



# congatec Application Note

Applicable Products Application Note Subject Document Name Usage Designation

conga-XLX, conga-CLX, conga-B945, conga-BM45 Setup and configure a SATA RAID system AN15\_Configure\_RAID\_System External

Application Note #15 Revision 1.1



## **Revision History**

Revision	Date (dd.mm.yy)	Author	Changes
0.1	21.06.07	OAL	Initial release
1.0	18.07.07	OAL	Official release
1.1	04/02/11	MSW	Added conga-BM45 CPU module



## Preface

This application note is a short example of how to setup and configure a system to operate in RAID Level 1 (Mirror) with two Serial ATA (SATA) hard disk drives (HDD) while using Microsoft Windows<sup>®</sup> XP.

### Disclaimer

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### **Intended Audience**

This Application Note is intended for technically qualified personnel. It is not intended for general audiences.

### **Symbols**

The following symbols may be used in this Application Note:



### Warning

Warnings indicate conditions that, if not observed, can cause personal injury.



### Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.



Notes call attention to important information that should be observed.



### Terminology

Some of the following terms may be used throughout this document.

Term	Description
RAID	RAID: Redundant Array of Independent Drives. A group of hard disks that operate together to improve performance or provide fault tolerance and error recovery through data striping, mirroring, and other techniques.
BIOS	BIOS: Basic Input Output System. BIOS is actually firmware, the software that is programmed into a ROM (Read-Only Memory) chip built onto the motherboard of a computer
Flash	A special type of EEPROM (Electrically Erasable Read Only Memory) that can be erased and reprogrammed in blocks instead of one byte at a time. Many modern PCs have their BIOS stored on a flash memory chip so that it can easily be updated if necessary.
POST	Power-on Self Test. A diagnostic testing sequence run by a computer's BIOS as the computer's power is initially turned on. The POST will determine if the computer's RAM, disk drives, peripheral devices and other hardware components are properly working.
ΡΑΤΑ	PATA: Parallel Advanced Technology Attachment is a standard interface for connecting storage devices such as hard disks and CD-ROM drives inside personal computers.
SATA	SATA: Serial Advanced Technology Attachment was designed as a successor to the legacy Advanced Technology Attachment standard (ATA) also known as Parallel ATA.
CGUTIL	congatec System Utility. Universal tool for BIOS updates and BIOS modifications.
CGOS	congatec Generic Operating System API. Software driver for the congatec Embedded BIOS features.

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## Contents

1	Introduction	6
2	Setup and configure a SATA RAID Level 1 System with the conga-B945 / conga-BM45	7
3	Setup and configure a SATA RAID Level 1 System with the conga-XLX	12



## **1** Introduction

The following sections describe how to setup and configure a system to operate in RAID Level 1 (Mirror) with two SATA hard disk drives while using Microsoft Windows<sup>®</sup> XP. RAID Level 1 uses disk mirroring, which provides 100% duplication of data. This offers the highest reliability. RAID Level 0 is also supported but has yet to be tested therefore is not included in this application note.

The first section of this application note describes the steps that must be done when using the conga-B945 or the conga-BM45 CPU module. The conga-B945 utilizes Intel's ICH7M-DH I/O controller hub, which supports Intel<sup>®</sup> Matrix Storage Technology that provides integrated RAID Level 0 and Level 1 functionality on the two SATA ports. The conga-BM45 utilizes Intel's ICH9M-E I/O controller hub.

The second section covers the required steps that must be done when using a conga-XLX or a conga-CLX CPU module. The LX800 based platform has an onboard VIA VT6421 Serial ATA RAID Controller that supports RAID Level 0 and RAID Level 1 functionality on the two SATA ports.

Software components include an option ROM for pre-boot configuration and boot functionality, a Microsoft Windows<sup>®</sup> compatible driver ('F6flpy32.zip' for the conga-B945 and conga-BM45 or 'vt6421\_win2kxp.zip' for the conga-XLX/CLX), and a user interface for configuration and management of the RAID capability.

#### ➡> Notes

Parallel ATA (PATA) RAID is not supported.

In order to ensure proper RAID functionality, it is recommended that the two SATA hard disk drives that are being used have the same storage capacity. Furthermore, using the Intel<sup>®</sup> Matrix Storage Manager to reduce the capacity of the SATA hard disk drive is not recommended. This may cause a malfunction of the SATA RAID functionality.



## 2 Setup and configure a SATA RAID Level 1 System with the conga-B945/BM45

This section describes how to setup and configure a conga-B945 or conga-BM45 based system to operate in Serial ATA RAID Level 1 (Mirror) mode while using Windows<sup>®</sup> XP.

1. Connect the CPU module to the baseboard. Attach two SATA RAID hard disk drives and enter the BIOS setup menu. Enter the 'IDE Configuration' setup node in the 'Advanced' menu and change the 'ATA/IDE Configuration' setting to [Enhanced].

Advanced		
* IDE Configuration	*********	* Options *
<pre>* ***********************************</pre>	[Enhanced] [RAID] : [Not Detected] : [ATAPI CDROM] [Disabled] [35] [Host & Device]	* Disabled * Compatible * Enhanced * * * * * * * * * * * * *
v02.59 (C)Copyright 1	**************************************	gatrends, Inc.

2. Additionally set 'Configure SATA as' to [RAID].

Advanced			
* IDE Configuration	*****	*	Options *
<pre>* ***********************************</pre>	[Enhanced] [RAID] : [Not Detected] : [ATAPI CDROM] [Disabled] [35] [Host & Device]	* IDE * RAID * AHCI * * * * * * * * * * * * * * * * * * *	* * * * Select Screen * Select Item Change Option General Help Save and Exit *
*		* ESC	Exit *
* ************************************	**************************************	******** egatrend	**************************************



3. Enter the 'Boot' menu. Set one of the boot devices to [PCI RAID] in the 'Boot Device Priority' list. It is important to note that the device that will be used to install the operating system must be listed above the 'PCI RAID' device in the 'Boot Device Priority' list. Below is as an example showing the 8th Boot Device selected as PCI RAID. Save the settings and exit the BIOS menu.

<u>Main</u>	Advanced	Boot	Security	Power	Exit		
* Boot Pr * Boot De	iority Sele	ction ty	"********* [Туре В	*********** ased] *********	******* ** ** **	Options Disabled Primary Master	***
* 1st Boo * 2nd Boo * 3rd Boo * 4th Boo * 5th Boo * 6th Boo * 7th Boo	ot Device ot Device ot Device ot Device ot Device ot Device ot Device ot Device		[USB F1 [USB Re [USB Ha [Onboar [Primar [Primar [Second	oppy] movable D rddisk] d LAN] y Master] y Slave] ary Maste	** evi]** ** ** r] **	Primary Slave Secondary Master Secondary Slave Legacy Floppy USB Floppy USB Harddisk USB CDROM	* * * * * * *
* * Boot Se	ettings Conf	iguration			**	** Select Screen ** Select Item	*
* Quick E * Quiet E * Automa * AddOn F * Halt Or	Boot Boot tic Boot Lis ROM Display D Error	t Retry Mode	[Enable [Disab] [Disab] [Keep C [Disab]	d] ed] ed] urrent] ed]	******	F1 General Help F10 Save and Exit ESC Exit	* * * *
	v02.59 (	C)Copyrig	nt 1985-200	5, Americ	an Mega	atrends, Inc.	

4. The next step is to configure the Serial ATA RAID driver (Intel<sup>®</sup> Matrix Storage Manager). During POST, the following window is displayed for a short period of time. Enter the configuration utility by pressing <CTRL-I> when this window is displayed.

Copyri	ght(C) 2003-06 In	tel Corporation.	All Rig	hts Reser	ved.	
RAID ID Ø	Volumes: Name Volume0	Level RAID1(Mirror)	Strip N∕A	Size 74.5GB	Status Normal	Bootable Yes
Phys: Port 2 Press	ical Disks: Drive Model WDC WD800BEVS-22 WDC WD800JD-75MS CCIRL-IN to enter	Serial # WD-WXE307161168 WD-WMAM9F947521 Configuration Uti	lity	<b>\$ize</b> 74.5GB 74.5GB	Type/Status Member Disk Member Disk	(Vol ID) (0) (0)



 In the storage manager's 'MAIN MENU' window the two attached SATA hard disk drives should be displayed in the 'Physical Disks' section. Choose item 1 'Create RAID Volume' and press <ENTER> to enter the 'CREATE VOLUME MENU'.

Copyright(C) 2 ************************************	2003-06 Intel Corporation 1 Create RAID Vo 2. Delete RAID Vo 3. Reset Disks to 4. Exit	h. All Rig Dume Dume Non-RAID	hts Reserved. ************************************
<pre>* RAID Volumes: * None defined. * * Physical Disks: * Port Drive Model * 0 WDC WD800BEVS-22 * 2 WDC WD800JD-75MS * * * * * * * * * * * * * * * * * * *</pre>	****[ DISK/VOLUNE INFORM Serial # WD-WXE307161168 WD-WMAM9F947521	<b>Size</b> 74.56B 74.56B	Type/Status(Vol ID) Non-RAID Disk Non-RAID Disk
[**]-Select	[ESC]-Exit	LENTER	R]-Select Menu

6. In the 'CREATE VOLUME MENU' name the RAID hard disk drives and select a RAID Level from the list. Confirm the settings by selecting the 'Create Volume' option. For this application note RAID Level 1 (Mirror) is selected.

Copyright(C) 2003-06 I	ntel Corporation. All Rights Reserved.
***********	REHIE VULUME MENU ]************************************
*	
* Name:	KHLU UISK *
* KHID Level:	RHIDI(Mirror) *
* Disks:	Select Disks *
* Strip Size:	N/H *
* Capacity:	/4.5 GB *
*	*
*	Create Volume*
*	*
*******************************	***************************************
******************************	****[
*	*
*	*
*	*
*	*
* Press "ENIER"	to Create the specified volume. *
*	*
*	*
*	*
*	*
*******************************	***************************************
[**]Change [TAB]-Nex	t LESCJ-Previous Menu [ENTER]-Select

#### Note

Using the Intel<sup>®</sup> Matrix Storage Manager to reduce the capacity of the SATA hard disk drive is not recommended. This may cause a malfunction of the SATA RAID functionality.



7. Once back in the 'MAIN MENU' the chosen settings are displayed in the window. If the settings are correct, exit the configuration utility by selecting the <Exit> option.

		C	opyright(C) 2	2003-06 Intel Corp	oration	. All Ri	ghts Reserve	d.
* * * * * *	*****	****	***************************************	**************************************	RAID Vo RAID Vo isks to	********** lume Non-RAID	*******	************* * * *
*	RAID	Volu Namo	************* IMes:	****[ DISK/VOLUME	INFORMA Stuin	FION ]***	**************************************	××××××××××× ×
*	0	RAID	Disk	RAID1(Mirror)	N/A	74.5GB	Normal	Yes *
* * *	Phys: Port 0 2	UCAL Driv WDC WDC	VISKS: ve Model WD800BEVS-22 WD800JD-75MS	<b>Serial #</b> WD-WXE307161168 WD-WMAM9F947521		<b>Size</b> 74.5GB 74.5GB	Type/Status Member Disk Member Disk	* (Vol ID) * (0) *
* *								*
* *								*
*	*****	<del>***</del> **	**]-Select	[ESC]-Exit	******	LENTE	Rl-Select Me	nu

- 8. Download the Intel<sup>®</sup> Matrix Storage Manager (F6flpy32.zip) from the congatec homepage (http://www.congatec.com) and extract the contents. The contents of this zip file are required to pre-install the SATA RAID driver using the <F6> method during Microsoft Windows XP setup. Prepare a floppy disk as described in section 5.3 of the 'Readme.txt' file included in the zip file.
- 9. Attach a floppy disk drive to the system. Reboot the system from the installation CD for Windows<sup>®</sup> XP and start the installation process. Immediately after the start of the Windows<sup>®</sup> XP Setup, press <F6> to install the third party SCSI/RAID driver. Later on during setup, Windows<sup>®</sup> XP will request that the device support disk for mass storage devices be inserted. When this request appears, insert the previously prepared floppy disk into the floppy drive. Press the <S> (<Z> for German installation) to implement the RAID driver. Choose the SATA RAID driver (Intel(R) 82801GHM SATA RAID Controller (Mobile ICH7MDH) from the displayed list and confirm by pressing <Enter>.

#### Notes 🗩

Legacy floppy is not supported on the conga-B945 and on the conga-BM45 therefore a USB floppy drive must used.

Be aware that not all USB Floppy disk drives are supported by Windows XP during installation. Refer to the Microsoft<sup>®</sup> support homepage (Article ID 916196): <u>http://support.microsoft.com/kb/916196/en-us</u>.



Windows Setup ******
You have chosen to configure a SCSI Adapter for use with Windows, using a device support disk provided by an adapter manufacturer.
Select the SCSI Adapter you want from the following list, or press ESC to return to the previous screen.
<pre>* Intel(R) 82801HR/HH/HO SATA AHCI Controller (Desktop ICH8R) * * Intel(R) 631xESB/632xESB SATA RAID Controller (Server/Workstation ESB2) * * Intel(R) 631xESB/632xESB SATA AHCI Controller (Server/Workstation ESB2) * * Intel(R) 82801GHM SATA RAID Controller (Mobile ICH7MDH) ************************************</pre>
_ ENTER=Select F3=Exit

- 10. The SATA RAID driver is now included in the operating system software. Continue and finish the installation by following the Microsoft Windows<sup>®</sup> XP installation commands.
- 11. After the installation is finished, the easiest way to determine the mode is to identify how the Serial ATA controller is presented within the Device Manager. Information about how this can be done can be found in section 4 of the 'Readme.txt' file that is part of the F6flpy32.zip.

#### Notes

The screenshot is from a conga-B945 equipped system. A conga-BM45 equipped system screenshot would be identical.



## 3 Setup and configure a SATA RAID Level 1 System with the conga-XLX

This section describes how to setup and configure a conga-XLX based system to operate in Serial ATA RAID Level 1 (Mirror) mode while using Windows<sup>®</sup> XP.

- 1. Connect the conga-XLX CPU module to the baseboard and attach two SATA RAID hard disk drives to the system. A change of BIOS settings is not necessary.
- 2. Boot your system. During POST the following window for the onboard VIA VT6421 SATA RAID Controller is displayed for a short period of time. Enter the configuration utility by pressing the <Tab> key.





3. The two attached SATA hard disk drives are displayed (as pictured below) in the main menu of the RAID configuration utility. Choose the 'Create Array' selection from the list, which is used for a new RAID array creation and confirm the selection by pressing <Enter>.

<ul> <li>Create Array</li> <li>Belete Array</li> <li>Select Boot Array</li> <li>Create/Belete Spar</li> <li>Expand Span (JBOD)</li> <li>Serial Munber View</li> </ul>	UIA UI6421 U-R e Array	AID Utility Only for advance by U-R All RA with U F1 : t,4 : Enter: ESC :	or new Ri e operat AID OS to ID operat IA U-RAII View Arr Move to Confirm Exit	AlD array ( ions should bol tions only D SW inside ray/disk St next item the select	creation, i be done co-work e OS tatus tion
Dev. Posi.	Drive Mane	Array Mane	Hode	Size(68)	Status
Ctrl0 Chml0 Master	WDC WD800BEV		SATA	74.53	Hdd
Ctrl0 Chml1 Master	WDC WD800JD-		SATA	74.50	Hdd

4. In the 'Create Array' menu window first select the 'Array Mode RAID 1 (Mirroring)' from the list. Once this is done then move up to the 'Auto Setup For Data Security' selection and confirm using <Enter>. A message appears that the data on the selected disks will be destroyed. Continue by selecting <YES>.

VIA VT6421 V-RAID Utility V4.99					
<ul> <li>Auto Setup For Dat</li> <li>Array Mode RAID 1</li> <li>Select Disk Drives</li> <li>Start Greate Proce</li> </ul>	Only for new RAID array creation, advance operations should be done by V-RAID OS tool All RAID operations only co-work with VIA V-RAID SW inside OS F1 : View Array/disk Status t,J : Move to next item Enter: Confirm the selection ESC : Exit				
Dev. Posi.	Drive Name	Array Name	Mode	Size(GB)	Status
Ctrl0 Chnl0 Master Ctrl0 Chnl1 Master	WDC WD800BEV WDC WD800JD-		SATA Sata	74.53 74.50	Hđđ Hđđ



5. Another message shows that a new array is created. Now the two SATA hard disk drives are combined to one array (Array 0 in the picture below). Exit the 'Create Array' menu by pressing <ESC>.

VIA VT642	1 V-RAID	Utility V4.	.99		
<ul> <li>Auto Setup For Data Security</li> <li>Array Mode RAID 1 (Mirroring)</li> <li>Select Disk Drives</li> <li>Start Grante Process</li> </ul>		Only for new RAID array creation, advance operations should be done by V-RAID OS tool All RAID operations only co-work with VIA V-RAID SW inside OS F1 : View Array/disk Status			
Create New Array OK!		t,↓ : Mo Enter: Co ESC : Es	ove to next onfirm the s cit	iten election	
Array No. Array Type	Stripe/B	lock Size	Cap.(GB)	Status	
Array 0 Mirror Ctrl0 Chnl0 Master Ctrl0 Chnl1 Master	N∕A WDC WD8 WDC WD8	00BEU 00JD-	74.50 74.53 74.50	Nornal Source Mirror	

6. Back in the main menu of the RAID configuration utility, go to the item 'Select Boot Array' and highlight the earlier created array (Array 0). A green letter b appears in brackets (b) in front of the selected array. Additionally, the message "Set Boot OK!" will be displayed in the upper left window. Exit the main menu by pressing <ESC> and confirm by selecting <YES>.

VIA VT642	21 V-RAID Utili	ty V4.99			
<ul> <li>Create Array</li> <li>Delete Array</li> <li>Select Boot Array</li> <li>Create/Delete Spare</li> <li>ixpand Span (UBID) Array</li> <li>Serial Number Vieu</li> <li>Set Boot OK!</li> </ul>	Set All wit F1 t,4 Ent ESC	Set/Clear bootable array All RAID operations only co-work with VIA V-RAID SW inside OS F1 : View Array/disk Status f,4 : Move to next item Enter: Confirm the selection ESC : Exit			
Array No. Array Type	Stripe/Block	Size Cap.(GB)	Status		
(b)Array 0 Mirror Ctrl0 Chnl0 Master Ctrl0 Chnl1 Master	N∕A WDC WD800BEV WDC WD800JD-	74.50 74.53 74.50	Normal Boot Boot		



7. When rebooting the system, the onboard VIA VT6421 SATA RAID controller scans for devices and will now indicate that the two attached SATA hard disk drives are ready for RAID. The message pictured below will appear for a short period of time during POST.

VIA Technologies, Inc.VIA VT6421 SATA RAID CDROM BOOT BIOS V4.99 Copyright (C) VIA Technologies, Inc. All Right reserved. 6421R499.ROM - FOR RAID					
Scan Devic Raid	es,Please	wait			
Array	j 0	Hirror	N/A	74.50	Normal
	- Ctrl0	Chnl0 Master	WDC WD800BEV	74.53	Source
	L Ctr10	Chnl1 Master	WDC WD800JD-	74.50	Mirror
Press <tab< th=""><th>&gt; Key int</th><th>o User Window</th><th>!</th><th></th><th></th></tab<>	> Key int	o User Window	!		
If you w OPROM crea	ant to in tion oper	stall Linux D ation!	efault partition	RAID driver,	please do not use

- 8. Download the VIA VT6421 SATA RAID driver (vt6421\_win2kxp.zip) from the congatec homepage (http://www.congatec.com) and extract the contents. The contents of this zip file are required to pre-install the SATA RAID driver using the <F6> method during Microsoft Windows<sup>®</sup> XP setup. Prepare a floppy disk as described in the 'Readme.txt' file included in the zip file.
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#### D Note

Be aware that not all USB Floppy disk drives are supported by Windows XP during installation. Refer to the Microsoft<sup>®</sup> support homepage (Article ID 916196): <u>http://support.microsoft.com/kb/916196/en-us</u>.



- 10. The SATA RAID driver is now included in the operating system software. Continue and finish the installation by following the Microsoft Windows<sup>®</sup> XP installation commands.
- 11. After the installation is finished, the easiest way to determine the mode is to identify how the Serial ATA controller is presented within the Device Manager.