NETMASTER TP-NM-R/2000

BACnet MS/TP to IP Router c/w Remote Access

Description

The Titan Products TP-NM-R/2000 NetMaster Router is a high performance, intelligent and secure communications product designed to route BACnet MS/TP network points to BACnet IP.

The TP-NM-R/2000 is fully compatible with the Titan Products Remote Access App download for IOS and Android devices. When added to a BACnet network and broadband router, the TP-NM-R/2000 allows the user to remotely control the compatible BACnet devices connected to the network or set a flexible time schedule remotely for these devices through a smart phone or tablet device.

Designed and manufactured by Titan Products in the UK, the router's feature set includes, remote access capabilities, secure setup HTML5 webpages, secure BACnet routing and Backup and Restore.

The TP-NM-R/2000 also offers advanced 10/100 Mbps Ethernet communications and supports MS/TP baud rates from 9,600 to 76,800 bps. Flexible routing for 2 x BACnet/IP networks is available as standard while all web pages are password protected for added security. Intelligent BACnet/IP networking is catered for via standard features such as BACnet Broadcast Management Device (BBMD) and Foreign Device Registration (FDR).

The TP-NM-R/2000 can be easily updated on site to the latest software while installation is quick and easy with the DIN rail mounted enclosure. Backup and Restore functionality allows the TP-NM-R/2000 to update the firmware of any connected Titan MS/TP devices within the network.

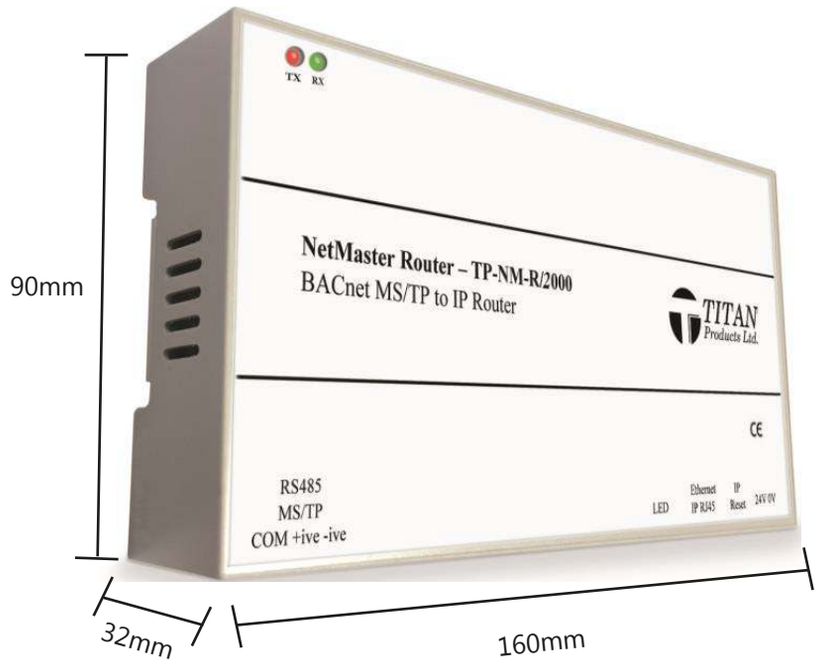
Features

- Full compatible with Titan Remote Access App
- Backup and Restore
- BACnet MS/TP to BACnet/IP Routing
- 2 x BACnet/IP Networks
- Powerful Routing capabilities
- Embedded HTML5 webpages for network commissioning and set up
- Responsive HTML5 web pages for smart mobile support
- Download updates on site
- Windows CE Operating System
- BACnet Broadcast Management Device (BBMD) Support
- Foreign Device Registration (FDR) Support
- MS/TP Slave Proxy Support
- 10/100 Mbps Ethernet
- MS/TP baud rates range for 9600 to 76800 bps
- Password protected web pages
- Optically isolated MS/TP port
- DIN Rail Mounted
- 24V AC/DC Supply

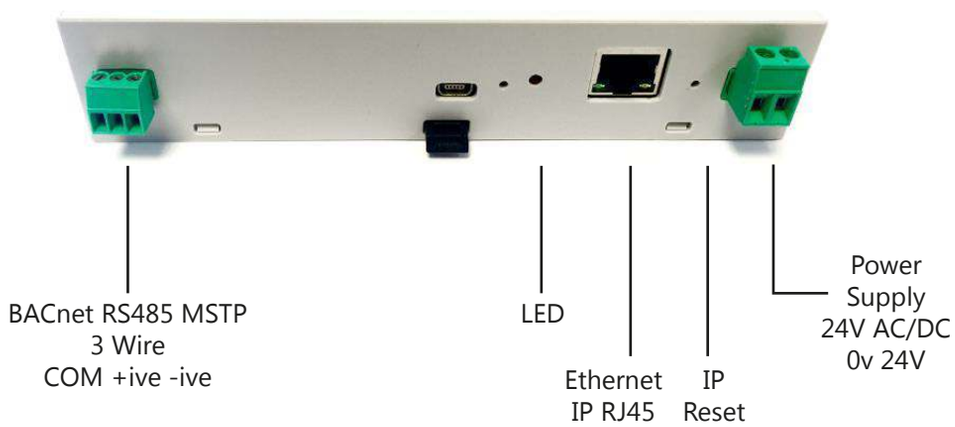
Specification

Power Supply	24V AC/DC +/-10%
Power Consumption	5VA MAX
CPU	ARM9
CPU Frequency	454 MHz
Operating System	Windows CE
Memory	64Mb SDRAM 128Mb NAND Flash
Connections	1 x RJ45 10/100 shielded Fast-Ethernet Port 1 x serial port EIA-485 BACnet MS/TP opto-isolated termination 1 x USB (OTG) used for programing tool
LED Indication	RxD LED TxDLED Power LED
Network Bias Resistors	2 x 560 Ohms (software selectable)
Termination Resistor	1 x 120 Ohms (software selectable)
Communications	10/100 Mbps Ethernet Optically isolated MS/TP port MS/TP baud rates range for 9600 to 76800 bps
Operating Temperature	0 – 40°C
Operating Humidity	20 – 80% RH Non-condensing
IP Rating	IP20
Enclosure Plastic Rating	L94-VO
Mounting	DIN Rail
Dimensions	160mm wide x 90mm high x 32mm
Reset Switch	Yes
Country of Origin	UK
Product Code	TP-NM-R/2000

Dimensions



Connections



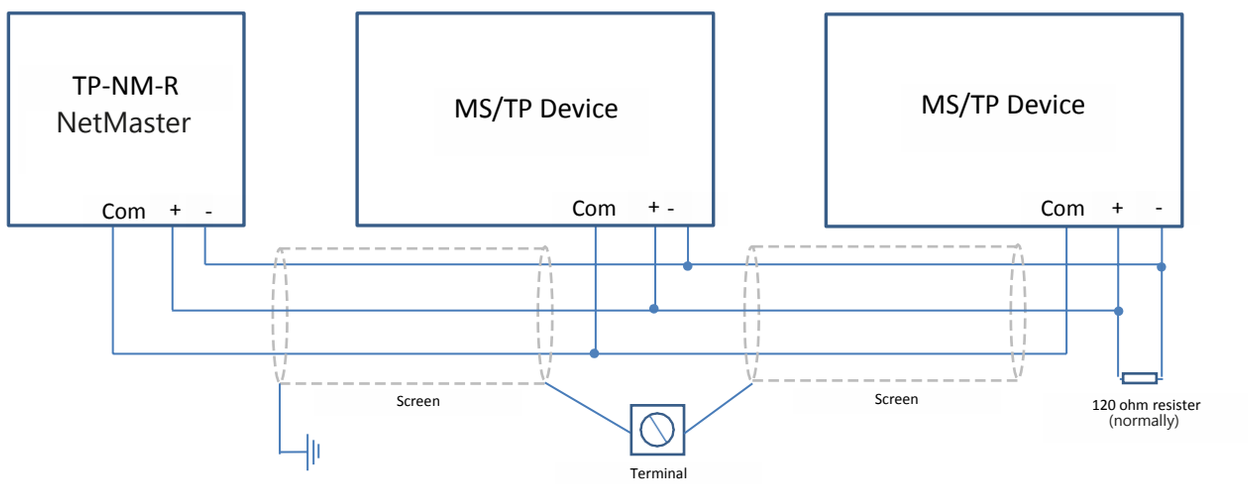
BACnet MS/TP Network Connections & Information

Based on the standards for RS485 networks, a BACnet MS/TP network layer allows for only a daisy-chained network configuration, consisting of a single cable routed between controllers. *Note: Star and Ring network topologies are not supported.*

The network electrically supports a maximum of 127 nodes, however BUS network size capability is determined by factors such as network traffic and BMS capabilities and Titan Products recommend maximum network size of 64 devices.

To comply with the EIA-485 standard, the maximum number of nodes per segment shall be 32 and any additional nodes will require the use of repeaters. If only Titan controllers are on the MS/TP network, the number of controllers may be increased but this will depend on the network traffic, the baud rate being used and the length/route of the cable.

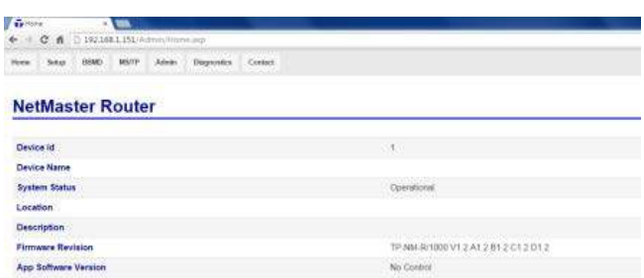
A termination resistor of 120 ohms should be connected at each of the end devices. Bias resistors should be used to bias the network at either a single point or at each end of a network segment.

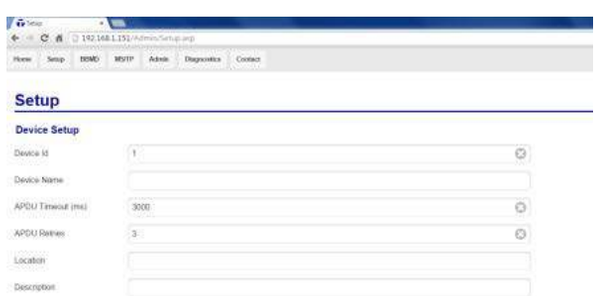


Note: End of line resistor optional selection within NetMaster software

User Screens

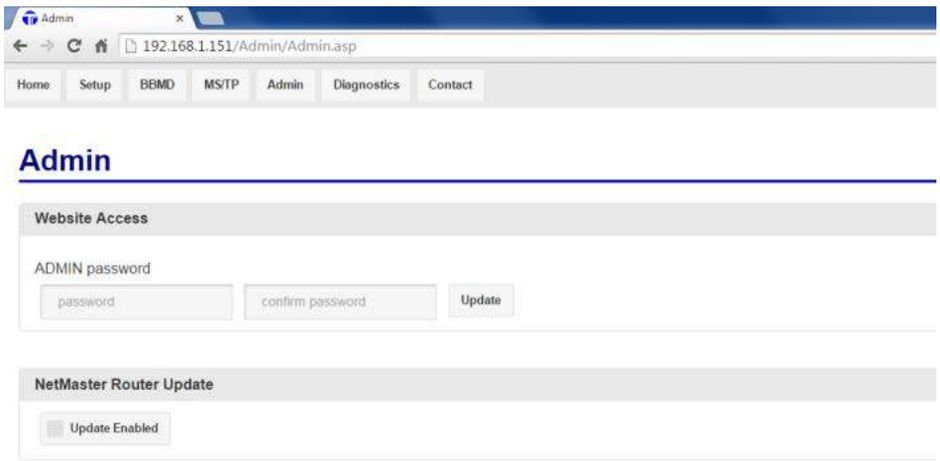
The TP-NM-R/2000 NetMaster Router from Titan Products is supplied with an intuitive and easy to use user interface for set up. All user screens are designed using HTML5 framework and offer responsive web pages which automatically adapt and resize for the screen type and device being used. This ensures the user interface remains easy to use on all devices including desktop, laptop and smart phone and tablet screens.





The user screens are accessed through a web browser once the TP-NM-R/2000 NetMaster Router is connected to the local IP network via the TP-NM-R/2000's IP address (192.168.1.151 default) using the default username 'ADMIN' and password 'admin'. Note that this password can be changed in the Admin screens.

It is recommend to bookmark http://192.168.1.151/Admin/AdminLogin.asp (edit IP address if required) if bookmarking the webpages within the TP-NM-R/2000. This will ensure the most current network information is shown once logged in.



Note: It is possible to reset the IP address and username / password to their default settings by pressing down the IP reset button for approximately 10 seconds. The LED will begin to flash slowly and then turn off. When the LED is off, release the reset button and the following settings will be restored. Please power cycle the TP-NM-R/2000 after the resetting.

- IP Address (192.168.1.151)
- Subnet Mask (255.255.255.0)
- Default Gateway (192.168.1.254)
- Username 'admin' and password 'admin'

The user screens allow the user to view:

- The NetMaster TP-NM-R/2000 Home Screen and current firmware settings
- The NetMaster TP-NM-R/2000 set up
- Admin pages
- BBMD, FDR setup & Broadcast Distribution Tables
- MS/TP and Network diagnostics screens
- Firmware update screens
- Backup & Restore screens
- Contact screens

Setup

Device Setup:

Device ID	A unique network wide device number in the range 0 to 4194302. Ensure this is unique to all other devices on the network.
Device Name	This is the name of the device E.g. Router 1.
APDU Timeout	This is the time to wait in m/s before re-transmitting an unacknowledged message
APDU Retries	This is maximum number of times an unacknowledged message is re-transmitted
Locations	This is the physical location the device is installed
Description	This is a description of the installed device

IP Primary Setup:

IP Address	The default IP Address is 192.168.1.151. This must to be set to a valid IP address which is unique to the local network. In the case of the default network this would be 192.168.1.x where x is in the range 0-254.
Subnet Mask	This is the current Subnet Mask address of the router (255.255.255.0 default). Devices on the same subnet should all use the same subnet mask.
Default Gateway	The default is 192.168.1.254. This should be set to the IP address of the router that is assumed to know how to forward packets on to other networks, defining where to send packets for IP addresses for which they can determine no specific route.
UDP Port	This the port being used for BACnet and must match other devices on the same BACnet Network.
Multicast Address	Please enter a valid Multicast address or remove if not required.
BACnet Network Number	This is the BACnet Network number for BACnet IP.

IP Secondary Setup:

Enable Port	Enable/Disable the secondary IP port
UDP Port	This the port being used for BACnet and must match other devices on the same BACnet Network.
Multicast Address	Please enter a valid Multicast address or remove if not required.
BACnet Network Number	This is the BACnet Network number for BACnet IP.
Public IP Address	If the TP-NM-R/2000 is being accessed through a NAT router, please enter the public IP address of the NAT router or remove if not required.

MS/TP Setup:

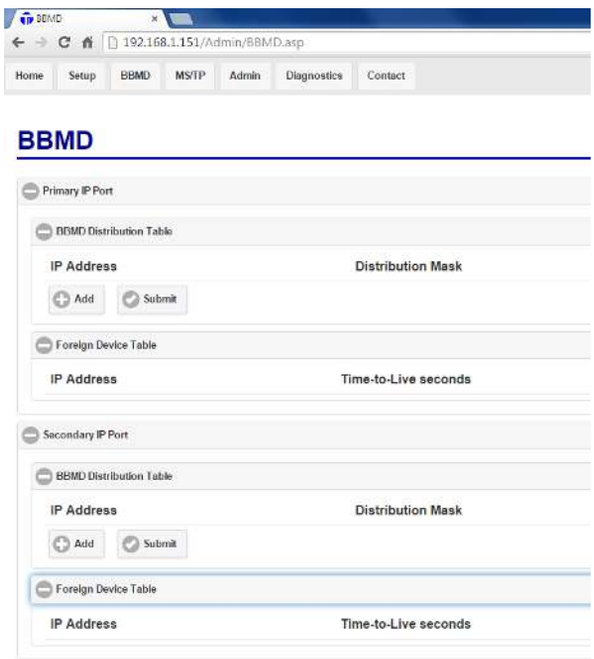
MAC Address	This is a unique MAC reference given to each device on the network. This needs to be unique for each devices and ranges from 0-127.

Baud Rage	Select the Baud Rate from the drop down menu. The baud rate should be the same for each device on the network.
Max Masters	The maximum permitted MS/TP master device address. If unknown, or future devices are expected, then this should be left at the default 127.
Max Info Frame	The number of messages that can be sent once a token has been received. A value of between 10 and 20 is recommended.
Enable Bias	It is recommended to bias the network at either a single point or at each end of a segment.
Enable Termination	It is recommended to terminate both ends of the network using 120 ohm resistors.
BACnet Network Number	This is the BACnet Network number for MS/TP Port.

Router Setup:

Send Establish Connection to Network	This instructs a BACnet half router to establish communications when the PTP link is currently inactive.
Establish Connection Termination Time	The time in seconds that the PTP connection should remain active in the absence of messages being sent. Use a value of 0 to indicate a permanent connection.

BBMD (BACnet Broadcast Management Device) & FDR (Foreign Device Registration) Setup



The BACnet Broadcast Management Device (BBMD) page is used to control the Broadcast Distribution Table (BDT) for the primary and secondary IP Ports. It also displays any Foreign Devices that are registered on each Port.

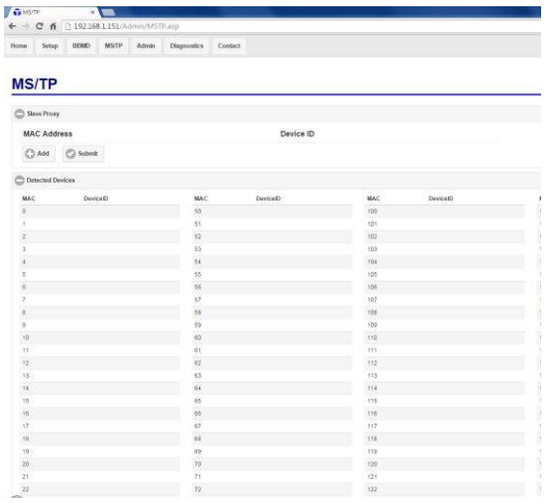
Note: The maximum number of BDT entries is set to 50 for each port. The Maximum number of Foreign Devices is also set to 50 for each Port.

BDT entries can be added, removed and the whole table submitted using the webpage buttons. The table can also be updated via BACnet. To add a BDT, enter the IP address of the BBMD devices and its associated Distribution Mask
(default = 255.255.255.255). Once all BBMD devices have been added for each port select submit.

Note: If the IP Router being used can transmit broadcast messages, the Distribution Mask can be set to the same mask as on the IP Router. This will cause any broadcast messages to be handled by the IP router.

Foreign Devices are BACnet devices that are on a different IP Subnet to the TP-NM-R/2000 and have been registered with it to send/receive BACnet broadcasts.

MS/TP Setup



The MS/TP page displays the manually setup MS/TP slave proxy devices and any detected devices on the MS/TP Port. The maximum Slave Proxy entries is set to 100.

Slave Proxy entries can be added, removed and the whole table submitted using the buttons on the webpages. Each entry consists of an MS/TP MAC address and associated Device ID while any other required parameters are automatically retrieved from the slave device.

The detected MS/TP devices (both Master and manually setup Slaves) are displayed in the table with their MAC address and associated Device ID. Please allow a couple of minutes for the devices to be added/removed from the table once edited.

Diagnostics

The TP-NM-R/2000 includes a Diagnostics webpage which provides real time information of the routers performance and active applications. This is designed to help with any troubleshooting while on site. For more information contact Titan Products.

Updating the TP-NM-R/2000

To update the TP-NM-R/2000 router to the latest software please follow the below instructions:

- Check the 'Update Enabled' check box on the Admin login page
- Open Internet Explorer and enter the TP-NM-R/2000 FTP address into the URL address bar (default FTP address = ftp://192.168.1.151/)
- Copy and Paste the update file to the TP-NM-R/2000
- Once the update file has been uploaded, uncheck the 'Update Enabled' check box on the Admin login page and the router application will be re-started.
- All updates are encrypted and can only be accessed with a password.

LED Indication

LED Indication: LED Status	Action
Permanently On	Router is ON and operating
Flashing Slowly	Router re-setting
Flashing Quickly	Router applying any updates

Remote Access

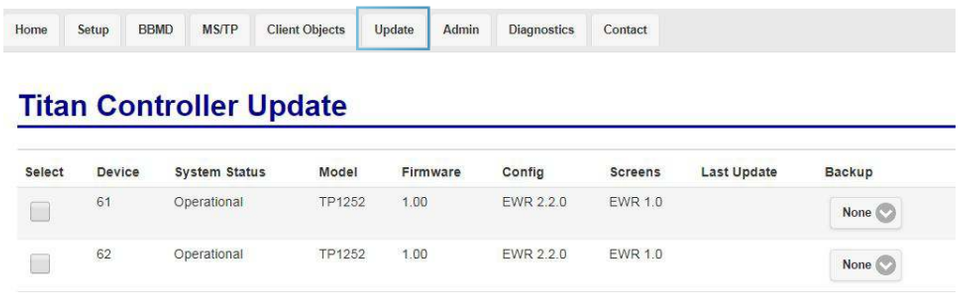
When connected to a Broadband router via an Ethernet connection, the TP-NM-R/2000 NetMaster router with Remote Access allows the user to adjust their comfort settings and set up a comprehensive time schedule for any connected and compatible MS/TP Titan controllers on the network via the Titan Products Remote Access App download.

The Titan Products App is available for download via the Apple App Store and the Google Play Store for Android devices.

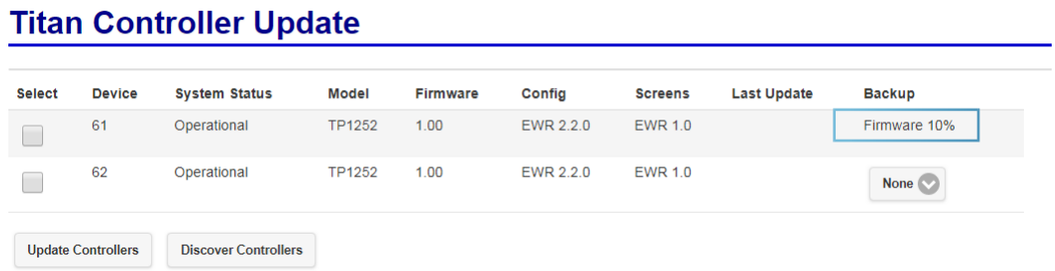
Backup and Restore

Backing up software files:

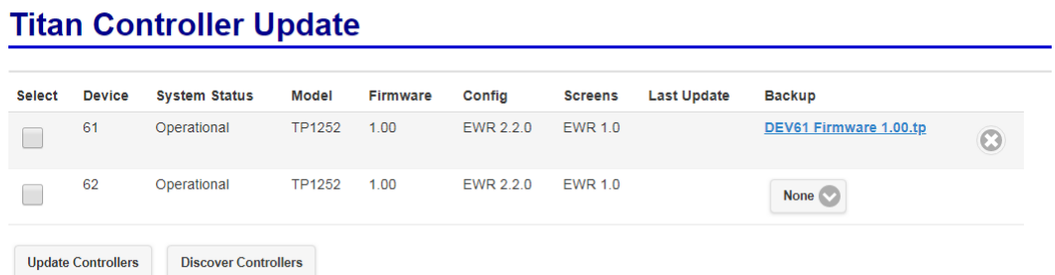
Select the Update tab to view connected controllers and Backup options.



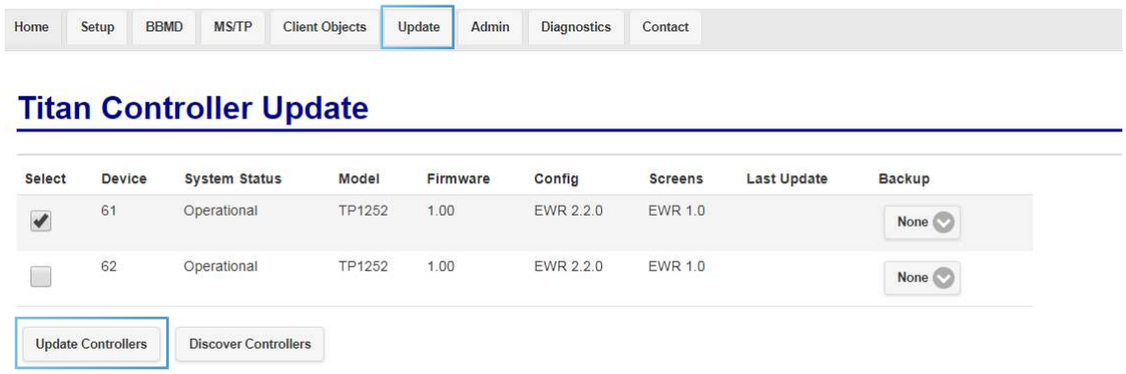
To back up the firmware, configuration or RDU screen files within a controller, select the file type you would like to Backup under the Backup dropdown. The file will then begin to download.



Once the Backup has completed, you will be able to click the file and save.



Updating the controllers with new software or restoring from a backup:
From with the Update tap, select the controllers you would like to update or restore and press the Update Controllers button.



Browse and select the file from the connected PC or Laptop you would like to use to update the controllers. The update will then begin.

Once updated, *Firmware Success* will show. The controllers are now updated to the new software.

BACnet Protocol Implementation Conformance Statement

Date:	**8th September 2015**
Vendor Name:	**Titan Products Ltd**
Product Name:	**NetMaster Router 2000**
Product Model Number:	**TP-NM-R/2000**
BACnet Protocol Revision:	**14**

BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-A/B	Data Sharing – ReadProperty – A/B
DS-RPM-A/B	Data Sharing – ReadPropertyMultiple – A/B
DS-WP-A/B	Data Sharing – WriteProperty – A/B
DS-WPM-A/B	Data Sharing – WritePropertyMultiple – A/B
DS-COV-A/B	Data Sharing – COV – A/B
DM-DDB-A/B	Device Management – Dynamic Device Binding – A/B
NM-CE-A	Network Management – Connection Establishment – A
NM-RC-B	Network Management – Router Configuration – B

Segmentation Capability

□ Segmented requests supported	Window Size _____
□ Segmented responses supported	Window Size _____

Standard Object Types Supported Data

Object Type	Property	Optional	Writable	Range Restriction
Device	Object_Identifier			
	Object_Name			
	Object_Type			
	System_Status			
	Vendor_Name			
	Vendor_Identifier			
	Model_Name			
	Firmware_Revision			
	Application_Software_Version			
	Location	•	•	max 100 characters
	Description	•	•	max 100 characters
	Protocol_Version			
	Protocol_Revision			
	Protocol_Services_Supported			
	Protocol_Object_Types_Supported			
	Object_List			
	Max_APDU_Length_Accepted			
	Segmentation_Supported			
	APDU_Timeout		•	1000 to 100000ms
	Number_Of_APDU_Retries		•	0 to 255
	Max_Masters	•	•	1 to 127
	Max_Info_Frames	•	•	1 to 255
	Device_Address_Binding			
	Database_Revision			
	Active_COV_Subscriptions	•		
	Slave Proxy Enable	•		
	Manual Slave Address Binding	•	•	0 to 100
	Auto Slave Discovery	•		
	Slave Address Binding	•		
	Property List			

Link Layer Options:

■ BACnet IP, (Annex J)

□ BACnet IP, (Annex J), Foreign Device

□ ISO 8802-3, Ethernet (Clause 7)

□ ATA 878.1, 2.5 Mb. ARCNET (Clause 8)

□ ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____

■ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

□ MS/TP slave (Clause 9), baud rate(s):

□ Point-To-Point, EIA 232 (Clause 10), baud rate(s):

□ Point-To-Point, modem, (Clause 10), baud rate(s):

□ LonTalk, (Clause 11), medium: _____

□ BACnet/ZigBee (Annex O) _____

□ Other:

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ■Yes □ No

Networking Options:

■ Router, Clause 6: routing between BACnet/IP and MS/TP

□ Annex H, BACnet Tunneling Router over IP

■ BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? ■ Yes □ No

Does the BBMD support network address translation? ■ Yes □ No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

■ ISO 10646 (UTF-8)	□ IBM□/Microsoft™ DBCS	□ ISO 8859-1
□ ISO 10646 (UCS-2)	□ ISO 10646 (UCS-4)	□ JIS X 0208

SETUP

By default the Netmaster has the IP address **192.168.1.151** and this is the access point to change any settings.

Access the NetMaster

To access the NetMaster, you will need to be on the same subnet as it, i.e. 192.168.1.x. This can be done in one of two ways: an Ethernet crossover cable or a network router/switch/hub.

Using a Network Router/Switch/Hub

To connect via network router, the router must be setup for the Network 192.168.1.x. There must be no other device on the network with the IP address 192.168.1.151. To setup your network router please consult the manual.

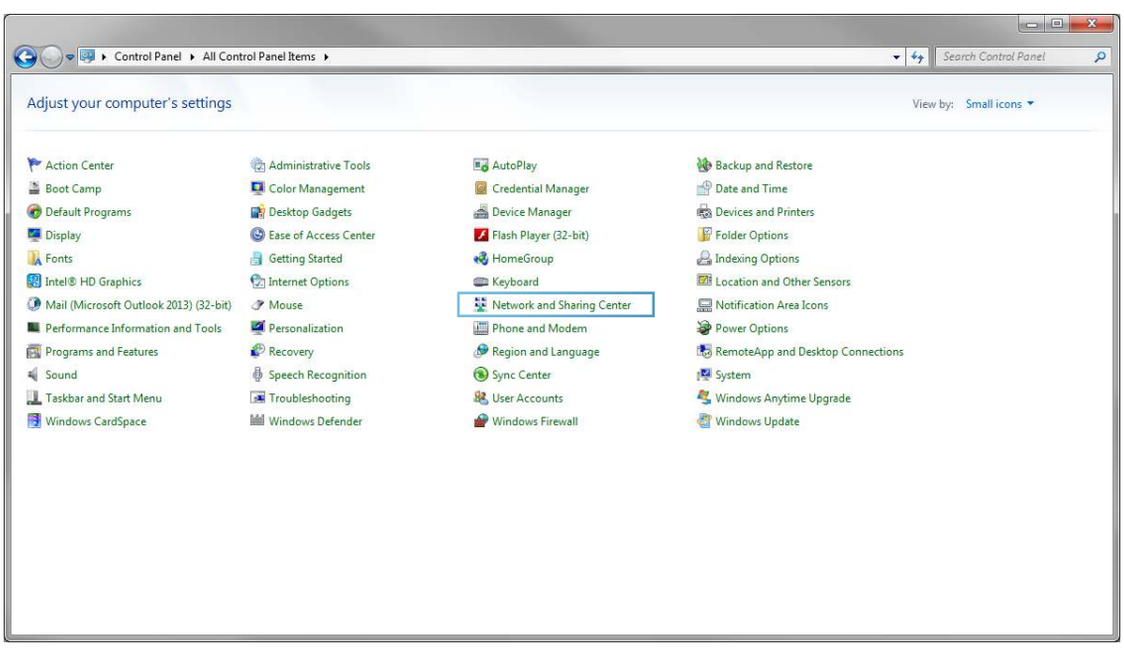
Once setup, connect your NetMaster to the router with an Ethernet cable and connect your computer either wirelessly or via an Ethernet cable. You should now be able to access the NetMaster.

Using an Ethernet crossover cable

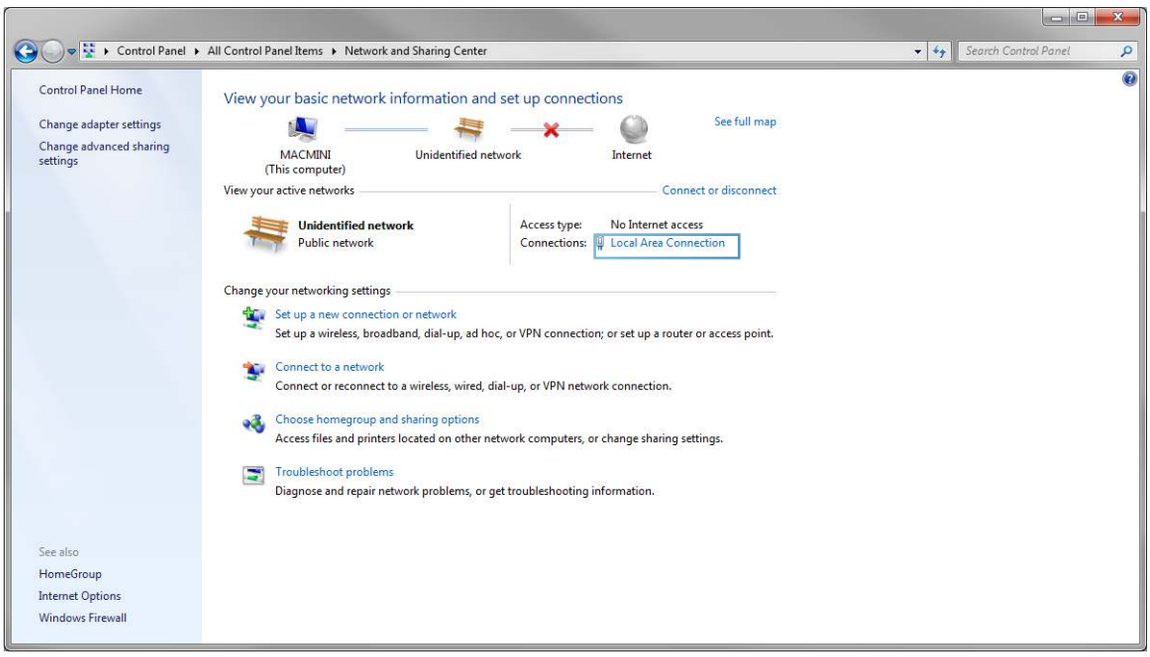
Connect one end of your Ethernet crossover cable to your computer's Ethernet port, and the other end to your NetMaster's Ethernet port.

You will need to make sure that your network adapter settings are correct to communicate with the NetMaster.

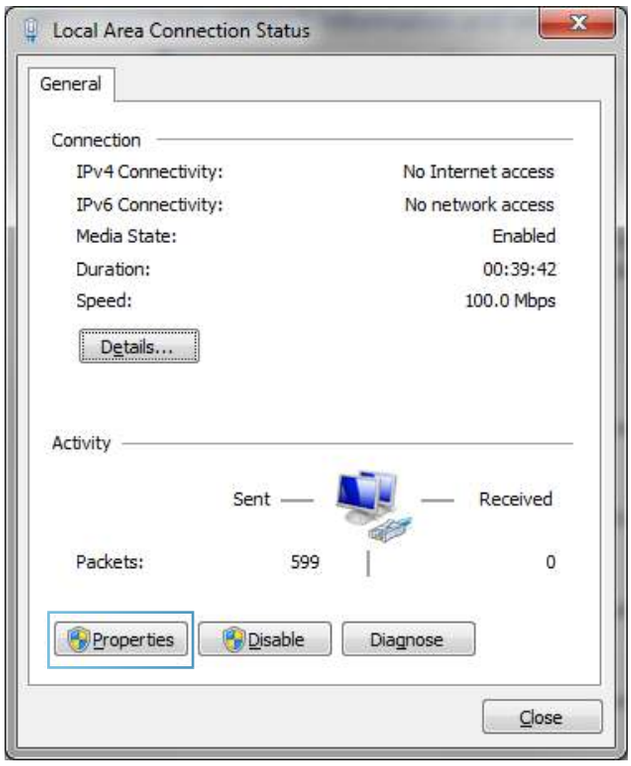
To do this, go to Control Panel and select Network and Sharing Center:



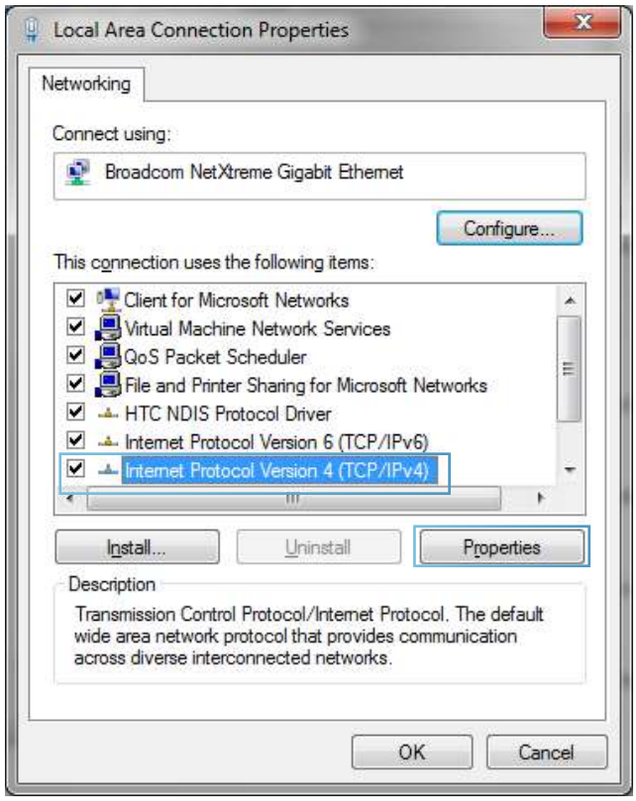
You should see the following page. From here you will need to click the Local Area Connection:



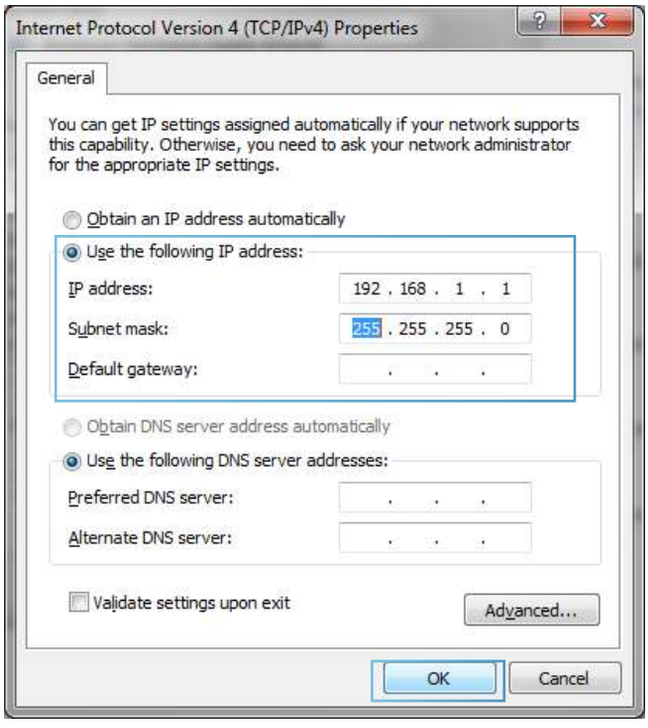
After clicking, you will be presented with a window where you can set the properties of the network adapter. Click the Properties button:



Another window will appear to allow you to set the IP settings for the adapter. Select 'Internet Protocol Version 4 (TCP/IPv4)' and then click the Properties button:



The following properties window will be shown. Select 'Use the following IP address:' and set the IP address to '192.168.1.1', the Subnet mask to '255.255.255.0' and then click OK:



Your network adapter should be setup to communicate with the NetMaster via an Ethernet crossover cable.