Smart Thermostat

Featuring LoRaWAN®

WT201

Communication Protocol

Revision History

Date	Doc Version	Description
Nov. 13, 2023	V 1.0	Initial version
May 15, 2024	V 1.1	1. Support to set the target temperature unit of schedule downlink command; 2. Support to report humidity and configure humidity related settings (hardware supported); 3. Support to report TSL version, relay status, control permission status and data exception; 4. Support command to configure control permission, screen display, fan settings and relay status

Contents

1. Overview

WT201 uses the standard Milesight IoT payload format based on IPSO. All data are based on following format:

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...

Note:

1) All explanations and examples in this document are based on HEX format.
2) For all Milesight IoT decoder examples please find files on https://github.com/Milesight-IoT/SensorDecoders

2. Uplink Payload

Uplink payloads of WT201 are made up of device basic information and device data.

2.1 Basic Information

WT201 reports basic device information of device everytime joining the network.

Channel	Type	Byte	Description
ff	01(Protocol Version)	1	01=>V1
	09 (Hardware Version)	2	02 10=>V2.1
	0a(Software Version)	2	01 01=>V1.1
	0b (Power On)	1	Device is on
	0f(Device Type)	1	00 = Class A, 01 = Class B, 02 = Class C
	16 (Device SN)	8	16 digits
	ff (TSL Version)	2	01 00 => V1.0

Example:

ff0bff ff0101 ff166791d19604050005 ff090100 ff0a0103 ff0f02 ffff0100

Channel	Type	Value	Channel	Type	Value
ff	0b (Power On)	ff (Reserved)	ff	01 (Protocol Version)	01 (V1)
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
ff	16 (Device SN)	6791d19604050005	ff	09 (Hardware Version)	0100 (V1.0)
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
ff	0a (Software Version)	0103 (V1.3)	ff	0f (Device Type)	02 (Class C)
Channel	**Type**	**Value**			
ff	ff (TSL Version)	0100 (V1.0)			

2.2 Device Data

Item	Channel	Type	Byte	Description
Temperature	03	67	2	INT16/10, Unit: °C

<table>
<tr><td>Target Temperature</td><td>04</td><td>67</td><td>2</td><td>INT16/10, Unit: °C</td></tr>
<tr><td>Temperature Control Mode and Status</td><td>05</td><td>e7</td><td>1</td><td>Bit 7-4: Current control status,
0000=Standby, 0001=1-stage heat,
0010=2-stage heat, 0011=3-stage heat,
0100=4-stage heat, 0101=emergency heat, 0110=1-stage cool, 0111=2-stage cool
Bit 3-2: 00
Bit 1-0: Current control mode,
00=Heat, 01=EM Heat, 10=Cool, 11=Auto</td></tr>
<tr><td>Fan Mode and Status</td><td>06</td><td>e8</td><td>1</td><td>Bit7-4: 0000
Bit 3-2: Current fan status,
00=Off, 01=High (Speed), 10=Low(Speed), 11=On
Bit1-0: Current fan mode,
00=Auto, 01=On, 10=Circulate</td></tr>
<tr><td>Plan Event</td><td>07</td><td>bc</td><td>1</td><td>00=Not executed, 01=Wake, 02=Away, 03=Home, 04=Sleep</td></tr>
<tr><td>Temperature Control System Status</td><td>08</td><td>8e</td><td>1</td><td>00=System Off, 01=System On</td></tr>
<tr><td>Humidity</td><td>09</td><td>68</td><td>1</td><td>UINT8/2, unit: %RH</td></tr>
<tr><td>Relay Status</td><td>0a</td><td>6e</td><td>1</td><td>For every bit: 0=disconnected, 1=connected
Corresponding relay of every bit:
<table>
<tr><th>Bit</th><th>Relay</th></tr>
<tr><td>0</td><td>Y1</td></tr>
<tr><td>1</td><td>Y2/GL</td></tr>
<tr><td>2</td><td>W1</td></tr>
<tr><td>3</td><td>W2/AUX</td></tr>
<tr><td>4</td><td>E</td></tr>
<tr><td>5</td><td>G</td></tr>
<tr><td>6</td><td>O/B</td></tr>
<tr><td>7</td><td>0</td></tr>
</table></td></tr>
<tr><td>Control Permission</td><td>ff</td><td>f6</td><td>1</td><td>00: Thermostat</td></tr>
</table>

				01: Remote Control
Wiring Settings	ff	ca	3	See Installation Setting
Supported Control Mode	ff	cb	3	See Installation Setting
Temperature Exception	b3	67	1	01: collection failure 02: out of measuring range
Humidity Exception	b9	68	1	01: collection failure 02: out of measuring range

Examples:

1. Periodic packet when control permission is Thermostat: report as reporting interval (10 minutes by default) or when system status, target temperature, temperature control mode, or fan mode changes.

03671101 0467fa00 05e772 06e806 07bc00 088e01 096844					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
03	67	Current Temp: 11 01=>01 11 =273/10=27.3°C	04	67	Target Temp: fa 00=>00 fa=250 /10 =25°C
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
05	e7 (Temperature Control Mode and Status)	72=>0111 0010 Bit 7-4: 0111=2-stage cool Bit 1-0: 10=Cool	06	e8 (Fan Mode and Status)	06=> 0000 0110 Bit 3-2: 01=High Bit 1-0: 10=Circulate
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
07	bc (Plan Event)	00=Not executed	08	8e	01=System on
Channel	**Type**	**Value**			
09	68	Humidity: 44=>68/2=34%RH			

2. Periodic packet when control permission is Remote Control: report as reporting interval (10 minutes by default) or when system status or relay status changes.

03671101 088e01 09684a 0a6e00					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
03	67	Current Temp: 11 01=>01 11 =273/10=27.3°C	09	68	Humidity: 4a=>74/2=37%RH
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
08	8e	01=System on	0a	6e	00=> All relays are disconnected

3. Control permission change packet: report immediately when control permission changes.

fff600		
Channel	**Type**	**Value**
ff	f6	00=Thermostat

2.3 Alarm

WT201 supports various types of alarms according to different settings:

Temperature threshold alarm: when current temperature is over or below the threshold value, the device will report the threshold alarm packet instantly. Only when the threshold is released and re-triggered, will the device report the alarm again.

Persistent low/high temperature threshold alarm: when current temperature is lower or higher than the target temperature for difference value and specific duration, the device will report the threshold alarm packet instantly. When the threshold is released, it will also report the alarm release packet.

Freeze protection alarm: when current temperature is lower than the protection temperature, the device will report this alarm packet instantly; when the temperature is higher than the protection temperature, it will also report the alarm release packet. This works when freeze protection option is enabled on Installation Settings.

Emergency heating timeout alarm: when the emergency heating time reaches this preset duration, report this alarm packet and switch back to Heat mode. This works when emergency heating duration option is enabled on Installation Settings.

Auxiliary heating timeout alarm: when current temperature does not reach the target temperature even heating for preset duration, the device will report this alarm packet and switch back to lower stage heating mode. This works when auxiliary heating duration option is enabled on Installation Settings.

Channel	Type	Byte	Description
83	67	3	**Byte 1-2:** Temperature, INT16/10, Unit: °C **Byte 3:** Alarm Type 01-Emergency Heating Timeout Alarm 02-Auxiliary Heating Timeout Alarm 03 -Persistent Low Temperature Alarm 04 -Persistent Low Temperature Alarm Release 05 -Persistent High Temperature Alarm 06 -Persistent High Temperature Alarm Release

			07 -Freeze Protection Alarm 08 -Freeze Protection Alarm Release 09 -Temperature Threshold Alarm 0a -Temperature Threshold Alarm Release

Examples:

1. Temperature alarm or alarm release packet: report according to alarm settings.

8367140109		
Channel	**Type**	**Value**
83	67	Temperature: 14 01=>01 14=276/10=27.6°C Alarm type: temperature threshold alarm

3. Downlink Command

WT201 supports downlink commands to configure the device. The application port is 85 by default and can be configured via ToolBox.

Note: If confirmed mode on the device or network server is enabled, the device will reply the downlink command with reply format.

1) Command Format 1:

Channel	Type	Command
ff	1 Byte	N Bytes

Reply Format:

Channel	Type	Command
fe	Same as command	Same as command

2) Command Format 2:

Channel	Type	Command
f9	1 Byte	N Bytes

Reply Format:

Channel	Type	Command	Return Code
f8	Same as command	Same as command	00: success 01: not support 02: out of range

3.1 Basic Settings

<table>
<tr><th>Item</th><th>Channel</th><th>Type</th><th>Byte</th><th>Description</th></tr>
<tr><td>Reboot</td><td rowspan="13">ff</td><td>10</td><td>1</td><td>ff</td></tr>
<tr><td>Query Current Status</td><td>28</td><td>1</td><td>01, the device will return a periodic packet</td></tr>
<tr><td>Reporting Interval</td><td>8e</td><td>3</td><td>Byte 1: 00
Byte 2-3: Interval time, unit: min</td></tr>
<tr><td>System On/Off</td><td>c5</td><td>1</td><td>00=Off, 01=On</td></tr>
<tr><td>Control Permission</td><td>f6</td><td>1</td><td>00=Thermostat, 01=Remote Control</td></tr>
<tr><td>Child Lock</td><td>25</td><td>2</td><td>Byte 1: ff
Byte 2: for every bit 0=disable, 1=enable.
<table>
<tr><th>Bit</th><th>Option</th></tr>
<tr><td>0</td><td>System on/off</td></tr>
<tr><td>1</td><td>Temperature +</td></tr>
<tr><td>2</td><td>Temperature -</td></tr>
<tr><td>3</td><td>Fan mode</td></tr>
<tr><td>4</td><td>Temperature control mode</td></tr>
<tr><td>5</td><td>Reset and reboot</td></tr>
<tr><td>6-7</td><td>00</td></tr>
</table></td></tr>
<tr><td>UTC Time Zone</td><td>bd</td><td>2</td><td>INT16/60</td></tr>
<tr><td>Daylight Saving Time</td><td>ba</td><td>10</td><td>Byte 1: 00-disable, 01-enable
Byte 2: DST bias, unit: min
Byte 3-6: Start time, Month (1B)+Week (1B) + Hours of a Day (2B)
Week:
<table>
<tr><th>Bit7-4</th><th>Bit3-0</th></tr>
<tr><td>1: 1st, 2: 2nd,...</td><td>1: Monday, 2: Tuesday,...7: Sunday</td></tr>
</table>Byte 7-10: End time</td></tr>
<tr><td>Data Storage</td><td>68</td><td>1</td><td>00: disable, 01: enable</td></tr>
<tr><td>Data Retransmission</td><td>69</td><td>1</td><td>00: disable, 01: enable</td></tr>
<tr><td>Data Retransmission Interval</td><td>6a</td><td>3</td><td>Byte 1: 00
Byte 2-3: Interval time, unit: s
range: 30~1200s (600s by default)</td></tr>
<tr><td>Multicast group</td><td>82</td><td>1</td><td>Bit 7-4: multicast group 4 to 1 change status, 0 = not allow control, 1 = allow control.</td></tr>
</table>

				Bit 3-0: multicast group 4 to 1 control status, 0 for disable, 1 for enable. **Note:** after disabling or enabling, the device will re-join the network.

Examples:

1. Reboot the device.

ff10ff		
Channel	**Type**	**Value**
ff	10 (Reboot)	ff

2. Set reporting interval as 2 minutes.

ff8e 00 0200		
Channel	**Type**	**Value**
ff	8e (Reporting Interval)	02 00=>00 02=>2 mins

3. Lock the reset and reboot feature of button.

ff25ff20		
Channel	**Type**	**Value**
ff	25	20=> 0010 0000 Bit5=1 => Reset and reboot lock

4. Set time zone.

ffbdc0fd		
Channel	**Type**	**Value**
ff	bd	c0 fd => fd c0 = -240/60=-4 the time zone is UTC-4

5. Set DST time: start time is October 1st Sunday 2:00, end time is April 1st Sunday 2:00, and bias is 1h (60 minutes).

ffba 01 3c 0a177800 04177800		
Channel	**Type**	**Value**
ff	ba	01=enable DST bias: 3c=>60 mins Start time: 0a=>10=October, 17=>1st (1) Sunday(7), 78 00 =>00 78=120 hours=2:00 End time: 04=>April, 17=>1st (1) Sunday(7), 78 00 =>00 78=120 hours=2:00

6. Set multicast group 1 as disable.

ff8210

Channel	Type	Value
ff	82 (Multicast group)	10=>0001 0000 Bit4=1=>group1, bit 0=0=>disable

3.2 Installation Settings

Below settings only take effect when control permission is Thermostat.

<table>
<tr><th>Item</th><th>Channel</th><th>Type</th><th>Byte</th><th>Description</th></tr>
<tr><td>Wiring Settings</td><td rowspan="4">ff</td><td>ca</td><td>3</td><td>Byte 1:
<table>
<tr><th>Bit</th><th>Wire</th><th>Description</th></tr>
<tr><td>1-0</td><td>Y1</td><td rowspan="4">00=disable, 01=enable</td></tr>
<tr><td>3-2</td><td>G/GH</td></tr>
<tr><td>5-4</td><td>OB</td></tr>
<tr><td>7-6</td><td>W1</td></tr>
</table>
Byte 2:
<table>
<tr><th>Bit</th><th>Wire</th><th>Description</th></tr>
<tr><td>1-0</td><td>E</td><td rowspan="3">00=disable,
01=enable</td></tr>
<tr><td>3-2</td><td>CL&CN</td></tr>
<tr><td>5-4</td><td>PEK</td></tr>
<tr><td>7-6</td><td>W2/AUX</td><td>00=disable, 01=W2,
10=AUX</td></tr>
</table>
Byte 3:
<table>
<tr><th>Bit</th><th>Wire</th><th>Description</th></tr>
<tr><td>1-0</td><td>Y2/GL</td><td>00=disable, 01=Y2,
10=GL</td></tr>
<tr><td>3-2</td><td>OB</td><td>00=O/B on cool,
01=O/B on heat
11=Keep Original Setting</td></tr>
<tr><td>7-4</td><td>---</td><td>0000</td></tr>
</table></td></tr>
<tr><td>Reversing Valve</td><td>b5</td><td>1</td><td>00=O/B on cool, 01=O/B on heat</td></tr>
<tr><td>Freeze Protection</td><td>b0</td><td>3</td><td>Byte 1: 00-disable, 01-enable
Byte 2-3: Protection temperature, INT16/10, unit: °C</td></tr>
<tr><td>Room Card Setting</td><td>c1</td><td>4</td><td>Byte 1: 00-disable, 01-enable
Byte 2: 00=System on/off, 01=Insert an event
Byte 3: for every bit: 0=disable, 1=enable
Corresponding event of every bit:</td></tr>
</table>

				Bit / Event 0 Insert card- Wake 1 Insert card- Away 2 Insert card- Home (Default) 3 Insert card- Sleep 4 Remove card- Wake 5 Remove card- Away(Default) 6 Remove card- Home 7 Remove card- Sleep Byte 4: 00

Reply format:

The device will send a reply including wirings, supported mode and levels when it receives a wiring setting command.

Channel	Type	Description
ff	cb	3 Bytes, for every bit: 0=disable, 1=enable Byte 1: Supported temperature control mode Bit / Event 0 Heat 1 EM Heat 2 Cool 3 Auto 7-4 0000 Byte 2: Supported heat level, only works when using heat mode Bit / Event 0 1-stage Heat 1 2-stage Heat 2 3-stage Heat 3 4-stage Heat 4 Auxiliary Heat 7-5 000 Byte 3: Supported cool level, only works when using cool mode Bit / Event 0 1-stage Cool 1 2-stage Cool 7-2 000000
ff	ca	The definition is the same as downlink command

Examples:

1) Enable W1, Y1, Y2, G, O/B, O/B=on heat.

ffca 550005

Channel	Type	Value
ff	ca (Wiring Settings)	Byte 1: 55=> 01 01 01 01=W1, O/B, G, Y1 enable Byte 3: 05=> 00 00 01 01= Y2 enable, O/B=on heat

Reply:

ffcb0d0703 ffca550005		
Channel	**Type**	**Value**
ff	cb	0d=>1101, Auto, Cool and Heat are supported 07=>00111, 1-stage, 2-stange and 3-stage Heat are supported 03=>0011, 1-stage and 2-stage cool are supported
ff	ca	The same as downlink command content

2) Enable freeze protection and set as 5°C.

ffb0 01 3200		
Channel	**Type**	**Value**
ff	b0 (Freeze Protection)	01=Enable 32 00=>00 32=50*0.1=5 °C

3.3 Thermostat Control Settings

When control permission is Thermostat, the device supports temperature control settings via below commands.

Item	Channel	Type	Byte	Description
Temperature Control Mode	ff	fb	1	00=Heat, 01=EM Heat, 02=Cool, 03= Auto
Target Temperature		fa	3	Byte 1: 00=Heat, 01=EM Heat, 02=Cool, 03= Auto Byte 2-3: Target temperature, INT16/10, unit: °C
Temperature Tolerance		b8	2	Byte 1: Target temperature tolerance, UINT8/10, unit: °C Byte 2: Temperature control tolerance, UINT8/10, unit: °C
Fan Mode		b6	1	00=Auto, 01=On, 02=Circulate
Fan Delay	f9	05	2	Byte 1: 00-disable, 01-enable Byte 2: duration of delay, UINT8, unit: min, range: 5-55
Fan Circulate		06	1	UINT8, unit: min/h, range: 5-55

Operation Time				
Fan Regulate Humidity		07	2	Byte 1: 00-disable, 01-enable Byte 2: regulate interval, UINT8, unit: min/h, range: 5-55
Target Humidity Range		09	2	Min. Value (1B) + Max. Value(1B) Min./Max. Value: UINT8, unit: %RH
Temp. Control and Dehumidify		0a	2	Byte 1: 00-disable, 01-enable Byte 2: tolerance value, UINT8/10, unit: °C

Examples:

1. Set temperature control mode as Auto.

fffb03		
Channel	**Type**	**Value**
ff	fb (Temperature Control Mode)	03=Auto

2. Set target temperature of Cool mode as 21.6°C.

fffa02d800		
Channel	**Type**	**Value**
ff	fa (Target Temperature)	02=Cool d8 00=>00 d8=216/10=21.6 °C

3.4 Remote Control Settings

When control permission is Remote Control, the device supports to control relay output status directly via below commands.

Item	Channel	Type	Byte	Description
Relay Status	ff	f7	4	7f00+relay status(1B)+00 **Relay status:** For every bit: 0=disconnected, 1=connected Corresponding relay of every bit:

Bit	Relay
0	Y1
1	Y2/GL
2	W1
3	W2/AUX
4	E
5	G

				6	O/B
				7	0
Room Card Setting		c1	4	00000000-disable 01000000-enable	
Offline Setting		f8	1	When the device is disconnected from server, the control status: 00: keep current status 01: support thermostat button controls during disconnection 02: disconnect all relays	

Examples:

1) Control Y1, Y2, W1, W2, G connected and others are disconnected.

fff77f002f00		
Channel	**Type**	**Value**
ff	f7 (Relay status)	2f=>00101111 Y1, Y2, W1, W2, G are connected, others are disconnected

3.5 Calibration and Threshold Settings

Item	Channel	Type	Byte	Description
Temperature Calibration	ff	ab	3	Byte 1: 00-disable, 01-enable Byte 2-3: calibration value, INT16/10, unit: °C
Humidity Calibration		f9	3	Byte 1: 00-disable, 01-enable Byte 2-3: calibration value, INT16/10, unit: %RH
Threshold Alarm		06	9	**Temperature threshold:** CTRL(1B)+Min(2B)+Max(2B)+ 00000000(4B) CTRL: 00=disable, 01=below (minimum threshold), 02=over (maximum threshold), 03=within, 04=below or over **Persistent low temperature threshold:** 09+Difference value(2B)+00000000(4B)+

				Duration(2B), duration unit: s **Persistent high temperature threshold:** 120000+Difference value(2B)+0000(2B) Duration(2B), duration unit: s

Examples:

1) Enable temperature and set calibration value.

ffab01fdff		
Channel	**Type**	**Value**
ff	ab (Temperature Calibration)	01=Enable fdff=>fffd=-3/10=-0.3 °C

2) Enable threshold alarm and set the below threshold value as 10°C.

ff06 01 6400 000000000000		
Channel	**Type**	**Value**
ff	06(Set Threshold Alarm)	CTRL: 01=below Threshold: 64 00=>00 64=100*0.1=10 °C

3) Enable persistent high temperature threshold difference as 1°C and duration is 10 minutes.

ff06120000 0a00 0000 5802		
Channel	**Type**	**Value**
ff	06(Set Threshold Alarm)	Difference: 0a 00=>00 0a=10*0.1=1°C Duration: 58 02=> 02 58=600s=10 mins

3.6 Schedule Settings

Below settings only take effect when control permission is Thermostat.

WT201 supports to send downlink commands to configure the contents of schedules.

Note:

1) if the repeat date is disabled, the schedule plan will only execute once.

2) When you send downlink command to modify current executing schedule plan, it will take effect in next time.

Item	Channel	Type	Byte	Description
Schedule Content	ff	c8	5	Plan(1B) + 03 + Fan Mode(1B) + Target Temperature(1B) + Tolerance(1B) Plan: 00-Wake, 01-Away, 02-Home, 03-Sleep Fan mode: 00=Auto, 01=On, 02=Circulate Target Temperature: UINT8, bit7 points to

<table>
<tr><td></td><td></td><td></td><td></td><td>temperature unit (0=°C, 1=°F)
Tolerance: UINT8/10, unit the same as target temperature</td></tr>
<tr><td>Schedule Time</td><td></td><td>c9</td><td>6</td><td>Plan(1B) + ID(1B) + Enable(1B) + Repeat Day(1B) +Time(2B)
Plan: 00-Wake, 01-Away, 02-Home, 03-Sleep
ID: 00~0f
Repeat Day: 0=disable, 1=enable
<table>
<tr><th>Bit7</th><th>.....</th><th>Bit1</th><th>Bit0</th></tr>
<tr><td>Sun.</td><td>,...</td><td>Mon.</td><td>0</td></tr>
</table>
Time: unit: min</td></tr>
<tr><td>Switch Schedule Plan</td><td></td><td>c2</td><td>1</td><td>00-Wake, 01-Away, 02-Home, 03-Sleep</td></tr>
<tr><td>Query Schedule</td><td></td><td>28</td><td>1</td><td>00, the device will reply schedule contents and times of all plans with the same format as downlink commands.
Note: even the schedule time is blank, the device will also reply totally 64 blank time records.</td></tr>
</table>

Examples:

1) Set Wake plan content: temperature control mode is Auto, fan mode is on, target temperature is 79°F, tolerance is 1°F.

ffc8 000301cf0a		
Channel	**Type**	**Value**
ff	c8 (Schedule Content)	00=Wake, 01=Fan On Target temperature: 1 1001111= > cf = 79°F Tolerance: 0a=10/10=1°F

2) Set Wake plan time: 6:30 am on weekdays (Mon. To Fri.), 8:00am on weekend (Sat. To San.).

ffc90000013e8601 ffc9000101c0e001		
Channel	**Type**	**Value**
ff	c9 (Schedule Time)	00=Wake, 00=Command ID is 0, 01=Enable 3e=>0011 1110 =Weekday enabled 86 01=>01 86=390 minutes=>6:30
ff	c9 (Schedule Time)	00=Wake, 01=Command ID is 1, 01=Enable c0=>1100 0000 =Weekend enabled e0 01=>01 e0=480 minutes=>8:00

3.7 Milesight D2D Settings

Item	Channel	Type	Byte	Description
D2D Feature	ff	c7	1	10=D2D Controller disabled, 11=D2D Controller enabled, 20=D2D Agent disabled, 22=D2D Agent enabled
D2D Controller		96	8	**Note: Below settings only take effect when control permission is Thermostat.** Byte 1: 00-Wake, 01-Away, 02-Home, 03-Sleep Byte 2: 00-disable, 01-enable Byte 3: 00-disable LoRa Uplink, 01-enable LoRa Uplink Byte 4-5: D2D control command Byte 6-8: 000000
D2D Agent		83	5	Byte 1: Command ID, 0~15 Byte 2: 00-disable, 01-enable Byte 3-4: D2D control command Byte 5: control action, 00=System off, 01=System on, 10=Wake, 11=Away, 12=Home, 13=Sleep

Examples:

1) D2D Controller

ff96 03 01 01 04e0 000000		
Channel	**Type**	**Value**
ff	96 (D2D Controller)	03=> Sleep, 01=> Enable; 01=>Enable LoRa Uplink; 04 e0=>e0 04, Control Command is e004;

2) D2D Agent

ff83 03 01 04e0 01		
Channel	**Type**	**Value**
ff	83 (D2D Agent)	03=> Command ID, 01=> Enable; 04 e0=>e0 04, Control Command is e004; 01=>System on

3.8 Use External Temperature Sensor

WT201 supports to disable internal temperature sensor and use external temperature sensor data via downlink commands.

Item	Channel	Type	Byte	Description
External Temperature Sensor	ff	c4	2	Byte 1: 00-disable, 01-enable Byte 2: timeout, unit: min **Note:** when the device does not receive the temperature for timeout, it will stop working to control the temperature.
Send External Temperature Value	03	-	3	Byte 1-2: INT16/10, unit: °C Byte 3: 00

Examples:

1) Enable external temperature sensor and set the timeout as 60 minutes.

ffc4013c		
Channel	**Type**	**Value**
ff	c4 (External Temperature Sensor)	01=Enable 3c=> 60 minutes

2) Send external temperature sensor data.

03640000	
Channel	**Value**
03	64 00=>00 64=100/10=10 °C

3.9 Screen Display Settings

WT201 supports to enable or disable screen display via downlink command.

Item	Channel	Type	Byte	Description
Screen Display	f9	08	1	00: enable 01: disable the display of plan status 02: disable

Example:

1) Disable the display of plans.

f90801		
Channel	**Type**	**Value**
f9	08	01=disable the display of plans

4. Historical Data Enquiry

WT201 supports sending downlink commands to enquire historical data for specified time point or time range. Before that, ensure the device time is correct and data storage feature was enabled to store the data.

Command format:

Channel	Type	Description
fd	6b (Enquire data in time point)	4 Bytes, Unix timestamp
fd	6c (Enquire data in time range)	Start time (4 bytes) + End time (4 bytes), Unix timestamp
fd	6d (Stop query data report)	ff
ff	6a (Report Interval)	3 Bytes Byte 1: 01 Byte 2-3: interval time, unit:s range: 30~1200s (60s by default)

Reply format:

fc	6b/6c	00: data enquiry success 01: time point or time range invalid 02: no data in this time or time range
20	ce (Historical Data)	Data time stamp (4 Bytes) + Data Contents (4 Bytes)

Data Content Format:

Bit	15-5	4	3	2	1	0
	(Current temperature+100)*10, unit: °C	System on=1, off=0	Fan status, 00=Off, 01=High, 10=Low, 11=On		Fan mode, 00=Auto, 01=On, 10=Circulate	
Bit	**15-5**	**4**	**3**	**2**	**1**	**0**
	(Target temperature+100)*10, unit: °C	control status, 000=Standby, 001=1-stage heat, 010=2-stage heat, 011=3-stage heat, 100=4-stage heat, 101=emergency heat, 110=1-stage cool, 111=2-stage cool			Temp. Control mode, 00=Heat, 01=EM Heat, 10=Cool, 11= Auto	

Note:

1. The device only uploads 300 data records per range enquiry at most.
2. When enquiring the data at the specific time point, it will upload the data which is closest to the search point within the reporting interval range. For example, if the device reporting interval is 10 minutes and users send command to search for the data at 17:00, if the device find there is

data stored in 17:00, it will upload this data; If not, it will search for data between 16:50 to 17:10 and upload the data which is closest to 17:00.

Example:

1. Enquire historical data between 2023/10/16 16:30:00 to 2023/10/16 16:40:00.

fd6c 88f42c65 e0f62c65		
Channel	**Type**	**Value**
fd	6c (Enquire data in time range)	Start time: 88f42c65 => 652cf488 = 1697445000 =2023/10/16 16:30:00 End time: e0f62c65 => 652cf6e0 = 1697445600 =2023/10/16 16:40:00

Reply:

fc6c00		
Channel	**Type**	**Value**
fc	6c (Enquire data in time range)	00: data enquiry success

20ce e0f62c65 969f 1ea0			
Channel	**Type**	**Time Stamp**	**Value**
20	ce (Historical Data)	e0f62c65 => 652cf6e0=2023/10/16 16:40:00	969f=>9f96 => 10011111100 1 01 10 Current temperature: 10011111100=>1276/10-100=27.6°C System: 1=On Fan Status: 01=High Fan Mode: 10=Circulate 1ea0=>a01e=> 10100000000 111 10 Target Temperature: 10100000000=> 1280/10-100=28°C Control Status: 111=2-stage cooling Temp. Control Mode: 10=Cool

-END-