Listening to Amateurs

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This article provides references that may assist prospective Amateur Radio Operators that have limited experience with making contacts in Amateur Radio.

This document is tailored towards directing prospective Amateur Radio Operators to resources where they can listen to active Amateurs and hence understand some of the protocols used.

We must start with a discussion of the radio types. There are two main types of radio:

- **Analogue**: This is the traditional type of Radio. The most common type of Analogue Radio being based on the "Superheterodyne" model.
- **Digital**: The most common type of architecture is the Software Defined Radio or SDR.

SDRs vs Analogue Radios

The traditional types of radio – often referred to as "Analogue Radios" – samples radio spectrum then by the use of hardware filters and mixing in signals converts the received signals into a usable form – often in the audio frequency range. The most common form of "traditional" radio follows the superheterodyne model.

A Software Defined Radio - SDR – is a "Digital Radio" performs a significant amount of signal processing in a general-purpose computer, or a reconfigurable piece of digital electronics. (ScienceDirect – 2022). Rather than using mixers they electronically sample a slice of spectrum – digitise it at the hardware level – and then pass that slice of spectrum to some form of microprocessor. The microprocessor's software decodes the signal into a human usable form.

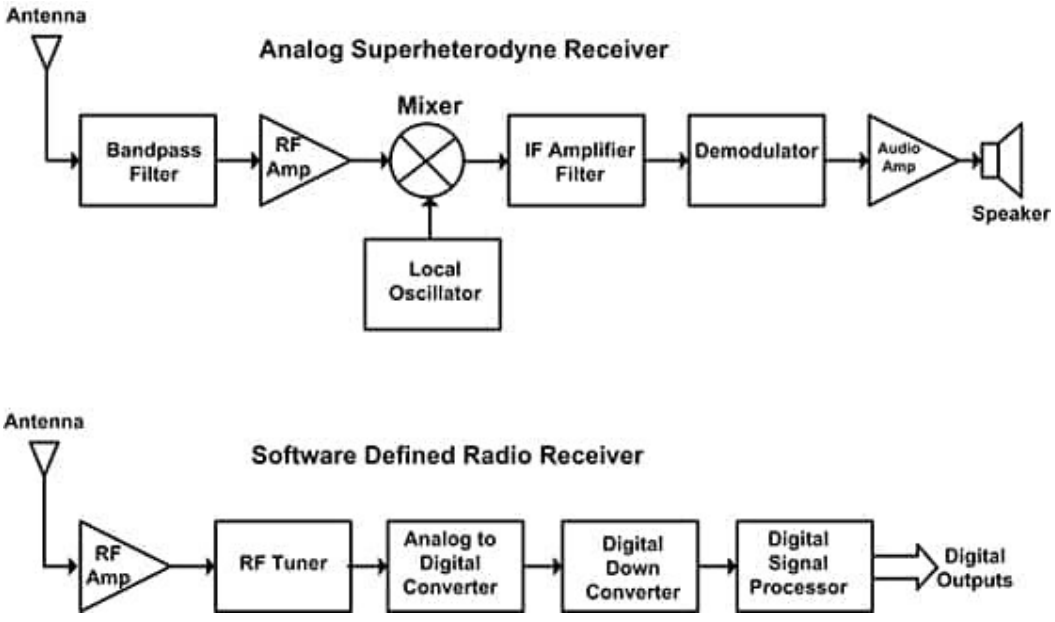

Figure 1: Analogue vs SDR Radio Block Diagram (source: Digikey – 2022)

The Digikey (2022) Reference provides more information for those interested further.

Web SDR's

As SDR's digitise samples of spectrum they can have web-accessible front ends. Some Amateurs and Short-Wave Listeners (SWL's) make their resources available on The Web. Sites that you may choose to visit (accurate as of 27/5/2022) that direct you to working Web SDR's include:

- websdr.org ← an interface to multiple Web Accessible SDR's
- kiwisdr.com/public/ ← An interface to web accessible hardware that uses the KiwiSDR platform

A sample screen for Web SDR http://sdr.websdrmaasbree.nl:8901/ based in The Netherlands monitoring stations on 7.097 MHz (many web SDR's show the frequencies in KHz) and working LSB is shown below:

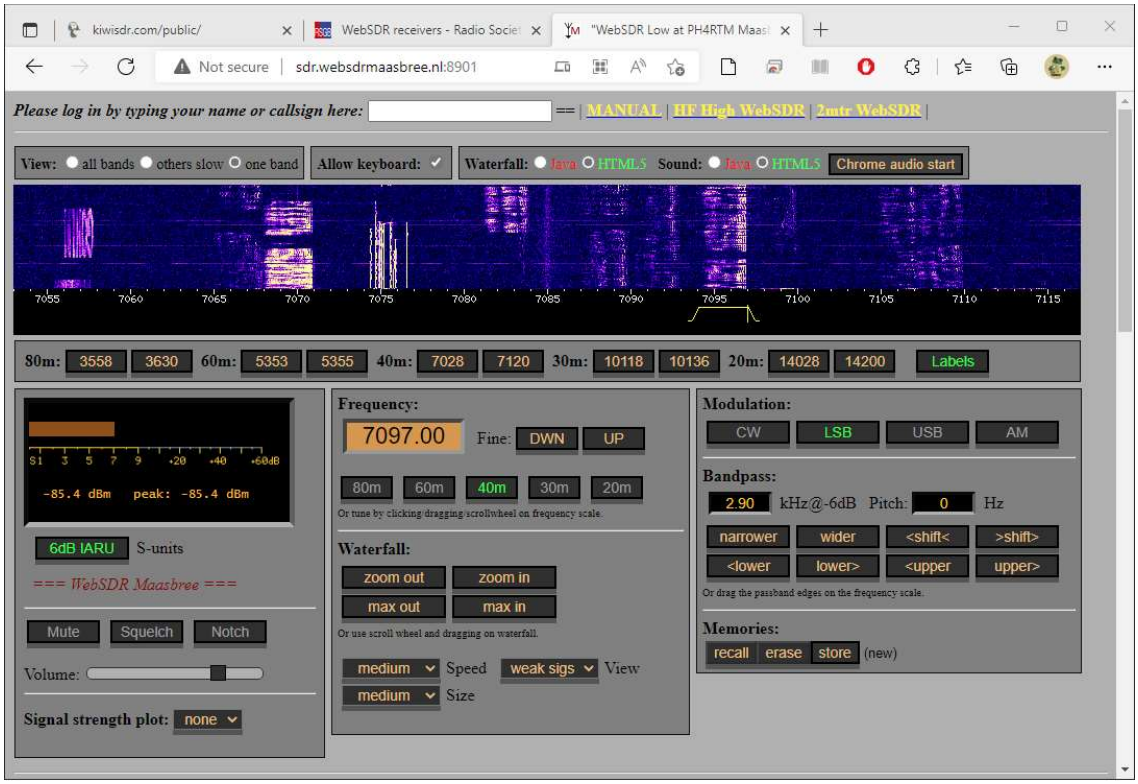

Figure 2: Sample Web SDR Screen (Source: http://sdr.websdrmaasbree.nl:8901/)

Any new Amateur should use these sites to listen to Amateurs operating within Amateur radio spectrum. How to use these resources is beyond the scope of this brief article.

Frequencies to Listen On

It is argued by many trainers that it may be best to direct new operators to monitor the frequencies that they are allowed to use. Mind you the radio spectrum available to Amateur Operators in Australia – defined in the Radiocommunications Licence Conditions (Amateur Licence) Determination 2015 (ACMA – 2022) – is quite extensive.

The spectrum available for transmitting signals to Australian Foundation-class Amateurs includes:

Item	Frequency band	Permitted emission modes
1	3.500 MHz–3.700 MHz 7.000 MHz–7.100 MHz	Any emission mode.
	21.000 MHz–21.450 MHz	Where the necessary bandwidth exceeds 8 kHz, the maximum power spectral density from the transmitter must not exceed 1 watt per 100 kHz.
2	28.000 MHz–29.700 MHz	Any emission mode. Where the necessary bandwidth exceeds 16 kHz, the maximum power spectral density from the transmitter must not exceed 1 watt per 100 kHz.
3	7.100 MHz–7.300 MHz	Any emission mode with a necessary bandwidth no greater than 8 kHz.
4	144.000 MHz–148.000 MHz 430.000 MHz–450.000 MHz	Any emission mode.

Figure 3: Permitted Frequencies for Foundation Licencees (Source: ACMA - 2022)

The best frequencies to listen on and times for signals to be heard are listed below:

Item	Frequency band	Frequencies and Times for Listening.
1	3.500 MHz–3.700 MHz	3.600 MHz LSB 24 hours (DX at night).
	7.000 MHz–7.100 MHz	7.090 – 7.110 MHz LSB Daytime
	21.000 MHz–21.450 MHz	21.200 – 21.350 MHz USB Daytime
2	28.000 MHz–29.700 MHz	28.400 - 28.500 MHz USB Daytime
3	7.100 MHz–7.300 MHz	7.150 MHz LSB Evenings
4	144.000 MHz–148.000 MHz 430.000 MHz–450.000 MHz	VK Repeaters heard from 144.600 MHz and 438.000 MHz FM

Figure 4: Frequencies, Modes and Times for listening to AR Traffic on the Foundation Allocation (after ACMA – 2022).

These are suggestions only. You should also consider the time zone that your web station is operating in. As an example, If you are in Australia and you select a European Web Station then remember that the station is most likely in the night time -so use the “night time” recommendations as a guide.

There will be exceptions to these suggestions in Figure 4. Often solar conditions permit “Band Openings” outside these generalisations.

Amateur Radio “Spots”

How can we know if a “band is open” i.e. is allowing signals to propagate to you? How can we know where to start tuning?

Amateur radio operators have a system of reporting conversations (QSO's). These systems are known as wen clusters. Each report is known as a "spot". The "spot" information helps you to know where to tune and hence to work a station that you may want.

One of the most useful "spot" sites is found at http://dxsummit.fi:

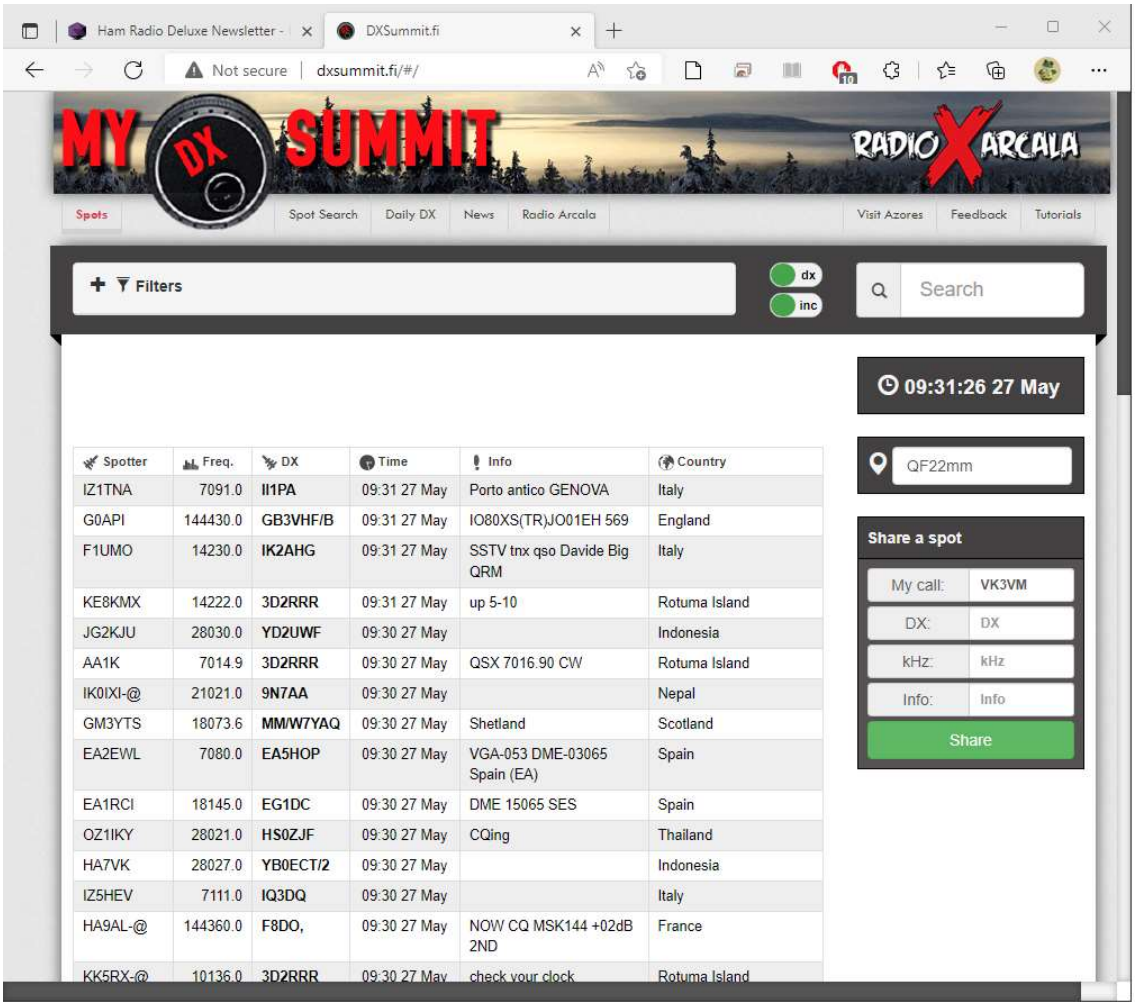

Figure 5: DXSummit Web Cluster Interface

The spotter is the station that reports a station operating (the "spot").

Refer to the first item in the table: In this case the spotter IZ1TNA is receiving II1PA on the frequency 7091.0 KHz – which is 7.091 MHz. The time that the spot was made is 09:31 UTC.

The comments often tell you what mode that the station is operating under i.e. F1UMO has reported station IK2AHG sending SSTV (Slow Scan TV) on frequency 14.230MHz at 09:31 UTC on the 31'st of May.

Sometimes the information is not that helpful. A little experience in AR will more than likely tell you what mode they are operating under. In our first example, IZ1TNA is receiving II1PA on the frequency 7091.0 KHz. The frequency 7.091 MHz is typically used for LSB conversations (QSO's).

You may therefore use this information from spots to see if you can receive the stations.

You can often access spot sites using the old Telnet terminal protocol. Discussion of this is beyond this guide.

Video Examples

Many Amateur radio operators have recorded and posted YouTube videos of the QSO's. Some examples that may assist new operators with regards to operating protocols include:

- https://youtu.be/h73EYcyszf8?t=697 ← From the International Space Station (ISS)
- https://youtu.be/_mXNpCnjUwA?t=324 ← A tutorial video on practise
- https://youtu.be/sqVJeww_eU8 ← A station operating

The procedure for working on repeaters (found on 10m, 2m and 70 cm) is a little different to working HF. One does not call "CQ" on a repeater.

The video below is a reasonable example of how to work on a repeater, though some protocols at around the 4:20 mark are not typically used by Australian Amateurs i.e. referring to repeaters by last digits – Australian Amateurs typically refer to repeaters by callsigns such as VK3RMM :

- https://youtu.be/Xq5J_0lwOvc

Note that some protocols may not be to reported standards. These are examples of how to conduct a QSO. Google "Calling CQ" and you will most certainly get lots of examples that you can learn from – and overcome "mike fright".

References

ACMA (2022) https://www.legislation.gov.au/Details/F2020C00376 accessed 27/05/2022

Digikey (2022) https://www.digikey.com/-/media/Images/Article%20Library/TechZone%20Articles/2020/June/Learn%20the%20Fundamentals%20of%20Software-Defined%20Radio%20and%20How%20to%20Use%20It%20with%20a%20Low-Cost%20Module/article-2020july-learn-the-fundamentals-fig1.jpg?la=en&ts=1daff413-b699-4e6d-81a6-cf072f82616a accessed 27/05/2022

ScienceDirect (2022) https://www.sciencedirect.com/topics/engineering/software-defined-radio accessed 27/05/2022