

**Abstract:** This document explains best practices and methods for disk-to-removable disk backup and restore of files on the AIX and Linux Power Platforms using the new *USB Removable Disk Drive for Backup/Restore*. The backup and restore are done using standard AIX and Linux commands.

**Disk-to-disk backup and restore of files on  
the AIX and Linux Power Platforms using  
the new *USB Removable Disk Drive for  
Backup/Restore.***

## **Introduction:**

Often the main backup method for a system is to a tape drive data cartridge. The *USB Removable Disk Drive for Backup/Restore* can offer a comparable long term cost alternative to using tape drive data cartridges (The customer should consider benefits of each solution including the initial costs and the long term costs of each solution in their determination of which to use). The *USB Removable Disk Drive for Backup/Restore* offers fast access to the previously stored data verses a tape drive data cartridge.

The *USB Removable Disk Drive for Backup/Restore* accomplishes the backup and restore process using standard AIX and Linux commands. The system administrator is already familiar with these commands, this solution does not introducing new complexity to the backup/restore process.

## **Benefits of Disk-to-Removable Disk Backups:**

Disk-to-Removable Disk backup using the *USB Removable Disk Drive for Backup/Restore* has many benefits when used with AIX or Linux:

- Easily installed in an existing half high media bay in many Power Systems or externally via an external USB port on a Power System.
- The *USB Removable Disk Drive* cartridge is as easily installed and removed from the *USB Removable Disk Drive* dock as a tape data cartridge without the delay in load or unload time found with many tape drives.
- AIX supports this device with many of the same commands used to backup data to a tape drive, such as:
  - o mksysb
  - o Backup and restore
  - o tar
  - o dd
  - o cpio
- AIX mksysb images backed up to the USB removable disk drive for backup/restore are directly bootable from the SMS menu.
- Linux supports the *USB Removable Disk Drive for Backup/Restore* as a standard disk drive, using standard Linux commands for copy, backup and restore.
- Eliminates the need for cleaning cartridges required for tape drives.
- Less effected by harsh environments which effect tape drives (dusty, high traffic areas), such as found in some office environments.
- Can repeatedly be used for small repetitive backups or large daily, weekly or monthly backups.
- Compliments a tape backup solution for those customers requiring both tape and disk backup solutions.
- System administrators are already familiar with copying files and the Universal Disk Format (UDF) file system.

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- Data compression can be done on the AIX system prior to putting the data on the *USB Removable Disk Drive for Backup/Restore* which could double the capacity, assuming a 2:1 compression(data dependent).
- USB 2.0 compatible.
- Relative data rate is approximately 20 MB/s\* compared to some low end tape drives that are approximately 6 to 12 MB/s. \*This is an optimal rate that is command and system dependent.

## Requirements:

- A Power System(p6)
- AIX
  - o AIX AIX 5.3 with the 5300-11 Technology Level, or later.
  - o AIX 6.1 with the 6100-04 Technology Level, or later.
- Linux
  - o SUSE Linux Enterprise Server 10 Service Pack 2, or later.
  - o SUSE Linux Enterprise Server 11, or later.
  - o Red Hat Enterprise Linux version 4.7 or later.
  - o Red Hat Enterprise Linux 5.3 or later
- An internal(IBM Feature Code 1103) or external(IBM Feature Code 1104)
- A 160GB RDX data cartridge(IBM Feature Code 1106, IBM P/N **46C5375**), or a 320GB RDX data cartridge(IBM P/N **46C5377**) or a 500GB RDX data cartridge(IBM Feature Code 1107, IBM P/N **46C5379**).
- Supported USB cables:
  - o The only supported cables are the USB cables supplied with the *USB removable disk drive for backup/restore*. The *USB removable disk drive for backup/restore* is not supported on any other USB cables or in combination with other USB cables.
- Hubs/port replicators are not supported for attach of the *USB removable disk drive for backup/restore*
- Supported USB ports/adapters:
  - o The integrated USB ports on the p6 system are all supported for attach of the external *USB removable disk drive for backup/restore*
  - o The 4 port PCIe USB adapter IBM feature code 2728 is supported for attach of the external *USB removable disk drive for backup/restore*

## Planning your backup/restore strategy:

You must decide if you are going to use only the *USB removable disk drive for backup/restore* as the primary backup solution or use a combination of disk and tape backup solutions.

## The USB Removable Disk Drive for Backup/Restore is NOT a replacement for your system disk drives:

- The *USB Removable Disk Drive for Backup/Restore* product is a backup and restore device only. The device is not a replacement or alternative to Disk Drives and other devices intended for on-line or near on-line storage.

## Understanding the USB Removable Disk Drive for Backup/Restore product:

AIX uses the *USB Removable Disk Drive for Backup/Restore* product differently depending on the program being used:

- The AIX mksysb process builds a list of files to backup, populates a UDF file system, puts a boot image, and puts the root vg on the data cartridge. Once the mksysb completes the *USB Removable Disk Drive for Backup/Restore* product can be used to boot the system.  
If a display of the file system is done during the mksysb process the mounted file system can be seen:

```
/dev/usbms0 312571556 312552452 1% 4776 1% /tmp/mksysb.426214/_udfs.426214
```

If you mount the *USB Removable Disk Drive for Backup/Restore* product you can display and copy files to and from the UDF file system on the data cartridge.

- The AIX tar, backup/restore, dd, and cpio use the *USB Removable Disk Drive for Backup/Restore* product as a sequential device meaning they do not put a file system on the *USB Removable Disk Drive for Backup/Restore* product. However these commands can be used in conjunction with the UDF file system put on the data cartridge by a mksysb and subsequently mounted.

### Using the *USB Removable Disk Drive for Backup/Restore*:

**User Commands:** *USB Removable Disk Drive for Backup/Restore* product is not a tape and does not behave like a tape, it is not possible to put filemarks on it and thus fast forward to put another image. It is used more like DVD.

## AIX

**Note:** User may see increase performance and decrease backup time by doing one or more of the following:

- o Use the drive as a “raw” device such as rusbms0 vs usbms0.
- o Use a large blocking factor such as the “-b512” with the mksysb or the -N512 with the tar command, By increasing the blocking factor AIX reduces the number of writes it takes to write the data to the data cartridge.
- o The "kernel\_heap\_psize" tunable value to increase the default variable to 64KB if it is not at least this size already.

### Generate a system backup

- To generate a system backup and create an /image.data file (generated by the mkszfile command) to a UDFS capable device named /dev/usbms0, enter the following command:

```
mksysb -i /dev/usbms0
```

### Smit to make a bootable disk drive

- Smit can be used to create a bootable disk with or without specific files. Do the following steps to create a bootable disk drive by selecting the following path with root authorization:

```
smitty (enter)
```

```
Software Installation and Maintenance (enter)
```

Alternate Disk Installation (enter)

Clone the rootvg to an Alternate Disk (enter)

### **List the contents of a system backup**

-To list the contents of the system backup located on device /dev/usbms0, use the following command:

```
listvgbackup -f /dev/usbms0  
lsmkysb -f /dev/usbms0  
lssavevg -f /dev/usbms0  
lssavewpar -f /dev/usbms0
```

### **Sample backup commands:**

- To backup all the files in the /etc directory:

```
cd /etc  
ls | backup -ivqf /dev/usbms0
```

- To backup all the files and subdirectories in the /home directory using full path names:

```
find /home -print | backup -i -f /dev/usbms0
```

- To backup all the files and subdirectories in the /home/mikectory directory using relative path names

```
cd /home/mikectory  
find . -print | backup -i -v -q -f /dev/usbms0
```

- To backup the / (root) file system

```
cd /  
backup -0 -u -f /dev/usbms0  
back up a file with "backup"  
cd /tmp  
echo ./cdi_0844A_61F | time backup -iqvf /dev/usbms0
```

### **Sample restore commands:**

The Restore Command extracts files from archives created with the backup command.

- To display a list of all the files backed up from /etc directory:

```
cd /etc  
restore -Tvqf /dev/usbms0
```

- To restore a specific file

```
restore -xvqf /dev/usbms0 myhome.bkup system.data
```

- To restore a specific directory and the contents of that directory from a file-name archive

```
tar -vtf /dev/usbms0
```

- To restore a specific file:

```
cd /tmp
mkdir -p readback
cd readback
restore -xqvf /dev/usbms0
```

### **Sample Backup to add files after backing up the root file system with a mkysyb:**

- To add files to a file system on the usbms it is necessary to mount the file system that was previously created, then either copy, backup, tar, dd, or cpio the additional files to the mounted file system.

```
mount -v udfs /dev/usbms0 /mnt
(note that the mkysyb would be /mnt/usr/sys/inst.images/mkysyb_image)
tar -cvf /mnt/usr/whatever /whatever
```

### **Sample tar commands:**

- To do a system backup with tar

```
cd /
tar -cvf /dev/usbms0 /
```
- To "tar" a directory:

```
tar -cvf /dev/usbms0 /usr
```
- To restore a directory from a "tar" backup:

```
tar -xvf /dev/usbms0
```

### **Compare files:**

- To compare the original and the copy file use the AIX command "cmp".

```
cmp /tmp/cdi_0844A_61F /tmp/readback/cdi_0844A_61F
```

The "cmp" command completes without errors and without showing a difference.  
Cleanup:

```
cd /tmp
rm -r ./readback
```

### **Backup the uservg**

- To back up the uservg volume group to the UDFS capable device /dev/usbms0, enter the following command:

```
savevg -i -f /dev/usbms0
```

**Backup a workload partition**

- To back up the wpar2 workload partition and create a new /tmp/wpardata/userwpar/image.data file to the UDFS capable device /dev/usbms0, enter the following command:

```
savewpar -f /dev/usbms0 wpar2
```

**Restore the workload partition**

-To restore the workload partition image from the /dev/usbms0 device, enter the following command:

```
restwpar -f /dev/usbms0
```

**Restore a partition**

- To read the backup stored at /dev/usbms0 and restore all files to the /data/myfiles directory, enter the following command:

```
restorevgfiles -f /dev/usbms0 -s -d /data/myfiles  
restwparfiles -f /dev/usbms0 -s -d /data/myfiles
```

**Restore the volume group image**

- To restore the volume group image from the /dev/usbms0 device, onto the disks specified in the vname.data file contained within the backup image, enter the following command:

```
restvg -f /dev/usbms0
```

### Display size of the disk cartridge in the dock

- To display the size of a disk cartridge in the dock

```
getconf DISK_SIZE /dev/usbms0
```

returns:

152623            indicates a 160 GB drive

or

305241            indicates a 320 GB drive

or

476936            indicates a 500 GB drive

### Display drive and dock information

- To display drive and dock information

```
lsattr -El usbms0
```

## Linux

### Commands to display drives:

- To display the USB devices  
`lsscsi | grep -i usb`

**Note:** lsscsi must be installed.

- To display the USB devices  
`lsusb`
- To display the USB device verbose details  
`lsusb -v`  
or  
`lsusb -v | more`
- To display the disks on the system  
`fdisk -l`

### Commands to write a backup to the drive.

### Sample backup commands:

**Note:** The `-b` on the backup increases the blocking factor on the write and using a `-b 500` can reduce the time it takes to backup the files.

To backup all the files in the `/` and sub directories

- `cd /`
- `find / -print | backup -i -q -b 500 -f /dev/sbx`

To backup all the files in the /etc directory:

- `cd /etc`
- `ls | backup -ivq -b 500 -f /dev/sbx`

To backup all the files and subdirectories in the /home directory using full path names:

- `find /home -print | backup -i -f /dev/sbx`

To backup all the files and subdirectories in the /home/mikectory directory using relative path names

- `cd /home/mikectory`
- `find . -print | backup -i -v -q -f /dev/sbx`

To backup the / (root) file system

- `cd /`
- `backup -0 -u -f /dev/sbx`
- `back up a file with "backup"`
- `cd /tmp`
- `echo ./cdi_0844A_61F | time backup -iqvf /dev/sbx`

### [Sample restore commands:](#)

The Restore Command extracts files from archives created with the backup command.

To display a list of all the files backed up from /etc directory:

- `cd /etc`
- `restore -Tvqf /dev/sbx`

To restore a specific file

- `restore -xvqf /dev/sbx myhome.bkup system.data`

To restore a specific file:

- `cd /tmp`
- `mkdir -p readback`
- `cd readback`
- `restore -xqvf /dev/sbx`

### Sample cpio commands:

To backup all the files in a directory and sub directories:

- `cd /`
- `find . -print | cpio -ov >/dev/sbx`

### Sample tar commands:

**Note:** The -N on the backup increases the blocking factor on the write and using a -N500 can reduce the time it takes to backup the files.

To do a system backup with tar

- `cd /`
- `tar -cvf /dev/sbx /`

To "tar" a directory:

- `tar -cvf /dev/sbx /usr`

To restore a directory from a "tar" backup:

- `tar -xvf /dev/sbx`

To restore a specific directory and the contents of that directory from a file-name archive

- `tar -vtf /dev/sbx`

## Create a UDF file system and mount the drive.

### **AIX:**

- Create a filesystem on the RDX  
udfcreate -d /dev/usbms0
- To mount the filesystem.  
mount -v udfs /dev/usbms0 /mnt
- To label the UDF filesystem on the usbms0 drive:  
udflabel -d /dev/usbms0 -l removabledisk

### **Linux:**

- Create a filesystem on the RDX  
\$mkfs >t ext2 /dev/sdf "Where /dev/sdf is the device that represents the RDX "
- **Note:** The file system doesn't have to be ext2, it can be other filesystems such as ext3, reiserfs, etc
- Create a directory  
\$mkdir rdx\_drive
- Then mount the directory to the target device  
\$mount /dev/sdf rdx\_drive
- Assuming that you are just copying files over to the RDX so that is a simple copy command  
\$cp file(s) rdx\_drive
- Display the files on the RDX?  
Use the list command "ls"  
\$ls rdx\_drive/\*
- To eject the Disk Drive first unmount the device  
\$umount rdx\_drive
- A mount of the device without any Disk Drive's in the Dock will get a "mount: No medium found" error  
\$mount /dev/sdf rdx\_drive/  
mount: No medium found