EtherNet/IP

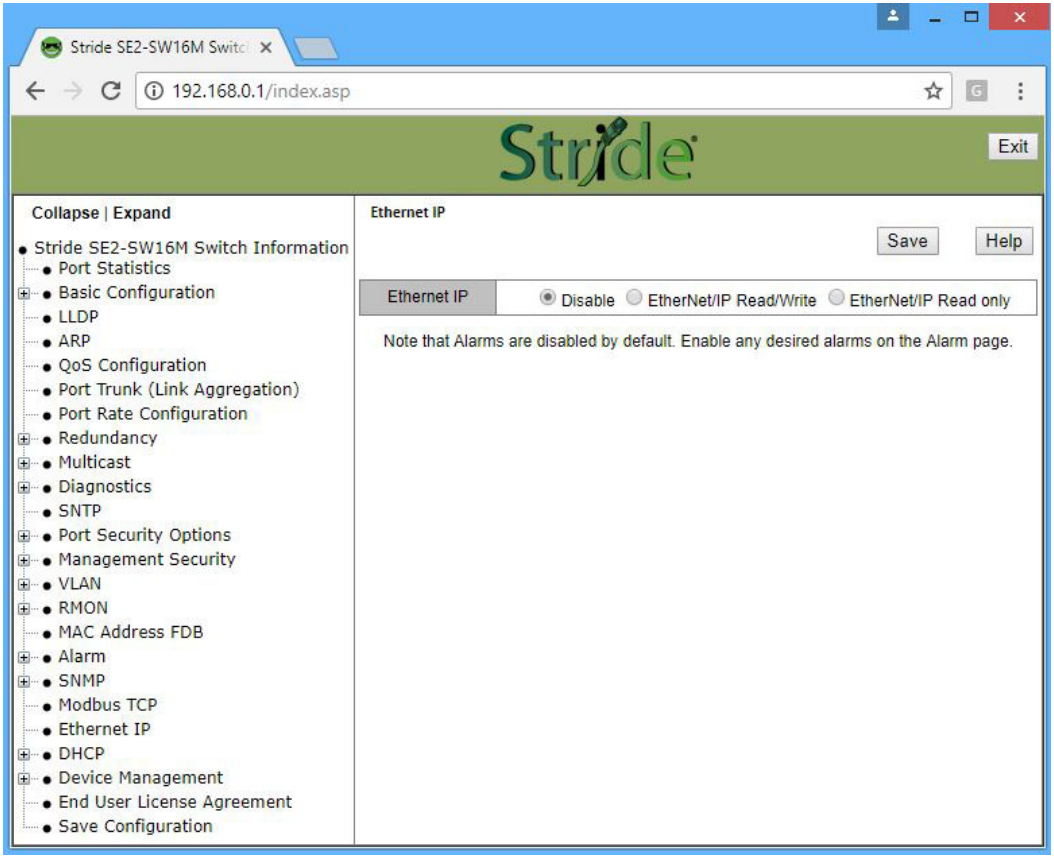
In this Appendix...

EtherNet/IP Switch Management

The **Stride** SE2 managed switch supports EtherNet/IP (Ethernet Industrial Protocol) in the following ways:

- Class 1 Implicit (I/O) Messaging Server/Adapter
- Class 3 Explicit Messaging Server/Adapter
- Unconnected Explicit Messaging Server/Adapter

The EtherNet/IP server is disabled by default in the Managed Switch.



NOTE: *The configuration must be saved (selection is available on left hand side at the bottom) or it will be lost upon the next power cycle.*

Implicit (I/O) Messaging

The **Stride** SE2 managed switch supports both Unicast and Multicast Implicit (I/O) Messaging. The required parameters are shown below:

Assembly Instance		
Connection Points		Size
Input	101 (0x65)	156 bytes
Output	102 (0x66)	20 bytes
Config	0	0

The Configuration is not required in the path. If it is included, use 0 for the Attribute and 0 size.

The Run/Idle (4 byte) header is required and is not included in the Output size specified above.

Input Data is defined as the data that is 'Produced' by the **Stride** managed switch and is read (Consumed) by the EtherNet/IP Master/Scanner device.

Input Data			
Byte Offset Number	**Size (in Bytes)**	**Name**	**Details**
Input Data			
0	2	Port Status: Ports 1–8	2 bits per port Diabled = 00 Up = 01 Down = 10 For example, Port 1 is the most significant bit and Port 8 is the least significant bit.
2	2	Port Status: Ports 9–16	
4	2	Port Status: Ports 17–24	
6	2	Port Status: Ports 25–32	
8	2	Port Status: Ports 33–40	
10	2	Port Status: Ports 41–48	
12	2	Port Status: Ports 49–56	
14	2	Port Status: Ports 57–64	
16	1	Alarm Status of Port 1	Diabled = 0x00 Normal = 0x01 Alarm = 0x02
17	1	Alarm Status of Port 2	
18	1	Alarm Status of Port 3	
19–79	1	Alarm Status of Port 4–64	
80	1	AD-Ring Alarm Status Ring 1	
81	1	AD-RP Ring Alarm Status Ring 1	Diabled = 0x00 Normal = 0x01 Alarm = 0x02 None = 0x03
82-143	2	AD-Ring Alarm and AD-RP Ring Alarm Status for Rings 2-32	Same format as previous 2 bytes but for Rings 2-32
144	2	IP Address Conflict Alarm Status	Diabled = 0x00 Normal = 0x01 Alarm - 0x02
145	1	MAC Address Conflict Alarm	
146	1	Power Alarm Status	Diabled = 0x00 Normal = 0x01 Power 1 Alarm = 0x02 Power 2 Alarm = 0x03
147	9	Reserved	

Output Data is defined as the data that is 'Produced' or written from the EtherNet/IP Master/ Scanner device and is received (Consumed) by the **Stride** managed switch.

Output Data			
Byte Offset Number	**Size (in Bytes)**	**Name**	**Details**
Output Data			
	4	Run/Idle Header	Bits 4-31: Reserved Bits 2-3: ROO (Ready for Ownership of Outputs) Bit 1:COO (Claim Output Ownership) Bit 0: Run/Idle (Run = 1, Idle = 0) This header is typically sent by the Operating System
0	2	Port Enable: Ports 1–8	2 bits per port: Enable = 01 Disable = 10 No change = 00 No change = 11
2	2	Port Enable: Ports 9–16	
4	2	Port Enable: Ports 17–24	
6	2	Port Enable: Ports 25–32	
8	2	Port Enable: Ports 33–40	
10	2	Port Enable: Ports 41–48	
12	2	Port Enable: Ports 49–56	
14	2	Port Enable: Ports 57–64	
16	2	Reserved	
18	2	Reserved	

Explicit Messaging

Explicit messaging allows for much more information to be accessed in the managed switch but does require more configuration.

There are 2 different services that the managed switch supports:

Set Single Attribute Service	
Service	16 (0x10): Set Single Attribute
Class	4
Instance	104 (0x68)
Attribute	3
Size	22 bytes

Get Single Attribute Service	
Service	14 (0x0e): Get Single Attribute
Class	4
Instance	103 (0x67)
Attribute	3
Size	260 bytes

The first two bytes of the data sent in the “Set Single Attribute Service” determine the meaning of the remaining 20 bytes of the write block and also what type of data is sent in the response to the “Get Single Attribute Service”.

The first two bytes of the data sent in the "Set Single Attribute Service" can be either of the following:

- Byte 0 = 01 Byte 1 = 00: Determines that the rest of the sent data is the same format as the I/O Messaging Output data. The data sent in the response to the "Get Single Attribute Service" will be the same as the I/O Messaging Input data.
- Byte 0 = 00 Byte 1 = 00: Allows access to many other pieces of data in the managed switch. These bytes should be followed by pointer values explained in the table below.

Address Matrix								
	00	**01**	**02**	**03**	**04**	**05**	**····>**	**N**
00	Port Status and alarm (Same as I/O Messaging)	–	–	–	–	–	–	–
01 (Device Info)	–	Mfg Name	Device Type	Mfg Address	Contact Phone Number	Other Info	–	–
02 (Port Info)	–	Port 1	Port 2	Port 3	Port 4	Port 5	····>	Port N
03 (AD-Ring Info)	Ring Mode	Ring 1	Ring 2	Ring 3	Ring 4	Ring 5	····>	Ring N
04 (AD-RP Ring Info)	Ring Mode	Ring 1	Ring 2	Ring 3	Ring 4	Ring 5	····>	Ring N
05 (RSTP Ring Info)	Root Bridge Status	Ring 1	Ring 2	Ring 3	Ring 4	Ring 5	····>	Ring N

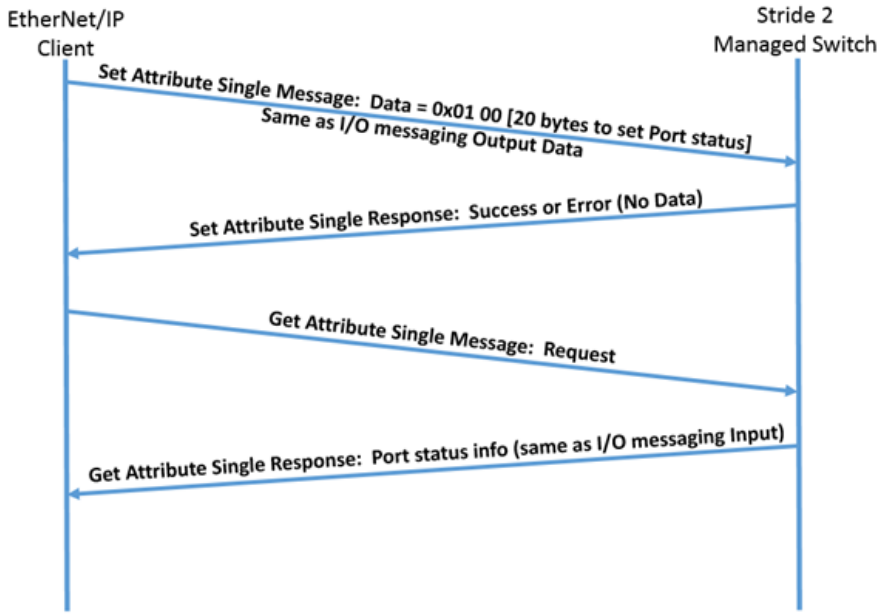
When Byte 0 = 00 and Byte 1 = 00, Byte 2 should be the value in the Row such as 01 for Device Info or 02 for Port Info and Byte 3 should be the value in the Column header to choose the specific piece of data from the Info type.

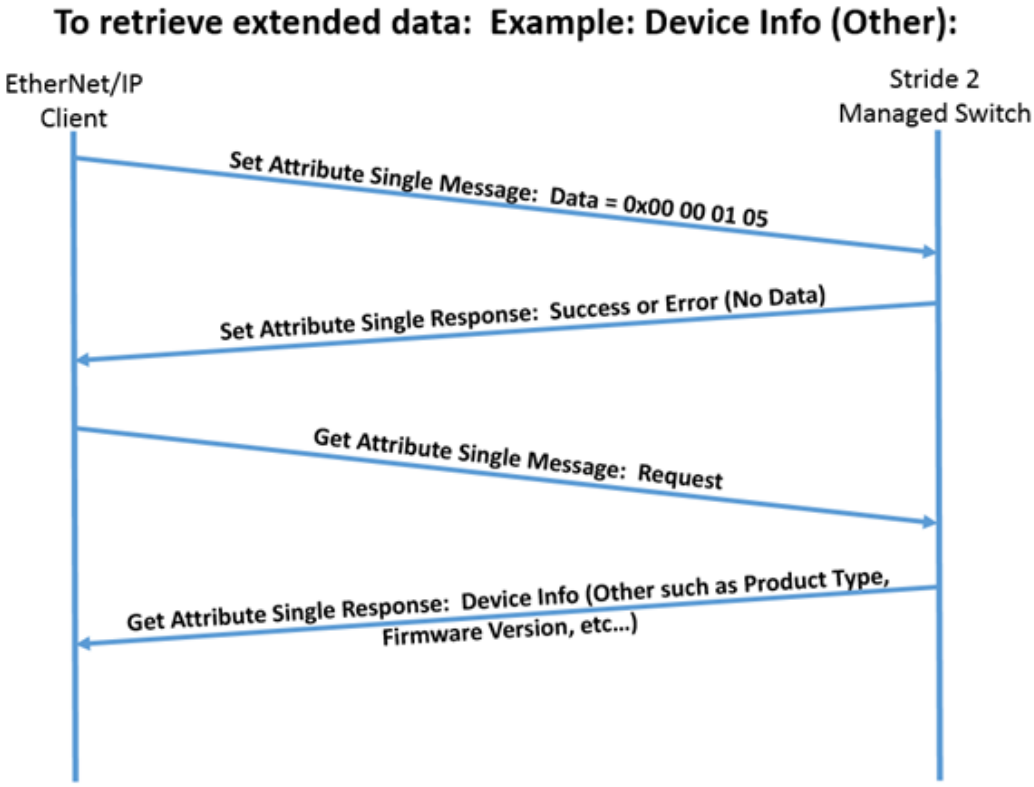
For example:

- To retrieve the Manufacturer Address, Bytes 0 – 3 should contain the following (in respective order) = 00 00 01 03
- To retrieve the Information for RSTP Ring 4, Bytes 0 – 3 should contain the following = 00 00 05 04

NOTE: *The first four bytes of "Set Attribute Single Service" message determine the response of the "Get Attribute Single Service" message. The "Set Attribute Single Service" response is always the same and does not contain the information in the switch.*

To Enable/Disable Ports and retrieve Port status (same as I/O Messaging):





The tables on the following pages detail the format of the data returned by the various information areas outlined in the table above.

Device Information				
Byte Offset Number	**Size (in Bytes)**	**Data Type**	**Name**	**Details**
Device Information: Manufacturer Name (Set Attribute Single = 0x00 00 01 01)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	258	ASCII	Mfg Name	Example: "A" = 0x41 "u" = 0x75 "t" = 0x74 "o" = 0x6f "m" = 0x6d "a" = 0x61 "t" = 0x74 etc.....
Device Information: Device Type (Set Attribute Single = 0x00 00 01 02)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	258	ASCII	Model Number	Example: "S" = 0x53 "E" = 0x45 etc.....
Device Information: Manufacturer Address (Set Attribute Single = 0x00 00 01 03)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	258	ASCII	Location	Example: "3" = 0x33 "5" = 0x35 etc.....
Device Information: Contact Phone Number (Set Attribute Single = 0x00 00 01 04)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	258	ASCII	Contact Phone Number	Example: "1" = 0x31 "(" = 0x28 etc.....

Device Information (cont'd)				
Byte Offset Number	**Size (in Bytes)**	**Data Type**	**Name**	**Details**
Device Information: Other Info (Set Attribute Single = 0x00 00 01 05)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	40	ASCII	Model Number	Example: "S"= 0x53 "t" = 0x74 "r" = 0x72 "i" = 0x69 "d" = 0x64 "e" = 0x65 "S" = 0x53 "E" = 0x45 "2" = 0x32 etc.....
42	30	ASCII	Serial Number	ASCII formatted as shown in "Model Number" ex. above
72	22	ASCII	Bootrom Version	
94	18	ASCII	Current Firmware Version	
112	4	INT32	Switch Management Interface IP Address	192.168.0.1 (0xc0a80001)
116	2	INT16	Device MAC Address Number	
118	6	INT16	Device Full MAC Address	00-1E-CD-00-00-01 Word 0 HI byte = 0x00 Word 0 LO byte = 0x1e Word 1 HI byte = 0xcd Word 1 LO byte = 0x00 Word 2 HI byte = 0x00 Word 2 HI byte = 0x00
124	1	INT	Power 1 Status	Power Off = 0x00 Power On - 0x01
125	1	INT	Power 2 Status	Power Off = 0x00 Power On - 0x01 None = -x-2
126	2	INT16	CPU occupancy rate (long term)	
128	2	INT16	CPU occupancy rate (short term)	
130	4	INT32	Total Memory (bytes)	
134	4	INT32	Free memory (bytes)	
138	4	INT32	Device running time (minutes)	

Port Information				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
Port Information (Set Attribute Single = 0x00 00 02 01 - Number of ports on switch)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	64	ASCII	Port Description	"FE" or "GE"
66	1	INT	Port Status	Up/Down/Disable Disable = 0x00 Up = 0x01 Down = 0x02
67	1	INT	Port Rate	10/100/1000/10000M 10M = 0x00 100M = 0x01 1000M = 0x02 10000M = 0x03
68	1	INT	Port Duplex	Half/Full Half = 0x00 Full = 0x01
69	1	INT	Port Flow Control Status	On/Off Off = 0x00 On = 0x01
70	8	INT64	Port Received Packets	
78	8	INT64	Port Received Bytes	
86	8	INT64	Port Sent Packets	
94	8	INT64	Port Sent Bytes	
102	8	INT64	Port Received Unicast Packets	
110	8	INT64	Port Received Multicast Packets	
118	8	INT64	Port Received Broadcast Packets	
126	8	INT64	Port Sent Unicast Packets	
134	8	INT64	Port Sent Multicast Packets	
142	8	INT64	Port Sent Broadcast Packets	
150	8	INT64	Port Received Pause Frames	
158	8	INT64	Port Sent Pause Frames	
166	8	INT64	Port received CRC Error Packets	

AD-RING Information				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
AD-RING Information: Ring Mode (Set Attribute Single = 0x00 00 03 00)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Ring Working Mode	Port/VLAN Port = 0x0000 VLAN = 0x0001
AD-RING Information: Ring Info (Set Attribute Single = 0x00 00 03 01-20 (32))				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Ring ID	
4	2	INT16	Station Role	Master/Normal Master = 0x0000 Normal = 0x0001
6	2	INT16	Ring Enable Status	Enable/Disable Disable = 0x0000 Enable = 0x0001
8	2	INT16	Ring Status	Open/Close/Alarm Open = 0x000 Close = 0x001 Alarm = 0x0002
10	2	INT16	Port 1 Status of the Ring	Down/Forward/Block Down = 0x000 Forward = 0x0001 Block = 0x002
12	2	INT16	Port 2 Status of the Ring	Down/Forward/Block Down = 0x000 Forward = 0x0001 Block = 0x002
14	2	INT16	Ring Switching Times	
16	2	INT16	AD-RING+ Status	Disable = 0x000 Enable = 0x0001
18	2	INT16	Backup Port Status	None = oxooo Forward = 0x0001 Block = 0x0002
20	4	INT32	Backup Port 1 Status: IP	192.168.0.1 (0xc0 1e cd 00 00 01)
24	6	INT16	Backup Port 1 Status: MAC	00-1e-cd-00-00-01 (0x00 1e cd 00 00 01)

AD-RING Information (cont'd)				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
30	2	INT16	Backup Port 1 Status	None = 0x000 Forward = 0x0001 Block = 0x0002
32	4	INT32	Backup Port 2 Status: IP	192.168.0.0 (0x00 1e cd 00 00 01)
36	6	INT16	Backup Port Status: MAC	00-1e-cd-00-00-01 (0x00 1e cd 00 00 01)
42	2	INT16	Backup Port 2 Status	None = 0x000 Forward = 0x0001 Block = 0x0002
44	8	INT16	Ring Port 1 Info	
52	8	INT16	Ring Port 2 Info	
60	8	INT16	Backup Port	
68	2	INT16	Main Port	0 = disable, non-zero = port number
70	32	INT16	VLAN List	

AD-RP RING Information				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
AD-RP RING Information: Ring Mode (Set Attribute Single = 0x00 00 04 00)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Ring Working Mode	Port or VLAN Port = 0x0000 VLAN = 0x0001
AD-RP RING Information: Ring Info (Set Attribute Single = 0x00 00 04 01-20 (32))				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Ring ID	
4	2	INT16	Station Role	Init = 0x0000 Root = 0x0001 B-Root = 0x0002 Normal = 0x0003
6	2	INT16	Station Priority	
8	2	INT16	Ring Protocol Enable Status	Disable = 0x0000 Enable = 0x0001
10	2	INT16	Ring Status	Init = 0x0000 Open = 0x0001 Close = 0x0002 None = 0x0003
12	2	INT16	Ring Port 1 Link Status	Down = 0x0000 Up = 0x0001
14	2	INT16	Ring Port 2 Link Status	
16	2	INT16	Backup Port Link Status	
18	2	INT16	Ring Port 1 Block Status	Forwarding = 0x0000 Blocked = 0x0001 Linkdown = 0x0002
20	2	INT16	Ring Port 2 Block Status	
24	8	INT16	Ring Port 1 Info	Ring Number
32	8	INT16	Ring Port 2 Info	
40	8	INT16	Backup Port	
48	2	INT16	Priority Port	None = 0x0000 Ring Port 1 = 0x0001 Ring Port 2 = 0x0002
50	2	INT16	CRC Threshold	

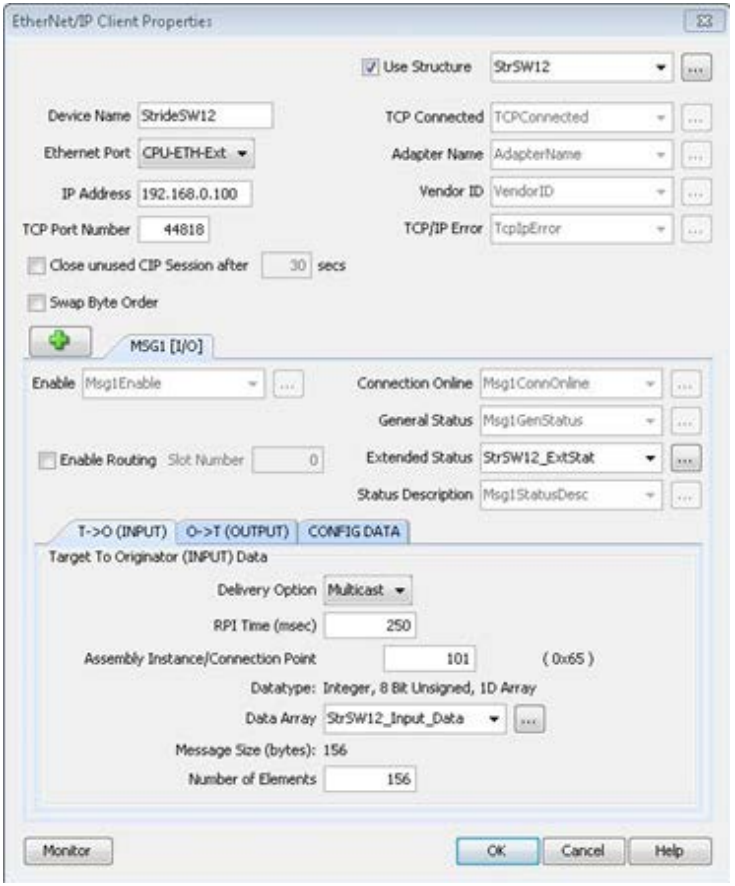
AD-RP RING Information (cont'd)				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
52	2	INT16	DHP Mode	Disable = 0x0000 Normal Node = 0x0001 Home Node = 0x0002
54	2	INT16	Home Port	None - 0x0000 Ring Port 1 = 0x0001 Ring Port 2 = 0x0002 Ring Port 1-2 = 0x0003
56	4	INT16	Boot IP	0 or the IP address. Ex: 192.168.0.1 (0xc0 a8 00 01)
60	2		Protocol VLAN	All 0xFF if none
62	32	INT16	Protected VLAN	16 VLAN, All 0xFF if none

RSTP Information				
Byte Offset Number	**Size (in bytes)**	**Data Type**	**Name**	**Details**
RSTP Information: Root Bridge Status (Set Attribute Single = 0x00 00 05 00)				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Protocol Enable Status	Disable = 0x0000 Enable = 0x0001
4	8	INT16	Root Bridge ID	Combination of priority and MAC address Example: Priority = 0x8000 MAC = 00-1e-cd-00-00-01 Root Bridge ID = 0x8000001ecd000001
12	8	INT16	Bridge ID	Combination of priority and MAC address
20	2	INT16	Spanning Tree Priority	
22	2	INT16	Hello Time	
24	2	INT16	Max Age Time	
26	2	INT16	Forward Delay Time	
28	2	INT16	Message-age Increment	Compulsion = 0x0001 Default = 0x0002
RSTP Information: Ring Info (Set Attribute Single = 0x00 00 05 01-20 (32))				
0	2	INT16	Query Status	Query Successful = 0x0000 Query Failure = 0xffff
2	2	INT16	Port Protocol Enable Status	Disable = 0x0000 Enable = 0x0001
4	2	INT16	Port Priority	Init = 0x0000
6	4	INT32	Routing Cost	
10	2	INT16	Cost Automatic Calculation Status	Disable = 0x0000 Enable = 0x0001
12	2	INT16	Port Role	Designated = 0x0000 Root = 0x0001 Alternate = 0x0002 Backup = 0x0003 Edge = 0x0004 RSTP disable = 0x0005 Linkdown - 0x0006
14	2	INT16	Port Status	Forwarding = 0x0001 Blocked = 0x0002

Examples

Productivity 2000 I/O Messaging

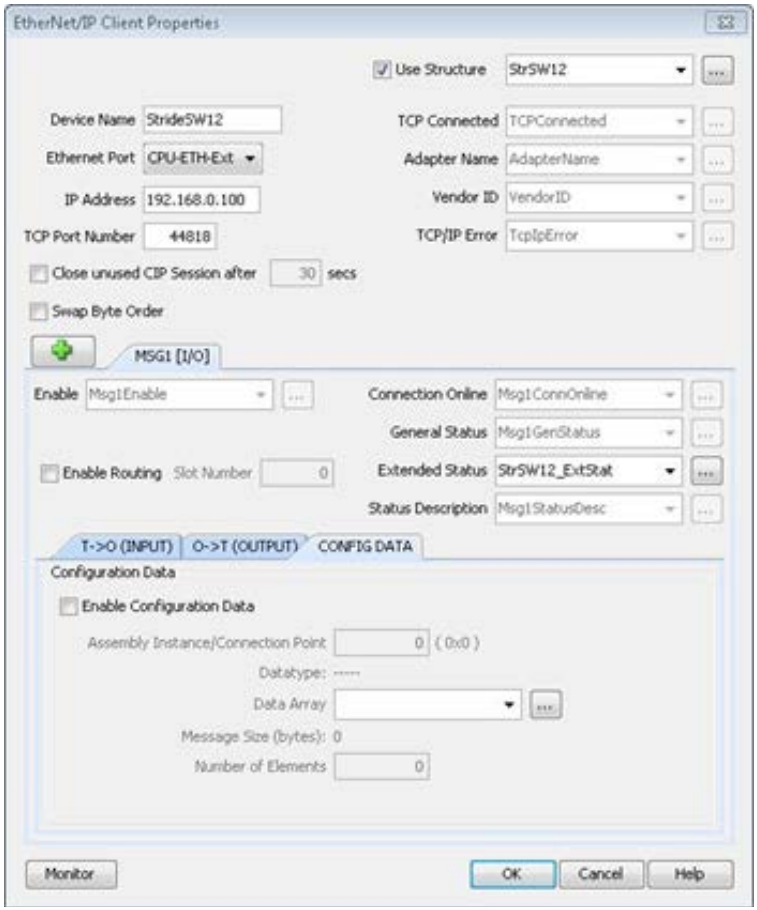
Input Data



Output Data

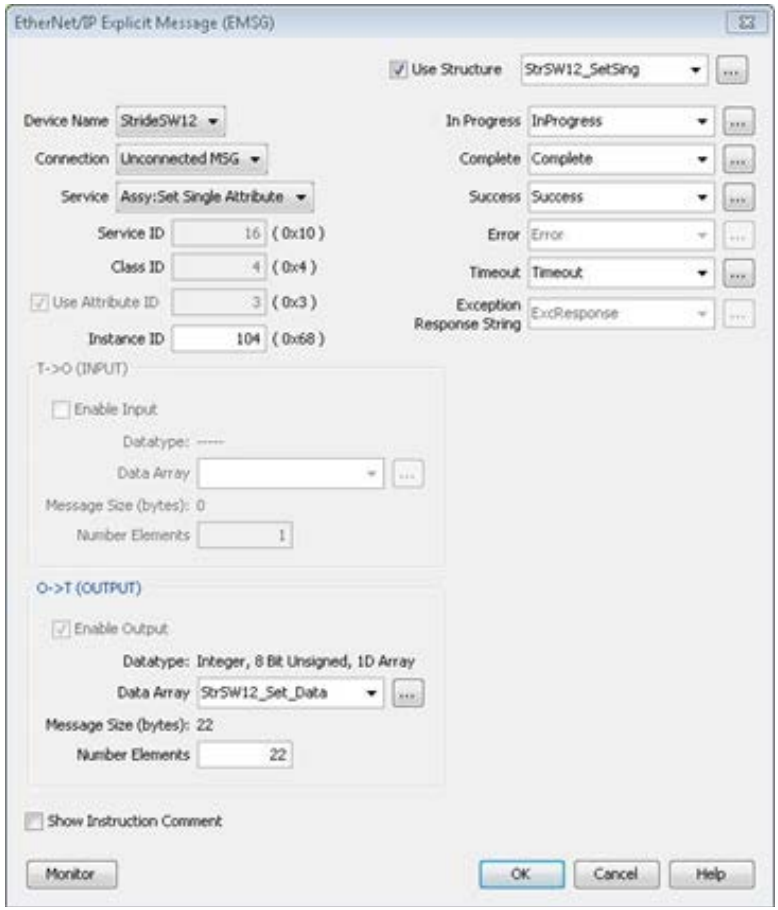

EtherNet/IP Client Properties
Use Structure
StrSW12
Device Name
StrideSW12
TCP Connected
TCPConnected
Ethernet Port
CPU-ETH-Ext
Adapter Name
AdapterName
IP Address
192.168.0.100
Vendor ID
VendorID
TCP Port Number
44818
TCP/IP Error
TcpIpError
Close unused CIP Session after
30
secs
Swap Byte Order
MSG1 [I/O]
Enable
Msg1Enable
Connection Online
Msg1ConnOnline
General Status
Msg1GenStatus
Enable Routing
Slot Number
0
Extended Status
StrSW12_ExtStat
Status Description
Msg1StatusDesc
T->O (INPUT)
O->T (OUTPUT)
CONFIG DATA
Originator To Target (OUTPUT) Data
RPI Time (msec)
250
Assembly Instance/Connection Point
102
(0x66)
Datatype: Integer, 8 Bit Unsigned, 1D Array
Data Array
StrSW12_Output_Data
Message Size (bytes): 20
Number of Elements
20
Include Status Header
Monitor
OK
Cancel
Help

Configuration Data (None)

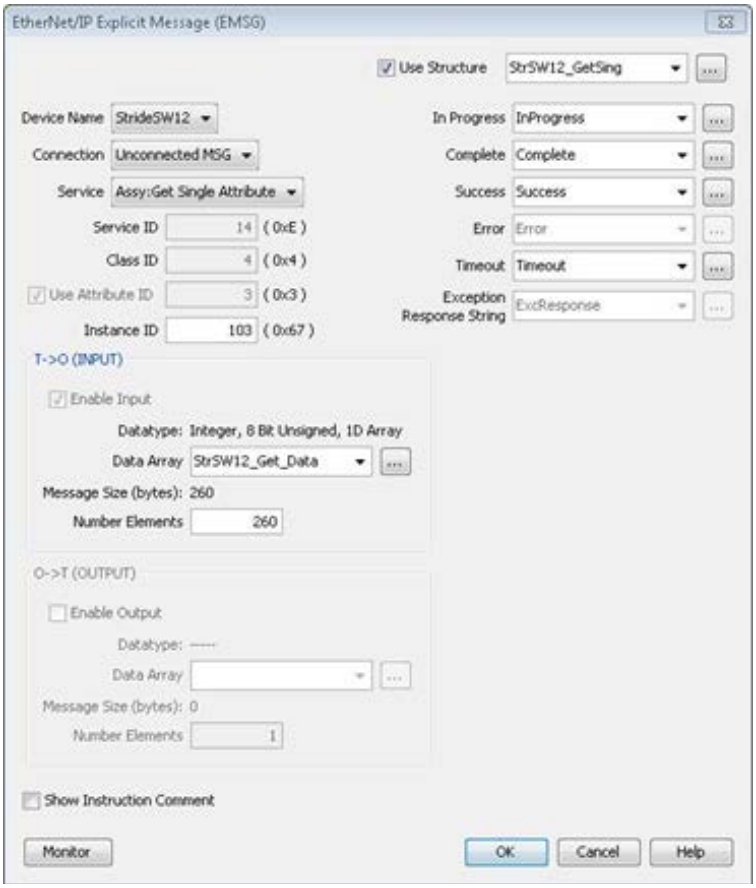


Productivity 2000 Explicit Messaging

Set Single Attribute Service

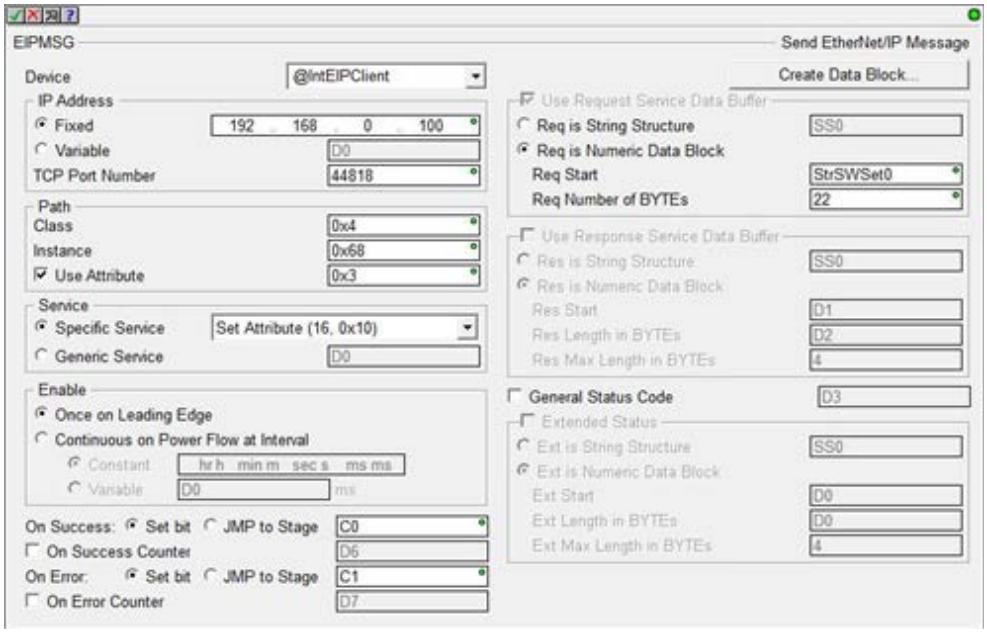


Get Single Attribute Service

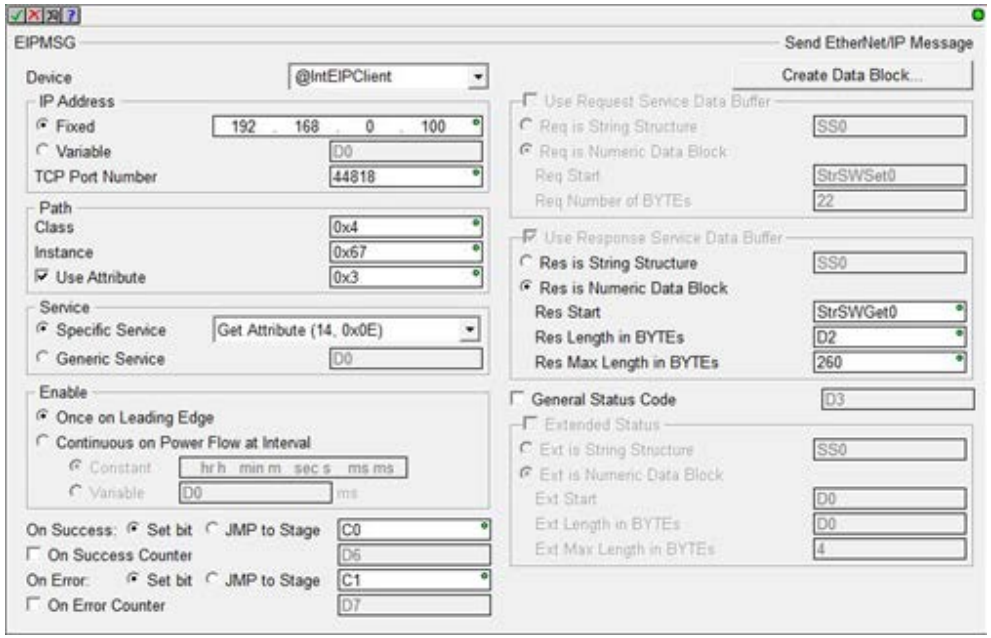


Do-more Explicit Messaging

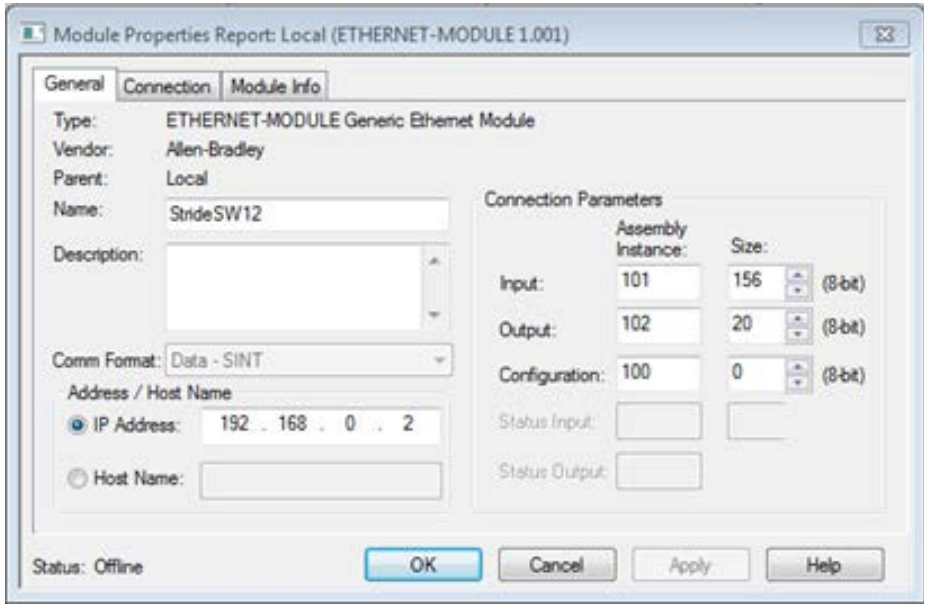
Set Single Attribute Service



Get Single Attribute Service

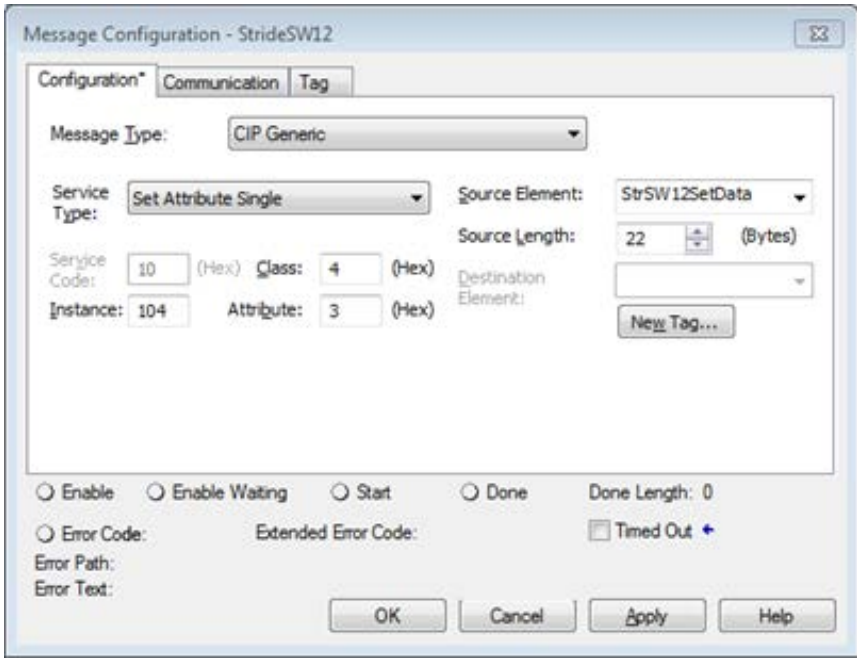


CompactLogix I/O Messaging



CompactLogix Explicit Messaging

Set Single Attribute Service



Get Single Attribute Service