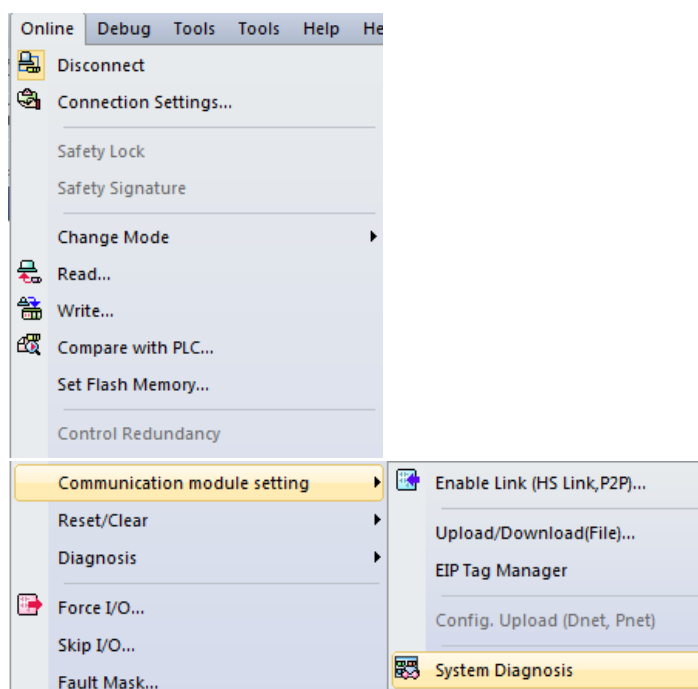


5.6 System Diagnosis

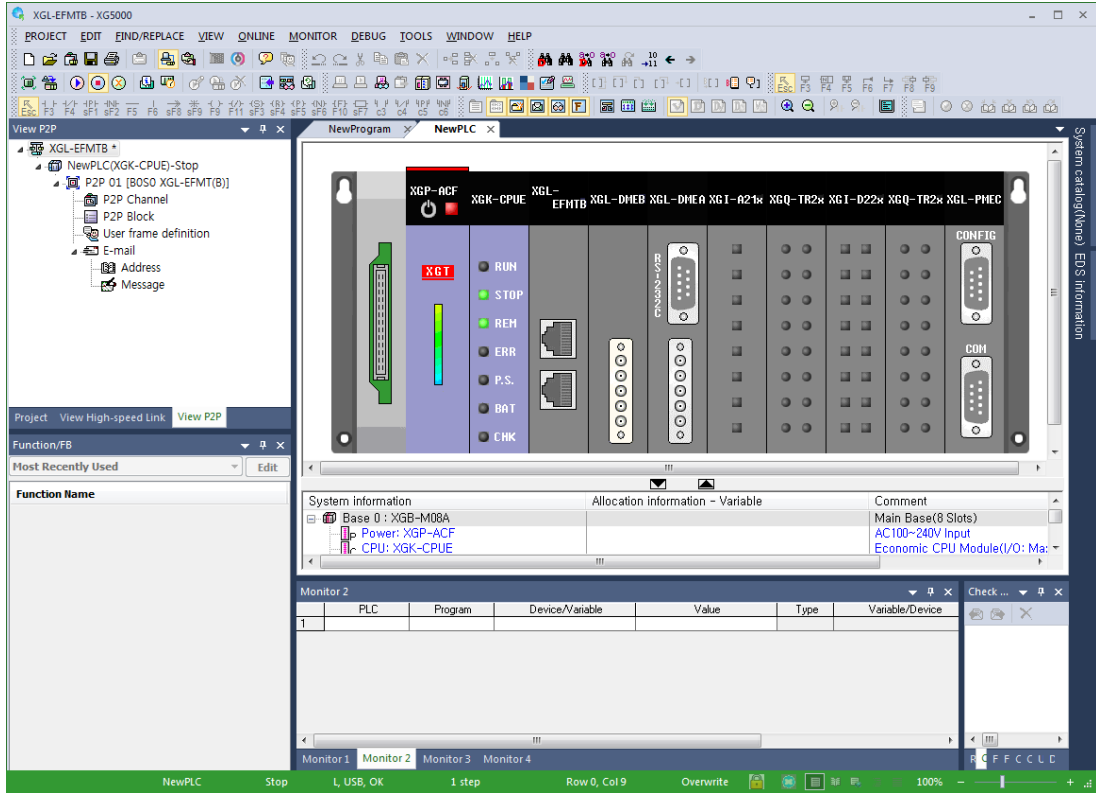
System Diagnosis function is used to display general service status and information of the communication module in Online status including link type, link information and OS version so to allow the user to precisely diagnose and debug the data Tx/Rx relation of the communication module presently used.

5.6.1 Execution of the diagnosis function

Run XG5000 to connect with and then select [Online] -> [Communication module setting] -> [System Diagnosis] to display [Fig. 5.6. 2], which shows base and slot information the present module is installed on and the operation status.



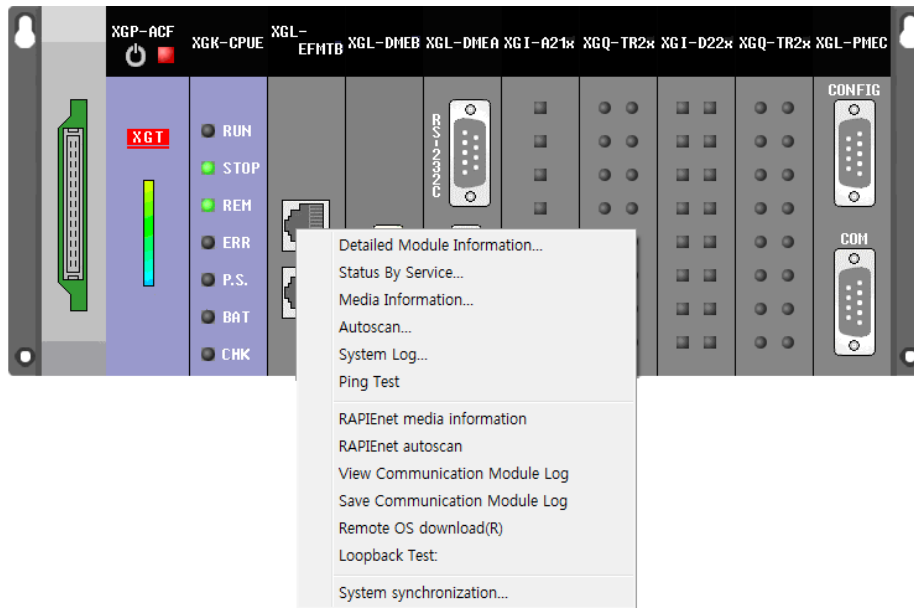
[Fig. 5.6.1] Selection of system diagnosis function



[Fig. 5.6.2] Module information of system diagnosis

5.6.2 Type of diagnosis functions

Through the pop-up menu as in the initial diagnosis screen [Fig. 5.6.3], system status can be diagnosed for the various communication modules. Main functions for each item are as described below in [Table 5.6.1].



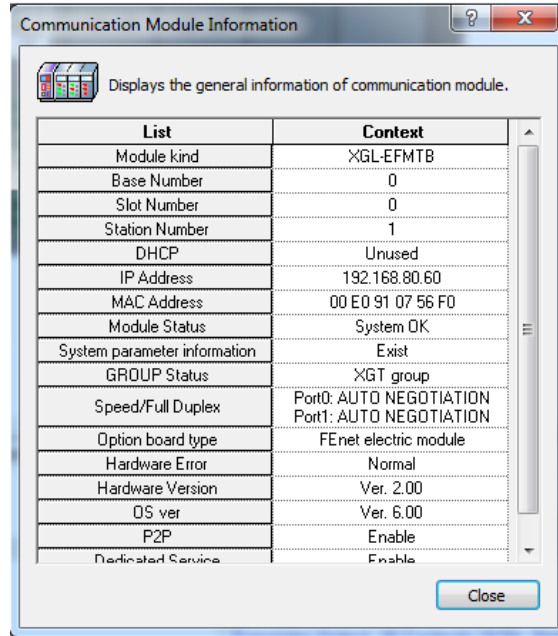
[Fig. 5.6.3] Diagnosis function pop-up of module

Classification	Description
Detailed module information	Displays communication module's basic information, H/W and communication status.
Status by service	Displays the status of dedicated communication, P2P, HS link service, etc.
Media information	Provides packet information of Tx/Rx data through media.
Ping test	Displays port connection status of other station specified on the network.
Autoscan	Provides active IP information for all the modules specified on the present network.
RAPIEnet media information (OS V6.0 or above)	Supports packet information of RAPIEnet
RAPIEnet auto scan (OS V6.0 or above)	Supports modules and configuration information on the RAPIEnet network.
Communication module history (OS V6.0 or above)	Supports event/communication history information of communication module.
Save communication module history (OS V6.0 or above)	Saves event and communication history information.
Remote OS download (OS V6.0 or above)	Updates the OS of the remote module in the network.
Loopback test (OS V6.0 or above)	It is a function to check the H / W abnormality of the local module and check loopback for each port.

[Table 5.6.1] Detailed diagnosis services

(1) Communication module information

Communication module information shows basic information such as base information, High-speed link station No., IP information, etc. in addition to media and start status of the communication service, through which the user can confirm that the communication module normally transmits and receives the data.



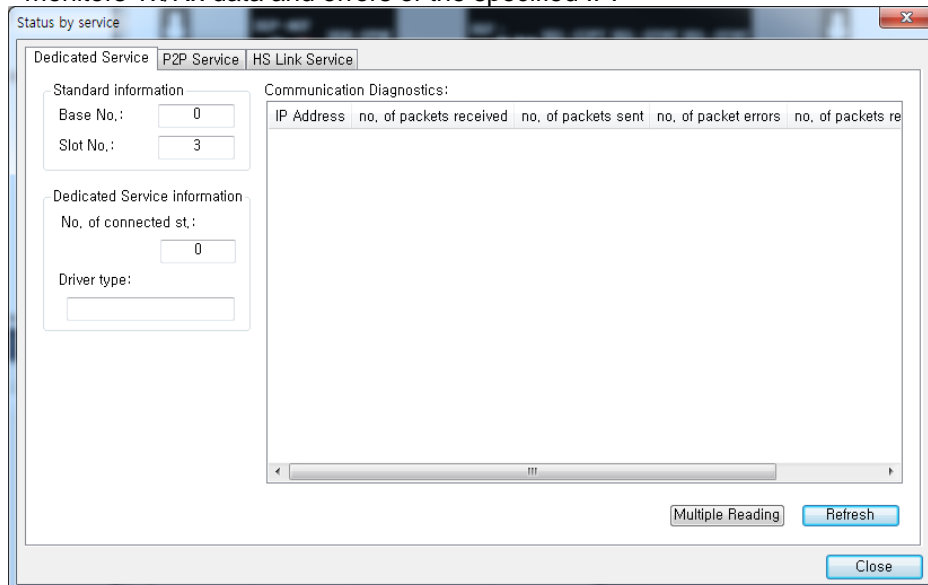
[Fig. 5.6.4] Communication module information

(2) Service status

Service status of the communication module is classified into 3 (dedicated communication, P2P and High-speed link), which show detailed information on the respective communication services.

1) Dedicated Service

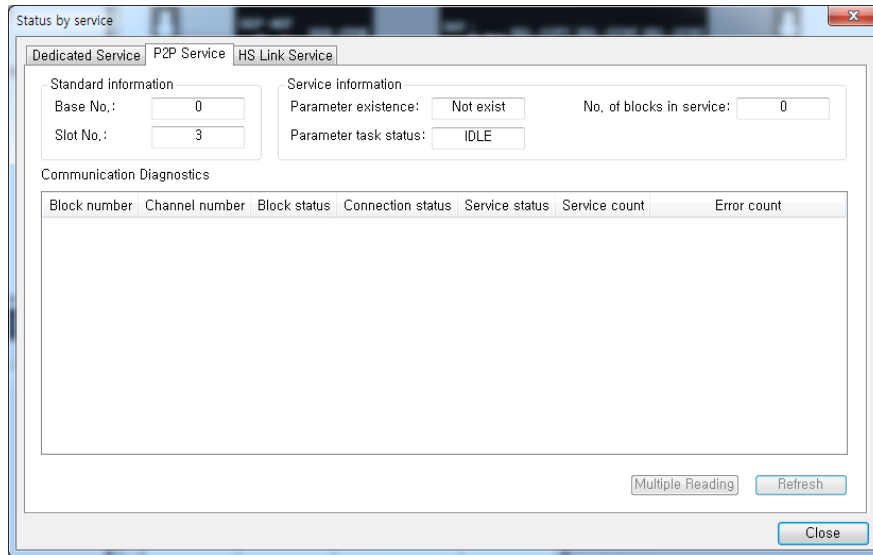
Displays the service status of MMI or HMI dedicated protocol by means of higher client, and monitors Tx/Rx data and errors of the specified IP.



[Fig. 5.6.5] Dedicated service monitor

2) P2P Service

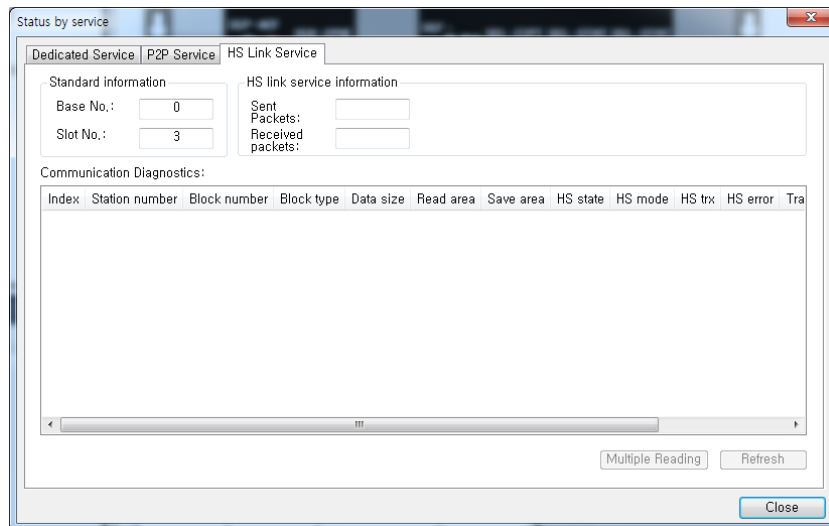
Displays detailed information on the user defined service executed, and checks normal service to read if P2P parameters are set and enabled, where real time monitoring is available with Individual Read or Continuous Read specified on the menu.



[Fig. 5.6.6] P2P service monitor

3) HS Link Service

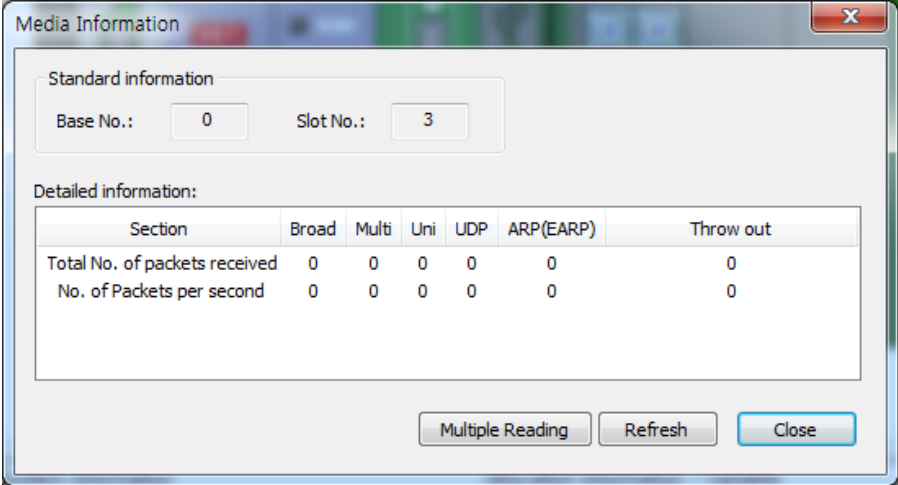
Monitor flags of respective parameters for High-speed link setting data. Run link, link trouble and individual information can be all monitored by High-speed link service.



[Fig. 5.6.7] High-speed link service monitor

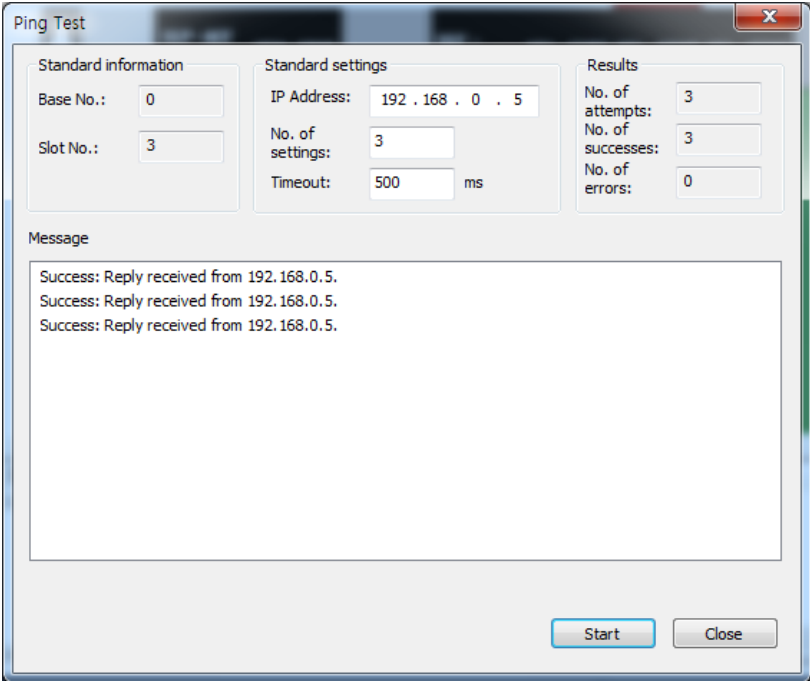
(3) Media Information

Displays the packet information input through the media.



[Fig. 5.6.8] Media information

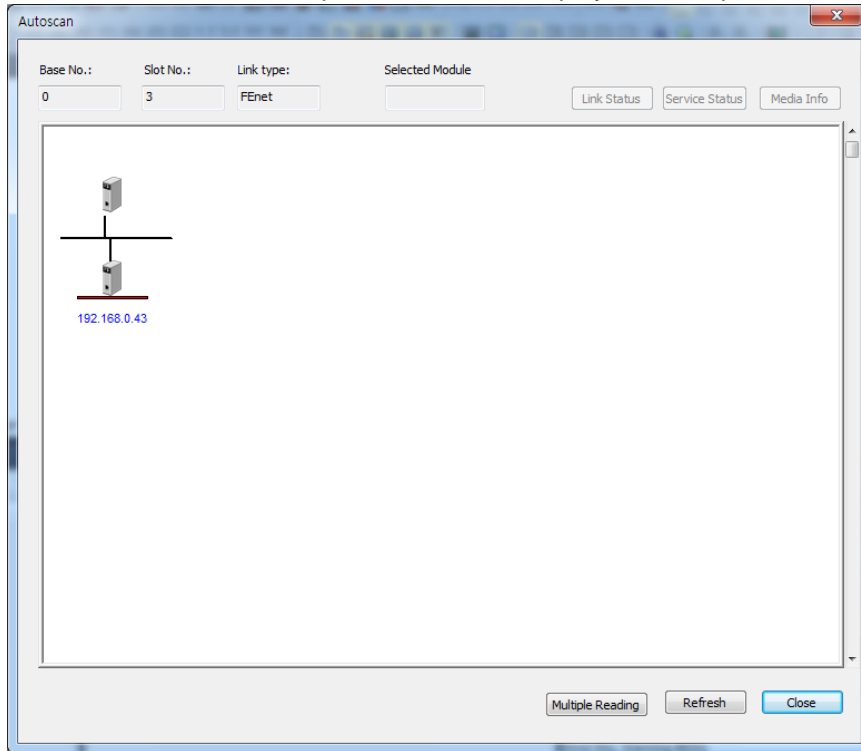
(4) Ping Test



[Fig 5.6.9] Ping Test monitor for the destination station number

(5) Auto scan

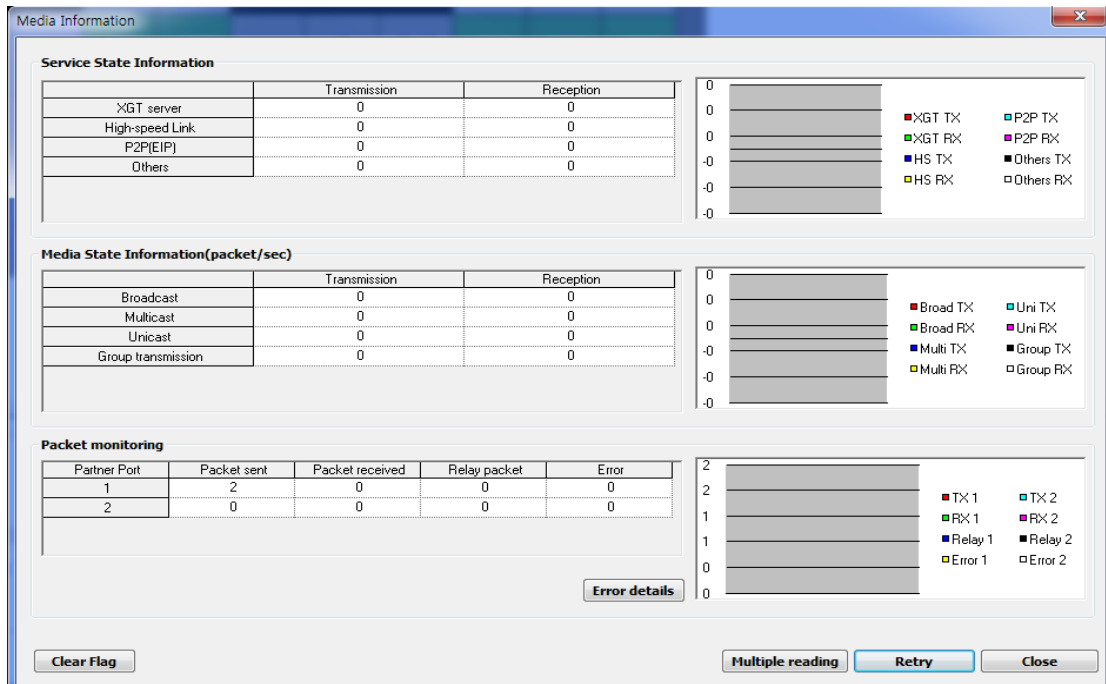
Display the link interface status of the whole network. The service status of FEnet I/F module connected with the public network is displayed as simple as shown in the diagram.



[Fig. 5.6.10] Network Auto scan

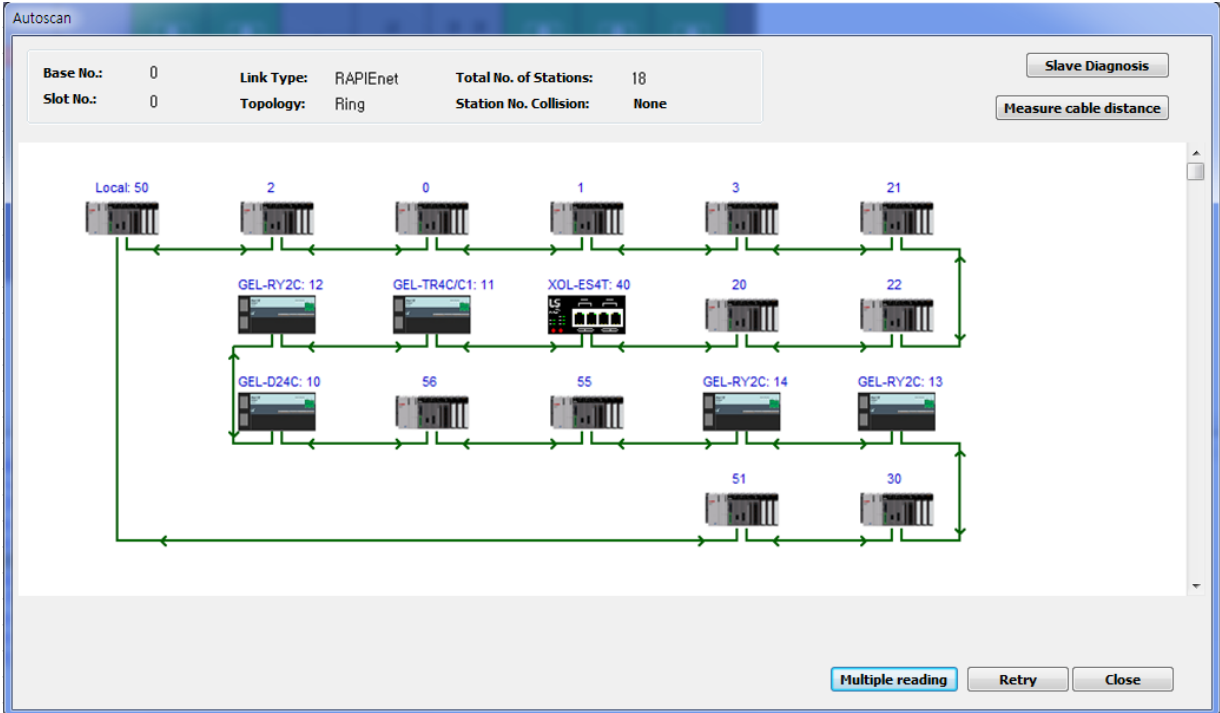
(6) Media information of RAPIenet (OS V6.0 or above)

Indicates the status of the link interface across the RAPIenet network.



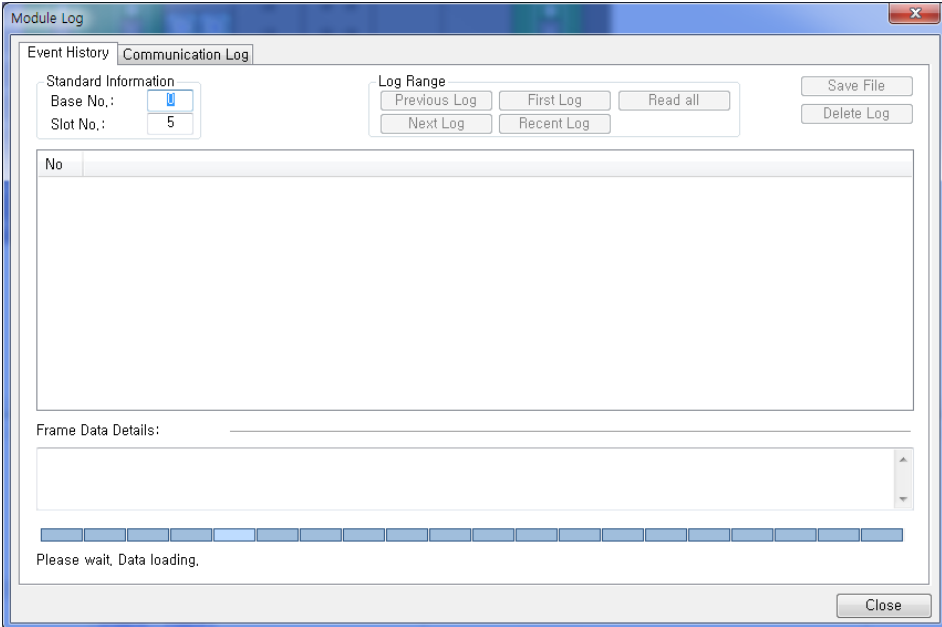
[Fig 5.6.11] Media information of RAPIenet

(7) Auto scan of RAPIEnet (OS v6.0 or above)
Indicates the status of the link interface across the RAPIEnet network.



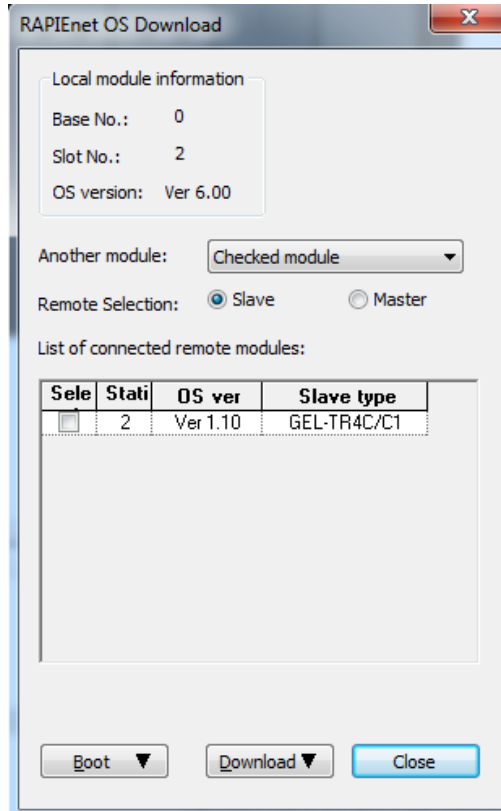
[Fig 5.6.12] Auto scan of RAPIEnet

(8) View Communication Module Log (OS v6.0 or above)
Indicates event and communication history occurred in communication module.



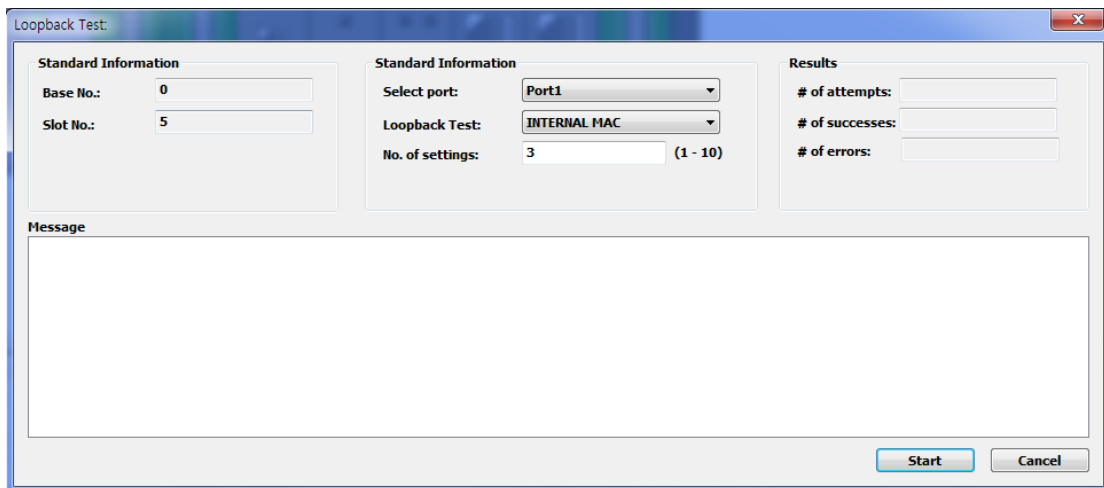
[Fig 5.6.13] View Communication Module Log

- (9) Remote OS download (OS v6.0 or above)
Updates the OS of the remote communication module.



[Fig 5.6.14] Remote OS download

- (9) Loopback test (OS v6.0 or above)
Tests the H/W abnormality through the loopback test of the Ethernet I / F of the local communication module.



[Fig 5.6.15] Loopback test

Chapter 6 High-speed Link Service

6.1 Introduction

High-speed link (HS link) is a communication method between XGT PLC communication modules to send and receive data with High-speed link parameters setting, which can also allow the user to use XG5000 to exchange data with parameters setting of Send/Receive data size, communication period, Send/Receive area and area to save through its data transmission service function.

However, since High-speed link service uses the subnet broad service, it may have an influence on other communication modules which use the identical network. Thus, setting block size as near to the maximum Send/Receive size (400 bytes or 200 words) as available per High-speed link block is recommended for the user to obtain the greatest communication efficiency with the lowest influence on other modules so to reduce the sum of blocks. In order to make use of all functions, surely specify the basic communication parameters in the status of communication available.

High-speed link functions are specified as below;

1) High-speed link block setting function

- (1) If there are many Send/Receive areas, up to 128 blocks can be setup.
- (2) 200 words are available for a block.

2) Communication period setting function

Send/Receive period can be setup per block by user for the areas where especially fast Tx/Rx is required and not required respectively in a Tx/Rx period of 20ms to 10 sec.

(OS v5.0 or above: The minimum transmission cycle is 5ms)

3) Send/Receive area setting function

Send/Receive area can be setup per data block by user according to memory address specified.

4) Providing function of High-speed link information

Reliable communication system can be easily configured by providing High-speed link information for user via the user keyword.

[Table 6.1.1] shows the data capacity of High-speed link communication whose basic unit is 1 word.

Classification	Max. communication words	Max. Send words	Max. blocks	Max. words per block
XGL-EFMT(B)	25,600	6,400	128 (0-127)	200

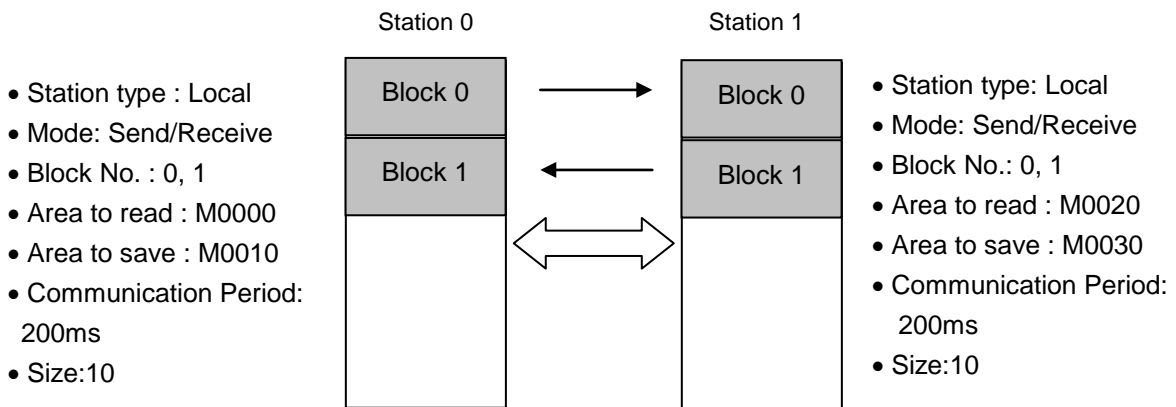
[Table 6.1.1] Max. Communication data capacity

6.2 High-speed Link Send/Receive Data Processing

High-speed link application will be described below with the example where FENet I/F modules of the stations No.0 and No.1 are to send and receive the data between each other.

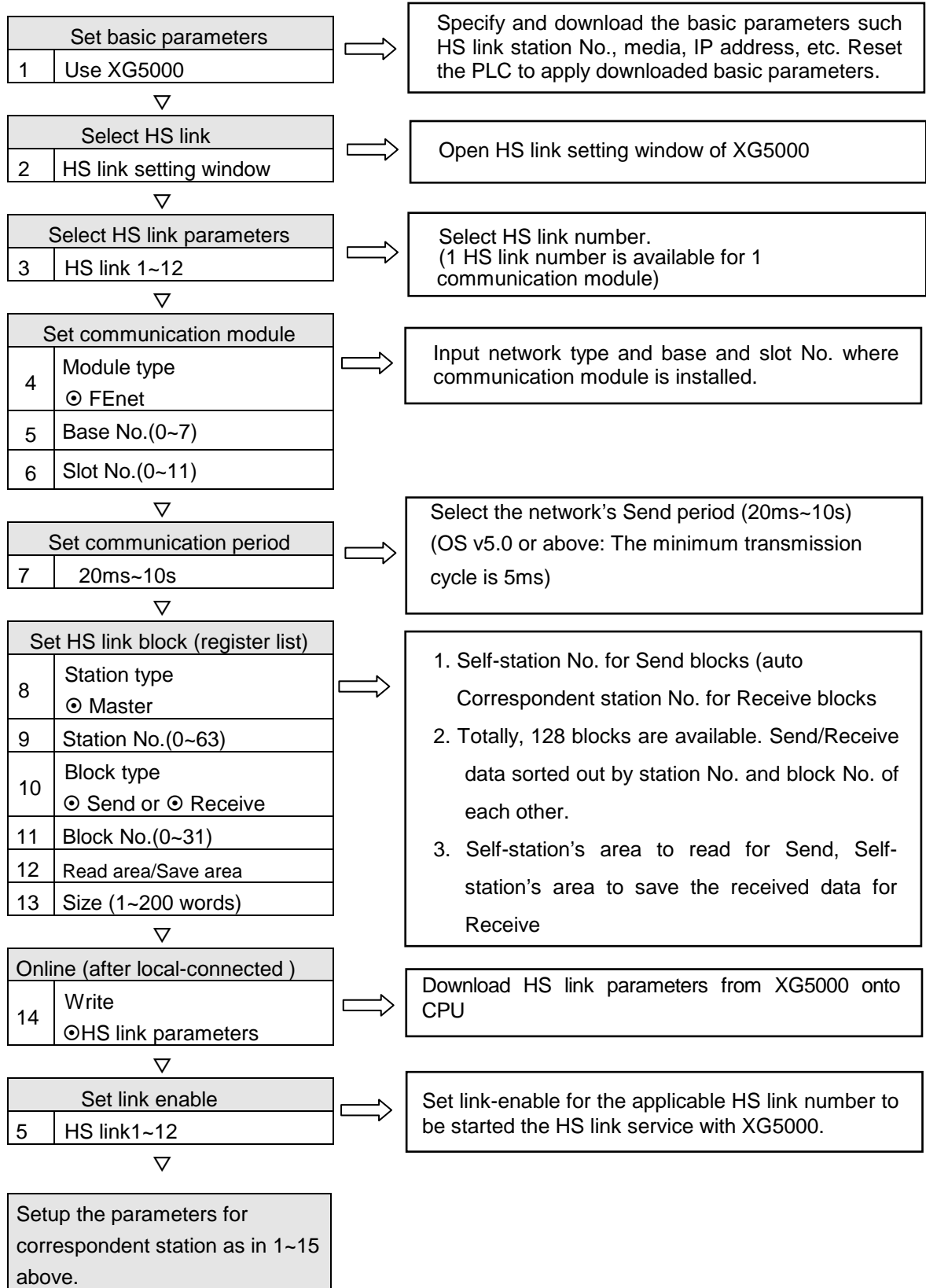
The station No.0 transmits the data of 10 words from M0000 to M0009 with block No.0 and the received data, transmitted by the station No.1, is saved on M0010. The station No.1 receives data of 10 words from the station No.0 to save on M0030, and transmits the data of 10 words from M0020 to M0029 word with block No.1.

There are 32 blocks for Send data and 64 blocks for Rx data in the High-speed link parameters. The block number can be set 0~31 for transmission or 0~63 for receiving. The Send side needs only to decide which data to read and which block number to send to without setting the destination station No. when transmitting the data is setup.



[Table 6.2.1] Diagram of High-speed link processing blocks

6.3 Operation Sequence through High-speed Link

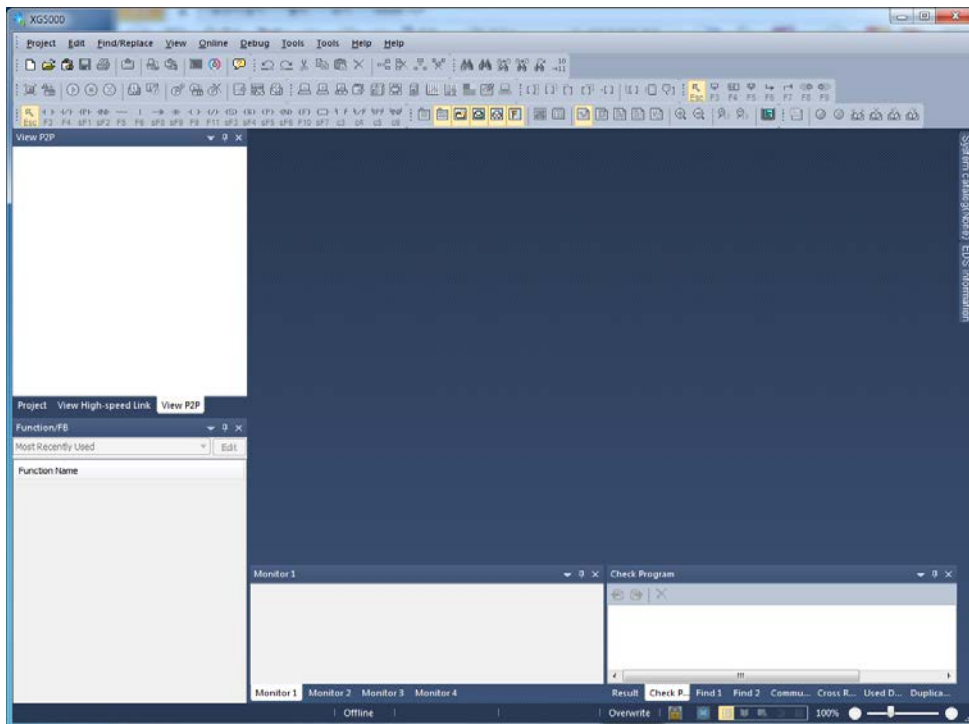


6.4 High-speed Link Parameters Settings

High-speed link parameters shall be setup by the means of setup respective items for High-speed link after selecting High-speed link parameter number on the Hs link screen of XG5000. The setting steps and the functions of respective items are explained below.

6.4.1 Execution of XG5000

The initial screen of XG5000 will be displayed as shown below [Fig. 6.4.1] when XG5000 is executed.



[Fig. 6.4.1] Initial screen of XG5000

6.4.2 Standard settings (Module)

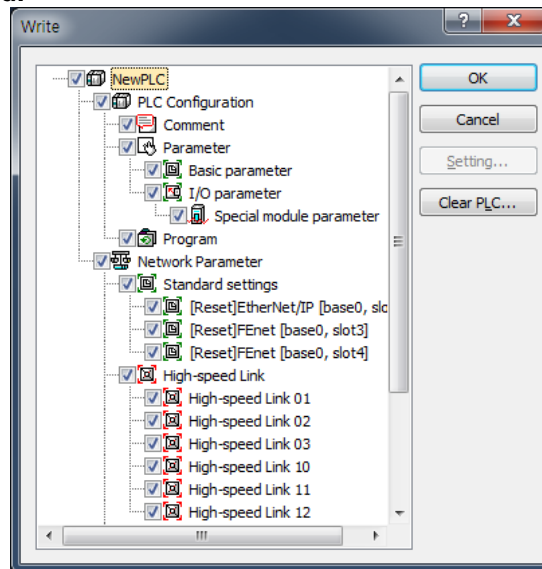
(1) Setting the communication module

Communication module setting can be registered via off-line or Online.
Refer to Chapter 5 XG5000 program for more details.

(2) Downloading standard settings

Select [Online] - [Write] to open the 'Write parameter' window of [Fig. 6.4.2]. Check applicable standard settings and click [OK] button.

After standard settings are downloaded, surely let PLC power turn off and on or reset. If the communication module is not reset, the new communication parameters information will not be applied.

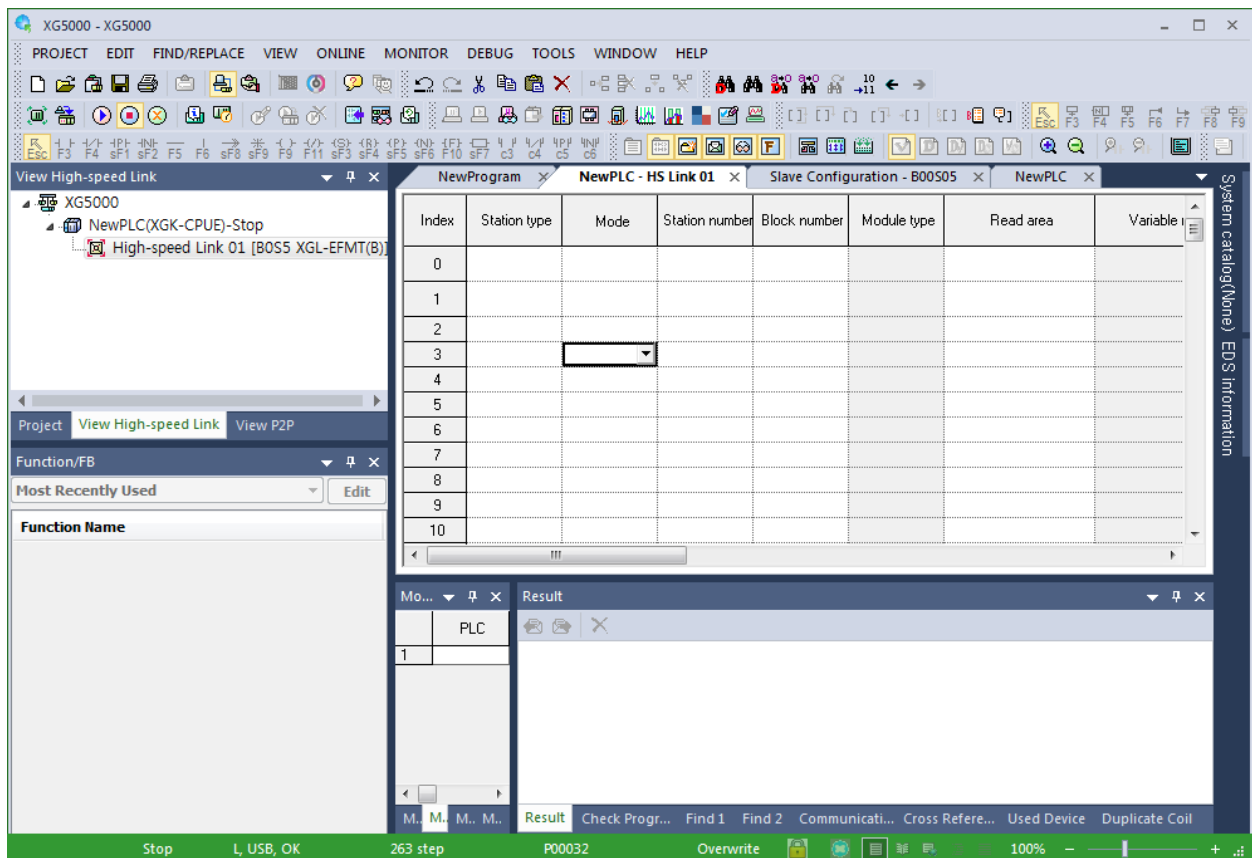


[Fig. 6.4.2] Write Parameter window

6.4.3 High-speed Link Parameters (HsLink)

(1) Initial screen setting of High-speed link parameters

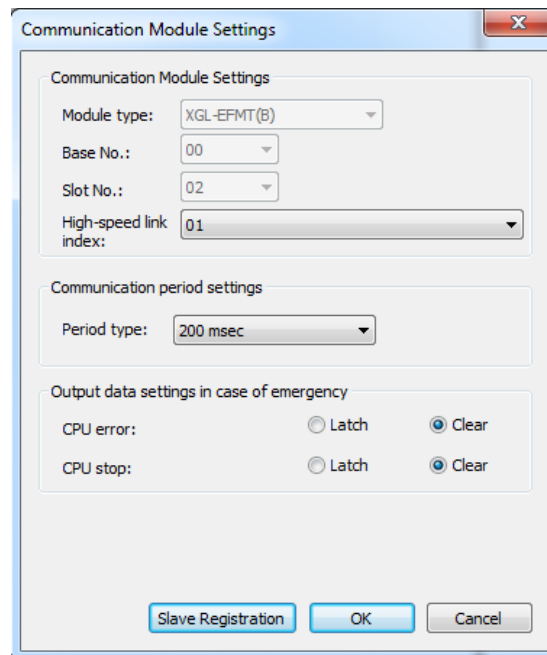
Select HsLink window of XG5000 to display the window where High-speed link parameters can be setup. 12 High-speed links are available for XGT series PLC. And parameters setting are available for the communication modules installed on the basic or extended base.



[Fig. 6.4.3] Initial screen of High-speed link settings

(2) Communication Module Settings and Communication period settings

Double-click one of the High-speed links 01~12 on the [Fig.6.4.3] screen to open the Communication Module setting dialog box depicted in [Fig. 6.4.4] to setup communication module and communication period.



[Fig. 6.4.4] Communication module setting

Set the applicable communication module and communication period in the dialog box.

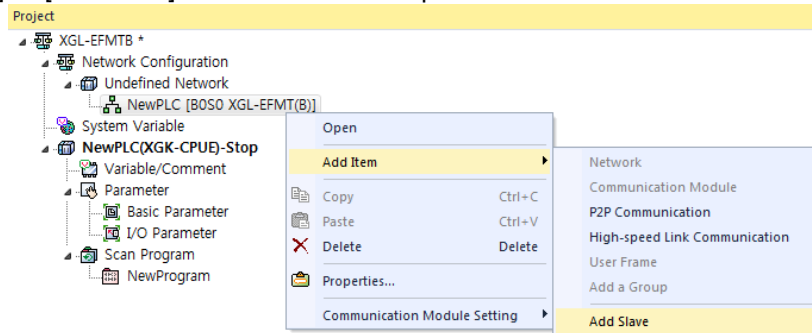
Item		Description
Communication module settings	Module type	Select the installed communication module type.
	Base No.	Select the base number where applicable FENet module is installed.
	Slot No.	Select the slot number where applicable FENet module is installed.
Communication period settings	Period type	<ul style="list-style-type: none"> - High-speed link service is used to send and receive data by user defined parameters when the execution of PLC program is ended. Thus, if the scan time of PLC program is as short as ms or less, the communication data will be increased since the communication module sends data at the end of every scan, which will cause decreased efficiency of the whole communication system. In order to prevent this, the communication is controlled by the specified communication period whose setting range is $20\ ms \sim 10\ sec$, which will be automatically set to default of $200\ ms$ if not specified. - The communication period will be applied for Send blocks. - The communication period will be applied identically to all the Send blocks included in the same High-speed link parameter number.

Output data setup in case of emergency	Latch	Maintain and send the latest data received from CPU. It is seen that it is cleared if CPU sends data as 0 even though latch is set. Make sure to check the emergency output data setting of CPU.
	Clear	It sends by setting received High-speed Link data as 0 in ignoring data from CPU. If emergency data is set as 'clear' in emergency output data setting of XG5000 High-speed Link module setting even though emergency output data setting of device area of High-speed Link sending part is set as latch in CPU, the data set as 0 is sent. Make sure to set it after checking desired operation.
Slave registration (OS v6.0 or above)		Selects RAPIenet Smart IO to register in high speed link.

[Table 6.4.2] Setting of communication module and communication period

(3) Add Slave

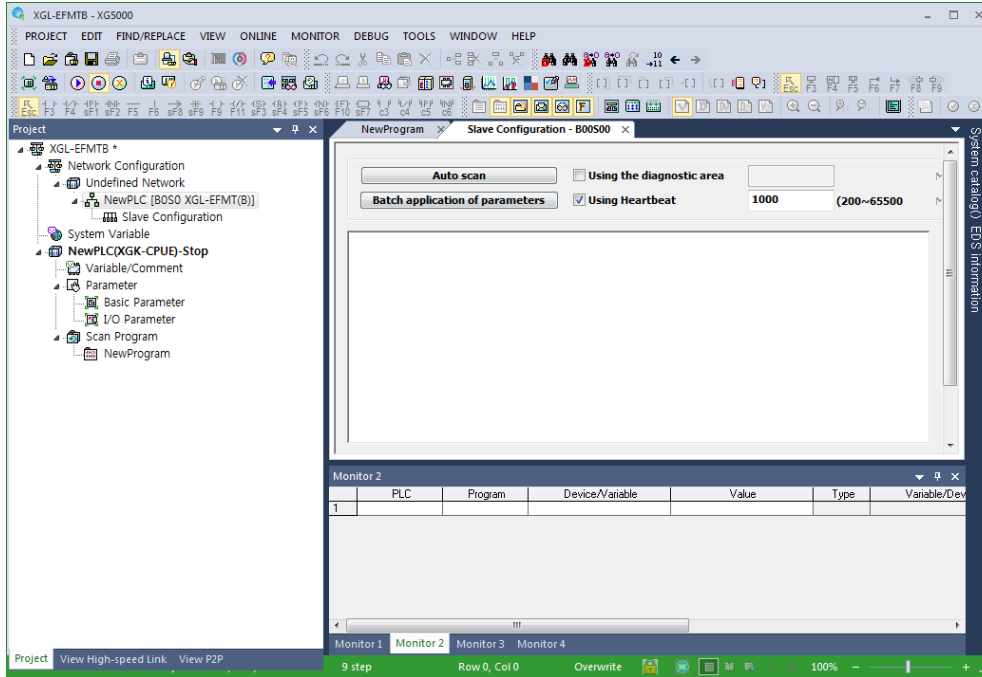
Select [Add item] →[Add slave] menu by clicking on the right mouse button after selecting XGL-EFMTB registered as new on the network configuration screen. Or, select [Project] →[Add item] →[Add slave] of XG5000 menu to perform the same function.



[Fig 6.4.5] Add Slave Configuration

(4) Slave Configuration window

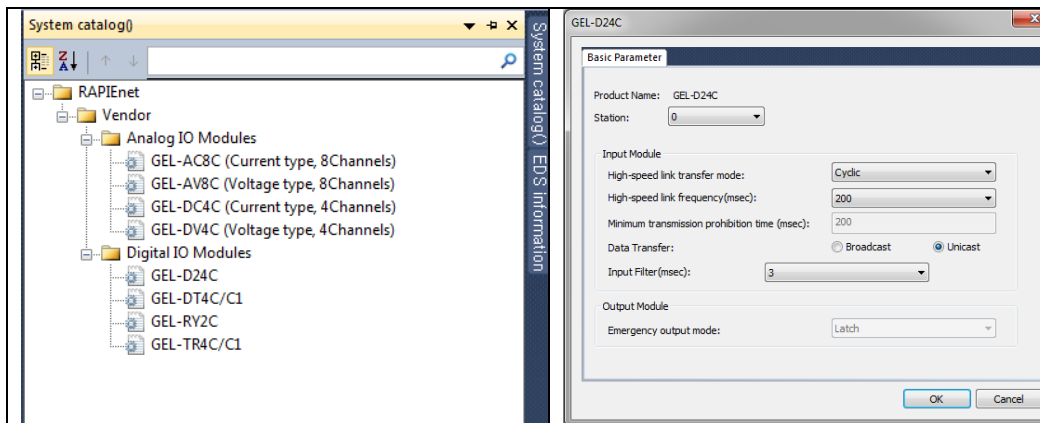
Smart I/O RAPIenet module is a slave module, and thus it requires parameter settings by each slave in order to communicate with a master module. The configuration window for slave setting is as follows.



[Fig 6.4.6] Slave Configuration window

(5) System catalog (Slave registration)

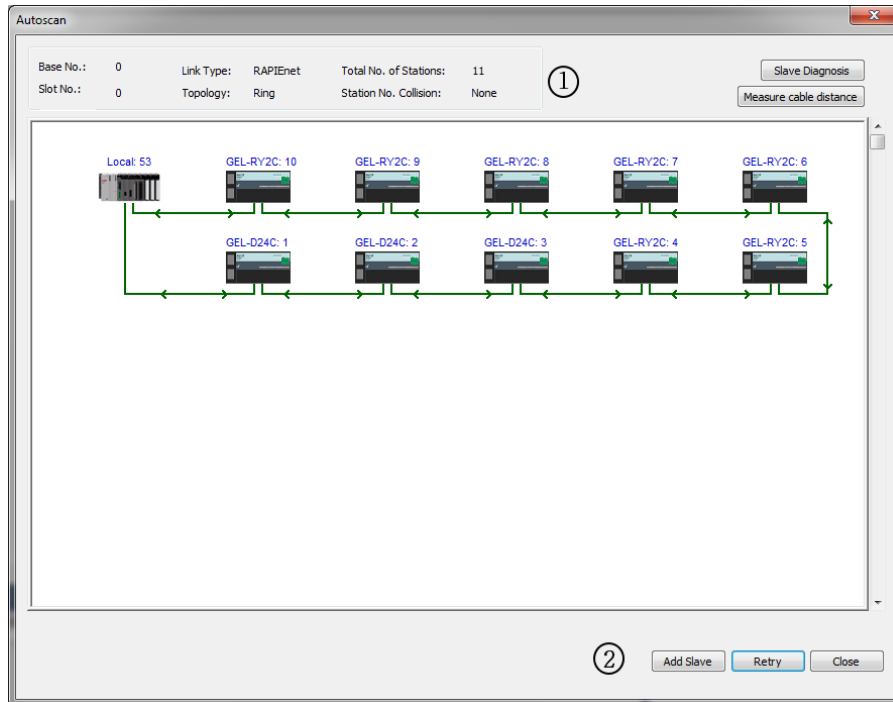
It includes the information about module parameter and basic parameter on the Smart I/O RAPIenet module. Double click the Smart I/O to be used or drag-in to the slave configuration window, and the parameter setting window for the module is created.



[Fig 6.4.7] System catalog and Example of Slave parameter setting window

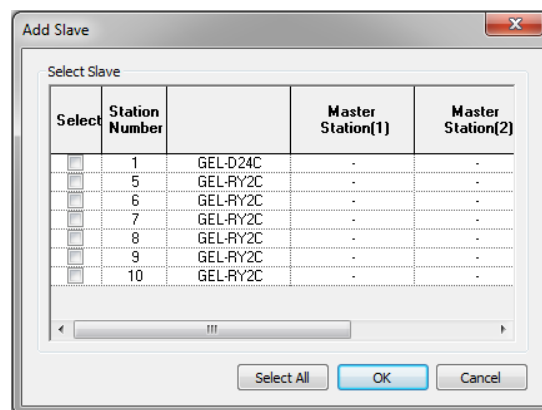
(6) Auto scan (Slave registration)

It is an item which is enabled only when XG5000 is connected to the PLC online. Smart I/O connected to the RAPIenet master module can be added by clicking Auto Scan. Click Add Slave of Auto Scan, and the slave list available on the network is created.



[Fig 6.4.8] Example of Scan

Division	Name	Meaning
1	Basic Information	It refers to the network configuration information of the master station No. (Local).
2	Add Slave	It is a function to select the module intended to controlled among Smart I/O modules that exist within the network in the master station No.(Local).



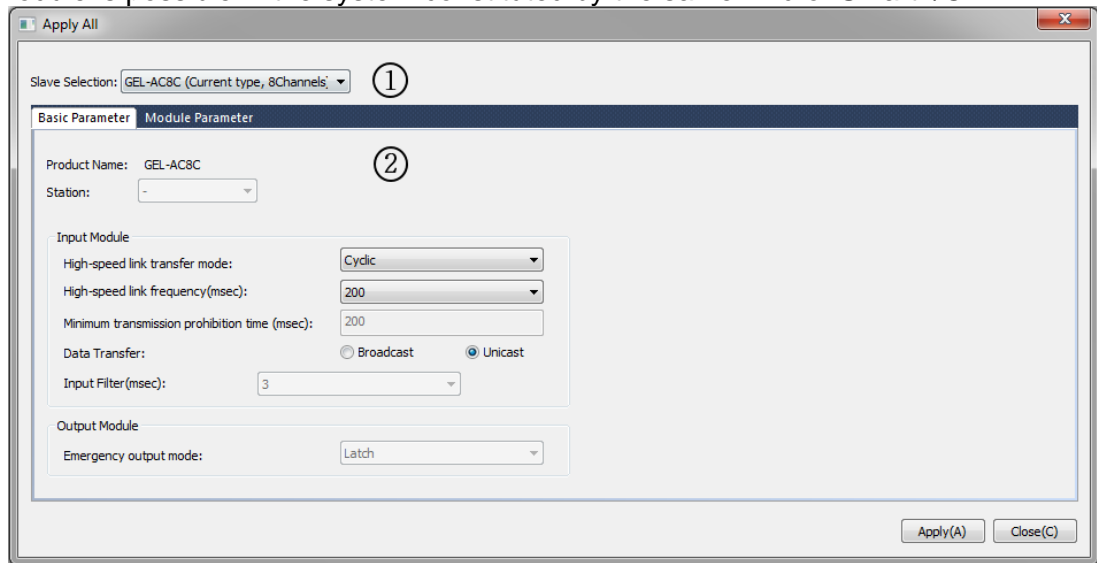
[Fig 6.4.9] Add slaves

Notes

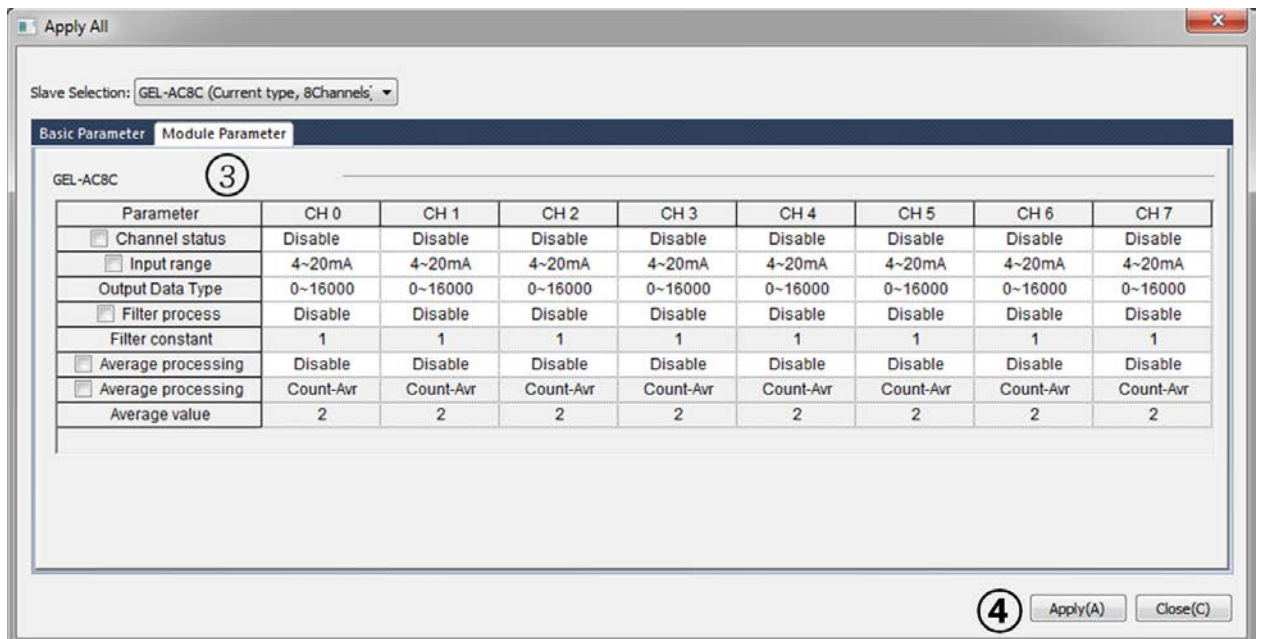
(1) When you click the Slave Add button, only the Smart I/O in which parameters are not set can be added. If the slave you want to select from [Add Slave] window is controlled by another master module, the slave cannot be selected.

(7) Batch application of parameters

It is a function used for batch application depending on the module type. It is convenient to set parameters since batch application of parameters for each module is possible in the system constituted by the same kind of Smart I/O.



[Fig 6.4.10] Batch application of parameters (Basic parameter)



[Fig 6.4.11] Batch application of parameters (Module parameter)

Functions for each menu are as follows.

Division	Name	Meaning
1	Slave selection	It refers to the module in which the parameter batch application function is to be applied.
2	Basic parameter	It means the basic parameter of the module.
3	Module parameter	It means the module parameter. The module parameter is enabled only if the analog I/O module is selected.

4	Apply	The set parameter is applied.
---	-------	-------------------------------

(8) Diagnostic use

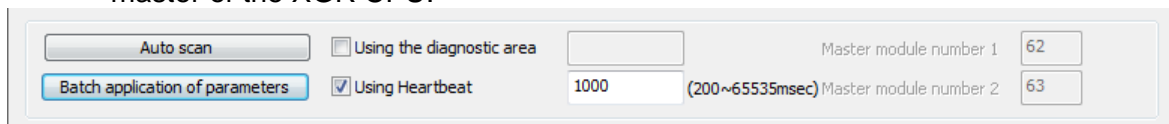
Diagnostic area use function is to transmit the diagnostic information provided by the slave module to the PLC device area. Check the diagnostic area use and enter the starting address of the PLC device in which the diagnostic information is stored, and the diagnostic area of 1 word per slave is automatically allocated to the high-speed link block.

(9) Heartbeat use

It is a function to check if network elimination between Smart I/O and RAPIEnet master occurs. The presence within the network can be confirmed by checking heartbeat signals at set time intervals. The heartbeat period can be set up to 200~65500msec, and the heart beat error information for each Smart I/O can be provided if the diagnostic area use is checked.

(10) Master module station No

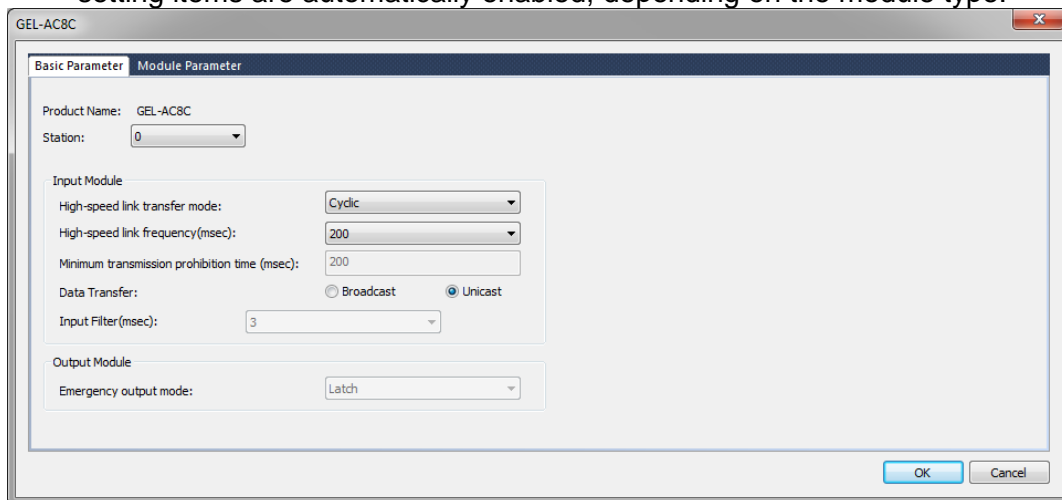
It is a function that is enabled when Smart I/O is used in the XGR CPU and refers to the station number of the master module mounted on the side of standby and master of the XGR CPU.



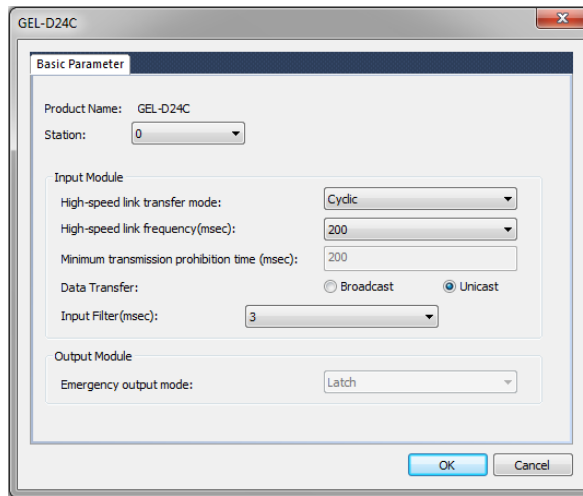
[Fig 6.4.12] Slave modules common parameter

(11) Basic parameter setting items

Basic parameter means the basic parameter settings for the communication between Smart I/O module and master, and the setting method is to double click or drag in the slave module to the slave module from the catalog menu of the slave configuration window. Basic parameter are largely divided into the station No. information, input module and output module setting items, and the setting items are automatically enabled, depending on the module type.



[Fig 6.4.13] Example of basic parameter (GEL-AC8C)



[Fig 6.4.14] Example of basic parameter (GEL-D24C)

*Product name: It displays the product name of the Smart I/O module.

*Station No: It is the setting menu for the station No. of the Smart I/O, and the setting range is from 0 to 63.

*High-speed link transmission mode

It is an item that is enabled only when the module of input type is selected and can be set to Cyclic and CoS..

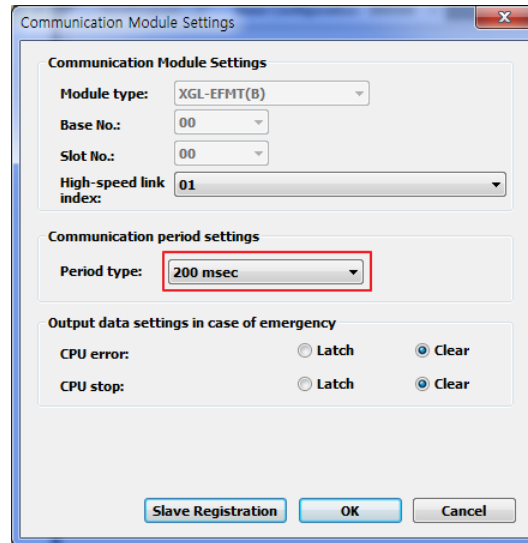
Name	Meaning	Remarks
Cyclic	It is used if the data is transmitted periodically.	Default value
CoS	It is used if the data is transmitted only when the input status changes. In case the change of data is slow, the network load can be reduced by applying the CoS method.	

* High-speed link transmission (Input data)

It is an item that is enabled only if the high-speed link mode is Cyclic mode means the transmission cycle in the Cyclic mode of the input module. The transmission cycle is as follows.

High-speed link transmission cycle (msec)	Reference
5	-
10	-
20	-
50	-
100	-
200	Default value
500	-
1000	-

The transmission cycle of the output module follows the data transmission cycle of the high-speed link.



* Minimum transmission prohibition time

It is a function that is enabled when the high-speed link transmission mode is CoS, and the time means the minimum interval for transmission in the CoS mode. Since if the non-periodical data transmission occurs frequently, it affects the network load of the entire system, the data is transmitted only if the input value is changed to more than the setting time, when the data of input module occurs non-periodically.

Notes

1. Examples of network load calculations according to the minimum transmission prohibition time

If the data of the input module is changed to the unit of 2msec

1) When the minimum transmission prohibition time is set to 2msec

(1) Packets per second(pps)= $1/0.002 = 500\text{pps}$

(2) 5,000pps(XGL-EIMT allowable packet amount(3,600pps)exceeded) when 10 units are configured with the module of the same condition

2) When the minimum transmission prohibition time is set to 200ms

(1) Packets per second(pps)= $1/0.2 = 5\text{pps}$

(2) 50pps when 10 units are configured with the module of the same condition

2. If the data change cycle of the input module is less than the minimum transmission cycle (5msec), it is recommended to select Cyclic mode as the high-speed link transmission mode for stable system operations.

*Input filter

This function is enabled only in case of the digital input module, and it supports the input filter function to prevent the processing of invalid values caused by external noise. It means that only when the data is maintained at more than the input filter value, it is processed into valid data, and it is required to set the input filter value in consideration of the use environment.

Setting range of input filter (msec)	Reference
1	-
3	Default Value
5	-
7	-
10	-
20	-
70	-
100	-

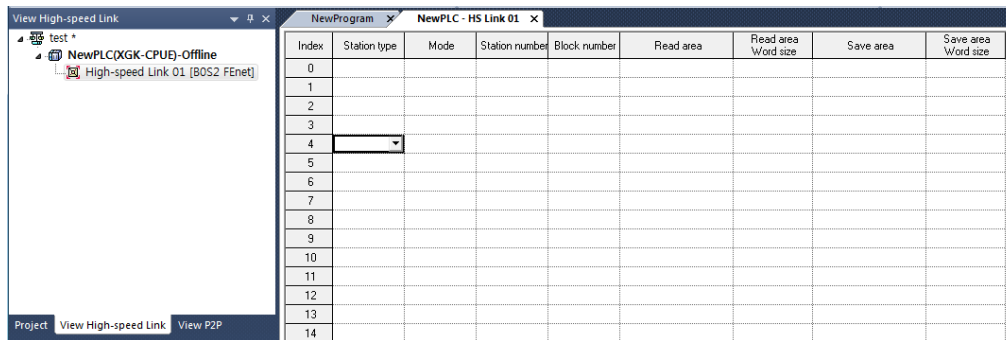
*Emergency output module

It is a function that is enabled only in case of the output module type. When the network configuration is disconnected physically during normal communication with master module, the existing output data can be set to latch mode and clear mode.

Name	Meaning	Reference
Latch	It maintains the existing output module when the communication is physically disconnected with the master module.	-
Clear	It initializes the existing output data to 0 when the communication is physically disconnected with the master module.	Default value

(12) High-speed link parameters settings

Click [OK] on [Fig.6.4.4] screen to display [Fig.6.4.5] of 'HS link block registration' window.



[Fig. 6.4.15] HS link block registration screen.

(13) High speed link block setting (Generic)

To register the High-speed Link parameter, double-click the registration window with the left mouse button to open the [Figure 6.4.6] screen.

Index	Station type	Mode	Station number	Block number	Module type	Read area	Variable name	Variable name comment	Read area Word size	Save area	Variable name	Variable name comment	Save area Word size	Diagnostic information device
0	FEnet	1. Send	0	0		M0000			1					
1	FEnet	2. Receive	1	1						M0100			1	
2	FEnet	2. Receive	2	2						M0110			1	
3	FEnet	2. Receive	3	3						M0120			1	
4														
5														

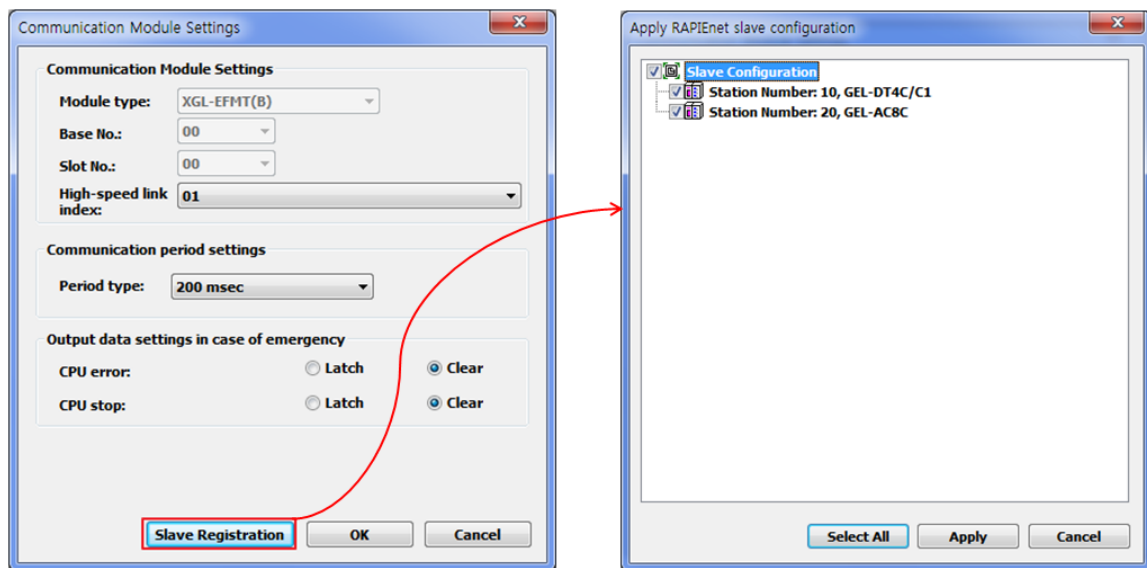
[Fig 6.4.16] High speed link parameter setting screen

(14) High-speed link block setting (slave)

High speed link data communication is only possible when Smart I / O is registered in high speed link block.

There are two slave registration methods to apply to high speed link block.

1. Register slave in [Communication module setting] menu.
2. Apply [Slave Registration] in High-speed link block.
 - Slave registration in communication module setting menu
 - [Communication Module Settings] -> Click [Slave Registration] and then [Apply RAPIEnet Slave Configuration] window will appear.
 - Select the slave you want to apply and click Apply.
 - Double-click [High-speed link 01] to check whether the selected Smart I/O is displayed in the High-speed link block window.

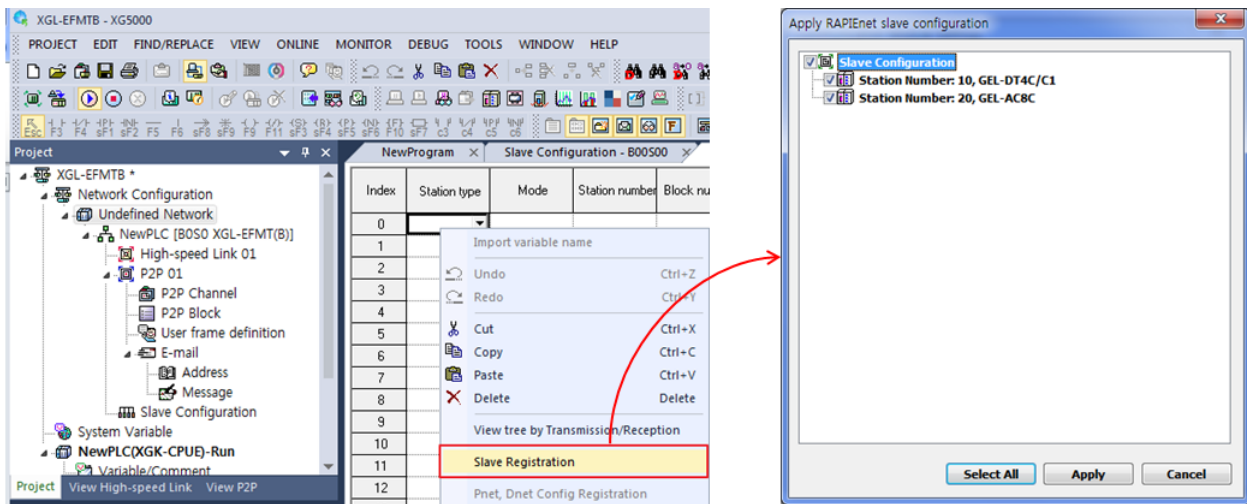


Notes

When changing slave items in High-speed Link block due to network system change, click Slave Registration to select the slave to be used and click Apply.

- Slave registration in high speed link block
 - [Project Window] -> Double Click [High-speed Link 01]
 - Select an arbitrary block of High-speed Link block, right-click and select [Slave Registration]
 - Select the slave you want to apply and click Apply.

Chapter 6 High-speed Link Service



Notes

When changing slave items in High-speed Link block due to network system change, click Slave Registration to select the slave to be used and click Apply.

Classification		Description
Station type	Master	FEnet I/F module operates as master. Slave function is not supported.
Mode	Send	Transmits data.
	Receive	Receives data.
Station number	Native/ Destination Station No	Automatically, The High-speed link station number of self-station will be setup for Send blocks. Setup the High-speed link station number of correspondent station for Receive blocks. Available station No. for High-speed link with FEnet I/F module is '0~63'. Duplicated number is not allowed for station numbers of FEnet I/F modules included in the identical network since it is a specific number to discriminate FEnet I/F modules in the network system.
Block No.	Block number	Used to specify Send/Receive blocks.
Read area	Address	The data memory address where the data to be transmitted is stored. Available memory area 1) XGK: P, M, K, F, T, C, U, Z, L, N, D, R, ZR 2) XGI/XGR: I, Q, M, L, K, U, R, W, F Refer to the list of XGT CPU memory device in appendix for available range of each memory area.
Read area Word size	Size (Word)	The size of data to be transmitted in word unit.