
Optical Disc Archive
2016

Menu

What is ODA...

- History in Optical technology

- Robust Storage Format based on Optical Disk technology (Like XDCAM)
- Launched in 2012
- 12* Bare Disks are stored in Media “Cassette”
- Current Capacities from 300GB - 1.5TB
- Uses UDF Vendor Neutral File system

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Business Benefits

Long Life Span

Non Contact Media - Robust and Secure

Ecologically Friendly

Excellent Backward Compatibly

Plug & Play

Easy to install and manage

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Alternative Storage Mediums

	Optical Disc	Data Tape	HDD	SSD
Media cost ($/GB)	+++	++++	++	-
Long term / Generational Compatibility	+++	+	-	-
Archive Life	+++	++	-	?
Reliability / Durability	+++	+	+	++
Access speed	++	-	+++	++++
Transfer Speed	++	+++	+++	++++

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Excellent Backward Compatibility

First CD Album
Billy Joel - 52nd Street 1982
Still plays today !!

Discs are the same physical size

More data stored closer together in a smaller space

Lasers have got more sensitive and older formats are easier to read

Menu

Good backward compatibility = No “Forced” Migration

- LTO requires you to migrate every 2 Generations
- Media Costs and Labour can be significant

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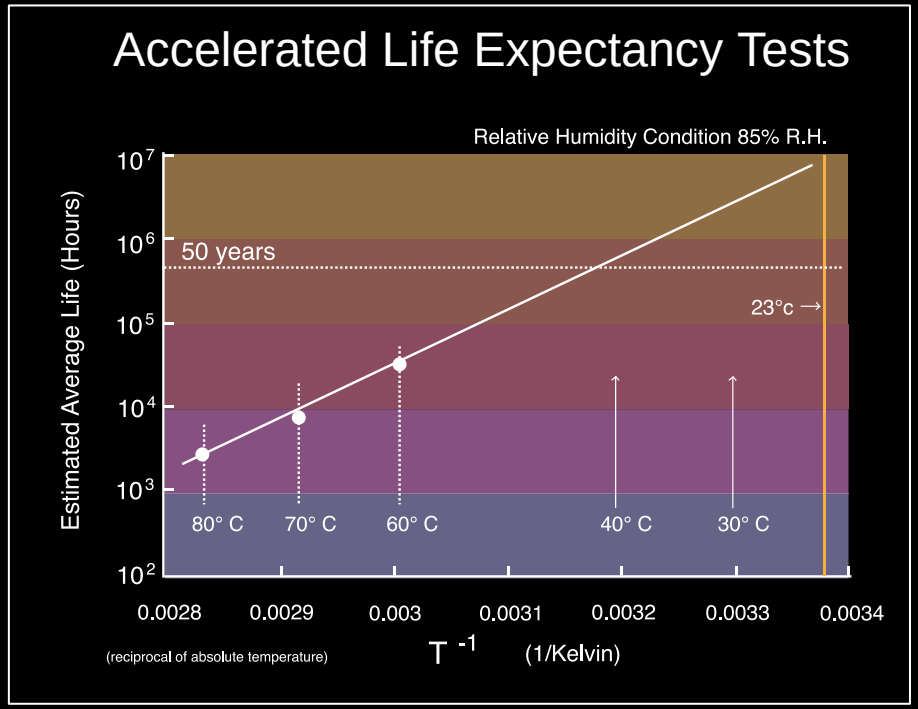
50 Year Life Span – Accelerated Testing

- Based on ISO Standard Life Acceleration Test => Arrhenius Law
- Even At 42oC = poor environment !



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50 Year Life Span – Fundamental design benefit !

- Optical Disks are a “**Non Contact**” Storage Media
- Uses Laser to read and write so surface integrity is maintained
- ODA “Cartridge” Design Maximises Life Span as Raw Disks are never Handled by Humans !

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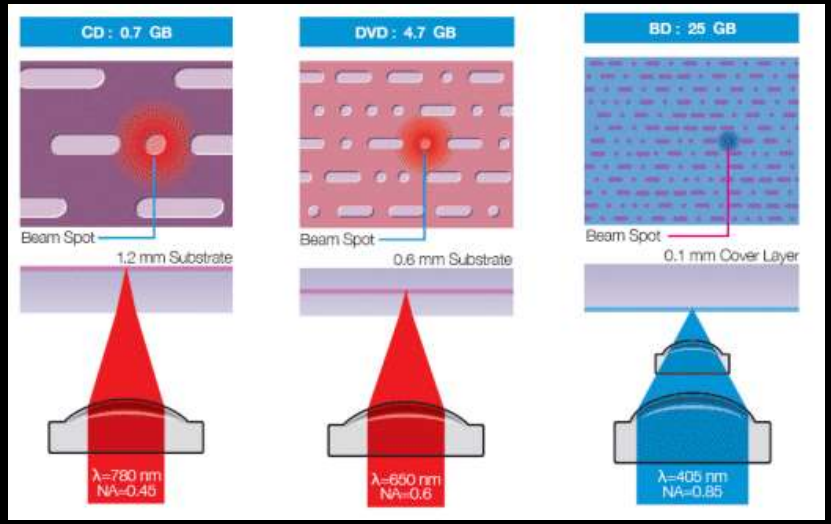
50 Year Life Span – Future Access

- File system is based on “UDF” Open, Vendor Neutral File System
- Bare Disks can be Read easily by simple application



- As Lasers become more sensitive old data is easier to read...!

Robust – Physically Strong

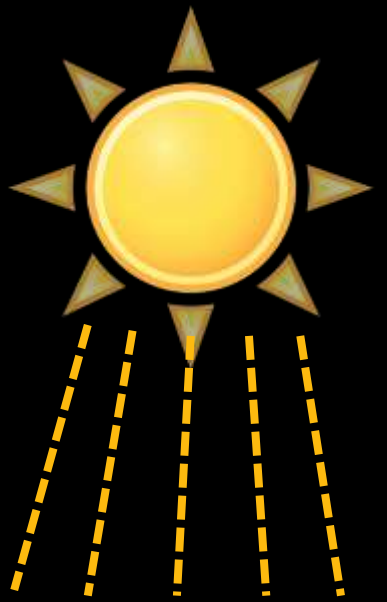
Japan Tsunami – Only Optical Based storage Survived

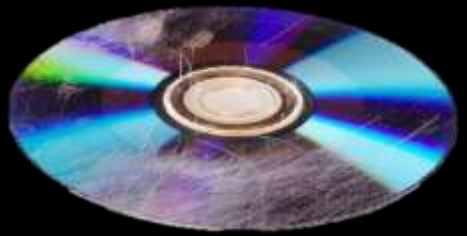
Sony Tests - 17 days submerged in Salt Water...and still worked

Robust – Benefits of Cartridge Design

Menu

- Some customers complain that CD/DVD format did not last as expected
- Most issues related to Poor quality Media,
- Poor Handling and UV, infrared, fluorescent Light also affects life.





- ODA Cartridge Design negates these issues

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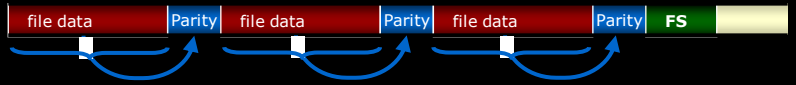
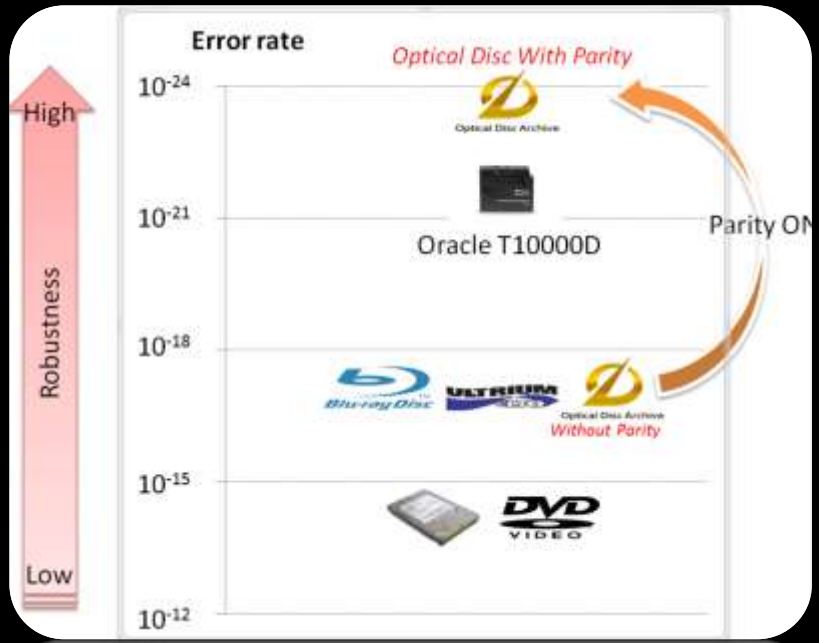
Robust - Lowest error rates



- Currently T10000 DataTape has the lowest Error rates
- With Parity Checking Switched on ODA exceeds T10000 to set new Benchmark



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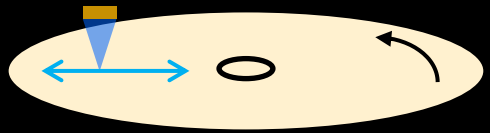
Performance In the Real World – Random Access

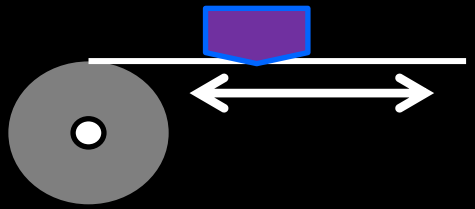
Workstation + ODA



Random Access

Scrubbing of Video

Workstation + LTO



Linear Access

Very slow update almost impossible

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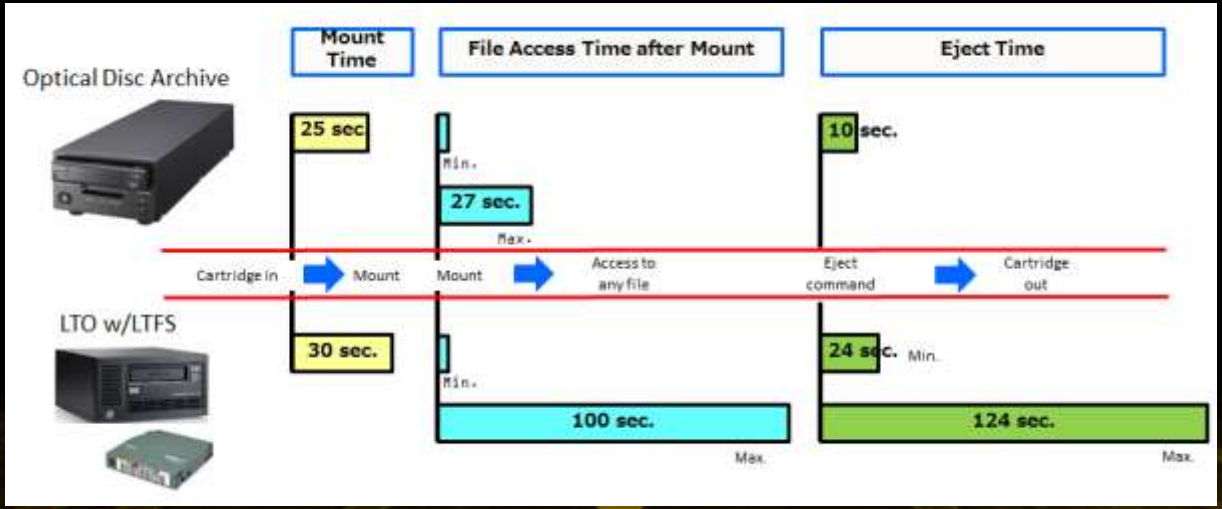
Real World Performance Data – Gen 1

- LTO has theoretically Faster throughput in MB/Sec
- But LTO is tape so loading and seek times are slower
- ODA has near instant access
- Recovering a HD program of an Hour or less ODA is Faster
- With Multiple Smaller files ODA is significantly faster



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Easy to Handle - Emergency Workflow

- In case of HSM or Library failure you can just pull a Cartridge out of the Library and Play it back in a USB Drive
- You can Always access your Media !

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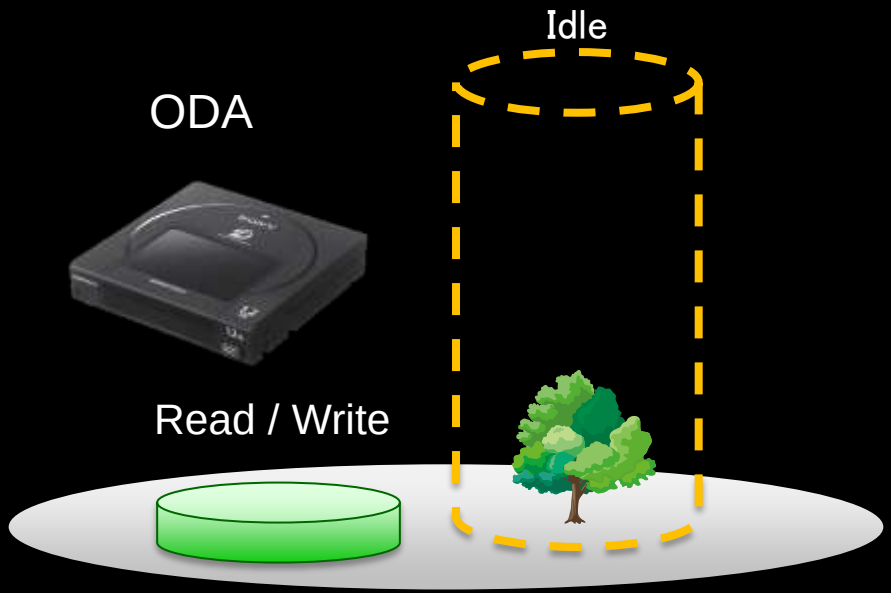
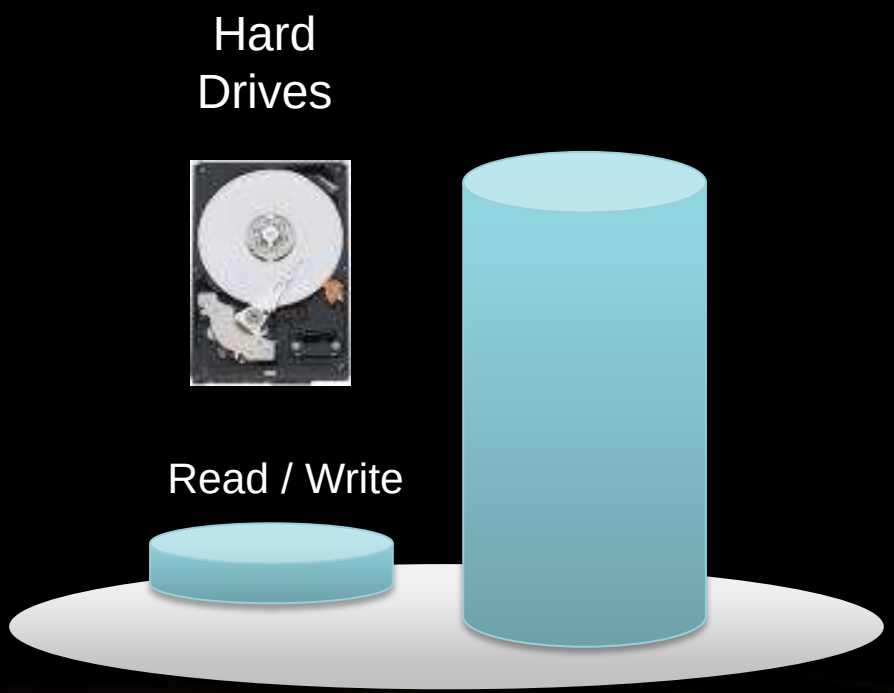
File Agnostic – Just like a Hard drive

- OD media is file format agnostic.
- Completely ‘data/file based’.
- Data written to disc using proven ISO standard.
- Format is Open and Non-proprietary

Menu

Excellent Eco Credentials – Low Power consumtion





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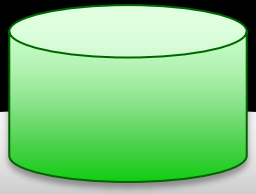
Excellent Eco Credentials – Flexible Storage Conditions

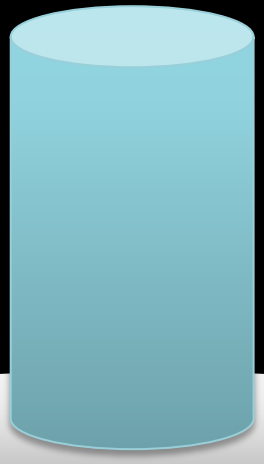
- In theory both consume no power when idle
- But Storage Environment much more strict for Tape

ODA
Recommended
Storage Temp -
10 ~ +55℃



Air conditioning

Recommended
Storage Temp +16 ~
+35℃



Air conditioning

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Line-up and Key Applications

Menu

ODA Solution Hardware Line-up and Media

Simple USB Drive

Small Workgroup Robots

Large Expandable Library

Model Number	Capacity	Type
ODC300R	300 GB	Write-once
ODC300RE		Rewritable
ODC600R	600 GB	Write-once
ODC600RE		Rewritable
ODC1200RE	1.2 TB	Rewritable
ODC1500R	1.5 TB	Write-once

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Sony Complimentary SW Solutions

	Windows Explorer/Apple Finder	ODA Filer	Content Manager	File Manager	Navigator
Price	Free	Free	200 Euro	850 Euro	2.5k Euro
Drive/Library Support	USB Drive Only	Both	USB Drive Only	Both	Both
Data Transfer	Yes	Yes	Yes	Yes	Yes
Job Control		Yes	Yes	Yes	Yes
Metadata			Yes	Yes	Yes
Hot Folder			Yes	Yes	Yes
Shelf Management			Yes	Yes	Yes
Thumbnail Extraction			Limited		Yes
Proxy Generation			Limited		Yes
Multi User				Yes	Yes
Transcoding					Yes
Advanced Metadata Handling					Yes
Dedicated Ingest - File					Yes
Dedicated Ingest - Tape					Yes
Workflow Engine					Yes
NLE Integration					Yes

Acquisition – Content Management - Archive

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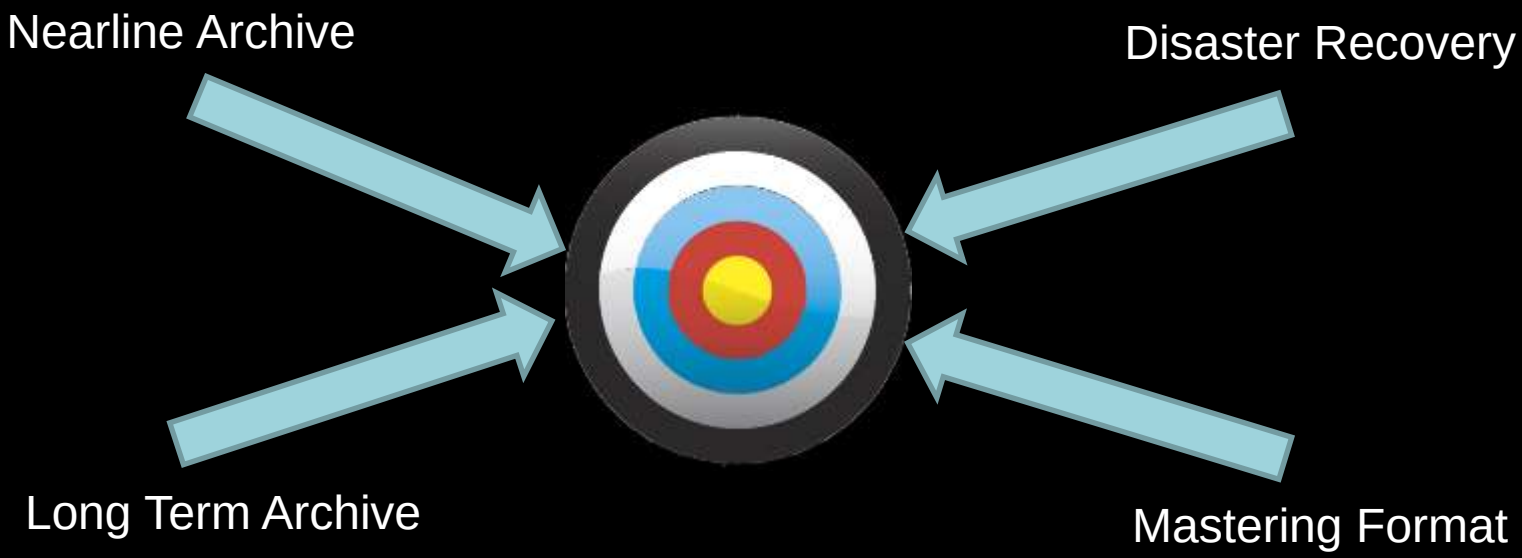
Key Uses of ODA – Understanding the Sweet Spots



Workflow examples – Simple HD Replacement

Drives can be treated just like a HD (Your staff will like this)

Easy to Handle

USB 3 Connectivity – It looks like a HD to you

Plug & Play

Any file format

Direct Viewing of Content without restoring

But they have a much more robust Storage Medium (You'll like that)

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Workflow examples – Mastering Format

Menu

- HDCAM SR used to be The Final Master
- Ultra Valuable and usually Insured
- Easy to Handel and review

		Accidental Erase	Video Quality	Robust -ness	Record Speed	Deliverable / Exchange	Cost
SR		✓	✗	✓ ✗ HD Max	✓	✗	✓	✗
ODA		✓	✓	✓	✓	✓	✓	✓
LTO		✗	✓	✓	✗	✓	✗	✓✓
HDD		✓	✗	✓	✗	✓	✗	✓ ✗

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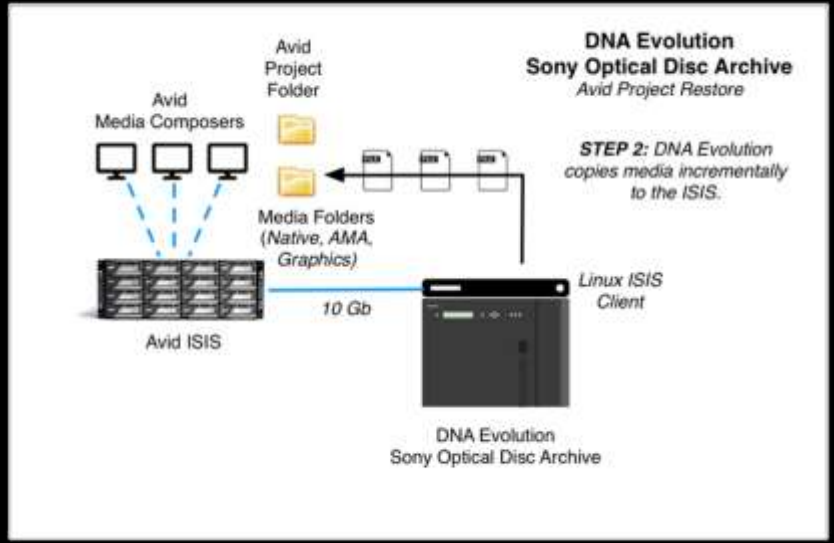
Workflow examples – Nearline Cache with Avid

"Faster than LTO – Cheaper than HD"

- Storage DNA use "Smart Access"
- Enables ODA to look and behave more like Nearline HD
- Some Workflows do not require a restore function
- Media can be read directly off ODA Media
- No need to "restore"
- Further Intelligence like Avid project "Awareness" is possible



storageDNA

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Workflow examples – Disaster Recovery

- 2nd Source of Technology (Archive Best practice)
- Not required to Scale as Big as Primary
- Shelf used to Store Extra capacity
- Environmental requirements Low
- Uses can even use Drive to review and restore

HSM
Middleware

Primary Online Storage

DR Site Smaller Library + Shelf

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Workflow examples – Deep “Long term” Archive

- Where Library and Shelf Workflow is accepted
- Library does not have to be large
- Lowest Environmental costs achieved as Media does not require special Storage conditions
- No Migration requirements – TCO benefits can be leveraged

Latest updates

Current Partners

Menu

Lower Media Pricing

75%

Lower than 2 years ago

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New Entry Level Robot

- Special Packages
- L30M/Pack 1 with 1 Drive = 19.5k Euro
- L30M/Pack 2 with 2 Drives= 26k Euro

- New 30 Slot Entry Level Library – L30M/3
- Can take 2 FC Drives
- Expansion option ODBK-103 enables optional L60 and L100 expansion cabinets to be added

New D77U (Standalone) Drive Pricing

- 4k Euro Per Drive

New – Navigator In detail

- Entry Level MAM Solution 1-30 Users
- Based on Same Architecture as MBC “Navigator”
- SD, HD and 4k Resolutions supported
- Huge range of files/formats supported
- Integrated Transcoding engine (FFMPEG based)
- SW only and Turnkey Solutions
- Good NLE integration
- Powerful Metadata tools
- Sony Ci integration for Review and Approve
- Built in WF engine with easy to use config tool

Menu

Workgroup Solution with ODA + Navigator

Solution for 1 to 30 Users
Direct Library Integration with
No need for HSM

Fibre Channel
GB Ethernet

Online Storage

Navigator Server

30 Slot ODA Library

Browsing and Ingest Terminals

Edit Suites – FCP, Avid or Adobe

Gateway PC (File exchange)

- 30 Slot ODA Library + 2 FC Drives
- 10 Seat MAM SW Licences
- 1 Transcode Node Included

<40k Euro

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Roadmap

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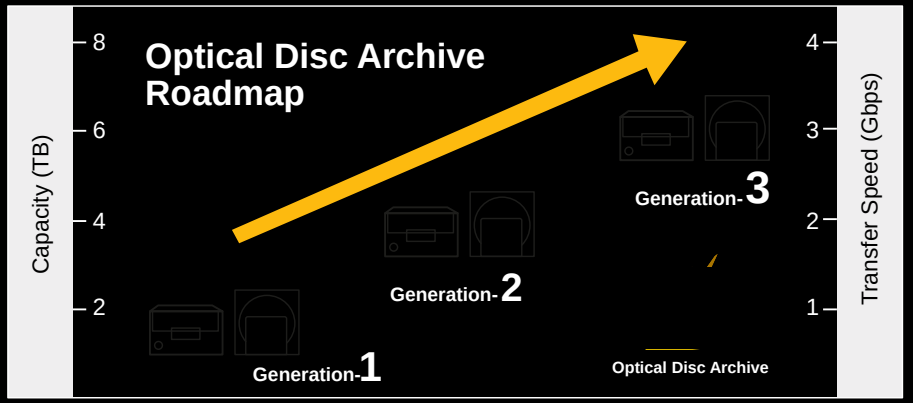
ODA Roadmap – Generation 2

- Gen 2 Was previewed NAB 2015
- Gen 2 Ships June 2016
- Capacity confirmed as 3.3TB RAW
- Gen 2 Media will only be “Write-Once”
- Gen 2 Drives can still Write to Current Gen 1 1.2Tb Re-Writable Media



		Generation-1	Generation-2	Generation-3
Capacity		Up to 1.5TB	~~3.3TB~~	6TB
Transfer Speed	Read	Up to 1.1Gbps	2Gbps	3Gbps
	Write (w/Verify)	Up to 440Mbps	1Gbps	1.5Gbps

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ODA Gen 2 uses new “Archival Disk”

Archival Disc

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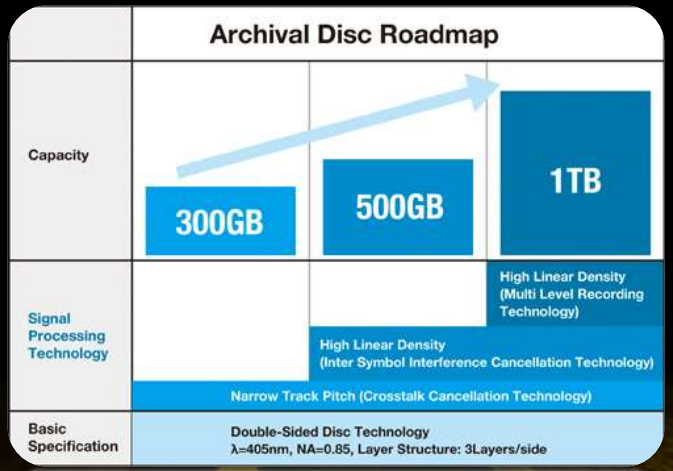
+

Panasonic

Both companies are sharing Dev and Manufacturing costs

“Archival Disk” is the Raw “Bare” Disk

11 Gen 1 Archive Disks are used for ODA Gen 2



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ODA Drive Compatibility List

Drives	Write Once Media					Re-writable Media		
	Gen 1 Media			Gen 2 Media		Gen 1 Media		
	300GB	600GB	1.5TB	1.8TB	3.3TB	300GB	600GB	1.2TB
Gen 1 Drive	Read/Write	Read/Write	Read/Write	No Support	No Support	Read/Write	Read/Write	Read/Write
Gen 2 Drive	Read Only	Read Only	Read Only	Read/Write	Read/Write	Read only	Read only	Read/Write

- Gen 2 Media will only be “Write-Once”
- Gen 2 Drives can still Write to Current Gen 1 1.2TB Re-Writable Media
- Gen 2 Drives and Read all Gen 1 Media
- Gen 1 Drives CAN NOT read or write Gen 2 Media

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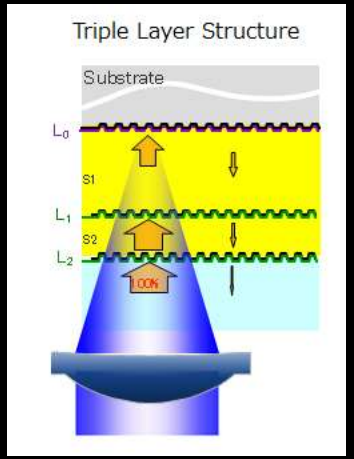
Gen 2 Technical Details – Greater Density

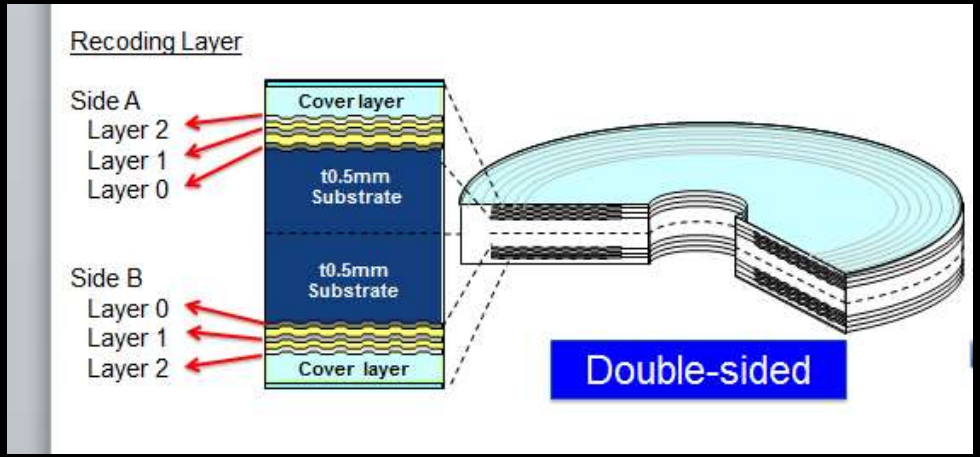
Recoding Layer

Side A
- Layer 2
- Layer 1
- Layer 0

Side B
- Layer 0
- Layer 1
- Layer 2



Triple Layer



Double Sided

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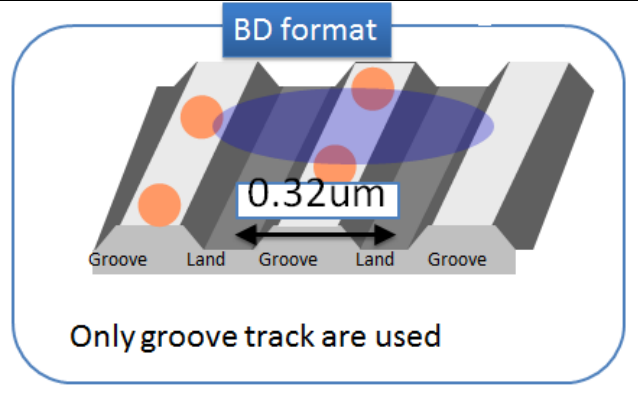
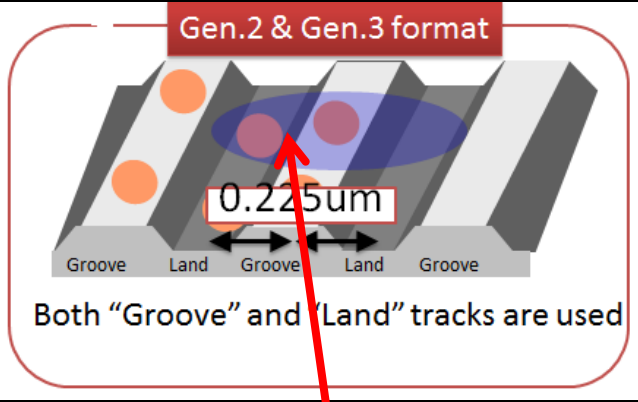
Gen 2 Technical Details – Greater Density





Blue Laser specification is same
λ = 405nm, NA=0.85
Easy Compatibility

Unique "Cross Talk Cancellation" Technology

Layer 0
Layer 1

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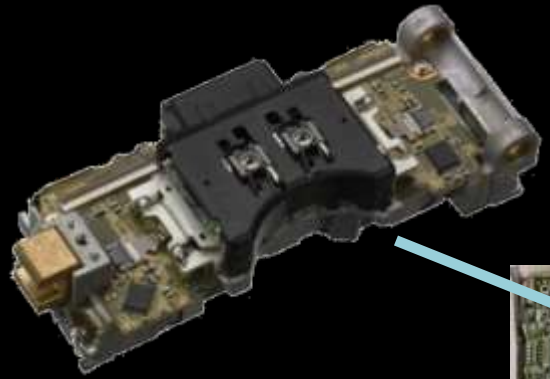
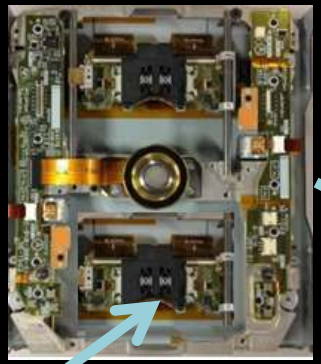
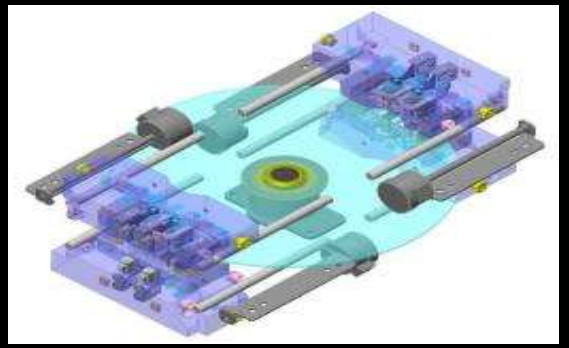
Gen 2 Technical Details – Double Speed



ODA Initial design
2 Lasers/Head
1 Head per Drive



Then 2 Heads incorporated into
One Drive = 4 Lasers



Gen 2 = Dual Side in same
Form factor = 8 Lasers

Layer 0
Layer 1

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Customers Examples

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Over 800 Customers World Wide

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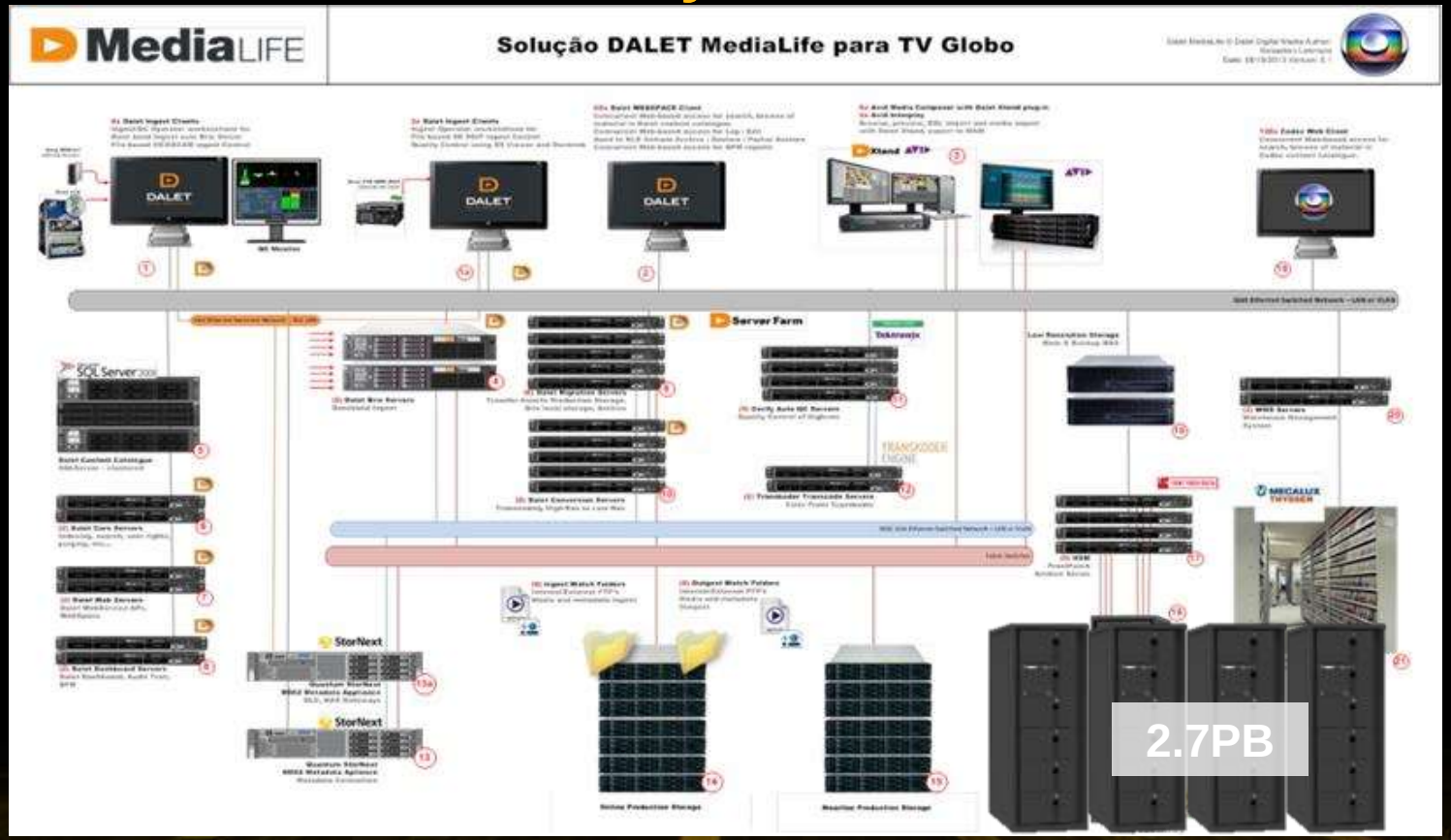
Case Study – Broadcast – TV Globo

TV Globo

Sony is collaborating with Dalet and Front Porch Digital to provide an enterprise MAM (media asset management) solution for TV Globo, who is deploying Optical Disc Archive as their main archive storage format. TV Globo was looking for a **reliable and long lifetime media to archive their valuable entertainment programs** such as novellas, series and shows.

Case Study – TV Globo



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Case Study – Historical Archive The Golf Channel

"The archive is in active use because projects, such as an upcoming three-part series on Arnold Palmer, make use of material shot decades ago. As we looked to reinvent our archive, we wanted something that we could access very quickly and on a regular basis."

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Case Study – Sports Archive

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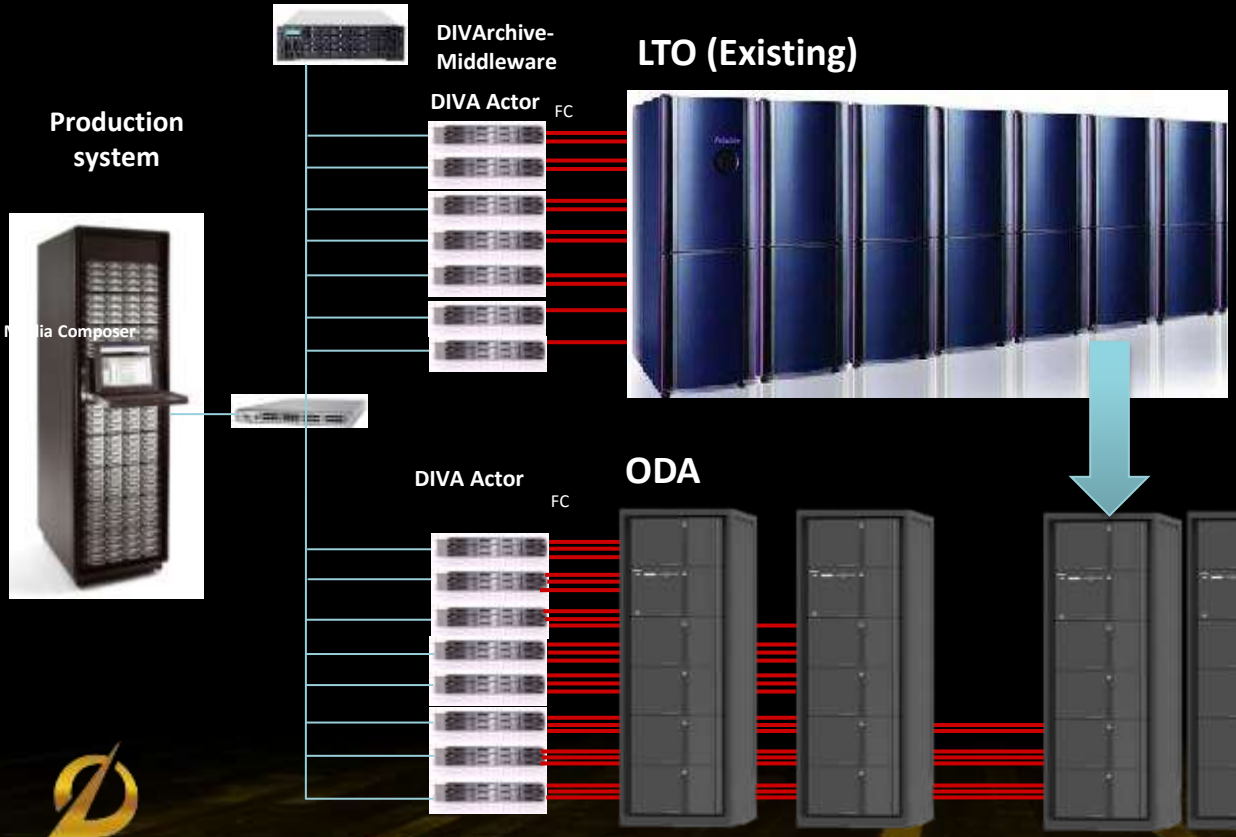

- LTO and ODA hybrid operation managed by Middleware
- Gradual migration from LTO to ODA
- Started operation from March 2014
- Expanding April 2015

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Case Study – Historical Archive The Vatican

Menu

CENTRO TELEVISIVO VATICANO

"Video footage of special moments in the lives of the Popes are among the Vatican's most precious assets" "Thanks to Sony technology these irreplaceable records will soon be **safer and more easily accessible than ever"**

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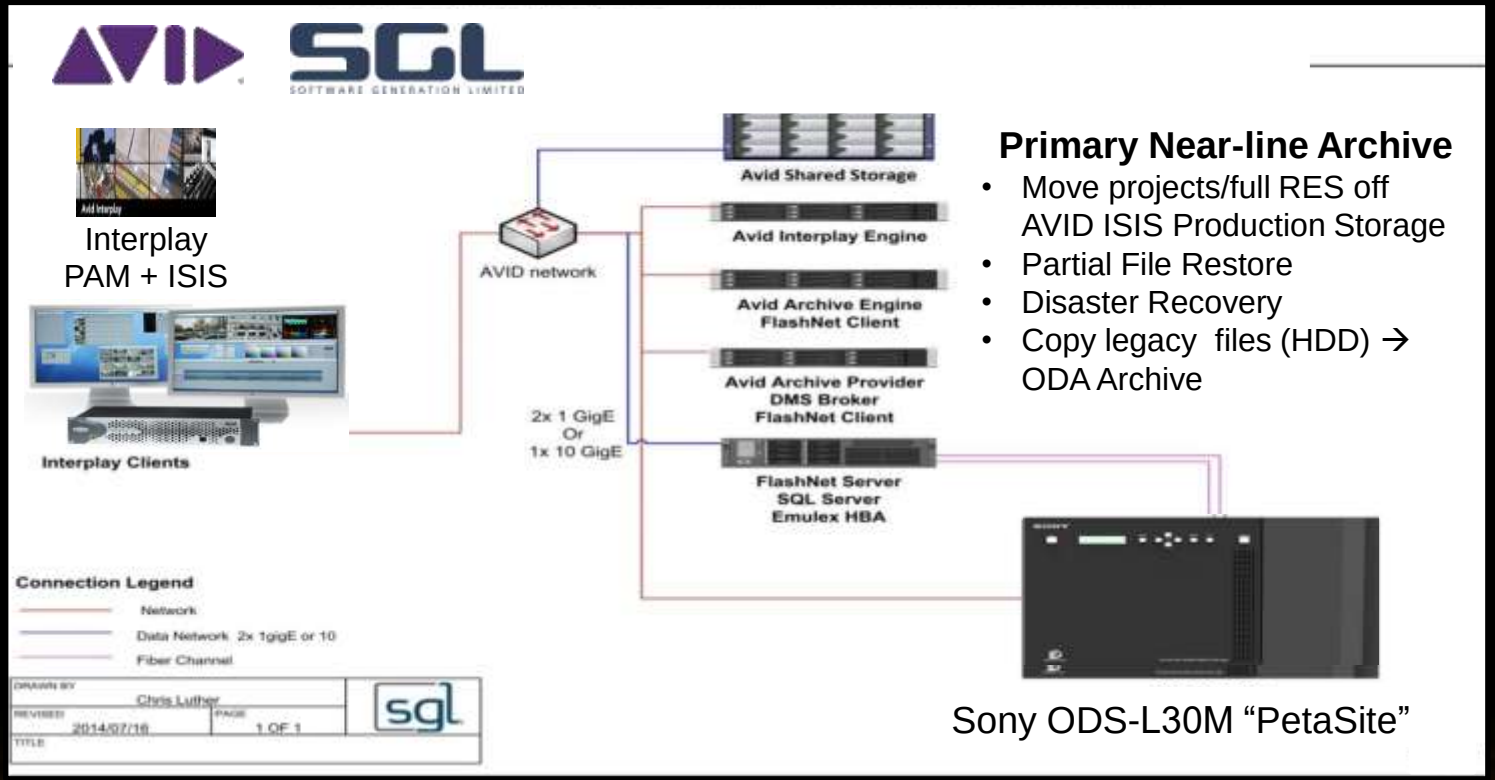
Case Study – Comcast Production Operations



Primary Near-line Archive

- Move projects/full RES off AVID ISIS Production Storage
- Partial File Restore
- Disaster Recovery
- Copy legacy files (HDD) → ODA Archive

Sony ODS-L30M “PetaSite”

How ODA works

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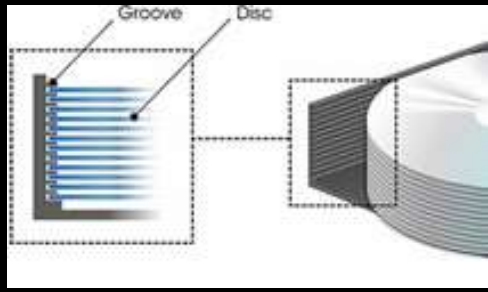
Make up of the Cartridge



- 12 x Blu-ray disks or 11 x Archive disks
- Disks never touch other disks ever
- Media never comes in contact with user
- No UV pollution as sealed closed case
- Only use High grade media

Disk top comes part in drive unit then push's the disk into the laser unit, on eject media is reset and top resealed

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Cartridge Memory

Menu

RFID tag is inside a medium cartridge.

8KBytes

Medium Information

System Information

Free Area

- Written by medium manufacturer.
- e.g. Medium type, serial number, …

- Written by drive firmware or file system driver.
- e.g. Volume label, medium life management information, …
- 32 bytes of BARCODE information can be used by application.

- Reserved for PC/Smartphone application use.
- Approximately 5KBytes of size.

Cartridge Memory

which is a RFID device conforming to ISO15693.

Cartridge Memory can be accessed by;

- Drive Unit.

Host PC application can access it via SCSI Interface and File System Driver API.

To easily use, the SDK is planned to be provided.

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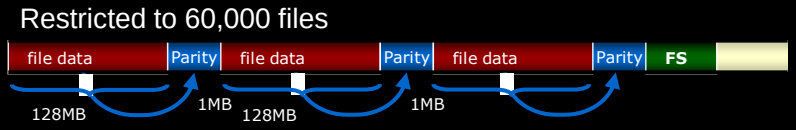
Robust - Lowest error rates



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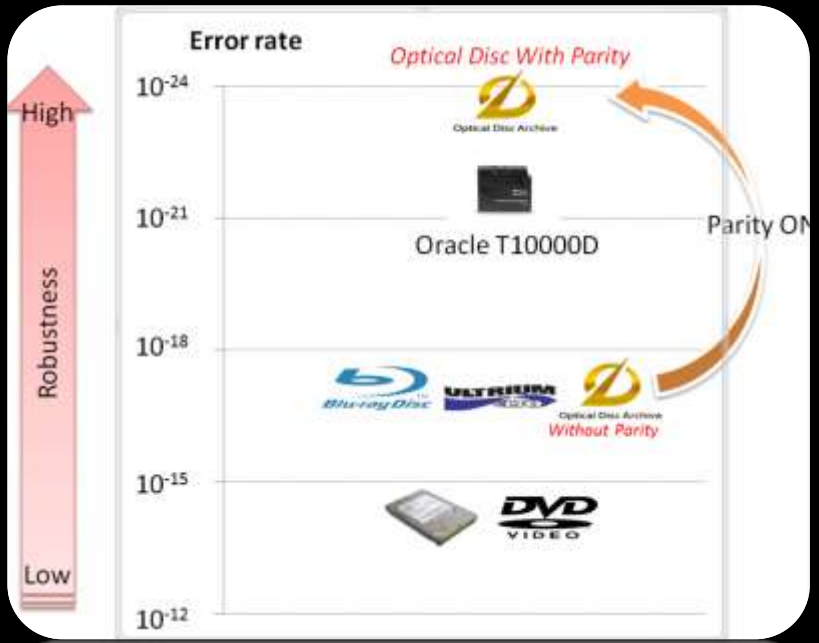

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How it writes on the disk

Data are recorded sequentially on a disc.

1. Just formatted.

ROOT

Initial FS (file system) data are written.

2. Put one file.

ROOT
File-1

The file data followed by updated FS data are written.

3. Put other two files.

ROOT
File-1
File-2
File-3

No FS data is written between the files written consecutively.
(within 5 sec.)

4. Delete File-1.

ROOT
~~File-1~~
File-2
File-3

Only the file system data are updated.
The deleted file data still remains, but is not referred by the updated FS.
Available capacity is NOT increased at this time. Need to be re-formatted.

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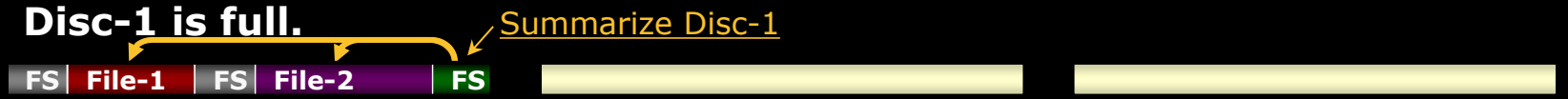
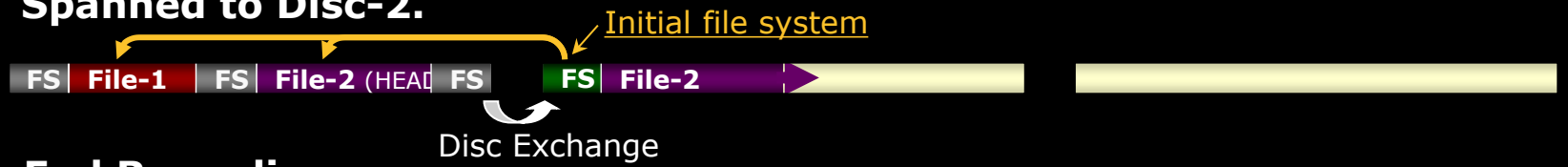
A file can be spanned across multiple discs.

1. **Begin Recording.**

2. **Disc-1 is full.**



3. **Spanned to Disc-2.**



4. **End Recording.**

Real-time application should consider the disc exchange time for spanned file.

Optical Disc Archive

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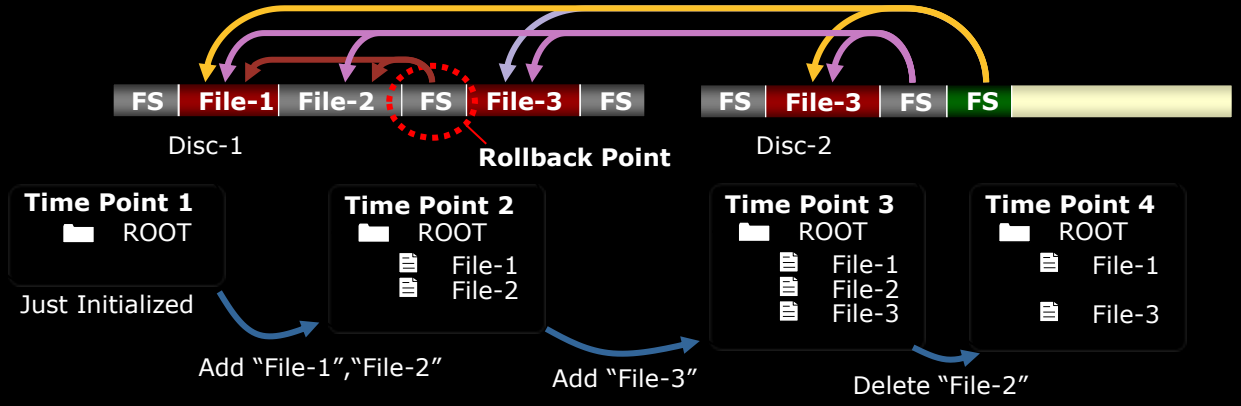
Rollback

By using ODA utility, the file system can be rolled back to arbitrary point in the past.

On the sequential recorded medium, the file data and the FS data once written are not removed physically.

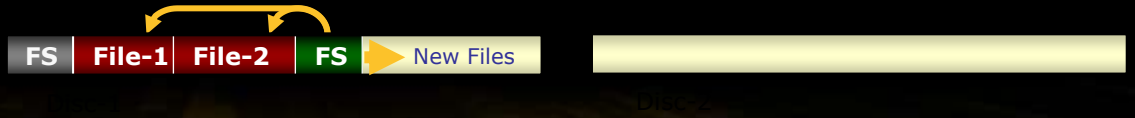


Rollback w/o de-allocate (WO/RE)

- Free space is NOT regained.
- "Undo" or "Redo" operations are available.

Rollback w/ de-allocate (RE only)

- Free Space is regained.
- "Undo" or "Redo" operations are NOT available.



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Cartridge line-up

300GB	ODC300RE	RE	SL(25GB) x 12
	ODC300R	R	SL(25GB) x 12
600GB	ODC600RE	RE	DL(50GB) x 12
	ODC600R	R	DL(50GB) x 12
1.2TB	ODC1200RE	RE	TL(100GB) x 12
1.5TB	ODC1500R	R	QL(128GB) x 12

R: Write Once
RE: Re-Writable

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Transfer Rates – ODS-D77U and ODS-D77F Drives

Media Type	Cartridge Model	Capacity	Write (Write w/o verify) (MB/s)	Read Mbps (MB/s)
Write Once	ODC-1500R	1.5TB	380Mbps (47MB/s) (650Mbps) (81MB/s)	1,170Mbps (146MB/s)
	ODC-600R	600GB	440Mbps (55MB/s) (730Mbps) (91MB/s)	1,070Mbps (133MB/s)
	ODC-300R	300GB	440Mbps (55MB/s) (730Mbps) (91MB/s)	1,070Mbps (133MB/s)
Rewritable	ODC-1200RE	1.2TB	160Mbps (20MB/s) (300Mbps) (37MB/s)	660Mbps (82MB/s)
	ODC-600RE	600GB	130Mbps (16MB/s) (260Mbps) (32MB/s)	1,070Mbps (133MB/s)
	ODC-300RE	300GB	130Mbps (16MB/s) (260Mbps) (32MB/s)	1,070Mbps (133MB/s)

<General Remarks>

- Driver ver. 3.1
- All of ODA performance are average value of whole 1 disc. Read performance are average speed to read 1GB file which is written on the cartridge.
- All these values are raw performance of drive. In case of writing through OS driver, write performance drops maximum 5% from these v
- All these values could be lower based on each drive/disc condition.

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Menu

ODA Hardware Products

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Menu

Media Types

Re-writable

Write Once
for security

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Security - Media Data Recovery

Menu

Included with Sony ODA media is free Data Recovery Service

http://www.sony.co.uk/pro/article/broadcast-products-data-recovery-service

What will Sony do to recover your data?

- We conduct a detailed investigation and report on the causes of unreadable data
- We rescue lost data for professional “non-tape products”
- We help prevent recurring problems by communicating detailed information to the customer
- We educate customers on the best way to look after and handle their media to avoid data issues
- We provide free advice and skills to help professionals protect their content

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Menu

Hardware for the media

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ODS-D77U Stand Alone Drive Benefits

Simple Customer Install
(Plug-In USB3)

Quickly find and retrieve your archived content
Simple To Find / Retrieve Content

Basic Driver

FL

Windows, Mac OS
And Linux driver

More feature Rich Archive
See existing library for Online and offline disks
Proxy, Metadata

CONTENT MANAGER

Explorer / Mac Finder/ Linux

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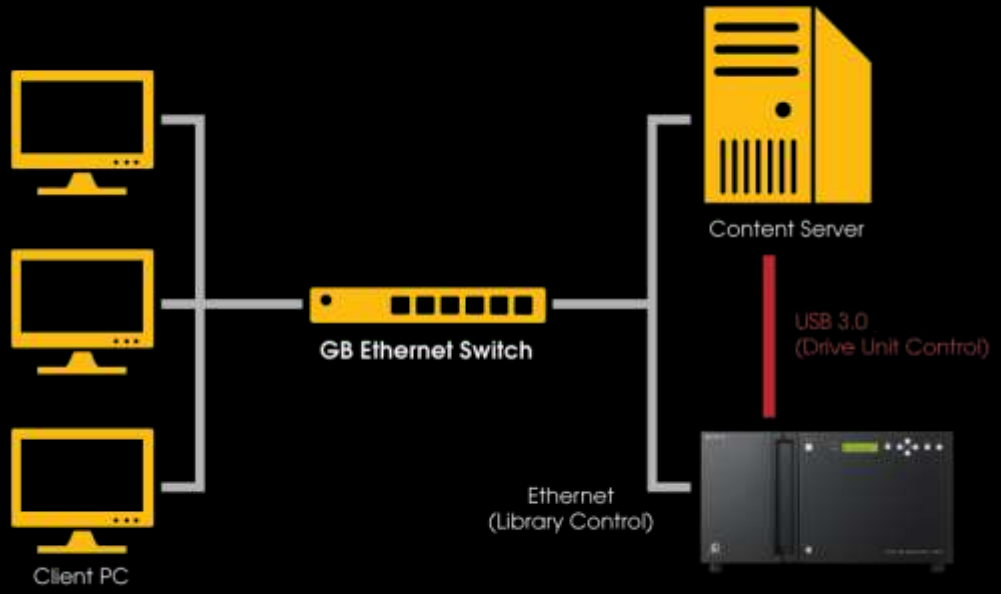
Small Robotics

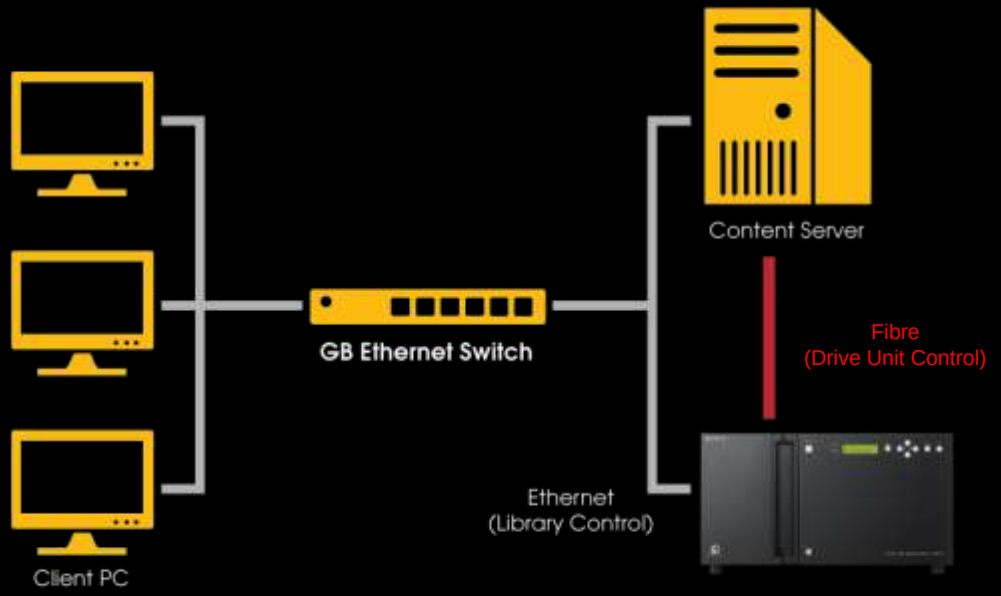
ODS-L10



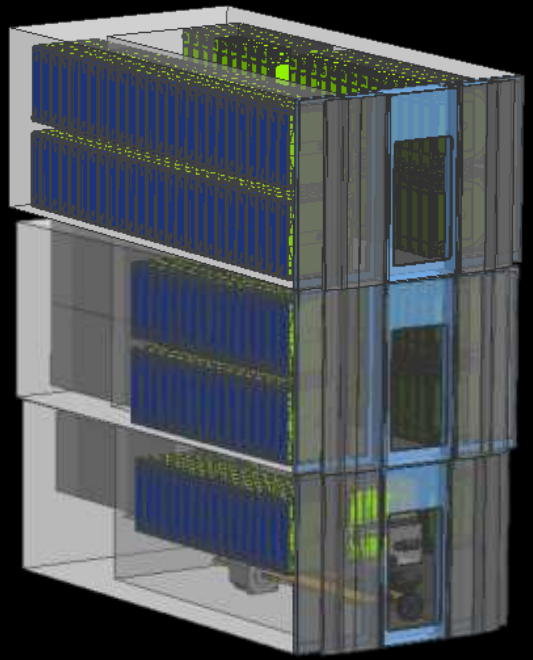
Small Robotics

ODS-L30M/3 - Up to 2 drives
30 cartridge slots – 45TB

Refreshed for FY15 for cheaper entry price for archiving



Scalable Robotics



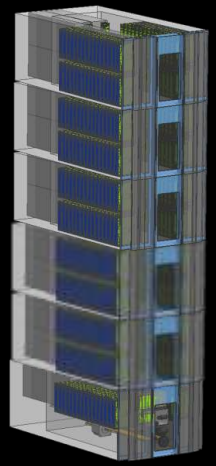
Add five extenders to Main Robot

Any combination of
ODS-L60E: 61 cartridges and up to 4 drives
ODS-L100E: 101 cartridges

ODBK-103: Electronics for Main Robot to accept extenders

ODS-L30M/3 - Main Robot
Contains 30 cartridges and up to two drives

Scalable Robotics – for your needs

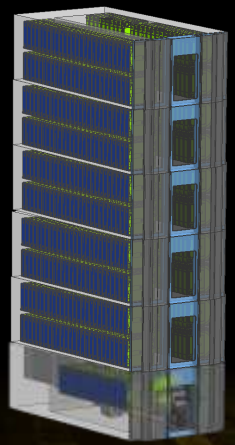


Need Performance?

ODS-L30M and 4x ODS-L60E + 1x ODS-L100

Max of 18 drives gives:

- Read over 205 TB per day
- Write over 129TB per day



Need Capacity?

ODS-L30M and 5x ODS-L100E

Max of 535 cartridge slots

- Gen 1 media: Over 800TB
- Gen 2 media: Over 1.6PB

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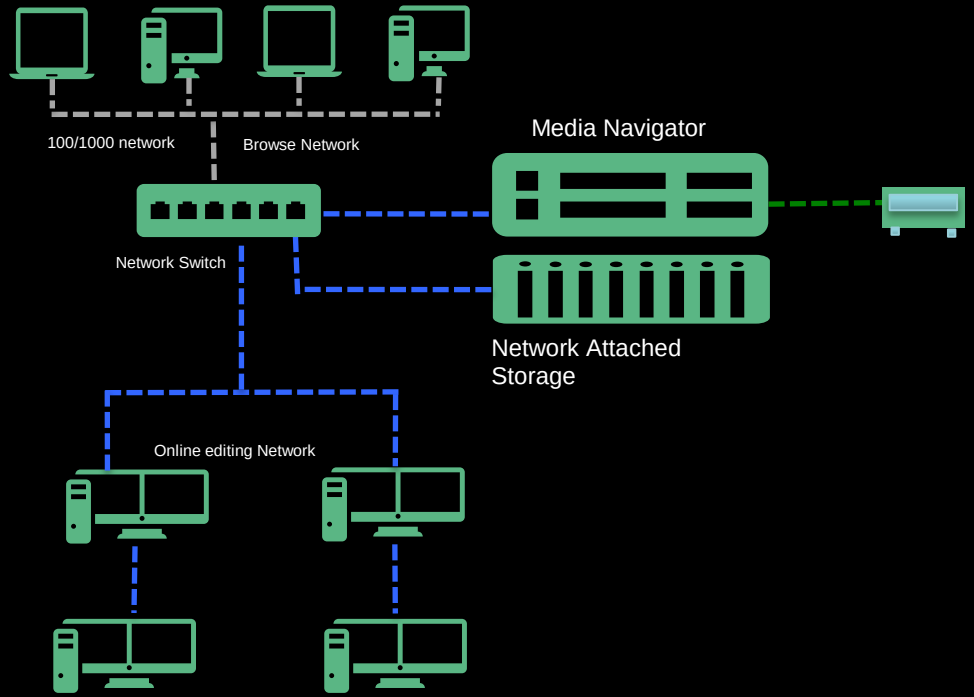
Basic Network configuration of MNV and ODA

Menu



Optical Disc Archive

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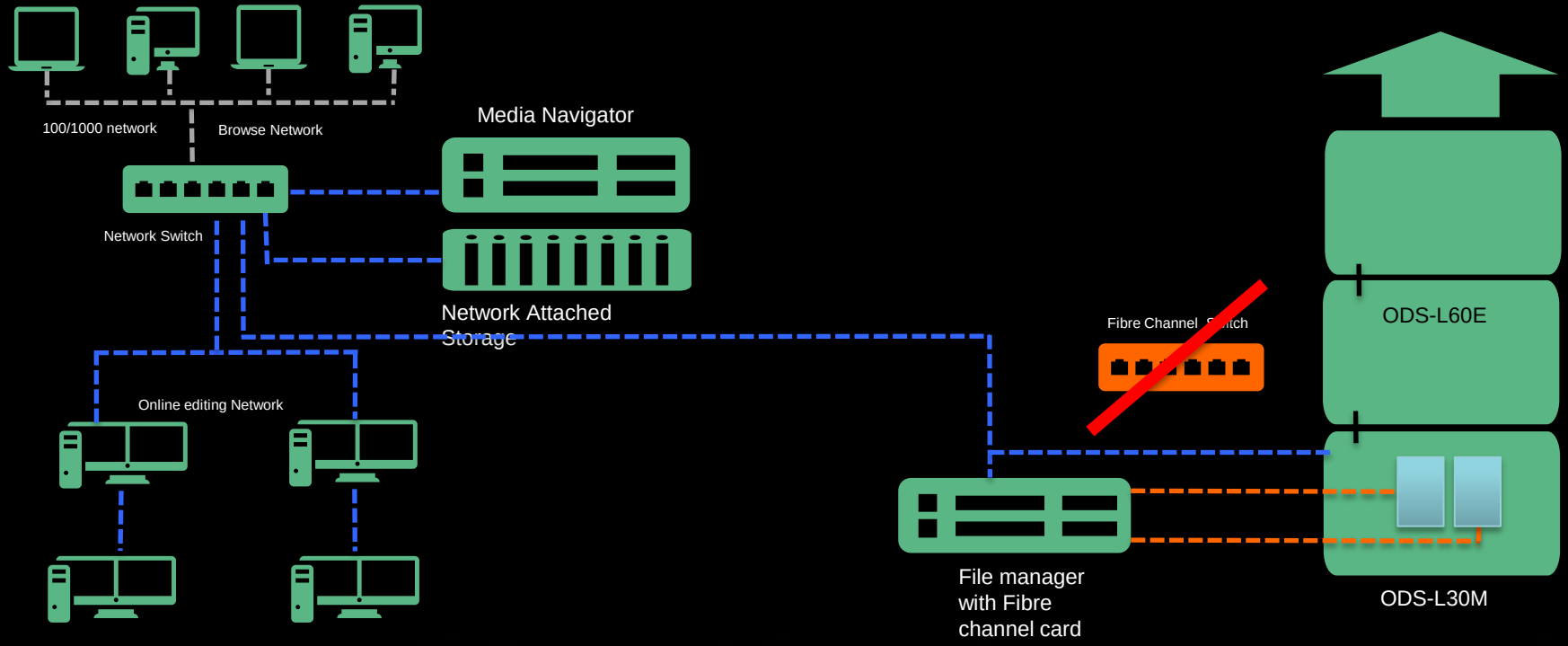
Basic Network configuration of MNV and ODA

Menu



Optical Disc Archive

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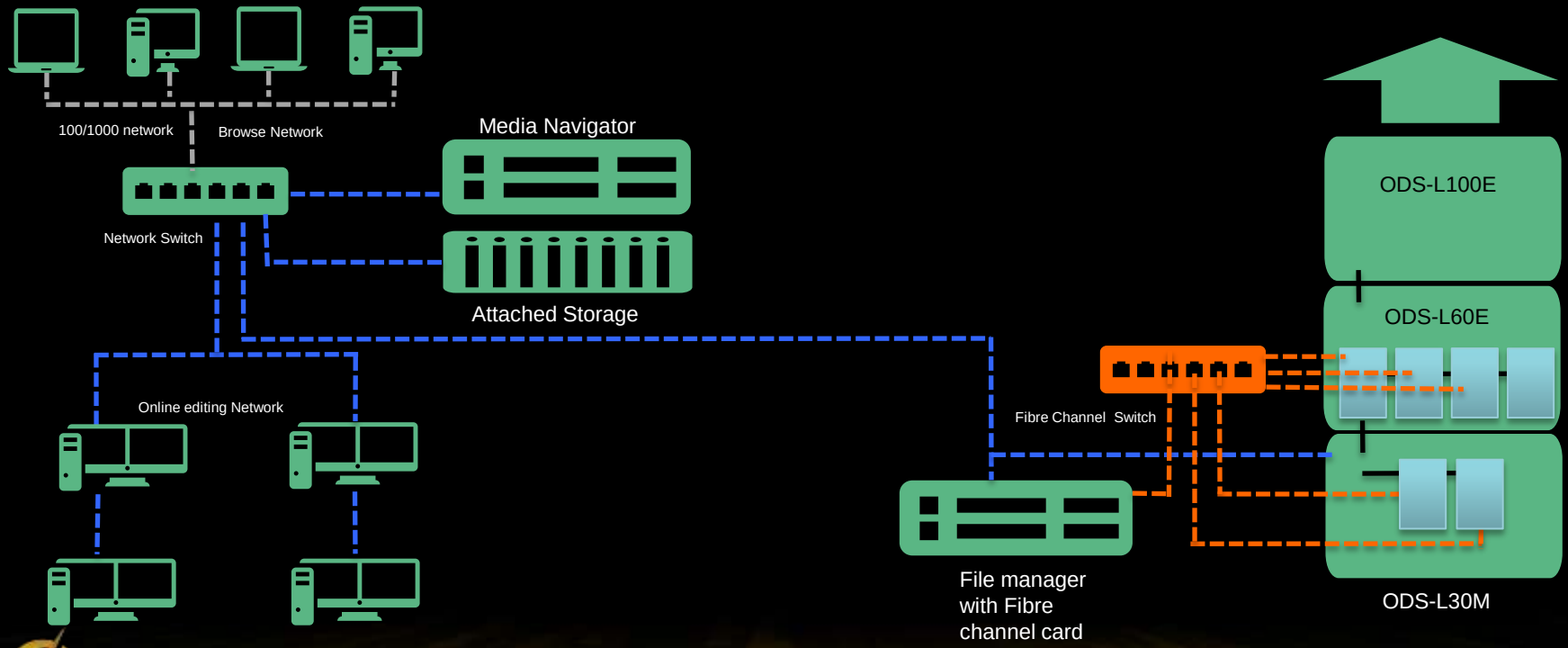
Basic Fibre Network configuration of MNV and ODA

Menu



Optical Disc Archive

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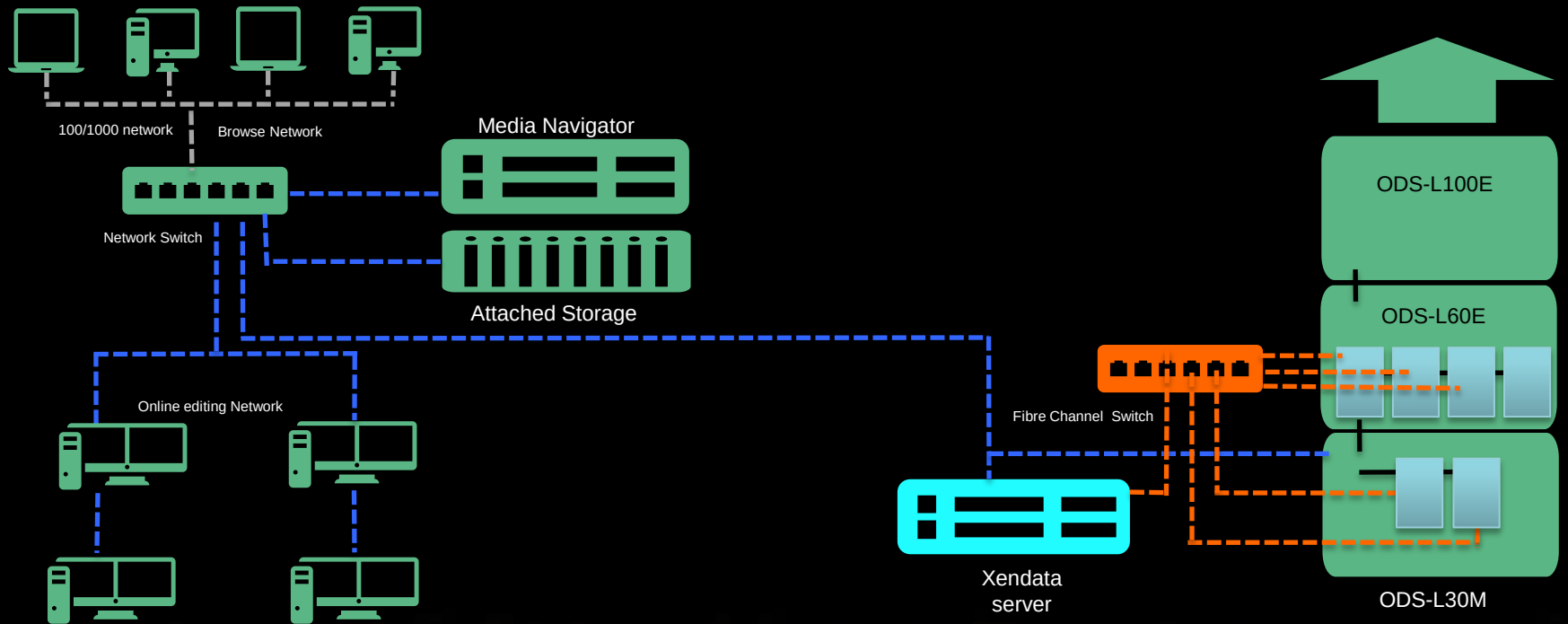
Basic Fibre Network configuration of MNV, HSM and ODA

Menu



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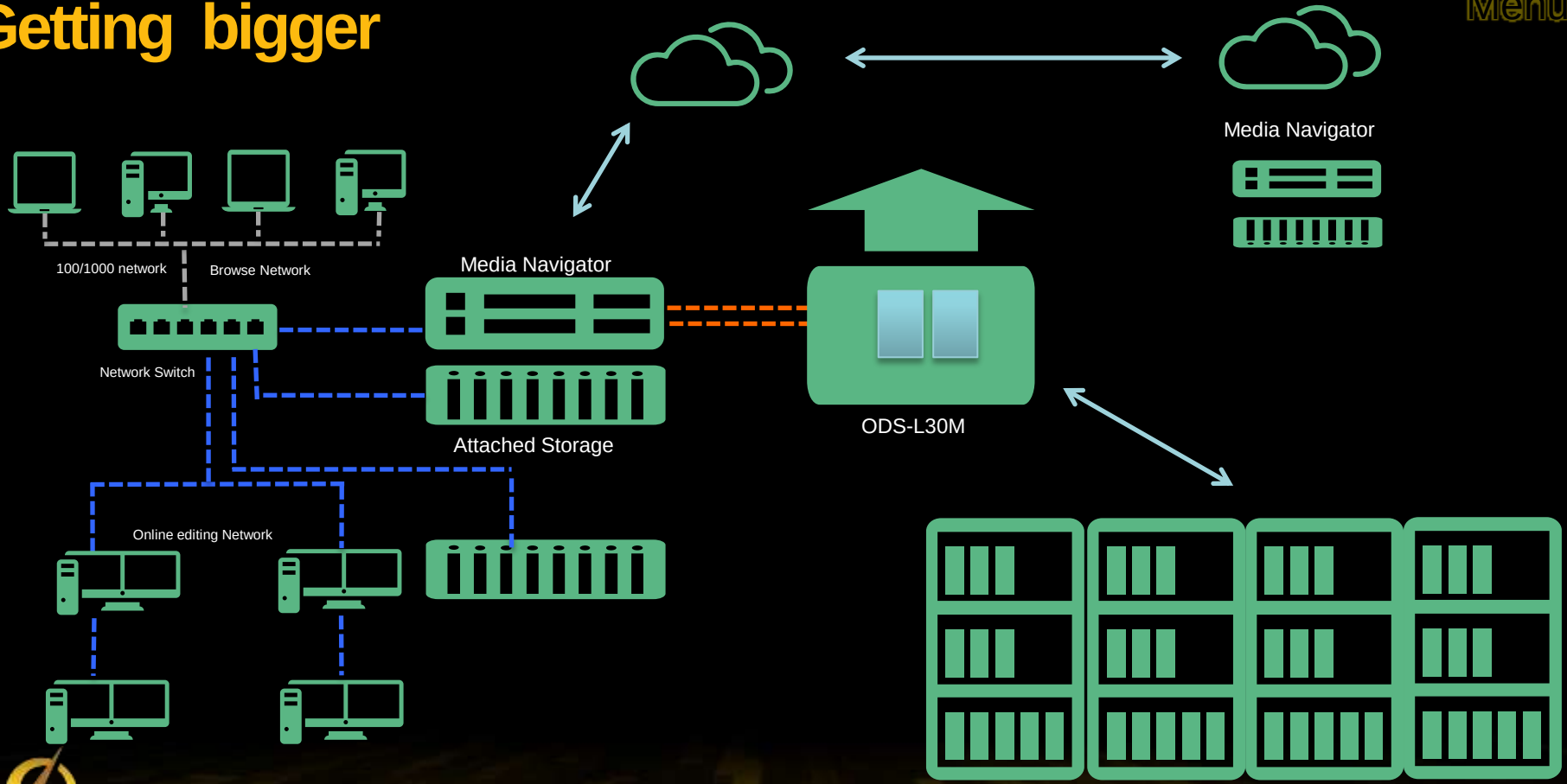
Getting bigger

Menu



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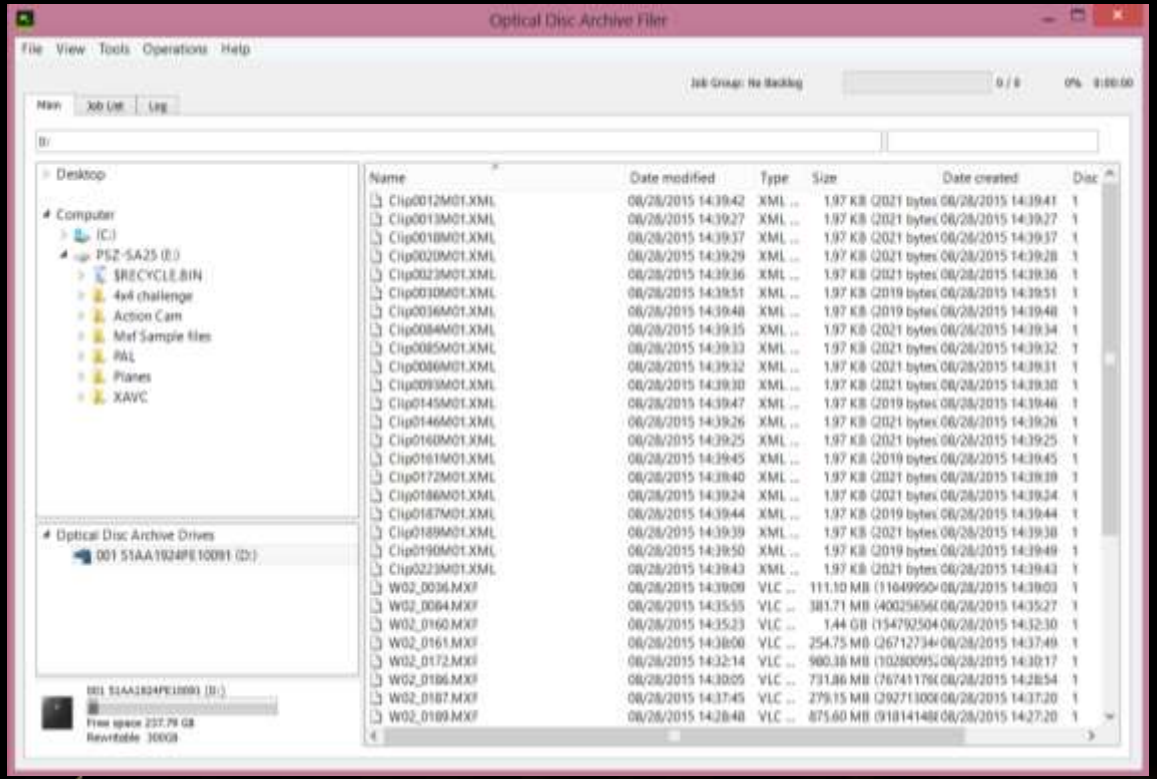
ODA Software Products

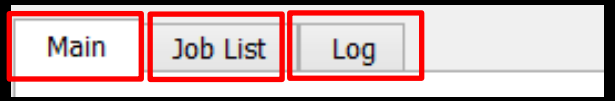
ODA Software for USB Direct Connection

http://www.sonycreativesoftware.com/download/software_for_sony_equipment

Product	Summary	ODA Hardware it supports	What it works with
ODA Drive Utility	Software Driver for the drives and allows basic operations, e.g. formatting media (includes Filer)	All ODA Drives	Windows, Mac, Linux
Filer	Simple tool for copying files to ODA in the most efficient way	ODA USB Drives	Windows, Mac
Content Manager	Managers content with searchable offline proxies that have been added to ODA media, limited network browsing	ODA USB Drives Free with Drive (Normally €200)	Windows, Mac

Filer software





- ODA works with Windows explorer and Mac Finder
- These product don't always tell the full story.
- Filer is designed to give file transfer to and from ODA but control this function beter as it also give you the list of files that are being written and their progress.
- Any problem are noted and logged but the transfer carries on. Unlike the OS file browsers where transfer are stop once you hit a problem

Logs can save and used to verify data transmission

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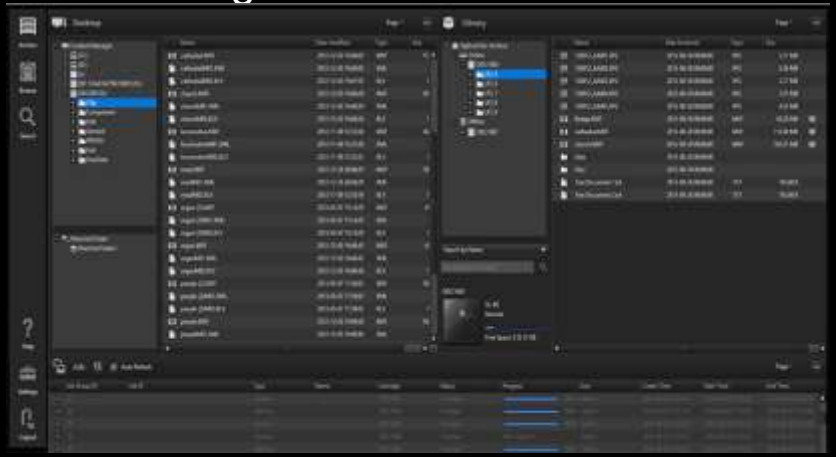
Content Manager

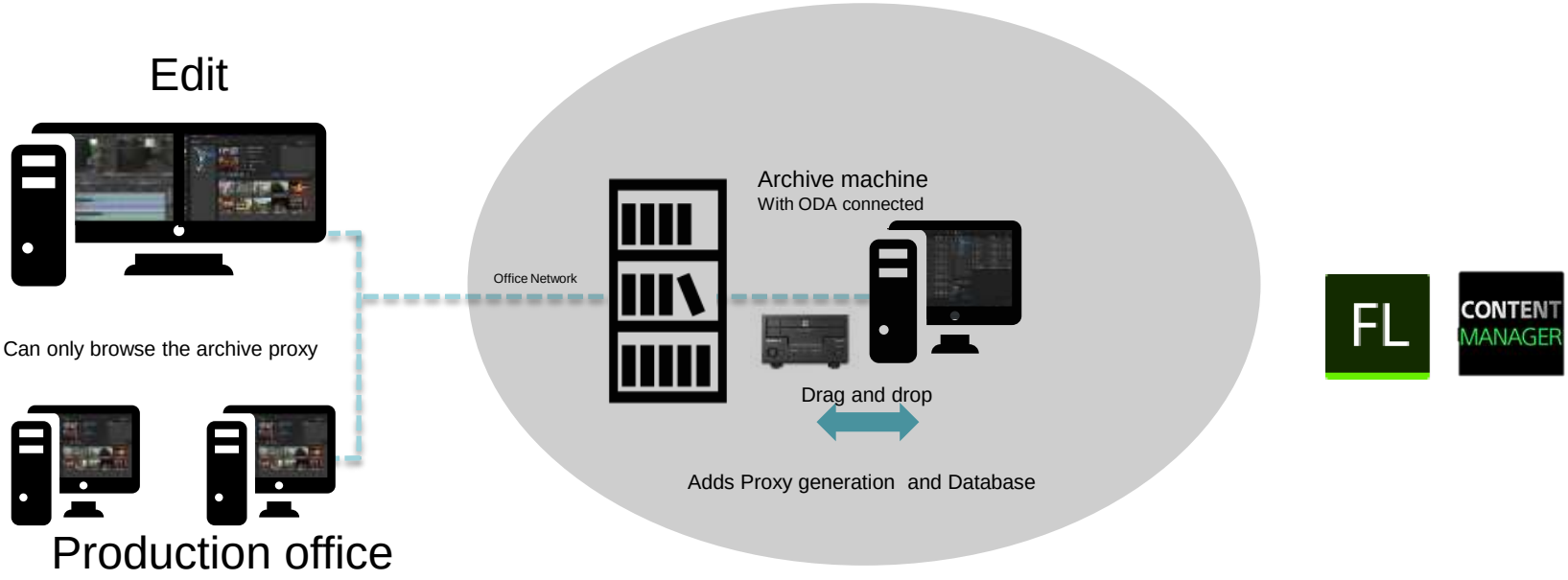
Content management software designed for the Optical Disc Archive System Content Manager.



- Features
  - Archiving audio-visual material to shelf-managed Optical Disc Cartridges.
  - Browsing, searching and retrieving archived contents.
  - Offline cartridge management (including printing labels).
  - Proxy video and thumbnail generation for browsing and searching of shelf-managed Optical Disc Cartridges.
  - Advanced search using speech-to-text script and/or face-recognition data.
  - Support Checksum Archive

Example of use with Filer and Content manager

WIN MAC



- Standalone system
- Library on shelves
- All processes are manual.
- Content manager has basic ability to view archived Disks (video only)
- No network drag and drop

Optical Disc Archive

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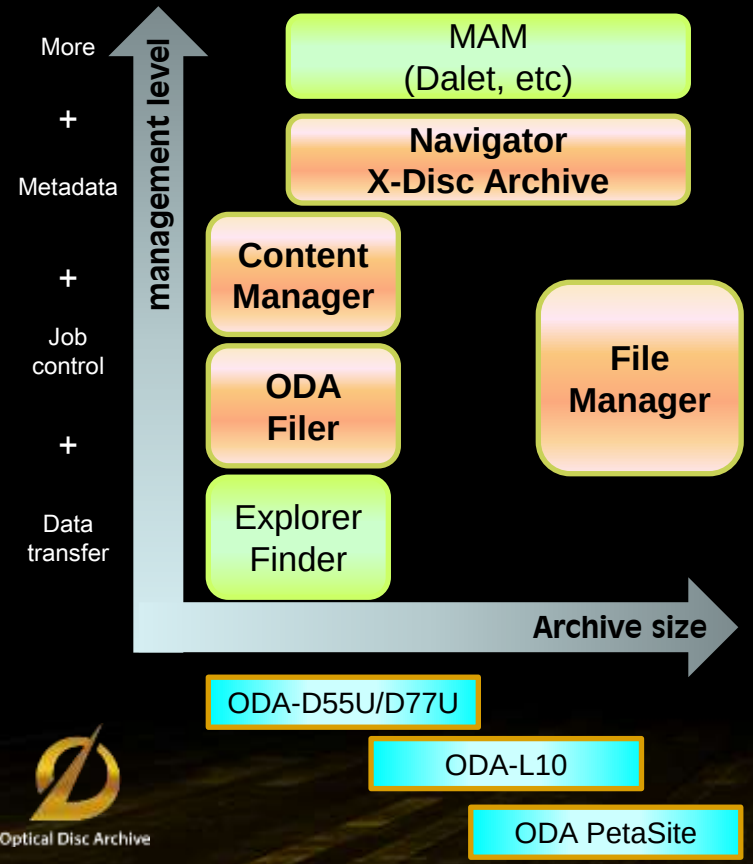
ODA Software for Network Based Workflows

Menu

Product	Summary	ODA Hardware it supports	What it works with
ODA Drive Utility	Software Driver for the drives and allows basic operations, e.g. formatting media (includes Filer) Not with Xendata as loads own driver	All ODA Drives	Windows, Mac, Linux

Product	Summary	ODA Hardware it supports	What it works with
File Manager	Webpage interface to control the library and move content	ODA Libraries	Windows
Web Service for ODS	Command structure for computers to control the ODA library	ODA Libraries	Windows
ODS Plug-in for CatDV	Gives ODA window within CatDV interface	ODA Libraries	Windows

Optical Disc Archive Software - Positioning



	Explorer/ Finder	ODA Filer	Content Manager	File Manager
Price	Free	Free	200 USD Included with each drive	1000 USD
Data Transfer	✓	✓	✓	✓
Job Control		✓	✓	✓
Metadata			✓	✓ (text only)
Hot Folder			✓	✓
Shelf Management			✓	✓
Basic video features (thumbnail, proxy, etc)			✓	
Multi User				✓

Optical Disc Archive

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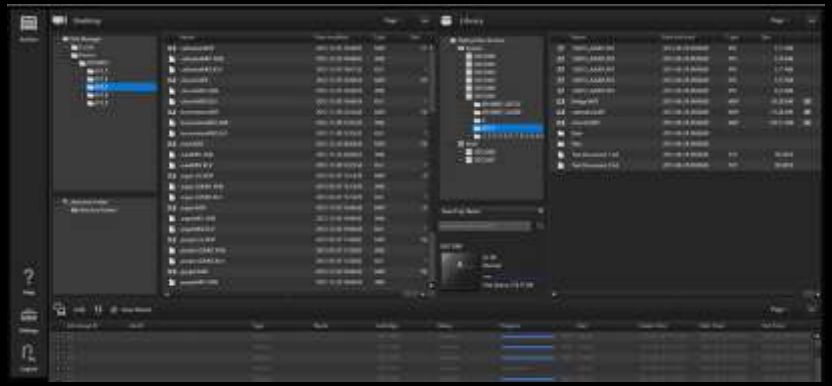
File Manager / Web Service for ODS

WIN MAC

Simple file management software designed for copying file from/to ODA, including library control.

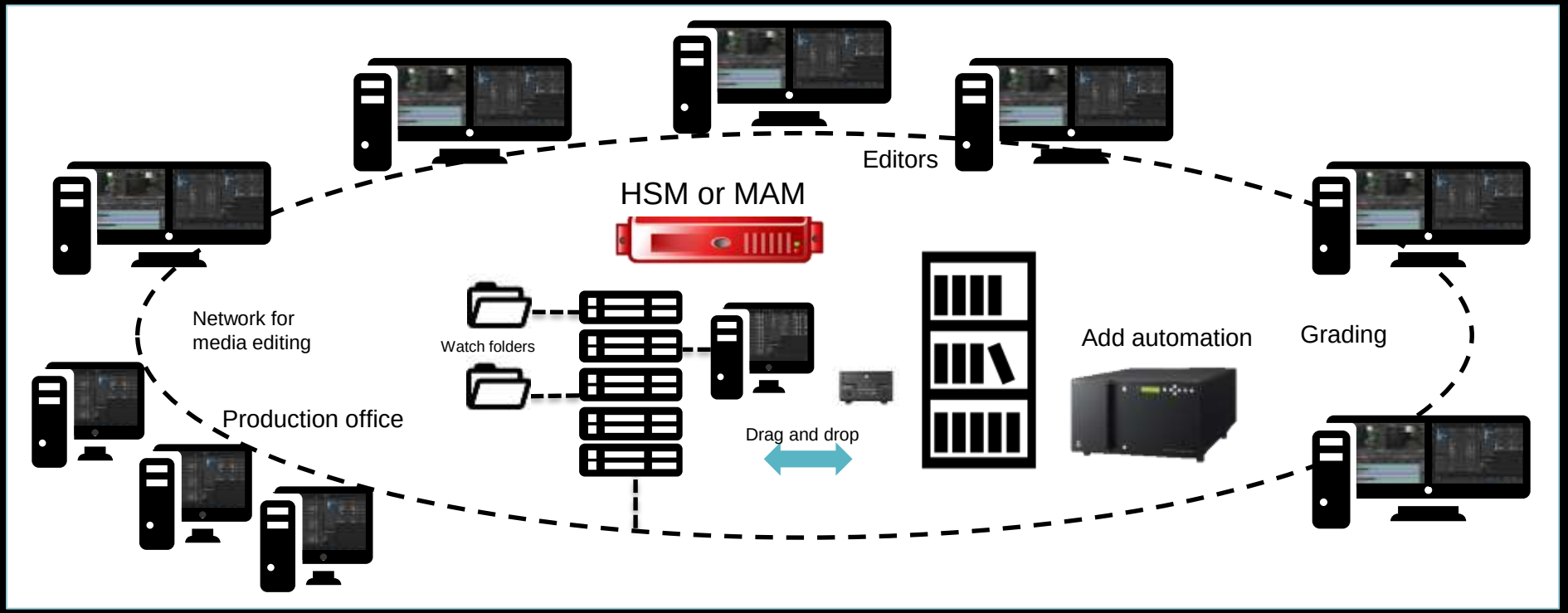
Available for standalone drive, ODS-L10 and ODS-L30M.

“Web Service for ODS” is basically same feature but without GUI.



- Features
  - Drag & Drop Archive operation
  - Watched folder archive
  - Offline cartridge management

Example network systems using File manager or Navigator or HSM



What is a HSM or MAM

File Manager is Sony's Network Interface. However if people want more complicated system using HSM or MAM systems

HSM (Hierarchical Storage Management) is policy-based management of file backup and archiving in a way that uses storage devices economically and without the user needing to be aware of when files are being retrieved from backup storage media.

MAM (Media Asset Management) also refers to the system managing all your digital asset from ingesting, transcoding, renaming, adding video metadata, creating viewing proxies, backing up, rating, grouping, archiving, optimizing, maintaining,, and exporting files.

Sony offers to work with partners and provide an 3 different types of SDK to allow partners to access and integrate the library and robots

1. ODA Drive SDK : If you would like to interface to the stand-alone drive (ODS-D77U), ODA Drive SDK will be required.

2. Web Service API: Simple interface with ODA Library (ODS-L10 Juke Box or ODS-L30M scalable library) for quick development. It provides upload/download type of basic file transfer capability to the library. Several medium size MAM partner are using this interface.

3. SCSI Interface: It provide low level control of library robotics. Together with ODA Drive SDK, you can perform full control of the library (ODS-L30M scalable library) through Fibre Channel interface. HSM partner are mainly using this interface

Current Middleware Partners

Media Navigator

Optical Disc Archive

SONY