

A Practical Guide

to

Using Ethernet IP

Yokogawa's
Ethernet IP
the difference in efficiency.



Yokogawa Corporation of America

Course Overview

A Practical Guide to Using Ethernet IP

Location:

Intercontinental Hotel – Founders IV (1st Floor)

Date:

Tuesday, May 19, 2009

Time:

1 - 3PM

Description: This course is a practical guide to implementing Ethernet IP in multi vendor process and manufacturing applications. The course is taught hands-on with live instruments with content for both new and experienced users of Ethernet IP. Students will receive a resource CD as part of the class. Topics covered include:

- Ethernet IP technology review
- Basic configuration: MicroLogix 1100 with DX2000 display station
- More configuration techniques: CompactLogix with MW100
- Etherent IP with serial devices: SLC5/03 with MW100
- CS3000 and Ethernet IP
- Using OPC and Ethernet IP
- Implicit vs. Explicit messaging
- Benefits of IGMP with Ethernet IP; managed switches and wireless radios

The course uses live hardware demonstrations including the following hardware and software:

- Allen-Bradley SLC500, Micrologix, CompactLogix PLC's
- Yokogawa CS3000
- Yokogawa MW100 data acquisition system
- Yokogawa DXAdvanced data acquisition and display station
- Kepware OPC servers
- Prosoft protocol gateways and wireless radios
- Managed switches (various vendors)

- ⇒ Quick Tour of Today's Hardware and Network (10/10)
- ⇒ Why Ethernet IP?
- ⇒ What is Ethernet IP (20/30)
- ⇒ Getting Ready to Program: RSLink and RSLogix (10/40)
- ⇒ Micrologix M1100 with MW100 data acquisition system (15/60)
- ⇒ A Short Break (5/45)
- ⇒ CompactLogix with DX2000 display station (15/75)
- ⇒ Ethernet IP with Serial (15/90)
- ⇒ Wireless I/O with Ethernet IP
- ⇒ Improving Performance with IGMP (10/110)
- ⇒ OPC with Ethernet IP (10/100)

- ⇒ This is an *introductory* seminar on Ethernet IP.
- ⇒ It is based on real applications from the field interfacing *data acquisition devices* with A-B PLC's.
- ⇒ It is not a *Rockwell* training course.

Today's Network

Instructor 1
10.200.1.201 (Wireless)
192.168.1.11 (Wired)



Switch



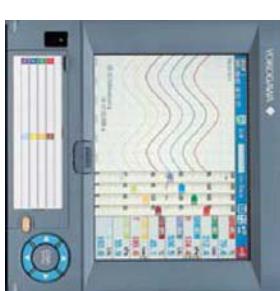
Wireless I/O
Gateway
192.168.1.180



Micrologix
M1100
192.168.1.126



Compactlogix
192.168.1.95



DX2000
192.168.1.21

MW100
192.168.1.22



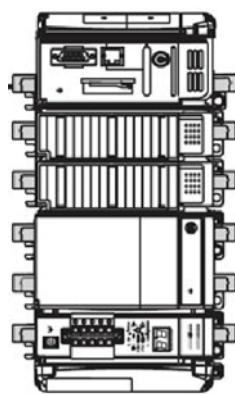
! Multi-Vendor Connectivity !

1. Allen-Bradley is a dominant PLC manufacturer.
2. Ethernet IP is a dominant protocol for A-B PLC's

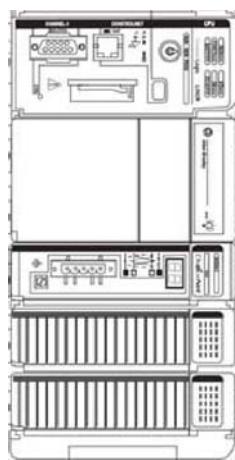
Multi Vendor Connectivity on an EtherNet/IP

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Control Logix



CompactLogix



MicroLogix



Third Party
EtherNet/IP
Devices

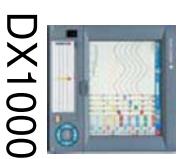
EtherNet/IP
Devices



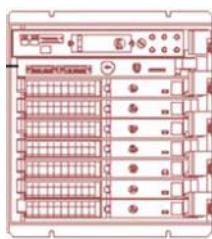
MW 100



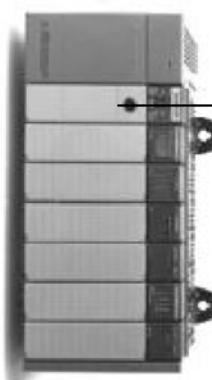
DX2000



DX1000



PLC-5



SLC-504/3/2



SLC-505

NET-ENI
serial to IP
converter

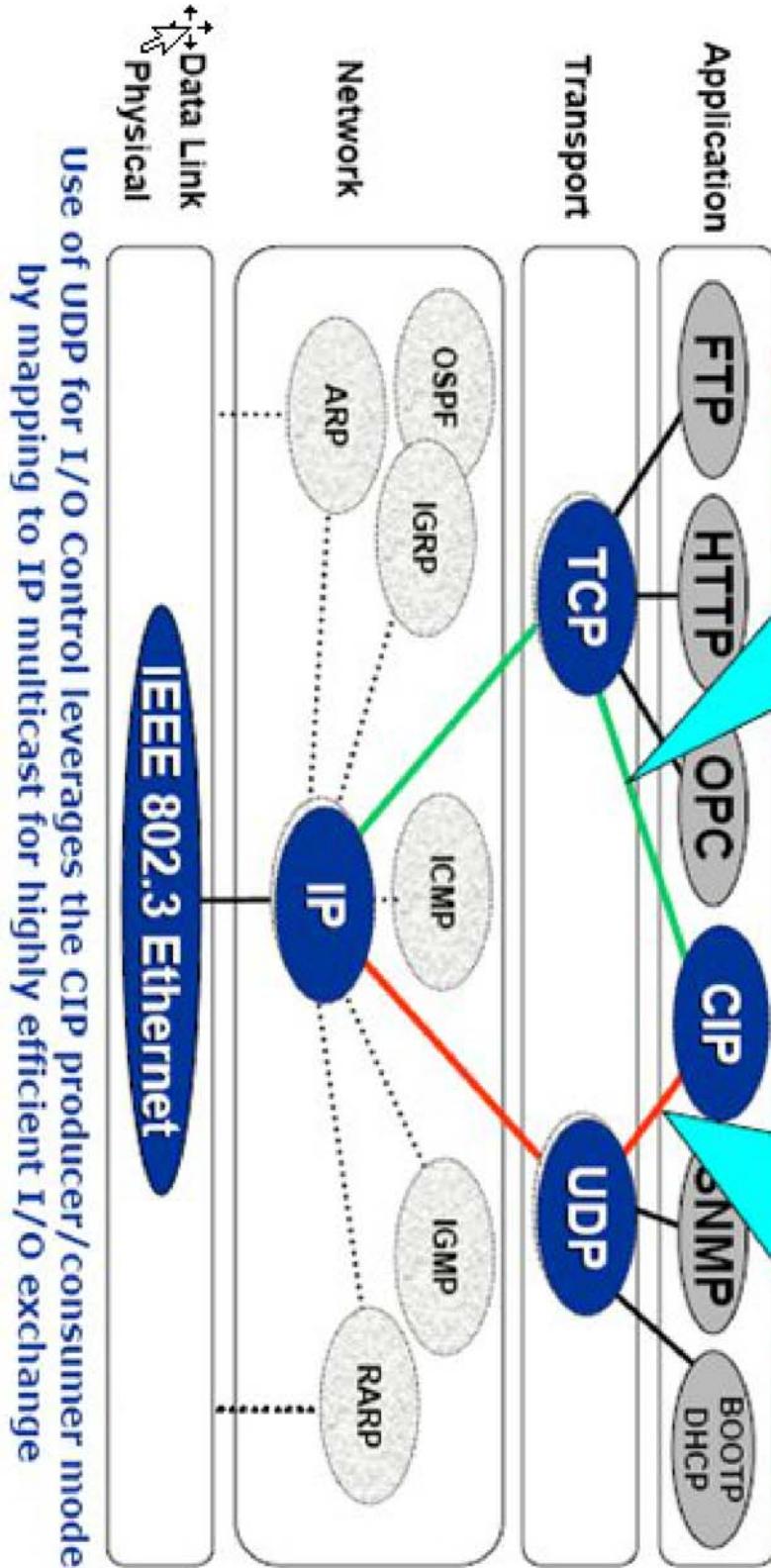


EtherNet/IP is the implementation of the Common Industrial Protocol (CIP) on Ethernet

CIP Explicit Messaging (configure, collect, diagnostics) takes advantage of the flow control and point-to-point nature of TCP

CIP Explicit Messaging

CIP Implicit (I/O) Messaging



Use of UDP for I/O Control leverages the CIP producer/consumer model by mapping to IP multicast for highly efficient I/O exchange



CIP Communications Model

CIP uses a very efficient and flexible data exchange model called the Producer/Consumer model

- ▼ Communication model introduced 10+ years ago with DeviceNet
 - Competitive offerings STILL do not have the level of efficiency seen in CIP Networks
- ▼ Provides more functionality and increases information flow
 - While reducing traffic on the wire
- ▼ A *Producer* is a sender of data
 - Producers transmit data packets on the network along with a unique identifier that indicates the packet content
- ▼ A *Consumer* is a receiver of data
 - Any interested consumers can pick data off the network by filtering the packet identifier
 - Many consumers can receive and make use of the data

Technical overview of Common Industrial Protocol (CIP™) and the family of CIP Networks
EtherNet/IP™: The Proven and Complete Solution for Manufacturing Automation
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Producer/ Consumer vs Source/ Destination

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Producer/ Consumer vs Source/ Destination

Source/Destination (dest) (point to point)

source	dest	data	crc

- Modbus Style
 - Synchronized action between nodes is very difficult as data arrives at a different time to each node
 - Wastes bandwidth as data must be sent multiple times when only the destination is different
 - Results in the need for multiple networks

Producer/Consumer (the data is identified)

identifier	data	crc

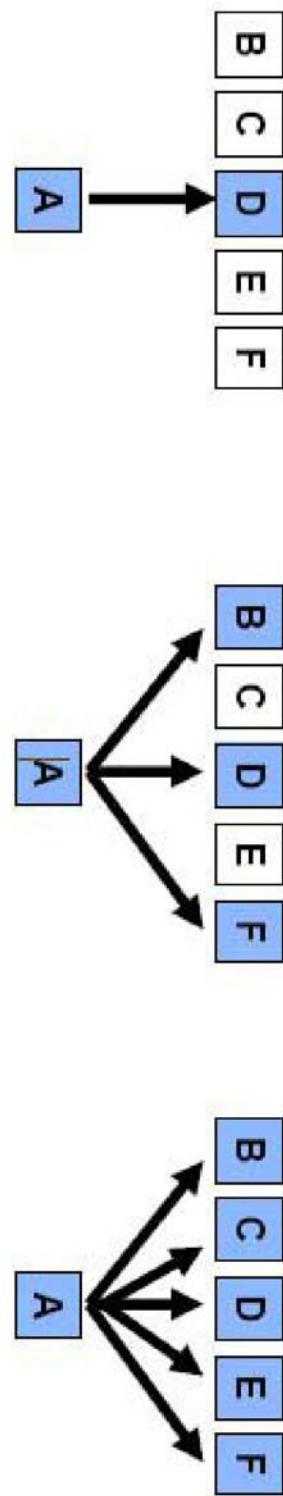
- EtherNet/ IP Style
 - Multiple nodes can consume the same data at the same time from a single producer so nodes can be synchronized
 - More efficient bandwidth usage
 - Results in higher degree of determinism and repeatability

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Review of Message Types

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Unicast:
One to one

Multicast:
One to several

Broadcast
One to all

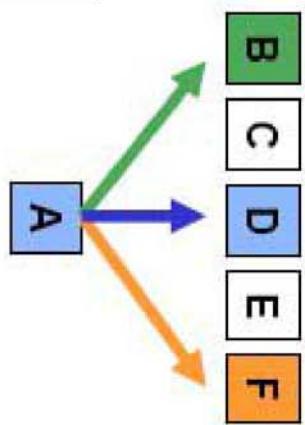
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Multicast Advantages

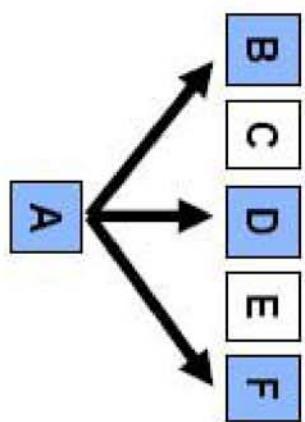
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Modbus Style



Example:
1 msg to
each of
3 devices

EtherNet/ IP Style



Unicast:
One to one

Multicast:
One to several

- Open Channel A>B
- A > Message 1 to B
- Close Channel A>B
- Open Channel A>D
- A > Message 2 to D
- Close Channel A>D
- Open Channel A>F
- A > Message 3 to F
- Close Channel A>F

- Open Channel A>B
- Open Channel A>D
- Open Channel A>F
- A > Message 1 to B
- A > Message 2 to D
- A > Message 3 to F

Time Savings

CIP Advantages/ Features

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CIP Features/Advantages

Efficiency and flexibility

- CIP model provides for efficient data exchange and since it exists on different mediums, there's a wide array of choices

Future Ready

- CIP is an extensible architecture that won't lock customers or developers into an antiquated system

Open Standards

- No single supplier dependencies
- Anyone can build products using CIP

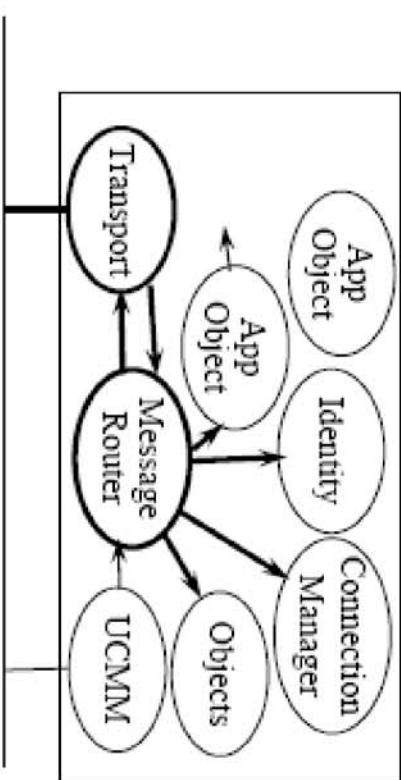
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Traditional method for PLC5, SLC500 and MicroLogix

Explicit Messages are used for point to point, client-server type transactions

- ▼ The Server side is bound to the Message Router object
 - Has access to all internal resources
- ▼ The Client side is bound to a client application object
 - Has a need to generate requests to the server
- ▼ Uses an explicit messaging protocol in the data portion of the message packet
- ▼ Connected or Unconnected
 - As previously discussed



⇒ Newer method for ControlLogix and CompactLogix

Implicit Messages transfer application specific I/O data

- ▼ The data source/destination is an application object (e.g. Assembly object)
- ▼ There is no protocol in the message data - it's all I/O data
 - It uses a dynamically chosen ID number to identify the data
 - The data format is specified in the Device Profile and can be described in an Electronic Data Sheet (EDS)
- ▼ Data transfer is more efficient because the meaning of the data is known ahead of time
- ▼ Transfer is initiated on a time basis (Cyclic Trigger) or on a value change basis (Change of State)
- ▼ Connection timing mechanism to alert application that the other side has stopped communicating
- ▼ Only connected - there is no unconnected implicit messaging

Implicit vs. Explicit

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Implicit messaging

- ▼ Real-time I/O data
- ▼ Functional safety data
- ▼ Motion control data

Explicit messaging

- ▼ Configuration
- ▼ Diagnostics
- ▼ Data collection



EtherNet/IP is CIP on Ethernet

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Network Adaptations of CIP

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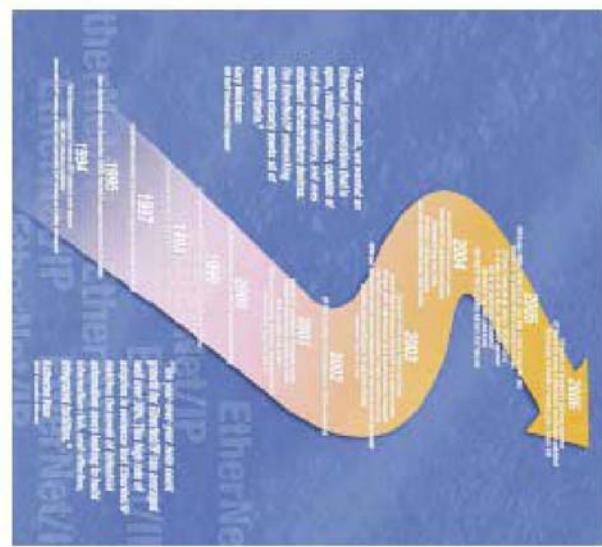
EtherNet/IP Key Differentiators



Why EtherNet/IP?

EtherNet/IP - Key Differentiators

- ▶ Standard
- ▶ Established
- ▶ Future-Proof
- ▶ Supported



The value of EtherNet/IP
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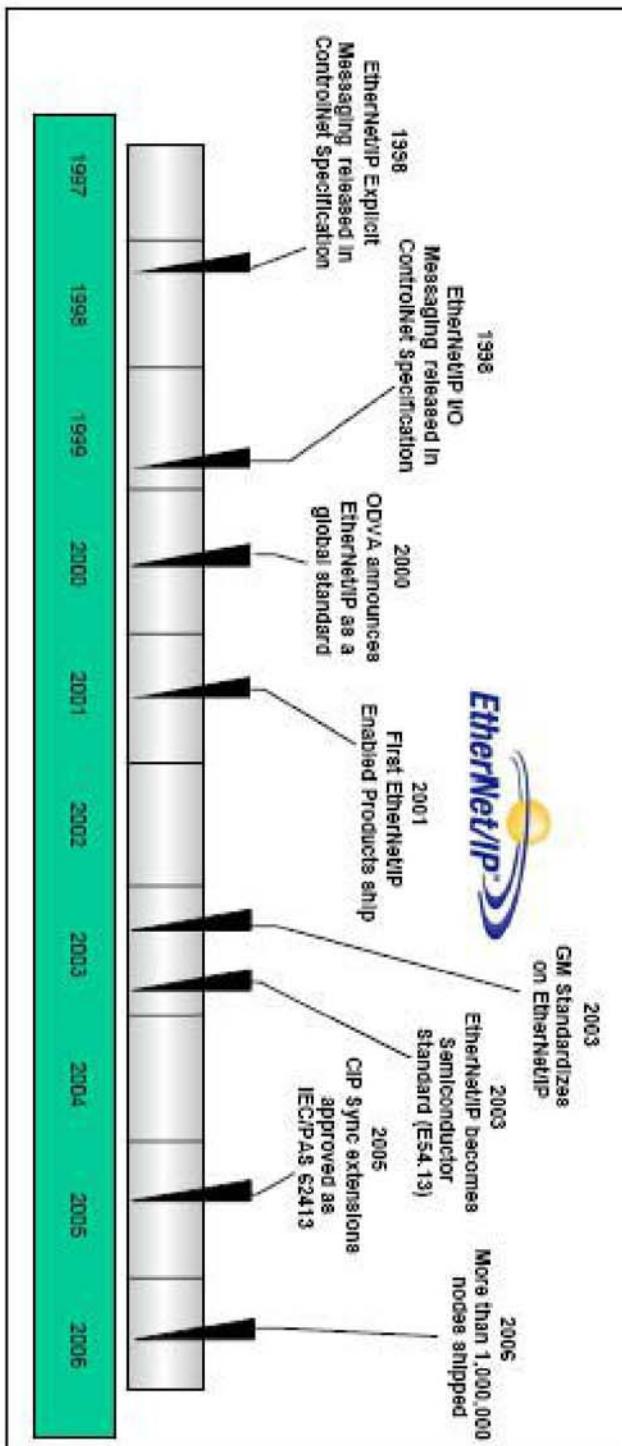
 Standard

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EtherNet/IP Timeline

Ethernet first used in industrial applications in the 1990s... EtherNet/IP is the first open standard to add real-time I/O capability



...More than 1,000,000 EtherNet/IP nodes shipped



EtherNet/IP is Future-Proof

Because EtherNet/IP is unmodified standard Ethernet, it can easily keep pace with the Continuously evolving Ethernet and Internet technologies

Most “modified-standards” industrial Ethernet networks are specified using 100Mbps wired Ethernet technology (today’s Ethernet)

Why is this important??

Let's look at what happens in 10 years!



EtherNet/IP Conformance Testing

Conformance testing is required for products that claim to be EtherNet/IP-compliant

Purpose:

- ▼ Provide vendor-independent **Quality Assurance** to industry that products and systems incorporating CIP technology comply with the CIP Network specifications
- ▼ Improve **Customer Satisfaction** with CIP technologies by verifying that devices will interoperate in multi-vendor installations
- ▼ Continue **Growth of ODVA** and solidify the value proposition for ODVA membership

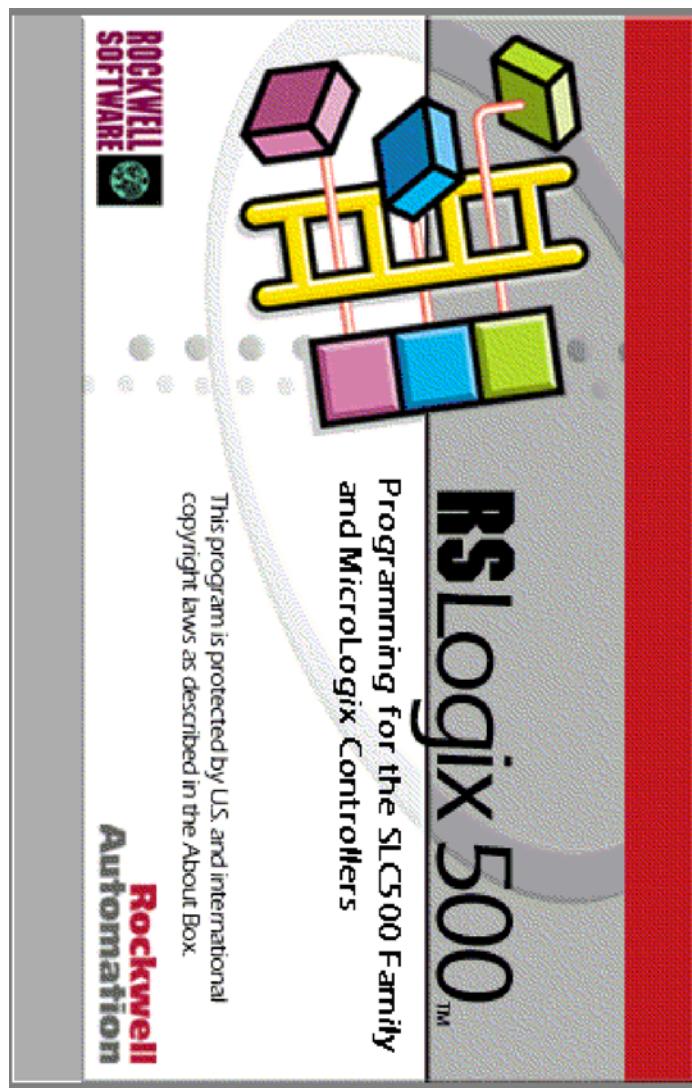
One More Thing, EDS Files (Electronic Data Sheets)

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Enough on the Technology, Lets Program!

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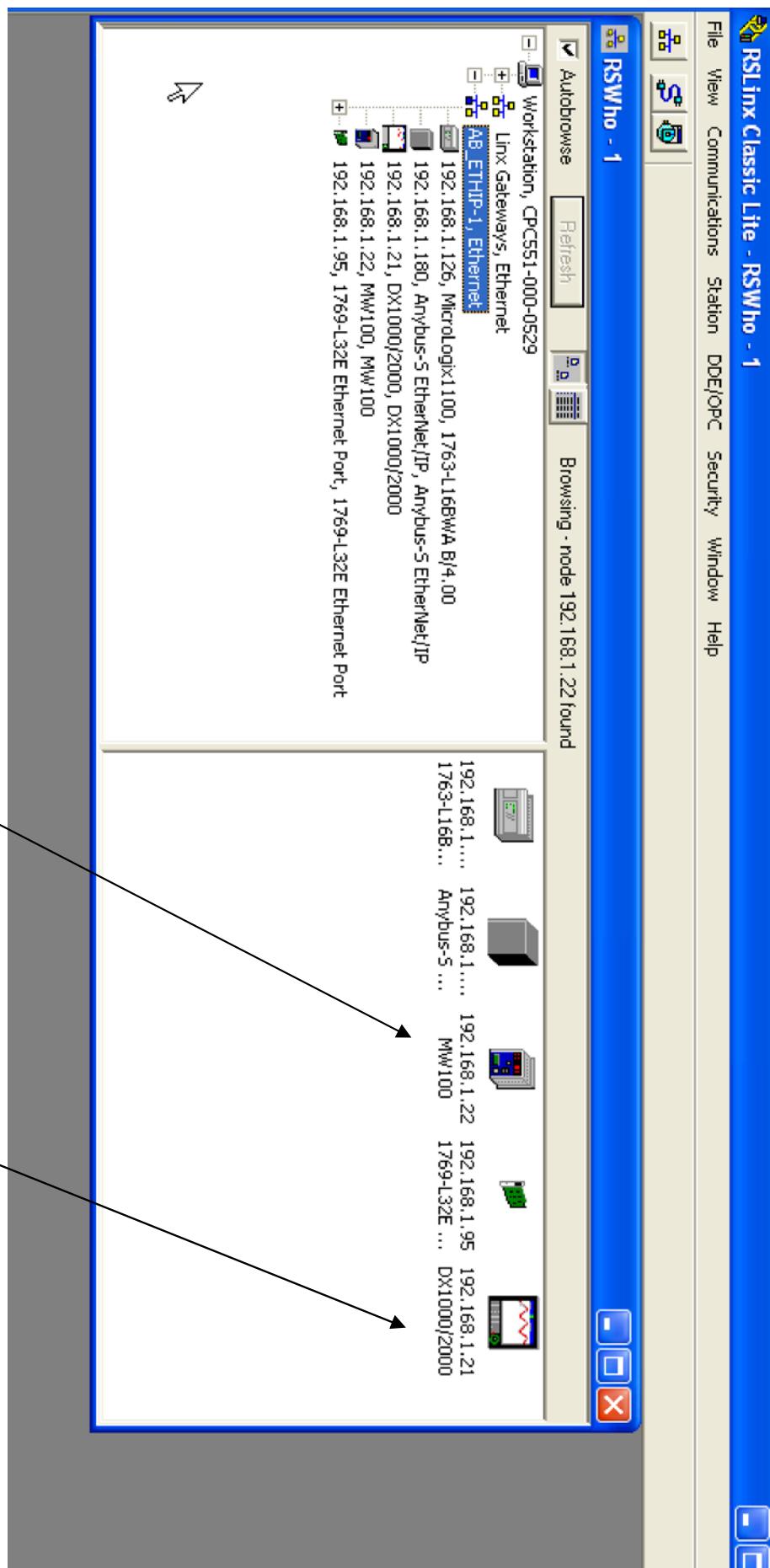


This program is protected by U.S. and international
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Getting Ready to Program: RSLinx Software

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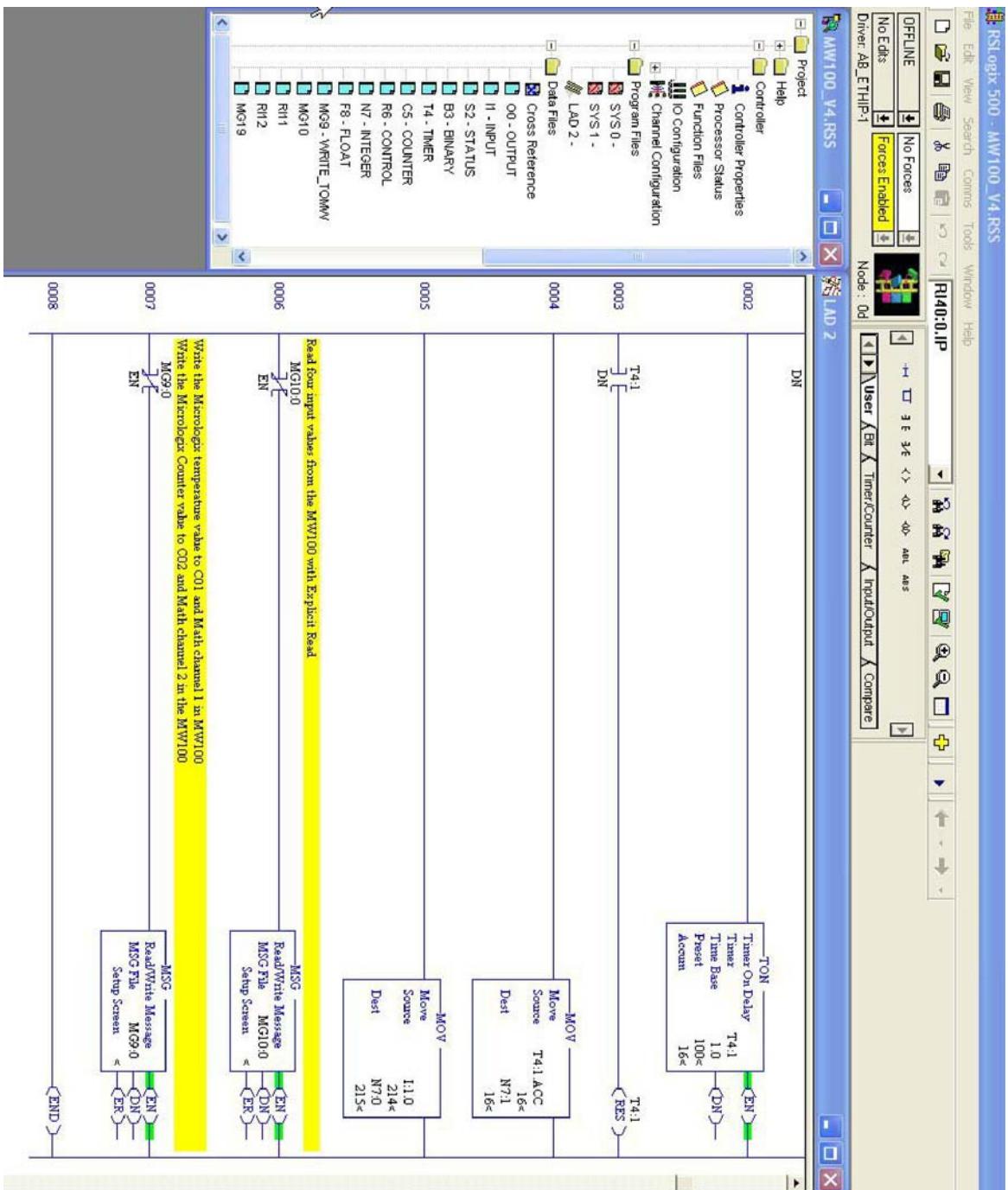
RSLinx is the background communications for RSLogix



RSLinx 500 for PLC5, SLC500 and MicroLogix

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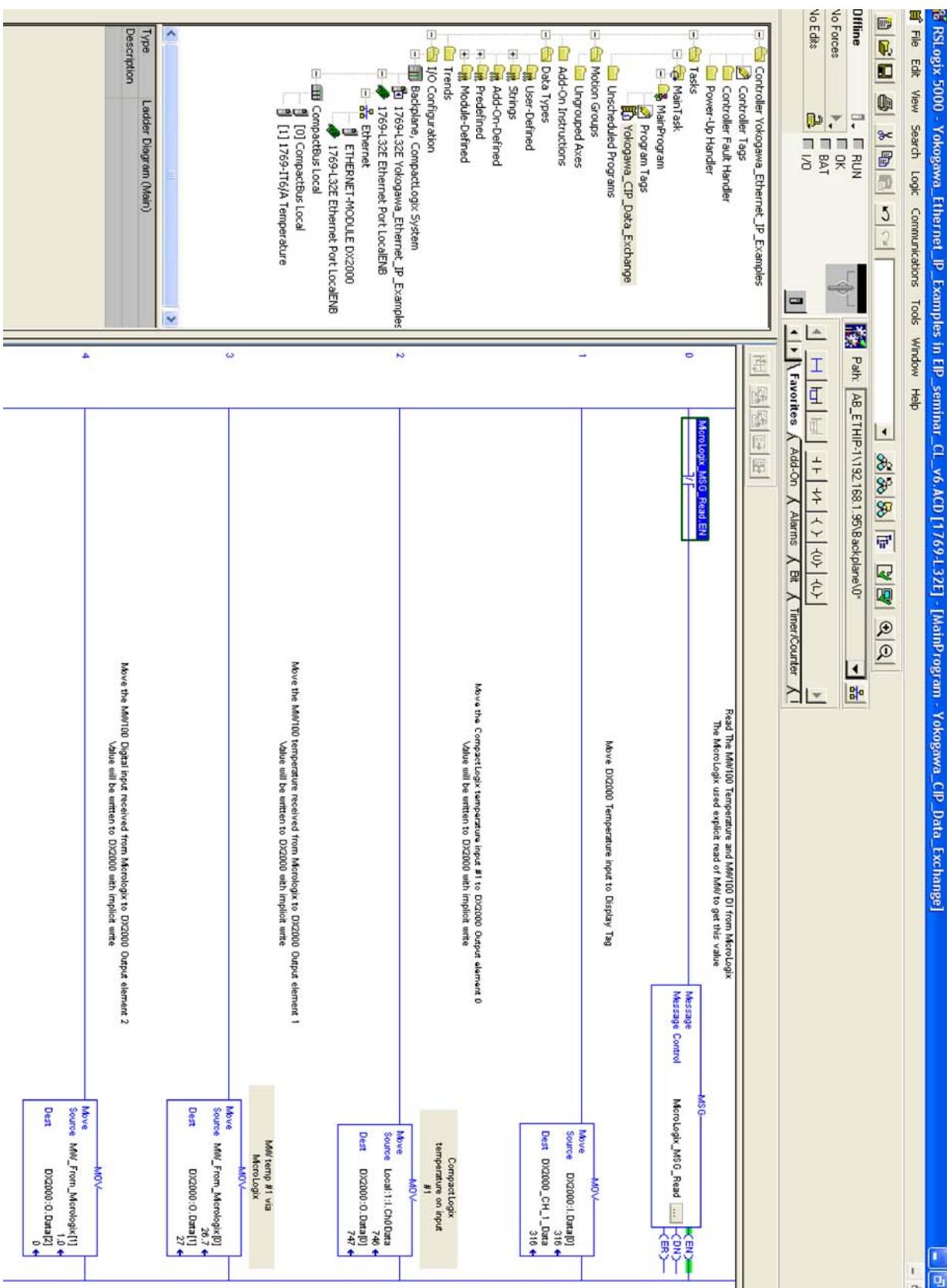


Show Live Example of RSLinx500

→ RSLinx 5000 for CompactLogix and ControlLogix

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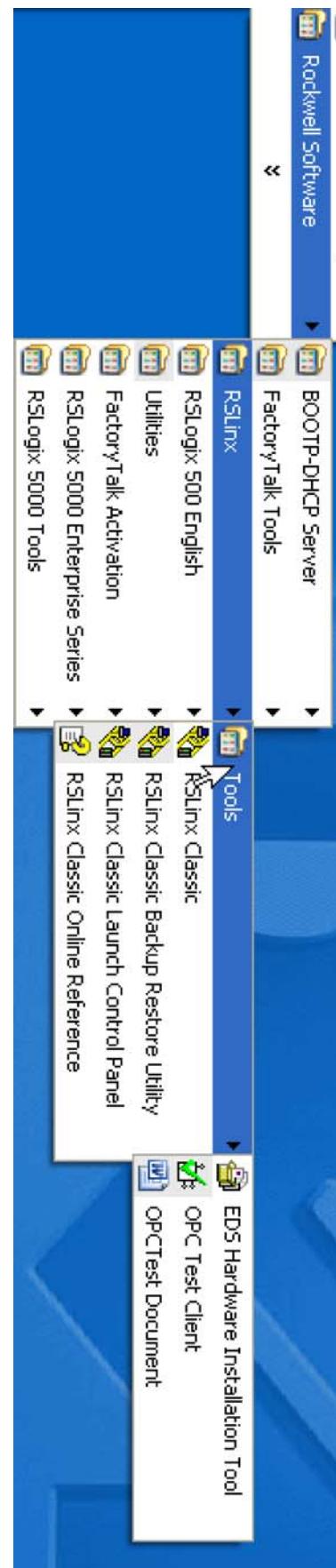
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EDS Wizard (In RSLinx Tools)

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Rockwell Software's EDS Wizard

Registration

Electronic Data Sheet file(s) will be added to your system for use in Rockwell Software applications.



Register a single file

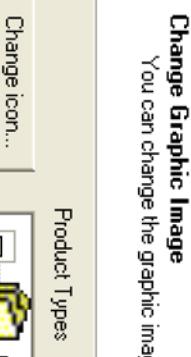
Register a directory of EDS files

Look in subfolders

Named:

C:\Hardware\Yokogawa\EDS Files\DXA.eds

[Browse...](#)



Product Types



Generic Device



DX1000/2000

Rockwell Software's EDS Wizard

Change Graphic Image

You can change the graphic image that is associated with a device.



- i** * If there is an icon file (.ico) with the same name as the file(s) you are registering then this image will be associated with the device.

To perform an installation test on the file(s), click Next



[Next >](#)

[Cancel](#)

- ⇒ **MW100/DXAdvanced** look like Allen-Bradley devices
- ⇒ All MW100 data is preformatted in A-B structures
- ⇒ **Programming is done on A-B side**
 - No Ethernet IP configuration required in MW100
- ⇒ **Full Read/Write data between A-B & MW100/DX2000/DX1000**
- ⇒ **Explicit messaging supported**
 - Flexible method using ladder logic
 - Supports MSG commands for all current A-B models
- ⇒ **Implicit messaging supported**
 - Requires no ladder logic
 - Happens “automatically”
- ⇒ **Serial to Ethernet interface modules available**
 - Use for SLC-500 and PLC5
 - A-B 1761 NET-ENI or Digi One IAP

Quick Start Guide Has Full Setup and Configuration Examples

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Manual Has Instructions for Each PLC Type

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MicroLogix 1100

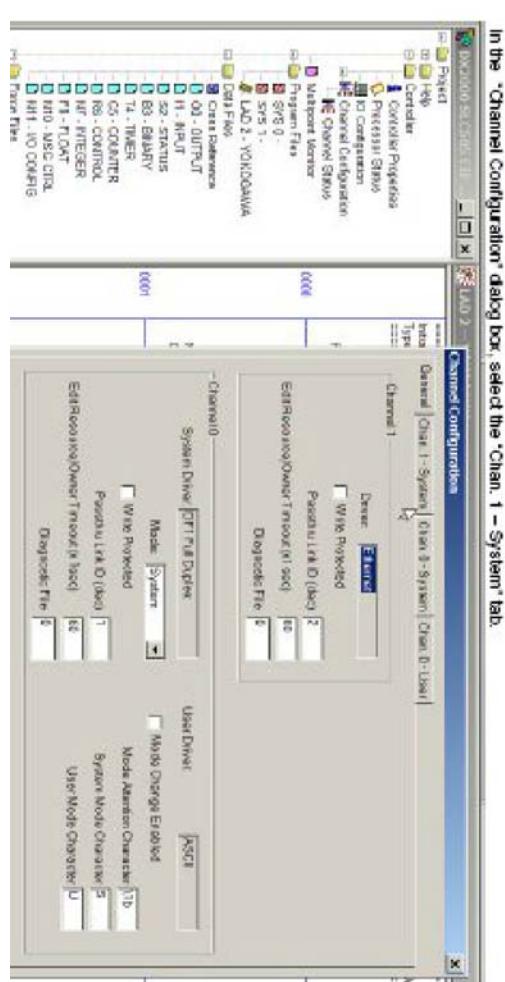
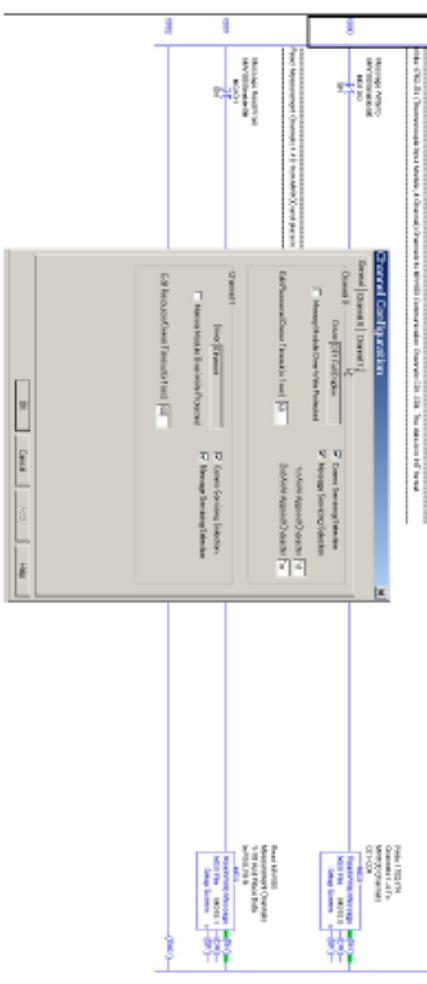
In this example, the system consists of a 1763 MicroLogix 1100, Series A processor and a 1762-IT4 Thermocouple Input Module residing in the first expansion slot. The MicroLogix 1100's IP address is 192.168.1.101. The 1762-IT4 module's four input channels are sent to the MV100's Measurement Channels C01 thru C04. The 1762-IT4's channels are configured for "Engineering Units" which will result in an integer value with an implied decimal point (i.e. 66.8 = .668). The MV100's Measurement Channels C01 thru 010 are being read and stored in 10 words starting with F10:0.

Data File "IM310" has been created for Message Files. "Data File R11" has been created for storing Message Routing Information.

Configuration of Channel 1
On the Project Tree, under the "Controller" folder, double-click on "Channel Configuration" (or right click and select "Open").



When the "Channel Configuration" dialog box opens, click on the "Channel 1" tab.



In the "Channel Configuration" dialog box, select the "Chan. 1 - System" tab.

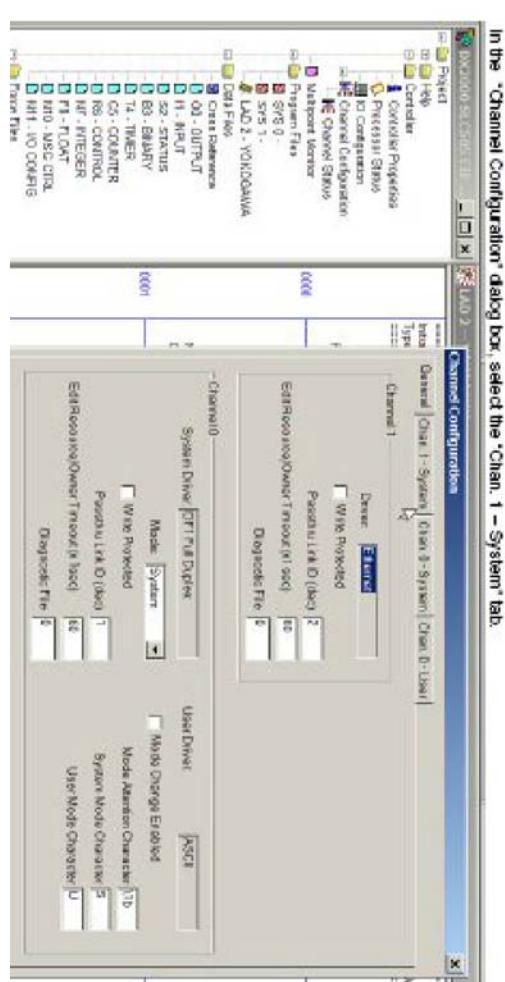
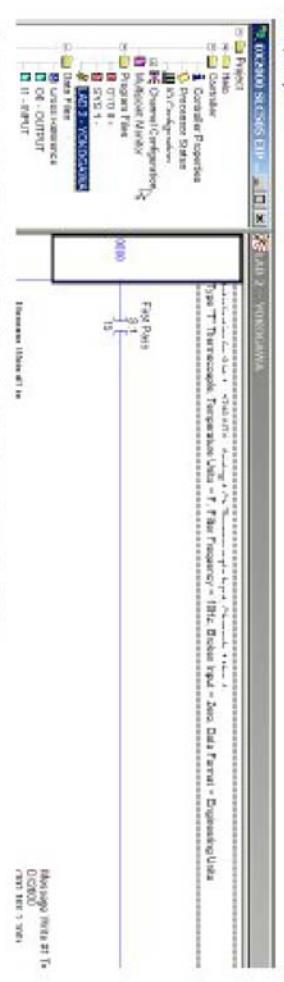
Explicit Messaging Examples

SLC 5/05

In this example, the system consists of a 1747-L51C (505CPU – 16K Mem., OS501 Series C FRN 10 and Later) processor and a 1746-NI4 Thermocouple Input module residing in slot #1. The SLC 5/05's IP address is 192.168.1.95. The 1746-NI4's channels are configured for "Engineering Units" which will result in an integer value with an implied decimal point (i.e. 66.8 = .668). The DX Advanced Measurement Channels C01 thru C04. The 1746-NI4's channels are configured for "Engineering Units" which will result in an integer value with an implied decimal point (i.e. 66.8 = .668). The DX Advanced Measurement Channels C01 thru 010 are being read and stored in 10 words starting with F10:0.

Data File "NI0:0" has been created for Message Instruction Control Block Data. "NI1" contain I/O Configuration Data.

Configuration of Channel 1
On the Project Tree, under the "Controller" folder, double-click on "Channel Configuration" (or right click and select "Open").



Data Mapping in MW and DXA for Explicit Messaging

□ Computation Channel (A001 to A300, max. 300 ch)

Ch.	PLC2	PLC5 / SLC	CIP int	CIP dint	CIP real
A001	2000	N,D,F20:0	int [2000]	dint [2000]	real [2000]
:	:	:	:	:	:
A300	2299	N,D,F22:99	int [2299]	dint [2299]	real [2299]

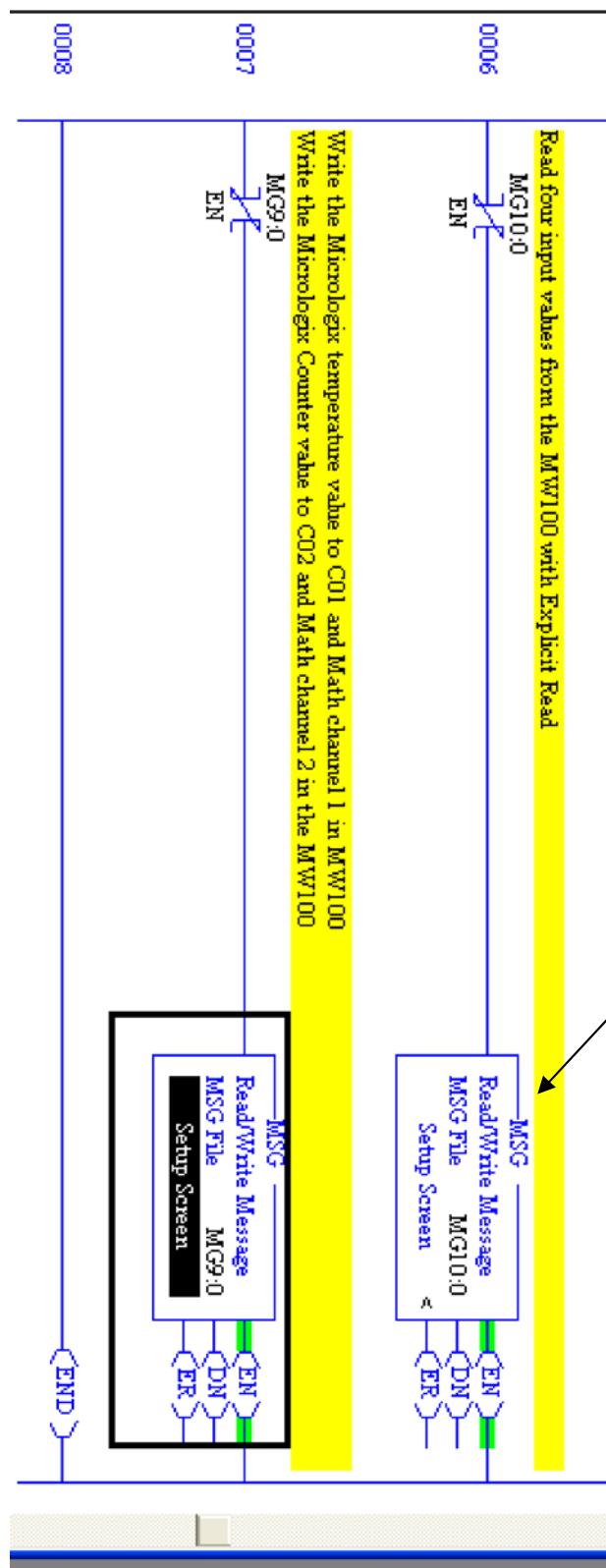
□ Communication Channel (C001 to C300, max. 300 ch)

Ch.	PLC2	PLC5 / SLC	CIP int	CIP dint	CIP real
C001	3000	N,D,F30:00	int [3000]	dint [3000]	real [3000]
:	:	:	:	:	:
C300	3299	N,D,F32:99	int [2299]	dint [3299]	real [3299]

Explicit Read/Write to MW100 (Ladder Logic)

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Uses MSG command

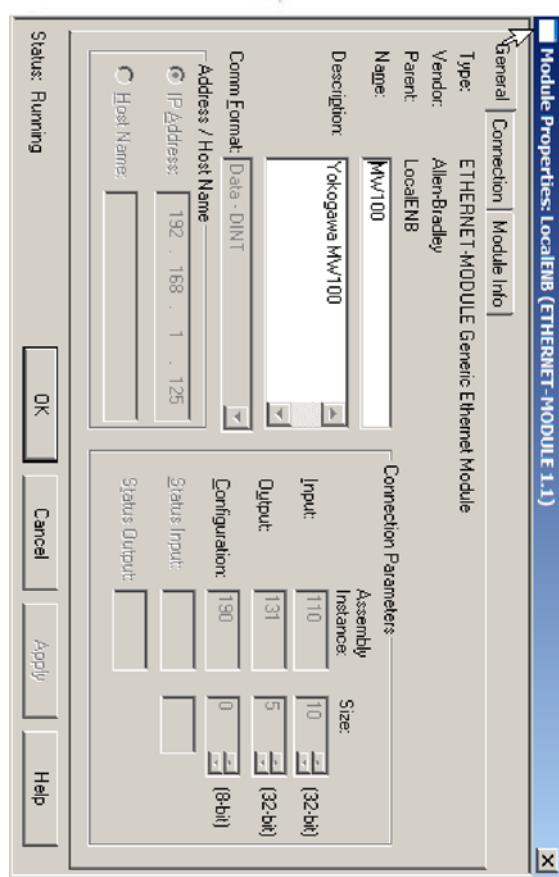


Implicit Messaging Uses Predefined “Instance ID’s”

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RS Logix 5000 screen



MW100 Implicit Message Assembly Map

Data Flow in our System

Micrologix
M1100
192.168.1.126

Compactlogix
192.168.1.95

1



2



3



Explicit Read
From MW to PLC

Ch 1 T/C
Ch 2 DI

Explicit Write
From PLC to MW

MW Temp
MW DI
MicroLogix Temp

Implicit Read
From DX2000 to PLC

Ch 1 T/C

MW100 T/C
MW100 DI
compactLogix T/C

PLC T/C to
Math channel 1

PLC counter to
Math channel 2

DX2000
192.168.1.21

MW100
192.168.1.22

1. Read/ Write data between MW100 and MicroLogix
2. Read data from MicroLogix to CompactLogix
3. Read/ Write data between CompactLogix and DX2000

Concepts for Data Flow in our System

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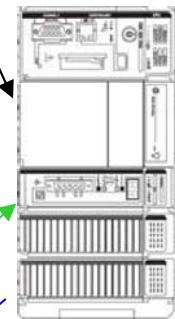
Micrologix
M1100
192.168.1.126

Compactlogix
192.168.1.95



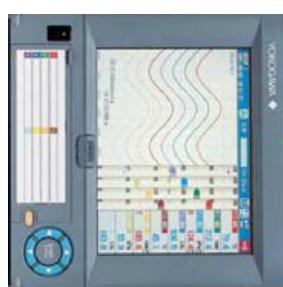
2

System has a
“master” PLC



3

DX2000
192.168.1.21



MW100
192.168.1.22



**MW100 is analog input
Extension for A-B PLC's**

**DX2000 is a secure
non PC data archive and
Viewing station for
A-B network data**

- ...
 - **MW100 data elements that MicroLogix will read**

- T/C on input #1
- DI on input #2

- ...
 - **MW100 data elements that MicroLogix will write**

- Math #1 will be T/C in MicroLogix (via comm channel C01)
- Math #2 will be counter in MicroLogix (via comm channel C02)

- ...
 - **MicroLogix has a T/C as input #1**

Quick Tour of MicroLogix Configuration

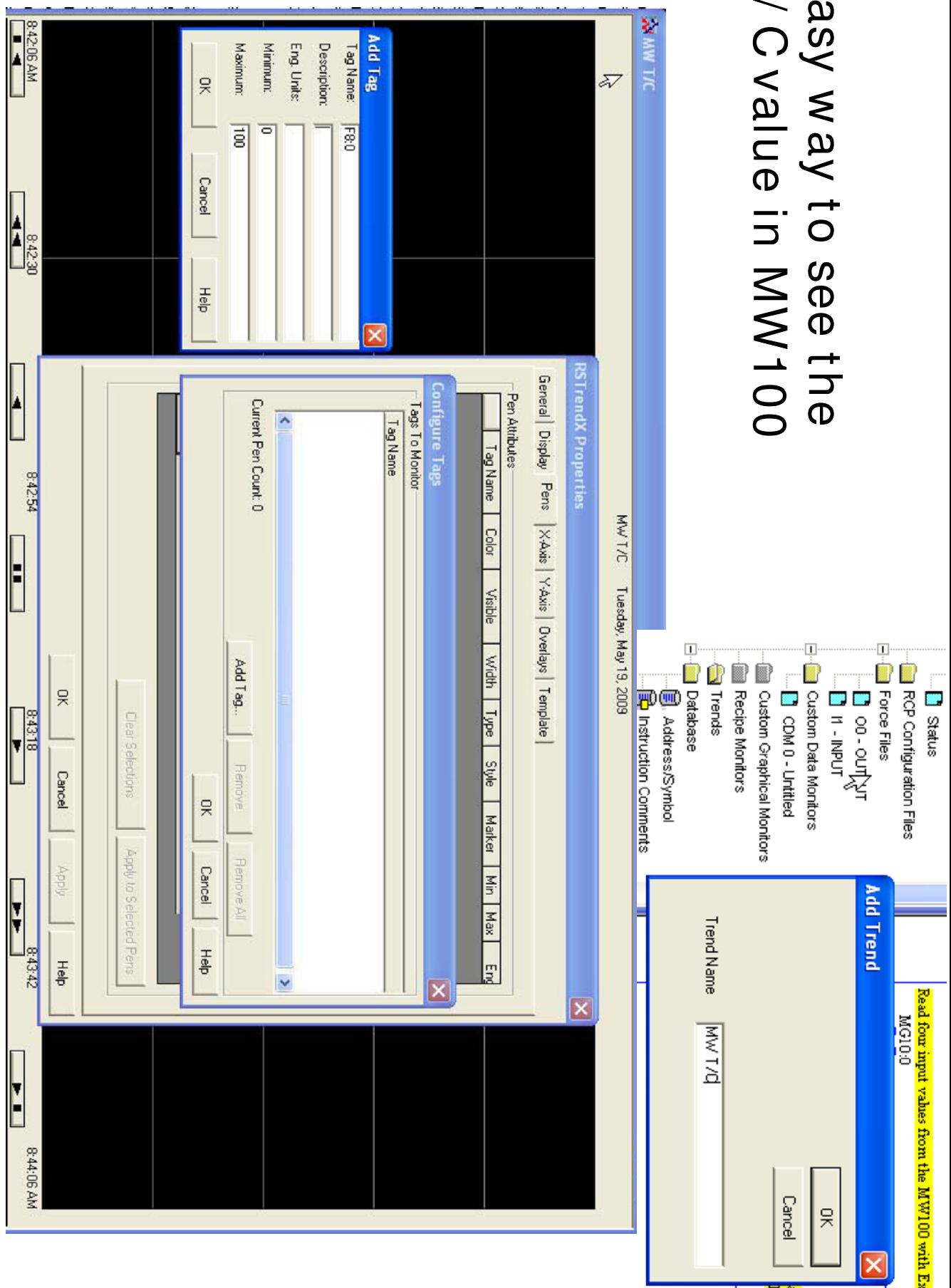
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- ⇒ MW and MicroLogix must be online
- ⇒ Open RSLogix to show that MW and DXA are live as EIP devices
- ⇒ Go to MW100 and show that ML T/C and counter are working
- ⇒ Open RSLogix500 and load program from file (or upload)
- ⇒ Add a trend to RSLogix500
- ⇒ Show MW T/C working in trend
- ⇒ Explain rungs 0-3 are the counter
- ⇒ Rung 4 moves counter to N7:1 so it is ready to go to MW
- ⇒ Rung 5 moves ML T/C to N7:0 so it is ready to go to MW
- ⇒ Rung 6 is read four channels of MW100
- ⇒ Rung 7 is write T/C and counter to MW100

Setting Up Trend in RSLogix 500

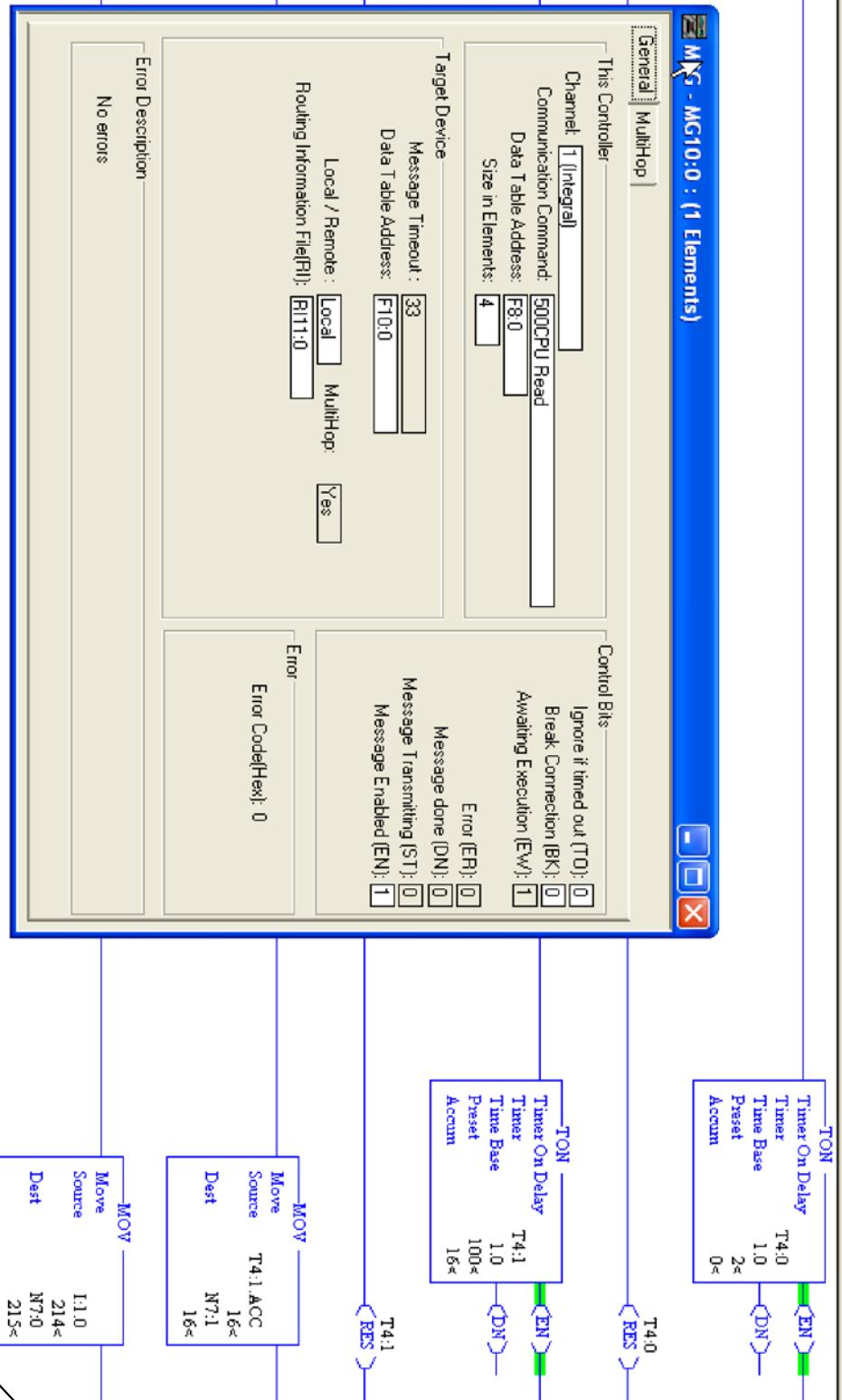
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Easy way to see the
T/C value in MW100



Looking at the Setup Screen Data on Read

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Click Here

Write four input values from the MW100 with Explicit Read

MG10.0 EN

Write the Micrologix temperature value to C01 and Math channel 1 in MW100

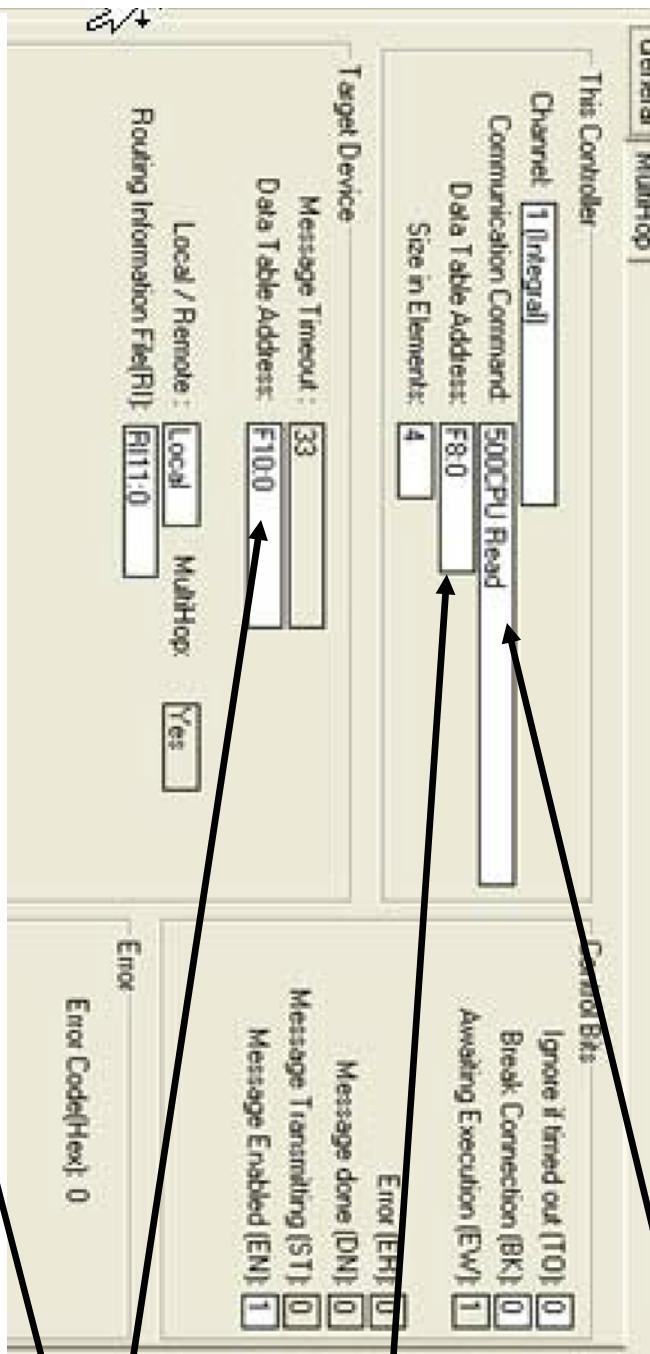
Write the Micrologix Counter value to C02 and Math channel 2 in the MW100

MW100

Parameters for Reading Data



Select command



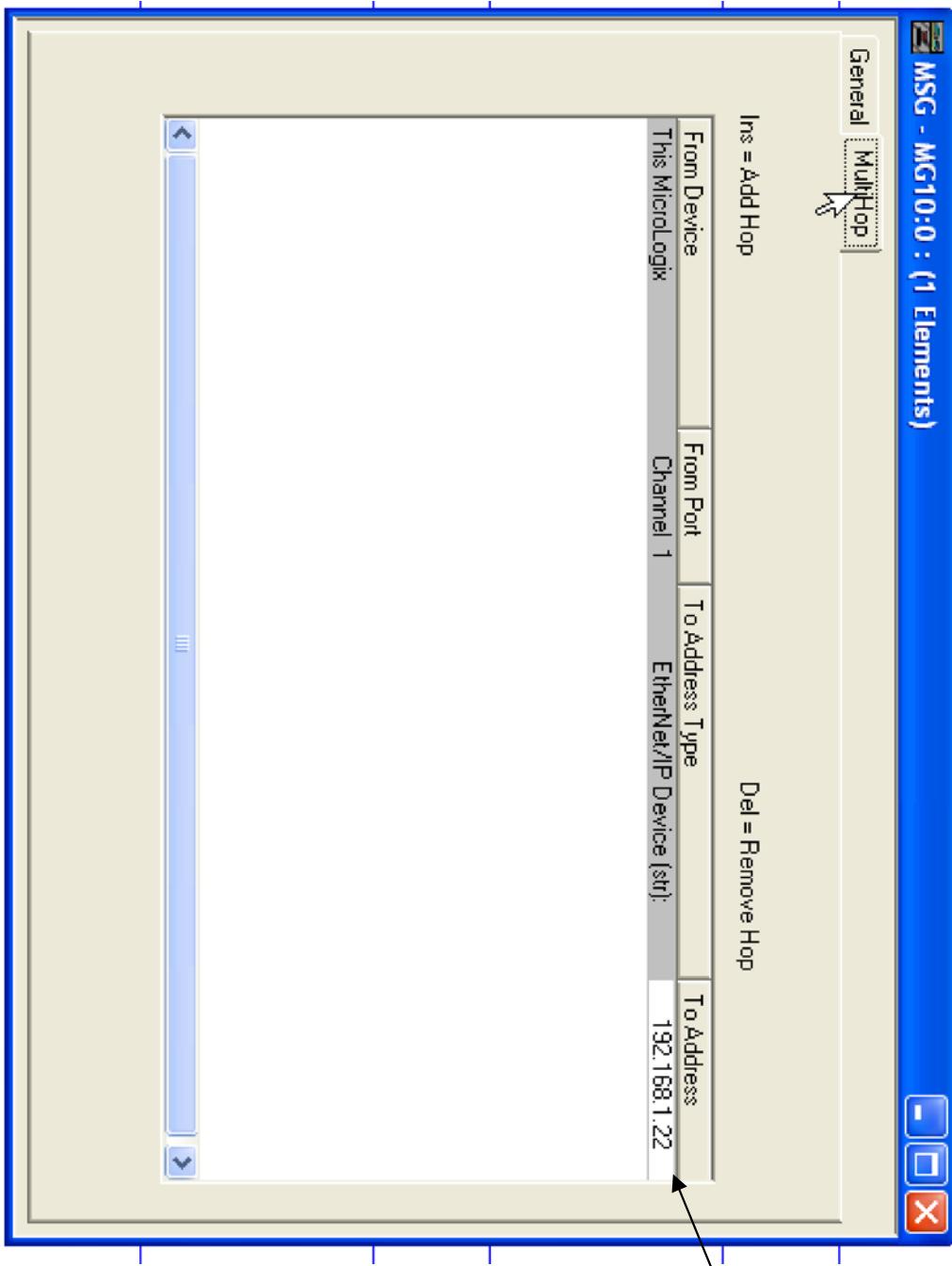
Put incoming data
In float table

Read from MW100
ch 1 and ch2

□ I/O Channel (001 to 060, max. 60 ch)

Ch.	PLC2	PLC5 / SLC	CIP int	CIP dint	CIP real
001	1000	N,D,F10:0	int [1000]	dint [1000]	real [1000]
:	:	:	:	:	:
060	1060	N,D,F10:60	int [1060]	dint [1060]	real [1060]

Setup the Multihop



IP address
Of MW

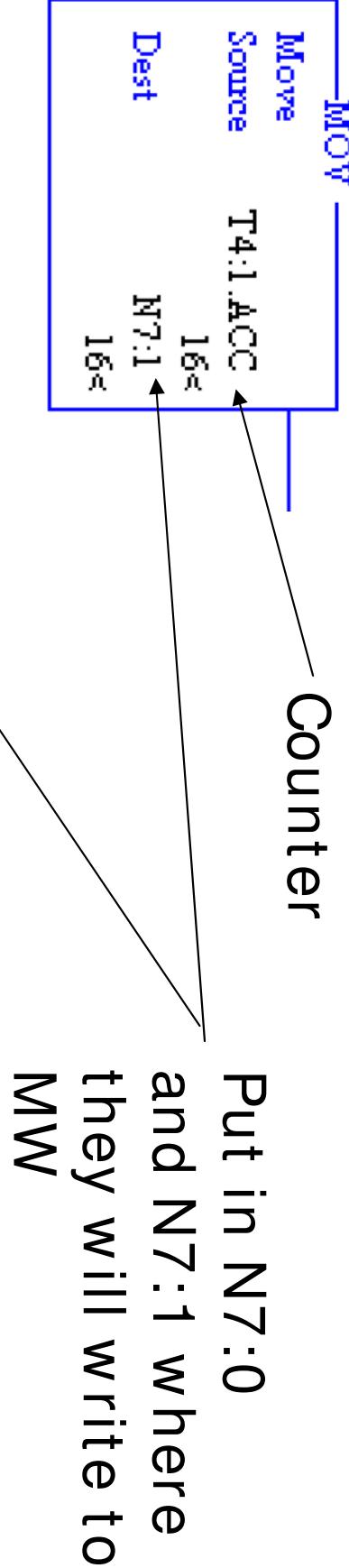
Logic for Counter

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Get the T/C and Counter Values Ready to Write

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Setup the Parameters for Write to MW

MSG - MG9:0 : (1 Elements)

General MultiHop

This Controller

Channel: **1 [Integral]**

Communication Command: **500CPU White**

Data Table Address: **N7:0**

Size in Elements: **2**

Control Bits

Ignore if timed out (T0):

Break Connection (BK):

Awaiting Execution (EW): **1**

Error

Error [ER]:

Message done (DN):

Message Transmitting (ST):

Message Enabled (EN): **1**

MSG - MG9:0 : (1 Elements)

General MultiHop

This Controller

Channel: **1 [Integral]**

Communication Command: **500CPU White**

Data Table Address: **N7:0**

Size in Elements: **2**

Control Bits

Ignore if timed out (T0):

Break Connection (BK):

Awaiting Execution (EW): **1**

Error

Error [ER]:

Message done (DN):

Message Transmitting (ST):

Message Enabled (EN): **1**

Select command

Put incoming data

In float table

Target Device

Message Timeout: **33**

Data Table Address: **N30:0**

Local / Remote: **Local**

Routing Information File(RI): **R112:0**

Multihop: **Yes**

Error

Error Code[Hex]: **0**

Put incoming data

In float table

Target Device

Message Timeout: **33**

Data Table Address: **N30:0**

Local / Remote: **Local**

Routing Information File(RI): **R112:0**

Multihop: **Yes**

Error

Error Code[Hex]: **0**

□ Communication Channel (C001 to C300, max. 300 ch)

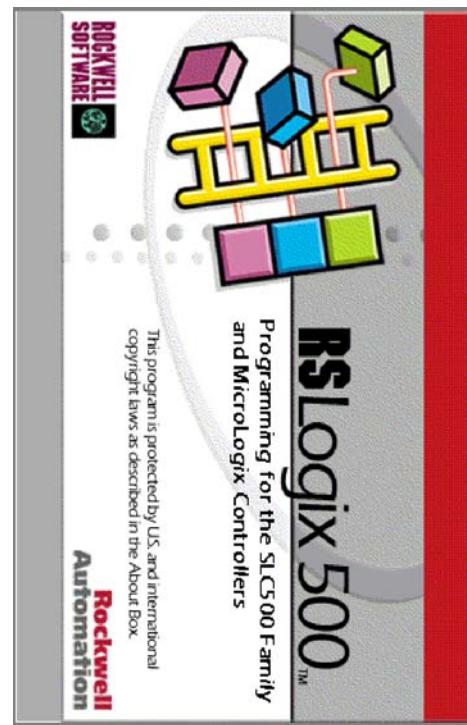
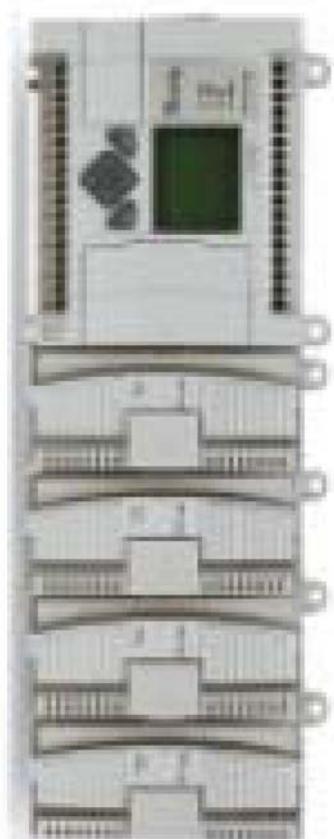
Read from MW100
ch 1 and ch2

Ch.	PLC2	PLC5 / SLC	CIP int	CIP dint	CIP real
C001	3000	N,D,F30:00	int [3000]	dint [3000]	real [3000]
:	:	:	:	:	:
C300	3299	N,D,F32:99	int [2299]	dint [3299]	real [3299]

No Configuration in the MW100 !!

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All Configuration is Done in MicroLogix with RSLogix 500



Network Area #2: CompactLogix to MicroLogix Overview

- …
 - ❖ **CompactLogix is the “master” PLC**
 - ❖ **CompactLogix collects data across the network**
 - ❖ **MicroLogix has MW100 values**
 - F8:0 is T/C from input #1
 - F8:1 is DI from input #2
 - ❖ **CompactLogix uses explicit read to get MicroLogix data**
 - Reads F8:0 and F8:1
 - ❖ **CompactLogix uses Controller Tags to hold values**
 - Incoming MicroLogix data goes into MW_From_MicroLogix

Ladder Logic in CompactLogix CPU

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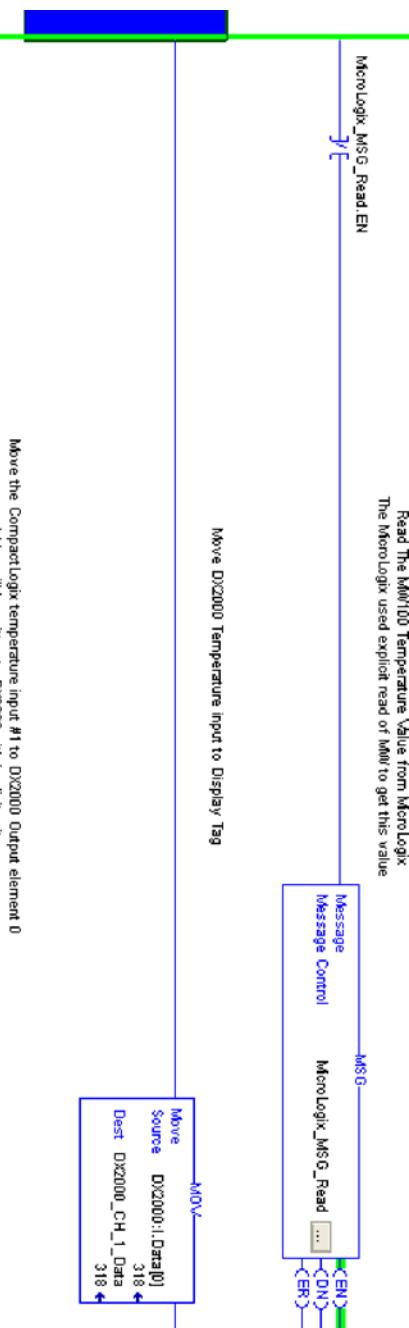


Five rungs to:

- Read MicroLogix

- Read DX2000

- Write DX2000

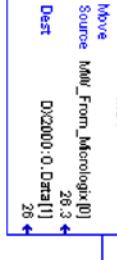


Move the M0100 temperature received from MicroLogix to DX2000 Output element 1

Value will be written to DX2000 with implicit write

M010 Temp #1 via MicroLogix

MOVL



Looking at the Incoming Data from MW100

Data Tag

RSLogix 5000 - Yokogawa_Ethernet_IP_Examples in EIP_seminar_CL_v6.ACD [1769-L32E] - [Controller Tags - Yokogawa_Ethernet_IP_Examples(controller)]

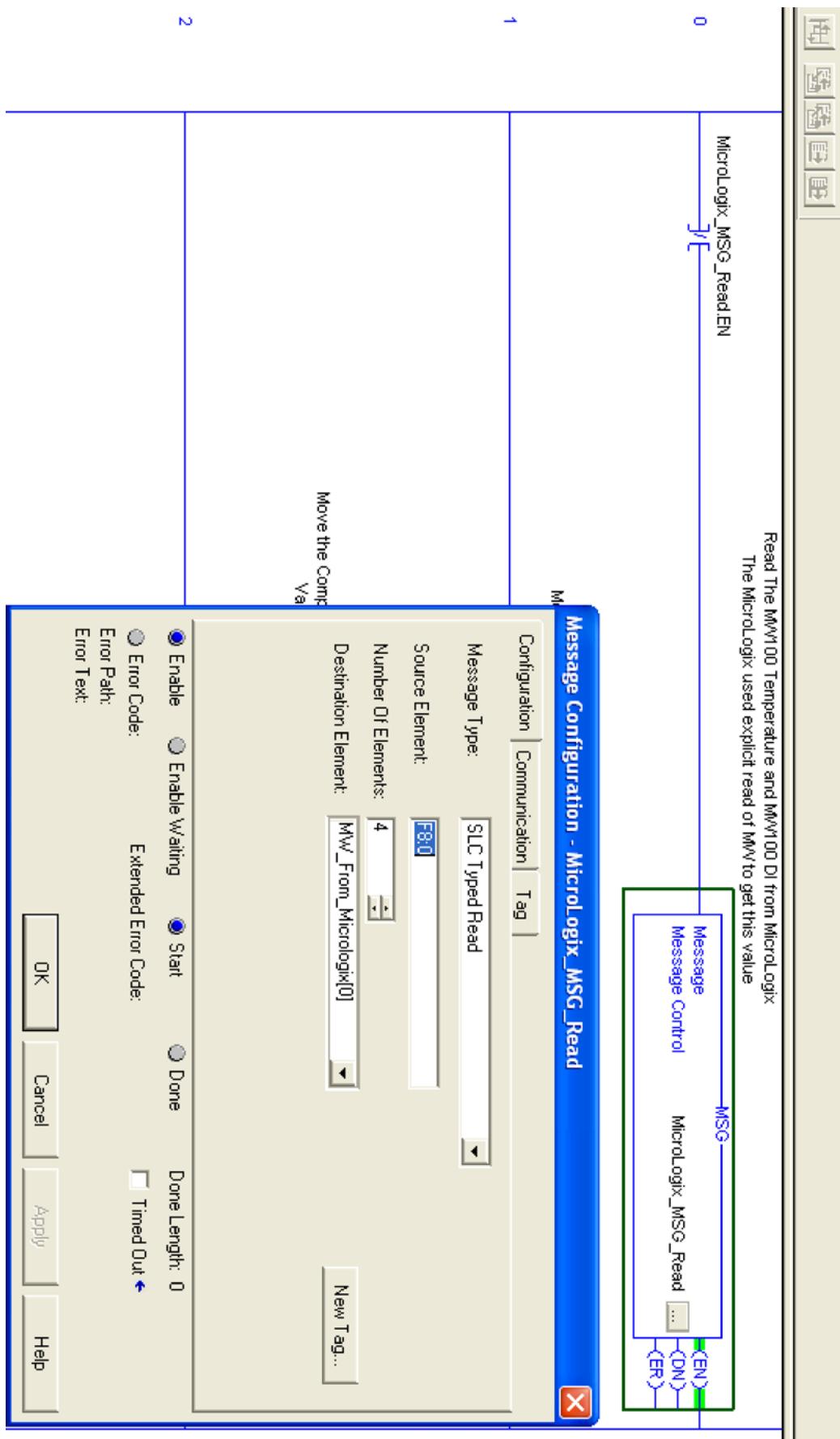
File Edit View Search Logic Communications Tools Window Help

Path: AB_EthernetP1K192.168.1.35\Backplane\0\

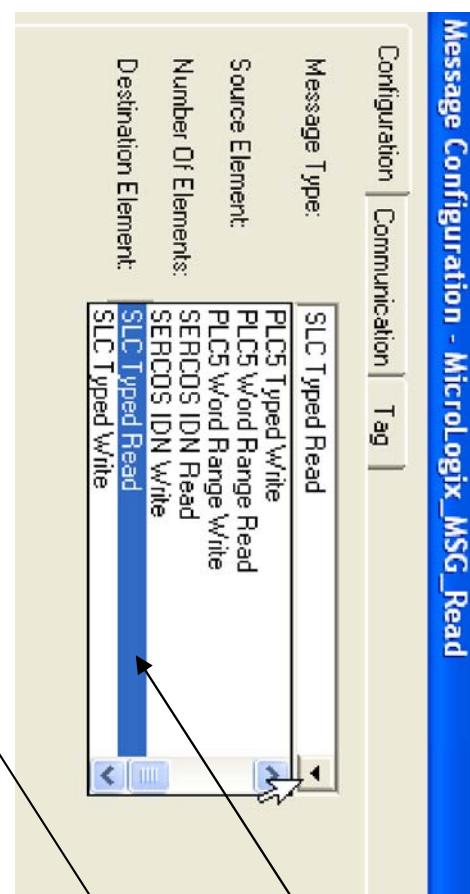
Name	Value	Force Mask	Style	Data Type	Description
+ count_1	(...)	(...)	(...)	COUNTER	AB:ETHERNET...
+ DX2000:C	(...)	(...)	(...)	AB:ETHERNET...	AB:ETHERNET...
+ DX2000:I	(...)	(...)	(...)	AB:ETHERNET...	AB:ETHERNET...
+ DX2000:D	(...)	(...)	(...)	AB:ETHERNET...	AB:ETHERNET...
+ DX2000:U	0	Decimal	DINT		
+ Local1:C	(...)	(...)	(...)	AB:1769_1T6C0	AB:1769_1T6C0
+ Local1:I	(...)	(...)	(...)	AB:1769_1T6I0	AB:1769_1T6I0
+ Micrologix.MSG_Read	(...)	(...)	(...)	MESSAGE	
= MW_From_Micrologix	(...)	(...)	(...)	REAL[4]	Read F8.0 in Micrologix which has MW100 inputs
MW_From_Micrologix[0]	26.7	Float	REAL	REAL	Read F8.0 in Micrologix which has MW100 inputs
MW_From_Micrologix[1]	1.0	Float	REAL	REAL	Read F8.0 in Micrologix which has MW100 inputs
MW_From_Micrologix[2]	-0.001	Float	REAL	REAL	Read F8.0 in Micrologix which has MW100 inputs
MW_From_Micrologix[3]	0.0	Float	REAL	REAL	Read F8.0 in Micrologix which has MW100 inputs
Test_Real_1	13433.297	Float	REAL	REAL	

Incoming data from MW100

Setting Up Explicit Read in CompactLogix



Explicit Read Parameter Details



Select SLC Typed Read

Where is data in MicroLogix

Message Configuration - MicroLogix_MSG_Read

Configuration | Communication | Tag |

Message Type: SLC Typed Read

Source Element: F8:0

Number Of Elements: 4

Destination Element: MW_From_Micrologix[0]

New Tag...

Name	Data Type	Description
MW_From_Micrologix[0]	REAL[4]	Read F8:0 in...
MW_From_Micrologix[1]	REAL	Read F8:0 in...
MW_From_Micrologix[2]	REAL	Read F8:0 in...
MW_From_Micrologix[3]	REAL	Read F8:0 in...

Enable Enable

Error Code:
Error Path:
Error Text:

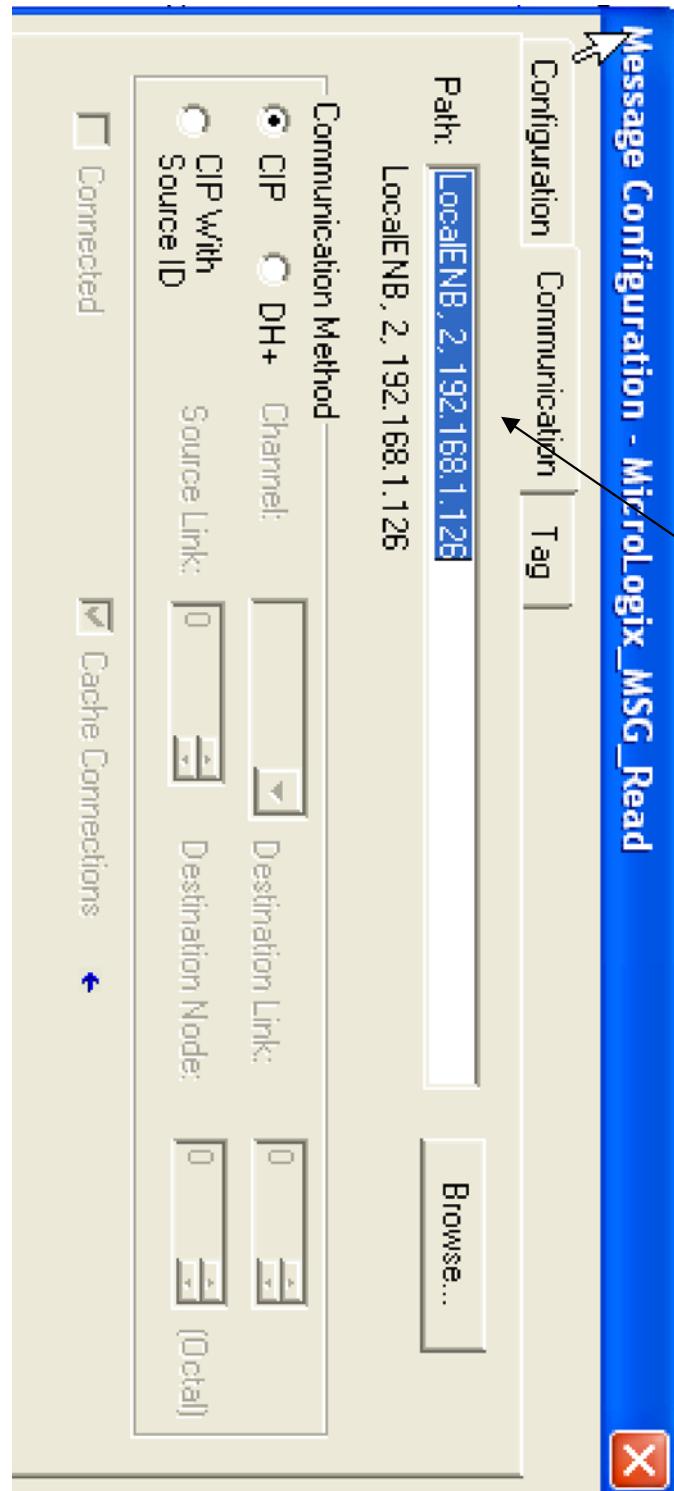
Controller Program

Number of items

Destination in
Compact Logix

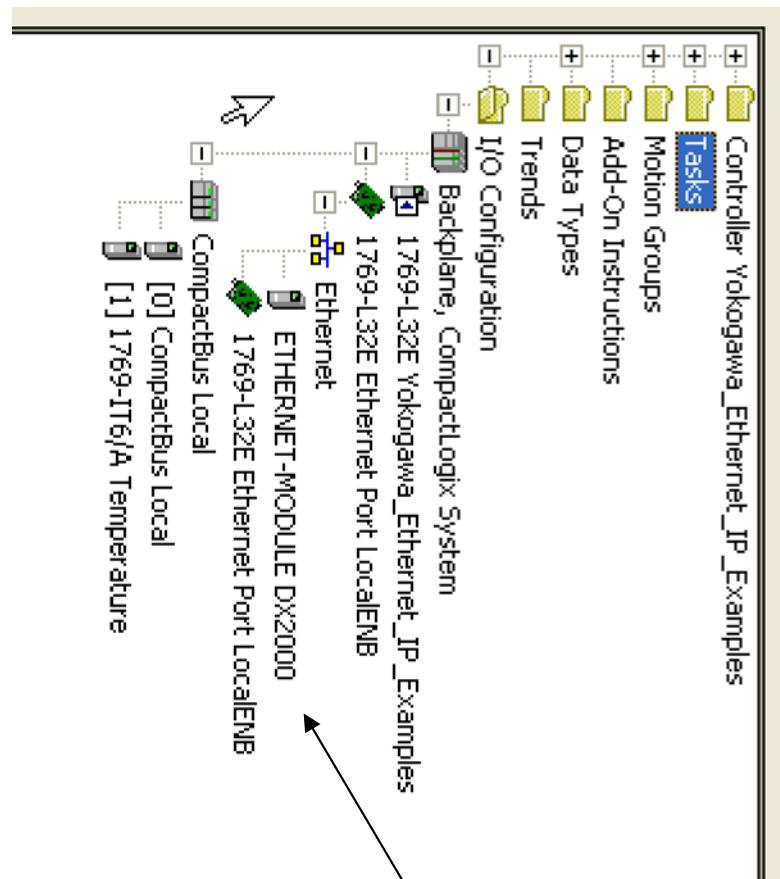
Setting up the Communications

Defining MicroLogix as data source



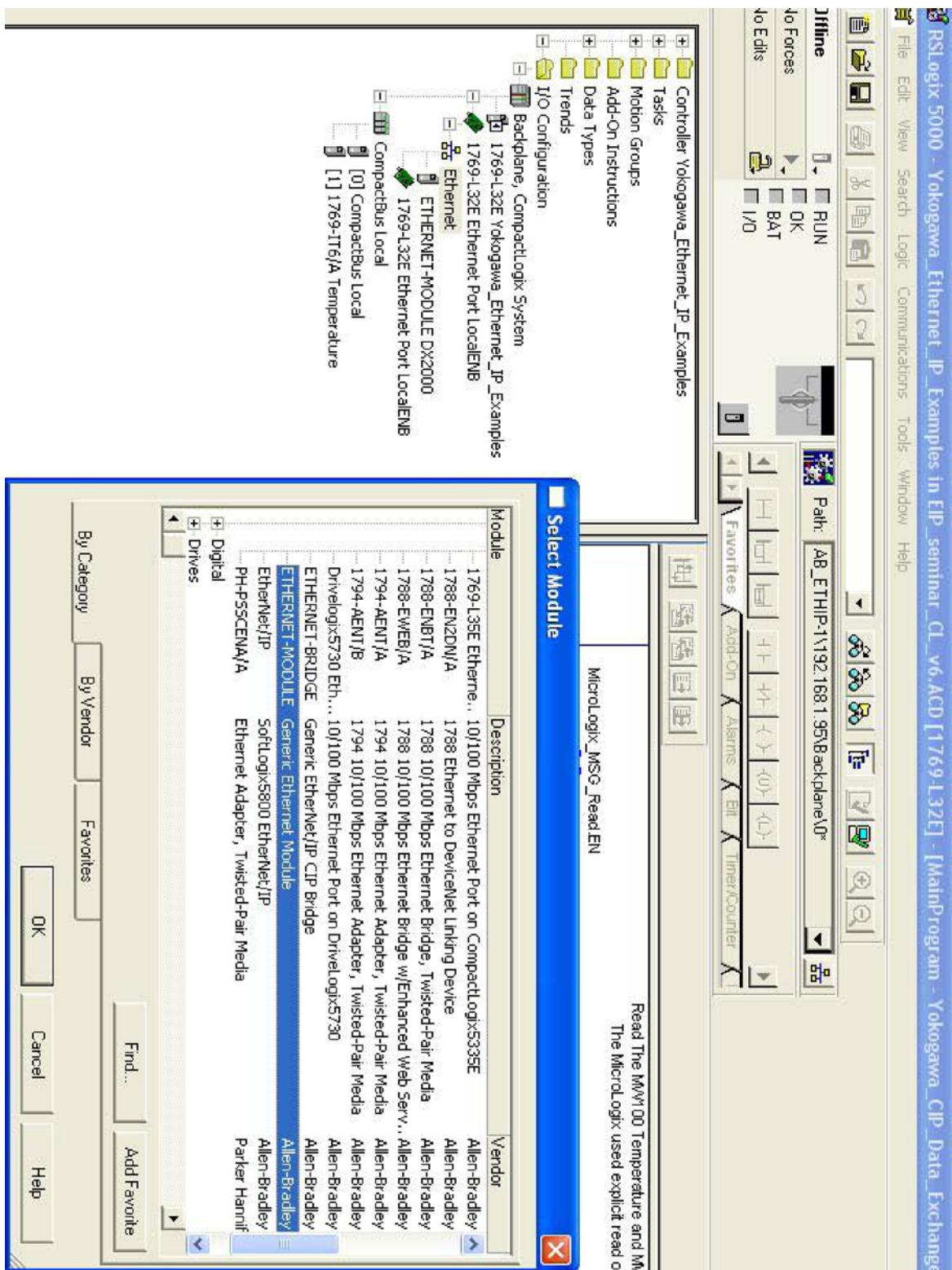
- ⇒ Using implicit read/write to DX2000
 - Requires no ladder rungs for read/write
- ⇒ DX2000 is added to I/O Configuration device list
- ⇒ Define an implicit message for read and write

Add DX2000 as I/O Device for Implicit R/W



Add MW and DX2000/ 1000 as Generic Ethernet

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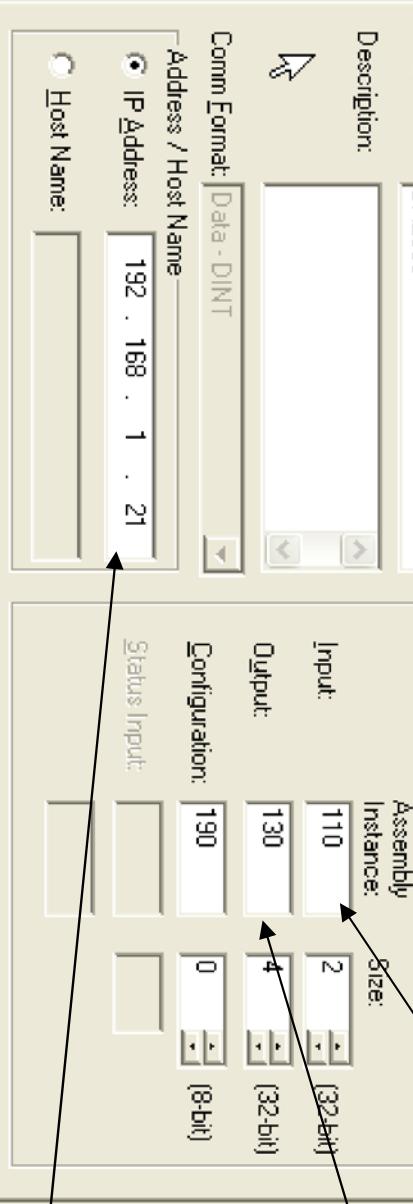


Defining Data Read and Write

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Read inputs from DX
 (Instance ID 110)
 Write data to DX
 (Instance ID 130)



DX2000 IP address

Type	Number	Operation type	Instance ID	Size	Data type
Measurement channel	001 – 048	Producer	110	192 (4 x 48)	INT32
Computation channel	001 – 048	Producer	115	192 (4 x 48)	FLOAT
Communication input data	101 – 160	Producer	120	240 (4 x 60)	INT32
Communication input data	101 – 160	Producer	125	240 (4 x 60)	FLOAT
Communication input data	C01 – C60	Producer / Consumer	130	240 (4 x 60)	INT32
Communication input data	C01 – C60	Producer / Consumer	135	240 (4 x 60)	FLOAT

Creation of I/O Module Creates Tags

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Creating DX2000 as I/O device automatically creates data tags

Controller Tags - Yokogawa_Ethernet_IP_Examples(controller)					
Scope:	Yokogawa_Ethe ▾	Show...	Show All		
Name	Value	Force Mask	Style	Data Type	Description
+ count_1	(...)	(...)		COUNTER	
+ DX2000:C	(...)	(...)		AB:ETHERNET_...	
- DX2000:I	(...)	(...)		AB:ETHERNET_...	
- DX2000:I:Data	(...)	(...)		DINT[2]	DX2000 input #1
+ DX2000:I:Data[0]	316			Decimal	DINT
+ DX2000:I:Data[1]	236			Decimal	DINT
- DX2000:O	(...)	(...)		AB:ETHERNET_...	
- DX2000:O:Data	(...)	(...)		DINT[4]	
+ DX2000:O:Data[0]	747			Decimal	DINT
+ DX2000:O:Data[1]	27			Decimal	DINT
+ DX2000:O:Data[2]	0			Decimal	DINT
+ DX2000:O:Data[3]	0			Decimal	DINT

Moving Data to DX2000 Write Area

Move the CompactLogix temperature input #1 to DX2000 with implicit write

Value will be written to DX2000 with implicit write

Move the MW#100 temperature received from MicroLogix to DX2000 Output element 0

CompactLogix
temperature on input
#1

MW#From_Micrologix[0]

{ ... }
26.7



Move the MW#100 temperature received from MicroLogix to DX2000 with implicit write

MW#temp #1 via
MicroLogix

MW#temp #1 via
MicroLogix

26.7

Move the MW#100 temperature received from MicroLogix to DX2000 with implicit write

MW#temp #1 via
MicroLogix

MW#temp #1 via
MicroLogix

26.7



Move the MW#100 Digital input received from MicroLogix to DX2000 Output element 2

MW#temp #1 via
MicroLogix

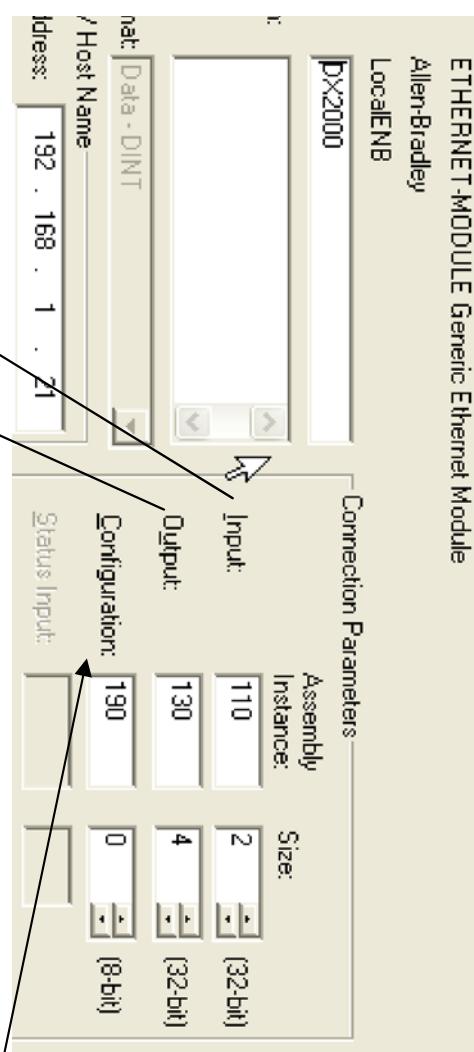
MW#temp #1 via
MicroLogix

26.7



Scope:	Yokogawa_Ethernet	Show...	Show All
Name	△ Value	◀ Force Mask	◀ Style
+ count_1	{ ... }	{ ... }	COUNTER
+ DX2000:C	{ ... }	{ ... }	AB:ETHERNET_...
+ DX2000:I	{ ... }	{ ... }	AB:ETHERNET_...
- DX2000:O	{ ... }	{ ... }	AB:ETHERNET_...
- DX2000:O:Data	{ ... }	{ ... }	DINT[4]
+ DX2000:O:Data[0]	747	Decimal	DINT
+ DX2000:O:Data[1]	27	Decimal	DINT
+ DX2000:O:Data[2]	0	Decimal	DINT
+ DX2000:O:Data[3]	0	Decimal	DINT

Tags are Automatically Linked to Input/ Output



Tags are linked to I/O instances

* Configuration is not used

Controller Tags - Yokogawa_Ethernet_IP_Examples(controller)						
Name	Value	Force Mask	Style	Data Type	Description	
+ count_1	(...)	(...)		COUNTER		
+ DX2000:C	(...)	(...)		AB:ETHERNET_...		
- DX2000:I	(...)	(...)		AB:ETHERNET_...		
- DX2000:I:Data	(...)	(...)	Decimal	DINT[2]	DX2000 input #1	
+ DX2000:I:Data[0]	316		Decimal	DINT		
+ DX2000:I:Data[1]	236		Decimal	DINT		
- DX2000:D	(...)	(...)		AB:ETHERNET_...		
- DX2000:D:Data	(...)	(...)	Decimal	DINT[4]	CompactLogix temperature on input #1	MW temp #1 via MicroLogix
+ DX2000:D:Data[0]	747		Decimal	DINT		
+ DX2000:D:Data[1]	27		Decimal	DINT		
+ DX2000:D:Data[2]	0		Decimal	DINT		
+ DX2000:D:Data[3]	0		Decimal	DINT		

Full Implicit Read/ Write Map for DX2000/ DX1000

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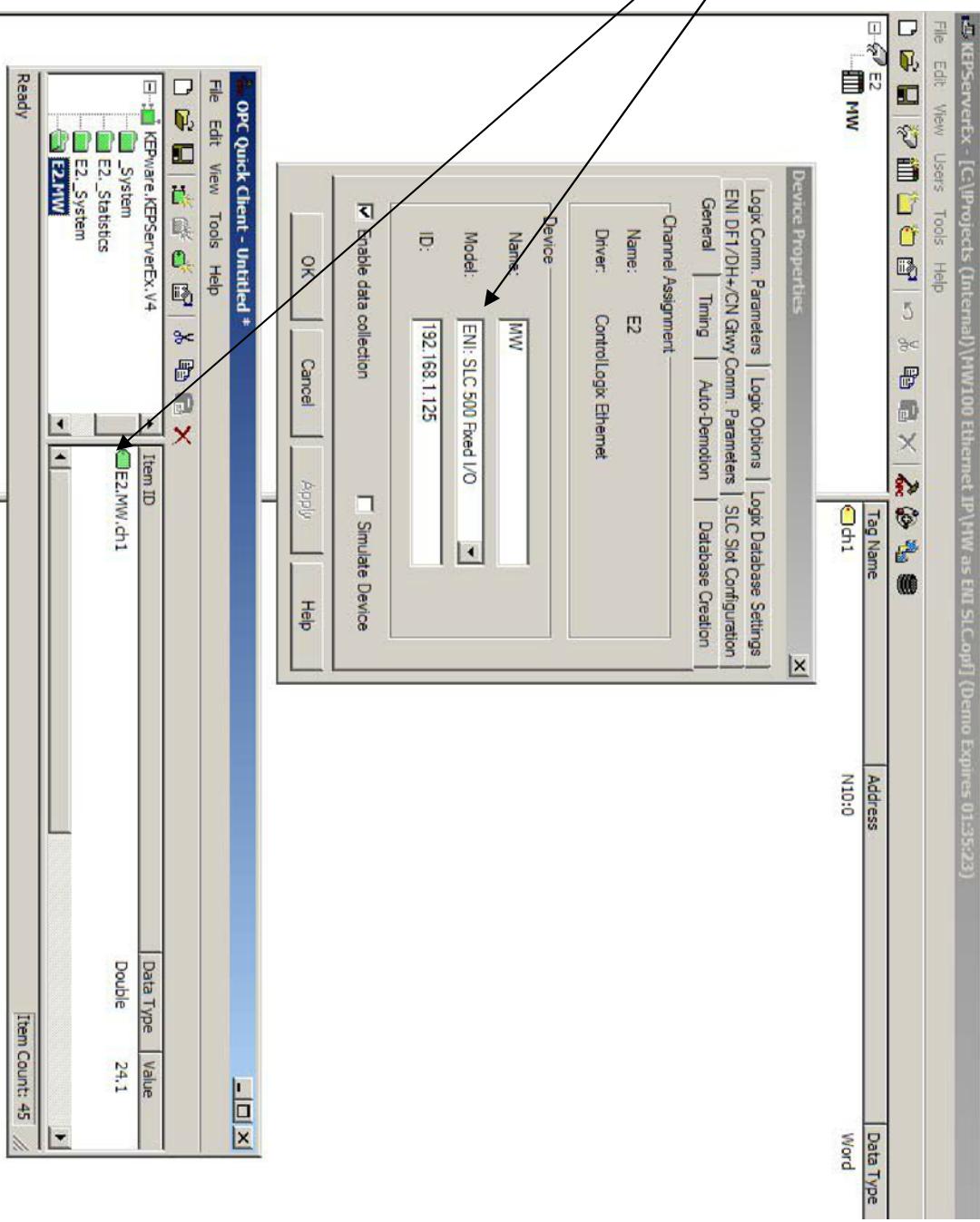
Notice: Each value is available as 32 bit integer or float

Type	Number	Operation type	Instance ID	Size	Data type
Measurement channel	001 – 048	Producer	110	192 (4 x 48)	INT32
Computation channel	001 – 048	Producer	115	192 (4 x 48)	FLOAT
Communication input data	101 – 160	Producer	120	240 (4 x 60)	INT32
External input channel	101 – 160	Producer	125	240 (4 x 60)	FLOAT
Communication input data	C01 – C60	Producer / Consumer	130	240 (4 x 60)	INT32
External input channel	C01 – C60	Producer / Consumer	135	240 (4 x 60)	FLOAT
External input channel	201 – 300	Producer / Consumer	140	400 (4 x 100)	INT32
External input channel	301 – 400	Producer / Consumer	141	400 (4 x 100)	INT32
External input channel	401 – 440	Producer / Consumer	142	160 (4 x 40)	INT32
External input channel	201 – 300	Producer / Consumer	145	400 (4 x 100)	FLOAT
External input channel	301 – 400	Producer / Consumer	146	400 (4 x 100)	FLOAT
External input channel	401 – 440	Producer / Consumer	147	160 (4 x 40)	FLOAT
External input channel	201 – 300	Producer	150	400 (4 x 100)	INT32
External input channel	301 – 400	Producer	151	400 (4 x 100)	INT32
External input channel	401 – 440	Producer	152	160 (4 x 40)	INT32
External input channel	201 – 300	Producer	155	400 (4 x 100)	FLOAT
External input channel	301 – 400	Producer	156	400 (4 x 100)	FLOAT
External input channel	401 – 440	Producer	157	160 (4 x 40)	FLOAT
External input channel	Configuration	190	0	-	-
External input channel	Producer / Consumer	191	0	-	-

Standard A-B OPC Servers Can See MW100/ DXAdvanced

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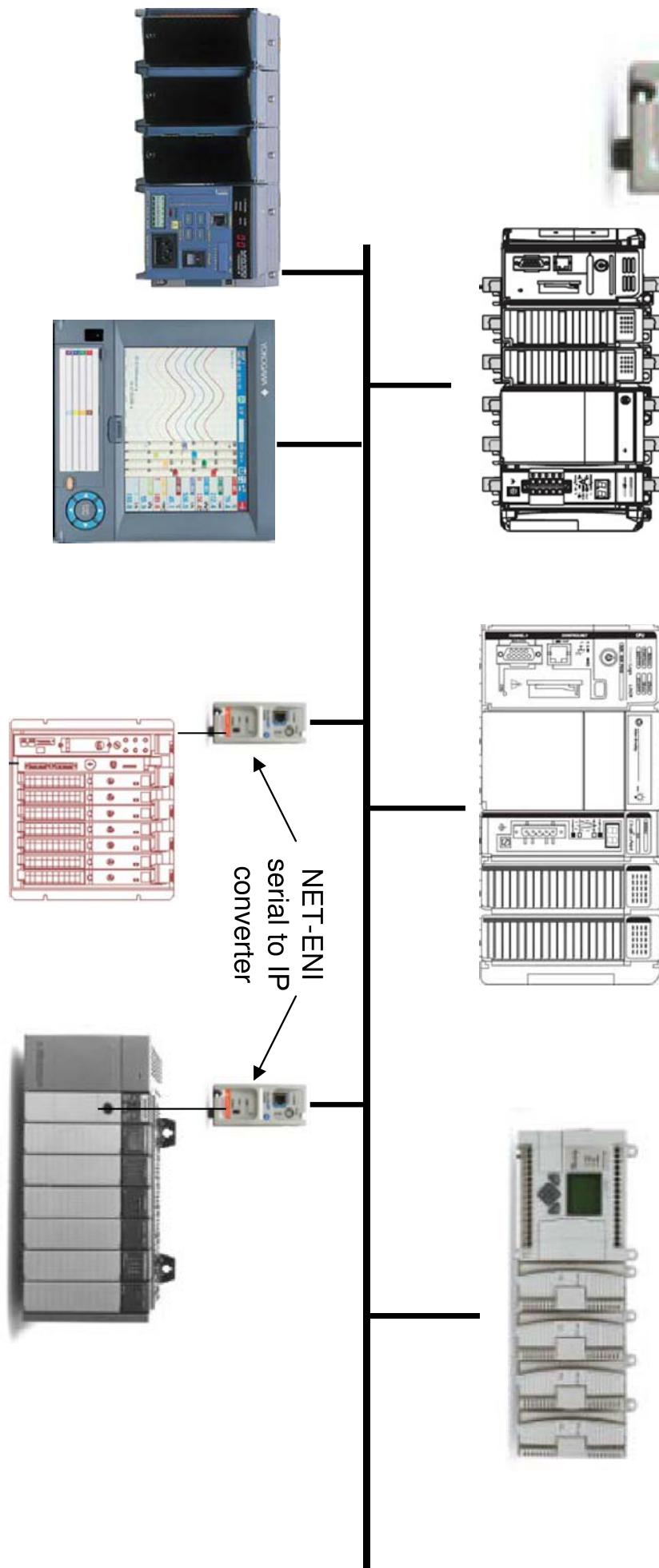
Kepware's ControlLogix
server configured for
SLC500 interface sees
MW100 realtime data!



You Can Use EtherNet/IP with Serial

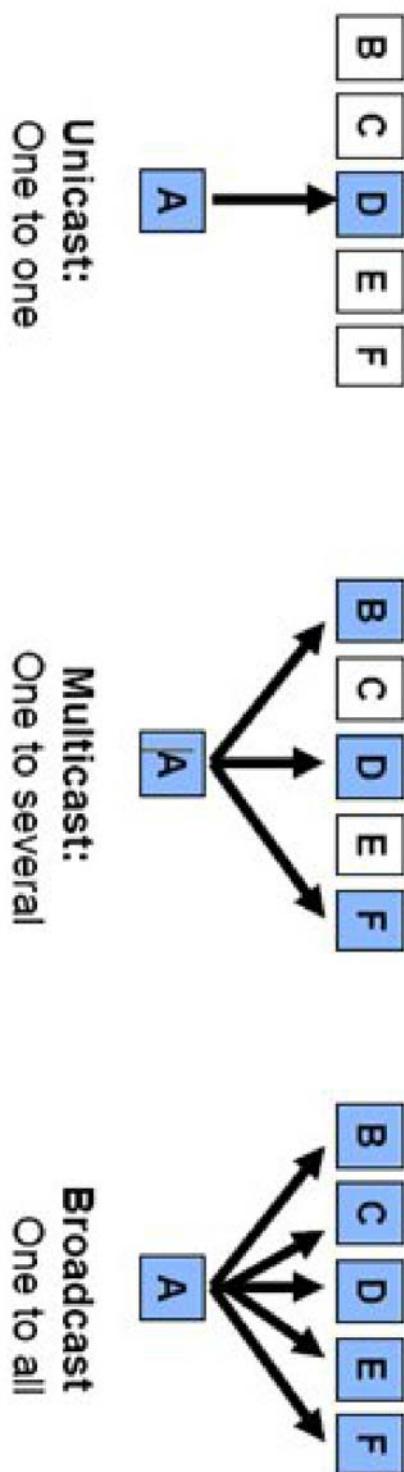
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Net-ENI module



IGMP: Improving Implicit Messaging Performance

- Switches keep unicast messages from going to all devices
- Basic switches do not limit multicast and broadcast
- EtherNet / IP uses multicast
 - This can put strain on bandwidth on larger networks



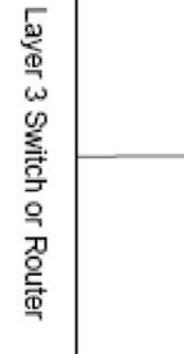
• I GMP: Improving Implicit Messaging Performance

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- I GMP is a protocol in managed switches
- I GMP allows switches to manage Multicast traffic

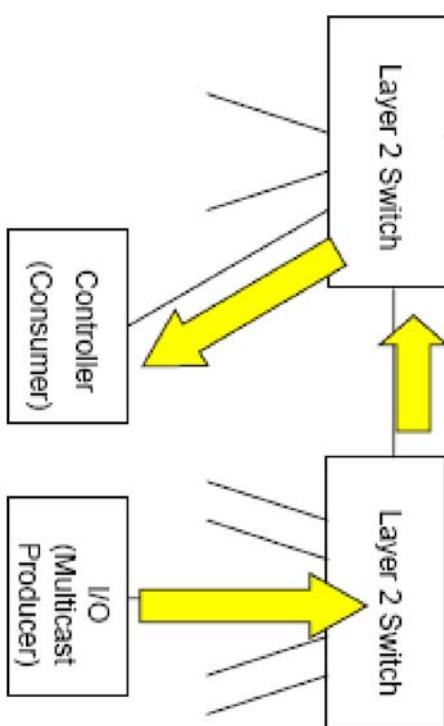
IGMP snooping constrains the flooding of multicast traffic by dynamically configuring switch ports so that multicast traffic is forwarded only to ports associated with a particular IP multicast group.

to plant network



Note that none of the multicast traffic hits the router

Switches that support IGMP snooping “learn” which ports have devices that are part of a particular multicast group and only forward the multicast packets to the ports that are part of the multicast group.



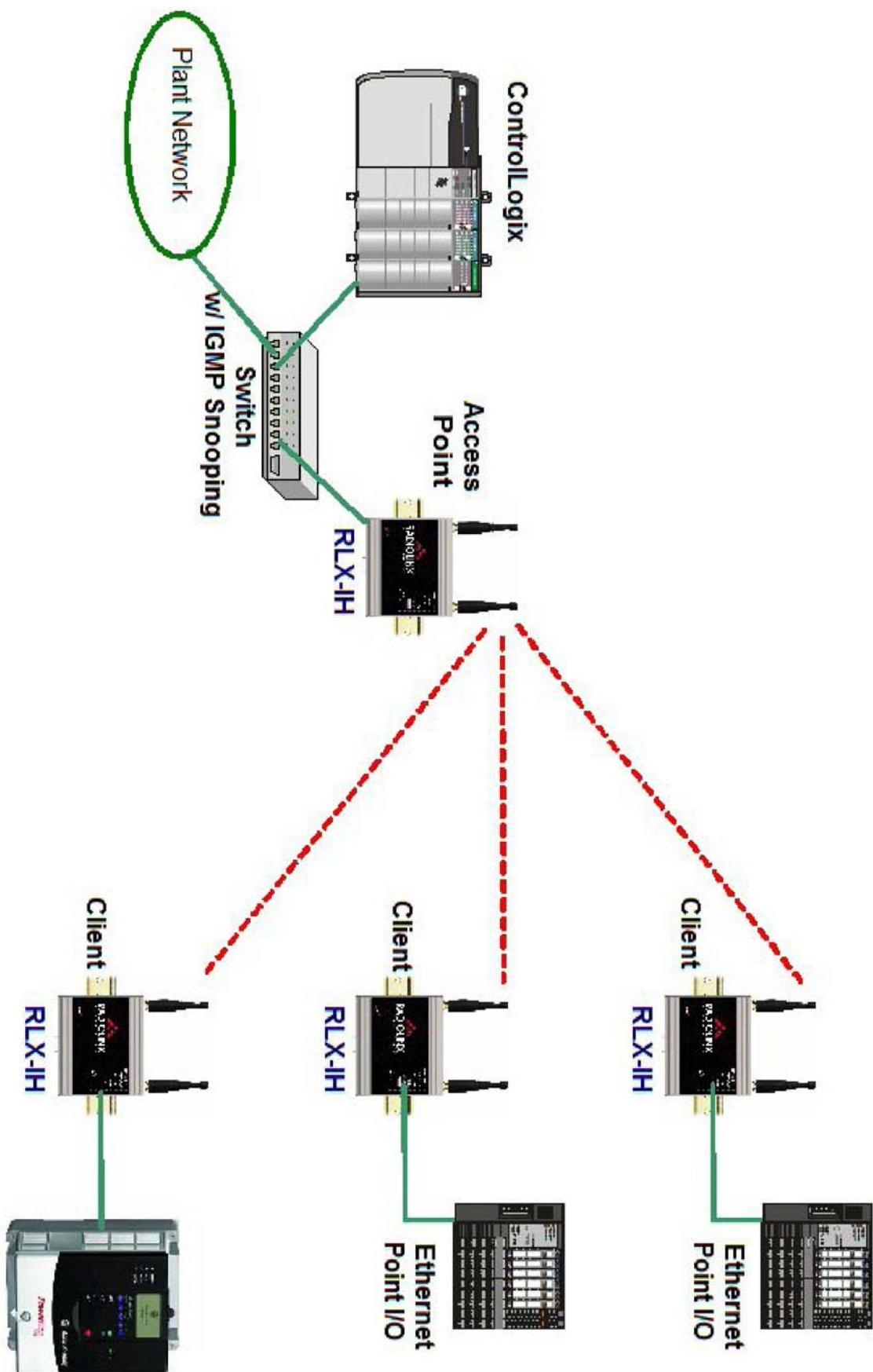
Basic overview of industrial Ethernet
EtherNet/IP™: The Proven and Complete Solution for Manufacturing Automation
page 202 © 2006-2007 Open DeviceNet Vendor Association, Inc. All rights reserved. www.odva.org



Wireless UDP/ IP CI P Applications

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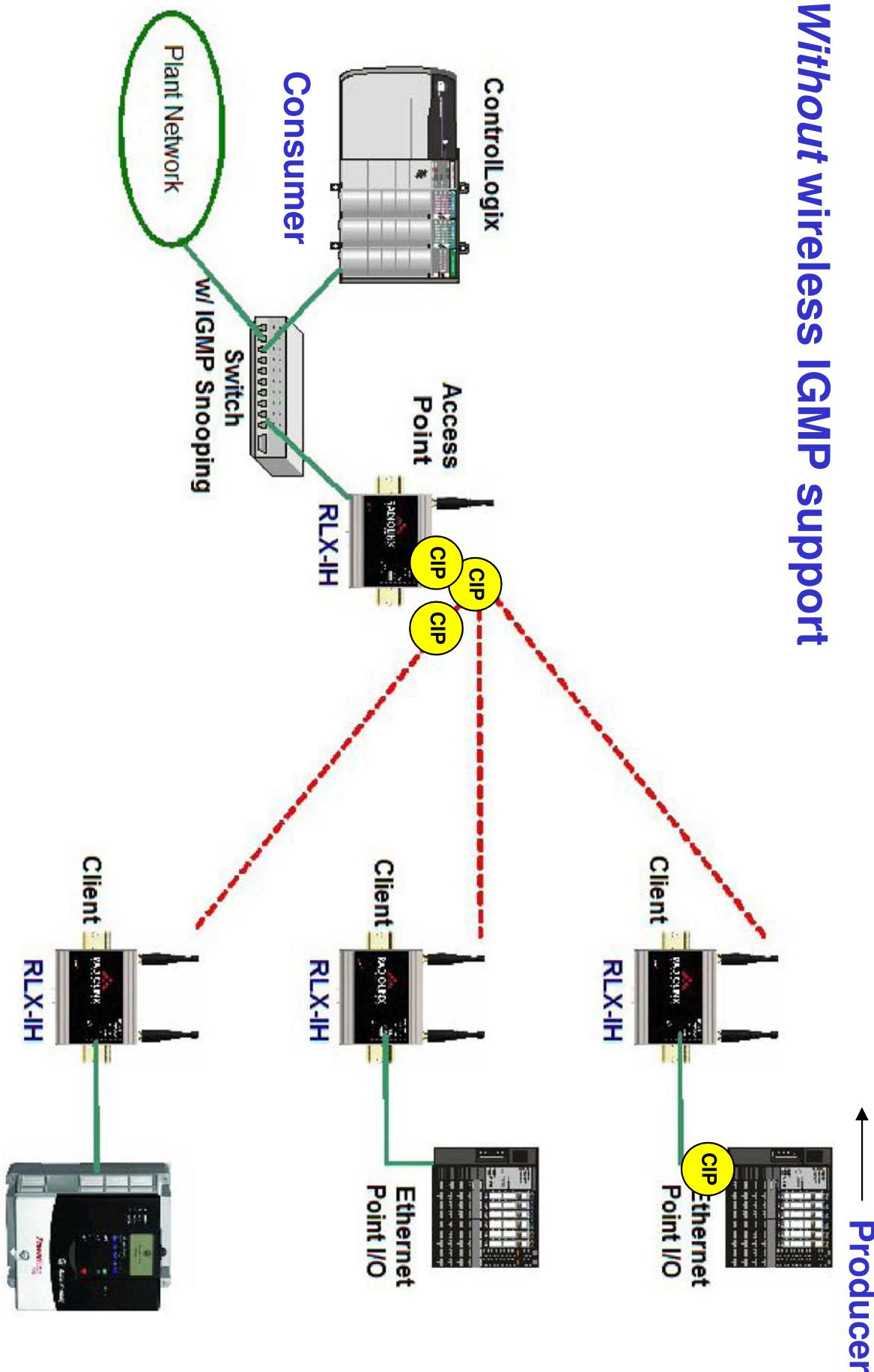


UDP Traffic on an 802.11 Network

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Without wireless IGMP support

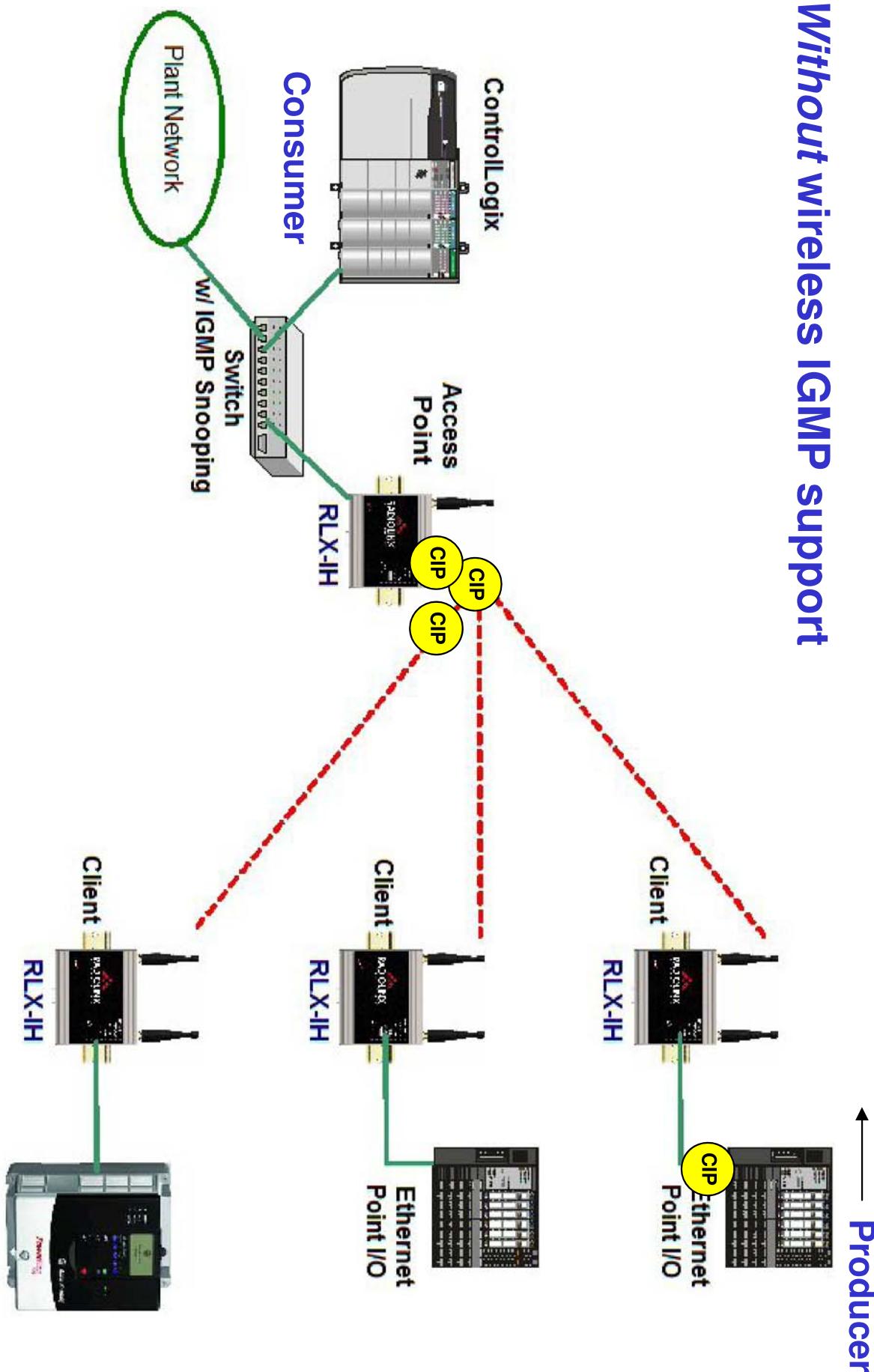


UDP Traffic on an 802.11 Network

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Without wireless IGMP support

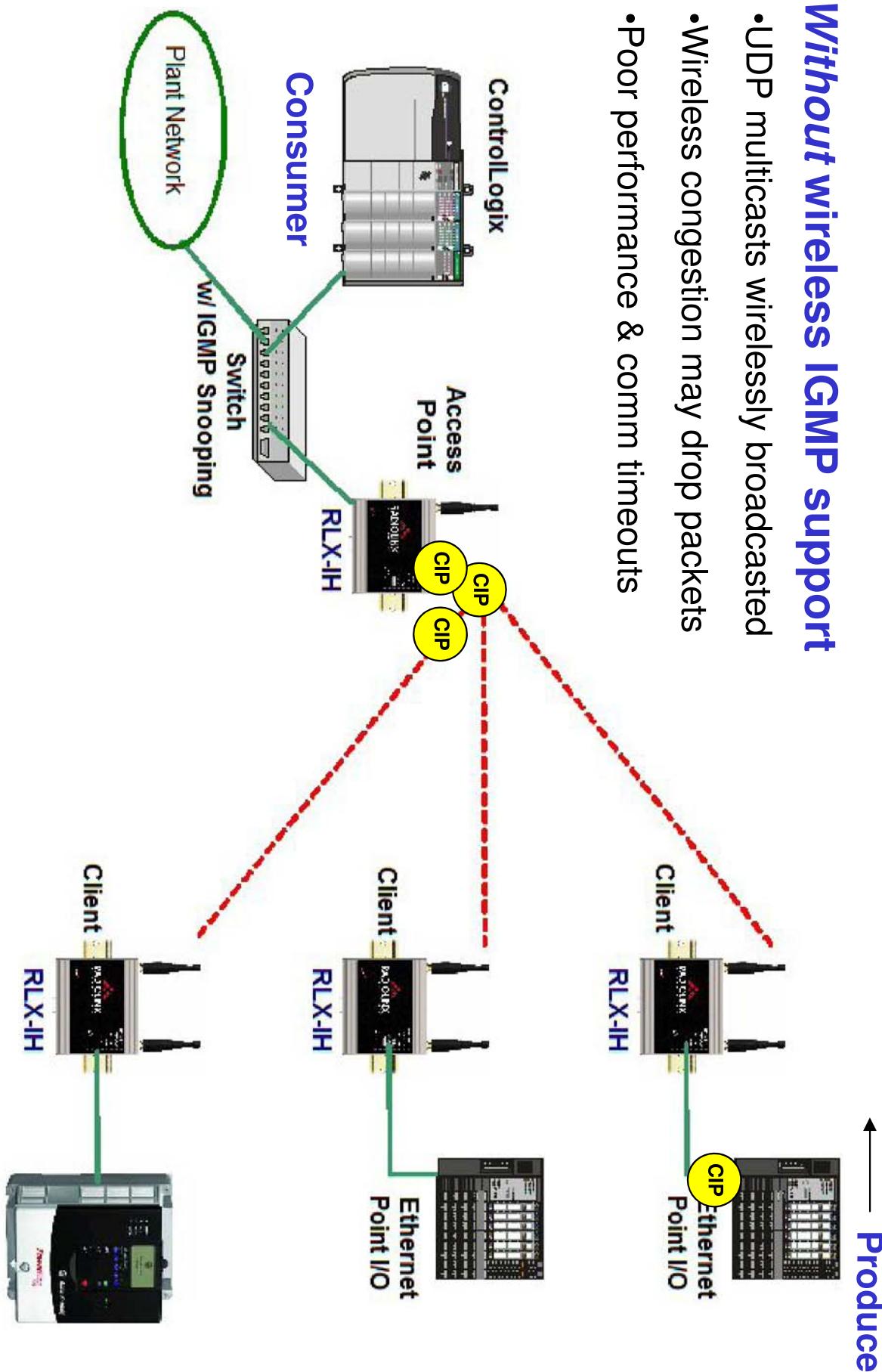


UDP Traffic on an 802.11 Network

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Without wireless IGMP support

- UDP multicasts wirelessly broadcasted
- Wireless congestion may drop packets
- Poor performance & comm timeouts

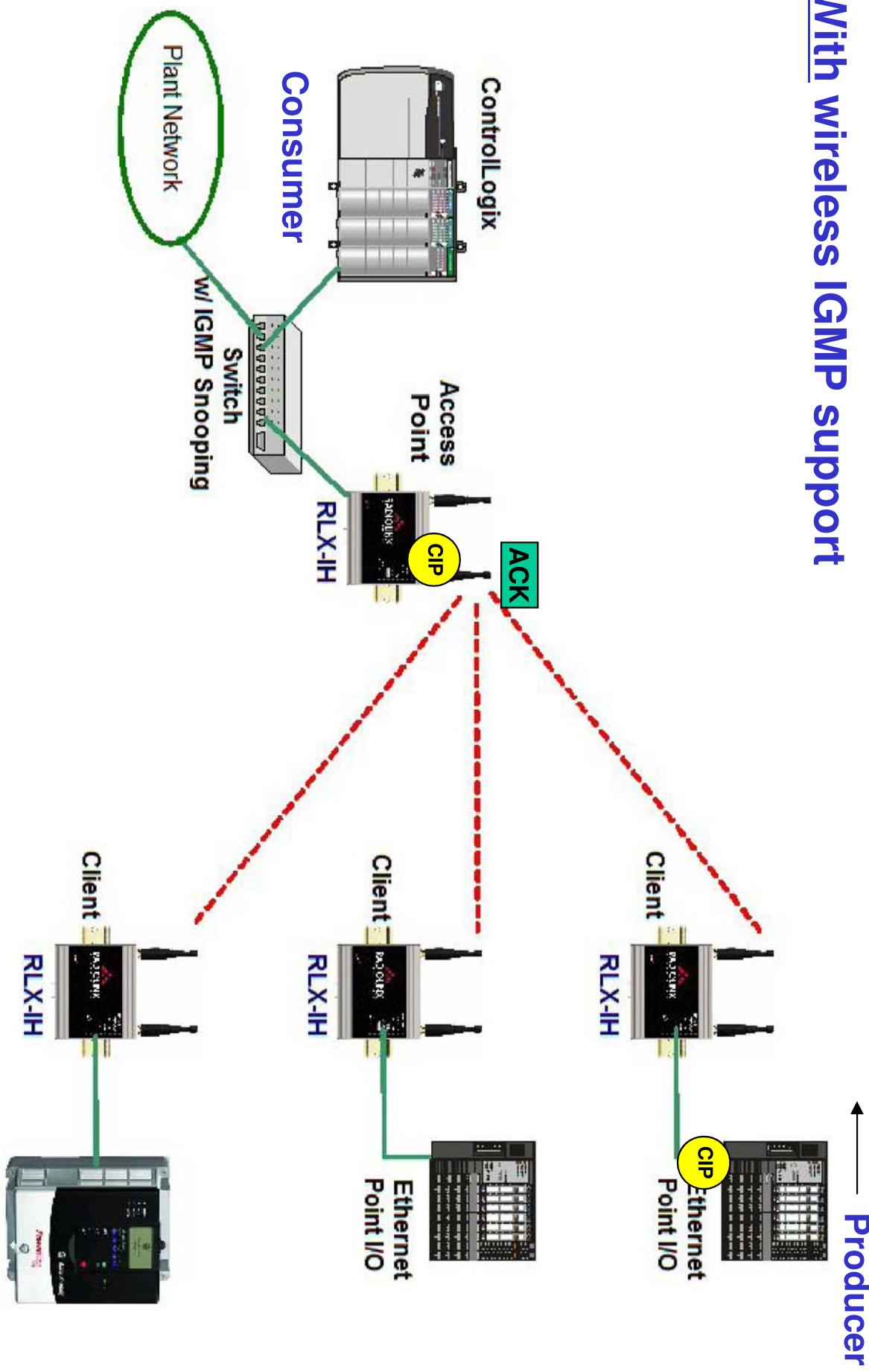


UDP Traffic on an 802.11 Network

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With wireless IGMP support



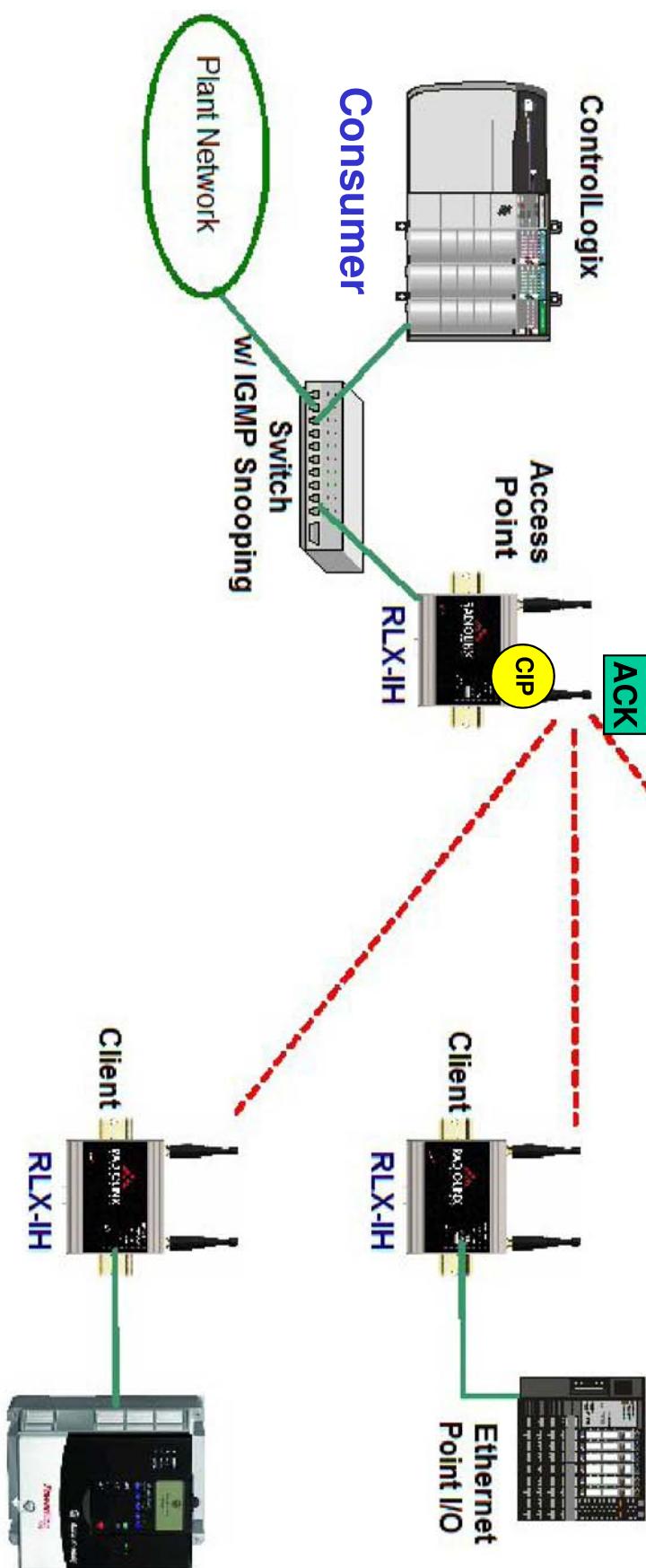
UDP Traffic on an 802.11 Network

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With wireless IGMP support

Producer



UDP Traffic on an 802.11 Network

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With wireless IGMP support

- Each modem builds a consumption table (IGMP snooping)
- Packets are filtered/ignored
- Each UDP packet is acknowledged & re-transmitted if necessary

