Spread Spectrum Spirit Analogy

Roald E. Peterson, Jr.

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Introduction

As an electrical engineer, among other things, I sometimes make analogies of spiritual things with technology. One day in my verbal ramblings with friends I made a comparison between the workings of the Spirit and something else I had been involved with, spread spectrum radio technology. One of those friends a few years later asked me to write it down for him. I think it's a good description of how we hear the Spirit through the noise of the world that is all around us – if you're not put off by the technical aspect. The idea has helped me, and perhaps some others, get better revelation.

Standard Radio

Most radio communications are transmitted in such a way that if you are within range and tune to the right frequency you can detect and receive the radio signal. There are different ways to put sound and data onto a radio frequency carrier wave, such as amplitude modulation (AM), frequency modulation (FM), etc. However, the signal bandwidth, the width of the signal in frequency, not the frequency it's being transmitted at, is close to the width of the frequency range of the original sound or data. As a simplified example, music radio stations transmit channels between 10,000 and 20,000 Hertz (Hz) wide because the music they transmit has a frequency range from 20 Hz to 20,000 Hz. This is their bandwidth, a fairly narrow piece of the radio spectrum. They essentially take the music, add it to the radio frequency (usually millions of Hz), and transmit it with an amplifier and antenna. When scanning the radio spectrum, it's easy to see that there is something there. The receiver detects it, removes the radio frequency from the signal and leaves the original sound. For this system to work, the transmitted signal must be strong enough to detect. What complicates matters is the fact that space is not quiet in the radio spectrum, but is actually rather noisy. Figure 1 shows a comparison between quiet space, the straight line, and space with random noise.

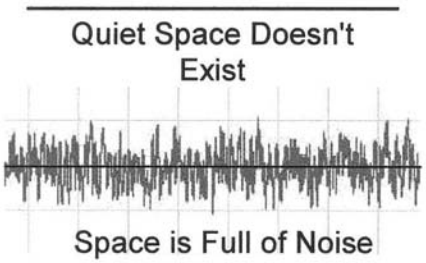

Figure 1 - Quiet and Noisy Space

This noise comes from many things, interactions between atomic particles, stars and planets, man-made radio transmissions, and other sources. To hear this noise, tune your AM or FM (especially FM) radio receiver between stations and listen to the hissing sound. For radio communications to be received they must be greater than the noise received by the receiver. If the receiver is too far away and the signal is so weak that it is the same or less strength than the noise, Your system will not be able to detect it. Figure 2 shows several seconds of actual broadcast of voice over an AM radio station. It is amplitude (strength) of the sound that is plotted. Notice that there is never a straight line. Between the mountains of speech there are valleys of noise. The noise is actually always there, the voice signal must be stronger or it cannot be heard; the signal would simply get "lost in the noise."

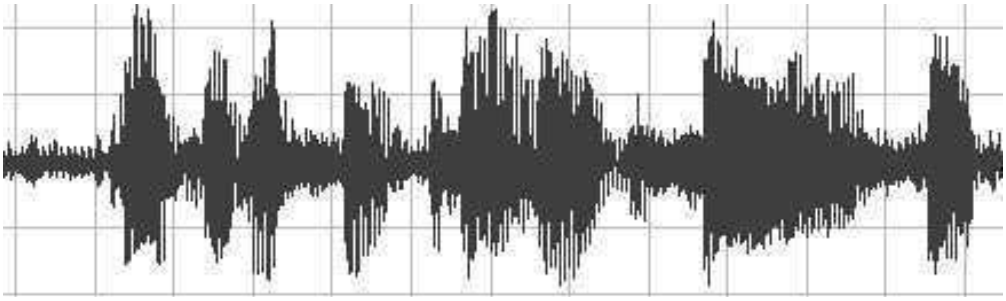

Figure 2 - AM Radio Voice Transmission

Spread Spectrum Radio

With the merging of computers and communications systems, it is now possible to do a little "magic" with radio transmissions. Instead of putting the sound on a radio wave, the sound is first digitized into a stream of ones and zeros. A pre-selected code is then used to encode the original digitized stream into a new digital stream which changes millions of times each second. The way it changes makes it look as if it were noise. Because it is has millions of changes per second, it has a frequency of millions of Hz and therefore has a bandwidth of millions of Hz. This means it now must spread out over a larger portion of the radio spectrum when transmitted, hence the designation spread spectrum. The transmitter transmits the signal at such a low power that the signal is less than the noise. Figure 3 shows how the transmitted coded signal mixes with the noise and is lost and undetectable. In other words, you don't even know it's there. For example, there are actual spread spectrum transmissions in Figure 2 above. However, they are undetectable and unseen. They are lost in the noise.

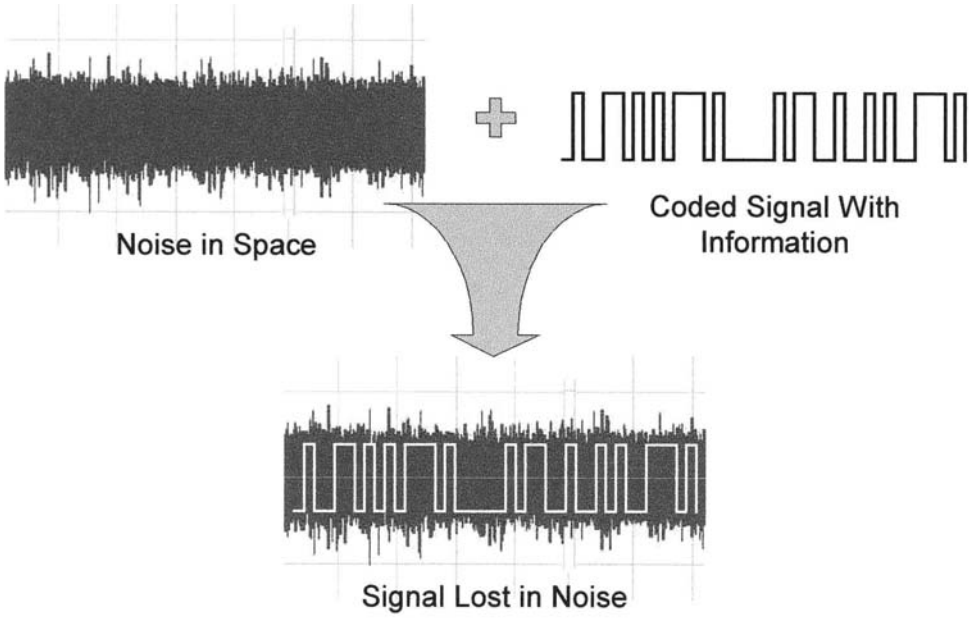

Figure 3 - Spread Spectrum Transmission

So what good is a system that hides your communications where it can't be seen or found? It's great for keeping your communications private and not interfering with others – as long as you have a receiver capable of decoding it. Getting the signal is not too difficult if you have the code. The receiver receives the noise and uses the code to add a digital stream to it. If it has the wrong code, it simply acts like more noise in the signal and nothing is detected. If it has the right code, it adds with the hidden code and suddenly becomes greater than the noise. This is shown in Figure 4. The signal is then read, decoded, and processed to extract the original information (voice, data, etc.)

The Voice of the Spirit

The operation of the Spirit of God, from the level of the Light of Christ to the greater manifestation of the Holy Ghost, is similar to spread spectrum technology. Our world is filled with noise. At this very moment I hear the sounds of fans on my computer and a fan on a shelf nearby, cooling me. If I leave the house and walk down the street, I will hear cars, children playing, televisions, radios, music systems, horses and cows in nearby fields, planes overhead, and many other things making noise. These sounds are not necessarily bad or good, but they are there and other sounds must be louder for me to hear them above the noise. There is also spiritual noise present. Noise tends to be chaotic and without intelligible pattern, so great amounts of noise, audible or spiritual, tend to mask intelligible communications. I can go places where there is greater or less audible noise. I can do the same with spiritual noise. They have a tendency to be the same places, but not always. For example, how easy is it to think and feel near a busy intersection? How does that compare with a mountaintop or a deserted country road?

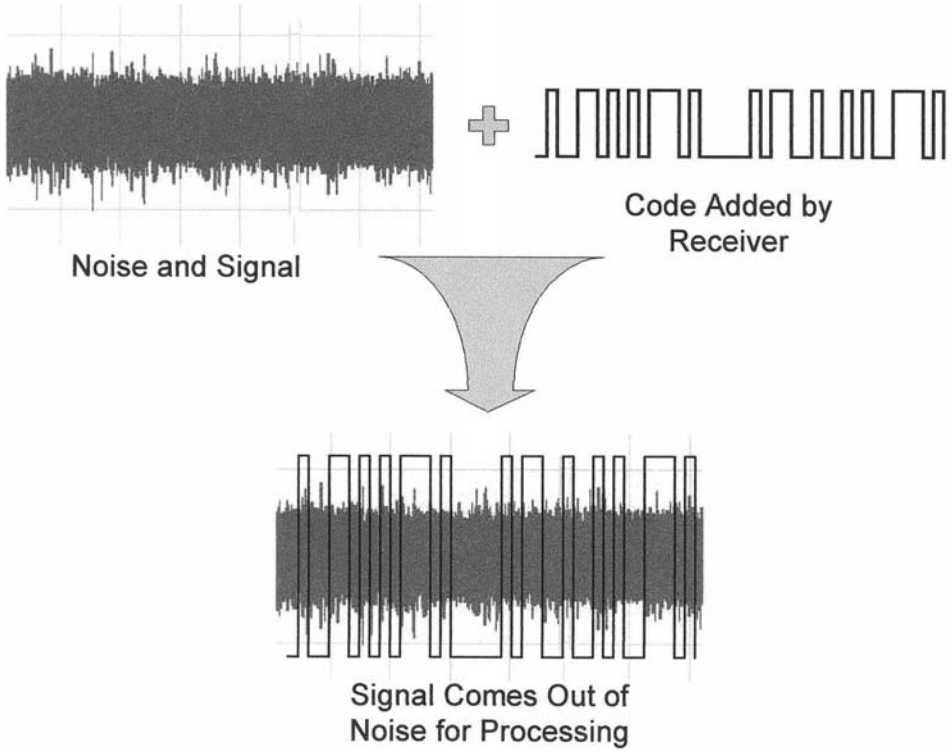

Figure 4 - Spread Spectrum Detection

The still, small voice of the Spirit seldom competes for our attention by shouting louder. It is transmitted at a detectable level but most of us are far too busy listening to the noise around us to detect that voice. One way to hear it better is to reduce the level of noise around us. While I tried running with a tape player and headphones when I was younger, I have not done so for many years. Lest I judge unrighteously, I need to remember that perhaps if I ran near heavy traffic, I would find taped music less noisy than the environment. Everywhere I live I try to find a quiet, restful place to sit and think. Winnie the Pooh had a "thotful spot," and I have learned much and received direction by listening in my own thoughtful spots. The place I have found to have the least noise, spiritual and audible, is the Temple. It seems best during the middle of the afternoon, when few people are there. I have found it worst (relatively speaking) during stake and ward temple nights and wedding sessions, when there are many people present. It seems that each of us, me included, brings a little bit of the world in on his feet. It all adds up in terms of spiritual noise.

Turning off the car radio, frequenting quieter, nicer places, staying away from the television, and similar actions can go a long way in making it easier to discern the voice of the Spirit. But there is more we can do. The voice of the
Spirit is the voice of Christ and it follows the patterns of his thoughts and speech. While the Spirit can be lost or almost lost in the noise around us, we can still detect and understand it by having the same spiritual patterns in our own thoughts and lives. If we know the voice of Christ through the scriptures, prayer, and living our lives as he would, it is as if we had the same code and we can pick out his voice from the noise around us. Our own spirit will carry the same pattern as – and respond to – the Spirit of God, even in darkness and chaos. The properly attuned spirit receiver can discern the word of the Lord where others hear only noise. It is hidden from and unnoticed by those who do not seek it.

All things bear witness of Christ and his gospel. If there were a better place or way to learn about spiritual things, He who has a perfect plan would have sent us there. We can and should learn about eternity from the temporal things around us.

"It's a noisy world, and you're going to have learn first...that revelation comes in the quiet times. It will come when the Lord can speak to our feelings.
"Go quietly into the world. Go quietly about your affairs, … and learn that in the still, small hours of the morning the Lord will speak to you. He will never fail to answer your prayers." (Boyd K. Packer, 17 Dec 2006, BYU-Hawaii Commencement speech.)