

# Distribution Options

A submission to the Review of Australian Broadcasting Services in the Asia Pacific.

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## Objective of this submission

Provide an overview of content distribution options for reaching the Asia Pacific region in light of recent technological changes.

Whatever the delivery technologies used, there will be no audience if the content isn't of high quality and well tailored to the audience. This document does not look at content but rather canvasses technical distribution options.

## The author

Peter Marks has experience in media including roles at ABC, News Interactive and CNN (based in Hong Kong). Peter, who has broad technical knowledge, is a software developer who worked on major projects including ABC iview. He holds a BOCPL and as such was licensed to perform technical work on broadcast transmitters. A lifelong shortwave listener and amateur radio licence holder (VK2TPM), Peter also has a track record of explaining technology and for over a decade was technology editor on Radio National Breakfast.

## Executive Summary

In a time of unprecedented fragmentation in content delivery options we should adopt a flexible, multi-platform, approach. The adoption of smartphones even in developing nations coupled with more affordable data makes streaming or podcasts increasingly practical but there are still unique benefits to shortwave broadcasting which can get through to the remotest communities, in the face of natural disaster or turmoil, and be received on low cost devices.

## Key recommendation

**Shortwave** broadcasting should be re-established in conjunction of other technologies. All programs should be made available as Podcast feeds and broadcasts should actively promote subscription to those podcasts.

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## Background

In the last decade, there have been significant changes in the media landscape both globally and in the Asia Pacific region.

The changes have been driven both by technology, such as the rise of smartphones since 2007, and the widespread availability of wireless data networks.

While developing countries [lag in smartphone ownership](#)<sup>1</sup> compared to advanced economies, ownership is rising strongly and lower cost devices running [Android One](#)<sup>2</sup> will further reduce the gap.

Smartphone shipments appear to have [plateaued](#)<sup>3</sup> in developed countries and this has led to a new focus on making devices affordable in developing countries.

## Considerations

Factors that should be considered when deciding on appropriate technical distribution options include:

- Cost to users to listen and watch
- Cost to the broadcaster
- Robustness in the face of extreme weather such as cyclones
- Ease of local disruption by those who wish to silence outside reporting

## Technology Options

### Shortwave AM broadcast

Amplitude Modulated (AM) shortwave has many advantages including long range and widespread availability of low cost receivers. Because shortwave transmission can originate far from the listener it is robust in the face of extreme weather, natural disaster and local censorship.

A single shortwave transmitter can cover thousands of kilometers.

While shortwave can be jammed by a wealthy power, this is rarely 100% effective.

Because shortwave broadcasting has been around for many decades there are receivers throughout the community. Counter-intuitively, in this era of smartphones, there appears to be a boom in production of new models of receivers from manufacturers including [Tecsun](#)<sup>4</sup>, [Sangean](#)<sup>5</sup> and others.

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<sup>1</sup> Pew Research Center, February, 2016, "Smartphone Ownership and Internet Usage Continues to Climb in Emerging Economies"

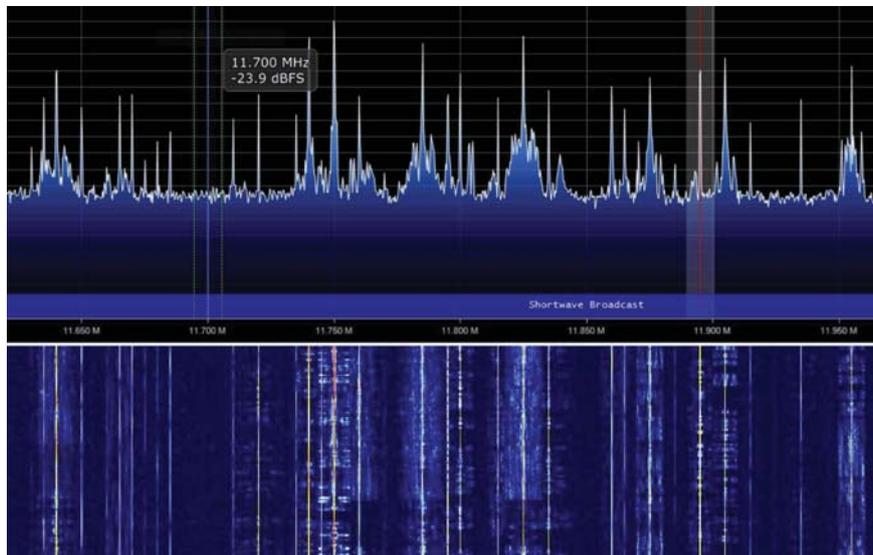
<sup>2</sup> [https://www.android.com/intl/en\\_au/one/](https://www.android.com/intl/en_au/one/)

<sup>3</sup> Mary Meeker's Internet Trends report 2018 published by Kleiner Perkins Caufield & Byers at the Code Conference

<sup>4</sup> <https://www.tecsunradios.com.au/store/>

<sup>5</sup> [http://www.sangean.com/products/product\\_category.asp?cid=10](http://www.sangean.com/products/product_category.asp?cid=10)

Despite the reduction in shortwave broadcasts in recent years there is still a significant amount of airtime [available](#)<sup>6</sup> via this platform. A glance at a shortwave band in the early evening shows enough activity to interest listeners.



China has significantly [ramped up](#)<sup>7</sup> its investment in international broadcasting in recent years.

China Radio International uses channels that were former ABC Radio Australia (RA) frequencies - they are perfectly entitled to do this.

17840 kHz, 15425 kHz, 12085 kHz, and 9580 kHz were used by Radio Australia in the past and are now used by China Radio International at powers from 100 KW to 500 KW.

As an aside, it's easy to tune in remotely using a network of web based software defined radios such as [this one](#) in Jakarta, Indonesia. There are networks of these receivers around the world including [SDR.hu](#) and [WebSDR](#).

Modern shortwave radios are much easier to use than they were a few decades ago, with digital frequency entry and display, and perform better than sets in the past. Many modern radios are rechargeable and can be charged from the same USB chargers as mobile phones including small solar chargers.

The transmitter sites and equipment previously used by Radio Australia have been offered for sale, and if no longer available, new sites, or time rental arrangements will be needed.

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<sup>6</sup> HFCC HF (Shortwave) Radio Broadcasts in A16 (Summer 2016) (Also shows DRM)

<sup>7</sup> <https://money.cnn.com/2018/03/21/media/voice-of-china-propaganda-broadcaster/index.html>

The ABC ceased shortwave broadcasting finally in early 2017 after years of cutting services citing [research](#)<sup>8</sup> in PNG that indicated only 2% of the audience had access to shortwave.

It seems likely that some people, for whom shortwave is their only media choice, may not have been surveyed. The small audience for shortwave should be multiplied by the value they place on the service.

Papua New Guinea's Communications Minister Sam Basil [announced](#)<sup>9</sup> in February 2018 that the country plans to restore NBC's shortwave broadcasts and that they plan to move from analog to digital technology. Continued investment in shortwave by other countries such as New Zealand and China places Australia out of step with others in our region.

An incidental benefit of shortware is that it can be received in the Australian outback.

Costs scale with broadcast duration.

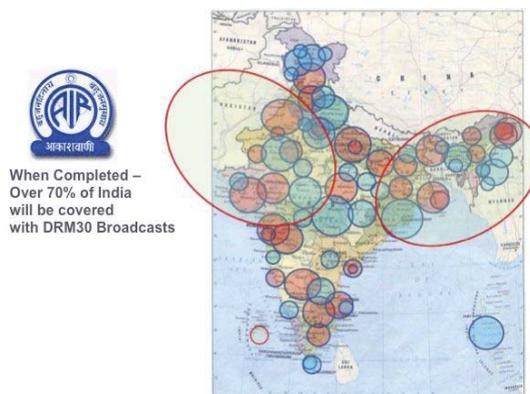
## Shortwave DRM broadcast

[Digital Radio Mondiale](#)<sup>10</sup> (DRM) has the potential to deliver FM quality audio plus useful metadata and text over long distances. It does this by leveraging modern digital modem and audio compression technology, carried over shortwave radio.

As with AM shortwave a single transmitter can cover a region of thousands of kilometers.

All India Radio has aggressively rolled out a network of local medium wave and some shortwave DRM broadcasts in that country. It is possible to simulcast both analog and digital modes on the same transmitter and India does this in many cases.

### AIR FINAL PLANNED DRM COVERAGE



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<http://www.abc.net.au/cm/lb/9080250/data/report---citizen-access-to-information-in-png-2014-data.pdf>

<sup>9</sup> In an interview on NBC marking World Radio Day in February 2018

<https://www.radionz.co.nz/international/pacific-news/350460/png-govt-to-extend-public-radio-services>

<sup>10</sup> <http://www.drm.org/>

In our region, DRM [broadcasters](#)<sup>11</sup> are:

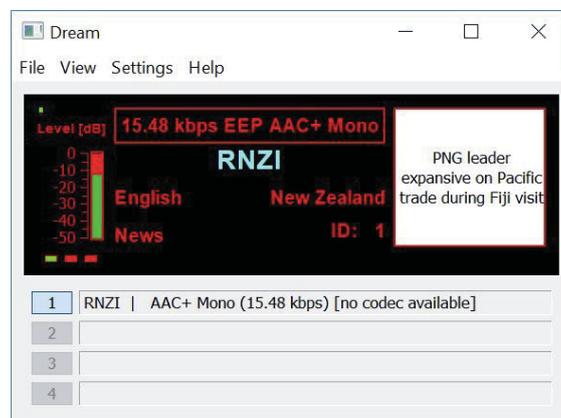
- China National Radio (to NE Asia)
- Radio Romania International (to China)
- BBC World Service (to India)
- Radio Kuwait (to India)
- Radio New Zealand International (to Pacific Islands)

DRM is good as a satellite replacement for local distribution and is much more available and cheaper than satellite Single Channel Per Carrier (SCPC).

So, despite the current lack of receivers a DRM transmission could be used to feed local FM relays and when receivers become available they could be used to receive directly thus mitigating the drawback of local political interference.

An incidental benefit of DRM shortwave is that it can be received in the Australian outback by listeners motivated enough to purchase a receiver.

Costs scale per broadcast. It would be cheaper to have our own dedicated transmission than to rent transmit capabilities if ramped up. If DRM receivers were to be supplied then this would scale by listener.



DRM can be decoded on a computer using free [software](#)<sup>12</sup>, above is the signal from [RNZI](#) heard in Sydney on 6115kHz.

DRM receivers have not taken off in the market so far. The World Radio and TV Handbook, in its 2008 review, commented that although 10% of shortwave radios are replaced every year, consumers won't spend more for a DRM receiver unless there is unique content available on it.

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<sup>11</sup>

<http://www.drm.org/wp-content/uploads/2018/06/SCHEDULES-OF-DRM-BROADCASTS-WORLDWIDE-A18-5.pdf>

<sup>12</sup> Dream DRM Receiver <https://sourceforge.net/projects/drm/>

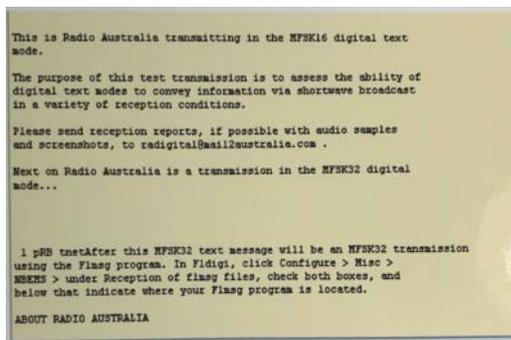
The adoption and promotion of DRM by Australia may help this technology to gain more of a foothold. DRM transmissions can accompany AM transmissions.

## Shortwave Data

The [Voice of America](#)<sup>13</sup> (VOA) radiogram program<sup>14</sup> and to a small extent, Radio Australia<sup>15</sup>, have experimented with transmission of text and images over shortwave using data modes.

These modes, which are decoded with freely available software, such as [fldigi](#)<sup>16</sup>, can get news through despite very poor signal conditions and have been [shown](#)<sup>17</sup> to get through even in the face of local jamming.

Here are some off air decodes captured by VK3RV.



Setting aside a small part of the air time schedule for digital modes could provide a highly valued way to get news through to places where extreme censorship is in place.

Digital modes are improving at an impressive rate and the speed and ability to be received despite very low signal to noise conditions means that these modes, combined with short wave's ability to cross borders can provide a tiny but eager audience with vital uncensored news.

Data over shortwave is not a primary mode but something that could be tacked on to an AM or DRM service.

<sup>13</sup> <https://www.voanews.com/>

<sup>14</sup> <http://voaradiogram.net/>

<sup>15</sup> <http://voaradiogram.net/post/50721595910/radio-australia-mfsk-tests-are-successful>

<sup>16</sup> <http://www.w1hkj.com/>

<sup>17</sup> VOA Radiogram paper which talks about getting through Chinese jamming by Kim Andrew Elliott, <https://www.tapr.org/pdf/DCC2015-VOA%20Radiogram-KD9XB.pdf>

## Satellite direct (C & Ku bands)

There are readily available consumer receiver boxes for satellite TV and radio channels can be added on.

The [Lyngsat](https://www.lyngsat.com/)<sup>18</sup> site has list of available satellite channels. (Note how much China's CRI and CCTV have expanded in recent years - e.g. there are 15-20 CRI channels now targeted at the Pacific).

Reception of satellite TV has lost popularity in recent years as increasingly all content is available via the internet.

Radio Australia used to be carried on PAS-2 and PAS-8 but that was five years ago and things have changed<sup>19</sup>.

Note that C band, while cheaper, is badly affected by rain whereas Ku band is not. Radio Australia was previously on C band. The C band dishes are also larger, at about 3m diameter and are frequently damaged by cyclones.

Costs scale per transponder / footprint area.

## Local FM

An excellent way to reach local listeners due to good signal strength and widespread access to FM receivers. Many Android phones include an FM receiver feature.

FM can be received up to 65 km from the transmission tower but the signal is obstructed by mountains so it is difficult in countries such as PNG and the Solomon Islands. FM is a perfect technology for town centres and heavily populated rural areas. Low power, short range FM transmitters are very cheap and modern remote monitoring systems make them much cheaper to maintain than in the past.

A drawback of this approach is that local transmitters are vulnerable to extreme weather, natural disaster and local censorship.

Program feeds have traditionally been via satellite downlink but some international broadcasters, including [RNZI](https://www.rnzi.co.nz/)<sup>20</sup>, are using DRM over shortwave to distribute content<sup>21</sup>.

To enable this in the past ABC would:

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<sup>18</sup> <https://www.lyngsat.com/>

<sup>19</sup> [REDACTED] at ABC can expand on this.

<sup>20</sup>

<https://www.radionz.co.nz/international/pacific-news/323555/rnzi-remains-essential-voice-of-the-pacific>

<sup>21</sup>

[REDACTED] at RNZI can advise on this.

- Buy equipment, possibly shared
- Install dishes, receivers
- Maintain equipment
- Pay power bills

During the 2010 - 2013 'heyday' for this activity<sup>22</sup>, there were about 30 sites at peak 3 in Cambodia, 2 in PNG, 2 in Solomons, 1 in Vanuatu, 2 in Fiji plus Samoa and the Cook Islands. These transmitted RA English and local language as available.

Radio Australia used to have two full time staff to maintain this network as there was little local capability for maintenance or fault finding.

Mistakes were made that limited the audience for Radio Australia's FM relays. Nearly all of its FM transmitters in the Pacific are on frequencies 100 Mhz or above. However most motor vehicles in the Pacific Islands are second hand Japanese models - whose radios only cover 76 - 90 MHz. So no car, bus, taxi was able to hear the RA broadcasts.

The ABC transmitters are so low powered that people whose mobile phones have built-in FM receives say the signal is too poor to be useful.

Costs scale per site but are fixed after that.

## Local Television

A local television channel can have a huge impact but it is expensive to fill its daily schedule with compelling content. Cable television systems in many markets have become crowded and finding a channel amongst, sometimes, hundreds of options is a challenge even for the most committed viewer.

## Online web

A news website targeting the region was once the primary way to reach readers but today these sites must work on small screen mobile devices. Online text stories have the advantage of long lifespans. All formats must be catered for including audio and video. Video, radio/audio streaming and podcasts are widely and increasingly available but many people in developing countries, especially in the Pacific, struggle to pay for data.

The problem with a website is discovery and a lack of 'stickyness'. Readers will typically visit a few key sites each time they check the news and increasingly readers get their news via aggregators including social media.

Ideally content developed for other delivery methods could be automatically published as a web site without too much manual intervention.

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<sup>22</sup> Check ABC Annual reports for more details.

## Online news feeds into aggregators

Increasingly users get their news via aggregators such as:

- Apple News
- Google News
- Flipboard

While we lose some control and add value to the aggregators we supply, they do bring our content to an audience that returns regularly.

Feeding these services requires producing a news feed in their desired format and publishing stories to their standards. But this work is not complex and is well documented.

There should be RSS feeds of all stories and sub-feeds for topics.

## Social media

In developed countries, most people [get at least some of their news from social media](#)<sup>23</sup>. 20% get most of their news from social media.

Today, Facebook dominates but this situation will change with time and we should be agile and able to go where the regional audiences are.

We should publish stories to a traditional, but mobile friendly, web site and share those posts to social media as a matter of course. Twitter posts can be used by many news aggregators such as Flipboard.

## Podcast

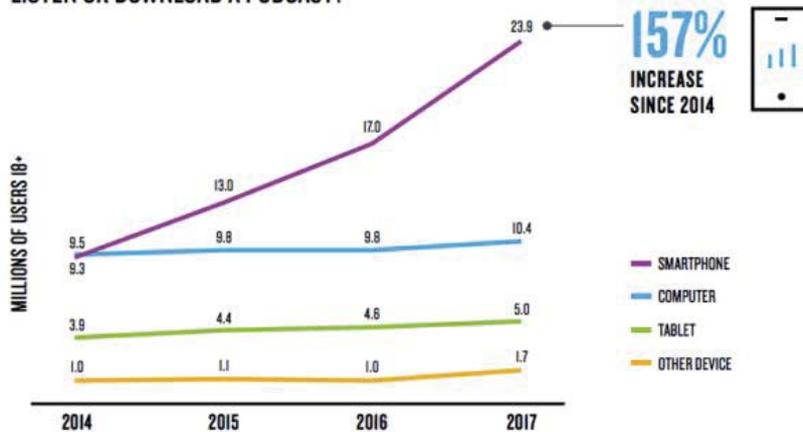
The internet-connected smartphone is ubiquitous in developed nations and has become the primary way for people to get news and communicate. Podcasts are still an emerging media but correlating with smartphone adoption, consumption is rising sharply.

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<sup>23</sup> News Use Across Social Media Platforms 2017. Pew Research Centre.

## SMARTPHONES DRIVE PODCAST USAGE

IN THE PAST 30 DAYS, WHICH DEVICE HAVE YOU USED TO WATCH, LISTEN OR DOWNLOAD A PODCAST?



Graph from Nielsen Q1 2018 Podcast Insights showing US data.

In developing nations, particularly those with rugged terrain, mobile networks are still to be rolled out and there are many communities that will not have a network for many years.

Wherever there are mobile data and smartphones, podcasts as a media platform have a number of advantages in the Asia Pacific region:

- They can be delivered over slow internet connections due to their asynchronous download delivery nature.
- Listeners “stick” because of the RSS based subscription system.
- Metrics are [available](#)<sup>24</sup> for some clients giving insights into how much of each program listeners use and what they skip.
- Listeners are not restricted to “appointment” listening but can choose when they listen and resume later

Internet distributed podcasts are vulnerable to local political censorship.

Podcast use in the Asia Pacific is growing strongly and are said to make up 15-20% of the ABC’s podcast downloads. It is likely that many users in China appear to be coming from North America as they must use virtual private networks (VPN) to get through internet filtering and thus appear to us to be in another part of the world.

Costs scale linearly by listener due to file hosting.

<sup>24</sup> <https://help.apple.com/itc/podcastsanalytics/#/itc623752a8d>

## Internet streaming

Looking to the future, (decades out), high speed internet will be available everywhere at a low enough cost that the price will have as little conscious impact as the consideration we now give to turning on a light.

Streaming does require a reliable internet connection during the stream. Unlike podcasts which can download over a slow or unreliable link, live streaming needs a fairly consistent speed of connection while listening.

I've measured the mp3 stream of Radio National and it's 500kB per minute, 30MB per hour.

[Digicel PNG's](#)<sup>25</sup> data plan gives you 5GB to use over 30 days for k110 or AU\$45.

On that plan you could listen to 166 hours or 5 hours a day without running out.

[bmobile](#)<sup>26</sup> (Vodafone) is a little more expensive at k150 for 3GB.

Despite these data challenges users of ABC streams in the Asia Pacific region are growing quickly. As with streams it is likely that many users in China appear to be coming from North America as they must use virtual private networks (VPN) to get through internet filtering and thus appear to us to be in another part of the world.

In developed countries the digital music business has already [transitioned](#)<sup>27</sup> from a model where music is purchased to one under which consumers pay to stream their music via services such as Spotify, Apple Music, Amazon, Pandora and others.

A problem for streaming broadcasters, that has been largely solved by music streaming services, is discovery. The [list](#)<sup>28</sup> of streaming radio stations is large and often listeners find them via promotion on traditional radio.

The day when all media will be distributed over the internet is [not too far away](#)<sup>29</sup>.

Local internet services are vulnerable to local political censorship and disruption in times of extreme weather.

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<sup>25</sup> <https://www.digicelgroup.com/pg/en/mobile.html>

<sup>26</sup> <http://www.bmobile.com.pg/>

<sup>27</sup> <https://www.statista.com/statistics/669113/number-music-streaming-subscribers/>

<sup>28</sup> [https://en.wikipedia.org/wiki/List\\_of\\_Internet\\_radio\\_stations](https://en.wikipedia.org/wiki/List_of_Internet_radio_stations)

<sup>29</sup> Chief Technology and Product Office, BBC, in a speech to the DTG Annual Summit in London on Thursday 10 May, 2018

## New LEO options

Mobile internet data costs are slowly falling, or rather the amount of data is going up for a similar cost, but it's possible that new [low earth satellite networks](#)<sup>30</sup> specifically launched for providing internet access will disrupt current internet provision in the years ahead. These systems have [major backers](#)<sup>31</sup> including [Elon Musk](#)<sup>32</sup>, Richard Branson and Bill Gates.

The significance of low earth orbit satellite data networks is that future pocketable devices may be able to access them directly, and technology has been developed to ensure high speed and [low latency](#)<sup>33</sup>. The price of delivering internet is dominated by the laying of cable and hooking up of home so direct from satellite may end up being the cheapest option.

The SpaceX system proposes 10,000 satellites at about 340 km in altitude "enabling the provision of high speed, high bandwidth, low latency broadband services that are truly competitive with terrestrial alternatives."

Google has [Project Loon](#)<sup>34</sup> which uses a network of balloons designed to extend internet connectivity to people in rural and remote areas worldwide. Loon has been tested and provided internet connections from balloons at 100 km altitude at 10 Mbps directly to LTE phones on the ground.

New options such as [Quika](#) even promise<sup>35</sup> free satellite internet for developing countries.

Streaming costs scale per listener.

## Program supply

An option to consider is producing programs and having local broadcast partners insert these into their schedules for transmission.

In the end, compelling, trusted content will earn the devotion of listeners and viewers. A successful model used by [PRX](#)<sup>36</sup> in the US, which includes popular programs including 'This American Life', 'The Moth', and the Radiotopia network, provides programs for airing through partners.

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<sup>30</sup>

<https://www.theverge.com/2018/3/29/17178126/spacex-satellite-broadband-internet-fcc-approval-license-starlink-spectrum>

<sup>31</sup> <http://time.com/4638470/spacex-internet-elon-musk/>

<sup>32</sup>

<https://www.cnet.com/news/how-spacex-brings-starlink-broadband-satellite-internet-to-low-earth-orbit/>

<sup>33</sup> [https://www.isoc.org/inet96/proceedings/g1/g1\\_3.htm](https://www.isoc.org/inet96/proceedings/g1/g1_3.htm)

<sup>34</sup> <https://x.company/loon/>

<sup>35</sup> <https://www.engadget.com/2018/01/15/quika-free-satellite-internet-access/>

<sup>36</sup> <https://www.prx.org/>

PRX also trains producers and develops technology. It claims a reach of 25 million people in the US.

Working with local broadcasters, providing regular programs that fit in with their daily schedules would save the expense of running ABC's own broadcast network.

Drawbacks include lack of assurance that the supplied programs won't be altered, broadcast at unappealing times or simply taken off due to local political pressure.

## Marketing

Whatever the choices and mix of delivery, a significant proportion of the budget should be spent on marketing the brand and how to receive its content.

In one [recent US survey](#)<sup>37</sup> it was found that Communications/Media businesses today spend 13% of their overall budget on marketing and co.

## Conclusion

We are in a time of technology change and it's likely Asia Pacific countries will follow a similar path to developed nations.

A multi-pronged and flexible approach is recommended with locally available broadcast that actively promotes deeper engagement via podcasts and news aggregators.

Shortwave remains a unique way to get a large reach and service people who have no other media access.

Regular on-the-ground surveys in each of the target regions should be undertaken to confirm the best and most cost-effective ways to reach those audiences.

A substantial marketing and cross promotion investment needs to be maintained in order to make the audience aware of the service.

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Peter B Marks  
July 2018  
[REDACTED]

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<sup>37</sup> Marketing Budgets Vary by Industry: The Wall Street Journal