

**AV-UHS500**  
**External interface**  
**Communication protocol**  
**Specifications**

Document No.  
Version 1.01  
March. 31. 2021

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## Change History

Date	Description	Version
2020.05.28	Issued the first edition	1.00
2021.03.31	Revisions to the entire document along with function additions	1.01

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# 1. Introduction

This document is the specification indicated the interface protocol between AV-UHS500 (live switcher) and the external equipment. Controls such as bus switching and receiving of source information are possible from external devices connected via a network to AV-UHS500.

## 2. About communication

### 2-1. Communication classification

The environment setting to communicate with AV-UHS500 is as follows.

- 1000Base-T (AUTO-MDIX supported)
- IPv4
- TCP, UDP
- IP Address; Changeable from MENU (Factory default settings; 192.168.0.8)
- Subnet Mask; Changeable from MENU (Factory default settings; 255.255.255.0)
- Receive Port Number; Changeable from MENU (Factory default settings; 62000)
  - \* Maximum of 20 simultaneous connections for external control
- Destination port number (UDP); Changeable from MENU (Factory default settings; 65000)
- Minimum command interval; 16 milliseconds or more

### 2-2. Command format

Transmission / Receive command formats of the are as follows.

#### Format

<STX> Command : Parameter1 : Parameter2 : Parameter3 <ETX>

#### Format description

<STX>	Start Of Text(=0x02)
command	Refer to the command list below (4 alphabetical characters)
: Parameter1	Refer to the parameter value of each command.
: Parameter2	Refer to the parameter value of each command.
: Parameter3	Refer to the parameter value of each command.
<ETX>	End Of Text(=0x03)

#### Example

<STX>SBUS:01:02<ETX>

Character string notation	<STX>	S	B	U	S	:	0	1	:	0	2	<ETX>
Hexadecimal notation	02	53	42	55	53	3a	30	31	3a	30	32	03

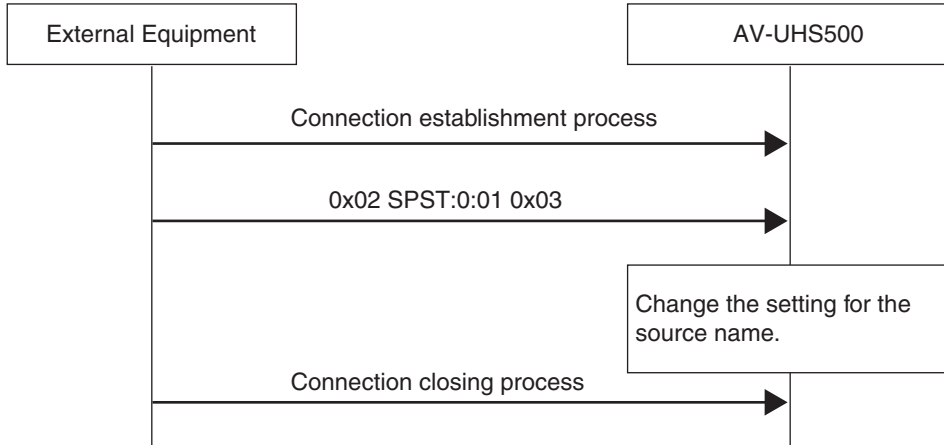
### 3. Sequence

There are control command sequences and query sequences performed via TCP and update notifications performed via UDP.

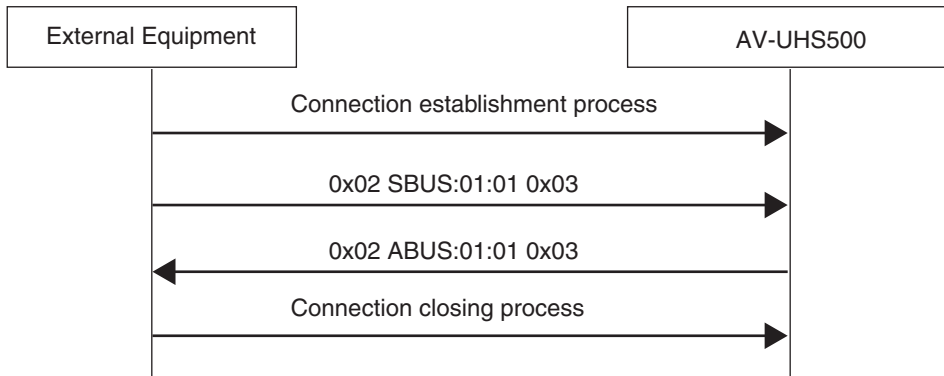
With TCP connections, if there is an interval of 20 seconds or more between when the external device sends a control command or query command and when the next command is sent, the connection is terminated from AV-UHS500.

#### 3-1. Control command

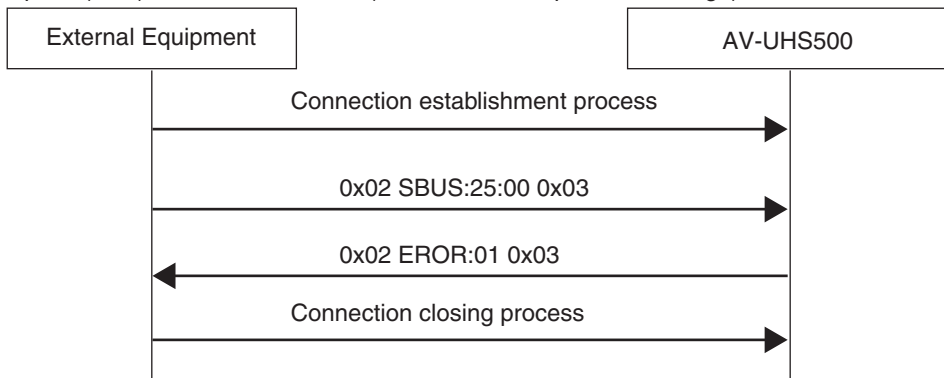
Example; Setting for the source name



Example; Crosspoint (XPT) control of the buses (Normal)



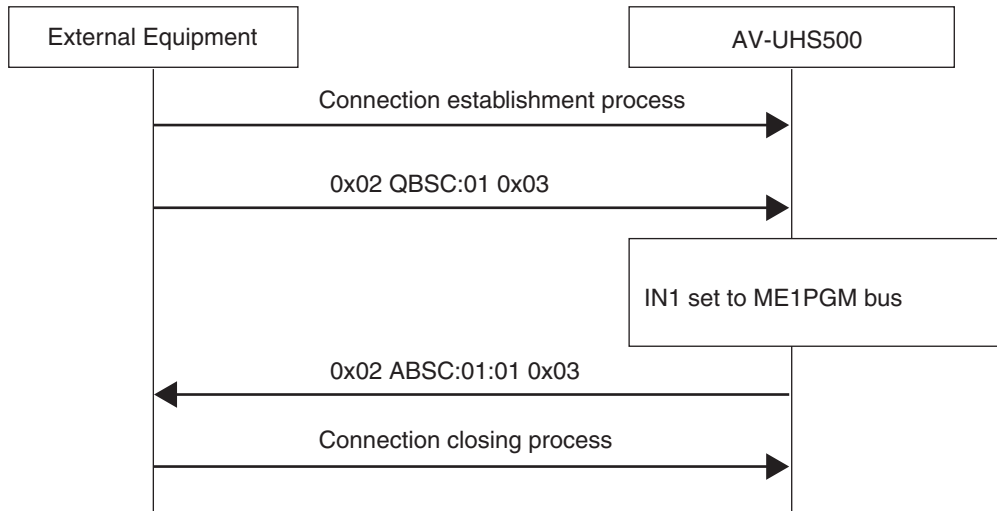
Example; Crosspoint (XPT) control of the buses (Error; Out of the parameter range)



### 3-2. Query command

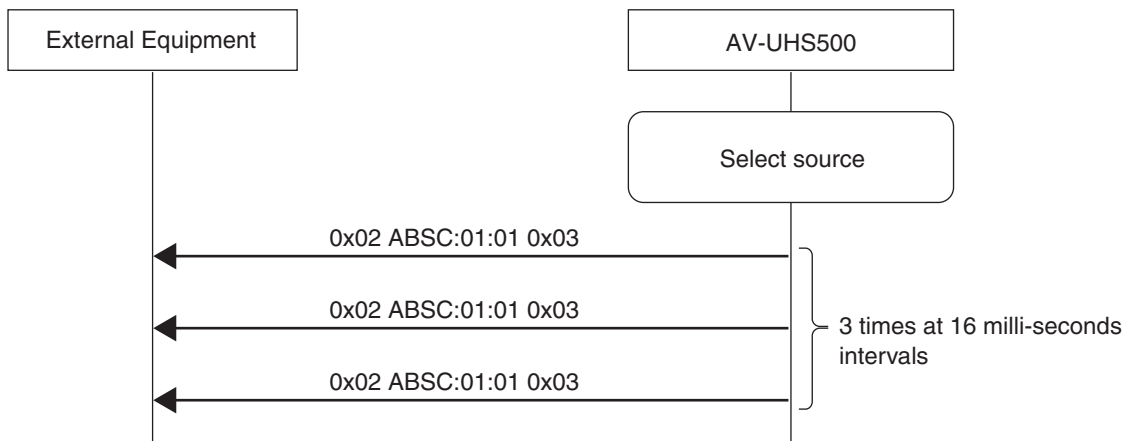
Example; Query for the status of each bus (XPT)

When a query is performed in a state where IN1 is set to ME1PGM bus



### 3-3. Update notification

As transmission is via UDP, a connection process is not performed and source selection information is sent by ABSC command to the external device from the AV-UHS500 at intervals of 16 milli-seconds when there is a change.



## 4. Command List

### 4.1 Crosspoint related command

No.	Classification	Command name	Function	Protocol
1-1	Control	SBUS	Setting for Bus selection control	Tcp
1-2	Response	ABUS	Response Bus selection	Tcp
1-3	Query	QBSC	Query to status of each bus	Tcp
1-4	Response	ABSC	Response on status of each bus	Tcp, Udp
1-5	Query	QBST	Query to crosspoint information for each bus	Tcp
1-6	Response	ABST	Response with crosspoint information for each bus	Tcp

### 4.2 Source name related command

No.	Classification	Command name	Function	Protocol
2-1	Control	SPST	Setting for displaying Source name (Default/User)	Tcp
2-2	Control	SSNM	Setting for Source name	Tcp
2-3	Response	ASNM	Response on Source name	Tcp
2-4	Query	QSNM	Query to Source name	Tcp

### 4.3 Bus linkage related command

No.	Classification	Command name	Function	Protocol
3-1	Control	SKRS	Setting for Key Signal Coupling	Tcp
3-2	Response	AKRS	Response on the setting for Key Signal Coupling	Tcp
3-3	Query	QKRS	Query to the setting for Key Signal Coupling	Tcp

### 4.4 Transition related command

No.	Classification	Command name	Function	Protocol
4-1	Control	SAUT	AUTO transition setting (trigger issued)	Tcp
4-2	Control	SCUT	Setting for CUT transition (trigger issued)	Tcp
4-3	Query	QTIM	Query to AUTO transition time	Tcp
4-4	Response	ATIM	AUTO transition time response and reply	Tcp
4-5	Control	STIM	Setting for AUTO transition time	Tcp
4-6	Query	QBTI	Query to setting status of bus transition	Tcp
4-7	Response	ABTI	Setting status of bus transition response and reply	Tcp
4-8	Control	SBTI	Setting for setting status of bus transition	Tcp
4-9	Query	QPAT	Query to transition pattern	Tcp
4-10	Response	APAT	Transition pattern response and reply	Tcp
4-11	Control	SPAT	Setting for transition pattern	Tcp
4-12	Query	QPNP	Query to status of PinP parameters	Tcp
4-13	Response	APNP	PinP parameter response and reply	Tcp
4-14	Control	SPNP	Setting for PinP parameters	Tcp

### 4.5 Error response

No.	Classification	Command name	Function	Protocol
–	Response	EROR	It is used when an error occurs with control commands with a response.	Tcp

### 4.5 Source Name/Tally related command (TSL Protocol)



#### 4-1. Crosspoint related command

No.	Classification	Command name	Function
1-1	Control	SBUS	Setting for Bus selection control

##### 【 Function description 】

- This function is a setting for Bus selection. The usual cross-point switching process is performed.
- ABUS is replied as a response.
- Depending on the bus selection, some sources cannot be selected. Refer to the operating instructions for AV-UHS500 for details.

##### 【 Number of Parameters 】

2

##### 【 Parameter 】

Parameter 1; Bus selection

01	ME1PGM	07	ME1KEY3-F	100	DSK2-S	∴		153	MV1-1
02	ME1PVW	08	ME1KEY3-S	∴		141	DISP	∴	
03	ME1KEY1-F	∴		113	AUX1	∴		168	MV1-16
04	ME1KEY1-S	97	DSK1-F	114	AUX2	150	VMEM-V	169	MV2-1
05	ME1KEY2-F	98	DSK1-S	115	AUX3	151	VMEM-K	∴	
06	ME1KEY2-S	99	DSK2-F	116	AUX4	∴		184	MV2-16

Parameter 2; Source

01	IN1	14	OPB IN2	151	STILL2-V	∴		227	AUX1
02	IN2	15	OPB IN3	152	STILL2-K	171	KEY OUT	228	AUX2
03	SDI IN3	16	OPB IN4	∴		172	CLN	229	AUX3
∴		∴		157	CLIP1-V	∴		230	AUX4
08	SDI IN8	145	CBGD1	158	CLIP1-K	201	PGM	∴	
09	OPA IN1	146	CBGD2	159	CLIP2-V	∴		251	CLOCK
10	OPA IN2	147	CBAR	160	CLIP2-K	203	PVW		
11	OPA IN3	148	BLACK	∴		∴			
12	OPA IN4	149	STILL1-V	165	MV1	209	ME PGM		
13	OPB IN1	150	STILL1-K	166	MV2	∴			

No.	Classification	Command name	Function
1-2	Response	ABUS	Response Bus selection

##### 【 Function description 】

- The status of Bus selection is replied as a response to SBUS.

##### 【 Number of parameters 】

2

##### 【 Parameter 】

Same as SBUS.

No.	Classification	Command name	Function
1-3	Query	QBSC	Request for the status of each bus

**【 Function description 】**

- Request for the status of the selection of each bus.
- ABSC is replied as a response.

**【 Number of parameters 】**

1

**【 Parameter 】**

Parameter 1; Bus selection  
Same as the Parameter 1 (Bus selection) of SBUS.

No.	Classification	Command name	Function
1-4	Response	ABSC	Response on the status of each bus

**【 Function description 】**

- The status of the bus selection is replied as a response to QBSC.
- The original selected status is replied during the AUX transition.

**【 Number of parameters 】**

2

**【 Parameter 】**

Same as SBUS.

No.	Classification	Command name	Function
1-5	Control	QBST	Query to crosspoint information for each bus

**【 Function description 】**

- A query is made about the crosspoint information taken at each bus.
- ABST is replied as a response.

**【 Number of parameters 】**

1

**【 Parameter 】**

Parameter 1; Bus selection

00	Bus A (upper side irrespective of mode)	07	KEY2-S	14	AUX1
01	Bus B (lower side irrespective of mode)	08	KEY3-F	15	AUX2
02	PGM (PGM column irrespective of mode)	09	KEY3-S	16	AUX3
03	PVW (PVW column irrespective of mode)	10	DSK1-F	17	AUX4
04	KEY1-F	11	DSK1-S	18	DISP
05	KEY1-S	12	DSK2-F		
06	KEY2-F	13	DSK2-S		

No.	Classification	Command name	Function
1-6	Response	ABST	Response with crosspoint information for each bus

**【 Function description 】**

- As the QBST response, the crosspoint information taken at each bus is replied.

**【 Number of parameters 】**

3

**【 Parameter 】**

Parameter 1; Bus selection

Same as the Parameter 1 (bus selection) of QBST.

Parameter 2; Crosspoint selection

00	XPT1	23	XPT24
01	XPT2	:	
:		99	No selection
22	XPT23		

Parameter 3; Tally information

0	Tally Off
1	Tally On

**4-2. Source name related command**

No.	Classification	Command name	Function
2-1	Control	SPST	Setting for displaying Source name

**[ Function description ]**

- Sets the classification of source name.  
The setting is made once rather than for each source.
- There is no response to this command.

**[ Number of parameters ]**

2

**[ Parameter ]**

Parameter 1; Object

0	Source name
---	-------------

Parameter 2; Classification

00	Default
01	User

No.	Classification	Command name	Function
2-2	Control	SSNM	Setting for Source name

**[ Function description ]**

- Sets the source name.
- ASNM is replied as a response.
- When you set the IN1 source name, the source names for both SDI IN1 and HDMI IN1 are changed, and when you set the IN2 source name, the source names for both SDI IN2 and HDMI IN2 are changed.

**[ Number of parameters ]**

3

**[ Parameter ]**

Parameter 1; Object

00	Source name
----	-------------

Parameter 2; Object

01	IN1	09	OPA IN1	14	OPB IN2
02	IN2	10	OPA IN2	15	OPB IN3
03	SDI IN3	11	OPA IN3	16	OPB IN4
:		12	OPA IN4		
08	SDI IN8	13	OPB IN1		

Parameter 3; Source name

Source Name	Maximum 12 bytes, alphanumeric characters and symbols
-------------	---

No.	Classification	Command name	Function
2-3	Response	ASNM	Response on Source name

**[ Number of parameters ]**

3

**[ Parameter ]**

Same as SSNM.

No.	Classification	Command name	Function
2-4	Query	QSNM	Query to Source name

**[ Function description ]**

- Requests the source name.
- ASNM is replied as a response.

**[ Number of parameters ]**

2

**[ Parameter ]**

Parameter 1; Object

Same as the parameter 1 (Object) of SSNM.

Parameter 2; Object

Same as the parameter 2 (Object) of SSNM.

**4-3. Bus linkage related command**

No.	Classification	Command name	Function
3-1	Control	SKRS	Setting for Key Signal Coupling

**【 Function description 】**

- Set whether to couple the key source signal to the key fill signal for the KEY1 to KEY3 buses and DSK1 and DSK2 buses on the ME, or to couple the key fill signal to the key source signal.  
When you select the key fill signal or the key source signal, the key source signal or key fill signal is changed according to the table set in the Key Signal Coupling 2 to 8 sub menus of the switcher.  
Fill to Source; When a key fill signal is selected, the key source signal is also automatically switched.  
Source to Fill; When a key source signal is selected, the key fill signal is also automatically switched.
- AKRS is replied as a response.

**【 Number of parameters 】**

1

**【 Parameter 】**

Parameter 1; Status

00	Fill to Source
01	Source to Fill

No.	Classification	Command name	Function
3-2	Response	AKRS	Response on the setting for Key Signal Coupling

**【 Function description 】**

- As a response to SKRS, reply whether to couple the key source signal to the key fill signal for the KEY1 to KEY3 buses and DSK1 and DSK2 buses on the ME, or to couple the key fill signal to the key source signal.

**【 Number of parameters 】**

1

**【 Parameter 】**

Same as SKRS.

No.	Classification	Command name	Function
3-3	Query	QKRS	Query to the setting for Key Signal Coupling

**【 Function description 】**

- Request whether the key source signal is coupled to the key fill signal for the KEY1 to KEY3 buses and DSK1 and DSK2 buses on the ME, or if the key fill signal is coupled to the key source signal.
- AKRS is replied as a response.

**【 Number of Parameters 】**

0

**【 Parameter 】**

None

#### 4-4. Transition related command

No.	Classification	Command name	Function
4-1	Control	SAUT	Setting for AUX transition (trigger issued)

##### 【 Function description 】

- Controls AUTO transition (trigger issued).

##### 【 Number of Parameters 】

3

##### 【 Parameter 】

Parameter 1; Source selection

00	BKGD	05	KEY3	08	DSK2
01	KEY1	06	FTB		
04	KEY2	07	DSK1		

Parameter 2; Effect when BKGD is selected for parameter 1

0	MIX
1	WIPE

Parameter 3; Operation setting

0	Trigger ON (issued when the normal AUTO button is pressed)
1	ON Take (transition from Off → On) (excluding when BKGD is selected)
2	Off Take (transition from On → Off) (excluding when BKGD is selected)

No.	Classification	Command name	Function
4-2	Control	SCUT	Setting for CUT transition (trigger issued)

##### 【 Function description 】

- Controls CUT transition (trigger issued).

##### 【 Number of Parameters 】

1

##### 【 Parameter 】

Parameter 1; Source selection

Same as the parameter 1 (source selection) of SAUT.

No.	Classification	Command name	Function
4-3	Query	QTIM	Query to AUTO transition time

**【 Function description 】**

- A query is made about the AUTO transition time.
- ATIM is replied as a response.

**【 Number of Parameters 】**

1

**【 Parameter 】**

Parameter 1; Source selection  
Same as the parameter 1 (source selection) of SAUT.

No.	Classification	Command name	Function
4-4	Response	ATIM	AUTO transition time response and reply

**【 Function description 】**

- As the QTIM and STIM response, the AUTO transition time is replied.

**【 Number of Parameters 】**

2

**【 Parameter 】**

Parameter 1; Source selection  
Same as the parameter 1 (source selection) of SAUT.

Parameter 2; Each time (in frames)

000	000 frames
:	
999	999 frames

No.	Classification	Command name	Function
4-5	Control	STIM	Setting for AUTO transition time

**【 Function description 】**

- Controls each AUTO transition time.
- ATIM is replied as a response.

**【 Number of Parameters 】**

2

**【 Parameter 】**

Parameter 1; Source selection  
Same as the parameter 1 (source selection) of SAUT.

Parameter 2; Each time (in frames)  
Same as the parameter 2 (each time (in frames)) of ATIM.



No.	Classification	Command name	Function
4-6	Query	QBTI	Query to setting status of bus transition

**【 Function description 】**

- A query is made about the setting status of bus transitions (MIX effects) in buses AUX1 and AUX2.
- ABTI is replied as a response.

**【 Number of Parameters 】**

1

**【 Parameter 】**

Parameter 1; Type of bus

01	AUX1
02	AUX2

No.	Classification	Command name	Function
4-7	Response	ABTI	Setting status of bus transition response and reply

**【 Function description 】**

- As the QBTI and SBTI response, the bus transition setting status is replied.

**【 Number of Parameters 】**

3

**【 Parameter 】**

Parameter 1; Type of bus

Same as the parameter 1 (type of bus) of QBTI.

Parameter 2; Enable/Disable

01	Enable
02	Disable

Parameter 3; Each time (in frames)

Same as the parameter 2 (each time (in frames)) of ATIM.

No.	Classification	Command name	Function
4-8	Control	SBTI	Setting for setting status of bus transition

**【 Function description 】**

- Sets the setting status of bus transitions (MIX effects) in buses AUX1 and AUX2.
- ABTI is replied as a response.

**【 Number of Parameters 】**

3

**【 Parameter 】**

Parameter 1; Type of bus

Same as the parameter 1 (type of bus) of QBTI.

Parameter 2; Enable/Disable

Same as the parameter 1 (type of bus) of ABTI.

Parameter 3; Each time (in frames)

Same as the parameter 2 (each time (in frames)) of ATIM.

No.	Classification	Command name	Function
4-9	Query	QPAT	Query to transition pattern

**【 Function description 】**

- A query is made about transition patterns.
- APAT is replied as a response.

**【 Number of Parameters 】**

1

**【 Parameter 】**

Parameter 1; Type

01	BKGD
02	KEY1

No.	Classification	Command name	Function
4-10	Response	APAT	Transition pattern response and reply

**【 Function description 】**

- As the QPAT and SPAT response, the transition pattern is replied.

**【 Number of Parameters 】**

2

**【 Parameter 】**

Parameter 1; Type

Same as the parameter 1 (type) of QPAT.

Parameter 2; Patterns

01 to 09	WIPE01 to 09
11 to 19	WIPE11 to 19
⋮	
61 to 69	WIPE61 to 69

**【 Notes 】**

When one of the following 11 wipe pattern numbers is selected, the wipe pattern waveform is not changed, but rather the previous wipe pattern will be enabled.

WIPE2	No. 18, No. 19
SQ2	No. 33, No. 38 (BKGD only), No. 39
SL	No. 45
3D2	No. 64 to No. 69

No.	Classification	Command name	Function
4-11	Control	SPAT	Setting for transition pattern

**【 Function description 】**

- Controls the transition pattern.
- APAT is replied as a response.

**【 Number of Parameters 】**

2

**【 Parameter 】**

Parameter 1; Type

Same as the parameter 1 (type) of QPAT.

Parameter 2; Patterns

Same as the parameter 2 (Enable/Disable) of APAT.

**【 Notes 】**

Same notes as for APAT

No.	Classification	Command name	Function
4-12	Query	QPNP	Query to status of PinP parameters

**【 Function description 】**

- A query is made about the status of PinP parameters.
- APNP is replied as a response.

**【 Number of Parameters 】**

1

**【 Parameter 】**

Parameter 1; Target setting

1	PinP (*KEY1)
2	PinP (DSK1)

**【 Notes 】**

\* Depending on the AV-UHS500 format and the existence of an option board (4KDVE), the KEY to be target will be modified.

With 2K	KEY2
With 4K and with 4KDVE	KEY2
With 4K without 4KDVE	KEY1

No.	Classification	Command name	Function
4-13	Response	APNP	PinP parameter response and reply

**【 Function description 】**

- As the QPNP and SPNP response, the status of the PinP parameters is replied.

**【 Number of Parameters 】**

6

**【 Parameter 】**

Parameter 1; Target setting

Same as the parameter 1 (target setting) of QPNP.

Parameter 2; Central X position

-10000	-100.00 (*Fixed at 6 digits)
⋮	
10000	+100.00 (*)

Parameter 3; Central Y position

-10000	-100.00 (*)
⋮	
10000	+100.00 (*)

Parameter 4; Size

0	0
⋮	
10000	100.00 (Fixed at 5 digits: when 10.00, it becomes 01000)

Parameter 5; Border width

0	None
1	Small
2	Medium

3	Large
4	None of the above

Parameter 6; Border color

0	White
1	Gray 1
2	Gray 2

3	Black
4	None of the above

No.	Classification	Command name	Function
4-14	Control	SPNP	Setting for PinP parameters

**【 Function description 】**

- Controls the status of PinP parameters.
- APNP is replied as a response.

**【 Number of Parameters 】**

6

**【 Parameter 】**

Parameter 1; Target setting

Same as the parameter 1 (target setting) of QPNP.

Parameter 2; Central X position

Same as the parameter 2 (central X position) of APNP.

Parameter 3; Central Y position

Same as the parameter 3 (central Y position) of APNP.

Parameter 4; Size

Same as the parameter 4 (size) of APNP.

Parameter 5; Border width

Same as the parameter 5 (border width) of APNP.

Parameter 6; Border color

Same as the parameter 6 (border color) of APNP.

#### 4-5. Error response

No.	Classification	Command name	Function
–	Response	EROR	It is used when an error occurs with control commands with a response.

##### **【 Function description 】**

- When an error occurs with control commands with a response, there is a reply from the switcher.

##### **【 Number of Parameters 】**

1

##### **【 Parameter 】**

Parameter 1; Details of the error

01	Out of the parameter range
02	Syntax error (If unrecognized)

#### 4-6. Source Name/Tally related command (TSL Protocol)

Conforming with the TSL Protocol5.0, the switcher source names and tallies are sent to external devices via UDP.

##### ■ Transmission

The following commands are sent from the switcher at regular intervals or when there is a change in source names or tallies.

(The regular interval can be set to 16ms, 32ms, 48ms, 64ms, or 80ms in the System—ExtControl Switcher sub menu on the switcher.)

The tally illumination color related settings, RED=Tally Group1 and GREEN=Tally Group2, are made in the System—Tally MV Color sub menu on the switcher. You can also set whether there is output from Tally Group1 and 2 in the System—Tally Mode sub menu on the switcher.

<Command>

Size (Bytes)	Parameter		Description
2	PBC	–	All data size length MAX: 2046bytes (Except this item)
1	VER	–	00 (fixed)
1	FLAGS	–	Bit0: 0 (fixed) ASCII based strings in packet. Bit1: 0 (fixed) If set, data after SCREEN is screen control data (SCONTROL) – otherwise, it's display message data (DMSG) Bit 2–7: 0 (fixed) Reserved
2	SCREEN	–	0: From Switcher to External equipment (For transmission)
2	DMSG	INDEX	Refer to the table in the next page.
2		CONTROL	Bit0–1: RH Tally Lamp State 0=Off, 1=Tally Group1 Bit2–3: Text Tally State 0=Off, 2=Tally Group2 Bit4–5: LH Tally Lamp State 0 (fixed) Bit6–7: Brightness value 3 (fixed) Bit8–14: Reserved 0 (fixed) Bit15: Control data 0 (fixed)
2		LENGTH	Length of TEXT: 12 (fixed)
12		TEXT	Source name (12bytes fixed) If the string of source name is less than 12 characters, fill the rest of the characters in the null character (¥0).
:			
Repeat DMSG necessary. (Total (including PBC) should be 2048 bytes or less.)			

All the 2-byte values in the table are transmitted in little endian format. For example, the hexadecimal value 1234 is transmitted in the order 34, 12.

<INDEX>

The relation between the INDEX and Source is as follows.

(Same as the parameter 2 (Source) of SBUS.

Note the differences in the representation of decimal and hexadecimal.)

INDEX		Source
Decimal	Hex	
01	01	IN1
02	02	IN2
03	03	SDI IN3
⋮	⋮	⋮ (SDI IN4 – SDI IN7)
08	08	SDI IN8
09	09	OPA IN1
10	0A	OPA IN2
11	0B	OPA IN3
12	0C	OPA IN4
13	0D	OPB IN1
14	0E	OPB IN2
15	0F	OPB IN3
16	10	OPB IN4
⋮	⋮	
145	91	CBGD1
146	92	CBGD2
147	93	CBAR
148	94	BLACK
149	95	STILL1-V
150	96	STILL1-K
151	97	STILL2-V
152	98	STILL2-K
⋮	⋮	

INDEX		Source
Decimal	Hex	
157	9D	CLIP1-V
158	9E	CLIP1-K
159	9F	CLIP2-V
160	A0	CLIP2-K
⋮	⋮	
165	A5	MV1
166	A6	MV2
⋮	⋮	
171	AB	KEY OUT
172	AC	CLN
⋮	⋮	
201	C9	PGM
⋮	⋮	
203	CB	PVW
⋮	⋮	
209	D1	ME PGM
⋮	⋮	
227	E3	AUX1
228	E4	AUX2
229	E5	AUX3
230	E6	AUX4
⋮	⋮	
251	FB	CLOCK