

License Management

DESCRIPTION

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1 Introduction

This document provides an overview of the management model and concepts associated with the License Management (LM) managed area.

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

Arwa is a license storage and management solution that is hosted by Ericsson outside the application environment. Arwa provides a central repository for application license keys. Arwa handles license requests from multiple License Managers operating at different locations. Arwa requires a network connection to communicate with LM. Arwa deployments support multiple connection types that define how often LM communicates with Arwa to perform license administration tasks.





2 Functions and Concepts

LM provides a management interface for the Managed Element (ME) license keys.

License keys grant the use of purchased functionality or capacity. License keys are generated by the Ericsson software supply organization based on the application licensing model. Arwa license keys are installed centrally in Arwa. Arwa licenses are identified only by a license name. Each license includes an expiration date that can be time limited or perpetual.

The ME licenses have the following categories:

- Capacity licenses
Control the number of licensed objects that can be active or used at the same time.
- Feature licenses
Control access to the optional features in a managed function.
- Throughput capacity licenses
Control the rate that licensed objects can be used.

Perpetual license keys have no expiration date or an expiry date that is far into the future (for example, 2099-12-31). All other license keys have an expiry date.

A licensed feature or capacity can no longer be used or granted after the license key expiry. Before the expiry date, the license keys enter a license expiry warning period. The start of this period and the license key expiry are notified as alarms to the user. The ME raises the alarms `License Management, License Key Not Available`, and `License Management, Capacity Usage Threshold Reached` to indicate these conditions.

2.1 Modes of Operation

LM operates in the following modes:

- Autonomous mode
- Emergency Unlock mode
- Integration Unlock mode
- Locked mode
- Normal mode



2.1.1 Autonomous Mode

The License Manager automatically transitions from Normal mode to Autonomous mode when communication with Arwa is interrupted. The ME raises the alarm `License Management, Autonomous Mode Activated` to indicate this mode. During Autonomous mode, licenses that are already reserved by the client application continue to function normally. However, new licenses cannot be requested from Arwa. Other licenses remain unavailable until communication with Arwa is restored.

Applications can release licenses during Autonomous mode. When a license has been released by all application instances, that license becomes unavailable.

While in Autonomous mode, LM denies any application request for a license that is not already reserved. Application capacity can be restricted during Autonomous mode, as applications cannot increase or decrease the number of capacity tokens and must use what is available

LM can operate in Autonomous mode for a maximum of 24 hours. If communication with Arwa cannot be re-established within this 24-hour window, LM enters Locked mode.

While operating in Autonomous mode, LM tries to reconnect to Arwa at regular intervals. When LM successfully synchronizes with Arwa, it automatically reverts to Normal mode.

From Normal mode, LM can transition to other operational states. These transitions are illustrated in Figure 1.

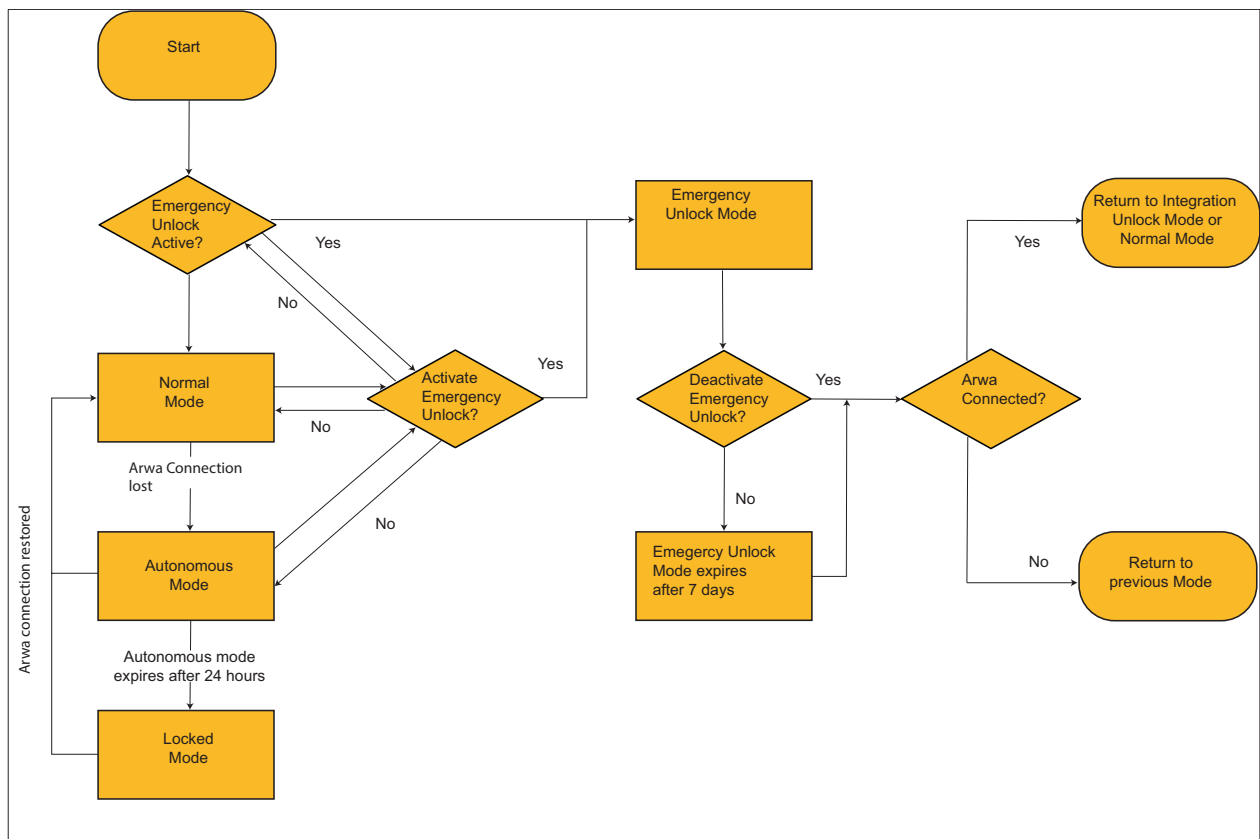


Figure 1 License Management State Transitions

2.1.2 Emergency Unlock Mode

Emergency Unlock mode authorizes access to all licensed features and objects independent of official license keys. The ME raises the alarm `License Management, Emergency Unlock Reset Key Required` to indicate this mode. Emergency Unlock is intended to provide or restore system functionality in extraordinary situations temporarily where an essential license cannot be renewed before it expires, or connectivity with Arwa is expected to remain unavailable for an extended period.

The Emergency Unlock mode window cannot exceed seven days. During this seven-day window, all application license requests are authorized. All licenses used during Emergency Unlock mode are set to expire at the end of the Emergency Unlock window.

When Emergency Unlock ends, LM automatically attempts to synchronize the granted licenses with Arwa. If synchronization is successful, LM begins operating in Integration Unlock Mode or Normal mode. If the synchronization fails, LM returns to the previous operating mode. These transitions are illustrated in Figure 1 and Figure 2.



2.1.3 Integration Unlock Mode

LM runs in Integration Unlock mode after installation. While in this mode, LM can function without access to official licenses. This mode allows use of the system when access to valid licenses is unavailable.

LM can enter Emergency Unlock mode during the Integration Unlock window, as shown in Figure 2.

LM automatically transitions to Normal mode when the Integration Unlock window has expired, recorded by attribute *expiration*. Any license that was used during Integration Unlock mode for which no valid license key was found expires.

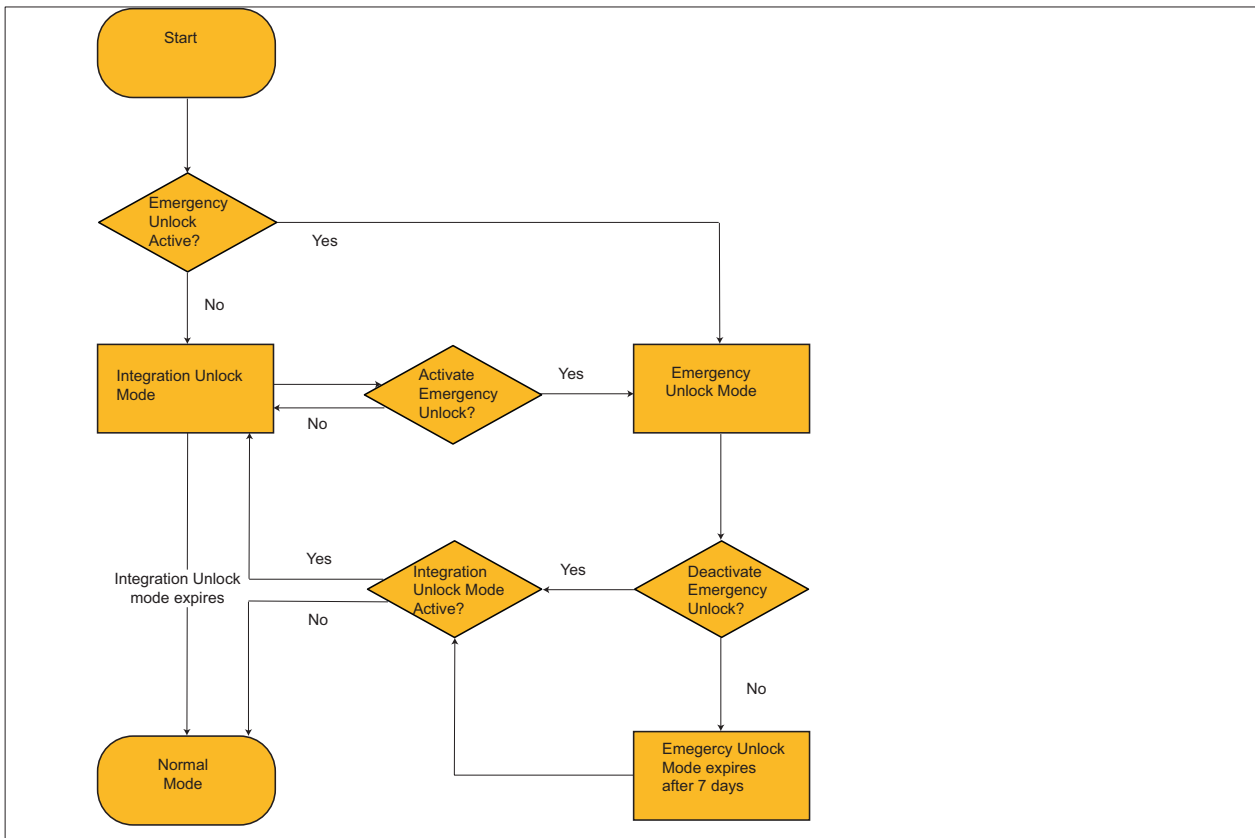


Figure 2 License Management State Transitions in Integration Unlock Mode

2.1.4 Locked Mode

The License Manager transitions from Autonomous mode to Locked mode if communication with Arwa has not been restored by the end of the 24-hour Autonomous mode window. The ME raises the alarm `License Management, Key File Fault` to indicate this mode.



While in Locked mode, LM answers all application license requests with a failure. Reserved licenses remain unmodified, but cannot be accessed by the application. During Locked mode, LM tries to re-establish communication with Arwa at regular intervals. When LM successfully synchronizes with Arwa, it automatically reverts to Normal mode.

Any reserved license that is not present in Arwa during synchronization is marked as not found, and a `License Management, License Key Not Available` alarm is raised.

2.1.5 Normal Mode

Normal mode is the default operational state of the LM. During normal operation, the system authorizes only those feature sets and capacity levels that have a valid license in Arwa.

From Normal mode, LM can transition to other modes, as shown in Figure 1.

2.2 Arwa Connection Mode

In Arwa deployment the following connection modes is available:

Permanent Connection

LM has a permanent connection to Arwa. All license requests are relayed to Arwa for processing.

Intermittent Connection

LM has an intermittent connection to Arwa. Automatic connections to the Arwa license server are established at fixed intervals of 80 days.

When LM is installed in Arwa permanent connection mode, application license keys are stored in the Arwa license repository. These keys are ordered from the Ericsson software supply organization. Ordered licenses are made available in Arwa and are not installed locally. When an application requests a new or updated license, LM retrieves the latest license information from Arwa and communicates any previously requested results back to the application.

2.3 Types of Operation

LM supports the following operations:

- Update of license information

The information about the available licenses and their use is published to the Management Information Base (MIB) and is automatically updated every 30 minutes. The procedure in *View License Information* provides further details on how to perform this operation.



The License Manager synchronizes reserved licenses with Arwa at regular intervals specified by attribute *serverSynchronizationInterval*. During the synchronization process, all reserved licenses are refreshed by LM. However, when new licenses are available ensure that the latest information is reflected in the MIB. It is done by triggering an immediate update of the license information. The procedure in *Update License Information* provides further details on how to perform this operation.

- View license information

The user can check the list of license keys available on the ME and their validity information for preventive maintenance purpose and in the problem resolution situations. The procedure in *View License Information* provides further details on how to perform this operation.

- Activation/deactivation of Emergency Unlock mode

Emergency Unlock mode is activated by the user to restore system functionality temporarily in extraordinary situations. The user can deactivate the Emergency Unlock mode before it automatically ends to check that the ME transitions to the expected LM operation mode. The procedures in *Activate Emergency Unlock Mode* and *Deactivate Emergency Unlock Mode* provide further details on how to perform these operations.

- Replenishment of Emergency Unlock activations

The number of Emergency Unlock activations is restricted. By default, Emergency Unlock mode can only be activated twice. An Emergency Unlock reset key must be ordered from the Ericsson software supply organization preferably before the two activations have been used. The corresponding key file must then be installed on the ME to reset the number of Emergency Unlock activations to two. The procedure in *Replenish Emergency Unlock Activations* provides further details on how to perform this operation.

- Update Arwa Connection

The address to the Arwa server is updated and the connectivity to Arwa server is verified. The procedure in *Update Arwa Connection* provides further details on how to perform this operation.

3 Managed Object Model

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

```
ManagedElement
+-SystemFunctions
+-Lm
+-ArwaConfiguration
+-AutonomousMode
+-CapacityKey
+-EmergencyUnlock
+-FeatureKey
+-IntegrationUnlock
```

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

The LM MOCs are described in Table 1.

Table 1 License Management Managed Object Class Descriptions

Managed Object Class	Description
<i>Lm</i>	The root of the LM model, supports activities and describes information related to LM.
<i>ArwaConfiguration</i>	Describes the Arwa server connection properties.
<i>AutonomousMode</i>	Describes the Autonomous Mode state.
<i>CapacityKey</i>	Describes the available capacity license and throughput capacity license keys.
<i>EmergencyUnlock</i>	Handles Emergency Unlock, activation/deactivation, and describes the Emergency Unlock state.
<i>FeatureKey</i>	Describes the available feature license keys.
<i>IntegrationUnlock</i>	Describes the Integration Unlock state.





4 Configuration Management

LM is accessed using NETCONF or the Ericsson Command-Line Interface (ECLI) to manipulate the MIB.

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

Manage License Information

- *Update License Information*
- *Update Arwa Connection*
- *View License Information*

Manage Emergency Unlock Mode

- *Activate Emergency Unlock Mode*
- *Deactivate Emergency Unlock Mode*
- *Replenish Emergency Unlock Activations*





5 Fault Management

The LM alarms are described in Table 2.

Table 2 License Management Alarms

Alarm	Description
<i>License Management, Autonomous Mode Activated</i>	Raised in Autonomous mode after LM losing its connection to the license repository.
<i>License Management, Capacity Usage Threshold Reached</i>	Applies to capacity and throughput capacity licenses. Raised with severity <code>WARNING</code> if <code>grantedCapacityLevel</code> for a given capacity license exceeds the alarm threshold set by attribute <code>capacityAlarmThreshold</code> , but is still below <code>licensedCapacityLimit</code> . If the reservation level reaches <code>licensedCapacityLimit</code> , the severity increases to <code>MAJOR</code> .
<i>License Management, Emergency Unlock Reset Key Required</i>	Raised in Emergency Unlock mode when counter <code>activationsLeft</code> is decremented. The severity increases as the counter is decremented. Cleared after a replenishment followed by a refresh of the license inventory.
<i>License Management, Key File Fault</i>	Raised in Locked mode when the license repository used by LM is unavailable. An unavailable license repository prevents the ME from using licensed features and functionality.
<i>License Management, License Key Not Available</i>	Raised in Normal mode with severity warning when a license key enters the expiration warning period before it expires. When the expiry date is reached, the severity is raised to major.