Cinegy Subtitle 25.10 Manual

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Overview

The Cinegy Subtitling Service is designed to insert the required subtitle information into an incoming IP stream and currently supports DVB Bitmap and Teletext insertion according to the existing broadcast standards. SRT and STL subtitle file types are supported.

Cinegy Subtitle is a part of the common Cinegy workflow and can be used together with Cinegy Air for on-the-fly embedding subtitle data into an IP stream, based on a subtitle file. The Cinegy Subtitling Service is implemented as a sidecar to the main Cinegy Air service.



To use the Cinegy Subtitling Service, we recommend using Cinegy Air v24.11 and above.

The integration with Cinegy Air is implemented using the same architectural methods as the previous Cavena and Screen integrations (by using Cinegy Air subtitling events).

Chapter 1 Common Architecture

The Cinegy Subtitling Service receives the master IP stream and performs data insertion based on subtitle files placed into a designated directory. The required subtitle files are recognized by the "Subtitle ID" metadata, which can be linked to every item in the Cinegy Air playlist. The Cinegy Subtitling Service reads from compatible subtitle files in a pre-defined folder referred to as a "Subtitle repository".

The "Subtitle ID" value can be specified either manually in the Cinegy Air playlist column for each item or automatically through the conversion by Cinegy Traffic Gateway of an external file.

	The subtitle file name should include the contents of the "Subtitle ID" field, but may also contain other characters.

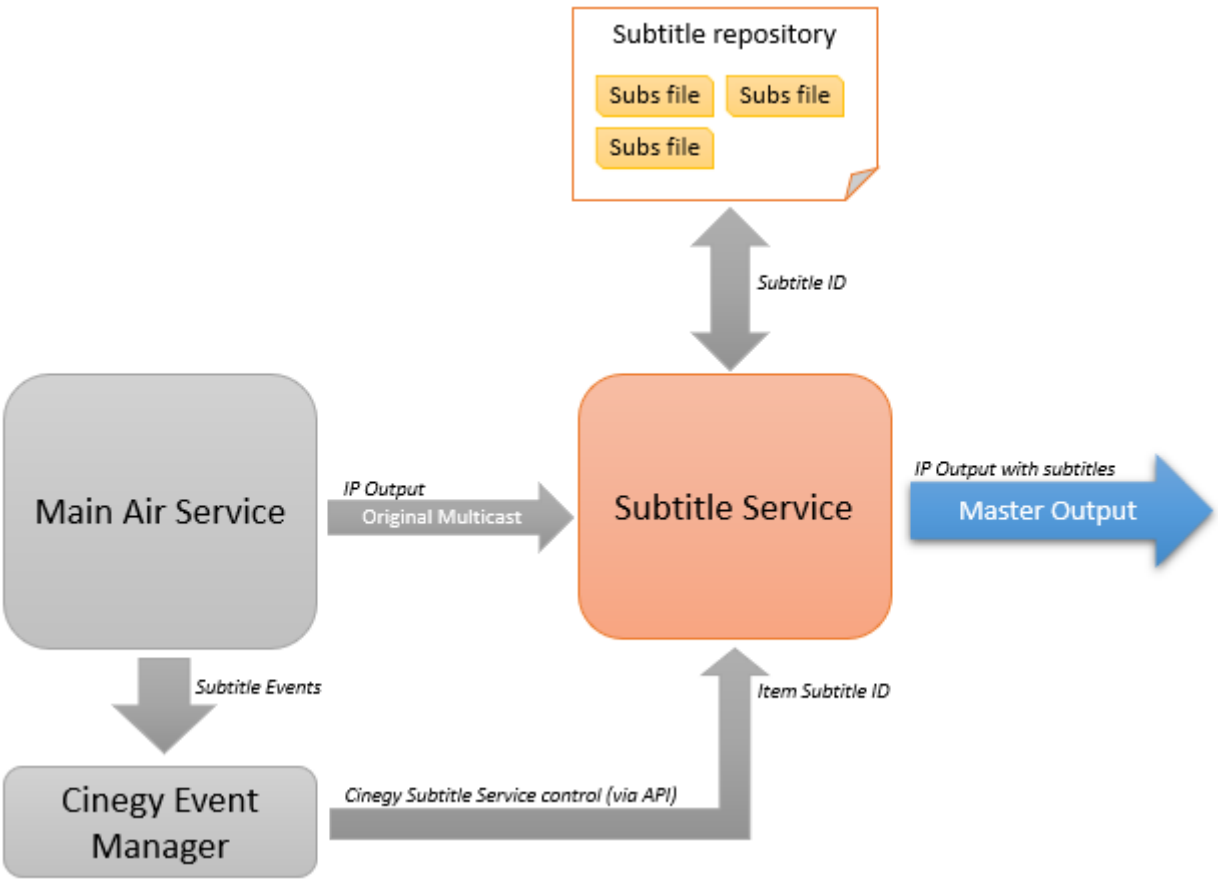
	The "Subtitle ID" field can only be edited if the "Metadata editing" option is enabled in the Cinegy Air Configuration. The "Subtitle ID" can contain alphanumerical characters.

The Cinegy Subtitling Service can work in two modes, covering different scenarios: insertion mode and overwrite mode.

	The simple and quick configuration of insertion and overwrite modes is described in detail in the Quick Start Guide.

1.1 Insertion Mode

Insertion mode is used when a signal from an engine does not contain any subtitle data, and the Cinegy Subtitling Service should generate a new subtitle stream with a predefined PID:



In this mode, the Cinegy Subtitling Service waits for an item with a valid (non-empty) Subtitle ID and then starts reading the

subtitle data from the corresponding file and generating a new subtitle stream.



This scenario describes the architectural model for the system producing a pure IP output. Refer to the **Inserting Baseband Teletext** section to learn how to embed Teletext data into an SDI output.

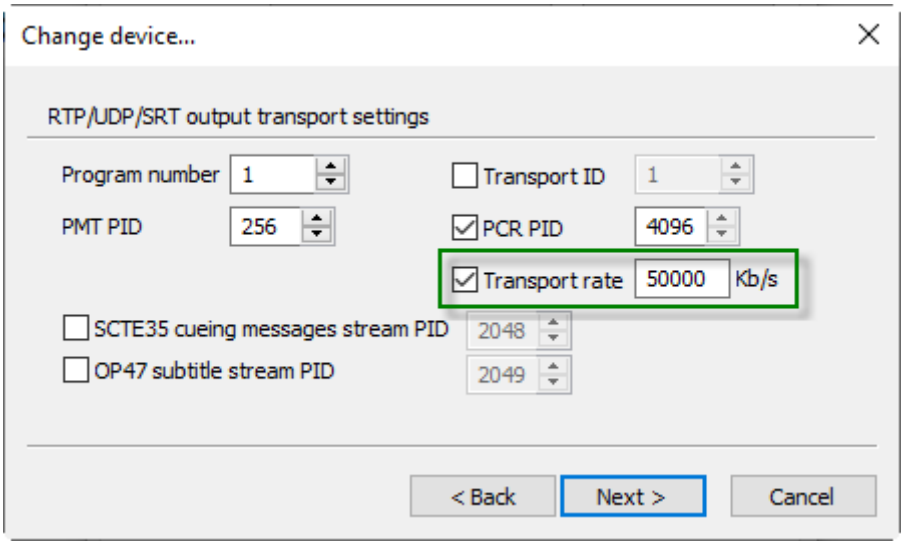
Cinegy Playout Engine Settings



The following configuration is relevant for scenarios where either the DVB Bitmap subtitle encoder or multiple Teletext streams are used with Cinegy Air v24.11 and above.

On the Cinegy Playout Engine side, you should ensure that there is always enough space in the transport stream to add subtitle data. Therefore, with DVB Bitmaps, for example, you have to increase the output data rate by about 30% in comparison to the video bitrate.

For example, if you configured a 35 Mb/s video stream, you need to increase the data rate to about 50 Mb/s:



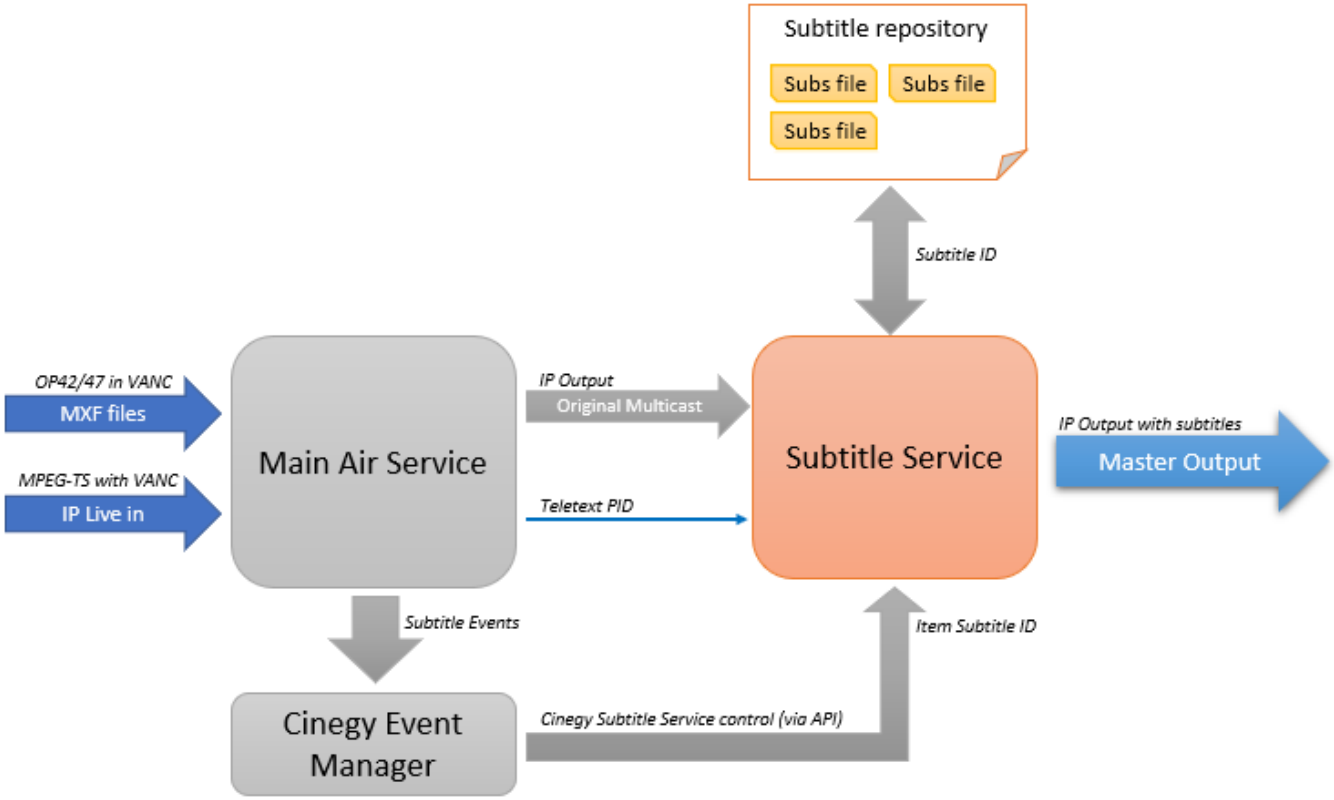


Refer to the **Transport Settings** paragraph in the **Cinegy Playout Manual** for details on configuring IP output transport settings.

1.2 Overwrite Mode

Overwrite mode can be used when the output transport stream from the Cinegy Playout Engine already contains some Teletext subtitle data. This can be obtained from either VANC data in source MXF files or passed through from an incoming IP live stream with Teletext subtitles embedded. Only MXF-based file items in the Cinegy Air playlist that require local Teletext subtitling can be "overwritten".

The Cinegy Subtitle Service preserves/passes through all Teletext subtitle data in the main stream when no file is found according to the specified *FileSearchPolicy*. If an appropriate file is found, the original Teletext subtitles will be replaced with new data from the subtitle file.



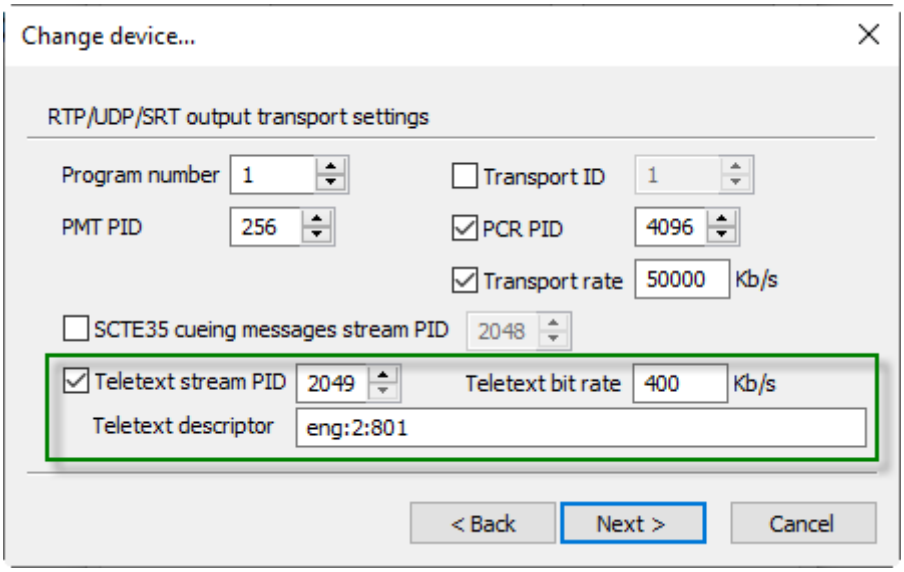
Please note that the predefined Teletext PID remains unchanged - only subtitle data will be altered.

In Overwrite mode, only one Teletext encoder is supported; therefore, the DVB Bitmap encoder configuration should be removed from the Cinegy Subtitling Service channel configuration section.

This scenario describes the architectural model for a system working in the pure IP output. Refer to the **Baseband Teletext Inserter** section to learn how to embed Teletext data into an SDI output.

Cinegy Playout Engine Settings

In this scenario, you need to define the Teletext stream for the output stream in the Cinegy Playout Engine Configurator:



Here you define the following Teletext settings:

- **Teletext stream PID** – select the checkbox and define the PID value to enable MXF VANC tracks in the playlist containing OP42/47 Teletext data packets to be read and inserted.
- **Teletext bit rate** – define the Teletext bit rate value.
- **Teletext descriptor** – define various Teletext properties which will be stored in the Teletext description. This option consists of three parts, separated by colons : `Language:Type:Number`, where:
  - *Language* is specified using an ISO 639-2/T language code (e.g., ENG, SPA, etc.).
  - *Type* defines the Teletext type. This descriptor can have the following values:

1	Initial Teletext page.
2	Teletext subtitle page.
3	Additional information page.
4	Program schedule page.
5	Teletext subtitle page for the hearing impaired.

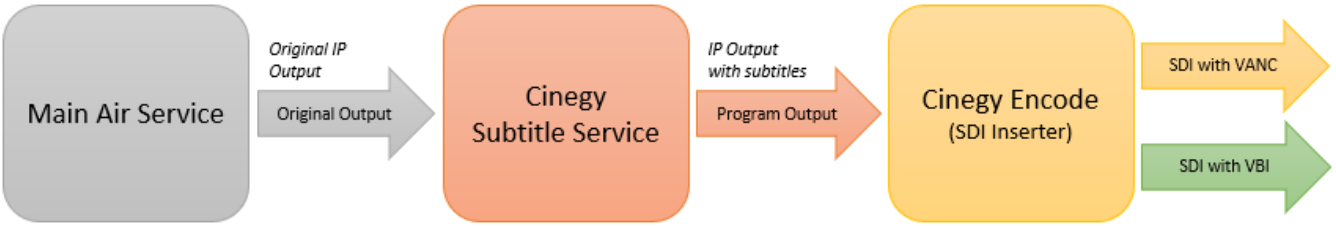
  - *Number* is identified by its single-digit magazine number and its two-digit page number.



Refer to the **Transport Settings** paragraph in the **Cinegy Playout Manual** for details on configuring IP output transport settings.

Chapter 2 Baseband Teletext Inserter

The sections above describe the architectural model for a system producing a pure IP output. The additional Cinegy Encode service is required to convert the IP output from the Cinegy Subtitling Service into an SDI output with the Teletext data included.



Note that this architectural model works with Teletext only, since a DVB Bitmap cannot be inserted into the baseband.

Installation

Chapter 3 Prerequisites

To use Cinegy Subtitle, the following Cinegy software components are required:

- Cinegy Subtitling Service v25.10.
- Cinegy Air v24.11 or higher is recommended.
- Cinegy Event Manager v24.11 or higher (provided as part of the Cinegy Air installation package).

The subtitling component consists of two parts: the Cinegy Subtitling Control and the Cinegy Subtitling Service.

To install and setup the Cinegy Subtitling Service, the installation of PowerShell version 7.2 or higher is required.

Chapter 4 Cinegy Subtitling Control Plugin

The Cinegy Subtitling Control is a subtitling secondary event plugin, installed along with Cinegy Event Manager. After installation, it should be properly configured and activated.



Refer to the **Cinegy Subtitling Control** paragraph in the **Cinegy Event Manager Manual** for details on its configuration.

Chapter 5 Cinegy Subtitling Service

The Cinegy Subtitling Service installation package contains the **SubtitlingService.exe** file, which is used to process incoming IP streams according to the settings specified in the **appsettings.json** configuration file, along with two files used to create a Windows service.

On first usage, Cinegy recommends running the Cinegy Subtitling Service as a console application to aid in the tuning of the configuration and debugging of any issues.



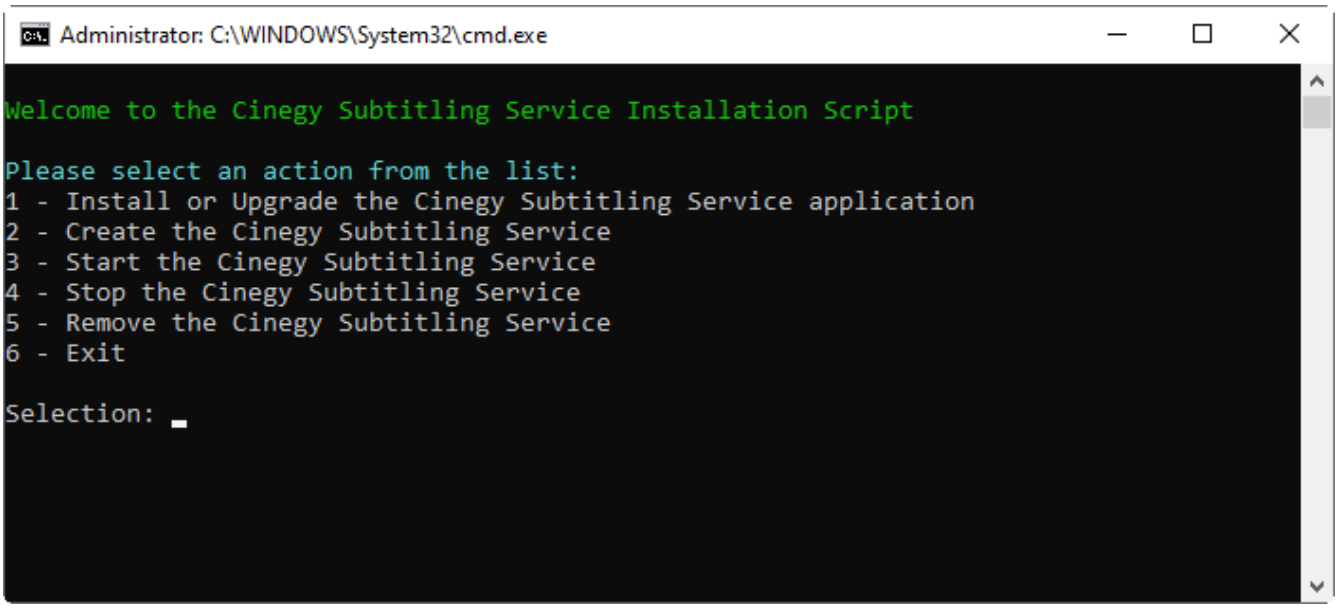
The provided **appsettings.json** file contains a basic set of values that must be adjusted for your environment before the initial launch of the Cinegy Subtitling Service.



Refer to the **Application Settings** article for details on configuration settings in the appsettings.json file.

Chapter 6 Installation as a Windows Service

The Cinegy Subtitling Service can be installed and run as a standard Windows service by using the delivered installation script. To do so, you should run the **Configure-Services.bat** file from your Cinegy Subtitling Service installation package using the "Run as administrator" command. The following management console window appears:



Here you can perform the following actions:

- **Install or Upgrade the Cinegy Subtitling Service application** – copies the SubtitlingService.exe file to the `C:\Program Files\Cinegy\Cinegy Subtitling Service` folder.

  > If detected, the previous version of the Cinegy Subtitling Service will be automatically replaced with the new one.

- **Create the Cinegy Subtitling Service** – creates the Cinegy Subtitling Service as a Windows service.

  > This step requires the "Install or Upgrade Cinegy Subtitling Service application" action to be previously completed.

- **Start the Cinegy Subtitling Service** – starts the pre-created Cinegy Subtitling Service as a Windows service. At this stage, the **appsettings.json** configuration file is copied to the `C:\ProgramData\Cinegy\SubtitlingService` folder if it is not already present.

  > This step requires the "Create Subtitling Service" action to be previously completed.

- **Stop the Cinegy Subtitling Service** – stops the pre-created Cinegy Subtitling Service started as a Windows service.
- **Remove the Cinegy Subtitling Service** – removes the Cinegy Subtitling Service from the Windows services list.
- **Exit** – quits the management console.

> After installation of the service, if further configuration is required, navigate to the `C:\ProgramData\Cinegy\SubtitlingService` folder and configure the **appsettings.json** file as described in the **Application Settings** article or replace the existing file with a pre-configured one. The service will need to be restarted to pick up any changes to the configuration file.

Configuration

Chapter 7 Application Settings

The appsettings.json configuration file is provided in the Cinegy Subtitling Service installation package. Below is a version of the appsettings.json configuration file with some example values and a detailed description:

```
{
  "ApplicationUrls": [
    "http://localhost:8501"
  ],
  "Logging": {
    "LogLevel": {
      "Default": "Trace",
      "Microsoft": "Warning",
      "Microsoft.Hosting.Lifetime": "Warning"
    }
  },
  "Telemetry": {
    "Enabled": false,
    "OrgId": "sandpit",
    "Tags": "dev, testchannel",
    "TelemetryServer": "https://telemetry.cinegy.com"
  },
  "Globals": {
    "LiveId": "LIVE",
    "SyncOffsetBase": 280
  },
  "SubtitleChannels": [
    {
      "Id": 1,
      "ClearInterval": 500,
      "Repositories": [
        {
          "Id": 0,
          "Language": "ENG",
          "FileSource": {
            "FileSearchPolicy": "Auto",
            "Directory": "D:\\Subtitles1"
          },
          "LiveSource": {
            "Enabled": true,
            "EndPoint": "127.0.0.1:50125",
            "VerbosityEnabled": false
          }
        },
        {
          "Id": 1,
          "Language": "GER",
```

```
        "FileSource": {
          "FileSearchPolicy": "SubtitleId",
          "Directory": "D:\\Subtitles2"
        },
        "LiveSource": {
          "Enabled": false,
          "EndPoint": "127.0.0.1:50125",
          "VerbosityEnabled": false
        }
      }
    ],
    "Streams": [
      {
        "InputUrl": "rtp://@239.1.1.2:1234",
        "InputAdapter": "0.0.0.0",
        "InputSrtLatency": -1,
        "InputSrtPassphrase": null,
        "OutputUrl": "rtp://239.1.1.3:1234",
        "OutputAdapter": "0.0.0.0",
        "OutputBackupAdapter": null,
        "OutputSrtPassphrase": null,
        "OutputTTL": 1,
        "FrameRate": "25",
        "VideoPid": 0,
        "SyncToInput": false,
        "Encoders": [
          {
            "Type": "Teletext",
            "RepositoryId": 0,
            "SubtitlePid": 4098,
            "SyncOffset": 0,
            "Magazine": 8,
            "Page": 1,
            "DefaultTextColor": "red",
            "DefaultBackgroundColor": "black"
          },
          {
            "Type": "Teletext",
            "RepositoryId": 1,
            "SubtitlePid": 4098,
            "SyncOffset": 0,
            "Magazine": 8,
            "Page": 2
          },
          {
            "Type": "DVB",
            "RepositoryId": 1,
            "SubtitlePid": 4099,
            "SyncOffset": 0,
            "FrameSize": "1920x1080"
            "FontSize": "36",
```

```
            "FontName": "Times New Roman",
            "DefaultTextColor": "yellow",
            "DefaultBackgroundColor": "black",
            "BackgroundMode": "AlwaysOn",
            "CompositionPageId": 1,
            "EmptyPayloadWhenNoData": false
          }
        ],
        "Multiplexer": {
          "Type": "Video",
          "Mode": "Insert",
          "SyncDelayFrames": 7,
          "SyncToleranceFrames": 0
        }
      }
    ]
  }
]
}
```



After editing the configuration file, the Cinegy Subtitling Service must be restarted for the changes to take effect.

7.1 Host Settings

`ApplicationUrls` is the address and port to which the application binds when running. This can be set as follows:

```
http://<server_name>:8501
```

where `<server_name>` is the REST IP of the server where the Cinegy Subtitling Service is running. This can be set to "0.0.0.0" to use all the available IPv4 addresses on the local machine.

7.2 General Settings

Settings within these configuration blocks pertain to the overall operation of the entire Cinegy Subtitling Service.

Logging

This section provides the logging configuration and comprises the following categories: `Default`, `Microsoft`, and `Microsoft.Hosting.Lifetime`:

```
"Logging": {
    "LogLevel": {
      "Default": "Trace",
      "Microsoft": "Warning",
      "Microsoft.Hosting.Lifetime": "Warning"
    }
   },
```

The `Default` category is responsible for logging the Cinegy Subtitling Service, while the `Microsoft` and the `Microsoft.Hosting.Lifetime` categories cover logging for the built-in HTTP server provided by Microsoft. The level of Microsoft-related logging is specified at the "Warning" level and should only be increased in cases of debugging.

The log level indicates the minimum severity of messages logged and ranges from "0" to "6", with lower numbers producing more detailed information in the resulting file. The available levels are:

Trace = "0", Debug = "1", Information = "2", Warning = "3", Error = "4", Critical = "5", and None = "6".

The log files are stored in the following directory: *C:\ProgramData\Cinegy\SubtitlingService\logs*.

Telemetry

The "Telemetry" section is reserved for cloud-based deep analysis and monitoring and is currently under development. At present, it only offers settings for log reporting.

```
  "Telemetry": {
    "Enabled": false,
    "OrgId": "sandpit",
    "Tags": "dev, testchannel",
    "TelemetryServer": "https://telemetry.cinegy.com"
  },
```

Globals

In this section, you can define the parameters that will be used globally:

```
"Globals": {
    "LiveId": "LIVE",
    "SyncOffsetBase": 280
  },
```

The Cinegy Subtitling Service supports two types of subtitle sources: file-based (SRT and STL subtitle files) and stream-based (streams with Teletext transferred via the Newfor protocol). In the "Globals" configuration block, `LiveId` is responsible for switching the subtitle source to stream-based type.



Once the Cinegy Subtitling Service receives an event from the Cinegy Event Manager for an item with Subtitle ID that corresponds to the `LiveId` value, the data from the stream will be transferred according to the channel configuration in the "LiveSource" block, while settings from the "FileSource" block will be ignored.

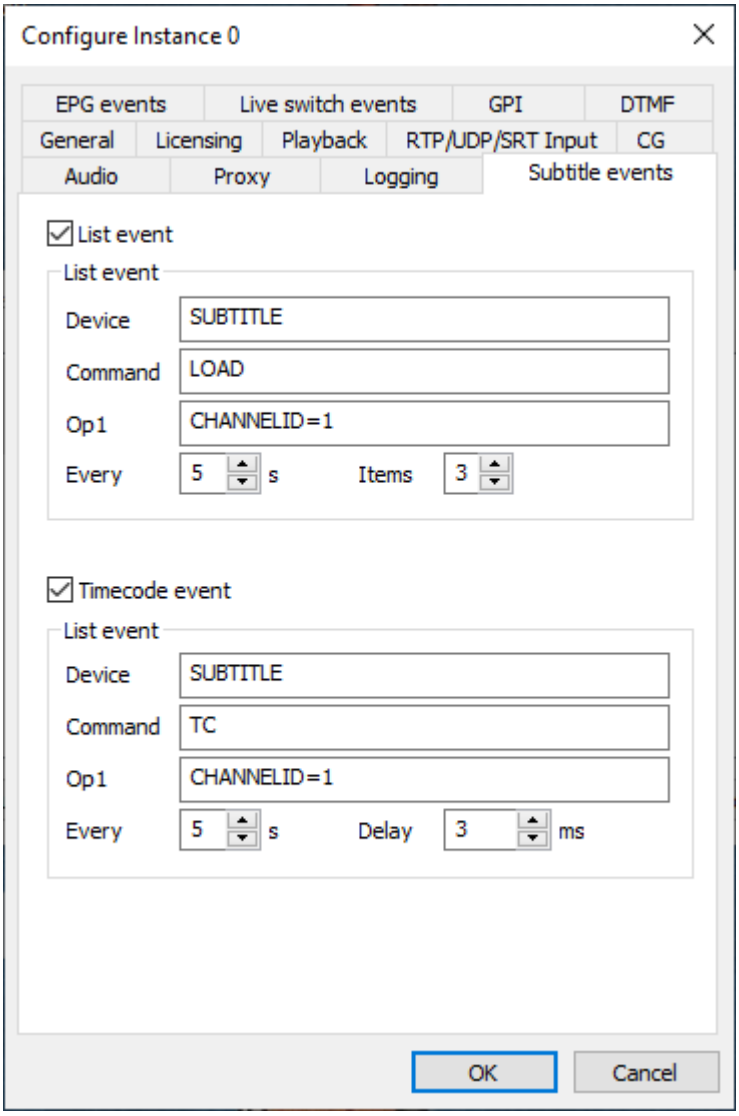
The `SyncOffsetBase` parameter determines the global offset of subtitles relative to the video for all encoders. Essentially, it shifts the initial frame, where the subtitle phrase should be inserted, by the specified value.

7.3 SubtitleChannels

A subtitle channel is a reflection of an upstream TV channel, which can contain one or more video streams (in the case of simulcast) based on the same Cinegy Air playlist, and hence all video streams within a subtitle channel have identical content. Each subtitle channel is configured individually within the "SubtitleChannels" section with the following parameters:

```
"SubtitleChannels": [
  {
    "Id": 1,
    "ClearInterval": 500,
```

The channel `Id` parameter serves to uniquely identify events generated by the Cinegy Playout engine for a specific subtitle channel. Therefore, the value assigned to the channel `Id` parameter should match the number used in the "Op1" field in the Subtitle events settings of the Cinegy Playout engine configuration:



If the "Op1" field in the "Subtitle events" settings is left empty, the events generated by this Cinegy Playout engine will be used for the subtitle channel with an `Id=0`.

To enable multichannel subtitle insertion, a separate channel configuration block should be created for each channel within the "SubtitleChannels" block, and each channel must have a unique `Id` number.

The `ClearInterval` parameter defines the time interval, in milliseconds, during which the Cinegy Subtitling Service sends the 'clear' command when a new item is started in the Cinegy Air playlist. This action aims to prevent the display of subtitles from the previous item. It is particularly relevant when an on-air item is interrupted by the manual starting of the next item in the playlist.

Subtitle Service Groups

Repositories

The "Repositories" block is responsible for configuring subtitle sources.

```
"Repositories": [
  {
    "Id": 0,
    "Language": "ENG",
    "FileSource": {
      "FileSearchPolicy": "Auto",
      "Directory": "D:\\Subtitles1"
    },
    "LiveSource": {
      "Enabled": true,
      "EndPoint": "127.0.0.1:50125",
      "VerbosityEnabled": false
    }
```

When subtitles need to be generated from various languages or different Live sources, configuring multiple repositories is necessary.

General Settings

The `Id` parameter defines the unique repository ID. These repository IDs are used to link the encoders with their respective repositories.

The value for the `Language` parameter is specified using an ISO 639-2/T language code (e.g., ENG, SPA, etc.). The `Language` parameter is used to create subtitle descriptors for both Teletext and DVB Bitmap, which are then transmitted in the transport stream.

For Teletext, the corresponding Teletext character set is selected according to the required language to ensure proper character encoding. The list of currently supported languages for Teletext is given in the following table:

Language	ISO 639-2 code	Language	ISO 639-2 code	Language	ISO 639-2 code
English	ENG	German	GER/DEU	Swedish	SWE
Finnish	FIN	Hungarian	HUN	Italian	ITA
French	FRE/FRA	Portuguese	POR	Spanish	SPA
Czech	CZE/CES	Slovak	SLO/SLK	Polish	POL
Turkish	TUR	Serbian	SRP	Croatian	HRV
Slovenian	SLV	Romanian	RON/RUM	Estonian	EST
Lettish	LAV	Lithuanian	LIT	Russian	RUS

FileSource

The "FileSource" configuration group is relevant for file-based scenarios, where the Cinegy Subtitling Service retrieves subtitle data from a subtitle file for further embedding into the output stream.

The `FileSearchPolicy` parameter defines the criteria for searching a subtitle file within a specified directory, corresponding to an item in the Cinegy Air playlist. This parameter can be assigned one of the following values:

- "SubtitleId" – used when matching is based on the Subtitle ID of the playlist item.
- "Name" – used when comparing with the Name of the playlist item.

- "Auto" – used when the Name is considered first, followed by the Subtitle ID.

The `Directory` parameter defines the path to the directory containing subtitle files.



We do not recommend using mapped drives as the directory for subtitles.

LiveSource

The "LiveSource" configuration is utilized when a stream is used as a source of subtitle data. The Cinegy Subtitling Service supports only the Teletext transferred via the Newfor protocol as a Live subtitle source.

The generation of stream-based subtitles can be enabled by setting the `Enabled` parameter to "true". In this scenario, when the Cinegy Subtitling Service receives an event from the Cinegy Event Manager for a playlist item with a Subtitle ID that corresponds to the `LiveId` value, the subtitle data source will be switched to the "LiveSource" for this item.

The `EndPoint` parameter defines *IP_Address:Port* to establish a TCP connection with the Newfor live subtitle stream generator. Setting the IP address to "127.0.0.1" limits connections to be accepted only from the local machine. To allow connections from external sources, specify the IP address "0.0.0.0", enabling access through any adapter. Alternatively, to restrict connections to a specific adapter, use its specific IP address. Also, you will need to specify the correct port, which will be listened to by the Cinegy Subtitling Service.



The Cinegy Subtitling Service does not support Newfor Message Type 1 (Set Subtitle Page) and Message Type 5 (Set Logical Channel), as these settings are configured at the Cinegy Subtitling service level.

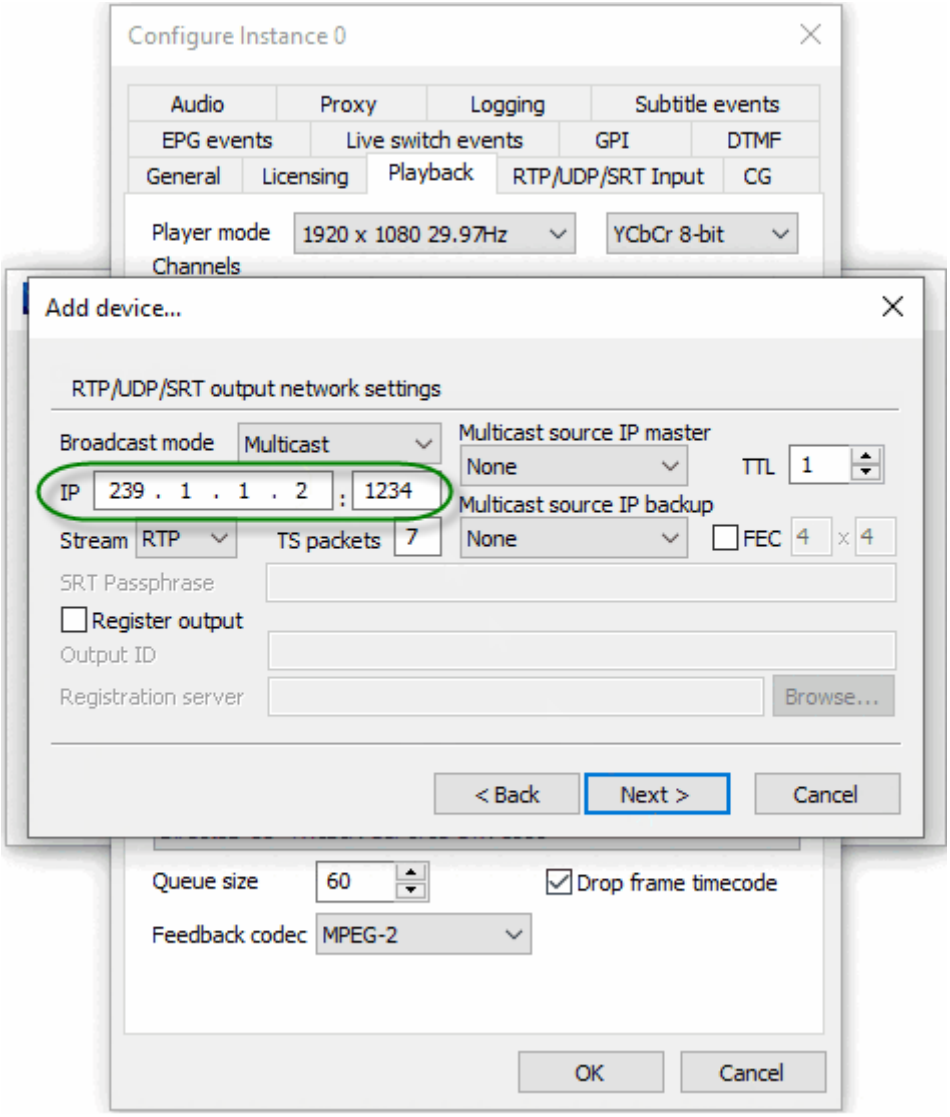
The `VerbosityEnabled` parameter enables/disables verbose mode logging for debugging.

Streams

This section comprises a configuration of streams:

```
"Streams": [
  {
    "InputUrl": "rtp://@239.1.1.2:1234",
    "InputAdapter": "0.0.0.0",
    "InputSrtLatency": -1,
    "InputSrtPassphrase": null,
    "OutputUrl": "rtp://239.1.1.3:1234",
    "OutputAdapter": "0.0.0.0",
    "OutputBackupAdapter": null,
    "OutputSrtPassphrase": null,
    "OutputTTL": 1,
    "FrameRate": "25",
    "VideoPid": 4096,
    "SyncToInput": false,
```

In this configuration block, the `InputUrl` parameter specifies the input stream URL for the subtitle channel. The URL will either correspond to the output stream or will use the relevant SRT mode configuration to match the master Cinegy Playout Engine. Please refer to our RTP/UDP/SRT URL Format article for additional information.



The `InputAdapter` defines the input network adapter to use for incoming RTP or UDP streams. It should be set to "0.0.0.0" to listen on all available adapters.

The `InputSrtLatency` parameter determines the latency, measured in milliseconds, for encoding the input SRT stream. If set to "-1", the default latency defined by the SRT library will be used. In `InputSrtPassphrase`, you can optionally define the passphrase for input SRT stream encryption.

The `OutputUrl` parameter determines the output stream URL.

The `OutputAdapter` parameter defines the output network adapter and allows the user to use any adapter when set to "0.0.0.0".

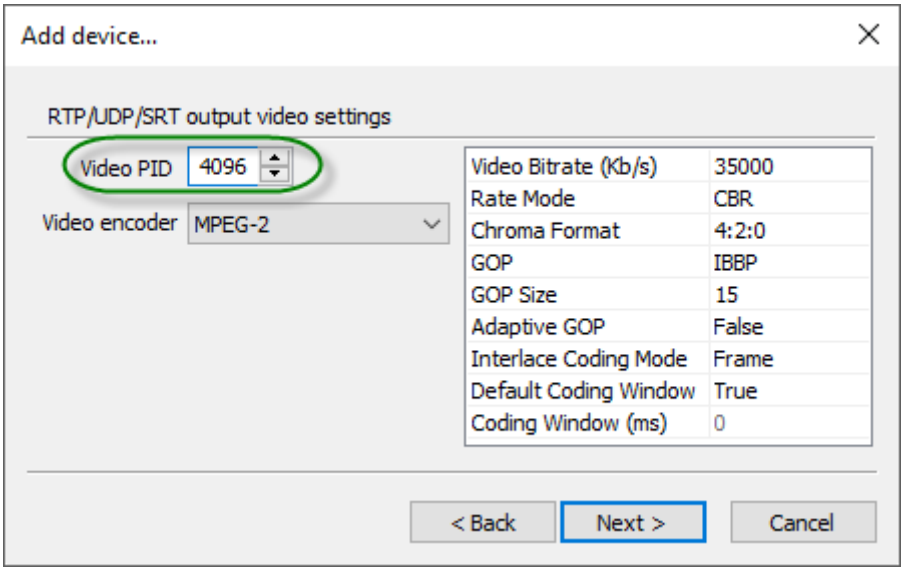
The optional `OutputBackupAdapter` defines the output backup network adapter for RTP or UDP streams.

The `OutputSrtPassphrase` parameter can be used optionally to define the passphrase for output SRT stream encryption.

`OutputTTL` defines the TTL (Time To Live) interval for output.

The `FrameRate` parameter defines the frame rate of the input stream.

The `VideoPid` parameter defines the video stream PID in the incoming transport stream. This parameter should match the output from the master Cinegy Playout Engine:



If the `VideoPid` is absent in the configuration file or its value is set to "0", the first elementary stream in the incoming transport stream will be used as a reference.

The `SyncToInput` parameter helps keep the output stream in sync with the input stream when the SDI clock is used as the master clock for Cinegy Air Playout. This synchronization is based on PCR values from the incoming TS stream and the time when data is received over the network.

Encoders

Subtitle encoders are configured within the "Streams" section. In the example below, the configuration of three encoders is shown: two utilizing Teletext data and one using DVB Bitmap data.

```
"Encoders": [
   {
     "Type": "Teletext",
     "RepositoryId": 0,
     "SubtitlePid": 4098,
     "SyncOffset": 0,
     "Magazine": 8,
     "Page": 1,
     "DefaultTextColor": "red",
     "DefaultBackgroundColor": "black"
   },
   {
     "Type": "Teletext",
     "RepositoryId": 1,
     "SubtitlePid": 4098,
     "SyncOffset": 0,
     "Magazine": 8,
     "Page": 2
   },
   {
     "Type": "DVB",
     "RepositoryId": 1,
     "SubtitlePid": 4099,
     "SyncOffset": 0,
     "FrameSize": "1920x1080"
     "FontSize": "36",
     "FontName": "Times New Roman",
     "DefaultTextColor": "yellow",
     "DefaultBackgroundColor": "blue",
     "BackgroundMode": "AlwaysOn",
     "CompositionPageId": 1,
     "EmptyPayloadWhenNoData": false
   }
 ],
```

The Cinegy Subtitling Service can embed DVB Bitmap and Teletext data into source IP streams. With the `Type` parameter, you can define whether "Teletext" or "DVB" subtitles will be generated.

In the `RepositoryId`, you can define the subtitle repository ID used by the encoder.



The number of encoders that can be used for a single output stream is limited to six.

Teletext Encoder

The `SubtitlePid` parameter defines the PID allocated to the subtitle stream.

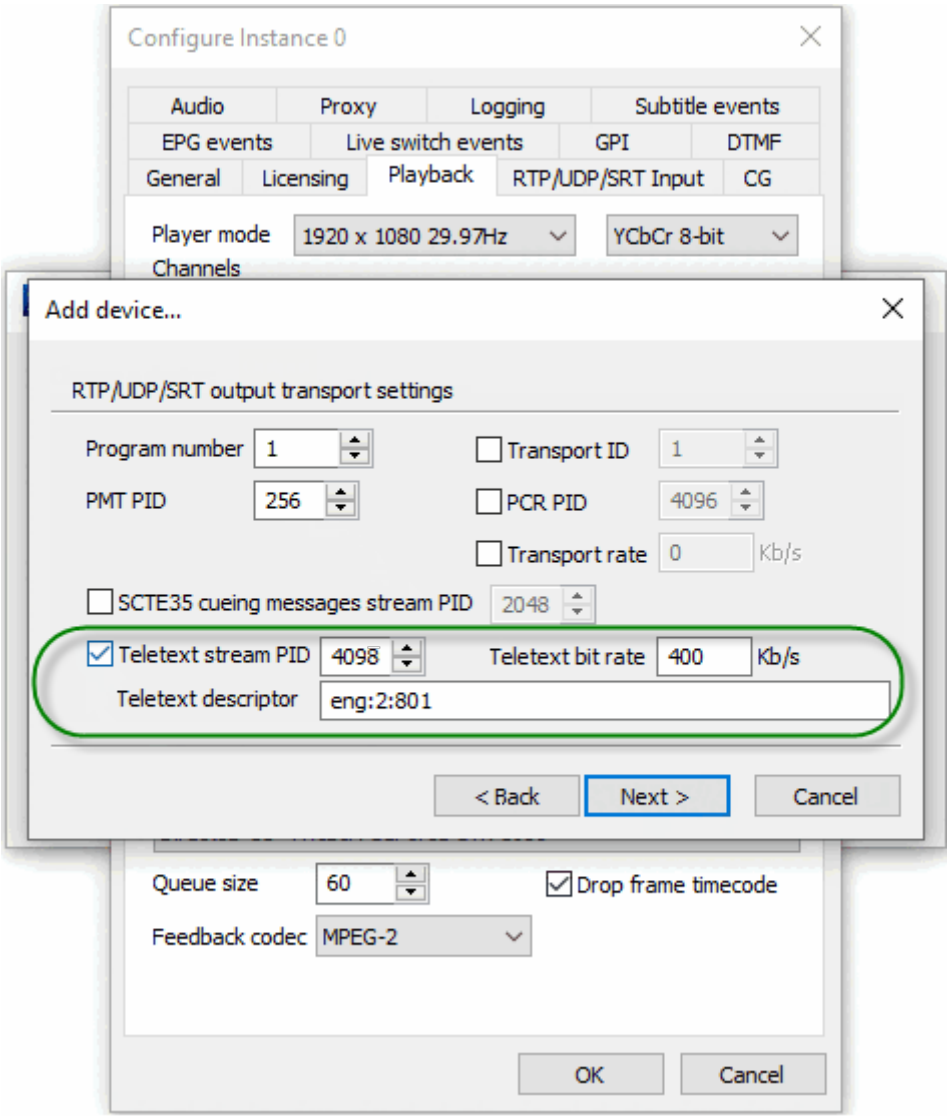
The `Magazine` and `Page` parameters define the Teletext magazine and page numbers correspondingly.

The optional `DefaultTextColor` and `DefaultBackgroundColor` parameters define the default text and background colors for subtitles. The following color values can be used for these parameters: `red`, `green`, `yellow`, `blue`, `magenta`, `cyan`, `white`, and `black`. However, if the font color is specified in the subtitle file, that configuration takes precedence, and

the DefaultTextColor parameter will be ignored.

In insertion mode, you can add up to 4 Teletext pages in one subtitle stream. If the number of pages exceeds 4, they should be split between several streams. The SubtitlePid parameter in this case should have identical values for all Teletext pages.

For overwrite mode, the SubtitlePid, Magazine, and Page parameters should be configured to match the setup of the master Cinegy Playout Engine that generates the video stream:



The SyncOffset parameter determines the offset of subtitles relative to the video for the respective encoder. The value is set in milliseconds. If SyncOffsetBase is specified in the "Globals" section was also specified, then the resulting offset will include the sum of both offsets.

DVB Encoder

The SubtitlePid parameter for the DVB encoder is configured in the same way as for Teletext in insertion mode.

The FrameSize parameter determines the frame size in pixels horizontally (width) and vertically (height) and should correspond to the incoming video stream.

The FontSize parameter determines the size of the font for encoding subtitles. The minimum font size is 5, and the maximum size is calculated as frame height / 6 (for example, for 1920x1080 video, it is 1080/6=180, which means the maximum font size is 180).

The FontName parameter indicates the font used for encoding subtitles, supporting TrueType (.ttf) and OpenType (.otf) fonts. It must match exactly the name of the font installed on the server running the Cinegy Subtitling Service, including spelling, capitalization, and spacing. If the font is not specified in the settings file, the service defaults to "Helvetica Monospaced".

The optional DefaultTextColor and DefaultBackgroundColor parameters define the default text and background colors for subtitles. The following color values can be used for these parameters: red, green, yellow, blue, magenta, cyan, white, black, darkred,darkgreen, darkyellow, darkblue, darkmagenta, darkcyan, and darkgray. However, font color formatting in the subtitle file takes precedence over the configuration in the subtitle encoder. Therefore, if the subtitle file includes font color formatting, the DefaultTextColor parameter defined in the encoder will be ignored.

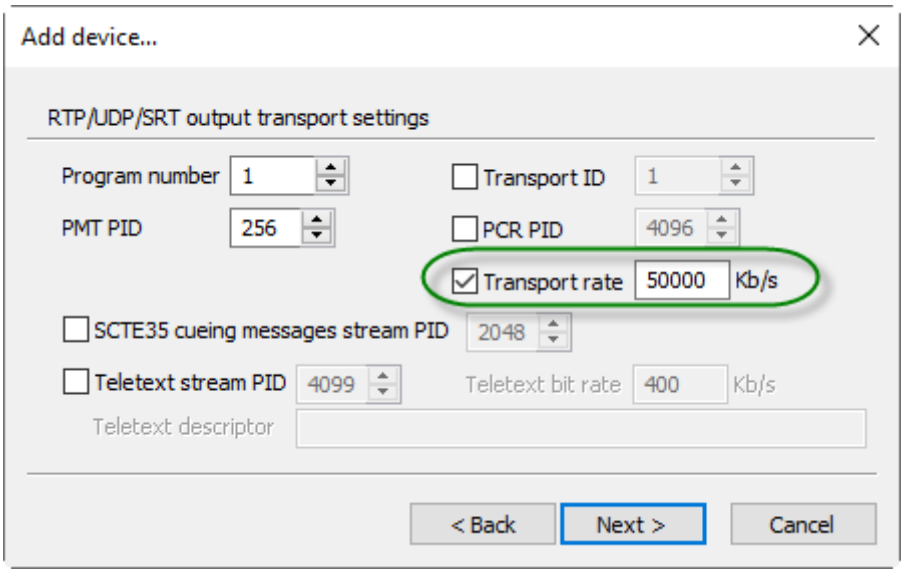
Background control is managed through the BackgroundMode option, which can be set to the following values:

- "AlwaysOn" – forces the background to be enabled using the color defined by the DefaultBackgroundColor parameter.
- "AlwaysOff" – disables the background.
- "PreserveOrigin" – displays the background color defined by the DefaultBackgroundColor parameter only for lines that have a background box formatting in the STL subtitle file.

The DVB encoder uses the CompositionPageId property to define the composition page ID in the MPEG-TS stream descriptor associated with a specific PID.

When the EmptyPayloadWhenNoData option is set to "true", the DVB encoder generates an empty TS packet without payload with the configured DVB subtitle PID for each video frame that does not contain subtitle data.

Also, on the Cinegy Playout Engine side, you should ensure that there is always enough space in the transport stream to add DVB subtitle data. Therefore, you have to increase the output transport rate by about 30% in comparison to the video bitrate. For example, if you configured a 35 Mb/s video stream, you need to increase the "Transport rate" value in the Cinegy Playout configurator to about 50 Mb/s:



Multiplexer

In this section, you can define how subtitle streams are muxed with video streams.

```
"Multiplexer": {
  "Type": "Video",
  "Mode": "Insert",
  "SyncDelayFrames": 7,
  "SyncToleranceFrames": 0
}
```

The Type parameter specifies the type of muxing that will occur. It can be either "Video" or "Subtitle".

Video Muxing

The video muxer can be applied to each subtitle stream in a channel to multiplex the generated subtitle stream with its reference video stream into a master output stream.

The Mode parameter determines the video multiplexer mode to be used: "overwrite" or "insertion".

The SyncDelayFrames parameter specifies the number of frames used by the Cinegy Subtitling Service to buffer the incoming stream. Considering the unique requirements of processing various subtitle types, Teletext requires a minimum value of "3" for this parameter, with a recommended value of "7". Meanwhile, DVB subtitles require a buffer of "25" frames.

The SyncToleranceFrames parameter determines the number of frames before a certain video frame where the Cinegy Subtitling Service can embed subtitle data. Setting a large value is not recommended as it may affect decoder stability. The recommended values are 2-3 frames for Teletext and 15-20 frames for DVB.

Subtitle Muxing

With the "Subtitle" type of multiplexer defined, the Cinegy Subtitling Service produces a separate subtitles output stream that is not muxed with video and audio streams. The external muxer should be used to combine these streams.

```
"Multiplexer": {
  "Type": "Subtitle",
}
```

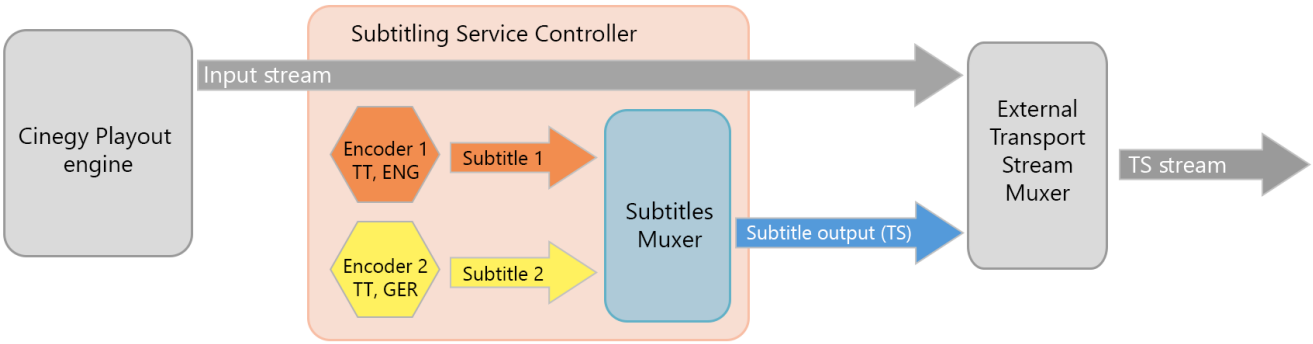
Chapter 8 Example Deployment Scenarios

This article provides examples of various scenarios in which the Cinegy Subtitling Service can be utilized, along with the licenses that would be required.

Subtitle encoders can be of Teletext (TT) or DVB type and support different languages or combinations of types and languages. In the following schemes, two Teletext encoders of the English and German languages are used as examples.

8.1 One Channel: Two Subtitle Encoders, No TS Muxer

Cinegy Subtitling Service can produce a separate subtitles output stream that is not muxed with video and audio streams. The external muxer is used to combine these streams.



Cinegy Subtitling Service

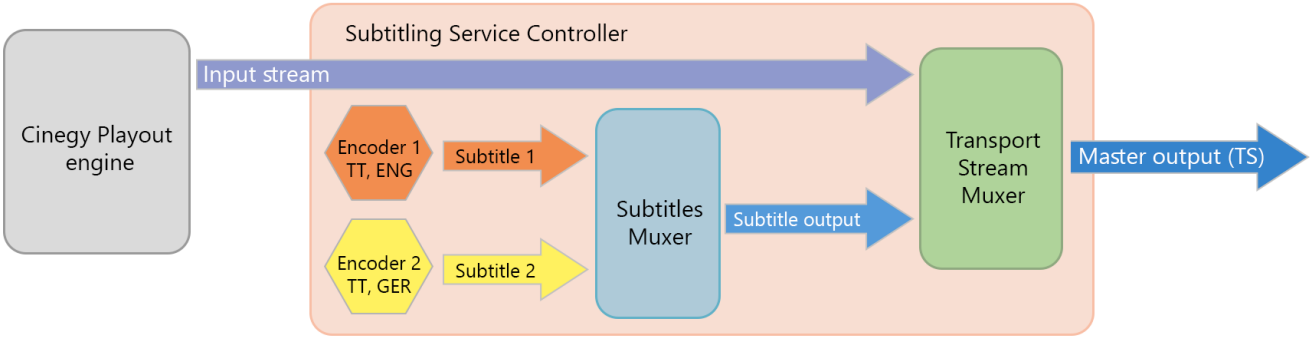
The following value should be set in the "Multiplexer" section within the appsettings.json configuration file for this workflow:

```
"Multiplexer": {
  "Type": "Subtitle"
}
```

The following licenses are required for this scenario: Subtitling Service Controller and two Subtitle Encoders.

8.2 One Channel: Two Subtitle Encoders, One TS Muxer

This is the standard operational workflow, in which the stream from the Cinegy Playout engine is muxed with the subtitles stream via an internal video muxer.



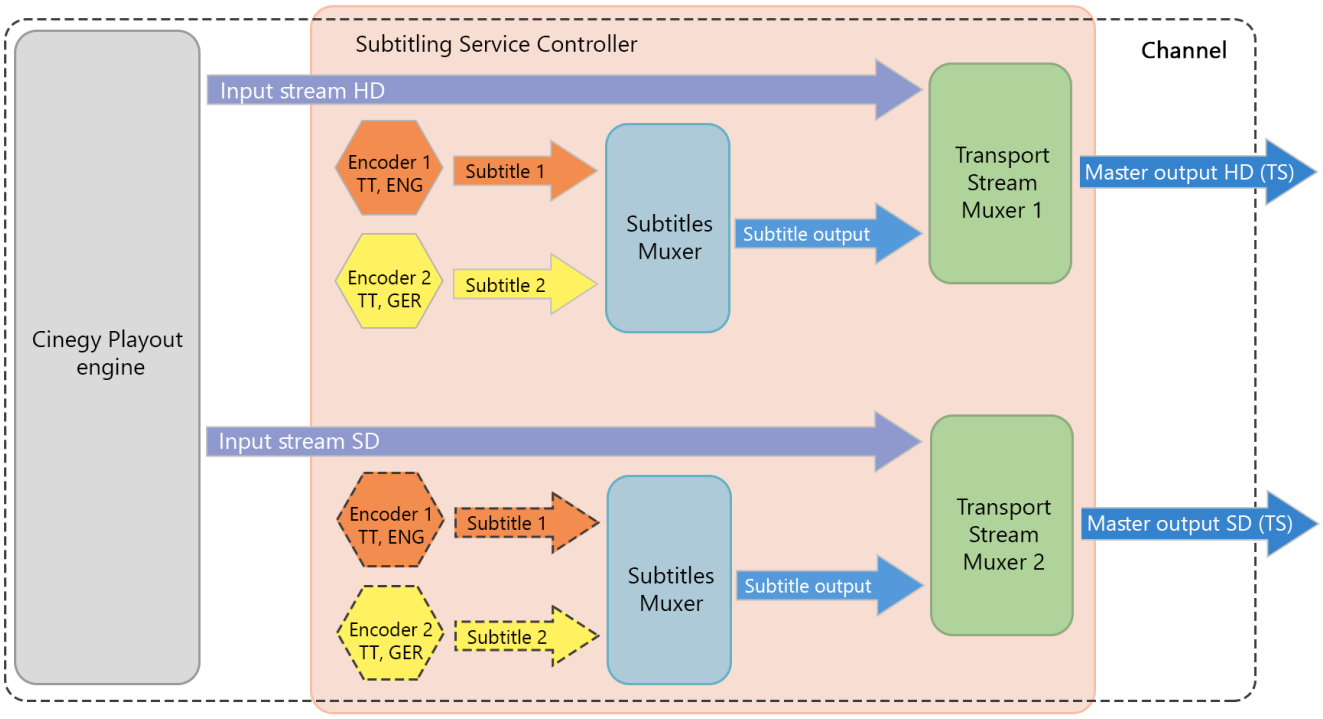
Cinegy Subtitling Service

The following licenses are required for this scenario: Subtitle Service Controller, two Subtitle Encoders, and Subtitle TS

Muxer.

8.3 One Channel: Two Subtitle Streams, Two Subtitle Encoders, Two TS Muxers

The Cinegy Playout engine can generate two video streams of different qualities concurrently within one channel. The subtitle streams can be muxed into these streams in parallel. In this scenario, the licenses allocated for the subtitle encoders of the same type and language are utilized for both streams, eliminating the necessity to acquire additional subtitle encoding licenses.

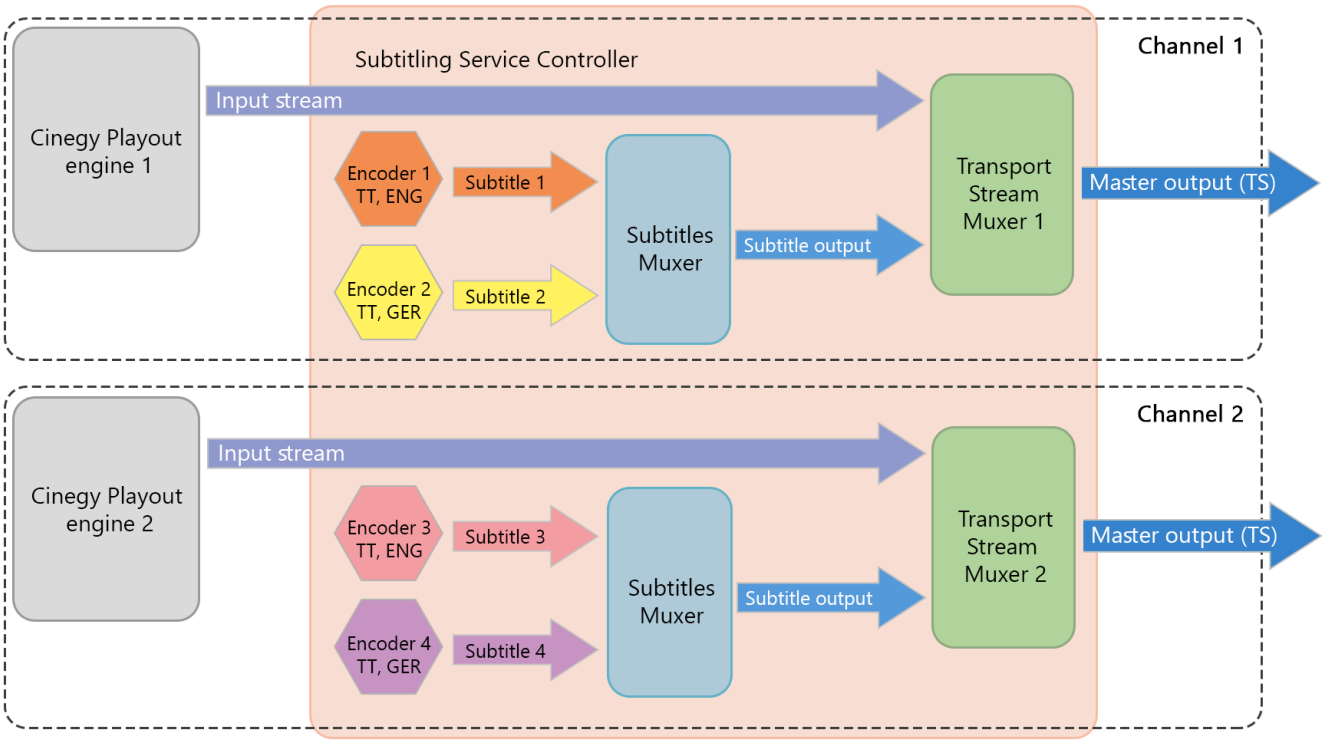


Cinegy Subtitling Service

The following licenses are required for this scenario: Subtitle Service Controller, two Subtitle Encoders, and two Subtitle TS Muxers.

8.4 Two Channels: Each One Has Two Subtitle Encoders, Two TS Muxers

To configure two separate channels with different subtitle streams, use this workflow. Only one instance of Cinegy Subtitling Service needs to be installed (only one Subtitle Service Controller license is required). Each channel will use its respective pair of encoder licenses.



Cinegy Subtitling Service

The following licenses are required for this scenario: Subtitle Service Controller, four Subtitle Encoders, and two Subtitle TS Muxers.

Subtitle Files

The following subtitle formats are supported with Cinegy Subtitling Service:

- **SRT (SubRip file format)** – it is a popular format used for creating subtitles for videos. It is a plain text file with the .srt extension that contains a sequential number of subtitles, start and end timestamps, and subtitle text, allowing subtitles to be displayed at specific times during playback.
- **EBU-STL (Subtitling Data Exchange Format)** – the STL format is a binary format developed by the European Broadcasting Union (EBU Tech 3264). It's widely used as an archiving and exchange format. The file has the .stl extension.

Chapter 9 SRT File Formatting

Each subtitle in the file is assigned a sequential index number, starting from 1.

Timing information: each subtitle consists of two timestamp lines. The first line indicates the start and end times of the subtitle, and the second line is usually left blank.

SRT files can be created and edited using any plain text editor. It's important to ensure the timing information is accurate, as it determines when the subtitles are displayed during video playback.

Here is an example of an SRT with six subtitles:

```
1
00:00:08,800 --> 00:00:12,500
Welcome to the sample video.

2
00:00:12,700 --> 00:00:17,700
<b>This is an example of a subtitle.</b>

3
00:00:12,700 --> 00:00:17,700
{\i1}In this example{\i0},

4
00:00:12,700 --> 00:00:17,700
<u>we will walk through the process</u>

5
00:00:12,700 --> 00:00:17,700
<font color="green">of creating subtitles for video</font>

6
00:00:12,700 --> 00:00:17,700
{\a5}using different text formatting.
```

The SRT format supports basic text formatting, which is derived from HTML:

Bold – `<b>text</b>` or `{\b1}text{\b0}`.

Italic – `<i>text</i>` or `{\i1}text{\i0}`.

Underline – `<u>text</u>` or `{\u1}text{\u0}`.



Currently, the text style formatting is only topical for the DVB encoder.

Font color – `<font color="color name">text</font>`. You can define either the ARGB code that corresponds to the basic color or the color name itself for some colors. Supported colors for Teletext and DVB encoders vary, with the following colors available:

Teletext basics colors	DVB basics colors	
FFFF0000 or red – Red	FFFF0000 or red – Red	FF7F0000 – Dark red
FF00FF00 or green – Green	FF00FF00 or green – Green	FF007F00 – Dark green
FFFFFF00 or yellow– Yellow	FFFFFF00 or yellow – Yellow	FF7F7F00 – Dark yellow
FF0000FF or blue – Blue	FF0000FF or blue– Blue	FF00007F – Dark blue
FFFF00FF or magenta– Magenta	FFFF00FF or magenta – Magenta	FF7F007F – Dark magenta
FF00FFFF or cyan– Cyan	FF00FFFF or cyan – Cyan	FF007F7F – Dark cyan
FFFFFFFF or white– White	FFFFFFFF or white – White	FF7F7F7F – Dark gray
	FF000000 or black – Black	

Font formatting specified in the subtitle file takes precedence over the text settings in the subtitle encoder. Therefore, if the subtitle file includes font color formatting, the text color settings in the encoder will be ignored.

Line position – {\an1}...{\an9} or {\a1}...{\a3}, {\a5}...{\a7} and {\a9}...{\a11}, which performs the following line alignment:

{\an7} or {\a5} *Top left*	{\an8} or {\a6} *Top center*	{\an9} or {\a7} *Top right*
{\an4} or {\a9} *Middle left*	{\an5} or {\a10} *Middle center*	{\an6} or {\a11} *Middle right*
{\an1} or {\a1} *Bottom left*	{\an2} or {\a2} *Bottom center*	{\an3} or {\a3} *Bottom right*

You can use any combination of text formatting by placing formatting tags one after the other. For example, to bold text and make it green, use the following formatting:

```
1
00:00:01,100 --> 00:00:10,100
{\i1}<b><font color="green">Bold green text is here</font></b>{\i0}
```

To use triangle brackets in subtitle text, use the \ character before < in the text line to avoid being read by the service as a tag:

```
1
00:00:01,100 --> 00:00:10,100
Some text \<more text in triangle brackets>
```

By default, subtitle text is displayed in white on a black background.