



# **SightLine Applications Command and Control Protocol**

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## Summary

This document describes the packet-based messaging command and control protocol used by the SightLine Applications video embedded stabilization and tracking systems. This protocol is valid for this release and any prior release. Changes between revisions are noted throughout the document.

## IMPORTANT NOTIFICATION!

Individual “Getter” commands have been replaced with a single generic getter command [Get Parameters Function \(0x28\)](#) which takes as an input the corresponding “Setter” command type id.

### For Example:

	<i>Becomes...</i>
Get Version Number	GetParameter( GetVersionNumber )
51,AC,02,00,5E	51,AC,03,28,00,<KK>
Get Ethernet Video Parameters	GetParameters( SetEthernetVideoParameters )
51,AC,02,1b,e3	51,AC,03,1a,<KK>

The objective in making this change is to reduce the number of new command types required in the future. Currently, when a new feature is implemented, three new commands are implemented: a setter, getter, and a results reply. With 2.17 and future releases, only a new setter and result reply will be needed. Most of the Getter function did not require any additional parameters, so a single generic getter has been implemented, which takes the Setter command ID as its parameter.

## Sample Code

SightLine provides sample C/C++ code for writing applications that implement our protocol. This is primarily seen in **slfip.h** and **slfip.cpp**. This code can be used as a starting point for writing your own application and is also useful for conforming to any changes to the protocol that may take place over time. Sample code can be downloaded from our web site (<http://sightlineapplications.com>).

## Protocol Changes

Summary of changes to protocol from previous release. See previous history [below](#). Please also refer to the sample **slfip.h** and **slfip.cpp**. The table below indicates messages that have changed in behavior from previous version. Any details describing the existing behavior or addition of details or example may not be reflected here.

2.21	MOD	<a href="#">Do SnapShot (0x60)</a>	Additional details regarding file naming.
	ADD	<a href="#">Get Ethernet Display Parameters (0x39)</a>	Description. Function was introduced earlier
	MOD	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	Add frame step parameter.
	MOD	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	Added reset MTI flag.
	MOD	<a href="#">Set Coordinate Reporting Mode (0x0B)</a>	Added max number of tracking positions to report.
	MOD	<a href="#">Set Advanced Moving Target Indication Parameters (0x76)</a>	Added down sample options.
	MOD	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	Added suspicious score which was previous in the advanced MTI message.
	MOD	<a href="#">Current Moving Target Indication Parameters (0x54)</a>	Updated to match <a href="#">Set Moving Target Indication Parameters (0x2D)</a> . Previous implementation in 2.20 was incorrect and the order of bytes did not match.
	MOD	<a href="#">Set Advanced Moving Target Indication Parameters (0x76)</a>	Added parameters to control how many MTI tracks will be output in telemetry and KLV messages.
	MOD	<a href="#">Set Lens Mode (0x6C)</a>	Add in set focus and zoom positions
	ADD	<a href="#">Current Stabilization Bias (0x7A)</a>	Return stabilization bias
ADD	<a href="#">Set Advanced Capture Parameters (0x7B)</a>	Advanced analog capture control for image stretching.	
2.20	MOD	<a href="#">Set Acquisition Parameters (0x37)</a>	Add Frame Step Parameter.
	MOD	<a href="#">Set Acquisition Parameters (0x37)</a>	Add InitPhoton to Flags in Generic Digital Interface
	ADD	<a href="#">Directory Statistics Reply (0x79)</a>	Report back the total “disk” space available (2.20.12)
	MOD	<a href="#">Current SD Card Recording Status (0x58)</a>	Deprecated file size and time params (RESERVED)
	MOD	<a href="#">Set SD Card Recording Parameters (0x1E)</a>	Byte 6 results in a <a href="#">Current SD Card Recording Status (0x58)</a> Byte 7 can now result in <a href="#">Directory Statistics Reply (0x79)</a>
	MOD	<a href="#">Set Acquisition Parameters (0x37)</a>	Add InitCameraLinkLowSpeed Flag
	ADD	<a href="#">Set Network Parameters (0x1C)</a>	Notes about Disable LIFO mode.
	MOD	<a href="#">Set Network Parameters (0x1C)</a>	Add NIC index
	MOD	<a href="#">Set Tracking Parameters (0x0C)</a>	Added new parameter <a href="#">Near Value</a>
	ADD	<a href="#">Set Acquisition Parameters (0x37)</a>	New <a href="#">Video Port Types (SLA-2000/2100)</a>
	MOD	<a href="#">Version Number (0x40)</a>	Add “Other Version” for hardware dependent version information. e.g. FPGA version on SLA1500
ADD	<a href="#">Set Host Name (0x66)</a> <a href="#">Current Network List (0x67)</a>	Ability to name a Network Interface / Device	

	MOD	<a href="#">Set Acquisition Parameters (0x37)</a>	Add SLA 1500 generic digital, add params for horizontal and vertical front porch, flags.
	MOD	<a href="#">Tracking Box Pixel Stats (0x78)</a>	Add Tracking Box Pixel Stats message for 14 bit digital camera mean,max,min
	ADD		Add SLA-3000 specific protocol (NOTE: 3000 is still in beta release. 3000 specific protocols may change in the future releases without notice)
	MOD	<a href="#">Set Blend Parameters (0x2F)</a> <a href="#">Current Blend Parameters (0x4D)</a>	Enable SD / HD image blending. Changed to warp the EO image. Added bit for alternate zoom control for HD. Returning EO/IR indicies.
	MOD	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	New MTI modes for small target detection.
	NEW	<a href="#">Set Advanced Moving Target Indication Parameters (0x76)</a>	Beta advanced MTI control
2.19	MOD	<a href="#">Set Packet Destination (0x64)</a>	Remove rate and flags parameters (use <a href="#">Set Coordinate Reporting Mode (0x0B)</a> )
	ADD	<a href="#">Set Lens Mode (0x6C)</a>	General commands sent to a lens mechanism
	ADD	<a href="#">Current Lens Status (0x6D)</a>	Return focus and zoom positions
	ADD	<a href="#">Set Lens Params (0x6E)</a>	Set Autofocus and Lens control params
	ADD	<a href="#">Current Lens Params (0x6F)</a>	Get Autofocus and Lens control params
	ADD	<a href="#">Set Digital Camera Parameters (0x70)</a>	Set Autogain and other Digital Camera params
	ADD	<a href="#">Current Digital Camera Parameters (0x71)</a>	get Autogain and other Digital Camera params
2.18	MOD	<a href="#">Set Stabilization Bias (0x12)</a>	Auto bias mode also uses manual bias offsets.
	MOD	<a href="#">Reset (0x01)</a>	Added non-hardware parameter reset, camera reset.
	ADD	<a href="#">HardwareID (0x50)</a>	New command to get the HWId.
	ADD	<a href="#">Current Tracking Positions (0x51)</a>	New bits for drawing
	MOD	<a href="#">Set ADC Parameters (0x18)</a> <a href="#">Current ADC Parameters (0x47)</a>	New field for mode Adding more values to the reply
	ADD	<a href="#">Set System Type (0x63)</a> <a href="#">Current System Type (0x65)</a>	Configure hardware for specific applications
	ADD	<a href="#">Set Packet Destination (0x64)</a>	Location where Telemetry data will be sent over the network
	MOD	<a href="#">Version Number (0x40)</a>	Added application bits
	ADD	<a href="#">Command Pass-through (0x3D)</a> <a href="#">Set SD Card Recording Parameters (0x1E)</a>	Added ability to write user strings to an SD card log file.
	ADD	<a href="#">Configure Communication Port (0x3E)</a>	Add attNav port setting. Added TCP pass-through and Raw pass-through modes.
2.17	MOD	<a href="#">Set Stabilization Parameters (0x02)</a>	Color edge option in stabilization
	ADD	<a href="#">Error: Reference source not found</a>	Get entire parameter set in human readable form.
	MOD	<a href="#">Modify Tracking (0x05)</a>	Optionally specify source image coordinates

	MOD	<a href="#">Set Video Mode (0x1F)</a>	Zoom to track picture-in-picture capability added
	MOD	<a href="#">Version Number (0x40)</a>	Added hardware type
	MOD	<a href="#">Reset (0x01)</a>	Added ability to clear parameters
	MOD	<a href="#">Do SnapShot (0x60)</a>	Added frame step and number of frames
	MOD	<a href="#">Set Registration Parameters (0x0E)</a>	Allow ignore edges to ignore more of the image
	ADD	<a href="#">Set Coordinate Reporting Mode (0x0B)</a>	Added get of this type
	MOD	<a href="#">Tracking Position (0x43)</a>	Added frame-to-frame angle, scale and fractional offset plus frame number
	MOD	<a href="#">Draw Object (0x3B)</a>	Added optionally drawing a shadow for vertical and horizontal lines.
2.16	MOD	<a href="#">Set Ethernet Video Parameters (0x1A)</a>	Down Sample and Frame Step
	MOD	<a href="#">Set H.264 Video Parameters (0x23)</a>	Down Sample in Set Ethernet Video Parameters
	MOD	<a href="#">Set Video Mode (0x1F)</a>	Ignore number of network display output channels
	ADD	<a href="#">Error: Reference source not foundSet Metadata Rate (0x62)</a>	Set binary KLV blob to be sent with H.264
	MOD	Length field is expanded to 2-bytes.	Support for longer packet, such as Set KLV Data
	ADD	<a href="#">Set SnapShot (0x5E)</a> , <a href="#">Do SnapShot (0x60)</a>	SnapShot functionality
	ADD	<a href="#">Set Acquisition Parameters (0x37)</a>	PAL video input and output support
	ADD	<a href="#">Draw Object (0x3B)</a>	FilledCircle and FilledRect types
2.15	ADD	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	New parameters; increases packet length
	ADD	<a href="#">Current Moving Target Indication Parameters (0x54)</a>	Reply changed; increases packet length
	MOD	<a href="#">Configure Communication Port (0x3E)</a>	Enum value change for port type
	ADD	<a href="#">Set H.264 Video Parameters (0x23)</a>	Configure H.264 ethernet video
	ADD	<a href="#">Current H.264 Video Parameters (0x56)</a>	Returned parameters for H.264 Ethernet video
	ADD	<a href="#">Set Overlay Mode (0x06)</a>	Ignore edge graphics
	ADD	<a href="#">Set Ethernet Display Parameters (0x29)</a>	Raw JPEG mode



## Coordinate Systems

Image coordinates are referenced as row and column coordinates, with the origin in the upper left corner of the frame. Increasing column values are to the right, and increasing row values are downward in the frame. Unless otherwise identified, a video frame is 640 pixels wide and 480 pixels high.

## Bit & Byte Order

All bits are “right aligned”.

0xC9							
7	6	5	4	3	2	1	0
1	1	0	0	1	0	0	1
C				9			

Table 1: Example Bit Order

All multi-byte fields are Least Significant Byte (LSB) followed by MSB *unless otherwise noted*.

				U16		U32			
Header		Length	Type	LSB	MSB	LSB			MSB
0x51	0xAC			0x80	0x02	0xF3	0xC6	0x96	0x18
				640		412534515			

## Packet Header

Every packet begins with a pair of signature header bytes (**0x51**, **0xAC**) and a length field. The length field can be 1 byte or 2 bytes long depending on the length of the packet. If the packet length is greater than 127 bytes, then the length field occupies 2 bytes. The length field is encoded as follows:

		LENGTH	Type	Type dependent			Checksum
0x51	0xAC	len	type	..	..	..	cs

		LENGTH >= 128		Type	Type dependent			Checksum
0x51	0xAC	xx	yy	type	..	..	..	cs

xx: Lower 7 bits of the length, the MSB (bit7) must be set to 1

yy: Upper bits of the length.

To obtain the length from xx and yy, here is a code snippet in C language: `Length = (yy << 7) | (xx & ~0x80);`

For example, 128 bytes is encoded as xx: 0x80, yy: 0x01.

NOTE: two bytes length field could be used for packets whose length is less than 128.

Checksum needs to be calculated for data highlighted in light blue.

The value specified in the length field is the number of bytes that follow up to and including the checksum. To ensure proper packet framing, if checksum fails, the bytes following the faulty signature

header should be scanned for the the signature header bytes.

NOTE: The checksum is also necessary when communicating over Ethernet with SightLine hardware.

## Length Example:

[Reset \(0x01\)](#):

		LENGTH	Type	Mode	Checksum
0x51	0xAC	0x03	0x01	0x02	0xBC
			<i>3 bytes specified by length</i>		

Table 2: Example Length Calculation

## Checksum Calculation

Checksums are calculated over the bytes following the length field, up to but not including the checksum field using the following table and pseudo code:

```
const int8 crc8_Table[ ] =
{
    0, 94, 188, 226, 97, 63, 221, 131, 194, 156, 126, 32, 163, 253, 31, 65,
    157, 195, 33, 127, 252, 162, 64, 30, 95, 1, 227, 189, 62, 96, 130, 220,
    35, 125, 159, 193, 66, 28, 254, 160, 225, 191, 93, 3, 128, 222, 60, 98,
    190, 224, 2, 92, 223, 129, 99, 61, 124, 34, 192, 158, 29, 67, 161, 255,
    70, 24, 250, 164, 39, 121, 155, 197, 132, 218, 56, 102, 229, 187, 89, 7,
    219, 133, 103, 57, 186, 228, 6, 88, 25, 71, 165, 251, 120, 38, 196, 154,
    101, 59, 217, 135, 4, 90, 184, 230, 167, 249, 27, 69, 198, 152, 122, 36,
    248, 166, 68, 26, 153, 199, 37, 123, 58, 100, 134, 216, 91, 5, 231, 185,
    140, 210, 48, 110, 237, 179, 81, 15, 78, 16, 242, 172, 47, 113, 147, 205,
    17, 79, 173, 243, 112, 46, 204, 146, 211, 141, 111, 49, 178, 236, 14, 80,
    175, 241, 19, 77, 206, 144, 114, 44, 109, 51, 209, 143, 12, 82, 176, 238,
    50, 108, 142, 208, 83, 13, 239, 177, 240, 174, 76, 18, 145, 207, 45, 115,
    202, 148, 118, 40, 171, 245, 23, 73, 8, 86, 180, 234, 105, 55, 213, 139,
    87, 9, 235, 181, 54, 104, 138, 212, 149, 203, 41, 119, 244, 170, 72, 22,
    233, 183, 85, 11, 136, 214, 52, 106, 43, 117, 151, 201, 74, 20, 246, 168,
    116, 42, 200, 150, 21, 75, 169, 247, 182, 232, 10, 84, 215, 137, 107, 53
};
```

Table 3: Checksum value lookup table.

To use the table:

```

crc = 0x01;

for ( each byte_Value between length and
checksum fields)
{
    crc = crc8_Table[ crc ^ byte_Value ] ;
}

```

Table 4: Psudo code describing how to generate CRC checksum.

**Checksum Calculation Example:**

Data	Description	Action	CRC
0x51	Header 1	Ignored	0x01
0xAC	Header 2	Ignored	0x01
0x02	Length	Ignored	0x01
0x07	Type	Used	$0x01 \wedge 0x07 = 0x06$
Look up result			Table[6] = 221 (0xDD)

*Table 5: Example Checksum Calculation*

CRC should equal 221.

**Serial Port**

Serial port parameters are configured:

<b>Baud</b>	57600
<b>Data Bits</b>	8
<b>Stop Bits</b>	1
<b>Parity</b>	None
<b>Handshake</b>	None

*Table 6: Default Serial Port Configuration*

See [Serial Port Parameters](#) for additional baud rates supported.

- You can set the serial port properties of the unit explicitly using the [Configure Communication Port \(0x3E\)](#) command.
- Refer the specific hardware ICD to determine if serial port is 3.3VTTL or RS-232C level signals.

**Ethernet**

Command and control is also available over Ethernet.

All commands can be sent as a UDP packet to the IP Address of the system on port **14001**. All replies will be sent to the IP address of the sender on port **14002**. The ports can be changed using [Set Network Parameters \(0x1C\)](#).

<b>Transport Layer</b>	UDP
<b>Inbound Port</b>	14001
<b>Reply Port</b>	14002

*Table 7: Ethernet Ports Used*

## IP Address Assignment

- You can set a **STATIC IP** address of the SLA-HARDWARE explicitly using [Set Network Parameters \(0x1C\)](#).
- If no STATIC IP address has been set, the SLA-HARDWARE will attempt to obtain an IP address using **DHCP**.
- If DHCP fails, the SLA-2000 will use a **192.168.1.ddd**, where *ddd* is internally determined using its MAC address.
  - SLA-1500 (etc.): If DHCP fails, the system will use a specific **Link Local (RFC 3927)** type address **169.254.1.180**.

## Summary Table

			If DHCP Fails try...	
	If Static...	Else try DHCP...	SLA-2000	All Other
<b>IP Address</b>	User Defined	DHCP Defined	192.168.1.ddd	169.254.1.180
<b>Subnet Mask</b>	User Defined	DHCP Defined	255.255.255.0	255.255.0.0
<b>Gateway</b>	User Defined	DHCP Defined	192.168.1.1	<i>NOT DEFINED</i>

*Table 8: IP Address Assignment*

**TIP:** Use this table as guidance for setting the IP address of your PC.

## Discover Protocol

When the SightLine Hardware powers up it will broadcast an SLDISCOVER packet identifying itself. The system also listens for SLDISCOVER Requests.

<b>Transport Layer</b>	UDP
<b>IP Address</b>	255.255.255.255
<b>Port</b>	51000

*Table 9: Discover Protocol Packet*

**Discover Packet Payload**

	3	2	1	0
0	ID			
4	Length			
8	Major Version		Minor Version	
12	Software Features		Hardware Type	
16	MAC ADDRESS			
...				
36	IP ADDRESS (see <a href="#">Set Network Parameters (0x1C)</a> )			
...				
52	Video Address (See <a href="#">Set Ethernet Video Parameters (0x1A)</a> )			
...				
68	HOST NAME (see <a href="#">Set Host Name (0x66)</a> )			
...				
100	Video Port (see Video Address)		C2 Port	

*Table 10: Discover Protocol Packet Layout*

Byte	Length	Name	Description
0	4	ID	Magic identifier number
4	4	Length	Discover message length
8	2	Minor Version	Discover protocol minor version.
10	2	Major Version	Discover protocol major version.
12	2	Software Features	Services provided (internal use only)
14	2	Hardware Type	See <a href="#">below</a>
16	20	MAC	MAC address of sender
36	16	IP Address	IP address of sender
52	16	Video Address	IP Address where images are sent (multicast or unicast)
68	32	Host Name	Human Readable name of hardware
100	2	Video Port	Port number where images are sent
102	2	C2 Port	Port number open to receive commands (default 14001)

*Table 11: Discover Protocol Packet Description*

## SightLine Hardware Types

See also [Version Number \(0x40\)](#).

Description	ID	Description	ID
SLA-2000-OEM	0	SLA-1500-OEM	7
SLA-2100-OEM	1	SLA-1501-OEM	8
SLA-1000-OEM	4	SLA-UPGRADE-SRV	10
SLA-PC-WIN	5		
SLA-PC-LINUX	6		

*Table 12: Hardware Type ID*

## Host Name

Default Host Name	SLA<HARDWARE TYPE>_<MAC>
-------------------	--------------------------

Where MAC is last 3 octets of the MAC address. This host name be changed to something more unique or applicable to your application by using [Set Host Name \(0x66\)](#).

## Network Interface Controllers (NIC):

SLA-HARDWARE may contain one or more physical network interfaces. For example, a system may include one wired Ethernet interface and one wireless interface. Alternately, a system can be Multihomed, have a number of VLANs, or other mechanisms to create additional network interfaces. Most systems will have only one NIC (index = 0).

## Commands

### Common Commands

For reference purposes, below are a list of the the most frequently used commands.

#### **Basic Stabilization and Tracking:**

- [Set Registration Parameters \(0x0E\)](#)
- [Set Stabilization Parameters \(0x02\)](#)
- [Set Tracking Parameters \(0x0C\)](#)
- [Set Coordinate Reporting Mode \(0x0B\)](#)
- [Modify Tracking \(0x05\)](#)

#### **Moving Target Detection:**

<a href="#">Set Stabilization Parameters (0x02)</a>	Make sure you set Mode = 1 in addition to the other parameters
<a href="#">Set Overlay Mode (0x06)</a>	Enable Overlays so you can see the detection boxes
<a href="#">Set Coordinate Reporting Mode (0x0B)</a>	Enable reporting so the SLA-2000 sends back telemetry Flags = 7
<a href="#">Set Moving Target Indication Parameters (0x2D)</a>	Set the Mode = 2 and change the Threshold = 5 (default). You can adjust the threshold down (1 = most sensitive and more false positives).
Then look for the following replies: <a href="#">Current Tracking Positions (0x51)</a>	

See [Set Network Parameters \(0x1C\)](#) and [Set Packet Destination \(0x64\)](#) to define where responses and telemetry will be sent. Querying the state of the hardware is now done using the generalized [Get Parameters Function \(0x28\)](#) which takes the “setter” type ID as an input. In a few cases, some more complicated messages have been implemented to get other types of results or status.version

**Get Version (0x00)**

<a href="#">Get Parameters Function (0x28)</a>	Version (0x00)
--	----------------

**Reset (0x01)**

Allow user to reset different aspects of the system. See [Save Parameters \(0x25\)](#) for information on persisting parameters.

Byte offset	Description	
2	Packet length = 3	
3	Packet type = 0x01	
4	Reset Type:	
	Value	Description
	0	parameters only reset to factory defaults
	1	Resets the onboard video decoder only.
	2	board soft reset (reboot board with saved defaults)
	3	DEPRECATED <b>NEW 2.20</b>
	4	Deletes any saved parameters and soft resets the board <b>NEW 2.17</b>
	5	Send reset command to any known camera attached (TAU, Sony, etc) <b>NEW 2.18</b>
	6	Soft parameter only reset to factory defaults (does not reset network, serial port or camera type settings) <b>NEW 2.18</b>
7 – 255	<i>Reserved</i>	

**Reset Type**

Value	Parameter file / Flash Memory	1500 / 3000	2000
0	No Change	Reset ALL parameters to factory defaults. Application continues to run.	
1	No Change	Not Used	Onboard ADC is reset.
2	No Change	Performs Linux Reboot	Application is reset. Does not run Upgrade Client.
4	Will be deleted	Reset run-time parameters to factory defaults.	
		Performs Linux Reboot	Application is reset. Does not run Upgrade Client.
5	No Change	Sends command to resets any digital camera if that known camera support a reset command.	Not used.
6	No Change	Run-time (video processing) parameter are reset to factory defaults. Does not reset network, serial port or camera type settings.	



## Set Stabilization Parameters (0x02)

Turn on or turn off stabilization and control re-centering rate for output video. Video stabilization smooths out jumpy sequences caused by camera vibration. Default value is “on” with re-centering rate = 50. A low number (approaching 0) = a slow drift to center. A high number (approaching 255) = a fast drift to center (see note [below](#)). Maximum stabilization limit is used to set an upper bound on the time-averaged stabilization solution.

**NOTE:** Bit 3 of the Mode field in the [Current Stabilization Parameters \(0x41\)](#) packet indicates the state of the Auto-Bias algorithm. See [Set Stabilization Bias \(0x12\)](#) for more information on enabling Auto-Bias.

Byte Offset	Description	
2	Packet length = 6	
3	Packet type = 0x02	
4	Mode:	
	Bit	Description
	0	0 – Stabilization OFF (default) 1 – Stabilization ON
	1	0 – Enable all (default) 1 – Disable all registration, stabilization, enhancement, and tracking
	2	0 – Previous Images background, with blur and no color (default) 1 – Black background
	3	<i>Reserved</i> - NOTE: Used for Auto-Bias in <a href="#">Current Stabilization Parameters (0x41)</a> .
	4	0 – Grey or black background (see bit 2) 1 - Previous Images background, no blur, with color <b>NEW 2.17</b>
	5 – 6	<i>Reserved</i>
	7	0 – Enable PIP image micro stabilization (default) 1 – Disable PIP image micro stabilization
5	Screen translation re-centering rate 0..255 (default = 50)	
6	Maximum translation stabilization limit, pixels (default = 0 for no clipping)	
7	Maximum rotational stabilization limit, degrees (default none = 0)	

**Re-center (Drift) Rate:**

Due to the nature of the stabilization process, large panning may cause undesirable rendering effects (display offsets). In layman's terms, the stabilization will “fight you” when you try to pan. This is most pronounced when the re-centering rate is low and there is sustained camera motion (i.e. pan). On the other hand, too high a re-centering rate will cause the stabilization algorithm to allow undesired video jitter.

**Reset Stabilization Parameters (0x04)**

Reset the internal motion smoothing filters that control video stabilization. Re-center the current video frame in the field of view.

Header 1	Header 2	Length	Type	Checksum
0x51	0xAC	0x02	0x04	0x3F

**Set Overlay Mode (0x06)**

Byte offset	Description	
2	Packet length = 5	
3	Packet type = 0x06	
4	Bits 0..3 Primary track color mode	0 = off 1 = white (default) 2 = black 3 = auto (white or black) 4 = rainbow 5 = red 6 = orange 7 = yellow 8 = green 9 = blue 10 = violet
	Bits 4..7 Primary track reticle type	0 = box corners (default) 1 = cross 2 = circle 3 = duplex crosshair 4 = modern range 5 = target dot 6..15 = <i>Reserved</i>
5	Bits 0..3	Secondary track color mode ( <i>SLA-2000 only</i> ) Same as primary track color mode, above
	Bits 4..7	Secondary track reticle type ( <i>SLA-2000 only</i> )

		Same as primary track reticle type, above
6	Bits 0..2	<i>Reserved</i> = 0
	Bit 3	Overlay Histogram 0 = don't 1 = do
	Bit 4	Overlay track index 0 = don't 1 = do
	Bit 5	Show track motion trails 0 = don't 1 = do
	Bit 6	<i>Reserved</i> = 0
	Bit 7	Show registration ignore edge lines 0 = don't 1 = do

### ***Start Tracking (0x08) (Deprecated)***

See [Modify Tracking \(0x05\)](#)

Command the system to start a track. Column and Row coordinates correspond to the pixel coordinate within a 640x480 frame of video in display (stabilized) coordinates. The origin is in the upper left corner of the image with values increasing down and to the right. Up to 5 tracks may be simultaneously engaged.

Byte offset	Description	
2	Packet length = 7	
3	Packet type = 0x08	
4	0..639: Column coordinate, LSB	
5	Column coordinate, MSB	
6	0..479: Row coordinate, LSB	
7	Row coordinate, MSB	
8	Track Modifier	
	Bit 0:	0: cursor only 1: initiate tracking
	Bit 1:	0 – Default 1 – Rotate and zoom coordinates with display
	Bit 2:	0 – Default 1 – Replace all tracks with one track at

		designated coordinates (SLA-2000 only)
	Bit 3:	0 – Default 1 – Add New (SLA-2000 only)
	Bit 4:	0 – Default 1 – Replace Near (SLA-2000 only)
	Bit 5:	0 – Default 1 – Designate Moving Target Near as Primary (SLA-2000 only)
	Bit 6	0 – Default 1 – Kill Near (SLA-2000 only)

### Modify Tracking (0x05)

Command the system to modify tracking: start a track, stop a track, designate a track as primary, nudge a track, etc. Column and Row coordinates correspond to the pixel coordinate within a 640x480\* frame of video in display (stabilized) coordinates. The origin is in the upper left corner of the image with values increasing down and to the right. Up to 5 tracks may be simultaneously engaged. See the Target Tracking Guide for more details about multiple target tracking. To control specifying tracks “near” existing tracks is available, see: [Near Value](#).

\* See [Current Image Size \(0x4E\)](#) for more information about capture image size.

Byte offset	Description	
2	Packet length = 7	
3	Packet type = 0x05	
4	Column coordinate, LSB	
5	Column coordinate, MSB	
6	Row coordinate, LSB	
7	Row coordinate, MSB	
8	Flag – controls how tracks are modified	
	<b>Coordinate Space Bits</b> – OR these with any modify mode NOTE: Do not set both Display and Source Coordinates	
	0x80	Display Coordinates - Rotate Zoom Modifier. OR this flag (set bit 7 to 1) with any any of the modify modes to indicate coordinates are rotated and zoomed with the display. By default, set this flag (bit 7 = 1) for coordinates in the display image space.
	0x40	Source Coordinates. OR this flag (set bit 6 to 1) with any of the modify modes to indicate that

		the coordinates specified are in the source image. By default, don't set this flag (bit 6 = 0) for coordinates in the display image space.
<b>Modify Modes</b>		
0		Show Cursor only
1		Kill any existing targets and then designate a new primary target at the cursor.
2		Designate another target at the cursor.
3		If there is a track “near” the coordinates, move track to coordinates. See <a href="#">Near Value</a>
4		If there is a track “near” the coordinates, move track to coordinates. Otherwise, add a new track at coordinate location. See <a href="#">Near Value</a>
5		Designate track “near” coordinates as primary target. See <a href="#">Near Value</a>
6		Designate track “near” coordinates as primary target if there is one. If not, add new track at coordinates. See <a href="#">Near Value</a>
7		If there is a track “near” coordinates, move track to location of coordinates and designate as primary. Otherwise, add a new track at coordinates and make primary. See <a href="#">Near Value</a>
8		If there is a track “near” coordinates, move track to location of coordinates and designate as primary. Otherwise, kill all existing tracks and add a new primary track at location of coordinates. See <a href="#">Near Value</a>
9		Kill track “near” coordinates. See <a href="#">Near Value</a>
10		Kill all tracks, but the primary track. (Coordinates are ignored).

### **Modify Track By Index (0x17)**

Modify a particular track by its index (stop or designate as primary)

Byte offset	Description
2	Packet length = 4
3	Packet type = 0x17
4	Track Index

5	0 = Stop Track 1 = Make Primary
---	------------------------------------

### Stop Tracking (0x09)

Turn off all tracks.

Byte offset	Value	Description
2	0x05	Packet length
3	0x09	Packet type
4	0x00	<i>Reserved</i>
5	0x00	<i>Reserved</i>
6	0x00	<i>Reserved</i>
7	0x1C	Checksum

### Nudge Tracking Coordinates (0x0A)

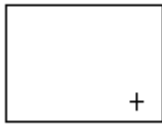
Adjust the primary track's coordinates by adding a nudge in pixel coordinate space to the current tracking coordinates.

Byte offset	Description
2	Packet length = 5
3	Packet type = 0x0A
4	-128..127: Column adjustment (2's complement signed 8-bit integer)
5	-128..127: Row adjustment (2's complement signed 8-bit integer)
6	<u>Nudge Mode:</u> 0: Do not rotate command with display 1: Rotate command with display

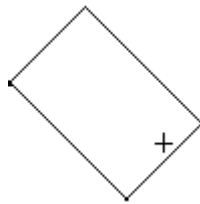
### Nudge Mode

Applies the display rotation set using [Set Display Parameters \(0x16\)](#) to the nudge command.

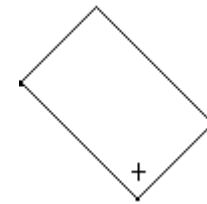
Assume rotation enable to 45°.



Original Image



“Do not rotate command with display”



“Rotate command with display”

### Set Coordinate Reporting Mode (0x0B)

Set the reporting rate of [Tracking Position \(0x43\)](#) and [Current Tracking Positions \(0x51\)](#) packets. The [Tracking Position \(0x43\)](#) packet contains measured previous frame to current frame offset, angle and scale, display offset/rotation, and primary track position. The [Current Tracking Positions \(0x51\)](#) packet contains the positions of all targets currently being tracked. All packets will be from the primary camera as selected by [Set Video Parameters \(0x10\)](#). Default reporting rate is “no coordinate reporting”.

Byte offset	Description	
2	Packet length = 5	
3	Packet type = 0x0B	
4	Frame period mode: 0 = no coordinate reporting (default) 1 = report coordinates every frame (29.97 Hz) 2 = report coordinates every 2 <sup>nd</sup> frame 3 = report coordinates every 3 <sup>rd</sup> frame ...	
5	Flags: Types of Output	
	Bit	Description
	0x00 (DEFAULT)	Send Tracking Position and Tracking Positions of primary track only. Same as 0x03
	0x01	Send Tracking Position - sends <a href="#">Tracking Position (0x43)</a>
	0x02	Send Tracking Positions of primary track – sends <a href="#">Current Tracking Positions (0x51)</a>
	0x04	Send Tracking Positions of non-primary tracks – sends <a href="#">Current Tracking Positions (0x51)</a>
0x20	Prioritize Stab/Track/Telemetry over Render/Enhance/Compress/Display. If this bit is on and telemetry is reported every frame, the system may skip displaying some frames so that it can maintain 30Hz telemetry output rate. <b>NEW</b>	

		2.17
	0x40	Report <a href="#">Tracking Box Pixel Stats (0x78)</a> over Track Box Area <b>NEW 2.20</b>
	Unused Bits	<i>Reserved</i>
6	Maximum number of tracking positions to report 0 - 100. (pass 0 for default of 10). <b>NEW 2.21</b>	

### Set Tracking Parameters (0x0C)

Set parameters used by tracking module. See also [Tracking Position \(0x43\)](#).

Byte offset	Description	
2	Packet length = 8 <b>NEW 2.20</b>	
3	Packet type = 0x0C	
4	Size of object, in pixels, to track. (for user designated tracking)	
5	Mode (see <a href="#">below</a> for description).	
	Bits 0..3	0 = no change <b>FIX 2.17.8</b> 1 = Stationary mode 2 = Vehicle mode 3 = <i>Reserved</i> 4 = Scene mode 5..15 = <i>Reserved</i>  Note that if tracking mode is set to stationary, then all moving target detection will be turned off if it is on.
	Bit 4	High noise compensation 0 = off (default) 1 = on – improves tracking in very high noise situations
	Bits 5..7	<i>Reserved</i> = 0
6	Size of object of interest, in pixels. (Used for clustering in motion assist and motion detection systems.) 0 = no change.	
7	Maximum number of frames to keep looking for a non-found object before stopping a track. (Default is 45 frames or 1.5 seconds.) Controls how long a track can be off screen or obscured (eg. behind a tree) before the track will give up. 0 = no change	
8	Near value, LSB (Default = 65) <b>NEW 2.20</b>	



9	Near value, MSB
---	-----------------

## Near Value

Near value is the “radius of engagement” used with [Modify Tracking \(0x05\)](#) modes. This is the area around an existing target that interactions can take place. Large values allow greater tolerance in selecting tracks.

## Tracking Modes

- Stationary Mode** Used to track non-moving object (e.g. door, window, building, etc.).
- Vehicle Mode** Used to track moving objects. Works best with relatively constant velocity objects such as a car.
- Scene Mode** Uses frame-to-frame registration to determine position of target. May work better than Stationary Mode for low-contrast non moving targets.

## Set Registration Parameters (0x0E)

Set parameters used by registration module.

Byte offset	Description
2	Packet length = 10
3	Packet type = 0x0E
4	Maximum translation in pixels, LSB – default of 0 is equivalent to 120 for a 480 high image ( $\frac{1}{4}$ of the image height)
5	Maximum translation in pixels, MSB
6	Maximum rotation range in degrees per frame: 0..10 (values larger than 10 clipped to 10). 5 is default.
7	Maximum zoom range in percent zoom per frame: 0..10. 0 is default.
8	Left image edge pixel band to ignore. 0..255. Used for overlays or foreground objects that appear near the edge of the image. 0 is default. At least $\frac{1}{4}$ of the smaller dimension of the image must be remaining. For NTSC, remaining non-ignored image must be at least 120x120. <b>MOD 2.17</b>
9	Right image edge pixel band to ignore. 0..255 0 is default.
10	Top image edge pixel band to ignore. 0..255 0 is default.
11	Bottom image edge pixel band to ignore. 0..255 0 is default.

Use the “ignore edge pixel band” to indicate that the registration algorithm to not include these pixels when determining the registration match. This can be used to compensate for effects of the optics such as vignetting or when there is an obstruction along an edge of the image.

## Set Video Parameters (0x10)

Set parameters used by tracking module. Default values: automatic detection of active video region (auto-chop) and apply deinterlacing as it assumes an interlaced analog video input.

**WARNING: Sending this message resets registration and stabilization.**

Byte offset	Description	
2	Packet length = 9	
3	Packet type = 0x10	
4	Auto-chop	
	Value	Description
	0	removed specified edge pixels ( <b>recommended</b> )
	1	automatically detect boundary pixels to remove (default)
	MANUAL CHOP: Number of Pixels to remove (Values are rounded down to the nearest 8)	
5	Top pixels to remove (values 8 to 64)	
6	Bottom pixels to remove (values 8 to 64)	
7	Left pixels to remove (values 8 to 128)	
8	Right pixels to remove (values 8 to 128)	
9	<b>Deinterlacing mode:</b>	
	Value	Description
	0	no deinterlacing
	1	apply digital deinterlacing (default)
10	Automatically reset video decoder when failed frame synchronization loss is detected.	
	Value	Description
	0	Never (default)
	1	When frame synchronization loss detected

## CHOP

Many cameras produce images with black pixels along one or more edges. It is important to remove these pixels as the hard edge transition can cause frame-to-frame registration to fail. The edge pixels are removed by either setting **automatic detection mode** or **manually specifying top, bottom, left and right edge pixels** to remove. For a known camera, manually specifying edge pixels is the most reliable option. If you see black edges in a moving stabilized image, that is an indication that edge

pixel removal is not set up correctly.

### Set Stabilization Bias (0x12)

Adjust the stabilization solution by adding a constant bias in pixel coordinate space to the current coordinates each frame. This is used to feed forward user controlled camera motion so that stabilization does not “fight” against camera pan and tilt. Set “auto bias” mode to automatically prevent the system from stabilizing against constant motion. Some amount of motion lag will still be experienced in “auto bias” mode.

**NEW 2.18** Manual bias offsets can be used in “auto bias” mode. In “auto bias” mode, set column and row bias to 0 for “auto bias” only. Changes to the column and row bias values will be added to the “auto bias” solution.

Byte offset	Description
2	Packet length = 5
3	Packet type = 0x12
4	-128..127: Per frame column adjustment (bias) in pixels (signed 8-bit integer)
5	-128..127: Per frame row adjustment (bias) in pixels (signed 8-bit integer)
6	1 = Enable auto bias (combined auto + manual bias) 0 = Disable auto bias (manual bias only)

### Set Metadata Data Values (0x13)

Getter					
Header	Length	Type	ID	Checksum	
0x51	0xAC	0x03	<a href="#">Get Parameters Function (0x28)</a>	0x13	Compute
<b>Reply:</b> <a href="#">Current Metadata Data Values (0x13)</a>					

Sets new KLV metadata data values. Latest values are output with h.264 digital video stream. Metadata is generated in accordance with MISB standards 0102.10, 0601.7, 0603.2, 0604.3, and 0903.3. Selectable KLV elements may be chosen from a superset of the Motion Imagery Sensor Minimum Metadata Set defined in ST 0902.3. For conversion of values see Table 1 on page 16 of: <http://www.gwg.nga.mil/misb/docs/standards/ST060107.pdf>.

Byte offset	Description
2	Packet length = 44
3	Packet type = 0x13
4 – 5	Valid data bit mask. Update corresponding data element when bit value = 1. Unsigned 16 bit integer

6 – 13	UTC time (bit 0) unsigned 64-bit integer
14 – 15	Platform heading angle (bit 1) unsigned 16-bit integer
16 – 17	Platform pitch angle (bit 2) signed 16-bit integer
18 – 19	Platform roll angle (bit 3) signed 16-bit integer
20 – 21	Sensor latitude (bit 4) signed 32-bit integer
24 – 27	Sensor longitude (bit 5) signed 32-bit integer
28 – 29	Sensor altitude (bit 6) unsigned 16-bit integer
30 – 31	Sensor horizontal field of view (bit 7) unsigned 16-bit integer
32 – 33	Sensor vertical field of view (bit 8) unsigned 16-bit integer
34 – 37	Sensor relative azimuth angle (bit 9) unsigned 32-bit integer
38 – 41	Sensor relative elevation angle (bit 10) signed 32-bit integer
42 – 45	Sensor relative roll angle (bit 11) unsigned 32-bit integer

### **Current Metadata Data Values (0x13)**

NOTE: Get response for [Set Metadata Data Values \(0x13\)](#) uses the same ID (0x13).

<b>Byte offset</b>	<b>Description</b>
2	Packet length = 42
3	Packet type = 0x13
4 – 11	UTC time (bit 0) unsigned 64-bit integer
12 – 13	Platform heading angle (bit 1) unsigned 16-bit integer
14 – 15	Platform pitch angle (bit 2) signed 16-bit integer
16 – 17	Platform roll angle (bit 3) signed 16-bit integer
18 – 19	Sensor latitude (bit 4) signed 32-bit integer
22 – 25	Sensor longitude (bit 5) signed 32-bit integer
26 – 27	Sensor altitude (bit 6) unsigned 16-bit integer
28 – 29	Sensor horizontal field of view (bit 7) unsigned 16-bit integer
30 – 31	Sensor vertical field of view (bit 8) unsigned 16-bit integer
32 – 35	Sensor relative azimuth angle (bit 9) unsigned 32-bit integer
36 – 39	Sensor relative elevation angle (bit 10) signed 32-bit integer
40 – 43	Sensor relative roll angle (bit 11) unsigned 32-bit integer

**Set Metadata Static Values (0x14)**

Getter						
Header		Length	Type	ID	Data	Checksum
0x51	0xAC	0x04	<a href="#">Get Parameters Function (0x28)</a>	0x14	<a href="#">Static Element Identifier</a>	Compute
<b>Reply: Set Metadata Static Values (0x14)</b>						

Sets new KLV metadata values. Latest values are output with H.264 digital video stream, at the rate for each element specified by message 0x62. For non-string values, data encoding is big-endian as defined by MISB 0603. For example, to encode Target Error Estimate CE90 which is specified as a uint16 value, “Identifier string length” should be set to 2, byte 6 to the most significant byte of the value, and byte 7 to the least significant byte of value.

Byte offset	Description
2	Packet length = 4+n
3	Packet type = 0x14
4	<p><b>Static Element Identifier</b></p> <ul style="list-style-type: none"> <li>0 = Mission Identifier</li> <li>1 = Platform Designation</li> <li>2 = Image Source Sensor</li> <li>3 = Image Coordinate System</li> <li>4 = Security: Classification</li> <li>5 = Security: Classifying country coding method</li> <li>6 = Security: Classifying country</li> <li>7 = Security: SCI/SHI information</li> <li>8 = Security: Caveats</li> <li>9 = Security: Releasing Instructions</li> <li>10 = Security: Object Country Coding Method</li> <li>11 = Security: Object Country</li> <li>12 = Motion Imagery Core Identifier</li> <li>13 = Platform Tail Number</li> <li>14 = Target Error Estimate CE90</li> <li>15 = Target Error Estimate LE90</li> <li>16 = Generic Flag Data 01</li> <li>17 = Platform Call Sign</li> </ul>
5	Identifier string length (n)
6 – (6+n-1)	Identifier string

**Set Metadata Frame Data Values (0x15)**

Getter					
Header		Length	Type	ID	Checksum
0x51	0xAC	0x03	<a href="#">Get Parameters Function (0x28)</a>	0x15	Compute
<b>Reply:</b> <a href="#">Current Metadata Frame Data Values (0x15)</a>					

Sets new KLV metadata frame data values. Latest values are output with H.264 digital video stream.

Byte offset	Description
2	Packet length = 20
3	Packet type = 0x15
4 – 5	Valid data bit mask. Update corresponding data element when bit value = 1. Unsigned 16 bit integer
6 – 9	Frame center latitude (bit 0) signed 32-bit integer
10 – 13	Frame center longitude (bit 1) signed 32-bit integer
14 – 15	Frame center elevation (bit 2) unsigned 16-bit integer
16 – 17	Target width (bit 3) unsigned 16-bit integer
18 – 21	Slant range (bit 4) unsigned 32-bit integer

**Current Metadata Frame Data Values (0x15)**

NOTE: Get response for [Set Metadata Frame Data Values \(0x15\)](#) uses the same ID (0x15).

Byte offset	Description
2	Packet length = 18
3	Packet type = 0x15
4 – 7	Frame center latitude (bit 0) signed 32-bit integer
8 – 11	Frame center longitude (bit 1) signed 32-bit integer
12 – 13	Frame center elevation (bit 2) unsigned 16-bit integer
14 – 15	Target width (bit 3) unsigned 16-bit integer
16 – 19	Slant range (bit 4) unsigned 32-bit integer

**Set Metadata Rate (0x62)**

Getter					
Header	Length	Type	ID	Data	Checksum

0x51	0xAC	0x04	<a href="#">Get Parameters Function (0x28)</a>	0x62	<a href="#">Bit field number</a>	Compute
<b>Reply</b>						
0x51	0xAC	0x04	<a href="#">Set Metadata Rate (0x62)</a>	<a href="#">Bit field number</a>	Frame Step	Compute

Sets the frame step rates at which KLV metadata is output.

Byte offset	Description
2	Packet length = 11
3	Packet type = 0x62
4 – 11	Set rate bit mask. Update the rate for the corresponding data element when bit value = 1. See <a href="#">Bit field number</a> for a list of bits. Unsigned 64 bit integer
12	Frame step at which to send the specified data values. 0=disable sending KLV metadata, 1=send each frame, etc.

### **Bit field number**

Bit	Field	Bit	Field
0	UTC time (2)	26	Security: Releasing instructions (48/6)
1	Mission ID (3)	27	Security: Object country coding method (48/12)
2	Platform heading angle (5)	28	Security: Object country (48/13)
3	Platform pitch angle (6)	29	Security: Metadata version (48/22)
4	Platform roll angle (7)	30	UAS local set version (65)
5	Platform designation (10)	31	Motion imagery core identifier (94)
6	Image source sensor (11)	32	Platform tail number (4)
7	Sensor latitude (13)	33	Offset corner latitude point 1 (26)*
8	Sensor longitude (14)	34	Offset corner longitude point 1 (27)*
9	Sensor true altitude MSL (15)	35	Offset corner latitude point 2 (28)*
10	Sensor horizontal field of view (16)	36	Offset corner longitude point 2 (29)*
11	Sensor vertical field of view (17)	37	Offset corner latitude point 3 (30)*
12	Sensor relative azimuth angle (18)	38	Offset corner longitude point 3 (31)*
13	Sensor relative elevation angle (19)	39	Offset corner latitude point 4 (32)*
14	Sensor relative roll angle (20)	40	Offset corner longitude point 4 (33)*
15	Frame center latitude (23)	41	Target location latitude (40)**
16	Frame center longitude (24)	42	Target location longitude (41)**

17	Frame center elevation MSL (25)	43	Target location elevation (42)**
18	Target width (22)	44	Target track gate width (43)**
19	Slant range (21)	45	Target track gate height (44)**
20	Image coordinate system (12)	46	Target error estimate CE90 (45)
21	Security: Classification (48/1)	47	Target error estimate LE90 (46)
22	Security: Classifying country coding method (48/2)	48	Generic flag data 01 (47)
23	Security: Classifying country (48/3)	49	Platform call sign (59)
24	Security: SCI/SHI information (48/4)	50	Vmti LDS targets (74)***
25	Security: Caveats (48/5)		

\*Values are calculated from platform angles, sensor angles, sensor position, frame center position, and slant range that are supplied by messages 0x13 and 0x15. All four corners are assumed to be at the same elevation as the frame center for these calculations.

\*\*Values are calculated from values supplied by messages 0x13 and 0x15, and by internal tracking position and box size. Target elevation is assumed to be the same as frame center elevation, and target latitude and longitude are calculated in a manner similar to the four corners. Track gate width and height are in pixels, derived directly from target box size.

\*\*\*Values are calculated from internal tracking information. Multiple targets (either user-designated or automatically-generated) are indicated. Pixel coordinates are in “display” coordinates suitable for directly rendering over streamed digital video.

Sets the frame step rates at which KLV metadata is output. Per STD 0601, version identifier fields for the UAS Local Data Set, Security Metadata Local Set, and Motion Imagery Track Metadata Local Set are emitted with elements of each local set.

### **Set KLV Data (0x61)**

Set KLV blob data constructed by user to be sent with H.264 stream. The KLV data will be sent along with the next H.264 frame.

When you use this feature, you may want to disable the transmission of the built-in KLV metadata. You can do that by setting Frame step to 0 using [Set Metadata Rate \(0x62\)](#) command.

Byte offset	Description
2	KLV data length + 4 (if > 127, see below)
3	Optional high bits of KLV data length (if > 127, see below)
n	Type = 0x61
n+1	<i>Reserved</i> (must be 0)



n+2	<i>Reserved</i> (must be 0)
n+3	KLV data start
...	KLV data continued

The following is used to set the data length:

```
u16 len = KLV_Length + 4;
if(len<=127) {
    data[2] = length;
    data[3] = 0;
} else {
    data[2] = (length & 0x7f) | 0x80;
    data[3] = (length>>7) & 0xFF;
}
```

### Example:

The following byte sequence is a packet with KLV data.

```
const unsigned char setKlvDataPacket[] = {
    //TotalPacketLen=163, klvLen=155
    0x51, 0xac,          // Signature bytes
    0x9f, 0x01,          // Length (159 (0x9f) bytes: type(1) + reserved(2) + KLV(155) + checksum(1))
    0x45,                // Type (SetKlvData)
    0x00, 0x00,          // Reserved (must be 0)
    // KLV Data (155 bytes)
    0x06, 0x0e, 0x2b, 0x34, 0x02, 0x0b, 0x01, 0x01, 0x01, 0x0e, 0x01, 0x03, 0x01, 0x01, 0x00, 0x00, 0x00,
    0x81, 0x89, 0x02, 0x08, 0x00, 0x04, 0xb2, 0xf0, 0xcc, 0x84, 0xe8, 0x00, 0x03, 0x29, 0x53, 0x61,
    0x6d, 0x70, 0x6c, 0x65, 0x20, 0x4b, 0x4c, 0x56, 0x20, 0x64, 0x61, 0x74, 0x61, 0x20, 0x62, 0x79,
    0x20, 0x53, 0x69, 0x67, 0x68, 0x74, 0x4c, 0x69, 0x6e, 0x65, 0x20, 0x41, 0x70, 0x70, 0x6c, 0x69,
    0x63, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x05, 0x02, 0x00, 0x00, 0x06, 0x02, 0x00, 0x00, 0x07,
    0x02, 0x00, 0x00, 0x0d, 0x04, 0x00, 0x00, 0x00, 0x00, 0x0e, 0x04, 0x00, 0x00, 0x00, 0x00, 0x0f,
    0x02, 0x00, 0x00, 0x10, 0x02, 0x00, 0x00, 0x11, 0x02, 0x00, 0x00, 0x12, 0x04, 0x00, 0x00, 0x00,
    0x00, 0x13, 0x04, 0x00, 0x00, 0x00, 0x00, 0x14, 0x04, 0x00, 0x00, 0x00, 0x00, 0x17, 0x04, 0x00,
    0x00, 0x00, 0x00, 0x18, 0x04, 0x00, 0x00, 0x00, 0x00, 0x19, 0x02, 0x00, 0x00, 0x16, 0x02, 0x00,
    0x00, 0x15, 0x04, 0x00, 0x00, 0x00, 0x00, 0x01, 0x02, 0xab, 0x22,
    0x7a                // Checksum
};
```

### Set Display Parameters (0x16)

Sets new display parameter settings. Current rotation is smoothly changed to specified value, digital zoom, and false color modes may be controlled.

Byte offset	Description
2	Packet length = 14
3	Packet type = 0x16
4 – 5	Rotation angle in degrees (0..360) * 128
6 – 7	Rotation rate limit in degrees (0..360) * 128 per frame (29.97 Hz)

8	Decay rate 0 to 255
9	<p>Bits 0 - 6: False color mode:  0, 1 = no false color  2, 3 = white hot, black hot  4, 5 = rainbow, rainbow inverted  6, 7 = iron, iron inverted  8, 9 = hot/cold, hot/cold inverted  10, 11 = jet, jet inverted  12, 13 = hot, hot inverted  14, 15 = HSV, HSV inverted  16, 17 = 470CLR_S, 470CLR_S inverted  18, 19 = Color1, Color1 inverted  20, 21 = Color2, Color2 inverted  22, 23 = Color3, Color3 inverted  24, 25 = hot iron, hot iron inverted  26, 27 = ice fire, ice fire inverted  28, 29 = IDDEF, IDDEF inverted  30, 31 = Iron256, Iron256 inverted  32, 33 = Rain256, Rain256 inverted  34, 35 = XVolcano, XVolcano inverted  36, 37 = Red, Red inverted  38, 39 = Green, Green inverted  40, 41 = Blue, Blue inverted  127 = User Palette. See <a href="#">Set User Palette (0x72)</a> command.</p> <p>Bit 7: Zoom mode  0 = zoom to center of display  1 = zoom to tracking box</p>
10	<p>Zoom – digital image magnification factor times 64.  0 to 31 – No zoom (1X) (<i>subject to change</i>)  32 to 63 – Zoom out by 0.5 to 0.98  64 – No zoom (1X)  65-255 – Zoom in by 1.01 to 3.98  NOTE: Zoom factors may be further limited for some HD camera and hardware combinations.</p>
11, 12	Display pan column offset in pixels (-32767 to 32768).
13, 14	Display tilt row offset in pixels (-32767 to 32768).
15	<p>Logical Camera Index  Specifies the logical camera to apply the false color field to (byte 9). See <a href="#">Set Video Mode (0x1F)</a> (bytes 8-11) for information about setting logical camera order.  Note: 0 is assumed if parameter is not supplied.</p>

### **Get Display Parameters (0x3A)**

Query the system for the current display parameters. Results in the transfer of a [Current Display Parameters \(0x57\)](#) packet.

Byte offset	Description
2	Packet length = 3
3	Packet Type = 0x3A
4	Logical Camera Index. Specifies the logical camera's index to retrieve enhancement parameters of. Note: 0 is assumed if parameter is not supplied.

### Set ADC Parameters (0x18)

Set parameters of the video analog-to-digital converter. See also [Current ADC Parameters \(0x47\)](#).  
Not functional on Digital Camera Inputs.

Byte offset	Description
2	Packet length = 12
3	Packet type = 0x18
4	Brightness 0 = dark 128 = default 255 = bright
5	Contrast 0 = minimum contrast 128 = default 255 = maximum
6	Saturation 0 = no color 128 = default 255 = maximum
7	Hue 8-bit signed integer (-128..127) 0 = default
8	Luma processing control #1 register (0x07) 96 (0x60) = default
9	Luma processing control #2 register (0x08) 0 = default
10	Luma processing control #3 register (0x0E) 0 = default
11	Chroma processing control #1 register (0x1A)

	12 (0x0C) = default
12	Chroma processing control #2 register (0x1B) 20 (0x14) = default
13	Reserved <b>NEW 2.18</b>

### Set Ethernet Video Parameters (0x1A)

Effects the quality (RTP-MJPEG only), size and frame rate of the individual video frames sent over Ethernet. See [Set H.264 Video Parameters \(0x23\)](#) for additional H.264 specific parameters.

Byte offset	Description
2	Packet length = 6 (or 8 for 3000)
3	Type = 0x1A
4	Quality – MJPEG video only. 0: lowest image quality to 100: highest image quality 0 to 100 (default 80)
5	Foveal – MJPEG video only. Reduces image quality for pixels away from image center. 0: no quality reduction, 100: maximum quality reduction. 0 to 100 (default 0)
6	Frame Step - 1 shows every frame, 2 shows every other frame, etc. Applies to both MJPEG and H.264 Ethernet video. 1 to 120 (default 1)
7	Lower nibble: Down Sample – Whole integer value that image will be down sampled by. Applies to both MJPEG and H.264 Ethernet video. 0, 1 = no downsample 2 = 2x2 downsample 4 = 4x4 downsample NOTE: Down Sample 4 is not supported for MJPEG on SLA-2x00. (default 1) Down sample is not supported on SLA-3000.  Upper nibble: Output frame size – size of destination video. Works only when Video Format is set to a compatible format (see <a href="#">Set Ethernet Display Parameters (0x29)</a> ) 0 = Default (1500/2000: 640x480 in NTSC mode, 720x576 in PAL mode; 3000: output size==input size) 1 = SD (1500/2000: 640x480 in NTSC mode, 720x576 in PAL mode; 3000: 640x480) 2 = 720x572 (3000 only)

	3 = 720p (1280x720) 4 = 720p cropped (960x720) 5 = 1080p (1920x1080) 6 = 1080p cropped (1440x1080) SLA-2x00: only size 0 is valid SLA-1500: size 0 always valid. Sizes 1, 2 are valid when Video Format is set to H.264 (HD) <b>NEW 2.20</b>
8 – 9	3000 only: [Optional] Network Display ID (0x0002=Net0, 0x0040=Net1, 0x0042=both, else the command will be ignored), if not present, then applies to both

### Set Network Parameters (0x1C)

Configure the network settings for the device. See also [Discover Protocol](#). Some SightLine products can support multiple physical/virtual network interface controllers; these can be itemized by their NIC index. However, for most applications, there will be only 1 NIC (index 0).

**IMPORTANT:** For parameter changes to take effect, a board soft reset should be performed, by issuing [Save Parameters \(0x25\)](#) and [Reset \(0x01\)](#) (Reset Type = 2, soft reset) messages.

Byte offset	Description	
2	Packet length = 22 <b>NEW 2.20</b>	
3	Packet type = 0x1C	
4	Mode	
	0	Use DHCP (bytes 5 -16 ignored)
	1	Use Static IP address
5 – 8	IP ADDRESS (dot form, e.g. 192 168 1 197) 0 = No Change	
9 – 12	Subnet Mask (dot form, e.g. 255 255 255 0) 0 = No Change	
13 – 16	Gateway (dot form, eg. 192 168 1 1) 0 = No Change	
17	MSB	Command and Control Reply Port (0 = No Change)
18	LSB	
19 – 20	Reserved <b>MOD 2.18</b>	
21	Modes	
	<b>Bit</b>	<b>Description</b>

	0 – 1	<i>Reserved</i>
	2	0 – Enable Last In First Out (default) 1 – Disable Last In First Out (Requires <a href="#">Set Packet Destination (0x64)</a> )
	3 – 7	<i>Reserved</i>
22		Network Interface Controller Index (default 0) <b>NEW 2.20</b> (see <a href="#">Set Host Name (0x66)</a> )

### Command and Control Reply Port

Port on remote device that SLA-HARDWARE will send outbound replies to any received commands. Zero (0) indicates no change. Default port is **14002**. Client should create a listening socket on this port. See [Discover Protocol](#) for inbound port that SLA-HARDWARE is listening for commands.

### Telemetry Reply Port (deprecated)

Port on remote device that SLA-HARDWARE will send all Telemetry responses (0x43, 0x51, etc.) Zero (0) indicates no change. Default is 14002. If **different** from Command and Control Reply Port telemetry responses will **NOT** be sent to Command and Control Reply Port. Client should create an additional listening socket on this port if different from C2 port.

### Disable Last In First Out (LIFO)

By default, the last client to send a command packet will get all future telemetry responses. If disable LIFO field is set to 1, the client must add themselves to response list via [Set Packet Destination \(0x64\)](#).

For example, Client A sends commands to the SLA-HARDWARE for configuring stabilization and [Set Coordinate Reporting Mode \(0x0B\)](#) frequency to 10 Hertz. Client A then gets all the [Tracking Position \(0x43\)](#) responses as expected. Client B sends a [Get Version \(0x00\)](#) command to the SLA-Hardware. Client B receives the [Version Number \(0x40\)](#) response as expected, but then begins getting all of the tracking position responses. Client A will no get NO tracking position responses, since Client B was the “Last In”.

If Client A had set the DISABLE LIFO bit to 1 and then added itself to the Packet Destination list, Client A would continue to get tracking position responses from the SLA-HARDWARE even if Client B sends it commands.

### Get Network Parameters (0x1D)

Generates a [Current Network Parameters \(0x49\)](#) packet.

Header 1	Header 2	Length	Type	NIC Index	Checksum
0x51	0xAC	0x03	0x1D	<i>NN</i>	<i>MM</i>

**Set SD Card Recording Parameters (0x1E)**

**NOTE: Recording of video and commands to SD Card is not available on the SLA-2000.**

Modify recording parameters for **on board video** and other data recording to secure digital card (SD Card). For SnapShot recording see [Set SnapShot \(0x5E\)](#).

Byte offset	Description	
2	Length = 11 + Length of label (see Byte 12)	
3	Type = 0x1E	
4	Modify Recording State	
	0	Don't Change State
	1	Start Recording (requires mode (byte 10) and filename (byte 12))
	2	Stop Recording
	3	Enable network debug trace of commands and responses
	4	Disable network debug trace of commands and responses
	5	Enable network debug trace of telemetry
5	Clear Flash	
	0	Don't clear
	1	Clear flash. If a recording is in progress, it will be stopped.
6	2	If a file name is specified, only that file will be deleted.
	Get Status – see <a href="#">Current SD Card Recording Status (0x58)</a>	
7	Get Directory	
	<b>Value</b>	<b>Description</b>
	0	Don't get directory
	1	Get directory information. (See <a href="#">Current SD Card Directory Contents (0x59)</a> ) If a file name is specified (byte 12), it will be interpreted as a path (SLA-1500 only)
	2	Get directory statistics (see <a href="#">Directory Statistics Reply (0x79)</a> <b>NEW 2.20.12</b> )
3 – 15	<i>Reserved</i>	

8 & 9	<i>Reserved</i>	
10	Record Type – specified as bits, but only commands and telemetry can be recorded together.	
	0x01	H.264
	0x02	JPEG
	0x04	Commands (file name will have <i>.log</i> appended)
	0x08	Output Telemetry (all platforms)
0x10	Pass-through log file – log data sent by <a href="#">Command Pass-through (0x3D)</a> to an SD card file.	
11	<i>Reserved</i>	
12	Length of FileName or a path Set to 0 if no label is necessary.	
13...13+labelLength-1	[OPTIONAL] FileName or path name When recording a video, file extension “.ts” is added to the file name. This video can then be played back in VLC.	

## FILE NAMING:

If **FileName** ends with non-numeric characters, file will save to <FileName>\_NNNN.ts where NNNN is an incrementing count, starting at 0. If FileName ends with a numeric character (0-9), file will save to <FileName>.ts

If you use FileName...	And then Do Snap (0x60)...	You should see...	Note
Hello		Hello_0000.ts	Count starts at 0
Hello		Hello_0001.ts	Count increments
World		World_0000.ts	Count restarts when FileName changes
Hello42		Hello42.ts	Count is not appended for FileName ending in a numeric character.

**NOTE: The file name count resets to 0 on power up. Files will be overwritten if you use the same base file name after a power cycle.**

## Example 1: Record commands to MicroSD

Start recording Commands to MicroSD

0	1	2	3	4	5	6	7	8	9	10	11	12	13 - 17	18
0x51	0xAC	0x10	0x1E	0x01	0x00	0x00	0x00	0x00	0x00	0x04	0x00	0x05	hello	chksum

Stop Recording Command



0	1	2	3	4	5	6	7	8	9	10	11	12	13
0x51	0xAC	0x0B	0x1E	0x02	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00	chksum

At this point the video file **hello\_0000.ts** will found on the MicroSD card.

## Example 2: Get the Directory Contents of the MicroSD Card

0	1	2	3	4	5	6	7	8	9	10	11	12	13
0x51	0xAC	0x0B	0x1E	0x00	0x00	0x00	0x01	0x00	0x00	0x00	0x00	0x00	0x05

### NOTES:

- System may stall for several seconds while writing video file to MicroSD Card when the STOP RECORDING command is issued (byte 4).
- System may stall for several seconds when files are deleted (byte 5).

### Set Video Mode (0x1F)

Configures capture and display options.

Byte offset	Description	
2	Packet length = 16 (or 20 for 3000)	
3	Type = 0x1F	
4	<i>This parameter is ignored.</i> Number of Input Camera channels (1-5) – hardware determines the number.	
5	<i>This parameter is ignored.</i> Display Destination determines the value for number of network outputs. 3000: this parameter must be 0.	
6	<a href="#">Display Modes</a>	
	Value	Description
	0	One UP
	1	Picture In Picture
	2	Two Up
	3	Quad Screen
	4	Blended (see also <a href="#">Set Blend Parameters (0x2F)</a> )
	5	Stitch
	6	Side-By-Side
7– 15	<i>Reserved</i>	

7	Display Destination 3000: ignored if packet length > 16	
	<b>Value</b>	<b>Description</b>
	0	NONE
	1	Analog Video
	2	Network
	3	Analog and Network
	4	HD-SDI 720P (SLA-2100 only)
	5	HD-SDI 1080P (SLA-2100 only)
	6	HD-SDI 1080I (SLA-2100 only)
	7	<i>Reserved</i>
	<b>Enable Bit</b>	<b>Description</b>
	0x08	NTSC_VBI output (SLA-1500,2000 only). Works with “Analog Video” and “Analog and Network” display destinations for NTSC output only (not PAL). <b>Requires save parameters and power cycle.</b>
0x40	Non-square pixel 720 wide output mode (2000 only) <b>NEW 2.20.18</b>	
0x80	3000: Secondary Network (Net1)	
8	Camera Stabilize Order Camera 0 index. Identifies the camera that the telemetry output comes from and indicates which camera channel receives camera specific parameters settings.	
9	2000 only: Camera Stabilize Order Camera 1 index	
10	2000 only: Camera Stabilize Order Camera 2 index	
11	2000 only: Camera Stabilize Order Camera 3 index	
12	PiP Scale 0 = don't change 1 = $\frac{1}{4}$ screen size thumbnail of full screen 2 = $\frac{3}{8}$ screen size thumbnail of full screen 3 = $\frac{1}{2}$ screen size thumbnail of full screen 4 = $\frac{1}{4}$ screen size zoom on primary track <b>NEW 2.17</b>	

	$5 = \frac{3}{8}$ screen size zoom on primary track <b>NEW 2.17</b> $6 = \frac{1}{2}$ screen size zoom on primary track <b>NEW 2.17</b>	
13	PiP Quadrant	
	Value	Description
	0	Top Right
	1	Bottom Right
	2	Bottom Left
	3	Top Left
14	2000/3000 only: Camera Display Order Camera 0 index. Identifies camera to display for single camera display or camera 0 for multi-camera display.	
15	2000/3000 only: Camera Display Order Camera 1 index. Identifies Camera 1 for multi-camera display (PiP, Two Up and 2000 only - Quad modes).	
16	2000 only: Camera Display Order Camera 2 index. Identifies Camera 2 for Quad camera display mode.	
17	2000 only: Camera Display Order Camera 3 index. Identifies Camera 3 for Quad camera display mode.	
18	3000 only: Analog Display Image 0, 1, 2 = Camera 0, 1, 2 4 = Multi Camera (PiP or Two-Up) 8 = Blend 255 = None	
19	3000 only: HDMI Display Image (0, 1, 2, 4, 8, 255) NOTE: 3000 cannot display to Analog and HDMI at the same time. If both are specified, then HDMI is ignored.	
20	3000 only: Network 0 Display Image (0, 1, 2, 4, 8, 255)	
21	3000 only: Network 1 Display Image (0, 1, 2, 4, 8, 255)	

## Display Modes

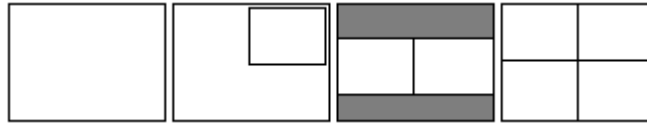


Illustration 1: Display Modes

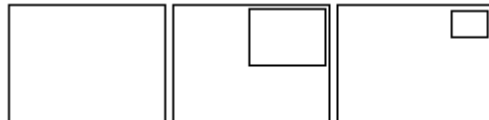


Illustration 2: Picture-In-Picture Scale

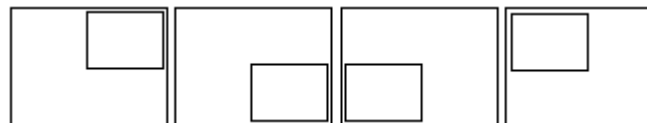
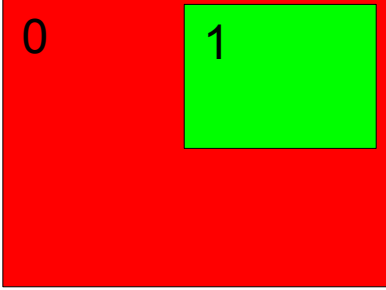
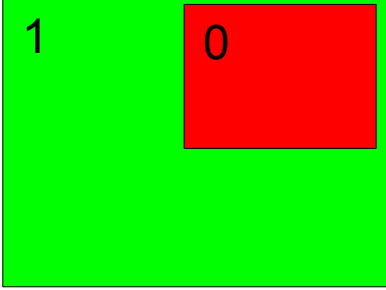
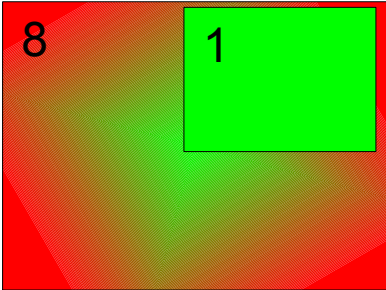


Illustration 3: Picture-In-Picture Quadrant

## Camera Display Order (2000 Only)

Defines the order in which cameras will be displayed for display mode. For Example:

 <p>0      1</p>	 <p>1      0</p>	 <p>8      1</p>
<p>Display Order: 0,1,2,3 0 = Camera 0 image</p>	<p>Display Order: 1,0,2,3 1 = Camera 1 image</p>	<p>Display Order: 8,1,2,3 8 = <b>Blend</b> image</p>

When using **Blend** mode, the first field for **Camera Display Order** value should be set to “8”. This indicates that the primary display will contain the blended image. For example:

Display Mode	Display Dest	Camera Order				...	Camera Display Order			
0x04	0x01	0x00	0x01	0x02	0x03	...	<b>0x08</b>	0x01	0x02	0x03

**Set Video Enhancement Parameters (0x21)**

Set parameters of the video analog-to-digital converter.

Byte offset	Description	
2	Packet length = 6	
3	Packet type = 0x21	
4	Enhancement Mode	
	Bits 0..3	Enhancement filter mode: 0 = None (default) 1 = CLAHE 2 = LAP
	Bits 4..7	Sharpening: 0 (none)..15 (max)
5	Alpha blending term 0..255 (200 nominal): 0 = use input frame only 128 = 50/50 mix 255 = use filtered frame only)	
6	Enhancement Parameter (Kernel)	
	Bits 0..6	0..127 None: not used CLAHE: contrast limit (typical 25) LAP: width of high pass kernel, clipped to 0..18. (typical 10)
	Bit 7	Limit Color. Limits the color near edges where aliasing effects might be scene.
7	Denoising coefficient (by running average): 0 = No denoising (default) 128 = 50/50 mix 255 = maximum averaging	

**Set H.264 Video Parameters (0x23)**

Modify H.264 output behavior. See also [Set Ethernet Display Parameters \(0x29\)](#) to set the receiver IP address, [Error: Reference source not found](#) to set KLV meta-data and [Set Ethernet Video Parameters \(0x1A\)](#) to change Down Sample and Frame Step. See also [Current H.264 Video Parameters \(0x56\)](#).

Byte offset	Description
2	Packet length = 11 (or 13 for 3000)
3	Packet Type = 0x23

4 – 7	Target Bit Rate (bits per second) [ LSB ] (Default 1500000)	
8	Intra Frame (I-frame) Interval (frames) (Default 30)	
9	Bits 0..3	0 = Filter All Edges (Default) 1 = Disable All Filtering 2 = Disable Slice Edge Filter Other values = <i>Reserved</i>
	Bits 4..6	<i>Reserved</i> , set to 0
	Bit 7	0 = Default 1 = Apply encoder fix to support hardware decoders (SLA-1500 only, SLA-2xxx set to 0)
10	Adaptive Intra Refresh AIR Mega-Block Period (frames) * (Default 0)	
11	Slice Refresh Row Number – number of rows to coded as each intra-slice* (Default 0)	
12	<i>Reserved</i> – See <a href="#">Set Ethernet Video Parameters (0x1A)</a> to change Down Sample and Frame Step for Ethernet video.	
13 - 14	3000 only: [Optional] Network Display ID (0x0002=Net0, 0x0040=Net1, 0x0042=both, else the command will be ignored), if not present, then applies to both	

## NOTES:

- To use Mega-Block Period or Slice Refresh, I-Frames must be set to zero (0).
- Problem: Target bit rate parameter changes don't take affect unless I-frame interval changes.
- Solution: when user commands target bit rate parameter change:
  - Change iframe interval to something random and set target bit rate to desired target bit rate
  - Change iframe interval back to old iframe interval.
  - Maximum bit rate: 10Mbits (10000000)

**Save Parameters (0x25)**

Commits current parameters to flash. Parameters are then loaded when system restarts. See [Reset \(0x01\)](#) for different options to reset parameters.

Byte offset	Value	Description
0	0x51	fixed header byte 1
1	0xAC	fixed header byte 2
2	0x02	Packet length
3	0x25	Packet Type
4	0x42	Checksum

**Get Parameters Function (0x28)**

The value of the **ID** field corresponds to the “Setter” of the same type. Response packets are unique and have their own ID.

Name	Header		Length	Type	ID	Checksum
Get Version Number	0x51	0xAC	0x03	0x28	0x00	0x73
Get Configuration (3000 only <sup>*2)</sup> )	0x51	0xAC	0x03	0x28	0x01	0x2d
Set Stabilization Parameters	0x51	0xAC	0x03	0x28	0x02	0xcf
Set Overlay Mode	0x51	0xAC	0x03	0x28	0x06	0xae
Set Tracking Parameters	0x51	0xAC	0x03	0x28	0x0C	0xd0
Set Coordinate Reporting Mode	0x51	0xAC	0x03	0x28	0x0B	0x53
Set Registration Parameters	0x51	0xAC	0x03	0x28	0x0E	0x6c
Set Video Parameters	0x51	0xAC	0x03	0x28	0x10	0xee
Set ADC Parameters	0x51	0xAC	0x03	0x28	0x18	0x2c
Set Ethernet Video Parameters <sup>(*)</sup>	0x51	0xAC	0x03	0x28	0x1A	0x90
Set Video Mode	0x51	0xAC	0x03	0x28	0x1F	0xaf
Set Video Enhancement Parameters	0x51	0xAC	0x03	0x28	0x21	0x0e
Set H.264 Video Parameters <sup>(*)</sup>	0x51	0xAC	0x03	0x28	0x23	0xb2
Set Stitch Parameters	0x51	0xAC	0x03	0x28	0x2B	0x70
Set Moving Target Detection Parameters	0x51	0xAC	0x03	0x28	0x2D	0xad
Set Blend Parameters	0x51	0xAC	0x03	0x28	0x2F	0x11
Get Image Size	0x51	0xAC	0x03	0x28	0x31	0x93
Set Ethernet Display Parameters <sup>(*)</sup>	0x51	0xAC	0x03	0x28	0x29	0xcc
Set SnapShot	0x51	0xAC	0x03	0x28	0x5E	0xb7
Set Parameter Block	0x51	0xAC	0x03	0x28	0x69	0x8a
Get Hardware ID	0x51	0xAC	0x03	0x28	0x50	0xa8
System Type	0x51	0xAC	0x03	0x28	0x63	0xf4

<sup>(\*)</sup> SLA-3000 Only

SLA-3000 takes an additional parameter in the following sub commands:

- Set Ethernet Display Parameters (0x29)
- Set H.264 Video Parameters (0x23)
- Set Ethernet Video Parameters (0x1A)

The packet format is shown below:

Byte offset	Description
2	Packet length = 3 (or 5 for 3000)
3	Type = 0x28
4	ID (0x1A, 0x23, or 0x29)
5 – 6	3000 only: [Optional] Network Display ID (0x0002=Net0, 0x0040=Net1), if not present, then Net0 is assumed

### (\*2) **Get Configuration (3000 only)**

This packet gets sent from SLA-3000 as a response to the Get Parameter / Get Configuration command.

Byte offset	Description
2	Packet length = 14
3	Type = 0x01
4	Max number of camera inputs (always 3)
5 – 7	<i>Reserved</i>
8 – 11	Camera present bit pattern, bit0=Cam0, bit1=Cam1,... (e.g. 0x00000005 indicates Cam0 and Cam2 are connected)
12 – 15	Display present bit pattern (e.g. 0x00000083 indicates Analog, Net0 and Net1 are available). See “Display Destination” in Set Ethernet Display Parameters command for display type values.

### **Set Ethernet Display Parameters (0x29)**

Configures output format of Ethernet Video. Set the destination IP address and port number where the video will be sent. See also [Set Video Mode \(0x1F\)](#) to set the Display Destination mode.

Byte offset	Description	
2	Packet length = 9 (or 11 for 3000)	
3	Type = 0x29	
	Description	
	Bits 0..3	Video Mode
	0	RTP MJPEG (default)
	1	H.264
	2	RTP MJPEG Source



		sends compressed source input image
	3	H.264 (HD) – SLA-1500 only
	4 - 14	<i>Reserved</i>
	15	None
	Bits 4..6	<i>Reserved, set to 0</i>
	Bit 7	Broadcast Ethernet video
	0	Disable Broadcast Video (default)
	1	Enable Broadcast (e.g. 255.255.255.255) Note setting this option may interact strongly with other network traffic. Use with caution. Affects H.264 video ONLY.
5 – 8	IP Address	
9 – 10	Base Port Number	
11 – 12	3000 only: [Optional] Network Display ID (0x0002=Net0, 0x0040=Net1, else the command will be ignored), if not present, then applies to both (Net1 uses Base Port Number + 1 in the case)	

## IP Address

Any valid IPv4 address. Internally, we determine if the IP address is within the [Multicast](#) range, so no additional setting are needed to use those address. If Byte 4 Bit 7 is set to 1, then you must set the IP address to 255.255.255.255.

## Example:

Tell the SLA-HARDWARE to send RTP-MJPEG video to IP address **192.168.1.140** on port **5004**.

Header		LEN	TYPE	MODE	IP Address				Port		CHK
0x51	0xAC	0x09	0x29	0x00	0xC0	0xA8	0x01	0x8c	0x8c	0x13	0x5B
					192	168	1	140	5004		

## Get Ethernet Display Parameters (0x39)

DEPRECATED: Use [Set Ethernet Display Parameters \(0x29\)](#). Use with [Get Parameters Function \(0x28\)](#). Returns a [Current Ethernet Display Parameters \(0x52\)](#).

[SLA-3000] Pass display destination in additional argument field to return parameters for each network destination (see [Set Video Mode \(0x1F\)](#) Byte 7).

**EXAMPLE:**

SLA HEADER		Length	Type	ID	Additional Args		checksum
0x51	0xAC	0x05	0x28	0x39	0x02	0x00	0x02

**Set Display Adjustments (0x2A)**

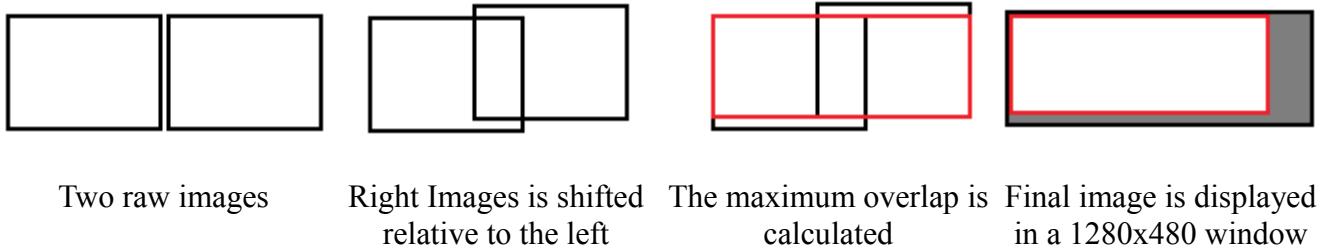
Set the parameters for fine-tuned adjustments of the display.

Byte offset	Description
2	Packet length = 8
3	Packet type = 0x2A
4,5	Ratio of secondary to primary imager zoom levels multiplied by 256
6, 7	Display pan column offset in pixels (-32768 to 32767). Signed 16-bit integer
8, 9	Display tilt row offset in pixels (-32768 to 32767). Signed 16-bit integer

**Set Stitch Parameters (0x2B)**

Set the parameters for image stitching mode. Requires [Set Video Mode \(0x1F\)](#) be used to set number of camera inputs to 2, display to Network Mode.

Byte offset	Description
2	Packet length = 10
3	Packet type = 0x2B
4	<i>Reserved = 0</i>
5	Shift camera one up. (0 ... 255) number of pixels
6	Shift camera one right. (0 ... 255) number of pixels
7	Shift camera one down. (0 ... 255) number of pixels
8	Shift camera one left. (0 ... 255) number of pixels
9	<i>Reserved = 0</i>
10	<i>Reserved = 0</i>
11	Reset calibration. (1 == reset, 0 == don't)



### Set Moving Target Indication Parameters (0x2D)

Set the parameters for Moving Target Indication (MTI). Results in [Current Tracking Positions \(0x51\)](#) results being generated. See also [Set Coordinate Reporting Mode \(0x0B\)](#).

Three modes of automatic moving target indication are available, depending on the security bits enabled.

1. **Vehicle** Medium Moving Target Indication. This mode works best when finding moving vehicles in a moving scene. It works well from a moving aerial platform for finding vehicles that are typically 10 to 100 pixels long in the scene. It does not work as well at finding very small, very large, slow or erratically moving objects. Available with SLA Baseline MTI [Application Bits \(App Bits\)](#).
2. **Staring** Small Moving Target Indication. This mode works well for a ground camera that is either stationary or moves then stares for an extended time at a scene. It can find objects that are small and move at slow, fast or varying rates or that temporarily stop. Available with SLA Baseline MTI [Application Bits \(App Bits\)](#).
3. **Aerial** Small Moving Target Indication. This mode works from a moving platform and can find small and slow, fast or erratically moving objects. It is capable of handling scene motion with frame to frame perspective change. It will lose objects that stop moving. This mode takes the most compute resource and is the most likely to run at less than full frame rate if other processing is also enabled (such as network video output). Available with SLA Enhanced MTI [Application Bits \(App Bits\)](#).

Byte offset	Description
2	Packet length = 9
3	Packet type = 0x2D
4	0 = Don't change motion modes <b>Note:</b> Only choose one of bits 4 (MTD), 5 (Staring MTI), 6 (Mobile MTI).
	Bit 0      1 = Disable All (Other bits ignored)
	Bit 1      1 = Reset MTI (Other bits ignored). This will clear all tracks, except in Vehicle mode the primary track will persist. <b>NEW 2.21</b>
	Bit 2      0 = Disable motion assist of primary target 1 = Enable motion assist for primary target only

	Bit 3	0 = Disable motion assist of all targets 1 = Enable motion assist for all targets
	Bit 4	<b>Vehicle</b> Medium Moving Target Indication – for use on a mobile platform 0 = Disable, 1 = Enable <b>Note:</b> if enabled, tracking mode will be set to vehicle tracking.
	Bit 5	<b>Staring</b> Camera Small Moving Target Indication - for use with a fixed camera or a ground mounted camera that moves then “stares”. 0 = Disable, 1 = Enable
	Bit 6	<b>Aerial</b> Platform Small Moving Target Indication – for use with an aerial moving camera. 0 = Disable, 1 = Enable
	Bit 7	<i>Reserved</i>
5		0 = Disable moving target debug display (default) 1 = Enable moving target debug display
6		Sensitivity 0 = Don't change sensitivity value. 1...10 Set sensitivity value. 1 = highest sensitivity 10 = lowest sensitivity. Default is 5.  The moving target indication sensitivity refers to the algorithm's “threshold” for deciding whether a particular candidate moving target is a moving target or a false positive. A lower value translates into greater sensitivity to moving targets and faster detection time, but also may introduce more false positives. A higher value translates into less sensitivity to moving targets, higher detection time for a given candidate, but less false positives.
7		MTI Threshold. (Not used in <b>Vehicle</b> MTI mode)  This is an advanced parameter. It controls the threshold at which potential moving targets are generated. The sensitivity parameter controls MTI threshold when this parameter is set to 0. Otherwise, it overrides the sensitivity parameter (byte 6).
8		MTI Watch Frames. (Not used in <b>Vehicle</b> MTI mode)  This is an advanced parameter. After a potential moving target is

	generated by the moving target indication system, it is watched by the system for a number of frames. This controls the number of frames the system watches a moving target before displaying it. The sensitivity parameter controls MTI watch frames when this parameter is set to 0. Otherwise, it overrides the sensitivity parameter (byte 6).
9	<p>MTI Suspicious Score. MOD 2.21. Was SuspScore16 in the advanced message. (Not used in <i>Vehicle</i> MTI mode)</p> <p>This is an advanced parameter. It controls the level at which we consider a track suspicious. Valid range is 0-10. 0 = Automatically set based on the sensitivity value. 1 = anything that doesn't move consistently is suspicious. 10 = track can move very erratically. Typically 1 is good for cars, 3-5 is good for people. Setting this value higher will result in more false positives.</p> <p>The sensitivity parameter controls MTI Suspicious Score when this parameter is set to 0. Otherwise, it overrides the sensitivity parameter (byte 6).</p>
10	<p>Frame Step. NEW 2.21 (Not used in <i>Vehicle</i> MTI mode)</p> <p>Step between frames. 1 processes every frame, 2 processes every other frame, etc. (1 to 5). Default 1.</p>

### Set Advanced Moving Target Indication Parameters (0x76)

This packet provides advanced control of the MTI parameters. Not used in *Vehicle* MTI mode.

Byte Offset	Name	Type	Description
2	Length	u8	Packet length = 40
3	Type	u8	Packet type = 0x76
4,5	MinVel8	s16	Minimum target velocity (256*pixels/frame) (-1 = not set)
6,7	MaxVel8	s16	Minimum target velocity (256*pixels/frame) (-1 = not set)
8,9	MaxAccel8	s16	Maximum target acceleration (256*pixels/frame <sup>2</sup> ) (-1 = not set)
10,11	MinWide	s16	Minimum target width (pixels) (-1 = not set)
12,13	MaxWide	s16	Maximum target width (pixels) (-1 = not set)
14,15	MinHigh	s16	Minimum target height (pixels) (-1 = not set)

16,17	MaxHigh	s16	Maximum target height (pixels) (-1 = not set)
18	Reserved	u8	<i>Reserved</i> <b>NEW 2.21</b>
19	NFramesBack	u8	Number of frames to go back in time to compare frames in MTI difference mode. (1 to 15). Default 15.
20	MergeRadius	u8	Maximum distance between targets at which they can be merged into a single target. (0 to 255 pixels) 0 = automatic, default = 0, typical is 10 to 25.
21	MergeDirTol	u8	Maximum angle heading difference between targets at which they can be merged. (0 to 180 degrees). Default = 45 degrees.
22	Reserved	u8	<i>Reserved</i> <b>NEW 2.21</b>
23	Reserved	u8	<i>Reserved</i> <b>NEW 2.21</b>
24,25	Reserved	s16	<i>Reserved</i> <b>NEW 2.21</b>
26,27	BgTimeConst	u16	Time constant (in frames) at which frames are averaged into the background model. At the default value of 600, the background will mostly be replaced after about 20 seconds.
28	BgEdgePenalty6	u8	Penalty to apply to edges in background model mode. Typical values are 0 (no edge penalty) to 64 (full edge penalty). Default 64.
29	BgResetConf	u8	Reset background model if registration confidence falls below this value for BgResetFrames frames. 0 to 100, default 60
30	BgResetOff	u8	Reset background model if the registration column or row offset exceeds this value for BgResetFrames frames. 0 to 255, default 100
31	BgResetAng	u8	Reset background model if the registration angle in degrees exceeds this value for BgResetFrames frames. 0 to 180, default 5
32	BgResetFrames	u8	Reset background model if the above conditions are met for this number of consecutive frames. 0 to 255, default 3. Allows for recovery from temporary bad frames or temporary large motion, but resets when there is a large amount of motion.
33	BgWarpConf	u8	Warp the background model if registration confidence falls below this value for BgWarpFrames frames. 0 to 100, default 80
34	BgWarpOff	u8	Warp the background model if the registration column or row offset exceeds this value for BgWarpFrames frames. 0 to 255, default 50
35	BgWarpAng	u8	Warp the background model if the registration angle in degrees exceeds this value for BgWarpFrames frames. 0 to 180, default 1
36	BgWarpFrames	u8	Warp the background model if the above conditions are met for this number of consecutive frames. 0 to 255, default 2. Allows for ignoring a small number of bad frames or temporary large motion, but warps when there is a significant amount of motion.

37	MaxTrackFrames	u8	Number of frames to keep tracking once target has disappeared. 1 to 244. 0 = automatic, 255 = don't drop.
38	DisplayIndices	u8	1 = show indices with targets, 0 = don't. TODO, use
39	Downsample	u8	Down Sample: <b>NEW 2.21</b> 0: None 1: 2x2 downsample, 2: 4x4 downsample 3: 8x8 downsample 255: Auto based on frame size <b>Note:</b> None is not supported for frame sizes greater than 1280x720.
40	MaxTrackTelem	u8	Maximum number of MTI tracks reported in the Current Tracking Positions (0x51) message. Default 10. <b>NEW 2.21</b>
41	MaxTrackKlv	u8	Maximum number of MTI tracks reported in the KLV data. Default 10. <b>NEW 2.21</b>

### **Set Blend Parameters (0x2F)**

Requires [Set Video Mode \(0x1F\)](#) be used to set [Display Modes](#) to Blend. See also [Current Blend Parameters \(0x4D\)](#).

**NEW 2.20** – Blend an EO (visible) and an IR camera. The EO camera can now be an HD digital camera. The EO camera will always be the camera that “warps” into the space of the IR camera to produce the output image.

When both cameras are standard definition with similar fields of view, set Absolute Zoom Mode off to scale the EO camera to match the IR. When the EO camera is HD, Absolute Zoom Mode can be turned on to achieve a more significant zoom factors. For example, if a 1280x720 HD camera is to be blended with a 640x480 camera where the horizontal fields of view match, pass zoom=128 and zoom absolute = 1 to get a zoom factor of 0.5 which will scale the HD image to 640x360 before blending.

Byte offset	Description	
2	Length = 18 <b>MOD 2.20</b>	
3	Packet type = 0x2F	
4	Bit 0	Offset Mode (see examples <a href="#">below</a> )
		0 Interpret bytes 5&6 as incremental offsets
		1 Interpret bytes 5&6 as absolute offsets
	Bit 1	Absolute Zoom Mode <b>NEW 2.20</b>
		0 Zoom (1 ... 255) maps to (0.9 ... 1.1). Usually used when both cameras are SD or have matching pixel size on target.
1 Zoom (1 ... 255) maps to (0.004 ... 0.996). Usually used when one camera is HD and the other is SD.		
Bits 2-7	<i>Reserved</i>	
5	Shift EO camera position vertically.	
	(-128...127) number of pixels.	
	Negative number = up Positive number = down	
6	Shift EO camera position horizontally.	
	(-128...127) number of pixels.	
	Negative number = left Positive number = right	
7	Rotation of EO camera (1 ... 255) maps to (-5 ... 5) degrees	
	0 = don't change rotation (default)	
8	Zoom scale factor applied to EO camera (1 ... 255). Maps to (0.9 ... 1.1) or to (0.004 to 0.996), depending on Absolute Zoom Mode in byte 4	
	0 = don't change zoom (default)	
9	Blend mode:	
	Value	Description
	0	Don't change (default)
	1	Frame Blend – basic percentage (controlled by Amount) blending of the two images, Optionally applies yellow Hue from bright areas in the EO image to the output.
	2	Thermal Blend – blends hot pixels from the IR camera



		(shown in red) with the EO image. Typically used to highlight hot areas in a daytime EO image.
	3	Night Blend – blends bright areas from the EO camera (modify color with Hue) with the IR image. Typically used to highlight bright lights in a night time IR image.
	4	Color Blend - percentage (controlled by Amount) blending of the two images like Frame Blend, but the color from the EO image is also passed to the output (also controlled by Amount).
10	Amount defines the amount of luminance information from the EO (visible) camera to include in the blended result.	
	0 = don't change/default.	
	(1 ... 255) maps to (0 ... 1).	
	Applies to: FrameBlend, NightBlend, ColorBlend and ThermalBlend modes.	
11	Hue scale factor. Amount of yellow hue to apply from bright areas in the EO camera.	
	0 = No Change	
	1 = No Hue ... 255 = Full Hue	
	Applies to: FrameBlend and NightBlend modes.	
12	<i>Reserved</i> (set to 0)	
13	Calibration reset (0 or 1). Resets the image warp calibration (zoom, rotate, shift up/down/left/right) back to default.	
14	<i>Reserved</i> (set to 0)	
15	EO camera index (0 to 4, default 1). This camera is warped into the space of the other camera through the calibrations settings before blending. It is assumed that this is the EO or visible camera input for Thermal and Night blend modes. <b>MOD 2.20</b>	
16	IR camera index (0 to 4, default 0). This camera is not warped before blending. It is assumed that this is the IR or infrared camera input for Thermal and Night blend modes. <b>MOD 2.20</b>	
17	Image Alignment Parameter Index <b>NEW 2.20</b>	
	0	Use the alignment parameters in this packet (default)
	1	Use a preset alignment (defined by <a href="#">Set Multiple Alignment (0x74)</a> ) and set index of preset alignment

	parameters in byte 18 below.
18	Indicate index of preset alignment parameters. This byte ignored if byte 17 above is set to zero. <b>NEW 2.20</b>
19	Horizontal zoom scale applied to EO camera (1 ... 255) on top of Zoom in byte 9. Maps to (0.9 ... 1.1). Vertical zoom = Zoom Horizontal zoom = HorizontalZoom*Zoom <b>NEW 2.20</b> 0 = don't change zoom (default)

## Offset Mode Examples

If byte 4 is 1, then field is interpreted as absolute offset  
e.g. new EO horizontal offset (relative to EO image) = byte 5

If byte 4 is 0, then field is interpreted as incremental offset  
e.g. new EO vertical offset (relative to EO image) = old IR vertical position + byte 5

## Designate Selected Track Primary (0x32)

Command the system to designate the selected track as primary.

Header 1	Header 2	Length	Type	Checksum
0x51	0xAC	0x02	0x32	0x5C

## Shift Selected Track (0x33)

Command the system to shift the selected track to the next track. See [Designate Selected Track Primary \(0x32\)](#) and

Header 1	Header 2	Length	Type	Checksum
0x51	0xAC	0x02	0x33	0x02

## Set Acquisition Parameters (0x37)

Configure video input for digital camera interfaces.

**NOTE:** For changes between NTSC and PAL camera mode to take effect, a board soft reset should be performed, by issuing [Save Parameters \(0x25\)](#) and [Reset \(0x01\)](#) (Reset Type = 2, soft reset) messages.

**NOTE:** systems cannot support different analog video formats on different analog ports. For example, when one analog video port is set to NTSC, all of the analog video ports are set to NTSC.

Byte offset	Description
-------------	-------------

2	Length = 16 MOD 2.21		
3	Type = 0x37		
4	Video Port Index		
	<b>Board</b>	<b>Analog Ports</b>	<b>Digital Port</b>
	SLA-2000	0 to 3	4
	SLA-2100	0 and 1	2
	SLA-1500	0 and 1	2
5	<a href="#">Video Port Types (SLA-2000/2100)</a> <a href="#">Video Port Types (SLA-1500)</a>		
6 – 7	High (pass 0 for default) NOTE: High, Wide and Bit Depth are ignored except in Generic Digital Mode.		
8 – 9	Wide (pass 0 for default)		
10	Bit Depth (pass 0 for default)		
11 – 12	Vertical Front Porch in Lines (pass 0 for default) (SLA1500)		
13 - 14	Horizontal Front Porch in Pixels (pass 0 for default) (SLA1500)		
15 - 16	Flags – configuration parameters (pass 0 for default) (SLA1500)		
	Bits 0..2	Input Data Mode 0=Greyscale 1= YUV Others = Reserved	
	Bit 3	Interlaced (1=interlaced)	
	Bit 4	VSync Polarity (1 = inverted) (for Sony 7500)	
	Bit 5	HSync Polarity (1 = inverted) (for Sony 7500)	
	Bits 6..9	Init code – calls camera initialization routine. Called with parameters specified above in this message 0 = no-op 1=InitSony(resolution(High)) 2=InitDRS(Bit Depth) 3=InitTau(Bit Depth) 4=InitPhoton(Bit Depth) 5=InitCameraLinkLowSpeed(Bit Depth)	
	Bits 10	Use Data Valid signal (SLA-3000)	
	Bits 11..15	Reserved	

17	Frame Step – step between frames – 0 means ignore (e.g. 2 = every other). (default 1) 0 → 255 <b>NEW 2.20</b>
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## Video Port Types (SLA-2000/2100)

Port ID	Description	Hardware Support
0	Disabled	
1	NTSC	NOTE: Save parameters and reset to change between PAL and NTSC. NOTE: Sets all analog camera ports to NTSC.
2	Generic Digital	SLA-2000 CameraLink NOTE: Uses High, Wide, and Bit Depth
3	Sentech CL33A	SLA-2000 CameraLink
4	Goodrich SU640HSX	SLA-2000 CameraLink
5	Nova Eagle MWIR 640	SLA-2000 CameraLink
6	Sentech STC-HD133DV	SLA-2000 Digital
7	720P	SLA-2100 HD-SDI
8	1080P	SLA-2100 HD-SDI
9	1080I	SLA-2100 HD-SDI
10	FLIR TAU 640 8 Bit	SLA-2000 CameraLink
11	FLIR TAU 640 14 Bit	SLA-2000 CameraLink
12	Goodrich SU640HSX (no serial control)	SLA-2000 CameraLink
13	PAL	NOTE: Save parameters and reset to change between PAL and NTSC. NOTE: Sets all analog camera ports to PAL.
14	<i>Reserved</i>	
15	HD Hitachi 720 P	Hitachi Block camera <b>NEW 2.20</b>
16 – 255	<i>Reserved</i>	

**Video Port Types (SLA-1500)**

Port ID	Description	Hardware Support
0	Disabled	
1	NTSC (Auto)	Automatically detect NTSC or PAL. Defaults to NTSC if no analog camera is connected. Analog video output type is matched to analog video input type. NOTE: Save parameters and reset to switch between PAL/NTSC. NOTE: Sets all analog camera ports to NTSC.
2	Generic Digital	Generic Digital Interface. NOTE: Uses High, Wide, Bit Depth, Vertical and Horizontal Front Porch, Flags
3 – 6	<i>Reserved</i>	
7	720P	SONY 6000 series, 3150
8	1080P	SONY 6000 series
9	1080I	SONY 6000 series
10	FLIR TAU 640 8 Bit	
11	FLIR TAU 640 14 Bit	
12	<i>Reserved</i>	
13	PAL	<b>NEW 2.19</b> Forces analog video input and output to PAL mode. NOTE: Save parameters and reset to switch between PAL/NTSC. NOTE: Sets all analog camera ports to PAL.
14	<i>Reserved</i>	
15	HD Hitachi 720 P	Hitachi Block camera
16	DRS Tam 640 8 bit	DRS Tamarisk 640
17	DRS Tam 640 14 bit	DRS Tamarisk 640
18	DRS Tam 320 8 bit	DRS Tamarisk 320
19	DRS Tam 320 814 bit	DRS Tamarisk 320
20	Alticam Barracuda 600P	Alticam Barracuda
21	HD-SDI 720P 30	
22	NTSC VBI	NTSC camera with VBI data
23	HD SONY 7500 720P 30	Sony 7000 series*
24	HD SONY 7500 1080P 30	Sony 7000 series*
25 – 255	<i>Reserved</i>	

\* **NOTE:** Sony 7000 series, camera requires a power cycle when changing between 720 and 1080 mode.

**Get Acquisition Parameters (0x38)**

Get video port configuration. Causes a [Current Acquisition Parameters \(0x4F\)](#) message to be sent.

Byte offset	Description
2	Length = 3
3	Type = 0x38
4	Video Port Index

**Draw Object (0x3B)**

Draw user specified overlay graphics on the screen.

Byte offset	Description	
2	Packet length = 15 (for non-text objects), variable for text object types (>15)	
3	Packet Type = 0x3B	
4	Unique Object ID (1 to 255 ), refer to this ID to destroy a created graphic object. ID=0 is used for destroying all objects when Action=Destroy. NOTE: Maximum number of simultaneous drawn objects is 64.	
5	Action 0 = Destroy 1 = Create  Note that if destroy action is specified, then fields following this are ignored.	
6	Coordinate Properties	
	Value = 0	Reserved
	Value = 1	Coordinates are specified in source coordinate space. In addition, draw object is moved with camera motion. This mode is useful for overlays such as laser reticles.
	Value = 2	Coordinates are specified in display coordinate space. In addition, draw object is moved with scene motion. This mode is equivalent to scene mode tracking with a custom overlay.
	Value = 3	Reserved
	Value = 4	Reserved

	Value = 5	This mode should be used for static overlays such as text.
	Bit 7	<p>If bit 7 = 0, then coordinates are specified with the center of the image at (0, 0). This means that the upper-left corner is at (-display width/2, -display height/2) or (-source width/2, -source height/2) depending on the coordinate mode.</p> <p>If bit 7 = 1, then coordinates are specified with the upper left corner of the image at (0, 0). This means that the center of the image is at (display width/2, display height/2) or (source width/2, source height/2) depending on the coordinate mode.</p>
7	<p>Object Type</p> <p>0 = Circle</p> <p>1 = Rect</p> <p>2 = Line</p> <p>3 = Text</p> <p>4 = FilledCircle</p> <p>5 = FilledRect</p> <p>6 = TextEx</p>	
8&9	Object	Interpretation
	Circle, FilledCircle	Center Point X-Coordinate
	Rect, FilledRect	Upper Left Corner X-Coordinate
	Line	End Point 1 X-Coordinate
	Text, TextEx	Upper Left X-Coordinate
10&11	Object	Interpretation
	Circle, FilledCircle	Center Point Y-Coordinate
	Rect, FilledRect	Upper Left Corner Y-Coordinate
	Line	End Point 1 Y-Coordinate
	Text, TextEx	Upper Left Y-Coordinate
12&13	Object	Interpretation
	Circle, FilledCircle	Radius
	Rect, FilledRect	Width
	Line	End Point 2 X-Coordinate
	Text	Length of the text string (referred to as “length” below)

		NOTE: Maximum length of text is 64 characters.
	TextEx	[12] = horizontal scale shifted left 5 (e.g. 32 means no scaling. 0 is also interpreted as no scaling). [13] = vertical scale shifted left 5
14&15	Object	Interpretation
	Circle, FilledCircle	Ignored
	Rect, FilledRect	Height
	Line	End Point 2 Y-Coordinate
	Text	Ignored
	TextEx	[14] = font ID (0=default, 1=bold font, 4=classic font) [15] = font spacing (pixels between a font to the next font. If 0, then uses the font's default spacing)
16	Color (See Table below for color to number mappings)	
	Bits 0-3	Background color. <b>NEW 2.17</b> for vertical and horizontal lines, the background color is drawn as a shadow. Pass Transparent (14) to disable drawing of shadow.
	Bits 4-7	Foreground
17 to 17+length-1	Text Object Only: Text string characters	

## Color To Number Mapping:

Value	Description	Value	Description
0	White	8	Light Green
1	Black	9	Green
2	Light Gray	10	Dark Green
3	Gray	11	Red
4	Dark Gray	12	Orange
5	Light Blue	13	Yellow
6	Blue	14	Transparent
7	Dark Blue	15	Automatic



### Stop Selected Track (0x3C)

Command the system to stop the currently selected track.

Byte offset	Value	Description
2	0x02	Packet length
3	0x3C	Packet type
4	0x43	Checksum

### Command Pass-through (0x3D)

Outputs data payload to the port specified. Use [Configure Communication Port \(0x3E\)](#) to setup the inbound and outbound physical ports.

Byte offset	Description
2	Length = 3 + payload length
3	Type = 0x3D
4	Destination Port ID (see <a href="#">below</a> )
5 – 5 + Payload Length	Payload <i>Minimum 1 byte</i> <i>Maximum 80 bytes</i>

NOTE: actual payload length can be anywhere between 1 and 80 bytes.

NOTE: no assumptions are made on terminating characters such as carriage return (0x0D), line feed (0x0A), or null (0x00)

### Port ID

NOTE: See Hardware specific ICD to see which ports your hardware currently support.

Port ID	Description
0	Serial Port 0
1	Serial Port 1
2	Ethernet Port
3	Reserved
4	Serial Port 2
11	SD Card log file. Start, stop and name this file with <a href="#">Set SD Card Recording Parameters (0x1E)</a>

### Example:

Send a 5 byte payload “HELLO” to serial port 1.

Header		LEN	Type	Port	Payload					Checksum
0x51	0xAC	0x08	0x3D	0x01	0x48	0x45	0x4c	0x4c	0x4F	0xCB
					H	E	L	L	O	

Where length = type + dest port + payload + checksum = 1 + 1 + 5 + 1 = 8

### Configure Communication Port (0x3E)

Configure one of the communication ports. Current setting can be retrieved using [Get Port Configuration \(0x3F\)](#).

Byte offset	Description
2	Length = 20
3	Type = 0x3E
4	Destination Port ID (see <a href="#">above</a> , <del>currently must be 1</del> )
5	Baud Rate (see <a href="#">below</a> )
6	Data Bits
7	Stop Bits
8	Parity
9	Maximum packet length
10	Maximum packet delay (ms)
11	Protocol parser: MOD 2.18 0: SLA Protocol (SLA-1500 at Port 0 only) 1: Scan Eagle Aquarius packet parsing & SLA Protocol 2: Reserved 0 3: Reserved 1 4: Port Not Used (allows use by other applications) 5: TCP Pass Through 6: Raw Pass Through (direct pass-through with no change)
12 – 13	Local inbound port number where UDP packets are expected LSB then MSB <i>Ethernet port were all payload data will be received. Hardware opens a new socket to listen on this port.</i>
14 – 17	Destination IP address of host where UDP packets will be sent
18 – 19	Port number where host is listening. <i>Hardware opens a new socket and sends data to the outbound destination IP Address at the destination port number.</i>
20-21	AttNav port number (default 65100) If configured as Pass Through, data on this port is passed on to

the serial port. <b>NEW 2.18</b>
----------------------------------

NOTE: Serial ports do not offer hardware or software flow control.

NOTE: For parameter changes to take effect, a board soft reset should be performed, by issuing [Save Parameters \(0x25\)](#) and [Reset \(0x01\)](#) (Reset Type = 2, soft reset) messages.

KLV Pass-through receives formatted KLV metadata via serial port generated by an external processor. This KLV metadata is injected into the MPEG2-TS stream along with compressed digital video. When using this mode, internally-generated KLV metadata should be disabled via Set Metadata Rate (0x62).

### Example:

Tell the SLA-HARDWARE to send data received on local port 1000 out on to serial port 2 configured at 57600 baud, 8 data bits, 1 stop bit, and no parity. Any data received from serial port 2 will be sent to the IP address of 192.168.1.119 on port 10000. Raw payload data can now be sent directly to the IP address of the SLA-HARDWARE on port 1234 or data can be sent through the SLA Protocol port (serial port 0 or Ethernet port 14001) using [Command Pass-through \(0x3D\)](#).

Header	LEN	Type	Dest Port	Baud	Data	Stop	Parity	Max	Max	Parser		
0x51	0xAC	0x12	0x3E	0x04	0x03	0x08	0x01	0x00	0x64	0x64	0x02	...
Header			Serial Port 1 configuration									

	Inbound Port		Outbound/Reply IP Address				Outbound Port		Checksum
...	0xe8	0x03	0xc0	0xa8	0x01	0xdb	0x10	0x27	0xc1
	1000		192	168	1	119	10000		

### Serial Port Parameters

Baud Rate	
Value	Baud Rate
0	4800 (1500 only)
1	9600
2	38400
3	57600 (Default)
4	115200
5	19200

### Protocol Parser

Index	Name	Description
0	Ignore	

1	Scan Eagle Aquarius	
2	FLIR TAU	
3	SLA Protocol	(SLA-1500 at Port 0 only)

### Get Port Configuration (0x3F)

Results in the generation of either a [Current Port Configuration \(0x53\)](#) or a [Current Network Parameters \(0x49\)](#).

Byte offset	Description
2	Length = 3
3	Type = 0x3F
4	Destination Port ID (see <a href="#">above</a> )

### Set SnapShot (0x5E)

Set up parameters for image snapshot to an FTP server or onboard MicroSD. For viewing a list of existing files, or recording video see [Set SD Card Recording Parameters \(0x1E\)](#). Image is recorded from the Camera Order 0 set by [Set Video Mode \(0x1F\)](#). When Image source is set to Capture, image contents and size will be the same as the raw image from the camera. For example, if using an Analog Video Source, the image size will be 640x480. If using a digital image from a Sony FCB-EH6300 the image will be 1280x720. When Image Source is set to Display Image, then the image will be a 640x480 image with all the overlay graphics, digital zoom, and other image processing applied.

- Instructions to configure an FTP server are available in **ApplicationNote\_FileZilla.pdf**.
- Instructions for formatting a MicroSD card are in **ApplicationNote\_FormattingMicroSDCards.pdf**

Byte offset	Description	
2	Packet length = 15 + userLen + passLen	
3	Packet type = 0x5E	
4	Snapshot Destination	
	0	FTP Server
	1	Micro SD Card <b>NEW 2.18</b>
	2 – 15	<i>Reserved</i>
5	<i>Reserved, set to 0</i>	

6	Image Source	
	0	<i>Reserved</i>
	1	Captured image
	2	Display image
	3 – 15	<i>Reserved</i>
7	Quality – JPEG compression quality level 0 to 100 (default 80)	
8	Down Sample	
	1	Full Resolution
	2	2x2 downsample
	4	4x4 downsample (SLA-1500 SD images only)
	All other values <i>Reserved</i>	
9 – 12	IP ADDRESS of the FTP server. (dot form, eg. 192 168 1 197)	FTP ONLY (Otherwise set to 0's)
13	Server Port MSB (default 0)	
14	Server Port LSB (default 21)	
15	[REQUIRED] Username Length - length of user name string	
16 - 16+userLen-1	[OPTIONAL] User Name – FTP server login user name	
16+userLen	[REQUIRED] Password Length – length of password string	
17+userLen – 17+userLen+passwordLen-1	[OPTIONAL] Password – FTP server login password	

### **Do SnapShot (0x60)**

Execute an image snapshot to an FTP server or the MicroSD Card. Run [Set SnapShot \(0x5E\)](#) first to specify the FTP server, login and other SnapShot parameters.

On the SLA-1500-OEM `/mnt/mmcblk0p1/` or `/mnt/mmcblk0p5/` is automatically prefixed to filename unless you start filename with “/” then no prefix is added and the file *may* be written to NAND FLASH. This is not recommended. If directory/path is specified, it will be created if it doesn't exist.

Byte offset	Description
2	Packet length = 5 + fileNameLen

3	Packet type = 0x60
4	Frame Step – step between frames (e.g. 2 = every other). (default 1)
5	Number of frame snapshots to take. (default 1)
6	[REQUIRED] File Name Length - length of file name string (Default 0)
16 - 6+fileNameLen-1	[OPTIONAL - RECOMMENDED] FileName – Base file name of saved files (see below).

## FILE NAMING:

If FileName ends with non-numeric characters, file will save to <FileName>\_NNNN.jpg where NNNN is an incrementing count, starting at 0 and maxing out at 4294967295. [NOTE: For values of NNNN less than 10,000 the file name count will pad 0's.] If FileName ends with a numeric character (0-9), file will save to <FileName>.jpg

If you use FileName...		You should see...	Note
Hello	<b>And then Do Snap (0x60)...</b>	Hello_0000.jpg	Count starts at 0
Hello		Hello_0001.jpg	Count increments
World		World_0000.jpg	Count restarts when FileName changes
Hello42		Hello42.jpg	Count is not appended for FileName ending in a numeric character.
Hello_		Hello__0000.jpg	Count restarts when FileName changes
Hello		Hello_0000.jpg	Count restarts when FileName changes. This overwrites the previous Hello_0000.jpg.

*NOTE: The file name count resets to 0 on power up. Files will be overwritten if you use the same base file name after a power cycle or changing files names per example above.*

## EXAMPLE (Single Snap to MicroSD):

Record a single JPEG called “hello\_0000.jpg”

HEADER	LEN	TYPE	SRC			Q	SMP	IP ADDRESS	port	USRLEN	PSSLEN	CHK SUM	
0x51	0xAC	0x0F	0x5E	0x01	0x00	0x01	0x50	0x01	0 0 0 0	0x00	0x00	0x00	0xD1

HEADER		LEN	TYPE	Step	numFr	Len	Base File Name					CHK SUM
0x51	0xAC	0x0a	0x60	0x01	0x01	0x05	0x68	0x65	0x6c	0x6c	0x6f	0x95

File hello\_0000.jpg is now on the MicroSD card. Sending the same command...

HEADER		LEN	TYPE	Step	numFr	Len	Base File Name					CHK SUM
0x51	0xAC	0x0a	0x60	0x01	0x01	0x05	0x68	0x65	0x6c	0x6c	0x6f	0x95

hello\_0001.jpg is now on the MicroSD card.

## EXIF HEADER:

Snapshot images are created with EXIF metadata headers populated from the following MISB fields:

MISB data element	EXIF tag
Sensor Latitude	GPS Latitude
Sensor Longitude	GPS Longitude
Sensor Altitude	GPS Altitude
UTC Time	GPS Time
Platform Indicated Air Speed	GPS Speed
Platform Heading	GPS Track Direction

See [Set Metadata Data Values \(0x13\)](#) for more information on populating these fields.

**Version Number (0x40)**

<a href="#">Get Parameters Function (0x28)</a>	Get Version Number (0x00)
--	---------------------------

Reports software and hardware version numbers.

Byte offset	Description
2	Packet length = 17
3	Packet type = 0x40
4	Software Version Major
5	Software Version Minor
6	<i>Reserved</i>
7	Temperature (degrees F)
8 – 10	Hardware UID
11 – 14	Application Bits (app bits) <b>NEW 2.18</b> <a href="#">below</a>
15	Hardware Type <b>NEW 2.17</b> <a href="#">above</a>
16	Software Revision (Release number)
17-18	Other Version (Used for FPGA on SLA1500) <b>NEW 2.20</b>

**Application Bits (App Bits)**

Bit	Value	Description
0	0x00000001	HD output (1500) <b>NEW 2.20</b>
1	0x00000002	Stabilization
2	0x00000004	H.264 video compression in MPEG2-TS network video output
3	0x00000008	Baseline MTI – <i>Vehicle</i> and <i>Staring</i> moving target indication
4	0x00000010	Tracking of objects
5	0x00000020	Enhanced MTI – <i>Aerial</i> moving target indication of small sized objects
6	0x00000040	Telemetry output for gimbal control
7	0x00000080	Enhancement
8	0x00000100	Stitching and blending of multiple images
9	0x00000200	HD input <b>NEW 2.20</b>
10	0x00000400	Recording of video and snapshot of still images
11	0x00000800	KLV metadata encoding into MPEG2-TS H.264 network video stream

*Table 13: Application Bits (App Bits)*



**Current Stabilization Parameters (0x41)**[Get Parameters Function \(0x28\)](#)[Set Stabilization Parameters \(0x02\)](#)

Describes the current stabilization mode. See also [Set Stabilization Parameters \(0x02\)](#) and [Set Stabilization Bias \(0x12\)](#).

Byte offset	Description	
2	Packet length = 6	
3	Packet type = 0x41	
4	Mode (default 9)	
	Bit	Description
	0	0 – Stabilization OFF 1 – Stabilization ON
	1	0 – Enable 1 - Disable all registration, stabilization, enhancement and tracking
	2	0 – Previous images background 1 - Black background
	3	0 – Auto bias disabled 1 – Auto bias enabled
	Bit 4– 6	<i>Reserved</i>
Bit 7	0 – Enable PIP image micro stabilization 1 – Disable PIP image micro stabilization	
5	Screen re-centering rate 0..255 (default 50)	
6	Limit – maximum stabilization offset in pixels. 0 = no limit. (default 0)	
7	Angle Limit – maximum stabilization rotation angle in degrees. (default 0)	

**Current Overlay Mode (0x42)**[Get Parameters Function \(0x28\)](#)[Set Overlay Mode \(0x06\)](#)

Byte offset	Description
2	Packet length = 5
3	Packet type = 0x42

4	Bits 0..3	Primary track color mode Same as primary track color mode, <a href="#">above</a>
	Bits 4..7	Primary track reticle type Same as primary track reticle type, <a href="#">above</a>
5	Bits 0..3	Secondary track color mode ( <i>SLA-2000 only</i> ) Same as primary track color mode, <a href="#">above</a>
	Bits 4..7	Secondary track reticle type ( <i>SLA-2000 only</i> ) Same as primary track reticle type, <a href="#">above</a>
6	Bit 0	Overlay cursor. 0 = don't, 1 = do
	Bit 1	Overlay track box. 0 = don't, 1 = do
	Bit 2	<i>Reserved = 0</i>
	Bit 3	Overlay Histogram 0 = don't 1 = do
	Bit 4	Overlay track index 0 = don't 1 = do
	Bit 5	Show track motion trails 0 = don't 1 = do
	Bit 6	<i>Reserved = 0</i>
	Bit 7	Show registration ignore edge lines 0 = don't 1 = do

### ***Tracking Position (0x43)***

Periodic report of primary track's position, measured scene translation, rotation and scale, and stabilization display offset and rotation of a camera. For reporting telemetry to multiple destinations see [Set Packet Destination \(0x64\)](#). Multiple tracks (or MTI Tracks) result in a [Current Tracking Positions \(0x51\)](#).

Tracking and scene confidence scores indicates the system's confidence between 0 (low) and 100 (high). Tracking position is in camera source (un-stabilized) coordinates. Track column and row is the center of the track box. See also [Set Tracking Parameters \(0x0C\)](#) and [Modify Tracking \(0x05\)](#).

Scene translation is the frame-to-frame offset, rotation, and scale accumulated over the number of frames since the last Tracking Position report. This interval is controlled by [Set Coordinate Reporting Mode \(0x0B\)](#).

Display offset is the translation applied to the current camera frame to create the current display frame.

Positive values of offset indicate shifts down and to the right. In order to render the tracking point of interest in display coordinates, with (0;0) being the top left pixel, use the following equation:

$$x = (x_t - x_d - x_c) * \cos(A/128) + (y_t - y_d - y_c) * \sin(A/128) + x_c$$

$$y = (x_t - x_d - x_c) * -\sin(A/128) + (y_t - y_d - y_c) * \cos(A/128) + y_c$$

where  $(x_t, y_t)$  are reported tracking coordinates,  $(x_c, y_c)$  are the coordinates of the center pixel of the frame,  $(x_d, y_d)$  are reported display offsets, and A is the reported screen rotation.

Byte offset	Description
2	Packet length = 26 <b>MOD 2.17</b>
3	Packet type = 0x43
4 & 5	Tracking column in camera source coordinates (signed 16-bit integer)
6 & 7	Tracking row in camera source coordinates (signed 16-bit integer)
8 & 9	Horizontal scene translation columns in pixels, positive indicates the scene has moved to the right (equivalent to panning left) (signed 16-bit integer) Fractional portion is in byte 22. See <a href="#">below</a> for how to extract scene translation. <b>MOD 2.17</b>
10 & 11	Vertical scene translation rows in pixels, positive indicates the scene has moved down (equivalent to panning up) (signed 16-bit integer) Fractional portion is in byte 23. See <a href="#">below</a> for how to extract scene translation. <b>MOD 2.17</b>
12 & 13	Display column offset (signed 16-bit integer)
14 & 15	Display row offset (signed 16-bit integer)
16	Bits 0..6 Tracking confidence (0..100) Bit 7 Target not visible flag
17	Scene measurement confidence (0..100)
18 & 19	Current display rotation (0..360 degrees) * 128 (unsigned 16-bit integer)
20	Camera Index
21	Frame number (0 to 255), count wraps to 0 when it exceeds 255. <b>NEW 2.17</b>
22	Horizontal scene translation 8 bit fractional pixel (combine with bytes 8 & 9). See <a href="#">below</a> for how to extract scene translation. <b>NEW 2.17</b>
23	Vertical scene translation 8 bit fractional pixel (combine with

	bytes 10 & 11). See <a href="#">below</a> for how to extract scene translation. <b>NEW 2.17</b>
24 & 25	Scene frame to frame rotation (-128 to 127 degrees)*128 (signed 16 bit integer) <b>NEW 2.17</b>
26 & 27	Scene frame to frame scale change factor * 256. 1.0*256 indicates no change. (unsigned 16 bit integer) <b>NEW 2.17</b>

**NOTE: To extract fixed or floating point scene translation from the Tracking Position packet:**

```
// Buffer containing the Tracking Position packet
u8 *buf;
// Fixed point, scaled up by 8 bits
s32 sceneCol8 = ((s32)(buf[ 9]<<24) | (buf[ 8]<<16) | (buf[22]<<8))>>8;
s32 sceneRow8 = ((s32)(buf[11]<<24) | (buf[10]<<16) | (buf[23]<<8))>>8;
// Floating point
f32 sceneColF = sceneCol8/256.0f;
f32 sceneRowF = sceneRow8/256.0f;
```

NOTE: Current display rotation: using command [Set Display Parameters \(0x16\)](#) to rotate the image, the amount of rotation is reported here.

**Current Tracking Parameters (0x44)**

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Tracking Parameters (0x0C)</a>
--	--

Byte offset	Description
2	Packet length = 6
3	Packet type = 0x44
4	Size of object, in pixels, to track. (default 40)
5	Mode (default 2) Lower nibble: 0 = no change 1 = Stationary mode 2 = Vehicle mode 3 = Person mode 4..15 = <i>Reserved</i> Bit 4: Noise compensation (for LAP mode) 0 = off (default) 1 = on Bits 5..7 <i>Reserved</i>
6	<i>Reserved</i> – set to 0

7	<i>Reserved</i> – set to 0
---	----------------------------

### Current Registration Parameters (0x45)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Registration Parameters (0x0E)</a>
--	--

Byte offset	Description
2	Packet length = 10
3	Packet type = 0x45
4	Maximum frame to frame translation in pixels, LSB. 0 = the maximum allowed which is ½ of the frame size. (default 0)
5	Maximum translation in pixels, MSB
6	Maximum rotation range in degrees per frame: 0..10. (default 5)
7	Maximum zoom range in percent zoom per frame: 0..10. (default 0)
8	Left image edge pixel band to ignore. 0..255. Used for overlays or foreground objects that appear near the edge of the image. (default 0)
9	Right image edge pixel band to ignore. (default 0)
10	Top image edge pixel band to ignore. (default 0)
11	Bottom image edge pixel band to ignore. (default 0)

### Current Video Parameters (0x46)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Video Parameters (0x10)</a>
--	---

Byte offset	Description
2	Packet length = 9
3	Packet type = 0x46
4	0 = removed specified edge pixels 1 = automatically detect boundary pixels to remove
5	Top pixels to remove (0..255)
6	Bottom pixels to remove (0..255)
7	Left pixels to remove (0..255)
8	Right pixels to remove (0..255)
9	Deinterlacing mode:

	0 = no deinterlacing 1 = apply digital deinterlacing
10	Automatically reset video decoder when failed frame unsynchronization detected 0 = Never 1 = When frame unsynchronization detected

### Current ADC Parameters (0x47)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set ADC Parameters (0x18)</a>
--	---

**NEW: 2.18** This command now returns all the values that can be set using Set ADC Parameters. See Set ADC Parameters (0x18) for packing order and description of the results.

### Current Ethernet Video Parameters (0x48)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Ethernet Video Parameters (0x1A)</a>
--	--

Format is the same as [Set Ethernet Video Parameters \(0x1A\)](#).

### Current Network Parameters (0x49)

Sent in response to a [Get Network Parameters \(0x1D\)](#) command. Format is the same as [Set Network Parameters \(0x1C\)](#).

### Current Video Enhancement Parameters (0x4A)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Video Enhancement Parameters (0x21)</a>
--	---

Describes the current video enhancement parameters. Under control of the Denoising parameter, a running average of frames is optionally calculated. The denoised frame is then passed through one of several filters to enhance contrast.

Byte offset	Description
2	Packet length = 6
3	Packet type = 0x4A
4	Bits 0..3 Enhancement filter: 0 = None (default) 1 = CLAHE 2 = LAP Bits 4..7 Sharpen level 0..15
5	Alpha blending term 0..255 (200 nominal): 0 = use input frame only 128 = 50/50 mix

	255 = use filtered frame only)	
6	Bits 0..6	0..127 None: not used CLAHE: contrast limit (typical 25) LAP: width of high pass kernel, clipped to 0..18. (typical 10)
	Bit 7	Limit Color
7	Denoising coefficient (by running average): 0 = No denoising (default) 128 = 50/50 mix 255 = maximum averaging	

### Current Video Mode Parameters (0x4B)

[Get Parameters Function \(0x28\)](#)
[Set Video Mode \(0x1F\)](#)

Byte offset	Description
2	Packet length = 16
3	Packet type = 0x4B
4	Number of Input Camera channels (1-4)
5	Number of Network Output Display channels (1-4)
6	Display Mode
7	Display Destination
8	Camera Index 0
9	Camera Index 1
10	Camera Index 2
11	Camera Index 3
12	PiP Scale
13	PiP Quadrant
14	Display Index 0
15	Display Index 1
16	Display Index 2
17	Display Index 3

**Current Stitch Parameters (0x4C)**[Get Parameters Function \(0x28\)](#)[Set Stitch Parameters \(0x2B\)](#)

Byte offset	Description
2	Packet length = 13
3	Packet type = 0x4C
4	<i>Reserved</i>
5&6	Camera one up shift. (0...480) number of pixels. (signed 16-bit integer)
7&8	Camera one right shift. (0...640) number of pixels. (signed 16-bit integer)
9&10	Camera one down shift. (0...480) number of pixels. (signed 16-bit integer)
11&12	Camera one left shift. (0...640) number of pixels. (signed 16-bit integer)
13	<i>Reserved</i>
14	<i>Reserved</i>

**Current Blend Parameters (0x4D)**[Get Parameters Function \(0x28\)](#)[Set Blend Parameters \(0x2F\)](#)

Byte offset	Description	
2	Packet length = 17 <b>MOD 2.20</b>	
3	Packet type = 0x4D	
4	Bit 0 <i>Reserved</i>	
	Bit 1	Zoom Mode <b>NEW 2.20</b>
		0 Zoom (1 ... 255) maps to (0.9 ... 1.1).
	1 Zoom (1 ... 255) maps to (0.004 ... 0.996).	
Bits 2-7 <i>Reserved</i>		
5	EO camera up shift. (0 ... 255) number of pixels	
6	EO camera right shift. (0 ... 255) number of pixels	
7	EO camera down shift. (0 ... 255) number of pixels	
8	EO camera left shift. (0 ... 255) number of pixels	
9	Rotation of EO camera (1 ... 255) maps to (-5 ... 5) degrees	



10	Zoom scale factor applied to EO camera (1 ... 255). Maps to (0.9 ... 1.1) or to (0.004 to 0.996), depending on Absolute Zoom Mode in byte 4
11	Blend Mode
	Value   Description
	0   don't change/default.
	1   FrameBlend
	2   ThermalBlend
	3   NightBlend
4   Color Blend	
12	Amount defines the amount of luminance information from the EO (visible) camera to include in the blended result. Applies to: FrameBlend, NightBlend, ColorBlend and ThermalBlend modes.
13	Hue scale factor. Amount of yellow hue to apply from bright areas in the EO camera. Applies to: FrameBlend and NightBlend modes.
14	<i>Reserved</i>
15	<i>Reserved</i>
16	EO camera index (0 to 4, default 1). This camera is warped into the space of the other camera through the calibrations settings before blending. It is assumed that this is the EO or visible camera input for Thermal and Night blend modes. <b>NEW 2.20</b>
17	IR camera index (0 to 4, default 0). This camera is not warped before blending. It is assumed that this is the IR or infrared camera input for Thermal and Night blend modes. <b>NEW 2.20</b>
19	Horizontal zoom scale applied to EO camera (1 ... 255) on top of Zoom in byte 9. Maps to (0.9 ... 1.1). Vertical zoom = Zoom Horizontal zoom = HorizontalZoom*Zoom <b>NEW 2.20</b>

### Current Image Size (0x4E)

#### [Get Parameters Function \(0x28\)](#)

Applies to the 0<sup>th</sup> (primary) camera. See Camera Display Order in [Set Video Mode \(0x1F\)](#) for camera selection. The Display Rectangle can change depending on Display Mode (1up, 2Up, Side-by-Side, etc.) also selected by the Set Video Mode command.

Byte offset	Description
2	Packet length = 18

3	Packet Type = 0x4E
4 – 5	Capture Width
6 – 7	Capture Height
8 – 9	Display Width
10 – 11	Display Height
12 – 13	Display Rectangle Column Offset
14 – 15	Display Rectangle Row Offset
16 – 17	Display Rectangle Width
18 – 19	Display Rectangle Height

### **Current Acquisition Parameters (0x4F)**

Sent in response to a [Get Acquisition Parameters \(0x38\)](#) command.

Same as [Set Acquisition Parameters \(0x37\)](#).

### **HardwareID (0x50)**

<a href="#">Get Parameters Function (0x28)</a>	Get HardwareID (0x50)
--	-----------------------

Reports the HardwareID.

Byte offset	Description
2	Packet length = 10
3	Packet type = 0x50
4 – 11	Hardware ID

## Current Tracking Positions (0x51)

Periodic report of all track's positions. Tracking and scene confidence scores indicates the system's confidence between 0 (low) and 100 (high). Tracking positions are in camera (un-stabilized) coordinates. Enabled using the [Set Coordinate Reporting Mode \(0x0B\)](#) command. For reporting telemetry to multiple destinations see [Set Packet Destination \(0x64\)](#).

## Render Track Points

In order to render the tracking point of interest in display coordinates , with (0;0) being the top left pixel, use the following equation:

$$x = (x_t - x_d - x_c) * \cos(A/128) + (y_t - y_d - y_c) * \sin(A/128) + x_c$$

$$y = (x_t - x_d - x_c) * -\sin(A/128) + (y_t - y_d - y_c) * \cos(A/128) + y_c$$

where  $(x_t, y_t)$  are reported tracking coordinates,  $(x_c, y_c)$  are the coordinates of the center pixel of the frame,  $(x_d, y_d)$  are reported display offsets, and  $A$  is the reported screen rotation. This information is contained in the [Tracking Position \(0x43\)](#) packet.

Byte offset	Description
2	Packet length. Given by the following formula: (15*numTracks)+4 if (15*numTracks)+4 < 127 Lower 7 bits of (15*numTracks)+4 if (15*numTracks)+4 >= 127 NumTracks is given in byte offset 5 of this packet. (see pseudo-code below for explanation of length field).
3	Optional high bits of packet length (if > 127, see below)
n	Packet type = 0x51
n+1	Camera Index {0,1,2,3}
n+2	Number of tracks. If high bit is set, packet contains MTI tracks rather than normal tracks.
n+3	Track Index $N$
n+4 – n+5	Tracking <b>column</b> in camera coordinates
n+6 – n+7	Tracking <b>row</b> in camera coordinates
n+8 – n+9	Track <b>width</b>
n+10 – n+11	Track <b>height</b>
n+12 – n+13	Track horizontal velocity multiplied by 256. Positive is to the right. Reported in pixels/frame. For stationary tracks, returns position rather than velocity.
n+14 – n+15	Track vertical velocity multiplied by 256. Positive is down. Reported in pixels/frame. For stationary tracks, returns position rather than velocity.

n+16	Track Confidence (0 ... 100)	
n+17	Mode	
	<b>Bit</b>	<b>Value</b>
	0	0 = Not Primary 1 = Primary see <a href="#">Designate Selected Track Primary (0x32)</a>
	1	0 = Not Selected 1 = Selected
	2 – 3	SL_TRACK_RESULT_STATE <b>NEW 2.18</b>
4 – 7	SL_TRACK_STATE <b>NEW 2.18</b>	
Repeat bytes n+3 through n+17 for each track (see byte offset n+2)		

### Length Handling Pseudo-code

```
int offset = 0;
int length = data[2];
if(length & 0x80 > 0) { //means high-bit is set and therefore length is extended
    length = (0x7F & data[2]) + (data[3] << 7);
    offset = 1;
}
int type = data[3+offset];
int nTracks = data[4+offset];
etc...
```

### Primary/Not Primary and Selected/Not Selected

<b>Primary</b>	<ul style="list-style-type: none"> <li>This target will be affected by <a href="#">Nudge Tracking Coordinates (0x0A)</a></li> <li>Telemetry information is reported by <a href="#">Tracking Position (0x43)</a></li> <li>Reticle color and shape change using <a href="#">Set Overlay Mode (0x06)</a></li> <li>New user designated tracks will become primary <a href="#">Modify Tracking (0x05)</a></li> <li>Zoom to track will use Primary Target <a href="#">Set Display Parameters (0x16)</a></li> </ul>
<b>Selected</b>	<ul style="list-style-type: none"> <li>Reticle changes to indicate target is selected <a href="#">Set Overlay Mode (0x06)</a></li> </ul>

You can use the INDEX to kill a track or designate as primary ([Modify Track By Index \(0x17\)](#)).

### Current Ethernet Display Parameters (0x52)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Ethernet Display Parameters (0x29)</a> <a href="#">Get Ethernet Display Parameters (0x39)</a>
--	--

Format is the same as [Set Ethernet Display Parameters \(0x29\)](#).

### **Current Port Configuration (0x53)**

<a href="#">Get Port Configuration (0x3F)</a>	
---	--

Format is the same as [Configure Communication Port \(0x3E\)](#).

### **Current Moving Target Indication Parameters (0x54)**

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Moving Target Indication Parameters (0x2D)</a>
--	--

Format is the same as [Set Moving Target Indication Parameters \(0x2D\)](#).

### **Current H.264 Video Parameters (0x56)**

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set H.264 Video Parameters (0x23)</a>
--	---

Format is the same as [Set H.264 Video Parameters \(0x23\)](#).

### **Current Display Parameters (0x57)**

Sent in response to a [Get Display Parameters \(0x3A\)](#) command.

Format is the same as [Set Display Parameters \(0x16\)](#).

### **Current SD Card Recording Status (0x58)**

Sent in response to [Set SD Card Recording Parameters \(0x1E\)](#) (byte 6) command. See also [Directory Statistics Reply \(0x79\)](#)

Byte offset	Description	
2	Length = 11	
3	Packet Type = 0x58	
4	Recording State	
	1	Recording
	2	Stopped
	0x04	Network trace commands enabled (OR this bit)
	0x08	Network trace telemetry enabled (OR this bit)
5 – 8	RESERVED <b>NEW 2.20.12</b>	
9 – 12	Recording size in bytes. <b>NEW 2.20.12</b>	

## Recording State

The recording state (byte offset 4) can be used to determine the presence or absence of the MicroSD Card. Bit 1 or bit 2 will be set if the MicroSD card is present.

### Current SD Card Directory Contents (0x59)

Sent in response to [Set SD Card Recording Parameters \(0x1E\)](#) command. Based on the number of file names that need to be sent, multiple packets (groups) might be needed.

Byte offset	Description
2	Length = variable
3	Packet Type = 0x59
4 & 5	Total number of files (16 bit-integer)
6 & 7	Start index in this packet (0 to nfiles-1)
8 & 9	End index in this packet (0 to nfiles-1)
10...10+(endIndex-startIndex+1)	Length of filename start ... Length of filename end
10+(endIndex-startIndex+1)..Variable	Ascii Encoded filename start ... Ascii Encoded filename end

### Examples:

Byte	Contents	Description
4 & 5	4	4 files
6 & 7	0	File index 0 is the first file in the group
8 & 9	2	File index 2 is the last file in the group
10	8	Length of file name 0
11	11	Length of file name 1
12	15	Length of file name 2
13 – 21	<i>File.txt</i>	File name 0
22 – 33	<i>Nextfile.ts</i>	File name 1
34 - 46	<i>AnotherFile.ext</i>	File name 2

Byte	Contents	Description
4 & 5	4	4 files

<b>6 &amp; 7</b>	3	File index 3 is the first file in the group
<b>8 &amp; 9</b>	3	File index 3 is the last file in the group
<b>10</b>	8	Length of file name 0
<b>11 – 19</b>	<i>boot.txt</i>	File name 3

### Current SnapShot (0x5D)

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set SnapShot (0x5E)</a>
--	-------------------------------------

2	Packet length = 18 + uLen + pLen + fLen
3	Packet type = 0x5D
4	<i>Reserved</i> , set to 0
5	<i>Reserved</i> , set to 0
6	Source – 1: Captured image, 2: Display image
7	Quality – JPEG compression quality level 0 to 100 (default 80)
8	Down Sample – 1: none, 2: 2x2 downsample, 4: 4x4 downsample
8– 11	IP ADDRESS (dot form, eg. 192 168 1 197) of the FTP server.
12	Command and Control Reply Port MSB (default 0)
13	Command and Control Reply Port LSB (default 21)
14	uLen - length of user name string
15 to 15+uLen-1	User Name – FTP server login user name
15+uLen	pLen – length of pass word string
16+uLen to 16+uLen+pLen-1	Pass Word – FTP server login pass word
16+uLen+pLen	Frame Step - 1 shows every frame, 2 shows every other frame, etc. 1 to 255 (default 1)
17+uLen+pLen	Num Frames – number of frame snapshots to take. (default 1)
18+uLen+pLen	fLen - length of file name string
18+uLen+pLen to 18+uLen+pLen+fLen-1	File Name – Base file name to save files to on the FTP server. Files will save to FileName_N where N is an incrementing count, starting at 0.

### Set System Type (0x63)

<a href="#">Get Parameters Function (0x28)</a>	Set System Type (0x63)
--	------------------------

Used to configure the primary functionality of a system. See also [Current System Type \(0x65\)](#). Default System Type is **0x03** (Analyze and Render).

Byte offset	Description	
2	Packet length = 4	
3	Packet type = 0x63 <b>NEW: 2.18</b>	
4 – 5	System Type	
	Bit	Functionality
	0	Analyze - System will perform image processing and will produce telemetry
	1	Render - System will perform rendering/display
	2	<i>Deprecated</i> <b>NEW 2.20</b>
3 – 15	<i>Reserved</i>	

### Set Packet Destination (0x64)

Used to configure the output destination for TELEMETRY. See [Set Coordinate Reporting Mode \(0x0B\)](#) for the types of telemetry output that are available.

Byte offset	Description	
2	Packet length = 12	
3	Packet type = 0x64 <b>NEW: 2.18</b>	
4	Function	
	Value	Description
	0	Unknown or Not Defined
	1	ADD -Add this IP address as telemetry output destination
	2	DELETE - Remove this IP address from receiving telemetry output
	3	DELETE ALL - Remove all IP address from telemetry output list
4 – 15	<i>Reserved</i>	
5	Camera ID - Results from this hardware are reported as cameraID in the <a href="#">Tracking Position (0x43)</a> and <a href="#">Current Tracking Positions (0x51)</a> . Receiver can then apply these results to the local camera of the same ID. (Defaults to 0xFF internally to indicate value has not been set.)	



6 – 9	IP Address – IP address of the receiver
10 – 11	Destination Port – data will be sent to this port on the receiver (default: 14001)
12 – 13	<i>Reserved</i> <b>NEW 2.19</b>

### Current System Type (0x65)

See [Set System Type \(0x63\)](#).

### Set Host Name (0x66)

<a href="#">Get Parameters Function (0x28)</a>	Host Name (0x66)
--	------------------

See also [Set Network Parameters \(0x1C\)](#) and [Discover Protocol](#).

Byte offset	Description
2	Packet length = 33
3	Packet Type = 0x66 <b>NEW 2.20</b>
4	Index Network Interface Controllers (NIC) (default 0)
5 - 37	NIC Name (variable length string) 32-bytes ('\0' for any unused bytes)

### Set Name Example:

Length	Type	Index	“SLAWEST”							\0	...	\0	chk
0x20	0x66	0x00	0x53	0x4c	0x41	0x57	0x45	0x53	0x54	0x00	...	0x00	0xNN

### Current Network List (0x67)

Sends back the names of all network interfaces controllers in response to:

<a href="#">Get Parameters Function (0x28)</a>	Network List (0x67)
--	---------------------

Byte offset	Description
2	Packet length = 3 + Length of Names
3	Packet Type = 0x67 <b>NEW 2.20</b>
4	Number of Network Interface Controllers (NIC)
5 - N	NIC Name (variable length string) separated by '\0'

### Reply Example:

Length	Type	# of NICs	“SLAWEST”	\0	“wifi0”	\0	chk

0x11	0x67	0x02	0x53	0x4c	0x41	0x57	0x45	0x53	0x54	0x00	0x77	0x69	0x66	0x69	0x30	0x00	0xNN
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

### Set Lens Mode (0x6C)

Used to control a lens mechanism. LensMode consists of commands to be sent to the lens. If any data needs to be sent along with a command, this data will be in the bytes following the LensMode.

Byte offset	Description			
2	Packet length = 3 + <b>Data Bytes</b> length			
3	Packet type = 0x6C <b>NEW: 2.19</b>			
4	LensMode			
	Value	Description	Data Bytes	Data
	0	Unknown or Not Defined	0	
	1	N/A	0	
	2	Reset Lens Mechanism	0	
	3	Request Lens Status	0	
	4	Zoom in Wide Direction	0	
	5	Zoom in Narrow Direction	0	
	6	Stop Zoom Motion	0	
	7	Focus in Far Direction	0	
	8	Focus in Near Direction	0	
	9	Stop Focus Motion	0	
	10	One Push Auto Focus	0	
	11	N/A	1	0 = disabled 1 = enabled
	12	Lens NUC (IR camera)	1	0 = no shutter 1 = shutter
13	Set Zoom Position	2	U16 (LSB,MSB)	
14	Set Focus Position	2	U16 (LSB,MSB)	
5,6 ...	Optional Data Byte(s)			

**Current Lens Status (0x6D)**

Returns current focus and zoom position. This is sent as a response to a GetParameters(CurrentLensStatus) request.

Byte offset	Description
2	Packet length = 6
3	Packet type = 0x6D <b>NEW: 2.19</b>
4,5	Focus Position Unsigned 16 bit (LSB,MSB)
6,7	Zoom Position Unsigned 16 bit (LSB,MSB)

**Set Lens Params (0x6E)**

Set the current parameters for controlling the lens mechanism

Byte offset	Description
2	Packet length = 9
3	Packet type = 0x6E <b>NEW: 2.19</b>
4	Lens Type, 0= none, 1 = Tamron SC001
5	AutoFocus Metric Region Size % of screen (0 to 100)
6	Zoom Track Focus (0= disabled, 1= enabled)
7	Autofocus method (0=scan far to near, 1=seek)
8	Autofocus Rate Adjust (0 to 255) 100 = default speed of motion
9	Autofocus Change Percent (0 to 255) in 1/10ths of a percent. 40 (default) = 4%

**Current Lens Params (0x6F)**

Return the current Lens Parameters persisted in the SLA1500. This is sent as a response to a GetParameters(CurrentLensParams) request.

Byte offset	Description
2	Packet length = 9
3	Packet type = 0x6F <b>NEW: 2.19</b>
4	Lens Type, 0= none, 1 = Tamron SC001

5	AutoFocus Metric Region Size % of screen (0 to 100)
6	Zoom Track Focus (0= disabled, 1= enabled)
7	Autofocus method (0=scan far to near, 1=seek)
8	Autofocus Rate Adjust (0 to 255) 100 = default speed of motion
9	Autofocus Change Percent (0 to 255) in 1/10ths of a percent. 40 (default) = 4%

### Set Digital Camera Parameters (0x70)

Set parameters that pertain to a specific digital camera. ROI (Region Of Interest) for autogain statistics is used to indicate a part of image to be used in calculations. This is defined as an offset from the relevant edge as a percentage of the full width/height of image.

Note: setting both “Autogain Max value” and “Autogain Min Value” to 0 will result in these parameters being ignored.

Byte offset	Description
2	Packet length = 12
3	Packet type = 0x70 <b>NEW: 2.19</b>
4	Camera Id of digital camera (SLA1500 = 2)
5	Mode (1 = freeze Autogain at min/max below)
6,7	Autogain Max value (max value maps to 255 in 8 bit output)
8,9	Autogain Min Value (min value maps to 0 in 8 bit output)
10	Row ROI for Autogain stats. Row Offset in % of image height (255=100%) Full image (default) = 0
11	Col ROI for Autogain stats. Col Offset in % of image width (255=100%) Full image (default) = 0
12	High ROI for Autogain stats. Height in % of image height (255=100%) Full image (default) = 255
13	Wide ROI for Autogain stats. Width in % of image width (255=100%) Full image (default) = 255

### Current Digital Camera Parameters (0x71)

Get current parameters that pertain to the currently selected digital camera. This is sent as a response to a [Get Parameters Function \(0x28\)](#)(CurrentDigCamParams) request.

Byte	Description
------	-------------

offset	
2	Packet length = 11
3	Packet type = 0x71 <b>NEW: 2.19</b>
4	Mode (1 = freeze Auto-gain at min/max below)
5,6	Auto-gain Max value (max value maps to 255 in 8 bit output)
7,8	Auto-gain Min Value (min value maps to 0 in 8 bit output)
9	Row ROI for Auto-gain stats. Row Offset in % of image height (255=100%) Full image (default) = 0
10	Column ROI for Auto-gain stats. Col Offset in % of image width (255=100%) Full image (default) = 0
11	High ROI for Auto-gain stats. Height in % of image height (255=100%) Full image (default) = 255
12	Wide ROI for Auto-gain stats. Width in % of image width (255=100%) Full image (default) = 255

### Set User Palette (0x72)

Set the Y, U, V values for the user false color palette.

Byte offset	Description
2, 3	Packet length = 770. Note: extended size packet.
4	Packet type = 0x72 <b>NEW: 2.20</b>
5	Y value for first entry
6	U value for first entry
7	V Value for first entry
...	
770	Y value for last entry
771	U value for last entry
772	V Value for last entry

### Current User Palette(0x73)

Return the current user palette in YUV values.

Byte	Description
------	-------------

offset	
2, 3	Packet length = 770. Note: extended size packet.
4	Packet type = 0x73 <b>NEW: 2.20</b>
5	Y value for first entry
6	U value for first entry
7	V Value for first entry
...	
770	Y value for last entry
771	U value for last entry
772	V Value for last entry

### **Set Multiple Alignment (0x74)**

Set the (5) alignment sets for a dual camera setup. See details for bytes 5 through 9 in [Set Blend Parameters \(0x2F\)](#). The length of the packet is fixed, so sending zero values for sets not used is fine.

Byte offset	Description
2	Packet length = 28
4	Packet type = 0x74 <b>NEW: 2.20</b>
5	Vertical offset for first set
6	Horizontal offset for first set
7	Rotation for first set.
8	Zoom for first set.
9	Horizontal zoom scale for first set
...	
25	Vertical offset for last set
26	Horizontal offset for last set
27	Rotation for last set.
28	Zoom for last set.
29	Horizontal zoom scale for last set

### **Current Multiple Alignment (0x75)**

Return the current multiple alignment sets. See details for bytes 5 through 8 in [Set Blend Parameters \(0x2F\)](#).

Byte offset	Description
2	Packet length = 23
4	Packet type = 0x75 <b>NEW: 2.20</b>
5	Vertical offset for first set
6	Horizontal offset for first set
7	Rotation for first set.
8	Zoom for first set.
...	
21	Vertical offset for last set
22	Horizontal offset for last set
23	Rotation for last set.
24	Zoom for last set.

### **Current Advanced Moving Target Indication Parameters (0x77)**

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Advanced Moving Target Indication Parameters (0x76)</a>
--	---

Format is the same as [Set Advanced Moving Target Indication Parameters \(0x76\)](#).

**Tracking Box Pixel Stats (0x78)**

Periodic report of pixel statistics within track boxes. Only reports for 14 bit digital camera data. Enabled using the [Set Coordinate Reporting Mode \(0x0B\)](#) command.

Byte offset	Description
2	Packet length. Given by the following formula: (7*numTracks)+4
3	Packet type = 0x78
4	Camera Index {0,1,2,3}
5	Number of tracks.
6	Track Index <i>N</i>
7 - 8	Mean value over tracking box area. Unsigned 16 bit integer
9-10	Max value over tracking box area. Unsigned 16 bit integer
11-12	Min value over tracking box area. Unsigned 16 bit integer
	Repeat bytes 6 through 12 for each track

**Directory Statistics Reply (0x79)**

Sent in response to a [Set SD Card Recording Parameters \(0x1E\)](#) byte 7 request. See [Current SD Card Directory Contents \(0x59\)](#) to get the list of files.

Byte offset	Description
2	Packet length = 10
3	Packet type = 0x79
4 – 7	Maximum Disk Size (bytes)
8 – 11	Total Space Used (bytes)

**Example:**

SLA Header		Length	Type	Maximum Space Available				Total Space Used			
0	1	2	3	4	5	6	7	8	9	10	11
81	172	10	121	3814088				10408			
0x51	0xAC	0x0A	0x79	0xc8	0x32	0x34	0x00	0xA8	0x28	0x00	0x00

**Current Stabilization Bias (0x7A)**

<a href="#">Get Parameters Function (0x28)</a>	<a href="#">Set Stabilization Bias (0x12)</a>
--	---



Format is the same as [Set Stabilization Bias \(0x12\)](#).

### Set Advanced Capture Parameters (0x7B)

Set advanced analog video decoding parameters for the TVP5154 video decoder. More details can be found in <http://www.ti.com/lit/ds/symlink/tvp5154.pdf>. For cameras that have significant amounts of black data on the left and/or right side, setting these values can stretch the image horizontally to get rid of the black edges. If the image is stretched, the pixels will no longer be square, so objects in the scene will appear slightly wider than they actually are.

Byte offset	Description
2	Packet length = 8
3	Packet type = 0x7B <b>NEW: 2.20.18</b>
4,5	Horz Control - Unsigned 16 bit (LSB,MSB) - Horizontal Scaling Control Register 3AD Value = $720 * 1024 / \text{Desired\_Pixels}$ . Standard for square pixels: $720 * 1024 / 640 = 1152$ Slightly stretched pixels: $720 * 1024 / 657.5 = 1121$ Default = 0 for standard square pixel operation.
6,7	XStart - Horizontal Pixel Start - Unsigned 16 bit (LSB,MSB) – adjust this value to move the starting left edge of the image Standard for square pixels: 0 Slightly stretched pixels: 8 (cuts off 8 pixels from the left) <i>Ignored if HorzControl==0</i>
8,9	YStart - Vertical Field Line Start - Unsigned 16 bit (LSB,MSB) – adjust this value to move the top line of the image. Standard for square pixels: 3 Slightly stretched pixels: 4 (cuts off 4 lines from the top of each field) <i>Ignored if HorzControl==0</i>

## Appendix: History

Changes for recent releases are summarized [above](#).

- 2.06 (03)
  - Change: Current Tracking Positions
- 2.07 (00)
  - Change: Set ADC Parameters and Current ADC Parameters
  - Change: Set Acquisition Parameters and Current Acquisition Parameters
  - Change: Current Tracking Positions
  - Change: Set Moving Target Detection Parameters and Current Moving Target Detection Parameters
  - New: Set Track Order, Get Track Order and Current Track Order
  - New: Modify Tracking
  - New: Modify Track by Index
  - New: Limit Color Enhancement Parameter
- 2.08 (00)
  - Change: Set Blend Parameters.
  - Change: Set Stabilization Bias
  - Change: Set Tracking Parameters
  - Change: Set Blend Mode Description
  - Change: Set Display Parameters
  - Change: Current Display Parameters
  - Change: Set Video Mode
  - Change: Current Video mode
- 2.09 (00)
  - Add: SD Card Recording Parameters
  - Add: Current SD Card Recording Status
  - Add: Current SD Card Directory Contents
  - Add: Set Display Adjustments
- 2.10 (00)
  - Add: new mode for Set Stabilization
- 2.12 (00)
  - Change: Separate typedef in slfip.h for Commands and Responses
  - Change: SetMetadataReportingMode → SetMetadataFrameValues
  - Add: SetRGB565Conversion & DrawObject commands
  - Change: SLFIPSetAVideoParameters cameraType → autoReset
- 2.13 (04)
  - Add: Set Registration Parameters – zoomRange
  - Add: Set Registration Parameters – ignore edge left, right, top, bottom
  - Add: Auto reset video decoder option to Set Video Parameters
  - Change: Corrected Current ADC Parameters
  - Change: Set Network Parameters – reply port and reply mode added.
  - Change: Current Stabilization Parameters - Return auto bias and black background enabled parameters
  - Add: Return of PIP stabilization disable in CurrentStabilizationParameters.
- 2.14 (01)
  - Add RTP MJPEG Source option to Set Ethernet Display Parameters

## Contacts

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