

NovaTech Communications Director (NCD) User Manual



November 18, 2010
Document Revision Q
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NCD may be installed on multiple computers as needed under the following conditions:

- The computers must be owned by the end user or its subsidiary.
- The NCD installation must be used for an Orion-related project.

All files installed by NCD are protected by copyright and may not be shared with any third party. By installing NCD on a computer, you agree to these terms and conditions.

DISCLAIMER

This manual contains information that is correct to the best of NovaTech's knowledge. It is intended to be a guide and should be used as such. It should not be considered a sole source of technical instruction, replacing good technical judgment, since all possible situations cannot be anticipated. If there is any question as to the installation, configuration, or use of this product, contact NovaTech, LLC at (913) 451-1880.

To ensure that the equipment described in this User Manual, as well as all equipment connected to and used with it, operates in a satisfactory and safe manner, all applicable local and national codes that apply to installing and operating the equipment must be followed. Since these codes can vary geographically and can change with time, it is the user's responsibility to determine which codes and standards apply, and to comply with them.


 **Warning:** Failure to comply with applicable codes and standards can result in damage to this equipment, damage to connected devices, and/or serious injury to personnel.

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I. Introduction

NCD Functionality

NCD is a Windows®-based configuration software with an intuitive graphic user interface (GUI). It does not require any programming or scripting to set up communications between the Orion and a protocol master, Human Machine Interface (HMI), Programmable Logic Controller (PLC), or an Intelligent Electronic Device (IED) such as a relay or meter. For many slave devices (i.e. devices being polled by the Orion), default files are available that contain the device's standard input and output points with name, point address, and range. This further facilitates fast setup of the Orion.

NCD is the configuration software for the entire Orion Automation Platform, which includes the following models:

- OrionLX and Orion5rL
- Orion5r
- Orion5
- Orion16

This version of the NCD User Manual covers the setup of the Orion5r, Orion5, and Orion16.

The setup of the OrionLX and Orion5rL, including their enhanced features, are described in the *OrionLX User Manual*.

Once the Orion's configuration has been created offline and saved to an .ncd file, the .ncd file must be transferred from the PC to the Orion using either a serial or USB connection between the PC running NCD and the Orion. Using the *File Transfer (PC -> Orion)* option of the Orion's MMI transfers the .ncd configuration file directly to the Orion.

In addition to the configuration options, NCD provides a built-in terminal window for viewing data values, port communications, device statistics, system events, and system/version information. It also allows firmware file and log file transfers via Z-Modem (bi-directional), as well as passthrough to connected relays and meters. This allows using the respective manufacturer's programming software to configure the relays and meters, retrieve event information, etc. The *Orion MMI User Manual* provides a full explanation of these features.

System Requirements

The PC running NCD must meet the following requirements:

- > 100MB hard drive space
- Windows® XP Pro, Windows Vista®, Windows® 7
- .NET 3.5
- Internet Explorer 6.0 or later, or Firefox
- Mouse
- Graphics resolution 1024x768 or better
- CD/DVD Drive
- Serial port or USB port
- Null-modem cable (included with Orion, NovaTech part number NT-NM9MF)
- Ethernet port

Chapter Summary

Chapter 2 will explain the installation of NCD.

Chapter 3 will explain how the various Orion options are configured from within NCD. However, the respective protocol and software manuals are also required for setup. For each option ordered with the Orion, the corresponding manual is included in the shipment. For example, if the DNP3 IP Master was ordered with the Orion, the corresponding *DNP3 IP Master User Manual* explains the DNP3-specific parameters, such as RTU addresses, point types, communication parameters, etc.

In addition to creating the Orion's configuration file, NCD also connects to the Orion and displays the Orion's MMI menu. This feature is fully explained in the *Orion MMI User Manual*. The *NCD User Manual* and the *Orion MMI User Manual* are two stand-alone manuals, explaining different aspects of the same project. However, in order to get familiar with the Orion, we strongly recommend referring to both manuals at the same time.

All manuals are installed as .pdf files on the PC's hard drive during the installation process described in chapter II. Installation of NCD. Once the installation in the next chapter has been completed, the manual can be opened as follows.

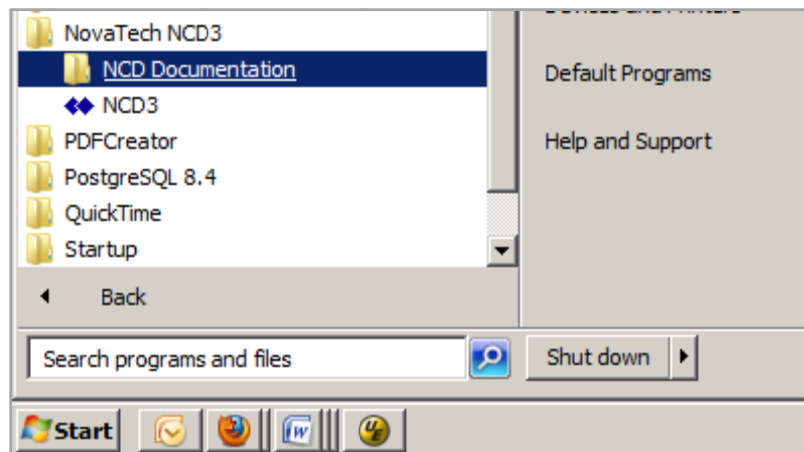


Figure 1: Access to NCD and Orion Documentation

II. Installation of NCD

1. The NCD installation CD must be inserted to the PC's CD drive.
2. If the PC is set up to autorun CDs, the NCD installation will automatically start itself at this point. If the installation does not start automatically, go to *Start*, then to *Run*. At this point, the Run window shown below is displayed, in which `D:\setup.exe` must be entered. If the CD drive has another drive letter, such as `E:`, `F:`, etc., that letter must be entered instead of `D:`.

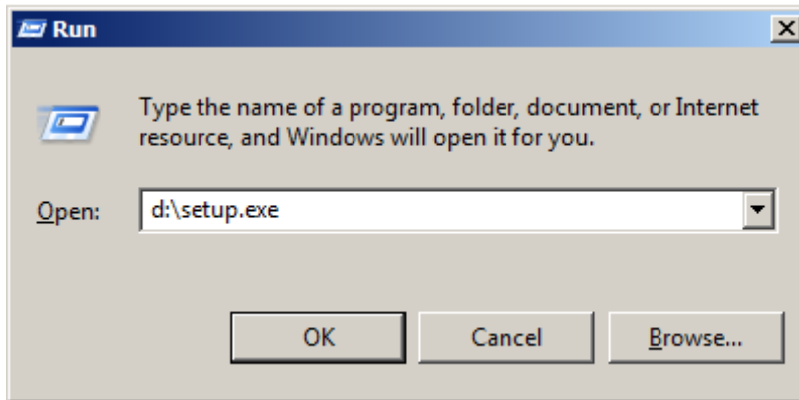


Figure 2: NCD Installation

3. In order to complete the installation, the PC must be restarted.
4. When the PC has started up again, NCD can be opened as shown in the following figure.

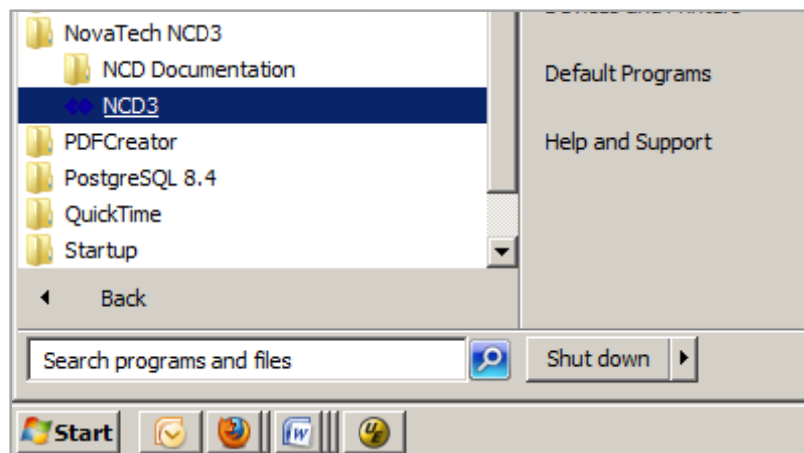


Figure 3: Starting NCD

NCD and accompanying files are installed in the following directory structure (Figure 4). The purpose for each directory is described in Table 1.

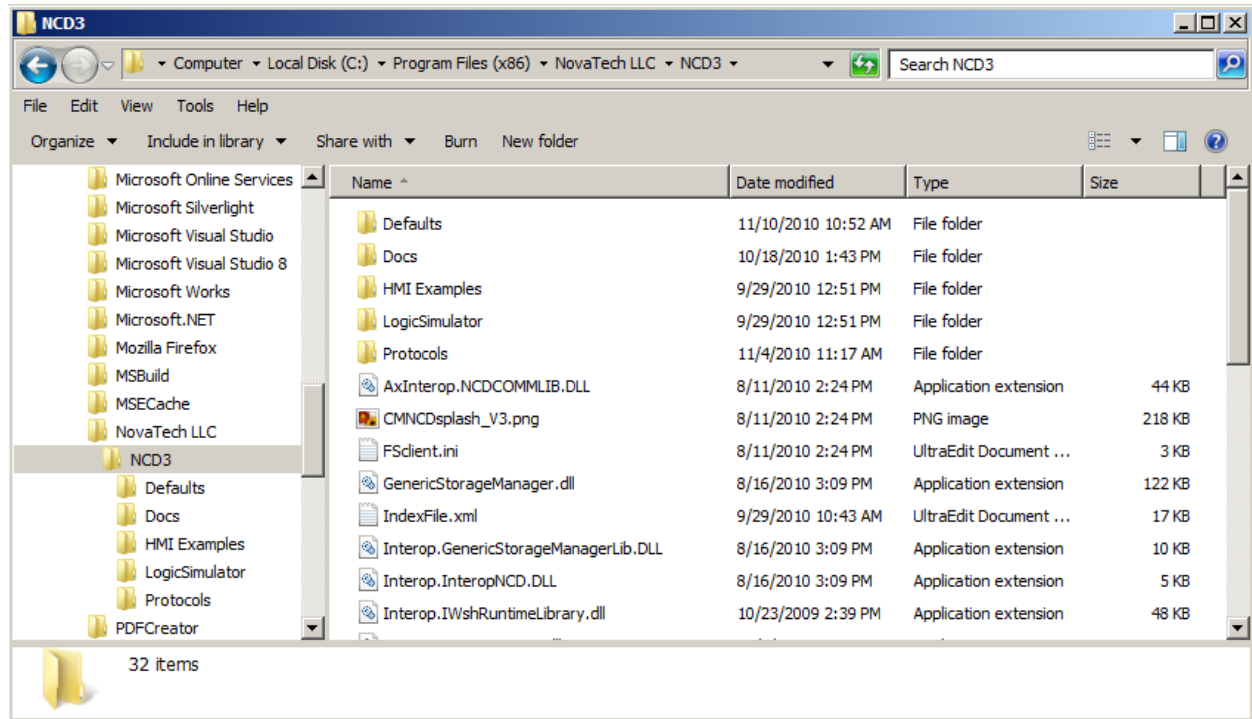


Figure 4: NCD Program Directory Structure

Directory	Description
\Defaults	Default files for IEDs and relays supported by the Orion. New default files can be added as needed and described by each respective protocol manual. The default files are .csv (comma separated value) files.
\Docs	All related documentation regarding the following: NCD, Orion, protocols, and Technical Notes.
\HMI Examples	Sample .ncd, .bas, and .svg files for use with the Orion HMI. This is used in conjunction with the XML Slave protocol. Refer to the <i>XML Slave for Orion Manual</i> for more information regarding the Orion HMI.
\LogicSimulator	LogicSimulator.exe allows running the logic program on the PC to check it for errors before transferring it to the Orion.
\Protocols	Each protocol has its own ActiveX control file (.ocx) that allows its configuration in NCD. These .ocx files are stored in the \Protocols directory.

Table 1: NCD Program Directory Structure

By default, the .ncd files created with NCD, as well as the connection files and the User Default Files are stored under \My Documents\NCD under the respective Windows® login. In the example shown in [Figure 5](#), the Windows® login account is nt. Therefore, the resulting default directory for NCD is C:\Document and Settings\nt\My Documents\NCD as displayed in the title bar of the Windows® Explorer. The purpose for each directory is described in [Table 2](#).

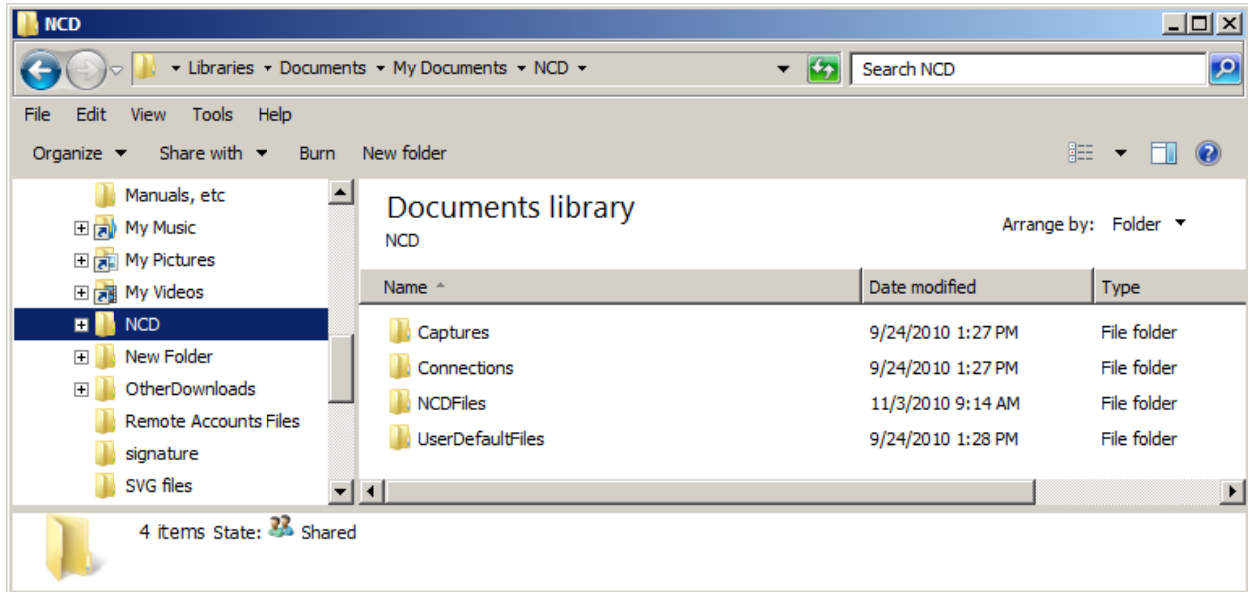


Figure 5: NCD User Files Directory Structure

Directory	Description
\Captures	Contains logged data/communications (.log files) as recorded in the communications window in NCD.
\Connections	.conn files for the NCD connections with the Orion.
\NCDFiles	By default, all .ncd files and .bas files are stored in this directory. If desired, these files can be stored anywhere on the PC's hard drive.
\UserDefaultFiles	Device-specific default files are user-defined and, by default, stored in this directory. These files are typically defined if meters and relays are used for which there are no standard default files defined in \Program Files (x86)\NovaTech LLC\NCD3\Defaults (see Table 1).

Table 2: NCD User Files Directory Structure

III. Running NCD

Main Menu

The main menu of NCD provides the following options. Each option is briefly described in [Table 3](#), and then fully discussed, including all sub options, in its respective chapter.

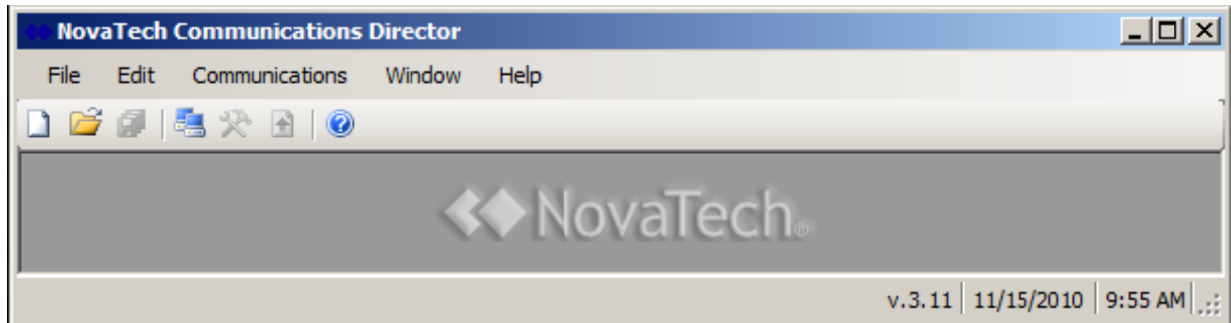


Figure 6: NCD Main Menu

Note that multiple Orion configurations (.ncd files and associated .bas/.lua files if Orion Math and Logic is used) can be opened at the same time.

Menu Bar	Description
File	Access to .ncd file-related options, such as New, Open, Close, Save, Save As, and recently edited files. Each .ncd file contains a single configuration for an Orion. Multiple .ncd files can be transferred to the Orion, but the Orion can run only one configuration at any given time. Chapter File Menu provides a full explanation of all file-related options.
Edit	The automatic login data to the Orion Support Site and the NCD Update Options are entered under the option Edit Menu .
Configure	The entire Orion configuration is set up from this option, including hardware configuration and options, software, port configurations, addresses, IP addresses, input/output point lists, poll rates, etc. The chapter Configure Menu provides a full explanation of all configuration-related options.
Communications	This option connects the PC to the Orion's MMI. It is described in Communications Menu . The Orion's MMI can be accessed with both NCD and standard terminal software, such as WinTerminal, CRT, etc. The Orion's MMI itself is fully explained in the <i>Orion MMI User Manual</i> .
Window	If multiple windows are open in NCD, this option allows cascading, selecting, or closing the windows.
Help	This option provides the standard About information, as well as Protocol Info which summarizes the current configuration.

Table 3: NCD Main Menu

File Menu

This option handles the .ncd files, which contain the Orion configuration. NCD supports multiple open .ncd files. The menu items are shown in [Figure 7](#), and are explained in [Table 4](#).

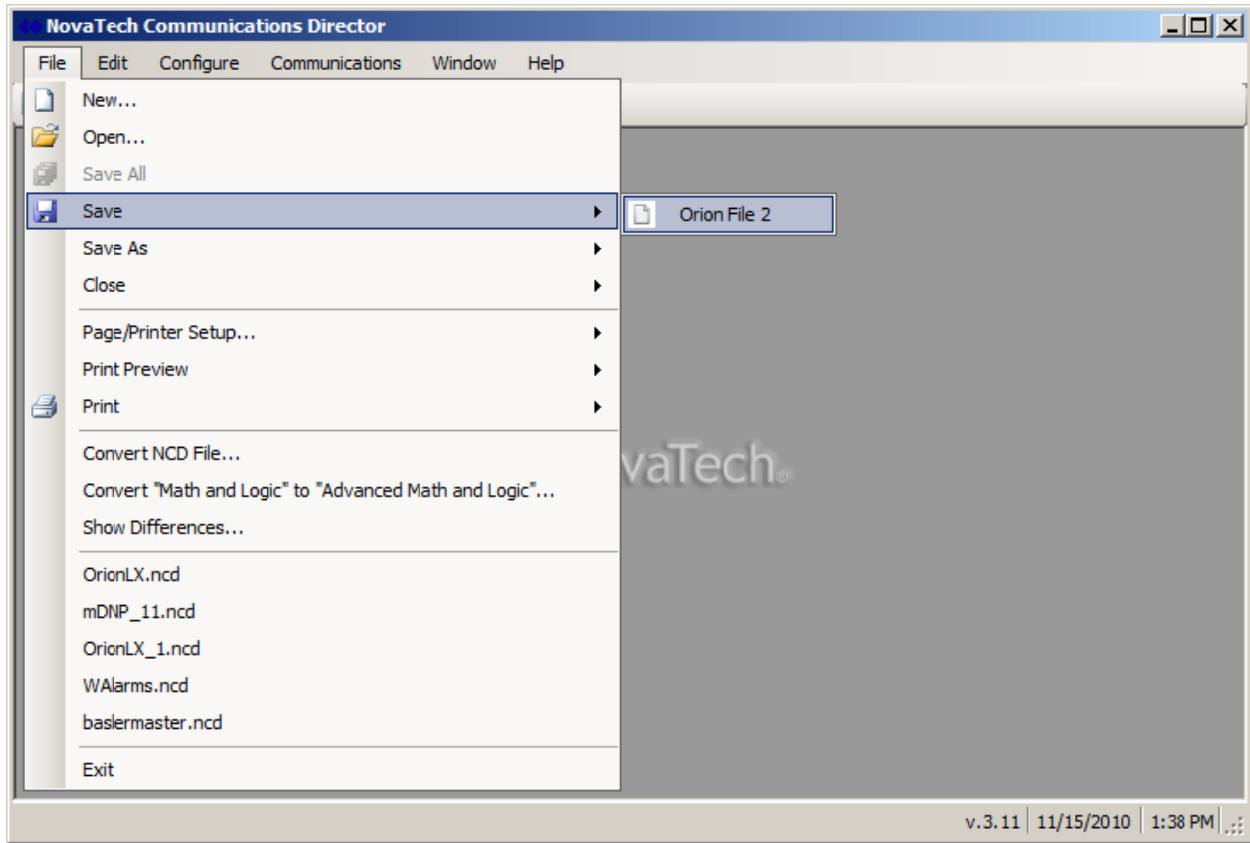


Figure 7: File Menu

Command	Description
New	Starts the configuration for a new Orion .ncd file. This configuration will later be saved using the <i>Save</i> or <i>Save As</i> functions. When creating a new configuration, the <i>Select Hardware</i> window (see Figure 16) will be displayed. After selecting the Orion hardware, the next step is to configure the individual ports of the Orion using the Configure Menu .
Open	Opens an existing .ncd file. The starting directory is C:\My Documents\NCD\NCDFiles\. Of course, .ncd (and associated .bas files) can be stored anywhere on the PC.
Save	Saves the current Orion configuration to the corresponding .ncd file (and associated .bas file if Logic is used) already on the hard drive. If this is the first time that this configuration is saved to file, a <i>Save As</i> window will appear. If multiple configurations are open, the configuration to be saved must be selected (see Figure 7).

Command	Description
Save As	Saves the current Orion configuration to a new <code>.ncd</code> file (and associated <code>.bas</code> file if Logic is used). The new file name must be entered. If multiple configurations are open, the configuration to be saved must be selected (see Figure 7).
Close	Closes the open Orion configuration without saving any new or changed parameters to an <code>.ncd</code> file. If multiple configurations are open, the configuration to be closed must be selected (see Figure 7).
Page/Printer Setup	Select the printer, and set up the paper size, paper source, paper orientation, and margins for printing. If multiple configurations are open, the configuration to be printed must be selected (see Figure 7).
Print Preview	Displays a complete preview of the printed configuration on PC screen for browsing and zooming. If multiple configurations are open, the configuration to be previewed must be selected (see Figure 7).
Print	Prints the current configuration on the printer. If multiple printers are installed on the PC, the correct printer must be selected. If several configurations are open, the configuration to be printed must be selected (see Figure 7).
Convert NCD File	This option converts existing NCD files for Orion5r to the OrionLX. Specifically, the Orion5r supports Modbus Plus while the OrionLX supports Modbus TCP. If the existing Orion configuration includes Modbus Plus, this function converts all related configuration information to Modbus TCP. This option is not required for setting up an Orion5r, Orion5, or Orion16.
Convert "Math and Logic" to "Advanced Math and Logic"	This option converts Orion Math and Logic (<code>.bas</code>) files to Advanced Orion Math and Logic (<code>.lua</code>) files for the OrionLX. This option is not used for setting up an Orion5r, Orion5, or Orion16.
Show Differences	This option compares two NCD files. The result of the comparison is displayed in a window, and can be copied to clipboard or saved to file for detailed analysis.
Exit	Exits NCD. If the current configuration has not yet been saved to an <code>.ncd</code> file, an additional prompt allows saving the file before exiting.

Table 4: NCD File Menu

Note: An Orion configuration is stored as an `.ncd` file on the PC's hard drive. If logic is used, NCD stores the logic for an `.ncd` configuration file in an associated `.bas` file located in the same directory. The name of the `.bas` file is stored in the corresponding `.ncd` file, such as `newcfg.ncd`.

If the `.ncd` file and the `.bas` file have been renamed (e.g. from `oldcfg.ncd` to `newcfg.ncd` and `oldcfg.bas` to `newcfg.bas`), or the `.ncd` file has been moved without moving the `.bas` file, NCD displays a prompt for the associated `.bas` file (see [Figure 8](#)). This is because the `.ncd` file still contains the original name of the associated `.bas` file, but now the `.bas` file has a new name, or is still in one directory while the `.ncd` file is in another directory. If the correct logic file name is not entered, NCD will continue with an empty logic file.

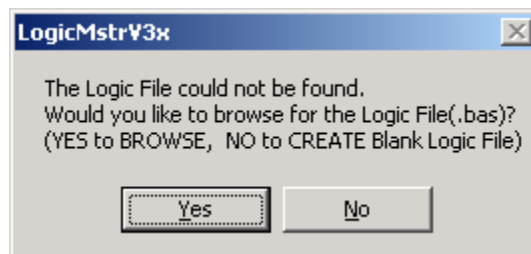


Figure 8: NCD Prompt for Logic File

Edit Menu

The Edit menu sets up features related to the operation of NCD as shown in the following figure.

Updates Tab

Under the Updates tab, the Orion Support Site Information, NCD Update Options, and the Proxy Server can be set up.

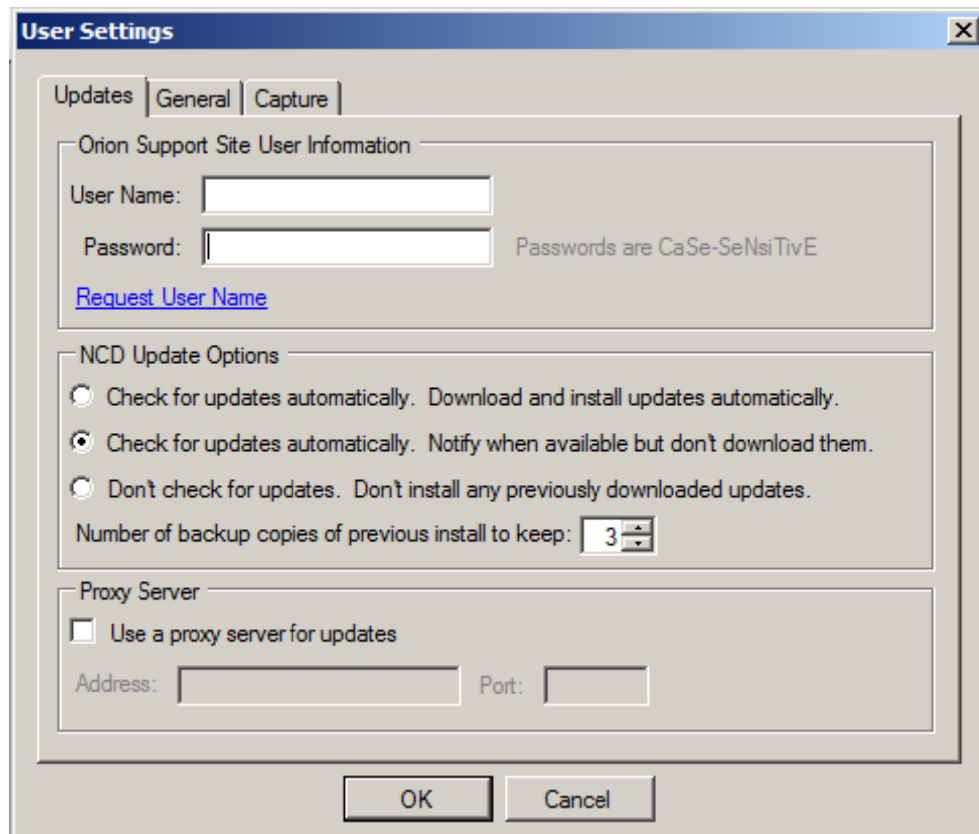


Figure 9: User Settings – Updates

Orion Support Site Information

Entering the NovaTech-issued `User Name` and `Password` allows automatic login to the NovaTech Orion Support Site. If the `User Name` and `Password` have not yet been issued, clicking on [Request User Name](#) generates an email to NovaTech using the default email client software installed on the PC, such as Outlook, Outlook Express, or Thunderbird.

NCD Update Options

NCD is updated based on the option selected here.

- Updates can be installed automatically whenever they are available.
- A notification can be displayed when an update becomes available, providing the option to download the update.
- If desired, updates can be disabled altogether.

If the update is downloaded, the update will be installed automatically when NCD is restarted.

The number of backup copies of previous installations which are kept on the hard drive is set here. The valid range is from 0-3.

Proxy Server

If the PC is connected to the Internet using a proxy server, its address and port number must be entered to allow NCD to access the NovaTech server.

General Tab

On the *General* tab, splash screen on startup can be enabled. Also, the logging of all NCD operations can be enabled. The resulting log file can be sent to NovaTech if needed. A default directory for NCD files can also be set.

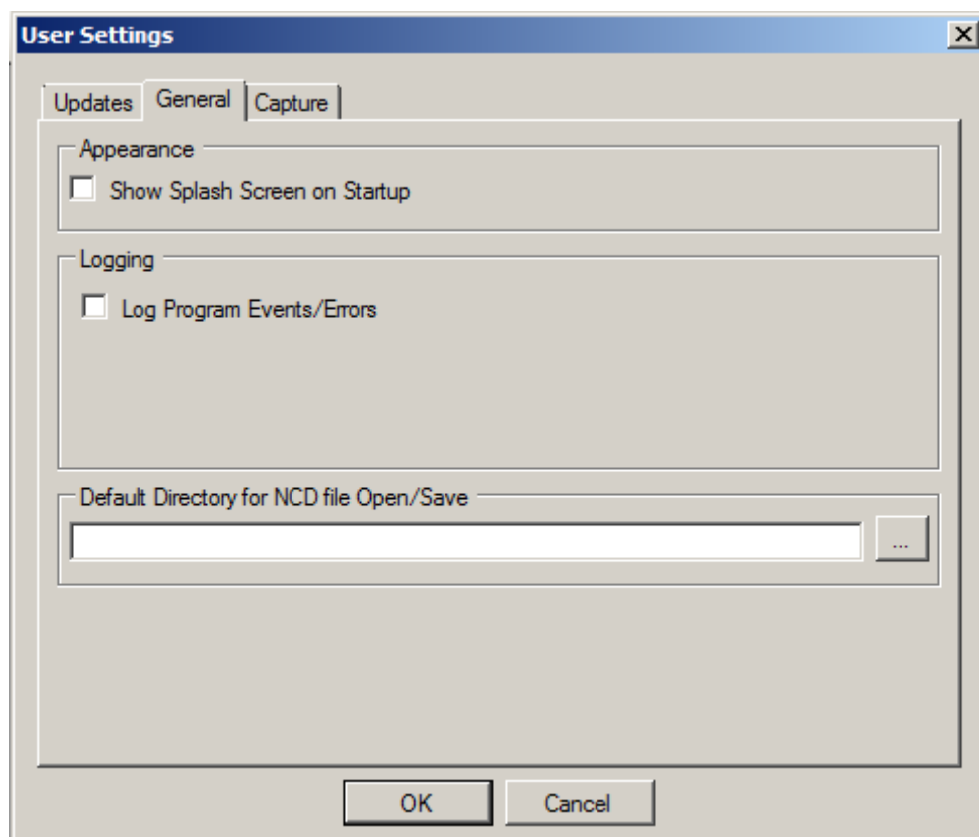


Figure 10: User Settings – General

Capture Tab

On the `Capture` tab, logging parameters for the data captured from the communications window are set. A limit on the number of captured files, as well as the file size, can be designated. An option for Rollover can also be checked. This setting will begin deleting the oldest files once the specified limit is reached. Otherwise, the capture will stop when the limit is reached.

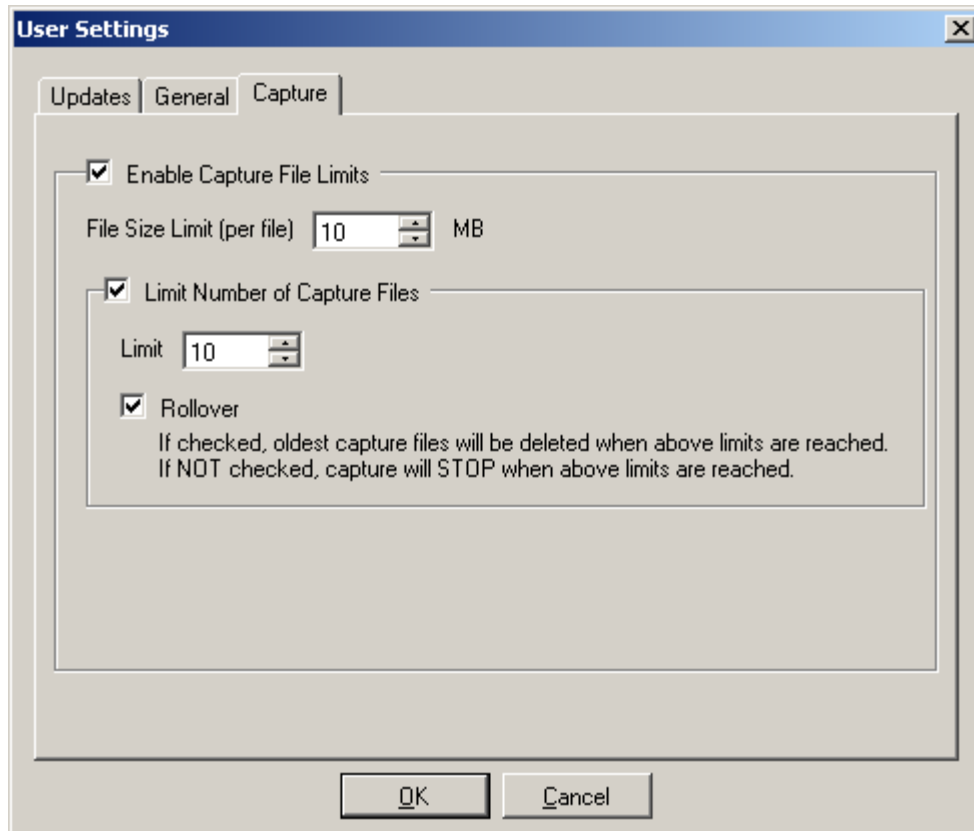


Figure 11: User Settings – Capture

Configure Menu

The options shown under *Configure* set up all aspects of the Orion with regards to master and slave protocols, communication parameters and address, point lists, logic, logging, etc.

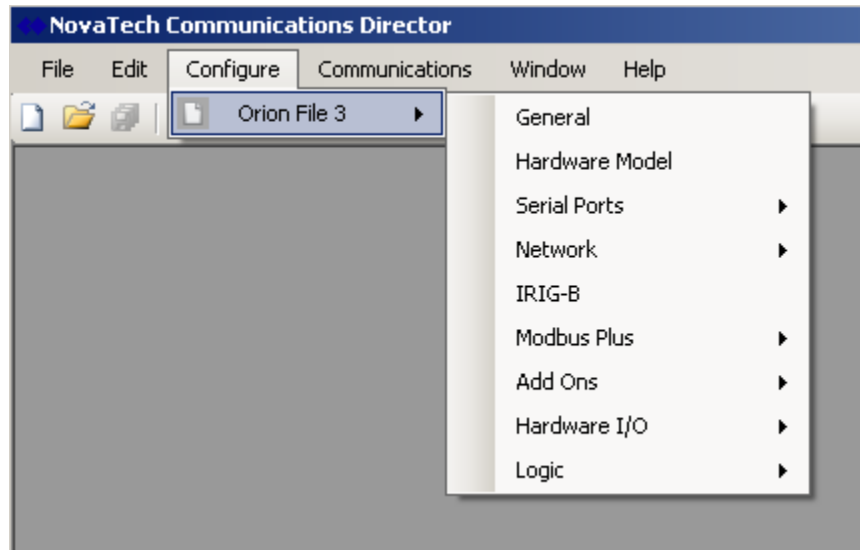


Figure 12: Configure Menu

The configuration is stored in an *.ncd* file on the PC's hard drive using the steps described in chapter II. Installation of NCD. If logic is used, NCD stores the logic for an *.ncd* in an associated *.bas* file located in the same directory. Once the *.ncd* (and *.bas*) file is created, it must be transferred from the PC to the Orion using the Orion's MMI (serial connection or USB connection). This option is fully described in the *Orion MMI User Manual*.

The data protocols available in the NCD installation for serial ports are shown in Figure 18, and the data protocols for network ports are shown in Figure 23.

Options under *Modbus Plus*, *Add Ons*, *Hardware I/O*, and *Logic* are marked with a once they are configured.

Additional drivers and options can be obtained by contacting NovaTech.

Port Options

Most of the options described in the following sections are set up using a Port setup window with the following `Port Options` displayed at the top of the window. Depending on the type of port, not all of the options are available. The * on the right side of the title bar text indicates that the current port setup has not yet been saved.



Figure 13: Port Options

Setting	Description
Copy Move	The current port configuration can be copied or moved to another port in the same Orion configuration. If multiple configurations files are open, the ports in the other configuration files are listed as well as targets for the copy or move operation. The selection window for the target port is shown in Figure 14 . Any port-specific parameters are automatically adjusted to the target port. All other parameters are simply moved or copied.
Delete	Remove the current port with all configured parameters and data points from the configuration. If other ports map points defined on this port, these ports are affected by the removal of this port.
Close	After configuring all parameters and data points for this port, clicking this option closes the port setup window.

Table 5: Port Options

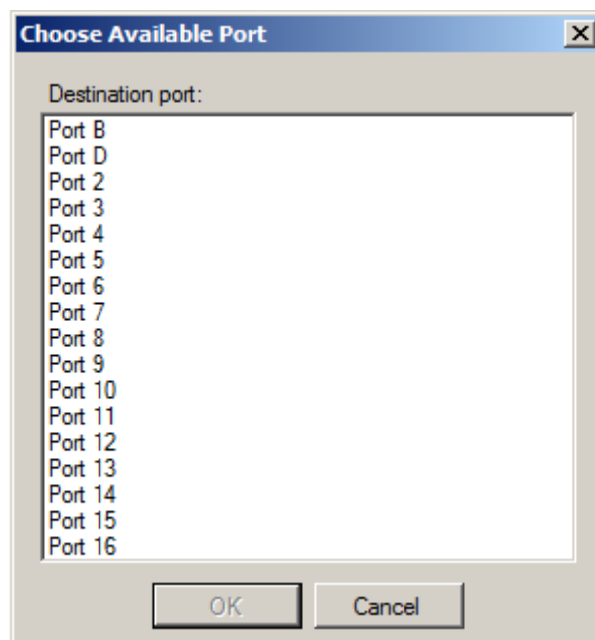


Figure 14: Choose Available Port

General

The following window sets up the general Orion options. [Table 6](#) provides the description for each setting under General Settings.

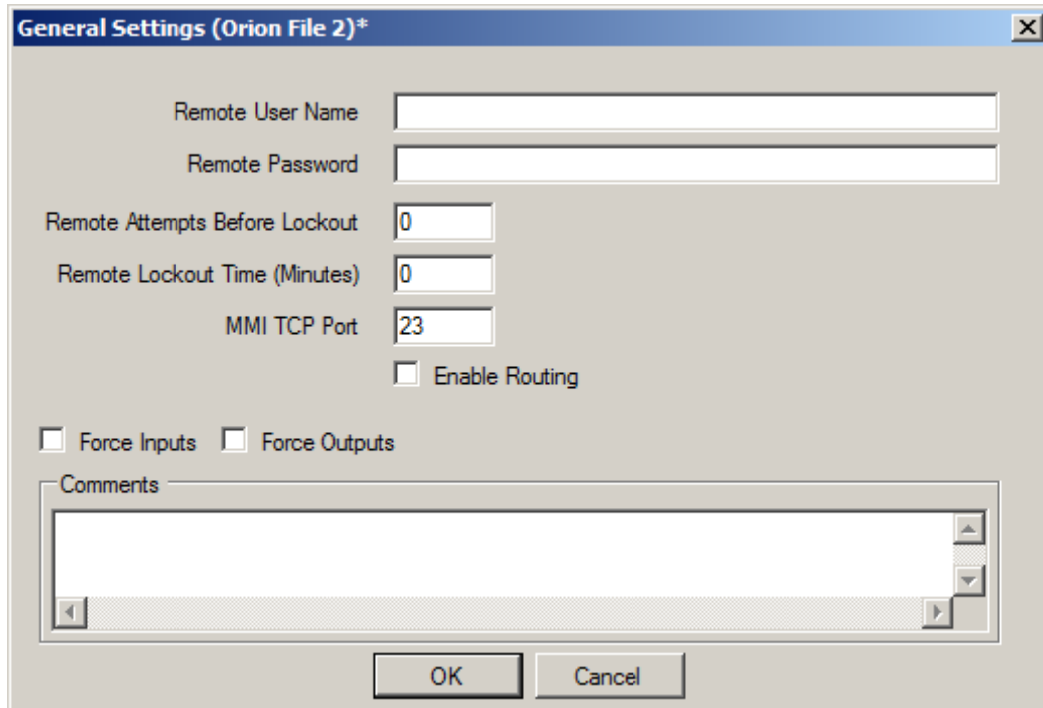




Figure 15: General Settings

Setting	Description
Remote User Name Remote Password	<p>If the Orion is set up with an Ethernet card and an IP address, a user accessing the Orion MMI through Telnet should be required enter a user name and password. If the remote user does not provide these credentials, the Orion will not run the MMI on that Telnet connection. These fields specify the required user name and password with the following characteristics.</p> <ul style="list-style-type: none"> ▪ up to 25 characters long ▪ case-sensitive ▪ no limitations or requirements on the characters used <p>For the serial connection on Port A, there will always be immediate access without a logon.</p>
Remote Attempts Before Lockout	<p>For a Telnet connection, the remote user has this number of <code>Remote Attempts</code> before the Orion does not allow any additional logon attempts for the period of time specified in <code>Remote Lockout Time</code>. 0 means there is no limit on the number of logon attempts.</p>
Remote Lockout Time	<p>Specifies the lockout time in minutes after the limit of failed Telnet logon attempts is reached. The default value is 0, which means that there is no lockout time set.</p>

Setting	Description
MMI TCP Port	The default TCP port for the MMI is 23. If needed, it can be set to another number.
Enable Routing	Allows TCP routing through the Orion.
ForceInputs	Allows forcing of input points from the Orion's MMI console. If the box is checked here and the input forced in the MMI, the master station will see the input point with the value forced at the Orion MMI, as opposed to the value obtained from the end device. This feature helps debugging the communication between the master station and the Orion, without having to force input values in the end device. See the chapter "Data Menu" in the <i>Orion MMI User Manual</i> for details.
ForceOutputs	Allows forcing of output points from the Orion's MMI console. If the box is checked here and the output forced in the MMI, the end device will receive a value for an output point as forced by the Orion, as opposed to sending a value all the way from the master. This feature helps debugging the communication between the end device and the Orion, without having to send output values in from the master. See the chapter "Data Menu" in the <i>Orion MMI User Manual</i> for details.
Comments	This field allows recording any kind of notes regarding this configuration, such as location, specific parameters, history, etc.

Table 6: General Settings

 **Warning:** Enabling `ForceInputs` allows forcing input values in the Orion's MMI console. Then, the forced Orion data point(s) will indicate an equipment state or condition to the SCADA master that is only simulated, and does not reflect the actual state or condition. This may lead the SCADA master computer or personnel to initiate operations based on the simulated state as opposed to the actual state. Depending on corporate safety policies, it may be required to get permission, or check with either end or both ends before forcing any values. Failure to do so may result in equipment damage and/or bodily harm.

 **Warning:** Enabling `ForceOutputs` allows forcing output values in the Orion's MMI console. This may operate a live piece of equipment on the end device, the same way it would be operated locally, or from the front end/SCADA master. Depending on corporate safety policies, it may be required to get permission, or check with either end or both ends before issuing any output commands. Failure to do so may result in equipment damage and/or bodily harm.

Hardware Model Information

Both the type of Orion and installed hardware options are specified in [Figure 16](#). The checkboxes corresponding to the hardware options installed on the specific Orion must be selected in order to load the respective software drivers.

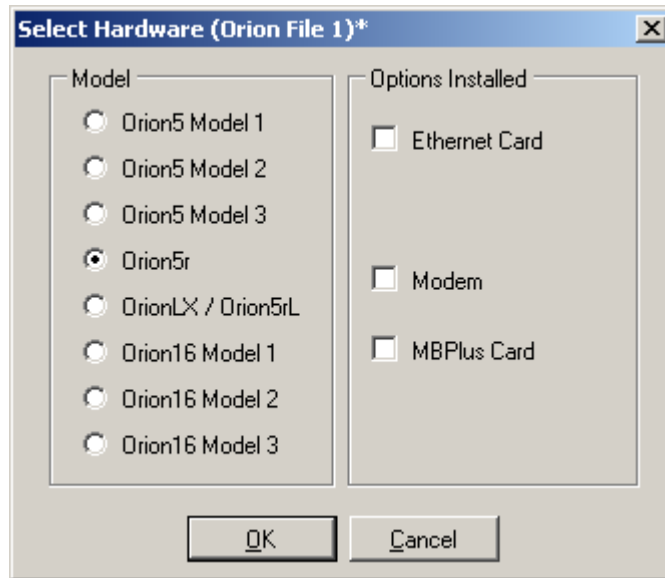


Figure 16: Orion Hardware Configuration

The ports can be a combination of RS-232, RS-485/422, and Fiber serial ports, as well as other specialty ports.¹ If an Ethernet port is selected, the TCP/IP parameters are configured under [Network](#).

Orion	Serial Ports	Modem (optional)	10BaseT (optional)	10/100BaseT (optional)
Orion5 Model 1	1	1	1	
Orion5 Model 2	5	1	1	
Orion5 Model 3	9	1	1	
Orion5r	1-17	1		Up to 2
OrionLX / 5rL	1-17	1		Up to 2 (copper or fiber)
Orion16 Model 1	3	1	1	
Orion16 Model 2	11	1	1	
Orion16 Model 3	19	1	1	

Table 7: Orion Models and Options

¹ See also *Orion5 Hardware Manual* or *Orion5r Hardware Manual*.

Ports

With the exception of Port A, all other ports can be individually configured with a specific protocol, the related communication parameter, device lists, and point lists. All ports are independent of each other, i.e. there are no limitations on the combinations of protocols used. After selecting a port in [Figure 17](#), the protocol selection screen in [Figure 18](#) allows selecting the protocol for the port.

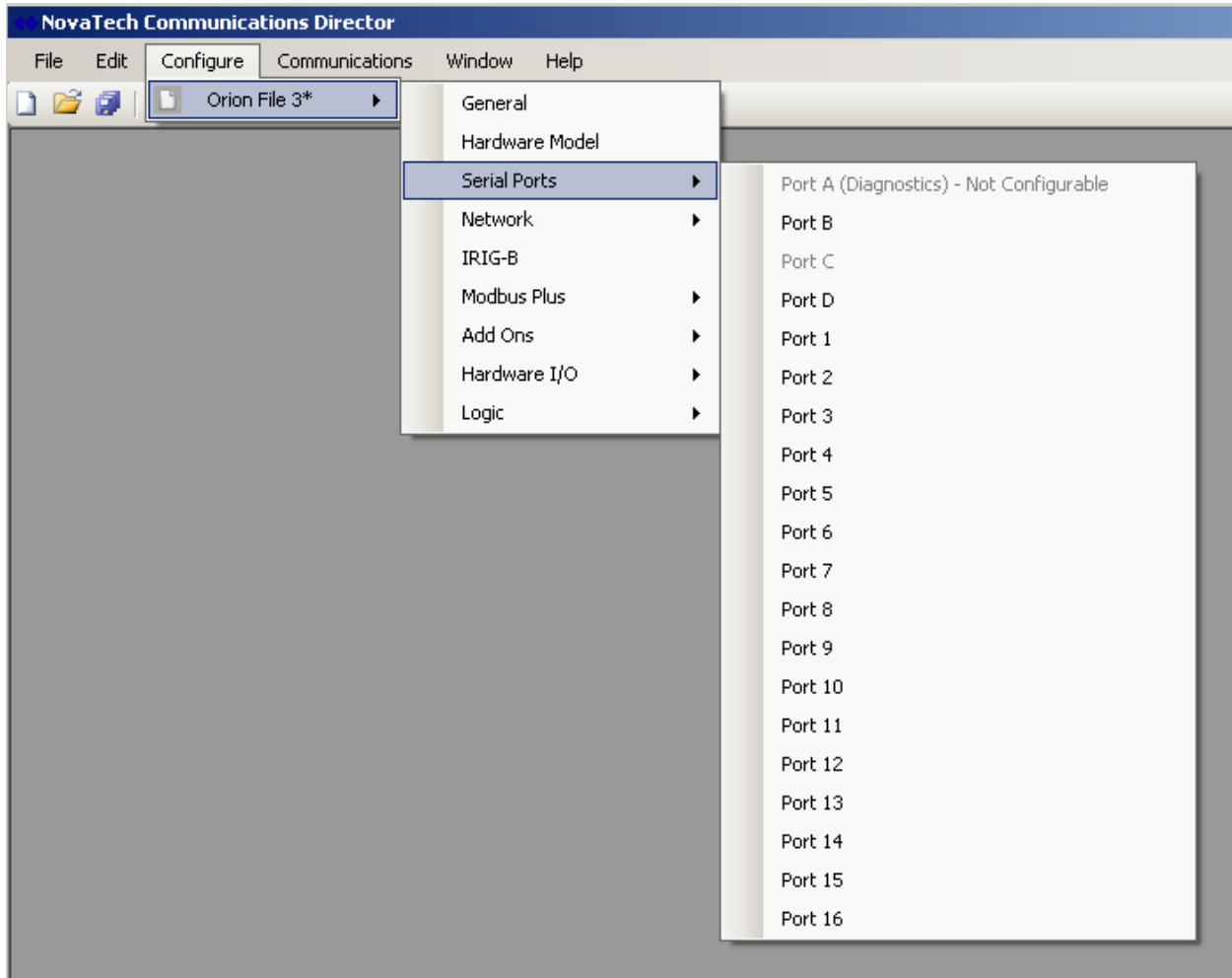


Figure 17: Port Selection

Port	Description
Port A	Built-in diagnostics port. The communication parameters are 115200N81 and cannot be changed.
Port B	This port is always available as a built-in RS-232 port on the main processor board.
Port C	On the Orion16 only, this port is always available as a built-in RS-232 port on the main processor board.
Port D	Orion5 and Orion5r: If the internal modem has been selected under <u>Hardware Model Information</u> , it is available as Port D. Orion16: This port is always available as a built-in RS-232 port on the main processor board.
Port 1-16	Depending on the modules ordered and installed in each slot, these ports can be RS-232, RS-485, RS422, fiber, various bit protocols, and HDLC.

Table 8: Orion Ports

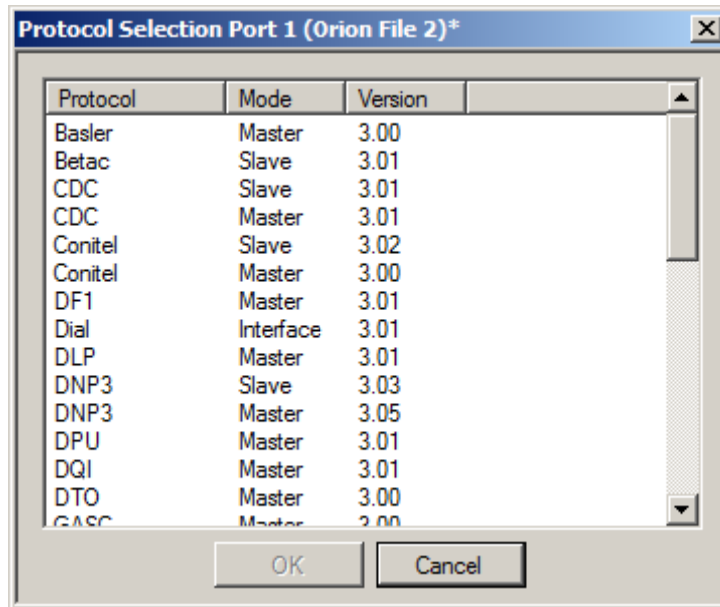


Figure 18: Protocol Selection Menu

Depending on the protocols purchased and implemented, a specific protocol may be available as a Master (the Orion acts as master, polling other devices with that protocol) and/or Slave (the Orion acts as slave, responding to polls by a remote master).

After selecting the protocol, refer to the specific NovaTech protocol documentation to configure the port communication parameters, RTU/device list, input point list, output point list, poll groups, and any other related parameters.

Network

Under `Network`, both the network parameters as well as the network ports are configured. The Orion's network address and related parameters are configured through the option `Parameters`. `Configure Network Port` sets up the master or slave protocols that are used to communicate with other devices using TCP/IP.

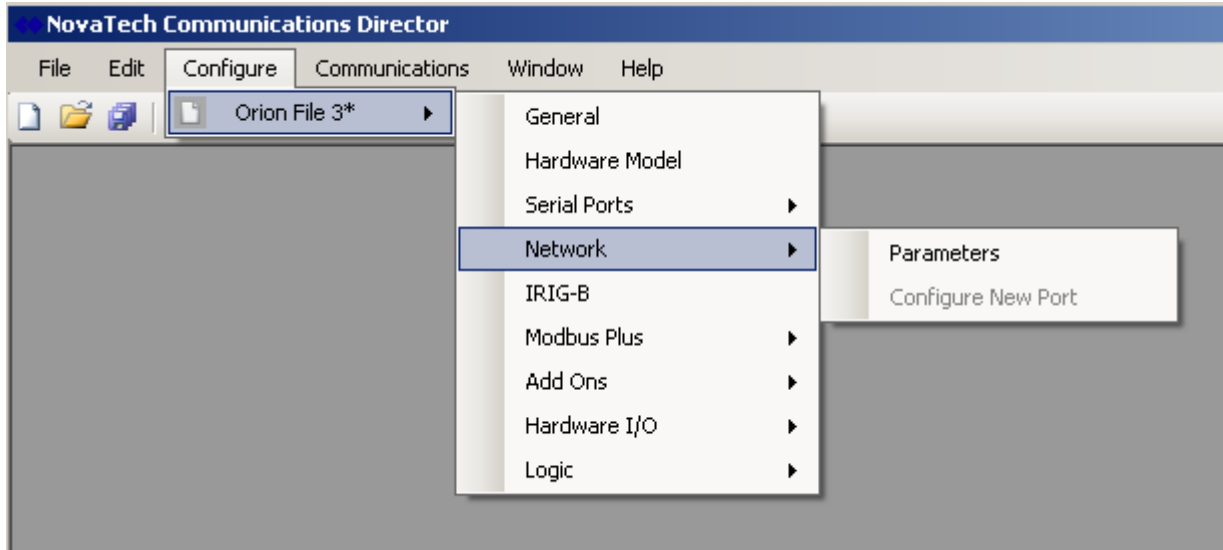


Figure 19: Network Parameter and Port Configuration

Under `Parameters`, both the `Ethernet` and the `PPP` parameters are configured on separate tabs ([Figure 20](#) and [Figure 21](#)).

Under `Configure Network Port`, the TCP/IP based protocols are selected ([Figure 23](#)) and configured, including port-related parameter, device lists, input point lists, and output point lists.

Parameters - Ethernet

For each configured Ethernet port, the parameters IP address, subnet mask, default gateway, and DNS server are required. Specific parameters are usually made available by the IT or communications department. Depending on the requirements and network setup, the IP addresses can be assigned automatically through a DHCP server on the network. However, unless the DHCP server is set up to assign a specific address to the Orion, this will result in random and varying addresses assigned by the DHCP server. In most network architectures, static IP addresses will be the preferred setup.

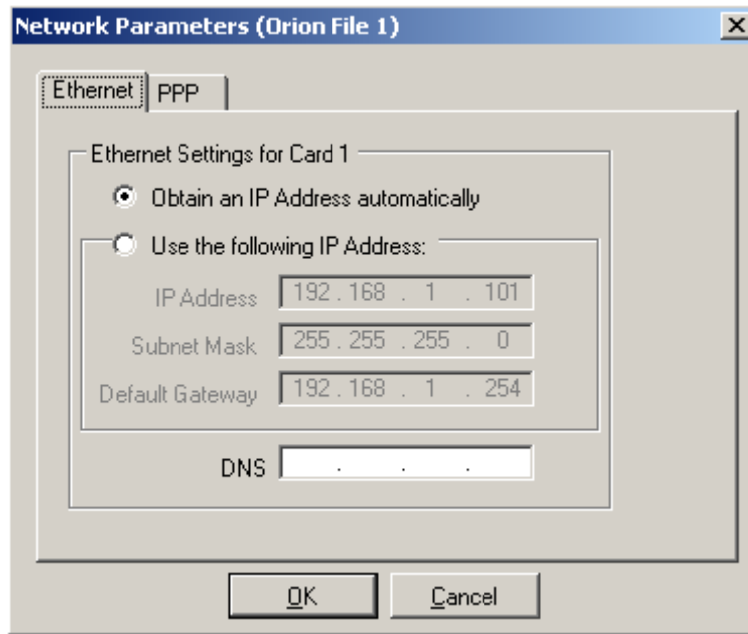


Figure 20: TCP/IP Address Setup

Parameter	Description
IP Address Subnet Mask Default Gateway DNS Server	TCP/IP parameters for the Orion’s Ethernet port 1 or port 2. If two Ethernet ports are installed on the Orion, they can be connected to the same or different networks. The correct TCP/IP parameters are generally available from the IT or Engineering personnel.

Table 9: TCP/IP Address Setup

Parameters - PPP

In the following window, the first section describes the common PPP parameters, the second section the PPP Client parameters, and the third section the PPP Server parameters. The PPP parameters are described in [Table 10](#).

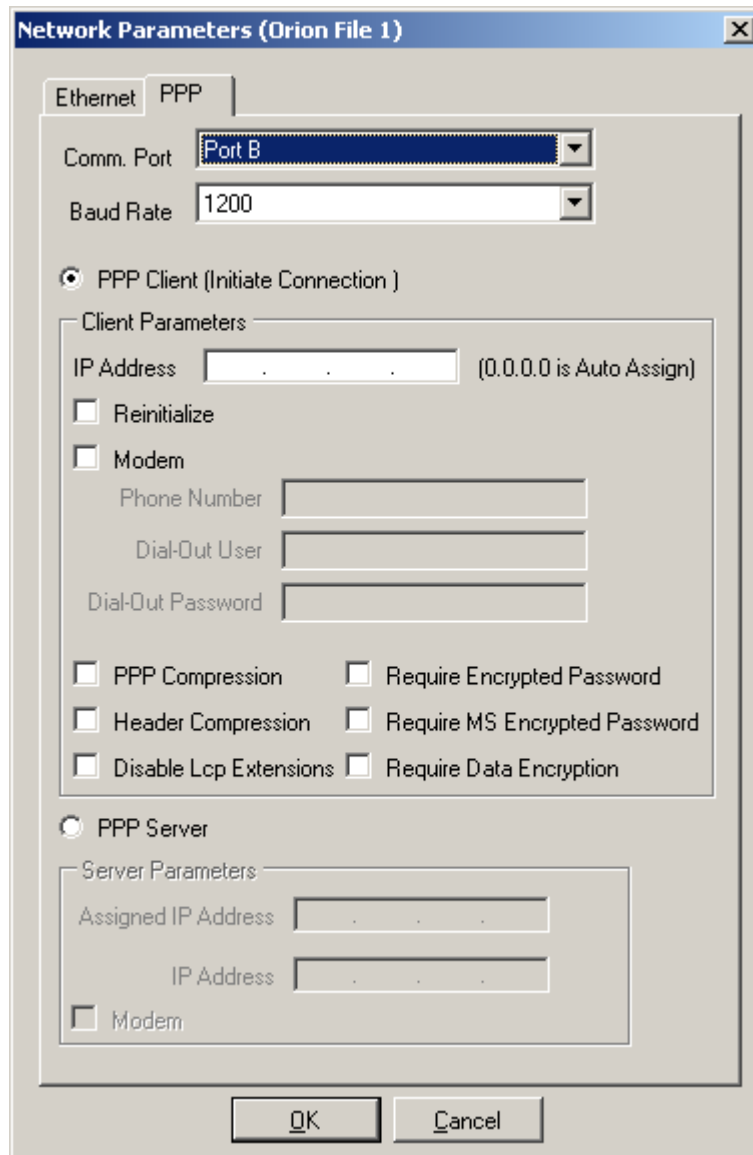


Figure 21: PPP Setup

Parameter	Description
Comm Port	Selects the Orion communication port for the direct connection. <ul style="list-style-type: none"> ▪ Port B is an RS-232 serial port. It can be used for a direct serial connection, or leased line modem, radio, etc. ▪ Port D is the Orion's internal dialup modem. Port C is available only on the Orion16.
Baud Rate	Selects the baud rate for the serial port specified. If using a modem, this is the baud rate between the Orion and local modem, not the baud rate between the local modem and the remote modem. The modem's technical documentation describes setting up the transmission rate between the modems.
PPP Client	This option sets up the port as PPP client. In this case, the Orion initiates connections.
IP Address	If an address is entered, the Orion will use this address when acting as a PPP Client to connect to a PPP Server. If left at 0.0.0.0, the Orion's PPP Client will be assigned an IP address by the PPP Server when the connection is established.
Reinitialize	If this box is checked, the PPP Client will reestablish the connection when it is lost. Otherwise, the connection will only be reestablished upon the next restart of the Orion.
Modem	This box must be checked <ul style="list-style-type: none"> ▪ when the PPP Server is set up on port B, and an external dialup modem is used on port B ▪ when the PPP Server is set up on port D, since this port is set up for the internal dialup modem.
Phone Number	When Modem is checked (which indicates a dialup modem connection), the phone number that the PPP Client must dial must be entered. This string must include all numbers and characters needed to make the connection, such as access to outside line, area code, and pause characters.
Dial-Out User Dial-Out Password	A user name and password must be entered if required by the PPP Server.
PPP Compression Header Compression Disable LCP Extensions Require Encrypted Password Require MS Encrypted Password Require Data Encryption	For most applications, these parameters should be left in their respective default setup. If they need to be changed, the IT or network engineering department will provide the correct settings.

PPP Server	This option sets up the port as PPP server. In this case, the Orion accepts connections requests.
Assigned IP Address	When a PPP Client connects to the PPP server, the Link Control Protocol (LCP) assigns an IP address to the PPP Client. The address is automatically computed from the previously entered IP address, by adding +1 to the last octet of the IP address. For example, if the IP address for the PPP Server is entered as 172.16.3.25, the IP address that will be assigned to a connecting PPP Client is 172.16.3.26.
IP Address	This is the IP address assigned to the PPP Server running on the OrionLX (not the IP address of the OrionLX). All PPP Server IP addresses should be the same on every TTY port.
Modem	This box must be checked when: <ul style="list-style-type: none"> ▪ the PPP Server is set up on port B, and an external dialup modem is used on port B ▪ the PPP Server is set up on port D, since this port is set up for the internal dialup modem.

Table 10: PPP Parameters

Setup of User Name and Password for Orion PPP Server

When a PPP Client accesses an Orion PPP Server, the access credentials set up on each must match for successful establishment of the PPP connection. The user name and password that the PPP Client must use are entered in the Orion PPP Server under *Configure – General Settings* in the NCD main menu. The user name is entered in field *Remote User Name*, and the password is entered in field *Remote Password* (Figure 22). The remote PPP Client accessing the Orion PPP Server is required to use these credentials in order to establish a PPP connection to the Orion.

Note: The *Remote User Name* and *Remote Password* entered in Figure 22 are also used as login credentials for other remote access to the Orion, such as Telnet.

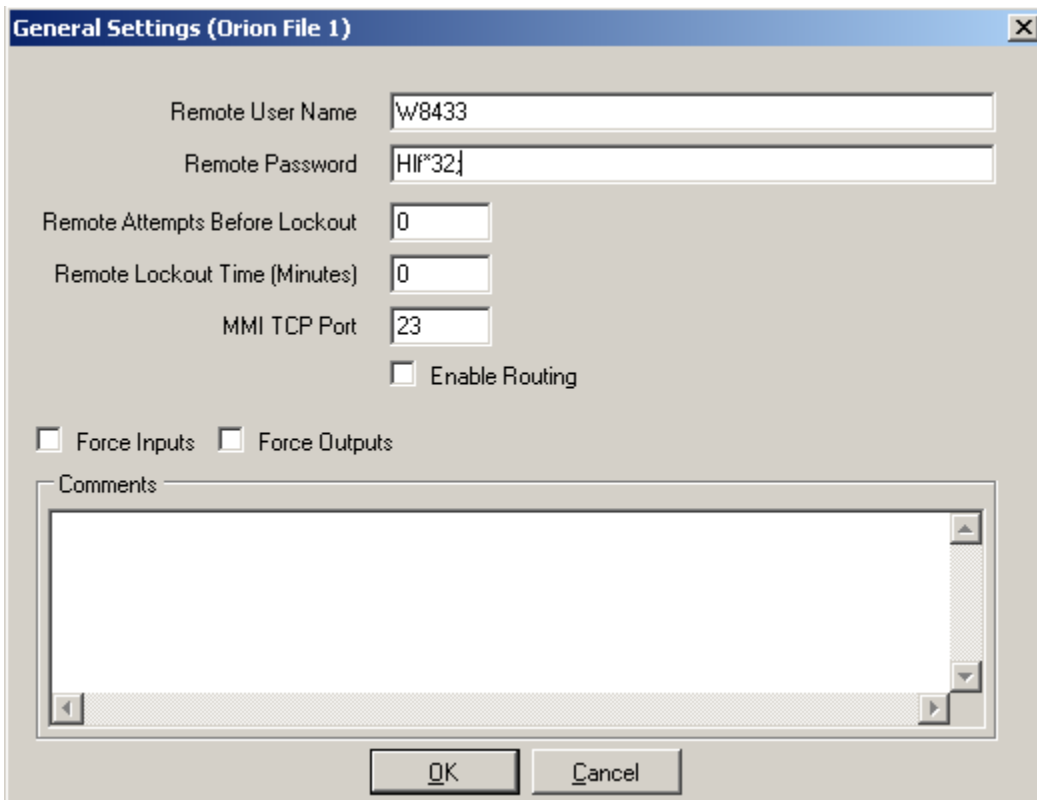


Figure 22: Setup of User Name and Password for Orion PPP Server

PPP Client Access to Devices on Orion’s Ethernet Network

If the PPP Client connecting to the Orion PPP Server needs access to devices on the Ethernet network that the Orion is connected to on its Ethernet port(s), the *Enable Routing* box (Figure 22) must be checked under *Configure – General Settings* in the NCD main menu.

Note: For each device on the Ethernet network that the client should connect to by PPP through the Orion, that device’s default gateway must be set to the Orion’s IP address.

Configure Network Port

After the network parameters have been set up, the network protocols can be configured (Figure 23).

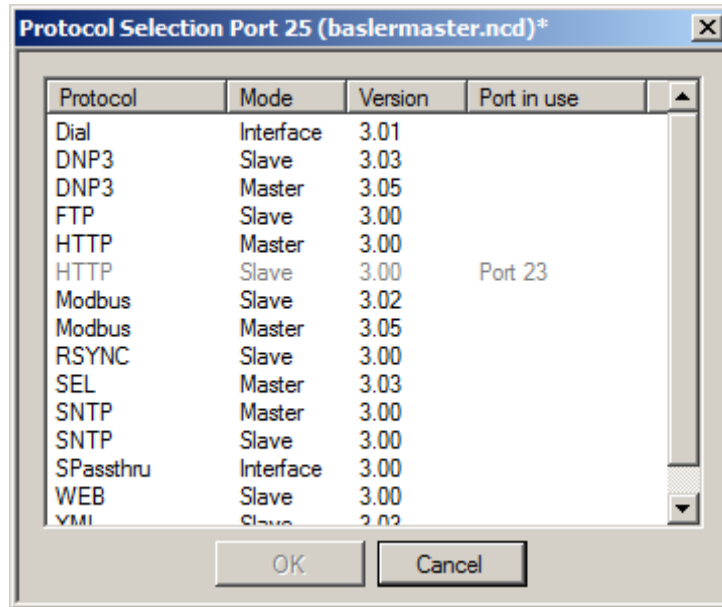


Figure 23: Network Protocol Selection Menu

Depending on the network protocols purchased and installed, a specific protocol may be available as a Master (the Orion acts as master, polling other devices with that protocol) and/or Slave (the Orion acts as slave, responding to polls by a remote master).

For each selected protocol, the protocol-specific NovaTech documentation is required for configuration of the port communication parameters, RTU/device list, input point list, output point list, poll groups, and any other related parameters.

IRIG-B

This option sets up the IRIG-B board, enabling the Orion to operate as an IRIG-B master. This means that the Orion distributes either IRIG-B time received from external IRIG-B receiver, or its own internal time, to IRIG-B capable IEDs and relays. This option is available for the Orion5r only. Specific setup and operation instructions are described in the *IRIG-B for Orion5r Software Manual*.

Modbus Plus

The Orion5r and the Orion16 are available with Modbus Plus interface card. Both Modbus Plus Master and Modbus Plus Slave are supported.

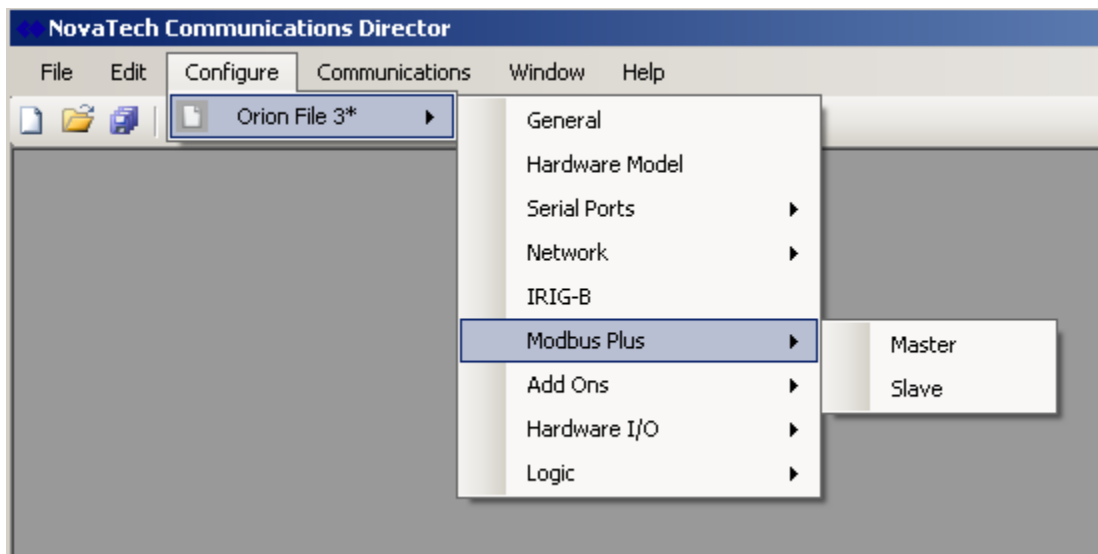


Figure 24: Modbus Plus Setup

The setup of the Modbus Plus card for master operation is described in the *Modbus Master for Orion Software Manual*.

The setup of the Modbus Plus card for slave operation is described in the *Modbus Slave for Orion Software Manual*.

Add Ons

The Orion has numerous optional modules available for data retrieval, storage, logging, and communications. These modules are listed under *Add Ons* (Figure 25).

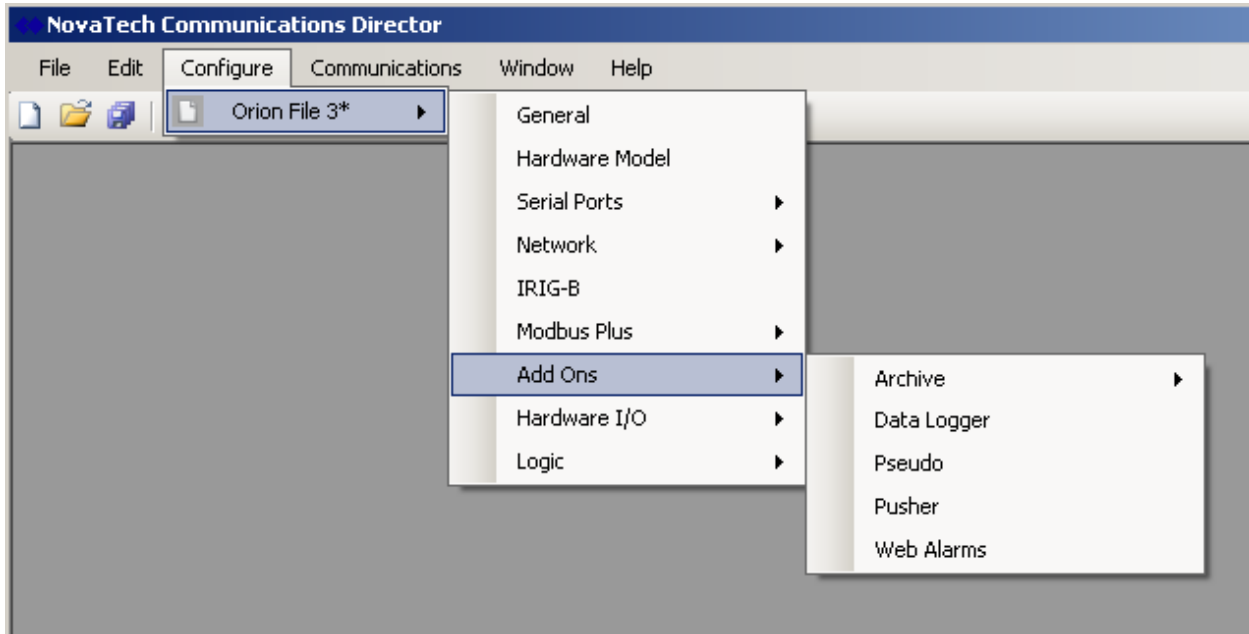


Figure 25: Add On Selection

The setup and operation of each option is described in the respective NovaTech software manual.

Archive

The *Archive* option allows archiving of either all points in the Orion, or a user-selected list of points. These values are then written to a file on the Orion’s flash disk. The files can be retrieved for analysis by engineering, or viewed as a HTML table in a web page. Setup and operation of this option are described in the *Orion Archive Module Software Manual*.

Data Logger

Using the SEL® Master, the Orion can be set up to poll multiple SEL® relays for point values as well as short event reports and long event reports. In addition to other processing of long event reports, they can also be logged to a text file on the Orion’s flash drive. This requires the Data Logger to be configured in NCD and running in the Orion. Whenever long event reports are retrieved from any of the connected SEL® relays, the Data Logger writes the long event report in plain text to the log file on the Orion’s flash drive.

Pseudo

Typically, data is being polled from an end device by the Orion through a master port. In turn, an Orion slave port is polled by a master station, such as a SCADA master or HMI. However, some applications specify that the Orion be connected to two master stations, and data to be exchanged between two masters. Thus, the outputs of one master become the inputs of the other master, and vice versa. This option allows setting up the data transfer between two slave ports on the Orion to exchange data between two master stations. Setup and operation of this option are described in the *Orion Pseudo Master Software Manual*.

Pusher

Generally, the Orion is polling data from the end device through a master port. In turn, an Orion slave port is polled by a master station. However, some applications specify that the Orion be connected to two slave devices, and data to be exchanged between those two slave devices. A typical example is two PLCs connected to the Orion, which need to exchange data. Thus, the Orion reads the inputs from one slave device and writes them as outputs to the other slave device, and vice versa. This option allows setting up the data transfer between two master ports on the Orion to exchange data between two slave stations. Setup and operation of this option are described in the *Orion Pusher Software Manual*.

Web Alarms

The Web Alarms option enables selected input and output points in the Orion (polled from field devices, logic points, etc.) to be annunciated in a color-coded web page served from the Orion. The Orion must have an Ethernet port, and the web browser must be set to the Orion's IP address. Setup and operation of this option are described in the *Orion Web Alarm Annunciator Slave Software Manual*.

Hardware I/O

All Orion models have built-in discrete I/O. In addition, an Orion can be set up with distributed I/O (DIOC).

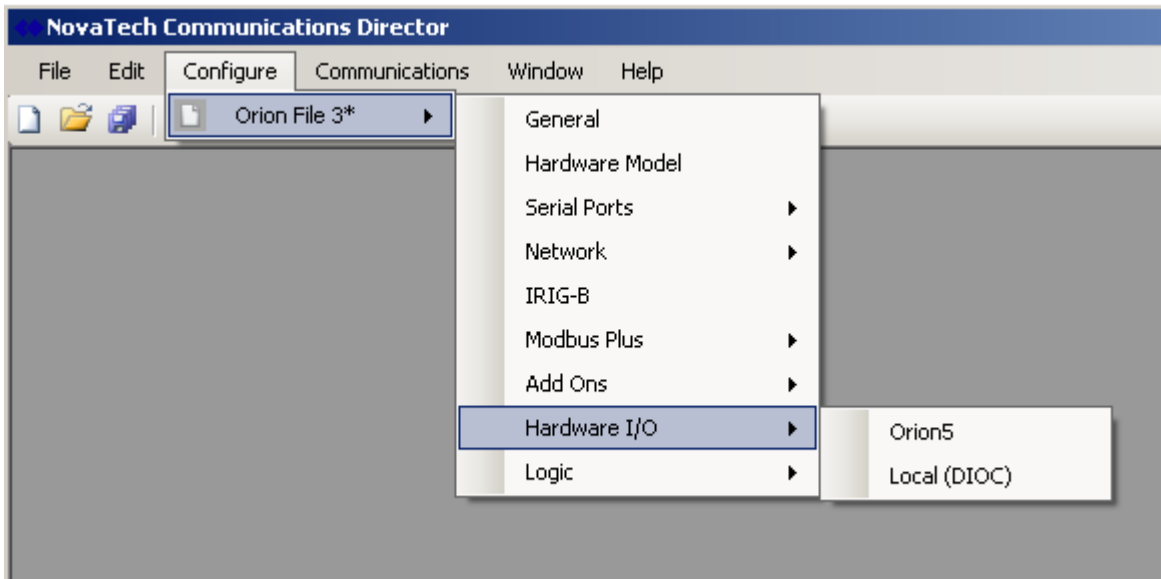


Figure 26: Hardware I/O

The setup of built-in I/O is described in the *Orion I/O Software Manual*.

The setup of distributed I/O is described in the *Orion DIOC Local I/O Manual*.

Logic

The Orion provides two optional logic modules ([Figure 27](#)).

Selecting `Editor` sets up the full Logic module. The Logic module processes the selected input points and output points and the programmed logic. It can set any input or output points configured in the Orion as well as define and set specific logic points which can be used by external master or slave devices. Setup and operation of this option are described in the *Logic for Orion Software Manual*.

The `LogicPak` module provides two pre-packaged functions:

- automatic switchover between redundant field devices
- ORing of status bits, such as Comm Fail flags, to combine values from multiple field devices into single bit for the master.

Setup and operation of this option are described in the *LogicPak for Orion Software Manual*.

Distribution Automation logic can be set up with `DA`. Before the DA Logic can be set up, all master ports in the Orion that communicate with the respective RTUs in the DA Logic must be set up. Setup and operation of this option are described in the *DA Logic for Orion Software Manual*.

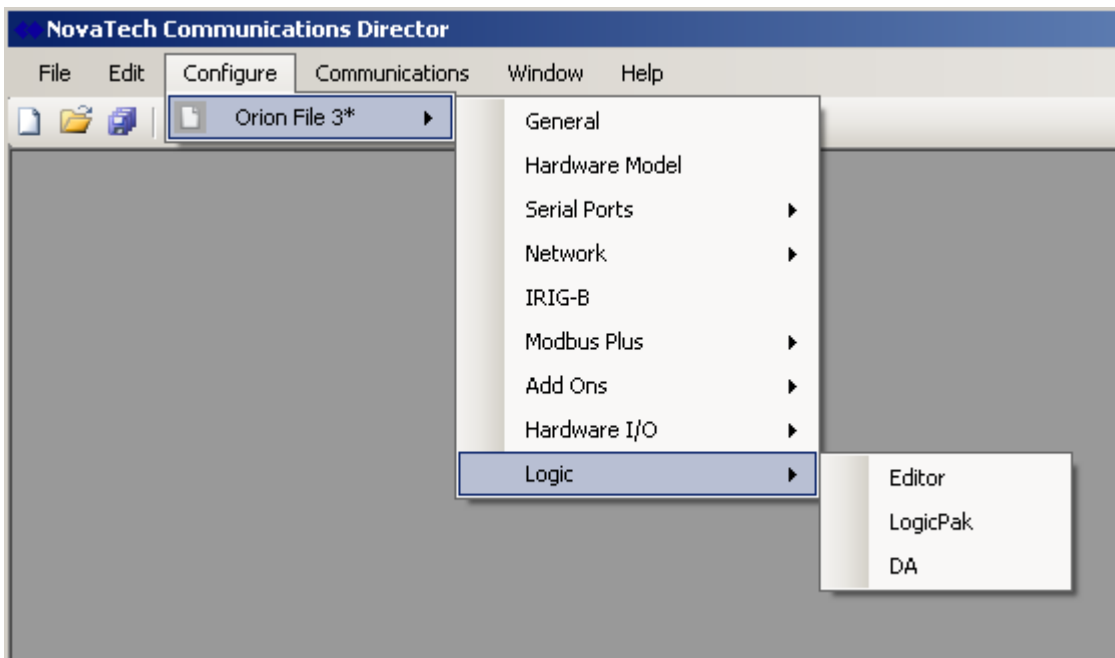


Figure 27: Logic Modules

Communications Menu

The following steps show how to connect to the Orion using NCD (NovaTech Communication Director) either by way of a serial connection or an Ethernet connection.

Note: When setting up an OrionLX, its IP address must be entered using the serial MMI as described in the *OrionLX User Manual*.

When using other terminal software, the documentation supplied with that software must be consulted regarding the setup for a connection to the Orion.

As shown in the following screen, first `Communications`, then `Online Connections...` must be selected.

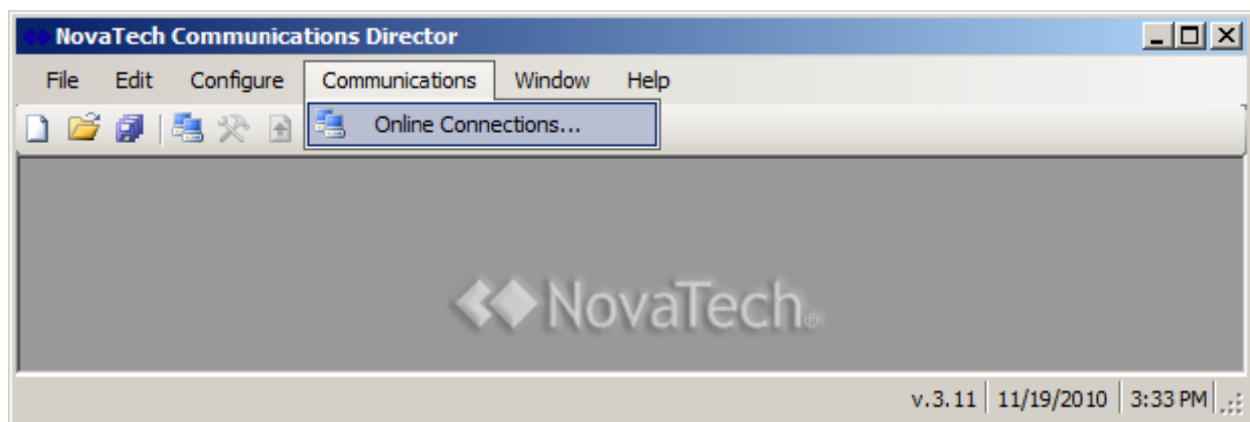


Figure 28: NCD Communications

Note: When a previously configured connection does not seem to work as intended, port A (serial or USB connection) allows reloading the configuration into the Orion and/or to determine the Orion's state.

NCD supports multiple serial and Ethernet connections. The settings for each connection can be saved to a separate file.

The bottom section of the window manages saving and loading the connection files from the hard drive. The display of this section can be toggled by clicking on **Advanced >>** and **<< Simple**.

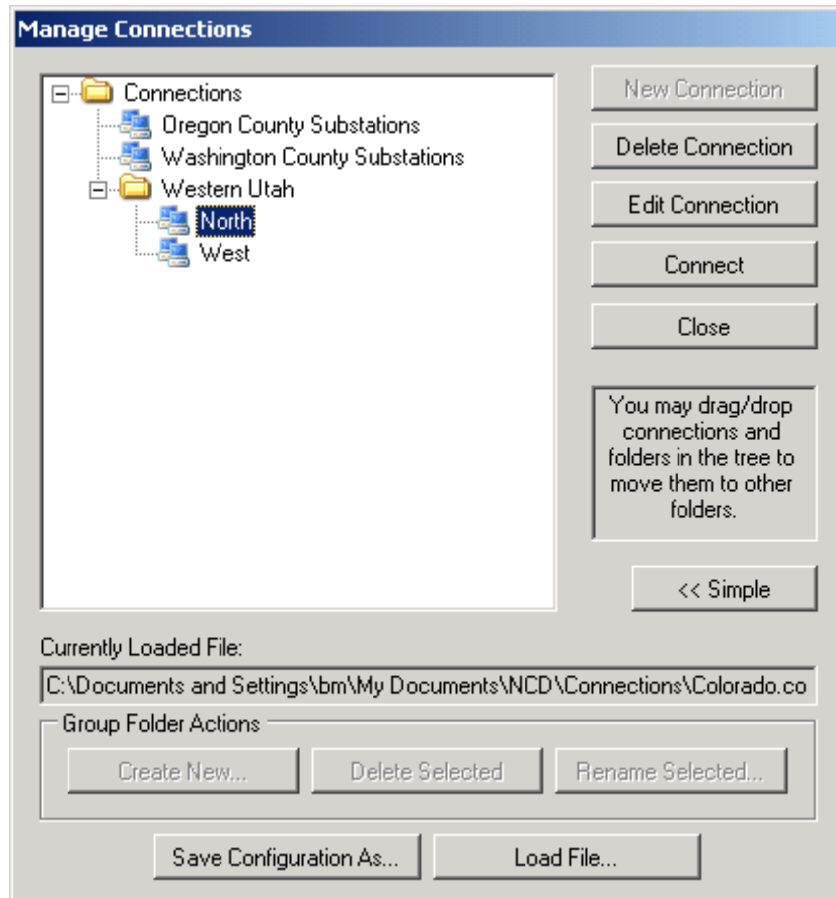


Figure 29: Manage Connections

Button	Function
New Connection	Creates a new connection, and open the window for setting it up as shown in Figure 31. In this window, the connection name is entered, such as Washington County Substations.
Delete Connection	Deletes the highlighted connection.
Edit Connection	Opens the window (Figure 31) for editing the highlighted connection.
Connect	Uses the parameters from the highlighted connection to connect to an Orion.
Close	Closes the Manage Connections window.
Advanced >> << Simple	Toggles the display of the following five options.

Button	Function
Create New	Creates a new folder for connections, such as Western Utah. Under a folder, new specific connections can be created, such as North or West. Folders can be nested. This allows easy connection management for multiple devices or locations.
Deleted Selected	Deletes the currently selected folder and all connections in it.
Rename Selected	Renames the currently selected folder.
Save Configuration As	Saves all current connections to a file as shown in Figure 30 .
Load File	Load a previously saved connection file.

Table 11: Manage Connections

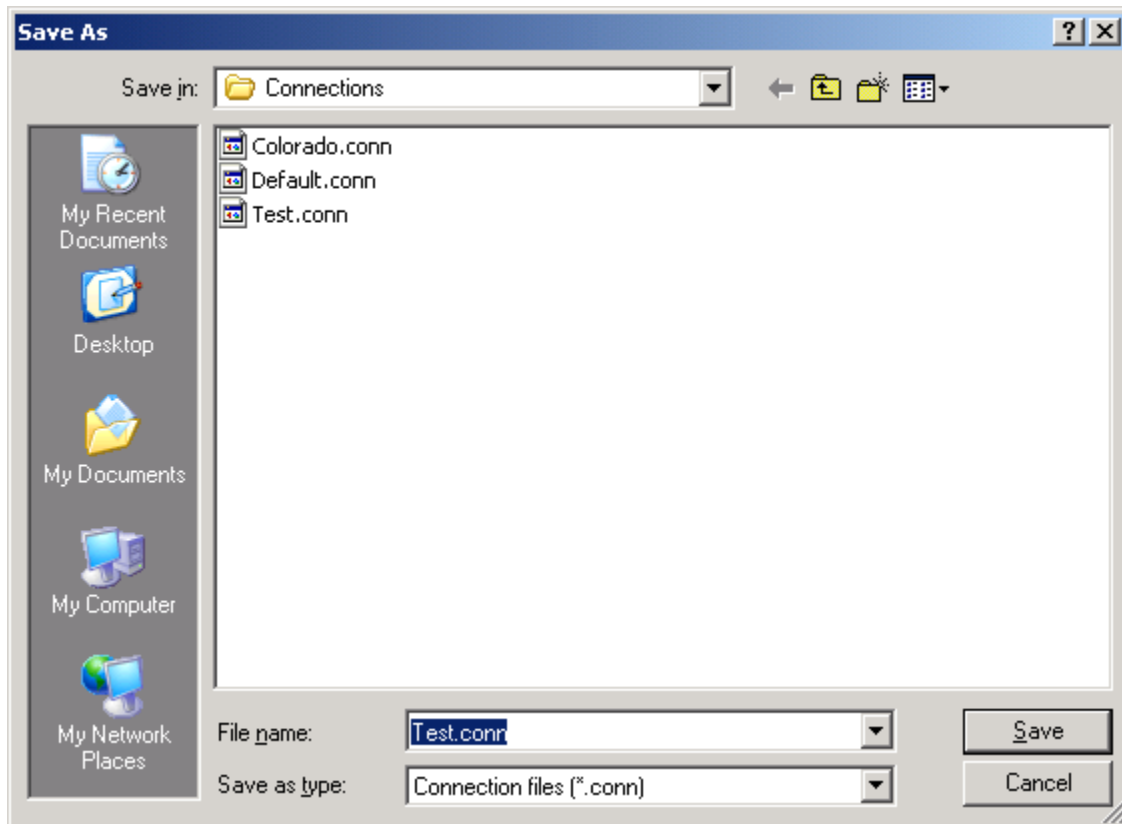


Figure 30: Saving/Loading Connection Files

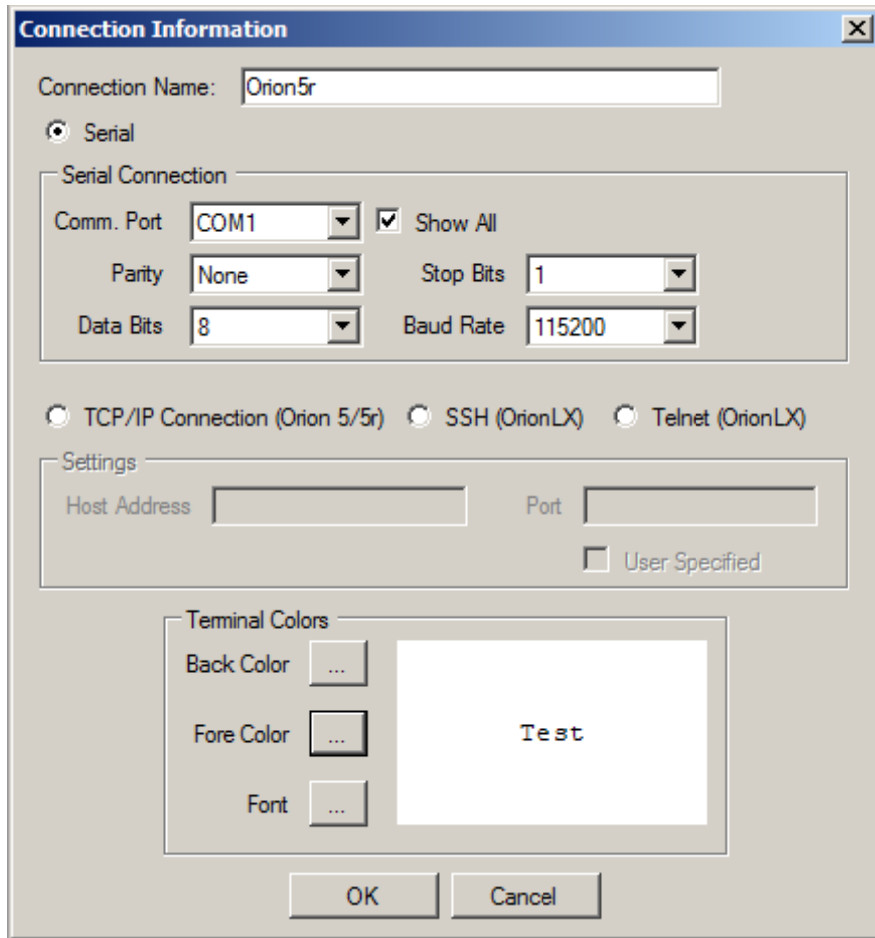


Figure 31: Connection Information

Table 12 provides descriptions for the parameters entered in the Connection Information window.

Parameter	Description
Connection Name	The name entered here is used to display the connection in Figure 29 .
Serial TCP/IP Connection SSH Telnet	These four buttons select the type of connection. Only one button can be selected for a connection, depending on the type of Orion. If a button is selected, the associated parameter frame (Serial Connection or Settings) is enabled, while the other frame is disabled.
Serial Connection	
Comm Port	Selects the COM port used to connect to the Orion. If <code>Show All</code> is checked, any COM port between 1 and 256 can be selected, whether it is installed or not on the PC. If <code>Show All</code> is not checked, only the COM ports installed on the PC will be available for selection.
Parity	None, Odd, or Even can be selected.
Data Bits	7 or 8 data bits can be selected.
Stop Bit	1 or 2 stop bits can be selected.
Baud Rate	Baud rates between 1200 and 115200 baud can be selected from the dropdown list.
Settings	
Host Address	Enter the IP address of the Orion that this connection is set for.
Port	Enter the port number used in this connection.
Terminal Colors	
Back Color	Background color of the window used to communicate with the Orion.
Fore Color	Foreground color of the window used to communicate with the Orion.
Font	Font used to display text in the window used to communicate with the Orion.

Table 12: Connection Information

When connecting to the serial Port A of an Orion, the communication parameters are 115200N81.

Clicking on **OK** saves the parameters and returns to the `Manage Connections` window ([Figure 29](#)).

Clicking on **Cancel** abandons any changes and returns to the `Manage Connections` window ([Figure 29](#)).

Communication Window

After highlighting the desired connection and clicking on **Connect** in [Figure 29](#), NCD will open the following communications window.

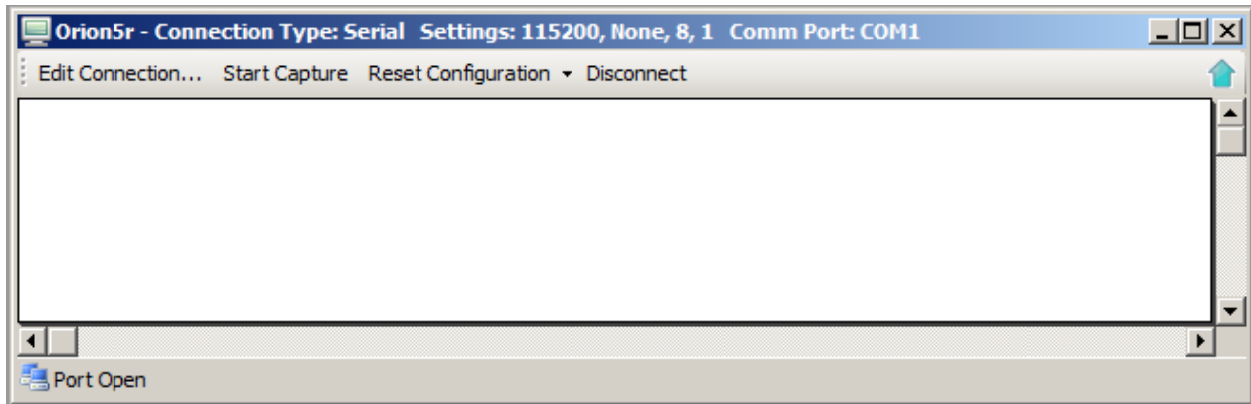


Figure 32: NCD Comm Window

The toolbar at the top of the window provides the tools described in the following table ([Table 13](#)).

Parameter	Description
Edit Connection	Clicking on this button opens the Connection Information window shown Figure 31 for editing the connection parameters.
Start Capture/ Stop Capture	Any communication between the PC and the Orion can be logged to file for analysis or tech support purposes. This button is a toggle button, i.e. either Start Capture or Stop Capture is displayed. After clicking on Start Capture , the log file name and location on the PC's hard drive must be specified. While the communication is being logged, Stop Capture is displayed. Clicking on it will stop the logging and close the log file.
Reset Configuration	Clicking this option disables the current configuration file of the connected Orion. The type of currently connected Orion (Orion5/5r, Orion5 SN < 2000, Orion16) must be specified. After the subsequent warm boot, the Orion will operate without configuration file. This option can be used, for example, if the current configuration file contains improper port or mapping parameters that cause operation errors.
Disconnect	Closes the current connection.

Table 13: NCD Comm Window

Window Menu

If multiple configuration and communication windows are open, this option allows:

- Cascading all windows
- Closing all windows
- Switching to one of the currently open windows

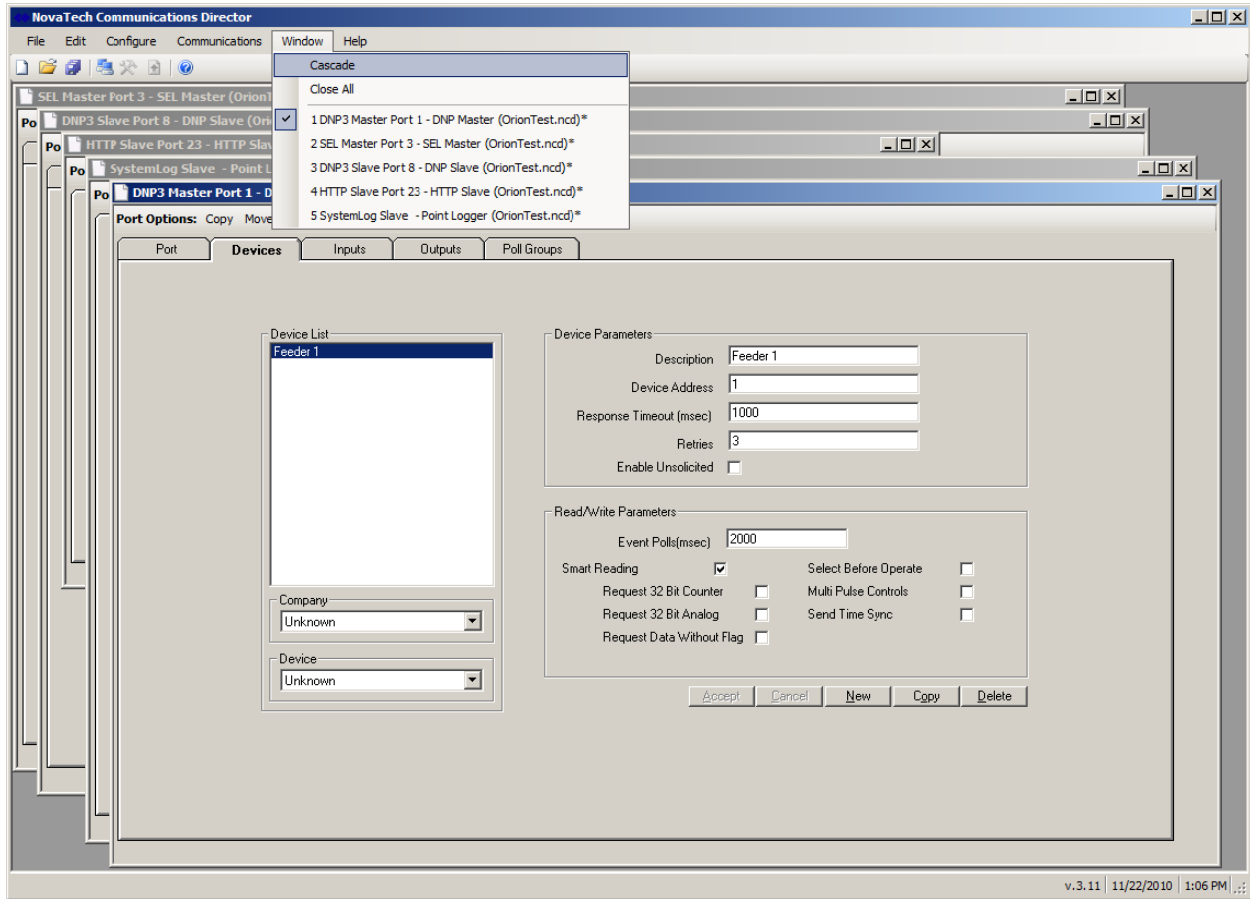


Figure 33: window Menu

Help Menu

Protocol Information

This option provides a point count for all currently open configurations as shown below.

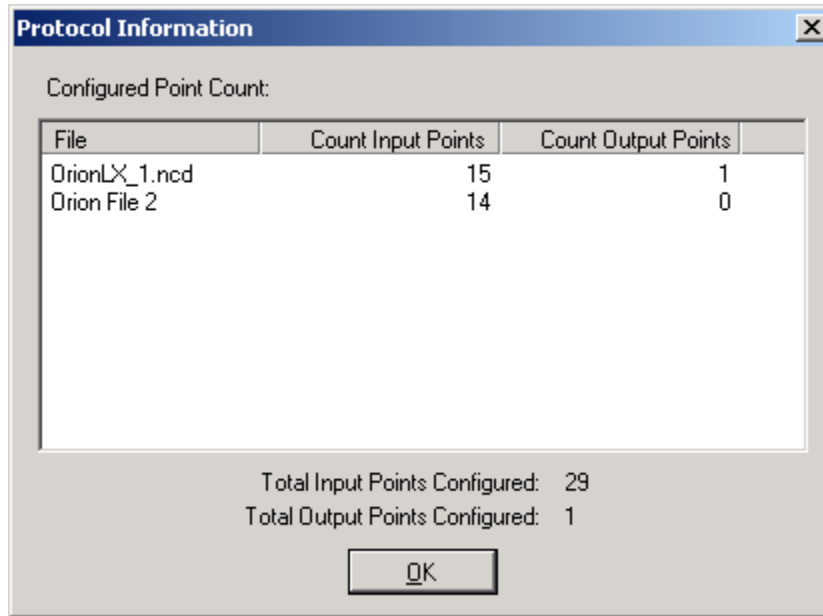


Figure 34: Protocol Information

About

This option displays the NCD version information.

In addition, specific driver information can be obtained by clicking on **Versions...** .

General information about the PC hardware, drivers, and operating system can be obtained by clicking on **System Info...** .

The information provided by these buttons may be required for technical support.



Figure 35: NCD Version Information

Appendix A – Glossary

Term	Description
HMI	Human Machine Interface
Input Point	An input point is generally a point whose value originates at an end device (slave device), such as a PLC, RTU, IED, relay, or meter, and is transferred to one or more master devices, such as a SCADA master, or a HMI. During the transfer, the information may be travel over different media (such as dialup or leased line modems, Ethernet, radio, etc.) as well as different protocols as dictated by the master's and end device's capabilities and locations.
IED	Intelligent Electronic Device. This general term includes relays, meters, and other devices equipped with a microprocessor.
Master Device	A master device issues polls or commands to slave devices, to obtain values from the slave device, or to cause specific behavior or actions by the slave device. Typical master devices are SCADA masters and HMIs. If a port on the Orion is set up as a master port, the Orion will on this port initiate communication with the slave device(s) connected to that master port.
NTP	Network Time Protocol
Output Point	An output point is generally a point whose value originates at a master device (such as HMI or SCADA master, etc.), and is then transferred to the end device to control some type of action or behavior of the end device (such as opening or closing connected switches, control computations, retrieve specific logs, etc.). During the transfer, the information may be travel over different media (such as dialup or leased line modems, Ethernet, radio, etc.) as well as different protocols as dictated by the master's and end device's capabilities and locations.
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
Slave Device	A slave device responds to a poll or command from a master device, but generally does not initiate communications with another device or the master on its own. Typical slave devices are PLCs, RTUs, IEDs, meters, and relays. If a port on the Orion is set up as a slave port, an external master must issue a poll or command to that port of the Orion for that port to issue communication.

Table 14: Glossary

Appendix B – List of Manuals

The following list of manuals shows the standard manuals that are shipped with each Orion. Depending on the options purchased for the Orion, the following optional manuals will be provided as well. The manuals are installed as a superset, i.e. if multiple Orions are purchased with different options, and the CDs provided with each Orion are installed on the same PC, the superset of these options and manuals will be available on that PC.

Standard Manuals

- *NCD User Manual*
- *Orion MMI User Manual*
- *Updating Orion Firmware and NCD*
- *Orion5r, Orion5, or Orion16 Hardware Manual*
- *OrionLX User Manual*

Manuals for Optional Features

- Protocol Manuals (DNP3, Modbus, etc.)
- *Orion DIOC Local I/O Manual*
- *IRIG-B for Orion5r Software Manual*
- *Orion Archive Module Software Manual*
- *Orion Pseudo Master Software Manual*
- *Orion Pusher Software Manual*
- *Orion Web Alarm Annunciator Slave Software Manual*
- *Orion I/O Manual*
- *Logic for Orion Software Manual*
- *LogicPak for Orion Software Manual*
- *DA Logic for Orion Software Manual*

Revision	Date	Changes
M	05/07/07	Standard layout, several additions. BM
N	08/29/07	New software features, layout. BM
O	07/22/08	NovaTech address change. PN
P	01/22/10	Update to NCD3. Include PPP Setup. Editorial changes. BM
Q	11/18/10	Updated screen captures. Correction per Mantis entry#000707. SZ