

Changing business models in Australia and the Cook Is.

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About the Author:

John de Ridder is a former Chief Economist of Telstra, Australia's largest telecommunications services provider. He led its team on the world's first costing of the community service obligation and its debates on how competition should be introduced to Australia. Then he was the first commercial manager of its inaugural interconnect unit; leaving this unit to join a new corporate pricing division after the first commercial interconnect with Optus had been completed. In the pricing division, he had visibility from the 'chinese wall' of all fixed, mobile, retail and wholesale pricing. His final two years in Telstra were back in wholesale with a focus on mobile and data pricing.

Since leaving Telstra in 2002, he has consulted to a range of national and international private and public sector clients. He wrote a report for the OECD on broadband take-up and re-wrote the competition and price regulation module of the ITU's [ICT Regulation Toolkit](#).

In the Pacific region, he has been a long-term consultant to the government-owned telecommunications entities in Papua New Guinea, as well as a consultant on competition and broadband pricing to government and industry in Fiji, the Solomon Islands and the Cook Islands.

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1 Summary

This paper is for telecoms operators and regulators who are trying to understand how business models for telecommunications have evolved and what this means for them today. It draws on the author's forty years of experience in Australia and applies it to the specific case of the Cook Islands – a tiny telecommunications market, but still relevant to the challenges experienced around the world.

The Cook Islands is embracing competition at a time when the nature of telecommunications markets has changed fundamentally with implications for operators and regulators in all countries; whether large or small.

Australia was one of the first countries to experience competition. This experience was in the context of circuit-switched fixed (PSTN) and mobile (2G) networks. The business model was based on growing the number of customers and their usage revenues. Initially, regulation of competition was aimed at facilitating access to connectivity services (wholesale access pricing) and managing fair competition (trade practices). This was during the telephony era of telecommunications.

Australia is getting to grips with the new digital world in which connecting customers is just a part of a larger internet value chain. With the loss of traditional revenues, there is now an increased focus on reducing costs¹, as well as searching for new revenue opportunities.

The Cook Islands is dealing with this transition to a digital world at the same time as introducing competition. Its current legislation is framed in the context of the telephony era. Policy makers and the regulator want to ensure that all islanders benefit from the new digital capabilities without losing existing services; particularly in the Pa Enea (Outer Islands).

In my view, the Cook Islands needs a strong incumbent that guarantees the resilience of the sector and can co-exist with competition and the new digital environment. Culture and regulation in the Cook Islands could support that – perhaps more easily than in developed markets with ingrained concepts of how competition and telecommunications markets work.

2 The Beginning

Initially, in many countries telecommunications was part of the government owned post and telegraph office. The incumbent in the Cook Islands remains responsible for postal services in the outer islands. In Australia, the Post Master General's Department was split into Australia Post and Telecom Australia in 1975.

A government-owned monopoly has almost complete discretion over how it runs telecommunications, subject to Ministerial fiat and the regulator, if it exists. A major government objective is often universal and affordable access to telecommunications services. This was for many years the key objective for the copper, public switched telephone network (PSTN).

The universal service objective was used by the incumbents in the USA (AT&T) and Australia to delay network competition which might compromise that objective. To delay network competition, Telstra thought that universal service cost at least A\$1 billion pa. But a study done jointly with government

¹ A 10-year mobile infrastructure sharing deal (subject to ACCC) announced in February 2022, will boost Telstra's revenue and help TPG improve its mobile coverage. TPG will decommission 725 mobile sites and give Telstra access to 169 of its existing mobile sites. Telstra will also gain access to TPG's 4G and 5G spectrum holdings, providing the incumbent telco cost-effective access to spectrum that will help expand its fixed wireless services. Source: Telstra, TPG Telecom bury the hatchet on mobile sharing, SMH Feb. 21, 2022

found the cost varied between A\$240m and A\$800m pa depending on the costing methodology². Australia licensed a fixed line duopoly in 1991 (Telstra and Optus) and introduced open network competition in 1997.

A similar universal service costing exercise was conducted for the Cook Islands which found the cost varied between NZ\$0.9m and NZ\$4m pa depending on cost definitions³. The Cook Islands issued several ISP licences in 2021 but has not issued a second mobile licence yet.

But the real issue for universal service was not the cost but retail pricing⁴.

To promote universal service, a monopolist could encourage take-up by keeping monthly line rentals below cost. To do that, call prices had to be much higher than cost. In fact, communications networks have largely fixed costs: the marginal cost of calls is very low. With a monopoly, this cross-subsidy was sustainable. But with service-based and infrastructure-based competition, this bundling of line rental and calls was no longer possible because call revenues became contestable.

2.1 Service-Based Competition

The initial focus for competition in the telephony era world was usually service-based competition. This entailed providing new entrants with originating and terminating access to customers on the incumbent's fixed copper access network (i.e. the connection between the home and the local exchange). Customers would continue to pay the incumbent for line rental but could choose to put their calls through another service provider; who would pay a small wholesale fee to the incumbent for each call (see Example 1 below).

Example 1: Service competition and Telstra's response

In 1995, the retail cost of a five minute call between Melbourne and Sydney was 166 or 154 cents using Telstra or Optus respectively. The access network at each end belonged to Telstra and if the call was made using Optus inter-capital transmission, Telstra would get total regulated interconnect fees across both ends of the five minute call of just 27 cents.

Telstra rebalanced retail tariffs. Today, Telstra does not even charge for calls. Residential customers wanting a fixed voice service can get phone line service with unlimited calls to local, national and standard Australian mobile numbers for A\$55 per month⁵.

Mandated originating (and terminating) access made sense because the fixed access network is a natural monopoly (except in high density areas). This means it is inefficient to duplicate the fixed access network; particularly in a developing country with scarce capital.

New entrants usually leased long-distance transmission capacity between population centres from the incumbent. Later, they obtained independent microwave, fibre or satellite backhaul. But access to fixed line customers at each end was through the incumbent's copper access network.

² Bureau of Transport and Communications Economics, Report 64, The Cost of Telecom's Community Services Obligations, 1989

³ Telecommunications Act 2019-Public Consultation No. 2 <https://cra.org.ck/consultations>

⁴ De Ridder J. Universal Service and Competition – What Counts? In the Telecommunications Journal of Australia, Vol. 45, No. 3, 1995

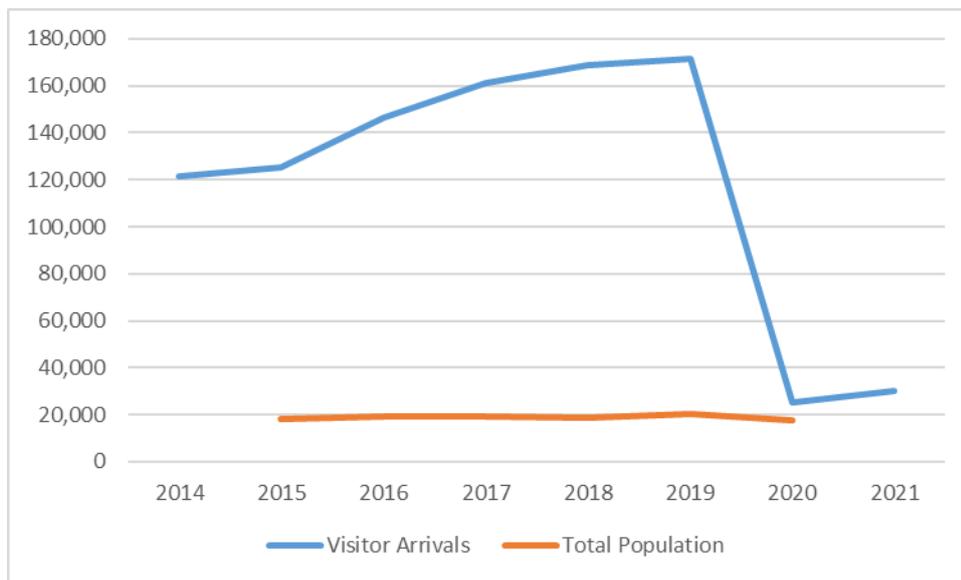
⁵ <https://www.telstra.com.au/home-phone>

Providing new entrants with access to customers on the fixed access distribution network meant that the incumbent could no longer count on call revenue to cross-subsidise line rentals. They had to ‘rebalance’ retail tariffs – raise line rentals so they could lower call prices to be more competitive.

At Telstra in 2000, fixed line call revenues accounted for over one third of total revenues. In the Cook Islands, they are just 6% of total revenue (but 13% including both fixed and mobile calls). So, the Cook Islands is not as exposed as Telstra was in 2000. But it can still be ‘cherry-picked’ – new entrants will target the most profitable services.

In Australia, the most profitable segments of the market were international and long-distance calls. In the Cook Islands, the tourist dollar (roaming and resorts) is a key target (see Figure 1⁶).

Figure 1: Tourist arrivals and total population – the Cook Islands



New entrants have to ‘buy’ market share by pricing under the incumbent. New entrants target ‘low hanging fruit’; especially tourist dollars, resorts and corporates. With satellites they can also target niche markets like boats and sensor networks. This does not require much advertising (except at airports and other points of entry for tourists) and direct approaches can be made ‘below the line’ (i.e. customer-specific pricing direct to client without advertising).

An incumbent cannot match entry prices when it cannot price discriminate and its own large market share would make the cost very high. A price war would destroy the profitability of the whole industry, jeopardising investment. Incumbency usually confers a competitive advantage through a strong brand, knowledge of customers and the provision of a ubiquitous and comprehensive suite of services.

While an incumbent should not try to match entry pricing, it could try to stop any new entrant owning blanket claims (i.e. ensure there are exceptions to ‘always cheaper’). And it may be able to offer frequent and temporary promotions and special offers.

2.2 Infrastructure-Based Competition

With infrastructure-based competition, a new entrant rolls out its own access and transmission networks. Typically, a new entrant deployed a mobile network; especially in developing countries

⁶ <http://www.mfem.gov.ck/statistics/social-statistics>

where fixed networks are not well established. Mobile networks are usually relatively cheap to get started and quicker to roll-out than fixed networks.

Policy makers typically believe that infrastructure competition is more effective than service competition. This is because with largely fixed costs and low marginal costs in networks, there is a strong incentive to grow market share to reach the scale needed to be financially sustainable⁷.

The Cook Islands legislation assumes one or more mobile entrants.⁸ An analysis of peer countries – those that had some market features in common with the Cook Islands and which had introduced a second mobile operator within the last decade – suggested that it may be possible to have a competitive second mobile entrant despite the tiny size of the Cook Islands market. But COVID-19 has delayed the opportunity to test interest in such market entry.

As with service competition, new mobile operators aimed in the early (pre data) days at lucrative call revenues. The incumbent was under more pressure to rebalance tariffs because the infrastructure entrant was under more pressure to achieve scale than in the case of service competition.

Example 2: Rebalancing in Papua New Guinea

In Papua New Guinea the new entrant, Digicel, rolled out a 2G mobile network and quickly became the dominant telecommunications operator in Papua New Guinea. In 2013, Telikom PNG undertook



The advertisement features three individuals using mobile phones. Text overlays include: 'Talk more on Fixed Line to Fixed Line for only 1t/min', 'Citifon calls from as low as 10t', and 'Save more on Fixed Line calls to other networks'. Logos for Telikom PNG (Always 4 here!) and the 2015 Pacific Games (Platinum Sponsor) are also present. At the bottom, it lists '24/7 Customer Care: 3456789 | www.telikompng.com.pg' and 'Exclusive Telecommunications Company for 2015 Pacific Games'.

a major retail price rebalancing of its voice services. Conventional rebalancing was impossible because very few fixed line customers paid monthly rentals. So Telikom had to rebalance within the call tariffs. The flagfall was tripled from 20 to 60 toea to achieve new 'fair and simple' prices that could be easily communicated (see above) and understood by customers. The number of long-distance zones were reduced dramatically - mobile services do not make any distinction between local and long-distance calls. These and other price changes were needed because pricing on time of day, distance and duration of call would become unsustainable.

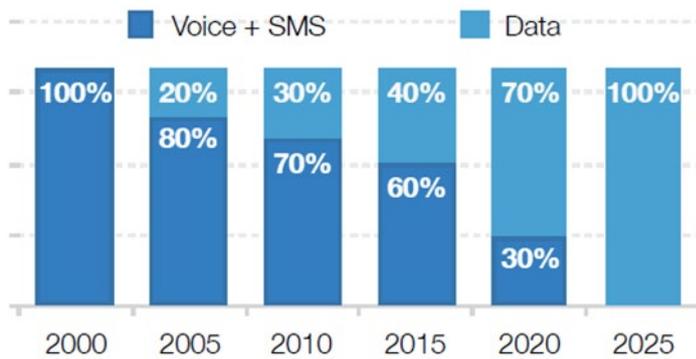
Voice and SMS were the main drivers of mobile operator revenues. But that has been changing rapidly with the advent of flexible digital networks that can carry any service; as illustrated below⁹.

⁷ Breakeven market shares suggested by regulators vary widely; see expert's report attached to Telecommunications Act 2019-Public Consultation No.1 at <https://cra.org.ck/consultations>

⁸ See the last of the mandated access services listed at Clause 40 of The Act

⁹ C. Stork and S. Esselaar, RIS, October 2019

Figure 2: Revenue is moving towards data only only business model



The transition may not be as fast in the Cook Islands because it depends on widespread adoption of 3/4G mobile phone devices with data capability. While Rarotonga and Aitutaki both have 4G (and both are connected to the new Manatua submarine cable) and Atiu, Mauke & Mitiaro have 3G, most of the other islands have only 2G which has limited data capacity¹⁰. But Vodafone Cook Islands (VCI), the incumbent, is racing to deploy 4G everywhere quickly to remain competitive and drive traffic.

3 Digitisation:

Digitisation has had seismic impacts on both fixed and mobile service operators. It is much more important than the advent of broadband. Digitisation turns all content into data so there is no distinction between voice, text and video for the purpose of carriage. Broadband just makes carriage faster.

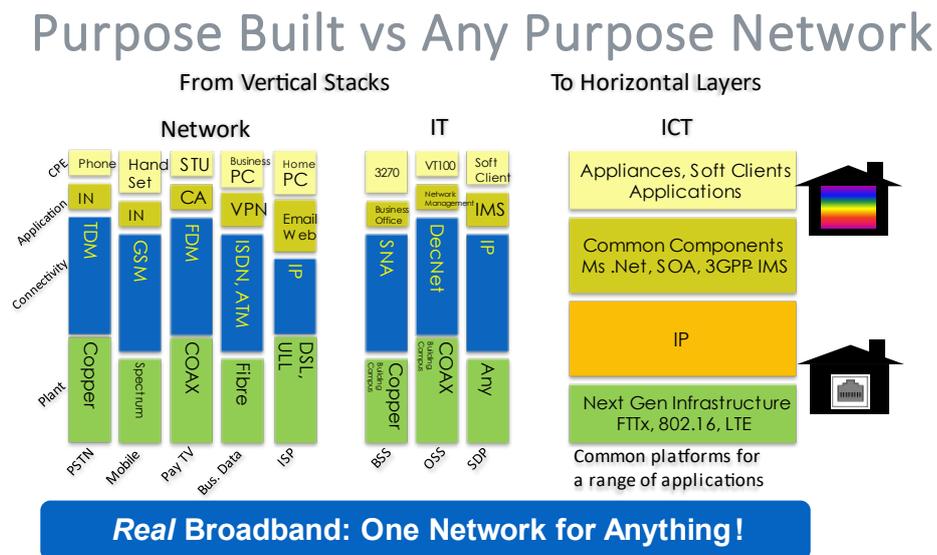
Digitised networks are replacing traditional circuit switched networks for both mobile and fixed line (PSTN) networks. In 2012, I updated and re-wrote Module 2 (Competition and Price Regulation) of the ICT Regulatory Toolkit for the World Bank/ITU, removing all references to PSTN cost models; noting that the era of data had arrived.

Before digitisation, networks were designed in 'stacks' around services and applications – below, the first three stacks are for the PSTN, mobile services and Pay TV¹¹.

¹⁰ <https://www.vodafone.co.ck/connect-4g>

¹¹ R. James and J de Ridder, Fixed Broadband – Australia's Next Utility?, Communications Policy and Research Forum, September 2008

Figure 3: Digitisation's impact on networks and services



Source: Robert (Bob) James, 2008

With Internet Protocol (IP), voice, data and video – and anything else - can be digitised. All forms of traffic are carried as data (bytes). Digitisation has separated content and carriage.

The separation of content and carriage is similar to the separation of access (line rentals) and call revenues that came with the introduction off competition discussed above – déjà vu. In both cases, existing business models were disrupted.

The first manifestations of the impact of the digital separation of content and carriage were over-the-top (OTT) voice services like Skype which targeted high value international call revenues.

Potentially, all traditional voice and SMS revenue can be taken by OTT providers. And new content players get revenues from end users significantly larger than the carriage provider can get.

4 The Second Mobile Licence

So, why would anyone want the second mobile licence in the Cook Islands when both VCI and a new mobile entrant have to struggle with the transition from the telephony world to the digital world?

It is possible to tweak mobile phones without numbers to provide communications services¹². But the numbering plan is an important resource and in the Cook Islands only VCI and mobile entrant(s) are allocated numbers. Digital services without numbers rely on users at each end of voice, SMS or video connection using the same App. There are many (e.g. WhatsApp, Skype, Facebook Messenger, Viber and WeChat), and users may have more than one.

It is critical for the Cook Islands to be able to issue timely cyclone and tsunami alerts. SMS is the only ubiquitous messaging system. It can reach all or selected parts of the population simultaneously on all mobile networks (with numbers). And SMS can be used by, say, banks for two-factor authentication.

¹² <https://www.techbout.com/use-android-phone-without-sim-card-1113/>

The standard mobile number remains important even as SMS evolves into the Rich Communications Service (RCS; which is SMS over IP). Google incorporates this into its Android operating system. Like SMS, RCS has universal reach. If the receiving phone is not RCS compatible (e.g. not an Android phone), the message defaults to SMS (without the extra features of RCS¹³).

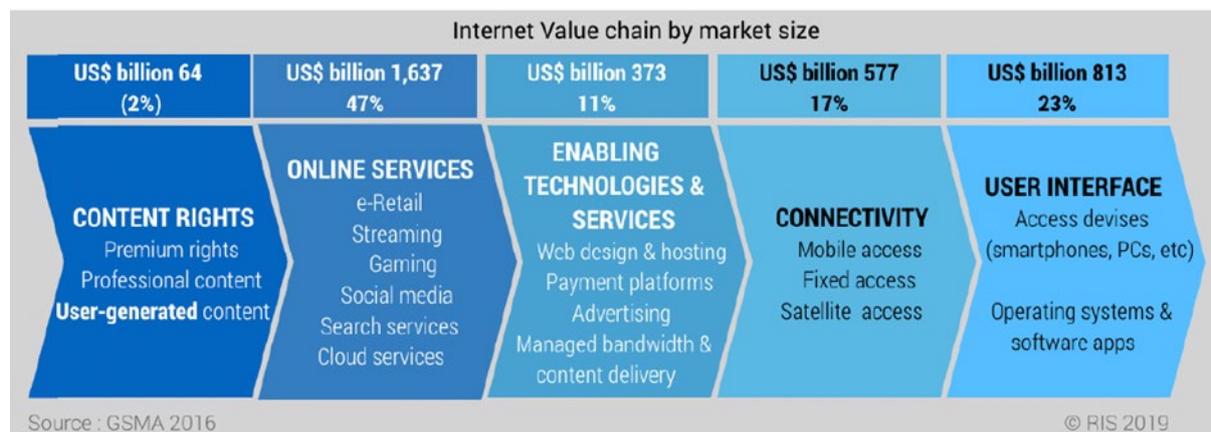
The Cook Islands connectivity market currently has just one provider entitled to use the number plan (VCI) and several ISPs who can provide wireless internet access including OTT communications Apps. Is that enough competition?

If a second mobile entrant arrived, both it and VCI would benefit from infrastructure-sharing that kept down their costs. Infrastructure sharing (including MVNOs) is one of six elements in the ITU's 'recipe for success'¹⁴.

5 The Digital World

Increasingly, network operators are being relegated to commodity carriage while most of the value is captured by content providers and other OTT players¹⁵.

Figure 4: Market share of global internet value chain in 2015



Regulators understand that much of the new value chain is outside their jurisdiction. Future Starlink satellites will have inter-satellite laser links. When asked how that would work with regulators if Starlink satellites could bypass local laws, Elon Musk said 'They can shake their fist at the sky'¹⁶.

In March 2022, Optus' regulatory chief Andrew Sheridan noted an "explosion in services and apps" carried over its network, arguing that some of the biggest global OTT providers are "in effect receiving a massive cross-subsidy" from the telco industry, internet users and taxpayers, while telcos face margin squeeze and growing investment costs.¹⁷

The digital world is the new reality and business models and policy must adapt accordingly.

¹³ <https://www.gsma.com/futurenetworks/rcs/demos-case-studies/>

¹⁴ <https://www.itu.int/pub/D-LDC-ICTLDC-2018>

¹⁵ C Stork and S Esselaar, 2019 at <https://researchictolutions.com/home/wp-content/uploads/2019/11/RIS-evolving-business-models.pdf>

¹⁶ Quoted by Gregg Daffner, president and CEO of the Asia-Pacific Satellite Communications Council (APSCC) <https://www.capacitymedia.com/articles/3829896/leo-satellite-operators-face-regulatory-challenge-panel-hears>

¹⁷ Optus exec laments regulatory burden, OTT players, CommsDay 16th March 2022

6 Carriage Operator Responses

Naturally, network operators fear becoming ‘dumb pipes’ which they see as giving a ‘free ride’ to the OTT players¹⁸. As noted, the challenge for network operators is to find and grow new revenues as the traditional sources of revenue dry up. Some of the key differences between the traditional and new mobile operator business models are illustrated below¹⁹.

Figure 5: The change in the mobile phone business model

	Analogue	Digital
Business model	Service	Connectivity
Metric	Minutes and SMS	bandwidth or throughput
Cost sensitivity	Distance, duration and location mattered	Time, distance and location insensitive
Billing	Access and usage billing: Detailed billing systems for voice and SMS that can distinguish between off-net / on-net, peak / off-peak	Simple access billing
Traffic Monitoring	Detailed traffic monitoring as part of the billing system	Usage monitoring limited to data use
Post paid subscribers	Detailed vetting to reduce risk or revenue loss and expenses that arise from call termination and subsidised handsets	<ul style="list-style-type: none"> • Postpaid risk limited to revenue of one billing cycle • No external expense risks • Prepaid and postpaid do not need to be distinguished by pricing • Postpaid may be extended without significant vetting
Network infrastructure	GSM 1G and 2G	2.5G, 3G, 4G, 5G

The transition from the voice and SMS business model to a datacentric business model is inevitable. Mobile operators will become mobile Internet access providers; distinguishing their products by speed (bandwidth), coverage and quality of service, and competing with other forms of access, such as public Wi-Fi and other connectivity options in places of work, study and home.

If rebalancing of line rentals and call tariffs was part of the answer to the separation of calls and access when competition was introduced for the PSTN, what is the answer to the separation of content and carriage in all IP networks? Pricing is part of the answer, as explained next.

6.1 Pricing Connectivity

A key part of the solution is to get a ‘clip fee’ by continuing to charge for data. OTT players cream value from the content they distribute over operators’ fixed and mobile networks with subscriptions and advertising. All the network operators see is the traffic – so charge for it.

Example 3: Two responses to a new OTT service

When WhatsApp announced in Barcelona in February 2014 that it would provide voice services in addition to its text service, the different responses from two multi-national carriers is instructive²⁰:

¹⁸ Telegeography reports (Comms Day 18 January 2022) that Google, Facebook, Microsoft and Amazon now account for over two thirds of all international bandwidth, compared with 6.4% in 2010

¹⁹C. Stork and S. Esselaar, 2019

²⁰ This 2014 incident is discussed in a short article ‘If you have to be dumb, don’t be stupid’ which can be found at <https://deridder.com.au/wp-content/uploads/2014/05/Economuse-2014-04-30.pdf>

- The CEO of Millicom, which started in Sweden and operated mobile services under the Tigo brand in Africa and Latin America, begged WhatsApp to ‘take it easy -70% of our revenues come from voice’. Oh dear!

- But the CEO of Tele2, which also started in Sweden and operates mainly in Europe, said ‘Customers get voice and SMS for free. Sorry Mr WhatsApp, but it’s free in the Tele2 world’.

Even a dumb pipe can be smart about pricing. As Tele2 said in Barcelona: ‘They [OTT players] make people use my network so I can charge them [users] for data. In many of our countries we charge only for data’. That’s how Tele2 can give its customers free SMS and voice services.

The way that fixed and mobile operators charged for data was usually by setting a fixed fee that included a certain amount of capped data. Once that cap was exceeded, there was either an excess data charge or the speed was dramatically slowed down (often according to some ‘fair use policy’).

In Australia, TPG was the first to break ranks in 2013 with an unlimited data offer. Other fixed service providers followed, with Telstra holding out until 2017. The consensus was that customers like certainty. They do, and they are prepared to pay a premium for it²¹.

Example 4: Paying a premium for unlimited data

It is sometimes possible to estimate the ‘typical’ retail broadband plan. My 2018 review of such plans in Australia²² estimated the best fit across post paid monthly capped plans on the National Broadband Network (NBN). The estimate for NBN 50Mbps plans was \$54 plus 3 cents/GB.

At the time, median monthly usage on the NBN was just over 100GB pm (the arithmetic average was 190GB). So a 100GB per month data capped plan would cost about \$57 per month.

In 2018, Optus offered a 50Mbps unlimited data plan for \$75 per month (\$65 if bundled with a mobile plan). Compared with the typical capped plan, this is a premium of \$18 per month.

In the Cook Islands, the incumbent’s fixed and mobile plans include data caps. That’s a good place to start from and the amount of data can (and should) be increased over time.

7 New Services

Getting a ‘clip fee’ for carrying data over your network plus, perhaps, a post-paid monthly fixed fee still leaves the incumbent as essentially a commodity carriage provider.

What other opportunities are there in the internet value chain? The following extends the earlier Figure 4 on the elements of the internet value chain to include the end user and some of the emerging enabling technologies²³ that affect the elements of the chain²⁴.

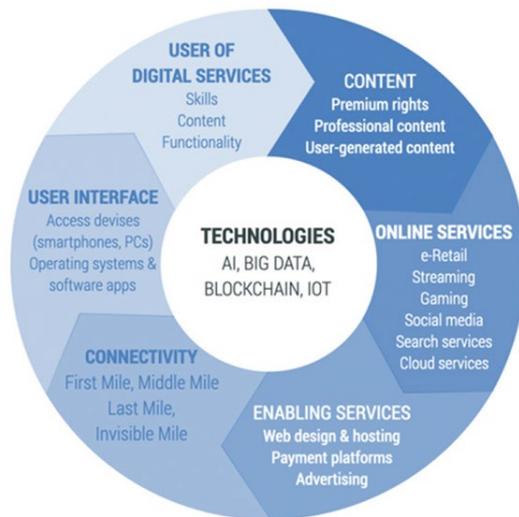
²¹ The same pattern followed with SIM-only mobile data with no unlimited offers in Australia in 2019. By 2022 all except Telstra offer unlimited mobile data, subject to ‘fair use policy’.

²² <https://deridder.com.au/wp-content/uploads/2018/10/Economuse-2018-10-04.pdf>

²³ Blockchain, AI, big data, the cloud, and the IoT have in common that they all deal in one way or the other with data and that they facilitate new business models that may shift value creation within and between segments of the value chain. The IoT generates data, the cloud stores data, big data combines large data sets, AI learns from data, including big data, and blockchain is a mechanism to reliably capture a data transaction history in a distributed manner.

²⁴ Fig 7.7, page 154, Digital Regulation Handbook: Geneva: International Telecommunication Union and the World Bank, 2020. <https://www.itu.int/hub/publication/D-PREF-TRH.1-2020/>

Figure 6: The Internet value circle



7.1 Content Rights

An early response to the loss of traditional revenues was for incumbents to get into the content game²⁵. In 2004, Telstra had a ten percent stake in a local TV network (Seven Network) and started building a pay TV network noting: *“As ‘pure carriage’ – the traditional core business of a telephone company – becomes, in relative terms, an increasingly smaller component of overall revenue, Telstra intends to be at the leading edge of the Information Age, both in its own right and as a proactive partner in international alliances and joint ventures”*²⁶.

Fixed and mobile operators in Australia have paid large sums to get exclusive streaming content (e.g. soccer rights) to differentiate their service from other carriage providers; fighting to keep the carriage business and charging customers for these content services.

If operators in the Cook Islands compete with each for the rights to exclusive content, the proceeds of these contests will go to the foreign rights holders and content providers²⁷.

7.2 Online Services

Mobile internet access providers (i.e. all mobile operators with 3/4G networks) quickly adopted cloud based services that drove traffic and/or increased customer loyalty to their (mobile) connection service. Facebook, TikTok, Spotify, YouTube are just a few examples.

With the increased speed and reliability of both fixed and wireless services, cloud-based business services will become more important and drive productivity. Cloud computing includes vendors that offer storage as a service, such as Dropbox and iCloud, and companies that focus on file transfer such as WeTransfer. Streaming services such as Netflix and YouTube and social media applications such as TikTok and Facebook all use cloud-based infrastructure.

²⁵ The major Indian mobile operators are buying content now. From Developing Telecoms 17 February 2022 <https://developingtelecoms.com/telecom-technology/consumer-ecosystems/12905-content-is-king-as-indian-operators-invest-in-music-movies-and-more.html>

²⁶ p11, Telstra Annual Report 1994.

²⁷ That was what happened in Australia when Pay TV operators competed for rights to Hollywood movies.

The main benefits to the mobile (or fixed) operator are revenue generated through data and improved customer retention. Many of these services do not have subscriptions, but where they do (e.g. Spotify and Netflix), they rarely share much of it with the carriage operator²⁸.

The opportunity for carriage operators arising from the new capabilities is to make themselves indispensable parts of the value chains of their customers. In Australia, this is what Telstra is doing with health services. Education and government are big business opportunities too.

7.3 Enabling Services

A useful application for countries such as the Cook Islands with relatives working overseas is e-money for international transfers. VCI has such a service²⁹.

In the absence of bi-lateral direct connections between VCI and domestic ISPs, any traffic exchange has to be 'tromboned' through an overseas site. With several ISPs in the Cook Islands, there needs to be an internet peering exchange point (IXP) run as a not-for-profit entity. That is, VCI and its competitors can exchange data, emails or offer access to public websites hosted by the respective service providers.

Once an IXP is created, backhaul and caching opportunities will arise. That is, there is an opportunity for VCI to provide backhaul to the IXP and the Manatua cable system.

VCI is best placed to entice overseas content providers like Google, Netflix and Meta (Facebook) to co-locate their caches close to the IXP to improve the quality of service.

7.4 Connectivity in the Cook Islands

The ITU says the connectivity segment has four links: the first, middle, last and invisible miles. The first mile refers to international data connectivity (i.e. how a country connects to the rest of the world via the Internet). The middle mile encapsulates national data connectivity including fibre networks and data centres. The last mile represents wireless or wired end-user access. The invisible mile captures regulatory and legislative factors that impact the ICT sector.

7.4.1 First Mile: Historically, the first mile has been a bottleneck. But with the Manatua submarine cable that is no longer the case because it can support cloud-based services. With capacity abundance, it will be possible for Avaroa Cable (which operates the Manatua Cable) to provide unconstrained bandwidth and pay-as-you-go wholesale pricing³⁰.

The new competitors appear to rely on various satellite services, which was the only option until the start of the Manatua submarine cable system in 2020. The cable is an important development although it cannot displace satellites for backhaul and last mile connection across the Cook Islands.

When ISPs use satellites they get global connectivity. When they use the Manatua cable they will need to acquire IP Transit in, say, Sydney to get global connectivity. Vodafone already has IP transit arrangements with providers in Australia and New Zealand which it can resell to the smaller ISPs in the Cook Islands.

²⁸ In September 2022, Optus started aggregating streaming services so that its customers could manage all services under an Optus account. In this, Optus acts as a collection agent for services such as Netflix, Amazon Prime Video. <https://www.optus.com.au/connected/entertainment/home-is-where-the-stream-is-meet-optus-subhub>

²⁹ <https://www.vodafone.co.ck/e-moni>

³⁰ See De Ridder, J. (2020) Structure, Conduct and Performance Issues for the Cook Islands Submarine Cable System, at <https://cra.org.ck/consultations>

VCI could also resell some of the cable capacity it leases from Avaroa Cable Ltd. (ACL). The larger operators in the Solomon Islands did not do that and that window closed with SISCC, the cable operator, now offering traffic-based pricing which is cheap and scales (larger operators can opt into this form of pricing)³¹.

7.4.2 Middle Mile: The middle mile will be much improved with the Manatua cable connecting Rarotonga and Aitutaki and the new satellite services.

Over 85% of the population is on the islands of Rarotonga and Aitutaki, which have the benefit of easy access to the international Manatua cable system. This system provides major opportunities for decreasing prices and increased levels of innovation enabled by the cloud.

The new capabilities available may entice repatriation of some of the Cook Islanders who had to go overseas to find work. This emigration began in 1996 with the loss of many public sector jobs. It has been estimated that over 1,600 more people have left than have entered the country during the period of 2006-2011, an average net-loss of about 322 people per year. The current trend of net migration continues to be negative³².

And now there the near-term prospect of ‘fibre-in-the-sky’ provided by low earth orbit (LEO) satellite constellations³³. They will face the same revenue challenges as existing fixed and mobile operators. The LEO value proposition has to be ubiquity and reliable service – but they are unlikely to be cheap³⁴. The economic viability of LEO systems is yet to be tested³⁵.

Until the LEOs arrive, there are number of existing GEO and LEO satellites used in the Cook Islands. In the Pa Enea, the Southern Island group has the O3b³⁶ MEO capacity (since 2013, used by VCI for mobile backhaul and Internet; costing >\$160 per Mbps) and Intelsat C-band GEO capacity for voice services (used for voice on all islands). The Northern Group has Intelsat and Kacific (both GEO) for voice and internet.

7.4.3 Last Mile: The last mile in the Cook Islands depends upon migrating end users to 4/5G mobile and fixed wireless services (the latter replacing aging copper access networks).

In the earlier discussion about service-based competition, it was noted that originating access on the fixed network was mandated for calls. It was never, and should not be, contemplated for mobile networks; which are not natural monopolies like the fixed network was until mobile alternatives arrived.

7.4.4 Invisible Mile: The ‘invisible mile’ is not a constraint with the light-handed regulatory regime in the Cook Islands. The key resources managed by the Cook Islands Regulatory Authority (CRA) are licenses, spectrum rights and the numbering plan. The CRA is also responsible for ensuring

³¹ De Ridder, J. (2020). Pricing in Abundance: The Economics of the Manatua Cable. *Journal of Telecommunications and the Digital Economy*, 8(3), 33–43. <https://doi.org/10.18080/jtde.v8n3.344>

³² <http://www.mfem.gov.ck/statistics/census-and-surveys/cook-islands-demographic-profile>

³³ For a recent survey of satellite systems, see Pritchard-Kelly, R., & Costa, J. (2022). Low Earth Orbit Satellite Systems: Comparisons with Geostationary and Other Satellite Systems, and their Significant Advantages. *Journal of Telecommunications and the Digital Economy*, 10(1), 1–22. <https://doi.org/10.18080/jtde.v10n1.552>

³⁴ <http://systemarchitect.mit.edu/docs/pachler21a.pdf>

³⁵ S. Kinney, The business case for LEO satellite constellations: Walking a tightrope to success, RCR Wireless News, March 2021 <https://www.rcrwireless.com/20210319/analyst-angle/the-business-case-for-leo-satellite-constellations-walking-a-tightrope-to-success-analyst-angle>

³⁶ <https://www.ses.com/our-coverage/o3b-meo> The Cook Islands was O3b’s first MEO customer.

that competition is consistent with the continuing provision of communications services to the Pa Eヌua (the outer islands).

How could the transition to a digital world affect regulation?

All OTT and internet enabled services rely on fixed or wireless connectivity to work. That last mile connectivity will now be provided in the Cook Islands by VCI and several ISPs over a combination of fixed, wireless and satellite platforms. This represents a significant increase in competition for the last mile; even though the internet service provider (ISP) licences do not allow the use of the numbering system to enable communications.

The practical benefits of such competition should be reflected in improved prices and quality of service. The CRA is monitoring these going forward.

Earlier, the need for carriage operators like VCI to get a 'clip fee' for data to obtain a share of OTT revenues was noted. A possible mechanism for ensuring that all last mile connectivity providers make a contribution to uneconomic services is to set the Pa Eヌua access levy as a small 'clip fee' on all downloads (uploads might not be counted to encourage local creativity).

8 Conclusion

The new digital era is very different from the telephony era. In much the same way that competition separated access (line rentals) and calls challenging traditional business models, the digital era has separated carriage and content leaving carriage providers struggling to find a new business model.

In the telephone era, competition was once about the growing number of customers and their usage revenues. Today growth in both is flat in most markets with most of the growth in revenues going to OTT providers.

In the digital era, carriage providers should not forgo data revenues with 'all you can eat' (unlimited) retail data plans. While no operator will give up aspiring for growth, profitability depends increasingly on controlling costs. Innovation is increasingly about how to lower costs, not about new complex charging models or new product constructs. Network sharing, mergers and writing down historical costs that cannot be recovered are becoming common.

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