

3rd party Lens Controller

CONFIDENTIAL

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1. Overview

A Lens Controller that can move the zoom ring of a manual zoom lens physically in the wide and tele direction is generally called a “follow zoom unit” and “lens servo motor”. This document describes some technical details of the communication protocol and basic rules for developing Lens Controller and realizing zoom-related control of a manual zoom lens by connecting the OPTION terminal of ILME-FR7. The communication protocol basically follows VISCA protocol for serial connection. The commands described in this document only deals with the implementation of follow-zoom related controls.

This document refers to the follow zoom unit as Lens Controller.

2. Target models

Model Name	Support Firmware Version
ILME-FR7	Version 2.00 or later

3. Hardware requirement

3.1. 3rd party Lens Controller should have a non-volatile memory.

When the camera sends the settings specified by Sony to the lens controller, the lens controller must store the values in non-volatile memory.

4. VISCA protocol

The target model in Chapter 2 is the controller, and Lens Controller is the target to be controlled. In this document, the following explanations will be given from the point of Lens Controller to be developed or integrated.

4.1. Communication physical layer

The target model is equipped with an Option terminal, please check the instruction manual for the connector shape and which terminal is TX, RX, GND. Electrical signals flowing in TX and RX conform to RS232C. RS232C communication parameters are shown in the table below.

Parameter Name	value
Communication Speed	38400bps +0~4%(fixed)
Data bit	8 bit
Start bit	1 bit
Stop bit	1 bit
Parity	None
Flow Control	None

4.2. VISCA Communication Specifications

4.2.1. VISCA Address

VISCA Address of Lens Controller is fixed to "1". However, in the document described later, the VISCA Address is in a form that includes cases other than 1, but do not forget that it is fixed to 1.

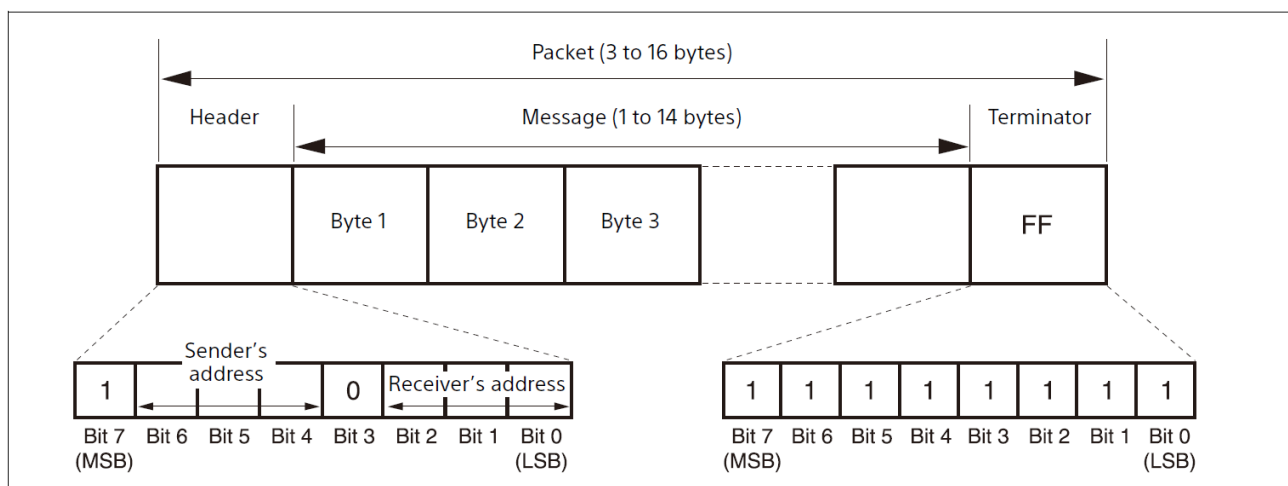
4.2.2. VISCA Packet Structure

The basic unit of VISCA communication is called a packet (diagram below). The first byte of the packet is called the header and comprises the sender's and receiver's addresses. For example, the header of the packet sent to Lens Controller (address 1) from the controller (address 0) is 81H in hexadecimal.

In the command list, as the header is 8X, input the address of Lens Controller to X. The header of the reply packet from Lens Controller assigned to address 1 is 90H. Some of the setting commands can be sent to all devices at one time (broadcast) *. In the case of broadcast, the header should be 88H in hexadecimal.

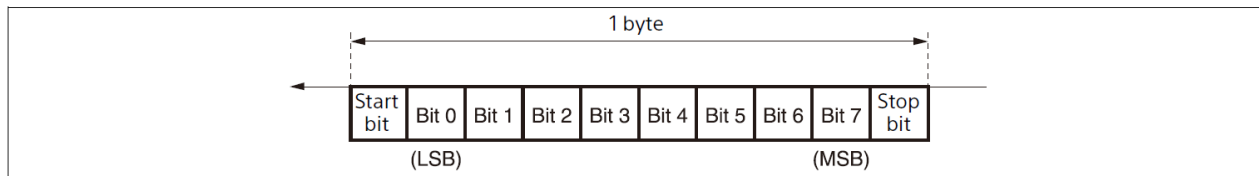
When the terminator is FFH, it signifies the end of the packet.

The method of data transmission is big-endian(Network byte order).



Note:

The diagram below shows the actual waveform. Data flow will take place with the LSB first.

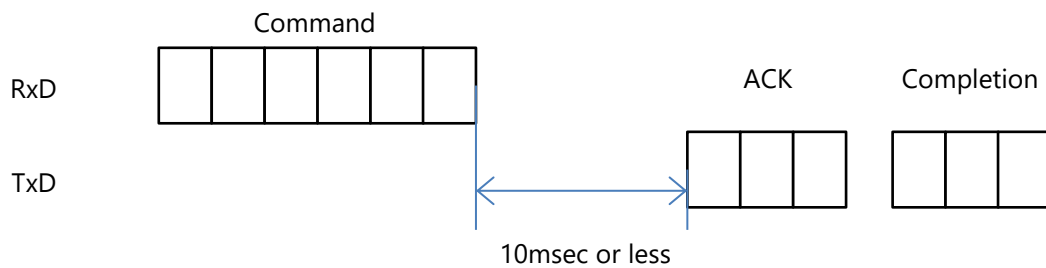


4.2.3. Timing chart

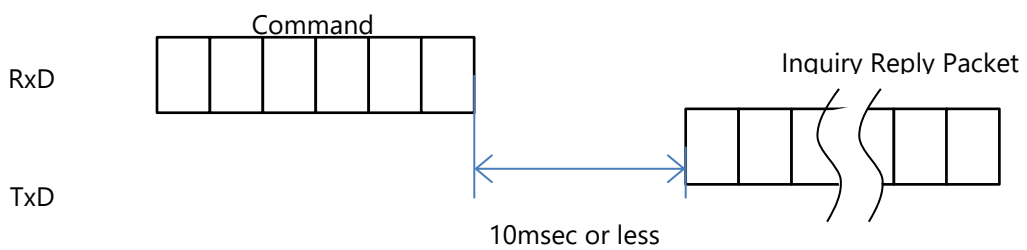
The controller issues the next command after receiving the response to General Command or Inquiry command.

The response time from the server for General Command and Inquiry command is expected to be about the following processing speed.

General Commands



Inquiry commands



4.2.4. Command and inquiry

- **(General)Command**
Sends operational commands to Lens Controller.
- **Inquiry**
Used for inquiring about the current state of Lens Controller.

Command/Inquiry Packet

8X QQ RR ... FF

QQ: Command/Inquiry (01=Command, 09=Inquiry)

RR: Category Code (00=Interface, 04=camera, 06=Pan/Tilter)

X = 1

For actual values to be sent, see sections 4.3 to 4.6.

4.2.5. Response for commands and inquiries

- **ACK message**
Returned by Lens Controller when it receives a command. No ACK message is returned for an inquiry.
- **Completion message**
Returned by Lens Controller when execution of commands or inquiries is completed. In the case of inquiry commands, reply data for the inquiry is contained after the 3rd byte of the packet. In the case of commands or inquiries that do not use sockets, the socket number will contain 0.
Lens Controller uses 1,2 for the socket number of ACK and Completion (Commands) at the so-called setting command.

Reply Packet

ACK	Y0 4Z FF
Completion (Commands)	Y0 5Z FF
Completion (Inquiries)	Y0 5Z ... FF
Y = 9: Address of Lens Controller + 8	
Z = socket number	

● Error message

When a command or inquiry command could not be executed or failed, an error message is returned instead of an ACK message or a Completion message. Lens Controller uses 0 for the socket number in the case of ‘Message length error’, ‘Syntax Error’, because those command can not be executed in any unit condition. Lens Controller uses 0 for the socket number in the case of ‘Command buffer full’, because all sockets are in use.

Error Packet

Message length error	Y0 6Z 01 FF
Syntax Error	Y0 6Z 02 FF
Command buffer full	Y0 6Z 03 FF
Command canceled	Y0 6Z 04 FF
No socket (to be canceled)	Y0 6Z 05 FF
Command not executable	Y0 6Z 41 FF
Y = 9: Address of Lens Controller + 8	
Z = socket number	

4.2.6. Socket number

The following three types of communication processing below were implemented in the devices that support VISCA protocol, as well as general communication devices.

- 1) Communication requesting inquiring about configuration or operation status
- 2) Communication requesting to set configuration or operation for processing other than queries
- 3) Abnormal response communication when the above(1), 2)) request cannot be executed normally.

When dealing with the VISCA protocol, implementers should understand the concept of sockets.

A socket is like a job memory or process. The socket number as well as the request command code is used to identify 1) or 2). The rules for which value the response packet uses are defined and should be noted when implementing the target. If not implemented correctly, the controller will not be able to correctly know the command processing status of the target, which may create a situation as if the system were stopped to recover from abnormal processing.

The table below shows the packet combinations for each of the command and response messages in the three types of communication shown above.

	Controller sending Command Message	Target responding reply message
1) Communication requesting to inquire configuration or operation status	81 09FF	Completion:90 50FF (z:0)
2) Communication requesting to set configuration or operation for processing other than queries	81 01FF	ACK:90 4Z FF ,And then Completion:90 5Z FF (z:1,2)
3) Abnormal response communication when the above(1), 2)) request cannot be executed normally	The same packet as 1) and 2)	Error Message: 90 6Z pq FF (Z:0,1,2)

Z: socket number

In the case of 1), use zero; in the case of 2), use non-zero.

In the case of 3), it is complicated and depends on whether the original communication

falls into 1) or 2), or if the anomaly occurs before 1) or 2) is identified in the first place. The maximum socket number for Lens Controller is 2. This means that two processing of 2) communication can be executed at the same time.

At the same time, it is important to note that although the internal operation is aware of parallel operation, in terms of communication, one communication is basically independent and the controller does not execute other communications concurrently. After the controller sends a command message, the controller will not initiate a new communication unless the target responds with the required response message. The table below shows the paired combinations for each communication.

	Controller sending Command Message	Target responding reply message
1) Communication requesting to inquire configuration or operation status	81 09FF	Completion:90 50FF (z:0)
2) Communication requesting to set configuration or operation for processing other than queries	81 01FF	ACK:90 4Z FF (z:1,2)
3) Abnormal response communication when the above(1, 2)) request cannot be executed normally	The same packet as 1) and 2)	Error Message: 90 6Z pq FF (Z:0,1,2)

Z: socket number

The communication of 2) shows that there is no Completion.

The controller communicates continuously with this combination without waiting for Completion and can also use two sockets for advanced operations.

To be more specific.

When the controller sends a command message, the controller waits for a message from the target.

The target indicates which socket number was used by the socket number presented in the ACK message.

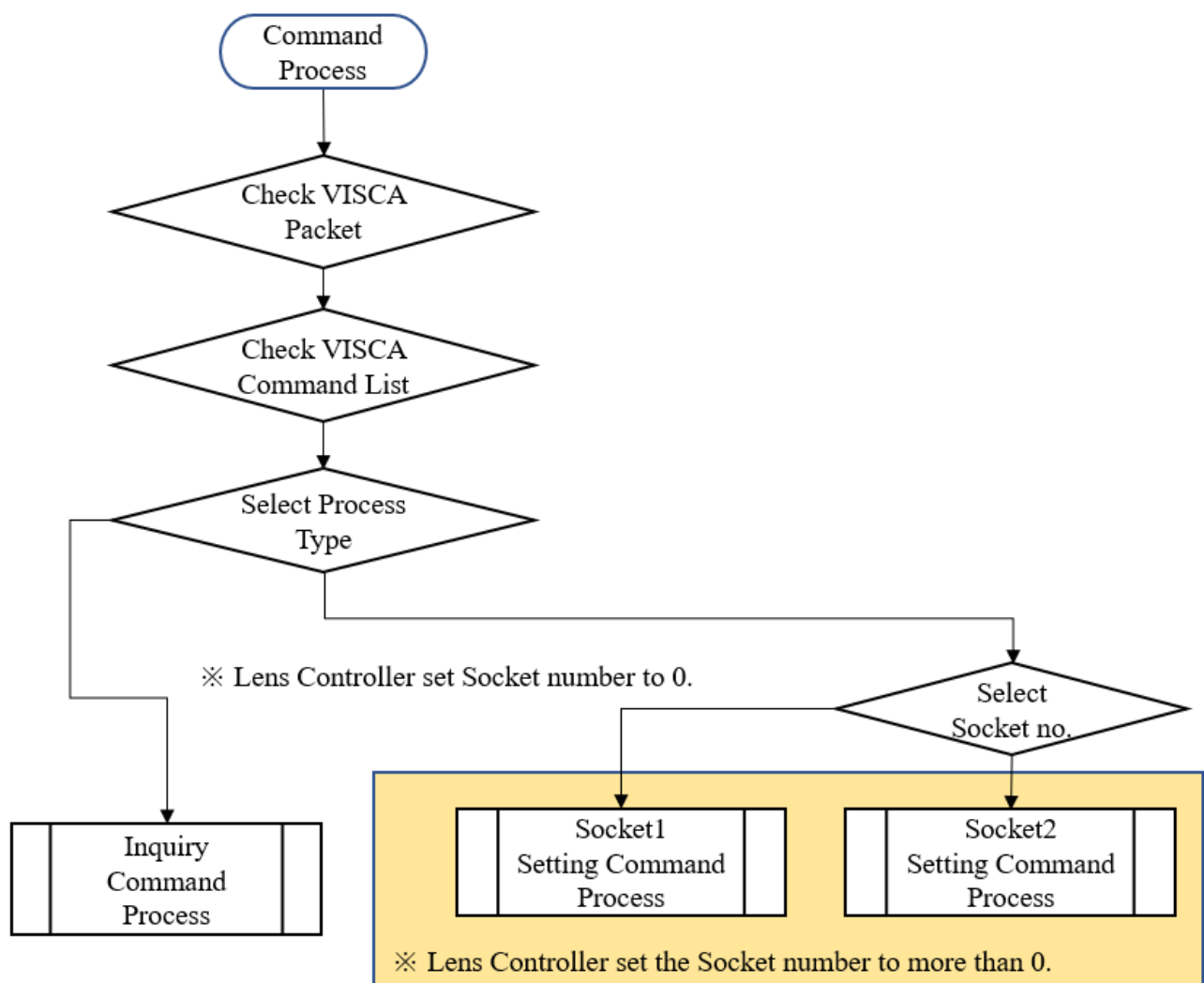
At this point, the controller can initiate a new communication(request). But waiting for a Completion message is necessary because a new request cannot be started if two sockets are running.

It is possible to present the socket number in the Completion message to inform the controller which socket number is being used for the process.

These measures allow the controller to correctly recognize the completion of the command sent.

Even when two command buffers are being used, Lens Controller management command and inquiry messages can be executed.

The usage of socket numbers can be expressed conceptually as shown in the figure below (the order of the actual program implementation is not specified).



Two sockets make the following controls feasible.

If a new command is sent while program control is running on Socket 1, the command will be executed on Socket 2. The command exclusivity condition will cause the program control on Socket 1 to terminate, or the processing on Socket 2 to terminate and the processing on Socket 1 to continue. The above allows the camera to control all

devices without having to know their control policies. Since a network camera is assumed to have at least two sockets for 2) network camera like ILME-FR7 is assumed to have at least two sockets for 2) communication, Lens Controller should also understand and implement this architecture.

4.2.7. Command execution cancel

To cancel a command which has already been sent, send a Cancel command as the next command.

	Cancel Packet
Cancel	8X 2Z FF
X = 1: Address of Lens Controller	
Z = socket number	

Error message “Command Canceled” will be returned for this command, but this is not a fault. It indicates that the command has been cancelled.

Note:See Section 4.4 about reply packet.

4.3. VISCA Device Setting Command

Camera send IF_Clear to Lens Controller before starting control of it.

4.3.1. For VISCA Device Setting Command

- **Address Set**

Sets the address of a peripheral device. Use when initializing the network and receiving the following network change message.

	Packet
Address Set	88 30 01 FF

Note:See Section 4.4 about reply packet.

- **Network Change**

Sent from the peripheral device to the controller when a device is removed from or added to the network. The address must be reset when this message is received.

	Packet
Network Change	Y0 38 FF
Y = 9: Address of Lens Controller + 8	

Note: See Section 4.4 about reply packet.

● IF_Clear

Clears the command buffer(socket) in Lens Controller. When cleared, the operation currently being executed is not guaranteed.

	Command Packet	Reply Packet
IF_Clear	8X 01 00 01 FF	Y0 50 FF
IF_Clear (broadcast)	88 01 00 01 FF	88 01 00 01 FF
X = 1: Address of Lens Controller		
Y = 9: Address of Lens Controller + 8		

Note: See Section 4.4 about reply packet.

Expected behavior:

- If the motor is rotating by STANDARD SPEED ZOOM, VARIABLE SPEED ZOOM, HIGH RESOLUTION SPEED ZOOM command, when the command is received, the hardware setting had been completed already, Completion (Commands) had been responded, and the process had been finished. Therefore, these commands should not stop rotating.
- If the motor is rotating by DIRECT, DIRECT(HIGH RESOLUTION SPEED), DIRECT(MOVE TIME), OPTION UNIT INITIALIZE command, Lens Controller continues the process of accomplishing the motion goal of each command, IF_Clear commad should cancel the process and stop the motor.

4.3.2. For VISCA Interface and inquiry

	Inquiry Packet	Reply Packet
CAM_VersionInq	8X 09 00 02 FF	Y0 50 GG GG HH HH JJ JJ KK FF

Parameter Description

Item Name	Description
GGGG=Vendor ID	Your Manufacturer Name (defined by Sony)
HHHH=Model ID	Your Model Name
JJJJ=ROM Version	Your version
KK=Maximum socket	#02h

X = 1: Address of Lens Controller (For Inquiry packet)

Y = 9: Address of Lens Controller +8 (For reply packet)

4.4. VISCA Command/ACK Protocol

Command	Command Message	Reply Message	Comments
General Command	81 01 04 38 02 FF (Example)	90 4z FF(ACK), 90 5z FF (Completion). (z : Socket No.)	Returns ACK when a command has been accepted, or Completion when a command has been executed.
	81 01 04 38 FF (Example)	90 60 02 FF (Syntax Error)	Accepted a command which is not supported or a command lacking parameters.
	81 01 04 38 02 FF (Example)	90 60 03 FF (Command Buffer Full)	Could not accept the command as there are two commands currently being executed.
	81 01 04 08 02 FF (Example)	90 6z 41 FF (Command Not Executable) (z : Socket No.)	Could not execute the command in the current mode.
Inquiry Command	81 09 04 38 FF (Example)	90 50 02 FF (Completion)	Does not return ACK for the Inquiry Command.
	81 09 05 38 FF (Example)	90 60 02 FF (Syntax Error)	Accepted an incompatible command.
Address Set	88 30 01 FF	88 30 02 FF	Always broadcasted. The device address number plus 1 is returned.
IF_Clear (Broadcast)	88 01 00 01 FF	88 01 00 01 FF	The same command is returned.
IF_Clear (For x)	8x 01 00 01 FF	y0 50 FF (Completion)	ACK is not returned for this command.
Command Cancel	8x 2z FF	y0 6z 04 FF (Command Canceled) (z : Socket No.)	Returned when the command of the specified socket is cancelled. Completion for the command cancelled is not returned.
		y0 6z 05 FF (No Socket) (z : Socket No.)	Returned when the command of the specified socket has already been completed or when the specified socket number is wrong.

4.5. VISCA Lens Controller – Issued Messages

ACK/Completion Messages

Command	Command Message	Comments
ACK	y0 4z FF (z: Socket No.)	Returned when the command is accepted.
Completion	y0 5z FF (z: Socket No.)	Returned when the command has been executed.

y = Device address + 8

Error Messages

Command	Command Message	Comments
Syntax Error	y0 60 02 FF	Returned when the command format is different or when a command with illegal command parameters is received.
Command Buffer Full	y0 60 03 FF	Could not accept a command that is received while two commands are currently being executed (two sockets have been used).
Command Canceled	y0 6z 04 FF (z: Socket No.)	Returned when a command which is being executed in a socket specified by the cancel command is cancelled. The completion message for the command is not returned.
No Socket	y0 6z 05 FF (z: Socket No.)	Returned when no command is executed in a socket specified by the cancel command, or when an invalid socket number is specified.
Command Not Executable	y0 6z 41 FF (z: Socket No.)	Returned when a command cannot be executed due to current conditions. For example, when HIGH RESOLUTUION SPEED ZOOM command is received while a so-called DIRECT command is running.

y = Device address + 8

Network Change Messages

Command	Command Message	Comments
Network Change	y0 38 FF	Lens Controller issued the command to the camera when the process of turning on has got completed.

y = Device address + 8

4.6. VISCA Zoom Commands for Lens Controller

The definition of x, y, and z used in the text are as follows.

x: Fixed to 1 (= Device address)

y: Fixed to 9 (= Device address + 8)

z: socket number

4.6.1. OPTION UNIT INITIALIZE

Type:Command

-	Command Packet	Description
-	8x 01 04 19 01 FF	See below

Description:

Lens Controller needs to recognize the position of the Tele End and Wide End by moving the Zoom ring of the lens. Then it makes a normalization of the position with the resolution of W: 0000h to T: 4000h. Then the Zoom ring position will be moved to the Wide end. Then it waits for the next command at this position.

4.6.2. STANDARD SPEED ZOOM

Type:Command

DIRECTION	Command Packet	Description
TELE	8x 01 04 07 02 FF	Move at standard speed for Tele direction
WIDE	8x 01 04 07 03 FF	Move at standard speed for Wide direction

Description:

This command is used to zoom at the standard speed in the Tele or Wide direction with the IR remote controller of the target camera. The Zoom speed used by this command equals to the "3" step of the VARIABLE SPEED ZOOM command described as following.

4.6.3. VARIABLE SPEED ZOOM

Type:Command

DIRECTION	Command Packet	Description
TELE	8x 01 04 07 2p FF	Move at specified speed for Tele direction
WIDE	8x 01 04 07 3p FF	Move at spesicied speed for Wide direction

Parameter Description:

p: speed 0(Minimum) to 7(Maximum)

Description:

Zooms in the Tele or Wide direction at the speed specified by p.

4.6.4. ZOOM STOP

Type:Command

DIRECTION	Command Packet	Description
STOP	8x 01 04 07 00 FF	Stop Zoom Operation

Description:

Stop Zoom operation by STABDARD SPEED ZOOM or VARIABLE SPEED ZOOM.

4.6.5. HIGH RESOLUTION SPEED ZOOM

Type:Command

DIRECTION	Command Packet	Description
TELE	8x 01 7E 04 17 02 0p 0p 0p 0p FF	Move at specified speed for Tele direction
WIDE	8x 01 7E 04 17 03 0p 0p 0p 0p FF	Move at spesicied speed for Wide direction

Parameter Description:

pppp: speed 0000h(Minimum) to 7FFEh(Maximum)

Description

Move in the Tele or Wide direction at the speed specified by pppp.

4.6.6. HIGH RESOLUTION SPEED ZOOM STOP

Type:Command

DIRECTION	Command Packet	Description
STOP	8x 01 7E 04 17 00 00 00 00 00 FF	Stop Zoom Operation

Description:

Stop the Zoom operation that works with HIGH RESOLUTION SPEED Zoom

4.6.7. DIRECT

Type:Command

DIRECTION	Command Packet	Description
-	8x 01 04 47 0z 0z 0z 0z FF	Move to specified position at maximum speed.

Parameter Description:

zzzz: position 0000h(Wide) to 4000h(Tele)

Shows the position of the Zoom ring.

Specified in the range of W: 0000h to T: 4000h (the position of the Zoom ring recognized by the OPTION UNIT INITIALIZE command).

Description:

The device moves the Zoom ring to the position specified by zzzz at the maximum speed of Lens Controller.

4.6.8. DIRECT (HIGH RESOLUTION SPEED)

Type:Command

DIRECTION	Command Packet	Description
-	8x 01 7E 04 48 0p 0p 0p 0p 0z 0z 0z 0z FF	Move to specified position at specified speed.

Parameter Description:

pppp: speed 0000h(Minimum) to 7FFEh(Maximum)

zzzz: position 0000h(Wide) to 4000h(Tele)

Shows the position of the Zoom ring. Specified in the range of W: 0000h to T: 4000h (the position of the Zoom ring recognized by the Option Unit Initialize command).

Description:

Moves the Zoom ring to the position specified by zzzz at the speed specified by pppp of Lens Controller.

4.6.9. DIRECT (MOVE TIME)

Type:Command

DIRECTION	Command Packet	Description
-	8x 01 7E 04 49 0p 0p 0p 0p 0p 0p 0z 0z 0z 0z FF	Move to specified position at specified time(unit: 10msec).

Parameter Description:

pppppp: moving time 000000h(Minimum) to

Specified by a moving time value greater than or equal to 0. Lens Controller is 10msec.

zzzz: position 0000h(Wide) to 4000h(Tele).

Shows the position of the Zoom ring. Specified in the range of W: 0000h to T: 4000h (the position of the Zoom ring recognized by the Option Unit Initialize command).

Description:

Moves the Zoom ring to the position specified by zzzz using the movement time pppppp.

4.6.10. OPERATION MODE

Type:Command

Command Packet	Description
8x 01 7E 04 59 0p FF	set the value of 'OPERATION MODE'

Parameter Description:

p: OPERATION MODE number 0 to 15

Description:

Operation Mode is a command that can define up to 16 types of operations for devices controlled from the OPTION terminal of ILME-FR7. By using this value, for example, it is possible to prepare 16 different actions on the device side for the same setting of the Zoom Speed command sent from ILME-FR7.

Note:

- 1) Implement at least 0.
- 2) Factory default value is 0.
- 3) Make syntax error when specifying an undefined OPERATION MODE number
- 4) Store the value in non-volatile memory at 'Command'.

Type:Inquiry Command

Command Packet	Reply Packet	Description
8x 09 7E 04 59 FF	y0 50 0p FF	Responds the current value of 'OPERATION MODE'

Description:

Response OPERATION MODE.

4.6.11. OPERATION REVERSE MODE

Type:Command

Command Packet	Description
8x 01 7E 04 5A 0p FF	set the value of 'OPERATION REVERSE MODE'

Parameter Description:

- p: 2=On(Reverse for direction parameter),
3=Off(Rotate in the original direction)

Description:

For Lens Controller, depending on the interchangeable lens, the Tele/Wide operation and the rotation direction of the Zoom ring may be reversed. In that case, you can use this command to reverse the rotation of the motor.

Note:

- 1) Factory default value is 3.
- 2) Store the value in non-volatile memory at 'Command'.

Type:Inquiry Command

Command Packet	Reply Packet	Description
8x 09 7E 04 5A FF	y0 50 0p FF	Responds the current value of ' OPERATION REVERSE MODE '

Description

Response OPERATION REVERSE MODE.

4.6.12. OPTION UNIT INDICATION MODE

Type:Command

Command Packet	Description
8x 01 7E 04 51 0p FF	set the value of 'OPTION UNIT INDICATION MODE'

Parameter Description:

- p: 2=On(lightning enable),
3=Off(no lightning)

Description:

It enables or disables the lighting of the LED on Lens Controller to notify its operating status.

When Lens Controller receives this command, it should change the status of the LED at its appropriate timing.

When lightning enables status, Lens Controller can control to turn on or turn off the light accordingly.

When no lightning status , the LED should be off regardless of the state of Lens Controller.

Note:

- 1) The value of turning on is 2.
- 2) Store the value in non-volatile memory at 'Command'.

Type:Inquiry Command

Command Packet	Reply Packet	Description
8x 09 7E 04 51 FF	y0 50 0p FF	Responds the current value of ' OPTION UNIT INDICATION MODE '

Description:

Response OPTION UNIT INDICATION MODE.

About the behavior when the power is turned on with the setting value turned off:

The purpose of this command is to turn off the LED of Lens Controller during shooting. There is no problem if the LED lights up or flashes immediately after the power is turned on. The same is true during firmware upgrades. Therefore, it must be turned off by some trigger. If it is used as a Zoom Unit, it is assumed that it will turn off after the execution of the OPTION UNIT INITIALIZE command is completed, for example. There are various use cases, so Sony looks forward to considering management policies.

4.6.13. ZOOM POSITION

Type: Inquiry Command

Command Packet	Reply Packet	Description
8x 09 04 47 FF	y0 50 0z 0z 0z 0z FF	Responds current ZOOM POSITION

Note: About the value returned by the Zoom Position Reply packet in the event of an error.

- 1) If the initialization process fails, fix it to 0000h.
- 2) If the initialization process succeeds and then an abnormal state occurs, the value should be updated by the ability of Lens Controller.

Parameter Description:

zzzz: position 0000h(Wide) to 4000h(Tele).

Shows the position of the Zoom ring. Specified in the range of W: 0000h to T: 4000h (the position of the Zoom ring recognized by the Option Unit Initialize command).

Note: About stability of value.

- Expect the value to remain unchanged when the motor is stopped. Also, expect the value to remain the same after moving to the specified position with the so-called DIRECT command.
- Expect continuous values while the motor is running

Description:

Responds with the position of the Zoom ring managed by Lens Controller.

4.6.14. OPTION UNIT STATUS

Type: Inquiry Command

Command Packet	Reply Packet	Description
8x 09 7E 04 4A FF	y0 50 pq rs tu FF	Responds current state of Lens Controller. p: Anomaly monitoring value q: Initialization status(for Option Unit Initialize) r: 0h fixed s: Zoom command execution status t:0h fixed u: Abnormal substate note:see below about p,q,s,u

Parameter Description:

p: Anomaly monitoring value(make from 'u' (Abnormal sub state))				
bit				Description
7	6	5	4	
0	0	0	0	Normal state(and at turning on,'u'(Abnormal sub state) value is 0)
0	0	0	1	Abnormal state occurrence(initializing processing is out of scope, when the value of 'u'(Abnormal substate) is not 0)

q: Initialization status(for 'Option Unit Initialize' command)				
bit				Description
3	2	1	0	
0	0	0	0	uninitialized
0	0	0	1	Fail to initialize, canceled
0	0	1	0	Initializing
0	0	1	1	Initialized correctly

s: Zoom motor move status				
bit				Description
3	2	1	0	
0	0	0	0	Motor stops
0	0	0	1	Motor is moving (including Retrying if in abnormal condition)

Operatiopn Example)

No	Situation	Zoom command move status(bit 0)
1)	After starting up, the confition that Lens Controller has not accepted an executable setting command	0h
2)	While executing the process of 'OPTION UNIT INITIALIZE', or 'DIRECT', or 'DIRECT(HIGH RESOLUTION SPEED)', or 'DIRECT(MOVE Time)'.	1h
3)	Lens Controller notices the failure of the process of 'OPTION UNIT INITIALIZE', or 'DIRECT', or 'DIRECT(HIGH RESOLUTION SPEED)', or 'DIRECT(MOVE Time)'. And when Lens Controller terminates the process. Include condition of 7).	0h
4)	While executing the process of 'OPTION UNIT INITIALIZE', or 'DIRECT', or 'DIRECT(HIGH RESOLUTION SPEED)', 'DIRECT(MOVE Time) ', the camera sends Cancel, or IF_Clear, or IF_Clear(Broadcast). And when Lens Controller terminates the process.	0h
5)	Lens Controller accepts 'STADARD ZOOM', or 'VARIAVLE SPEED ZOOM', or 'HIRESOLUTION SPEED ZOOM', and when executing the process of so-called ZOOM, the motor ia moving toward Tele End, Wide End	1h
6)	If Lens Controller continue the state of 5), the zoom ring will reach the Tele end or the Wide end. And when Lens Controller stops the motor.	0h
7)	Retrying: When Lens Controller detects some abnormalities, Lens Controller try to achieve the desired operation by retries. During the entire retry period is the period until Lens Controller gives up. Maybe Lens Controller may take a moment to rest before Lens Controller starts to try again, at that moment, the status also should be 'Moving'.	1h
8)	When Lens Controller finish the entire retry period. (Lens Controller finished the process of 7)	0h

u: Abnormal sub state					
bit				Description	The value which Set in bit 1 of 'p' as Anomaly monitoring value
3	2	1	0		
0	0	0	0	No Error	0h
0	0	0	1	System Error	1h
0	0	1	0	Rotation Error(initializing processing is out of scope)	

Description:

Responds to the operation status, initialization status, and error status of Lens Controller.

4.6.15. OPTION UNIT ERROR CODE**Type: Inquiry Command**

Command Packet	Reply Packet	Description
8x 09 7E 04 4C FF	90 50 0p 0p 0p 0p FF	Responds the current value of 'OPTION UNIT ERROR CODE'

Parameter Description:

pppp: Error Code 0000h to ppph

- 0000h: Normal State(when p value of OPTION UNIT STATUS is 0000h.)
- Other than 0000h: indicating something abnormal (when p value of OPTION UNIT STATUS is not 0h)

Description:

Responds with a 16-bit error code defined by Lens Controller Manufacturer.

Note:

Note the relation to the value of OPTION UNIT STATUS.

This command is for Support and Service, see the chapter 6.

4.6.16. OPTION UNIT ADJUSTMENT

Type:Command

Command Packet	Description
8x 01 7E 04 4D 0p 0p 0p 0p FF	Set the adjustment value used by Lens Controller

Parameter Description:

pppp: Adjustment value 0000h to FFFFh

Description:

It is for setting the adjustment value used by Lens Controller itself. It is up to Lens Controller Manufacturer to determine which specific adjustments to use. All the ranges from 0000h to FFFFh can be used according to the command specification. However, the actual usable range is defined by Lens Controller Manufacturer. It is up to Lens Controller Manufacturer to determine the accuracy of the adjustment values.

Note:

- 1) The minimum value does not have to be 0000h either. Also, the maximum value does not need to be FFFFh.
- 2) Lens Controller should respond with Syntax Error if it is out of the usable range for Lens Controller Manufacturer.
- 3) Factory default value is not specified by Sony. Please set it according to the convenience of Lens Controller Manufacturer.
- 4) Store the value in non-volatile memory at 'Command'.

Type:Inquiry Command

Command Packet	Reply Packet	Description
8x 09 7E 04 4D FF	y0 50 0p 0p 0p 0p FF	Responds the current value of 'OPTION UNIT ADJUSTMENT'

Description:

Response OPTION UNIT ADJUSTMENT.

4.7. Command exclusive relationship of Zoom Category

		—	Option Unit Initialize	Move	Move (High Resolution Speed)	DIRECT	DIRECT (High Resolution Speed)	DIRECT (Move Time)
ZOOM	Option Unit Initialize	Yes	No	No	No	No	No	No
	Move	Yes	No	Yes	Yes	No	No	No
	Move (High Resolution Speed)	Yes	No	Yes	Yes	No	No	No
	DIRECT	Yes	No	Yes※	Yes※	Yes※	Yes※	No
	DIRECT (High Resolution Speed)	Yes	No	Yes※	Yes※	Yes※	Yes※	No
	DIRECT (Move Time)	Yes	No	Yes※	Yes※	No	No	No
	Operation Mode	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Operation Reverse Mode	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note:

- Yes(Overtake operation): executable. If moving in the same direction, keep moving without stopping.
(※:Execute after automatic stop once)
- No(Exclusive operation): returns error message as ‘Command not executable’

5. Application note

The descriptions from this chapter onwards are based on the operation of ILME-FR7 Ver2.00. We do not guarantee that the description will remain the same in the future.

5.1. Basic Rules

- The initialization of Lens Controller should be triggered by the camera.
(Not executed autonomously in Lens Controller)
- The Camera will manage Enable/Disable setting of Lens Controller.
Camera will communicate with Lens Controller only when this setting is Enabled.
- The Lens Controller stores those values that Sony specify in non-volatile memory, recalls the stored values when power is turned off/on.
The target settings are as follows
 - OPERATION MODE
 - OPERATION REVERSE MODE
 - OPTION UNIT INDICATION MODE

5.2. Connection / Initialize

- The Camera will send inquiry of the following items at each polling interval:
 - Status of Lens Controller (OPTION UNIT STATUS) to know the connection / initialized or not / error of Lens Controller.
 - Current zoom position (ZOOM POSITION)
- * In condition with Lens Controller setting is enabled.

- The Camera will send an initialize command to Lens Controller when:
 - Connected Lens Controller is uninitialized. (Detected by OPTION UNIT STATUS inquiry)
 - The Camera's user executes initialization of Lens Controller manually.

- Zoom position after initialization should be managed by the camera.
Camera will send absolute position command to move zoom position to expected initial position according to camera's specification.

* We expect that zoom position at initialization completed is wide-end position.

5.3. Basic policy for emergencies

- If the device is incompletely initialized or has an abnormal condition after initialization, the device should immediately indicate the condition in the OPTION UNIT STATUS Reply packet. Even if the ILME-FR7 recognizes the abnormal situation, it will continue to send commands to the device that the ILME-FR7 received without blocking. Also, even under such circumstances, the device is required to respond normally to commands sent from the ILME-FR7. (It is up to the device to determine whether or not to actually execute the command received on the device side.)
- Accept the initialization process from ILME-FR7 even if the device encounters an initialization error or abnormal state after initialization. If the initialization process ends normally, indicate normality in the OPTION UNIT STATUS Reply packet.
- Device status can be obtained with the Option Unit Status command. (Normal, initialization error, or abnormal state after initialization)
- The camera sends the OPTION UNIT ERROR CODE command when it recognizes an error in the response value of OPTION UNIT STATUS.

5.4. Zoom stop before initializing

- ILME-FR7 provides an initialization command to the device from Web App. The Zoom command issues a Zoom command according to the operation of the Zoom slider on the Web App and issues a Zoom Stop command when the zoom slider is released.
Then the user operates initialize on the Web App.
- When operating from the RM-IP500, when the Zoom lever is pushed down, a command with Zoom speed is issued, but when its lever is released, a Zoom Stop command is issued.
Then the user operates initialize on the Web App or on RM-IP500.

6. Support and service

Sony has prepared a command (see OPTION UNIT ERROR CODE in section 4.6.15) that allows you to obtain a 16-bit error code so that Sony or customers can directly contact the Lens Controller Manufacturer.

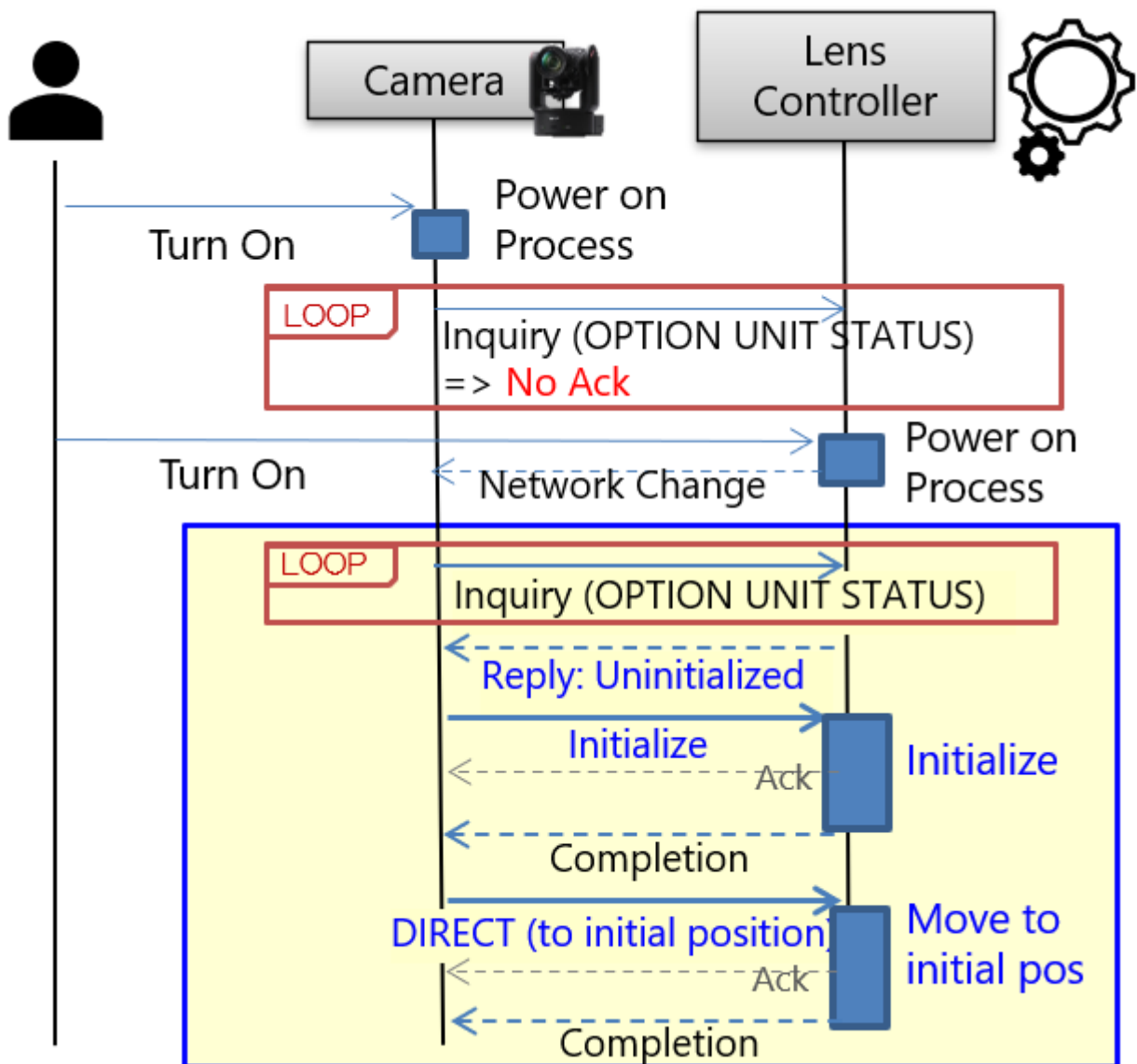
This error code should be defined by the Lens Controller Manufacturer.

7. Command Sequence Example

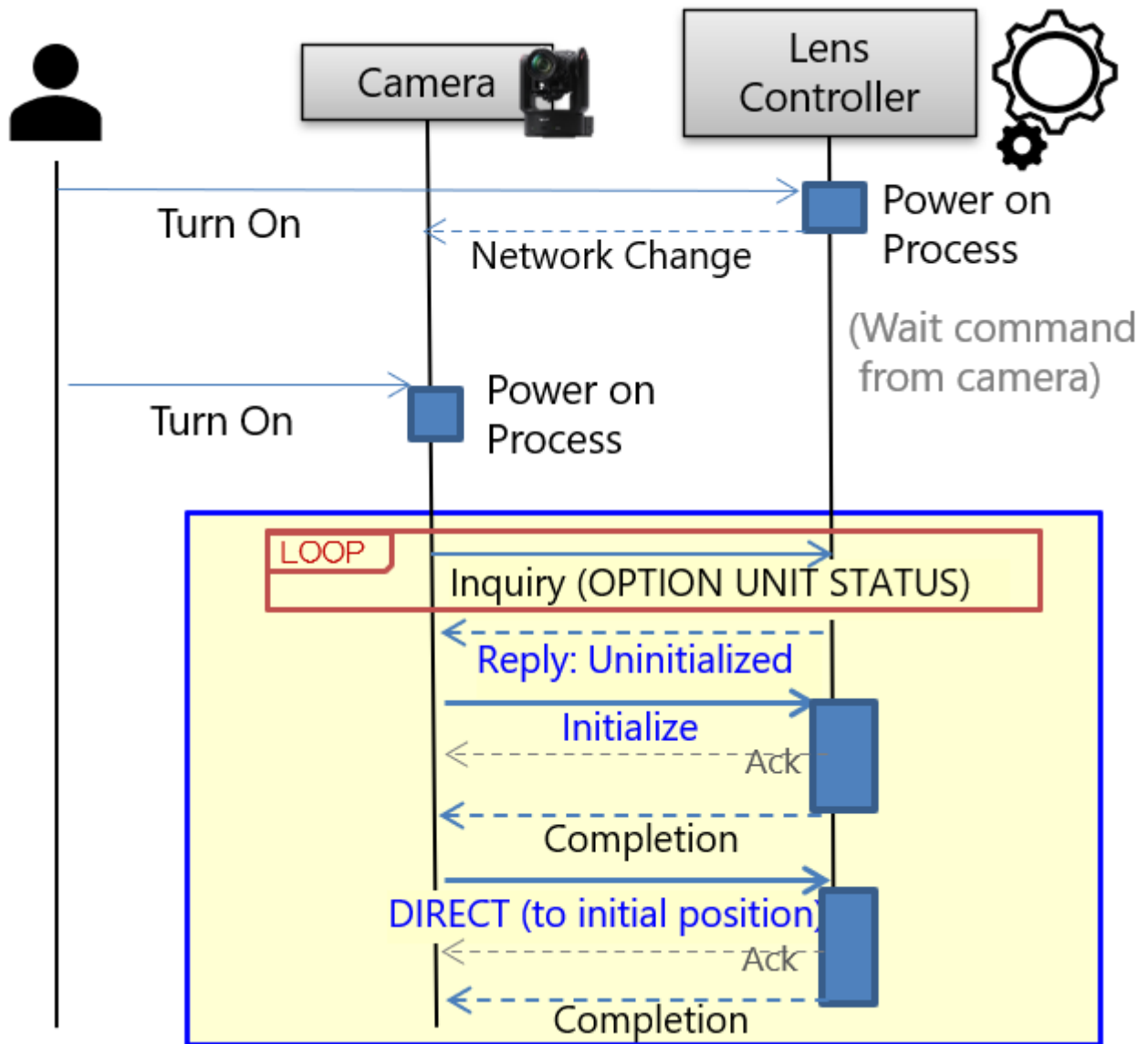
Examples of command sequences to implement typical functions are shown below. For details on individual functions, please refer to the ILME-FR7 Help guide.

7.1. Connection / Initialize sequence

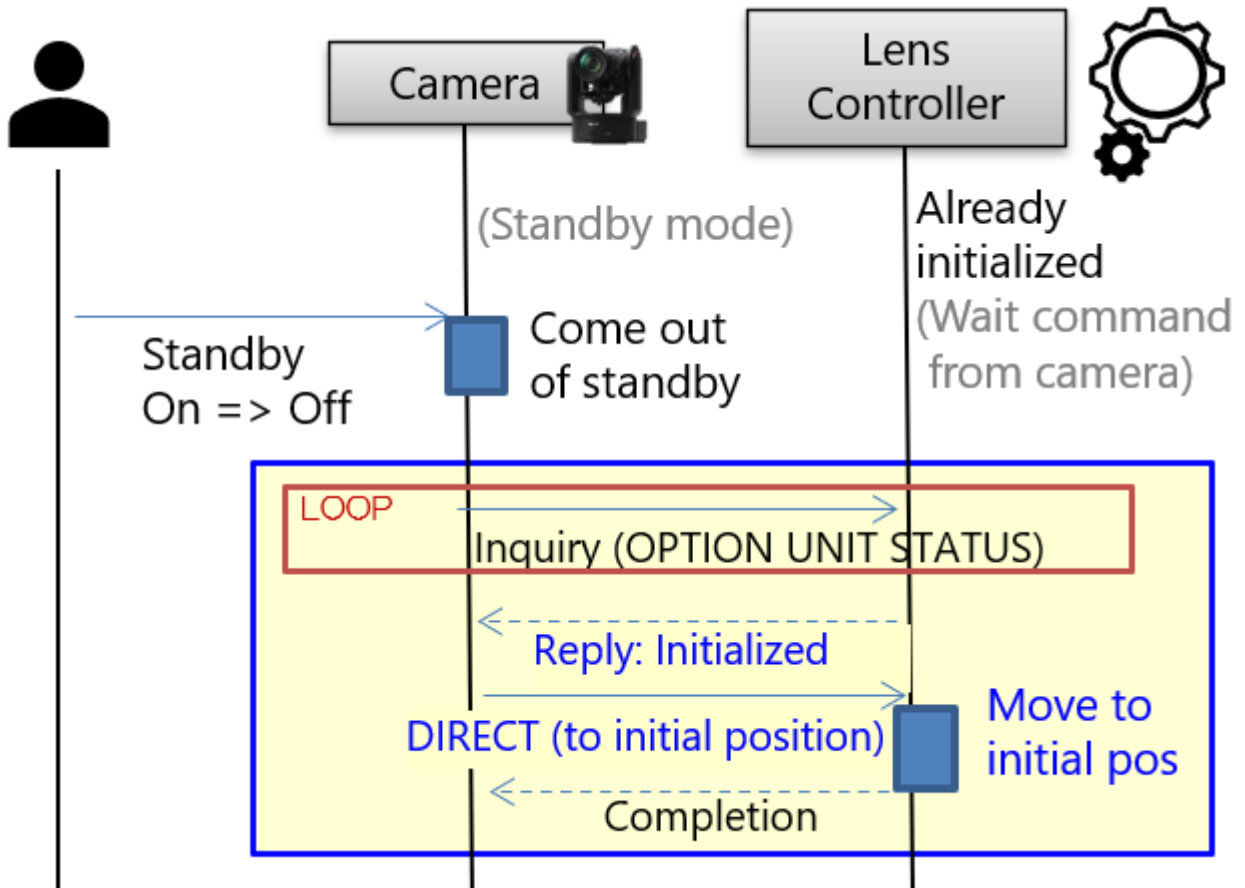
7.1.1. Case 1: Turn On (camera => zoom unit)



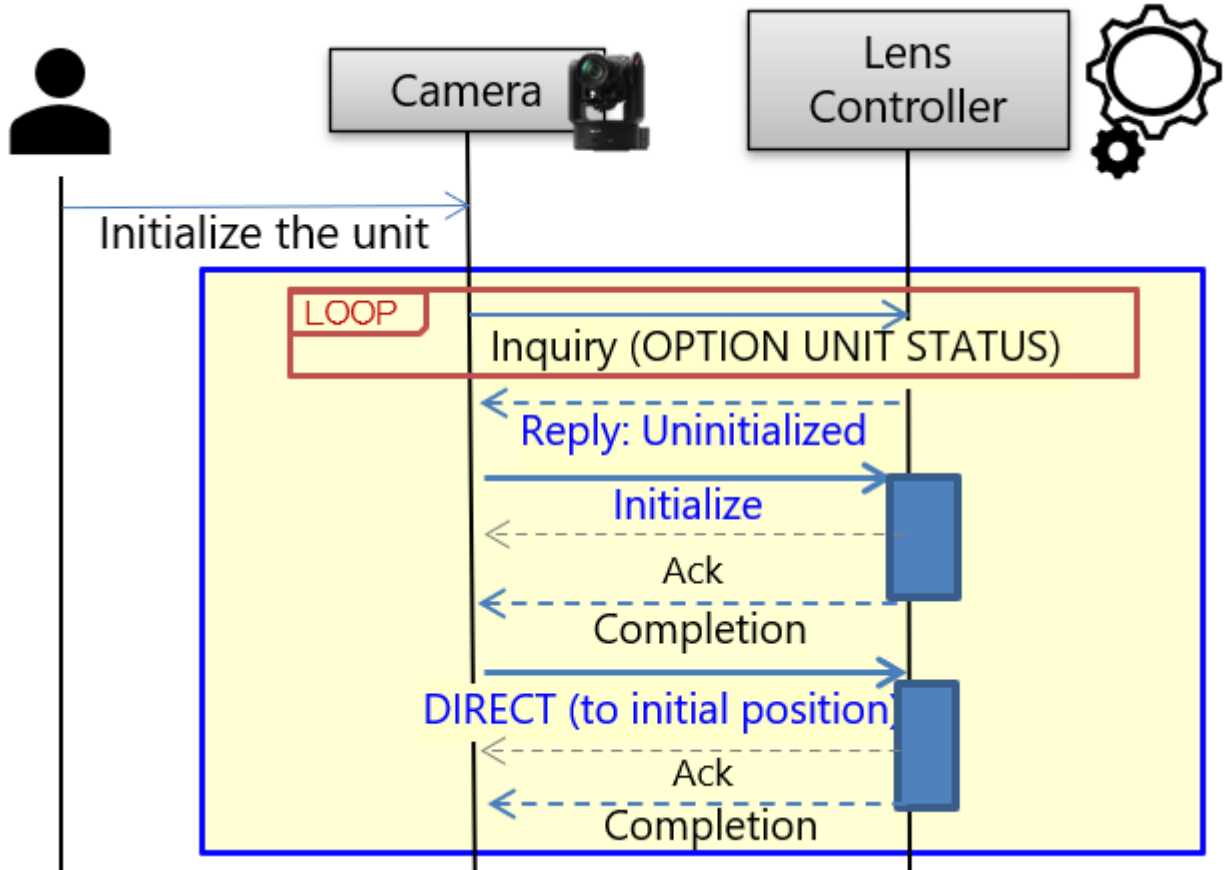
7.1.2. Case2. Turn On (zoom unit => camera)



7.1.3. Case3: Camera Stand-by On => Off



7.1.4. Case4: Execute initialization manually



7.2. Tele/Wide control (with speed)

Tele/Wide operation assumes operation from the web application or RM-IP500; in the case of the web application, the zoom slider is located at the bottom left of the web application.

For RM-IP500, the zoom lever is located at the bottom left of the main unit. The joystick also has a zoom ring on the bottom right. Please refer to the instruction manual for both.

Tele/Wide control (with speed)

◆ Use case
– Adjust the framing using WebApp and RM-IP500

Zoom slider knob in the [T] (Telephoto) direction or [W] (Wide) direction to adjust the zoom.
Control by the amount you move the zoom slider

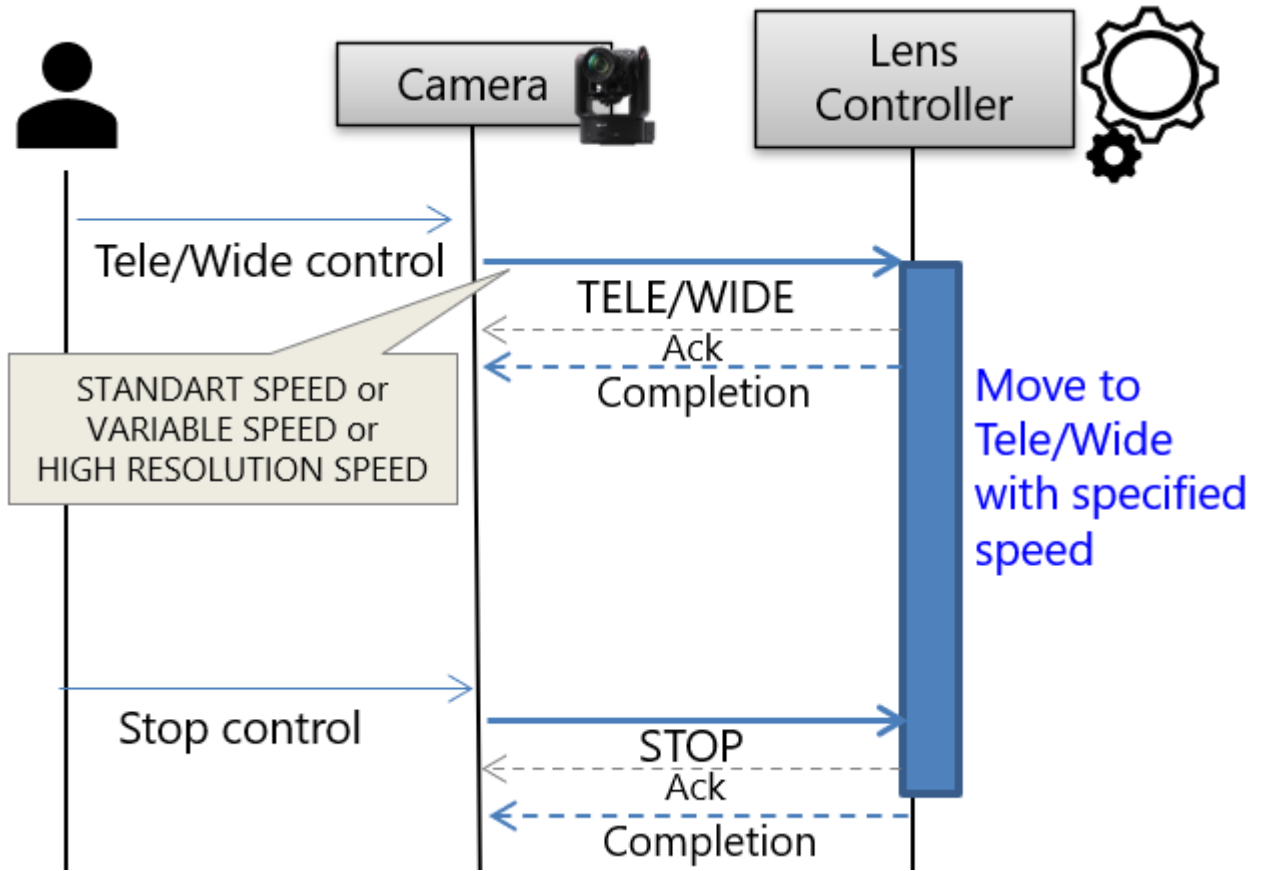


Zoom seesaw in the [T] (Telephoto) direction or [W] (Wide) direction to adjust the zoom.
Control by the amount you press the zoom seesaw



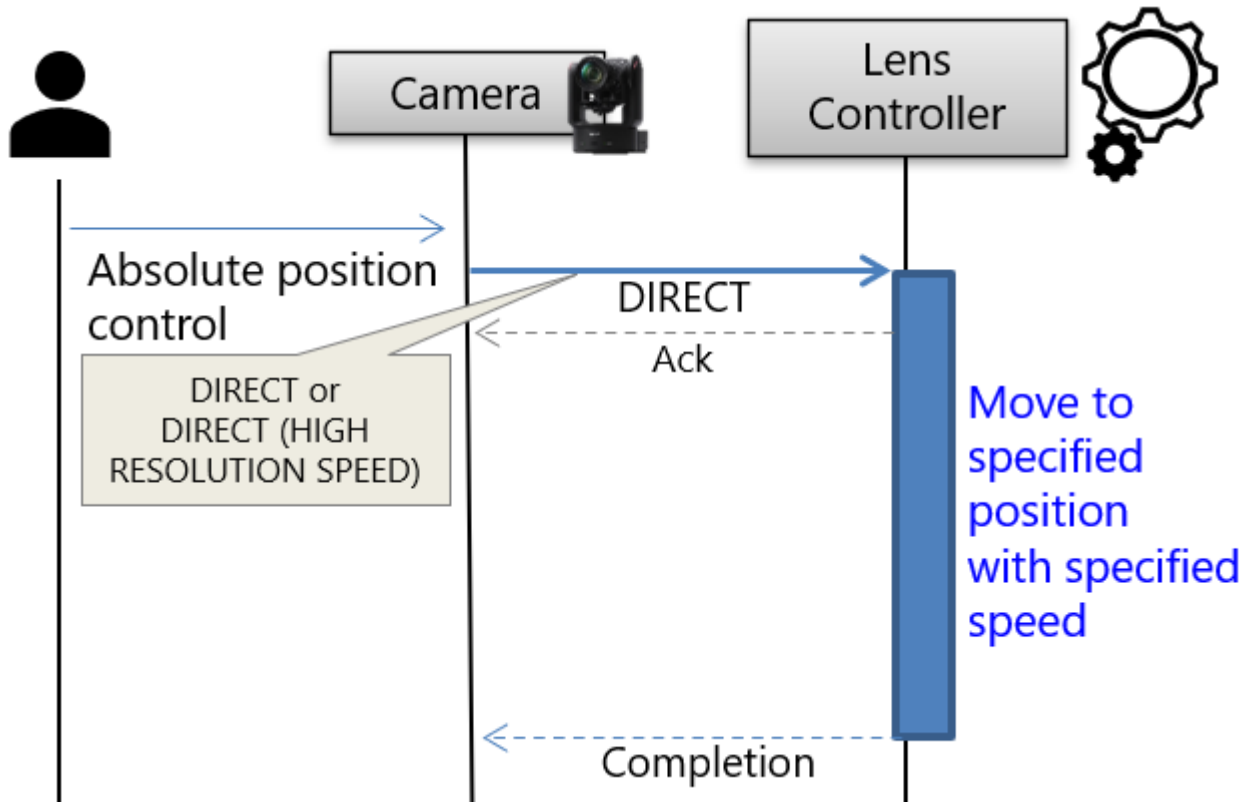
SONY Cinema Line

7.2.1. Tele/Wide control by user



7.3. Absolute position control (with speed)

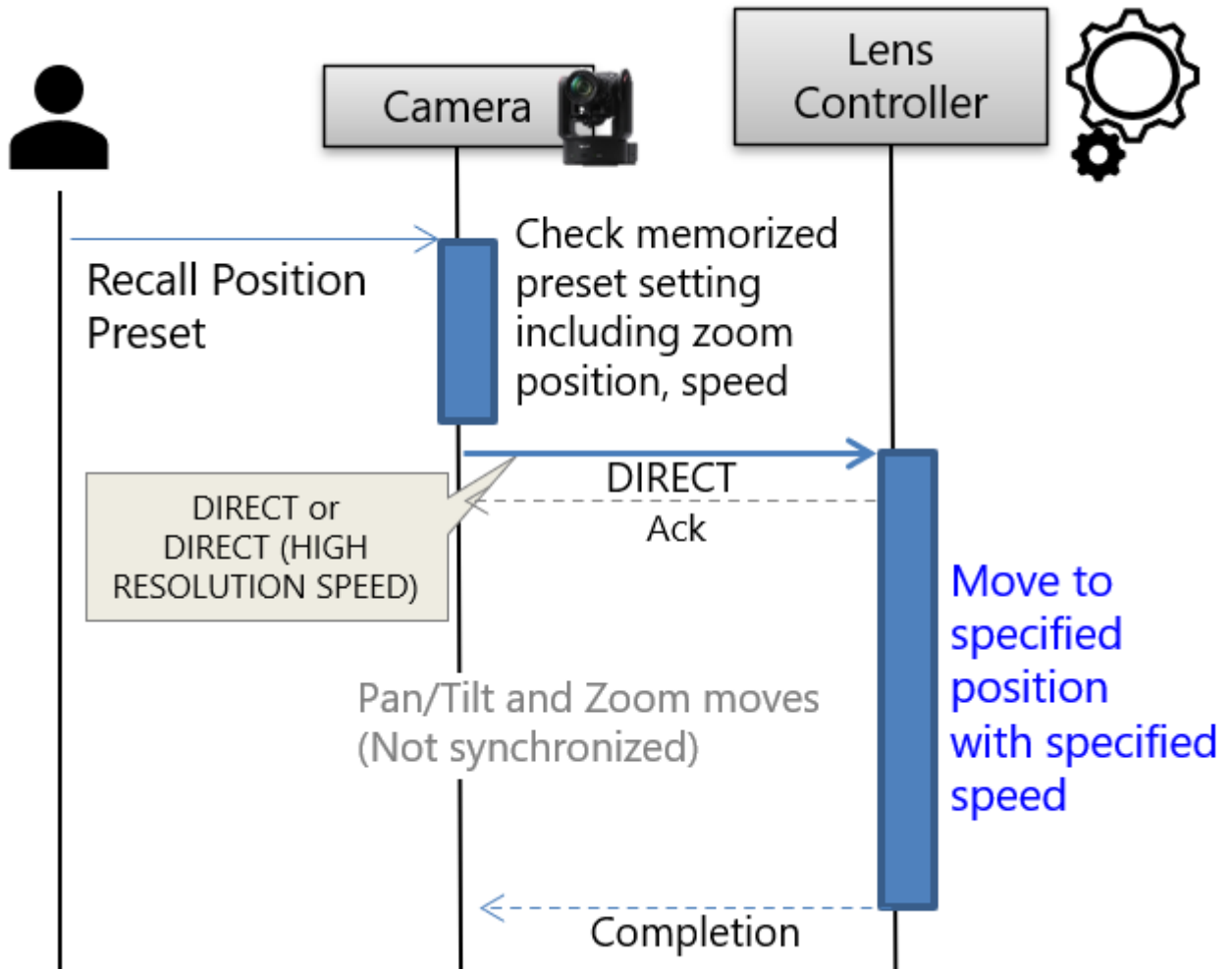
7.3.1. Case1: Absolute position control by user



7.3.2. Case2: Preset Recall(PTZ sync=OFF)

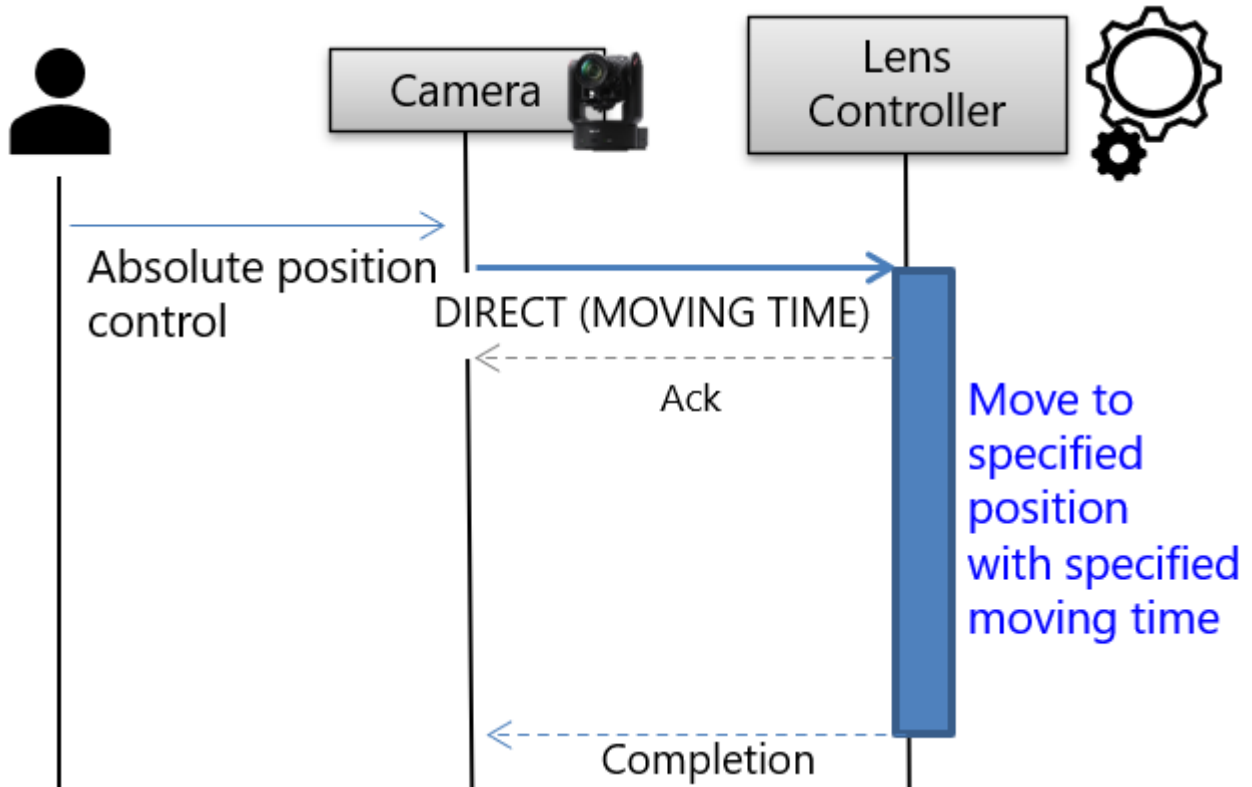
The user operates Preset Recall to move to the preset PTZ position.



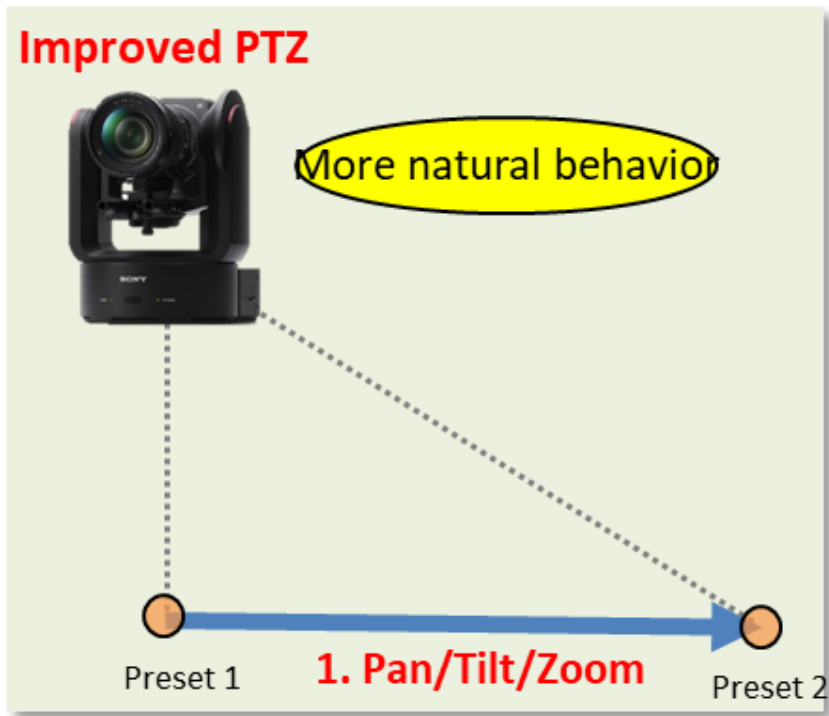


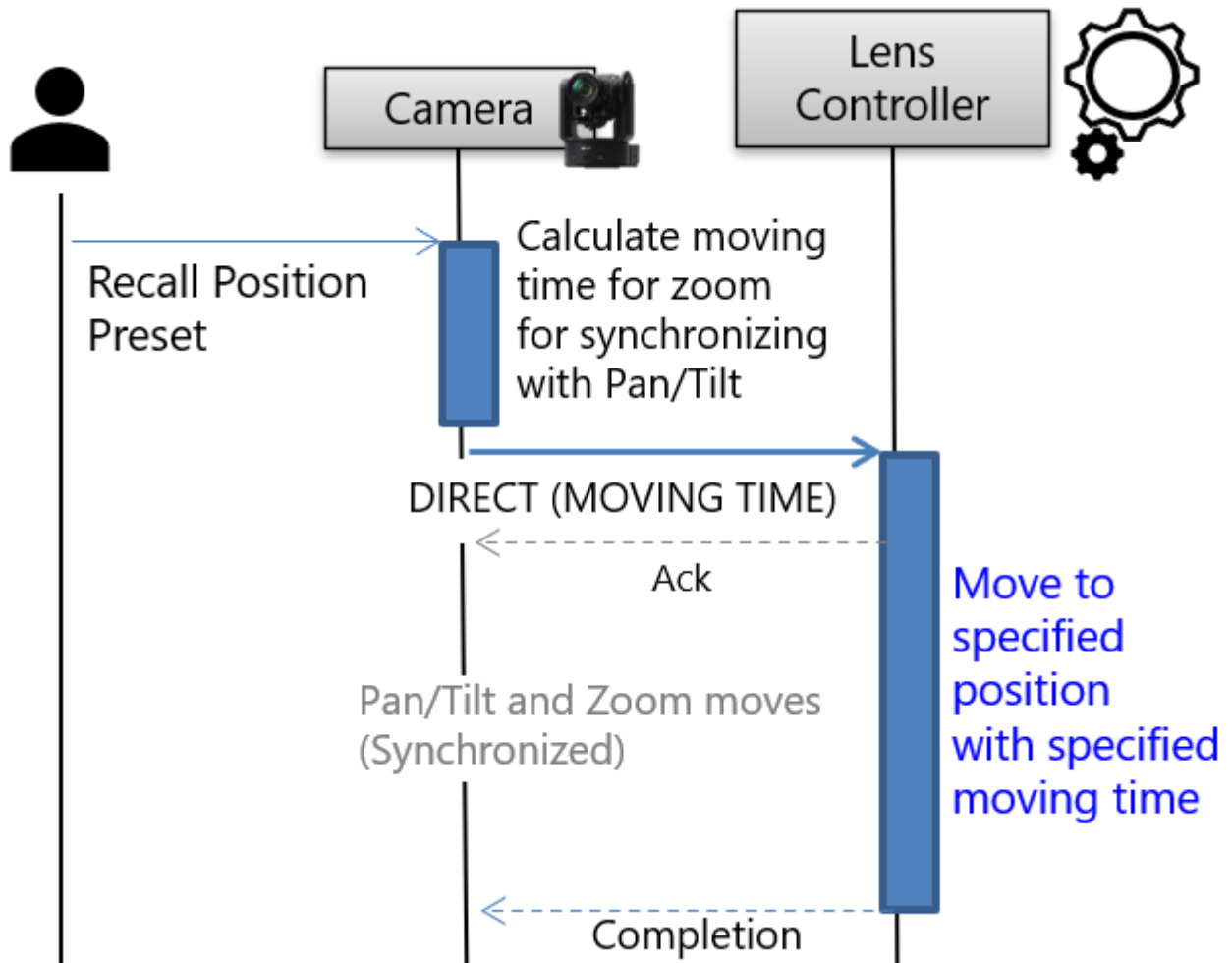
7.4. Absolute position control (with moving time)

7.4.1. Case1: Absolute position control by user

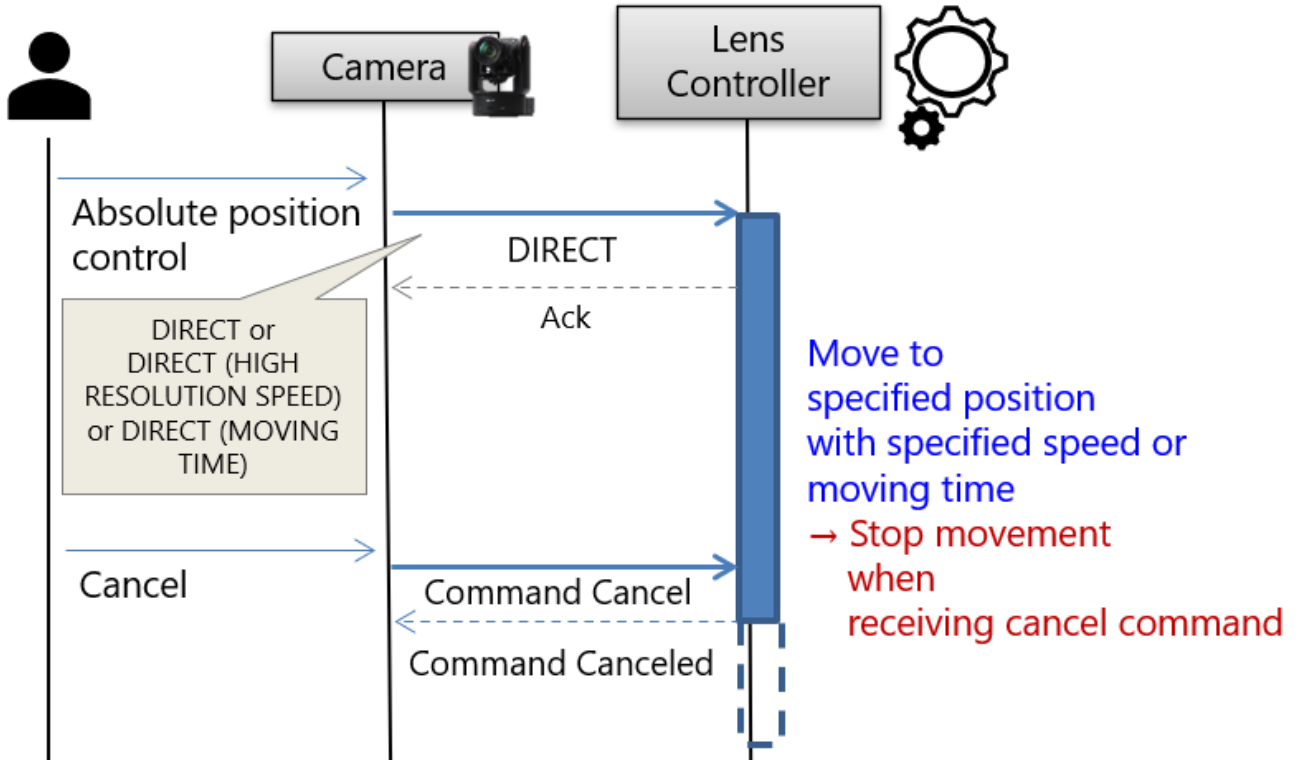


7.4.2. Case2: Recall Preset (PTZ sync=ON)





7.4.3. Case3: Cancel of Absolute position control

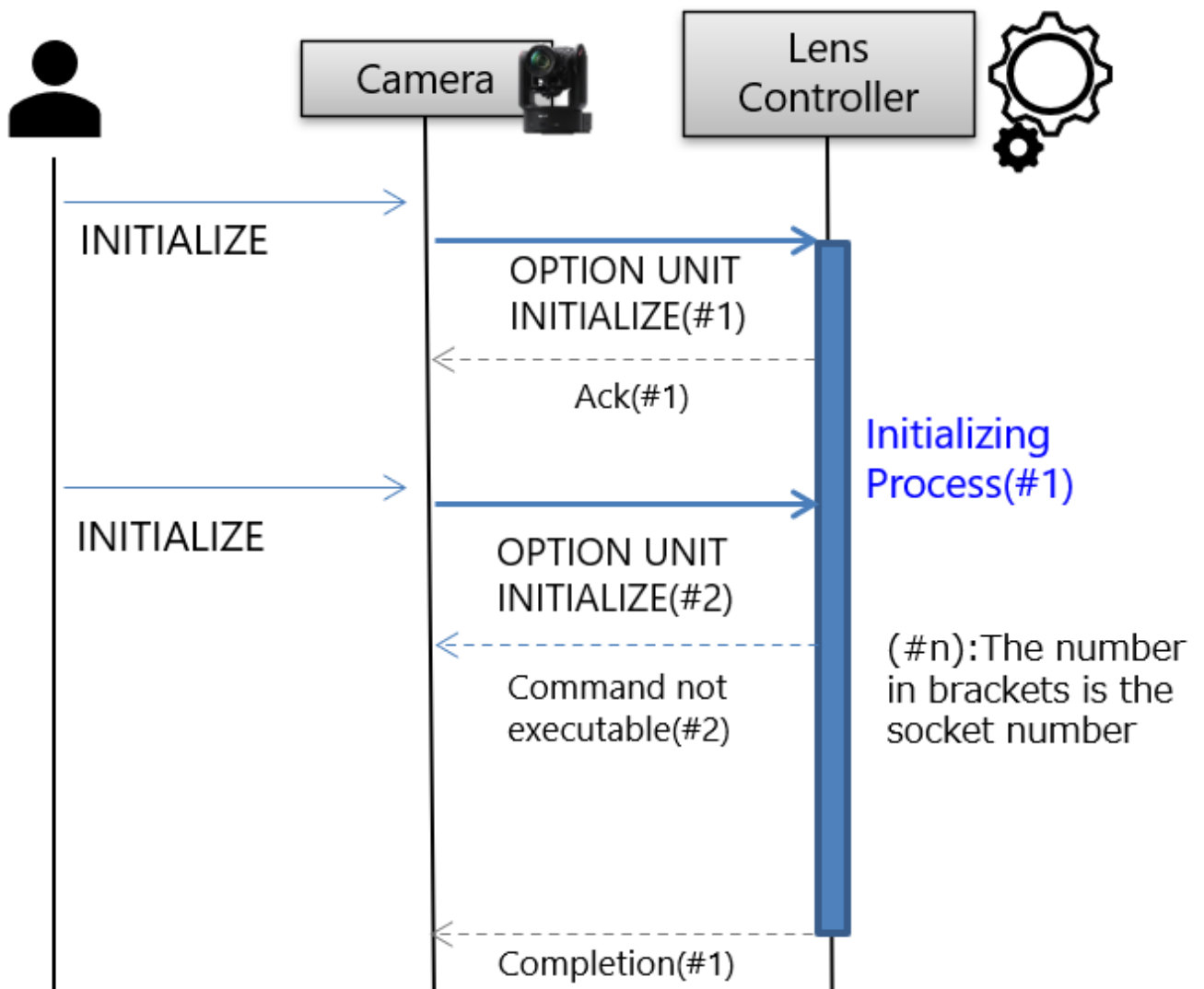


7.5. Command executable relationship Control

Section 4.7 shows ‘Command exclusive relationship table of Zoom category’. Here are some examples of how it works.

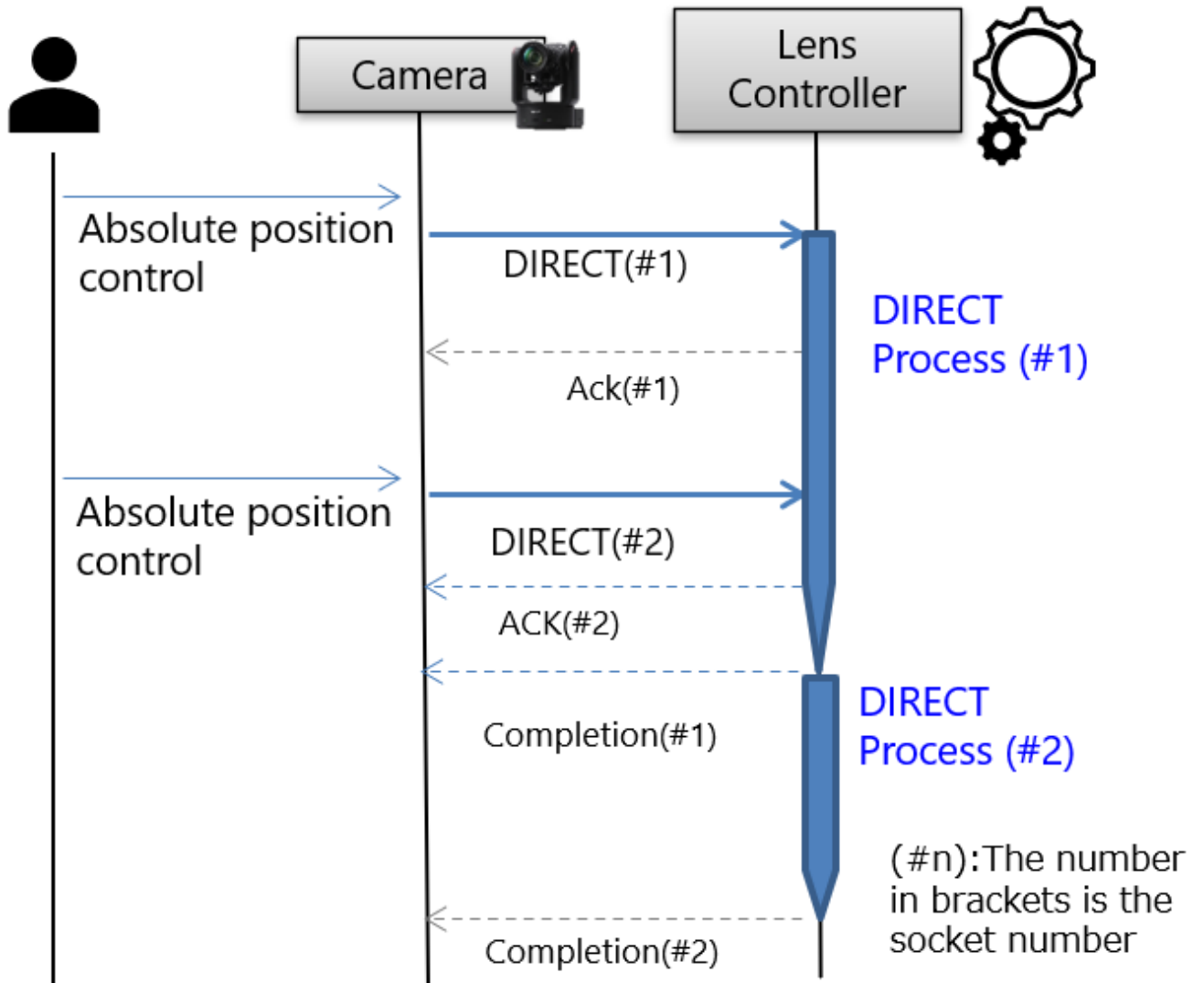
7.5.1. Exclusive operation : Case ‘No’

7.5.1.1. OPTION UNIT INITIALIZE to OPTION UNIT INITIALIZE

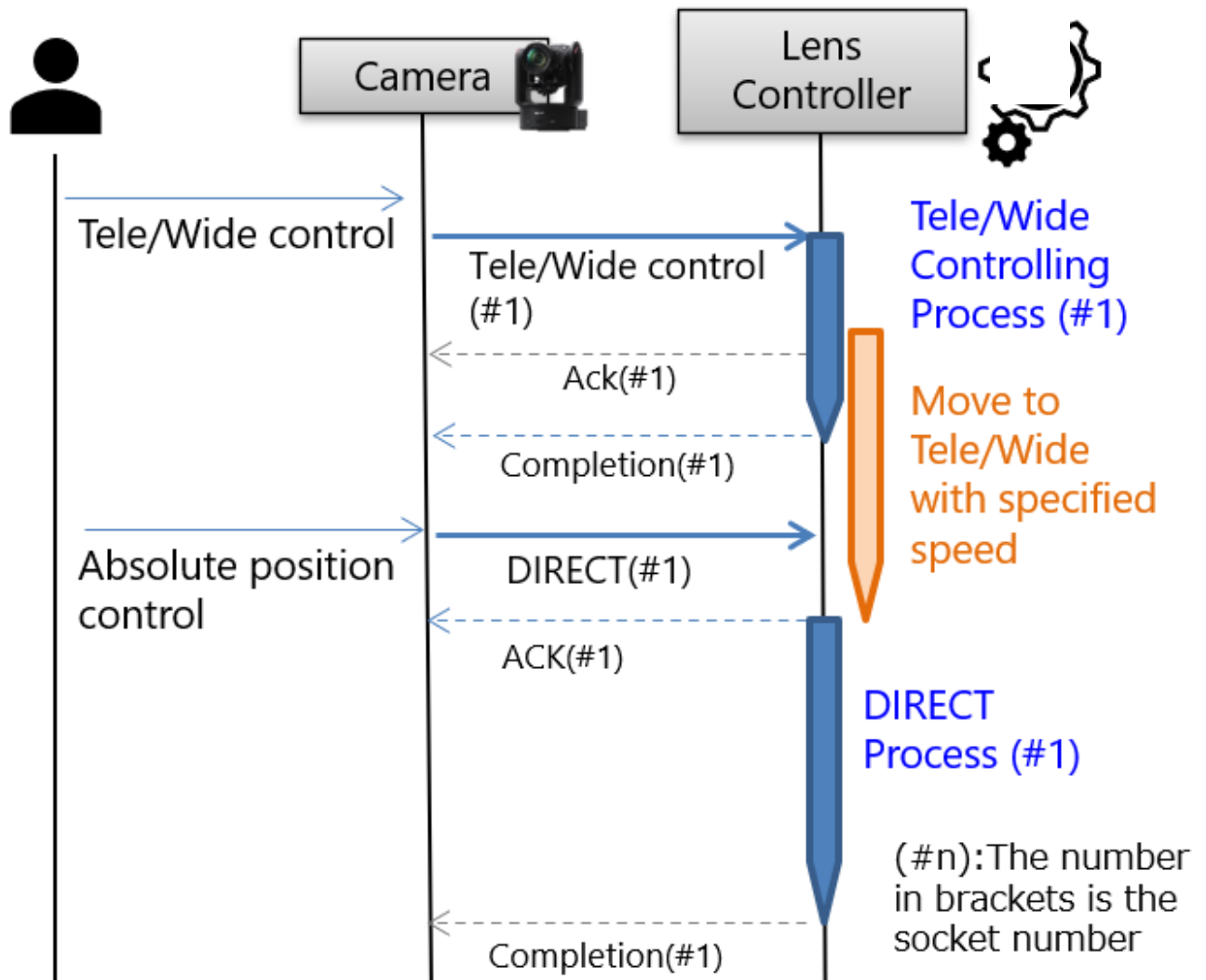


7.5.2. Overtake operation: Case 'Yes'

7.5.2.1. DIRECT or DIRECT(HIGH RESOLUTION SPEED) to DIRECT or DIRECT(HIGH RESOLUTION SPEED)



7.5.2.2. MOVE condition to so-called DIRECT



Revision history

Date	Revision	Description
28th/Nov, 2023	1.00	First edition

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