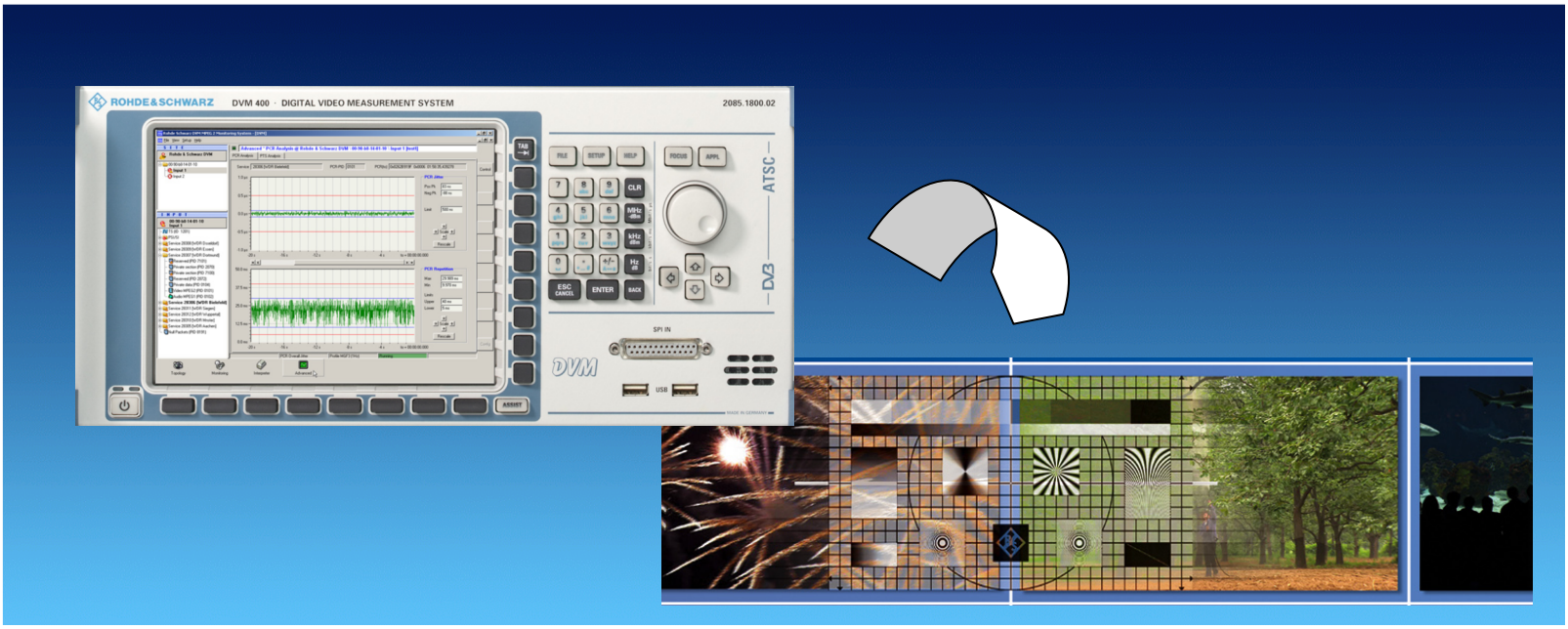

Products: R&S®DVM50, R&S®DVM100, R&S®DVM120, R&S®DVM400, R&S®DV-ASC

Extracting Video Elementary Streams Using the R&S®DVM 50/100/400

Application Note

This Application Note describes two easy ways of extracting the video content of MPEG-2 transport streams and storing it as video elementary streams. These elementary streams can later be used to generate customized MPEG-2 transport streams by means of the Advanced Stream Combiner R&S®DV-ASC application.

ROHDE&SCHWARZ

Subject to change – H. Gsoedl 04.2006 - 7BM58_0E

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1 Introduction

The R&S®DVM family offers a wide range of analysis and monitoring features for MPEG-2 transport streams (TS). Furthermore, comprehensive functions for processing and analyzing elementary streams have been implemented.

This Application Note describes two easy ways of extracting the video content of MPEG-2 transport streams and storing it as video elementary streams. These elementary streams can later be used to generate customized MPEG-2 transport streams by means of the Advanced Stream Combiner R&S®DV-ASC application.

2 Hardware and Software Requirements

R&S®DVM Requirements

Depending on the chosen extraction method, the following two requirements for the R&S®DVM are necessary.

Software options	Elementary Stream Analyzer	R&S®DV-ESA	2085.8904.02
Hardware options	R&S®DVM400: DVM-B1	R&S®DVM-B1	2085.5505.02

PC Hardware Requirements for R&S®DV-ASC

	Minimum	**Recommended**
CPU	Pentium 300 MHz	Pentium II 450 MHz or higher
RAM	256 Mbyte RAM	512 Mbyte
Hard disk	1 Gbyte free space	50 Mbyte free hard disk space
Monitor	VGA monitor (640x480)	SVGA color monitor, resolution 800x600 or better

PC Software Requirements for R&S®DV-ASC

	Minimum	Recommended
OS	Windows 95 / 98 / NT 4.0 / 2000 / Me / XP	Windows 98 / 2000 / Me / XP
OS add-ons	---	Microsoft Internet Explorer 5.0 or later

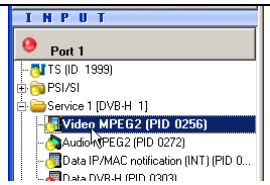
Thorough knowledge of MPEG-2 and DVB is necessary in order to understand the discussed topic. Please see [1] for more details.

3 Extracting Elementary Streams (ES)

As mentioned in the introduction, this document explains two different ways of extracting ES from a transport stream.

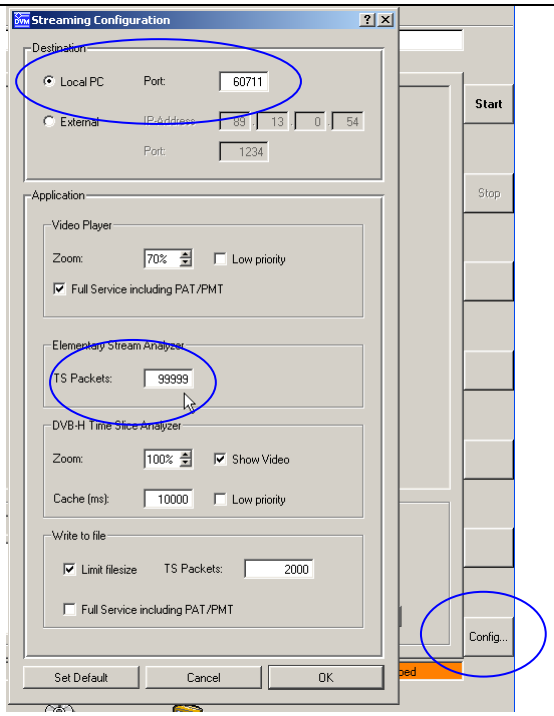
The first method uses the Elementary Stream Analyzer R&S®DV-ESA option. The second method uses the internal VLC player to capture the ES. In the first case, the exact number of TS packets to be captured can be specified, but is limited to 99999. The second option offers the possibility to record ES, whose length is limited only by the available disk space.

ES Extraction with the Elementary Stream Analyzer (R&S®DV-ESA)

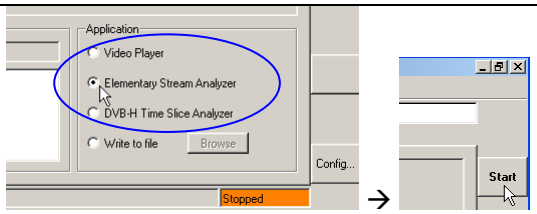
1. Select the DVM streaming function.	
2. Select the target video in TS input tree.	

3. Open the *Streaming Configuration* dialog.
4. Under *Destination*, select *Local PC*.
5. Specify the number of TS packets to be extracted. The maximum number is 99999.
   The maximum recording time depends on the bit rate of the video elementary stream.

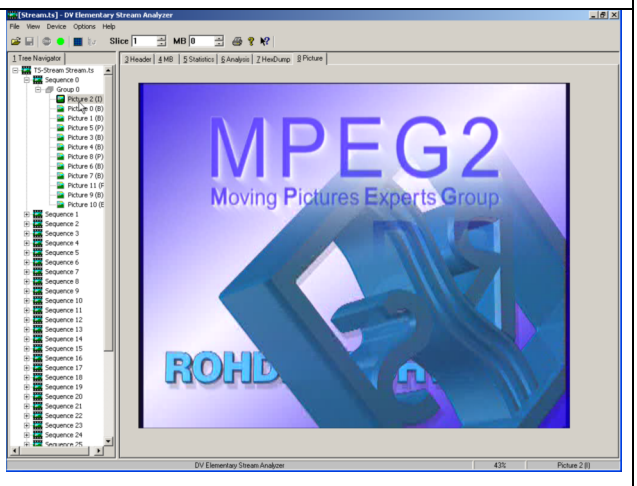
   Example:
   ES bit rate is 3 Mbit/s → recording time approx. 45 s.
6. Click *OK* to close the window.

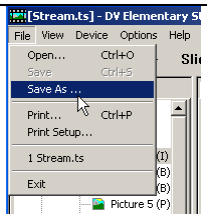


7. Select *Elementary Stream Analyzer* and click *Start*.

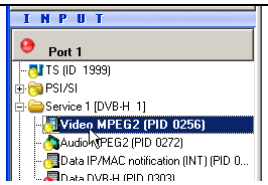
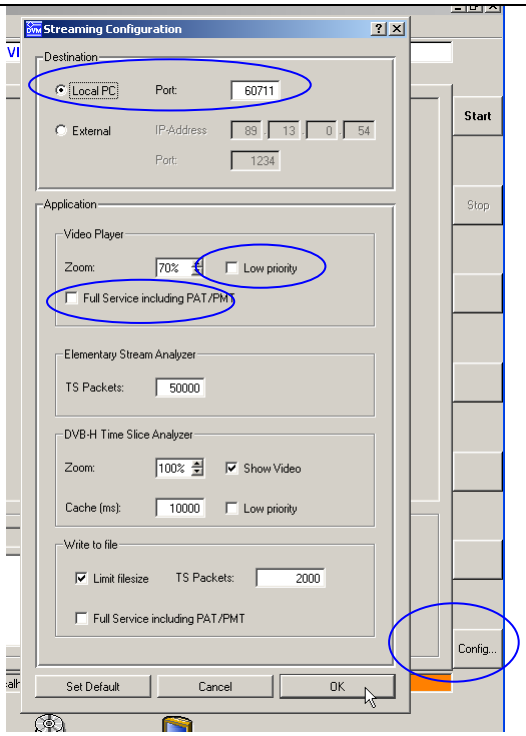
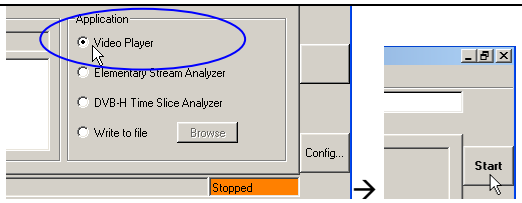


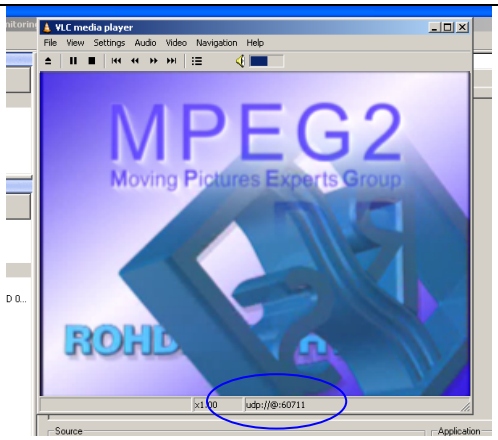
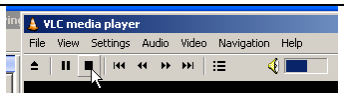
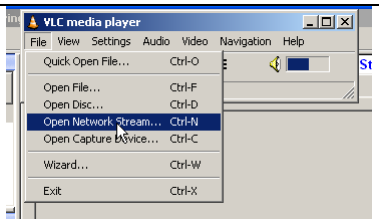
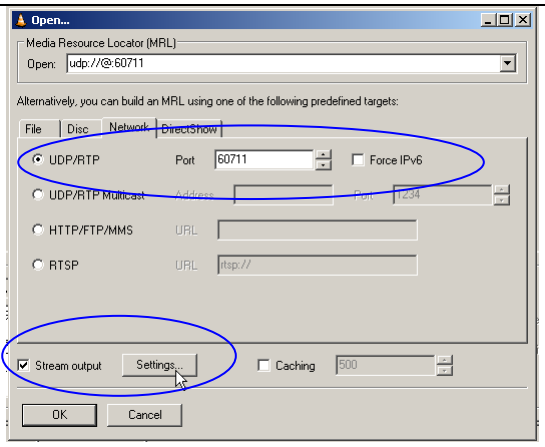
8. The elementary stream analyzer appears and loads the selected video stream.



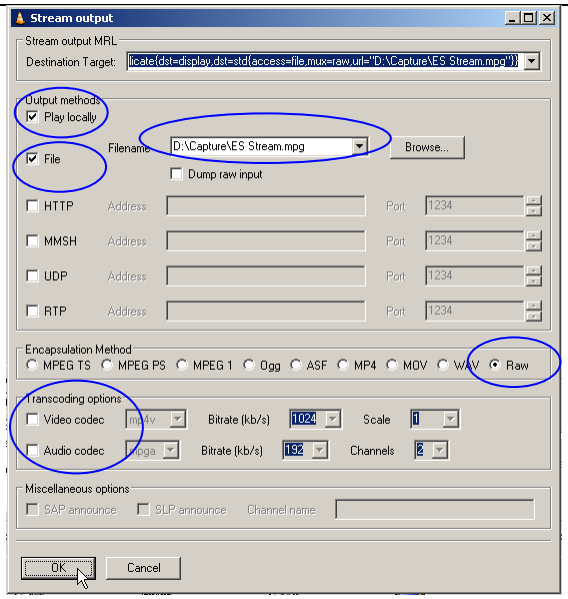
9. Save the video ES via *File/Save As … .*	

ES Extraction with the Integrated VLC Player

1. Select the DVM streaming function.	
2. Select target video in TS input tree.	
3. Open the *Streaming Configuration* dialog. 4. Under *Destination*, select *Local PC*. 5. Under *Application*: - Deselect *Low priority* - Deselect *Full Service including PAT/PMT*. 6. Leave the other parameters unchanged. Click *OK* to close the window.	
7. Select *Video Player* and click *Start*.	

8. The video player appears and shows the selected video. 9. Read out the UDP port number – here, 60711.	
10. Stop the video player.	
11. Open the *File / Open Network Stream…* dialog.	
12. The *Open* dialog appears. 13. Select *UDP/RTP* with the port number read out before – here, 60711. 14. Select *Stream output* and click *Settings*.	

15. The *Stream output* dialog appears.
16. Under *Output methods*:
    - Select *Play locally*
    - Select *File* and specify *Filename*.
17. Under *Encapsulation Method*, select *Raw*.
18. Under *Transcoding options*, deselect *Video codec* and *Audio codec*.
19. Click *OK* to close the *Stream output…* dialog, and click OK again to close the *Open….* dialog and to start the player.



20. As long as the player is running, the video elementary stream is stored on the hard disk.

    Note: Make sure that enough disk space is available.

4 Editing Captured Elementary Streams Using R&S®ES2Loop

To be able to integrate the captured ES into a customized transport stream using R&S® Advanced Stream Combiner, the streams must first be preprocessed.

Preprocessing is advisable in order for the resulting transport stream to run continuously. Therefore the duration of the elementary streams must be the same as that of the transport stream or a whole-number fraction of the transport stream length (see chapter 5).

Please refer to [2] for a more detailed introduction to *R&S®*ES2Loop.

5 Creating the Transport Stream Using Advanced Stream Combiner (R&S®DV-ASC)

The **Advanced Stream Combiner** (R&S®DV-ASC) software allows you to generate seamless and endless MPEG-2 transport streams on R&S® transport stream generators.

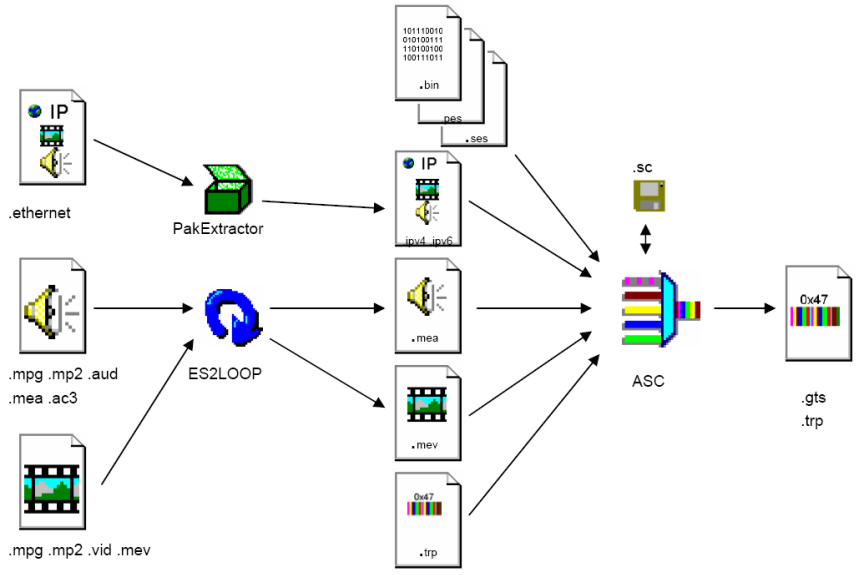


Fig. 1: R&S®DV-ASC

As the above figure shows, audio, video and data elementary streams of any kind can be multiplexed into a customized transport stream for ATSC, DVB-C, DVB-H and DVB-T using R&S®DV-ASC.

To configure a transport stream, all defined elements are clearly displayed in a tree structure (see below).

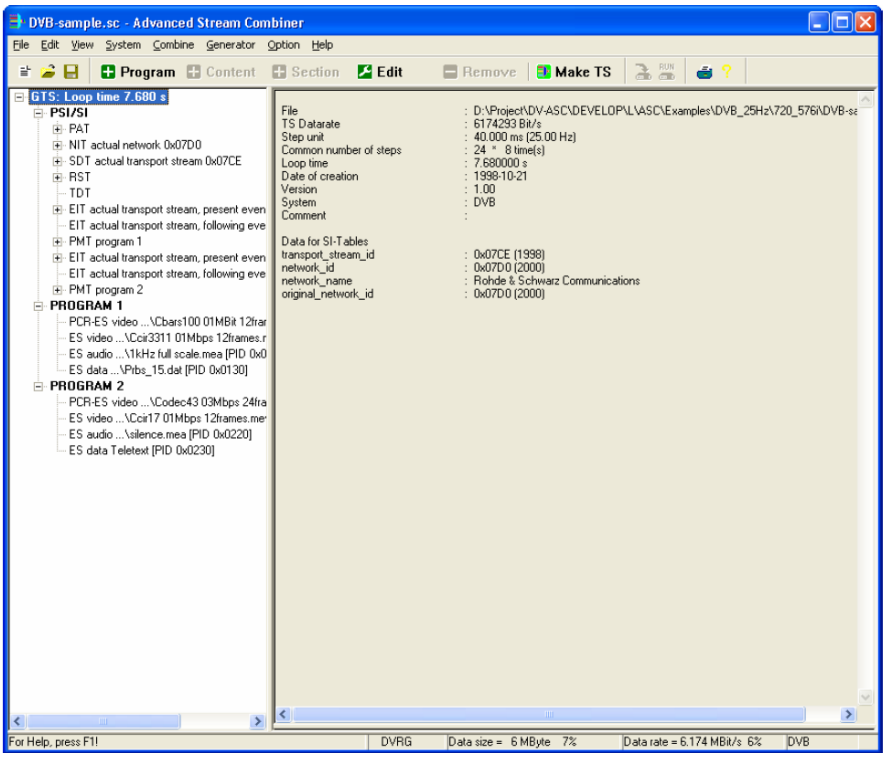


Fig. 2: R&S®DV-ASC GUI

This makes it possible to easily apply user-specific configurations of e.g. the used tables (PSI/SI/PSIP) and to insert elementary streams that have just been captured.

Please be aware of the following insertion constraint: The duration of the elementary streams to be inserted and the final length of the transport stream are directly dependent on each other, as shown in Fig. 3.

The figure below shows the dependencies:

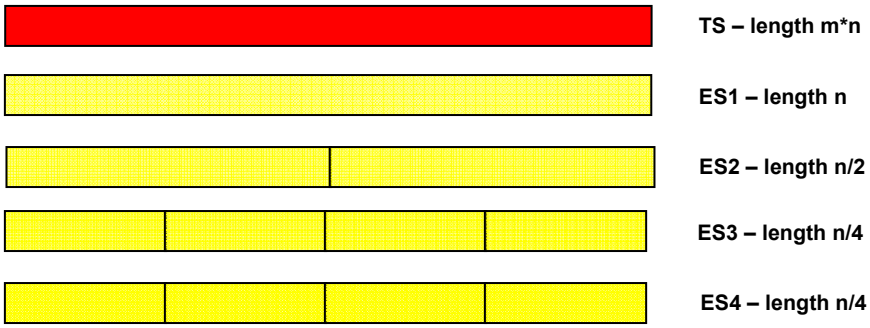


Fig. 3: DV-ASC GUI

The longest elementary stream determines the duration of the transport stream. The TS is always a whole-number multiple of the duration of the longest ES.

Please see the program's manual [3] for a more detailed explanation.

6 Abbreviations

ATSC	Advanced Television Systems Committee
DVB	Digital video broadcasting
ES	Elementary stream
GTS	R&S file format for generating endless and seamless TS loops
MPEG	Moving Picture Experts Group
PAT	Program association table
PMT	Program map table
PSI	Program-specific information
PSIP	Program and system information protocol
SI	Service information
TRP	File format for TS dumps
TS	Transport stream

7 References

[1] Fischer, Walter (2005). Digital Television. A Practical Guide for Engineers. Berlin: Springer.

[2] Rohde & Schwarz (Ed.) (1998). Program Description ES2LOOP. Munich: Rohde & Schwarz GmbH & Co. KG

[3] Rohde & Schwarz (Ed.) (2005). DV-ASC: Advanced Stream Combiner Manual. Munich: Rohde & Schwarz GmbH & Co. KG

8 Additional Information

Our Application Notes are periodically updated. Please visit the Rohde & Schwarz website in order to download new versions.

Please send any comments or suggestions about this Application Note to Broadcasting-TM-Applications@rohde-schwarz.com.

9 Ordering Information

DVM50	**MPEG-2 Monitoring System**	**2085.1900.02**
DVM-K1	Additional TS Input	2085.5211.02
DVM50-K10	In-Depth Analysis	2085.5434.02
DVM-K11	Data Broadcast Analysis	2085.5311.02
DVM100	**MPEG-2 Monitoring System**	**2085.1600.02**
DVM120	**MPEG-2 Monitoring System**	**2085.1700.02**
DVM-B1	Analyzer Board	2085.3283.02
DVM-K1	Additional TS Input	2085.5211.02
DVM-K10	In-Depth Analysis	2085.5228.02
DVM400	**Base Unit**	**2085.1800.02**
DVM400-B1	Analyzer	2085.5505.02
DVM-K1	Additional TS Input	2085.5211.02
DVM-K2	TS Capture	2085.5234.02
DVM-K11	Data Broadcast Analysis	2085.5311.02
DVM400-B2	TS Generator	2085.5511.02
DVM400-B3	Upgrade TS Recorder up to 90 Mbit/s	2085.5528.02
DVM400-B4	Upgrade TS Recorder up to 214 Mbit/s	2085.5534.02
DV-ASC	Advanced Stream Combiner	2085.8804.02
DV-DVBH	DVB-H Stream Library	2085.8704.01
DV-ESA	Elementary Stream Analysis	2085.8904.02
DV-TCM	Test Card M Streams	2085.7708.02
DV-HDTV	HDTV Sequences	2085.7650.02
DVM-DCV	Documentation of Calibration Values	2082.0490.29
	Service Manual	2085.1839.02

For additional information about MPEG-2 measurement equipment, see the Rohde & Schwarz website www.rohde-schwarz.com.

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