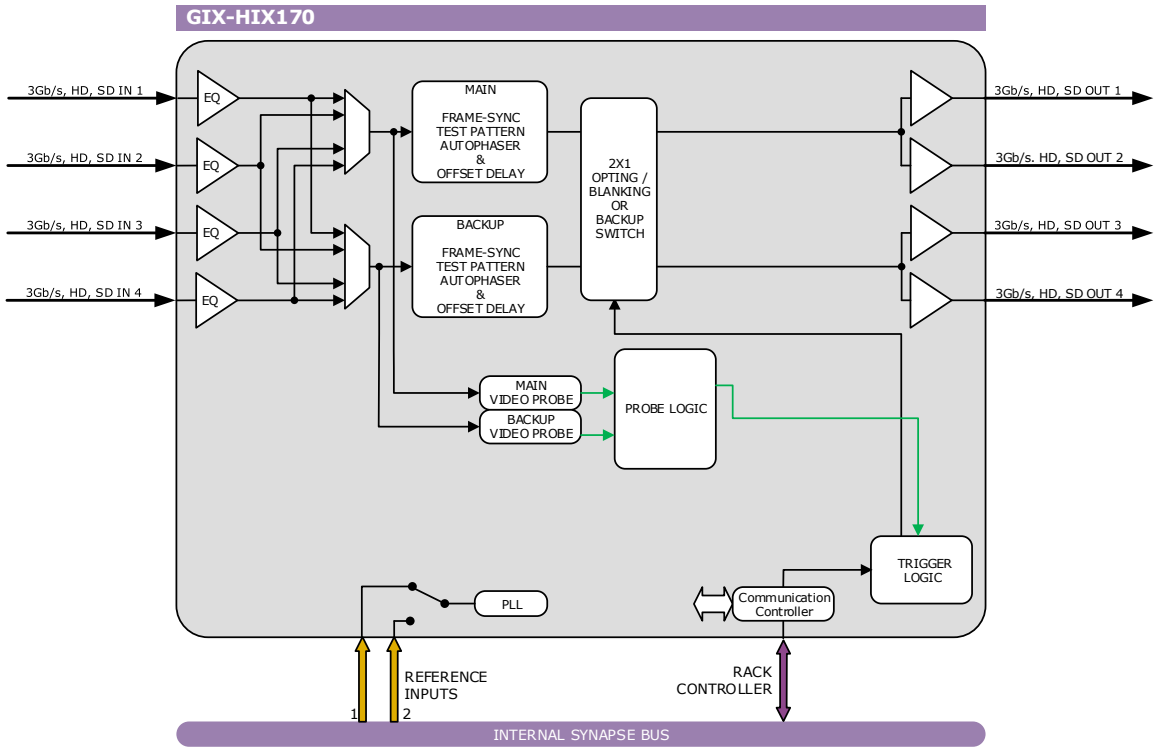
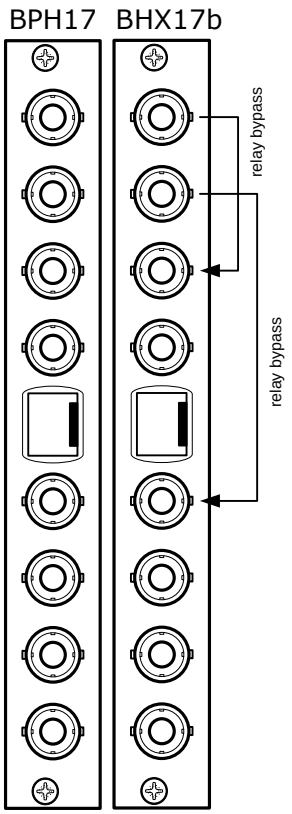
GIX/HIX170

Dual channel 3Gb/s, HD, SD integrity checking probe with SCTE104 (WHP296) compatibility

A Synapse® product

Block schematics & I/O panel





3Gb/s, HD, SD INPUT 1 (OPTIONAL FIBER IN)
3Gb/s, HD, SD INPUT 2 (OPTIONAL FIBER IN)
3Gb/s, HD, SD OUTPUT 1 (OPTIONAL FIBER OUT)
3Gb/s, HD, SD OUTPUT 2
RESERVED I/O
3Gb/s, HD, SD OUTPUT 3 (OPTIONAL FIBER OUT)
3Gb/s, HD, SD OUTPUT 4
3Gb/s, HD, SD INPUT 3
3Gb/s, HD, SD INPUT 4

Features

The GIX170 and HIX170 are dual channel high performance 3Gb/s, HD and SD SDI video and SCTE104 probes (signal integrity monitor) with opting, blanking or backup video switch-over function.

The switch function can be triggered by any of the integrity controls. Besides the extensive probe functions, the cards also provide full line and frame synchronization on both inputs.

An interesting feature is the ability to apply 4 individual sources and pre-route these signals to any of the main channels. This enables a backup functionality beyond two channels and can be used for adding a third or fourth backup channel.

The core capacity of the GIX/HIX170 is the ability to switch on SCTE104 (WHP296) triggers or the absence of them as outlined below. When not used as SCTE104 switch, the card reverts to a 2x1 backup function without SCTE probing.

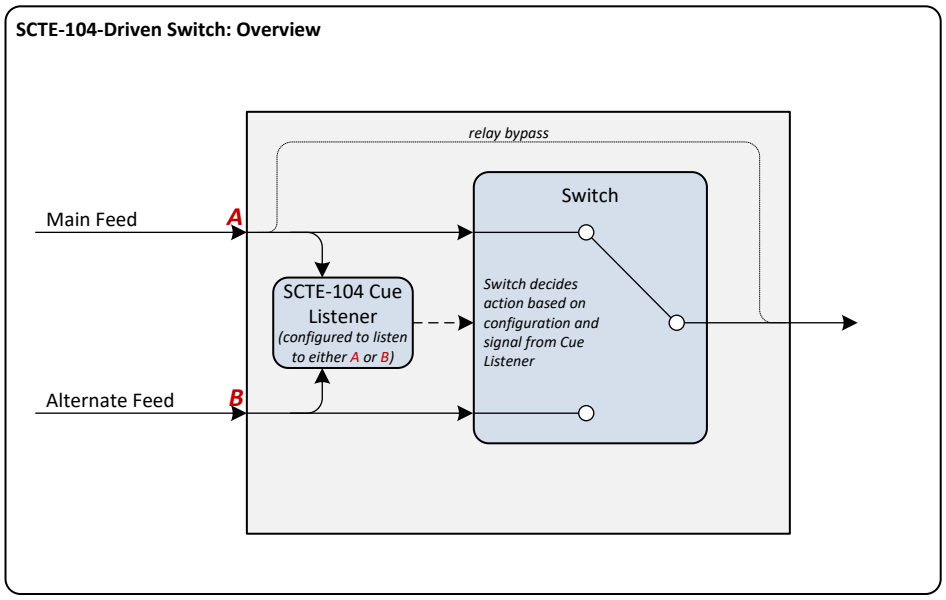
- 4 free selectable inputs per probe input
- Clean backup switching through built-in frame synchronizers
  - Input formats need to be equal
- Output configuration of 4 x main
- Probe functions:
  - SCTE104 triggers (see explanation below)
  - SDI carrier detect
  - TRS validation
  - ANC checksum validation
- An extensive probing matrix allows adjustment of individual classes of importance of the channels next to the main and backup channels.
- Test pattern generator as 5th source for emergency and test.
- Quad Speed Audio Add-On bus, monitoring only
- Locks to Bi-level, Tri-level or SDI input
- Full control and status monitoring through the front panel of the SFR04/SFR08/SFR18 frame and the Ethernet port (ACP)
- Optional 2 fiber inputs (replacing 2 SDI inputs) or 2 fiber outputs (replacing 2 SDI outputs) on I/O panel

SCTE104 functionality

Introduction

The GIX/HIX170 will monitor the SCTE-104 signalling of an input video feed and switch between video sources according to the card's internal configuration.

The diagram below shows the logical design of the card.



There are two use cases for this card:

- **Blanking** (switching away from) a video based on that video's SCTE-104 signalling
- **Opting** (switching towards) a video based on that video's SCTE-104 signalling

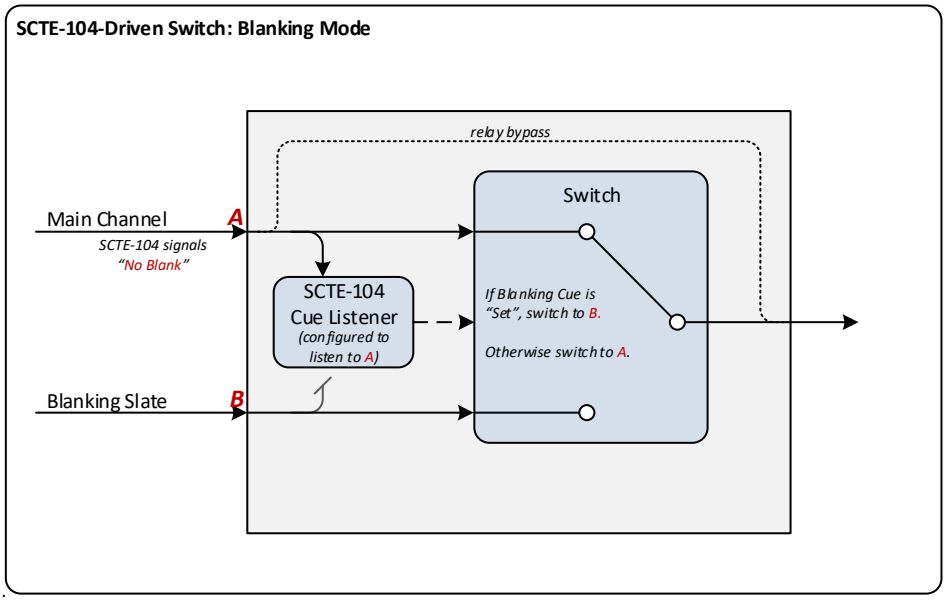
These two use cases will be explained in the following sections.
The design of the card is such that both these use cases (and many more) can be configured via Cortex into individual Presets.

Blanking

The intent of this use case is to temporarily replace a channel with an alternate video due to legal or rights limitations.

Inputs:

- **Input A** (relay protected): would carry the main programme, including a SCTE-104 blanking cue
- **Input B**: would contain an alternate video stream



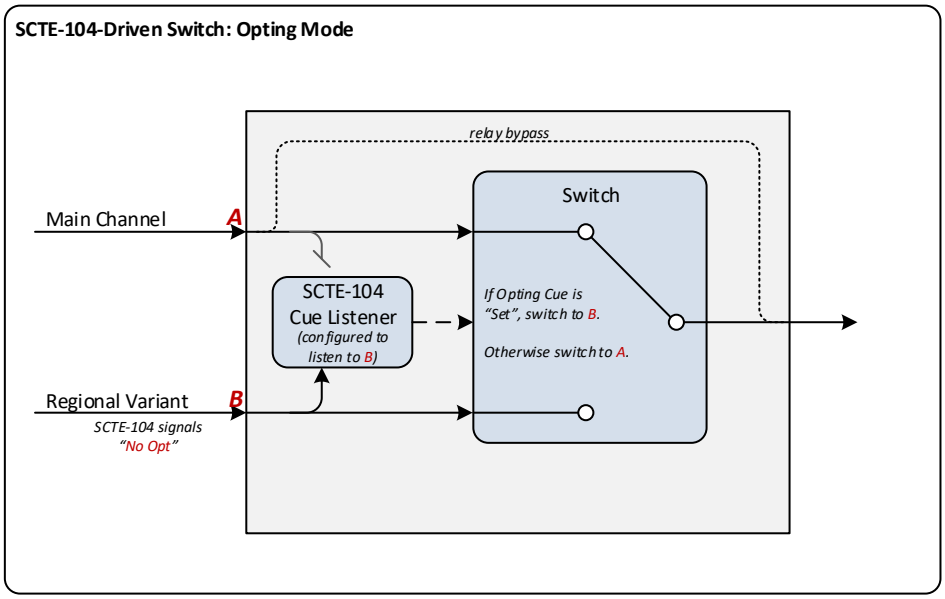
Basic Card Configuration:

Source of SCTE-104 Cue	Input A
Cue Type	Blanking Cue
Action on Cue being Set	Switch to Input B
Action on Cue being UnSet	Switch to Input A
Action on Cue being Missing	Switch to Input A
Action on Input B Video Missing and Cue is Set	Stop sending valid SDI as output
Action on Input A Video Missing (whilst it is going to air)	Stop sending valid SDI as output

Opt Switching

The intent of this use case is to allow regional content to be inserted ("Opted") into a channel.
Inputs:

- **Input A** (relay protected): would carry the main programme
- **Input B**: would contain regional content, including a SCTE-104 opting cue



Basic Card Configuration:

Source of SCTE-104 Cue	Input B
Cue Type	Opting Cue
Action on Cue being Set	Switch to Input B
Action on Cue being UnSet	Switch to Input A
Action on Cue being Missing	Switch to Input A
Action on Input B Video Missing	Switch to Input A
Action on Input A Video Missing (whilst it is going to air)	Stop sending valid SDI as output

Expected Input

The GIX/HIX170 has 4 physical inputs that can be routed to two probing engines, referred to as "Input A" and "Input B".
The card will work in either SD or HD mode. Both inputs will be the same format. If they are not, an alarm will be raised.
Either input (or both inputs) could include SCTE-104 signaling. The card will allow configuration to select which video feed should be monitored for SCTE-104 signaling. Any signaling on the non-monitored feed will be ignored.

SCTE-104 signaling

The trigger to monitor for switching video streams will be based on a configured selection of one of BBC R&D White Paper 296[1]. The cues will be from "psp_flags_prog" as shown below:

- Blanking Platform 1 (bit 4)
- Blanking Platform 2 (bit 5)
- Opt-Out (bit 11)
- Reserved (bit 14)
- Reserved (bit 15)

Expected Output

Output Video Signal

The card will output in the same format as received in the input video signal. At least 3 identical HD/SDI outputs are provided. The first output will be protected by relay bypass from Input A when using a BHX17.
The output video will be appropriate video feed as chosen via the SCTE signaling and card configuration.

Output during a switch

All switching will be clean, seamless with no switching artefacts.
Switching will be 'frame accurate' relative to the SCTE signaling.

[1] http://downloads.bbc.co.uk/rd/pubs/whp/whp-pdf-files/WHP296.pdf

Configuration

32 Presets will be available in Cortex
For each Preset, the following options will be configurable:

<table>
<tr><th>Configuration</th><th>Options available</th><th>Notes</th></tr>
<tr><td>Input containing SCTE-104 cue signal</td><td>• Off
• Input A
• Input B</td><td>Determines which input will be monitored for the SCTE-104 cue signals.

Any cues on the other input will be ignored.

If ‘Off’ state switch operates as a normal 2x1 switch.</td></tr>
<tr><td>Type of Cue to monitor</td><td>• Blanking Platform 1
• Blanking Platform 2
• Opt-Out
• Reserved 14
• Reserved 15</td><td>Determines the type of cue to listen out for. All other cues will be ignored.</td></tr>
<tr><td>Cue “unset” action</td><td rowspan="9">Uniquely configurable for each option:

• Switch to A
• Switch to B
• Stop outputting valid SDI
• Do nothing</td><td>Action to take when the cue is in “unset” mode.</td></tr>
<tr><td>Cue “set” action</td><td>Action to take when the cue is in “set” mode.</td></tr>
<tr><td>Cue missing</td><td>Action to take if the cue is missing.

Note that should this occur, and alarm should be raised.</td></tr>
<tr><td>Video input monitored for cue missing.
Cue “set”</td><td rowspan="3">Action to take if the input that is configured to contain the SCTE-104 cue is missing

Note that should this occur, and alarm should be raised.</td></tr>
<tr><td>Video input monitored for cue missing.
Last received cue “unset”</td></tr>
<tr><td>Video input monitored for cue missing.
Last received cue missing</td></tr>
<tr><td>SDI on input not monitored for cue is missing.
Last received cue “set”</td><td rowspan="3">Action to take if the input that is configured to not contain the SCTE-104 cue is missing.

Note that should this occur, and alarm should be raised.</td></tr>
<tr><td>SDI on input not monitored for cue is missing.
Cue “unset”</td></tr>
<tr><td>SDI on input not monitored for cue is missing
Cue missing</td></tr>
<tr><td>SDI on both inputs missing</td><td>N/A</td><td>Configuration and action follows the ‘Video input monitored for cue missing’ setting.

If the non-monitored input returns first (regardless of the order that the two feeds were lost) then the ‘SDI on input not monitored’ settings should then be observed.</td></tr>
</table>

Note: An event may take place that requests that the switch switches to the same source input as is currently selected. In this case, no action should be taken.

Monitoring and Control

Monitoring

- Status/Alarms
  - Current switch state (Input A or Input B)
  - Current switching state (manual or automatic)
  - Input video standard
  - Input video mismatch (between the two inputs)
  - Input A missing
  - Input B missing
  - Input cue missing
  - Current input being monitored for the cue
  - Current cue type being monitored
  - Current cue state

Control

Auto/Manual Switch

It shall be possible to take the card out of automatic switching mode and manually switch between Input A and Input B.

Card Bypass

It is be possible to put the card into bypass mode via Cortex.

Applications

- The GIX170 can be used as station output card, and ingest quality control card or a generic 2 x 1 switch.
- The integrity checking can also be performed for alarm monitoring purposes with the switch function disabled.
- Generic probing with automatic back-up switching
- Multi input backup capability allows for complex backup routing in multiplatform environments

Ordering information

Module:
- **GIX170:** Dual channel 3Gb/s, HD, SD basic integrity checking probe with switch-over function
- **HIX170:** Dual channel HD, SD basic integrity checking probe with switch-over function*

Standard I/O:
- **BPH17_GIXxxx:** I/O-panel for GIXxxx

Relay bypass I/O:
- **BHX17b_GIXxxx:** Relay backup I/O-panel for GIXxxx

Fiber outputs:
- **BPH17T_FC/PC_GIXxxx:** I/O panel for G-HIXxxx with one fiber transmitter on FC/PC
- **BPH17T2_FC/PC_GIXxxx:** I/O panel for G-HIXxxx with two fiber transmitters on FC/PC
- **BPH17T_SC_GIXxxx:** I/O panel for G-HIXxxx with one fiber transmitter on SC
- **BPH17T2_SC_GIXxxx:** I/O panel for G-HIXxxx with two fiber transmitters on SC

Fiber inputs:
- **BPH17R_FC/PC_GIXxxx:** I/O panel for G-HIXxxx with one fiber receiver on FC/PC
- **BPH17R2_FC/PC_GIXxxx:** I/O panel for G-HIXxxx with two fiber receivers on FC/PC
- **BPH17R_SC_GIXxxx:** I/O panel for G-HIXxxx with one fiber receiver on SC
- **BPH17R2_SC_GIXxxx:** I/O panel for G-HIXxxx with two fiber receivers on SC

Fiber inputs and outputs:
- **BPH17TR_FC/PC_GIXxxx:** I/O panel for G-HIXxxx with one fiber transmitter and one receiver on FC/PC
- **BPH17TR_SC_GIXxxx:** I/O panel for G-HIXxxx with one fiber transmitter and one receiver on SC

Specifications

Serial video input

Standard	3Gb/s, HD and SD SDI:, SMPTE424, SMPTE 292M, SMPTE 259M
Number of inputs	4
Connector	BNC
Equalization	Typical maximum equalized length of Belden 1694A cable: 90m at 2.97Gb/s, 120m at 1.485Gb/s, and 250m at 270Mb/s
Return loss	> 15dB up to 1.5GHz

Serial video output

Number of outputs	4
Connector	BNC
Signal level	800mV nominal
DC offset	0V ±0.5V
Rise/fall time	135ps nominal
Overshoot	< 10% of amplitude
Return loss	> 15dB up to 1.5GHz (typ.); > 10dB up to 3GHz (typ.)
Wideband jitter	< 0.2UI

Reference Input through RRC

Number of Inputs	2 on SFR18, 2 on SFR08 and 1 on SFR04
Tri-level	SMPTE274M, SMPTE296M 600 mVp-p nominal, 75 Ohms terminated through loop
Bi-level	PAL Black Burst ITU624-4/SMPTE318, Composite NTSC SMPTE 170M 1Vp-p nominal, 75 Ohms terminated through loop

Miscellaneous

Weight	Approx. 450g
Operating temperature	0 °C to +40 °C
Dimensions	137 x 296 x 20 mm (HxWxD)

Electrical

Voltage	+24V to +30V
Power	<17 Watts