

FF Link/B

Connection via ControlNet Router

Technical Application Note

A-FFL/B

Document No. D122-018

Document Revision 1.0

04/2024

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1 PREFACE

1.1 PURPOSE OF THIS DOCUMENT

This document will assist the user to configure a Logix connection to an FF Link via a ControlNet Router.

1.2 ADDITIONAL INFORMATION

The following resources contain additional information that can assist the user with the module installation and operation.

Resource	Link
Slate Installation	http://www.aparian.com/software/slate
FF Link User Manual FF Link Datasheet Example Code & UDTs	https://www.aparian.com/products/ff-link-b
ControlNet Router User Manual ControlNet Router Datasheet Example Code & UDTs	http://www.aparian.com/products/controlnetrouter
ControlNet	http://www.odva.org
ControlNet Cabling	ControlNet Coax Media Planning and Installation Guide https://literature.rockwellautomation.com/idc/groups/literature/documents/in/cnet-in002_-en-p.pdf

1.3 SUPPORT

Technical support will be provided via the Web (in the form of user manuals, FAQ, datasheets etc.) to assist with installation, operation, and diagnostics.

For additional support the user can use either of the following:

Resource	Link
Contact us web link	www.aparian.com/contact-us
Support email	support@aparian.com

2 INTRODUCTION

The FF Link provides an interface between FOUNDATION™ Fieldbus (FF) H1 devices and EtherNet/IP or Modbus TCP.

By using the Aparian ControlNet Router, the FF Link can be effectively connected on an existing ControlNet network.

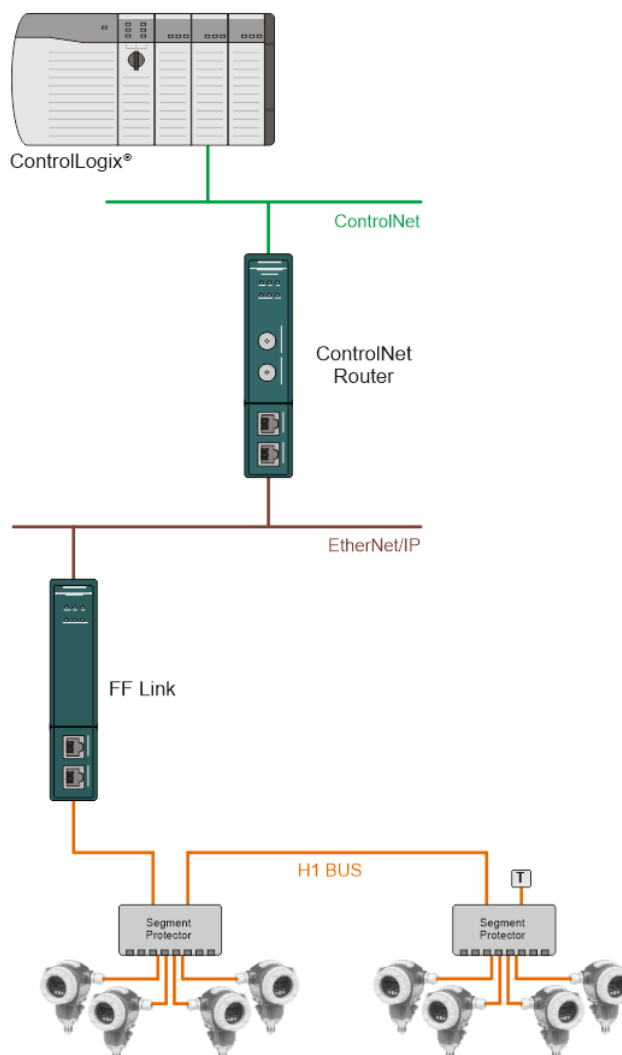
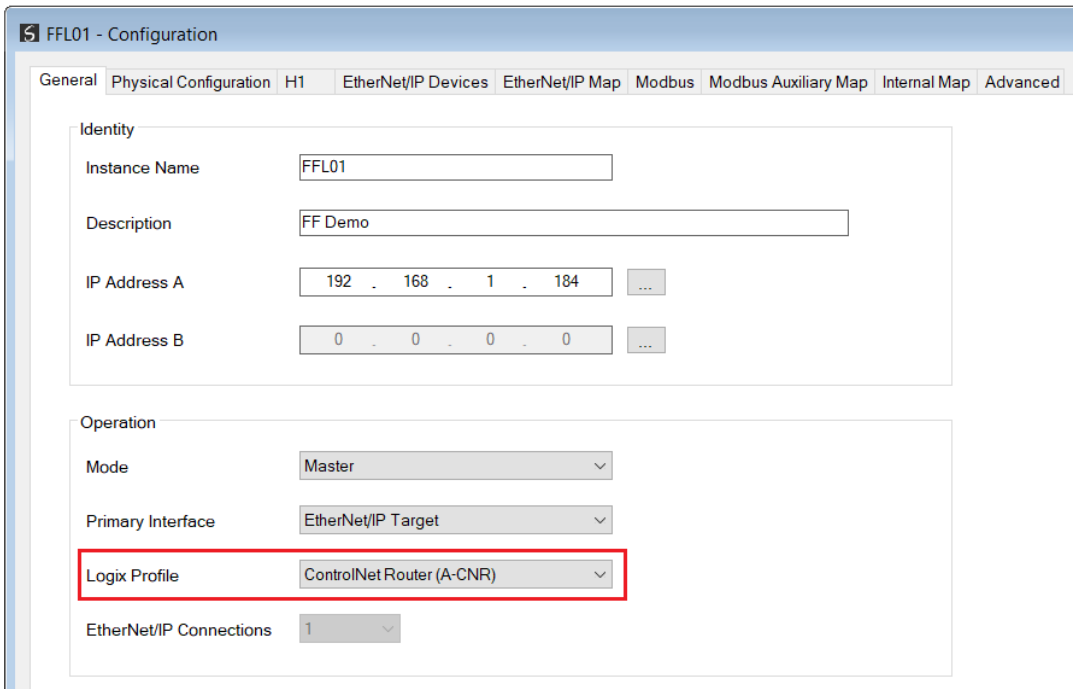


Figure 2.1 – FF Link connection via a ControlNet Router

3 CONFIGURATION

3.1 FF LINK CONFIGURATION

The FF Link would be configured as normal, with an EtherNet/IP Primary Interface, and its **Logix Profile** set to **ControlNet Router (A-CNR)**.



The screenshot shows the 'FFL01 - Configuration' window with the 'General' tab selected. The 'Identity' section contains fields for 'Instance Name' (FFL01), 'Description' (FF Demo), 'IP Address A' (192.168.1.184), and 'IP Address B' (0.0.0.0). The 'Operation' section contains 'Mode' (Master), 'Primary Interface' (EtherNet/IP Target), 'Logix Profile' (ControlNet Router (A-CNR)), and 'EtherNet/IP Connections' (1). The 'Logix Profile' dropdown is highlighted with a red rectangle.

Figure 3.1 – FF Link configuration – General tab

The **Logix Profile** parameter is used when generating the Logix L5X mapping code.



NOTE: When using the ControlNet Router option only a **single** connection is supported, limiting the total H1 data that can be exchanged.

The configuration can now be accepted by clicking on the **Ok** button.

Download the configuration to the FF Link module.

3.2 CONTROLNET ROUTER CONFIGURATION

The FF Link requires the ControlNet Router to be configured in a specific way, including the EtherNet/IP Originator connection to the FF Link.

To simplify the ControlNet Router configuration, a pre-configured device export file:
ControlNetRouter - FFLink Bridge Example.spx
can be imported into the FF Link's Slate project.

In Slate, right-click on the project and select the **Import** option.

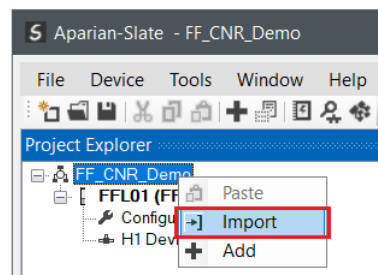


Figure 3.2 – Import ControlNet Router configuration

In the file browser, select the file (downloaded from the Aparian website):
ControlNetRouter - FFLink Bridge Example.spx

The pre-configured ControlNet Router instance will be added to the project.

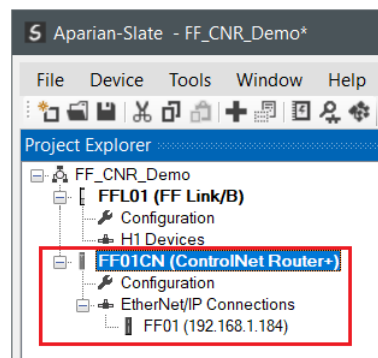


Figure 3.3 – ControlNet Router Imported

The configuration of the ControlNet Router will now need to be modified to suite the specific application.

In the **General** configuration tab, modify the **IP Address**. Note that this IP address must be on the same subnet has the previously configured FF Link.

The screenshot shows the 'FF01CN - Configuration' window with the 'General' tab selected. The 'Instance' section contains the following fields:

- Instance Name: FF01CN
- Description: ControlNet Router to FF Link
- IP Address: 192 . 168 . 1 . 5 (highlighted with a red box)
- Major Revision: 1

The 'Operational Mode' section contains three dropdown menus:

- Main Mode: Operational
- ControlNet Mode: Target
- Ethernet Mode: EtherNet/IP Originator

The 'PCCC / PLC5 Emulation' section contains an IP Address field with the value 0 . 0 . 0 . 0.

Figure 3.4 – ControlNet Router configuration – General tab

In the ControlNet tab, adjust the **ControlNet Channel** configuration and the ControlNet **Node Address**.

The screenshot shows the 'FF01CN - Configuration' window with the 'ControlNet' tab selected. The 'ControlNet' section contains the following fields:

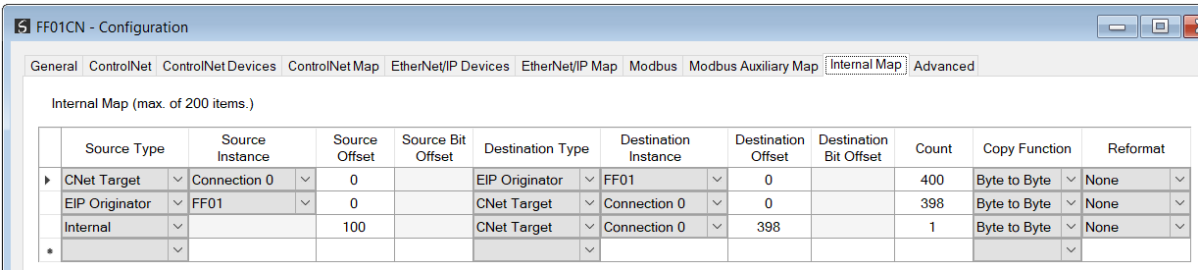
- ControlNet Channels: A Only (highlighted with a red box)
- Node Address: 7 (highlighted with a red box)
- Originator Schedule Control: Hardware
- Message Pass-through Timeout: 1000 [10-5000] ms
- Internal Mapping Control / Status:
 - Internal Status Offset Start: 0
 - Internal Control Offset Start: 64
- Target Assemblies:
 - Input Assembly Size: 400 [1-400] bytes
 - Output Assembly Size: 400 [1-400] bytes

There are also two checkboxes on the right side of the 'ControlNet' section:

- ☐ Enable ControlNet Keeper
- ☒ Force Run Mode

Figure 3.5 – ControlNet Router configuration – ControlNet tab

The **Internal Map** tab shows the required mapping items, which includes the mapping between the EtherNet/IP (FF Link) and the ControlNet Target assemblies. It also includes the mapping of the connection failure status word (Internal:100).



Internal Map (max. of 200 items.)											
Source Type	Source Instance	Source Offset	Source Bit Offset	Destination Type	Destination Instance	Destination Offset	Destination Bit Offset	Count	Copy Function	Reformat	
CNet Target	Connection 0	0		EIP Originator	FF01	0		400	Byte to Byte	None	
EIP Originator	FF01	0		CNet Target	Connection 0	0		398	Byte to Byte	None	
Internal		100		CNet Target	Connection 0	398		1	Byte to Byte	None	
*											

Figure 3.6 – ControlNet Router configuration – Internal Map tab



NOTE: Do not modify these mapping items.

The ControlNet Router configuration form can then be accepted by clicking the **Ok** button.

To modify the connection parameters to FF Link, double-click on the “FF01” connection, or right-click on it and select the **Configuration** option.

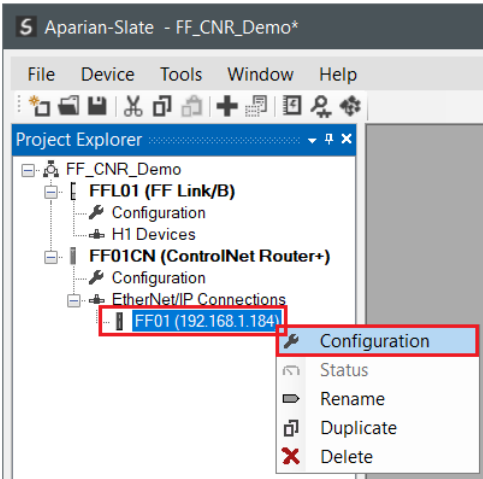


Figure 3.7 – EtherNet/IP Connection configuration

Update the **Path** to the IP Address assigned to the FF Link (section 3.1.).

The screenshot shows a configuration window titled "FF01CN - Class 1 Connection - FF01 (192.168.1.184)". At the top, there are buttons for "Import", "Export", and "Tools". Below these are three fields: "Connection Name" (FF01), "Communication Status Offset" (100), and "Interface Fail Action" (Offline). The main area is divided into three sections: "General", "Electronic Keying", and "Advanced".

General		
Path	192.168.1.184	
RPI	50	(ms)
	Instance	Size (bytes)
Input (T=>O)	140	500
Output (O=>T)	141	496
Configuration	102	0

Electronic Keying	
Keying	Disabled
Vendor ID	1370
Device Type	12
Product Code	119
Major Revision	2
Minor Revision	1

Advanced	
Tick Time	32 ms
Time-Out Ticks	156
Time-Out Multiplier	x4
Time-Out	4992 ms
Transport Trigger Direction	Server

At the bottom, there is a "Configuration" section with a large empty text area.

Figure 3.8 – EtherNet/IP Class 1 Conneciton parameters

The *RPI* can be adjusted if required.



NOTE: Do not modify any other parameters.

Press the **Ok** button to accept the configuration.

Download the configuration to the ControlNet Router.

3.3 LOGIX CONFIGURATION

3.3.1 ADDING THE CONTROLNET ROUTER TO THE IO TREE

The ControlNet Router can be added to the Logix 5000 I/O tree under a ControlNet bridge (e.g. 1756-CNB). The module will need to be added as a generic ControlNet module. This is done by right clicking on the ControlNet Bridge in the Logix 5000 and selecting *New Module* after which the *CONTROLNET-MODULE* is selected to be added as shown in the figure below.

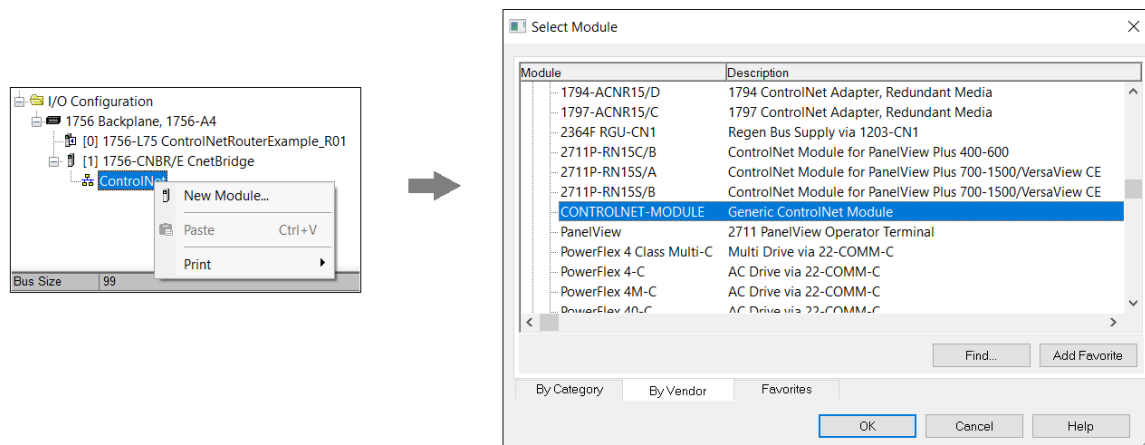


Figure 3.9 – Adding ControlNet Router – Generic profile

The **Name** of the added module must match the **Instance Name** configured in Slate for the FF Link module.

That is, it must be the FF Link name, not the **ControlNet Router name**.

The ControlNet **Node** must match that configured in Slate for the ControlNet Router.

The Connection Parameters must be as follows:

Connection Parameter	Assembly Instance	Size
Input	130	408
Output	131	404
Configuration	102	0

Table 3.1. – ControlNet Router (ControlNet) Connection Parameters

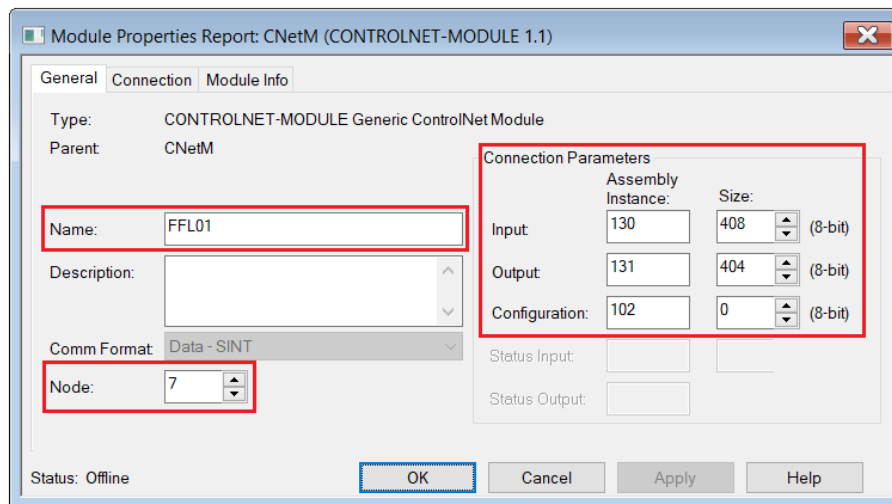


Figure 3.10 – ControlNet Router configuration - General

In the **Connection** tab, adjust the **RPI** as required, typically 50ms.

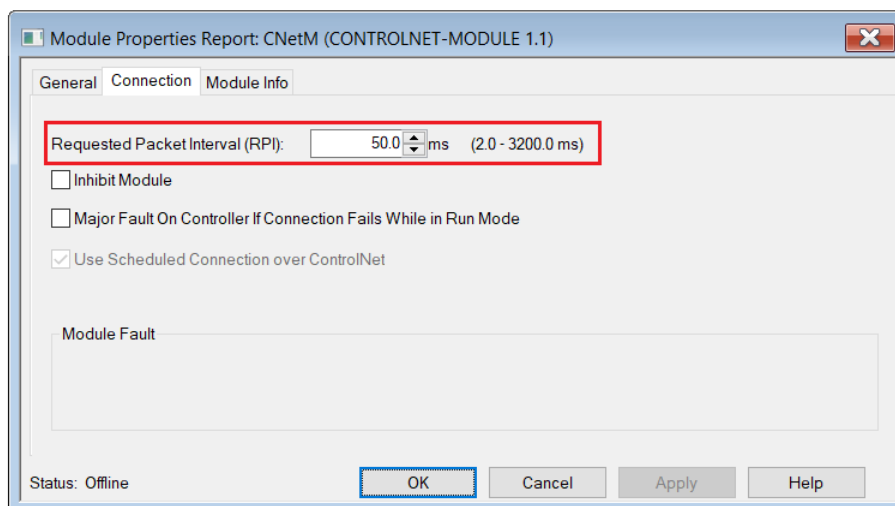


Figure 3.11 – ControlNet Router configuration - Connection

3.3.2 IMPORT FF LINK MAPPING

Slate will generate the required UDTs and Routines (based on the FF Link configuration) to map the required H1 device input and output data.

This mapping will be specifically modified to suit the ControlNet Router.

In Slate, right-click on the FF Link module and select the **Generate Logix L5X** option.

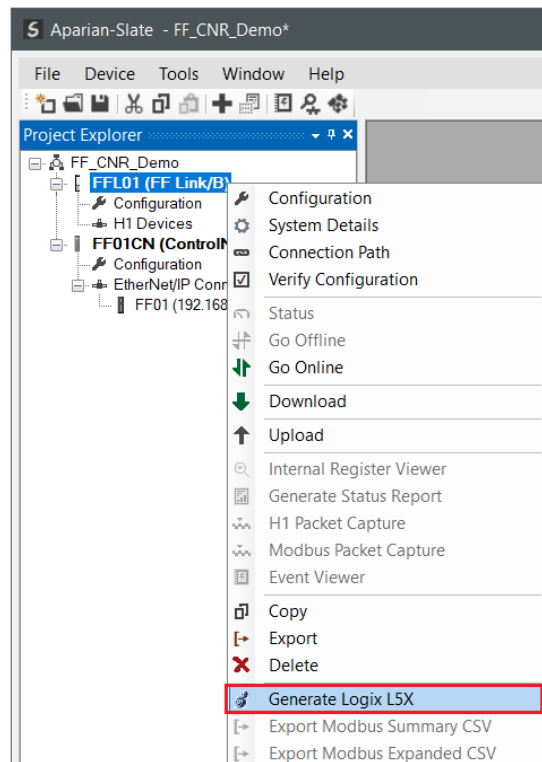


Figure 3.12 – FF Link – Generate Logix L5X

Select a suitable file name and path for the L5X file.

This L5X file can now be imported into the Studio 5000 project by right-clicking on a suitable **Program** and selecting **Add**, and then **Import Routine**.

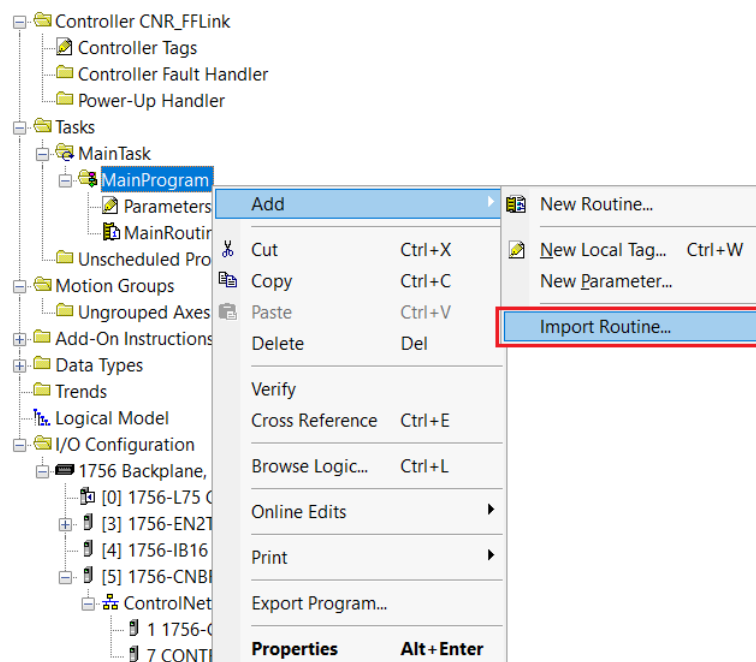


Figure 3.13 – Studio5000 – Import Routine

3.3.3 DOWNLOAD TO LOGIX

Once the configuration is complete, the Studio5000 configuration can be downloaded to the Logix controller.

At this point, it may be beneficial to leave the Logix controller in **Program** mode to facilitate the ControlNet scheduling in RSNetworkx for ControlNet.

3.3.4 SCHEDULE CONTROLNET

The ControlNet network will then need to be scheduled using RSNetworkx for ControlNet, as normal.

In the **Network Parameters**, make sure that the **Max. Scheduled Address** and **Max. Unscheduled Address** are such to include the assigned ControlNet Router's Node Address.

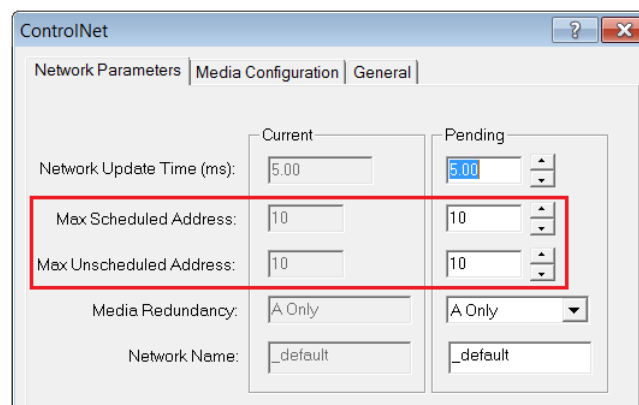


Figure 3.14 – RSNetworkx – Network Parameters