Sentera Camera Control Protocol

Contents

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1 Packet Format

The Sentera camera protocol format is as follows:

Byte #	Description	Value
0	Header 0	0x46
1	Header 1	0x57
2	Packet Type	See packet definition.
3	Count (LSB)	Data length (# of bytes 5 to N).
4	Count (MSB)	
5 … N	Data	See packet definition. Multi-byte values use little endian.
N + 1	CRC	CRC-8 (polynomial of x^8 + x^2 + x^1 + x^0) of bytes 2 to N.

2 Packet Summary

Packet Type	Data Direction	Description	1.2MP/ 10MP	Q Rev 1	Q Rev 2	Dual 4k (v0.14.1)
0x01	To Payload	Aircraft Metadata	Yes[*1]	Yes[*1]	Yes	Yes[*1]
0x02	To Payload	Imager Trigger	Yes[*2]	Yes[*2]	Yes[*3]	Yes[*4]
0x03	To Payload	Imager Power	No	No	No	No
0x04	To Payload	Still Capture Session	Yes[*5]	Yes[*5]	Yes	Yes
0x05	To Payload	Video Session	Yes	No	No	No[*6]
0x06	To Payload	Video Focus Session	Yes	No	No	No
0x07	To Payload	Still Focus Session	Yes	No	No	No
0x08	To Payload	Autopilot Ping Response	Yes	Yes	Yes	No
0x09	To Payload	Video Session Advanced	Yes	No	No	No[*6]
0x0A	To Payload	Video Adjust	Yes	No	No	No
0x0B	To Payload	(Reserved)	--	--	--	--
0x0C	To Payload	Imager Zoom	No	No	Yes	Yes
0x0D	To Payload	Imager Preview Stream Setup	No	No	Yes	Yes
0x0E	To Payload	Elevation Metadata	No	No	No	Yes
0x0F	To Payload	System Time	No	No	No	Yes
0x10	To Payload	Video Adjust Relative	No	No	No	Yes
0x81	From Payload	Payload Metadata	Yes[*7]	Yes[*7]	Yes	Yes
0x82	From Payload	Imager Trigger Ack	Yes	Yes	Yes	Yes
0x83	From Payload	Still Capture Session Ack	Yes[*8]	Yes[*8]	Yes	Yes
0x84	From Payload	Autopilot Ping Request	Yes	Yes	Yes	No
0x85	From Payload	Image Data Ready	No	No	No	Yes
0x8F	From Payload	System Time Ack	No	No	No	Yes
0xD0	From Payload	Focus Score	Yes	No	No	No
0xFF	From Payload	Payload Exception	Yes	Yes	Yes	No

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1. Baro/AGL Ignored
2. TriggerDist, TriggerOverlap Ignored, Modes 0x00, 0x01, 0x02 Supported
3. TriggerDist, TriggerOverlap Ignored, Modes 0x00, 0x01, 0x02, 0x80, 0x81 Supported
4. Modes 0x80 and 0x81 not yet supported
5. Resume session field not supported, enabled by default, Session name <= 32 characters
6. Video mode automatically starts with still image mode when enabled
7. VideoDestIP, VideoDestPort, CaptureStatus Not supported
8. ImagerID Not sent (shorter packet)

3 Packet Data Dictionary

3.1 Metadata

3.1.1 Aircraft Metadata (0x01)

Message Type	Aircraft Metadata (0x01)				
Description	This packet contains autopilot sensor and state information used to geo-reference payload data. It is also used to populate MISB KLV metadata in video streams.				
Data Direction	To Payload				
Frequency	33 Hz Typical, System Dependent				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x01	87	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT16	-	agentID	-	Autopilot agent ID number.
2	UINT32	-	sessionTime	ms	Milliseconds since start of session.
6	UINT8	-	gpsFixType	-	GPS Fix Type: 0x00 = No Fix 0x02 = 2D Fix 0x03 = 3D Fix 0x05 = Time only fix
7	UINT8	-	gpsSVs	-	GPS number of SVs used in navigation solution.
8	INT32	1e7	lat	deg	Instantaneous nav filter latitude.
12	INT32	1e7	lon	deg	Instantaneous nav filter longitude.
16	FP32	-	alt	m	Instantaneous nav filter altitude MSL.
20	FP32	-	vNorth	m/s	Instantaneous nav filter north velocity.
24	FP32	-	vEast	m/s	Instantaneous nav filter east velocity.
28	FP32	-	vDown	m/s	Instantaneous nav filter down velocity.
32	INT16	1e4	roll	rad	Aircraft roll (X) angle. Range: -PI to PI

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34	INT16	1e4	pitch	rad	Aircraft pitch (Y) angle. Range: -PI/2 to PI/2
36	INT16	1e4	yaw	rad	Aircraft yaw (Z) angle. Range: -PI to PI
38	INT16	1e4	payloadRoll	rad	Payload roll (X) angle. Range: -PI to PI
40	INT16	1e4	payloadEl	rad	Payload elevation (Y) angle. Range: -PI/2 to PI/2
42	INT16	1e4	payloadAz	rad	Payload azimuth (Z) angle. Range: -PI to PI
44	INT16	1e4	payloadRollRate	rad/s	Payload roll (X) angular rate.
46	INT16	1e4	payloadElRate	rad/s	Payload elevation (Y) angular rate.
48	INT16	1e4	payloadAzRate	rad/s	Payload azimuth (Z) angular rate.
50	INT16	1e4	xGyro	rad/s	X Gyroscope, bias compensated.
52	INT16	1e4	yGyro	rad/s	Y Gyroscope, bias compensated.
54	INT16	1e4	zGyro	rad/s	Z Gyroscope, bias compensated.
56	INT16	1e2	xAccel	m/s/s	X Accelerometer, unfiltered.
58	INT16	1e2	yAccel	m/s/s	Y Accelerometer, unfiltered.
60	INT16	1e2	zAccel	m/s/s	Z Accelerometer, unfiltered.
62	INT16	-	xMag	mG	X Magnetometer, unfiltered.
64	INT16	-	yMag	mG	Y Magnetometer, unfiltered.
66	INT16	-	zMag	mG	Z Magnetometer, unfiltered.
68	UINT16	-	ias	cm/s	Indicated Air Speed, offset by -2000 (e.g. 0x0000 = -2000 cm/s).
70	INT16	1e4	windDir	rad	Wind direction. Range: -PI to PI
72	UINT16	-	windMag	cm/s	Wind magnitude.
74	UINT8	-	apMode	-	Autopilot mode: 0 = PREFLIGHT 1 = DISARMED 2 = SPOOL_UP 3 = MANUAL_READY 4 = AUTO_READY 5 = CLIMB_OUT 6 = AIRBORNE_NORMAL 7 = AIRBORNE_NO_GPS 8 = LANDING 9 = POST_FLIGHT 10 = GROUND_RC_MODE 11 = AIRBORNE_RC_MODE
75	UINT8	-	waypointType	-	Fixed wing waypoint types: 2 = GOTO 4 = LOITER 7 = TAKEOFF

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					8 = LOOP 10 = APPROACH_LAND 11 = LOITER_RACETRACK_FIG8 24 = PANORAMA 30 = AREA VTOL waypoint types: 20 = GOTO 21 = TAKEOFF 22 = LOOP 23 = LAND_APPROACH 24 = PANORAMA 30 = AREA
76	UINT8	-	waypointNum	-	Current active waypoint number.
77	UINT16	-	gpsDiscardCount	-	Counter for GPS packets discarded by the autopilot for checksum failure. Rolls over to zero after reaching max uint16.
79	FP32	-	baro	m	Autopilot barometer value in meters.
83	FP32	-	agl	m	Height above launch in meters.

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3.1.2 Elevation Metadata (0x0E)

Message Type	Elevation Metadata (0x0E)				
Description	This packet contains elevation metadata.				
Data Direction	To Payload				
Frequency	System Dependent				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x0E	14	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8		mode	-	0 = cameraAGL Use provided cameraAGL. 1 = terrainMSL Subtract terrainMSL from an altitude provided elsewhere. 2 = cameraMSL Subtract terrainMSL from cameraMSL provide here.
1	UINT8		dataValid	-	Bitfield (0 = invalid, 1 = valid) Bit 7 (MSB): Reserved … Bit 2 (LSB): cameraMSL Valid Bit 1 (LSB): terrainMSL Valid Bit 0 (LSB): cameraAGL Valid
2	FP32	-	cameraAGL	m	Camera height above ground level.
6	FP32	-	terrainMSL	m	Terrain height above MSL. (Above EGM96 Geoid)
10	FP32	-	cameraMSL	m	Camera height above MSL. (Above EGM96 Geoid)

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3.1.3 Payload Metadata (0x81)

Message Type	Payload Metadata (0x81)				
Description	This packet contains payload metadata.				
Data Direction	From Payload				
Frequency	0.5 Hz x [number of payload imagers]				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x81	41	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imagerID	-	Imager ID bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0
1	UINT8	-	imagerType	-	Imager type. 0 = Unknown 1 = NIR 2 = RGB 3 = Thermal
2	UINT16	-	imagerVersion	-	Imager version.
4	UINT16	1e2	imagerVFOV	degrees	Current imager vertical field of view.
6	UINT16	1e2	imagerHFOV	degrees	Current Imager horizontal field of view.
8	UINT16	1e2	imagerZoom	%	Imager zoom level. 0 = Max imager field of view. 100 = Min imager field of view.
10	UINT16	-	memCapacity	GB	Memory capacity.
12	UINT8	-	memUsed	%	Memory used, 0-100%.
13	INT16	1e2	mntRoll	degrees	Imager mount roll angle, -180 to 180.
15	INT16	1e2	mntPitch	degrees	Imager mount pitch angle, -90 to 90.
17	INT16	1e2	mntYaw	degrees	Imager mount yaw angle, -180 to 180.
19	UINT8	-	pwrMode	-	Power mode: 0x00 = Normal Mode 0x01 = Low Power Mode
20	UINT8	-	sessionStatus	-	Session status: 0x00 = Open 0x01 = Closed
21	UINT32	-	sessionImgCnt	-	Count of images/videos in current session.

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25	UINT8	-	captureStatus	-	Imager ID bitfield: Bit 1: Recording Video Bit 0: Auto-triggering Images
26	UINT16	1e2	minHFOV	degrees	Minimum imager HFOV.
28	UINT16	1e2	minVFOV	degrees	Minimum imager VFOV.
30	UINT16	1e2	maxHFOV	degrees	Maximum imager HFOV.
32	UINT16	1e2	maxVFOV	degrees	Maximum imager VFOV.
34	UINT8	-	videoStatus	-	Streaming video status: 0 = Disabled 1 = Enabled
35	UINT32	-	videoDstIP	-	Streaming video destination IPv4 address. Example: 192.168.168.101 = 0xC0A8A865
39	UINT16	-	videoDstPort	-	Streaming video destination port.

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3.1.4 System Time (0x0F)

Message Type	System Time (0x0F)				
Description	Used to get or set the internal UTC time of the camera. This time gets used in file system and exif timestamps to indicate the time of image capture. It will not change the log file timestamps, since they use a monotonic boot clock.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x0F	11	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	command	-	System Time Command: 0x00 = Set Time 0x01 = Get Time
1	UINT16	-	requestID	-	ID for the request echoed in ACK
3	UINT64	-	timeStamp	us	Microseconds since Unix epoch (1/1/1970). Unused for get time.

3.1.5 System Time ACK (0x8F)

Message Type	System Time ACK (0x8F)				
Description	Sent in response to a Get/Set System time packet and contains both the monotonic time since boot and the UTC wall clock time. The ACK is sent for both get/set time requests and occurs AFTER the set has been processed.				
Data Direction	To Payload				
Frequency	Response to 0x0F				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x8F	18	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT16	-	requestID	-	ID of received request
2	UINT64	-	timeStamp	us	Microseconds since Unix epoch (1/1/1970). Returned after set time is run.
10	UINT64	-	bootTime	ns	Nanosecond since system boot. Monotonic clock not changed by set time requests.

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3.2 Data Capture

3.2.1 Still Capture Session (0x04)

Message Type	Imager Session (0x04)				
Description	This packet has three possible commands: open, close, and kill. Open is specific to still image sessions. Close and kill are common between video and still sessions. Do not use this packet to open a video session.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x04	142	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open 0x01 = Close 0x02 = Kill (debug)
1 : 128	CHAR[128]	-	sessionName	-	Imager session name as a NULL terminated ASCII string. A default name will be assigned if the string is empty. If the session name already exists on the local storage media, a unique identifier will be appended to the string. New sessions may be created at any time. This field is ignored for “Close” and “Kill” session command types. Invalid characters: / \ : * ? ” < > |
129	UINT8	-	utcYear	-	UTC year – 1900 ** Timestamp ignored if set to 0
130	UINT8	-	utcMonth	-	UTC month
131	UINT8	-	utcDay	-	UTC day
132	UINT8	-	utcHour	-	UTC hour
133	UINT8	-	utcMinute	-	UTC minute
134	UINT16	-	utcMillisecond	ms	UTC millisecond (range 0:59999), includes seconds.
136	UINT16	-	sessionID	-	Session ID which will be echoed in acknowledgment if successful
138	UINT16	-	buildVersion	-	Autopilot firmware build version. (ex: 146)

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140	UINT8	-	aircraftType	-	0x01 = Fixed Wing 0x02 = VTOL
141	UINT8	-	resumeSession	-	Enable for adaptive scouting mission. 0 = Disable (default) 1 = Enable

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3.2.2 Still Capture Session Ack (0x83)

Message Type	Still Capture Session Ack (0x83)				
Description	This packet contains imager session acknowledgement data.				
Data Direction	From Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x83	4	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open 0x01 = Close 0x02 = Kill (debug)
1	UINT16	-	sessionID	-	Session ID echoed from session command if successful.
3	UINT8	-	imagerID	-	Imager ID bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0

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3.2.3 Imager Trigger (0x02)

Message Type	Imager Trigger (0x02)				
Description	This packet contains payload imager triggering command data.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x02	9	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imgSelect	-	Imager trigger selection bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 Multiple imagers may be selected, e.g. 0x03 selects imagers 0 & 1.
1	UINT16	-	trigID	-	Trigger ID. Trigger acknowledgement packet will echo this ID, if successful.
3	UINT8	-	trigMode	-	Trigger mode: 0x00 = Disable triggering 0x01 = Single 0x02 = Continuous 0x03 = GPS Distance 0x04 = GPS Overlap 0x80 = Stop Video Recording 0x81 = Start Video Recording
4	UINT16	-	trigPeriod	ms	Trigger period in milliseconds for continuous trigger mode (0x02). Ignored for other modes. 0 = Use default period.
6	UINT16	-	trigDistance	cm	Trigger distance in centimeters for GPS distance mode (0x03). Ignored for other modes. 0 = Use default distance.
8	UINT8	-	trigOverlap	%	Trigger overlap in percent for GPS overlap mode (0x04). Ignored for other modes. 0 = Use default overlap.

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3.2.4 Imager Trigger Ack (0x82)

Message Type	Imager Trigger Ack (0x82)				
Description	This packet contains imager trigger acknowledgement data.				
Data Direction	From Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x82	3	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imagerID	-	Imager ID bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0
1	UINT16	-	trigID	-	Trigger ID echoed from imager trigger command packet, if successful.

3.2.5 Imager Data Ready (0x85)

Message Type	Image Data Ready (0x85)				
Description	This packet announces the availability of new file data in the current session.				
Data Direction	From Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x85	49	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0:	UINT8	-	imagerID	-	Imager ID bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 No bits set = session data
1: 48	CHAR[48]	-	filename	-	Null terminated filename and path inside the session folder of the imager data ready from the active session. Eg. RGB/IMG_00001.jpg Accessed via: http://192.168.143.141:8080/cur_session?path=/RGB/IMG_000001.jpg

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3.2.6 Video Session (0x05)

Message Type	Video Session (0x05)				
Description	This packet contains payload video session command data.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x05	13	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open 0x01 = Close 0x02 = Kill (debug)
1 : 4	UINT32	-	exposureTime	us	0: Autoexposure 100 to 320,000: Manual Exposure
5:12	UINT64	-	timeStamp	us	Microseconds since Unix epoch (1/1/1970). Used to provide timestamp information in MISB KLV metadata.

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3.2.7 Video Session Advanced (0x09)

Message Type	Video Session Advanced (0x09)				
Description	This packet contains payload video session command data. You can send a new video session commands without closing the current session.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x09	28	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open 0x01 = Close 0x02 = Kill (debug)
1 : 4	UINT32	-	exposureTime	us	0: Autoexposure 100 to 320,000: Manual Exposure
5:12	UINT64	-	timeStamp	us	Microseconds since unix epoch (1/1/1970). Used to provide timestamp information in MISB KLV metadata.
13:16	UINT32	-	bitrate	bps	Video Bitrate
17	UINT8	-	gop	frames	Group of Pictures (decrease for increased quality of dynamic scenes)
18	UINT8	-	metadataSource	-	0: No Metadata 1: Aircraft Metadata provided as specified in this ICD 2: Changing Tffwest Values 3: Static Test Values
19	UINT8	-	eStab		0: Electronic Stabilization Disabled 1: Electronic Stabilization Enabled
20:21	UINT16	-	aeTarget		1.2MP 12 bit value, 0xFFF is max. Pre-gamma target. 10MP 8 bit value, 0xFF is max Post-gamma target
22:23	UINT16	-	gain		Set to zero to retain color balance from config file. 1.2MP Range: [0:255] 16=1.0x

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					10MP Range: [64:2047] 64=1.0x
24:25	UINT16	-	hResolution		Max: 1248 Multiples of 32
26:27	UINT16	-	vResolution		Max: 720 Multiples of 32

3.2.8 Video Adjust (0x0A)

Message Type	Video Adjust (0x0A)				
Description	This packet contains payload video session command data.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x0A	10	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0:3	UINT32	-	bitrate	bps	Video Bitrate
4	UINT8	-	gop	frames	Group of Pictures (decrease for increased quality of dynamic scenes)
5	UINT8	-	eStab		0: Electronic Stabilization Disabled 1: Electronic Stabilization Enabled
6:7	UINT16		aeTarget		1.2MP 12 bit value, 0xFFF is max. Pre-gamma target. 10MP 8 bit value, 0xFF is max Post-gamma target
8:9	UINT16		gain		Set to zero to retain color balance from config file. 1.2MP Range: [0:255] 16=1.0x 10MP Range: [64:2047] 64=1.0x

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3.2.9 Video Adjust Relative (0x10)

Message Type	Video Adjust Relative (0x10)				
Description	This packet contains payload video relative adjustments to exposure.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x10	3	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imgSelect	-	Imager selection bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 Multiple imagers may be selected, e.g. 0x03 selects imagers 0 & 1.
1	UINT8		ev		Exposure Value: 0 – No change 1 – Decrease 2 – Increase 3 – Decrease with rollover 4 – Increase with rollover
2	UINT8		iso		ISO Value: 0 – No change 1 – Decrease 2 – Increase 3 – Decrease with rollover 4 – Increase with rollover

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3.3 Control

3.3.1 Imager Zoom (0x0C)

Message Type	Camera Zoom (0x0C)				
Description	This packet contains camera zoom command data. Feedback is obtained from the data in the payload metadata packet.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x0C	4	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imgSelect	-	Imager selection bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 Multiple imagers may be selected, e.g. 0x03 selects imagers 0 & 1.
1	UINT8	-	zoomMode	-	Zoom mode 0x01 = Rate 0x02 = Steps
1	INT8	-	zoomRate	-	Adjust zoom continuously at the specified rate, until reaching the imager's physical limit, or sending a rate of 0. Ignored when zoomMode is not set to Rate. -X = Zoom wider FOV. +X = Zoom narrower FOV. 0 = Stop.
1	INT8	-	zoomSteps	-	Adjust zoom in discrete steps relative to current zoom position. Ignored when zoomMode is not set to Steps. -X = Zoom wider FOV. +X = Zoom narrower FOV.

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3.3.2 Imager Preview Stream Setup (0x0D)

Message Type	Imager Preview Stream Setup (0x0C)				
Description	This packet contains imager video preview stream configuration data. Feedback is obtained from the data in the payload metadata packet.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x0D	13	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imgSelect	-	Imager trigger selection bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 Multiple imagers may be selected, e.g. 0x03 selects imagers 0 & 1. NOTE: Multiple imager selection should only be used for disabling the preview stream, as video corruption may occur if multiple streams are enabled with the same destination IP and port number.
1	UINT8	-	videoStatus	-	Set streaming video status: 0 = Disabled 1 = Enabled
2	UINT32	-	videoDstIP	-	Set streaming video destination IPv4 address. Ignored when videoStatus is set to disabled. 0 = Use previous or default IP. Example: 192.168.168.101 = 0xC0A8A865
6	UINT16	-	videoDstPort	-	Set streaming video destination port. Ignored when videoStatus is set to disabled. 0 = Use previous or default port.
8	UINT32	-	cameraConfig	-	Can have different meaning for different camera. Currently, only the 4k uses this field. For 4k:

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					Byte 0: Camera 0 Position Byte 1: Camera 0 Option Byte 2: Camera 1 Position Byte 3: Camera 1 Option Positions: 0 = Use Previous or Default 1 = Disabled 2 = Fullscreen 3 = Lower Right 4 = Top 5 = Bottom 6 = Overlay Options: 0 = Use Previous or Default 1 = Normal (NIR/RGB) 2 = Live Colormapped NDVI – Fixed Color Map (NIR Only) Ex. Byte 0: 0x02 Byte 1: 0x01 Byte 2: 0x03 Byte 3: 0x02 Cam0 : Fullscreen, RGB Display Cam 1 : Lower Right, Colormap NDVI
12	UINT8	-	overlayConfig	-	Configures overlay options. Applies to both video recording and video preview. Currently, only the 4k uses this field. For 4k: 0 = Use Previous or Default 1 = Disabled 2 = Enabled

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3.3.3 Imager Power (0x03)

Message Type	Imager Power (0x03)				
Description	This packet contains payload imager power command data.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x03	2	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	imgSelect	-	Imager power selection bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0 Multiple imagers may be selected, e.g. 0x03 selects imagers 0 & 1.
1	UINT8	-	pwrMode	-	Power mode: 0x00 = Normal Mode 0x01 = Low Power Mode

3.4 Communication

3.4.1 Autopilot Ping Request (0x84)

Message Type	Autopilot Ping Request (0x84)				
Description	This packet is a ping request to the autopilot, used to retrieve version and type information.				
Data Direction	From Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x84	0	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
N/A					

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3.4.2 Autopilot Ping Response (0x08)

Message Type	Autopilot Ping Response (0x08)				
Description	This is the autopilot ping response packet.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x08	5	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT16	-	agentID	-	Autopilot agent ID number.
2	UINT16	-	buildVersion	-	Autopilot firmware build version.
4	UINT8	-	aircraftType	-	0x01 = Fixed Wing 0x02 = VTOL

3.4.3 Payload Exception (0xFF)

Message Type	Payload Exception (0xFF)				
Description	This packet contains payload exception data used for debug purposes.				
Data Direction	From Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0xFF	5	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT32	-	exception	-	0x01 = Session Failure 0x02 = Application Failure 0x03 = SD Card Full 0x04 = Adaptive Scouting Failure 0x05 = Low Light Warning 0x06 = Missing Local SD Card 0x07 = Missing Remote SD Card 0x08 = Remote SD Card Backward
4	UINT8	-	imagerID	-	Imager ID bitfield: Bit 7 (MSB): Imager 7 … Bit 0 (LSB): Imager 0

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3.5 Factory Test

3.5.1 Video Focus Session (0x06)

Message Type	Video Focus Session (0x06)				
Description	This packet opens a new focus session in video mode, providing focus score info to the console and over the network.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x06	5	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open
1 : 4	UINT32	-	exposureTime	us	0: Autoexposure 100 to 320,000: Manual Exposure

3.5.2 Still Focus Session (0x07)

Message Type	Still Focus Session (0x07)				
Description	This packet opens a new focus session in still image mode, providing focus score info to the console and over the network.				
Data Direction	To Payload				
Frequency	Asynchronous				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0x07	5	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	UINT8	-	sessionCmd	-	Session command type. 0x00 = Open
1 : 4	UINT32	-	exposureTime	us	0: Autoexposure 100 to 320,000: Manual Exposure

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3.5.3 Focus Score (0xD0)

Message Type	Focus Score (0xD0)				
Description	This packet contains a focus score for use in focusing lenses, and is only sent when the payload is explicitly placed in focus mode.				
Data Direction	From Payload to Video Destination IP				
Frequency	Asynchronous – 1 per frame				
Message Structure	Header	Type	Length (Bytes)	Payload	CRC
	0x46 0x57	0xD0	4	See below.	CRC-8

Byte Offset	Number Format	Scaling	Name	Unit	Description
0	Float	-	focusScore	-	Focus Score

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