

Wireless Thermostat

WT401

Payload Protocol (JSON)

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Chapter 1. Preface

Overview

This guide describes the uplink data packet and downlink commands (JSON format) supported by the device when using the codec provided by Milesight. It is intended for most users to integrate with third-party platforms.

This document does not describe physical installation and configuration steps in detail. Please use it together with the related documents.

Related Document

Document	Description
WT401 User Guide	Provides introductions, compatibility check, installation and configuration steps.
WT401 BACnet Object List	Lists the BACnet objects exposed through a Milesight gateway with the BACnet feature enabled.
WT401 Payload Protocol (HEX)	Provides the raw HEX payload format for uplink data and downlink commands.

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Revision History

Release Date	Version	Revision Content
Nov. 24, 2026	V1.0	Initial version.

Chapter 2. Uplink Data

This chapter describes the uplink packets reported by the device.

Basic Information Packet

After joining the network, the device reports a packet containing the basic device information. Example:

```
{
 "all_configurations_request_by_device": 1,
 "device_status": 1,
 "lorawan_configuration_settings": {
  "mode": 0  //0=Class A,2=Class C
 },
 "oem_id": "0000",
 "product_sn": "6409f23258520003",
 "tsl_version": "v1.0",
 "version": {
  "firmware_version": "v1.1",
  "hardware_version": "v1.2"
 }
}
```

Periodic Data Report

The device will report a data report at a configured reporting interval. The report content depends on the periodic report mode. Example when the periodic report mode is Only Status:

```
{
  "battery": 100,  //Unit: %
  "humidity": 49.5, //Unit: %RH
  "pir_status": 1,   //0=Vacant,1=Occupied,2=Night Occupied
  "fahrenheit_temperature": 80.49,
  "celsius_temperature": 26.94
}
```

Status Change Report

The device reports a packet when a parameter or status is changed.

1. Configuration Change Report

   A configuration change report is sent when system status, target temperature, temperature control mode, fan mode or temperature control schedule ID changes. Example:

```
{
 "celsius_target_temperature1": 18,  //Heat target temperature (Dual Target) or Target Temperature
 "celsius_target_temperature2": 23.5,  //Cool target temperature (Dual Target)
 "fahrenheit_target_temperature1": 64.4,
 "fahrenheit_target_temperature1": 74.3,
 "cfg_trigger_src": 1,  //0=Non-button trigger, 1=Button trigger
 "execution_plan_id": 255,  //Range: 0-7, 255=Not executed
 "fan_mode": 0, //0=Auto, 1=Circulate, 2=On, 3=Low, 4=Medium, 5=High
 "system_status": 1, //0=Off, 1=On
 "temperature_mode": 3 //0=Heat, 1=EM Heat, 2=Cool, 3=Auto, 4=Dehumidification, 5=Ventilation
}
```

2. Bluetooth Status packet.

   When communication mode is **BLE + LoRa**, a Bluetooth status packet will be reported once after the device joins the network or when Bluetooth pairing status changes. Example:

```
{
 "ble_new_event": [
  {
   "index": 0,
   "mac": "24e124826068b876",
   "status": 2  //0=Not paired, 1=Paired, 2=Disconnected
  }
 ]
}
```

Alarm Report

The device supports various types of alarm reports.

1. Temperature alarm

```
{
 "temperature_alarm": {
  "collection_error": {},
  "type": 0  //0=Collection error, 1=Under-range, 2=Over-range, 3=No data
```

```
 }
}
```

2. Humidity alarm

```
{
 "humidity_alarm": {
  "collection_error": {},
  "type": 0  //0=Collection error, 1=Under-range, 2=Over-range, 3=No data
 }
}
```

3. Battery alarm

```
{
  "battery_event": {
    "type": 1,  //0=Normal, 1=Low battery voltage
    "low_volt": {}
  }
}
```

4. Button 1 event report

```
{
  "key_event": {
    "type": 0,  //0=Button 1, 1=Button 2, 2=Button 3
    "f1": {}
  }
}
```

Chapter 3. Downlink Commands

Downlink commands can be used for remote control of the device through a network server.

Note:
The examples in this guide are JSON-like examples with inline comments for explanation. Remove all comments before sending commands if strict JSON format is required.

Downlink Commands for Network Parameters

This section describes the JSON format for downlink commands for network parameters.

Configure Communication Parameters

Name	Example

communication_mode	Communication Mode is BLE.
	`{`
	`"communication_mode": 0 //0=BLE, 1=LoRa, 2=BLE+LoRa`
	`}`

reporting_interval	LoRa Reporting Interval is 10 minutes.
	`{`
	`"reporting_interval": {`
	`"lora": {`
	`"minutes_of_time": 10 //Unit: min, range: 1-1440`
	`},`
	`"ble_lora": {`
	`"minutes_of_time": 10 //Unit: min, range: 1-1440`
	`}`
	`}`
	`}`

period_pack_mode	Periodic report mode is Only Configuration.

Name	Example

	{
	"period_pack_mode": 1 //0=Only status (Default), 1=Only configuration, 2=Status + Configuration
	}

communicate_interval	BLE Transfer Interval is 5 minutes for BLE mode, 10 minutes for BLE+LoRa mode.
	{
	"communicate_interval": {
	"ble": {
	"minutes_of_time": 5 //Unit: min, range: 1-30
	},
	"ble_lora": {
	"minutes_of_time": 10 //Unit: min, range: 1-30
	}
	}
	}

Rejoin the Network

Name	Example

reconnect	Rejoin the Network.
	{
	"reconnect": "yes"
	}

Configure Milesight D2D Parameters

Name	Example

d2d_send_config	Enable D2D Data Transmission feature, enable LoRa uplink, and enable sending all data.
	{
	"d2d_send_config.enable": 1
	}

Name	Example

	{
	"d2d_send_config": {
	"enable": 1, //0=Disable (Default), 1=Enable
	"uplink": 1, //LoRa uplink, 0=Disable (Default), 1=Enable
	"switch": { //0=Disable (Default), 1=Enable
	"temp": 1,
	"humi": 1,
	"occupied": 1,
	"system": 1,
	"mode": 1,
	"fan": 1,
	"target": 1,
	"plan": 1,
	"reserved": 0
	}
	}
	}

Downlink Commands for Temperature Control Parameters

This section describes the JSON format for downlink commands for temperature control parameters.

Configure Data Source

Name	Example

collection_interval	Collect Interval is 300s.
	{
	"collection_interval": {
	"seconds_of_time": 300 //Unit: s, range: 1-360, default: 60
	}
	}

data_sync_to_peer	Data Source is LoRa.

Name	Example

	{
	"data_sync_to_peer": 1 //00=Embedded (Default), 01=LoRa
	}

data_sync_timeout	Data Timeout is 30 minutes.
	{
	"data_sync_timeout": 30 //Unit: min, range: 1-60, default: 10
	}

origin_temperature	External Temperature is 20.5°C.
	{
	"origin_temperature": 20.50 //Unit: °C, range: -26-60
	}

origin_humidity	External Humidity is 47.3%RH.
	{
	"origin_humidity": 47.30 //Unit: %RH, range: 0-100
	}

Configure Temperature Control System Parameters

Note:
When the thermostat is paired with or connected to the Milesight controller, the supported options depend on the controller and it is suggested to send downlink commands to the controller directly.

Name	Example

system_status	Turn on the system.
	{
	"system_status": 1 //0=Off, 1=On
	}

mode_enable	Configure Temperature Control Mode Enable options.

Name	Example

	{
	"mode_enable": 1 //1: Heat+EM Heat+Cool+Auto, 2: Heat+Cool+Auto, 3: Heat, 4: Cool, 5: Heat+Cool, 6: All Modes
	}

temperature_control_mode	Temperature Control Mode is Heat.
	{
	"temperature_control_mode": {
	"mode": 0 //0=Heat, 1=EM Heat, 2=Cool, 3=Auto, 4=Dehumidification, 5=Ventilation
	}
	}

target_temperature_mode	Target Temperature Mode is Dual target temperature.
	{
	"target_temperature_mode": 1 //0=Single Target Temperature, 1=Dual Target Temperature
	}

target_temperature_resolution	Target Temperature Resolution is 0.5.
	{
	"target_temperature_resolution": 0 //0=0.5, 1=1
	}

target_temperature_settings	Configure the target temperature of every mode.
	{
	"target_temperature_settings": { //Unit: °C, Range: 5-35
	"heat": 22.0,
	"em_heat": 24.0,
	"cool": 26.0,
	"auto": 24.0,
	"auto_heat": 22.0,
	"auto_cool": 26.0
	}
	}

minimum_dead_zone	Deadband is 3°C.

Name	Example

	{
	"minimum_dead_zone": 3 //Unit: °C, range: 1-10, default: 5
	}

target_temperature_range	Configure the target temperature regulation range of every mode.
	{
	"target_temperature_range": { Unit: °C, Range: 5-35
	"heat": {
	"min": 16.0,
	"max": 30.0
	},
	"em_heat": {
	"min": 16.0,
	"max": 30.0
	},
	"cool": {
	"min": 16.0,
	"max": 30.0
	},
	"auto": {
	"min": 16.0,
	"max": 30.0
	}
	}
	}

fan_enable	Enable Auto/Circulate/Low/Medium/High.
	{
	"fan_enable": 1 //1=auto/circulate/low/medium/high, 2=auto/low/medium/high,
	3=circulate/low/medium/high, 4=auto/circulate, 5=low/medium/high
	}

fan_control_mode	Fan Mode is Auto.

Name	Example

	{
	"fan_control_mode": 0 //0=Auto,, 1=Circulate, 2=On, 3=Low, 4=Medium, 5=High
	}

Configure Occupancy Detection Parameters

Name	Example

pir_common	Enable Occupancy Detection and set the delay time.
	{
	"pir_common":{
	"enable": 0, //00=Disable, 01=Enable (default)
	"release_time": 15 //Unit: minute, Range: 1 ~ 360, Default: 30
	}
	}

pir_energy	Enable Energy-saving Setting and configure the execution plan IDs.
	{
	"pir_energy":{
	"enable": 0, //00=Disable, 01=Enable (default)
	"plan":
	{
	"occupied":1, //Range: 0-7, 255=Not executed
	"unoccupied": 2 //Range: 0-7, 255=Not executed
	}
	}
	}

pir_night	Enable Night Setting, set night time is 0:00 to 7:00, the execution plan ID is 2.
	{
	"pir_night":{
	"enable": 1, //00=Disable (default), 01=Enable
	"night_time": Unit: min, Range: 0-1439
	{
	"start":0,
	"stop":420

Name	Example

	<pre>},
	"occupied": 2 //Range: 0-7, 255=Not executed
	}
	}</pre>

Configure Schedule Parameters

Name	Example

insert_temporary_plan	Execute Schedule Plan 1.
	<pre>{
	"insert_temporary_plan": 0 //Range: 0-7
	}</pre>

delete_task_plan	Delete/Reset Schedule Plan 2.
	<pre>{
	"delete_task_plan": 1 //Range: 0-7
	}</pre>

schedule_settings	Add schedule 1 and configure the settings.
	<pre>{
	"schedule_settings": [
	{
	"id": 0, //Schedule ID, range: 0-7
	"enable": 1, //0: Disable, 1: Enable
	"name_first": "schedu", //6 charaters max.
	"name_last": "le", //4 charaters min.
	"system_on_off":0, //0: Off, 1: On
	"tstat_mode":0, //0=Heat, 1=EM Heat, 2=Cool, 3=Auto, 4=Dehumidification, 5=Ventilation
	"fan_mode":0, //0=Auto,, 1=Circulate, 2=On, 3=Low, 4=Medium, 5=High
	"heat_target_temperature":16, //Unit: °C, Range: 5-35
	"cool_target_temperature":23, //Unit: °C, Range: 5-35
	"auto_target_temperature":23 //Unit: °C, Range: 5-35
	}
	]
	}</pre>

Downlink Commands for Auxiliary Features

This section describes the JSON format for downlink commands for auxiliary features.

Configure General Parameters

Name	Example

reboot	Reboot the device.
	{
	"reboot": "yes"
	}

temperature_unit	Temperature Unit is °F.
	{
	"temperature_unit": 1 //00=°C, 01=°F
	}

query_device_status	Enquiry periodic report.
	{
	"query_device_status": "yes"
	}

Configure Button Parameters

Name	Example

button_custom_function	Enable Button Customization and configure the feature for every button.
	{
	"button_custom_function": {
	"enable": 1, //0=Disable, 1=Enable
	"mode1": 1, //1=Temperature Control Mode (default), 2=Fan Mode, 6=Event 1 Report, 7=°C or °F switch
	"mode2": 6, //1=Temperature Control Mode, 2=Fan Mode (default), 6=Event 1 Report, 7=°C or °F switch
	"mode3": 7 //0=System On/Off (default), 6=Event 3 Report, 7=°C or °F switch
	}
	}

children_lock_settings	Enable Child Lock.

Name	Example

	{
	"children_lock_settings: 2 //1=Disable all, 2=Enable all
	}

unlock_button	Enable temporary unlock and the unlock time is 3600s.
	{
	"unlock_button": {
	"enable": 1, //0=Disable, 1=Enable
	"timeout": 3600 //Unit: s, range: 1-3600, default: 30
	}
	}

bacnet_unlock_enable	Enable Temporary Unlock.
	{
	"bacnet_unlock_enable": 1 //0=Disable (default), 1=Enable
	}

bacnet_unlock_timeout	Unlock time is 3600s.
	{
	"bacnet_unlock_timeout": 300 //Unit: s, range: 1-3600, default: 30
	}

unlock_combination_button_settings	Configure the button combination for temporary unlock.
	{
	"unlock_combination_button_settings": 1 //1=button1/2, 2=button2/3, 3=button3/4, 4=button4/5, 5=button1/2/3, 6=button2/3/4, 7=all
	}

Configure Screen Parameters

Name	Example

screen_display_settings	Disable ambient temperature display and enable the others.
	{
	"screen_display_settings": { //0: disable, 1: enable

Name	Example

	<pre>"ambient_temp": 0,
	"ambient_humi": 1,
	"target_temp": 1,
	"plan_name": 1,
	"reserved": 0
	}
	}</pre>

screen_temp_mode_enable	Disable Temperature Control Mode Display.
	<pre>{
	"screen_temp_mode_enable": 0 //0=Disable, 1=Enable (default)
	}</pre>

screen_fan_mode_enable	Disable Fan Mode Display.
	<pre>{
	"screen_fan_mode_enable": 0 //0=Disable, 1=Enable (default)
	}</pre>

screen_off_enable	Disable display data when system off.
	<pre>{
	"screen_off_enable": 0 //0=Not Display (display OFF), 1=Display (Default)
	}</pre>

intelligent_display_enable	Disable Screen Smart Mode.
	<pre>{
	"intelligent_display_enable": 0 //0=Disable, 1=Enable (default)
	}</pre>

backlight_enable	Disable frontlight (WT401-Flat-FL Only).
	<pre>{
	"backlight_enable": 0 //0=Disable, 1=Enable (default)
	}</pre>

Configure Time Parameters

Name	Example

time_zone	Set UTC Time Zone as UTC-4.
	{
	"time_zone: -240 //Time zone*60
	}

daylight_saving_time	Enable DST, start time is October 1st Sunday 2:00, end time is April 1st Sunday 2:00, bias is 60 minutes.
	{
	"daylight_saving_time": {
	"enable": 1, //0: Disable (default), 1: Enable
	"daylight_saving_time_offset": 60, //Unit: min, range: 1-120
	"start_month": 10, //Range: 1-12
	"start_week_num": 1, //Range: 1-5
	"start_week_day": 7, //Range: 1-7
	"start_hour_min": 120, //Unit: min, range: 0-1439
	"end_month": 4, //Range: 1-12
	"end_week_num": 1, //Range: 1-5
	"end_week_day": 7, //Range: 1-7
	"end_hour_min": 120 //Unit: min, range: 0-1439
	}
	}

synchronize_time	Sync time from LNS.
	{
	"synchronize_time": "yes"
	}

Configure Calibration Parameters

Name	Example

temperature_calibration_settings	Enable Temperature Calibration and configure the calibration value as -2°C.
	{
	"temperature_calibration_settings": {

Name	Example

	<pre>"enable": 0, //0: Disable (default), 1: Enable
	"calibration_value": -2 //Unit: °C, Range: -80-80
	}
	}</pre>

humidity_calibration_settings	Enable Humidity Calibration and configure the calibration value as -2%RH.
	<pre>{
	"humidity_calibration_settings": {
	"enable": 0, //0: Disable (default), 1: Enable
	"calibration_value": -2 //Unit: %RH, Range: -100-100
	}
	}</pre>

Chapter 4. Services

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Technical Support Mailbox: iot.support@milesight.com

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