

# **NEW SUPERLINK SYSTEM BACnet GATEWAY PRODUCT SPECIFICATION**

**MODEL : SC-BGWN-A**

Product Drawing No.: PSZ006A014FA

**Ver. 1.0**

**April 1, 2008**

**MITSUBISHI HEAVY INDUSTRIES, LTD.  
AIR-CONDITIONING & REFRIGERATION  
SYSTEMS HEADQUARTERS**

## **1. INTRODUCTION**

### **1.1 SCOPE**

This product specification is applied to the communication unit SC-BGWN-A that connects a Building Management System network and MITSUBISHI HEAVY INDUSTRIES' "SUPERLINK" networks by the "BACnet"\*<sup>1</sup> communication protocol. This document describes the overview specifications of the product as for April 1, 2008. Any contents of this document may be changed without prior notification.

\*<sup>1</sup> BACnet : Building Automation and Control networks

### **1.2 STANDARDS/GUIDELINES**

This product is designed as conforming to the following standard and guideline.

- (1) BACnet/IP standard 2004 version  
"ANSI/ASHRAE Standard 135-2004 : Data Communication Protocol for Building Automation and Control Networks"
- (2) JRAIA Interface Committee Guideline  
"BACnet Implementation Guideline for Packaged Air-conditioners" Ver.1.0 Feb.5, 2004  
issued by the Interface Committee of the Japanese Refrigeration and Air-conditioning Industry Association.

### **1.3 ENGINEERING WORK**

"Engineering work" means technical service work such as dispatching engineers to the site, the address allocation planning work, configuration of this Gateway, trial operation of the system and so on. These engineering works may be paid services.

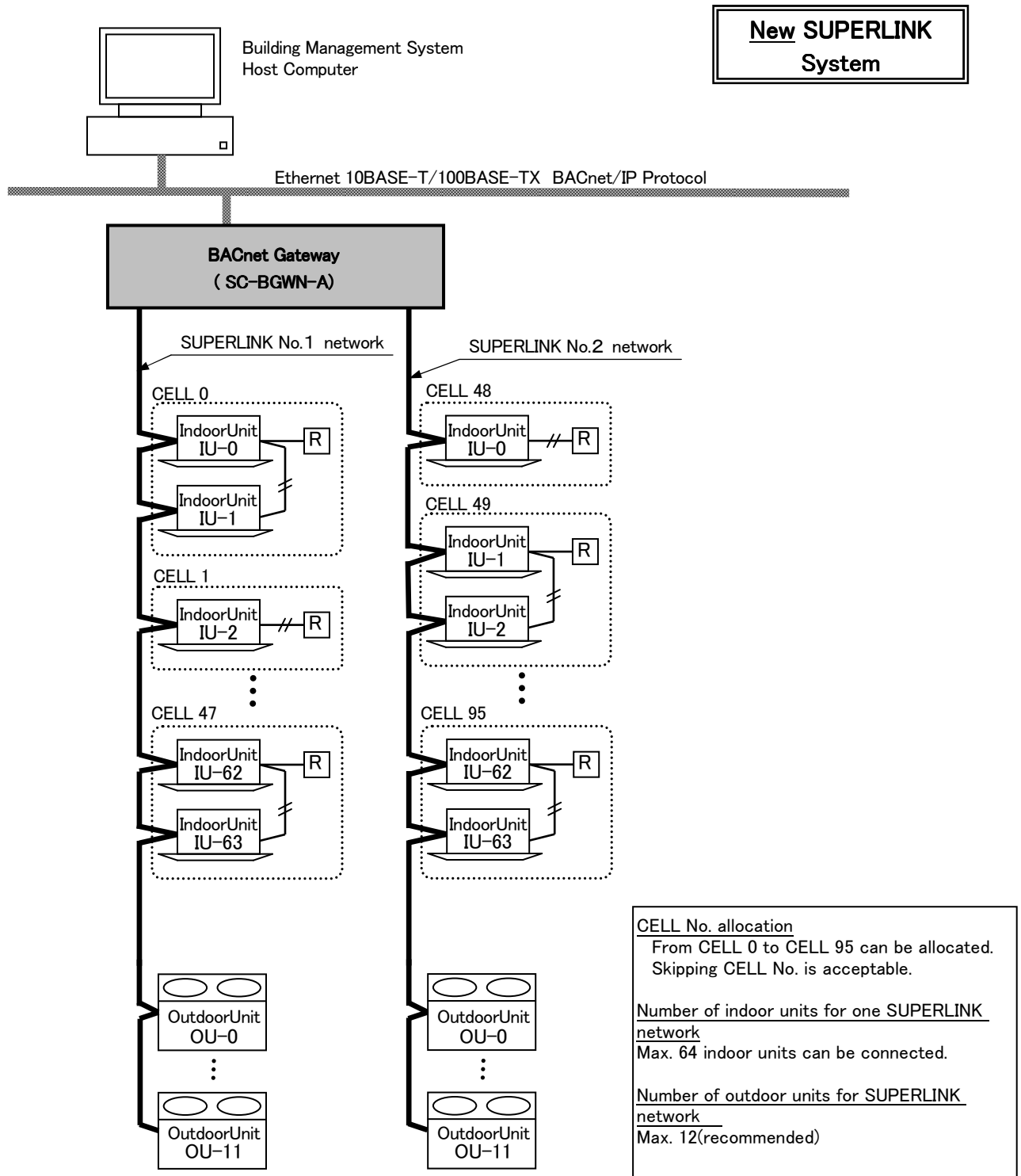
### **1.4 CUSTOMIZE WORK**

This Gateway is a kind of ready-made product. Customization of the functions including software modification of this Gateway will not be accepted.

## 2. SYSTEM ARCHITECTURE

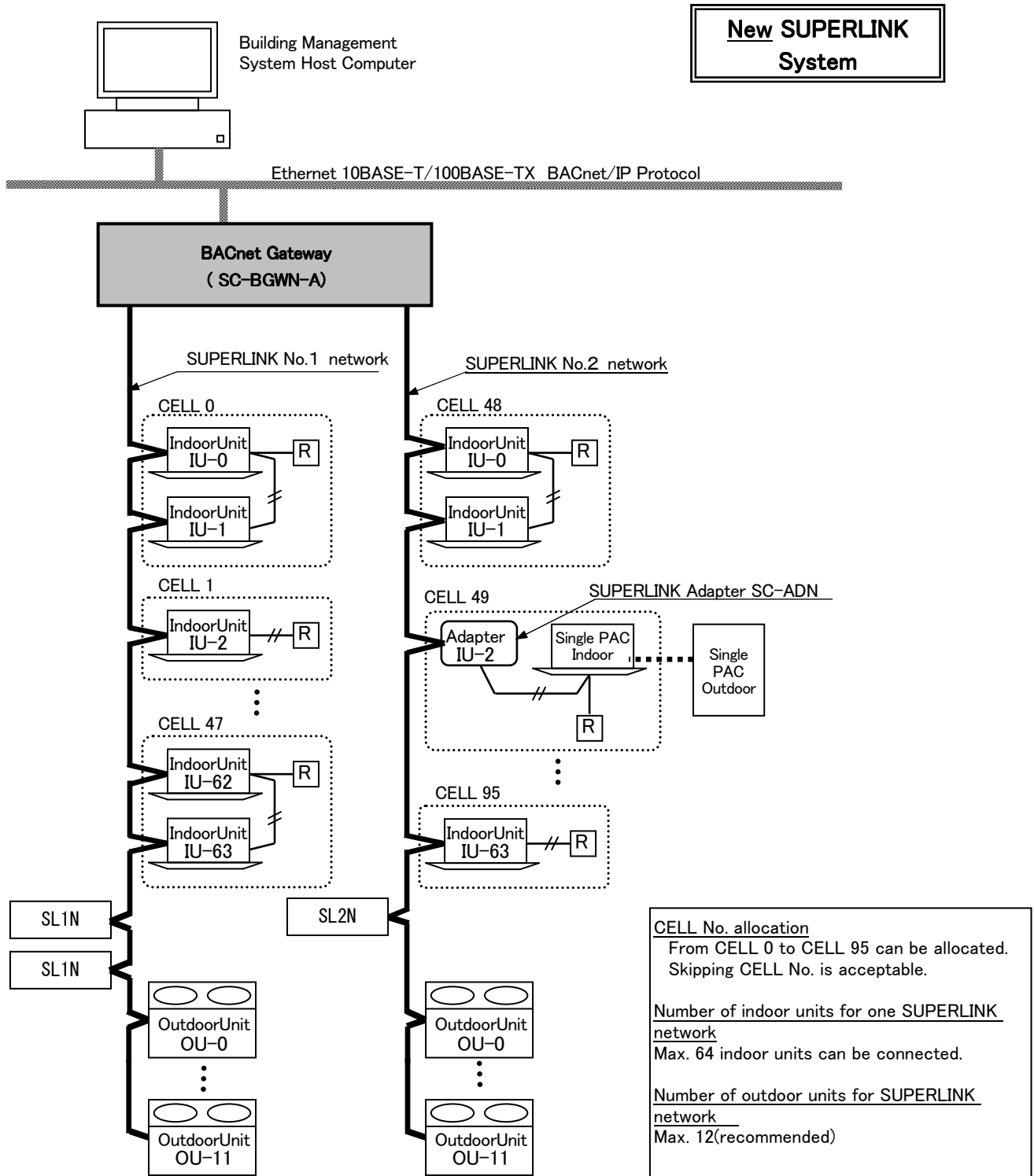
### 2.1 SYSTEM DIAGRAM

Fig.2.1.1 shows a basic case of the system diagram of connection between the building management system host computer, the BACnet Gateway and the new SUPERLINK control networks. A "CELL" is a group of indoor units controlled by one remote controller, and it is treated as one logical unit.



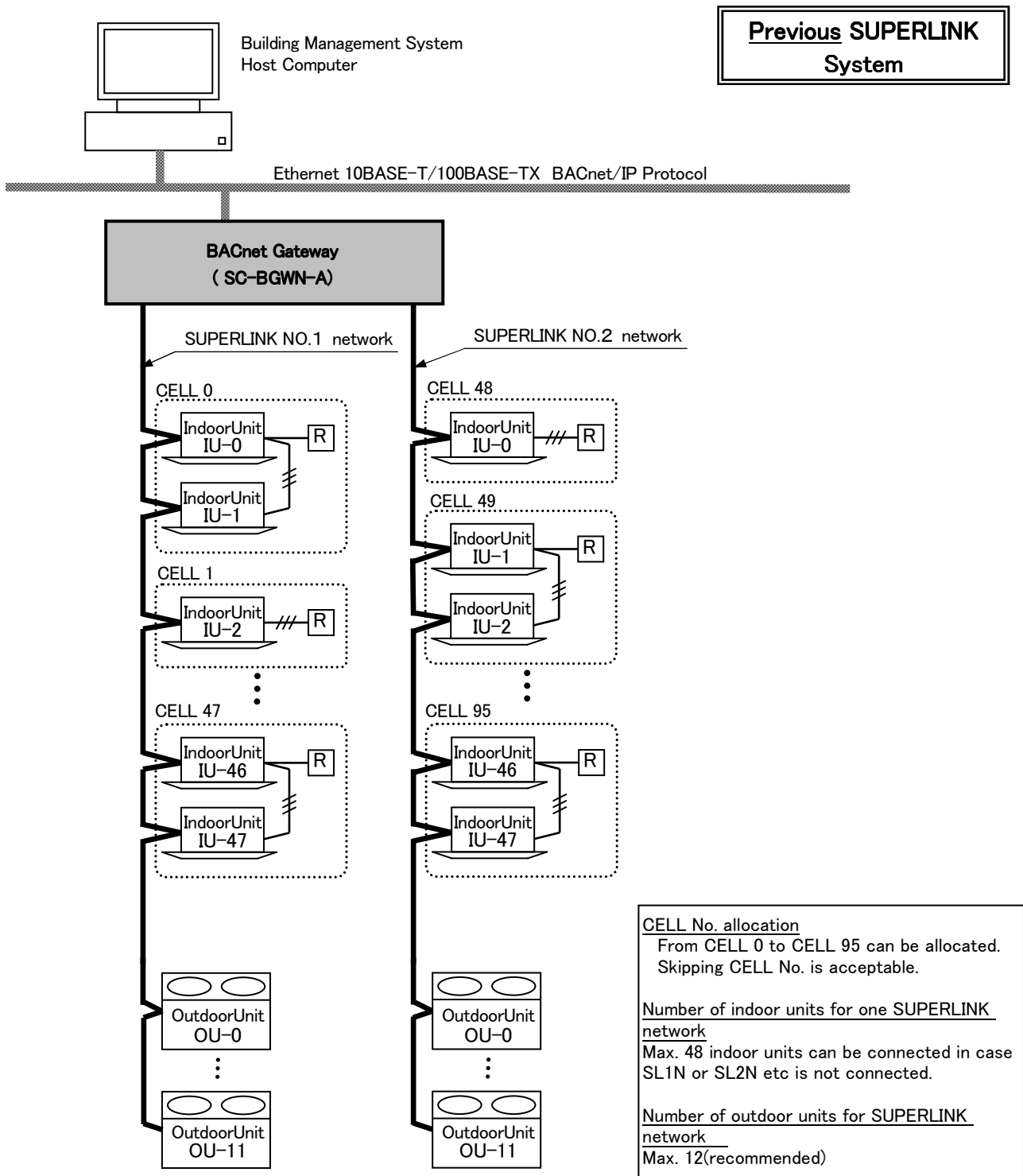
**Fig. 2.1.1 System Diagram (Basic case of the new SUPERLINK communication system)**

Fig.2.1.2 shows a case of the system diagram of connection between the building management system host computer, the BACnet Gateway, and the new SUPERLINK control networks along with SUPERLINK option controllers such as SL1N, SL2N or SL3N. The SC-ADN adapter should be used for connection of MHI's single packaged air-conditioners models.



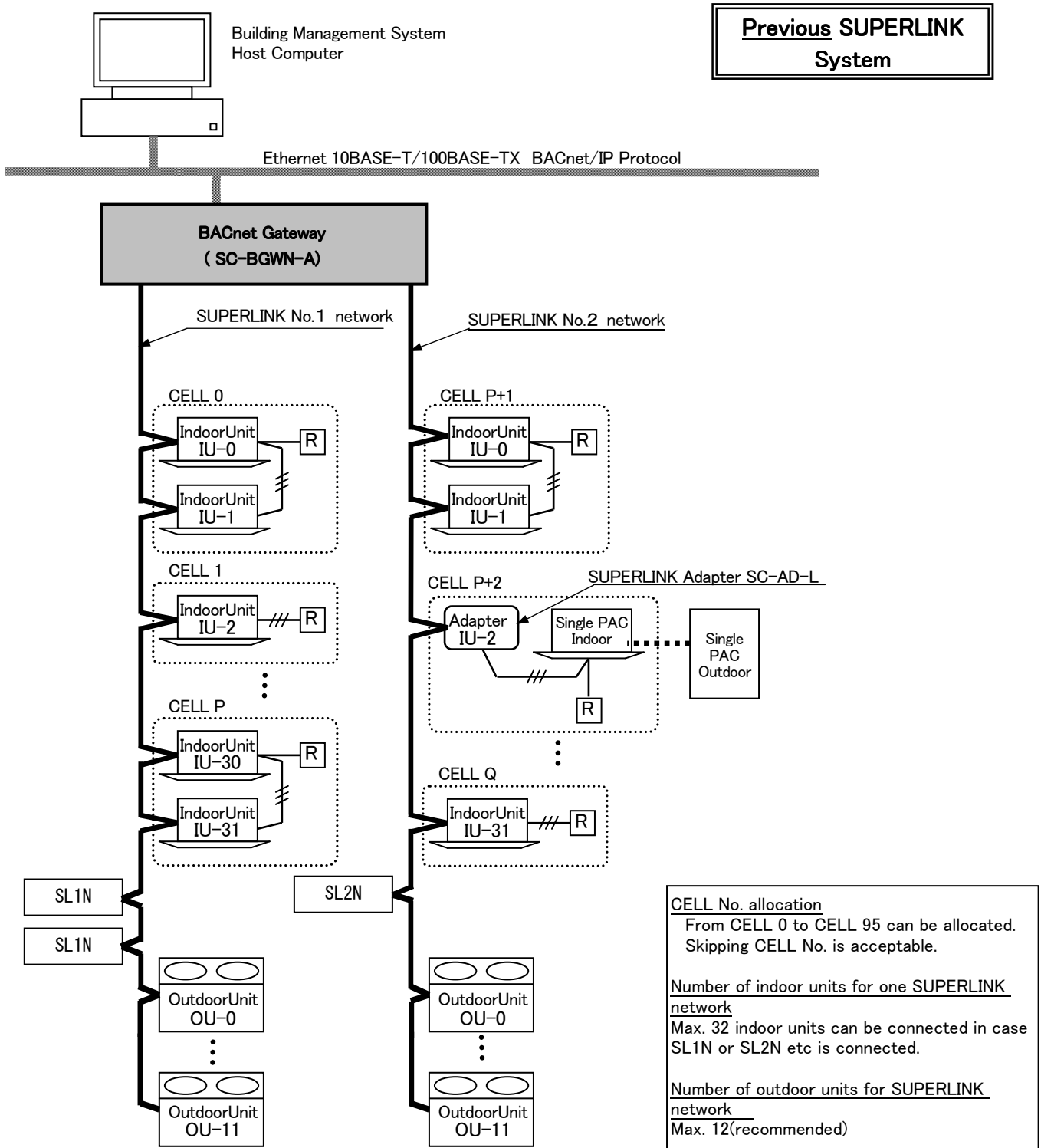
**Fig. 2.1.2 System Diagram (Option controller connected case of the new SUPERLINK communication system)**

Fig.2.1.3 shows a basic case of the system diagram of connection between the building management system host computer, the BACnet Gateway and the previous SUPERLINK control networks.



**Fig. 2.1.3 System Diagram (Basic case of the previous SUPERLINK communication system)**

Fig.2.1.4 shows a case of the system diagram of connection between the building management system host computer, the BACnet Gateway, and the previous SUPERLINK control networks along with SUPERLINK option controllers such as SL1N(SLA-1) or SL2N(SLA-2A). The SC-ADN(SC-AD-L) adapter should be used for connection of MHI's single packaged air-conditioners models.



**Fig. 2.1.4 System Diagram (Option controller connected case of the previous SUPERLINK communication system)**

## 2.2 BMS CONNECTION

### (1) Lower Layer of the BACnet Protocol

This Gateway is to be connected to the Building Management System (BMS) network by the BACnet/IP lower layer communication protocol that works over an IP network.

- Lower layer protocol : BACnet/IP of the BACnet standard “ANSI/ASHRAE Standard 135-2004”
- Physical layer : Ethernet 10BASE-T or 100BASE-TX (Automatic selection)

## 2.3 AIR-CONDITIONER CONNECTION

### (1) Packaged Air-Conditioner Models

- MHI's Multi KX series
- MHI's Multi GHP series
- SC-ADN adapter + Separate PAC series

When the SC-ADNs are used, some functions will become invalid. The detail explanation of the limitations for the SC-ADN will appear in the later version of this document.

### (2) “AIR-CON CELL”

A concept of the “Air-con CELL” is introduced in this Gateway system. An Air-con CELL is defined as a logical group of indoor units for control & monitor of the air-conditioners. An Air-con CELL consists one indoor unit or more than one indoor units connected by one remote controller.

In the Fig.2.1.1, an Air-con CELL is indicated by a surrounding dashed line. The indoor units of the CELL should be on the same SUPERLINK network. But the CELL identification numbers can be allocated over the SUPERLINK networks as shown in Table 2.4.1 and 2.4.2 below.

Issuing a control command to a CELL is equal to issuing the control command to every indoor unit of the CELL. Therefore, operation of each indoor unit is identical for every indoor unit within the CELL. It is possible to control and monitor each individual indoor unit by defining a CELL equals to an indoor unit. All indoor units in the same CELL must be connected by the same remote controller, that is remocon group connection.

The CELL grouping definition is common to all the functions of this Gateway. The CELL definition is provided by the PAC information file. The information file must be set before the test operation of this Gateway. This PAC information file is memorized by the non-volatile memory of this Gateway once it is uploaded.

(3) Max number of indoor units and option controller

(3.1) New SUPERLINK communication system

The maximum number of indoor units connected is shown in the Table 2.4.1 depending on connection of the SUPERLINK option controller such as SL1N, SL2N and SL3N.

	Without option controller	With option controller(*)
Number of SUPERLINK networks	2 networks	2 networks
Number of indoor units	Max64 units x 2 = Max 128	Max64 units x 2 = Max 128
Number of CELLS	Max48 CELLS x 2 = Max 96	Max48 CELLS x 2 = Max 96
Range of CELL number	CELL 0 to CELL 95	CELL 0 to CELL 95

(\*) The maximum number of option controllers are max. 4 of SL1N, one of SL2N and one of SL3N for one SUPERLINK network. In the case of SL2N or SL3N, it is necessary to erase registration of non-connected inside unit. For SL2N and SL3N, change is required for the setup deprived of the right of instruction of Remocon control Lock/Unlock.

Option controllers should be max. 4 of SL1N, one of SL2N and one of SL3N for one SUPERLINK network. SL2N and SL3N are necessary to erase registration of non-connected inside unit.

For SL2N and SL3N, change is required for the setup deprived of the right of instruction of Remocon control Lock/Unlock.

(3.2) Previous SUPERLINK communication system

The maximum number of indoor units connected is shown in the Table 2.4.2 depending on connection of the SUPERLINK option controller such as SL1N(SLA-1) or SL2N(SLA-2A). The reason why the number of indoor units connectable is reduced in the case of option controller connection is for communication traffic limitation.

	Without option controller	With option controller(*)
Number of SUPERLINK networks	2 networks	2 networks
Number of indoor units	Max48 units x 2 = Max 96	Max32 units x 2 = Max 64
Number of CELLS	Max48 CELLS x 2 = Max 96	Max32 CELLS x 2 = Max 64
Range of CELL number	CELL 0 to CELL 95	CELL 0 to CELL 63

(\*) Option controllers should be max. 2 of SL1N(SLA-1) or only one of SL2N(SLA-2A) for one SUPERLINK network.



### 3. FUNCTION OVERVIEW

#### 3.1 COMMUNICATION FUNCTIONS

Table 3.1 shows the list of the functions of this BACnet Gateway from a view point of BACnet communication between a building management system host computer and this Gateway.

Table 3.1 Communication Function List

Function	Description
Alive check	Broadcasts BACnet "I_Am" message every 1 minute continuously.
Write service from host	Accepts BACnet Write Services from the host computer.
Read service from host	Responds to BACnet Read Service form the host computer.
Change of Value Report	Broadcasts Change of Value of the packaged air-conditioners.
Alarm report	Broadcasts Alarm report of the packaged air-conditioners
Object check	Responds BACnet I-Have Service to Who-Has Service from the host computer
Time Synchronize	Set current time

#### 3.2 CONTROL&MONITOR FUNCTIONS

Table 3.2 shows the list of the functions of this BACnet Gateway from a view point of control & monitor of the packaged air-conditioners. An "Air-con CELL" is a logical group of indoor units for one remote controller as defined in the section 2.2 in this document.

Table 3.2 Control & Monitor Functions List

Function	Description	
C O N T R O L	On/Off command	Sends On/Off command to an Air-con CELL through the SUPERLINK.
	Mode command	Sends Mode command (Cool, Heat, Fan, Auto, Dry) to an Air-con CELL through the SUPERLINK.
	Fan Speed command	Sends Fan Speed command (Hi, Me, Lo) to an Air-con CELL through the SUPERLINK.
	Set Temp command	Sends Set Temperature (18 - 30 deg C) to an Air-con CELL through the SUPERLINK.
	Filter Sign Reset command	Sends Filter Sign Rest command to an Air-con CELL through the SUPERLINK.
	Remocon Lock command (All button)	Sends Remocon Lock command to an Air-con CELL through the SUPERLINK. All the functions will be locked/unlocked simultaneously.
	System Stop command	Sends Off and Remocon Lock commands to all Air-con CELLS simultaneously.
M O N I T O R	On/Off status	Reports On/Off status of an Air-con CELL to the host computer.
	Alarm status	Reports occurrence of failure stop of an Air-con CELL to the host computer.
	Error Code status	Reports failure stop Error Code of an Air-con CELL to the host computer.
	Mode status	Reports Mode status (Cool, Heat, Fan, Auto, Dry) of an Air-con CELL to the host computer.
	Fan Speed status	Reports Fan Speed setting status of an Air-con CELL to the host computer.
	Room Temp status	Reports Room Temperature sensor data of an Air-con CELL to the host computer.
	Filter Sign status	Reports Filter Sign status of an Air-con CELL to the host computer.
Communication status	Reports SUPERLINK communication status of an Air-con CELL to the host computer.	

#### **4. HARDWARE SPECIFICATIONS**

(1) Power Supply

- AC single phase 100V - 240V +10%, -15% 50/60Hz

(2) Operation Temperature

- Ambient Temperature : 0 to 40 degrees Celsius
- Relative Humidity : Max 85 %RH (without dewing)

(3) Storage Temperature

- Ambient Temperature : -10 to 50 degrees Celsius
- Relative Humidity : Max 85 %RH (After 48 hours from out of storage, dewing should not exists)

(4) Power Blackout Compensation

- This Gateway does not have a battery circuit for power blackout compensation.
- If blackout or manual power off occurs, the monitoring data and the setting of each CELL(indoor unit), such as the operation mode or set point temperature, may be lost.
- This Gateway periodically writes the "Remocon Lock/Unlock command(All Remocon functions)" of the CELLS to the non-volatile memory at every 10 minutes. If the power supply is cut off, this Gateway will restore the "Remocon Lock/ Unlock command(All Remocon functions)" at least 10 minutes before when it restarts.

(5) Appearance

- Outline drawing : Fig 4.1 on the following page
- Outline dimensions : 260(W) x 200(H) x 79(D) mm
- Color : Blue



## 5. INSTALLATION

### 5.1 INSTALLATION CONDITIONS

This Gateway SC-BGWN-A has a terminal block for the AC power supply on the outside surface of the casing.

For avoiding electrical shock injury, the SC-BGWN-A should be installed inside a cabinet with a lock

The direction of placement of this Gateway when installation should be such a way that the front panel is vertical and the lettering of the front panel is right direction because of air-cooling.

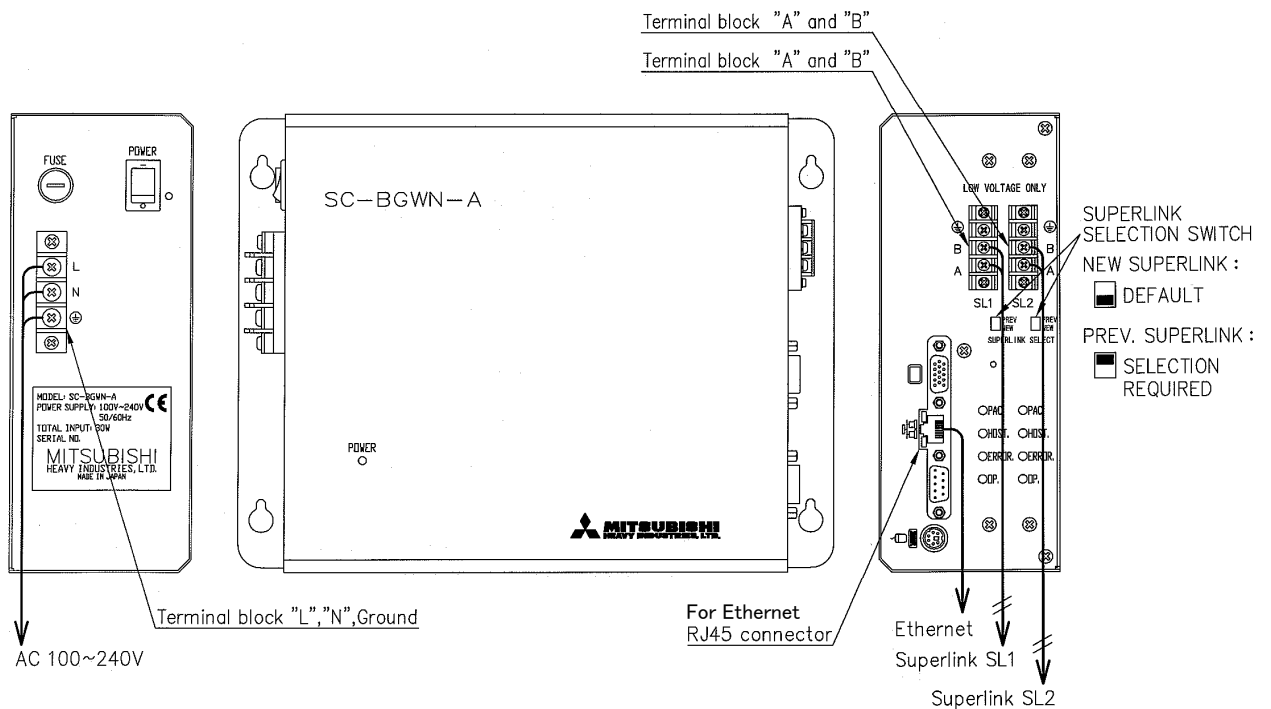
The recommended service space surrounding this Gateway is as follows:

- Upper clearance : Minimum 30 mm
- Lower clearance : Minimum 30 mm
- Right side clearance : Minimum 50 mm (more than 200 mm is recommended)
- Left side clearance : Minimum 50 mm (more than 200 mm is recommended)

The side clearance is for wiring workspace.

### 5.2 WIRING

The Fig 5.1 shows the wiring of this Gateway. After wiring to the Gateway, the terminal covers, which are included in this Gateway's product package, should be installed by screws as shown in the Fig 4.1.



**Fig. 5.1 SC-BGWN-A Wiring**

**\*\*** : If the previous SUPERLINK communication system is to be used, Change selection switch to "PREV" side.

### 5.3 ETHERNET CABLE

This Gateway supports the Ethernet 10BASE-T or 100BASE-TX which are most popular among the standards of the Ethernet. In the case of only one PC is used for control and monitor, the PC and the Gateway can be connected directly by a cross Ethernet cable. The cross cable is a kind of Ethernet cable which connects two computers directly. In the case of using more than one PCs for control and monitor, an Ethernet HUB must be used. For either cases, the category 5 cable grade or higher must be used.

Materials for wiring the Ethernet, such as cables or HUBs, are not included this Gateway's product package. The type of the HUB may be ordinary office LAN use.

### 5.4 SUPERLINK CABLE

Shielded wire(double-core,  $0.75\text{mm}^2\sim 1.25\text{mm}^2$ ).

Max. 1000m per line (Max. distance: 1000m, Total wire length: 1000m)

Note 1: When this Gateway is used, use a shielded wire for the SUPERLINK signal wire. Ground both ends of the shielded wire. (Please wire the ground of the Gateway at  $\oplus$  Ground position.)

Note 2: If the indoor and outdoor units connected to the network are all compatible units with New SUPERLINK, a total wire length of 1500m per line is possible (maximum distance: 1000m). However, be sure to use a  $0.75\text{mm}^2$  wire diameter if the total wire length exceeds 1000m. For further information, please contact your sales representative or dealer.

## 6. PICS and BIBBs

### 6.1 BACnet Protocol Implementation Conformance Statement (PICS)

#### BACnet Protocol implementation Conformance Statement

Date: Jan. 31, 2008

Vendor Name: MITSUBISHI HEAVY INDUSTRIES,LTD.

Product Name: Superlink BACnet Gateway

Product Model Number: \_\_\_\_\_

Application Software Version: \_\_\_\_\_

Firmware Revision: \_\_\_\_\_ BACnet Protocol Revision: 1.0

#### Product Description:

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#### BACnet Standardized Device Profile (Annex L):

- BACnet Operator Workstation (B-OWS)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K): See section 5.2.

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#### Segmentation Capability:

- Able to transmit segmented messages Window Size \_\_\_\_\_
- Able to receive segmented messages Window Size \_\_\_\_\_

#### Standard Object Types Supported:

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of proprietary properties and for each its property identifier, datatype, and meaning
- 6) List of any property range restrictions

See section 6 and 8.

**Data Link Layer Options:**

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ANSI/ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) \_\_\_\_\_
- MS/TP master (Clause 9), baud rate(s): \_\_\_\_\_
- MS/TP slave (Clause 9), baud rate(s): \_\_\_\_\_
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): \_\_\_\_\_
- Point-To-Point, modem, (Clause 10), baud rate(s): \_\_\_\_\_
- LonTalk, (Clause 11), medium: \_\_\_\_\_
- Other: \_\_\_\_\_

**Device Address Binding:**

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)  Yes  No

**Networking Options:**

- Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)  
Does the BBMD support registrations by Foreign Device?

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- |   |   |                                     |
|---|---|-------------------------------------|
| <input checked="" type="checkbox"/> ANSI X3.4 | <input type="checkbox"/> IBM™ / Microsoft™ DBCS | <input type="checkbox"/> ISO 8859-1 |
| <input type="checkbox"/> ISO 10646 (UCS-2)    | <input type="checkbox"/> ISO 10646 (UCS-4)      | <input type="checkbox"/> JIS C 6226 |

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

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6.2 BACnet Interoperability Building Blocks Supported (BIBBs)

(1) Data Sharing BIBBs

BIBB Type	Supported	BACnet Service	Initiate	Execute	Note
DS-RP-A	<input type="checkbox"/>	ReadProperty	x		
DS-RP-B	<input checked="" type="checkbox"/>	ReadProperty		x	
DS-RPM-A	<input type="checkbox"/>	ReadPropertyMultiple	x		
DS-RPM-B	<input checked="" type="checkbox"/>	ReadPropertyMultiple		x	
DS-RPC-A	<input type="checkbox"/>	ReadPropertyConditional	x		
DS-RPC-B	<input type="checkbox"/>	ReadPropertyConditional		x	
DS-WP-A	<input type="checkbox"/>	WriteProperty	x		
DS-WP-B	<input checked="" type="checkbox"/>	WriteProperty		x	
DS-WPM-A	<input type="checkbox"/>	WritePropertyMultiple	x		
DS-WPM-B	<input checked="" type="checkbox"/>	WritePropertyMultiple		x	
DS-COV-A	<input type="checkbox"/>	SubscribeCOV	x		
		ConfirmedCOVNotification		x	
		UnconfirmedCOVNotification		x	
DS-COV-B	<input type="checkbox"/>	SubscribeCOV		x	
		ConfirmedCOVNotification	x		
		UnconfirmedCOVNotification	x		
DS-COVP-A	<input type="checkbox"/>	SubscribeCOV	x		
		ConfirmedCOVNotification		x	
		UnconfirmedCOVNotification		x	
DS-COVP-B	<input type="checkbox"/>	SubscribeCOV		x	
		ConfirmedCOVNotification	x		
		UnconfirmedCOVNotification	x		
DS-COVU-A	<input type="checkbox"/>	UnconfirmedCOVNotification		x	
DS-COVU-B	<input checked="" type="checkbox"/>	UnconfirmedCOVNotification	x		

(2) Alarm and Event Management BIBBs

BIBB Type	Supported	BACnet Service	Initiate	Execute	Note
AE-N-A	<input type="checkbox"/>	ConfirmedEventNotification		x	
		UnconfirmedEventNotification		x	
AE-N-I-B	<input type="checkbox"/>	ConfirmedEventNotification	x		Must support AE-ACK-B
		UnconfirmedEventNotification	x		
AE-N-E-B	<input type="checkbox"/>				Must support DS-RP-A, AE-N-I-B
AE-ACK-A	<input type="checkbox"/>	AcknowledgeAlarm	x		
AE-ACK-B	<input type="checkbox"/>	AcknowledgeAlarm		x	
AE-ASUM-A	<input type="checkbox"/>	GetAlarmSummary	x		
AE-ASUM-B	<input type="checkbox"/>	GetAlarmSummary		x	
AE-ESUM-A	<input type="checkbox"/>	GetEnrollmentSummary	x		
AE-ESUM-B	<input type="checkbox"/>	GetEnrollmentSummary		x	
AE-INFO-A	<input type="checkbox"/>	GetEventInformation	x		
AE-INFO-B	<input type="checkbox"/>	GetEventInformation		x	
AE-LS-A	<input type="checkbox"/>	LifeSafetyOperation	x		
AE-LS-B	<input type="checkbox"/>	LifeSafetyOperation		x	

(3) Scheduling BIBBs

BIBB Type	Supported	BACnet Service	Initiate	Execute	Note
SCHED-A	<input type="checkbox"/>				Must support DS-RP-A, DS-WP-A
SCHED-I-B	<input type="checkbox"/>				Must support DS-RP-B, DS-WP-B, and either DM-TS-B or DM-UTC-B
SCHED-E-B	<input type="checkbox"/>				Must support SCHED-I-B, DS-WP-A



(4) TrendingBIBBs

BIBB Type	Supported	BACnet Service	Initiate	Execute	Note
T-VMT-A	<input type="checkbox"/>	ReadRange	x		
T-VMT-I-B	<input type="checkbox"/>	ReadRange		x	
T-VMT-E-B	<input type="checkbox"/>				Must support T-VMT-I-B, DS-RP-A.
T-ATR-A	<input type="checkbox"/>	ConfirmedEventNotification		x	
		ReadRange	x		
T-ATR-B	<input type="checkbox"/>	ConfirmedEventNotification	x		
		ReadRange		x	

(5) Device and Network Management BIBBs

BIBB Type	Supported	BACnet Service	Initiate	Execute	Note
DM-DDB-A	<input type="checkbox"/>	Who-Is	x		
		I-Am		x	
DM-DDB-B	<input checked="" type="checkbox"/>	Who-Is		x	
		I-Am	x		
DM-DOB-A	<input type="checkbox"/>	Who-Has	x		
		I-Have		x	
DM-DOB-B	<input checked="" type="checkbox"/>	Who-Has		x	
		I-Have	x		
DM-DCC-A	<input type="checkbox"/>	DeviceCommunicationControl	x		
DM-DCC-B	<input type="checkbox"/>	DeviceCommunicationControl		x	
DM-PT-A	<input type="checkbox"/>	ConfirmedPrivateTransfer	x		
		UnconfirmedPrivateTransfer	x		
DM-PT-B	<input type="checkbox"/>	ConfirmedPrivateTransfer		x	
		UnconfirmedPrivateTransfer		x	
DM-TM-A	<input type="checkbox"/>	ConfirmedTextMessage	x		
		UnconfirmedTextMessage	x		
DM-TM-B	<input type="checkbox"/>	ConfirmedTextMessage		x	
		UnconfirmedTextMessage		x	
DM-TS-A	<input type="checkbox"/>	TimeSynchronization	x		
DM-TS-B	<input checked="" type="checkbox"/>	TimeSynchronization		x	
DM-UTC-A	<input type="checkbox"/>	UTC TimeSynchronization	x		
DM-UTC-B	<input type="checkbox"/>	UTC TimeSynchronization		x	
DM-RD-A	<input type="checkbox"/>	ReinitializeDevice	x		
DM-RD-B	<input type="checkbox"/>	ReinitializeDevice		x	
DM-BR-A	<input type="checkbox"/>	AtomicReadFile	x		
		AtomicWriteFile	x		
		CreateObject	x		
		ReinitializeDevice	x		
DM-BR-B	<input type="checkbox"/>	AtomicReadFile		x	
		AtomicWriteFile		x	
		ReinitializeDevice		x	
DM-R-A	<input type="checkbox"/>	UnconfirmedCOVNotification		x	
DM-R-B	<input type="checkbox"/>	UnconfirmedCOVNotification	x		
DM-LM-A	<input type="checkbox"/>	AddListElement	x		
		RemoveListElement	x		
DM-LM-B	<input type="checkbox"/>	AddListElement		x	
		RemoveListElement		x	
DM-OCD-A	<input type="checkbox"/>	CreateObject	x		
		DeleteObject	x		
DM-OCD-B	<input type="checkbox"/>	CreateObject		x	
		DeleteObject		x	

DM-VT-A	<input type="checkbox"/>	VT-Open	x		
		VT-Close	x	x	
		VT-Data	x	x	
DM-VT-B	<input type="checkbox"/>	VT-Open		x	
		VT-Close	x	x	
		VT-Data	x	x	
NM-CE-A	<input type="checkbox"/>	Establish-Connection-To-Network	x		
		Disconnect-Connection-To-Network	x		
NM-CE-B	<input type="checkbox"/>	Establish-Connection-To-Network		x	
		Disconnect-Connection-To-Network		x	
NM-RC-A	<input type="checkbox"/>	Who-Is-Router-To-Network	x		
		I-Am-Router-To-Network		x	
		I-Could-Be-Router-To-Network		x	
		Initialize-Routing-Table	x		
		Initialize-Routing-Table-Ack		x	
NM-RC-B	<input type="checkbox"/>	Who-Is-Router-To-Network	x	x	
		I-Am-Router-To-Network	x	x	
		Initialize-Routing-Table		x	
		Initialize-Routing-Table-Ack	x		

## 7. BACNET OBJECTS

### 7.1 BACNET OBJECT TYPES

A “BACnet Object” is a kind of data structure defined by the BACnet Standard. It corresponds to a control point, such as “On/Off command of the Air-con CELL No.1”. In the BACnet Standard, objects are categorized in to a number of the “BACnet Object Types”. This BACnet Gateway selects and implements the following BACnet Object Types listed in the Table 7.1. This selection of the BACnet Object Types conforms to the guideline of “BACnet Implementation Guideline for Packaged Air-conditioners” Ver.1.0, Feb.5, 2004, issued by the Interface Committee of the Japanese Refrigeration and Air-conditioning Industry Association.

Table 7.1 BACnet Object Type Implementation

BACnet Object Type	Usage in this Gateway	Creatable	Deletable	Notes
Analog Input	Room temperature of an Air-con CELL	No	No	
Analog Value	Set temperature of an Air-con CELL	No	No	
Binary Input	On/Off status Failure Stop Alarm of a Air-con CELL Filter Sign of a Air-con CELL SUPERLINK communication status of a Air-con CELL	No	No	
Binary Output	On/Off command	No	No	
Binary Value	Reset command of Filter Sign of an Air-con CELL Remocon Lock command of an Air-con CELL System Stop command to all Air-con CELLS	No	No	Only System Stop command is for whole air-conditioners
Device	Represents this BACnet Gateway itself.	No	No	Only one instance in this Gateway.
Multi-state Input	Mode status of a Air-con CELL Error Code of failure stop of an Air-con CELL Fan speed status of an Air-con CELL	No	No	
Multi-state Output	Mode command to a Air-con CELL Fan Speed command to a Air-con CELL	No	No	

## 7.2 OBJECT MEMBER OF A CELL

Each object in an Air-con CELL is called “Member Object” and identified by the member number , which is called Object Member No. The Table 7.2 shows a list of the Object Members of an Air-con CELL and the Data which each Object Member will takes.

This Table conforms to the guideline of the “BACnet Implementation Guideline for Packaged Air-conditioners” Ver.1.0, Feb.5, 2004, issued by the Interface Committee of the Japanese Refrigeration and Air-conditioning Industry Association.

Table 7.2 Air-con CELL’s Object Member List

Mem-ber No.	Object Member (Control&Monitor Item)	Object Type	Data				
			Inactive	Active			
			1	2	3	4	5
1	On/Off command	BO	Off	On			
2	On/Off status	BI	Off	On			
3	Failure Stop Alarm	BI	Normal	Failure			
4	Error Code	MI	0 ~ 99				
5	Mode command	MO	Cool	Heat	Fan	Auto	Dry
6	Mode status	MI	Cool	Heat	Fan	Auto	Dry
7	Fan Speed command	MO	Lo	Me	Hi		
8	Fan Speed status	MI	Lo	Me	Hi		
9	Room Temperature	AI	0.0 ~ 35.0 degree (C)				
10	Set Temperature command	AV	18 ~ 30 degree (C)				
11	Filter Sign status	BI	Off	On			
12	Filter Sign Reset command	BV	Reset				
13	Remocon Lock/Unlock command (All Remocon functions)	BV	Unlock	Lock			
20	Communication status	BI	Normal	Failure			
21	Air-con System Stop command	BV	Release	Stop			

(\*1) Some package air-conditioner models do not support the “Auto” mode.

(\*2) All remocon functions will be locked or unlocked simultaneously.

(\*3) Since there is only one instance of the Air-con System Stop command object for the Gateway, this object is defined to belong to the Air-con CELL No.0.

(\*4) Definition of the abbreviation of the BACnet Object Types are as follows

AI : Analog Input  
 AV : Analog Value  
 BI : Binary Input  
 BO : Binary Output  
 BV : Binary Value  
 MI : Multistate Input  
 MO : Multistate Output

### 7.3 OBJECT INSTANCE NUMBER

The BACnet standard defines the format of the BACnet Object Identifier as shown in the following diagram. That is, the 32 bits of the BACnet Object Identifier consists of the higher 10 bits of the BACnet Object Type and the lower 22 bits of the Instance No.

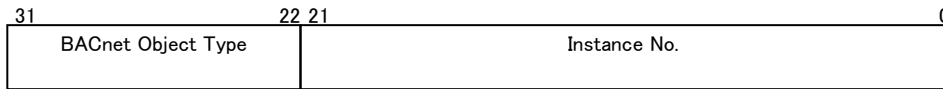


Fig. 7.1 Format of the BACnet Object Identifier

In this BACnet Gateway, the 22 bits of the Instance No. shown above is divided into the higher 14 bits and the lower 8bits as corresponding with the Air-con CELL No. and its Object Member No. as shown in the following diagram. This structure comes from the concept that each Air-con CELL has a number of Object Members.

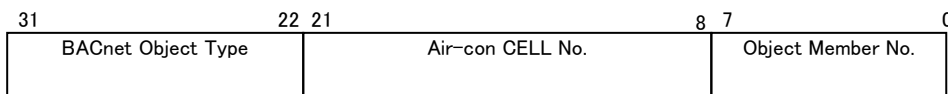


Fig 7.2 Format of the Instance No. in this Gateway

For example, the Instance No. of the Mode command Object(Member No. is 5) of the Air-con CELL No.10 is be defined as follows.

	Air-con CELL No.	Object Member No.
Meaning	CELL No. = 10	Object Member No. = 5
Bits of CELL & Member	00000000001010	00000101
Instance No. bit string	00000000001010 00000101 = X'0A05' = 2565	
Calculation method	10 x 256 + 5 = 2565	

In the case of the System Stop command Object which is only one for this Gateway, the Instance No. of the System Stop command object is defined so as to be the Object Member No.21 of the Air-con CELL No.0.

Table 7.3 shows examples of the Object Identifier Allocation for CELL 0 and CELL 1.

**Table 7.3 Object ID Allocation for SC-BGWN-A**

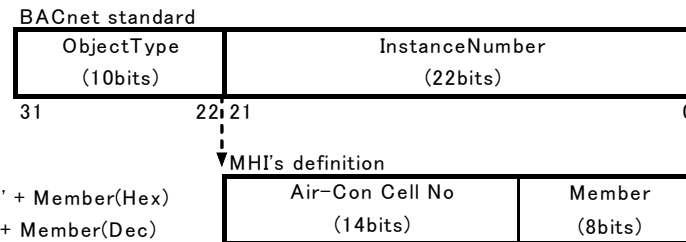
Air-con CELL No.	FunctionMember	Member Code	ObjectName	ObjectType		InstanceNumber		ObjectIdentifier	
				Name	Code	Decimal	Hexadecimal	Decimal	Hexadecimal
Air-con. Cell 0	On/Off command	1	StartStopCommand_000	BO	4	1	X '000001'	16777217	X '01000001'
	On/Off status	2	StartStopStatus_000	BI	3	2	X '000002'	12582914	X '00C00002'
	Alarm status	3	Alarm_000	BI	3	3	X '000003'	12582915	X '00C00003'
	Error Code	4	MulfunctionCode_000	MI	13	4	X '000004'	54525956	X '03400004'
	Mode command	5	AirConModeCommand_000	MO	14	5	X '000005'	58720261	X '03800005'
	Mode status	6	AirConModeStatus_000	MI	13	6	X '000006'	54525958	X '03400006'
	Fan Speed command	7	AirFlowRateCommand_000	MO	14	7	X '000007'	58720263	X '03800007'
	Fan Speed status	8	AirFlowRateStatus_000	MI	13	8	X '000008'	54525960	X '03400008'
	Room Temperature	9	RoomTemp_000	AI	0	9	X '000009'	9	X '00000009'
	Set Temperatuer command	10	TempAdjust_000	AV	2	10	X '00000A'	8388618	X '0080000A'
	Filter Sign status	11	FilterSign_000	BI	3	11	X '00000B'	12582923	X '00C0000B'
	Filter Sign Reset command	12	FilterSignReset_000	BV	5	12	X '00000C'	20971532	X '0140000C'
	Remocon Lock/Unlock command	13	RemoteControl_000	BV	5	13	X '00000D'	20971533	X '0140000D'
	Communication status	20	CommunicationStatus_000	BI	3	20	X '000014'	12582932	X '00C00014'
Air-con. Cell 1	On/Off command	1	StartStopCommand_001	BO	4	257	X '000101'	16777473	X '01000101'
	On/Off status	2	StartStopStatus_001	BI	3	258	X '000102'	12583170	X '00C00102'
	Alarm status	3	Alarm_001	BI	3	259	X '000103'	12583171	X '00C00103'
	Error Code	4	MulfunctionCode_001	MI	13	260	X '000104'	54526212	X '03400104'
	Mode command	5	AirConModeCommand_001	MO	14	261	X '000105'	58720517	X '03800105'
	Mode status	6	AirConModeStatus_001	MI	13	262	X '000106'	54526214	X '03400106'
	Fan Speed command	7	AirFlowRateCommand_001	MO	14	263	X '000107'	58720519	X '03800107'
	Fan Speed status	8	AirFlowRateStatus_001	MI	13	264	X '000108'	54526216	X '03400108'
	Room Temperature	9	RoomTemp_001	AI	0	265	X '000109'	265	X '00000109'
	Set Temperatuer command	10	TempAdjust_001	AV	2	266	X '00010A'	8388874	X '0080010A'
	Filter Sign status	11	FilterSign_001	BI	3	267	X '00010B'	12583179	X '00C0010B'
	Filter Sign Reset command	12	FilterSignReset_001	BV	5	268	X '00010C'	20971788	X '0140010C'
	Remocon Lock/Unlock command	13	RemoteControl_001	BV	5	269	X '00010D'	20971789	X '0140010D'
	Communication status	20	CommunicationStatus_001	BI	3	276	X '000114'	12583188	X '00C00114'

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Instance Number Allocation Rule

$$\begin{aligned} \text{Object\_Identifier} &= \text{ObjectType} * X'400000' + \text{InstanceNumber(Hex)} \\ &= \text{ObjectType} * 4194304 + \text{InstanceNumber(Dec)} \end{aligned}$$

$$\begin{aligned} \text{InstanceNumber} &= \text{Cell} * X'100' + \text{Member(Hex)} \\ &= \text{Cell} * 256 + \text{Member(Dec)} \end{aligned}$$



## 8. BACNET SERVICES

### 8.1 BACNET SERVICE LIST

“BACnet Services” are a kind of data access to the BACnet Objects defined by the BACnet Standard. Among the BACnet Services defined in the BACnet Standard, this Gateway selects and implements services listed in the Table 8.1.

This Table conforms to the guideline of the “BACnet Implementation Guideline for Packaged Air-conditioners” Ver.1.0, Feb.5, 2004, issued by the Interface Committee of the Japanese Refrigeration and Air-conditioning Industry Association.

Table 8.1 BACnet Services Implementation

BACnet Service	Description	Note
ReadProperty	The host computer reads one property of one object in this Gateway.	
ReadPropertyMultiple	The host computer reads plural properties of plural objects in this Gateway.	Can be used as ReadProperty
WriteProperty	The host computer writes one property of one object in this Gateway.	
WritePropertyMultiple	The host computer writes plural properties of plural objects in this Gateway.	Can be used as WriteProperty
UnconfirmedCOVNotification	This Gateway broadcasts Change of Value without the host's acknowledge.	Non-Subscribe broadcast
UnconfirmedEventNotification	This Gateway broadcasts Event of Alarm without the host's acknowledge.	Broadcast without NotificationClass
Who-Is / I-Am	This Gateway responds I-Am to the Who-Is issued by the host computer.	This Gateway does not issue Who-Is
Who-Has / I-Have	This Gateway responds I-have to the Who-Has issued by the host computer.	This Gateway does not issue Who-Has.
TimeSynchronization	The host computer corrects current time of this Gateway.	

### 8.2 CONDITIONS FOR BACNET SERVICES

This BACnet Gateway does not support “APDU segmentation” of the BACnet Standard. The APDU segmentation is optional function of a BACnet device. The APDU segmentation is a communication function in which the sender divides a long BACnet message into many communication packets whose length is less than 1024 bytes, and receiver gather these packets to make the original long message.

Therefore, the absolute conditions for this Gateway is as followings:

- (1) The BACnet APDU segmentation can not be used for this Gateway.
- (2) The maximum APDU length is 1024 bytes for this Gateway.

## 9. OBJECT PROPERTY LIST

**Table 9.1 Analog Input (Room Temperature Sensor Data)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"RoomTemp_XXX"
Object_Type	BACnetObjectType	R	R	
Present_Value	REAL	R1	R	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Sensor Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal NO_SENSOR:Sensor Failure UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Update_Interval	Unsigned	0	-	
Units	BACnetEngineeringUnits	R	R	DEGREES_CELSIUS(°C) fixed
Min_Pres_Value	REAL	0	-	
Max_Pres_Value	REAL	0	-	
Resolution	REAL	0	-	
COV_Increment	REAL	02	-	
Time_Delay	Unsigned	03	-	
Notification_Class	Unsigned	03	-	
High_Limit	REAL	03	-	
Low_Limit	REAL	03	-	
Deadband	REAL	03	-	
Limit_Enable	BACnetLimitEnable	03	-	
Event_Enable	BACnetEventTransitionBits	03	-	
Acked_Transitions	BACnetEventTransitionBits	03	-	
Notify_Type	BACnetNotifyType	03	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	03	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~03:Optional, -:Not supported)



**Table 9.2 Analog Value (Setpoint Temperature command)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"TempAdjust_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	REAL	R4	W	18.0~30.0
Description	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Units	BACnetEngineeringUnits	R	R	DEGREES_CELSIUS(°C) fixed
PriorityArray	BACnetPriorityArray	01	R	
RelinquishDefault	REAL	01	R	23.0 fixed
COV_Increment	REAL	02	-	
Time_Delay	Unsigned	03	-	
Notification_Class	Unsigned	03	-	
High_Limit	REAL	03	-	
Low_Limit	REAL	03	-	
Deadband	REAL	03	-	
Limit_Enable	BACnetLimitEnable	03	-	
Event_Enable	BACnetEventTransitionBits	03	-	
Acked_Transitions	BACnetEventTransitionBits	03	-	
Notify_Type	BACnetNotifyType	03	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	03	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~03:Optional, -:Not supported)

**Table 9.3 Binary Input without Intrinsic Report (On/Off status)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"StartStopStatus_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	BACnetBinaryPV	R1	R	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Polarity	BACnetPolarity	R	R	NORMAL fixed
Inactive_Text	CharacterString	02	-	
Active_Text	CharacterString	02	-	
Change_Of_State_Time	BACnetDateTime	03	R	
Change_Of_State_Count	Unsigned	03	W	0~1999998
Time_Of_State_Count_Reset	BACnetDateTime	03	R	
Elapsed_Active_Time	Unsigned32	04	W	0~3599996400
Time_Of_Active_Time_Reset	BACnetDateTime	04	R	
Time_Delay	Unsigned	05	-	
Notification_Class	Unsigned	05	-	
Alarm_Value	BACnetBinaryPV	05	-	
Event_Enable	BACnetEventTransitionBits	05	-	
Acked_Transitions	BACnetEventTransitionBits	05	-	
Notify_Type	BACnetNotifyType	05	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	05	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~05:Optional, -:Not supported)

**Table 9.4 Binary Input with Intrinsic Report (Alarm Status, Filter Sign Status, Communication Status)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"Alarm_xxx" "FilterSign_xxx" "CommunicationStatus_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	BACnetBinaryPV	R1	R	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(TRUE:Failure Stop) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL:Normal operation OFFNORMAL:Failure Stop
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Polarity	BACnetPolarity	R	R	NORMAL fixed
Inactive_Text	CharacterString	02	-	
Active_Text	CharacterString	02	-	
Change_Of_State_Time	BACnetDateTime	03	R	
Change_Of_State_Count	Unsigned	03	W	0~1999998
Time_Of_State_Count_Reset	BACnetDateTime	03	R	
Elapsed_Active_Time	Unsigned32	04	W	0~3599996400
Time_Of_Active_Time_Reset	BACnetDateTime	04	R	
Time_Delay	Unsigned	05	R	0 fixed
Notification_Class	Unsigned	05	R	0 fixed(no Notification_Class)
Alarm_Value	BACnetBinaryPV	05	R	ACTIVE fixed
Event_Enable	BACnetEventTransitionBits	05	R	TO_OFFNORMAL(always TRUE) TO_FAULT(always FALSE) TO_NORMAL(alwaysTRUE)
Acked_Transitions	BACnetEventTransitionBits	05	R	All TRUE fixed
Notify_Type	BACnetNotifyType	05	R	ALARM fixed
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	05	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~05:Optional, -:Not supported)

**Table 9.5 Binary Output (On/Off command)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"StartStopCommand_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	BACnetBinaryPV	W	W	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Polarity	BACnetPolarity	R	R	NORMAL fixed
Inactive_Text	CharacterString	01	-	
Active_Text	CharacterString	01	-	
Change_Of_State_Time	BACnetDateTime	02	-	
Change_Of_State_Count	Unsigned	02	-	
Time_Of_State_Count_Reset	BACnetDateTime	02	-	
Elapsed_Active_Time	Unsigned32	03	-	
Time_Of_Active_Time_Reset	BACnetDateTime	03	-	
Minimum_Off_Time	Unsigned32	0	-	
Minimum_On_Time	Unsigned32	0	-	
Priority_Array	BACnetPriorityArray	R	R	
Relinquish_Default	BACnetBinaryPV	R	R	INACTIVE fixed
Time_Delay	Unsigned	04	-	
Notification_Class	Unsigned	04	-	
Feedback_Value	BACnetBinaryPV	04	-	
Event_Enable	BACnetEventTransitionBits	04	-	
Acked_Transitions	BACnetEventTransitionBits	04	-	
Notify_Type	BACnetNotifyType	04	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	04	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~04:Optional, -:Not supported)

**Table 9.6 Binary Value (Filter Sign Reset command, Remocon Lock command, System Stop command)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"FilterSignReset_xxx" "RemoteControl_xxx" "SystemForcedOff"
Object_Type	BACnetObjectType	R	R	
Present_Value	BACnetBinaryPV	R1	W	
Description	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Inactive_Text	CharacterString	02	-	
Active_Text	CharacterString	02	-	
Change_Of_State_Time	BACnetDateTime	03	-	
Change_Of_State_Count	Unsigned	03	-	
Time_Of_State_Count_Reset	BACnetDateTime	03	-	
Elapsed_Active_Time	Unsigned32	04	-	
Time_Of_Active_Time_Reset	BACnetDateTime	04	-	
Minimum_Off_Time	Unsigned32	0	-	
Minimum_On_Time	Unsigned32	0	-	
Priority_Array	BACnetPriorityArray	05	R	
Relinquish_Default	BACnetBinaryPV	05	R	INACTIVE fixed
Time_Delay	Unsigned	06	-	
Notification_Class	Unsigned	06	-	
Alarm_Value	BACnetBinaryPV	06	-	
Event_Enable	BACnetEventTransitionBits	06	-	
Acked_Transitions	BACnetEventTransitionBits	06	-	
Notify_Type	BACnetNotifyType	06	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	06	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~06:Optional, -:Not supported)

**Table 9.7 Multistate Input (Error Code Status, Mode Status, Fan Speed Status)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"MalfunctionCode_xxx" "AirConModeStatus_xxx" "AirFlowRateStatus_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	Unsigned	R1	R	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	02	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Number_Of_States	Unsigned	R	R	99 (Error Codes) 5 (Modes) 3 (Fan Speeds)
State_Text	BACnetARRAY[N] OF CharacterString	0	R	"E01" - "E99" "Cool", "Heat", "Fan", "Auto", "Dry" "Low", "Medium", "High"
Time_Delay	Unsigned	03	-	
Notification_Class	Unsigned	03	-	
Alarm_Values	List of Unsigned	03	-	
Fault_Values	List of Unsigned	03	-	
Event_Enable	BACnetEventTransitionBits	03	-	
Acked_Transitions	BACnetEventTransitionBits	03	-	
Notify_Type	BACnetNotifyType	03	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	03	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~03:Optional, -:Not supported)

**Table 9.8 Multistate Output (Mode command, Fan Speed command)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	
Object_Name	CharacterString	R	R	"AirConModeCommand_xxx" "AirFlowRateCommand_xxx"
Object_Type	BACnetObjectType	R	R	
Present_Value	Unsigned	W	W	
Description	CharacterString	0	-	
Device_Type	CharacterString	0	-	
Status_Flags	BACnetStatusFlags	R	R	IN_ALARM(always FALSE) FAULT(TRUE:Failure) OVERRIDDEN(always FALSE) OUT_OF_STATUS(always FALSE)
Event_State	BACnetEventState	R	R	NORMAL fixed
Reliability	BACnetReliability	0	R	NO_FAULT_DETECTED:Normal UNRELIABLE_OTHER:Failure
Out_Of_Service	BOOLEAN	R	R	always FALSE
Number_Of_States	Unsigned	R	R	5 (Modes) 3 (Fan Speeds)
State_Text	BACnetARRAY[N] of CharacterString	0	R	"Cool", "Heat", "Fan", "Auto", "Dry" "Low", "Medium", "High"
Priority_Array	BACnetPriorityArray	R	R	
Relinquish_Default	Unsigned	R	R	1(Cool) / 3(Hi) fixed
Time_Delay	Unsigned	01	-	
Notification_Class	Unsigned	01	-	
Feedback_Value	Unsigned	01	-	
Event_Enable	BACnetEventTransitionBits	01	-	
Acked_Transitions	BACnetEventTransitionBits	01	-	
Notify_Type	BACnetNotifyType	01	-	
Event_Time_Stamps	BACnetARRAY[3] OF BACnetTimeStamp	01	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~01:Optional, -:Not supported)

**Table 9.9 Device (This Gateway itself)**

Property Identifier	Property DataType	BACnet STD	Implemented	Note
Object_Identifier	BACnetObjectIdentifier	R	R	Configurable
Object_Name	CharacterString	R	R	"MHI_PAC_GATEWAY"
Object_Type	BACnetObjectType	R	R	
System_Status	BACnetDeviceStatus	R	R	OPERATIONAL fixed
Vendor_Name	CharacterString	R	R	"MITSUBISHI HEAVY INDUSTRIES, LTD. "
Vendor_Identifier	Unsigned16	R	R	83 fixed
Model_Name	CharacterString	R	R	"BACnet Superlink Gateway"
Firmware_Revision	CharacterString	R	R	"0.00"
Application_Software_Version	CharacterString	R	R	"SC-BGWN-A mmm dd, 'yy" example:SC-BGWN-A Jan 31, '08
Location	CharacterString	0	-	
Description	CharacterString	0	-	
Protocol_Version	Unsigned	R	R	1 fixed
Protocol_Revision	Unsigned	R	-	
Protocol_Services_Supported	BACnetServicesSupported	R	R	
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	R	
Object_List	BACnetARRAY[N] OF BACnetObjectIdentifier	R	R	Read by index number only
Max_APDU_Length_Accepted	Unsigned	R	R	1024 fixed
Segmentation_Supported	BACnetSegmentation	R	R	NO_SEGMENTATION fixed
Max_Segments_Accepted	Unsigned	01	-	
VT_Class_Supported	List of BACnetVTClass	02	-	
Active_VT_Sessions	List of BACnetVTSession	02	-	
Local_Time	Time	03,4	R	
Local_Date	Date	03,4	R	
UTC_Offset	INTEGER	04	R	-540(JST) fixed
Daylight_Saving_Status	BOOLEAN	04	-	
APDU_Segment_Timeout	Unsigned	01	-	
APDU_Timeout	Unsigned	R	R	3000(3 sec) fixed
Number_Of_APDU_Retries	Unsigned	R	R	3 times fixed
List_Of_Session_Keys	List of BACnetSessionKey	0	-	
Time_Synchronization_Recipients	List of BACnetRecipient	05	-	
Max_Master	Unsigned(1..127)	06	-	
Max_Info_Frames	Unsigned	06	-	
Device_Address_Binding	List of BACnetAddressBinding	R	R	
Database_Revision	Unsigned	R	-	
Configuration_Files	BACnetARRAY[N] of BACnetObjectIdentifier	07	-	
Last_Restore_Time	BACnetDateTime	07	-	
Backup_Failure_Timeout	Unsigned16	08	-	
Active_COV_Subscriptions	List of BACnetCOVSubscription	09	-	
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	010	-	
Manual_Slave_Address_Binding	List of BACnetAddressBinding	010	-	
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	011	-	
Slave_Address_Binding	List of BACnetAddressBinding	012	-	
Profile_Name	CharacterString	0	-	

(R:Read Only, W:Read/Write, 0~012:Optional, -:Not supported)



## 10. FUNCTION OF CONTROL & MONITOR

### 10.1 On/Off command

Object Member No. : 1  
Object Name : StartStopCommand\_xxx (xxx shows Cell No.)  
Object Type : Binary Output  
Present\_Value : INACTIVE(Off), ACTIVE(On)  
Description :

This function sends the On/Off command to the Air-con CELL to switch the indoor units On and Off. The result of this command is same as the operation from the remocon of the indoor units.

If the Off command is sent to the Air-con CELL which is in the failure status with the red LED on the remocon blinking ("Failure Stop Alarm" function should be "Failure" status), the "Off" command turns off the red LED on the remocon ("Failure Stop Alarm" function becomes "Normal" status) regardless of the actual failure of the indoor units. Then, if the "On" command is sent to the Air-con CELL in this situation, the indoor units would be switched On in case that the internal failure is removed, or the indoor units would go Failure indication again with the red LED On in case that the internal failure has not been removed.

### 10.2 On/Off status

Object Member No. : 2  
Object Name : StartStopStatus\_xxx (xxx shows Cell No.)  
Object Type : Binary Input  
Present\_Value : INACTIVE(Off), ACTIVE(On)  
Description :

This function indicates the On/Off status of the Air-con CELL. The indication is same as the indication on the remocon of the indoor units. This function indicates "On" when at least one indoor unit in the Air-con CELL is On.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

### 10.3 Failure Stop Alarm

Object Member No. : 3  
Object Name : Alarm\_xxx (xxx shows Cell No.)  
Object Type : Binary Input  
Present\_Value : INACTIVE(Normal), ACTIVE(Failure)  
Description :

This function indicates the Failure status of the Air-con CELL. The indication of this function is same as the indication on the remocon of the indoor units. This function indicates "Failure" when at least one indoor unit in the Air-con CELL is in failure.

If the failure is reset from the remocon or another system, this function indicates "Normal" even if the internal failure has not been removed. Also, if the failure is not reset, this function indicates "Failure" even if the internal failure is removed.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

### 10.4 Error Code

Object Member No. : 4  
Object Name : MalfunctionCode\_xxx (xxx shows Cell No.)  
Object Type : Multistate Input  
Present\_Value : 0 ~ 99  
Description :

This function indicates the Error Code of the Air-con CELL. The indication of this function is same as the indication on the remocon of the indoor units.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

#### 10.5 Mode command

Object Member No. : 5  
Object Name : AirConModeCommand\_xxx (xxx shows Cell No.)  
Object Type : Multistate Output  
Present\_Value : 1(Cool), 2(Heat), 3(Fan), 4(Auto), 5(Dry)  
Description :

This function sends the Operation mode command to the Air-con CELL to set Cooling, Heating, Fan, Automatic, or Dry mode. The result of this command is same as the operation from the remocon of the indoor units.

#### 10.6 Mode status

Object Member No. : 6  
Object Name : AirConModeStatus\_xxx (xxx shows Cell No.)  
Object Type : Multistate Input  
Present\_Value : 1(Cool), 2(Heat), 3(Fan), 4(Auto), 5(Dry)  
Description :

This function indicates the Operation mode of the Air-con CELL. The indication of this function is same as the indication on the remocon of the indoor units.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

#### 10.7 Fan Speed command

Object Member No. : 7  
Object Name : AirFlowRateCommand\_xxx (xxx shows Cell No.)  
Object Type : Multistate Output  
Present\_Value : 1(Lo), 2(Me), 3(Hi)  
Description :

This function sends the Fanspeed setting command to the Air-con CELL to set Hi, Me, or Lo. The result of this command is same as the operation from the remocon of the indoor units. This command can not switch off the fan of the indoor units.

#### 10.8 Fan Speed status

Object Member No. : 8  
Object Name : AirFlowRateStatus\_xxx (xxx shows Cell No.)  
Object Type : Multistate Input  
Present\_Value : 1(Lo), 2(Me), 3(Hi)  
Description :

This function indicates the Fanspeed of the Air-con CELL. The indication of this function is same as the indication on the remocon of the indoor units.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

#### 10.9 Room Temperature

Object Member No. : 9  
Object Name : RoomTemp\_xxx (xxx shows Cell No.)  
Object Type : Analog Input  
Present\_Value : 0.0 ~ 35.0 degree (C)  
Description :

This function indicates the Inlet air temperature status of the Air-con CELL by 0.25 degree step. When the temperature data is less than 0.0 degree or larger than 35.0 degree the output data of this function becomes 0.0 or 35.0 respectively. The indication of this function is same as the indication on the remocon of the indoor units.

In rare cases that this gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

#### 10.10 Set Temperature command

Object Member No. : 10  
Object Name : TempAdjust\_xxx (xxx shows Cell No.)  
Object Type : Analog Value  
Present\_Value : 18 ~ 30 degree (C)  
Description :

This function sends the temperature setpoint command to the Air-con CELL. The result of this command is same as the operation from the remocon of the indoor units. The range of the setting is from 18 to 30 degree by 1 degree step. If value with decimal point is input, it will be set to the rounded number. If the value less than 18 or larger than 30 is input, ErrorPDU which reports "PROPERTY, VALUE\_OUT\_OF\_RANGE" is returned.

Also this function indicates the temperature setpoint status. If the temperature setpoint is changed from the remocon, this function indicates the value.

With some types of remocon, the setpoint can be set by 0.5 degree step. In this case, the function indicates the value. But as mentioned above, this function accepts 1 degree step from the host computer.

In rare cases that this Gateway fails to receive the change of status broadcast from the indoor units, the change of status indication would delay for about 1 minute at the worst case.

#### 10.11 Filter Sign status

Object Member No. : 11  
Object Name : FilterSign\_xxx (xxx shows Cell No.)  
Object Type : Binary Input  
Present\_Value : INACTIVE(Off), ACTIVE(On)  
Description :

This function indicates the Filter Sign status of the Air-con CELL to report the Filter Sign LED on the remocon of the indoor units. The Filter Sign LED indicates recommendation that the intake air filter of the indoor units to be cleaned. The indication of this function is same as the indication on the remocon.

In rare cases that this Gateway fails to receive the change of status broadcast from an indoor unit, the change of status indication would delay for about 1 minute at the worst case.

#### 10.12 Filter Sign Reset command

Object Member No. : 12  
Object Name : FilterSignReset\_xxx (xxx shows Cell No.)  
Object Type : Binary Value  
Present\_Value : INACTIVE(Reset), ACTIVE(On)  
Description :

This function sends the Filter Sign Reset command to the Air-con CELL to turn off the Filter Sign LED on the remocon of the indoor units. The result of this command is same as the operation from the remocon.

The acceptable value to input is "Reset" only. If "On" is input, ErrorPDU which reports "PROPERTY, VALUE\_OUT\_OF\_RANGE" is returned.

#### 10.13 Remocon Lock/Unlock command

Object Member No. : 13  
Object Name : RemoteControl\_xxx (xxx shows Cell No.)  
Object Type : Binary Value  
Present\_Value : INACTIVE(Unlock), ACTIVE(Lock)  
Description :

This function sends the Remocon Lock/Unlock command to prohibit/allow the remocon operation. The all function of the remocon will be Lock/Unlock all together.

In case that SL1N or SL2N is connected, this command should be set as "Unlock" and SL1N/SL2N should be set as also Remocon Unlock.

In preparation for the case of power off, the value of this function is written to the non-volatile memory at every 10 minutes and is restored when the gateway restarts. The action is different from other functions.

The reason is that the value is sent to the SUPERLINK periodically, so the value should not to be lost.

#### 10.14 Communication status

Object Member No. : 20

Object Name : CommunicationStatus\_xxx (xxx shows Cell No.)

Object Type : Binary Input

Present\_Value : INACTIVE(Normal), ACTIVE(Failure)

Description :

This function indicates the communication status between this Gateway and the indoor units in the Air-con CELL. If this Gateway can not communicate all indoor units in the Air-con CELL, this function indicates "**Failure**".

This function indicates "**Failure**" when this Gateway is switched On. And this function indicates "**Normal**", when the all communications with the indoor units are established,

#### 10.15 Air-con System Stop command

Object Member No. : 21

Object Name : SystemForcedOff

Object Type : Binary Value

Present\_Value : INACTIVE(Release), ACTIVE(Stop)

Description :

This function sends the Off and the Remocon Lock command to all indoor units to stop all air-conditioners and prohibit all the remocon operation.

After the System Stop command is sent, the operation from the remocon becomes possible if the Remocon "**Unlock**" command is sent using "Remocon Lock/Unlock command" function of the specified Air-con CELL. Even in the System Stop state, each indoor unit can be operated from the BMS computer by sending commands using the "On/Off command" function. When System Stop "**Release**" command is sent to this function, all remocon becomes "**Unlock**" simultaneously but any indoor unit does not become **On** automatically.

■ End of Document