USER GUIDE

TUNet® NC-900
NETWORK COLLECTOR

Tantalus

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1. The device may not cause harmful interference.

2. The device must accept any interference received, including interference that may cause undesired operation.

The device is specifically designed to be used under Section 15.247 of the FCC Rules and Regulations. Any unauthorized modification or changes to this device without the express approval of Tantalus Systems Corp. may void the user's authority to operate this device.

Furthermore, this device is intended to be used only when installed in accordance with the instructions outlined in the installation manual. Failure to comply with these instructions may also void the user's authority to operate this device.

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1 :: Product Description

The TUNet NC-900 Network Controller is as an array of TUNet devices that provides increased connectivity distances, thus permitting increased network coverage. It is designed for utilities that want to drive more value from an existing Ethernet system by using Ethernet as the backbone for TUNet data transport.

The NC-900 Network Controller consists of two components: the internal control unit, and the antenna mast.. The internal control unit contains the individual radios and all digital components necessary to gather meter readings, power quality data, and outage reports from multiple endpoints and relays information to the operations center over an Ethernet data network. The antenna mast has 1 dedicated receive and transmit antennas connected to it and is intended to be mounted 200ft in the air in the direction of its intended coverage area. An NC-900 can also send commands to individual or groups of LAN devices using the standard TUNet procedures.

1.1 Product Specification: NC-900 Network Collector

Switching Capacity	10/100 Ethernet Switch, RJ45
Operating Temperature	-22 to 130°F (-30 to +50°C)
Operating Humidity	5% to 95% non-condensing
Outdoor Rating	Outdoor Antennas - NEMA 3R certified rain-proof

2 :: Configuring and Installing the NC-900

Before the NC-900 is ready for installation in the field, it must be configured to operate on the Utility's network.

Contact the System Administrator for the correct settings.

2.1 Programming Instructions for the Meter Shop (NC-900)

Ensure that you have a DT-400 Programming Station .

1. Remove the NC-900 from the box. Plug the Ethernet cable into RJ-45 port.

2. Ensure that the DT-400 Programmer is powered and connected to the NC-900 using a crimped-style Ethernet cable.

3. Power up the NC-900.

4. Start the programming software on the DT-400 and follow the prompts. Refer to *Section 3 :: DT-400 Programming Software Guide* on page 5 for more information.

   When the process is finished, the DT-400 programmer will provide notification on whether the programming was successful.

2.2   Registering the NC-900 on the Network

Each NC-900 Network Collector must be registered on the Tantalus Network Server as part of the activation process. This must be done by individually configuring the 4 NC-90 modules situated in the NC-900 Network Controller.

Each NC-90 module in the NC-900 has a unique identifier called the Network ID located on an outside label. No two devices produced by Tantalus have the same Network ID.

To successfully activate an NC-900 on a server, you must record or scan the 10-digit TUNet Network ID located on the label on the back of the NC-900 and enter it into the Network Server.

Refer to *Working with WAN Portals* in the *TUNet User Guide: Network Administrator* for details on where to enter this information.

3 :: DT-400 Programming Software Guide

Configuring an NC-900 Network Collector using the programmer is similar to configuring any home network router. You must choose a dynamic or static network addressing scheme, and then enter the address of the NS-2000 Network Server.

The DT-400 runs in two modes:

- The "TUNet User" account which is used to program the NC-90 devices. This account can also view or download programming log files over USB.

- The "System Administrator" account which is used to change the network settings of the DT-400. This account also is used to set up the date and time zone for the programmer.

An online help file is available on the DT-400 which will provide more detailed explanations. If you do not know the network address, or if you are unclear about which addressing scheme to choose for the NC-90, speak to your Network Administrator.

Note: Please contact Tantalus Technical Support for passwords to the two accounts.

3.1 Programming Quick Start

Note: Ensure that the date, time, and time zone have been set under the sysadmin account before first use of the DT-400. Refer to section 3.3.4 for details.

EQUIPMENT REQUIRED

- DT-400 laptop

- Ethernet Cable

NETWORK SETTINGS PROVIDED BY SYSTEM ADMINISTRATOR

Dynamic IP Scheme	Static IP Scheme
Time Zone Offset _____ IPNM Server Address _____ IPNM Port Number _____	Time Zone Offset _____ IPNM Server Address _____ IPNM Port Number _____ IP address for Device _____ Netmask _____ Gateway _____ DNS _____

*** Note the IPNM (IP Network Manager) server address is typically at the same address as the Tantalus Network Server.

PROGRAMMING QUICK START PROCEDURE

1. Start the laptop and log in as "tunet".

2. Plug the network cable into NC-90 port and the other end to the laptop.

3. Apply power to the NC-900 Network Controller.

4. Wait approximately 90 seconds until the solid orange status light on the NC-90 changes to either solid red (factory default / never programmed), flashing orange (previously programmed) or flashing red (previously programmed but no network connection found).

5. Proceed to configure the TUNet NC-90 as explained in the following sections.

Note: The TUNet NC-90 reboots every 5 minutes if it is not communicating with a Tantalus Network Server. This is indicated by the status light changing to flashing red 6 minutes after initial power up. This may result in an unsuccessful programming attempt. It is recommended to remove power for 20 seconds and reapply. The device will then go through the normal startup cycle.

3.2 TUNet User Account

Before you can use the DT-400 programmer to program the NC-90, you must choose between a dynamic or static network addressing scheme. Tantalus recommends dynamic addressing in all cases, unless there is a specific technical reason that static addressing must be used instead.

If you are unclear about which addressing scheme to choose, speak to your Network Administrator.

LAUNCHING DEVICE CONFIGURATION

1. Log in to the DT-400 laptop. The DT-400 Device Configuration Tool will start automatically and you will see a menu of the available options.

2. Select one of the available options:

```
Tantalus DT-400 Device Configuration Tool (version 200.0004).


Select one of the following options
1) Configure for Static Network Address
2) Configure for DHCP
3) Options (DeviceIP=24.25.26.28)
4) Copy log file to USB memory stick
5) View log file
6) Help
7) Quit


[2]>
```

3.2.1 Configuring a Dynamic Network Addressing Scheme

Dynamic network addressing is the simplest network addressing scheme to setup and to maintain.

TO CONFIGURE A DYNAMIC NETWORK ADDRESSING SCHEME

Note: Make sure that the cable from the DT-400 is plugged into the NC-90 and is powered up. The NC-90 is ready for configuration when the status light on the NC-90 is either solid red, flashing orange, or flashing red.

1. To configure for DHCP, choose 2.

2. At each prompt, enter the network settings provided by your Network Administrator or press <enter> to accept the last entered values shown in brackets (green).

```
Tantalus DT-400 Device Configuration Tool (version 200.0004).


Select one of the following options
1) Configure for Static Network Address
2) Configure for DHCP
3) Options (DeviceIP=24.25.26.28)
4) Copy log file to USB memory stick
5) View log file
6) Help
7) Quit


[2]>2
TZ offset(5)>
IPNM Address (10.1.1.75)>
IPNM Port(12345)> █
```

TZ Offset: Timezone offset is the number of hours to be added to the local STANDARD time to obtain Universal Time (UTC).

Time Zone	Hours to Input
Pacific (PST)	8
Mountain (MST)	7
Central (CST)	6
Eastern (EST)	5
Atlantic (AST)	4

IPNM Address: This is the IP address of the Tantalus IPNM Server (usually the same as the Tantalus Network Server).

Example: 66.119.167.133

IPMN Port: This is the port number of the Tantalus IPNM Server that the NC-90 uses for communication.

At the last prompt, you will see a list of the configuration information that is about to be sent to the NC-90. Some values are supplied by the program.

3. Press <enter> to send the configuration to the NC-90.
   OR, type "n" to cancel.

```
[2]>2
TZ offset(5)>
IPNM Address (10.1.1.75)>
IPNM Port(12345)>

The configuration file you are about to send:

TZvar = TUN+5
IPNMAddr = 10.1.1.75
IPNMPort = 12345
Interface = eth0
InterfaceType = inet
NetworkAddressing = dhcp
Configure device? ( [ y ] n ):
```

3.2.2 Configuring a Static Network Addressing Scheme

Static configuration requires additional variables and is much more difficult to change. In addition, an error in setting up a static addressing scheme may cause serious technical complications within your network.

⚡ **Warning**	An incorrect net mask setting may render the NC-90 unable to communicate with the Network Server or the DT-400.

⚡ **Warning**	Each NC-90 must have a unique network address. If multiple NC-90's have the same network address, this will cause communications problems on the NS-2000 Network Server.

TO CONFIGURE A STATIC NETWORK ADDRESSING SCHEME

Note: Make sure that the cable from the DT-400 is plugged into the NC-90 and is powered up. The NC-90 is ready for configuration when the status light on the NC-90 is either solid red, flashing orange, or flashing red.

1. To configure for a static network address, choose 1.

2. At each prompt, enter the network settings provided by your Network Administrator or press <enter> to accept the last entered values shown in brackets (green).

```
[2]>1
TZ offset(5)>
IPNM Address >10.1.1.75
IPNM Port>12345
Device IP Address >10.1.50.32
Net Mask >255.255.0.0
Gateway >10.1.1.20
DNS 1 >10.1.1.25
DNS 2 >

The configuration file you are about to send:

TZvar = TUN+5
IPNMAddr = 10.1.1.75
IPNMPort = 12345
Interface = eth0
InterfaceType = inet
NetworkAddressing = static
IpcIP = 10.1.50.32
IpcMask = 255.255.0.0
IpcNetwork = 10.1.0.0
IpcGateway = 10.1.1.20
IpcDNS1 = 10.1.1.25
Configure device? ( [ y ] n ):
```

TZ Offset: Timezone offset is the number of hours to be added to the local STANDARD time to obtain Universal Time (UTC).

Time Zone	Hours to Input
Pacific (PST)	8
Mountain (MST)	7
Central (CST)	6
Eastern (EST)	5
Atlantic (AST)	4

IPNM Address: This is the IP address of the Tantalus IPNM Server (usually the same as the Tantalus Network Server).

   Example: 66.119.167.133

IPMN Port: This is the port number of the Tantalus IPNM Server that the NC-90 uses for communication.

IP: This is the unique IP address to be assigned to the NC-90 to be programmed.

Net Mask: This is the network mask on the network where the NC-90 is to be installed.

Gateway: This is the gateway IP address on the network.

DNS 1: This is the 1st DNS IP address. At least one DNS address must specified.

DNS 2: This is the 2nd DNS IP address (optional).

DNS 3: This is the 3rd DNS IP address (optional).

At the last prompt, you will see a list of the configuration information that is about to be sent to the NC-90. Some values are supplied by the program.

3. Press <enter> to send the configuration to the NC-90.
   OR, type "n" to cancel.

3.2.3 Configuring Options

The DT-400 Programmer laptop is designed to be directly connected to the NC-90 without requiring a switch or router. The laptop has a DHCP server that distributes a specific IP address to any NC-90 that requests one.

You can use the Device IP option to control which IP address the laptop assigns to the NC-90 for purposes of programming. Most of the time you will just use the default address. But under certain circumstances, you may want to update the IP address from the default setting. For example, you might do this if a statically addressed NC-90 requires reprogramming.

CONFIGURING A SPECIFIC IP ADDRESS

1. To configure a specific IP address, choose 3.

2. Enter the IP address that the program will attempt to communicate to or press enter to accept the default in brackets.

3. Press <enter> to save the settings to the programmer.

```
Tantalus DT-400 Device Configuration Tool (version 200.0004).


Select one of the following options
1) Configure for Static Network Address
2) Configure for DHCP
3) Options (DeviceIP=24.25.26.28)
4) Copy log file to USB memory stick
5) View log file
6) Help
7) Quit


[2]>3
Device IP Address (24.25.26.28)>
```

3.2.4   Working with Log Files

The DT-400 stores a history of all successful programming sessions. This file is store in .cvs format for easy importation into third party spreadsheet programs. The file can be viewed on the DT-400 or may be copied to a USB storage device. The name of the DT-400 (see 3.3.5 Setting the Unit ID) is appended to the beginning of the export file in the following format "<Unit ID>_client.csv".

The figure below shows a typical output of the log file. The first line in the log file contains the field names.

```
timestamp,device-network-id,device-mac-addr,hw-release,fw-release,product-
id,timezone-offset,ns-ip,ns-port,interface,inet,addressing-type,device-ip,network-
mask,network, gateway,dns2,dns1
2010-01-20 10:35:19,000648D22F,00:25:5A:06:48:D2,307,300,32,TUN+5,10.1.1.105,
12345,eth0,inet,dhcp,,,,,,,
2010-01-20 10:35:24,000648D22F,00:25:5A:06:48:D2,307,300,32,TUN+5,10.1.1.105,
12345,eth0,inet,dhcp,,,,,,,
2010-01-20 10:35:29,000648D22F,00:25:5A:06:48:D2,307,300,32,TUN+5,10.1.1.105,
12345,eth0,inet,dhcp,,,,,,,
2010-01-20 10:36:11,000648D22F,00:25:5A:06:48:D2,307,300,32,TUN+5,10.1.1.105,
12345,eth0,inet,static,10.1.3.250,255.255.252.0,10.1.0.0,10.1.1.1,10.1.1.1,10.1.1.
2,10.1.1.3
2010-01-20 10:36:18,000648D22F,00:25:5A:06:48:D2,307,300,32,TUN+5,10.1.1.105,
12345,eth0,inet,dhcp,,,,,,,
```

The information is stored in the following format:

Example	Field Name	Description
2010-01-20 10:36:11	timestamp	time stamp when device was programmed
000648D22F	device-network-id	network id for the device
00:25:5A:06:48:D2	device-mac-addr	Mac address
307	hw-release	Hardware revision number
300	fw-release	Overall firmware revision number
32	product-id	Type of tunet device
TUN+5	timezone-offset	timezone offset
10.1.1.105	ns-ip	IP address of the NS server
12345	ns-port	port number of the NS server
eth0	interface	always eth0 for NC-90 (ignore)
inet	inet	always inet (ignore)
static	addressing-type	static or dhcp
10.1.3.250	device-ip	for static device IP address
255.255.252.0	network-mask	for static device network mask
10.1.0.0	network,	for static network portion of IP address
10.1.1.1	gateway,	for static network gateway IP

10.1.1.1	dns1,	for network DNS server 1
10.1.1.2	dns2,	for network DNS server 2 (Optional)
10.1.1.3	dns3	for network DNS server 3 (Optional)

When viewing log files on the DT-400, the following commands are available:

Key	Function
Arrow keys	Scroll up / down 1 line Scroll left / right
f	Scroll forward one screen
b	Scross backward one screen
/pattern	Searches the log file for the pattern you are looking for (case sensitive). The curser will immediately go to the first instance and highlight any additional matches. Example: /2010-01-20 or /000648D22F Pressing 'n' will go to the next instance. Pressing 'N' will go to the previous instance.
h	Additional Commands
q	Exits the viewer

3.3 System Administration Account

The System Administration account allows initial configuration of the DT-400 and provides pre-set network configurations that allow Tantalus Technical Support to provide remote servicing.

```
Tantalus DT-400 System Administration (version 200.0004).


Select one of the following options:
1) Configure DT-400 for TUNet programming
2) Configure for remote login using DHCP Addressing
3) Configure for remote login using Static Addressing
4) Set DT-400 date/time
5) Unit ID
6) Help
7) Shutdown
8) Quit

[1]>
```

3.3.1 Configuring the DT-400 for TUNet programming

This is the default state of the DT-400 when first powered up. In this configuration, the DT-400 runs an internal DHCP server to enable direct communications with a NC-90. Note: the DT-400 will not be able to communicate to an NC-90 that has a static address assigned to it. Refer to section 3.4 on how to configure the DT-400 for this scenario.

Once you have configured this setting, the settings will be automatically saved and you will be logged out of the account. You must log in again to the System Admin account if you want to make further changes.

3.3.2 Configuring the DT-400 for remote login using DHCP Addressing

Select this option if Tantalus personnel must remotely access the DT-400 when computers on your network are required to use DHCP. Make sure the DT-400 is connected to your corporate network so that it can get an IP address. After a successful IP lease is obtained, the program will display the assigned IP address. Please report this address to Tantalus.

Once you have configured this setting, the settings will be automatically saved and you will be logged out of the account. You must log in again to the System Admin account if you want to make further changes.

3.3.3 Configuring the DT-400 for remote login using Static Addressing

Select this option if Tantalus personnel must remotely access the DT-400 when computers on your network are required to use static IP assignment. You will be asked a series of questions (sample answer shown after '>' character):

a) IP address for this unit: >10.1.3.80
b) Net Mask: >255.255.252.0
c) Gateway: >10.1.1.1
d) DNS: > 10.1.1.1

After a short delay, the program will echo the assigned IP address to the operator. In special circumstances, this option may also be used to change the network setting of the NC-90 if it was mistakenly configured for a Static Network Address and the wrong IP was programmed, or if you must configure it back for DHCP Addressing.

Once you have configured this setting, the settings will be automatically saved and you will be logged out of the account. You must log in again to the System Admin account if you want to make further changes.

3.3.4   Setting the DT-400 Date/Time

A new DT-400 programmer will require the date, time and time zone changed. This will ensure that the programming logs record the correct time. Follow the prompts on the DT-400 screen to update.

3.3.5   Setting the Unit ID

If there is more than one programmer available, it may be beneficial to change the ID of the device. This can be helpful when reconciling the log files.

The default unit ID is set to tunet02. The DT-400 will add this tag to any log files exported to the usb stick.

3.3.6   Shutdown

Select this option to shutdown the programmer. This is the same as pressing the power button. It is not recommended to remove the battery while the programmer is operating.

3.4 Reprogramming Devices with Static Addresses

In the event that a statically assigned TUNet device requires reconfiguration of its network parameters, the DT-400 must be reconfigured to match the same network parameters that were originally assigned to the device. The DT-400 must then be configured in the options to point to the IP address of the device that requires reprogramming.

1. Note the Network ID printed on the NC-90. Use this number to look up the network parameters previously assigned to the device in the DT-400 programming logs (refer to section 3.2.4 on working with log files).

Example log file:

Network ID

2009-05-06 16:23:30, **1234567890**, 00:25:5A:34:56:87,307,300,32,TUN+5,10.0.0.99,
12345,eth0,inet,static,**10.0.0.10**, **255,255,255,0**,10.0.0.0,10.0.0.1, 10.0.0.1,,

Device IP
Address

Net
Mask

Write down the following: IP ADDRESS (device-IP), NETMASK (network-mask)

IP Address: 10.0.0.10

Netmask: 255.255.255.0

2. Log out then log back in as "sysadmin".

3. Select option 3: "Configure for remote login using Static Addressing".

   The DT-400 now requires an IP address in the same subnet as the NC-90. Take the current IP Address of the NC-90 and replace the last number with 254. If the last number is already 254 then use 253.

   The IP address to be assigned to the DT-400 in this example is **10.0.0.254**.

4. The DT-400 now requires to be assigned the same Net Mask as was assigned to the NC-90. Enter this in now.

   Netmask: 255.255.255.0

5. Use the following values for the Gateway and DNS:

   Gateway: 1.1.1.1

   DNS: 1.1.1.1

6. Logout and log back in as "tunet".

7. Select Options and select Configure DeviceIP. Set this to the IP ADDRESS of the NC-90 to be reprogrammed (In this case it is **10.0.0.10**).

8. Connect a network cable from the NC-90 to the DT-400 and insert it into a meter collar.

9. Apply power to the NC-90. Wait for the lights to change to flashing orange or flashing red indicating that it is ready to be reprogrammed. The device is now ready to communicate with the DT-400.

10. Follow the standard programming instructions as described in Section 3.1.

Note: After a statically configured device has been reprogrammed to use dynamic addressing, the DT-400 must be changed back to Option 1 under the "sysadmin" account to resume reprogramming of new NC-90's. Alternatively, the DT-400 may be turned off then restarted to get back into the default dynamic programming mode.

3.5 Programming Error Codes

When attempting to send the configuration to the NC-90, error codes may appear under certain conditions.

110 – No communication with the TUNet device.

Check the following:

1. Check correct device IP. The default is 24.25.26.28 for dynamic address programming.

2. Check network cable connections between the DT-400 and the TUNet device.

3. Check DT-400 is in the correct network configuration. For dynamic address configuration, choose option 1 in the sysadmin account. For reprogramming a device that has already been pre-configured with a static address, the DT-400 will have to be configured to match the network setting of the device. See section Reprogramming Devices with Static Addresses.

4. Check that the TUNet device is powered by seeing if the status LED is on.

5. The NC-90 device may have timed out and is restarting. This will occur 6 minutes after power is first applied. It is recommended to disconnect power to the stick for 20 seconds and reapply.

255 – TUNet Device has started but is not ready.

The NC-90 has not completed its boot up cycle. Try again in 10 seconds.

4 :: Contact nformation

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