

Using the 2572 UDP “Send To” Feature to Exchange Memory with Multiple PLCs

Sometimes an application may require one PLC to collect data from or write data to multiple PLCs on the network. Typically, a “socket” must be opened from the Client 2572 to each Server 2572 before data can be exchanged using the Memory Transfer Commands. The Create Socket Commands contain the IP address of the remote 2572s to which subsequent Memory Exchange Commands will be directed. The logic required to create the socket connections and implement memory exchange with multiple servers can become quite cumbersome. The 2572 supports a feature called “UDP Sent To” which simplifies implementation of memory exchange with multiple servers. Using this feature, only one “socket” needs to be opened. The IP address of the remote 2572 is read from the Memory Exchange Command rather than from the Create Socket Command. Using this method, a different remote server IP address can be loaded into a Memory Exchange Command each time the command is executed. Using this method, each 2572 server can be sequentially “polled” by the 2572 client.



This application example illustrates one proven way to sequentially “poll” multiple 2572 servers from one 2572 client.

This sample application requires that PLC #1 must read and store 16 words of data beginning at V2001 in four other PLCs (PLC #2, PLC #3, PLC #4 and PLC #5). All the PLCs have 2572s installed. Logic and command blocks must be set up in PLC #1 to start the network server, create a UDP socket, and initiate memory exchange with PLCs #2, #3, #4 and #5. The IP addresses used in this application are:

- PLC #1 - IP address 199.184.177.231 (Client)
- PLC #2 - IP address 199.184.177.233 (Server)
- PLC #3 - IP address 199.184.177.238 (Server)
- PLC #4 - IP address 199.184.177.251 (Server)
- PLC #5 - IP address 199.184.177.71 (Server)

First, a Start Network Server Command Block must be set up in PLC #1. In this example, V100 will be the starting location for the Start Network Server Command.

V Memory Location	Description	Hex Value	Decimal Value
V100	Command Error Word	0000	0
V101	Command (Start Network Server)	0004	4
V102	Connection Number (19291-19298)	4B62	19298
V103	Protocol Manager Number	0023	35
V104	Startup Option Bits	0	0
V015	TCP Stale Socket Timeout in seconds (0 = none)	003C	60
V106	IP Address of this Module (High 16 bits) 199.184	C7B8	51128
V107	IP Address of Default Router (Low 16 Bits) 177.231	B1E7	45543
V108	TCP/UDP Port Number	05E1	1505
V109	IP Address of Default Router (High 16 bits)	0	0
V110	IP Address of Default Router (Low 16 bits)	0	0
V111	Max Number of TCP Connections (0 = default = 8)	0	0
V112	Subnet Mask (High 16 bits)	0	0
V113	Subnet Mask (Low 16 bits)	0	0
V114	Unused - Set to 0	0	0
V115	Unused - Set to 0	0	0



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Next, a Create Socket Command Block must be built to create the initial UDP socket. The Create Socket Command begins at V120. Note that a valid IP address must be pre-loaded into V126 and V127 and the Port Number in V129 even though the destination IP address and port number will be read from the Memory Transfer Command Block. Otherwise, the Create Socket Command will fail when it is executed.

V Memory Location	Description	Hex Value	Decimal Value
V120	Command Error Word	0000	0
V121	Command (Create Socket)	0004	3
V122	Connection Number (19221-19228)	4B15	19221
V123	Protocol Manager Number	0024	36
V124	Startup Option Bits (Set bit 15 to use IP Address in Memory Xfer Cmd)	0002	2
V125	Type of Service (1 = TCP, 2 = UDP) <i>Must use UDP if bit 15 set above</i>	0002	2
V126	IP Address of Remote Device (High 16 bits) 199.184	C7B8	51128
V127	IP Address of Remote Device (Low 16 Bits) 177.233	B1E9	45545
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

Next, the Memory Transfer Command Block must be created. In this example, we will be using the Read Remote Memory command that will begin at V140. Note that we have pre-loaded the destination V memory address in V145 and the IP address of the remote device in V150 and V151 to point to the first remote PLC (PLC #2).

V Memory Location	Description	Hex Value	Decimal Value
V140	Command Error Word	0000	0
V141	Command (Read Remote Memory)	0202	514
V142	Connection Number (19221-19228)	4B15	19221
V143	Source: Starting V Memory Address in Remote PLC	07D1	2001
V144	Number of Words to Transfer (1 - 256)	0010	16
V145	Destination: Starting V Memory Address in this PLC	07D1	2001
V146	Command Timeout in Seconds (0 = default = approx. 9 seconds)	0003	3
V147	Unused - Set to 0	0000	0
V148	Unused - Set to 0	0000	0
V149	Unused - Set to 0	0000	0
V150	IP Address of Remote Device (High 16 bits) 199.184	C7B8	51128
V151	IP Address of Remote Device (High 16 bits) 177.233	B1E9	45545
V152	UDP Port Number of Remote Device	05E1	1505
V153	Unused - Set to 0	0000	0
V154	Unused - Set to 0	0000	0
V155	Unused - Set to 0	0000	0

Our application requires 16 words to be read from each of the four PLCs beginning at V2001 and be stored in unique areas of V memory in the Client. We have implemented **Move Word From Table (MWFT)** instructions to move a different Destination V Memory Address into V145 and a different Destination IP Address (low 16 bits) into V151 of the Memory Transfer Command. Since the high 16 bits of all the remote servers are the same, we only have to change the V location that contains the low 16 bits. The table moves will be incremented together to synchronize the data transfers. These tables are stored in V memory.

The table that contains the destination V memory locations begins at V250.

V Memory Location	Description	Hex Value	Decimal Value
V250	Pointer Word - MWFT instruction increments this location		
V251	Destination V Memory Location for First Transfer	07D1	2001
V252	Destination V Memory Location for Second Transfer	07E1	2017
V253	Destination V Memory Location for Third Transfer	07F1	2033
V254	Destination V Memory Location for Fourth Transfer	0801	2049

The table that contains the low word IP addresses begins at V280.

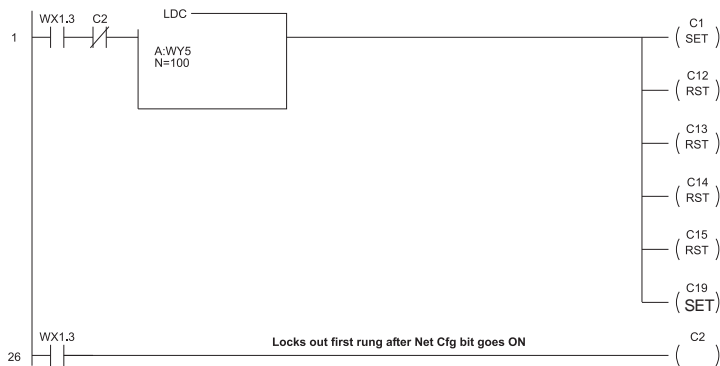
V Memory Location	Description	Hex Value	Decimal Value
V280	Pointer Word - MWFT instruction increments this location		
V281	Destination IP Address for First Transfer (low 16 bits)	177.233	B1E9
V282	Destination IP Address for Second Transfer (low 16 bits)	177.238	B1EE
V283	Destination IP Address for Third Transfer (low 16 bits)	177.251	B1FB
V284	Destination IP Address for Fourth Transfer (low 16 bits)	177.71	B147

The results of the transfers will be stored in PLC #1 as illustrated by the table below.

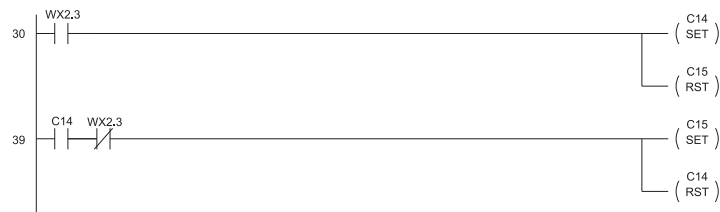
Transfer Data From	IP Address	V Memory	Transfer Data To	V Memory
PLC #2	199.184.177.233	V2001 to V2016	PLC #1	V2001 to V2016
PLC #3	199.184.177.238	V2001 to V2016	PLC #1	V2017 to V2032
PLC #4	199.184.177.251	V2001 to V2016	PLC #1	V2033 to V2048
PLC #5	199.184.177.71	V2001 to V2016	PLC #1	V2049 to V2064

Ladder logic must be implemented in the Client PLC to control command execution in the 2572. In this example, the 2572 is logged into the PLC's I/O configuration with a starting address at WX1. We are using Command Slot 1 Status and Control Bits for command processing.

This rung loads the location of the Create Connection Command Block (V100) into the command word for command slot 1 (WY5) if the Network Cfg bit (WX1.3) is ON. The 2572 will set this bit ON until its network parameters are loaded.



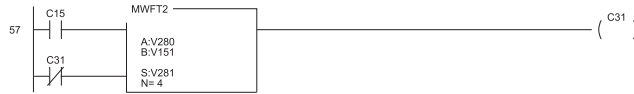
The next two rungs toggle the state of C14 and C15 to determine the completion of a command cycle. C15 is RESET at the beginning of a command cycle and is SET when the command is finished.



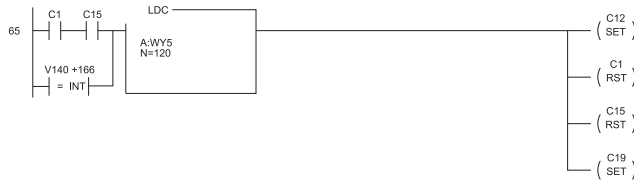
This Move Word From Table (MWFT1) instruction moves a new Destination V Memory Location into the Memory Transfer Command Block on each completion of a command cycle.



This Move Word From Table instruction moves a new Destination IP Address (Low 16 bits) into the Memory Transfer Command block on each completion of a command cycle. It is incremented at the same time as MWFT1 above.



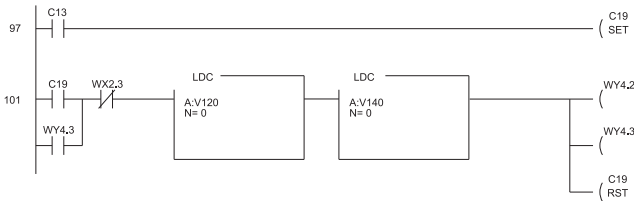
This rung loads the V memory location of the Create Socket command block (V120) into WY5 after the Start Network Server command has been loaded and executed. This rung is also enabled if the command error word of the Memory Transfer command (V140) contains the error code 166 (Socket not Connected error).



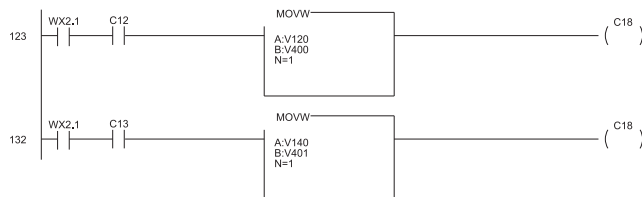
This rung loads the V memory location of the memory Transfer command (V140) into WY5 after the Create Socket command has been loaded and executed.



The next two rungs cause a command cycle to take place by turning ON the command trigger bits for command slot 1 (WY4.2 and WY4.3). The command error words for the Create Socket command (V120) and the Memory Transfer command (V140) are written to 0 on each command execution.



If a command error occurs, the command error bit (WX2.1) will be turned ON by the 2572. In the event of a command error, the next two rungs move the appropriate command error word to another V memory location where it can be examined.



In the event of a command error, the Error Acknowledge bit (WY4.1) must be turned ON by logic in order for the 2572 to clear the Command Error bit (WX2.1) and allow another command to be processed on the command slot.

