API Guide MSS-8 and MVS-16

API Instructions for RS232

RS232 Connection:
Port Settings: Bps 9600, Data bits 8, Parity None, Stop Bits 1, Flow Control None

Communication Protocol:
The protocol has 3 formats as below. It is sent as ASCII Code and not processed back (no feedback results)

[x]v[y].	Connect Input “x” with Output “y”
[x]v[y],[z].	Connect Input “x” with Output “y” and “z”
[x]All.	Connect Input “x” with all Outputs

Examples:

1v2.	Input 1 to Output 2
1v2,3,4,5.	Input 1 to Outputs 2,3,4,5
5All.	Input 5 to All Outputs

- All instructions must end with a “.”
- With the “v” format multiple outputs can be assigned to a single input
- “All” always represents Output Channels
- Only one Input can be routed with each command line

Configuration and Control API Guide for LAN

Description:
This document describes the Osprey Matrix Switch Configuration and Control API (OMSCC API). The API uses HTTP UDP packet transmissions utilizing both broadcast and unicast addresses.
All Osprey Matrix Switchers are shipped with the OMSCC API pre-installed. This API can be used in C++, C#, Java, IOS, etc. There is a full C# example application that can be complied in Microsoft Visual Studio at the end of this User Guide.

Locating a Switcher on the Network

Method: UDP Broadcast
Packet Format: a56c140081ff010000000000000000000ffa503
Destination Address: Broadcast 255.255.255.255
Destination Port: 7000

Response Payload:
aA56c23008**2**ff010000000000000000000ff00**4**d5353303831312d102d43043155a906ae (hex)

The above red marked 82 indicate the device type 0x82, means matrix switcher.

The above red marked 00 indicate data return succeed.

The above green marked 4D 53 53 30 38 31 31 2D 10 2D **43 04 31 55** indicates that this is the Osprey 8x8 Matrix Switcher. Different matrix switcher will return different codes.

Configuring Output Ports

Description:
The following commands configure the output ports to output based on the configured input port.
Method: UDP Unicast
Destination Address: IP address of the matrix switcher
Destination Port: 7000

Commands Table: All commands must be sent as ASCII code to the IP address of the matrix switch on port 7000.

[x]v[y]. Connect Input “x” with Output “y”
[x]v[y],[z]. Connect Input “x” with Output “y” and “z”
[x]All. Connect Input “x” with all Outputs

Examples:
1v2. Input 1 to Output 2
1v2,3,4,5. Input 1 to Outputs 2,3,4,5
5All. Input 5 to All Outputs
All#. All channels correspond one by one
- All instructions must end with a “.”
- With the “v” format multiple outputs can be assigned to a single input
- “All” always represents Output Channels
- Only one Input can be routed with each command line
- Response Payload – none

Broadcast from PC to MSS-8

Data Packet	Value	Byte	Description
Packet Header	0xA5 0x6C	2	The beginning of data packet
Data Length	0x0000~0x0420	2	The length of the entire data packet from packet header to end (including header and end). The lower byte stays head.
Device Type	0x00~0xFF	1	Definition of device type, OXFF means broadcast.
Device ID	0x00~0xFF	1	A distinguishing of the device when there are several devices in a same LAN at same time. OXFF means broadcast.
Interface Type	0x00~0xFF	1	0x00:UART（serial port) 0x01: LAN
Reserve	0x00	9	For reserve. This device is not reserved.
Command	0x00~0xFF	1	Command for each function.
Packet Data	…….	Variable length	<= 1024
Checksum	0x0000~0xFFFF	2	The algebraic sum of all bytes from packet header to checksum (including the packet header but excluding the checksum). Take 2 bytes, other parts omitted. The lower byte stays ahead.
Packet End	0xAE	1	The end of the packet.

Response from MSS-8 to PC

Data Packet	Value	Byte	Description
Packet Header	0xA5 0x6C	2	The beginning of data packet.
Data Length	0x0000~ 0xFFFF	2	The length of the entire data packet from packet header to end (including the packet header and end). The lower byte stays ahead.
Device Type	0x00~0xFF	1	Definition of device type, OXFF means broadcast.
Device ID	0x00~0xFF	1	A distinguishing of the device when there are several devices in a same LAN at same time. OXFF means broadcast.
Interface Type	0x00~0xFF	1	0x00: UART（serial port); 0x01: LAN
Reserve	0x00	9	Reserve. This device is not reserved.
Command	0x00~0xFF	1	Command for each function.
Response Status	0x00 ~ 0xFF	1	0x00: Succeed; 0x01: Error; Other data undefined.
Response Content		Variable length	Reserve. The length of response content is variable when backward reading command, and it is consistent with the format of "packet data".
Checksum	0x0000~0xFFFF	2	The algebraic sum of all bytes from packet header to checksum (including the packet header but excluding the checksum). Take 2 bytes, other parts omitted. The lower byte stays ahead.
Packet End	0xAE	1	The end of the packet.

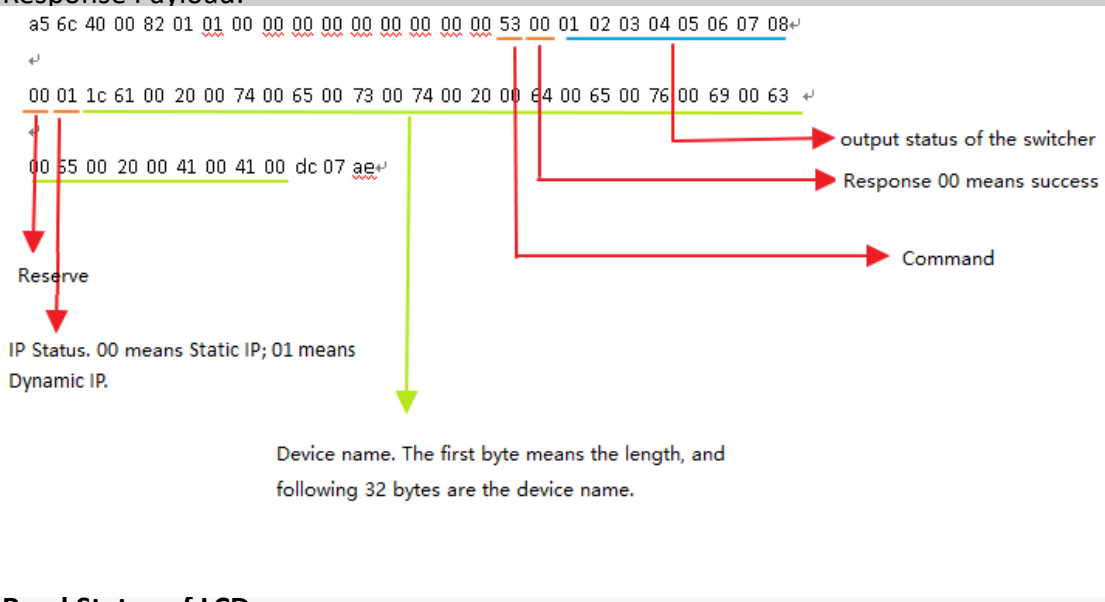
Command List

Function	Command	Description
Read Status of Switcher	0x53	Read the current status of switcher, including IP status, input and output information, and device name.
Read Status of LCD	0x50	Read the current status of LCD information, including LCD backlight time and LCD brightness. (Device type: 0x03)
Setting Device Name	0x0f	Send the device name (max 16 character) by Unicode
Setting LCD Backlight Time	0x51	0: 15s Dim 1: 60s Dim 2: 15s Off 3: 60s Off 4: Always On (Device type: 0x03)
Setting LCD Brightness	0x52	Set the LCD brightness between 10-100. (Device type: 0x03)
Setting IP between Static and Dynamic	0x05	The 13th byte of the data bit 0x01: Dynamic IP; 0x00: Static IP

Examples

Read the current status of switcher
Broadcast
a5 6c 14 00 82 01 01 00 00 00 00 00 00 00 00 00 53 fc 01 ae

Response Payload:



Read Status of LCD
Broadcast
a5 6c 14 00 03 01 01 00 00 00 00 00 00 00 00 00 50 7a 01 ae

Response Payload:
a5 6c 17 00 03 01 02 00 00 00 00 00 00 00 00 00 50 00 00 2b a9 01 ae
00 indicates the current LCD Backlight Time is 15s Dim.
2b indicates the current LCD Brightness is 43

Setting the device name to "this is a matrix"
Broadcast
a5 6c 34 00 82 ff 01 00 00 00 00 00 00 00 00 00 0f 74 00 68 00 69 00 73 00 20 00 69 00 73 00 20 00 61 00 20 00 6d 00 61 00 74 00 72 00 69 00 78 00 c0 08 ae

Response Payload:
a5 6c 15 00 82 ff 01 00 00 00 00 00 00 00 00 00 0f 00 b7 02 ae

Setting LCD Backlight Time to "Always On"
Broadcast
a5 6c 15 00 03 ff 01 00 00 00 00 00 00 00 00 00 51 04 7e 02 ae

Response Payload:
a5 6c 15 00 03 01 02 00 00 00 00 00 00 00 00 00 52 00 7e 01 ae

Note: When setting LCD, the response command is always 0x52

Setting LCD brightness to 100
Broadcast
a5 6c 15 00 03 ff 01 00 00 00 00 00 00 00 00 00 52 64 df 02 ae

Response Payload:
a5 6c 15 00 03 01 02 00 00 00 00 00 00 00 00 00 52 00 7e 01 ae

Change network to Static IP, and set IP address to 192.168.1.219
Broadcast
a5 6c 21 00 82 ff 01 00 00 00 00 00 00 00 00 00 05 c0 a8 01 db ff ff ff 00 c0 a8 01 01 00 64 09 ae

The above Blue indicates the IP address, subnet mask and default gateway.
The above Green indicates the network connecting method. If it is 0x01 (Dynamic IP), above Blue are meaningless. If it is 0x00 (Static IP), above Blue are the information of IP address.

Response Payload:
a5 6c 15 00 82 ff 01 00 00 00 00 00 00 00 00 00 05 00 ad 02 ae

Sample C# Application

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Net.Sockets;
using System.Net;
using System.Globalization;

namespace OspreyMatrixSwitcher
{
    class Program
    {
        static void Main(string[] args)
        {
            Sender s = new OspreyMatrixSwitcher.Sender();
            s.Send();
        }
     }

    public class Sender
    {
        public void Send()
        {
            UdpClient client = new UdpClient();
            client.EnableBroadcast = true;
            IPEndPoint broadcastConnAddress = new IPEndPoint(IPAddress.Broadcast, 7000);

            byte[] bytes = HexToByte("a56c140081ff010000000000000000000ffa503ae");

            client.Send(bytes, bytes.Length, broadcastConnAddress);

            IPEndPoint ServerEp = new IPEndPoint(IPAddress.Any, 0);

              // Wait for a response
            var ServerResponseData = client.Receive(ref ServerEp);
             // Type 0x82 is the matrix switcher
            Byte type = ((byte[])ServerResponseData)[4];
```

Sample C# Application

```
 // A success bit of 0 indicates data returned successfully.
Byte success = ((byte[])ServerResponseData)[17];
bool bSuccess = false;

if (success == 0)
    bSuccess = true;

Console.WriteLine(@"Response from with IP address: {0} with type: {1}
    and success of: {2}",
    ServerEp.Address.ToString(),
    String.Format("{0:x2}", type), bSuccess.ToString());

 /* Now we attempt to setup ports on the matrix switch.
 * At this point all communication is
 * directed on port 7000 of the matrix swicher's IP address
 */
IPEndPoint matrixSwitcherConnectionAddress = new IPEndPoint(ServerEp.Address, 7000);

/* Configure the Matrix switcher for input port 1 to be routed to port 5
 * Format is [x]v[y] where x is input port and y is output port PLUS all
 * commands must end with a period */
Console.WriteLine("\r\nConfigure input port 1 to be routed to port 5...");

bytes = Encoding.ASCII.GetBytes("1v5.");

client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

/* Pause the client, view the matrix switcher and note that output port 5
 * has a source port of 1*/
PrintPortStatus(ref client, ref matrixSwitcherConnectionAddress, ref ServerEp);

System.Console.WriteLine("Press any key to continue.");
System.Console.ReadKey(); // Hit any key to continue

 /* Configure input port 3 to route to all output ports.
 * The format is [x]v[y] where x input port and y is output port PLUS all
 * commands must end with a period */
Console.WriteLine("\r\nConfigure input port 3 to be routed to all output ports...");
```

```
    bytes = Encoding.ASCII.GetBytes("3all.");

    client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

    /* Pause the client, view the matrix switcher and note that all output
     * ports have a source port of 3*/
    PrintPortStatus(ref client, ref matrixSwitcherConnectionAddress, ref ServerEp);

    System.Console.WriteLine("Press any key to continue.");
    System.Console.ReadKey(); // Hit any key to continue

    /* Configure all the ports to have their input port correspond to
     * their output port. The format is is all# PLUS all commands must
     * end with a period */
    Console.WriteLine("\r\n\r\nConfigure all the ports to have their input port
     correspond to all output ports...");

    bytes = Encoding.ASCII.GetBytes("all#.");
    client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

    /* Pause the client, view the matrix switcher and note that all output
     * ports have a source port of 3
     */
    PrintPortStatus(ref   client, ref  matrixSwitcherConnectionAddress, ref  ServerEp);

    System.Console.WriteLine("Press any key to continue.");
    System.Console.ReadKey(); // Hit any key to continue

    System.Console.WriteLine("Press any key to exit.");
    // Close the connection
    client.Close();

    return;
}
public static void PrintPortStatus(ref UdpClient  client,
ref IPEndPoint matrixSwitcherConnectionAddress,
ref IPEndPoint ServerEp)
{
    /* Send command to retreive the port status of each port */
    byte[] bytes = HexToByte("a56c1400820101000000000000000053fc01ae");
    client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);
```

```
            // Wait for a response
            var ServerResponseData = client.Receive(ref ServerEp);

            // Type 0x82 is the matrix switcher
            Byte Port1 = ((byte[])ServerResponseData)[18];
            Byte Port2 = ((byte[])ServerResponseData)[19];
            Byte Port3 = ((byte[])ServerResponseData)[20];
            Byte Port4 = ((byte[])ServerResponseData)[21];
            Byte Port5 = ((byte[])ServerResponseData)[22];
            Byte Port6 = ((byte[])ServerResponseData)[23];
            Byte Port7 = ((byte[])ServerResponseData)[24];
            Byte Port8 = ((byte[])ServerResponseData)[25];

            Console.WriteLine("Formatted as: Input Port:Output Port \r\n 1:{0}, 2:{1}, 3:{2},
             4:{3}, 5:{4}, 6:{5}, 7:{6}, 8:{7}",
              Port1.ToString(), Port2.ToString(), Port3.ToString(), Port4.ToString(),
              Port5.ToString(), Port6.ToString(), Port7.ToString(), Port8.ToString());
        }

        public static byte[] HexToByte(string hexString)
        {
            if (hexString.Length % 2 != 0)
            {
                throw new ArgumentException(String.Format(CultureInfo.InvariantCulture,
                    "The binary key cannot have an odd number of digits: {0}", hexString));
            }

            byte[] HexAsBytes = new byte[hexString.Length / 2];
            for (int index = 0; index < HexAsBytes.Length; index++)
            {
                string byteValue = hexString.Substring(index * 2, 2);
                HexAsBytes[index] = byte.Parse(byteValue, NumberStyles.HexNumber,
                    CultureInfo.InvariantCulture);
            }

            return HexAsBytes;
        }
    }
}
```

Configuration and Control API Guide for LAN

Description: This document describes the Osprey Matrix Switch Configuration and Control API (OMSCC API). The API uses HTTP UDP packet transmissions utilizing both broadcast and unicast addresses.
All Osprey Matrix Switchers are shipped with the OMSCC API pre-installed. This API can be used in C++, C#, Java, IOS, etc. There is a full C# example application that can be complied in Microsoft Visual Studio at the end of this User Guide.

Communication Mode:
Method: UDP Broadcast
Destination Port: 7000

Broadcast from PC top MVS-16

Data Packet	Value	Byte	Description
Packet Header	0xA5 0x6C	2	The beginning of data packet
Data Length	0x0000~0x0420	2	The length of the entire data packet from packet header to end (including header and end). The lower byte stays head.
Device Type	0x00~ 0xFF	1	Definition of device type, OXFF means broadcast.
Device ID	0x00~0xFF	1	A distinguishing of the device when there are several devices in a same LAN at same time. OXFF means broadcast.
Interface Type	0x00~0xFF	1	0x00:UART（serial port) 0x01: LAN
Reserve	0x00	9	For reserve. This device is not reserved.
Command	0x00~0xFF	1	Command for each function.
Packet Data	…….	Variable length	<= 1024
Checksum	0x0000~0xFFFF	2	The algebraic sum of all bytes from packet header to checksum (including the packet header and checksum). Take 2 bytes, other parts omitted. The lower byte stays ahead.
Packet End	0xAE	1	The end of the packet.

Response from MVS-16 to PC

Data Packet	Value	Byte	Description
Packet Header	0xA5 0x6C	2	The beginning of data packet.
Data Length	0x0000~0xFFFF	2	The length of the entire data packet from packet header to end (including the packet header and end). The lower byte stays ahead.
Device Type	0x00~ 0xFF	1	Definition of device type, OXFF means broadcast.
Device ID	0x00~0xFF	1	A distinguishing of the device when there are several devices in a same LAN at same time. OXFF means broadcast.
Interface Type	0x00~0xFF	1	0x00: UART（serial port); 0x01: LAN
Reserve	0x00	9	Reserve. This device is not reserved.
Command	0x00~0xFF	1	Command for each function.
Response Status	0x00 ~ 0xFF	1	0x00: Succeed; 0x01: Error; Other data undefined.
Response Content		Variable length	Reserve. The length of response content is variable when backward reading command, and it is consistent with the format of "packet data".
Checksum	0x0000~0xFFFF	2	The algebraic sum of all bytes from packet header to checksum (including the packet header and checksum). Take 2 bytes, other parts omitted. The lower byte stays ahead.
Packet End	0xAE	1	The end of the packet.

Note: Broadcast---CMD+ data; Response--- CMD+ status+ data

Device Type and Commands

Device Type: 0xa3

Commands:

Function	Command （hex）	Description
Scanning	0xff	Broadcast to scan the multiviewer from the LAN.
Reading All the Data	0x0a	After device scanned, reading all status data of the device. Find out the device, read the status list of devices
Output Layout	0x33	Change the output layouts
Output Resolution	0x19	Change the device output resolution. Value refer to 3.3 output resolution list
UMD Overlay Enable	0x5c	Turn on/off the UMD overlay 1: ON, 0: OFF
Audio Meter Enable	0x5b	Turn on/off the audio meter. 1: ON, 0: OFF
OSD Enable	0x5d	Turn on/off the OSD. 1: ON, 0: OFF
Audio Alarm enable	0x56	Turn on/off the audio alarm function 1: ON, 0: OFF
Time Code Enable	0x5e	Turn on/off time code 1: ON, 0: OFF
Operating Mode	0x62	Change the mode between Multiviewer and Switcher 0： Multiviewer, 1: Switcher
Matrix Switcher Input and Output Correspondence	0x5a	One to one correspondence between input and output under Matrix Switcher Mode E.g.: input SDI1 output SDI 1, input SDI2 output SDI 2, and so forth
Change Matrix Switcher Input	0x34	Change the input sources under Matrix Switcher mode

Partial Parameter List:

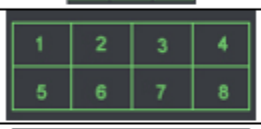
```
Response Format
typedef struct
{
                unsigned char value:6;          // output resolution
                unsigned char signal:1;         //OSD enable 1 on  0 off
                unsigned char res:1;            //Reserved
}Reso_Byte;

typedef struct
{
                unsigned char uEn:1;
                unsigned char Color:4;
                unsigned char BGColor:5;
}Text_Dsip;

typedef struct
{
                unsigned char char_len;         // UMD length
                unsigned char char_buf[34];     //UMD text        //
}Umd_String;

typedef struct
{
                unsigned char AudioBarEn:1;     //Audio meter in each window
                unsigned char AuidoDeCh:4;      // Audio de-embedding channel select
                Reso_Byte InReso;               // Read resolution from FPGA, the first 6bits means value
                                being read,7bit means whether there is signal, 8bit is reversed.
                Text_Dsip InputInfo;            //Input resolution color (OSD color)
                Text_Dsip TimeCode;             //Time code color

                Text_Dsip AudioAlarm;           //Audio alarm
}Osd_View_Cfg;

typedef struct
{
                unsigned char tWinMode;         //Mode
                unsigned char tOutReso:4;       //Output resolution
                unsigned char tAudioOutNum:5;   //Choose audio from a certain window as the source for audio output
                //unsigned char tAuidoDeCh:4;   // Audio de-embedded channel
                unsigned char tCustom:2;        //Select custom mode

                unsigned char tAudioBarOnOff:1; //Audio meter enable
                unsigned char tUmdOnOff:1;      //UMD enable
```

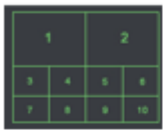
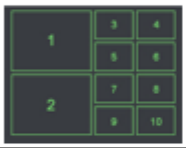
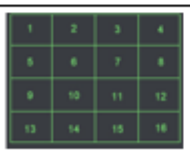
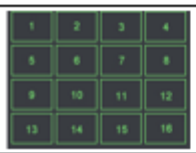
```
                unsigned char tInputInfoOnOff:1;          //OSD enable
                unsigned char tTimeCodeOnOff:1;           //Time code enable
                unsigned char tAudioAlarmOnOff:1;         //Audio alarm enable

                unsigned char tBorderOnOff:1;             //Border enable
                unsigned char tLockStatus:1;              //Front panel lock status

                unsigned char tDhcpStatus:1;              //DHCP status

                unsigned char tMatrixFlag:1;              //Matrix switcher mode
                unsigned char tMulti_InputBuf[16];        //Multiviewer input source
                unsigned char tMatrix_InputBuf[16];       //Matrix switcher input source

                Text_Dsip  tUmdDisp[16];                   // UMD setting of 16 windows
                Osd_View_Cfg tView[16];                   // OSD of 16 windows

}ST_Public_Data;

typedef struct
{
                ST_Public_Data stPub;             //Data synchronization between PC software and LCD display
                Umd_String stUmdStr[16];          //UMD string

                unsigned char ucDevNameLen;
                unsigned char ucDevName[32];
}ST_MultiView_Set;
```

Output Layout List:

Layouts	Value（Int）	Note
	1	Full screen 1-16, total 16 full-screen layouts
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	

RACKMOUNT 16x16 MATRIX SWITCHER
16 CHANNEL MULTI VEWER
MVS-16

	40	Quad-split view Audio meter, UMD, OSD inside
	41	Quad-split view Audio meter, UMD, OSD outside
	42	Quad-split view Audio meter, UMD, OSD outside, with analog clock
	60	6 windows-1 Audio meter, UMD, OSD inside
	61	6 windows-2 Audio meter, UMD, OSD outside
	80	8 windows-1 Audio meter, UMD, OSD inside
	81	8 windows-2 Audio meter, UMD, OSD outside
	82	8 windows-3 Digital clock in top center Audio meter, UMD, OSD outside
	83	8 windows-4 Digital clock in the middle Audio meter, UMD, OSD outside
	90	9 windows-1 Audio meter, UMD, OSD inside
	91	9 windows-2 Audio meter, UMD, OSD outside
	92	9 windows-3 With analog clock, Audio meter, UMD, OSD outside Biggest window in the middle

	93	9 windows-4 With analog clock Audio meter, UMD, OSD outside Biggest window in the upper left corner
	100	10 windows-1 Audio meter, UMD, OSD inside
	101	10 windows-2 Audio meter, UMD, OSD outside
	102	10 windows-3 Audio meter, UMD, OSD outside
	111	11 windows-1 Audio meter, UMD, OSD outside, biggest window in the middle, with digital clock
	121	11 windows-2 Audio meter, UMD, OSD outside, with both analog and digital clock
	160	16 windows-1 audio meter, UMD, OSD inside
	161	16 windows-2 audio meter, UMD, OSD outside

Output Resolution List:

Output Resolution	Broadcast Value
1080p60	0x07
1080p50	0x0b
1080p30	0x03
1080p25	0x0d
1080p24	0x05
1080i60	0x09
1080i50	0x01
720p60	0x0e
720p50	0x06

Examples:

Note 1: Following examples are through LAN port.
If using the serial port just change the interface byte and recalculate the Checksum.
Note 2: All data are hexadecimal.
Note 3: CMD in red, data in green.
Note 4: Every packet data is in couple, including broadcast and response.

4.1 Locating a Switcher on the Network
Method: UDP Broadcast

Packet Format: a5 6c 14 00 81 ff 01 00 00 00 00 00 00 00 00 00 ff a5 03 ae
Destination Address: Broadcast 255.255.255.255
Destination Port: 7000
Response Payload:
a5 6c 2c 00 a1 ff 01 00 00 00 00 00 00 00 00 00 ff 00 31 36 43 48 20 4d 75 6c 74 69 76 69 65 77 65 72 2d 0d 2d 43 04 26 35 95 0a ae

4.2 Read All Data of the Device's Current Status

Broadcast
a5 6c 14 00 a1 ff 01 00 00 00 00 00 00 00 00 00 0a d0 02 ae

Above Response Description:

a5 6c 09 03 a1 ff 01 00 00 00 00 00 00 00 00 00	From packet header to reserve
0a	Command byte
00	Response success
64	Output layout value
01	Definition of resolution, audio channel, and others overlay enables
01	
10	
01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f 10	Input channel under multiviewer mode (Total 16 channel)
01 02 03 06 05 06 07 08 09 0a 0b 0c 0d 0e 0f 10	Input channel under matrix switcher mode (Total 16 channel)
0d 0f	UMD of 16 windows From structure Text_Dsip
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	
0d 0f	

continued

01 03 0d 0f 0d 0f 0f 02	Display information of 16 windows, including resolution, audio meter, OSD, time code, audio alarm	
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 00 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 03 0d 0f 0d 0f 0f 02		
01 00 0d 0f 0d 0f 0f 02		
0c	WIN 1 UMD length	UMD length and test of 16 windows, length occupies 1 byte, test occupied 34 byte.
53 00 44 00 49 00 20 00 30 00 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 1 UMD text	
0c	WIN 2 UMD length	
53 00 44 00 49 00 20 00 30 00 32 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 2 UMD text	
0c	WIN 3 UMD length	
53 00 44 00 49 00 20 00 30 00 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 3 UMD text	
0c	WIN 4 UMD length	
53 00 44 00 49 00 20 00 30 00 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0000 00 00 00 00 00	WIN 4 UMD text	
0c	WIN 5 UMD length	
53 00 44 00 49 00 20 00 30 00 35 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 5 UMD text	
0c	WIN 6 UMD length	
53 00 44 00 49 00 20 00 30 00 36 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 6 UMD text	

Continued

0c	WIN 7 UMD length
53 00 44 00 49 00 20 00 30 00 37 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 7 UMD text
0c	WIN 8 UMD length
53 00 44 00 49 00 20 00 30 00 38 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 8 UMD text
0c	WIN 9 UMD length
53 00 44 00 49 00 20 00 30 00 39 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 9 UMD text
0c	WIN 10 UMD length
53 00 44 00 49 00 20 00 31 00 30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 10 UMD text
0c	WIN 11 UMD length
53 00 44 00 49 00 20 00 31 00 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 11 UMD text
0c	WIN 12 UMD length
53 00 44 00 49 00 20 00 31 00 32 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 12 UMD text
0c	WIN 13 UMD length
53 00 44 00 49 00 20 00 31 00 33 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 13 UMD text
0c	WIN 14 UMD length
53 00 44 00 49 00 20 00 31 00 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 14 UMD text
0c	WIN 15 UMD length
53 00 44 00 49 00 20 00 31 00 35 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 15 UMD text
0c	WIN 16 UMD length
53 00 44 00 49 00 20 00 31 00 36 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	WIN 16 UMD text
e3 21 ae	Checksum and packet end（2byte）+0xae

Note: The above information (starting from cmd, omit return value 0x00) use ST MultiView_Set from Part 4.1 to extract the data one by one according to the parameters.

4.3 Output Format Setting
E.g.: Setting the output resolution to 1080p50.
Broadcast
a5 6c 16 00 a1 ff 01 00 00 00 00 00 00 00 00 00 19 00 0b ec 02 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 19 00 e0 02 ae
Note: In this command, the first byte after 0x19 must be fixed at 0x00, the following 1 byte is the resolution value.

4.4 UMD Enable
E.g.: Turn on UMD
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5c 01 24 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5c 00 23 03 ae

4.5 Audio Meter Enable
E.g.: Turn on audio meter
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5b 01 23 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5b 00 22 03 ae

4.6 OSD Enable
E.g.: Turn on OSD
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5d 01 25 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5d 00 24 03 ae
4.7 Audio Alarm Enable
E.g.: Turn on audio alarm
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 56 01 1e 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 56 00 1d 03 ae

4.8 Time Code Enable
E.g.: Turn on time code
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5e 01 26 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5e 00 25 03 ae

4.9 Switch between Multiviewer and Matrix Switcher Mode
E.g.: Switch to Multiviewer mode
Broadcast
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 62 00 29 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 62 00 29 03 ae

4.10 One to One Correspondence between Input and Output under Matrix Switcher Mode
Note: No parameter for this command
Broadcast
a5 6c 14 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5a 20 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 5a 00 21 03 ae

4.11 Switching one input to output under matrix switcher mode
E.g.: Switch input 15 to Output 8. Select “SDI 15” from the pull-down list of “OUTPUT 8”
Broadcast
a5 6c 16 00 a1 ff 01 00 00 00 00 00 00 00 00 00 34 0f 08 13 03 ae
Response Payload
a5 6c 15 00 a1 ff 01 00 00 00 00 00 00 00 00 00 34 00 fb 02 ae

Sample C# Application

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Net.Sockets;
using System.Net;
using System.Globalization;

namespace OspreyMatrixSwitcher
{
    class Program
    {
        static void Main(string[] args)
        {
            Sender s = new OspreyMatrixSwitcher.Sender();
            s.Send();
        }


    }


    public class Sender
    {
        public void Send()
        {
            UdpClient client = new UdpClient();
            client.EnableBroadcast = true;
            IPEndPoint broadcastConnAddress = new IPEndPoint(IPAddress.Broadcast, 7000);

            byte[] bytes = HexToByte("a56c140081ff010000000000000000000ffa503ae");

            client.Send(bytes, bytes.Length, broadcastConnAddress);

            IPEndPoint ServerEp = new IPEndPoint(IPAddress.Any, 0);

            // Wait for a response
            var ServerResponseData = client.Receive(ref ServerEp);

            // Type 0x82 is the matrix switcher
            Byte type = ((byte[])ServerResponseData)[4];
```

Sample C# Application

```
// A success bit of 0 indicates data returned successfully.
            Byte success = ((byte[])ServerResponseData)[17];
            bool bSuccess = false;

            if (success == 0)
                bSuccess = true;

            Console.WriteLine(@"Response from with IP address: {0} with type: {1}
                and success of: {2}",
                ServerEp.Address.ToString(),
                String.Format("{0:x2}", type), bSuccess.ToString());


            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue

            /* Now we attempt to setup ports on the matrix switch.
             * At this point all communication is
             * directed on port 7000 of the matrix swicher's IP address
             */
            IPEndPoint matrixSwitcherConnectionAddress = new IPEndPoint(ServerEp.Address,
7000);


            /* Configure the Matrix switcher for multiviewer mode*/
            Console.WriteLine("\r\n Configure the Matrix switcher for multiviewer mode using
command 0x62 ...");

            bytes = HexToByte("a56c1500a1ff010000000000000000000062002903ae");
            client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue

/* Configure the Matrix switcher for input port 15 to be routed to port 8
            */
            Console.WriteLine("\r\nConfigure input port 15 to be routed to port 8 using command
0x34 (Change Matrix Switcher Input)...");

            bytes = HexToByte("a56c1600a1ff010000000000000000000340f081303ae");

            client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue
```

Sample C# Application

```
/* Configure the Matrix switcher for multiviewer mode*/
            Console.WriteLine("\r\n Configure the Matrix switcher for matrix switcher mode
using command 0x62 ...");

            bytes = HexToByte("a56c1500a1ff010000000000000000000062012a03ae");
            client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue


            /* Configure the Matrix switcher for input port 15 to be routed to port 8
            */
            Console.WriteLine("\r\nConfigure input port 1 to be routed to port 5 using command
0x34 (Change Matrix Switcher Input)...");

            bytes = HexToByte("a56c1600a1ff0100000000000000000000340f081303ae");

            client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);

            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue



            /* Configure the Matrix switcher for all input ports to be routed to their
corresponding output work
            */
            Console.WriteLine("\r\n\r\nConfigure all the ports to have their input port
correspond to all output ports using command 0x5a...");

            bytes = HexToByte("a56c1400a1ff010000000000000000005a2003ae");

            client.Send(bytes, bytes.Length, matrixSwitcherConnectionAddress);


            System.Console.WriteLine("Press any key to continue.");
            System.Console.ReadKey(); // Hit any key to continue



            System.Console.WriteLine("Press any key to exit.");
            // Close the connection
            client.Close();

            return;
        }
```

Sample C# Application

```
        public static byte[] HexToByte(string hexString)
        {
            if (hexString.Length % 2 != 0)
            {
                throw new ArgumentException(String.Format(CultureInfo.InvariantCulture,
                    "The binary key cannot have an odd number of digits: {0}", hexString));
            }

            byte[] HexAsBytes = new byte[hexString.Length / 2];
            for (int index = 0; index < HexAsBytes.Length; index++)
            {
                string byteValue = hexString.Substring(index * 2, 2);
                HexAsBytes[index] = byte.Parse(byteValue, NumberStyles.HexNumber,
                    CultureInfo.InvariantCulture);
            }

            return HexAsBytes;
        }
    }
}
```