



Healthcare Application Note

Simple Facility Clock Implementation for Legally Traceable Time®

Spectracom NetClock® systems offer Legally Traceable Time® for time stamps and log files used in audit trails, security systems, records management, and network troubleshooting. The NetClock time server is used as a master clock to synchronize all critical networks and devices, including servers, PCs, security systems, building automation, fire alarms, electronic record systems, and many more devices and applications. A NetClock-based wireless time solution enables display clocks to become part of the network infrastructure for synchronized time throughout the facility, offering unprecedented convenience and reliability.

Legally Traceable Time®

Today's NetClocks are GPS-enabled devices that utilize the official time broadcast from the 24 satellites that make up the Global Positioning System. Ultra-precise clocks onboard the satellites are controlled to synchronize to the official worldwide time standard, Coordinated Universal Time (UTC), which is maintained by national metrology institutes such as the National Institute of Standards of Technology (NIST) in the United States and Bureau Internationale des Poids et Mesures (BIPM) in France. The NetClock tracks up to 12 GPS satellites, using error-checking algorithms to ensure GPS reception is reliable and accurate. Synchronization status is monitored and alerts can be config-

ured for "loss of sync" and automatic failover to alternate time sources, such as GPS backup precision oscillators. Additionally, an optional dial-out modem can be used to provide a synchronization reference through NIST's Automated Computer Time Service (ACTS), and can also be used as primary sources of time for installations in which a rooftop or window-mount GPS antenna setup is impractical.

Wireless Time Distribution— Reliable and Easy

In the past, synchronized display clocks were limited to wired installations. Today's wireless solutions eliminate the cost and disruption associated with wiring a facility for synchronized time. Some issues of concern associated with wireless time distribution include inconsistent or unreliable facility coverage, interference with other devices, and the administrative cost of applying for and maintaining an FCC-licensed radio station.

The 900 MHz frequency offers a robust and easy-to-implement solution for wireless time synchronization of clocks throughout a facility. Years ago, radio frequency regulators allocated certain frequencies for flexible use. ISM bands were defined for use in industrial, scientific, and medical industries, including 900 MHz and 2.4 GHz (better known as WiFi). Different systems can operate within



these open-frequency bands through the use of various spread-spectrum technologies such as frequency hopping. Frequency hopping concentrates transmitter power on one narrow channel at any one time for a short duration. A random hopping sequence is then used to transmit the data over a wider band. Operating similarly to cell phone technology, this is how a large number of different devices can function in the same frequency range. If two different devices hop onto the same channel at the same time, they will almost immediately hop to different channels and rebroadcast their messages. Because time-encoded transmissions contain little data, frequency-hopping offers excellent reliability, as the chance of even one "collision" with another system is almost zero.

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Simple Facility Clock Implementation

Mesh Networking Ensures Coverage

Each facility has unique structural properties that make a single wireless transmitter solution problematic. A single-transmitter wireless time solution can be made extremely reliable, however, by using each device as a repeater. This type of system is not limited to the distance or signal path between the transmitter and the clock. Because each clock also acts as a transmitter, the significant factor is the distance from one clock to another. Clocks work together in a specific area. The more clocks there are, the greater the signal strength to each unit. An additional advantage of this mesh networking is that it offers redundancy. Should one unit fail, other clocks continue to broadcast in the wireless mesh time network.

Conclusion

A wireless clock system consisting of a NetClock time server coupled to a "base" transmitter, connected through an RS-485 (twisted pair) interface or as an NTP client, offers reliable synchronized time throughout a facility. The unique combination of a secure network time server and a 900 MHz frequency-hopping mesh network ensures accuracy for Legally Traceable Time®. Implementation is simple (analog clocks are designed for 5-year life with 2 "D" cell batteries to offer a completely wireless solution; 24 or 110 VAC available) and does not require the time, expense, and administration of the FCC licensing process to ensure interference-free operation.

The result is Legally Traceable Time® throughout the enterprise.

- Synchronizing network time with facility time
 - Easy installation and management
 - Low-cost investment protection against the risks of inaccurate time
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