SOYAL

Communication Protocol

	Item No.	Version
	AR-721Ev2	4.05
	AR-725Ev2	4.05
	AR-727Ev5	4.05
	AR-331E/EF	4.05
	AR-881E	4.05
	AR-821EFv5	4.05
	AR-829Ev5	4.05
	AR-837E/EF	4.05
Date	**January 10, 2024**	

Communication Protocol

1.1 Preparing Connect

The communication protocol is using in the "interrogation/reply" mode and the protocol can be used over a two-wire RS485 or CAT5e Ethernet TCP/IP. Before connect to Peripheral Device (PD), the node ID of PD has to be known and that could be checked from the keypad or DIP switch as shown on the table below:

Steps	AR-725Ev2/ AR-881E	AR-821EFv5/AR829Ev5
Step 1:(Enter into EDIT MODE)	＊１２３４５６＃	＊１２３４５６＃
Step 2:(Setting Node ID)	００＊００１＃	Setting by Manual
Step 3:(Exit)	＊＃	＊＃

1.2 Data Format

All SOYAL® devices use the same protocol, only the commands given vary depending on different devices

	Baud Rate				9600，N，8，1				
	Data Format				Binary HEX Data				
	Data Package								
	Header (HEX)	Length		RND	DID	Function Code	Data		2 Bytes Check SUM
Standard Short	7E	Byte			8 bits	8bits	0~240		xor / sum
Standard Large (RS485)	FF 00 5A A5	High byte	Low byte		8 bits	8bits	0~500		xor / sum
Standard Large (TCP/IP)	FF 00 5A A5	High byte	Low byte		8 bits	8bits	0~1400		xor / sum
Security Short	7F	Byte		32 bits	8 bits	8bits	0~240	Padding	crc16 left / crc16 right
Security Large (RS485)	FF 00 55 AA	High byte	Low byte	32 bits	8 bits	8bits	0~500	Padding	crc16 left / crc16 right
Security Large (TCP/IP)	FF 00 55 AA	High byte	Low byte	32 bits	8 bits	8bits	0~1400	Padding	crc16 left / crc16 right

※ DID: Destination Node ID.

※ Area Code: The high nibble of high byte in large format package is controller's area code.

※ RDN: 4 Bytes of Challenge Random Data.

※ Padding: Padding data for 8-byte block encryption session on PAD_ISO2 format. Append the character 0x80 to the data block, then continue to append as many characters of 0x00 as are required to make the size of the data block to be evenly divisible by the block size of eight. Padding is not necessary for the length of the original data block is evenly divisible by eight.

1.3 Data package

There have standard mode and security mode can be use in communication between control panel and peripheral device. On the power on state, if the 8-byte of device security code is all 0xFF then the device will start in standard communication mode. Otherwise, the device will start in security mode. Supports short data packets and long data packet transmission formats in both standard and secure communication modes.

1.3.1 Standard Short Data Package

	Size（Byte）	Description	XOR 0xFF	SUM 0x00
Head	1	0x7E	No	No
Length	1	Data Length Indicator which denotes the length from Destination to the end including XOR and SUM (must less than 250 bytes)	No	No
DID	1	Destination Node ID 00: Reserved for the bus master FF: Broadcast to each reader	Yes	Yes
Command Code	1	Instruction Command	Yes	Yes
Data	…	Length of Data Block which varies depending on instructions	Yes	Yes
XOR	1	To XOR each byte from Destination ID to Data with 0xFF		Yes
SUM	1	TO sum each byte from Destination to XOR with 0x00. If the summary is greater than 0xFF, it should keep the low byte.		

Example：Polling Status from Node. 1						
Head	Length	Destination	Command	Data …	XOR	SUM
0x7E	0x04	0x01	0x18		0xE6	0xFF
		XOR Fields (Initial code:0xFF)				
		SUM Fields (Initial code:0x00)				

XOR = 0xFF ^ 0x01 ^ 0x18 = 0xE6   SUM = 0x01 + 0x18 + 0xE6 = 0xFF

1.3.2 Standard Large Data Package

	Size（Byte）	Description	XOR 0xFF	SUM 0x00
Head	4	0xFF 0x00 0x5A 0xA5 (MSB First)	No	No
Length	2	Data Length Indicator (MSB First) which denotes the length from next byte until end of package. The max data length is 1024 bytes and the high nibble of high byte is controller's area code.	No	No
DID	1	Destination Node ID 00: Reserved for the bus master FF: Broadcast to each reader	Yes	Yes
Command Code	1	Instruction Command	Yes	Yes
Data	00 ～ 0x3FA	Length of Data Block which varies depending on instructions (RS485 must less than 1018 bytes, TCP/IP must less than 1400 bytes)	Yes	Yes
XOR	1	To XOR each byte from Destination ID to Data with 0xFF		Yes
SUM	1	TO sum each byte from Destination to XOR with 0x00. If the summary is greater than 0xFF, it should keep the low byte.		

Example：Polling Status from Node. 1						
Head	Length	Destination	Command	Data …	XOR	SUM
0xFF005AA5	0x0004	0x01	0x18		0xE6	0xFF
		XOR Fields (Initial code:0xFF)				
		SUM Fields (Initial code:0x00)				

XOR = 0xFF ^ 0x01 ^ 0x18 = 0xE6   SUM = 0x01 + 0x18 + 0xE6 = 0xFF

Node ID needs to set from the keypad. Please refer to the command list for- 00

1.3.3 Security Short Data Package

	Size（Byte）	Description	Encrypt	CRC16
Head	1	0x7F	NO	
Length	1	Data Length Indicator which denotes the length from Destination to the end including XOR and SUM.	NO	
RDN	4	4 bytes of random challenge number	Yes	Check
DID	1	Destination Node ID 00: Reserved for the bus master FF: Broadcast to each reader	Yes	Check
Function	1	Instruction Command	Yes	Check
Data	n	Length of Data Block which varies depending on instructions	Yes	Check
Padding		8-byte Block padding data.	Yes	Check
CRC16-I	1	Encrypted data CRC16-Modbus from RDN to last Padding data.	NO	
CRC16-r	1		NO	

Example：Polling Status from Node. 1								
Head	Length	RDN	DID	CMD	Data …	Padding	CRC-I	CRC-r
7F	04	01 35 76 88	01	18		80 00	??	??
		ECB Encrypted data in 8-byte block padding format						
7F	04	E2 C7 57 12 56 72 07 13					3E	DC
		CRC16 Fields (Initial value:0xFFFF)					Plain code	
Echo ACK Package								
7F	04	01 35 76 89	01	04		80 00	??	??
		ECB Encrypted data in 8-byte block padding format						
		Encrypted data CRC16 Fields (Initial value:0xFFFF)					Plain code	

Data Length: The data length calculation will be the same whether in the standard mode or in the encryption mode, that is to say, in the encryption mode, RDN and Padding are not included in the total length of the packet. Therefore, in the encryption mode, if the data length of the packet is equal to 4, the receiver will need to receive an additional 10 bytes of data.

		Len	RDN	DID	CTL	Parameter	Padding	Check SUM (CRC16-Modbus)		Total Length
Standard	7E	04		01	18			XOR	SUM	6(Dec)
Security	**7F**	04	**4 Bytes**	**01**	**18**		**80 00**	**CRC-I**	**CRC-r**	**12(Dec)**
Standard	7E	05		01	26	01				7(Dec)
Security	**7F**	05	**4 Bytes**	**01**	**26**	**01**	**80**	**CRC-I**	**CRC-r**	**12(Dec)**
Standard	7E	06		01	21	81 00		5E	01	8(Dec)
Security	**7F**	06	**4 Bytes**	**01**	**21**	**81 00**	**--free padding--**	**CRC-I**	**CRC-r**	**12(Dec)**

※　Standard package vs. security package table.

Padding: Padding data for 8-byte block encryption session on PAD_ISO2 format. Append the character 0x80 to the data block, then continue to append as many characters of 0x00 as are required to make the size of the data block to be evenly divisible by the block size of 8. Padding is not necessary for the length of the original data block is evenly divisible by 8.

RDN: Secure communication section must have an RDN that increments by one on each communication sequence. After the peripheral device completes an instruction from the master, it must increase the received

RDN by one and then send it back to the sender's control panel.

Control panel in "Initialization Request" command must assign the initial RND value and it can be unique value between different peripheral devices. If security session failed by RDN then the control panel must initial the other security session by "Initial Request" command.

Command	Control Panel	Peripheral Device	RDN
Initial Request	Transmitter	Receiver	0x12345678
Echo	Receiver	Transmitter	0x12345679
Change Session Key	Transmitter	Receiver	0x1234567A
Echo	Receive	Transmitter	0x1234567B

CRC16: The CRC16 is encrypted data check sum in CRC16-MODBUS rules with a 0xFFFF initial value and append to the end of the data package in unencrypted plain code.

1.3.4 Security Long Data Package

	Size（Byte）	Description	Encrypt	CRC16
Head	1	FF 00 55 AA	No	
Length	2	Data Length Indicator which denotes the length from Destination to the end including XOR and SUM	No	
RDN	4	4 bytes of random challenge number	Yes	Check
DID	1	Destination Node ID 00: Reserved for the bus master FF: Broadcast to each reader	Yes	Check
Function	1	Instruction Command	Yes	Check
Data	…	Length of Data Block which varies depending on instructions	Yes	Check
Padding	n	8-byte Block padding data.	Yes	Check
CRC16-l	1	Encrypted data CRC16-Modbus from RDN to last Padding data.	No	
CRC16-r	1		No	

Example：Polling Status from Node. 1								
Head	Length	RDN	DID	CMD	Data …	Padding	CRC-l	CRC-r
FF 00 55 AA	00 04	87 65 56 7A	01	18		80 00	??	??
		ECB Encrypted data in 8-byte block padding format						
FF 00 55 AA	00 04	E2 C7 57 12 56 72 07 13					3E	DC
		Encrypted data CRC16 Fields (Initial value:0xFFFF)					Plain code	
Echo ACK Package								
FF 00 55 AA	00 04	87 65 56 7B	01	04		80 00	??	??
		ECB Encrypted data in 8-byte block padding format						
		Encrypted data CRC16 Fields (Initial value:0xFFFF)					Plain code	

Data Length: The data length calculation will be the same whether in the standard mode or in the encryption mode, that is to say, in the encryption mode, RDN and Padding are not included in the total length of the packet. Therefore, in the encryption mode, if the data length of the packet is equal to 4, the receiver will need to receive an additional 10 bytes of data.   That is 4(Length) + 4(RDN) + 2(Padding) = 10byte

Padding: Padding data for 8-byte block encryption session on PAD_ISO2 format. Append the character 0x80 to the data block, then continue to append as many characters of 0x00 as are required to make the size of

the data block to be evenly divisible by the block size of 8. Padding is not necessary for the length of the original

data block is evenly divisible by eight.

RDN: Secure communication section must have an RDN that increments by one on each communication

sequence. After the peripheral device completes an instruction from the master, it must increase the received

RDN by one and then send it back to the sender's control panel.

Control panel in "Initialization Request" command must assign the initial RND value and it can be unique

value between different peripheral devices. If security session failed by RDN then the control panel must initial

the other security session by "Initial Request" command.

Command	Control Panel	Peripheral Device	RDN
Initial Request	Transmitter	Receiver	0x1234567E
Echo	Receiver	Transmitter	0x1234567F
Change Session Key	Transmitter	Receiver	0x12345680
Echo	Receive	Transmitter	0x12345681

CRC16: The CRC16 is encrypted data check sum in CRC16-MODBUS rules with a 0xFFFF initial value

and append to the end of the data package in unencrypted plain code.

1.4 Command Echo Format

After command executed the target controller will echo result code and append data on followed format.

Echo	Value	Description
Header	??	The header will be same with send command. (0x7E or 0xFF005AA5)
Length	00 ??	Data Length bytes will be same with send command. (1 or 2 bytes)
Node	00	Always 00, mean this is one echo package to host where command from.
Function Echo		**Command Echo Code**, Reference to Echo Table
Source ID	01	The source node ID of data package come from (Who send)
Data 0~n		**Appended Data Field**, This field will depend on different controller.
Check Sum	??/??	

1.4.1 Echo Code List

Echo Code	*Description*	*Note*
03h	Echo requested data	7E xx 00 03 [Data...] checksum
04h	Command acknowledged (ACK)	7E 04 00 04 FB FF
05h	Command unacknowledged (NACK)	7E 04 00 05 FA FF
06h	Authentication failed (AUTHERR)	7E 04 00 06 F9 FF
07h	Tag operation error: no tags presented (NOTAG)	7E 04 00 07 F8 FF
08h	Tag operation error: User not login (NOT LOGIN LEVEL2)	7E 04 00 08 F7 FF
09h	Tag operation error: CRC8 check error for ReadBlockCRC8	7E 04 00 09 XX XX
0Ah	Tag operation error: Data sector not authenticated	
0Bh	Tag operation error: Data sector authentication error	
0Ch	Reject command for communication level error.	
0Dh	TCP Linker Operation Timeout	
0Eh	TCP Keep Alive	

1.4.2 Appended Data

1.4.2.1   AR881E/725Ev2/AR721Ev2 Append data

Filed	Value	Description
Data 0	0xC0	Controller Type (0xC0:AR881E/0xC1:AR725Ev2/0xC5:AR721Ev2)
Data 1	0x??	Firmware Version
Data 2	0x??	Bit mapping of Input port Bit0: Status of Main Egress (0: Active) Bit1: Status of Main Door Sensor (0: Active) Bit2: Status of WG1 Egress (0: Active) Bit3: Status of WG1 Door Sensor (0: Active)
Data 3	0x??	Bit mapping of Relay Port. Bit0: Main Door Relay (1/0: On/Off) Bit1: Bit2: Bit3: Bit4: WG1 Door Relay (1/0: On/Off) Bit5: Bit6: Bit7: Alarm Relay Status (1/0: On/Off)
Data 4	0x??	Option byte of Main Port Bit7: Anti-pass back (1/0: Ena/Dis) Bit6: In/Out for anti-pass back (1/0: In/Out) Bit5: Force Open Alarm (1/0:Enable/Disable) Bit4: Egress Button (1/0:Enable/Disable) Bit3: Skip PIN check while Card & PIN access mode. Bit2: Bit1: Auto Lock Door at Door Close (1/0:Enable/Disable) Bit0: Is time attendance door (1:0: No/Yes)
Data 5	0x??	Option byte of WG1 Port (Same with Option byte of Main Port)
Data 6	0x??	Reserved
Data 7		Bit 7: Alarm status indicator for WG port. Bit 6: Alarm status indicator for Main port. Bit 5: Force open alarm status for WG port. Bit 4: Force open alarm status for Main port. Bit 3: Arming status for WG port. Bit 2: Arming status for Main port. Bit 1: Keyboard locked status for WG port. Bit 0: Keyboard locked status for Main port.
Data 8		Host Overwrite Flag: (Please reference to Section 2.3.15)
Data 9		Bit 0: Set to indicate the main port stays in auto open state. Bit 1: Set to indicate the WG port stays in auto open state.

1.4.2.2   AR829Ev5/821EFv5 Append Data

Filed	Value	Description
Data0	0xC2	Controller Type (0xC2:AR829Ev5/0xC3:AR821EFv5/0xC4:AR727Ev5)
Data1	0x??	Firmware Version
Data2	0x??	Bit mapping of DI port Bit0: Status of Main Egress (0: Active) Bit1: Status of Main Door Sensor (0: Active) Bit2: Status of WG1 Egress (0: Active) Bit3: Status of WG1 Door Sensor (0: Active)
Data3	0x??	Bit mapping of Relay Port. Bit0: Main Door Relay (1/0: On/Off) Bit1: Bit2:

		Bit3:
		Bit4: WG1 Door Relay (1/0: On/Off)
		Bit5:
		Bit6:
		Bit7: Alarm Relay Status (1/0: On/Off)
Data4	0x??	Option byte of Main Port
		Bit7: Anti-pass back (1/0: Ena/Dis)
		Bit6: In/Out for anti-pass back (1/0: In/Out)
		Bit5: Force Open Alarm (1/0:Enable/Disable)
		Bit4: Egress Button (1/0:Enable/Disable)
		Bit3: Skip PIN check while Card & PIN access mode.
		Bit2:
		Bit1: Auto Lock Door at Door Close (1/0:Enable/Disable)
		Bit0: Is time attendance door (1:0: No/Yes)
Data5	0x??	Option byte of WG1 Port (Same with Option byte of Main Port)
Data6	0x??	Reserved. (must be zero)
Data7		
Data8		

2. Command List

2.1 Security Session Command Set (10H)

	Value	Description
Head	??	Leading Code could be short or large format
Length	?? 0B	Data length can be one or two bytes depend on protocol format.
RDN	??	Random challenge for security session (32 bits is MSB first format)
Node ID	01	Node ID of destination
Command	10	Secure Session Command Set
Parameter	??	Sub Code 00h: Initialization Request 01h: Change Security Session Key
Data …		
Padding		
CRC-l		Encrypted data CRC16-Modbus from RDN to last Padding data.
CRC-h		

※ **This command support security session package format only.**

2.1.1   Initialization Security Session RDN Request (10h.00h)

	Value	Description
Head	??	Leading Code could be short or large format (0x7F or 0xFF0055AA)
Length	?? 05	Data length can be one or two bytes depend on protocol format.
RDN	55 66 77 88	None zeros RDN for new security session in MSB first format.
Node ID	01	Target peripheral device Node ID
Command	10	Secure Session Command Set
Parameter	00	Sub function code: Initialization Request
Padding	80	8-byte block padding data
CRC-l		Encrypted data CRC16-Modbus from RDN to last Padding data
CRC-r		

※   This command must be the first command to synchronize random numbers and it can be executed at any time during the whole communication process to change the random number.

※   This command can switch the controller communication from plain mode to encrypted mode.

※   Switch plain mode to encrypted mode must use single DES encryption and 8-byte key (all 0xFF) as default key.

※   This command must be in encryption format and depend on the current encryption mode.

Example：Initial Security Session from RDN = 0x55667788								
Head	Length	RDN	DID	CMD	Data …	Padding	CRC-I	CRC-r
7F	05	55 66 77 88	01	10	00	80		
		ECB Encrypted data in 8-byte block padding format						
7F	05	D1 3B 68 0F 4D 63 6D AB					D0	EC
		CRC16 Fields (Initial value:0xFFFF)					Plain code	
Echo ACK Package (case for w/ append data)								
7F	0F	C8 C5 C4 2A DC 49 49 8C 39 58 01 97 1D CB B0 DB 70 37 AC C3 C6 05 4D 87					A1	2F
		ECB Encrypted data in 8-byte block padding format						
		CRC16 Fields (Initial value:0xFFFF)					Plain code	
7F	0F	55 66 77 89	00	04	01 C2 42 0D 91 10 10 00 00 00 00	80 00 00 00 00 00 00	A1	2F

※　The default encryption mode is key is single DES_ECB and the key is 8 bytes of 0xFF.

※　Polling Message in Security Session :

Tx

7F 04 55 66 77 8A 01 25   ; Plain

7F 04 E0 A3 29 72 40 C5 2C 17 BB 88   ; Security Session

Rx:

7F 21 7D DE D8 A1 63 96 8A 5F 07 23 E2 EB 3C 53 96 2F EA 25 CD 61 08 82 06 C7 CA AA AF 4D EA F1

DB AE FC 8D 7D 2A 26 C9 34 5A 7E D6   ; Security Session

7F 21 55 66 77 8B 00 18 01 11 12 12 01 03 03 13 11 00 00 00 00 10 00 00 00 01 00 00 00 00 00 00 00 00

00 00 00 80 00 00 00 00   ; Plain

2.1.2 Change to DES 64-bit Key Security Mode (10h.01h)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	0D	Data length can be one or two bytes depend on protocol format.
RDN	4 bytes	Challenge for security session (32 bits is MSB first format)
Node ID	01	Target peripheral device Node ID
Command	10	Change Key
Parameter	01	Change Security Session Key to 8 bytes DES mode.
Data 01	??	1st byte of new Session Key.
Data 02	??	2nd byte of new Session Key. Bit 55~48
Data …		… …
Data 08	??	8th byte of new Session Key. Bit 07~00
Padding	80	
CRC-I	??	CRC16-MODBUS from RDN to last Padding data

CRC-r	??	

※   This command is only available in security mode otherwise; you will receive an error response (0x0C).

※   **Set 8 bytes key value all to 0xff will switch the controller to standard mode after echo ACK.**

2.1.3   Change to 3DES 128-bit Key Security Mode (10h.02h)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	15	Data length can be one or two bytes depend on protocol format.
RDN	4 bytes	Challenge for security session (32 bits is MSB first format)
Node ID	01	Target peripheral device Node ID
Command	10	Change Key
Parameter	02	Change Security Session Key to 16 bytes 3DES mode.
Data 01	??	1st byte of new Session Key.
Data 02	??	2nd byte of new Session Key.
Data …		… …
Data 16	??	16th byte of new Session Key.
Padding	80	
CRC-l	??	CRC16-MODBUS from RDN to last Padding data
CRC-r	??	

※   This command is only available in security mode otherwise; you will receive an error response (0x0C).

※   **Set 16 bytes key value all to 0xff will switch the controller to standard mode after echo ACK.**

2.2 Get data of Get Controller's Parameters (12H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	06/07	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination controller
Command	12	Read controller's parameters
Data	00	*Sub Code:* *00H: Controller's Option Parameters (No extension parameters)* *01H: Auto Open Time Zone (No extension parameters)* *02H: Daily Alarm Setting (No extension parameters)* *03H: Auto Duty Shift Time Table (V2.9 and later)* *(Index and records must be assigned)* *04H: Master Card UID* *05H: RS484 sub Node Door number and Relay Port.* *06H: 16 bytes of custom data.* *07H:* *08H:* *09H:* *0AH:* *0BH:64 bytes custom duty text. [8 * 8]* *16H:Read Relay Delay Time* *17H:Get Host Overwrite Flag* *18H:Get Controller Edit Password* *19H:Get Controller Access Mode* *25H: Area and Temperature Warring level*
(Index)		The start record index of requirement. Range from 0 to 6 for Sun, Mon,… to Sat.
(Records)		How many daily records will be read.
XOR		XOR
SUM		SUM

2.2.1   Echo data of Get Controller's Option Parameters (sub code 00H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		Controller Type (0xC0:AR881E/0xC1:AR725Ev2/0xC2:AR829Ev5/0xC3:AR821EFv5)
Data 02		Door Number of Main Port
Data 03		Door Number of WG1 Port
Data 04~07		Edit Password. (Big endian)
Data 08~11		Start of Master user range. (Big endian)

Data 12~15		End of Master user range. (Big endian)
Data 16~17		General Password.
Data 18~19		Duress Code
Data 20~21		Reserved (must be zero).
Data 22~23		Bit mask for connected reader from bit 15 ~ 00. (for AR721Ev2 only) Data22: bit 15~08(Node 16~9), Data 23: bit 07~00(Node 8~1)
Data 24~25		Tag hold time base on 10ms. (Reject same card in this period)
Data 26~27		Main port door relay active time. (Base on 10ms)
Data 28~29		WG1 port door relay active time. (Base on 10ms)
Data 30~31		Alarm relay active time. (Base on 10ms)
Data 32		Main port options Bit7: Anti-pass back (1/0: Ena/Dis) Bit6: In/Out for anti-pass back (1/0: In/Out) Bit5: Force Open Alarm (1/0:Enable/Disable) Bit4: Egress Button (1/0:Enable/Disable) Bit3: Skip PIN check while Card & PIN access mode. Bit2: Auto Open Zone (1/0:Enable/Disable) Bit1: Auto lock door at door closed (1/0:Enable/Disable) Bit0: Is time attendance door (1:0: No/Yes)
Data 33		WG1 port options (same as main port)
Data 34		Main port extend option1 Bit 7: Set to enable door relay active in auto open time zone. (Free Zone Open Immediately) Bit 6: Set to enable stop alarm at door closed. Bit 5: Set to enable free tag access mode. Bit 4: Reserved. (must be zero) Bit 3: Set to enable auto disarmed time zone. (Time zone 62) Bit 2: Set to inhibit Key pad Bit 1: Set to enable fingerprint only (skip card check). *Fingerprint Only Bit 0: **Set to enable sounds for Egress Button. (1/0:Enable/Disable)**
Data 35		WG1 port extend option1 Bit 7: Set to enable door relay active in auto open time zone. (Free Zone

		Open Immediately)
		Bit 6: Set to enable stop alarm at door closed.
		Bit 5: Set to enable free tag access mode.
		Bit 4: Set to use main door relay replace WG port door relay output.
		Bit 3: Set to enable auto disarmed time zone. (Time zone 62)
		Bit 2: Set to inhibit Key pad
		Bit 1: Reserved. (must be zero)
		Bit 0: **Set to enable sounds for Egress Button. (1/0:Enable/Disable)**
Data 36		Main port door close delay time.(Base on seconds)
Data 37		WG1 port door close delay time.(Base on seconds)
Data 38		Bit mapping of Arming status. (1:Armed, 0:Disarm)
		Bit 0: Main port
		Bit 1: WG1 port
Data 39		Controller access mode of Card or PIN.
		Mode 4: Key in 5 digital of user address then 4 digital user PIN
		Mode 8: Access by 4 digital user PIN
Data 40		Pulse with of armed output signal. (Base on 10ms)
Data 41		Arming delay time after user set. (Base on seconds)
Data 42		Alarm delay time after alarm event triggered. (Base on seconds)
Data 43		Xxxx xx11: UART2 is Fingerprint 9000.
		Xxxx xx10:reserved
		Xxxx xx00:UART2 is Fingerprint 3DO-1500
		Xxxx xx01:UART2 is defined as
		Xxxx 0001: UART2 is Lift controller port
		Xxxx 0101:UART2 is slave port under AR716E
		Xxxx 1001:UART2 is Voice module port. (for EV5 only…)
		Xxxx 1001:UART2 is reader port for channel 1 (for AR721Ev2 only…)
		Xxxx 1101: UART2 is serial printer port
		00xx xx01: UART2 baud 4800
		01xx xx01: UART2 baud 9600
		10xx xx01: UART2 baud 19200
		11xx xx01: UART2 baud 38400

		Xx00 xxxx: UART3 is Yung TAI lift port
		Xx01 xxxx: reserved
		Xx10 xxxx: UART3 is LED display panel port(9600)
		Xx11 xxxx:UART3 is Voice module port. (for EV5 only…)
		Xx11 xxxx:UART3 is reader port for channel 2 (for AR721Ev2 only.)
Data 44		Common options.
		Bit 7: Set to enable BLACK TABLE user check.(Only for 16384 users mode)
		Bit 6: Set to show local Language manual instead of English manual.
		Bit 5~4: RS485 port function selections
		00b: Lift control output port. (4800,N,8,1)
		01b: Host communication port. (9600,N,8,1)
		10b: LED display panel port. (9600,N,8,1)
		11b: Serial printer port. (9600,N,8,1)
		Bit 3: WiG0 & WG1 signal output disable. (is duress and armed output)
		Bit 2: LCD display show DD/MM exchange MM/DD. (AR82xEv5 Only)
		Bit 1: Auto reset anti-pass back status
		Bit 0: Trigger alarm event at expiry user access.
Data 45		Display options
		Bit 7:
		Bit 6:
		Bit 5: Duplication check at enroll new fingerprint.(Ver:2.08 later)
		Bit 4: Enable auto duty code shift table. (Ver:2.08 later)
		Bit 3: Show WG port message on main controller LCD (Ver:2.06 later)
		Bit 2~0: (Ver:2.05 later)
		000b: Disable Tag UID Display 001b:Show WG32 UID
		010b: Show ABA10 UID 011b:Show HEX UID
		100b: Show WG26 UID 101b:Show ABA8 UID
		110b: Show Custom Format**
Data 46	(Ver2.5)	Max error times for lock keyboard. (version 2.05 and later only)
Data 47	(Ver2.5)	Baud selection for Host port
		00h:9600 01h:19200 02h:38400 03h:57600 04h:115200
Data 48	(Ver2.5)	Slave flags (version 2.05 and later only)
		Bit 7: Set to enable slave mode. In slave mode controller will send out user

		UID via WG output pin. (Just like WG reader)
		Bit 6: Set to lock keyboard operations.
		Bit 5: Set to lock LCD update via controller. The host can take all operation privilege after lock it. (ref. to cmd:27h)
		Bit 4: Set to inhibit 125KHz Tag access.
		Bit 3: Set to inhibit 13.56MHz Tag access.
		Bit 2: Set to enable fire alarm input and release all door.*AR721Ev2 only)
		Bit 1: Set to enable alarm event at invalid tag access. (V3.01)
		Bit 0: Reserved
Data 49	(Ver2.9)	Operation Mode 0x00: Mode 16384 with 64 Floors for each user. (Range from 0 to 16383) 0x01: Mode 32768 with 32 Floors for each user. (Range from 0 to 32767) 0x02: Mode 65535 with 16 Floors for each user. (Range from 0 to 65534) ※1
Data 50	V3.3	Egress Beeps of main controller (Max. is 3 beeps)
Data 51	V3.3	Egress Beeps of WG port (Max. is 3 beeps)
Data 52		Reserved for further use
XOR		XOR
SUM		SUM

※1: Only for LCD version

2.2.2　Echo data of Get Auto Open Time Zone　(sub code 01H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	65	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01~02		The 1st record of start time in minutes. (Little endian)
Data 03~04		The 2nd record of start time in minutes. (Little endian)
…		The 3rd ~ 15th record of start time.
Data 31~32		The 16th record of start time in minutes. (Little endian)
Data 33~34		The 1st record of stop time in minutes. (Little endian)

Data 12~15		The 2nd record of stop time in minutes.
…		
Data 63~64		The 16th record of stop time in minutes. (Little endian)
Data 65		The 1st record bitmapping of available port Bit 7~2: Reserved Bit 1: Reset to indicate this set of auto open zone is available in WG1 port. Bit 0: Reset to indicate this set of auto open zone is available in Main port.
Data 66		The 2nd record bitmapping of available port
Data …		
Data 80		The 16th record bitmapping of available port
Data 81		The 1st record bitmapping of available weekday Bit 7: Reset to enable this set of auto open zone on Saturday. Bit 6: Reset to enable this set of auto open zone on Friday. Bit 5: Reset to enable this set of auto open zone on Thursday. Bit 4: Reset to enable this set of auto open zone on Wednesday. Bit 3: Reset to enable this set of auto open zone on Tuesday. Bit 2: Reset to enable this set of auto open zone on Monday. Bit 1: Reset to enable this set of auto open zone on Sunday. Bit 0: Reset to enable this set of auto open zone on holiday.
Data 82		The 2nd record bitmapping of available weekday
…		
Data 96		The 16th record bitmapping of available weekday
XOR		XOR
SUM		SUM

2.2.3 Echo data of Get Daily Alarm Table   (sub code 02H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	55	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)

Data 01~02		The 1st record of start time in minutes. (Little endian)
Data 03~04		The 2nd record of start time in minutes. (Little endian)
…		The 3rd ~ 15th record of start time.
Data 31~32		The 16th record of start time in minutes. (Little endian)
Data 33~34		The 1st record of active time in seconds. (Little endian)
Data 12~15		The 2nd record of active time in seconds. (Little endian)
…		
Data 63~64		The 16th record of active time in seconds. (Little endian)
Data 65		The 1st record bitmapping of available weekday Bit 7: Reset to enable this set of auto open zone on Saturday. Bit 6: Reset to enable this set of auto open zone on Friday. Bit 5: Reset to enable this set of auto open zone on Thursday. Bit 4: Reset to enable this set of auto open zone on Wednesday. Bit 3: Reset to enable this set of auto open zone on Tuesday. Bit 2: Reset to enable this set of auto open zone on Monday. Bit 1: Reset to enable this set of auto open zone on Sunday. Bit 0: Reset to enable this set of auto open zone on holiday.
Data 66		The 2nd record bitmapping of available weekday
Data …		
Data 80		The 16th record bitmapping of available weekday
XOR		XOR
SUM		SUM

2.2.4 Echo data of Get Auto Duty Shift Time Table   (sub code 03H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		40 bytes Start time, End time and duty code of 1st Record. The 1st section start hour

22

Data 02		The 1st section start minute
Data 03		The 1st section stop hour.
…		The 1st section stop minute.
…		The 2nd section start hour
…		…
…		The 8th section stop hour.
Data 31		The 8th section stop minute.
Data 32		Duty Code of 1st section. Bit7~4: Duty code for holiday, Bit 3~0: Duty Code of working day For example: If duty code is 23h, the controller will echo 02h on holiday otherwise the 03h will be echo.
Data 33		Duty Code of 2nd section.
…		…
Data 40		Duty Code of 8th section.
Data 41~79		40 bytes Start time, End time and duty code of 2nd Record.
Data 80~119		40 bytes Start time, End time and duty code of 3rd Record.
XOR		XOR
SUM		SUM

※ It will take 40 bytes for each day.

※ Record 1 and 8 are auto duty switch time set 0~7 of Sunday.

※ Record 2 and 9 are auto duty switch time set 0~7 of Monday.

※ ….

※ Record 7 and 14 are auto duty switch time set 0~7 of Saturday.

2.2.5 Echo data of Get Master Card UID   (sub code 04H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.

Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01~08		The 1st Master Card UID (MSB first).
Data 09~16		The 2nd Master Card UID (MSB first).
Data 17~24		The 3rd Master Card UID (MSB first).
XOR		XOR
SUM		SUM

2.2.6 Echo data of Get sub-Node Door/Relay Setting (sub code 05H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01~16	xx	Door Number for WG0/WG1/Node3/Node4…Node16
Data 17~32	xx	Relay Port for WG0/WG1/Node3/Node4…Node16
XOR		XOR
SUM		SUM

2.2.7 Echo data of Get 16 bytes of custom define data (sub code 06H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01~16	xx	Custom define data

XOR		XOR
SUM		SUM

2.2.8 Echo data of Get Particular UID Block Parameters (sub code 08H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		Set Bit7 set 1 for KeyB or 0 for KeyA access. Bit 0~6 is Key Index (00h ~ 1Fh)
Data 02		UIDBLK: Data Block (00h ~ 3Fh) Number
Data 03		Start Byte Index(00h ~15h) or (nibble range 00h~1Fh for BCD format)
Data 04		Bit(7~4):Data Format assignment. 0x00=Binary, 0x1=BCD(Nibble Mode), 0x2=ASCII-BCD, 0x3=ASCII-HEX Bit(3~0) How many byte/nibble need to read? (UID Bits/8 = Bytes) Data Length (03h~08h Bytes) or (06h~10h Nibbles for BCD format)
Data 05		If set UIDBLK to zero, This byte will be standard UID/ PIN length define byte. Bit(7~4): PIN code bytes. Bit(3~0): UID bytes (UID Bits/8 = Bytes)
XOR		XOR
SUM		SUM

P.S. Set Data Length to 0 to disable particular Block UID assignment.

2.2.9 Echo data of Get Remote TCP Server IP and Port (sub code 0AH)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo

Data 01		The first remote server address "*192*.168.1.129"
Data 02		The first remote server address "192.*168*.1.129"
Data 03		The first remote server address "192.168.*1*.129"
Data 04		The first remote server address "192.168.1.*129*"
Data 05		The first remote server TCP port (High byte of word data)
Data 06		The first remote server TCP port (Low byte of word data)
Data 07		The second remote server address "*192*.168.1.130"
Data 08		The second remote server address "192.*168*.1.130"
Data 09		The second remote server address "192.168.*1*.130"
Data 10		The second remote server address "192.168.1.*130*"
Data 11		The second remote server TCP port (High byte of word data)
Data 12		The second remote server TCP port (High byte of word data)
XOR		XOR
SUM		SUM

Data Format: 0x00=Binary, 0x10=BCD(Nibble Mode), 0x20=ASCII-BCD, 0x30=ASCII-HEX

P.S. Set Data Length to 0 to disable particular Block UID assignment.

2.2.10 Echo data of Get 8 sets duty text (64 byte) (sub code 0BH)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01~16	xx	8 sets of user define duty text
XOR		XOR
SUM		SUM

※ Each set has 8 characters space, according to duty code 0~7, but only 6 bytes of the leading character is

    available. Ex. 73h A4h 57h AFh 5Ah 75h 00h 00h for set 1 is Big5 code for On Duty.

2.2.11 Echo data of Get DESFire Field Assignment　(sub code 12H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01	xx	Key Number of access key (Range 0 ~7)
Data 02		File ID of Document
Data 03		Application ID of Document. bit 23~16
Data 04		Application ID of Document. bit 15~8
Data 05		Application ID of Document. bit 7~0
Data 06		Offset of Binary Document. Bit 15~8
Data 07		Offset of Binary Document. Bit 7~0
XOR		XOR
SUM		SUM

※　Each set has 8 characters space, according to duty code 0~7, but only 6 bytes of the leading character is

available. Ex. 73h A4h 57h AFh 5Ah 75h 00h 00h for set 1 is Big5 code for On Duty.

2.2.12 Echo data of Get Hosting Flag　(sub code 13H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01	xx	Hosting Flag Bit 7: RFU: Must be zero Bit 6: Key pad Hosting. Set to hosting key pad and get by 0x18 command. Bit 5: LCD screen hosting. Set to hosting LCD screen. Bit 4: RF 125KHz disabled while set. Bit 3: RF 13.56MHz disabled while set

		Bit 2: RFU: Must be zero
		Bit 1: Tag error key card will trigger alarm output
		Bit 0: Disable Buzzer. The controller will work on silent mode.
XOR		XOR
SUM		SUM

2.2.13 Echo data of Get IPv4 Address and MAC Address (sub code 14H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		Network Options Bit 7: Set to enable DHCP.
Data 01~06		MAC Address
Data 07~10		IPv4 Address
Data 11~14		IPv4 Sub Mask Address
Data 15~18		IPv4 Gateway Address
Data 19~20		TCP Port
Data 21~24		IPv4 Primly DNS Address
Data 25~28		IPv4 Second DNS Address
Data 29~30		Http Server Port
XOR		XOR
SUM		SUM

2.2.14 Echo data of Get Available Users Count (sub code 15H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host

Command	03	Data echo
Data 00		Controller Node ID
Data 01		Available Users Count. Bit 31~24.
Data 02		Available Users Count. Bit 33~16.
Data 03		Available Users Count. Bit 15~08.
Data 04		Available Users Count. Bit 07~00.
XOR		XOR
SUM		SUM

2.2.15 Echo data of Get Relay Delay Time (sub code16H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00~01		Main port door relay active time. (Base on 10ms)
Data 02~03		WG port door relay active time. (Base on 10ms)
Data 04~05		Alarm relay active time. (Base on 10ms)
Data 06~07	xx	Lift controller relay active time. (Base on 10ms)
XOR		XOR
SUM		SUM

2.2.16 Echo data of Get Host Overwrite Flag (sub code 17H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		Host Overwrite Flags: Bit 0: Inhibit door relay active on normal Access, but RTE and host control.

		Bit 1:
		Bit 2:
		Bit 3: Reject Tag Access. *Sounds 3 beep and show "Tag inhibited"
		Bit 4: Set to disable egress function.
		Bit 5: Latch Door relay status (Keep the status from serial port command).
		Bit 6: Door Relay Latch state On/Off(1:0)
		Bit 7: Check password always when access on this device.
XOR		XOR
SUM		SUM

2.2.17 Echo data of Get Controller Edit Password (sub code 18H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		Edit Password. (bit 31~24)
Data 01		Edit Password. (bit 23~16)
Data 02		Edit Password. (bit 15~8)
Data 03		Edit Password. (bit 7~0)
XOR		XOR
SUM		SUM

2.2.18 Echo data of Get Controller Access Mode (sub code 19H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host

Command	03	Data echo
Data 00		Free Access for any Tag status for Main Door. (0x01/0x00:Ena / Disable)
Data 01		Free Access for any Tag status for WG Door. (0x01/0x00:Ena / Disable)
Data 02		Enable Black UID function. (0x01/0x00:Ena / Disable) ** Only available for User Capacity Mode0 (16348)
Data 03		User Capacity Selection: 0x00/0x01/0x02 for 16384/32768/65536:
Data 04		Controller access mode of Card or PIN. Mode 4: Key in 5 digital of user address then 4 digital user PIN Mode 8: Access by 4 digital user PIN
XOR		XOR
SUM		SUM

2.2.19 Echo data of Area and Temperature Warring level (sub code 25H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		Area Code of Controller (Range 00h ~ 0Fh)
Data 01		Temperature warring value on 0.01degree C above 36.5
XOR		XOR
SUM		SUM

※   If warring value is 0x64 that mean the real warring is (36.50 + 1.00) = 37.5.

2.2.20 Echo data of Get Controller Serial Number (sub code FEh)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host

Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		CPU Flash Size Code (bit 31~08).*1
Data 02		CPU Flash Size Code (bit 7~0).*1
Data 03~14		12 Bytes CPU serial number
XOR		XOR
SUM		SUM

※   Shift left 10 times to get CPU Flash Size.

2.2.21 Echo data of Get RS485 Reader Status (sub code 81H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	03	Data echo
Data 00		The source node ID of data package come from (Who send)
Data 01		Bit mask for channel 1 reader. Bit 0~7 mapping to Node 1 to 8
Data 02		Bit mask for channel 2 reader. Bit 0~7 mapping to Node 9 to 16
Data 03~18	xx	16 bytes of Reader communication status. (0x00:Online, 0x8x:Offline)
Data 19~34	xx	16 bytes of Reader IO status from Node 1 to 16. The bit mapping will depend on various type of device. Please reference to specified controller's document..
XOR		XOR
SUM		SUM

※   Each set has 8 characters space, according to duty code 0~7, but only 6 bytes of the leading character is available. Ex. 73h A4h 57h AFh 5Ah 75h 00h 00h for set 1 is Big5 code for On Duty.

※   AR721EV2 Only

2.3 Set Controller Parameters (20H)

2.3.1   Set Controller's Parameters (sub code 00H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	31	Data length can be one or two bytes depend on protocol format.
Node ID	??	Node ID of destination controller
Command	20	Set controller's parameters
Data 00		*Sub Code:* *00H: Controller's Option Parameters (No extension parameters)* *01H: Auto Open Time Zone (No extension parameters)* *02H: Daily Alarm Setting (No extension parameters)* *03H: Auto Duty Shift Time Table (V2.9 and later)* *(Index and records must be assigned)* *04H: Master Card UID* *05H: RS484 sub Node Door number and Relay Port.* *06H: 16 bytes of custom data.* *07H:* *08H: Set Particular UID Block Parameters* *09H: Set Remote Server Address and TCP Port* *0AH:* *0BH: 64 bytes custom duty text. [8 * 8]* *12H: Set DESFire Field Assignment* *13H: Set Hosting Flag* *14H: Set IPv4 Address and MAC address* *16H: Set Relay Delay Time* *17H: Set Host Overwrite Flag* *18H: Set Controller Edit Password* *19H: Set Controller Access Mode* *25H: Set Area and Temperature Warring level*
Data 01		New node ID assign
Data 02		Door Number of Main Port
Data 03		Door Number of WG1 Port
Data 04~07		Edit Password. (Big endian)
Data 08~11		Start of Master user range. (Big endian)
Data 12~15		End of Master user range. (Big endian)
Data 16~17		General Password. (Big endian)
Data 18~19		Duress Code.(Big endian)
Data 20~21		Global Free Node Mask.
Data 22~23		Bit mask for connected reader from bit 15 ~ 00. (for AR721EV2 & 716EV5 only) Data22: bit 15~08, Data 23: bit 07~00
Data 24~25		Tag hold time base on 10ms. (Reject same card in this period)
Data 26~27		Main port door relay active time. (Base on 10ms)

Data 28~29		WG1 port door relay active time. (Base on 10ms)
Data 30~31		Alarm relay active time. (Base on 10ms)
Data 32		Main port options Bit7: Anti-pass back (1/0: Ena/Dis) Bit6: In/Out for anti-pass back (1/0: In/Out) Bit5: Force Open Alarm (1/0:Enable/Disable) Bit4: Egress Button (1/0:Enable/Disable) Bit3: Skip PIN check while Card & PIN access mode. Bit2: **Auto Open Zone (1/0:Enable/Disable)** Bit1: Auto Lock Door at Door Close (1/0:Enable/Disable) Bit0: Is time attendance door (1:0: No/Yes)
Data 33		WG1 port options. (same as main port option)
Data 34		Main port extend option1 Bit 7: Set to enable door relay active in auto open time zone. **(Free Zone Open Immediately)** Bit 6: Set to enable stop alarm at door closed. Bit 5: Set to enable free tag access mode. Bit 4: Reserved. (must be zero) Bit 3: Set to enable auto disarmed time zone. (Time zone 62) Bit 2: Set to inhibit Key pad Bit 1: Set to enable fingerprint only (skip card check). *Fingerprint Only Bit 0: **Set to enable sounds for Egress Button. (1/0:Enable/Disable)**
Data 35		WG1 port extend option1 Bit 7: Set to enable door relay active in auto open time zone. **(Free Zone Open Immediately)** Bit 6: Set to enable stop alarm at door closed. Bit 5: Set to enable free tag access mode. Bit 4: Reserved. (must be zero) Bit 3: Set to enable auto disarmed time zone. (Time zone 62) Bit 2: Set to inhibit Key pad Bit 1: Reserved. (must be zero) Bit 0: **Set to enable sounds for Egress Button. (1/0:Enable/Disable)**
Data 36		Main port door close delay time.(Base on seconds)

Data 37		WG1 port door close delay time.(Base on seconds)
Data 38		Bit mapping of Arming status. (1:Armed, 0:Disarm) Bit 0: Main port Bit 1: WG1 port
Data 39		Controller access mode of Card or PIN. Mode 4: Key in 5 digital of user address then 4 digital user PIN Mode 8: Access by 4 digital user PIN
Data 40		Pulse with of armed output signal. (Base on 10ms)
Data 41		Arming delay time after user set. (Base on seconds)
Data 42		Alarm delay time after alarm event triggered. (Base on seconds)
Data 43		Xxxx xx11: UART2 id Fingerprint module port (9000). Xxxx xx10:UART2 is Finger Vein port(2000) Xxxx xx01:UART2 is defined as Xxxx 0001: UART2 is Lift controller port Xxxx 0101:UART2 is slave port under AR716E Xxxx 1001:UART2 is reader port for node 1 (AR721/747…) Xxxx 1101: reserved 00xx xx01: UART2 baud 4800 01xx xx01: UART2 baud 9600 10xx xx01: UART2 baud 19200 11xx xx01: UART2 baud 38400 Xx00 xx01: UART3 is Yung TAI lift port Xx01 xx01: reserved Xx10 xx01: UART3 is LED display panel port(9600) Xx11 xx01:UART3 is reader port for node9 (AR721H/747….)
Data 44		Common options. Bit 7: Bit 6: Set to show local Language manual exchange english manual. Bit 5~4: RS485 port function selections 00b: Lift control output port. (4800,N,8,1) 01b: Host communication port. (9600,N,8,1) 10b: LED display panel port. (9600,N,8,1)

		11b: Serial printer port. (9600,N,8,1)
		Bit 3: WiG0 & WG1 signal output disable. (is duress and armed output)
		Bit 2: LCD display show DD/MM exchange MM/DD. (AR82xEv5 Only)
		Bit 1: Auto reset anti-pass back status
		Bit 0: Trigger alarm event at expiry user access.
Data 45		Display options
		Bit 7:
		Bit 6:
		Bit 5: Duplication check at enroll new fingerprint.(Ver:2.08 later)
		Bit 4: Enable auto duty code shift table (Ver:2.08 later)
		Bit 3: Show WG port message on main controller LCD (Ver:2.06 later)
		Bit 2~0: (Ver:2.05 later)
		000b: Disable Tag UID Display 001b:Show WG32 UID
		010b: Show ABA10 UID 011b:Show HEX UID
		100b: Show WG26 UID 101b:Show ABA8 UID
		110b: Show Custom Format**
Data 46	(Ver2.5)	Max error times for lock keyboard. (version 2.05 and later only)
Data 47	(Ver2.5)	Baud selection for Host port
		00h:9600 01h:19200 02h:38400 03h:57600 04h:115200
Data 48	(Ver2.5)	Slave flags (version 2.05 and later only)
		Bit 7: Set to enable slave mode. In slave mode controller will send out user UID via WG output pin. (Just like WG reader)
		Bit 6: Set to lock keyboard operations.
		Bit 5: Set to lock LCD update via controller. The host can take all operation privilege after lock it. (ref. to cmd:27h)
		Bit 4: Set to inhibit 125KHz Tag access.
		Bit 3: Set to inhibit 13.56MHz Tag access.
		Bit 2: Set to enable fire alarm input and release all door.*AR721Ev2 only)
		Bit 1: Set to enable alarm event at invalid tag access. (V3.01)
		Bit 0: Reserved
Data 49	(Ver2.9)	Operation Mode. Please check Update log for details (V2.9 of section 4.1)
		0x00: Mode 16384 with 64 Floors for each user. (Range from 0 to 16383)
		0x01: Mode 32768 with 32 Floors for each user. (Range from 0 to 32767)

		0x02: Mode 65535 with 16 Floors for each user. (Range from 0 to 65534) ※1
Data 50	(V3.2)	Egress Beeps of main controller (Max. is 3 beeps) 2014.Sep.18 and later
Data 51	(V3.2)	Egress Beeps of WG port (Max. is 3 beeps) 2014.Sep.18 and later
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.2 Set Auto Open Time Zone (sub code 01H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	65	Data length can be one or two bytes depend on protocol format.
Node ID	??	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	01	Sub Code: 01: Set Auto Open Time Zone
Data 01~02		The 1st record of start time in minutes. (Little endian)
Data 03~04		The 2nd record of start time in minutes. (Little endian)
…		The 3rd ~ 15th record of start time.
Data 31~32		The 16th record of start time in minutes. (Little endian)
Data 33~34		The 1st record of stop time in minutes. (Little endian)
Data 12~15		The 2nd record of stop time in minutes.
…		
Data 63~64		The 16th record of stop time in minutes. (Little endian)
Data 65		The 1st record bitmapping of available port Bit 7~2: Reserved Bit 1: Reset to indicate this set of auto open zone is available in Main port. Bit 0: Reset to indicate this set of auto open zone is available in WG1 port.
Data 66		The 2nd record bitmapping of available port
Data …		
Data 80		The 16th record bitmapping of available port
Data 81		The 1st record bitmapping of available weekday

		Bit 7: Reset to enable this set of auto open zone on Saturday.
		Bit 6: Reset to enable this set of auto open zone on Friday.
		Bit 5: Reset to enable this set of auto open zone on Thursday.
		Bit 4: Reset to enable this set of auto open zone on Wednesday.
		Bit 3: Reset to enable this set of auto open zone on Tuesday.
		Bit 2: Reset to enable this set of auto open zone on Monday.
		Bit 1: Reset to enable this set of auto open zone on Sunday.
		Bit 0: Reset to enable this set of auto open zone on holiday.
Data 82		The 2nd record bitmapping of available weekday
…		
Data 96		The 16th record bitmapping of available weekday
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.3 Set Daily Alarm Table (sub code 02H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	55	Data length can be one or two bytes depend on protocol format.
Node ID	00	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	02	Sub Code: 02: Set daily alarm table
Data 01~02		The 1st record of start time in minutes. (Little endian)
Data 03~04		The 2nd record of start time in minutes. (Little endian)
…		The 3rd ~ 15th record of start time.
Data 31~32		The 16th record of start time in minutes. (Little endian)
Data 33~34		The 1st record of active time in seconds. (Little endian)
Data 12~15		The 2nd record of active time in seconds. (Little endian)
…		
Data 63~64		The 16th record of active time in seconds. (Little endian)

Data 65		The 1st record bitmapping of available weekday Bit 7: Reset to enable this set of auto open zone on Saturday. Bit 6: Reset to enable this set of auto open zone on Friday. Bit 5: Reset to enable this set of auto open zone on Thursday. Bit 4: Reset to enable this set of auto open zone on Wednesday. Bit 3: Reset to enable this set of auto open zone on Tuesday. Bit 2: Reset to enable this set of auto open zone on Monday. Bit 1: Reset to enable this set of auto open zone on Sunday. Bit 0: Reset to enable this set of auto open zone on holiday.
Data 66		The 2nd record bitmapping of available weekday
Data …		
Data 80		The 16th record bitmapping of available weekday
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.4 Set Auto Duty Shift Time Table (sub code 03H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	55	Data length can be one or two bytes depend on protocol format.
Node ID	00	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	03	Sub Code: 03: Auto Duty Shift Time Table (V2.9 and later)
(Index)	0	The start record index of 1st records. (Range 0~6 for Sun to Sat).
(Records)	7	How many daily records will be followed.
Data 03		40 bytes Start time, End time and duty code of 1st Record. The 1st section start hour
Data 04		The 1st section start minute
Data 05		The 1st section stop hour.
Data 06		The 1st section stop minute.
…		The 2nd section start hour.

…		The 2nd section start minutes.
…		…
…		The 8th section starts time in minutes.
…		The 8th section end time in minutes.
Data 34		Duty Code of 1st section.
		Bit7~4: Duty code for holiday, Bit 3~0: Duty Code for working day
		For example: If duty code is 23h, the host will get 02h on holiday otherwise the 03h will return.
Data 35		Duty Code of 2nd section.
…		…
Data 42		Duty Code of 8th section.
Data 43~81		40 bytes Start time, End time and duty code of 2nd Record.
Data 82~121		40 bytes Start time, End time and duty code of 3rd Record.
		…
XOR		XOR
SUM		SUM

If index and records are all zero that mean this command will be erase auto duty shift time table.

※ Record 1 and 8 are auto duty switch time set 0~7 of Sunday.

※ Record 2 and 9 are auto duty switch time set 0~7 of Monday.

※ ….

※ Record 7 and 14 are auto duty switch time set 0~7 of Saturday.

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.5　Set Master Card UID (sub code 04H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	04	Sub Code:

		04: Set Master Card UID (3 * 8 = 24 Bytes)
Data 01~08	xx	The 1ˢᵗ Master Card UID (MSB first).
Data 09~16	xx	The 2ⁿᵈ Master Card UID (MSB first).
Data 17~24	xx	The 3ʳᵈ Master Card UID (MSB first).
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.6 Set Sub Node Door Number / Relay Port   (sub code 05H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	05	Sub Code: 05: Set RS485 Reader Door Number and Relay Port
Data 01~16	xx	Door Number for WG0/WG1/Node3/Node4…Node16
Data 17~32	xx	Relay Port for WG0/WG1/Node3/Node4…Node16
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.7 Set 16 Bytes of Custom Define Data (sub code 06H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	06	Sub Code: 06: Set 16 bytes of custom define data
Data 01~16	xx	Custom data can be any encrypted code.

41

XOR		XOR
SUM		SUM

2.3.8 Set Particular UID Block Parameters (sub code 08H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	08	Sub Code 0x08
Data 01		Set Bit7 set 1 for KeyB or 0 for KeyA access. Bit 0~6 is Key Index (00h ~ 1Fh)
Data 02		UIDBLK: Data Block (01h ~ 3Fh) ※0x00 will disable particular UID.
Data 03		Start Byte Index(00h ~15h) or (nibble range 00h~1Fh for BCD format)
Data 04		Bit(7~4):Data Format assignment. 0x0=Binary, 0x1=BCD(Nibble Mode), 0x2=ASCII-BCD, 0x3=ASCII-HEX Bit(3~0) How many byte/nibble need to read? (UID Bits/8 = Bytes) Data Length (03h~08h Bytes) or (06h~10h Nibbles for BCD format)
Data 05		If set UIDBLK to zero, This byte will be standard UID/ PIN length define byte. Bit(7~4): PIN code bytes. Bit(3~0): UID bytes (UID Bits/8 = Bytes)
XOR		XOR
SUM		SUM

2.3.9 Set Remote Server Address and TCP Port (sub code 0AH)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	0A	Sub Code 0x0A
Data 01		The first remote server address "*192*.168.1.129"

Data 02		The first remote server address "192.**168**.1.129"
Data 03		The first remote server address "192.168.**1**.129"
Data 04		The first remote server address "192.168.1.**129**"
Data 05		The first remote server TCP port (High byte of word data)
Data 06		The first remote server TCP port (Low byte of word data)
Data 07		The second remote server address "**192**.168.1.130"
Data 08		The second remote server address "192.**168**.1.130"
Data 09		The second remote server address "192.168.**1**.130"
Data 10		The second remote server address "192.168.1.**130**"
Data 11		The second remote server TCP port (High byte of word data)
Data 12		The second remote server TCP port (High byte of word data)
XOR		XOR
SUM		SUM

Data Format: 0x00=Binary, 0x10=BCD(Nibble Mode), 0x20=ASCII-BCD, 0x30=ASCII-HEX

2.3.10 Set 8 sets duty text (64 byte) (sub code 0BH)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	0B	Sub Code: 0B: Set 64 bytes of custom define duty text
Data 1~8	xx	"F1" Duty Text. Default: 20 A4 57 AF 5A 20 FF FF
Data 9~16	xx	"F2" Duty Text. Default: 20 A4 55 AF 5A 20 FF FF
Data 17~24	xx	"F3" Duty Text. Default: 20 A5 7E A5 58 20 FF FF
Data 25~32	xx	"F4" Duty Text. Default: 20 AA F0 A6 5E 20 FF FF
Data 33~40	xx	"F1+F1" Duty Text. Default: A4 C8 A5 F0 A5 58 FF FF
Data 41~48	xx	"F2+F2" Duty Text. Default: A4 C8 A5 F0 A6 5E FF FF
Data 49~56	xx	"F3+F3" Duty Text. Default: A5 5B AF 5A A4 57 FF FF
Data 57~64	xx	"F4+F4" Duty Text. Default: A5 5B AF 5A A4 55 FF FF
XOR		XOR

SUM		SUM

Echo:

After command received, the controller will echo ACK or NACK to the source node.

EX: Default Big-5 duty text "上班、下班、外出、返回、午休出、午休回、加班上、加班下" **is followed.**

20 0B 20 A4 57 AF 5A 20 FF FF 20 A4 55 AF 5A 20 FF FF 20 A5 7E A5 58 20 FF FF 20 AA F0 A6 5E 20 FF FF A4 C8 A5 F0

A5 58 FF FF A4 C8 A5 F0 A6 5E FF FF A5 5B AF 5A A4 57 FF FF A5 5B AF 5A A4 55 FF FF

2.3.11 Set DESFire Field Assignment (sub code 12H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	12	Sub Code of set command
Data 01	xx	Application access key number. (0x00 ~0x07). Set to 0x0F will just read UID.
Data 02		File ID of Document
Data 03		Application ID of Document. bit 23~16
Data 04		Application ID of Document. bit 15~8
Data 05		Application ID of Document. bit 7~0
Data 06		Offset of Binary Document. Bit 15~8
Data 07		Offset of Binary Document. Bit 7~0
Data 08~31		24 bytes application authentication key. 3DES use the leading 16 bytes.
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.12 Set Hosting Flag (sub code 13H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.

Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	13	Sub Code of hosting flag assignment
Data 01	xx	Hosting Flag Bit 7: RFU: Must be zero Bit 6: Key pad Hosting. Set to hosting key pad and get by 0x18 command. Bit 5: LCD screen hosting. Set to hosting LCD screen. Bit 4: RF 125KHz disabled while set. Bit 3: RF 13.56MHz disabled while set Bit 2: RFU: Must be zero Bit 1: Tag error key card will trigger alarm output Bit 0: Disable Buzzer. The controller will work on silent mode.
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.13 Set IPv4 Address and MAC address (sub code14H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	Xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	20	Set controller's IPv4 parameters
Data 00	14	Sub Code of set IPv4 Address.
Data 01		Network Options Bit 7: Set to enable DHCP.
Data 02~07		MAC Address
Data 08~11		IPv4 Address
Data 12~15		IPv4 Sub Mask Address
Data 16~19		IPv4 Gateway Address

Data 20~21		TCP Port
Data 22~25		IPv4 Primly DNS Address
Data 26~29		IPv4 Second DNS Address
Data 30~31		Http Server Port
XOR		XOR
SUM		SUM

2.3.14 Set Relay Delay Time (sub code16H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	xx	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	20	Set controller's parameters
Data 00	16	Sub Code of set command
Data 01~02		Main port door relay active time. (Base on 10ms)
Data 03~04		WG port door relay active time. (Base on 10ms)
Data 05~06		Alarm relay active time. (Base on 10ms)
Data 07~08	xx	Lift controller relay active time. (Base on 10ms)
XOR		XOR
SUM		SUM

2.3.15 Set Host Overwrite Flag　(sub code 17H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	17	Sub Code of set command
Data 01	xx	Host Overwrite Flags: Bit 0: Inhibit door relay active on normal Access, but RTE and host control.

		Bit 1:
		Bit 2:
		Bit 3: Reject Tag Access. *Sounds 3 beep and show "Tag inhibited"
		Bit 4: Set to disable egress function.
		Bit 5: Latch Door relay status (Keep the status from serial port command).
		Bit 6: Door Relay Latch state On/Off(1:0)
		Bit 7: Check password always when access on this device.
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.16 Set Controller Edit Password (sub code 18H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	18	Sub Code of set command
Data 01		Edit Password. (bit 31~24)
Data 02		Edit Password. (bit 23~16)
Data 03		Edit Password. (bit 15~8)
Data 04		Edit Password. (bit 7~0)
XOR		XOR
SUM		SUM

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.3.17 Set Area and Temperature Warring level (sub code 25H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.

Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	25	Sub Code of set command
Data 01		Area Code range from 0x00 to 0x0F (Default is 0x00)
Data 02		Temperature Warring value base on 0.0 degree above 36.50.
XOR		XOR
SUM		SUM

Echo:

   After command received the controller will echo ACK or NACK to the source node.

2.3.18 Set Controller Access Mode (sub code 19H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	xx	Node ID of destination controller
Command	20	Set controller's parameters
Data 00	19	Sub Code of set command
Data 01		Free Access for any Tag status for Main Door. (0x01/0x00:Ena / Disable)
Data 02		Free Access for any Tag status for WG Door. (0x01/0x00:Ena / Disable)
Data 03		Enable Black UID function. (0x01/0x00:Ena / Disable) ** Only available for User Capacity Mode0 (16348)
Data 04		User Capacity Selection: 0x00/0x01/0x02 for 16384/32768/65536:
Data 05		Controller access mode of Card or PIN. Mode 4: Key in 5 digital of user address then 4 digital user PIN Mode 8: Access by 4 digital user PIN
XOR		XOR
SUM		SUM

Echo:

   After command received the controller will echo ACK or NACK to the source node.

2.4 Relay On/Off Control (21H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	0B	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination
Command	21	Relay On/Off Control
Data 0	80	Sub Code 00h:Get current status 80h:Enable armed state. (The specify port must be assigned in Data 1) 81h:Disable armed state. (The specify port must be assigned in Data 1) 82h:On door relay (Latch). (The specify port must be assigned in Data 1) 83h:Off door relay. (The specify port must be assigned in Data 1) 84h:On door relay (pulse). (The specify port must be assigned in Data 1) 85h:On alarm relay (latch). 86h:Off alarm relay. 87h:On alarm relay (pulse)
Data 1	00	Port assignment: FFh for all ports, 00H/01H/02H for Main/WG1/WG2 port
XOR		XOR
SUM		SUM

Echo: Current IO status.

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	0D	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data	??	The source node ID of data package come from (Who send)
Data		Firmware version
Data		Bit mapping of DI port Bit0: Status of Main Egress (0: Active)

		Bit1: Status of Main Door Sensor (0: Active)
		Bit2: Status of WG1 Egress (0: Active)
		Bit3: Status of WG1 Door Sensor (0: Active)
Data		Bit mapping of Relay Port. Bit0: Main Door Relay (1/0: On/Off) Bit1: Bit2: Bit3: Bit4: WG1 Door Relay (1/0: On/Off) Bit5: Bit6: Bit7: Alarm Relay Status (1/0: On/Off)
Data		Current state of main port option setting Bit7: Anti-pass back (1/0: Ena/Dis) Bit6: In/Out for anti-pass back (1/0: In/Out) Bit5: Force Open Alarm (1/0:Enable/Disable) Bit4: Egress Button (1/0:Enable/Disable) Bit3: Skip PIN check while Card & PIN access mode. Bit2: Reserved (must be zero) Bit1: Auto Lock Door at Door Close (1/0:Enable/Disable) Bit0: Is time attendance door (1:0: No/Yes)
Data		Current state of WG1 port option setting. (Same as main port)
Data		Reserved. (always 0)
Data		Armed status for each port (1/0: armed/disarm) Bit0: Main port, Bit1: WG1 port.
Data	00	Reserved. (always 0)
XOR		XOR
SUM		SUM

2.5 Hosting Polling (18H) (Polling Controller Current Status)

	Value	Description

Head	??	Leading Code could be standard format or extended format
Length	04	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination
Command	18	Hosting Polling
	*	[Second], Optional data
	*	[Minute]
	*	[Hour]
	*	[Weekday]
	*	[Day]
	*	[Month]
	*	0x00
	*	[Weekday]
	*	[Year]
	*	0x00
XOR	E6	XOR= FF^01^18 =E6
SUM	FF	SUM= 01+18+E6=FF

P.S.: The optional data can support real time clock synchronization between slave and host.

Echo:

The device respond data will depending on different status as follows

(1) Standby status w/o event log

(2) User key buffer status for PIN only or card and PIN.

(3) Card flashing Status

(4) Standby status with event log

(5) Echo hosting keypad buffer if keypad is in hosting mode

	Value	
Head	7E	Leading Code
Length	??	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Destination	00	Destination Node ID. 00H mean send to host (PC or AR716E)
Function Code	09	09H is echo reader status code.
Source	01	Source Node ID. (Who send);

Event	×	Type of message echo from device (please refer Event Table)
Data Field	Data 0	Data 0
	..	..
XOR		Check byte
SUM		Check byte

Event Table:		
Event	Meaning	Description of Data Bit
00	I/O status	Neither card nor key event, the controller will echo device I/O status. Data 0: I/O Status Byte: Bit7: Keypad status. If keypad locked by errors than this bit will be set Bit6: Door release output status of main port. (1/0: On/Off) Bit5: Alarm output Status. Bit4: Arming status. Bit3: Alarm status of controller. Bit2: RFU Bit1: Egress Button status. (1/0: Release/Pressed) Bit0: Door sensor status. (1/0: Open/Close) Data 1: Bit7: Force alarm status. (1/0: Force alarm / Open too long alarm), only available in Data 0 bit5 is set. Data 2: Controller's Option Parameters (Data 32 or 33 for command 0x12, sub code 0x00) Bit7: Anti-pass back (1/0: Ena/Dis) Bit6: In/Out for anti-pass back (1/0: In/Out) Bit5: Force Open Alarm (1/0:Enable/Disable) Bit4: Egress Button (1/0:Enable/Disable) Bit3: Skip PIN check while Card & PIN access mode. Bit2: Auto Open Zone (1/0:Enable/Disable)

		Bit1: Auto lock door at door closed (1/0:Enable/Disable)
		Bit0: Is time attendance door (1:0: No/Yes)
		Data 3: RFU. Always 0.
01	4/5 Keys pressed Note： Mode4: 5 keys pressed, Mode8: 4 keys pressed	Data 0：The 5th Key data. Set Bit7 while working on Mode 8.
		Data 1：Input value's MSB
		Data 2：Input value's LSB
		Data 3：Undefined default value=0
		Data 4：Device parameters. (Setting by command: 20＊XXX＃)
		Data 5：401RO16's parameter (24*xxx#)
		Data 6：Undefined default value=0
		Controllers are allow to identify the value
		Data 7~ Data 11：
		M4：The Key data
		M8：Data 7~Data 10 = Key data , Data 11 = 00
		Data 12：Undefined default value=0
02	New Card Present	The inner code of the card is 40bits in length which can be tabled
		7E xx 00 09 01 02 Dat0 UID3 UID2 Dat3 Dat4 UID1 UID0 UID4……. XOR SUM
		below:
	UID4: Tag ID Bits(39~32) UID3: Tag ID Bits(31~24) UID2: Tag ID Bits(23~16) UID1: Tag ID Bits(15~08) UID0: Tag ID Bits(07~00)	(see table below)

MSB	Inner Code				LSB
ID	Site Code		Card Code		
	High	Low	High	Low	
ID	Site Hi	Site Lo	Card Hi	Card Lo	
8 Bits 39~32	8 Bits 31~24	8 Bits 23~16	8 Bits 15~08	8 Bits 07~00	

Data 0：Time & Attendance，Bit7~Bit5 : Time &

    Attendance Selection

    Other LSBs refer to "Exit Input"

Data 1：High byte of site code (bit 15~08)

Data 2：Low byte of site code (bit 07~00)

		Data 3/4：The MSB / LSBs of the value input before card flashing, it would show the previous value if there is not value input before flashing Data 5：High byte of card code (bit 15~08) Data 6：Low byte of card code (bit 07~00) Data 7：ID Code(Bits(39~32) of EM4001 Chi Data 8：Bit Selection (20*xxx#) Data 9： Bit7:1/0 Set for multi door Controller or WG port event at single door controller. Bit6: 1/0 Setting Forced Open Alarm
06	Keypad buffer	Echo Keypad buffer status in hosting mode. The followed data we be: Data 1: fixed to 0x80 Data 2: Key counter (n), how many key had pressed. Data 3 ~ 3+n: Key data.

Invalid Tag examples

Host Polling :7E 0D 01 18 20 2B 0B 08 04 00 01 12 00 F9 87

Slave Echo :7E 10 00 09 01 02 0B 10 01 00 00 10 01 77 C8 00 41 B9

Host Responce:7E 0B 01 05 00 10 01 3A 98 10 01 59 53

Card Only Tag example:

Host Polling :7E 0D 01 18 0D 2C 0B 08 04 00 01 12 00 D3 4F

Slave Echo :7E 10 00 09 01 02 0B 00 65 00 00 0F C5 42 C8 00 DB 35

Host Responce:7E 0D 01 04 00 0F C5 00 4E 00 00 00 65 1B A7

Card and PIN Tag example:

Host Polling :7E 0D 01 18 17 3A 0B 08 04 00 01 12 00 DF 73

Slave Echo   :7E 10 00 09 01 02 0B 04 D5 00 00 B8 26 01 C8 00 78 0F

Host Responce:7E 0D 01 09 40 B8 26 00 59 16 2E 04 D5 99 37   ;This tag is Card & PIN

Host polling :7E 0D 02 18 17 3A 0B 08 04 00 01 12 00 DC 71 (Polling next Node ...)

....

Host polling :7E 0D 01 18 1B 3A 0B 08 04 00 01 12 00 D3 6B   (The Node who got Tag)

Slave Echo :7E 18 00 09 01 03 0B 00 59 02 C8 16 2E 05 06 07 08 0B 00 E7 A7 8D 8C 7F 6D 37 (User Input)

Host Responce:7E 0D 01 04 08 B8 26 00 59 00 00 04 D5 E4 01

Host polling :7E 0D 02 18 1B 3A 0B 08 04 00 01 12 00 D0 69   (Polling next Device)

2.6 Setup real time clock of target device (23H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	0B	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination
Command	23	Setup real time clock
Data	00	Second
	01	Minute
	02	Hour
	03	Day of a week (SUN ~ SAT: 1~7)
	04	Day of month
	05	Month
	0B	Year % 100. (2011 = 0Bh)
XOR	DA	XOR=FF^01^23^00^01^02^03^04^05^06 =DA
SUM	13	SUM=(01+23+00+01+02+03+04+05+06+DA) · FF=13(LSB)

Echo:

After command received the controller will echo ACK or NACK to the source node.

2.7 Get real time clock from target device (24H)

	Value	Description
Header	??	Leading Code could be standard format or extended format
Length	04	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here

Command	24	
XOR	DA	XOR=FF^01^24 =DA
SUM	FF	SUM=01+24+DA=FF

Echo:

	Value		Description
Head	??		Leading Code could be standard format or extended format
Length	12		Data length can be one or two bytes depend on protocol format.
Node	00		The value 00 is fixed, the message would be sent to PC from the device
Function	03		Response to the request
Reader ID	01		Reader ID
Data Field	0A	Data 0	Second
	16	Data 1	Minute
	0D	Data 2	Hour
	06	Data 3	Day of a week (from 1 to 7 mapping to Sunday to Saturday)
	09	Data 4	Date
	0C	Data 5	Month
	05	Data 6	Year % 100. (2009 = 09)
	17	Data 7	Firmware Version (1V7)
	27	Data 8	Reserved.
	01	Data 9	Reserved.
	01	Data 10	Firmware Identify Code 00: Is standard firmware
	85	Data 11	Controller type (0xC0:AR881E/0xC1:AR725Ev2/0xC2:AR829Ev5/0xC3:AR821EFv5)
XOR	..		
SUM	..		

2.8 Get the oldest event log of device (25H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	04/07	Data length can be one or two bytes depend on protocol format.
Node	01	Node ID of destination, the node id is 01 here

Command	25	Reading the oldest event log from the device
(Data 1)	(FF)	Extension bytes for specified record read. (Bits 23~16) Note 2.8.1
(Data 2)	(FF)	Extension bytes for specified record read. (Bits 15~08) Note 2.8.1
(Data 3)	(FF)	Extension bytes for specified record read. (Bits 07~00) Note 2.8.1
XOR	DB	XOR=FF^01^25 =DB
SUM	01	SUM=(01+25+DB) · FF=01(LSB)

If there have no any log, the controller will echo ACK to host.

If there have any log in the event buffer, Controller will echo the oldest one. **About the echo package, please take reference to section [4.Data format of event log].**

Note 2.8.1: Fill data 1~3 by 0xff will return the current message queue status in 24 bits format (HL LH LL).

ex: LEN DID 03 [event log counter] [Input point of log queue] [Output point of log queue] XOR SUM

fill data between 0x00 and maximum event log capacity will return the specified log in memory. This extension format are supported after version 2.07 and later.

2.9 Remove the oldest event log of device (37H)

	Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Node ID	01	Node ID of destination, the node id is 01 here
Command	37	Remove the lasted log
XOR	C9	XOR=FF^01^37 =C9
SUM	01	SUM=(01+37+C9) · FF=01(LSB)

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.10 Empty the event log of device (2DH)

	Value	Description
Head	7E	Leading Code could be standard format or extended format
Length	04	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here

Command	2D	Clearing all events of the device
XOR	..	
SUM	..	

Echo:

    After command received the controller will echo ACK or NACK to the source controller or PC.

2.11 Buzzer Sounds (26H)

	Value	Description
Head	7E	Leading Code could be standard format or extended format
Length	05	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	26	LED and Buzzer on/off control
	00 / 01	Channel assignment. 0x00 for controller and 0x01 for WG port
	xx	Beep will make (xx) sounds.
		Active LED/LCD assignment. Bit0: Set to on green LED lamp. Bit1: Set to on red LED lamp. Bit2: Set to On backlight LED. Bit3: Set to Off backlight LED. Bit4: Bit5: Bit6: Set to inhibit LCD update. (Reserved for user text via command 0x28) Bit7: Set to Lock The Keypad
		Bit 15~08 of LED delay time. (Base on 10ms),
		Bit 07~00 of LED delay time. (Base on 10ms). 0x0001 is Off command
XOR	..	
SUM	..	

Echo:

    After command received the controller will echo ACK or NACK to the source controller or PC.

2.12 Send text to LCD and turn on the LCD backlight (28H)

	Value	Description
Head	7E	Leading Code could be standard format or extended format
Length	04	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	28	Send text to LCD
	00 ~ 3F	LCD Column of first text. The index range must between 0x00 to 0x3F. 0x00 ~ 0x0F is first row. 0x10 ~ 0x1F is second row. 0x20 ~ 0x2F is third row. 0x30 ~ 0x3F is forth row.
	xx	How many bytes followed will be send to LCD
		[Text data bytes]
		Bit 15~08 of backlight delay time. (Base on 10ms)
		Bit 07~00 of backlight delay time. (Base on 10ms)
		Beep Sounds
XOR	..	
SUM	..	

Echo:

After command received, the controller will echo ACK or NACK to the source controller or PC.

P.S. Before send text to LCD need to lock LCD update via command 0x26 and release it after use.

Ex: 7E 0E 02 28 20 05 6A 61 73 6F 6E 01 2C 05 XOR SUM will display 'jason' on third row 3Sec and

Beep 5 Sounds.

2.13 Daily Time Zone (2AH)

2.13.1 Download/Write

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	26	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2A	Time zone setting
Index	01	The first time zone index of this data package.

Records	01	How many records of time zones data that will be download to
Data 0	0C	Link to next time zone. Set to zero mean this is a free time zone user will be passed any time. If the value larger then 63 mean no link to others. Bit7 : Enable/Disable (1/0) access on holiday Bit6～0: Value of link to time zone index.
Data 1	00	Level of time zone

Data 2	01	Sun.	Beginning (08:00) 0x1E0	
Data 3	E0			
Data 4	03		End (18:00) 0x384	
Data 5	84			
Data 6	01	Mon.	Beginning (08:00) 0x1E0	
Data 7	E0			
Data 8	03		End (18:00) 0x384	
Data 9	84			
		…		
Data 26	01	Sat.	Beginning (08:00) 0x1E0	
Data 27	E0			
Data 28	03		End (18:00) 0x384	
Data 29	84			
Data 30	00	Reserved		
Data 31	00	Reserved		
XOR	BE			
SUM	CF			

Note: If the index and records are all zero mean this command is erase time zone command. For speed up download purpose. We suggest you send erase command before download all data records.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.13.2 Upload/Read

	Value	Description
Head	??	Leading Code could be standard format or extended format

Length	08	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2A	Time zone parameters
Index	00	The start index of required record.
Records	02	How many records of time zone are required
Data	52	Put ASCII code 'R' here will be a read command
XOR	??	
SUM	??	

Echo:

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data 00~29		The 1st record of requested time zone.
Data 30~59		The 2nd record of requested time zone.
XOR		XOR
SUM		SUM

2.14 Read/Write Begin Day (2BH)   Supported after version 2.07 and late

2.14.1 Download/Write

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2B	Read begin day parameters
Index H	00	High byte of start index of required record.
Index L	00	Low byte of start index of required record.
Records H	00	High byte of records to be read
Records L	01	Low byte of records to be read
Data 1	0C	Year of begin day in HEX mode of 1st record (2012/Jun/01)
Data 2	06	Month of begin day in HEX mode of 1st record

Data 3	01	Day of begin day in HEX mode of 1st record
Data 4	0C	Year of begin day in HEX mode of 2nd record　(2012/Feb/01)
Data 5	02	Month of begin day in HEX mode of 2nd record
Data 6	01	Day of begin day in HEX mode of 2nd record
…		…
XOR	BE	
SUM	CF	

Note: If the index and records are all zero mean this command is erase begin day command. For speed

up download purpose. We suggest you send erase command before download all data records.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.14.2 Upload/Read

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	08	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2B	Read begin day parameters
Index H	00	High byte of start index of required record.
Index L	00	Low byte of start index of required record.
Records H	00	High byte of records to be read
Records L	01	Low byte of records to be read
XOR	??	
SUM	??	

Echo:

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data 0	??	The source node ID of data package come from (Who send)
Data 01~03		The 1st record of requested data.

Data 04~06		The 2nd record of requested data.
…		…
XOR		XOR
SUM		SUM

2.15 Annual holiday setting (2CH)

2.15.1 Download/Write

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	12	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	2C	Holidays parameters	
Index	01	The first holiday index of this data package.	
Records	03	How many records of holidays data that will be download to	
Data 0	0C	Month (November)	Before download to controller. The data must be sorted. All used holidays must be put to the header of data area. And set all none used data byte to 0xFF, please.
Data 1	01	Day of Month	
Data 2	01		
Data 3	05		
Data 4	03		
Data 5	08		
XOR	??		
SUM	??		

Note: If the index and records are all zero mean this command is erase holiday command. For speed

up download purpose. We suggest you send erase command before download all data records.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.15.2 Upload/Read

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	12	Data length can be one or two bytes depend on protocol format.

Node ID	01	Node ID of destination, the node id is 01 here
Command	2C	Holidays parameters
Index	00	The start index of required holiday.
Records	02	How many records are required
Data	52	Put ASCII code 'R' here will be a read command
XOR	??	
SUM	??	

Echo:

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data	??	The source node ID of data package come from (Who send)
Data		The month byte of 1st requested holiday.
Data		The day byte of 1st requested holiday.
Data		The month byte of 2nd requested holiday.
Data		The day byte of 2nd requested holiday.
XOR		XOR
SUM		SUM

2.16 Read/Write User Alias (2EH)   Supported after version 2.07 and later

2.16.1 Download/Write

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2E	Write user alias
Index HL	00	High byte of start index of required record. (Bit 24~16)
Index LH	00	Middle byte of start index of required record. (Bit 15~08)
Index LL	00	Low byte of start index of required record. (Bit 07~00)
Records	01	How many user alias records to be read

Data 01~16	…	16 bytes of alias for 1st record.
Data 17~32	…	16 bytes of alias for 2nd record.
…		…
XOR	Xx	
SUM	Xx	

Note: If the index and records are all zero mean this command is erase all user alias command. For speed up download purpose. We suggest you send erase command before download all data records.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.16.2 Upload/Read

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2E	Read user alias
Index HL	00	High byte of start index of required record. (Bit 24~16)
Index LH	00	Middle byte of start index of required record. (Bit 15~08)
Index LL	00	Low byte of start index of required record. (Bit 07~00)
Records	01	How many user alias records to be read
XOR	??	
SUM	??	

Echo:

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data 00~15		The 1st record of requested data.
Data 16~31		The 2nd record of requested data.
…		…
XOR		XOR

SUM		SUM	

2.17 Read/Write User Floor (2FH)   Supported after version 2.09d and later

2.17.1 Download/Write

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	2F	Set user access able floor data
Index HH	00	Start Index Bit 31~25.
Index HL	00	Start index Bit 24~16
Index LH	00	Start index Bit 15~08
Index LL	00	Start index Bit 07~00
Bytes		How many bytes of writing data. (Bit 15~08)
Bytes	N	How many bytes of writing data. (Bit 07~00)
Data	xx	First data byte
…		
Data n		Last data byte
…		
XOR	Xx	
SUM	Xx	

Note: If the index and records are all zero mean this command is erase all user data command. For speed up download purpose. We suggest you send erase command before download all data records.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.17.2 Upload/Read

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here

Command	2F	Read user access able floor data
Index HH	00	Start Index Bit 31~25.
Index HL	00	Start index Bit 24~16
Index LH	00	Start index Bit 15~08
Index LL	00	Start index Bit 07~00
Records	00	How many bytes to be read. (Bit 15~08)
Records	01	How many bytes to be read. (Bit 07~00)
XOR	??	
SUM	??	

Echo:

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
Data 00~xx		Requested data.
…		…
XOR		XOR
SUM		SUM

2.18 Specific format of data transmission through serial (30H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
DID	01	Node ID of destination, the node id is 01 here
CMD	30	
Channel	0/1/2	Destination port. 0: Host Channel, 1: 2nd Lift Port, 2: Extent TTL Port
Timeout H	00	High byte of timeout interval base on 10ms
Timeout L	64	Low byte of timeout interval base on 10ms
Bytes H	00	High byte of specified data that will be passed to assigned serial port
Bytes L	06	High byte of specified data that will be passed to assigned serial port

Data 0	(7E)	(First data byte that will be send out)
	(04)	()
	(01)	()
	(25)	()
	(DB)	()
Data n	(01)	(Last data byte that will be send out)
XOR	1	XOR=FF^DID^CMD^…^…^Level
SUM	1	SUM=(DID+CMD+…+…+XOR

※ Set Tmout-H & Tmout-L to zero will be NO_ECHO transmit mode

※ Set Bytes-H & Bytes-L to zero will be read command (Echo receiver buffer immediately)

Echo:

After command received the controller will echo ACK / NACK or response data to the source controller or

PC.

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	00	Echo to host
Command	0x03	Data echo
…		…
XOR		XOR
SUM		SUM

2.19 Set User Parameters (83H/84H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
DID	01	Node ID of destination, the node id is 01 here
CMD	83/84	83H:with anti-passback , 84H:without anti-passback flag byte
Records	??	How many records of user will be download to

User Addr	??	Two bytes of user address. (Little endian)		
Tag UID	??	Eight bytes of Tag ID. (Little endian)		
PIN Code	??	Four bytes of PIN code. (Bit 31 ~ 24)	※3 Bitmask for HTZ 9~16	
		Four bytes of PIN code. (Bit 23 ~16)	※3 Bitmask for HTZ 1 ~ 8	
		Four bytes of PIN code. (Bit 15 ~ 8)	Word PIN Code (16 Bits)	
		Four bytes of PIN code. (Bit 7 ~ 0)		
Mode	1	Bit7/6:Access Mode	Access Mode Define (Bit 7/6)	
		Bit5：patrol card	00	Invalid
		Bit4：Card omitted after fingerprint recognition.	01	Card Only
			10	Card or PIN
		Bit3：Fingerprint omitted after card recognition.	11	Card + PIN
		Bit2：enable expire check	After V4.4: PIN [bit31~16] is begin minutes on begin day and PIN [bit15~0] is end minutes on ending day. (V4.4 and after)	
		Bit1 : Set for Guest user and PIN code is available start/end time of minute of today. (AfterVer4.04) ※4		
		Bit0：password change available		
Zone	1	Bit 7: 　　Multi door controller: 　　　　Set to enable independent time zone for each node. (Cmd: 89H) 　　Single door controller: 　　　　Set to 0 if WG port will use the same time zone. Otherwise, the 　　　　WG port will accord to Zone2. Bit 6: Reserved, must be 0. Bit5~0: User Access Time Zone. Zero for free zone control		
Group 1	1	Bit mapping of available door. (Door 16~9/Bit 7~0)　　※1		
Group 2	1	Bit mapping of available door. (Door 8~1/Bit 7~0)　　※1		
Year	1	Year of the last allowed date at 2 digital format		
Month	1	Month of the last allowed date at 2 digital format		
Day	1	Day of the last allowed date at 2 digital format		
Level	1	Bit7~6: User Level define range 0x00 to 0x03 Bit5~0: Zone 2 for WG port.		

Option	1	Extend option Byte. Bit7: 1/0 En/Disable Anti-pass-back check
		Only available for command 83H, for 84H this byte will be discarded.
	3	Reserved
…	N*26	Followed the next record of user data if records more than one set
		(Address UID PIN …Reserved)
XOR	1	XOR=FF^DID^CMD^…^…^Level
SUM	1	SUM=(DID+CMD+…+…+Level+XOR

Note:

※1 Set the corresponding bit to 1 will allow user access on this port.

Door16 ~03 are mapping to RS485 Sub Node ID 16 to 3, Door2 is WG1, Door1 is Main Controller for

AR829Ev5/AR881E/AR727Ev2/AR725Ev2 or WG0 for AR721Ev2.

※2 If the index and records are all zero mean this command is erase user database command. For speed

up download purpose. We suggest you send erase command before download all data records.

※3 For customize use.

※4 For guest user the PIN code bit(31~16) is start time and bit(15~00) is end time of available time in this day

and it is based on minute.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.20 Erase user data (85H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	08	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	85	Erase user data
Start-H		High byte of start user address (0 ~16383)
Start-L		Low byte of start user address
End-H		High byte of end(last) user address
End-L		Low byte of end(last) user address
XOR		
SUM		

Echo:

1) After command received the controller will echo ACK or NACK to the source controller or PC.

2) It will take 100ms to 6 seconds depend on how many user assigned,

3) To avoid timeout, please erase less than 1000 users at once.

2.21 Initial anti-pass-back table (86H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	86	Restoring the initial setup of anti-pass-back (AR725E only)
Type	0~4	0:Enable/Disable Anti-pass back check of users. Set status byte to 1 will enable anti-pass back check. 1:Set/Reset Anti-pass initial status of users. Set status byte to 1 to initial anti-pass back status. 2:Set current inside/outside flag of users. Set status byte to 1 will be inside status. 3:Set users to initial state from start to end.(Status byte will be discarded) 4:Set anti-pass back need table according to Status bytes..
Start-H		High byte of start user address (0 ~16383)
Start-L		Low byte of start user address
Rec.-H		High byte of records
Rec.-L		Low byte of records
Status		Set status to (0 or 1) for command type 0~3 or bitmapping data bytes of command type 4.
…		Bitmapping data bytes
XOR		
SUM		

Note 1: If send package just including command code without any parameters followed.

(like:7E 04 DID 86 XOR SUM) that is mean initial all anti-passback table.(initial/Current/

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

※ Each user take one bit in the mapping memory. The device will discard the unused bits.

User addr.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	...
Byte	0								1								2		
Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	...

Ex. Setup user anti-pass back enable flag from address 07(Dec) to 46(Dec).

7E 0E DID 86 00 [00 07] [00 2E] 80 FF FF FF 7F xor sum

2.22 Get User Parameters (87H)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	07	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	87	Get the user Parameters	
Addr H	00	User Address – High	Addr H Addr L=0x02(00002)
Addr L	02	User Address - Low	User Address : 00002
Nums	02	Continue number of cards	
XOR		XOR	
SUM		SUM	

Echo	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	??	Data length can be one or two bytes depend on protocol format.	
Node	00	The value 00 is fixed, the message would be sent to PC from the device	
Function	03	Response to the request	
Source ID	??	The source node ID of data package come from (Who send)	
Data Field	24 bytes	The 1st User Parameters	Check reference to user data
	24 bytes	The 2nd User Parameters	structure of command (82/83H)
XOR			
SUM			

2.23 Read/Write multi Zone for multi door controller (89H)

	Value	Description
Head	??	Leading Code could be standard format or extended format

Length		Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	89	Read/Write the user access time zone for each door	
Sub Code	00	00:Read data.	
Index HL		Start User Address – Bit 23~17	
Index LH		Start User Address – Bit 16~08	
Index LL		Start User Address – Bit 07~00	
Num-H		Read user records (High byte).	
Num L		Read user records (Low byte).	
XOR		XOR	
SUM		SUM	

Echo:

Echo	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data xx		Read users X16 bytes data.
		…
XOR		
SUM		

∗   Each user takes 16 bytes time zone index that mapping to AR721Ev2 readers from node 1 to node 16.

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09/08	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	89	Read/Write the user access time zone for each door	
Sub Code	01	01:Write data.	
Index HL		Start User Address – Bit 23~17	
Index LH		Start User Address – Bit 16~08	

Index LL		Start User Address – Bit 07~00	
Num-H		Write user records (High byte).	
Num L		Write user records (Low byte).	
	16 bytes	The 16 bytes time zone index of 1st user.	
	16 bytes	The 16 bytes time zone index of 2nd user.	
	…	…	
XOR		XOR	
SUM		SUM	

Echo for status setting: After command received the controller will echo ACK or NACK to the source controller or PC.

2.24 Anti-passback Database Management (8AH)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09/08	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8A	Anti-passback Database Management	
Sub Code	00	00:Get current in/out status memory map. (Max 1024 Bytes each time) 01:Set specifically user in/out status. (One user each time)	
Index HL		User Address – Bit 23~17	Must be zero for status getting
Index LH	00	User Address – Bit 16~08	Offset of status getting. Bit 16~08
Index LL	02	User Address – Bit 07~00	Offset of status getting. Bit 07~00
Status or Num-H	02	Status assign for in/out status setting. 0x00:Outside,0x01:Inside,0x02:Init High byte of how many bytes for memory map.	
Num L		Must be zero for in/out status setting. Low byte of how many bytes for memory map.	
XOR		XOR	
SUM		SUM	

In/Out status mapping: Each user takes one bit of single byte. Set to 1 is "In" status. Whole memory size of in/out status is

74

16384/8 = 2048 bytes.

Echo for status setting: After command received the controller will echo ACK or NACK to the source controller or PC.

Echo for memory getting:

Echo	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data xx		The memory mapping data of specifically.
		…
XOR		
SUM		

2.25 Set Guest Access Time Period include lift data (8BH)

	Value	Description			
Head	??	Leading Code could be standard format or extended format			
Length	??	Data length can be one or two bytes depend on protocol format.			
DID	01	Node ID of destination, the node id is 01 here			
CMD	8B	Set Guest date			
Sub Cmd	57	0x52('R') for Read or 0x57('W') for Write			
Index HL		User Address – Bit 23~17			
Index LH	00	User Address – Bit 16~08			
Index LL	02	User Address – Bit 07~00			
Tag UID	??	Eight bytes of UID. (Little endian: First byte is UID bits 63~56)			
PIN Code	??	Four bytes of PIN code. (Bit 31 ~ 24)			
		Four bytes of PIN code. (Bit 23 ~16)			
		Four bytes of PIN code. (Bit 15 ~ 8)		Word PIN Code (16 Bits)	
		Four bytes of PIN code. (Bit 7 ~ 0)			
Mode	1	Bit7/6:Access Mode	Access Mode Define (Bit 7/6)		
		Bit5：patrol card	00	Invalid	

		Bit4：Card omitted after fingerprint recognition.	01	Read Only
			10	Card or PIN
		Bit3：Fingerprint omitted after card recognition.	11	Card + PIN
		Bit2：enable expire check		
		Bit1：Check begin time & End Time.		
		Bit0：must set to 0		
Zone	1	Bit 7:　　Multi door controller:　　　　Set to enable independent time zone for each node. (Cmd: 89H)　　Single door controller:　　　　Set to 0 if WG port will use the same time zone. Otherwise, the　　　　WG port will accord to Zone2.　Bit 6: Reserved, must be 0.　Bit5~0: User Access Time Zone. Zero for free zone control		
Group 1	1	Bit mapping of available door. (Door 16~9/Bit 7~0)　　　※1		
Group 2	1	Bit mapping of available door. (Door 8~1/Bit 7~0)　　　※1		
Year	15	Year of the begin date.　(ex:2021/6/1 00:00)		
Month	06	Month of the begin date		
Day	01	Day of the begin date		
Hour	00	Begin Hour on begin day		
Minute	00	Begin minute on begin day		
Year	15	Year of the last allowed date　(ex:2021/7/31 23:59)		
Month	07	Month of the last allowed date		
Day	31	Day of the last allowed date		
Hour	17	End Hour on end day		
Minute	3B	End minute on end day		
Lift	??	Four bytes of Lift 1~8,…,…,…Lift 25~32.		
XOR	1	XOR=FF^DID^CMD^…^…^Level		
SUM	1	SUM=(DID+CMD+…+…+ Lift[57~64] +XOR		

Note:

※1　Set the corresponding bit to 1 will allow user access on this port.

Door16 ~03 are mapping to RS485 Sub Node ID 16 to 3, Door2 is WG1, Door1 is Main Controller for

AR829Ev5/AR881E/AR727Ev2/AR725Ev2 or WG0 for AR721Ev2.

※1   Supports for 16384 User Mode Only.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
DID	01	Node ID of destination, the node id is 01 here
CMD	8B	Set Guest date
Sub Cmd	'R'	'R' for Read or 'W' for Write
Index HL		User Address – Bit 23~17
Index LH	00	User Address – Bit 16~08
Index LL	02	User Address – Bit 07~00
XOR	1	XOR=FF^DID^CMD^…^…^Level
SUM	1	SUM=(DID+CMD+…+…+ Lift[57~64] +XOR

Echo of Read Command:

		Value	Description	
Head		??	Leading Code could be standard format or extended format	
Length		??	Data length can be one or two bytes depend on protocol format.	
DID		00	Node ID of destination	
CMD		03	Echo Data	
SID			Source Node ID	
Tag UID		??	Eight bytes of UID. (Little endian: First byte is UID bits 63~56)	
PIN Code		??	Four bytes of PIN code. (Bit 31 ~ 24)	
			Four bytes of PIN code. (Bit 23 ~16)	
			Four bytes of PIN code. (Bit 15 ~ 8)	Word PIN Code (16 Bits)
			Four bytes of PIN code. (Bit 7 ~ 0)	
Mode		1	User Access Mode	
Zone		1	User Access Time Zone	
Group 1		1	Bit mapping of available door. (Door 16~9/Bit 7~0)	

Group 2	1	Bit mapping of available door. (Door 8~1/Bit 7~0)
Year	15	Year of the begin date. (ex:2021/6/1 00:00)
Month	06	Month of the begin date
Day	01	Day of the begin date
Hour	00	Begin Hour on begin day
Minute	00	Begin minute on begin day
Year	15	Year of the last allowed date (ex:2021/7/31 23:59)
Month	07	Month of the last allowed date
Day	31	Day of the last allowed date
Hour	17	End Hour on end day
Minute	3B	End minute on end day
Lift	??	Four bytes of Lift 1~8,…,…,…Lift 25~32.
XOR	1	XOR=FF^DID^CMD^…^…^Level
SUM	1	SUM=(DID+CMD+…+…+ Lift[57~64] +XOR

2.26 Launch DESFire Application (8CH)

2.26.1 Create UID and User Define Hex Data File.

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	19	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8C	Launch DESFire Application
Sub Code	01	Command of Create UID and User Define Hex Data File..
Data 01		File ID of Document
Data 02		Application ID of Document. bit 23~16
Data 03		Application ID of Document. bit 15~8
Data 04		Application ID of Document. bit 7~0
Data 05~20		16 bytes of user define that will be programming to DESFire Card.
XOR		
SUM		

Echo: The controller will echo ACK for available or NACK for unavailable.

※The controller will write [8 bytes UID of Mifare DESFire tag] + [16 bytes User data] into DESFire tag.

2.26.2 Change Key of Specified Application File.

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	29	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8C	Launch DESFire Application
Sub Code	10	Command of Change Application Key..
Data 01		File ID of Document
Data 02		Application ID of Document. bit 23~16
Data 03		Application ID of Document. bit 15~8
Data 04		Application ID of Document. bit 7~0
Data 05~20		The 16 bytes of Original Key.
Data 21~35		The 16 bytes of New Key.
XOR		
SUM		

Ex: **Change key of application `112233.01`**

from `11 11 11 11 11 11 11 11 22 22 22 22 22 22 22 22` to `77 77 77 77 77 77 77 77 22 22 22 22 22 22 22 22`.

T : 7E 29 01 8C 10 01 11 22 33 11 11 11 11 11 11 11 11 22 22 22 22 22 22 22 22 77 77 77 77 77 77 77 77 22 22 22 22 22 22 22 22 63 C7

R : 7E 0F 00 04 01 C2 44 0D 90 10 10 00 00 00 00 00 E1 A9

T : 7E 1C 01 20 12 01 01 11 22 33 00 08 77 77 77 77 77 77 77 77 22 22 22 22 22 22 22 22 C4 2F   ;Update Controller's Key

R : 7E 0F 00 04 01 C2 44 0D 91 10 10 00 00 00 00 00 E0 A9

2.27 (8DH)

2.28 (8EH)

2.29 Fingerprint or vein data command (8FH)

2.29.1 Check template ID existed or not (Mode-3DO only)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.

Node ID	01	Node ID of destination, the node id is 01 here
Command	8F	Fingerprint data command
Sub Code	01	Command of check template.
Addr HH	??	Template ID Bit 31~24
Addr HL	??	Template ID Bit 23~16
Addr LH	??	Template ID Bit 15~08
Addr LL	??	Template ID Bit 07~00
XOR		
SUM		

Note: Each user has 3 template ID, The template ID range for user 000 is 0 ~2, for user 001 is 3~5, … etc.

Template ID range is user ID x 3,(ID x 3)+1 and (ID x 3) +2. Before upload template data from device the

s/w must check template ID is available or not then upload the availed template data.

Echo:

The controller will echo ACK for available or NACK for unavailable.

2.29.2 Delete user's all enrolled templates (Mode-3DO only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	02	Delete enrolled fingerprint template	
Addr HH	??	User Address Bit 31~24	Template Begin
Addr HL	??	User Address Bit 23~16	（＊）0xFFFFFFFF for delete all.
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
Addr HH	??	User Address Bit 31~24	Template End
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
XOR			
SUM			

Before download fingerprint templates must delete enrolled template first.

Echo:

The controller will echo ACK for successes or NACK for failed.

2.29.3 **Upload(read) fingerprint template data** (Mode-3DO only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	0D	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	03	Upload(read) fingerprint template	
Addr HH	??	Template ID Bit 31~24	
Addr HL	??	Template ID Bit 23~16	
Addr LH	??	Template ID Bit 15~08	
Addr LL	??	Template ID Bit 07~00	
Offset H	00	Offset of fingerprint template. (Bit 15~8)	
Offset L	00	Offset of fingerprint template. (Bit 7~0)	
Bytes H	02	Return data bytes. (Bit 15~8)	
Bytes L	00	Return data bytes. (Bit 7~0)	
XOR			
SUM			

Echo	Value	Description
Head	??	Leading Code
Length	??	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data	…	Return template data. (The bytes had assigned in byte counter field of read command).
..	…	…
..	…	

..	…	
XOR		
SUM		

2.29.4 **Download(write) fingerprint template data** (Mode-3DO only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	02.0F	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	04	Download(save) fingerprint template	
Addr HH	??	Template ID Bit 31~24	
Addr HL	??	Template ID Bit 23~16	
Addr LH	??	Template ID Bit 15~08	
Addr LL	??	Template ID Bit 07~00	
Total H	08	How many bytes of template data will be download. (Bit 15~8)	
Total L	00	How many bytes of template data will be download.. (Bit 7~0)	
Offset H	00	Offset of fingerprint template. (Bit 15~8)	
Offset L	00	Offset of fingerprint template. (Bit 7~0)	
Bytes H	02	Save byte counter. (Bit 15~8)	
Bytes L	00	Save byte counter. (Bit 7~0)	
Data 0		Template data	
…			
Data n			
XOR			
SUM			

Note: Each template takes 498 bytes, the long data format is recommended. (Short format supported after 2015.Jul.22)

Echo:

The controller will echo ACK for successes or NACK for failed.

2.29.5 Get total enrolled templates number (Mode-3DO only)

..	Value	Description

Head	??	Leading Code could be standard format or extended format
Length	02.0F	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8F	Fingerprint data command
Sub Code	06	Get enrolled template in total
XOR		
SUM		

Echo:

Echo	Value	Description
Head	??	Leading Code
Length	07	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data 0	…	Enrolled template counter. (bit 15~08).
Data 1	…	Enrolled template counter. (bit 07~00).
XOR		
SUM		

2.29.6 Get enrolled finger vein user counter (Mode-2000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	11	Get enrolled user counter.	
Addr HH	??	User Address Bit 31~24	
Addr HL	??	User Address Bit 23~16	

Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
XOR			
SUM			

Echo	Value	Description
Head	??	Leading Code
Length	09	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data 0	…	Enrolled or not of specified user. (bit 15~08).
Data 1	…	Enrolled or not of specified user. (bit 07~00).
Data 2	…	Total enrolled user. (bit 15~08).
Data 3	…	Total enrolled user. (bit 07~00).
XOR		
SUM		

Note: Data 0~1 will be 0 if user didn't enrolled any finger vein or 1 for enrolled. No matter how many veins enrolled for this user.

2.29.7 Delete enrolled finger vein template (Mode-2000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	12	Delete enrolled finger vein template	
Addr HH	??	Start user Address Bit 31~24	
Addr HL	??	Start user Address Bit 23~16	
Addr LH	??	Start user Address Bit 15~08	
Addr LL	??	Start user Address Bit 07~00	
Addr HH	??	End user Address Bit 31~24	

Addr HL	??	End user Address Bit 23~16
Addr LH	??	End user Address Bit 15~08
Addr LL	??	End user Address Bit 07~00
XOR		
SUM		

Before download finger vein templates must delete enrolled template first.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.29.8 Upload(read) finger vein template   (Mode-2000 only)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	0D	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8F	Fingerprint data command
Sub Code	13	Upload(read) finger vein template
Addr HH	??	User Address Bit 31~24
Addr HL	??	User Address Bit 23~16
Addr LH	??	User Address Bit 15~08
Addr LL	??	User Address Bit 07~00
Offset H	00	Offset of finger vein template. (Bit 15~8)
Offset L	00	Offset of finger vein template. (Bit 7~0)
Bytes H	02	Read byte counter. (Bit 15~8)
Bytes L	00	Read byte counter. (Bit 7~0)
XOR		
SUM		

Echo	Value	Description
Head	??	Leading Code
Length	??	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)

85

Data	…	Return template data. (The bytes had assigned in byte counter field of read command).
..	…	…
..	…	
..	…	
XOR		
SUM		

Note: Each user's template takes 1728 bytes no matter how many finger veins enrolled

Example:

Step 1:Check use 7 has enrolled or not ?

Send: FF 00 5A A5 00 09 01 **8F 11** **00 00 00 07** 67 0F

Echo: FF 00 5A A5 00 09 00 03 01 **00 01** 00 01 FD 03   // Return YES

Step 2: Upload(Read) 864 of 1728 bytes of template from offset 0x0000.

Send: FF 00 5A A5 00 0D 01 **8F 13** **00 00 00 07** **00 00 03 60** 06 13

Echo: FF 00 5A A5 **03 65** 00 03 01 EA A4 59 E7 68 … … … … 6A B9

Step 3: Upload(Read) 864 of 1728 bytes of template from offset 0x0360.

Send: FF 00 5A A5 00 0D 01 8F 13 **00 00 00 07** **03 60 03 60** 65 D5

Echo: FF 00 5A A5 03 65 00 03 01 C2 A8 DA 43 B1 … … … … 92 81

(End)

2.29.9 Download(save) finger vein template (Mode-2000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	03.6F	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	14	Download(save) finger vein template	
Addr HH	??	User Address Bit 31~24	
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	

Total H	06	How many bytes of template data should be download. (Bit 15~8)
Total L	C0	How many bytes of template data should be download.. (Bit 7~0)
Offset H	00	Offset of fingerprint template. (Bit 15~8)
Offset L	00	Offset of fingerprint template. (Bit 7~0)
Bytes H	03	Save byte counter. (Bit 15~8)
Bytes L	60	Save byte counter. (Bit 7~0)
Data 0		Template data
…		
Data n		
XOR		
SUM		

Note: Each user's template takes 1728 bytes no matter how many finger veins enrolled

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

Example:

Step 1:Delete existed templates before download.

Send: FF 00 5A A5 00 0D 01 **8F 12** 00 00 00 06 00 00 00 06 63 11

Echo: FF 00 5A A5 00 0C 00 **04** 01 C0 18 3D 91 18 18 00 8E 69   // Return ACK

Step 2: Download 864 of 1728 bytes of template data from offset 0x0000.

Send: FF 00 5A A5 **03 6F** 01 **8F 14** 00 00 00 06 06 C0 00 00 03 60   .. … … 72 CB

Echo: FF 00 5A A5 00 0C 00 **04** 01 C0 18 3D 91 18 18 00 8E 69   // Return ACK

Step 3: Download 864 of 1728 bytes of template data from offset 0x0360.

Send: FF 00 5A A5 **03 6F** 01 **8F 14** 00 00 00 06 06 C0 03 60 03 60 .. … … 31 F3

Echo: FF 00 5A A5 00 0C 00 **04** 01 C0 18 3D 91 18 18 00 8E 69   // Return ACK

(End)

2.29.10   Get enrolled fingerprint template counter (Mode-9000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	21	Get enrolled templates counter.	
Addr HH	??	User Address Bit 31~24	**Set User Address to 0xFFFFFFFF will echo all enrolled templates.**
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
XOR			
SUM			

Echo	Value	Description
Head	??	Leading Code
Length	09	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data	…	Enrolled templates of specified user. (bit 15~08).
Data	…	Enrolled templates of specified user. (bit 07~00).
Data	…	Total enrolled fingerprints. (bit 15~08).
Data	…	Total enrolled fingerprints. (bit 07~00).
XOR		
SUM		

Example:

Step 1:Get how many templates does user 0001 have ?

Send: FF 00 5A A5 00 09 01 8F 21 00 00 00 01 51 03

Echo: FF 00 5A A5 00 09 00 03 01 [00 02] 00 02 FD 05   // Return two templates (4096 bytes)

2.29.11   Delete enrolled fingerprint template (Mode-9000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	22	Delete enrolled fingerprint template	
Addr HH	??	Start of user Address Bit 31~24	0xFFFFFFFF will be empty command
Addr HL	??	Start of user Address Bit 23~16	(Delete All)
Addr LH	??	Start of user Address Bit 15~08	
Addr LL	??	Start of user Address Bit 07~00	
Addr HH	??	End of user Address Bit 31~24	0xFFFFFFFF will be empty command
Addr HL	??	End of user Address Bit 23~16	(Delete All)
Addr LH	??	End of user Address Bit 15~08	
Addr LL	??	End of user Address Bit 07~00	
XOR			
SUM			

Before download fingerprint templates must delete enrolled template first.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.29.12   Upload(read) fingerprint template   (Mode-9000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	0D	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	23	Upload(read) fingerprint template	
Addr HH	??	User Address Bit 31~24	
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
Offset H	00	Offset of fingerprint template. (Bit 15~8)	

Offset L	00	Offset of fingerprint template. (Bit 7~0)
Bytes H	02	Read byte counter. (Bit 15~8)
Bytes L	00	Read byte counter. (Bit 7~0)
XOR		
SUM		

Echo	Value	Description
Head	??	Leading Code
Length	??	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data	…	Return template data. (The bytes had assigned in byte counter field of read command).
..	…	…
..	…	
..	…	
XOR		
SUM		

Note: Each template take 2048 bytes. If user has two templates will take 4096 bytes.

Example:

Step 1:Pause fingerprint module auto scan before upload or download !

Send: FF 00 5A A5 00 06 01 8F 25 **30** 64 49

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

Step 2:Get how many templates does user 3 have ?

Send: FF 00 5A A5 00 09 01 8F 21 00 00 00 07 57 0F

Echo: FF 00 5A A5 00 09 00 03 01 **00 02** 00 0E F1 05   // Return two templates (384x2 bytes)

Step 3: Upload(Read) 384 of 768 bytes of template from offset 0x0000.

Send: FF 00 5A A5 00 0D 01 8F 23 00 00 00 07 **00 00** 01 80 D4 0F

Echo: FF 00 5A A5 **01 85** 00 03 01 46 4D 52 00… … … … 1C 7C 2B DD

Step 4: Upload(Read) 384 of 768 bytes of template from offset 0x0180.

Send: FF 00 5A A5 00 0D 01 8F 23 00 00 00 00 03 **01 80** **01 80** 55 11

Echo: FF 00 5A A5 **01 85** 00 03 01 **3A 23 29 17… … … …** **1F 6C** 6A B9

Step 5: Restart fingerprint module auto scan after upload or download !

Send: FF 00 5A A5 00 06 01 8F 25 **31** 65 4B

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

(End)

2.29.13   Download (save) fingerprint template (Mode-9000 only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	01.8F	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Fingerprint data command	
Sub Code	24	Download(save) fingerprint template	
Addr HH	??	User Address Bit 31~24	
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
Total H	03	How many bytes of template data should be download. (Bit 15~8)	
Total L	00	How many bytes of template data should be download.. (Bit 7~0)	
Offset H	00	Offset of fingerprint template. (Bit 15~8)	
Offset L	00	Offset of fingerprint template. (Bit 7~0)	
Bytes H	01	Save byte counter. (Bit 15~8)	
Bytes L	80	Save byte counter. (Bit 7~0)	
Data 0		Template data	
…			
Data n			
XOR			
SUM			

Note: Each template take 384 bytes. If user has two templates will take 768 bytes.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

Example:

Step 1:Pause fingerprint module auto scan before upload or download !

Send: FF 00 5A A5 00 06 01 8F 25 **30** 64 49

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

Step 2: Download(Save) 384 of 768 bytes of template from offset 0x0000.

Send: FF 00 5A A5 01 8F 01 8F 24 00 00 00 07 **03 00** 00 00 **01 80** xx … … … 06 F3

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

Step 3: Download(Save) 384 of 768 bytes of template from offset 0x0100.

Send: FF 00 5A A5 01 8F 01 8F 24 00 00 00 07 **03 00** 01 80 **01 80** xx … … … 06 F3

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

Step 4: Restart fingerprint module auto scan after upload or download !

Send: FF 00 5A A5 00 06 01 8F 25 **31** 65 4B

Echo: FF 00 5A A5 00 0D 00 04 01 C3 25 0D 91 10 10 00 00 80 2B   // Return ACK

(End)

2.29.14   **Pause/Restart Auto Scan**   (Mode-9000 only)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	01.8F	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8F	Fingerprint data command
Sub Code	25	Pause/Restart Auto Scan function
Data 0	30/31	0x30: Pause, 0x31: Restart
Data n		
XOR		
SUM		

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.29.15   Get enrolled face ID counter (Mode-EA only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Face ID data command	
Sub Code	31	Get enrolled templates counter.	
Addr HH	??	User Address Bit 31~24	**Set User Address to 0xFFFFFFFF will echo total enrolled face ID.**
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
XOR			
SUM			

Echo total enrolled face ID number:

Echo	Value	Description
Head	??	Leading Code
Length	09	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data	…	0x00
Data	…	0x00
Data	…	Total enrolled face ID. (bit 15~08).
Data	…	Total enrolled face ID. (bit 07~00).
XOR		
SUM		

Echo specified face ID enrolled or not:

Echo	Value	Description
Head	??	Leading Code
Length	09	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request

Source ID	??	The source node ID of data package come from (Who send)
Data	…	0x00
Data	…	0x00
Data	…	Total enrolled face ID. (bit 15~08).
Data	…	Total enrolled face ID. (bit 07~00).
XOR		
SUM		

Example:

Step 1:Get how many templates does user 0001 have ?

Send: FF 00 5A A5 00 09 01 8F 21 00 00 00 01 51 03

Echo: FF 00 5A A5 00 09 00 03 01 [00 02] 00 02 FD 05　　　// Return two templates (4096 bytes)

2.29.16　　Delete enrolled face ID (Mode-EA only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Face ID data command	
Sub Code	32	Delete enrolled fingerprint template	
Addr HH	??	Start of user Address Bit 31~24	0xFFFFFFFF will be empty command
Addr HL	??	Start of user Address Bit 23~16	(Delete All)
Addr LH	??	Start of user Address Bit 15~08	
Addr LL	??	Start of user Address Bit 07~00	
Addr HH	??	End of user Address Bit 31~24	0xFFFFFFFF will be empty command
Addr HL	??	End of user Address Bit 23~16	(Delete All)
Addr LH	??	End of user Address Bit 15~08	
Addr LL	??	End of user Address Bit 07~00	
XOR			
SUM			

Before download face ID must delete enrolled face ID first.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

2.29.17   Upload face ID from controller (Mode-EA only)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	0D	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	8F	Face ID data command	
Sub Code	33	Upload face ID data from controller	
Addr HH	??	User Address Bit 31~24	
Addr HL	??	User Address Bit 23~16	
Addr LH	??	User Address Bit 15~08	
Addr LL	??	User Address Bit 07~00	
Offset H	00	Offset of face ID data. (Bit 15~8)	
Offset L	00	Offset of face ID data. (Bit 7~0)	
Bytes H	02	Read byte counter. (Bit 15~8)	
Bytes L	00	Read byte counter. (Bit 7~0)	
XOR			
SUM			

Echo	Value	Description
Head	??	Leading Code
Length	??	How many bytes of data will be followed
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data	…	Return template data. (The bytes had assigned in byte counter field of read command).
..	…	…
..	…	
..	…	
XOR		
SUM		

Note: The total amount of each face ID data is 784 bytes, but at most 200 bytes can be extracted each time, and the interval between each section is at least 500ms.

Example: Upload (read) face ID of address 888 user.

Step 1: Upload(Read) 200 of 784 bytes of face ID from offset 0x0000.

Send: ff 00 5a a5 00 0d 01 8f 33 **00 00 03 78** 00 00 00 c8 f1 f7   //Address 0x378, data 0 ~ 199

Echo: ff 00 5a a5 00 cd 00 03 01 00 00 01 09… … … … e7 09 47 69

[Sleep 500ms]

Step 2: Upload(Read) 200 of 784 bytes of face ID from offset 0x00C8.

Send: ff 00 5a a5 00 0d 01 8f 33 00 00 03 78 00 c8 00 c8 39 07

Echo: ff 00 5a a5 00 cd 00 03 01 1e 01 fb 17 0a … … … … ee 0f 15 69

[Sleep 500ms]

Step 3: Upload(Read) 200 of 784 bytes of face ID from offset 0x0190.

Send: ff 00 5a a5 00 0d 01 8f 33 00 00 03 78 01 90 00 c8 60 f7

[Sleep 500ms]

Echo: ff 00 5a a5 00 cd 00 03 01 31 0c 1d fe … … … … e0 03 a9 7d

Step 4: Upload(Read) 184 of 784 bytes of face ID from offset 0x0258.

Send: ff 00 5a a5 00 0d 01 8f 33 00 00 03 78 02 58 00 b8 db 2b

Echo: ff 00 5a a5 00 bd 00 03 01 02 07 3e 31 f5 … … … … fc f7 c9 e9

(End)

2.29.18   Download face ID data to controller   (Mode-EA only)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	01.8F	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	8F	Face ID data command
Sub Code	34	Download face ID data to controller
Addr HH	??	User Address Bit 31~24
Addr HL	??	User Address Bit 23~16
Addr LH	??	User Address Bit 15~08
Addr LL	??	User Address Bit 07~00
Total H	03	How many bytes of data should be download. (Bit 15~8) (Fixed to 0x03)

Total L	00	How many bytes of data should be download.. (Bit 7~0) (Fixed to 0x10)
Offset H	00	Offset of face ID data. (Bit 15~8)
Offset L	00	Offset of face ID data. (Bit 7~0)
Bytes H	01	Followed data bytes. (Bit 15~8)
Bytes L	80	Followed data bytes. (Bit 7~0)
Data 0		face ID data
…		
Data n		
XOR		
SUM		

Note: The total amount of each face ID data is 784 bytes, but at most 200 bytes can be extracted each time, and the interval between each section is at least 500ms.

Echo:

After command received the controller will echo ACK or NACK to the source controller or PC.

Example:

Step 1: Download 200 of 784 bytes of face ID data to controller from offset 0x0000.

Send: ff 00 5a a5 00 d7 01 8f 34 00 00 03 78 03 10 00 00 00 c8 00 00 01 09 01 … … … 5f 97

Echo: ff 00 5a a5 00 0f 00 04 01 c3 43 0d 91 10 10 00 00 00 00 00 e6 af   // Return ACK

[Sleep 500ms]

Step 2: Download 200 of 784 bytes of face ID data to controller from offset 0x00C8.

Send: ff 00 5a a5 00 d7 01 8f 34 00 00 03 78 03 10 00 c8 00 c8 1e 01 fb 17 … … … c5 f7

Echo: ff 00 5a a5 00 0f 00 04 01 c3 43 0d 91 10 10 00 00 00 00 00 e6 af   // Return ACK

[Sleep 500ms]

Step 3: Download 200 of 784 bytes of face ID data to controller from offset 0x0190.

Send: ff 00 5a a5 00 d7 01 8f 34 00 00 03 78 03 10 01 90 00 c8 31 0c 1d… … … 20 9b

Echo: ff 00 5a a5 00 0f 00 04 01 c3 43 0d 91 10 10 00 00 00 00 00 e6 af   // Return ACK

[Sleep 500ms]

Step 4: Download 184 of 784 bytes of face ID data to controller from offset 0x0258.

Send: ff 00 5a a5 00 c7 01 8f 34 00 00 03 78 03 10 02 58 00 b8 02 07 3e 31 … … … fb 7b

Echo: ff 00 5a a5 00 0f 00 04 01 c3 43 0d 91 10 10 00 00 00 00 00 e6 af   // Return ACK

(End)

2.30 Black UID Management (90H)   (Only available on 16384 Users Mode)

2.30.1 Read Black UID Data Records (Sub code 00H)

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	09	Data length can be one or two bytes depend on protocol format.	
Node ID	01	Node ID of destination, the node id is 01 here	
Command	90	Black UID management command	
Sub Code	00	Read Black UID Data Records and base on 8 bytes UID.	
Addr LH	??	The begin Black UID Record Index. (Bit 15~08)	
Addr LL	??	The begin Black UID Record Index. (Bit 7~0)	
Records		How many records will be reading. Each Record will take 8 Bytes and in little ending format.	
XOR			
SUM			

Echo:

Echo	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	??	Data length can be one or two bytes depend on protocol format.
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	03	Response to the request
Source ID	??	The source node ID of data package come from (Who send)
Data xx		Echo (8 X Records) Bytes Data.
XOR		
SUM		

2.30.2 Write Black UID Data Records (Sub code 01H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	90	Black UID management command

Sub Code	01	Write Black UID Data Records and base on 8 bytes UID.	
Addr LH	??	The begin Black UID Record Index. (Bit 15~08)	
Addr LL	??	The begin Black UID Record Index. (Bit 7~0)	
Records		How many records will be writing. Each Record will take 8 Bytes and in little ending format.	
1st Record		8 Byte UID	
2nd Record		8 Byte UID	
		…	
XOR			
SUM			

Echo:

The controller will echo ACK for available or NACK for unavailable.

2.30.3 Add One Black UID Data Records (Sub code 02H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	90	Black UID management command
Sub Code	02	Add One Black UID Data Record.
1st Record		8 Byte UID
XOR		
SUM		

Echo:

The controller will echo ACK for available or NACK for unavailable. If the specified UID has existed in the list, the controller will echo NACK.

2.30.4 Delete One Black UID Data Records (Sub code 03H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here

Command	90	Black UID management command
Sub Code	03	Delete One Black UID Data Record.
1st Record		8 Byte UID
XOR		
SUM		

Echo:

The controller will echo ACK for available or NACK for unavailable. If the specified UID has not existed in the list, the controller will echo NACK.

2.30.5 Erase All Black UID Records (Sub code 04H)

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	09	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	90	Black UID management command
Sub Code	04	Erase All Black UID Records.
XOR		
SUM		

Echo:

The controller will echo ACK for available or NACK for unavailable.

2.31 System Command (A6H)

2.31.1 System reboot

	Value	Description
Head	??	Leading Code could be standard format or extended format
Length	05	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	A6	System Command
Sub Code	FD	Reboot system.
XOR		
SUM		

Echo:

The controller will echo ACK for available or NACK for unavailable.

2.31.2 System parameters reset

	Value	Description

100

Head	??	Leading Code could be standard format or extended format
Length	06	Data length can be one or two bytes depend on protocol format.
Node ID	01	Node ID of destination, the node id is 01 here
Command	A6	System Command
Sub Code	FE	Parameter reset.
Keep		Keep Data Selection: Bit 3: Set to keep MAC address. Bit 2: Set to keep user mode. Bit 1: Set to keep SOR parameters. Bit 0: Set to keep Mifare Key/AB.
XOR		
SUM		

Echo:

The controller will echo ACK for available or NACK for unavailable.

Use A6 FE 08 to keep MAC address is strong recommend.

3. Data Structure

3.1 Data Structure of Time Zone

	Data 0 : Link			
	Data 1 : Level			
	Beginning Time		End Time	
	High	Low	High	Low
Sunday	Data 2	Data 3	Data 4	Data 5
Monday	Data 6	Data 7	Data 8	Data 9
Tuesday	Data 10	Data 11	Data 12	Data 13
Wednesday	Data 14	Data 15	Data 16	Data 17
Thursday	Data 18	Data 19	Data 20	Data 21
Friday	Data 22	Data 23	Data 24	Data 25
Saturday	Data 26	Data 27	Data 28	Data 29
	Data 30 : Reserved			
	Data 31 : Reserved			
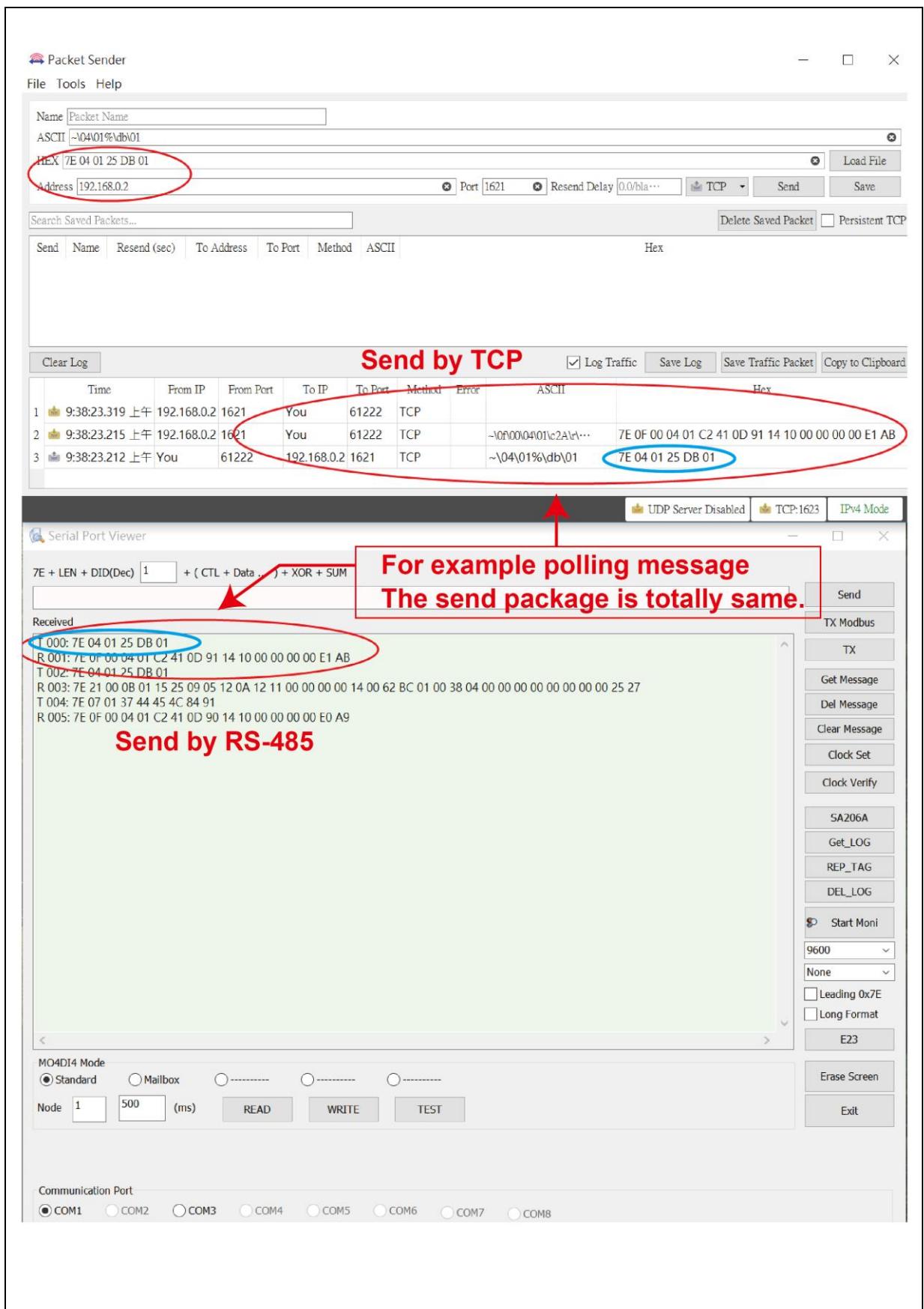
64 time zones available to setup, Time Zone 0 refers to Auto-shift

3.2 Data Structure of Holiday

Set 00		Set 01			Set xx	
Month	Date	Month	Date	· · · · · · ·	Month	Date
Data 0	Data 1	Data 2	Data 3		Data xx	Data xx

120 days available to setup for holiday

3.3 Send Package of RS485 vs TCP/IP

4. Data format of event log

4.1 Date fields

	Value	Description	
Head	??	Leading Code could be standard format or extended format	
Length	21	Data length can be one or two bytes depend on protocol format.	
Node ID	00	Echo to host	
Function code	27	Event function code. Please reference to "3.2 Function code define table"	
Data 0	??	The source node ID of data package come from (Who send)	
Data 1	??	Second	
Data 2	??	Minute	
Data 3	??	Hour	
Data 4	??	Weekday	
Data 5	??	Day	
Data 6	??	Month	
Data 7	??	Year (Range 00~99, that is mean 2000~2099)	
Data 8	??	Port Number. 17:Main port, 18:Port WG1. 19: Port WG2	
Data 9	??	User address bit 15~08 of normal access. (Tag ID bit 15~08 of invalid card))	
Data 10	??	User address bit 07~00 of normal access. (Tag ID bit 07~00 of invalid card)	
Data 11	Sub Code	Sub message code	
Data 12	Sub Func.	Set bit 7 for force open in alarm event.(function code: 17)	
Data 13	Ext Code	Option byte of event port for normal access.	
Data 14	User level	Bit 5~0 are user level. Set bit 6 for free access event. Set bit7 for multi door controller or set for WG port event at single door controller.	
Data 15	Tag ID	Tag ID bit 31~24 of normal access.	
Data 16	Tag ID	Tag ID bit 23~16 of normal access.	
Data 17	Door Num.	The door number of event port.	
Data 18	??		
Data 19	Tag ID	Tag ID bit 15~08 of normal access.	
Data 20	Tag ID	Tag ID bit 07~00 of normal access.	
Data 21	Value/Tag ID	SOR: Tag deduction amount.	Bit 47~40 of 8 Byte UID

		(Bit 15~08 of deduction access)	
Data 22	Value/Tag ID	SOR: Tag deduction amount. (Bit 07~00 of deduction access)	Bit 39~32 of 8 Byte UID
Data 23	Balance/ Tag ID	SOR: Tag balance. (Bit 15~08 of deduction access)	Bit 63~56 of 8 Byte UID
Data 24	Balance/ Tag ID	SOR: Tag balance. (Bit 07~00 of deduction access)	Bit 48~55 of 8 Byte UID
Data 25	??	User Inputted Code (Bit 31~24) [Note1], (Only valid for event code 0x01)	
Data 26	??	User Inputted Code (Bit 23~16) [Note1], (Only valid for event code 0x01)	
Data 27	??	User Inputted Code (Bit 15~8) [Note1], (Only valid for event code 0x01)	
Data 28	??	User Inputted Code (Bit 0~7) [Note1], (Only valid for event code 0x01)	
XOR		XOR	
SUM		SUM	

Note 1: For PIN access event or user press user code before flash tag here will be user input code.For

function code 1 , 8, 10, 28, 33 this bytes is user input password value.

Note 2: If the function code is 59(0x3B) or 11(0x0B) and ((Data25<<8)|Data26) is between 0xDDE and 0xF8C

and ((Data25<<8)|Data26) = ~((Data27<<8)|Data28) then ((Data25<<8)|Data26) is body temperature.

0xDDE is 35.5 and 0xF8C is 39.8

4.2 Function code define table

00	Site code error	
01	Invalid user PIN	
02	Keypad Locked by error access over limits times	
03	Invalid card	
04	Time Zone error	
05	Door Group error	
06	Expiry Date	
07	Over access times	
08	PIN Code error	
09	Press duress PB	
10	Access by Card and PIN	
11	Normal Access by tag	

12	Force Controller Relay ON	
13	Force Controller Relay Off	
14	Controller armed	
15	Controller disarmed	
16	Egress	
17	Alarm event	
20	Controller Power Off	
21	Duress	
22	Guards for help	
23	Cleaner access	
24	Controller Power On	
25	Force Controller Relay On/Off Error	
26	Reader Return to Normal(RTN)	
27	Help push button pressed	
28	Access by PIN (Key Only)	
29	Digital input actives	
31	RS485 slave reader off line (Disconnected)	
32	RS485 slave reader on line (Connected)	
33	User PIN code changed	
34	Change user PIN error	
35	Enter Auto Door Open Procedure	
36	Exit Auto Door Open Procedure	
37	Auto Disarmed	
38	Auto Armed	
39	Access by fingerprint or finger vein	
40	Fingerprint identify failed	
41		
42	Remote control "Up Key" pressed	
43	Disable Reader	
44	Enable Reader	
45	Remote control "Panic Key" pressed	
46	User entrance at parking system	

47	User exit at parking system	
48	Counter triggered at parking system	
49	Latch Relay	
50		
51		
52		
53	Enter/Exit Edit Mode	
55	Free Access Mode Enable/Disable (SubFunc 0/1 is Dis/Enable) 在 721Ev2 底下的卡機直接設定『見卡即開』，開放全部卡片通行	
56	Access via Fingerprint Error	
57		
58		
59	Access Inhibit, maybe body temperature not accepted or some reason	
60	Never open door after card accessed	
61		
62	Can't Read Date/Time from mifare card	
63	Can't Read command from mifare card	
64	Can't deduct from mifare card	
65	SOR global card accessed	
66	SOR disturber layer error	
67	Access rejected : before begin date	
68	Access rejected : expiry	
69	Access rejected : card value not enough	
70	Access ok and card value deducted	
71	Access ok and read lift data from media failed	
72	SOR global access ok and card value deducted	
73	SOR global access reject by value not enough	
74	SOR global access ok but card value deducted failed	
75	SOR global access ok without deducted	
76		
77		

78		
79		
80		
81		
82		
83		
84		
85		
86	Black table tag accessed	
87		
88		
89		
90	Mailbox message, the subfunc will be 0x00=New leater, 0x02=Unclose alarm	
100	Access ok : access via vein	
101	Access reject : access via vein	
102	Inhibited by internal lock locked for door Lock	
103		
104	Fire alarm input trigged	
105		
106		
107		
108	Face ID Passed	
109	Face ID Rejected	
110	Car Plate ID Passed	
111	Car Plate ID Rejected	
112	Black list of Face ID	
113	Black list of Car Plate	
114	Cloud Time Attendance Duty Code	
115	External verification passed and with data	
116	External verification failed	

5. Update log

5.1 AR881EF/EV & AR725Ev2 & AR829Ev5 & AR821EFv5

Ver 1.09

2011.Sep.15　　　First Release

Ver 2.01

2011.Dec.09　　　Add 9000 fingerprints module support for AR881E & AR821EFv5.　(28*003#)

Ver 2.02

2011.Dec.15　　　Add Slave Mode support of under AR716Ex

Ver 2.03

2011.Dec.27　　　Add NET chip option function

Ver 2.04

2012.Feb.14　　　Add "EnrollTool.exe" Support to SF3500

Ver 2.05

2012.Mar.01　　　Add User define image support

Ver 2.06

2012.Jun.01　　　Bug fixed of daily alarm actives on each weekday

　　　　　　　　　Add Begin Day and Alias

Ver 2.07

2012.Jun.18　　　Add Begin day and user alias download/upload commands.

Ver 2.08

2012.Jul.05　　　Add operation mode option for 16384/32768/65530 mode.

Compare between 16384 & 32768 & 65530 Users Mode					
※ Please reference to 2.3.1 Data 49					
Mode	Users	Floors	UID	Alias	User PIN
0	16384	64	4~8 Bytes	16 Bytes	4~8 Digital
1	32768	32	4~8 Bytes	16 Bytes	4~8 Digital
2	65535※1	16	4~8 Bytes	8 Bytes	4~8 Digital

※1: Only for LCD version

Ver 2.09

2012.Jul.12　　　Add auto duty shift time table for auto duty shift function.

2012.Sep.21　　　Add operation mode option for 16384/32768/65535 mode.

Ver 3.00

2012.Nov.23	Add Multi Door / Time Zone and user level for Card & Pin support

Ver 3.01

2013.Apr.01	Add Master Key Card Functions
2013.May.23	Add broadcast function in Ethernet.
2013.Sep.18	Fix bug of Command 0xA0. (size of parameters is 512 not 256)
	Change Web font from Unicode (Three Bytes) to BIG5 (two Bytes)
2013.Sep.26	User Level supported
2014.Feb.24	Fix Delete User Failed Bug.

Ver 3.02

2014.May.10	Add F/w update by UART port support, "ExtCommPort" Bug
2014.Jul.03	Add HTTP_PORT changeable.
2014.Jul.28	Add MSG_FIRE_ALARM message for AR721Ev2 fire alarm input.

Ver 3.03

2014.Sep.23	Add real time clock setting web page
	Extend auto duty time schedule form 8 to 16 sets per day.
	Add egress beep Enable/Disable/Sounds selection function.
	Add 5 beeps water level alarm on 90% event log buffer.