

REPLACING A PEERLINK™ NETWORK WITH 2572-A ETHERNET

This is an example of how 2572-A Ethernet Modules may be used share data among multiple PLC's using the IP Multicast feature. The purpose of this document is to provide a specific example of how the IP Multicast feature of the 2572-A may be used to emulate an existing Peerlink™ Network.

Comparison of Peerlink™ and IP Multicast Operation

- In a Peerlink™ network, there is a limit of 16 stations that can participate.

In a Multicast session, there is no physical limit to the number of modules that can participate in a Multicast session.

- In a Peerlink™ network, the maximum number of words that can be transferred is 16 words per station.

In a Multicast session, the number of words that may be transferred is 1 - 256 words per module.

- In a Peerlink™ network, a block of V memory must be reserved in each PLC that is equal to 16 times the highest module address participating in the session. Each module has a 16 word block of the reserved memory, based on the module's assigned address, which it writes to all other modules. Even if less than 16 words are configured to be transferred, zeros will be written to the remaining 16 word block from each module.

In a Multicast session, the source (beginning location of V memory in local PLC to write), number of words (number of words to write), and destination (beginning V memory location in remote PLCs to write the data) are defined in the Producers. This gives greater flexibility in determining the source data, the number of words that get written, and the destination that the data gets written to in the consumers in the Multicast session.

- In a Peerlink™ network, the Active Monitor is responsible for initiating all network communications. It must poll each station on the network which responds by broadcasting its message on the network.

In a Multicast session, each station broadcasts its message asynchronously at the configured production intervals. This eliminates the need for each station to be polled to broadcast its data.

CAMP Multicast Operation Overview

2572-A modules, with Firmware version 2.00 and above, provide support for IP Multicast. Using multicast, you can write data to multiple modules using one command. This reduces network loading and simplifies the client logic.

The TCP/IP protocol reserves a block of IP addresses (224.0.0.3 through 239.255.255.255) for multicast use. 2572-A modules can be configured to accept packets with one of these addresses. When a packet with the specified address is received, the message is passed to the CAMP server, which processes the command. Unlike the typical unicast address, multiple modules can have the same multicast address; thus, a single packet can be used to update multiple modules. Modules that are not configured with a multicast address or that use a different multicast address do not process the message. This allows you to create a group of modules that will participate in a specific multicast session.

You can configure a 2572-A to receive on a multicast address using the same methods used to establish the other TCP/IP network parameters.

1. If you are using the PLC Start method, the multicast address can be specified in the Start Network Server command block.
2. If you are starting the module using IP parameters stored in EEPROM, you can use the Web Server interface to enter the multicast address.
3. If you are using DHCP, you can add the multicast address to the parameters that are provided by the DHCP server.

Application Overview

An existing system consisting of 4 PLCs are sharing 16 words of data each over a Peerlink™ network. The PLC systems are being moved onto Ethernet using a 2572-A in each PLC system. The intention is to move the data sharing responsibilities away from the Peerlink™ network and onto the Ethernet network with the least amount of impact to existing programs.

Assumptions

- There are four PLC systems which will be referred to as PLC #1, PLC #2, PLC #3, and PLC #4.
- Each of the PLCs has a 2572-A installed with each logged into the PLC IO configuration starting at WX1.
- There is no Router on the network.
- The same V locations will be used in all PLCs for the command blocks so that the same programming can be used with only minimal changes.
- The IP addresses for the 2572-A modules will be as follows:
PLC #1 – 192.168.1.1
PLC #2 – 192.168.1.2
PLC #3 – 192.168.1.3
PLC #4 – 192.168.1.4
- The IP Multicast address configured for all the 2572-A modules will be 225.1.1.1.
- The network configuration for the 2572-A modules is being loaded from PLC logic.
- In the existing Peerlink™ system, data is being transferred between the four PLCs as follows:

PLC #1 writes its data to V2001 through V2016 in PLC #2, #3, and #4
PLC #2 writes its data to V2017 through V2032 in PLC #1, #3, and #4
PLC #3 writes its data to V2033 through V2048 in PLC #1, #2, and #4
PLC #4 writes its data to V2049 through V2064 in PLC #1, #2, and #3

Configuring the 2572-A Module

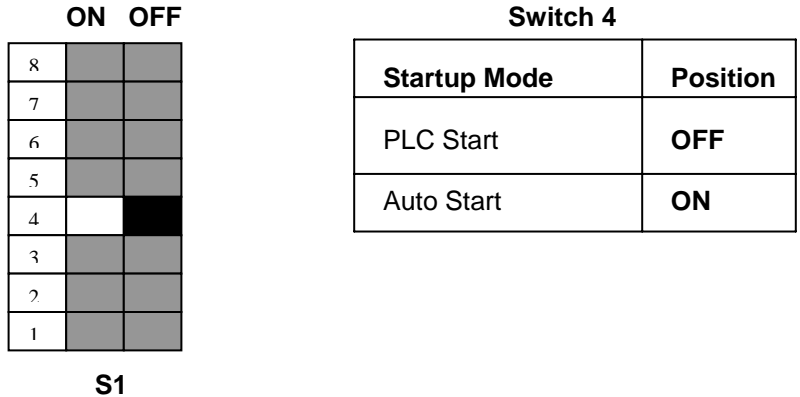
Before the 2572-A can communicate on a TCP/IP network, you must establish the network parameters. These include an **IP Address** and **Subnet Mask** for the module, a **TCP/UDP port number** for the PLC Network Server function, and an **IP Multicast Address** if it is going to participate in a Multicast session, and, if your network contains a router, the IP Address of the **Default Router**. See **Appendix D of the CTI 2572-A Ethernet Module Installation and Operation Guide** for a complete description of TCP/IP address nomenclature.

There are two methods for establishing the network parameters. One method allows you to load the information directly from data stored in EEPROM on the 2572-A. The second method, which is described in this application note, allows you to use the PLC program to set the IP address and other network parameters. When you use PLC logic to set the network parameters, you can ensure that the IP address is directly associated with the PLC and not the module.

The 2572-A uses the PLC V memory to store command information and the module **WX/WY** words to control execution of the commands. If you are not familiar with this interface, please refer to **Appendix C of the CTI 2572-A Ethernet Module Installation and Operation Guide**.
2572-A Dip Switch Settings for PLC Start

To start the network server from PLC logic, the 2572-A module Network Startup dipswitch must be set for PLC Start mode (OFF position). The Network Startup Option is selected by switch #4 on S1.

NOTE: S1 is a 12 position dip switch on the 2572-A.



Checking PLC Login

The 2572-A module must be logged into the PLC I/O configuration and given a starting address. The 2572-A logs in as a Special Function module with 2 **WX** and 6 **WY** words. To configure the PLC I/O, refer to your Simatic® 505 programming application software manual. In the example below, the 2572-A module is installed into slot 1 on I/O base 0 and will be logged in starting at address 1. The starting I/O address assignment can be any WX address on an 8 point boundary, e.g. WX9, WX17, etc. Ensure that the starting I/O address selected does not conflict with any previously configured Word I/O or the module will not work correctly. The module words are offset from the starting address. For example, if you select WX9 as the I/O address, the words used by the module will be WX9, WX10, WY11, WY12, WY13, WY14, WY15, and WY16. The starting I/O address will affect the ladder logic programming shown later in this example.

I/O MODULE DEFINITION FOR CHANNEL. . . 1 BASE00

SLOT	I/O ADDRESS	NUMBER OF BIT AND WORD I/O				SPECIAL FUNCTION
		X	Y	WX	WY	
01.	0001	00	00	02	06	YES
02.	0000	00	00	00	00	NO
..
15.	0000	00	00	00	00	NO
16.	0000	00	00	00	00	NO

After you read the I/O base, if the number of WX and WY words are the same as those shown in the example above and Special Function = YES, then the PLC can recognize the module. Change the address as required by your application and save the result. If the line is blank or erroneous, re-check the module to ensure that it is firmly seated in the I/O base slot. Generate the PLC I/O configuration chart again by reading the I/O base.

NOTE:
If you do not log the module in correctly, it will not function properly.

Configuring IP Multicast

After the network server has been started you need to do the following to send a multicast message:

1. Execute a Create Socket command using a multicast address.
2. Use the Unacknowledged Write command to send a multicast message containing the data you wish to write.

Create Socket Command

Refer to **Chapter 5. Camp Client Commands of the 2572-A Installation and Operation Guide** for detailed descriptions of the command block entries.

The Create Socket command provides a means for your PLC logic to refer to another network node when sending messages. You must complete the Create Socket command before you send messages to another node on the network.

For IP Multicast, UDP must be specified as the Type of Service. The 2572-A saves the Multicast address and port number as the default remote socket. The IP Multicast address is specified in offsets 6 and 7 of the Create Socket command block. Once the Create Socket command completes successfully, your logic can use the Connection Number to refer to the remote socket.

CREATE SOCKET COMMAND BLOCK

Note: This command block will be the same for PLCs 1, 2, 3, and 4.

V Memory Location	Description	Hex Value	Decimal Value
V120	Command Error Word	0000	0
V121	Command (Create Socket)	0003	3
V122	Connection Number (19221-19228)	4B15	19221
V123	Protocol Manager Number	0024	36
V124	Startup Option Bits (None Used – Set to 0)	0000	0
V125	Type of Service (1 = TCP, 2 = UDP)	0002	2
V126	IP Address of Remote Device or Multicast Address (High 16 bits) 225.1	E101	57601
V127	IP Address of Remote Device or Multicast Address (Low 16 bits) 1.1	0101	257
V128	Unused – Set to 0	0000	0
V129	TCP/UDP Port Number of Remote Device	05E1	1505
V130	Unused – Set to 0	0000	0
V131	Unused – Set to 0	0000	0
V132	Unused – Set to 0	0000	0
V133	Unused – Set to 0	0000	0
V134	Unused – Set to 0	0000	0
V135	Unused – Set to 0	0000	0

NOTE:

If parameter changes are made to the Create Socket Command Block, the 2572-A module must be reset before the changes will take effect.

Unacknowledged Write Command

This command is designed to be used with multicast addresses, where one message can be used to update multiple modules. Like the standard write command, this command reads the contents of a designated area of V memory in the local PLC and writes the values to a specified area of memory in another PLC. However, because multiple modules could receive this message, CAMP servers that receive this command do not reply and the client does not verify that the message was received by any server.

Refer to **Chapter 5. Camp Client Commands** of the **2572-A Installation and Operation Guide** for detailed descriptions of the command block entries.

Unacknowledged Write Command Block

V Memory Location	Description	Hex Value	Decimal Value
V140	Command Error Word	0000	0
V141	Command (Unacknowledged Write)	0204	516
V142	Connection Number (19221-19228)	4B15	19221
V143	Source: Starting V Memory Address in Local PLC	07D1	2001
V144	Number of Words to Transfer (1 – 256)	0010	16
V145	Destination: Starting V Memory Address in Remote PLC	07D1	2001
V146	Unused – Set to 0	0000	0
V147	Unused – Set to 0	0000	0
V148	Unused – Set to 0	0000	0
V149	Unused – Set to 0	0000	0
V150	Unused – Set to 0	0000	0
V151	Unused – Set to 0	0000	0
V152	Unused – Set to 0	0000	0
V153	Minimum Production Interval (0 = default = 1000 milliseconds)	01F4	500
V154	Unused – Set to 0	0000	0
V155	Unused – Set to 0	0000	0

Note that offset 3 (V143) determines the starting V location of the write block in the local PLC. Offset 4 (V144) determines the number of words to be written. Offset 5 (V145) determines where this block of data gets written to in the remote PLC.

In this example, all the 2572-As will be “Producers” and must have similar command blocks and ladder programming in the PLCs. In a session where only one 2572-A writes to multiple other 2572-As, only the one **producing** the data would need the command blocks and PLC programming. The 2572-As that are only **consuming** the data would only need to be started as a network server and have a Multicast address configured. For this application, the same basic program and ladder logic must reside in all the PLCs. Only minimal changes to the command blocks will be required. For instance, only the source and destinations would need to change for the different PLCs as follows:

		PLC #1	PLC #2	PLC #3	PLC #4
Source: V Memory Address in Local PLC	V143	2001	2017	2033	2049
Number of Words to Write	V144	16	16	16	16
Destination: V Memory Address in Remote PLC	V145	2001	2017	2033	2049

NOTE:

If parameter changes are made to the Unacknowledged Write command and un-coupled mode triggering is used, the command must be disabled and then re-enabled or the module must be reset for the changes to take effect.

Also note that offset 13 (V153) specifies the “Minimum Production Interval”. This value is specified in **milliseconds**. As long as the Command Trigger for the Unacknowledged Write command is ON, the data will be broadcast at the time interval specified here. For this example, we have specified the broadcast interval to be 0.5 seconds (500 milliseconds). The minimum time interval that can be specified is 50 milliseconds. The maximum interval that can be specified is 10000 milliseconds (10 seconds). If no production interval is specified (entry is 0) then the default production interval will be 1000 milliseconds (1 second).

Note:

If a production interval value of less than 50 or greater than 10000 is specified, the command will error and an error code of 698 (decimal) “Minimum Production Interval Out of Range” will be written to offset 0 (V140) of the command block. Also note that, depending on the PLC scan time, the actual interval may be greater than the interval specified. It requires two scans to process the command. If the Minimum Production Interval value is greater than two scan times, you must add one scan time to the interval specified.

LADDER LOGIC PROGRAMMING

The 2572-A modules log into the PLC as 2 WX inputs and 6WY outputs. The PLC controls the module by placing values in specific WY words. The PLC obtains status information from the module via the WX words. Areas of V memory called Command Blocks are used to store command information.

The figure below illustrates the 2572-A PLC Command Interface. The control structures consist of the module WX/WY words and the Command Blocks. Words WY5 – WY8 contain the V memory addresses of the command blocks. Using this command interface, the PLC can initiate up to four commands at one time. The status and control bits for the four commands are located in WX2 and WY4, respectively.

Refer to “Appendix C. PLC COMMAND INTERFACE” in the 2572-A Installation and Operation Guide for a detailed description of the Command Interface.

WX1 MODULE STATUS WORD
WX2 COMMAND STATUS WORD
WY3 MODULE CONTROL WORD
WY4 COMMAND CONTROL WORD
WY5 COMMAND SLOT 1
WY6 COMMAND SLOT 2
WY7 COMMAND SLOT 3
WY8 COMMAND SLOT 4

NOTE:

The ladder example provided here is the minimum logic required to start the network server, create a UDP socket for multicast, and to execute the multicast Unacknowledged Write command. If the Auto Start option (start from EEPROM) is used, Network1 is not required.

For simplicity of the PLC logic, three of the four available command slots of the 2572-A will be used. Command Slot 1 will be used to start the network server. Command Slot 2 will be used to create the socket for Multicast. Command Slot 3 will be used to execute the Unacknowledged Write command. **Note that the Start Network Server and Create Socket command error words are loaded to 0 each time the commands execute. This is done to clear out any previous error codes that may have been written into these words.**

Network 1

This rung loads and executes the Start Network Server command who's starting V memory address is at V100. This is triggered by a low to high transition of the status bit WX1.3. This bit is set ON by the 2572-A on startup to signal that network configuration is required. Once the network server has been started successfully, the module then sets this bit OFF.

```
!WX1.3 WX2.3 LDC-----+ LDC-----+ WY4.2
[-] [-*-]/[---! !---! *-----*( )
! ! ! A:WY5 ! ! A:V100 ! !
!WY4.3! ! N=100 ! ! N=0 ! ! WY4.3
[-] [-+ ! ! ! +- ( )
+-----+ +-----+
```

Network 2

This rung loads and executes the Create Socket command who's starting V memory address is at V120. This is triggered by a low to high transition of status bit WX1.1. The 2572-A modules sets this bit to ON after startup diagnostics are successful and the Network Server has been successfully started. The bit remains ON as long as the module is good so a one-shot is used to prevent multiple triggering of the Create Socket Command. The create socket command only needs to execute once after the network server has started.

```
!WX1.1 1 WX2.7 LDC-----+ LDC-----+ LDC-----+ WY4.6
[-] [---:O:-*-]/[---! !---! !---! !---! !*---( )
! ! ! A:WY6 ! ! A:V120 ! ! A:V140 ! !
!WY4.7 ! ! N=120 ! ! N=0 ! ! N=0 ! ! WY4.7
[-] [-----+ ! ! ! ! +- ( )
+-----+ +-----+ +-----+
```

Network 3

This rung loads and executes the Unacknowledged Write command who's starting V memory address is at V140. This rung executes as long as WX1.1 is ON. We are using "un-coupled mode" command triggering so the command will execute as long as WY4.11 is ON and continue to broadcast data at the time interval specified in the Unacknowledged Write command block. **The command will continue to execute even if the PLC is placed in Program Mode. If additional control is needed, a contact may be placed in series with WX1.1 to provide a means for enabling and disabling the command.**

```
!WX1.1 LDC-----+ WY4.11
[-] [---! !------( )
! A:WY7 !
! N=140 !
! !
+-----+
```


Troubleshooting Tips

NETWORK SERVER STARTUP PROBLEMS

Before the Network Server is started, the **MS** (Module Status) indicator will blink Green at a rate of about once per second. The **NS** (Network Status) indicator will be **OFF**. After the Network Server is successfully started, the **MS** and **NS** indicators will be solid Green. If the indicators do not show the correct status you can use the following troubleshooting techniques to determine the cause. Also, refer to **Chapter 8** of the *CTI 2572-A Ethernet Module Installation and Operation Guide* for general troubleshooting aids.

STATUS WORDS

WX1 is the Module Status Word. This word is used to communicate the overall status of the module. The module uses the following bit structure:

1	2	3	4	5	6	7	8-15	16
Module Status	RSVD	Net Cfg	RSVD	RSVD	LS	RSVD	RSVD	Heart Beat

Bit 1 – MOD STATUS – *Module Status*

This bit is set to 1 when the module diagnostics are OK *and* the network server has started.

Bit 2 – RSVD – *Reserved*

This bit is reserved for future use.

Bit 3 – NET CFG – *Network Configuration Required*

This bit is set ON by the module application code to indicate that the network CAMP server has not been started. The primary use of this bit is to condition PLC ladder logic to trigger the Start Network Server command. When the PLC Start option is selected, this bit is set to a value of 1 at startup. When the CAMP network server has started successfully, this bit is set to a value of 0.

Bits 4 and 5 – RSVD – *Reserved*

These bits are reserved for future use.

Bit 6 – LS – *Link Status*

This bit indicates status of the Ethernet link. It is set to a value of 1 when the port is connected to a functioning Ethernet hub or switch. Otherwise, it is set to a value of 0.

Bits 7 through 15 – RSVD – *Reserved*

These bits are reserved for future use.

Bit 16 – HEARTBEAT

The module toggles this bit between 1 and 0 approximately once per second. It is used as an indication that the module software is functioning.

MODULE STATUS WORD TROUBLESHOOTING MATRIX

WX1

WX1.1 MOD STATUS	WX1.3 NET CFG	WX1.6 LINK STATUS	WX1.16 HEART BEAT	POSSIBLE PROBLEM
1	0	1	1-0-1	Network server is started, the module is functioning normally, and network connection is good
1	0	0	1-0-1	Network server is started and module is functioning normally but is not physically connected to the network – check network connections to module
0	1	1 or 0	1-0-1	Module is waiting for network configuration If using Auto Start option, check that dip switch #4 is ON If using PLC Start option, see Note1 below
0	0	0	0	The PLC is not reading the module. Check that the module is logged into the PLC IO configuration properly.

Note 1

If you are using PLC Start to load the network parameters and the module is not starting properly, check the following things:

1. Look at the Command Error Word of the Start Network Server command. If there is an error code written there, look up the code in the error code listing in the *2572-A Installation and Operation Guide*. Generally, the problem is an incorrect data entry in the Start Network Server command block. If so, correct the command block and reset the 2572-A module.
2. If no error code has been written to the Command Error Word, see the Command Status Word troubleshooting matrix.

WX2 is the Command Status Word. The module sets bits in this word to communicate command status to the PLC. The status bits in this word are directly associated with the corresponding command control bits in the Command Control Word (WY4) and the Command Slots (WY5 – WY8). The bit structures for these words are as follows:

WX2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CMD Err	PLC Err	CMD Busy	Abort Busy	CMD Err	PLC Err	CMD Busy	Abort Busy	CMD Err	PLC Err	CMD Busy	Abort Busy	CMD Err	PLC Err	CMD Busy	Abort Busy
Command 1				Command 2				Command 3				Command 4			

WY4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Err Ack	CMD Mode	CMD Trig	Abort Trig	Err Ack	CMD Mode	CMD Trig	Abort Trig	Err Ack	CMD Mode	CMD Trig	Abort Trig	Err Ack	CMD Mode	CMD Trig	Abort Trig
Command 1 - WY5				Command 2 - WY6				Command 3 - WY7				Command 4 - WY8			

These words are divided into 4 sets of 4 bits each. Bits **1 to 4** of the Command Status Word (WX2) reflect command status of command slot 1, **5 to 8** – command slot 2, **9 to 12** – command slot 3, and **13 to 16** – command slot 4. Likewise, bits **1 to 4** of the Command Control Word are associated with command slot 1 (WY5), **5 to 8** – command slot 2 (WY6), **9 to 12** – command slot 3 (WY7), and **13 to 16** – command slot 4 (WY8).

COMMAND STATUS BIT DEFINITIONS (WX2)

CMD Err – Command Error

The 2572-A sets this bit to 1 when it encounters an error while attempting to execute the command specified in its corresponding command slot. The 2572-A will write an error code into offset 0 of the specified command block unless the PLC Err bit is also set.

PLC Err – PLC READ/WRITE ERROR

The 2572-A sets this bit to 1 to indicate that it could not read a valid command block from V memory. Therefore, there is no place to write an error word. This may be caused by loading a value into the command slot which is not a valid V memory location (such as 0) or which points to a V location that does not contain a command block.

CMD Busy – Command Busy

The 2572-A sets this bit 1 while it is processing a command. The module then sets this bit to 0 when command processing is finished.

ABORT Busy

This indicates that the module is attempting to abort a command after an “abort trigger” has been received in WY4.

COMMAND CONTROL BIT DEFINITIONS (WY4)

ERR Ack – Error Acknowledge

The PLC sets this bit to acknowledge the error bit which was set by the 2572-A.

CMD Mode – Command Mode

The PLC sets this bit to control how the module command execution is synchronized with the PLC logic:

- 0 = Uncoupled mode – The 2572-A command processing is not synchronized with the PLC logic.
- 1 = Coupled mode – The 2572-A command processing is synchronized with the PLC logic.

CMD Trig – Command Trigger

The PLC sets this bit to initiate a command.

ABORT Trig – Abort Trigger

The PLC sets this bit to abort a command in progress. In most applications, use of this bit is not required.

COMMAND STATUS WORD TROUBLESHOOTING MATRIX

Only the status bits for command slot 1 (bits 1 – 4) are shown here since they operate the same for all command slots. Monitoring command slots 2, 3, and 4 would be done in the same way.

WX2

WX2.1 CMD Err	WX2.2 PLC Err	WX2.3 CMD Busy	WX2.4 Abort Busy	POSSIBLE PROBLEM
0	0	0	0	No command is in process. This could mean that a command has been triggered and successfully completed, or that no command has been triggered. Check ladder logic to ensure that the correct status bits are being monitored and the correct control bits are being exercised.
0	0	1	0	A command is currently in process. If uncoupled triggering mode is used, this bit will remain ON as long as the associated trigger bit in WY4 is ON. If coupled mode triggering is used, this bit will toggle ON when the command is triggered from plc logic and toggle OFF when the command has finished processing.
1	0	1	0	A command error has occurred. Examine the command error word of the command being processed for an error code. Find the listing for the error code in the IO Guide for possible causes. Correct the problem and then reset the 2572-A module.
1	1	1	0	The module could not read a valid command block from V memory. Ensure that the correct pointer value is being loaded into WY5 and that the command block being pointed to contain the correct entries. Correct and then reset the 2572-A module.

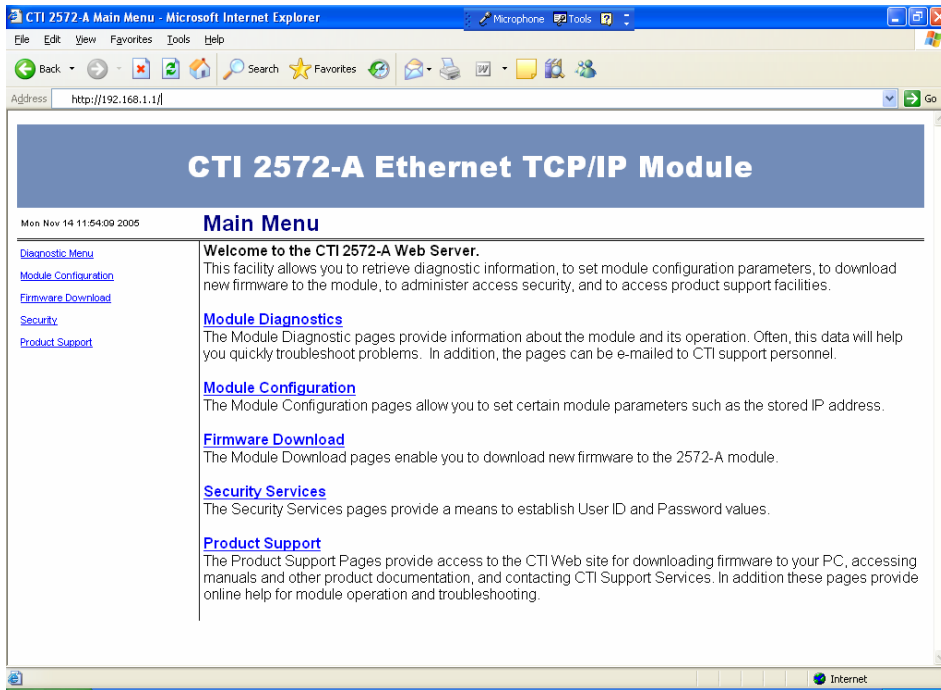
On a successful startup of this application the WX and WY words should be displaying the following values when viewed from a chart or data window:

The values are shown in both HEXADECIMAL and INTEGER (decimal) format.

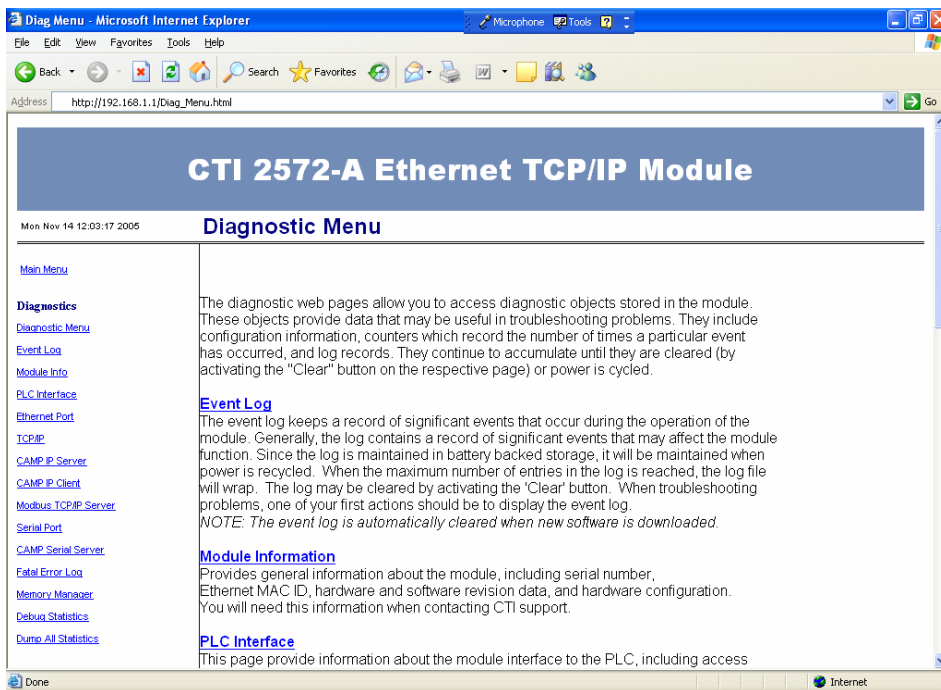
WX Offset	Description	Value in HEX	Value in Decimal
WX1	Module Status Word	8400 – 8401 (toggling)	33792 – 33793 (toggling)
WX2	Command Status Word	0020	32
WY3	Module Control Word	0000	0
WY4	Command Control Word	0020	32
WY5	Command Slot 1	0064	100
WY6	Command Slot 2	0078	120
WY7	Command Slot 3	008C	140
WY8	Command Slot 4	0000	0

If these values are correct, the module should be configured properly, sending Multicast data, and is ready to receive data from other modules participating in the Multicast session. You can verify that all the modules in this multicast session are broadcasting and receiving the IP Multicast messages by using a Web Browser as follows:

1. From a pc that is on the same network, open the web browser and type the IP address of the 2572-A that you want to connect to in the address field of the browser and Enter. Once connected to the 2572-A, the following web page should be displayed.



2. From the menu, select **Module Diagnostics**. The following page should then be displayed:



- From the Diagnostic menu, select **ETHERNET PORT**. When the page comes up, look at the “**Multicast Packets Received**” counts and the “**Multicast Packets Transmitted**” counts. If the 2572-A is broadcasting and receiving multicast messages successfully, these counts should be non-zero. When you do a “Refresh” on this page, these values should increment. There should also be a Multicast MAC Address shown. If the module does not have a Multicast address, it will say “Not Configured”.

Mon Nov 14 12:10:54 2005

Ethernet Port Diagnostic Data

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Link Status	Active
Link Interface Type	Twisted Pair
Interface Speed	10 Mb
Duplex Mode	Half
Ethernet MAC Address	00:20:25:0F:6E:5B
Multicast MAC Address	01:00:5E:01:01:01
Total Bytes Received	95464566
Total Packets Received	7273692
Multicast Packets Received	7097512
Broadcast Packets Received	175959
Discarded Packets: No Buffer	0
Discarded Packets: Alignment Error	891
Discarded Packets: CRC Error	891
Discarded Packets: Frame Too Short	891
Discarded Packets: Frame Too Long	0
Discarded Packets: Unsupported UDP Port	0
Discarded Packets: Unsupported Ether Type	28041
Total Discarded Packets	30714
Packets Sent to Stack	7164851
Multicast Packets Sent to Stack	7097512
Total Bytes Transmitted	298268590
Total Packets Transmitted	121
Multicast Packets Transmitted	2367608
Broadcast Packets Transmitted	6
Transmit: Deferred Packet Count	25233
Transmit: CRC Errors	0

- You can also determine if a module is sending Multicast messages by selecting **CAMP IP Client** from the diagnostic menu and observing that the Connection Number is the number of the socket created and the Remote IP address is the IP Multicast address. Also, the “Unacknowledged Write Initiated” and “Unacknowledged Write Message Sent” counts should increment at the rate you specified when you refresh the page.

Mon Nov 21 15:49:13 2005

CAMP IP Client Diagnostic Data

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Connection Number	19221
Remote IP Address	225.1.1.1
Remote Port	1505
Protocol Used	UDP
Protocol Error Detected Count	0
Protocol Error Message Count	0
Memory Read Initiated	0
Memory Read Message Sent	0
Memory Read Success	0
Memory Read Initiate Error	0
Memory Read Error Response	0
Memory Read Response Timeout	0
Memory Read Completion Error	0
Memory Write Initiated	0
Memory Write Message Sent	0
Memory Write Success	0
Memory Write Initiate Error	0
Memory Write Error Response	0
Memory Write Response Timeout	0
Memory Write Completion Error	0
Memory Exchange Initiated	0
Memory Exchange Message Sent	0
Memory Exchange Success	0
Memory Exchange Initiate Error	0
Memory Exchange Error Response	0
Memory Exchange Response Timeout	0
Memory Exchange Completion Error	0
Unknowledge Write Initiated	91635
Unknowledge Write Message Sent	91635
Unknowledge Write Initiate Error	0
Unknowledge Write Overrun	0

Configuring a Multicast Address via the Web Browser Interface

A Multicast address may also be configured in a 2572-A using a web browser. Below is an example for configuring a Multicast address via the Web Server:

From the MAIN MENU, select **Module Configuration**. If the "Password Bypass" option has not been disabled via dip switch 7, you will be prompted for a "**User Name**" and "**Password**". The default user name *and* password is "**config**". Type 'config' for both the User Name and Password and then the Module Configuration page will be displayed.

Initially, if no Multicast address has ever been configured in the module, there may be invalid values in the "Multicast IP Address" field.

Enter the desired values into the IP Multicast Address field and then select "**Update Module**" at the lower left of the **TCP/IP Configuration** box. Once the parameters have been updated, the module must be configured for "Auto Start" via dip switch 4 of S1 (placed in the ON position) and then the module must be reset. A reset may be accomplished by selecting "**Module Reset**" from the "Module Configuration" page or by pressing the recessed RESET button on the front panel of the module.

The screenshot shows a web browser window titled "Configuration - Microsoft Internet Explorer" with the address bar displaying "http://192.168.1.1/Module_Configuration.html". The page content includes a "Main Menu" link, a "Module Configuration" header, and a "TCP/IP Configuration" section. A red warning message states: "Module will have to be reset for changes to take effect." The TCP/IP Configuration section contains the following fields:

Module IP Address	192	.	168	.	1	.	1
Network Address Mask	255	.	255	.	255	.	0
Default Gateway Address	0	.	0	.	0	.	0
Multicast IP Address	225	.	1	.	1	.	1
TCP KeepAlive Interval (0 - 65535)	0	seconds					
CAMP Server Alternate Port # (1 - 65535)	1505						
CAMP Maximum TCP Connections (1 - 24)	16						

Below these fields are two buttons: "Update Module" and "Restore Initial Values".

The "Event Log" section contains the following fields:

SYSLOG Server IP Address	0	.	0	.	0	.	0
SYSLOG Server Port (1 - 65535)	514	(default 514)					
SYSLOG Enable	<input type="checkbox"/>						

Below these fields are two buttons: "Update Module" and "Restore Initial Values".

POINTS FOR CONSIDERATION

1. At the time of this writing, the current version of the 2572-A application code is 2.07. There are some operational characteristics associated with IP Multicast in versions 2.00 to 2.07 of the application code that should be noted. There may be some changes and enhancements made to IP Multicast operation in future releases of the 2572-A application code, which will not affect the basic functionality.
 - *The valid range for multicast addresses is 224.0.0.3 through 239.255.255.255. If you enter a value for the Multicast address that is outside of this range in the Module Configuration page of the web browser, an error is returned that says:

“The Multicast IP Address is Invalid”
“The Multicast Address must be between 224.0.0.2 and 239.255.255.255 inclusive.”*

*This is a documentation error and should be **“224.0.0.3 and 239.255.255.255”**.*
 - *If the Multicast address is being configured by the PLC, the Start Network Server command checks for out of range values entered for the Multicast address. It does not write invalid multicast address values to the module, but it does not report an error to the Start Network Server error word. If the other IP parameters are valid, it will write those values correctly without indicating that an invalid Multicast address was entered. Subsequently, if a module has been preconfigured with a valid Multicast address and is then started again from the PLC with 0's in the Multicast address fields, the module will retain the Multicast address previously configured.*
 - *When IP parameters are configured from the PLC, the new parameters are automatically saved to the module's EEPROM, including the Multicast address if configured in the Start Network Server command. However, once a Multicast address has been configured and stored in EEPROM, the only way to remove the Multicast address is via the Module Configuration page of the web browser interface. Zero's must be written into the Multicast address field and then updated to the module. **Loading IP parameters from the PLC via the Start Network Server command with zeros in the entries for the Multicast address will not clear the Multicast address from the EEPROM of a previously configured module. Therefore, care must be taken not to inadvertently place a module with a configured Multicast address into an application where it may receive unintended Multicast messages.***
 - *When using un-coupled mode triggering of the Unacknowledged Write command, the 2572-A will continue to initiate write commands at the time interval specified, even if the 2572-A is removed from the PLC IO configuration (as would be the case of a complete program clear or new program download to the PLC). The module will continue to broadcast Multicast messages until it is reset. When coupled mode triggering is used, command execution is halted when the module is removed from the PLC IO configuration.*
2. There is no status confirmation to the PLC that a 2572-A is actively receiving or producing Multicast messages. If it is important to know that the data being received is valid, the user must implement some method to determine this. One method that might be used is to implement ladder logic in the producers to increment the value in one word being written that could be monitored in the ladder logic of the consumers to indicate that valid data is being received.

IMPORTANT!!

To prevent inadvertent overwriting of V memory in other PLCs, ensure that only the modules that you want to participate in the multicast session are configured with the multicast address.

Also note that when the network server is started from the PLC, the network parameters are automatically updated to EEPROM, including the IP Multicast address if configured from the PLC. In the event that a module is configured with a Multicast address by the PLC and then later the module is configured to start from EEPROM it will still retain the previously configured Multicast address.