



Avid Unity™ ISIS® v2.0.x Performance / Redistribution Guide

Avid Unity ISIS v2.x Change History

Date Revised	Release	Changes Made
4/20/2009	v2.0.1	Avid has started an initiative to characterize a variety of software applications in an Avid Unity ISIS shared storage environment. Apple® Final Cut Pro® is one of the applications that have been tested. For more information, see “Supported Stream Counts with Apple Final Cut Pro on page 7.”
1/09/2009	v2.0.1	The term “full remapping redistribution” was introduced in Avid Unity ISIS v2.0.1 and times for the full remapping redistribution was added. For details see “Full Remapping Redistribution on page 14.”

Executive Summary

This document provides performance guidance to help you plan for Avid Unity ISIS v2.0. This release introduces support for Ultra High Resolution clients (UHRC), editing in Uncompressed HD and higher DNxHD/SD stream counts. Updated charts have also been presented to provide guidance under redistribution conditions.

- △ **Avid stresses that the information in this document should be used as guidelines only. The type of ISIS Storage Blade (ISB) can cause changes in the provided guidelines.**
- △ **When working with a 512k file system, a reduction in audio or video tracks might be necessary to allow for Nitris DX and Mojo DX attached editors and pre-xw8400 workstations to play through redistribution un-affected.**

A combination Zone 1 and Zone 2 clients using the Avid editor application as well as test tools were used to generate bandwidth on the system. The bandwidth applied by the Avid editor application was a mix of read and write functions.

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Improved Performance Capabilities for ISIS v2.0

- Support for editing in uncompressed HD (8Bit & 10Bit) & Higher DNxHD/SD Stream counts.
- Next Generation of switching hardware (ISS2000 & ISX2000)
- New 2TB high capacity ISBs (i2000)
- Improved Engine Performance

Engine and Switch Performance

Scaling the Avid Unity ISIS environment is based on the amount of bandwidth an ISIS engine (or several engines) is able to provide. A single ISIS engine is comprised of 16 storage blades and can produce upwards of 400 MB/s aggregate throughput by serving multiple clients simultaneously. All of the results stated in this document were based on a mirrored workspace.

Scaling an Avid Unity ISIS beyond a single engine effectively scales in a linear fashion based on a single engines performance. To understand what that rating is, use the following table to define an engine's capabilities based on the chunk size selected when creating a storage group and the resolutions in use.

Engine Bandwidth Performance (MB/s) with Avid Editing Clients

Block Size Switch Storage Blade	256 Chunk Size				512 Chunk Size			
	ISS1000		ISS2000		ISS1000		ISS2000	
	SD	HD/SD	SD	HD/SD	SD	HD/SD	SD	HD/SD
i2000	N/S	N/S	N/S	N/S	N/S	N/S	400	400
I1000	300	240	300	240	N/S	N/S	400	400
I500	300	240	300	240	N/S	N/S	400	400

Legend

- N/S indicates not supported

Switch Performance (MB/s)

Block Size Switch	256 Chunk Size		512 Chunk Size	
	ISS1000	ISS2000	ISS1000	ISS2000
Bandwidth	230	230	N/S	600

Note: These ratings can be attained by using the 10Gb 1Gb or a combination of both

Example Switch Ratings

# of Clients	Client Speed	Size of trunk	Resolution	Chunk Size	Format	Switch	Bandwidth	Pass / Fail
4	10Gb	20Gb	1:1 10Bit HD	512k	1080i 59.94	ISS2000	1.2 GB/s	Pass
5	10Gb	20Gb	1:1 10Bit HD	512k	1080i 59.94	ISS2000	1.5 GB/s	Fail
10	1Gb	10Gb	DNxHD220	512k	1080i 59.94	ISS2000	560 MB/s	Pass
11	1Gb	10Gb	DNxHD220	512k	1080i 59.94	ISS2000	616 MB/s	Fail
40	1Gb	40Gb	DNxHD220	512k	1080i 59.94	ISS2000	2.3 GB/s	Pass

Note: A Cisco 4900M was the Zone2 switch used during testing.
All bandwidth is based on 2 tracks of video and 8 audio tracks.

Supported Stream Counts with Avid Editors

The charts below define the bandwidth used per resolution and the recommended stream count for each. For some of the supported platforms, achieving the recommended stream count may require switching the video quality mode during playback (e.g. Draft or Full Quality). This level of functionality allows for better scalability of the ISIS environment while still allowing an adequate degree of client performance and functionality. Attempting to increase the number of streams beyond what is shown may result in unexpected results for the Client, but should not impact the ISIS system.

Take the following into consideration when reading the tables below.

- All bandwidth ratings have been adjusted to include up to 8 tracks audio
- Data in this document was obtained using these Avid editing applications: Media Composer 3.x, NewsCutter 7.x, DS10.1.1, and Symphony DX 3.x.
- The sequence we chose for testing was a two minute sequence with two second audio and video cuts offset by one second.
- Writes to a mirrored workspace are always two times a single stream.

△ **Avid stresses that the information in the following charts is based on the Avid Unity ISIS v2.0 default file system chunk size of 512k. When using a 256k File system please refer to the ISIS v1.5 Performance guide, search the Avid Knowledge Base at <http://avidtechnology.custhelp.com/> for the Avid Unity ISIS Performance Guide.**

DV

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
DV 25	30i NTSC PAL	4	8	12	16	N/S	N/S	20	40	14
DV 50	30i NTSC PAL	8	16	24	N/S	N/S	N/S	40	80	28

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

MPEG

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
MPEG 30	30i NTSC 25i PAL	4	8	12	16	N/S	N/S	20	40	14
MPEG 40	30i NTSC 25i PAL	5	10	15	20	N/S	N/S	25	50	18
MPEG 50	30i NTSC 25i PAL	6.5	13	19.5	N/S	N/S	N/S	32.5	65	23

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

JFIF Progressive

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
35:1	24p 23.976p NTSC	1.5	3	4.5	6	N/S	N/S	7.5	15	5
	25p, 24p PAL	1.5	3	4.5	6	N/S	N/S	7.5	15	5
28:1	24p, 23.976p NTSC	1.5	3	4.5	6	N/S	N/S	7.5	15	5
	25p, 24p PAL	1.5	3	4.5	6	N/S	N/S	7.5	15	5
14:1	24p, 23.976p NTSC	2.5	5	7.5	10	N/S	N/S	12.5	25	9
	25p, 24p PAL	2.5	5	7.5	10	N/S	N/S	12.5	25	9
3:1	24p, 23.976p NTSC	6	12	18	24	N/S	N/S	30	60	21
	25p, 24p PAL	7	14	21	28	N/S	N/S	35	70	25
2:1	24p, 23.976p NTSC	8	16	24	N/S	N/S	N/S	40	80	28
	25p, 24p PAL	9.5	19	28.5	N/S	N/S	N/S	47.5	95	33
1:1 SD	24p, 23.976p NTSC	17.5	35	N/S	N/S	N/S	N/S	87.5	175	62
	25p, 24p PAL	22	44	N/S	N/S	N/S	N/S	110	220	77
1:1 10b SD	24p, 23.976p NTSC	22	44	N/S	N/S	N/S	N/S	110	220	77
	25p, 24p PAL	25	50	N/S	N/S	N/S	N/S	125	250	88

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

JFIF Interlaced

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
15:1s	30i NTSC, 25i PAL	1.5	3	4.5	6	N/S	N/S	7.5	15	5
4:1s	30i NTSC, 25i PAL	2.5	5	7.5	10	N/S	N/S	12.5	25	9
2:1s	30i NTSC, 25i PAL	4	8	12	16	N/S	N/S	20	40	14
20:1	30i NTSC, 25i PAL	2.0	4	6	8	N/S	N/S	10	20	7
10:1	30i NTSC, 25i PAL	3	6	9	12	N/S	N/S	15	30	11
3:1	30i NTSC, 25i PAL	7	14	21	28	N/S	N/S	35	70	25
2:1	30i NTSC, 25i PAL	9.5	19	28.5	N/S	N/S	N/S	47.5	95	33
1:1 SD	30i NTSC, 25i PAL	22	44	N/S	N/S	N/S	N/S	110	220	77
1:1 10b SD	30i NTSC, 25i PAL	28.5	57	N/S	N/S	N/S	N/S	142.5	285	100

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

1080i

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
1:1 10-bit HD	1080i/59.94	150	300	N/S	N/S	N/S	N/S	N/S	N/S	527
1:1 HD		125	250	N/S	N/S	N/S	N/S	N/S	N/S	439
DNxHD 220 X		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 220		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 145		18.5	37	55.5	N/S	N/S	N/S	92.5	185	65
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51
1:1 10-bit HD	1080i/50	131	262	N/S	N/S	N/S	N/S	N/S	N/S	461
1:1 HD		105	210	N/S	N/S	N/S	N/S	N/S	N/S	369
DNxHD 185 X		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 185		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 120		16	32	48	N/S	N/S	N/S	80	160	56
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

1080p

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
1:1 10-bit HD	1080p/29.97	150	300	N/S	N/S	N/S	N/S	N/S	N/S	527
1:1 HD		125	250	N/S	N/S	N/S	N/S	N/S	N/S	439
DNxHD 220 X		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 220		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 145		18.5	37	55.5	N/S	N/S	N/S	92.5	185	65
DNxHD 45		6	12	18	24	N/S	N/S	30	60	21
1:1 10-bit HD	1080p/25	131	262	N/S	N/S	N/S	N/S	N/S	N/S	461
1:1 HD		105	210	N/S	N/S	N/S	N/S	N/S	N/S	373
DNxHD 185 X		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 185		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 120		16	32	48	N/S	N/S	N/S	80	160	56
DNxHD 36		5	10	15	20	N/S	N/S	25	50	18
1:1 10-bit HD		1080p/24	126	252	N/S	N/S	N/S	N/S	N/S	N/S
1:1 HD	101		202	N/S	N/S	N/S	N/S	N/S	N/S	355
DNxHD 175 X	23		46	69	N/S	N/S	N/S	115	230	81
DNxHD 175	23		46	69	N/S	N/S	N/S	115	230	81
DNxHD 115	15.5		31	46.5	N/S	N/S	N/S	77.5	155	54
DNxHD 36	5		10	15	20	N/S	N/S	25	50	18

1:1 10-bit HD	1080p/23.976	126	252	N/S	N/S	N/S	N/S	N/S	N/S	443
1:1 HD		101	202	N/S	N/S	N/S	N/S	N/S	N/S	355
DNxHD 175 X		23	46	69	N/S	N/S	N/S	115	230	81
DNxHD 175		23	46	69	N/S	N/S	N/S	115	230	81
DNxHD 115		15.5	31	46.5	N/S	N/S	N/S	77.5	155	54
DNxHD 36		5	10	15	20	N/S	N/S	25	50	18

720p

Resolution	Project Format	Number of Streams per client (MB/s)						Multi-cam (MB/s)		GB/Hour
		1	2	3	4	5	6	4-way	9-way	
1:1 10-bit HD	720p/59.94	142	284	N/S	N/S	N/S	N/S	N/S	N/S	499
1:1 HD		106	212	N/S	N/S	N/S	N/S	N/S	N/S	373
DNxHD 220 X		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 220		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 145		18.5	37	55.5	N/S	N/S	N/S	92.5	185	65
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51
1:1 10-bit HD	720p/50	120	240	N/S	N/S	N/S	N/S	N/S	N/S	422
1:1 HD		89	178	N/S	N/S	N/S	N/S	N/S	N/S	313
DNxHD 185 X		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 185		23.5	47	70.5	N/S	N/S	N/S	117.5	235	83
DNxHD 120		15	30	45	N/S	N/S	N/S	75	150	53
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51
1:1 10-bit HD	720p/29.97	71	142	N/S	N/S	N/S	N/S	N/S	N/S	250
1:1 HD		53	106	N/S	N/S	N/S	N/S	N/S	N/S	186
DNxHD 220 X		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 220		28	56	84	N/S	N/S	N/S	140	280	98
DNxHD 145		18.5	37	55.5	N/S	N/S	N/S	92.5	185	65
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51
1:1 10-bit HD	720p/25	60	120	N/S	N/S	N/S	N/S	N/S	N/S	211
1:1 HD		48	96	N/S	N/S	N/S	N/S	N/S	N/S	169
DNxHD 90 X		12	24	36	N/S	N/S	N/S	60	120	42
DNxHD 90		12	24	36	N/S	N/S	N/S	60	120	42
DNxHD 60		8	16	24	N/S	N/S	N/S	40	80	28
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51
1:1 10-bit HD	720p/23.976	58	116	N/S	N/S	N/S	N/S	N/S	N/S	204
1:1 HD		46	92	N/S	N/S	N/S	N/S	N/S	N/S	162
DNxHD 90 X		11.5	24	35.5	N/S	N/S	N/S	57.5	115	40
DNxHD 90		11.5	24	35.5	N/S	N/S	N/S	57.5	115	40
DNxHD 60		7.5	16	22.5	N/S	N/S	N/S	37.5	75	26
DVCPRO HD		14.5	29	43.5	N/S	N/S	N/S	72.5	145	51

Legend

- Shaded cells indicate 10Gb connectivity required (UHRC) **not supported during a redistribution**
- N/S indicates not supported

Supported Stream Counts with Apple Final Cut Pro

Avid has tested Final Cut Pro as a client in the Avid Unity ISIS shared storage environment. Testing was done with Avid Unity ISIS v2.0.1 and Final Cut Pro v6.0.4 and v6.0.5. There is no Avid restriction on the QuickTime version. Use the QuickTime version recommended in the Final Cut Pro application. QuickTime v7.6 was the version used in the Avid testing. The following provides information on how many streams were qualified per client at various resolutions.

△ Avid Interplay Access supports the Mac OSX platform, and through this application Final Cut Pro QuickTime files and projects can be checked into Interplay. Any Interplay workstation can search for these files and edit their Interplay metadata, though there is currently no tightly integrated workflow between Avid editors and Final Cut Pro within Interplay.

The following list characterizes the setup guidelines for your Final Cut Pro client with Avid Unity ISIS:

- You need to stay in line with the general client parameters specified for all Avid Unity ISIS Macintosh clients. The following are the specific hardware details used in the Avid testing:
 - Platforms — Mac Pro (early 2008) “Harpertown” Dual Quad-Core 3.0 or 3.2 GHz.
 - Operating system — Mac OS 10.5.4 and later.
 - Avid Unity ISIS — Ethernet connection using the built-in network ports on the Macintosh system.
- Final Cut Pro editing software was characterized with the AJA KONA™3 hardware. The complete Apple Studio 2 bundle was installed.
- Verification tests on Apple Color and Sound Track Pro were run to verify Push - Pull capabilities.
- Final Cut Pro media should be in its own Storage Group. Including:
 - Scratch disks
 - Project files

△ Do not mix Final Cut Pro clients and Avid editor clients within the same Storage Group.

- Final Cut Pro Storage Groups can be configured to either operate using 256 KB or 512 KB chunk sizes.
- Final Cut Pro clients are supported in ISIS Zones 1 and Zone 2 (not Zone 3).
- The Avid Unity ISIS Client Manager preference settings follow the same guidelines as for Avid editors. The default setting is set to Medium Resolution (limited to resolutions that draw 16 MB/s or less). Use the High Resolution setting when working with High Definition media (resolutions that draw higher than 16 MB/s). For data rate specifications, see the data in the following tables.
- Final Cut Pro editing systems require 30% to 50% more bandwidth than Avid Media Composer at similar resolutions.
- The number of Final Cut Pro clients supported in a Storage Group are about 1/2 the number of Avid Media Composer clients at similar resolutions.

△ Make sure the workspaces you are using is part of the Storage Group you created for Final Cut Pro clients. When Final Cut Pro clients are sharing the same Storage Group as Avid editing clients, the Final Cut Pro clients have poor performance.

- Digidesign Pro Tools software was not tested with Final Cut Pro clients.

Scaling the Avid Unity ISIS environment is based on the amount of bandwidth an ISIS engine (or several engines) is able to provide. A single ISIS engine is comprised of 16 storage blades and can produce upwards of 200 MB/s aggregate throughput by serving multiple Final Cut Pro clients simultaneously. All of the results stated in this document were based on a mirrored workspace.

Scaling an Avid Unity ISIS beyond a single engine effectively scales in a linear fashion based on a single engines performance. To calculate the rating for your ISIS system, use the following table to define an engine’s capabilities based on the chunk size selected when creating a storage group and the resolutions in use.

Engine Bandwidth Performance (MB/s) with Final Cut Pro Clients

	SD	HD/SD
Single Engine	200	160
Single ISB	12.5	10

Legend

- N/S indicates not supported

The charts below define the bandwidth used per resolution and the recommended stream count for each. Attempting to increase the number of streams beyond what is shown may result in unexpected results for the Client, but should not impact the ISIS system.

Take the following into consideration when reading the tables below.

- All bandwidth ratings have been adjusted to include up to 8 tracks audio
- Data in this document was obtained using the Final Cut Pro v6.0.4 and v6.0.5 editing application.
- The sequence we chose for testing was a two minute sequence with two second audio and video cuts offset by one second.

△ Avid stresses that the information in the following charts is based on the Avid Unity ISIS with a chunk size of 256k. The sample testing of the 512k chunk size did not change the performance data.

Apple DVCPRO Resolutions

Resolution	Project Format	Number of Streams per client (MB/s)					
		1	2	3	4	5	6
720*480	SD DVCPRO25 NTSC	8.72	13.84	19.42	25.30	30.43	36.76
720*576	SD DVCPRO25 PAL	8.56	12.16	16.91	21.60	27.76	33.27
720*480	SD DVCPRO50 NTSC	14.97	25.29	38.49	48.55	60.18	N/S
720*576	SD DVCPRO50 PAL	14.29	25.32	36.69	48.49	59.37	N/S

Legend

- N/S indicates not supported

Apple ProRes 422 Resolutions

Resolution	Project Format	Number of Streams per client (MB/s)					
		1	2	3	4	5	6
1280*720	NQ 23.98	11	19	27	34	44	52
720*576	HQ PAL 25	11	19	28	34	44	52
1280*720	NQ 25	11	22	30	39	49	59
720*486	HQ NTSC 29.97	12	20	30	39	49	60
1280*720	HQ 23.98	16	32	47	62	77	N/S
1280*720	HQ 25	16	30	44	58	73	87
1920*1080	NQ 23.98	20	35	51	67	N/S	N/S
1920*1080	NQ 25	23	37	54	71	N/S	N/S
1280*720	NQ 50	23	41	57	78	N/S	N/S
1280*720	NQ 59.94	28	50	73	N/S	N/S	N/S
1920*1080	NQ 29.97	27	48	70	N/S	N/S	N/S
1920*1080	HQ 23.98	31	48	N/S	N/S	N/S	N/S
1280*720	HQ 50	32	58	N/S	N/S	N/S	N/S
1920*1080	HQ 25	32	60	N/S	N/S	N/S	N/S
1280*720	HQ 59.94	38	72	N/S	N/S	N/S	N/S
1920*1080	HQ 29.97	38	72	N/S	N/S	N/S	N/S

Legend

- N/S indicates not supported

Redistribution Performance

The following sections help you understand the amount of bandwidth that can be sustained during redistribution and how to determine the time to completion based on the used capacity of a given configuration.

Take the following into consideration when reading the following tables.

- UHRC clients not supported during Redistribution.
- A reduction in resolution type or audio and video track count might be necessary to allow for optimal performance during redistribution.

Single Blade Removal Redistribution

Use the following tables to determine the amount of time required when removing a single ISB from an existing storage group. The tables are based on the bandwidth to the storage group and the amount of data that will be removed from the ISIS Storage Blade (ISB).

Time to Completion with No Bandwidth (Minutes)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	36	N/S	25	50	73	N/S	57	114	110	N/S	87	172
6 Engines	20	N/S	20	40	35	N/S	40	80	55	N/S	60	120
12 Engines	12	N/S	11	22	17	N/S	22	44	35	N/S	32	64

Legend

- N/S indicates not supported

Time to Completion with 120 MB/s per Engine (Minutes)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	60	N/S	40	80	130	N/S	80	160	190	N/S	120	240
6 Engines	25	N/S	22	44	45	N/S	44	88	65	N/S	65	130
12 Engines	17	N/S	21	42	28	N/S	24	48	40	N/S	35	70

Legend

- N/S indicates not supported

Time to Completion with 200 MB/s per Engine (Minutes)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
6 Engines	55	N/S	27	54	100	N/S	54	108	190	N/S	80	160
12 Engines	65	N/S	15	30	110	N/S	30	60	200	N/S	45	90

Legend

- N/S indicates not supported

Single Blade Add Redistribution

Use the following table to determine the amount of time required when adding a single ISB to an existing storage group. The table is based on the bandwidth to the storage group, as well as the amount of data being added to the ISIS Storage Blade (ISB).

Time to Completion (Hours) 1-12 Engines

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
No Bandwidth	3	N/S	2.5	5	6	N/S	4.5	9	10	N/S	6	12
120MB/s of B/W	4	N/S	3	6	9	N/S	6	12	13	N/S	8	16
220MB/s of B/W	6	N/S	4	8	12	N/S	7	14	19	N/S	9.5	19

Legend

- N/S indicates not supported

Adding a Single or Multiple Engines

Use the following tables to determine the amount of time required when adding a single or multiple engines to an existing storage group. The tables are based on the bandwidth to the storage group, as well as the amount of data being added.

Time to Completion with no Bandwidth (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1-2 Engines	2.4	N/S	2.5	5	4.8	N/S	5	10	7.1	N/S	7	14
2-3 Engines	3.2	N/S	2.5	5	6.3	N/S	5	10	9.5	N/S	7.5	15
3-4 Engines	3.6	N/S	2.5	5	7.1	N/S	5	10	10.7	N/S	7.5	15
4-5 Engines	3.8	N/S	2.5	5	7.6	N/S	5	10	11.4	N/S	7.5	15
5-6 Engines	4	N/S	3	6	7.9	N/S	6	12	11.9	N/S	9	18
6-7 Engines	4	N/S	3	6	7.6	N/S	6	12	11.5	N/S	9	18
7-8 Engines	4	N/S	3	6	7.4	N/S	6	12	11.2	N/S	9	18
8-9 Engines	4	N/S	3	6	7.5	N/S	6	12	11.3	N/S	9	18
9-10 Engines	4	N/S	3	6	7.6	N/S	6	12	11.4	N/S	9	18
10-11 Engines	4	N/S	3	6	7.7	N/S	6	12	11.6	N/S	9	18
11-12 Engines	4	N/S	3	6	7.9	N/S	6	12	11.9	N/S	9	18

Legend

- N/S indicates not supported

Time to Completion with 120 MB/s of Bandwidth per Engine (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1-2 Engines	5	N/S	2.5	5	9.5	N/S	5	10	14.5	N/S	7.5	15
2-3 Engines	6.5	N/S	2.5	5	12.7	N/S	5	10	19.0	N/S	7.5	15
3-4 Engines	7	N/S	3	6	14.3	N/S	6	12	21.5	N/S	9	18
4-5 Engines	7.5	N/S	3	6	15.2	N/S	6	12	23	N/S	9	18
5-6 Engines	8	N/S	4	8	15.8	N/S	8	16	24	N/S	12	24
6-7 Engines	8	N/S	4	8	15.6	N/S	8	16	24	N/S	12	24
7-8 Engines	8	N/S	4	8	15.4	N/S	8	16	24	N/S	12	24
8-9 Engines	7.5	N/S	5	10	15.3	N/S	10	20	22.5	N/S	15	30
9-10 Engines	7.5	N/S	5.5	11	15.4	N/S	11	22	23	N/S	16.5	33
10-11 Engines	8	N/S	5.5	11	15.2	N/S	11	22	23	N/S	16.5	33
11-12 Engines	8	N/S	6	12	15.8	N/S	12	24	24	N/S	18	36

Legend

- N/S indicates not supported

Full Redistribution

For the ISIS 2.0 release dramatic improvements have been made for the time a full redistribution takes to complete. In order to take advantage of these improvements, after upgrading to ISIS 2.0 an initial full redistribution must take place. Some full redistribution that formerly took hours can now be completed in a matter of 20 minutes.

To experience the benefits of these faster full redistributions there are two requirements. First, all workspaces in the storage group must participate in the full redistribution. Second, ISB “adds” and “removals” must be done in a symmetric fashion leading up to the full redistribution. This means that the same quantity of ISBs that were removed from a storage group need to then be added in a single configuration change.

The following examples explain how this works.

Example 1:

- 1.) Remove a single ISB from the storage group
- 2.) Then add a single ISB to the same storage group.
- 3.) Perform a Full redistribution to all workspaces in the storage group

Total time to completion should be less than 20 minutes

Example 2:

- 1.) Remove a single ISB from the storage group
- 2.) Remove two ISBs from the storage group.
- 3.) Add three ISBs back to the storage group
- 4.) Perform a Full redistribution to all workspaces in the storage group

Total time to completion should be less than 20 minutes

Example 3:

- 1.) Remove a single ISB from the storage group
- 2.) Remove two ISBs from the storage group.
- 3.) Add one ISB back to the storage group in a single configuration change
- 4.) Add two ISBs back to the storage group in a single configuration change
- 5.) Perform a Full redistribution to all workspaces in the storage group

This example would not qualify for a quick redistribution like the two previous examples because all the ISBs previously removed were not added back in a single configuration change. For non-symmetrical full redistribution guidance, refer to the following tables.

The following tables should help you estimate the full redistribution times with non-symmetric configuration changes.

Time to Completion with No Bandwidth (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	6.0	N/S	6.3	12.7	13.5	N/S	12.7	25.3	27.5	N/S	19.0	38.0
6 Engines	4.7	N/S	5.0	10.0	11.4	N/S	10.0	20.0	20.0	N/S	15.0	30.0
12 Engines	3.9	N/S	5.0	10.0	9.4	N/S	10.0	20.0	18.0	N/S	15.0	30.0

Legend

- N/S indicates not supported

Time to Completion with 120 MB/s per Engine (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	6.7	N/S	6.8	13.5	15.0	N/S	13.5	27.0	34.0	N/S	20.3	40.5
6 Engines	5.0	N/S	5.8	11.5	13.0	N/S	11.5	23.0	26.7	N/S	17.3	34.5
12 Engines	4.2	N/S	5.8	11.5	11.0	N/S	11.5	23.0	25.0	N/S	17.3	34.5

Legend

- N/S indicates not supported

Time to Completion with 200 MB/s per Engine (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity				60% Capacity				90% Capacity			
	256k		512k		256k		512k		256k		512k	
	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000	i1000	i2000
1 Engine	8.5	N/S	7.0	14.0	18.0	N/S	14.0	28.0	N/S	N/S	N/S	N/S
6 Engines	7.5	N/S	6.5	12.5	16.0	N/S	12.5	25.0	N/S	N/S	N/S	N/S
12 Engines	6.5	N/S	6.5	12.5	14.0	N/S	12.5	25.0	N/S	N/S	N/S	N/S

Legend

- N/S indicates not supported

Full Remapping Redistribution

Avid Unity ISIS v2.0 employs a new file mapping algorithm. The benefits of this new file mapping algorithm includes much faster redistributions for the most common add and move redistributions. After upgrading to v2.x, the first full redistribution moves all your data into the new file maps. This unique onetime full remapping redistribution moves more data than any other full redistribution. All additional full redistributions after the full remapping redistribution is now optimized to take advantage of the faster redistributions included in Avid Unity ISIS v2.x.

The time to complete this unique, onetime, full remapping redistribution is approximately 30% longer than the time typically need for a full redistribution as observed in Avid Unity ISIS v1.x. New full remapping redistribution guidelines have been added to the performance data on Avid Unity ISIS.

The faster full redistributions only apply to workspaces that have had symmetric configuration changes. This means that the same number of ISBs that were removed from a storage group need to then be added in a single configuration change. For examples of symmetric configuration changes, see “[Full Redistribution](#)” on page 12.

The following tables helps you estimate the full remapping redistribution times for the first redistribution after the Avid Unity ISIS v2.x upgrade (only 256k chunk sizes were supported in Avid Unity ISIS v1.x). The throughput supported in this full remapping redistribution supports up to a rate of 120 MB/s per engine. You must reduce your client load to 120 MB/s for the duration of the full remapping redistribution. Exceeding this amount of client bandwidth will impact the client causing some I/Os to fail. At the rate of 120 MB/s per engine, clients can do reads and writes without failing.

Time to Completion with No Bandwidth (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity 256k		60% Capacity 256k		90% Capacity 256k	
	i500	i1000	i500	i1000	i500	i1000
	1 Engine	3.9	7.8	8.8	17.6	17.9
6 Engines	3.1	6.1	7.4	14.8	13.0	26.0
12 Engines	2.6	5.1	6.1	12.2	11.7	23.4

Time to Completion with 120 MB/s per Engine (Hours)

Capacity Filled Block Size Storage Blade	30% Capacity 256k		60% Capacity 256k		90% Capacity 256k	
	i500	i1000	i500	i1000	i500	i1000
	1 Engine	4.4	8.7	9.8	19.5	22.1
6 Engines	3.3	6.5	8.6	16.9	17.4	34.7
12 Engines	2.8	5.5	7.2	14.3	16.3	32.5

Hardware and Software Used During Testing

The following chart describes the hardware and software used to testing and qualification this release.

Platform	OS	CPU	Memory	Editor Version	ISIS Client
HP xw8600	Vista-64 SP1	Dual-Quad 2.66GHz Intel Xeon	4GB	Media Composer v3.1	v2.0
HP xw8600	XP 32 SP2	Dual 2.66GHz Intel Xeon	4GB	Media Composer v3.1	v2.0
HP xw8400	XP 32 SP2	Dual 2.66GHz Intel Xeon	2GB	Media Composer v3.1	v2.0
HP xw8400	XP 32 SP2	Dual 2.66GHz Intel Xeon	2GB	Symphony Nitris v3.1	v2.0
HP xw8400	Vista-64 SP1	Dual-Quad 2.66GHz Intel Xeon	4GB	Media Composer v3.1	v2.0
HP xw8200	XP 32 SP2	Dual 2.66GHz Intel Xeon	4GB	Media Composer v3.1	v2.0
Mac Pro	10.5.4	2 x 3GHz Dual-Core Intel Xeon	4GB	Media Composer v3.1	v2.0
Mac Pro	10.5.4 and 10.5.6	2 x 3GHz Dual-Core Intel Xeon	4GB	Final Cut Pro v6.0.4	v2.0.1