G9SP Ethernet IP Communication to Rockwell CompactLogix PLC's

Rev1.0

Micheal Paradiso

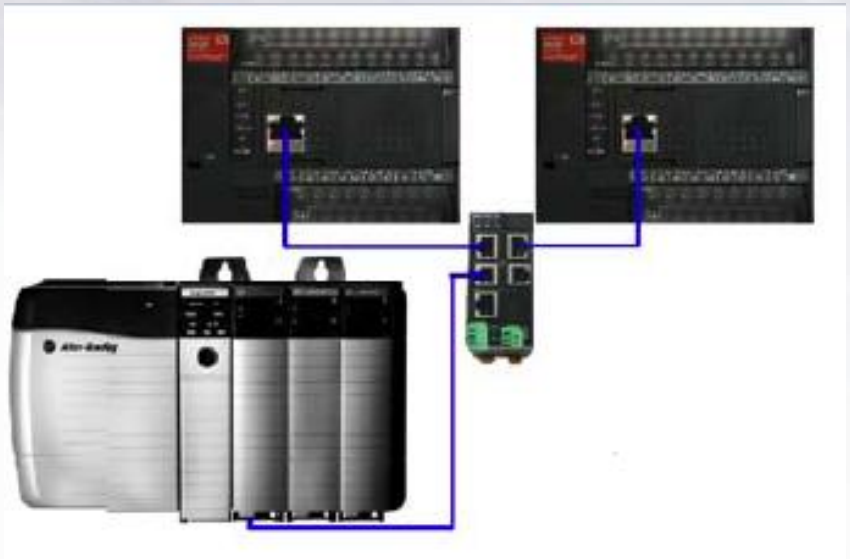
This document will walk you through a step by step setup for communication from a G9SP to a Allen Bradley CompactLogix PLC using Ethernet IP communications .

Example code for this presentation has two files associated with it, one file can be opened using Omron's Network Configurator for Safety Devices and other with Allen Bradley RSLogix 5000 software.

File Names

G9SP_Ethernet_IP_Rockwell_Example_Rev1.ACD

Overview of G9SP Ethernet IP



The CM-EIP-1 adapter has been developed to allow Omron STI G9SP safety controllers to be monitored and controlled from PLCs and other automation equipment using the EtherNet/IP communications protocol. This communications capability allows the G9SP to function as an integrated part of entire automation system. The adapter is an EtherNet/IP Connection Target, meaning the adapter cannot establish a connection to another device. A device, such as an Omron CJ or CS series PLC or Rockwell Automation CompactLogix or ControlLogix programmable controller with an EtherNet/IP module, functioning as a Connection Originator, must be the device used to establish the Implicit Message (Datalink) connection to the CM-EIP-1. Only 1 Originator can establish a connection to CM-EIP-1. The CM-EIP-1 does not support communications to multiple Originator PLCs.

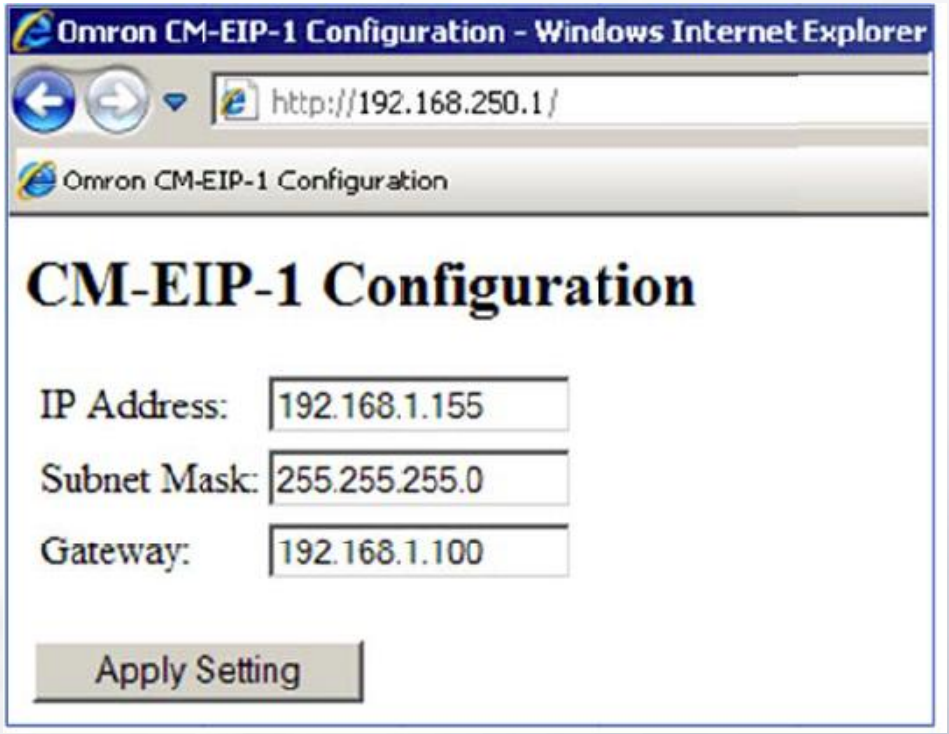
Some manufacturers, including Omron, require an .eds file for use in a software configuration package to connect the CM-EIP-1 to a PLC. This .eds file is available from the Omron STI website:

G9SP Ethernet IP Adapter Setup

The CM-EIP-1 is assigned a default IP address of 192.168.250.1. The IP address can be changed using a web browser pointed to the IP address of the adapter. A static IP address must be assigned to the PC's Ethernet card for this purpose. Simply enter the IP address of the CM-EIP-1 adapter (192.168.250.1) in the web browsers address field to access the configuration page. Enter the desired new IP address (192.168.1.155 shown as an example), subnet mask, and default gateway (if applicable). When finished, click **Apply Setting**.

For the setting to take affect, reboot the G9SP safety controller after changing the IP address through the web page interface

Note: The IP address for the CM-EIP-1 cannot be configured from within the G9SP Configurator. The configuration section is only for Ethernet for the FINS Ethernet Adapter CP1W-CIG41



Data Exchange With A G9SP

There are 2 assemblies that Produce data from the G9SP to the PLC. The user can select which assembly is used at the time the connection to the G9SP is configured. Consult the G9SP Operation Manual (Z922) for a definition of the data in the assemblies. Note: The order of the data from the CM-EIP-1 is **not** identical to that shown in Omron manual Z922 for serial or FINS Ethernet communications.

Assembly 100

Bytes	Data
0 + 1	Optional Comms Transmission Data
2 + 3	Optional Comms Transmission Data
4 + 5	Safety Input Terminal Data Flags
6 + 7	Safety Input Terminal Data Flags
8 + 9	Safety Input Terminal Data Flags
10 + 11	Safety Output Terminal Data Flags
12 + 13	Safety Output Terminal Data Flags
14 + 15	Safety Input Terminal Status Flags
16 + 17	Safety Input Terminal Status Flags
18 + 19	Safety Input Terminal Status Flags
20 + 21	Safety Output Terminal Status Flags
22 + 23	Safety Output Terminal Status Flags
24 + 25	Safety Input Terminal Error Causes
26 + 27	Safety Input Terminal Error Causes
28 + 29	Safety Input Terminal Error Causes
30 + 31	Safety Input Terminal Error Causes
32 + 33	Safety Input Terminal Error Causes
34 + 35	Safety Input Terminal Error Causes
36 + 37	Safety Input Terminal Error Causes
38 + 39	Safety Input Terminal Error Causes
40 + 41	Safety Input Terminal Error Causes
42 + 43	Safety Input Terminal Error Causes
44 + 45	Safety Input Terminal Error Causes
46 + 47	Safety Input Terminal Error Causes
48 + 49	Safety Output Terminal Error Causes
50 + 51	Safety Output Terminal Error Causes
52 + 53	Safety Output Terminal Error Causes
54 + 55	Safety Output Terminal Error Causes
56 + 57	Safety Output Terminal Error Causes
58 + 59	Safety Output Terminal Error Causes
60 + 61	Safety Output Terminal Error Causes
62 + 63	Safety Output Terminal Error Causes
64 + 65	Unit Status
66 + 67	Communications Status

Assembly 102

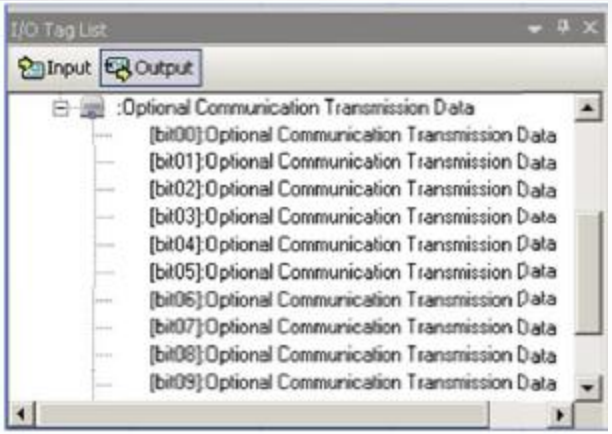
Bytes	Data
0 + 1	Optional Comms Transmission Data
2 + 3	Optional Comms Transmission Data
4 + 5	Safety Input Terminal Data Flags
6 + 7	Safety Input Terminal Data Flags
8 + 9	Safety Input Terminal Data Flags
10 + 11	Safety Output Terminal Data Flags
12 + 13	Safety Output Terminal Data Flags
14 + 15	Safety Input Terminal Status Flags
16 + 17	Safety Input Terminal Status Flags
18 + 19	Safety Input Terminal Status Flags
20 + 21	Safety Output Terminal Status Flags
22 + 23	Safety Output Terminal Status Flags
24 + 25	Unit Status
26 + 27	Communications Status

Bit layout of the **O**ptional **C**ommunications **T**ransmission **D**ata

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	OCTD 07	OCTD 06	OCTD 05	OCTD 04	OCTD 03	OCTD 02	OCTD 01	OCTD 00
1	OCTD 15	OCTD 14	OCTD 13	OCTD 12	OCTD 11	OCTD 10	OCTD 09	OCTD 08
2	OCTD 23	OCTD 22	OCTD 21	OCTD 20	OCTD 19	OCTD 18	OCTD 17	OCTD 16
3	OCTD 31	OCTD 30	OCTD 29	OCTD 28	OCTD 27	OCTD 26	OCTD 25	OCTD 24

Data Exchange With A G9SP

The Optional Communications Transmission Data bits correspond to the Optional Communications Transmission Data bits in the G9SP configurator as shown below.



5.2 Consumed Data:
There is 1 assembly that Consumes data from the PLC into the G9SP. The only data consumed by the G9SP is the 32 bits of Optional Communications Reception Data.

Bytes	Data
0 + 1	Optional Communications Reception Data
2 + 3	Optional Communications Reception Data
4 + 5	Reserved

Unit Status: The G9SP Unit Status will be stored in bytes 24 and 25 for assembly 102, and bytes 64 and 65 for assembly 100. The data format is shown below.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
24 or 64	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Unit OK
25 or 65	Reserved	Reserved	FB Error	Reserved	Reserved	Safety Term Err	Output Pwr Err	Reserved

Communications Status: The status of the G9SP to CM-EIP-1 communications will be stored in bytes 26 and 27 for assembly 102, and bytes 66 and 67 for assembly 100. Check the value of Byte 26 / 66 before considering the Produced Data to be valid.

Byte	No Comms Errors	Communications Error
26 or 66	01	00
27 or 67	CB	Error Code

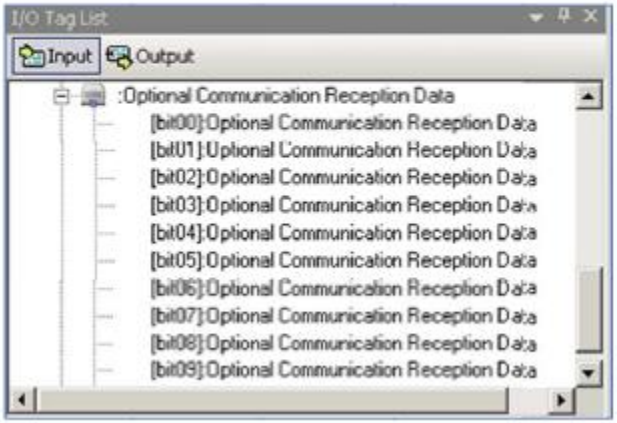
always in control

Data Exchange With A G9SP

Bit layout of the Optional Communications Reception Data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	OCRD 07	OCRD 06	OCRD 05	OCRD 04	OCRD 03	OCRD 02	OCRD 01	OCRD 00
1	OCRD 15	OCRD 14	OCRD 13	OCRD 12	OCRD 11	OCRD 10	OCRD 09	OCRD 08
2	OCRD 23	OCRD 22	OCRD 21	OCRD 20	OCRD 19	OCRD 18	OCRD 17	OCRD 16
3	OCRD 31	OCRD 30	OCRD 29	OCRD 28	OCRD 27	OCRD 26	OCRD 25	OCRD 24

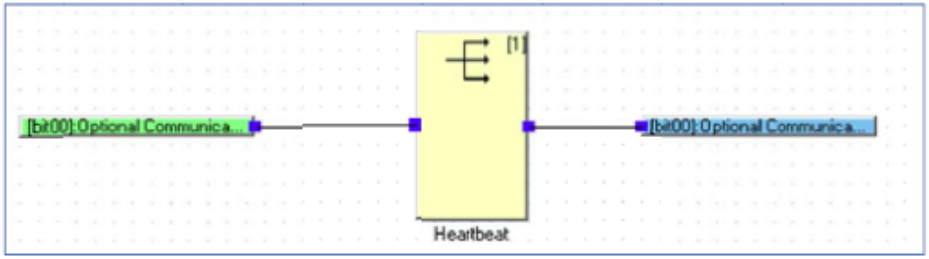
The Optional Communications Reception Data bits correspond to the Optional Communications Reception Data bits in the G9SP configurator as shown below.



Section 6: Application Heartbeat

An option that many users may find useful is a user created heartbeat signal. This signal would originate from the PLC, transfer to the G9SP, through the logic programming in the G9SP, and back to the PLC. This allows the PLC to easily determine if the entire communications pathway and the associated G9SP program are functioning normally.

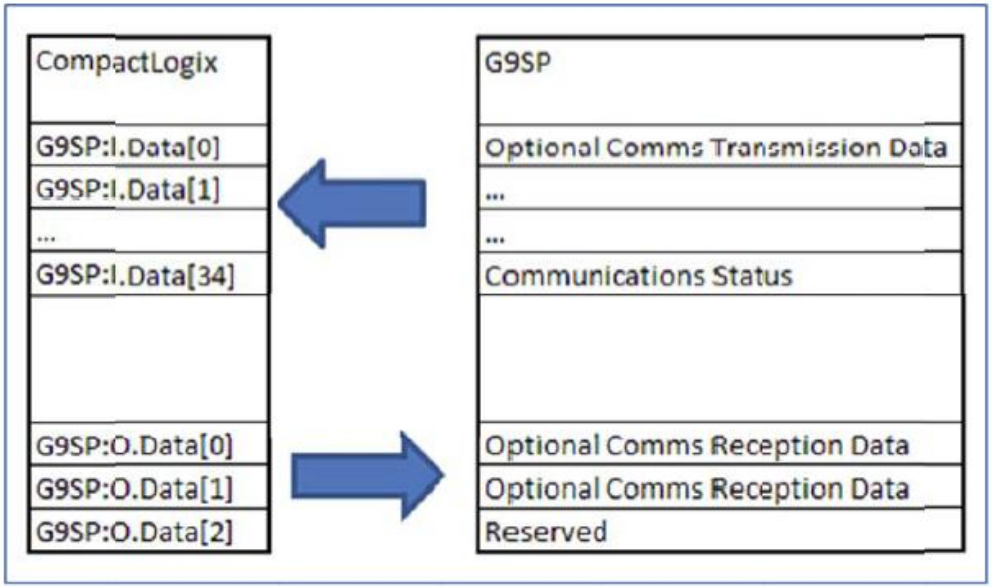
A simple Routing Function Block connecting an Optional Communications Reception Data bit to an Optional Communications Transmission bit will accomplish this in the G9SP. The PLC programmer can then pulse the Optional Communication Reception bit, and look for the Optional Communications Reception bit to turn on.



Setting up EIP Connection To Rockwell

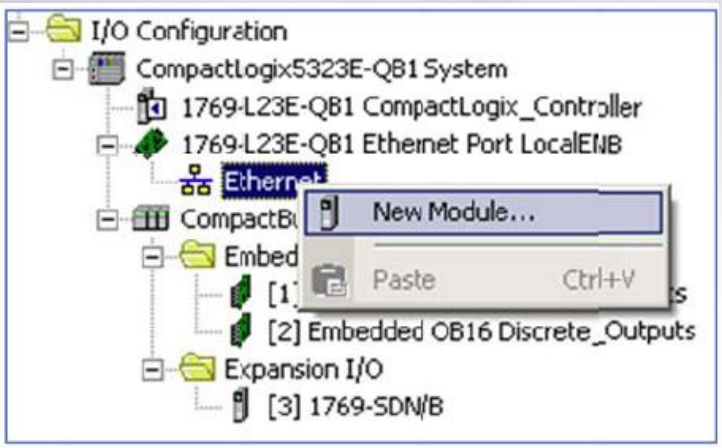
Section 8: Establishing a Connection with an Rockwell Automation CompactLogix: Example

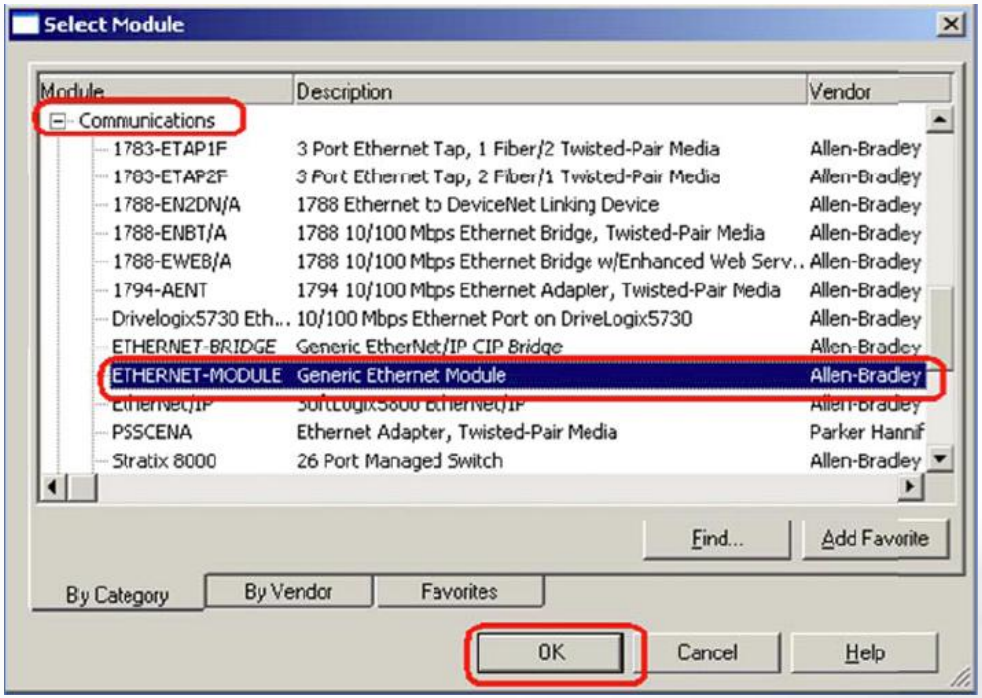
A connection will be established between a G9SP and a CompactLogix in the following steps. A ControlLogix would be nearly identical.



1. Plug the CM-EIP-1 adapter the G9SP, and apply power to the G9SP.
2. Connect the CompactLogix, CM-EIP-1, and PC to an Ethernet Switch.
3. Open the project file or create a new project file for the CompactLogix in RSLogix 5000.
4. Configure the IP address of the CompactLogix as 192.168.1.77 using RSLogix 5000.
5. Configure the IP address of the CM-EIP-1 as 192.168.1.25 through the Web Page interface, as shown previously in **Section 3.**

Setting up the Allen Bradley PLC

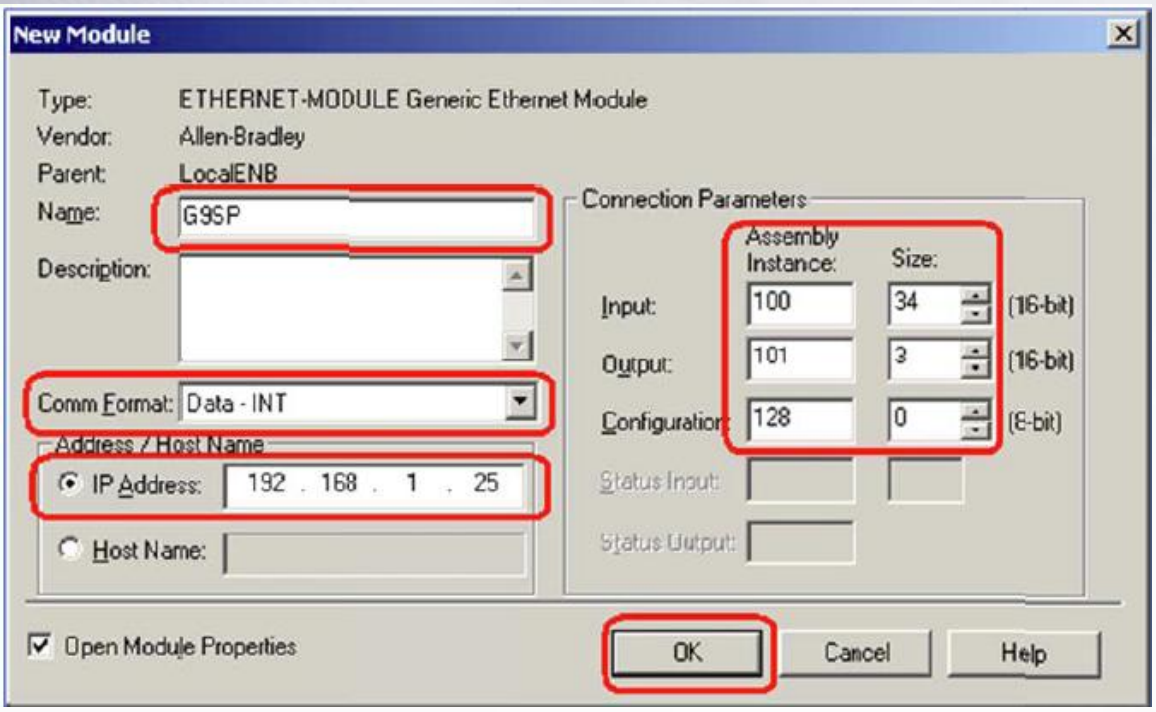




- **Connect the G9SP , Allen Bradley PLC and PC to the Ethernet IP switch.**
- Open or create a new project file for the CompactLogix in RSLogix 5000.
- Configure the IP address of the CompactLogix to the same sub net as the PC and the G9SP 192.168.250.XXX,
- Right click on the Ethernet module in the CompactLogix, and click “New Module”.
- In the Communications group, select Ethernet-Module Generic Ethernet Module, and click OK.

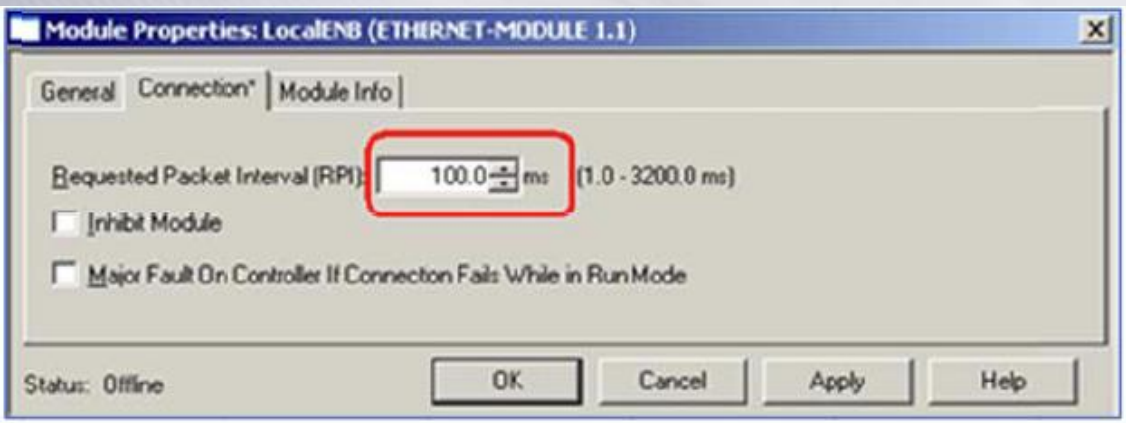
always in control

AB Software Configuration



- Type in the Name you would like to use in the Name field.
- In the Comm Formant field select "**Data-INT**".
- **Configure the IP address to the IP address of the G9SP for the Address/Host name**.
- In the Connection Parameters put **100** for the **Input** "Assembly Instance" and the size to **34** because the AB PLC uses 16 bit format, the data size will be 34 instead of 68 that is shown for the Omron PLC's.
- In the **Output** "Assembly Instance" put **101** the data size to **3**
- The Configuration data type is not used by the Omron controllers, this field should always have "255" and "0"
- Select OK once all the data has been entered into the fields.

AB Software Configuration



- Configure the RPI for 100ms and click OK.
- The tags will be created automatically for the G9SP
- Download the project to the CompactLogix processor
- This is all that is needed for this configuration.