STUDER
professional audio equipment

Route 6000

Audio Routing System – SW V2.1

Product Information

(September 2009, 2nd Edition)

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Printed in Switzerland
Order no. BD10.275220-1 (0909)

Subject to change

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1 GENERAL

1.1 Utilization for the Purpose Intended

The Route 6000 system is intended for professional use.
It is presumed that the unit is operated only by trained personnel. Servicing is reserved to skilled technicians.
The electrical connections may be connected only to the voltages and signals designated in this document.

1.2 First Steps

1.2.1 Unpacking and Inspection

Your new system is shipped in special packing which protects the units against mechanical shock during transit. Care should be exercised when unpacking so that the surfaces do not get damaged.
Check the condition of the equipment for signs of shipping damage. If there should be any complaints you should immediately notify the forwarding agent and your nearest Studer distributor.
Please retain the original packing material because it offers the best protection in case your equipment ever needs to be transported.

1.2.2 Installation

Primary Voltage: The power supply units are auto-ranging; they can be used for mains voltages in a range of 100 to 240 VAC, 50 to 60 Hz.

Power Connection: The attached female IEC 320/C13 mains cable sockets have to be connected to appropriate mains cables by a trained technician, respecting your local regulations. Refer to the "Installation, Operation, and Waste Disposal" chapter at the beginning of this document.

Earthing: *This equipment must be earthed, due to the mains input filter network being connected to the mains earth.*
Some consideration must be given to the earthing arrangement of the system, at the center of which is the frame. The frame is earthed to the mains earth via the power supply. Ground loops may occur where signal processing equipment, patched to the frame, has its signal earth commoned to the equipment chassis.

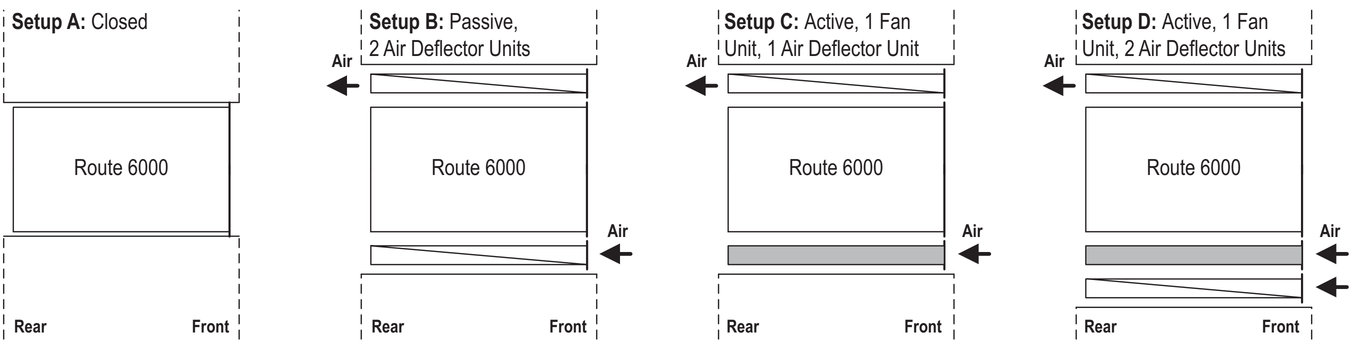
Thermal Considerations: The unit must not be used in conditions of excessive heat or cold, near any source of moisture, in excessively humid environments, or in positions where it is likely to be subjected to vibration or dust. The ambient temperature range for normal operation of the unit is +5...+40° C.
Under standard circumstances (open 19" frame) and an ambient temperature between +5 and +40° C, the power dissipations listed below must not be exceeded. Please note that these figures may change for special environments, such as air-conditioned machine rooms, etc.

Principal Rule *The cooler the better* – a temperature increase of only 10° C reduces component lifetime by 50%!

Ventilation Implementation

A power dissipation estimation, considering the number of cards and their configuration within the frame, is strongly recommended. The following tables give some guidelines.

Card No.	Card Name/Description	Power Dissipation (approx.)
	Backplane with power supply	10 W
DSP cards:		
A943.0326xx	Host card	10 W
A943.0331xx	Ext. Sync card	0.2 W
A943.0360xx	DSP Pro card	11 W
A943.0370xx	Bridge card	11 W
D21m I/O cards*:		
A949.0427xx	Mic/Line in card	11 W
A949.0428xx	Analog insert card	2 W
A949.0421xx	Line In card	7 W
A949.0420xx	Line out card	7 W
A949.0422xx	AES/EBU card	3.5 W
A949.0423xx	AES/EBU card with input SFC	4.5 W
A949.0424xx	AES/EBU card with input/output SFC	5.5 W
A949.0430xx	MADI card	4.5 W
A949.0425xx	ADAT card	1.7 W
A949.0429xx	ADAT card, long-distance option	1.7 W
A949.0426xx	TDIF card	1 W
A949.0412xx	HD card	5 W
A949.0411xx	MADI HD card	5.5 W
A949.0437xx	Serial card	0.2 W
A949.0438xx	Serial Merger card	0.6 W
A949.0435xx	GPIO card	3 W
** For more information on the D21m I/O cards, please refer to the separate D21m Product Information brochure.*		



Thermal Setup	Total Height	Max. Dissipation	Restrictions	Bottom Cooling	Top Cooling
A	6 U	50 W	-	-	-
B	8 U	100 W	-	Deflector Unit	Deflector Unit
C	8 U	150 W	Config. N1...N4 (see below)	Fan Unit	Deflector Unit
D	9 U	400 W	-	Deflector Unit + Fan Unit	Deflector Unit

If required, the air flow direction may be changed by reversing the deflector and fan units. However, air intake at the front and air outlet at the rear is the recommended scheme.

DSP/Bridge Card Configurations

Nine standard configurations are possible. It is *mandatory* to use the slot order given in the table below for optimum thermal results. The Bridge card *must* be located in slot 10. (For slot numbering refer to chapter 4.1.1.1).

Config	Slot									
	1	2	3	4	5	6	7	8	9	10
N1	DSP									Bridge
N2	DSP		DSP							Bridge
N3	DSP		DSP		DSP					Bridge
N4	DSP		DSP		DSP		DSP			Bridge
N5	DSP	DSP	DSP	DSP	DSP					Bridge
N6	DSP	DSP	DSP	DSP	DSP	DSP				Bridge
N7	DSP	DSP	DSP	DSP	DSP	DSP	DSP			Bridge
N8	DSP	DSP	DSP	DSP	DSP	DSP	DSP	DSP		Bridge
N9	DSP	DSP	DSP	DSP	DSP	DSP	DSP	DSP	DSP	Bridge

1.2.3 Adjustments, Repair, Cleaning

Danger:

All internal adjustments as well as repair work on this product must be performed by expert technicians!

Replacing the Supply Unit:

The primary fuse is located within the power supply module and cannot be replaced. In case of failure, the complete power supply unit must be replaced. Please ask your nearest Studer representative.

Cleaning:

Do not use any liquids to clean the exterior of the unit. A soft, dry cloth or brush will usually do.

2 INTRODUCTION

Route 6000 is a DNET-based audio routing and processing system that is seamlessly integrated with the Studer OnAir 2500, OnAir 3000 and Vista consoles. Since the star network is the most common computer network topology, we draw the same advantages for our network of routing and mixing systems. Route 6000 operates as a central hub in a network of mixing consoles.

Route 6000 may be controlled in different ways. For simple switching commands there is a specific controller software called *Route 1000*. Predefined snapshots with inserted, assignable processes may even be recalled directly on an OnAir desk surface as well as on hardware panels. Alternatively, a comprehensive scheduler organizes television or radio programs in a daily, weekly, or season-long schedule.

Based on Studer's DNET framework, a system-wide I/O Sharing functionality (Studer RELINK, 'Resource Linking') provides complete routing and control flexibility across networked OnAir and Vista consoles. Different types of multichannel NetSources like inputs, summing buses or direct channel outputs are available via the Route 6000 network hub. Multiple Vista or OnAir consoles can take control of other inputs or outputs on other consoles remotely with routing being taken care of centrally. Furthermore, RELINK supports intelligent codec management, remote microphone parameter control, resource management, red-light, loudspeaker cut, fader start, seamless call management system integration, etc.

Configuration of a Route 6000 system can take place from any point within the network, using the same configuration tool as is used for the Studer OnAir consoles. One central Log Screen monitors all system information, warnings and errors from Route 6000 as well as from all OnAir consoles. Furthermore, Route 6000 reports SNMP data to an SNMP manager. For critical errors it will even send data without being asked using SNMP traps. The SNMP manager may visualize these, trigger an alarm and/or send an SMS to a specified phone number.

Route 6000 is based upon the high-efficiency SCore Live DSP core and the comprehensive D21m I/O system, which is running 24/7 in hundreds of Vista and OnAir 3000 installations worldwide.

3 ROUTE 6000 AT A GLANCE

- **Large matrix size:** Route 6000 accommodates up to 1728 mono-equivalent inputs and outputs each.
- **Internal DSP processes:** The high-performance DSP cards of the SCore Live provide numerous assignable processes.
- **Basic functions** such as fader and phase inversion are provided for every single output as well as for every assignable process.
- **Distributed, modular system.**
- **I/O:** The very cost-effective D21m I/O system supports lots of different I/O cards and provides maximum flexibility, while maintaining the well-known Studer sound quality.
- **Hardware compatibility:** Customers who already use a Studer Vista or OnAir console based on SCore Live save money with spare parts. All cards can be purchased once in order to maintain several different systems.
- **Integration with Studer consoles:** Route 6000 may be controlled and operated directly from a Studer OnAir desk.
- **Studer RELINK** (Resource Linking) allows Studer Vista and OnAir consoles to access remote audio signals on other systems and even controlling their parameters in a managed implementation.
- **Based on Studer's DNET:** The use of the same communication platform ensures system maturity from day one and immediate availability of already implemented functionality. Furthermore it allows controlling the Route 6000 even from OnAir desks. Networked products like Route 1000, LogScreen, Remote ConfigTool and SystemViewer are on hand, and the learning curve for the customer is pretty short as the user interfaces are just the same.
- **Output monitoring:** Signals within Route 6000 may be accessed at nearly any position within the signal flow. It is possible to listen to inputs, to signals after processing, between two separate processings, or before a signal leaves the TDM bus to be converted to any particular output format. Output monitoring also allows listening after a crosspoint in order to verify whether it is set correctly.
- **No licences:** Route 6000 provides RELINK, 5.1 support, Pro-Bel and SNMP without the need for any licences.
- **Nothing but TCP/IP:** The total system is based on TCP/IP only. No matter whether Route 6000 is controlled from a console, an OnAir channel screen (via VSM), from a hardware control panel or from a VSM panel control software – the one and only interconnection is TCP/IP. Even GPIO interfaces are attached directly to TCP/IP. The result is much less cabling effort as well as absolute freedom where to install devices.
- **True channel count:** The entire DSP processing described in this specification is done virtually. No physical inputs and outputs are lost. The maximum count of 1728 inputs and outputs will not be affected by the number of internal processes used.
- **Scalable multichannel count:** D21m allows configuration of the number of channels used with a MADI interface individually per connection. This allows an effecient I/O channel setup. Customers requiring only eight channels on a MADI connection between the router and a console can size the total MADI channel count to 8, so there is no loss of unused channels.
- **Silent patching:** Route 6000 performs an automatic cross fade (20 ms) whenever the signal patched to an output or to an assignable process changes. Therefore inserting of assignable processes during runtime or changing the source for a destination (assignable process/output) will never be audible.

4 HARDWARE

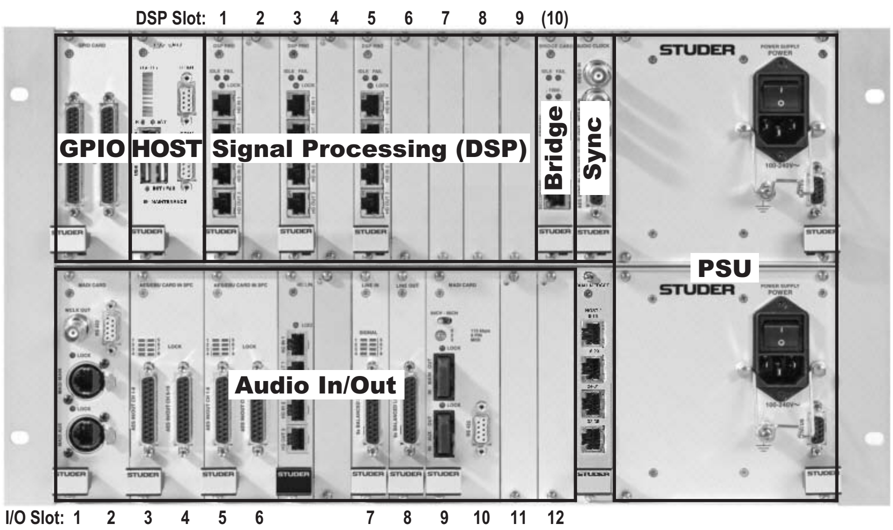
4.1 Audio

4.1.1 Core

Route 6000 is based upon the high-efficiency *SCore Live* DSP core. It offers a highly scalable system, allowing the choice of DSP size and I/O capacity needed for a specific installation that may be expanded easily at a later date. Equipped with an internal D21m I/O system, it takes up only 6U of rack space. Up to 18 additional D21m hubs, up to 36 stage boxes may be added. Multiple cores simply interconnect using CAT5 tie lines (no D21m I/O system needed). SCore Live supports DSP module and PSU redundancy, as well as hot swapping of modules.
For detailed information on the SCore Live system please refer to the separate Product Information 'Studer SCore Live' (order no. BD10.275160).

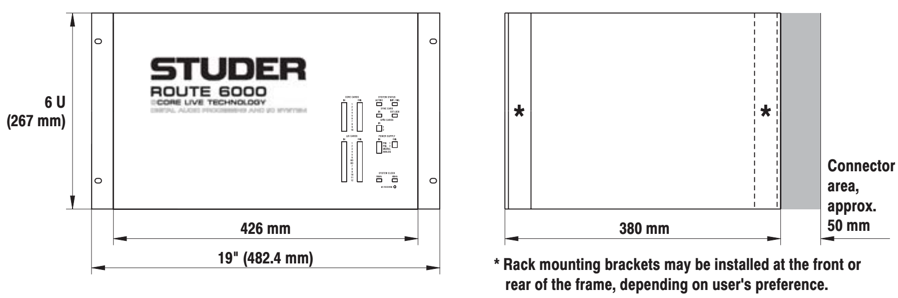
Note: *The Studer Compact SCore is not supported with Route 6000.*

4.1.1.1 Core Frame



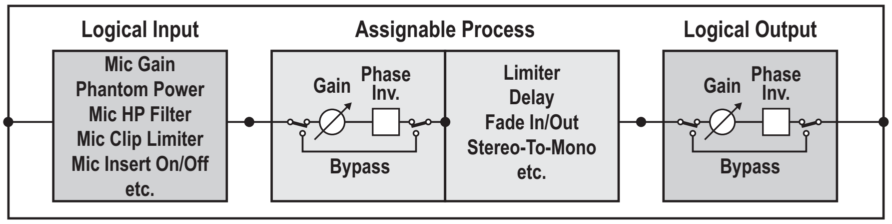
A Route 6000 frame houses up to nine DSP modules in the center of the upper frame section; the Host card is always inserted at the left of the DSP modules. It may also hold one D21m GPIO module at the left of the Host card. The lower section is reserved for D21m audio I/O and GPIO modules.

Dimensions:



4.1.1.2 Core Configuration

Route 6000 basically offers inputs, assignable processes, and outputs. All inputs have individual microphone parameters, controllable via RELINK or VSM (Virtual Studio Manager, see chapter 5.2.1.2). Every assignable process offers gain, phase inversion and bypass as input parameters. Depending on the selected assignable process, its specific audio parameters follow. Every output has gain, phase inversion and bypass as well.

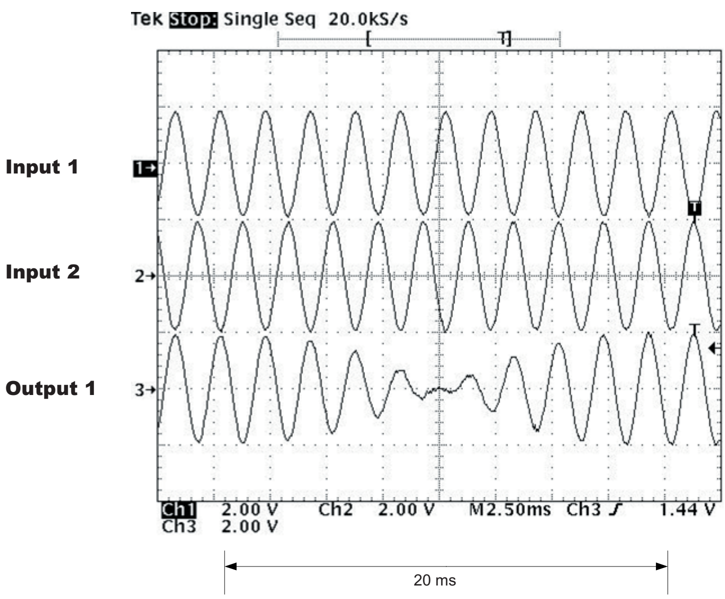


4.1.1.3 Audio Processing

The audio data is processed with a resolution of 40-bit floating-point, guaranteeing absolute high end audio quality. SCore Live and, consequently, Route 6000 use the same DSP algorithms that are also used in the large-frame Vista mixing consoles, resulting in unparalleled audio quality.

4.1.1.4 Silent Patching

Internally, every audio consumer – regardless of whether it is a logical output or an assignable process – consists of two inputs. As soon as a signal is patched to it, an automatic cross-fade (20 ms) is performed between the two inputs. Therefore the patching process is absolutely free from switching transients.



4.1.1.5 Audio Clock

Route 6000 can either be operated with its own, internal clock or with a variety of external clock signals. A clock synchronization module allows the internal clock frequency to be synchronized with an external master clock. Synchronization to the following external signals is possible:

Clock Source	External Signal
AES/EBU (AES11 compatible)	44.1 kHz, 48 kHz
Wordclock	44.1 kHz, 48 kHz
Video Sync	25 fps, 29.97 fps, 30 fps

In ‘Auto Select’ mode, the sync source is automatically selected according to the following priority scheme:

Clock Source	Priority
Video	1
AES/EBU	2
Wordclock	3
Internal	4

A switch-over from one clock signal to a different one, regardless whether ‘Auto Select’ mode is active or not, is *never* audible thanks to two internal PLLs.

Note: 96 kHz operation is *not* supported.

4.1.1.6 Time Synchronization

Route 6000’s internal clock may be synchronized using NTP (Network Time Protocol). NTP is well established and provides a highly accurate time using UDP as its transport layer.

4.1.1.7 Input Functions

Every input contains a set of basic functions.

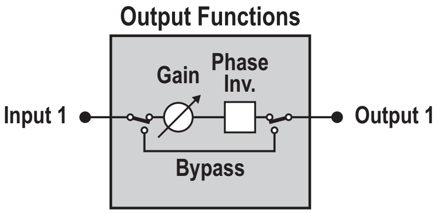
Parameters:

Parameter	Range	Default Value	Resolution
Mic Gain	**–11 dB…+75dB**	**0 dB**	**1 dB**
Mic Phantom Pwr	**0 / 1**	**0**	**-**
Mic High-Pass Filter	**0 / 1**	**0**	**-**
Mic Clip Limiter	**0 / 1**	**0**	**-**
Mic Insert On/Off	**0 / 1**	**0**	**-**
Mic has Insert	**0 / 1**	**0**	**-**

4.1.1.8 Output Functions

Every Output contains a set of basic functions.

Schematic Symbol



Parameters

Parameter	Range	Default Value	Resolution
Gain	–90...+10 dB	0 dB	0.1 dB
Phase	0 / 1	0	-
Bypass	0 / 1	0	-
* Lock	0 / 1	0	-

* Every output may be locked or unlocked via Ember (see chapter 5.2.4.2) or Route1000. An attempt to set a patch point to a locked output will generate a user warning.

4.1.1.9 Assignable Processes

Various standalone processing types may be inserted 'on the fly'. Assigning multiple processes to a single router signal is also allowed. Since the assignable processes are handled in a virtual way, they do not have any effect on the I/O count, which means that, regardless of whether they are used or not, or how many of them are used, no inputs or outputs have to be sacrificed. The amount of available processes increases with every DSP card.

Note: For version 2.1, types and amount of available assignable processes have been massively improved. Some of the V2.0 processes have been integrated into more complex process bundles, allowing a strongly customized signal management.

In version 2.1, the following processes are implemented:

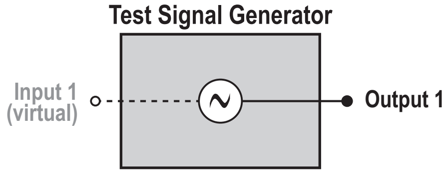
Assignable Process	Number per DSP Card	Max. Number (System with 9 DSP Cards)
Fader	– *	– *
Phase Inversion	– *	– *
Tie Line	– **	– **
Generator	6	6
Stereo Format Converter	24	216
Delay	60	540
Fade In/Out	24	216
Mixer	4	36
Filter	12	108
Dynamics	30	270
Downmix	6	54
Upmix	5	45

* 'Fader' and 'Phase Inversion' functions are available on every single output, and they are also part of every assignable process.

** External tie lines for re-inserting signals are unnecessary since Route 6000 provides internal routing. An output may be patched internally to another output (see chapter 5.3, Monitoring).

4.1.1.9.1 Generator

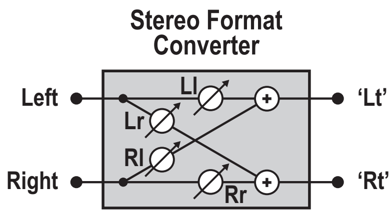
There are six non-correlated, independently adjustable test signal generators available per core.

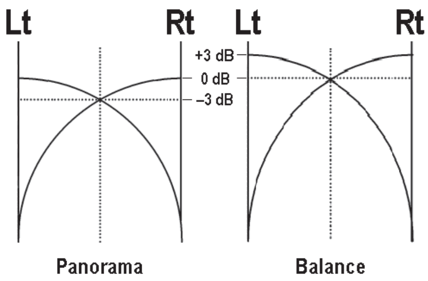


Parameter	Range	Default Value	Resolution
Generator Signal	Sine Wave, White or Pink Noise	Sine Wave	Sine Wave
Generator Frequency	20 Hz...20 kHz	1 kHz	120 log steps 0: 20 Hz 68: 1 kHz 120: 20 kHz
Generator Level	$-90...0\ dB_{FS}$	$-20\ dB_{FS}$	0.1 dB

4.1.1.9.2 Stereo Format Converter

The stereo format converter is a multi-purpose format converter providing stereo-to-mono conversion, panorama and stereo balance.





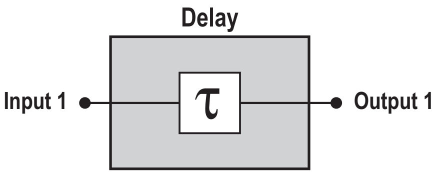
The stereo-to-mono function consumes the Left and Right signals, attenuates them both by 3 dB and provides their sum to the 'Lt' output. ($Ll = Rr = 1/\sqrt{2}$, $Lr = Rl = 0$).
The panorama function is a L/R panner for mono input signals. It passes the left input signal to the 'Lt' and 'Rt' outputs, according to the left diagram. In the center position, both outputs 'Lt' and 'Rt' are fed with the input signal attenuated by 3 dB.
The balance function is a direction/width panner for stereo input signals. It mixes both left and right input signals to the 'Lt' and 'Rt' outputs, according to the right diagram. The 'input width' parameter allows specifying the applied effect. Values below 100% will gradually center the stereo soundstage, up to mono sound at 0%. Values above 100% widen the soundstage. A value of 100% leaves the soundstage unaltered.

Parameter	Range	Default Value	Resolution
Mode	StereoToMono, Pan, Bal	StereoToMono	–
Mode StereoToMono	(Lt serves as output)		
Cal	–18...+18 dB	–3 dB	0.5 dB
Mode Panorama	(Left serves as Input)	–	–
Panorama On/Off	On / Off	On	–
Panorama	30L...30R	0	1

Parameter	Range	Default Value	Resolution
Mode			
Stereo Balance			
Balance On/Off	On / Off	On	–
Input Width On/Off	On / Off	Off	–
Input Width	0%...200%	100%	10%
Balance	30L...30R	0	1

4.1.1.9.3 Delay

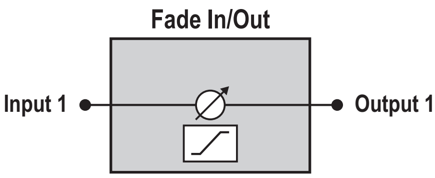
The delay function shifts the consumed signal in time by up to 10 seconds per process.



Parameter	Range	Default Value	Resolution
Delay On/Off	0 / 1	1	-
Delay Time @ 48 kHz	0 µs...10 s	0 µs	1 µs
Delay Time @ 44.1 kHz	0 µs...10.8844 s	0 µs	1 µs

4.1.1.9.4 Fade In/Out

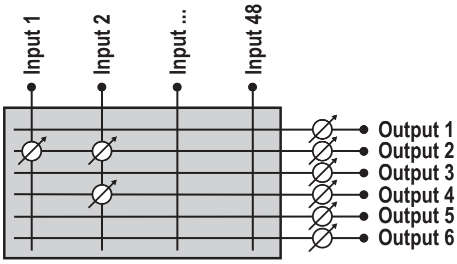
This process consists of a fader combined with a driving logic that runs a specified fader ramp. A controlling device may ask the current fader value (Gain) and then set a target value (FInTarget or FOutTarget) that is to be reached within the ramp time (FInTime or FOutTime). Setting FInStart or FOutStart to 'true' will start the fader ramp. If a target value is set with a ramp time equal to 0, it is set immediately.



Parameter	Range	Default Value	Resolution
Gain	–90...+10 dB	0 dB	0.1 dB
Target Gain	–90...+10 dB	0 dB	0.1 dB
Ramp Time	0...20 s	0 ms	1 ms
FInStart	0 / 1	0	–
FInTarget	–90...+10 dB	0 dB	0.1 dB
FInTime	0...20 s	1 s	1 ms
FOutStart	0 / 1	0	–
FOutTarget	–90...+10 dB	–90 dB	0.1 dB
FOutTime	0...20 s	1 s	1 ms

4.1.1.9.5 Mixer

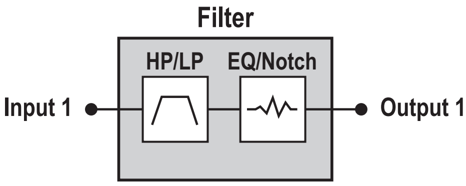
The input 1…48 signals are summed to produce the combined output signals Output 1…6. All patch points may be set, and an individual, additional gain can be set for every patch point.



Parameter	Range	Default Value	Resolution
Matrix Gain Out1 / In1	–90...+10 dB	0 dB	0.1 dB
Matrix Gain Out1 / In1 On/Off	On / Off	Off	–
...	...	...	...
Matrix Gain Out6 / In48	–90...+10 dB	0 dB	0.1 dB
Matrix Gain Out6 / In48 On/Off	On / Off	Off	–
Output Gain 1...6	–90...+10 dB	0 dB	0.1 dB

4.1.1.9.6 Filter

The filter process contains a high-pass and a low-pass filter and, depending on its mode, either a parametric four-band EQ or four notch filters.



Parameter	Range	Default Value	Resolution
Filter OnOff	On, Off	On	–
Mode	Notch, EQ	EQ	–
HP OnOff	On, Off	Off	–
Frequency HP	20Hz ...20 kHz	20 Hz	120 log. steps: 0 = 20 Hz; 68 = 1.00 kHz; 120 = 20.0 kHz
Slope HP	12, 18, 24 dB	12	–
LP OnOff	On, Off	Off	–
Frequency LP	20Hz ...20 kHz	20 kHz	120 log. steps: 0 = 20 Hz; 68 = 1.00 kHz; 120 = 20.0 kHz
Slope LP	12, 18, 24 dB	12	–
Mode Notch:			
Notch 1 OnOff	On, Off	Off	–
Notch 1 Narrow / Wide	Narrow, Wide	Narrow	–
Notch 1 Frequency	20Hz ...20 kHz	50 Hz	478 1/8-tone steps: 0 = 20 Hz ... 478 = 20.0 kHz

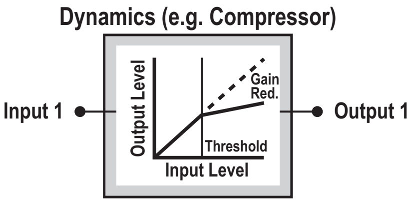
Parameter	Range	Default Value	Resolution
Notch 2 OnOff	On, Off	Off	–
Notch 2 Narrow / Wide	Narrow, Wide	Narrow	–
Notch 2 Frequency	20Hz ...20 kHz	100 Hz	478 1/8-tone steps: 0 = 20 Hz ... 478 = 20.0 kHz
Notch 3 OnOff	On, Off	Off	–
Notch 3 Narrow / Wide	Narrow, Wide	Narrow	–
Notch 3 Frequency	20Hz ...20 kHz	60 Hz	478 1/8-tone steps: 0 = 20 Hz ... 478 = 20.0 kHz
Notch 4 OnOff	On, Off	Off	–
Notch 4 Narrow / Wide	Narrow, Wide	Narrow	–
Notch 4 Frequency	20Hz ...20 kHz	120 Hz	478 1/8-tone steps: 0=20 Hz ... 478 = 20.0 kHz
Mode EQ:			
EQ LF OnOff	On, Off	Off	–
Frequency LF	20Hz ...20 kHz	79 Hz	120 log. steps: 0 = 20 Hz; 48 = 316 Hz; 120 = 20.0 kHz
Gain LF	–18...+18 dB	0 dB	0.5 dB
Q LF	0.268…8.681	1.419	29 log. steps: 0 = 0.268; 15 = 1.419; 29 = 8.681
EQ LMF OnOff	On, Off	Off	–
Frequency LMF	20Hz ...20 kHz	316 Hz	120 log. steps: 0 = 20 Hz; 48 = 316 Hz; 120 = 20.0 kHz
Gain LMF	–18...+18 dB	0 dB	0.5 dB
Q LMF	0.268…8.681	1.419	29 log. steps: 0 = 0.268; 15 = 1.419; 29 = 8.681
EQ HMF OnOff	On, Off	Off	–
Frequency HMF	20Hz ...20 kHz	1.26 kHz	120 log. steps: 0 = 20 Hz 72 = 1.26 kHz 120 = 20.0 kHz
Gain HMF	–18...+18 dB	0 dB	0.5 dB
Q HMF	0.268…8.681	1.419	29 log. steps: 0 = 0.268; 15 = 1.419; 29 = 8.681
EQ HF OnOff	On, Off	Off	–
Frequency HF	20Hz ...20 kHz	5.01 kHz	120 log. steps: 0 = 20 Hz 96 = 5.01 kHz 120 = 20.0 kHz
Gain HF	–18...+18 dB	0 dB	0.5 dB
Q HF	0.268…8.681	1.419	29 log. steps: 0 = 0.268; 15 = 1.419; 29 = 8.681

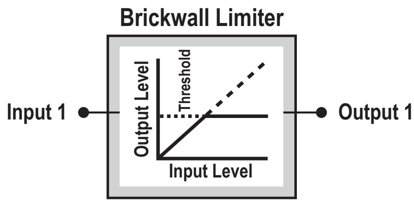
4.1.1.9.7 Dynamics

Depending on the selected mode, the dynamics process either contains the four standard parts (limiter, compressor, expander and gate), or a brickwall limiter.

- The compressor reduces the dynamic range of an input signal if its amplitude exceeds a threshold. The amount of gain reduction is determined by a ratio control.
- The limiter is a compressor with a higher ratio, of about greater than 10:1.
- The expander is the complementary process to compression: It actually increases the dynamic range of a signal. When a signal falls below a threshold level, the gain is decreased. The gain for signals below the threshold may vary from none (as in a gate), to a ratio that only slightly reduces the gain of low-level sounds.
- The gate attenuates the output for input signals below the threshold.
- The brickwall limiter is a compressor with such a high ratio that a hard 'ceiling' is imposed on the signal level – once the signal reaches the threshold, it can go no further.

In case of a mode change (from standard dynamics to brickwall limiter and vice versa), the core configuration mutes the output, changes the mode parameter and then un-mutes the output again.



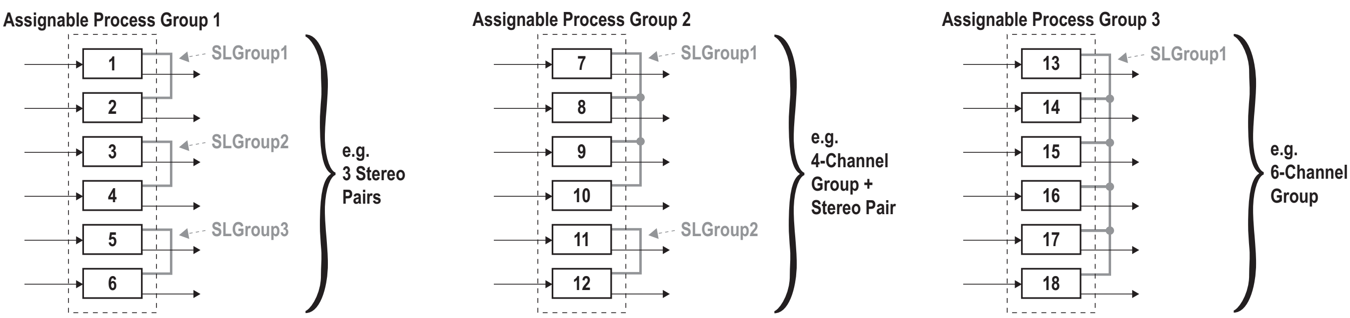


Parameter	Range	Default Value	Resolution
Dynamics OnOff	On, Off	On	–
Mode[1]	Brickwall Limiter, Lim/Comp/Exp/Gate	Brickwall Limiter	–
SideChainLink Membership	Off, SLGroup1, SLGroup2, SLGroup3	Off	–
Mode Brickwall Limiter			
Threshold	–48…0 dB_{FS}	0 dB_{FS}	1 dB
Release Time	10…10'000 ms (= 10 s)	1 s	12 log. steps: 0 = 10 ms; 1 = 20 ms; 2 = 30 ms; 3 = 50 ms; 4 = 100 ms; 5 = 200 ms; 6 = 300 ms; 7 = 500 ms; 8 = 1 s; 9 = 2 s; 10 = 3 s; 11 = 5 s; 12 = 10 s
Mode Lim/Comp/Exp/Gate			
Limiter			
Limiter OnOff	On, Off	Off	–
Threshold	–48…0 dB_{FS}	0 dB_{FS}	1 dB
Attack Time	0.2…1 ms	0.2 ms	0.1 ms
Release Time	10…10'000 ms (= 10 s)	1 s	12 log. steps: 0 = 10 ms; 1 = 20 ms; 2 = 30 ms; 3 = 50 ms; 4 = 100 ms; 5 = 200 ms; 6 = 300 ms; 7 = 500 ms; 8 = 1 s; 9 = 2 s; 10 = 3 s; 11 = 5 s; 12 = 10 s

Parameter	Range	Default Value	Resolution
Compressor			
Compressor AutoMakeUp Gain OnOff	On, Off	Off	–
Compressor OnOff	On, Off	Off	–
Threshold	–96…0 dB_{FS}	0 dB_{FS}	1 dB
MakeUpGain	0…24 dB	0 dB	1 dB
Ratio	20:1…1:1	5:1	0 = 20:1; 1 = 10:1; 2 = 7:1; 3 = 5:1; 4 = 3:1; 5 = 2:1; 6 = 1.67:1; 7 = 1.5:1; 8 = 1.33:1; 9 = 1.25:1; 10 = 1:1
Attack Time	0.2…20 ms	0.2 ms	8 log. steps: 0 = 0.2 ms; 1 = 0.3 ms; 2 = 0.5 ms; 3 = 1 ms; 4 = 2 ms; 5 = 3 ms; 6 = 5 ms; 7 = 10 ms; 8 = 20 ms
Release Time	10…10’000 ms (= 10 s)	1 s	12 log. steps, see Limiter Parameters
Expander			
Expander OnOff	On, Off	Off	–
Threshold	–96…0 dB_{FS}	–96 dB_{FS}	1 dB
Ratio	20:1…1:1	5:1	0 = 20:1; 1 = 10:1; 2 = 7:1; 3 = 5:1; 4 = 3:1; 5 = 2:1; 6 = 1.67:1; 7 = 1.5:1; 8 = 1.33:1; 9 = 1.25:1; 10 = 1:1
Attack Time	0.2…1 ms	0.2 ms	8 log steps, see Compressor Parameters
Release Time	10…10’000 ms (= 10 s)	1 s	12 log. steps, see Limiter Parameters
Gate			
Gate OnOff	On, Off	Off	–
Threshold	–96…0 dB	–96 dB	1 dB
Attenuation	Max, –48…0 dB	0 dB	1 dB
Attack Time	0.2 … 1 ms	0.2 ms	8 log steps, see Compressor Parameters
Release Time	10…10’000 ms (= 10 s)	1 s	12 log. steps, see Limiter Parameters

Side Chain Link(s)

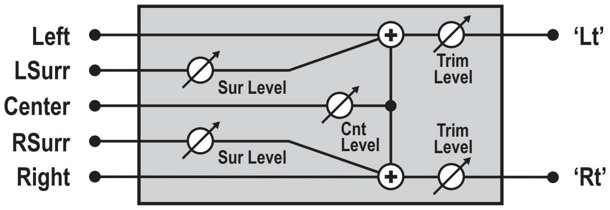
Every assignable process has a SideChainLink parameter that can have the values Off, SLGroup1, SLGroup2 oder SLGroup3. This is useful for stereo or multi-channel (surround) applications. Up to six neighboring channels (i.e. channel nos. 1...6, 7...12, etc.) may share from one to three side chain signal groups, as illustrated below. In this way it is possible to have three stereo pairs (e.g. channels 1+2, 3+4, 5+6), or one 5.1-channel group (e.g. channels 13...18), and so on, as illustrated below.



4.1.1.9.8 Downmix

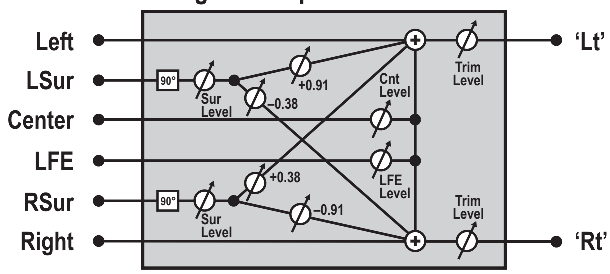
Two different downmix modes can be selected: ITU-R BS.775.1 or ‘Logic 7 Compatible’. Since a straightforward ITU downmix of fully correlated and fully decorrelated signals (e.g. an ambient microphone fully panned to the rear), would change the mix in such a way that the correlated signals stick out, the Logic 7 Compatible downmix can be used then. It offers optional activation of a 90° phase shift in the surround signals to de-correlate the rear channels before summing them to the front channels. In that mode the rear channels will also be slightly panned to the center rather than fully left/right to avoid over-separation of the sound image and generating holes between left and right channel. These are the same processes as used in the Studer Vista series mixing consoles. If a 6-to-1 channel downmix is required, an additional stereo-to-mono process can be appended.

ITU-Compatible Downmix



Sur Level = 0...–10 dB; Default: –3 dB
Cnt Level = 0...–10 dB; Default: –3 dB
Trim Level = 0...–10 dB; Default: 0 dB

Logic7-Compatible Downmix



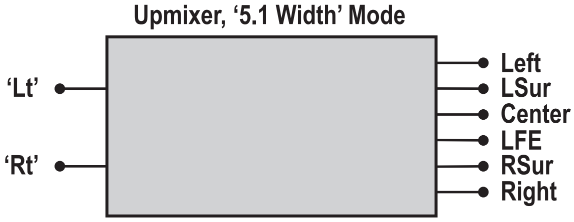
Crosstalk:
0.38 = sin(22.5°) = pan@45°
0.91 = cos(22.5°) = pan@45°

Parameter	Range	Default Value	Resolution
Downmix Mode	Logic 7 compatible, ITU-R	ITU-R	–
Mode: ITU			
Surround Level (L+R)	–10 dB … 0 dB	–3 dB	0.1 dB
Center Level	–10 dB … 0 dB	–3 dB	0.1 dB
Trim Level	–10 dB … 0 dB	0 dB	0.1 dB
Mode: Logic 7 Compatible			
Surround Level (L+R)	–10 dB … 0 dB	–3 dB	0.1 dB
Center Level	–10 dB … 0 dB	–3 dB	0.1 dB
LFE Level	–90dB … 6dB	–90 dB	0.1 dB
Trim Level	–10dB … 0dB	0 dB	0.1 dB
Phase Shift	On, Off	On	–

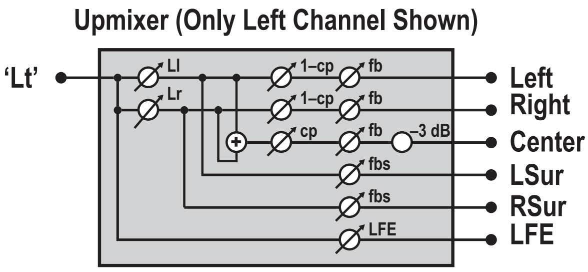
In case of a phase shift change, the core configuration mutes the output, changes the mode parameter and then un-mutes the output again.

4.1.1.9.9 Upmix

A significant amount of stereo source material is available that often needs to be brought into the 5.1-channel format. The upmix function offers a way to pan stereo signals into a multi-channel surround signal. It supports two different modes: ‘5.1’ and ‘5.1 width’ mode.
The ‘5.1’ mode simply uses ‘standard’ panning where e.g. the left channel is also sent to the Ls speaker, etc. The ‘5.1 width’ mode is an algorithm that uses Harman corporate intellectual property and basically extends the stereo width control also to the surround speakers.



Parameter	Range	Default Value	Resolution
Mode	5.1, 5.1 width	5.1 width	–
Mode: 5.1			
Front - Rear	30F … 30R	0	1
Input width OnOff	On, Off	Off	–
Input width	0% ... 200%	100%	10%
Center Percentage OnOff	On, Off	Off	–
Center Percentage	0 … 100%	100%	5%
LFE OnOff	On, Off	On	–
LFE	–90 … +10 dB	–90 dB	0.1 dB
Stereo Dir	30L … 30R	0	1
Mode: 5.1 width			
Width	0° … 180°	0°	3.6°
LFE OnOff	On, Off	On	–
LFE	–90 … +10 dB	–90 dB	0.1 dB



The diagram above illustrates the ‘5.1’ mode for the left channel signal only.

4.1.1.10 Surveillance Processes

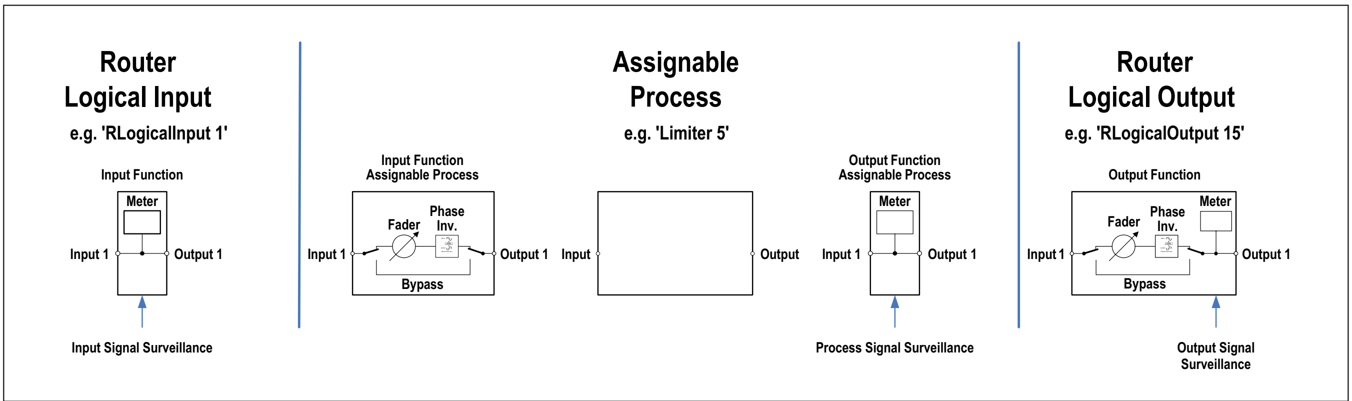
Route 6000 offers three different surveillance processes. The number of processes and link groups can be configured independently from the DSP configuration.
A surveillance process is different from an assignable process:

1. It can be inserted or removed with the ConfigTool only (not via Ember).
2. It doesn’t consume any DSP resources as its functionality is implemented in the host software. It is based on core parameters (such as the meter value of an input for silence detection).

Note: *Dolby E-coded signals cannot be monitored by surveillance processes.*

4.1.1.10.1 Silence Detection

The silence detection process observes a specific audio input (Input Signal Surveillance), an audio process (Process Signal Surveillance), or an audio output (Output Signal Surveillance). As soon as the observed signal is ‘quiet’ for longer than a preconfigured time (Signaling Trigger Time), a User Warning and an SNMP trap are sent. At the same time, silence is signaled using a GPO.
The timer that measures the Signaling Trigger Time may be reset to zero if the signal does not fulfill the silence condition for longer than the Signaling Trigger Reset Time.



When the signal returns, the unit will revert to its original state either automatically or by user action, depending on the ‘Reset Mode’ setting. GPO and SNMP state are reset as well.

'Auto' Reset Mode: Automatic return to the original state after the signal level has been above the threshold for a preconfigured time (Reset Time).

'Manual' Reset Mode: The user must confirm the alarm using either a GPI or a button on a VSM panel (Reset Request).

Parameter	Range	Default Value
Silence Detection On/Off	0 / 1	1
Source	RLI 1...1728, RLO 1...1728, Generator 1...n, StereoFormatConverter 1...n, Delay 1...n, Fade In/Out 1...n, Mixer Matrix 1...n, EQ 1...n, Dynamics 1...n, Downmix 1...n, Upmix 1...n	0 = None
Threshold	Off, –89...0 dB_{FS}	Off
Signaling Trigger Time	0...300 s	15 s
Signaling Trigger Reset Time	0...300 s	3 s
Reset Time	1...60 s	5 s
Reset Mode	Auto / Manual	Manual
Reset Request	0 = Off, 1 = On	0
State	0 = OK, 1 = Silence Detected	0

4.1.1.10.2 Silence Switch

The silence switch process observes a specific target for audio. Such a target can be an output (Output Source Surveillance) or an input of an audio process (Process Input Surveillance). As soon as the source signal of the specified target is 'quiet' for longer than a preconfigured time (Switching Trigger Time), the unit will switch over to the predefined alternative source, and a User Warning and an SNMP trap are sent. At the same time, it indicates using a GPO that the system has switched to alternative source, as well as to a Pro-Bel RemoteDevice using the 'CONNECTED' and associated Pro-Bel messages.
The timer that measures the Switching Trigger Time may be reset to zero if the signal does not fulfill the silence condition for longer than the Switching Trigger Reset Time.

When the original source's signal returns, the unit will revert to its original state either automatically or by user action, depending on the 'Reset Mode' setting. GPO and SNMP state are reset as well.

'Auto' Reset Mode: Switching back automatically to the original source after the signal level has been above the threshold for a preconfigured time (Reset Time).

'Manual' Reset Mode: The user must initiate the unit to switch back to the original source using either a GPI or a button on a VSM panel (Reset Request).

Parameter	Range	Default Value
Silence Switcher On/Off	0 / 1	1
Source	RLO 1...1728, Generator 1...n, StereoFormatConverter 1...n, Delay 1...n, Fade In/Out 1...n, Mixer Matrix 1...n, EQ 1...n, Dynamics 1...n, Downmix 1...n, Upmix 1...n	0 = None
AlternativeSource	RLI 1...1728, RLO 1...1728, Generator 1...n, StereoFormatConverter 1...n, Delay 1...n, Fade In/Out 1...n, Mixer Matrix 1...n, EQ 1...n, Dynamics 1...n, Downmix 1...n, Upmix 1...n	0 = None
Threshold	Off, –89...0 dB_{FS}	Off
Switching Trigger Time	0...300 s	30 s
Switching Trigger Reset Time	0...300 s	3 s
Reset Time	1...60 s	5 s
Reset Mode	Auto / Manual	Manual
Reset Request	0 = Off, 1 = On	0
Silence Detection State	0 = OK, 1 = Silence Detected	0
Source State	0 = Original Source, 1 = Alternative Source	0

4.1.1.10.3 Overload Detection

The overload detection process works just as an 'inverted' silence detection; it observes a specific input (Input Signal Surveillance), audio process (Process Signal Surveillance) or output (Output Signal Surveillance). As soon as its signal exceeds a specified level for a specified time (Signaling Trigger Time) it will send a User Warning and an SNMP trap. At the same time, it indicates overload using a GPO.
The timer that measures the Signaling Trigger Time may be reset to zero if the signal does not fulfill the overload condition for longer than the Signaling Trigger Reset Time.

When signal is below the threshold again the unit will return to its original state either automatically or by user action, depending on the 'Reset Mode' setting. GPO and SNMP state are reset as well.

'Auto' Reset Mode: Automatic return to the original state after the signal level has been below the threshold for a preconfigured time (Reset Time).

'Manual' Reset Mode: The user must confirm the alarm using either a GPI or a button on a VSM panel (Reset Request).

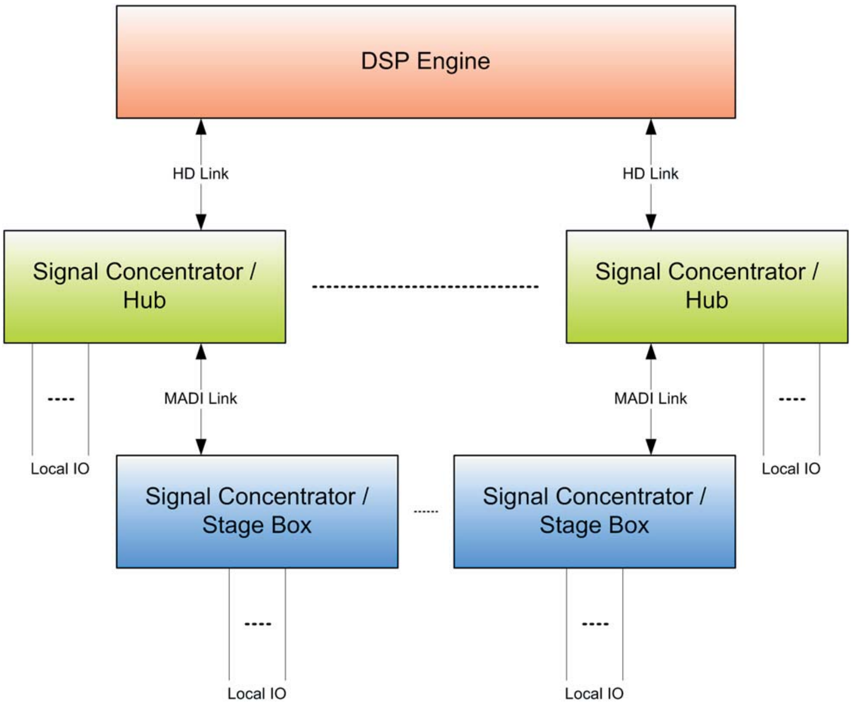
Parameter	Range	Default Value
Overload Detection On/Off	0 / 1	1
Source	RLI 1...1728, RLO 1...1728, Generator 1...n, StereoFormatConverter 1...n, Delay 1...n, Fade In/Out 1...n, Mixer Matrix 1...n, EQ 1...n, Dynamics 1...n, Downmix 1...n, Upmix 1...n	0 = None
Threshold	–90...0 dB_{FS}	0 dB_{FS}
Signaling Trigger Time	0...300 s	15 s
Signaling Trigger Reset Time	0...300 s	3 s
Reset Time	1...60 s	5 s
Reset Mode	Auto / Manual	Manual
Reset Request	0 = Off, 1 = On	0
State	0 = OK, 1 = Overload Detected	0

4.1.2 D21m I/O System

The Studer D21m high-density audio interface system provides the highest quality analogue and digital interfaces at a very cost-effective price. The system is based on a 19” 3U rack which can house up to 12 audio interface cards. Different I/O modules can be plugged into a frame, providing I/O systems tailor-made to customer needs. One rack can host up to 384 inputs and outputs. Long distance I/O boxes may be connected via MADI; thereby the control data is embedded into the MADI stream. I/O parameters can be controlled directly on the consuming console or via Virtual Studio Manager.

4.1.2.1 Inputs/Outputs

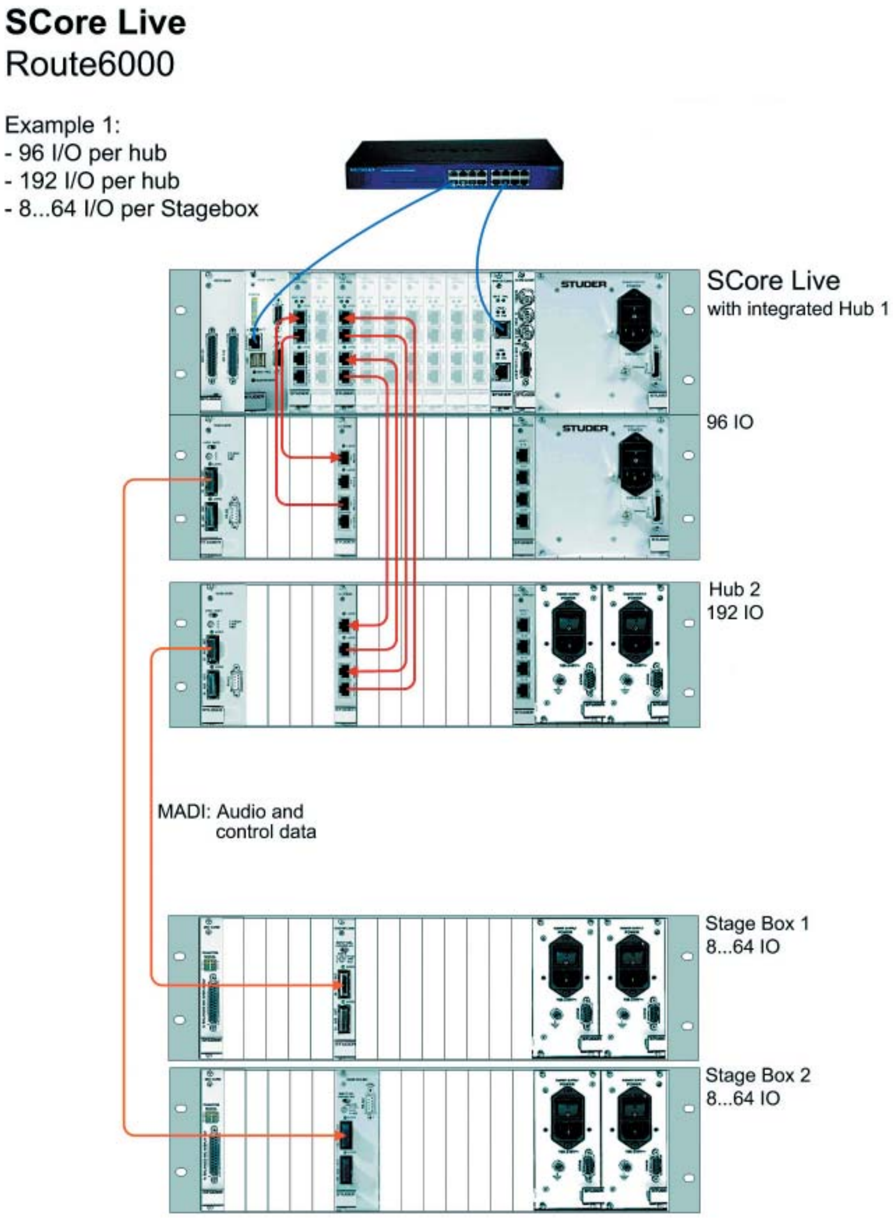
Route 6000 has a maximum matrix size of 1728 physical inputs and 1728 physical outputs. These figures result from the maximum routing capacity of one DSP module (192 I/O) multiplied by the maximum number of DSP modules that can be used per system (9).
The typical I/O setup of a Route 6000 core follows the well-established SCore architecture.



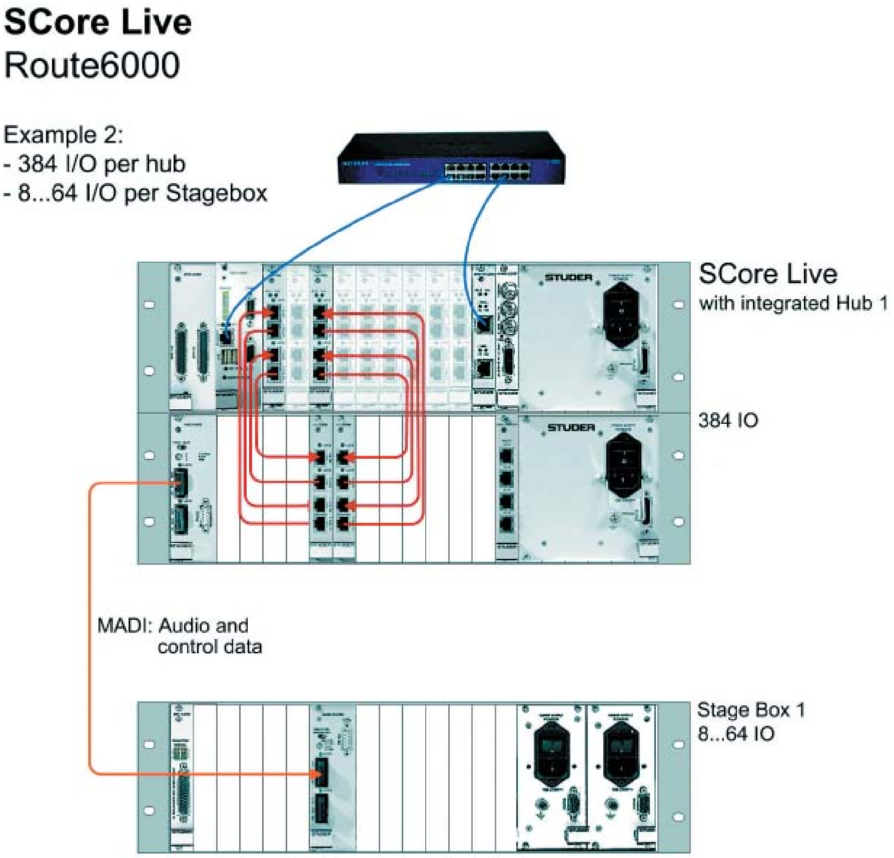
The DSP engine is hosted within the central Route 6000 core frame. Every DSP module supplies two high-density input ports (192 Ch) and two high-density output ports (192 Ch). These ports are used to create multichannel links to Hub frames. At least one HD link (in and out) feeds one hub. Up to four HD links can feed one single hub (384 Ch max.). A hub could be equipped with local I/Os (line in/out modules, AES modules, etc.) and multichannel interfaces (MADI) to connect to distributed stage boxes. Stage boxes can be equipped with local I/O modules. Up to 18 D21m hubs and up to 36 stage boxes may be added to a routing system.
The individual I/O layout of a Route 6000 is fully depending on individual project specifications. Setups with similar I/O count may differ very much due to the required number and I/O density of stage boxes and hubs.

The following figures show wiring examples with Route 6000.

Example 1 Hub 1 is connected via a single HD link to the DSP engine and supplies 96 inputs and outputs. A single MADI card is inserted into the hub and interconnects to a stage box via fibre. The MADI connection itself can be scaled in groups of 8 channels (8, 16, 24, …, 64) for effective channel usage. The total of channels connected to the hub is 96 (in and out).
The secondary hub is interlinked with a double HD connection to the DSP engine. It carries 192 input and outputs. Again, a MADI connection connects up to 64 channels between the hub and a second stage box. In case all possible MADI channels are used up by the stage box link, the hub allows connecting a further 128 channels. This can be realised with additional MADI or other types of modules.



Example 2



This example shows a Route 6000 in a small but high-density setup. The integrated hub is linked via four HD connections to the DSP engine, and supplies 384 I/O channels (4 x 96). In the example it contains one single MADI module, which connects 64 I/O channels to a stage box. In order to expand this setup, up to 6 MADI modules could be contained by the hub, each of them with the maximum amount of 64 channels (6 x 64 = 384).

High-Density Setup Example

Based on Example 2, a high-density setup could be realised as follows:
- The DSP engine is fully equipped with nine DSP modules
- Four single hubs are connected via four HD links each (in and out) to four pairs of DSP modules (4 x 384 Ch)
- A fifth hub is connected via a double HD link to DSP module no. 9 (1 x 192 Ch).

This setup makes the full capacity of 1728 input and output channels available to five hubs. If equipped with MADI modules carrying the full load of channels each (64 Ch), the total number of MADI interfaces is 4 x 6 + 1 x 3 = 27 .

4.1.2.2 Dolby® E Transparency

Route 6000 features the distribution of encoded audio and metadata, such as Dolby® E streams. To enable transparent distribution, neither SFCs (sampling frequency converters) nor internal processing (exception: Delay) within the signal path is allowed; otherwise the Dolby® E metadata will be lost. If an encoded audio stream is switched to another output, the stream is distorted and invalid for the duration of the switching process (approx. 20 ms, see chapter 4.1.1.4).

4.1.2.3 I/O Modules

Analog
- Mic/Line in
- Analog insert
- Line in
- Line out

Digital
- AES/EBU input/output
- MADI input/output
- ADAT input/output
- TDIF input/output
- SDI input/output
- SDI input
- Dolby® E/Digital decoder (input)
- CobraNet® input/output
- Aviom A-Net output
- Ethersound® input/output

For more details of the D21m I/O system please refer to the separate D21m Product Information document (order no. BD10.275102).

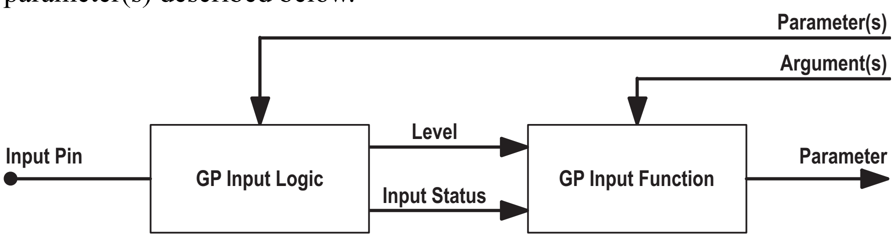
4.1.2.4 GPIO

The GPIO (General Purpose Input/Output) interface allows different router functions to be controlled by external control signals, and to generate control signals depending on the current status of different router functions. Assignment of functions and control signals to the pins of the I/O connectors as well as the behavior of the input and output signals can be freely configured.

Distributed Control Please note that in I/O sharing applications, a GP input may also control a function of a neighboring system, and a GP output may be controlled from a function of a neighboring system, without additional wiring.

4.1.2.4.1 GPI

The GP input function generates an output parameter depending on the level and the input status signals (open, closed/momentary, or closed/latching) from the GP input logic, according to the input pin signal and the argument(s) and parameter(s) described below.



The parameters described below refer to the corresponding configuration page in the configuration tool.

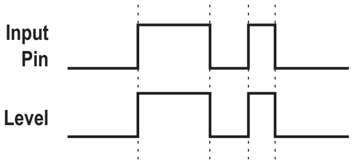
Label — The label of the corresponding frame/GPIO card/input pin is displayed here for reference.

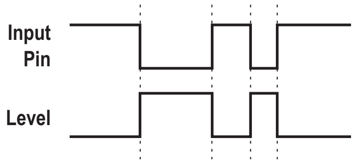
Function Type — When touching this button, a menu appears where all available functions can be selected from, as shown above. For details see the table below.

Argument 1...3	Depending on the selected function, up to three different parameters may contribute to the internal processing of the input control signal. These can be selected here. For a function and arguments description see the table below.
Action	Action is only relevant if Triggered Edge is falling or rising. In this case, it defines if the specified edge activates (set only high), deactivates (set only low), or toggles (set low and high) the Level. Usually Action is set to set low and high. set only high and set only low are used in case of linked GP Inputs (e.g. for separate **ON** and **OFF** keys).
Time	Defines the minimum length that a pulse at the input pin must have in order to be interpreted as 'momentary'. Time is only relevant if Triggered Edge (see below) is set to both. Possible values are 0 ms or 20 ms...1 s.
Polarity	Polarity of the signal at the input pin: Active high is positive, active low is negative polarity.
Triggered Edge	Defines which edge of the input signal causes the **Level** to change: falling, rising, or both.
Activate	Used to activate/deactivate an input pin. The Level used as input to the GP input function only changes if Activate is On.
Notes:	On power up, Level is initialized according to the input pin signal. Action***,*** Time***,*** Polarity***, and*** Triggered Edge ***must not be changed while the GP input is active.*** ***For correct take-over after a modification, it is important to select*** Active ***to*** On***, because it is automatically set to*** Off ***when a modification is made.***

GPI Function	Arguments	Description
Outgate	GP Output Pin	Output x is only active if the Out function is active *and* the Gate input is active.
LinkInput	GP Input Pin	Links the GP input to an existing GP input function (e.g. when two keys shall be used for an On/Off function; the ON key requires Action 'set only high', the OFF key 'set only low').
FadeIn	FadeInOut Process	Starts the fade-in ramp of the specified FadeInOut process.
FadeOut	FadeInOut Process	Starts the fade-out ramp of the specified FadeInOut process.
OutputRoutingIn	Partial Output Routing 1...24 / – / Ignore Enable Key / Group1...8	Recall of the Partial Output Routing Snapshot with the name specified by 'String'. Argument 2 is either undefined (for downward compatibility), IgnoreEnableKey, or a valid group 1...8. All partial output routings with the option UseEnableKey set to 'true' need Argument 2. If Argument 2 is IgnoreEnableKey partial output routings are loaded unconditionally. If Argument 2 is Group1...8, partial output routings check on loading the enable status of the corresponding desk group. If Argument 2 is not defined, the snapshot is not loaded! Partial output routings with the option UseEnableKey set to 'false' are loaded unconditionally and do not need Argument 2.
EnableOutput RoutingIn	Group 1...8	Sets the enable parameter of the corresponding DeskGroup.
Reset SilenceDetection	SilenceDetectionProcess SilenceDetectionLinkGroup	The GPInput resets the specified silence detection process or detection link group status from 'silence detected' to 'ok'.
Reset OverloadDetection	OverloadDetectionProcess OverloadDetectionLinkGroup	The GPInput resets the specified overload detection process or detection link group status from 'overload detected' to 'ok'.
ResetSilenceSwitcher	SilenceSwitcherProcess SilenceSwitcherLinkGroup	The GPInput resets the specified silence switcher process or detection link group status from 'alternative source' to 'original source'.

Example 1, Momentary Mode:





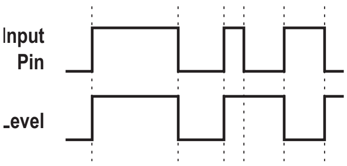
Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	positive
Action	--
Triggered Edge	both

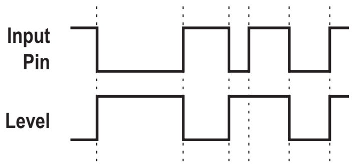
Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	negative
Action	--
Triggered Edge	both

Note: In order to avoid inconsistencies, please be careful when using a GP input in momentary mode in parallel with a button for the same function.

Example 2, Momentary/Latching Mode:

If the input pulse is shorter than the time specified, the level is latched. The falling (or, in case of negative polarity, the rising) edge is ignored in this case.





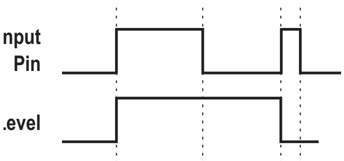
Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	positive
Action	--
Triggered Edge	both

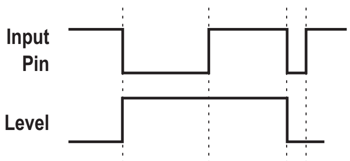
Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	negative
Action	--
Triggered Edge	both

Note: In order to avoid inconsistencies, please be careful when using a GP input in momentary/latching mode in parallel with a button for the same function.

Example 3, Latching Mode:

To achieve latching mode only, the triggered edge attribute is set to rising or falling; the time attribute is then ignored.





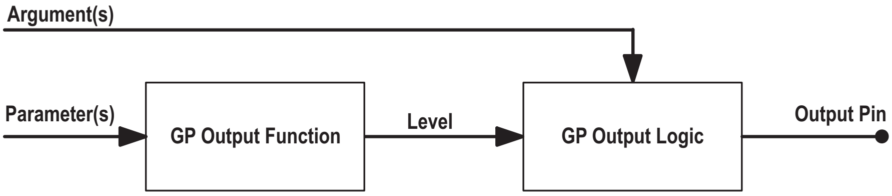
Pin Attributes	Setting
Activate	On
Time	--
Polarity	--
Action	set low and high
Triggered Edge	rising

Pin Attributes	Setting
Activate	On
Time	--
Polarity	--
Action	set low and high
Triggered Edge	falling

Note: In order to avoid inconsistencies, it is recommended to use a GP input in latching mode if a button is used in parallel for the same function.

4.1.2.4.2 GPO

The GP output logic generates an output signal depending on the GP output function, its parameters, and the argument(s).



The parameters described below refer to the corresponding configuration page in the configuration tool.

Label The label of the corresponding frame/GPIO card/output pin is displayed here for reference.

Function Type When touching this button, a menu appears where all available functions can be selected from, as shown above. For a function and parameter description see the table below.

Argument 1...3 Depending on the selected function, one or more parameters contribute to the processing of the output control signal. These can be selected here. For a function and parameter description see the table below.

Time Defines the duration of the pulse at the output pin. Time is only relevant if Triggered Edge is falling or rising.
Possible values are 0 ms or 20 ms...1 s.

Polarity Defines the polarity of the output pin signal: Active high is positive, active low is negative polarity.

Triggered Edge Defines which edge of the input signal causes the **Level** to change: falling, rising, or both.

Activate Used to activate/deactivate an output pin. The **Level** used as input to the GP output function only changes if Activate is On.

Notes: On power up, **Level** is initialized according to the input signal.
Time, Polarity, ***and*** Triggered Edge ***must not be changed while the GP output is active.***
For correct take-over after a modification, it is important to select Activate ***to*** On, ***because it is automatically set to*** Off ***when a modification is made.***

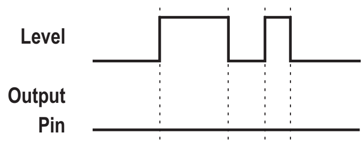
GPO Function	Arguments	Description
TransparentOut	Device ID	Active if the value of the specified parameter is different from zero (this function is normally used for factory testing only). Only 64-bit device ID numbers in hex format are accepted as argument 1 – i.e., 0x followed by 16 digits (e.g. 0x1122334455667788)
LinkOutput	GP Output Pin	Links the GP output to another GPO function
OutputRoutingOut	Partial Output Routing	Active if the cross points of the specified partial output routing are set as specified by ‘string’
ForwardInput	GP Input Pin	Active if the specified input pin is active
SilenceDetection	SilenceDetectionProcess / SilenceDetectionLinkGroup / Any	Indicates the status of the specified silence detection process or link group. In case of ‘Any’, the level of the GPOut function is high as long as at least one of the silence detection processes is in ‘silence detected’ status.
OverloadDetection	OverloadDetectionProcess / OverloadDetectionLinkGroup / Any	Indicates the status of the specified overload detection process or link group. In case of ‘Any’, the level of the GPOut function is high as long as at least one of the overload detection processes is in ‘overload detected’ status.
SilenceSwitcherState	SilenceSwitcherProcess / Any	Indicates the silence detection status of the specified silence switcher process. In case of ‘Any’, the level of the GPOut function is high as long as at least one of the silence switcher processes is in ‘silence detected’ status.
SilenceSwitcher Source	SilenceSwitcherProcess / SilenceSwitcherLinkGroup / Any	Indicates the source status of the specified silence switcher process. In case of ‘Any’, the level of the GPOut function is high as long as at least one of the silence switcher processes is in ‘alternative source’ status.

Notes:

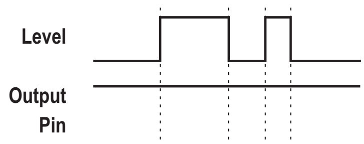
- **TransparentOut Function**
  Active if the value of the specified parameter is different from zero. *This function is normally used for factory testing only.*
  For experts only! Localizing a device ID number requires the ‘Tree Viewer’ application and its handling.
  By entering the address of a parameter (i.e., the device ID number), a particular function may be monitored by a GP output. Only 64-bit device ID numbers in hex format are accepted as argument 1 – i.e., ‘0x’ followed by 16 digits, such as 0x1122334455667788.
- **LinkOutput Function**
  This function can be used to link a GP output to another GPIO function. The linked output may then be set to answer to the same input conditions, but with different logic, such as a pulse signal, whereas the original GP output is a continuous signal.
- **ForwardInput**
  This function can be used to mirror a GP input status of a remote stage box on a GP output of the I/O system, if the remote stage box is connected to the I/O system via a MADI link.

Example 1, Inactive:

If the output is deactivated, the output signal remains constant, regardless of the 'Level' attribute.



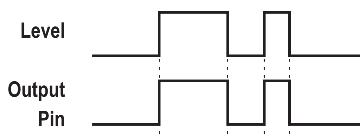
Pin Attributes	Setting
Activate	Off
Time	--
Polarity	positive
Triggered Edge	both



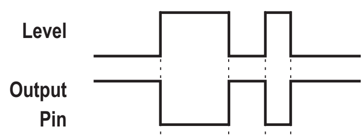
Pin Attributes	Setting
Activate	Off
Time	--
Polarity	negative
Triggered Edge	both

Example 2, Normal Output Mode:

To make the output follow the 'Level' attribute, the 'Active' attribute must be set, and the 'Triggered Edge' attribute must be set to 'both'. The 'Time' attribute is ignored in such a case.



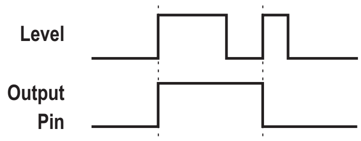
Pin Attributes	Setting
Activate	On
Time	--
Polarity	positive
Triggered Edge	both



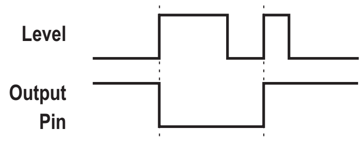
Pin Attributes	Setting
Activate	On
Time	--
Polarity	negative
Triggered Edge	both

Example 3, Latching Mode:

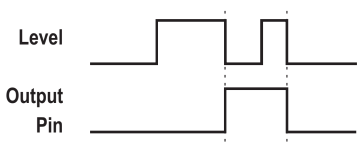
To get the level latched at the output pin, the 'Triggered Edge' attribute must be set to either 'rising' or 'falling', the 'Time' attribute must be 0 ms.



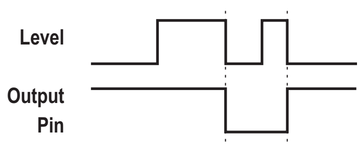
Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	positive
Triggered Edge	rising



Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	negative
Triggered Edge	rising



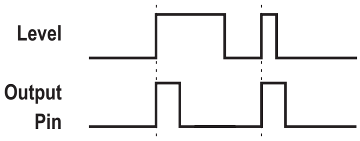
Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	positive
Triggered Edge	falling



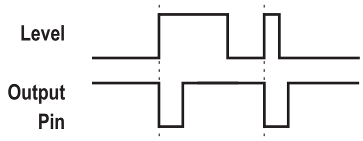
Pin Attributes	Setting
Activate	On
Time	0 ms
Polarity	negative
Triggered Edge	falling

Example 4, Pulse Output Mode:

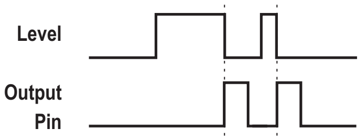
To get a pulse at the output pin, the 'Triggered Edge' attribute must be set to either 'rising' or 'falling', the 'Time' attribute (> 0 ms) defines the pulse duration.



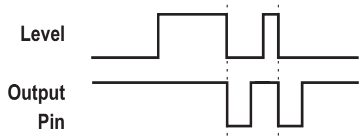
Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	positive
Triggered Edge	rising



Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	negative
Triggered Edge	rising



Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	positive
Triggered Edge	falling



Pin Attributes	Setting
Activate	On
Time	> 0 ms
Polarity	negative
Triggered Edge	falling

4.1.2.5 VUCP Bits

D21m AES and MADI interfaces comply with the AES standard for digital audio – digital input-output interfacing.

0 … 3	4 … 27	28			31
Preamble	LSB 24-bit audio sample word MSB	V	U	C	P

(a)

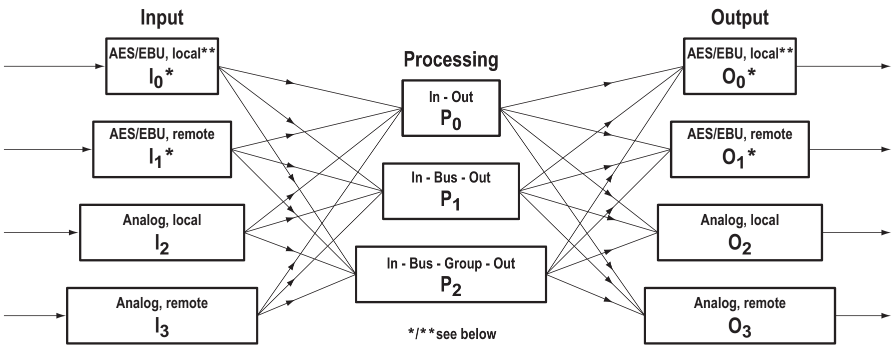
V Validity bit
U User data bit
C Channel status bit
P Parity bit

Bits 28…31 are set to the following default values at the output:

Bit	Default Value	Details
Validity	0	Audio sample word is suitable for conversion to an analog audio signal
User Data	0	User-specified content
Channel Status	0	Sampling frequency, emphasis, lock, etc.
Parity	1	Detection of an odd number of errors resulting from malfunctions in the interface

4.1.3 Input/Output Delays

The different I/O cards cause different delays. Several facts require additional consideration. Total I/O delay is the sum of the delays given in the tables below and depends on configuration.



D21m I/O

Block	Samples	48 kHz [µs]	44.1 kHz [µs]
I_0 */**	0	0	0
I_1 *	7	146	159
I_2	38	792	862
I_3	45	938	1021
O_0 */**	0	0	0
O_1 *	4	83	90
O_2	28	583	635
O_3	32	667	726

* Enabled input and output SFCs each cause an additional delay, depending on input and output sampling frequencies – for details refer to chapter 4.1.3.1.

** Local MADI, ADAT, and TDIF interfaces have approximately the same delay as the AES/EBU interface (±1...2 samples)

Processing (SCore Live)

Block	Samples	48 kHz [µs]	44.1 kHz [µs]
P_0	16	333	362
P_1	34	708	771
P_2	47	979	1066

4.1.3.1 Additional SFC Delay

Enabled input and output SFCs each cause an additional delay (D) depending on the input and output sampling rates (f_{S_IN} and f_{S_OUT}).
Input and output delays can be calculated using the two formulas below:

$$[1]\ f_{S\_IN} > f_{S\_OUT}:\ D = \frac{16}{f_{S\_IN}} + \frac{32}{f_{S\_OUT}}\ [s] \qquad [2]\ f_{S\_OUT} > f_{S\_IN}:\ D = \frac{48}{f_{S\_IN}}\ [s]$$

Example: *For a 96 kHz input signal and a 48 kHz system clock (i.e., the input SFC's output), the input delay is **40 output samples** or 833 µs (formula [1]).*

4.1.3.2 Additional Processing Delay

Processing Block	Delay	Comment
Limiter	1 ms	if active (look ahead)
Core-Core MADI Link	17 samples	–
Assignable Process	5 samples	e.g. fader, delay, etc.

4.2 Control

Route 6000 supports standard communication protocols in order to allow integration with various existing controllers for a routing system. Furthermore, Route 6000 supports integration with Studer OnAir consoles. This means that Route 6000 can be operated directly, either on an OnAir Main Screen (ext. Router Control), an OnAir Fader Assign Module or an OnAir Channel Screen.

4.2.1 OnAir Main Screen

Predefined groups of Route 6000 sources may be routed directly to a selected fader of an OnAir 2500 or OnAir 3000 desk.

4.2.2 OnAir Fader Assign Module

Hardware keys of OnAir 3000 fader assign modules or of the OnAir 2500 central section may be configured to remotely execute a predefined partial output routing snapshot on the Route 6000. Such an output routing snapshot may e.g. route the program output of the desk to a specified transmission line. To safeguard unintended switching, the key may be secured with a second 'enable' key. Even assignable processes may be inserted in such a way.

4.2.3 OnAir Channel Screen

VSM panel software (see chapter 5.2.1.2) can run directly on an OnAir Channel Screen since the latter is available with a switch-selectable DVI input (order no. A943.0414). The VSM panel software is freely configurable. It may for instance provide information about which studio is currently on air, or for directly operating Route 6000 with the touch screen functionality.

4.2.4 Hardware Panels

Route 6000 supports the Pro-Bel interfaces SW-P-02 and SW-P-08 over serial interfaces or TCP/IP (see also chapter 5.2.4.1). This ensures that it can be controlled by many third party manufacturers of router control systems.
For parameter control, 'Ember' is implemented (for details, refer to chapter 5.2.4.2).
Route 6000 is closely integrated with Virtual Studio Manager (VSM), a comprehensive router control system of L-S-B Broadcast Technologies GmbH in Germany. See chapter 5.2.1.2 for several additional possibilities for controlling Route 6000 via VSM.

4.2.5 Computer

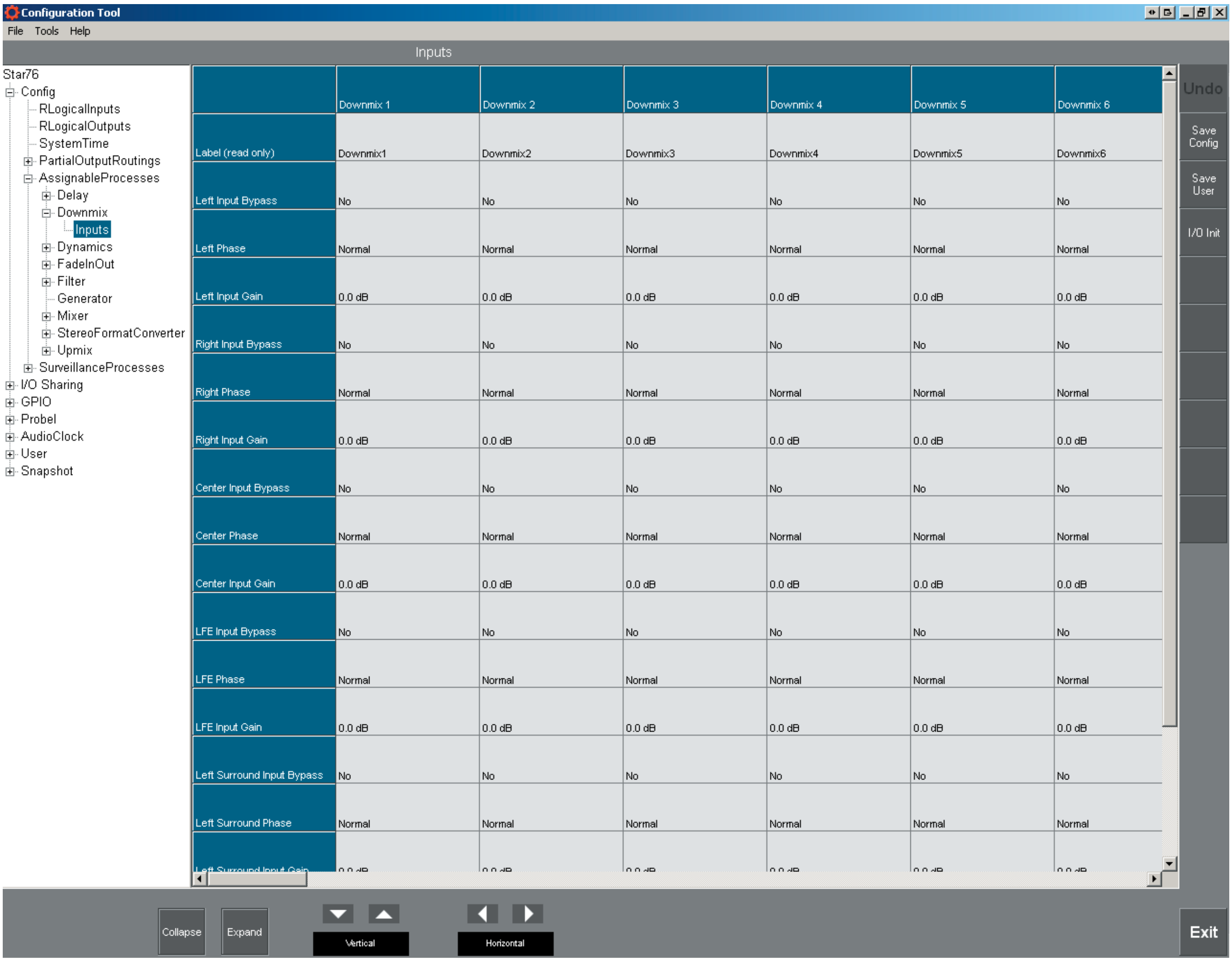
Since every participant of a Route 6000 system is connected using TCP/IP, any computer or touch panel may serve as a control panel for Route 6000. For specific applications see chapter 5.

5 SOFTWARE

Route 6000 is based on Studer's DNet platform. There are several different applications for configuring, operating and surveying the Route 6000 system that are already used for OnAir 3000 consoles.

5.1 Configuration

5.1.1 Remote Configuration Tool



The remote configuration tool (ConfigTool) provides a user interface for managing and changing a configuration of several DNET applications, such as Route 6000, OnAir 2500, OnAir 3000 and Vista I/O Sharing. It can be used anywhere within the system's network.

The application appears in a divided-window view. On the left, a tree view allows navigation through different configuration sections. Some of them contain sub-branches. Once a configuration section is selected, the according parameters are displayed in the right window and can be edited there. The configuration is performed live on the routing system and can be saved after editing. Unsaved changes will be discarded after the next restart of Route 6000. Additionally, the ConfigTool allows updating of the bridge card firmware of the SCore Live.

5.1.1.1 Editing Labels

The ConfigTool also supports import and export of all Route 6000 labels using CSV-formatted files. A CSV-formatted file is an implementation of a delimited text file that uses a tab (originally a comma) for value separation. Providing such files allows editing labels easily in an editor of the user's choice (e.g. Excel).
The label size may exceed 8 characters; numbers, letters and + - _ / ( ) # < and > characters are allowed. If however OnAir 2500/3000 are present within the routing network, the labels will be truncated to 8 characters. A 'Test Signal' will be displayed as 't Signal' on OnAir 2500 or OnAir 3000 consoles.
All supported labels are given in the table below.

Product	Inputs	Outputs	Assignable Processes
OnAir 3000	Logical Inputs	Logical Outputs	–
	Patch Inputs	Patch Outputs	
OnAir 2500	Logical Inputs	Logical Outputs	–
Route 6000	RLogical Inputs	RLogical Outputs	Delays
			Downmixers
			Dynamics
			Fade Ins/Outs
			Filters
			Generators
			Mixers
			Stereo Format Converters
			Upmixers
			Silence Detectors
			Silence Detection Groups
			Silence Switchers
			Silence Switcher Groups
			Overload Detectors
			Overload Detector Groups

5.1.1.2 Editing Routable Sources

Every Pro-Bel controller session has a list of routable sources configured (see also chapter 5.2.4.1). For easy editing of routable sources, a CSV-formatted file can be created 'Tools – Export Labels'. This file can be edited with an editor of your own choice: Delete all sources you should not be routable sources. Save the file and reimport it using 'Tools – Import Routable Sources'. This process must be performed for every controller session.

5.1.1.3 Parameter Control

The 'gain', 'phase' and 'bypass' output parameters, as well as all assignable process parameters (such as the brickwall limiter's threshold) can be adjusted in the ConfigTool as well. This is just intended for the configuration of default parameters. It may be used 'online', too, in case no other user interface should be available, but it is not intended for use in the daily workflow.

5.1.1.4 Partial Output Routing Snapshots

A partial output routing snapshot allows setting, clearing or changing single crosspoints without touching the rest of the console's output matrix. The ConfigTool facilitates the configuration of one or more cross points and a label for every partial output routing snapshot. During operation, a partial output routing snapshot is recalled by pressing an OnAir desk key or by using one of its GP Inputs. When pressing an 'output routing' desk key, its associated partial output routing snapshot is loaded. The desk key is illuminated as long as the pre-defined cross points for that partial output routing snapshot are set accordingly.

There is a simple security function that prevents from accidental recalls of partial output routing snapshots. Every partial output routing snapshot allows the use of an additional 'enable' key that has to be pressed simultaneously with the 'recall' key. This is also configurable in the ConfigTool.

Output Routing Snapshots can be used for applications such as:

- Monitoring Selectors
- Transmission Control
- Studio Sharing (refer to chapter 7)

Possible sources are:

- All RLogicalInputs (RLI)
- All RLogical Outputs (RLO)
- All assignable processes

Possible destinations are:

- All RLogical Outputs (RLO)
- All assignable processes

5.1.1.5 User Privileges

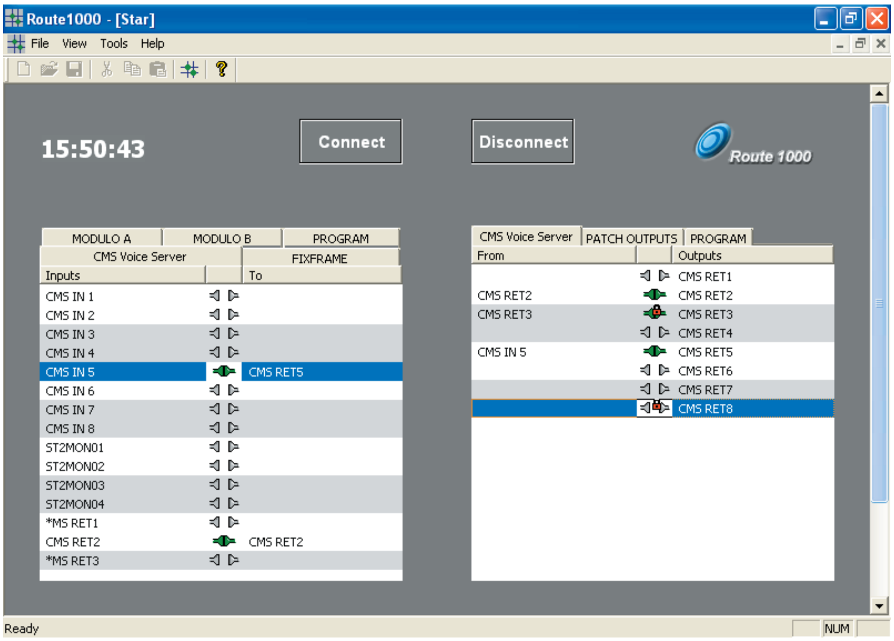
The ConfigTool may be accessed only after entering an administrator password.
The factory default administrator password is '**admin**'. Please note that the passwords are case sensitive.

5.2 Router Control

5.2.1 User Interfaces

5.2.1.1 Route 1000

Route 1000 is a standalone Windows application that allows the control of Route 6000 or OnAir 3000 cores via Studer's proprietary DNET communication. It mainly connects or disconnects inputs or outputs. It can also lock outputs and handle inputs of distant mixing consoles.



The left part of the window lists all input signals and their destinations. The right part of the window lists all output signals and their sources. All sources and destinations of the selected router core are available. The labels are requested directly from the router core via DNET. Any desired groups of inputs or outputs can be defined. Outputs may be locked.

5.2.1.2 Virtual Studio Manager (VSM)

For controlling the system, Route 6000 is closely integrated with Virtual Studio Manager (VSM), a control interface of L-S-B Broadcast Technologies GmbH in Germany. VSM is a client/server application with a centralized connection between Route 6000 and the VSM server and, on the other hand, a decentralized control via customizable hardware or software panels.

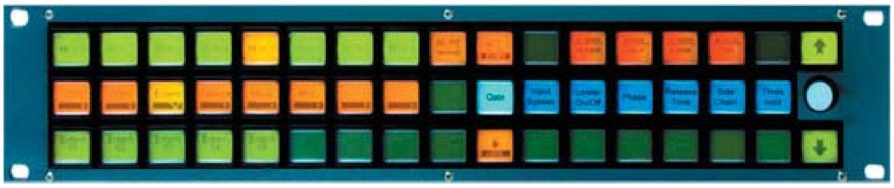
VSM utilizes a Pro-Bel interface for crosspoint switching, and Ember for controlling and setting parameters of the DSP functions.

The panels either consist of multiple RGB LCD keys combined with rotary encoders in rack-mount or table-top format (hardware panels), or configurable software panels running low to high screen resolutions. VSM also allows the transfer of labels between the controlled devices and the control panels.

HW Panel Examples

Desktop Panel

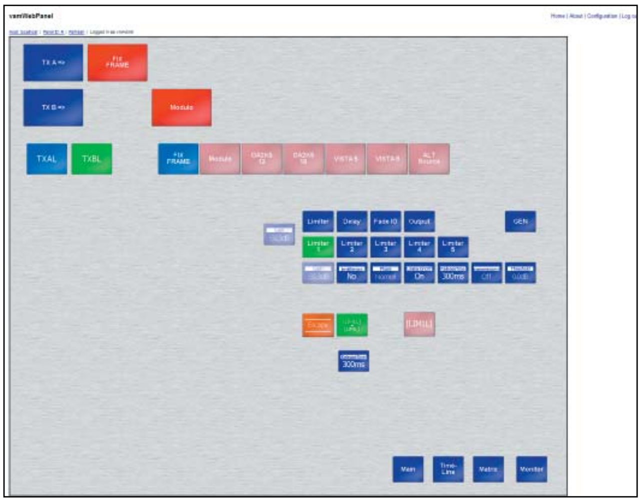
Rack-mount Panel



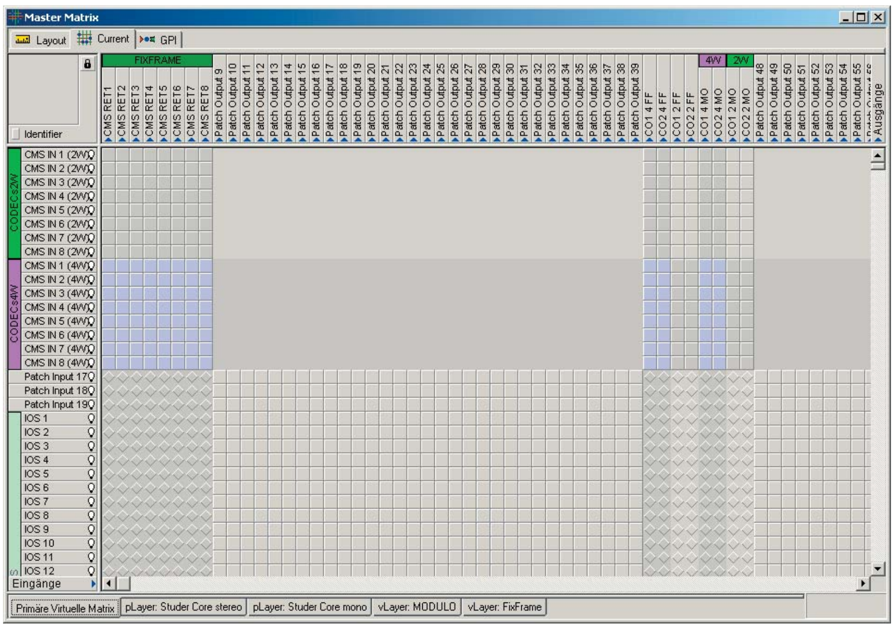
SW Panel Examples

Touch Screen

Web Panel

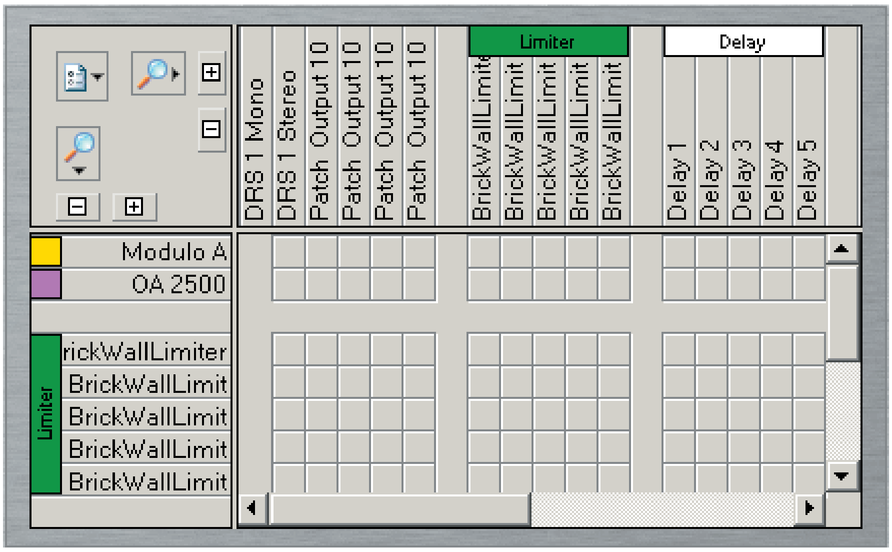


VSM is capable of creating signal groups, where two or more signals are attached to each other; an action on any of these signals, such as setting a crosspoint, forces the attached signals to follow. This allows connecting a 5.1-channel signal as well as its related stereo and mono downmixes to suitable corresponding outputs with one single action.

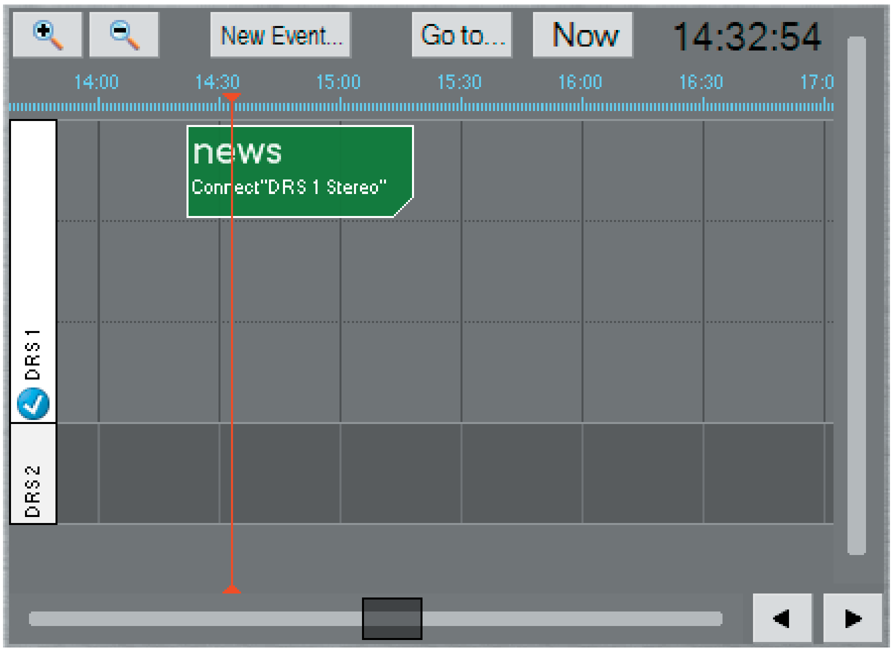


Via VSM interfaces it is not only possible to set crosspoints within Route 6000, but also to assign router DSP processes to inputs or outputs and to adjust process parameters, using hardware items like keys or rotary controls or software items like on-screen sliders e.g. to set an output gain value.

It is also possible to create customized matrix views that represent only the individual inputs and outputs, e.g. for a specific production suite.



With the VSM Scheduler, individual events can be scheduled and executed, even on a regular basis and combined with a comprehensive conflict management system.



In addition, VSM interfaces with many other applications in both video and audio domains; it therefore offers a variety of interfaces. From the operational point of view, different applications can be operated in a joint way. Using different layers within VSM allows distinguishing video from audio applications, but it is easy to link actions through all layers.

For security purposes, the VSM server can be covered by two or more redundant servers providing a seamless control takeover without any perceivable effect to the connected clients or to the connected Route 6000.

Software Options

In order to downsize the complexity, VSM Studio can be tailored to the customer needs by selecting only those software options which are necessary for a particular project. These options are reflected in the Route 6000 Calculation Tool as well.
(Rows in the table below with text in grey contain features that are usually uncommon for the control of a Route 6000).

Function	Description
Signal path entries (small)*	This parameter defines the basic size of the system. Each input and each output counts (total number of all mono-equivalent input and output channels of routing matrix – small: up to 128)
Signal path entries (medium)*	This parameter defines the basic size of the system. Each input and each output counts (total number of all mono-equivalent input and output channels of routing matrix – medium: 129 to 2048)
Signal path entries (large)*	This parameter defines the basic size of the system. Each input and each output counts (total number of all mono-equivalent input and output channels of routing matrix – large: ≥ 2049)
* Example for signal path entries: For a CD Player, you count two entries, CD left and right. For a VTR, you may have many more: two entries for VTR in and out SD, two for HD, 16 for Audio.	
Control Ports	Total number of 3rd-party devices (ports) that the VSM system should control (e.g. Route 6000 w. one core = 1; Route 6000 w. two cores in redundant configuration = 2, etc.)
Control Ports for Multiviewer	With the Multiviewer option, VSM allows to have 10 interfaces per control port. For example: With two control ports for an Axxon Multiviewer, you can control 20 cards. This feature is typical for video router applications.
vLayer	With 'virtual Layer' enabled, the VSM system actually acts like a router, remote controlled by a 3rd-party device. For example, to control the VSM system from a Studer OnAir 3000 audio console or another external Pro-Bel controller, this function must be enabled. Can be enabled or disabled.
Event Scheduler	The event scheduler is a simple tool used to set cross-points in a time-controlled way. Advanced features like collision detection and protected mode are not available. Example: This is a standard MCR scheduler feature to make sure that time-wise repeated cross-point action is taking place. When the event is created, the recurrences can be scheduled for 100 years. It is only possible to set the START TIME. Can be enabled or disabled.
Presentation Bus	A time line scheduler per transmission channel (e.g. for 1 stereo transmitting channel). Includes collision detection, gap control and automated gap filling. For each single event, various actions (cross-points, timers, set parameters) can be assigned to various points in time (start of pre-roll, start of event, end of event, end of post-roll). For example, this scheduler is used for automated playout or for advanced MCR scheduling.
Router Bus	Time line scheduler that includes collision detection for up to ten transmission channels (e.g. 10 stereo transmitting channels). In each event, various actions (cross-points, timers, set parameters) can be assigned to various points in time (start of pre-roll, start of event, end of event, end of post-roll). For example this scheduler is used for automated playout or for advanced MCR scheduling.
RFID Tag	Enables Radio Frequency Identification system. The optionally available RFID Tag Reader can be connected through RS-422 port to any LBP series panel. If someone brings up a known RFID tag card in front of the reader, the panel comes up with a special configuration assigned to this card and jumps back to the previous configuration after a default time, or remains still at this panel if desired. This feature is predominantly used by maintenance staff (RFID hardware is not included).
Views	This is an XY matrix view related to a device, a location or a logical function. A view can be created for any available signals in the signal path list. For example, to have a clear picture of the audio channel of one VTR and a quick access for channel swapping, this feature may help. Can be enabled or disabled

Function	Description
Storage Groups	Storage groups are ‘folders’ containing multiple destinations (outputs). For each storage folder an unlimited number of storage discs may be created that contain different snapshots of the cross-point settings (Salvos) for the specified destinations. Additionally, signal parameters are stored in storage groups as well. Storage groups are predefined in the configuration. The storage discs can be preconfigured or can be recorded and saved during operation. For example, one can save the whole production setup for a studio or the whole mobile truck: Cross-points, signal parameters etc., and recall this entire setup by pressing a single button, by a mouse click or as a scheduled event. Can be enabled or disabled.
Referenced Gadgets (up to 50)	Parameters (Gadgets) (up to 50) out of the Gadget list, which are accessed at the same time, e.g. on hardware or software panels, are so called Referenced Gadgets. Example: Route 6000’s delay process can be controlled by two parameters – Delay On/Off and Delay Time. If you want to have both parameters accessible at once, 2 referenced gadgets are required. This feature allows up to 50 gadget parameters to be controlled at a time. Can be enabled or disabled
Referenced Gadgets (up to 500)	Same as above, but up to 500.
Referenced Gadgets (unlimited)	Same as above, but unlimited.
vSignals	With this feature enabled, one can create virtual re-entries in the router. Example: The physical source CCU1 is connected to the virtual signal CAM1. If CCU1 fails, you connect CCU2 to CAM1. No reassign of the user panels or the vision mixer is needed, this happens automatically by changing the physical source to CAM1.
Pseudo Devices	A signal bundle consisting of video, audio and time code is a ‘Pseudo Device’. If a signal bundle is connected to another signal bundle, all signals which are available on both ends will be connected. Example: If the audio router appears as a mono router, you need to assign left and right in the pseudo device list for switching in stereo mode. Can be enabled or disabled.
Timers	Additional timer functions, down counter, up counter, start, stop, reset and restart to be displayed on buttons or UMDs and assigned to GPIs or events. Example: To start a down counter automatically 120 seconds before a scheduled event starts (or ends), put the down counter as an END AT action into the scheduled event, and if the checkmark is set, it will start flashing for the last 10 seconds. Can be enabled or disabled.
Tally	The system can act like a tally controller for red, yellow and green tally. Can be enabled or disabled.
Alarms	This function allows the system error logging and report and provides a workflow for alarms including escalation mechanism. Examples: Every single action in the entire system can be assigned to an alarm, and every alarm has a priority. E.g. a GPI input gets an alarm priority of 10 (high priority). If the GPI is active, this alarm will be logged into the alarm database and will be displayed in the “priority 10 table”. Any action assigned to this alarm will be triggered. Can be enabled or disabled.
email and SMS	Interface to the email server as an add-on for the alarm feature (email server is not included – to be provided by the customer). Example: In conjunction with the escalation mechanism of the alarm function, an email and/or SMS will be generated automatically and will be sent to your mail server. Can be enabled or disabled.
GPI	Management of internal, virtual GPIO which can be assigned to physical GPIO, for example on GPIO panel. Note: Every LBP panel has a set of GPIO by default.

5.2.2 Studer RELINK (Resource Linking)

Based on Studer's DNET framework, a system-wide I/O Sharing functionality (Studer RELINK) provides complete routing and control flexibility across networked OnAir and Vista consoles. Different types of multichannel Net-Sources like inputs, summing buses or direct channel outputs are available via the Route 6000 network hub. Multiple Vista or OnAir consoles can take control of other inputs or outputs on other consoles remotely with routing being taken care of centrally. Furthermore, RELINK supports intelligent codec management, remote microphone parameter control, resource management, red-light, loudspeaker cut, fader start, seamless call management system integration, etc.

For detailed information on RELINK please refer to the separate Product Information document (order no. BD10.275210).

5.2.3 Snapshots / Power On

Route 6000 will always start up with the same status that was active before the last shutdown or power failure. Internally, two different snapshot files are distinguished: A *configuration snapshot* and an *operational snapshot*.

The configuration snapshot consists of all configuration data such as labels or input mapping. Basically it contains everything that can be set in the ConfigTool.

The operational snapshot consists of the current router status. It includes e.g. patch points or assignable process parameters.

An intelligent handling of saving snapshots is implemented, which succeeds even if there is a power down while saving the snapshot. These two snapshots are saved to the CF card not later than 10 s after the last status change.

To ensure system consistency, the operational snapshot is saved on the core's Bridge Card and will be loaded immediately after the core start-up. Consequently, within less than 10 seconds after start-up of the core, audio is provided exactly the same as before shutdown. The operational snapshot is saved on the Bridge Card for one week at least thanks to gold cap.

The Bridge Card must not be hot plugged. When replacing the Bridge Card, the new card must be preconfigured with the same IP address as the original bridge card. After having replaced the card, the core has to be restarted.

In case of a Host Card replacement, the CF card has to be moved from the original Host Card to the spare Host Card in order to transfer the configuration data and the operational snapshot.

If the CF card should be faulty, the spare Host Card will start up with the last saved snapshots on the spare card. Therefor a backup of the CF card containing the configuration data and the operational snapshot on a different medium or on a computer HDD is strongly recommended.

5.2.4 Protocols

5.2.4.1 Pro-Bel

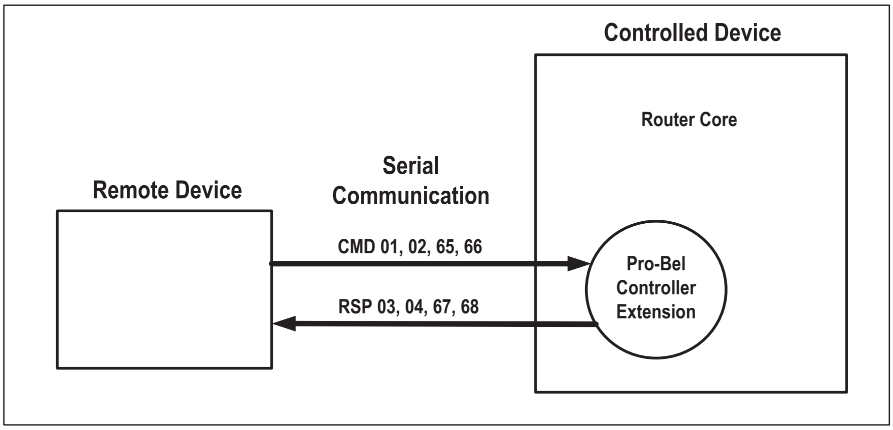
The Pro-Bel General Switcher Communication Protocol provides an interface to set or remove audio connections on a controlled device from remote devices. It provides a fail-safe asynchronous method and is the preferred protocol for crosspoint switching in audio routers.
A remote device can send Pro-Bel messages either through a serial COM port or via TCP/IP.
Route 6000 always acts as a controlled device. It can manage multiple protocols, multiple sessions and multiple physical connections at the same time.
For every session, 'Routable Sources' may be configured in the Remote Configuration Tool. 'Routable Sources' is a subgroup of all available sources and destinations that can be reached via the specified port. Also spontaneous routing updates and labels will only be communicated for the I/O defined in 'Routable Sources'.
The following amounts of inputs and outputs are supported:

- all 1728 RLogicalInputs (RLI)
- all 1728 RLogicalOutputs (RLO) (also as sources, refer to chapter 5.3)
- all 1230 Assignable Processes

For a detailed list of Pro-Bel source and destination numbers refer to Appendix A.

Note: The number of Routable Sources needs to be limited to the required minimum for reasons of system performance. Delete all sources from the selection that are not used by the corresponding session (e.g. no Assignable Processes). For editing Routable Sources please refer to chapter 5.1.1.2.

5.2.4.1.1 SW-P-02

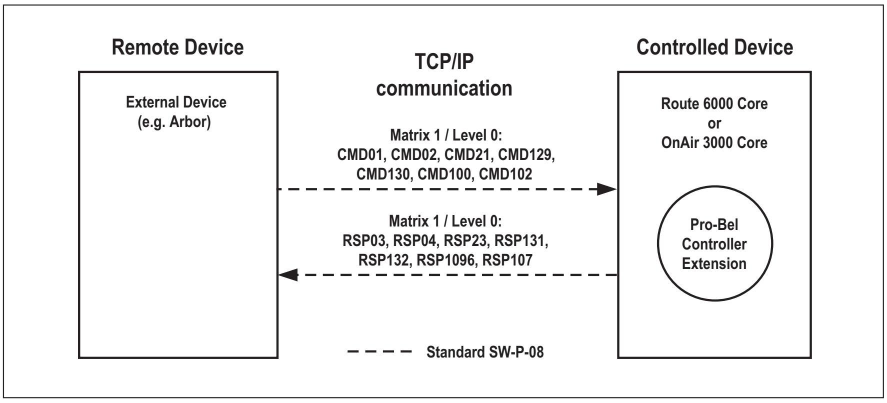


For Route 6000, the following subset of Pro-Bel SW-P-02 commands is implemented:

Remote Device => Route 6000:
CMD 01: INTERROGATE
CMD 02: CONNECT
CMD 65: EXTENDED INTERROGATE
CMD 66: EXTENDED CONNECT

Route 6000 => Remote Device:
RSP 03: TALLY
RSP 04: CONNECTED
RSP 67: EXTENDED TALLY
RSP 68: EXTENDED CONNECTED

5.2.4.1.2 SW-P-08



For Route 6000 the following subset of Pro-Bel SW-P-08 commands are implemented:

Remote Device => Route 6000:
CMD 01: CROSSPOINT INTERROGATE
CMD 02: CROSSPOINT CONNECT
CMD 21: CROSSPOINT TALLY DUMP REQUEST
CMD 129: EXTENDED CROSSPOINT INTERROGATE
CMD 130: EXTENDED CROSSPOINT CONNECT
CMD 100: ALL SOURCE NAMES REQUEST
CMD 102: ALL DESTINATION ASSOCIATION NAMES REQUEST

Route 6000 => Remote Device:
RSP 03: CROSSPOINT TALLY
RSP 04: CROSSPOINT CONNECTED
RSP 23: CROSSPOINT TALLY DUMP (Word)
RSP 131: EXTENDED CROSSPOINT TALLY
RSP 132: EXTENDED CROSSPOINT CONNECTED
RSP 106: SOURCE NAME RESPONSE
RSP 107: DESTINATION ASSOCIATION NAMES RESPONSE

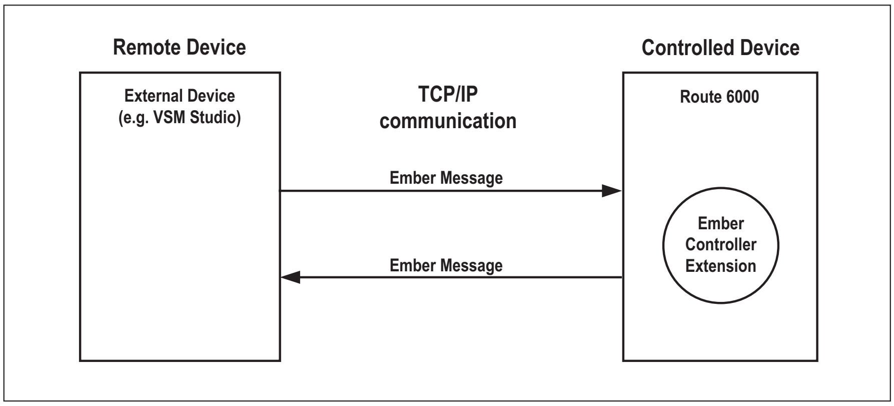
Note: All commands use Matrix 1 / Level 0

5.2.4.2 Ember

Ember provides an interface to access and change parameters of a controlled device from remote devices. A remote device can send messages through TCP/IP using the Ember Communication Protocol. This protocol provides a robust and asynchronous method to get parameters from and set parameters in a router. Ember is a proprietary standard by L-S-B, but open for third-party integration.
Route 6000 always acts as Controlled Device. It can manage multiple sessions and multiple connections per session for redundancy at the same time.

Parameter communication between VSM and Route 6000 via Ember:
- all assignable process parameters (e.g. mic gain)
- labels of all RLogicalInputs, RLogicalOutputs and all Assignable Processes

Note: For a detailed list of all parameters communicated via Ember refer to Appendix C.



Ember has been designed to provide the following assets:
1. Conformity with a well-known and widely adopted standard
2. Compact size of the encoded data to minimize transmission load
3. Platform independency
4. XML-like flexibility
5. Binary saving of values for fast encoding and decoding

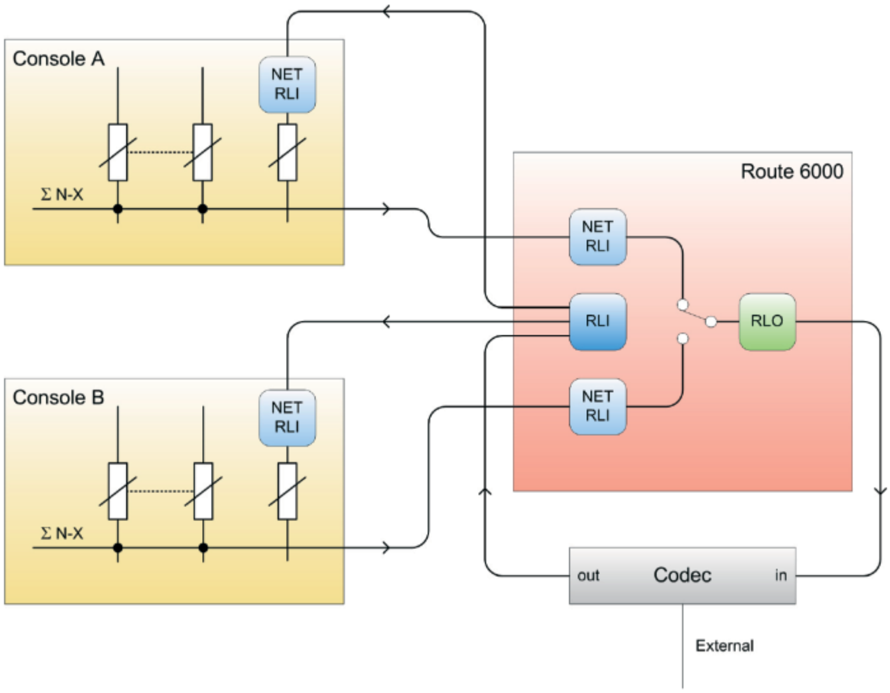
Ember forms a subset of the Basic Encoding Rules (BER), an ITU and ISO standard developed by the ASN.1 consortium (ASN.1: ITU-T X.680, ISO/IEC 8824-1; BER: ITU-T X.690, ISO/IEC 8825-1).

ASN.1 and BER are used by widely adopted technologies and standards, such as
- LDAP, Active Directory
- PKCS (Public Key Cryptography Standard)
- X.400 Electronic Mail
- Voice over IP
- SNMP
- UMTS

5.2.5 Codec Management

The Codec Management of Route 6000 allows attaching codecs to the router directly instead of installing them in the studios. Once again, RELINK provides an intelligent, system-wide solution for consuming and returning codec signals by OnAir consoles. Any number of consoles can consume the codec's signal at the same time, but only one can provide its N–X bus back to the codec's input.

Basically, if a codec input is on a fader, the corresponding return line (N–X) can be connected automatically or manually to the codec output (RLO). Depending on the CodecReturnLineActivation mode of a codec input, different operation scenarios are possible:



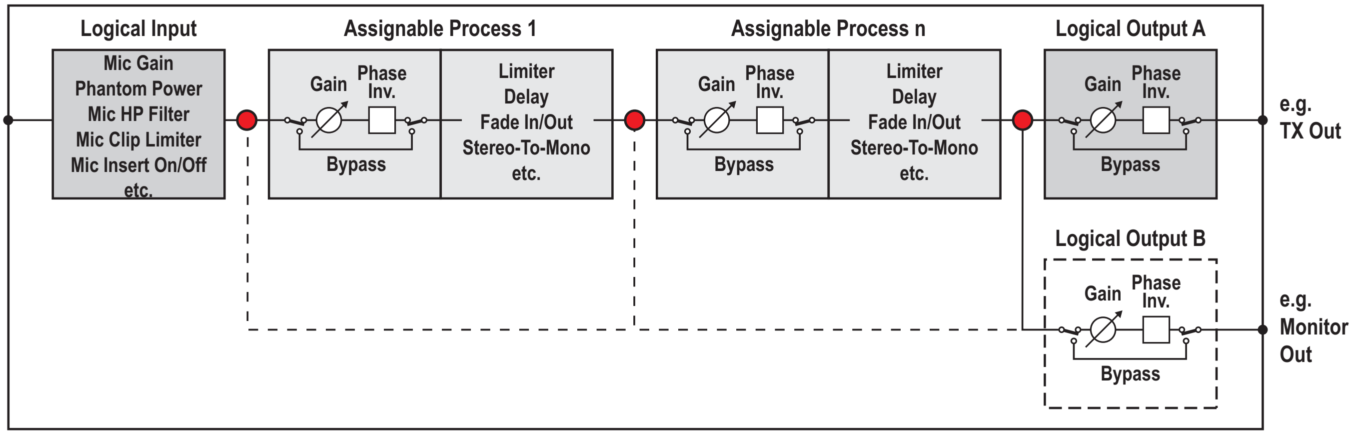
2-Wire Connection: If a codec input is assigned to a fader, the console only consumes a specific Codec Output. No N–X is returned.

Conditional 4-Wire Connection: If a codec input is assigned to a fader, the operator is able to overwrite the return line from another console, but he has to confirm it.

Forced 4-wire Connection: If a codec input is assigned to a fader, the codec return line is occupied without any user interaction and regardless whether it is used by another console or not.

Studer OnAir consoles (OnAir 2500 and OnAir 3000) fully support codec management. A 4-wire switch over can be executed directly in the console's fader module. A key light shows the current status of a specific codec (attached to Route 6000), and the display shows the name of the desk container currently using the requested return line output. In case of a forced take-over, a user warning will appear on the main screen of the desk that lost the N–X return line.
Since the RLogicalInputs and RLogicalOutputs are mono, only mono return lines are handled.

5.3 Monitoring



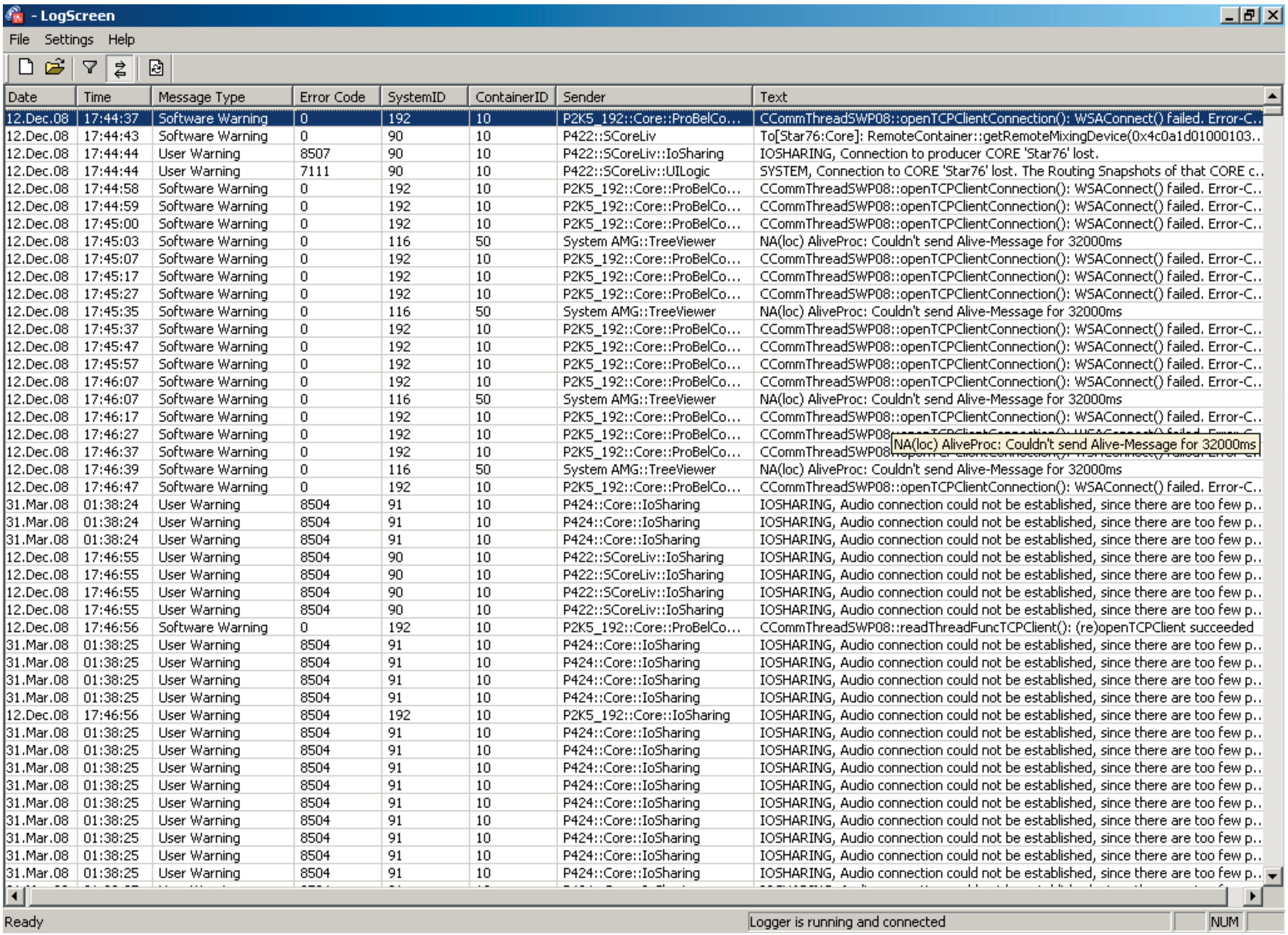
Nearly any position within the signal flow is accessible for audio monitoring (red dots in the diagram above). It is possible to listen to logical inputs, to signals after or even between assignable processes (dashed lines in the diagram). In addition, outputs may be linked (solid line in the diagram).
This means that e.g. a transmission output may be linked to a second, additional monitoring output (Logical Out B). This output then consumes the TX Out signal before it leaves the TDM bus to be converted to any output format. This revolutionary way of output monitoring allows listening exactly to what is really sent to Logical Out A (TX Out) and the D21m I/O system. Furthermore, it makes the need for tie lines obsolete and has no effect on the available I/O count.

5.4 Surveillance

Route 6000's system health is monitored via the central LogScreen application as well as via Simple Network Management Protocol (SNMP). The SystemViewer application gives you an overview of all running DNET based systems within the network. The MUSiC (MUlti Signal Control) application takes care of important outputs such as transmission lines. It will alarm in case of audio loss (visually and acoustically) and even command the Route 6000 to switch over to an emergency source.

5.4.1 Logger/LogScreen

The logger is a standalone Windows application that normally runs on a central computer. The same logger is also used for OnAir 3000 and OnAir 2500, meaning that one single central logging application for all these systems is offered.



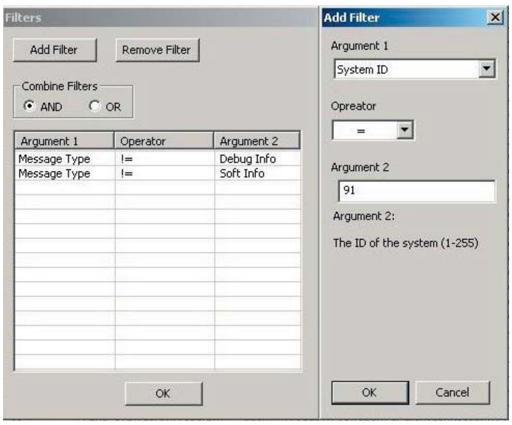
Date	Time	Message Type	Error Code	SystemID	ContainerID	Sender	Text
12.Dec.08	17:44:37	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:44:43	Software Warning	0	90	10	P422::SCoreLiv	To[Star76:Core]: RemoteContainer::getRemoteMixingDevice(0x4c0a1d01000103..
12.Dec.08	17:44:44	User Warning	8507	90	10	P422::SCoreLiv::IoSharing	IOSHARING, Connection to producer CORE 'Star76' lost.
12.Dec.08	17:44:44	User Warning	7111	90	10	P422::SCoreLiv::UILogic	SYSTEM, Connection to CORE 'Star76' lost. The Routing Snapshots of that CORE c..
12.Dec.08	17:44:58	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:44:59	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:00	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:03	Software Warning	0	116	50	System AMG::TreeViewer	NA(loc) AliveProc: Couldn't send Alive-Message for 32000ms
12.Dec.08	17:45:07	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:17	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:27	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:35	Software Warning	0	116	50	System AMG::TreeViewer	NA(loc) AliveProc: Couldn't send Alive-Message for 32000ms
12.Dec.08	17:45:37	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:47	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:45:57	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:46:07	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:46:07	Software Warning	0	116	50	System AMG::TreeViewer	NA(loc) AliveProc: Couldn't send Alive-Message for 32000ms
12.Dec.08	17:46:17	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
12.Dec.08	17:46:27	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08
12.Dec.08	17:46:37	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08
12.Dec.08	17:46:39	Software Warning	0	116	50	System AMG::TreeViewer	NA(loc) AliveProc: Couldn't send Alive-Message for 32000ms
12.Dec.08	17:46:47	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::openTCPClientConnection(): WSAConnect() failed. Error-C..
31.Mar.08	01:38:24	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:24	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:24	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:55	User Warning	8504	90	10	P422::SCoreLiv::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:55	User Warning	8504	90	10	P422::SCoreLiv::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:55	User Warning	8504	90	10	P422::SCoreLiv::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:55	User Warning	8504	90	10	P422::SCoreLiv::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:56	Software Warning	0	192	10	P2K5_192::Core::ProBelCo...	CCommThreadSWP08::readThreadFuncTCPClient(): (re)openTCPClient succeeded
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
12.Dec.08	17:46:56	User Warning	8504	192	10	P2K5_192::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..
31.Mar.08	01:38:25	User Warning	8504	91	10	P424::Core::IoSharing	IOSHARING, Audio connection could not be established, since there are too few p..

All activities are written into log files with preconfigured name and path. The "Back-upTime" parameter allows specification of a time interval after which the log file will be backed up. Route 6000 sends system messages via DNET in case of any activities, events, warnings and alarms.

Saved log files can be opened with the LogScreen application for post-processing.

The LogScreen application displays all received log messages. The message data shown in the main window is separated into several columns, showing: date, time, message type, error code, system ID, container ID, sender and error message text.

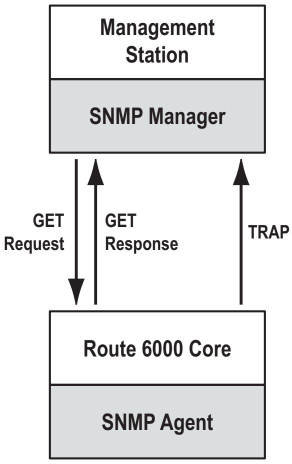
Viewing filters with various filtering arguments may be applied in order to reduce the number of displayed entries. Different filters may be logically linked with AND or OR operators.



5.4.2 SNMP (Simple Network Management Protocol)

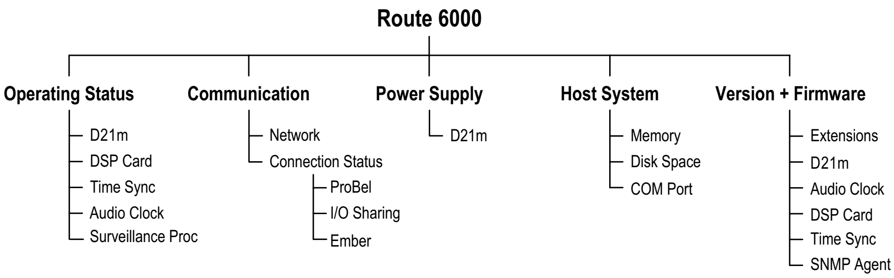
SNMP is used in network management systems for monitoring devices connected to the network for conditions that require administrative attention.
The 'traditional' SNMP management is implemented: The management task is subdivided into two layers – agents and managers. The agents provide management data that is read out and processed by the manager.

Basic Concept



The Route 6000 SNMP implementation allows monitoring a large variety of parameters, including operating status, communication, power supplies, etc. These parameters are called 'managed objects'.

Managed Objects Overview



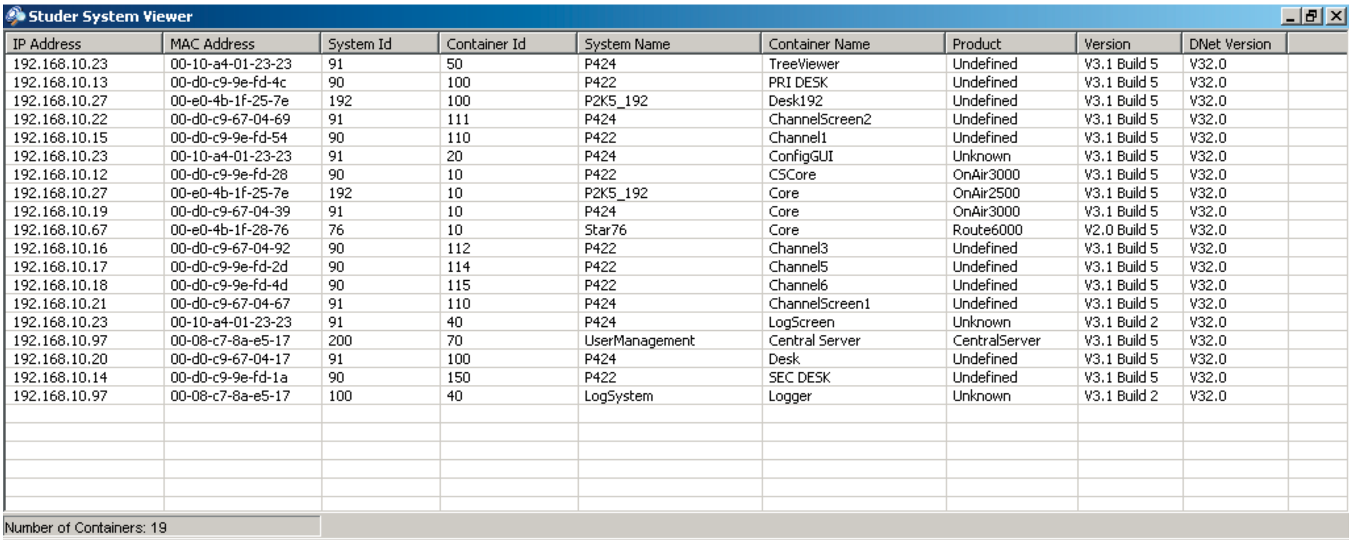
The manager may send requests for any available parameter values. Furthermore, an agent can send information to the network in an active way, as soon as a surveyed parameter exceeds a specified threshold (such as a level). Information sent when exceeding a threshold is called 'trap'. Traps are usually used to transfer critical system messages that need to be sent on an emergency basis. An SNMP manager may analyse traps, monitor messages, and alert or even send an SMS to a specified mobile phone.
A management information base (MIB) describes the structure of the management data for Route 6000. It uses a hierarchical namespace containing object identifiers (OID). Each OID identifies a variable that can be read via SNMP.
Traps are configured in the `snmp.xml` file. A 'limit' and an 'operator' can be defined for each possible managed object. If Route 6000 generates a user message, this may also generate a trap (including message ID, type, text, range, etc.).

SNMP is an integral part of Route 6000. Some information, such as firmware versions or DSP temperatures, are accessible via SNMP only. It is therefore mandatory to have at least one simple SNMP manager installed in every system. Many different SNMP manager softwares are available. If none is present already, an MG-Soft MIB Browser can be provided.

A reference list of all manageable objects (MOs) provided by the 'SNMP Agent' implemented in the Route 6000 is given in Appendix B. This list also specifies the manageable objects that are able to fire traps.

5.4.3 SystemViewer

The SystemViewer is a small application used for visualizing all containers running within a network. It lists Studer OnAir 3000, OnAir 2500, Route 6000 and Vista products.



Studer System Viewer

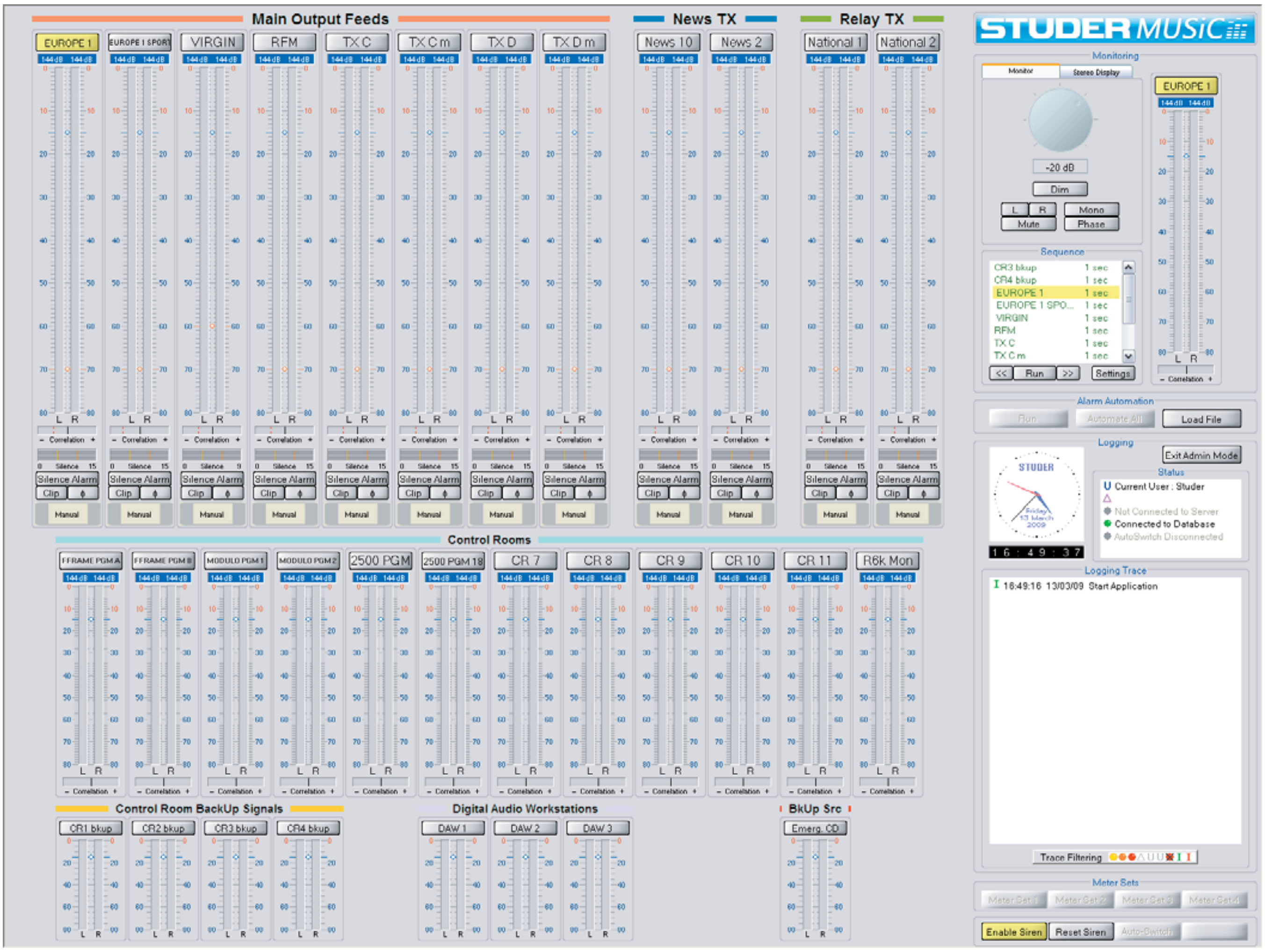
IP Address	MAC Address	System Id	Container Id	System Name	Container Name	Product	Version	DNet Version
192.168.10.23	00-10-a4-01-23-23	91	50	P424	TreeViewer	Undefined	V3.1 Build 5	V32.0
192.168.10.13	00-d0-c9-9e-fd-4c	90	100	P422	PRI DESK	Undefined	V3.1 Build 5	V32.0
192.168.10.27	00-e0-4b-1f-25-7e	192	100	P2K5_192	Desk192	Undefined	V3.1 Build 5	V32.0
192.168.10.22	00-d0-c9-67-04-69	91	111	P424	ChannelScreen2	Undefined	V3.1 Build 5	V32.0
192.168.10.15	00-d0-c9-9e-fd-54	90	110	P422	Channel1	Undefined	V3.1 Build 5	V32.0
192.168.10.23	00-10-a4-01-23-23	91	20	P424	ConfigGUI	Unknown	V3.1 Build 5	V32.0
192.168.10.12	00-d0-c9-9e-fd-28	90	10	P422	CSCore	OnAir3000	V3.1 Build 5	V32.0
192.168.10.27	00-e0-4b-1f-25-7e	192	10	P2K5_192	Core	OnAir2500	V3.1 Build 5	V32.0
192.168.10.19	00-d0-c9-67-04-39	91	10	P424	Core	OnAir3000	V3.1 Build 5	V32.0
192.168.10.67	00-e0-4b-1f-28-76	76	10	Star76	Core	Route6000	V2.0 Build 5	V32.0
192.168.10.16	00-d0-c9-67-04-92	90	112	P422	Channel3	Undefined	V3.1 Build 5	V32.0
192.168.10.17	00-d0-c9-9e-fd-2d	90	114	P422	Channel5	Undefined	V3.1 Build 5	V32.0
192.168.10.18	00-d0-c9-9e-fd-4d	90	115	P422	Channel6	Undefined	V3.1 Build 5	V32.0
192.168.10.21	00-d0-c9-67-04-67	91	110	P424	ChannelScreen1	Undefined	V3.1 Build 5	V32.0
192.168.10.23	00-10-a4-01-23-23	91	40	P424	LogScreen	Unknown	V3.1 Build 2	V32.0
192.168.10.97	00-08-c7-8a-e5-17	200	70	UserManagement	Central Server	CentralServer	V3.1 Build 5	V32.0
192.168.10.20	00-d0-c9-67-04-17	91	100	P424	Desk	Undefined	V3.1 Build 5	V32.0
192.168.10.14	00-d0-c9-9e-fd-1a	90	150	P422	SEC DESK	Undefined	V3.1 Build 5	V32.0
192.168.10.97	00-08-c7-8a-e5-17	100	40	LogSystem	Logger	Unknown	V3.1 Build 2	V32.0

Number of Containers: 19

The SystemViewer application lists all running containers. The message data shown in the main window is separated into several columns, showing IP address, MAC address, system ID, container ID, system name, container name, product, version and DNET version.

5.4.4 MUSiC (Multi Signal Control)

For very sophisticated signal surveillance, Route 6000 may be enhanced with the optional MUSiC application.



MUSiC is a PC-based signal metering application that can be used to show up to 64 stereo meter sets, in customized layouts on up to four large-format LCD screens. Three different types of meter formats are available, which also may be grouped in order to show e.g. all transmission outputs or all studio summing buses.

In a monitoring section, any of the 64 stereo signals can be monitored, selected either manually or in a sequential, automated way.

Each one of the 64 stereo inputs can be assigned to a signal analyzer surveilling level, phase and load for each individual signal. Thresholds and time frames can be set individually for each analyser. Each signal surveillance can trigger three different alarm levels. If signals remain below a specified threshold level for a longer time than predefined, an alarm will be activated; the alarm will enter the next level in case the signal should not return. Any alert is saved in a database. The highest active alarm level will trigger the system's status and set a graphical indication, a GPO as well as an acoustic notification.

With the *Autoswitch* option activated and a signal no longer feeding a specific output, MUSiC is also able to make the router switch over to an alternative signal. Up to three individual, alternative signals may be configured for every custom output set.

6 REDUNDANCY

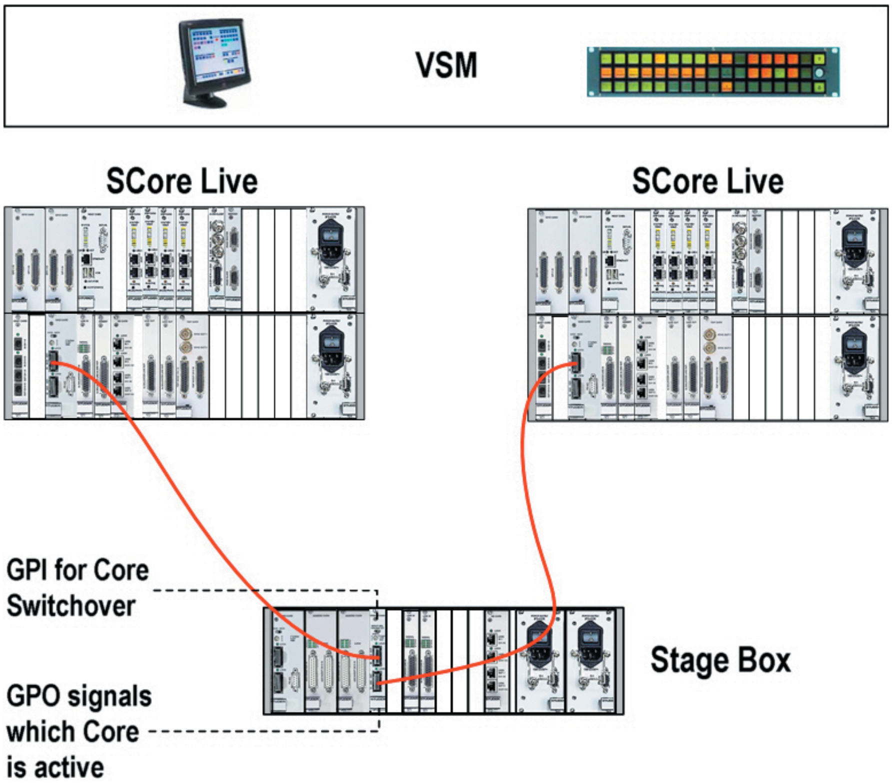
Networking of systems and sharing of hardware resources (e.g. shared I/O, codecs, voice servers) open new perspectives and possibilities for complex projects consisting of several systems. On the other hand, the need for redundancy and total system stability is even much more important than ever before.

In the case that any component of the system may fail, Route 6000
1. Detects the failure (e.g. 'bridge card removed'),
2. Generates a user error,
3. Generates an SNMP trap (if configured).

Since the system must be running 24/7, redundancy provides a safeguard means so that the service of the failed component can be restored in the shortest time possible. A second hardware component will then take over the task of the failed device.

SCore Live and the D21m system support redundant power supplies (hot-pluggable), redundant DSP cards, and hot-pluggable I/O cards. For a major part of the installations this is sufficient; nevertheless, full system redundancy may even be better.

The entire routing system can be covered by a redundant system connected in parallel to the same controlling user interface. The secondary, backup routing system may be designed either in the same layout or smaller.



Both cores 'listen to' and follow all commands sent to them by the control interface in order to have the same settings for all crosspoints and parameters in case of a switchover. The two redundant cores are connected to the same stage box(es) using the MAIN and AUX links of the stagebox MADI HD card(s). A simple GP input will cause the cores to switch over. In a smaller system installation the GPI may be triggered by a simple key switch, whereas in an extended broadcast house a sophisticated SNMP manager may evaluate several SNMP states, apply a complex logic and eventually trigger it. A GP output indicates which core is currently active. The audio signals coming from the stage box invariably go to both router cores (MAIN and AUX), regardless of which one of them is the master currently.

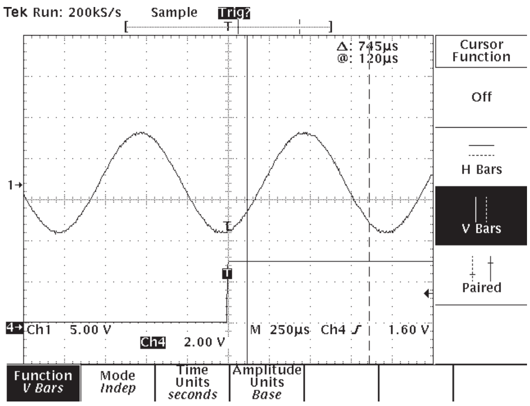
There is no redundancy solution without a single point of failure. In this solution, this point of failure lies in the MADI HD card. However this card has a very simple layout and may in addition be powered by two redundant power supplies.

6.1 MAIN/AUX Switchover Time

The following examples show a 1kHz sinewave signal on a D21m Line Out module. First it is fed by the MAIN input, then by the AUX input of a MADI HD module.

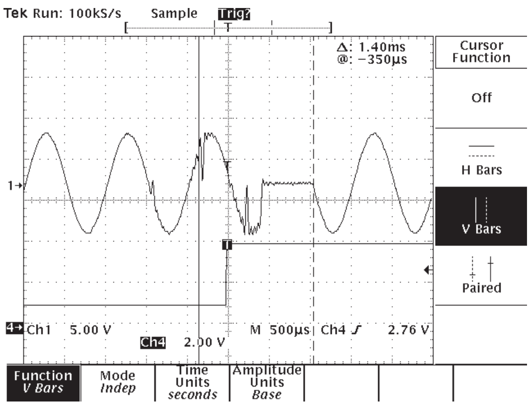
Example 1: (Manually triggered)

Switchover from MAIN to AUX (or vice versa) while both input signals are ok ⇨ no switching time (i.e., less than 1 sample).

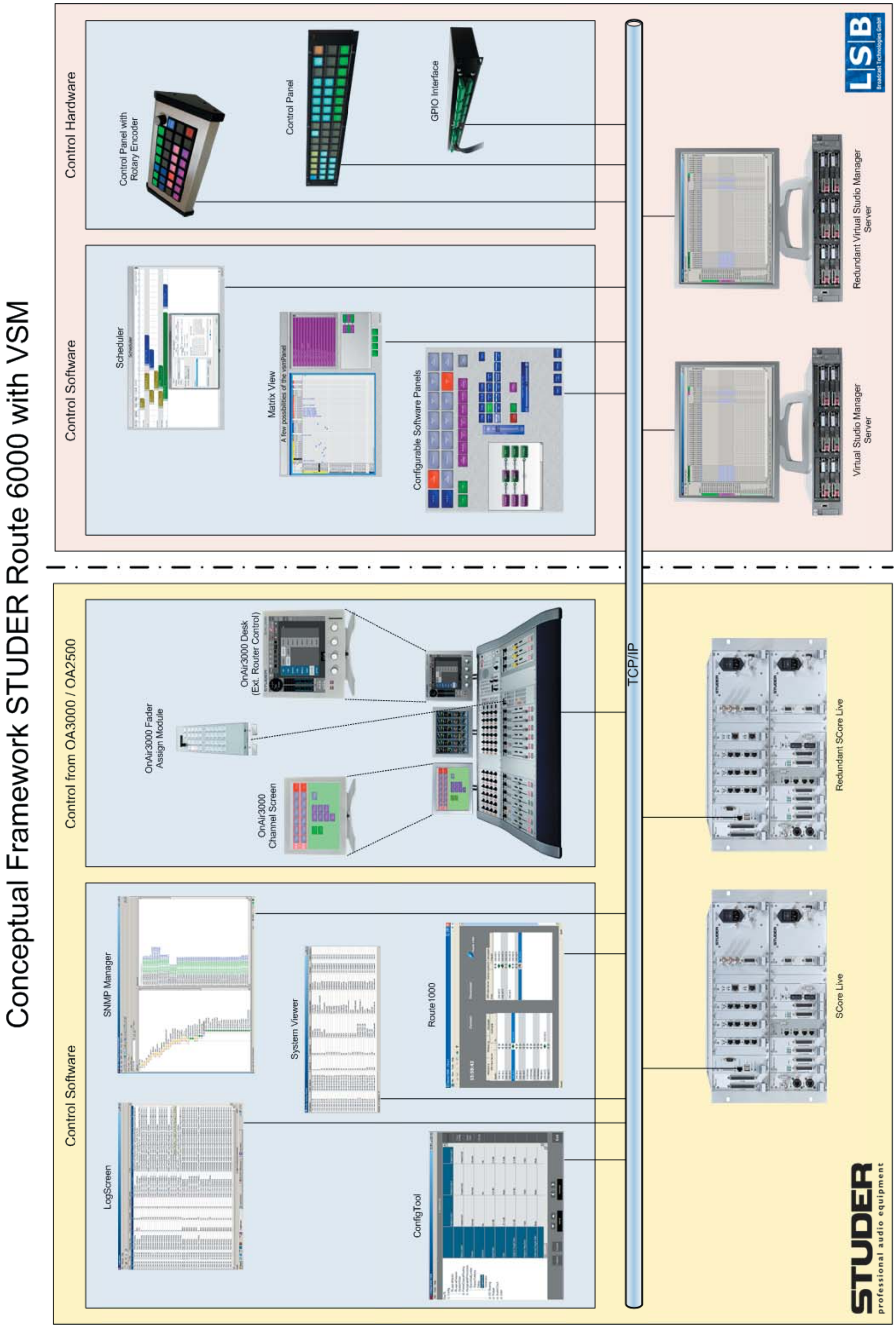


Example 2:

Automatic Switchover from MAIN to AUX (or vice versa) if the currently active MADI input signal is lost ⇨ the switching time is approx. 1.4 ms (< 2 ms) and thus hardly audible.

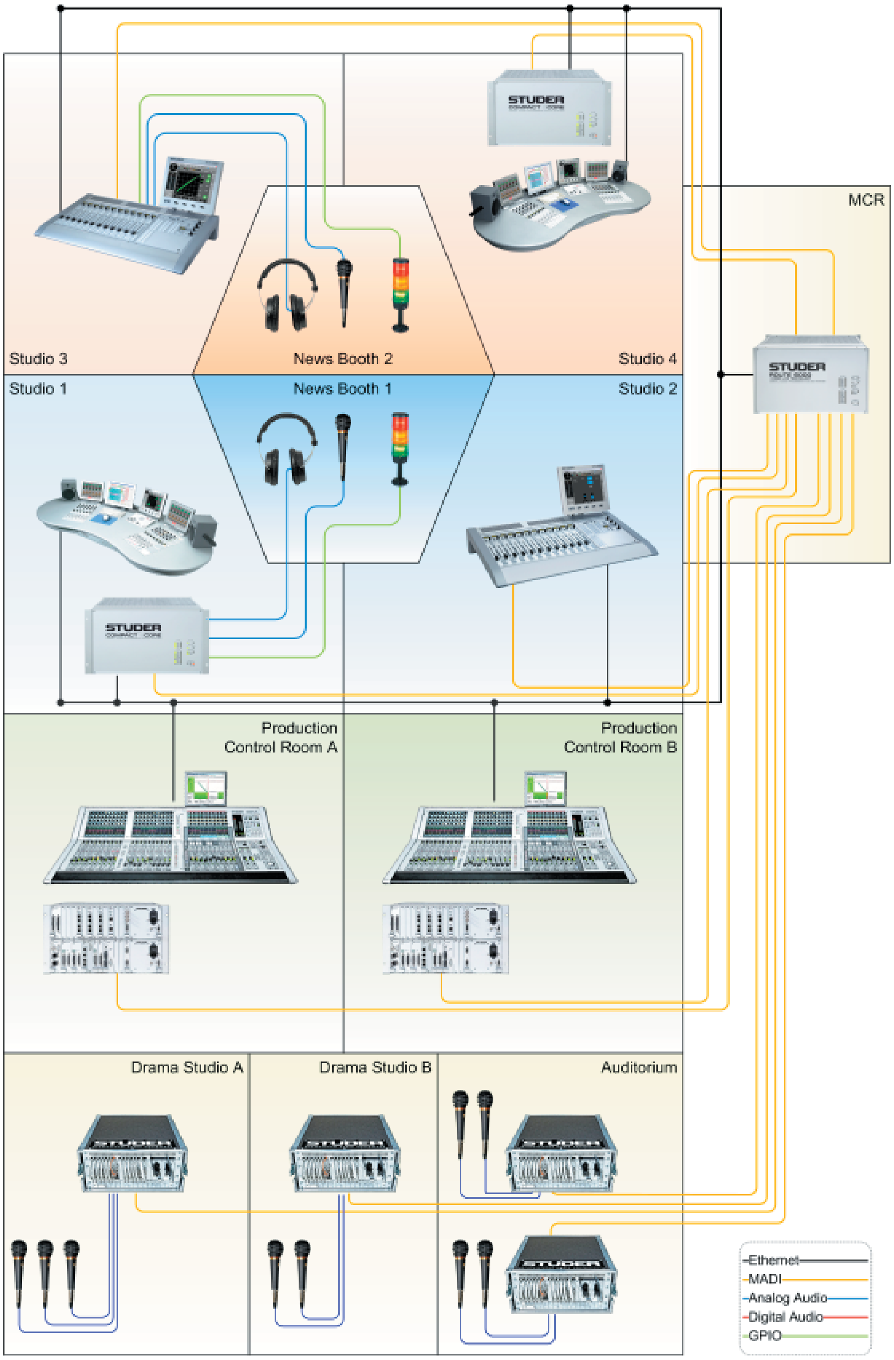


7 INTEGRATION



7.1 Applications

7.1.1 Signal Concentration and Distribution



Example for a Medium-Sized Broadcast/Production Facility

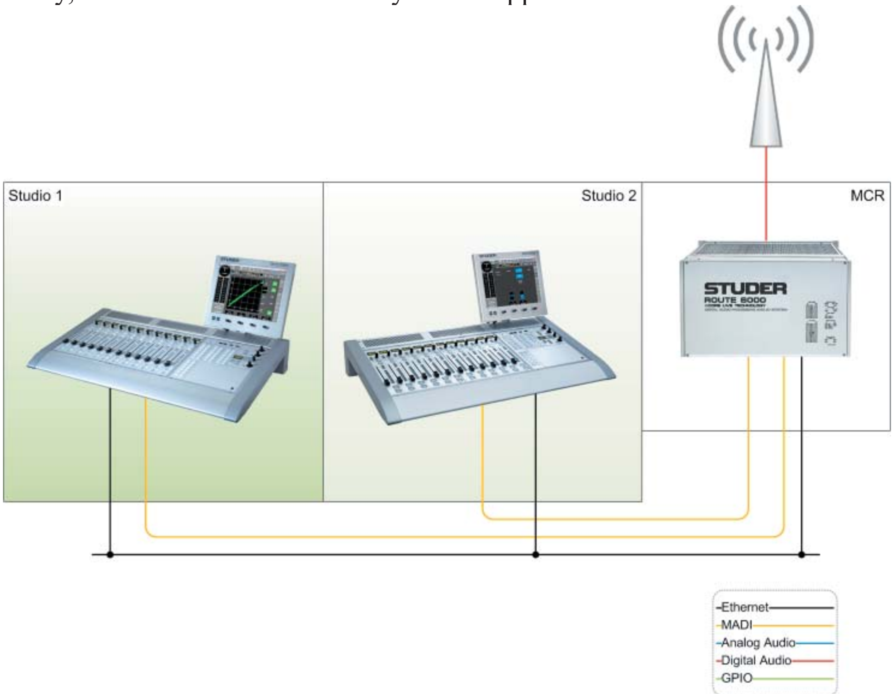
Route 6000 can be generally used as a signal concentrating device, collecting signals from connected audio device centrally and making them available for further routing and processing in a flexible way. In a broadcast facility, consoles in various production or live studios may require access to signals from a drama studio or an auditorium. A maximum level of flexibility can be reached by connecting all those devices to a Route 6000, delivering and consuming multi-purpose signals.

By recalling cross-point snapshots within Route 6000, predefined signal routes can be activated. Recalling snapshots as well as general cross-point control can be triggered remotely, e.g. from a console surface or a control device (VSM), or via a central control interface from the MCR.
In combination with RELINK, the interconnections between studio consoles, stage boxes and Route 6000 can be used in a flexible way.

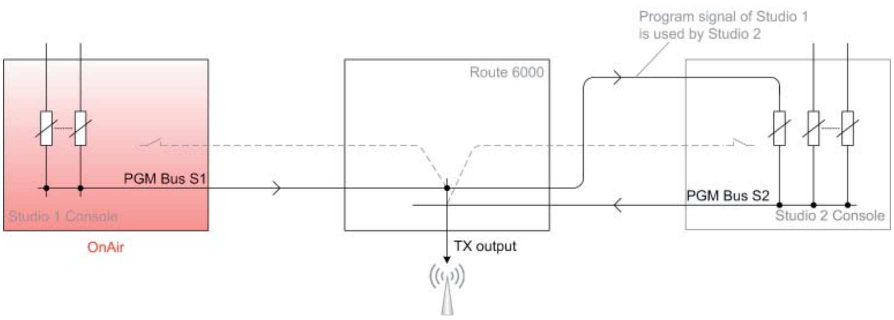
7.1.2 Transmission Switching

A common router application is switching over a transmission feed delivered by two connected consoles. The following diagrams visualize two examples of such an application.

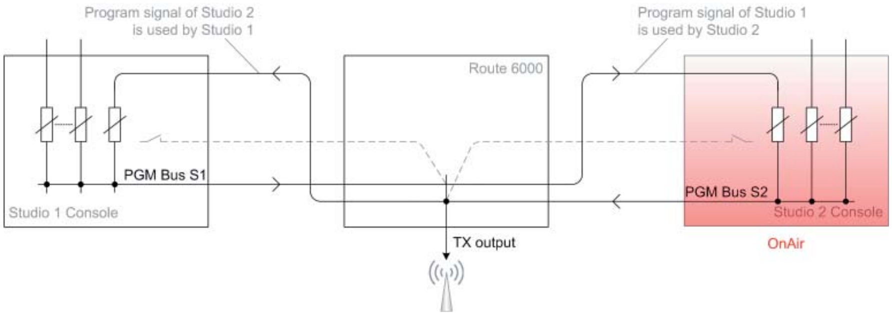
Example 1 The consoles (an OnAir 2500 in each Studio 1 and 2) and a Route 6000 are connected via a TCP/IP network and audio-linked via MADI. Through MADI, each Studio provides its main program sum to Route 6000. Alternatively, the audio link can be in any other supported format.



For a broadcast, various sources are mixed on the console in Studio 1. The program sum of Studio 1 is provided to the router, where it is connected to an output feeding a transmitter link.

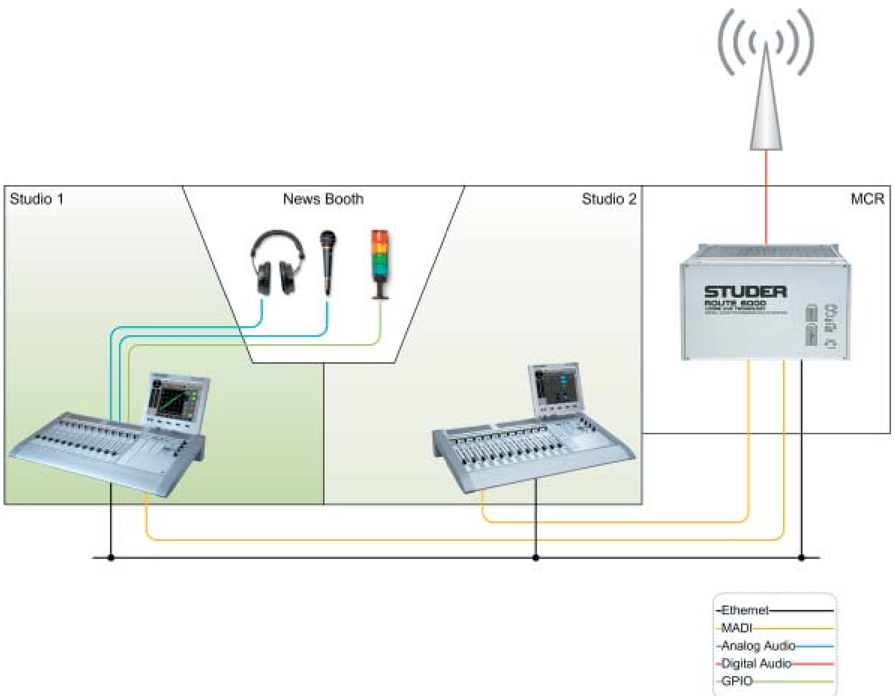


In addition, the program signal is shared to the console in Studio 2, where it is assigned to a fader channel. In case a silent switch over of the broadcast feed between Studio 1 and Studio 2 is required, the DJ in Studio 2 opens the fader with the PGM Bus S1 signal.



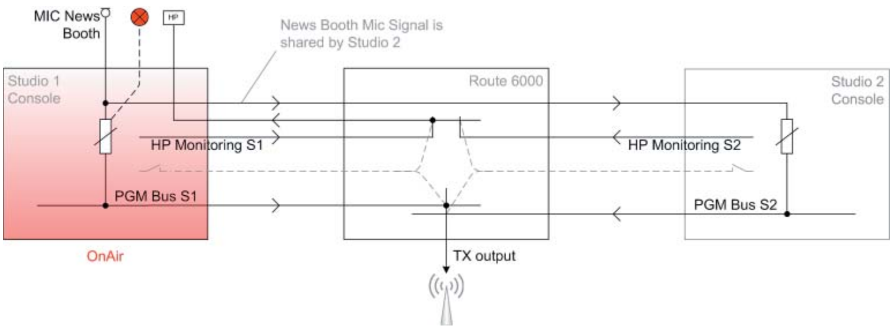
He levels the program signal of his console to match the program feed of Studio 1 and remotely activates a partial output routing within Route 6000, that routes the transmission feed from Studio 1 to Studio 2.
In case this action has to be performed the opposite way, the program feed of the Studio 2 console needs to be shared to Studio 1 as well.

Example 2 The consoles (an OnAir 2500 in each Studio 1 and 2) and a Route 6000 are connected via a TCP/IP network and audio-linked via MADI. Through MADI, each Studio provides its main program sum to Route 6000.



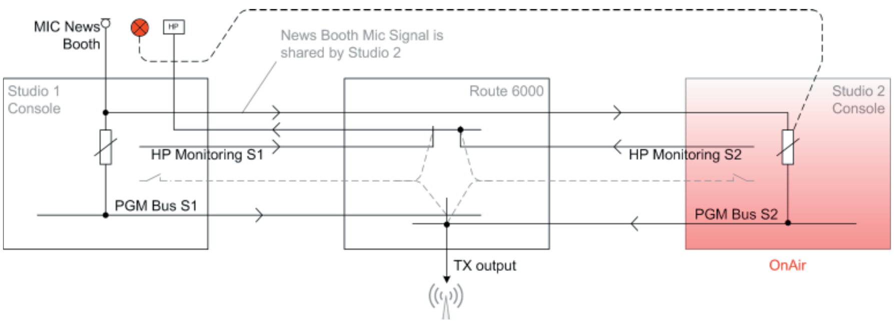
Studio 1 has a direct connection to a news booth, and the technical facilities (microphone, headphone and red light) of this booth are wired to the console in studio 1. Additionally via MADI, every console feeds a studio headphone monitoring signal to the router. The microphone signal of the booth is shared via RELINK to Studio 2. Route 6000 provides one main output to feed the broadcast signal to a transmission facility.

In this example it is assumed that Studio 1 is on-air and a journalist in the booth is presenting the news, mixed by the Studio 1 console. During the news, the DJ in Studio 2 wants to take over the control of the news booth signal, finish it, and seamlessly continue the program with his show from Studio 2.



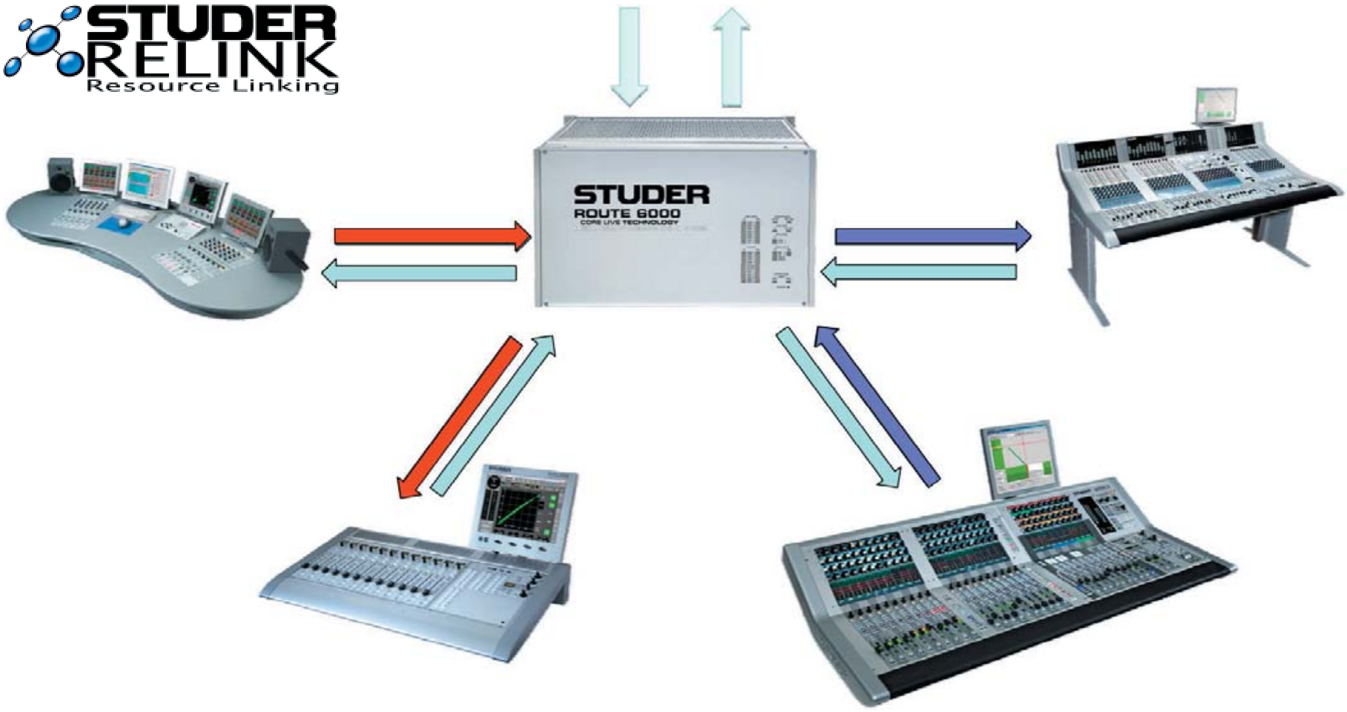
Within Route 6000, when Studio 1 is on-air, its program signal is routed to the transmission output and the studio monitoring signal is routed to the output connected to a headphone amplifier in the news booth. Both connections are combined in a Partial Output Routing Snapshot in Route 6000, which is remotely triggered by a momentary switch in Studio 1 (e.g. a console surface key). While being on-air, the DJ in Studio 1 assigns the news booth microphone to a fader and opens it. This action switches on the red light in the booth. The news is presented.

In the meantime, a second DJ has prepared Studio 2 for the show following the news. In order to perform an inaudible takeover, the DJ has to assign the news booth microphone signal to a fader of the console in Studio 2.



While the news is presented, he opens the news microphone fader and levels his program signal to match the program feed from Studio 1. Once the levels match, the DJ remotely triggers another Partial Output Routing of Route 6000 by pressing a console surface key, where the program signal of Studio 2 is switched to the transmission output, and the headphone monitoring feed is routed to the headphone amplifier.
Now, the control of the news microphone is with console 2 that also produces the broadcast feed now. The DJ at this console closes the news microphone fader once the news is finished, which at the same time turns off the red light in the booth.
The whole takeover process example has, of course, been performed in an inaudible and seamless way.

7.1.3 Studer RELINK (Consuming Signals from other Devices)



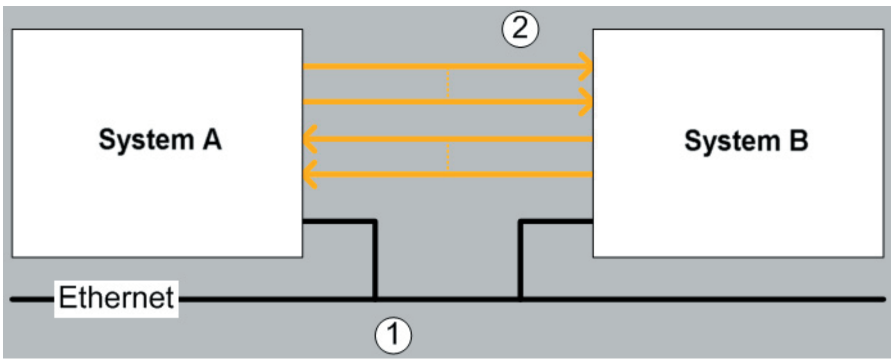
In a networked installation with multiple Studer digital mixing consoles and routers connected to each other, RELINK (Input/Output sharing) enables every single device to consume shared signals from any other device within the network.

Consuming and sharing audio signals requires a standard infrastructure for audio and control signals. It may already exist, or it must be possible to be set up using additional standard I/O modules and wiring. In order to enable RELINK, the system software of a Studer device may require an upgrade to a new version. In some cases an additional software license may need to be installed.

RELINK is based on two elementary technical requirements:

1 A TCP/IP network between all Studer consoles which consume and share resources.

2 A suitable amount of physical connections (tie lines) between the devices involved that will exclusively be available for RELINK. The amount of physical connections between two devices defines the number of signals which can be shared simultaneously.



Appendix A – Pro-Bel Ids

Destination Number [decimal]	Route 6000 Destination
255	RLogicalOutput 1
:	:
830	RLogicalOutput 576
1800	RLogicalOutput 577
:	:
10000	RLogicalOutput 8777 [1]
10001	Dynamics 1 [2]
:	:
12000	Dynamics 2000
12001	StereoFormatConverter 1 L [3]
:	:
15000	StereoFormatConverter 1500 R
15001	Delay 1
:	:
17000	Delay 2000
17001	FadeInOut 1
:	:
19000	FadeInOut 2000
19001	Generator 1
:	:
20000	Generator 1000
29001	Mixer Matrix 1 Input 1
29002	Mixer Matrix 1 input 2
:	:
29048	Mixer Matrix 1 input 48
29049	Mixer Matrix 2 Input 1
:	:
32984	Mixer Matrix 83 Input 48
33001	Filter 1
:	:
35000	Filter 2000
35001	Downmix 1 Left
:	Downmix 1 Right
:	Downmix 1 Center
:	Downmix 1 LFE
:	Downmix 1 LSur
35006	Downmix 1 RSur
35007	Downmix 2 Left
:	:
38000	Downmix 500 RSur
38001	Upmix 1 Left
38002	Upmix 1 Right
38007	Upmix 2 Left
38008	Upmix 2 Right
:	:
40996	Upmix 500 Right
65535	DEST_UNDEFINED

[1] The Pro-Bel ranges exceed the specification of the Route 6000's core (Pro-Bel: 8777; SCore Live: default 384, max. 1728 RLogicalOutputs, defined in the config.xml file). If the specified destination number is invalid, the message will be ignored, and the trace window will indicate 'invalid dest.'.
[2] Formerly known as 'Brickwall Limiter'
[3] Formerly known as 'StereoToMono'

Source Number [decimal]	Route 6000 Source
255	RLogicalInput 1
:	:
830	RLogicalInput 576
1023	Disconnect Source
:	:
1800	RLogicalInput 577
:	:
2951	RLogicalInput 1728
10000	RLogicalInput 8777 [1]
10001	Dynamics1 [2]
:	:
12000	Dynamics 2000
12001	StereoFormatConverter 1 L [3]
:	:
15000	StereoFormatConverter 1500 R
15001	Delay 1
:	:
17000	Delay 2000
17001	FadeInOut 1
:	:
19000	FadeInOut 2000
19001	Generator 1
:	:
20000	Generator 1000
20001	RLogicalOutput 1
:	:
28777	RLogicalOutput 8777 [1]
29001	Mixer Matrix 1 Output 1
:	:
29006	Mixer Matrix 1 Output 6
29049	Mixer Matrix 2 Output 1
:	:
32942	Mixer Matrix 83 Output 6
33001	Filter 1
:	:
35000	Filter 2000
35001	Downmix 1 Left
35002	Downmix 1 Right
35007	Downmix 2 Left
35008	Downmix 2 Right
:	:
37996	Downmix 500 Right
38001	Upmix 1 Left
:	Upmix 1 Right
:	Upmix 1 Center
:	Upmix 1 LFE
:	Upmix 1 LSur
38006	Upmix 1 RSur
:	:
41000	Upmix 500 RSur
65535	SOURCE_UNDEFINED

[1] The Pro-Bel ranges exceed the specification of the Route 6000's core (Pro-Bel: 8777; SCore Live: default 384, max. 1728 RLogicalInputs or RLogicalOutputs, defined in the config.xml file). If the specified destination number is invalid, the message will be ignored, and the trace window will indicate 'invalid source'.
[2] Formerly known as 'Brickwall Limiter'
[3] Formerly known as 'StereoToMono'

Notes Using RLogicalOutputs as sources allows implementing 'real' output monitoring and also saving tie lines. You may e.g. send a Pro-Bel command such as

`connect (dest=RLogicalOutput1, source=RLogicalOutput2)`

➔ RLogicalOutput1 will consume the backplane timeslot of RLogicalOutput2 and therefore sends what RLogicalOutput2 sends.

As there is no disconnect command specified in the SW-P-02 / SW-P-08 protocols, 1023 (0x3FFh) is used to disconnect any source from a destination.

For compatibility with the normal 'CONNECT' command, the 'EXTENDED CONNECT' command also uses the source number 1023 (0x3FFh) to disconnect.

Appendix B – SNMP-Managed Objects and Traps

Information covered by MIB-II (handled by the Windows SNMP Agent) is marked with an *.
Managed objects and parameters that can generate a trap are indicated in the 'Trap' column. Thresholds and operators are configurable in the 'snmp.xml' file.

Operating State				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.1	Operating State			
.1.30	D21m State:			
.1.30.100	- Number Of Expected Racks	D21m → Rack 1..n → NumberOfExpectedRacks		2.0
.1.30.101	- Number Of Available Racks (=n)	D21m → Rack 1..n → NumberOfAvailableRacks		2.0
	Rack 1..n (=x)			
.1.30.102.1.1.x	- Rack Name [x]	D21m → Rack → 0..n → RackName		2.0
.1.30.102.1.3840.x	- HD Card State[x]: locked or unlocked	D21m → Rack 1..n → System Status → LockFail	>0	2.0
.1.30.102.1.3072.x	- Fan Present[x]	D21m → Rack 1..n → System Status → FanPresent	<1	2.0
.1.30.102.1.3328.x	- Fan Failed[x]	D21m → Rack 1..n → System Status → FanFail	>0	2.0
	Slot 1..12 [x]			
.1.30.102.1.10257.x	- Slot1 Card Type[x]	D21m → Rack 1..n → Slot1 → Card Name		2.0
.1.30.102.1.10513.x	- Slot2 Card Type[x]	D21m → Rack 1..n → Slot2 → Card Name		2.0
.1.30.102.1.10769.x	- Slot3 Card Type[x]	D21m → Rack 1..n → Slot3 → Card Name		2.0
.1.30.102.1.11025.x	- Slot4 Card Type[x]	D21m → Rack 1..n → Slot4 → Card Name		2.0
.1.30.102.1.11281.x	- Slot5 Card Type[x]	D21m → Rack 1..n → Slot5 → Card Name		2.0
.1.30.102.1.11537.x	- Slot6 Card Type[x]	D21m → Rack 1..n → Slot6 → Card Name		2.0
.1.30.102.1.11793.x	- Slot7 Card Type[x]	D21m → Rack 1..n → Slot7 → Card Name		2.0
.1.30.102.1.12049.x	- Slot8 Card Type[x]	D21m → Rack 1..n → Slot8 → Card Name		2.0
.1.30.102.1.12305.x	- Slot9 Card Type[x]	D21m → Rack 1..n → Slot9 → Card Name		2.0
.1.30.102.1.12561.x	- Slot10 Card Type[x]	D21m → Rack 1..n → Slot10 → Card Name		2.0
.1.30.102.1.12817.x	- Slot11 Card Type[x]	D21m → Rack 1..n → Slot11 → Card Name		2.0
.1.30.102.1.13073.x	- Slot12 Card Type[x]	D21m → Rack 1..n → Slot12 → Card Name		2.0
.1.30.102.1.22817.x	- Slot1 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card1Present		2.0
.1.30.102.1.22818.x	- Slot2 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card2Present		2.0
.1.30.102.1.22819.x	- Slot3 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card3Present		2.0
.1.30.102.1.22820.x	- Slot4 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card4Present		2.0
.1.30.102.1.22821.x	- Slot5 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card5Present		2.0
.1.30.102.1.22822.x	- Slot6 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card6Present		2.0
.1.30.102.1.22823.x	- Slot7 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card7Present		2.0
.1.30.102.1.22824.x	- Slot8 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card8Present		2.0
.1.30.102.1.22825.x	- Slot9 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card9Present		2.0
.1.30.102.1.22826.x	- Slot10 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card10Present		2.0
.1.30.102.1.22827.x	- Slot11 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card11Present		2.0

Operating State				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.1.30.102.1.22828.x	- Slot12 Card Present[x]	D21m → Rack 1..n → System Status → Slots → Card12Present		2.0
.1.30.102.1.32829.x	- Slot1 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card1Fail	>0	2.0
.1.30.102.1.32830.x	- Slot2 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card2Fail	>0	2.0
.1.30.102.1.32831.x	- Slot3 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card3Fail	>0	2.0
.1.30.102.1.32832.x	- Slot4 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card4Fail	>0	2.0
.1.30.102.1.32833.x	- Slot5 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card5Fail	>0	2.0
.1.30.102.1.32834.x	- Slot6 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card6Fail	>0	2.0
.1.30.102.1.32835.x	- Slot7 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card7Fail	>0	2.0
.1.30.102.1.32836.x	- Slot8 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card8Fail	>0	2.0
.1.30.102.1.32837.x	- Slot9 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card9Fail	>0	2.0
.1.30.102.1.32838.x	- Slot10 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card10Fail	>0	2.0
.1.30.102.1.32839.x	- Slot11 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card11Fail	>0	2.0
.1.30.102.1.32840.x	- Slot12 Failed[x]	D21m → Rack 1..n → System Status → Slots → Card12Fail	>0	2.0
.1.30.201	- Number Of MADI Cards (=n)	D21m → Rack 1..n → Slot 1..m → Card Specific		2.0
	MADI Cards 1..n (=x)			
.1.30.202.1.1.x	- Rack Name[x]	D21m → Rack 1..n → RackName		2.0
.1.30.202.1.2.x	- Slot Number[x]	D21m → Rack 1..n → Slot 1..m → getDeviceIdName()		2.0
.1.30.202.1.6.x	- Master IF[x]	D21m → Rack 1..n → Slot 1..m → Card Specific → Master IF		2.0
.1.30.202.1.8.x	- Main Lock[x]	D21m → Rack 1..n → Slot 1..m → Card Specific → Main Lock	<1	2.0
.1.30.202.1.9.x	- Aux Lock[x]	D21m → Rack 1..n → Slot 1..m → Card Specific → Aux Lock	<1	2.0
.1.40				
DSP Card State:				
.1.40.16	- Current Core Hardware	CoreDriver → Core Hardware		2.0
.1.40.21	- Current DSP configuration	CoreDriver → DSPConfiguration		2.0
.1.40.101	- Number of DSP Cards	CoreDriver → Slots → 0..n → CardType		2.0
	Slot 1..n			2.0
.1.40.102.1.3.x	- Slot Name[slot x]	CoreDriver → Slots → 0..n → name		2.0
.1.40.102.1.10.x	- Card Type[slot x]	CoreDriver → Slots → 0..n → CardType NOTE: if card state == Empty or Missing then card type = “unknown”		2.0
.1.40.102.1.11.x	- Card State[slot x]	CoreDriver → Slots → 0..n → Status	!= working	2.0
.1.40.102.1.33.x	- DSPTemperature1[slot x]	CoreDriver → Slots → 0..n → Temperature → T1	>n	2.0
.1.40.102.1.34.x	- DSPTemperature2[slot x]	CoreDriver → Slots → 0..n → Temperature → T2	>n	2.0
.1.40.102.1. 49.x	- DSPVoltage1[slot x]	CoreDriver → Slots → 0..n → Voltage → V1	<m	2.0
.1.40.102.1. 50.x	- DSPVoltage2[slot x]	CoreDriver → Slots → 0..n → Voltage → V2	<m	2.0

Operating State				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.1.40.102.1. 51.x	- DSPVoltage3[slot x]	CoreDriver → Slots → 0..n → Voltage → V3	<m	2.0
.1.40.102.1. 52.x	- DSPVoltage4[slot x]	CoreDriver → Slots → 0..n → Voltage → V4	<m	2.0
.1.40.102.1. 53.x	- DSPVoltage5[slot x]	CoreDriver → Slots → 0..n → Voltage → V5	<m	2.0
.1.40.102.1.66.x	- DSPTemperature_Name1[slot x]	CoreDriver → Slots → 0..n → Temperature → T1 → Label		2.0
.1.40.102.1.68.x	- DSPTemperature_Name2[slot x]	CoreDriver → Slots → 0..n → Temperature → T2 → Label		2.0
.1.40.102.1. 98.x	- DSPVoltage_Name1[slot x]	CoreDriver → Slots → 0..n → Voltage → V1 → Label		2.0
.1.40.102.1. 100.x	- DSPVoltage_Name2[slot x]	CoreDriver → Slots → 0..n → Voltage → V2 → Label		2.0
.1.40.102.1. 102.x	- DSPVoltage_Name3[slot x]	CoreDriver → Slots → 0..n → Voltage → V3 → Label		2.0
.1.40.102.1. 104.x	- DSPVoltage_Name4[slot x]	CoreDriver → Slots → 0..n → Voltage → V4 → Label		2.0
.1.40.102.1. 106.x	- DSPVoltage_Name5[slot x]	CoreDriver → Slots → 0..n → Voltage → V5 → Label		2.0
.1.40.201	- Number of Bridge Cards	CoreDriver → Slots → 0..n → CardType		2.0
	Slot 1..n			2.0
.1.40.202.1.3.x	- Slot Name[slot x]	CoreDriver → Slots → 0..n → name		2.0
.1.40.202.1.10.x	- Card Type[slot x]	CoreDriver → Slots → 0..n → CardType NOTE: if card state == Empty or Missing then card type = “unknown”		2.0
.1.40.202.1.11.x	- Card State[slot x]	CoreDriver → Slots → 0..n → Status	!= work-ing	2.0
.1.40.202.1.33.x	- BridgeTemperature1[slot x]	CoreDriver → Slots → 0..n → Temperature → T1	>n	2.0
.1.40.202.1.34.x	- BridgeTemperature2[slot x]	CoreDriver → Slots → 0..n → Temperature → T2	>n	2.0
.1.40.202.1. 49.x	- BridgeVoltage1[slot x]	CoreDriver → Slots → 0..n → Voltage → V1	<m	2.0
.1.40.202.1. 50.x	- BridgeVoltage2[slot x]	CoreDriver → Slots → 0..n → Voltage → V2	<m	2.0
.1.40.202.1. 51.x	- BridgeVoltage3[slot x]	CoreDriver → Slots → 0..n → Voltage → V3	<m	2.0
.1.40.202.1. 52.x	- BridgeVoltage4[slot x]	CoreDriver → Slots → 0..n → Voltage → V4	<m	2.0
.1.40.202.1. 53.x	- BridgeVoltage5[slot x]	CoreDriver → Slots → 0..n → Voltage → V5	<m	2.0
.1.40.202.1. 66.x	- BridgeTemperature_Name1[slot x]	CoreDriver → Slots → 0..n → Temperature → T1 → Label		2.0
.1.40.202.1. 68.x	- BridgeTemperature_Name2[slot x]	CoreDriver → Slots → 0..n → Temperature → T2 → Label		2.0
.1.40.202.1. 98.x	- BridgeVoltage_Name1[slot x]	CoreDriver → Slots → 0..n → Voltage → V1 → Label		2.0
.1.40.202.1. 100.x	- BridgeVoltage_Name2[slot x]	CoreDriver → Slots → 0..n → Voltage → V2 → Label		2.0
.1.40.202.1. 102.x	- BridgeVoltage_Name3[slot x]	CoreDriver → Slots → 0..n → Voltage → V3 → Label		2.0
.1.40.202.1. 104.x	- BridgeVoltage_Name4[slot x]	CoreDriver → Slots → 0..n → Voltage → V4 → Label		2.0
.1.40.202.1. 106.x	- BridgeVoltage_Name5[slot x]	CoreDriver → Slots → 0..n → Voltage → V5 → Label		2.0
.1.40.301	- Number of Assignable Audio Proc			2.0
	Proc 1..9	Dynamics, StereoFormatConverter, Delay, FadeIn-Out, Generator, Mixer, EQ, DownMixes, UpMixes		2.0
.1.40.302.1.1.x	- Proc Name[Proc x]	Config → [Proc x] → getDeviceIdName()		2.0
.1.40.302.1.2.x	- Proc Total[Proc x]	Config → [Proc x] → getNoOfChildren()		2.0

Operating State				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.1.50	TimeSync State:			
.1.50.3	- External Time Sync Reference	Config → SystemSettings → FSystenTime → Time-SyncRef		2.0
.1.50.4	- Time Sync Card Available	TimeSync → TimeSyncModulValid	<1	2.0
.1.50.1	- Time Synchronized	TimeSync → TimeValid	<1	2.0
.1.50.2	- Time Sync Protocoll	TimeSync → TimeSource		2.0
.1.60	Audio Clock State:			
.1.60.2	- Sampling Frequency	AudioClock → Sampling Rate State		2.0
.1.60.4	- Synchronisation Source	AudioClock → Sync Source State		2.0
.1.60.6	- Video Available	AudioClock → Video Available	<1	2.0
.1.60.7	- AES/EBU Available	AudioClock → AES/EBU Available	<1	2.0
.1.60.8	- Worldclock Available	AudioClock → Worldclock Available	<1	2.0
.1.60.11	- Audio Clock Communication State	AudioClock → Valid	<1	2.0
.1.60.14	- MADI Clock Available	AudioClock → MADI Clock Available	<1	2.0
.1.70	Surveillance State:			
.1.70.101	- Number of Surveillance Proc			2.1
	Proc 1..6	SilenceDetection, SilenceSwitcher, OverloadDetection, SilenceDetectionGroup, SilenceSwitcherGroup, OverloadDetectionGroup		2.1
.1.70.102.1.1.x	- Proc Name [Proc x]	Config → [Proc x] → getDeviceIdName()		2.1
.1.70.102.1.2.x	- Proc Total [Proc x]	Config → [Proc x] → getNoOfChildren()		2.1
.1.70.200	- State of any Silence Detections	Config → SilenceDetectionGroups → SilenceDetectionGroupAny → FSilenceDetectionGroupAny → State. 0 = ok, 1 = any silence detected.	>0	2.1
.1.70.201	- Number of Silence Detections			2.1
	Silence Detection 1..n			
.1.70.202.1.1.x	- Name [SD x]	Config → SilenceDetections → SilenceDetection x → FRLabel → Label		2.1
.1.70.202.1.2.x	- State [SD x]	Config → SilenceDetections → SilenceDetection x → FSilenceDetection → State. 0 = ok, 1 = silence detected.	>0	2.1
.1.70.211	- Number of Silence Detection Groups			2.1
	Silence Detection Group 1..n			
.1.70.212.1.1.x	- Name [SDG x]	Config → SilenceDetectionGroups → SilenceDetectionGroup x → FRLabel → Label		2.1
.1.70.212.1.2.x	- State [SDG x]	Config → SilenceDetectionGroups → SilenceDetectionGroup x → FSilenceDetectionGroup → State. 0 = ok, 1 = silence detected.	>0	2.1
.1.70.300	- State of any Silence Switcher	Config → SilenceSwitcherGroups → SilenceSwitcherGroupAny → FSilenceSwitcherGroupAny → State. 0 = ok, 1 = silence detected.	>0	2.1
.1.70.301	- Number of Silence Switchers			2.1
	Silence Switchers 1..n			
.1.70.302.1.1.x	- Name [SS x]	Config → SilenceSwitchers → SilenceSwitcher x → FRLabel → Label		2.1
.1.70.302.1.2.x	- SilenceDetectionState [SS x]	Config → SilenceSwitchers → SilenceSwitcher x → FSilenceSwitcher → SilenceDetectionState.0 = ok, 1 = silence detected.	>0	2.1
.1.70.302.1.8.x	- SourceState [SS x]	Config → SilenceSwitchers → SilenceSwitcher x → FSilenceSwitcher → SourceState. 0 = original source, 1 = alternative source.	>0	2.1
.1.70.311	- Number of Silence Switcher Groups			2.1

Operating State				
OID	**Information**	**Information Source**	**Trap**	**Ver**
	Silence Switcher Groups 1..n			
.1.70.312.1.1.x	- Name [SSG x]	Config → SilenceSwitcherGroups → SilenceSwitcherGroup x → FRLabel → Label		2.1
.1.70.312.1.2.x	- State [SSG x]	Config → SilenceSwitcherGroups → SilenceSwitcherGroup x → FSilenceSwitcherGroup → State. 0 = original source, 1 = alternative source.	>0	2.1
.1.70.400	- State of any Overload Detections	Config → OverloadDetectionGroups → OverloadDetectionGroupAny → FOverloadDetectionGroupAny → State. 0 = ok, 1 = overload detected.	>0	2.1
.1.70.401	- Number of Overload Detections			2.1
	Overload Detection 1..n			
.1.70.402.1.1.x	- Name [OD x]	Config → OverloadDetections → OverloadDetection x → FRLabel → Label		2.1
.1.70.402.1.2.x	- State [OD x]	Config → OverloadDetections → OverloadDetection x → State. 0 = ok, 1 = overload detected.	>0	2.1
.1.70.411	- Number of Overload Detection Groups			2.1
	Overload Detection Groups 1..n			
.1.70.412.1.1.x	- Name [ODG x]	Config → OverloadDetectionGroups → OverloadDetectionGroup x → FRLabel → Label		2.1
.1.70.412.1.2.x	- State [ODG x]	Config → OverloadDetectionGroups → OverloadDetectionGroup x → FOverloadDetectionGroup → State. 0 = ok, 1 = overload detected.	>0	2.1

Communication				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.2	Communication			
.2.10	Network			
1.3.6.1.2.1.1.5 *	- Host name (computer name) *	MIB-II*		2.0
.2.10.10	- IP address	ContainerInformation → IPAddress		2.0
.2.10.11	- MAC address of active network card	ContainerInformation → MACAdress		2.0
.2.10.20	- System name	Container API		2.0
.2.10.21	- System ID	Container API		2.0
.2.10.30	- Container name	Container API		2.0
.2.10.31	- Container ID	Container API		2.0
.2.10.101	- Number of Multicast addresses	ContainerParameters → MulticastGroups → 0..n		2.0
	Multicast addresses 1..n:			
.2.10.102.1.1.x	- Multicast address[x]	ContainerParameters → MulticastGroups		2.0
.2.20	Connection State			
.2.20.100	ProBel			
.2.20.100.101	- No Of Sessions	n+m of ProBel → ControllerSessions → Session1..n(role 'Controller') ProBel → Facilities → Facility 1..m(role 'RemoteDevice')		2.0
	Sessions 1..n			
.2.20.100.102.1.1.x	- Session Name[x]	ProBel → ControllerSessions → Session n or ProBel → Facilities → Facility m		2.0
.2.20.100.102.1.6.x	- is connected[x]	ProBel → ControllerSessions → Session n → Session is connected or ProBel → Facilities → Facility m → Session is connected	<1	2.0

Communication				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.2.20.100.102.1.7.x	- Role[x]	‘Controller’ in case of ‘Controller Session’ or ‘Remote Device’ in case of ‘Facilities’		2.0
.2.20.100.102.1.8.x	- Protocol[x]	ProBel → ControllerSessions → Session n → Session Protocol or ProBel → Facilities → Facility m → Session Protocol		2.0
.2.20.100.102.1.9.x	- Port[x]	ProBel → ControllerSessionsSession n → Session Port or ProBel → Facilities → Facility m → Session Port		2.0
.2.20.100.102.1.10.x	- No Of Active Connections[x]	ProBel → ControllerSessions → Session n → Session NumberConnections or ProBel → Facilities → Facility m → Session NumberConnections		
<1	2.0			
.2.20.130	IO Sharing			
.2.20.130.101	- Number of known Producer Systems			
(one or two step IOSharing).	IoSharing → Summary → ProducerSystems			
	I/O Sharing Producer Systems 1..n			
.2.20.130.102.1.1.x	- Name[x]	IoSharing → Summary → ProducerSystems		2.0
.2.20.130.102.1.2.x	- ID[x]	IoSharing → Summary → ProducerSystems		2.0
.2.20.130.102.1.3.x	- Licensed[x]	IoSharing → Summary → ProducerSystems		2.0
.2.20.130.102.1.4.x	- Available[x]	IoSharing → Summary → ProducerSystems	<1	2.0
.2.20.130.102.1.5.x	- Total physical audio connections[x]	IoSharing → Summary → ProducerSystems		2.0
.2.20.130.102.1.6.x	- Free physical audio connections[x]	IoSharing → Summary → ProducerSystems	<n	2.0
.2.20.140	Ember			
.2.20.140.101	- No Of Sessions	EmberController → Session 1..n		2.0
	Sessions 1..n			
.2.20.140.102.1	-Session Name[x]	EmberController → Session 1..n → Name		2.0
.2.20.140.102.2	-is connected[x]	EmberController → Session 1..n → Session is connected	<1	2.0
.2.20.140.102.3	-Port[x]	EmberController → Session 1..n → Session Port		2.0
.2.20.140.102.4	-No Connections[x]	EmberController → Session 1..n → Session NumberConnections	<n	2.0

Power Supply				
OID	**Information**	**Information Source**	**Trap**	**Ver**
.3	Power Supply			
.3.13	D21m			
.3.13.101	- Number Of Available Racks	D21m → Rack 0..n → connected		2.0
	Available Racks 1..n			
.3.13.102.1.1.x	- Rack Name[x]	D21m → Rack → 0..n → RackName		2.0
.3.13.102.1.1793.x	- Rack 0..n Primary Present[x]	D21m → Rack 0..n → System Status → PrimaryPower → Present	<1	2.0
.3.13.102.1.1794.x	- Rack 0..n Primary Failed[x]l	D21m → Rack 0..n → System Status → PrimaryPower → Fail	>0	2.0
.3.13.102.1.2049.x	- Rack 0..n Secondary Present[x]	D21m → Rack 0..n → System Status → SecondaryPower → Present	<1	2.0
.3.13.102.1.2050.x	- Rack 0..n Secondary Failed[x]	D21m → Rack 0..n → System Status → SecondaryPower → Fail	>0	2.0

Host System				
OID	Information	Information Source	Trap	Ver
.4	Host System			
.4.2	COM Port:			
.4.2.2	- Free COM Ports	Operating System		2.0
.4.4	Memory			
.4.4.1	- Total physical memory	ContainerParameters → Application → Memory → PhysicalTotal		2.0
.4.4.2	- Free physical memory	ContainerParameters → Application → Memory → PhysicalAvailable	<n	2.0
.4.5	Disk Space (HD or CF Card internal)			
.4.5.1	- Total Disk Space	Operating System		2.0
.4.5.2	- Free Disk Space	Operating System ContainerParameters → Application → Memory → FreeDiskSpace	<n	2.0

Version and Firmware			
OID	Information	Information Source	Ver
.5	Version and Firmware		
1.3.6.1.2.1.1.1 *	- Hardware and OS Version *	MIB-II*	2.0
.5.1	- Platform Version (Build)	ContainerParameters → PlatformVersion (only for WinCE)	2.0
.5.2	- Route6000 Software Version (Build)	ContainerDevice → getVersion()	2.0
.5.3	Extension Versions:		
.5.3.1	- Number of Extensions	Extension API	2.0
.5.3.2.1.1.x	- Extension: Name + Version[x]	Extension API	2.0
.5.13	D21m Firmware:		
.5.13.1	- Number Of Available Racks:	D21m → Rack → 0..n	2.0
	Available Racks 1..n		
.5.13.2.1.10.x	- Rack Number + Name + Firmware[x]	D21m → Rack → 0..n → DeviceIdName + RackName + System Status → Firmware	2.0
.5.28	Audio Clock Firmware:		
.5.28.1	- Firmware (CLAUDIO)	AudioClock → Firmware	2.0
.5.12	DSP Card Firmware:		
.5.12.101	- Number of active DSP cards	CoreDriver → Slots → 0..n AND CoreDriver → Slots → 0..n → FirmwareVersionReady == true	
	2.0		
.5.12.102.1.3.x	- Slot Name[card x]	CoreDriver → Slots → 0..n → Name(DeviceIdName)	2.0
.5.12.102.1.10.x	- Card Type[card x]	CoreDriver → Slots → 0..n → CardType	2.0
	- SH4:		
.5.12.102.1.0101.x	- Bios[card x]	CoreDriver → Slots → 0..n → FirmwareVersion → SH4 → Bios	2.0
.5.12.102.1.0102.x	- Firmware[card x]	CoreDriver → Slots → 0..n → FirmwareVersion → SH4 → Firmware	2.0
	- VDCA:		
.5.12.102.1.0201.x	- Firmware[card x]	CoreDriver → Slots → 0..n → FirmwareVersion → VDCA → Firmware	2.0
	- DSP Firmware Versions:		
.5.12.102.1.030000.x	- Number of DSPs	.. → Slots → 0..n → FirmwareVersion → DSP → 0..12	2.0
.5.12.102.1.0300yy.x	- DSP Name [DSP yy].[card x]	.. → Slots → 0..n → FirmwareVersion → DSP → 0..12 → Name(DeviceIdName)	2.0
.5.12.102.1.0301yy.x	- Audio Function Library [DSP yy].[slot x]	.. → Slots → 0..n → FirmwareVersion → DSP → 0..12 → AudioFunctionLibrary	2.0
.5.12.102.1.0302yy.x	- Xrtos [DSP yy].[slot x]	.. → Slots → 0..n → FirmwareVersion → DSP → 0..12 → xRTOS	2.0
.5.12.102.1.0303yy.x	- Task File [DSP yy].[slot x]	.. → Slots → 0..n → FirmwareVersion → DSP → 0..12 → TaskFile	2.0

Version and Firmware			
OID	**Information**	**Information Source**	**Ver**
	- Bridge (only for SCoreLive):		
.5.12.102.1.0601.x	- Firmware[slot 10]	.. → Slots → 0..n → FirmwareVersion → Bridge → Firmware	2.0
.5.23	Time-Sync Versions:		2.0
.5.23.3	- Firmware	TimeSync → Firmware If TimeSync card available: TimeSync → TimeSyncModulValid == true	
	2.0		
.5.254.	SNMPAgent Versions:		
.5.254.1	- SNMPAgentVersion	dll API	2.0

Appendix C – Parameters Communicated via Ember (VSM – Route 6000)

Process	Parameter
RLogicalInputs	
FRInputLabel	Label
FRouterInput	MicGain
FRouterInput	MicPhantom
FRouterInput	MicHPF
FRouterInput	MicClipLimiter
RLogicalOutputs	
FRLabel	Label
FRouterOutput	RoutingLocked
FRouterOutput	Gain
FRouterOutput	Phase
FRouterOutput	Bypass
Generators	
FRLabel	Label
FGenerator	GeneratorSignal
FGenerator	GeneratorFrequency
FGenerator	GeneratorLevel
Delays	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FAsnProcDelay	DelayOnOff
FAsnProcDelay	DelayTime
Dynamics	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FBrickWallLimiter	Threshold
FBrickWallLimiter	ReleaseTime
FDynamics	DynamicsOnOff
FDynamics	Mode
FDynamics	SideChainLinkMembership
FLimCompExpGate	LimiterOnOff
FLimCompExpGate	LimiterThreshold
FLimCompExpGate	LimiterAttackTime
FLimCompExpGate	LimiterReleaseTime
FLimCompExpGate	CompressorOnOff
FLimCompExpGate	CompressorThreshold
FLimCompExpGate	CompressorAutoMakeUpOnOff
FLimCompExpGate	CompressorGain
FLimCompExpGate	CompressorRatio
FLimCompExpGate	CompressorAttackTime
FLimCompExpGate	CompressorReleaseTime
FLimCompExpGate	ExpanderOnOff
FLimCompExpGate	ExpanderThreshold
FLimCompExpGate	ExpanderRatio
FLimCompExpGate	ExpanderAttackTime
FLimCompExpGate	ExpanderReleaseTime
FLimCompExpGate	GateOnOff
FLimCompExpGate	GateThreshold
FLimCompExpGate	GateAttenuation
FLimCompExpGate	GateAttackTime
FLimCompExpGate	GateReleaseTime

Process	Parameter
FadeInOut	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FFadeInOut	Gain
FFadeInOut	FInTarget
FFadeInOut	FInTime
FFadeInOut	FInStart
FFadeInOut	FOutTarget
FFadeInOut	FOutTime
FFadeInOut	FOutStart
Mixer	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FContribution	ContributionGain
FContribution	ContributionOn
FMixerOutput	OutputGain
Filter	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FFilter	FilterOnOff
FFilter	Mode
FHighPassLowPass	HPOnOff
FHighPassLowPass	HPFrequency
FHighPassLowPass	HPSlope
FHighPassLowPass	LPOnOff
FHighPassLowPass	LPFrequency
FHighPassLowPass	LPSlope
FNotch	Notch1OnOff
FNotch	Notch1NarrowWide
FNotch	Notch1Frequency
FNotch	Notch2OnOff
FNotch	Notch2NarrowWide
FNotch	Notch2Frequency
FNotch	Notch3OnOff
FNotch	Notch3NarrowWide
FNotch	Notch3Frequency
FNotch	Notch4OnOff
FNotch	Notch4NarrowWide
FNotch	Notch4Frequency
FEQ	LFOnOff
FEQ	LFGain
FEQ	LFQ
FEQ	LFFrequency
FEQ	LMFOnOff
FEQ	LMFGain
FEQ	LMFQ
FEQ	LMFFrequency
FEQ	HMFOnOff
FEQ	HMFGain
FEQ	HMFQ
FEQ	HMFFrequency
FEQ	HFOnOff
FEQ	HFGain
FEQ	HFQ
FEQ	HFFrequency

Process	Parameter
Downmix	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FDownmix	DownmixMode
FDownmixITU	SurLevel
FDownmixITU	CntLevel
FDownmixITU	TrimLevel
FDownmixLogic7	SurLevel
FDownmixLogic7	CntLevel
FDownmixLogic7	TrimLevel
FDownmixLogic7	LFELevel
FDownmixLogic7	PhaseShift
Upmix	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FUpmix	Mode
FUpmixMode51	FrontRear
FUpmixMode51	InputWidthOnOff
FUpmixMode51	InputWidth
FUpmixMode51	CenterPercentageOnOff
FUpmixMode51	CenterPercentage
FUpmixMode51	LFEOnOff
FUpmixMode51	LFE
FUpmixMode51	StereoDir
FUpmixMode51Width	Width
FUpmixMode51Width	LFEOnOff
FUpmixMode51Width	LFE
Silence Detection	
FRLabel	Label
FSilenceDetection	OnOff
FSilenceDetection	State
FOverloadDetection	State
FSilenceDetectionProcess	Threshold
FSilenceDetectionProcess	SignallingTriggerTime
FSilenceDetectionProcess	SignallingTriggerResetTime
FSilenceDetectionProcess	ResetTime
FSilenceDetectionProcess	ResetMode
FSilenceDetectionProcess	ResetRequest
Silence Switcher	
FRLabel	Label
FSilenceSwitcher	OnOff
FSilenceSwitcher	SilenceDetectionState
FSilenceSwitcher	SourceState
FSilenceDetectionProcess	Threshold
FSilenceDetectionProcess	SignallingTriggerTime
FSilenceDetectionProcess	SignallingTriggerResetTime
FSilenceDetectionProcess	ResetTime
FSilenceDetectionProcess	ResetMode
FSilenceDetectionProcess	ResetRequest
Overload Detection	
FRLabel	Label
FOverloadDetection	OnOff
FOverloadDetection	State
FOverloadDetectionProcess	Threshold
FOverloadDetectionProcess	SignallingTriggerTime
FOverloadDetectionProcess	SignallingTriggerResetTime
FOverloadDetectionProcess	ResetTime
FOverloadDetectionProcess	ResetMode
FOverloadDetectionProcess	ResetRequest

Process	Parameter
Silence Detection Groups	
FSilenceDetectionGroup	State
FSilenceDetectionGroup	ResetRequest
FSilenceSwitcherGroup	State
FSilenceSwitcherGroup	ResetRequest
FOverloadDetectionGroup	State
FOverloadDetectionGroup	ResetRequest
FSilenceDetectionGroupAny	State
FOverloadDetectionGroupAny	State
Silence Switcher Groups	
FRLabel	Label
FSilenceSwitcherGroup	State
FSilenceSwitcherGroup	ResetRequest
StereoFormatConverter	
FRLabel	Label
FAsnProcInput	Gain
FAsnProcInput	Phase
FAsnProcInput	InputBypass
FStereoFormatConverter	Mode
FStereoToMono	Cal
FBalance	BalOnOff
FBalance	InputWidthOnOff
FBalance	InputWidth
FBalance	Bal
FPanorama	PanOnOff
FPanorama	Pan
FStereoToMono	Cal