

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).

Network License Server (NeLS) is a license storage and management solution that is running outside the application environment. Network license management is a distributed solution for simplifying the license management in complex network solutions. NeLS performs license management aggregation at network level, and each Managed Element (ME) performs license management at ME level. For the distributed solution to work, connection is required between the different parts.





2 Functions and Concepts

LM provides a management interface for the network 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. Network license keys for the MEs are installed centrally in NeLS. Network licenses are identified by a license name and a version number. A valid license is one that has been provisioned in NeLS and is not expired or future dated.

The network licenses have the following categories:

- Capacity licenses

Control the capacity that can be shared (divided) among the MEs at the same time.

- Feature licenses

Control access to the optional features for the MEs in a network function.

Perpetual license keys have no expiration date, or rather, 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 is notified as alarms to the user.

2.1 Modes of Operation

LM operates in the following modes:

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



2.1.1 Autonomous Mode

The License Manager transitions from Normal mode to Autonomous mode when the connection between LM and NeLS is lost, or a License Key File (LKF) corresponding to the ME product type is missing or unavailable in NeLS. The ME raises the alarm `License Management, Autonomous Mode Activated` to indicate this mode. During Autonomous mode, licenses that are already reserved by the ME continue to function normally. However, new licenses cannot be requested from NeLS. Other licenses remain unavailable until communication with NeLS is restored.

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 configured period of time, usually 24 hours. If communication with NeLS cannot be re-established within this window, or a valid LKF is not installed in NeLS, all licenses are considered expired and the ME enters Locked mode.

When the NeLS connection goes down, LM waits for a preset period (for example, 3–5 minutes) before attempting to reconnect for the first time. LM tries to reconnect to NeLS at regular intervals as specified by the `NeLSConfiguration.retryInterval` attribute. After re-establishing the NeLS connection, LM automatically reverts to Normal mode.

LM will not transition into Autonomous mode if licenses have never been provisioned in NeLS. These transitions are illustrated in Figure 1.

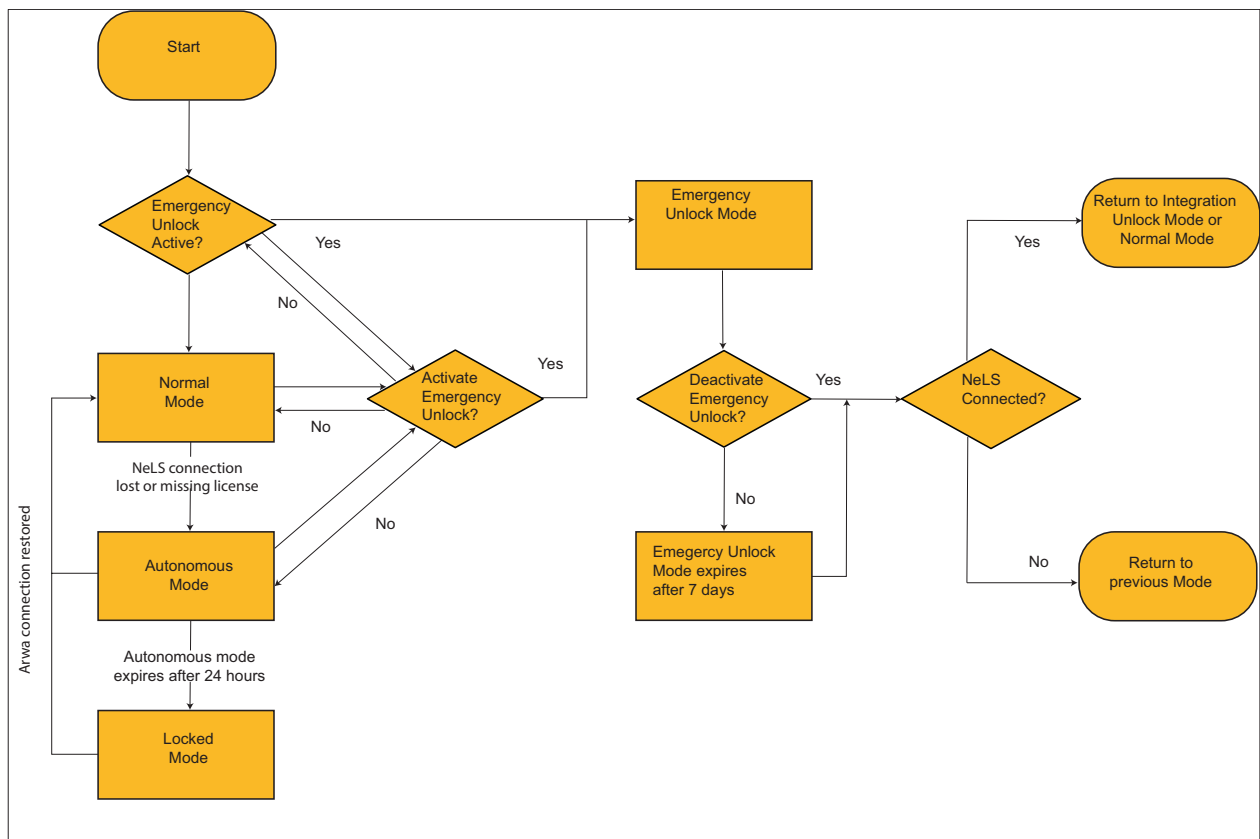


Figure 1 License Management State Transitions

2.1.2 Emergency Unlock Mode

Emergency Unlock mode authorizes access to all licensed features and all available capacity 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 NeLS 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 requests to use features and capacity up to resource availability 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, or a valid LKF is installed, LM automatically attempts to compare and synchronize the granted licenses against NeLS. If the comparison is successful, LM begins operating in Integration Unlock Mode or Normal mode. If the synchronization fails, LM returns to the previous operating mode. Any license granted during Emergency Unlock mode that is not present in NeLS during synchronization is marked as not found. 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 installed licenses. This mode allows use of the system when access to valid licenses is unavailable, for example, because a valid LKF is missing, or the connection to NeLS has not been configured yet.

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.

When Integration Unlock ends, or a valid LKF is installed, LM attempts to synchronize the granted licenses with NeLS.

Note: For virtual MTAS Integration Unlock mode period is set to 0 ,by default. The system enters into Normal mode.

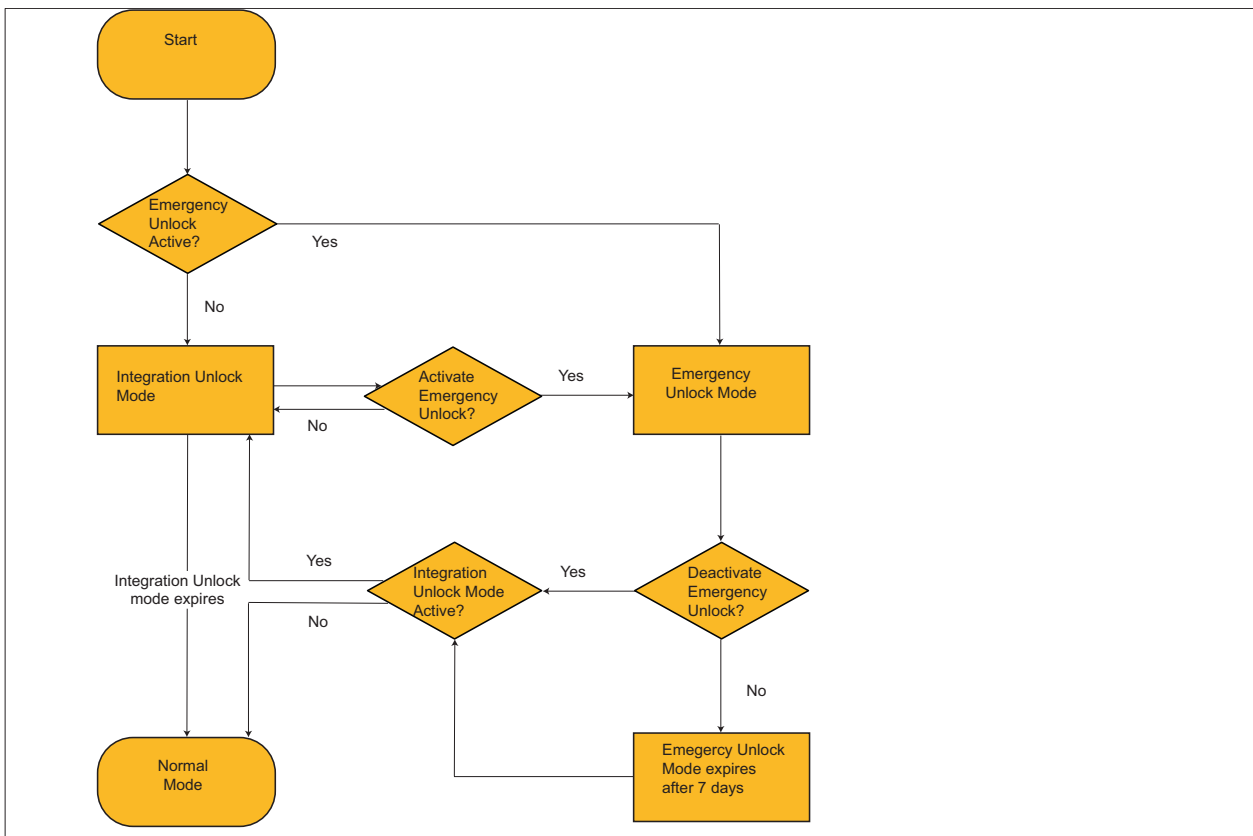


Figure 2 License Management State Transitions in Integration Unlock Mode



2.1.4 Locked Mode

The License Manager transitions from Autonomous mode to Locked mode if access to the NeLS license repository 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 operating in Locked mode, LM tries to reconnect to NeLS at regular intervals as specified by the `NeLSConfiguration.retryInterval` attribute. If a valid LKF is available, after re-establishing the NeLS connection, LM automatically reverts to Normal mode.

If NeLS triggered the transition from Normal mode because of a fault in the license repository, LM waits for NeLS to initiate a transition back to Normal mode when the fault has been resolved.

Note: During Locked mode, until the cluster restart, licenses that are already reserved by the ME continue to function normally .

2.1.5 Normal Mode

Normal mode is the default operational state of the LM. During normal mode, the LM provides the application client with information about the feature sets and capacity levels that are available in the LKF in NeLS.

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

2.2 Types of Operation

LM supports the following user 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 NeLS 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 license inventory 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.

- Configure NeLS Connection

LM must be configured to direct license requests to NeLS using the `NeLSConfiguration.host` and `NeLSConfiguration.port` attributes. The procedure in *Configure Connection to NeLS* provides further details on how to perform this operation.

- Configure SSL Connection to NeLS

The NeLS connection must always be encrypted using SSL certificates provided by Ericsson. The customer security layer, using the network operator's SSL certificates, must be enabled only in case NeLS is configured with network operator node credentials. A faulty SSL setup can lead to connectivity issues. For high level support, there is an instruction *Configure SSL Connection to NeLS* available.

3 Managed Object Model

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

```
ManagedElement
+-SystemFunctions
+-Lm
+-NeLSConfiguration
+-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>NeLSConfiguration</i>	Describes the NeLS 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

- *Configure Connection to NeLS*
- *Update License Information*
- *View License Information*

Manage Emergency Unlock Mode

- *Activate Emergency Unlock Mode*
- *Deactivate Emergency Unlock Mode*





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, 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.