

## Sapling Repeaters for the Wireless Clock System

Sapling offers two repeater models for the wireless clock system – the Wireless Network Repeater (SMA-1SM) and the Wireless Repeater (SMA-1SR). This brochure explains the differences between the two types of repeaters, and when repeaters might be needed with the Sapling Wireless Clock System.



**SMA 1000 Repeater**

### Principle of Operation:

The Sapling Wireless Clock System consists of a master clock with a transmitter and wireless secondary clocks. A unique feature utilized in Sapling Wireless Secondary Clocks is that each clock has a built-in repeater. This allows the clock to both receive time data and retransmit it to other secondary clocks in the system. This feature extends system coverage since the clocks are not limited to the master clock transmitter's range, as the signal is repeated by each clock. Sapling's built-in repeater technology also adds reliability and redundancy to the system since each clock can receive time data from multiple directions and sources—not only from the master clock.

### When Repeaters Might Be Needed:

Sapling offers repeaters to provide economical solutions for various applications. For example, in a campus environment, a master clock can be used in the main building while network repeaters may be used in the secondary buildings (eliminating the need to purchase a master clock with a transmitter for each building). Another scenario when a repeater might be needed is when a secondary clock is beyond the transmission range of the master clock and all other secondary clocks. We recommend planning to place each clock within 300 feet (100 meters) from the nearest clock, although the distance can fluctuate depending on facility infrastructure. In these scenarios, repeaters will provide a solution.

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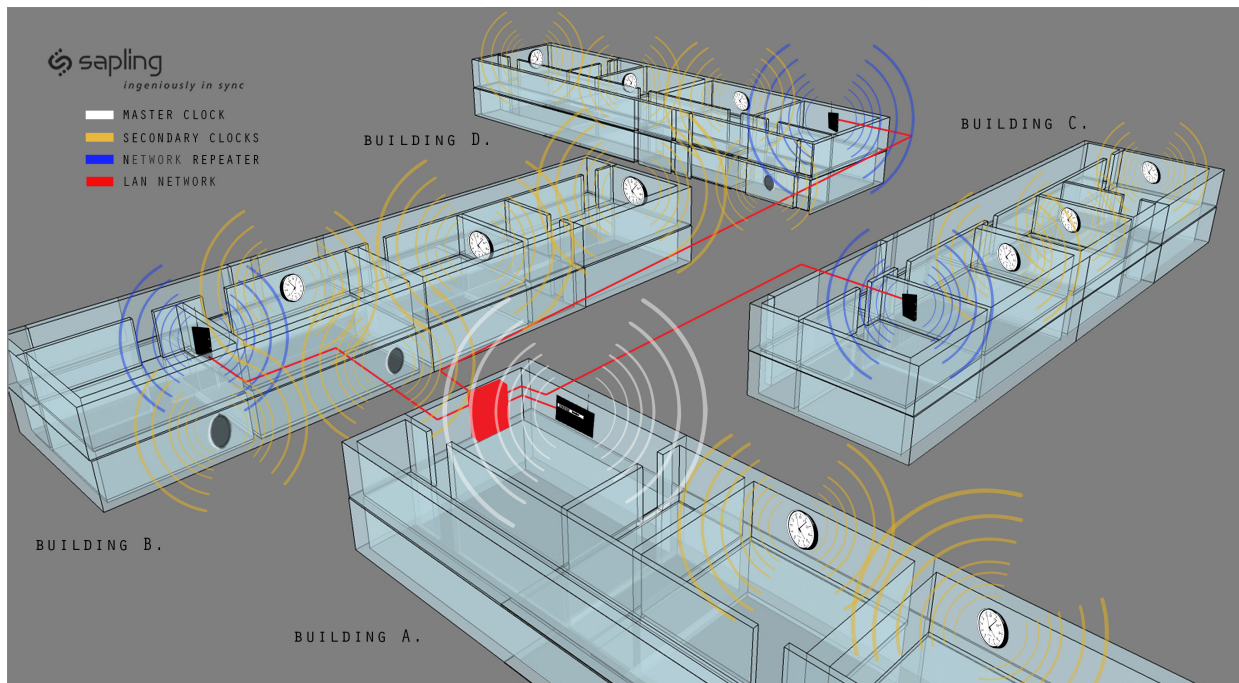
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### The Wireless Network Repeater (SMA-1SM):

The wireless network repeater is locally powered (110-230 VAC) and connected to the network using a standard network cable. For any scenario in which LAN is available, or for a campus environment where LAN is shared between the buildings, the network repeater should be used.

### Principle of Operation:

When using a wireless network repeater, the master clock in the main building should be configured with a static IP address, while the network repeater will be programmed with the master clock's IP address. This will direct the network repeater to take time from the master clock. The wireless network repeater communicates with the master clock over LAN, and because of that, the network repeater does not have to be within signal range of the master clock or any of the secondary clocks. The network repeater transmits time data at the same rate and transmission output strength as the master clock, allowing all clocks on campus to display uniform time.



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### **The Wireless Repeater (SMA-1SR):**

The wireless repeater is locally powered (110-230 VAC). It is typically used when LAN infrastructure is not available, eliminating the option of using the wireless network repeater.

### **Principle of Operation:**

There are two ways for the wireless repeater to repeat the time signal:

1. As long as the wireless repeater is powered and within signal range of the master clock or a secondary clock's transmission, it will repeat the time signal at the same rate that it is receiving it.
2. The wireless repeater can be hard-wired (using a pair of electrical wires) to the master clock to receive the time data signal and transmit it to a remote location. We have measured up to 2,000 feet (610 meters) between the master clock and a wireless repeater using 16 AWG wires to connect them. While a network repeater is more practical for most hard-wired situations, this option can be used when LAN is not available.

### **Summary:**

Repeaters provide an economical solution, eliminating the need to purchase additional master clocks with transmitters in certain scenarios. Understanding the infrastructure available will help you make an educated decision on which repeater model is right for your application.

If you have any questions, the Sapling Team will be happy to help you!