Advantech AE Technical Share Document

Date	2023/08/21	**SR#**	1-4247353557
Category	■FAQ □SOP	**Related OS**	N/A
Abstract	The General Concept of WISE-2410 Operation Mechanism		
Keyword	WISE, LoRaWAN, vibration, temperature, frequency domain, spatial domain.		
Related Product	WISE-2410 series		

■ 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.

■ 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.

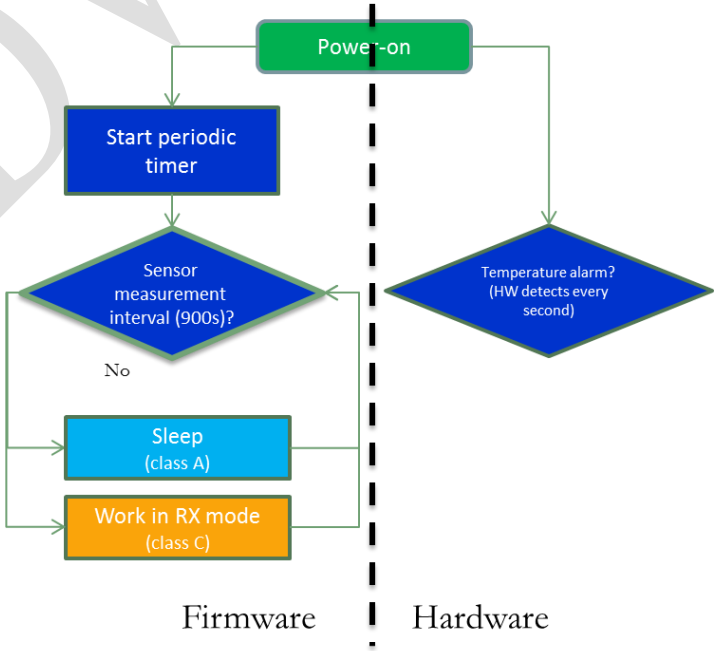

Figure. Work flow chart of WISE-2410 firmware.

According to the LoRaWAN standard, if a node is using class A, there are 2 receiving slot timing after a transmit time on air. To achieve battery saving and longer battery life, WISE-2410 is in sleep between RX2 until next transmit time window. If a node is using class C, the receiving slot timing is continuously until next transmit time on air. First part of time is using RX1, the other is using RX2, which means WISE-2410 always listens whether there is any downlink message from network server. The detail can be found in the following figures captured from *lorawan_specification_v1.0.2*. WISE-2410 follows LoRaWAN standard v1.0.2.

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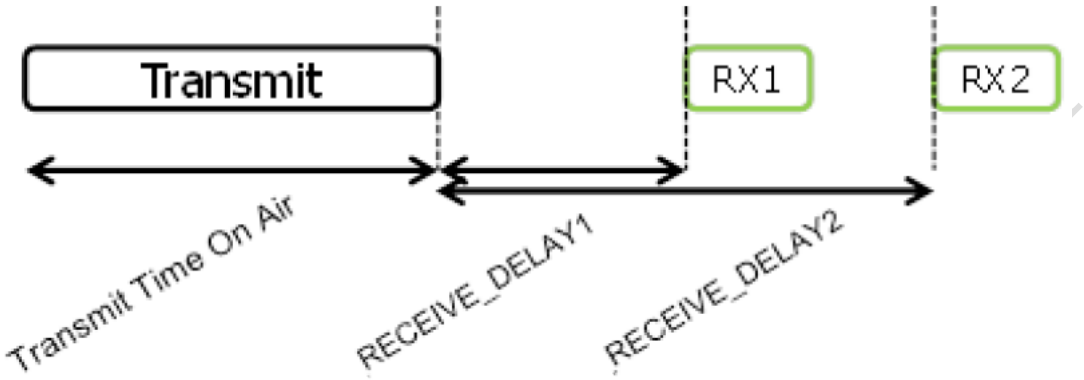
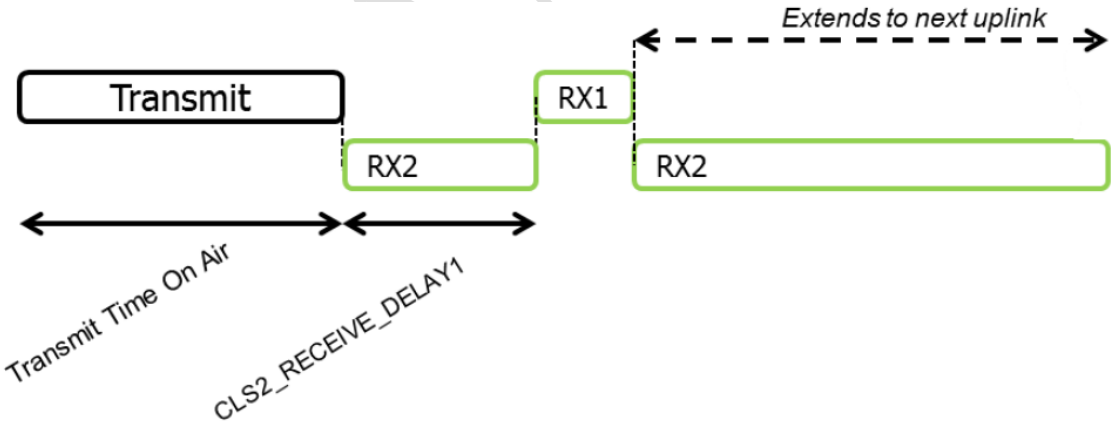


Class A End-device receive slot timing.

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 measure 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.

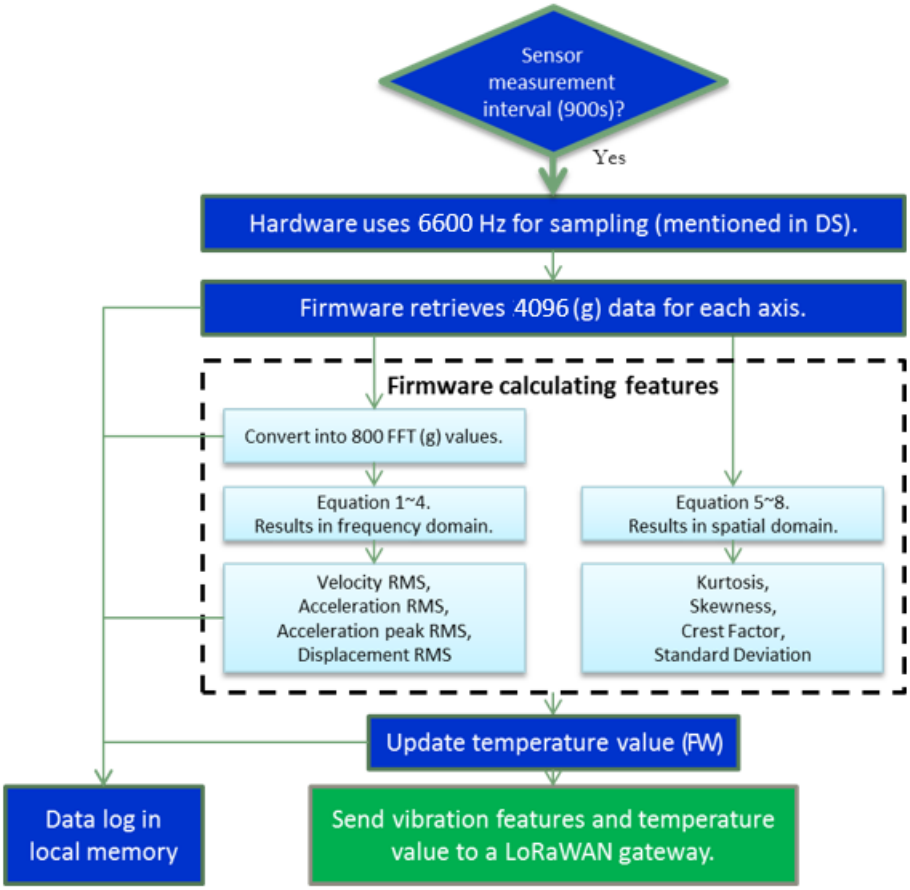
- 8 different outputs as 8 features of vibration after applying 8 different equations.

◆ 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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