

## Gallery SIENNA PictureReady Direct Ingest to Omneon MediaGrid

### **Configuration Guidelines**

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Omneon Technical Marketing  
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#### **Overview**

PictureReady by Gallery is a video capture application based on the Apple platform using AJA Kona video interface cards. It can be used as a stand-alone application, or in conjunction with other applications from the SIENNA newsroom suite. PictureReady is ideally suited for ingesting or capturing video and audio material directly to Omneon MediaGrid active storage, due to the unique way in which PictureReady buffers and writes the data.

In conjunction with MediaGrid, PictureReady enables collaborative production of media within seconds of start of capture, while still providing the reliability and scalability assumed by Omneon customers.

## ■ CONFIGURATION GUIDELINES

### 1 PictureReady Operation

PictureReady uses QuickTime encoders to encode the incoming media, giving it immediate compatibility with Final Cut Pro and other QuickTime-based applications. To date, Omneon testing has focused on DVCPRO video formats. As Apple hardware on which the encoder runs becomes more powerful, XDCAM HD and other QuickTime encoders will be tested.

There are several significant configuration parameters within PictureReady.

1. Record destination (e.g. any directory on MediaGrid)
2. RAM buffer size (in frames)
3. Buffer flush size (in frames)

When a recording is initiated, PictureReady creates a movie (.mov) for the entire specified duration, or the default duration. This .mov file is the wrapper that is used by Final Cut Pro and other applications to determine the clip's duration (among other things). It then creates separate files for audio and video and these files grow in a left-to-right manner during the recording. Writing reference files with video essence written in a left-to-right manner is optimal for keeping the load on the MediaGrid at a minimum. At the end of the recording session the .mov wrapper is "cleaned up" to match the actual duration of the recorded clip if the actual record duration differs from the specified or default duration.

As media is captured, it is encoded and placed in the buffer until the buffer flush size is reached at which point the data is written to disk while the buffer continues to fill. The buffer size can be set to a significant number of frames such that it will cover any network interrupts or storage latencies that may otherwise cause problems.

The effect of writing the .mov wrapper first with the full duration is that the clip can instantly be opened in Final Cut Pro. The growing clip can be placed on the timeline or in the preview window of Final Cut Pro and even scrolled through or, played while the clip is still recording. For DVCPRO material, there is no need for the editor to click out of and then back into Final Cut Pro for the most recently ingested portion of the clip to be available in the application. The video will "fill in" under the clip.

### 2 PictureReady Configuration

The figure below shows a typical configuration of PictureReady used during testing with important parameters circled.

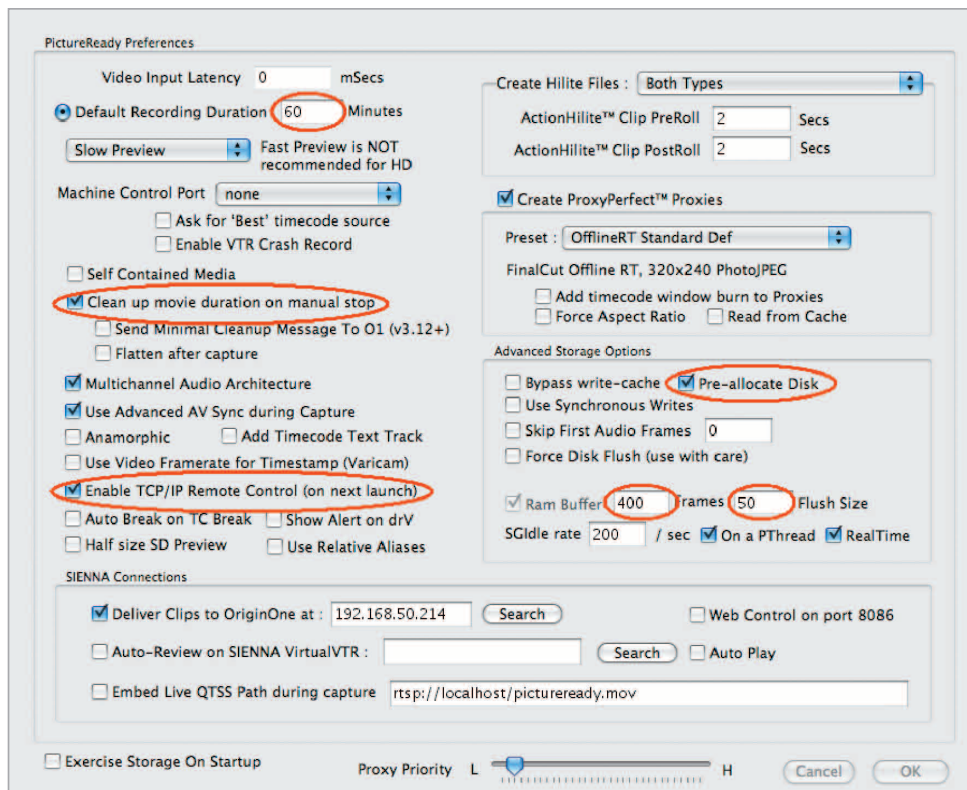


Figure showing PictureReady preferences used in testing

- **Default Recording Duration:** The default recording duration is what allows the entire clip to be placed on the Final Cut Pro timeline before the recording is completed.
- **Clean up movie duration on manual stop:** When the recording is terminated before reaching the default duration, PictureReady will edit the information at the end of the recording to reflect the true duration/
- **Enable TCP/IP Remote Control:** This setting allows the instance of PictureReady to be controlled remotely by SIENNA IngestControl
- **Pre-allocate Disk:** Pre-allocating the disk forces PictureReady to connect to the MediaGrid before ingest starts ensuring that the MediaGrid is available from both a network and storage point-of-view.
- **Ram Buffer and Flush Size:** These two values are key to the success of PictureReady direct ingest to MediaGrid. 400 frames (or 16 seconds) of buffer ensure that any network interrupts or storage latencies are “smoothed over” and that no media is lost between the encoding process and writing to disk. These values may be increased if desired but these settings were successfully tested.

Gallery does not specify system requirements for the PictureReady application, however, depending on the compression format, CPU and memory loads can be significant. Testing was conducted with a variety of Macintosh platforms and operating system versions, stable performance was observed with the following.

<b>Model:</b>	XServe
<b>CPU:</b>	2x Quad Core 2.8Ghz
<b>RAM:</b>	4GB

### 3 Testing with PictureReady and MediaGrid

Over the course of 2008, significant testing was performed, both by Omneon and others, using PictureReady as a direct ingest device to MediaGrid. Gallery created realtime analysis tools that established that MediaGrid behaved very well with regard to write latencies and other factors in writing of data by PictureReady.

Combined with recent enhancements to performance monitoring of MediaGrid within the Omneon SystemManager, these tools were used to test how PictureReady and MediaGrid react when scaling the number of ingest channels.

Using a 12-ContentServer MediaGrid (system software and file system driver for OS X version 2.2) up to eight Macintosh clients were tested writing media of up to 200Mb/s each. Two critical factors were being watched for in these tests:

1. **MediaGrid bandwidth utilization:** This data is key to the ability to accurately size MediaGrid and design systems which will employ PictureReady direct ingest.
2. **Client write duration and latency:** It is important to know in larger systems what effect adding clients has on write duration and latency and, in turn, whether this impacts the ability to write media directly to MediaGrid without dropping frames.

Additional testing focused on the effect that other MediaGrid file access and grid processing operations (e.g. edit-in-place, ProXchange and active transfers) had on direct ingest performance.

### 4 Sizing MediaGrid for Direct Ingest Operation with PictureReady

Tests have shown that direct ingest to MediaGrid with PictureReady scales very linearly. The data gathered enabled the creation of a simple formula for calculating the required bandwidth needed for PictureReady ingests. The tests also revealed that other bandwidth requirements need to be taken into consideration when designing an overall system.

The total bandwidth utilized in megabytes per second by direct ingest operations is a combination of write and read bandwidth as follows.

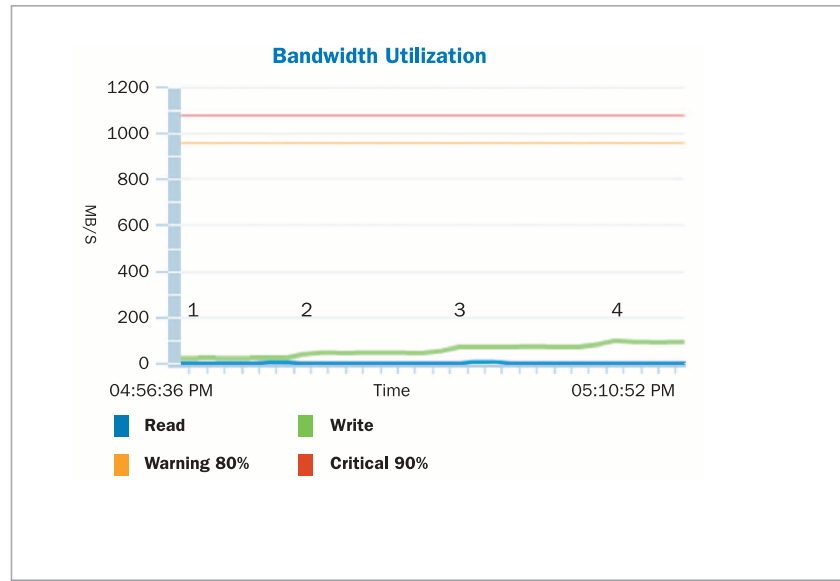
$$\text{Write Bandwidth} = (\# \text{ of Channels}) * (\text{Bit rate}) * (\text{Replication Factor}) * 110\%/8$$

$$\text{Read bandwidth} = 10\% * (\text{Write bandwidth})$$

Notes:

- Bit rate includes video and all audio tracks
- MediaGrid replication factor is nominally set to two
- 110% allows for a 10% overhead
- Dividing by 8 converts the bit rate to a Byte rate
- *Read Bandwidth is needed for file checking operations*

## ■ CONFIGURATION GUIDELINES



MediaGrid Bandwidth Utilization for various stream counts of DVCPRO HD

The figure above shows the results of a test performed where four channels of DVCPRO HD material was ingested into a 12-ContentServer MediaGrid. First one stream of ingest was initiated by PictureReady, then a 2nd, 3rd, and 4th. The red and orange horizontal lines near the top of the chart represent 90% and 80% of the 1,200 megabyte maximum bandwidth limitation of a twelve-ContentServer MediaGrid. These reference lines are simply drawn on this test result for reference, exceeding these levels does not necessarily cause any disruption to service. As you can see, the write (and read) bandwidth required for four streams is 110 Megabytes per second or a little more than 10% of the available bandwidth of the MediaGrid. This would suggest that many other operations, including additional ingests, edit-in-place operations and file transfers to other devices could be performed simultaneous to these four channels being captured.

## 5 Total System Bandwidth Considerations

While the equation above makes calculating how much bandwidth is required for direct ingest simple, it is important to ensure that this bandwidth is always available to the ingest clients. Bandwidth calculations for each edit seat that is added would be somewhere between one and two streams per edit station depending on use. However scrubbing of timelines in an editor can increase the file access demand on the storage system beyond two streams. And based on the aggregate activity of the MediaGrid, this could cause the overall workflow demands to exceed the maximum bandwidth of the MediaGrid. One approach for limiting the bandwidth draw of a given client is to provide it with only a single GigE connection. This will limit the bandwidth draw of that client to below 80 megabytes per second (varies by operating system and protocol).

## 6 PictureReady as Part of an End-to-End System

PictureReady is one of a suite of applications that make up the SIENNA newsroom system. It can also be used as a standalone application or in conjunction with SIENNA IngestControl – a remote control and scheduling application that can control up to 15 instances of PictureReady.

SIENNA PictureReady is capable of ingesting a broad range of video formats. While edit-in-place with MediaGrid and Final Cut Pro are supported for most of these formats, a smaller range of these formats are natively supported by Omneon Spectrum and MediaDeck. For broadcast operations where Omneon media servers are used for on-air playout, care should be taken that the clips ingested by PictureReady are natively compatible with Spectrum or MediaDeck for playout. Other valid workflows include ingesting in any format that is supported for MediaGrid edit-in-place with Final Cut Pro and then publishing Final Cut Pro projects in a suitable format for playout or dub out to tape.



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