LENOVO THINKSTATION P920, P720, P520, & P520C

# **ONBOARD/INTEGRATED INTEL STORAGE CONFIGURATION**





# Contents

**OVERVIEW** 

SECTION 1 – THINKSTATION P920

SECTION 2 – THINKSTATION P720

SECTION 3 – THINKSTATION P520

SECTION 4 – THINKSTATION P520C

SECTION 5 – CONFIGURING RAID ARRAYS

SECTION 6 – DELETING RAID ARRAYS

SECTION 7 - GLOSSARY

SECTION 8 – DOCUMENT REVISION HISTORY

# Overview

The purpose of this document is to provide guidance for users on how to configure their SATA storage options using the onboard integrated Intel SATA controller in the ThinkStation P520c, P520, P720, and P920. These ThinkStation systems are capable of supporting up to six SATA HDDs/SSDs at Gen3 (6Gb/s) maximum theoretical throughput. It is important to note that only SATA devices are supported with the onboard integrated Intel SATA controller.

# Section 1 – ThinkStation P920

## • Level of Support Summary

Maximum Number of Drives	6
Connection Method	Tool-less FLEX tray blind-mounted to a backplane (BCA). BCA is standard.
Drive Locations	Drives install into HDD Bays via FLEX Tray.
Hardware Required	BCA-S <sup>1</sup> or BCA-P Blind HDD FLEX Tray Assembly
Drive Type Supported (6Gb/s)	3.5" SATA HDD (7200rpm) 2.5" SATA SSD
RAID Level Support	RAID 0 RAID 1 RAID 5 RAID 10
Drive Data Rate	Maximum drive data rate is 6Gb/s.
Drive Bay Configuration	0,1,2 drive bays used $\rightarrow$ single BCA-S with dual blind connect FLEX Trays 3,4 drive bays used $\rightarrow$ dual BCA-S with 4 blind connect FLEX trays.

<sup>&</sup>lt;sup>1</sup> BCA-S comes standard in P920.

### • How to Utilize the Onboard Intel SATA Controller

In the P920 system, drives are always connected through a backplane called Blind Connect Assembly (BCA). When using the onboard Intel SATA controller, up to four drives can be connected to the first (bottom) BCA and up to two drives can be connected to the second (top) BCA. This gives the P920 support for up to 6 drives with the onboard Intel SATA controller via two BCA's.

The red boxes in the diagram below show the active SATA ports that are available with the onboard Intel SATA controller.



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# Section 2 – ThinkStation P720

• Level of Support Summary

"Default" - Manual HDD Connect Option		
Maximum Number of Drives	4	
Connection Method	Manual plug for data and power using standard cabling methods.	
Drive Locations	Drives install into HDD Bays via FLEX Tray.	
Hardware Required	SATA HDD cable(s) HDD Power cable Manual HDD FLEX Tray Assembly	
Drive Type Supported (6Gb/s)	3.5" SATA HDD (7200rpm) 2.5" SATA SSD	
RAID Level Support	RAID 0 RAID 1 RAID 5 RAID 10	
Drive Data Rate	Maximum drive data rate is 6Gb/s.	
Drive Bay Configuration	0,1 drives $\rightarrow$ 1 SATA + 1 dual drop power 2 drives $\rightarrow$ 2 SATA + 1 dual drop power 3 drives $\rightarrow$ 3 SATA + 1 quad drop power + 2 manual FLEX trays 4 drives $\rightarrow$ 4 SATA + 1 quad drop power + 2 manual FLEX trays	

"Optional" – Blind Connect Ass	embly (BCA) using the integrated Intel Controller
Maximum Number of Drives	4
Connection Method	Tool-less via BCA. BCA is optional.
Drive Locations	Drives install into HDD Bays via FLEX Tray.
Hardware Required	Up to two BCA-S or one BCA-S + BCA-P. Blind HDD FLEX Tray Handle Assembly.
Drive Type Supported (6Gb/s)	3.5" SATA HDD (7200rpm) 2.5" SATA SSD
RAID Level Support	RAID 0 RAID 1 RAID 5 RAID 10
Drive Data Rate	Maximum drive data rate is 6Gb/s.
Drive Bay Configuration	0,1,2,3,4 drives $\rightarrow$ 2 BCA's + 4 FLEX trays

### • How to Utilize the Onboard Intel SATA Controller

In the P720 system, SATA drives are connected to the onboard Intel SATA controller via a manual plug method. This consists of manually cabling both power and data to each drive individually. The P720 system can support up to 4 drives using the onboard Intel SATA controller.

# HDD/SSD Manual Connect Option



*Optionally*, in the P720 system, SATA drives can be connected to the onboard Intel SATA controller via BCA's. This consists of the Blind Connect to SATA cable and dual BCA-S. The P720 system can support up to 4 drives using the onboard Intel SATA controller.

The red boxes in the diagram below show the active SATA ports that are available with the onboard Intel SATA controller.

# Blind Connect Assembly (BCA) Option



# Section 3 – ThinkStation P520

• Level of Support Summary

Maximum Number of Drives	4
Connection Method	Manual plug for data and power using standard cabling methods. BCA is not supported.
Drive Locations	4 Drives install into HDD Bays via FLEX Tray.
Hardware Required	SATA HDD cable(s) <sup>2</sup> SATA HDD Power cable(s) <sup>3</sup> SATA HDD Power cable(s) <sup>4</sup>
Drive Type Supported (6Gb/s)	3.5" SATA HDD (7200rpm) 2.5" SATA SSD
RAID Level Support	RAID 0 RAID 1 RAID 5 RAID 10
Drive Data Rate	Maximum drive data rate is 6Gb/s.
Drive Bay Configuration	0,1 drives → 1 SATA + 1 dual drop power 2 drives → 2 SATA + 1 dual drop power 3 drives → 3 SATA + 1 quad drop power + 1 cage/tray kit 4 drives → 4 SATA + 1 quad drop power + 1 cage/tray kit

<sup>&</sup>lt;sup>2</sup> SATA HDD cable(s) should equal the quantity of HDD's/SSD's in the HDD bays and FLEX bays.

<sup>&</sup>lt;sup>3</sup> 2-drop HDD Power cable for the HDD's/SSD's in the HDD bays comes standard.

<sup>&</sup>lt;sup>4</sup> 4-drop HDD Power cable for the HDD's/SSD's in the HDD bays gets derived when more than two drives are selected.

### How to Utilize the Onboard Intel SATA Controller •

In the P520 system, SATA drives are connected to the onboard Intel SATA controller via a manual plug method. This consists of manually cabling both power and data to each drive individually. The P520 system supports up to 4 drives using the onboard Intel SATA controller.



# Section 4 – ThinkStation P520c

• Level of Support Summary

Maximum Number of Drives	2
Connection Method	Manual plug for data and power using standard cabling methods. BCA is not supported.
Drive Locations	2 Drives install into HDD Bays via FLEX Tray.
Hardware Required	SATA HDD cable(s) <sup>5</sup> HDD Power cable(s) <sup>6</sup>
Drive Type Supported (6Gb/s)	3.5" SATA HDD (7200rpm) 2.5" SATA SSD
RAID Level Support	RAID 0 RAID 1
Drive Data Rate	Maximum drive data rate is 6Gb/s.

<sup>&</sup>lt;sup>5</sup> SATA HDD cable(s) should equal the quantity of HDD's/SSD's in the HDD bays and FLEX bays.

<sup>&</sup>lt;sup>6</sup> 2-drop HDD Power cable for the HDD's/SSD's in the HDD bays.

### How to Utilize the Onboard Intel SATA Controller •

In the P520c system, SATA drives are connected to the onboard Intel SATA controller via a manual plug method. This consists of manually cabling both power and data to each drive individually. The onboard Intel SATA controller supports up to 4 drives (2 drives in the HDD bays and 2 drives in the FLEX bays).



# Section 5 – Configuring RAID Arrays

- Follow the instructions below to create a basic RAID array using the onboard Intel SATA controller.
- 1. Install the drives for the RAID array into the system. See the above sections to determine the correct hardware and placement of the storage devices.
- 2. Power on the system and press the 'F1' function key at the 'Lenovo' splash screen indicated below to enter BIOS.



3. Select the "Setup" menu option at the screen indicated below.





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4. Select the "Devices" menu along the left column and "PCH SATA Configuration" menu along the right column at the screen indicated below.



5. Select the "Configure SATA as" menu option drop-down menu box and select "RAID" as indicated below.

<b>)</b> Setup	Configure SATA as	From	
Main Devices Advanced	Contriguine SATA as Select ARC/NAED Prote. NOTE Device driver support is required for Al Depending on how the hard disk strage present the system from hording.	AHCI AHCI RAID was installed, changing this set	Ting may
Security	Port 1 Enable or Disable SATA port	Enabled	~
⊒ Startup ≅ Exit	Port 2 Drable or Disable SATA port.	Enabled	~
	Port 3 Diable of Disable SATA port	Enabled	~
	Port 4 Diable of Disable SATA port	Enabled	~
	Port 5 Drable of Disable SATA port	Enabled	~
Lenovo.	Port 6 Peoble of Disable SATA core	Enabled	~

6. Select F10 key to "Save and Exit" the BIOS setup menu.



- 7. As the system reboots, repeat steps 2 and 3 above.
- 8. Select the "Advanced" menu along the left column and "Intel® RSTe SATA Controller" menu along the right column at the screen indicated below.



9. Select the "Create RAID Volume" menu option.



10. Enter a unique name to use for the RAID array.



11. Select the "RAID Level" drop-down menu box and select the RAID type.

0	Sotup	Create RAID Volume		
÷	Main Devices Advanced	Name: Enter a unique volume name that has no specia less.	Volume0 i characters and is 16 characters or	111 Freekour Value VIII
1 a [] #	Power Security Startup Exit	RAID Level: Select RAID Level	RAIDO(Stripe) RAIDO(Stripe) RAID2(Hirror) RAID2(Hirror) RAID1(RAID0-1)	Cytimier Defection
		Select Disks: Select Disks: Port 0, SanDisk SDBSB8U1T001001 SN:16541420042, 953.968 X - to Select Disk		Nerr A Fai (110)
Ľ	enovo	Port 1, SanDisk SD8SB8U1T001001 SN:162289421724, 953.968	V	
	UEFI Setup Utility	Version 1-01-0040. Copyright (C) 2017 Americ	an Megalizends, Inc.	

12. Select the disks to use in the RAID array by selecting the drop-down box next to each disk and select 'X' to select the disk to use in the RAID array creation.

🕞 Setup	Create RAID Volume	
<ul> <li>★ Main</li> <li>⇒ Devices</li> <li>&gt; Advanced</li> <li>⇒ Power</li> <li>⇒ Security</li> <li>⇒ Startup</li> <li>⇒ Exit</li> </ul>	Name:         Volume0           Enter a unique volume name that has no special characters and is 16 characters or least         RAID Level           RAID Level:         RAID(Stripe)         N           Select RAID Level         N	C C C C C C C C C C C C C C C C C C C
	Select Disks: Select Disks: Port 0, SanDisk SD8SB801T001001 SN:162671420042, 953.9G8 x as 64000000000000000000000000000000000000	
Lenov UEFI Setup Utilit	Port 1, SanDisk SD8SB8U1T001001 SN:162289421724, 953.9G8	2

13. Scroll down to the bottom of the window and select "Create Volume".

Setup	Port 3, SanDisk SD8588017001001 SN:162289421561, 953.9GB X-Tacketect Dask	x v	
Advanced  Advanced  Advanced  Security  Security  Exit	Strip Size: Strip cze help Capacity (MB): Capacity in MIC Enter desired volume size: P	12866	Star Star Dati
Lenovo.	Create Volume Create a volume with the settings specified	altowe	

14. The RAID array will then show up under the "RAID Volumes:" section as indicated in the screenshot below.



15. Once finished with creating the RAID array(s), press 'F10' to 'Save and 'Exit' BIOS.

- PIG V 0115 C 0			and and an entry of the second s
	Save & reset		
	Save configuration and resel?		
		Yes No	
	Insteep: Dission 54.14	1. (2011)	

# Section 6 – Deleting RAID Arrays

- Follow the instructions below to delete an existing RAID array using the onboard Intel SATA controller.
- 1. Power on the system and press the 'F1' function key at the 'Lenovo' splash screen indicated below to enter BIOS.



2. Select the "Setup" menu option at the screen indicated below.

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3. Select the "Advanced" menu along the left column and "Intel® RSTe SATA Controller" menu along the right column at the screen indicated below.



4. To delete the RAID volume, select the RAID volume and select "Delete".

0	Catal	RAID VOLUME INFO		i i i i i i
*	Setup Main Devices Advanced Power	Volume Actions Dat of actions available for RAID Volume Delete		tii Previoue Valer-1077
-	Security Startup Exit			Optimized Defaulta(19)
		Name: Volume name	Volume0	
		RAID Level: RAID Level (type)	RAIDO(Stripe)	
		Strip Size: Indicates the strip size of the RAID volume	128KB	Save & Init (F10)
		Size: Size(capacity) in GB or TB	3.53TB	·
		Version 1.01.0040. Copyright (C) 2017 Americ	can Megalirends, Inc.	

# Section 7 - Glossary

### Blind Connect Assembly (BCA)

**<u>BCA-S</u>**: Blind Connect Assembly consisting of four 8482-SFF ports (supporting SAS and SATA drives). The assembly also contains the following cable connections:

- One 4-pin power connector that connects to the motherboard.
- One mini-SAS HD connector labeled "S/X" that connects to either the onboard Intel controller or the Broadcom controller







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4-pin power connector



**<u>BCA-P</u>**: Blind Connect Assembly consisting of two 8639-SFF (U.2) ports (supporting PCIe, SAS, or SATA drives) and two 8482-SFF ports (supporting SAS or SATA drives). The assembly also contains the following cable connections:

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- One 4-pin power connector that connects to the motherboard.
- Two mini-SAS HD connectors that connect to the Broadcom adapter (for PCIe connections).
- One mini-SAS HD connector labeled "S/X" that connects to either the onboard Intel controller or the Broadcom controller.



Connector Type	Drives Supported
	SATA
8639-SFF (U.2) PCIe port	SAS (only with Broadcom controller)
	NVMe (U.2 only)
9493 SEE nort	SATA
8482-SFF port	SAS (only with Broadcom controller)

### FLEX Tray



Blind Connect FLEX Tray : Tool-less tray that can hold up to two drives and utilizes a "pull-bar" style handle to connect drive(s) to the BCA



Manual Connect FLEX Tray : Tool-less tray that can hold up to two drives. These trays utilize hinged pulls that open and allow for cable access and manual cable connections.

### Blind Connect to SATA cable

Blind Connect to SATA cable used to support SATA drives on Intel Onboard Controller via BCA-S for P720.



mini-SAS HD connectors

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### Manual HDD Connect Cables

Manual HDD connect cables are used to support SATA drives using Intel onboard SATA controller.



# Section 8 – Document Revision History

Version	Date	Author	Changes/Updates
1.2	10/24/2018	Jason Moebs	Update Glossary Section.
1.1	10/10/2018	Jason Moebs	Updates throughout.
1.0	10/10/2018	Jason Moebs	Initial launch release.