

Ardis Technologies - manufacturer of the

# DDP - Dynamic Drive Pool

# DDP - Extremely Fast Shared Storage Solutions



DDP is short for Dynamic Drive Pool. DDPs are SAN shared storage solutions using ethernet.



The Ardis Virtual File System (AVFS) is the software engine/metadata controller underneath. AVFS is a scale out high availability (HA) single file system developed in house for Media and Entertainment (M and E) and High Performance Computing (HPC).

# AVFS - Scale out HA SAN File System



To get SAN performance iSCSI is used on Mac, Windows and Linux servers, workstations and desktops.



DDP is optimised for Edit, MAM, PAM, ingest, play out & rendering applications such as Premiere, FCX, Da Vinci Resolve, Edius, Cantemo, CatDV, EVS, Pro Tools, Arri, Softron and Avid Media Composer.

# Unique Ethernet SAN Technology



Hyper DDP 12 D

# Shared Storage: 1GB/s SSD Performance with HD Capacity

HyPer DDP12D, 2U with SSD4, 1TB and HD4, 8TB packs MSRP for 36TB Euro 10:470 or USD 11,425

uro 10:470 or USD 11,425 Now Euro 11.270 or USD 12,285 \* due to extreme SSD/HD price increase \* temporary



- \* HyPerDDP12D comes with dual 10GbE/RJ45 ports and 2 extra PCIe slots for cards
- \* Includes V5 scale out DDP Ethernet SAN software
- \* Modular and capacity and bandwidth expandable within one file system
- \* SSD and HD packs are RAID 5 protected
- \* The HyPerDDP12D has 4 spare slots for additional SSD and HD packs
- \* The HyPerDDP12D comes with 1 year warranty, see Delivery Conditions on www.ddpsan.com
- \* Support can be purchased for 1200,- Euro per year, see Support on www.ddpsan.com
- \* Available desktop drivers are always free. DDP updates are part of a support contract
- \* The DDP components are of the shelf and replacements can be purchased locally
- \* Archiware P5 is installed. Ask your dealer to purchase a license
- \* Scale out shared storage solution for post production
- \* Sliding arms can be supplied for 165,- Euro
- \* Functions with Avid Media Composer, Premiere Pro, FCPX, DaVinci Resolve and MAM

Opramich verbal

Having SSD cache and HD Data Locations has many advantages

- 1 Files transparently can be moved/copied within the HyperDDP12D between cache and spindles without changes to the directory tree.
- 2 Audio, DPX and low bandwidth video formats which give bad performance (seek time issues) with spindles, can be kept or consolidated on SSDs. That way they do not influence the spindle performance of regular video formats.
- 3 If needed you can split copying / rendering from streaming with streaming materials on SSDs to prevent drop frames.
- 4 Because bandwidth of SSDs and spindles add up the DDP has a bandwidth of 1 GB/s plus the spindle bandwidth.
- 5 Files ingested to SSD are duplicated to spindles. The newest files are then on SSD and also on spindles.
- 6 Folder volume files can be pinned to cache.
- 7 Folder volume files can be copied on demand to cache.

The standalone DDP series

# Hybrid

DDPTZD
DDP16D
DDP24D

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	DDP16D base system	DDP24D base system
Content	MB + dual 10GbE/RJ45, dual Xeon, 32GB, LSI raidcard	MB + dual 10GbE/RJ45, dual Xeon, 32GB, LSI raidcard
Maximum bandwidth	2,5 GB/s	2,5 GB/s
Available PCIe slots	6	6
SSD4 or SSD8 packs	SSD4: up to 4. SSD8 up to 2; 1, 2, or 4TB size	SSD4: up to 6. SSD8 up to 3; 1, 2, or 4TB size
HD4 or HD8 packs	HD4: up to 4 HD8: up to 2; up to 18TB	HD4: up to 6. HD8: up to 3; up to 18TB
Ethernet cards	1GbE, 10GbE, 25GbE, 40GbE, 100GbE	1GbE, 10GbE, 25GbE, 40GbE, 100GbE
EX/RAID card	optional	optional
SAS/TAPE card	optional	optional
Other cards	on request	on request
DDP dimensions	43 x 68 x 13,3 cm/17 x 26.8 x 5.2 inch	43 x 68 x 17,7 cm/17 x 26.8 x 7.0 inch
DDP power usage	800W/redundant power supplies (two)	1200W/redundant power supplies (two)
Package dimensions	59 x 88,5 x 43,5 cm/23.2 x 34.8 x 17.1 inch	64,5 x 68 x 41 cm/25.4 x 26.8 x 16.1 inch
Package weight	44 Kg/97 lbs /base system with rails and carton on pallet	47 Kg /103.6 lbs /base system with rails and carton on pallet
Remark	When used with 2 x SSD8 packs F version is recommend	When used with 3 x SSD8 packs F version is needed

1) The DDP base systems are modular Ethernet SAN Shared Storage Servers with the file system and metadata management build in.

2) The supported operating systems are OSX, Windows and Linux. In order to guarantee the highest performance, an iSCSI initiator and AVFS client driver must be installed on each desktop. For clients wishing to use DDP as an NAS, no drivers are required.

# Flash and Spindles: Hybrid

Each DDP can be configured with an SSD pack as cache plus spindles as a larger storage pool. Having a DDP type cache is great for postproduction studios working for clients who may come up with different audio track count, video and film format requirements. No matter these requirement the total bandwidth given is always at your disposal. This is because SSDs can be compared to memory. The preferred method here is that editors ingest, copy, play out and edit to and from the cache with file duplication automatically to the spindles. When a file is no longer in the cache it is taken from the spindles. Spindle performance is optimized as well. When two or more HD8 packs are installed files can be balanced between these packs partly averaging out the spindle seek time problem.



For situations with a lower then 1GB/s bandwidth requirement an SSD4 pack is sufficient. Between 1 and 2GB/s an SSD8 pack is needed. Beyond 2GB/s multiple SSD packs are required. The pack capacity must be large enough so that the materials of active projects can fit in.



Of course any other combination of SSD and HD packs and cards can be selected. Such configured DDP tailored to the studio requirements can be used immediately. Also DDPs can be ordered partly populated so that additional HD and or SSD packs can be added later.



A cache is not the solution for everything. When a company plans to ingest much more data than the SSD capacity has available ingesting directly to the spindles would be a better choice. In that case caching can be from spindles to SSD. In another situation the cache could be used only for audio or DPX with video using spindles predominantly.



Values in the table are minimum values.

With SSD the number of streams of any format can be obtained by dividing 2000 (SSD bandwidth) by the bandwidth of your format. For HD these values depend on audio, video and film formats used.

The mini DDP 24 DF

Flash



The DDP can be filled with up to 24 SSDs, to be delivered in packs of 4 and 8. Per SSD8 pack performance increases with 2,3GB/s on reading. When the miniDDP 24DF is completely filled with 3 x SSD8 packs the performance is 6,9 GB/s. SSD packs consists of 1, 2 or 4TB SSDs. For data protection the SSD packs are configured with RAID5.



The 2U miniDDP24DF is a shared storage DDP base system for SSDs. Its CPUs are specifically selected for very high performance in bandwidth and IOPs. It is developed for M & E companies where a limited number of seats work with very high quality video and film material in the 2K, 4K and 8K domain.

So one miniDDP24DF with 96 TB total (24 x 4TB) can store 84 TB of data because there are then 3 x RAID5 sets of 8 SSDs. 84 TB is sufficient to store 6 hours of uncompressed 8K, 10bit media.

# DDP Cluster 12GB/s

Regarding the DDP Cluster 12GbE/s picture: one of the miniDDP24DF (any one) manages the AVFS file system. AVFS stands for Ardis Virtual File System.

The desktops know where to read from and where to write to and who has access when and how. It could be that the 6,9 GB/s bandwidth is required, but not all that capacity is needed for active projects. In that case 3 SSD packs of 1, 2 or 4 TB SSDs can be selected.

In addition one of the PCIe slots can be used for an EX card to which a DDP16EX or DDP24EX with HD packs, can be connected. The SSDs are then used as a large cache and each file present on the SSDs have a duplicate on the spindles. So when a file is no longer in the cache because it has not been used for a while, the file is automatically taken from the spindles.

The video on our website about the HyPer DDP12D explains how this cache / spindles tiering functions. To extend the SSD capacity of course a mini DDP24EXR can also be connected.



### miniDDP24DF

DDP dimensions DDP power usage Package dimensions Package weight 3 x 68 x 8,8 cm/17 x 26.8 x 3.5 inch 800W/dual power supplies 59 x 85 x 39 cm/23.2 x 33.2 x 15.4 inch 33 Kg/72.8 lbs / on carton pallet with rails



The micro DDP series

# Flash



# microDDPs are small, lightweight and low noise DDPs



There is a 1GB/s and a 2,2 GB/s version. For companies involved in outside registrations – where size and weight matters – the microDDP is a good solution. Also when the company lacks a machine room and is looking for a low noise shared storage server the microDDP is a good fit. Lightweight also means that it can be hand carried and taken as hand luggage on a plane.



MicroDDPs are like all DDPs: Ethernet SAN systems. A DDP SAN utilizes the network most efficiently. Therefore despite the small footprint multiple users can share the highest picture quality used these days. CTOs, Technical Managers, Technicians and other interested in DDP technology please take the time also to read the technology page on our website.



SSDs are small, hardly produce heat, but most importantly they behave similar to memory. So how much material can be stored and how many users are able to work simultaneously? 7 TB effective capacity is enough to hold 70 hours of ProRes HQ or DNxHD220 video material or approximately 300 hours of DNx HD45 or more than 100 hours of Pro Tools 100 track sessions.

There are two microDDP base systems. They can be equipped with one SSD8 pack of 1,2 or 4TB SSDs. Because the SSD8 pack is configured as RAID5 the usable capacity is 7, 14 and 28 TB (total 32 TB). Instead of an SSD8 pack they can also be delivered with a SSD4 pack.



Storage Arrays

Flash & Hybrid

# DDP EX Storage Array Specifications

When a DDP is full and additional capacity is needed or a DDP with only HD packs was ordered and now an SSD pack as cache is required a DDP16EX, DDP24EX, miniDDP24EX and DDP78EXR can be connected after installing an EX card in the DDP first. See the table below for the specifications and options. To setup a scale out cluster to increase bandwidth beyond 6 GB/s and capacity beyond 1PB another DDP can be integrated as well.



# miniDDP24EX

miniDDP24EX base system Connection type 1x SAS Expander SSD4: up to 6. SSD8 up to 3; 1, 2, or 4TB size SSD4 or SSD8 packs HD4 or HD8 packs **DDP** dimensions 43 x 53.4 x 8.8 cm/16.9 x 21 x 3.5 inch DDP power usage 549W/ two, redundant Package dimensions 59,6 x 78,5 x 37,8 cm/23.4 x 30.9 x 14.9 inch Package weight 23 Kg/50.7 lbs /base system with rails and carton on pallet Remark connected to standalone DDP via EX card in DDP



# DDP78EXR

DDP78EXR base system
2x SAS Expander
SSD4: up to 4. SSD8 up to 2; 1, 2, or 4TB size
HD4: up to 4. HD8: up to 2; up to 18TB
43,4 x 97,5 x 17,6 cm/17 x 38.4 x 7 inch
1600W/ two, redundant
67,5 x 112 x 54 cm/26.6 x 44.1 x 21.1 inch
57,7 Kg / 121.1 lbs /base system with rails and carton on
pallet
connected to standalone DDP via EXcard in DDP



DDP16EX

Connect SSD4 or HD4 or H DDP dim DDP pov

Package

Package

Remark

# DDP16EX

6EX	DDP24EX
base system	DDP24EX base system
der	1x SAS Expander
. SSD8 up to 2; 1, 2, or 4TB size	SSD4: up to 4. SSD8 up to 2; 1, 2, or 4TB size
HD8: up to 2; up to 18TB	HD4: up to 6. HD8: up to 3; up to 18TB
2  cm/17  x 21  x 52  inch	43 x 53 4 x 17 4 cm/17 x 21 x 6 9 0 inch

ion type	1x SAS Expander	1x SAS Expander
SSD8 packs	SSD4: up to 4. SSD8 up to 2; 1, 2, or 4TB size	SSD4: up to 4. SSD8 up to 2; 1, 2, or 4TB size
ID8 packs	HD4: up to 4 HD8: up to 2; up to 18TB	HD4: up to 6. HD8: up to 3; up to 18TB
ensions	43 x 53,4 x 31,2 cm/17 x 21 x 5.2 inch	43 x 53,4 x 17,4 cm/17 x 21 x 6.9.0 inch
ver usage	549W/redundant	549W/ two, redundant
dimensions	59,6 x 78,5 x 44 cm/23.5 x 30.9 x 17.3 inch	59 x 85,1 x 47,8 cm/23.2 x 33.5 x 18.8 inch
weight	29,8 Kg/65.7 lbs /base system with rails and carton	34 Kg /75 lbs /base system with rails and carton on pallet
	on pallet	
	connected to standalone DDP via EX card in DDP	connected to standalone DDP via EX card in DDP



Single File System No matter what storage configuration is chosen



Quota Management Capacity is managed by quota



Security DDP uses HTTPS and two factor authentication via the web interface

DDP 10 EF - extreme fast



# DDP10EF: 1U, 19", 30GB/s shared storage for 8K DPX and all other formats

The DDP10EF is for companies looking for shared storage for workstations working with up to 8K uncompressed material (up to 10GB/s). Protocols which can be used are NVME-oF/RDMA, iSCSI and SMB.

The DDP10EF base system is a 1U Base system. EF stands for Extreme Fast because it combines the use of NVME Flash memory with fast CPU's. The DDP comes standard with one PCIe, Gen 4 x 16 full length slot, two AIOM slots for ethernet cards and 10 x 2,5" NMVE carriers.

The bandwidth of the system scales approximately linear with the number of NVME SSD's with Raid 5 up to total 30GB/s on read and up to 6 GB/s on write given the proper CPUs and cards. Bandwidth per desktop on Linux and Windows can be up to 10GB/s when using NMVE-oF/RDMA. When using the iSCSI protocol bandwidth on read is up to 3 GB/s. The SSD's are raid 5 protected. So the capacity is the number of SSD's -1.

The base system can be delivered with an SSD4, SSD8 or SSD8+2 pack with SSD capacities of 960GB, 1.92TB., 3.84TB and 7.68TB each. For higher capacities please ask us.



The 2 AIOM slots can optionally be equipped with	with use case bandwidth per port:
dual port 10GbE RJ45	750 MB/s
dual port 10GbE +	750 MB/s
dual port 10GbE SFP+	750 MB/s
dual port 10GbE/SFP+ and RJ45	750 MB/s
dual port 25GbE/SFP28	1,75 GB/s
dual port 100GbE/QSFP28	7,5 GB/s



The one PCIe slot can optionally be equipped with an EX card or a single or dual ethernet card, 10, 25, 40, 56, 100 or 200 GbE. With the 200 GbE port the use case bandwidth per port is 15GB/s.

	Add-on Card Slots
1	RAID Card
2	PCle 4.0 x 16 slot full-height, half-length (CPU2)
A 1	PCle 4.0 x 16 OCP 3.0 AIOM slot slot (CPU1)
A 2	PCIe 4.0 x 16 OCP 3.0 AIOM slot slot (CPU2)

# Hybrid DDP10EF

To use the DDP10EF as extreme performance file based cache system in combination with spindles in the PCIe slot an EX card can be installed. A DDP16EX, DDP24EX and / or DDP78EXR can then be integrated.

These storage arrays can be equipped with 2, 4, 6, 8, 10, 12, 14, 16 and / or 18TB spindles.

An EX card is necessary to connect the arrays to the DDPEF base system. The EX card must be placed in the available PCIe slot.

It is advised to use the flash in the DDPEF as cache. In that case the system delivers NVME SSD performance with HD capacity.

And further ...

### Adding a new DDP to an existing one and continue as is.

A DDP customer in the Asian part of the world uses DDP since 2012 and renewed in 2018 with a DDP48D. Towards the end of 2019 they extended the DDP48D with a DDP60EXR. Because that capacity towards the end of 2021 became full again the decision was made to expand with a DDP cache and additional DDP storage. So Ardis Technologies supplied a miniDDP24-DF, a miniDDP24EX and a DDP78EXR. In 2018 they had a total capacity of around 200TB which grew to 560 TB a year later and is now roughly 1.3 PB.

The plan was to connect the DDP48D and DDP60EXR together with the mini-DDPs and DDP78EXR into a DDP cluster. That way there is only one web interface to consider and all operators can still use the single AVFS directory tree they have been using for years now. It is just that they need more bandwdith and capacity. There was ample time to install but due to the tremendous efforts of all involved around Christmas/New Year the DDP cluster could be used for the

scheduled event immediately after installation.

### In line auditing standard in the DDP

We all experience the increasing vulnerability of our infrastructures. Problems can come from outside and from inside. There are software, settings and trainings which can be used to prevent a security breach from happening and there is software which can be used to locate the offender: auditing. The auditing software on the DDP or AVFS products can be used to check at regular times if anything irregular happened and it can be used to monitor the activities during. Which mechanism one prefers is a company decision. The following actions can be monitored:





## DDP Cluster 12GB/s

- 1. The day and start time of connections
- 2. The name of the folder volumes
- 3. The user which has logged on
- 4. The user actions on file and folders
- 5. The file path
- 6. The from/to day and time
- 7. The day and end time of connections



### More security features

The DDP comes with more security features. There is the possibility to use HTTPS and two factor authentification. Also Debian 10 is used as Linux operating system. HTTPS can be used with the default self signed certificate or using an officially signed certificate added by the company. The two factor authentification option is available in the User page but the implementation must be a combined effort of Ardis Technologies and the company. Companies requiring encryption can opt for a DDP solution with in line encryption for the DDP for one, more or all Data Locations using self encrypting HDs and or SSDs.



### **Other features**

- Native SMB support
- Native Archiware backup, archive and synchronization support
   Native Avid Media files directory support

# Our Technology Additional of the second seco

### DDP uses a single file system



The name on the top right on the home page shows DDP Volume. That is the name of the single file system. It is developed in house especially for M & E.

The single file system has one directory / folder tree, which is also shown on the right. The file system handles all metadata and is separate from the media.

### How and where is the media stored?

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Media is stored as raw data in data containers called Data Locations (DL). One or more raid or drive sets can be a Data Location.

Data Locations can be found at the bottom left. The file system controls on which Data Location a file is stored.

### How do desktops access the DDP?

Desktops access Data Locations in parallel. Data Locations are mounted using iSCSI and show up as volumes, called folder volumes. Folder volumes are folders given volume properties.

The more Data Locations the higher the bandwidth.

AVFS is a scale out file system, because capacity and bandwidth can be increased separately.

### How about access rights?

In M & E access right per user or group and per file is not necessary. Therefore user/group credentials are selectable per directories/folders. These credentials can be set in the Edit Access page on the DDP. User names can be entered manually or can be obtained and synchronized via Active or Open Directory or LDAP. The credentials of the AD, OD, LDAP users/groups are checked against AD, OD and LDAP.



The DDP web interface

### Cache Storage Manager

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# Why combine SSD and HD packs in the DDP?

SSD's have no seek time. This makes the system bandwidth not depending on files sizes and fragmentation. Having a hybrid system (SSD and HD) combines the best of both worlds: SSD performance with HD capacity.

### How are SSD/HD packs integrated in the DDP?

When an SSD pack is installed its Data Location can be used as file based cache. Files ingested in the cache are automatically duplicated on spindles. So files gone from the cache are taken from the spindles. Internally, transparent for users files can be moved, copied, duplicated, (re) distributed and consolidated between Data Locations in different ways.

The file level cache is a unique feature of the file system AVFS. With this feature one gets SSD performance with HD capacity.

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### How about Quota?

Quota can be set as folder volume property and can be changed dynamically. When files are deleted the capacity released becomes available in general. So no manual shrinking or expansion activity is needed. Every application but especially Avid benefits from this quota mechanism. This is because each folder volume can hold an Avid Media files directory and as such behaves as workspace.

### What about mirroring, backup, archiving, health monitoring and cloud?

The fourth row on the GUI Home page shows the Archiware P5 icon. Archiware P5 is installed on the DDP and comes with a standard AWB100 backup license free of charge. This license can be traded in for other licenses. These can be purchased from your dealer.

DDPs locally or globally can be kept identical (mirroring) using Archiware synchronise. Archiware archive is to archive and restore files to and from spindles, tapes and cloud. Archiware supports the major cloud protocols. Please check www.archiware.com for more information.

The home page contains pages to monitor the health of the raidcard(s) and disks. The IO of the system is monitored in the IO monitor on the left on the Home page. Also the long term history of the IO can be monitored optionally with Nagios. Nagios is also installed on the DDP and is optionally available to monitor chassis components and possibly other devices using SNMP.





### How come DDPs can be clustered?

Different DDPs even of different type and build date can be clustered because the data of each file is contained in a single Data Location within a DDP or storage array.

Because AVFS and data are separate one DDP can have AVFS active while both DDPs provide data.

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DDP Distribution fo USA & Canada	r the Cinesys i.o. Houston HC Tel: 713-272 caspian.bra www.cinesy	Cinesys i.o. Houston HQ - 2119 Union Street - Houston, TX 77007 Tel: 713-272-0732 Toll free: 1-866-905-2050 caspian.brand@ddp-americas.com www.cinesys.io			

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