Wireless Data Acquisition System for WD Pro Receiver

Application Note

■ Notice to Customer

Thank for your purchasing our PATLITE products.

- Prior to use, read this manual and [WDT-□LR-Z2, WDR-L(E)-Z2-PRO (-L) Installation Manual] thoroughly.
- If you have any questions about the contents of this manual, please contact our sales office.

1. Before you begin

1.1. The Purpose of This Manual

This manual describes how you can collect information in a WD system with the WD PRO receiver.
This manual covers the following:

・Operating a new WD PRO receiver with socket communication (WDR-PRO format protocol)
・Operating WD PRO receiver with database communication
・Operating WD PRO receiver with Modbus/TCP communication
・Operating WD PRO receiver with Cloud communication

When collecting information using the following methods, refer to the specified manual.
・Adding a WD PRO receiver with socket communication (WDR format protocol)
Refer to ☞ [Wireless Data Acquisition System Application Note]
Refer to ☞ [Application Note for WD PRO Series]

・Using the WDS-WIN01 CSV file
Refer to ☞ [Application Note for WD PRO Series]
Refer to ☞ [Wireless Data Acquisition System Hardware System Setting Software WDS-WIN01 Instruction Manual]

*This manual does not include steps on how to store (such as in a database) nor how to visualize (such as in a Gantt chart or graph) collected Signal Tower information.

1.2. Precautions

CAUTION	
⚠	◆ This document describes only the information that is required to design an information collection method for a WD PRO receiver. Please note that this document is not intended to describe information about WD PRO receivers. ◆ Any unauthorized copying of part or all of this manual is prohibited. ◆ The contents of this manual are subject to change without notice. ◆ There is no assumption of responsibility for inaccuracies in this manual. ◆ The software described in this manual and related information are provided as examples. You may use this information for software design subject to assuming all responsibility. There is no assumption of responsibility for damages incurred by you or a third party as a result of using this information. ◆ Sample code is not provided.

1.3. **Term**

Descriptions of terms used in this manual are listed below.

Term	Description
WDT	Transmitter for a WD system. Refers to the WDT-6M-Z2, WDT-5E-Z2, WDT-6LR-Z2, WDT-5LR-Z2, WDT-4LR-Z2, and WDT-6LR-Z2-PRO (including WDB-D80S-PRO).
WDR	Receiver for a WD system. Refers to the WDR-L-Z2, WDR-LE-Z2, WDR-L-Z2-PRO, WDR-LE-Z2-PRO, WDR-L-Z2-PRO-L, and WDR-LE-Z2-PRO-L.
WD PRO Receiver	Among the WDR, refers to WDR-L-Z2-PRO, WDR-LE-Z2-PRO, WDR-L-Z2-PRO-L, and WDR-LE-Z2-PRO-L only.
WD Series	Series that refers to all WDR and WDT.
Host	In this manual the term is in reference to a device that communicates with WDR over either LAN or USB, gets information from WDR and WDT, and controls WDR and WDT. In most cases the device is a personal computer.
WD System	Refers to the system as a whole. Consists of WDT, WDR, and host.
Existing WD System	On the WDR-L-Z2 and WDR-LE-Z2, refers to a WD system that is already running.

2. Before Design

2.1. Applicable Products

WDR-L-Z2-PRO, WDR-LE-Z2-PRO, WDR-L-Z2-PRO-L, WDR-LE-Z2-PRO-L

2.2. Selecting the Information Collection Method

For each of the described purposes, use to the references provided for the information collection method.

1. In an existing WD system, add the ability to collect information	[Wireless Data Acquisition System Application Note] [Application Note for WD PRO Series]
2. Use WDS-WIN01 CSV file to collect information	[Wireless Data Acquisition System Hardware System Setting Software WDS-WIN01 Instruction Manual] [Wireless Data Acquisition System Application Note]
3. Use a database to collect information*1	Refer to ☞ "3. Using DB communication".
4. Use Modbus/TCP protocol to collect information*1	Refer to ☞ "4. Using Modbus/TCP communication".
5. Use WD PRO receiver and socket communication to collect information*1	Refer to ☞ "5. Using Socket Communication (WDR-PRO Protocol)".
6. Use Cloud Communication to collect information*1	Refer to ☞ "6. Using Cloud Communication (MindSphere) ".

*1 On WDR-L-Z2-PRO-L and WDR-LE-Z2-PRO-L, you cannot collect information with database, Modbus/TCP, or socket communication (WDR-PRO format protocol),Cloud Cmmunication.

2.3. Precautions on adding or replacing in existing WD system

You can use the WD PRO receiver as a receiver that is equivalent to WDR-L-Z2 or WDR-LE-Z2.
Make sure it is used under the following conditions.

・Specify and communication via the [WDR Port]. (Default value: 10001)
*Communication is not possible using the Setting Port, WDR-PRO Port 1, or WD-PRO Port 2.

・The WD PRO receiver firmware version does not display properly with WDS-WIN01 Ver1.04 or earlier, nor with WDS-WIN01 or earlier (such as WDS-AUTO2).
For example, WD PRO receiver Ver1.00 displays Ver129.00 (status where the major version most significant bit is ON).

2.4. Precautions on operating with WD PRO receiver and multiple hosts

In addition to connecting to multiple hosts, WD PRO receivers can collect information and implement settings.
However, be aware there is a limit to the number of units you can connect.

Host connection method		Number of hosts you can connect (maximum)*1
Socket communication connection	WDR Port	1 unit
	WDR-PRO port	2 units
	Setting port*2	1 unit
Database connection		1 unit
Modbus/TCP connection		1 unit

*1 With the above combination, you can connect a maximum 6 hosts.
*2 You can use only with WDT/WDR settings in WDS-WIN01.

3. Using DB communication

Describes requirements for the WD PRO receiver to write Signal Tower information to the database.

3.1. **Preparing the database**

Describes the database required for the WD PRO receiver to write information as well as the required preparations.

3.1.1. Database

Item	Preparation items	
Database System	MySQL (version 5.6) recommended	
Database Address	Database system host name or IP address	
Port Number	Port number used by the database system	
Database	Create the following database.	
	Database Name	Name of database set up in the WD PRO receiver
	User Name	User name for writing (INSERT/UPDATE) to the database set up in the WD PRO receiver
	Password	Password set up in the WD PRO receiver * If "Authentication Type" can be selected, be sure to specify "Standard"
Table Name	Create table with the following name. For information on tables, refer to "Table Settings".	
	wdt_signal_info	Signal Tower information is written to this table.
	counter_info	A simple counter's count information is written here.

3.1.2. Table Settings

(1) wdt_signal_info table

Describes the required fields and data types for the wdt_signal_info table.

Field Name	Data Type	Information Written
insert_timestamp	TIMESTAMP	Date/Time
ieee_address	UNSIGNED BIGINT	WDT IEEE address information
red_information	UNSIGNED SMALLINT	Signal Tower Information (red)
amber_information	UNSIGNED SMALLINT	Signal Tower Information (amber)
green_information	UNSIGNED SMALLINT	Signal Tower Information (green)
blue_information	UNSIGNED SMALLINT	Signal Tower Information (blue)
white_information	UNSIGNED SMALLINT	Signal Tower Information (white)
buzzer_information	UNSIGNED SMALLINT	Buzzer information
wdt_monitoring_information	UNSIGNED TINYINT	WDT monitoring information
external_input_information	UNSIGNED TINYINT	External Input information
serial_number	UNSIGNED TINYINT	Serial number (for serial data)
rs_232c_data	VARBINARY	Serial data
clear_input_information	UNSIGNED TINYINT	Clear Input information
time_counter	UNSIGNED SMALLINT	Time Counter

(2) counter_info table

Describes the required fields and data types for the counter_info table.

Field Name	Data Type	Information Written
timestamp	TIMESTAMP	Date/Time
ieee_address	UNSIGNED BIGINT	WDT IEEE address information
count_val	UNSIGNED INT	Counter value

3.2. Information About Each Field

Describes information about each field.

3.2.1. wdt_signal_info table

(1) insert_timestamp field

Indicates the date and time the WDR received notification from WDT that there was a change in Signal Tower information.

The value is based on the WD PRO receiver's internal clock. (timezone: UTC)

(2) ieee_address field

Indicates the WDT IEEE address (8-byte hexadecimal value) where there was a change in Signal Tower information.

Note that the field is set with a decimal value.

(Example)

When "1885667171979194497" (decimal value) is written to ieee_address,

the address is "1A2B3C4D5E6F7081" (hexadecimal value).

(3) red_information field

Indicates the status of Signal Tower Information (red). Values are as follows.

Value	Description
0	Light off
1	Light on
2	Flashing

(4) amber_information field

Indicates the status of Signal Tower Information (amber). Values are as follows.

Value	Description
0	Light off
1	Light on
2	Flashing

(5) green_information field

Indicates the status of Signal Tower Information (green). Values are as follows.

Value	Description
0	Light off
1	Light on
2	Flashing

(6) blue_information field

Indicates the status of Signal Tower Information (blue). Values are as follows.

Value	Description
0	Light off
1	Light on
2	Flashing

(7) white_information field

Indicates the status of Signal Tower Information (white). Values are as follows.

Value	Description
0	Light off
1	Light on
2	Flashing

(8) buzzer_information field

Indicates the status of buzzer information. Values are as follows.

Value	Description
0	Buzzer off
1	Buzzer on

(9) wdt_monitoring_information field

Indicates the WDT connection status. Values are as follows.

Value	Description
0	WDT disconnected
9	WDT connected

(10) external_input_information field

Indicates the status of the WDT external input line. Values are as follows.

<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0 to 255</td><td>The value indicates the status of input information 1 to 8.
<table>
<tr><th>External Input Line</th><th>bit</th><th>References</th></tr>
<tr><td>External Input 8</td><td>7</td><td rowspan="9"><table><tr><th>Status</th><th>Description</th></tr><tr><td>0b0</td><td>OFF</td></tr><tr><td>0b1</td><td>ON</td></tr></table></td></tr>
<tr><td>External Input 7</td><td>6</td></tr>
<tr><td>External Input 6</td><td>5</td></tr>
<tr><td>External Input 5</td><td>4</td></tr>
<tr><td>External Input 4</td><td>3</td></tr>
<tr><td>External Input 3</td><td>2</td></tr>
<tr><td>External Input 2</td><td>1</td></tr>
<tr><td>External Input 1</td><td>0</td></tr>
</table></td></tr>
</table>

(11) serial_number field

Number (0 to 255) that indicates the serial information is a retransmission.

If the number is the same, consider it retransmitted data.

(12) rs_232c_data field

Indicates serial information received from WDT-PRO.

Maximum length of 60 bytes.

(13) clear_input_information field

Indicates the WDT-PRO clear input information. Values are as follows.

Value	Description
0	Clear input has not executed
1	Clear input has been executed

(14) time_counter field

Amount of time (in seconds) from a Signal Tower status change to a Signal Tower information transmission

Calculate the amount of time it took for the change to occur by subtracting the time_counter (seconds) from the date and time in the date_time field.

3.2.2. counter_info table

(1) timestamp field

Indicates the date and time the database server received notification from WD PRO receiver.

The value is based on the internal clock of the database server.

(2) ieee_address field

Indicates the WDT IEEE address (8-byte hexadecimal value) where there was a change in the counter value.

Same as the wdt_signal_info table, note that the field is set with a decimal value.

(3) count_val field

Indicates the simple counter function's counter value stored on WDT.

0 to 4,294,967,295

3.3. **Design Considerations**

■ Data is written to the database whenever there is a change in status any of the WDT information.

■ Depending on the number of WDT connected and the frequency of changes in Signal Tower information, the database may become very large, resulting in poor responses when trying to get information from the database.

・Periodically back up old data
・Create a different database for each receiver

Make adjustments so too many records are not collected.

(Example)

In an environment with 30 WDT, where the status of Signal Towers change 100 times per day, in 1 month (30 days) 90,000 records are generated.

4. Using Modbus/TCP communication

The WD PRO receiver operates as a Modbus/TCP slave.

Using a Modbus/TCP master such as SCADA software, you can read the WDT status information into the WD PRO receiver.

4.1. **Steps to Start Using**

4.1.1. Procedure

The steps to start using Modbus/TCP are as follows.

Step	Description
1	On the WD PRO receiver's Modbus/TCP communication screen, set up the port
2	On the WD PRO receiver's transmitter user name registration screen, register a user name * The unit identifier, for specifying which transmitter data to read, is assigned with transmitters that have been registered with a user name For information, refer to ☞ "4.1.2 About the Unit Identifier and User Name"
3	Set up the Modbus/TCP master (Start address of registers to read, number of registers to read, transmission interval, and so on)
4	Start operation: ① Establish a connection between the master and WD PRO receiver ② Send a request from the Modbus/TCP master to the WD PRO receiver ③ Receive a response from the WD PRO receiver ④ During operation, steps ② and ③ are repeated ⑤ At the end of the operation, release the connection *Only 1 master can connect at any one time with the WD PRO receiver. Multiple masters cannot connect simultaneously

4.1.2. About the Unit Identifier and User Name

The unit identifier number is assigned, in order of registered user names, starting from 1.

For example, unit identifiers when registering user names in the following CSV file (abc.csv)

Unit Identifier		Contents of "abc.csv"
1	⇒	00255CFFFEBABDDC, Line 01 Transmitter
2	⇒	00255CFFFEBABDDD, Line 02 Transmitter
3	⇒	00255CFFFEBABDDE, Line 03 Transmitter
4	⇒	00255CFFFEBABDDF, Line 04 Transmitter
:		:
:		:
:		:
29	⇒	00255CFFFEBABDFA, Line 29 Transmitter
30	⇒	00255CFFFEBABDDB, Line 30 Transmitter

* For information on how to register user names, refer to ☞ 7.3.4.5 Register Tranmitter User Name, in the "[WDT-□LR-Z2、WDR-L(E)-Z2-PRO(-L) Instruction Manual]".

4.2. Modbus/TCP communication protocol

4.2.1. Communication Data Format

(1) Request command from master

Item	Number of bytes	Data	Description
Transaction ID	2	High Low	The value set here is applied to the WD PRO receiver's reply command 0x0000 to 0xFFFF
Protocol ID	2	High Low	Static value 0x0000
Field Length	2	High Low	Static value 0x0006
Unit ID	1		Requested WDT identification number *Unit identification (1 to 30) is assigned in order of user name registration 0x01 to 0x1E
Function Code	1		Static value 0x03
Register's start address	2	High Low	Specify the value of the start address of registers to read minus 1 0x0000 to 0x002C
Number of Registers	2	High Low	Specify the number of registers to read 0x0000 to 0x002D

*Items with multiple bytes are stored in **Big Endian** format, unless otherwise specified.

(2) Response command from the WD PRO receiver

Item	Number of bytes	Data	Description
Transaction ID	2	High Low	Sets the value in the request command 0x0000 to 0xFFFF
Protocol ID	2	High Low	Static value 0x0000
Field Length	2	High Low	Sets number of bytes after the unit identification 0x0000 to 0x005A
Unit ID	1		Identification number of responded WDT 0x01 to 0x1E
Function Code	1		Static value 0x03 (Read Holding Registers)
Number of bytes read	1		Sets the number of bytes read. (Number of registers x 2 bytes) 0x00 to 0x5A
Read data	Variable	MSB LSB	Sets the data requested by the master. (Number of registers x Number of bytes of data read)

*Items with multiple bytes are stored in **Big Endian** format, unless otherwise specified.

(3) Error command from the WD PRO receiver

Returned when there is an issue with a request command from the master.

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Data</th><th>Description</th></tr>
<tr><td>Transaction ID</td><td>2</td><td>High
Low</td><td>Sets the value in the request command
0x0000 to 0xFFFF</td></tr>
<tr><td>Protocol ID</td><td>2</td><td>High
Low</td><td>Static value
0x0000</td></tr>
<tr><td>Field Length</td><td>2</td><td>High
Low</td><td>Static value
0x0003</td></tr>
<tr><td>Unit ID</td><td>1</td><td></td><td>Sets the received unit identifier.</td></tr>
<tr><td>Function Code</td><td>1</td><td></td><td>Adds 0x80 with the received function code and sets the resulting value.</td></tr>
<tr><td>Exception Code</td><td>1</td><td></td><td>Code indicating error type
<table>
<tr><th>Exception Code</th><th>Description</th></tr>
<tr><td>0x01</td><td>Illegal Function
Function code other than 0x03</td></tr>
<tr><td>0x02</td><td>Illegal Address
Register Address out of range</td></tr>
<tr><td>0x03</td><td>Illegal Data Value
Invalid register start address or invalid number of registers</td></tr>
<tr><td>0x04</td><td>Server Device Failure
Transmitter user name is not registered</td></tr>
</table></td></tr>
</table>

4.2.2. WDT Data Allocation

The following WDT information is allocated to register addresses.

Registers are 2 bytes long. Note that there is a distinction between the top part and bottom part of register storage locations.

<table>
<tr><th>Register Address</th><th>Item</th><th colspan="2">Data</th><th>Description</th></tr>
<tr><td rowspan="8">1
2
3
4</td><td rowspan="8">IEEE Address</td><td>High</td><td>MSB</td><td rowspan="8">WDT IEEE address (unique 8-byte value)</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td>High</td><td></td></tr>
<tr><td>Low</td><td>LSB</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Signal Tower Information (red)</td><td>High</td><td></td><td rowspan="8">Signal Tower status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x0000</td><td>Light off</td></tr><tr><td>0x0001</td><td>Light on</td></tr><tr><td>0x0002</td><td>Flashing</td></tr></table></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Signal Tower Information (amber)</td><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Signal Tower Information (green)</td><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Signal Tower Information (blue)</td><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Signal Tower Information (white)</td><td>High</td><td></td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Buzzer information</td><td rowspan="2">High
Low</td><td rowspan="2"></td><td>Buzzer status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x0000</td><td>Buzzer off</td></tr><tr><td>0x0001</td><td>Buzzer on</td></tr></table></td></tr>
</table>

<table>
<tr><td rowspan="2">11</td><td rowspan="2">WDT monitoring information</td><td>High</td><td></td><td rowspan="2">WDT monitoring information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x0000</td><td>WDT disconnected</td></tr><tr><td>0x0009</td><td>WDT connected</td></tr></table>
*When the WDT is not connected, the Signal Tower information, Buzzer information, Counter value, external input information, and RS232C data are all read in as “0”.</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Counter value</td><td>High</td><td>MSB</td><td rowspan="2">Counter value information
0x00000000 to 0xFFFFFFFF</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td>13</td><td>High</td><td></td></tr>
<tr><td></td><td>Low</td><td>LSB</td><td></td></tr>
<tr><td rowspan="2">14</td><td rowspan="2">External Input information</td><td rowspan="2">High</td><td rowspan="2"></td><td rowspan="2">External input status information
<table><tr><th>Item</th><th>bit</th><th>Description</th></tr><tr><td>Dummy Data</td><td>15 to 8</td><td>Static value
0x00</td></tr><tr><td>External Input 8</td><td>7</td><td rowspan="9"><table><tr><th>Value</th><th>Description</th></tr><tr><td>0b0</td><td>OFF</td></tr><tr><td>0b1</td><td>ON</td></tr></table></td></tr><tr><td>External Input 7</td><td>6</td></tr><tr><td>External Input 6</td><td>5</td></tr><tr><td>External Input 5</td><td>4</td></tr><tr><td>External Input 4</td><td>3</td></tr><tr><td>External Input 3</td><td>2</td></tr><tr><td>External Input 2</td><td>1</td></tr><tr><td>External Input 1</td><td>0</td></tr></table>
*For anything other than WDT-PRO, read in "0".</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">15</td><td rowspan="5">RS232C Data</td><td>High</td><td></td><td rowspan="2">Serial number for Serial information
0x0000 to 0x00FF
Each time RS232C data is received from WDT, 1 is added to the number.
After 00FF, resets to 0000.</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td rowspan="2">16</td><td>High</td><td>MSB</td><td rowspan="2">RS232C data information
Maximum 60 bytes</td></tr>
<tr><td>Low</td><td></td></tr>
<tr><td>To</td><td></td><td></td><td>*For anything other than WDT-PRO, read in "0".</td></tr>
<tr><td rowspan="2">45</td><td>High</td><td></td><td rowspan="2"></td></tr>
<tr><td>Low</td><td>LSB</td></tr>
</table>

*Items with multiple bytes are stored in **Big Endian** format, unless otherwise specified.

4.2.3. Example communication

The following are actual examples of communication. (The communication example is a hexadecimal byte string)

Get the WDT Signal Tower information registered with the 20th user name: red: light on status, yellow: flashing status, green: light off status, blue: light off status, white: light off status, buzzer information: buzzer on status

[Send Host]

Item	Set value (hexadecimal)
Transaction ID	0x00
	0x00
Protocol ID	0x00
	0x00
Field Length	0x00
	0x06
Unit ID	0x14
Function Code	0x03
Register's start address	0x00
	0x04
Number of Registers	0x00
	0x06

[Receive Host]

Item		Set value (hexadecimal)
Transaction ID		0x00
		0x00
Protocol ID		0x00
		0x00
Field Length		0x00
		0x0F
Unit ID		0x14
Function Code		0x03
Number of bytes read		0x0C
Read data	Signal Tower Light Information (red)	0x00
		0x01
	Signal Tower Light Information (amber)	0x00
		0x02
	Signal Tower Light Information (green)	0x00
		0x00
	Signal Tower Light Information (blue)	0x00
		0x00
	Signal Tower Light Information (white)	0x00
		0x00
	Buzzer information	0x00
		0x01

4.3. **Design Considerations**

・Cannot connect simultaneously to multiple masters.
・Cannot use as a master. Fixed as a slave.
・Can only read registers. You cannot write to them.

5. Using Socket Communication (WDR-PRO Protocol)

Use to collect information via TCP socket communication when WD PRO receiver is connected directly to a PC or PLC.

5.1. **Operation Sequence**

Describes the sequence of steps between the host and WD PRO receiver.

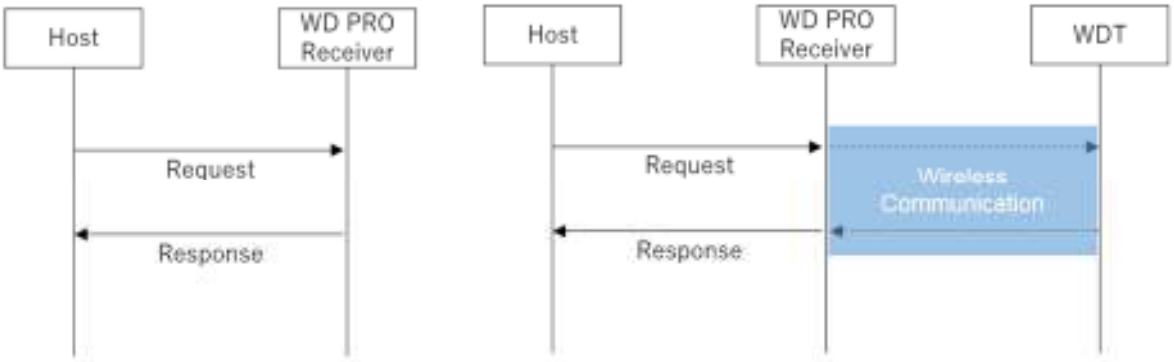
5.1.1. Sequence

Describes the sequence between the host and WD PRO receiver.

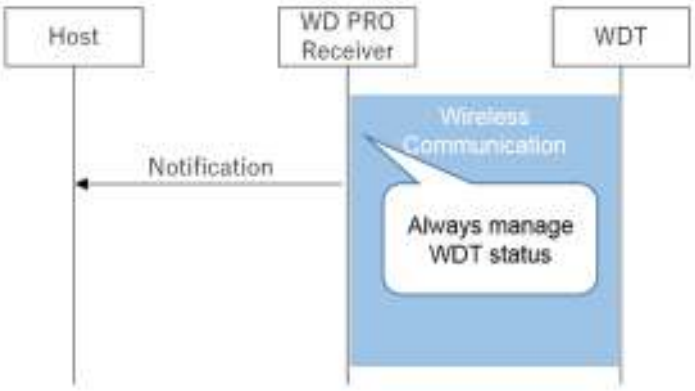
There are two patterns: 1) Host sends a [request] and receives a [reply], and 2) WD PRO receiver monitors the WDT status, and sends a [notification] when there is a status change.

*As the [notification] is outside the host's control, it could be received between a [request] command and its corresponding [response]. Please take care when making your design.

Host Request Sequence example



Host Notification Sequence example

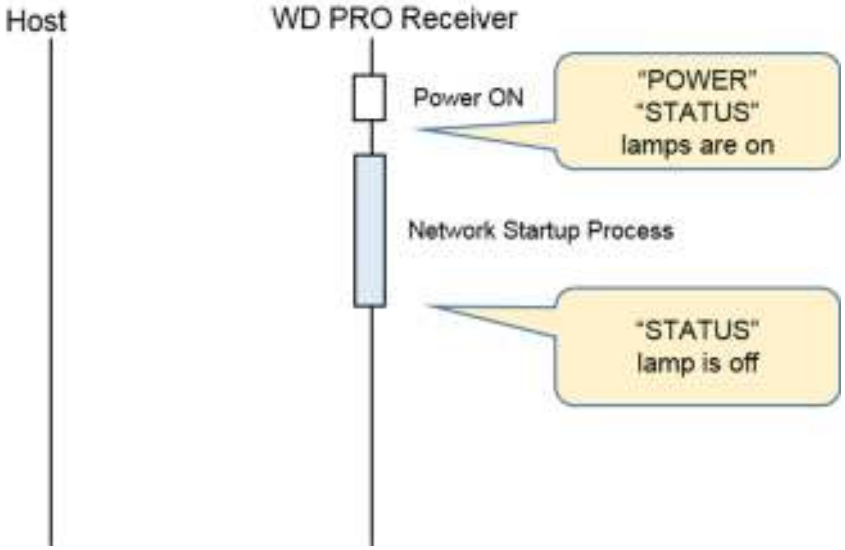


5.1.2. Startup sequence

(1) WD PRO Receiver Startup Sequence

Operation sequence when starting up the WD PRO receiver. The network startup process is run automatically.

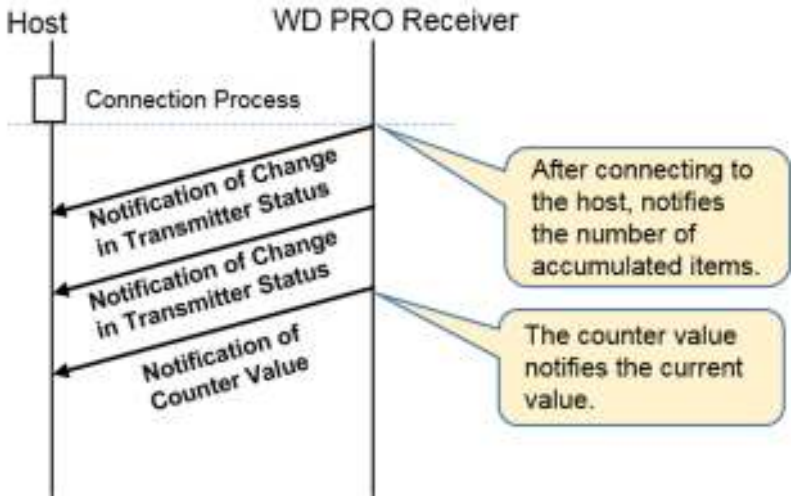
When the network startup process is complete, the WDT can join the network.



(2) Initial Host Connection Sequence

Operation sequence when the host executes the connection process. Implement after the sequence is complete (WD PRO Receiver Startup Sequence).

*If WDT status information and counter values are accumulated, after connection the accumulated values for [Notify WDT Change Information] and [Counter Value Notification] are continuously notified.

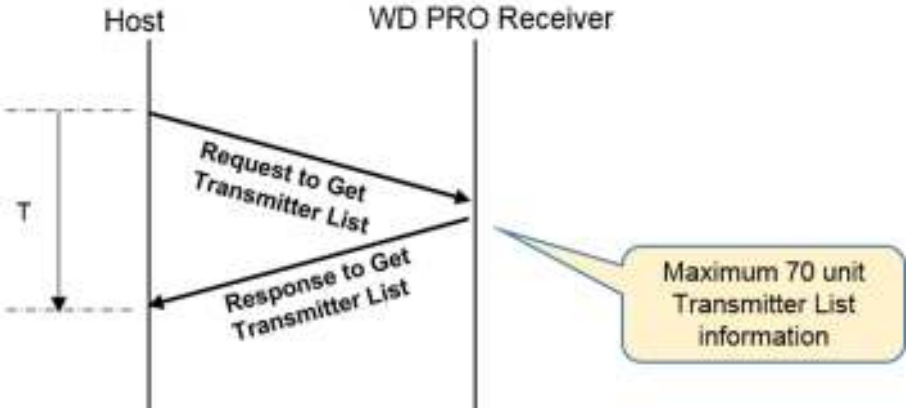


(3) Get Transmitter List Sequence

Operation sequence for getting the list of transmitters connected to the WD PRO receiver. Design as required.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



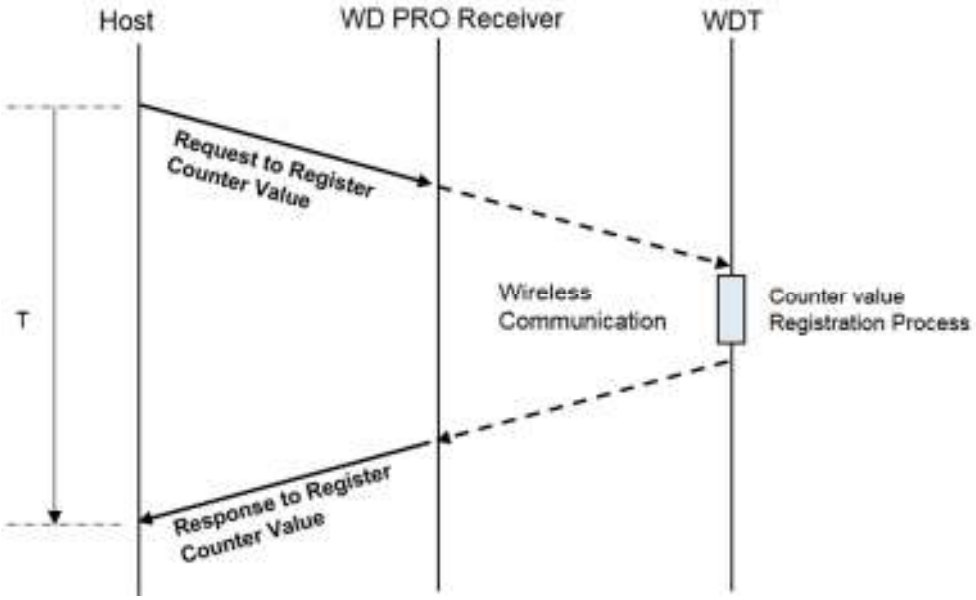
(4) Counter Value Initialization Sequence

Operation sequence for registering the initial value (usually 0) when starting the counter on the WDT. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

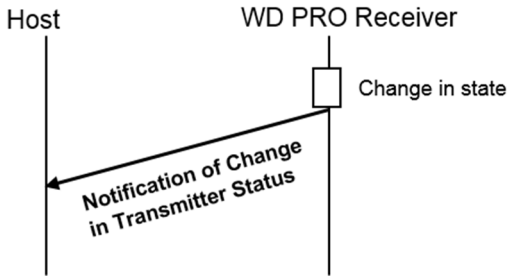
*Timeout (T) of 15 seconds is recommended between a request and its response.



5.1.3. WDT Notification Sequence

(1) Sequence for Notification of Change in Transmitter Status

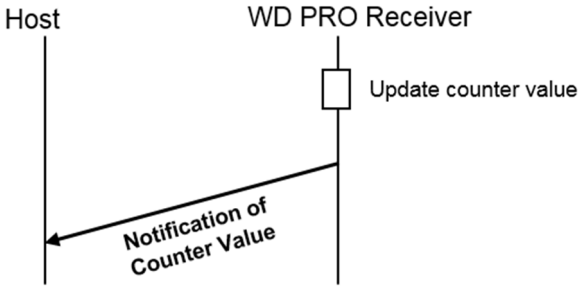
Notified when there is a change in WDT Signal Tower information, buzzer information, external input information, RS232C data, or the WDT monitoring status, and when the WDT connection status changes from connected to unconnected status.



(2) Counter Value Notification Sequence

If the WDT counter setting is enabled, notified when the counter value is updated.

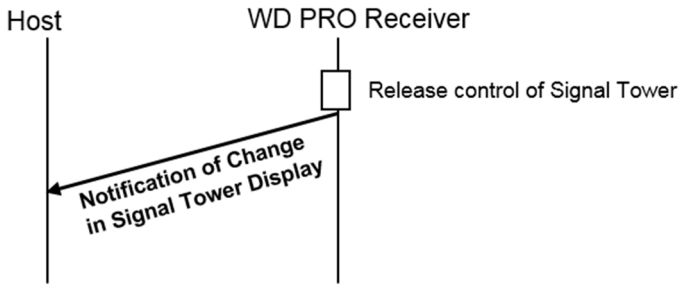
*Notification of value updates is not done in real time.



(3) Sequence for Notification of Change in Signal Tower Display

Notified when the WDT Signal Tower display is released.

*WDT-PRO only



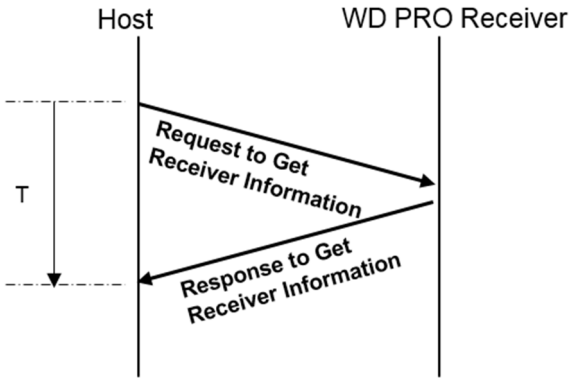
5.1.4. WD PRO Receiver Control Sequence

(1) Get Receiver Information Sequence

Operation sequence for getting WD PRO receiver information (such as ExtendedPanID and firmware version). Design as required.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.

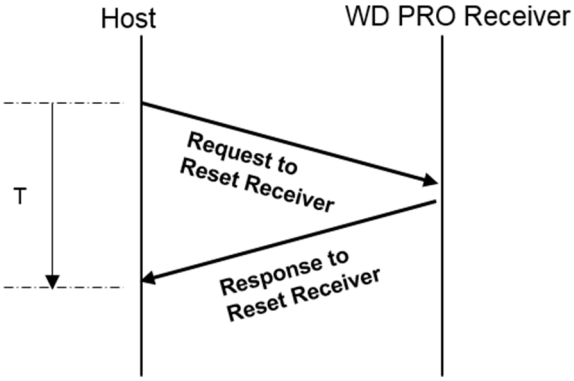


(2) Reset Receiver Sequence

Operation sequence for restarting the WD PRO receiver. Design as required.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



5.1.5. WDT Control Sequence

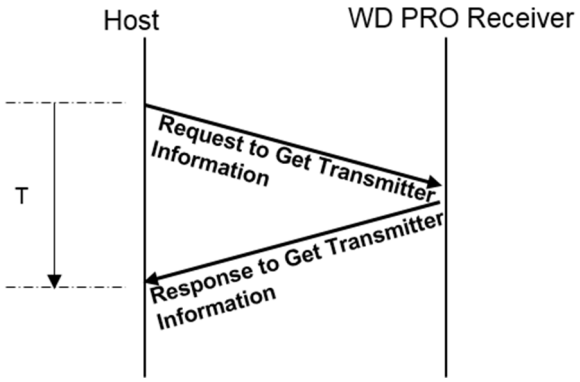
(1) Get Transmitter Information Sequence

Operation sequence for getting transmitter information (such as firmware version) or transmitter setup information (such as user names, firmware version, and ExtendedPanID). Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



(2) Get Transmitter Status Sequence

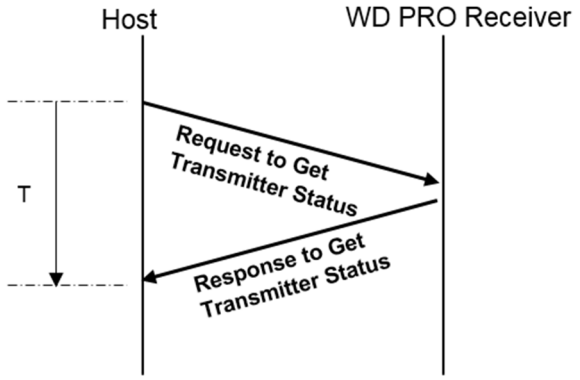
Operation sequence for getting the transmitter status (such as changes in Signal Tower information and buzzer information). Design as required.

*If the status of transmitters is accumulated, you can get the status from the oldest.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



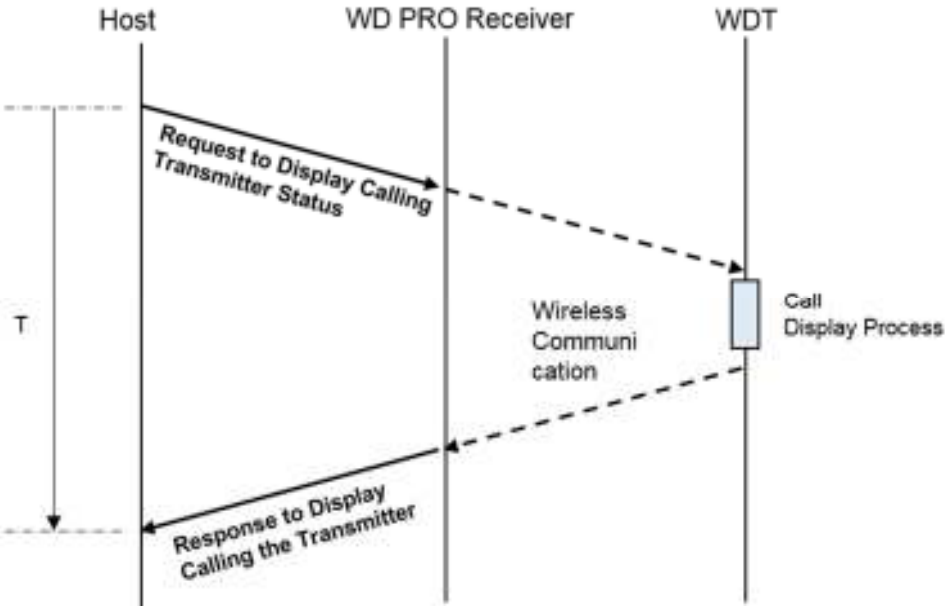
(3) Call Transmitter Sequence

Operation sequence when calling the transmitter (WDT indicator flashes blue). Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 15 seconds is recommended between a request and its response.



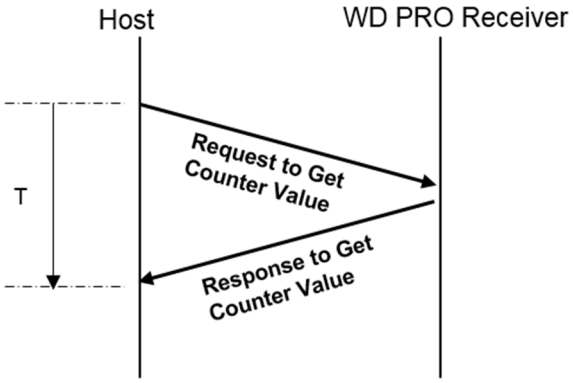
(4) Get Counter Value Sequence

Operation sequence for getting the counter value in the WDT. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



5.1.6. WDT-PRO Control Sequence

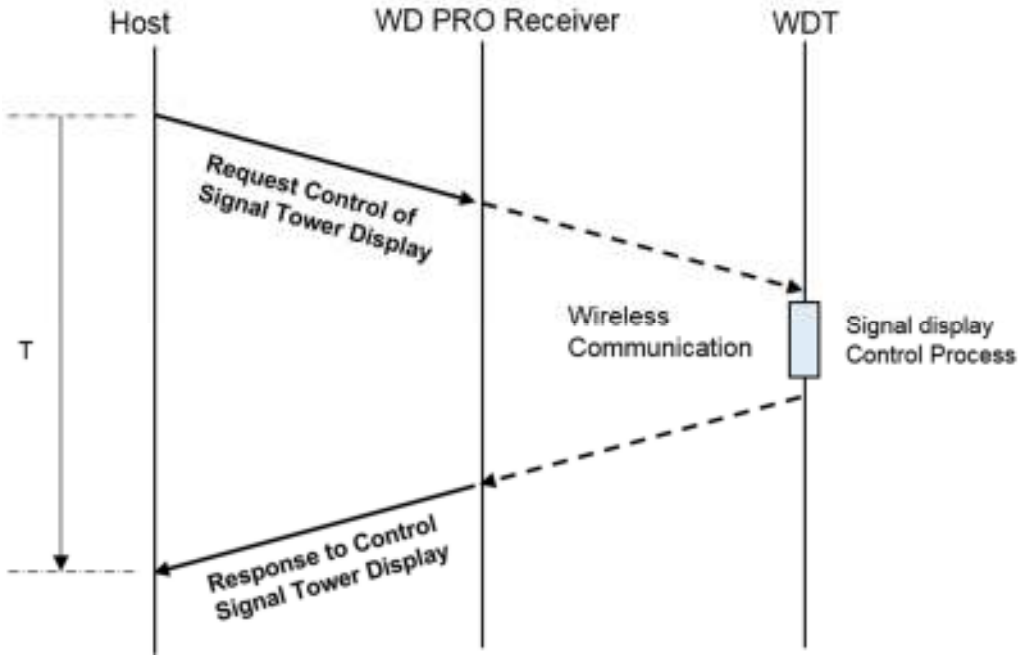
(1) Output Serial Data Sequence

Operation sequence when outputting data from the WDT-PRO RS232C interface. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 15 seconds is recommended between a request and its response.



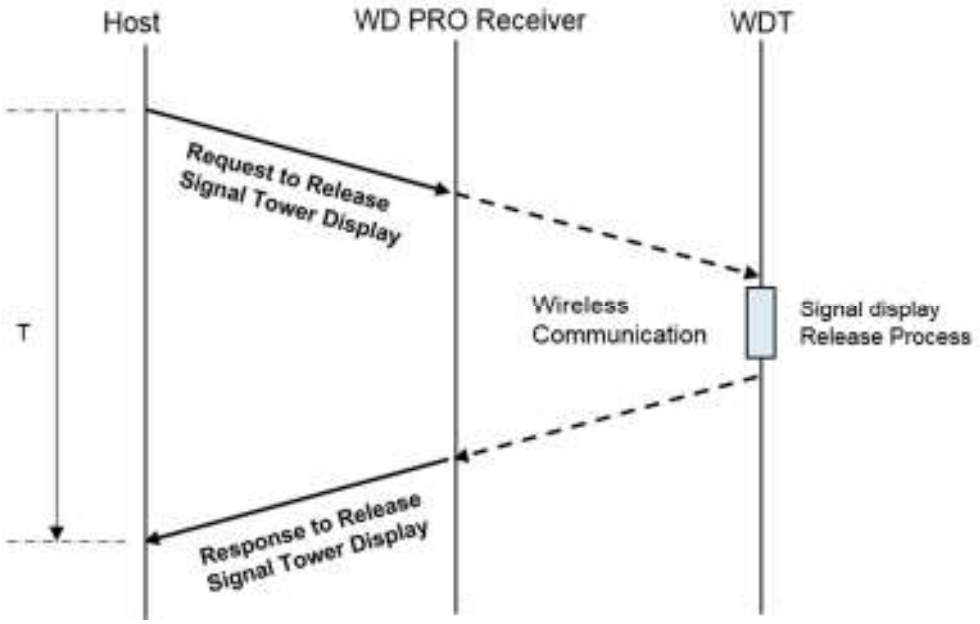
(2) Control Signal Tower Display Sequence

Operation sequence for controlling the WDT-PRO Signal Tower display. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 15 seconds is recommended between a request and its response.



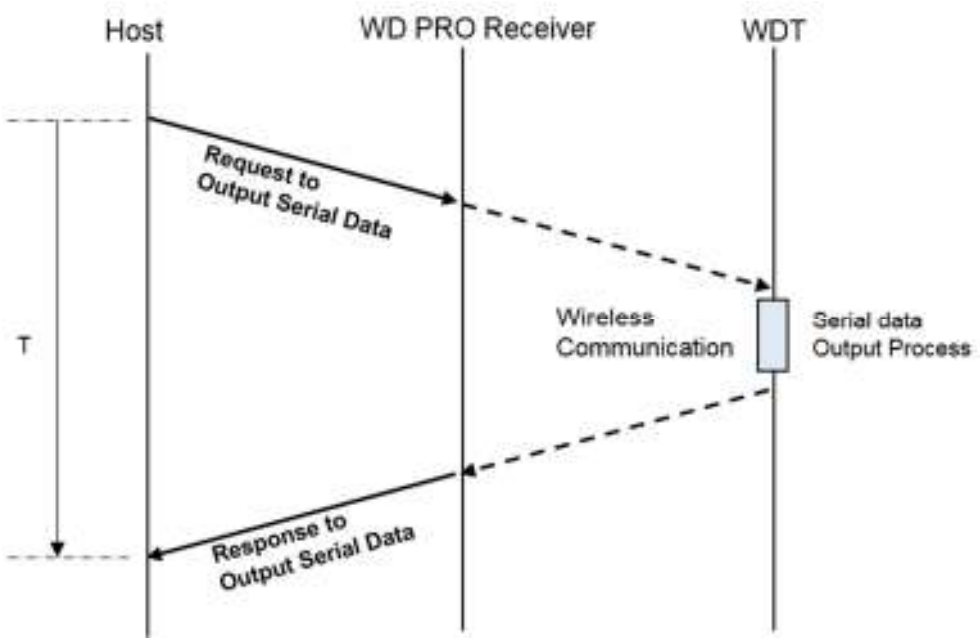
(3) Release Signal Tower Display Sequence

Operation sequence for releasing control of the WDT-PRO Signal Tower display. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 15 seconds is recommended between a request and its response.



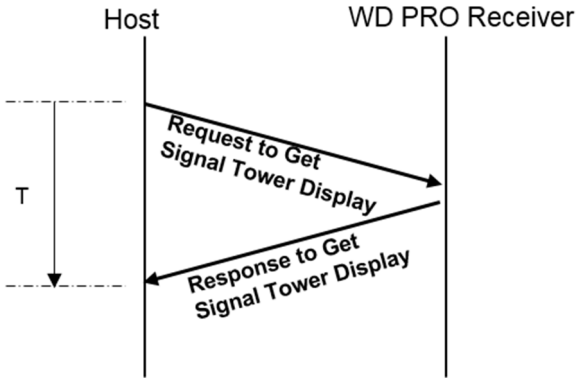
(4) Get Signal Tower Display Sequence

Operation sequence for getting the control status of the WDT-PRO Signal Tower display. Design as required.

*Specify an IEEE address for each unit.

*In regards to a request, wait until you receive a response before sending the next request.

*Timeout (T) of 2 seconds is recommended between a request and its response.



5.2. Communication Protocol

Describes the data format for communication control.

5.2.1. Communication Data Format

The structure of communication data format is as follows.

Item	Number of bytes	Set value (Example)	Description
Product Category	2	0x58 0x42	Indicates a wireless product (“XB”)
ID	1	0x01	Indicates the WD PRO Receiver
Extension	1	0x00	Static value
Size	2	0xXX 0xXX	Data length (bytes) of "communication packet" part
Communication packet	Variable	0xXX to	Data of the WDR-PRO protocol part *Variable value 0 to XX bytes

The format of the communication packet varies depending on whether it is a request command, response command, or notification command.

Basic configuration of the communication packet part is shown below.

(1) Data Format of Request Command

Item		Number of bytes	Set value (Example)	Description
Communication packet	Command type	1	0x20	Indicates a request command
	IEEE Address	8	-	IEEE address (MAC address) of the request destination
	Command mode	2	-	Command mode of the request
	Data Area	Variable	-	Data added to the command or mode

(2) Data Format of Response Command

Item		Number of bytes	Set value (Example)	Description
Communication packet	Command type	1	0x30	Indicates a response command
	IEEE Address	8	-	IEEE address (MAC address) of the source of the response
	Command mode	2	-	Indicates the requested command mode
	Response status	1	-	Response status for a request
	Data Area	Variable	-	Data added to the command or mode

(3) Data Format of Notification Command

Item		Number of bytes	Set value (Example)	Description
Communication packet	Command type	1	0x10	Indicates a notification command
	IEEE Address	8	-	IEEE address (MAC address) of the request destination
	Command mode	2	-	Command mode of the notification
	Data Area part	Variable	-	Data added to the command or mode

5.2.2. List of Communication Packet Commands

List of commands you can use and relationships between commands.

(1) Notification command (command type: 0x10)

Notification commands for the WDR are shown below.

	Notification Command	Command mode
Command	Notification of Change in Transmitter Status	0x2001
	Notification of Counter Value	0x2007
	Notification of Change in Signal Tower Display	0x2008

(2) Request command (command type: 0x20) and response command (command type: 0x30).

Request and response commands for WDR are shown below.

	Request Command	Response Command	Command mode
Command	Request to Get Transmitter Status	Response to Get Transmitter Status	0x2002
	Request to Get Transmitter List	Response to Get Transmitter List	0x2003
	Request to Get Transmitter Information	Response to Get Transmitter Information	0x2004
	Request to Display Calling Transmitter Status	Response to Display Calling the Transmitter	0x4010
	Request to Output Serial Data	Response to Output Serial Data	0x9011
	Request Control of Signal Tower Display	Response to Control Signal Tower Display	Request: 0xE001 Response: 0xE000
	Request to Release Signal Tower Display	Response to Release Signal Tower Display	0xE0FF
	Request to Register Counter Value	Response to Register Counter Value	0x6001
	Request to Get Receiver Information	Response to Get Receiver Information	0x2005
	Request to Reset Receiver	Response to Reset Receiver	0x2006
	Request to Get Counter Value	Response to Get Counter Value	0x2009
	Request to Get Signal Tower Display	Response to Get Signal Tower Display	0x200A
	–	Command Error response	-

5.3. **Communication Packet Commands**

Describes information about commands.

The size and communication packet parts of the “communication data format” are described in the following example.

Item		Number of bytes	Set value (Hexadecimal)	Description
Size		2	0x00	
			0x0C	
Command type		1	0x01	Static value
IEEE Address		8	-	Set the IEEE address on WDT.
Command mode		2	0x10	Static value
			0x11	
Data Area part	Status	1	-	0x12: XXXX 0x13: VVVV
	...	.	-	...

*In the command details, describe the Set Value for important items only. Otherwise, a dash “-” is shown.

*Items with multiple bytes are stored in **Big Endian** format, unless otherwise specified.

*Item names in the data area vary depending on the command. Or, it may consist of multiple items.

5.3.1. Notification of Change in Transmitter Status

Notified when there is a change in WDT Signal Tower information, buzzer information, external input information, RS232C data, or the WDT monitoring status.

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x6F</td></tr>
<tr><td>Command type</td><td>1</td><td>0x10</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0x20</td><td rowspan="2">Static value</td></tr>
<tr><td>0x01</td></tr>
<tr><td>Dummy data</td><td>1</td><td>0x00</td><td>Static value</td></tr>
<tr><td>Serial number</td><td>4</td><td>-</td><td>Every time there is a notification about a change in WDT information, increments and sets the counter value.
The count starts at 0, and after it reaches the maximum value, the count starts again from 0.</td></tr>
<tr><td>Time</td><td>8</td><td>-</td><td>Time when change occurred
*The format is UNIX time (UTC)</td></tr>
<tr><td rowspan="2">Version information</td><td rowspan="2">2</td><td>-</td><td>Major version
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x01</td><td>WDT-6M/5E</td></tr>
<tr><td>0x02</td><td>WDT-5E/6M-Z2</td></tr>
<tr><td>0x03</td><td>WDT-4LR/5LR/6LR-Z2</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO*</td></tr>
</table>
*Version information is static (0xFFFF)
For information, refer to ☞ "WDT Information".</td></tr>
<tr><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter mode</td></tr>
<tr><td>0x04</td><td>Check Radio Waves mode</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Base Unit Information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Signal Tower Information (red)</td><td>1</td><td rowspan="5">-</td><td rowspan="5">Signal Tower status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Not registered, unused</td></tr><tr><td>0x01</td><td>Light off</td></tr><tr><td>0x02</td><td>Light on</td></tr><tr><td>0x04</td><td>Flashing</td></tr></table></td></tr>
<tr><td>Signal Tower Information (amber)</td><td>1</td></tr>
<tr><td>Signal Tower Information (green)</td><td>1</td></tr>
<tr><td>Signal Tower Information (blue)</td><td>1</td></tr>
<tr><td>Signal Tower Information (white)</td><td>1</td></tr>
<tr><td>Buzzer information</td><td>1</td><td>-</td><td>Buzzer status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Buzzer off</td></tr><tr><td>0x01</td><td>Buzzer on</td></tr></table></td></tr>
<tr><td>WDT monitoring information</td><td>1</td><td>-</td><td>WDT monitoring information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>WDT disconnected</td></tr><tr><td>0x09</td><td>WDT connected</td></tr></table></td></tr>
<tr><td>External Input information</td><td>1</td><td>-</td><td>External input status information
<table><tr><th></th><th>bit</th><th>Description</th></tr><tr><td>External Input 8</td><td>7</td><td rowspan="8"><table><tr><th>Value</th><th>Description</th></tr><tr><td>0b0</td><td>OFF</td></tr><tr><td>0b1</td><td>ON</td></tr></table></td></tr><tr><td>External Input 7</td><td>6</td></tr><tr><td>External Input 6</td><td>5</td></tr><tr><td>External Input 5</td><td>4</td></tr><tr><td>External Input 4</td><td>3</td></tr><tr><td>External Input 3</td><td>2</td></tr><tr><td>External Input 2</td><td>1</td></tr><tr><td>External Input 1</td><td>0</td></tr></table></td></tr>
<tr><td>RS232C Data</td><td>62</td><td>-</td><td>RS232C data information
*For information, refer to ☞ "RS232C data information details"</td></tr>
</table>

(1) WDT Information

Item	Number of bytes	Description
Version information	1	WDT-PRO major version 0x01 to 0xFF *Other than for WDT-PRO, version information is static (0x0000)
	1	WDT-PRO minor version 0x00 to 0xFF
	1	Static value
Status information	1	Static value

(2) Base Unit Information

Item	Number of bytes	Description
Unit model	1	Unit model information Value: 0x00 = Unknown; 0x11 = WDB-D80S-PRO
Version information	1	Major version 0x01 to 0xFF *Other than for WDT-PRO, version information is static (0x0000)
	1	Minor version 0x00 to 0xFF
	1	Static value
DIP switch information	1	States of 4 DIP switches bit 3 / 2 / 1 / 0 Value: 0b0 = OFF; 0b1 = ON

(3) RS232C data information details

Item	Number of bytes	Description
Size of Input Information	1	Data length of input information (bytes) 0x00 to 0x3C (0 to 60)
Serial number	1	Number to indicate retransmission 0x00 to 0xFF *When you receive data with the same number, consider it a retransmission.
Input Information	60	RS-232C receive data 0x00 to 0xFF *Areas besides the input information size are stored with 0xFF *Until input information is updated, the previous information is kept

5.3.2. Notification of Counter Value

Notifies when the WDT counter value is updated.

*Notification of value updates is not done in real time.

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x2D</td></tr>
<tr><td>Command type</td><td>1</td><td>0x10</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0x20</td><td rowspan="2">Static value</td></tr>
<tr><td>0x07</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Time</td><td>8</td><td>-</td><td>Time when change occurred
*The format is UNIX time (UTC)</td></tr>
<tr><td rowspan="2">Version information</td><td rowspan="2">2</td><td>-</td><td>Major version
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x01</td><td>WDT-6M/5E</td></tr>
<tr><td>0x02</td><td>WDT-5E/6M-Z2</td></tr>
<tr><td>0x03</td><td>WDT-4LR/5LR/6LR-Z2</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO*</td></tr>
</table>
*Version information is static (0xFFFF)
For information, refer to ☞ "WDT Information".</td></tr>
<tr><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter mode</td></tr>
<tr><td>0x04</td><td>Check Radio Waves mode</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit Information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
</table>

Item	Number of bytes	Set value (Hexadecimal)	Description
Counter value	4	-	Counter value information 0x00000000 to 0xFFFFFFFF

5.3.3. Notification of Change in Signal Tower Display

Notifies when the WDT Display Control status is released.

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00 0x2F	
Command type	1	0x10	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x20 0x08	Static value
Dummy data	5	0x00 0x00 0x00 0x00 0x00	Static value
Time	8	-	Time when change occurred *The format is UNIX time (UTC)
Version information	2	-	Major version Value / Description 0x01 / WDT-6M/5E 0x02 / WDT-5E/6M-Z2 0x03 / WDT-4LR/5LR/6LR-Z2 0xFF / WDT-6LR-Z2-PRO* *Version information is static (0xFFFF) For information, refer to ☞ "WDT Information".
		-	Minor version (0x00 to 0xFF)
Operation Mode	1	-	Transmitter Operation Mode information Value / Description 0x00 / Normal operation 0x02 / Counter mode 0x04 / Check Radio Waves mode 0xFF / WDT-6LR-Z2-PRO static value* *Regardless of the operation mode, 0xFF static value.
WDT Information	4	-	WDT-PRO version information *For information, refer to ☞ "WDT Information"
Base Unit information	5	-	Version information of WDT-PRO base unit *For information, refer to ☞ "Base Unit Information"

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Red unit</td><td>1</td><td>-</td><td rowspan="6">Unit status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Non-control state</td></tr><tr><td>0x10</td><td>Light off / buzzer off</td></tr><tr><td>0x11</td><td>Light on / buzzer on</td></tr><tr><td>0x12</td><td>Flashing / continuous buzzer</td></tr><tr><td>0x13</td><td>Triple flash</td></tr></table></td></tr>
<tr><td>Yellow unit</td><td>1</td><td>-</td></tr>
<tr><td>Green unit</td><td>1</td><td>-</td></tr>
<tr><td>Blue unit</td><td>1</td><td>-</td></tr>
<tr><td>White unit</td><td>1</td><td>-</td></tr>
<tr><td>Buzzer Unit</td><td>1</td><td>-</td></tr>
</table>

5.3.4. Request/Response to Get Transmitter Status

Gets the WDT status information (information about changes).

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Specifies the WDT IEEE address for the get operation
Command mode	2	0x20	Static value
		0x02	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x6F	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x20	Static value
		0x02	
Response status	1	-	Status information Value: 0x00 – Normal response 0x86 – Get data error 0xFF – Exception error
Dummy data	4	0x00	Static value
		0x00	
		0x00	
		0x00	
Time	8		Time when change occurred *The format is UNIX time (UTC)

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Version information</td><td rowspan="2">2</td><td>-</td><td>Major version
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x01</td><td>WDT-6M/5E</td></tr><tr><td>0x02</td><td>WDT-5E/6M-Z2</td></tr><tr><td>0x03</td><td>WDT-4LR/5LR/6LR-Z2</td></tr><tr><td>0xFF</td><td>WDT-6LR-Z2-PRO*</td></tr></table>*Version information is static (0xFFFF)
For information, refer to ☞ "WDT Information".</td></tr>
<tr><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Normal operation</td></tr><tr><td>0x02</td><td>Counter mode</td></tr><tr><td>0x04</td><td>Check Radio Waves mode</td></tr><tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr></table>*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Signal Tower Information (red)</td><td>1</td><td rowspan="5">-</td><td rowspan="5">Signal Tower status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Not registered, unused</td></tr><tr><td>0x01</td><td>Light off</td></tr><tr><td>0x02</td><td>Light on</td></tr><tr><td>0x04</td><td>Flashing</td></tr></table></td></tr>
<tr><td>Signal Tower Information (amber)</td><td>1</td></tr>
<tr><td>Signal Tower Information (green)</td><td>1</td></tr>
<tr><td>Signal Tower Information (blue)</td><td>1</td></tr>
<tr><td>Signal Tower Information (white)</td><td>1</td></tr>
<tr><td>Buzzer information</td><td>1</td><td>-</td><td>Buzzer status information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Buzzer off</td></tr><tr><td>0x01</td><td>Buzzer on</td></tr></table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>WDT monitoring information</td><td>1</td><td>-</td><td>WDT monitoring information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>WDT disconnected</td></tr>
<tr><td>0x09</td><td>WDT connected</td></tr>
</table></td></tr>
<tr><td>External Input information</td><td>1</td><td>-</td><td>External input status information
<table>
<tr><th>Item</th><th>bit</th><th>Description</th></tr>
<tr><td>External Input 8</td><td>7</td><td rowspan="8"><table><tr><th>Value</th><th>Description</th></tr><tr><td>0b0</td><td>OFF</td></tr><tr><td>0b1</td><td>ON</td></tr></table></td></tr>
<tr><td>External Input 7</td><td>6</td></tr>
<tr><td>External Input 6</td><td>5</td></tr>
<tr><td>External Input 5</td><td>4</td></tr>
<tr><td>External Input 4</td><td>3</td></tr>
<tr><td>External Input 3</td><td>2</td></tr>
<tr><td>External Input 2</td><td>1</td></tr>
<tr><td>External Input 1</td><td>0</td></tr>
</table></td></tr>
<tr><td>RS232C Data</td><td>62</td><td>-</td><td>RS232C data information
*For information, refer to ☞ "RS232C data information details"</td></tr>
</table>

5.3.5. Request/Response to Get Transmitter List

Gets the WDT list managed by the WD PRO receiver.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	0x00	Static value
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
Command mode	2	0x20	Static value
		0x03	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	-	0x000D to 0x02C9
Command type	1	0x30	Static value
IEEE Address	8	0x00	Static value
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
Command mode	2	0x20	Static value
		0x03	
Response status	1	-	Status information

Value	Description
0x00	Normal response
0xFF	Exception error

<table>
<tr><th>Item</th><th colspan="2">Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Number to get</td><td colspan="2">1</td><td>-</td><td>Number of WDT managed by the WD PRO receiver
0x00 to 0x46 (0 to 70)</td></tr>
<tr><td rowspan="3">WDT Status Information 1</td><td rowspan="4">Variable
0 to 700</td><td>8</td><td>-</td><td>WDT IEEE address</td></tr>
<tr><td>1</td><td>0x01</td><td>WDT Registration Status
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Not registered</td></tr><tr><td>0x01</td><td>Registered</td></tr></table></td></tr>
<tr><td>1</td><td>0x01</td><td>WDT connection status
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Disconnected</td></tr><tr><td>0x01</td><td>Connect</td></tr></table></td></tr>
<tr><td>WDT Status Information 2</td><td rowspan="3"></td><td rowspan="3">*WDT status information (0 to 70 units) is added to the number of units to get part.</td></tr>
<tr><td>.
.
.</td></tr>
<tr><td>WDT Status Information 70</td></tr>
</table>

5.3.6. Request/Response to Get Transmitter Information

Gets transmitter information of the specified WDT.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00 0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Specifies the WDT IEEE address for the get operation
Command mode	2	0x20 0x04	Static value

(2) Response

■ For WDT-6M/5E-Z2 and WDT-6LR/5LR/4LR-Z2

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00 0xA7	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x20 0x04	Static value
Response status	1	-	Status information Value: 0x00 – Normal response; 0xFF – Exception error
User Name	121	-	WDT user name *If nothing is registered, NULL
Version information	2	-	Major version Value: 0x01 – WDT-6M/5E; 0x02 – WDT-5E/6M-Z2; 0x03 – WDT-4LR/5LR/6LR-Z2; 0xFF – WDT-6LR-Z2-PRO* *Version information is static (0xFFFF) For information, refer to ☞ "WDT Information".
		-	Minor version (0x00 to 0xFF)

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter mode</td></tr>
<tr><td>0x04</td><td>Check Radio Waves mode</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td>Dummy data</td><td>5</td><td>0x00
0x00
0x00
0x00
0x00</td><td>Static value</td></tr>
<tr><td>ExtendedPanID</td><td>8</td><td>-</td><td>ExtendedPanID information
0x0000000000000000
to 0xFFFFFFFFFFFFFFFE</td></tr>
<tr><td>Frequency Channel</td><td>4</td><td>-</td><td>Frequency Channel Information
*For information, refer to ☞ "Frequency Channel Information details"</td></tr>
<tr><td>Determine Signal Tower Input</td><td>1</td><td>-</td><td>Determine Signal Tower Input information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal</td></tr>
<tr><td>0x05</td><td>Flashing (Short)</td></tr>
<tr><td>0x10</td><td>Flashing (medium)</td></tr>
<tr><td>0x20</td><td>Flashing (Long)</td></tr>
</table></td></tr>
<tr><td>Power Supply Settings</td><td>1</td><td>-</td><td>Power Supply Settings information
<table>
<tr><th>Value</th><th>Description</th><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Power Supply Wire</td><td>0x03</td><td>Green</td></tr>
<tr><td>0x01</td><td>Red</td><td>0x04</td><td>Blue</td></tr>
<tr><td>0x02</td><td>Yellow</td><td>0x05</td><td>White</td></tr>
</table></td></tr>
<tr><td>Counter Settings</td><td>1</td><td>-</td><td>Counter Settings information
<table>
<tr><th>Value</th><th>Description</th><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Do not use</td><td>0x04</td><td>Blue</td></tr>
<tr><td>0x01</td><td>Red</td><td>0x05</td><td>White</td></tr>
<tr><td>0x02</td><td>Yellow</td><td>0x06</td><td>Buzzer</td></tr>
<tr><td>0x03</td><td>Green</td><td></td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Transmission Mode</td><td>2</td><td>-</td><td>Transmission Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x0000</td><td>Immediate transmission mode</td></tr>
<tr><td>0x0001</td><td>Request transmission mode</td></tr>
</table></td></tr>
</table>

■ For WDT-6LR-Z2-PRO

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0xB0</td></tr>
<tr><td>Command type</td><td>1</td><td>0x30</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0x20</td><td rowspan="2">Static value</td></tr>
<tr><td>0x04</td></tr>
<tr><td>Response status</td><td>1</td><td>-</td><td>Status information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal response</td></tr>
<tr><td>0xFF</td><td>Exception error</td></tr>
</table></td></tr>
<tr><td>User Name</td><td>121</td><td>-</td><td>WDT user name
*If nothing is registered, NULL</td></tr>
<tr><td rowspan="2">Version information</td><td rowspan="2">2</td><td>-</td><td>Major version
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x01</td><td>WDT-6M/5E</td></tr>
<tr><td>0x02</td><td>WDT-5E/6M-Z2</td></tr>
<tr><td>0x03</td><td>WDT-4LR/5LR/6LR-Z2</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO*</td></tr>
</table>
*Version information is static (0xFFFF)
For information, refer to ☞ "WDT Information".</td></tr>
<tr><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter mode</td></tr>
<tr><td>0x04</td><td>Check Radio Waves mode</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>ExtendedPanID</td><td>8</td><td>-</td><td>ExtendedPanID information
0x0000000000000000
to 0xFFFFFFFFFFFFFFFE</td></tr>
<tr><td>Frequency Channel</td><td>4</td><td>-</td><td>Frequency Channel Information
*For information, refer to ☞ "Frequency Channel Information details"</td></tr>
<tr><td>Determine Signal Tower Input</td><td>1</td><td>-</td><td>Determine Signal Tower Input information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal</td></tr>
<tr><td>0x05</td><td>Flashing (Short)</td></tr>
<tr><td>0x10</td><td>Flashing (medium)</td></tr>
<tr><td>0x20</td><td>Flashing (Long)</td></tr>
</table></td></tr>
<tr><td>Power Supply Settings</td><td>1</td><td>-</td><td>Power Supply Settings information
<table>
<tr><th>Value</th><th>Description</th><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Power Supply Wire</td><td>0x03</td><td>Green</td></tr>
<tr><td>0x01</td><td>Red</td><td>0x04</td><td>Blue</td></tr>
<tr><td>0x02</td><td>Yellow</td><td>0x05</td><td>White</td></tr>
</table></td></tr>
<tr><td>Counter Settings</td><td>1</td><td>-</td><td>Counter Settings information
<table>
<tr><th>Value</th><th>Description</th><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Do not use</td><td>0x04</td><td>Blue</td></tr>
<tr><td>0x01</td><td>Red</td><td>0x05</td><td>White</td></tr>
<tr><td>0x02</td><td>Yellow</td><td>0x06</td><td>Buzzer</td></tr>
<tr><td>0x03</td><td>Green</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Transmission Mode</td><td>2</td><td>-</td><td>Transmission Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x0000</td><td>Immediate transmission mode</td></tr>
<tr><td>0x0001</td><td>Request transmission mode</td></tr>
</table></td></tr>
<tr><td>Input Information Transmission Method</td><td>1</td><td>-</td><td>Input Information Transmission Method information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>WDT-PRO Format</td></tr>
<tr><td>0x01</td><td>WDT-LR Format</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Signal Tower Format</td><td>1</td><td>-</td><td>Signal Tower Format information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Standard Format</td></tr>
<tr><td>0x01</td><td>Extended Format</td></tr>
</table></td></tr>
<tr><td>Periodic Transmission</td><td>1</td><td>-</td><td>Periodic Transmission information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>None</td></tr>
<tr><td>0x01</td><td>Unit Information</td></tr>
<tr><td>0x02</td><td>Input Information/Signal Tower Information</td></tr>
</table></td></tr>
<tr><td>Determine Simultaneous Input Sensitivity Setting</td><td>1</td><td>-</td><td>Determine Simultaneous Input Sensitivity Setting information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>High sensitivity</td></tr>
<tr><td>0x01</td><td>Medium sensitivity</td></tr>
<tr><td>0x02</td><td>Low sensitivity</td></tr>
</table></td></tr>
<tr><td>File Format for Received Data</td><td>1</td><td>-</td><td>File Format for Received Data information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Direct Communication Format</td></tr>
<tr><td>0x01</td><td>Bar Code Reader (Denso Wave) Communication Format</td></tr>
<tr><td>0x02</td><td>Barcode Reader (Generic) Communication</td></tr>
<tr><td>0xFF</td><td>Other Communication Method</td></tr>
</table></td></tr>
<tr><td>Communication Settings
Baud rate</td><td>1</td><td>-</td><td>Baud rate information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>4800bps</td></tr>
<tr><td>0x01</td><td>9600bps</td></tr>
<tr><td>0x02</td><td>19200bps</td></tr>
<tr><td>0x03</td><td>38400bps</td></tr>
<tr><td>0x04</td><td>57600bps</td></tr>
<tr><td>0x05</td><td>115200bps</td></tr>
</table></td></tr>
<tr><td>Communication Settings
Data Length</td><td>1</td><td>-</td><td>Data Length information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>7</td></tr>
<tr><td>0x01</td><td>8</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Communication Settings
Parity</td><td>1</td><td></td><td>Parity information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>None</td></tr><tr><td>0x01</td><td>Even</td></tr><tr><td>0x02</td><td>Odd</td></tr></table></td></tr>
<tr><td>Communication Settings
Stop Bit</td><td>1</td><td></td><td>Stop Bit information
<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>1</td></tr><tr><td>0x01</td><td>2</td></tr></table></td></tr>
</table>

(3) Frequency Channel Information details

Frequency Channel	byte	bit	Description
-	4	31 to 27	
Channel 26		26	
Channel 25		25	
Channel 24		24	
Channel 23	3	23	
Channel 22		22	
Channel 21		21	
Channel 20		20	
Channel 19		19	
Channel 18		18	
Channel 17		17	
Channel 16		16	
Channel 15	2	15	
Channel 14		14	
Channel 13		13	
Channel 12		12	
Channel 11		11	
-		10	
		9	
		8	
-	1	7 to 0	

Value	Description
0b0	OFF
0b1	ON

5.3.7. Request/Response to Display Calling Transmitter Status

Display on the specified WDT to indicate calling a transmitter.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00 0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0x40 0x10	Static value

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00 0x0C	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x40 0x10	Static value
Response status	1	-	Status information Value: 0x01 — Description: Successful

5.3.8. Request/Response to Output Serial Data

Output serial data from the specified WDT-PRO RS232C interface.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	-	0x000F to 0x0036
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0x90 0x11	Static value
Dummy data	2	0x00 0x00	Static value
Serial number	1	-	Number to indicate retransmission 0x00 to 0xFF *When you receive data with the same number, design so it is determined a retransmission.
Output information	1 to 40	-	RS-232C output data 0x00 to 0xFF *Maximum 40 bytes of data can be stored as variable length.

(2) Response

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x0C</td></tr>
<tr><td>Command type</td><td>1</td><td>0x30</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0x90</td><td rowspan="2">Static value</td></tr>
<tr><td>0x11</td></tr>
<tr><td>Response status</td><td>1</td><td>-</td><td>Status information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x01</td><td>Normal response</td></tr>
<tr><td>0x81</td><td>Mode error</td></tr>
<tr><td>0x83</td><td>Connection unit error</td></tr>
<tr><td>0xFF</td><td>Exception error</td></tr>
</table></td></tr>
</table>

5.3.9. Request/Response to Control Signal Tower Display

Controls the specified WDT-PRO Signal Tower display.

(1) Request

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x12</td></tr>
<tr><td>Command type</td><td>1</td><td>0x20</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Sets the defined WDT IEEE address</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0xE0</td><td rowspan="2">Static value</td></tr>
<tr><td>0x01</td></tr>
<tr><td>Control time</td><td>1</td><td>-</td><td>Specifies the amount of the control time (seconds).
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>No time is specified</td></tr>
<tr><td>0x01 to 0xFF</td><td>Control time is specified</td></tr>
</table></td></tr>
<tr><td>Red unit</td><td>1</td><td>-</td><td rowspan="5">Specifies the light pattern of each unit.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Control by control wiring</td></tr>
<tr><td>0x10</td><td>Light off</td></tr>
<tr><td>0x11</td><td>Light on</td></tr>
<tr><td>0x12</td><td>Flashing</td></tr>
<tr><td>0x13</td><td>Triple flash</td></tr>
</table></td></tr>
<tr><td>Yellow unit</td><td>1</td><td>-</td></tr>
<tr><td>Green unit</td><td>1</td><td>-</td></tr>
<tr><td>Blue unit</td><td>1</td><td>-</td></tr>
<tr><td>White unit</td><td>1</td><td>-</td></tr>
<tr><td>Buzzer Unit</td><td>1</td><td>-</td><td>Specifies the buzzer pattern.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Control by control wiring</td></tr>
<tr><td>0x10</td><td>Buzzer off</td></tr>
<tr><td>0x11</td><td>Buzzer on</td></tr>
<tr><td>0x12</td><td>Intermittent buzzer</td></tr>
</table></td></tr>
</table>

(2) Response

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x13</td></tr>
<tr><td>Command type</td><td>1</td><td>0x30</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td rowspan="2">Command mode</td><td rowspan="2">2</td><td>0xE0</td><td rowspan="2">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Response status</td><td>1</td><td>-</td><td>Status information<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Successful</td></tr></table></td></tr>
<tr><td>Control state</td><td>1</td><td>-</td><td>Control Status Information<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Non-control state</td></tr><tr><td>0x01</td><td>Control state</td></tr></table></td></tr>
<tr><td>Red unit</td><td>1</td><td>-</td><td rowspan="7">Unit status information<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Light off / buzzer off (control line)</td></tr><tr><td>0x01</td><td>Light on / buzzer on (control line)</td></tr><tr><td>0x10</td><td>Light off / buzzer off</td></tr><tr><td>0x11</td><td>Light on / buzzer on</td></tr><tr><td>0x12</td><td>Flashing / continuous buzzer</td></tr><tr><td>0x13</td><td>Triple flash</td></tr></table></td></tr>
<tr><td>Yellow unit</td><td>1</td><td>-</td></tr>
<tr><td>Green unit</td><td>1</td><td>-</td></tr>
<tr><td>Blue unit</td><td>1</td><td>-</td></tr>
<tr><td>White unit</td><td>1</td><td>-</td></tr>
<tr><td>Buzzer Unit</td><td>1</td><td>-</td></tr>
</table>

5.3.10. Request/Response to Release Signal Tower Display

Releases control of the specified WDT-PRO Signal Tower display.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0xE0	Static value
		0xFF	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x13	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0xE0	Static value
		0x00	
Response status	1	-	Status information Value: 0x00 — Description: Successful
Control state	1	-	Control Status Information Value: 0x00 — Description: Non-control state
Red unit	1	-	Unit status information Value: 0x00 — Description: Light off / buzzer off (control line) Value: 0x01 — Description: Light on / buzzer on (control line)
Yellow unit	1	-	
Green unit	1	-	
Blue unit	1	-	
White unit	1	-	
Buzzer Unit	1	-	

5.3.11. Request/Response to Register Counter Value

Registers the value as the specified WDT counter value.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0F	
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0x60	Static value
		0x01	
Count Registration value	4	-	Registered count value 0x00000000 to 0xFFFFFFFF
		-	
		-	
		-	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0C	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x60	Static value
		0x01	
Response status	1	-	Status information Value: 0x01 — Description: Successful

5.3.12. Request/Response to Get Receiver Information

Gets the WD PRO receiver information.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	0x00	Static value
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
Command mode	2	0x20	Static value
		0x05	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x25	
Command type	1	0x30	Static value
IEEE Address	8	-	WD PRO Receiver IEEE address
Command mode	2	0x20	Static value
		0x05	
Response status	1	-	Status information Value: 0x00 – Normal response Value: 0xFF – Exception error
ExtendedPanID	8	-	ExtendedPanID information 0x0000000000000000 to 0xFFFFFFFFFFFFFFFE
Frequency Channel	4	-	Frequency Channel Information *For information, refer to ☞ "Frequency Channel Information details"
Firmware Version	2	-	Major version 0x00 to FF
		-	Minor version 0x00 to 0xFF

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td>Network status</td><td>1</td><td>-</td><td>Network Status information<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Network not started</td></tr><tr><td>0x01</td><td>Network starting up</td></tr><tr><td>0x02</td><td>Waiting for network to start</td></tr><tr><td>0x03</td><td>Network operating</td></tr></table></td></tr>
<tr><td>Network startup method</td><td>1</td><td>-</td><td>Network Startup Method information<table><tr><th>Value</th><th>Description</th></tr><tr><td>0x00</td><td>Automatic Start</td></tr><tr><td>0x01</td><td>Manual Start</td></tr></table></td></tr>
<tr><td>In operation ExtendedPanID</td><td>8</td><td>-</td><td>ExtendedPanID information during network operation</td></tr>
<tr><td>In operation Frequency Channel</td><td>1</td><td>-</td><td>Frequency channel during network operation
Channel 11 to 26 (0x0B to 0x1A)</td></tr>
</table>

5.3.13. Request/Response to Reset Receiver

Resets the WD PRO receiver.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	0x00	Static value
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
Command mode	2	0x20	Static value
		0x06	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0C	
Command type	1	0x30	Static value
IEEE Address	8	0x00	Static value
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
		0x00	
Command mode	2	0x20	Static value
		0x06	
Response status	1	-	Status information Value: 0x00 — Description: Normal response

5.3.14. Request/Response to Get Counter Value

Gets the specified WDT counter value.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0x20	Static value
		0x09	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x2D	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x20	Static value
		0x09	
Response status	1	-	Status information Value: 0x00 – Normal response; 0x86 – Get data error; 0xFF – Exception error
Dummy data	4	0x00	Static value
		0x00	
		0x00	
		0x00	
Time	8	-	Time when change occurred *The format is UNIX time (UTC)
Version information	2	-	Major version Value: 0x01 – WDT-6M/5E; 0x02 – WDT-5E/6M-Z2; 0x03 – WDT-4LR/5LR/6LR-Z2; 0xFF – WDT-6LR-Z2-PRO* *Version information is static (0xFFFF) For information, refer to ☞ "WDT Information".

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td></td><td></td><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter operation</td></tr>
<tr><td>0x04</td><td>Check Radio Waves operation</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit Information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Counter value</td><td>4</td><td>-</td><td>Counter value information
0x00000000 to 0xFFFFFFFF</td></tr>
</table>

5.3.15. Request/Response to Get Signal Tower Display

Gets the specified WDT Signal Tower display status.

(1) Request

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x0B	
Command type	1	0x20	Static value
IEEE Address	8	-	Sets the defined WDT IEEE address
Command mode	2	0x20	Static value
		0x0A	

(2) Response

Item	Number of bytes	Set value (Hexadecimal)	Description
Size	2	0x00	
		0x2F	
Command type	1	0x30	Static value
IEEE Address	8	-	Set IEEE address of responding WDT
Command mode	2	0x20	Static value
		0x0A	
Response status	1	-	Status information Value: 0x00 Normal response; 0x86 Get data error; 0xFF Exception error
Dummy data	4	0x00	Static value
		0x00	
		0x00	
		0x00	
Time	8	-	Time when change occurred *The format is UNIX time (UTC)
Version information	2	-	Major version Value: 0x01 WDT-6M/5E; 0x02 WDT-5E/6M-Z2; 0x03 WDT-4LR/5LR/6LR-Z2; 0xFF WDT-6LR-Z2-PRO* *Version information is static (0xFFFF) For information, refer to ☞ "WDT Information".

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td></td><td></td><td>-</td><td>Minor version (0x00 to 0xFF)</td></tr>
<tr><td>Operation Mode</td><td>1</td><td>-</td><td>Transmitter Operation Mode information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Normal operation</td></tr>
<tr><td>0x02</td><td>Counter operation</td></tr>
<tr><td>0x04</td><td>Check Radio Waves operation</td></tr>
<tr><td>0xFF</td><td>WDT-6LR-Z2-PRO static value*</td></tr>
</table>
*Regardless of the operation mode, 0xFF static value.</td></tr>
<tr><td>WDT Information</td><td>4</td><td>-</td><td>WDT-PRO version information
*For information, refer to ☞ "WDT Information"</td></tr>
<tr><td>Base Unit information</td><td>5</td><td>-</td><td>Version information of WDT-PRO base unit
*For information, refer to ☞ "Base Unit Information"</td></tr>
<tr><td rowspan="5">Dummy data</td><td rowspan="5">5</td><td>0x00</td><td rowspan="5">Static value</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>0x00</td></tr>
<tr><td>Red unit</td><td>1</td><td>-</td><td rowspan="6">Unit status information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x00</td><td>Non-control state</td></tr>
<tr><td>0x10</td><td>Light off / buzzer off</td></tr>
<tr><td>0x11</td><td>Light on / buzzer on</td></tr>
<tr><td>0x12</td><td>Flashing / continuous buzzer</td></tr>
<tr><td>0x13</td><td>Triple flash</td></tr>
</table></td></tr>
<tr><td>Yellow unit</td><td>1</td><td>-</td></tr>
<tr><td>Green unit</td><td>1</td><td>-</td></tr>
<tr><td>Blue unit</td><td>1</td><td>-</td></tr>
<tr><td>White unit</td><td>1</td><td>-</td></tr>
<tr><td>Buzzer Unit</td><td>1</td><td>-</td></tr>
</table>

5.3.16. Command Error response

Returned by the WDR when there is an issue with the request command's command mode.

<table>
<tr><th>Item</th><th>Number of bytes</th><th>Set value (Hexadecimal)</th><th>Description</th></tr>
<tr><td rowspan="2">Size</td><td rowspan="2">2</td><td>0x00</td><td rowspan="2"></td></tr>
<tr><td>0x0C</td></tr>
<tr><td>Command type</td><td>1</td><td>0x30</td><td>Static value</td></tr>
<tr><td>IEEE Address</td><td>8</td><td>-</td><td>Set IEEE address of responding WDT</td></tr>
<tr><td>Command mode</td><td>2</td><td>-</td><td>Sets the requested command mode</td></tr>
<tr><td>Response status</td><td>1</td><td>-</td><td>Error Status information
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0x80</td><td>Command Error</td></tr>
<tr><td>0x81</td><td>Mode error</td></tr>
<tr><td>0x82</td><td>Data error</td></tr>
<tr><td>0x83</td><td>Connection unit error</td></tr>
<tr><td>0x84</td><td>Error Response from Wireless Module</td></tr>
<tr><td>0x86</td><td>Get data error</td></tr>
<tr><td>0xC0</td><td>Initialization error</td></tr>
<tr><td>0xFF</td><td>Exception error</td></tr>
</table></td></tr>
</table>

5.4. **Design Considerations**

- UDP socket communication is not run.
- WDR and WDT setting changes not run. Run in WDS-WIN01.
- WDR-PRO port cannot be used with the WDR protocol.

6. Using Cloud Communication (MindSphere)

Information for MindSphere communication in WD PRO Reciever.

6.1. **Use APIs & Services**

Service	Description
Iot Time Series Service	This service is used to obtain or control information on the WDT.

API	Description
GET	Used to get information on the WDT. *The "_time" indicates the time and date when the receiver detects a change in the transmitter information (time zone: UTC).
PUT	Used to control the WDT. *"_time" sets a fixed value of "2018-01-1T00:00:00Z

Please contact Siemens for more information on APIs and services.

6.2. **Asset**

6.2.1. Asset name

Wdt + IEEE Address of WDT

例）Wdt0011223344556677 * IEEE Address :0011223344556677

6.2.2. Asset type name

PatWdt01

6.2.3. Asset type Configurations

Aspect name	Description
WdtSignal	Signal Tower Information
WdtExtInput	External Input Information
WdtSerialData	Serial Information
WdtCount	Count Information
WdtConfigInfo	Control Information
WdtControlRequest	Control Request
WdtCountControl	Control Result（Count Clear）
WdtControlResult	Control Result（Signal Tower Control）

6.2.4. Aspects Detail

(1) WdtSignal

Variables	type	value	Description
Red	Int	Value: 0 = Light off; 1 = Light on; 2 = Flashing	Signal Tower Information (red)
Yellow	Int		Signal Tower Information (amber)
Green	Int		Signal Tower Information (green)
Blue	Int		Signal Tower Information (blue)
White	Int		Signal Tower Information (white)
Buzzer	Int	Value: 0 = Buzzer off; 1 = Buzzer on	Buzzer information
WdtState	Int	Value: 0 = WDT disconnected; 9 = WDT connected	WDT monitoring information
TimeCounter	Int	status change to a Signal Tower information transmission. (seconds)	Time counter

(2) WdtExtInput

Variables	type	value	Description
Input1	Int	Value: 0 = OFF; 1 = ON	External Input 1
Input2	Int		External Input 2
Input3	Int		External Input 3
Input4	Int		External Input 4
Input5	Int		External Input 5
Input6	Int		External Input 6
Input7	Int		External Input 7
Input8	Int		External Input 8
TimeCounter	Int	status change to a External Input information transmission. (seconds)	Time counter

(3) WdtSerialData

Variables	type	value	Description
SerialData	string	String of Max 60 bytes.	Serial Data
TimeCounter	Int	status change to Serial data transmission. (seconds)	Time counter

(4) WdtCount

Variables	type	value	Description
Count	long	0 to 4294967295	Count Information

(5) WdtConfigInfo

Variables	type	value	Description
Control	Int	Value: 0 = Disabled; 1 = Enabled	Signal Tower Display Control state
CounterState	Int	Value: 0 = Disabled; 1 = Enabled	Simple Counter state

(6) WdtControlRequest

<table>
<tr><th>Variables</th><th>type</th><th>value</th><th>Description</th></tr>
<tr><td>Trigger</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>ON</td></tr></table></td><td>Control request for Signal Tower Display.
* Set to "OFF" after the request has been executed.</td></tr>
<tr><td>ControlTime</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>No time is specified</td></tr><tr><td>1 to 255</td><td>Control time is specified</td></tr></table></td><td>Specifies the amount of the control time (seconds).</td></tr>
<tr><td>Red</td><td>Int</td><td rowspan="5"><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Control by control wiring</td></tr><tr><td>16</td><td>Light off</td></tr><tr><td>17</td><td>Light on</td></tr><tr><td>18</td><td>Flashing</td></tr><tr><td>19</td><td>Triple flash</td></tr></table></td><td>Red unit</td></tr>
<tr><td>Yellow</td><td>Int</td><td>Yellow unit</td></tr>
<tr><td>Green</td><td>Int</td><td>Green unit</td></tr>
<tr><td>Blue</td><td>Int</td><td>Blue unit</td></tr>
<tr><td>White</td><td>Int</td><td>White unit</td></tr>
<tr><td>Buzzer</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Control by control wiring</td></tr><tr><td>16</td><td>Buzzer off</td></tr><tr><td>17</td><td>Buzzer on</td></tr><tr><td>18</td><td>Intermittent buzzer</td></tr></table></td><td>Buzzer Unit</td></tr>
<tr><td>CounterClear</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>ON</td></tr></table></td><td>Control request for Count Clear.
Set to "OFF" after the request has been executed.</td></tr>
</table>

(7) WdtCountControl

<table>
<tr><th>Variables</th><th>type</th><th>value</th><th>Description</th></tr>
<tr><td>Result</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>No request</td></tr><tr><td>1</td><td>Running</td></tr><tr><td>2</td><td>Successful</td></tr><tr><td>3</td><td>Failure</td></tr></table></td><td>Request result of Count Clear</td></tr>
</table>

(8) WdtControlResult

<table>
<tr><th>Variables</th><th>type</th><th>value</th><th>Description</th></tr>
<tr><td>Result</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>No request</td></tr><tr><td>1</td><td>Running</td></tr><tr><td>2</td><td>Successful</td></tr><tr><td>3</td><td>Failure</td></tr></table></td><td>Request result of Signal Tower Display control.</td></tr>
<tr><td>State</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Non-control state</td></tr><tr><td>1</td><td>Control state</td></tr></table></td><td>Control Status Information</td></tr>
<tr><td>Red</td><td>Int</td><td rowspan="5"><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Control by control wiring</td></tr><tr><td>16</td><td>Light off</td></tr><tr><td>17</td><td>Light on</td></tr><tr><td>18</td><td>Flashing</td></tr><tr><td>19</td><td>Triple flash</td></tr></table></td><td>Red unit</td></tr>
<tr><td>Yellow</td><td>Int</td><td>Yellow unit</td></tr>
<tr><td>Green</td><td>Int</td><td>Green unit</td></tr>
<tr><td>Blue</td><td>Int</td><td>Blue unit</td></tr>
<tr><td>White</td><td>Int</td><td>White unit</td></tr>
<tr><td>Buzzer</td><td>Int</td><td><table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>Control by control wiring</td></tr><tr><td>16</td><td>Buzzer off</td></tr><tr><td>17</td><td>Buzzer on</td></tr><tr><td>18</td><td>Intermittent buzzer</td></tr></table></td><td>Buzzer Unit</td></tr>
</table>

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