuing need for many of the current telephony numbering requirements, in particular for local and long-distance service distinctions and untimed local calls;
- Changes to the Australian telephony numbering scheme to reflect the NBN requirements, and the fact that the NBN is likely to accelerate the trend to new services (such as “near telephony” or Internet telephony/VoIP);
- The relationship between IP and telephony numbering and addressing; and
- The approach to be used with current systems and facilities that use telephone numbers rather than IP addresses (for example, emergency services, legal interception and the IPND).

**Services that use the existing copper telephony network.**

There are at present a number of services that make use of some of the features of the existing copper telephone access network: for example alarm services that require DC connectivity. The need to update these services has been recognised in the new legislation, where the TUSMA is required to ensure “appropriate safety net arrangements are in place to support the continuity of supply of carriage services during the transition to the NBN.” (DBCDE 2012)

Other services use voice frequency carriage of data. If a Standard Telephone Service is supplied as part of the USO, the service provider must offer customer equipment. The requirement to offer a standard telephone service equivalent for people with a disability is explicitly included, and a TTY service has been developed to meet this obligation. TTY equipment may work with some forms of voice coding, but will definitely not work with others. Should the specification of any USO telephony service with the NBN support current TTY equipment, or make use of better technology?

**“Near Telephony” Services**

There are a number of services built on the current telephone networks (both fixed and mobile) that need to be considered.
**Voice over IP**

Voice over IP (VOIP) services are becoming popular. Some services are provided over quality of service enabled IP facilities meet full telephony standards, particularly when relatively simple coding is used. Other services are provided over ‘best endeavours’ IP facilities, and may use low bit-rate encoding – at times the quality will be well below that expected for telephony.

Many of these VOIP services are marketed as telephone services, with numbering allocated from the telephony numbering plan.

**Text Services**

The GSM standards provided for a low bit-rate text channel in addition to a voice connection. This SMS (short message service) is now used almost as much as voice, and has been carried forward to later mobile standards (3G, 4G/LTE). As well, fixed networks have been extended to carry equivalent low rate text. The current text services are 'store and forward' rather than fully interactive, and generally use the telephony numbering plan.

**TTY Services**

As described above, the network of TTY devices provide text communication for people not able to use the voice telephony service, using the telephone network for connection.

**TELEPHONY + SERVICES**

The greater capacity of modern ICT technologies has made it possible to add additional services to traditional telephony – for example, by adding video on 3G mobile calls.

Some hybrids are Internet applications, using the Internet numbering and addressing scheme. Others may use the underlying telephony numbering scheme, for example mobile services such as:

- Telephony + text;
- Telephony + still image; and
- Telephony + video

**OTHER SERVICES AND APPLICATIONS**

In general, if the IP network connectivity gives adequate support, the full range of Internet applications will be able to be accessed over the NBN Co customer access and the Retail (Internet) Service Provider facilities.

**PROVISION, OPERATIONS AND MAINTENANCE**

A major requirement of any Universal Service will be the ability to provide the service on demand, and then to find and correct any fault. This will be difficult at any location within the country, with responsibility split between the NBN Co and the Retail Service Provider(s), and especially so in rural and remote areas where users may depend on the USO.

**CONCLUSION**

The suite of universal service reform legislation recently passed by the Australian Parliament is designed to support the transition from the current copper and telephony based network (mostly provided by Telstra) to the future optical fibre and wireless based network (using NBN Co facilities in the CAN, together with Retail Service Provider facilities). The legislation does not address the need for ‘universal service’ in the future network.

There should be an end-to-end transport facility available to all users, able to support a full range of services and applications. The NBN Co will not provide this, as they have restricted their obligation to providing Layer 2 services between the edge of a users premises and the POI. There is at present no certainty that one or more Retail Service Providers will be
available to offer this service in areas that are not commercially viable, and this consideration
could form the basis for a future Universal Service. This raises the question as to whether the
future USO should be restricted to an underlying requirement for a Layer 3 service, based on
the Internet Protocols.

If there needs to be a more detailed Universal Service definition, higher-layer
communications applications (or services) in the NBN environment could be divided into two
distinct categories:

• Communications services of social importance as an extension of the current USO
  concept. This category should encompass communications services which meet a
  defined, minimum standard and which are available on an ubiquitous, or near-
  ubiquitous, basis; and
• All other communications services and applications.

Telephony would (at present) fall into the first category, as would a suitable communication
service for those users unable to make use of a telephony service.

DETERMINING THE FUTURE STANDARD TELECOMMUNICATIONS SERVICE (STS)

It seems almost certain that there will be a continuing community need for a universal service
(or services) to support basic social communication requirements. This provides a policy
challenge – not just about whether an STS (or more ambitious IP-based service) ought to be
mandated, but rather how this should be done. I believe the underlying policy need for an
STS will not change, but many policy details need to be negotiated. Policy issues requiring
resolution include:

• The longer term need for a telephony USO;
• Whether the current Standard Telephone Service ought to be expanded to include
  other services or purposes; and
• Whether the list of regulatory requirements that are currently attached to the STS
  ought to be contracted (or expanded).

Much of this policy work will require technical work to define the service(s) adequately.

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ENDNOTES


2. In the case of new 'Greenfields' developments, the NBN Co NBN Co Limited is responsible as provider of last resort for the installation of fibre in developments of 100 or more premises approved after 1 January 2011; developments that have fibre that is ready for service and capable of connection; and new developments within areas where NBN Co has announced it will roll out fibre within the coming 12 months. See http://www.dbcde.gov.au/broadband/national_broadband_network/fibre_in_new_development

3. The TTY service has developed from the initial modification of 'Teletypewriters' to enable hearing impaired users to communicate over the telephone network. Many commercial and Government organisations now offer service with compatible equipment on dedicated numbers for such users, and a special emergency code '106' is available. (The National Relay Service provides translation between TTY, Internet and Voice.)

4. This may explain the agreement between Telstra and the Government to use existing copper technology to provide the transitional USO overseen by the TUSMA

5. See endnote 1

QUALITY AND AVAILABILITY OF THE STANDARD TELEPHONE SERVICE

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INTRODUCTION

Australia’s elaborate legislative guarantees around fixed-line phone service availability are evidence of the historic social consensus that access to a phone is a universal right and an essential feature of an industrialised society. It would be unfortunate if the construction of a new access network in the form of the National Broadband Network (NBN), designed to enhance Australia’s technological prowess in the digital age, were to have the effect of reducing the quality or availability of the basic fixed-line phone service, which remains today the taken-for-granted service.

QUALITY OF TELEPHONY OVER THE NBN

The Standard Telephone Service (STS) is regarded by the community, if people think about it at all, as something that is always there. The bulk of residential and business users rely on it and will continue to do so for the foreseeable future.

Even for people who now rarely use a fixed-line telephone, it is considered an always available fall-back – a high quality, reliable and dependable service for when voice quality and drop-outs on mobiles get too irritating.

As the consumer peak body for communications, ACCAN (the Australian Consumer Communications Action Network) has not received any indication from NBN Co or service providers that the quality of the voice service over the NBN will differ from the quality of the voice service carried by copper. But people knowledgeable in the field have sufficient concerns to raise the need for end-to-end Quality of Service (QoS) standards for telephony over the NBN in industry forums, including this journal (Darling 2011; Gerrand & Horsley 2011).

One key observation about the end-user experience that has stuck in the mind of ACCAN advocates is that excessive delay by a matter of a few hundred milliseconds in the transmission of voice can cause a conversation to become psychologically uncomfortable and undermine natural communication between callers (Gerrand & Horsley 2011).

To date, there has been little by way of reassurance to the public that the voice quality of the telephone service will be maintained by retail service providers using the NBN, and industry seems to have given the issue a low priority. This is despite the social importance of good quality voice services. The low priority accorded the issue is surprising given the high profile it has been given in some parts of the media, usually accompanied by misinformation about the implications of the NBN for telephony.
It has not been unusual to hear on talkback radio a caller saying they don’t want the NBN to carry their phone calls because they don’t think voice quality is as good when “it is over the Internet”. No doubt this is said as the caller remembers their latest disappointing attempt to chat on Skype. (The NBN will of course be a managed network, and STS calls will not be “over the Internet.”)

Nevertheless, the NBN will allow service providers to provision their offerings to consumers in various new ways. Ensuring that the minimum quality of voice on an STS is not diminished and is the same across all service providers, no matter how cut-price they are, would make sense given the legislated scheme of consumer protections and guarantees built around the STS.

Of course, there may be some who argue voice quality should be allowed to differ – with the principle of ‘you get what you pay for’ applying to the quality of your voice service as it does with so many other consumer goods and services.

If this is the path we are taking with the NBN, it should only be done with an open public discussion first. We should not be sleepwalking into a scenario where those who pay for it get the type of quality they are used to on their fixed-line, while others get something less.

**AVAILABILITY CONSIDERATIONS REQUIRE OPT-OUT NBN INSTALLATION**

ACCAN’s position favouring an opt-out approach to NBN fibre installation arises from the starting point that the NBN is the replacement phone network. (ACCAN 2011a) ACCAN has of course been on the record arguing for broadband generally to be seen as a utility akin to water, energy and gas. However, arguments around the importance of broadband are secondary. Ensuring availability of a fixed-line phone service alone should be sufficient to convince governments that an opt-out approach to the rollout is the best policy.

The National Broadband Network (Tasmania) Act 2010 provides a laudable model for opt-out policy (Tasmania 2010). It strikes a prudent balance between allowing individuals the opportunity to opt-out if they so choose while at the same time ensuring that the NBN is a tool of social inclusion. Default policy settings in the NBN rollout will have a significant impact on the most vulnerable, including low-income consumers, tenants and older consumers. Sadly Tasmania’s opt-out legislation has not been replicated in other states and territories.

**NEW STATUTORY DEFINITION NEEDED FOR STS**

The statutory Standard Telephone Service is of course limited to voice telephony. Meanwhile, Telstra’s decisions and the Commonwealth’s Telecommunications (Equipment for the Disabled) Regulations (Commonwealth 1998) have excessively confined the STS in a way that allows for no consumer choice as to the form in which the STS should be delivered.

It is ACCAN’s view that a new statutory concept to replace the STS in terms of ‘network access’ or ‘connectivity’ should be created to legislatively support a universal service which allows for individuals to choose the services that meet their needs (ACCAN 2011b). The aim should be to deliver functional equivalence for telecommunications services, not necessarily limited to ‘voice’, in a converged environment.

The Australian Communications and Media Authority’s recent Numbering paper notes:

> “the intent of the enabling legislation in regard to the STS was to define a basic communications service—indeed of delivery technology—to which a number of regulatory obligations and consumer safeguards relating to a minimum community standard of communications service are attached.” (ACMA 2011, 8)

Today, for many people, the ‘basic communications service’ is just as likely to be a mobile and safeguards which are attached to a service they do not use are of no comfort.
In a similar vein, Peter Darling (2011) has suggested a Basic Communication Service which comprises a bundle of services to meet a range of individual needs.

It is regrettable that under the government’s policy and its definitive agreements with Telstra, consideration of these substantial issues of what should comprise universal service has been deferred until close to the end of the NBN rollout.

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THE AUSTRALIAN GOVERNMENT INTERNET FILTER: ITS SCOPE, AND ITS POTENTIAL CIVIL LIBERTIES IMPLICATIONS

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In this article, we examine the structural elements of the Australian Government's filter policy as it has evolved over time, paying particular attention to the scope of the proposal, and the possible civil liberties implications of the proposal as it is presently formulated. More precisely, we argue that, by anchoring the proposal in the RC classification scheme, the filter will block far more than illegal material and, as a consequence, there is cause to be worried that a censorship regime is being created, as opposed to a system to protect children. We also explore the significance of civil liberties in the context of a liberal democracy and demonstrate the value they bring to Australia and show how freedom of speech, expression and information are not properly protected under Australia's Constitutional Framework creating consequences for established democratic freedoms in Australian society if the present ISP policy is to be implemented.

INTRODUCTION

The capability and magnitude of the Internet challenges conventional boundaries in respect to available information and speed of delivery allowing considerable educational, cultural and economic opportunities. While regulation of content itself is not a new issue, the method of Internet delivery is problematic for regulatory regimes. Consequently, the Australian Federal government faces significant challenges in developing a regulatory framework that balances the risks of the online environment yet protects citizen's freedoms in a democratic country, as well as promoting the opportunities the Internet offers.

In this article, we examine the scope and potential civil liberties implications of the Australian Government's proposed Internet Service Provider (ISP) filter, which is based on the Refused Classification (RC) Content criteria that is administered by the National Classification Scheme. This examination draws on government documentation on, as well as press reportage and scholarly analyses of, the filter proposal. These varied sources are valuable insofar as they make possible an exploration of the filter proposal that incorporates understanding of government policy (and how this policy has shifted over time), public commentary and debate, and academic evaluation and critique.

In examining this material, we argue that the subjective nature of the RC criteria increases the potential for extensive expansion of the scope of the content that is to be filtered, giving rise to civil liberty concerns in respect to freedom of speech, expression and information. We conclude that, by following the present arrangement, the balance between the State protecting children online and adults having the right to choose will be disproportionately in the favour of the State with no real benefit for the children it seeks to protect.
THE AUSTRALIAN GOVERNMENT ISP FILTERING POLICY

The Government's attempt to establish mandatory filtering of the Internet has become a complex and controversial debate. Although, the intention of the scheme is the protection of children online (Conroy 2007), this key motivator has arguably become lost. Much has been written about the value of such a system in the protection of children and whether such a system can actually provide such protection.

The Government argues that it is responding to perceived parental concerns of being unable to safeguard their children from harmful content online. This motivation is valid and genuine and political reality necessitates that the Government responds to these concerns (see Vaile 2009 for evidence of this). However, in its attempt to facilitate this, Senator Conroy has poorly articulated the arguments, which at times have been confusing and unconvincing, further increasing the challenges of implementing such a regime. Consequently, it faces significant challenges in developing a regulatory framework that balances the risks of the online environment yet protects citizens' freedoms in a democratic country.

Senator Conroy argues that there is no 'silver bullet' for cyber safety, and that a range of measures (education, research and law enforcement) is necessary (Conroy 2009a; Conroy 2007). However, his focus on the filter as the key component to protect children online as well as his continuous shifting of the goalposts in terms of policy aspects leaves him open to criticism of producing a deficient approach not able to respond to parental concerns or evolving technology. Moreover, Conroy's remark that those who do not support the filter support child pornography is perceived by some as a tactic to shut down debate (Dudley-Nicholson 2008a), while the suggestion that the filter is not censorship because it is protecting children is deeply flawed. While discussion perhaps ought to be centred on what is the best way to protect children online, this has largely not occurred to date, despite a growing body of research in this area (see, in particular, Livingstone 2009; Green et al. 2011).

As a result, a lack of cohesive debate has done little to enhance discussion and has meant that the needs of children have been neglected. To date, discussion on this key aspect of the original policy, and how best to develop a model that could provide solutions to protect children online, has been lacking. The Government's attempt to respond to parental concerns, therefore, has produced a system that is flawed and arguably unworkable. The key difficulty with the current policy is the gap between what it promises and what it can in reality deliver.

The Australian Communications and Media Authority (ACMA) has identified three risks for the online world:

1. content risks (exposure to inappropriate content);
2. e-security risks (viruses, identity theft);
3. and behavioural risks (cyber bullying, grooming) (ACMA 2009).

Labor (Conroy 2007) acknowledges all these risks; however, the proposed filter will only address content risks on the Web. It will not do anything for material passed through peer to peer networks, which are secure, encrypted and avoid a central network server (thereby operating outside the filtering system) and where most child pornography is channelled (Vaile and Watt 2009), or chat forums and services such as MySpace, MSN, Skype, and so on (Collins et al 2008) where grooming is a concern. With development in Internet technologies and an increase in user-generated content and interactivity by young Australians, the risks for Internet users have increased (ACMA 2008a), and “analysts predict that, within a few years, 75 percent of all broadband internet services will be used for user generated content services” (ACMA 2008a, p. 24). This means that the filter, in its presently proposed form, is unlikely to effectively address the concerns of parents.

Additionally, the government does not provide evidence of the percentage of accidental exposure nor any evidence-based approach in justifying this policy (Hansard 2010; Wright 2010). Labor often cites research by Flood and Hamilton (2003a; 2003b) which recommended ISP mandatory filtering (with an opt-out system), as well as acknowledging that it was technically feasible (Lundy 2010). However, the Flood and Hamilton research was
not an extensive study and has now been discredited (von Brasch 2010a). Considering the Internet is an environment where information is searched for, it might be argued that accidental exposure is likely to be relatively low. A user is not presented with information unless it is requested either by entering a website address in the browser or requesting the information through a search engine. Where exposure does occur unintentionally or through keyword or image searches that result in inappropriate links or redirections, there is no guarantee that the filter would prevent these occurrences (Meloni 2009; cf. Eneman 2010).

Furthermore, it has been suggested that the proposed filtering regime could actually give parents a false sense of security when it comes to Internet safety, as they may believe the filter will make the online environment safe (Hansard 2010; Jacobs 2009). Parents play a critical role in the wellbeing of children online by controlling their child’s access (Byron 2008); if parents believe the filter will do the work for them they may possibly change their supervision and management of Internet access.

As the policy currently stands, legislation would make it mandatory for ISPs to legally filter RC material (hosted on international servers) under the National Classification Scheme. The Labor Party 2007 scheme focused on the ‘clean feed’ concept that essentially means the government will legislate for ISPs to provide a service to censor certain content (through a blacklist) therefore removing access from the public. The original proposal was based on the 'prohibited' content criteria with an optional opt-out mechanism. Subsequently, the ISP policy has undergone a number of amendments: content to be filtered has changed from initially prohibited content (Nov 2007), to illegal content (Oct 2008), and finally to RC material (Mar 2009). The opt-out option has been removed meaning that adults would be excluded from having the choice of being part of the scheme, thus making it a mandatory system and a complete reversal from the 2007 position.

The reality of this current proposal is that the filter will only cover a small part of the Internet, with little prospect of achieving the objective of protecting children online (Moses 2008a; Moses 2008b; Dudley-Nicholson 2008b). Although parental concerns have been in the forefront of the Government's efforts in developing the initial filtering proposal, their failure to adequately address these concerns fuels criticism of the scheme. It has also become a much more complicated proposal given it reliance on the classification scheme and censorship.

Much has been written about the ISP filter policy, especially with respect to issues of transparency, accountability and appeals mechanisms – all of which were seen to constitute key aspects lacking in the original scheme. As a result of commentary on these issues, a consultation process was undertaken to address some of these concerns with changes being announced in 2010.

THE CURRENT SITUATION

In July 2010, before the Federal election, Senator Conroy revealed a “comprehensive suite of transparency and accountability measures to accompany the introduction of ISP filtering of RC content” (Conroy 2010a) taken as a result of a consultation process to address accountability and transparency concerns raised by stakeholders. Additionally, Senator Conroy announced a review to examine “the current scope of existing RC classification, and whether it adequately reflects community standards” (Conroy 2010a) owing to unease over this criteria being used in the mandatory scheme. These announcements, it could be argued, neutralised the debate by appearing to respond to criticisms of the policy and creating the impression that the scheme had altered. However, the four main structural elements of the scheme – that the system is mandatory, that RC Classification criteria is to apply (although presently under review), that the RC Content blacklist is secret, and that URLs will be added from international agencies – essentially remains the same, meaning that the scheme is fundamentally unchanged (unless there is some alteration to the RC criteria).

As the ISP filter survived the 2010 Federal election it is continuing to progress in the current minority government. Some reports say mandatory ISP filtering is at least two years away (Stilgherrian 2011) once the RC review is completed and implementation begins. Yet there is still strong opposition to it (Moses 2010a) and confusion as to when and if it will be
operational. In the 2011 budget, ISP filter grants were cut and it was announced that the government “would not proceed with a funding program that has seen Australian ISPs provided with grants to offer internet filtering options to customers, citing a lack of interest in the project” (LeMay 2011a). Further, the Joint Select Committee on Cyber-Safety tabled its Interim report on the Inquiry into Cyber Safety (High-Wire Act: Cyber-Safety and the Young) on 20 June 2011 which questioned the effectiveness of ISP filtering and the “committee declined to make any recommendations or endorse the policy” (Hilvert 2011).

In June 2011, the Internet Industry Association (IIA) indicated it would release a voluntary ISP level blocking code. It is not clear what this code would entail, other than what was released in an IIA Media Release on 27 June 2011 which said “the voluntary industry code of practice for ISPs in Australia would entail blocking child pornography sites which would otherwise be available to Australians. It would rely on a blocklist compiled and supplied by Interpol, in cooperation with the Australian Federal Police” (IIA 2011). As of January 2012 this code has not been released.

In July 2011, a voluntary filtering scheme commenced which sees those ISPs who sign up to the scheme blocking a list of Interpol-compiled child abuse URLs. The Interpol list, as it is known, is said to contain “the worst of the worst” of such website URLs (Stilgherrian 2011). Although the scheme is voluntary for ISPs, users will have no choice but to be part of the scheme if their ISP has opted in (Moses 2011) and users will be unaware that their Internet connection is filtered (LeMay 2011b). The IIA had predicted that most ISPs would be part of the scheme by the end of 2011; however, it is believed that as of December 2011 only five ISPs have signed up for the voluntary scheme (LeMay 2011b). This voluntary scheme, which is administered by the Australian Federal Police, is completely separate from the mandatory ISP scheme the government is trying to implement and which forms the basis of this article.

Senator Conroy is steadfast in his commitment to implementing mandatory ISP filtering after the RC review (Moses 2011), even though there is currently no parliamentary (and limited public) support for it. While mainstream commentary has widely reported on a number of concerns with respect to the ISP policy including censorship, far less consideration is given to the possible civil liberties implications of this policy, which is the main focus of this article. Closer scrutiny of the filtering policy uncovers extensive ramifications for civil liberties that, we argue, makes the scheme incompatible with a liberal democracy such as Australia. We develop this argument in two directions: first, by examining the present scope of the policy and the possibility for further expansion of this scope; second, by considering the impact of this scope on civil liberties.

**THE SCOPE OF THE FILTER PROPOSAL, AND THE POTENTIAL FOR FUTURE EXPANSION**

The Government's commitment to use RC content to form the basis of the new Content List is problematic. According to von Brasch (2010a), Australia is “unique” as “in most countries, there is illegal material and there is legal material [...] however] with RC, Australia has a category that is not illegal, but the government would prefer that we thought it was”. Senator Conroy insists that the material he wants to block is illegal material under RC; however, this, to a degree, is misleading. Although, a portion of RC material is illegal, there is another portion which is not. For example, a “detailed discussion of euthanasia” regularly falls under the RC category of “detailed instruction to crime” and is blocked (von Brasch 2010b). Furthermore, the difficulty with RC material is that,

> the interpretation of the RC category on its own opens an array of potential issues [...] in that] the Classification Act does not offer detailed criteria for determining whether content is RC. Rather, it states that material be classified in accordance with the principles in the National Classification Code. These guidelines are extremely broad (Lumby et al 2009, ii).
RC material is currently readily available and “is actually material that should be made available to the general public […] and] stopping such material, information about the holocaust, inquisition, torture […] and so on] has other far more dangerous consequences” (Landfeldt 2009). Additionally, and as already noted, RC content is not necessarily synonymous with illegal content. As von Brasch notes,

almost everything that is RC is legal to own and view by a majority of Australians […] the notable exception being child pornography, which is illegal everywhere. The Government's proposal to block RC material on the Internet is thus an attempt to censor legal material (von Brasch 2010b).

A key issue with RC classification is the question of what will occur to socially or politically sensitive material under the scheme. RC potentially includes controversial content relating to such things as suicide, crime, and religious issues (Sandy 2009), as well as educational information on safe drug taking. Other content that could be deemed RC and potentially blocked includes information discussing the “geo-political causes of terrorism” or a “safe site for young gay and lesbians” (Lumby et al 2009, iii).

Moreover, Mark McLelland (2010) argues that certain genres of Japanese animated fiction could be potentially blocked, particularly as Australia’s legislation governing sexual abuse materials and child pornography is broad. The reasons for this are twofold. First, child sexual abuse imagery is an extremely wide category. As McLelland explains,

[it] extends even to purely fictional representations of ’under age’ characters in violent or sexual scenarios – including animation, comics, art work and text […] hence, existing legislation targets not only a small coterie of adult paedophiles […] but extensive communities of animations, comics and gaming (ACG) and ’slash’ fans (McLelland 2010, 3-4).

Second, child pornography has no clear-cut and universally accepted definition. As Maurushat and Watt (2009, 5) explain, “the term is ambiguous even within Australia, where State and Federal definitions vary”. Here is an issue that perhaps ought to be clear-cut yet isn't and where the definition is also dependant on State legislation.

This potentially allows grey material under the RC classification to become more contentious, as interpretations are at the discretion of the Classification Board (CB), and, even though they are the most capable body, they will deal with “an online environment in which the range, scope and purpose of material is far wider than that encountered in films produced for entertainment purposes” (Lumby et al 2009, ii). These examples illustrate how RC content could encroach on territory that is arguably not child sexual abuse material. As the scope is more comprehensive than child pornography it challenges the government's claims that the filter is principally for the protection of children, as its reach is potentially far more extensive.

What is important to note with these examples, however, is that they are, for all intents and purposes, hypothetical, as material has to be deemed RC in order to be blocked. Nevertheless, due to the nature and breadth of the category, and based on the CB's and ACMA's previous classification decisions, these are genuine possibilities (Lumby et al 2009). Overblocking is thus a real likelihood, and managing such a likelihood is critical, particularly in a mandatory scheme where the public has no control over what is blocked.

Use of the RC category also makes it plausible that the filtered content will increase from the original intention of the policy. This can occur in at least two ways:

(1) when future governments legislate to broaden the classification of RC; and/or

(2) where classification expands by increasing the amount of “grey material” as content that is deemed RC.

Such “scope creep” was one of the concerns raised by content providers in the Feasibility Study ISP Level Content Filtering Report that “content broadens beyond what may be initially in scope” (Collins et al 2008, p. 39). This is not only credible, it is made easier by the fact that filtering will be mandatory. Senator Ludlum argues that “the idea that
future governments will not be tempted to expand its scope is impossible to entertain” (Hansard 2010, 2606) and “inevitably it will be expanded – the temptation will be too great for governments to resist” (Karena 2009).

Already the ACMA blacklist includes material which is “not illegal” but “offensive” (Lumby et al 2009) and the RC category has content which includes “legal material such as regular gay and straight porn sites, fetish sites, euthanasia material and innocuous sites that have been mistakenly prohibited” (Moses 2009).

Although politicians do not classify content, they do legislate what “categories of content” will be prohibited (Moses et al 2010). Any government of the day could possibly expand the content criteria (Moses 2010b) for material they find objectionable by, for example, undertaking a deal with an Independent who holds the balance of power in the Senate and using it as a bargaining chip in negotiations to pass legislation. Additionally, vocal lobby groups could campaign and pressure politicians to increase the list of material subject to RC classification (Moses et al 2010). These are legitimate possibilities that need to be considered before a mandatory system is put in place.

Governments do respond to outside influence and under pressure could possibly change legislation. By way of illustration, we might consider the example of artist Bill Henson in 2008. When some of his offline works were put online, a public outcry followed as some of the images were of young teenagers (Lumby et al 2009). Following this outcry, Henson’s works were seized by police with comments from the Prime Minister down (von Brasch 2010b). No uproar had occurred earlier when these same images hung in an art gallery (Lumby et al 2009). Ultimately, the CB rated all of the artwork at “G” (Lumby et al 2009; von Brasch 2010b). This example is not drawn upon to debate whether the images were appropriate or not, but to illustrate how easily an issue can become political and how images that were legal offline, can easily become contentious once placed online.

Controversial issues may become more contentious in the future. As Lumby et al (2009, 4) argue, “the potential for the broad language of the current classification code and guidelines […] is particularly the case under a mandatory rather than a voluntary filtering system. The diversity, intent and audience of online material multiplies this potential exponentially”.

Once infrastructure is in place, history shows that original policy can and does change with the passage of time and that expansion of the policy (rather than further restriction of its scope) is the most likely outcome. As Sandy notes, “there is plenty of precedents where something has been legislated for (or against) but this has resulted in unforeseen consequences. Legislation passed for one purpose can with interpretation or amendment be used for another” (Sandy 2009, 6).

It is these structural concerns which lay the groundwork for the consideration of the civil liberties discussion that follows. The civil liberties implications are of concern because the structure of the ISP policy illustrates potential difficulties associated with the policy and provides a framework that highlights the policy’s complexity and potential complications in its implementation. These complications relate to particular freedoms being impinged upon when this policy is made operational. These are significant concerns in any democratic framework as civil liberties are core values in a democracy and as such require protection from the State.

**THE POTENTIAL CIVIL LIBERTIES IMPLICATIONS OF THE FILTER PROPOSAL**

Any attempt to interfere with established civil liberties (even when the objective is regarded as well intentioned) requires considerable dialogue to ensure that the foundations of democracy are maintained.

Debate concerning civil liberties partially centres around the issue of the protection of the state versus the rights of individuals. With respect to the ISP policy, this involves the government’s perceived responsibility to protect minors from damaging material online versus the individual
having the right to choose what they view. In Australia, this is important and relevant given that, as a democratic country, individual freedoms are generally acknowledged, recognised and respected as an accepted part of society (Jones 1990; Gaze and Jones 1990).

One of the most influential liberal thinkers is John Stuart Mill (On Liberty 1859) who argued that an individual's full potential cannot be achieved if they can't think and act as they wish. Freedom of the individual, for Mill, is paramount; through the process of engagement, individuals are able to participate in the development of critical debate. It is this engagement which is of considerable value in a democracy as it allows the flow and exchange of views and ideas (Warburton 2009). In theory, through this exchange, individuals are better able to clarify their views, contribute to discussion and, ultimately, to decision making. Mill's views could, to a certain extent, be considered utopian as he believed the only justification for state intervention was when there was risk of harm to others (Mill 1969). Today, freedom is a balancing act: “it is not absolute and is restricted by legislation and common law […] balanced against the interest of state security, public order, public morality, and protection of privacy” (Jones 1990, 6).

According to philosopher Isaiah Berlin, the view of liberal thinkers, where individualism is the focus, is based on the notion of negative liberty (freedom from constraint). Berlin made the distinction between the “two concepts of negative and positive liberty”, where, in the case of negative liberty, there is an absence of restriction or intrusion from others and, in the case of positive liberty, the presence of something, the freedom to act (Berlin 1969).

Civil liberties are linked to democracy and are important to its function (Gaze and Jones 1990). In theory, these safeguards protect a citizen from the state, as they place restrictions on government that lessen the opportunities for its representatives to abuse their power and limit the lives of individual citizens. Democracy, however, is fundamentally a complex idea with no universal accepted model or definition (Strömbäck 2005) and “is not a unitary concept”.

The focus of discussion of civil liberties in this paper is on how they bring value to a democracy. This is done in order to show how the ISP policy will affect these freedoms. Civil liberties are here understood and discussed as freedoms “intended to safeguard individuals against the abuse of power. In this sense they are ‘negative rights’: they are about limiting what governments can do” (Rayner 1997, 35) – an understanding that links with Isaiah Berlin's concept of negative liberty.

**Freedom of Speech and Expression**

It is argued that freedom of speech and expression are essential in a democratic society as “voters have an interest in hearing and contesting a wide range of opinions […] having access to facts and interpretations, as well as contrasting views” (Warburton 2009, 3) so that they can engage in debate and discussion (Jones 1990). This varied selection and availability of information, ideas, and opinions (particularly opposing ones), reflects the plurality and wealth of a society (Warburton 2009, 85-86).

In addition, it is worth noting the “public sphere” argument developed by Jürgen Habermas, with the “public sphere” being a place “made up of private people gathered together as a public and articulating the needs of society with the state” (Habermas 1989, 176). Through these acts of communication and dialogue, engagement with the public process is generated which either confirms or challenges the affairs of the state. A free society requires this engagement as “freedom of speech provides the ideological underpinning of individualism: it is fundamental that we can […] hold widely varied ideas and beliefs. This is the litmus test of democracy” (Jones 1990, 6).

Freedom of speech and expression to a certain extent is reliant on the information available to the public. Individuals are arguably less able to participate in debate if information is not easily accessible. Consequently, communication, which allows discovery and disclosure of information, provides the opportunity for the public to participate in debate if they choose to be involved.
**Freedom of Information**

Thus, the flow and access of information – the right to seek, receive and impart information and ideas – is vital for democracy. Citizens can only determine what is occurring in society and whether it is acceptable if they have access to information (Mendel 1999). A participatory representative form of democracy (Gaze and Jones 1990; Strömbäck 2005) encourages individual participation in public and political life as democracy is strengthened as people engage in their activities. As Strömbäck explains,

> democracy is the result of the attitudes and the actions [...] among ordinary people [...] [T]o fulfill the role ascribed to them in the participatory model of democracy, people need the kind of knowledge and information that facilitates collective action, participation and engagement (Strömbäck 2005, 336).

The Internet has facilitated ready access to information. In respect to government information, access is based on the notion of the public interest and the argument that the public has the right to know what a government is doing in a democratic society (Mendel 1999). As Gaze and Jones explain,

> it is important that much of this information be made available to the public, in order that intelligent scrutiny of government actions and decisions can take place and citizens can vote and participate meaningfully in the political process (Gaze and Jones 1990, 226).

Access to this information allows the public to examine the activities and behaviour of government and thereby take part in an informed debate (Mendel 1999). Freedom of information is crucial to a healthy functioning democracy. The risk that the scheme will block far more content than it was set up to block means that it poses particular challenges to established democratic principles – even if the intentions for initially setting up the scheme were honourable.

**Constitutional Framework**

Australia is unusual insofar as it has no Bill of Rights protection, nor any provision under the Constitution for protection of civil liberties; it is one of only a handful of democratic countries where there is no legal instrument asserting freedoms for its citizens. In 2010, the Labor government rejected a Human Rights Charter, which would have recognised basic individual rights in legislation. The then Attorney-General Robert McClelland argued that there was concern about the outcome of such a charter resulting in a “shift of power from parliament to the judiciary” (Dunkerley 2010).

Therefore, under Australia's current framework, the only protection Australians are afforded in legislation is limited to freedom of political communication. As Gelber (2004, 48) states, “with exception of the constitutional freedom of communication on political matters, free speech in Australia has historically been a residual freedom protected by the common law”. Since 1992, the High Court of Australia has clarified this implied freedom of political communication, however, there is still debate as to what it means in practice.

The benefit of having civil liberties enshrined in the Constitution is that they can only be modified or removed by having a referendum where the public votes for the change (Jordan 2002). Hence, “legal protection for civil liberties is, by the combined actions or failure to act on the part of judges, politicians, and the community, quite inadequate” (Gaze and Jones 1990, 24). Consequently, it may be possible to argue that Australia's civil liberties protection is weaker than in other liberal democracies because of this lack of constitutional framework.

Australia's lack of solid constitutional and legal structures, which protect civil liberties, could be seen to clear the road for full implementation of a mandatory scheme, as scrutiny is not supported by constitutional structures. Australia is a tolerant society and its civil liberties have been valued (Gaze and Jones 1990). However, as Gaze and Jones argue,
complacency should not lead us to think that legal protection for civil liberties is not important. A tradition of tolerance can be eroded unless care is taken to maintain it [...] without clear protection, civil liberties depend on restraint of those who hold, but may choose not to exercise, legal or governmental powers to interfere with them (Gaze and Jones, 1990, 24).

The ISP policy creates a situation where there is significant encroachment into the civil liberties of Australian citizens as a result of the design of the policy. The government, in undertaking to design a filter to solve the issue of online safety for children, has inadvertently produced a set of conditions that carry significant ramifications for Australian society in respect to democratic freedoms. While we fully support the need to protect the civil liberties of children (Eneman 2010, 234), the larger impact of this filter far exceeds the original dilemma the government was trying to solve (online protection of children), and will cause damage to Australia externally as a liberal democracy and internally as a society that values its civil liberties if it proceeds.

CONCLUSION

The ISP filter is a complicated proposal that does not adequately address the issues of online safety for children in ways that justify a mandatory ISP filtering policy. Although child sexual abuse content online is illegal and unquestionably wrong, essentially this filter is ineffective in protecting children from such content or other questionable material. The government is in the challenging position of having to respond to parental concerns and balance online freedoms for the community. Although well intentioned in wanting to protect children online it has proposed a filter that is a deficient approach as it will not effectively block sufficient harmful content in a way that will make a material difference to the protection of children. As Vaile and Watt state, such an approach is “unlikely to work in practice to effectively address either the threat of child pornography/child abuse material, or access to material with some capacity for harm” (Vaile and Watt 2009, p. 28).

Despite the transparency and accountability measures to be established and the review of RC guidelines, the ISP scheme remains flawed. The main structural components of the policy are unchanged, meaning that the scheme will still operate as a mandatory regime and the blacklist will yet remain secret, therefore forfeiting transparency and accountability (regardless of measures in place) and opening up the ISP regime to possible mistakes and possible political interference. The breadth of scope of the filter scheme, and its anchorage in RC classification criteria, result in a policy that has been revealed as capturing a significant amount of socially and politically controversial material that should not be blocked in a democratic country. As a paper by Hartley et al (2010, 4) states, “if material is heinous enough to be censored, it should be illegal, as determined by Parliament”.

As the Internet becomes more significant in terms of media, communication and distribution platforms, it can perhaps be argued that civil liberties need protection. Future debate on this possibly needs to be tied into the ways the Internet is being accessed and used by the public.

Rather than implementing a censorship regime, providing the public with the tools and skills to allow them to make decisions for themselves is a practice that is more aligned with democratic principles of choice. The government can play a productive role as “risk manager” by assisting the public, especially parents and children, with the necessary information and education to equip them so that they are able to make choices to correspond with their circumstances.

That there has been a marked shift in focus away from the original policy plan means that the policy now has no cyber safety benefit and it is highly doubtful that protection of children is still the principal aim of this policy.

Although there are unique challenges for the government in providing a regulatory framework, balance is required in managing protection of children and the protection of society's freedoms. Implementing a mandatory regime that does not adequately respond to
key issues for children online and in turn encroaches on established civil liberties arguably means that government interference must be seen as a negative influence that undermines democratic principles.

It is argued that “the greatest threat to an individual's freedom of speech comes from rules requiring conformity to standards of public morality, which censor unacceptable material, and which are intolerant of unusual behaviour” (Jones 1990, 7). Arguably the ISP policy will deny access to socially challenging material, consequently resulting in clear ramifications for the Australian public. Blocking this material does little by way of protecting children online but clearly violates established freedoms where the flow, access and reporting of information is so fundamental to the basic principles of democracy.

REFERENCES


McLelland, M. J. 2010. 'Australia's Proposed Internet Filtering System: Its Implications For Animation, Comic and Gaming (ACG) and Slash Fan Communities', *Media International Australia*, 134, February: 7-19.


ENDNOTES

1. Australia is a signatory to the United Nations Article 19 of the 1948 *Universal Declaration of Human Rights* (UDHR) and Article 19 of the 1966 *International Covenant on Civil and Political Rights* (ICCPR) (Jordan 2002; Lumby et al 2009) (which is ratified), which affirms the rights to freedom of opinion and expression, however, what protection this brings to Australian citizens is unclear.
People with complex communication needs are limited in their ability to speak and type. This makes it difficult for them to express their specific needs and to gain access to the telecommunications solutions currently available. This paper describes the development of the community-based Newell Network (www.newell.org.au), a Web 2.0 site centred on empowering individuals with complex communication needs, their carers and support organisations. The site enables users to add information on available telecommunication solutions and be directed to known applicable resources. Reflections on the project development, process undertaken and issues identified are discussed.

BACKGROUND

'Complex Communication Needs' (CCN) is a term used to describe the needs of people who have little or no speech. These communication problems are associated with a wide range of physical, sensory and environmental causes which restrict or limit a person's ability to participate independently in society. People with CCN may include those with Cerebral Palsy, Autism, Stroke, Intellectual Disability, sensory impairments and degenerative conditions such as Motor Neurone Disease.

In Australia, just under one in five people (18.5%) have a disability, for which about 6% of the people results in profound to severe restriction of core activities. Of those with a reported disability, 87% had a specific limitation or restriction which also includes communication (ABS 2009). One in seven users of government disability services (over the age of five years) has little or no effective communication. Over 40% of users require assistance for communication (SPA 2012). Communication is one of the most crucial requirements to participation in society. Communication enables us to:

- express feelings and thoughts in order to understand and respond to others
- achieve our goals and advocate for ourselves and others
- build friendships and socialise
- engage services and supports within society
- acquire and share information.

All of these factors may be impacted if a person has CCN.

The UN Convention of the Rights of Persons with Disabilities states that 'communication enables peoples with disabilities to fully enjoy all human rights and fundamental freedoms'. Enabling people with CCN to communicate via the telecommunication system is essential.
Research has shown that with the right processes and support in place, current solutions can assist people with disabilities to effectively communicate with other members of society and access the same range of information systems and services enjoyed by the able-bodied community via the telecommunications system (Nguyen 2007 & 2008, Garrett 2010).

INTRODUCTION

It is well known that there are many significant issues that make it difficult for people with CCN to access the telecommunications network (Goggin & Newell 2003). As a result, it was essential that we identified the important issues through consultation with people with CCN along with their supporters. To this end, a community of end users and their supporters was established.

Initially an email list server was created for discussion of issues, ideas, activities and solutions related to assisting people who have a CCN to gain meaningful and effective access to the Australian telecommunications system either via a phone or the Internet. An email-based system was accessible to people with CCN. Interested individuals were sought from the Australia Rehabilitation & Assistive Technology Association (ARATA), AGOSCI (a group representing people with CCN, as well as those who live, know or work with people with CCN) and other appropriate networks. An important role in the establishment of this community was to identify participants who had experience with CCN and who were prepared to contribute. An invitation to participate in a one-day workshop was distributed via the list server.

The objectives of the workshop were to identify and prioritise the problems, issues and needs of the group that were impeding successful access to the telecommunication network. A total of nine people participated in the workshop held on 28 October 2009 at Novita Children's Services; five participants were from South Australia, three from Victoria and one from Western Australia. Three attendees had CCN and six had extensive experience working with individuals with CCN. The workshop participants identified and prioritised the following key areas as important issues (in decreasing order of priority) related to accessing the telecommunications system:

1. access to information
2. funding
3. emergency services
4. training and education
5. access to support
6. innovative solutions
7. equity
8. implementing existing known solutions and services.

When the group considered solutions to the highest priority item 1 ('access to information'), they called for a national phone help-line to support them with telecommunications access. Given a help-line would require ongoing significant commitment of recurrent funding which may be difficult to secure, a website containing details of known solutions was considered a reasonable and possible alternative.

The establishment of a website became the focus. A funding submission to the Australian Communications Consumer Action Network (ACCAN) Grants Scheme that included in-kind & funding support from Australian Communication Exchange (ACE), Telstra and Novita was successful. The grant requirement was to establish a website to provide a useful and sustainable information and education tool for people with CCN and people supporting them.

Implicit in the creation of the website is an acknowledgement that the existing Disability Equipment Programs are not adequately supporting people with CCN, due to the complex nature of the solutions. Solutions for people with CCN typically involve experienced health
professionals from range of backgrounds who are skilled at identifying and evaluating a person's physical abilities, identification of potential phone control sites on the person's body as well as identification of their particular telecommunications needs. Once this information is known, telecommunication solutions can be identified. Finding workable solutions can be a significant task in its own right.

For an individual who has limited body control and who is able to speak, the solution could require a phone that can be operated via a single switch positioned or mounted so that the user can activate it reliably when needed. Phone solutions are available that enable a single switch press to answer an incoming call in speaker mode or dial a pre-stored phone number. A more complex solution could involve identifying, installing and trialling an assistive technology needed to enable access to a personal computer configured to provide access to text based communication as well as the home and/or mobile phone network. This case might also involve the identification of phone systems that can be connected to the computer, allowing the user access via the assistive technology.

These examples illustrate that the solutions are complex, require a range of skills and knowledge along with good communication between the all of the key players. Some of the key players are individuals with knowledge and experience who are typically scattered across the country. It is important to note that the particular abilities of the end user and the type of solution needed dictate the key players that need to be involved. This project aimed to assist and augment this process.

OVERVIEW

This paper describes the development of a community-based website that empowers individuals with CCN, their supporters and organisations to add information on available solutions and to receive direction to known applicable resources.

Objectives of the project were to:

- share information about solutions for people with CCN
- highlight gaps in telecommunications access and information
- collect information the community needs and collate it in one space
- allow a space where individuals can voice their opinions
- identify actions and funding required to make telecommunications more accessible.

Key features of this website were that it be:

- easy to access
- easy for people to contribute ideas, solutions and comments
- designed for both end users and their supporters
- oriented towards low maintenance beyond the initial funding period.

To ensure the final website did meet the perceived need, end users and their supporters were involved in the development processes as much as possible. A Website Project Reference Group (WPRG) was established to provide support and direction throughout the project. This reference group included three people with CCN and three professionals with extensive experience working with people with CCN. The role of the group was to:

- advise the management team
- respond to proposed web site design
- provide feedback and input
- assess (evaluate and appraise) significance of the website, by commenting on the following areas:
  - accessibility
appropriate for the community
- complexity
- layout and navigation
- use of language

assist in marketing the website by:
- making it known in their State and/or community
- distributing information provided

contribute to or identify website content contributions needed.

Both before and after the website launch, group members were expected to:

- be contributors
- follow up potential contributors
- suggest other contributors.

Given people with CCN were involved in the website development process, new methods of communication were needed to be explored and tested. In addition, the communication needed to occur between members who were located in New South Wales, Victoria, South Australia and Western Australia.

An initial and essential face-to-face WPRG meeting was held in Adelaide on the 3rd September 2010 to establish a functional group and ensure members understood the communication needs within the group. Subsequent meetings occurred via the free Internet Skype® conferencing facility. This solution supported communication via text and voice conferencing simultaneously. The experience was a learning process and issues and challenges ensued including:

- WPRG members using different versions of Skype, hence making it difficult to support remote users when instructions needed to be customised for particular versions of the Skype software. The resolution was to ensure that all users were using version 4.2.0 or above.
- Difficulties in managing meetings because it was unclear as to whether the communications were being received by all members. The reliability of the communication was a major factor for some meetings. Any more than two intermittent connections made the meetings impractical.
- Problems associated with the different mode and rates of communication (i.e text vs voice) between members. Inevitably some of the responses in the conversation were missed. The keen awareness of all participants to this problem was vital for the teleconference to function effectively.
- The three-hour time differences between different States in summer, made it impractical to have meetings of duration greater than about two hours.

Even with these issues and challenges it was impressive that we were able to function with participants scattered across Australia. Members who were experienced users of Skype were essential to the successful outcome.

The significant outcomes of the WPRG meetings were:

- There was a clear resolution that the project needed to focus on people with CCN.
- The site needed to be straightforward, uncluttered, usable and functional and compliant with W3C guidelines.
- Members contributed to a list of individuals and organisations that needed to be contacted and informed about the new community site.
• ‘Complex Communication Needs’ was the agreed terminology that will be used throughout the project to describe the community.

• The URL ‘www.newell.org.au’ was chosen in recognition of the contribution of Revd Canon Dr Christopher Newell AM, who made a very significant impact in the field of telecommunications and disability (Goggin & Newell 2003 & 2005).

DEVELOPMENT OF THE WEBSITE

SPECIFICATION

Prior to the development of the website, some of telecommunication products for people with CCN were already listed amongst other products on other websites. However, they were not effectively marketed to people with CCN. The 2009 workshop participants identified that solutions do exist but are scattered across the nation and are not readily known about or available to people with CCN and their supporters. It was important that people with knowledge and experience could easily share their experience on the site. This community-based role of the site called for the careful analysis of likely questions and contributions. Dr Daniel Woo supported the management team with suggested processes. These included the WPRG members identifying questions that are likely to be asked and itemising features they consider essential.

Some of the questions were:

• How can I dial my home phone using just my voice?

• I can’t read but need a mobile phone to call for help if I need it when I’m out. Is there a mobile phone with pictures?

• I can’t read or speak but can use a switch and drive my power wheelchair. How can I call for help when I’m out?

• I am having difficulty finding a phone that meets my requirements and capability, what help is available?

Analysis of all of the information revealed that issues could be classified into different areas needing moderation and contribution from various individuals with skills, knowledge and experience in the various areas of need. For example, some questions related to the selection of an appropriate phone and others to the implementation of a recommended solution. The support and skills needed for each of these areas of activity is likely to be sourced from different sectors of the community. In addition, some resources are only available within particular regions of Australia. To this end, the specification was written to enable moderators or groups of moderators to be associated with categories or regions selected by the website users.

The 'Must Do's' named by the WPRG members confirmed the original mandate that the site needed to be straightforward, uncluttered, accessible and easy to use. The items named also influenced the priorities of the tasks to be tackled.

The website specification was contracted to Red Neon Designs and the website's logo, look and feel was created by Heidi Rurade Design. Feedback on the specification and appearance was sought from the WPRG members before being passed to the ACE's web developers for implementation.

IMPLEMENTATION

Whereas the specification served as a valuable tool to define the site requirements, it became evident that some parts of the requirements were readily implemented and others did not fit within the available resource and timescale.
The Newell Network site was built using the open source Joomla Content Management System (www.joomla.org) that contains a core framework along with modules to provide additional functionality. Joomla can be modified to create the required user interface through the use of cascading style sheets, but the actual functionality required was determined by the module used. There are numerous modules available across a wide spectrum of functionality. Implementation of the functionality required the selection of the module that most closely matched our requirements. Having identified a potentially suitable module, features could be easily omitted but could not be readily added. The modification of a module's functionality was possible but had the added complication of needing to be repeated or checked to confirm that the changes worked correctly following an upgrade in the version of the module. The resource available and the timescale did not support the writing of software code.

The current website uses the Joomla core framework for management of the 'Home', 'Resources', 'Feedback' and 'Contact Us' features. The 'Ask' section is built on the 'Community Answers' Joomla module. These two modules do not necessarily have common features. For example, the task of adding tag words is readily available in the core module but not in the Community Answers module.

**Website Content**

**The 'Ask' website feature**

![Figure 1 - The 'Ask' section of The Newell Network.](image)

Central to the Newell Network website is the 'Ask' section. People with CCN can share information and ideas, ask questions and get answers from their peers or from experts in the field. The 'Ask' section (Figure 1) is based on the 'Community Answers' Joomla module. Users can submit their question and nominate a category from 'Finding the right phone', 'Testing the phone', 'Costs', 'Using the phone' and 'Troubleshooting'. In each case, the sub-category is consistent with the categories in the Products section i.e. home phones, mobile phones and computer-based solutions. Considerable thought was put into these categories to reflect the real-life situation of a person trying to work through their telecommunications options. These categories are as intuitive as possible and as the content of the website grows, it will assist a user to locate information and share ideas.
A response to a particular question automatically sends an email to the originator. The originator can then check if the answer resolves the question and indicate this on the site. Question listings also indicate if the question was asked hours, days, weeks or months ago and states how many answers have been received. It is also possible to search within the 'Ask' section for particular questions. Currently, the 'Home' section is set up to list up to ten the most recently asked questions and up to six recently resolved questions. The 'Open' tab lists questions that are still to be resolved. The 'Popular' tab lists 33 questions that have been the most 'clicked on'. The 'Answered' tab has 31 questions that have been answered.

**The 'Resources' Section**

The 'Resources' section of The Newell Network.

The 'Resources' page (Figure 2) has been categorised as 'Disability service providers', 'Choosing products', 'Phone companies and industry associations', 'Community organisations', 'Your rights' and 'Government information'. An online form has been created for other organisations to submit information about themselves to be included in the Resource section of the website. This single page set format form enables people to provide information in an easy-to-use, structured format and gives the Resource section consistency in the amount and type of information provided and the layout and look.

There are currently a total of 17 resources listed on the website.
The 'Products' Section

The 'Products' page (Figure 3) has been categorised as 'Mobile phones', 'Home phones' and 'Computer-based solutions'. The website description identifies the features of the product that are likely to be relevant to people with CCN and contains a link to the supplier's website for full details. An online form enables the submission of details of relevant products and provides an opportunity to tag the product as 'Single switch', 'Infrared', 'Large button', 'Regular qwerty keyboard', 'Speaker phone', 'Video', 'Text messaging', 'Speech only', 'Touch Screen' and provides an option to suggest additional appropriate tags.

'Feedback' website submissions

Since the launch of the website in May 2011 at the AGOSCI Conference, a total of 14 people have completed the feedback form online. The overall feedback was positive with the majority respondents indicating that the structure was good (N=4), very good (N=4) or excellent (N=5) (mean = 3.93 out of 5). A high proportional of the respondents said that accessibility of the website was very good (N=4) or excellent (N=7) (mean = 4 out of 5). The feedback about website content was spread with poor (N=1), fair (N=2), good (N=6), very good (N=2) and excellent (N=3) (mean = 3.29 out 5). This could reflect that the content is still being added to the site and be influenced by whether people found the information they were seeking.

Most people offered ideas for making the site even better. The ideas included:

- prompting people to indicate which State they were based in to facilitate better answers to questions asked
- a stronger reminder to the originator of the question to flag that the question has been resolved
- making links to each of the State Independent Living Centres
- increasing the number of images
- adding details about the functionality of a particular product listed in the Products section.
'Contact Us' website submissions

The 'Contact Us' page provides people with an option to communicate information or questions that do not fit into the 'Feedback' and 'Ask' a question sections of the website. It also provides people with a more private forum than the 'Ask' section of the website if they have a question they do not want to be open to the website community.

To date we have received online submissions from five people through the 'Contact Us' page. The reasons people have used this section has been varied, and included enquiries, as well as giving information. Specific examples include:

- One individual informed administrators that she had promoted the Newell Network on her blog, and sought permission to use images.
- Two individuals asked to feature a product or service on the website.
- Two individuals ask questions specific to their needs, similar to those found in the 'Ask' section.

DISCUSSION

COMMUNITY INVOLVEMENT

From the outset of this project, it was clear that no one individual or organisation had the answers needed to resolve all the issues and diversity of needs associated with providing individuals with CCN access to the telecommunications network. The possible solutions were also challenged by the short lifetime of commercially available options and solutions. As a consequence, the establishment of a community of individuals and organisations that are willing to share information and solutions was considered essential for the project to be a success.

Given that the aim was to create a Web 2.0 community-based website, the WPRG was an essential part of the project. Not only did the members define the bounds of the project and raise issues not initially expected, they demonstrated a very high level of commitment to the project, were acutely aware of the unmet needs, provided essential links to other interested parties and fully appreciated the need for the website.

The involvement of the WPRG members from across Australia required new approaches as some participants had CCN. Once a person has access to email, the time taken to create the email has no effect on the communication. However, the time taken to create a text message in a telecommunications based conference can have a significant effect on the flow of ideas and discussion. Our experience using the Skype based conference facility for both voice and text communication demonstrated that the participants needed to be aware of, and experienced with, the alternative communication techniques used by people with CCN and to have guidelines to manage the different rates of communication.

Connection difficulties and drop-outs throughout the Skype conference was unacceptably high making it necessary to have individual contact information for all participants readily available so that it was possible to quickly contact individuals via phone, email or SMS. Our experience showed that a more reliable Internet is needed and increased bandwidth would have been required to enable the addition of video to the conference to function effectively. This will be required to ensure reliable and workable meetings that will enable individuals with various abilities to effectively communicate and contribute.

Video conferencing could well be significant, given the greater effectiveness of face-to-face communication, compared with just voice and text. The use of video was not used for the project meetings because the extra demand on download and upload network bandwidth was likely to decrease the reliability and quality of service. The reliability of the Internet system needs to match the reliability of the current landline phone system before considering the use
of video. The rollout of the NBN is expected to significantly improve the reliability and support the effective use of video.

MODERATION AND MAINTENANCE

Analysis of the information supplied by the WPRG along with the goal of involving the community in the moderation of the website content to minimise the ongoing operational costs led to the specification including the concept of multiple groups of moderators. Each group of moderators would have skills and experience in a particular area associated with The Newell Network. The aim was to create website categories and tags that would relate to the particular moderator group so that when the users of the site select a category or tag, this information would be used to direct the inquiry to the associated group of moderators automatically. Clearly this approach would depend on the establishment of moderator groups and would be a significant task in its own right.

Early indications from discussions with the WPRG members indicated that there are individuals in this community who would be prepared to participate in this project as a moderator, provided that the frequency of notifications were low and clearly directed to their particular area of expertise. Some of these individuals would contribute, seeing this activity as enhancing or extending their capacity in paid employment, and others as a volunteer with particular skills and experience. Some suppliers of products to this community could well see their contribution as a way of informing the community about their skills and capabilities.

Some of the groups could be linked to the categories already in the 'Ask' section, namely 'Finding the right phone', 'Using the phone', 'Testing the phone', 'Costs' and 'Trouble-shooting'. There could also be groups associated with the assessment of products and resources submitted to the site. In this case, the tags specified by the submitter could be used to identify the appropriate group of moderators.

Currently any activity on the site instigates an email to the administrators involved in the development of the site. This situation has meant a website moderator knowledgeable in this field has been employed to respond to site activity by directing activity to appropriate experts in the field. The concept of moderator groups would decrease the paid moderator role but not eliminate it. There would still be a role in the maintenance of the moderator group lists and the creation, development and maintenance of the network of moderators. This group of moderators could well become the knowledgeable and committed group who would direct the development and changes to the site that will be needed over time. It is important to note that the actual site activity needs to be analysed before further development of the moderator groups is undertaken. Ongoing funding to support the moderation of this site is essential.

SEARCH CAPABILITY

The website is built using the Joomla core Content Management System for all but the 'Ask' section, which is using the Joomla 'Community Answers' module. These components of the site can be considered as two separate websites, both customised to meet the look & feel requirement of The Newell Network site. The consequence of this approach is that the content in one section is not readily available in the other section and the search processes supplied with each section are not the same. For example the questions and answers contained within the Community Answers module added under the category of 'Finding the right mobile phone' have no relationship to the products added under the category 'Mobile phones'. To find similar entries under a particular category requires the activation of two different search processes, one for each component of the site.

In addition to this issue, there is potentially a lack of consistency in the words and tags used in each section of the site. For example, searching for a 'home phone' solution will not find entries that have been submitted using the words 'landline phone' or 'fixed phone'. The introduction of the 'Submit Product' and 'Submit Resource' web based form does promote consistency of the tags as the contributors are asked to select words from a supplied list, alternative techniques are needed in the 'Ask' section.
A careful analysis of the performance of the search facility within the core Joomla system and the search facility within the 'Ask' section needs to be undertaken and, if found inadequate, alternative search processes be considered. This may involve a search system or wizard that requires the user to select items applicable to their needs rather than the user having to try a search word, which may or may not be found.

While the content in the site is relatively small it is feasible and practical to browse the site for solutions to a particular problem or issue. As the content increases, the search facility will become critical and will need to be improved to ensure that users can find content relevant to their issue.

**FUTURE OF THE SITE**

In the eight months since the launch of the website, the total number of visitors to the site has been in the order of 150. The questions and solutions shared by the community to date could have a very important impact on the individuals concerned. Further assessment of the value of this website needs to be centred on the impact the results have on the lives of people with CCN.

The approach taken by this site could be significant to other sectors of the disability community. As a result of the difficulties experienced by people with CCN trying to access the telecommunications network, the WPRG felt strongly that the resources available at the time needed to be focused on people with CCN and not diluted by the needs of the other sectors. Having now developed the site, it does seem appropriate to extend the concept to the other sectors in such a way that the site displays only information relevant to the particular community.

The experience so far confirms the significance of this site and now raises the issue of the support for the ongoing future of the site. End user community involvement can support important and cost effective solutions for people with CCN. This new resource needs to be seen as an integral part of the solutions that are currently available that enable people with a disability to access the telecommunication network and funded appropriately.

**CONCLUSION**

As a result of the broad recognition of the complex issues associated with the identification of workable and satisfactory telecommunication solutions needed for people with CCN, this project has received financial, in-kind and community support from industry, end users, supporters and carers. Creation of The Newell Network community-based website has established a network of Australians wanting to share their experience and to assist others gain access to the telecommunications system. The project has demonstrated that there are important solutions available to assist people with CCN and there are community minded individuals who are prepared to share their experience and knowledge.

Given that the content contribution is driven by end user needs and that the nature of solutions are varied and often customised to meet individual needs, it will take a considerable period of time for a meaningful and comprehensive array of solutions to be included. Once this 'critical mass' of information exists, it will entice others to use the site and to become aware of the site's value and significance.

The experience to date fully supports the concept and now raises the issue of ongoing support for the site. Given that little of the shared community moderation specification could be implemented, ongoing paid moderation and administration support is essential. It is clear there will always be a need for some level of ongoing moderation of content and administration of the website necessary to maintain this valuable resource.

This needs to be recognised and funded along with other services provided to enable people with a disability to access the telecommunication network like the majority of the Australian population are able to do.
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Most importantly, the authors would like to thank all the users of the website that have contributed content to the website either by posting questions, answers, products or resources to make it an effective community based website.

ENDNOTES

1. The Australian Communication Exchange provided the financial support for this activity.

2. A community-based Web 2.0 style that had earlier been suggested by Robert Morsillo from Telstra’s Disability Services in discussion with Rob Garrett as a venture worth trialling.

3. Typically Occupational Therapy, Physiotherapy, Speech Pathology & Rehabilitation Engineering.

4. Assistive Technology can be defined as any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. (Assistive Technology Act, 29 U.S.C. Sec 2202(2)).

5. Such as SMS, email, Twitter, Facebook, MSN, instant messaging, etc.

6. Skype is a proprietary Voice Over Internet Protocol (VOIP) service and software application that allows users to communicate with peers by voice, video, and instant messaging over the Internet.

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Christopher Newell was both optimistic and sceptical regarding the potential of digital technologies and advanced telecommunications to assist individuals with disability (Newell 1998, Goggin & Newell 2000, Goggin & Newell 2003). With Newell’s body of work in mind, this paper considers current policy issues which intersect disability, telecommunications and participation that have garnered government and public attention in Australia in recent years. Three important case studies are offered – the national broadband network, digital television and mobile telephones. I demonstrate the tangible benefits innovative use of these telecommunications technologies can deliver, in assisting individuals with disabilities, while cautioning their potentially disabling elements. Using an ethos of ‘accessibility 2.0’ (Ellis & Kent 2011), the paper takes the policy discussion beyond the provision of infrastructure to consider issues of accessibility and usability, relevant to disabled users and, by extension, us all (Goggin 2008b). This paper recommends a reformulation of telecommunications policy to recognise different accessibility requirements are needed for different impairments and that these may benefit the mainstream community which is interested in customising its digital technologies (Jaeger 2006). An extraordinary value lies in using telecommunications – such as the NBN, digital television and mobile telephones – to connect people with disability who are physically and socially marginalised.

INTRODUCTION

We observe that when disability is discussed, it is often to invoke a central myth [...] that technology, especially telecommunications and the Internet, are [...] inherently liberating for people with disabilities. [...] In place of this myth of technology and disability, we call for a different approach. International trade rules, standards-setting activities, and the power of transnational corporations means national actors need to be all the more creative in their activities of government and policy formation. (Goggin & Newell 2006).

Goggin and Newell (2003) express concern that disabling mechanisms are built into telecommunications because of a disregard for accessibility and the social position of people with disability in our society – they describe this as 'digital disability'. Ellis and Kent (2011) propose a creative approach to accessibility, which borrows from the web 2.0 ethos of customisation. This so-called 'accessibility 2.0' approach concentrates on the mainstream benefits of accessibility options. Accessibility 2.0 refers to the capacity to access information in the user’s format of choice. While this framework moves beyond government regulation, it works best when considered alongside legislation that mandates equitable access to places, goods and services.
This paper uses accessibility 2.0 to take the telecommunications policy discussion beyond the provision of infrastructure to consider issues of accessibility and usability relevant to disabled users and, by extension, us all (Goggin 2008b). This approach integrates government legislation, customisation and corporate behaviour to ensure telecommunications benefits are made available to people with disability. The incorporation of disability into national visions, policies, and programs is vital to the full inclusion of people with disability into society.

A framework promoting human rights and full autonomy is integral to incorporating the interests of people with disabilities in telecommunications policy (Goggin & Newell 2000). Disability activists and academics seek to reconceptualise 'disability' by advancing the idea that people are disabled, not by their bodies, but by a world structured to exclude their bodies (Finklestein 2004). As Newell explains:

> People with disability need not necessarily be identified as a particular section of the public, but can be viewed as being just like anybody else. [...] In other words, does the problem lie with deviance in the individual, or in the narrow norms that we associate with telecommunications? (Newell 1998).

His work in telecommunications focused on the potential for innovation in assisting individuals with disabilities to participate in a disabling world, while cautioning against disappointing trends in digital disability (Goggin & Newell 2007, Goggin & Newell 2003). Technology is not value-free but rather it has the capacity to further exclude people with disability. In his 1998 publication Disability Disadvantage and Telecommunications, Newell takes the Universal Declaration on Human Rights as a starting point, to offer some tangible ways the disability policy debate in telecommunications can be reformulated for the benefit of people with disability. He urges us to:

- re-examine, question and reformulate prevailing notions of disability
- change social structures and policies rather than individuals
- consider how much it will cost not to connect people rather than how much it will cost to connect people
- acknowledge the needs of people with disability vary according to their social situation
- widen the scope of what we understand as a standard telecommunications service
- urge corporations to make voluntary commitments to work towards enhanced universal service
- link schemes to include people with disability to regulation.

Some of these ideas specifically relate to telecommunications while others are concerned with the inclusion of people with disability in Australia, and the ways access to telecommunications can achieve this. As Australia switches over to digital television, rolls out the National Broadband Network (NBN) and becomes increasingly reliant on mobile telephones, Newell’s (1998) recommendations are increasingly pertinent. In this paper I take his ideas as a starting point to a consideration of current policy issues which intersect disability, telecommunications and participation in Australia.

### RE-EXAMINE, QUESTION AND REFORMULATE PREVAILING NOTIONS OF DISABILITY

The dominant discourse of disability in the context of telecommunications reinforces the oppression of disabled people (Newell 1998). People with disability exist outside dominant understandings of what is considered normal. In order to understand the disabled body we must first understand the concept of normalcy (Davis 1995). Society encourages people who exist outside the 'statistical mean' of normalcy to strive to become elevated to the level of normalcy by denying signifiers of their difference (Bauman & Murray 2009). Newell’s discussion of the social construction of disability is particularly illustrative of this concept.
Newell 2008). He observes that people are disabled, not by their bodies, but by a society which chooses to exclude them. In the context of digital technology accessibility is a choice, as is inaccessibility (Ellis & Kent 2011). People with disabilities should not have to adapt to society’s disabling limitations, policy makers should instead question the status quo and adapt according to accessibility imperatives.

Australia is a signatory of the United Nations Convention on the Rights of Persons with Disabilities. Access to telecommunications services is recognised in this document alongside access to health and education. The Gillard government again identified telecommunications as being particularly important to the inclusion of people with disability in the 2011 Review of Access to Telecommunications Services by People with Disability, older Australians and people experiencing illness:

Telecommunication services play a vital role in the lives of all Australians. They provide access to emergency assistance and are important for community participation, employment and social interaction. They also promote independence. (DBDCE 2011)

While this commitment to telecommunications access for people with disabilities is promising, further analysis regarding accessibility and usability is required to make the rhetoric a reality. A reformulation of telecommunications policy to include people with disability must address three areas. First, an increased understanding of accessibility is required through consultation with people with disability about how and why they use information communication technologies (ICT). Second, policy-makers must recognise different accessibility requirements are needed for different impairments. Technology that is enabling for one person might be disabling for another. Finally, the benefits of accessibility to the mainstream community must be recognised (Jaeger 2006). Using a framework of accessibility 2.0, this paper focuses on Jaeger’s last two points, to specifically emphasise a variety of accessibility options are required and these may benefit the mainstream community which is interested in customising its digital technologies.

POLICY AND LEGISLATION: INCLUDE PEOPLE WITH DISABILITIES

Telecommunications policy for people with disability in Australia has been governed the Disability Discrimination Act 1992 (DDA) and the Telecommunications Act 1997. The DDA places responsibilities on service providers to ensure that disabled people are not denied access to the goods, facilities and services the majority of the population find readily accessible. Proceeding from a social constructivist framework, the legislation centres on the concept of discrimination and reasonable adjustments. People with disability can not be refused service or provided with a poorer quality of service on the basis of their disability. The legislative responsibility concentrates on ensuring organisations take social responsibility for the inclusion of people with disability, a concept often at odds with traditional telecommunications policy (Bourk 2000).

The Universal Service Obligation (USO), which has been a feature of Australian telecommunications legislation since 1975, puts in place a guarantee that all Australians can access a standard telephone service (Bourk 2000). The wording 'for all Australians' transformed universal service into a social-equity issue (Bourk 2000). The unavailability of some telecommunications services to people with disability contravened the DDA and led to Geoff Scott, a man with hearing impairment, lodging a complaint with the Human Rights and Equal Opportunity Commission in 1995. The DDA legislation proceedings, with its vastly different socio-political context to telecommunications, was used to argue people with disability required access to telecommunications to participate in social life in a way that enhanced quality of life (Bourk 2000, 73). Scott’s victory confirmed telecommunications access as a basic right. As a result, the Telecommunications Act 1997 was expanded to specifically include TTYs, a telephone–text technology required by people with hearing impairment to communicate via phones. With the advent of digital telecommunications, the
usefulness of the Universal Service Obligation is again being called into question (Given 2008, Morsillo 2011, Goggin 2008c).

Likewise, in 2000, Bruce Maguire’s successful DDA claim, that the inaccessibility of the Sydney Olympics web site discriminated against people with vision impairment, initiated a change in telecommunications policy (for further discussion see Ellis & Kent 2011, Goggin & Newell 2003, Goggin & Newell 2005a). The inaccessibility of Australia's Olympics web site was judged to be an unjustifiable hardship by William Carter QC, the human rights commissioner presiding over the case. He believed the Olympics organising committee should have thought about web accessibility when it began setting up its web site, that it would have been easy to do so and beneficial for a number of people. As a result of this successful litigation, the legal requirement surrounding web accessibility in Australia is clear – if goods and services, including telecommunications technologies, are available to people without disability, then people with disability must be afforded the same access.

The emergent NBN promises to connect all Australians to the Internet. The importance of providing the infrastructure for broadband connection to people with disability has been well established (Hawkins 2011b, Horsley & Gerrand 2011, Morsillo 2011, Slater, Lindström & Astbrink 2010), particularly in relation to allowing people with disability the opportunity to utilise multimedia-rich environments (Wood 2010, Morsillo 2011). However, the varying access needs of people with disability, according to different social situations and impairments, have not been as routinely considered.

THE NBN: THE NEEDS OF PEOPLE WITH DISABILITY VARY ACCORDING TO SOCIAL SITUATIONS

The NBN is touted to offer 'high-speed broadband services to all Australians' at a speed 100 times faster than most currently experience (Australian Labor Party 2011). It is described by the Gillard government as a nation-building project that will significantly improve broadband services, initiate a new wave of digital innovation, stimulate the economy, improve service delivery, and connect cities and rural areas (NBN Progress Update 2010). However the NBN, which did not undergo a public review process, has been criticised as having major policy gaps, encompassing areas relevant to people with disability (Horsley & Gerrand 2011, Hawkins 2011a). For people with disability, access and affordability are two major issues that could prevent them from reaping the benefits of a fast broadband connection (Morsillo 2011, Hawkins 2011a, Hawkins 2011b).

At the 2011 National Digital Inclusion Summit, Communications minister Senator Stephen Conroy described the NBN as vital to the inclusion of people with disability. He emphasised the opportunity to decrease the social isolation of this group but cautioned it would not be a simplistic process. Nevertheless, the focus continues to be on the provision of infrastructure (Herrick 2011). The provision of high-speed broadband to people with disability would be quite simply revolutionary. Craig Wallace, a self-described 'person with a disability, with a pinch of geek', agrees with Conroy, arguing on the ABC’s disability discussion site Ramp Up that the NBN has the potential to dramatically change the lives of people with disability:

The promise of new communications technology combined with high speed is genuinely liberating. It won't 'remove' our disabilities, but it can connect people who are isolated, and help level the playing field. (Wallace 2011)

According to Gillard’s Digital Economy Strategy, the NBN will revolutionise the lives of many Australians by providing the opportunity to work and study from home, shop online and remotely attend medical consultations using video link-ups. These benefits seem particularly relevant to people with disabilities who may be unable to leave their homes, due to either their impairments or an inaccessible built environment. Public transport can be unreliable and inaccessible, while many shopping centres do not adhere to basic physical accessibility requirements. Inaccessible environments transform physical disability into social disability.
Gillard and Conroy’s celebrations of what the NBN will do for ‘every Australian’ corresponds to World Wide Web inventor Sir Tim Berners-Lee’s vision for the web as a place where people of diverse abilities, countries and cultures can connect (Berners-Lee 1997). It is certainly true people with disability have used online spaces for the purposes of community involvement, activism and education (Third & Richardson 2010, Ellis 2011, Ellis 2010, McCarthy 2011, Kent & Cake 2012, Matthews et al. 2010). However, the possibility of digital disability must be kept in mind.

Although technological advancement can greatly improve the lives of people with disabilities, it is not an automatic source of liberation (Ellis & Kent 2011, Goggin & Newell 2003). Technological advancements such as the NBN and broadband occur in the same social world that stigmatises and disables this group. Further, if individuals with disability are encouraged to use digital technologies in their homes because the outside world is inaccessible and difficult or impossible to navigate, then the likelihood that the built environment will ever become more accessible is low, causing further isolation.

People with disability are a disparate group connected in political activism by their shared experience of social stigma. However, people with disability are separated, also, by their differing impairments and the ways these intersect with social stigma. People with different impairments require different telecommunications software and hardware (Ellis & Kent 2011, Hawkins 2011b). No longer can we ignore the impact of differing impairment in order to enforce a coherent ‘social model of disability’, which enlightens an ableist world of the daily oppressions experienced by people with disability (Shakespeare 2006, Ellis & Kent 2011). This is particularly illustrative in the telecommunications arena, as people with disability interact with computer interfaces differently, depending on their impairments and the adaptive technologies they may require. Accessibility for a person with a certain type of impairment can have disastrous consequences for a person with a different impairment (Goggin & Newell 2003). Recognition of these differing accessibility requirements is required to transform telecommunications policy (Jaeger 2006).

The discussion must shift from the mere provision of infrastructure, and recognise how people with disability access the Internet:

- Real-time captioning, audio description, talking books and video-calling could all be made widely available by a fast-speed broadband service.[…] For people with a disability fast-speed broadband means […] access to information becomes possible. It means participation becomes possible. It means inclusion. (Innes 2011)

In order to come even close to achieving these endless possibilities, a wider Internet accessibility project must be given attention by governments and industry, through adherence to standards. Likewise, an ability to customise the online experience is vital. Accessibility 2.0 allows users to access information in their format of choice. For example, people with vision impairments may select audio while those with hearing impairments could favour video. Like the NBN, digital television may be an enabling technology for people with disability, as it provides a similar opportunity for customisation.

**DIGITAL TV: CHANGE SOCIAL STRUCTURES AND POLICIES, NOT INDIVIDUALS**

Between 2010 and 2013, Australia is progressively switching to digital television signals. In order to receive these signals, residents must purchase a digital television or a set-top box to convert their existing analogue television into a digital receiver.

Described as offering superior sound and image, as well as a greater number of channels and interactive features, digital TV can potentially lessen the social isolation of people with disabilities (Slater, Lindström & Astbrink 2010), increase their independence (Carmichael et al. 2006) and allow access to a global media sphere (Ellcessor 2011). Despite these inclusive benefits, if key issues of accessibility and usability are overlooked, digital television could further disable this group. For Slater, Lindström and Astbrink (2010), the potential digital TV
sets represent for the inclusion of people with disability goes beyond television programming and includes such possibilities as a TV-based videophone which allows phone calls through the set’s screen, by pressing a button on the remote control. This function could also provide services to the home and enhance the national relay service used by people who communicate via sign language to make phone calls. Currently the relay service is text-based, whereas video will allow sign language users a greater degree of spontaneity and autonomy (Slater, Lindström & Astbrink 2010). Interactive features which offer a new way to receive government information and services could be of particular importance to people with disability more familiar with television interfaces than computers (Pedlow 2008).

The interactive potential offered by digital television may be thwarted by the reality that people with disability are among the poorest members of the community and will purchase the most affordable set-top boxes to receive a digital signal on their analogue television sets (Pedlow 2008). Low-cost set-top boxes have limited processing power, rendering them unlikely to support accessibility features such as audio description. They may also be difficult to customise (Carmichael et al. 2006). Customisation is central to the everyday user experience as well as accessibility 2.0. The capacity to customise puts the disabled and non-disabled on an equal level – it gives the opportunity to achieve individual user preference.

Aside from the potential digital TV offers to increase independence and access to information, other tangible benefits to the disability community are enabled with caption and video description capability (Goggin & Newell 2003). Slater, Lindström and Astbrink (2010) identify several areas where people with disabilities could benefit from digital television, with audio description, signing subtitles, spoken subtitles and clean audio provision.

People who are deaf or hard of hearing are frequently touted as a group who could greatly benefit from the affordances of digital TV through captions, a feature that describes the audio components of television in text at the bottom of the screen. Other methods of translation and description benefit a sizeable portion of the disability community, including people who predominantly communicate in sign language, people with both hearing and vision impairments, and people with dexterity impairments (Pedlow 2008).

Considered complicated and not user-friendly, digital television has a reputation for poor usability (Pedlow 2008, Slater, Lindström & Astbrink 2010). Usability, under the sub-strand of accessibility, refers to simple and straightforward web content that can be used by all with minimal specialised knowledge or equipment (Ellcessor 2010). Prior to the decommissioning of the analogue system in the US, The Coalition of Organizations for Accessible Technology identified several problems regarding the provision and usability of digital TV services in the context of people with disability. These include

- technical difficulties associated with pass through of closed-captioning
- confusion over the scope of […] captioning regulations
- inability to locate and activate accessibility features through remote controls or menus
- barriers to resolving concerns with television stations, cable companies, and other video-programming providers
- concerns about pass-through of video description for people with vision loss (Crawford 2007).

Similarly, in the UK, despite legislation for universal access and an equitable provision of service to people with disability, key issues of accessibility and usability were neglected during the transition to a digital TV signal (Carmichael et al. 2006). So-called 'vulnerable people' were offered assistance through a government-funded scheme which provided set-top boxes to people with disability and the elderly. However, these boxes were difficult to customise, and the scheme did not address issues of accessibility and usability.

The Australian government likewise plans to provide a high-definition set-top-box training and technical support through a Household Assistance Scheme to assist people who receive
the full rate of the disability support pension. While these sorts of schemes nominally assist people with disability, they do not fully address accessibility and usability difficulties inherent in the technology or include people not receiving the full government benefits who may experience difficulty. Technological creation is a social process in which disability is implicated in a set of social relations of power, influenced by public policy and commercial decisions (Goggin & Newell 2003).

**MOBILE: WIDEN THE SCOPE OF WHAT WE UNDERSTAND AS A STANDARD TELECOMMUNICATIONS SERVICE**

In 2009 Senator Stephen Conroy described mobile phones as an important means of ‘social inclusion, independence and security’ for people with disability (Conroy & Shorten 2009). Mobile telephones are broadly important to the entire population having eclipsed the fixed telephone as the preferred method of telecommunications. With a penetration rate of 125% in Australia (Communications Alliance 2011), mobile telephones offer a significant case study demonstrating the enabling and disabling consequences of telecommunications in a deregulated market.

Although Alexander Bell’s motivation for inventing the telephone was to create a communication device for his deaf wife, people with hearing impairments did not gain access to this network until the introduction of the telephone typewriter, TTY, in the 1960s in the US and 1980s in Australia (Harper 2003). In fact, the communication needs of people with hearing impairments were disregarded due to perceived costs when the first telephone networks were built (Jaeger 2006). However, people with hearing impairments especially have embraced mobile telephones (Communications Alliance 2011). Short-message-service technology, an unexpected feature of mobile phones, gives the hearing and deaf communities a common language (Power & Power 2004).

Deaf people, who reportedly use SMS ten times more often than hearing people (Harper 2003), are able to achieve greater autonomy in a hearing world through this technology. However, SMS is not automatically liberating, as some people with hearing impairments have limited language literacy (Power, Power & Rehling 2007). The availability of SMS may also cause people to forsake other vital technologies such as TTY and voice/TTY relay services, thus reducing access to important information and services (Power, Power and Horstmanshof 2006).

Discussions of access to telephone telecommunications has tended to concentrate on providing access to people with hearing impairments (Ellis & Kent 2011, Goggin & Newell 2003, Goggin and Newell 2005b, Harper 2003). However, there are many other groups of people with disability who can benefit from mobile phone technology, including people with vision impairments and those with learning disabilities or dexterity impairments. Mobile telephony has the capacity for both inclusion and exclusion:

People with a disability do not have equitable access to the modern telecommunication medium. Many experience difficulty typing, handling the phone, dialling or answering calls. For those who are unable to speak, the only option is to type messages using whatever functional control site exists on their body. The provision of accessible mobile phones for people with disabilities can significantly improve their quality of life through an increased range of accessible activities, and mobile phones can improve their independence, safety, security and self-esteem. (Nguyen et al. 2007)

Nguyen et al. (2007) found that following education and training, people with disability reportedly experienced increased satisfaction with mainstream accessibility and usability features on existing mobile phones. Therefore, it is not enough to provide the features; people with disabilities must be given training on how to use them, especially when usability is a problem.
Mobile phones were identified as important in Labor’s July 2011 review of access to telecommunications. The terms of reference outline a number of accessibility features available on mainstream mobile phones:

- text to speech – such as mobile phones capable of reading SMS messages aloud and broadcasting instant messages in a synthesised voice
- screen reading – such as information on a computer screen and, in some instances, a smartphone touch screen that can identify text and translate it into speech or Braille
- speech recognition – such as mobile phones that enable voice-dialling by speaking the name or telephone number of the contact
- on-screen keyboards – such as a keyboard display on a smartphone touch screen that can make it easier to send a SMS rather than having to push smaller mobile-phone keypad buttons
- touch-screen functions – such as a touch-screen smartphone that can help people with dexterity problems to adjust volumes by lightly sliding their finger instead of holding down buttons
- visual alerts – such as mobile phones that use a flashing light to alert people with hearing impairments that the phone is ringing, or that an SMS or email has arrived
- adjustable user interfaces – such as mobile phones that allow users to adjust the volume, lighting, contrast and/or display settings to suit individual needs.

This list would suggest the mobile phone user with disability is no longer stigmatised since the mainstream market expect, and benefit from, each of these accessibility measures. Submissions responding to the discussion paper (for example, the Communications Alliance and Australian Mobile Telecommunications Association joint submission) similarly focused on the ability of the market to respond to the issue of accessibility and usability, by highlighting a number of mainstream accessibility features of Nokia and Apple products. This corporate interest in usability has changed the social position of people with disabilities, with regard to access to mobile telecommunications.

The exclusion of people with disabilities, from being able to use telecommunications, is due to what Newell (1998) describes as the narrow norms with which members of society associate with telecommunications. The advent of digital technologies has broadened the community’s view of telecommunications. The above list of features available on mainstream ‘smartphones’ highlights the changing ways accessibility and usability are considered.

PEOPLE WITH DISABILITY AS CONSUMERS: URGE CORPORATIONS TO MAKE VOLUNTARY COMMITMENTS TO WORK TOWARDS ENHANCED UNIVERSAL SERVICE

With the recognised importance of new media and telecommunications to social and political life, governments in the US and Australia have sought to provide 'universal service' to all citizens (Goggin 2008a). However, with the deregulation of markets, this responsibility has shifted to the market. Goggin and Newell acknowledge new media could potentially provide solutions to social problems, however warn against relying on market forces to deliver these (Goggin & Newell 2000). The collaborators were doubtful the market would meet the needs of consumers with disabilities, who were more often viewed as a drain on resources than an actual market segment. Despite this, they acknowledge the potential for telecommunications innovation exists (Goggin & Newell 2000).

While people with disabilities have traditionally been considered within an individualised or medical discourse, following the introduction of national and state-based disability discrimination legislations in nations across the globe, Beth Haller (1995) found members of this group could be seen as potential consumers, or collectively as an untapped market. Newell was cynical about whether a deregulation of markets would result in real changes to
the social position of people with disabilities and whether individuals would gain access to vital telecommunications (Newell 1998).

Yet Newell acknowledges people with disability have benefited from the opportunities offered to them by the consumer movement (Newell 1998). Ellessor (2011) is similarly cautious about embracing this neoliberal rhetoric but suggests it may have merit if legal policy and corporate behavior intersect in an increasingly internationalised market. For example, if a corporation is required to adhere to certain accessibility guidelines in one nation, as a result of legislation, this may lead to accessibility compliance across all its markets. Take the case of Apple computer, for example. A coalition of people with hearing impairments claimed the popular iPhone contravened legislation in the US and accordingly threatened Apple with legal action. Apple took the opportunity to upgrade accessibility across its suite of products and its subsequent product, the iPad, is fully accessible and simple to customise (see Ellis & Kent 2011).

In 2009, I had the opportunity to meet with an educational representative from Apple who was encouraging the university where I was employed to use Apple products instead of specialised assistive technology. When this rep made the claim Apple computers and phones were the most accessible products on the market, I asked why the corporation had decided to rectify its well-documented accessibility problems (Ellis & Kent 2008). I was told the organisation was upgrading its systems anyway and it made sense to do it all at the same time. It was a good business decision. Perhaps Apple was adopting the ethos suggested by Newell, that people with disability could be viewed as a subset of the market the corporation would be proud to associate with (Newell 1998). In any case, who would not love accessibility features such as mobile-phone or MP3-player voice-command? At the recent Consumer Electronics Show in Las Vegas, the possibility that individuals could one day control digital televisions with their voices was a much applauded future technology. Usability features such as these have origins in accessibility for people with disability.

CONCLUSION

Telecommunications is recognised as an important public good that should be available to all citizens (Goggin 2008a). As Bill Shorten explains:

If people with disability are to be full participants in society, it is crucial that they have the same access to phones, the Internet and other forms of communication as the rest of the community. (Conroy & Shorten 2009)

The telecommunications discussed in this paper, including the NBN, digital television and mobile phones, provide exciting possibilities for home entertainment, increasing independence and access of information. If made accessible, these possibilities will go on to empower people and provide all members of society with more opportunities for achieving user-preference customisation. Australia must learn from the mistakes of other nations to ensure people with disabilities can access these exciting new digital telecommunications.

Christopher Newell (1998) saw telecommunications as an important arena for re-conceptualisation of disability as part of the diversity of humanity. Although disability is built into digital technologies, possibilities exist for innovation. This paper recognises the innovative ways people with disability can potentially use digital technologies, for the purposes of greater social inclusion, however it cautions that accessibility and usability must continually be kept in mind. An accessibility 2.0 approach, alongside government legislation, customisation and corporate behaviour is needed to ensure telecommunications – such as broadband infrastructure, digital television and mobile telephones – are made available to people with disability and, by extension, to all of us.
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Despite its well-established critique of the under- and misrepresentation of disability in the media, disability studies literature is not clear on how disability should best be ‘re’presented. Critics either advocate a representational strategy with disability entirely incidental to the narrative of a media text or a ‘non-incidentalist’ strategy highlighting the exigencies of living with disability. We argue that combining the two strategies is more in line with current media critiques and theorising. This hypothesis is tested with two experimental studies using footage from a Dutch Reality Television programme featuring participants with physical impairments. Results indicate that such positive representations of disability may initially increase affective prejudice, with more positive effects emerging only after repeated viewing. Further study into the reception of positive portrayals of disability in (entertainment) media is needed to improve our understanding of the possibilities of challenging disablism through and within the media.

INTRODUCTION

Prejudice continues to be a major factor in the disability of people with physical impairments. While law may prohibit overt discrimination, subtle and unconscious forms of disablism continue to hamper their participation and acceptance in society (Pruett and Chan 2006). Rules and regulations may constrain overt acts of discrimination, but do not address the pejorative connotations we attribute to physical impairment in our culture. When these problematic meanings of physical impairment remain unaddressed, they continue to fuel both conscious and unconscious disablism (Phillips 1990). A more fundamental challenge to disablism therefore requires a change in the everyday cultural meanings of physical impairment and disability.

In the disability studies literature, ‘the media’ are usually blamed for contributing to the negative connotations of physical impairment. They are criticised for excluding people with physical impairments from public view and for thereby suggesting disability is an anomaly (Ganahl and Arbuckle 2001; Saito and Ishiyama 2005). When they do include people with physical impairments, the media are accused of using stereotypes and reinforcing prejudice and discrimination. This concern goes out especially to viewers who have no personal contact with people with disabilities in their daily lives that might inoculate them against its persuasive effects (Barnes 1992; Byrd 1989; Cumberbatch and Negrine 1992; Nelson 1994).

Such criticisms also imply that the media are potentially a powerful agent of positive change. Generally, it is assumed that such potential would be realised if the media would only represent people with physical disabilities more often and in a more positive and realistic way. In the last decade, a number of television shows have been produced that seek to ‘re’ present impairment and disability in prejudice reducing ways. These exploits have taken
diverse forms, ranging from serious documentaries about living with disability to beauty contests and talent shows for people with physical impairments. Until now, however, most media research has focused on establishing a critique of existing representations of disability in the media. The positive potential of the media in the struggle against disablism therefore remains to be demonstrated in empirical research. We address this hiatus in the literature by providing a theoretical argument for this assumed positive potential. We then test this theory using one cross-sectional and one longitudinal experiment.

In the following pages, first the critique of the representation of disability on television and film is reviewed. Then follows a general discussion of the ways in which the positive potential of audio-visual media in reducing stereotypes could be theorised. This is succeeded by a specification of the type of representation of persons with physical impairments that may be hypothesised to have the greatest potential to produce attitude change.

Subsequently, the presentation of the two experimental studies mentioned above. In the first study, we analyse how the main representational styles used in the reality TV genre are perceived by audiences using 20-minute video clips. In the second study, we elaborate on these results by investigating the effects of repeated exposure to full episodes of the reality TV show ‘Expedition Unlimited’. Participants watched three episodes (each lasting 45 minutes) of the show over a three-week period. The paper concludes with a discussion of the implications of the results of these studies for further research into the potentials of audio-visual media in the struggle against disablism.

REPRESENTATIONAL STYLES

Crisicism of contemporary representations of disability in the mass media has generally taken two forms. First, criticism has been levelled at the relative under-representation of people with physical impairments in the media (Ganahl and Arbuckle 2001; Saito and Ishiyama 2005). Secondly, critics argue that when disability is represented in the media, it is mostly in a negative, stereotypical way as passive, hopeless, dangerous, perverted and monstrous, amongst many other things (Barnes 1992; Cumberbatch and Negrine 1992; Nelson 1994). Representations that are too positive are also considered undesirable. These so-called ‘supercrip’ representations depict people with physical impairments as individuals who have overcome the obstacles of their disability either through sheer and unusually strong willpower or with the use of certain rare talents (Harnett 2000; Kama 2004).

Both the under- and misrepresentation critiques are usually made from a normative standpoint, without reference to empirical evidence of their impact on audiences. In the case of under-representation, the invisibility of people with physical impairments is assumed to lead audiences to conclude that the marginalisation of disability in society is a natural state of affairs. Possible fears and prejudice about this group also remain unchallenged when they remain invisible on television. Regarding misrepresentation of disability, the media are also seen to feed prejudice and disablism through the use of stereotypes (Nelson 1994).

Since critiques of misrepresentation have targeted both positive and negative stereotypical representations of disability, it is not clear what kind of representation of disability is needed instead. Amongst the most clear and concrete proposals is one by Black and Pretes (2007, 82) for a so-called ‘incidentalist’ representational strategy in which physical impairments are incidental to the narrative of the media text. Individuals with impairments are represented as similar to the non-disabled viewer in almost all respects. Also, this may avoid the pitfall of overcompensating for all the negative stereotyping and lapsing into ‘supercrip’ representations.

The incidentalist representational strategy may, however, also carry risks of its own. Representing physical impairment as entirely ‘incidental’ risks producing a media text that obscures the very real impact of physical impairment on everyday life in an ablist society. This strategy presents audiences with a ‘sanitised’ version of the world in which the ‘problem of disability’ has been erased and where physical impairment is no longer an issue worth discussing. It could be read as sending out the message that in contemporary society, no
special arrangements need to be made for people with physical impairments and that the struggle for equal rights is no longer necessary. This criticism implies that a more ‘non-incidentalist’ strategy is required which breaks with common stereotypes by demonstrating how impairments can affect the life of an individual and how their subsequent disability is a produced relationally.

IDENTIFICATION AND SOCIAL LEARNING

The incidentalist and non-incidentalist representational strategies, we argue, correspond to different theories of attitude change through media consumption. The incidentalist strategy is most in line with theories of persuasion centring on the beneficial effects of identification with characters in media entertainment. These theories hold that viewers may be more inclined to judge favourably about an out-group once they perceive more similarity with and empathy towards individuals from this group (Cohen 2006; Müller 2009). With the incidentalist representation of people with a physical impairment discussed above, the potential for identification is presumably guaranteed. Characters are purposively represented in positive, yet, ordinary ways that make them appear similar to an average viewer and allow for strong identification (Hoffner and Buchanan 2005).

A non-incidentalist representational style, on the other hand, emphasises the difference of people with physical impairments from the mainstream norm. Consequently, the difference between the target audience and the on-screen character may be accentuated in ways that may diminish the potential for identification. Therefore, this approach is more likely to exert its effects through processes of social learning. A non-incidentalist representation would offer viewers the opportunity to learn things about disability that they could not through an incidentalist style. It allows them to see what life with a disability is like and, more importantly perhaps, how positive interactions of their own non-disabled in-group with people with impairments can be negotiated. Vicarious experiences of positive inter-group contact are assumed to lead to attitude change through processes of social learning and social identity renegotiation (Gaertner et al. 1993).

‘Identification’ and ‘social learning’ are both cornerstones of what Schiappa, Gregg and Hewes (2005) have called ‘the parasocial contact hypothesis’, which holds that prejudice is reduced by giving viewers opportunities for ‘parasocial contact’ with individuals from the relevant out-group. The parasocial contact hypothesis assumes that the effects of these kinds of representations will be most pronounced for those viewers who do not have regular contact with people with physical impairments in their daily lives (Schiappa, Gregg and Hewes 2005). At the same time, this group is also the most likely target for this kind of media intervention. For people who have themselves no friends or relatives with physical impairments and therefore rely on the media for their understanding of disability, the under- and misrepresentation of people with physical disabilities in the media is most influential (Farnall and Smith 1999). Studies on the effects of contact with people with physical or mental impairments on attitudes towards disability have shown that attitudes are indeed more negative when people have little positive personal contact with individuals with impairments (Gething et al. 1997; McManus, Feyes and Saucier 2011). As such, it would seem that disablist attitudes among people with little contact might be challenged through exposure to incidentalist and non-incidentalist representations of disability with which they can identify or through which they may engage in social learning. These assumptions lead to the following hypothesis that can be tested in empirical research:

H1: Exposure to representations of disability that enable identification or social learning reduces cognitive and affective prejudice among viewers without physical impairments who have little personal contact with the represented group.
REALITY TELEVISION

The incidentalist and non-incidentalist representational strategy are generally used separately in a media text. However, an effective representational strategy may have to combine or alternate between an incidentalist and non-incidentalist one to represent disability in a realistic and counter-hegemonic way as either representational strategy alone will result in either an overtly politised (non-incidentalist) or personalised (incidentalist representation) that fails to encompass all facets of life with a physical impairment. A combination of both would show a person in one scene as indistinguishable from their non-disabled peers (an incidentalist approach). Yet in another as a person who has faced unusual adversities as a result of the disabilism of an ablist society or as a person who requires help with certain aspects of everyday life (non-incidentalist). By combining representational strategies, multiple aspects of a person’s identity are highlighted simultaneously, and the potential for identification as well as social learning will be guaranteed simultaneously. This could help audiences without physical impairments to develop a deeper understanding of the various ways in which physical impairment can play a role in a person’s life, without losing sight of the fundamental sameness between them and people with physical impairments. ‘Incidentalism’ and ‘non-incidentalism’ may therefore work better together than alone, but the actual production of such a text may seem to be a rather complicated affair.

As different television genres have been noted to facilitate different kinds of narrative- and representational styles (Mittell 2004), it may be possible to determine particular genres of television entertainment that are exceptionally suitable to the task of re-presenting disability in the ways described above. Reality television, in theory at least, may be such a genre. Both in Britain and in the Netherlands, so-called reality-television shows featuring participants with physical impairments have been aired on national television.

In reality television, ‘ordinary’ citizens (i.e. not actors) are shown in various roles in everyday life (i.e. as a friend, teammate, competitor, but also as woman, cook, etc.). Moreover, they can be followed over time and across a range of contexts as they express their opinions, change their minds, make mistakes and develop as a person. As a result, reality TV shows are often enjoyed precisely because they have the potential to show the depth and range of a person’s identity, attitudes and behaviours and enable empathy for and identification with the ‘ordinary’ participants in the programme (Biressi and Nunn 2005). For the representation of people with physical impairments, these qualities have a particular importance. While their physical impairment may always be visible, it does not play a role in the narrative all the time. This multi-layered representation offers an important alternative to the stereotypical representation of disability (cf. Black and Pretes 2007).

Furthermore, although reality TV may not always or ever be ‘real’ in a positivist sense of the word, it nonetheless is perceived as ‘real’ by the majority of its audience (Biressi and Nunn 2005). Empirical studies have demonstrated that the perceived realism of a particular media production is an important determinant of its effect on audiences (Potter 1988). Moreover, as a popular genre in television entertainment, reality TV draws large and diverse audiences, and may therefore have a larger societal reach and impact than, for example, documentaries that seek to represent disability in similarly realistic ways.

Therefore, the genre of reality TV may distinguish itself from other genres such as the soap (which has multiple episodes and characters but is not generally perceived as real) and the documentary (which is realistic but usually doesn’t have multiple episodes or characters generally). Within reality TV, a person with a disability is represented often in an ‘incidentalist’ strategy. For instance, he or she may be filmed at length while sitting at the kitchen table talking to other participants, watching television or calling on the phone. At other times, their disability will be the focal point of attention as it would be in real life, as it constitutes an obstacle to participation in various areas of social life. Moreover, the genre of reality television offers viewers with a heightened sense of perceived realism. Since the participants are not actors, and storylines are not invented or written out, the semblance of a
reality is convincingly produced – fulfilling a crucial assumption in the parasocial contact hypothesis proposed by Schiappa et al. (2005).

Based on the above considerations, we expected that watching the two hypothesised effective representational styles combined as they are in the reality TV genre would have a stronger effect on viewers as compared to watching either alone.

**H2:** Exposure to both representational styles mentioned in H1 simultaneously through a reality television format, has an increased attitudinal effect as compared to exposure to either representation alone.

Furthermore, a long tradition of media effects research has shown that the negative effects of television viewing are more pronounced over time (Gerbner 1994). As a result of this process of cultivation, we expected that the effects of watching alternative representational styles would increase with additional viewing of similar, consecutive episodes.

**H3:** Longer and/or repeated exposure to the combination of both representational styles results in longer lasting attitudinal change.

**METHOD**

In order to test the hypotheses formulated above effectively, two separate studies were undertaken based on material derived from the television show ‘Expedition Unlimited’. This show was chosen because it is the only Dutch reality TV show at present featuring multiple physically-impaired participants and was designed with the explicit intention to produce positive ‘re’presentations of disability for consumption by Dutch non-disabled audiences. As was mentioned earlier, like other shows of the genre it contains at least two distinct representational styles.

First of all, the show contains segments in which the ‘person behind the disability’ is highlighted in an incidentalist fashion. In these segments, participants are interviewed on camera about their concerns with the proceedings of the show, or filmed as they go about their business in their daily life (when new participants are introduced in an episode). In these segments, the physical impairment of contestants was generally incidental.

Second, the show contains segments focused on ‘action and interaction’ in which participants are shown completing the tasks set for them in the reality environment. In the case of the series ‘Expedition Unlimited’ these tasks ranged from physical activities like riding a specially designed bicycle and catching fish to painting a picture. In each of these activities, the physical impairment of various contestants was highlighted and not incidental to the storyline.

**Study 1**

In order to address the effects of both representational strategies separately, the first study was set up as a randomised experiment with two experimental and one control condition. In the first experimental condition, the ‘identification’ condition, participants watched a 20-minute compilation of the incidentalist ‘up close and personal’ clips from the series Expedition Unlimited. In the second experimental condition, the ‘Social Learning’ condition, participants watched a compilation of ‘action and interaction’ oriented clips from the same series. In the control condition, participants watched a game show called ‘5on5’ in which no persons with physical impairments were present and the topic was not mentioned. If the hypothesis H1 is correct, cognitive and affective prejudice would be lower for the two experimental conditions for participants with little personal contact with people with a physical impairment.

In this study, 188 people without a physical impairment participated. Their average age was 31; 69% were female and 76% were college educated. 44% had little to no contact with persons with a physical impairment. Participants came to a university computer lab to take part in the experiment and each viewed their clippings in an individual isolated booth.
Study 2

Because the 20-minute clips in Study 1 were constructed for purposes of this study, they do not reflect the normal viewing experience of reality television such as the show ‘Expedition Unlimited’ from which these clips were derived. When watching the reality TV show in full, participants are confronted with alternating the two representational styles of disability, ‘incidentalist’ and ‘non-incidentalist’. Moreover, the show lasts longer (i.e. 45 minutes) which could lead to either a stronger impact or a dissipation of initial priming derived effects. In order to assess what the impact would be of watching full episodes of the show over a period of time, the second study was set up as a longitudinal experiment with two conditions and three repeated measures.

In the experimental condition, participants watched one full episode of ‘Expedition Unlimited’ per week for a total of three weeks. In order to reduce the effects of particular episodes, half of the respondents in the experimental condition watched episodes 1, 2 and 3 consecutively and half of the respondents watched episodes 4, 5 and 6. In the control condition, participants watched three consecutive episodes of a Dutch reality TV show that did not feature people with physical impairments called ‘Peking Express’. After each session, they completed a questionnaire in which their attitudes and fears towards people with physical impairments were measured.

In this study, 150 people without a physical impairment participated. To further increase the generalisability of the results, care was taken to include a broader range in respondents’ age and educational levels. Their average age was 26 years (SD=5.6), 50% were female and 47% were college educated or higher. 36% had little to no contact with persons with a physical impairment. Participants were selected from applications gathered through a widely disseminated online call for participation. The participants were selected from this pool of applications, so that a wide and normal distribution was achieved for age and educational levels, and equal participation for men and for women. Everyone participated online in the study from his or her own home. Care was taken to insure that each participant watched all three episodes under reasonably similar circumstances, by sending the link on a given day and time and closing off access after a certain period of time. At each session, participants first filled in a number of survey questions and were then shown the relevant episode for their condition. After viewing, subjects filled in a second set of survey questions.

Measurements

Cognitive Prejudice.

Prejudice against people with a disability was measured using the Attitudes Towards Disabled People scale (Yuker and Block 1986). The version ATDP-O was used because it is shorter than the original scale and its validity has been demonstrated (Haba and Ogiwara 2001). The ATDP consists of 20 items. Each item is a statement to which the participant gives their agreement. For instance, one of the items reads ‘physically disabled people are equally intelligent as non-disabled people’. Answers were scored on a 5-point Likert scale from 0 (totally disagree) to 5 (totally agree). The scale (M=3.61, SD=.41) had a Cronbach’s alpha of 0.74.

Affective prejudice.

Affective prejudice was measured with a fear of disability scale developed by Park, Faulkner and Schaller (2003). Factor analysis showed that the 11 items of their scale formed two coherent subscales for fear of becoming disabled and fear of interaction with people with a physical impairment. Two separate scales were constructed. Fear of becoming disabled was measured with items such as ‘the thought of the possibility of becoming disabled worries me’. The five-item scale (M=3.01, SD=0.76) had a Cronbach’s alpha of 0.74. Fear of interaction with persons with physical impairments was measured with items such as ‘when I am around a disabled person I will feel relaxed’ (reverse scored). The five-item scale (M=3.58, SD=0.67) had a Cronbach’s alpha of 0.82.
Contact with people with physical impairments.

Contact with persons with a disability was measured using the contact with disabled persons scale by Pruett et al. (2008). This scale consists of items such as ‘How often have you had a short conversation with a person with a physical impairment?’ Answers were scored on a scale ranging from 1 (never) to 5 ((almost) daily). The five-item scale (M=2.35, SD=0.75) had a Cronbach’s alpha of 0.81.

Perceived realism.

In order to assess whether the selected episodes and clips were indeed considered realistic, perceived realism was measured with an adapted version of the perceived realism scale (Perse 1994). This scale measured the extent to which participants believed that what they had seen in the video they just watched was a true reflection of the way things go in everyday life and how people would normally behave. The four-item scale (M=2.87, SD=0.76) had a Cronbach’s alpha of 0.81. An example question was ‘in this video, I could see what the people were really like’. Answers were given on a 5-point Likert scale.

Identification.

In order to measure the extent to which viewers had been able to identify with the characters in the programme they had seen, two six items scales were used that measured identification either with the group of participants with physical impairments or participants without physical impairments. Each question was formulated to capture the sense of identification with the characters in either a cognitive way (e.g. I could understand these characters’ actions) or an affective way (e.g. I could feel the emotions of these characters while I was watching the film). Answers were given on a 5-point Likert scale. Factor analysis demonstrated that all items loaded onto a single factor, which we labelled ‘Identification’, with a Cronbach’s alpha of 0.84 (M=3.22, SD=0.50).

RESULTS

For clarity, the results of Study 1 and Study 2 will be presented consecutively. However, both studies address H1 and H2. Theoretical implications of the results will be discussed integrally in the discussion.

Study 1: representational strategies

In the first study, no significant differences were found between the conditions for the variables age, educational level, gender and contact with people with physical disabilities. Manipulation control questions indicated that identification with the characters in the watched clip was significantly higher in the ‘Identification’ condition (M=6.07, SD=0.68) than in the control condition and the ‘Social learning’ condition (M=4.62, SD=0.80 and M=5.56, SD=0.68 respectively, F(2, 185)=64.677; P<.0005). Moreover, participants in the ‘Social Learning’ condition reported that they had seen significantly more interactions between people with a physical disability and people without (M=4.33, SD=0.72 and M=3.57, SD=1.00 respectively, F(1,126)=24.532; p<.0005).

The means of each condition for dependent variables fear of becoming disabled, fear of interaction with people with physical impairments and prejudice (ATDP) are shown in table 1. Analysis showed that there were no main effects for either ATDP scores (F(2,182)=0.255; p=0.78), fear of interaction with people with physical impairments (F(2,182)=1.686; p=0.19) or fear of becoming impaired oneself (F(2,182)=0.291; p=0.75). However, as hypothesised, there was a significant interaction between the effects of the representational style used in each condition and amount of personal contact with physically impaired people on both measures of fear (F(3,182)=7.293; p<0.0005 and F(3,182)=3.323; p=0.021 for fear of interaction and fear of interaction respectively).
These results suggest that, as expected in Hypothesis 1, seeing realistic representations of disability that invite identification or allow for Social Learning have an impact on those viewers who have little contact with people with physical impairments in their personal lives. After watching these short clips, affective responses to disability were slightly altered in this group. This was not the case for their cognitive responses to disability as measured in the ATDP-O. Contrary to Hypothesis 1, however, these results suggest that positive representations may have primed people’s fears of becoming disabled themselves and their fear of interaction with this group. However, it is quite possible that the results reflect mere initial ‘startle reactions’ upon seeing highly unusual television content (both in the amount of people with physical impairments shown as well as the way in which they are shown). As such, they may not last long and subsequent exposure could give way to more desirable affective and cognitive changes in viewing audiences as hypothesised in H2 and H3. In order to address this issue, we now turn to the second study described in this article.

**Study 2**

In the second study, no significant differences were found between the conditions for the variables age, educational level, gender and contact with people with physical disabilities. The means of each condition for the variables perceived realism, fear of becoming disabled, fear of interaction with people with physical impairments and prejudice (ATDP) are shown in Table 2. Analysis of variance showed that there were no main effects for prejudice as measured with the ATDP-O (F(1,142)=2.418; p=0.12), fear of interaction (F(1,143)=0.021; p=0.886) or fear of becoming disabled oneself (F(1,143)=0.79; p=.0779). However, as hypothesised in H2, there was a significant interaction between condition and the amount of personal contact with people with physical impairments prior to watching the show. This interaction was found for prejudice as measured with the ATDP-O (F(2,143)=3.249; p=0.042) as well as fear of interaction (F(2,143)=11.043; p<0.0005) and fear of becoming disabled oneself (F(2,143)=3.647; p=0.029).

The results found from watching a full 45-minute episode in the first week of Study 2 differ notably from the results from Study 1, in which 15-minute compositional video clips were used to isolate the representational styles ‘identification’ and ‘Social Learning’. Where Study 1 showed an increase in fear scores, this was not the case in Study 2. Moreover, for viewers who had extensive personal contact with people with impairments, the opposite appeared to be the case. An examination of the mean scores for this group suggests that they responded with a lowered fear of becoming disabled themselves as well as a lowered fear of interaction, compared to those with extensive contact who had been in the control condition and those who saw the same show but had had little personal contact.

### Table 1 - Fear and prejudice scores after viewing different representations of disability.

<table>
<thead>
<tr>
<th>Amount of contact</th>
<th>Little personal contact with disability</th>
<th>Frequent personal contact with disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>Identification</td>
<td>Social learning</td>
</tr>
<tr>
<td></td>
<td>N=28</td>
<td>N=32</td>
</tr>
<tr>
<td>Cognitive prejudice (ATDP-O)</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>3.60</td>
<td>.45</td>
<td>3.55</td>
</tr>
<tr>
<td>Affective prejudice1: Fear of becoming disabled</td>
<td>3.69</td>
<td>.74</td>
</tr>
<tr>
<td>Affective prejudice2: Fear of interaction</td>
<td>3.23</td>
<td>.74</td>
</tr>
</tbody>
</table>

These results suggest that, as expected in Hypothesis 1, seeing realistic representations of disability that invite identification or allow for Social Learning have an impact on those viewers who have little contact with people with physical impairments in their personal lives. After watching these short clips, affective responses to disability were slightly altered in this group. This was not the case for their cognitive responses to disability as measured in the ATDP-O. Contrary to Hypothesis 1, however, these results suggest that positive representations may have primed people’s fears of becoming disabled themselves and their fear of interaction with this group. However, it is quite possible that the results reflect mere initial ‘startle reactions’ upon seeing highly unusual television content (both in the amount of people with physical impairments shown as well as the way in which they are shown). As such, they may not last long and subsequent exposure could give way to more desirable affective and cognitive changes in viewing audiences as hypothesised in H2 and H3. In order to address this issue, we now turn to the second study described in this article.

**Study 2**

In the second study, no significant differences were found between the conditions for the variables age, educational level, gender and contact with people with physical disabilities. The means of each condition for the variables perceived realism, fear of becoming disabled, fear of interaction with people with physical impairments and prejudice (ATDP) are shown in Table 2. Analysis of variance showed that there were no main effects for prejudice as measured with the ATDP-O (F(1,142)=2.418; p=0.12), fear of interaction (F(1,143)=0.021; p=0.886) or fear of becoming disabled oneself (F(1,143)=0.79; p=.0779). However, as hypothesised in H2, there was a significant interaction between condition and the amount of personal contact with people with physical impairments prior to watching the show. This interaction was found for prejudice as measured with the ATDP-O (F(2,143)=3.249; p=0.042) as well as fear of interaction (F(2,143)=11.043; p<0.0005) and fear of becoming disabled oneself (F(2,143)=3.647; p=0.029).

The results found from watching a full 45-minute episode in the first week of Study 2 differ notably from the results from Study 1, in which 15-minute compositional video clips were used to isolate the representational styles ‘identification’ and ‘Social Learning’. Where Study 1 showed an increase in fear scores, this was not the case in Study 2. Moreover, for viewers who had extensive personal contact with people with impairments, the opposite appeared to be the case. An examination of the mean scores for this group suggests that they responded with a lowered fear of becoming disabled themselves as well as a lowered fear of interaction, compared to those with extensive contact who had been in the control condition and those who saw the same show but had had little personal contact.
Watching the reality television show furthermore appeared to affect prejudice scores in people without personal contact with persons with physical impairments. Their prejudice scores were similar both to the scores of viewers who have frequent personal contact with persons with physical impairments in their daily lives (in both conditions). In contrast, viewers with little personal contact with persons with physical impairments in the control condition scored notably higher.

In the two weeks subsequent to this first exposure, participants watched two more episodes. The scores for the dependent measures in week two and three are shown in Table 3.

<table>
<thead>
<tr>
<th>WEEK2</th>
<th>Little personal contact with disability</th>
<th>Frequent personal contact with disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reality TV with disability</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>N=36</td>
<td>N=18</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Cognitive prejudice (ATDP-O)</td>
<td>2.39</td>
<td>.42</td>
</tr>
<tr>
<td>Affective prejudice1: Fear of becoming disabled</td>
<td>3.80</td>
<td>.71</td>
</tr>
<tr>
<td>Affective prejudice2: Fear of interaction</td>
<td>2.93</td>
<td>.67</td>
</tr>
</tbody>
</table>
Table 3 - Fear and prejudice after watching a second and third episode of a reality TV show featuring people with physical impairments.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Little personal contact with disability</th>
<th>Frequent personal contact with disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reality TV with disability</td>
<td>Control</td>
</tr>
<tr>
<td>N</td>
<td>N=36</td>
<td>N=18</td>
</tr>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Cognitive prejudice (ATDP-O)</td>
<td>2.36</td>
<td>.44</td>
</tr>
<tr>
<td>Affective prejudice1: Fear of becoming disabled</td>
<td>3.74</td>
<td>.75</td>
</tr>
<tr>
<td>Affective prejudice2: Fear of interaction</td>
<td>2.94</td>
<td>.71</td>
</tr>
</tbody>
</table>

In both the second and the third week of viewing, again no main effects were found for condition on prejudice (F(1,143)=2.131; p=0.122 and F(1,143)=1.436; p=0.233 for week 2 and 3 respectively), fear of becoming disabled (F(1,143)=1.338; p=0.24 and F(1,143)=0.001; p=0.98 for week 2 and 3 respectively) and for fear of interaction (F(1,143)=1.351; p=0.25 and F(1,143)=1.406; p=0.24 for week 2 and 3 respectively). Also no interaction effect was found for condition with amount of contact on prejudice scores in week two (F(2,143)=0.384; p=0.536) and week 3 (F(2,143)=1.378; p=0.255). Furthermore, there was no significant interaction effect for condition with amount of contact on the fear of becoming disabled (F(2,143)=2.775; p=0.066 and F(2,143)=3.647; p=0.69 for week 2 and 3 respectively).

However, the data did show a persistent interaction between condition and amount of contact for the fear of interaction with people with a physical impairment (F(2,143)=8.872; p<0.0005 for week 2 and F(2,143)=6.991; p=0.001 for week3). The group means in Table 3 suggest a rather equivocable picture for the cause of this significant interaction effect. While in the first week, fear of interaction scores were evidently lower for the groups in the experimental condition that had already had extensive contact with persons with physical impairments in their daily lives, group scores were spread out more in week 2 and remain this way in week 3. As would be expected, the fear of interaction is highest for participants with little contact in the control condition (M=3.14 in week 3), followed by participants with little contact who watched the reality show with characters with physical impairments (M=2.94). Both groups with extensive contact scored even lower, with, as would be expected, a higher score for those who had been in the control condition (M=2.73) as compared to those in the experimental condition (M=2.64). This order of means for the different groups suggest that Hypotheses 2 and 3 are supported with respect to the dependent variable fear of interaction, but not the fear of becoming disabled.

Taken together, the findings from Study 2 suggest that extensive viewing of positive representations of disability as found in a reality TV initially influenced both cognitive and affective components of attitudes towards people with physical impairments among people with little contact with disability in their daily lives. After repeated viewing of three episodes, however, only the effect of viewing on the fear of interaction remained.

**DISCUSSION**

In this paper, we have argued that current academic theorising on the representation of disability in the media suggests that a combination of an incidentalist with a non-incidentalist representation will be most effective in challenging disablist attitudes. The results above suggest this representational style has both intended and unintended effects on viewers. The
The first hypothesis stated that representations of persons with physical impairments that enabled identification or social learning would have an effect on attitudes of viewers with little personal contact with people with physical impairments. The first study demonstrated that this was the case. However, the effect was found only on affective prejudice towards disability. More importantly, it also appeared to be negative: fear of interaction and fear of becoming disabled were increased for this group after viewing short 15-minute clips.

The evidence is more ambiguous for the second hypothesis, which stated that a combination of such positive representations in the genre of reality TV would more extensively reduce prejudice in non-disabled viewers with little personal contact with individuals with a physical impairment. After watching a full episode of the stimulus material, their cognitive and affective prejudice scores were significantly lowered and approached the baseline levels found for people with extensive contact with disabled persons. Effects were also found on fears of becoming disabled and fears of interaction with people with disabilities, but only for people who already had had extensive contact with disabled persons in their personal lives. Furthermore, although reductions were found for this in the first week for all the dependent measures, only gains in the fear of interaction were still evident after three weeks. These results suggest that the effect of watching the show on cognitive prejudice was short lived and that Hypothesis 3 is not (fully) supported.

Taken together, these results suggest that the combination of incidentalism and non-incidentalism as can be achieved through the reality television genre has more impact on affective than cognitive dimensions of prejudice. It appears that this impact may initially be negative and only becomes positive after longer exposure. This initial fear arousing nature of realistic representations of disability suggests that they may put off exactly the group that most likely benefits from prolonged engagement in the ‘parasocial interaction’ that they offer: those people with little personal contact with persons with a physical impairment. Limiting the number of participants with physical disabilities in a programme until the audience has developed a liking for the programme may perhaps diminish these effects. Alternatively, a different mix of an incidentalist and a non-incidentalist representational strategy might be constructed so that initial viewing reactions will not be characterised by heightened affective prejudice.

All forms of representation invariably are a reconstruction of reality. Thus, they can never hope to be a simple reflection of ‘Truth’ about disability (if it exists at all). Moreover, some aspects of disability may be threatening to audiences no matter how they are represented (c.f. Shakespeare 1994). For a viable alternative, it is crucial to go beyond the call ‘not to use stereotypes’ and to concretise what kinds of constructions of disability might be deemed especially effective. This study suggests that theoretical innovations are possible in our thinking about representation of minority groups in general and people with physical impairments in particular and hopefully points the way forward to more studies into the effects of particular forms of representations on viewers.

ACKNOWLEDGEMENT

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REFERENCES


INTRODUCTION

An essential part of participating in and belonging to a community is the ability to communicate (Collier et al. 2010); this is an integral aspect of the Human Rights charter in The United Nations Convention on the Rights of Persons with Disabilities (United Nations 2010). The Augmentative and Alternative Communication (AAC) field emerged in response to the needs of people with Complex Communication Needs (CCN) who are unable to use speech for everyday communication and may not be able to benefit from traditional speech therapy given their limited or lack of functional speech (Alant et al. 2006). The term AAC means “a compilation of methods and technology designed to supplement spoken communication for people with limited speech or language skills” (Wilkinson and Hennig 2007). Originally, the AAC field was concerned with the physical use of the AAC technology, but in recent years, has expanded into the cognitive and social sciences (Alant et al. 2006).

People with CCN are increasingly participating in society (Blackstone et al. 2007; McNaughton and Bryen 2007; Collier et al. 2010) through taking up socially-valued roles such as parents, lovers and productive workers (Bryen 2008). The literature discusses the barriers arising from communication difficulties that reduce the power of individuals with CCN to fully participate in society (DeRuyter et al. 2007; McNaughton and Bryen 2007; Bryen 2008; Eardley, Bruce and Goggin 2009). DeRuyter et al. (2007) suggest people with CCN require improved access to telecommunications to enhance their communication and therefore their participation in society.

Social relationships are increasingly being maintained through the use of telecommunications (Notley and Foth 2007). Eardley, Bruce and Goggin (2009) summarise research suggesting
there are economic and social benefits that flow to the community when individuals have access to telecommunications. These benefits include improved personal safety, enhanced social networks, increased access to local and international communities, greater participation in self-directed learning and more efficient government service delivery. However, access to telecommunications has become essential for participation (Owens 2006; Sengara 2009) and new telecommunications technology is often not as accessible to people with disabilities (Goggin and Newell 2007; Eardley, Bruce and Goggin 2009). In an attempt to overcome these barriers, Speech-to-Speech Relay was introduced in Australia under the Universal Service Obligation (USO) and has been operating since 2000 (ACMA 2010).

Speech-to-Speech Relay (SSR) is a service that assists with telephone conversations between two parties, one of whom has CCN. The person with CCN can choose to communicate using their natural speech or using an AAC speech-generating device. A trained Relay Officer (RO) remains on the line to assist when communication difficulties occur. The introduction of Video-Assisted Speech-to-Speech Relay (VAS) is seen as a move to modernise SSR (COAT 2011). This technology also involves making a phone call over a standard telephone line and has a Relay Officer to assist with the communication breakdowns. However, in addition, VAS allows people with CCN to employ multiple communication modes during telephone calls by using Internet instant messaging and video services, such as Skype. All three parties can hear and speak to each other, but the person with CCN and the Relay Officer can use the video and text facilities to help overcome communication breakdowns.

This research explores the telecommunications access methods that can empower individuals with CCN to more fully participate in society. This paper draws on Bourdieu’s theory of society and post-modern perspectives on disability. As Bourdieu (1986) suggests, social capital is accumulated through a variety of communication strategies. Accordingly, Notley and Foth (2007) argue the ways social capital is accumulated are changing as increasingly people use telecommunications technology to maintain their social relationships. Similarly, people with disabilities are benefiting from having access to telecommunications, reducing isolation and improving social networks and obtaining a sense of control over one’s own life (Tilley et al. 2002). In doing so, people with CCN are increasingly participating in their communities in socially valued roles (Bryen 2008).

The research reported in this paper explored the perspectives of people with CCN on the usefulness of their current methods of accessing telecommunications and on the usefulness of VAS. Both perspectives are compared in an attempt to understand the barriers people with CCN face in accessing telecommunications to accumulate capital.

METHODOLOGY

INTRODUCTION

All of the participants in this research project have both physical disabilities and communication difficulties. The researcher also has a physical disability and Complex Communication Needs (CCN). Therefore, the project design took into account the ability of both the participants and the researcher. The research tools used included online surveys and an online focus group. Human Research Ethics approval was obtained from the University of South Australia’s Human Research Ethics Committee prior to the commencement of the research.

METHODOLOGICAL ISSUES CONSIDERED

In designing this research, the researcher also had to devise strategies for dealing with the challenge of both researcher and participants having physical disabilities and communication difficulties. Many things that are often taken for granted in research needed to be reconsidered, these include:
time and energy required by participants to fill in surveys and participate in the focus group

literacy issues amongst the cohort

time and energy required by the researcher to coordinate tasks, analyse surveys and participate in the focus group

potential influence from the participants’ personal assistants or family members when assisting with typing responses

There were four phases in the project:

1. Recruitment
2. Survey
3. Focus Group
4. Analysis

Recruitment

A recruitment email was distributed to professionals working in the disability field, interested persons known to the researcher and two electronic mailing lists (Australian Group on Severe Communication Impairment (AGOSCI) and Severe Communication Impairment Telecommunications). The email provided the details of the project, the criteria for participation and a web link to the online anonymous survey.

The inclusion criteria for respondents were:

A) the participant needed to be over the age of 18 years at the time of the survey;
B) the participant must be a user of an AAC device; and
C) the participant needed to have a level of literacy adequate to complete the survey and participate in the online focus group.

Survey

The research tool used to collect data in this phase was an anonymous online survey. Taking into account the physical limitations of the participants and the researcher, the number of questions included in the survey was limited to twenty-four and the majority of these questions were in multiple-choice format. There were some open-ended questions included to give the participants the opportunity to contribute additional information.

The questions included demographic information, such as age, gender and type of disability, the AAC device/s used, communication modes, and information about the participant’s current use of technology and telecommunications. Most of the questions relating to technology and telecommunications employed Likert scales and multi-select lists. There were two questions assessing the confidence of the participants in making different types of phone calls. One question assessed the participant’s perception of the usefulness of a VAS in making the same types of phone calls. These three questions all used the same set of call types such as calling family, ordering a pizza and booking a taxi.

Respondents were invited to view a ten-minute online video introducing the concept of VAS and how to use it as preparation for their participation in the survey. The video introduction highlighted a number of techniques for using a VAS system.

Focus Group

At the end of the survey, an invitation to participate in the three-week online focus group was presented. The focus group was conducted after the surveys were reviewed. The purpose of the online focus group was to gain richer qualitative data to help understand and interpret the survey data. Each week during the Focus Group Phase of the project the researcher created a
new discussion thread with a question for discussion. Topics discussed in the focus group included preferred telecommunications method, personal experiences of successful communication and whether access to telecommunications empowers people.

**Analysis Phase**

Due to the small sample size, it was only possible to analyse the survey data using descriptive statistics. Therefore, the data is summarised and described by the use of means, standard deviations and medians. Contingency tables assisted to identify relationships between the type of telecommunications access methods, technology use and type of calls. The focus group data was analysed to identify any common themes emerging from the data.

**Results**

The following sections report the findings from a descriptive analysis of survey and focus group responses. The findings are presented using only descriptive summary data. It was not possible to conduct inferential statistical analysis due to the low number of respondents and the design of the survey. Medians of the data are presented rather than means, since the data is generally skewed.

**Participants**

A total of 24 surveys were received and out of these 13 surveys were deemed usable, however, not all of respondents responded to each of the survey questions. Six survey respondents indicated their interest in participating in the online focus group. Table 1 presents basic demographic information relating to the 13 respondents of the survey.

<table>
<thead>
<tr>
<th>Demographic information</th>
<th>Male</th>
<th>Female</th>
<th>Education</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>High school</td>
<td>0</td>
</tr>
<tr>
<td>18 - 24 years</td>
<td>0</td>
<td>0</td>
<td>Diploma (e.g. TAFE or 2 year college)</td>
<td>6</td>
</tr>
<tr>
<td>25 - 34 years</td>
<td>1</td>
<td>1</td>
<td>Tertiary degree</td>
<td>4</td>
</tr>
<tr>
<td>35 - 44 years</td>
<td>3</td>
<td>2</td>
<td>Post graduate studies (i.e. Masters or PhD)</td>
<td>3</td>
</tr>
<tr>
<td>45 - 54 years</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 + years</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>N</th>
<th>Disability</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>6</td>
<td>Cerebral Palsy</td>
<td>11</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
<td>Dystonia</td>
<td>1</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1</td>
<td>Traumatic Brain Injury</td>
<td>1</td>
</tr>
<tr>
<td>United States</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 - Demographic Information.

The respondents are all users of AAC devices, though not all participants use their devices as their primary communication method. Nearly half the respondents indicated using multiple primary communication methods, with four using both natural speech and an AAC device, and three using natural speech, gestures/body language and an AAC device. Respondents indicated having a low to medium confidence in the use of technology.

Unfortunately, of the six participants who expressed interest in participating in the focus group, there were only three active members plus the researcher as moderator who participated in the forum. Of the active members, there was one male and two females. One is from the United States and two from Australia.
Respondents reported using various types of telecommunications. A common theme is the use of text-based telecommunications (e.g. SMS, email, instant messaging and social networking sites). All respondents use email and social networking sites independently. The following comment by one of the focus group participants highlights this theme and gives possible reasons.

“My favorite [sic] telecommunication method so far is email or text because they are so universal, everyone uses them now to communicate so I find it makes things simpler. I do use a TTY when I have to, but find it not as user friendly. Sometimes use Facebook [sic].”

Table 2 shows a summary of the telecommunication methods used by respondents for different interaction types. The three main findings relate to the use of email, making emergency calls by landline and making video calls. First, email is the most commonly used method in general across the interaction types. Landline is the second most common telecommunications method used. Interestingly, one respondent indicated they would make an emergency call using social networking tools. Finally, six respondents indicated they use video calling independently.

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>N</th>
<th>Landline</th>
<th>Email</th>
<th>Mobil e calls</th>
<th>SMS</th>
<th>VOIP</th>
<th>Text chat</th>
<th>Video call</th>
<th>Social Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking with close family members</td>
<td>12</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Talking with friends</td>
<td>13</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Ordering home delivery such as pizza</td>
<td>11</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Booking a taxi</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Speaking with your doctor (GP)</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contacting a call centre with important information</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Making a complaint</td>
<td>11</td>
<td>3</td>
<td>10</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Doing business</td>
<td>11</td>
<td>4</td>
<td>10</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Making a 000 emergency call</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2 - Telecommunication method versus interaction types.

Out of the seven respondents who identify as users of SSR, only four use SSR on a regular basis. Of the SSR users, four reside in the United States and three in Australia. The majority of these users use the service only 1-6 times a year, one uses it monthly and only one uses it daily. Five respondents use more than one type of relay service, whereas three use only one type of relay service.

Table 3 lists the interaction types along with participants’ reported levels of confidence in using their current methods and SSR.
As shown in Table 3, respondents expressed greatest confidence in using their current methods for Talking with friends and Talking to close family members. The highest expressed confidence using SSR, is in Making a 000 emergency call and the lowest are Talking to friends and Speaking with their doctor. However, further analysis of the raw data reveals an unexpected difference between SSR users and non-SSR users, which is not apparent in Table 3. The overall level of confidence median for Making a 000 emergency call using their current method is 3.0 (Somewhat confident). The non-SSR users expressed the same level of confidence in both their current methods and SSR for this type of interaction with a median of 3.0 (Somewhat Confident). However, SSR users differ with a median of 2.0 (Not Confident) for their current methods increasing to a median of 4.0 (Confident) when using SSR.

A third respondent indicated they did not use a landline, but they would make emergency calls by landline, email, SMS or social networking sites. It is unclear whether this is making a call directly to emergency services or if it is indirect contact, for example putting a message on a social networking site for emergency assistance. A respondent highlighted the need for an SMS emergency service by stating, “If I'm out I can't text 000 on my mobile.”

**User Perspective of a Video-Assisted Speech-to-Speech Relay**

This section addresses the second research question and presents the data regarding the respondents’ use of VOIP and their perspectives of a VAS.

The survey data relating to Using VoIP Features reveals:

- eight respondents use VOIP to make calls to family and friends
- the voice capability is useful for nine respondents
- nine respondents prefer to use VoIP than a landline
- none of the respondents disagree it is useful for their communication partner to see them while they are communicating
- ten respondents indicated the instant messaging feature was useful for overcoming communication breakdowns

The results show that the perceived usefulness of VAS in all the interaction types is high with a rating of Useful to Very Useful. However, the three interaction types perceived as least useful are Talking with close family members, Talk with friends and Doing business, each

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**Table 3 - Confidence in using current access methods and SSR.**

<table>
<thead>
<tr>
<th>Interaction type</th>
<th>Current Methods</th>
<th>Using SSR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>x</td>
</tr>
<tr>
<td>Talking with close family members</td>
<td>13</td>
<td>4.0</td>
</tr>
<tr>
<td>Talking with friends</td>
<td>13</td>
<td>5.0</td>
</tr>
<tr>
<td>Ordering home delivery such as pizza</td>
<td>13</td>
<td>2.0</td>
</tr>
<tr>
<td>Booking a taxi</td>
<td>13</td>
<td>2.0</td>
</tr>
<tr>
<td>Speaking with your doctor (GP)</td>
<td>13</td>
<td>3.0</td>
</tr>
<tr>
<td>Contacting a call centre with important</td>
<td>12</td>
<td>2.5</td>
</tr>
<tr>
<td>information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a complaint</td>
<td>13</td>
<td>3.0</td>
</tr>
<tr>
<td>Doing business</td>
<td>13</td>
<td>3.0</td>
</tr>
<tr>
<td>Making a 000 emergency call</td>
<td>13</td>
<td>3.0</td>
</tr>
</tbody>
</table>

\(n = \) Number of Responses; \(sd = \) Standard Deviation; \(\bar{x} = \) Median;

Scale: 0 = N/A, 1 = Wouldn't Attempt, 2 = Not Confident, 3 = Somewhat Confident, 4 = Confident, 5 = Very Confident
having a rating of Useful. The respondents perceive the ability to see the Relay Officer and the Relay Officer being able to see them as positive, with ten respondents in agreement. Most respondents would use the instant messaging facility to provide the Relay Officer prepared information for calls. However, only half of the respondents agreed VAS would be faster than their current methods of accessing telecommunications.

**Comparing Telecommunications Access Methods to Types of Call**

The results of the previous two sections have been summarised in Figure 1, including the SSR results to assist in the interpretation. This research considers the reported level of confidence in the use of telecommunications methods and the perceived usefulness of a potential alternative method. The first bar in Figure 1 indicates the median of expressed confidence of respondents in using their current access methods. The second is the median of the respondents’ expressed confidence in using SSR and the third bar shows the median of the perceived usefulness of the respondents in using VAS for the various interaction types. The left axis shows confidence and the right usefulness.

In general, the respondents expressed a higher perception of the usefulness of using VAS in each of the interaction types than their expressed confidence in their current access methods and using SSR. The findings suggest the respondents would be likely to have greater confidence in using their current access methods than using VAS for the interaction types, Talking with close family members and Talking to friends.

![Figure 1 - Comparison of Users' Perceptions of Current Methods, SSR and VAS.](image)

**DISCUSSION**

The findings from this research highlight several issues surrounding the barriers facing people with CCN to accumulate social capital via telecommunications. Respondents indicated they use a number of communication strategies in different interactions, AAC is not always their primary communication method, and they use a range of telecommunications access methods in their communication. This accords with the notion that people choose the communication strategy which will attract the most capital (Bourdieu 1986). The high use of text-based telecommunication in the cohort (e.g. email, SMS and instant messaging) highlights the need for sufficient education to be literate, not just in the traditional sense, but also in the digital sense. Surprisingly, the respondents indicated low usage of SSR and the findings suggest the types of telecommunication the respondents use with familiar communication partners are...
The perceived usefulness of VAS is high for each interaction type, but is lower with family and friends than with unfamiliar communication partners. The large difference between the confidence in SSR and the perceived usefulness of VAS is likely due to the extra modes of communication offered by VAS. The results indicate respondents might use a VAS more frequently than SSR.

The respondents indicated that they use a number of communication strategies and their primary communication method is not always AAC. These findings indicate, as Bourdieu (1986) asserts, that people choose the communication strategy which will attract the most capital. All the respondents in the survey indicated that they have an education greater than secondary education and a degree of digital literacy as they use technology, which is both assistive and mainstream. Digital literacy includes traditional literacy—reading and writing skills—and encompasses the skills required to access and manage online information (Bulfin and North 2007; Poore 2011).

The research assumes familiar communication partners are likely to be family and friends, and the other interaction types in the survey likely to be with unfamiliar communication partners. Thus, as previously noted, people with CCN are more likely to communicate with familiar communication partners (Collier et al. 2010). In light of this, Bourdieu might suggest that being in the same social field they could share a similar habitus with these familiar communication partners enabling easier communication, leading to increased participation in their communities.

Respondents expressed more confidence in using their current methods than using SSR with familiar communication partners. A possible explanation is that when communicating with familiar partners they use an increased variety of communication strategies, which include text-based methods. Respondents expressed a lower level of confidence in communicating with people who are outside their ‘field’ of family and friends, supporting previous research by Collier et al. (2010). Surprisingly, the results of this study suggest respondents are more likely to use landline telephones to communicate with unfamiliar communication partners.

The results seem to suggest the respondents use predominantly text-based telecommunications with familiar communication partners. However, as the survey did not investigate the frequency of use for the various types of telecommunications, it is not possible to ascertain which telecommunications access methods are predominantly used. Therefore, it is possible individuals with CCN use voice-based telecommunications methods more regularly than text-based.

The most recent annual NRS Users Satisfaction Survey revealed that the service overall received a satisfaction level of 92% (ACE 2011), which seems to be in contrast with the findings of this study. However, it is not possible to isolate the satisfaction levels of SSR users since SSR calls makes up a small percentage of total calls made through the NRS. There could be numerous reasons for these findings. Firstly, based on previous experiences and preferences, some respondents’ habitus might not incorporate a disposition towards this type of service; their habitus prompts them to use methods they already find more effective.

The findings suggest the methods available for people with CCN to access these services may not be adequate. Yet, as respondents indicated, they use a variety of text-based telecommunications accessing methods; this highlights the importance of implementing a text-based emergency call service (e.g. an SMS or internet-based emergency service). Furthermore, ACCAN (2011) suggests SSR “has proven to be unreliable, and there are particular concerns regarding making 000 calls, because in times of stress, a user’s speech may become less easily understood”. Contrary to this assertion, and to the researcher’s expectations, the respondents indicated they have little confidence in SSR in their day-to-day use of telecommunications, yet a greater confidence in using SSR to make emergency calls.

For most interaction types, the respondents expressed a higher perception of the usefulness of VAS than both their expressed confidence in their current access methods and using SSR. The perceived usefulness of VAS is high for all interaction types, yet it is slightly lower than ratings of current methods for familiar communication partners. Bourdieu may argue that the
respondents seem to share a similar habitus, which views VAS as an improved communication strategy to assist them to accumulate social and cultural capital. This accumulation of capital provides the respondents with increased social positioning in the fields in which they participate. Therefore, this increases their influence in their own social networks, and potentially assists them in gaining empowerment in their lives.

CONCLUSION

The findings from this study suggest that the respondents predominately use text-based telecommunications with familiar communication partners and have a willingness to embrace new technology. Respondents reported confidence communicating with familiar communication partners, which lowered when interacting with unfamiliar partners. They reported a preference for using their current access method with familiar communication partners, as opposed to using SSR, but for interacting with unfamiliar communication partners they indicated a preference to use landline telephones or email. Furthermore, the study reveals the methods available for people with CCN to access emergency services might not be adequate. The results indicate respondents, in participating and positioning in social fields, might use a VAS more frequently than SSR and this perceived usefulness is likely due to the extra modes of communication offered by VAS.

The research attracted respondents who all indicated having greater than secondary education and expressed confidence in using technology, raising the question of how representative the sample is of the general population of people with CCN. Therefore, the findings of this research are difficult to generalise for the broader population of people with CCN.

The first author acknowledges he has potential bias towards relay services, due to his work with the Australian provider of the National Relay Service, Australian Communication Exchange, as part of the AAC community and as a user of SSR. This potential bias may have inhibited the researcher from analysing and reporting the findings in an objective manner. However, his knowledge and experience of the field could also have enriched the findings of this study.

Further research into telecommunications for people with CCN could include investigation of the usefulness of SSR, as well as the barriers preventing potential users from using SSR, and the effectiveness and usefulness of such a service. In addition, research investigating the role that VAS might play in enhancing the participation of people with CCN in society would shed further light on the potential of VAS. This would in turn assist researchers and therapists determine if such services could be effective in assisting people with CCN to maintain and gain social capital within their various social fields.

ACKNOWLEDGEMENTS

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ENDNOTES

1. Due to the low numbers, the demographic information is reported in a way that avoids easy identification of individual respondents.
Government investment in ubiquitous high-speed broadband, such as the Australian National Broadband Network (NBN) is often seen as putting the cart before the horse, due to the lack of existing applications that can utilise the technology. From a commercialisation perspective, the NBN and its technology is not the innovation; instead it is a platform that enables innovation. Innovators can use the NBN to fundamentally transform existing products and services, or to create new ones. This paper examines two applications: hospital-in-the-home and agricultural water management, representing a sliver of the commercial and social opportunities made possible through broadband infrastructure investment.

INTRODUCTION

A common critique of investment in ubiquitous high-speed broadband is the lack of economically compelling applications that rely on the technology. Similar complaints were levied against the rollout of electricity networks (Tobey 1997, 12). However, it is often hard to imagine possibilities that require subsequent inventions before being realised. The initial domestic application of electricity was lighting, and domestic refrigerators hadn’t even been conceived of. Even by the 1920s, utilities didn’t see domestic uses beyond lighting, and were reluctant to invest in infrastructure to support heavier uses. However, the subsequent century has delivered vast wealth into the home through electrical appliances.

In 2009 the Australian Government announced the National Broadband Network (NBN). The NBN is a $37 billion investment and will provide high-speed broadband via fibre to the premises to 93 percent of the population, with 4 percent to receive wireless and the remaining 3 percent of the Australian population receiving a satellite service (Rudd et al., 2009). In early 2012, Australian Opposition Leader Tony Abbott reconfirmed his desire to scrap the Australian National Broadband Network (NBN) should the Coalition be returned to office. “People don’t need and don’t want to pay more for [the NBN].” Better broadband will be “delivered through market competition” (Abbott, 2012). However, this argument relies on the assumption that a broadband network delivered to those who can afford it at the time when private providers choose to deliver it, rather than a ubiquitous and reliable broadband network delivered to everyone early in the global adoption process, is more valuable to the nation. Just as a wholly private road network would impoverish the nation dramatically, the purpose of this article is to point to the sorts of applications that ubiquitous and reliable broadband networks like the NBN can support, and therefore some of the innovation opportunities for Australian companies.
This paper considers two applications of broadband – hospital-in-the-home and agricultural water management. We have selected these two applications because they rely on a ubiquitous and reliable broadband network. Hospital-in-the-home is not feasible in its most radical form unless there is reliable high-speed broadband to the homes of those who are least likely to buy it – the poor and the elderly. Sensor-web irrigation management requires broadband on farms – places that are generally not attractive to private providers because they represent a very high marginal cost. In both cases, the principal contribution of broadband will be to deliver policy outcomes that are nationally important but unrelated to communications, just like the principal role of roads is to deliver outcomes unrelated to transportation (e.g. providing people with a safe and secure food supply).

Hospital-in-the-home offers the possibility of delivering higher-quality health care at lower cost at a time when an aging population and increasing population densities are putting pressure on the health system. Sensor-web irrigation offers the possibility of saving vast quantities of water and averting salinisation, at a time when climate change and current practices threaten the viability of irrigated agriculture. These solutions are examples of the sorts of social benefits that Australians can expect to leverage from the Commonwealth’s investment in a National Broadband Network. They are also examples of the sorts of innovation opportunities an NBN creates for Australian companies. Over time, we expect that there will be many more. As such, we hope these examples will broaden the discussion about the possibilities of our broadband-enabled future.

HOSPITAL-IN-THE-HOME

Before the modern era, hospitals were principally religious institutions, designed to care for the patient’s spiritual and corporeal needs simultaneously, and often conflating the two. The first modern hospital – one designed to serve medical needs exclusively, and constructed around the needs of physicians and surgeons – was built in the early eighteenth century (Foucault, 1989). It was very much a creation of the modern era. That is, unlike its predecessors, the hospital was based on a Cartesian separation of the (orthogonal) spiritual and corporeal needs of the patient and focused exclusively on the corporeal needs. The understandings of disease and medicine at that time, as well as the technical needs for efficient healthcare delivery, and the ongoing power of medical practitioners vis a vis patients had a strong influence on the architecture of both the hospital itself and the services provided within it. Those influences continue today. Central to that paradigm is the idea of concentrating patients in a small space, so as to maximise the efficient use of medical staff and equipment.

However, the physical concentration of patients has costs. We would like to focus on three. First, hospitals have become incubators for bacteria. The intense concentration of immunocompromised patients means that it is relatively easy for bacteria to jump from individual to individual. This has manifested itself as the proliferation of “super-bugs” – bacteria that resist even our strongest antibiotics. In addition to making hospitals a much riskier place to be, this has dramatically increased the cost of hospital operations because sepsis control has become a major expense. Second, the intense concentration of patients means that hospital staff must meet all the patients’ needs, not just their medical needs. Therefore, hospitals provide a large number of expensive non-medical services, such as food, laundry, and cleaning. Third, from a patient’s perspective, the hospital is not an environment that is particularly conducive to improving health. It is noisy, uncomfortable, and alienating.

Health care costs are expected to rise relative to GDP over the coming decades, with two main factors at play – increased costs in the delivery of medical care through new treatments, and increased servicing of patients as the population ages (Commonwealth of Australia, 2007). The Australian federal government’s contribution to healthcare is expected to increase from 3.8% of GDP in 2006-07 to 7.3% in 2046-47 (Commonwealth of Australia, 2007). If state and private contributions increase proportionately, we can expect health costs to rise to approximately 17% of GDP (from about 9% now and about 3% in the 1970s). It is not clear that this is affordable. The government can contain its costs by moving more of the cost from
the public to the private purse; by rationing access to health care by refusing to authorise expensive but effective new therapies or by restricting budgets; or by facilitating innovation that qualitatively changes the way services are delivered, and hence the price. Of these alternatives, innovation is the most attractive.

When people talk about the use of broadband in medicine, they often refer to telemedicine. Recent examples include video conferencing for remote stroke diagnosis and treatment (Nagao & Yan 2011) and the use of Internet based technologies to deliver cost-effective asthma care (van der Meer et al. 2011). The Australian Government has recognised the importance of high-speed broadband in supporting health care by providing, from July 2011, Medicare rebates for patients in rural, remote and outer metropolitan regions for telehealth consultations with medical specialists (Commonwealth of Australia 2011) and sponsoring extensive telemedicine research and trials (e.g. Commonwealth of Australia 2012). These, however, are basically quantitative changes. They extend access to specialist healthcare to those who live far from the major medical centres. They don't change the overall system for delivering medical care, or its cost basis, in any appreciable way.

There are, however, at least two ways in which broadband technologies can help to fundamentally change the medical system. The first is to use these technologies to reduce days in hospital through continual monitoring and early intervention of at-risk patients. For example, studies of patients with heart failure have found that remote monitoring and early intervention substantially reduces the risk of and cost of rehospitalisation (Seto 2008).

The second, which is our focus, is to provide hospital services in the home. Hospital-in-the-home provides care to patients in the home “that would otherwise need to be delivered within a hospital as an admitted patient” (State of Victoria 2011). The delivery of care to patients in their home can provide an alternative to hospital admission, or opportunity for early discharge. Hospital-in-the-home has been in existence in Victoria since 1994 (State of Victoria 2011). However, with high-speed broadband, new and additional services can be delivered to patients. Most importantly, medical staff can monitor patients’ vital statistics in real-time through broadband connections delivered from the patients’ home. To be effective this requires sufficient upstream capacity. This could be complemented with a high definition video link between the patient and the nursing staff. Such a link could provide communication of equivalent quality to that within the hospital today. The immediacy of video communication might well make up for the loss of direct contact. Nursing and medical staff who visit the patient either on a regular schedule, or when a need arises, would provide the rest of the service.

Hospital-in-the-home offers a number of benefits. These include a reduction in total health cost because there is reduced need for expensive primary care facilities and reduced need for sepsis control. It also shifts cost from the state to the patient because the family provides non-medical services such as food and laundry. Deloitte Access Economics found that, for six diagnostic groups (AR-DRGs), a much more primitive form of Hospital-in-the-home than the one described here saved the government 6-37% compared to inpatient hospitalisation (Deloitte Access Economics 2011). Hospital-in-the-home also increases patient comfort and reduces the chance of infection, especially from anti-biotic resistant bacteria. Important considerations for ensuring the suitability of technology for hospital-in-the-home are the ability to receive data without interruption and the ability for early intervention/follow up should issues occur. Fibre optic networks can deliver high bandwidth both upstream and downstream to the home, supporting continual data transmission along with more intensive uses such as video conferencing for consultations.

However, in order to maximise the use of a hospital-in-the-home service throughout the community, high-speed broadband networks must be ubiquitous, connecting all homes, rich and poor, young and old. The National Broadband Network provides an ideal platform to support the delivery of hospital-in-the-home services. The NBN will provide capacity for both upstream and downstream data transmission to support continued communications in a hospital-in-the-home setting. It also offers the potential for high quality data encryption and security to protect patient confidentiality and maintain the integrity of service. The design of
the NBN equipment, with four access ports available in the customer premises, allows for a various business models to support the delivery of the service. The service provider, such as the local health network, can arrange access through a retail service provider to deliver connectivity, which means that the patient does not need to have an existing Internet contract. The hospital can provide the connection and equipment. With such connections in place, hospital, clinicians and carers have a wider range of treatment options available to manage patient care while lowering overall costs of health care for the economy.

Most interestingly, hospital-in-the-home breaks the nexus between the delivery of high-intensity medical services and the close proximity of all the participants. Consequently, while at the moment, we can only think of it in terms of the replication of existing services in a slightly different form, it actually opens the door for profound innovations in service delivery. Just as we would never have predicted the Internet-enabled television set in 1900, we can’t say with any precision what those innovations might be. However, with the primary drivers of hospital design (the need to concentrate patients) removed, and parallel technological developments, such as the proliferation of cheap robots, many things become possible.

AGRICULTURAL WATER MANAGEMENT

Another application of broadband that has a direct positive impact upon national policy goals is the development of effective data systems to support water management in agriculture. Australia produced agricultural commodities worth $40.1 billion in 2010-11 (Australian Bureau of Statistics 2011). Water is an essential ingredient in agriculture and is vitally important in the production of a range of crops, fruits and vegetables. As the climate warms, the country is expected to become significantly drier, and rainfall more variable. Consequently, effective water management is increasing in importance. However, recent government attempts to develop a coherent plan to manage water in the Murray-Darling basin have been met with various impassioned responses from farmers, communities and environmentalists, with some irrigators resorting to burning the draft report (Smith & du Prezz 2011). Water is a contentious issue in the second driest continent (after Antarctica), increasing the importance of effective management of this finite and variable resource.

Three fundamental realities undermine the efficient use of water in agriculture. First, and most important, it is often very difficult for farmers to know if they are over-watering their crops. Under-watering is generally obvious – the plant wilts. Over-watering however often simply results in more water making its way to the water table – where it can draw up salt. Second, the farmer must be able to get the water to the crops when the crops need water. Given that irrigation systems often extend for miles from the source rivers, this is not a trivial problem. Under current manual systems, water often has to be ordered two weeks in advance, and farmers do not know if they will receive the allocation they have ordered (Saleem et al. 2009). Finally, the amount of water the crops need depends on meteorological conditions -- the temperature, humidity, wind and rain -- along with soil moisture conditions (Saleem et al. 2009).

There are two ways in which information can be used to increase the efficiency of irrigation. The first is to make the distribution system work more efficiently, while the second is to water plants in response to their needs. Both of these are inter-linked. Farmers cannot water plants on demand unless the irrigation system can deliver water on demand (Saleem et al. 2009). These optimised watering systems are not possible without ubiquitous broadband networks to capture data from plants, the soil, the atmosphere, the irrigation system, and satellite observations, allowing the development of integrated systems (Saleem et al. 2009). This can also be in a garden setting, through the use of smart apps to allow gardeners to water effectively at home (University of Melbourne 2011), or through the development of online decision tools to support crop irrigation.

However, managed irrigation techniques cannot only assist stewardship of collective resources. They can also increase crop yields. In a trial of a sensor-web irrigation system, NICTA scientists were able to obtain water savings of 23% from dairy farms (Saleem et al. 2009).
and a 74% increase in the economic productivity of water in horticultural applications (NICTA 2010). If these savings could be scaled up, then given that over 40% of the water usage in the Murray Valley is dairy farming, these savings could provide dramatic environmental and social benefits if realised more generally. Presumably, similar savings can be realised for other high-water use crops in other locations, such as cotton and rice.

Cherries are one crop where economic productivity ($/HA) is critically dependent on the amount and timing of water application. They are a high value crop. However the fruit quality can vary significantly because the crop is very sensitive to water. If the trees don’t receive enough water, the fruit is small. If they receive too much, or receive water at the wrong time, the fruit can split and/or rot, becoming worthless. Key variables for cherry quality and productivity include temperature, soil moisture, humidity, the amount of water on fruit and flowers, and the timing of rain. Ill-timed rain can destroy whole crops.

Consequently, farmers will go to great lengths to protect their crops. It is common for farmers to cover their orchards (at a cost of about $75,000 per hectare) to protect the trees from excess rain, heat and wind. They will also bring in helicopters to blow water off the fruit if they receive heavy rain too close to harvest. Ubiquitous broadband networks support increased data flows providing low cost, and highly effective business intelligence for the farmer’s armoury. They can help the farmer ensure that cherries are kept in optimal conditions, increasing fruit quality and reducing damage, to deliver higher yields. For example, with highly reliable predictive models of rainfall and fruit quality, farmers could determine when to use rain covers on their orchards.

Sensor web technologies currently under development by the CSIRO and NICTA provide the backbone of these effective water management systems. They make it possible for applications to integrate large volumes of local and regional data and therefore enable farmers to better model and act on climate and weather conditions. The data needed comprise macro and micro measurements to ensure optimisation of the system. Long-range weather forecasts, local conditions and local soil moisture content, along with remote sensing and other weather data, and system status information are used to predict future conditions and guide action. For example, a model might integrate local and regional historical data with radar or satellite data to create a rainfall and wind prediction tailored to a particular farm. This could then be combined with local soil moisture data, along with the farmer’s observations on the state of the fruit, to recommend appropriate interventions.

Sensor technologies underpinning water management can be aggregated regionally or nationally to provide up-to-the-date data on water usage and moisture in the environment. Along with saving water through efficient management such a tool will also allow farmers to better plan their water usage in real time, selling or purchasing water entitlements from the market. Such developments will assist the agricultural sector to increase yields and avoid wastage and adverse environmental impacts.

CONCLUSION

This paper has discussed only two applications that make use of high-speed broadband networks. For sensor-web agriculture, much of the value is in the alternative uses of the water that is saved, including just letting it flow down the rivers as environmental flows. For hospital-in-the-home, the costs of hospitalisation for the old and the poor are borne principally by the state. Therefore, the end user may well not have sufficient incentive to connect to a market-supplied broadband network. Without such a connection, the market cannot provide the applications. Because the primary benefits of the applications accrue to the society, rather than to the end user, there is a good chance of a market failure inhibiting early adoption of these applications.

Furthermore, neither application relies just on the speed of a national broadband network to provide these benefits. Hospital-in-the home relies on speed, but also on security, reliability and ubiquity – particularly availability to those who otherwise might not afford it or wouldn’t
demand it. Sensor-web agriculture probably doesn’t need very high network speeds. It does, however, require a ubiquitous and reliable network.

That is not to say that these applications will not, one day, be pervasive. Every major city in the world faces similar pressure on medical costs. Every country with irrigated agriculture has an incentive to improve its efficiency. At the moment, these systems are essentially the playthings of researchers. Within a few years, entrepreneurs will turn them into commercial products.

Hospital-in-the-home will be relatively easy to commercialise since the implementations in all cities will rely on standardised technical infrastructure. Sensor-web agriculture will be more difficult because systems will need to be optimised for each farm, and farmers will need to be trained to maximise their benefits from the system. These difficulties – the lack of software, the need for customisation – represent entrepreneurial opportunities. With a rapid national rollout and the right policy environment, there is a chance these opportunities will be grabbed by Australian companies and sold to the world. Without it, we are likely to be purchasing these services from companies in countries whose governments acted decisively and supportively.

Broadband networks provide a platform for innovation; they are not the key innovation in their own right. By building a National Broadband Network, the potential societal benefits are large. Just as previous infrastructure investments in electricity and roads have led to a transformation of energy and transport, high-speed broadband is doing the same to information, creating new opportunities for the control, monitoring and management of resources across Australia.

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SOME COMMENTS ON PAUL FLETCHER'S ARTICLE ‘BROADBAND: WHAT IS THE PROBLEM TO BE SOLVED, AND IS THE NBN SOLVING IT?’

Wayne Fitzsimmons

The Member for Bradfield has argued well for the Coalition's position on the NBN (Fletcher 2012). I would like to present an alternative perspective on some of the key issues surrounding the NBN implementation. Most importantly I wish to counter some extravagant assertions such as the NBN being 'stupendously expensive and unnecessarily complicated'. I will argue that the nation can and must afford it, and that from the 100,000-foot level, the Coalition approach to the NBN is essentially identical to the existing NBN Co plan; the difference lies in the timeline to full implementation.

INTRODUCTION

The Member for Bradfield has argued well for the Coalition's position on the NBN. I would like to present an alternative perspective on some of the key issues surrounding the NBN implementation. Most importantly I wish to counter some extravagant assertions such as the NBN being 'stupendously expensive and unnecessarily complicated'. I will argue that the nation can and must afford it and that from the 100,000-foot level, the Coalition approach to the NBN is essentially identical to the existing NBN Co plan; the difference lies in the timeline to full implementation.

Just how all of this got started when Labor came to power in 2007 appears to be some source of conjecture as evidenced by the Member for Bradfield's assertions. As an interested citizen, my observations are as follows: In 2007, the government of the day called tenders for a Fibre to the Node (FTTN) – yes a FTTN, broadband network. Our major carrier of the day, Telstra, just happened to 'no bid' with great wringing of hands and many press conferences to explain it all away. Senator Stephen Conroy faced up to this dilemma as the responsible Minister with a visionary solution based on the premise, (I presume) that this market failure demanded that the government step in on a piece of infrastructure that was fundamental to ensuring this great trading nation of ours remained internationally competitive. This is critical, clearly, to ensuring our standard of living we all take for granted, will be sustained over the long term – 50 years?

Unfortunately the arguments from both persuasions are not being articulated well enough for most of us to make an informed decision about which one is best for Australia. I hope this discussion assists those Australians who are interested in ensuring our politicians get it right on the NBN; such a critical piece of national infrastructure deserves nothing less.
A PRIMER ON THE ALTERNATIVES

It would appear that the Coalition argument is that there are huge savings to be made by embracing the FTTN solution. The schema is approximately like this: run fibre from the local exchange to nodes mounted in street hardware so that maximum distance from the node to any household is less than 200m give or take a few metres; then utilise the existing copper pairs and/or Hybrid Fibre Cable (HFC) (currently owned by Telstra but will transition to NBN Co as the NBN is rolled out) to link to each premise (house, office, apartment blocks etc).

The current NBN Co approach is to run fibre from the local exchange right to each premise (house, office or apartment block) – that is, Fibre to the Premise (FTTP). The existing copper pairs and HFC will eventually be de-commissioned and NBN Co is paying Telstra some $11 Billion to withdraw them from service over time.

It goes without saying that the FTTN is substantially cheaper than FTTP in terms of capital costs relating to cabling (digging holes in the ground largely) as it will utilise existing ducting/cable runs to connect node to user. In regard to capital equipment costs, I am unaware of the estimated number of nodes required in the FTTN solution but will concede the capital required to install the nodes could be as low as 25% of the FTTP rollout and certainly will be less than the savings made by not having to dig holes.

However, there are a few other high level considerations that we as consumers need to be aware of, before concluding there would be long-term meaningful savings to be made by the nation by switching architectures. The Coalition's approach is to run FTTN and retain the HFC and existing copper pairs to take advantage of the emerging new capabilities on these two forms of distribution – high speed (but not as fast as optic fibre), lower cost and faster rollout. Further it is not clear what are the costs and complexities of mixing FTTN and FTTP or of the impact on the final transition to FTTP. This clearly will be significant, to say the least. Whilst the capital cost of the equipment in the street cabinets will undoubtedly be lower in cost than running new lines from the local exchange to all premises, determining the lifetime expenses for this option must also include such elements as:

1. Incremental training costs
2. Duplication of sparing
3. Failure rates (given optic fibre is passive and these street cabinets are active) – damage rates due to ‘traffic accidents’, many more points of equipment failure
4. Incremental power consumption (the large green footprint will not thrill lots of citizens)
5. Obsolescence - how long before they all need to be phased out and replaced – 5 years, 20 years?
6. Opportunity costs associated with mixing technologies v uniform equipment and doing FTTP now versus later
7. Price penalties because of purchase volume compromises

SO WHAT ABOUT THE NUMBERS?

So there needs to be some numbers run (Operating Expenses and Capital) to put all of these issues in context and not just sweep them under the carpet as irrelevancies lost in the huge self-evident disparities in the capital cost between the two approaches. I have not quantified these items as I simply don't have the resources, but am just applying some simplistic engineering principles to this situation. And, by the way, architecturally in telecommunications parlance, they are not considered to be different architectures but rather subsets of a common distribution model termed FTTX. In other words, the arguments are about affordability and timelines.

We are told by some that FTTP has never been applied anywhere else in the world. This is not the case, as FTTP has been implemented by Verizon in the US and also in a number of
European and Asian markets, albeit not on a national basis. We also are told that many countries, like Korea and Singapore, have used FTTN architectures and have installed very high speed broadband networks nationally in record time and at a fraction of the cost of the NBN's proposed investment. Again this is not the case from my understanding. Apart from the obvious geographic disparities between these two countries and Australia, my observations after visiting these nations many times over many years, are that (apart from businesses) they are, broadly speaking, densely populated urban communities living in high rise apartment blocks with no rural coverage requirement. FTTP would be totally inappropriate and – as our NBN Co will do here – FTTN for apartments and green fields is the most cost-effective manner of distribution. It really doesn't matter (in the green fields case) whether or not the link from the node to each household is copper, HFC or optical fibre, as I would presume the capital cost of an initial installation would be roughly the same for each. Further it needs to be appreciated that the NBN Implementation Study Report (DBCDE 2010), shows that 25% of the estimated total spend of $43 billion is to provide rural and remote coverage to the 7% of Australia's population residing outside the optical footprint – and the Coalition endorses this approach!

It is generally conceded by FTTN proponents that FTTP performance exceeds FTTN, but that for most of us the reduced performance is not meaningful, at least for the next 10 years. It's self-evident isn't it? No it isn't! Let's agree that looking out five years is reasonable, but no one is able to predict 10 years out with this new world of the Internet. Fifteen years ago 32Kbits/sec was an almost acceptable Internet access speed at home but now no one would seriously consider anything less than 1Mbit/sec. So in five years' time (maybe 10), this nation will have to seriously look at its telecommunications infrastructure once more and plan yet another super high speed network. Capital costs let alone labour costs will hardly have decreased by then, one would have thought.

Based on my anecdotal experience in dealing with Telstra over the last 15 years or so in inner suburban Melbourne, the HFC solution prior to the advent of NBN Co was unreliable, and capacity for downloads once the kids returned home after school was severely diminished – that's a function of the laws of physics so it wasn't Telstra's doing (optical fibre overcomes this fundamental limitation of HFC). I switched to ADSL2 a couple of years back because of these issues and, in general, it has been reliable and satisfactory in terms of download speeds. I still have the cable, of course, for my Foxtel service (the reason it is there in the first place was to deliver cable TV, you may recall) and I was never quite sure why the reliability of the cable TV was substantially better than the cable data service – could it have been the modem, the exchange kit, who knows?

One other obvious comment to make is that, in broad terms, the copper network is old and many would say coming to the end of its technical life (but perhaps not its commercial life!). In my opinion, Telstra have a dream deal with NBN Co – $11 Billion to stop using it! I haven't looked in detail at Telstra's asset register on their balance sheet but I would think that the copper asset is largely written off after 50 years or maybe it's only 40 years?

THE CRUNCH ISSUE

So now we are closing on the real issue – the costs to the nation. One dimension, that I feel is often left out of discussions by all participants in this debate, is the time line for expenditure. We are talking very large numbers (tens of billions of dollars) so normalising over a time horizon is critical in comparing solution costs. NBN Co have set out their version of this very clearly and opened it to very detailed analysis, as they should do as a Commonwealth Government Business Enterprise (for now). As mentioned earlier, 25% of the total spend is for the 7% of the population of our diverse nation who can't get access to a FTTP solution^1 (it will be fixed wireless, or satellite), and the Coalition are supporting this concept also, as I understand it. So now instead of arguing over $37.3 Billion, we are arguing over $30 Billion over – is it five years or 10 years? Let's say it is eight years – that is $3.5 Billion a year, which still sounds like a lot of money. So can Australia afford the FTTP solution?
The ANZ Bank's 2010 Economics & Global Markets Research indicated that over the past 25 years the average investment in Telecommunications in Australia was about 0.5% of GDP, but since 2001 it has dropped to 0.4% of GDP (ANZ Bank 2010). Whilst the NBN Co spend is large, it probably will not account for all of the annual spend on telecomms. Some facts will help in placing these numbers in perspective. The World Bank estimates that Australia's GDP in 2012 will be close to $A1.6 trillion so the data in Table 1 is a reasonable basis for contextual discussions:

<table>
<thead>
<tr>
<th>Avg % of GDP spent on telecomms</th>
<th>National GDP in 2012 $1.6 Trillion/ann</th>
<th>NBN Total Capital spend over 8 years $37.3 Bill</th>
<th>NBN spend as % of telecomms avg spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4%</td>
<td>$6.4 bill/ann</td>
<td>$4.67 Bill/ann</td>
<td>73%</td>
</tr>
<tr>
<td>0.5%</td>
<td>$ 8.0 Bill/ann</td>
<td>$4.67 Bill/ann</td>
<td>58%</td>
</tr>
<tr>
<td>0.6%</td>
<td>$ 9.6 Bill/ann</td>
<td>$4.67 Bill/ann</td>
<td>49%</td>
</tr>
</tbody>
</table>

**Table 1 - Average Spend levels on Telecommunications Infrastructure**

It is true that NBN will increase the average spend over the next eight years but even at 73%, it would appear the nation can well and truly afford it.

The coalition concedes that ultimately FTTP will be the only long-term viable solution to fully exploit the new technologies as they become available. So their argument is that we should increment our way to this ideal over a yet to be defined period. In the interim NBN Co will be instructed to take a hybrid approach and extend the life of the installed copper/HFC etc. In the short term this will be at a much lower cost compared to FTTP and the performance achieved will be satisfactory in terms of ensuring our nation's international competitiveness. If this is how the coalition sees it, then let us have a public debate on the merits of each approach, but remove from the argument that we simply can't afford it – it being FTTP. Several informed sources are suggesting that instead of the FTTP footprint covering 93% of the population, a 85% footprint might be more appropriate – surely these type of alternatives warrant serious analysis and debate, Regardless, each year the FTTP rollout is delayed, the more expensive it will be and potentially Australia will fall further behind the rest of the world.

So whilst we are on about performance, the Coalition is proposing to refer the NBN to our Productivity Commission (PC) to do the cost benefit analysis. Given the coalition is proposing to implement NBN almost identically to Labor's plan only more slowly and with a blend of existing distribution technologies and fibre, surely they must therefore agree the benefits are already evident and the PC will merely articulate and quantify them given Labor has not seen it necessary to do so. Is the Coalition really suggesting this is the rationale for delaying the rollout?

**SO WHY DON'T WE JUST DO IT ONCE AND DO IT RIGHT?**

The challenge before us is not how fast the rollout will go or what are acceptable uptake rates in the early years, rather it is what we do to exploit this wonderful new platform that has such a huge potential for our nation. I, for one, am looking for leadership from our federal politicians to articulate the benefits we can look forward to and how our children will be assured of the legacy they deserve.

**REFERENCES**

ENDNOTES

1. The technologies utilised should be Fibre to 93% of premises (including Greenfields developments), Fixed Wireless to 4% of premises (delivering at least 12Mbps), and Satellite to 3% of premises (NBN Co. 2011).

2. Investment in Australian telecommunications (average 0.5% of GDP) over the past 25 years seems adequate given that in 2001 it scored a B (ANZ Bank 2010). However, since 2001 spending has dropped to an average of only 0.4% of GDP and this has been accompanied by an assessed decline in infrastructure quality. Investment in the National Broadband Network has now begun and this should lead to substantial investment in the sector over the next 8 years that will raise infrastructure quality. US investment has been weak relative to Australia. However, Australia might be expected to invest more as a % of GDP because its population is more concentrated in the major capital cities and the cost to provide telecommunications to regional areas is marginally more expensive.

This paper responds to an earlier paper by Prof. Rodney Tucker, 'Broadband facts, fiction and urban myths' (Tucker 2010), which suggested that many of the criticisms of Australia's NBN superfast broadband project were founded on myths. This paper argues that the 'myths' Prof. Tucker cites are in fact legitimate criticisms.

It points out that there are numerous examples of the benefits of technology being overestimated. For fibre broadband, high penetration in other countries has frequently depended on very aggressive pricing, perhaps because there are still no 'killer apps' that require it. Nor is the simultaneous usage of existing apps likely to add up to a high enough bandwidth requirement to justify fibre, and the rate of growth of domestic data consumption is likely to slow. Moreover, the capabilities of alternative, far cheaper technologies continue to grow rapidly, leaving a diminishing set of cases that actually require expensive fibre to the home.

INTRODUCTION

In August 2010 the Telecommunications Journal of Australia published a paper by Prof. Tucker (Tucker 2010), in which he sought to address a set of 'myths' he said had grown up about the NBN and to provide some basic facts on the topic. The objective of this current article is to provide a response, testing the logic and factual basis of Prof. Tucker's positions, and reviewing how they have stood up to the passage of 18 months since.

OVERLY PESSIMISTIC AND OPTIMISTIC FUTURE-GAZING

Prof. Tucker's paper opens by citing examples of people underestimating future demand for technology. Of course demand for technology can be underestimated – but equally it can be overestimated. That's the problem with the future, it's somewhat uncertain.

For balance with Prof. Tucker's quotes, consider the following:

'Introducing Pioneer LaserDisc. The biggest innovation in television since television'
Pioneer, 1980 (eBay 2012)

'Replacement of the ageing sub-sonic jets used on ranges above 2000 miles, plus an annual growth rate of about 5 per cent, could well require 1500 Concordes and Concorde development aircraft to be in service by the end of the century.'
Sir George Edwards, Chairman, British Aircraft Corporation, 1971 (Valery 1972)

'In the United States, the integrated services digital network (ISDN) is viewed as the ultimate network ... In Europe, where analog technology lags considerably behind that of North America, ISDN is also viewed as a vehicle for leapfrogging into state-of-the-art digital communications and attaining parity in technology and quality of
service with the United States and Canada. That accounts for why, collectively and individually, European countries are so busy planning the early introduction of ISDN services’

Communications News, 1984 (Edwards 1984)

I predict that before the turn of the century Picturephone will ... displace today's means of communication ... the need for many ordinary trips for shopping, for conducting normal business, and for some social purposes should be greatly reduced. As a result, there will be less need for dense population centers. We can even hope to see an end to the continuing increase in city traffic and traffic jams. Picturephone is therefore much more than just another means of communication. It may in fact help solve many social problems’

Julius Molnar, Executive Vice President, Bell Telephone Laboratories, 1969 (Molnar 1969)

Of course laserdiscs, Concorde, ISDN and videophones all worked perfectly well as technologies – they just didn't live up to enthusiasts' expectations in terms of the level of demand. FTTP may live up to its advocates' hopes, but equally it may not, and precisely this risk is a key reason to be cautious about committing now to spending billions of dollars on superfast broadband.

INTERNATIONAL ADOPTION OF FIBRE

In seeking to disprove that NBN is a potential white elephant, Prof. Tucker then says (accurately) that fibre penetration in Australia lags other countries. Of course, just because other countries have already bought a white elephant doesn't prove that the animal you're considering buying isn't also a white elephant.

To put it another way, to see lagging in the fibre-race as a problem is to presume that national competitiveness depends on superfast broadband, which is not by any means a given. In fact, Prof. Tucker goes further, saying fibre is 'the most important infrastructure for the 21st century'. A bold claim indeed to make 10% into the century. More important than, say, fusion power might be?

Prof. Tucker then discusses what's happened in Japan, saying 'as a mature technology, ADSL penetration is now decreasing and it was overtaken by FTTP in 2008'. However, as in many other countries that have achieved meaningful fibre penetration, Japan has had to set fibre prices at similar levels, or indeed below ADSL prices.
Indeed, in a 2009 survey 43% of FTTP users in Japan said one of the reasons they switched was because it was cheaper than alternative technologies (Takita 2011). The transition to fibre is not driven by ADSL being a mature technology (which, as we will see, it is not), but rather by aggressive fibre pricing that may well be loss making (and which bears little resemblance to the price premium assumed by the NBN Corporate Plan).

Prof. Tucker then reports 2010 forecasts from Graham Finnie of Heavy Reading (Finnie 2010), predicting fibre adoption around the world and Australia's relative standing. (Although Prof. Tucker doesn't mention it, this report was paid for by the FTTP Council, a leading pro-fibre lobby group). Again, it presumes the answer to the question, to worry that Australia might lag in forecasts of fibre penetration. Moreover, since Prof. Tucker's paper, Finnie has updated his presentation. Comments in the latest edition (Finnie 2011) include:

- 'Overall forecast down slightly on last year'
- 'Generally very slow progress in Western Europe'
- 'Incumbents, CLECs and munibuilders all missing targets'
- 'Strong trend to higher-speed non-fiber products'
- 'No really compelling application that requires a fiber connection'
- 'Painfully slow new customer acquisition in many countries'

It is particularly striking that work funded by a pro-fibre lobbying group is acknowledging that there are no compelling applications and, presumably in part for this reason, consumers are not interested. This highlights the risk in the presumption that fibre is the inevitable future, since today we simply don't have the applications that would make this so. (For completeness, we should note that Finnie was more optimistic about developments outside the EU, and felt that the leading indicators were positive for fibre).

**HISTORIC GROWTH IN BANDWIDTH, AND PROJECTING FORWARD**

Prof. Tucker next reports the historic growth in available bandwidth. He says 'data rates in the telecommunications network have been growing exponentially for many years. Given the unbridled growth of new and emerging applications that use the Internet, one would have to be very brave or naive to suggest that this growth will suddenly stop'. While no one is...
suggesting it might suddenly stop, there are substantive reasons to believe that the increase in required access speeds may slow significantly.

Past growth in peak per-home usage (which drives access speed needs) has been driven two factors: firstly, by porting ever larger existing media-types onto the Internet – text, then photos, then video (initially standard definition and increasingly HD); and secondly by more simultaneous users per home. Today multiple individuals in a home will be Internet savvy, and WiFi networks enable them all to be online at the same time. However, neither of these trends is infinite.

Firstly, many people's connections today can carry HD video\(^1\). Cable broadband is well capable of this and increasingly so is DSL. Thus the content that would overwhelm today's connections is not anything that is widely available today. If 3D TV becomes widely adopted at home (likely many years away), and sees heavy on-demand use, and if compression does not bring the required bandwidth down to within the ever rising capabilities of copper, then maybe it will be an application that requires fibre. However, even then it is hard to see what the societal case is that justifies subsidising its availability, as with the NBN.

Secondly, the rise of simultaneous use in home must slow once the number of online users per home stops growing, a point we are surely approaching as the Internet becomes ever more widespread and familiar. Of course, the same number of people may spend a greater percentage of their home time online, but there are only so many hours in a day. (Machine-to-machine usage of the Internet will continue to rise, but given that electricity meters and the like are not big watchers of video, their impact on bandwidth is not significant).

It is surely less naïve to take into account the issues above, which suggest a slowing in the growth of peak-bandwidth requirements, rather than simply to assume that historic growth rates will continue in perpetuity?

**Simultaneous usage**

Prof. Tucker then deploys the familiar argument that multiple simultaneous usage will require 100 Mbps, saying "[a] number of high-definition, and perhaps 3D, video signals in a single house, together with some on-line gaming and some telecommuting could easily make large inroads in a 100 Mb/s link".

It is not clear what he means by 'a number', but let us assume three. This means five simultaneous tasks. The average Australian household size is 2.5 people (including small children). Of course there may be larger households that manage this level of simultaneous usage, but even in these it is likely to be a relatively rare scenario. Moreover, since this scenario that supposedly necessitates fibre for all involves four entertainment applications, it is not clear why the general taxpayer should be supporting it. Why should those who live in smaller or less prosperous households be subsidising the on-demand TV and gaming of a large family?

Finally, even this scenario could be readily handled by fibre to the cabinet, far cheaper than the fibre to the premises planned by NBN. Prof. Tucker posits that even more than FTTP's 100 Mbps might be needed because of additional applications such as on-line health monitoring, energy monitoring and home security. On line health monitoring is often low bandwidth (if, for instance, blood pressure or other such readings are being sent back to a health facility), with high bandwidth video needed only occasionally. And of course any such video for, say, a consultation, would represent a sixth person in the house using the Internet at the same time. Energy monitoring is a low bandwidth application, requiring kilobits per second not megabits per second. Home security as an additional simultaneous bandwidth user on top of those already raised by Prof. Tucker is surprising – how much security does a house with six people at home and awake require? (Of course, such security might be needed when they're out, but this bandwidth need cannot be added to gaming, TV and so on, since it takes place at a different time).
Prof. Tucker then moves on to compare wireless to fibre. This includes the entertaining 'artist's impression' of a wireless network delivering 100 Mbps to every home, which shows a cell tower outside almost every house. Clearly this is an artist's impression, not that of a telecoms engineer, because the latter would know that the last thing you do in an area of dense usage is to put base stations on top of a tower. For a variety of technical reasons, it makes much more sense to put them at street level, perhaps attached to the outside of a premises, on a lamp post or similar. For such low power and dense uses, the equipment is in fact quite small, about the size of a box of cereal, and can be easily and discretely located in many locations. Thus the urban blight suggested by the artist's impression is myth-creation rather than myth-busting.

Moreover, in painting this picture Prof. Tucker sets the objective of a network that could deliver 100 Mbps to \textit{all houses simultaneously}. As we have seen, even a single house using 100 Mbps is an unlikely scenario any time soon. That all adjacent houses would each be using 100 Mbps at the same time is even less likely. It is a fundamental principle of telecoms network design that not all users will fully use the network at the same time. It would be vastly wasteful to build the network so that they could, since it is such an extremely improbable event.

This is the principle behind 'contention ratios' – the ratio between the total bandwidth of the Internet access links (be they fibre or DSL or cable) to an aggregation point, and the bandwidth from that aggregation point to the rest of the Internet. Contention ratios for domestic broadband are often in the range of 20:1 to 50:1. In other words, in the former case if all users were to be online simultaneously, they would only get 1/20th of their advertised access link bandwidth. Of course in practice this doesn't happen. At any given point, many are not online, or only need a portion of their bandwidth. Consequently, the contention ratio need not materially degrade perceived performance.

Wireless can take advantage of the same phenomenon. Because one antenna can serve multiple houses, it can provide high bandwidth to each, because for all of them to simultaneously need maximum bandwidth is unlikely. Consequently, Prof. Tucker's suggestion that one antenna per household is required is a significant overstatement.

Prof. Tucker sees wireless and FTTP as complementary: the former providing mobility and the latter high speeds. To an extent this is true, but mobile phones are rapidly becoming a requirement of life. This means that mobile broadband will increasingly be a given for consumers, with fixed broadband at home being seen as incremental expense. While for the foreseeable future it is likely that fixed services will offer faster speeds, consumers may well decide that these extra speeds are not worth the cost. This is certainly the trend in the UK, where of those with broadband, 9.5% have wireless broadband only, up from 4.4% two years ago (Ofcom 2011). To the extent to which Australian consumers go down the same path, this will shrink the addressable market for NBN.

**FTTP AND DSL**

Prof. Tucker dismisses DSL on the basis that delivering 100 Mbps to each home would require a node outside each house, and says that DSL technologies are now mature. Again, Prof. Tucker is more myth creating than myth busting. He includes an (unsourced) chart showing that VDSL2 speeds drop to about 25 Mbps once you are 400m from a node. However, Alcatel recently announced (Spruyt & Vanhastel 2011) that they were achieving speeds of 100 Mbps at distances of 400m (after field trials with a range of European carriers). That the speed at 400m has quadrupled in the less than two years since Prof. Tucker's paper rather suggests that the technology is not quite mature yet. Moreover, if 100 Mbps can be delivered over 400m, then certainly a node is not required outside each house. For a typical Sydney suburb, 800m of street (400m on either side of a node) might have over 100 houses.
One node per 100 houses sounds rather less alarming than one per house, Prof. Tucker's suggestion.

FTTP AND HFC

Prof. Tucker dismisses HFC as an alternative high speed network, saying it is better to have a 'single advanced network rather than multiple networks', which he suggests would be wastefully duplicative. This is puzzling logic – it seems to miss the fact that the HFC network already exists. It is the NBN that is wastefully duplicative, an overbuilding of a perfectly functional existing network, providing similar capabilities. The incremental benefit of building the NBN in cable areas is even slimmer than everywhere else in the country, but the costs are the same.

FTTP AND THE ENVIRONMENT

In making the environmental case for FTTP, Prof. Tucker cites a study by CTC for the City of Seattle (CTC 2009). As we will see, this study had a number of serious flaws, both in its analysis of environmental and its treatment of other issues.

The study claimed that fibre would reduce Seattle's CO$_2$ emissions by 600,000 tonnes per year, the bulk of this benefit coming from reduced traffic congestion due to telecommuting. However, the basis for this calculation is consumer research commissioned by CTC that found that 29% of respondents claimed they needed home broadband of 100 Mbps or more in order to telecommute. This simply does not pass the common sense test – what possible applications for work at home that needed 100 Mbps could 29% of respondents have in mind? This result tells us much more about the dangers of asking survey respondents technical questions regarding Internet speeds than it does about the impact of fast broadband on telecommuting.

The CTC study also takes a completely one-sided view of the impact of fibre on CO$_2$ emissions. For instance, it does not mention the increase in emissions caused by teleworkers having to heat or cool homes during the working day that would otherwise be unoccupied.

Prof. Tucker is similarly one-sided. He compares the power consumption of various access networks, with FTTP having low consumption. But the environmental issue with FTTP is not its ongoing power consumption, but rather the fact that it involves substantial construction, which has its own environmental impact, both in the civil works (digging up the roads and so on) and in the manufacture of the necessary fibre. It also requires in-home battery back-up, which also carries an environmental cost. This is not necessarily to argue that these costs overwhelm the benefits – rather it is to make the simple point that one should not suggest (as Prof. Tucker does) that you have disproved a myth that FTTP is environmentally unfriendly simply by saying FTTP has some environmental benefits.

ECONOMIC JUSTIFICATION FOR NBN

Here Prof. Tucker again cites the CTC paper, mentioning the environmental and healthcare benefits CTC forecast for Seattle. As we have seen, the estimate of environmental benefits was on very shaky ground. CTC’s estimate of healthcare benefits is even more questionable.

CTC forecast medical savings of US$600M per annum. This is based on a 30% reduction in the cost of treatment for chronic illness, a figure sourced to research by economist Robert Litan (Litan 2005). However Litan in turn sources the 30% figure to a McKinsey Quarterly article that said: ‘disease-management programs combining a smart mix of technology and operational excellence would let insurers reap net savings of 10 to 30 percent for specific patient groups’ (Adomeit et al 2001). The first point to note is that a 30% upper bound in the McKinsey analysis is used as a midpoint forecast in the CTC report. However, the second more important point is that the McKinsey article dates to 2001. Given the date and the content of the article, it is clear that the mooted savings have nothing to do with superfast
broadband. CTC's sources simply provide no basis whatsoever for its estimate of the healthcare savings due to fibre.²

Prof. Tucker goes on to cite an OECD report (OECD 2009) in favour of the economic benefits of fast broadband. Unfortunately this report too had serious problems. For instance, as Prof. Tucker quotes, this report claimed that 'smart electrical grids ... will require fast communications networks'. This belief seems to have been based on a simple misreading of sources. The OECD report cites a figure of 100 Kbps needed for smart grids. However, this figure (from Flynn 2007) is not a per-household requirement, but rather that for a system of 'several thousand meters'. In practice smart meters have already been installed in millions of homes without making use of fibre.

CONCLUSION

Prof. Tucker seeks to position some of the criticisms of NBN as myths. However, these criticisms seem to have rather more validity than he has credited them with. Indeed, some of them look stronger by the day.

FTTP is substantially more expensive than alternate broadband infrastructures. This incremental expense must be justified on the basis of applications that depend on the very fast broadband that only FTTP can deliver. However, advocates for FTTP very often blur the benefits of very fast broadband with the benefits of simple broadband. This is exactly what the OECD and CTC do in the papers Prof. Tucker cites.

What makes this problem worse is that, as we have seen, the capabilities of far cheaper technologies such as fibre-to-the-cabinet are getting ever better. This means that the unique capabilities of FTTP are getting narrower. Consequently, it is an ever-narrower set of applications that must be used to justify the incremental costs. Advocates of FTTP resort to discussing 3D TV and the like. Not only is the level of consumer demand for such services highly speculative at this stage, it is hard to see that there is a case for subsidising them out of general taxation – these are not services with 'externalities', benefits to the wider community beyond those directly using them.

The NBN is an expensive project involving a substantial restructuring of the telecoms industry. It is also an experiment, in that no other government in the world has intervened on this scale. None of these features of NBN prove that it is a bad idea. However, it suggests there is a high burden of proof on those advocating this path, and conversely says that it may be rash to dismiss criticisms as myths.

REFERENCES


ENDNOTES

1. Though congestion elsewhere in the network may make it impractical, a problem FTTP won’t solve.

2. Though because of the statistics of small versus large numbers, a 20:1 contention ratio for a small group of households would certainly not be viable.

3. This is a conservative estimate – depending on the layout of the existing copper, the node could theoretically serve all the houses in a circle with a diameter of 800m, not just those on a single street length of 800m.

4. For further discussion of the CTC paper, see Kenny & Kenny 2011.
Mr Kenny and I disagree on many points. In the interest of brevity, I will focus this response on two key issues: the expected growth in demand for high-speed broadband, and the superiority of fibre to the home (FTTH) as a long-term solution to broadband access in urban areas.

**DEMAND FOR HIGH-SPEED BROADBAND**

Cisco regularly publishes detailed growth projections of data on the Internet (CISCO 2011), providing information for different geographic regions and types of service. Averaged across regions and services, Cisco predicts compound annual growth rates on the order of 30-40%. These demand-driven growth rates continue to be exponential and are consistent with the historic data supply-side presented in my paper. There is no suggestion in the Cisco report that the rates of growth will slow significantly.

Australian Bureau of Statistics (ABS) data shows that the total volume of data downloaded in Australia on fixed and wireless access networks from ISP’s with more than 1000 subscribers grew from 192 TB in December 2010 to 274 TB in June 2011 and to 345 TB in December 2011 – an annual increase of more than 50%, which is even higher than suggested by the Cisco projections.

In 2011, the fraction of data downloaded on fixed-line access networks in Australia increased from 91.1% to 93.3% and the fraction downloaded on wireless networks decreased from 8.9% to 6.7%. There are two important conclusions from this. First, the demand for fixed broadband downloads continues to grow rapidly. Secondly, the fraction of data being downloaded on mobile wireless devices is shrinking. The inescapable conclusion form these data is that Australia will need improved fixed line infrastructure that can meet the public’s ever-increasing demands for more data.

**SUPERIORITY OF FTTH**

FTTH provides the only future-proof solution to fixed-line broadband needs. A little more bandwidth can probably be eked out of ADSL and fibre to the node (FTTN) networks. However, only FTTH will be able to keep up with the exponentially-increasing demand for bandwidth. FTTN is essentially a short-term and short-sighted solution. It is initially less expensive to install than FTTH, but the closer to the home the nodes are placed, the smaller the cost difference. The cumulative costs (and embedded energy) associated with incremental upgrades of FTTN to a final FTTH solution will be larger than for a one-time FTTH rollout.

Some of my colleagues and I recently published a paper (Ayre et al 2012) in this journal, in which we reported a detailed technical analysis of the capabilities of wireless broadband access in rural, suburban, and urban areas. Our study confirms the conclusion in my original article that the only way to achieve wireless broadband in urban areas is to use very small cell sizes, with multiple wireless base stations in each street, and with all base stations fed by fibre.
Many wireless service providers are becoming frustrated by the lack of fibre backhaul to locations where new base stations are required. In this context, a number of equipment vendors are now offering gigabit passive optical network (GPON) fibre backhaul for picocells, nanocells and femtocells in 3G and 4G systems as well as in WiFi systems. In fact, GPON, in FTTH networks, is emerging as a key enabler of future wireless broadband networks. FTTN networks cannot provide the connectivity required for these applications, particularly in Australia, where there are relatively few available unused copper pairs in the access network. Ubiquitous fibre-based GPON access networks will therefore become indispensable as backhaul for wireless base stations as well as for bandwidth-hungry fixed-line broadband users. This is likely to have significant positive impact on the long-term commercial viability of FTTH.

REFERENCES


**INTRODUCTION**

This book was published last year, and, given the fast-moving nature of the subject matter, and the thrust and counter-thrust in the litigation and other strategies of copyright holders and software infringers, it is remarkably current. Even in a few years’ time it is likely to provide an excellent background in the way in which ill-suited legal concepts have been taken out of the physical world environment and applied, with limited short term and no long term effect, to the software world. But read the book soon in any case.

The story told clearly and crisply in the book is of the attempts by courts in the United States, the UK, Canada and Australia to come to grips with the challenge of balancing the interests of rights holders against the innovation and other values that might be represented by developers of infringing peer-to-peer (P2P) distribution software on the Internet.

The code wars referred to in the title are of recent origin and only go back to the turn of this century – effectively a decade. But the legal concepts that were applied by the courts have much longer lineage than that.

Of course the interest of rights holders is not to pursue individual copyright infringers who download content illegally from the net but to attack the source of the problem – the P2P software developers and distributors who create the means for mass infringement in the first place. The problem is that the legal tools are, as Giblin calls them, 'physical world' tools that were developed by the courts in vastly different technological circumstances, long before the Internet and an alternative software world were imagined.

In the United States the various doctrines of secondary liability (contributory liability, vicarious liability, and, arguably, inducement) were deployed for the task. In the UK, Canada and Australia the emphasis was on the concept of authorisation of an infringement. Primary liability for copyright infringement is with the actual downloader and user. The real culprits were seen to be the code developers and distributors, who, apart from culpability might also be assumed to have a commercial interest in encouraging infringement to attract advertising or other fee revenue. The idea was to protect copyright by pinning secondary liability on such culprits.

Giblin very thoroughly describes the 1984 *Sony* case\(^1\), in which the United States Supreme Court was divided on the rules to apply from the physical world context. The plaintiff and other rights holders were concerned that the Sony Betamax product might be used for copyright infringing activities such as recording and time shifting\(^2\). In the event Sony was...
held to be not liable. The importance of the case was that a whole range of criteria were applied to drive various tests of secondary liability, all of which reaffirmed the applicability of the physical world assumptions subsequently applied to P2P infringing software liability in cases such as Napster, Aimster and Grokster. Sony was not a software case. The Betamax was a player/recorder – a physical product that could be used for many purposes, not all of which would be copyright infringing.

However the case established the basis on which early P2P infringement secondary liability cases were analysed and decided in the first half of the last decade in the United States.

The physical world elements that were assumed, on Giblin's analysis, are:

- That products and services with copyright infringement potential (or even primary purpose) were assumed to require substantial investment and development effort;
- That as a result of the investment, a business model would exist for a commercial return on that investment – with a profit motive clearly apparent;
- That gatekeepers exist that are central to the distribution and infringement process and are accessible for legal accountability.

Giblin is very interesting and detailed in her descriptions of the nature of the software developed by Napster, Aimster and Grokster associates and how it evolved to minimise risk of liability as the case law unfolded. In particular she describes very well how the problem of a central site, and continuing possibilities for intervention and control in the case of Napster, were addressed by the distributed file-sharing technologies employed in Grokster and other FastTrack P2P protocols. Some reference is made to the people behind the developments and the circumstances of their involvement. The story is not dry and purely legal. But most importantly – and this is Giblin's central thesis – she demonstrates how inadequate the legal framework based on physical world paradigms is for dealing with P2P software infringement. The uncertainty of the courts and their development of new versions of older concepts – such as the concept of liability based on inducement in Grokster – is manifest time and again.

All of the assumptions outlined in the dot points above proved to be wrong in the later cases. Software based distribution technology capable of vast infringements can be created cheaply and quickly. Many developers did not have a profit motive, far less a recognisable business model. The investments were limited and not capital intensive in any case. Many involved time by hobbyists. With distributed file management the notion of a gatekeeper was weakened. The notion of a gatekeeper finally disappeared later with Bit Torrent, where the software was (and is) open-sourced.

2005 is described as the high point in the litigation by the rights holders. They had won in the courts in the United States and Australia. But it was the end of the major action as well because of the realisation that Bit Torrent technology was effectively unassailable by any level of litigation in the courts. Closing down hundreds of sites was inadequate. The software enabled sites to be moved and established or put back into operation within minutes.

So what happens next? Are rights holders interests indefensible in practice? Do we have to accept that they are fair game? Giblin outlines a new approach and ends the book with a useful proposal that builds on a recognition that the courts and the law must develop around software realities rather than physical world analogies. Essentially software such as Bit Torrent is a very efficient distribution protocol that can serve many purposes, not all of which are necessarily copyright infringing, and, being open source, it can and does encourage innovation across a wide front. In these circumstances Giblin proposes a more cooperative model based on a different strand of legal thinking – a reasonable alternative design test, drawn from the law of product liability. It would be unfair to attempt to set out here the details that Giblin has provided on this approach. On the other hand, her book is not intended to have a surprise twist at the end like a detective novel, so some reference is appropriate.
The approach she favours is based on the notion that liability for rights infringement should only attach if a court determines whether it was practicable for a defendant to create and retain a technical and contractual ability to update its software product post-distribution to make it safer in the future. If not, then liability results only if at the outset there was a reasonable alternative design that could have reduced foreseeable risks of harm. But if there is a continuing ability to update distributed software to reduce the risks of infringement, then liability would depend on whether or not a defendant took reasonable action to do so.

This approach has advantages of not seeking to show actual or constructive knowledge on the part of defendants of infringements by software users (downloaders). It avoids the almost impossible calculus of infringing and non-infringing uses, including future uses. It avoids the whole issue of intent and motive, which has to be inferred from behaviour. It avoids concern about the indicia of control and whether any residual controls rest with a defendant. All of these issues are problematic. They are matters that weighed heavily in the law before Sony and were carried forward in an uncertain way in that case.

Giblin recognises that her suggested approach is not without challenges. Not the least of these challenges is that the issues associated with legal certainty will not disappear overnight. Case law or legislation will be needed to provide a framework of certainty where none exists at present.

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ENDNOTES

1. Sony Corporation of America v Universal City Studios, 464 US 417 (Supreme Court, 1984)

2. In the event the Court determined that time-shifting was not an infringing use of the product.

3. A&M Records Inc v Napster Inc, 239 F Supp 3d 1004 (9th Circuit 2001)


5. MGM Studios Inc v Grockster Ltd, 259 F Supp 2d 1029 (CD Cal 2003)

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