OPERATOR INTERFACE PRODUCTS APPLICATION NOTE

Subject: Steps to Setup a Multi-Link Network with GP/GLC AN# 1106
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Description: The steps to set up a Multi-Link system with a specific example using an Omron Sysmac CVM1 PLC.

Affected Products:

GP and GLC series models when connecting to a Multi-Link PLC (usually RS422)
-Mitsubishi, Omron Sysmac, Hitachi Hidic, Matsushita MEWNET, Yokogawa Factory Ace, Toshiba Prosec T, AB SLC500, Keyence KZ 300/350.

Problem:

What are the steps to configure the GPs, GLCs, and the PLC for Multi-Link communication?

Solution:

The outline of the steps:

1. Confirm that the PLC type is supported
2. Make the physical cable connections
3. Configure the Communication Parameters
4. Make a GP project for each GP in the network using Pro/PB Win
5. Configure the Multi-Link settings for each GP (in GP Setup)
6. Configure the Multi-Link settings for the PLC or Link Unit
7. Write the enable bits on the PLC to start communications.

Confirm that PLC type is supported

Look at the "Connectable PLCs" in the table in section 4.2 of the PLC Connection Manual to confirm that the PLC type you wish to connect is in that table. Also confirm the link unit which is required. The example here was done on an OmronCVM1 CPU01, and connected to the Link Unit on the CPU.

Make the physical cable connections
Again the best place to look is the PLC connection manual in Chapter 5 under the PLC of your choice. For the Omron Sysmac CVM1 used in this example, see section 5.2. Referring to the table on pg 5-2-2 (Sysmac CV Series) the CPU link type notes that Cable diagram 4 is to be used for making cables. That will be on page 5-2-7. Don't leave out the termination resistors, or the loop-back connections.

Configure the Communication Parameters (on the PLC)
On the PLC, make sure you set the communication parameters to match the table listed in the PLC Connection Manual under the appropriate section. For this Omron example, the table is on page: 5-2-16. Settings:
Baud Rate: 19200 bps
Data Length: 7 bits
Stop Bits: 2
Parity: Even
Communication Format (toggle switch on PLC): RS422
The table mentions that Station Number should be set to 0. It will operate under this configuration, but will also operate with any other legal Link Unit Machine Number. This setting is discussed in more detail later.

Make a GP project for each GP in the network using Pro/PB Win
Make a simple project with a single screen for testing out the link. Just use a single bit switch, a word switch incrementing a register on the PLC, plus a numeric display to watch that register as it changes.

Part	Address to set	
Bit Switch	0010	Bit Invert, Monitor ON
Word Switch	D100	Add/Subtract Constant: 1
Value Display Part	D100	

Save this project, and make two copies of it on the PC so we can configure one for each GP unit to be used in this example.

Configure the Multi-Link settings for each GP (in GP Setup)
Open up GP Setup, and click on the mode settings tab.
For GP1:

- Set the System Address to D0000
- Set the Read Area to 0 (we will not use it in this example)
- Set the Machine Number to 3.
- Set the Link Protocol Type to N:1 Note the settings below that become available.
- Set the Node Number to 0 (which will be different from the other GP unit)
- Set the Transmission Status Register to D0020

For GP2:

- Set the System Address to D0040 (must not overlap the other GP's System block, which is usually about 20 words.)
- Set the Read Area to 0
- Set the Machine Number to 3 as for the other GP. This is the link unit to communicate with on the multi-drop connection.
- Set the Link Protocol Type to N:1 Note the settings below that become available.
- Set the Node Number to 1 (different from GP1)
- Set the Transmission Status Register to D0020 (identical to all GPs in this network)

Now, save each project (prw file) and download to the appropriate physical GP.

Configure the Multi-Link settings for the PLC or Link Unit

Other than the data format, and environmental settings already discussed earlier, there are two things that must be done on the PLC for Multi-Link to operate:

1. The Node Number or Link Unit Machine number must be set, or determined for settings on the GPs. (For the example here the Machine Number was set to 3 in the PLC and on the GPs)

AND…

Write the enable bits on the PLC to start communications.

2. When the network is starting up, the PLC must write bits in the Transmission Status Register address to enable specific GP units for communication. For our system with the two GPs involved, we would write the value 3 (or binary 0011) into the register D0020. This enables GP units 0, and 1 for communication on this Multi-Drop network.

At this point, the switches on the GP's should appear, and the value displays (numeric readout parts) should have values showing in them. Try pushing the switches, and see the results.

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Notes & References

- Very important is the first 7 sections of Chapter 4 in the PLC Connection Manual that comes with the Pro/PB Win software.
- A separate Application Note discusses the terminology related to station numbers, unit numbers, node numbers etc. Please see that one for more clarification beyond the manual and help files.
- Refer to the PRW files associated with this Application Note: OmronMultiA.prw, and OmronMultiB.prw.
- Note that the example here is only one specific method of connecting. Read the PLC Connection manual to determine other cable options, and other PLC types, etc.
- To debug this configuration, try unplugging all but one GP, and the PLC. Also, try setting that one GP to 1:1 again. If this doesn't work, then the communications parameters or the cable connections may be incorrect. If this works, then you just need to fix the Multi-Link parameters, and the Transmission Status Register.
- Links to sample files: ftp://ftp.xycom.com/pub/oif_mmi/App_Note/omronmultia.prw and ftp://ftp.xycom.com/pub/oif_mmi/App_Note/omronmultib.prw