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User Manual for
IC300ETN100

SmartStack™
Ethernet Module

January 03, 2001 **GFK-1784A**

Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Revisions to this Manual

This version (GFK-1784A) of the SmartStack Ethernet Module Supplement contains the following revisions, additions, and/or deletions.

1. Revised Table 1.1.

2. Added a new mode of operations (SRTP) to Sections 1.2 and 1.4. Relabeled Section 1.3 and 1.5. Revised Section 3.1 to include the SRTP mode.

4. Revised Section 3.3, Steps 6 and 7 to include SRTP mode. Revised Figure 3.4.

Table of Contents

CHAPTER 1: INTRODUCTION

1.1 General

The SmartStack Ethernet Module (IC300ETN100) is designed for use with Operator Control Station (OCS) products in an Ethernet network. An example Ethernet network containing ETN100 modules is depicted in Figure 1.1.

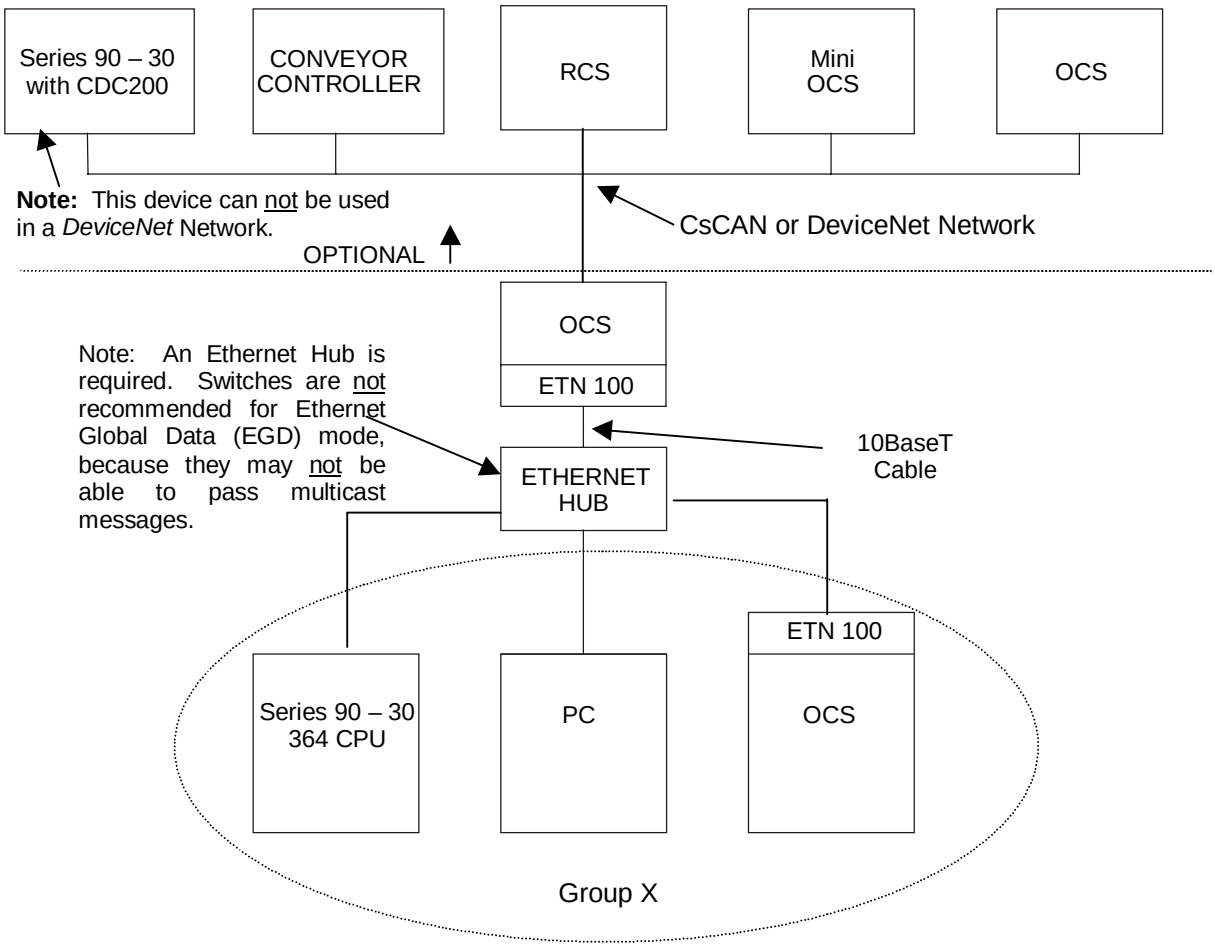

Figure 1.1 – Example of an Ethernet Network

Table 1.1 – ETN100 Specifications			
Network	10 BaseT - Ethernet	Modes Supported	Half or Full Duplex
Status LEDs	Receive Transmit Collision Link OK	Size of a Single Exchange (Total size is the sum of data type lengths of all data elements within the list.)	1,400 Bytes
Maximum Exchanges per ETN100	127 possible exchanges (produced, consumed or any combination thereof)	Maximum Open Connections per ETN100 (An Open Connection is an IP Address or Group that is produced or consumed.)	32 Open Connections (produced, consumed or any combination thereof)
General Specifications			
Required Power (Steady State)		CE	Pending
Required Power (Inrush)		UL	Pending
Relative Humidity	5 to 95% Non-condensing	Terminal Type	Shielded RJ-45
Operating Temperature	0° to 60° Celsius	Weight	1.9 g (9.5 oz.)

1.2 Overview – Modes of Operation

Figure 1.1 depicts an overview of an Ethernet network. The ETN100 has three modes of configuration; EGD (Ethernet Global Data), SRTP (Service Request Transport Protocol), and ICMP (Ping).

a. IP Address

Each node in the network is assigned a unique **IP Address**, which is represented by 4 dotted-decimal numbers. In existing networks, IP Addresses are assigned by Network Administrators. For users who need to "build" a network, the recommended IP Address is 192.168.0.**x** (where **x** = 01 – 254 addressable nodes). These are IP Addresses that are set aside for private, internal IP Addresses per InterNIC.

b. Group ID

In some instances, a group of 2 or more devices are configured to *consume* (or receive) an exchange from a producer. A **group** consists of any node that produces or transfers exchanges to 2 or more nodes *or* is a node that is configured to consume those particular exchanges. Up to 32 separate groups are supported. Each group is assigned a unique Group ID between 1 and 32. A Group ID is considered an IP Address. Note, however, that each node in a group is assigned a unique IP Address. When setting parameters for *Consumed* Exchanges, the value 0 is entered into the Group ID block when there is no group.

1.3 Ethernet Global Data (EGD) Mode

a. EGD Functions

Ethernet Global Data (EGD) exchanges are designed for simple, efficient communication of sampled data between devices. EGD is not intended for event notification where the possible loss of a sample of data would be significant.

In the EGD mode, a device can be configured to function as:
1. A producing device, which sends or transfers an exchange (a block of data) to one consuming device or a group of consuming devices;
2. A consuming device, which receives exchanges from a producing device;
3. Both a producing and consuming device.

Note: An **Exchange** is a block of data that is assigned a numerical value by the user.

b. Exchange Configuration and Interaction

Producing and consuming devices operate asynchronously to each other. *For each device, both the data that it produces and the data that it consumes must be separately configured.* During configuration, the user needs to select *the Produced Exchanges Tab* to configure the produced exchanges and then select the *Consumed Exchanges Tab* to configure the consumed exchanges.

Example of Producing and Consuming Exchanges

Figure 1.2 depicts an example where Node 1 is configured to produce or transfer a block of data (Exchange 1) to Node 2 at a regularly scheduled transfer rate. Node 2 consumes the block of data (a consumed exchange. In addition to being configured to consume Exchange 1, Node 2 is also configured to produce (transfer) a different block of data (Exchange 2) on the network to Node 1. Node 1 is configured to consume Exchange 2.

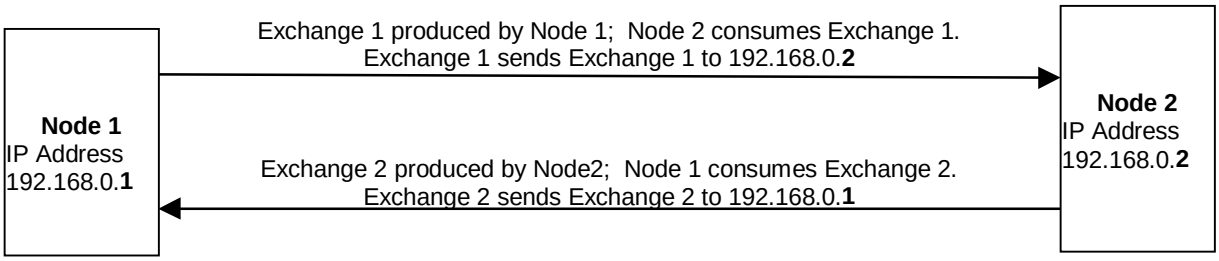

Figure 1.2 –Example of Exchange Interaction

c. PLC Timing (Using Timestamp Feature)

The PLC scan time and the exchange time settings are asynchronous. The exchange time settings are the Produced Period for produced exchanges and the Update Timeout for consumed exchanges. Producing a data sample occurs as specified by the Produced Period. However, the update of the data sample to the CPU is not necessarily guaranteed to occur at that interval due to the PLC sweep time. To verify whether the data is new, the user can select to use the Timestamp feature (see Figure 3.18). Data consistency is handled on a per exchange basis.

d. Obtaining a Status (Status Feature)

To obtain a status, the user can select the status feature (see Screen 3.13 and Screen 3.18). The following tables provide status descriptions.

Table 1.2 - Produced Exchange Status		
State	**Value**	**Description**
INVALID	0	Specifed exchange is not defined on consuming node.
HEALTHY	1	Exchange is defined; Valid data was recently received.
UNHEALTHY	2	Exchange is defined but the last data sample received was invalid or A sample was not received within a specific time period.

Consumed Exchange Status	
Condition	**Description**
INVALID_ERROR *	Producer indicates that data in the produced exchange is invalid. **
SHORT_ERROR *	Produced exchange was received but its length was less than expected.
REFRESH_ERROR *	Consumer did not successfully receive the exchange within a pre-configured time period.
PROTOCOL_ERROR *	Consumer received the exchange, but the protocol version was incompatible with version implemented on the consuming node.
SIGNATURE_ERROR *	The format of the user data in the produced exchange did not match the expected configuration on the consuming node.
LONG_EXCHANGE	The exchange was received successfully but was larger than expected.
NOT_TIMESYNCED	The producer has indicated that the data is valid, but the timestamp included in the exchange may not be accurate. **
* This condition forces a transition to the UNHEALTHY State	
** These values are set by the producer node and are included in the produced data exchange.	

1.4 SRTP (Service Request Transport Protocol)

Note: The SRTP mode is available starting with the following versions: Ethernet Module Version 1.44 or greater,Cscape 4.0, and OCS/RCS Firmware 9.0

SRTP is a GE Fanuc proprietary protocol. This allows a remote client to request services from an OCS/RCS containing the ETN100 Ethernet module. SRTP (Service Request Transport Protocol) is a Client/Server, Request/Reply Protocol and the ETN100 provides the Server side of the protocol. As the SRTP was designed to provide the services available on the GE Series 90 PLC, not all services are available from the OCS/RCS. This implementation of SRTP is mainly limited to those services required in the transport of PLC register data. The following are Service Requests processed by the ETN100:

Req. Code	Service Name
0	PLC_SSTAT
1	PLC_LSTAT
4	READ_SMEM
7	WRITE_SMEM
33	CHG_PRIV_LEVEL
67	RET_CONTROL_INFO
79	SESSION_CONTROL
97	PLC_FEATURES_SUPP

The READ_SMEM and WRITE_SMEM requests are used for that Register Data Transfers and Following Register Types are valid:

Sel.	Register Type	
8	%R	16 bit
10	%AI	16 bit
12	%AQ	16 bit
16	%I	8 bit
18	%Q	8 bit
20	%T	8 bit
22	%M	8 bit
30	%S	8 bit
70	%I	1 bit
72	%Q	1 bit
74	%T	1 bit
76	%M	1 bit
84	%S	1 bit

There is No configuration of the ETN100 module required to use SRTP, other than the IP Address, Net Mask and the check box enabling the protocol. The ETN100 acts a Server and responds to Requests from all Clients. SRTP can be used simultaneously with all other protocols available on the ETN100.

1.5 ICMP (Ping) Mode

The ICMP (Ping) mode is used for diagnostic purposes only. It functions similarly as depicted in Figure 1.2 except that an internally generated ping signal is produced and consumed. The user can then check the response time. The procedures are covered in Section 3.3, Step 8a.

NOTES

CHAPTER 2: INSTALLATION

2.1 General

All applicable codes and standards are to be followed in the installation of this product. For detailed installation information, refer to Chapter Two in the Control Station Hardware Manual (GFK-1631). A handy checklist is provided that covers panel box layout requirements and minimum clearances.

2.2 Connector

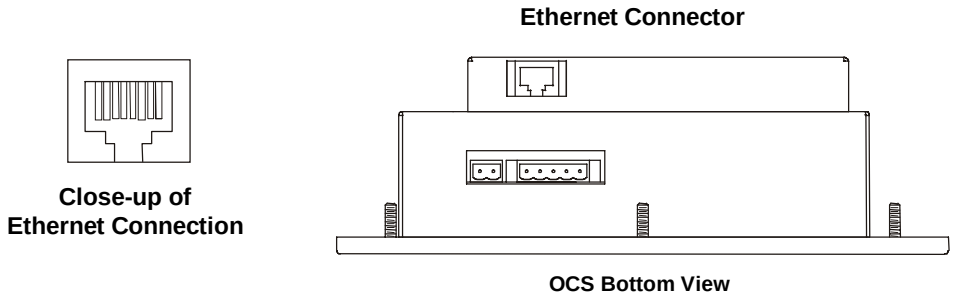

Figure 2.1 – Ethernet Connector

2.3 Registers

The ETN100 has no predefined registers. All registers are defined by the user.

2.4 LEDs

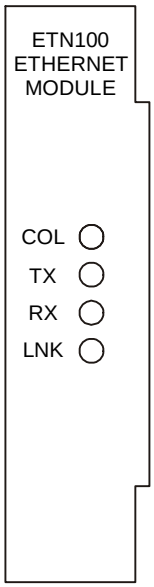

Table 2.1 – LEDs for ETN100		
COL	Collision	Red lamp indicates collisions of data on the Ethernet.
TX	Transmit	Yellow lamp indicates data is being transmitted.
RX	Receive	Yellow lamp indicates data is being received.
LNK	LINK OK	Green lamp indicates that the link (connectivity) to the Ethernet is OK.

Figure 2.2 – Ethernet Connector

2.5 Additional Technical Resources

It is assumed that the user has working knowledge of Ethernet networks. There are several references available to assist the user in learning more about Ethernet. For a technical summary of Ethernet and other information, refer to **www.techfest.com/networking/lan/ethernet.htm**.

CHAPTER 3: CONFIGURATION

3.1 Terms and Parameters

It is essential that the user understand the following key terms and parameters in order to configure the ETN100.

Ethernet Global Data (EGD)	Allows a device (producer) to transfer (exchange) data to one or more consuming devices at a regularly scheduled transfer rate.
Service Request Transport Protocol (SRTP)	Allows a remote client to request services from an OCS/RCS containing the ETN100 Ethernet module. SRTP is a Client/Server, Request/Reply Protocol and the ETN100 provides the Server side of the protocol.
Producing and Consuming Devices	Producing and consuming devices operate asynchronously to each other. For each device, both the data that it produces and the data that it consumes must be separately configured. During configuration, the user needs to select *the Produced Exchanges Tab* to configure the produced exchanges and then select the *Consumed Exchanges Tab* to configure the consumed exchanges.
Producing Device	A device that produces (transfers) exchanges to a consuming (receiving) device.
Consuming Device	A device that consumes (or receives) exchanges from a producing (sending) device.
EGD Exchange	EGD exchanges are designed for simple, efficient communication of sampled data between devices. It is not intended for event notification where the possible loss of a sample of data would be significant.
Exchange Number	A block of data that is assigned a numerical value by the user. The exchange number consists of a Producer ID and the Exchange number.
Produced Exchanges	This is a numerical value assigned by the user to indicate a specific block of data that a producing device *produces* (sends). Each produced exchange must have a unique number. When an Exchange Number is produced, register data is transmitted to a *consuming* device or a *group of consuming* devices.
Consumed Exchanges	This is a numerical value assigned by the user to indicate a specific block of data that is *consumed* (received) by a consuming device or a group of consuming devices. When an Exchange number is received by a consuming device(s), data is received from a *producing* device.
IP Address	This is the unique id for a device on a network and is represented by 4 dotted-decimal numbers.
Recommended IP Address to Build a Network	When a user intends to "build" a network, the recommended IP Address is 192.168.0.**x.** (**x** = 01 – 254 addressable nodes.) This is an IP Address that is set aside for private, internal IP Addresses per InterNIC.
Group ID	When an Exchange Number is produced, it can be transferred to a *consuming* device or a *group of consuming* devices. Up to 32 separate groups are supported. Each group is assigned a unique group number between 1 and 32. When setting parameters for *Consumed* Exchanges, the value 0 is entered into the Group ID block when there is no group.
Produced Period	This is a value (in milliseconds) that indicates how often data is transferred on to the network.

Ranges for Selected Exchange — Indicates the memory range for a specified produced *or* consumed exchange.

- **Offset** — This parameter is automatically determined by Cscape. Assists in determining byte locations inside the exchange packet.
- **Reference** — Specifies the specific memory type (%AQ, %Q,%R…) for a *Produced* Exchange. Specifies the specific memory type (%AI, %I, %R…) for a *Consumed* Exchange.
- **Start** — Indicates the first point for this range in the selected Reference Memory.
- **End** — Indicates the last point for this range in the selected Reference Memory.

Update Timeout — A value that specifies the time limit in which an exchange packet must be received by. The value needs to be set at least double the producer's Produced Period.

Subnet Mask — A Subnet is a portion of a network which shares a network address with other portions of a network. Subnets are distinguished from one another by a Subnet Number. The subnet defines the size of the subnet. The default Subnet Mask is 255.255.255.0.

Producer ID — This is the source (IP Address or Group ID) from which a particular exchange is received from.

ICMP Ping — Used for diagnostics only. A ping signal is produced and consumed to test an ETN100.

3.2 Suggested Order of Configuration (Refer to Terms / Parameters in Section 3.1.)

Prior to configuration, it is recommended that a programmer use a spreadsheet and/or a drawing package to organize the required information. It is also recommended that the physical layout of the network be determined to include devices on the network and their locations.

1. Assign all IP addresses. There is one IP address per node. All devices require a unique IP Address even if the device is part of a group.
2. Assign Group IDs if a producing device is going to produce (send) an exchange to more than one consuming (receiving) device. A group includes all producing and consuming devices.
3. Determine the type of data that is going to be sent by each device.
4. Assign Exchange Numbers for each produced exchange (block of data) in Cscape Configuration by pressing the *Produced Exchanges Tab*. Also, set the memory range for each produced exchange. (See required parameters below. Section 3.3: Configuration)
5. Assign Exchange Numbers for each consumed exchange (block of data) in Cscape Configuration by pressing the *Consumed Exchanges Tab*. Also, set the memory range for each consumed exchange. (See Section 3.3: Configuration)

Parameters required to configure Produced Exchanges (Refer to Section 3.1: Terms / Parameters.)					
Exchange #	Type	Address	Produced Period	Reply Rate *Reserved for Future Use*	Ranges for Selected Exchange
Parameters required to configure Consumed Exchanges (Refer to Section 3.1: Terms / Parameters.)					
Exchange #	Producer ID		Group ID	Update Timeout	Ranges for Selected Exchange

3.3 Configuration Procedures

The following procedures are used to configure the SmartStack ETN100 using Cscape Software.

1. Go to the Main Screen of Cscape and press Controller. Select I/O Configure.

2. The following screen appears. Ensure that the proper controller is selected. The OCS100-CsCAN is shown as the selected controller in this example. If a different controller is desired, press the Config button located next to the controller shown and select the appropriate controller.

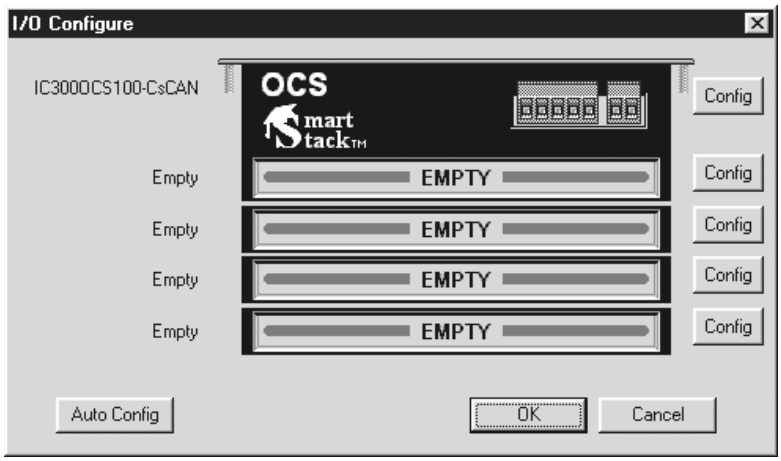

Figure 3.1 – Configure Controller Type Dialog

3. After the proper controller has been selected, place the ETN100 into the first slot (or replace the first slot if already occupied.) To add the ETN module, click on the CONFIG button to the right of the desired module or double-click on the EMPTY slot. Either method invokes the SmartStack Module Selection Dialog.

Caution: For proper functioning and to avoid possible damage, do not install more than four SmartStack™ Modules per controller

4. The Add I/O Screen appears. Press **Other** and use the mouse to select the ETN100 as shown in Figure 3.2 address OK.

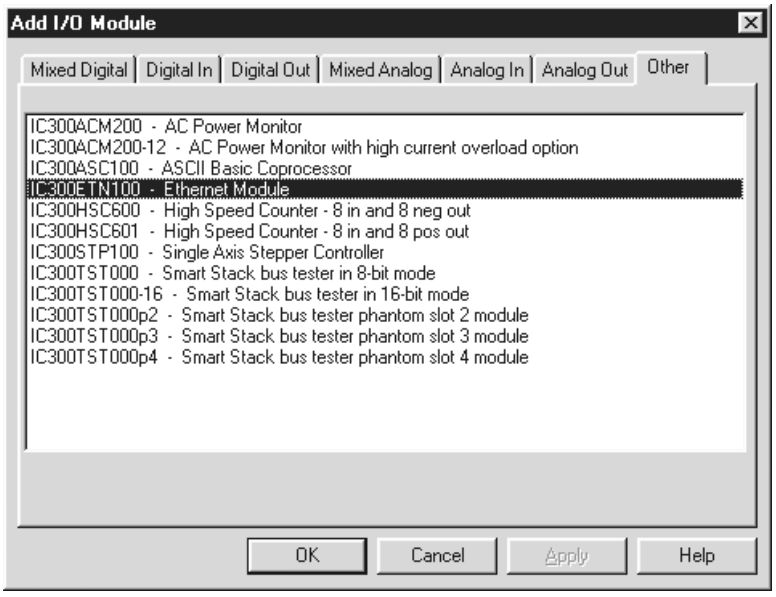

Figure 3.2 – Selecting ETN100

5. The ETN100 is now installed as shown in Figure 3.3. Click on the Config button next to the ETN100 (or double click on the slot).

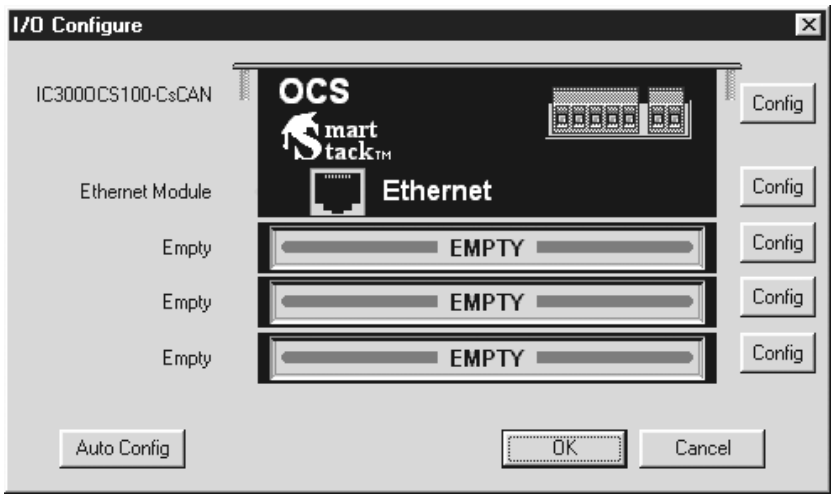

Figure 3.3 – Ethernet Module Selected

6. The Module Configuration Screen appears. Two tabs are available for selection.

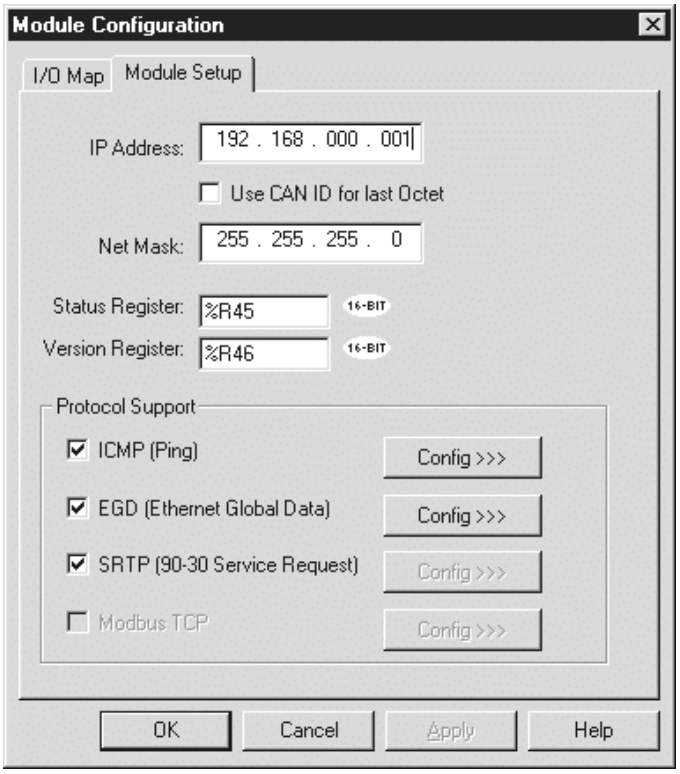

Figure 3.4 – Module Configuration Screen (Module Setup Tab Selected)

7. Use the mouse to select either **ICMP (Ping)** or **EGD (Ethernet Global Data)** by clicking the desired box.

The **ICMP (Ping)** is used for diagnostic purposes. A ping signal is sent to another device and then the ping is sent back to the originating device.

The **EGD** (**Ethernet Global Data)** allows peer-to-peer or peer-to-group data sharing.

The **SRTP** (Service Request Transport Protocol**)** allows a remote client to request services from an OCS/RCS containing the ETN100 Ethernet module. If this mode is desired, select the SRTP box. ***No further selection is required.***

a. I/O Map Tab (Screen Not Shown)

The I/O Map describes which I/O registers are assigned to a specific SmartStack™ Module. Although there are no user-defined parameters, the I/O Map needs to be viewed after an option is selected and configured to determine where the module is located in the point map. ***Once an option has been configured, the Module Configuration screen reappears, and the user can then select the I/O Map tab to review the settings.***

b. Module Setup Tab (Shown in Figure 3.4.)

The Module Setup Tab is used for defining parameters.

8. After pressing the Module Setup Tab, set the **IP Address, Net Mask, Status Register, and Version Register**.

The **IP Address** is the address of the ETN100 that is being configured. In this example the IP Address is 192.168.0.1. The **Subnet Mask** is 255.255.255.0 and allows up to 254 devices on the subnet.

The **Status Register** is a 16-bit register written by the module to indicate operational status.
The **Version Register** is a 16-bit register written by the module to indicate the module firmware version.

9. Use the mouse to select either **ICMP (Ping)** or **EGD (Ethernet Global Data)** by clicking the desired box. When appropriate, both items can be selected. (Figure 3.5.)

The **ICMP (Ping)** is used for diagnostic purposes. A ping signal is sent to another device and then the ping is sent back to the originating device.

The **EGD** (**Ethernet Global Data)** allows peer-to-peer or peer-to-group data sharing.

a. If the **ICMP (Ping)** box is selected, press the Config button next to it. The following screen appears. The **Ping Timeout** indicates how often a ping signal is sent out in milliseconds. The range available for selection is 100 – 100,000 milliseconds. (Figure 3.5.)

The **IP Address** register is a 32-bit register read by the module to determine the IP Address to pins. The **Ping Time** register is a 32-bit register written by the module indicating the time millisecond the last ping took.

After setting the ping timeout, it is necessary to go to the ladder program and write the ping address to the registers. To view the ping response time, go to the Ladder Program or Cscape's Data Watch Window or an OCS screen, and view the ping time register.

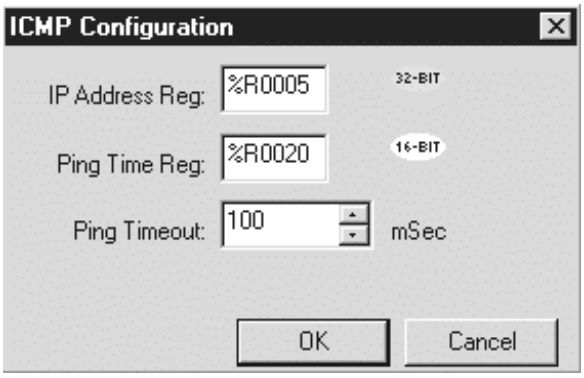

Figure 3.5 – ICMP Configuration Screen

To test the ICMP functionality use the watch window to modify the IP address and view the ping time.

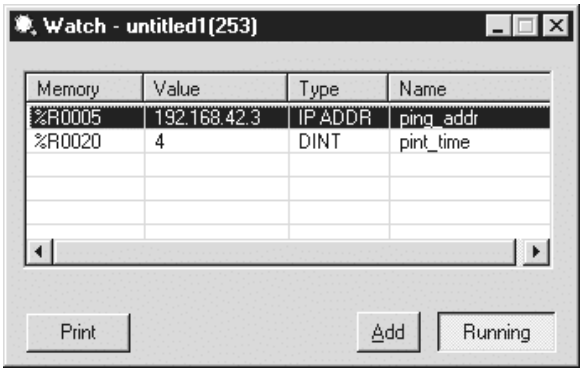

Figure 3.6 – Data Watch Window

b. If the EGD box (Ethernet Global Data) is selected, the following screen appears. Two tabs are available for selection; **Produced Exchanges** and **Consumed Exchanges**.

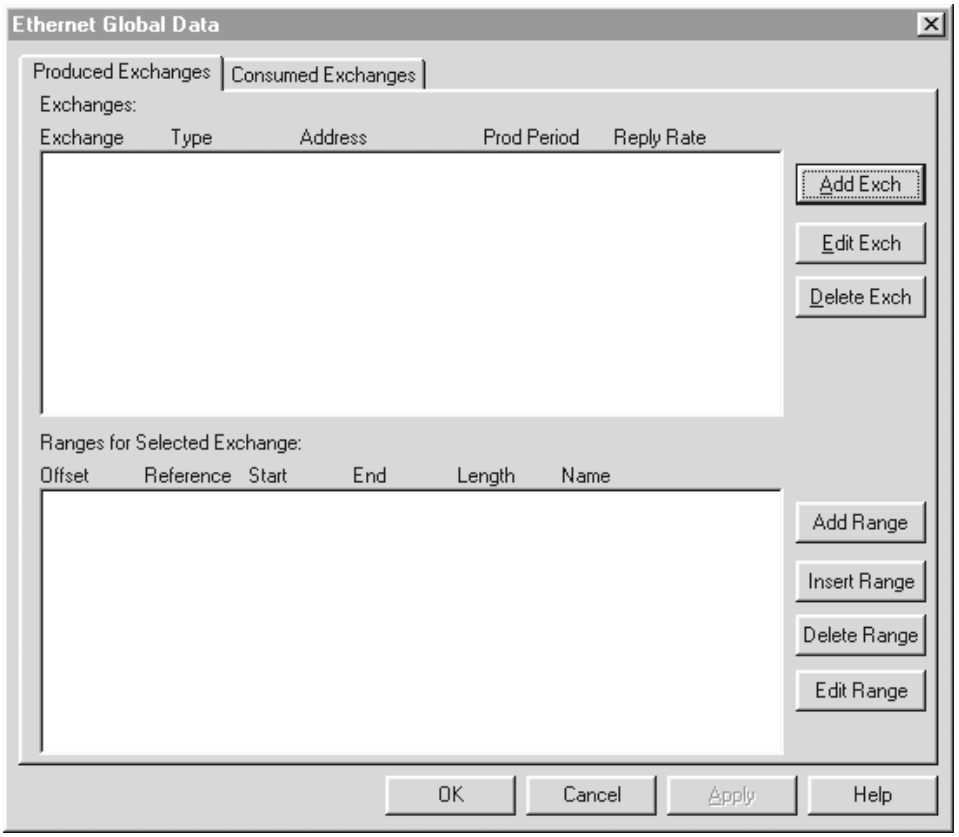

Figure 3.7 – Ethernet Global Data Screen

10. At this point in the configuration, it is important to understand:

a. How to create separate nodes; Interaction between *produced* and *consumed* exchanges.
b. How to set-up an individual node in detail using IP Addresses and Group IDs.

Items a and b are covered step-by-step in the following examples.

10a. How to create separate nodes; Interaction between *produced* and *consumed* exchanges.

Note: This example has been purposely kept very simple to demonstrate how to set-up **two separate nodes (Node 1 and Node 2.)**

Step 1. Refer to Section 3.2, Items a and b. They cover important terms needed to perform this configuration and the initial steps required to be taken prior to configuring the ETN100.

In this example, Nodes 1 and 2 are going to be configured as follows. Figure 3.8 depicts how *produced* and *consumed* exchanges interact.

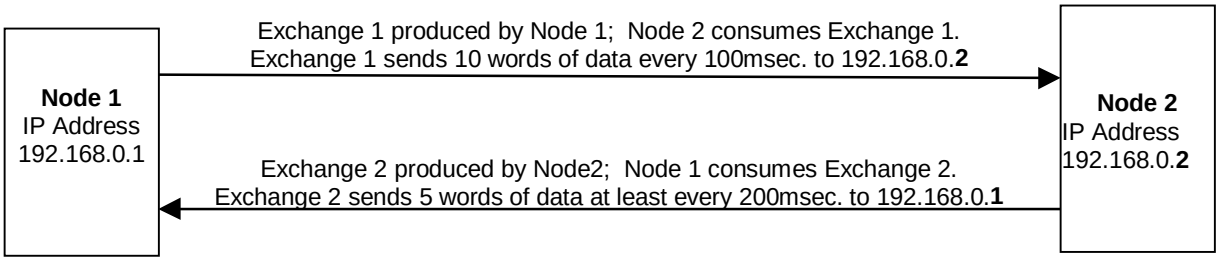

Figure 3.8 – Identifying Parameters for Nodes 1 and 2 prior to Configuration

Step 2. Follow steps 1-6 in Section 3.3: Configuration Procedures. In step 6, the following screen appears. **In order to create a node, a unique address must be entered into this screen.** Node 1 is given an IP Address depicted in Figure 3.9. Note that the **EGD** (Ethernet Global Data) box is selected. Press the **Config** button located to the right of the EGD box.

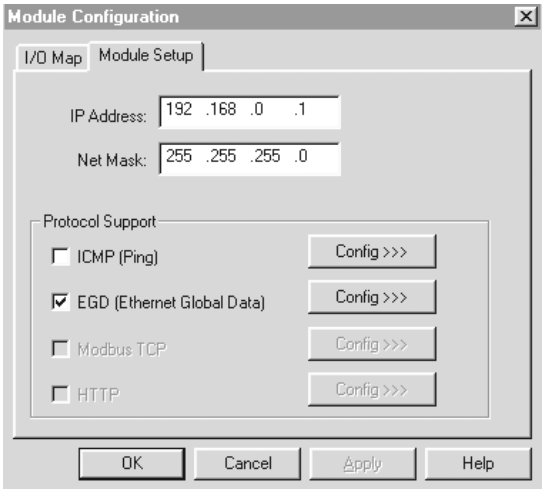

Figure 3.9 – Node 1 IP Address

The following screen appears. Click the **Produced Exchanges** Tab. Click the **Add Exch** button.

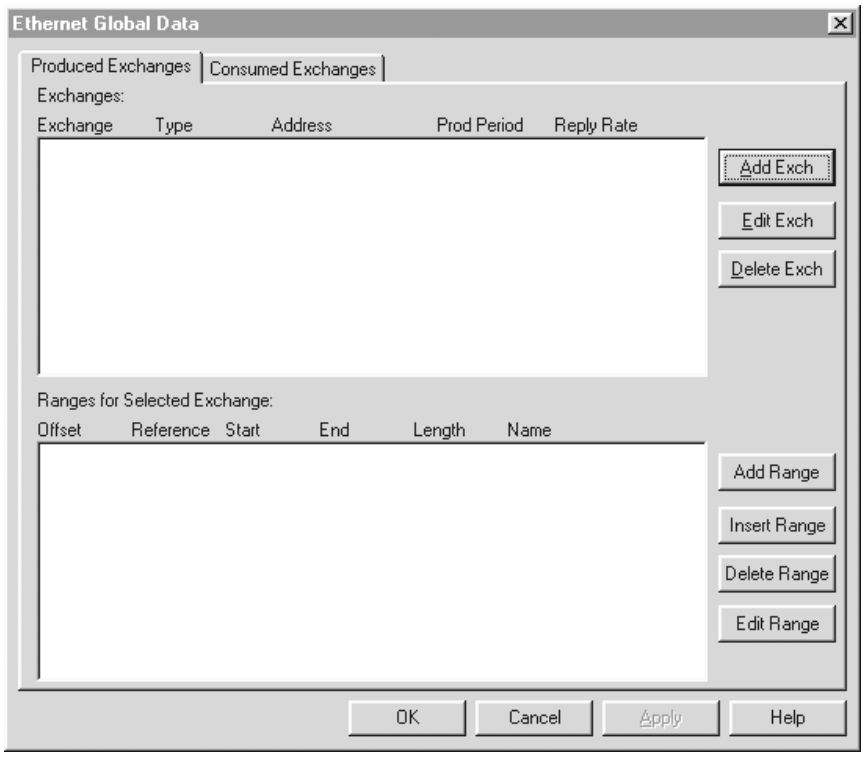

Figure 3.10 – Ethernet Global Data Screen

Step 3 The following screen appears.

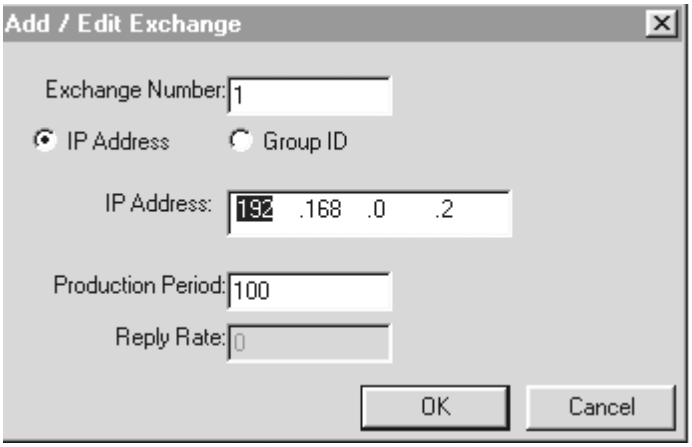

Figure 3.11 – Adding a Produced Exchange for Node 1

To configure, enter a unique **Exchange Number**. If the exchange (a block of data) is being sent to only one consuming device, click **IP Address**. If the exchange is being sent to more than one consuming device, click **Group ID**. In this case, IP Address is clicked.

In the **IP Address block**, enter the decimal dotted address of the node that Exchange 1 is being sent to. In other words, enter the IP Address of the node that will consume Exchange 1.

For Production Period, enter the time (in milliseconds) to indicate how often data is produced (sent) on to the network. Click OK.

The following screen appears.

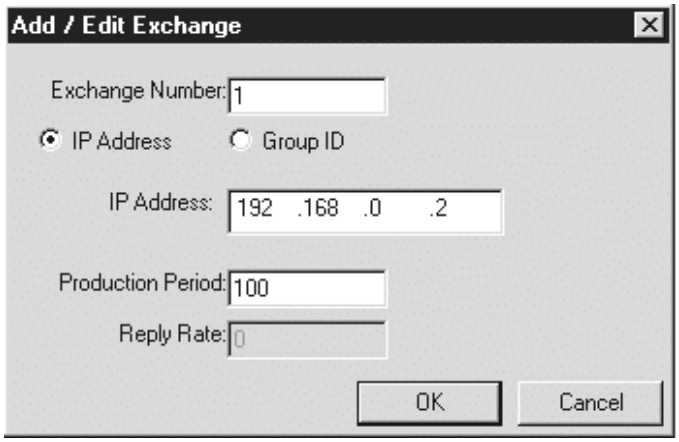

Figure 3.12 – Produced Exchange for Node 1

If it is necessary to edit Exchange 1, highlight it, and click **Edit Exch**. If it needs to be deleted, click **Delete Exch**.

Step 4. If the user is satisfied with the Exchange selection, memory range parameters must be provided for the selected exchange number. The **Ranges for Selected Exchange** (located on lower screen) indicates the memory range for a specified produced exchange. Note that numerous exchange numbers can be created. However, in this example, only one Exchange Number has been created.

Highlight the Exchange Number as depicted in Figure 3.12 and then click **Add Range**. The following screen appears.

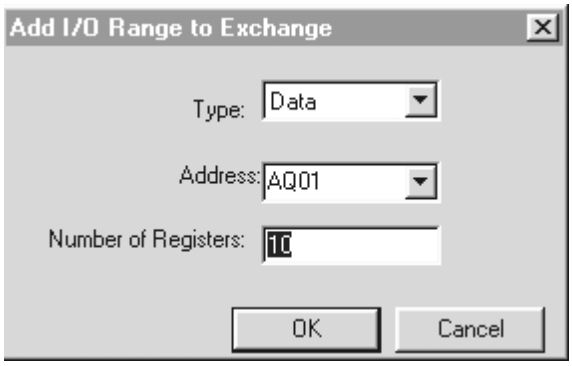

Figure 3.13 – Produced Exchange Memory Range for Node 1

Using the pull-down menu, select the type of information that is to be produced. Then, select the specific memory reference type. Then enter in the number of registers. (Parameters are explained below.) Press OK. The following screen appears.

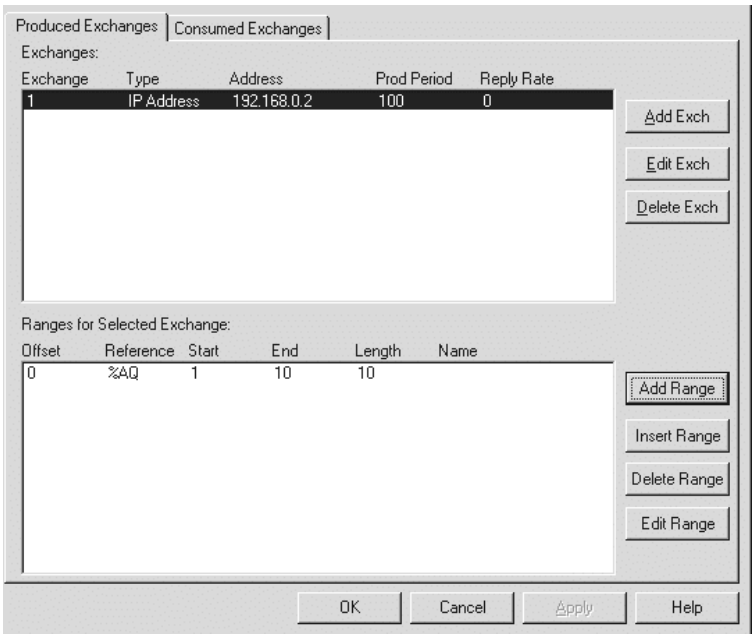

Figure 3.14 – Produced Exchange Memory Range for Node 1

Offset This parameter is automatically determined by Cscape. Assists in determining byte locations inside the exchange packet.
Reference Specifies the specific memory type (%AQ, %Q, %R…) for a *produced* exchange.
Start Indicates the first point for this range in the selected reference memory.
End Indicates the last point for this range in the selected reference memory.

If it is necessary to edit the range, highlight it, and click **Edit Range**. If it needs to be deleted, click **Delete Range**. To insert a new range, press **Insert Range**.

Interpretation of Figure 3.14

Thus far, Node 1 has been configured to indicate that Exchange 1 will send 10 words of data every 100msec. to 192.168.0.2 (Node 2's IP Address). (Reminder: Refer to Figure 8 to recall the desired configuration parameters for this example.)

Step 5. Now that the Produced Exchange parameters have been configured, it is now necessary to configure the Consumed Exchange parameters. (Again, as a reminder, refer to Figure 3.9 to recall the desired configuration parameters for this example.) Click the **Consumed Exchanges** tab located on the screen in Figure 3.14.

Step 6 The following screen appears. Click **Add Exch**.

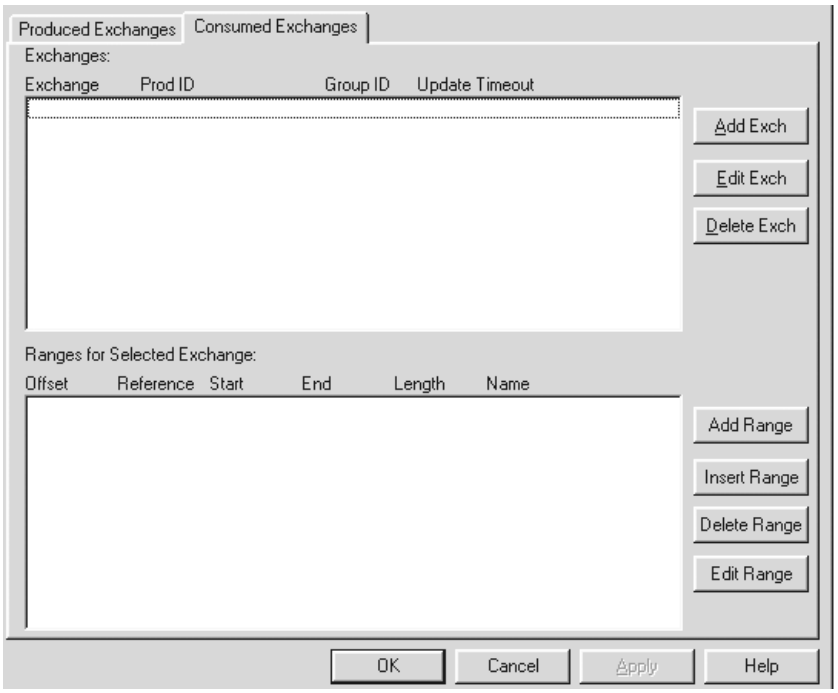

Figure 3.15 – Consumed Exchanges Tab Selected

The following screen appears.

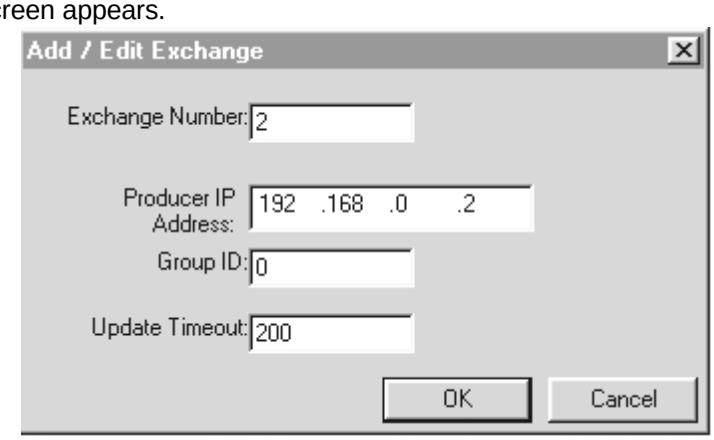

Figure 3.16 – Adding a Consumed Exchange for Node 1

Step 7 To configure enter a unique **Exchange Number**. If the exchange (a block of data) is going to be received from one device, enter the **IP Address** that will send the exchange. If the exchange is going to be received from more than one device, enter the **Group ID**. The IP address is entered in this case. In the **Update Timeout**, enter the value that specifies the time limit in which an exchange packet must be received by. The value needs to be set at least double the producer's Produced Period. Click OK.
The following screen appears

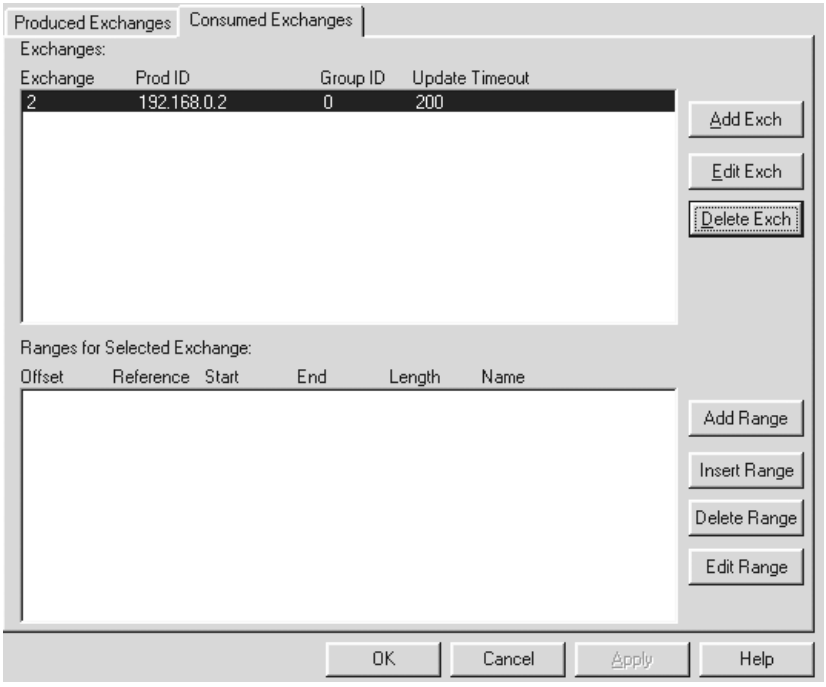

Figure 3.17 – Consumed Exchange for Node 1

If it is necessary to edit Exchange 2, highlight it, and click **Edit Exch**. If it needs to be deleted, click **Delete Exch**.

Step 4. If the user is satisfied with the Exchange selection, memory range parameters must be provided for the selected exchange number. The **Ranges for Selected Exchange** (located on lower screen) indicates the memory range for a specified consumed exchange. Note that numerous exchange numbers can be created. However, in this example, only one Exchange Number has been created.

Highlight the Exchange Number as depicted in Figure 3.17 and then click **Add Range**. The following screen appears.

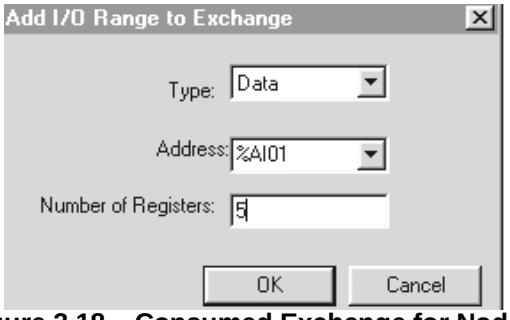

Figure 3.18 – Consumed Exchange for Node 1

Using the pull-down menu, select the type of information that is to be consumed (data, timestamp or status). . To verify whether the data is new, the user can select timestamp. For a status, select status. Data consistency is handled on a per exchange basis. Then, select the specific memory reference type. Then enter in the number of registers. (Parameters are explained below.) Press OK. The following screen appears.

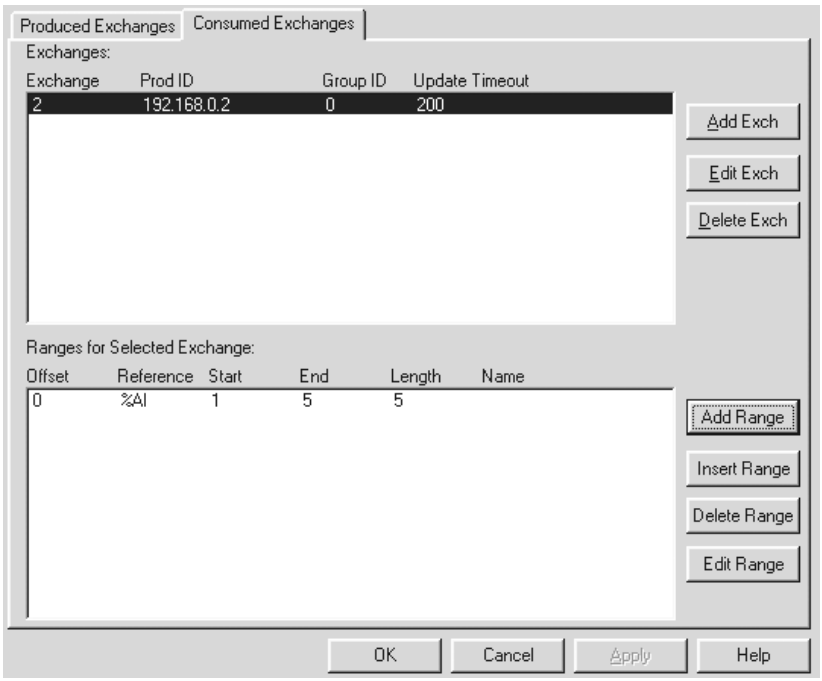

Figure 3.19 – Produced Exchange Memory Range for Node 1

Offset This parameter is automatically determined by Cscape. Assists in determining byte locations inside the exchange packet.
Reference Specifies the specific memory type (%AI, %I, %R…) for a *consumed* exchange.
Start Indicates the first point for this range in the selected reference memory.
End Indicates the last point for this range in the selected reference memory.

If it is necessary to edit the range, highlight it, and click **Edit Range** or double-click. If it needs to be deleted, click **Delete Range**. To insert a new range, press **Insert Range**.

Interpretation of Figure 3.19

Thus far, Node 1 has been configured to indicate that Node 1 is set to consume (receive) 5 words of data at least every 200msec. from Exchange 2. Exchange 2 is sent from 192.168.0.2. (Reminder: Refer to Figure 3.8 to recall the desired configuration parameters for this example.)

Configuring Node 2

At this time, Node 1 has been configured for Produced and Consumed Exchanges. The user needs to write the Ladder Code for Node 1. When the user is ready to configure Node 2, begin a new Cscape configuration using the steps outlined in Section 3.3.

Reminder: In this example, Nodes 1 and 2 are going to be configured as follows.

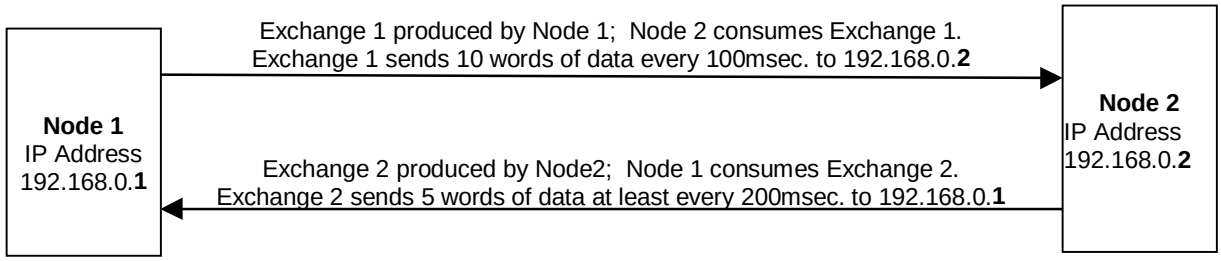

Figure 3.20 - Identifying Set up Parameters for Nodes 1 and 2

Reminder: Be sure to assign a unique IP Address for Node 2 such as the address in Figure 3.21. **In order to create a new node, a unique address must be entered into this screen.**

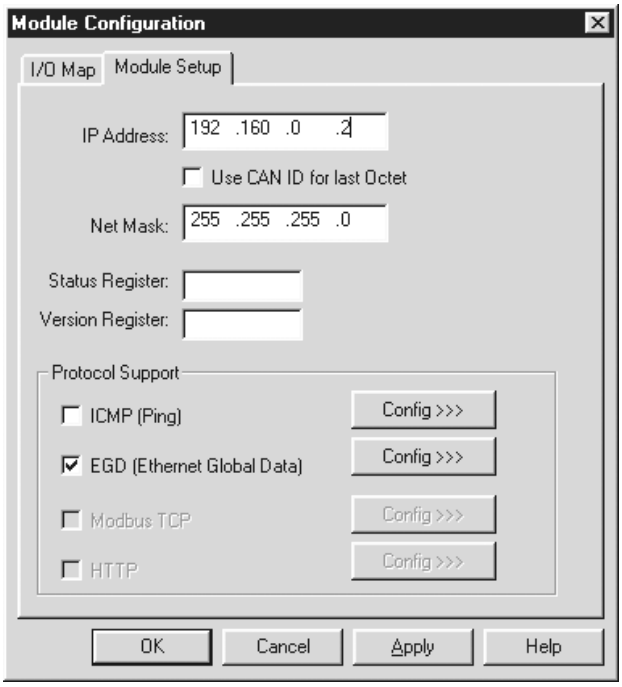

Figure 3.21 - Assigning a New IP Address for Node 2

Upon completing configuration for Node 2, the following **Produced Exchanges** screen and **Consumed Exchanges** screen appears.

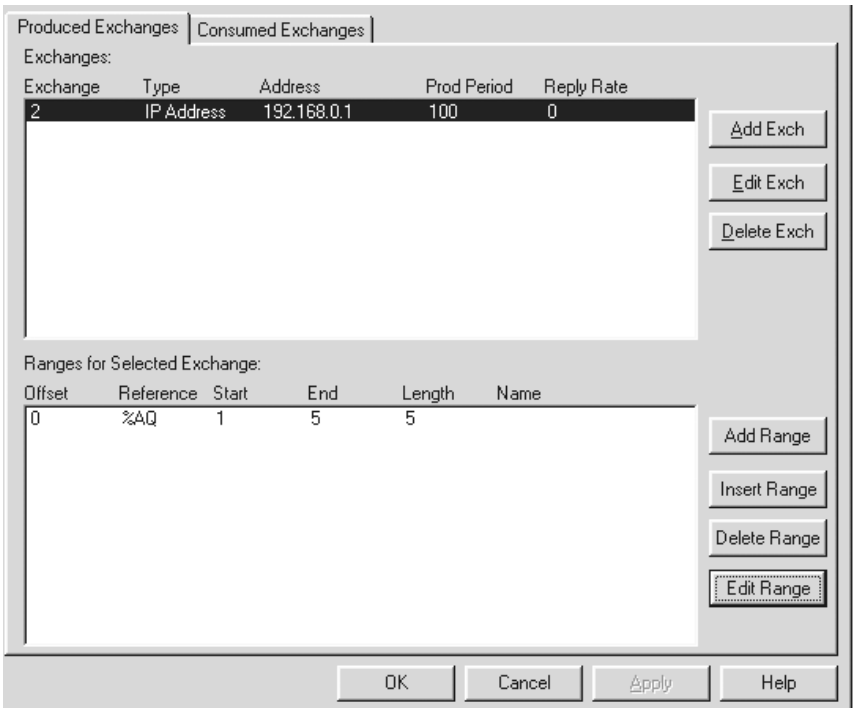

Figure 3.22 – Produced Exchanges Configuration for Node 2

Interpretation of Figure 3.22

Thus far, Node 2 has been configured to indicate that Exchange 2 will send 5 words of data every 100msec. to 192.168.0. (Node 1's IP Address).

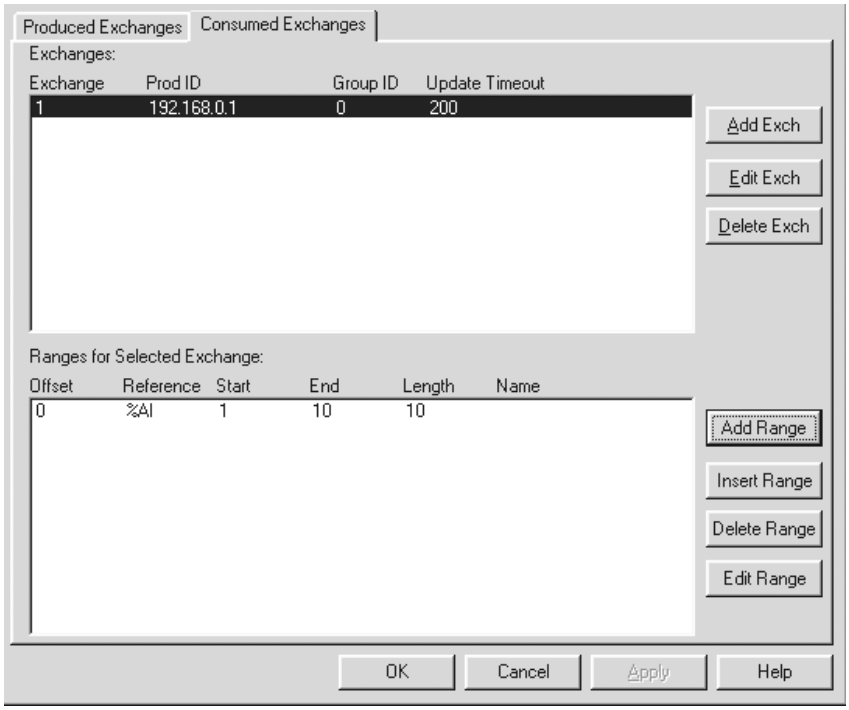

Figure 3.23 – Consumed Exchanges Configuration for Node 2

Interpretation of Figure 3.23

Thus far, Node 2 has been configured to indicate that Node 2 is set to consume (receive) 10 words of data at least every 200msec. from Exchange 1. Exchange 1 is sent from 192.168.0.1

10b. How to Set-up a Node using IP Addresses and Group IDs

Step 1. Refer to Section 3.2, Items a and b. They cover important terms needed to perform this configuration and the initial steps required to be taken prior to configuring the ETN100.

In the following configuration example, Node 1 needs to *produce* (or send) various exchanges to different IP Addresses and to Group ID #5. Node 1 also needs to *consume* (or receive) various exchanges from different IP Addresses and Group ID #5. For this example, Figure 3.24 depicts how the nodes need to be configured to interact with one another in terms of Produced Exchanges and Consumed Exchanges.

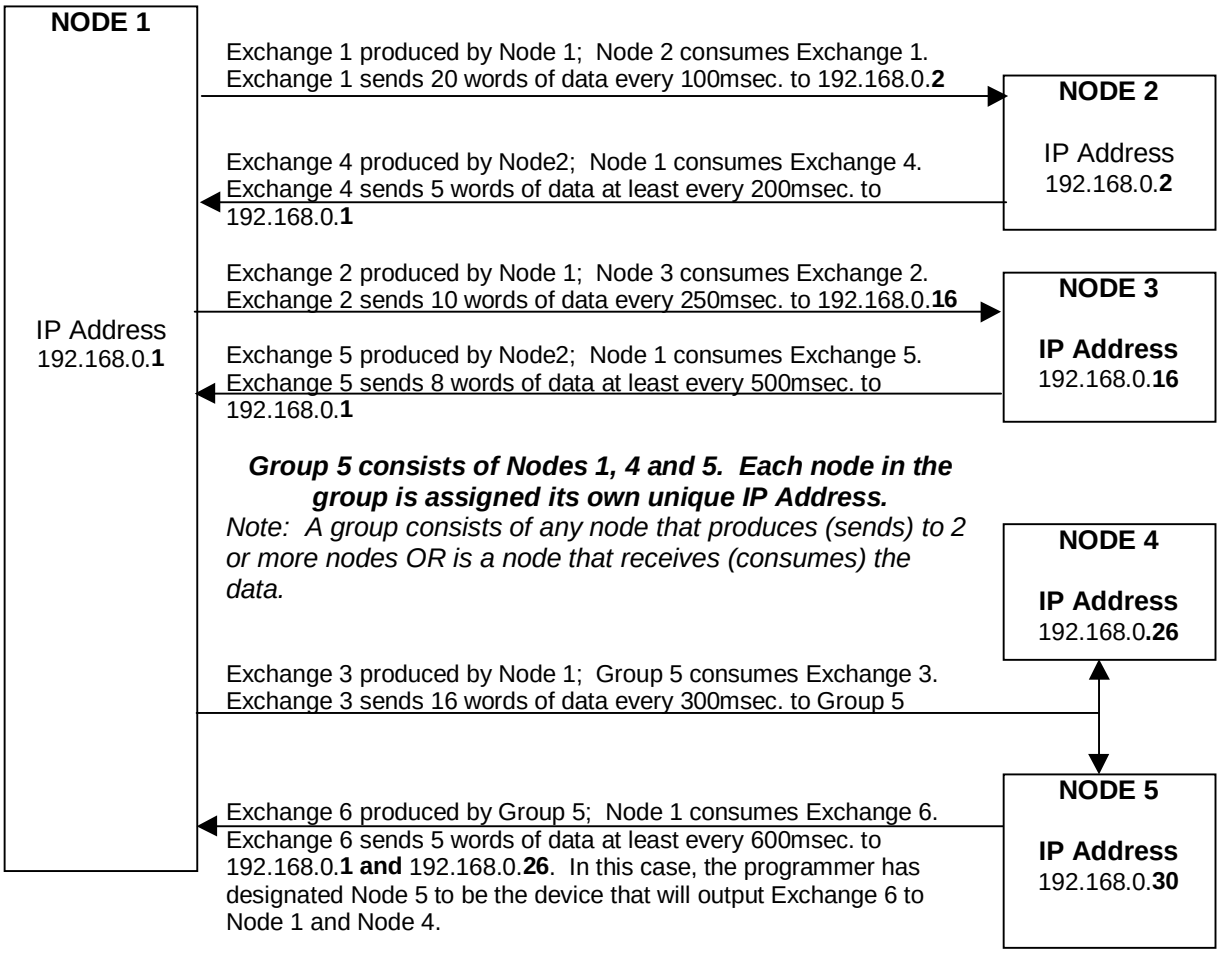

Figure 3.24 - Identifying Configuration Parameters for Node 1

Step 2. Follow steps 1-6 in Section 3.3: Configuration Procedures. In step 6, the screen in Figure 3.25 appears.

Reminder: At this point, Node 1 is going to be the first node to be created and configured. **In order to create a node, a unique IP Address must be entered into this screen.**

After Node 1 is created and configured, it will be necessary to eventually return to this screen and create a new IP Address for Nodes 2-5. **Note:** A new Cscape configuration program must be opened for each node.

Node 1 is given an IP Address depicted in Figure 3.25. Select the **EGD** (Ethernet Global Data) box. Press the **Config** button located to the right of the EGD box.

Figure 3.25 – Node 1 IP Address

It is now appropriate to configure the Node 1's Produced and Consumed Exchanges.

The following screen appears. Click the **Produced Exchanges** Tab. Click the **Add Exch** button.

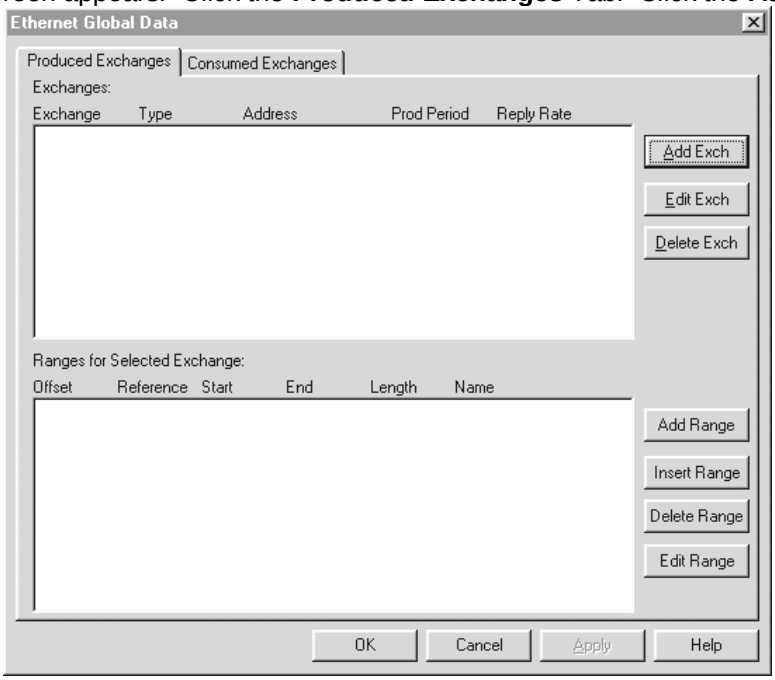

Figure 3.26 – Ethernet Global Data Screen

A Produced Exchange is a block of data that is produced (or sent) to one node's IP Address or it is sent to a Group ID containing two or more nodes.

Step 3 The Add / Edit Exchange screen appears. To configure, enter a unique **Exchange Number**.. An example is provided to show the configuration using an IP Address (Figure 3.27) and one example depicts using a Group ID (Figure 3.28).

- ***If the exchange (a block of data) is being sent to only one consuming device:***

Click **IP Address** as depicted in the screen that follows. In the **IP Address block**, enter the decimal dotted address of the node that Exchange 1 is being sent to. In other words, enter the IP Address of the node that will consume Exchange 1.

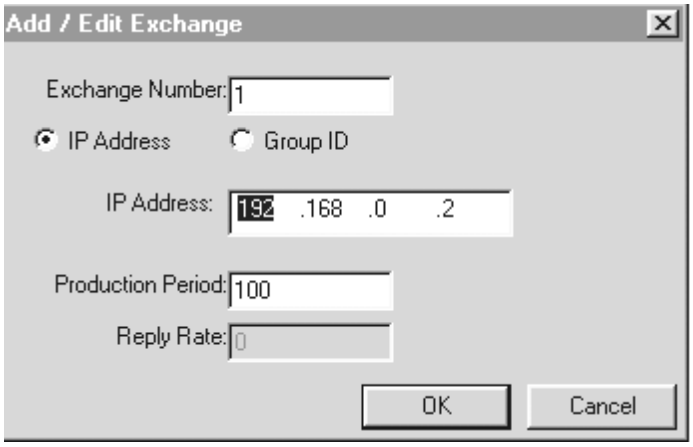

Figure 3.27 – Adding a Produced Exchange using an IP Address for Node 1

- ***If the exchange is being sent to more than one consuming (receiving) device:***

Click **Group ID** as depicted in the screen that follows. In the **Group ID block**, enter the decimal dotted address of the node that the Exchange 3 is being sent to. In other words, enter the IP Address of the node that will consume Exchange 3.

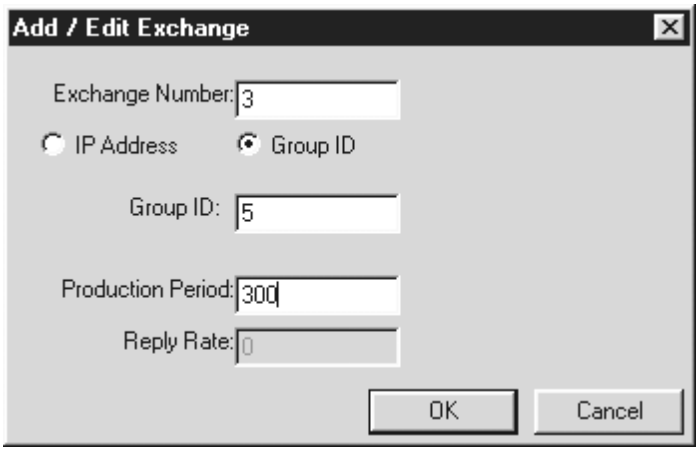

Figure 3.28 – Adding a Produced Exchange using a Group ID for Node 1

After entering the IP Address or Group ID, enter the time (in milliseconds) to indicate how often data is produced (sent) on to the network (Production Period) .

Click OK. Repeat the above procedures for each Produced exchange for Node 1.

After adding produced exchanges for Node 1, the following screen appears.

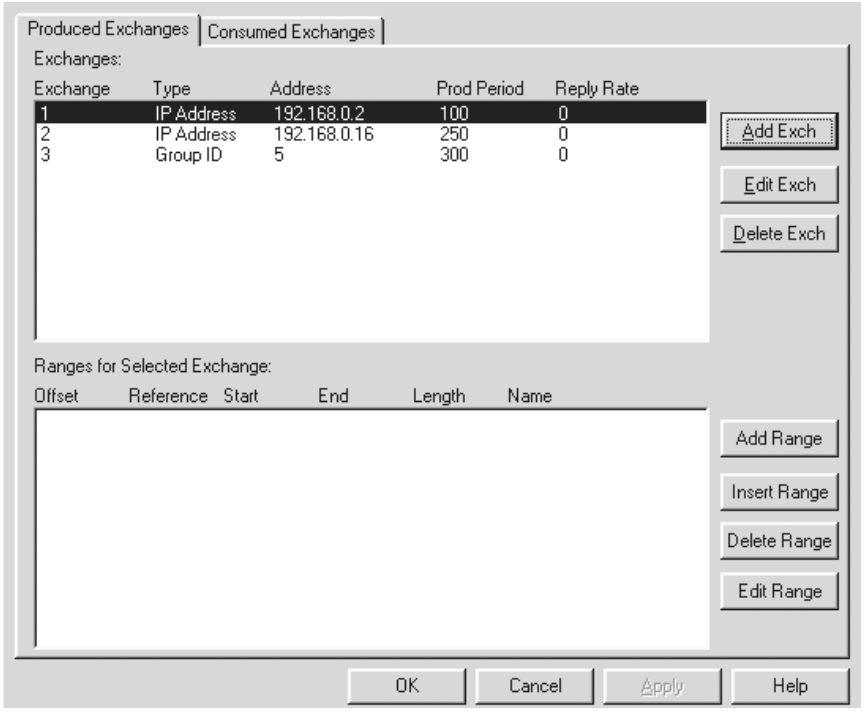

Figure 3.29 – Node 1: Adding a Range for Exchange 1

If it is necessary to add another exchange, press **Add Exch** and repeat the previous steps. If it is necessary to edit an exchange, highlight it, and click **Edit Exch**. If it needs to be deleted, click **Delete Exch**.

Step 4. If the user is satisfied with the Exchange selection, memory range parameters must be provided for each exchange number. The **Ranges for Selected Exchange** (located on Figure 3.29's lower screen) indicates the memory range for a specified produced exchange.

At the top end of the screen, highlight one of the Exchange Numbers. Then, go to the lower part of the screen and click **Add Range**.

Figure 3.30 appears. Using the pull-down menu, select the type of information that is to be produced. Then, select the specific memory reference type. Then enter in the number of registers. (Parameters are explained below.) Press OK.

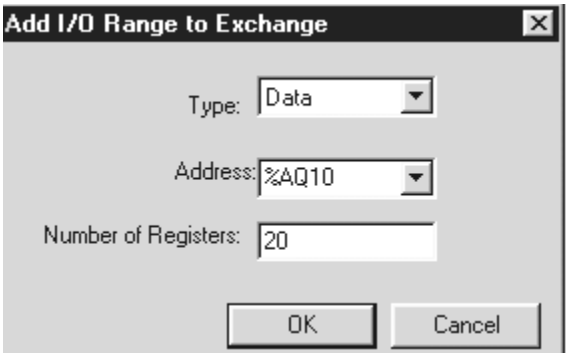

Figure 3.30 – Node 1: Adding a Range for Exchange 1

After configuring the produced exchanges for Node 1, the screen in Figure 31 appears.

Note: At any given time, only one memory range appears on-screen depending upon which exchange is highlighted at the top of the screen. It is not possible to view all memory ranges at the same time.

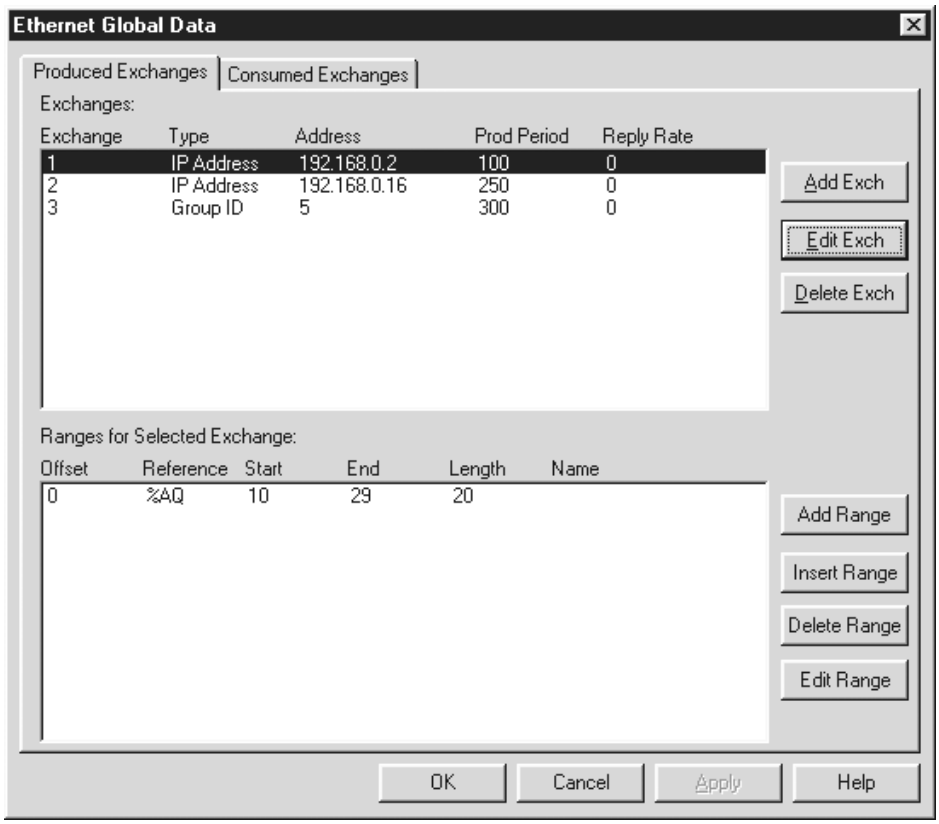

Figure 3.31 – Produced Exchange Memory Range for Node 1

Offset This parameter is automatically determined by Cscape. Assists in determining byte locations inside the exchange packet.
Reference Specifies the specific memory type (%AQ, %Q, %R…) for a *produced* exchange.
Start Indicates the first point for this range in the selected reference memory.
End Indicates the last point for this range in the selected reference memory.

Interpretation of Figure 3.31

Thus far, Node 1 has been configured to indicate that Exchange 1 will send 20 words of data every 100msec. to 192.168.0.2 (Node 2's IP Address). Exchange 2 will send data every 250msec. to 192.168.0.16 (Node 3' IP Address). Because Exchange 2 is not selected in this example screen, the user is unable to see how many words will be sent. Also, Exchange 3 will send data every 300msec. to Group ID #5. Again, , the user is unable to see how many words will be sent, because Exchange 3 is not selected. (Reminder: Refer to Figure 3.24 to recall the desired configuration parameters for this example.)

Step 5. Now that the Produced Exchange parameters have been configured, it is now necessary to configure the Consumed Exchange parameters. (Again, as a reminder, refer to Figure 25 to recall the desired configuration parameters for this example.) Click the **Consumed Exchanges** tab located on the screen in Figure 3.32.

Step 6 The following screen appears. Click **Add Exch**.

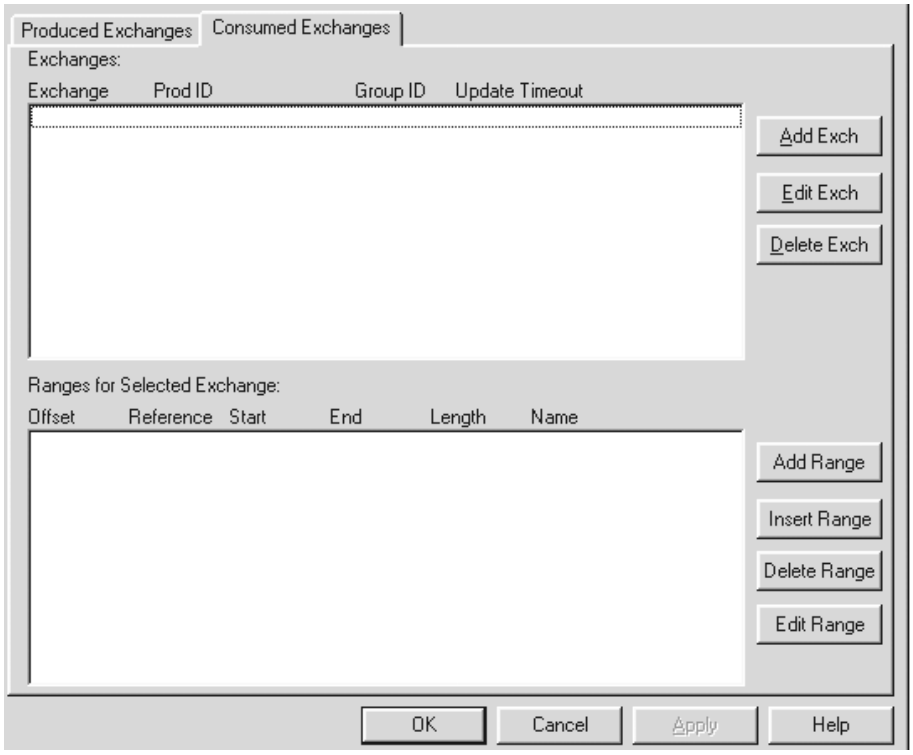

Figure 3.32 – Consumed Exchanges Tab Screen

Step 7 (Refer to Figures 3.33 and 3.34.) To configure, enter a unique **Exchange Number** . The **Producer ID** is the IP Address or Group ID from which the exchange is received from.

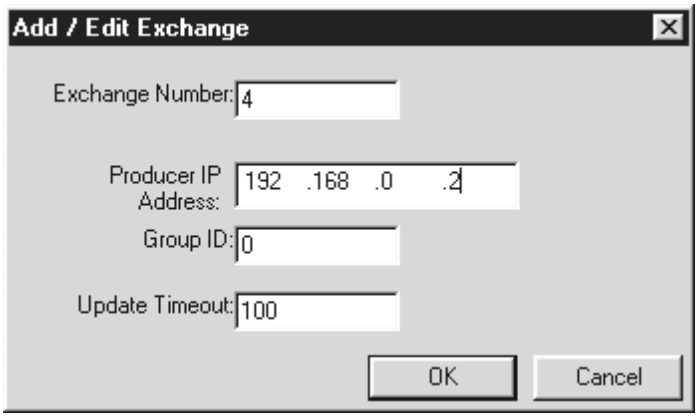

Figure 3.33 – Adding a Consumed Exchange for a Single IP Address

- If the exchange (a block of data) is going to be received from one device, enter the **IP Address of the node** that will send the exchange (**Figure 3.33**).

- If the exchange is going to be received from more than one device, enter the **Group ID (Figure 3.34**). For this example, the **IP Address** of Node 5 (192.168.0.30) is going to be entered as the **Producer ID**. The user (in this particular case) has designated that Node 5 will send out the exchange to all the group members (Node 1, Node 4, and Node 5). (Refer to Figure 3.24 to see how group members interact.)

  In the **Update Timeout**, enter the value that specifies the time limit in which an exchange packet must be received by. The value needs to be set at least double the producer's Produced Period.

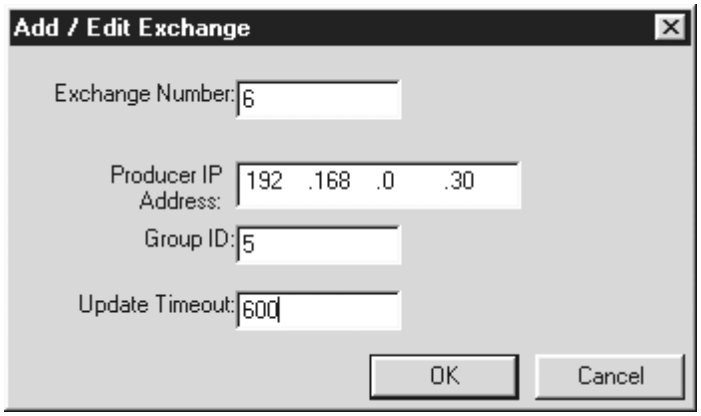

Figure 34 – Adding a Consumed Exchange for a Group

Click OK and repeat the process for each consumed exchange. The following screen appears

If it is necessary to edit Exchange 2, highlight it, and click **Edit Exch**. If it needs to be deleted, click **Delete Exch**.

Step 4. If the user is satisfied with the Exchange selection, memory range parameters must be provided for the selected exchange number. The **Ranges for Selected Exchange** (located on lower screen) indicates the memory range for a specified consumed exchange. Note that numerous exchange numbers can be created. However, in this example, only one Exchange Number has been created.

Highlight the Exchange Number as depicted in Figure 3.35 and then click **Add Range**. The following screen appears.

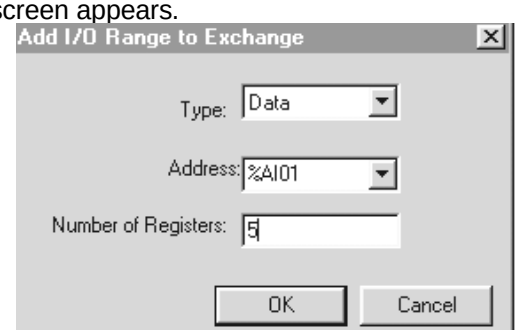

Figure 3.35 – Consumed Exchange for Node 1

Using the pull-down menu, select the type of information that is to be consumed (data, timestamp or status). . To verify whether the data is new, the user can select timestamp. For a status, select status. Data consistency is handled on a per exchange basis. Then, select the specific memory reference type. Then enter in the number of registers. (Parameters are explained below.) Press OK. **Repeat procedures for each exchange.** The following screen appears.

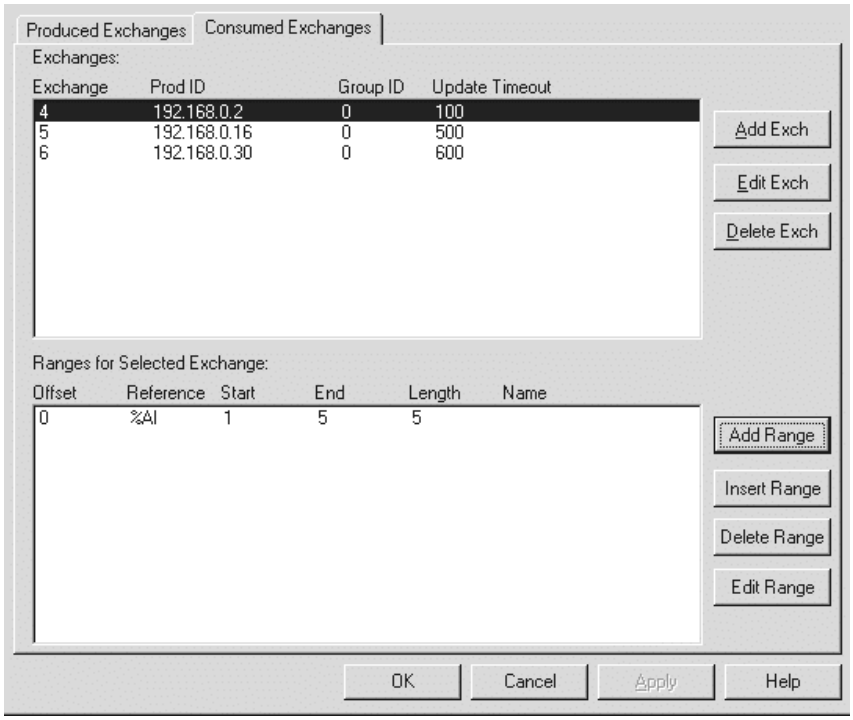

Figure 3.36 – Consumed Exchange Memory Range for Node 1

Note: Only one memory range is displayed on the screen at a time depending upon which exchange is highlighted at the top of the screen. It is not possible to view all memory ranges at one time.

Offset This parameter is automatically determined by Cscape. Assists in determining byte locations inside the exchange packet.
Reference Specifies the specific memory type (%AI, %I, %R…) for a *consumed* exchange.
Start Indicates the first point for this range in the selected reference memory.
End Indicates the last point for this range in the selected reference memory.

If it is necessary to edit the range, highlight it, and click **Edit Range**. If it needs to be deleted, click **Delete Range**. To insert a new range, press **Insert Range**.

Interpretation of Figure 3.36

Node 1 has been configured such that Node 1 is set to consume (receive) 5 words of data at least every 100msec. from Exchange 4. Exchange 4 is sent from 192.168.0.2. Node 1 is set to consume Exchange 5 at least every 500 msec. Exchange 5 is sent from 192.168.0.16. Also, Node 1 is set to consume Exchange 6 every 600msec. Exchange 6 is sent from 192.168.0.30, which is a part of Group 5. In this case, the user has designated 192.168.0.30 as the output device in the group. (Reminder: Refer to Figure 3.24 to recall the desired configuration parameters for this example.)

NOTES

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