

Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
Parliament House
Canberra ACT 2600

Australian Broadcasting Corporation Amendment (Restoring Shortwave Radio) Bill 2017

Dear Secretary,

My background demonstrates extensive strategic and practical experience in shortwave (High Frequency - HF) technologies applicable to broadcasting, data & telemetry and emergency communications as well as all other technologies used for radio broadcasting including online and satellite systems. e.g.

* **from 1990-2013** Transmission Manager, Radio Australia, at the Australian Broadcasting Corporation. Responsibilities included delivery of Radio Australia (RA) programming to international audiences using Australian based HF, satellite, online, re-broadcast (off-shore HF and in-country AM/FM) and transcription technologies.

* **2002-present** member of Australian Radio Study Group 3 (Radio Propagation in ionised & non-ionised media) which is an ITU-R review and proposal group under the local direction of ACMA.

* **1997-present** member of the High Frequency Consultative Committee (HFCC), Geneva .

* **1983-present** volunteer member of VICSES where HF technology is a proven and valuable dimension to emergency communications.

I offer a submission in support of Shortwave (High Frequency or HF) broadcasting for the consideration of the Committee. The submission addresses the need for Australia to retain a HF delivery infrastructure for domestic and international broadcasting as a component of national security and soft diplomacy, and as a key broadcasting conduit for the ABC to meet its charter obligations. The submission questions ABCs motives and methods in using HF systems in recent years.

Summary: High Frequency (HF) is the frequency spectrum with a practical range of 2 MHz to 40 MHz. It has unique and useful propagation characteristics allowing long range communication with simple apparatus. Australia is the world's largest civilian user of HF spectrum for remote area communications. All militaries retain and use HF plant. Most Australian emergency services use HF infrastructure.

Properly managed HF broadcasting is an economically and technically efficient way to communicate to a dispersed population across very large geographic expanses. HF broadcasting has a long history of providing reliable communication to marginalised communities in remote parts of Australia and the Pacific region. HF transmissions for Radio Australia have carried the day when other technologies had failed due to environmental factors or political interference.

Operating efficiencies can be greatly improved for the Australian domestic HF transmissions with an improvement in reach and reliability of those transmissions and a reduction in operating costs. HF broadcasting continues to be widely used by international broadcasters to reach dispersed populations who for political, economic or environmental reasons are unable to avail themselves of satellite, cell phone and "broadband" technologies.

ABC is neglecting a charter obligation to cater for all Australians.

Does the ABC know what it's doing?

Michael Mason, ABC's Director of Radio stated that:

"While shortwave technology has served audiences well for many decades, it is now nearly a century old and serves a very limited audience. The ABC is seeking efficiencies and will instead service this audience through modern technology." (ABC website December 2016)

Mason needs some remedial lessons on the history of broadcasting. Medium Frequency (MF) ("AM") broadcasting commenced around 1921 and HF broadcasting came along a decade later. But Mason's ill-informed comment begs the question: when did the maturity of a technology determine its use-by-date? Would Mason champion a triangular wheel on the grounds that the existing model has been around for a few thousand years? Mason and the rest of the ABC executive are probably aware that John Faine, Steve Price, Ray Hadley, Alan Jones and Neil Mitchell command huge audiences - through the full range of media available to "radio" broadcasters including "AM" which, by Mason's thinking must be hopelessly outdated. I could be mean and point out that "AM" continues to provide the lion's share of audience to these worthies.

What we see here is an insight to the ABC's intention to found a view that HF broadcasting is ineffective in order to subvert transmission funds from HF to program production and more sexy modes of delivery, i.e. expand DAB+ around the capital cities and environs. After several years of intentionally degrading its domestic and international HF services ABC felt sufficiently safe to answer the question:

"How much money will the ABC save through ending the shortwave services?"

with this bizarrely damning effort

"This decision is about maximising finite resources and better focussing them on audiences. The closure of shortwave radio transmission services will potentially allow for \$1.9 million to be reinvested in expanded content and services. Part of this reinvestment includes improved FM broadcasting capabilities to some of the regions currently relying on shortwave.

Domestically, the costs of transmission via shortwave will be reinvested in extending digital radio services into all eight capital cities. "

(about.abc.net.au/press-releases/shortwave-radio/ 2017 January 7)

Or in other words: we at the ABC really like making programs...less keen on distributing them and really irritated by remote area listeners when we could be pandering to our inner city elites.

And if the dispersed HF audiences across the remote areas of Australia were in any doubt on how the ABC views them then the answer to the next question clarified the matter once and for all.

"What will the ABC reinvest this money in?"

Answer: *"Domestically, the ABC, working alongside SBS, is currently planning to extend digital radio services in Darwin and Hobart, and to make permanent its current trial in Canberra.*

Extending DAB+ into all eight capital cities would represent an additional reach of 700,000 people, increasing the overall reach [of DAB+] to 60% of the Australian population.

ABC Radio is also investigating transmission improvements to address reception gaps in the existing five DAB+ markets. It aims to ensure a resilient DAB+ service in every capital city, with enhanced bitrates and infill where necessary.

Internationally, part of this reinvestment includes improved FM broadcasting capabilities to some of the regions currently relying on shortwave."
(about.abc.net.au/press-releases/shortwave-radio/ 2017 January 7)

I'll pause here to let the roars of approval from the former HF listeners in Canberra subside. The miserable cries of the grey (& black) nomads, truckers, stockmen and Jillaroos within a 1000 km of Tennant Creek don't reach the upper floors of the ABCs HQ fortunately.

This is a good place to comment on the last paragraph of that ABC response.

Up to 2011 RA had a fully funded network of dozens of in-country FM relays through either partnerships with local broadcasters or with new self-contained FM transmission facilities, all fed from a comprehensive satellite distribution network across southeast Asia and the Pacific regions. There were two specialised staff within RA who installed and commissioned the new FM transmitters, and provided technical support to maintain the FM relay systems. From 2011 to the present ABC progressively attenuated money and staff in the RA transmission arena with predictable results. The money was diverted into television programming, international business development and questionable relationships with overseas broadcasters. Most of these FM relays are now permanently off-air. But FM relays were merely one string in the bow of RAs international broadcasting conduits.

Across the Pacific cyclones routinely bowl satellite dishes into the ocean, drop local broadcast towers and devastate communities. Political upheavals leave local media under real threat. Local infrastructure such as electricity plant is often out of action for hours or days for lack of maintenance or funds. In these situations battery powered HF receivers are life savers.

In 2009 the two local RA FM relays in Suva and Nadi were terminated at gun point and remained off-air for over two years. HF carried the vitally important RA news and current affairs services into a country desperately starved of uncensored media.

Cyclone Pam flattened the RA FM relay in Port Vila (Vanuatu) in 2015 just when it might have had something helpful to communicate. The local VBTC services were also disrupted. RAs HF broadcasts remained loud and clear and available.

Recently an Australian retailer shipped in to Solomon Islands 500 HF broadcast receivers, small, portable, battery-powered, solar-charged. This enabled listeners beyond the 20 km reach of RAs FM relay in Honiara to hear: their own SIBC domestic HF, runner up was RA on HF followed by Radio New Zealand International on HF.

The RA FM relays in Lae and Port Moresby have a range of about 20 km on a good day. How does the rest of the country fare? I'll give you another clue, HF is used by PNGs NBC. Yup, listeners across PNG can listen to their domestic broadcasts on HF. They used to be able hear RA on HF until January this year. To be fair I have to point out that NBC transmitters are often off-air due to poor maintenance and/or non-payment of salaries & power bills.

But surely the ABC is not distorting facts that support HF broadcasting?

The ABC is spreading falsehoods in the fervent hope the casual reader will take these as gospel based on the broadcaster's previous good reputation. ABC asks us the question:

What is the shortwave service area in the NT?

And answers:

The current shortwave system was designed as a “vertical incident transmission system”, with reliability designed for a 200km radius from the transmission tower. While the service can be received beyond this (on occasion, due to atmospheric conditions, across the other side of the globe), it is in no way assured.

For reliable day/night coverage frequency changes are recommended and are common place. The single frequency at Rowe (sic) Creek (due to equipment reliability issues) has caused interference problems with other broadcasters for some time, leading to coverage issues.

Further to this, QLD, SA, WA and NSW do not have an ABC shortwave service, nor has there been an expressed need for this – these States also having vast remote areas.

ABC has stated the range of the domestic HF service is a radius of 200 km from each site.

The ABCs statement is wrong and misleading.

The design range is 450 km with an omnidirectional pattern. The actual service area is 630,000 square kilometres or **five times greater** than the area the ABC would like us to believe **for each site** (Alice Springs, Tennant Ck & Katherine).

In practise HF signals gallop across state and national boundaries a fact which irritates dictators and the ABC alike. The signals from the domestic HF stations at night provided worthwhile reception in most of WA and QLD. Hell, I could routinely hear the evening signals from Alice Springs 2,000 km away in Melbourne at good level. In fact the original design service areas covered part of Queensland. The design service range of 450 km was verified by commissioning tests in 1986 and was maintained until ABC deliberately used an inappropriate night-time channel for the Alice Springs transmitter.

Starting with the domestic HF service ABC has mounted a campaign of wilful degradation in the management of its HF transmission systems to promote a perception of poor performance and declining listenership.

Part of an HF system is frequency management. Due to the unique propagation mechanisms utilised by HF signals a range of frequencies must be used across the 24 hours, and across the 11-year solar cycle. Typically two frequencies will be necessary for a domestic service with a range of 0-450 km (the service range of each of the three NT domestic HF transmitters). A "day" frequency around 5 MHz and a "night" frequency around 2.3 MHz had been used at each NT site since the service commenced in 1986.

Under the guise of improving transmitter availability due to poor maintenance ABC insisted its contractor drop the night frequency at the most important NT site (near Alice Springs) and run the day frequency continuously. This had the effect of diminishing the night-time signal in the range of 0-450 km - precisely that site's prime target area! An unintended consequence was a massive *increase* in the strength of the night-time signal at ranges of 1000-5,000 km! Listeners in the Top End > 1000 km from Alice found an extra service in addition to those from Tennant Creek and Katherine while RAN listeners afloat in the Indian Ocean were really chuffed at being able to follow rugby coverage over and above that offered on RA.

On the serious issue of emergency communications including alerts of severe weather events ABC has continued in the vein of partial truths and pushing inquirers towards its preferred position.

"Are Bureau of Meteorology shortwave broadcasts for marine forecasts/info only?"

Answer:

"The only weather information broadcast on HF(shortwave) in Australia is from the BoM, which is mainly for maritime use. This is except in emergency situations, where BoM provides detailed reports on cyclones and other storm emergencies.

BoM HF reports are specific to maritime weather, more specifically cyclones which are predominantly the major cause of mass emergency in the NT. BoM is the best place for advice, and is the same source of information for the ABC.

BoM services scale to the conditions, i.e. while day to day services have a maritime focus, during periods of forecast cyclone activity the Bureau provides appropriate information (supplemented with their online services).

There are no full time HF (shortwave) broadcasts of emergency information in Australia, except for the BoM maritime reports at the top of each hour for approximately 10 minutes. They cover the coastal areas and areas where cyclones occur."
(about.abc.net.au/press-releases/shortwave-radio/ 2017 January 7)

ABC routinely takes BoM information and inserts it into MF ("AM") and FM broadcasts which have a limited range, typically 150 km and 100 km respectively during daytime, and cover much smaller areas compared the HF services. Clearly ABC is telling the public that people travelling outside of Sydney or indeed even Darwin do so at their peril and cannot hope for timely information from ABC on safety-of-life matters.

Again, a damning example of half-truth is contained in the ABC answer above: ABC conveniently neglects to mention that the BoM HF broadcasts employ "upper-sideband, suppressed carrier" modulation (USB) which is *completely incompatible* with HF broadcast receivers intended for reception of services such as the ABC domestic HF transmissions.

n.b. the converse does not hold. Professional-grade USB receivers & transceivers may receive HF domestic broadcasts quite well. This fact is exploited by grey nomads, sailors & truckers using HF two-way radios, e.g. RFDS, private & maritime HF networks. Many sailors programmed their HF transceivers with RA HF channels to receive news and entertainment across the Pacific.

If the ABC is correct in its observation concerning a lack of emergency broadcasts on HF, using accessible modes, then it should continue to fill this void with its domestic HF services.

Following the successful ploy to degrade the efficiency of the NT HF service from Alice Springs by using an entirely inappropriate frequency, ABC extrapolated the idea to Radio Australia HF services into the Pacific. An efficient HF schedule using six transmitters was established many years ago and used around forty frequencies over 144 hours of transmission daily. This was verified with reception reports, modelling using Space Weather Services (formerly IPS) programs and assessment by external agencies. After 2013 ABC applied the "domestic" model of frequency management to RA HF services and cut the senders to just three using just two frequencies per transmitter, *six* frequency assignments in total. This was entirely incompetent frequency management that puzzled HF professionals around the world (not just broadcasters). The desired result during the key reception periods in the Pacific morning and Pacific evening saw RA broadcasts on too low a frequency completely attenuated in the upper atmosphere before even returning to earth while those on too high a frequency were fired, equally uselessly, into outer space, punching through the upper atmosphere. Reception across the Pacific was harmed to the ABCs satisfaction.

Beyond Broadcasting - Who Else Uses HF?

ABC asks

"What is shortwave broadcasting?"

and says

"... Shortwave radio is used for broadcasting of voice and music to shortwave listeners, and long-distance communication to ships and aircraft, or to remote areas out of reach of wired communication or other radio services.

Additionally, it is used for two-way international communication by amateur radio enthusiasts for hobby, educational and emergency purposes."

The correct question is "Who uses HF in Australia?" Answer: "Hundreds of different organisations and hundreds of thousands of individuals."

HF communication is a primary medium of choice when large geographic areas require a minimum level of reliable service using simple, economic and often portable or mobile receivers or transceivers. Clearly ABC doesn't understand Australia is a large geographic area or that the Pacific is even larger.

Australia is the largest civilian user of HF communication technology in the world. Several Australia companies are world leaders in HF radio design, construction and sales. They sell to grey nomads in Queensland and the world's military alike. Earlier this year, one of these companies, Barrett Communications provided portable HF radio communications equipment to the West Midlands Fire Services (WMFS) for its specialist search-and-rescue teams who respond to international emergencies. I looked, but couldn't find a reference to this in ABC news.

see <http://www.army-technology.com/contractors/navigation/barrett-tactical/pressbarrett-equipment-rescue.html> and

http://www.barrettcommunications.com.au/News84_West_Midlands_Fire_Service.html

Consider just one sliver of HF spectrum 4750-5060 kHz (4.75-5.06 MHz). This is globally allocated to tropical broadcasting as opposed to international broadcasting, land mobile, aero mobile, marine mobile etc..

However it is such a useful commodity here that we find it contains over 500 Australian assignments mostly non-broadcasting i.e. in those other mobile categories. Three of these relate to the ABC broadcasts in the NT (4835, 4910 & 5025 kHz) *each* covering an area of >600,000 square km. A random, but not exhaustive sample of the non-broadcast users included:

Australian Plague Locust Commission,
Geraldton Fishermens Co Operative Ltd,
Ergon Energy Corporation,
Alcoa,
Ambulance Victoria,
Ambulance Service of NSW,
Royal Flying Doctor Service,
Newcrest Mining,
Queensland Fire and Emergency Services,
Telstra,
Morr Morr Pastoral Co,
Bureau of Meteorology,
Ardmona Stainless Steel,
Shire of Upper Gascoyne,

McConnell Dowell Constructors (Aust) Pty Ltd,
Queensland Police Service,
VICPOL,
Derby Volunteer Marine Rescue Group Inc.

and numerous private users in remote and suburban regions of Australia. The point is that HF remains an affordable, ubiquitous and proven method of communicating over vast areas. ABC doesn't want the public to know this.

The HF spectrum from 3-30 MHz has 21,250 assignments in Australia. These are people and organisations which pay ACMA annual licence fees for access to HF spectrum. They do so because this spectrum meets needs for communications and data transfer which are essential to their operations. This number does **not** include broadcast listeners, amateur radio operators or CBers.

QANTAS, Defence, Telstra, RFDS, Newcrest Mining and VICSES use satellites, digital terrestrial VHF/UHF radio and broadband services. These are not poverty stricken operations, they know the meaning of mission critical communications and the need for timely dissemination of information. Unlike the ABC they know which way is up. They all use HF in routine operations. The same propagation technology that Michael Mason calls "nearly a century old" is an essential component in providing security and diversity in communications to organisations which really do know the value of money (especially taxpayers' money). But the ABC knows better it says.

ABC points at satellite services such as VAST & satellite telephone and pleads that marginalised communities are thus economically and completely served. It could be that ABC is out of touch with communities it is supposed to consider in planning content and delivery.

ABC suggests

"Many 4WD and long distance truck drivers are equipped with comprehensive long-range radio and/or satellite phones - both of which are two-way in nature and therefore more useful in an emergency than SW's one-way path."

(about.abc.net.au/press-releases/shortwave-radio/ 2017 January 7)

ABC doesn't seem to understand that AM/FM, DAB+ and VAST are also one-way paths or that the *"comprehensive long-range radio"* uses . . . HF (SW)! Sounds like the ABC would really like to get out of disseminating emergency information in any shape or form.

ABC suggests using satellite telephone technology to establish remote area emergency communication. Sure, that works. The ABC is less forthcoming about the capex required to establish a satellite telephone facility or the continuing costs of each and every call when accessing the system. It's expensive at every step, far more expensive than operating a HF broadcast receiver or even an HF two-way transceiver, but ABC doesn't have to meet that cost so it's happy.

Satellites are not sacred

The fragility of satellites and indeed all inner geo orbits was demonstrated in 2007 when China intentionally shot down a satellite with a missile. The resultant debris field worried communication (and space travel) professionals far more than the act itself which merely duplicated earlier US and USSR demonstrations. Two years later two satellites collided creating a debris catastrophe. Orbital debris destroys one satellite per year on average, adding further to the problem. Earlier in 1989 high altitude satellites were destroyed by solar emanations. First world consumers' affordable access to satellite technology into the future is not guaranteed.

It is imperative that Australia retains a minimum HF broadcast facility not just internally, but also for regional stability and disaster support operations.

Who uses HF broadcasting these days anyway?

The current HFCC registration of international HF broadcasts list over 4,900, mostly daily, frequency assignments scheduled for the next six months.

While the BBC World Service no longer uses HF to reach southeast Australia or New York it retains a swarm of HF channels in its schedule for remotes areas with limited access to online or AM/FM services or to regimes where politic volatility makes this sensible.. BBC has been in this game just about longer than anyone else and knows about horses for courses. BBC is not constipating its international HF delivery options to support domestic digital roll-outs. It has just concluded a twenty million pound refurbishment to the key HF broadcast site on Ascension Island. The current A17 BBC WS schedule shows 254 HF assignments broadcasting from UK (two sites), Singapore, UAE, Ascension Is, Taiwan and others. see <http://www.hfcc.org/data/schedbybrc.php?seas=A17&broadc=BBC>

A similar story applies to Deutsche Welle (43 assignments from sites in Germany, Sri Lanka, UAE, UK, Ascension Is and South America), and NHK (134 assignments from mostly its own site at Yamata, but also Germany, UAE, Tashkent, Palau, UK).

Many other leading broadcasters have retained HF broadcasts today where it is clearly an effective vehicle. Voice of America runs a swarm of HF channels too - to regions where it recognises that HF works. See <http://www.hfcc.org/data/schedbybrc.php?seas=A17&broadc=IBB>

China is extending the range, duration and number of HF broadcasts in every HFCC registration since 2000. It has taken over at least one channel formerly used by RA into the Pacific. China's HF registrations now outnumber the combined schedules of the next three international broadcasters. I gave up counting their current assignments - it's a motza. If you have the urge see <http://www.hfcc.org/data/schedbybrc.php?seas=A17&broadc=CRI>

Why do CRI, NHK, VOA and BBC and others (RNZI etc.) operate major HF broadcast schedules? What do they know that escapes the wit of the ABC?

PNG, Solomon Islands and Vanuatu use HF for domestic broadcasting to reach out the hundreds of kilometres necessary to cover their islands. The remote populations have HF radios and were happy to use them to receive RA as well.

What can be done?

A domestic HF service carrying ABC regional programming is necessary as a service to taxpayers in remote areas. It can be provided more cheaply and more reliably than at present.

One scheme would see the relatively new Continental 418G transmitter relocated from NT to the Shepparton International High Frequency Transmitting Station where electricity is much cheaper, the site's environment is more benign, trained staff are available onsite and spares are consolidated with the existing international-service Continental transmitter. One or both HF aerials from the former RA site at Brandon would be relocated to Shepparton and aligned to service a sector ranging from 020 degrees to 300 degrees azimuth with minimum overlap. Both aerials would be established with equal radiating characteristics. The relocated transmitter would feed both aerials simultaneously and use an appropriate day frequency (9 or 11 MHz would be considered) and a night frequency around 5.9 MHz. This would cover a sector ranging from 1500 to 3000 km between the bearings nominated. Coverage would be

close to that presently achieved from the three NT sites. The transmitter would operate under an appropriate frequency management regime.

A minimum international HF broadcast capability needs to be maintained at Shepparton International High Frequency Transmitting Station in the interests of national security and to offer choice to Pacific listeners in the face of rising Chinese HF broadcasting presence in the region. The HF capacity would also provide an immediate response capability in the event of natural or political interruptions to the access to free media in the Pacific region. Four transmitters should be retained with appropriate aerial plant and frequency management for this purpose.

Electricity costs are a substantial part of the operating costs of transmitter plant. These costs could be off-set by an appropriately scaled solar photovoltaic facility in the southern half of the Shepparton site. This would be a project that could receive funding assistance from the Commonwealth and State governments as a facility with > 220, 000 PV modules would provide excess power into the regional grid and provide continuing revenue to the site's operator.

Nigel Holmes
April 2017