

# WARP Mechanics® WDS-8460 Ultra-Dense Storage Platform

## Features & Benefits

- Up to 2PB per rack
- Up to 60x HDD, SSD, and NV-RAM modules / enclosure
- Enterprise RAS (reliability, availability, & serviceability)
- Hot-plug drives, controllers, and power / cooling FRUs

## EBOD:

- >10GB/s in dual EBOD SAS controller configuration

## RAID/NAS:

- Dual WARPr RAID/WARPnas controllers
- Up to 24GB/s burst, 12GB/s sustained (dual controller)
- Interface options:  
1/10/40 Gbps Ethernet  
40/56 Gbps FDR

IT architects require much larger building blocks to meet modern data growth rates. To access such giant data sets, storage must also be faster in terms of IOPS and throughput. The WARP Mechanics **WDS-8460** fills these needs in an efficient, cost-effective package.



With up to sixty 3.5" or 2.5" drives per 4U enclosure, this platform is an ultra-dense solution, fitting up to 240TB in a standard 19" cabinet with high-capacity drives, or 120TB of enterprise high-performance SSD.

The platform supports both 6Gb SAS IO modules and intelligent storage controllers. Intelligent controllers include built-in dual 1Gb and 10Gb Ethernet ports and interface options for additional 1/10/40Gbps Ethernet, 6Gb SAS, or 40/56Gbps FDR InfiniBand.

The unit can be configured as an EBOD, WARPr RAID, or WARPnas.

An EBOD allows numerous SAS drives to be shared via SAS expanders. As an EBOD, it may connect to customer-provided servers via 24Gbps (x4 6Gbps) miniSAS ports, or act as an expansion enclosure for other WARP Mechanics products.

The WDS-8460 becomes much more interesting when configured as a WARPr RAID or WARPnas.

WARPr RAID modules support advanced features such as thin provisioning, de-duplication, block-level checksums, copy-on-write, snapshots, replication, and more. WARPnas modules offer the same advanced features as WARPr RAID, with the added benefits of network storage protocols such as NFS, SMB/CIFS, FTP, and iSCSI.

## Example WARPr RAID and WARPnas Configurations

### Deep Archive

- ~240TB raw capacity
- 12x 10Gbps or 20x 1Gbps Ethernet interfaces

### Hybrid Balance

- ~200TB raw capacity – plus 10s of TBs SSD cache & NV-RAMs
- 4x 40Gbps or 56Gbps FDR Infiniband interfaces

### Flash Performance

- ~120TB raw capacity - pure SSD, with optional NV-RAMs
- 4x 40Gbps or 56Gbps FDR Infiniband interfaces

# WARP Mechanics® WDS-8460

## Ultra-Dense Storage Platform

### Technical Specifications



#### Ordering Part Number and Product Description

JPS-080460 • Ultra-Dense EBOD • WDS-8460

#### Scalability/Capacity

Up to 60 drive modules – 240 TB if using 4TB modules. Cascading of enclosures for additional capacity will commonly be limited by the SAS HBA or RAID card used. Practical configurations of 2PB in a single cabinet are possible. Selected system-level configurations have no known upper limit. (Zettabyte range.)

#### Throughput Performance

Theoretically, one chassis with two I/O modules supports a burst rate of 24GBps half-duplex. *Practically*, bandwidth tends to be limited by the installed drive modules. Sustained bandwidth is 8 to 12GBps per system, depending on drives, interfaces, and controller types.

#### Latency Performance

SAS expanders have orders of magnitude lower latency than fast HDD or even SSD modules, and are a second order derivative with respect to IOPS.

#### Dual I/O Controllers

Redundant active/active I/O modules. EBOD: Auto-negotiate data path speeds; in-band management; four 4x6 Gb SAS 2.0 ports (SFF-8088) per controller. WARPr RAID/WARPnas: Per-controller built-in dual-port 10GbE NIC + two PCIe g3 x8 slots, which can accept SAS, FC, IB, or Ethernet cards.

#### Redundant Hot-Swap Components

- Two I/O controller modules
- Two advanced power and cooling modules (APC)
- Two independent AC power inlets
- Up to 60 drive modules

#### Rackmount Enclosure

Dimensions Without Cable Management Arms: 6.90" H x 16.56" W x 35.1" D (175.3 mm H x 420.6 mm W x 891.5 mm D)

Dimensions With Cable Management Arms: 6.90" H x 16.56" W x 39.17" D (175.3 mm H x 420.6 mm W x 994.9 mm D)

Weight without HDDs Single Shipping Pack: 125 lbs (56.8 kg) max

Weight w/ 60 HDDs Single Shipping Pack: 235 lbs (106.8 kg) typical

#### Firmware/Software

WARP Mechanics controller firmware supports SCSI Enclosure Services (SES) 3.0 for in-band management. WARPware hosts include tools for managing firmware and advanced features.

#### Disk Drive Modules

60 independent 6Gbps point-to-point connections to each SAS or SATA drive module with dual-port access and failover by each I/O controller to each drive. SATA drive modules include active MUX for redundant I/O. Form factor: 3.5" HDDs; 2.5" supported for SSDs via adapter. Rotational speeds: 5400 RPM, 7200 RPM, 10K RPM, and 15K RPM.

#### Active Failure Notifications

In-band via SES-3 with EBOD, audible alarms, and LEDs

#### Maximum External SAS Cable Length

Up to 6m. Within selected WARP end-to-end systems, longer distances are supported via SAS switches, or by using WARPware storage clustering heads.

#### Host/Expansion Interfaces

WARPr RAID/WARPnas: 1/10/40GbE, 40/56GbIB, 8/16GbFC.

EBOD: Two SAS 2.0 I/O controller modules per chassis, each with four 4x6Gbps SAS 2.0 SFF-8088 connections. (24Gbps per interface.) SAS ports can be used for host connections or a combination of host and expansion. When used in certain end-to-end WARP systems, they may be connected to SAS switches.

#### EBOD Monitoring and Reporting

Monitoring for temperature, advanced power and cooling modules including blower speed control, disk drives and I/O module(s). In-band reporting of all serial number, part number and revision of each FRU and chassis via SES.

#### EBOD Partitioning / SAS Zoning

EBOD I/O controller modules can be zoned as 1x60, 2x30 or 4x15 via in-band SES tools. (Provided for WARPware hosts.) The two I/O Modules may be configured as redundant or an exclusive Split Bus mode can be set such that 30 HDDs are mutually exclusive to the first module and the other 30 HDDs are mutually exclusive to the second module.

#### Major OEM Hardware Component Providers

Seagate, WD, Intel, and Sanmina-SCI

#### Warranty Information

Standard one year; up to three years via normal renewable support; up to five years for large accounts. Contact us to discuss special requirements.

#### AC Power

Input voltage: Auto ranging, 90-264V AC

Input frequency: 47-63Hz

Power factor correction: Per EN61000-3-2

Input current 14.5A RMS max @ 110 VAC

Maximum system continuous DC output power rating 1200W

Efficiency

- 20% load @ 230V ~ 88%

- 50% load @ 230V ~ 92%

- 20% load @ 115V ~ 87%

- 50% load @ 115V ~ 90%

#### Operating Environment

Temperature: 5° to 35°C

Temperature gradient: 20°C per hour

Relative humidity: 10 to 80 percent (non-condensing)

Humidity gradient: 10% per hour

Altitude: -200 to 10,000 ft.

Shock: 5G at 11ms, 1/2 sine wave pulse

Vibration: 0.15Grms

#### Non-Operating Environment

Transit Non-Operating

- Temperature: -40° to 60°C

- Relative humidity: 10% to 90% (non-condensing)

- Vibration: 0.75G

- Shock: 10G at 11ms, 1/2 sine wave pulse

#### Standards Compliance

IEC/EN/UL/CSA 60950-1, 2nd Edition; RoHS and WEEE compliant; EN55022

:2006 + A1 :2007; EN55024-IT product family for immunity; meets requirements of IEC60331; manufactured under ISO 9002 registered quality system

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