

## Lo-Q VQ2020 Protocol Overview

The primary application of the Q-cnx is as a wireless transceiver device used within the Lo-Q VQ2020 Guest Services System.

Multiple Q-cnx Basestation and Q-cnx Repeaters are installed in a theme park and form the wireless network for the VQ2020 system. This network carries park, ride and guest booking information between the Park Server and Q-bots using the 802.15.4 protocol standard.

IEEE 802.15.4-2006 is a standard which specifies the physical layer and media access control for low-rate wireless personal area networks (LR-WPANs).

The Q-cnx supports IEEE 802.15.4 operation in channels 11 through 25, channel 26 is internally disabled and cannot be selected. The actual channels used are determined by the system configuration and is pre-programmed during installation using a configuration tool.

## Status Packets

Every minute, the server sends out 24 identically time stamped status packets using every Q-cnx Basestation in the park, with a delay of approximately 480ms between them.

Q-bots and Q-cnx repeaters deal with status packets identically. When they receive a status packet with a timestamp they haven't seen before, they re-transmit the packet multiple times (without changing the timestamp), similarly to how the server sends the packets. Q-bots and Q-cnx repeaters ignore status packets if their packet type or length is incorrect, or if the timestamp is older than a previously seen status packet.

If a Q-bot or Q-cnx repeater does not receive a status packet for 5 minutes, it will re-transmit the last one it got.

The only difference between Q-cnx repeaters and Q-bots in terms of status packet handling is that Q-bot radios are only switched on for a tenth of the time. This should not result in any difference of forwarding behaviour, however, as the number/frequency of packets that are sent should guarantee reception.