Selectivity of XetaWave's Xeta9x Radio vs. FreeWave's FGR2 and FGR3

The 900 MHz Unlicensed Band is very congested and any radio operating in that band must be able to reject interfering radios transmitting anywhere within that band. The ability to reject interference is called *Selectivity* and it is measured in dB. *Selectivity is a logarithmic measurement and the higher the number, the better the radio is in rejecting interference.*

XetaWave measured the Selectivity of the Xeta9x Radio and compared it to FreeWave's legacy radio, the FGR2, and their new replacement, the FGR3. The results are plotted in Fig 1, page 2. Each radio was set to receive at approximately 915Mhz which is the center of the unlicensed band. An interfering signal was adjusted in frequency and amplitude to produce a 10% reduction of the packet reception success in each radio. This level is very close to the level in which all reception is blocked. The frequency range of XetaWave's interfering signal was +/- 6Mhz in our test. All radios exhibited a mostly flat rejection floor beyond that.

*The **FGR3 was 20 dB worse** than either the FGR2 or the Xeta9x. 20dB means the **FGR3 will be blocked** by signals 100 times less in strength than the FGR2 or Xeta9x.*

Results

1) Both the FGR2 and the Xeta9x had similar rejection (over 80 dB) of signals far removed (>2 MHz) from 915MHz. The Xeta9x, however had a slightly better rejection than the FGR2. At 80 db rejection, these radios will not be affected by other radios collocated on the same tower.
2) Between 1 and 2 MHz separation, the Xeta9x was 10 dB better than the FGR2.
3) The FGR3 was 20 dB worse than either the FGR2 or the Xeta9x. 20dB means the FGR3 will be blocked by signals 100 times less in strength than the FGR2 or Xeta9x.

Discussion

Both the FGR2 and the Xeta9 use a superheterodyne architecture in their design. This type of architecture produces the highest performance compared to other approaches in radio design. The downsides to a superheterodyne architecture are its cost and difficulty to design. Engineers cannot just use an application circuit from a chip manufacturer, rather they must perform many calculations and be aware of many subtleties to design a successful product.

The FGR3 uses a direct conversion chipset. This approach, commonly used in consumer grade equipment, is very inexpensive and very easy to design. The FreeWave Zumlink also uses a direct conversion chipset. Direct conversion can never get to the performance level that one can achieve with a superheterodyne design used for XetaWave radios.

Conclusion

As the data shows, one should be very leery of using the FGR3 in any application where there are interfering radios nearby which is very typical in the 900 MHz spectrum.

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