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Captioned by: Bernadette McGoldrick & Kasey Allen

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ANDREW WILLIAMS: So, if Gareth and the panel can get organised, we'll probably take a minute or so.

GARETH DOWNING: Hello. Thank you. Is this working? Yes. Excellent. Great. For those of you who haven't met me, I'm Gareth Downing, ACCAN Deputy CEO. I'm very glad to kick off this panel, which is focused in on risk and resilience. The genesis of this particular panel really flows from a critical piece of work being undertaken by the Australian National University on communications risk and resilience, and unfortunately I have to regret to inform you all that, unfortunately, Dr Huon Curtis is unable to join us today, so he will not be giving an overview of that. I will attempt to give a very brief overview in his absence. But broadly speaking, that project is really focused on undertaking for Australia the first-ever holistic review of risk and resilience in the communications sector. That will produce the first Risk and Resilience Sector profile for Australia, so that's gonna cover everything from space issues, submarine cables, fires, floods, natural disasters, cyber, you name it - if it's a risk, it's gonna be in there. And I sit as part of the expert panel, and I'm joined by some of the other individuals on this panel who are also expert panel members or, alternatively, have an expertise in risk and resilience within their own organisation. In terms of format, this is a bit of a different one, and really the opportunity is here for each of the members of the panel to introduce themselves, tell you all a little bit about what they're doing - noting that their work is often critical but invisible - and then we'll go into questions. So, the intent is really to give people on the floor the opportunity to ask questions and get feedback from the expert members of my panel. So, I'm just gonna hold it off there and pass to Sanjay to introduce himself.

SANJAY RAI: Good afternoon. Thank you. I'm Sanjay Rai. I'm the technology risk product owner for Telstra. So, that means - and resilience as well. So, that covers anything relating to how do we support the people who operate our technology systems, who support our teams in delivering the services, and making sure they're managing the risk effectively. And so that's my role, but also, because of the impact technology has across the company, I collaborate across the company, reaching out to the various functions, working with them to see how we collectively manage the risk of Telstra and its customers. Because it's really important it's done in a collaborative manner. It's not about we can all do it alone, and I guess across the room, I look around, it has to be a team effort to really have risk management and resilience across product, services and infrastructure.

GARETH DOWNING: Thanks. And I will throw to Cameron.

CAMERON SCOTT: Thank you. My name is Cameron Scott. I'm the National Emergency Manager for the NBN. Basically, that role entails developing our internal capability to respond to all sorts of mass disruption events, so no matter what the cause, really, it comes to me if it's impacting customers at the end. And I also manage our interface into emergency services and government. So, we have a program where we have about 60 to 80-odd emergency management liaison officers, who are in other roles in the business but are positioned around the country, and those people become our interface into those local or district or state emergency management groups when they stand up so that we have a single source of truth in and out of those emergency groups. And to make sure that what we're doing to restore our network in disasters is coordinated with the priorities of the emergency services and

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government.

LUKE COLEMAN: Thank you. My name is Luke Coleman. I'm head of government affairs at Vocus. With the work of the panel on ANU, I have been concentrating my efforts on submarine cable security. Vocus owns and operates a number of submarine cables, including a cable from Perth to Singapore called the Australia-Singapore Cable, a cable from Darwin to Port Hedland called the North-West Cable System, and more recently a cable that connects those two from Port Hedland to the Australia-Singapore Cable, which is a complete system we call the Darwin-Jakarta-Singapore Cable System. And a couple of years ago, we saw one of those submarine cables, the ASC Cable, was cut off the coast of Perth, which raised a number of questions about the ability of Australia's submarine cable protection zone regime to actually protect these cables. Is it worth the paper that it's written on? Do we need to be doing more? In this particular instance, it happened to just be a ship that had dropped its anchor and had cut not only this cable but a number of other cables within a Submarine Cable Protection Zone off Perth. But what would happen if we were in a conflict situation or there was a malicious actor that actively wanted to go and cut those cables? If we can take off almost the entirety of Australia's capacity off the west coast by accident, imagine what you could do if you were a deliberate actor trying to do that. So, that's been a lot of the discussion that's been had as part of this ANU policy design process, feeding into the Department of Communications and Home Affairs, which hopefully we can talk a bit more about. The other real interest that I have is in low Earth orbit satellites. Working with Starlink is currently the only provider, but there are a number of other providers hot on its heels, such as Telesat, Amazon, Kuiper, OneWeb as well, and I think there's a real opportunity for LEOS to

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change the disaster response in regional areas where connectivity options are limited at the best of times, but during natural disasters, when terrestrial networks, fibre optic networks have been affected by natural disasters, that these LEO satellites provide a complete step-change in the experience from traditional satellites in the ability of emergency services operators to stay connected both with themselves in communicating, but also for communities to stay connected, when often they might have fallen back to be reliant on traditional radio services as the only kind of comms that might be stood up if telecoms has gone down. That's a couple of areas of interest for me in risk and resilience. Thanks for having me here.

GARETH DOWNING: Please, go ahead.

DAVID HAIGH: My name is David Haigh, head of field operations for Optus. I operate a team across Australia for the break-fix for all the mobile network for Optus, as well as the fibre optic network and all the exchanges and hub sites, as well as two cable stations - one not far from here and one on the Northern Beaches. It feeds 80% of Australia's internet across the Pacific. We operate those stations as well. I back Luke up on everything he said there. As well as that, I have been in the Rural Fire Service since I have been 16 years old, so for quite a while. And only took a break from that when I went over and spent some time in the United States doing a similar role, dealing with a lot more range of disasters, from tornadoes to riots in St Louis, to ice storms, floods, to everything. So, yeah, it's an interesting career path, but, anyway, that's my role. Thanks.

GARETH DOWNING: Yeah, thanks, everyone, for introducing yourselves

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and your backgrounds. I'm gonna throw an open question to the panel just to kick things off. Obviously, there's been a lot of natural disasters over the last few years - flooding, fires - what do you think we've learned from the last few years of disasters and what are we implementing? Where are your organisations looking to make changes and make positive changes to address emerging risks as we go into the disaster season? Noting the smog this morning from back-burning. I might throw that one to you, David.

DAVID HAIGH: Back to me again. It's been an interesting few years, from fires to floods. So, since the 2019-2020 fires, we've implemented several different programs. First off, we kicked off a study with the CSIRO and did a study on how our shelters were impacted from fires. We wanted to understand how they were impacted and what we could do as an organisation to prevent further impact. So, we've come up with a bunch of recommendations from the CSIRO. We've got a pilot program out there, around 40 sites have already been, I guess, adjusted with some new technology stopping embers getting in certain locations, trying to make them more fire-resilient. I say "try" because just on the RFS side of things, there's only so much you can do if there's a fire with radiant heat within 20m, you know, it may not do enough. But from the study we performed, a lot of the shelters could have been prevented if we had implemented some measures there.

Outside of that, we do some modelling. We've actually done some modelling over the past few years, floods and fire, and as part of the CSIRO program as to which sites we need to look at backing up resilient power. As part of the, I guess, the studies since, the Bushfire Inquiry, et cetera, 88% of telcos' sites were impacted by loss of power, not actual bushfire damage. So, we've implemented a program to put fixed

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generators out at selected sites. We selected sites based on certain criteria. One down a bush track where we're not going to send RF crews due to danger or trees coming down due to a storm. Or we look at other areas where we have a town, it's the only mobile service in that town, maybe just Optus or it's our only site in town, we'll go and put it at that site. If we've got overlapping coverage and we know that another site is on a building away from fires and floods, and we know there's a generator already there, we may steer away from covering that site as well because there's only so many generators we can put out there. On the flood side of things, just over the last few years, we've done some modelling. I live out in the north-west part of Sydney, the Hawkesbury, so I know how to do flood modelling out there. We've modelled different locations we can put fixed generators to make sure, when access is cut off and they turn the power off proactively so the network doesn't get impacted in a negative way on the power front that, we can keep those sites up. We do try and proactively put portable generators there today, but when we've got 40 or 50 sites being told they're gonna cut off power within four hours, there's only limited resources. So, we model those the best we can. We also have hub sites, where a lot of these sites go back to, and that hub site has to stay up to keep the other sites more resilient - well, not resilient, but up as well. So, I know I'm going to go down probably another question path here. We also developed an item called a CPX, which is a critical power extender. I will make it simple for you. When a couple of mobile sites bounce through some hub sites, we need to keep that transmission up to have those four or five dependencies up and running. If that site goes down, the other five sites go down. What we've implemented is a power system that can keep the transmission up and running at that site. We may lose RF coverage, unfortunately, and hopefully we've got some overlapping coverage, which we always try and

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map out. But we try and keep that, I guess, transmission path back so the five dependencies still stay up and running. And the reason why we can do that is about 90% of the power at a site consumed is by the radio and talking to the mobile phones, et cetera. We only need a small amount to keep the transmission back haul going. There's a quick snapshot of what Optus has been doing.

GARETH DOWNING: Yeah, thanks for that. I think it picks up on a point that we were probably talking to quite a lot last week, which is how much advancement there has been in technology to improve risk and really improve resilience in communities. I mean, I'm tempted to ask about COWs, but that's (indistinct) for those not familiar with them. But obviously the advancements that Luke has raised with respect to satellite are obviously very promising. I suppose that, in and of itself, raises a separate question, which is, you know, with each of these new technologies - and maybe this is one for Sanjay - that also creates its own product risk. So, if we end up in a situation where we have satellite services and we're using them for reliance, you know, to improve resilience, there are then challenges associated with that, whether there's a lack of sovereign capability, but happy to throw that one to the panel and then maybe move to some questions from the floor.

LUKE COLEMAN: Can I jump on that one? First of all, just to follow up on the disaster resilience point, let's talk about LEOS for a minute. I would like to address that sovereignty point which comes up with low Earth orbit satellites. One of the great things that LEOS enables in disaster response situations - "enables" might be too strong a word. Certainly, LEOS improve the backhaul capacity and employable technologies in disaster response beyond what geosatellites might have been able to previously

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provide. Technology which Vocus has done live demonstrations of with various state Rural Fire Service bodies over the last year has been what we call a mobile network in the sky, where we have an industrial-grade drone, which is typically used for movie-making, that they'll attach cameras to these drones, so they can lift about 20kg. We've attached a small-scale LTE base station to the drone. Which has a cable connected to it for both power and fibre optic for communications. The drone can fly about 100m into the air. And it can stay there, virtually indefinitely because it is powered by the ground. Now, in a real-world situation, you would probably put it up for the day, you wouldn't leave it up there forever, but technically it's capable of that. And then on the ground it's connected both to a power supply through a generator or battery backup unit, and a Starlink ground station terminal. So, what that enables is - you mentioned a moment ago COWs or MEOWs is the one we hear about - mobile exchanges on wheels - that to have a COW or a MEOW set up in a disaster recovery situation, you might have an antenna of maybe 8m in height that's mounted to the back of a trailer, and that might give you coverage of a few hundred metres, which in disaster response is brilliant, and so as soon as there's a fire, you know, I'm sure that you always get a call, "How soon can you roll out a COW and get it to us so we can get coverage back up?" The beauty of this solution that we have been demonstrating is that, whereas a COW might give you coverage of a few hundred metres, having a drone a hundred metres in the air provides you coverage of 10-20km, which is an absolute game-changer, if you've got vast coverage requirements. The other beauty of that solution is it can be put in three or four boxes of about 25kg each. So, two people in a single 4-wheel drive can get to places that might otherwise be inaccessible, if roads have been cut off by floods or bushfires, that it's difficult to get a trailer out to, and two people can set up this network and

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have it operational in about 30 minutes.

It gets around the problem that you have of latency with traditional satellites, that would typically have 600 milliseconds latency. It provides more coverage, as I've just mentioned. And it avoids that issue of having to get a trailer through what otherwise might be an inaccessible road. So, there are some great, innovative technologies. This isn't a sales pitch but mainly to illustrate that LEOS and things like drones provide a complete game-changer when it comes to disaster response for emergency services operators. If I can do a little switch and move to your point about sovereignty of LEOS satellites. I think this is a legitimate question to ask - should we be concerned that LEOS operators are always overseas-based? There's no Australian operator. And the affect that has on sovereignty. I would counter the view that Australia needs to build its own sovereign LEO satellite network. LEO satellite networks, unlike traditional satellites, are, by definition, global in nature. You can't put a LEO fleet just above Australia because the network design, these things are spinning around the world at very, very high speeds, and so they will always be providing coverage to other parts of the world rather than just Australia. So, if you did build a sovereign fleet, they are going to be spending the majority of their time not serving Australia. Now, that's not necessarily a problem. But the fact is they are global and there is an advantage to having these global networks. The other part is, if the ground infrastructure of those LEO satellites are being operated by a sovereign Australian company that provides fibre backhaul to them, that either owns or operates the ground stations in Australia, so much of what LEOS do and the technical wizardry that they perform actually occurs on the ground rather than in the sky. And so I would say that there is a middle ground to be found on the question of sovereignty with LEOS, that if you can have a LEO network in the sky that is supported by sovereign

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operators on the ground, sovereign networks on the ground, regulated by Australian regulators to Australian standards, then it may not completely solve the question of having a sovereign LEO fleet. But it certainly nullifies a lot of the issues that people might raise, or concerns, about why we wouldn't have a sovereign LEO network.

GARETH DOWNING: Yeah. Thanks. On that point - oh, did you want to say something, Cameron?

CAMERON SCOTT: I just wanted to touch on, you're sort of talking about improvements. You know, since some of the larger events. And I think going back to coordination amongst agencies, there's been a massive shift and it's only going to continue in terms of data sharing, things like that. So, there's been a big program over the last few years from NBN's behalf, and I know the other carriers are doing similar, to be providing better data to emergency services and government around where our sites are, which helps right through integrated emergency planning, right down to the local level, where they can actually understand where critical assets are. There's been a lot of work done between sectors. So, I think everyone understands there's a huge interdependency between the power providers and the telcos. David mentioned before - and we're in exactly the same boat - that in 2019-20 season that everyone talks about, it was about 88-89% of outages were due just to loss of power, not actually loss of infrastructure. So, there has been a lot of work happening again between telcos and power providers in terms of better data-sharing, but also just better coordination of restoration efforts. So, if we can understand and dovetail our restoration efforts in with power providers, you actually see a better result at the other end in terms of restoration time. So, you don't have resources being wasted, for example, where a

carrier goes and deploys a generator somewhere, just as that generator gets there, that site gets the power mains restored, that could have gone somewhere else, which is due to be restored further down the track. So, things like that. Data sharing, and real-time information-sharing is critical. One thing that is a constant challenge for us, I think, is how we look at risk. So, historically, people look at risk, we look at the historical record, and base our network design and other things on the historical record. We have seen over the last few years that events have routinely surpassed the historical record. So, we need to be thinking about how we design our networks and then how we make those resilient in a constantly changing landscape that we face now.

SANJAY RAI: Yeah, I agree with all that has been said because I think, as Cameron touched on, the challenges are similar. And there's a lot that's happened since the last natural disaster, big one, which was the bushfires in 2019-20, and there's been a lot more collaboration with energy providers, a lot more to be done, but I think it's good progress. But sharing information, because in addition to what was just said, it's also that if we have advanced information of where the power is going to be restored, or vice versa, if we can influence where the power should be restored first - if possible - and because the mobile coverage, for example, from the base stations that then go live, would provide much larger coverage. It's that close working and understanding. Because at the end of the day, the intent is to give the consumers, the customers, that service. I think that's the key intent. And when they're using the service, to make sure that they are protected. So, I think we talked about scam calls in the morning a lot of work done in relation to scam-blocking. Millions of scam calls that have been blocked. And in a situation where there's a natural disaster, when we're all emotionally in a different state,

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much more exposed to these scammers. So, any work that's done on blocking scams, making sure we are blocking fraud and the work Telstra has been doing with the Commonwealth Bank - we have launched a scam indicator using artificial intelligence, and using data but making sure customer data is kept private. So, anything we share between the banks is just ones and zeros. But what that shows is if there's a scammer calling you and they say, "There's a transaction happening." Sorry, what the bank thinks is a scam transaction and they send a message. And we can provide some indicators to say, "Yes, this looks like one." They can correlate that data with their own data to say, "OK, there is a scam." So, I think the work to do is really think - is in addition to what's been said. That's that technology can make things happen. But at the end, what can we do more to help the people on the ground? And things like, OK, we have done this where it's possible, is where we have got emergency coordination centres, we try and increase the bandwidth coverage, available for calls. Because typically these smaller towns allow for smaller bandwidth. But a lot of emergency services are using that, the contact centre, a lot of people there, you need to increase the bandwidth. Where possible, we do that. That's best effort. These are the kind of things if we think about how as an industry, across the sector, regulators, we can collaborate to make this happen. Because from a Telstra perspective, we got coverage right across the country, 99.6% of the population. So, I think a lot more regional coverage where we have to cater for, and it's really close working with other operators, energy providers, the emergency services, that makes it happen.

GARETH DOWNING: Thank you. And thanks, everyone, for providing that overview. I think it's a really good overview of the broad cross section of issues that have been engaged with in this project. I agree with you. I

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think a sovereign Australian capability is probably not feasible, and the satellite industry as a global industry does also provide a measure of resilience through that because there are now operators who are emerging across the world. On that note, I might throw open to questions from the floor, if there are any questions. I see a few hands already raised. Thank you. Yes, we'll start with Chris Dodds.

CHRIS DODDS: I found the presentations really interesting, focused on technology responses. And I think - and I'm interested to hear whether your organisations have thought about preventative responses. In other words, taking a much more public stand in terms of your corporate responsibilities to the nation, to the citizens, around the cause of the extreme events that are costing your organisations and customers large amounts of money? I.e., climate change. For a long time, the only voices from the business community around climate change have been those voices with a vested interest in continuing to produce carbon. And yet your industry - and a range of other industries, the insurance industry, for example - are adversely affected by the continued mining of coal and gas. And the terrible consequences. I am 70 now, so I'm not gonna live with them, but my grandkids are, and your organisations are going to live with terrible things. So, what are your organisations doing about actually trying to balance the conversation around climate change and the business community?

LUKE COLEMAN: I'm happy to have a first crack at that, if you like. Great question. All telcos, whenever there is a natural disaster, really do feel the brunt of the effects of climate change. Speaking on behalf of Vocus, we announced last year our commitment to get to net zero in coming years. It was a really interesting process because, going through that, we

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engaged a consultancy firm that reviewed where our energy usage comes from. The telecommunications network we operate only contributed a very, very small amount to our overall carbon footprint. The vast majority of our energy use is in data centres and co-location facilities. And I think your point is very valid. Looking at how much of what we use, the applications that we use every day, they live in data centres - the internet lives in data centres. And as things like artificial intelligence push more processing into data centres - and there will inevitably be more built - it's a real question of how do we make sure that those data centres are using sustainable energy sources or are being built on a sustainable basis to reduce their energy usage? So, I can only speak for Vocus on that. We have certainly made our commitment to achieving net zero through a combination of factors. And even for the small amount of energy usage that is in operating our network, which is predominantly what we call our CEVs - our control environmental vaults - think of those like a mini exchange on our intercapital routes. Increasingly, it makes sense for those to be powered by alternative data sources, such as solar, for example. Not only are they resilient if mains power is ever cut out, but as the technology inside those CEVs becomes more energy-efficient and can be powered by solar, that's another thing we're doing to decrease our carbon footprint. Others might want to make their own comments from their own companies' perspective?

SANJAY RAI: Yes. I guess a very good point and I think this is something we are very conscious about at Telstra. Because we are a large consumer operator. It is required for what we do. When you're providing a network across the country, a lot of exchanges, a lot of power being utilised for the switching, routeing, and transmission. However, what we are doing to counter that is making sure we have a commitment to net zero - I can

come back to you on that. But also we are investing on how do we decommission our systems so we become more efficient in the use of power? So, basically, that means rather than having four racks of servers runs, we have one which is... Or we use the capability that's provided by the hyper-scalers, who are more efficient at utilising the computer storage capability, capacities, and we move more applications to cloud. So, we've got a commitment to move more applications to the cloud, 90% of our applications. Also, we have invested in farms, energy and wind farms and solar farms to offset our carbon footprint. So, there's a strong focus right from the CEO downwards, and we have got a team which is all about sustainability, to focus on making sure that we are driving that through the company, supporting that externally as we can.

CAMERON SCOTT: Obviously, we have our own sustainability targets and that is about being smarter where you're using power and not powering elements that don't need to be. But it's also leading to innovation. So, particularly in the power resilience space, so just as an example of something that NBN has been rolling out are these hybrid power cubes that are sort of a combination now of battery technology, solar, and the last thing that gets turned on is the generator. And they sit on our fixed wireless sites, so if we lose power, that site will stay up. It's positive from that perspective. It removes a massive health and safety risk for us, when we're potentially trying to send people to deploy generators in either flood-impacted areas or fire-impacted areas. And those can run without intervention for six months. So, I guess with climate change and the pressure on us for sustainability but also to be smart about how we use power, is also leading to innovation. And you'll see all the carriers have sort of been progressing different solutions to that over the last few years. And I think that's just going to continue.

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DAVID HAIGH: I will just touch on Optus' approach. We're in line with Telstra and Vocus as well. We have a sustainability department working through those towards net zero. We've got a trial right now - it's actually not a trial, it's our exchange down in East Burwood, Victoria - that's fully covered in solar panels right now, working through that to see how that can progress us forward towards net zero. Decommissioning equipment, as soon as equipment is not required, we power it down, remove it from service, and take away any carbon emissions from that. Absolutely in lock step with the others as well.

GARETH DOWNING: Thanks for that. I'm aware there are further questions.

VINCE HUMPHREYS: ACCAN board member. I've also got a question that relates to the power issue. And I guess really focusing on the dependency on power supplies and how that gets quite critical when there's some kind of crisis or disaster. I'm conscious that, just as there's innovation in the telecommunications sector, there's also innovation happening in the energy sector as well. And I'm particularly thinking about the innovation around microgrids and community or neighbourhood batteries, both of which Arena is putting a lot of money into co-funding the developments in those respects. I guess my question to the panel is whether any of your companies are looking at making use of those microgrids and community batteries or, indeed, whether, you know, because there's often a co-funding thing, whether you're considering supporting the introduction of microgrids or community batteries that could actually assist your own infrastructure, particularly in those kind of rural and remote areas, where often there's one powerline going into a particular town, when that

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powerline goes down, the microgrid or the community battery can be kicking in to continue the supply of power? Because that's actually often the number one or number two reason why those microgrids and community batteries are established, is to provide resilience in those circumstances. So, yeah, just thinking about whether your companies are thinking about those opportunities?

DAVID HAIGH: I can say you must be reading my inbox. I got an email before I walked in here about microgrids. I can't comment too much further but something we are looking at, so I will take the question on notice. But can't comment much more.

SANJAY RAI: We have been doing work with the community on community, co-funded, community-generated batteries... Sorry, I will start again! Given extensive coverage, I guess we have been working with communities on how we can work with them. Because we are limited by the distances we have to have people travel when replacing batteries, and the power availability. So, we have been working on opportunities where we can have co-funded generators, where the community is actually maintaining the generator, and batteries as well. But I will have to take your question on notice on further details about the microgrids and activities that are happening.

GARETH DOWNING: Yeah, thank you. And on that, I have just come from the energy sector about a year ago, so there is quite a lot of work happening in the regulatory and policy space there as well to enable some of these conversations to take place. So, there is quite a lot happening, I think it's fair to say, across energy and telco to boost resilience. Are there any further questions from the floor? I see Keith. Directly... If Keith could

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raise his hand, it will help... Sorry, thank you.

KEITH: Thank you. This is a question for Luke Coleman. Thanks for raising the issue of the cables. I find it remarkable in this country, there's so much discussion about defence and vulnerabilities, nobody talks about the submarine cables that carry 99% of all our global electronic traffic. Satellites aren't very important, they may be important in future. But right now there's about a dozen cables that carry everything. I was involved in some work looking at this a number of years ago. One of the key vulnerabilities we identified was that Australia possesses no capable repair ships. And in those days, the closest one was based in Singapore. Has that gotten any better or are we still basically at the mercy of a small number of cable repair ships that are, in some cases, weeks' sailing time away from Australia?

LUKE COLEMAN: Great question. And good to see you, Keith. It is something that the work of the ANU Tech Policy Design Centre is looking at very actively. So, I'm encouraged to see that it has the attention of policymakers, although I would like to see it get more than just attention and get some real change and results in the very near future. Before I get to the precise question about the ships themselves, there's a few things that need to be remedied in the Submarine Cable Protection Zone regime to give it some real teeth. So, at the moment, Australia has three Submarine Cable Protection Zones - two off Sydney, one off Perth. Those were put in place almost two decades ago, at a time where there was much less data coming in and much fewer cables coming in. There are now cables going into Darwin - we have seen public announcements of more cables coming into Darwin - we have a cable that lands in Port Hedland. We have - not "we" but there is a cable which lands in

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Maroochydore in Queensland. There have been publicly announced cables going into Melbourne. We have cables going across to Tasmania. All of these do not have the coverage of a Submarine Cable Protection Zone. Now, as we experienced off the coast of Perth almost two years ago, just because there is a Protection Zone, it doesn't necessarily mean that they're protected, of course. And so I would say the second part is, first of all, we should have more Protection Zones and we should have them ASAP. Second of all, it needs to be more than just the threat of a criminal charge against a ship operator, should a cable be cut. That's what the current Protection Zone regime, that's the consequences if a cable is damaged in a Protection Zone. But an active monitoring of shipping activity in Cable Protection Zones, which might be done by a harbour master or another relevant law enforcement authority to play a prevention role, maybe in a storm to warn any ships that might be in a Cable Protection Zone and seeking safe harbour during a storm, not to drop their anchors in the first place. To your question about ships - so, for those of you in the room who might not understand how submarine cable maintenance works, operators do not typically deploy or maintain their own submarine cables. There is a very small number of companies around the world which deploy these cables and many of those same companies also provide maintenance services. So that when a cut occurs, they will send a ship out to bring it up to the surface, splice the fibre back together, and then put it down to the bottom of the ocean. These are typically done as what you might call a buyer's consortium, that a number of cable operators within a certain geographic region will all contribute to the overall cost of cable maintenance. And so there is a region between Perth and Singapore, covering cables in that area. There is a region covering Japan and the Pacific, similarly around in the Atlantic. But Keith's point is really relevant - there is an extremely small number of ships that

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actually perform those duties and they are typically housed in Singapore or other places in the Pacific, so that the time to get to Australia might be a number of months that those cables can be offline. Certainly, in our experience when the ASC Cable was cut, as well as a number of other cables off the coast of Perth, we just got lucky that there happened to be a cable ship that was deploying a new cable - the Oman-Australia Cable - it was 20km away. A complete stroke of luck. And so it stopped what it was doing, it quickly came over and repaired these damaged cables. Now, you can only imagine, if that was a malicious actor that deliberately cut not only those cables but all of the cables, that you would simply not have the shipping resources available to make those repairs. So, I don't come to you with a solution, but I think the problem you've highlighted is one that absolutely deserves the attention of regulators and policymakers. Is the commercial market enough? Are these group buying arrangements sufficient from a national security perspective, knowing how reliant we are today on submarine cables for not only, you know, the internet more generally, but banking transactions, everything else that we do on submarine cables, which is reliant on international connectivity, is something that I think needs urgent attention from policymakers.

GARETH DOWNING: Thank you, I will toss to Ian.

IAN BINNIE: Independent ACCAN member. I have some observations and questions about the reliability of the 000 service. In my 40 years as a telecommunications planner in several different carriers and several different mobile networks, we spent an inordinate amount of time building the reliability of the system. Not just double backed up, quadrupled, or in Telstra's case, it used to have six times' backup to emergency services. The first NBN fibre-to-the-premises installations had batteries to provide

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reliable communications. But all of the network plans so far have relied on the fact that there was a physical wire back to a telephone exchange somewhere, which will continue operating in the event of a power failure. That no longer is the case. Very few NBN services have this. Most are relying on active electronics. And, indeed, an increasing number of our consumers do not even have a fixed telephone service, they're relying on mobile telephone services. My concern is that, when there is a major power failure and these seem to be increasingly common, the base stations which are responsible for providing the access to emergency services for most of their customers do not have adequate battery backup. So, effectively we have no 000 service to most of our customers in the event of an extended power outage.

GARETH DOWNING: Happy to throw that one to NBN! (LAUGHTER) No, no, no! I think it's a very fair question, Ian, and I think, you know, you've probably observed from the panel that there's a lot of engagement with the challenges associated with the new infrastructure arrangements. I think it's fair to say that everybody on this panel is cooperatively working together to try and make sure consumers are informed of that. I know that there's a lot of, you know, challenges and there's been research undertaken by the department on this particular issue. And I think it goes back to something that Chris raised with me earlier, which is the consumer education and consumer communications piece about what will and won't work in a disaster, what we can do collectively as consumers and individuals to engage with disasters and outages in a way that's constructive and useful. I think something that's certainly come out of the discussions that we have been having is there are challenges with power. Radio remains, in many ways, the kind of backbone in natural disaster circumstances. And there's a lot more work that can be done through this

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project with the ANU to get better outcomes for consumers and get power restoration more quickly to address some of these challenges. But I think some of the more fundamental network design questions are a bit difficult to work around after the fact, in many respects. But happy to throw to Cameron.

CAMERON SCOTT: Thank you. Yeah, I think one of the biggest changes with the advent of the NBN was the requirement for power in the end-user premise, basically. I know, having been at NBN now for eight years and doing a lot of talks, particularly in Northern Australia, there was very much a learned behaviour around keep your old phone and you can plug that into the wall and that will still work in a power outage if there's power at the exchange. There's a whole lot of caveats to that. From our perspective, particularly of more recent times, we're very up-front in terms of the public awareness and education around when NBN will and won't work. And I think we've got a few extra complications with variance in technology that we operate as well, which makes the message a little bit more complicated. There are quite a few "it depends" in there that impact how things are gonna operate at your particular premise. You know, in terms of potentially our network may still be operating, but if you've got no power in your premise and no power resilience in your premise, your service is not gonna work - those sort of things. Part of that is being, if we can be as up-front, candid around what is gonna work, what isn't gonna work, and why, that allows people then to make decisions around their particular risk profile and what other telecommunications options may they need. So, for example, it's a completely different scenario if I'm living in the middle of metropolitan Melbourne, potentially, where I can probably rely on the mobile coverage around me as opposed to living in a rural or remote area, where my NBN

connection may be the only thing, and if I think I'm gonna require communications, I need to look at other options. So, I think we've made a real commitment to that public awareness and education campaign, and that's something that's going to continue to help people make those decisions as to what is gonna be appropriate for them.

DAVID: Independent ACCAN member. I have three questions for different panel members. For Luke: How did Elon Musk disrupt Starlink in Ukraine? For David: Nice to hear that you fixed the problems that could have been foreshadowed that would be issues in 2019 and 2020 - what have you done to identify what the risks are that you don't know about from experience? And, Sanjay: You talked about the need for talking closely to the electricity providers. I wasn't quite sure whether the answer to my question - so, if we had a repeat of 2019-20 this year, have you got in place all the communications you require with the electricity supply authorities to ensure that prioritisation of connection that you mentioned?

LUKE COLEMAN: I was asked first, so I will go first. I cannot speak on behalf of another company. I would only say that there has been some clarifications in the media about the circumstances that came up in the news around that, and I would advise you to read the latest commentary on that. But I have no comment on it, on the specifics.

GARETH DOWNING: I'll throw to you, David.

DAVID HAIGH: On the 2019-20 fires, there's a lot been done. We've deployed over 130 fixed generators across a vast amount of Australia on the sites that we have deemed - numerous amounts of models. Where they've got access from fires, floods, you name it. You've gotta start

somewhere. We can't put generators at 3,000 sites all at once. We've used advanced modelling from the CSIRO to work out which sites are gonna be impacted by fires, most likely. We're doing trials on lithium batteries as well, which have a higher capacity. With older lead acid batteries, they take a significant time to charge. Lithium, you can charge really quickly and get to operational level a lot quicker as well. Newer technology we're putting out there at locations. We're taking mobile generators out there ahead of time to put them on site before any disasters even get there. A lot of proactive approaches across numerous areas, floods and fires. We've had to look at multiple approaches, even storms, which is even different as well. East Gippsland, Victoria, got nailed by a few storms. We've had to dissect that one a few times and see how we can better approach it. You know, we've had a few government grants come out, which is absolutely great because a lot of capital investment does take place. So, that's helped fund that. We've got fuel pods as well that we've developed. So, a lot of these generators will run for five to seven days. These fuel pods, you can put externally outside and they'll let them run a significant amount of time longer as well before we have to refuel them as well.

GARETH DOWNING: Yeah, thanks, David. I think picking up on that point about storms as well, that is something that is a major issue in the energy context as well. Going back to that 88% figure, storms are a huge problem in the energy sector because obviously they knock over your poles and wires, and so when I was in the energy sector, that was one of the key issues we were working on, was how do we build up resilience in that space because there's a lot of challenges? And then obviously that impacts on the telco sector. Sanjay, did you want to respond?

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SANJAY RAI: Yes. Following the 2019 bushfires, there was memorandum of understanding between the telcos and the energy providers. Now, to your specific question, have we made as much progress as we would have liked to make? Probably not. But we have made progress, substantial progress. So, for example, in the recent floods in South-East Queensland and NSW, there was very good engagement with energy providers. We were sharing with key points of failure, where they were providing information about where the power restorations were happening. So, it varies. I think we are getting there but we are not there yet.

CAMERON SCOTT: Maybe just to add to that, with the power talk MOU. There's a lot of work being done around APIs and better ways of sharing data. That's happening and it's certainly something NBN is committed to, to really speed up, I guess, and maintain the accuracy of that. But it's also really dependent on relationships. Because what is a priority site for us on a cold day when nothing is happening can be completely different when you're actually in a disaster scenario. So, it's really critical that... And sometimes government or emergency services just say, "Just give us your priority list, 1 to 1,000, and we'll run with that in every disaster." It's gonna be different. So, the most critical thing for this has been establishing those relationships and making sure that the right people can talk to each other in an easier way to actually communicate those changing priorities and making sure that you're just maintaining that open line of communication, yeah, rather than just having some people thinking an exchange of data is just the answer. But it never replaces explanation around consequence and, yeah, understanding that priorities completely change depending on where in your network that you're impacted. And also that input from emergency services around potentially vulnerable communities or other areas that they want us to prioritise

restoration for is gonna change the way that we do our restoration planning as well.

GARETH DOWNING: I just want to... I'm conscious we've hit time and possibly gone over time. I just wanted to thank the panel again for your contributions. I'm sure that they'll be more than happy to answer questions if you bump into them over a coffee later. But thank you again for your participation. And I also wanted to thank the department for funding the ANU research project, which is really an excellent example, I think, of the collaboration that's possible between industry, government, and the consumer sector on some of these emerging and pressing challenges. But on that note, I think I'll wrap up. (APPLAUSE)