An In-depth Look at LoRaWAN® Class C Devices

Semtech Corporation

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Introduction

End devices in Class C mode are used when extremely low power consumption is not an issue and latency needs to be minimized. The server-side application determines that it is managing class C devices during the join procedure.

Characteristics of a Class C Device

- Based on Class A foundations
- Devices cannot simultaneously operate in Class B and Class C mode
- Lowest latency among all operating modes
- Uses more power than Class A and Class B devices

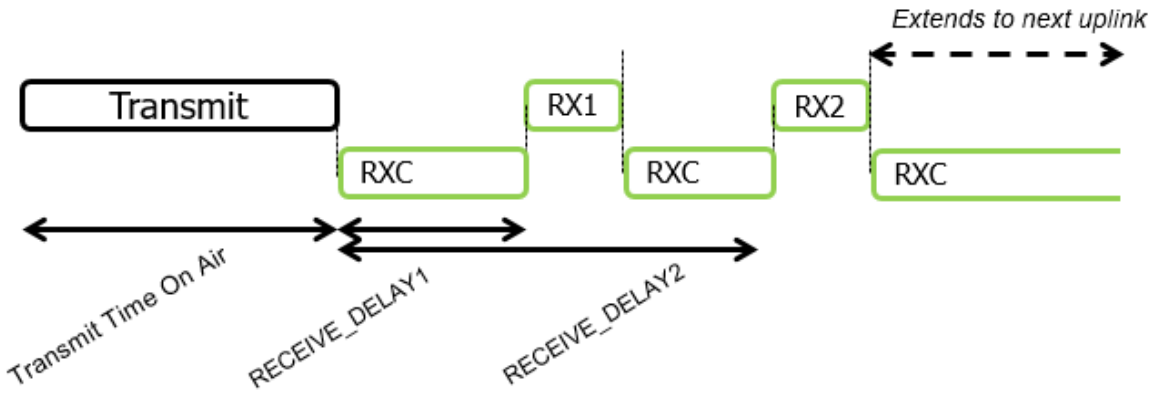
Class C: Continuous Reception

End devices operating in Class C mode have receive windows that are almost always open. These windows close only when the device is transmitting. Because of this, Class C end devices use more power to operate than Class A or Class B devices. However, in turn, they offer the lowest latency for communication from the server to an end device.

A device may be switched to Class C mode temporarily. This approach may be used to perform a firmware upgrade of a battery-powered device. A battery-powered Class A device may switch to Class C for a few minutes at a given time in order to receive a firmware update over-the-air (FUOTA) broadcast. Once the broadcast of the update is complete, the device can return to its default Class A, low-power mode of operation.

Class C end devices implement the same two receive windows as Class A devices, but they do not close the RX2 window until they send the next transmission back to the server. Therefore, they can receive a downlink in the RX2 window at almost any time. A short window at the RX2 frequency and data rate is also opened between the end of the transmission and the beginning of the RX1 receive window, as illustrated in **Error! Reference source not found.**.

Figure 1: Receive Windows: Packet can be received in RX2 window



Multicast Downlinks

Class C end devices may receive multicast downlink frames in a manner similar to end devices in Class B mode. The multicast address and the associated network session key and application session key must come from the application layer.

The **FPending** bit is used to indicate that there is more multicast data to be sent. Given that a Class C device keeps it receiver active most of the time, the **FPending** bit does not trigger any specific behavior on the end device.

MAC Commands

All commands described in the Class A specification must be supported in Class C end devices.

For more information about other end device operating modes, see *An In-Depth Look at Class A Devices* and *An In-Depth Look at Class B Devices.*

For the full range of LoRaWAN® training offerings, please visit the Video Library on the LoRa® Developer Portal.

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Contact Information

Semtech Corporation
200 Flynn Road, Camarillo, CA 93012
Phone: (805) 498-2111, Fax: (805) 498-3804
www.semtech.com