Norfolk Island Regional Council Connectivity

09 June 2020 V1.0

Executive summary

Connectivity on Norfolk Island has gone through many changes over the last decade. At one stage Norfolk Island did have its own cable connection to Australia; this was disconnected with the onset of satellite communications. Norfolk Island is currently dependant on satellite links (NBN and a redundancy link) which is constrained by a range of factors, including cost, speed and reliability.

With growing demand for digital and data services, Norfolk Island Regional Council (NIRC) is seeking to assess the feasibility of investment in an International Submarine Cable connection directly to the island. The need to address the digital divide created by its geographic isolation is now a priority for the social and economic outcomes of the island.

This document provides information against the NIRC requirements for this engagement, namely:

- Source potential investors / constructors for an undersea cable project
- Preparation of Ministerial Brief and Council report for the project
- Basic business plan for future revenue, potential clients, and estimated payback period
- Verbal advice to the General Manager on the topic to prepare responses to the elected members.

From stakeholder interviews, research and analysis it is evident that a significant amount of preparation is still required to attract investment (public and/or private) and build a viable business model. Through this document, GWI has outlined the challenges, the demand and the way forward. GWI has recommended that NIRC conduct detailed economic analysis to clearly articulate the current and future demand for connectivity. From this analysis and economic planning, GWI believes Norfolk Island would be well positioned to attract the level of investment required to build the undersea cable from the Australia Federal Government.

The background

Norfolk Island* has a diverse environment and notable historic sites offering a unique heritage seldom found elsewhere within Australia and around the world. This remote island is also of major biological importance with many native species being unique to the island.

Norfolk Island has a population of 1,748 (ABS 2016), with approximately 20% identifying as having Pitcairn ancestry. This compares with a population of 1,796 in 2011 (Norfolk Island Government Census) and 2,601 in 2001.

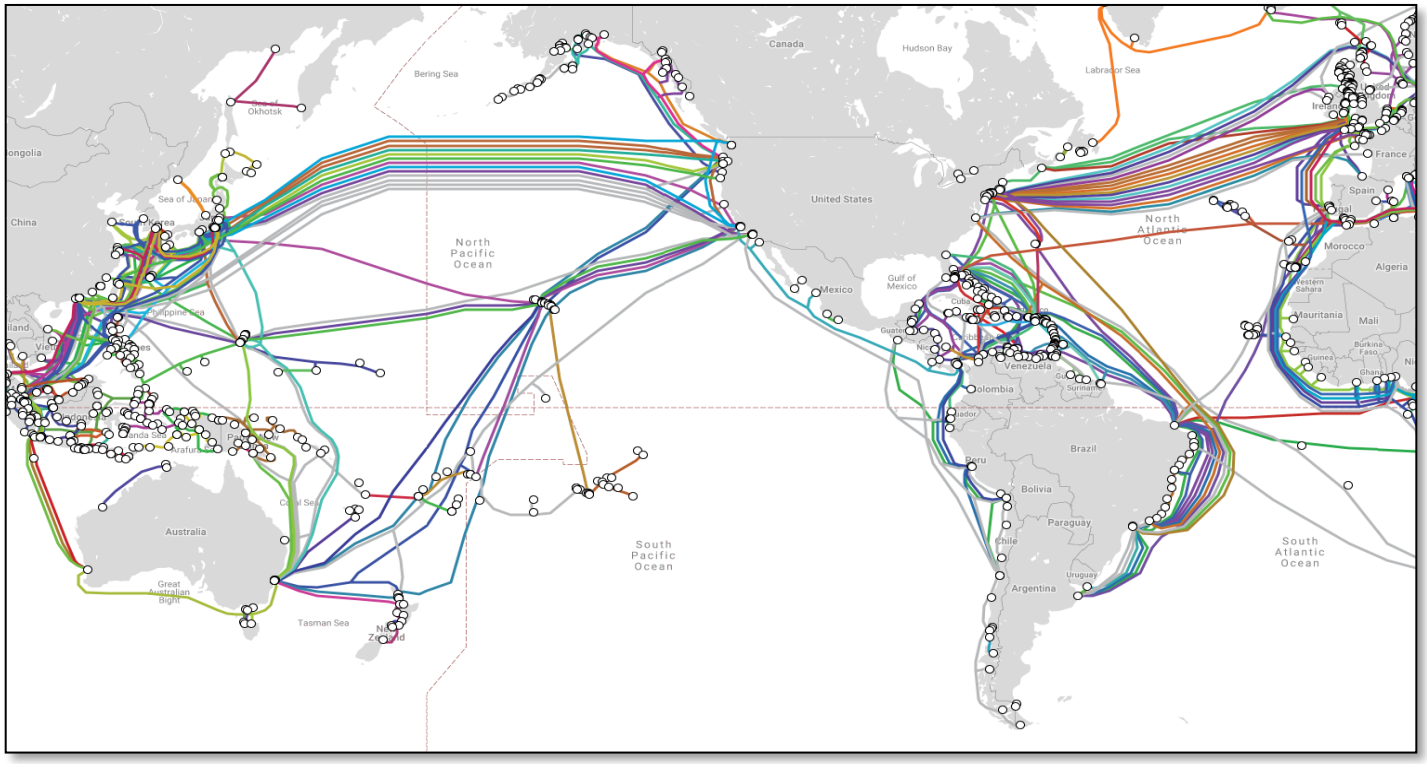
Norfolk Island's connectivity to mainland Australia has been the source of considerable angst for residents. With the growth in data driven and digital services, Norfolk Island is constrained by satellite communication. While connectivity is achieved, the cost and complexity involved in delivering basic services are not sustainable over the long-term.

Satellite communication, while serving a critical function is not well suited to the ongoing commercial and domestic needs of Norfolk island.

* https://www.regional.gov.au/territories/norfolk_island/

Norfolk Island and Information-led economic growth

The NIRC understands the potential of leveraging the increased creation and use of data to deliver organisational efficiencies, and improve service delivery and economic growth on the island. Implicit in a modern economy is access to high speed internet. At a city/region/island level this must be more than a domestic connection. In the same way an airport can connect a island directly to the world, an international internet connection is now a **<u>critical enabler for social and economic growth</u>**.



Submarine Cable Map (2019)

Missed opportunity

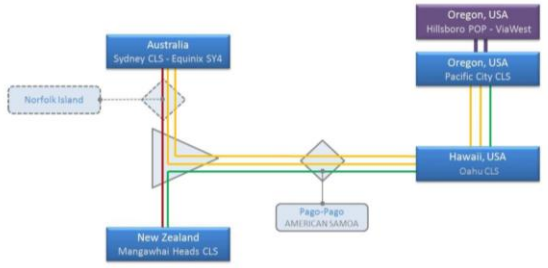
In 2016, NIRC was presented with a carrier neutral system from Hawaiki Submarine Cable which did not proceed. This comprised of a ~ 42 Terra Bits Per Second (Tbps) capacity and a guarantee of 100 Mega Bits Per Second (Mbps) to Australia. In return for a ~$14m (AUD) investment (plus on going costs), Norfolk Island would have received a branch of approximately 90km long, unrepeated (unpowered) 2 fibre pairs branch with a design capacity of 100 Giga bits per second (Gbps). This connection would have offered direct connectivity to Australia, New Zealand and, USA. **This opportunity did not proceed.**

Norfolk connectivity I The right technology for broadband Internet access

Applications	Submarine cable	Satellite
Voice telephony	Yes	Yes
Email	Yes	Yes
Low speed Internet (10 Mb)	Yes	Yes
High speed Internet (100 Mb)	Yes	No
Ultra fast Internet (1 Gb)	Yes	No
TV broadcast	Yes	Yes
High Definition TV broadcast	Yes	No
Next generation TV broadcast (4k / 8k / 16k)	Yes	No
e-Health (real time echography, scanner, MRI)	Yes	No
e-Education HD	Yes	No
e-Administration	Yes	No

- In 2016, the lack of broadband Internet access already represents a major obstacle
- In 10 years from now, it will make economic development almost impossible
- Satellite will never be as fast as submarine cable (speed of light)
- Norfolk Island and its inhabitants must be connected to a submarine cable to have the same level of service as Australia and have equal chance with the other Pacific Islands

Hawaiki system design I Configuration



Technology

- Coherent D+ fiber design
- Transmission:
  - ✓ 100 x 100 Gbps wavelengths on Trans-Pacific
  - ✓ 120 x 100 Gbps wavelengths on Trans-Tasman
  - ✓ Design capacity of 42 Tbps
- Redundant fiber backhaul from Pacific City CLS to ViaWest Hillsboro POP

Segment	From	To	Distance	Latency
			km	ms
AU - US	Sydney	Pacific City	13 280	133
NZ - US	Mangawhai	Pacific City	12 518	125
HI - Mainland	Oahu	Pacific City	4 330	43
AU - NZ	Sydney	Mangawhai	3 211	33
US Backhaul	Pacific City	Hillsboro	156	2,5

Opportunity to connect Norfolk Island:

- Connection through OADM Branching Unit (BU)
- To be implemented on the NZ-AUS fibre pair
- Direct connection to NZ, Australia, Hawaii and the US within single system

Why an international submarine cable matters to the NIRC

Traditionally, economies trade in physical goods and services transported by air, sea and land. The free trade of these activities is a crucial enabler of economic growth.

The capital investment to provide the infrastructure needed to move physical goods can stretch into the billions of dollars. As such, significant ports (air, sea and land) are confined to capital cities, stifling the opportunities outside those areas.

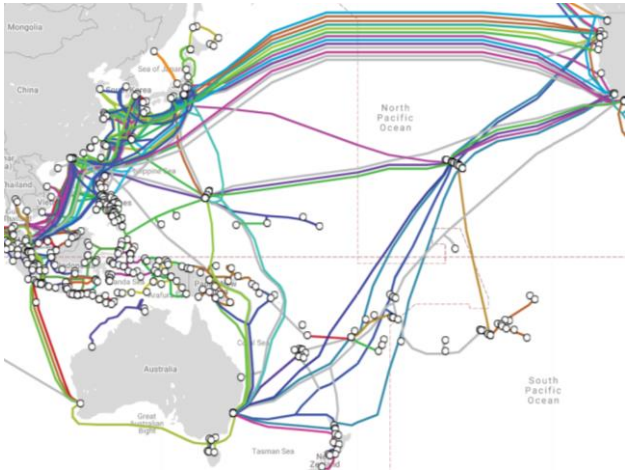
While these industries continue to provide much needed economic prosperity, the last ten years have been defined by the **trading of data** through the internet regardless of location.

From basic websites, music, movies, goods and services and virtual experiences, **data provided at ever-increasing speeds and volumes** has cemented access to the **internet as critical infrastructure**.

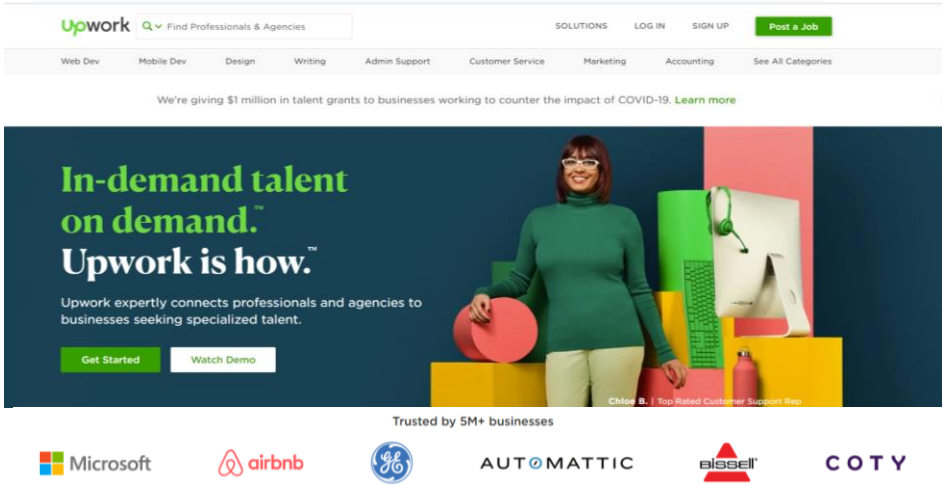
Why is this so important to the Norfolk Island economy?

The diagram to the right shows how undersea cables dominate the region around Norfolk Island. They offer a strategic advantage to 1st and 3rd world economies within the island region.

A submarine cable for Norfolk Island represents a fast, scalable, reliable and cost effective internet connection. Satellite connections, while extremely valuable are a shared and limited resource. Bandwidth usage on satellites is relatively expensive and latency is higher than with a submarine connections.



https://www.submarinecablemap.com



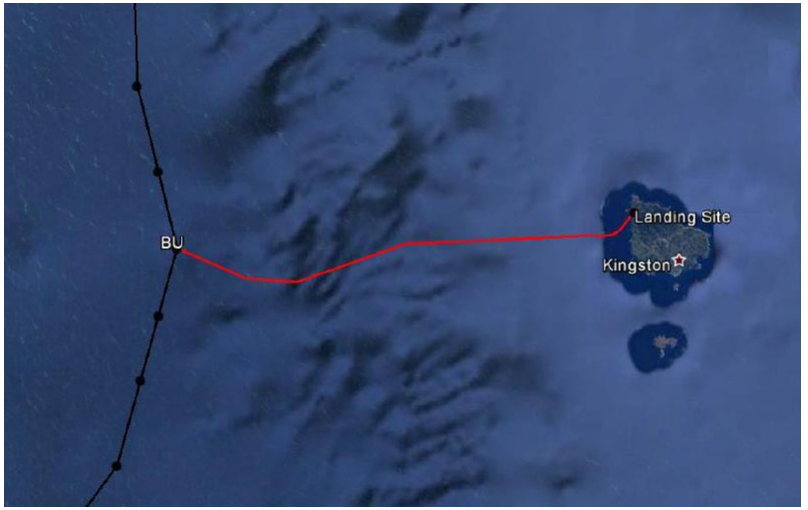
https://www.upwork.com/ is an example of economic opportunities for Norfolk Island residents. Upwork is an on demand talent platform used by major brands globally. On demand access to talent regardless of geography is now accessible. This platform is now a primary source of income for many people regardless of their location.

The challenge

During the last five years a significant amount of analysis has occurred on the islands economics* and wider financial sustainment**. The evidence has highlighted an over reliance on external assistance and a narrow economy focused around tourism. The numerous reports contain significant feedback from the Island's residents highlighting the need to change economic direction.

An investment in an undersea cable is a major undertaking for any nation. Such a project must be well planned and the return on investment (ROI) must be understood from the outset. While Norfolk Island was offered an undersea cable in 2016 for <$20M (AUD), the variables have now radically changed leading to a very different cost model.

Norfolk Island was given the opportunity to create junction point (branching unit) in the cable at the nearest point to the Island, ~50km off shore. This investment would have been cost effective given the small (relative to undersea cables) distance from the junction point. The only viable junction at this point is in the closest cable now some 440km from Norfolk Island. Such a branch from the Hawaiki Submarine Cable System would now come at a higher cost.



* http://www.norfolkisland.gov.nf/tourism-and-economic-development/economic-development
** https://www.regional.gov.au/territories/norfolk_island/norfolk-island-economy/files/2019_Norfolk_Island_Inquiry_final_report.pdf

Current State

NIRC currently provides telecommunications for many domestic and commercial* applications on the island. This is operated as a beneficial enterprise, the notable elements related to this are:

- Primary Satellite connection, 113 Mbps download and 37 Mbps upload capacity
- A new supplier has been identified offering 150 Mbps download and upload
- A secondary (redundancy) connection is maintained, 20Mbps download and 4Mbps upload
- An extensive underground fibre network (FTTN).

GWI has created a basic model** to demonstrate that all factors remained equal. A five year cost estimate for the satellite connection is ~$8M investment. GWI understands that due to range of factors including NBN that Norfolk Island Communications does not operate in surplus. The basic model does not factor:

- Inflation
- Increased bandwidth
- Asset renewals
- Exchange rates (contracts are in USD)
- Duplication of services by other government agencies.
- Competition from NBN via Sky Muster.

*GWI understand that other satellite services are in use for education and Federal Government agencies.
**Annex A

Future state

For Norfolk Island, the linking of the investment between a submarine cable and a data centre is a powerful economic multiplier but the demand must be well planned. The benefits could include:

- Supporting new jobs, industries and the focal point for new island services.
- Investment attraction for businesses that consume, use or create vast amounts of data storage and compute capacity in a secure location.
- The ability to build local innovation and industry hubs around the capability provided in the island, with optional start-up incubator models taking advantage of services delivered digitally.
- Localised storage of data for local industry growth and economic development.
- High levels of security, redundancy and resilience for core business systems and data.
- Increased local government revenue from new businesses and residents.
- More significant social opportunities through a vibrant economy.

Analysis

GWI has conducted extensive analysis and research* to understand the situation for Norfolk Island. With the undersea cable opportunity not being exploited in 2016, the island's connectivity (for social and economic outcomes) is now dependent upon NBN Sky Muster and Norfolk Island Telecommunications Satellite Service. Anecdotal evidence suggests that there is a steady uptake of NBN on the island, lowering revenue for Norfolk Island Telecommunications.

The costs involved to connect the island with a submarine cable are conservatively estimated to be in the range of $35m - $45m (AUD). This is due to a range of factors, most notably the lack of a local (within 200km) branching unit (BU) of the closet cable. Given the current size of the island's economy, a linear return on investment would not be viable on face value.

The current investment profile for public or even private investment to establish a new undersea cable is not attractive. While the current case could be argued on a social or economic need, the NBN Sky Muster could be considered adequate. GWI is not suggesting that an undersea cable is not required, the approach must be reassessed to ensure the supply of such an expensive asset is considered against genuine demand / return on investment.

GWI believes NIRC has three options to consider which are outlined on the following page.

*Stakeholder interviews, background research and industry insights that included Government, Corporates and telecommunications carrier (submarine cable operators).

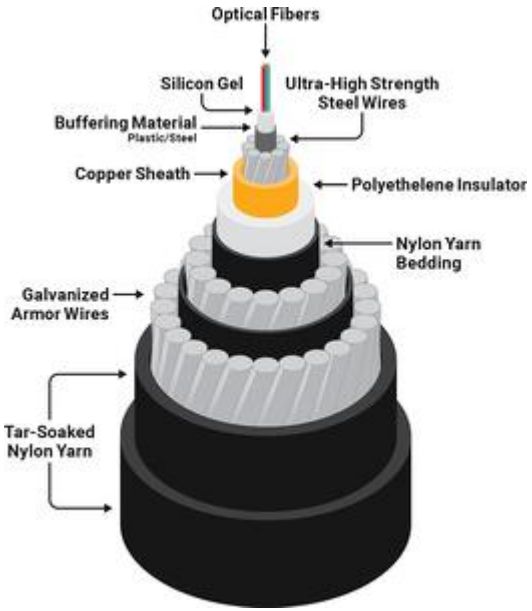
How can a cable be so important?

Telephone Exchanges were the data centres of their day. They provided a central location for all communication of the time (phone, fax and even dial-up internet). With the rise of 'digital everything' the analogue phones and networks of yesteryear have been replaced with the internet, mobile network-connected devices and the internet of things (IoT).

Investing in a Submarine Cable Network will allow Norfolk Island to directly transmit and receive substantial volumes of internet, video, voice and mobile data globally without the latency challenges of a satellite connection.

With this reliable direct global access, Norfolk Island will be positioned to broaden and build resilience into the current economic model, something that is urgently needed*. With the rising demand for internet based products and services - a fast, scalable, reliable and cost effective internet connection for Norfolk Island must be a priority.

Such a project will be a defining legacy admired in decades to come like the airport and port.



Parts of a submarine cable

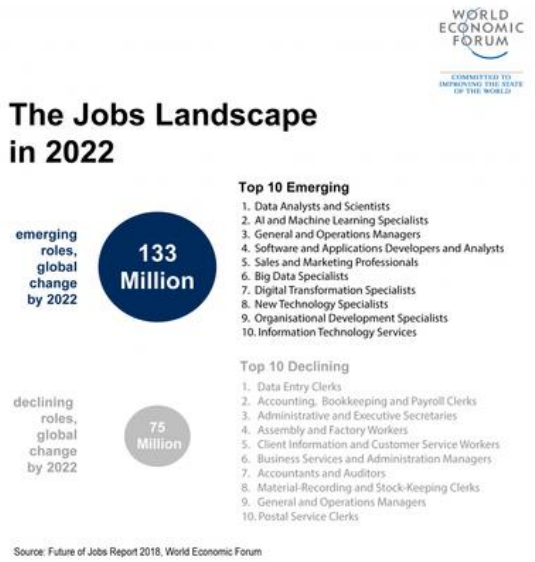
* http://www.norfolkisland.gov.nf/tourism-and-economic-development/economic-development
** https://www.regional.gov.au/territories/norfolk_island/norfolk-island-economy/files/2019_Norfolk_Island_Inquiry_final_report.pdf

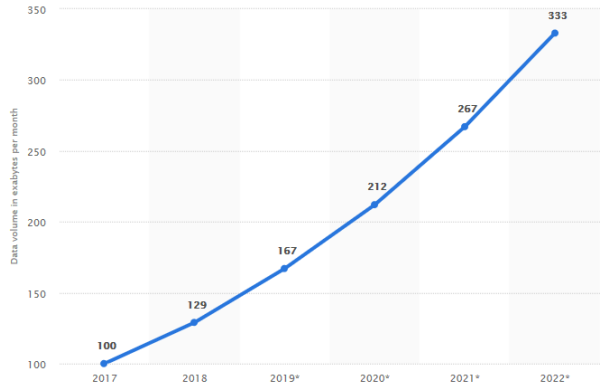
Why does everyone talk about data?

The future of economic growth and employment will be defined around the access, use, storage and trade of data.

The World Economic Forum (WEF) has consistently documented the rise in data literacy as a primary skill for future employment.

With skills globally accessible, it's imperative that international access is available at Norfolk Island's doorstep.





Data Volume of Global Consumer IP Traffic 2017 to 2022 (Exabytes per Month). Source: https://www.statista.com/statistics/267202/global-data-volume-of-consumer-ip-traffic/

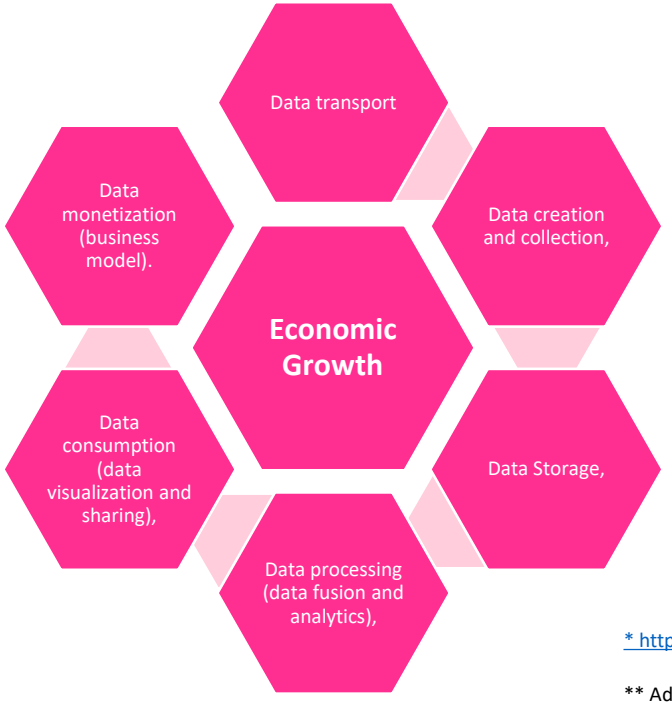
With consumer appetite for data (such as services, movies, gaming, experiences) showing little sign of decline, the NIRC must take **urgent steps** to participate in the data economy. The graph on the left shows that anticipate data demand will continue to increase.

With the onset off fifth generation mobile technology (5G), consumer and business data needs will only grow further and Norfolk Island must stay connected.

Is data really worth something?

Businesses and governments are increasingly 'data centric', and their business models are founded on data collection, retrieval, value addition and in some cases sale. It's estimated that the data economy will be worth $13 trillion (USD) by 2030*.

The valuation of data provides a significant opportunity to gain competitive advantage for places like Norfolk Island as geography is no longer a factor. Those economies that are not investing in their data infrastructure will experience greater barriers and slower economic growth. The model** below defines data value activities that enable social and economic growth in a modern economy.



Norfolk Island **must enable and participate** in some or all of these activities to enable future economic growth.

* https://hbr.org/2019/01/which-countries-are-leading-the-data-economy

** Adapted from Visconti et al. (2017) data value chain

gwi

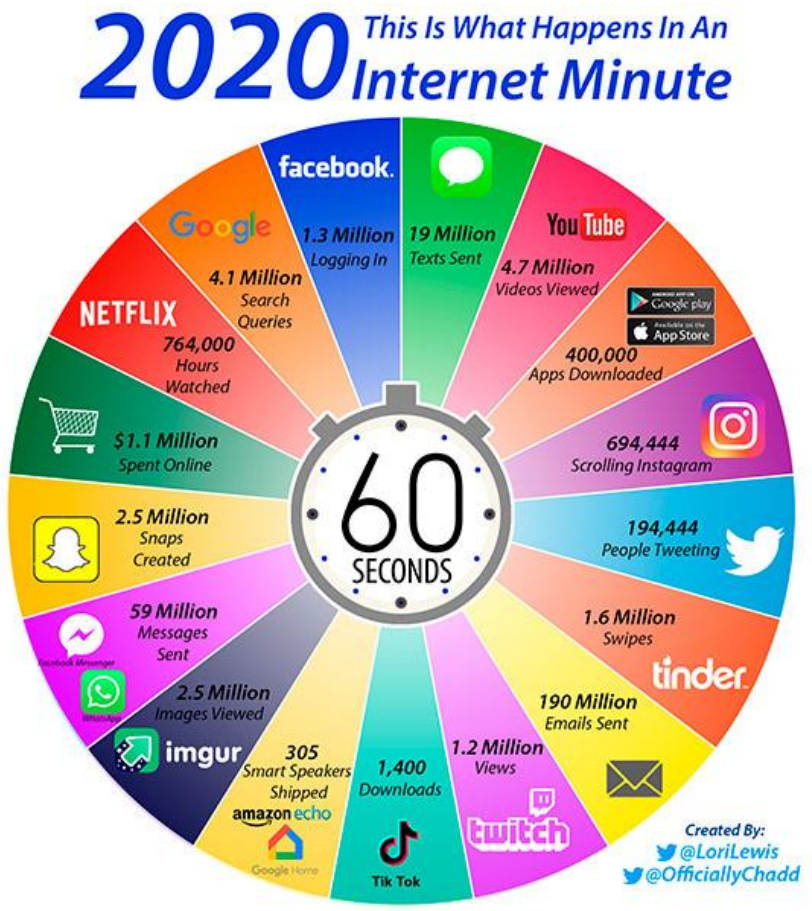
Will there be the internet demand?

By 2025, the premier global market intelligence firm, International Data Corporation (IDC), have stated worldwide data will grow by 61% to 175 zettabytes (currently ~ 50ZB). Growth has not been and will not be linear, but exponential. Data creation and consumption has grown so rapidly that 90% of the world's data was created in the last 2 years.

Much of this data will reside in data centres, known as the cloud. First and even third world economies are investing in the critical infrastructure to leverage the social and economic opportunities of this data growth.

While traditional infrastructure such as roads, rail, bridges and housing has an indispensable role, there is a need to evolve to meet future economic demands.

To achieve sustained economic growth and remain competitive, Norfolk Island must invest in the capacity and capability to access, store and trade vast amounts of data needed in a modern economy.

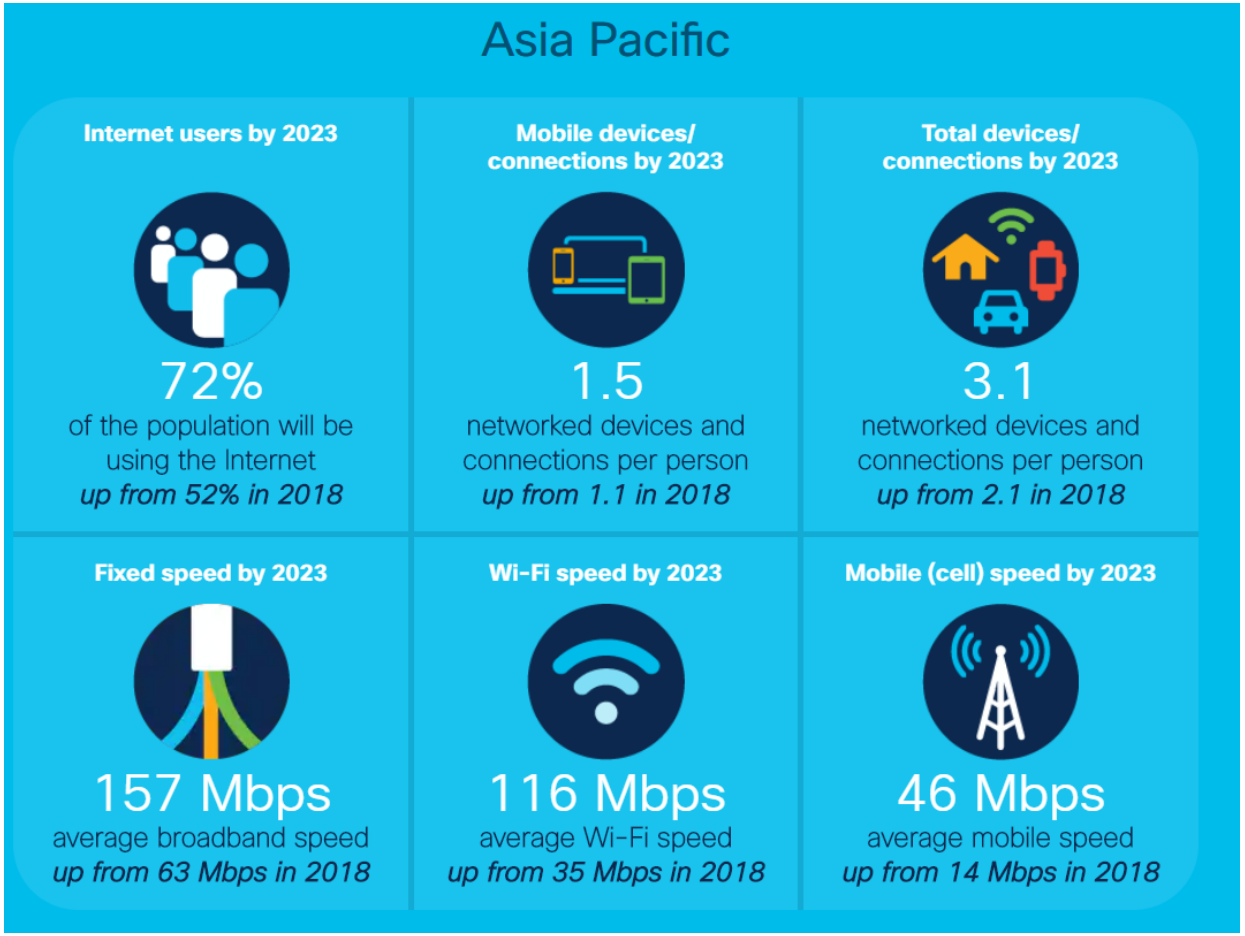


- (1) https://economy.id.com.au/gold-coast/employment-by-industry
- https://www.networkworld.com/article/3325397/idc-expect-175-zettabytes-of-data-worldwide-by-2025.html

The Asian Pacific demand

The Cisco* Annual Internet Report is a global forecast/analysis that assesses digital transformation across various business segments (enterprise, small-to-medium business, public sector, and service providers). The report covers fixed broadband, Wi-Fi, and mobile (3G, 4G, 5G) networking.

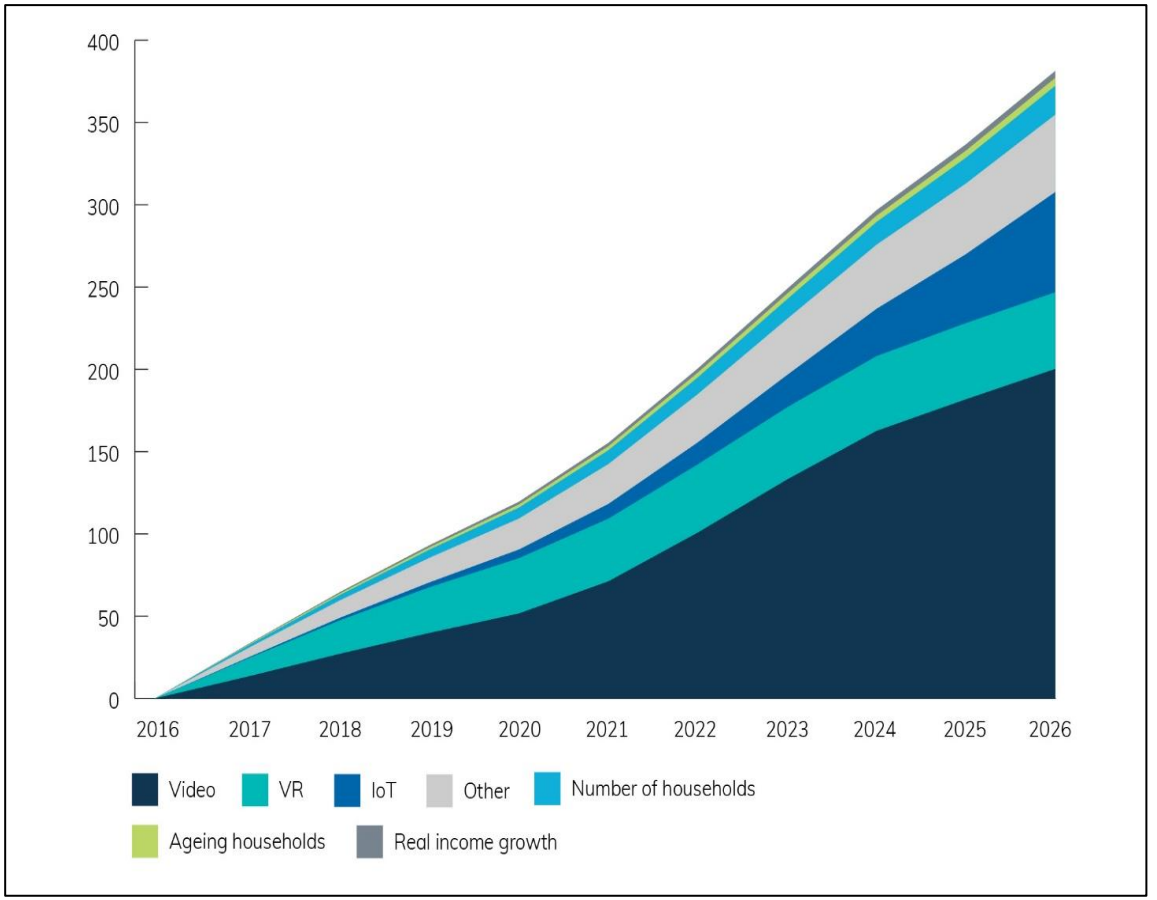
The infographic to the right demonstrates growth in digital and data demand within the Asia Pacific region.



*https://www.cisco.com/c/en/us/solutions/executive-perspectives/annual-internet-report/index.html

The Australian Demand

The diagram* to the right reflects households spending more time watching video over the internet and that content providers will also shift from SD or HD video to 4K and 8K content that is more data intensive. This means that both SD and HD video are expected to contribute less to overall demand in 2026 when compared to 2016. Further improvements in compression technology mean that the bandwidth requirements for each video type decline over time. Compression rate improvements also apply to VR technology.



*https://www.communications.gov.au/publications/demand-fixed-line-broadband-australia

Options

The options analysis highlights the stark choices for NIRC. GWI recommends option three as the preferred way forward.

	Option 1- No change	Option 2 – NBN	Option 3 – Build the case and change the game.
Summary	Do nothing – Make use of current satellite links. Continue to compete with NBN Sky Muster.	Cease satellite services via Norfolk Islands Communications, direct all traffic to NBN Sky Muster.	Conducted detailed economic analysis to understand current and future digital/data demand. Build a genuine case for great bandwidth with a strong economic and social narrative.
Negative	Bandwidth and service will be limited, costs will increase over time and NI Telecom will be unable to compete with NBN. Community unrest will continue. Ongoing duplication.	Less control over service delivery and job losses may occur within NI Telecom. Limited services and more expensive over the long-term.	Funding required to support the analysis. Large scale changes required in the island economic mix.
Positive	No extra costs, no further requested to the Federal Government.	Lowering costs and risks related to telecommunications.	Long term vision, economic and financial sustainability. Digital connectivity to meet growing demand.

Recommendation – Option 3

GWI believes there is limited funding available for a new connection to the island without a robust business case and strong economic plan. GWI recommends that NIRC seek to conduct detailed economic analysis to understand current and future digital / data demand.

To attract the required investment, NIRC must be able to robustly articulate the market demand. GWI highlights the following elements of the market demand for Norfolk Island:

1. Current demand (domestic and industrial).
2. Future demand based on a different economic model (domestic and industrial).
3. Aggregated demand analysis. Combined expenditure across all Norfolk Island stakeholders.
4. Strategic vision demand e.g. Norfolk Island offering defence or research capability.
5. Strategic review of the Norfolk Island Exclusive Economic Zone (NIEEZ).

Option 3: Build the case and change the game

Understand

Undertake consultation to confirm the key elements of the Norfolk Island economy, including:

- Economic drivers, including the need to better leverage local capability and the need to broaden the base of the local economy and grow local businesses.
- The need to collaboratively and inclusively build an approach which will shape the future of the island.
- The need to create value to the residents of the island.
- Create a game changing economic vision and plan for long term self sustainment.

Market Demand

- Carry out an initial assessment of the Island's entire digital and data demands.
- Conduct an assessment of all costs aggregated into a single financial model.
- Assess the potential strategic defence capability of Norfolk Island.

Analyse

- Construct a robust cost benefit model over 25 years to define Satellite V submarine cable.

Develop

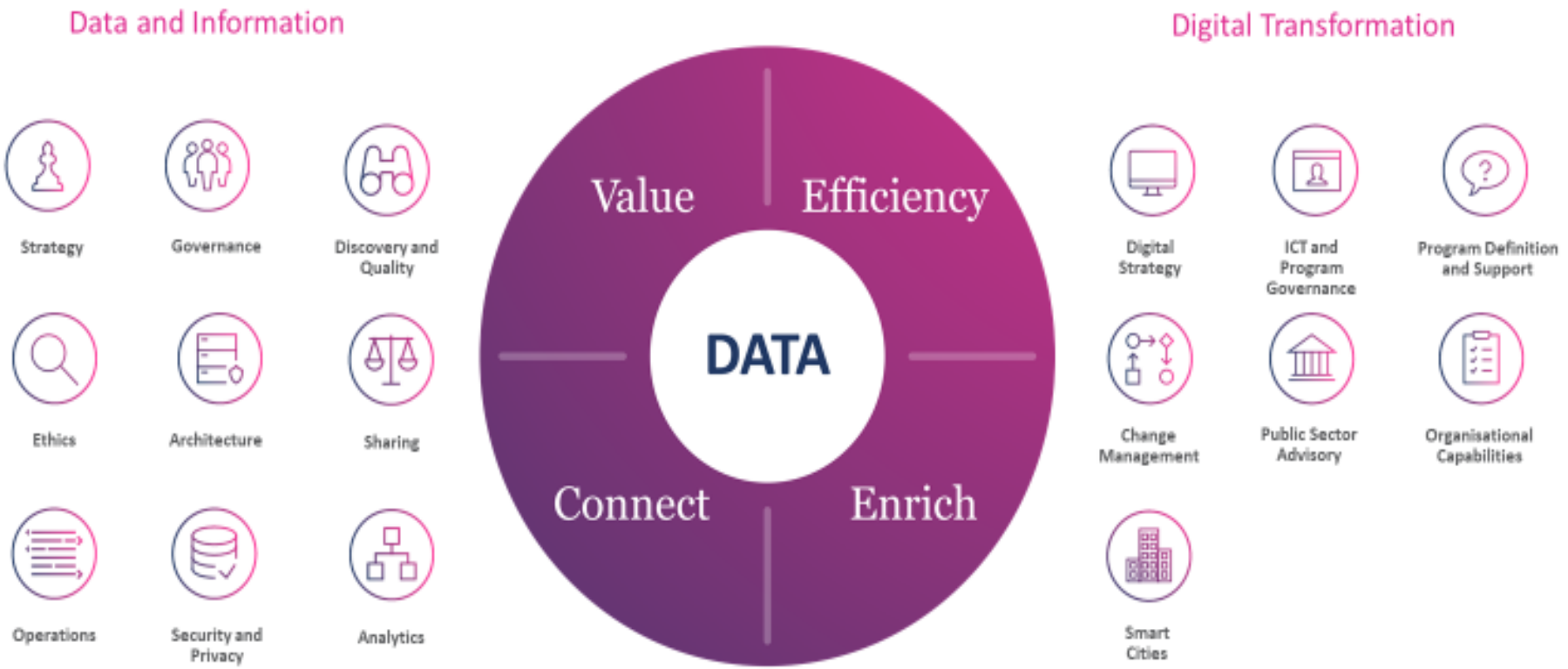
- Develop the proposed model, based on opportunities identified and existing knowledge about the island and lessons learned.
- Produce a high-level community engagement and communication plan.
- Create a mature budget proposal for the Federal Government and a pathway to being financially self-sustaining.

Deliver

- Deliver an evidenced based model of social and economic demand for Norfolk Island connectivity.
- Deliver an implementation plan outlining and sequencing the next steps.
- Commence project 2021.

Who is GWI?

Why GWI


Data and Information
Strategy
Governance
Discovery and Quality
Ethics
Architecture
Sharing
Operations
Security and Privacy
Analytics
Value
Efficiency
DATA
Connect
Enrich
Digital Transformation
Digital Strategy
ICT and Program Governance
Program Definition and Support
Change Management
Public Sector Advisory
Organisational Capabilities
Smart Cities

Why GWI

We've equipped clients across a range of sectors with the bandwidth to deliver.

- Government – Local, State and Federal
- Public safety and justice
- Finance, superannuation and insurance
- Not-for-profit
- Tourism, transport and logistics
- Utilities and energy
- Healthcare and social services
- Higher education
- Gaming and entertainment

Why GWI – Corporate and social Responsibility

Our staff are empowered to choose annual causes we can support. We've supported PlanetArk, REDcycle, Dressed for Success and more.

Every year we run 110km overnight to raise tens of thousands to end domestic violence. In 2018 GWI was a major sponsor of the event.

Through our pro bono program we supported the GMRF's PTSD initiative to improve support services for Australian war veterans.

We believe in diversity in the tech sector. GWI support the amazing work of the Tech Girls Movement through mentoring students and judging the Tech Girl Superhero competition.

GWI staff participate in the Beyond Blue Movember Foundation charity challenge to help raise money for men's health.

Every night more than 100,000 Australians sleep rough or couch surf. Every year we sleep rough too to fund services for the homeless.

GWI staff participate in R U OK? Day each year, a national day of action in September initiated by the Mental Health Commission of NSW dedicated to reminding people to ask family, friends and colleagues how they are going in a meaningful way.

GWI supports Share the Dignity's It's in the Bag annual Christmas campaign. Each year GWI staff donate bags filled with items for homeless women and other women in need to support this great cause.

GWI is a major sponsor for this year's Cairns Indigenous Arts Fair, which is committed to strengthening and celebrating culture, creating professional development opportunities for artists, and cultural exchange between Aboriginal and Torres Strait Islanders and visitors.

Annexures

Annex A – Cost model for current state.

GWI has created a basic model** to demonstrate that all factors remained equal. A five years cost estimate for the satellite connection is ~$8M investment. GWI understands that due to range of factors including NBN that Norfolk Island Communications does not operate in surplus. The basic model does not factor:

- Inflation
- Increased bandwidth
- Asset renewals
- Exchange rates (contracts are in USD)
- Duplication of services by other government agencies.
- Competition from NBN via Sky Muster.

	USD Month	AUD Month (1.45 to USD)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Primary Connection	$ 64,334.00	$ 93,284.30	$ 1,119,411.60	$ 1,119,411.60	$ 1,119,411.60	$ 1,119,411.60	$ 1,119,411.60	
Secondary connection	$ 12,000.00	$ 17,400.00	$ 208,800.00	$ 208,800.00	$ 208,800.00	$ 208,800.00	$ 208,800.00	
Estimated On costs(staff, power, maintenance etc)		20%	$ 265,642.32	$ 265,642.32	$ 265,642.32	$ 265,642.32	$ 265,642.32	
	Total		**$ 1,593,853.92**	**$ 1,593,853.92**	**$ 1,593,853.92**	**$ 1,593,853.92**	**$ 1,593,853.92**	**$ 7,969,269.60**

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