

# Marquis Broadcast

The Cost of Managing and  
Optimising Shared Storage

*Full Version*



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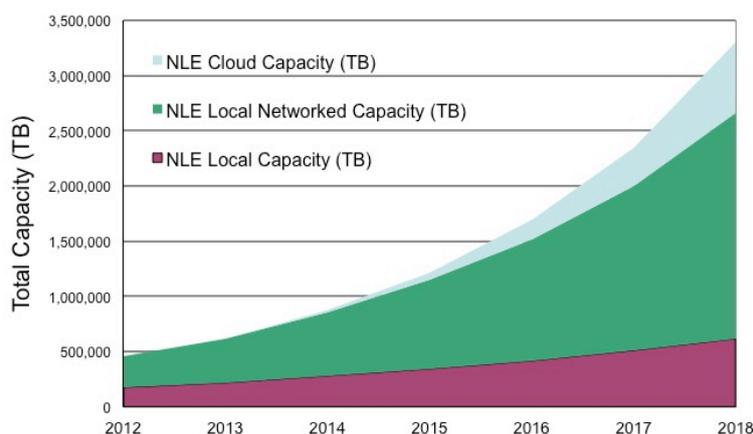
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# 1 Introduction

## 1.1 Scope and Purpose

It is a well-known fact that storage requirements are not only increasing but the rate of change is accelerating and this will always be the case based on the need for high quality and innovative presentation of content. This shouldn't be a surprise considering for the first time, consumer display suppliers are driving higher resolutions (in particular 4K) and increased quality. Ironically, this is a complete turnaround to how the industry grew in the early years of television and film – where content, broadcasters or film studios led the development of quality.

Specifically, when we look at content creation and the demands on the non-linear editing, requirements are increasing and this is clearly illustrated and represented in the following graph.



Tom Coughlin and Coughlin Associates, Forbes (June 2014)

Other key points to consider when reading the white paper<sup>1</sup> and from 2013 Digital Storage for Media and Entertainment Report, Coughlin Associates: -

- Creation, Distribution & Conversion of video content creates a huge demand driver for storage device and systems manufacturers
- As image resolution increases and as stereoscopic (and even more immersive) video becomes more common, storage requirements explode
- The development of 4K TV and other high resolution venues in the home and in mobile devices will drive the demand for digital content (especially enabled by high HEVC (H.265) compression.
- The slow-down in real density growth for HDDs will slow the historical \$/GB decline until at least 2016.
- Activity to create capture and display devices for 8K X 4K content is occurring with planned implementation in common media systems by the next decade

<sup>1</sup> Reference,

<http://www.tomcoughlin.com/Techpapers/M&E%20Storage%20Report%20Brochure,%202013,%20071613.pdf>

- Active archiving will drive increased use of HDD storage for “archiving” applications, supplementing tape for long term archives

Apart from the obvious observations, predictions or empirical evidence, the most interesting point is the increased use of HDD storage for archiving. The main reason being the demarcation between online, near-line and archive is constantly being blurred, but how do you manage this and how much does it cost? The purpose of this white paper is walk through a financial comparison of buying more storage, optimising existing storage, or using Project Parking and the advantages and disadvantages of each approach.

## **1.2 About Marquis Broadcast**

Founded in 1998, Marquis Broadcast provides a range of media integration products designed for the data-intensive and challenging requirements of today's fast-paced broadcasting environments, enabling broadcasters and other users of digital media to achieve maximum efficiencies from their workflow processes.

### **1.2.1 History and Customer Focus**

Marquis began as a workflow consultancy and held the belief that it was the interaction between people and not technology that affected the successful implementation of new technologies.

The company became committed to interoperability and identified the need to develop integration products to ensure that its customers had the flexibility to mix and match the best array of Broadcast and Production tools for their requirements.

The company has developed a number of products including, Medway, Project Parking, X2Pro and other applications.

For more details reference [www.marquisbroadcast.com](http://www.marquisbroadcast.com)

### **1.2.2 Medway**

Medway integrates broadcast platforms by providing transfer and format conversion workflows for media and metadata.

### **1.2.3 Project Parking**

Manage your Avid edit storage, move projects between tiers of storage or different locations, create project archives, identify duplicate media and clear out unused media.

### **1.2.4 X2Pro**

X2Pro Audio Convert is an application for delivering Final Cut Pro X projects to Avid Pro Tools for audio finishing.

## 2 Current Situation

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### 2.1 Introduction

As of July 2014 there are more providers of storage and shared storage solutions than ever before. Some vendors provide viable alternatives to more traditional shared editing storage and it is becoming difficult to differentiate between different solutions apart from guaranteed performance and excellent quality of service or support.

From Marquis Broadcast's perspective it doesn't matter which storage solution is used and Project Parking supports many different storage and archive solutions and will continue to add more as required. What does matter is how you manage shared storage and how you can best utilise it; this is why Project Parking was originally developed to manage shared storage albeit online (Tier-1), nearline (Tier-2) and archive (Tier-3).

### 2.2 What is the problem?

The main problem with workgroups and shared projects is keeping track of where and which assets are used within a project. In particular, how media is distributed between workspaces and when is it safe to delete content. Marquis' Project Parking was conceived with this problem in mind by creating an application that can both manage archives and utilisation.

There are other approaches that are viable from fully integrated asset management systems to utility or command line based approaches to fixing some of these issues.

Project Parking provides an agile and seamless solution to a complex problem or an alternative to complex solutions. As mentioned before, one observation is how the lines between Tier-1 and Tier-2 are blurred and alternatives to traditional Avid shared storage encompass a hybrid storage platform that balances between performance, reliability and durability i.e. T1 + T3 solutions.

### 2.3 What is Project Parking?

In one single application Project Parking provides tools to improve efficiency when using edit storage - reducing capital expenditure on additional edit storage and accelerating archiving, transferring and consolidating projects.

Project Parking analyses all Avid projects and media to understand and present which projects are using up most storage and take action to transfer, archive or delete. As well as finding large projects, Project Parking can identify unused (orphaned media) or duplicate media which can be deleted or archived.

With Project Parking users can create project archives based upon bin selection, move projects between tiers of storage or transfer to different locations. After archiving and

transferring media off-line - selected Projects or Bins can be restored and merged with the original media back on-line or other share storage.

## 2.4 What are the options?

There are several options to solve the problem of lack of storage space: -

1. Buy an additional industry and production proven Tier-1 storage platform
2. Share a proportion of an existing production proven Tier-1 storage platform
3. Buy a more cost effective Tier-1 storage platform
4. Share a proportion of an existing more cost effective Tier-1 storage platform
5. Use Media Composer to consolidate sequences within a project (New license)
6. Use Media Composer to consolidate sequences within a project (Subscription license)
7. Use an existing Media Composer to consolidate sequences within a project

Obviously, buying more storage will solve the problem immediately or whenever the new system has been delivered and configured. As with any additional capacity, users become less disciplined when managing content and the new storage will soon fill up without strict controls or procedures. Hence, in the long-term the problem does not really go away, in fact it gets bigger.

Sharing a proportion of existing storage is a good short-term solution, but it assumes you already have enough space to share. Without optimising existing storage, this is going require manual or semi-automated scripting to make space available and will also run the risk of accidentally deleting live/used content. There is also the human cost of managing more storage and the time it takes.

Using Media Composer to consolidate sequences is an industry proven way to manage a sequences and potentially projects. The main problem with this approach is 1) utilises a revenue making workstation, 2) time consuming to do, 3) is not version aware. Hence, using Media Composer is inefficient, manual process and error prone when creating new version of a sequence or project.

## 2.5 How does Project Parking save money?

We can look at four perspectives of how Project Parking saves money, 1) operating cost saving i.e. cost of purchase and use, 2) utility cost saving when using Project Parking to optimise shared storage, 3) seamlessly transferring projects and media cost saving and 4) intelligent archiving and removing the occurrence of duplication.

1. **Operating cost saving:** Project Parking will save you 43% (at £5.50 per day) over the cheapest alternative approach using Media Composer and Assistant Editor<sup>2</sup>
2. **Storage utility cost saving:** Release up to 15% of your shared storage facilitating greater throughput and driving increased profitability.
3. **Transferring projects and media cost saving:** Save up 95% in storage costs when using Project Parking to transfer projects from online to archive storage.<sup>3</sup>
4. **Intelligent archiving:** reduces the cost of duplication by up to 50%. Project Parking will only archive changes between versions of projects, reduce the cost of archiving and removing the need to duplicate media.<sup>4</sup>

To see this in detail we will review seven different options to solving the lack of space problem commonly seen in production and post-production in relation to Operating Cost Saving as highlight at the start of the section 2.2.

Using the following financial assumptions: -

Project Parking License	£6,000.00	outright
Project Parking Workstation	£1,000.00	outright
Marquis Maintenance %	12.5%	
Marquis Maintenance	£750.00	per annum
Production Proven Tier-1 64TB	£50,000.00	outright
Size of Production Proven Tier-1	64	TB
Production Proven Tier-1 Maintenance %	20.0%	
Production Proven Tier-1 Maintenance	£10,000.00	per annum
Other Tier-1 or 2 Storage 50TB	£30,000.00	outright
Size of Storage	50	TB
Other Tier-1 or 2 Maintenance %	12.5%	
Other Tier-1 or 2 Maintenance	£3,750.00	per annum
Capital depreciation/Term	3	years
Cost of Technician/Admin	£20,000.00	per annum
Cost of Asst. Editor	£30,000.00	per annum
Large Project Size	10	TB

<sup>2</sup> Comparison is based on an existing workstation and Media Composer license that is operated by an Assistant Editor over 3 years

<sup>3</sup> Tier-1, Tier-2 and Tier-3 storage TB/month cost is calculated based on the July 2014 market figures and includes all soft cost estimated as 30% value of the asset cost and consists of power, cooling, hosting, maintenance, support and human resources.

<sup>4</sup> Based on at least 2 versions of the same project with minor changes to the project and sequence settings.

Editor time to consolidate Projects	0.50	days/week
Number of large projects	3	
Frequency of archive	1	week
Admin time for Project Parking	0.125	days/week
Number of work days	235	per annum

First a summary of how much it costs to run Project Parking over 3 years where proportion of time per by either a System Administrator or Assistant Editor is 0.125 days a week to manage 1 archive or 3 (10TB) large projects per week. In this case, as the process of archiving and transferring projects has been de-skilled we are using the cost of a Technician rather than the cost of an Assistant Editor or Editor.

<b>Project Parking</b>		<b>Per/Day</b>
<u>Project Parking License</u>	<u>£6,000.00</u>	<u>£5.48</u>
Marquis Maintenance	£2,250.00	£2.05
Project Parking Workstation	£1,000.00	£0.91
Cost of Technician/Admin	£4,978.72	£4.55
<b>Total over 3yrs</b>	<b>£14,228.72</b>	<b>£12.99</b>

## Option 1) buying an additional industry and production proven Tier-1 storage platform

<b>1) Additional New Tier-1 storage</b>		<b>Per/Day</b>
Tier-1 storage 64TB	£50,000.00	£45.66
Tier-1 Maintenance	£30,000.00	£27.40
<b>Total over 3yrs</b>	<b>£80,000.00</b>	<b>£73.06</b>

Project Parking savings 462%

In comparison to Project Parking buying an additional production proven Tier-1 storage cluster is considerably more expensive than Project Parking, but does have the advantage of being able to handle a lot more projects than before. Even this option, the problem doesn't completely go away and efficient use still needs to be managed and Project Parking is designed to help manage and optimise storage as it grows.

## Option 2) sharing a proportion of an existing production proven Tier-1 storage platform

<b>2) Share of Existing Tier-1 storage</b>		<b>Per/Day</b>
Tier-1 storage 64TB	£50,000.00	£45.66
Tier-1 Maintenance	£30,000.00	£27.40
<b>Total over 3yrs</b>	<b>£37,500.00</b>	<b>£34.25</b>

Project Parking savings 164%

Even when a proportion of an existing production proven Tier-1 storage platform is used, the equivalent cost is more than Project Parking when managing three projects of 10TB over 3 years. This doesn't include the human cost of managing this amount of content on an existing platform which is arguably going to be 0.5 day per week for either a System Administrator or Assistant Editor. Project Parking can be used to reduce the intervention time of any operator enabling him/her to focus on higher priority tasks while ensuring existing storage is optimally used.

### Option 3) Buying a more cost effective Tier-1 or 2 storage platform

<b>3) Additional New Other Tier 1 or 2 Storage</b>		<b>Per/Day</b>
Other Tier-1 or 2 Storage 50TB	£30,000.00	£27.40
Other Tier-1 or 2 Maintenance	£11,250.00	£10.27
<b>Total over 3yrs</b>	<b>£41,250.00</b>	<b>£37.67</b>

Project Parking savings 190%

In comparison to Project Parking buying an additional other Tier-1 or 2 storage cluster is still more expensive than Project Parking. As before, this option does have the advantage of being able to handle a lot more projects than before. Again, the problem doesn't completely go away and efficient use still needs to be managed and Project Parking is designed to help manage and optimise storage as it grows.

### Option 4) Sharing a proportion of an existing more cost effective Tier-1 or 2 storage platform

<b>4) Share of Existing Other Tier 1 or 2 Storage</b>		<b>Per/Day</b>
Other Tier-1 or 2 Storage 50TB	£30,000.00	£27.40
Other Tier-1 or 2 Maintenance %	£11,250.00	£10.27
<b>Total over 3yrs</b>	<b>£24,750.00</b>	<b>£22.60</b>

Project Parking savings 74%

Again, when a proportion of an existing other and more cost effective Tier-1 or 2 storage platform is used, the equivalent cost is more than Project Parking when managing three projects of 10TB over 3 years. This doesn't include the human cost of managing this amount of content on an existing platform which is arguably going to be 0.5 day per week for either a System Administrator or Assistant Editor. Project Parking can be used to reduce the intervention time of any operator enabling him/her to focus on higher priority tasks while ensuring existing storage is optimally used

## Option 5) Using Media Composer to consolidate sequences within a project (New license)

<b>5) Media Composer Consolidation (New License)</b>		<b>Per/Day</b>
Avid Software license	£1,000.00	£0.91
Avid Workstation	£2,000.00	£1.83
Avid Maintenance	£375.00	£0.34
Cost of Assistant Editor		£18.19
	£19,914.89	
<b>Total over 3yrs</b>	<b>£23,289.89</b>	<b>£21.27</b>
Project Parking savings		64%

As mentioned before Media Composer can be used to sequence consolidate and this can be repeated for all key sequences within a project, but there is no easy way to consolidate a project or even archive a project that includes intelligent comparison between the latest version and previous versions. Even using this option Project Parking is more cost effective and doesn't require the use of Media Composer.

Project Parking provides a MD5 checksum comparison of all assets within a project and only the changes or differences are archived. As sequence consolidation is a manual process the time required to archive a project needs to be taken into account and any consolidations requires the lock-up of an editing seat. Whereas, with Project Parking all project or workspace functions can be independently used assuming the Project Parking workstation is connected to the ISIS workspace via the ISIS client software.

## Option 6) Using Media Composer to consolidate sequences within a project (Subscription license)

<b>6) Media Composer Consolidation (Subscription)</b>		<b>Per/Day</b>
Avid Software Subscription	£1,684.80	£1.54
Avid Workstation	£2,000.00	£1.83
Avid Elite Support	£828.00	£0.76
Cost of Assistant Editor		£18.19
	£19,914.89	
<b>Total over 3yrs</b>	<b>£24,427.69</b>	<b>£22.31</b>
Project Parking savings		72%

Recently Media Composer has been made available as a monthly subscription service for £46/month and initially, this is a very cost effective way to use Media Composer for sequence consolidation and general media management. But as with the previous option, within Media Composer there is no easy way to consolidate a project or even archive a project that includes intelligent comparison between the latest version and previous versions.

Over a 3 year term even this option becomes less cost effective and Project Parking is cheaper and doesn't require the use of Media Composer.

## Option 7) Using Media Composer to consolidate sequences within a project (Existing license)

7) Media Composer Consolidation (Existing License)		Per/Day
Avid Software license	£ -	£-
Avid Workstation	£ -	£-
Avid Maintenance	£375.00	£0.34
Cost of Assistant Editor	£19,914.89	£18.19
<b>Total over 3yrs</b>	<b>£20,289.89</b>	<b>£18.53</b>
Project Parking savings	43%	

Finally, consider situations where an existing Media Composer license is used and only the cost of the Assistant Editor is the major cost factor. Even when using this approach Project Parking is more cost effective as the amount of time required to use the application is considerably reduced and deskilled to ¼ of the amount of operator time and the responsibility moving from Assistant Editor to Technician. In real-terms using Project Parking is 43% more cost effective that using any existing Media Composer license, setup and Assistant Editor.

## 2.6 How does Project Parking make money?

The Efficiency Index is highlighted below in green and will relate to the duplicate and orphaned files volume and % calculations. An additional calculation will be required to determine the media and workspace cost association and resultant summation.

13	Duplicate Files <i>Excluding duplicate orphan files</i>	1.72 GB	redundant	1.09%	could be	<b>Efficiency Index 56.3%</b>
500	Orphaned Files <i>Including duplicate orphan files</i>	7.19 TB	storage	45.51%	cleared	
		<u>7.35 TB</u>		<u>46.6%</u>	<b>£350 saved per month</b>	

The Efficiency Index is designed to explicitly indicate the efficiency of the workgroup and associated workspaces and other connected storage platforms. This is explained in the following section and is predominately used to quickly assess a customer's configuration when using Project Parking Storage Analysis Summary.

The efficiency index is used to illustrate the overall efficiency of all (and in the future selected projects/workspaces) in relation to the average of two calculations, the ratio of total unique number of files and total number of all files and the ratio of total volume of unique files and total volume of all files.

$$\frac{\frac{\text{Total number of unique files}}{\text{Total number of all files}} + \frac{\text{Total volume of unique files}}{\text{Total volume of all files}}}{2} = \text{Efficiency Index (EI)}$$

The resultant value will be different from the % of inefficient utilised space i.e. Duplicate or Orphaned files for two reason, 1) the EI is specific to unique number of files and volume of those files and not inefficient files and corresponding volume, 2) the EI is an average of two ratios specific to number and volume of efficiently used files.

100% calculated efficiency indicates there are no duplicates or orphaned media and customers can feel rest assured they are maximising the space on the shared storage. Anything less than 100% would indicate either by choice there is redundant media or media is inefficiently distributed.

In the current version of Project Parking with Storage Analysis Summary, users can clearly see how much storage is being efficiently utilised and an approximate saving per month is highlighted if users were to delete duplicate media or sweep/delete unused or orphaned media.

Project Parking provides tools to securely delete duplicate media on the basis that another copy of the media is retained on the system. This is similar to the delete project function as the deletion function checks to ensure there is another an archive copy of the project that has been selected for deletion.

When dealing with unused or orphaned media or assets Project Parking provides tools to sweep (move) unused media to another workspace or location that is more cost effective.

Within the Storage Analysis Summary area there is a cost comparison tool to estimate the saving when moving or transferring projects and associated media to another workspace or archive location.

When maximising the use of storage, facilities and departments will be able to do more jobs while having the security of being able to move around or consolidate projects to more cost effective storage for short or long-term parking or archiving.

When comparing different types of storage (Table 1 Storage Type and equivalent TB/month cost) from the perspective of cost per TB, accessibility, total cost per month per TB for 3 year period, it is not surprising to see that LTO is still the most cost effective storage option while sacrificing accessibility. This doesn't include LTO archive libraries where access and control is far better. Conversely, the most expensive storage option is generic cloud storage, but this is offset by bundling storage costs and operating costs, higher physical security or redundancy or duplicity.

Tier	Storage Type	No. TBs	Cost per TB	Access	Ease of Use	Total Cost / month / TB	Rank (Cost / month / TB)
2.5	Cloud Archive Storage	50	£284.85	2	4	£7.91	6
<b>2.5</b>	<b>Cloud Storage</b>	<b>10</b>	<b>£2,238.75</b>	<b>2</b>	<b>4</b>	<b>£62.19</b>	<b>15</b>
2	Portable HDD	8	£59.38	3	3	£2.32	2
2	Portable HDD	2	£125.00	3	3	£4.88	5
<b>3</b>	<b>Portable Tape (LTO)</b>	<b>6</b>	<b>£16.00</b>	<b>1</b>	<b>2</b>	<b>£0.62</b>	<b>1</b>
2	Semi-portable HDD	8	£62.50	4	4	£2.44	3
2	Semi-portable HDD	16	£107.81	4	4	£4.20	4
0	Solid State Drive (SSD)	1	£350.00	5	5	£13.65	8
1	Tier-1 Medium Scale Storage	128	1,046.88	5	5	£40.83	13
1	Tier-1 Small Scale Storage	32	£468.75	5	5	£18.28	10
1	Tier-1 Small Scale Storage	32	£750.00	5	5	£29.25	11
1	Tier-1 Small Scale Storage	21	£841.35	5	5	£32.81	12
2	Tier-2 Large Scale Storage	500	£350.00	5 or 4	5	£13.65	8
1	Tier-2 Small Scale Storage	12	1,345.83	5 or 4	5	£52.49	14
2	Tier-2 Very Large Scale Storage	1000	£250.00	5 or 4	5	£9.75	7
<b>Storage Tiers</b>							
Tier 0 - Very high performance SSD			Cost per TB is Purchase Cost / number of TBs	(5-High, 1-Low)	(5-High, 1-Low)	8% Amortisation over 3 years and 30% soft costs	Ranking is based on total cost per month per TB
Tier 1 - High performance & reliability HDD							
Tier 2 - High reliability HDD							
Tier 2.5 - High reliability and capacity HDD/LTO							
Tier 3 - High capacity LTO							
						Where soft costs include:- Power, Cooling, Human resources, hosting, Maintenance, Upgrades, Support and Service	

Table 1 Storage Type and equivalent TB/month cost

In reality, there are many trade-offs between using different storage platforms and it is not an obvious criteria to just use price, but in many cases is a significant deciding factor. From Project Parking's point of view it does not matter if you are using LTO or Cloud based storage and everything in between – the key benefit is that Project Parking is seamless to manage media on whatever the platform. Project Parking has a significant impact on the amount of human resource time and typically is ¼ of what it would take an equivalent assistant editor or system administrator to do manually or via a number of scripts.

### 3 Summary & Conclusion

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Storage utilisation and requirements are always going to go up for the foreseeable future and this needs to be managed accordingly to ensure storage is constantly used effectively. Project Parking works in tandem with any pre-existing procedures or media asset management systems.

Purchasing new storage is an option, however, it is very expensive and fundamentally makes the storage management task harder and more time consuming.

Sharing a proportion of existing storage is another viable option assuming the existing storage has been optimised already i.e. removing old project, duplicate or unused media. Independent to Project Parking sharing existing storage is not a trivial task and is a constant sliding puzzle between projects being ingested, in progress and awaiting final sign off.

Using Media Composer is also viable but cumbersome to manage projects, media and trying to archive or restore projects. This approach also utilises a revenue making seat where by Project Parking can be used independently to any Media Composer.

Taking into account all the comparisons albeit disk costs, efficiency index and various different approaches. Project Parking is fundamentally more cost effective to use, will reduce system administration time and provides a high number of features to increase the workspace and project efficiency via archiving projects, transferring projects, deduplication and removing unused media.