SONY

CAMERA CONTROL NETWORK ADAPTOR

CNA-1

TECHNICAL MANUAL English

1st Edition

Table of Contents

Overview

Abstract

CNA-1 is a network point that works as a “Protocol converter”. It acts as an entrance to the Sony Camera Network System (CNS).
Your system can control a Sony Camera, and can be controlled from Sony Control Panels via CNA-1 with its communication protocol.

How does the CNA-1 work?

CNA-1 participates in CNS as another “Sony protocol capable” device.
It can talk to your system with a simple command protocol (Sony Simple Camera Protocol: SSCP), providing a simple communication mechanism for your system.
It mutually translates the protocol for a Sony Camera to SSCP.

Terminology

CNS: Sony Camera Network System

A network system consisting of Sony Cameras (Sony CCUs) and Sony Control Panels, connected to each other via TCP/IP.

SPP: Sony Proprietary Protocol

A communication protocol used by CNS devices.

SSCP: Sony Simple Camera Protocol

A communication protocol between CNA-1 and your system.

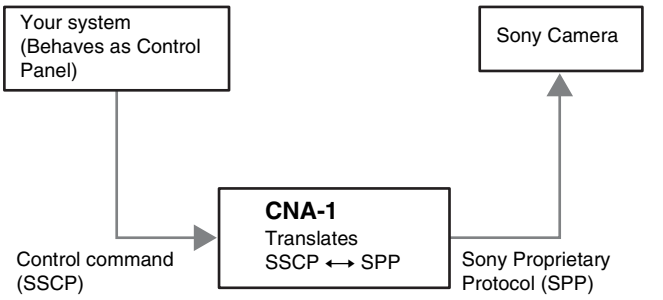
RCP-mode, CAM-mode:

An emulation mode of CNA-1.
CNA-1 acts as a Sony Control Panel in RCP-mode.
CNA-1 acts as a Sony Camera in CAM-mode.
This configuration can be selected using the Web configurator of CNA-1.

Application example

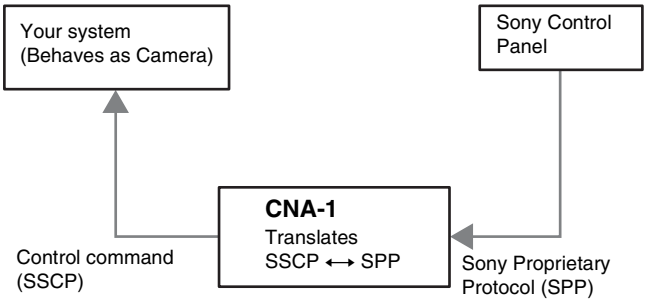
Sony camera control application

In this application, your system behaves as a controller for a Sony Camera.
Your system can control a Sony Camera via CNA-1 (RCP-mode configured) with SSCP.



Your system participates in CNS as “Sony Camera”

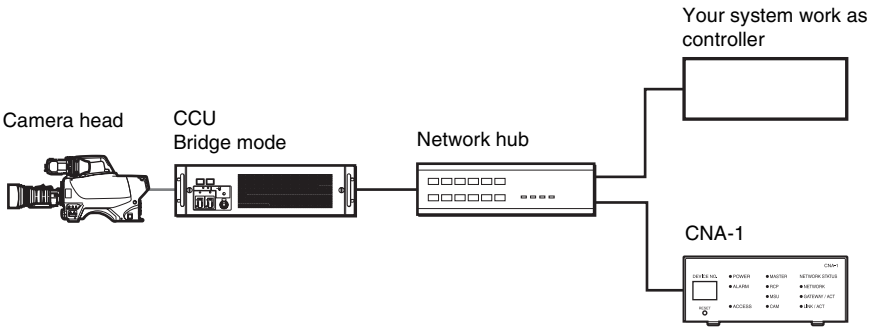
In this application, your system may behave as a Camera or other device similar to a camera.
Your system can be controlled from Sony Control Panels via CNA-1 (CAM-mode configured) with SSCP.



CNA-1 Configuration

Examples of system configurations

One camera control by your system

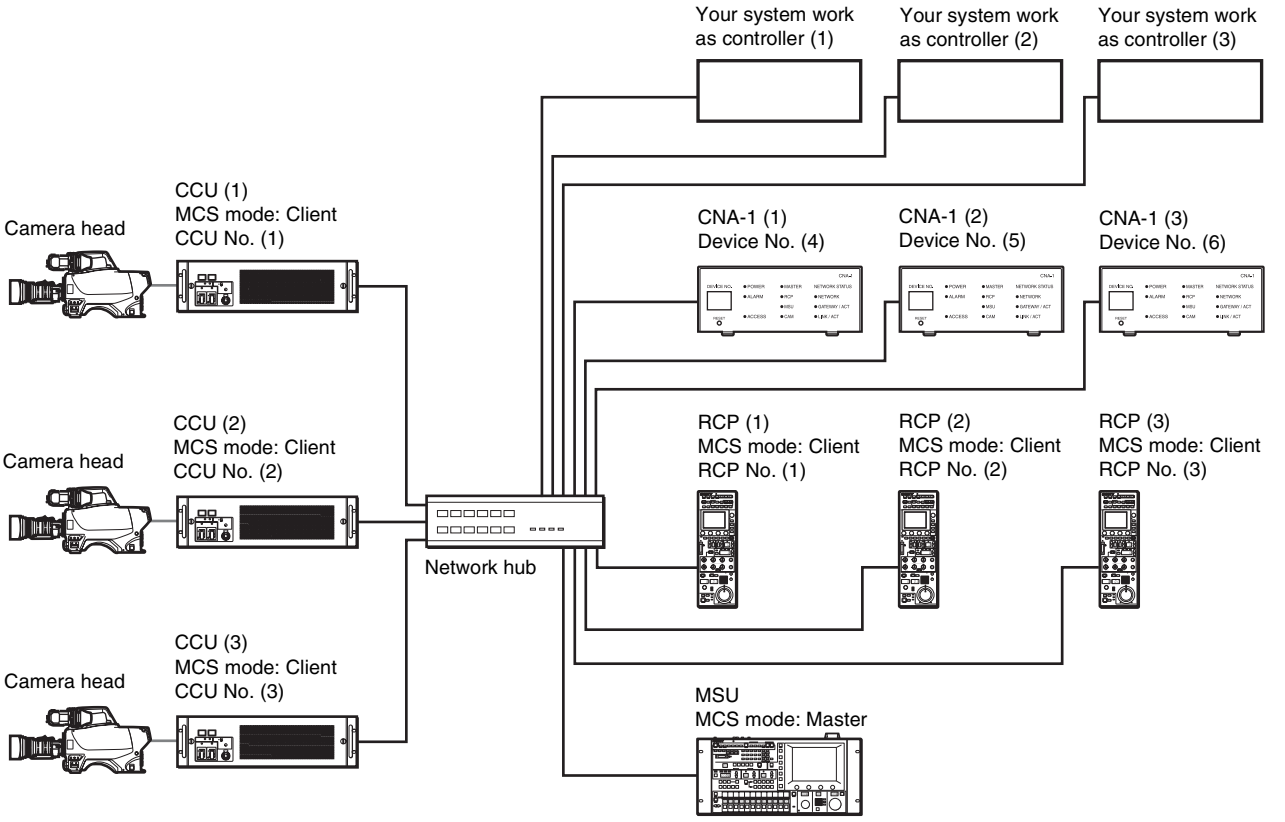


CNA-1 setup

For details of the following setting items, see “Operation Manual (page 17).”

CNS Configuration	CNS Mode	Bridge
	Master Mode	Disable
	Master IP Address	Variable
	Target IP Address	CCU’s IP Address
	Device No.	Variable
Gateway Configuration	Gateway Mode	Enable
	Emulation Mode	RCP

Multiple camera control application with your system



CNA-1 setup

For details of the following setting items, see “Operation Manual (page 17).”

CNS Configuration	CNS Mode	MCS
	Master Mode	Disable
	Master IP Address	Master MSU’s IP address
	Target IP Address	Variable
	Device No.	Depends on RCPs connected to the network.
Gateway Configuration	Gateway Mode	Enable
	Emulation Mode	RCP

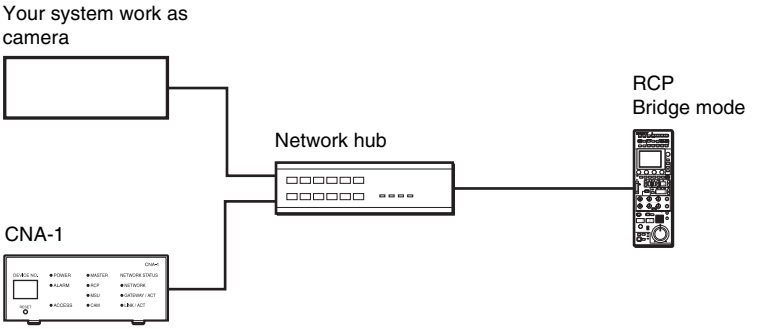
Device No. Configuration for CNA-1

In this case, Device number of CNA-1 must be set to different number from RCPs connected to the network. CNA-1 will be recognized as one of RCP and CNA-1’s Device number is handled as RCP number in CNS.
In default setting of RCP assignment, RCP can control CCU (and camera) which has same number from RCP number.

Ex. RCP No. (1) can control CCU No. (1)

CNA-1 (1)-(3) has Device number (4)-(6). In this setting, CNA-1 cannot control any CCU (and camera) (4)-(6) because CCU (4)-(6) is not connected in this network.
For control (1)-(3) camera by CNA-1 (1)-(3), CNA-1 must be assigned to CCU (and camera) (1)-(3) by RCP assignment function provided from MSU. MSU will find CNA-1 as RCP (4)-(6).
For detail of RCP assignment function, see MSU's Operation Manual.

Your system controlled by Sony RCP peer-to-peer



CNA-1 setup

For details of the following setting items, see “Operation Manual (page 17).

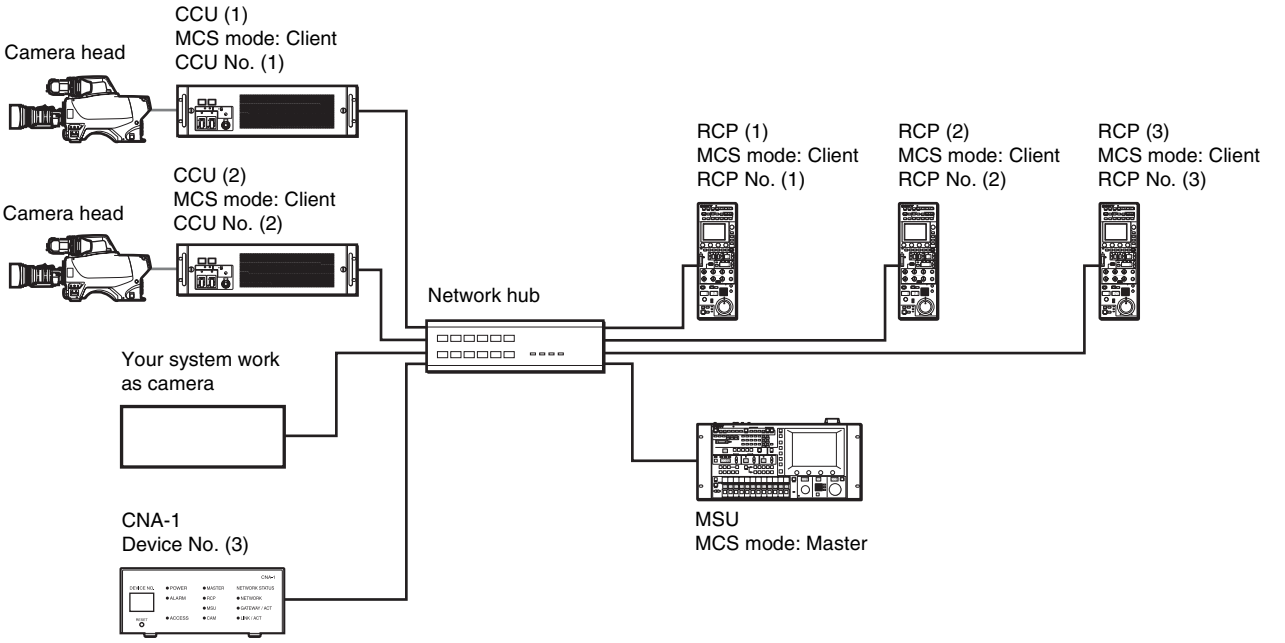
CNS Configuration	CNS Mode	Bridge
	Master Mode	Disable
	Master IP Address	Variable
	Target IP Address	Variable
	Device No.	Variable
Gateway Configuration	Gateway Mode	Enable
	Emulation Mode	CAM

RCP setup

For details of the following setting items, see RCP’s Operation Manual.

CNS Configuration	CNS Mode	Bridge
	Bridge Mode: Connection mode	Semi-Auto
	Bridge Mode: Target	CNA-1’s IP address

Your system participates in CNS as one of Sony camera



CNA-1 setup

For details of the following setting items, see “Operation Manual (page 17).

CNS Configuration	CNS Mode	MCS
	Master Mode	Disable
	Master IP Address	Master MSU’s IP address
	Target IP Address	Variable
	Device No.	Depends on CCUs connected to the network.
Gateway Configuration	Gateway Mode	Enable
	Emulation Mode	CAM

Device No. Configuration for CNA-1

In this case, Device number of CNA-1 must be set to different number from CCUs connected to the network. CNA-1 will be recognized as one of camera and CNA-1's Device number is handled as CCU number in CNS.
CNA-1’s Device number is set to (3). Therefore, MSU can find CNA-1 as Camera (3) and also RCP (3) can control CNA-1 as Camera (3).

System/Command log configuration

CNA-1 can record system event log and SSCP command log. This utility function assists you to develop and validate software for your system.

Log format

CNA-1 records log using Syslog format.

To display the Log menu

Access to the following URL by a PC with its web browser.
"http://(CNA-1's IP address)/admin/log.html"

For details of how to access the menu, see "Operation Manual (page 16)"

Log menu

1 Log Configuration
- System Log:
  Set the log function to on/off
- Command Log:
  Set the SSCP command log function to on/off
- Log Level:
  Select the minimum message severity level to record in CNA-1
  * If you plan to record command log, do not set the level to "Notice" or higher.
- Show All System Log button:
  Click to show all system log and command log stored in CNA-1's RAM.
- Show All Command Log button:
  Click to show only command log stored in CNA-1's RAM.
  * If there is a large amount of log stored in RAM, displaying log list operation may take long time depending on the network and performance of the PC.

2 Log Storage Configuration
- Storage:
  Select storage for log.
- Next File every ** KB, Ring buffer with ** Files:
  Select log rotation number and size of file.
- Eject button:
  Eject the inserted USB flash drive.

3 Sever Log
- Server Log:
  Set the Server log function to on/off
- Server IP Address:
  Set the IP address of a server which can receive log from CNA-1.
- Server UDP Port:
  Set the UDP port of a server.

Notes on using USB flash drive

- Do not operate CNA-1 with USB flash drive.
  USB flash drive is development use only.
  Log processing with USB flash drive may interfere with CNA-1's SSCP connection if an inserted USB flash drive has some malfunction or does not have enough capability of data writing speed.
- Sony USB flash drive USM*GLX series are recommended.
  USB drives other than those recommended may not be recognized when connected to the USB connector.
  USB drives must be formatted with the FAT16 or FAT32 file system. Recommended Sony USB drives are preformatted, and can be used without any prior setup.

Sony Simple Camera Protocol

Introduction

Overview

Sony Simple Camera Protocol (SSCP) is a communication protocol between your system and CNA-1. It is an ASCII character based protocol via TCP/IP. The port number of TCP is configurable.
It has no complex mechanism such as Application-level session control, Keep-alive, Device identification or Authentication. Therefore, your system can control Sony Cameras, or can be controlled from Sony Control Panels, using just send/receive command(s) without any complex procedure.

Overall operation

Basically, CNA-1 listens to a specified TCP port and awaits a connection from your system. When a connection is established, CNA-1 is ready to send and receive control commands immediately.
The connection behavior varies based on its emulation mode. (See connection section.)

Specification

Network

Link layer:
Ethernet, 100BASE-TX
Network layer:
IPv4
Transport Layer:
TCP
Port number is configurable other than 7700 (CNA-1 reserved) or well known ports (1-1023)

Data structure

Packet:
Variable length depends on MTU configuration.
MTU value of CNA-1 is 1500 bytes. It is preferred that MTU of your system is configured less than 1500.
Data:
ASCII character codes:
- Available ASCII printable characters:
  – Lower alpha: “a” .. “z”
  – Higher alpha: “A” .. “Z”
  – Digit: “0” .. “9”
  – Others: “,” (comma)
- Available ASCII control characters:
  – New line: “\n”, “\r”

Note

If a packet includes unavailable characters or bytes, it is handled as an invalid packet and discarded.

Command

A command is described by Hexadecimal data assembled by ASCII characters above.

Lower and upper case alphabetical/numeric:
2 characters requires 1 byte
Comma:
Delimiter of each byte
New line:
Termination of a command, “\n”, “\r” and “\n\r” are available.

Example: (Set Master Black to 0):
“23,a9,00,00\n”

Constructing a command by multi-packet is possible.
Example:
“23,” Packet1
“a9” Packet2
“,00,00” Packet3
“\n” Packet4
CNA-1 will concatenate packets (1-4) and recognize that as “23,a9,00,00\n”.

Multiple commands in a packet is possible.
Example (Set White Balance R-ch, G-ch, B-ch to 0 at the same time):
“23,01,00,00\n23,02,00,00\n23,03,00,00\n”

Important limitation

Maximum command length: 160 byte (characters) / packet
If CNA-1 cannot find the terminator (New line) after it receives 160 bytes, it will discard the received data.
Minimum inter-packet (including complete command(s)) interval: 50 msec
This limitation is important to avoid Camera malfunctions. An overly short inter-packet gap can impose a heavy load on a Camera’s processor, and interfere with its processing. It is possible that unexpected Camera errors might occur.
If your system needs to send a number of commands, the commands must be concatenated and put in a packet.
In an application including periodic scan for Camera status, it is recommended that the inter-packet-interval is set to as long as possible, for effective Camera operation.
Terminator:
CNA-1 only sends “\n” as terminator even if it receives “\r” and “\n\r”.

Connection

CNA-1 configured for RCP mode

1 CNA-1 searches for a Sony Camera or Sony CCU by CNS configuration.

2 When CNA-1 connects to that, CNA-1 listens to specified TCP port and awaits a connection from your system.

3 Your system ready to connect to CNA-1

Note

If CNA-1 loses its CNS connection (to Camera or CCU), it terminates the connection with your system, and returns to (1).

CNA-1 configured for CAM mode

1 After booting CNA-1, it listens to the specified TCP port, and awaits connection from your system immediately.

2 Your system connects to CNA-1.

3 When connection is established, CNA-1 searches a CNS by its configuration and participate in CNS as one of a Sony Camera.

Note

If CNA-1 loses connection with your system, it closes the session to CNS, and returns to (1).

Examples of using commands

For details of commands, see “Details of Command” and “List of available commands”.

Master Gain control (Inc/Dec command)

Get current Gain value
Send: “20,01,00\n” => Receive: “21,01,02\n” (Reply current status from Camera)
Increase Gain
Send: “21,01,80\n” => Receive: “21,01,03\n” (in case of current parameter being 02)
Reduce Gain
Send: “21,01,40\n” => Receive: “21,01,01\n” (in case of current parameter being 02)
Set Gain value directory
Send: “21,01,01\n” => Receive: “21,01,01\n”

Control several Camera functions (Bit command)

Get current function states (ON or OFF) at CHU_FUNCTION01
Send: “20,81,00\n” => Receive: “21,81,31\n” “31” is handled as bits-array: “00110001” means:
- Knee Saturation (Bit7) = OFF
- Auto Knee (Bit6) = OFF
- Knee (Bit5) = ON
- Gamma (Bit4) = ON
- Flare (Bit3) = OFF
- S-EVS (Bit2) = OFF
- ECS (Bit1) = OFF
- Shutter (Bit0) = ON

Invert function states
Send: “20,81,33\n” (00110011) => Receive: “21,81,02\n” (in above condition)
- Knee Saturation (Bit7) = OFF (0 no operation)
- Auto Knee (Bit6) = OFF (0 no operation)
- Knee (Bit5) = OFF (1 ON to OFF)
- Gamma (Bit4) = OFF (1 ON to OFF)
- Flare (Bit3) = OFF (0 no operation)
- S-EVS (Bit2) = OFF (0 no operation)
- ECS (Bit1) = ON (1 OFF to ON)
- Shutter (Bit0) = OFF (1 ON to OFF)

Set function states
Send: “21,81,31\n” (00110001) => Receive: “21,81,31\n” (in above condition)
- Knee Saturation (Bit7) = OFF
- Auto Knee (Bit6) = OFF
- Knee (Bit5) = ON
- Gamma (Bit4) = ON
- Flare (Bit3) = OFF
- S-EVS (Bit2) = OFF
- ECS (Bit1) = OFF
- Shutter (Bit0) = ON

Set function status with bit-mask
Send: “29,81,03,11\n” (00000011 & 00010001) =>
Receive: “21,81,21\n” (in above condition)
- Knee Saturation (Bit7) = OFF (0-0 no operation)
- Auto Knee (Bit6) = OFF (0-0 no operation)
- Knee (Bit5) = ON (0-0 no operation)
- Gamma (Bit4) = OFF (0-1 Effective OFF)
- Flare (Bit3) = OFF (0-0 no operation)
- S-EVS (Bit2) = OFF (0-0 no operation)
- ECS (Bit1) = OFF (1-0 no operation)
- Shutter (Bit0) = ON (1-1 Effective ON)

Control White Balance R-Channel of Camera (Word command)

Get current value
Send: “22,01,00,00\n” => Receive:“23,01,01,40\n”
Current value is “01,40” = 0x0140 (16bits Hex)

Add/Subtraction control
Send: “22,01,00,01\n” => Receive: “23,01,01,41\n” (Add +0001)
Send: “22,01,ff,ff\n” => Receive: “23,01,01,3f\n” (Subtraction -0001)

Set value directory
Send: “23,01,00,01\n” => Receive: “23,01,00,01\n”

Details of Command

Command has 2 parts, “Command group: CMD-GP” and “Parameter: PARAM”.
CMD-GP is a byte at the head of a command. PARAM is one or a number of bytes describing the contents of a command. The length of PARAM is dependent on CMD-GP.

“[CMD-GP],[PARAM0],[PARAM1],[PARAM2],...,[PARAM N]\n”

Example: “23,a9,00,00\n”
CMD-GP: “23”
Adjust the word-size parameter of Camera
PARAM: “a9,00,00”
PARAM0:
“a9” Parameter address of Master Black of Camera
PARAM1-2:
“00,00” 2 bytes parameter value of Master Black (PARAM0)

Types of the command

There are several types of commands and formats, depending on CMD-GP or combination of CMD-GP and PARAM0.

[CMD-GP]:
Categorizes a command into “Byte type”, “Word type”, “Other type”, and appends a control method “Relative” or “Absolute”
[CMD-GP] + [PARAM0]:
Categorizes “Byte type command” into “Byte command”, “Bit command”, “Inc/Dec command”

Almost all commands have two different control types: “Relative” and “Absolute” assigned to a different CMD-GP (see the List of available commands)

Example: Master Black control
- Relative control: “22,a9,00,01\n” This command “adds” 0x0001 to the current parameter
- Absolute control: “23,a9,00,01\n” This command “sets” 0x0001 to the parameter (overwrite)

Byte command

Controls or Queries a byte-size parameter of a Camera.

Format:
- “[CMD-GP],[PARAM0],[PARAM1]\n”
- PARAM0: Parameter address
- PARAM1: Value

Relative control:
It means a status query.
PARAM1 is ignored and does not affect the status of the Camera.

Absolute control:
Set the parameter of Camera specified by the PARAM0 address to PARAM1, or a response of the value of the parameter from the Camera.

Bit command

Controls or Queries the ON or OFF state of a function of a Camera using bit (0 or 1).

Format:
- “[CMD-GP],[PARAM0],[PARAM1]\n”
- PARAM0: Parameter address
- PARAM1: Value affects each bit

Relative control:
Inverts the function state specified by the PARAM0 address ON to OFF, or OFF to ON when bit is set to 1. If PARAM1 bits are all set to 0, it means a status query.

Absolute control:
Set the state at the PARAM0 address to PARAM1 or a response of the value of the parameter from the Camera.

Inc/Dec command

Increments or decrements a Camera parameter and also adjusts a value directory.

Format:
- “[CMD-GP],[PARAM0],[PARAM1]\n”
- PARAM0: Parameter address
- PARAM1: Value

PARAM1
bit7-6: Inc/Dec control
[00] Set a value directory or status query
[01] Increment the parameter specified by the PARAM0 address
[10] Decrement the parameter specified by the PARAM0 address
[11] N/A
bit5-0: Value of the parameter

Relative control:
bit5-0 is ignored.
bit7-6 [00] or [10] or [01]: Parameter (bit5-0) query.
bit7-6 [11]: Maximum value query for the parameter (bit5-0).

Absolute control:
bit7-6:
[00]: Set the parameter specified by the PARAM0 address to bit5-0.
[01]: Increment the parameter. bit5-0 is ignored.
[10]: Decrement the parameter. bit5-0 is ignored.
[11]: Maximum value reply from a Camera. Do not use this bit pattern to control.
bit5-0: Value of the parameter.

Word command

Adjust a word-size parameter of a Camera, or status response of it.

Format:
“[CMD-GP],[PARAM0],[PARAM1],[PARAM2]\n”
PARAM0: Parameter address
PARAM1-2: Value 16bit
PARAM1: Higher byte
PARAM2: Lower byte

Relative control:
PARAM1-2 [0x0000]:Parameter query.
[Others]: Add PARAM1-2 to the current parameter.

Absolute control:
Set the parameter to PARAM1-2.

Other command

Depends on CMD-GP, details are described in the list of commands.

Rules

Request and Response

Requests and response correspond loosely.
There is no one to one mapping between requests and responses: “No reply” means “I can’t process such a command”.
Do not send anything if an error has occurred. Errors must be handled the same as “No command”.

Responses from a Camera can be sent to your system anytime without a request from your system. The status of Camera can be changed by itself (Auto iris function, etc.), changed by a camera operator’s hand manually or changed by another control panel connected to the Camera. The Camera sends status changes to all connected controllers.
Your system can ignore any responses not needed by your system.

When to send

In the case of your system working as a controller for a Camera, your system should send a parameter query that it want to get.
Almost Sony Camera only send status when its status is changed by receiving commands or its function (ex. automatic iris control or etc.).
The status of your system can be updated by receiving status responses from a connected Sony Camera by sending status queries to that Camera (via CNA-1).

In another case, your system works as a Camera among CNS, your system should send commands when its status is changed (must behave like a Sony Camera). The commands must be absolute commands in this case.
If Sony control panels receive no absolute command responses from your system, they cannot update their status and also cannot update the displays.
Therefore, the absolute command responses from your system are necessarily for the control system.

Permission control (Panel Active control)

CNS supports operating multiple cameras by multiple control panels. In case of using the Panel Assign Function, control panels are assigned to Cameras by a CNS Master device, such as MSU.
The assignment function allows duplicate assignment, meaning one camera can be controlled by two or more control panels. Control conflicts can occur in this case. Therefore, permission control for the Camera is determined by the CNS Master device, using Panel Active command.
If a network system with your system requires permission control, your system should use Panel Active command and your system’s Panel Active state should be controlled by the CNS Master device because CNA-1 behaves in the same way as the Sony Control Panel in RCP-mode.
In a single connection (CNA-1 configured Bridge mode of CNS setting), the permission control is managed by CNA-1 itself.

Permission allows your system to send all available commands. Without permission, your system can send only Status Query commands (Control commands are rejected). Permission control does not regulate receiving commands.

When your system receives permission using Panel Active command, another control panel assigned to the same Camera loses permission.
If your system does not want to affect the permission of another control panel, your system can use Para command instead of Panel Active command. Usage of Para command is the same as Panel Active command. However, permission by Para command does not allow controlling of Iris, Master Black and sending Absolute Word command.

A configuration of CNA-1 “Panel Active Function Enable/ Disable” enables this permission control function. If Panel Active Function is enabled, CNA-1 manages Panel Active state and your system can use Panel Active/ Iris Active/ Para commands. If the function is disabled, CNA-1 rejects these commands.

Permission control is not necessarily in the network system. Your system can ignore that and can send command if CNA-1 configured “Panel Active Disable (default)”. However, if a duplicate assignment is set to CNA-1 and another control panel, conflict can occur between other control panels in the no permission control state. Especially, Absolute type commands will certainly conflict, and erratic Camera behavior can occur. For this reason, pay close attention to Absolute type commands

Panel active command examples:

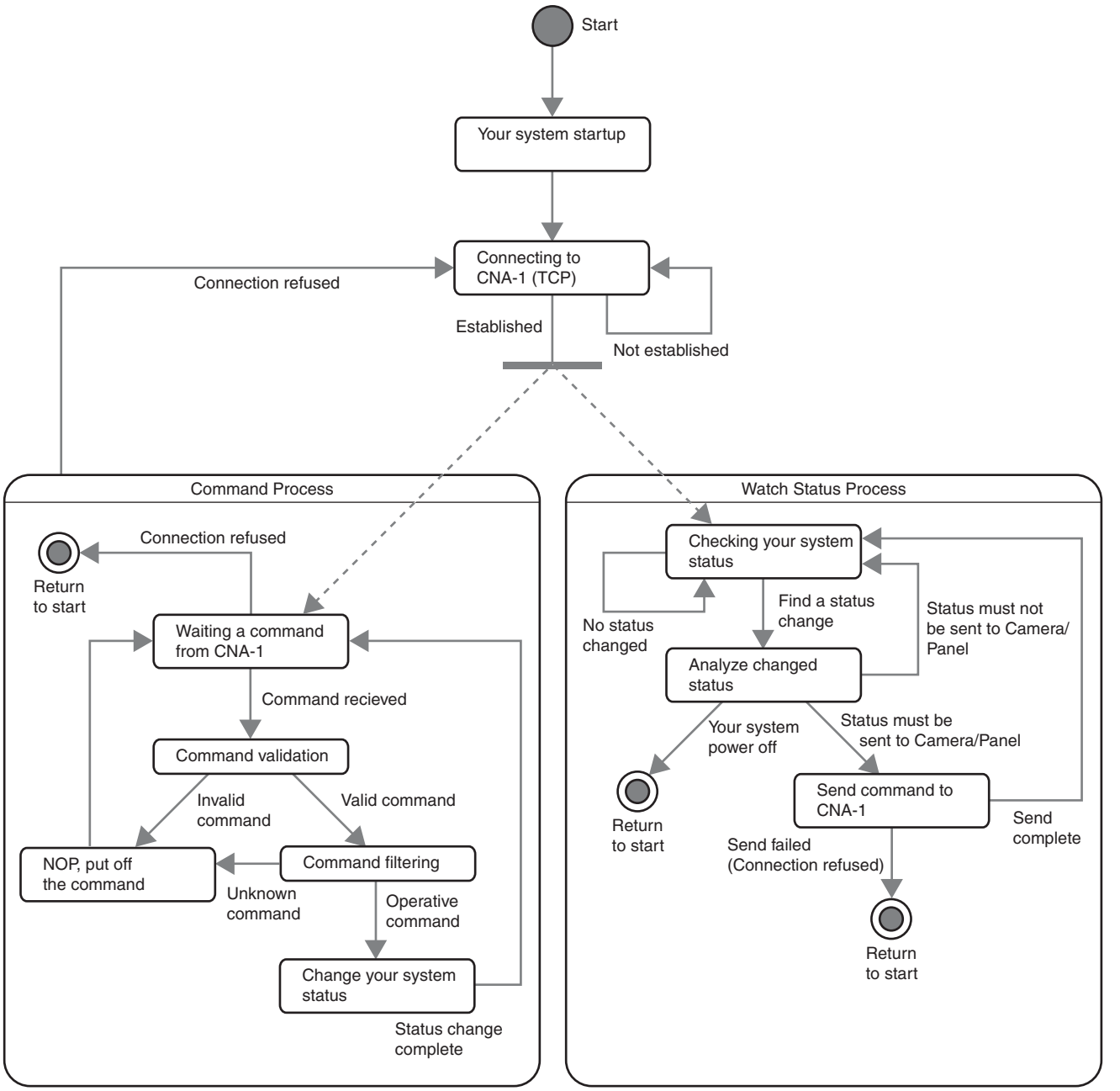
Get current permission state
- Send: “0b,90,01,00\n” => Receive: “0b,XX,01,81\n”
  XX is ID of Master device. Value “81” means sender (your system) has No permission
- Send: “0b,90,01,00\n” => Receive: “0b,XX,01,82\n”
  XX is ID of Master device. Value “82” means sender (your system) has permission to control

Require the permission
- Send: “0b,90,01,02\n” => Receive: “0b,XX,01,81\n” or “0b,XX,01,82\n”

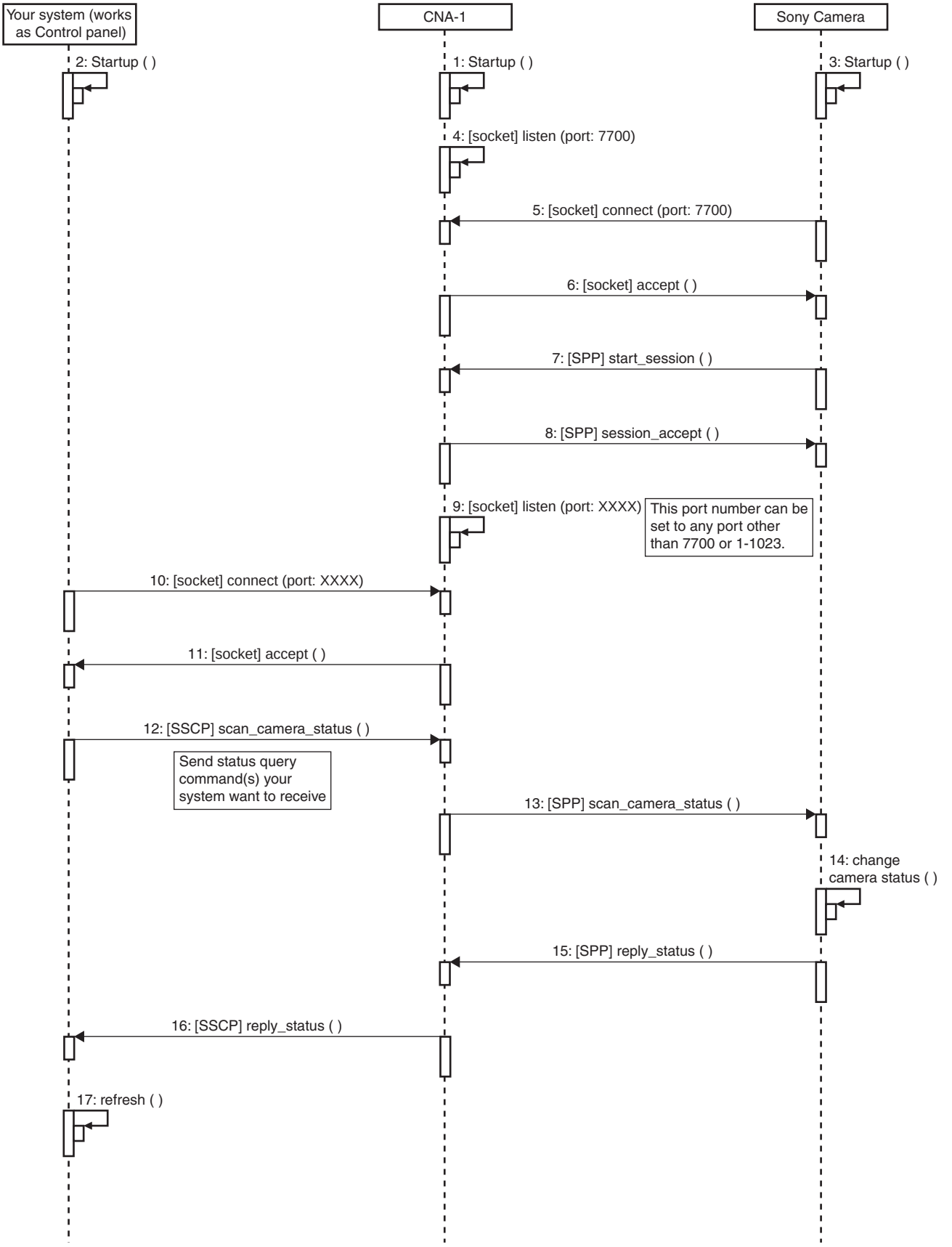
Release the permission
- Send: “0b,90,01,01\n” => Receive: “0b,XX,01,81” or “0b,XX,01,82\n”

Appendix

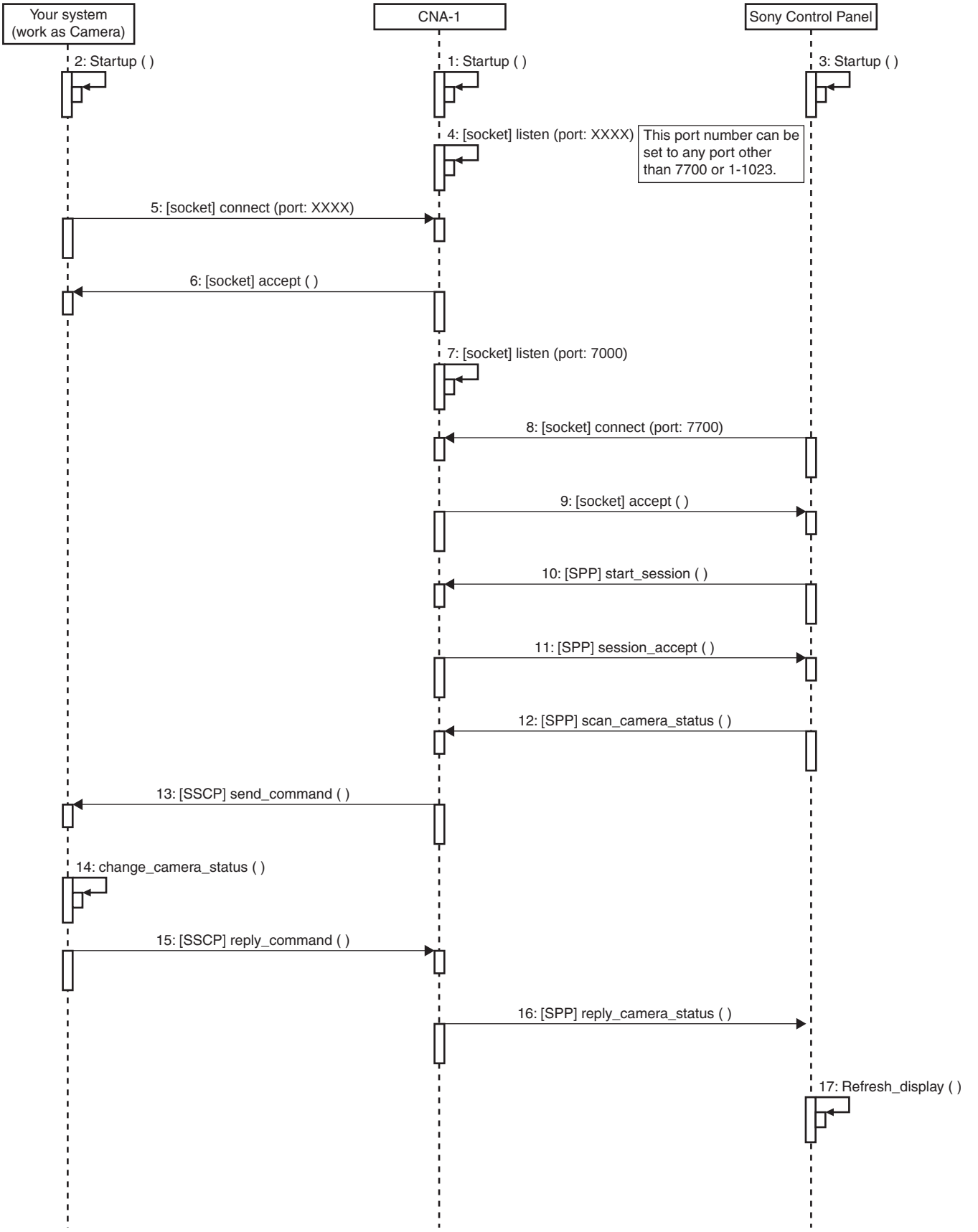
Example of State Machine diagram for your system



Example of Startup Sequence (your system works as Controller)



Example of Startup Sequence (your system works as Camera)



List of available commands

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
System Control	Bit command	tally	0x08	0x20	TALLY_ DATA	–	* Receive only When Sony CCU inputs a Tally signal via External I/O, The CCU sends the tally command to CNA-1 TALLY_DATA= bit0 Red bit1 Green bit2 Yellow
	Other command	call	0x0b	SENDER_ SRCID	0x00	CALL VALUE	SENDER_SRCID= 0x90 when your system works as Controller 0x20 when your system works as Camera CALL VALUE= 0x80 current status query 0x81 Call off 0x82 Call on (two seconds)
		panel_active	0x0b	SENDER_ SRCID	0x01	CONTROL VALUE	SENDER_SRCID= 0x90 CONTROL VALUE= 0x00 Current active status query 0x01 Active-off (release own control to Camera) 0x02 Active-on (get control to Camera) 0x81 Active-off status reply 0x82 Active-on status reply *This command is available in condition of Panel Active Function of CNA-1 is enabled (default is disable).
		iris_active	0x0b	SENDER_ SRCID	0x02	CONTROL VALUE	Same as panel_active command but this command affects only Iris and MasterBlack control.
		para	0x0b	SENDER_ SRCID	0x03	CONTROL VALUE	Same as panel_active command but this command does not affect permission of another control panel (parallel control can be used). * Iris, Master Black, all absolute word commands are not allowed in the permission received by this command.

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CHU Function Control	Inc/Dec command	shutter_ speed	0x20/0x21	0x00	INC/DEC value	–	Bit5-0 00: 1/60 01: 1/100 02: 1/125 03: 1/250 04: 1/500 05: 1/1000 06: 1/2000 07: 1/3000 08: 1/4000 09: 1/5000 0A: 1/10000 0B: 1/32 0C: 1/33 0D: 1/40 0E: 1/48 0F: 1/50 10: 1/96 11: 1/120
		master_gain		0x01	INC/DEC value	–	Bit5-0 00: -6dB 01: -3dB 02: 0dB 03: 3dB 04: 6dB 05: 9dB 06: 12dB 07: 15dB 08: 18dB 09: 21dB 0A: 24dB 0B: 27dB 0C: 30dB 0D: 33dB 0E: 36dB 0F: 39dB 10: 42dB 11: 45dB 12: 48dB 13: 51dB 14: 54dB 15: 57dB 16: 60dB
		nd_filter		0x03	INC/DEC value	–	Bit5-0 00: Filter 1-1 (ND 1) 01: Filter 1-2 (ND 2) 02: Filter 1-3 (ND 3) 03: Filter 1-4 (ND 4) 04: Filter 1-5 (ND 5)
		cc_filter		0x04	INC/DEC value	–	Bit5-0 00: Filter 2-1 (CC A) 01: Filter 2-2 (CC B) 02: Filter 2-3 (CC C) 03: Filter 2-4 (CC D) 04: Filter 2-5 (CC E)

Command							Usage
Command Category	Command Type	Command Name	CMD_GP (Relative/ Absolute)	PARAM0	PARAM1	PARAM2	
CHU Function Control	Inc/Dec command	master_ gamma_ select	0x20/0x21	0x06	INC/DEC value	–	Bit5-0 00: 1 01: 0.95 02: 0.90 03: 0.85 04: 0.80 05: 0.75 06: 0.70 07: 0.65 08: 0.60 09: 0.55 0A: 0.50 0B: 0.45 0C: 0.40 0D: 0.35 0E: 0.30 0F: 0.25 10: 0.20 11: 0.15 12: 0.10
		auto_iris_ window_ select		0x0a	INC/DEC value	–	Bit5-0 00: Cutting the top end 01: Cutting the top, bottom, left and right ends 02: Cutting the left and right ends 03: Cutting uniformly 04: Cutting the top, left and right ends 05: Cutting the bottom end 06: Variable-Window
		preset_mtx_ select		0x0d	INC/DEC value	–	Bit5-0 00: Default 01: SMPTE-240M 02: REC-709 03: SMPTE-WIDE 04: NTSC 05: EBU
		standard_ gamma_ table_mode		0x13	INC/DEC value	–	Bit5-0 00: Standard 01: Special 1 02: Special 2 03: User
		standard_ gamma_ select		0x14	INC/DEC value	–	
		special_ gamma_ select		0x15	INC/DEC value	–	
		hyper_ gamma_ select		0x16	INC/DEC value	–	
		user_gamma _select		0x17	INC/DEC value	–	
		blk_gamma_ RGB_low_ range		0x18	INC/DEC value	–	Bit5-0 00: Low Range 01: Lower Middle Range 02: Higher Middle Range 03: High Range

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CHU Function Control	Inc/Dec command	low_key_sat _low_range	0x20/0x21	0x1d	INC/DEC value	–	Bit5-0 00: Low Range 01: Lower Middle Range 02: Higher Middle Range 03: High Range
		sls_select		0x20	INC/DEC value	–	Bit5-0 00: 1F 01: 2F 02: 3F 03: 4F 04: 5F 05: 6F 06: 7F 07: 8F 08: 11F 09: 12F 0A: 15F 0B: 16F 0C: 22F 0D: 24F 0E: 25F 0F: 30F 10: 32F 11: 45F 12: 48F 13: 50F 14: 60F 15: 64F 16: 90F 17: 96F 18: 100F 19: 120F 1A: 128F 1B: 180F 1C: 192F 1D: 200F 1E: 240F 1F: 256F
		digital_ extender		0x27	INC/DEC value	–	Bit5-0 00: x1.0 (OFF) 01: x1.5 02: x2.0 03: x2.5 04: x3.0 05: x3.5 06: x4.0 07: x4.5 08: x5.0 09: x5.5 0A: x6.0 0B: x6.5 0C: x7.0 0D: x7.5 0E: x8.0
		flicker_ reduce_area _select		0x28	INC/DEC value	–	* Only for HDC3300.
		compensation		0x29	INC/DEC value	–	

Command							Usage
Command Category	Command Type	Command Name	CMD_GP (Relative/ Absolute)	PARAM0	PARAM1	PARAM2	
CHU Function Control	Inc/Dec command	ns_level_ mode	0x20/0x21	0x2a	INC/DEC value	–	Bit5-0 00: 0% (OFF) 01: 5% 02: 10% 03: 15% 04: 20% 05: 25% 06: 30% 07: 35% 08: 40% 09: 45% 0A: 50% 0B: 55% 0C: 60% 0D: 65% 0E: 70% 0F: 75% 10: 80% 11: 85% 12: 90% 13: 95% 14: 100%
		flicker_ reduce_ave_ mode		0x2d	INC/DEC value	–	* Only for HDC3300.
	Byte command	3D_camera_ select		0x2e	LEFT/ RIGHT/ BOTH	–	LEFT=0x00, RIGHT=0x01. BOTH=0x02 *Only for HDFA-200
	Bit command	chu_function 01		0x81	ON/OFF bit value	–	Bit 7: Knee Saturation 6: Auto Knee 5: Knee 4: Gamma 3: Flare 2: S-EVS 1: ECS 0: Shutter
		chu_function 02		0x82	ON/OFF bit value	–	Bit 7: Detail Level Depend 6: Detail 5: User Matrix 4: Preset Matrix 3: V Mod Saw 2: Black Gamma 1: White Clip 0: Knee Aperture
		chu_function 03		0x83	ON/OFF bit value	–	Bit 7: Slim Detail 6: Multi Matrix 5: N/A 4: Matrix 3: Auto Iris 2: Skin Gate 1: Skin Detail 0: Iris Close
		chu_function 04		0x84	ON/OFF bit value	–	Bit 7: N/A 6: ATW 5-0: N/A

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CHU Function Control	Bit command	chu_system_mode	0x20/0x21	0x85	ON/OFF bit value	–	Bit 7: CHU Saturation Enable * If your system (works as Camera) has Saturation control function, your system should send this command with bit7=1 to Sony Control Panel. 6: ECS Display Type 5-2: N/A 1: SD/HD 0: NTSC/PAL
		test_signal_select		0x86	ON/OFF bit value	–	Bit 7: CHU Bars 6-3: N/A 2: Test3 10 step 1: Test2 3 or 10 step 0: Test1 Saw
		chu_function 05		0x87	ON/OFF bit value	–	Bit 7-6: N/A 5: N/A 4: Knee Max 3: N/A 2: 5600K 1: N/A 0: Filter Remote/Local Select * If your system's filter can be controlled remotely, your system should send this command with bit0 = 0 (Filter Remote) to Sony Control Panel.
		chu_function 06		0x89	ON/OFF bit value	–	Bit 7-5: N/A 4: Slow Shutter 3-0: N/A
		chu_function 07		0x8b	ON/OFF bit value	–	Bit 7: N/A 6: Flicker Reduction 5-1: N/A 0: Low Key Matrix
		skin_detail_ch		0x8d	ON/OFF bit value	–	Bit 7-4: N/A 3: Natural Skin Detail 2: CHU Skin Detail CH3 1: CHU Skin Detail CH2 0: CHU Skin Detail CH1
		skin_detail_gate_ch		0x8e	ON/OFF bit value	–	Bit 7-3: N/A 2: CHU Skin Gate CH3 1: CHU Skin Gate CH2 0: CHU Skin Gate CH1
		chu_function 08		0x94	ON/OFF bit value	–	Bit 7-6: N/A 5: Select FPS 4-1: N/A 0: Saturation
		flicker_reduction_power_frequency		0x99	ON/OFF bit value	–	Bit 7-1: N/A 0: 50Hz=0, 60Hz=1

Command							Usage
Command Category	Command Type	Command Name	CMD_GP (Relative/ Absolute)	PARAM0	PARAM1	PARAM2	
CHU Function Control	Bit command	chu_mode_ sw00	0x20/0x21	0xa0	ON/OFF bit value	–	Bit 7: Adaptive Matrix 6-0: N/A
		chu_mode_ sw02		0xa2	ON/OFF bit value	–	Bit 7-2: N/A 1: Adaptive Knee Mode 0: N/A
		chu_mode_ sw03		0xa3	ON/OFF bit value	–	Bit 7-4: N/A 3: Noise Suppression 2-0: N/A
		chu_mode_ sw04		0xa4	ON/OFF bit value	–	Bit 7-2: N/A 1: V Detail Source Mode 0: Freq 1001/1000 1001=0 , 1000=1
				0xc2	ON/OFF bit value	–	Bit 7: N/A 6: SD Detail 5-0: N/A
	Word command	white_R	0x22/0x23	0x01	value H	value L	Effective size = 10bits
		white_G		0x02	value H	value L	
		white_B		0x03	value H	value L	
		master_mod _shd_v_saw		0x04	value H	value L	
		mod_shd_v_ saw_R		0x05	value H	value L	
		mod_shd_v_ saw_G		0x06	value H	value L	
		mod_shd_v_ saw_B		0x07	value H	value L	
		master_flare		0x08	value H	value L	
		flare_R		0x09	value H	value L	
		flare_G		0x0a	value H	value L	
		flare_B		0x0b	value H	value L	
		detail_limiter		0x0c	value H	value L	
		detail_white_ limiter		0x0d	value H	value L	
		detail_black_ limiter		0x0e	value H	value L	
		master_ black_ gamma		0x10	value H	value L	
		black_ gamma_R		0x11	value H	value L	
		black_ gamma_G		0x12	value H	value L	
		black_ gamma_B		0x13	value H	value L	

Command							Usage
Command Category	Command Type	Command Name	CMD_GP (Relative/ Absolute)	PARAM0	PARAM1	PARAM2	
CHU Function Control	Word command	master_knee_point	0x22/0x23	0x14	value H	value L	Effective size = 10bits
		knee_point_R		0x15	value H	value L	
		knee_point_G		0x16	value H	value L	
		knee_point_B		0x17	value H	value L	
		master_knee_slope		0x18	value H	value L	
		knee_slope_R		0x19	value H	value L	
		knee_slope_G		0x1a	value H	value L	
		knee_slope_B		0x1b	value H	value L	
		master_gamma		0x1c	value H	value L	
		gamma_R		0x1d	value H	value L	
		gamma_G		0x1e	value H	value L	
		gamma_B		0x1f	value H	value L	
		master_white_clip		0x20	value H	value L	
		white_clip_R		0x21	value H	value L	
		white_clip_G		0x22	value H	value L	
		white_clip_B		0x23	value H	value L	
		flicker_reduce_gain_m		0x24	value H	value L	
		flicker_reduce_ofs_m		0x28	value H	value L	
		ecs_frequency		0x41	value H	value L	
		evs_data		0x42	value H	value L	
		skin_detail_phase		0x43	value H	value L	
		skin_detail_width		0x44	value H	value L	
		chu_optical_level		0x47	value H	value L	Effective size = 15bits unsigned
		skin_detail2_phase		0x54	value H	value L	Effective size = 10bits
		skin_detail2_width		0x55	value H	value L	
		skin_detail3_phase		0x56	value H	value L	
		skin_detail3_width		0x57	value H	value L	

Command							Usage
Command Category	Command Type	Command Name	CMD_GP (Relative/ Absolute)	PARAM0	PARAM1	PARAM2	
CHU Function Control	Word command	iris	0x22/0x23	0x60	value H	value L	Effective size = 12bits unsigned
		detail_level		0x9b	value H	value L	Effective size = 10bits
		detail_ crispening		0x9c	value H	value L	
		detail_mix_ ratio		0x9d	value H	value L	
		detail_HV_ ratio		0x9e	value H	value L	
		H_detail_HL _ratio		0x9f	value H	value L	
		detail_level_ depend		0xa0	value H	value L	
		skin_detail_ level		0xa1	value H	value L	
		skin_detail_ sat		0xa2	value H	value L	
		matrix_GR_ R		0xa3	value H	value L	
		matrix_BR_ R		0xa4	value H	value L	
		matrix_RG_ G		0xa5	value H	value L	
		matrix_BG_ G		0xa6	value H	value L	
		matrix_RB_B		0xa7	value H	value L	
		matrix_GB_ B		0xa8	value H	value L	
		master_ black		0xa9	value H	value L	Effective size = 12bits signed
		black_R		0xaa	value H	value L	Effective size = 10bits
		black_G		0xab	value H	value L	
		black_B		0xac	value H	value L	
		knee_sat_ slope		0xae	value H	value L	
		knee_ aperture		0xaf	value H	value L	
		comb_filter		0xb0	value H	value L	
		low_key_clip _level		0xb7	value H	value L	
		adaptive_ knee_point		0xc4	value H	value L	
		adaptive_ knee_slope		0xc5	value H	value L	
		slim_detail		0xc6	value H	value L	
		skin_detail2_ level		0xc7	value H	value L	
		skin_detail2_ sat		0xc8	value H	value L	

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CHU Function Control	Word command	skin_detail3_ level	0x22/0x23	0xc9	value H	value L	Effective size = 10bits
		skin_detail3_ sat		0xca	value H	value L	
		chu_ saturation		0xd2	value H	value L	
		white_color_ temp_ctrl		0xdc	value H	value L	
		chu_color_ temp_ balance		0xde	value H	value L	
		select_fps		0xdf	value H	value L	
		SD_detail_ level		0xe0	value H	value L	
		SD_detail_ crispening		0xe1	value H	value L	
		SD_detail_ H/V_ratio		0xe2	value H	value L	
		SD_detail_ limitter		0xe3	value H	value L	
		SD_detail_ white_limitter		0xe4	value H	value L	
		SD_detail_ black_limitter		0xe5	value H	value L	
		SD_detail_ frequency		0xe6	value H	value L	
		SD_detail_ level_ depend		0xe7	value H	value L	
		SD_detail_ detail_comb		0xeb	value H	value L	
		master_ white_gain		0xf2	value H	value L	
CHU AutoSetup Control	Other command	auto_setup	0x25	TYPE	EXECUTE / STATUS	–	TYPE 0x00: Status query 0x01: Auto White Balance 0x02: Auto Black Balance 0x03: Auto Level 0x07: Skin Detail Auto Hue(CH1) 0x0A: Skin Detail Auto Hue(CH2) 0x0B: Skin Detail Auto Hue(CH3) EXECUTE / STATUS 0x00: Status query 0x01: Start 0x02: Break 0x03: OK 0x04: NG 0x05: Under execution 0x06: Standby 0x07: Cancel Standby 0x08: Reset Status 0x09: Busy

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CHU Scene FileControl	Other command	scene_file_ control	0x27	EXECUTE / STATUS	0x03	FILE_NO	EXECUTE / STATUS 0x00: Canceling the operation (Cancel) 0x01: Initialization (Formatting) 0x02: Calling 0x03: Saving 0x04: Erasing 0x05: Canceling the call 0x06: Status request 0x07: File call in progress 0x08: This file contains data that is not called 0x09: There is a file but no data 0x0a: The corresponding file does not exist 0x0b: Transmission of number of files 0x0c: File operation is not possible at present. Or, this command was transmitted while file operation was not possible for some reason. FILE_NO 1-32 (Decimal)
Utility	Other command	chu_switch_ with_mask	0x29	SW_ADDR	SW_DATA	MASK_ DATA	Only absolute control. This command helps you to send Bit-type command absolutely. PARAM0-1 are same as an absolute Bit command. PARAM2 is masking datum for PARAM1. Each bit of PARAM1 is enabled when PARAM2 bit set to 1.
CCU Function Control	Bit command	ccu_function 00	0x40/0x41	0x10	ON/OFF bit value	–	Bit 7: N/A 6: CCU Skin Gate 5-2: N/A 1: Chroma 0: CCU Bars
		ccu_function 01		0x12	ON/OFF bit value	–	Bit 7-3: N/A 2: Mono 1-0: N/A
		preview_ control		0x31	ON/OFF bit value	–	Bit 7-1: N/A 0: Preview
	Inc/Dec command	SD_letter_ box_mode		0x40	INC/DEC value	–	Bit5-0 00: 16:9 01: 15:9 02: 14:9 03: 13:9 04: 12:9
	Bit command	SD_function 02		0xc2	ON/OFF bit value	–	Bit 7: N/A 6: SD Detail 5: SD User Matrix 4: SD Preset Matrix 3-0: N/A
		SD_function 03		0xc3	ON/OFF bit value	–	Bit 7: N/A 6: SD Multi Matrix 5: N/A 4: SD Matrix 3-0: N/A

Command							Usage
Command Category	**Command Type**	**Command Name**	**CMD_GP (Relative/ Absolute)**	**PARAM0**	**PARAM1**	**PARAM2**	
CCU Function Control	Bit command	crop_control	0x40/0x41	0xe0	ON/OFF bit value	–	Bit 7-4: N/A 3: HD 16:9 squeeze 2: HD Letter Box 1: HD 4:3 Edge Crop 0: HD Crop Center Lock
	Word command	mono_ saturation	0x42/0x43	0x07	value H	value L	Effective size = 10bits
		mono_hue		0x08	value H	value L	
		crop_ position		0x70	value H	value L	
		SD_detail_ limiter		0x8c	value H	value L	
		SD_detail_ white_limiter		0x8d	value H	value L	
		SD_detail_ black_limiter		0x8e	value H	value L	
		SD_master_ gamma		0x9c	value H	value L	
		SD_matrix_ GR_R		0xa3	value H	value L	
		SD_matrix_ BR_R		0xa4	value H	value L	
		SD_matrix_ RG_G		0xa5	value H	value L	
		SD_matrix_ BG_G		0xa6	value H	value L	
		SD_matrix_ RB_B		0xa7	value H	value L	
		SD_matrix_ GB_B		0xa8	value H	value L	
		SD_detail_ comb		0xb0	value H	value L	
		SD_detail_ level		0xdb	value H	value L	
		SD_detail_ crispening		0xdc	value H	value L	
		SD_detail_ HV_ratio		0xde	value H	value L	
		SD_detail_ frequency		0xdf	value H	value L	
		SD_detail_ level_ depend		0xe0	value H	value L	
		optical_level		0xf0	value H	value L	Effective size = 15bits unsigned
Utility	Other command	ccu_switch_ with_mask	0x49	SW_ADDR	SW_DATA	MASK_ DATA	Same as chu_switch_with_mask
System Control	Byte Command	camera_ number	0x60/0x61	0x0a	CAMERA NO.	–	CAMERA NO. = 1-96 (Decimal) * Status Query only

Format list

* If your system works as Camera that need to display a Sutter value on Sony Control Panel, your system must send Format value with these commands in advance.

Video Format	chu_ mode04 (0xa4)	format_mode (0x91)						chu_system_mode (0x85)		
	bit0	bit5	bit4	bit3	bit2	bit1	bit0	bit6	bit1	bit0
1035/59.94I	0	*	*	*	*	*	*	0	1	0
1035/60I	1	*	*	*	*	*	*	0	1	0
PAL	*	*	*	*	*	*	*	0	0	1
NTSC	*	*	*	*	*	*	*	0	0	0
NTSC 29.97P	0	0	1	0	0	0	0	1	0	0
NTSC 23.98P	0	0	1	0	0	1	0	1	0	0
NTSC 59.94I	0	0	0	0	0	0	0	1	0	0
PAL 50I	1	0	0	0	0	0	1	1	0	1
PAL 25P	1	0	1	0	0	0	1	1	0	1
1080/60I	1	0	0	0	0	0	0	1	1	0
1080/59.94I	0	0	0	0	0	0	0	1	1	0
1080/30P	1	0	1	0	0	0	0	1	1	0
1080/29.97P	0	0	1	0	0	0	0	1	1	0
1080/50I	1	0	0	0	0	0	1	1	1	0
1080/25P	1	0	1	0	0	0	1	1	1	0
1080/24P	1	0	1	0	0	1	0	1	1	0
1080/23.98P	0	0	1	0	0	1	0	1	1	0
1080/60P	1	0	1	0	1	0	0	1	1	0
1080/59.94P	0	0	1	0	1	0	0	1	1	0
1080/50P	1	0	1	0	1	0	1	1	1	0

Sony Corporation

CNA-1 (SY)
4-431-827-**01**(1)

http://www.sony.net/