

SAPPHIRE BROADCAST SERVER



▶ MPEG BROADCAST SERVER

Sapphire, a Unique “Channel-in-a-Box” Broadcast Server

Sapphire is a unique “channel-in-a-box” product featuring advanced ingest, playout and downstream insertion/regionalization capabilities. Based around a complete broadcast server and housed in a single cost-effective unit, the Sapphire provides all the functions necessary to acquire, process, brand and generate

TV channels ready to go on-air or to be sent to the Thomson ViBE compression system.

Thanks to its sophisticated functionalities, the Sapphire broadcast server has become for many broadcasters, a complete broadcast station — able to handle all

operational needs. Others choose to use it as a reliable transport stream recorder, ingest station or time shifter, making the most of its program routing, clip editing and playback functions. Compliant with many of the major automation and traffic systems on the market today, the Sapphire integrates perfectly into a studio workflow.

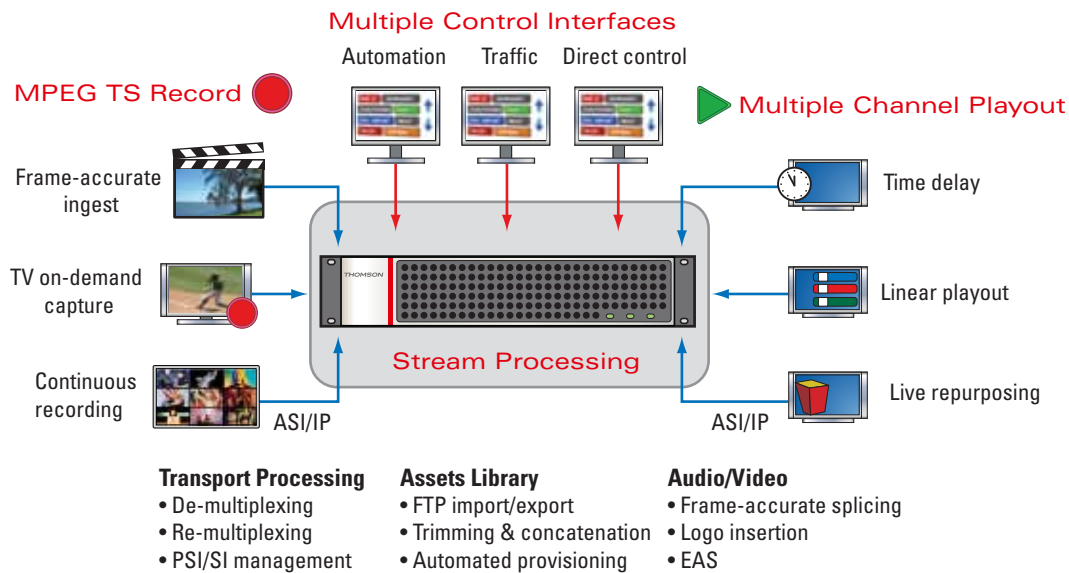


Figure 1 – Sapphire Overview of Functionalities

▶ KEY FEATURES

- Support for SD and HD content with MPEG-2 or H.264 video
- High-performance ASI and Gigabit Ethernet MPEG interfaces
- Scalable and highly reliable storage system
- Advanced transport stream or program captures capabilities
- Unique frame-accurate and seamless audio/video splicing
- Superior remultiplexing capabilities
- Integrated automation (playlist and record-list management)
- Advanced asset management (clip import, export, editing, trimming, and concatenation)
- Multiple control Interfaces (BVW-75, VDCCP, BXF, ...)
- Graphic overlays capabilities

The Sapphire offers multiple capabilities for the editing of and adding to playlists.

- The Sapphire is Video Disk Control Protocol (VDCP) compliant and in terms of playlist cueing, execution and reporting, it can be fully controlled by an automation or traffic system.
- The Sapphire can receive playlist schedule files generated by a traffic system (multiple file formats are supported, such as Paradigm or BXF) and automatically add them to the channel playlist. The Sapphire also generates As-run log files, which report the playout status of each clip or live stream.
- Finally, if no automation or traffic systems are available, the user-friendly Sapphire graphical interface allows stand-alone channel playlist editing.

Video Clip Library Management

The Sapphire broadcast server maintains a complete library of pre-recorded clips and provides multiple capabilities for importing, browsing, editing or modifying clips. The clip editing tool allows the visualization of each asset in the library, setting in and out points on any frames, and performing clip trimming or extraction.

Thanks to its powerful splicer, the Sapphire also boasts the ability to link together several clips into one single file, with seamless and frame-accurate transition.



Figure 3 – MPEG clip editing.

The Sapphire comes with a customized FTP server, which automatically performs clip provisioning when new material is being transferred to the server. The new clip is immediately available for playback, even while the FTP transfer is in progress, thus ensuring the user time savings and efficiency.

TV on Demand Captures

The Sapphire is able to simultaneously and independently record multiple incoming live programs or transport streams. This results in single- or multi-program transport stream files, which are automatically added to the media library, and are therefore immediately available for editing, playback or FTP

transfer (even if the capture is still in progress).

In terms of control, the Sapphire broadcast server can manage a record list for each stream to capture, and therefore to define a series of events to record. It is possible for the user to start and stop each event by means of a scheduler, GPI input and/or SCTE-35 triggers.

Similar to playlists, with the Sapphire, one can fully control record lists by means of an automation system via VDCP, or can automatically add to the record lists by using a schedule created by a traffic system. If none is available, the Sapphire's flexible user interface allows an operator to completely control the editing and updating of the record lists.

Frame-Accurate Clip Ingest

Combined with a Thomson ViBE encoder, the Sapphire broadcast server provides all the necessary tools to ingest, edit and check assets, thus creating high quality, low bandwidth MPEG-2 or H.264 files. The Sapphire controls the video source and the ViBE encoder (using time-codes) and thus the resulting clips feature closed GOP, meaning improved handling. Each asset can be enriched by means of user-defined metadata and transferred automatically to a separate playout or VOD server.

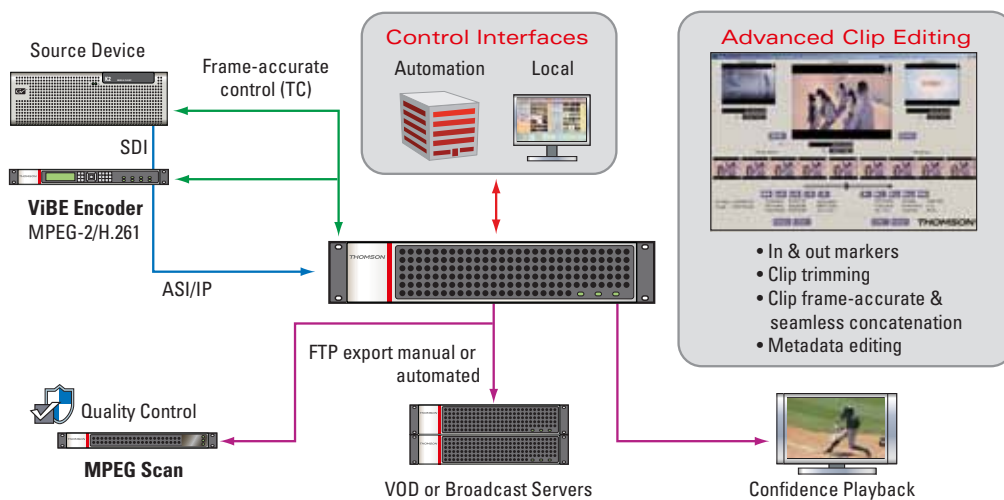


Figure 4 – Frame-accurate ingest.

Time Delay

By combining its record and playout capabilities, the Sapphire broadcast server offers a reliable time shifting function. At the input, the video server continuously records the incoming program(s) to delay, into a loop file.

At the output these loop files are played back with constant and accurate time delays (from 10 seconds to 24 hours).

The Sapphire broadcast server automatically manages standard errors, such as loss of input signal or server down time. The Sapphire

is also able to detect any incoming signal outage, which could result in a temporary interruption. Should such a situation occur, a trigger system would automatically replace the 'lost' content within the playlist with a substitution clip, another delayed channel or a live program.

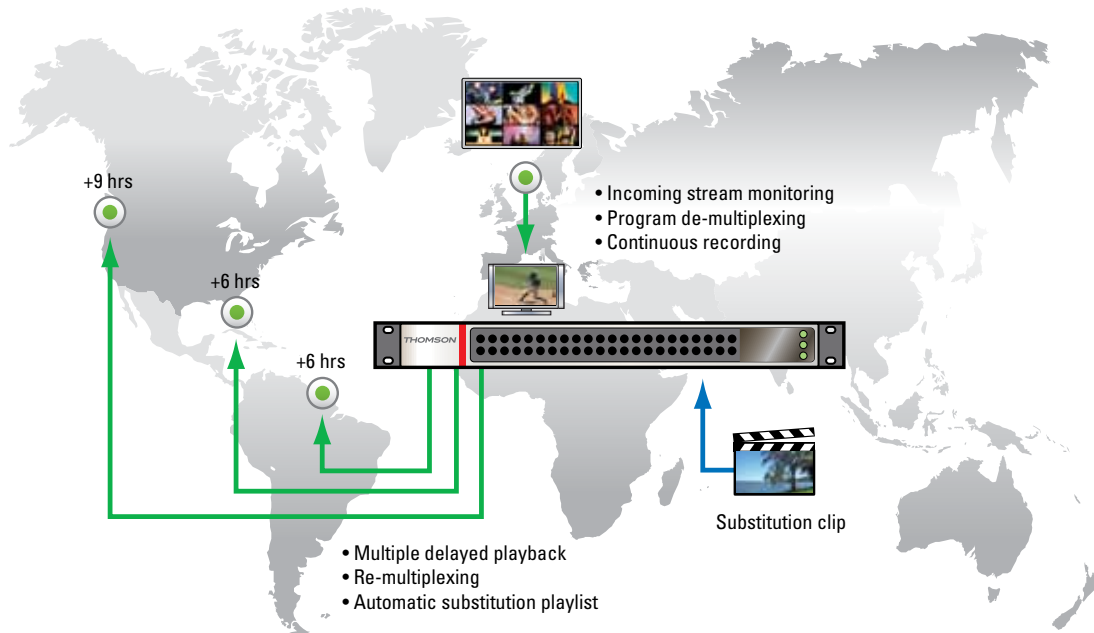


Figure 5 – Time delay application.

▶ **Sapphire, a Broadcast Station in a Box**

In addition to its extensive video server features, the flexible Sapphire can also serve as a master control switcher, a logo inserter and a character generator. It therefore offers a unique "channel-in-a-box" solution, replacing in some cases the majority of equipment a broadcast facility requires. This also includes master control functions for source routing, branding and any ad or program insertion.

Live Source Routing

The Sapphire can route any incoming program to any transport stream output and can even duplicate a single incoming program to multiple outputs. Using the Sapphire playlist, it

is possible to switch any output service between incoming programs, or pre-recorded clips, or delayed programs. All transitions are seamless and frame-accurate in MPEG-2 and H.264 (SD and HD) providing the same high quality as a traditional system.

Graphics Insertion

The Sapphire can dynamically insert graphics into any of the programs being played out. This process takes place directly in the compressed video, avoiding a costly decoding/recoding process and thus preserving the initial video quality.

Moreover, The Sapphire can insert static bitmaps, with user-defined position, size and transparency. The Sapphire

is also able to dynamically insert text crawls — background and foreground colors, transparency, position, character font and text messages are fully customizable.

This feature allows Sapphire to fully support Emergency Alert Systems (EAS). The video server is connected to an EAS encoder/decoder and when an alert is raised, the Sapphire converts the alert message into a text crawl. The Sapphire receives the EAS audio from one input, and immediately switches the program audio components to EAS audio while the text crawl is inserted in the video.

▶ Additional Sapphire Applications

Thanks to its advanced ingest, playout and insertion capabilities, the Sapphire is suitable for a number of applications. These include linear playout, ad-insertion, disaster recovery, media archival, store/ forward, and secure time-delay.

Ad Insertion

The ad insertion application of the Sapphire, when managed by a traffic control system, consists of seamlessly replacing the advertisement of one or several incoming MPEG programs with local ads.

The Sapphire receives the primary live program to process over an ASI or IP input and de-multiplexes it if it is part of an MPTS. This live feed is then used as the default content of a local program, generated by the server over one of its

ASI or IP outputs. The local program is managed through the use of a playlist designed to define the sequence of local ads, which replaces the specific events of the primary default program.

The traffic system periodically transmits a schedule file, which will automatically add items to the playlist. When the Sapphire receives a new schedule, defining the ads to play out over a certain period of time, it automatically updates its local channel playlist. Commonly, each ad block features a valid time-window and is activated using either a GPI input or an in-band SCTE-35 trigger. All clips of an ad block are linked and played back to back with seamless transition.

If by chance a commercial clip is scheduled in a playlist but is missing from the broadcast server, the Sapphire

automatically creates a place holder in its media asset library and reports it as missing. The Sapphire is also able to prompt actions when detecting such missing clips. It can either submit an ingest job request to the Sapphire ingest server, or start an FTP transfer from an archive to a transcoder device or directly to the Sapphire playout server if the clip is already in the appropriate "broadcast ready" format.

Each time the next ad block is activated, the Sapphire splices from the primary default program to the first segment of the block, in a seamless and frame-accurate way. The Sapphire then plays all the clips of the block back to back and thereafter switches back to the primary default program. Furthermore, it simultaneously reports the playout status of each clip in an As-run log file.

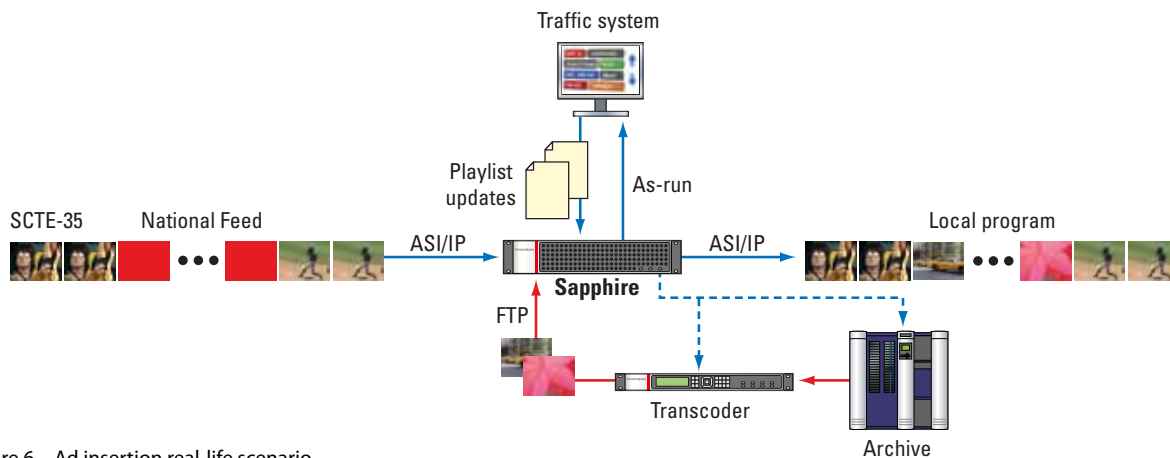


Figure 6 – Ad insertion real-life scenario.

Disaster Recovery

The Sapphire includes all of the most common functions necessary for a broadcast playout environment. When used together with an automation system, the Sapphire can for example backup a complete broadcast chain for multiple MPEG-2 or H.264 channels.

In this case, the Sapphire playout server receives a live feed over ASI or IP. As for the clips, it can be connected to a mass storage, a transcoder device or an ingest station consisting of an SDI server, a Thomson ViBE encoder and a Sapphire ingest server. The

ingest station can also be controlled by the automation, so that the clips are referred only once in the main and backup systems.

Broadcast-ready clips suitable for the Sapphire playout are created either through a transcoding platform or via an ingest station. A typical ingest station comprises an SDI server, an MPEG encoder and a Sapphire ingest server.

In order for each channel to operate at the output, the automation system sends a real-time cue, play/ stop commands, as it does toward the SDI

servers for the main broadcast chain (in this context, the Sapphire device is considered a backup server). It is also possible to utilize a live feed as the channel default content (it is played back whenever no clip is on-air).

The Sapphire can be used simultaneously for inserting logos (such as for channel branding). It is also possible to connect the video server to an EAS in order to broadcast alert messages in the form of text crawls and audio announcements over video program.

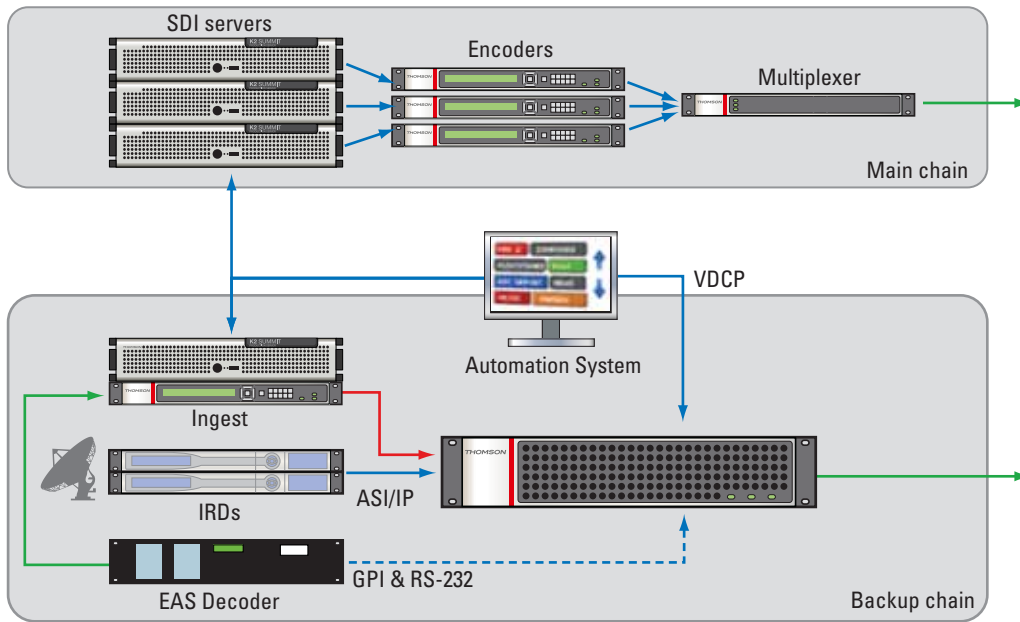


Figure 7 – Backup recovery Application

Redundant Time Delay

This application consists of delaying one or multiple incoming live programs, without causing output service interruption and ensuring continuous operation. The Sapphire is ideal for such an application using a time-shift mechanism combined with its playlist feature.

When the Sapphire receives the same feed from two different sources and

continuously captures these two streams as loop recording files, one capture is used for the playout with a user-defined delay, as the default content of a playlist based channel.

The playlist attached to the delayed channel contains two segments. The first one refers to the second program capture: if the first record contains a discontinuity (because the signal has been temporarily lost on input 1),

the video server then automatically switches to the second capture and thus guarantees the delay-line continuity. The second playlist segment can be a pre-recorded clip, which is played out in a loop if the signal outage occurs on both inputs, or if the video server is restarted.

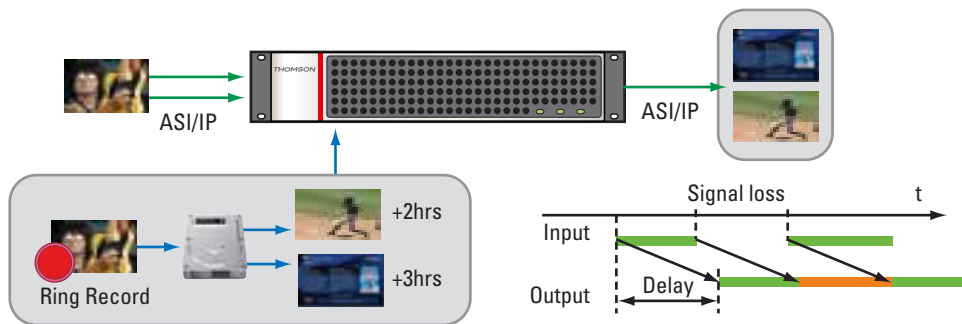


Figure 8 – Redundant time delay.

▶ SPECIFICATIONS

ASI Interfaces

- Up to 4 I/O pairs
- Connector: BNC F, 75Ω
- Up to 84 Mbps per connector
- Data format: burst, packet
- Packet length: 188, 204

Gig-E Interfaces

- Dual port NIC adapter
- Dual port MPEG adapter
- Up to 300 Mbps in
- Up to 300 Mbps out
- Unicast and multicast
- Data format: UDP, RTP

Stream Processing

- Multiple stream recording
- Multiple channel playout
- MPEG stream monitoring and visualization
- Multiplexing, de-multiplexing
- Continuous or event-based capture
- Frame-accurate splicing
- Logo insertion
- PSI/SI/PSIP management
- PID remapping
- Playlist & clip management

Supported Formats

- ISO, DVB, ATSC signaling
- MPEG-2 and MPEG-4 video (4:2:0, 4:2:2, frame, field)
- MPEG-1, AAC, AC3 audio

Management

- Client/server GUI
- FTP import, export
- Automatic clip provisioning
- Automatic schedule import
- SNMP v2 agent
- VDCP interfaces
- GPI inputs

2-RU Server

- CPU: 2.66 GHz quad core
- RAM: 6 GB
- Internal storage: SAS, RAID-5 from 700 GB to 6 TB
- Possible external storage
- Redundant power supply
- From 1 to 4 ASI I/O
- Gig-E MPEG adapter

1-RU Server

- CPU: 2.66 GHz quad core
- RAM: 6 GB
- Internal storage: SAS, RAID-5 from 300 GB to 1.5 TB
- Possible external storage
- Redundant power supply
- ASI (2 I/O) or Gig-E adapter

▶ ORDERING INFORMATION

1 RU Server

Chassis

TNM-5102AC
Sapphire Server

MPEG Interfaces (Options)

TNM-511xCC
ASI I/O boards (x I/O)

TNM-5120CC
Gig-E MPEG adapter

Storage System

TNM-514XCC
Extensible RAID storage system
(from 600 GB to 1.3 TB)

2 RU Server

Chassis

TNM-5100AC
Sapphire Server

MPEG Interfaces (Options)

TNM-511xAC
ASI I/O boards (x I/O)

TNM-5120AC
Gig-E MPEG adapter

Storage System

TNM-514XAC
Extensible RAID storage system
(from 1.5 TB to 5.8 TB)

Channel Licenses

TNM-5150AA
Record (per stream to record)

TNM-5160AA
Playout channel

TNM-5161AA
Time delay (per stream to delay)

TNM-5162AA
SCTE30 ad insertion channel

TNM-5180AA
Logo insertion

TNM-5180AA
EAS support

E-mail: sales@thomson-networks.com

▶ PROFESSIONAL SERVICES

Our professional services offerings ensure optimal system performance and maximize uptime. These services include call centers staffed around the clock; system planning, design, and commissioning; professional training courses; and technical maintenance programs and service agreements.