

AIX 6 with Technology Level 8

Release Notes



AIX 6 with Technology Level 8

Release Notes



Note

Before using this information and the product it supports, read the information in "Notices" on page 39.

Fourth Edition (May 2013)

This edition applies to IBM AIX 6 with Technology Level 8 and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this document

The Release Notes topics include late technical information that is not included in other topics and highlights new functions for the IBM® AIX® 6 with Technology Level 8 licensed program.

Highlighting

The following highlighting conventions are used in this document:

Bold	Identifies commands, subroutines, keywords, files, structures, directories, and other items whose names are predefined by the system. Also identifies graphical objects such as buttons, labels, and icons that the user selects.
<i>Italics</i>	Identifies parameters whose actual names or values are to be supplied by the user.
Monospace	Identifies examples of specific data values, examples of text similar to what you might see displayed, examples of portions of program code similar to what you might write as a programmer, messages from the system, or information you should actually type.

Case-sensitivity in AIX

Everything in the AIX operating system is case-sensitive, which means that it distinguishes between uppercase and lowercase letters. For example, you can use the **ls** command to list files. If you type **LS**, the system responds that the command is not found. Likewise, **FILEA**, **FiLea**, and **filea** are three distinct file names, even if they reside in the same directory. To avoid causing undesirable actions to be performed, always ensure that you use the correct case.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

What's new

HyperSwap for PowerHA SystemMirror

The HyperSwap[®] function in PowerHA[®] SystemMirror 7.1.2 Enterprise Edition for AIX provides for continuous availability against storage errors. With the HyperSwap function, you can manage DS8800 Synchronous Peer-to-Peer Remote Copy (PPRC) storage systems.

To correctly implement and use the HyperSwap function in your environment, review the following information:

- The DS8800 storage systems must be managed by the AIX Path Control Module (PCM). To configure the AIX PCM to manage the DS8000[®] family of storage systems, run the **manage_disk_drivers -d 2107DS8K -o AIX_AAPCM** command. After you run the **manage_disk_drivers** command, you must reboot your system.

Note: The **manage_disk_drivers** command supports the **NO_OVERRIDE** option (the default option) and the **AIX_AAPCM** option, which are required to use the HyperSwap function. By using the **NO_OVERRIDE** option, you can use vendor software, such as Subsystem Device Driver Path Control Module (SDDPCM), to manage the DS8000 family of storage systems. To allow vendor software to manage the DS8000 family of storage systems, run the **manage_disk_drivers -d 2107DS8K -o NO_OVERRIDE** command. For more information about the **manage_disk_drivers** command, see the **manage_disk_drivers** command topic in the AIX 6.1 Information Center.

- The ODM unique type field for the DS8000 family of storage systems managed by AIX PCM changed from **disk/fcp/mpioosdisk** to **disk/fcp/aixmpiods8k**. This change does not affect other software such as SDDPCM.
- The DS8800 storage subsystem and microcode levels must allow SCSI commands to manage the PPRC storage systems.
- Only synchronous PPRC storage systems, such as Metro Mirror, are supported.
- You must have PowerHA SystemMirror 7.1.2 Enterprise Edition for AIX installed.
- You can use the **lspprc** command to query the states of those storage systems that are using the HyperSwap function. For more information about the **lspprc** command, see the **lspprc** command topic in the AIX 6.1 Information Center.
- Support for the Network Interface Card configuration mode of the PCIe2 10 GbE RoCE Adapter.

Switch Network Interface Runtime

To use the Switch Network Interface (SNI) hardware, your system must have 256 MB of disk space available in the rootvg volume group. The name of the package that you install to use SNI is **devices.common.IBM.sni**. The fileset name for this package is **devices.common.IBM.sni.rte**. The installation fails if you do not have 256 MB of disk space available in the rootvg volume group. After the installation is complete, the LPAR is restarted and determines if the SNI hardware is available. If the SNI hardware is available, a 256 MB logical volume named **/var/adm/sni** is created.

Role-based access control

Role-based access control (RBAC) is designed to improve security and manageability by allowing administrators to delegate system administrative duties to non-root users. RBAC in AIX has been enhanced to provide very fine granular authorizations that identify the privileged operation that they control. These authorizations can be used to create the required roles necessary and assign those roles to the users required to manage the system.

The **rbacqry** command is used as a monitor utility to enable RBAC for applications. The **rbacqry** command reports authorizations and privileges used by a program after the program is run. For more information about the **rbacqry** command, see the **rbacqry** command topic in the AIX 6.1 Information Center.

Enterprise Storage Management

AIX Version 6.1 includes new improvements to Enterprise Storage Management. These enhancements include:

- **NFS Support for Workload Partitions**

When mounting NFS file systems from within a system, WPAR performs the same as a regular NFS mount (Versions 2, 3, and 4 supported). Statistics (**nfsstat**) and tunables (**nfs0**) commands from within a WPAR are specific to that WPAR. NFS mounts from within a mobile WPAR are relocated with the WPAR.

- **JFS2 Integrated Snapshots**

JFS2 has provided support for snapshots in external logical volumes since AIX Version 5.2. In AIX Version 6.1, snapshots are created in the same storage device as the file system. This new feature allows:

- Ease of management by removing management of separate logical volumes for snapshots. The snapshot resides in the same host storage object as the primary file system. These snapshots are referred to as internal snapshots to contrast with the snapshots in separate logical volumes, which are now referred to as external snapshots.
 - The number of snapshot generations per file system has been increased to 64. This increase provides better support for real world environments where snapshots are taken at weekly, daily and hourly intervals compared to the external snapshot limit of 15.
 - The new integrated snapshot facility provides superior ease of use. Since the snapshot is in the primary file system, earlier versions of files can be accessed by non-privileged users without requiring a separate mount of the snapshot. This new facility also allows NFS client access to snapshot data for exported file systems.
- Thread support enhancements add support for thread local storage, thread I/O Prioritization, unique thread identifiers to enable the next generation of database technology.
 - PowerHA SystemMirror[®] asynchronous global disk mirroring is supported, a key requirement for Disaster Recovery data protection.

Firmware assisted system dump

The firmware assisted system dump function is supported on EMC PowerPath. You can use EMC PowerPath to configure and save the system dump to a logical volume on the EMC PowerPath disk.

Read this before installation

This software might contain errors that can result in a critical business impact. You must install the latest available fixes before using this software. Fixes can be obtained from the Fix Central website (<http://www.ibm.com/support/fixcentral>).

The AIX 6 with 6100-08 Release Notes include information that helps you install the AIX operating system. To view the most current version, see AIX Release Notes in the AIX 6.1 Information Center (http://pic.dhe.ibm.com/infocenter/aix/v6r1/topic/com.ibm.aix.ntl/releasenotes_kickoff.htm).

Installation tips

The latest installation hints and tips are available at the IBM Subscription Service website (<http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmd>).

Software License Agreements

There are instances where the Software License Agreements (SLA) might not be displayed correctly. In this event, the License Agreements can be viewed for all languages at the Software license agreements website (<http://www.ibm.com/software/sla/slab.nsf>).

Software Maintenance Agreement

In AIX 6 with 6100-08, a separate Software Maintenance Agreement (SWMA) acceptance window displays during installation immediately after the license acceptance window. The response to the SWMA acceptance (accept or decline) is stored on the system, and either response allows the installation to proceed, unlike license acceptance which requires an accept to proceed.

The SWMA acceptance window is displayed during a New Overwrite or Preservation installation from base CD media.

For base CD media New Overwrite or Preservation installations, if a non-prompted installation is desired, the **ACCEPT_SWMA** field in the control_flow stanza of the **bosinst.data** file should be set to yes (to accept the SMWA terms) or no (to decline the SWMA terms). The **ACCEPT_SWMA** field is set to blank by default.

For NIM installations, if licenses have been accepted either from the choices made when initializing the installation, or using the **ACCEPT_LICENSES** field in a customized **bosinst.data** file, then this will constitute SWMA acceptance.

Service

Fixes and problem-solving databases

You can download AIX fixes and search technical databases (including "APARS" and "Tips for AIX administrators"), at the Fix Central website (<http://www.ibm.com/support/fixcentral>).

Security advisories

Security subscription services are available at My notifications website (<https://www.ibm.com/systems/support/myview/subscription/css.wss/folders?methodName=listMyFolders>).

After you subscribe to the AIX security advisories, you will receive the advisories by email as soon as they are published. You can also view AIX security advisories at the IBM Subscription Service website (<http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmjtd>).

System requirements

Review the following information to determine the minimum and recommended system requirements needed to run AIX 6 with 6100-08.

Required hardware

Only 64-bit Common Hardware Reference Platform (CHRP) machines running selected PowerPC® 970, POWER4, POWER5, POWER6®, and POWER7® processors that implement the Power Architecture® Platform Requirements (PAPR) are supported.

To see if you have a supported machine, log into the machine as the root user, and run the following command:

```
prtconf | grep 'Processor Type'
```

Note: RS64, POWER3, and 604 processors, 32-bit kernel, 32-bit kernel extensions, and 32-bit device drivers are no longer supported.

Firmware

Some AIX systems might not boot from CD-ROM

Some AIX systems might not boot from CD-ROM because of firmware issues. To determine if your system will be affected by this problem, perform the following steps before you migrate or install a running AIX 4.3, AIX 5.1, or AIX 5.2 system:

1. At the command prompt, type the following:

```
lscfg -v1 cd*
```

2. Examine the data that is returned.

If *Part Number* is 04N2964 and *ROS Level and ID* is less than or equal to 1_04 (for example, 1_02, 1_01, or 1_00), contact your local service representative. Tell your service representative that your system requires the CD-ROM firmware upgrade that is described in RETAIN® TIP H1332.

If the data returned does not match the data described in the preceding paragraph, your system is not affected by this problem.

Firmware upgrade required to support an alternate boot device

The requirement of upgrading firmware when installing or booting AIX 6 with 6100-08 in the scenarios described in this section applies only to the systems listed in the table included at the end of this section.

Installation

Some systems might encounter installation problems when you are installing AIX 6 with 6100-08 on a system that is currently installed with a earlier version of AIX or when you are installing an earlier version of AIX on a system currently installed with AIX 6 with 6100-08.

A firmware upgrade is required to support the following installation scenarios:

1. When an installation device is specified using the SMS menus or the Open Firmware command-line and the specified device is not the first available device in the AIX bootlist.

Note: SMS menus differ, depending on the system. On some systems, the installation device is specified under the Multiboot menus. On other systems, the installation device is specified under the Select Boot Options menus.

- When the F5 key is selected during boot, which is the fast path to install from the CD device, and the CD device is not the first available device in the AIX bootlist.

No firmware upgrade is required if no installation device is specified in the SMS menus or the Open Firmware prompt or if the specified installation device is the first available device in the AIX bootlist.

I/O devices IPL limitation

Because of a firmware memory size limitation, only I/O devices in the first 144 I/O slots assigned to a logical partition or single system image partition can be used as an IPL (boot) source.

You can use the HMC to identify which devices are in the first 144 I/O slots by doing the following:

- Select Partition Properties>Hardware>I/O.
- Click the Bus column to sort the I/O devices in ascending order.

The first 144 I/O devices in the sorted list are in the bootable adapter slots.

If you are using a partition or single-system image partition with more than 144 assigned I/O slots, the following scenarios and their results and resolutions are possible.

Table 1. Scenarios for partitions with more than 144 assigned I/O slots

Scenario	Result	Resolution
Attempting to boot from a device beyond the first 144 I/O slots for installation or diagnostic purposes.	The device is not selectable as a boot source from the SMS menus.	Use a device in the first 144 I/O slots.
Booting from a device in the first 144 I/O slots, and then attempt to select a target installation device in a slot beyond the first 144 I/O slots.	The boot will succeed to the installation menus, but devices beyond the first 144 I/O slots will not be listed as bootable installation targets in the AIX menus.	Select a device that is available and marked as bootable.
Using an MPIO configuration where one adapter is in the first 144 I/O slots and another adapter is in a slot beyond the first 144 I/O slots. Both adapters are present at boot time.	The boot will succeed to the installation menus, and the device will be listed as bootable in AIX installation menus. The installation will proceed, but it will fail with the bootlist command failure "unable to set bootpath for all paths."	Use a device in the first 144 I/O slots for all paths.
Using DLPAR to add an adapter in a slot beyond the first 144 I/O slots, and then attempting to run the alt_disk_install command for the newly added device.	The device will not be listed as bootable.	Use a device in the first 144 I/O slots.
Using DLPAR to add an adapter in a slot beyond the first 144 I/O slots, and using the bootlist command to add the device as a bootable device (for example, by dynamically adding a redundant path to a current boot device or setting up for a network boot). Then removing the original adapter and rebooting.	The bootlist command succeeds, but the boot fails from the specified device, and AIX will not receive control.	Use a device in the first 144 I/O slots.
Using DLPAR to add an adapter whose probe order will make it displace a current bootable device, and then rebooting.	The boot fails, and AIX will not receive control.	Move the boot device to one of the first 144 I/O slots or remove the previously added device.

Table 1. Scenarios for partitions with more than 144 assigned I/O slots (continued)

Scenario	Result	Resolution
Selecting a device in a slot beyond the first 144 I/O slots as a dump device for a firmware-assisted dump.	The sysdumpdev command does not allow devices in slots beyond the first 144 I/O slots to be selected as firmware-assisted dump storage devices. An error occurs during the firmware-assisted dump configuration, and a traditional AIX dump automatically becomes available.	Use a device in the first 144 I/O slots for firmware-assisted dumps.
Using DLPAR to add an adapter whose probe order will make it displace a currently valid firmware-assisted dump target device, and then rebooting after the dump.	The firmware-assisted dump process fails during the boot process and displays an error message. The traditional AIX dump still runs to retrieve the dump image.	Avoid displacing the selected firmware-assisted dump target device or reconfiguring the sysdumpdev command for the firmware-assisted dump target device selection, and specify a device within the first 144 I/O slots.
Using DLPAR to add an adapter whose probe order will make it displace a currently valid firmware-assisted dump target device, and then rebooting.	The sysdumpdev command does not allow devices in slots beyond the first 144 I/O slots to be selected as firmware-assisted dump storage devices. An error occurs during the firmware-assisted dump configuration, and a traditional AIX dump automatically becomes available.	Use a device in the first 144 I/O slots for firmware-assisted dumps.

Memory requirements

AIX 6 with 6100-08 minimum current memory requirements vary, based on the configuration.

A general rule for a minimum current memory requirement for AIX 6 with 6100-08 is 512 MB. A smaller minimum current memory might support a configuration with a small number of devices or a small maximum memory configuration. To install the AIX 6 with 6100-08 operating system with only 512 MB, you can overwrite only the existing operating system, and you cannot install any bundles or devices. If you update the AIX operating system with the **install_all_updates** command, your system must have more than 512 MB.

AIX 6 with 6100-08 requires the minimum current memory requirement to increase as the maximum memory configuration or the number of devices scales upward, or both. Larger maximum memory configurations or additional devices scale up the minimum current memory requirement. If the minimum memory requirement is not increased along with the maximum memory configuration, the partition hangs during the initial program load (IPL).

Host Ethernet Adapter memory requirements

Configurations containing a Host Ethernet Adapter (HEA) require more memory than the 512 MB minimum. Each logical HEA port that is configured requires an additional 102 MB of memory. The minimum memory requirement for configurations with one or more HEA ports configured, where n is the number of HEA ports, is $512 \text{ MB} + n \times 102 \text{ MB}$.

IBM Tivoli Directory Server memory requirements

IBM Tivoli® Directory Server Version 6.1 requires a minimum of 256 MB RAM for the Client and a minimum of 512 MB of RAM (1 GB or more is strongly recommended) for the Server. IBM Tivoli Directory Server (including the Client and the Server) requires about 160 MB of disk space.

IBM Tivoli Directory Server includes the DB2 Universal Database™ for AIX Version 9.1 Restricted Enterprise Server Edition. No previous versions of DB2® databases are supported. If you already have DB2 database installed, you need approximately 45 MB of disk space to create the empty database and start the server. DB2 database requires between 300 MB and 500 MB of disk space. Disk space required for data storage is dependent upon the number and size of database entries.

Your machine must be running on 64-bit hardware.

Your machine must be running a 64-bit kernel.

Paging space requirements

AIX 6 with 6100-08 creates a 512 MB paging space (in the `/dev/hd6` directory) for all new and complete overwrite installations.

Disk requirements

AIX Version 6.1 with the recommended AIX 6 with 6100-08 requires a minimum of 5 GB of physical disk space for a default installation, which includes all devices, the Graphics bundle, and the System Management Client bundle.

The following table provides information about disk usage when you install AIX 6 with 6100-08.

Location	Allocated (Used)
/	204 MB (190 MB)
/usr	2468 MB (2275 MB)
/var	540 MB (316 MB)
/tmp	128 MB (6 MB)
/admin	128 MB (1 MB)
/opt	444 MB (262 MB)
/var/adm/ras/livedump	256 MB (1 MB)

Note:

1. If the `/tmp` directory has less than 64 MB, it is increased to 64 MB during a migration installation so that the AIX 6 with 6100-08 boot image is successfully created at the end of the migration.
2. The boot logical volume is required to be 24 MB. The pre-migration script in the `usr/lpp/bos` directory on your media or in your AIX 6 with 6100-08 NIM Shared Product Object Tree (SPOT) will check if you have adequate room. During the migration, `hd5` will be increased if necessary. The logical partitions must be contiguous and within the first 4 GB of the disk.

You must format the SCSI disk properly before you install AIX on it. The AIX operating system requires the disk to be formatted to a sector size supported by the attached SCSI controller. All AIX SCSI controllers support 512 byte sector SCSI disks. The 522 byte sector SCSI disks are only supported when they are attached to SCSI RAID controllers. If the disk has been formatted for SCSI RAID, but is not attached to a SCSI RAID controller, the disk might not configure. If the disk does configure, it might be unreadable in the AIX environment. In some instances, the `certify` function and the `format` function in AIX diagnostics can be used to reformat the disk for the attached SCSI controller.

During a migration installation, if **/opt** exists only as a directory and has less than 3 MB of data, then a new **/dev/hd10opt** logical volume and **/opt** file system are created, and the data that existed in the **/opt** directory is moved to the new **/opt** file system.

If there is more than 3 MB of data in the **/opt** directory, then the new logical volume and file system are not created.

If any existing file system has a mount point in the **/opt** directory, or a mount point of **/opt** itself, the new logical volume and file system are not created.

Disk capacity

SAS RAID controllers and Fibre Channel controllers support attached arrays and disks with capacities which exceed 2 TB. The maximum supported capacity (beyond 2 TB) is limited by either the attached storage subsystem or the upper level logical storage management.

For additional information about SAS RAID controllers, see the SAS RAID controller for AIX topic in the IBM Power Systems™ Hardware Information Center.

For information about AIX capacity limitations for logical storage, see the Limitations for logical storage management topic in the AIX 6.1 Information Center.

Installation, migration, upgrade, and configuration information

Installation

This section contains information about installing AIX 6.1 that supplements the information contained in the Installation and Migration topic in the AIX 6.1 Information Center.

To order these installation guides, contact your point of sale, or in the U.S., call IBM Customer Publication Support at 1-800-879-2755. Give the order number of the book you want to order.

To obtain AIX 6.1 installation hints and tips, go to the IBM Subscription Service website (<http://www14.software.ibm.com/webapp/set2/subscriptions/pqvcmjtd>).

Installing AIX 6 with 6100-08

The following methods can be used to install AIX 6 with 6100-08:

- Complete overwrite installation
- Preservation installation
- Migration installation

The **cp_bos_update** command is automatically run during a complete overwrite installation, a preservation installation, or a migration installation to enable WPARs to move from one global system to another global system. For more information about the **cp_bos_update** command, see the `/usr/lpp/bos/README.cp_bos_updates` file.

Note: After you install or migrate a system to AIX 6 with 6100-08, you can install a lower level of AIX by restoring a system backup or by performing a new and complete overwrite with base media. Preservation installations from AIX Version 6.1 to a lower level of AIX are not supported.

If your system is running a previous version of the AIX operating system, you can use the Update media (recommended) or the base media to update the operating system to AIX 6 with 6100-08. To verify the level, run the **oslevel -r** command. To perform the update, run the **smitty update_all** command.

Attention: Using the Update media is recommended for updates. If you use the base media to update, some ODM settings (such as SRC subsystems settings) might be lost.

Note:

1. Because only the base installation images are on the media, you cannot reject the software and return to the previous level if you use the product media to update to AIX 6 with 6100-08.
2. The minimum size of the boot logical volume is 24 MB. If your current boot logical volume is 16 MB or less, the installation process tries to increase it. However, partitions in a boot logical volume must be contiguous, and within the first 4 GB on the disk. If your system does not have free space that meets these requirements, a message will indicate that there is not enough space to expand **hd5** (the boot logical volume).
3. To install the `devices.common.IBM.sni` package, your system must have 256 MB of disk space available in the `rootvg` volume group.

To install AIX 6 with 6100-08, boot your system from the product media, and follow the instructions in the Installing the base operating system topic in the AIX 6.1 Information Center.

NIM installations with updated LPP_SOURCE

NIM installations using an LPP_SOURCE directory that contains base images from a prior release and that contains updates to the current release require that you use an image_data resource during operating system installations.

When you use an LPP_SOURCE directory that contains base images from a prior release and updates to the current release, create an image_data resource to use for any operating system installations. The SPOT must be updated with the updates added to the LPP_SOURCE directory, or a new SPOT must be created. In that SPOT, copy the image.template file found at <SPOT_LOCATION>/lpp/bosinst/image.template to a new location outside of the SPOT. Create a new NIM image_data resource that points to that location. Use that NIM image_data resource for all operating system installations.

Certain file systems have grown in size, and the default image.data file used during an operating system installation comes from the **bos** image in your LPP_SOURCE directory, which is the prior release image.data file.

IBM Systems Director Common Agent

AIX 7 with 7100-02 includes the IBM Systems Director Common Agent 6.3. It is installed as part of the System Management Client Software bundle, which is part of the default installation options.

Note: If you are updating or migrating the AIX operating system and have IBM Systems Director Server Version 6.2, or earlier, installed, you must update to IBM Systems Director Server Version 6.3, or later, after the update or migration.

When the AIX system is rebooted, the Director agent and the prerequisite processes for it, like the Pegasus CIM server, are automatically enabled. If you do not want to install or enable the Director agent, see the following information for the steps needed to stop, disable, and uninstall the Director agent.

To stop the Director agent, run the following commands:

```
stopsrc -s cas_agent
stopsrc -s platform_agent
stopsrc -s cimsys
```

To start the Director agent, run the following commands:

```
startsrc -s platform_agent
```

| **Note:** The **startsrc -s platform_agent** command implicitly starts the cimsys subsystem.

```
startsrc -s cas_agent
```

| To permanently disable the Director agent, comment out the following lines in the **/etc/inittab** file by adding a # symbol in front of each of them:

```
| cas_agent:2:once:/usr/bin/startsrc -s cas_agent >/dev/null 2>&1
| platform_agent:2:once:/usr/bin/startsrc -s platform_agent >/dev/null 2>&1
```

| **Note:** Comment out the following line only if you do not need the **cimserver** command to run other applications.

```
| cimservices:2:once:/usr/bin/startsrc -s cimsys >/dev/null 2>&1
```

To permanently uninstall the Director agent components and leave the file sets that might be used by other applications, run the following command:

```
/opt/ibm/director/bin/diruninstall
```

To uninstall the file sets that remain after you run the **diruninstall** command (if they are not required for other applications), do the following:

- Run the following command:

```
installp -u cas.agent
```

Note: The **artex.base.agent** file set has an installation prerequisite on the **cas.agent** fileset. The **cas.agent** file set can only be removed if the **artex.base.agent** fileset is removed.

- To uninstall Tivoli Guid, run the following command:

```
installp -u tivoli.tivguid
```

- To uninstall SMIS CIM providers, run the following command:

```
installp -u sysmgt.cim.smisproviders*
```

- To uninstall the remaining CIM providers, run the following command:

```
installp -u sysmgt.cim.providers*
```

- To uninstall the Pegasus CIM server, run the following command:

```
installp -u sysmgt.cimserver.pegasus
```

For more information about IBM Systems Director 6.3, see the IBM Systems Director V6.3 Information Center (<http://pic.dhe.ibm.com/infocenter/director/pubs/index.jsp>).

Disk format requirement

You cannot install AIX on an improperly formatted SCSI disk. AIX requires the disk to be formatted to a sector size supported by the attached SCSI controller. All AIX SCSI controllers support 512 byte sector SCSI disks. The 522 byte sector SCSI disks are only supported when they are attached to SCSI RAID controllers. If the disk has been formatted for SCSI RAID, but is not attached to a SCSI RAID controller, the disk might not configure. If the disk does configure, it might be unreadable in the AIX environment. In some instances, the certify function and the format function in AIX diagnostics can be used to reformat the disk for the attached SCSI controller.

Creating a bootable CD or DVD

You might want to create a CD or DVD that can be used to boot and perform maintenance on your system that matches your current level of AIX.

To create a bootable CD or DVD, run the following commands (where *cdx* is an attached CD or DVD writer). The **bosinst.data** file must be set for a prompted installation (PROMPT = yes).

Perform the following steps to create a boot-only media:

1. Create a file `/etc/exclude.rootvg` using an editor. For example, vi editor. Add the following line in it.

```
^./
```

2. Run the following command.

```
# mkcd -e -d /dev/cdx      # Where cdx is an attached cdwriter
OR
# mkcd -e -S              # Creates a CD image that can be
                           # transferred to a system with a cdwriter
```

Notes:

- The final **mkcd** command in the previous example makes an image that can be transferred to another system (AIX or other than AIX) for burning.
- When a bootable disc is created, the boot image reflects the kernel that is currently running. If the current kernel is the 64-bit kernel, the disc's boot image is also 64-bit, and boots only 64-bit systems. If the current kernel is a 32-bit kernel, the disc's boot image is 32-bit, and it can boot both 32-bit and 64-bit systems.

Using the current kernel

The 32-bit systems cannot boot using a 64-bit kernel. Additionally, some configurations require the system to boot from the 64-bit kernel in order to install the operating system. To ensure that the backup works on the system it came from, the boot image is created to contain the kernel that was running when the backup was created.

Base operating system installation options

In the Base operating system installation menus, if there are more than 50 disks on the system, the disks are ordinarily grouped by adapter. However, for some types of disks, the grouping is slightly different:

SCSI disks

Disks may be grouped by adapter or SCSI bus

IBM TotalStorage DS4000®

Disks are grouped by disk array controller (DAC)

In each case, the user can select the adapter, SCSI bus, or DAC by name and see the associated disks. The physical location of the adapter, SCSI bus, or DAC is also displayed.

Installing AIX using the media device to install a partition with an HMC

The instructions for installing AIX using the media device to install a partition with an HMC have been changed to:

1. Activate the partition, as follows:
 - a. Insert the *AIX Volume 1* CD or DVD into the media device of the managed system.
 - b. Select the checkbox that corresponds to the partition you want installed.
 - c. In the Operations menu in the lower window pane, select **Activate**.
 - d. In the **Activate** window, click **Advanced**.
 - e. For the Boot mode, select **SMS**.
 - f. Click **OK**. Ensure that the appropriate partition profile is highlighted.
 - g. Select the Open a terminal window or console session checkbox, and then click **OK**.
2. In the SMS menu on the vterm, do the following:
 - a. Press Enter to select **5. Select Boot Options**.

```
PowerPC Firmware
Version SF220_001
SMS 1.5 (c) Copyright IBM Corp. 2000, 2003 All rights reserved.
-----
Main Menu

1. Select Language
2. Setup Remote IPL (Initial Program Load)
3. Change SCSI Settings
4. Select Console
5. Select Boot Options

-----

Navigation Keys:

X = eXit System Management Services
-----
Type the number of the menu item and press Enter or select Navigation Key: 5
```

- b. Press Enter to select **2. Select Boot Devices**.
- c. Press Enter to select **1. Select 1st Boot Device**.
- d. Press Enter to select **3. CD/DVD**.
- e. Select the media type that corresponds to the media device and press Enter.
- f. Select the device number that corresponds to the media device and press Enter. The media device is now the first device in the Current Boot Sequence list.

- g. Press the ESC key until you return to the Configure Boot Device Order menu.
 - h. Press the x key to exit the SMS menu. Confirm that you want to exit SMS.
3. Boot from the *AIX Volume 1* CD or DVD, as follows:
- a. Select console and press Enter.
 - b. Select language for BOS Installation menus, and press Enter to open the Welcome to Base Operating System Installation and Maintenance menu.
 - c. Type 2 to select **Change/Show Installation Settings and Install** in the **Choice** field and press Enter.

```

Welcome to Base Operating System
Installation and Maintenance

```

Type the number of your choice and press Enter. Choice is indicated by >>>.

```

1 Start Install Now with Default Settings

2 Change/Show Installation Settings and Install

3 Start Maintenance Mode for System Recovery

88 Help ?
99 Previous Menu
>>> Choice [1]: 2

```

4. Verify or Change BOS Installation Settings, as follows:
- a. Type 1 in the **Choice** field to select the **System Settings** option.
 - b. Type 1 for New and Complete Overwrite in the **Choice** field and press Enter.

Note: The installation methods available depend on whether your disk has a previous version of AIX installed.

- c. When the Change Disk(s) screen displays, you can change the destination disk for the installation. If the default shown is correct, type 0 in the **Choice** field and press Enter. To change the destination disk, do the following:
 - 1) Type the number for each disk you choose in the **Choice** field and press Enter. Do not press Enter a final time until you have finished selecting all disks. If you must deselect a disk, type its number a second time and press Enter.
 - 2) When you have finished selecting the disks, type 0 in the **Choice** field and press Enter. The Installation and Settings screen displays with the selected disks listed under System Settings.
- d. If needed, change the primary language environment. Use the following steps to change the primary language used by this installation to select the language and cultural convention you want to use.

Note: Changes to the primary language environment do not take effect until after the BOS installation has completed and your system is rebooted.

- 1) Type 2 in the **Choice** field on the Installation and Settings screen to select the **Primary Language Environment Settings** option.
- 2) Select the appropriate set of cultural convention, language, and keyboard options. Most of the options are a predefined combination, however, you can define your own combination of options.
 - To choose a predefined Primary Language Environment, type that number in the **Choice** field and press Enter.
 - To configure your own primary language environment, do the following:
 - a) Select **MORE CHOICES**.
 - b) Select **Create Your Own Combination**.
 - c) When the Set Primary Cultural Convention screen displays, type the number in the **Choice** field that corresponds to the cultural convention of your choice and press Enter.

- d) When the Set Primary Language screen displays, type the number in the **Choice** field that corresponds to your choice for the primary language and press Enter.
 - e) When the Set Keyboard screen displays, type the number in the **Choice** field that corresponds to the keyboard attached to the system and press Enter.
- e. After you have made all of your selections, verify that the selections are correct. Press Enter to confirm your selections and to begin the BOS installation. The system automatically reboots after installation is complete.
5. Complete the BOS Installation, as follows:
- a. Type vt100 as the terminal type.

```

Set Terminal Type
The terminal is not properly initialized. Please enter a terminal type
and press Enter. Some terminal types are not supported in
non-English languages.

```

```

ibm3101      tvi912      vt330
ibm3151      tvi920      vt340
ibm3161      tvi925      wyse30
ibm3162      tvi950      wyse50
ibm3163      vs100       wyse60
ibm3164      vt100       wyse100
ibmpc        vt320       wyse350
lft          sun

```

```

+-----Messages-----
88 Help ?
99 Exit
| If the next screen is unreadable, press Break (Ctrl-c)
| to return to this screen.

```

```
>>> Choice []: vt100
```

- b. In the License Agreement menu, select **Accept License Agreements**.
- c. Select **yes** to ACCEPT Installed License Agreements.
- d. Press F10 (or Esc+0) to exit the License Agreement menu.
- e. In the Installation Assistant main menu, select **Set Date and Time**.

Installation Assistant

Move cursor to desired item and press Enter.

```

Set Date and Time
Set root Password
Configure Network Communications
Install Software Applications
Using SMIT (information only)

```

```

F1=Help      F2=Refresh      F3=Cancel      F8=Image
F9=Shell     F10=Exit        Enter=Do

```

- f. Set the correct date, time, and time zone. Press the F3 (or Esc+3) key to return to the Installation Assistant main menu.
- g. Select **Set root Password**. Set a root password for the partition.
- h. Select **Configure Network Communications**.
- i. Select **TCP/IP Startup**.
- j. Select from the Available Network Interfaces and press Enter.
- k. Enter the appropriate network information in the Minimum Configuration and Startup menu and press Enter. Use the F3 (or Esc+3) key to return to the Installation Assistant main menu.
- l. Exit the Installation Assistant by pressing F10 (or Esc+0).
- m. The vterm window displays a login prompt.

Secure by default installation

A CD or DVD installation of AIX 6.1 with the Secure by Default (SbD) option prompts for the Expansion Pack CDs after the base operating system is installed. This step is necessary to install SSH and SSL packages for secure remote system accessibility. If this step is skipped, the system will not be network accessible because SbD erases binaries that use clear text passwords (for example, **telnet**, and **ftp**-similar binaries). If the SbD installation option is selected through NIM, the system administrator should ensure that the NIM **lpp_source** has the **openssh** and **openssl** images in place.

AIX Toolbox Media and NIM lpp_sources

When a Network Install Manager **lpp_source** is used for base system installs, do not copy the contents of the *AIX Toolbox for Linux Applications* CD into the **lpp_source**. This results in multiple copies of **cdrecord** and **mkisofs** software installing during base installation. Neither **cdrecord** or **mkisofs** installs if multiple copies are present.

Network Installation Management

Network Installation Management (NIM) includes a readme file that is installed with the NIM Master **bos.sysmgt.nim.master** fileset. The path name of the file is **/usr/lpp/bos.sysmgt/nim/README**. The readme file contains additional information about the AIX Version 6.1 NIM product and includes the following topics:

- Restrictions on SPOT Creation for Releases Prior to 5.3 (New LPP_SOURCE Directory Structure)
- Web-based System Manager NIM May Have Problems Installing SW on Client Machines
- Restrictions on Customize Operation for RPM Packages
- Steps Necessary For Adding GNOME -or- KDE Desktop Support

When Live Partition Mobility (LPM) is used to migrate a machine (that is, move a machine from one physical server to another) and the machine is defined as a NIM client, the NIM administrator must update the **cupid** attribute for the NIM client to reflect the new hardware value after the LPM migration completes. To update the **cupid** attribute, do the following:

1. On the NIM client, acquire the new **cupid** ID by running the following command:

```
uname -a
```

2. On the NIM master, run the following command:

```
nim -o change -a cupid+<cupid> <client>
```

Installing with an updated LPP_SOURCE

NIM installations using an **LPP_SOURCE** directory that contains base images from a prior release and that contains updates to the current release require that you use an **image_data** resource during operating system installations.

When you use an **LPP_SOURCE** directory that contains base images from a prior release and updates to the current release, create an **image_data** resource to use for any operating system installations. The SPOT must be updated with the updates added to the **LPP_SOURCE** directory, or a new SPOT must be created. In that SPOT, copy the **image.template** file found at **<SPOT_LOCATION>/lpp/bos/inst/image.template** to a new location outside of the SPOT. Create a new NIM **image_data** resource that points to that location. Use that NIM **image_data** resource for all operating system installations.

Certain file systems have grown in size, and the default **image.data** file used during an operating system installation comes from the **bos** image in your **LPP_SOURCE** directory, which is the prior release **image.data** file.

CSM server

Before you install the CSM Server, you must read the *Software Planning and Installation Guide* for specific procedural steps to use when you are installing CSM. Installation of this product is not possible if you do not use the documented procedures in this book.

The CSM Server requires three **installp** filesets that are shipped on the base media and one open-source **rpm** fileset. These filesets must be installed prior to installing the CSM Server software and its dependent packages, the CSM Distributed Command Execution Manager (DCEM) GUI and the CSM DCEM Web-based System Manager application. The required filesets are:

- tcl (installp)
- tk (installp)
- expect (installp)
- conserver (rpm)

Note: The **tcl**, **tk**, and **expect** filesets are installed by default. To verify that these filesets are installed, run the **lslpp** command.

As the root user, do the following to install the rpm fileset and the CSM Server:

1. Install the **rpm** fileset by using the SMIT Install Software (type **smitty install_latest** at the AIX command line).
 - a. Press F4, and select **/dev/cd0** (CD Drive) as the **INPUT device / directory for software**.
 - b. Press F4, and select (by pressing F7) **conserver** as the **SOFTWARE to install** value, or press F4 and select all of the software packages that you want.
 - c. To accept the software license agreements, press the Tab key to change no to yes as the **ACCEPT new license agreements** value, and then press Enter.
 - d. Press Enter again to confirm that you want to continue the installation process.
 - e. Review the installation results, and press F3 to return to the installation panel, or press F10 to return to the AIX command line.
2. Install the CSM Server and its dependent software using SMIT Install Software (type **smitty install_latest** at the AIX command line).
 - a. Press F4, and select (by pressing F7 for each package) **csm.server**, **csm.gui.dcem**, and **csm.gui.websm** as the **SOFTWARE to install** values, or press F4 and select all of the software packages you want.
 - b. To accept the software license agreements, press the Tab key to change no to yes as the **ACCEPT new license agreements** value, and then press Enter.
 - c. Press Enter again to confirm that you want to continue the installation process.
 - d. Review the installation results, and press F3 to return to the installation panel, or press F10 to return to the AIX command line.

IBM SDK for AIX, Java Technology Edition

IBM software development kit (SDK) for AIX, Java™ Technology Edition is released in JavaV.x filesets, where V represents the version of Java, such as Java6, and x is the individual fileset, such as Java5.sdk. To obtain the latest update, complete the following steps:

1. Go to the developerWorks® website (<http://www.ibm.com/developerworks/java/jdk/aix/>).
2. Click **Downloads, User Guides, and Service information**.
3. Click **Fix Info** from the respective Java version column.

IBM Tivoli Directory Server

You must purchase a full-use license through Passport Advantage® for any other use of the IBM Tivoli Directory Server other than authentication and AIX user registry.

The Passport Advantage package includes a White Pages application. The Passport Advantage license entitles you to use and to receive support for the IBM Tivoli Directory Server Proxy server and the White Pages application. You can install and use IBM Tivoli Directory Server only in association with your licensed use of AIX operating system functions.

Other installation information

Installation packaging formats

AIX Version 6.1 supports the following installation-packaging formats:

- `installp`, AIX system installation command and packaging format
- RPM, a Linux installation command and packaging format
- ISMP, InstallShield Multi-Platform packaging format

With the **geninstall** command, you can list and install packages from media that contains installation images packaged in any of the listed formats. The **geninstall** and **gencopy** commands recognize the non-`installp` installation formats and either call the appropriate installers or copy the images, respectively.

The AIX Version 6.1 product media contains `installp` packages and RPM packages that are installed during a BOS installation. The `installp` packages are located in the following path, where *mount_point* is the mount point:

```
/mount_point/installp/ppc
```

The RPM packages are located in the following path, where *mount_point* is the mount point:

```
/mount_point/RPMS/ppc
```

If you have media that contains ISMP packages for AIX 6.1, the ISMP packages are located in the following path, where *mount_point* is the mount point:

```
/mount_point/ismpp/ppc
```

The **installp**, **bffcreate**, **geninstall**, **gencopy** and **nim** commands recognize this media structure.

For more information about software packaging, see the Software product packaging topic in the AIX 6.1 Information Center.

Troubleshooting problems with installation from `mksysb` backup

Check that you have sufficient free blocks in the file systems to write temporary files. Check that each file system has at least 500 blocks free when the **mksysb** backup image is made. The system needs work space in each file system when installing from a **mksysb** backup image.

Note: Depending on the type of data or files in the file system, you might need additional blocks free. For example, if the file system has a lot of small files, an extra 4 KB is automatically allocated to allow for metadata expansion.

Migration

When you migrate from AIX 5.3 to AIX 6.1, you can avoid the risk of down-leveling fixes previously installed on your AIX 5.3 system by migrating to the latest available Technology Level of AIX 6.1. If you are using a NIM `lpp_source` created with a prior level base media and later levels of updates added, you should initially create the `lpp_source` with the base media at the same release date or later than the level of AIX 5.3 that you are migrating from. The last 4 digits of the output of the **oslevel -s** command represent the year and week of the service pack currently installed (YYWW).

Note: Installing any new level of AIX requires more disk space than previous levels. You must verify that you have enough free space in the file systems, or that you have free partitions in the rootvg. If you have

the `devices.common.IBM.sni.rte` fileset installed on a system running the AIX 5.3 operating system, you must have an additional 256 MB of available disk space in the `rootvg` for installation.

Maximum size of boot image increased

For AIX Version 6.1, the maximum size of the boot image has changed from the previous value used for AIX 5.2 (and earlier releases) value of 11,984 KB (12 MB minus 16 KB) to 31,984 KB (32 MB minus 16 KB). The size of the boot logical volume has increased from 16 MB to 20 MB.

System migrated to AIX 5.3 (or later) might experience double boot

When booting AIX Version 5.3 (or later) on a system that has previously been running an earlier release of AIX, you may notice that the system automatically reboots and restarts the boot process. This is how the firmware processes changed information in the boot image.

This reboot also occurs if the process is reversed. A system previously running AIX 5.3 (or later) that is booting a release of AIX prior to 5.3 goes through the same process. This "double boot" occurs only once; if the stored value does not change, then the second boot does not occur.

If you install AIX 5.3 (or later) and continue to use only that version, this double boot occurs once, and it occurs only if your system was running a pre-AIX 5.3 release before you boot AIX 5.3 (or later). Systems that are preinstalled with AIX 5.3 (or later) and use only that version do not experience the "double boot."

Replacements for the `vmtune` and `schedtune` commands

When you migrate a new version of the AIX operating system from a previous version of AIX operating system, your system is to automatically set to run in compatibility mode (`pre520tune` mode).

Compatibility scripts that replace the `vmtune` and `schedtune` commands are included with AIX 5.2, which means that the previous behavior of the tuning commands is preserved to a large extent after a migration.

DSM

The `dsm.core` ships a `/etc/ibm/sysmgmt/dsm/overrides/dsm.properties` file which allows user to override the SSH configuration. If this file is modified, the file will need to be backed up manually before an update or a migration, as it will be overwritten.

xlC runtime software

When you migrate from an AIX 5L™ operating system to an AIX 6.1 operating system, the `xlC.aix50.rte` fileset is replaced by the `xlC.aix61.rte` fileset. If you upgraded the `xlC.aix50.rte` fileset after you installed your system, the migration may replace your upgraded version with a downlevel version. Before you migrate to an AIX 6.1 operating system, save the level of your `xlC.aix50.rte` fileset. After the migration is complete, compare your saved level of the `xlC.aix50.rte` fileset with the `xlC.aix61.rte` fileset. If the changes that you made to your level of the `xlC.aix50.rte` fileset are not in the `xlC.aix61.rte` fileset, upgrade the `xlC.aix61.rte` fileset.

KDE desktop

If the CDE and KDE desktops are both installed on a system migrated from AIX 5.x to AIX 6.1, the KDE desktop might not start from the CDE login. To fix this problem, remove the following CDE startup information from the `/etc/inittab` file:

```
dt:2:wait:/etc/rc.dt
```

Note: You must have root user authority to remove this CDE startup information.

Do not delete the following KDE entry from the `/etc/inittab` file:

```
kdm:2:once:/opt/freeware/kde/bin/kdm
```

Thin Servers

If you migrate any previous version of the AIX Common Operating System Image (COSI) and associated AIX Thin Servers to the AIX 6.1 with 6100-05 version, it is recommended that you delete any dump device associated with the migrated Thin Servers and re-create the Thin Servers.

Additionally, you must install the **devices.tmiscsw.rte** fileset on the NIM master for the AIX 6.1 with 6100-05 Thin Server to create a dump device. The **devices.tmiscsw.rte** fileset is available in the AIX Expansion Pack.

pmtoolkit fileset

The Performance Monitoring API is contained in the **bos.pmapi** fileset. A beta version of the same code was made available to selected customers, and also through alphaWorks®, under the name *pmtoolkit*.

When you are migrating from AIX with the beta fileset installed, you must uninstall the **pmtoolkit** fileset and reboot the machine before you install the **bos.pmapi** fileset. If you do not, the machine will fail to boot when you attempt to load the **pmtoolkit** fileset's kernel extension.

Verify that the **pmtoolkit** fileset is installed by typing the following at the command line:

```
lslpp -l pmtoolkit
```

- If you get the following output:

```
lslpp: 0504-132 Fileset pmtoolkit not installed
```

you can safely install the **bos.pmapi** fileset.

- If you get the following output:

Fileset	Level	State	Description

Path: /usr/lib/objrepos			
pmtoolkit	1.3.1.6	COMMITTED	Performance Monitor Toolkit 1.3.1

complete the following steps:

1. Run the following command:

```
installp -u pmtoolkit
```

2. Reboot the machine. After the machine reboots, you can safely install the **bos.pmapi** fileset.

SNMPv3

After you migrate to AIX 6.1 from pre-AIX 5.2 systems, the non-encrypted version of SNMPv3 will run by default. If you have your own community, trap, or smux entries in your **/etc/snmpd.conf** file, those must be manually migrated to the **/etc/snmpdv3.conf** file. For instructions on how to migrate this information, see "Network Management" in *Networks and communication management* in the AIX Information Center.

Kerberos

All of the secure remote commands use the Kerberos Version 5 library and the GSSAPI library provided by IBM Network Authentication Service Version 1.4 that is located on the *AIX Version 6.1 Expansion Pack* CD. However, you must install the **krb5.client.rte** fileset that is located on the AIX Version 6.1 Expansion Pack CD.

If you are migrating to AIX 6.1 with CD or DVD media, and have Kerberos Version 5 installed, the installation scripts will prompt you to install the **krb5.client.rte** fileset from the Expansion Pack. If you are migrating your operating system using NIM resources, add **krb5** to your **lpp_source**. The secure remote commands support Kerberos clients and servers from both Native Kerberos 5 and DCE.

For more information about the secure remote commands, see the Authentication and the secure rcmds topic in the AIX 6.1 Information Center.

Multipath I/O (MPIO)

In AIX Version 6.1, the DS4K products are configured as Multipath I/O (MPIO) devices by default.

A DS4K product using the FCPARRAY driver may be migrated to the MPIO driver by using the following instructions, or all DS4K devices may be migrated by uninstalling the **devices.fcp.disk.array.rte** package and then running the **cfgmgr** command or rebooting.

The DS3K products are always configured as MPIO devices. There is no FCPARRAY support for these devices. The MPIO support for these devices removes the limitation of connecting only one adapter to each DS3/4K controller port.

IBM BladeCenter issues

To ensure that the storage devices are properly configured on the IBM BladeCenter® server, change the **init_link** setting on the Fibre Channel adapter from arbitrated loop to point to point.

Enter the following commands to change the **init_link** setting on the Fibre Channel adapter:

```
chdev -l fcsX -ainit_link=pt2pt -P
bosboot -aD
cfgmgr
```

Limitations and restrictions

This section lists restrictions and limitations applying to AIX Version 6.1.

EMC PowerPath support for traditional and firmware assisted dump

- | To complete a traditional assisted dump or a firmware assisted dump, you must have installed EMC PowerPath Version 5.5.0.2, or earlier.

console special file limitation

The EIO errors are restricted in some cases when the connection to the console is lost. The EIO errors that result from the console write function are restricted because the streams file is marked when a tty that is connected to a modem is disconnected. All of the writes to the console are redirected to where the console points, and any writes to the file descriptor are returned with EIO errors. These EIO errors continue until a process reopens the console.

clogin command limitation

When you run the **clogin** command, some programs will not function properly, especially those programs that are in multibyte locales. Use the **clogin** command only for emergency system maintenance.

chuser attributes prerequisite

- | The following attributes of the **chuser** command are supported only on AIX 6 with 6100-08, or later:
 - | • minloweralpha
 - | • minupperalpha
 - | • mindigit
 - | • minspecialchar

Workload Partitions not supported on thin servers

Workload Partitions (WPARs) are not supported on thin servers (diskless and dataless systems that are not capable of booting and running without the assistance of servers on a network).

System software cannot be directly managed in a nonshared /usr Workload Partition

If a WPAR is configured to have writable, nonshared **/usr** and **/opt** filesystems, the AIX system software within that WPAR cannot be directly managed from within the WPAR. Operations that are prevented on system software include **apply**, **commit**, **deinstall**, and **reject**. If it is necessary to modify system software within a nonshared WPAR, use the **/usr/sbin/swvpdmgr -w <fileset_names>** command to allow those filesets to be directly managed within the Workload Partition.

SNMPv3

Due to the security concern, the public community name configured in **snmpdv3** agent configuration file **/etc/snmpdv3.conf** will be disabled from AIX 6100-07 and AIX 7100-01 release. The AIX **snmpdv3** agent will not respond to any request on behalf of the public community name.

AIO has been removed from the ODM

For each Asynchronous I/O (AIO) function there is a Legacy and a POSIX definition. In AIX 6 with 6100-08, both POSIX and Legacy extensions are loaded at boot time. Do not run the `mkdev -l [aio0 | posix_aio0]` command to load the extension because it will fail on AIX 6 with 6100-08. AIO attributes have been removed from the Object Data Manager (ODM) and can no longer be queried with the `lsattr` command or changed with the `chdev` command. All of the tunable have been removed from the ODM and are managed by the `ioo` command.

Using a USB optical device with VIOS

When you switch USB optical devices away from a Virtual I/O Server platform, then switch them back, the client partitions cannot use the optical devices until you delete the virtual optical devices, as well as the real optical devices. Run the `cfgmgr` command to make the optical devices available.

Performing an internal or external snapshot of a JFS2 filesystem

The `snapshot` command fails in the following instances:

- The `snapshot` command fails with a Not owner error if you are trying to create an internal snapshot and the filesystem already has an external snapshot and vice versa. In this instance, the `fscntl` system call returns -1 and the `errno` parameter has the EPERM value.
- The `snapshot` command fails with a Not owner error if trying to create an internal or an external snapshot and the filesystem is HSM enabled. In this instance, the `fscntl` system call returns -1 and the `errno` parameter has a EPERM value.
- The `chfs` command fails with a A system call received a parameter that is not valid error if trying to enable HSM for a filesystem that has an internal or an external snapshot. In this instance, the `info` system call returns -1 and the `errno` parameter has a EINVAL value.
- The `snapshot` command fails with a No space left on device error when trying to create an internal snapshot and the snapshot limit is exceeded. In this instance, the `fscntl` system call returns -1 and the `errno` parameter has a ENOSPC value.

Host Ethernet Adapter limitation

AIX Dynamic Logical Partitioning (DLPAR) of Integrated Virtual Ethernet (IVE), also known as Host Ethernet Adapter (HEA), is not supported in AIX 5.3 with the 5300-06 Technology Level and AIX 5.2 with the 5200-10 Technology Level. Support for this feature is enabled in AIX 5.3 with the 5300-07 Technology Level and AIX 6.1 with the 6100-00 Technology Level and later releases.

Xterm with locale support limitations

Xterm, the terminal emulator for the X Window System, is enabled for locale support, except for bidirectional locales. This emulator requires ISO 10646-1 encoded fonts to display results. These fixed-width fonts are shipped with AIX CDs. Install the `X11.fnt.xorg.misc-misc` fileset to properly display locale text. The fixed-width fonts are limited to two sizes: default and large.

All Latin languages, Japanese, and Korean languages are supported. The Chinese language is not supported.

Note: Japanese support is provided only for JISX0201 and JISX0208 characters.

Messages from the `xterm` application are not displayed in locale-specific languages.

InfiniBand EEH limitation

The 4X IB Dual Port DDR Exp CD, CFF/PCIE adapter (feature 8258) does not support full EEH recovery. If you get a bus error (MXIB_EEH_HARDWARE_ERROR in the error log), you might have to manually perform the recovery steps. These steps may include manually reconfiguring the adapter or replacing the adapter. To manually reconfigure the adapter, do the following:

1. Unconfigure the adapter by using the **rmdev** command (for example, `rmdev -l iba0`).
2. Configure the adapter by using the **mkdev** command.

Note:

1. If the adapter instance is busy (a program or kernel extension has called `open` on the adapter), you might not be able to unconfigure the adapter. If you cannot unconfigure the adapter, reboot the system.
2. If the bus error (MXIB_EEH_HARDWARE_ERROR) is present after a successful manual recovery, replace the adapter.

WPAR storage devices

System WPARs can import one or more storage devices. Non-rootvg volume groups, logical volumes, and file systems can be created and managed on imported storage devices within the WPAR.

A storage device is deployed to a WPAR in the following phases:

1. Use the **mkwpar** or **chwp** command to allocate a device to a WPAR.
2. The device is automatically exported to the WPAR when the WPAR starts.
3. The device is automatically imported when the WPAR is booted with the **cfgmgr** command.

After the device is exported to a WPAR, the device state is listed as Defined and it is not available in the Global environment until it is unexported by using either the **chwp** command or the **stopwpar** command.

Supported storage devices

The disk drives that are supported in a WPAR include any FibreChannel disk drive that is supported by AIX 6 and uses the **scsidisk** device driver with the AIX MPIO (default PCM) multipath software. These include the following:

- IBM System Storage[®] DS3400
- IBM System Storage DS4200
- IBM TotalStorage DS4300 (FAStT600)
- IBM TotalStorage DS4500 (FAStT900)
- IBM System Storage DS4700
- IBM System Storage DS4800
- IBM System Storage DS5100
- IBM System Storage DS5300
- IBM XIV[®] Storage System

The tape drives that are supported in a WPAR are any FibreChannel tape drives that are supported by AIX 6 and use the **sctape** device driver.

Note: The **atape** device driver is not supported.

Allocating a device

A device can be allocated to a WPAR when the WPAR is created or it can be added to WPAR in a later operation. For a device to be allocated to a WPAR, it must be in the available state or defined state in the Global environment.

To query the device state, run the following command:

```
lsdev -l <device>
```

To create a system WPAR and allocate the hdisk3 storage device, run the following command:

```
mkwpar -D devname=hdisk3 -n mywpar1
```

To allocate a storage device to an existing WPAR, run the following command:

```
chwp -D devname=hdisk4 mywpar1
```

When you allocate a storage device to an active WPAR, the device is exported to the WPAR unless it was previously exported. To import the newly allocated device into the WPAR, invoke the **cfgmgr** command within the WPAR.

The **-D** flag for the **mkwpar** and **chwpar** commands supports a new attribute, **devid**. The **devid** attribute can be used if the unique device identifier for the storage device is known. The **devid** and **devname** attributes cannot be specified together. The **devtype** attribute has been updated to accept three additional device types: **disk**, **tape** and **cdrom**.

A storage device can be allocated to more than one WPAR. However, the device can be exported to only one WPAR at a time. The device is exported to the WPAR that starts first. After a device has been exported to a WPAR, the extended state of the device is listed as **Exported**. To see the extended state of a device, run the following **lsdev** command with the new **-x** flag:

```
lsdev -x -l hdisk1
```

A message similar to the following is displayed:

```
hdisk1 Exported 01-08-02 MPI0 Other DS4K Array Disk
```

Deallocating a device

To deallocate a storage device from an existing WPAR, enter the following command.

```
chwpar -K -D devname=hdisk3 mywpar1
```

When a storage device is deallocated from an inactive WPAR, the device is removed from the configuration file. When a storage device is deallocated from an active WPAR, the **chwpar** command attempts to unconfigure the device. If the device is being used, the unconfiguration operation fails and the command to remove the device from the WPAR also fails. When the command is successful, the device in the WPAR changes from the **available** state to the **defined** state.

Configuring a device in a WPAR

Each storage device that is configured in the WPAR has an ODM entry in the WPAR. Each storage device also has a virtualized parent device. Configuration of the parent devices and management of the paths to the actual devices are not allowed in the WPAR. The following commands are used to configure and manage the Global environment and the devices in the WPAR:

- **mkdev**
- **chdev**
- **rmdev**
- **lsdev**
- **cfgmgr**
- **lsattr**
- **lspath**

Managing file systems for a device

When a device is configured in the WPAR, commands that are used to create and manage volume groups, logical volumes, and file systems operate in the same way as they do in the Global environment. To create and modify volume groups, use the following commands:

- **mkvg**
- **importvg**
- **extendvg**

To create and modify logical volumes, use the following commands:

- mklv
- chlv

To create and modify file systems, use the following commands:

- mkfs
- chfs

Limitations

The following limitations apply to WPAR storage devices.

- A storage device can be exported to only one active WPAR.
- The JFS2 file system must be used for disk storage devices.
- A WPAR that contains a storage device cannot be made as a checkpoint in AIX 6.1 with the Technology Level 6100-03.
- To use the WPAR storage device feature, the `wio.common` and `wio.fcp` packages must be installed.
- Allocating storage devices to WPARs that were created prior to AIX Version 6.1 with the Technology Level 6100-03 is not supported.
- You must be a root user to use the `startwpar` command and the `stopwpar` command on a rootvg WPAR.

WPAR parameters must be in English ASCII text

WPAR input parameters must consist of upper or lower case ASCII letters, numbers, and underscores (_). This includes the following WPAR variables:

- WPAR name
- WPAR password
- WPAR paths
- WPAR application
- WPAR hostname

Installing applications in a WPAR environment

The WPAR documentation describes how to install applications in a WPAR environment using various applications such as Apache, DB2 and WAS. These examples are not intended to imply that they are the supported versions or configurations of these applications.

Additional information

AIX 6.1 Information Center

To view the most current version of the information center, see the AIX 6.1 Information Center website (<http://pic.dhe.ibm.com/infocenter/aix/v6r1/index.jsp>). The AIX Information Center can be installed from or be viewed directly from the DVD on any AIX or Microsoft Windows systems that are capable of reading a DVD.

If you require a translated version of the documentation and cannot access the Web site or use a DVD, then you might be able to download a copy of the DVD contents from the "Entitled Software Service" site under the terms of your AIX Software Maintenance Agreement if electronic download is offered in your country.

For information about using the electronic software delivery, see the My entitled software website (<https://www.ibm.com/servers/eserver/ess/ProtectedServlet.wss>) and click **Help**. The electronic install image is provided in a **tar.gz** format. After downloading the compressed tar image, decompress, unpack, and run **install_aix** to start the installation wizard.

Note: It is recommended that you restart your system after the AIX Information Center is installed. On AIX systems, exit the installation wizard after the installation of the documentation for each language. On AIX systems, to set the default browser, type the following command:

```
chwebconfig -b <browser location>
```

USB Blu-ray drive read-only support

AIX Version 6.1 with the 6100-06 Technology Level recognizes and configures USB attached Blu-ray drives. This feature is included in the following device package:

```
devices.usbif.08025002
```

The capability of the AIX operating system to read Blu-ray media is validated against a sample of industry standard OEM USB Blu-ray drives.

USB Blu-ray drives are configured with logical names, such as `cd0` and `cd1`. The drives present both raw and block special files. For example, the raw special file for `cd0` is `/dev/rcd0`, and the block special file is `/dev/cd0`.

The read-only capability is provided for the ISO file system (read-only ISO9660), the Universal Disk Format (UDF) file system (version 2.01, or earlier) and standard optical media access commands, such as **dd** and **tar**.

AIX does not support the write operation to CD, DVD, or Blu-ray media present in the USB Blu-ray drive. Although the write operation is not prevented (if the drive is write capable), IBM does not provide support for any issues encountered during the write operation.

AIX does not support plug-and-play for USB Blu-ray drives. To make a USB Blu-ray drive available to AIX users, a root user must connect the drive to a system's USB port and run the following command:

```
cfgmgr -l usb0
```

After the drive is removed, the drive remains in the available state in the Object Data Manager (ODM) database until the root user runs the following command:

```
rmdev -l cd<n>
```

When a drive is in the available state, you can reconnect it to the system, and it can be remounted or reopened. If a drive is disconnected from a system USB port while it is still open to a user, you cannot use that drive until you close and reopen it.

Cluster Aware AIX

The Cluster Aware function is part of the AIX operating system. Using Cluster Aware for AIX you can create a cluster of AIX nodes and build a highly available solution for a data center.

Migration is not supported for AIX 6 with 6100-08 or for AIX 7 with 7100-01. To upgrade from AIX 6.1 with 6100-06 of Cluster Aware AIX (CAA) or from AIX 7 with 7100-00 of CAA to AIX 6 with 6100-08 or to AIX 7 with 7100-01, first remove the cluster, and then install AIX 6 with 6100-08 or install AIX 7 with 7100-01 on all nodes that will be included in the new cluster.

Removal of solidDB® CAA no longer uses an embedded IBM solidDB database. The `bos.cluster.solid` files set still exists, but it is now obsolete. The `solid` and `solidhac` daemons are no longer used by CAA.

clusterconf command

CAA commands no longer support forced cleanup options.

The following is a list of options, by command, that are not supported in AIX 6 with 6100-08 or in AIX 7 with 7100-01.

```
chcluster -f
clusterconf -f, -s, -u
rmcluster -f
```

The `clctrl` command can be used for tuning the cluster subsystem. Only tune the cluster subsystem at the direction of IBM customer support.

Vendor disk support The CAA infrastructure now provides limited support for some disks that are managed by vendor disk drivers. No disk events are available for these disks, but they can be configured into a cluster as a repository or as shared disks. See the documentation for the clustering product that you are using, such as IBM PowerHA SystemMirror for AIX, for a complete list of vendor disk devices that are supported for your environment.

Cluster Data Aggregation Tool

AIX Version 7.1 and AIX Version 6.1 with the 6100-06 Technology Level introduces a new reliability, availability, and serviceability (RAS) tool called Cluster Data Aggregation Tool.

The Cluster Data Aggregation Tool provides a single instance to launch RAS debug and monitoring actions, and to collect problem determination data for multiple nodes. The Cluster Data Aggregation Tool environment is made of a central master node and remote nodes. The Cluster Data Aggregation Tool is installed on and executed from the central master node. The central master node hosts the data collection repository, which is a new file system that contains all the collection data from multiple remote nodes. The remote nodes are the nodes where Cluster Data Aggregation Tool data are collected, which are the AIX logical partition (LPAR), VIOS, PowerHA™ pureScale™, and HMC data.

The Cluster Data Aggregation Tool has the following features:

- Captures problem determination data across multiple nodes.
- Supports sending the data gathering tool to remote nodes.
- Provides an extensible plug-in feature that supports new data collection types for a user.
- Integrates with RBAC to enable a nonroot user to collect Cluster Data Aggregation Tool data.

- Relies on Secure Shell (SSH) for secure connectivity between nodes.
- Is controlled by the CLI (command-line interface) and SMIT panel.

The Cluster Data Aggregation Tool is managed by the **cdat** command that is divided into several subcommands. The subcommands are **access**, **archive**, **check**, **collect**, **delete**, **discover_nodes**, **init**, **list_nodes**, **list_types**, and **show**.

For more information about the Cluster data Aggregation Tool, see the Cluster Data Aggregation Tool topic in the AIX 6.1 Information Center.

DB2 migration

You can upgrade your DB2 environment with DB2 Version 9.5, DB2 Version 9.1, or DB2 UDB Version 8 copies to DB2 Version 9.7. For more information about upgrading to DB2 Version 9.7, see the Upgrade to DB2 Version 9.7 topic in the DB2 Information Center.

Note: The DB2 High Availability feature is not included in the DB2 version 9.7 FP2. The DB2 HA feature is available in the DB2 Version 9.7 from FP3.

The devices.artic960 fileset

The **devices.artic960** fileset provides support for the IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947). This includes EEH support and 64-bit support for the FC 2947 adapter. If an additional fileset is installed to access the IBM ARTIC960 FC 2947 adapter, full EEH and 64-bit support depends on the ability of the additional fileset to support EEH and 64-bit.

Included with the **devices.artic960** fileset are the following filesets:

- **devices.artic960.rte**, IBM ARTIC960 Runtime Support
- **devices.artic960.unicode**, IBM ARTIC960 Adapter Software
- **devices.artic960.diag**, IBM ARTIC960 Adapter Diagnostics

When a PCI I/O error occurs on an IBM PCI ARTIC960 adapter, the adapter slot becomes frozen and the IBM ARTIC960 adapter can be reset. Following an EEH error, the adapter software needs to be downloaded to the adapter again.

To determine if an EEH error occurred on an IBM ARTIC960 adapter, inspection of the error log is necessary. A temporary EEH error on an IBM ARTIC960 adapter is logged as a temporary EEH error followed by I/O errors specific to the IBM ARTIC960 adapter. Recovery from a temporary EEH error is accomplished by removing and making the IBM ARTIC960 device driver using the **rmdev** and **mkdev** command. This process loads the necessary adapter software onto the adapter.

If the error log shows a permanent EEH error, it is necessary to use the hot plug manager to remove and make the adapter again.

The **devices.artic960** fileset does not support interprocess communication through mailboxes on AIX Version 6.1.

The devices.pci.14108c00 fileset

The **devices.pci.14108c00** fileset provides support for SDLC and bi-synchronous protocols on the IBM ARTIC960Hx 4-Port Selectable PCI Adapter (FC 2947). When combined with the installation of the **devices.artic960** fileset, Enhanced Error Handling (EEH) support is provided. Either 32-bit or 64-bit kernel mode is supported. 32-bit applications are supported.

Error log labels for Fibre Channel adapters have changed in AIX 6.1

The error log templates are in the `devices.common.IBM.fc.rte` files. The `devices.pci.df1000f7.com` driver files that reference the error log templates has changed. The following changes were made in the error logs:

- Errors previously logged using the `FCS_ERRn` template label (where n is between 0 and 10, inclusive) are now logged using the `FCA_ERRn` template label (where n is between 0 and 15, inclusive).
- Errors previously logged using the `FSCSI_ERRn` template label (where n is between 0 and 10, inclusive) are now logged under the `FCP_ERRn` template label (where n is between 0 and 15, inclusive).

The new templates also provide 1024 bytes of detailed data whereas the previous templates had only 228 bytes.

AIXLink/X.25 LPP

AIXLink/X.25 LPP Version 2.1 is supported on AIX Version 6.1.

USB flash drive support

Beginning with AIX 5L version 5.3 with the Technology Level 5300-09 and AIX 6.1 with the Technology Level 6100-02, USB flash drives are supported. Support for these devices is included in the following device package:

```
devices.usbif.08025002
```

AIX support for USB flash drives was validated against a sample of industry standard OEM USB flash drives.

Note: The AIX USB-host controller device driver supports USB 2.0 on AIX 5.3 with Technology Level 5300-10 and later and AIX 6.1 with Technology Level 6100-03 and later.

USB flash drives are configured with logical names such as `usbms0` and `usbms1`, and they present both raw and block special files. For example, the raw special file for `usbms0` is `/dev/rusbms0`, and the block special file is `/dev/usbms0`.

Note: Prior to AIX 5.3 with the Technology Level 5300-11 and AIX 6.1 with the Technology Level 6100-04, USB flash drives were configured as `/dev/flashdrive0`.

The ISO file system (read-only ISO9660) is supported on these drives. It is also possible to create a system backup on the drives by using the `tar` command, `cpio` command or the backup or restore archives. You can also use the `dd` command to add the ISO images to the drives.

AIX does not support plug-and-play for USB flash drives. To make a flash drive available to AIX users, a root user must connect the drive to a system USB port and run the following command:

```
cfgmgr -l usb0
```

Note: Note: Use caution when you remove the flash drives from ports. If the drives are not properly closed or unmounted before you remove them, data on the drives can be corrupted.

After you remove the drives, they remain in the available state in the ODM until the root user runs the following command:

```
rmdev -l usbms<n>
```

When a drive is in the available state, you can reconnect it to the system, and it can be remounted or reopened. If a drive is disconnected from a system USB port while it is still open to a user, that drive will not be reusable until the user closes and reopens it.

iSCSI boot support and IPv6 support

AIX supports booting from an iSCSI attached disk when running on POWER6 or later processors and using the iSCSI software initiator and IPv4. An iSCSI boot does not support IPv6. An iSCSI boot is supported on Power[®] Blade systems using either the iSCSI software initiator or the iSCSI TOE daughter card using IPv4.

The iSCSI TOE PCI adapter and the iSCSI TOE blade daughter card support only IPv4 for both boot and data disks.

When you are booting the iSCSI software initiator, ensure that the Ethernet network is configured so that the link comes up without delay. After the Ethernet link is enabled, the AIX iSCSI software initiator will attempt to contact the iSCSI target for approximately 30 seconds before declaring that the boot disk cannot be found and indicating "554 Unknown Boot Disk". Some Ethernet protocols, such as spanning tree protocols, might prevent the link from coming up in 30 seconds and will cause boot failures. Such protocols must be disabled or overridden on the Ethernet switch if they prevent the Ethernet link from coming up in less than 30 seconds.

Lightweight Infrastructure

The following AIX components rely on and incorporate Lightweight Infrastructure (LWI) v7.1:

- Electronic Service Agent[™] (eSA)
- IBM Systems Director Console for AIX
- Common Agent Services (CAS) Agent

PCIe2 10 GbE RoCE Adapter support

The PCIe2 10GbE RDMA Over Converged Ethernet (RoCE) Adapter was supported only on previous versions of the AIX operating system to use the Remote Direct Memory Access (RDMA) configuration mode. AIX 6 with 6100-08 or later supports the adapter that is configured in either the RDMA or the network interface card (NIC) configuration. The host bus adapter (HBA), which was not available in earlier versions of the AIX operating systems, manages which mode is enabled.

Any firmware updates can be downloaded from IBM Fix Central (www.ibm.com/support/fixcentral/).

The adapter is still configured by default to support the RDMA mode. Complete the steps in Network Interface Card to change it to the NIC mode.

Network Interface Card

As of AIX 6 with 6100-08, the PCIe2 10 GbE RoCE Adapter can be configured to run in the NIC configuration. If you do not have the network-intensive applications that benefit from RDMA, then you can run the adapter in the NIC configuration.

To use the PCIe2 10 GbE RoCE Adapter in the NIC configuration, you must update and install certain filesets that support the NIC configuration. The following filesets are required and are available on the AIX 6 with 6100-08 base operating system CD.

devices.ethernet.mlx

Converged Ethernet Adapter main device driver (mlxentdd)

devices.pciex.b315506b3157265

Packaging support for the NGP ITE Converge Ethernet Adapter ASIC2

devices.pciex.b3155067b3157365

Packaging support for the NGP ITE Converge Ethernet Adapter ASIC1

devices.pciex.b315506714101604

Packaging for Mellanox 2 Ports 10 GbE Converge Ethernet Adapter with the small form factor pluggable (SFP+) transceivers

devices.pciex.b315506714106104

Packaging for Mellanox 2 Ports 10 GbE Converge Ethernet Adapter that supports any SFP+ transceivers

devices.common.IBM.ib

ICM device driver that is required to use the RDMA configuration

devices.pciex.b3154a63

Mellanox 10 GbE Converge Ethernet Adapter device driver that is required to use the RDMA configuration

After the existing RDMA filesets are updated with the new filesets, both the `roce` and the `ent` devices might appear to be configured. If both devices appear to be configured when you run the `lsdev` command on the adapters, complete the following steps:

1. Delete the `roceX` instances that are related to the PCIe2 10 GbE RoCE Adapter by entering the following command:

```
# rmdev -d1 roce0[, roce1][, roce2,...]
```
2. Delete the `entX` instances that are related to the PCIe2 10 GbE RoCE Adapter by entering the following command:

```
# rmdev -d1 ent1[,ent2][, ent3...]
```
3. If there are one or more converged host bus adapters (`hbaX`) that are related to the PCIe2 10 GbE RoCE Adapter, delete them by entering the following command:

```
# rmdev -d1 hba0[, hba1][,hba2...]
```
4. Run the configuration manager to incorporate the changes by entering the following command:

```
# cfgmgr
```

Complete the following steps to switch over to the NIC configuration from the RDMA configuration:

1. Stop all RDMA applications that are running on the PCIe2 10 GbE RoCE Adapter.
2. Delete or redefine the `roceX` instances by entering one of the following commands:
 - `# rmdev -d -l roce0`
 - `# rmdev -l roce0`

The `rmdev -l roce0` command retains the definition of the `roce0` configuration so you can use it the next time to create instances.

3. Change the attribute of the `hba stack_type` setting from `aix_ib` to `ofed` by entering the following command:

```
# chdev -l hba0 -a stack_type=ofed
```
4. Run the configuration manager tool so that the host bus adapter can configure the PCIe2 10 GbE RoCE Adapter as a NIC adapter by entering the following command:

```
# cfgmgr
```
5. Verify that the adapter is now running in NIC configuration by entering the following command:

```
# lsdev -C -c adapter
```

The following example shows the results when you run the `lsdev` command on the adapter when it is configured in NIC mode:

```
ent1 Available 00-00-01 PCIe2 10GbE RoCE Converged Network Adapter
ent2 Available 00-00-02 PCIe2 10GbE RoCE Converged Network Adapter
hba0 Available 00-00 PCIe2 10GbE RoCE Converged Host Bus Adapter (b315506714101604)
```

Figure 1. Example output of **lsdev** command on an adapter with the NIC configuration

Remote Direct Memory Access

The PCIe2 10 GbE RoCE Adapter is preconfigured to operate in the RDMA configuration mode. A network that uses RDMA is more complicated to set up than the NIC configuration mode, but provides better performance than the NIC mode for network-intensive applications. This mode is often helpful for network storage or high-performance computing.

The RDMA configuration requires the use of libraries, such as the Direct Access Programming Library (uDAPL), or interfaces, such as the Message Passing Interface, which are used by the DB2 database system. Example output of the **lsdev** command for the adapters when it is using the RDMA configuration shows the output when the adapter is running in RDMA mode.

The PCIe2 10 GbE RoCE Adapter shows only one adapter instance when it is in RDMA mode, but it can have up to two ports. Use the **ibstat** command to determine how many ports are configured by completing the following steps:

1. Determine whether the **icm** kernel extension is configured by entering the following command:

```
# lsdev -c | grep icm
```
2. If the **icm** kernel is not configured, configure it by entering the following command:

```
# mkdev -c management -s infiniband -t icm
```
3. Run the **ibstat** command by entering the following command:

```
# ibstat roce0
```

While the PCIe2 10 GbE RoCE Adapter is initially configured to use the RDMA mode, you might need to switch back from the NIC configuration. To switch over from the NIC configuration to the RDMA configuration, complete the following steps:

1. Verify that the adapter is in the NIC mode by entering the following command:

```
# lsdev -C -c adapter
```

The output of the **lsdev** command is similar to the example in Example output of **lsdev** command on an adapter with the NIC configuration.

2. Stop the TCP/IP traffic and detach the IP interfaces by entering the following command:

```
# ifconfig en1 down detach; ifconfig en2 down detach
```
3. Delete or redefine the NIC instances by entering one of the following commands:
 - ```
rmdev -d -l ent1; rmdev -d -l ent2
```
  - ```
# rmdev -l ent1; rmdev -l ent2
```

The **rmdev -l ent1; rmdev -l ent2** command retains the definition of the Ethernet devices so that you can use it the next time that you create instances.

4. Change the attribute of the **hba** `stack_type` from `ofed` to `aix_ib` by entering the following command:

```
# chdev -l hba0 -a stack_type=aix_ib
```
5. Run the configuration manager tool so that the host bus adapter can configure the PCIe2 10 GbE RoCE Adapter as an RDMA adapter by entering the following command:

```
# cfgmgr
```
6. Verify that the adapter is now running in the RDMA configuration by entering the following command:

```
# lsdev -C -c adapter
```

The following example shows the results when you run the **lsdev** command for adapters, and the adapter is configured in the RDMA mode.

```
roce0 Available 00-00-00 PCIe2 10GbE RoCE Converged Network Adapter  
hba0 Available 00-00-00 PCIe2 10GbE RoCE Converged Host Bus Adapter (b315506714101604)
```

*Figure 2. Example output of the **lsdev** command for the adapters when it is using the RDMA configuration*

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