

Backup and Restore

DESCRIPTION

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1 Introduction

This document provides an overview of the management model and concepts associated with the Backup and Restore managed area.

A managed area is represented by a group of Managed Object Classes (MOCs) within the Managed Object Model (MOM).

Note: If the Geographic Redundancy has been installed, remove it on the local site before performing the restore. For more detail, refer to the section *Remove Geographic Redundancy with Single Provisioning* in document *IPWorks Geographic Redundancy*.





2 Functions and Concepts

Backup and Restore Management (BRM) provides a management interface for backup and restore of the Managed Element (ME).

2.1 Types of Backup

BRM supports two predefined backup types, named **System Data** and **User Data**.

The characteristics of the backup types are as follows:

- A System Data backup contains the entire software and configuration of the ME.

These backups are to be performed at least weekly. They are recommended after initial installation, before upgrade, and after successful upgrade. In these three situations, the backup files are to be manually exported to an external data repository to avoid unintentional deletion during preventive maintenance.

- A User Data backup contains all the user data provisioned to the ME associated to subscribers, such as IPWorks configuration or provisioning data, or both.
 - For User Data backup that contains configuration and provisioning data, this is called **IPWorks Complete backup**.
 - For User Data backup that only contains configuration data, this is called **IPWorks Partial backup**.

These backups are to be performed daily. They are recommended before and after bulk data provisioning. In these two situations, the backup files are to be manually exported to an external data repository to avoid unintentional deletion during preventive maintenance.

System Data backups and User Data backups are subject to different and separately configured scheduling and preventive maintenance policies. However, only one running backup operation is supported across the two backup types in the ME.

Backups can be created manually, automatically scheduled, and triggered by software management upgrades.

Manual and scheduled backups are subject to different and separately configured preventive maintenance policies. Manual backups and upgrade triggered backups are subject to the same preventive maintenance policies.



The default value for the maximum number of scheduled backups is 5. The default value for the maximum number of manual backups is 100.

Backups can be exported to and imported from an external storage system.

The following backups are automatically labeled by the ME so they can easily be found by the user:

- Last created backup
- Last imported backup
- Last exported backup
- Last restored backup
- Last backup restored or created on the ME

2.2 Backup Files

IPWorks BRFP as a User Data PSO is used to back up IPWorks relevant data.

The following table shows the data to be backed up and restored:

Table 1 Backup Files

Category	Data
MySQL Database	MySQL NDB data ⁽¹⁾
Configuration Files	Configuration data in /etc/ipworks/ License Key files in /cluster/storage/system/software/lm-apr9010503 SS7 configuration files in /opt/sign/etc/
MySQL NDB Cluster	MySQL NDB Cluster configuration files in /etc/ipworks/mysql/confs ⁽²⁾
Component configuration	IPWorks configuration under dn ManagedElement=<Node Name>, IpworksFunction=1 LM configuration under dn ManagedElement=<Node Name>, SystemFunctions=1, Lm=1 PM jobs under dn ManagedElement=<Node Name>, SystemFunctions=1, Pm=1, SystemFunctions=1, Pm=1 JavaCaf configuration under dn ManagedElement=<Node Name>, JavaCaf=1



Category	Data
C-Diameter	The C-Diameter related backup files can be found with class <code>otpdia</code> . For more details about the classes, refer to the section <i>IMM Classes</i> in document <i>C-diameter Programmer's Guide, 198 17-APR 901 0580/1 Uen</i>
Others	<code>/cluster/etc/cluster.conf⁽²⁾</code>

(1) This data is included in IPWorks Complete backup, not in IPWorks Partial backup.

(2) The configuration file can only be backed up.

2.3 Typical Size and Duration

Table 2 provides the typical size and duration of backup and restore:

Table 2 Typical Size and Duration

Types of Backup		Traffic	BRF Level	Backup Duration (s)	Restore Duration(s)	Backup File Size
System Data with EPC AAA		2M Sta + 2M S6b + 2M SWm (mix)	System	60	1200	0.2 GB
User Data	Backup and restore with EPC AAA	6M SWMplus session + 12M NSDS user	Complete	130	780	0.2 GB
	Backup and restore with EPC AAA	2M Sta + 2M S6b + 2M SWm (mix)	Partial	15	170	100 K
	Backup and restore with DNS/ENUM	24M ENUM + 2M DNS	Complete	290	4300	0.4 GB
	Backup and restore with DHCPv4	DHCPv4 1000 pools with 5M IP addresses ⁽¹⁾	Complete	120	220	382 K

(1) Lease files are not included in the backup.

2.4 Types of Operation

BRM supports the following operations for System Data and User Data backups:

- Create a backup

This operation creates a backup with the specified name on the local persistent storage media. BRM provides an option for automated preventive maintenance of such manual backups by setting a quota on the maximum number of manual backups to be stored on the persistent storage media of the ME. The procedure in *Create Backup* provides further details on how to perform this operation.

- Restore a backup



This operation restores the ME using a backup stored on the local persistent media of the ME. Restoring the ME using a System Data backup is automatically followed by an ME reboot. After reboot, the operation progress information is lost. Restoring the ME using a User Data backup does not always require an ME reboot but always preserves the operation progress information. The procedure in *Restore Backup* provides further details on how to perform this operation.

Note: Restore may fail if the PL number of the backup package is not same with the current PL number. To avoid this situation, it is recommended to backup after scaling operation finished.

- Delete a backup

This operation deletes the backup specified by its name from the persistent storage media. The procedure in *Delete Backup* provides further details on how to perform this operation.

- Cancel a backup related operation

Since the following operations are typically long-lasting, this operation can be used to cancel an ongoing operation:

- Create a backup
- Delete a backup
- Export a backup
- Import a backup

The procedure in *Cancel Backup Operation* provides further details on how to perform this operation.

- Schedule backups

Schedules can be configured to trigger creation of backups automatically. Such schedules can be single (one-shot) events or periodic, either defined according to fixed time intervals or calendar-defined intervals. There is also support for automated preventive maintenance of scheduled backups based on a configurable quota on the maximum number of scheduled backups to store. The scheduler can be locked to disable periodic backups during maintenance windows. A scheduled event can be deleted when no longer needed. The procedures in *Schedule Single Backup*, *Schedule Backups Based on Calendar Event*, and *Schedule Backups Based on Periodic Event* provide further details on how to perform these operations. The ME raises the alarm *BRM*, *Auto Export Backup Failed* or *BRM*, *Scheduled Backup Failed* when a scheduled backup is failed.

- Export a backup

This operation exports a backup file specified by its name to an external storage system.



Export is used to store the important ME backups in a safe place. It therefore limits the impact of unintentional local deletion of backup files on the ME. Export can indirectly be used to free up space on the ME since all exported backups are not always needed to be present locally on the ME. The procedure in *Export Backup* provides further details on how to perform this operation.

- Import a backup

This operation imports a backup file specified by its name from an external storage system.

Import is used to make a backup locally available on the ME after the backup has previously been exported and deleted from the ME. Import can be done before a coming backup restore operation or as preventive maintenance to ensure that important backups are locally available. The procedure in *Import Backup* provides further details on how to perform this operation.

- Change prefix for exported backup names

This operation is used to specify a prefix for the label that is generated for all backup export packages. This can be used to identify the ME from which the exported backup originated. The procedure in *Change Prefix for Exported Backup Names* provides further details on how to perform this operation.

- View available backups

Backups available on the local storage media of the ME, including the labelled backups, can be viewed through BRM. Each backup contains basic information such as the time the backup was created and its status (complete, incomplete, or corrupt). The procedure in *List Backups* provides further details on how to perform this operation.

- Upgrade triggered backups and backup restores

Upgrades automatically trigger a backup for a software management activation operation and a backup restore for an upgrade failure.

One long-running operation at a time is supported among create backup, scheduled backup, upgrade triggered backup and restore, delete backup, and restore backup. If a long-running backup operation is in progress, any scheduled backup event that is triggered is suppressed.

The automated deletion of manual backups is triggered in either of the following situations:

- When setting attribute `autoDelete=ENABLED` if the number of existing manual backups is already above the value of attribute `maxStoredManualBackups`.



- When changing `maxStoredManualBackups` to a value below the number of existing manual backups while `autoDelete=ENABLED`.
- A backup creation operation is invoked while the maximum allowed number of manual backups defined by `maxStoredManualBackups` is already reached and `autoDelete=ENABLED`.

The procedures in *Enable Automatic Deletion of Manual Backups* and *Change Maximum Number of Manual Backups* provide further details on how to perform these operations.

The automated deletion of scheduled backups is triggered in either of the following situations:

- A scheduled backup creation operation is invoked while the maximum allowed number of scheduled backups defined by `maxStoredScheduledBackups` is already reached.
- When changing `maxStoredScheduledBackups` to a value below the number of existing scheduled backups.

Automated deletion of backups always deletes the oldest backup(s). The procedure in *Set Maximum Number of Scheduled Backups* provides further details on how to perform this operation.

3 Managed Object Model

The Backup and Restore managed area is represented in the *Managed Object Model (MOM)* as follows:

```
ManagedElement
+-SystemFunctions
+-BrM
+-BrmBackupManager
+-BrmBackup
+-BrmBackupHousekeeping
+-BrmBackupLabelStore
+-BrmBackupScheduler
+-BrmCalendarBasedPeriodicEvent
+-BrmPeriodicEvent
+-BrmSingleEvent
```

For general information about the MOM, MOCs, Managed Object (MOs), cardinality, and related concepts, refer to *Managed Object Model User Guide*.

The BRM MOCs are described in Table 3.

Table 3 BRM Managed Object Class Descriptions

Managed Object Class	Description
<i>BrM</i>	The root of the BRM model.
<i>BrmBackupManager</i>	Two <i>BrmBackupManager</i> MOs exist containing backups of the System Data and User Data types, respectively. Provides actions for creating new backups and deleting backups of the corresponding type.
<i>BrmBackup</i>	Describes one backup of the type specified by MO <i>BrmBackupManager</i> .
<i>BrmBackupHousekeeping</i>	Handles preventive maintenance of manually created backups for the type specified by MO <i>BrmBackupManager</i> .
<i>BrmBackupLabelStore</i>	Describes labeled backups for the type specified by MO <i>BrmBackupManager</i> .
<i>BrmBackupScheduler</i>	Handles scheduling of a backup for the type specified by MO <i>BrmBackupManager</i> .
<i>BrmCalendarBasedPeriodicEvent</i>	Handles periodic scheduled backup events using a calendar-based interval for the type specified by MO <i>BrmBackupManager</i> .

*Table 3 BRM Managed Object Class Descriptions*

Managed Object Class	Description
<i>BrmPeriodicEvent</i>	Handles periodic scheduled backup events for the type specified by MO <code>BrmBackupManager</code> .
<i>BrmSingleEvent</i>	Handles single scheduled backup events for the type specified by MO <code>BrmBackupManager</code> .



4 Configuration Management

BRM is accessed using NETCONF or the Ericsson Command-Line Interface (ECLI) to manipulate the Management Information Base (MIB).

The following operations can be performed by the user and are described in Operating Instructions using the ECLI:

Basic Backup Operations

- *Create Backup*
- *Restore Backup*
- *Delete Backup*
- *Cancel Backup Operation*
- *List Backups*
- *View Progress Report*

Schedule Backups

- *Schedule Single Backup*
- *Schedule Backups Based on Calendar Event*
- *Schedule Backups Based on Periodic Event*

Note: To perform a schedule backup that includes MySQL data, ensure the scheduled backup name is appropriate. For details, refer to *Change Scheduled Backup Name*.

Manage Scheduled Backups

- *Change Scheduled Backup Name*
- *Delete Scheduled Event*
- *Set Maximum Number of Scheduled Backups*
- *Lock Backup Scheduler*
- *Unlock Backup Scheduler*

Manage Manual Backups

- *Change Maximum Number of Manual Backups*



- *Enable Automatic Deletion of Manual Backups*
- *Disable Automatic Deletion of Manual Backups*

Import and Export Backups

- *Export Backup*
- *Import Backup*
- *Change Prefix for Exported Backup Names*
- *Set Automatic Export of Scheduled Backups*

Note: All operations are supported for both System Data backups and User Data backups. To simplify the documentation, most of the corresponding Operating Instructions include only the User Data backup instructions.

All Operating Instructions are applicable to System Data backups with the following differences:

- Navigation to the User Data *BrmBackupManager* in step 1:

```
dn ManagedElement=<Node Name>,SystemFunctions=1,Br  
M=1,BrmBackupManager=SYSTEM_DATA
```




5 Fault Management

The BRM alarms are described in Table 4.

Table 4 BRM Alarm2

Alarm	Description
<i>BRM, Auto Export Backup Failed</i>	Issued when an auto-export backup fails.
<i>BRM, Scheduled Backup Failed</i>	Issued when a scheduled backup fails.





6 Security Management

BRM access is managed by an authentication and authorization mechanism. For each BRM role, specific rules are applied to determine the scope of what is accessible.

One BRM role is defined, named System Administrator.

Once authenticated as a System Administrator, full access is granted to MO *BRM* and its attributes.

For more information on authentication and authorization, refer to *Security Management for ECLI, NETCONF, and SFTP Users*.





7 Geographic Redundancy

After performing restoration, the data on Site A and Site B may be different. Refer to the section *Geographic Redundancy* in document *IPWorks Troubleshooting Guideline* to resynchronize the data.