

*Primex Smart-Sync™ Solution  
using Bluetooth®  
Low Energy Wireless Technology*

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**PRODUCT OVERVIEW:**

The Primex Smart-Sync synchronized time solution consists of a clock network that uses Bluetooth® low energy technology (also referred to as Bluetooth ‘smart’) as the wireless communication method for the synchronized clock network. The Smart-Sync Bridge is a component of the network, securely bridging the Bluetooth low energy clock information with Primex’s IP based OneVue™ cloud application, communicating via wired Ethernet connection.

The Primex Smart-Sync Bridge acquires NTP time and passes the time to clocks within the clock network using a self-healing mesh based protocol. The Bluetooth low energy technology network is also used to gather individual clock status information (battery voltage, RF strength, Error codes, etc.) that is sent to the Primex Bridge which encrypts and forwards to the Primex OneVue cloud application. End users are able to use a web browser on a PC or mobile device to access information concerning the clock network, individual clocks or the bridge device.

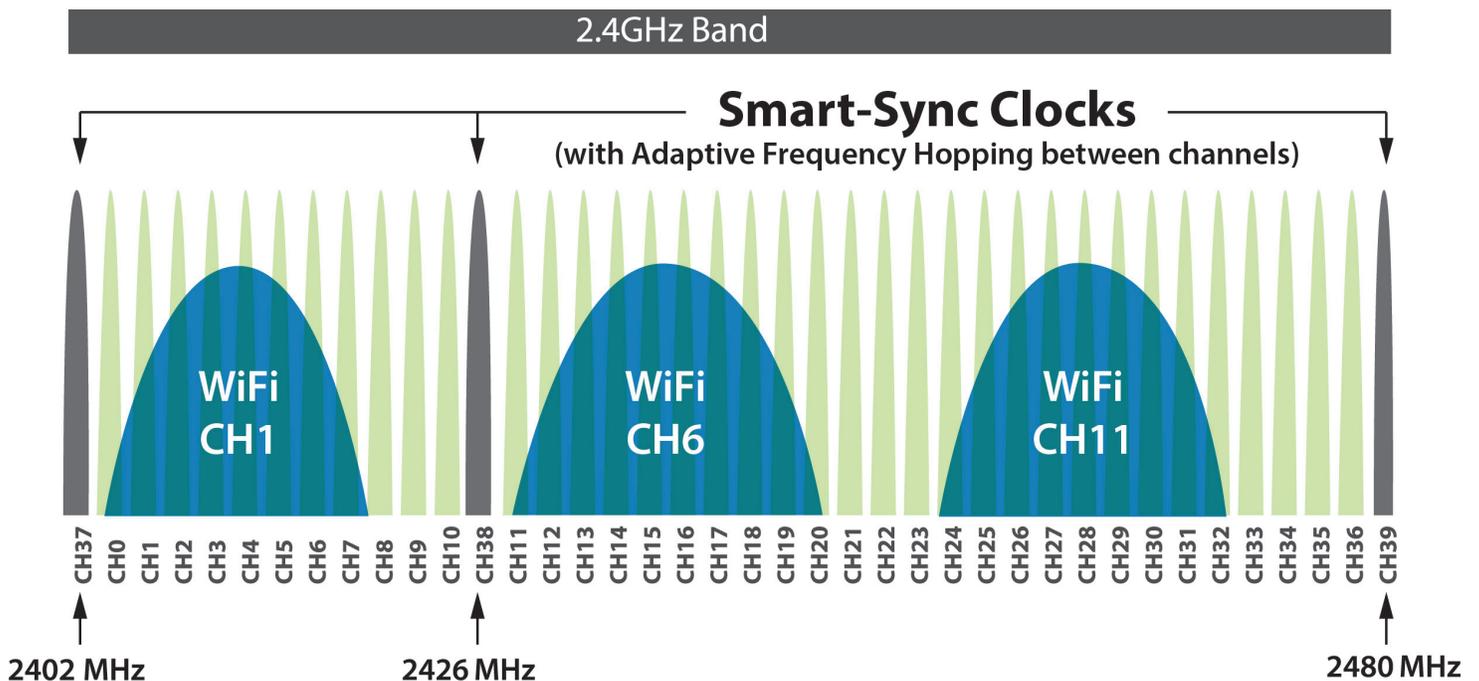
**BLUETOOTH LOW ENERGY TECHNOLOGY RADIO FREQUENCY (RF) DETAILS:**

The 2.4 GHz ISM band extends from 2402 MHz to 2480 MHz, channels 0-39. Our implementation of Bluetooth Low Energy only uses channels 37, 38 and 39. 802.11 (WiFi) uses channels 1, 6, and 11 (See diagram). In the event that WiFi signals are bleeding over into these channels for some reason (Access point power turned up too high, etc.), Bluetooth low energy technology employs adaptive frequency hopping (AFH) built in to the Nordic chipset to sense any conflicts and skip to one of the other 2 channels.

Our network is proprietary, and it does not use pairing. Smart-Sync Clocks seek out the strongest Smart-Sync Clock or bridge each time they wake up.

Data traffic for our Smart-Sync system consists of sending advertising packets between clocks and data communications over these channels, which occurs once a day for up to 12 minutes and every 5 minutes for 1.5 seconds for the add-a-clock feature after deployment mode. The rest of the time the Bluetooth radio is off with no RF energy being transmitted by the Smart-Sync clocks.

The Bluetooth low energy technology radio within the Smart-Sync clock and Bridge has a maximum output power of +4 dBm (2.5 mW).



## BLUETOOTH LOW ENERGY TECHNOLOGY IN HEALTHCARE:

One of the advantages of Bluetooth low energy technology over other wireless technologies is the very low power aspect of the technology. This low power draw allows devices to be powered by very small batteries or ensure very long intervals between battery changes for devices using standard form factor batteries. In addition, the RF power output of Bluetooth low energy technology devices is low relative to other widely adopted technologies such as Wi-Fi.

The significance of this to the healthcare and fitness industry is that a number of new products are entering the market that eliminate cables or provide battery operated solutions. Some examples of Bluetooth low energy technology-enabled medical and health products are: the 3M Littmann® Electronic Stethoscope Model 3200; iHealth Gluco-Monitoring System; Onyx II wireless pulse oximeter from Nonin; and Withings Wireless Scale. These and other devices can automatically transmit the data to a smartphone, tablet or computer.

## SUMMARY:

1. While Smart-Sync does use the 2.4 GHz frequency band, there are no conflicts with Wi-Fi or other devices because of the channels we use and the adaptive frequency hopping technology.
2. Our network is proprietary, specific to our clocks, with no pairing.
3. Our clocks are asleep most of the time, waking only briefly to communicate or add a new clock to the system.
4. The output power of our Bluetooth low energy implementation is extremely low, only +4 dBm (2.5 mW).

## ABOUT BLUETOOTH® WIRELESS TECHNOLOGY:

Bluetooth technology is the global wireless standard for simple, secure connectivity. Propelled by a global community of nearly 30,000 companies, Bluetooth serves to unify, harmonize, and drive innovation in the vast range of connected devices all around us. Through collective creation and shared technical standards, Bluetooth simplifies, secures and enriches the technology experience of users worldwide. Find out more at [www.bluetooth.com](http://www.bluetooth.com).

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