

# DaVinci Resolve OS X<sup>®</sup> CLIENT PERFORMANCE ON R&S<sup>®</sup> SpycerNode SC

White paper | Version 01.00 | Dirk Thometzek

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# CONTENTS

- 1 Overview**.....3
  
- 2 DaVinci Resolve and R&S®SpycerNode SC**.....3
  - 2.1 Blackmagic Design DaVinci Resolve.....3
  - 2.2 Platform support .....3
    - 2.2.1 Resource considerations.....3
  - 2.3 R&S®SpycerNode SC.....3
    - 2.3.1 Network .....3
    - 2.3.2 R&S®SpycerNode performance .....4
  - 2.4 Single frame formats .....4
    - 2.4.1 Picture sequences.....4
    - 2.4.2 DPX .....4
    - 2.4.3 Open EXR .....4
  
- 3 Specification and configuration**.....5
  - 3.1 Environment.....5
  
- 4 System configuration** .....6
  - 4.1 OS X® network .....6
  - 4.2 Blackmagic Design DaVinci Resolve.....7
  
- 5 Test cases**.....9

# 1 OVERVIEW

This document describes optimizations for Blackmagic Design DaVinci Resolve version 17 with R&S®SpycerNode SC release Ruby, and provides guidance for configuration and achievable client data rates.

## 2 DaVinci Resolve AND R&S®SpycerNode SC

### 2.1 Blackmagic Design DaVinci Resolve

For two decades, Blackmagic DaVinci Resolve has been at the heart of high-end post production. Together with R&S®SpycerNode SC, it provides a powerful platform to meet the requirements of distributed post production workflows. DaVinci Resolve combines editing, color correction, visual effects, motion graphics and audio post production in a single application featuring collaborative workflow tools. High-performance shared storage is the basis for collaborative workflows.

### 2.2 Platform support

DaVinci Resolve is available on different operating systems. All platform optimizations need to be carried out before applying DaVinci Resolve to a specific operating system. This document describes R&S®SpycerNode SC network bandwidth optimizations on the Mac OS X® platform.

#### 2.2.1 Resource considerations

Please note that DaVinci Resolve consumes a large portion of system resources to ensure smooth media data processing. System performance therefore not only depends on the central storage system bandwidth but also on overall system resources performance. This includes:

- ▶ Network performance
- ▶ Network interface card performance and configuration
- ▶ Workstation CPU, GPU and RAM

### 2.3 R&S®SpycerNode SC

R&S®SpycerNode SC is a central storage system specifically designed for working with post production media files and broadcast workflows.

It is ideally suited to play back and record image sequences and other media content that pose a challenge to many other storage systems in terms of resource consumption. R&S®SpycerNode prevents side effects such as performance degradation due to increasing fragmentation and lack of parallel performance during simultaneous playback of multiple video streams, making it a superior storage system for media and entertainment workflows.

#### 2.3.1 Network

IP networks offer immense advantages over legacy protocols such as Fibre Channel. Flexibility, routing, bandwidth and interconnectivity are just some of them. However, it is important to configure these networks as efficiently as possible to ensure the best possible performance. Rohde&Schwarz provides and configures high-speed storage networks. This requires certain parameters to be met, from the right network cables to interface cards and switches that are able to handle extreme media data load.

Network complexity depends on the requirements, making a case-by-case approach necessary. Rohde&Schwarz provides media network infrastructure that meets all the requirements and ensures the best possible performance.

### **2.3.2 R&S®SpycerNode performance**

R&S®SpycerNode is based on 100 Gbit/s network technology and can deliver up to 22 Gbyte/s bandwidth depending on the selected hard disk technology. To upload such a bandwidth into the network, several network ports must be interconnected in a trunk. 200 Gbit/s and 400 Gbit/s Ethernet technology can be used for future higher order networks.

## **2.4 Single frame formats**

### **2.4.1 Picture sequences**

Picture sequences are file formats used to store a single frame of a motion picture or video data stream. Multiple single frame files are used to store and exchange digital moving picture sequences between a wide variety of electronic and computer systems.

Typical image sequence resolutions are 2K (2048 × 1080), UHD (3840 × 2160) and 4K (4096 × 2160) in anamorphic aspect ratios. The anamorphic process is a way of recording cinema productions with specially constructed camera lenses (anamorphic lenses) for creating a particularly wide image that is closer to human perception than e.g. the 4:3 film format. Instead of cropping the image at the top and bottom and thus losing resolution, the anamorphic lenses create distortion towards the edge. Equalization then takes place during playback. In addition to the formats already mentioned, there is a wide variety of other resolutions such as 4K Academic (4096 × 3112) in 4:3 aspect ratio, used to a limited extent in historical film material preservation.

### **2.4.2 DPX**

Digital picture exchange (DPX) is a common file format for feature film production based on digital intermediate processes. The file format is designed to handle large amounts of contrast typical for digital cinema cameras or film material. Each color channel is stored with up to 32 bit (linear or logarithmic). A widely used film scanning device for digital editing, for example, delivers 10-bit logarithmic data, fully covering the contrast range of 16 mm material. Professional compositing or color editing systems work with DPX data, which can also be used at the end of the production chain to expose the film content. The DPX file format was originally derived from the Kodak Cineon open file format (.cin file extension) used for digital images generated by Kodak's original film scanner. It is standardized in line with ANSI/SMPTE (SMPTE 268M-2003, v 2.0), which goes back to the ANSI/SMPTE 268M-1994, v 1.0 draft standard.

### **2.4.3 OpenEXR**

OpenEXR has been developed since 1999 as an open format specified by the US company Industrial Light & Magic (ILM) and has been published since 2003 under an open source license. ILM provides development environment files, including display applications for viewing OpenEXR images as well as a program library for image format processing.

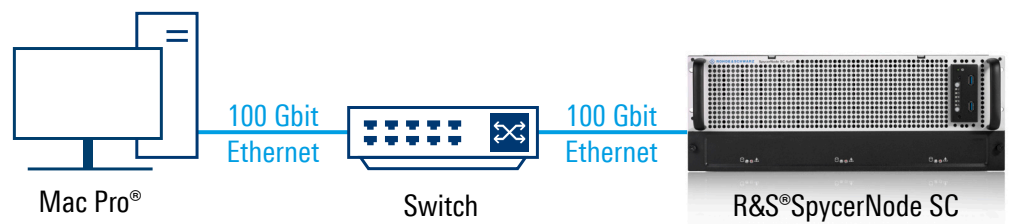
To store image data, OpenEXR uses a 16-bit floating point number as the basis per color channel, as well as various compression techniques including lossless and lossy compression algorithms. OpenEXR also supports 32-bit floating point data and 32-bit integer data per pixel. These formats can store special data such as depth information and object identifiers.

# 3 SPECIFICATION AND CONFIGURATION

## 3.1 Environment

Workstation	Apple Mac Pro®
Operating system	macOS® version 11.4 (Big Sur)
Processor	3.5 GHz 8-Core Intel Xeon W
Memory	64 Gbyte 2666 MHz DDR4
GPU	AMD Radeon Pro 580X 8 Gbyte
Software	Blackmagic Design DaVinci Resolve Studio version 17.1.1 build 9
Network adapter	ATTO Technology FastFrame N312, 100 Gbit Ethernet, PCIe width x16 (slot 5), driver version 1.08.0f1, firmware version 16.29.1016
100 Gbit Ethernet switch	NVIDIA Mellanox SN 2100
Rohde & Schwarz storage	R&S®SpycerNode SC 4u60, half populated SSD. Release Ruby 1.2

### Block diagram.



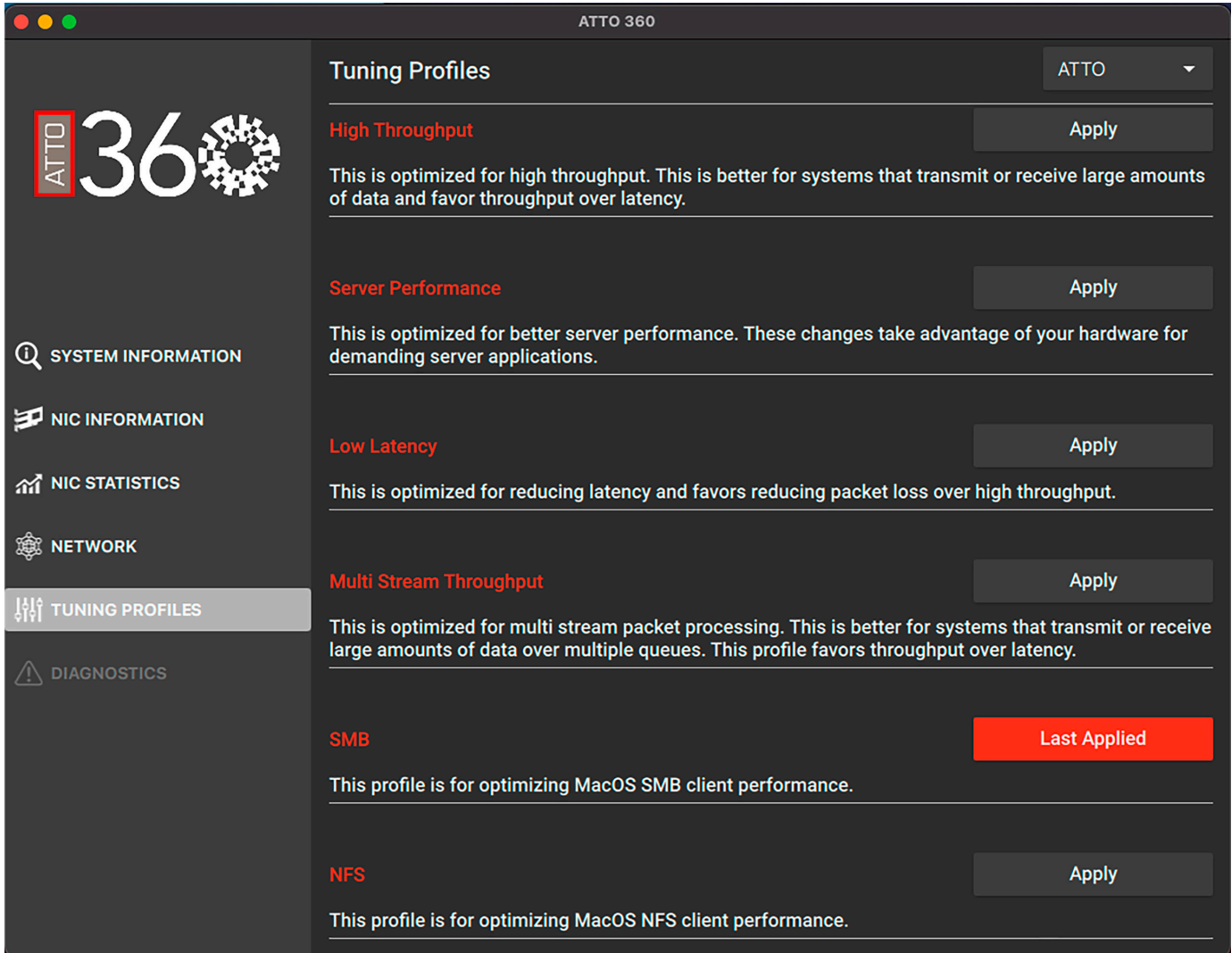
# 4 SYSTEM CONFIGURATION

## 4.1 OS X® network

We recommend ATTO Technology network adapters as the basis for connecting to the R&S®SpycerNode storage system.

ATTO Technology provides the ATTO 360 software tool together with the network adapters for adjusting network settings depending on the workflow. In combination with DaVinci Resolve, the best results are achieved using the SMB tuning profile. Future releases will include dedicated R&S®SpycerNode settings for optimal results.

### ATTO 360 settings.

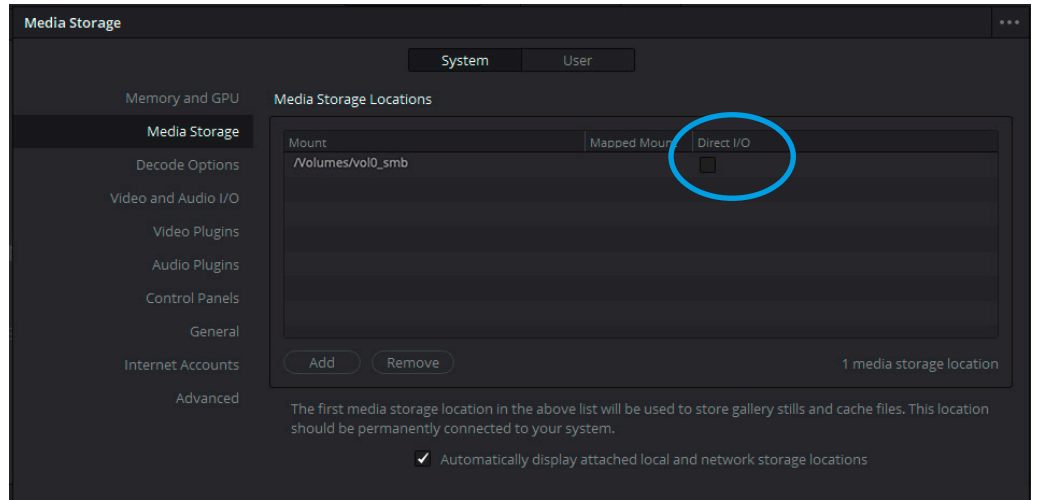


## 4.2 Blackmagic Design DaVinci Resolve

We recommend the following settings to achieve the best possible DaVinci Resolve performance:

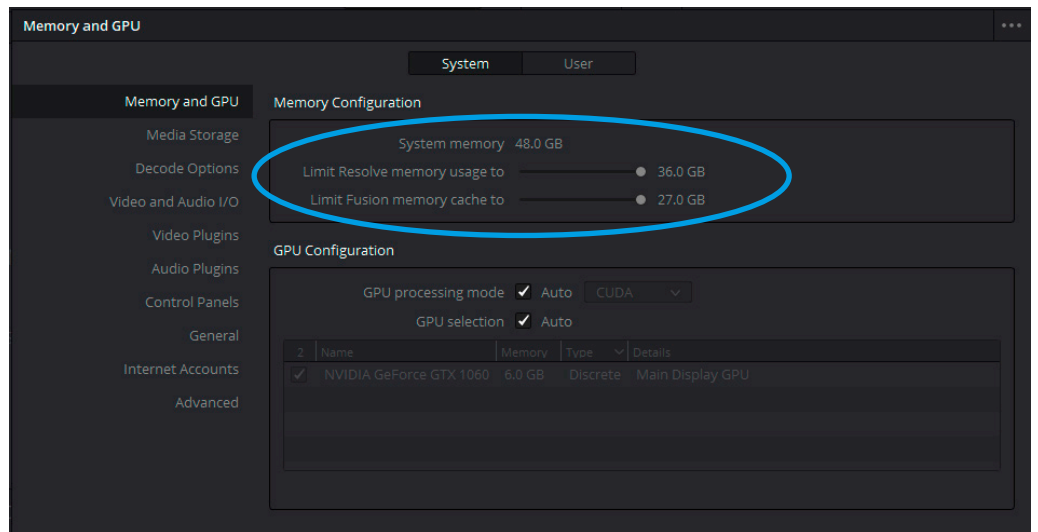
- ▶ In this setting, the media storage location is fixed. To work in buffered I/O mode, please uncheck "Direct I/O"

### DaVinci Resolve/Preferences/(System)/Media Storage.



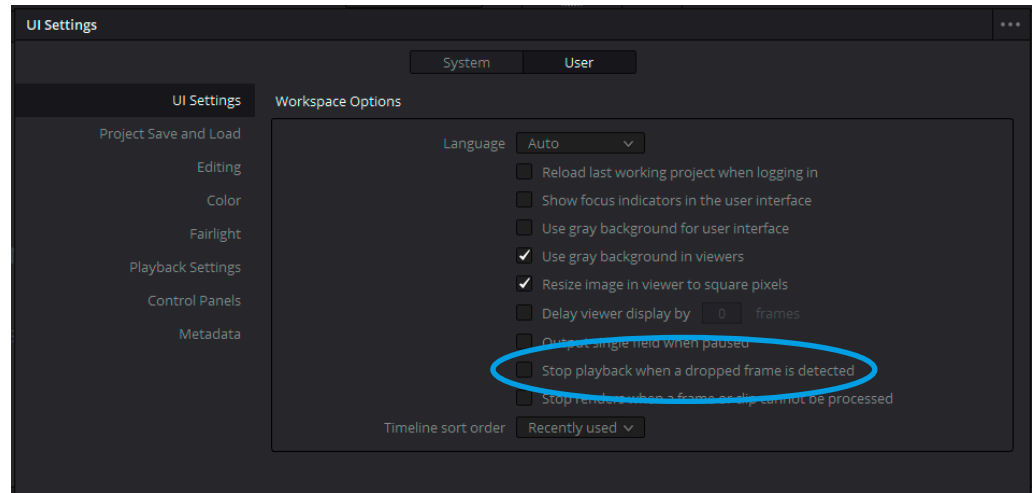
- ▶ Limit the system memory so that DaVinci Resolve and Fusion have at least 10 Gbyte for the operating system. Please note that Rohde&Schwarz recommends at least 64 Gbyte RAM for running DaVinci Resolve on a Mac computer connected to R&S®SpycerNode

### DaVinci Resolve/Preferences/(System)/Memory and GPU configuration.

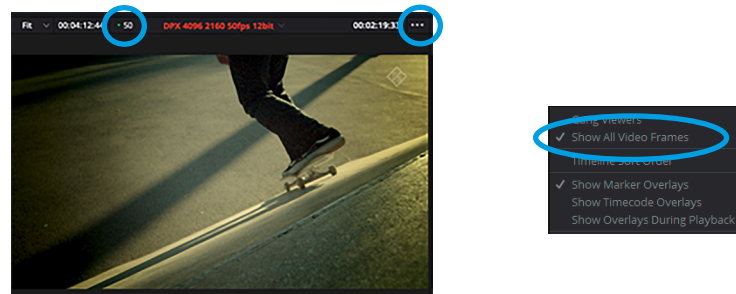


To compensate for network-related latency fluctuations, "Stop playback when a dropped frame is detected" should be switched off. This does not necessarily affect video playback continuity.

### DaVinci Resolve/Preferences/(User)/UI Settings.

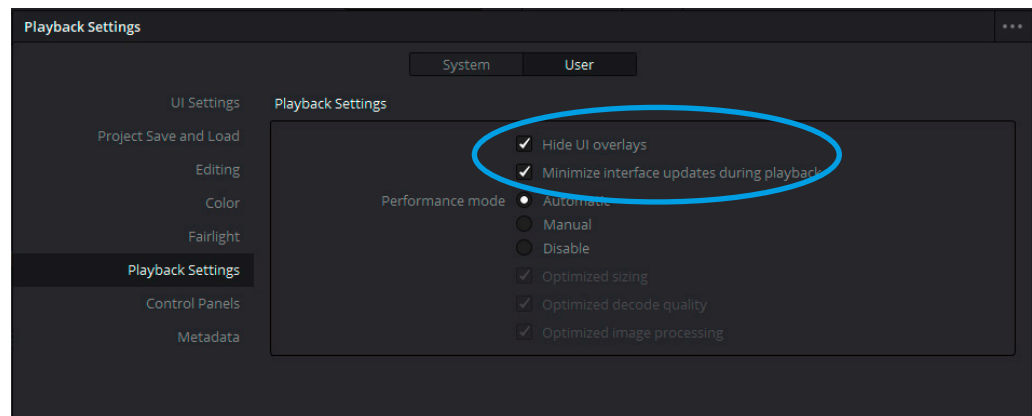


After a very short startup phase, the available frame rate and a green status indicator can be displayed above the player or recorder window. Please note that "Show All Video Frames" must be selected in the three-dot menu to the right of the indicator.



Activate "Hide UI overlays" and "Minimize interface updates during playback" for optimal playback performance.

### DaVinci Resolve/Preferences/(User)/Playback Settings.





# 5 TEST CASES

The test results in the table below were obtained by playing a sequence over several hours while constantly monitoring the data transfer performance on the OS X® client and R&S®SpycerNode SC server.

Codec	Pixel resolution	Description	FPS	Quantization bit	Color space	Compression	Single frame size in Mbyte	Data rate in Mbyte/s	Continuous playback
DPX	4096 × 2160	4K DCI	50	16	RGB	non	53	2650	•
DPX	4096 × 2160	4K DCI	50	12	RGB	non	40	2000	•
DPX	4096 × 2160	4K DCI	50	10	RGB	non	35	1750	•
DPX	4096 × 2160	4K DCI	25	16	RGB	non	53	1325	•
DPX	4096 × 2160	4K DCI	25	12	RGB	non	40	1000	•
DPX	4096 × 2160	4K DCI	25	10	RGB	non	35	875	•
DPX	4096 × 3112	4K full Ap	50	10	RGB	non	51	2550	•
DPX	4096 × 3112	4K full Ap	30	12	RGB	non	57	1710	•
DPX	4096 × 3112	4K full Ap	30	16	RGB	non	77	2310	•
OpenEXR	4096 × 2160	4K DCI	50	16	RGB	PLZ	0.133 to 29	≤1450	•
OpenEXR	4096 × 3112	4K full Ap	30	16	RGB	PLZ	0.192 to 44	≤1320	•
OpenEXR	4096 × 2160	4K DCI	50	16	RGB	non	53	2650	•





## **Rohde & Schwarz**

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