On Farm Connectivity Program Discussion Paper: BIRRR Submission 2023

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Introduction

We would like to take this opportunity to thank the Federal government and the Department for the opportunity to comment and for the development of a program that offers producers access to grants to improve connectivity and digital innovation.

Better Internet for Regional, Rural and Remote Australia (BIRRR) welcomes the opportunity to provide input into the design of the On Farm Connectivity Program (the Program). BIRRR understands the Australian Government is introducing the $30 million Program to enable primary producers in agriculture, forestry and/or fisheries to extend connectivity in their fields and take advantage of connected machinery and sensor technology.

The objective of the Program is to improve digital connectivity across a farm, including in the forestry and fisheries sector, by contributing to the cost of a service provider who will provide and install connectivity equipment, and provide some initial training on its use.

The Program will enhance local agricultural productivity by increasing the usage of connected machinery and sensor technology.

BIRRR has advocated strongly for assistance to be provided in extending a connection and believes that a grant alone will not solve the problems of connectivity literacy and the impact it has on producers getting and staying connected. To improve digital adoption the Department must ensure that there is independent and fit for purpose advice on the products and connectivity solutions available under the Program.

Better Internet for Rural Regional and Remote Australia Volunteer Group

The Better Internet for Rural, Regional & Remote Australia (BIRRR) group was founded in 2014 due to a lack of information, advocacy, and support for bush broadband consumers. There are now almost 15,000 active and engaged BIRRR members from every state and territory of Australia. In particular, the BIRRR group includes those that are requiring equitable telecommunications for their regional businesses (including many farmers and producers), telehealth and the education of their children.

BIRRR is a technology agnostic, apolitical and independent volunteer support, advisory, information and advocacy group. Our admin all live in regional areas, are using a variety of connections and have extensive grassroots experience in regional connectivity, none of our admin profit in any way from the telecommunications industry and BIRRR is entirely based on a volunteer model.

Rural, Regional & Remote (RRR) consumers are extremely reliant on effective telecommunications, due to the nature of their geography and vulnerability, and this also heightens the need for effective representation. In an industry that lacks independent advice, advocacy and assistance, BIRRR combines lived experience, regional and industry knowledge to address the barriers to regional Australians in getting connected and staying connected.

BIRRR believes that *"Every Australian, irrespective of where they live or work, should be confident they have the skills, knowledge and infrastructure to access quality, reliable, affordable and equitable voice, and broadband services with consumer support guarantees".*

Connectivity Literacy

While connectivity literacy is not addressed in the Program, it is important to understand that connectivity literacy skills are required to assist producers to clearly understand how the Program will assist them to extend connectivity in their paddocks and take advantage of connected machinery and sensor technology.

Connectivity literacy was first termed by BIRRR Admin, Kristy Sparrow, who has extensive grassroots experience and knowledge in regional telecommunications. *"Connectivity literacy is all of the skills and knowledge needed by a consumer to get connected and stay connected to equitable, affordable and reliable voice and broadband services that meet their needs and budgets".*

It is separate from digital literacy as the skills required to navigate through a choice of providers and technologies, understand terminologies, plans and equipment are different skills than what are needed to physically use a broadband service. BIRRR research demonstrates that connectivity literacy does not have any demographic barriers such as age, gender, location, or education level.

Connectivity illiteracy exists not only at a consumer level but also within local government, industry, state government, telcos and other regional stakeholder groups. Connectivity illiteracy issues have developed in RRR areas due to misinformation/ disinformation, a lack of support and education, procurement processes and poor consumer guarantees as regional Australia has moved from limited providers with a limited choice of technologies and plans, to a patchwork quilt of connectivity, plans, speeds, providers, and technologies. Regional connectivity illiteracy is generated by the vast differences between urban and regional connectivity solutions and exacerbated by vendor driven (see Appendix 3), rather than independent place-based connectivity advice and solutions.

Likewise, new innovative Agtech equipment and equipment used to extend a connection require a consumer to have a specific set of skills to be able to navigate through:

1. What is their problem?

2. What equipment purchase/solution is going to solve their problem?

3. Who sells this solution and if there are multiple different brands or technologies, which one is best for their specific problem?

4. Can they afford the solution that is being offered, does it come with consumer support and warranties, is it good fit for their weather conditions, terrain etc?

Image 1: BIRRR: Beef Producers Word Cloud regarding barriers to Agtech adoption

BIRRR Submission

Program Objective: *Program enables external antennas, repeaters, boosters, sensors and Wi-Fi solutions which extend connectivity and enable agricultural productivity.*

Who is in Scope?

*a) **Primary Producers***

*There are **two options** being considered to establish the eligibility of primary producers to participate in the Program.*

1. *Primary producers such as commercial farmers, fishery and forestry businesses with an EVAO of $40,000 or more are in scope.*
2. *Primary producers located outside UCLs geographical units classified by the ABS as Major Urban with a population of 100,000 people or more.*

Hobby farmers potentially not in scope.

Primary Producers should have to demonstrate their eligibility to participate in the program. BIRRR has outlined several suggestions below in regards to eligibility for the Program.

- BIRRR agrees that **hobby farmers** should **not** be in scope for this Program.
- BIRRR **strongly agrees** that producers already receiving a similar service through a state or territory government program, for example the NSW Government Farms of the Future Program, **should not** be eligible to access the Program.
- BIRRR's **preferred option** for eligibility is: Primary producers such as commercial farmers, fishery and forestry businesses with an EVAO of $40,000 or more are in scope. However it should be stipulated that this income **must** be derived from farming / production enterprises.
- BIRRR suggests that a good hurdle to exclude non-productive enterprises and hobby farmers would be to state that grant recipients may be required to submit information on their farming enterprise as part of a case study analysis.
- Option 2 should not be considered for the Program as there are significant primary producing enterprises surrounding major urban centres such as Canberra, Toowoomba,

Ballarat, Hobart, Darwin, Adelaide, Perth, Geelong, Newcastle, Hawkesberry, Cairns and Bendigo, who would be excluded from the program should the second point be activated.

- Other options:

  1. Size of primary production property

Unless specifically targeting broadacre businesses alone, putting size restrictions on the producer's eligibility will exclude cane growers, horticulture, piggeries and other high value, small acreage applicants. The only other mechanism would be to put different rules for different enterprises and BIRRR would recommend approaching the council of Research Development Corporations should the Department wish to go down this more complex path.

  2. Current connectivity options

BIRRR considered if the Program should initially be targeted to Primary Producers in areas with no mobile coverage and low/poor/unstable mobile coverage. Arguably these producers have a greater need and costs involved to extend a connection are more expensive. However, coverage maps are frequently inaccurate and regional mobile networks are very congested, thus a 'bars on phone' approach would not be reflective of the on the ground experiences and capacity of regional mobile networks for producers.

b) Equipment Service Providers

Companies who sell an agri-business connectivity product service are in scope for this Program. *In effect an eligible company must be able to supply the appropriate equipment and, if required, install the equipment and provide some initial training on its usage.* ***Operation and maintenance costs are out of scope.***

BIRRR recommends that a panel of Agtech experts be established to conduct vigorous assessment of potential suppliers, based on an in depth application process. BIRRR offers several points to consider in regards to suppliers:

- BIRRR agrees that eligible businesses should have an ABN, additionally eligible companies should be able to supply a Directors ID.

- BIRRR agrees that Telecommunications services or internet service providers are not in scope for this Program, unless they have products and installation services tailored to the agricultural sector to improve connectivity for primary producers. For example,some carriers provide mobile boosting equipment and technology and others provide wi-fi solutions.

- BIRRR agrees that 'last mile' connectivity solutions should not be eligible for this Program as other grant programs are better suited, such as the Regional Connectivity Program or the [North Queensland Telecommunications and Energy Improvement (TIEP) Grants](#) .

- If the product being installed requires cabling (LAN cabling etc), then this must be installed by an [ACMA registered cabler](#)

- Suppliers should include those who will cover a wide mix of geographical areas

- Suppliers should offer installation or be able to suggest approved installers of equipment if needed.

- Suppliers **MUST** offer support for the product/equipment to be eligible under the Program. There have been too many instances come across the BIRRR inbox of product vendors supplying equipment that:

    - Has poor support

    - Has limited instructions for installation and use

    - Is not fit for purpose

    - Is too complex, using terminology not understood by producers (see Appendix 4)

    - Does not work in the required location or

    - Does not solve the problem faced by the producer (See Appendix 1)

    It is imperative that eligible companies are able to demonstrate that they can supply, support, offer training and installation of the equipment. If all of these components are not covered the Program risks not meeting its objective of enabling agricultural productivity.

It is important to understand that network extension specialists are usually not technology agnostic and therefore independent advice is difficult to source for producers. BIRRR is concerned that without independent advice specific to each property/solution there is a risk

that equipment purchased for the Program will not solve the specific problems of that individual property (see Appendix 1 as an example). BIRRR suggests exploring the possibility of establishing specific Agtech and connectivity support through each state agricultural department or at least commissioning an independent review into market opportunities for Agtech consultancy and connectivity and digital literacy training. BIRRR is willing to discuss this in further detail with the Department.

What products are in Scope?

The following types of equipment are proposed for funding under the Program:

- *external antennas;*
- *repeaters;*
- *boosters;*
- *sensors; and*
- *Wi-Fi solutions.*

This list is not exhaustive. Input received from this consultation process will help refine the list of eligible equipment. At this stage the Program is not intended to fund the following:

• drones or autonomous vehicles; and

• robotic technology or equipment.

The BIRRR submission has been prepared by numerous producers across Queensland, New South Wales and the Northern Territory, involved in a range of agricultural industries. BIRRR believes that voice communication is the number one priority for producers, followed by SMS and data. Voice and SMS communications have considerable safety benefits to producers as well as aiding in business productivity including communicating with workers, ordering parts, communicating with off-farm agents such as agronomists, stock agents, transport contractors etc. Whereas data is used for sensors, weather monitors, updating software in machinery, security cameras, stock recording, NLIS tags, stock movement permits and more.

A place-based approach to each solution should be encouraged to ensure network extension equipment is fit for purposes and solves a specific problem. Appendix 1 details a case study of a BIRRR member who received quotes on extending a network that didn't solve his actual problem, Appendix 4 details the lengths a producer has had to go to to get independent advice

on extending connectivity on farm. For an uplift in Agtech growth independent advice and solutions that match problems will be key.

BIRRR believes the purpose of the Program should be centered around connectivity and include equipment used to extend or mesh connectivity. Equipment BIRRR thinks should be eligible as part of the Program includes:

- ACMA approved signal boosters and repeaters - both fixed and mobile
- External antennas and cabling
- BIRRR recommends that infrastructure costs such as small sheds, mounts and poles, fences to stock proof equipment, cement for stable positioning pads etc should be included in the grant where this infrastructure is required to be installed to extend connectivity on-farm.
- Wi-fi and mesh solutions including mesh routers
- High gain repeaters
- Non Standard nbn fixed wireless or wireless internet service provider (WISP) extension equipment
- Point-to-point equipment used to extend a connection
- Power for connectivity solutions e.g. generator, solar equipment to power connectivity extension solutions to unpowered sites such as cattle yards, walk over weighing stations, weather monitoring sites, silos etc
- LoRaWAN wireless gateways and base stations
- Professional connectivity reports / audits: Independent professional reports on connectivity options and pricing comparison (Department should ensure there is a template for these to be eligible) which includes expected coverage, pros and cons, costings, estimate of lifespan etc.
- Equipment that supplies portable connectivity solutions such as satellite trailers, nbn satellite fly away kits and portable Starlink equipment (Starlink RV).

BIRRR **does not** agree with the inclusion of sensors, monitors or cameras as these are a production tool, not a connectivity solution.

Digital literacy training is not in scope for the Program

As mentioned above, the objective of the Program is to improve digital connectivity across a farm, including in the forestry and fisheries sector, by contributing towards the cost of a service provider who will provide and install equipment, and provide some initial training on its use. Digital literacy training is not in scope for this Program. However, digital literacy is an important capability for primary producers.

BIRRR **strongly disagrees** with not including digital literacy and connectivity literacy within the scope of the Program. If the aim of the Program is to extend connectivity and enable agricultural productivity, the exclusion of digital and connectivity literacy requirements will have a considerable impact on the Program outcomes. As stated above:

"Connectivity literacy is all of the skills and knowledge needed by a consumer to get connected and stay connected to equitable, affordable and reliable voice and broadband services that meet their needs and budgets".

Connectivity literacy also plays a role in extending connectivity and enabling agricultural productivity, if producers do not have the skills and knowledge to choose equipment, or suppliers then adoption and productivity are low.

Likewise digital literacy plays an important role in producers understanding how products and equipment work and having the skills and knowledge needed to use them. Digital literacy means **being able to understand and use technology.**

To have digital inclusion and digital adoption in the agricultural industry producers must have **both digital literacy and connectivity literacy.** Without both the program risks accelerating

early adopters and leaving other producers behind.

Figure 1: Telstra Regional Policy Workshop Slide (November, 2022)

Figure 2: BIRRR Telstra Regional Policy Workshop Slide (November, 2022)

BIRRR has consulted extensively with farmers and graziers across Australia and identified several barriers to the adoption of Agtech on farm (see Figure 3), including a lack of connectivity

literacy and a lack of independent advice that prevents farmers/ graziers from installing solutions that are fit for purpose and designed to solve their specific connectivity problems. Agtech adoption is further complicated by a vast array of solutions that are vendor driven and connectivity solutions that are not always reliable nor practical.

BIRRR has identified a lack of independent advice and support available to producers as a major barrier in being able to fully utilise and participate in grant programs (See Appendix 2 for Beef producer comments on barriers to Agtech adoption). Telcos and equipment vendors are commercially driven, resulting in producers often struggling to understand or find the knowledge needed to plan and roll out telecommunication solutions, extend connectivity and choose the best solution for their property or farm. There is a huge need for producers to be able to find easy to access and accurate information that educates on the benefits of increasing on farm connectivity, covering factors such as safety, efficient communications, sensor and other Agtech use. If this education and information is not provided many producers, particularly those without mobile coverage, will deem the Program not relevant or available to their business.

A Lack of Time to research, learn, set up, troubleshoot etc

B Lack of knowledge, confusion, poor digital literacy, the unknowns

C Lack of Independent Advice, Help, Support for individual properties

D Trust, concerns with loss of data, data security, failure, mistrust in results

E AgTech providers & platforms not user friendly, not plug & play, difficult to install, lack of compatibility

F Misinformation that all AgTech needs on site connectivity

G Not robust or made for the conditions or designed to solve a problem.

H Cost, lengthy contracts, data charges

Barriers to Adopting AgTech

The Department should provide assistance to producers who may not have the connectivity literacy skills required to analyse the different solutions and suppliers that would be eligible for the Program. It is suggested that the Department develop a handbook / web page that clearly outlines the terminologies used and purposes / abilities of eligible equipment, with clear pictorial guidelines. A table outlining the pros and cons of each solution (mobile coverage extenders, point to point equipment, mesh solutions e.t.c.) would also be beneficial. Resources such as these help educate and inform producers.

BIRRR has previously compiled similar resources after being contacted by numerous producers for assistance in understanding how to match connectivity solutions and extension projects to needs, budgets and available resources. However, BIRRR is a volunteer group, under-resourced and not able to provide this support on a large scale, to our knowledge the Regional Tech Hub (RTH) is also not resourced or equipped to provide this information and education. Whilst it would be useful to link producers to the Regional Tech Hub (RTH) so they can receive a connectivity report that audits all the connectivity options available to the property / farm, before producers invest in extension equipment. This report is unlikely to be specifically ag-focused and include technologies such as LoRaWAN and current wait times for a RTH connectivity report are approximately 4 weeks. Following a RTH connectivity audit producers would still need assistance in choosing extension equipment and suppliers.

Regional technologies change rapidly and not all producers will have the skills and connectivity literacy knowledge to know what their existing and future needs are and if they are currently connected to the best solution for their business. These are gaps that can not be filled by the RTH under current funding, contractual obligations and staffing. Additionally the RTH should not be called upon to be independent knowledge brokers for the agricultural industry. If the Government requires the Regional Tech Hub to provide this support, extra funding and specialist support staff would need to be acquired for this to be achievable.

Whilst we acknowledge that there are digital literacy courses available to producers there is very limited connectivity literacy within the industry where producers can be given independent

and needs based advice. A Program that does not include digital literacy and connectivity literacy will risk the Program having poor outcomes for producers as these skills are needed for producers to choose and be able to use the right equipment for the program. Producers will need to be supported through the grant application, however this support can not be provided by commercially driven suppliers who will only recommend their product and solution, regardless if this is in the best interest of the business.

BIRRR Recommendations to address Connectivity Literacy support for producers

1. BIRRR recommends that a panel of Agtech experts be established to conduct vigorous assessment of potential suppliers, based on an in depth application process.

2. BIRRR recommends that the Department or a contracted organisation be tasked with developing an instructional and educational handbook / website on how to extend connectivity on-farm, with appropriate glossary and explanations of what can be achieved on-farm. There may be existing resources that can be utilized such as the NSW [AgSkilled](#) program, Federation University, BIRRR, RTH, James Cook University (JCU) and the [nbn Agtech glossary](#) . However, this information all needs to be pulled together and adapted to be easily understood and in one location and available for use by other Programs. It also needs to outline clearly what is possible and achievable and the many different ways producers can extend connectivity on-farm.

3. BIRRR suggests exploring the possibility of establishing specific Agtech and connectivity support through each state agricultural department.

4. BIRRR recommends the Department commission an independent review into market opportunities for Agtech consultancy and connectivity and digital literacy training within the agriculture industry.

5. BIRRR encourages the Department to look at independent research conducted by JCU (Appendix 5), nbn, ACCAN and BIRRR and to commission further research if needed, to analyse and address the barriers to the adoption of Agtech.

BIRRR is willing to discuss these recommendations in further detail with the Department.

Proposed Funding Process

The funding will be delivered via a grant process. The intention is for the Department to partner with the Business Grants Hub to deliver the Program. The anticipated value of the rebate will be

1. *Minimum rebate amount: $1,000*

2. *Maximum rebate amount: $20,000*

3. *Co-funding contribution: up to 50% of the cost of an equipment service (that is, an eligible product, including installation and initial training if required)*

For example, a primary producer could seek to purchase a cellular repeater from an equipment service provider to connect remote sensors and monitors. The primary producer would contact a number of eligible equipment service providers under the Program to seek quotes for the purchase of the cellular repeater, its installation and an initial training session. By way of an illustrative example, if the quote that most suited the primary producer's needs was $16,000, the primary producer would contribute half the cost, i.e. $8,000, and the equipment service provider would seek reimbursement for the remaining $8,000 through the Business Grants Hub.

Proposed funding process

It is proposed that an eligible equipment service provider receive a 50% rebate of the costs quoted.

- *The primary producer will only pay 50% to the equipment service provider.*
- *The equipment service provider will be provided a rebate for the other 50% of the cost.*

Question: We want to know

- *Is 50% an appropriate rebate level?*
- *Is there a better way for the Program to be implemented?*

BIRRR is in agreement that the rebates for the Program should be 50%, this will ensure that the Program can be accessed by producers who are invested in achieving improved connectivity on-farm. The 50% should be the final invoice price, not the quoted price as these are subject to change quickly in the agricultural industry. Additionally, the Program should allow for installation, travel costs of installer and freight of required equipment. The Program should cover the costs of training and support of the connectivity product. Suppliers should be

encouraged to provide a full service, subcontracting local installers and providing installation materials.

Consultation Questions: Suppliers

The Department is aiming to run an Expression of Interest (EOI) process in the first quarter of 2023 for the opportunity to participate in the Program and be included as an eligible equipment service provider. It is envisioned that once the EOI process is completed, a list of eligible equipment service providers will be published on the Department's website. The EOI process will be undertaken annually to ensure the list of providers remains current and to provide opportunities for new providers to be considered for eligibility under the Program.

It is of critical importance that equitable transactions between all parties be at the heart of the Program. Eligible equipment service providers will be required to meet a series of criteria that will ensure primary producers can have confidence in purchasing connectivity solutions that meet their needs as primary producers and improve digital connectivity on their farms. Consultation questions On Farm Connectivity Program Discussion Paper 11 Eligible equipment service providers will also be required to demonstrate their qualifications and track record as a mature commercial operator in the market, and agree to a fixed price model (i.e. 6-month fixed price12).

BIRRR suggests that equipment suppliers should be able to offer the following services and information to support producers who wish to apply for a grant.

- Equipment must have clear and detailed descriptions to enable producers to understand exactly what connectivity problem it will resolve for their agricultural business. For example, will the product extend or boost mobile coverage. Is the producer's issue poor coverage or is it a capacity issue that won't be helped by mobile boosting equipment.
- The product must clearly state what connectivity it is designed to support, the weather and terrain conditions it will work best in, if there are any extras needed, approximate costs for installation and freight or travel costs.

- The supplier must be able to offer support for the product, as well as a user guide and instructions on what is needed to install and use the equipment.
- The terminology used to describe the product must be consistent and not add to existing misinformation and disinformation that is prevalent within the industry (see Figure 4).
- Equipment must clear state warranty timeframes
- Information on if the equipment is Plug n Play, ease of installation (i.e., is the equipment pre-configured), does it need professional installation or can it be self-installed, does the 'package' come with everything that is required - cabling, adapters etc (i.e. are you purchasing a 'burger' or a 'happy meal')
- Are there any consumer reviews of the product that could be shared with producers

Figure 4: Example of misinformation, distributed during Beef Week in Rockhampton (May, 2021)

- The supplier must be able to offer support with installation of the equipment or be able to recommend a reputable installer.

- The Department to consider a complaints process for garnet recipients who may be sold equipment that is not suitable or doesn't work.

If the above conditions are not met the Program risks producers being sold equipment that doesn't solve their problem (see Appendix 1).

Producers need independent advice, in establishing their equipment needs and configurations over different sized properties and for different purposes. A place-based approach to each solution should be encouraged to ensure network extension equipment is fit for purposes and solves a specific problem. Appendix 2 details a case study of a BIRRR member who received quotes on extending a network that didn't solve his actual problem. For an uplift in Agtech adoption, independent advice and solutions that match problems will be key.

Consultation Questions: Primary Producers

As outlined in Part A, it is envisioned that primary producers will be able to purchase connectivity solutions from eligible equipment service providers at a rebated price. However, it is anticipated that primary producers will need to demonstrate their eligibility to participate in the Program before purchasing. This verification process seeks to ensure that only genuine agricultural, forestry or fishery businesses participate in the Program, and only receive one benefit under the Program. As discussed above under 'Who is in scope?', the Program is intended for commercial producers whose main source of income is primary production. The Department will determine the eligibility of an agricultural business by using either the ABS's EVAO or UCLs geographical units. The Department is proposing to use an EVAO of greater than $40,000 as the threshold to determine if a primary producer can participate in the Program. Alternatively, primary producers located in eligible areas (all parts of Australia that do not fall within UCLs geographical units classified by the ABS as Major Urban, with a population of

100,000 or more) may be in scope. Primary producers must use eligible equipment service providers. Not every supplier of connectivity products will meet the criteria necessary to participate in this Program. It is expected that details regarding eligible equipment service providers will be available on the Department's website once the Program design process has been finalised.

Q 8. What connectivity solutions do you believe are most needed on farms or in forestry or fishery businesses, and why?

Answered under: What products are in Scope.

Question 9. Do you have any comments or questions regarding the eligibility requirement options for primary producers?

Answered under: Who Is in Scope?

Question 10. Please provide any other information that you think would assist the Department design this Program.

Answered under: Connectivity Literacy

Appendix 1: BIRRR Case Study 1

Sam runs a large broadacre property in the Riverina, he recently approached a rural connectivity specialist to assist with extending and improving mobile coverage in the main shed and homestead. There are three residences on the property each with nbn Sky Muster internet installed. Mobile coverage around the homes and shed is patchy. There is no mobile reception in the large shed. A professional network extension provider was engaged to quote on the installation. They offer *Last-mile connectivity for vehicles, machinery & farms*.

Sam stated his main need was to be easily able to make voice calls. Sam is one of few farmers in his area that has widely adopted AgTech.

Sam's laterals use a 3G /4G connection, they are made by Zimmatic/Lindsay and [FieldNet](#) supply the computer aspects. Sam's irrigation management did use the 3G network, however after continued unreliability he has now moved to [Padman](#) Devices which use the LoRaWAN network, connecting back to an antenna on the silos which then connect to the local Telstra 3G tower. Sam's soil moisture probes did use 3G via Goanna Ag, however the mobile service was continually unreliable and Sam had difficulty in getting support through the company, who would analyse equipment and respond that it was working fine. He has recently moved to [ScheduleIt](#) who offer better support and installation of equipment, however are still reliant on reliable mobile coverage.

Sam is happy with his existing nbn Sky Muster services for the office, which meets his needs for data at this stage as he is on a Plus plan.

Sam attempted a few years back to establish whole farm Wi-Fi and the Agtech products he needed all had different connectivity requirements. He also has tried working with Agtech vendors to find one company to meet all his needs however was also unable to achieve this. He has found other farmers in his area ask him for advice as there is no independent advice, even his agronomist gets a cut from selling certain Agtech products. Sam stated that he encountered plenty of 'Snake Oil salesmen' and that often the Agtech vendors don't know enough about the products they are selling, farmers purchase the equipment and then it doesn't do what they required it to do.

Sam spends a significant amount of time organising grain contracts and managing staff and needs quality and reliable voice calling to do so. The proposal Sam was offered is to extend Wi-Fi in approximately a 300 metre radius and is detailed below:
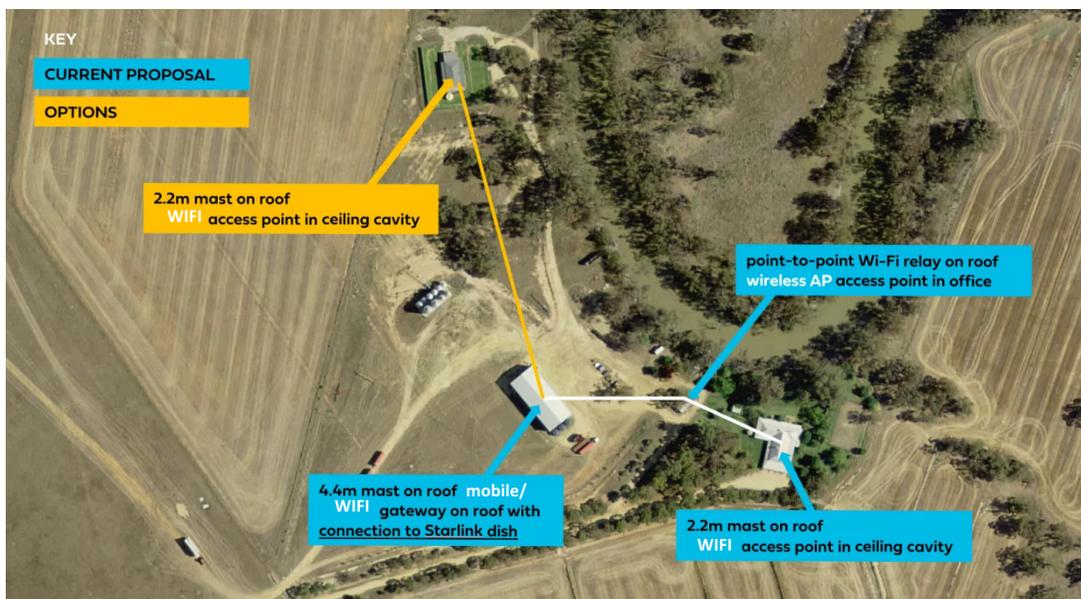
Problems with the proposal offered

Rather than mobile coverage, VoWIFI is planned. The site is busy with many contractors and staff using mobile connectivity. The internet to support VoWIFi is at the customer's cost i.e., mobile 4G and satellite Starlink. This is seen as not appropriate for Sam's business.

The Wi-Fi network is not meshed. Therefore, as you move around the property, visitors and staff would need to log on to different password protected channels.

- Each device we provide (e.g. The Cell base station plus additional access points) will operate as a separate Wi-Fi network. You may need to manually select the best Wi-Fi signal in each location and moving between these networks can cause problems with Wi-Fi Calling.

This would not be acceptable for Sam, his employees or contractors visiting the site.

Additional internet access was an essential adjunct to the quotation (at customer expense) i.e., new mobile connectivity (SIM plan) as a back-up and a new Starlink installation in the shed. Sam was quoted $4700 to extend wi-fi via Starlink to two homesteads and the workshop/shed. Additional to these expenses were the costs of Starlink equipment/plan ($450 and $139 per month plan). There is an ongoing maintenance fee of $77 per month. Wi-Fi network extension does offer a solution, albeit very clunky; but one that made little sense to the customer. Sam struggled to even grasp the thrust of the proposal and contacted BIRRR as he was confused about the solution offered to him and if it actually solved his problem.

Solution

BIRRR were able to assist Sam in accessing independent advice. Following this independent advice the customer will engage a local technician to install approved mobile booster technology i.e., Cel-Fi GO; which meets their requirements at a lower upfront cost and no ongoing maintenance cost, nor the need for additional internet connectivity or plans. ***Note: nbn™ Sky Muster Plus meets their current internet connectivity requirements and none of their existing AgTech via multiple companies works via Wi-Fi.***

If Sam had been able to access funding under the Program, he may have ended up with a solution that wasn't fit for purpose, as solutions are vendor rather than producer driven.

Appendix 2: Beef Producer comments about the barriers in adopting Ag-Tech products

Sandra, Queensland

I Think it's about knowing what's out there available & how after the time it takes to set it up all learn it & implement it into your yards, office record keeping etc will it really save you time & money.

Melissa, Queensland

No coverage at our place. Only wifi when I'm inside the house so there are no paddock Ag Tech out here.

Amanda, Queensland

The 3G-4G-5G slide. Bigger picture I know, but lack of decent coverage and varying coverages with each update is frustrating when you are borderline. (And apps being written for the latest mobile coverage versions).

Phil, Western Australia

Also a lack of understanding that there are other options out there (communications wise) like LoRaWAN, Radio and even NB-IoT that work in areas where there predominantly isn't phone signal.

Juliet, Queensland

Also frustrating is the lack of understanding/education of sales reps of what is being sold, often they say yes yes yes you can do that but actually being able to do that crush side/in the paddock or without needing to buy an adapter, another piece of equipment etc etc or changing file type/exporting is a very different story.

Kylie, Queensland

Misinformation - e.g. that all ag tech requires mobile service so people don't even look into it if they don't have service.

Jay, Northern Territory

Comms across the place. Whether it be WiFi, 4G or something else. It needs to be relatively cheap. Something that has capacity to accommodate the future.

What solutions are available? How do we find the right ones?

Sam, Victoria

Lack of consistent coverage, bit hard to use any ag tech in a beef cattle enterprise in a valley considered a blackspot.

Beck, Queensland

We've tried a number of in-paddock and crush side tech over a number of years. We are still trying to find the perfect fit. Issues have included programs that don't fit our specific needs/won't work in with other programs, and can't be adapted by the user to meet their needs. It's also very frustrating not having access to the tech support needed to get it to work the way we need it (timing, availability, unclear explanation) or the system not living up to the promises/hype. Most want you to sign up to a yearly payment and if you find out 3 months in your system can't handle it or it's not what you need you're a bit stuck and any data you have managed to gather may disappear if you pull out. Equipment getting dust in it, overheating etc is also a concern as none of it is cheap. I think Agtech needs to really focus on making their products user friendly, accessible and compatible, "australia tough", with good after service and accessible through a number of options eg satellite, 3/4G, LoRaWAN etc

Appendix 3: Agtech is vendor driven

The Australian Agritech Association is a member-driven organisation representing Agritech nationally https://ausagritech.org/. The following chart identifies key Agtech technology applications. The wide array of technology is bewildering and often confusing for farmers and graziers looking to adopt Agtech products, many which are vendor driven and not designed to solve the specific problems faced by producers. Likewise, connectivity solutions for producers are also confusing, with many producers unsure of what is needed, what agtech products need connectivity and how to go about getting independent advice.

Appendix 4: BIRRR Case Study 2

Northern Territory Cattle Station seeking whole of Farm coverage

Jay manages a 652Km^2 property (not large by NT norms) in tropical northern territory. He runs approximately 5,000 head of cattle. He is a progressive technology adopter and sees Agtech as fundamental to improving his herd health and productivity. There is no mobile network connectivity on the property. At this time UHF CB provides the most secure voice communication with up to 70 Km range from the homestead. He has trialled GPS collar tracking, walk over weighing (at dams) and remote water management, but is finding many challenges in implementing a 'whole of farm' access solution.

Jay has trialled a Point-to-Point system to his nearest dam for a 'walk over weigh installation', with mixed results. He is unsure if the problem is with the 600m Point-to-Point system, or his primary internet connectivity. The extension of Point-to-Point systems to all dams is not feasible due to distance and terrain.

Walk over weigh technology is seen as a huge step forward for pastoral operations, providing detailed information on the entire herd. Algorithms and machine learning can quickly identify poorly performing animals, pregnancies, and animal health. He yards his stock on an annual basis where he must make immediate decisions with little data.

He is currently negotiating with Vodafone to provide farm wide LTE coverage from a central location. He is also trialing whole farm LoraWan coverage. He considers Lora and LTE as the most readily available and most reliable AgTech device technologies.

Reliable primary internet connectivity currently remains a bridge too far. To date Jay has consulted widely, assessing many options for network coverage across his property, he has found the terminology used by extension specialists to be confusing, with a lack of understanding of his issues and products/equipment to solve them. He currently has no other option for broadband connectivity other than nbn Sky Muster Plus, which he has been unable to use effectively and efficiently due to the ongoing issues with his service which have required extensive troubleshooting. Jay has found BIRRR the only source of independent advice, despite having access to industry professionals and other stakeholder groups.

- Regional Australians are incredibly frustrated. They want better connectivity but they don't know where to start. They don't know where to look. They don't know who to ask. It's confusing and overwhelming and misinformation about connectivity is widespread. They don't know who to trust because everyone has something to sell.
- A co-designed mixed methods study of SMEs (n=91) in rural, regional and remote Australia found:
  - Nearly all respondents agreed that their internet connection is as important to their business as other utilities (electricity, water, etc), and consider the internet essential to their business.
  - However, nearly half of respondents said their connection is not meeting their business needs. On farms, the lack of internet access beyond the vicinity of the homestead is a significant concern.
  - More than half of respondents said that the limitations of their connection are preventing them from adopting new technologies - delaying the implementation of agricultural technologies that could potentially improve efficiency, profitability and/or sustainability on farms.
  - Just over half of respondents are not confident that they know all the internet connectivity options available to their business. As one focus group participant said, "You don't know what you don't know, so it's hard to know what you need".
  - A considerable proportion (40%) of respondents encounter difficulties in solving their own connectivity issues. Some of these difficulties are related to connectivity literacy, including: not knowing where to start, finding it confusing, lack of knowledge, lack of understanding, and finding it difficult to apply information to their unique situation.
  - Inertia is a significant barrier to connectivity technology adoption. Nearly 40% of Sky Muster™ users have not yet upgraded to Sky Muster™ Plus, which would likely solve some of the problems they reported, such as insufficient data.
  - Whilst a user may have a perceived need to upgrade, the behavioural intention to upgrade can be significantly weakened by inertia, causing them to persist with using their current system. This is influenced by Procedural Switching Costs (the time and effort involved in finding and adapting to a new provider or plan) and Incumbent System

Habits (subconscious predisposition to continue using a current system in an automatic and unthinking manner).

- ○ This shows that resources that improve connectivity literacy and/or simplify the process of getting connected will increase adoption.
- The results of the study show that connectivity literacy is positively correlated with connectivity technology adoption.
- Better support is needed to empower business owners with relevant knowledge and skills, and to overcome barriers to connectivity technology adoption.

1 Introduction

The sustainability of small and medium enterprises (SMEs) in rural, regional and remote (RRR) Australia in the digital era increasingly depends on digital connectivity.

Whilst the rural-urban digital divide has narrowed over time, it has stagnated in recent years. Attention has shifted from issues surrounding availability and access, to inequalities of digital skills and usage.[3]

Rural connectivity is complex, often requiring additional equipment. Little is known about the human factors that influence the adoption and effective use of connectivity technologies within RRR SMEs.

Q: What types of SMEs are operating in RRR Australia? What are their characteristics?

Q: What factors influence the choice of internet connectivity tools, providers, and solutions by RRR SMEs?

Q: Where do RRR SMEs go to find information and support on internet connectivity?

2 Methods

1	2	3	4	5
EXPLORATORY RESEARCH	ONLINE SURVEY	INITIAL DATA ANALYSIS	ONLINE FOCUS GROUPS	DATA ANALYSIS
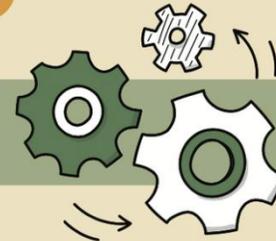
Co-designed mixed methods study

Survey: n = 91 (127 businesses represented by 91 business owners)

Focus groups: n = 8

3 Results

Business in the bush
Contextual foundation

- Profile of RRR SMEs
- Importance of connectivity
- Geographic inequity
- Women and unpaid labour

Connectivity choice & adoption in RRR SMEs

- Inertia in technology adoption
- Technology fatigue
- Connectivity literacy[2] & motivation

Addressing the challenges of connectivity technology adoption

- Connectivity challenges
- Business impacts
- Sources of info & support

4 Conclusions

Better support is needed to empower business owners with relevant knowledge and skills, and to overcome barriers to connectivity technology adoption.

Access to more resources that can be utilised offline would be beneficial - for example, downloadable and printable guides.

A concerted effort to clear up misinformation about connectivity in RRR Australia could prove beneficial in reducing inertia.

Nearly all respondents agreed that their internet connection is **as important to their business as other utilities** (electricity, water, etc), and consider the internet essential to their business.

However, nearly half of respondents said their connection is **not meeting their business needs**. On farms, the lack of internet access beyond the vicinity of the homestead is a significant concern.

More than half of respondents said that the limitations of their connection are **preventing them from adopting new technologies** - delaying the implementation of agricultural technologies that could potentially improve efficiency, profitability and/or sustainability on farms.

Just over half of respondents are **not confident that they know** all the internet connectivity options available to their business.

A considerable proportion (40%) of respondents encounter **difficulties in solving their own connectivity issues**. Some of these difficulties are related to connectivity literacy[2], including: not knowing where to start, finding it confusing, lack of knowledge, lack of understanding, and finding it difficult to apply information to their unique situation.

The results of the study show that connectivity literacy[2] is positively correlated with connectivity technology adoption.

"People in cities think what we do is less valid."

Geographic narcissism[5]

"You don't know what you don't know, so it's hard to know what you need."

Awareness knowledge[6]

Given that time is scarce, and that help is often some distance away, it is important for RRR SMEs to have good connectivity literacy[2] skills to get connected and stay connected. This places an added burden onto those RRR SME owners who **do not have strong technical skills yet are responsible for managing the technology** in their business.

There appears to be an intention-action gap, whereby many RRR SME owners would like to improve their technology skills but are not taking the action needed. It may prove challenging to convince RRR SMEs to invest the time and effort required to improve their connectivity literacy[2], as **many are time poor and already feel pressured by a large mental load**.

Inertia[4] is a significant barrier to connectivity technology adoption. Nearly 40% of Sky Muster™ users have not yet upgraded to Sky Muster™ Plus, which would likely solve some of the problems they reported, such as insufficient data.

Whilst a user may have a *perceived need* to upgrade, the *behavioural intention* to upgrade can be significantly weakened by *inertia*, causing them to **persist with using their current system**[4]. This is influenced by *Procedural Switching Costs* (the **time and effort** involved in finding and adapting to a new provider or plan) and *Incumbent System Habits* (subconscious predisposition to continue using a current system in an automatic and unthinking manner)[4].

Wilson, C.-A., Hay, R., Atkinson, I. (2022). Understanding the motivations and barriers to adoption and effective use of connectivity technologies by SMEs in RRR Australia [James Cook University]. https://doi.org/10.25903/6ps6-1505