Multiviewer KVM-Switch

4 in 1
KVM Switch

DEVICE CONTROL PROTOCOL

Manual

V1.2

INTRODUCTION

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INTRODUCTION

DCP-XML permits control of the Multiviewer KVM-Switch by a computer or other device, using the RS-232 serial port.

DCP-XML allows remote control of the Multiviewer KVM-Switch to facilitate its deployment in large-scale KVM systems.

DCP is an XML-based protocol. Using DCP, all important settings of the Multiviewer KVM-Switch can be queried and changed.

A description of XML can be found at http://www.w3.org/XML/

The XML Schema for DCP can be found on the enclosed CD, under the name "DCP.xsd"

DCP Modes

DCP has two modes of operation

Control

This mode is intended for direct control of a Multiviewer KVM-Switch, for example using a computer.

Synchronize

This mode is used to synchronize multiple, linked devices.
In Synchronize mode, the Multiviewer KVM-Switch sends all settings changes as DCP messages.
Thus, a chain of linked Multiviewer KVM-Switch can be controlled synchronously.

Important:

When Synchronize mode is first activated, and on startup (in Synchronize mode), a Multiviewer KVM-Switch sends all its settings as a DCP message to synchronize all connected devices.
Thus, it is recommended to switch on all connected Multiviewer KVM-Switch starting with the last device in the chain, and proceeding backwards to the first Multiviewer KVM-Switch. This ensures that all devices have the same settings.

When connecting a chain of linked Multiviewer KVM-Switchs, do not connect the last device in the chain to the first device (i.e. it is not possible to make a ring).

Note:

In this description, XML has been formatted using indentation to make it easier to read.
This type of formatting is not needed when communicating with the device.

Using DCP, it is possible to create inconsistent settings.
For example, you could set single PiP mode, with fullscreen channel 1 and PiP channel 2, with mouse/keyboard control of channel 2 (i.e. the PiP), or even mouse/keyboard control of another, non-visible channel.

INTRODUCTION

INTRODUCTION

In DCP, settings data are contained inside XML **elements**. An XML element consistes of an opening **tag** - the element name in angle brackets -, the element contents, and finally a closing **tag** - a slash followed by the element name. Example: <tag>contents</tag>.
A element with no contents is referred to as an **empty element**.
An empty element may be abbreviated as <tag/>.

Elements containing sub-elements are referred to as **Complex Elements**. Elements with values are called **Simple Elements**. The sub-elements of complex elements may be arranged in any order.

The message below includes all elements supported in DCP V1.2.
Not all elements must be used in a message.

Example of a DCP-XML message containing all elements

```
<dcp-xml>
      <device>
          <type>VSQ</type>
          <version>
              <dcp-protocol>1.2</dcp-protocol>
              <hardware>34</hardware>
              <software>1.31c</software>
          </version>
          <mode>
              <console>
                  <channel>0</channel>
              </console>
              <video>
                  <channel>0</channel>
                  <layout>pip</layout>
                  <pip>
                      <layout>single-fixed</layout>
                      <size>25</size>
                      <offset>0</offset>
                      <zoom>100</zoom>
                      <channel>0</channel>
                      <direct>
                          <channel>0</channel>
                      </direct>
                      <fixed>
                          <channel>0</channel>
                      </fixed>
                      <scan-time>5</scan-time>
                  </pip>
              </video>
          </mode>
      </device>
  </dcp-xml>
```

CHANGING SETTINGS

To change settings, send a DCP message containing the desired settings.

Example:

Set console and video channel to channel 1 (internal number 0).

```
<dcp-xml>
      <device>
            <mode>
                  <console>
                        <channel>0</channel>
                  </console>
                  <video>
                        <channel>0</channel>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

In **DCP control mode**, a reply to this message containing the actually adopted settings is sent after configuration has been completed.

```
<dcp-xml>
      <device>
            <mode>
                  <console>
                        <channel>0</channel>
                  </console>
                  <video>
                        <channel>0</channel>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

SETTINGS

CHANGING SETTINGS

The example below is a DCP message containing illegal values.

The message attempts to modify the device type (read-only), and to change PiP size to an invalid value (200%):

```
<dcp-xml>
      <device>
            <version>
                <dcp-protocol>1.0</dcp-protocol>
            </version>
            <mode>
                  <video>
                        <pip>
                              <size>200</size>
                        </pip>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

In **DCP control mode**, the Multiviewer KVM-Switch reply to this message contains the invariable version number „1.2"
and the maximum valid value for PiP size, i.e. 50:

```
<dcp-xml>
      <device>
            <version>
                <dcp-protocol>1.2</dcp-protocol>
            </version>
            <mode>
                  <video>
                        <pip>
                              <size>50</size>
                        </pip>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

The size parameter may vary depending on PiP number and display mode.

In cases involving invalid numeric values, the device will convert the value to the nearest valid value and include this value in its reply.

PiP size, for example cannot be set in steps of 1%.

QUERYING SETTINGS

Empty elements are interpreted as queries. Empty Complex Elements are considered as a query of the entire contents, i.e. the sub-tree of the element in question. Queries are only replied to in **DCP control mode**.

Example of a query for the entire device status:

```
<dcp-xml/>
```

You can of course also query individual values or sub-trees.

You can query and set values in one and the same DCP message.

In the following example, the console and video channel settings are queried:

```
<dcp-xml>
      <device>
            <mode>
                  <console/>
                  <video>
                        <channel/>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

A Multiviewer KVM-Switch will reply to this command by sending the following message:

```
<dcp-xml>
      <device>
            <mode>
                  <console>
                        <channel>0</channel>
                  </console>
                  <video>
                        <channel>0</channel>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

SETTINGS

ERROR MESSAGES

Error messages have the following format:

```
<dcp-xml>
  <error>text</error>
</dcp-xml>
```

Here also, indentation is used to make the error message easier to read. In reality, error messages look as follows:

```
<dcp-xml>[CR][LF]
<error>text</error>[CR][LF]
</dcp-xml>[CR][LF]
```

DCP V1.2 contains the following error messages:

- `malformed xml`   Malformed XML.

- `tag mismatch`   Opening and closing tags do not match.

- `tag not closed`   Opening tag without matching closing tag. Only occurs with Simple Elements. In the case of Complex Elements, a timeout error is reported.

- `subtag in simple element`   A simple element contains a subtag.

- `tag name too long`   Tag name exceeding 16 characters.

- `wrong data type`   Incorrect data type. For list types, such as Device Name, this error message also refers to values not included in the list.

- `content too long`   Contents of a Simple Element exceeding 30 characters.

- `timeout`   Receive timeout. This error message is displayed if a DCP message is not complete after expiry of the timeout, but no other error has occurred.

- `parser stack overflow`   This error occurs when unknown elements are nested too deeply, or in the case of an internal error.

- `internal parser error`   Internal error parser error.

- `unknown error`   Unknown error.

DCP COMMUNICATION

DCP-XML messages exceeding 38 characters must be divided into individual lines before being sent to a device.

Replies sent by a device are also divided into lines.

When sending a DCP message, the following constraints apply:

Serial Port Settings: 57600 baud, 8-N-1

Configure the serial port with the following settings:

Speed:	57600 bps
Data Bits:	8
Parity:	none
Stop Bits:	1
Flow Control:	none

Linefeed: LF

Linefeed (0x0A) is used as terminating character of each line.

Whitespace: TAB, SPACE, CR

Whitespace characters are Tab (0x09), Space (0x20) and Carriage Return (0x0D).

Whitespace may occur anywhere between two tags, except at the start of a line and inside simple elements

Whitespace is ignored.

Line length: maximum 38 characters

The line length may not exceed 38 characters.
(Not including the terminating LF.)

Timeout: 750 ms

Timeout for DCP messages is 750 milliseconds.

DCP messages containing errors are not regarded as completed until the timeout period has elapsed.

Therefore, it is recommended to wait for this time between DCP messages to allow the parser to handle possible errors.

Correct messages are processed immediately upon completion.

Unknown elements

Unknown tags in a DCP message are ignored for the sake of upwards compatibility of the protocol.

Messages containing unknown elements must still be syntactically correct.

Unknown tags may not be nested deeper than 5 levels.

SIMPLE ELEMENTS

DEVICE TYPE AND VERSION INFORMATION

The valid values of **Simple Elements** are specified below:

DEVICE TYPE

```
<dcp-xml>
        <device>
                <type>VSQ</type>
        </device>
</dcp-xml>
```

Type of connected device.

read-only

Valid values: VSQ   Multiviewer KVM-Switch

VERSION INFORMATION

```
<dcp-xml>
<dcp-xml>
      <device>
            <version>
                    <dcp-protocol>1.2</dcp-protocol>
                    <hardware>34</hardware>
                    <software>1.31c</software>
            </version>
      </device>
</dcp-xml>
```

DCP, hardware, and software version. These tags may also be used individually.

read-only

CONSOLE CHANNEL AND VIDEO CHANNEL

Note: Numerical settings in DCP start off numbered at „0".
Thus, the first channel is channel 0, and the last channel is channel 3.

CONSOLE CHANNEL

```
<dcp-xml>
     <device>
          <mode>
               <console>
                    <channel>0</channel>
               </console>
          </mode>
     </device>
</dcp-xml>
```

Active console channel, i.e. the channel that receives keyboard/mouse input.

Valid values: 0-3

VIDEO CHANNEL

```
<dcp-xml>
     <device>
          <mode>
               <video>
                    <channel>0</channel>
               </video>
          </mode>
     </device>
</dcp-xml>
```

Active video channel, i.e. the channel displayed in Fullscreen mode.

Valid values: 0-3

SIMPLE ELEMENTS

VIDEO LAYOUT AND PIP LAYOUT

VIDEO LAYOUT

```
<dcp-xml>
      <device>
            <mode>
                  <video>

                        <layout>full</layout>

                  </video>
            </mode>
      </device>
</dcp-xml>
```

Video layout

Valid values:	full	Fullscreen mode
	quad	Quad mode
	pip	Fullscreen mode with PiP function
	win1, win2, win3, win4	Win mode 1-4

PIP LAYOUT

```
<dcp-xml>
      <device>
            <mode>
                  <video>
                        <pip>

                              <layout>triple-gap</layout>

                        </pip>
                  </video>
            </mode>
      </device>
</dcp-xml>
```

PiP mode

Valid values:	triple-gap	triple PiP with gap
	triple-no-gap	triple PiP without gap
	single-fixed	single PiP, fixed channel selection
	single-direct	single PiP, direct channel selection
	single-scan	single PiP, channel scanning

PIP SIZE AND PIP OFFSET

PIP SIZE

```
<dcp-xml>
     <device>
          <mode>
               <video>
                    <pip>

                         <size>15</size>

                    </pip>
               </video>
          </mode>
     </device>
</dcp-xml>
```

PiP size in percent of full screen height.

Valid values: 0-50   for single PiP
                    0-33   for triple PiP without gap
                    0-25   for triple PiP with gap

Actual valid values for VSQ Multiviewer KVM-Switch: 3, 5, 7, 10, 15, 20, 25, 28, 33, 38, 44, 50

PIP OFFSET

```
<dcp-xml>
     <device>
          <mode>
               <video>
                    <pip>

                         <offset>5</offset>

                    </pip>
               </video>
          </mode>
     </device>
</dcp-xml>
```

PiP offset from the top screen edge in percent of full screen height.

Valid values: 0-97   depending on PiP size and mode

SIMPLE ELEMENTS

PIP ZOOM AND PIP CHANNEL

PIP ZOOM

```
<dcp-xml>
     <device>
          <mode>
               <video>
                    <pip>

                         <zoom>100</zoom>

                    </pip>
               </video>
          </mode>
     </device>
</dcp-xml>
```

PIP zoom factor in percent.

Valid values: 100   no zoom

                       200   2x zoom

PIP CHANNEL

```
<dcp-xml>
     <device>
          <mode>
               <video>
                    <pip>
                         <direct>

                              <channel>0</channel>

                         </direct>
                    </pip>
               </video>
          </mode>
     </device>
</dcp-xml>
```

PiP channel in single, direct PiP mode.

Valid values: 0-3

PIP SCAN TIME & SECURITY LEVELS

PIP SCAN TIME

```
<dcp-xml>
    <device>
        <mode>
            <video>
                <pip>

                        <scan-time>1</scan-time>

                </pip>
            </video>
        </mode>
    </device>
</dcp-xml>
```

PiP scan time in seconds in single, scan PiP mode.

Valid values: 1-9

SECURITY LEVELS

The security level settings in the OSD menu described on page 28 also apply to control via DCP messages. Queries are possible up to security level 7.

The table below shows the maximum security levels for simple element settings. These settings may be changed via DCP up to the specified protection level.

Maximum security level for:

CONSOLE CHANNEL	6
VIDEO CHANNEL	6
VIDEO LAYOUT	5
PIP LAYOUT	4
PIP SIZE	4
PIP OFFSET	4
PIP ZOOM	4
PIP CHANNEL	4
PIP SCAN TIME	4