

Contents

| | |
|--|-----------|
| Introduction | 2 |
| 1. Overview..... | 3 |
| 2. Preparation..... | 5 |
| 2.1 Planning Configuration Items..... | 5 |
| 2.1.1 Planning Device Provisioning and Access Point Initial Configuration Parameters..... | 5 |
| 2.1.2 Planning Network Information..... | 6 |
| 2.1.3 Planning Field Wireless Device Parameters..... | 7 |
| 2.1.4 Planning Modbus Register Mapping..... | 8 |
| 2.2 Installing Software and CF/DD File..... | 9 |
| 2.3 Connecting Cable..... | 11 |
| 2.3.1 Connecting Field Wireless Management Station Cable | 11 |
| 2.3.2 Connecting Field Wireless Access Point Cable | 12 |
| 2.3.3 Connecting Grounding Wire..... | 13 |
| 2.4 Mounting Antenna..... | 15 |
| 3. Configuration..... | 16 |
| 3.1 PC Network Configuration | 16 |
| 3.2 Wireless System Configuration..... | 16 |
| 3.2.1 Field Network Registration | 17 |
| 3.2.2 Network ID Registration | 17 |
| 3.2.3 Backbone Router Registration | 18 |
| 3.2.4 Hopping Pattern Registration..... | 19 |
| 3.2.5 Field Device Registration | 20 |
| 3.2.6 Modbus Mapping..... | 22 |
| 3.3 Device Provisioning..... | 23 |
| 3.4 Access Point Initial Configuration | 25 |
| 3.5 Provisioning File Registration | 27 |
| 3.6 Download New Configuration..... | 28 |
| 4. Confirmation | 29 |
| 4.1 Wireless System Confirmation | 29 |
| 4.1.1 Backbone Device List..... | 30 |
| 4.1.2 Field Device List | 30 |
| 4.1.3 Status Indicator..... | 31 |
| 4.2 Backup Files Confirmation | 31 |
| 5. Monitoring Network Status | 32 |
| Appendix 1 Modbus Protocol | 34 |
| Appendix 2 Configuration Items (Blank Form)..... | 40 |
| Revision Information | 44 |

Introduction

This startup guide provides basic guidelines for the minimum ISA100 wireless system with Management Station. It does not provide maintenance, service, or troubleshooting procedure.

Refer to the Instruction Manual (IM01W02D01) for more information and instructions.

This manual is also available on www.yokogawa.com.

The sample system of this document consists of Management Station YFGW410 (R1.03.01) with Access Point (R1.03.01), Temperature Transmitter YTA510 (R2.01.01) and ISA100 wireless network using Yokogawa configuration tools, Field Wireless Management Console (FWMC:R1.03.01) and FieldMate (R2.05).

■ Notes

- This startup guide may be revised periodically to incorporate updated information.
- Please use a computer's administrator account to install or update the software.
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1. Overview

This document describes one example of Field Wireless System configuration procedure, which consists of Field Wireless Management Station (YFGW410), Field Wireless Access Point (YFGW510) and one Field Wireless Device (Temperature Transmitter YTA510). These are connected via the ISA100.11a Field Wireless Network. The Management Station provides several communication interfaces such as Modbus/TCP for Host System and proprietary interface for system configuration. The process data is acquired by the Host System via Field Network. The system configurations parameters are modified by Field Wireless Management Console (FWMC) which is Web based software without installation and is used on Configuration & Monitoring PC.

■ System Architecture

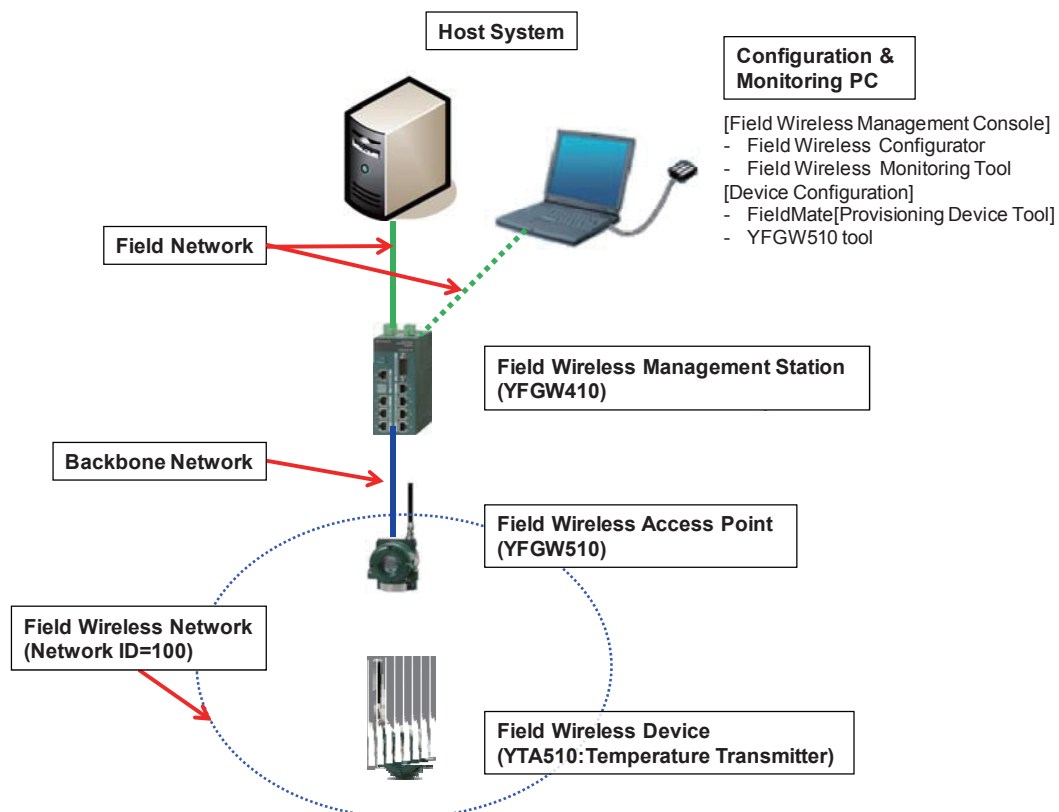


Fig.1 System Architecture

Fig.1 System Architecture

■ Work Flow

[Installation]

Step 1



Step 2



Step 3

Preparation (Chapter 2)

- Configuration Items Planning
- Software and CF/DD Installation
- Cable Connection
- Antenna Mounting

Configuration (Chapter 3)

- PC Network Configuration
- Wireless System Configuration
- Device Provisioning
- YFGW510 Initial Configuration
- Provisioning File Registration
- Download New Configuration

Confirmation (Chapter 4)

- Wireless System Confirmation
- Backup Files Confirmation

[Operation & Maintenance]

Monitoring Network Status (Chapter 5)

2. Preparation

2.1 Planning Configuration Items

2.1.1 Planning Device Provisioning and Access Point Initial Configuration Parameters

Before provisioning a Field Wireless Device, decide the Network ID and the Device Tag.

Table. 1 Device Provisioning and Access Point Initial Configuration setting

| Item | Settings | Chap |
|------------------------------------|-----------------|------|
| Network ID | <i>100</i> | 3.3 |
| Device Tag (Field Wireless Device) | <i>YTA510_1</i> | |
| Device Tag (Access Point) | <i>BBR001</i> | 3.4 |

2.1.2 Planning Network Information

Before configuring the Field Wireless System, determine the settings for Field Network (network between Management Station and Configuration & Monitoring PC) and Network ID (ID number, Hopping Pattern, Backbone router).

This setup example uses the settings shown in Table.2.

(See Appendix.2 “Remark” column for additional information for each items.)

Table.2 Network setting

| Item | | Settings | | Chap | |
|--|--------------------------------|--------------------------------|------------------------------|--------------------------------|-------|
| YFGW410 Settings | | Use default setting | | - | |
| ↪ | Interfaces | Field Wireless Backbone | Use default setting | - | |
| | | Field Network 1 | IP Address | 192.168.0.101 | 3.2.2 |
| | | | Subnet Mask | 255.255.255.0 | |
| | | | Default Gateway | 192.168.0.1 | |
| | Field Network 2 | Not used in this configuration | | - | |
| Field Network 3 | Not used in this configuration | | - | | |
| Access Control Lists | | Not used in this configuration | | - | |
| Time Sorce | | Not used in this configuration | | - | |
| Operation Mode | | Not a configurable parameter | | - | |
| Hopping Pattern | Channels for advertisements | Use default setting | | 3.2.4 | |
| | Pattern | A | | | |
| | Channels | 11~25 | | | |
| Field Wireless Networks | Network ID | 100 | 3.2.3 | | |
| ↪ | NetworkID:100 | Network Information | Hopping Pattern | A | 3.2.4 |
| | | Backbone Routers | Device Tag | BBR001 | 3.2.3 |
| | | | Model | Not a configurable parameter | - |
| | | | Duocast ID | Not used in this configuration | - |
| | | | Use factory default password | Use default setting | - |
| Field Device | See Table.3 | | 3.2.5 | | |
| Graphic Editor | | Not used in this configuration | | - | |
| Alert Setting | | Use default setting | | - | |
| Sampling Data | | See Table.3 | | 3.2.5 | |
| Modbus Settings | | See Table.4 | | 3.2.6 | |
| Resource | | Not a configurable parameter | | - | |
| Field Network (Configure & Monitoring PC) | | IP Address | 192.168.0.110 | 3.1 | |
| | | Subnet Mask | 255.255.255.0 | | |

2.1.3 Planning Field Wireless Device Parameters

Before operating the Field Wireless System, sensor configuration parameters should be defined. This setup example uses the settings shown in Table.3.

(See Appendix.2 “Remark” column for additional information for each items.)

Table. 3 Field Wireless Device setting

| Item | | Settings | Chap |
|--------------------------|--------------------------|--------------------------------|-------|
| General settings | | - | 3.2.5 |
| Properties | Device Tag | YTA510_1 | |
| | Device Role | IO (Auto) | |
| | Primary Router | Not used in this configuration | |
| | Secondary Router | Not used in this configuration | |
| | Not online | Use default setting | |
| | Device Group | Not used in this configuration | |
| Alert | Enable Diagnostic Alert | Use default setting | |
| Device Group | | Not used in this configuration | |
| Sampling Settings | | - | |
| Device Tag | | YTA510_1 | |
| CF /DD | CF File | 00020101.cff | |
| Parameters Parameters | Update Policy | Periodic | |
| | Publication Period (sec) | 10 | |
| | Stale Limit (Times) | 10 | |
| | Retry Mode | Use default setting | |

2.1.4 Planning Modbus Register Mapping

When using Modbus communication between the Management Station and control system in order to communicate process value and diagnostic information, this task needs to be performed. In this setup example, configure the Modbus registers as shown below. (See Appendix1 for additional information)

Table. 4 Modbus setting

| Absolute Address | Input Register Number | Allocation | Data Type (words) |
|------------------|-----------------------|-------------------------|--|
| 30001 | 0 | <i>Status</i> | <i>Unsigned16 (x 1)</i> |
| 30002~30003 | 1~2 | <i>DIAG_STATUS</i> | <i>Unsigned32 (x 2)</i> |
| 30004 | 3 | <i>Data Status</i> | <i>Unsigned16 (x 1)</i> |
| 30005~30006 | 4~5 | <i>PV</i> | <i>Float (x 2)</i> |
| 30007 | 6 | <i>Data Status [*1]</i> | <i>Unsigned16 (x 1)</i> |
| 30008~30015 | 7~14 | <i>GW_STATUS</i> | <i>Unsigned16 (x 8)</i> |
| 30016 | 15 | <i>Data Status [*1]</i> | <i>Unsigned16 (x 1)</i> |
| 30017~30024 | 16~23 | <i>BBR_STATUS</i> | <i>Unsigned16 (x 8)</i> |
| 30025 | 24 | <i>Data Status [*1]</i> | <i>Unsigned16 (x 1)</i> |
| 30026~30033 | 25~32 | <i>DEV_STATUS</i> | <i>Unsigned16 (x 1)</i> <i>Integer16 (x 1)</i> <i>Unsigned16 (x 6)</i> |

2.2 Installing Software and CF/DD File

Table.5 shows the software that is required for each purpose (Installation, Operation and Maintenance).

Install these required software tools, CF/DD File, and the infrared adapter driver on Configuration & Monitoring PC.

For the installation procedure, refer to the instruction manual of the respective software.

Table. 5 PC and Software

| No. | Software | Usage | Required steps | Installation | Operation | Maintenance |
|-----|--|---|---|--------------|-----------|-------------|
| 1 | Field Wireless Management Console | Wireless Network Configuration & Monitoring | Web based software without Installation | ✓ | (✓) | ✓ |
| 2 | FieldMate Basic Advance and Device Files | Device Provisioning Sensor configuration | Install the software from FieldMate DVD (Need to purchase) | ✓ | - | ✓ |
| 3 | Infrared adapter driver: | Device Provisioning | Install the driver from Infrared adapter accessory DVD. (ACTiSYS Infrared Adapter [ACT-IR224UN 9600bps]) | ✓ | - | ✓ |
| 4 | YFGW510tool | Initial setting for Access Point | Copy the software from YFGW510 accessory DVD to the recommended folder below. <C:/Yokogawa/FieldWireless/YFGW510tool> | ✓ | - | - |
| 5 | CF/DD File | Field Wireless Device Registration (CF files contain the vendor names, model names, revisions etc.) | (1) Confirm the appropriate revision on the website. [*1] < http://www.field-wireless.com/en/download/index.html >->"Support for Field Wireless Devices and FieldMate /PRM" (2) Save the CF/DD files to the recommended folder below. <C:/Yokogawa/FieldWireless/CFDD/59543/**** [*2]>. | ✓ | ✓ | ✓ |

[*1] The second bit positioned character on a Main name plate [SUFFIX column] of Field Wireless Device indicates "Amplifier housing basic specification code".

[*2] "0005" for Temperature Transmitter YTA510,
"000c" for Pressure Transmitter E.JX series,
"1802" for Multi-Input Temperature Transmitter YTMX580.

■ Recommended System Requirements

- Field Wireless Management Console (FWMC)

[Supported Operating System]

Windows 7 Professional Service Pack 1 (32bit/64bit)

Windows Vista Business Edition Service Pack 2 (32bit)

Windows Server 2008 Enterprise Service Pack (32bit)

Windows Server 2008 Enterprise R2 (32/64bit)

Language: Japanese or English

[Hardware Requirements]

| Item | Recommended System Requirements |
|-----------------|---|
| Processor | Intel Core 2 Duo 2.66 GHz or equivalent, or better |
| RAM | 2 GB or more |
| Hard Disk Drive | 40 GB or larger (at least 15 GB of free space) |
| Display | Color: True Color (24 bits or more) recommended Resolution: 1280 x 800 recommended |
| Network port | Ethernet-compatible network ports |

- FieldMate Basic/Advance

[Operating System]

Windows 7 Professional, Home Premium 32bit/64bit SP1 or later

Language: Japanese, English, Chinese (simplified), German, French, Russian

Windows Vista Business 32bit SP2 or later

Language: Japanese, English, Chinese (simplified)

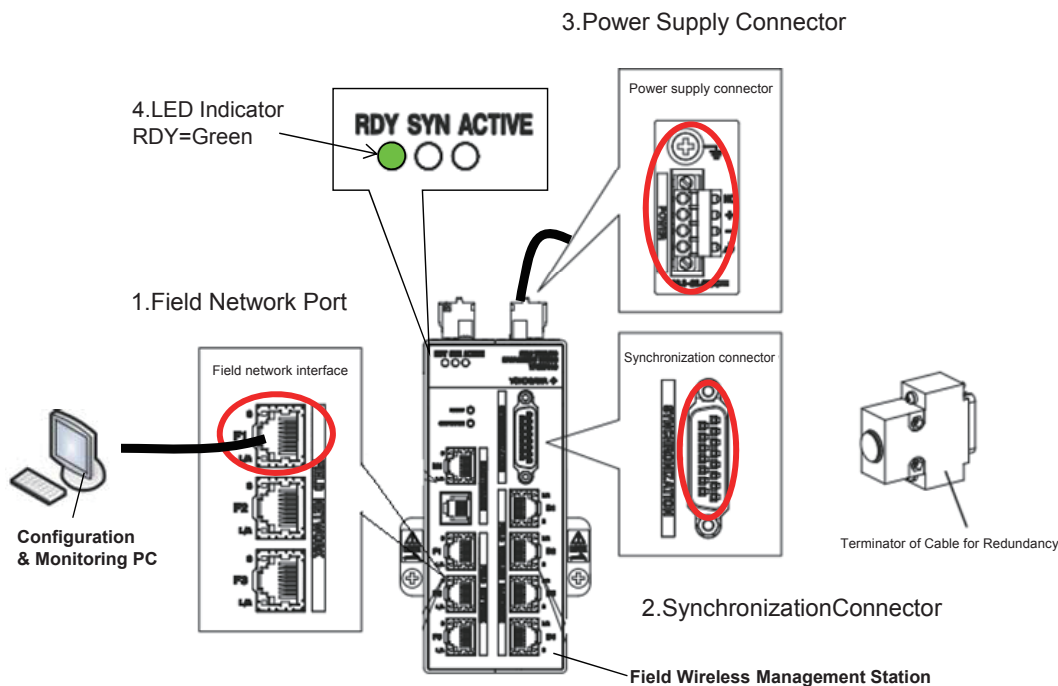
[Hardware Requirements]

| Item | Windows 7 | Windows Vista |
|-----------------|--|--|
| Processor | Intel® Core™2 Duo T7100 or similar specification CPU | |
| Memory | 2GB or more | 1GB or more (2GB or more recommended) |
| Hard Disk Drive | 8GB or more | |
| DVD-ROM Drive | Windows 7 compatible | Windows Vista compatible |
| Display | 1024×768 or better resolution recommended Windows 7 compatible | 1024×768 or better resolution recommended Windows Vista compatible |

2.3 Connecting Cable

2.3.1 Connecting Field Wireless Management Station Cable

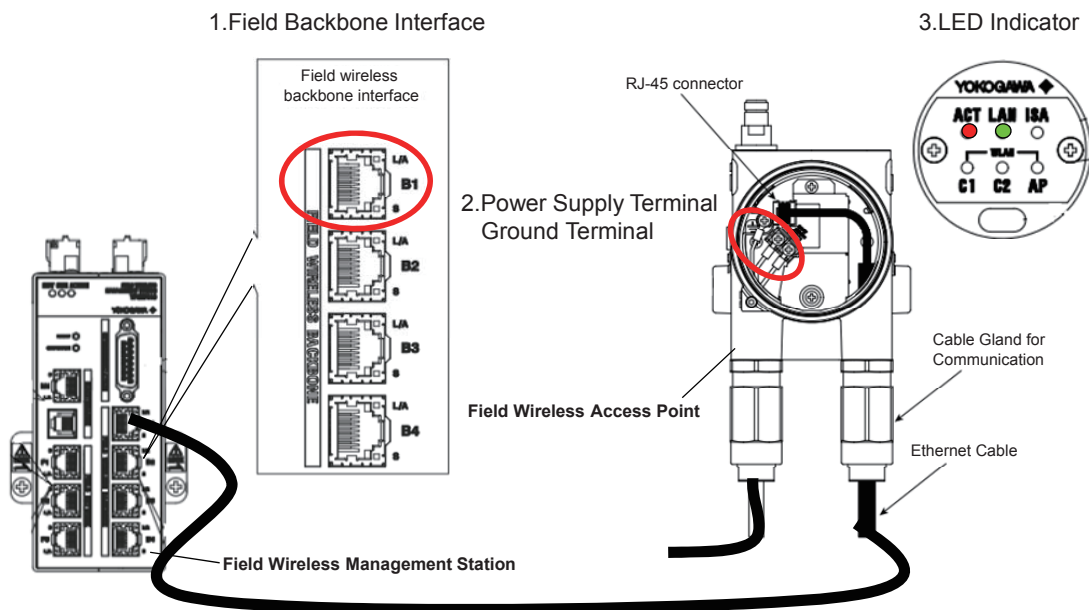
Following connections are required to activate Management Station.



1. Connect Ethernet cable from Field Network Port (F1) to the Configuration & Monitoring PC.
2. Plug the Terminator to the Synchronization connector.
3. Connect the power source to the power supply connector.
4. Confirm that the indicator LED RDY turns green.
 - Management Station (YFGW410) : RDY LED = Green

2.3.2 Connecting Field Wireless Access Point Cable

Connect backbone network and start Access Point.



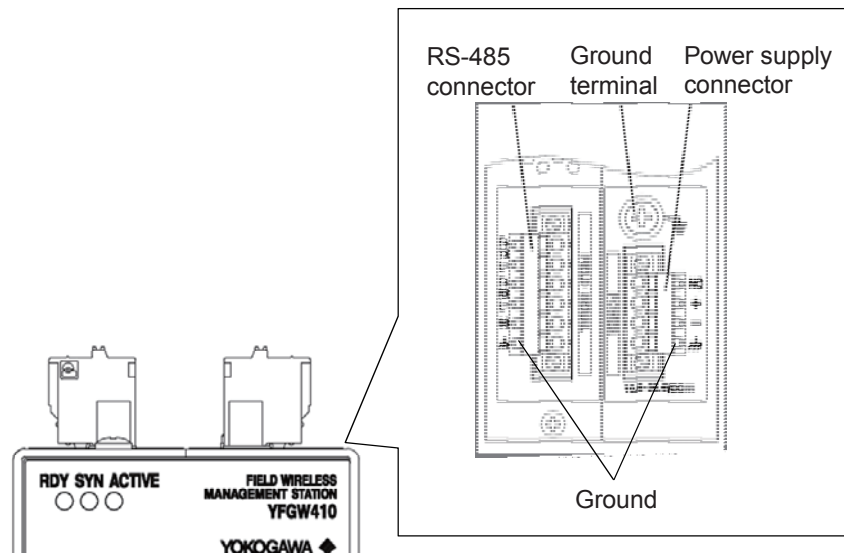
1. Connect Ethernet cable from Management Station (B1: Backbone Interface) to Access Point.
2. Insert the power supply cable through the power supply cable gland into the housing. Connect the + cable to the + terminal and the – cable to the – terminal.
3. For grounding, connect the grounding wire to the ground terminal next to the power supply terminal.
4. After supplying power confirm that the indicator LED RDY turns green.
 - Access Point (YFGW510) : LAN LED = Green

2.3.3 Connecting Grounding Wire

Proper grounding is essential for the stable operation of Field Wireless System.

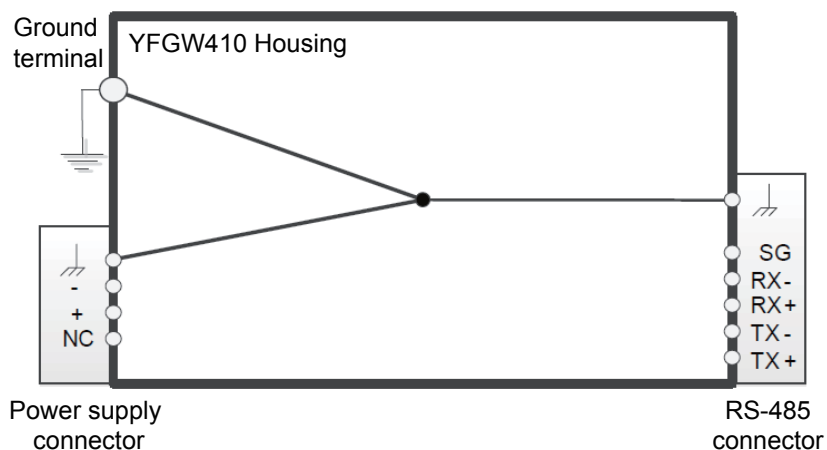
■ Field Wireless Management Station (YFGW410)

Management Station has two ground terminals: the frame ground (FG) terminal secured by the M4 screw at the side of power supply connector (on the top side of the main body), and the ground terminal at the power supply spring terminal.



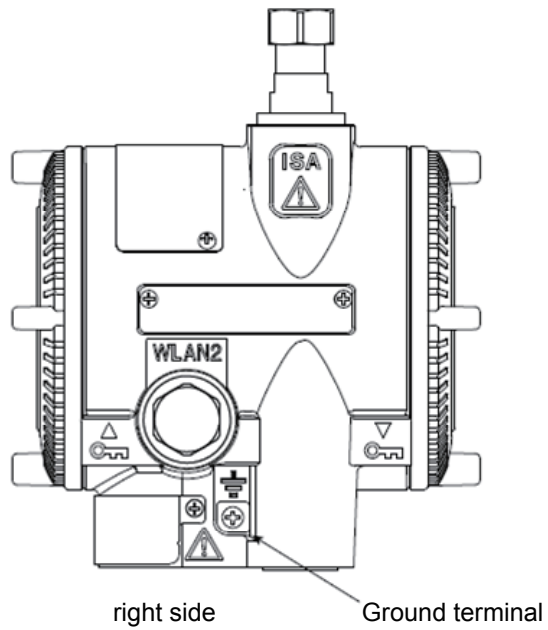
Connect the ground cable from the frame ground (FG) terminal to the ground. Class D grounding (the third class grounding) with the ground resistance of 100 ohms or less is necessary.

Connect the grounding wire to the ground terminal. The internal wiring of YFGW410 main body is connected as shown in the following figure.



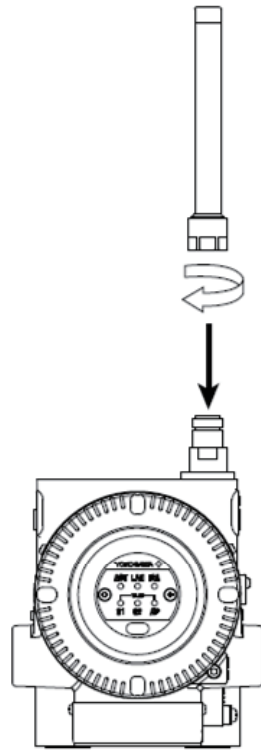
■ Field Wireless Access Point (YFGW510)

Connect the grounding wire to the ground terminal of Access Point. The ground terminal is located at the bottom on the right side of the housing. Class D grounding (the third class grounding) with the ground resistance of 100 ohms or less is necessary. Do not share the ground wiring with other devices.



2.4 Mounting Antenna

Screw the antenna into the antenna connector on the top of the device. Ensure that the antenna is properly mounted.



1. Turn counter-clockwise the cover of the antenna connector on the top of YFGW510 to remove.
2. Mount the provided antenna into the antenna connector.
Tighten the antenna connector with a torque of 2 to 3 N·m.

3. Configuration

3.1 PC Network Configuration

Configure the network settings (IP address of Configuration & Monitoring PC) as shown in Table.2.

NOTE

Before starting configuration tools, “Automatically detect Proxy” setting of internet browser needs to be disabled.

3.2 Wireless System Configuration

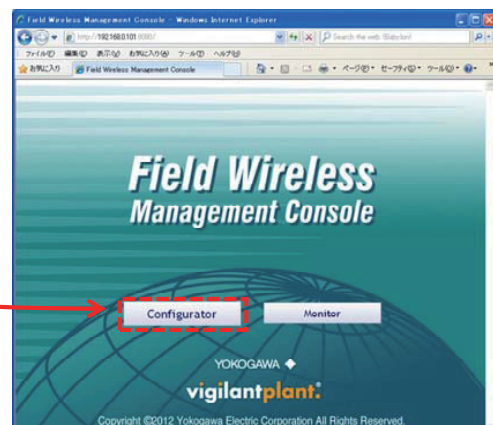
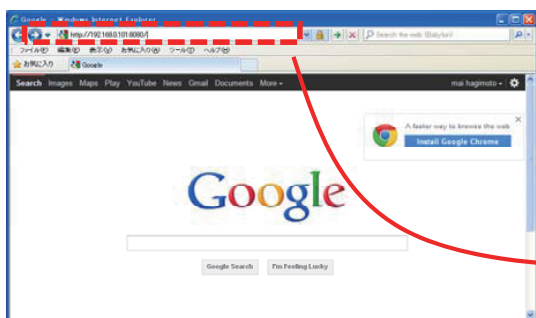
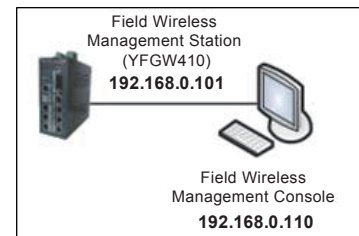
Perform the following six steps to configure field wireless system. Field Wireless Management Console (Configurator and Monitoring tool) is the software used to configure the Field Wireless System.



■ Start Configurator

Start Field Wireless Management Console over a web-browser.

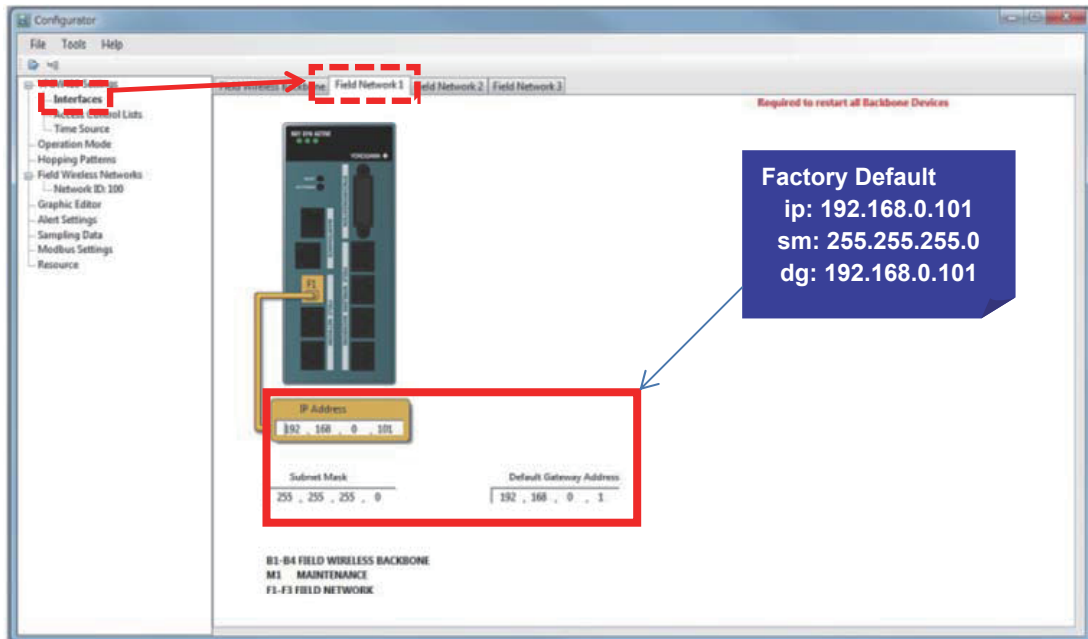
1. Check Ethernet connection from Management Station (F1 port) to the Configuration & Monitoring PC.
2. Start web-browser and enter <http://192.168.0.101:8080/> in the web browser's navigation field.
Click [Configurator] and the login dialog will appear.
 - Default login user is “**admin**” and password is “**!admin**”.
 - First window requires default password change.
Enter both old password & new password and click “ok”.



3.2.1 Field Network Registration



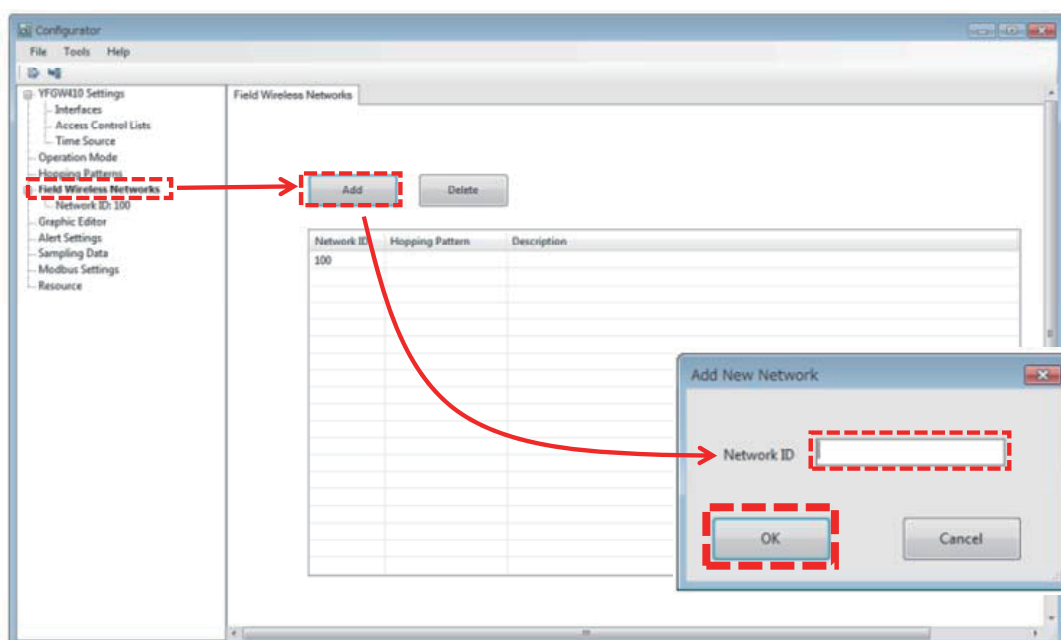
1. Click [Interfaces] from Menu tree in the left pane and click [Field Network1].
2. See Table.1 and configure the Field Network's IP Address.



3.2.2 Network ID Registration



1. Click [Field Wireless Networks] from Menu tree in the left pane.
2. Click [Add] and enter Network ID and click [OK]. In this example, we use 100.as Network ID
 - Network ID: 2~65534. (1 and 65535 are reserved)

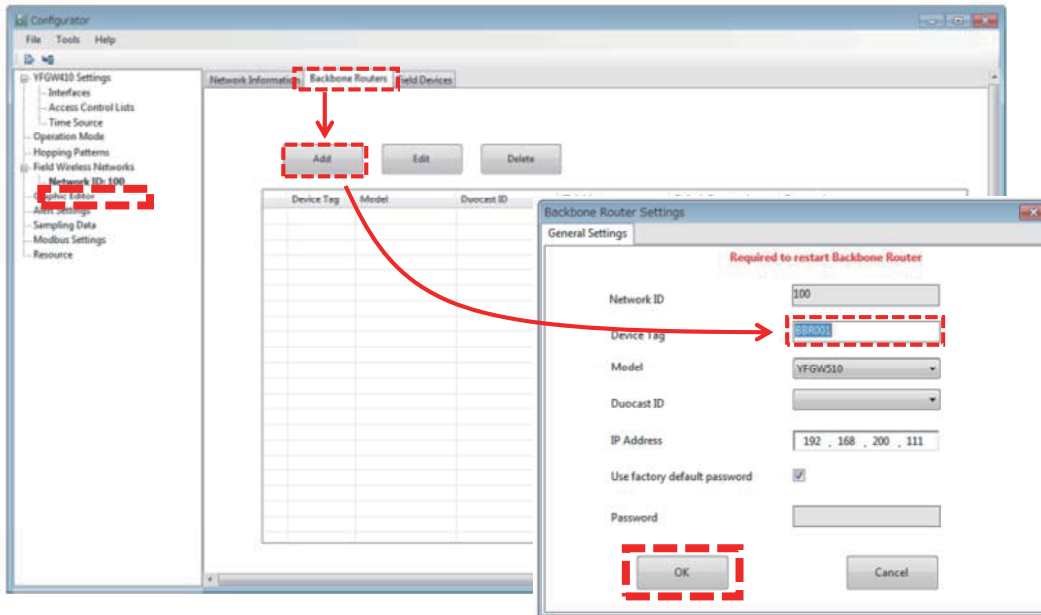


3.2.3 Backbone Router Registration



Configuration items for Network ID

1. Click [Network ID: 100] from Menu tree in the left pane and click [Backbone Routers] tab.
2. Click [Add] and enter [BBR001] in Device Tag to register an initialized Access Point.
 - Enter the Device Tag name which is set by YFGW510Tool.exe or the one on a Tag plate.
3. Click [OK] to finish registration.

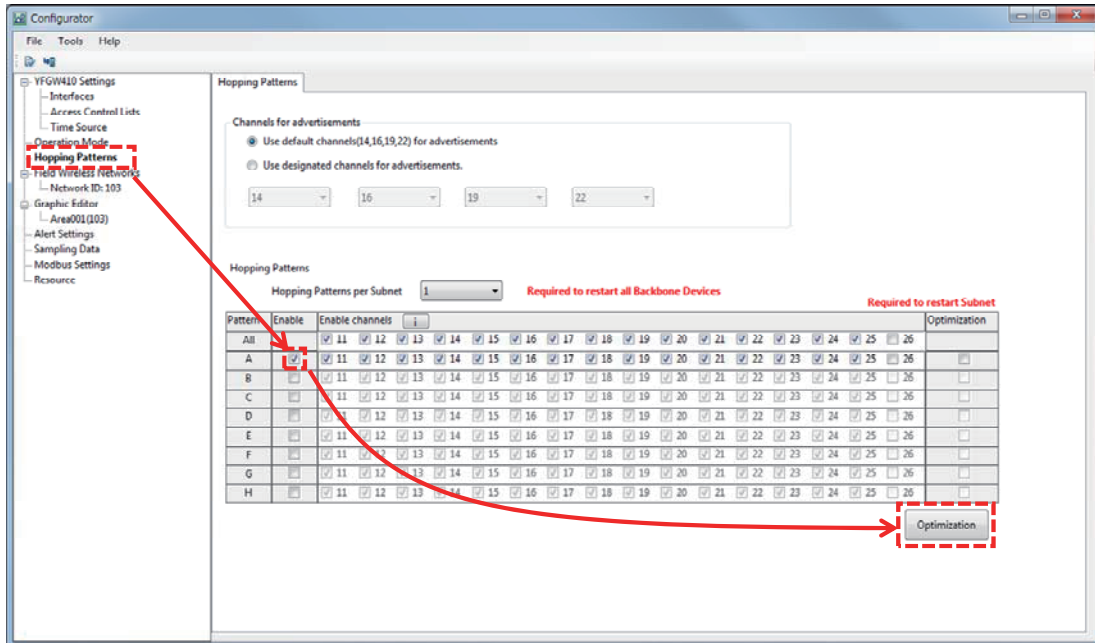


3.2.4 Hopping Pattern Registration

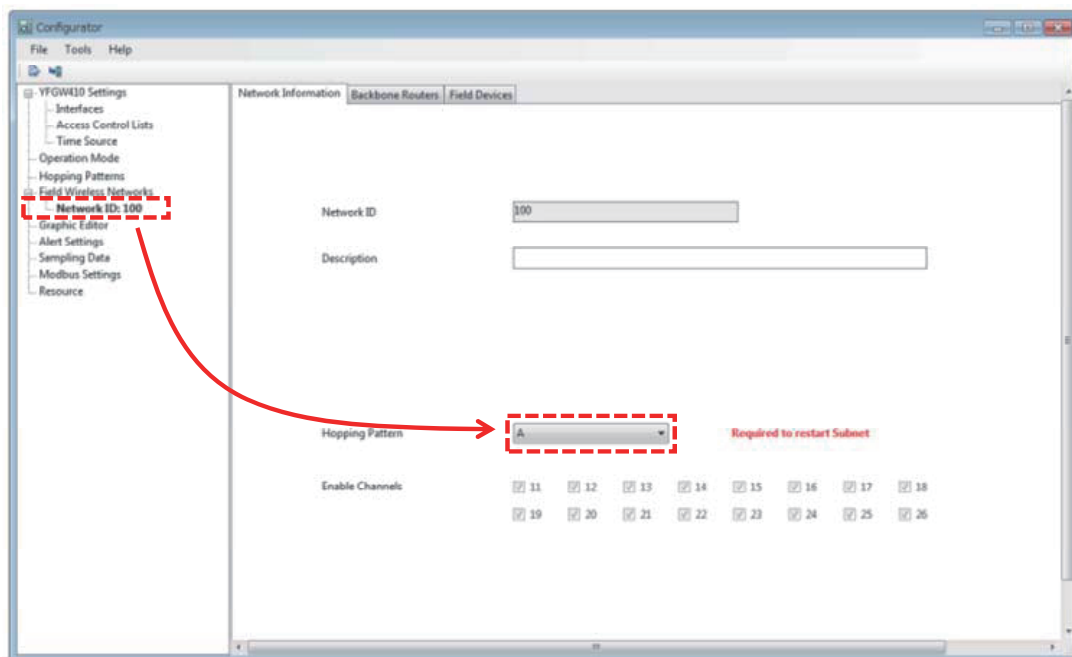


Configuration items for Network ID

1. Click [Hopping Patterns] from Menu tree in the left pane.
2. Click the checkbox and enable pattern [A] and click [Optimization].



3. Click created [Network ID:100] from Menu tree in the left pane.
4. Select [Hopping Pattern] A from the pull down menu. (Network ID 100 uses hopping pattern A.)

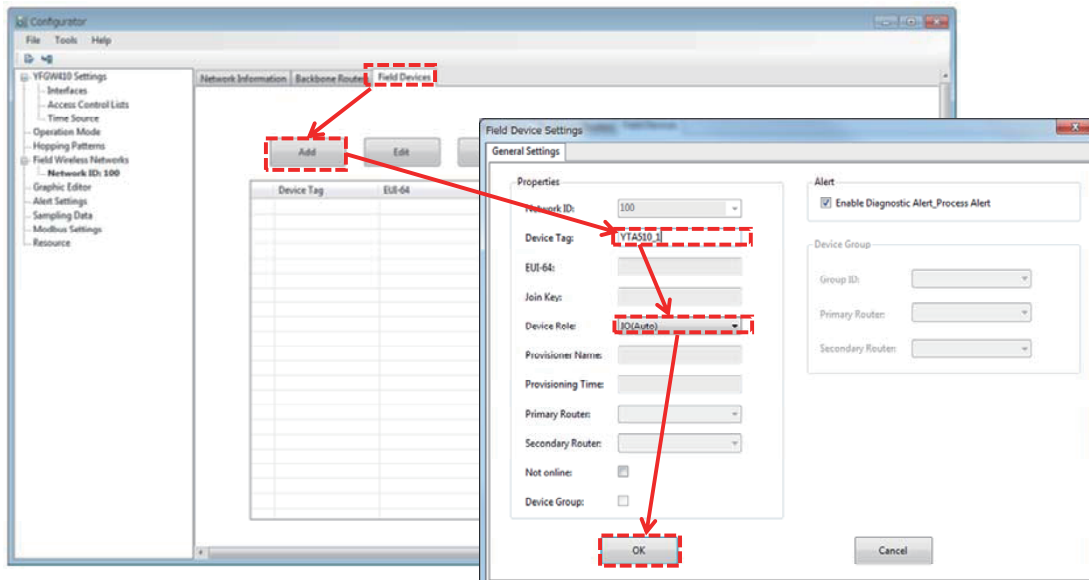


3.2.5 Field Device Registration

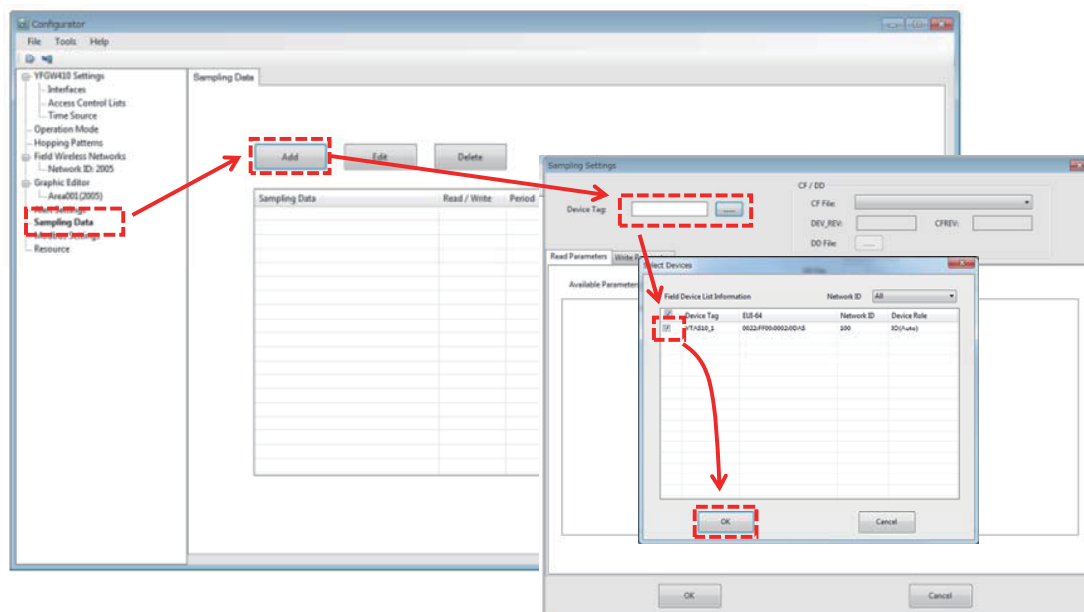


Configuration items for Network ID

1. Click [Field Devices] tab and click [Add] to register Field Wireless Device .
2. Enter [YTA510_1] in Device Tag, select Device Role [IO (Auto)] and click [OK].



3. Click [Sampling Data] from Menu tree in the left window.
4. Click [Add] and open Sampling Setting window.
5. Click [...] button and check the target Field Devices and click [OK].
 - It allows multiple device selection for same model.

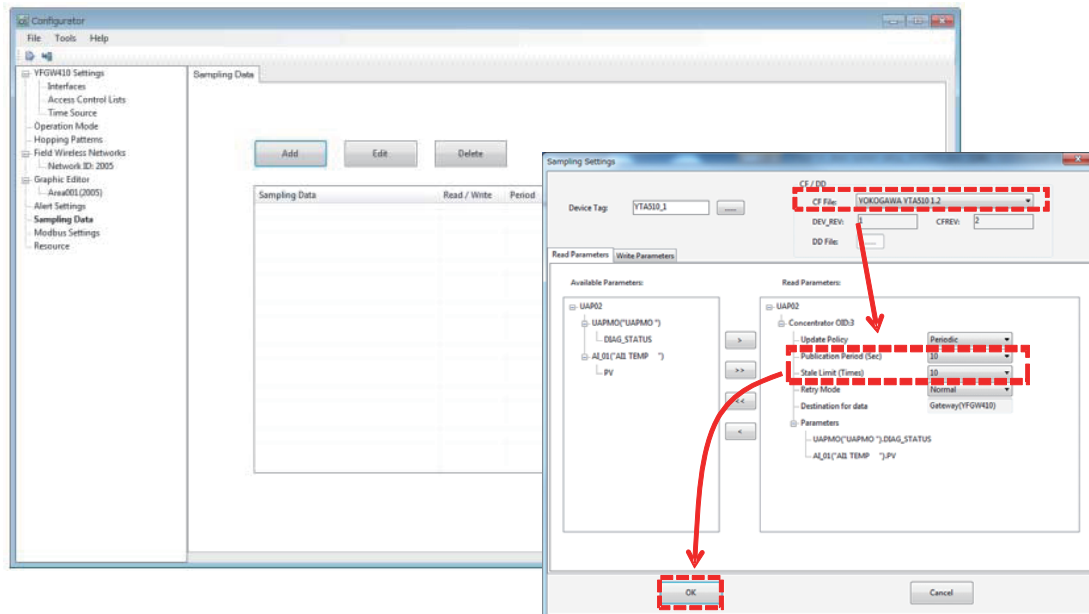


6. Select [Load CF/DD] from the [CF File] pull down menu and load a proper CF file from the recommended folder below. Click the pull down menu again and select the CF file for Field Wireless Device (YTA510) .

<C:/Yokogawa/FieldWireless/FieldWirelessConfigurator/CFDD/59543/0005>

7. Enter 10 (sec) in Publication Period and 10 (times) in Stale limit.

When the configuration of the parameters is completed, click [OK] to apply the configuration.



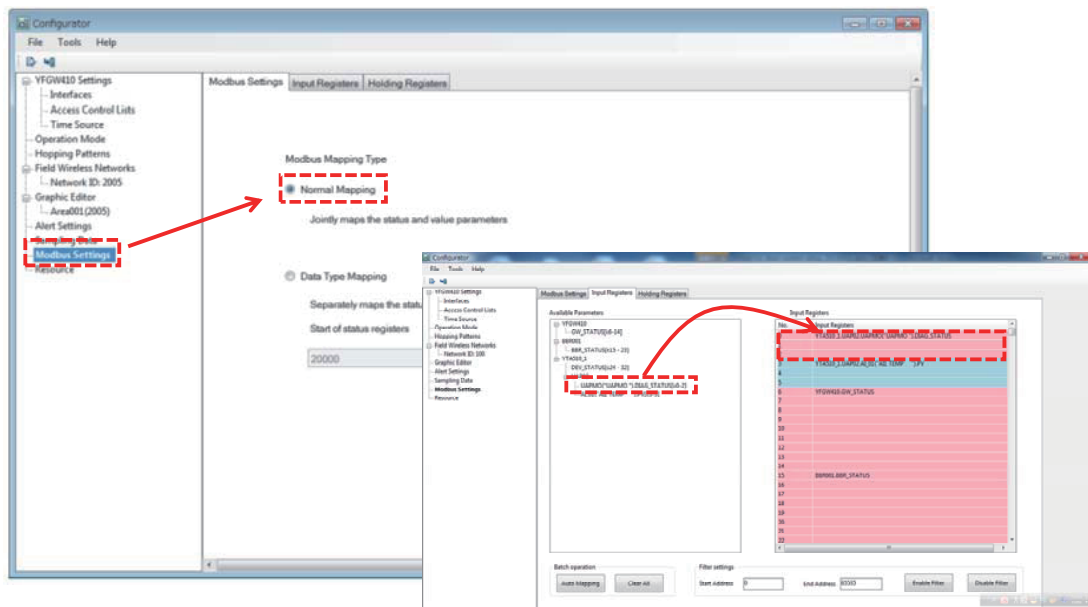
3.2.6 Modbus Mapping



1. Click [Modbus Settings] from Menu tree in the left pane.
2. Click [Normal Mapping] as the Mapping type.
3. Map the process data (parameters) to the registers of the Management Station according to the Table.4.
 Drag and drop the [DIAG_STATUS] to the Input Register Number 0-2 etc...

NOTE

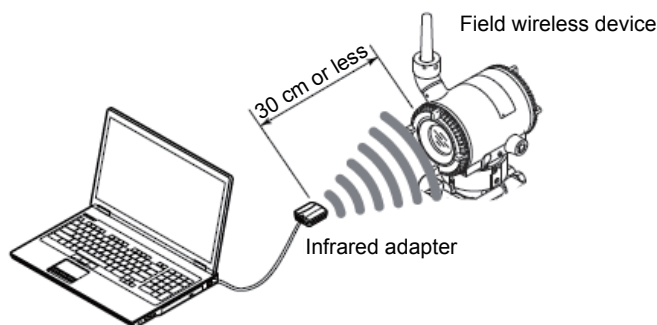
To remove assigned registers, click the registered data from the [Input Registers] area and press delete key.



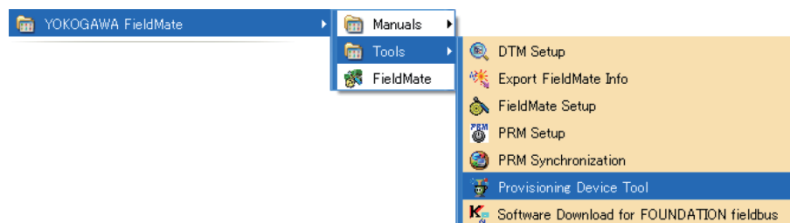
3.3 Device Provisioning

Device provisioning creates Join Key. The Join Key is a unique key for each Field Wireless Device and needs to be exported to the provisioning file. Exported provisioning file will be imported to the Gateway and it allows a Field Wireless Device to join a specific network.

1. Connect the infrared adapter to Configuration & Monitoring PC.
 - Make sure that the distance between infrared adapter and infrared communication port on the front of the Field Wireless Device is less than 30 cm.

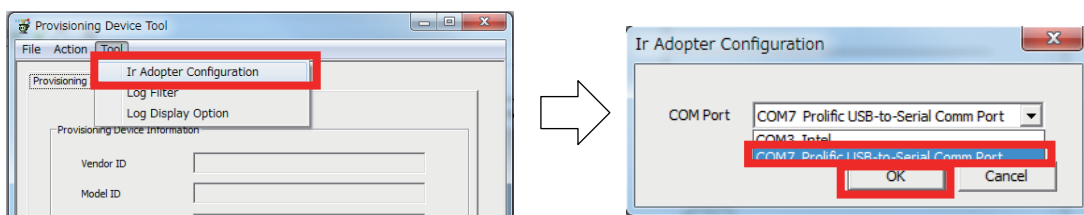


2. Start [Provisioning Device Tool] from the Start menu.

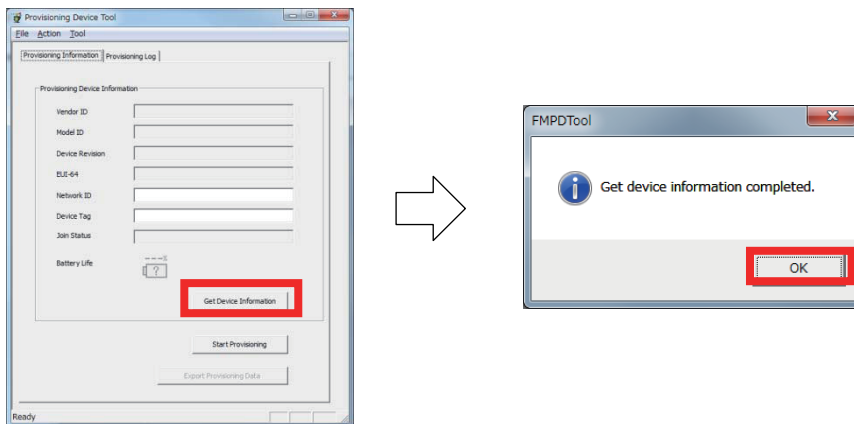


3. Select [Ir Adapter Configuration] from the Tool menu.

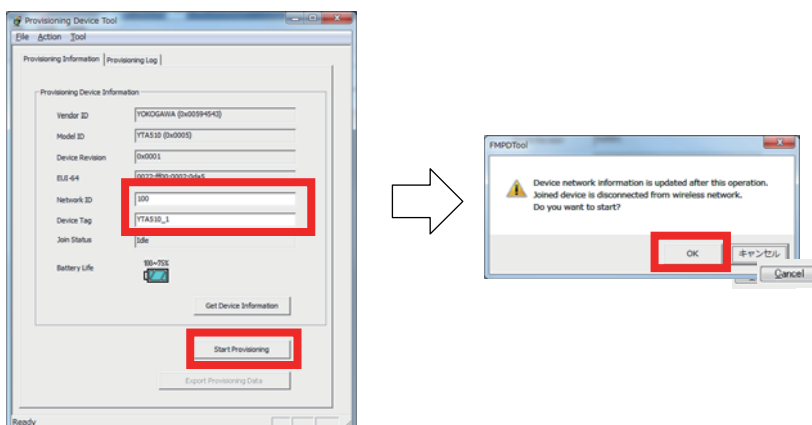
Select COM Port that is assigned to “Prolific USB-to-Serial COM Port” for the infrared adapter from the pull down menu and click [OK].



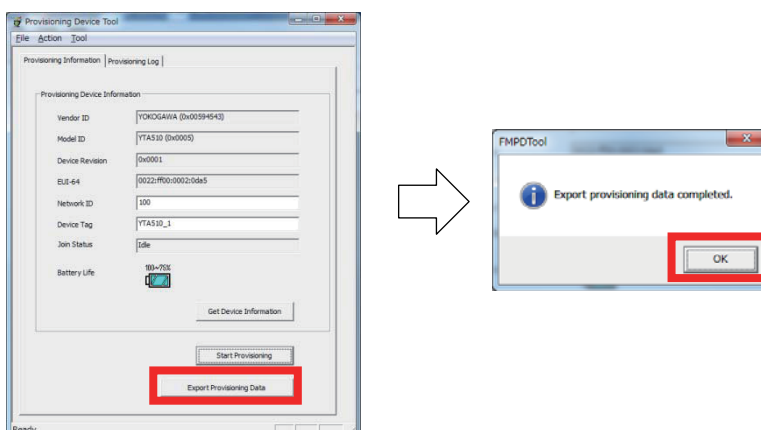
4. Select [Get Device Information] and then the information acquisition will start.
Click [OK] when the dialog appears.
 - This step requires pointing IR adapter at Field Wireless Device.



5. Refer the Table.1 (Chapter 2) and enter [100] in Network ID and [YTA510_1] in Device Tag, and select [Start Provisioning].
 - This step requires pointing IR adapter at Field Wireless Device.



6. Select "Export Provisioning Data" to save result to a file (example: "YTA510_1_100.yipif").
 - The file includes security key information and it is encrypted.
 - Export the provisioning data to the recommended export folder.
<C:/Yokogawa/Field Wireless/PD>.

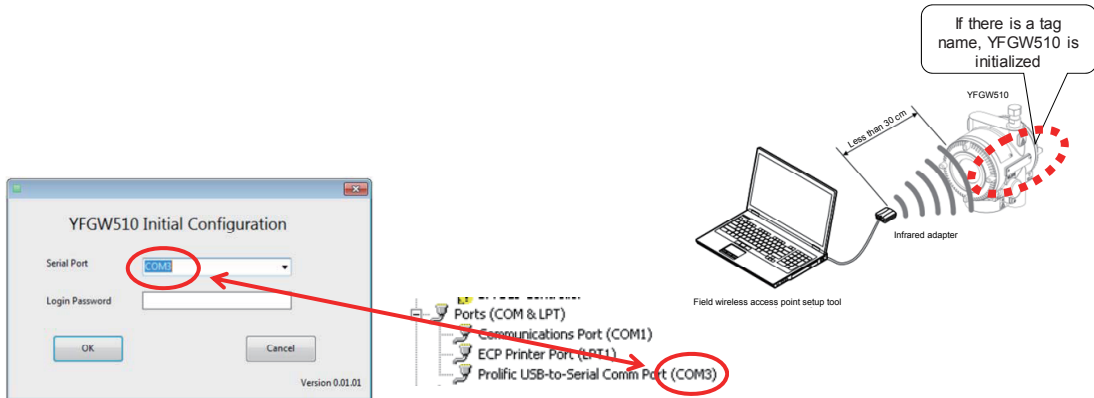


3.4 Access Point Initial Configuration

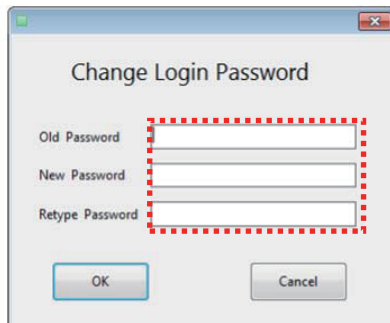
Access Point initial configuration is the procedure to set Device Tag and Password to Access Point using IR adapter.

If the Device Tag is set at factory, please skip this configuration.

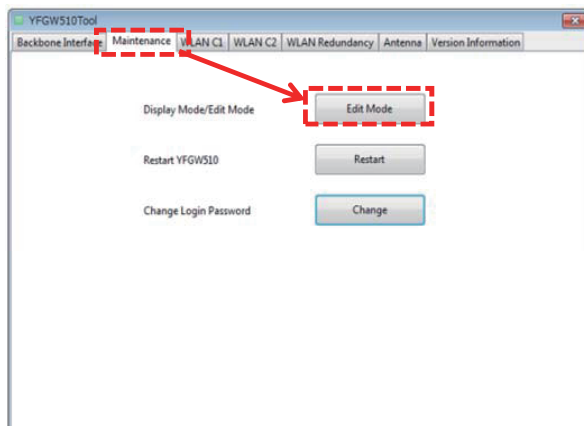
1. Double-click the YFGW510Tool.exe.
 - Select serial communication port for IR adapter.
 - Default Login Password is “**yokogawa**”.
 - The IR adapter needs to be held in position until the communication has finished.



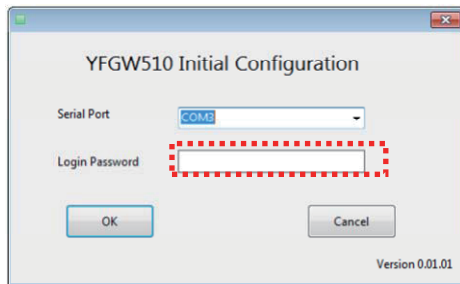
2. Change login password from factory default.
 - User must change password on his first time login.
 - Up to 8 single byte alphanumeric characters, A-Z, 0-9, or special characters (e.g., !, \$, #)



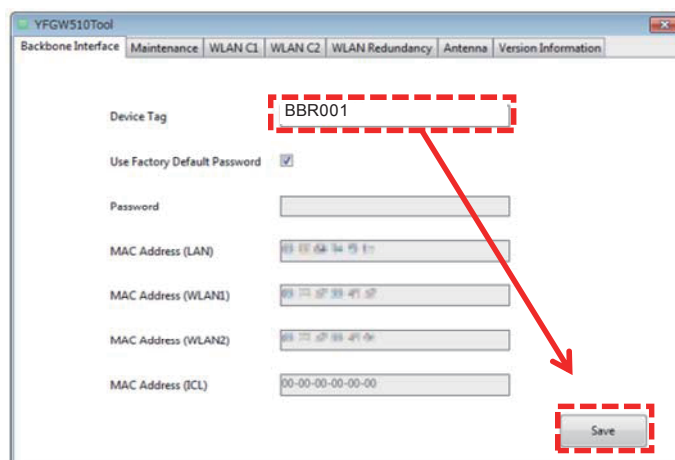
3. Open [Maintenance] Tab and select [Edit mode].
 - It restarts the tool automatically and login again with new password.



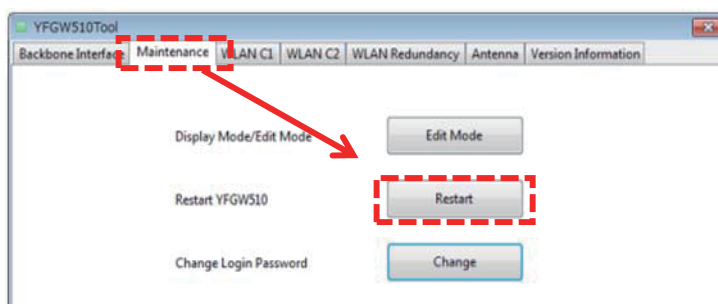
4. Login with the new password.



5. Enter [BBR001] in Device Tag and click [Save] to finish initial configuration.
 - Up to 16 single byte alphanumeric characters, A-Z, 0-9, and special characters (underscore and hyphen).



7. Open Maintenance Tab and select [Restart] to restart the Access Point.



3.5 Provisioning File Registration

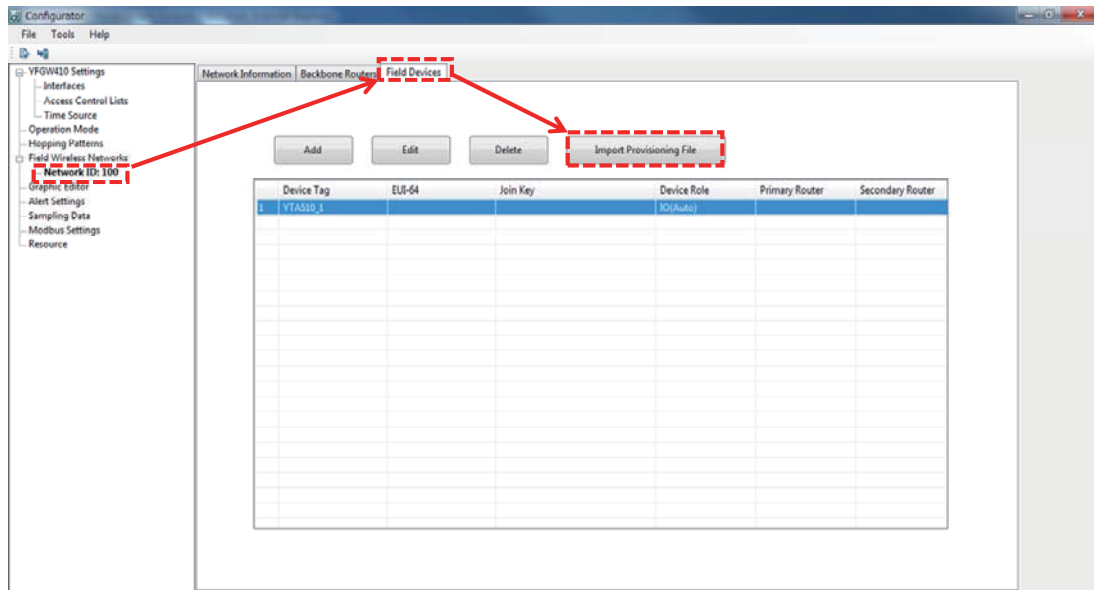
1. Return to Configurator and Select [Network ID: 100] from the tree menu.

Select [Field Devices] tab and click [Import Provisioning File] to import provisioned Field Wireless Device.

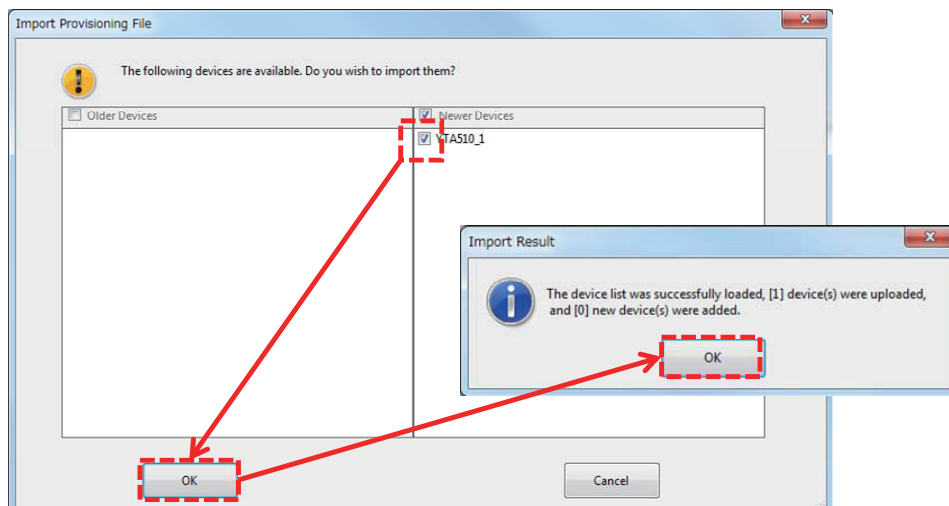
Select the provisioning file [YTA510_1_100.ypif] from recommended export folder below and click [Open].

<C:/Yokogawa/Field Wireless/PD>

* Field Wireless Configurator automatically filters out the Field Wireless Device s by Network ID when it imports the Provisioning File (.ypif).

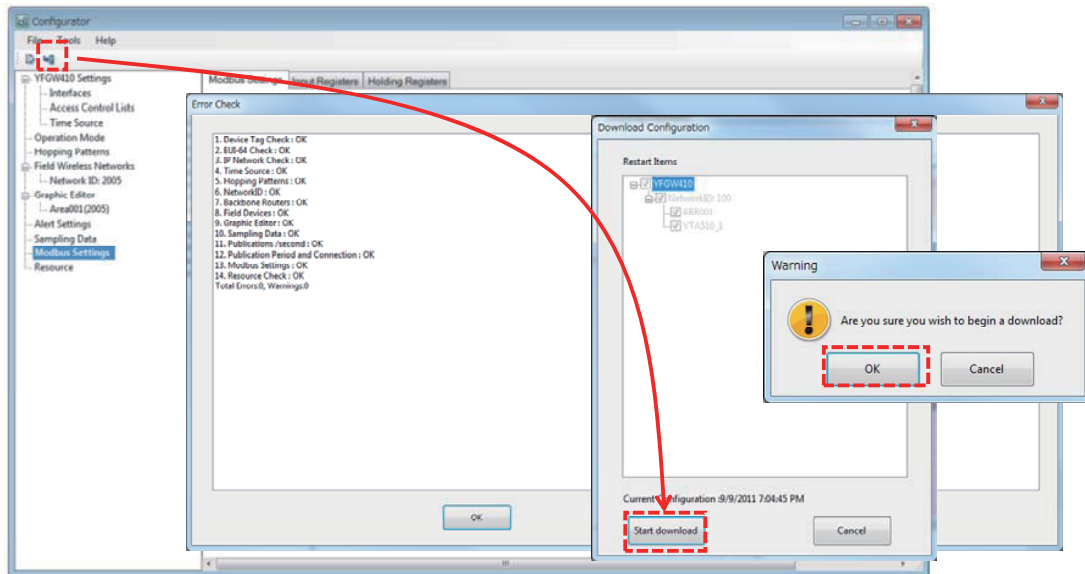


2. Check the [YTA510_1] from the Newer Devices and click [OK].
Confirm the import result and click [OK] to finish the configuration.

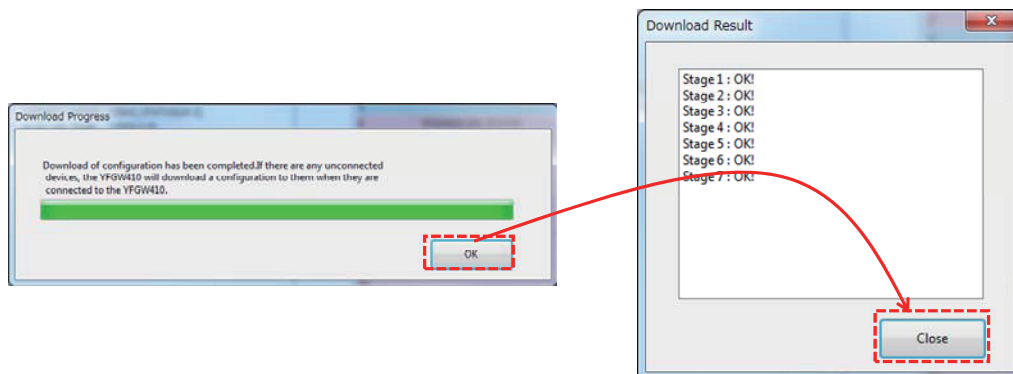


3.6 Download New Configuration

1. Select [Download] in the menu bar. And then Error Check process automatically starts.
2. Select [Start download] and click [OK] to download the new setting.
 - “Devices need to reboot” will be automatically checked.



3. Click [OK] after download progress and confirm that there are no errors and click [Close].



4. Confirmation

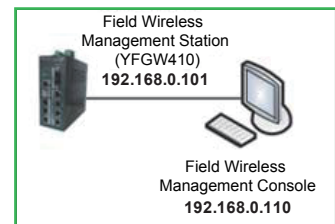
4.1 Wireless System Confirmation

Confirm the join status and publish status after Field Wireless System configuration.

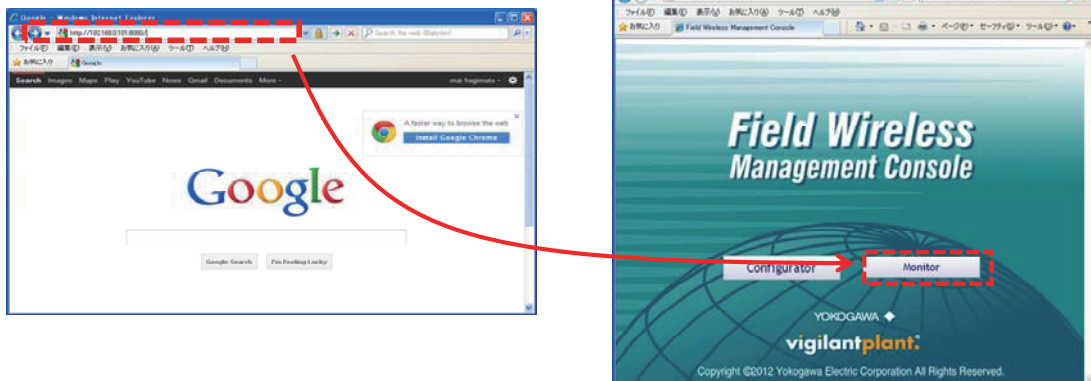
■ Start Monitoring

Start Field Wireless Management Console over a web-browser.

1. Confirm Ethernet connection from Management Station (F1 port) to the Configuration & Monitoring PC.

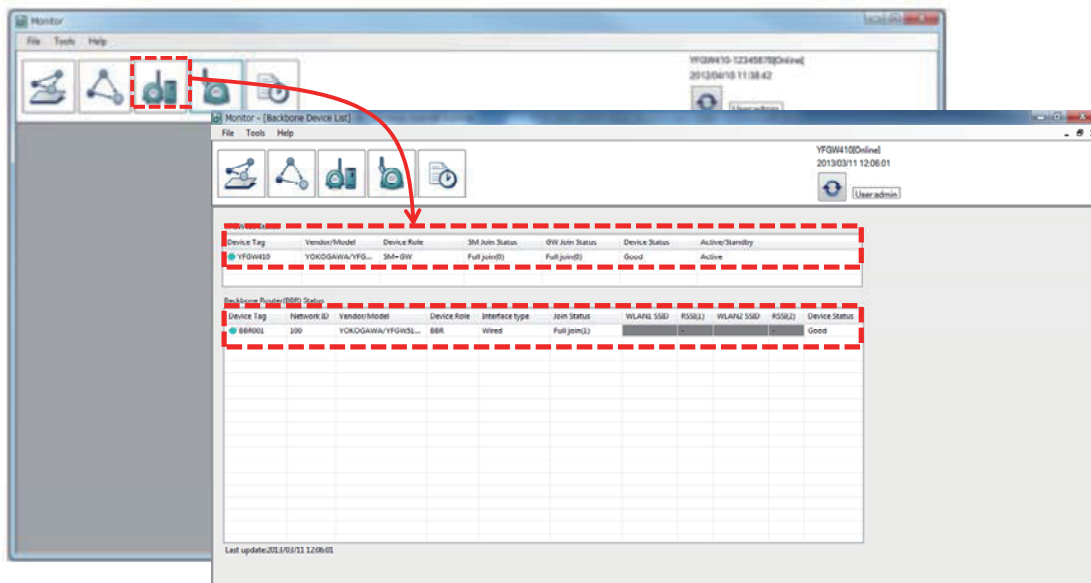


2. Start web-browser and enter <http://192.168.0.101:8080/> in the web browsers navigation field. Select [Monitor] and start new window.



4.1.1 Backbone Device List

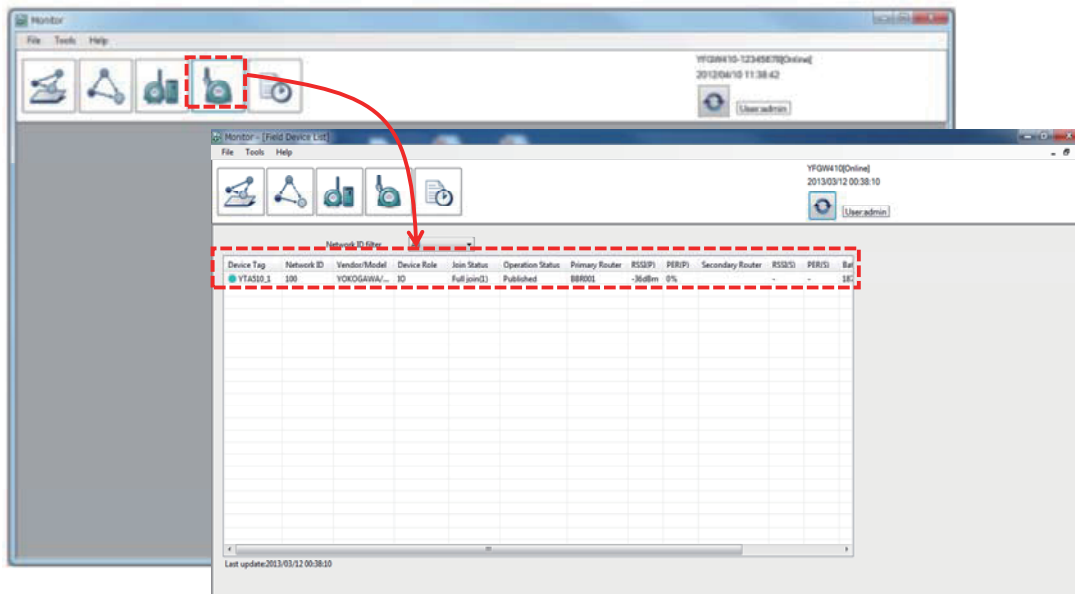
Backbone Device List displays the status of the field wireless backbone devices (YFGW410, YFGW510).



- Select [Backbone Device List] and confirm status below for Management Station and Access Point.
 - YFGW410 (Management Station) : GW Join Status = Full join
 - BBR001 (Access Point) : Join Status = Full join

4.1.2 Field Device List

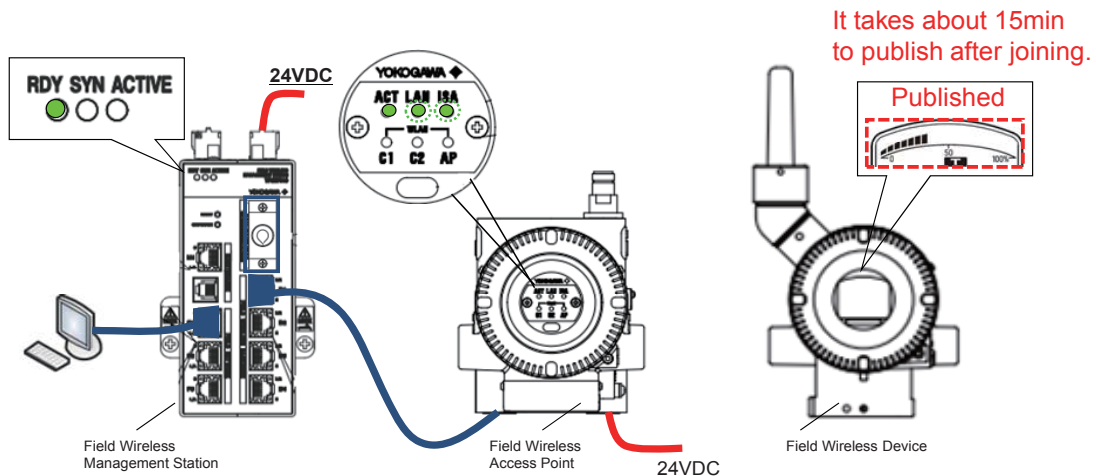
Field Device List displays the status of the field wireless devices.



- Select [Field Device List] and confirm status below for Field Devices.
 - Join Status : Full join
 - Operation Status : Published

NOTE

It takes approximately 5~15 [min] to publish the data after Field Wireless Device has joined the network.

4.1.3 Status Indicator

1. Confirm JOIN status with LED and LCD indicators.
 - Management Station (YFGW410) : RDY LED = Green
 - Access Point (YFGW510) : ACT LED = Green, LAN LED = Green Blink, ISA = Green Blink
 - Field Wireless Device (YTA510) : Status bar = Published

4.2 Backup Files Confirmation

Ensure that all files below have been saved to recommended folder after the system configuration.

1. Provisioning File
 - Extension : ".ypif"
 - Recommended folder : <C:/Yokogawa/FieldWireless/PD>
2. Field Wireless Configurator setting info
 - Extension : ".bkup"
 - Recommended folder : <C:/Yokogawa/FieldWireless/FieldWirelessManagementConsole/Backup>.

5. Monitoring Network Status

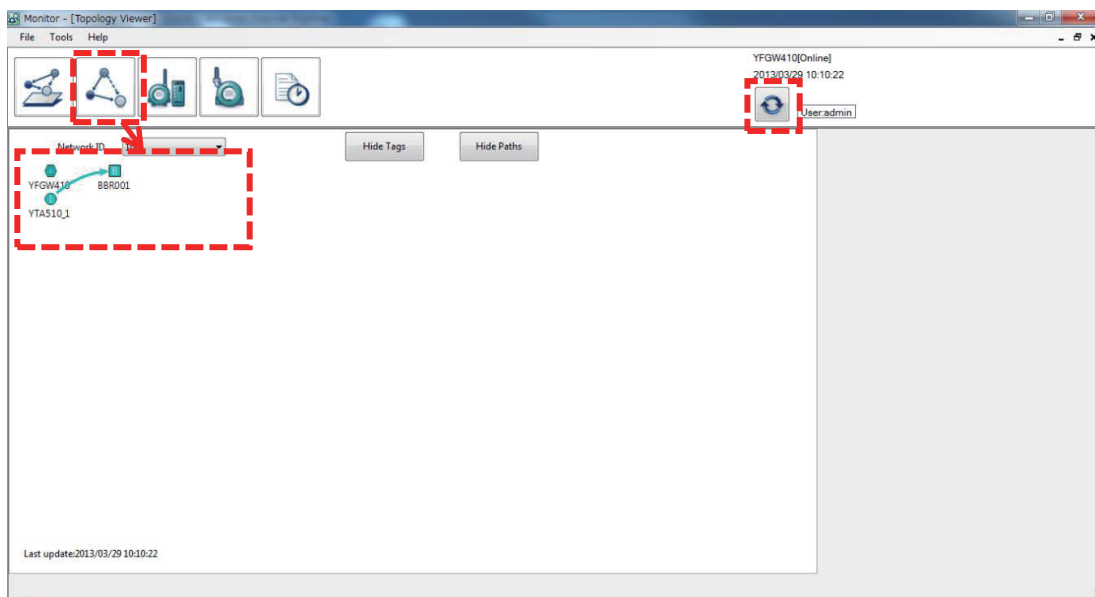
In addition, two functions below enable monitoring the operation status of Field Wireless System.

- Topology Viewer
- Field Device List

■ Topology Viewer

The Topology Viewer shows the field wireless network topology for each field wireless network. The field wireless devices transmit data via the Access Point, which is the central device in the network.

The Access Point further relays to the gateway. Gateway includes system manager role which controls the entire network.



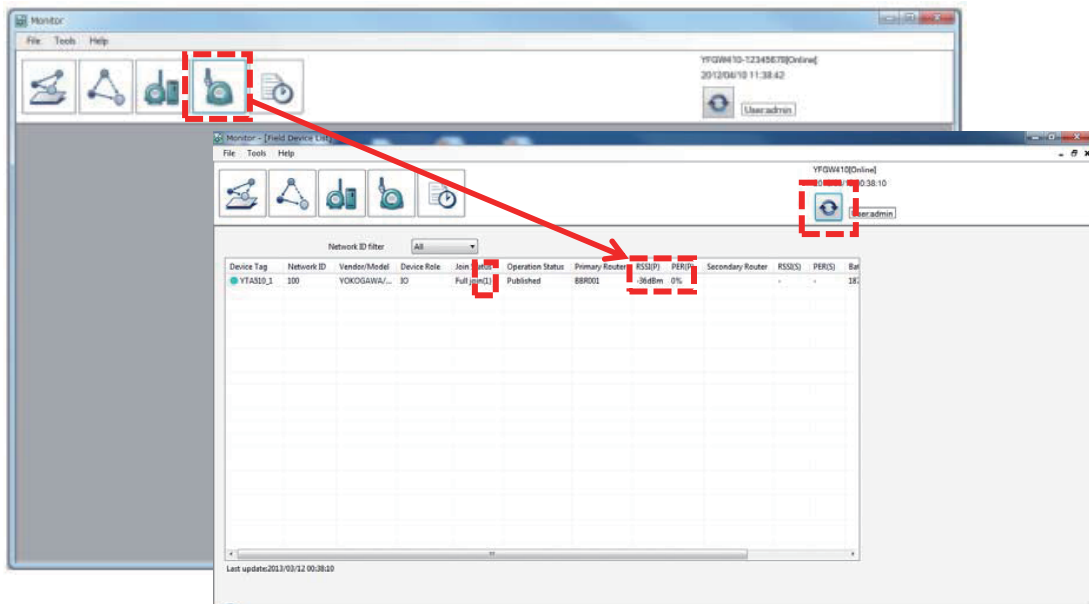
1. To view all the links among devices, select [Topology Viewer] icon from the Tab menu.

NOTE

- Database is automatically refreshed every minute. Click [Refresh] icon to force a database refresh.
- Full line indicates Primary path. Dots line indicates Secondary path.

■ Device List

The Field Device List provides communication health reports such as RSSI (signal strength) and PER (packet error rate) at the network level.



1. Select [Field Device List] icon from the Tab menu.
2. Confirm the [RSSI (P)] [PER (P)] column.
[Join Count] is indicated in the bracket at [Join Status] and it shows the total number of joins per device.

NOTE

- It takes approximately 30 [min] to indicate RSSI and PER after Field Wireless Device has started publishing the data. (RSSI and PER are shown as 30min moving average.)
- Database is automatically refreshed every minute. Click [Refresh] icon to refresh the database promptly.

Appendix 1 Modbus Protocol

■ Overview

Gateway provides Modbus/TCP server (slave) function. During Modbus communication, the Field Wireless Device data is transmitted to the host system. Below are supported Modbus function codes.

- Read Input Register (3X)
Modbus Function Code: 0x04, Address: 0~ 66535
- Write Holding Register (4X)
Modbus Function Code: 0x10, Address: 0~66535

Before transmitting data to a host system, it is necessary to map the transmission process value, device status, alert information and other data on registers.

In the host systems, system engineering is required to embed the error detection mechanism using Device Status of each wireless system component, Process Data Status, and self-diagnosis status (DIAG_STATUS) of the field wireless device; error types can be identified.

NOTE

Process Value will hold previous value if the Communication error or Sensor error occurred. Therefore you need to check the Process Data Status in order to confirm the data quality.

■ Parameters

[PV]

Below is the Process Value data block. Data block always starts with 8bit "Data Status" information.

| | |
|-----------------------------------|-------------------------|
| Data Status (8bit :Unsigned16) | Value (32bit: Float) |
|-----------------------------------|-------------------------|

The Modbus registers are all 2 bytes (1 word). Therefore, PV is mapped as below with 8bit reserved space.

| | | | |
|---------------------|--------------------|---|---|
| 16 | 8 | 7 | 0 |
| 00000000 | Data Status (8bit) | | |
| Value (Upper 16bit) | | | |
| Value (Lower 16bit) | | | |

Below is an example of 8bit Data Status information for PV.

Typically host system checks first bit (Bit7) to determine data quality. (0x80(128): Good condition without error)

| Quality | Limit Condition | | | | Contents | Bit strings | | | | | | |
|-----------|-----------------|-------------|-------------|----------|---|-------------|---|---|---|---|---|---|
| | Not Limited | Low Limited | How Limited | Constant | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| =BAD | 0x00 | 0x01 | 0x02 | 0x03 | Non-specific | 0 | 0 | 0 | 0 | 0 | 0 | - |
| | 0x04 | 0x05 | 0x06 | 0x07 | Configuration Error | 0 | 0 | 0 | 0 | 0 | 1 | - |
| | 0x08 | - | - | - | Not Connected | 0 | 0 | 0 | 0 | 1 | 0 | - |
| | 0x0C | 0x0D | 0x0E | 0x0F | Device Failure | 0 | 0 | 0 | 0 | 1 | 1 | - |
| | 0x10 | 0x11 | 0x12 | 0x13 | Sensor Failure | 0 | 0 | 0 | 1 | 0 | 0 | - |
| | 0x14 | - | - | - | No Communication with Last Usable Value | 0 | 0 | 0 | 1 | 0 | 1 | - |
| | 0x18 | - | - | - | No Communication with No Usable Value | 0 | 0 | 0 | 1 | 1 | 0 | - |
| | 0x1C | 0x1D | 0x1E | 0x1F | Out of Service | 0 | 0 | 0 | 1 | 1 | 1 | - |
| Uncertain | 0x40 | 0x41 | 0x42 | 0x43 | Non -specific | 0 | 1 | 0 | 0 | 0 | 0 | - |
| | 0x50 | 0x51 | 0x52 | 0x53 | Sensor Conversion not Accurate | 0 | 1 | 0 | 1 | 0 | 0 | - |
| | 0x54 | 0x55 | 0x56 | 0x57 | Range Limits Exceeded | 0 | 1 | 0 | 1 | 0 | 1 | - |
| =Good | 0x80 | 0x81 | 0x82 | 0x83 | No Special Conditions Exist | 1 | 0 | 0 | 0 | 0 | 0 | - |

(Example of wireless communication status)

- Not Join : 0x08(8) : Not Connected
- Removing Battery/LEAVE : 0x14(20) : No Communication with Last Usable Value.
User specific communication timeout based on "stale limit" setting.
- Join Phase : 0x18(24) : No Communication with No Usable Value.

NOTE

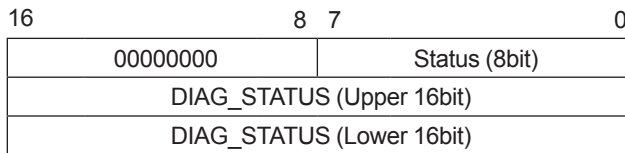
All the data types are big-endian format.

[DIAG_STATUS]

SA100.11a Field Wireless Device supports self-diagnostics data block which is called DIAG_STATUS. Below is the DIAG_STATUS data block. Data block starts with 8bit “Data Status” information.

| | |
|------------------------------|------------------------------------|
| Status (8bit :Unsigned16) | DIAG_STATUS (32bit: Unsigned32) |
|------------------------------|------------------------------------|

DIAG_STATUS is mapped as below with 8bit reserved space.



Below is an example of DIAG_STATUS information. Typically the host system checks the first 4 bits (Bit28 to Bit31) to determine device diagnostics results. Alarm categories, F, C, O, and M are configurable.

| Modbus address | Name | Data format | Contents | Detail |
|----------------|------------------------------|---------------------------------|--|--|
| Bit31 | No name | UINT32 | F: Failure status | |
| Bit30 | | | C: Function check status | |
| Bit29 | | | O: Out of specification status | |
| Bit28 | | | M: Maintenance required status | |
| Bit27 | | | Faults in electronics | AMP Err, MEMORY Err, Firm update Err, ADC Err |
| Bit26 | | | Faults in sensor or actuator element | Sensor1 Failure Term SNS Failure |
| Bit25 | | | Installation, calibration problem | Sensor1 Span Adj Err Sensor1 Zero Adj Err |
| Bit24 | | | Out of service | AI1 O/S MODE |
| Bit23 | | | Outside sensor limits | |
| Bit22 | | | Environmental conditions out of device specification | SENSOR1 TEMP HI SENSOR1 TEMP LO AMB TEMP HI AMB TEMP LO |
| Bit21 | | | Fault prediction: Maintenance required | FIRMWARE CONDITION CHECK |
| Bit20 | | | Power is critical low: maintenance need short-term | LOWBAT FOR DEEPSLEEP |
| Bit19 | | | Power is low: maintenance need mid-term | LOWBAT |
| Bit18 | | | Software update incomplete | |
| Bit17 | | | Simulation is active | AI1 SIMULATE MODE |
| Bit16 – Bit8 | | | Reserved for Baseline Device Profile | |
| Bit7 – Bit1 | | | Vendor specific area | |
| Bit0 | Detail information available | 1: available 0: no available | | |

Bit0 always indicates “1: available”.

NOTE

All the data types are big-endian format.

[GW_STATUS]

Management Station operating status information is notified with the gateway status (GW_STATUS).

The following table shows the attributes of the GW_STATUS.

| |
|---------------------------------------|
| GW_STATUS (32bit x 8 : Unsigned16) |
|---------------------------------------|

And the data elements of a device are mapped to Modbus registers as follows.

| | | | | |
|-------------------------|---|---|-------------------|-----|
| 16 | 8 | 7 | 0 | |
| 00000000 | | | 0x0080 (Reserved) | n |
| GW_STATUS (Upper 16bit) | | | | n+1 |
| ⋮ | | | | ⋮ |
| GW_STATUS (Lower 16bit) | | | | n+8 |

Below is an example of GW_STATUS information.

| Modbus Address | Name | Data Type | Contents |
|----------------|----------------|------------|---|
| n | Data status | Unsigned16 | Always 0x0080: Normal |
| n+1 | Gateway status | Unsigned16 | GW0/1 system error (0: No error, 1: Error detected) GW 1 in redundant system, GW0 in single system |
| n+2 | | Unsigned16 | GW2 system error (0: No error, 1: Error detected, 0xFFFF:Not used) |
| n+3 | | Unsigned16 | GW0/1 system status (0: Ready, 1: Active, 2: Standby) GW 1 in redundant system, GW0 in single system |
| n+4 | | Unsigned16 | GW2 system status (0: Ready, 1: Active, 2: Standby, 0xFFFF:Not used) |
| n+5 | | Unsigned16 | Status of field wireless device 0: No error (Join for all field wireless devices) 1: Error detected. (Leave for one or more field wireless devices) |
| n+6 ~ n+8 | | Unsigned16 | Always 0 (Reserved bits) |

[BBR_STATUS]

The Access Point operational status information is shown in the backbone router status (BBR_STATUS).

The following table shows the attributes of the BBR_STATUS.

| |
|--|
| BBR_STATUS (32bit x 8 : Unsigned16) |
|--|

And the data elements of a device are mapped to Modbus registers as follows.

| | | | | |
|--------------------------|-------------------|---|---|-----|
| 16 | 8 | 7 | 0 | |
| 00000000 | 0x0080 (Reserved) | | | n |
| BBR_STATUS (Upper 16bit) | | | | n+1 |
| ⋮ | | | | ⋮ |
| BBR_STATUS (Lower 16bit) | | | | n+8 |

Below is an example of BBR_STATUS information.

| Modbus Address | Name | Data Format | Contents |
|----------------|------------------------|-------------|---|
| n | Data status | Unsigned 16 | 0x0080, fixed: normal |
| n+1 | Backbone router status | Unsigned 16 | Backbone router status (0: connected/1: not connected) |
| n+2 ~ n+8 | | Unsigned 16 | 0, fixed (reserved bits) |

[DEV_STATUS]

The Field Device operation status information is shown in the device status (DEV_STATUS).

The following table shows the attributes of the DEV_STATUS.

| |
|--|
| DEV_STATUS (32bit x 8 : Unsigned16) |
|--|

And the data elements of a device are mapped to Modbus registers as follows.

| | | | | |
|--------------------------|---|---|-------------------|-----|
| 16 | 8 | 7 | 0 | |
| 00000000 | | | 0x0080 (Reserved) | n |
| DEV_STATUS (Upper 16bit) | | | | n+1 |
| ⋮ | | | | ⋮ |
| DEV_STATUS (Lower 16bit) | | | | n+8 |

Below is an example of DEV_STATUS information.

| Modbus address | Name | Data format | Contents |
|----------------|-------------|-------------|---|
| n | Data status | Unsigned16 | Usually 0x0080: Normal |
| n+1 | DEV_STATUS | Unsigned16 | Status of the field wireless device (0: connected, 2: not connected) |
| n+2 | | Integer16 | Battery life (0>: days, <0: hours, 0x7FFF: external power source) |
| n+3 ~ n+8 | | Unsigned16 | Usually 0 (Reserved bits) |

Appendix 2 Configuration Items (Blank Form)

■ Device Provisioning

| Item | Settings | Remarks | Chap |
|------------------------------------|----------|--|------|
| Network ID | | Numeric identity of a Field Wireless Network. (2 to 65535) | 3.3 |
| Device Tag (Field Wireless Device) | | A name assigned to the Field Wireless Device for identifying the device. | |

| | | | |
|---------------------------|--|---|-----|
| Device Tag (Access Point) | | A name assigned to the Access Point for identifying the device. | 3.4 |
|---------------------------|--|---|-----|

■ Network setting

| Item | Settings | Remarks | Chap | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------------|--|--|---------------------|--|-----------------|------------|--|-------|-------------|-----------------|-----------------|--------------------------------|---|---|-----------------|--------------------------------|---|---|----------------------|--------------------------------|---|---|------------|--------------------------------|---|---|--|--|--|
| YFGW410 Settings | Use default setting | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr> <td rowspan="5">Interfaces</td> <td>Field Wireless Backbone</td> <td>Use default setting</td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="3">Field Network 1</td> <td>IP Address</td> <td rowspan="3">Network parameters necessary to connect Management Station and the Configuration & Monitoring PC through Ethernet. Do not use identical IP addresses on the same Ethernet.</td> <td rowspan="3">3.2.2</td> </tr> <tr> <td>Subnet Mask</td> </tr> <tr> <td>Default Gateway</td> </tr> <tr> <td>Field Network 2</td> <td>Not used in this configuration</td> <td>-</td> <td>-</td> </tr> <tr> <td>Field Network 3</td> <td>Not used in this configuration</td> <td>-</td> <td>-</td> </tr> <tr> <td>Access Control Lists</td> <td>Not used in this configuration</td> <td>-</td> <td>-</td> </tr> <tr> <td>Time Sorce</td> <td>Not used in this configuration</td> <td>-</td> <td>-</td> </tr> </table> | Interfaces | Field Wireless Backbone | Use default setting | - | - | Field Network 1 | IP Address | Network parameters necessary to connect Management Station and the Configuration & Monitoring PC through Ethernet. Do not use identical IP addresses on the same Ethernet. | 3.2.2 | Subnet Mask | Default Gateway | Field Network 2 | Not used in this configuration | - | - | Field Network 3 | Not used in this configuration | - | - | Access Control Lists | Not used in this configuration | - | - | Time Sorce | Not used in this configuration | - | - | | | |
| | | Interfaces | Field Wireless Backbone | Use default setting | - | | - | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Field Network 1 | IP Address | Network parameters necessary to connect Management Station and the Configuration & Monitoring PC through Ethernet. Do not use identical IP addresses on the same Ethernet. | | 3.2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Subnet Mask | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Default Gateway | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Field Network 2 | | Not used in this configuration | - | - | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Field Network 3 | Not used in this configuration | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Access Control Lists | Not used in this configuration | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Time Sorce | Not used in this configuration | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operation Mode | Not a configurable parameter | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hopping Pattern | Channels for advertisements | Use default setting | - | 3.2.4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Pattern | | Set the transmission channels used by the Network ID | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Channels | | Select the check boxes for the channels to be used. Clear the check boxes for the channels whose use is prohibited by the law of your country or region. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Field Wireless Networks | Network ID | Numeric identity of a Field Wireless Network (2 to 65535). | 3.2.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Item | | Settings | | Remarks | Chap |
|--|---------------------|--------------------------------|--------------------------------|--|-------|
| ▶ | Network Information | Hopping Pattern | | Select the Hopping Pattern for Network ID. | 3.2.4 |
| | | Device Tag | | Device Tag of the Access Point | 3.2.3 |
| | Backbone Routers | Model | Not a configurable parameter | - | - |
| | | Duocast ID | Not used in this configuration | - | - |
| | | Use factory default password | Use default setting | - | - |
| | Field Device | See Table.3 | | Configuration items for Field Wireless Device. | 3.2.5 |
| Graphic Editor | | Not used in this configuration | | - | - |
| Alert Setting | | Use default setting | | - | - |
| Sampling Data | | See Table.3 | | Configuration items for Field Wireless Device. | 3.2.5 |
| Modbus Settings | | See Table.4 | | Select the method of mapping to the Modbus register, such as process values, and mapping to the Input registers and Holding registers | 3.2.6 |
| Resource | | Not a configurable parameter | | - | - |
| Field Network (Configure & Monitoring PC) | | IP Address | | Network parameters necessary to connect Management Station and the Configuration & Monitoring PC through Ethernet. Do not use identical IP addresses on the same Ethernet. | 3.1 |
| | | Subnet Mask | | | |

Field Device setting

| Item | | Settings | Remarks | Chap |
|--------------------------|-----------------|--------------------------------|--------------------------------|--|
| General settings | | - | - | |
| ↳ | Properties | Device Tag | | A name assigned to the Field Wireless Device for identifying the device. |
| | | Device Role | | A device role refers to the functional role of the field wireless device. Select from (1) IO, (2) IO+Router, (3) Router, and (4). IO (Auto). |
| | | Primary Router | Not used in this configuration | - |
| | | Secondary Router | Not used in this configuration | - |
| | | Not online | Use default setting | - |
| | | Device Group | Not used in this configuration | - |
| | Alert | Enable Diagnostic Alert | Use default setting | - |
| Device Group | | Not used in this configuration | - | |
| Sampling Settings | | - | - | 3.2.5 |
| ↳ | Device Tag | | | A name assigned to the Field Wireless Device for identifying the device. |
| | CF /DD | CF File | | Confirm the appropriate revision on the website. (See Table.5) |
| | Read Parameters | Update Policy | | Periodic : Update periodically Change of state : Update with change of state |
| | | Publication Period (sec) | | The setting range is from 0 to 3,600 seconds. When "0" is selected, there is no publication. |
| | | Stale Limit (Times) | | When this specified time is exceeded and data cannot be received from the field wireless device, Management Station considers that a communication error has occurred. Communication status bit of DIAG_STATUS register will indicate the error. |
| Retry Mode | | Use default setting | - | |

■ Modbus setting

| Absolute Address | Input Register Number | Allocation | Data Type (words) |
|------------------|-----------------------|------------------|---|
| | | Status | Unsigned16 (x 1) |
| | | DIAG_STATUS | Unsigned32 (x 2) |
| | | Data Status | Unsigned16 (x 1) |
| | | PV | Float (x 2) |
| | | Data Status [*1] | Unsigned16 (x 1) |
| | | GW_STATUS | Unsigned16 (x 8) |
| | | Data Status [*1] | Unsigned16 (x 1) |
| | | BBR_STATUS | Unsigned16 (x 8) |
| | | Data Status [*1] | Unsigned16 (x 1) |
| | | DEV_STATUS | Unsigned16 (x 1) Integer16 (x 1) Unsigned16 (x 6) |

[*1] Fixed value = 0x0080

Revision Information

Document Name : YFGW410 Field Wireless Management Station Startup Guide

Document Number : TI 01W01A56-01EN

| Edition | Date | Page | Revised Item |
|----------------|-------------|-------------|---------------------|
| 1st | Mar. 2014 | | New issue |