



Remtron Technical Note Spread Spectrum

Remtron does not use spread spectrum techniques in its design. Why not? Spread spectrum is the technique of transmitting messages by spreading the transmitted energy across a frequency band. It was first used by the military to defeat attempts by the enemy to jam our transmissions or intercept messages. The enemy would try to jam a transmission by scanning a frequency band, identifying a target transmitter, and then transmitting at the same frequency to interfere with the receivers. By spreading the energy, the transmitted signal was difficult to detect. The wireless communications industry was interested in finding other uses for this clever technique. Proponents of spread spectrum reasoned that by using the technique, more users could be accommodated in the same frequency bandwidth. Although this was a controversial argument, it nevertheless convinced some developers to use spread spectrum in their equipment designs.

Would spread spectrum techniques improve the performance of wireless control systems? Not for the type of operations required by our customers. First, wireless control applications do not have the operational uses that would benefit from using spread spectrum techniques. There are not hundreds of units in the same geographical location competing for access. Second, spread spectrum does not improve performance over current wireless control systems. For controlling equipment at ranges less than 1,000 feet, spread spectrum does not perform better than normal packet communications at 900 MHz. That is because the packet communications protocols implemented by Remtron are effective in reliably delivering packets and defeating interference in this frequency band. This has been demonstrated repeatedly over years of experience in real operational environments.

The one advantage spread spectrum does have turns into a disadvantage in practical operation. The FCC permits transmission at a higher power when in a spread spectrum mode. By taking advantage of this FCC ruling, spread spectrum systems can command equipment well beyond 1,000 feet. However, this distance is also well beyond the safe operational range for controlling equipment, and the capability to operate at such a distance introduces an additional safety hazard in operations. Remtron designed its wireless control systems to meet the specific needs of the industry and its customers with a special emphasis on safety.

Why not use spread spectrum for whatever additional value it may offer, even if that value is marginal? With any additional complexity, there are penalties. The use of spread spectrum increases the power drain on batteries and shortens the time between battery replacement or recharge. More complex transmission algorithms also complicate diagnostics. It is harder to determine the cause of problems with equipment with spread spectrum algorithms. To get the full benefit of frequency hopping spread spectrum technology, the implementation must use a long sequence of channels. The longer the sequence, the longer it takes for the receiver to acquire or lock on to the transmitter before it can transmit data. This not only delays operation when the units are first turned on, but it also further reduces the opportunity to decrease power consumption in the transmitters by permitting frequent time-outs to extend the operating life of the battery.

Remtron's approach is to design for the intended use of the system, not for the available technology. Remtron's equipment is fully capable of implementing spread spectrum algorithms if and when our customers need their unique benefits.