R&S®TSStream Multi-TS Streaming Software Manual









Broadcasting

Manual

The manual describes the following R&S®Multi-TS Streaming Software.

• 2116.8945.02

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The following abbreviations are used throughout this manual: $R\&S^{\circledast}XYZ$ is abbreviated as $R\&S\:XYZ$

Table of Contents

1	Range of Functions	4
2	Getting Started	4
2.1	System Requirements	4
2.2	Installation Instructions	4
2.3	Licensing	4
3	Graphical User Interface	5
3.1	Configuration View	5
3.1.1	Configuration management	5
3.1.2	Stream configuration table	6
3.1.3	Stream configuration table controls	6
3.1.4	RAM usage preview	7
3.1.5	Streaming control	7
3.2	Streaming View	8
3.2.1	Stream status monitor matrix	8
3.2.2	Thread load monitor	9
3.2.3	Output data rate monitor	10
3.2.4	Streaming control	10
4	Troubleshooting	11
4.1	Configuration	11
4.2	Streaming	11
4.2.1	General	11
4.2.2	Operation with R&S CLG / R&S SLG	12

1 Range of Functions

The R&S Multi-TS Streaming Software plays out a large number of MPEG-2 transport streams via an IP network interface in seamless loop simultaneously.

One typical application is the provision of input feed for the multi-channel TV signal generators R&S CLG or R&S SLG of Rohde & Schwarz. Furthermore, testing of IPTV-equipment is addressed.

2 Getting Started

2.1 System Requirements

For details refer to the release notes.

2.2 Installation Instructions

For details refer to the release notes.

2.3 Licensing

From version 1.05, R&S Multi-TS Streaming Software is free software. No licensing is required.

3 Graphical User Interface

The installation instructions are provided in the release notes.

The graphical user interface consists of two views, which are described in the following sections.

3.1 Configuration View

This is the startup view of the R&S Multi-TS Streaming Software, allowing the configuration and management of the individual transport stream files to be played out.

	R&S TSSTREAM	1.00 [96ch_live.tss]			5	172.29.31.71 stination IP	x x Stream
	Alias	TS File	Destination Port	Status			
	057 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\057 MHz.trp	10000				*
2	065 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\065 MHz.trp	10001				
	073 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\073 MHz.trp	10002				
₫.	081 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\081 MHz.trp	10003				
	089 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\089 MHz.trp	10004				
2	097 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\097 MHz.trp	10005				
	105 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\105 MHz.trp	10006			\sim	
2	113 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\113 MHz.trp	10007			`))	
	121 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\121 MHz.trp	10008				
2	129 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\129 MHz.trp	10009				
	137 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\137 MHz.trp	10010				
	145 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\145 MHz.trp	10011				
	153 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\153 MHz.trp	10012				
	161 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\161 MHz.trp	10013				
	169 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\169 MHz.trp	10014				
	177 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\177 MHz.trp	10015				
	185 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\185 MHz.trp	10016				
	193 MHz	C:\Program Files\Rohde-Schwarz\TSSTREAM\ts\Live\193 MHz.trp	10017				
Impe R&S	ort from CLG / R&S SLG	Add Delete Select Deselect row selected rows all all	3	4	RAM Usage	e [MBytes] 3648	

Fig. 1: Configuration view

3.1.1 Configuration management

Use the buttons to save or load the settings done in this view.

3.1.2 Stream configuration table

One table row refers to one output stream and consists of the following columns:

Selection

Use the checkbox to select/deselect the row. Row selection affects transport stream file assignment and deletion of rows (both see below).

Alias

This user-defined text will uniquely represent the row's output stream settings (TS file and destination port) in the streaming view (3.2.1).

 TS (transport stream) File Click on this cell to assign the desired transport stream file to the row's destination port.

If more than one row has been selected before, then a multi-file selection dialog will be shown. Selecting then fewer files than rows previously will assign the files to more than one row. (E.g. selecting all rows but only one file is the quickest way of assigning this file to all rows.)

Selecting more than one row will also activate "Drag and Drop" functionality. Instead of the multi-file selection dialog, file(s) can then also be directly dragged from the Windows Explorer into the stream configuration table.

- Destination Port The UDP destination port for the row's stream.
- Status

This column cannot be edited. It is used to display row specific status information after streaming start has been initiated (3.1.5).

3.1.3 Stream configuration table controls

- Import from R&S CLG / R&S SLG
 This feature analyzes an R&S CLG / R&S SLG configuration file to extract all active UDP destination ports, which thus have to be fed with content. In addition, the related RF modulation frequency is taken as the related row alias for quick identification.
- Add row Adds a row at the bottom of the stream configuration table.
- Delete selected rows
 Deletes all rows which previously have been selected in the stream configuration table.
- Select all Selects all rows in the stream configuration table.
- Deselect all Deselects all rows in the stream configuration table.

3.1.4 RAM usage preview

In order to achieve reliably high output stream data rates, all transport stream files selected in the stream configuration table are loaded to RAM before streaming finally starts. Assigning the same transport stream file to multiple table rows will not require additional RAM, since this resource will be shared between all affected output streams.

This real-time RAM usage preview allows already during configuration to check, how much system memory is required for the current transport stream file assignment, and how much is still available for further assignments:

- The white figure shows the currently required absolute amount of Mbytes.
- The green bar shows the percentage of the white figure compared to the currently available RAM.
 This currently available RAM figure is always 500 Mbytes lower than the physically free RAM to keep a reserve for long-term system operation stability.
- A red warning border will show up, if the current transport stream file assignment exceeds the available RAM.

3.1.5 Streaming control

This area consists of two items:

- Destination IP Defines the destination IP address for all entries of the stream configuration table.
- Start streaming button Before the software switches to the streaming view (3.2), the following preparation procedure is run for every row in the stream configuration table:
 - The related transport stream input file is cached into RAM.
 - Subsequently, the timings of this input stream are analyzed to determine play out data rate and restamping positions for seamless looping.
 - \circ $\;$ The progress can be tracked in the related status column.
 - In case the remaining available RAM is not sufficient or the analysis cannot sync on the transport stream input file format, these errors will also be reported in the status column.

3.2 Streaming View

This view is being switched to after a successful streaming start initiated by the streaming control (3.1.5).

ы R&S TSSTI	REAM 1.00 [96ch_live.tss]									׾
								1		
								L	T 172.29.31.71	Stop
2000	1115							ſ	555 and 56 million in	
057 MHz	Pos 58.4% at 50.87 MBit/s	📀 065 MHz	Pos 58.3% at 50.87 MBit/s	📀 073 MHz	Pos 58.4% at 50.87 MBit/s	📀 081 MHz	Pos 58.3% at 50.87 MBit/s	📀 089 MHz	Pos 58.3% at 50.87 MBil/s	
😋 097 MHz	Pos 58.3% at 50.87 MBit/s	🔁 105 MHz	Pos 58.4% at 50.87 MBit/s	🔁 113 MHz	Pos 58.3% at 50.87 MBit/s	📀 121 MHz	Pos 58.3% at 50.87 MBit/s	2 129 MHz	Pos 58.3% at 50.87 MBit/s	
📀 137 MHz	Pos 58.3% at 50.87 MBil/s	📀 145 MHz	Pos 58.3% at 50.87 MBit/s	📀 153 MHz	Pos 58.4% at 50.87 MBit/s	📀 161 MHz	Pos 58.4% at 50.87 MBit/s	📀 169 MHz	Pos 58.4% at 50.85 MBil/s	
📀 177 MHz	Pos 58.4% at 50.85 MBit/s	📀 185 MHz	Pos 58.4% at 50.87 MBit/s	📀 193 MHz	Pos 58.4% at 50.87 MBit/s	201 MHz	Pos 58.3% at 50.85 MBit/s	209 MHz	Pos 58.3% at 50.85 MBit/s	
📀 217 MHz	Pos 58.3% at 50.87 MBil/s	225 MHz	Pos 58.3% at 50.87 MBit/s	📀 233 MHz	Pos 58.3% at 50.85 MBit/s	241 MHz	Pos 58.3% at 50.85 MBit/s	249 MHz	Pos 58.4% at 50.85 MBil/s	
📀 257 MHz	Pos 58.4% at 50.87 MBit/s	📀 265 MHz	Pos 58.4% at 50.85 MBit/s	📀 273 MHz	Pos 58.4% at 50.87 MBit/s	📀 281 MHz	Pos 58.4% at 50.85 MBit/s	📀 289 MHz	Pos 58.4% at 50.87 MBit/s	
📀 297 MHz	Pos 58.3% at 50.87 MBit/s	😎 305 MHz	Pos 58.3% at 50.87 MBit/s	😎 313 MHz	Pos 58.3% at 50.87 MBit/s	📀 321 MHz	Pos 58.4% at 50.87 MBit/s	😎 329 MHz	Pos 58.4% at 50.87 MBil/s	
📀 337 MHz	Pos 58.4% at 50.87 MBit/s	📀 345 MHz	Pos 58.3% at 50.87 MBit/s	📀 353 MHz	Pos 58.3% at 50.85 MBit/s	📀 361 MHz	Pos 58.3% at 50.87 MBit/s	📀 369 MHz	Pos 58.3% at 50.87 MBit/s	
377 MHz	Pos 58.3% at 50.85 MBit/s	385 MHz	Pos 58.3% at 50.87 MBit/s	📀 393 MHz	% at 50.87 MBit/s	📀 401 MHz	Pos 58.3% at 50.87 MBit/s	📀 409 MHz	Pos 58.3% at 50.87 MBit/s	
📀 417 MHz	Pos 58.3% at 50.87 MBit/s	📀 425 MHz	Pos 58.3% at 50.87 MBit/s	📀 433 MHz	Pos 9% at 50.87 MBit/s	📀 441 MHz	Pos 58.4% at 50.85 MBit/s	📀 449 MHz	Pos 58.3% at 50.87 MBi/s	
📀 457 MHz	Pos 58.3% at 50.87 MBit/s	📀 465 MHz	Pos 58.3% at 50.87 MBit/s	📀 473 MHz	Post 1% at 50.87 MBit/s	😎 481 MHz	Pos 58.3% at 50.87 MBit/s	😎 489 MHz	Pos 58.3% at 50.85 MBit/s	
🔁 497 MHz	Pos 58.4% at 50.85 MBit/s	😎 505 MHz	Pos 58.3% at 50.85 MBit/s	📀 513 MHz	Pos 58.3% at 50.85 MBit/s	📀 521 MHz	Pos 58.3% at 50.87 MBit/s	📀 529 MHz	Pos 58.3% at 50.87 MBit/s	
📀 537 MHz	Pos 58.4% at 50.87 MBit/s	545 MHz	Pos 58.4% at 50.87 MBit/s	📀 553 MHz	Pos 58.4% at 50.87 MBit/s	📀 561 MHz	Pos 58.4% at 50.87 MBit/s	S69 MHz	Pos 58.4% at 50.87 MBit/s	
📀 577 MHz	Pos 58.4% at 50.85 MBil/s	📀 585 MHz	Pos 58.4% at 50.85 MBit/s	📀 593 MHz	Pos 58.4% at 50.87 MBit/s	📀 601 MHz	Pos 58.4% at 50.87 MBit/s	📀 609 MHz	Pos 58.4% at 50.85 MBit/s	
📀 617 MHz	Pos 58.4% at 50.85 MBit/s	📀 625 MHz	Pos 58.4% at 50.87 MBit/s	📀 633 MHz	Pos 58.4% at 50.87 MBit/s	📀 641 MHz	Pos 58.4% at 50.90 MBit/s	📀 649 MHz	Pos 58.4% at 50.90 MBit/s	
📀 657 MHz	Pos 58.4% at 50.87 MBil/s	📀 665 MHz	Pos 58.4% at 50.85 MBit/s	📀 673 MHz	Pos 58.4% at 50.87 MBit/s	📀 681 MHz	Pos 58.3% at 50.87 MBit/s	😎 689 MHz	Pos 58.3% at 50.87 MBit/s	
📀 697 MHz	Pos 58.4% at 50.85 MBit/s	😎 705 MHz	Pos 58.3% at 50.87 MBit/s	😎 713 MHz	Pos 58.3% at 50.87 MBit/s	📀 721 MHz	Pos 58.3% at 50.85 MBit/s	📀 729 MHz	Pos 58.3% at 50.85 MBit/s	
📀 737 MHz	Pos 58.3% at 50.87 MBil/s	📀 745 MHz	Pos 58.3% at 50.87 MBit/s	📀 753 MHz	Pos 58.3% at 50.87 MBit/s	📀 761 MHz	Pos 58.3% at 50.87 MBit/s	📀 769 MHz	Pos 58.3% at 50.87 MBit/s	
	Pos 58.4% at 50.87 MBit/s	📀 785 MHz	Pos 58.4% at 50.87 MBit/s	📀 793 MHz	Pos 58.4% at 50.87 MBit/s	📀 801 MHz	Pos 58.3% at 50.85 MBit/s	📀 809 MHz	Pos 58.4% at 50.85 MBit/s	
📀 817 MHz	Pos 58.4% at 50.87 MBit/s									
		Thread load [%]				Output [Mbit/s]			
100-		_			4883.8-		-		l .	
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60-					4883.6-	\/\/\/\/\/	¬NIMMM≪\)	NMMIN	יו אוא אא אי	
40-					4883.5-	A. A. A. A.				
20-					4883.4-			V V		
0-					4883.3-					
-60s	-50s -40s	-30s	-20s	-10s	0s -60s	-50s	-40s -30s	-20s	-10s	0s

Fig. 2: Streaming view

3.2.1 Stream status monitor matrix

The purpose of this matrix is to provide an overview about the complete streaming status at a glance. For each output stream, the following information is provided:



Further details are provided by a tooltip:

- First line: [Alias]=>[UDP destination port] @ [Data rate] ([Loop time]).
- Second line: Transport stream input file.
- Further lines: List of packet PIDs in hexadecimal and decimal notation, for which seamless PCR/PTS/DTS restamping is applied.

🔁 3 😭	MHz	Pos 77.9%	at 50.87 MBit/s	📀 329 MHz	Pos 77.9% at 50.87	/ MBit/s				
€ 353	321 MHz => c:\Program	Port 10033 Files\Rohde-	@ 50.872 MBit/s -Schwarz\TSStre	(6.3 s) am\ts\Run 1\458MHz_	QAM256_2.trp	MBit/s				
•• 389	PCR/PTS/DT	PCR/PTS/DTS seamless for the following PES PIDs:								
<mark>€</mark> 417	0x0259 (60 0x0962 (24	0x0259 (601), 0x025A (602), 0x025B (603), 0x025C (604), 0x0961 (2401) 0x0962 (2402), 0x0963 (2403), 0x0964 (2404), 0x0BB9 (3001), 0x0BBA (3002)								

Fig. 3: Tooltip in streaming view

3.2.2 Thread load monitor

This graph shows the load of the individual streaming threads over the last 60 seconds. This information can be used to quickly check the PC performance being sufficient enough to process an error-free IP stream output.



Fig. 4: Thread load monitor

If e.g. a scheduled background process like antivirus or defragmentation tool is unintendedly getting active and taking too much performance, this effect will be clearly and immediately get visible in this view.

For a reliable IP stream output, it is recommended to run a configuration, which does not drive the thread load above 50% on average to keep enough reserves for performance peaks.

In case of thread loads exceeding 50%, either upgrade to a processor with higher performance or reduce the total IP output data rate by either reducing the data rate per streams or the number of streams.

3.2.3 Output data rate monitor

Supportive to the thread load monitor (3.2.2) this view also confirms correct system operation and stream output quality by tracking the total stream output data rate over the last 60 seconds.



Fig. 5: Output data rate monitor

Due to the y-axis auto-scaling mode, the data rate precision can be quickly rated by evaluating the min/max values.

3.2.4 Streaming control

This area shows the streaming destination IP address and provides the button to stop streaming.

4 Troubleshooting

4.1 Configuration

PCR information not found error

The format of the related transport stream input file is not supported. Common reasons are:

- The MPEG-2 packet length is not 188 bytes, 204 bytes or 208 bytes.
- The transport stream does not contain any elementary stream with valid PCR timestamps.
- The transport stream file content is encrypted. The R&S Multi-TS Streaming Software does not support decryption.

4.2 Streaming

4.2.1 General

No IP packet reaches the streaming destination

Check cabling, firewall settings, target IP address and subnet mask.

The streaming screen indicates errors and/or the thread load reaches 100%

The average available computer performance does not seem to be sufficient. Refer to chapter 3.2.2 for more details.

4.2.2 Operation with R&S CLG / R&S SLG

Less PCR accuracy

The R&S CLG does not perform PCR correction and this may result in PCR irregularities. These irregularities can be minimized by feeding the R&S CLG a pre-corrected data stream near the maximum data rate. There would still likely be some PCR mismatch due to differences between the source clock and the R&S CLG clock, and occasional null packet insertion.

Loss of transport stream packets

This happens, when the transport stream data rate exceeds the capacity of the targeted channel. Either select a transport stream file with a lower data rate or increase the channel capacity by adjusting the instrument's modulation parameters (e.g. increase symbol rate).