

TURCK
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Industrial
Automation

BL67-GW-EN-IP-DN for ControlLogix Startup Guide

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1 Introduction

1.1 About this Quick Start-up Guide

This start-up guide contains information about the BL67-GW-EN-IP-DN. This gateway is a slave on the EtherNet/IP network and a master on the DeviceNet sub-network. This gateway can be used with or without local BL67 I/O slices. This gateway can only establish polled connection with the DeviceNet slaves.

2 Required Parts

2.1 Hardware

The following parts will be required to setup this BLident system.

- BL67-GW-EN-IP-DN – EtherNet/IP gateway with DeviceNet master
- DeviceNet slaves
 - In this example the following TURCK DeviceNet Aim stations with the corresponding addresses and data size are used. For a detailed I/O map, refer to the *Fieldbus I/O and Media* catalog (B3026):

1. FDNL-CPG88-T	(5 input bytes, 1 Output byte)
2. FDNL-CSG88-T	(2 Input bytes, 1 Output byte)
3. FDNL-L1600-T	(6 Input bytes)
4. FDNL-L1600-T	(6 Input bytes)
5. FDNL-S1600-T	(3 Input bytes)
6. FDNP-S0008G-TT	(1 Input byte, 1 Output byte)
7. FDNP-S0404G-TT	(1 Input byte, 1 Output byte)
8. FDNP-S0808G-TT	(2 Input bytes, 1 Output byte)
9. FDNP-XSG16-TT	(3 Input bytes, 2 Output bytes)
10. FDNQ-CSG44-T	(1 Input byte, 1 Output byte)
11. FDNQ-S0002G-T	(1 Input byte, 1 Output byte)
12. FDNQ-S0200G-T	(1 Input byte)
13. FDNQ-S0201G-T	(1 Input byte, 1 Output byte)
 - Any combination of FDN, BL20, BL67 and any other DeviceNet slaves will work.
- *BL67 I/O modules and corresponding bases
 - In this example the following BL67 I/O modules are used:

1. BL67-8DI-P
2. BL67-4DO-0.5A-P
3. BL67-4DO-0.5A-P
- EtherNet/IP master
 - In this example a ControlLogix rack with a ControlLogix 5563 controller and a ControlLogix ENBT/A Ethernet bridge module
- RKM 50-*M – Power cable
 - * indicates length in meters
- RSSD RJ45S 441-*M – Ethernet cable to connect the gateway to the ControlLogix Ethernet module
 - * indicates length in meters
- *XN-PS2-CABLE – serial programming cable for the gateway
- DeviceNet media
 - One cable with a female M12 connector – connects to the gateway
 - Any other DeviceNet media (T's, terminating resistors, etc) required to build a network
 - DeviceNet power supply and any additional media
 - Power supply for any slaves requiring auxiliary power
- Ethernet or other media required for programming the ControlLogix – Ethernet switch recommended

*Optional



2.2 Software

The following software will be required to setup this system.

- IO Assistant ([http://www.turck-usa.com/Support/Downloads ~ Software/IO_Assistant_Software.htm](http://www.turck-usa.com/Support/Downloads~Software/IO_Assistant_Software.htm))
 - In this example version 3.0 is used
- EtherNet/IP master configuration and programming software
 - In this example RSLogix V16.00.00 is used

3 Setup

3.1 Hardware Setup

1. Prepare the BL67 hardware. In this example the 8DI module is located in slot 1 of the BL67 rack and the two 4DO modules occupy slots 2 and 3. The gateway can operate without any BL67 I/O modules. If no I/O modules are connected, the gateway will simply act as a DeviceNet to EtherNet/IP gateway.
2. Set the IP address of the gateway using the rotary switches. In this example the x100, x10 and x1 rotary switches are set to 0, 1 and 0 respectively. This means the IP address is 192.168.1.10. To change the IP address to something other than 192.168.1.xxx, refer to the *IO Assistant 3 App Note – Changing the IP Address*.
3. Build the DeviceNet network following all DeviceNet rules. Remember to include a DeviceNet power supply, auxiliary power as needed, as well as two terminating resistors.
4. Power up the programmable gateway and the DeviceNet devices.
5. Push the SET button for about 10 seconds to store the gateway configuration. The DeviceNet master will automatically detect and add all connected stations to its scan list. During this process, the DN LED on the gateway will blink green. The Network LED's on the DeviceNet slave devices will most likely also be blinking. This process may take a few minutes. When the DeviceNet network is learned by the gateway, the DN LED should turn solid green as well as all the Network LED's on the slave devices. At this point the IO, GW, VCC, VO, VI and DN gateways should all be solid green.

The hardware is ready. The final configuration should look like the figure below.

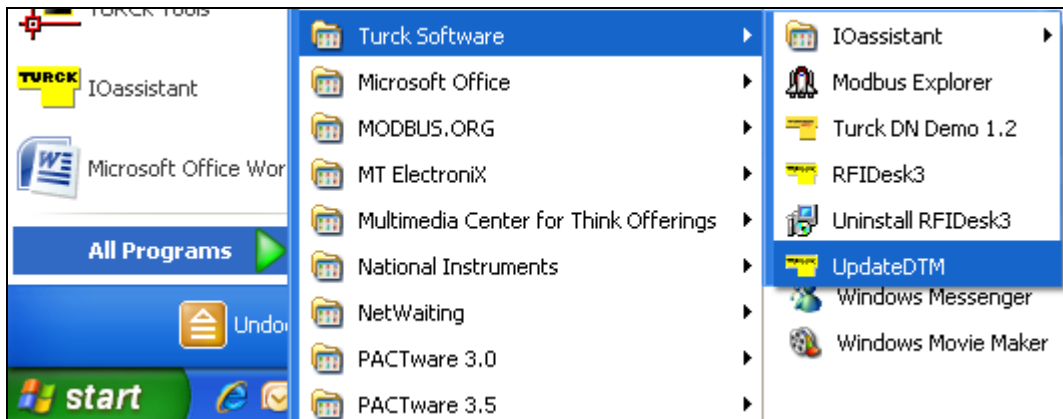


3.2 IO Assistant Configuration

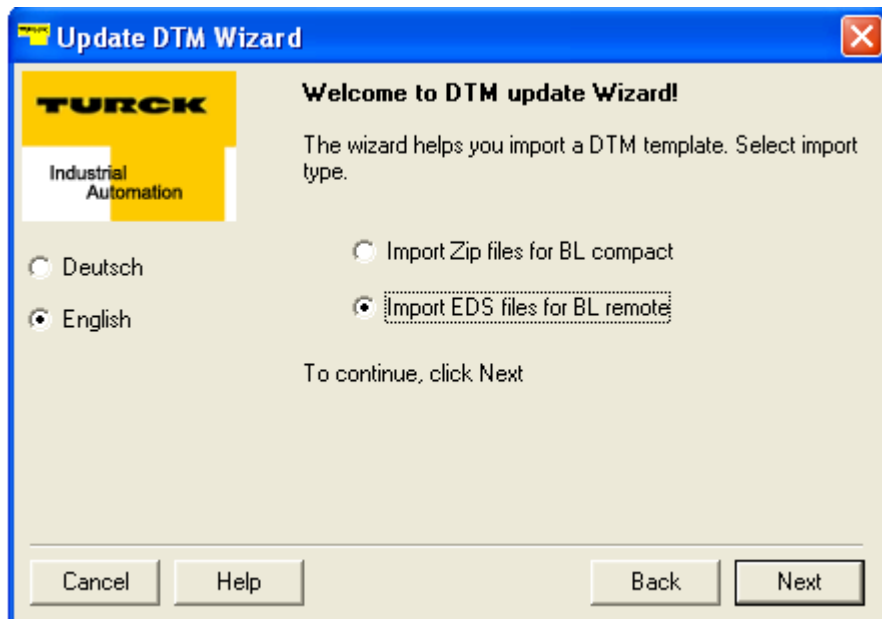
If the local BL67 I/O modules and DeviceNet subnetwork do not include modules that require special configuration (i.e. 4-20 vs. 0-20 mA, thermocouple type, etc) and the list of modules is not significantly large, IO Assistant software will not be necessary. However, if IO Assistant is not used, the process data map will need to be determined manually. In this example IO Assistant V3.0 will be used to show how to configure the local modules and the DeviceNet slaves and how to generate the process input/output map.

Before jumping into IO Assistant, there is a step that can be taken to make working with DeviceNet devices in IO Assistant easier. This step import the EDS files into IO Assistant to make the configuration of the device easier. This, like IO Assistant, is not a necessary step in working with the BL67-GW-EN-IP-DN, but it can be a very useful tool and therefore it will be covered in this example.

1. Open the "UpdateDTM" program under "Turck Software." This program gets downloaded with the DTM version V1.00.0400.



2. Highlight "Import EDS files for BL remote" and click on "Next"



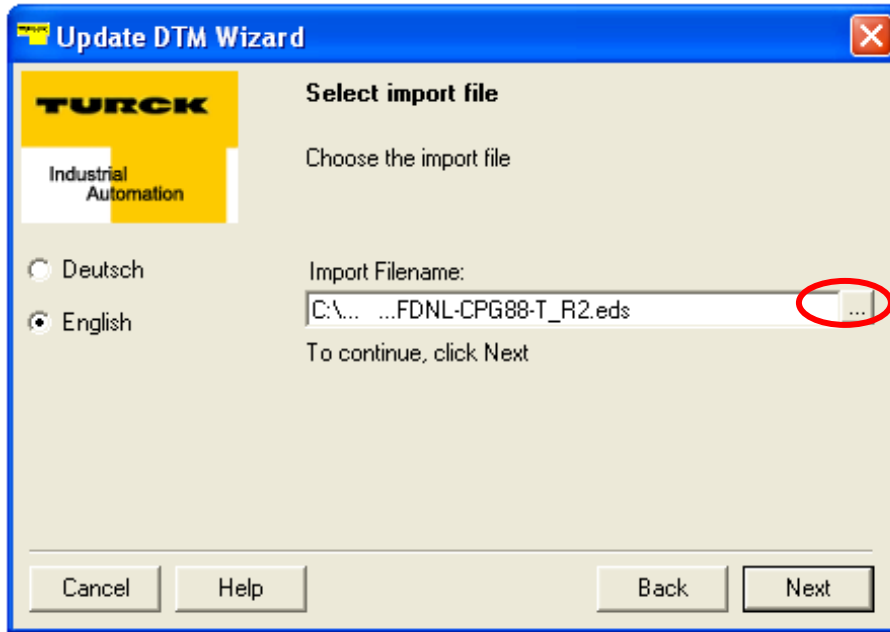
3. Click on the browse button on the right. When the EDS file select window appears, select the correct path to where the EDS files are saved and select the EDS files that you want to import. There is a limit



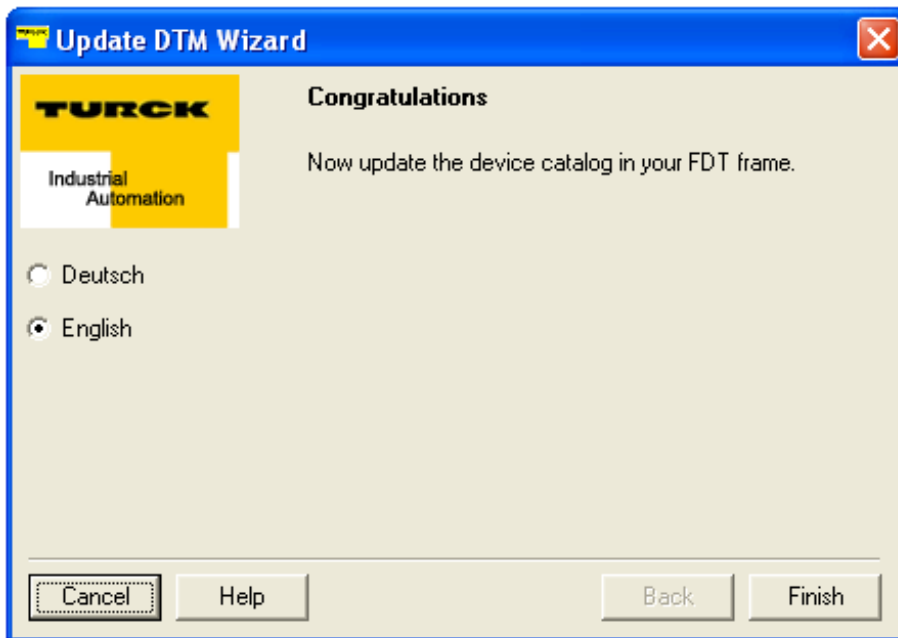
to about seven EDS files, depending on the name length of the files. To download TURCK EDS files follow the link below:

http://www.turck-usa.com/Support/Networks/Configuration_Files.htm

The name of the files should appear in the "Import Filename:" Click on "Next."

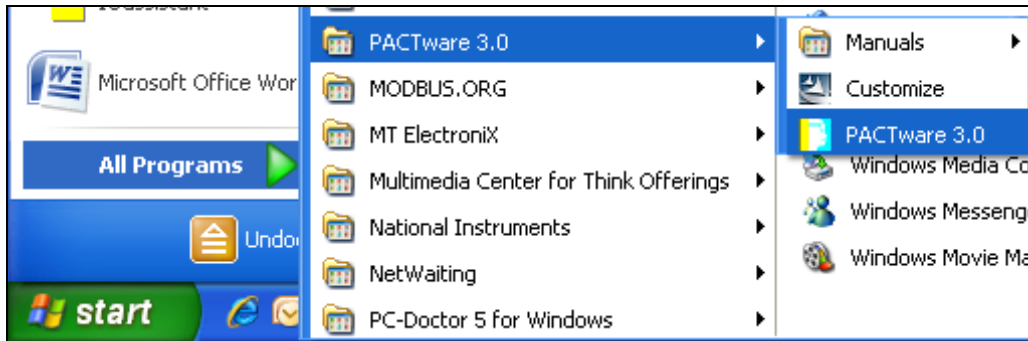


4. The following message will appear. Updating the device catalog will be covered in the next section. Click on "Finish."



This example assumes that IO Assistant V3.0 (PACTware 3.0 with version V1.00.0400 DTM's) is installed.

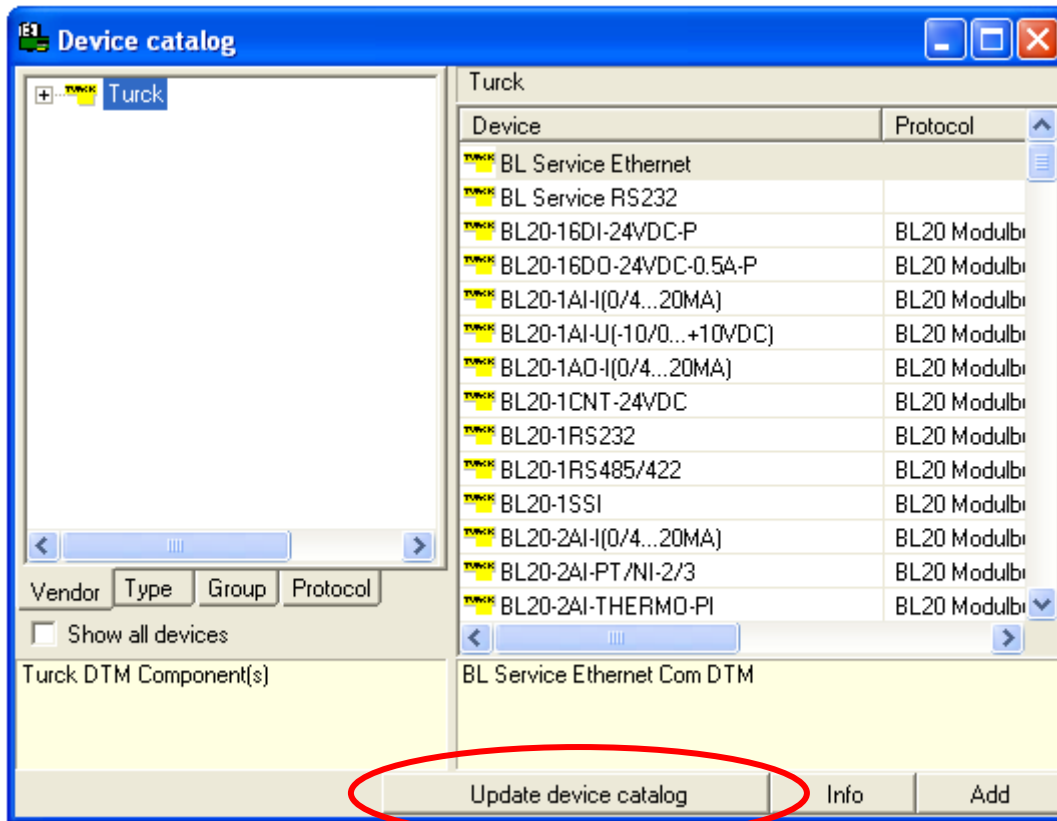
1. Open IO Assistant V3.0 (PACTware)



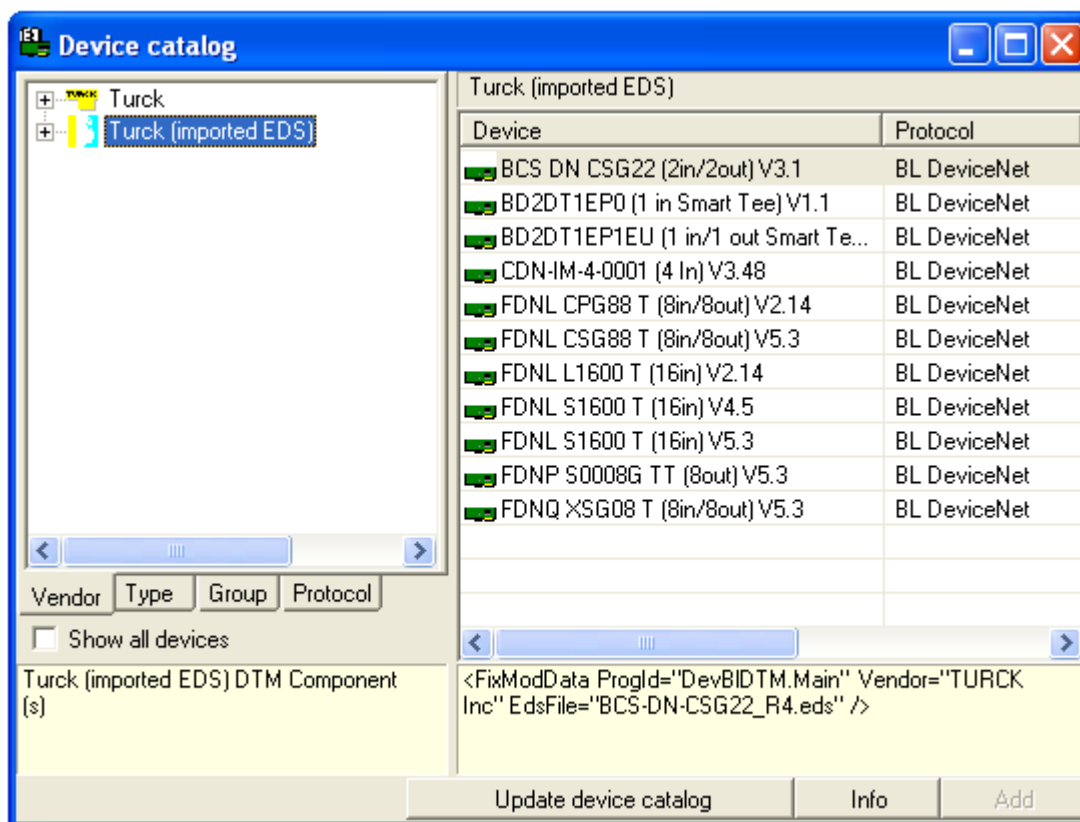
2. Click on the "Device catalog" button on the taskbar.



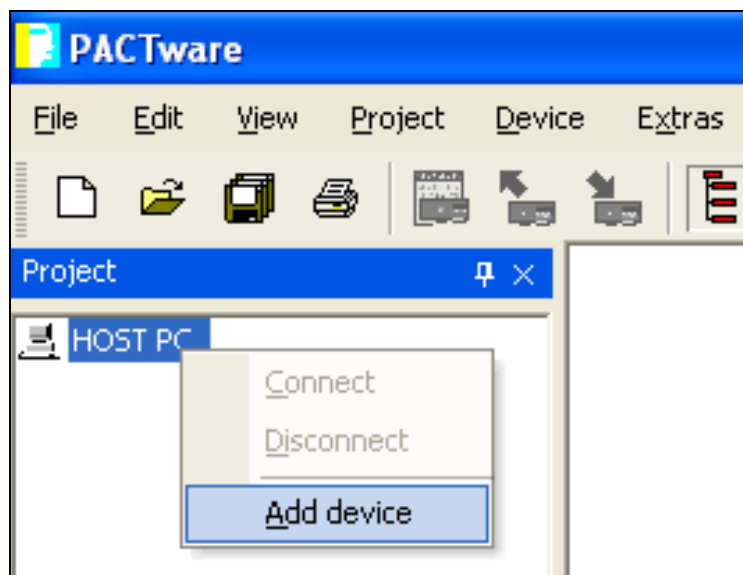
3. Click on "Update device catalog" button at the bottom then click "Yes" on the "Create new PACTware device catalog?" window.



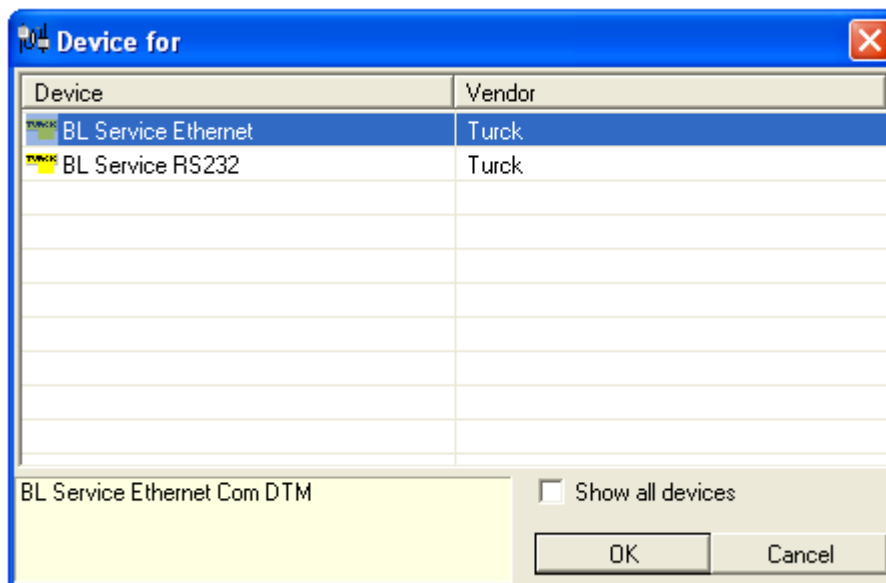
4. "Turck (imported EDS)" should now show up in the Device catalog. Close the Device catalog.



5. Right-click on the "HOST PC" in the project window and then click on "Add device"

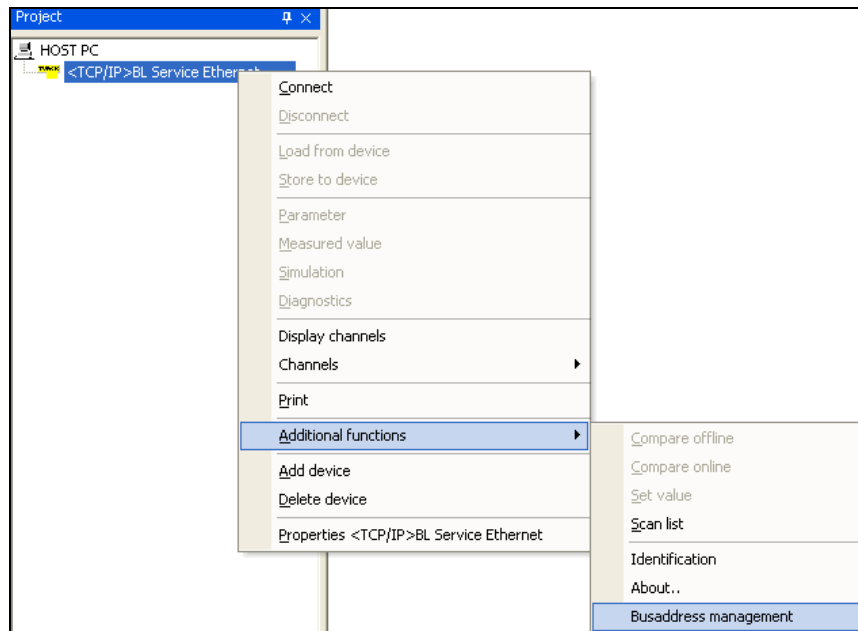


- There will be a list of communication DTM's which will include the two TURCK communication devices. Either device can be chosen. The "BL Service RS232" device will require the XN-PS2-CABLE. This communicates through the port under the clear programming window. The "BL Service Ethernet" will communicate through the Ethernet (middle) port on the BL67-GW-EN-IP-DN. Either a crossover cable or a patch cable can be used. (In order to establish communication between the BL67-GW-EN-IP-DN, ControlLogix rack and the PC at the same time, an ethernet switch will have to be used.) The "BL Service Ethernet" DTM will be used in this example. Highlight "BL Service Ethernet" and click "OK."

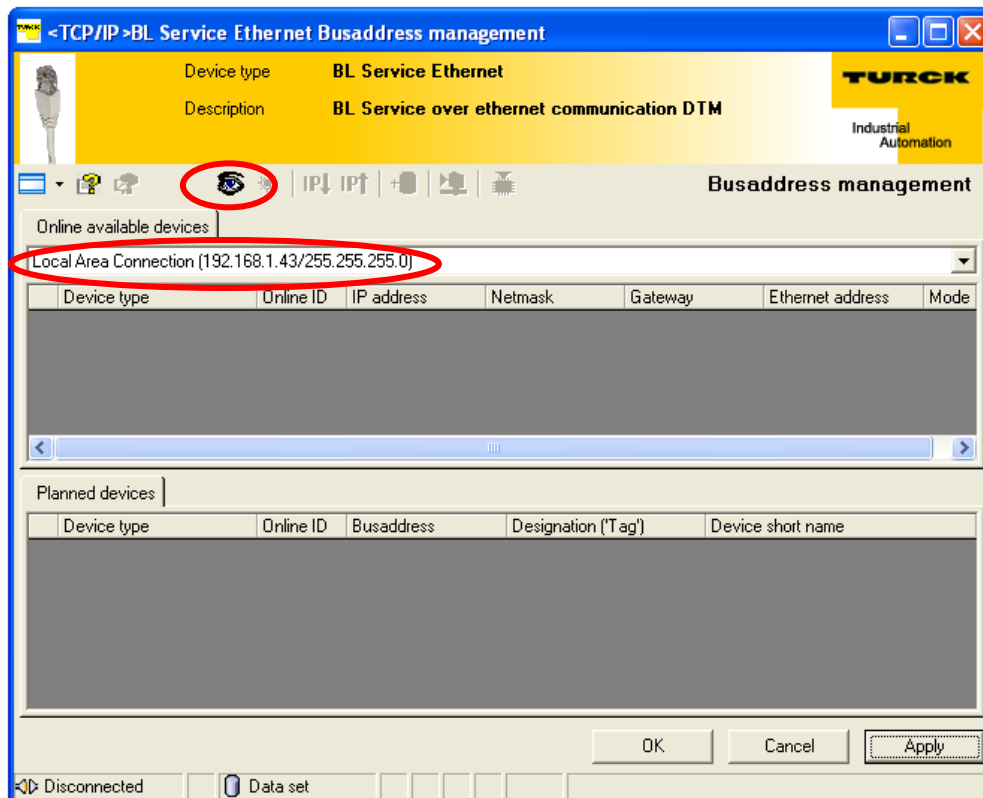


- Make sure the BL67-GW-EN-IP-DN is connected to the PC. The PC's IP address will need to be in the same subnet as the BL67-GW-EN-IP-DN. By default the BL67-GW-EN-IP-DN will be in the 192.168.1.xxx subnet. See the Appendix to change your PC's IP address.

- Right-click on "<TCP/IP>BL Service Ethernet" and then click on "Additional functions" >> "Busaddress management"

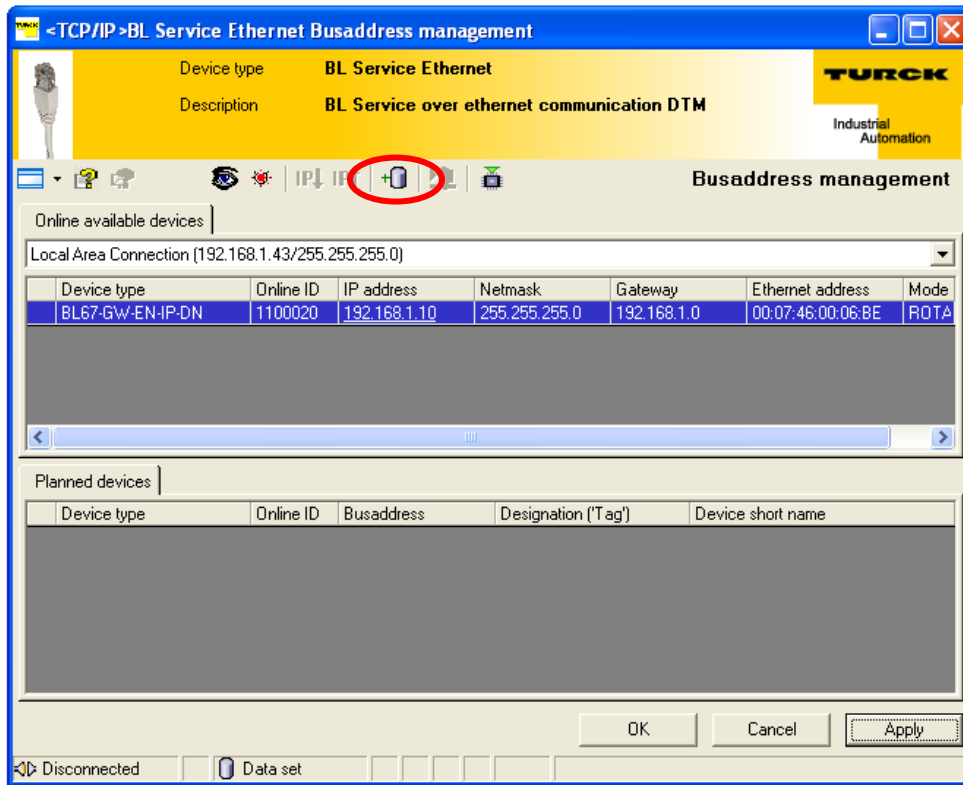


- Make sure that Local Area Connection <IP address of the PC> is chosen from the pull down menu. Click on the "Search" button (the eye.)

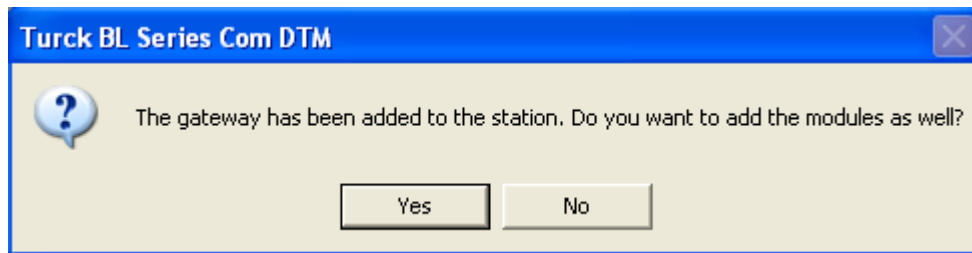




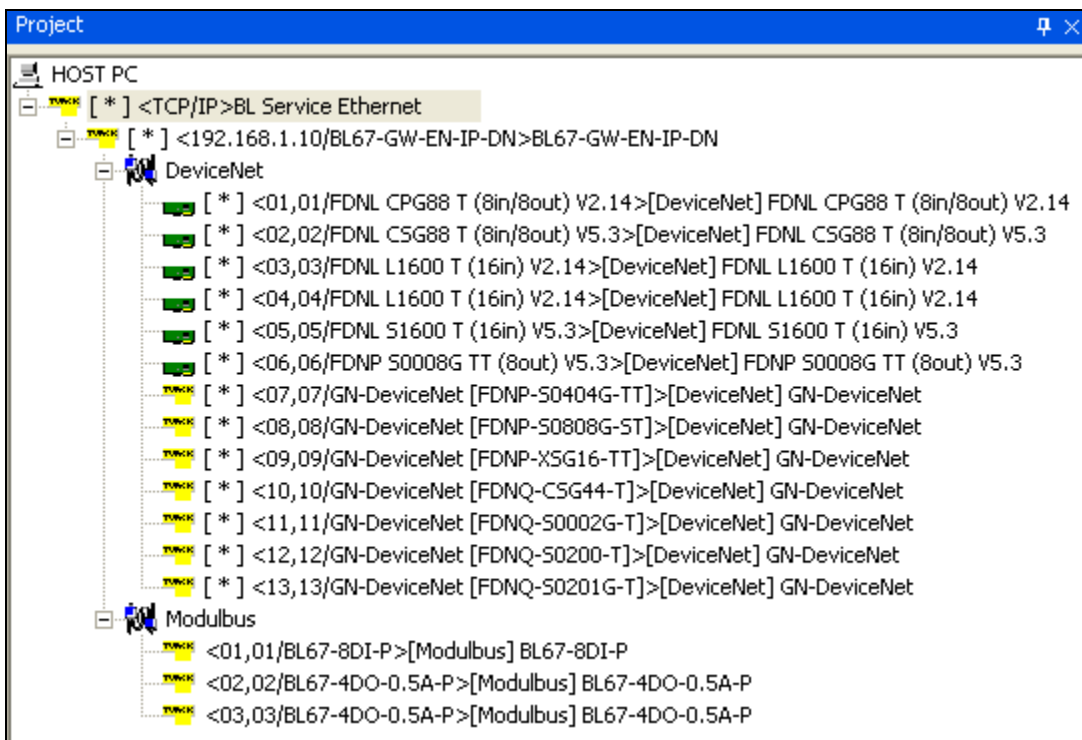
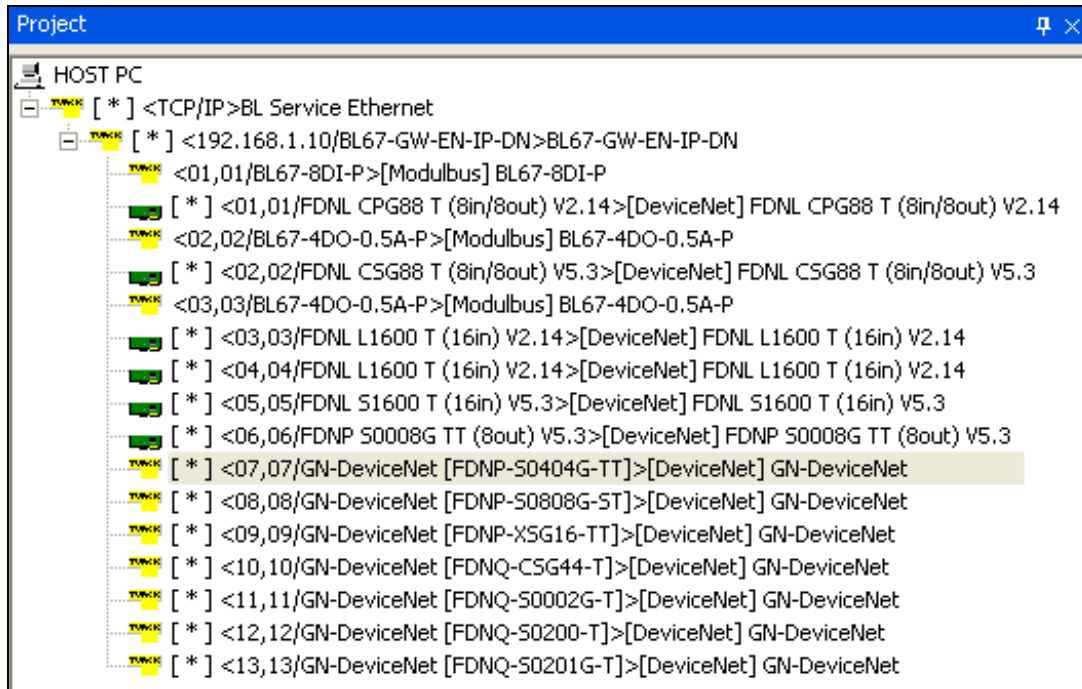
- The BL67-GW-EN-IP-DN will appear in the “Online available device.” Highlight the BL67-GW-EN-IP-DN and click on the “Add Device/DTM to project” button.



- The following message should appear. Click “Yes.” It may take a few seconds for IO Assistant to populate the project with the complete system.

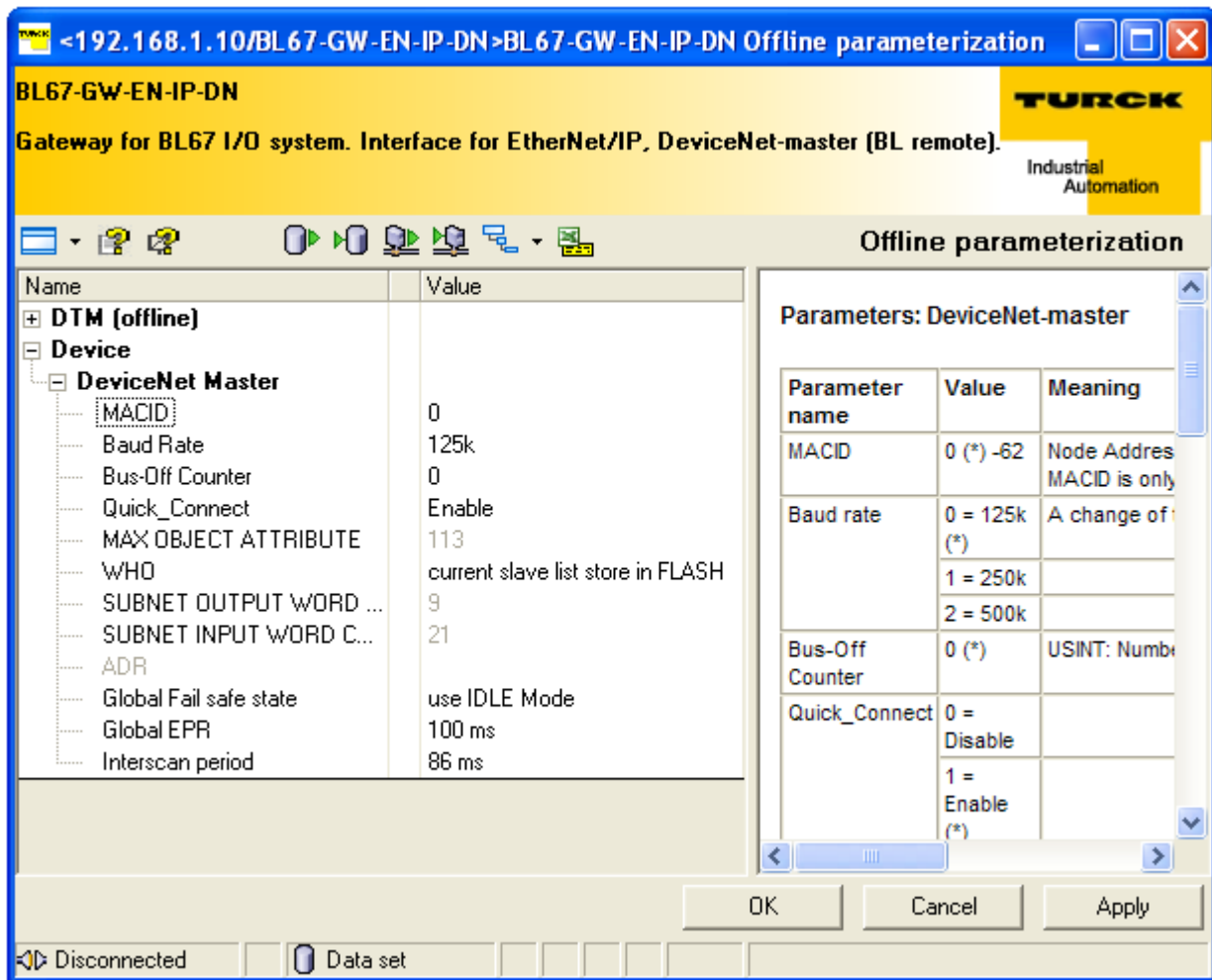


- The BL67-GW-EN-IP-DN and the connected local modules and DeviceNet devices will appear in the project window. The connected modules and devices can be displayed together (first figure) or grouped under the channel (Modulebus or DeviceNet) they belong to (second figure.) This option can be toggled by right-clicking on the BL67-GW-EN-IP-DN in the project window and choosing “Display channels”/”Do not display channels.”

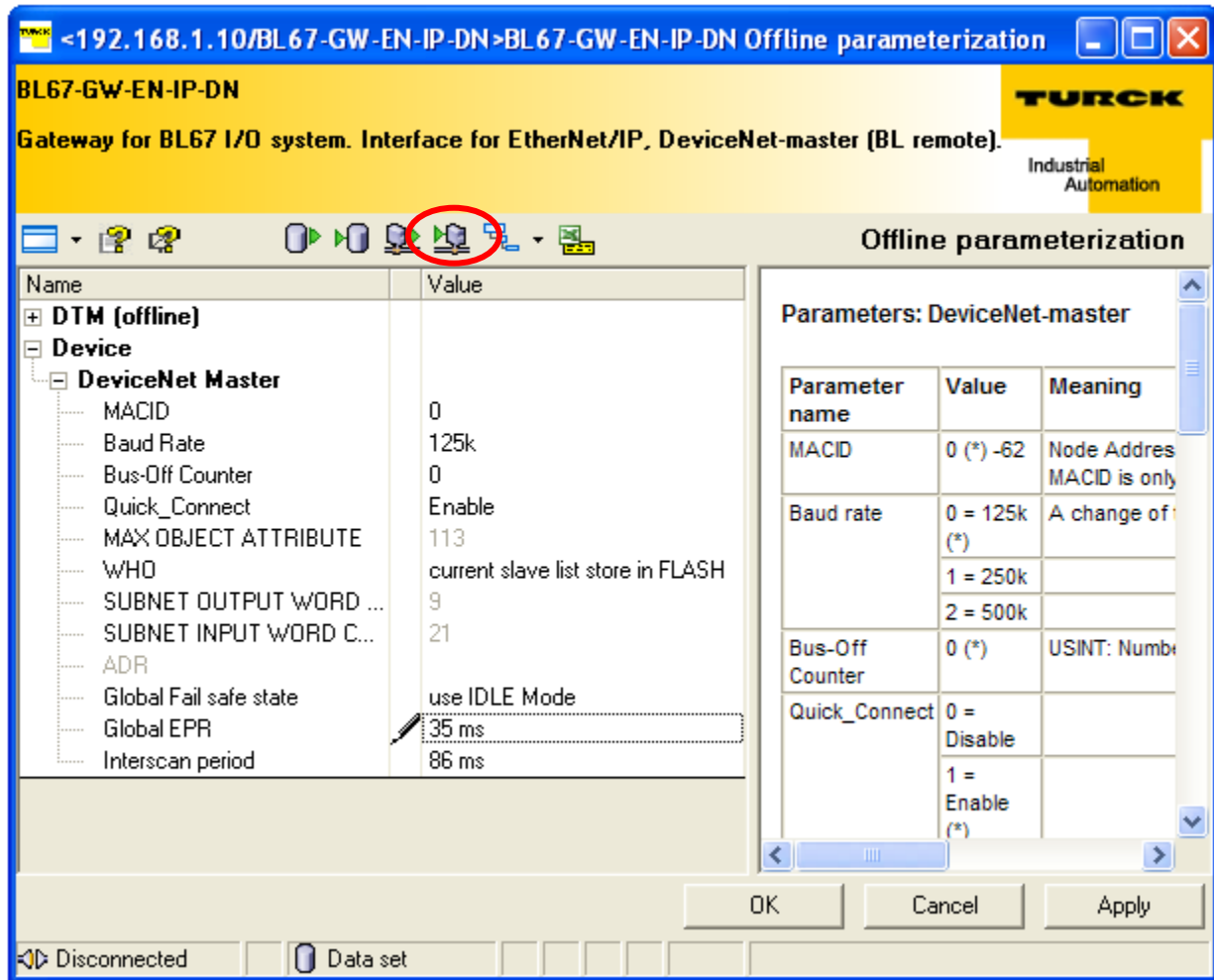




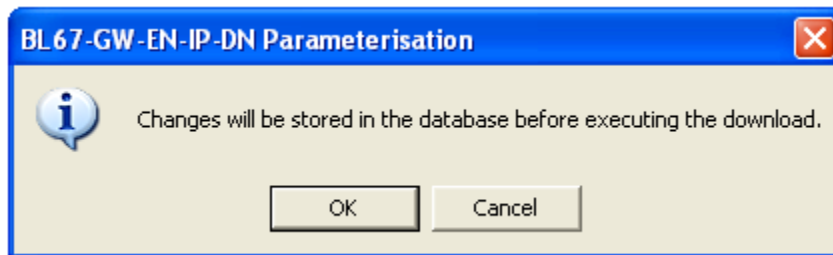
- Right-click on the BL67-GW-EN-IP-DN then click on “Parameter” >> “Offline parameterization.” There are several parameters that can be set here. The focus will be on the DeviceNet parameters.



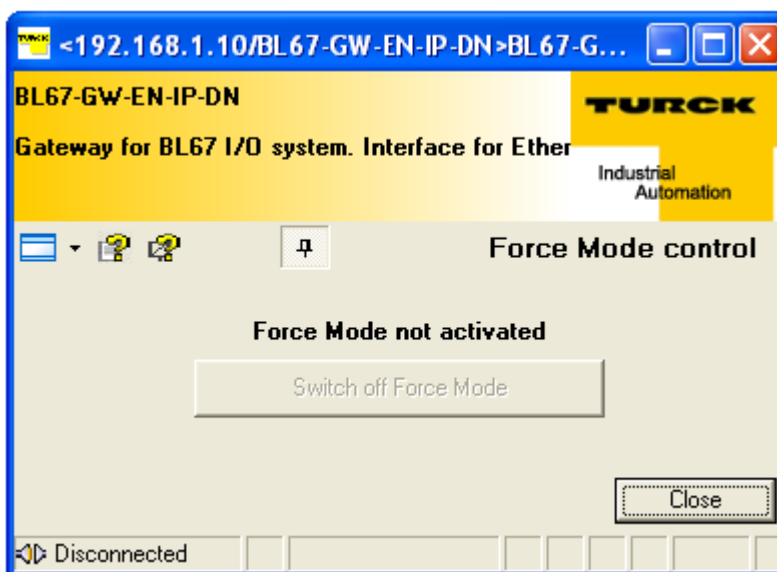
- The parameters as they appear in the figure above are the default values. Note the 125k baud rate. Also note that the “Global EPR” and the “Interscan period” (in this example) are 100 ms and 86 ms respectively. The “Interscan period” is a status (read only) value. The “Global EPR” can be adjusted to improve network performance. Highlight “100 ms” and type in a new value. (in this example, an interscan delay of approximately 20 ms is desired, therefore the EPR will be adjusted by the difference between current and desired interscan delay – 100ms – (86 – 20) ~ 35)



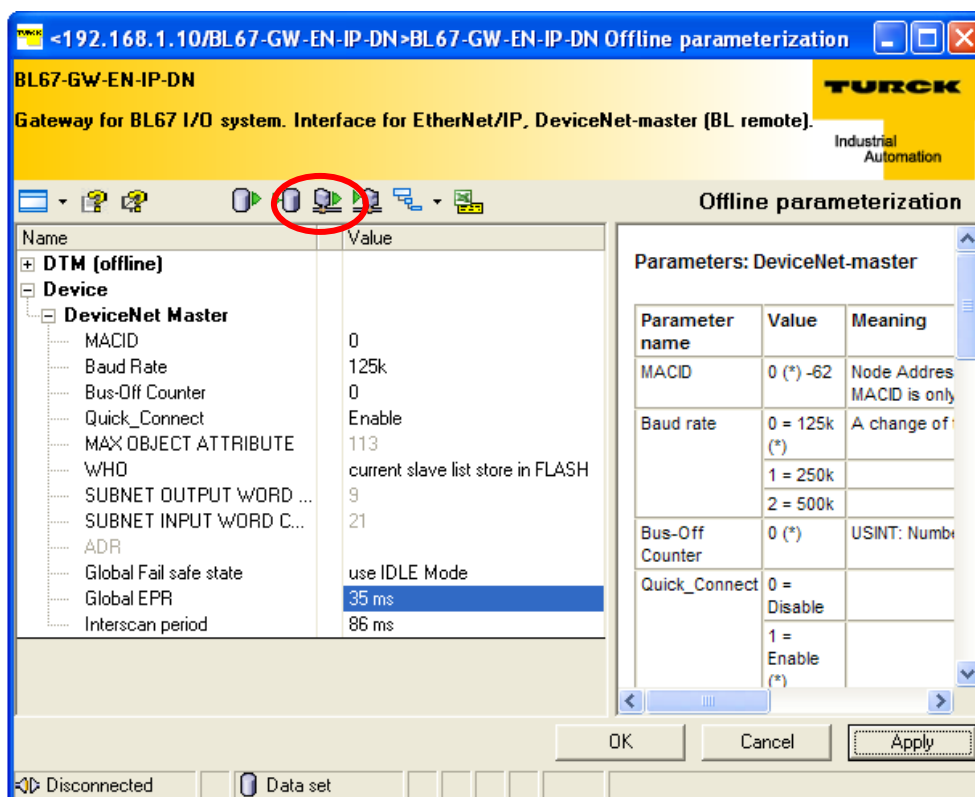
- When a new value is typed in a pencil appears to the left of the new value. This indicates that the new value is ready to be written to the device. If the new value is invalid, a red "!" will appear. Click on the "Transmit data to device" button. The following message should appear. The BL67-GW-EN-IP-DN automatically connects to download the new values.



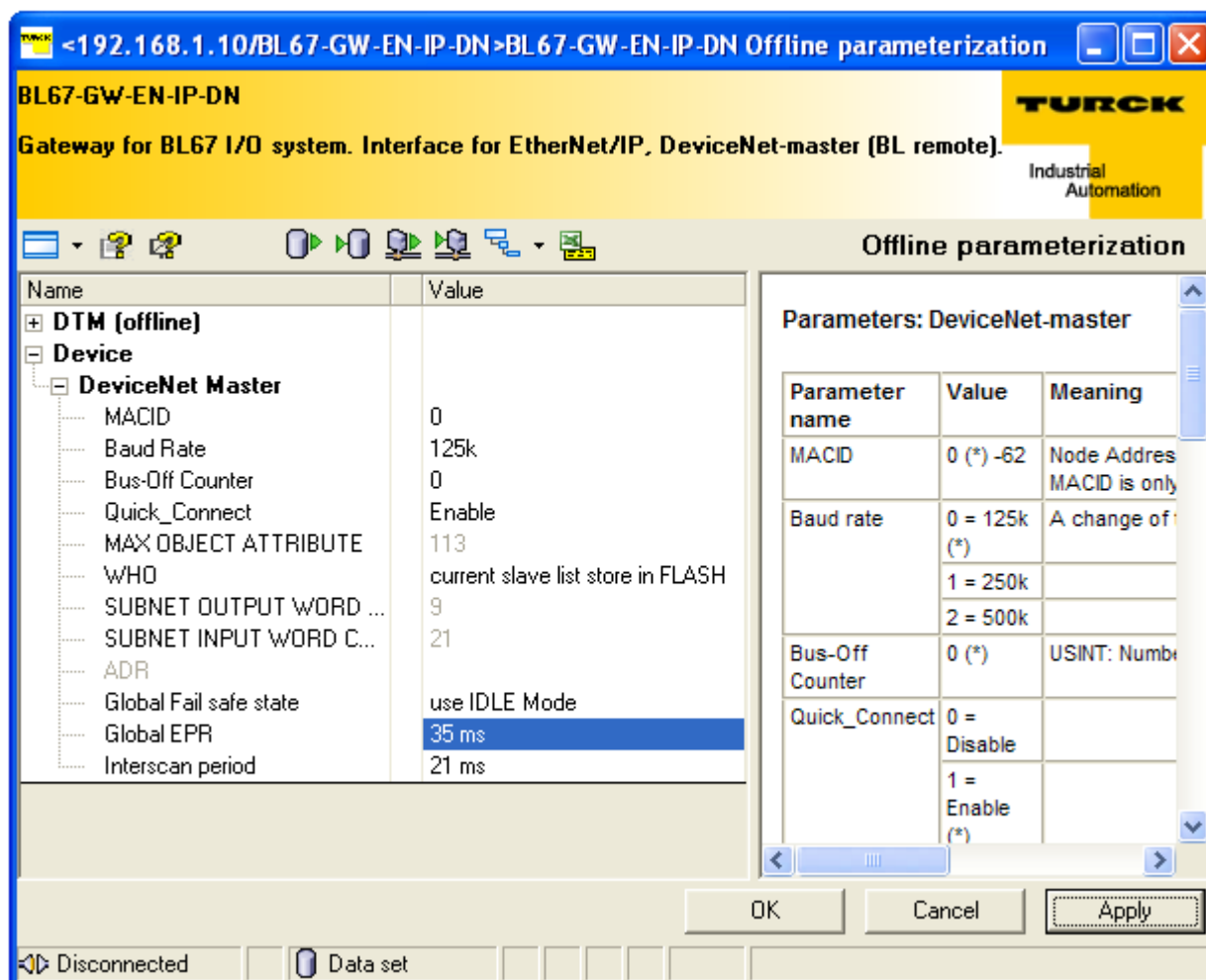
- Click “OK.” During the download the gateway needs to be in the force mode. After the download, depending on the settings, the gateway may remain in the force mode or it may deactivate the force mode. Either way, a force mode control window will appear. This window can be minimized or closed.



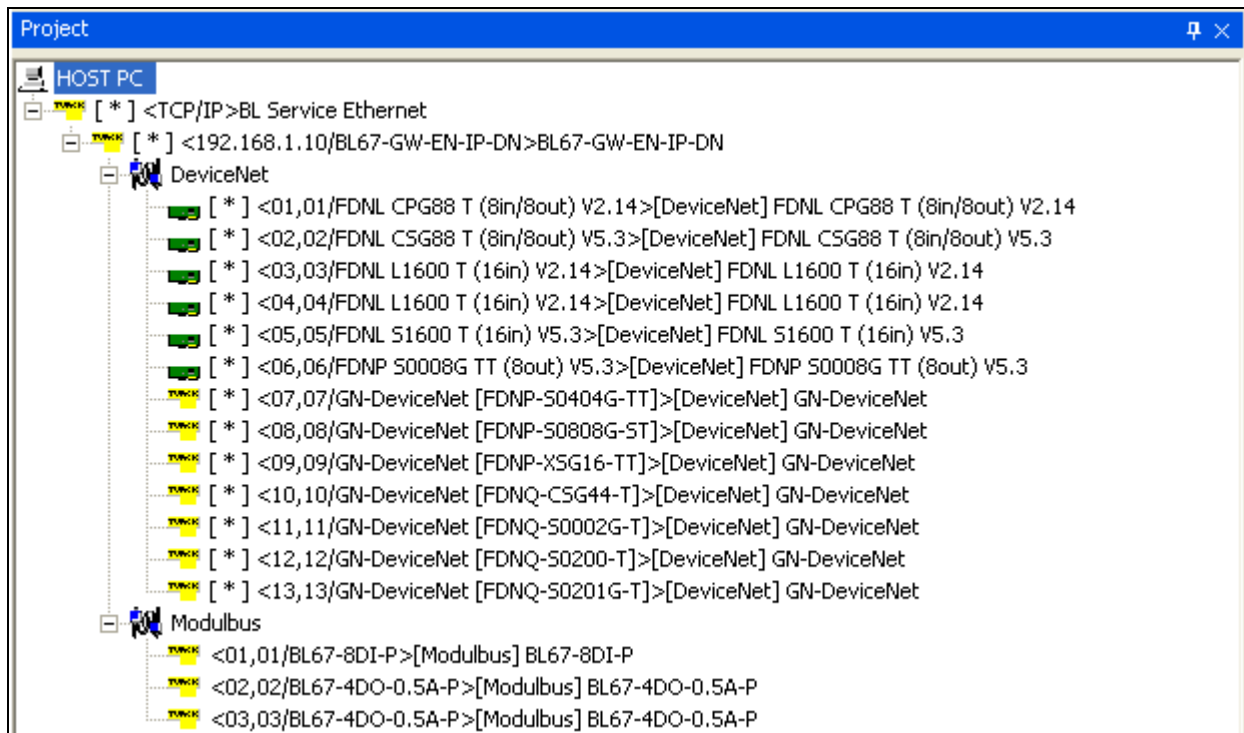
- After the download, the interscan period will still display the last value. To get the new interscan period, click on the “Read data from device” button.



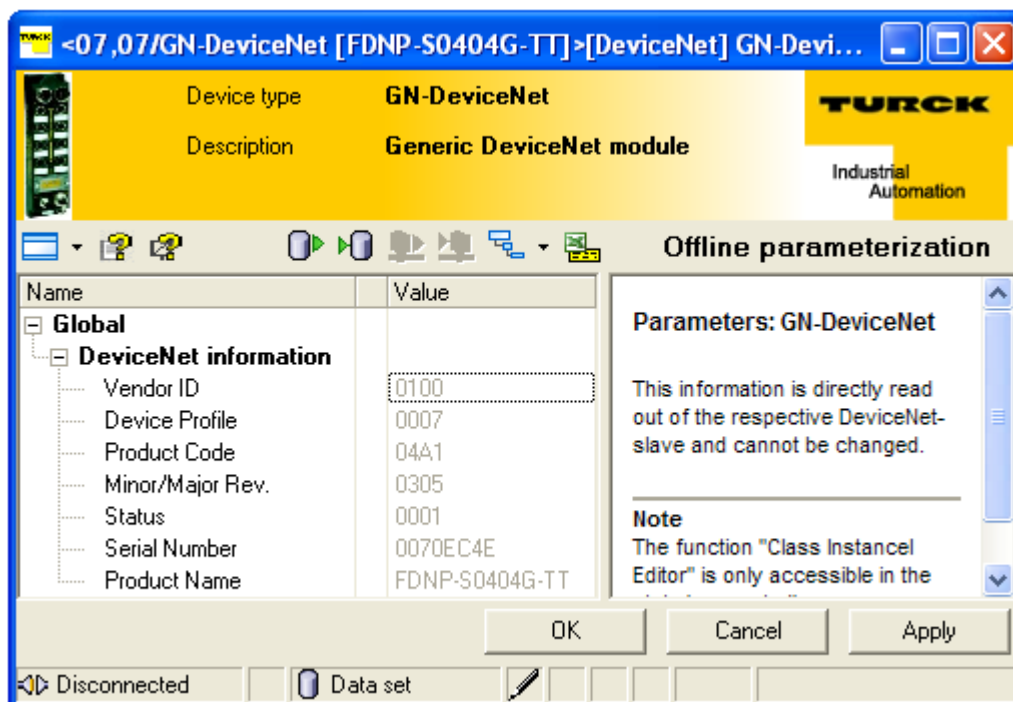
18. The other parameters can be set in a similar manner. An explanation of the parameters is in the right frame of the window.



19. The parameters of the modules can be set as well. Note the difference between the DeviceNet devices in the project window. The devices whose EDS files have been downloaded into IO Assistant will appear with a different graphic from the ones that haven't. The EDS files for devices 1 through 6 in the project below have been uploaded into IO Assistant. The EDS files for devices 7 through 13 have not.

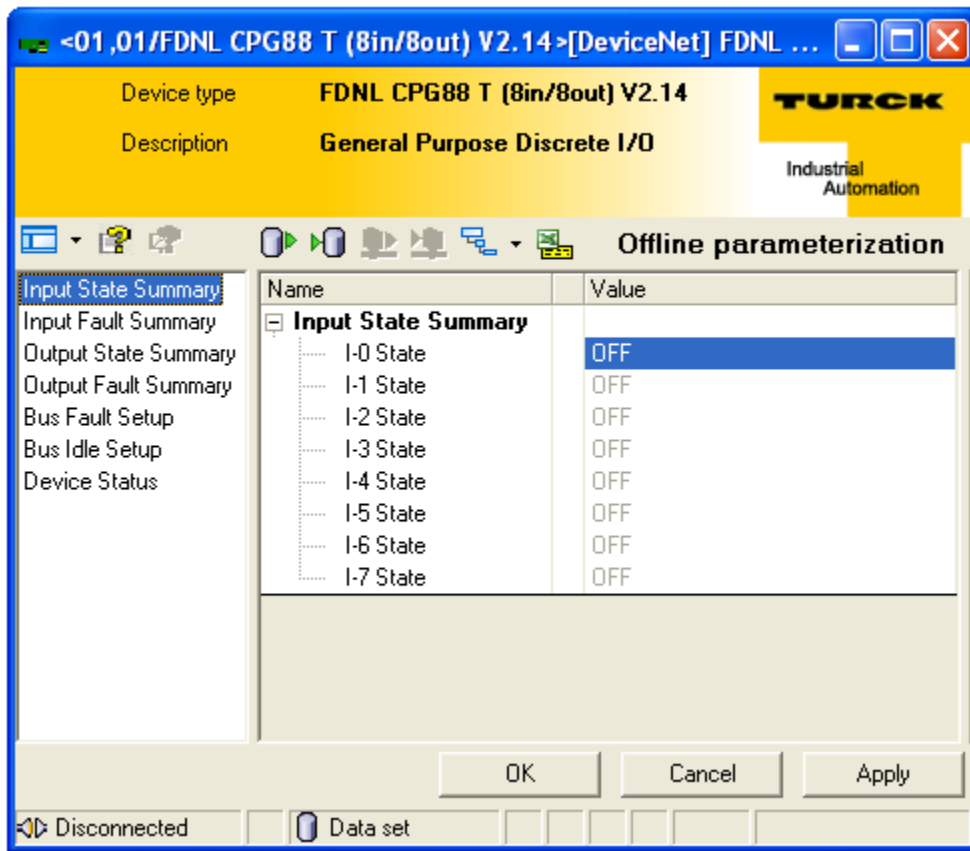


20. The parameters for devices without an EDS file can be seen in the figure below. Note there are no parameters that can be adjusted. For simple device without any parameters that need to be set or devices that can be used with their default parameters, this is sufficient and there is no need to upload any EDS files.





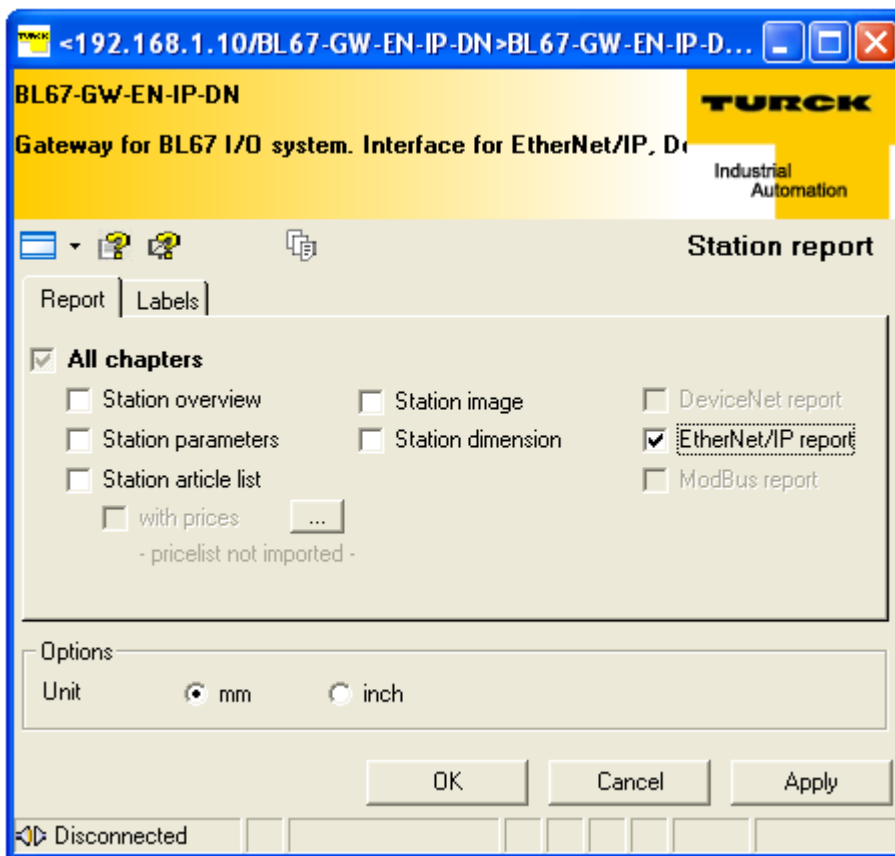
- For modules that will need to be configured, the EDS files will need to be uploaded and the modules parameters will be accessible. The figure below shows the parameters of the FDNL-CPG88-T.



3.3 EtherNet/IP I/O process data map

The data from the local modules and the DeviceNet devices is packed into one input and one output EtherNet/IP assembly. The DeviceNet devices are packed using a two-byte boundary. To obtain the EtherNet/IP I/O process map follow these steps.

- Right-click on the BL67-GW-EN-IP-DN in the project window and make sure the gateway is connected. (“Connect” should be greyed out, and “Disconnect” should be available.) If it is not, click on “Connect.”
- Right-click on BL67-GW-EN-IP-DN >> “Additional functions” >> “Station report”

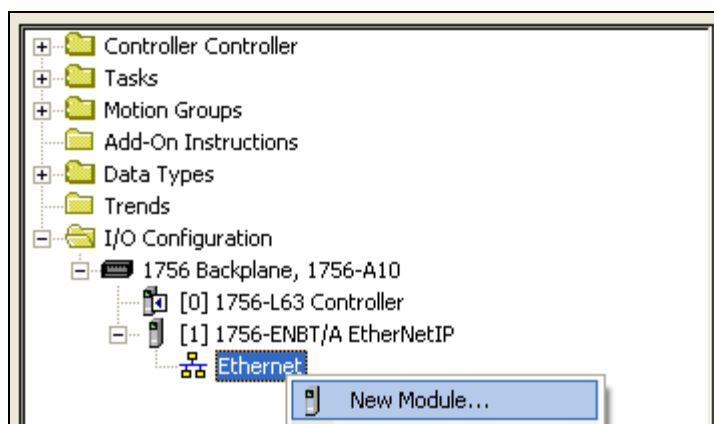


3. Check the “EtherNet/IP report” box and click “OK.” The other boxes can be checked to include additional information in the report. See Appendix B for the EtherNet/IP report.

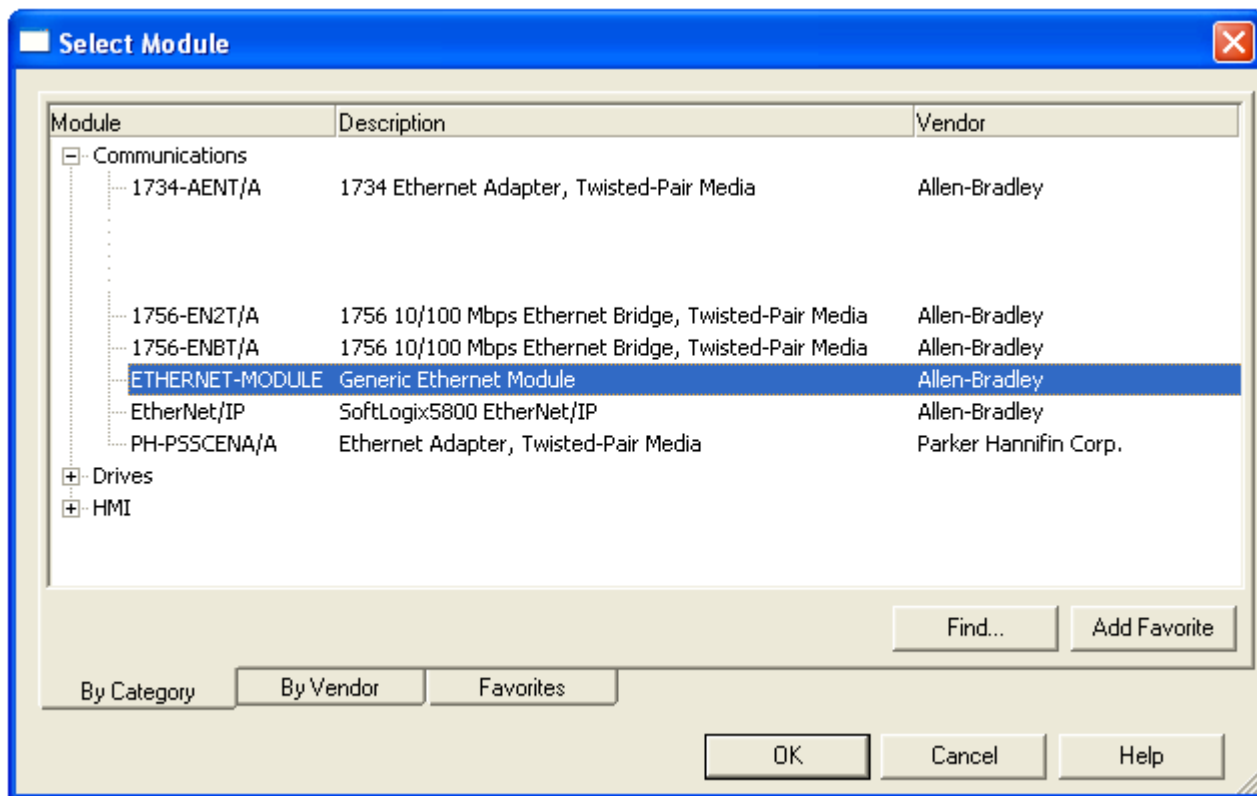
4 ControlLogix example

In this example, the BL67-GW-EN-IP-DN is going to be added to a ControlLogix configuration as a generic Ethernet device. The following steps assume that a project has already been started which includes an Ethernet/IP module. In this example the example project configuration includes a 1756-A10 (a 10 slot backplane) with a 1756-L63 (controller) in slot 0 and a 1756-ENBT/A (Ethernet bridge – Ethernet/IP master) in slot 1.

4. Right-click on “Ethernet” under the 1756-ENBT/A and then click on “New Module...”

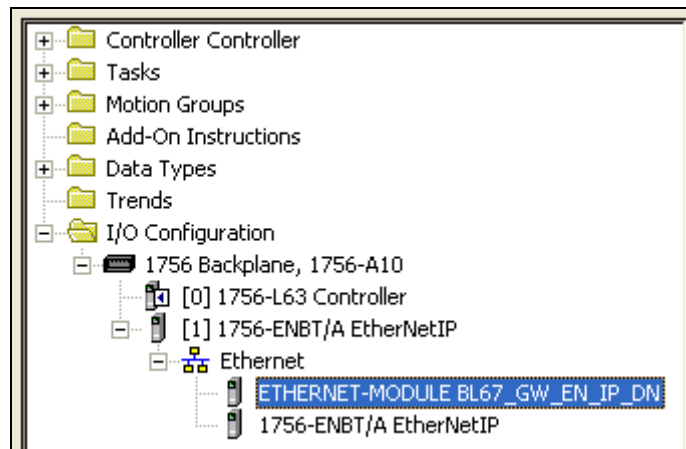
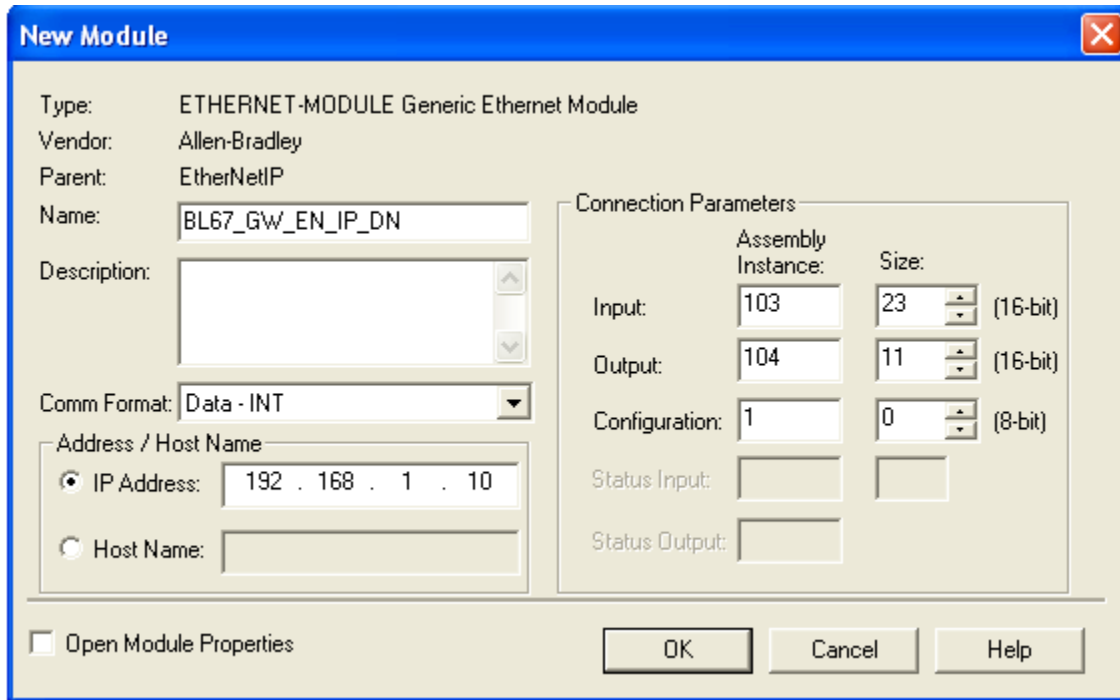


5. Expand the communications modules, scroll down to “ETHERNET-MODULE – Generic Ethernet Module - Allen-Bradley,” and click “OK”

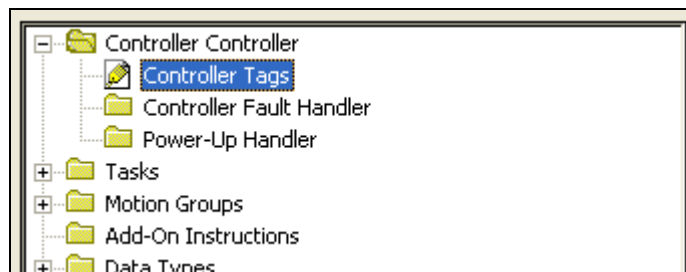


6. Fill in the following fields
 - a. Name: (any name, no spaces or special characters)
 - b. Comm Format: Data-INT
 - c. IP Address: (IP address of the BL67-GW-EN-IP-DN, in this example 192.168.1.10)
 - d. Input:
 - i. Assembly Instance: (101 or 103, in this example 103)
 1. 101 is the fixed 128 word instance
 2. 103 is the new dynamic size instance
 - ii. Size: (128 or dynamic)
 1. If “Assembly Instance” is 101, then 128
 2. If “Assembly Instance” is 103, then the size is determined by the process input data. In this example the process input data size is 46 bytes, therefore size is 23 (46/2)
 - e. Output:
 - i. Assembly Instance: (102 or 104, in this example 104)
 1. 102 is the fixed 128 word instance
 2. 104 is the new dynamic size instance
 - ii. Size: (128 or dynamic)
 1. If “Assembly Instance” is 102, then 128
 2. If “Assembly Instance” is 104, then the size is determined by the process input data. In this example the process input data size is 22 bytes, therefore size is 11 (22/2)
 - f. Configuration:
 - i. Assembly Instance: 1

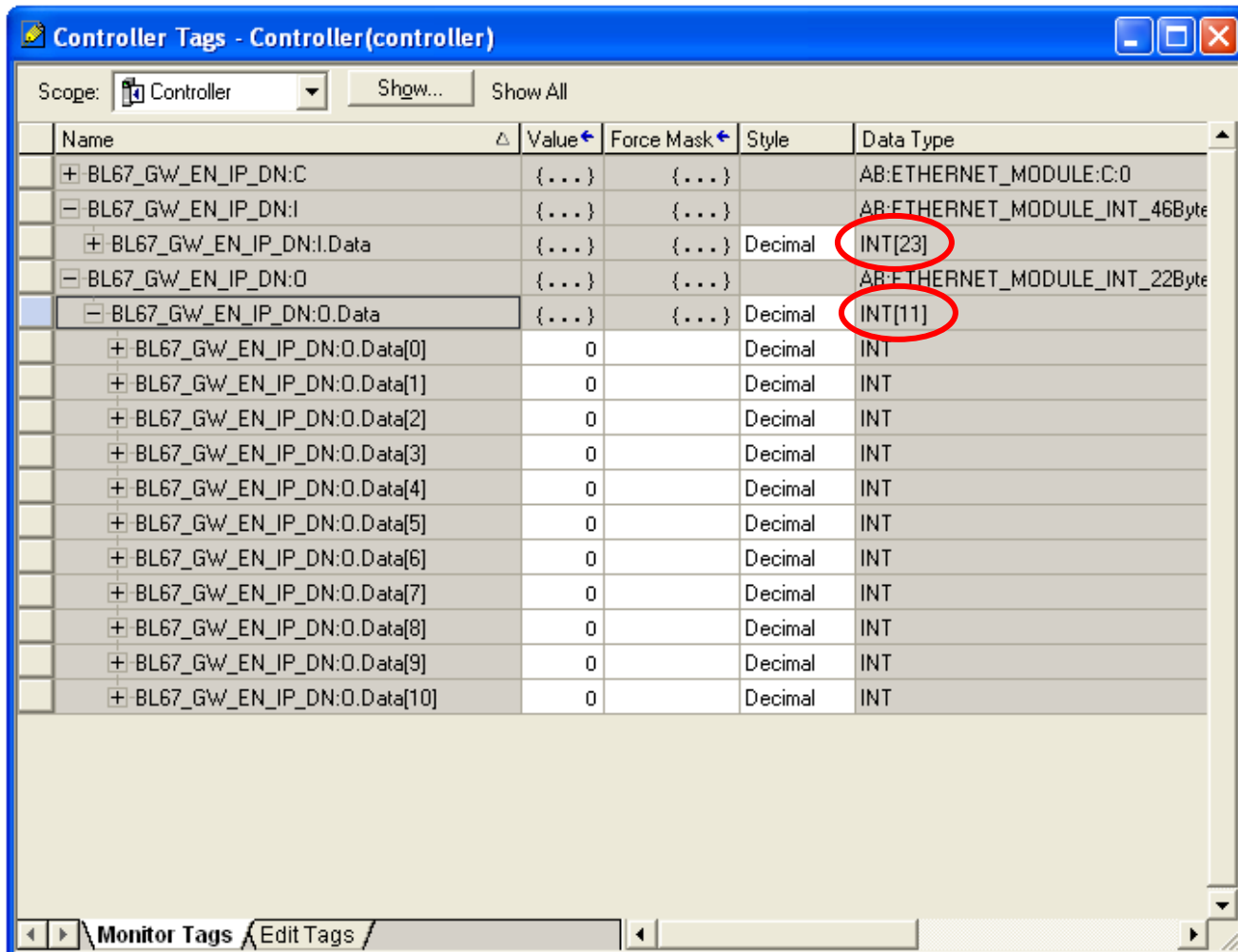
ii. Size: 0



7. Expand the “Controller <controller name>” and click on “Controller Tags”



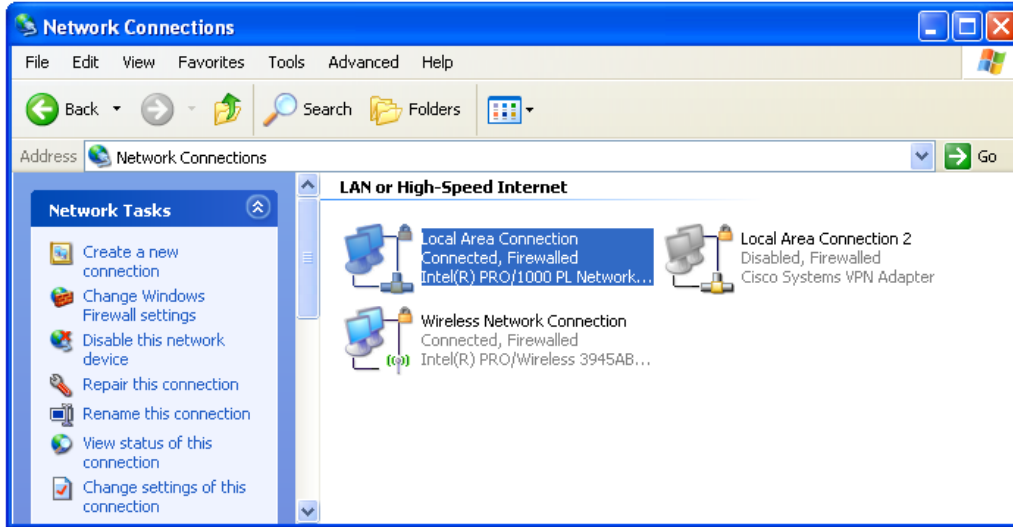
8. The following data tags starting with the name of the generic Ethernet module previously created. Note the size of the input and output data arrays. The output data array is expanded to show all words. It can be expanded to the bit level. These input/output words will be mapped according to the EtherNet/IP report.



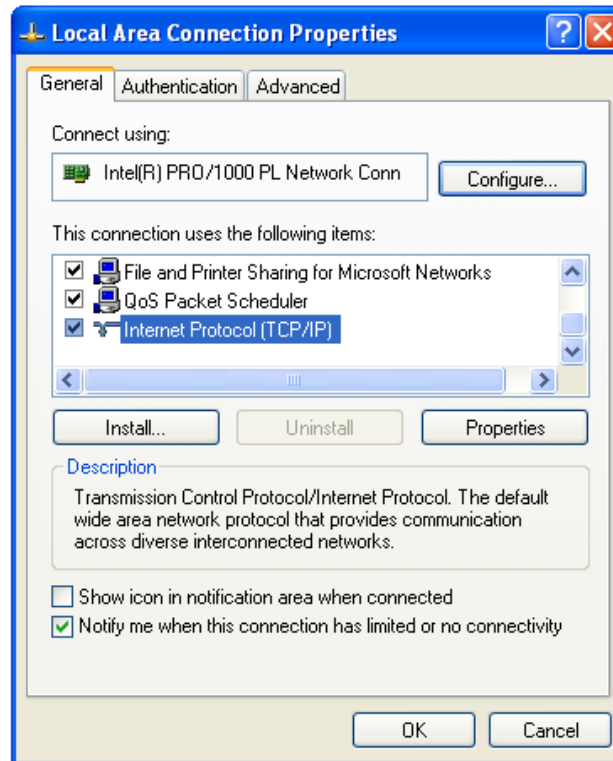
Name	Value	Force Mask	Style	Data Type
BL67_GW_EN_IP_DN:C	{...}	{...}		AB:ETHERNET_MODULE:C:0
BL67_GW_EN_IP_DN:I	{...}	{...}		AB:ETHERNET_MODULE_INT_46Byte
+ BL67_GW_EN_IP_DN:I.Data	{...}	{...}	Decimal	INT[23]
BL67_GW_EN_IP_DN:O	{...}	{...}		AB:ETHERNET_MODULE_INT_22Byte
- BL67_GW_EN_IP_DN:O.Data	{...}	{...}	Decimal	INT[11]
+ BL67_GW_EN_IP_DN:O.Data[0]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[1]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[2]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[3]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[4]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[5]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[6]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[7]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[8]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[9]	0		Decimal	INT
+ BL67_GW_EN_IP_DN:O.Data[10]	0		Decimal	INT

5 Appendix A – Network Connections setup for the PC

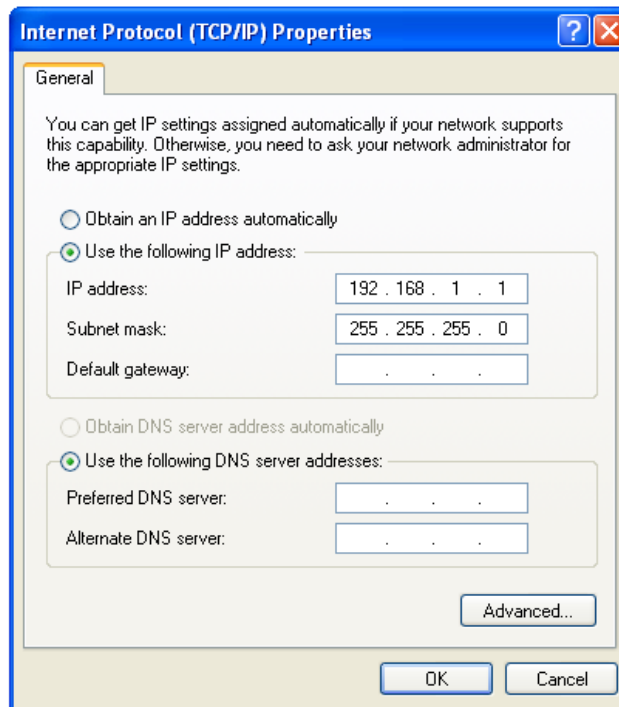
1. Open the “Network Connections” folder.



2. Right click on the “Local Area Connection” icon and choose “Properties.”



3. Highlight “Internet Protocol (TCP/IP)” and click on the “Properties” button.



4. Choose the "Use the following IP address" option and set the IP address to 192.168.1.x. The x can be set to anything from 0-255 and must be a unique number. It cannot be the same as the IP address chosen for the gateway.
5. The "Subnet Mask" should be set to 255.255.255.0.
6. Close the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection Properties" windows by clicking the "OK" button.



6 Appendix B – EtheNet/IP Report

(Report starts on the next page)

1. EtherNet/IP report

1.1. Station description

Station address: 192.168.1.10

Adr./Slot	Name	TAG	Descr.	Data Size In	Data Size Out
Slot 0*	BL67-GW-EN-IP-DN	192.168.1.10/BL67-GW-EN-IP-DN	Term0A	16 bit	16 bit
Slot 1	BL67-8DI-P	01/BL67-8DI-P	Term0B	8 bit	0 bit
Slot 2	BL67-4DO-0.5A-P	02/BL67-4DO-0.5A-P	Term0C	0 bit	4 bit
Slot 3	BL67-4DO-0.5A-P	03/BL67-4DO-0.5A-P	Term0D	0 bit	4 bit
DeviceNet process data				42 Byte	18 Byte
Total size for in/out data in bytes (rounded on full words)				46	22

*For detailed information about status/control word see online help

1.2. I/O map for input data

Bit	Byte n+1								Byte n							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word0*	0A.15	0A.14	0A.13	0A.12	0A.11	0A.10	0A.9	0A.8	0A.7	0A.6	0A.5	0A.4	0A.3	0A.2	0A.1	0A.0
Word1	-	-	-	-	-	-	-	-	0B.7	0B.6	0B.5	0B.4	0B.3	0B.2	0B.1	0B.0
Word2**	DeviceNet Slave Adr. 1 (Byte 1)								DeviceNet Slave Adr. 1 (Byte 0)							
Word3**	DeviceNet Slave Adr. 1 (Byte 3)								DeviceNet Slave Adr. 1 (Byte 2)							
Word4**	DeviceNet Slave Adr. 1 (Byte 5)								DeviceNet Slave Adr. 1 (Byte 4)							
Word5**	DeviceNet Slave Adr. 2 (Byte 1)								DeviceNet Slave Adr. 2 (Byte 0)							
Word6**	DeviceNet Slave Adr. 3 (Byte 1)								DeviceNet Slave Adr. 3 (Byte 0)							
Word7**	DeviceNet Slave Adr. 3 (Byte 3)								DeviceNet Slave Adr. 3 (Byte 2)							
Word8**	DeviceNet Slave Adr. 3 (Byte 5)								DeviceNet Slave Adr. 3 (Byte 4)							
Word9**	DeviceNet Slave Adr. 4 (Byte 1)								DeviceNet Slave Adr. 4 (Byte 0)							
Word10**	DeviceNet Slave Adr. 4 (Byte 3)								DeviceNet Slave Adr. 4 (Byte 2)							
Word11**	DeviceNet Slave Adr. 4 (Byte 5)								DeviceNet Slave Adr. 4 (Byte 4)							
Word12**	DeviceNet Slave Adr. 5 (Byte 1)								DeviceNet Slave Adr. 5 (Byte 0)							
Word13**	DeviceNet Slave Adr. 5 (Byte 3)								DeviceNet Slave Adr. 5 (Byte 2)							
Word14**	DeviceNet Slave Adr. 6 (Byte 1)								DeviceNet Slave Adr. 6 (Byte 0)							
Word15**	DeviceNet Slave Adr. 7 (Byte 1)								DeviceNet Slave Adr. 7 (Byte 0)							
Word16**	DeviceNet Slave Adr. 8 (Byte 1)								DeviceNet Slave Adr. 8 (Byte 0)							
Word17**	DeviceNet Slave Adr. 9 (Byte 1)								DeviceNet Slave Adr. 9 (Byte 0)							
Word18**	DeviceNet Slave Adr. 9 (Byte 3)								DeviceNet Slave Adr. 9 (Byte 2)							
Word19**	DeviceNet Slave Adr. 10 (Byte 1)								DeviceNet Slave Adr. 10 (Byte 0)							
Word20**	DeviceNet Slave Adr. 11 (Byte 1)								DeviceNet Slave Adr. 11 (Byte 0)							
Word21**	DeviceNet Slave Adr. 12 (Byte 1)								DeviceNet Slave Adr. 12 (Byte 0)							
Word22**	DeviceNet Slave Adr. 13 (Byte 1)								DeviceNet Slave Adr. 13 (Byte 0)							

*For detailed information about status/control word see online help

**DeviceNet online process data

Process input data: 46 Byte

1.3. I/O map for output data

Bit	Byte n+1								Byte n							
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Word0*	0A.15	0A.14	0A.13	0A.12	0A.11	0A.10	0A.9	0A.8	0A.7	0A.6	0A.5	0A.4	0A.3	0A.2	0A.1	0A.0
Word1	-	-	-	-	-	-	-	-	0D.3	0D.2	0D.1	0D.0	0C.3	0C.2	0C.1	0C.0
Word2**	DeviceNet Slave Adr. 1 (Byte 1)								DeviceNet Slave Adr. 1 (Byte 0)							
Word3**	DeviceNet Slave Adr. 2 (Byte 1)								DeviceNet Slave Adr. 2 (Byte 0)							
Word4**	DeviceNet Slave Adr. 6 (Byte 1)								DeviceNet Slave Adr. 6 (Byte 0)							
Word5**	DeviceNet Slave Adr. 7 (Byte 1)								DeviceNet Slave Adr. 7 (Byte 0)							
Word6**	DeviceNet Slave Adr. 8 (Byte 1)								DeviceNet Slave Adr. 8 (Byte 0)							
Word7**	DeviceNet Slave Adr. 9 (Byte 1)								DeviceNet Slave Adr. 9 (Byte 0)							
Word8**	DeviceNet Slave Adr. 10 (Byte 1)								DeviceNet Slave Adr. 10 (Byte 0)							
Word9**	DeviceNet Slave Adr. 11 (Byte 1)								DeviceNet Slave Adr. 11 (Byte 0)							
Word10**	DeviceNet Slave Adr. 13 (Byte 1)								DeviceNet Slave Adr. 13 (Byte 0)							

Station report

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**DeviceNet online process data

Process output data: 22 Byte