

Application Note



Broadcast of multi-format subtitles with Swift TX from Softel

Synopsis

This application note describes how broadcasters can transmit multi-format subtitles using Softel's Swift TX subtitle & caption transmission solution.

It explores various delivery methods and explains how Swift TX can be configured in relation to timecode and automation.

Introduction

Subtitling and captioning are becoming an integral part of modern broadcasting and content delivery, as statutory requirements, viewer expectation and a desire to reuse content across regions increase throughout the world.

Meanwhile, broadcasters and network operators are increasingly handling multi-channel digital operations, requiring multi-format support. To deliver the high quality expected by their viewers and reduce their cost of operation, they need reliable subtitling/captioning solutions that combine automation with 'at a glance' management control.

As subtitle workflows are moving from tape based to file based environments, traditional methods for inserting, distributing and transmitting subtitles and captions are becoming obsolete, needing to be replaced by efficient automated solutions that enable high quality of service.

The Solution

Swift TX from Softel provides a flexible architecture for "Time of Air" subtitle transmission, encompassing all common subtitling formats – VBI Teletext, Line 21 Closed Captions, Open CG and DVB Bitmaps.

It is capable of delivering simultaneous subtitling for Open and Closed formats and supports multiple languages where required.

Challenge

- Broadcast of subtitles across digital networks, including real-time transcoding.

Solution

- Softel Swift TX 'time-of-air' subtitle playback.

Benefits

- Efficient, reliable, scalable subtitle transmission, with facilities for late or live subtitles and tight integration with automation control.

Subtitle timecode and 'timecodeless' playout

Various types of timecode input are possible with Swift TX, depending on configuration, including LTC, VITC, DVITC and HDVITC. Additionally 'timecodeless' playout, now employed by some broadcasters using file based content, is possible depending on the automation system involved.

Typically timecodeless playout of subtitles will be triggered by the automation system, using frame references and an artificial start time code to synchronize subtitles with video.

Subtitle workflow

Subtitle transmission most often relies on content being created in advance of transmission. However there can be circumstances where this is not feasible, for example, there may be subtitle files that are received late from preparation or there may be a live or 'near live' event, such as sports or news.

Swift TX supports standard file based playout, as well as externally fed "live" insertion. The file based playout could be either from subtitles encoded in a video server asset or a file 'dropped' onto the Swift TX box and associated with the content being aired, so that it is triggered for playout at time of air.

Live subtitles can be input directly from Swift Create, Softel's leading subtitle creation and repurposing solution, enabling live or near live events to be subtitled.

To enable any subtitle format to be broadcast, Swift TX supports 'on the fly' transcoding of subtitles from one format to another, for example accepting subtitles in Teletext and transcoding to DVB. DVB bitmap subtitles are generated and inserted into the DVB multiplexer using Program Clock Reference (PCR) to correctly timestamp the subtitle packets, ensuring correct delivery and presentation on output. VBI can also be output directly into the multiplexer. Teletext subtitles are output from the Swift TX transmission engine across Serial or Network interfaces, into an ancillary data inserter, such as the Softel vFlex, or a Softel Cyclone TX unit.

Automation integration

Swift TX is equally suited to standalone manual operation or controlled externally from virtually any automation system using a serial, network or GPI interface or Softel's own "XAP" network control protocol. XAP is now widely implemented in many leading automation systems.

The automation system provides Swift TX with a schedule of events that have subtitles associated with them. Swift TX will then automatically search a pre-defined file store for the relevant subtitle file based on material ID. Once located the files are copied to the local Swift TX system for playout under automation and timecode control, or if supported by the automation system, using timecodeless playout.

High availability

To enable high availability for subtitle transmission, Swift TX can be configured with redundant paths. Typically this will be an 'N+1' configuration for the main Swift TX playout devices. The timecode for each channel is passed to the individual units and duplicated on a standard SDI router for the spare unit.

Automation control is passed to master and standby servers for network connection to the Swift TX units.

In the event of a failure the N+1 unit will assume the role of the failed unit, connect to the automation port on the server, routing the appropriate timecode feed to allow subtitle playout to resume on the spare channel.

The spare unit can also be connected to a terminal server RS232 output port to service the Teletext subtitle playout.

This automatic switching may be replaced by manual 'patching' of the timecode feed should the broadcaster wish to adopt this type of failover.

Additionally Swift TX is available as a multi-channel, single unit solution, ideal where space or budgets are limited, or as a single channel per unit for ultimate reliability and flexibility.

Swift TX Event List with timecode

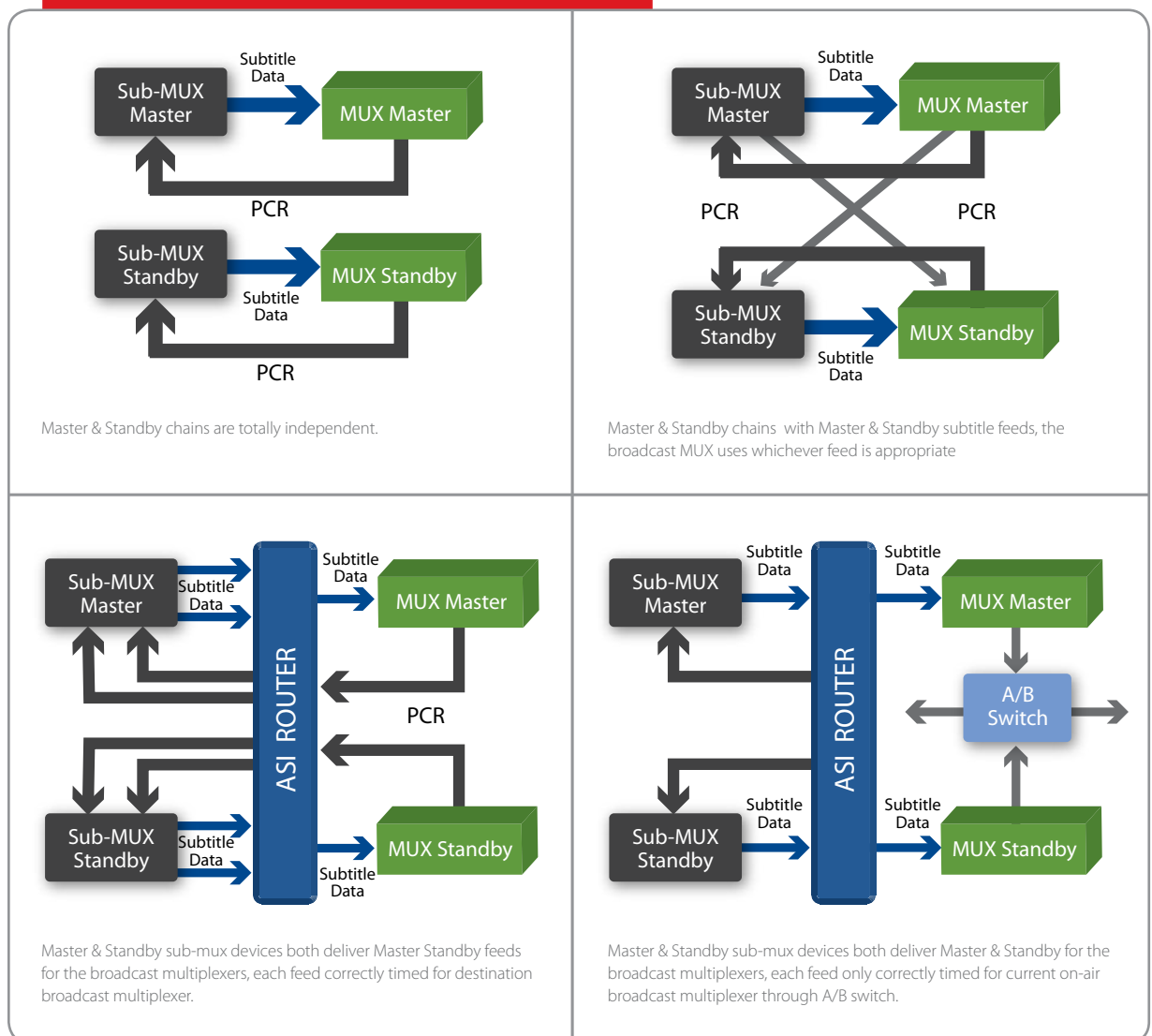


Flexible configuration

Swift TX can be configured for many different output formats and DVB outputs, providing support for all major multiplexer manufacturers and configurations.

Some multiplexers support individual master and standby ports, while others require external switching and control. Swift TX also supports Gigabit Ethernet (GiGE) output for feeding IP based multiplexer networks using a range of output configurations and options. The diagrams below provide examples of Swift TX Master/Standby configurations with ASI output.

Different configurations of Swift TX



The Swift monitoring system provides web based subtitle output and system monitoring functions with GPI and SNMP output to third party monitoring or tally systems.

Pre-encoding subtitles into video server assets

To enable an easier method of transporting subtitles without burning them in to the video asset, Softel can combine their Swift vTX insertion product with the Swift TX playout product. Swift vTX is a software based solution for the encoding and transcoding of subtitles into video assets, either under manual control or via automation.

The solution uses a proprietary method to encode subtitles into ancillary data associated with a video server asset, such as separate VBI tracks or MXF files, then transcoding at time-of-air into Open or DVB format using Swift TX.

To achieve this, Swift vTX encodes the subtitles into the VBI or ANC data of the video asset, smart file handling means that the encoding can be handled across multiple formats. The result is that the subtitles are effectively hidden, with the subtitles stored in ancillary packet data and decoding occurring at the transmission stage. The encapsulated subtitle content is then sent, along with the video and audio tracks, to the Swift TX subtitle transmission unit at time-of-air.

As well as modifying the VBI data file, the wrapper descriptor will also be updated. Swift vTX can encode the data into the asset under manual control. Automation control integrated with broadcast schedules can also be used to encode subtitles in advance of transmission.

Subtitle transmission delay on re-encoded transport streams

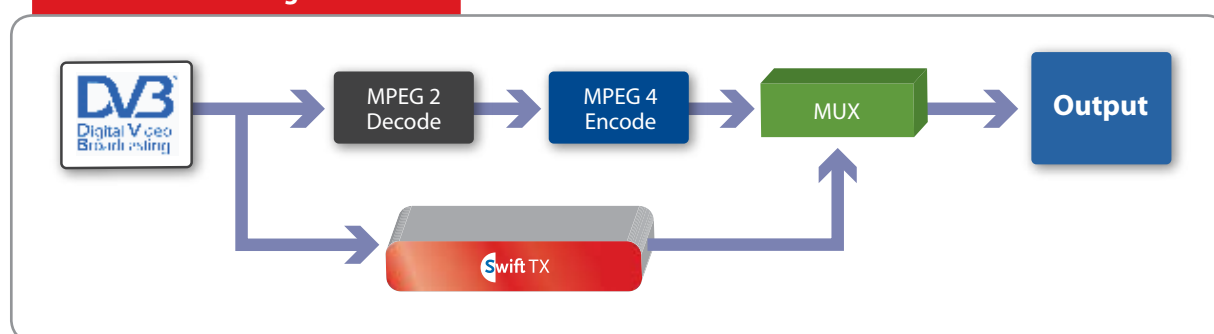
Broadcasters and network operators often transmit content received on another transport stream that needs to be repurposed, for example taking an MPEG-2 stream from a satellite feed and re-encoding in MPEG-4 for local distribution on digital terrestrial (DTT). This process is known as a 'turnaround' service.

The challenge is to preserve the subtitle content present in the incoming stream and ensure that retransmission is correctly timed with the video. This timing needs to take account of the delay introduced in the re-encoding process which, although relatively short, is enough to cause subtitles to become misaligned.

To overcome this issue, Swift TX can be used to take the incoming ASI or Gigabit Ethernet (GiGE) transport stream containing the subtitle content, for example DVB bitmaps. The unit will then store the packets for a configurable delay, typically one to one and a half seconds, relaying them to the DTT multiplexer for retransmission.

Swift TX uses Presentation Time Stamp (PTS) values that correspond to Program Clock Reference (PCR) feedback signals from the video. The PTS is used to correctly time the output of the delayed subtitle packets. The output of the subtitle content can also be across ASI and/or GiGE.

Overview of retiming solution



About Softel

Backed by three decades of broadcast experience, Softel is a global leader in key TV & video technologies including Interactive TV, MPEG stream processing & multiplexing, Captioning, Opt cuing, Teletext and Subtitling; delivered through a full range of products, professional services and bespoke development.