



RELEASE NOTES

**EMC[®] NetWorker[®]
Module for SAP with Oracle
Release 3.5
Multiplatform Version**

Release Notes
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These release notes contain supplemental information about EMC[®] NetWorker[®] Module for SAP with Oracle, Release 3.5, Multiplatform Version software. Topics include:

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Revision history

The following table presents the revision history of this document.

Revision	Date	Description
A12	March 20, 2009	Added section: "Where to find the most recent supported operating system and version information" on page 24.
A11	January 19, 2009	Added section: "Configuration wizard not supported with NetWorker Release 7.5 and later" on page 3 and note in: "Wizard for scheduled backup configuration" on page 8.
A10	September 30, 2008	Added documentation errata: "Additional information on PowerSnap configuration" on page 24 and "Additional information on PowerSnap rollback restores" on page 25.
A09	August 13, 2008	Added known problem "PowerSnap PIT restore fails with large number of datafiles" on page 22.
A08	June 20, 2008	Added new feature: "Limited support added for Oracle RAC on Windows" on page 3. Modified new feature: "Support added for LPAR on pSeries AIX and Linux PowerPC operating systems" on page 4 to include support for Linux PowerPC.
A07	June 17, 2008	Revised "Support for Solaris Containers (including Solaris Zones)" on page 9. Added the following known problems and limitations: <ul style="list-style-type: none"> "Backups and restores fail for pathnames that begin with "\\\" on Windows" on page 21 "Sapclone clones all save sets instead of those from the last 24 hours" on page 21 "PowerSnap backups fail with NMSAP on AIX" on page 22 "PowerSnap relocated restore fails" on page 22 "PowerSnap restores fail without the group parameter set in the init<DBSID>.util file" on page 22
A06	March 5, 2008	Added feature: "Support added for LPAR on pSeries AIX and Linux PowerPC operating systems" on page 4.
A05	February 5, 2008	Added feature: "Support added for backup and restore with a NetWorker 7.3.x and earlier client" on page 4 with information for the software patch.
A04	November 16, 2007	Added feature change: "PATH parameter is now mandatory for NMSAP operations" on page 4. Added feature: "Improved save set reporting to NetWorker Management Console" on page 8 with description of PID format.
A03	October 24, 2007	Added feature: "Support for split-mirror backups" on page 9.
A03	October 24, 2007	Added known limitation: "Recovery of split-mirror backups may fail on Microsoft Windows" on page 23 and "Configuration wizard not supported for split-mirror backups" on page 23.
A02	September 21, 2007	Added feature: "Support for ZFS file systems on Solaris" on page 9.
A01	August 2, 2007	Initial release of the product.

Product description

The NetWorker[®] Module for SAP with Oracle (NMSAP) software is an add-on module for EMC[®] NetWorker client software that provides a backup and restore interface between the SAP **BRTools** program and the NetWorker server. The main component of the NMSAP software is the **backint** program, which provides backup, inquiry, and restore operations for SAP Oracle data.

The NMSAP software provides the following operations for SAP Oracle data:

- ◆ Manual backups
- ◆ Scheduled backups
- ◆ Inquiry of backed up data
- ◆ Restores of backed up data
- ◆ Automated media management
- ◆ Snapshot backup and recovery (using EMC PowerSnap[™] software)
- ◆ Split-mirror backup and recovery (using EMC Replication Manager software)
- ◆ Sapclone

Environment and system requirements

As a client-side product, the NMSAP software, along with the NetWorker client software, must reside on each SAP Oracle server. The NetWorker server software and SAP software can reside on either the same or separate systems.

The *EMC Information Protection Software Compatibility Guide*, available on the EMC Powerlink website, provides current details on supported operating systems and versions on which this release of NMSAP software operates, as well as the supporting software that is required to properly configure this software.

New features and changes

The NMSAP release 3.5 software includes the following new features and changes.

Configuration wizard not supported with NetWorker Release 7.5 and later

The NMSAP Release 3.5 scheduled backup configuration wizard is not supported with NetWorker release 7.5 or later software. A scheduled backup in this case must be manually configured according to the instructions in the *NetWorker Module for SAP, Release 3.5, Administration Guide*.

Limited support added for Oracle RAC on Windows

Oracle Real Application Clusters (RAC), a cluster database with a shared cache architecture, on Oracle Cluster File Systems (OCFS) with Oracle Clusterware is supported on Microsoft Windows operating systems. This support is limited to use without PowerSnap or Relpication Manager (split-mirror backups).

Support added for LPAR on pSeries AIX and Linux PowerPC operating systems

IBM Dynamic Logical Partitioning (LPAR) and micro-partitioning with multiple LPAR partitions is supported on pSeries AIX and Linux PowerPC operating systems.

LPAR allows the dynamic division of a single server into several completely independent virtual servers or logical partitions without restarting the partitions. Micro-partitioning allows multiple logical partitions to automatically share the system's processing power. These features provide more efficient resource allocations, more logical partitions, and higher resource utilization.

Note: NMSAP must be installed on each LPAR partition on pSeries AIX or Linux PowerPC systems.

Support added for backup and restore with a NetWorker 7.3.x and earlier client

As released, NMSAP 3.5 software supports only NetWorker 7.4 and later clients. A binary patch file, **nsr_render_log.exe**, enables the NMSAP 3.5 software to perform backup and restore operations with a NetWorker 7.3.x or 7.2.x client.

Note: The **nsr_render_log** file does not add new features and functionality that were added in NetWorker Release 7.4. These include I18N and L10N support, backup configuration wizard support, and improved scheduled backup reporting in NMC.

To install the patch:

1. Obtain the **nsr_render_log** file from the Updates download site.
`ftp://ftp.legato.com/pub/NetWorker/Updates/render_logs/platform`
where *platform* is the folder for the operating system of the NMSAP client.
2. Place a copy of the **nsr_render_log** file into the same directory that contains the NetWorker client binaries.
3. Ensure the NetWorker client binaries directory is in the \$PATH environment variable. It should be either in the environment for manual backup operations or in the nsrsapsv.cfg file for scheduled backup operations.

Note: For Microsoft Windows systems, this patch should be manually removed before an upgrade to a NetWorker 7.4 or later client.

The *EMC NetWorker Command Reference Guide* and the Support Solution esg92218, available through the EMC Powerlink website at <http://Powerlink.EMC.com>, provide details on the nsr_render_log binary.

PATH parameter is now mandatory for NMSAP operations

The PATH parameter in the scheduled backup configuration file (nsrsapsv.cfg or renamed version of this file) must be set to the location of the NetWorker client binaries. For manual backups and restores, the \$PATH environment variable must be set in the shell in which the BRTTools commands are run.

The NMSAP Administration Guide provides details on how to configure the PATH parameter.

Note: Ensure the path to the location of the NetWorker client binary is specified if the following error occurs: “The version of the NetWorker client application that is installed is not supported. Please see NMSAP documentation for more details.”

Internationalization

The NMSAP 3.5 software provides internationalization (I18N) support. Non-ASCII data from a NMSAP 3.5 client can be monitored, backed up, and restored with a NetWorker 7.4 server that may be configured for any of the supported locales. For example, a NetWorker server with an English locale can view and manage backups from a NMSAP client with a Japanese locale and vice versa.

I18N support assumes the use of NMSAP 3.5 software with the following I18N products:

- ◆ Internationalized operating system
- ◆ Unicode version of BRTools
- ◆ NetWorker release 7.4 and later server and client

Non-ASCII characters

The NMSAP client supports non-ASCII (I18N) characters for the following:

- ◆ Full pathnames of configuration and parameter files, for example: `init<DBSID>.sap`, and `init<DBSID>. utl`.
- ◆ Full pathnames of operational log files, for example for `SAPBACKUP` and `SAPTRACE`.
- ◆ Full pathnames of variables that are set in the `nsrsapsv.cfg` file, for example: `PATH`, `SAP_BIN`, `SAPBACKUP`, `SAPARCH`, `SAPCHECK`, `SAPREORG`, and `SAPTRACE`.
- ◆ Most strings that are passed as command-line options to the NMSAP programs **nsrsapadm**, **nsrsapsv**, **sapclone**, and **backint**. Exceptions are the Oracle username and password, which is an Oracle limitation, and the full pathname of the NMSAP scheduled backup configuration file, which is a NetWorker 7.4 software limitation. “[ASCII characters](#)” on page 5 gives details.
- ◆ All NetWorker parameters that are supported by NetWorker 7.4 software. Currently the NMSAP uses only one of these parameters, the save set name.
- ◆ Environments configured by the scheduled backup wizard.

Note: The `NLS_LANG=AMERICAN.AMERICA.US7ASCII` parameter value, which is used in the sample backup configuration file (`nsrsapsv.cfg`) that is shipped with the product or generated by the NMSAP backup configuration wizard, is an example or default value. This value can, and in some cases should, be set to another value. Refer to the SAP documentation on how to set the `NLS_LANG` parameter.

ASCII characters

Some Oracle, BRTools, and NetWorker software configurations that are used with the NMSAP client do not support I18N and are required to use ASCII characters. Read the appropriate product documentation for complete details. Some examples of these exceptions are as follows:

- ◆ Oracle requires ASCII characters for the following:
 - ORACLE_HOME environment variable
 - Password for the Oracle database user
 - Oracle instance name (DBSID)
- ◆ BRTools requires ASCII characters for the following:
 - Connection strings (database username and password) to the Oracle database
 - Oracle data files, log files, control files, parameter file name and paths
 - Oracle tablespace name
- ◆ Snapshot-based NMSAP backups and restores are not supported for I18N and use ASCII characters only.
- ◆ NetWorker 7.4 software requires ASCII characters for the following:
 - The NetWorker client, server, pool, group, expiration policy, and email notification parameters, which are set in the NMSAP parameter file (init<DBSID>.utl).
 - The NMSAP scheduled backup configuration file pathname, which is passed to the Backup command attribute in the NetWorker Client resource.

Language packs

NMSAP 3.5 language packs, new for this release, provide localized operation in Japanese, Korean, Simplified Chinese, and French. The language packs enable NMSAP features such as wizard pages, man pages, logs, and error messages to be displayed in the localized languages and numerical formats.

If the computer operating system is localized for a one of the supported languages and the NMSAP software is installed with the language pack for that language, then the NMSAP software detects the locale and runs in that language.

Supported Locales [Table 1 on page 6](#) lists the supported locales.

Table 1 Supported Locales (Sheet 1 of 2)

Language	Operating system				
	Windows	Solaris	HPUX	AIX	Linux
English	English	OS Default Locale	OS Default Locale	OS Default Locale	OS Default Locale
French	French (France)	UTF-8 ISO8859-1 ISO8859-15	UTF-8 ISO8859-1 ISO8859-15	UTF-8 ISO8859-1 ISO8859-15	UTF-8 ISO8859-1 ISO8859-15
Japanese	Japanese (Japan)	UTF-8 EUC-JP S-JIS	UTF-8 EUC-JP	UTF-8 EUC-JP	UTF-8 EUC-JP S-JIS

Table 1 Supported Locales (Sheet 2 of 2)

Language	Operating system				
	Windows	Solaris	HPUX	AIX	Linux
Chinese	Chinese (China)	UTF-8 EUC-CN GB18030 GBK BIG5	UTF-8 EUC-CN	UTF-8 EUC-CN	UTF-8 EUC-CN GB18030 GBK BIG5
Korean	Korean (Korea)	UTF-8	UTF-8	UTF-8	UTF-8

Note: Localization is not supported on the Mac OS, Tru 64 or SGI platforms.

Man page locales Man pages are displayed based on the locale setting for a specific language.

The following EUC locales are supported:

- ◆ Chinese: **EUC-CN**
- ◆ French: **ISO8859-15**
- ◆ Korean: **EUC-KR**
- ◆ Japanese: **EUC-JP**

If the locale is not set to a specific language matching an installed language pack, the man pages will be displayed in English.

Localized and non-localized logs

The NMSAP operational log file, backint<DBSID>.log, which runs during normal NMSAP client operation, is localized by the language packs. The localized version of this log can be read and interpreted to any of the supported locales by the NetWorker log viewer, new for NetWorker 7.4.

Logs that are generated in debug mode are intended for technical support and engineering troubleshooting only and are not localized. Also the nrsapsv and sapclone log files are not localized.

Localized documentation

Localized versions of the NMSAP 3.5 administration guide, installation guide, and command reference guide are available from the EMC Powerlink website in English, Japanese, Korean, Simplified Chinese, Traditional Chinese, and French. The release notes are available in English only.

Support added for operating systems

The NMSAP 3.5 software adds support for the following platforms:

- ◆ Linux on Power PC
- ◆ Solaris AMD64
- ◆ Microsoft Windows (64-bit) AMD64

Note: The RMAN component is not supported on Linux on Power PC.

Wizard for scheduled backup configuration

The NMSAP 3.5 software provides a wizard for the configuration of scheduled backups. The wizard can lead users through either a "typical configuration," by presenting a limited number of steps with typical default values, or through a "custom configuration," which offers more steps and flexibility in the settings of non-default backup parameters.

For example, a custom backup configuration would be used to perform an on-line backup, a backup of only a specific tablespace, data file or archived logs, or to set some non-default values for SAP and NMSAP parameters.

Note: The NMSAP scheduled backup configuration wizard is not supported with NetWorker release 7.5 or later. In this case, a scheduled backup must be manually configured according to the instructions in the *NetWorker Module for SAP, Release 3.5, Administration Guide*.

Integration with PowerSnap for NAS devices

The NMSAP 3.5 software supports PowerSnap backup and recovery of Oracle databases on EMC Celerra.

NMSAPO package removed

The RMAN component of NMSAP, which in previous releases required installation from a separate NMSAPO installation package, is now included as part of the NMSAP installation.

Improved save set reporting to NetWorker Management Console

The NMSAP 3.5 software now reports save set information to a NetWorker 7.3.2 and later Management Console (NMC), including the number of sessions and the amount of data backed up by NMSAP for non-snapshot-based backups.

During a backup, NMSAP 3.5 adds a process ID (PID), to each save set name as follows:

```
ssNameFormat=old          backint:<DBSID>_PID
ssNameFormat=new          backint:<DBSID>_PID:filepath
```

Note: "Known problems and limitations" on page 18 provides details and workarounds for the following cases where NMSAP information may not be reported in NMC.

- ◆ "RMAN save sets are not displayed by the NetWorker Console on Windows systems" on page 19.
- ◆ "Backup information for clients in snapshot groups is not displayed in NMC" on page 21.

Support for Solaris Containers (including Solaris Zones)

Solaris 10 operating systems provide a type of virtualization, known as Solaris Containers, that is implemented at the level of the operating system. Solaris Containers consist of system resource controls and boundary separations that create zones. Each zone acts as a completely isolated virtual server within the single operating system instance. Thus multiple sets of application services can be placed into isolated virtual server containers on one computer. This consolidation of resources reduces cost and provides the same protection as separate computers.

Zones hosted by the "global" zone are divided into two types: "Whole Root Zones" and "Sparse Zones." Each Whole Root Zone has its own copy of the global zone resources. Sparse Zones are used to conserve disk space and each Sparse Zone reads a portion of the resources from the global zone.

The NMSAP 3.5 software may be installed on Solaris SPARC and AMD64 platforms to run in any of these Solaris zones. No special steps are required to install NMSAP software on global or Whole Root Zones. Sparse Zones require the NMSAP software to be installed on the global zone as well as each Sparse Zone.

Support for ZFS file systems on Solaris

The NMSAP 3.5 software adds support for ZFS file systems on Solaris operating systems. This support has the following limitations:

- ◆ Only a root user with full access to ZFS directories may recover files, which means that the **brrecover** and **brrestore** commands must be run by a root user.
- ◆ When restoring ZFS files to a UFS file system, only the permission information is retained. The access control entries are not retained.
- ◆ Backup and recovery of raw partitions on Solaris ZFS file systems is not supported.

Support for split-mirror backups

NMSAP 3.5 software supports split-mirror backup of production data stored on an EMC storage array, such as Symmetrix[®] or Clariion[®], using EMC Replication Manager (RM) software. RM performs replica (mirror) creation and the mounting, dismounting, and expiration of replicas on disk subsystems.

At backup time, data on the production host is replicated by RM to a mount host (also known as the backup host) and then it is backed up from the mount host to the NetWorker server by NMSAP.

This technology nearly eliminates the use of the production host's resources to perform backups. It also enables rapid cloning of the entire database system and the quick implementation of a standby failover server.

Split-mirror backup and restore processes

During a backup of SAP data, the SAP **brbackup** command interacts with RM to create the replica (mirror) and with NMSAP to back up the replica.

Note: The SAP split-mirror backup framework does not support the backup of archived logs. To fully protect the SAP environment, NMSAP should be configured on the production host to directly back up archived logs.

The SAP **splitint** interface is *not* supported by the NMSAP with RM split-mirror backup implementation.

Manual split-mirror backup processes

A manual split-mirror backup is started on the mount host by running the SAP **brbackup** command. This involves the following interactions.

1. The **brbackup** program contacts the production database to determine the location of objects to be backed up. For an online backup, it also creates a copy of the control file on the mount host.
2. **brbackup** prepares the production database for the backup.
 - For an online backup, it puts the required tablespaces into backup mode.
 - For an offline backup, it shuts down the database.
3. **brbackup** executes the script specified by the **split_cmd** parameter in the `init<DBSID>.sap` file.
4. The split script runs a Replication Manager job that creates a database replica and mounts it on the mount host.
5. The script ends executions and returns control to **brbackup**.
6. **brbackup** completes its interaction with the production database.
 - For an online backup, it takes the tablespaces out of backup mode.
 - For a offline backup, it restarts the database.
7. **brbackup** runs the NMSAP **backint** binary on the mount host to save the replica data.
8. **backint** establishes connection with the NetWorker server, backs up the data and records the backups in the NetWorker server catalog.
9. **brbackup** records the backup in its own catalog on the mount host and makes a copy of the catalog on the production host.

Scheduled split-mirror backup processes

Scheduled split-mirror backups are scheduled through the NetWorker server. At the scheduled backup start time, the following interactions occur:

1. The NetWorker server contacts the NetWorker client on the mount host.
2. The NetWorker client calls the NMSAP **nsrsapsv** scheduled backup program.
3. **nsrsapsv** sets the environment needed to run the **brbackup** program, and runs the **brbackup** program, as configured in the NMSAP `nsrsapsv.cfg` configuration file.
4. From this point onward, the backup follows the same processes as a manual backup.

Recovery processes

Recovery operations are the same as for regular NMSAP backups and do not involve Replication Manager.

By default, NMSAP stores backup entries in the NetWorker catalog under the name of the client that it backs up, in this case the mount host. The backup data can be restored to either the mount host or the production host by running the **brrestore** command on the host where the restored data is to reside.

The *EMC NetWorker Module for SAP with Oracle Administration Guide* provides the details on data recovery.

Split-mirror implementation

EMC split-mirror backup implementation requires the configuration of four hosts. Some of the hosts may be installed on the same physical computer.

- ◆ SAP Oracle database production host
- ◆ SAP Oracle database mount host (also known as the backup host)

The database replica (mirror) may be mounted on the production host (single-host configuration) or on a separate mount host computer (two-host configuration).
- ◆ Replication Manager (RM) server host

RM has client-server architecture in which a single RM server (supported on Windows only) can manage multiple clients (called agents) installed on different operating systems.

 - The RM server may be installed on either the production host, the mount host, or a third host.
 - The RM agent software must be installed on both the production host and mount host.
- ◆ NetWorker server host

The NetWorker server may be installed on either the production host, the mount host, or a third host.

How to configure the production host for split-mirror backups

The production host requires configuration of Oracle, BRTools, and NMSAP software.

Note: Examples of scripts, configuration files, and environment examples are provided at the end of the split-mirror backup section, starting with [“Example Replication Manager scripts for split-mirror backups”](#) on page 15.

Oracle

Follow the SAP documentation for details on how to create an Oracle production database on the production host.

The following details apply specifically to split-mirror backups:

1. It is recommended to use the same ORACLE_HOME and user operating system account on both the production host and mount host.
2. Ensure the database is in archived log mode.
3. Ensure the following database files are located on the storage array:
 - Database files
 - Control file
 - Parameter file (init<SID>.ora)
 - Redo log files
 - Archived logs
 - Dump files
4. Configure and start the Oracle Net services. This enables the mount host to connect to the production database.

- Grant sysoper and sysdba privileges to the SAP database user for BRTools operations.

BRTools

Follow the SAP documentation for details on how to configure BRTools on the production host.

The following details apply specifically to split-mirror backups:

- It is recommended to use the same paths for SAP specific parameters such as SAPBACKUP, SAPARCH, etc. on both the production host and mount host.
- On Microsoft Windows systems, use NFS to share the %SAPBACKUP% directory, located on the production host, with the mount host.

Ensure the Oracle and SAP user and services on the mount host have read and write permissions on the %SAPBACKUP% directory. This is required to copy the control file to the %SAPBACKUP% directory during a split-mirror backup.

Note: NFS sharing enables the files located in the %SAPBACKUP% directory to be backed up. However, restore of these files requires the use of NetWorker file system tools, such as the **recover** command or the client graphical user interface. [“Recovery of split-mirror backups may fail on Microsoft Windows” on page 23](#) provides details.

NMSAP

Install NMSAP on the production host. This enables the following activities:

- ◆ Back up of Oracle archived logs, which must be performed outside of the split-mirror backup framework.
- ◆ Recovery of the backups directly to the production host instead of the mount host.

How to configure the mount host for split-mirror backups

The following sections give some important details for the mount host configuration.

Note: Examples of scripts, configuration files, and environment examples are provided at the end of the split-mirror backup section, starting with [“Example Replication Manager scripts for split-mirror backups” on page 15](#).

Oracle

Follow the Oracle documentation for details on how to configure the Oracle software on the mount host.

The following requirements and recommendations apply specifically to split-mirror backups:

- It is recommended to use the same ORACLE_HOME and user operating system account on both the production host and mount host.
- Configure and start the Oracle Net services. This enables the mount host to connect to the production database.
- Either copy the init<SID>.ora parameter file from the production host to the mount host, or create a dummy init<SID>.ora file that contains the following parameters:
 - db_name=*SID of the production database*

- `control_files=(location of the control file on the production host, location2)`

BRTools

Follow the SAP documentation for details on how to configure BRTools on the mount host.

The following requirements and recommendations apply specifically to split-mirror backups:

1. It is recommended to use the same paths for SAP specific parameters such as SAPBACKUP, SAPARCH, etc. on both the production host and mount host.
2. Create the **split** command script by following the appropriate Replication Manager documentation.
3. Set the following parameters in the `init<DBSID>.sap` BRTools configuration file:

- `split_cmd = location of the RM split command script`
- `primary_db = SID of the production database`

Note: For a single-host configuration (where the mount host is the same as the production host), this parameter must be set to the following key word:
`primary_db = LOCAL`

- `orig_db_home = $SAPDATA_HOME on the production host`

Note: This parameter is required when the replica is mounted onto a different directory than the production database, for example in a single-host environment.

4. For a two-host UNIX environment, set the following parameters in the `init<DBSID>.sap` file:

- `remote_host = production database host`
- `stage_copy_cmd = rcp | ftp | scp`
Set one of these values only.

Note: Ensure that the SAP user on the mount host is allowed to perform the specified command on the production host.

5. In a Microsoft Windows environment, mount the shared `%SAPBACKUP%` directory under the same path as on the production host.

Note: The `%SAPBACKUP%` directory must be shared because SAP split-mirror backups do *not* support FTP or RCP on Windows.

6. Set the following parameters in the `init<DBSID>.sap` file, or specify them as command line options to the **brbackup** command.

Note: The command line options take precedence over the corresponding parameters set in the `init<DBSID>.sap` file.

- `backup_type = online_split | offline_split`
- `backup_dev_type = util_file`
- `util_par_file = location of the NMSAP config utl.file`

7. Set the SAP environment variables as follows:
 - `$SAPDATA_HOME` = *location of the replica*
 - Set other required variables, for example `$SAPBACKUP`, as described in the BRTools documentation.

Note: It is recommended to use the same parameter values on both the production host and mount host whenever possible.

NMSAP

Follow the NMSAP administration guide for details on how to configure NMSAP.

For scheduled backups, ensure that the `nsrsapsv.cfg` file, on the mount host, contains the following setting:

`PATH = location of the Replication Manager agent binaries`

Note: The NMSAP 3.5 configuration wizard does not support the configuration of split-mirror backups. Scheduled split-mirror backups must be manually configured.

How to configure the Replication Manager server host for split-mirror backups

Follow the Replication Manager (RM) documentation for details on how to configure the RM server for SAP replication.

The following requirements apply specifically to split-mirror backups:

1. Add the array devices to the RM storage pool. The devices must be visible to both the production host and mount host.
2. Create an application set and a RM job for the SAP Oracle database instance. In the RM job properties, select the **Consistent split replication** option.
3. In the RM job properties, unselect **Unmount the replica on job completion**. The replica should stay mounted after the RM job completes and the job should fail if the replica mount attempt fails.

How to configure the NetWorker server host for split-mirror backups

Follow the NMSAP administration guide for details on how to configure the NetWorker server for NMSAP manual and scheduled backups.

The following requirements apply specifically to split-mirror backups:

1. Configure the NetWorker Client resource for the production host with the following settings:
 - Scheduled backup group: None, unless this resource is configured for archived log backups.
 - Remote access: `SAP_user@mount_host`
2. Configure the NetWorker Client resource for the mount host with the following settings:
 - Save set: **backint:**<DBSID>
 - Group: `NMSAP group`
 - Backup command: **nsrsapsv -f** *location of nsrsapsv.cfg file*
 - Remote access: `SAP_user@production_host`

How to configure a cluster environment for split-mirror backups

Follow the NMSAP and NetWorker administration guides for details on how to configure a cluster environment for scheduled backups.

The following requirements apply specifically to split-mirror backups:

1. Configure the required production host software on each physical node of the cluster, and configure the required mount host software on a computer that is located *outside* of the cluster.

Note: Only a production host can be in a cluster environment. The mount host must be a stand-alone host.

2. Store the BRTools configuration file, `init<DBSID>.utl`, and NMSAP configuration file, `nsrsapsv.cfg`, in the same location on each physical node.
3. Use the virtual node name for the production hostname.
4. On the NetWorker server, create and configure the NetWorker Client resource for each physical node with the following settings:
 - Generic NetWorker resource (not NMSAP-specific)
 - Group: none
5. On the NetWorker server, create and configure the NetWorker Client resource for the virtual node with the following settings:
 - Group: none, unless this resource is configured for archived log backups.
 - Remote access:
 - `SAP user@physical node #1`
 - `SAP user@physical node #2`
 - `SAP user@mount host`
6. Configure the NetWorker Client resource for the mount host with the following settings:
 - Save set: **backint:**`<DBSID>`
 - Group: `NMSAP group`
 - Backup command: `nsrsapsv -f location of nsrsapsv.cfg file`
 - Remote access: `SAP_user@virtual_node`

Example Replication Manager scripts for split-mirror backups

This section contains example Replication Manager (RM) scripts that can be modified as needed for specific environments and configurations. Different scripts are used on UNIX and Microsoft Windows platforms.

Note: The following simple scripts have no error handling and do not consider possible use cases where the operations might fail.

sap_online_split script for RM on UNIX

```
# SAP_ONLINE_SPLIT
# File to launch into ermcli and read the commands to execute
WDIR=/space10/home/ora101/nmsap/nas
RMDIR=/opt/emc/rm/gui
LOG=/opt/emc/rm/logs/cli
DATE=`date '+DATE %m_%d_%y_'|awk '{print $2}'`
```

```

echo "Date $DATE" >>
/db/app/oracle/product/10.1.0/db_1/SAP/sapbackup/echo.log 2>&1
TIME=`date '+TIME %H:%M'|awk '{print $2}'`
echo "Time $TIME" >>
/db/app/oracle/product/10.1.0/db_1/SAP/sapbackup/echo.log 2>&1
$RMDIR/rmcli host=cdendobread1c port=65432
file=$WDIR/erm_brbackup_online_split.sh >> $LOG/brbackup_online_spl
it$DATE$TIME.log 2 >&1
echo "End of the RM split command" >>
/db/app/oracle/product/10.1.0/db_1/SAP/sapbackup/echo.log 2>&1

```

erm_brbackup_online_split.sh script for RM on UNIX

```

login user=Administrator password=emc
run-activity name=sap_brbk_j infoset=sap_brbk
exit

```

sap_online_split.cmd script for RM on Microsoft Windows

```

@echo off
REM EMC_SAP_ONLINE_SPLIT
REM File to launch into ermcli and read the commands to execute
set WDIR=C:\oracle\product\brtools\7.00
set RMDIR=C:\Program Files\EMC\rm\gui
set LOG=C:\Program Files\EMC\rm\logs\client
"%RMDIR%\rmcli.bat" file=%WDIR%\erm_online_split.cmd >>
%LOG%\rmjob_output.txt

```

```

echo #INFO Success

```

erm_online_split.cmd script for RM on Microsoft Windows

```

connect host=cdendobread1c port=65432
if-not login user=Administrator password=emc then exit 1
if-not run-job name=sap_buhuron appset=clar_buerie then exit 1

```

Example configuration file attributes for split-mirror backups

This section lists examples of attributes that must be set in configuration files on the production host and mount host for split-mirror backup and restore. These example values should be modified according to the requirements of the environment.

Note: In the following examples, the name of the production host is "bu-erie."

Example attributes to set on the production host

The production host contains configuration files for Oracle, BRTools, and NMSAP.

Oracle

initSAP.ora — Example configuration file attributes

```

control_files = (H:\oradata\SAP\sapdata1\cntrl\ctrlSAP.ctl,
H:\oradata\SAP\sapdata2\cntrl\ctrlSAP.ctl,
H:\oradata\SAP\saparch\cntrl\ctrlSAP.ctl)
background_dump_dest = H:\oradata\SAP\saptrace\background
user_dump_dest = H:\oradata\SAP\saptrace\usertrace
log_archive_dest = H:\oradata\SAP\saparch
log_archive_format = SAParch%t_%s_%r

```

listener.ora — Example configuration file attributes

```

SID_LIST_LISTENER =
(SID_LIST =
(SID_DESC =
(SID_NAME = SAP)

```

```

        (ORACLE_HOME = C:\oracle\product\10.2.0\db_1)
    )
)

```

Example attributes to set on the mount host

The mount host contains configuration files for Oracle, BRTools, and NMSAP.

Note: In this example, settings on the mount host refer to the production hostname "bu-erie."

Oracle

initSAP.ora — Example configuration file attributes

```

db_name=SAP
control_files = (H:\oradata\SAP\sapdata1\cntrl\ctrlSAP.ctl,
H:\oradata\SAP\sapdata2\cntrl\ctrlSAP.ctl,
H:\oradata\SAP\saparch\cntrl\ctrlSAP.ctl)

```

tnsnames.ora — Example configuration file attributes

```

SAP =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = bu-erie) (PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = SAP)
    )
  )
)

```

BRTools

initSAP.sap — Example configuration file attributes

```

split_cmd = F:\oracle\product\brtools\7.00\online_split.cmd
backup_type = online_split
primary_db = SAP
backup_dev_type = util_file
util_par_file = initsAP.utl
orig_db_home = H:\oradata\SAP

```

Note: If mount host is the same as production host then set primary_db = LOCAL.

nsrsapsv.cfg — Example scheduled backup configuration file attributes

```

BR_EXEC=brbackup -m all -d util_file -r
F:\oracle\product\10.2.0\db_1\database\initsAP.utl -p
F:\oracle\product\10.2.0\db_1\database\initsAP.sap
ORACLE_HOME=F:\oracle\product\10.2.0\db_1
ORACLE_SID=SAP
NLS_LANG = AMERICAN_AMERICA.US7ASCII
SAPBACKUP=\\bu-erie\I\oradata\SAP\sapbackup
SAPDATA_HOME=H:\oradata\SAP
SAP_BIN=F:\oracle\product\brtools\7.00
Path=C:\Program Files\EMC\rm\client\bin

```

Fixed problems

Table 2 on page 18 lists important defects that were found to have occurred under certain circumstances and are now resolved by the NMSAP Release 3.5 software.

Table 2 Defects fixed in NMSAP Release 3.5

Number	Description
LGTpa65601	The group parameter in the init<DBSID>.utl file is now optional. The group attribute set in the Client resource on the NetWorker server is now used for NMSAP scheduled backups unless explicitly overwritten by a different value in the init<DBSID>.utl file. This change allows a central NetWorker server to more effectively schedule and apply changes to NMSAP backups.
LGTpa87497	The pool parameter in the init<DBSID>.utl file is now optional. The pool attribute set in the Client resource on the NetWorker server is now used for NMSAP scheduled backups unless explicitly overwritten by a different value in the init<DBSID>.utl file. This change allows a central NetWorker server to more effectively schedule and apply changes to NMSAP backups.
LGTpa88393	Once used, some backup directives could not be reset. The backup directive file, is now session-specific so that subsequent backup sessions do not apply unwanted directives that were used previously.
LGTpa93229	No method of backup notifications on Microsoft Windows systems were documented. “Backup email notifications” on page 23 gives details on how to enable backup notifications on Windows systems.
LGTpa94438	The browse and retention policies in the init<DBSID>.utl file are now optional. The browse and retention attributes set in the Client resource on the NetWorker server are now used for NMSAP scheduled backups unless explicitly overwritten by different values in the init<DBSID>.utl file. This change allows a central NetWorker server to more effectively schedule and apply changes to NMSAP backups.

Known problems and limitations

Table 3 on page 18 lists problems and limitations that were found to occur under certain circumstances and continue to be applicable to this release of the NMSAP software.

Note: Some of the issues, which are not identified by a defect number, are dependant on the functionality of other products that are used with the NMSAP software. The most up-to-date product issues for NMSAP are detailed online in the EMC Issue Tracker available on the EMC Powerlink website: <http://Powerlink.EMC.com>.

Table 3 Known problems and limitations that continue to be applicable (Sheet 1 of 2)

Number	Description	Operating system
“LGTpa96555” on page 19	Snapshot backups leave NetWorker out of sync with Clariion	Solaris
“LGTsc03751” on page 19	Client installation on HP-UX systems elicits a dependency check error	HP-UX
“LGTsc05741” on page 19	RMAN save sets are not reported by the NetWorker Console on Windows systems	Microsoft Windows
“LGTsc06455” on page 20	Backup configuration wizard does not show NetWorker client version on Linux	Linux
“LGTsc06833” on page 20	Backup fails if a NSR* parameter for RMAN is set to an invalid value	Microsoft Windows
“LGTsc07211” on page 20	Scheduled backups fail if the nsrsapsv.cfg file contains non-ASCII characters	UNIX, Linux
“LGTsc07628” on page 20	Savegroup error message lacks proper display of log file location on localized Linux systems	Linux
“LGTsc07671” on page 20	Localized wizard displays incorrect characters on Solaris	Solaris

Table 3 Known problems and limitations that continue to be applicable (Sheet 2 of 2)

Number	Description	Operating system
"LGTsc07710" on page 21	Language pack fails to install on Linux due to file conflict	Linux
"LGTsc07817" on page 21	Backup information for clients in snapshot groups are not displayed in NMC	Any
"LGTsc08826" on page 21	Backups and restores fail for pathnames that begin with "\\\" on Windows	Microsoft Windows
"LGTsc10057" on page 21	Sapclone clones all save sets instead of those from the last 24 hours	Any
"LGTsc10767" on page 22	PowerSnap backups fail with NMSAP on AIX	AIX
"LGTsc14742" on page 22	PowerSnap relocated restore fails	Microsoft Windows
"LGTsc16358" on page 22	PowerSnap restores fail without the group parameter set in the init<DBSID>.utl file	Solaris
"LGTsc10753" on page 22	PowerSnap PIT restore fails with large number of datafiles	Any
n/a	"Canceled manual online backup on Linux leaves database in backup mode" on page 22	Linux
n/a	"Chained symbolic links are not supported" on page 23	UNIX
n/a	"Recovery of split-mirror backups may fail on Microsoft Windows" on page 23	Microsoft Windows
n/a	"Configuration wizard not supported for split-mirror backups" on page 23	Any supported

Snapshot backups leave NetWorker out of sync with Clariion

LGTpa96555 A PowerSnap NMSAP backup made on a Clariion storage array may have been successful and be deleted from the array, but the NetWorker media database index does not record the backup and still shows the previous backup entry.

The daemon.log file may contain errors similar to the following:

```
nsrd: Impersonation was requested by: "remoteuser@jupiter", but the
user does not have enough privileges to impersonate.
```

```
nsrd: PowerSnap notice: Operation Requested for: backint:SAP:PS:
```

This discrepancy can occur when:

- ◆ The remote user does not have enough NetWorker permissions
- ◆ There are no users for the particular host in User groups
- ◆ The remote user is not in the Administrator/User groups list

Workaround — Provide the user with enough permission for the backups.

Client installation on HPUX systems elicits a dependency check error

LGTsc03751 When the NetWorker client is installed on HPUX systems, the system displays an unnecessary NMSAP installation dependency error message.

Workaround — Continue the installation. The product installs properly.

RMAN save sets are not displayed by the NetWorker Console on Windows systems

LGTsc05741 If the RMAN utility is used for scheduled backups on Microsoft Windows systems, then the information for the save sets generated by RMAN is not reported in the

Group Details window of the NetWorker Management Console. Only the information for save sets generated by the **backint** program is reported.

Workaround — To obtain information on the RMAN save sets, use the NetWorker **nsrinfo** or **mminfo** commands.

Backup configuration wizard does not show NetWorker client version on Linux

LGTsc06455 The final, summary page of the NMSAP scheduled backup configuration wizard should list the NetWorker client version and build number. If the NetWorker client is on a Linux operating system, then the version number fails to display properly and is listed as "<unknown>."

Workaround — None.

Backup fails if a NSR* parameter for RMAN is set to an invalid value

LGTsc06833 For an NMSAP backup using RMAN, if an NSR* parameter is set to an invalid value, then the backup fails and Oracle may hang. Subsequent backups also fail, whether they are correctly configured or not.

Workaround — Set a valid parameter value and restart the Oracle services. If necessary restart the operating system.

Scheduled backups fail if the nsrsapsv.cfg file contains non-ASCII characters

LGTsc07211 On some UNIX or Linux, if the NMSAP scheduled backup configuration file, nsrsapsv.cfg, contains non-ASCII characters and uses encoding other than UTF-8, such as EUC, then the scheduled backups may fail.

Workaround — Restart the NetWorker client **nsrexecd** daemon, on the SAP host in the locale with UTF-8 encoding.

Savegroup error does not display non-ASCII characters for the log location on Linux

LGTsc07628 If the pathname for the BRTools SAPBACKUP log on Linux contains non-ASCII characters, and a backup fails, then the error message in the NetWorker Management Console savegroup report for the failed backup may not properly display the non-ASCII characters in the pathname.

In the part of the error message that reads, "Refer to brbackup's <pathname> log for details," <pathname> may not display properly.

Workaround — None.

Localized wizard displays incorrect characters on Solaris

LGTsc07671 The scheduled backup configuration wizard uses the Arial font by default. Non-English characters might display incorrectly in the localized version of the wizard on Solaris.

Workaround — Change the wizard font and font size as follows:

- ◆ To set the wizard font in general, edit the font and font size variables in the `/usr/bin/nwwiz` script.

For example, for Japanese:

```
NSR_WIZARD_FONT=Mincho
NSR_WIZARD_FONT_SIZE=14
```

- ◆ If the `nwwiz` wizard program is run from a shell, then the font and font size can be specified in that shell each time the wizard is run.

For example, for Japanese:

```
NSR_WIZARD_FONT=Mincho; export NSR_WIZARD_FONT
NSR_WIZARD_FONT_SIZE=14; export NSR_WIZARD_FONT_SIZE
nwwiz -s server_name
```

Language pack fails to install on Linux due to file conflict

LGTsc07710 NMSAP language packs may not install by the normal procedure on Linux systems because of a conflict with the NetWorker catalog file.

Workaround — Use the undocumented `--replacefiles` option in the `rpm` installation command. The following example uses this option to install the Japanese language pack.

```
# rpm -i --replacefiles lgtosapja-3.5-1.x86_64.rpm
```

The installation completes successfully.

Backup information for clients in snapshot groups is not displayed in NMC

LGTsc07817 If an NMSAP 3.5 client is assigned to a NetWorker snapshot group, then the NMSAP save sets for that client are not reported in the NetWorker Management Console Group Details window, even though the backup runs successfully.

Workaround — To obtain information on the NMSAP save sets, use the NetWorker `nsrinfo` or `mminfo` commands.

Backups and restores fail for pathnames that begin with "\\\" on Windows

LGTsc08826 On Microsoft Windows systems, backups and restores of files with a pathname that begins with "\\\" elicits the error message: "Use absolute path name for: ..."

If you experience this problem, contact your EMC Customer Support Representative.

Sapclone clones all save sets instead of those from the last 24 hours

LGTsc10057 The `sapclone` program tries to clone all NMSAP save sets instead of just the save sets created during the previous 24 hour period. The `sapclone` command should clone all of the NMSAP save sets only when it is run with the `-a` option.

If you experience this problem, contact your EMC Customer Support Representative.

PowerSnap PiT restore fails with large number of datafiles

LGTsc10753 Restores of large numbers of datafiles (more than 500) from PowerSnap point-in-time backups on Celerra systems with multiple NFS shares intermittently fail.

Workaround — Retry.

PowerSnap backups fail with NMSAP on AIX

LGTsc10767 On IBM AIX systems, the NMSAP backs up data using the traditional method when NMSAP PowerSnap backup is requested.

If you experience this problem, contact your EMC Customer Support Representative.

PowerSnap relocated restore fails

LGTsc14742 A file that was backed up by using NMSAP with PowerSnap fails to be restored to different location.

If you experience this problem, contact your EMC Customer Support Representative.

PowerSnap restores fail without the group parameter set in the init<DBSID>.utl file

LGTsc16358 The NMSAP restore with PowerSnap fails if the group parameter is not set in the init<DBSID>.utl configuration file.

If you experience this problem, contact your EMC Customer Support Representative.

Canceled manual online backup on Linux leaves database in backup mode



CAUTION

If a manual online backup on a Linux operating system is canceled, then the next backup operation fails because the SAP program, brbackup or brarchive, leaves Oracle tablespaces in "backup status." This issue does not apply to scheduled backups or offline manual backups.

Workaround — Shut down and restart the Oracle database. Restart may require an additional step to recover the database to its last consistent state. See Oracle documentation for further details.

Chained symbolic links are not supported



CAUTION

On UNIX systems, if the path of a file contains a chained symbolic link (a link that points to another link), then the backup succeeds but restores of the file will fail.

The SAP program does not support chained symbolic links. SAP Note 27428 provides details.

Recovery of split-mirror backups may fail on Microsoft Windows

Split-mirror backups on Microsoft Windows systems use NFS sharing, which enables files located in the %SAPBACKUP% directory to be backed up. Files in this directory include the copy of a Oracle database control file, generated during online split-mirror backup, and the BRTools backup catalogs. Restore of these files with the **brrestore** command may fail because NMSAP cannot find the request file in the NetWorker index.

Workaround — Restore these files by using NetWorker file system tools, such as the **recover** command or the NetWorker client graphical user interface.

Configuration wizard not supported for split-mirror backups

The NMSAP backup configuration wizard does not support the configuration of split-mirror backups.

Workaround — Configure scheduled backups manually.

Technical notes

This section contains notes for implementing this release of the product.

Backup email notifications

Email notifications of NMSAP backup results are available on all supported platforms, provided a command line utility is used to convey the email. On UNIX systems, the mailx utility, which is supplied as a standard feature, can be used. On Microsoft Windows systems, no command line email utility is supplied. However, command line email utilities for Windows systems can be downloaded for free from the Internet. Once installed and configured, an email utility for Windows can send NMSAP backup notifications.

The section "How to configure NMSAP parameters," in the *EMC NetWorker Module for SAP with Oracle Administration Guide*, provides details on enabling the **notify_done**, **notify_error**, **notify_start**, and **notify_success** parameters in the `init<DBSID>.utl` file.

Documentation

The following EMC documents are relevant to the NMSAP product, and are available at <http://softwaresupport.EMC.com>:

- ◆ *EMC NetWorker Module for SAP with Oracle Administration Guide*
- ◆ *EMC NetWorker Module for SAP with Oracle Installation Guide*
- ◆ *EMC NetWorker Module for SAP with Oracle Command Reference Guide*
- ◆ *EMC NetWorker PowerSnap Module Installation and Administration Guide* appropriate for your implementation
- ◆ *EMC NetWorker Administration Guide* appropriate for your implementation
- ◆ UNIX man pages
- ◆ *EMC NetWorker Command Reference Guide*
- ◆ *EMC Information Protection Software Compatibility Guide*

Documentation errata

The following corrections or additions should be included in the NMSAP Release 3.5 documentation.

Where to find the most recent supported operating system and version information

The *EMC NetWorker Module for SAP, Release 3.5 Installation Guide* and *Administration Guide* do not contain the most recent supported operating system and version information. Consult the *EMC Information Protection Software Compatibility Guide* at <http://softwaresupport.EMC.com> for the most up-to-date information on supported operating systems and versions.

Additional information on PowerSnap configuration

Add the following information to the section "How to configure the PowerSnap configuration file" on page 73 of the *NetWorker Module for SAP with Oracle Release 3.5 Multiplatform Version Administrators Guide*:

Ensure that the following PowerSnap parameters are set in the user-defined configuration file or files, for example, `/nsr/res/nas_backup.cfg` and `/nsr/res/nas_restore.cfg`:

- ◆ `NSR_DATA_MOVER=name or IP of NetWorker data mover`
Identifies the NetWorker data mover to use for rollovers.
- ◆ `NSR_SNAP_NAS_CEL_CS_HOST=name or IP of Celerra control station`
Identifies the Celerra control station.
- ◆ `NAS_SNAP_SUBTYPE=CEL_SNAPSURE`
Identifies the NAS SCM subtype to use.
- ◆ `NSR_SNAP_TYPE=nas`
Specifies that this is a NAS save object.

Note: The value of `NSR_SNAP_TYPE` must be lowercase `nas`.

- ◆ `NSR_SNAP_NAS_CLIENT=name or IP address of NAS filer with the NFS file system`
Identifies the NFS server for the specified mount point.

The PowerSnap Module documentation provides more details on these PowerSnap parameters.

Example 1 Example PowerSnap configuration file settings for NAS devices

```
cat /nsr/res/nas_backup.cfg

NSR_PS_DEBUG_LEVEL=9
NSR_DEBUG_LEVEL=9
NSR_DATA_MOVER=datamover.emc.com
NSR_SNAP_NAS_CEL_CS_HOST=controlstn
NAS_SNAP_SUBTYPE=CEL_SNAPSURE
NSR_SNAP_TYPE=nas
NSR_SNAP_NAS_CLIENT=11.222.333.44

cat /nsr/res/nas_restore.cfg

NSR_PS_DEBUG_LEVEL=9
NSR_DEBUG_LEVEL=9
NSR_DATA_MOVER=datamover.emc.com
NSR_SNAP_NAS_CEL_CS_HOST=controlstn
NAS_SNAP_SUBTYPE=CEL_SNAPSURE
NSR_SNAP_TYPE=nas
NSR_SNAP_NAS_CLIENT=11.222.333.44
RESTORE_TYPE_ORDER=conventional
```

Additional information on PowerSnap rollback restores

Add the following section to the PowerSnap chapter of the *NetWorker Module for SAP with Oracle Release 3.5 Multiplatform Version Administrators Guide*:

Rollback restores on Celerra NAS devices

The NMSAP software supports the PowerSnap rollback safety check feature for restores on Celerra NAS devices. A resource file, `psrollback.res`, lists all the files, directories, partitions, and volumes that are to be excluded from the rollback safety check. The items excluded from the safety check will be overwritten during a rollback operation.

Note: For NMSAP systems ".etc" must be added to the `psrollback.res` file.

To enable remount of the NAS file system at the end of a rollback operation, place an entry for the target file system in the appropriate file for the operating system:

- ◆ Solaris: `/etc/vfstab`
- ◆ HP-UX: `/etc/fstab`
- ◆ IBM AIX: `/etc/filesystems`

If this is not done, the remount at the end of the rollback fails. The data is recovered, but the file system must be remounted manually and the tablespace brought back online.

Installation

For information and procedures on how to install the NMSAP software, or how to upgrade this software from a previous installation, refer to the *EMC NetWorker Module for SAP with Oracle Installation Guide*.

Troubleshooting and getting help

For information about software patches, technical documentation, support programs, sales, and licensing, go to:

<http://powerlink.EMC.com>

Verifying version information

Depending on the operating system, verify the release information and version number for the installation as follows:

- ◆ On UNIX operating systems, enter the following command as the root user:
`what filenm | more`
where `filenm` is the name of a NMSAP binary file, for example `backint` or `nsrsapsv`.
- ◆ On Linux operating systems, enter the following command as the root user:
`strings filenm | grep "@(#)"`
where `filenm` is the name of a NMSAP binary file, for example `backint` or `nsrsapsv`.
- ◆ On Microsoft Windows operating systems:
 - a. Locate the NMSAP binary file, for example `backint.exe` or `nsrsapsv.exe`.
 - b. Right-click the file, and select **Properties**.
 - c. In the **Properties** window, select the **Version** tab to display the release information.

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