



Uses For Dual ADC Analog Transceivers

EXPLORING MULTIRX AND DIVERSITY MODES

Background on Diversity Reception



- ▶ Diversity Reception seemingly has different meanings to different hams.
- ▶ Diversity seems to have first been coined by the notion that the audio of two independent receivers with independent antennas feeding their audio output to left and right audio channels to be fed to the left and right ears could reduce the effects of fading and help the operator better hear weak signals.

Background on Diversity Reception



- ▶ Rather than focusing on the terminology, I decided that maybe what Joe Ham really wants to know is how can I leverage dual ADC's with 2 antennas, one hooked to each. Also the question often asked, Is this feature really worth purchasing.

Simple Uses for Dual RX

Feed both receivers, physical or virtual the same signal (via a splitter if they are true independent physical receivers) and use them for monitoring and or operation on more than a single frequency or band at the same time, IE working 20m and 40m Simultaneously. This may not require a dedicated physical second receiver and virtual receivers would already be fed with just one antenna. Alternately you could have a second physical receiver and use two different antennas.

Operate SPLIT mode – works with both virtual and physical receivers where there are more than 1. A QSO is listening on one frequency and transmitting on another. Also works on most single receiver transceivers now days.

Background on Diversity Reception



- ▶ **Advanced Uses for Dual RX** – Second physical receiver and antennas required

Interference Mitigation - use the diversity feature in PowerSDR to reduce/mitigate interfering signals. Both antennas receive both wanted and unwanted signals where the unwanted signal on one of the antennas is stronger than the other. Through comparative signal phase analysis and phase adjustment via the Diversity adjustment feature the unwanted signal can be reduced or eliminated while the good signals are retained.

- ▶ <https://youtu.be/Xnc3vpArof8> - Demonstration Video

Fade Reduction - potentially antenna 1 can be augmented at times with Antenna 2 in MultiRX mode. If the signal fades in one antenna but not the other then the effects of fading can be mitigated. This also can help leverage different antenna types and or polarizations to virtually mix them with selective hearing in either the right or left ear for the strongest reception result. This could be true of non polarized or Polarized antennas.

Background on Diversity Reception



- ▶ **Multidirectional Reception** - In MultiRX mode directional antenna element 1 is pointed at [1 or many contacts] while beam 2 is pointed in another direction to a second group of [1 or many contacts] with the result of picking up more directional geographic coverage and improved reception. Nice for Nets where hams are geographically dispersed in all different directions.

Simulated Stereo - two antennas receiving same signal and routing it to left and right ears. MultiRX. The theory that two ears can hear better than one.

Potential applications with additional equipment and or programming in PowerSDR - Automated Antenna Switching: This is based on an automated voting system where the radio votes for the best signal based on user programmed criteria to automatically route the best signal to the listener. Would require super-fast processing!

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- ▶ **Potential applications with additional equipment and or programming in PowerSDR**

Automated Antenna Switching – This is based of an automated voting system where the radio votes for the best signal based off user programmed criteria to automagically route the best signal to the listener. Would require super-fast processing!

- ▶ **Signal Summing** – Signals from two antennas are evaluated and summed into a cleaner better signal to be processed. Would require super-fast processing!

This whole topic is rather fascinating and can be quite complicated if you were to attempt to understand the full concepts and math behind them. This is just a look at the receive side.

- ▶ Already beam steering for transmission is in use and equally fascinating!

Background on Diversity Reception



- ▶ The links below may help you dig in another layer deep into this as well as potentially lead you to even deeper exploration.



Helpful Links for further exploration

- ▶ <https://www.dropbox.com/s/kjuhdmykila01gb/Diversity.pdf?dl=0>
- ▶ www.w8ji.com/polarization_and_diversity.htm
- ▶ casper.berkeley.edu/wiki/images/7/7f/201...-Beamforming-WCB.pdf
- ▶ www.homingin.com/dualfeed.html
- ▶ www.puertobalsillas.com/radio/Polarization_Diversity_W9RPK.pdf
- ▶ www.puertobalsillas.com/radio/Dual_Polarization_AB2KC.pdf

Beam Steering for Transmission



- ▶ The links below may help you begin understanding beam transmission:
- ▶ **Helpful Links for further exploration**
- ▶ <https://youtu.be/vtPPAnvJS6c>
- ▶ <https://youtu.be/8rMtqRObvvU>
- ▶ Thanks for Tuning in today!