Object of this guide

This quick start guide is to allow a new user to PROFINET to attach PROFINET I/O to an Omron PLC and configure it to work.

PROFINET products supported in this guide

- CJ1W-PNT21   PROFINET I/O Controller for CJx series PLC's
- CS1W-PNT21   PROFINET I/O Controller for CJ1 series PLC's
- GRT1-PNT   PROFINET I/O Device – Smart Slice Bus coupler.

Prerequisites

- A PC computer with both Serial/USB and Ethernet (via PROFINET) connection to Omron PLC.
- Omron Cx-One V3.x or V4.x installed and up to date using Cx-One Auto Update utility. Cx-One suite contains the utility application 'Cx-Configurator FDT' for configuring and setting PROFINET devices.
- PLC & I/O Controller and IO Devices (at least one) for configuration. I/O table on PLC should be created using Cx-Programmer.
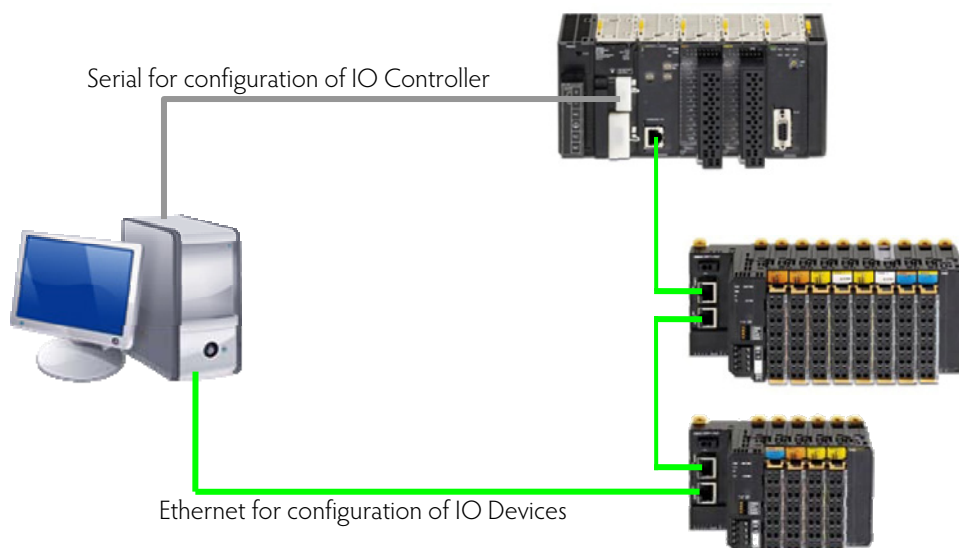
Network

- It is recommended that the PROFINET network is 'stand alone'. This means not part of a larger network.
- The network speed must be 100MBaud. Using a 10BaseT hub will not allow the network to operate correctly.
- If you wish to use switching hubs as part of the network, we recommend that these are managed switches and of an industrial nature (e.g. Hirschmann).

Connection of devices for configuration

- To configure the I/O controller – use a serial or USB connection from PLC to PC.
- To configure the I/O devices – connect a network cable to the last I/O device (in case of GRT1-PNT).

Typical Initial Connection diagram

Serial for configuration of IO Controller

Ethernet for configuration of IO Devices

Configuration outline

1. Create IO Table in Cx-Programmer (for new Cx1W-PNT21)
2. Create the network topology in Cx-Configurator FDT
3. Set 'names' in real IO Devices using Ethernet connection (Search Devices)
4. Set same names of IO Devices to IO Controller in network topology
5. Download Configuration of IO Devices to IO Controller (via Serial connection)
6. Restart system to finish configuration (IO Controller connects to IO Devices)

Create a network using Cx-Configurator FDT

Using Cx-Configurator FDT, open the Device Catalogue and show PROFINET IO. Highlight PROFINET IO Controller (e.g. CJ1W-PNT21) and click 'Add Device'.
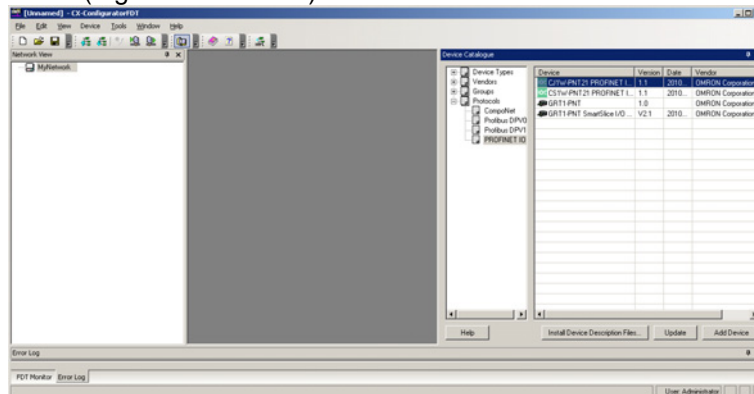
Now add any IO Devices to the Controller (Controller must be highlighted in 'MyNetwork' tree).
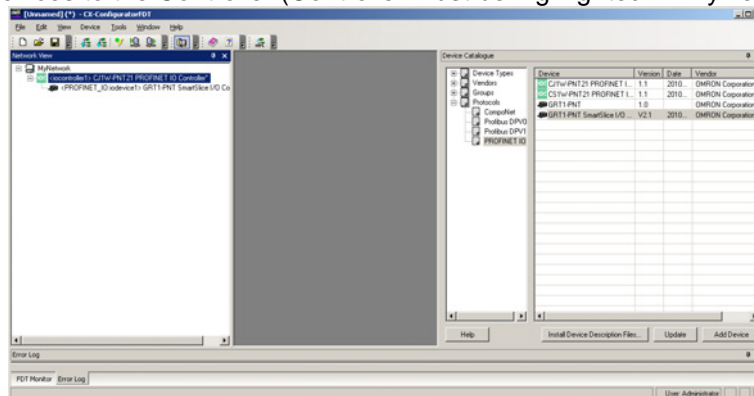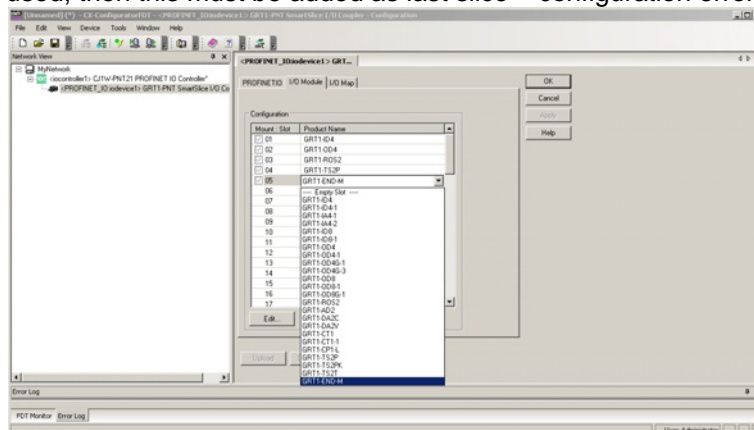

Device Catalogue can be closed now.

### Configure IO Device with correct set of IO Modules (Slices)

Double click on 'iodevice1' to configure the correct slices used in real system.
If GRT1-END-M is used, then this must be added as last slice – configuration error will occur if not.

Configure IO Controller and IO Device 'names'

Open the IO Controller in the 'tree' (double click) and initial screen will be 'PROFINET Identification'. First operation is to use 'Network Scan' to 'find' devices on the Ethernet network. This is done by searching for MAC addresses (so IP does not need to be configured at this point).
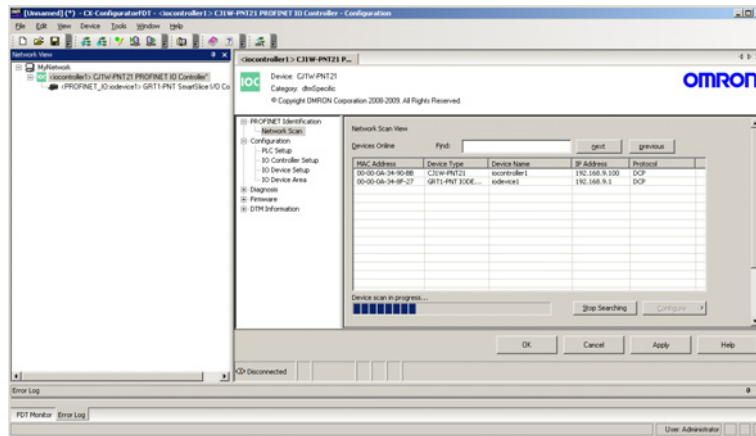
Once all devices have been recognised, the IO devices now **require unique** 'Device names' set. Use the 'Configure' button and 'Set Device Name' option to give each IO device a name. The name is used by the IO Controller at boot time to confirm existence and then allow configuration by the IO Controller (setting IP address, etc.).
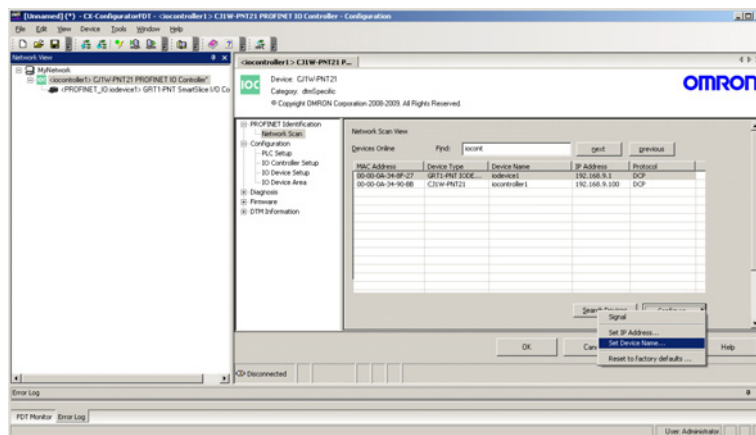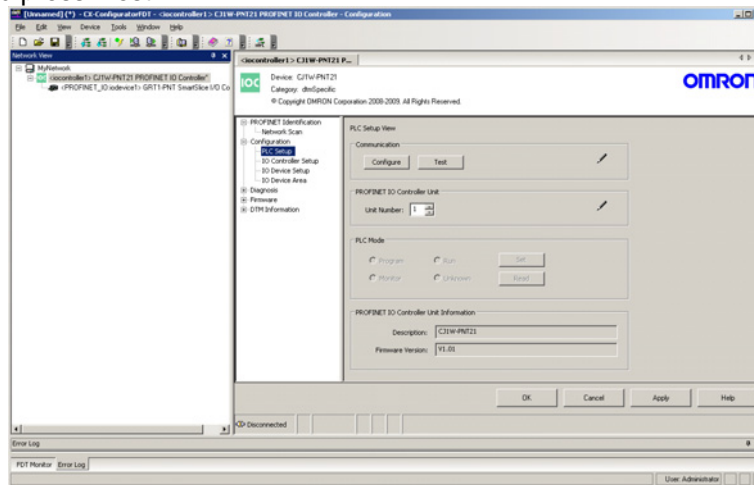

For example the IO Device now has the name 'fred'
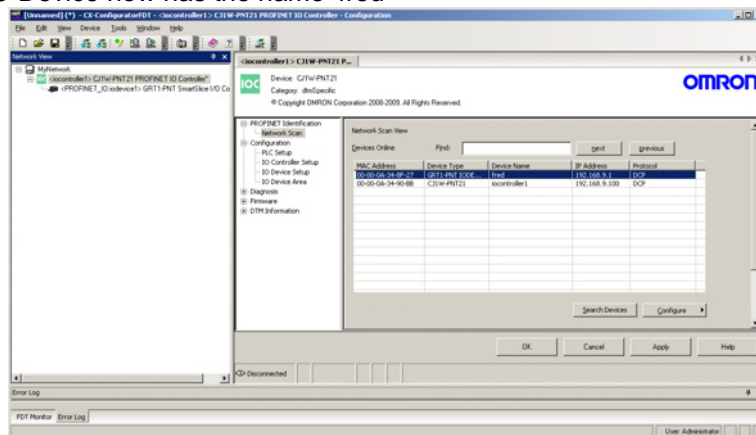
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Set up communication to PLC CPU by way of Serial/USB connection

Enter PLC type and communication settings using 'Configure'. Enter the PROFINET unit number (set on front of unit) and press 'Test'.


The IO Controller will respond with data in 'Unit Information'

The IO Controller Setup allows user to specify name and IP address for network (leave as defaults if unsure).
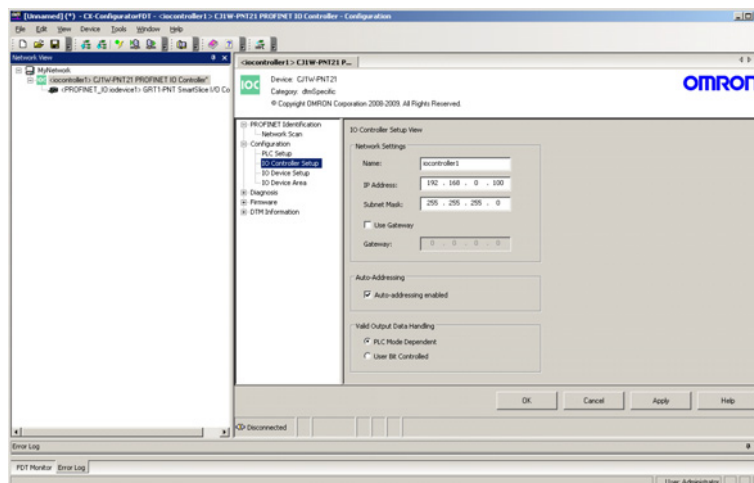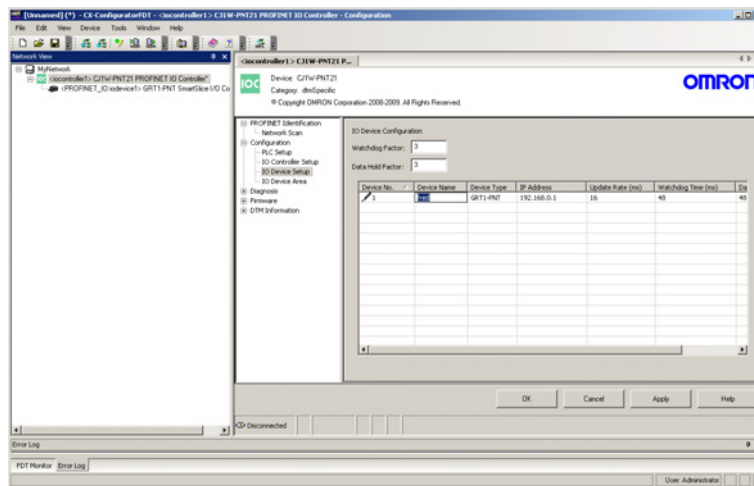

IO Device Setup

The IO Device names must be changed to those set in the 'Network Scan'. This allows the IO Controller to make initial communication by 'name' (using ARP) and thereafter set the IP Address (using DCP). Therefore change from….
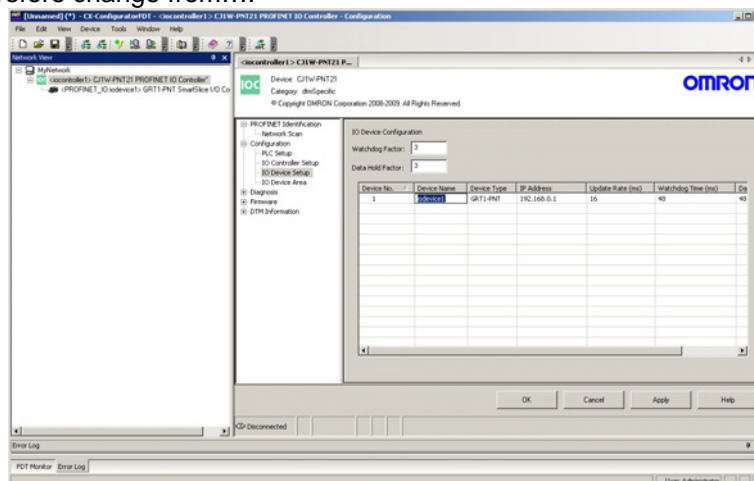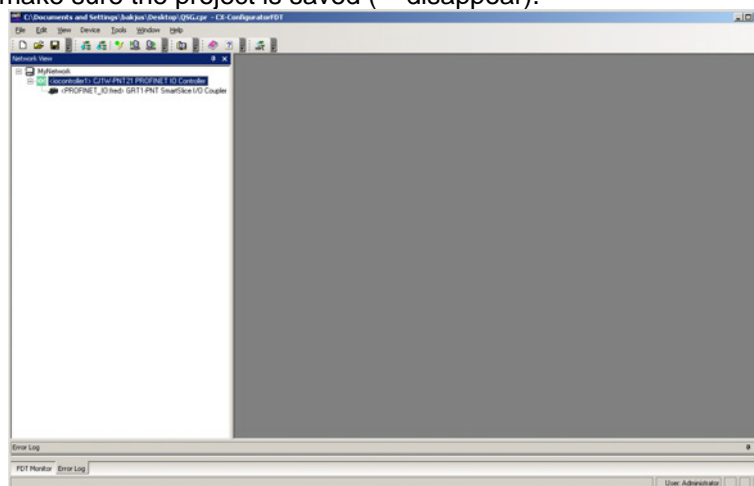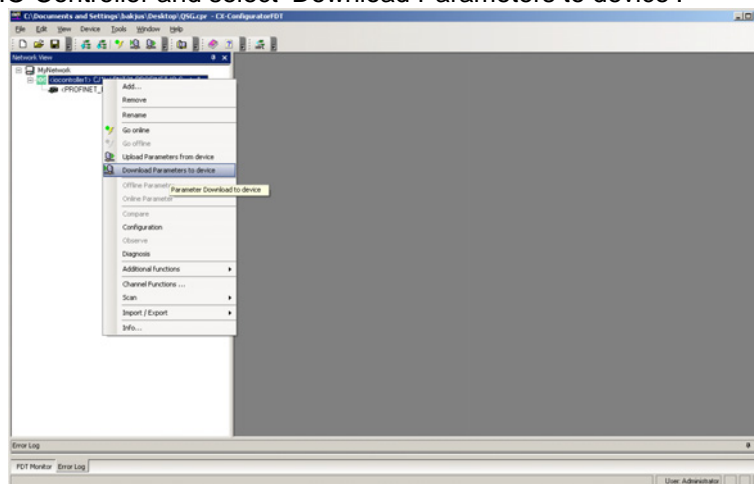
to…

Saving configuration before download to IO Controller

When there is an '*' displayed in Windows title or in network 'tree', then the configuration on the 'screen' does not match that stored on Disk. Before downloading Configuration changes to the IO Controller, please make sure the project is saved ('*' disappear).

Download Configuration

Now the project (configuration) can be sent to the IO Controller.
Right Click on the IO Controller and select 'Download Parameters to device'.

Once Parameters Downloaded, system requires restart. This is easily achieved by turning power off and then on. Please make sure the IO Devices are powered on before the IO Controller (or at least at the same time).

This should result in communication between IO Device(s) and IO Controller and hence cyclic IO exchange.

Where is my data?

Data is mapped to/from PLC where IO Device configuration was set.
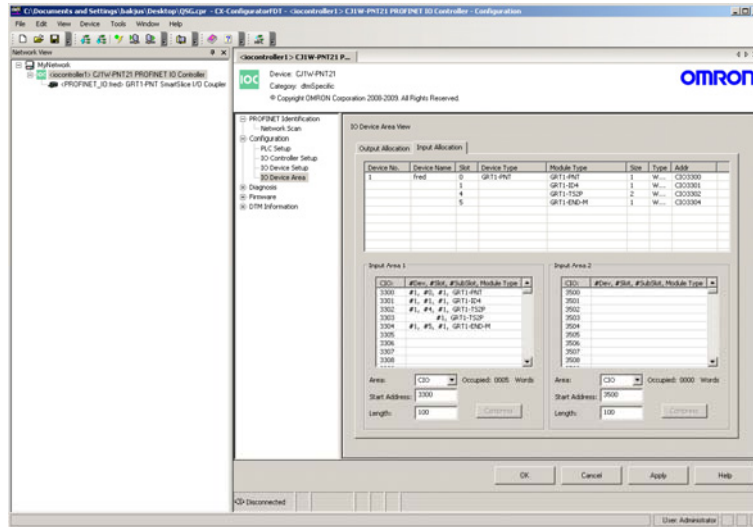

In this example, the input data from the Input devices will start at CIO 3300. Note that the PROFINET Smart Slice bus coupler (GRT1-PNT) has IO allocated – to allow user to read Slice 'status'.
Select the 'Output Allocation' tab for output IO.

Configuring individual Smart Slice parameters

To configure/setup parameters on individual Smart Slices (e.g. changing range on an Analogue input from 0V-5V to 4mA-20mA), Cx-Configurator FDT must be connected to the Profinet using an Ethernet connection (same connection to set 'names'). It is not currently possible to use another communication option (e.g. via USB on PLC CPU).

Once 'on-line', configuration data for Individual Smart Slices can be modified, compared and uploaded.

Connection diagram for Smart Slice Parameter configuration

Ethernet to configure Smart Slices of IO Devices
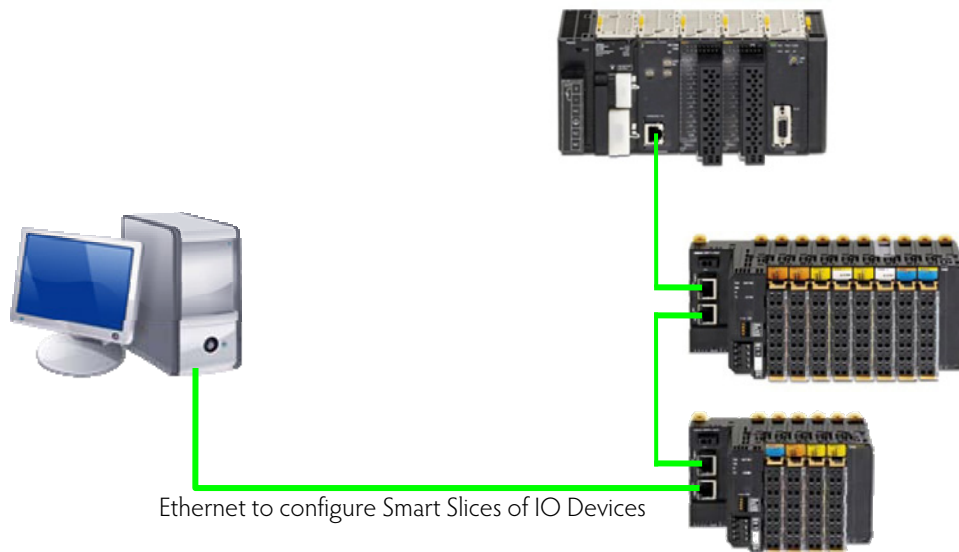
The PC running Cx-Configurator FDT must have a unique IP address set on the same network as the Profinet. For example, if the PROFINET IO Controller is 192.168.9.100, PROFINET IO Device is 192.168.9.90, then set PC IP address to 192.168.9.20 (say).

Messages sent from Cx-Configurator FDT to the Smart Slice coupler are sent as FINS packets over PROFINET/Ethernet.

In the project tree 'open' the Smart Slice component. Also right click on the same component in the tree and 'Work Online'. When connected, the buttons along the component will no longer be greyed out.
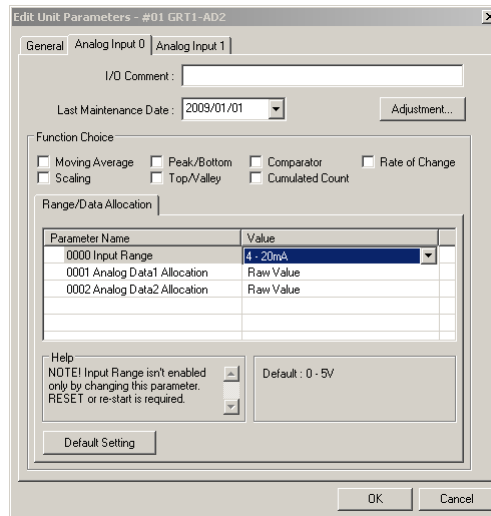
Italic = online

Online = not greyed out
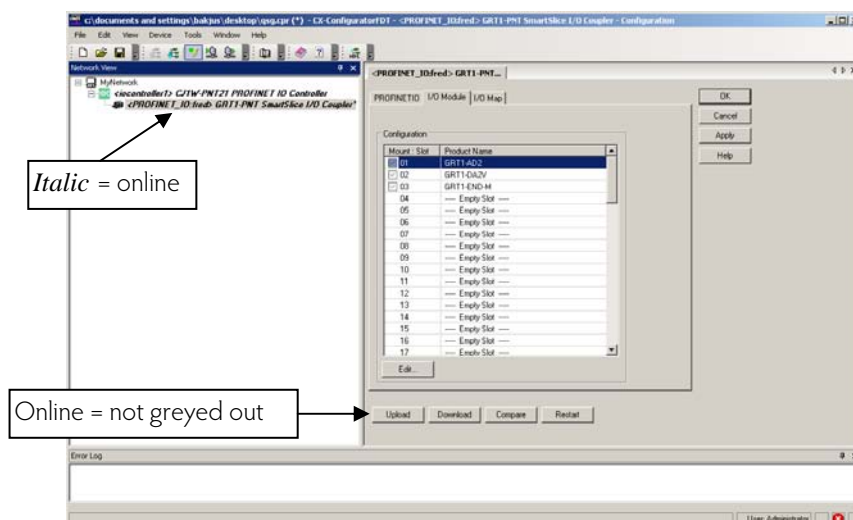
Use 'Edit' button to modify settings.
For example, to change the input range on 'Smart Slice AD2' from 0V-5V to 4mA-20mA

Once changes have been made, click 'OK' to close the Edit window. Use the 'Download' button to transfer the new settings to the Smart Slice Coupler. The unit will usually require a 'restart' for the new settings to take effect.

Hint – make a backup

Please keep a backup copy of the Cx-Configurator FDT file (*.cpr). Once configuration is downloaded to the IO Controller, it is not possible to upload configuration 'layout' details. It is not possible to connect with a 'blank' Cx-Configurator FDT network and upload devices that are connected to resurrect Cx-Configurator FDT configuration.

Further Information

For more detailed information about PROFINET IO setup, configuration and operation please refer to the relevant Omron manuals and support information:-

W12E-EN-xx   CJ1W-PNT21 Operation Manual
W16E-EN-xx   CS1W-PNT21 Operation Manual
W13E-EN-xx   GRT1-PNT Operation Manual

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PROFINET Quick Start Guide
Revision 1.00   November 2010   Original document
Revision 1.01   December 2010   Addition of Smart Slice parameter setup via Ethernet