

## Yaesu System Fusion 201 by KØHCV

After my article titled Yaesu System Fusion 101 I was asked to provide a little more detail regarding the differences between Fusion and DMR. This article is a follow up to that one.

First of all let me remind everyone that Yaesu System Fusion Digital is different from DMR. All Fusion capable radios are just normal ham radios with a couple of extra features.

A Fusion capable radio functions just like any other ham radio you have used. The only difference is that it offers one additional mode. That mode is digital.

A normal analog radio offers just the one mode, analog. With fusion you can select either analog (FM) or digital (DN) or (VW). When you select digital you can select from two different flavors. One mode is Data Narrow (DN) and the other mode is Voice Wide (VW). This selection is made with the mode selection option on your radio. You will see either FM, DN or VW displayed on the screen of your radio. If you see a solid bar either above or immediately to the left of the FM, DN or VW that means you are in Automatic Mode Select or AMS. I will explain that later.

When you select the DN mode you are transmitting in C4FM digital mode but your voice only takes up half of the transmitted bandwidth. The other half contains data. This data contains your GPS coordinates. Using the DN mode any receiving station can see your call sign displayed on their radio along with the distance and direction to your station.

When you select the VW mode you are still transmitting in C4FM but with a much higher fidelity audio signal. This is because your voice takes up the entire transmitted bandwidth. Your call sign is still transmitted however the GPS data is no longer transmitted. The receiving station will still see your call sign but will not know the direction to your station or how far away you are. However your voice will have higher fidelity and

sound much more like a broadcast studio.

When you select the FM mode you will be transmitting in analog and it will be just like any other analog radio you have used. While there may be a PL tone used with your analog signal no data is transmitted. One very important point here regarding analog vs. digital. While you may or may not use a PL tone on an analog repeater, **THERE ARE NO PL TONES USED WITH DIGITAL COMMUNICATIONS!** If the repeater is in AMS mode there may be a PL tone associated with the analog side but **THERE ARE NO PL TONES USED WITH DIGITAL COMMUNICATIONS!** If you see a repeater listed somewhere that says it is a Fusion repeater but shows a PL tone, it is either operating in AMS mode or the information is incorrect.

Now to Automatic Mode Select or AMS. AMS was designed by Yaesu to allow their radios to use the new C4FM mode but still allow you to operate in the analog mode on analog repeaters. The idea behind AMS is that your radio will automatically select the proper mode depending on the mode of the signal you are receiving. If your radio is in AMS mode and someone calls you in analog, your radio automatically switches to analog and you can carry on your conversation in analog. If they call you in either DN or VW mode your radio will switch to the proper mode and you can carry on your conversation in digital. Very simple very easy. No operator intervention or code plugs required.

The Yaesu DR-1X Fusion repeater can be configured one of four ways. They can be set up as strictly analog. That is analog in / analog out. They can be set up as strictly digital. That is digital in / digital out. And they can be configured mixed mode. This way they can accept either digital in or analog in and force analog out or mixed mode where whatever mode comes in is the mode that goes out.

When Yaesu started selling their two thousand dollar repeaters for five hundred dollars a lot of

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clubs and individuals bought them to replace their aging repeaters. These folks set their repeater up to be fixed analog in and fixed analog out. Some clubs, experimenting with C4FM digital, set their repeaters up to be either analog or digital in but fixed analog out. The real daring clubs set their repeaters up to be anything in anything out (AMS mode). Very few set their repeaters up as fixed digital in and fixed digital out. Doing this had the potential to alienate club members which is why most of the digital only repeaters are individually owned or have been assigned new repeater frequencies.

Yaesu realized that allowing the repeater to be set to fixed analog in and fixed analog out was not going to sell many new Fusion radios. So they have made it a little more difficult to do that with the new DR-2X repeater. I won't discuss that any further here.

Now we will get to the Fusion repeaters in the Kansas City metro area. I cannot speak for all of them because it is in a constant state of flux. Some clubs are debating whether or not to buy a new DR-2X while those who have purchased them are discussing just how they want to configure it.

I can tell you about the repeaters I am affiliated with. These are as follows:

146.910- fixed digital Overland Park  
442.600+ fixed digital Shawnee  
444.400+ fixed digital Olathe  
147.315- fixed digital Louisburg  
443.275+ fixed digital The Plaza KCMO

These machines are digital only. The Overland Park, Shawnee, Olathe, Louisburg and Plaza repeaters are all linked together full time.

The activity on these machines varies just as it does on other repeaters. More activity during drive time and a little less during the day. However, we have hams from all over the world that connect to our linked repeaters from time to

time. It has been very interesting conversing with these hams and adds to the excitement of the digital capabilities. It's kind of exciting to see a DX call sign and a distance of four or five thousand miles on your radios display.

There are several other Fusion repeaters in the metro area that will link to ours from time to time but the ones listed above are linked full time.

The Overland Park, Shawnee, Olathe, Plaza and Louisburg repeaters are currently DR-2X's.

One final note. The Johnson County Radio Amateur Club holds a weekly net on the 442.600 Shawnee repeater at 8 PM every Wednesday. If you can reach the Shawnee machine check in on the 442.600 repeater. If you can't, check in on any of the other repeaters. Since they are linked you will be heard throughout the entire network.

One final final note. If you have a Fusion radio PLEASE make sure the firmware in your radio is current. Your instruction manual will tell you how to check the firmware level. You can go to Yaesu dot com to see what the current firmware level is for all of their Fusion radios and download the new firmware and instructions there.

One very important point to remember with linked digital systems. Do not tail end the previous transmission. Wait a second or two before you key up and begin to transmit. These repeaters are linked via the internet and there is a certain amount of latency encountered during operation. This applies to both Fusion and DMR.