

# ProMedia™ Carbon

## FILE-BASED TRANSCODER

### Performance Benchmarks

This Performance Benchmark chart provides reference points for the transcoding speed of the Harmonic ProMedia™ Carbon file-based media transcoder from specific sources to some of its output formats. The chart indicates results specific to the Harmonic ProMedia 5200 G3 application server.

The headers across the top of each column—SD NTSC MPEG-2 transport stream at 3 and 15 mbps, DV25 and 1080i MPEG-2 transport stream at 50 mbps, and HD ProRes 422 at 220 mbps—identify the source content used to establish the benchmarks. The ProMedia Carbon output formats are listed down the left-hand side of the chart.

Each source file—containing the exact same video content with a duration of 300 seconds—was transcoded individually to each target file listed. The results for each transcode are recorded as a factor of real time (RT). To calculate the encoding rate, the source duration is divided by how long it took for the file to completely transcode. For example, if the transcode took 300 seconds to complete, the calculation would be 300/300 for a result of 1.00 x RT. If the transcode took 60 seconds to complete, the calculation would be 300/60 for 5.0 x RT, or five times faster than real time.

Put another way:

$$\frac{\text{Source Duration (in seconds)}}{\text{Transcode Duration}} = \text{Rate of RT}$$

You can use this rate to calculate how long it will take to transcode an individual file by using the following formula:

$$\frac{\text{Source Duration (in seconds)}}{\text{Rate of RT}} = \text{Transcode Duration}$$

ProMedia Carbon can simultaneously transcode multiple source files in parallel and maintain the Rate of RT for each individual source file, as if each source file were transcoded on its own dedicated machine. This capability significantly impacts the number of machines needed to achieve a certain throughput, as a machine that can transcode three files simultaneously, for instance, will generate three times more throughput than a machine that can only do one file at a time.

The number of source files that can be simultaneously transcoded (transcode slots) depends on the hardware profile of the host server and the employment of CPU-intensive operations such as deinterlacing, scaling and frame-rate conversion. As a rough guideline, the hardware used for the benchmarks in this document can perform six parallel HD-to-HD transcodes if no CPU-intensive operations are involved; for SD-to-SD the number is approximately eight. For conversion from HD to SD, or the other way around, the average number of conversions is four to five, but can vary substantially.

The above numbers are approximations and are not guaranteed. Harmonic recommends conducting a test in your own environment to determine more precise speeds, and will support this procedure by providing a temporary license that can be obtained through Harmonic sales.

Codec Type	Codec	SD MPEG-2 TS 3 mbps	SD MPEG-2 TS 15 mbps	DV 25 mbps	HD MPEG-2 TS 50 mbps	HD ProRes 422 HQ 220 mbps
Broadcast Servers	GXF Long-GOP 1080i	N/A	0.3	0.40	1.49	1.24
	GXF MPEG-2 SD	N/A	4.71	5.85	1.51	1.48
	LXF I-Frame 1080i	N/A	0.3	0.4	1.43	1.30
	Spectrum Long-GOP 1080i	N/A	0.29	0.39	1.29	0.8
	Spectrum Long-GOP SD	N/A	3.81	4.71	1.63	0.86
	Quantel OP1a SD	N/A	2.73	3.53	1.29	1.27
Broadcast	ATSC HD	N/A	1.32	1.40	1.3	0.51
	ATSC SD	N/A	4.53	5.33	2.11	1.6
	CableLabs 1080i MPEG-2	N/A	0.26	0.33	0.75	0.56
	CableLabs 720p MPEG-2	N/A	1.31	1.12	0.65	0.51
	CableLabs 3/4 Screen	N/A	5.58	6.00	1.52	1.18
	H.264 TS 1080i30	N/A	0.26	0.35	0.71	0.93
	H.264 TS 720p60	N/A	0.94	1.03	0.74	0.42
	H.264 TS 480i30	N/A	2.20	2.35	1.67	1.59
	H.264 TS 720p30	N/A	2.30	2.16	1.17	0.80
	H.264 TS 640x360p30	N/A	1.31	1.24	1.02	0.85
	H.264 TS 320x180p30	6.86	5.58	6.86	1.72	1.19
H.264 TS 640x360p15	N/A	6.32	5.85	1.71	1.14	
DVD	DVD—Mastering Quality	N/A	3	2.86	1.65	1.71
Editing	DNxHD HD 220	N/A	1.13	1.37	1	0.56
	ProRes 422 HQ 220	N/A	0.30	0.39	1	N/A
	XDCAM DV25	N/A	1.41	2.24	1.08	0.81
	D10 OP1a	N/A	1.21	1.66	1.01	0.77
	P2 DVCPRO HD 1080i	N/A	1.16	1.21	0.84	0.52
	XDCAM HD 422 MPEG-2 1080i	N/A	0.28	0.37	0.94	1.45
Mobile	iPhone 640x480	4.90	4.36	5.00	1.72	1.17
	iPhone 320x240	7.50	7.74	12.63	1.74	1.22
	iPhone HD	3.29	3.29	3.58	1.73	1.13
	iPad	2.38	2.26	2.61	1.17	0.79
	iPad Retina	1.15	0.24	0.36	1.54	1.19
Web	H.264 852x480 1.2 mbps	4.90	4.71	5.58	1.67	0.90
	H.264 720p 4.0 mbps	N/A	2.38	2.72	1.67	0.87
	H.264 432x240 400 kbps	16.00	7.74	8.57	1.91	1.21
	VC-1 852x480 1.3 mbps	0.85	0.82	0.86	0.84	0.56
	VC-1 720p 4.1 mbps	N/A	0.79	0.87	0.70	0.61
	VC-1 432x240 500 kbps	1.40	1.66	2.00	1.38	1.39
	Microsoft SS—H264 (8 Layers)	1.25	1.11	1.21	0.90	0.66
	Apple HLS—H264 (8 Layers)	1.92	1.89	1.98	1.37	1.32

## Test Environment

Transcode Node	Harmonic ProMedia 5200 G3 application server
Motherboards	Two available, only one used per test (specifications below pertain to a single motherboard)
CPU	Two Intel® Xeon® X5680 CPUs (3.33 GHz, 6 cores/12 threads, 12 MB cache, 130 W)
RAM	12 GB of DRAM (six 2G, DDR3-1333 MHz ECC RDIMMs)
Drives	Two 10k RPM HDDs, each 600 GB
Network Connectivity	Six GbE ports
Software Version	ProMedia Carbon 3.21
Storage	The internal hard drives of the 5200 G3 were used as storage for source and target files.