EloView Remote Management: Local Command Set

for 01 Series Interactive Digital Signage (IDS) products

Content Cloud

EloView Server
(on the Elo Cloud)

User Application

Elo API

EloView Device Client

EloView Web Client

Elo Driver

EloVESA DDC/CI
Interface

MDC Interface

EloView App

Elo IDS Display

Host (Player PC or
Computer Module)
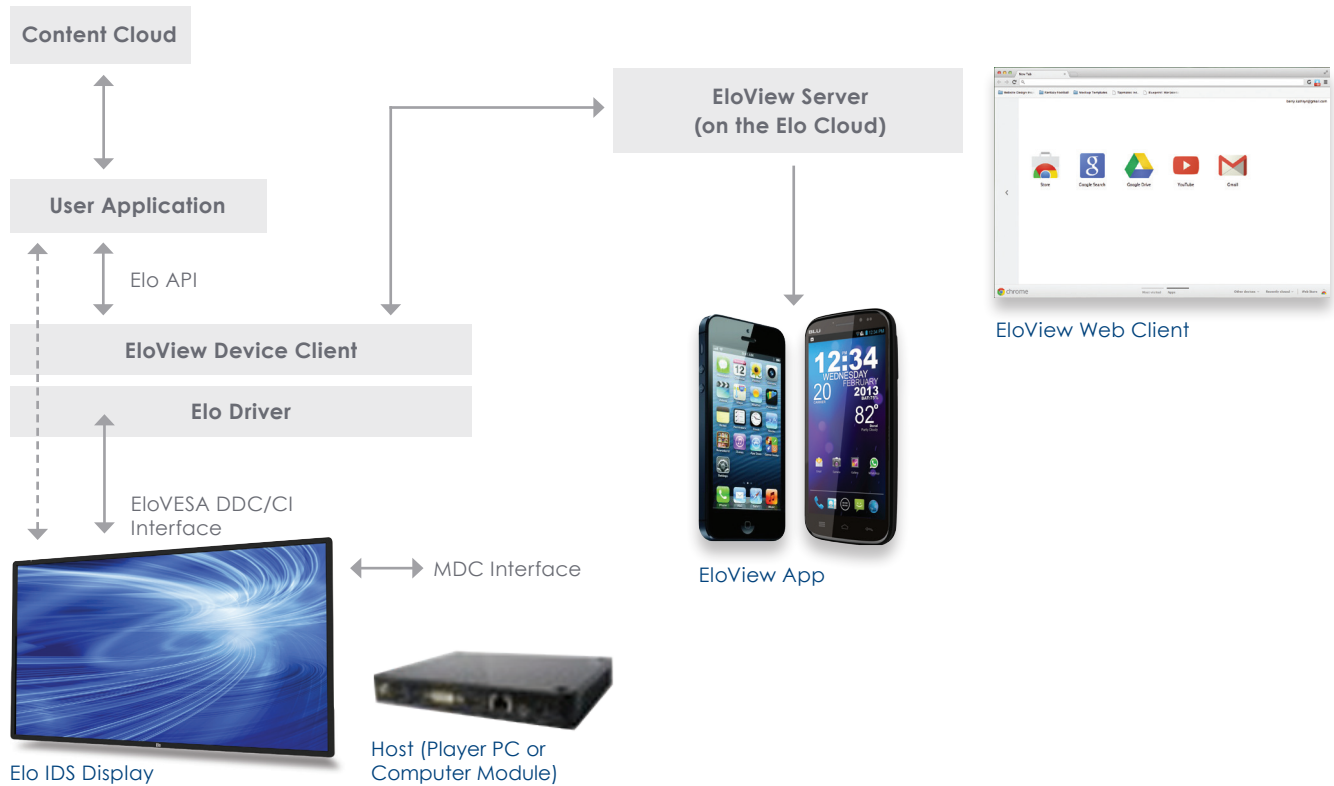
Elo Interactive Digital Signage products now support EloView technology that greatly simplifies remote management and diagnostics. With appropriate software implementation, it will reduce on-premise support calls and help maintain a consistent user experience. EloView has the following components:

- Local interface to the IDS display (over USB and Display lines) ← topic of this application note
- A Device Client providing local control of a registered IDS display
- An API (application programming interface) for Windows to access the IDS Display and Computer Module diagnostics and control functions
- A web based interface that allows central control of the registered fleet of IDS displays and user account management
- A smartphone based application that allows control of a registered IDS display

This application note discusses local interface to the IDS display. Two methods are possible: over HDMI or DisplayPort using the VESA DDC/CI protocol and over USB using the MDC protocol. The VESA protocol enables the full functionality found in the Eloview Device Client while the MDC protocol provides backward compatibility to the 00 series remote management features.

Elo founders pioneered the touch screen over 40 years ago. Today, Elo Touch Solutions is a leading global supplier of touch-enabled technology, products and industry solutions.

Elo's Interactive Digital Signage (IDS) products are available in 32" to 70" and include the thinnest (3-3.5") all-in-one commercial touch displays on the market.

I. VESA DDC/CI protocol

All Elo IDS 01 series monitors (with a "01" suffix after the size, for example 3201L and 4201L) support the Eloview VESA DDC/CI protocol. This provides device control/status via the monitor digital video interfaces (HDMI and DisplayPort). This protocol is employed by the Eloview Device Client but it can also be utilized to provide local custom applications as required.

Summary of Functions	Control	Monitor
Brightness	✓	✓
Contrast	✓	✓
Sharpness	✓	✓
Select Color Temperature	✓	✓
Adjust Red/Green/Blue Gain	✓	✓
Black Level of Red/Green/Blue	✓	✓
Auto Color	✓	✓
Save Color	✓	
Sub Contrast	✓	
Auto Adjustment	✓	✓
Adjust Horizontal/Vertical/Phase Position	✓	✓
Timing Index	✓	✓
Get Timing Request		✓
Adjust Clock	✓	✓
Aspect Ratio	✓	✓
Image Rotation		✓
Horizontal/Vertical Frequency		✓
Volume	✓	✓
Speaker Select	✓	✓
Audio Mute	✓	✓
New Control Value	✓	✓
Restore Factory Defaults	✓	
Power Mode	✓	✓
Touch Switch	✓	✓
Input Source	✓	✓
Ambient Light Sensor	✓	✓

Summary of Functions	Control	Monitor
OSD Enable	✓	✓
OSD Language	✓	✓
OSD Display Switch	✓	
Output Select	✓	✓
Temperature Value	✓	
Load Color Temperature Value	✓	
Factory Menu	✓	
Fan Status	✓	✓
Save User Setting	✓	
Save Monitor SN	✓	
Get Monitor SN		✓
Get/Save Monitor PN	✓	✓
Get/Save Touch SN	✓	✓
Get Serial Number		✓
Get Command Set		✓
System Temperature		✓
CPU Temperature		✓
Display Usage Time		✓
Alarm		✓
Flat Panel Type		✓
Monitor Type		✓
Display Controller Type		✓
Firmware Revision		✓
VCP Version		✓
Panel Name		✓

Connections and Setup

No special hardware connection is required since the VESA DDC/CI protocol is implemented on the HDMI and DisplayPort interfaces. Software access is provided via loading the Elo Touch Solutions Multitouch 4.5 driver or greater. The driver can be found at http://www.elotouch.com/Support/Downloads/dnld.asp

Command Set Format

The command set format used follows the VESA (Video Electronics Standards Association) Display Data Channel Command Interface (DDC/CI) Standard Version 2.

Command Reference

The following table provides Command Code definition with Elo defined data referenced in the description column.

Code	Code Name	Elo Usage	Code Type	Description
02h	New Control Value	New Value	R/W	Used to indicate that a display's user control(s) (excluding power control) has been used to change a control value. **Byte: SL** 00h — Reserved, must be ignored 01h — No new control value(s) 02h — One or more new control value(s) has been saved 03h→FEh — Reserved, must be ignored FFh — No user controls are present All changes made using the controls on the display must be reported even if these values have not been saved. The new control value must be reported to a host request for the current control value (i.e. a "GetVCP" command) A value = 02h must only be reset to a value = 01h by a host write operation and not by the display Support of this code is a mandatory requirement for compliance with MCCS standard Version 2 and higher
04h	Restore Factory Defaults	Recall default	W	Restore all factory presets including luminance / contrast, geometry, color and TV defaults. Any non-zero value causes defaults to be restored. A value of zero must be ignored.
05h	Restore Factory Luminance/Contrast Defaults	Recall Factory Mode	W	Restores factory defaults for luminance and contrast adjustments. Any non-zero value causes defaults to be restored. A value of zero must be ignored.
06h	Restore Factory Geometry Defaults	Geometry Reset	W	Restore factory defaults for geometry adjustments. Any non-zero value causes defaults to be restored. A value of zero must be ignored.
07h	Get Timing Request	Get Timing Request	R	Get H Frequency and V Frequency Value H Frequency's unit : K Hz V Frequency's unit: Hz MHML: H frequency SHSL: V frequency Return 0x00 when no active display
0Eh	Clock	Adjust Clock	R/W	Increasing (decreasing) this value will increase (decrease) the video sampling clock frequency
10h	Luminance	Brightness	R/W	Increasing (decreasing) this value will increase (decrease) the Luminance of the image.
12h	Contrast	Contrast	R/W	Increasing (decreasing) this value will increase (decrease) the Contrast of the image. Notes: 1) The actual range of contrast over which this control applies is defined by the manufacturer. 2) Care should be taken to avoid the situation where the contrast ratio approaches 0 … this may be non-recoverable since user will not be able to see the image.

14h	Select Color Preset	Select Color Temperature	R/W	Select a specified color temperature. This is a 2 byte value, the MH byte defines the tolerance associated with any preset … this is fixed by the display manufacturer. If no tolerance level is specified, the presets must be interpreted as relative values supporting a scale which can move to warmer (lower color temperature) or cooler (higher color temperature).

Byte: MH

00h	No tolerance is specifie, treat as relative scale.
01h	A tolerance of 1% is specified
02h	A tolerance of 2% is specified
03h	↓
09h	No user controls are present
0AH	A tolerance of 10% is specified
≥ 0Bh	Reserved, must be ignored

SL

	If MH byte ≠ 00h	If MH byte = 00h
00h	Reserved, must be ignored	Reserved, must be ignored
01h	sRGB	sRGB
02h	Display native	Display native
03h	4000 K	Warmer
04h	5000 K	↑
05h	6500 K	↑
06h	7500 K		
07h	8200 K		
08h	9300 K	↓
09h	10000 K	↓
0Ah	11500 K	Cooler
0Bh	User 1	User 1
0Ch	User 2	User 2
0Dh	User 3	User 3
≥ 0Eh	Reserved, must be ingorned	Reserved, must be ingorned

16h	Video Gain (Drive): Red	Adjust Red Gain	R/W	Increasing (decreasing) this value will increase (decrease) the luminance of red pixels. The value returned must be an indication of the actual red gain at the current color temperature and not be normalized. Elo defined: If enter factory menu, maximum value will be 0xFF.
18h	Video Gain (Drive): Green	Adjust Green Gain	R/W	Increasing (decreasing) this value will increase (decrease) the luminance of green pixels. The value returned must be an indication of the actual green gain at the current color temperature and not be normalized. Elo defined: If enter factory menu, maximum value will be 0xFF.
1Ah	Video Gain (Drive): Blue	Adjust Blue Gain	R/W	Increasing (decreasing) this value will increase (decrease) the luminance of blue pixels. The value returned must be an indication of the actual blue gain at the current color temperature and not be normalized. Elo defined: If enter factory menu, maximum value will be 0xFF.

1Eh	Auto Setup	Auto Adjustment	R/W	Perform auto setup function (H/V position, clock, clock phase, A/D converter, etc)

Perform auto setup function (H/V position, clock, clock phase, A/D converter, etc)

Byte: SL	
00h	Auto setup is not active
01h	Perform / performing auto setup
02h	Enable continues / periodic auto setup
≥ 03h	Reserved, must be ignored

Note: A value of '02h' (when supported) must cause the display to either continuously or periodically (event or timer driven) perform an auto setup. Cancel by writing a value of either '01h' or '00h'.

20h	Horizontal Position (Phase)	Adjust Horizontal Position	R/W	Increasing (decreasing) this value moves the image toward the right (left) side of the display.
30h	Vertical Position {Phase}	Adjust Vertical Position	R/W	Increasing (decreasing) this value moves the image toward the top (bottom) edge of the display.
3Eh	Clock Phase	Adjust Phase Position	R/W	Increasing (decreasing) this value will increase (decrease) the phase shift of the sampling clock.
60h	Input Source	Input Source	R/W	A one byte write/read (Byte 0), allows the host to set (write) one and only one input as 'the source' and identify (read) the current input setting.

A one byte write/read (Byte 0), allows the host to set (write) one and only one input as 'the source' and identify (read) the current input setting.

Byte: SL	Input Definition	
01_b	Analog video (R/G/B) 1	
02_b	Analog video (R/G/B) 2	
03_b	Digital video (TMDS) 1	DVI1
04_b	Digital video (TMDS) 2	DVI2
05_b	Composite video 1	
06_b	Composite video 2	
07_b	S-Video 1	
08_b	S-Video 2	
09_b	Turner 1	
$0A_b$	Turner 2	
$0B_b$	Turner 3	
$0C_b$	Component video (YPrPb / YCrCb) 1	
$0D_b$	Component video (YPrPb / YCrCb) 2	
$0E_b$	Component video (YPrPb / YCrCb) 3	
$0F_b$	DisplayPort 1	
10_b	DisplayPort 2	
11_b	Digital Video (TMDS) 3 HDMI 1	
12_b	Digital Video (TMDS) 1 HDMI 2	
$≥ 13_b$	Reserved and are un-assigned	

62h	Audio: Speaker Volume	Volume Adjust R/W	R/W	Allows the volume to be adjusted.

Allows the volume to be adjusted.

Byte: SL	
00h	Fixed (default) level
01h→FEh	Volume level
FFh	Mute

Note:
The level will increase from a minimum at a value = 01h to a maximum at a value = FEh

63h	Speaker Select	Speak Select	R/W	Allows a "pair" (may be physically more than two speakers) of speakers to be selected.

Byte: SL	
00h	Front L / R
01h	Side L / R
02h	Rear L / R
03h	Center / Sub woofer
04h→FFH	Reserved, must be ignored

66h	Ambient Light Sensor	Ambient Light Sensor	R/W	Used to control the action of an ambient light sensor

Byte: SL	Definitions
00h	Reserved, must be ignored
01h	Ambient light sensor is disabled
02h	Ambient light sensor is enabled
≥ 03h	Reserved, must be ignored

6Ch	Video Black Level: Red	Black level of Red	R/W	Increasing (decreasing) this value will increase (decrease) the black level of the red video.
6Eh	Video Black Level: Green	Black level of Green	R/W	Increasing (decreasing) this value will increase (decrease) the black level of the green video.
70h	Video Black Level: Blue	Black level of Blue	R/W	Increasing (decreasing) this value will increase (decrease) the black level of the blue video.
87h	Sharpness	Sharpness	R/W	Allows one of a range of algorithms to be selected to suit the type of image being displayed and/or personal preference. Increasing (decreasing) the value must increase (decrease) the edge sharpness of image features.
8Dh	Audio Mute	Audio Mute	R/W	Provides for the audio to be muted or unmuted.

Byte: SL	
00h	Reserved, must be ignored
01h	Mute the audio
02h	Unmute the audio
≥ 03h	Reserved, must be ignored

AAh	Screen Orientation	Image Rotation	R	Indicates the orientation of the screen. Byte:

Byte: SL		
00h	Reserved	Shall be ignored
01h	0 degrees	The normal landscape mode
02h	90 degrees	Portrait mode achieved by clockwise rotation of the display 90 degrees
03h	180 degrees	Landscape mode achieved by rotation of the display 180 degrees
04h	270 degrees	Portrait mode achieved by clockwise rotation of the display 270 degrees
05h → FEh	Reserved	Shall be ignored
FFh	Not applicable	Indicates that the display cannot supply the current orientation

Note: "Clockwise rotation" when viewing the display from user's viewpoint.

ACh	Horizontal Frequency	Horizontal Frequency	R	Horizontal synchronization signal frequency in Hz as determined by the display. MH = ML = SH = SL = FFh: Indicates that the display cannot determine the frequency or it is out of range. Example: A reported value of 01h, 21h, 10h indicates a Hz frequency of 74.0KHz (nominal for 1920 x 1200 @ 60Hz reduced blanking)
ADh	FAN Status	FAN Status	R/W	00: Turn off Fan function 01: Turn on Fan function with min Fan speed 02: Turn on Fan function with Max Fan speed FF: N/A
AEh	Vertical Frequency	Vertical Frequency	R	Vertical synchronization signal frequency in 0.01Hz as determined by the display. MH = ML = SH = SL = FFh: Indicates that the display cannot determine the frequency or it is out of range. Example: A reported value of 17h, 7Ah indicates a Hz frequency of 60.1Hz.
B0h	Setting	Save User Setting	W	Store / Restore the user saved values for current mode. **Byte: SL** 01h — Store current settings in the monitor 02h — Restore factory defaults for current mode. If not factory defaults then restore user values for current mode All other values are reserved and must be ignored.
B1h	System Temp	System Temp	R	Return the temperature of Video board
B2h	Flat Panel sub-pixel Layout	Flat Panel Type	R	Indicates the type of LCD sub-pixel structure. **Byte: SL** 00h — Sub-pixel layout is not defined 01h — Red / Green / Blue vertical stripe 02h — Red / Green / Blue horizontal stripe 03h — Red / Green / Blue vertical stripe 04h — Red / Green / Blue horizontal stripe 05h — Quad - pixel, a 2x2 sub-pixel structure with red at top left, blue at bottom right and green at top right and bottom left 06h — Quad-pixel, a 2x2 sub-pixel structure with red at bottom left, blue at top right and green at top left and bottom right 07h — delta (triad) 08h — Mosaic with interleaved sub-pixels of different colors ≥ 09h — Reserved, must be ignored
B3h	CPU Temp	CPU Temp	W	Return the temperature of CPU

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B4h	Sourcing Timing Mode	Timing Index	R/W	Indicates the timing mode being sent by the host. This command has a 5 byte data structure: Byte 0: flags for DMT timing modes Byte 1: flags for DTV timing modes Bytes 2 – 4: CVT descriptor bytes Note: Only one Timing Mode must be indicated, any combination with more than a single Timing Mode identified is invalid and must be ignored. Note: 'RB' in following table indicates 'reduced blanking' as defined by the VESA CVT standard Note: The aspect ratio (AR) identified in the following table is the physical aspect ratio of the image. The following describes the contents of the 3 byte CVT descriptor, this is correct at the time of writing but for complete description and to verify accuracy the user should verify using the latest revision of the VESA VTBEXT standard. If the CVT descriptor is not being used then the three bytes must be set to 00h.
B6h	Display Technology Type	Monitor Type	R	Indicates the base technology type. Caution: Care should be taken that the information declared by this code is consistent with that provided elsewhere within the same display by DisplayID or EDID.

Byte: SL

00_b	Reserved, must be ignored
01_b	CRT (shadow mask)
02_b	CRT (aperture grill)
03_b	LCD (Active matrix)
04_b	LCoS
05_b	Plasma
06_b	OLED
07_b	EL
08_b	Dynamic MEM eg iMOD
09_b	Static MEM e.g. iMOD
$\geq 0A_b$	Reserved, must be ignored

Byte: SH — **Technology Implementation**

00_b	Reserved, must be ignored
01_b	Direct View CRT
02_b	Direct View Flat Panel
03_b	Projection Rear
04_b	Projection Front
05_b	Glasses Mono
06_b	Glasses Stero
$\geq 07_b$	Reserved, must be ignored

Byte: ML

$> 00_b$	Reserved, must be ignored

Byte: MH

$\geq 00_b$	Reserved, must be ignored

C0h	Display Usage Time	Information	R	Returns the current value (in hours) of 'active power on' time accumulated by the display in the ML, SH and SL bytes. The MH byte must be set to 00h. 'Active power on' time is defined as the period when the emissive elements(s) of the display – cathodes for a CRT, fluorescent lamps for a LCD, etc – are active. Elo Define: MH/ML: Total on time, from 0 to 65535 hrs SH/SL: Back Light on time, From 0 to 65535 hrs
C7h	Touch Switch	Touch Switch	R/W	00: Turn off Touch function 01: Turn on Touch function
C8h	Display Controller Type	Display Controller Type	R	This VCP code will provide the host with knowledge of the controller type being used by a particular display which will enable a table based approach (by applications) to what features may be available on attached display. SL byte : Indicates controller manufacturer ML and SH bytes : Provide a numeric indication of controller type Notes: 1. Each controller manufacturer supporting this command is required to publish and maintain an equivalence table between the actual product identifier (alpha-numeric marketing identifier) and the simple numerical value here. 2. A host application would use the combination of data from MH, ML and SH bytes to uniquely identify a particular controller.

SL Byte	
01h	Conexant
02h	Genesis Microchip
03h	Macronix
04h	MRT (Media Reality Technologies)
05h	Mstar Semiconductor
06h	Myson
07h	Philips
08h	PixelWorks
09h	RealTek Semiconductor
0Ah	Sage
0Bh	Silicon Image
0Ch	SmartASIC
0Dh	STMicroelectronics
0Eh	Topro
0Fh	Trumpion
10h	Welltrend
11h	Samsung
12h	Novatek Microelectronics
13h	STK
14h→FEh	Reserved, must be ignored
FFh	Not defined - a manufacturer designed controller

Please check the MCCS_UP.pdf document on the VESA website for any extensions to this list.

C9h	**Display Firmware Level**	**Firmware Revision**	R	This VCP code results in two bytes of data being sent by the display. SH byte: defines the firmware version number SL byte: defines the firmware revision number e.g. 03h, 05h defines a firmware level of 3.5

				Indicates the current state of the display OSD	
CAh	OSD	OSD Enable	R/W	**Byte: SL**	
				00h	Reserved, must be ignored
				01h	OSD is disabled
				02h	OSD is enabled
				7Fh→FEh	Reserved, must be ignored
				FFh	Indicated that the display cannot supply this information
				Allows the display OSD language to be selected.	
CCh	OSD Language	OSD Language	R/W	**Byte: SL**	
				00h	Reserved, must be ignored
				01h	Chinese (traditional / Hantai)
				02h	English
				03h	French
				04h	German
				05h	Italian
				06h	Japanese
				07h	Korean
				08h	Portuguese (Portugal)
				09h	Russian
				0Ah	Spanish
				0Bh	Swedish
				0Ch	Turkish
				0Dh	Chinese (simplifies / kantai)
				0Eh	Portuguese (Brazil)
				0Fh	Arabic
				10h	Bulgarian
				11h	Croatian
				12h	Czech
				13h	Danish
				14h	Dutch
				15h	Estonian
				16h	Finnish
				17h	Greek
				18h	Hebrew
				19h	Hindi
				1Ah	Hungarian
				1Bh	Latvian
				1Ch	Lithuanian
				1Dh	Norwegian
				1Eh	Polish
				1Fh	Romanian
				20h	Serbian
				21h	Slovak
				22h	Slovenian

				Data size: Write = 4 bytes / Read = 8 bytes A possible value is selected by setting the corresponding bit = 1. Note: Setting more than one bit = 1 is invalid and must be ignored by the display. Used to select the active video output.
D0h	Output Select	Output Select	R/W	**Byte 0**
				Bit 7 — Analog Video (R/G/B) #1
				Bit 6 — Analog Video (R/G/B) #2
				Bit 5 — Digital Video (TMDS) #1
				Bit 4 — Digital Video (TMDS) #2
				Bit 3 — Composite Video #1
				Bit 2 — Composite Video #2
				Bit 1 — S-video #1
				Bit 0 — S-video #2
				Byte 1
				Bit 7 — Turner - Analog #1
				Bit 6 — Turner - Analog #2
				Bit 5 — Turner - Digital #1
				Bit 4 — Turner - Digital #2
				Bit 3 — Component Video (YPrPb / YCrCb) #1
				Bit 2 — Component Video (YPrPb / YCrCb) #2
				Bit 1 — Component Video (YPrPb / YCrCb) #3
				Bit 0 — Reserved, must be ignored
				Byte 2
				Bit 7 — Digital Video (DisplayPort) #1
				Bit 6 — Digital Video (DisplayPort) #2
				Bit 5 → 0 — Reserved, must be ignored
				Byte 3
				Bit 7 → 0 — Reserved, must be ignored

Power Mode – DPM & DPMS standards are supported along with other power function(s).

				SL byte	DPM	DPMS
D6h	Power Mode	Power Status	R/W	00h	Reserved, must be ignored	
				01h	On	On
				02h	Off	Standby
				03h	Off	Suspend
				04h	Off	Off
				Item(s) below are not part of the DPM or SPMS Standards		
				05h	Power off the display - functionally equivalent to turning off power using the "power button"	
				≤06h	Reserved, must be ignored	

Note 1: Following a MCCS command with a value of 01h → 04h, the display must respond to the appropriate DPM(or DPMS) protocols.
Note 2: Following a MCCS command with a value of 05h, user intervention at the display (pressing / toggling the power switch) may be required to restore operation.
Elo Define:
00 or >=6: No actived.
01: Power on
02: Sleep mode
04: Power off
05: BL off (PC box and System still work)

				Controls aspects of the displayed image. **Note:** This VCP code is intended for use with TV applications.
DBh	Image Mode	Aspect to Ratio	R/W	<table><tr><th>Byte: SL</th><th>Name</th><th>Description</th></tr><tr><td>00h</td><td></td><td>No effect</td></tr><tr><td>01h</td><td>Full mode</td><td>Linear expansion (compression) of the imaege on horizontal axis</td></tr><tr><td>02h</td><td>Zoome mode</td><td>Linear expansion (compression) of the imaege on horizontal and vertical axis</td></tr><tr><td>03h</td><td>Squeeze mode</td><td>Display all of the image content on visible screen. May result in unused areas a of visible screen... bars at top, bottom or sides.</td></tr><tr><td>04h</td><td>Variable</td><td>Display all of the image content by applying non-linear expansion (compression) to the horizontal axis.</td></tr><tr><td>≥05h</td><td></td><td>Reserved, must be ignored</td></tr></table> Note: a more complete description of these modes may be found in the VESA DI-EXT standard.
DFh	VCP Version	VCP Version	R	Defines the version number of the MCCS standard recognized by the display. SH byte: defines the MCCS version number SL byte: defines the MCCS revision number e.g. 03h 00h defines a MCCS level of 3.0 (this standard) Note: Support of this code is a mandatory requirement for compliance with MCCS standard Version 2 and higher.
EAh	Alarm	Alarm	R	00: No alarm 01: No support alarm sensor 02: Temp over spec 03: BL breakdown 04: Fan stop
E3h	Auto Color	Auto Color	W/R	01: Do Auto Color Return Result Value: Success :6E_51_E3_02_01_Chksum Failure: 6E_51_E3_03_01_Chksum
E5h	Save Color Temperature Value	Save Color Temperature Value	W	
E8h	OSD Display on/off	OSD Display	W	01: On 00: Off
E6h	Load Color Temperature Value	Load Color Temperature Value	W	
F2h	Factory Menu	Factory Menu	W	
F3h	Get Command Set	Get Command Set	R	Get Command Set
F4h	Get Monitor SN(1-4bytes) VCP String	Get Monitor SN(1-4bytes)	R	MH & ML : Serial Number 1 byte and 2 byte SH & SL : Serial Number 3 byte and 4 byte
F5h	Get Monitor SN(5-8bytes) VCP String	Get Monitor SN(5-8bytes)	R	MH & ML : Serial Number 5 byte and 6 byte SH & SL : Serial Number 7 byte and 8 byte

F6h	Get Monitor SN(9-10bytes) VCP String	Get Monitor SN(9-10bytes)	R	MH & ML : Serial Number 9 byte and 10 byte SH & SL : 20h and 20h (ASCII Code: space)
F9h	Sub Contrast	Sub Contrast	W	
EC	Panel Name	Pnel Name	R	MH ML :0x00 0xFF SH SL : 0x00 Panel ID
F0h	Save Monitor SN	Save Monitor SN	W	Save Monitor Serial Number Write Monitor SN : 6E_51_8F_F0_Chr1_Chr2_Chr3_..._Chr13_Chr14_Checksum *The length of command depends on how long the SN is, the Maximum length is 14.

E1h	Get/Save Touch SN	Get/Save Touch SN	W/R	Get Touch Serial Number
				Save:
				6E_51_8F_E1_Chr1_Chr2_Chr3_..._Chr14_Checksum + Stop
				Read:
				// Get VCP: S_6E_51_82_01_(E1)_CHK_P
				// Reply: S_6F_6E_90_02_(E1)_Dat1_Dat2_Dat3_Dat4_Dat5_Dat6_Dat7_Dat8_Dat9_Dat10_ Dat11_Dat12_Dat13_Dat14_Chk
				*The length of command depends on how long the SN is, the Maximum length is 14.

E2h	Get Serial Number	Get Serial Number	R	Get Serial Number
				Read:
				// Get VCP: S_6E_51_82_01_(E2)_CHK_P
				// Reply: S_6F_6E_90_02_(E2)_Dat1_Dat2_Dat3_Dat4_Dat5_Dat6_Dat7_Dat8_Dat9_Dat10_ Dat11_Dat12_Dat13_Dat14_Chk
				*The length of command depends on how long the SN is, the Maximum length is 14.

E9h	Get/Save Monitor PN	Get/Save Monitor PN	W/R	Get Touch Serial Number
				Save:
				6E_51_8F_E9_Chr1_Chr2_Chr3_..._Chr7_Checksum + Stop
				Read:
				// Get VCP: S_6E_51_82_01_(E9)_CHK_P
				// Reply: S_6F_6E_89_02_(E9)_Dat1_Dat2_Dat3_Dat4_Dat5_Dat6_Dat7_Chk
				*The length of command depends on how long the SN is, the Maximum length is 7.

II. MDC Protocol

All Elo IDS 01 series monitors (with a "01" suffix after the size, for exmple 3201L and 4201L) support the Eloview MDC protocol. This provides device control/status via the monitor USB interface. For Elo customers who have utilized the IDS 00 series MDC remote management capabilities, this enables seamless backward compatibility on the 01 series. Access to the MDC protocol via a virtual com port is provided by the Elo driver. Remote management functions and command set protocols are the same as with the 00 series.

Summary of Functions	Control	Monitor
Brightness	✓	✓
Contrast	✓	✓
Audio	✓	✓
Auto Adjust Video	✓	
Restore Defaults	✓	
Touch Controls On/Off	✓	✓
Display Power On/Off	✓	✓
Power-on Hours		✓
Backlight-on Hours		✓
Serial Number		✓
Command Set Supported by Device		✓
Switch Input Source	✓	✓
Adjust Audio Volume by %	✓	✓
Switch Input Video and Audio Source	✓	✓
Fan Status	✓	✓
System Temperature		✓
Alarm		✓

Connections and Setup

Elo 01 Series IDS displays have a USB connector which allows access to touch, MDC functionality and other peripheral devices (e.g., web cam and RFID reader) connected to the unit. This is implemented through an internal USB hub. MDC functions are implemented on a virtual serial port. If you are using an Elo Computer Module you can skip steps 1 through 3.

Step 1: The Elo VCP driver is required to be loaded. This can be downloaded from http://www.elotouch.com/Support/Downloads/dnld.asp (part of driver pack for IDS Computer Modules ECMG2) or found on the IDS 01 series &ECMG2 driver CD shipped with the monitor.

Step 2: Connect the monitor touch USB cable to the host computer.

Step 3: In the On-Screen Display of the 4201L, navigate to "MDC Settings" and select "Virtual Serial" – this is done with the "wired remote" supplied with your 4201L Display

DDC/CI ▶ Virtual Series

1920x1080 60Hz
Elo Computer module
HDMI
www.elotouch.com

Step 4: Select the virtual serial port on the Host computer. Procedure for Windows: In Control Panel, open Device Manager. Under the Ports (COM and LPT) group, you will see a "Silicon Labs CP210x USB to UART Bridge (COMXX)" listed. With XX being the available Serial (COM) port number which the ELO VCP driver has been mapped. The application (e.g., content player) that is managing the device should send hardware control commands to this port. Other operating systems provide for different ways to access COM ports.

Command Set Format

All values are big-endian. The required sequence of commands for this interface to be useful is:

First: Send a "Get Serial Numbers"
(host PC queries the bus to find out how many IDS displays are connected; each connected display responds with its serial number)

Second: Send separate Get Command Set for each connected IDS display
(host PC asks a specific IDS display for its supported command set; the IDS display responds with its supported command set)

Third: host PC issues any command to one IDS display
(host PC issues any supported command to one IDS display, the IDS display responds with a status

Format for Host PC Commands:

Position:	1	2	3	4	5	6	7	8	9
Description:	Start	Host address	Length	Target Audience	Command R/W Format	Command Type	Write Value	Checksum	Stop

Format for IDS Display Response to a Host PC Read Command:

Position:	1	2	3	4	5	6	7	8	9
Description:	Start	Host address	Length	Slave Address	Requested R/W Format	Requested Type	Return Data	Checksum	Stop

Format for IDS Display Response to a Host PC Write Command:

Position:	1	2	3	4	5	6	7	8	9
Description:	Start	Host address	Length	Slave Address	Error Code	Requested Command	Checksum	Stop	Stop

Start
Value: always 02h

Host Address
Value: always 6Eh

Length
Value: variable number that represents the number of bytes between LENGTH and CHECKSUM (non-inclusive). Range of allowable values is between 80h and FFh. 80h means 0 bytes of length, FFh means 127 bytes of length.

Target Audience
Value: Value depends on target.

If the target is all connected IDS displays (for the GET SERIAL NUMBERS command), the value is FFh.

If the target is one specific IDS display (for all other commands), the value is 10 ASCII bytes representing that specific display's 10-character serial number. For example, if the serial number of the target display is G10C987654, then the TARGET AUDIENCE would be: 47h 31h 30h 43h 39h 38h 37h 36h 35h 34h

Slave Address
From Host to IDS:

If the target is all connected IDS systems, the value is FFh.

If the target is one specific IDS system (for all other commands), the value is 10 ASCII bytes representing that specific system's 10-character serial number. For example, if the serial number of the target system is G10C987654, then the TARGET AUDIENCE would be: 47h 31h 30h 43h 39h 38h 37h 36h 35h 34h

From IDS System Response to a Host PC Command:

The value is 10 ASCII bytes representing that specific system's 10-character serial number.

Command R/W Format
Value: Depends if the command will be a Read or a Write.

If command is a Read, then the value is 01h

If command is a Write, then the value is 04h

See the command section for details

Write Value
Value: depends if the COMMAND R/W FORMAT is Read or Write.

If the COMMAND R/W FORMAT is Read, this field does not exist.

If the COMMAND R/W FORMAT is Write, this field exists. See the COMMAND TYPE description for details of each COMMAND TYPE's intended/allowable WRITE VALUE.

Return Data
This field reports variable-length data from a Read command (representing things like current brightness, on/off status).

See the COMMAND TYPE description for details of each COMMAND TYPE's RETURN DATA

Error Code
This field reports a 1-byte error code from a Write command:

04h – No Error

01h – COMMAND TYPE not supported by slave

00h, 02h, 03h, or 05h - Error

Requested R/W Format
Value: depends if the COMMAND R/W FORMAT is Read or Write

If the Host PC's COMMAND R/W FORMAT was Read, the value is the same as the Host PC's COMMAND R/W FORMAT.

If the Host PC's COMMAND R/W FORMAT was Write, this field does not exist.

Requested Command
Value: depends if the COMMAND R/W FORMAT is Read or Write

If the Host PC's COMMAND R/W FORMAT was Read, the value is the same as the Host PC's COMMAND R/W FORMAT.

If the Host PC's COMMAND R/W FORMAT was Write, this field does not exist.

Checksum
Value: the checksum for the data between the START and CHECKSUM fields, non-inclusive.

Stop
Value: always 03h

Command Reference

Value: select from the following options:

Function	Command Type value	R/W options	Function (for Writes)	WRITE VALUE (for write commands)	RETURN VALUE (for read commands)
Recall defaults	04h	W	Restores brightness, contrast, volume, and Analog VGA video timing parameters to factory defaults	01h	00h: Recall function not active: no action taken 01h: All settings recalled
Change Brightness	10h	R/W	For Read commands: slave will return its current brightness setting in RETURN DATA For Write commands: slave will set its brightness setting according to the WRITE VALUE	2 Byte setting: 00h 00h (minimum) FFh FFh (maximum) (High Byte of setting – Low Byte of setting)	Returns 4 bytes: 2 bytes for max adjustable value (high byte followed by low byte) Followed by 2 bytes for current value (high byte followed by low byte)
Change Contrast	12h	R/W	For Read commands: slave will return its current contrast setting in RETURN DATA For Write commands: slave will set its contrast setting according to the WRITE VALUE	2 Byte setting: 00h 00h (minimum) FFh FFh (maximum) (High Byte – Low Byte)	Returns 4 bytes: 2 bytes for max adjustable value (high byte followed by low byte) Followed by 2 bytes for current value (high byte followed by low byte)
Perform Auto-Adjust	1Eh	R/W	Automatically adjusts input Analog VGA video for optimum display on the display. NOTE: IDS displays with Elo IDS Computer Modules use digital HDMI video	N/A – this field does not exist for this command	00h: auto-adjust not active – no action taken 01h: Auto-adjust performed
Switch Input source	60h	R/W	Switch Input source	0x80: External VGA port 0x20: External HDMI port Note: Data size: From Host to PID Write = 16 bytes from S1 to below Byte' 0 Read = 12 bytes from S1 to CMD A possible value is selected by setting the corresponding bit = 1. Setting more than one bit = 1 is invalid and must be ignored by the display. Used to select the active video source. Byte' 0: Bit 7 External VGA port Bit 6 Reserved, must be ignored Bit 5 External HDMI port Bit 4 ECM-HDMI port Bits 3 □ 0 Reserved, must be ignored	Data size: From PID reply to Host Write = 12 bytes from S1 to CMD Read = 16 bytes from S1 to below Byte' 0
Adjust Audio volume by percentage	61h	R/W	For Read commands: slave will return its current volume percentage and max percentage in RETURN DATA For Write commands: slave will set its volume setting according to the WRITE VALUE	2-byte setting: First byte for volume increase or reduce (00h: increase, 01h: reduce) Second byte for volume percentage, from 1h to 5h	Returns 2 bytes: First byte for max percentage (from 0h up to 64h) Second byte for current percentage (from 0h to 64h)
Change Audio Volume	62h	R/W	For Read commands: slave will return its current volume setting in RETURN DATA For Write commands: slave will set its volume setting according to the WRITE VALUE	2-byte setting: 00h 00h (minimum) FFh FFh (maximum) (High Byte – Low Byte)	Returns 4 bytes: 2 bytes for max adjustable value (high byte followed by low byte) Followed by 2 bytes for current value (high byte followed by low byte)

Switch Input Video and Audio source	65h	R/W	Switch Input video and audio source	0x80: External VGA port, Audio from PC line-in 0x20: External HDMI port, Audio from HDMI 0x10: ECM-HDMI port, Audio from ECMHDMI Note: Data size: From Host to PID Write = 16 bytes from S1 to below Byte' 0 Read = 12 bytes from S1 to CMD A possible value is selected by setting the corresponding bit = 1. Setting more than one bit = 1 is invalid and must be ignored by the display. Used to select the active video source. Byte' 0: Bit 7 External VGA port Bit 6 Reserved, must be ignored Bit 5 External HDMI port Bit 4 ECM-HDMI port Bits 3 → 0 Reserved, must be ignored	Data size: From PID reply to Host Write = 12 bytes from S1 to CMD Read = 16 bytes from S1 to below Byte' 0
FAN Status	ADh	R/W		00: Turn off Fan function 01: Turn on Fan function with min Fan speed 02: Turn on Fan function with Max Fan speed	
System Temp	B1h	R		0: 0 degree C 32: 50 degree C 64: 100 degree C	
Get Lifetime Information	C0h	R	Requests the slave to report two values: 1. How many accumulated hours the system has been on (includes SLEEP) 2. How many accumulated hours the system's backlight has been on.	N/A – this field does not exist for this command	Returns 4 bytes: 2 bytes for accumulated display power hours (high byte first, maximum of FFh FFH 65025 hrs) Followed by 2 bytes for backlight on hours (high byte first, maximum of FFh FFH 65025 hrs)
Control Touch Functionality	C7h	R/W	For Read commands: slave will return whether or not touch functionality is turned on For Write commands: slave will turn touch functionality on or off according to the WRITE VALUE	00h (turn touch off) 01h (turn touch on)	00h: touch function is off 01h: touch function is on
Control System Power	D6h	R/W	For Read commands: slave will return whether or not the IDS system is turned on. For Write commands: slave will power the system on or off according to the WRITE VALUE NOTE: This function will not work if the Host PC is an Elo IDS Computer Module NOTE: The system can be an IDS monitor by itself or an IDS monitor with integrated Computer Module.	04h (turn display off) 01h (turn display on)	04h: display is off 01h: display is on
Get Serial Numbers	E2h	R	All IDS systems connected to the bus report their serial number. This allows Host PC software to address unique IDS systems.	N/A – this field does not exist for this command	10 ASCII-coded hex bytes representing that specific display's 10-character serial number
Alarm	EAh	R		00: No alarm 01: No support alarm sensor 02: Temp over spec 03: BL breakdown 04: Fan stop	
Get Command Set	F3h	R	Addressable (by serial number) to only one connected system at a time. The slave reports the list of commands that its hardware supports.	N/A – this field does not exist for this command	A list of COMMAND TYPES supported by the slave, excluding the "Get Command Set" command. For example, if the slave system supports Get Command Set, Get Serial Numbers, Control System Power, and Control Touch Functionality, then this field would return 3 bytes: E2h D6h C7h

The following provides an example transaction between the host PC and IDS display.

Host PC Command:

Get Serial Numbers: 02 6E 83 FF 01 E2 D3 03

IDS Display Response:

Serial Number Response: 02 6E 8D 00 01 E2 48 31 31 43 30 32 31 39 30 32 F9 03

Notes about command timing:

1. After issuing a GET SERIAL NUMBERS command, the Host PC should wait at least 5 seconds before issuing the next command. This should give all slaves on the bus enough time to respond.

2. After issuing any other command, the Host PC should wait at least 50ms before issuing the next command. This should give the addressed slave enough time to respond.

Contact the technical support center nearest you for more information on Elo IDS displays:
http://www.elotouch.com/Support/TechnicalSupport/tech.asp

To find out more about our extensive range of Elo touch solutions, go to **elotouch.com**, or call the office nearest you.

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