



Final report

MDH Nangram & Wallumba – WAN and Wide Area Wi-Fi

Project code: P.PSH.1049 MDH Nangram & Wallumba – WAN and Wide Area Wi-Fi

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Date published: 22/04/2021

PUBLISHED BY
Meat and Livestock Australia Limited
PO Box 1961
NORTH SYDNEY NSW 2059

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

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Abstract

MarchNet's installation of a high speed, quality, and reliable internet connection throughout MDH's property allows them to connect their Wallumba & Nangram properties to the outside world. The McDonald Family operating through MDH Pty Ltd is one of Australia's largest cattle operations thus this project sought to evaluate improved connectivity.

The installation of MarchNet was found to enable remote monitoring of critical points of MDH's operations. This has allowed for off-site management of critical controls and real time reliable information. This ability to capture live data provides a further advantage, contributing towards better and faster operational decisions. The Wide Area Wi-Fi network across their property has also assisted in the recent expansion of their feedlot.

The installation and service delivered has and is demonstrating a suitable option for MDH's Wallumba and Nangram properties. This project provides evidence to ensure deployments of a similar design will deliver the required results for projects within the Red Meat industry.

Executive summary

Background

The purpose of this research is to determine if the network upgrades undertaken at MDH meet the below project objectives.

Objectives

- greater efficiency in day-to-day operations
- better connect staff to family and friends
- assist with effective livestock control and decisions
- enable more effective management through real time information and feedback, and
- improve maintenance procedures.

Methodology

- Install a Managed Wi-Fi and Voice over Wi-Fi (VoWi-Fi) network around the site.
- Install 2 x Wide Area Network (WAN) connections of 40 Mbps symmetrical to Nangram and Wallumba respectively via Point-to-Point microwave, Point-to-Multipoint microwave and Wi-Fi mesh.

Results/key findings

- An increase in speed and reliability of the network
- Enabled remote monitoring of livestock and operational systems
- Enabled remote access to the private network
- Delivers real time, reliable information to help make smarter, faster decisions
- Enabled video surveillance and recording
- Enabled cloud computing and facilitated scalable technology choices
- Helped to improve staff hiring, satisfaction and retention

Benefits to industry

The industry operates in similar rural and remote locations. Access to high speed, reliable telecommunications can produce similar results for other industry participants.

Future research and recommendations

MarchNet will look to perform similar studies with other industry participants in the future to confirm the findings of this report are repeatable.

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1. Background

MarchNet is an established communications provider dedicated to creating value by connecting people and operating exclusively in regional and remote environments. MDH approached MarchNet after experiencing several years of connectivity issues at their Nangram Homestead and Wallumba Feedlot. Prior to the installation of the upgraded network, MDH was using multiple nbn residential grade Skymuster satellite connections. These services had such slow connection speeds and limited availability, MDH resorted to using the limited cellular coverage for broadband access.

Due to increased bandwidth demand at the site and a planned feedlot expansion, MDH required an extensive network upgrade. MarchNet was awarded the contract to design, build and operate the upgraded telecommunications infrastructure.

The results of the research undertaken throughout this project will demonstrate the advantages of faster connectivity, network availability and reliability, and increased wireless network footprint to the Red Meat Industry.



Figure 1 – Wallumba Feedlot (foreground) and Mill (background)

2. Objectives

The project aimed to improve staff connectivity around the site and to the outside world. This would allow for:

- greater efficiency in day-to-day operations,
- connecting staff to family and friends,
- more effective livestock control and decisions,

- smarter management through real time information and feedback, and
- improved maintenance procedures.

The project would literally connect the paddock to the homestead and office.

3. Methodology

To meet the objectives set out by MDH, MarchNet designed a state-of-the-art network solution for the Wallumba Feedlot and Nangram Homestead. This solution provided high quality Internet, Managed Wi-Fi and VoWi-Fi services across the offices, feedlot and homestead.

This was achieved through the construction of two separate fixed wireless WAN links to connect to high speed, reliable carrier grade internet. Each individual link can deliver up to 40 Mbps download and 40 Mbps upload throughput. These connections enable the use of industry specific applications, which ensures MDH's competitive future and relevance in the market.

To maximise their investment MDH requested the design of two Wide Area Wi-Fi solutions from MarchNet, broadcasting high speed internet service 360 degrees from their existing Mill and Machine Shed at Wallumba and Nangram sites respectively, servicing the expansive feedlot, grazing operation, 11 staff quarters, operations and offices.

Two Point to Point (PtP) microwave links were built into the site and distributed around the site by using Point to Multi-Point (PtMP) and WAP off these key locations to provide coverage in around all buildings and infrastructure around the site.

A series of observations was then made on the performance of the solution, including review of Bandwidth, Content and Data Usage along with service availability and latency. The below images showcase the various network paths.



Figure 2 – Wireless Network Paths

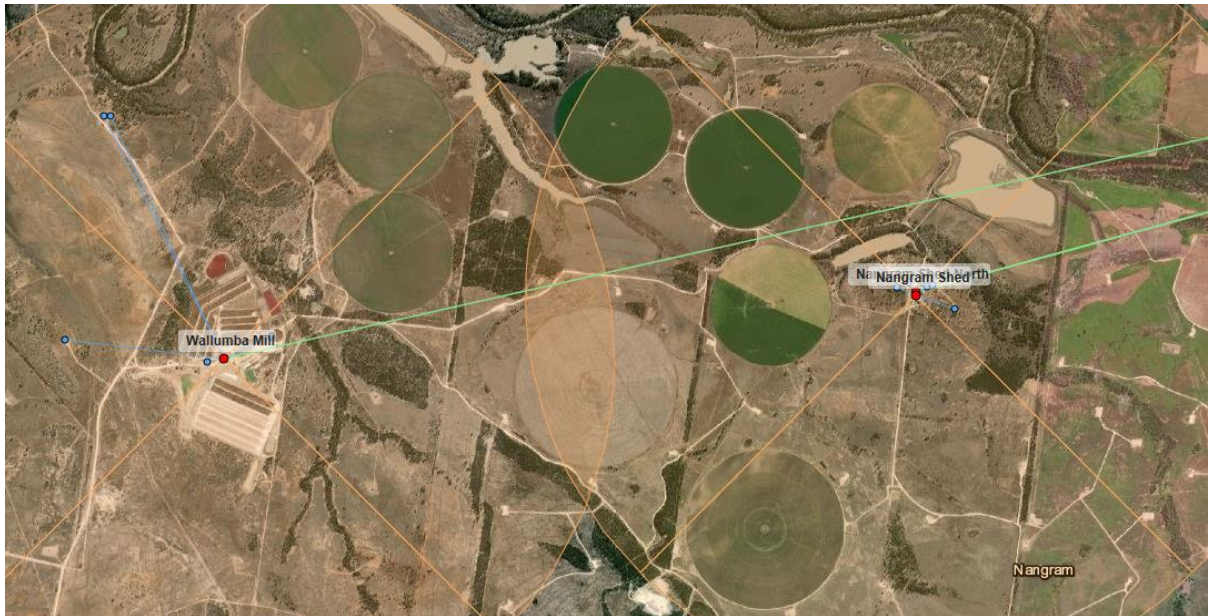


Figure 3 – Wireless Network Paths

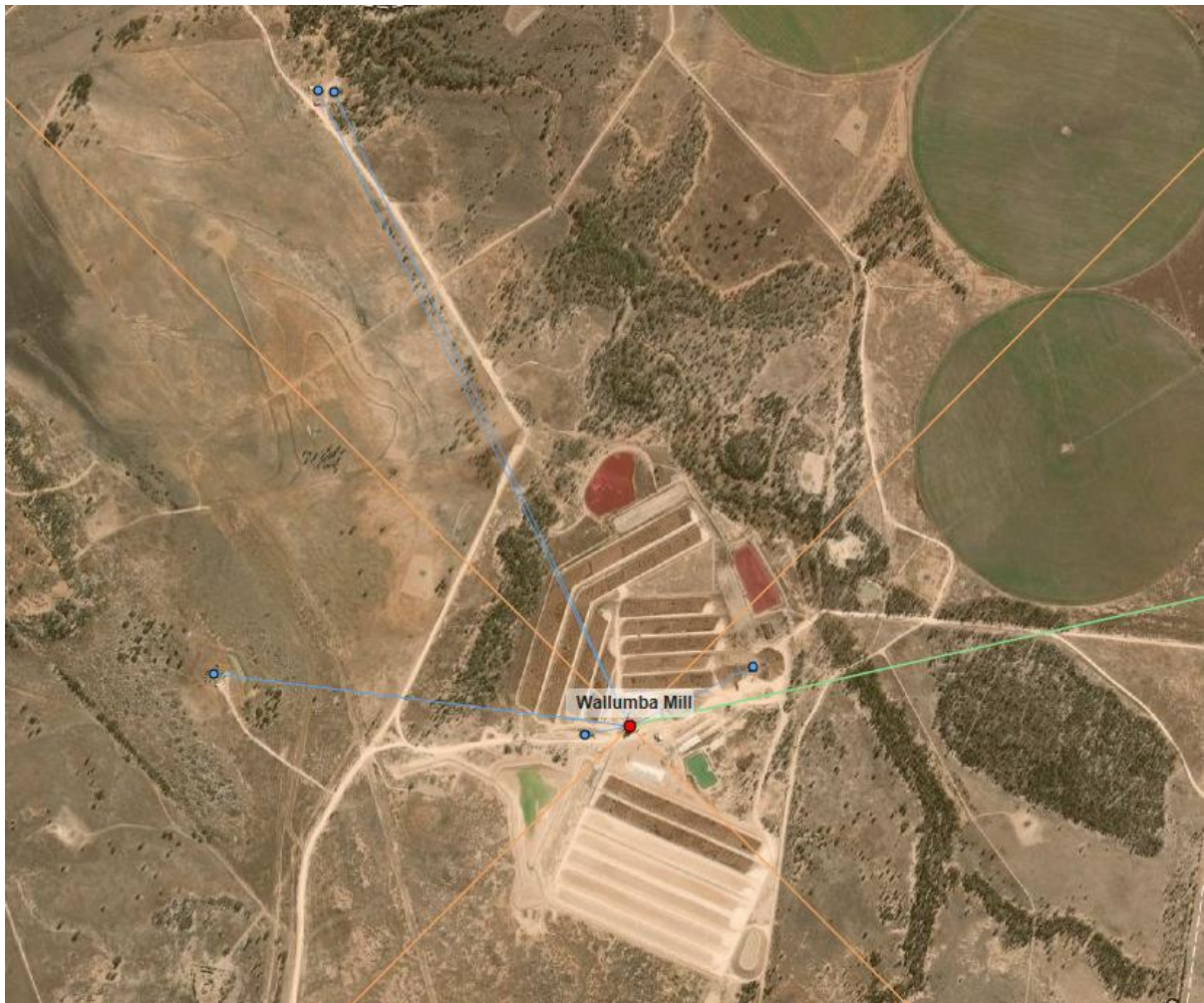


Figure 4 – Wireless Network Paths

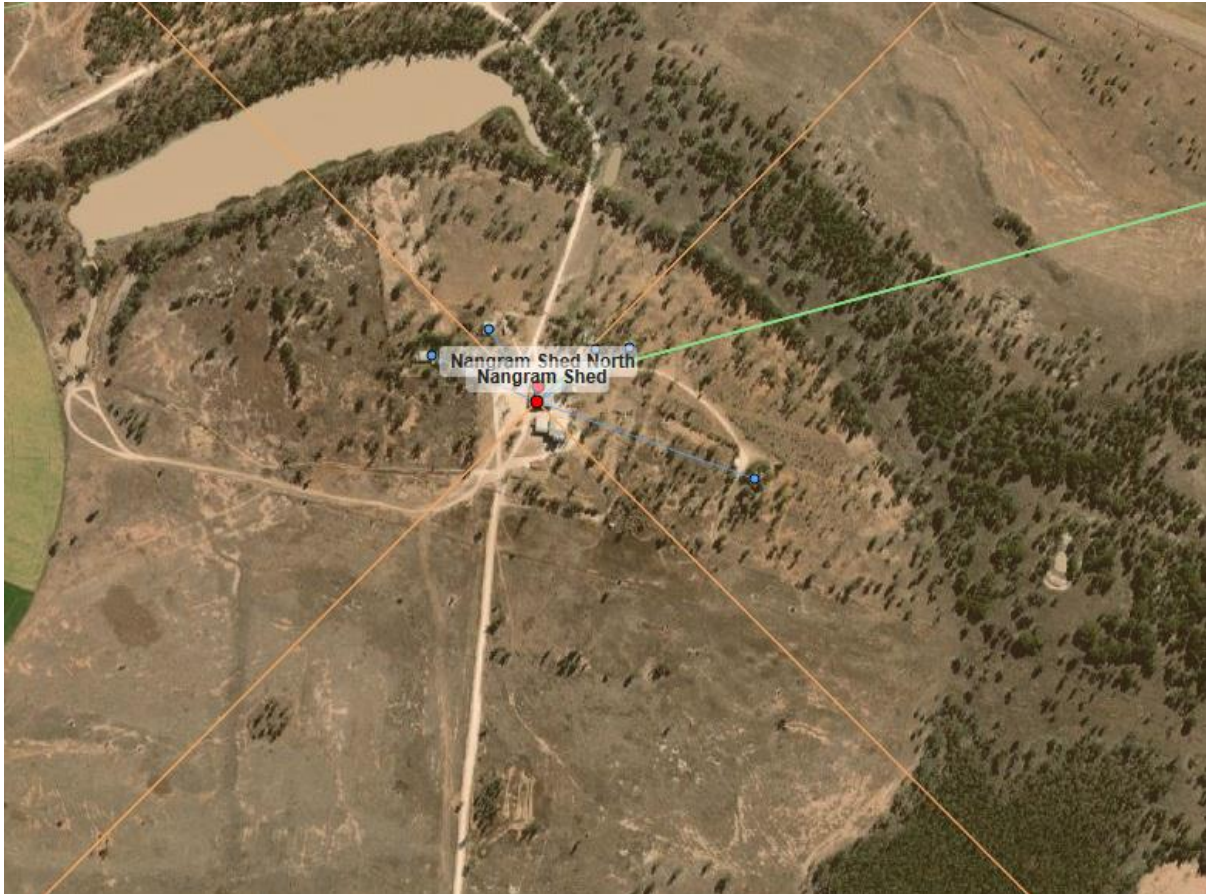


Figure 5 – Wireless Network Paths

4. Results

Every month a bandwidth usage report is generated and sent to MDH highlighting the total data consumed for the month including upload and download volumes. The usage for the services is recorded against the current bandwidth being supplied to ensure the current plan is meeting the client's expectations. The last three years of bandwidth usage highlights that the 40 Mbps upload / 40 Mbps download service is meeting the client's requirements.

The below findings are from MarchNet's active monitoring platform and outline the typical monitoring outputs over the past three years. The areas monitored are:

1. Bandwidth Usage - **Daily**
2. Bandwidth Usage – **Quarterly**
3. Content Usage - **Quarterly**
4. Data Usage – **Quarterly**
5. Service Availability and Latency – **Quarterly**

Bandwidth Usage - Daily

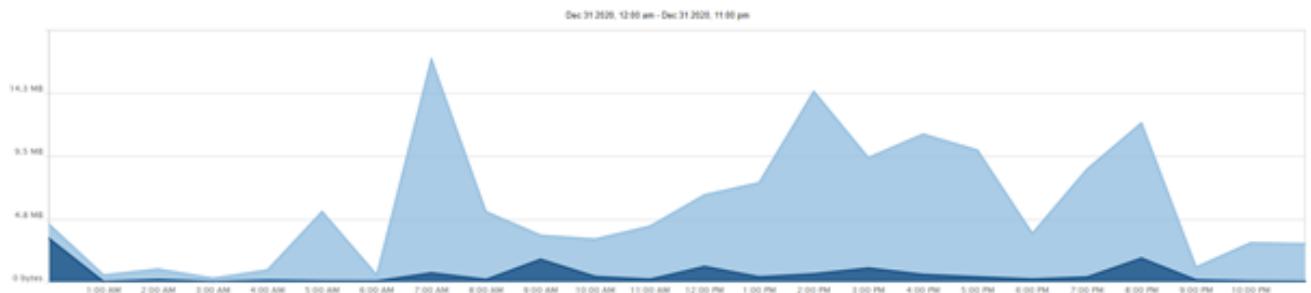
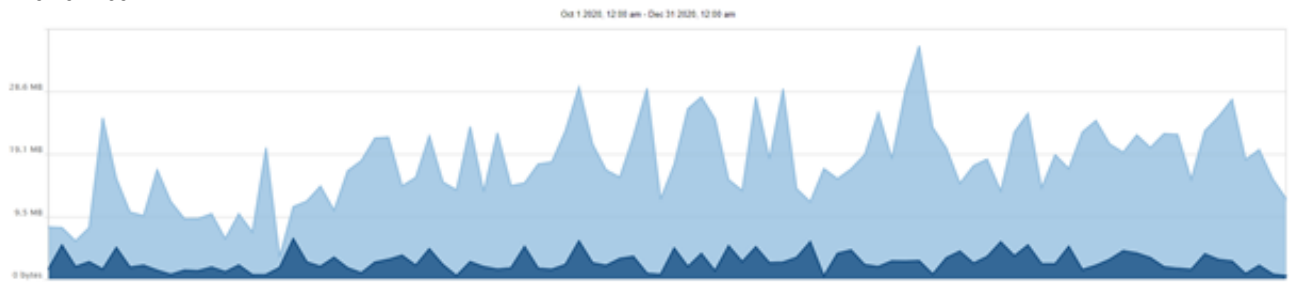


Figure 6 - Typical Daily Bandwidth Usage

This graph highlights the bandwidth usage as an example of a typical day during the period. This indicates the service is being utilised well. The graph shows a peak in the morning when operations begin with usage peaking around midday and continue into the afternoon through to the evening.

Bandwidth Usage – Quarterly

Wallumba:



Nangram:

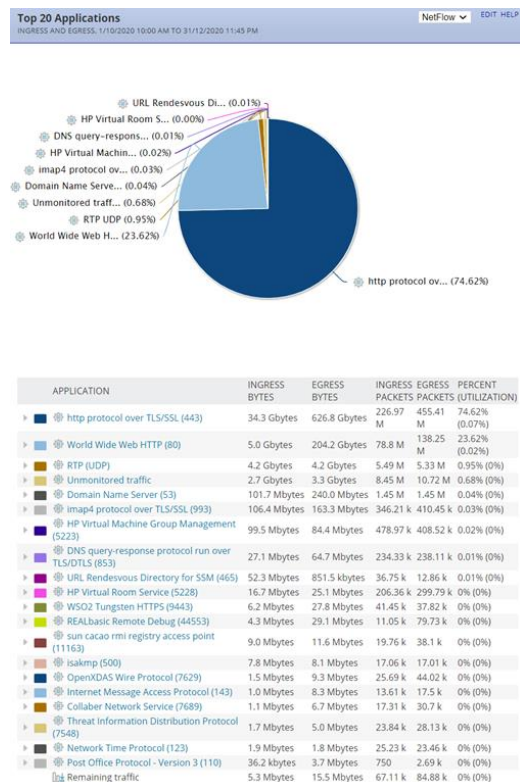


Figure 7 – Typical Quarterly Bandwidth Usage

MDH's bandwidth usage during an average reporting period shows consistent download and upload usage throughout the reporting period. This graph demonstrates that the service is being well utilised and the speed profiles are adequate for MDH's current requirements.

Content Usage – Quarterly

Wallumba:



Nangram:

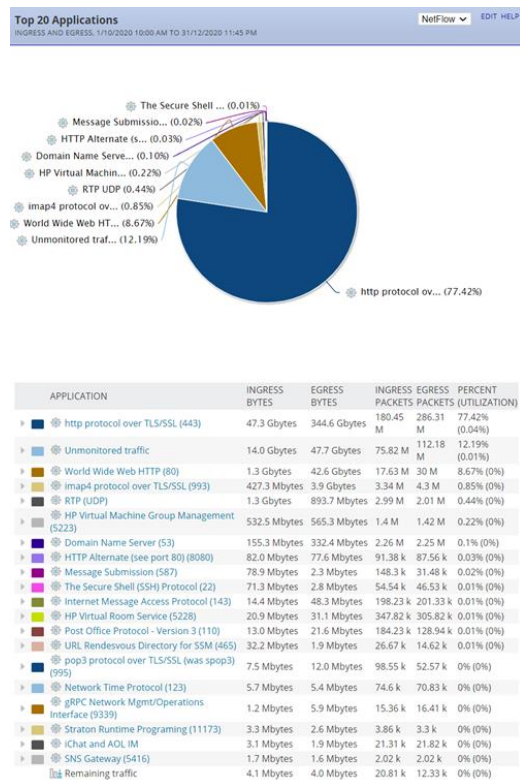
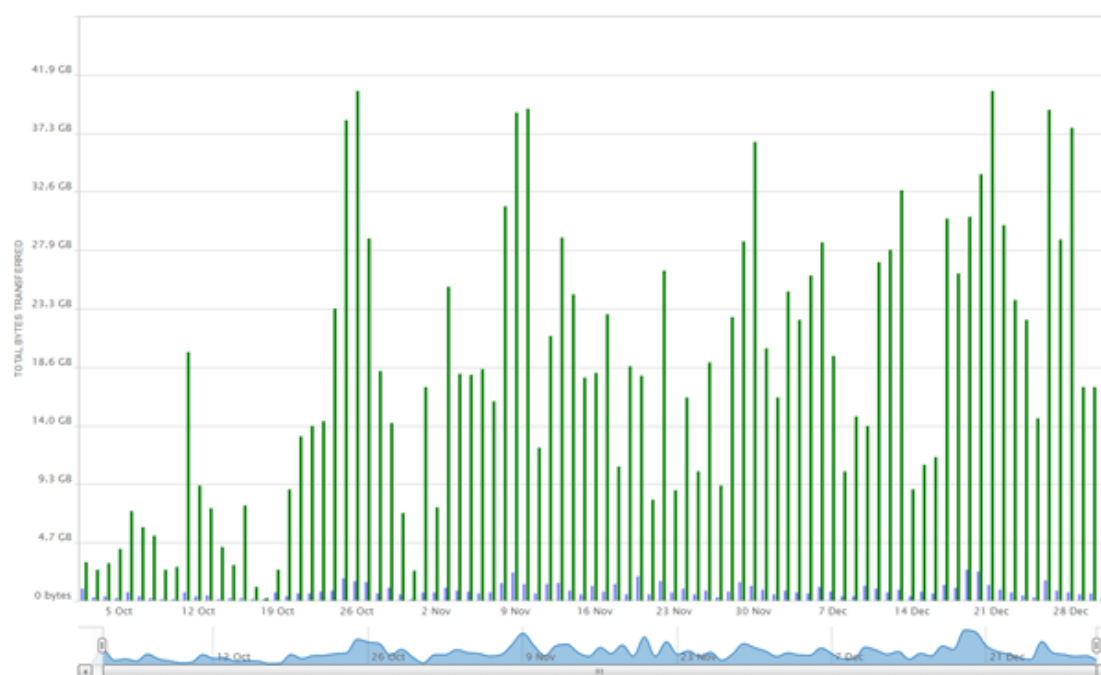


Figure 8 – Typical Quarterly Content Usage

The content usage report highlights that 77.42% has been recorded for web-based traffic across both secured and unsecured content for this reporting period. 12.19% of content usage is unmonitored traffic, which is utilised by third party applications that do not fall into standard categories. This content usage is typical over the entire 3 years of the project.

Data Usage – Quarterly

Wallumba:



Nangram:

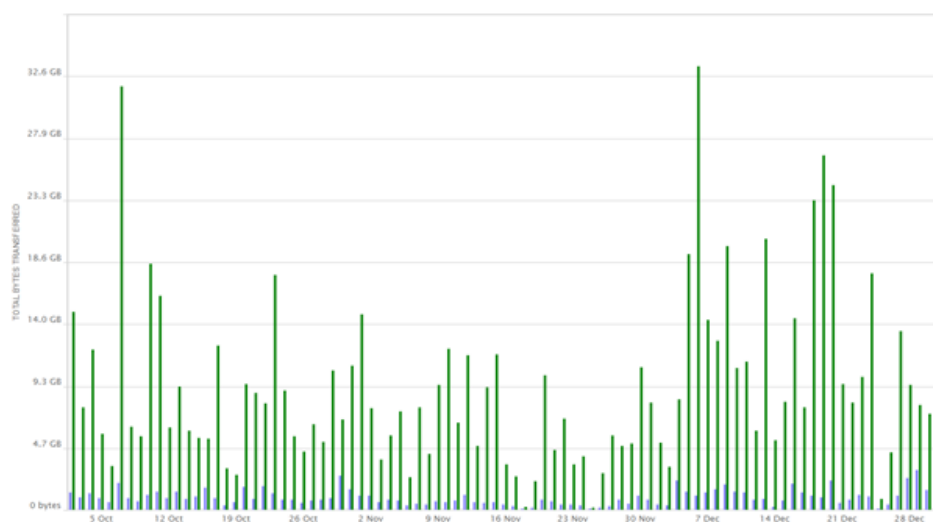
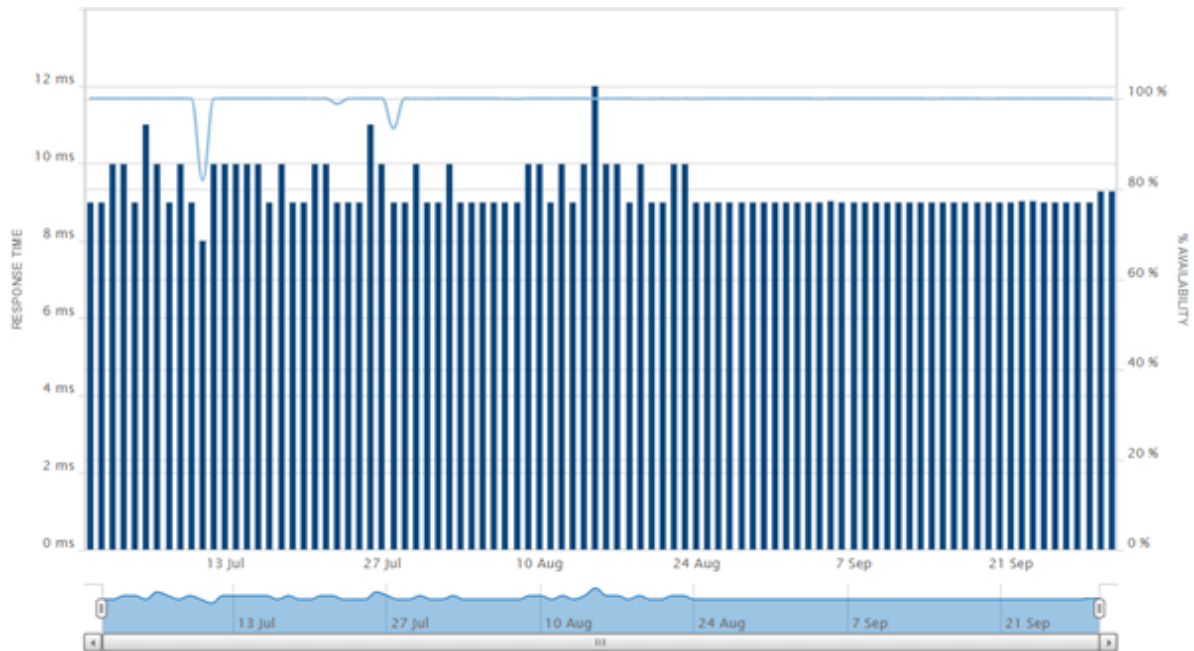


Figure 9 – Typical Quarterly Data Usage

The data usage graph shows both download usage in green and upload usage in blue. The speed of the service continues to allow for high download and high upload volumes without crippling the performance of the system for all other users during peak consumption periods.

Service Availability and Latency – Quarterly

Wallumba:



Nangram:

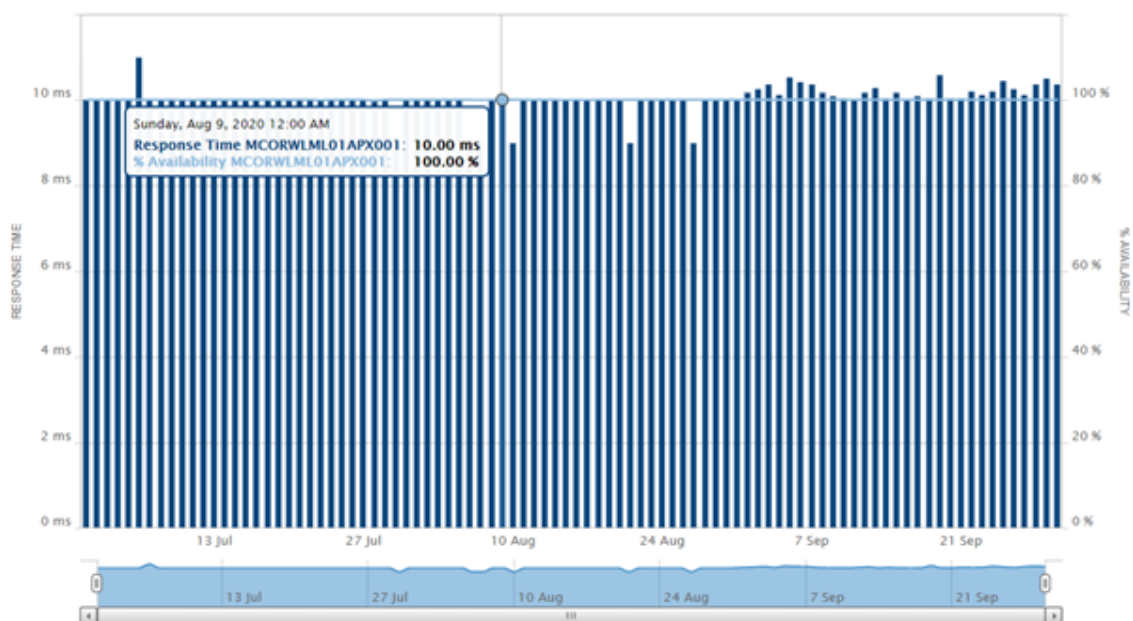


Figure 10 – Typical Quarterly Service Availability and Latency

Latency is the delay before a transfer of data begins. The latency for MDH's service at both Nangram and Wallumba was recorded at a consistent 10 milliseconds across the three-month period, which results in an excellent experience for users. This is the typical latency experienced over the three-year period. As a comparison, NBN Skymuster Satellite services operate with 600-1,000ms of latency.

The MarchNet service delivered to MDH was designed and built to meet the MarchNet Service Level Agreement of 99.9%. The service availability and capacity for the last three months performed at 99.999%, which represents the typical performance over the three-year period.

5. Key findings

The below overviews the key findings throughout this project, it is a combination of MDH's feedback and MarchNet's observations through its active monitoring throughout the project.

- MDH completed a project customer feedback report, where they scored MarchNet a 9 out of 10 when asked 'how likely they are to recommend MarchNet services to your colleagues?'. The feedback report asked if the rating was over 8 to explain what they like about our services? The feedback received was that, 'The product is great and generally customer service is good.'
- MDH advised they begun investigating how to leverage pre-existing services to gain efficiencies in how they operate. MDH confirmed that remote access to private networks is having a positive impact. The ability to not be restricted to the location of the office to complete tasks not only saves time, but also allows for a more flexible work environment for staff to be more focused on what they are doing.
- Remote monitoring of the weather station and critical control points of operations can be managed off-site which increases access to controls and reliable information, to make better operational decisions.
- The new service has also provided MDH with the ability to use a cloud-based server, which has huge benefits for storage and access of documents and procedures. Several applications that are utilised throughout the property can be hosted via the cloud, which increases efficiency and staff productivity.
- The ability to capture and record live data whilst staff are operating throughout the property ensures a greater level of reliability and confidence with data. Previously all information was recorded and uploaded later. This posed risks associated with data loss and/or greater error rates.
- MDH can now remotely monitor security cameras. This increases security at and around the site. MDH installed additional cameras after the network upgrade was completed.
- The introduction of high quality, reliable telecommunications allowed MDH to increase their workplace health and safety significantly. The implementation of a Safe Ag Systems online solution for managing Workplace Health and Safety was introduced. Its capabilities include:
 - the ability for MDH to induct workers and contractors,
 - scan QR codes when using machinery on-site to access Safe Work Procedures before operating,
 - identify when services are due,
 - take photos of hazards and sending them directly to the office,
 - report incidents or near misses, and
 - an online message board.
- The ability to provide high speed, quality internet services provide a large benefit to MDH in the form of staff recruitment and retention. The ability to communicate in real time with the rest of the world provides MDH with an incentive to attract quality staff. MDH's Wallumba and Nangram properties are located within a close proximity to several competitor businesses, which all access the same pool of resources for staffing. Also, staff with families and children can access reliable communications for schooling purposes.
- MDH has continued to see improvements in work accessibility and work flexibility, which is a positive result. Their internet service and property Wi-Fi is providing a reliable and robust platform that enables their operations to continue with little or no interruptions. MDH have also identified the importance of connecting critical operational points within the property enabling communication and data access. MDH current focus is on planning the expansion of their operations across these two sites which is expected to result in future expansion of their network to keep their operations connected.

- MDH have installed new server infrastructure, which enabled them to remove three old internal legacy networks that were still operating alongside their new MarchNet network. All associated traffic on-site now runs across a single network, which has significantly increased the reliability and performance across their entire site.
- The introduction of the MarchNet service at the feedlot has allowed the feedlot managers' son to return home full time, with the ability for him to complete this schooling via an online curriculum. This previously was not an option, as the previous internet connection, an nbn Skymuster satellite, could not provide sufficient bandwidth or data usage limits. This is expected to provide a considerable cost saving by eliminating costs of living away from home, such as accommodation, travel, meals and other associated costs.
- During the project, the world was heavily affected by COVID-19 and this also affected MDH's operation. While MDH has implemented strict new access policies for staff, suppliers and contractors, the business is operating in a business-as-usual state due to the enhanced connectivity MarchNet provides.
- MDH have connected the pivots into the network and now have an app which allows them to monitor the system.
- The trend for all staff to utilise video conferencing continues to increase, and the MarchNet service supports multiple video calls simultaneously as required.

6. Conclusion and recommendations

By investing in the latest technology MDH have guaranteed safer working conditions for staff, more efficient outcomes and commitment to their future through innovation. This state-of-the-art network not only provides internet and mobile services across the property but also provides owners and stakeholders with reliable high speed internet services to the homesteads, connecting homes to the private network and creates an extension of the office network, enabling remote monitoring and control of the feedlot control systems from the manager's property, or any other authorised locations.

Using innovative technologies such as VoWi-Fi, mobile coverage has been extended across the property and delivers a platform for improved asset management, livestock control and condition monitoring.

MDH have been able to add general security and longevity through their investment, facilitating water management and observation system upgrades, increasing productivity, improving biosecurity and livestock management - delivering an immediate return on their solution and attracting staff - connecting the paddock to their homesteads.

The MarchNet solution is demonstrating that it is fit for purpose and MarchNet is providing concrete evidence that future deployments of a similar design will deliver the required results for future projects within the same industry.

There are several benefits that an appropriate telecommunications infrastructure can deliver for any Red Meat producer. Considerable cost savings can be attributed towards making better business decisions with access to live data. Remote monitoring and remote controls provide the ability to watch and respond to situations as they are required, providing a huge benefit in productivity and improvement in response times.

Access to high-speed Internet services also provide other producers with the ability to adopt cloud-based services. These can have major economic benefits through the elimination of onsite infrastructure such as servers for backups.

Regional and remote Red Meat producers have the opportunity to provide major social benefits to their staff by providing a reliable telecommunications infrastructure. The ability to connect with friends and family who do not live with them is a huge benefit. Staff and their families can also afford to relocate to a remote or rural property with good communications, because it provides greater access to educational platforms for their children to complete schooling.

This project provides evidence to ensure deployments of a similar design will deliver the required results for the Red Meat industry.