Advantech AE Technical Share Document

Date	2021/12/13	**SR#**	1-4247353557
Category	■FAQ □SOP	**Related OS**	N/A
Abstract	The general concept of WISE-2410-xB.		
Keyword	WISE, LoRaWAN, vibration, temperature, frequency domain, spatial domain.		
Related Product	WISE-2410 series. B version hardware		

■ Problem Description:

WISE-2410 is targeting periodical on-site inspection market. WISE-2410 firmware only wakes up while the upload interval is reached. This document explains when does sensor sensing how many data, which domain vibration features are sent to a LoRaWAN gateway.

This document is suitable for WISE-2410-xB version hardware. This hardware is using different vibration sensor with higher sampling rate, more sampling g values compare with A version hardware.

■ Brief Solution - Step by Step:

The description is divided into 2 parts: situation 1 and 2, which explain the different behavior of WISE-2410 when the upload interval is come or not.

Situation 1: After power-on the WISE-2410, and the upload interval has not come:

- Firmware is sleeping (class A)
- Firmware is in RX mode (class C)
- Hardware is detecting temperature every second.
  - If the temperature reaches alarm threshold, hardware wakes up firmware, and send temperature alarm immediately to the gateway.

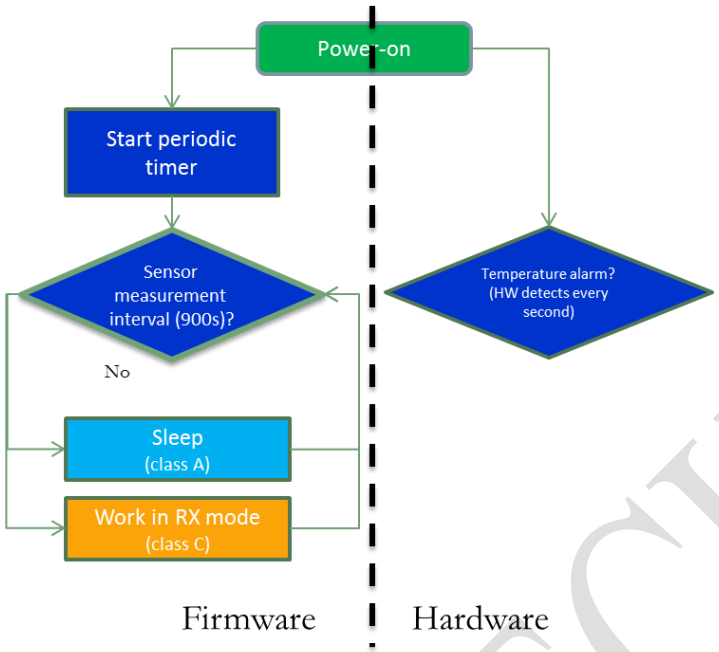

Figure. Work flow chart of WISE-2410 firmware.

According to the LoRaWAN statndard, if a node is using classA, there are 2 receiving slot timing after a transmit time on air. To achieve battery save and longer battery life, WISE-2410 is in sleep between RX2 and next transmit time window. If a node is using classC, the receiving slot timing is continuously until next transmit time on air. Sometimes using RX1, sometime using RX2. The detail can be found in the following figures captured from *lorawan_specification_v1.0.2*. WISE-2410 follows LoRaWAN statndard v1.0.2.

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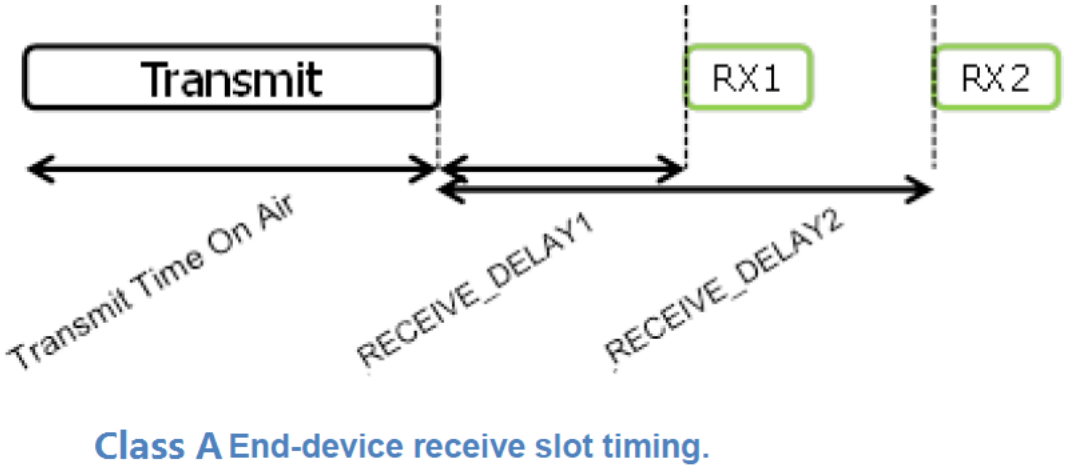
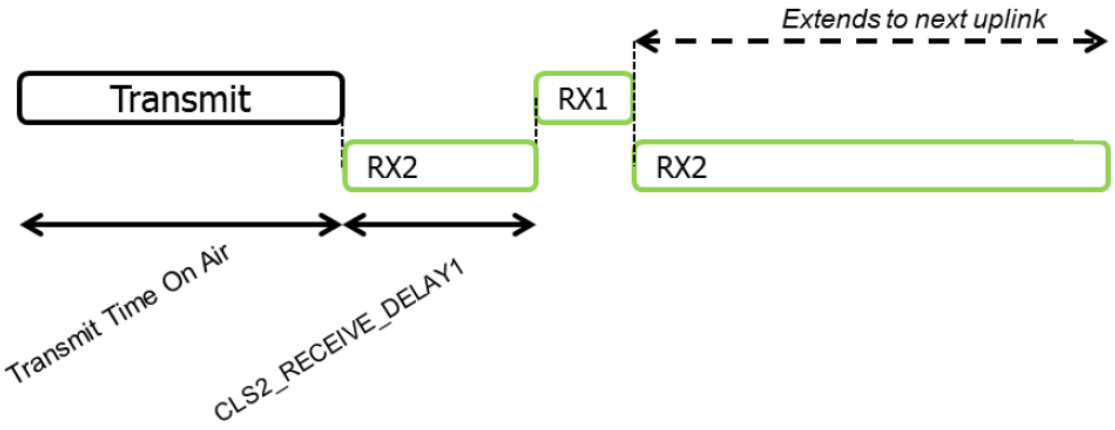


Figure captured from *lorawan_specification_v1.0.2*.



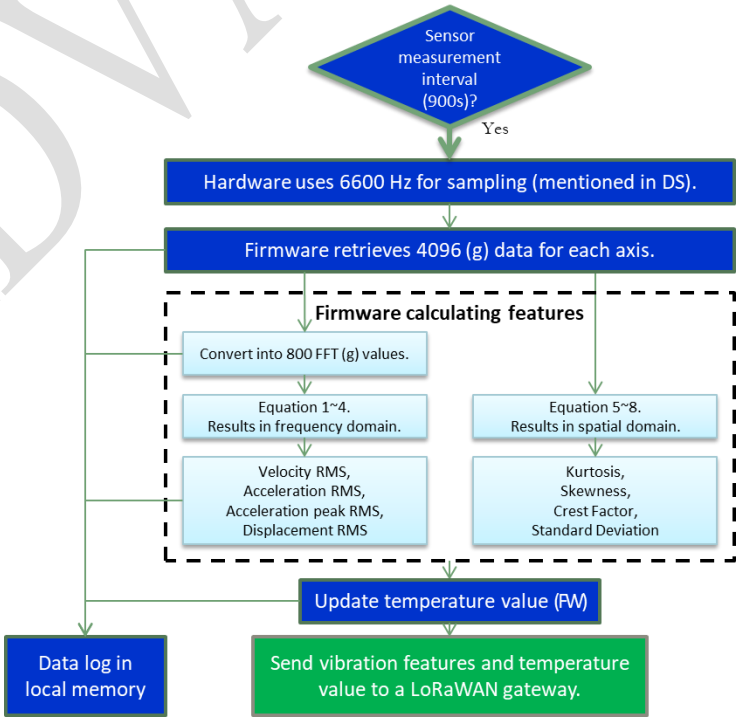
Class C end-device reception slot timing.

Figure captured from *lorawan_specification_v1.0.2*.

Situation 2: when the upload interval is coming:

WISE-2410 firmware only wakes up while the upload interval is reached. In another word, WISE-2410 does not sense vibration data all the time.

- Hardware uses 6600 Hz for sampling (mentioned in DS).
- Firmware retrieves 4096 (g) data for each axis.
- All of 4096 data is used for calculation.
  - 8 different outputs as 8 features of vibration after applying 8 different equations.
- Frequency domain outputs:
  - Velocity RMS, Acceleration RMS, Acceleration peak RMS, Displacement RMS.
- Spatial domain outputs:
  - Kurtosis, Skewness, Crest Factor, Standard Deviation.



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