Elecard CodecWorks v.4.6
User Guide
User Guide Notices

Elecard CodecWorks 4.6 User Guide
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1. INTRODUCTION

1.1 Preface

Elecard CodecWorks is a professional software solution for real-time decoding, encoding and transcoding into MPEG-2/AVC/HEVC with up to 16K resolution supporting multiscreen encoding and HLS/MPEG-DASH adapting streaming technologies. CodecWorks has passed through comprehensive testing and guarantees high performance and continuous content delivery suitable for projects of any scale and complexity.

1.2 Using This Guide

This Guide allows the user to find information on basic operation and working principles of Elecard CodecWorks software solution. The Guide describes installation and configuration of Elecard CodecWorks.

1.3 System Requirements

System requirements depend on several factors:

- type of task (encoding, transcoding, multiplexing, etc.);
- format, resolution, stream input and output resolution;
- signal processing functions (frame size changing, deinterlacing, frame conversion, etc.);
- number of channels to be processed.

The minimal system requirements recommended for proper operation of Elecard CodecWorks:

<table>
<thead>
<tr>
<th>CPU encoding</th>
<th>CPU encoding (Intel® QuickSync)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CPU (Intel® from 4 gen, Xeon e7/5/3 v3 and upper, Xeon E/W/D)</td>
<td>• CPU (Intel® from 5 gen, Xeon e3, Xeon E)</td>
</tr>
<tr>
<td>• 8 GB RAM (two-channels mode is required)</td>
<td>• 8 GB RAM (two-channels mode is required)</td>
</tr>
<tr>
<td>• Any Graphic card</td>
<td>• Intel Graphics Technology</td>
</tr>
<tr>
<td>• Windows® 10/Server 2019 (64 bit)/ Linux (CentOS 7.4/7.5)</td>
<td>• Windows® 10 (64 bit) /Server 2019 (64 bit)/ Linux (CentOS 7.4/7.5)</td>
</tr>
</tbody>
</table>

1.4 Activating Elecard CodecWorks

There are two ways to activate Elecard CodecWorks described below:

- HWkey License.
  Unique identifying code is compiled based on target PC hardware configuration with the help of a special utility, and CodecWorks build is tied to this code. To receive the utility, contact Elecard Technical Support Team or your project coordinator.

- HASP License.
  Elecard mails a HASP key which has a unique code and should be plugged into a PC where CodecWorks is going to be used.
1.5 Licensing and Technical Support

Elecard CodecWorks is available as a demo version or a registered product. By installing, copying, or otherwise using the SOFTWARE PRODUCT or any UPDATES, you agree to be bound by the terms of the "Elecard" End-User License Agreement ("EULA"). This EULA is a legal agreement between you (either an individual or a single entity) and Elecard for the "Elecard" software product(s) accompanying this EULA, which include(s) computer software and may include "online" or electronic documentation, associated media, and printed materials ("SOFTWARE PRODUCT"). For sales and licensing information, contact the Elecard Sales Department: sales@elecard.com
For technical support, contact Elecard Technical Support Team at: tsup@elecard.com
2. Describing CodecWorks

2.1 Installing CodecWorks

Before CodecWorks is installed, the following should be taken into consideration:

- CPU performance is of crucial importance for real time encoding process. Take it into account, when you choose hardware for the encoding server.
- The disk selected for the program installation should have enough free space for saving of the system log (for highly detailed logs) and memory dump files (if the application fails or abnormally closes).
- For QuickSync hardware accelerated encoding, the graphical chip Intel® Graphics is required.
- To manage encoding server via SNMP protocol, the corresponding service must be installed in the system\(^1\).

2.1.1 For Installing CodecWorks on Windows:

1. Run Elecard CodecWorks Setup.
2. To complete installation, follow the onscreen instructions.
3. When setup has finished installing all the necessary files on your computer, the Elecard CodecWorks has been successfully installed dialog box will appear, and the program is ready to run. You do not need to reboot your computer.
4. The software will be installed to C:\Program Files\Elecard\Elecard CodecWorks
   Created schemas will be saved in C:\ProgramData\Elecard\CodecWorks\(folder with a console number)\n
2.1.2 For Installing CodecWorks on Linux:

1. For the proper installation of a product, access to the Internet for downloading dependencies is required.
2. Run the installer:
   ```bash
   sudo yum install Elecard-CodecWorks*.rpm
   ```
3. The software will be installed to /usr/bin/Elecard/CodecWorks
   Created schemas will be saved in /etc/Elecard/CodecWorks.

2.2 Uninstalling CodecWorks

2.2.1 Windows

To uninstall Elecard CodecWorks follow the steps below:

1. Open the folder C:\Program Files\Elecard\Elecard CodecWorks or C:\Program Files\Elecard\Elecard CodecWorks Demo (if Demo version is used) and run the Uninstall.exe.
2. To complete uninstallation of Elecard CodecWorks, follow the onscreen instructions.

2.2.2 Linux

To uninstall Elecard CodecWorks follow the steps below:

```bash
sudo yum erase elecard-codecworks-encoder.x86_64
```

\(^1\) See the Management via SNMP section.
2.3 Running CodecWorks

2.3.1 Windows

To run Elecard CodecWorks, open the folder C:\Program Files\Elecard\Elecard CodecWorks and run cwManager.

2.3.2 Linux

1. To run the service in a terminal window:
/usr/bin/Elecard/CodecWorks/cwWatcher.sh
2. To run the service in a background mode:
/usr/bin/Elecard/CodecWorks/cwWatcher.sh /start
3. To run a manager:
/usr/bin/Elecard/CodecWorks/cwManager.sh
4. To stop the service:
/usr/bin/Elecard/CodecWorks/cwWatcher.sh /stop
5. The following commands may be used to run, stop, restart the service and to see its status:
service elecard-codecworks {start|stop|status|restart}

Note: Management and creation of encoding schemas may be carried out both directly through a local manager and with the help of web-interface and also through a manager of Windows or Linux Operating System located in the same network.

2.4 Specifications

2.4.1 Windows

Elecard CodecWorks supports the following formats and protocols:

- MPEG-2 Transport Stream
- MPEG-2 Video stream
- AVC/H.264 Video stream
- HEVC/H.265 Video stream (only for Intel® QuickSync)
- RTSP Input
- RTMP Output
- HLS
- MPEG-DASH Output
- NDI
- UDP/RTP/SRT

2.4.2 Linux

- MPEG-2 Transport Stream
- MPEG-2 Video stream
- AVC/H.264 Video stream
- HEVC/H.265 Video stream (only for Intel® QuickSync)
- RTSP Input
- HLS
- UDP/RTP
2.5 Features

2.5.1 Windows

Elecard CodecWorks provides the following functionality:

- Adaptive streaming support over HLS/MPEG-DASH protocols;
- Encoding schemas configurator;
- Centralized control over several encoding servers via GUI and web-interface;
- Accelerated GPU-based encoding for highest density possible;
- Mechanism for quick back up in N+M Mode;
- Redundancy mode and immediate automatic changeover to a redundant source in case absence of input stream, CC errors, PID loss occur;
- Error notifications via e-mail or using SNMP protocol;
- Recording of encoding streams in archive;
- Activation of Color Bar Generator in case absence of stream input, CC errors, PID loss occur.

2.5.2 Linux

Elecard CodecWorks provides the following functionality:

- Adaptive streaming support over HLS protocol;
- Encoding schemas configurator;
- Centralized control over several encoding servers via GUI and web-interface;
- Accelerated GPU-based encoding for highest density possible;
- Mechanism for quick back up in N+M Mode;
- Redundancy mode and immediate automatic changeover to a redundant source in case absence of stream input, CC errors, PID loss occur;
- Recording of encoding streams in archive.

2.6 Quick Start

Elecard CodecWorks can be started as a Windows system service or as a console application. To manage and control encoding servers, use the Elecard CodecWorks Manager program.

When the Manager is started, it detects locally started CodecWorks server and displays the server information. If the server is not detected, select the Local server → Settings command and set the network interface IP address value which is consistent with the Manager settings and the multicast address (if it is required) to receive announcements regarding existence of CodecWorks services in the network for their easy detection and management through the established IP network interface address.

If the Manager program is started on another computer, adjust the automatic detection of remote encoding servers using the Preferences command of the Application menu. The Multicast IP value (must be matched with the corresponding setting of the encoding server), and the network interface address used for management must be specified. If the address is set to 127.0.0.1 value, the automatic detection is available only for local (started on the same computer) encoding node.

To simplify management for group of servers, set the same Multicast IP and Multicast Port values for all servers of the group (however, make them unique for each group). In this case the Manager displays only servers from the specified group.

Besides automatic detection of a new server, the encoding server can be added manually. Click the Add server button and type the Multicast IP and Multicast Port values for the selected server.

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2 The console work mode is recommended on the first workspace adjustment stage because it is more visually informative. For the well-tuned system, the system service mode is more convenient.
If the **Local Server → Start Elecard CodecWorks (console)** is selected from the **Start → All Programs → Elecard → Elecard CodecWorks** menu, the **Elecard CodecWorks Watcher** console is started. It starts the **Elecard CodecWorks Dispatcher** program automatically. The dispatcher activates encoding consoles according to the initial configuration. If the **Local Server → Start Elecard CodecWorks** (console) is selected, no other windows are opened.

Each encoding console performs an individual task (with the only one DirectShow graph) and may be started or stopped separately from the other tasks. The task details can be viewed in the encoding schema.

The encoding servers and launched consoles are managed using shortcut menus. The shortcut menu appears when the user right-clicks a selected GUI element.

To stop the Elecard CodecWorks server operation, select the **Deactivate** command from the shortcut menu. The **Restart** command forces the CodecWorks server to restart. The server computer is not restarted or turned off.

To select or change the encoding schema, select the **Change schema** command. The Schema list window is displayed. The typical task is a new schema creation. For its creation, see the **Schema Configurator** section. You can create several schemas with different settings and use them later without any additional configuration. Select a schema from the opened list and press the **OK** button.

To start or stop the encoding process, click the **Start** or **Stop** commands, respectively. To restart the encoding console, click **Restart**.

The **Statistics** window is used for monitoring the console encoding process. To open the window, select the **Statistics** command. The Statistics window indicates the encoding schema parameters. Furthermore, the Manager window displays status, name of the selected schema, start date/time and utilized system resources for each console.

The **Parameters** command opens the list of component parameters that can be changed. In the schemas created with the Schema Configurator, the components are grouped into separate tabs. To apply changes, press the **OK** button, to discard – the **Cancel** button. Double-click the selected console to open the Parameter window. Use the Schema Editor to configure encoding process more precisely. To enter the Schema Editor, click the required console and press the hot keys combination: **Ctrl+Shift+E**.

### 2.7 Program Structure and Module Description

Only one encoding server can be installed per one operational system.

- **Encoding console** – a program that builds and starts the encoding schema, receives and processes control commands from the Manager (using the CodecWorks Dispatcher program), and controls license limitations. Each server allows starting of several consoles (depending on the number of purchased licenses).
- **Dispatcher** – a program (console or system service at user's discretion) that supervises the dispatcher work of encoding consoles, starts and reboots the consoles, provides “external communications”, gathers the server capacity statistics. Each server allows starting only one dispatcher.
- **Watcher service** – a program (console or system service at user's discretion) that supervises the dispatcher work and reboots it in case of failure. The watcher service, dispatcher and encoding consoles can be started as system services or as console applications at user's discretion.
- **CodecWorks Manager** - a program with graphical user interface (GUI), that manages work of encoding consoles, adjusts and starts encoding schemas depending on the user’s actions, and gathers statistics. One Manager can manage several servers.
- **CodecWorks Manager (console)** – a console application that provides command line

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3 New values for some parameters cannot be applied without stopping the encoding process. If the value is not applied, the corresponding error message appears.
management of encoding servers.

- **Encoding schema** – an XML document that contains full information about the encoding DirectShow graph structure and its settings (similar to a GRF file used in the Graph Edit program). Usually the schema is intended for encoding of the specific input stream on the particular server.

- **Schema configurator** – a program that is intended for the encoding schema creation using the complete set of component sections. Each component section represents structure and parameters of an encoding graph part that performs certain function (stream receiving, decoding, encoding, etc.). Templates can be used for schema preparation as well.

- **Template** – an XML document intended for a new encoding schema creation. The document consists of limited set of component sections. The component section set defines the sort of encoding tasks that are performed with the template. It is recommended to set up a template if nonstandard complicated schema is built. Templates are prepared by Elecard.

### 2.8 CodecWorks Manager

The CodecWorks Manager main window contains a list of available servers and launched encoding consoles. Activity status, statistics, start time, CPU usage (%), and used RAM (Mb) are displayed for each server and console. Besides, the selected encoding schemas are displayed for the consoles.

![CodecWorks Manager – Main Window](image)

If CodecWorks Manager is started on the encoding server (local), then there is no need to adjust the Manager anyhow. Otherwise it may be required to open the Preferences dialog from the Application menu and set the Multicast address value for receiving announcements. The value should match with the corresponding setting of the CodecWorks server\(^4\). In some cases, it is required to specify the Network interface value used for the Manager communication with encoding servers.

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\(^4\) To manage a group of servers, set the same Multicast IP and Multicast Port values for all nodes. In this case the Manager automatically detects all servers from the group and performs centralized monitoring and management.
The Preferences dialog box allows selecting the user interface language. Right-click the encoding server or console to open its shortcut menu which provides main commands for the servers and consoles management.

### 2.8.1 Encoding Server Management

The **Find servers** command opened from the shortcut menu starts detection of the CodecWorks servers compatible with the announcements sent to the network multicast group that is specified in the Manager settings.

The **Add server** command opens the dialog box for manual addition of a new CodecWorks server. The **Restart** command forces the CodecWorks server restart, and the **Deactivate** command turns off the encoding server. The server computer is not restarted or turned off.

The **Remove server** command removes the selected server from the server list.
The **Settings** command opens the Server settings dialog box for the encoding server.
The **Show log** command opens the selected server system log for preview.
The **Diagnostics** command reports detailed information about the CodecWorks server configuration. This report should be sent to Elecard Technical Support Team if any issue occurs. From the window shortcut menu select the **Save to file...** command.

**Reserving** opens **Reserving Dialog Box**.
**Source reserving** opens **Source reserving Dialog Box** to set triggers for changeover to a reserving source.

The **Open application** folder command opens File explorer in the installed Elecard CodecWorks folder. The **Open data folder** command – opens File explorer in the folder with configuration files, encoding schemas, logs, application events and samples.

The **Edit configuration file** command opens a configuration file for editing.

![Figure 4. Server Settings Dialog Box](image)

The dialog box allows adjusting the server name, specifying IP-address to send multicast announcements for CodecWorks Managers, and IP-address of the used network interface.

The **Enable logging** option enables recording of system messages into the encoding server log.

The **SNMP support** enables the SNMP management (if the SNMP protocol is not used, disable it to save the system resources).

The **Web server** option enables automatic start of nginx that is used for HLS/MPEG-DASH streaming and Web-interface. Web-interface address: http://localhost:8088.

**Edit Server Settings** command opens the nginx configuration file where configuration parameters can be adjusted.

If the Manager and the CodecWorks server are installed on the same computer, the local server settings are available from the Manager shortcut menu (right-click in the Manager window), even if the server is turned off. The server can be started as console or service via the Manager as well.
Reserving address - address used for communication of main and reserving servers.
Number of failed requests - number of consecutive failed requests within the TCP session. If the specified number of failed requests in a row is reached, a reserving server will start.
Request timeout (milliseconds) - time between requests within the TCP session.
Switchover timeout (milliseconds) - calculated parameter defining time of a problem detection of a main server and changeover to a reserving server.
2.8.1.1 SNMP Trap Settings

![SNMP Settings](image)

The **Add** button under the **Communities** column allows to add a name of your SNMP community. The **Add** button under the **Hosts** column allows to add destination addresses where traps for a chosen community will be sent. If usage of several destination addresses is required, repeat the procedure of hosts adding.

There are two types of trap notifications:

1. **Application events** - this notification type occurs one time. Application events are mostly connected with a state change. For instance, in the changeover to a reserve.
2. **States** notify about the beginning and the end of the event. State is transmitted to the **Status** field which can have active/cleared value.

Notifications are sent twice: when entering an event by specific triggers and when exiting the event. With trap notifications, CodecWorks can report about the problems related to an input stream, the start/stop of encoding schema work, a changeover to a reserving source, etc.
2.8.1.2 Log Clean-up Settings

In the **Log Clean-up Settings** window, you can specify a period and a storage capacity for files, such as log files, dumps, and backups.

- **Log files** - records of system messages into the log.
- **Dumps** - process dumps in various situations caused by incorrect operation.
- **Backups** - schemas saved as backups in the console /backup folder after each schema setting change so that these changes can be reversed.
2.8.2 Encoding Console Management

To start or stop the encoding process, click the Start or Stop command, respectively. The **Activate** command activates the encoding console. If the console is not used, it can be deactivated with the **Deactivate** command. The console can be restarted with the **Restart** command whether it is in the Start or Stop state. The restarted console returns to the pre-restart state (encoding or pending).

The **Change schema** command displays the list of available encoding schemas. The **Schema list** dialog box allows you to add, save, rename or delete encoding schemas.
To apply the selected schema, press the OK button.
To create a new schema, press the Create new button. The configurator window allows to set up a schema according to project requirements. For details see the Schema Configurator section. When the schema adjustment is completed, specify the schema name and brief description.
The Rename button allows editing the schema name and its description.
The View graph button visualizes the filter graph that corresponds to the selected encoding schema.
Settings adjusted in this mode will not be saved.
The Parameters button displays the list of schema components and the component parameter values. Tool tips on the parameter names display the parameter identifiers. The identifiers can be used, if the encoding process is managed via console or SNMP.
To remove the selected schema from the list, press the Delete button. If the schema is used in an encoding process, it cannot be removed.
If an encoding schema was prepared with configurator, the Edit button opens the schema for editing in the configurator program.
To add a new schema, press the Add existing button, the dialog box for a schema file selection will open. The selected schema validation is performed before the schema addition. The schema is added to the schema list, if validation is successfully completed. The schema is considered to be valid, if all used components are present (contained in the Components folder or registered in the system), their parameters are adjusted according to the current system environment, and the task execution is not restricted with the console license limitation. Some schema parameters related to the system environment (network interface IP-address, etc.) will be cleared, when the console is started. The new parameter values must be set.
There is one more way for an encoding schema loading – import from another CodecWorks server. The Import button opens the dialog box where the server IP-address should be specified. Select the required schema from the list of consoles operating on the server. In all other respects, import is similar to the Add existing option.
Note: Usually, if a schema uses a specified multiplexed input stream (not raw video), the schema cannot be used for another input stream encoding. So, the Add existing and Import options are used quite seldom.

Figure 9. Schema list
The **Save as...** button saves the selected schema to a file.

The **Statistics** command displays the tree-type list of read-only parameters that are intended for control of the encoding schema operation. You can increase the number of the monitored statistical parameters by pressing Ctrl+Shift+E and opening the schema editor. Double left-click the selected parameter with the required component, and it will be available in the **Statistics** window.

![Statistics Window]

*Figure 10. Statistics Window*

The **Parameters** command displays the tree-type list of the schema editable parameters. You can increase the number of the monitored statistical parameters by pressing Ctrl+Shift+E and opening the schema editor. Double left-click the selected parameter with the required component to make it available in the Statistics window.
To edit a parameter value, click the parameter. To save changes, press the OK button, to discard – the Cancel button.

Depending on the used schema template, components in the Statistics and Parameters windows can be grouped into separate tabs.

The Parameters window tab names are editable. Right-click the tab and select the Rename command. It is useful, if the prepared schema contains several sections with the same name.

**Color Bar Generator (CBG)** - allows to control the color bar generator mechanism. There are two options: Allow and Run CBG. When the Allow option is enabled, CBG will start its work after identification the input stream problem. The console will be highlighted in yellow till CBG works. When the Run option is enabled, CBG will be forcibly launched. Only by the disabling this option, CBG ends its operation. The console will be highlighted in yellow till CBG works.

The **Reset AST** button resets previously saved Availability Start Time (AST) for MPEG DASH in the template duration mode. The functionality is available only if there is a saved AST for the selected console.

The **Details → Settings** command opens the console Settings dialog box.
The Start delay option allows you to set delay time (in seconds) between the CodecWorks server start and the console start (if required).

The Enable logging option enables logging of the console system messages. If this option is selected, time interval for the statistics logging must be specified.

In some cases, automatic restart of the encoding console is needed (at regular intervals or at low level of CPU utilization). Select the required option and set the corresponding parameter values to restart the encoding console.

The Details → Show limits menu command displays the license limitation list for the selected console (depends on the purchased license).

To adjust the reserving settings, select the Details → Reserving command (see the Reserving section).

The Details → Show log command opens the console system log for preview.

The Save to file shortcut menu command allows you to save the console system log to a text file. To preview the log previous records, select the Show previous logs command.

Some commands are available for simultaneous execution in several consoles. Press and hold down the CTRL (or SHIFT) key and select necessary consoles. Open the shortcut menu and click one of available commands. For instance, you can simultaneously start or stop encoding in the selected consoles.

### 2.9 Schema Configurator

The encoding schema configurator is intended to facilitate the schema creation or graph building process (i.e. Direct Show corresponding graph).

To open the configurator, click the Create new button in the Schema list dialog box.

Select the source type and adjust the source parameters in the Input settings tab. Different sources can have different parameters. The mandatory parameters are red highlighted.

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5 For instance, if A console sends data and B console receives the data. Both consoles work on the same server. Simultaneous start of A and B consoles may produce unpredictable results. In that case, it is recommended to start the B console with delay.
The broadcast stream parameters should be set (address, port, etc.) when selecting a template with IP source. The parameter values can be set automatically, if the list of available announcements is opened in the Multicast Group or Unicast Address field and one of the announcements is selected. Several input sources can be added. To add a new source, select the + tab. After adjusting the input stream parameters, click the Input tab.

If the source parameters are set properly, the elementary stream list is displayed on the Input tab. The transformation section (encoding profile) must be selected for each required stream using the corresponding profile list.

If several sources are selected in the Input Settings tab, the elementary streams will be grouped according to their source.
To refresh the elementary stream list, press the F5 key.

To preview or edit parameters of an encoding profile, click the Parameters button to the right of the profile selection box.

On the Output tab select the output component for each encoded stream. This is the schema section that is responsible for the output stream generation.

If you need to send an encoded stream to several output devices of the same type (for instance, to create several single-program transport streams), select the required output device (for instance IP Render) for an elementary stream, right-click list box, click the Increase output number command, and specify the required number. These actions enable selection of additional input devices in the list.

The Output settings tab allows you to adjust the output parameters.
The View graph button displays the built graph structure at every step. To preview or edit component parameters, right-click the component. Read-only parameters are displayed with italic font. If a parameter is displayed with gray font, it will not be presented in the Parameters window (Statistics window for read-only parameters) on the encoding console. To change a parameter visibility mode, double-click the parameter name\(^6\).

When the adjustment is completed, click the Save button and specify the schema name and short description. After that the created schema appears in the list of schemas available for the selected console.

### 2.10 Reserving

There are two reserving modes used in Elecard CodecWorks:

- Server reserving
- Source reserving

Both reserving modes ensure integrity of the Elecard CodecWorks encoding systems.

#### 2.10.1 Server Reserving

A reserve server is monitoring the CodecWorks server proper operation by sending special signals to it and receiving timely responses. If a response is not received from the CodecWorks server dispatcher during the specified period, the reserve server starts encoding channels which have been previously set and are controlled by the server.

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\(^6\) The default parameter values are optimized for performance and quality in most cases. The default visibility mode provides access to the base set of encoding parameters. Advanced users can expand the list of visible parameters.
One reserve server can backup several CodecWorks encoding servers (N+1 mode). Several reserve servers can backup as many CodecWorks servers as required (N+M mode).

The **Reserving** button in the console Settings window opens the Reserving dialog box that displays the list of reserved nodes (identified by IP-address) and the reserve encoding schemas, which should be started automatically if connection with the server is lost.

![Reserving Dialog Box](image)

**Figure 17. Reserving Dialog Box**

The reserve encoding consoles must be started, if connection with the CodecWorks server is lost, which means that the reserve server dispatcher does not receive any response from the CodecWorks server dispatcher.

If several consoles work on the server, the same number of reserve consoles must be started after the server failure. In this case, it is necessary to add a record and specify encoding schema for each console that must be reserved. The same **Host** (dispatched node IP-address) and **Port** values must be specified for all reserve consoles.

### 2.10.2 Source Reserving

Each channel of the encoding server can be configured for using reserve sources of the original signal. The reserve sources are connected with the encoding schema, and if the main signal is lost or a failure occurs (in case absence of stream input, CC errors, PID loss occur).

Such a reserving mode can be used even if additional reserve signal sources are available.

**Note:** Special encoding schema is configured for this reserving mode exactly. Configuration of the encoding schema should only be performed by Elecard’s certified engineers.

To configure the encoding schema by yourselves, follow the steps below: Set a main source for an encoding signal when creating a schema. Press the Add (+) tab and set a reserving source. To add other reserving sources, repeat this procedure.
After the required reserving sources are added, continue to set up the encoding console as described in Schema Configurator.

### 2.11 Command Line Management

The console application `cwManagerConsole.exe` for Windows and `cwManagerConsole.sh` for Linux are included into the Elecard CodecWorks package. The application allows command line management of the encoding server. For instance, it may be useful in any batch-mode processing.

If the application is started, the command line parameter information is displayed:

Usage:

- `cwManagerConsole command_name [parameters] [/host ip_address:port] [/console console_number]`
- `cwManagerConsole /diagnostics [/host ip_address:port]`
- `cwManagerConsole /help`
- `cwManagerConsole /help commands`

If you click the `/help` parameter, the same information is printed.

To get information about available commands, start the application via `/help commands` options. The following commands list is printed:

--- Information commands ---

- ListConsoles
- GetLog
- GetPerfInfo
ListLoadedLibs
GetLimits
GetState
ListSchemas
GetGraphName
GetGraphSource
GetGraphStatistics
GetGraphParameters
GetGraphParameter <parameter_number>

---Control commands---

Activate
Deactivate
Restart
ClearLog
Start
Stop
SetGraph <graph_name>
SetGraphFromFile <local_file_name>
AddGraph <local_file_name>
SetGraphParameter <parameter_number> <new_value>

Information commands

This list contains commands that provide information about the encoding server and started processes.

- ListConsoles
  Prints the list of encoding consoles that are available on the CodecWorks server with the specified address (/host option). The loaded encoding schema name and state (0 – wait, 1 – pause, 2 – encoding) is printed for each console.
  Example:
  cwManagerConsole ListConsoles /host 192.168.1.45:1535
- GetLog
  Prints the current system log of encoding server (or console, if the /console option is specified).
  Examples:
  cwManagerConsole GetLog /host 192.168.1.45:1535
  cwManagerConsole GetLog /console 2 /host 192.168.1.45:1535
- GetPerfInfo
  Prints information about the CPU utilization and available system main memory, if only the /host option is specified. If the /console option is specified too, the CPU and memory information for the specific console is printed.
  Examples:
  cwManagerConsole GetPerfInfo /host 192.168.1.45:1535
  cwManagerConsole GetPerfInfo /console 2 /host 192.168.1.45:1535
- ListLoadedLibs
  Prints the list of DLLs (names and versions) loaded by the server.
  Example:
  cwManagerConsole ListLoadedLibs /host 192.168.1.45:1535
- GetLimits
  Prints the license limitation list for the selected console.
  Example:
cwManagerConsole GetLimits /console 2 /host 192.168.1.45:1535
  •  GetState
Prints the current state of the specified console (0 – wait, 1 – pause, 2 – encoding).
Example:
cwManagerConsole GetState /console 2 /host 192.168.1.45:1535
  •  ListSchemas
Prints the list of encoding schemas that are available for the specified console.
Example:
cwManagerConsole ListSchemas /console 2 /host 192.168.1.45:1535
  •  GetGraphName
Prints the name of the current encoding schema for the specified console.
Example:
cwManagerConsole GetGraphName /console 2 /host 192.168.1.45:1535
  •  GetGraphSource
Prints the source XML code of the current encoding schema for the specified console.
Example:
cwManagerConsole GetGraphSource /console 2 /host 192.168.1.45:1535
  •  GetGraphStatistics
Prints the read-only parameter list (names and values) of the current encoding schema for the specified console.
Example:
cwManagerConsole GetGraphStatistics /console 2 /host 192.168.1.45:1535
  •  GetGraphParameters
Prints the editable parameter list (names, values, and identifiers) of the current encoding schema for the specified console. The parameter identifier is used in the GetGraphParameter and SetGraphParameter commands.
Example:
cwManagerConsole GetGraphParameters /console 2 /host 192.168.1.45:1535
  •  GetGraphParameter <parameter_number>
Prints the value of the encoding schema parameter (specified with parameter_number).
Example:
cwManagerConsole GetGraphParameter 45 /console 2 /host 192.168.1.45:1535

**Control commands**

This list contains commands that provide the encoding server management.
  •  Activate
Activates the specified console.
Example:
cwManagerConsole Activate /console 2 /host 192.168.1.45:1535
  •  Deactivate
Deactivates the specified console.
Example:
cwManagerConsole Deactivate /console 2 /host 192.168.1.45:1535
  •  Restart
Restarts the CodecWorks service (or console, if the /console option is specified).
Example:
cwManagerConsole Restart /host 192.168.1.45:1535
cwManagerConsole Restart /console 2 /host 192.168.1.45:1535
  •  ClearLog
Clears the system log of the CodecWorks server (or console, if the /console option is specified).
Examples:
cwManagerConsole ClearLog /host 192.168.1.45:1535

• Start
Starts encoding process in the specified console.
Example:
cwManagerConsole Start /console 2 /host 192.168.1.45:1535

• Stop
Stops encoding process in the specified console.
Example:
cwManagerConsole Stop /console 2 /host 192.168.1.45:1535

• SetGraph <graph_name>
Loads the specified XML-schema into the console. Only schemas presented in the Schema list window are available for the loading.
Example:
cwManagerConsole SetGraph "my schema" /console 2 /host 192.168.1.45:1535

• SetGraphFromFile <local_file_name>
Loads XML-schema from the specified file into the console.
Example:
cwManagerConsole SetGraphFromFile "C:\my schema.xml" /console 2 /host 192.168.1.45:1535

• AddGraph <local_file_name>
Adds XML-schema from the specified file into the console.
Example:
cwManagerConsole AddGraph "C:\my schema.xml" /console 2 /host 192.168.1.45:1535

• SetGraphParameter <parameter_number> <new_value>
Sets new value for the encoding schema parameter.
Example:
cwManagerConsole SetGraphParameter 45 1500000 /console 2 /host 192.168.1.45:1535

Note: Some parameters cannot be changed without terminating the encoding process.

Example:
cwManagerConsole SetGraphParameter 45 1500000 /console 2 /host 192.168.1.45:1535

Note: If the required /console option is skipped, the command is executed for the first console (number 1).

If the console Manager is started with the /diagnostics option, the detailed configuration information (diagnostic log) will be printed for the CodecWorks server.

Example:
CwManagerConsole /diagnostics /host 192.168.1.45:1535 > diag.txt

### 2.12 Management via HTTP Protocol

The dispatcher processes HTTP-POST requests to manage encoding servers.

Example of an HTTP-POST request:

```xml
<?xml version="1.0" encoding="UTF-8" ?>  
<XMLConfig console="2">  
  <GetValue Name="SchemaParameter">  
    <Parameter>162</Parameter>  
  </GetValue>  
  <SetValue Name="SchemaParameter">  
    <Parameter><p>45</p><p>1500000</p></Parameter>  
  </SetValue>
</XMLConfig>
```

Note: If the required /console option is skipped, the command is executed for the first console (number 1).

If the console Manager is started with the /diagnostics option, the detailed configuration information (diagnostic log) will be printed for the CodecWorks server.
Simultaneous call of several commands is possible. Report is formed for each command. In case of error, the <Fault> tag is used instead of the <RetVal> tag. The following illustrates the HTTP-OK message body:

```xml
<XMLConfig console="2">
  <GetValue Name="SchemaParameter">
    <RetVal>[8] [NET] Server Address=10.10.30.214</RetVal>
  </GetValue>
  <SetValue Name="SchemaParameter">
    <Fault>No input signal detected</Fault>
  </SetValue>
</XMLConfig>
```

For the HTTP management details, contact Elecard Technical Support Team at: tsup@elecard.com.

### 2.13 Management via SNMP Protocol

Simple Network Management Protocol (SNMP) is intended for network monitoring and management of network devices.

The special `cwSnmpAgent.dll` module is a network agent that is embodied as an extension of the SNMP Windows service (SNMP extension agent DLL). The agent allows monitoring CodecWorks server using any SNMP client. To enable the monitoring, select the SNMP support option in the Server settings dialog box.

To configure the response system to GET requests from the monitoring system, it is necessary to configure the SNMP service in Windows. Open the list of services from Control Panel - System and Security - Administrative tools. Select the SNMP Service and right-click Properties. Select the Security tab and add public community with necessary rights. It is accepted to separate community with read-only and read/write rights. Since the community name is a password, creation of a new community with read/write rights allows other users knowing the server address and the community name to get access to the system information and partial management. After adding a community, select Accept SNMP packets from all hosts, save settings and launch the service. The SNMP support option in the Server settings dialog box should be enabled, as it was already stated.

Since SNMP GET requests are in the digital format, it is difficult to remember them. Management information bases (MIBs) are used to facilitate the work.

MIBs describe the structure of the management data of a device subsystem; they use a hierarchical namespace containing object identifiers (OID).

Each OID consists of two components: a text name and a SNMP address in the digital format. MIB-files are located in the CodecWorks root directory.

It is possible to get the information about CodecWorks, its consoles, its work status, an operating time, a number of launched consoles using GET requests.
3. Advanced Features

3.1 Preparation of Encoding Schemas

Knowledge of DirectShow technology basics and GraphEdit program is required to prepare encoding schemas without assistance.

The encoding schema preparation should be done if the suitable template for building of the required encoding schema is not supplied.

Register all components (DirectShow filters) required for the schema building in your system. Execute the register_filters.bat file in the CodecWorks root directory. (It is recommended to start the file as a root using the command line.)

Start the GraphEdit program, build the required filter graph, and adjust filter settings. Add Elecard Graph Export/Import Filter to the filter graph, open the filter settings, open the Main tab, and click the Save XML Graph button. Then in the CodecWorks Manager select the Change schema command for the console. To load the created file, click the Add existing button.

To change previously prepared schema, press the Load XML Graph button on the Elecard Graph Export/Import Filter property page and select the required file.

When the schema preparation is completed, it is recommended to unregister the components using the unregister_filters.bat file.

3.2 Additional Functions

3.2.1 Component Property Opening

Parameter adjustment is available only for the encoding schema components that support special Elecard ModuleConfig technology. However, it is possible to open Property Page of any third-party component and adjust its settings.

By default, this option is disabled. To enable the option, set the “1” value for the following subkey in the registry database:

HKEY_CURRENT_USER\Software\Elecard\Elecard CodecWorks Manager\Preferences\ShowFilterPropertyPage.

After the Manager restart the Property page button appears in the encoding schema Parameters dialog box. This button opens the list of components used in the current schema. Select the required component and press the OK button.

Note 1: This option is available, if the Manager and the CodecWorks server are installed on the same computer. The server must be started in the console mode (not service). The Property Page window can be opened, if the component is registered in the system.

Note 2: The Property Page settings are not saved in the encoding schema file. Depending on the component implementation and on the CodecWorks configuration, the settings can be saved as default values or are valid only for the current console session.
3.2.2 Hot Keys

To start an encoding schema - "Ctrl+S";
To stop an encoding schema - "Ctrl+X";
To restart an encoding schema - "Ctrl+R";
To show the encoding schema statistics - "Ctrl+T";
To show the encoding schema parameters - "Ctrl+P";
To open the Change Schema list window - "Ctrl+L";
To show log - "Ctrl+H";
To show a created schema - "Ctrl+G";
To enter the Schema Editor - "Ctrl+Shift+E";
To create a new schema - "Ctrl+N";
To find a schema "Ctrl+F".