



# Avid<sup>®</sup> ISIS<sup>®</sup> | 2500 - 2000 v4.7.7

## Performance and Redistribution Guide

### Change History

Date	Release	Changes
11/13/2015	4.7.7	<ul style="list-style-type: none"><li>Added support for El Capitan (Mac OS 10.11)</li><li>Added support for Atto Thunderlink 10Gb for Mac OS 10.10, and 10.11 (on newer Mac Pro's only)</li></ul>
11/14/2014	4.7.3	Update to opening paragraph. Corrected typo.
6/10/2014	4.7	First Draft.
12/8/2013	4.6	Avid has added support for Windows v8.1 and Mac OSX v10.9.
10/11/2013	4.5	Release of the 2000 v4.5 Performance Guide

*This document provides performance guidance for the Avid ISIS v4.7 release, including charts detailing the bandwidth required for supported resolutions in multiple formats. Expected performance and the duration of redistributions have been outlined. This release supports Symphony/Media Composer v8.x, 7.0.x and 6.5.x.*

*The performance and bandwidth data included in this document were observed during testing at Avid, and do not represent a guarantee of performance or error-free operation. Avid recommends using a play-out server for play-to-air workflows.*

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## 1.0 What's new for ISIS | 2500 – 2000 in version 4.7.7

For a complete list of features new to 4.7.7 refer to the Avid ISIS ReadMe. This document only covers performance-related features for ISIS 2500 - 2000.

- Support for El Capitan (Mac OS 10.11)
- Support for Thunderlink 10Gb for Mac OS 10.10, and 10.11 (on newer Mac Pro's only)

## 2.0 What's new for ISIS | 2500 – 2000 in version 4.7

For a complete list of features new to 4.7 refer to the Avid ISIS ReadMe. This document only covers those features that are ISIS | 2500 – 2000 performance related.

- This release introduces the ISIS | 2500 (ISIS 2000 name does not change), in the following configurations:
  - 2.1 ISIS | 2500-320, with 82 x 4 TB drives, providing 320 TB of raw storage which equates to 256 TB of usable storage
  - 2.2 ISIS | 2500-160, with 42 x 4 TB drives, providing 160 TB of raw storage which equates to 128 TB of usable storage
- The v4.7 release supports dual 10 Gb network connections on all ISIS systems for higher bandwidth.
- A Redistribution Monitor now displays progress and estimated time to complete.
- This release supports 10 Gb clients using Adobe Premiere Pro.
- This release supports Red Hat Enterprise Linux versions 6.2, 6.3, and 6.5 on ISIS clients.
- Temperature Sensor Information Added for ISIS | 2500 – 2000 (See ISIS | 2500 – 2000 Setup Guide).

## 3.0 What's new for ISIS | 2500 - 2000 in version 4.6

Avid has added support for Windows v8.1 and Mac OSX v10.9.

## 4.0 What's new for ISIS | 2500 - 2000 in version 4.5

The following is a list of what is new in ISIS 4.5 as it pertains to ISIS | 2500 - 2000. This is not a complete list of all the new features for that release. For a full list, see the ISIS 4.5 ReadMe.

- The Avid ISIS 7000, Avid ISIS 5500/5000 and Avid ISIS | 2500 - 2000 infrastructures now support clients with the Windows 8 64-bit operating system.

Note: Version 4.5 will be the last ISIS Client Manager release tested on workstations and laptops with the Microsoft Windows XP and Windows Vista Operating Systems. Avid recommends that you update your client Operating Systems to Windows 7 or Windows 8 if you plan to upgrade to future versions of ISIS software.

The Avid ISIS |7500-7000, Avid ISIS 5500/5000 and Avid ISIS | 2500 - 2000 infrastructures now support Red Hat® Enterprise Linux®v6.2 and 6.3 clients. 1 Gb and 10 Gb connections are supported. 2 X 1 Gb offers redundancy with no performance benefit.

- The ISIS v4.5 release provides the capability to upgrade a half populated ISIS | 2500 - 2000-120 Engine to a fully populated ISIS | 2500 - 2000-240 Engine.
- The Avid ISIS | 2500 - 2000 system increased the number of Engines supported in the ISIS | 2500 - 2000 environment from one to five. An ISIS | 2500 - 2000 configuration with five ISIS 2000-240 Engines supports 1.2 PB of shared storage.

**Note:** When adding ISIS | 2500 - 2000 Engines to an existing Storage Group or when expanding from 120TB to 240TB by installing additional drives, a redistribution of the files in the Storage Group is required. ISIS | 2500 - 2000 clients are permitted to read and write during “Add” redistribution.

- ISIS | 2500 - 2000 now supports Redundant System Director configurations providing file system metadata protection to deliver higher availability.
- Mac OSX finder level copy performance and directory navigation improvements: ISIS v4.5 dramatically increases the performance of copying files to and from ISIS workspaces and allows you to browse directories with high file counts quickly. Directory browsing performance improvements will only be realized on newly copied material—any material that was written to ISIS workspaces prior to v4.5 may exhibit degraded performance until the files are copied to a new ISIS location. Note that moving workspaces from one storage group to another will not improve performance for browsing existing directories—the directories and files themselves must be copied to another location.
- Improved CIFS sharing. ISIS v4.5 expands the capabilities of the ISIS File Gateway— you can now configure all of your workspaces to be shared simultaneously. In previous versions of ISIS, the File Gateway was limited to sharing 25 workspaces at a time.
- The previous releases of Avid ISIS | 2500 - 2000 supported 100 ISIS clients, ISIS v4.5 supports up to 200 ISIS clients and unlimited Common Internet File System (CIFS) clients.

## 5.0 Overview

ISIS | 2500 - 2000 is high density resilient, RAID 6 based, nearline storage system that integrates seamlessly into the ISIS Interplay workflow. The purpose of this section is to provide a performance characterization of an ISIS | 2500 - 2000 Engine configuration. The ISIS | 2500 - 2000 System Director and Engine(s) connect to a separate VLAN on the Avid Production Network (APN) switch. The Engine requires a 10 Gb link to the APN and the System Director can either be a 10 Gb or 1 Gb connection to the APN. However, if CIFS or FTP sharing of workspaces is required, the ISIS | 2500 - 2000 System Director must be connected to the APN via a 10 Gb link. CIFS or FTP sharing of ISIS | 2500 - 2000 workspaces is not supported with a 1 Gb link. The engine ratings published in this guide can be achieved whether the System Director is connected via 10 Gb or 1 Gb. Adding an ISIS | 2500 - 2000 nearline system to your ISIS | 7500-7000 or 5500-5000 online environments does not affect the performance guidelines previously stated in those online environments.

The available bandwidth can be utilized in several different ways. In general, the system supports the following:

### ISIS | 2500 - 2000 Supported Workflows

System	Function
Airspeed 5000/AirSpeed Multi Stream/AirSpeed	Ingest up to 10 streams of DNxHD 145
Symphony/Media Composer/NewsCutter	Consolidate/Transcode/Import/Export
Symphony/Media Composer/Assist	H.264 Proxy Playback 3 Mbps or less: Up to 200 clients
Symphony/Media Composer/NewsCutter	Send to Playback
File Gateway/CIFS	Bandwidth limited to 100 MB/sec. This value can be increased or decreased if necessary.
Pro Tools	Import/Export

## 6.0 Engine Bandwidth

The following ratings can be expected on average for a single ISIS | 2500 - 2000 engine. Keep in mind that you may achieve higher values at times due to the nature and size of the cache available in ISIS | 2500 - 2000. However, the numbers provided below are what you would expect to see on average for a healthy system.

### Engine Rating: Healthy

Workflow	Fully Populated Engine Average Rating (MB/sec)	Half Populated Engine Average Rating (MB/sec)
All Read	1000	550
All Write	500	250
Mixed	700	350

## 5.0 Engine Bandwidth During Initialization/Rebuilds

The ISIS | 2500 - 2000 system is optimized for performance during initialization and rebuilds operations. Because the system is RAID 6 based, with 10 X 8 drive RAID 6 arrays, it is possible to sustain up to two drive failures within any RAID 6 array and not lose any data. For a system that is not under load the time it takes for an initialization, or rebuild, to complete is approximately 72 hours for 3 TB drives and 96 hours for 4 TB drives. Load on the system could significantly prolong an initialization or rebuild process.

### Engine Rating: Initialization or Rebuild Conditions

Workflow	Fully Populated Engine Average Rating (MB/sec)	Half Populated Engine Average Rating (MB/sec)
All Read	950	475
All Write	450	225
Mixed	650	325

## 6.0 Performance of Data Movement

One of the common mechanisms for moving data between ISIS | 2500 - 2000 and ISIS 7000 and/or 5000 is via the Interplay copy/move service. The performance of data moves between these elements will vary greatly. In general, you can expect to see about 180 - 200 MB/sec on average for project movement. For example, a project that has 500 GB of media associated to it will take less than one hour, or approximately 45 minutes.

## 7.0 Data Conversion following the ISIS | 2500 - 2000-240 Engine Upgrade

As part of the 4.2 to 4.5 upgrade on an ISIS | 2500 - 2000-240 engine an additional Storage Manager is created. As a result of this change the existing data on the engine has to be redistributed across the two Storage Managers in preparation for future resiliency. This process is also called data conversion. This process only applies to a fully populated ISIS 2000-240. This redistribution of data occurs at a rate of approximately 800 gigabytes per hour on an internal bus. During this movement the system can be used up to 50% of the engine rating. Because the data conversion occurs internally, the external load has little impact on the conversion process.

## 8.0 ISIS 2000-120 to ISIS 2000-240 Engine Upgrade

Avid offers an ISIS 2000 Engine with 42 media drives. This is 120 terabytes (TB) of raw storage and equates to 96 TB of usable storage. ISIS v4.5 provides the capability to update this ISIS 2000-120 to ISIS 2000-240. The media drives are configured for RAID 6 storage protection with two spares that automatically initiate a repair if a drive failure occurs.

The ISIS 2000-120 Engine configuration functions exactly like the fully populated ISIS 2000-240 Engine. ISIS 2000 Engines connect to an ISIS 7000 or ISIS 5500 switch using a 10 Gb connection and in a separate subnet. The ISIS 2000 Management Console provides the same workspace and user functionality offered in all ISIS environments. Clients access any combination of ISIS online systems (ISIS 5500 and ISIS 7000) and ISIS near-line systems (ISIS 2000) system through external switch connections. The ISIS 2000 near-line system workflows provides basic video playback of low bit rate media and high-speed file transfers to online ISIS systems. The ISIS 2000-120 Engine has a unique drive placement between the two drawers. For instructions on installing the media drives Engines, see the Avid ISIS 2000 Setup Guide. After you have updated your ISIS 2000-120 infrastructure to the latest ISIS software, add the 40 new drives (120 TB) to the existing ISIS 2000-120 Engine and bind the new Storage Manager. After the new Storage Manager is bound, you can add additional ISIS 2000 Engines and bind them. Then select all your new Storage Managers and do a single Add redistribution.

## 9.0 Adding Engines

ISIS 4.7 introduces the Redistribution Monitor feature, accessed via the Tools menu in the Management Console. This feature displays the overall progress of the redistribution as well as the aggregate rate at which the data is moving. Additionally, you can monitor the progress of individual Storage Managers. ISIS 4.7 users should refer to the Redistribution Monitor to determine the completion time for a given redistribution. The redistribution results in section 9 of this document are based on tests using the 4.6 software. However, the results will be close to what is expected in 4.7 and can be used as a reference.

This release supports up to 5 ISIS 2000 engines. You can add a single or multiple engines to an existing Storage Group at any given time. The process of adding an engine to an existing Storage Group will cause a redistribution to evenly distribute the existing data, and new data, across all the engines present in that Storage Group. When doing so the rating (the amount of client load that can be applied) of the new Storage Group is equal to 50% of the rating for the total number of engines present prior to the add. For example, if you are going from 2 to 3 fully populated engines, the rating during the redistribution of data to those engines is 700 MB/sec. For specific add redistribution time see section 4.1.

The data in Table 1 is presented in hours. The 50% mixed load is based on the number of Storage Elements present in the Storage Group following the Add. For example, if you are adding a fifth engine to a four engine group then the 50% mixed load that is supported is 1750 MB/sec, or 5 X 350 MB/sec.

**Table 1: Add Redistribution at 50% Capacity Before Add (hours)**

	1 to 2 Engines	2 to 3 Engines	3 to 4 Engines	4 to 5 Engines
No Load	42	61	95	114
50% Mixed Load	57	78	117	156

**Table 2: Engine Ratings During Redistribution**

	4.2 to 4.5 Data Conversion or 120 TB to 240 TB update	1 to 2 Engines	2 to 3 Engines	3 to 4 Engines	4 to 5 Engines
All Read	500	500	1000	1500	2000
50% Mixed Load	350	350	700	1050	1400
All Write	250	250	500	1000	1250

## 10.0 Editor Hardware and Software Used During Testing

The following chart describes the hardware and software used while testing this release. This table does not reflect all platforms that are supported.

\* Platform requires the Intel 18.3 driver family or later. The 18.3 kit is not included with the ISIS 4.5 release, but is available at Avid's Download Center. The ISIS 4.6 kit includes the 18.6 driver family.

Capabilities and limitations for the individuals systems listed above can be found on Avid's Knowledge Base.

Platform	OS	CPU	Memory	Editor Version	ISIS Client
HP z820	Windows 8/8.1 64-bit Windows 7 64-bit SP1	8 Core 2.6 GHz Intel Xeon Gen2	16 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP z820	Windows 8/8.1 64-bit Windows 7 64-bit SP1	8 Core 2.7 GHz Intel Xeon	16 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
Lenovo C30	Windows 8/8.1 64-bit Windows 7 64-bit SP1	8 Core 2.2 GHz Intel Xeon	16 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP z800	Windows 8/8.1 64-bit Windows 7 64-bit SP1	6 Core 2.67GHz Intel Xeon	12 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP z820	Red Hat Linux 6.2/6.3	8 Core 2.7 GHz Intel Xeon	16 GB	N/A	v4.7
HP z420	Windows 8/8.1 64-bit Windows 7 64-bit SP1	6 Core 3.20 GHz Intel Xeon	8 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
Lenovo S30	Windows 8/8.1 64-bit Windows 7 64-bit SP1	6 Core 3.20 GHz Intel Xeon	16 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP z400	Windows 8/8.1 64-bit Windows 7 64-bit SP1	6 Core 3.33GHz Intel Xeon	12 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP Z240	Windows 8.1 64-bit Windows 7 64-bit SP1	Intel Xeon E3-1245 v5 @3.5 GHz	32GB	Media Composer 8.4	V4.7
HP Z230*	Windows 8/8.1 64-bit Windows 7 64-bit SP1	4 Core E3-1245 v3 3.40 GHz Intel Xeon	8 GB	Media Composer 8.0 Media Composer 7.0.3	v4.7
Dell T-1700*	Windows 8/8.1 64-bit	4 Core E3-1245 v3 3.40 GHz Intel Xeon	8 GB	Media Composer 7.0.3	v4.7
Lenovo E32*	Windows 8/8.1 64-bit	4 Core E3-1245 v3 3.40 GHz Intel Xeon	8 GB	Media Composer 7.0.3	v4.7

<b>Platform</b>	<b>OS</b>	<b>CPU</b>	<b>Memory</b>	<b>Editor Version</b>	<b>ISIS Client</b>
HP Z220	Windows 7 64-bit SP1	4 Core E3-1245 3.40 GHz Intel Xeon	8 GB	Media Composer 8.0 Media Composer 7.0.3 Media Composer 6.5	v4.7
HP Z210	Windows 7 64-bit SP1	4 Core E31270 3.40 GHz Intel Xeon	4 GB	Media Composer 6.5	v4.7
HP 8570w	Windows 7 64-bit SP1	i7-3820QM 2.7 GHz	8 GB	Media Composer 7.0 Media Composer 6.5	v4.7
HP 8760w	Windows 7 64-bit SP1	4 Core 2.3 GHz Intel i7	4 GB	Media Composer 6.5	v4.7
Dell M6600	Windows 7 64-bit SP1	4 Core 2.20 GHz Intel i7	4 GB	Media Composer 6.5	v4.7
Mac Pro (Westmere)	10.7.4 – 10.9	2 X 2.6 GHz 6 Core Intel Xeon	12 GB	Media Composer 7.0 Media Composer 6.5	v4.7
Mac Pro (Westmere)	10.7.4 – 10.9	2 X 2.4 GHz Quad Core Intel Xeon	6 GB	Media Composer 7.0 Media Composer 6.5	v4.7
MacBook Pro 15"	10.7.4 – 10.9	2.3/2.6/2.7 GHz I7 quad core Retina & Thunderbolt	8 GB	Media Composer 6.5	v4.7
Mac Pro (Nehalem)	10.7.4 – 10.9	2 x 2.66 GHz Dual-Core Intel Xeon	6 GB	Media Composer 7.0 Media Composer 6.5	v4.7
iMac	10.7.4 – 10.9	3.6 GHz Intel Core i5	6 GB	Media Composer 7.0.3 Media Composer 6.5	v4.7