FOXMAN-UN/FOX61x

Upgrading FOXMAN-UN and FOX61x

Upgrade to system release R18

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Contents

1 Preface

1.1 Precautions and Safety

Before you handle any equipment you must comply with the safety advices.

Adherence to the safety instructions ensures compliance with the safety requirements as defined in IEC 62368-1 (Audio/video, information and communication technology equipment - Part 1: Safety requirements).

Please refer to the following document:

[1KHW002497] Operating Instruction "Precautions and safety".

1.2 Symbols and Notations

This Application Note uses the following symbols:

NOTICE **Non-observance could result in equipment damage.**
Failing to comply with this may result in physical damage of equipment.
→ Possible actions are given.

Risk of operating trouble!
Indicates that an action may lead to operating trouble or loss of data.
→ Possible actions are given.

Please note:
Shows significant information.
→ Possible actions are given.

1.3 Target Audience

This Application Note is targeted at persons who are entrusted with the operation and administration of the system.

The persons targeted are

• the operation and administration personnel.

Please note:
Only instructed or skilled persons as per IEC 62368-1 may install and maintain the system.

1.4 Terms and Abbreviations

Table 1: **Terms and abbreviations**

Term	Meaning	Explanation
Core Unit		Designates the core and control unit CESM1, CESM1-F, CESM2, CESM2-F, CESM4, CESM4-F, CESM4EF, CESM4E, or CESM3 of FOX61x. Where certain features or characteristics apply to a specific core unit only, the CESM1, CESM1-F, CESM2, CESM2-F, CESM4, CESM4-F, CESM4EF, CESM4E, or CESM3 is named explicitly.

Table 1:   Terms and abbreviations (continued)

Term	Meaning	Explanation
ESW	Embedded Software	Software that is running on a specific HW unit of the FOX61x.
FO	Foreign Object	Any third-party object that can be modeled with sections and termination points included in a managed network.
GUI	Graphical User Interface	
HW	Hardware	
ID	Identifier	
DIRAC		Centralized management system for the SENC1 units, responsible for the generation and distribution of the Master Keys.
FOXCST	FOX61x Configuration Software Tool	Network element manager for FOX61x network elements.
ENP	Ethernet Networking Package	A part of the FOXMAN-UN, used for the configuration, provisioning, and monitoring of MPLS-TP services.
ESM	Ethernet Security Manager	A part of the FOXMAN-UN, user interface for setting up security related network functions such as encrypted transmission.
NE	Network Element	A network node, e.g. a FOX615.
NEM	Network Element Manager	A network element manager, e.g. FOXMAN-UN
NP	Networking Package	A specific package included in FOXMAN-UN for managing TDM networks.
RHEL	Red Hat Enterprise Linux	Red Hat Enterprise Linux operating system
FOXMAN-UN	Universal Network Manager	Hitachi Energy Network Manager software for FOX61x network elements.
VM	Virtual Machine	

2 Purpose and Scope

This Application Note describes the procedure for upgrading specific versions of the FOXMAN-UN network manager and of the FOX61x network elements.

The Application Note includes a description of the prerequisites, the steps to be executed, and the expected result of the upgrade.

2.1 Supported Upgrade Scenario

2.1.1 FOXMAN-UN Upgrade

This Application Note describes the procedures for

- upgrading the FOXMAN-UN network manager
    − from system release R17A to system release R18,
    − from system release R16B to system release R18.

Basically the following upgrades are supported within the scope of this Application Note:

Upgrade to R18 from version...	Details	Uninstall and reinstall required?
R17A	OS upgrade to RHEL 9.6 required.	- Create backup of NEM database,
R16B	OS upgrade to RHEL 9.6 required.	- Uninstall old version, - upgrade OS, - install new version, - restore backup from old version.

For more information see

- section 3.1 FOXMAN-UN and DIRAC upgrade (on page 14) for the R17A to R18 upgrade, or
- section 4.1 FOXMAN-UN and DIRAC upgrade (on page 24) for the R16B to R18 upgrade.

2.1.2 Foreign Object (FO) Upgrade

If your managed network includes Foreign Objects (FO), every FO from a release R16A or older will need to go through a migration procedure after upgrading FOXMAN-UN. For details see section 3.1.2 Upgrade FOXMAN-UN database from R17A to R18 (on page 15) or section 4.1.2 Upgrade FOXMAN-UN database from R16B to R18 (on page 25), and section 5 Foreign Object (FO) Upgrade to R18 (on page 35).

2.1.3 FOX61x Upgrade

This Application Note describes the procedures for

- upgrading the FOX615, FOX612, FOX611 and/or FOX610 network elements
    − from system release R17A to system release R18,
    − from system release R16B to system release R18,

  using the FOXMAN-UN network management system, see section 3.2.2 Upgrade via FOX-MAN-UN (ESW Distribution Wizard) (on page 17) or section 4.2.2 Upgrade via FOXMAN-UN (on page 27).
- upgrading the FOX615, FOX612, FOX611 and/or FOX610 network elements
    − from system release R17A to system release R18,
    − from system release R16B to system release R18,

  using the standalone version of the FOXCST element manager, see section 3.2.3 Upgrade via FOXCST (on page 18) or section 4.2.3 Upgrade via FOXCST (on page 28).

The FOX61x system release determines the type and ESW version of the core unit(s) and the related set of service units that can be operated with the core unit(s). The version details of the ESW for each system release can be found in the respective system release notes, and in section 2.3 Version Information (on page 11).

i	**Please note:**
	If weak or empty passwords have been used for accessing NEs (because that was possible in previous releases), this shall be changed with the present release. For a guidance on appropriate password policies read and follow the sections "Password Rules for Local Authentication" and "Strong Password Policy" in [1KHW028522] User Manual "Management Communication" (FOX61x R18).

2.1.4 Upgrade Sequences

The FOXMAN-UN and FOX61x upgrade procedure requires to strictly follow the correct sequence of upgrading steps.

i	**NOTICE**	**Non-observance could result in equipment damage.**
		Upgrading Embedded Software of FOX61x network elements from ESW released prior to R18 to ESW released with R18 before having upgraded FOXMAN-UN to R18 may result in incompatibility of FOXMAN-UN and FOX61x network elements software and cause unpredictable behavior.
		→ Always upgrade FOXMAN-UN to R18 **before** upgrading any ESW of FOX61x network elements to R18.

STOP	**Risk of operating trouble!**
	Do not change any configuration of the FOX61x network elements during the network upgrade process.
	→ The changes could be lost.

i	**Please note:**
	FOXMAN-UN (including add-ons) of system release R18 require a RHEL 9.6 operating system.

i	**Please note:**
	FOXMAN-UN R18 includes a new DIRAC version (18.0.0) vs. the one previously released with FOXMAN-UN R17A.
	→ The DIRAC database of a previous R16B or R17A installation is compatible with the new R18 RHEL 9.6 server.

i	**Please note:**
	Prior to the start of the upgrade procedure, it is strongly recommended to save the latest used NE configurations on the NE, then create a backup of every NE configuration by saving the NE configurations to disk.

2.1.4.1   Network Upgrade Sequence without MPLS-TP Encryption

The Figure 1 shows the upgrade sequence for FOXMAN-UN and FOX61x to system release R18 when no MPLS-TP encryption is used in the network, i.e., if no DIRAC and SENC1 units are used in your network.

For the detailed upgrade procedure see section 3 Upgrade R17A to R18 (on page 14) and section 4 Upgrade R16B to R18 (on page 24).
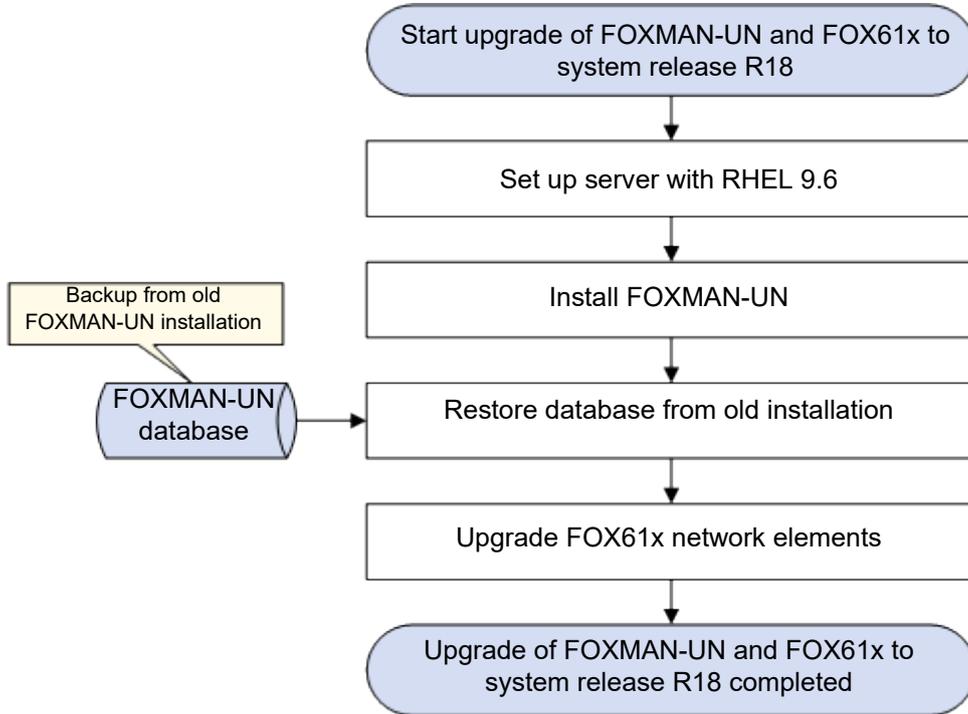
Figure 1:   Upgrade sequence without MPLS-TP encryption

2.1.4.2 Network Upgrade Sequence with MPLS-TP Encryption

The Figure 2 shows the upgrade sequence for FOXMAN-UN and FOX61x to system release R18 when MPLS-TP encryption is used in the network, i.e., if you have installed DIRAC and if you are using SENC1 units in your network.

For the procedures to upgrade from R17A or R16B to R18 see details in section 3 Upgrade R17A to R18 (on page 14) and section 4 Upgrade R16B to R18 (on page 24).
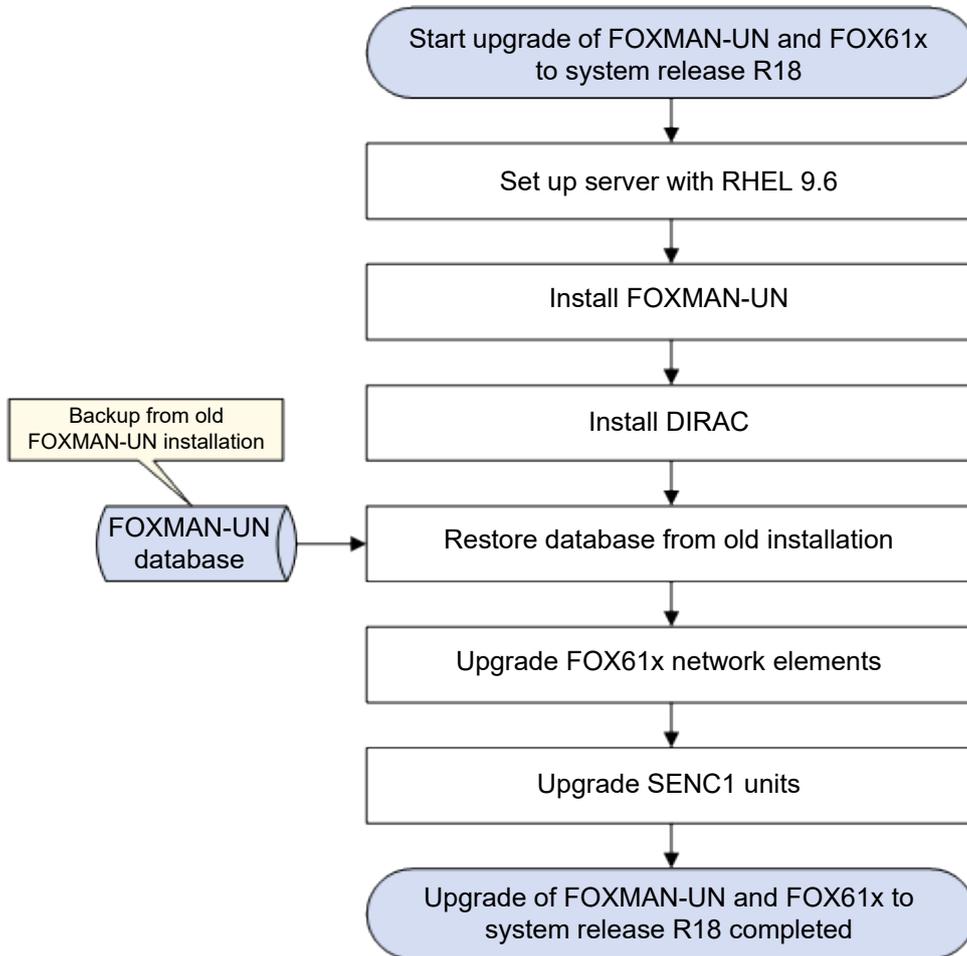
Figure 2:   Upgrade sequence with MPLS-TP encryption

2.1.4.3   **Network Upgrade Sequence without Network Manager**

A FOX61x network managed only by the element manager FOXCST requires no FOXMAN-UN and no DIRAC applications, provided no encryption is applied to the MPLS-TP tunnels. The Figure 3 shows the upgrade sequence for FOX61x to system release R18.

For the detailed procedure of the R17A to R18 upgrade see 3.2.3 "Upgrade via FOXCST". For the detailed procedure of the R16B to R18 upgrade see 4.2.3 "Upgrade via FOXCST".

```
┌─────────────────────────────────┐
│  Start upgrade of FOX61x to     │
│         system release R18       │
└─────────────────────────────────┘
               │
               ▼
┌─────────────────────────────────┐
│   Upgrade FOX61x network elements│
└─────────────────────────────────┘
               │
               ▼
┌─────────────────────────────────┐
│  Upgrade of FOX61x to system    │
│       release R18 completed      │
└─────────────────────────────────┘
```
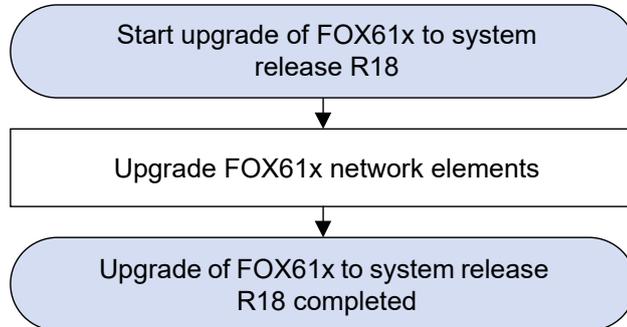
Figure 3:   Upgrade sequence without network manager

2.1.5   Workaround for FOXMAN-UN Upgrade in Main/Standby Setup

This chapter describes a workaround for the limitation "Unable to pair servers after reinstallation without unpairing" described in the list of limitations provided with the FOXMAN-UN R18 release note.

Initial situation: Main server and Standby server are paired.

To upgrade the Standby server, the previous FOXMAN-UN version on the Standby server is uninstalled, and the FOXMAN-UN 18.0.0 is installed on the Standby server.

Also, Main/Standby functionality on the Standby server, i.e., periodic backup and configuration as cold or warm standby, is re-enabled. The described limitation describes the fact that while uninstalling, the existing pairing is broken.

Now when you connect to the Main server using the Remote Admin Tool (RAT), to configure the Partner server (i.e., the Standby server), you get an error message ("Communication to the remote server is broken"), and the RAT is closed.

To prevent this:

1. Open the RAT again but do not click on "Configure Partner Server...", but click on "Main/Standby Configuration...".

2. Acknowledge the error message.

3. In the Main/Standby Settings, select the Partner Server that is still configured by clicking on the respective table entry.

4. Click the "Unpair" command button and acknowledge the confirmation message.
   - Click on "Cancel".

5. Back in the RAT main window, click on "Main/Standby Configuration..." again.

6. In the Main/Standby Settings, click the "Pair..." command button.
   - Log in to the remote (Standby) server by entering username, password, and host name and/or IP address, then click the "Pair" button.

7. Accept the SSL Certificate, then acknowledge the confirmation of successful pairing.

8. Click OK to conclude the Main/Standby settings.

Result: Servers are successfully paired again.

2.2 Unsupported Upgrade Scenarios

2.2.1 FOXMAN-UN Upgrade

FOXMAN-UN network managers with a system release older than R16B must first be upgraded to one of the upgradeable system releases as listed in section 2.1 Supported Upgrade Scenario (on page 6) before upgrading to system release R18. Please refer to the corresponding upgrade Application Note of an earlier system release.

2.2.2 FOX61x Upgrade

For any upgrades of FOX61x network elements running on ESW from a system release older than R16B refer to the upgrade application note included in the respective system release documentation for intermediate upgrades.

For the case of ERPS applications in system release R1D SP04, see separate document [1KHW029183-FR17A] Application Note "Upgrade ERPS from R1D to R17A".

i	**NOTICE**	**Non-observance could result in equipment damage.**

Upgrading Embedded Software of FOX61x network elements from ESW released prior to R14A to ESW released with R18 may result in non-operational units.

→ FOX61x network elements running on ESW from any system release older than R14A must first be upgraded to the system release R14A before upgrading to newer system releases. Please refer to the corresponding upgrade Engineering Bulletins or Application Notes.

Upgrades from FOX61x configurations running on HW and/or ESW other than shown in Table 2: "Upgradeable Units and ESW with System Release R17A" (on page 19) or Table 3: "Upgradeable Units and ESW with System Release R16B" (on page 29) are not described in this Application Note.

If you have ESW running on your units that is different from the ESW types and versions listed in Table 2 or Table 3, please contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).

2.3 Version Information

With regard to system release R16B and/or R17A, the system release R18 provides new ESW files for the following core units:

*   CESM1, CESM1-F,
*   CESM2, CESM2-F,
*   CESM3,

and for the following service units:

*   BIGO1,
*   ELET1,
*   EPEX1,
*   EROP1, EROP1-F,
*   ETOP1, ETOP1-F,
*   ESPO1 (ESW running on EPOI1 HW),
*   ESOP1, ESOP1-F (ESW running on ETOP1, ETOP1-F HW),
*   EPOI1,
*   DEFM1, DEFM1-F,
*   SAMO2, SAMO2-F, SAMO3, SAMO5, SAMO5-F,
*   TEPI2,

- ODIS1 (R1, R2 HW),
- OPIC1,
- OPIC2 (R1, R2 HW),
- TEGO1,
- SENC1-4, SENC1F4, SENC1-8, SENC1F8,
- CEPI1 (R3 HW),
- LEDE1 (R2 HW),
- LEDS1 (R1, R2 HW).

Any release can potentially include hotfixes for these or other units.

> **i**
>
> **Please note:**
>
> Before upgrading, make sure to have access to the latest versions (including hot-fixes where available) for each ESW released with the target FOX61x system release R18. Hotfixes are either provided by Hitachi Energy technical support or are available for download on the Hitachi Energy Publisher (https://publisher.hitachienergy.com).

> **i**
>
> **Please note:**
>
> An ESW running on a unit can be a regular ESW, a hotfix ESW, a test ESW, or a customer specific ESW.
>
> → The ESW names are composed correspondingly:

regular ESW:	**\<name\>_rnxnn**	(e.g. samo1_r3d01),
hot fix ESW:	**\<name\>_rnxnn_nn**	(e.g. samo1_r3d01_02),
test ESW:	**\<name\>_rnxnn_tnn**	(e.g. samo1_r3d01_t01),
customer specific ESW:	**\<name\>_rnxnn_cnn**	(e.g. samo1_r3d01_c01),

> where:
>
> \<name\> stands for the ESW name in small letters and digits,
>
> r stands for "release",
>
> n stands for a digit   1 … 9,
>
> x stands for a letter   a … z,
>
> nn stands for two digits   01 … 99,
>
> t stands for "test version",
>
> c stands for "customer specific version".

Any **test** ESW or **customer specific** ESW running on a unit that is to be upgraded may present an increased risk for encountering problems during the upgrade procedure. Also there is no warranty that test features or customer specific features built into one of these ESWs will still be present after the upgrade to regular system release ESW unless implementation has been confirmed by Hitachi Energy.

Some of the ESW files that are listed as part of a system release may have been released with an earlier system release but are still compatible, and are therefore no impediment to an upgrade.

> **i**
>
> **Please note:**
>
> When upgrading to R18, the upgrade procedure described in this Application Note is **exclusively** applicable to the FOX61x units listed in the "Unit name" column of Table 2 or Table 3.
>
> → Units that are not listed in one of these tables are not upgradeable with the procedure described in this Application Note.

2.4　Background Information

STOP **Risk of system crash!**

If an upgrade is done while operating units with a HW or ESW that does not match the state or version given in this Application Note, the FOX61x may get into an operation state that doesn't allow to provide services as expected.

Also in case of complying with the HW and the ESW versions given in this Application Note there is a small risk of getting the FOX61x into an operation state that doesn't allow to provide services as expected after the upgrade.

→ In such a case you should restore the previous configuration and contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).

→ Make sure that you save the NE configuration and create a backup file **before** proceeding to the upgrade procedure via the FOXCST menu function "File > Save Configuration to Disk …" or "File > Save Configuration to Disk As …". Save the NE configuration as .tar file.

3   Upgrade R17A to R18

> ℹ️ **Please note:**
> FOXMAN-UN and DIRAC of system release R18 require a RHEL 9.6 operating
> system. It is recommended to prepare a new separate RHEL 9.6 server or VM for
> FOXMAN-UN R18. The old RHEL server machine or VM, used by the FOXMAN-
> UN before system release R18, can be switched off once the system upgrade is
> successfully completed.
> Be aware that if you want to be able to use the FOXMAN-UN R17A and R18 clients
> on Windows at the same time, they need to be installed on separate machines.
> Also refer to the FOXMAN-UN R18 release note for more details on the upgrade
> procedure.
>
> If you do not have a new server HW or VM available, upgrade via the basic steps:
>
> • Create database backup on installation prior to upgrade and save it to a secure
>   folder.
> • Uninstall current FOXMAN-UN R17A.
> • Upgrade RHEL OS to version 9.6.
> • Install FOXMAN-UN R18 core and add-ons as required. Install R18 client(s).
> • Restore database backup from old installation to the new R18 installation.
> • Start NEM services (nemstart), then log in from client.
> • Recommended: Execute a force poll of each managed node.
> • Make sure to still follow the steps listed below (except the one to provide a new
>   server or VM).

3.1   FOXMAN-UN and DIRAC upgrade

3.1.1   FOXMAN-UN R18 Installation on RHEL 9.6 Server

Follow the steps below to install the FOXMAN-UN and DIRAC of system release R18 on a
RHEL 9.6 server:

1 Install RHEL 9.6 on an appropriate server or VM.

2 Install FOXMAN-UN R18 on the RHEL 9.6 server.

   Apply the FOXMAN-UN R18 license on the RHEL 9.6 server. If you are using MPLS-TP tun-
   nel encryption with SENC1 units and DIRAC, the license must include the DIRAC feature.

3 Install R18 NEM_ADDONS as required.
   - While coming from R17A, **do also** install DIRAC if you are using the ESM (Ethernet
     Security Manager) feature.

> ℹ️ **Please note:**
> The new R18 RHEL 9.6 server will most likely have a different IP address than the
> old RHEL server used by the FOXMAN-UN before system release R18. Therefore
> agent IP addresses need to be adjusted accordingly.
>
> This can be done manually once the database is restored and services are run-
> ning.
>
> Another option is to set up a "`/opt/nem/etc/iptranslate.conf`" file and use
> the "`-a`" key during the database restore:
>
> `edbrestore -b <database_name> -a.`
>
> → In this way, the agent IP addresses will be automatically adjusted according to
>   the information in the "iptranslate.conf" file.

3.1.2   Upgrade FOXMAN-UN database from R17A to R18

For an upgrade from R17A to R18, the procedure is considering that the DIRAC database must be upgraded from R17A to R18. Follow the steps below:

1 Perform a force poll on all network elements on your existing (old) FOXMAN-UN server.

   The network should be as stable and alarm free as possible. Take note of the following:

   − Any present alarms and unmanaged network element.

   − Anything in invalid state on NP, ESM or ENP.

2 Create a backup of the NEM database on your existing (old) FOXMAN-UN server.

3 Create a backup of the following files from the folder "/opt/nem/etc" on your existing (old) FOXMAN-UN server:

   /opt/nem/etc/iptranslate.conf

   /opt/nem/etc/firewall.conf

   Create a backup of the following files if they are present:

   /opt/nem/etc/cst1_license.xml

   /opt/nem/etc/npfotool_crossconnect.csv

   /opt/nem/etc/npfotool_termination.csv

   /opt/nem/etc/npfotool_trailhierarchy.csv

4 Restore the backed-up files from /opt/nem/etc on the new FOXMAN-UN R18 RHEL 9.6 server.

5 Restore the backed-up NEM database on the new FOXMAN-UN R18 RHEL 9.6 server.

   Some general information on the database upgrade is given in [1KHW002414] User Manual "FOXMAN-UN under Linux".

6 Start FOXMAN-UN services by executing nemstart.

> **i**
>
> **Please note:**
>
> In networks with 1000 or more NEs, the initialization of the NMS system can take between 20 and 30 minutes. The system is not fully operational during this time.

7 Once the FOXMAN-UN services are running, log in to FOXMAN-UN and check the NEM Browser, Networking Package (NP), Ethernet Security Manager (ESM) and Ethernet Networking Package (ENP). Refer to the following table for the status:

Item	Status
NEM Browser	All network elements are manageable and are alarm free.[1]
NP	The status matches the one on the server of the previous release.
ESM	All Crypto Engines have the Communication Status "Manageable". Note that it may take some time until this status is shown.
ESM	The port mappings are present.
ENP	All encrypted tunnels have the Encryption Status "Valid" and the Status "Deployed Valid".
ENP	VPLS, VPWS, Pseudo Wire, Link, NE and Service Profile are in the same state as on the server of the previous release. Some services may be "Unaligned".

1. On a customer network there might be alarms or unmanageable network elements present before the upgrade. The alarm and network element situation on the new R18 server should match the situation on the server of the previous release.

All network elements still run the ESW of the old system release (R17A) but are now managed by FOXMAN-UN R18.

8 MPLS Service migration: MPLS services without control word (if there are any) must be migrated to services with control word. Control word shall be migrated before upgrading the nodes, else there is a risk to lose packets due to time stamping non PTP packets on SENC1

or EPEX1 units. It is recommended to do this step even if you currently do not operate SENC1 or EPEX1 units.

Therefore, execute the script "Set PW Control Word" from the FOXMAN-UN - R18 "NEM Desktop - System - Remote Executor...". Execute the script service by service, node by node or network-wide, as preferred.

9 Upgrade FOX61x network elements ESW to R18. For details see section 3.2.2 Upgrade via FOXMAN-UN (ESW Distribution Wizard) (on page 17).

10 If any services appear invalid or unaligned after the NE ESW upgrade has been successfully terminated, execute the steps in section 3.1.3 "Post-upgrade steps".

11 If your setup includes Foreign Objects (FO), follow the instructions given in section 5 Foreign Object (FO) Upgrade to R18 (on page 35).

12 Once the new system is stable, disconnect or uninstall the old FOXMAN-UN.

3.1.3   Post-upgrade steps

If you are using Service Supervision and you have VPWS system services with service supervision enabled,

Proceed as follows:

1. **Disable** service supervision for all such VPWS system services. This can be done from the ENP GUI, VPWS tab.
   - Wait until all VPWS are removed from the Service Supervisor.

2. Execute a "Clear and Synchronize" from the ENP menu option "Network - Clear and Synchronize".
   - This menu option requires Expert Mode to be active. To activate it, select "Options - Expert Mode" from the ENP menu.

3. **Enable** service supervision for all previous VPWS system services. This can be done from the ENP GUI, VPWS tab.
   - Wait until all VPWS are listed again in the Service Supervisor.

End of instruction

In certain cases, some MPLS-TP services may appear as "Deployed Invalid" in ENP after the database has been restored and the FOXMAN-UN services are started. This may be the case e.g. if modifications to the MPLS-TP configuration made with FOXCST have not been loaded to the FOXMAN-UN database. The following steps will resolve this.

Proceed as follows:

1 Execute a force poll on all nodes.

2 Check the services status again in ENP.

3 If there are still services with status "Deployed Invalid", execute a "Clear and Synchronize" in ENP by selecting the menu option "Network - Clear and Synchronize". This menu option requires Expert Mode to be active. To activate it, select "Options - Expert Mode" from the ENP menu.

   "Clear and Synchronize" will clear the services from the database and load them again from all nodes in the network. Wait until this has been terminated. The services should now all have "Deployed Valid" status.

4 Align all ENP services (VPLS and VPWS) from the ENP main window that are not aligned.

End of instruction

In case VPWS services are added to service supervision, VPWS services from previous releases that are using PWAC ports are missing those PWAC ports in the service supervision. VPWS modeling in Service Supervision was missing the PWAC ports. This is now fixed in R18.

To update the existing VPWS supervision from previous releases with the PWAC ports,

Proceed as follows:

1. Execute the command "Reload Configuration" from the service context menu in the ENP legacy application for the affected VPWS services. This will add the missing PWAC ports to the Service Supervision model of the VPWS services.

End of instruction

3.2 FOX61x upgrade

This section describes the FOX61x nodes upgrade.

3.2.1 Pre-upgrade steps

Before starting the node upgrade, perform the following steps:

1. MPLS Service migration: MPLS services without control word (if there are any) must be migrated to services with control word. Control word shall be migrated before upgrading the nodes, else there is a risk to lose packets due to time stamping non PTP packets on SENC1 or EPEX1 units. It is recommended to do this step even if you currently do not operate SENC1 or EPEX1 units.

   Therefore, execute the script "Set PW Control Word" from the FOXMAN-UN - R18 "NEM Desktop - System - Remote Executor...". Execute the script service by service, node by node or network-wide, as preferred.

> **STOP** **Risk of operating trouble!**
> After upgrading to R18, packets without PW control word may get time stamped even they are not PTP packets, this may result in packet loss.

> **STOP** **Risk of operating trouble!**
> Make sure that ENP services are in valid state before starting the service migration with the Remote Executor tool.

2. Make sure that gateway address for static routes and for default routes are not identical to the IP address of the local management interface, else you may risk to lose connectivity to the network. If the addresses are identical, reconfigure them before starting the upgrade procedure.

3.2.2 Upgrade via FOXMAN-UN (ESW Distribution Wizard)

> **ℹ️ NOTICE** **Non-observance could result in equipment damage.**
> Upgrading Embedded Software of FOX61x network elements from ESW released prior to R18 to ESW released with R18 before having upgraded FOXMAN-UN to R18 may result in incompatibility of FOXMAN-UN and FOX61x network elements software and cause unpredictable behavior.
>
> → Always upgrade FOXMAN-UN to R18 **before** upgrading any ESW of FOX61x network elements to R18.

> **ℹ️ NOTICE** **Non-observance could result in equipment damage.**
> Upgrading Embedded Software of FOX61x network elements from ESW released prior to R14A to ESW released with R18 may result in non-operational units.
>
> → FOX61x network elements running on ESW from any system release other than R14A must first be upgraded to the system release R14A before further upgrading. Please refer to the corresponding upgrade Engineering Bulletin or Application Note.

Follow the steps in the FOXMAN-UN ESW Distribution Wizard recommended below to upgrade the FOX61x network elements to system release R18 (including SENC1 units):

1   Select "Network - ESW Management - Distribution Wizard" from the NEM Desktop menu to create an ESW distribution job; give the job an appropriate name. Click "Next >".

2   Mark "Download ESW on all Units", "Delete oldest unassigned ESW before", "Start ESW on all Units"; if you are using equipment protection, do not mark "Minimal Service Interruption - Revertive EQP" or "Minimal Service Interruption - Non-Revertive EQP", but mark "System Release Upgrade". Optionally mark "Abort on first Error". Click "Next >".

3   Import R18 ESW ZIP archive via the "Import ESW..." button, then select "R18" in the "Desired System Release" drop-down box. Select all applicable ESW from the "Select ESW" list. Make sure the correct ESW version is selected for each unit. Click "Next >".

4   Select the NEs to be upgraded. Click "Next >".

5   Expand all NEs. Verify "Current ESW Version" and "ESW to Install" for each NE and unit. When OK, click "Next >".

6   Set the processing order of NEs in accordance with network specific requirements. Click "Next >".

7   If required, rearrange the NEs in groups. When OK, click "Next >".

8   Set the schedule actions as required. When OK, click "Next >".

9   Mark "Launch the 'Task Viewer' upon <Activate>", then click "Activate" to activate the job and create the related tasks to be executed.

10 In the Task Viewer you can now follow the progress of the task execution.

> **i**   **Please note:**
> Once the ESW has been upgraded on any FOX61x NE, a force poll of the NE is recommended in FOXMAN-UN after the ESW has started.

When executed successfully, all core and service units of the FOX61x network elements run the software of the R18 system release packet.

3.2.3   Upgrade via FOXCST

> **i**   **NOTICE**   **Non-observance could result in equipment damage.**
> Upgrading Embedded Software of FOX61x network elements from ESW released prior to R14A to ESW released with R18 may result in non-operational units.
> → FOX61x network elements running on ESW from any system release other than R14A must first be upgraded to the system release R14A before further upgrading. Please refer to the corresponding upgrade Engineering Bulletin or Application Note.
> → Use FOXCST R18 for connecting to the network elements and for downloading and installing the new ESW.

The following upgrade method is described in this Application Note:

•   Upgrade using the FOXCST GUI with the "Tools > Software Download …" function, for which a detailed description is provided.

For the preferred upgrade method using the FOXMAN-UN GUI with the "ESW Management - Distribution Wizard" function refer to section 3.2.2 Upgrade via FOXMAN-UN (ESW Distribution Wizard) (on page 17).

There are other possible ways to upgrade a FOX61x, like an upgrade using the FOXCST GUI with manual upgrade of each unit; however these methods are not recommended and are not covered in the present Application Note.

> **i**   **Please note:**
> You may only perform the upgrade to system release R18 if all prerequisites given below are fulfilled.

> **STOP**
>
> **Risk of operating trouble!**
>
> The use of weak or empty passwords for accessing FOX61x nodes bears a high risk of unauthorized access, service unavailability, and equipment damage.
>
> → We strongly recommend to set strong passwords for all user classes once FOXCST R18 is installed and set up.

> **STOP**
>
> **Risk of operating trouble!**
>
> Any deviation from the steps described herein for the upgrade procedure conceal a risk of operating trouble after the upgrade procedure.
>
> → Make sure you follow these steps to minimize the risk of system unavailability or malfunction.

Prerequisites:

Your FOX61x equipment needs to fulfill the following prerequisites before the upgrade procedure can be started.

- Unit ESW has System Release R17A Status (on page 19),
- Management Connection to the Active Core Unit (on page 20),
- Equipment is Fault Free (on page 21),
- Correct FOXCST Version is being used (on page 21).

These prerequisites are described in more detail below.

3.2.3.1 Unit ESW has System Release R17A Status

All units need to run

- the latest embedded software (ESW) that had been released in the scope of the FOX61x system release R17A,

i.e. the units and their ESW are of the types and versions shown in Table 2.

Table 2:   Upgradeable Units and ESW with System Release R17A

Unit name	Upgrade from R17A ESW [1]	To R18 ESW [2]
CESM1, CESM1-F	cesun_r17a01_03	cesun_r18a01
CESM1 (NE Controller)	cesne_r17a01_03	cesne_r18a01
CESM2, CESM2-F	cesun_r17a01_03	cesun_r18a01
CESM2 (NE Controller)	cesne_r17a01_03	cesne_r18a01
CESM3	cesm3_r17a01_03	cesm3_r18a01
BIGO1	bigo1_r17a01	bigo1_r18a01
CEPI1 (R1, R2 HW)	cepi1_r4b07_01	No upgrade required; keep ESW version.
CEPI1 (R3 HW)	cepi1_r17b02	cepi1_r18a01
COSI1	cosi1_r4b02_03	No upgrade required; keep ESW version.
DATI1	dati1_r5e02_11	No upgrade required; keep ESW version.
DEFM1, DEFM1-F	defm1_r17a01	defm1_r18a01
ELET1	elet1_r17a01_03	elet1_r18a01
EPEX1	epex1_r17a01	epex1_r18a01
EPOI1	epoi1_r17a01	epoi1_r18a01
EPSI1	epsi1_r2c02_11	No upgrade required; keep ESW version.
EROP1, EROP1-F	erop1_r17a01_03	erop1_r18a01
ESOP1, ESOP1-F	esop1_r17a01_03	esop1_r18a01
ESPO1	espo1_r17a01_03	espo1_r18a01
ETOP1, ETOP1-F	etop1_r17a01_03	etop1_r18a01

Table 2:   Upgradeable Units and ESW with System Release R17A (continued)

Unit name	Upgrade from	To
	R17A ESW [1]	**R18 ESW** [2]
FOX610 (Unit)	f10un_r17a01_03	f10un_r18a01
FOX610 (NE Controller)	f10ne_r17a01_03	f10ne_r18a01
LECO1	leca1_r1a02_04	No upgrade required; keep ESW version.
	leco1_r1d03_02	No upgrade required; keep ESW version.
LEDA1	leda1_r2d02_02	No upgrade required; keep ESW version.
LEDE1 (R1 HW)	lede1_r5c02_02	No upgrade required; keep ESW version.
LEDE1 (R2 HW)	lede1_r17a01_01	lede1_r18a01
LEDS1 (R1 HW)	leds1_r2g02	leds1_r2g02_02
LEDS1 (R2 HW)	leds1_r17a01_01	leds1_r18a01
LESU1	lesu1_r2d03	No upgrade required; keep ESW version.
LEXI1	lexi1_r2c03_05	No upgrade required; keep ESW version.
ODIS1 (R1 HW)	odis1_r17a01_03	odis1_r18a01
ODIS1 (R2 HW)	odis1r2_r17a01_03	odis1r2_r18a01
OPIC1	opic1_r1d02_01	opic1_r1d02_02
OPIC2 (R1 HW)	opic2_r17a01_03	opic2_r18a01
OPIC2 (R2 HW)	opic2r2_r17a01_03	opic2r2_r18a01
SAMO1	samo1_r3g01_06	No upgrade required; keep ESW version.
SAMO2, SAMO2-F	samo2_r17a01_03	samo2_r18a01
SAMO3	samo2_r17a01_03	samo2_r18a01
SAMO5, SAMO5-F	samo2_r17a01_03	samo2_r18a01
SENC1, SENC1-F	No upgrade possible.	No upgrade possible.
SENC1-4, SENC1F4, SENC1-8, SENC1F8	app-416_r17a06	app-416_r18a01
TEGO1	tego1_r17a01	tego1_r18a01
TEPI1	tepi1_r2c01	No upgrade required; keep ESW version.
TEPI2	tepi2_r17a01	tepi2_r18a01
VFTLF	vftlf_ r1a06	No upgrade required; keep ESW version.

1. The latest version, including hotfixes (where available) is required. If the ESW is not on the mentioned version yet, first upgrade to this version.
2. Use the latest version available in accordance with the FOX61x R18 Release Note or the latest hotfix where available. Hotfixes may have been published after this document was issued.

> [i] **Please note:**
> Make sure that, prior to the upgrade from R17A, you have installed the latest ESW that corresponds to the versions released with the system release R17A, including the latest hotfix where available, for all units in any network element to be upgraded.
>
> If you have a unit or ESW that is not listed in Table 2, please contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).
>
> If you have units running embedded software of a system release that is older than what is listed in Table 2, please contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).

3.2.3.2   Management Connection to the Active Core Unit

If you are using the local management port of the CESM1, CESM2 or CESM3, make sure that you have the port of the active CESM1, CESM2 or CESM3 connected to your PC.

i	**Please note:** When doing an ESW download while using CESM1, CESM2 or CESM3 redundancy use the start "Algorithm" parameter "System Release Upgrade". With "System Release Upgrade", the system will make sure that core unit in slot 11 will be the active core unit after the upgrade (independent of which unit was active before the upgrade).

3.2.3.3 Equipment is Fault Free

Make sure that the equipment (i.e. all units that are operated in the NE) has the equipment state "Ok" (check each unit in the "Tree View" of the FOXCST), and that it is free of equipment related alarms such as hardware or software incompatibilities or units that are unassigned.

3.2.3.4 Correct FOXCST Version is being used

When using the FOXCST GUI and "Tools > Software Download …", make sure you have a PC running a supported Windows® version, with an installed element manager FOXCST R18 (file name FOXCST_18.0.0-0.exe). For information on how to install the FOXCST refer to [1KHW002466] User Manual "FOXCST" (FOX61x R18).

For version details of the FOXCST to be installed, refer to [1KHW028777] Release Note "FOX-61x R18".

3.2.3.5 Limitations for the Upgrade

STOP	**Risk of operating trouble!** Incomplete ESW selection for the upgrade will lead to incompatibilities and service interruptions, and can even lead to the loss of the management connection. → If you miss a unit that needs to be upgraded the old unit ESW will be incompatible with the new ESW of the upgraded units. Therefore always select all units for upgrade that are operated in your NE as listed in Table 2 before executing "Download and Start…" or "Start…".

STOP	**Risk of operating trouble!** Please note that the upgrade procedure will interrupt services for up to a few minutes. → If you do not want services to be interrupted at the moment, do not perform the upgrade now but choose a time for the upgrade when the impact of service interruptions on customers is minimal. → As an alternative you may want to **download** the new ESW to the FOX61x **without installing** the new ESW and **without re-starting** the units yet. This reduces the risk of a failed upgrade. Also see steps 8. to 11. in the following procedure, but selecting "Download" in step 11., and only select "Start…" after all ESW files have been downloaded. Note: The open "Software Download" dialog blocks any further FOXCST action.

i	**Please note:** The ESW upgrade for the SENC1-4, SENC1F4, SENC1-8, and SENC1F8 encryption units cannot be done with the procedure described in section 3.2.3.6 Step-by-Step Procedure (on page 22). → For a description of the SENC1-4, SENC1F4, SENC1-8, and SENC1F8 units specific ESW upgrade procedure please refer to [1KHW029028] User Manual "SENC1-4, SENC1F4, SENC1-8, SENC1F8".

i	**Please note:** The risk of failed upgrades can be further reduced by running only one FOXCST instance on one PC.

3.2.3.6 Step-by-Step Procedure

The following order of actions is required for upgrading FOX61x with a system release R17A state to ESW that is part of the system release R18.
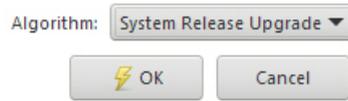
ESW upgrade procedure

Proceed as follows:

1. Start the FOXCST.

2. Select the menu command "File - Manage ESW …".

3. In the "ESW Package Manager" dialog window click on the "Import" button.

   - Browse to the appropriate folder or file source containing the new ESW and SIM files (see the appropriate columns in Table 2).
   - Select the ESW zip file needed to get your units to the "R18" status.
   - Click on the "Open" button.
   - Select the software types (all, .esw, .sim, none) to be imported.
   - Wait until all ESW files have been imported.
   - Close the "ESW Package Manager" dialog with the "Close" button.

4. Connect to the FOX61x to be upgraded (via the menu command "File - Connect …") with the "User Class" set to "Manager".

5. Check the equipment.

   - Make sure the equipment status (FOXCST "Tree View") is "**Ok**" for all units to be upgraded. If this is not the case, take the appropriate measures to correct this before proceeding.
   - Make sure there are no equipment related alarms active (FOXCST "Alarms" view). If you have equipment alarms, take the appropriate measures to correct this before proceeding.

6. Perform a "Save to NE" operation to store the current running configuration to the NE database.

7. Create a backup (to your PC) of the network element configuration.

   - This is done on the FOXCST GUI by using the menu selection "File - Save Configuration To Disk …" or "File - Save Configuration To Disk As …".

> ⓘ **Please note:**
> FOXCST keeps the file name; without disconnection/reconnection, a later config save overwrites this original saved file without confirmation dialog.

8. Start the software download manager.

   - Select the menu command "Tools - Software Download …".
   - Wait until all plugged units are listed in the table.

9. Configure the software download.

   - In the "Available System Releases" selection box select the system release "R18 (FOX-61x)".
   - Check the "Software to install" column of all units to show the correct Software for the unit, including the core unit (one or two CESM1, (CESM2) or CESM3) and the core unit's neController (CESM1 (and CESM2) only) (see Table 2).
   - The "Status" column shows "Software needs to be downloaded", "Software is downloaded", or "Software is running", depending on the current condition.
   - Mark the checkboxes "Delete unused software" to make sure there is enough space in the flash memory of the unit.

10. Double check that all settings displayed in the "Software Download" table are correct.

11. Start the upgrade

    - When all required units are configured, click on the "**Download and Start** …" button.
    - When prompted with "Parameters for command Download and Start" set the Algorithm to "**System Release Upgrade**":

Algorithm: System Release Upgrade ▼

⚡ OK   Cancel

- Click "OK" to apply the settings and start the upgrade process.
- This will first delete unused software (ESW) files where necessary, download the new software (ESW) to the units to be upgraded, then restart the ESW on the units to be upgraded.
- Do not close the "Software Download" dialog while the upgrade process is running.

12. Since you will lose the management connection to the FOX61x during the restart of the core unit(s), you need to re-connect to the FOX61x when the ESW upgrade has been completed.

13. After re-connecting check that everything is OK with the upgraded core unit(s) and service units.

14. Perform a "Save to NE" operation.

- This will create a new database.

15. Create a backup (to your PC) of the network element configuration.

- This is done on the FOXCST GUI by using the menu selection "File - Save Configuration to Disk …" or "File - Save Configuration to Disk As …".

Result: You have successfully upgraded your FOX61x.

End of instruction

| i |

Please note:

If the upgrade was not successful for any reason, you might need to restore the backup configuration (i.e. the file stored to your PC in step 7. above) to your FOX-61x. This is done by downloading the saved FOX61x R17A backup file to the NE.

→ Before downloading the saved backup file make sure that the ESW files used in the R17A system release, respectively, are still available on the units. If required for any reason, download all missing ESW files via the FOXCST menu function "File > Manage ESW … > Import".

→ Download the backup file via the FOXCST menu function "NE > Download Configuration …". Select the previously stored .tar file to be downloaded.

→ If the conditions remain that have led to an unsuccessful upgrade contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)) for assistance.

3.2.4   Post-upgrade steps

In certain cases, some MPLS-TP services may appear as "Deployed Invalid" in ENP after the database has been restored and the FOXMAN-UN services are started. This may be the case e.g. if modifications to the MPLS-TP configuration made with FOXCST have not been loaded to the FOXMAN-UN database. The following steps will resolve this:

1 Execute a force poll on all nodes.

2 Check the services status again in ENP.

3 If there are still services with status "Deployed Invalid", execute a "Clear and Synchronize" in ENP by selecting the menu option "Network - Clear and Synchronize". This menu option requires Expert Mode to be active. To activate it, select "Options - Expert Mode" from the ENP menu.

"Clear and Synchronize" will clear the services from the database and load them again from all nodes in the network. Wait until this has been terminated. The services should now all have "Deployed Valid" status.

4 Align all ENP services (VPLS and VPWS) from the ENP main window that are not aligned.

4 Upgrade R16B to R18

| i | **Please note:**
FOXMAN-UN and DIRAC of system release R18 require a RHEL 9.6 operating system. It is recommended to prepare a new separate RHEL 9.6 server or VM for FOXMAN-UN R18. The old RHEL server machine or VM, used by the FOXMAN-UN before system release R18, can be switched off once the system upgrade is successfully completed. |

Be aware that if you want to be able to use the FOXMAN-UN R16B and R18 clients on Windows at the same time, they need to be installed on separate machines. Also refer to the FOXMAN-UN R18 release note for more details on the upgrade procedure.

If you do not have a new server HW or VM available, upgrade via the basic steps:

- Create database backup on installation prior to upgrade and save it to a secure folder.
- Uninstall current FOXMAN-UN R16B.
- Upgrade RHEL OS to version 9.6.
- Install FOXMAN-UN R18 core and add-ons as required. Install R18 client(s).
- Restore database backup from old installation to the new R18 installation.
- Start NEM services (nemstart), then log in from client.
- Recommended: Execute a force poll of each managed node.
- Make sure to still follow the steps listed below (except the one to provide a new server or VM).

4.1 FOXMAN-UN and DIRAC upgrade

4.1.1 FOXMAN-UN R18 Installation on RHEL 9.6 Server

Follow the steps below to install the FOXMAN-UN and DIRAC of system release R18 on a RHEL 9.6 server:

1 Install RHEL 9.6 on an appropriate server or VM.
2 Install FOXMAN-UN R18 on the RHEL 9.6 server.

Apply the FOXMAN-UN R18 license on the RHEL 9.6 server. If you are using MPLS-TP tunnel encryption with SENC1 units and DIRAC, the license must include the DIRAC feature.

3 Install R18 NEM_ADDONS as required.
- While coming from R16B, **do also** install DIRAC if you are using the ESM (Ethernet Security Manager) feature.

| i | **Please note:**
The new R18 RHEL 9.6 server will most likely have a different IP address than the old RHEL server used by the FOXMAN-UN before system release R18. Therefore agent IP addresses need to be adjusted accordingly. |

This can be done manually once the database is restored and services are running.

Another option is to set up a "`/opt/nem/etc/iptranslate.conf`" file and use the "`-a`" key during the database restore:

`edbrestore -b <database_name> -a.`

→ In this way, the agent IP addresses will be automatically adjusted according to the information in the "iptranslate.conf" file.

4.1.2   Upgrade FOXMAN-UN database from R16B to R18

For an upgrade from R16B to R18, the procedure is considering that the DIRAC database is compatible between R16B and R18. Follow the steps below:

1   Perform a force poll on all network elements on your existing (old) FOXMAN-UN server.

   The network should be as stable and alarm free as possible. Take note of the following:

   − Any present alarms and unmanaged network element.

   − Anything in invalid state on NP, ESM and ENP.

2   Create a backup of the NEM database on your existing (old) FOXMAN-UN server.

3   Create a backup of the following files from the folder "/opt/nem/etc" on your existing (old) FOXMAN-UN server:

   /opt/nem/etc/iptranslate.conf

   /opt/nem/etc/firewall.conf

   Create a backup of the following files if they are present:

   /opt/nem/etc/cst1_license.xml

   /opt/nem/etc/npfotool_crossconnect.csv

   /opt/nem/etc/npfotool_termination.csv

   /opt/nem/etc/npfotool_trailhierarchy.csv

4   Restore the backed-up files from /opt/nem/etc on the new R18 RHEL 9.6 server.

5   Restore the backed-up NEM database on the new R18 RHEL 9.6 server.

   Some general information on the database upgrade is given in [1KHW002414] User Manual "FOXMAN-UN under Linux".

6   Start FOXMAN-UN services by executing nemstart.

> [i]   **Please note:**
> In networks with 1000 or more NEs, the initialization of the NMS system can take between 20 and 30 minutes. The system is not fully operational during this time.

7   Once the FOXMAN-UN services are running, log in to FOXMAN-UN and check the NEM Browser, Networking Package (NP), Ethernet Security Manager (ESM) and Ethernet Networking Package (ENP). Refer to the following table for the status:

Item	Status
NEM Browser	All network elements are manageable and are alarm free. [1]
NP	The status matches the one on the server of the previous release.
ESM	All Crypto Engines have the Communication Status "Manageable". Note that it may take some time until this status is shown.
ESM	The port mappings are present.
ENP	All encrypted tunnels have the Encryption Status "Valid" and the Status "Deployed Valid".
ENP	VPLS, VPWS, Pseudo Wire, Link, NE and Service Profile are in the same state as on the server of the previous release. Some services may be "Unaligned".

1.   On a customer network there might be alarms or unmanageable network elements present before the upgrade. The alarm and network element situation on the new R18 server should match the situation on the server of the previous release.

All network elements still run the ESW of the old system release (R16B) but are now managed by FOXMAN-UN R18.

8   MPLS Service migration: MPLS services without control word (if there are any) must be migrated to services with control word. Control word shall be migrated before upgrading the nodes, else there is a risk to lose packets due to time stamping non PTP packets on SENC1

or EPEX1 units. It is recommended to do this step even if you currently do not operate SENC1 or EPEX1 units.

Therefore, execute the script "Set PW Control Word" from the FOXMAN-UN - R18 "NEM Desktop - System - Remote Executor...". Execute the script service by service, node by node or network-wide, as preferred.

9 Upgrade FOX61x network elements ESW to R18. For details see section 4.2.2 Upgrade via FOXMAN-UN (on page 27).

10 If any services appear invalid or unaligned after the NE ESW upgrade has been successfully terminated, execute the steps in section 4.1.3 "Post-upgrade steps".

11 If your setup includes Foreign Objects (FO), follow the instructions given in section 5 Foreign Object (FO) Upgrade to R18 (on page 35).

12 Once the new system is stable, disconnect or uninstall the old FOXMAN-UN.

4.1.3 Post-upgrade steps

In certain cases, some MPLS-TP services may appear as "Deployed Invalid" in ENP after the database has been restored and the FOXMAN-UN services are started. This may be the case e.g. if modifications to the MPLS-TP configuration made with FOXCST have not been loaded to the FOXMAN-UN database. The following steps will resolve this:

1 Execute a force poll on all nodes.

2 Check the services status again in ENP.

3 If there are still services with status "Deployed Invalid", execute a "Clear and Synchronize" in ENP by selecting the menu option "Network - Clear and Synchronize". This menu option requires Expert Mode to be active. To activate it, select "Options - Expert Mode" from the ENP menu.

"Clear and Synchronize" will clear the services from the database and load them again from all nodes in the network. Wait until this has been terminated. The services should now all have "Deployed Valid" status.

4 Align all ENP services (VPLS and VPWS) from the ENP main window that are not aligned.

4.2 FOX61x upgrade

This section describes the FOX61x nodes upgrade.

4.2.1 Pre-upgrade steps

Before starting the node upgrade, perform the following step:

1 MPLS Service migration: MPLS services without control word (if there are any) must be migrated to services with control word. Control word shall be migrated before upgrading the nodes, else there is a risk to lose packets due to time stamping non PTP packets on SENC1 or EPEX1 units. It is recommended to do this step even if you currently do not operate SENC1 or EPEX1 units.

Therefore, execute the script "Set PW Control Word" from the FOXMAN-UN - R18 "NEM Desktop - System - Remote Executor...". Execute the script service by service, node by node or network-wide, as preferred.

STOP   **Risk of operating trouble!**
After upgrading to R18, packets without PW control word may get time stamped even they are not PTP packets, this may result in packet loss.

STOP   **Risk of operating trouble!**
Make sure that ENP services are in valid state before starting the service migration with the Remote Executor tool.

4.2.2   Upgrade via FOXMAN-UN

> **ℹ** **NOTICE**   **Non-observance could result in equipment damage.**
>
> Upgrading Embedded Software of FOX61x network elements from ESW released prior to R18 to ESW released with R18 before having upgraded FOXMAN-UN to R18 may result in incompatibility of FOXMAN-UN and FOX61x network elements software and cause unpredictable behavior.
>
> → Always upgrade FOXMAN-UN to R18 **before** upgrading any ESW of FOX61x network elements to R18.

> **ℹ** **NOTICE**   **Non-observance could result in equipment damage.**
>
> Upgrading Embedded Software of FOX61x network elements from ESW released prior to R14A to ESW released with R18 may result in non-operational units.
>
> → FOX61x network elements running on ESW from any system release other than R14A must first be upgraded to the system release R14A before further upgrading. Please refer to the corresponding upgrade Engineering Bulletin or Application Note.

Follow the steps in the FOXMAN-UN ESW Distribution Wizard recommended below to upgrade the FOX61x network elements to system release R18:

> **ℹ** **Please note:**
>
> The procedure below excludes the SENC1 units. For the upgrade of the SENC1-4, SENC1F4, SENC1-8, SENC1F8 refer to section 4.2.5 SENC1 Software upgrade to R18 (on page 33).

1 Select "Network - ESW Management - ESW Distribution Wizard" from the NEM Desktop menu to create an ESW distribution job; give the job an appropriate name. Click "Next >".

2 Mark "Download ESW on all Units", "Delete oldest unassigned ESW before", "Start ESW on all Units"; if you are using equipment protection, do not mark "Minimal Service Interruption - Revertive EQP" or "Minimal Service Interruption - Non-Revertive EQP", but mark "System Release Upgrade". Optionally mark "Abort on first Error". Click "Next >".

3 Import R18 ESW ZIP archive via the "Import ESW..." button, then select "R18" in the "Desired System Release" drop-down box. Select all applicable ESW from the "Select ESW" list. Do **not** select the SENC1-4, SENC1F4, SENC1-8, SENC1F8 units. Make sure the correct ESW version is selected for each unit. Click "Next >".

4 Select the NEs to be upgraded. Click "Next >".

5 Expand all NEs. Verify "Current ESW Version" and "ESW to Install" for each NE and unit. When OK, click "Next >".

6 Set the processing order of NEs in accordance with network specific requirements. Click "Next >".

7 If required, rearrange the NEs in groups. When OK, click "Next >".

8 Set the schedule actions as required. When OK, click "Next >".

9 Mark "Launch the 'Task Viewer' upon <Activate>", then click "Activate" to activate the job and create the related tasks to be executed.

10 In the Task Viewer you can now follow the progress of the task execution.

> **ℹ** **Please note:**
>
> Once the ESW has been upgraded on any FOX61x NE, a force poll of the NE is recommended in FOXMAN-UN after the ESW has started.

When executed successfully, all core and service units of the FOX61x network elements run the software of the R18 system release packet.

4.2.3   Upgrade via FOXCST

ℹ | **NOTICE**   **Non-observance could result in equipment damage.**

Upgrading Embedded Software of FOX61x network elements from ESW released prior to R14A to ESW released with R18 may result in non-operational units.

→ FOX61x network elements running on ESW from any system release other than R14A must first be upgraded to the system release R14A before further upgrading. Please refer to the corresponding upgrade Engineering Bulletin or Application Note.

→ Use FOXCST R18 for connecting to the network elements and for downloading and installing the new ESW.

The following preferred upgrade method is described in this Application Note:

• Upgrade using the FOXCST GUI with the "Tools > Software Download …" function, for which a detailed description is provided.

For the upgrade using the FOXMAN-UN GUI with the "ESW Task" function refer to section 4.2.2 Upgrade via FOXMAN-UN (on page 27).

There are other possible ways to upgrade a FOX61x, like an upgrade using the FOXCST GUI with manual upgrade of each unit; however these methods are not recommended and are not covered in the present Application Note.

ℹ | **Please note:**

You may only perform the upgrade to system release R18 if all prerequisites given below are fulfilled.

STOP | **Risk of operating trouble!**

The use of weak or empty passwords for accessing FOX61x nodes bears a high risk of unauthorized access, service unavailability, and equipment damage.

→ We strongly recommend to set strong passwords for all user classes once FOXCST R18 is installed and set up.

STOP | **Risk of operating trouble!**

Any deviation from the steps described herein for the upgrade procedure conceal a risk of operating trouble after the upgrade procedure.

→ Make sure you follow these steps to minimize the risk of system unavailability or malfunction.

Prerequisites:

Your FOX61x equipment needs to fulfill the following prerequisites before the upgrade procedure can be started.

• Unit ESW has System Release R16B Status (on page 28),
• Management Connection to the Active Core Unit (on page 30),
• Equipment is Fault Free (on page 30),
• Correct FOXCST Version is being used (on page 30).

These prerequisites are described in more detail below.

4.2.3.1   Unit ESW has System Release R16B Status

All units need to run

• the latest embedded software (ESW) that had been released in the scope of the FOX61x system release R16B,

i.e. the units and their ESW are of the types and versions shown in Table 3.

Table 3:   Upgradeable Units and ESW with System Release R16B

Unit name	Upgrade from R16B ESW [1]	To R18 ESW [2]
CESM1, CESM1-F	cesun_r16b04_11	cesun_r18a01
CESM1 (NE Controller)	cesne_r16b04_11	cesne_r18a01
CESM2, CESM2-F	cesun_r16b04_11	cesun_r18a01
CESM2 (NE Controller)	cesne_r16b04_11	cesne_r18a01
CESM3	cesm3_r16b04_11	cesm3_r18a01
CEPI1 (R1, R2 HW)	cepi1_r4b07_01	No upgrade required; keep ESW version.
COSI1	cosi1_r4b02_03	No upgrade required; keep ESW version.
DATI1	dati1_r5e02_11	No upgrade required; keep ESW version.
DEFM1, DEFM1-F	defm1_r16b04	defm1_r18a01
ELET1	elet1_r16b04_11	elet1_r18a01
EPEX1	epex1_r16b04	epex1_r18a01
EPOI1	epoi1_r16b04	epoi1_r18a01
EPSI1	epsi1_r2c02_11	No upgrade required; keep ESW version.
EROP1, EROP1-F	erop1_r16b04_11	erop1_r18a01
ESOP1, ESOP1-F	esop1_r16b04_11	esop1_r18a01
ESPO1	espo1_r16b04_11	espo1_r18a01
ETOP1, ETOP1-F	etop1_r16b04_11	etop1_r18a01
FOX610 (Unit)	f10un_r1b604_11	f10un_r18a01
FOX610 (NE Controller)	f10ne_r1b604_11	f10ne_r18a01
LECO1	leco1_r1d03_02	No upgrade required; keep ESW version.
	leca1_r1a02_04	No upgrade required; keep ESW version.
LEDA1	leda1_r2d02_02	No upgrade required; keep ESW version.
LEDE1 R1 HW	lede1_r5c02_02	No upgrade required; keep ESW version.
LEDE1 R2 HW	lede1_r17a01_01	lede1_r18a01
LEDS1 R1 HW	leds1_r2g02	No upgrade required; keep ESW version.
LEDS1 R2 HW	leds1_r16c02	leds1_r18a01
LESU1	lesu1_r2d03	No upgrade required; keep ESW version.
LEXI1	lexi1_r2c03_05	No upgrade required; keep ESW version.
ODIS1 R1 HW	odis1_r16b04_11	odis1_r18a01
ODIS1 R2 HW	odis1r2_r16c02_03	odis1r2_r18a01
OPIC1	opic1_r1d02_01	opic1_r1d02_02
OPIC2 R1 HW	opic2_r16b04_11	opic2_r18a01
OPIC2 R2 HW	opic2r2_r16c02_03	opic2r2_r18a01
SAMO1	samo1_r3g01_06	No upgrade required; keep ESW version.
SAMO2, SAMO2-F	samo2_r16b04_11	samo2_r18a01
SAMO3	samo2_r16b04_11	samo2_r18a01
SAMO5, SAMO5-F	samo2_r16b04_11	samo2_r18a01
SENC1, SENC1-F	No upgrade possible.	No upgrade possible.
SENC1-4, SENC1F4, SENC1-8, SENC1F8	app-416_r16b03_01	app-416_r18a01, see section 4.2.5.
TEGO1	tego1_r16b04	tego1_r18a01
TEPI1	tepi1_r2b02	tepi1_r2c01
TEPI2	tepi2_r16b04_11	tepi2_r18a01
VFTLF	vftlf_r1a06	No upgrade required; keep ESW version.

1. The latest version, including hotfixes (where available) is required. If the ESW is not on the mentioned version yet, first upgrade to this version.
2. Use the latest version available in accordance with the FOX61x R18 Release Note or the latest hotfix where available. Hotfixes may have been published after this document was issued.

> **i** **Please note:**
> Make sure that, prior to the upgrade from R16B, you have installed the latest ESW that corresponds to the versions released with the system release R16B, including the latest hotfix where available, for all units in any network element to be upgraded.
>
> If you have a unit or ESW that is not listed in Table 3, please contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).
>
> If you have units running embedded software of a system release that is older than what is listed in Table 3, please contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)).

4.2.3.2 Management Connection to the Active Core Unit

If you are using the local management port of the CESM1, (CESM2) or CESM3, make sure that you have the port of the active CESM1, (CESM2) or CESM3 connected to your PC.

> **i** **Please note:**
> When doing an ESW download while using CESM1, CESM2 or CESM3 redundancy use the start "Algorithm" parameter "System Release Upgrade". With "System Release Upgrade", the system will make sure that core unit in slot 11 will be the active core unit after the upgrade (independent of which unit was active before the upgrade).

4.2.3.3 Equipment is Fault Free

Make sure that the equipment (i.e., all units that are operated in the NE) has the equipment state "Ok" (check each unit in the "Tree View" of the FOXCST), and that it is free of equipment related alarms such as hardware or software incompatibilities or units that are unassigned.

4.2.3.4 Correct FOXCST Version is being used

When using the FOXCST GUI and "Tools > Software Download …", make sure you have a PC running a supported Windows® version, with an installed element manager FOXCST R18 (file name FOXCST_18.0.0-0.exe). For information on how to install the FOXCST refer to [1KHW002466] User Manual "FOXCST" (FOX61x R18).

For version details of the FOXCST to be installed, refer to [1KHW028777] Release Note "FOX-61x R18".

4.2.3.5 Limitations for the Upgrade

> **STOP** **Risk of operating trouble!**
> Incomplete ESW selection for the upgrade will lead to incompatibilities and service interruptions, and can even lead to the loss of the management connection.
>
> → If you miss a unit that needs to be upgraded the old unit ESW will be incompatible with the new ESW of the upgraded units. Therefore always select all units for upgrade that are operated in your NE as listed in Table 3 before executing "Download and Start…" or "Start…".

Risk of operating trouble!

Please note that the upgrade procedure will interrupt services for up to a few minutes.

→ If you do not want services to be interrupted at the moment, do not perform the upgrade now but choose a time for the upgrade when the impact of service interruptions on customers is minimal.

→ As an alternative you may want to **download** the new ESW to the FOX61x **without installing** the new ESW and **without re-starting** the units yet. This reduces the risk of a failed upgrade. Also see steps 8. to 11. in the following procedure, but selecting "Download" in step 11., and only select "Start…" after all ESW files have been downloaded. Note: The open "Software Download" dialog blocks any further FOXCST action.

Please note:

The ESW upgrade for the SENC1-4, SENC1F4, SENC1-8, and SENC1F8 encryption units cannot be done with the procedure described in section 4.2.3.6 Step-by-Step Procedure (on page 31).

→ For a description of the SENC1-4, SENC1F4, SENC1-8, and SENC1F8 units specific ESW upgrade procedure please refer to [1KHW029028] User Manual "SENC1-4, SENC1F4, SENC1-8, SENC1F8" and to section 4.2.5 SENC1 Software upgrade to R18 (on page 33).

Please note:

The risk of failed upgrades can be further reduced by running only one FOXCST instance on one PC.

4.2.3.6   Step-by-Step Procedure

The following order of actions is required for upgrading a FOX61x with a system release R16B state to ESW that is part of the system release R18.
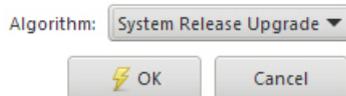

ESW upgrade procedure

Proceed as follows:

1. Start the FOXCST.
2. Select the menu command "File - Manage ESW …".
3. In the "ESW Package Manager" dialog window click on the "Import" button.
   - Browse to the appropriate folder or file source containing the new ESW and SIM files (see the appropriate columns in Table 3).
   - Select the ESW zip file needed to get your units to the "R18" status.
   - Click on the "Open" button.
   - Select the software types (all, .esw, .sim, none) to be imported.
   - Wait until all ESW files have been imported.
   - Close the "ESW Package Manager" dialog with the "Close" button.
4. Connect to the FOX61x to be upgraded (via the menu command "File - Connect …") with the "User Class" set to "Manager".
5. Check the equipment.
   - Make sure the equipment status (FOXCST Tree View) is "Ok" for all units to be upgraded. If this is not the case, take the appropriate measures to correct this before proceeding.
   - Make sure there are no equipment related alarms active (FOXCST "Alarms" view). If you have equipment alarms, take the appropriate measures to correct this before proceeding.
6. Perform a "Save to NE" operation to store the current running configuration to the NE database.

7. Create a backup (to your PC) of the network element configuration.

   - This is done on the FOXCST GUI by using the menu selection "File - Save Configuration To Disk …" or "File - Save Configuration To Disk As …".

> ⓘ **Please note:**
> FOXCST keeps the file name; without disconnection/reconnection, a later config save overwrites this original saved file without confirmation dialog.

8. Start the software download manager.

   - Select the menu command "Tools - Software Download …".
   - Wait until all plugged units are listed in the table.

9. Configure the software download.

   - In the "Available System Releases" selection box select the system release "R18 (FOX-61x)".
   - Check the "Software to install" column of all units to show the correct Software for the unit, including the core unit (one or two CESM1, (CESM2) or CESM3) and the core unit's neController (CESM1 (and CESM2) only) (see Table 3).
   - The "Status" column shows "Software needs to be downloaded", "Software is downloaded", or "Software is running", depending on the current condition.
   - Mark the checkboxes "Delete unused software" to make sure there is enough space in the flash memory of the unit.

10. Double check that all settings displayed in the "Software Download" table are correct.

11. Start the upgrade

    - When all required units are configured, click on the "**Download and Start** …" button.
    - When prompted with "Parameters for command Download and Start" set the Algorithm to "**System Release Upgrade**":

    - Click "OK" to apply the settings and start the upgrade process.
    - This will first delete unused software (ESW) files where necessary, download the new software (ESW) to the units to be upgraded, then restart the ESW on the units to be upgraded.
    - Do not close the "Software Download" dialog while the upgrade process is running.

12. Since you will lose the management connection to the FOX61x during the restart of the core unit(s), you need to re-connect to the FOX61x when the ESW upgrade has been completed.

13. After re-connecting check that everything is OK with the upgraded core unit(s) and service units.

14. Perform a "Save to NE" operation.

    - This will create a new database.

15. Create a backup (to your PC) of the network element configuration.

    - This is done on the FOXCST GUI by using the menu selection "File - Save Configuration to Disk …" or "File - Save Configuration to Disk As …".

Result: You have successfully upgraded your FOX61x.

End of instruction

> ⓘ **Please note:**
> If the upgrade was not successful for any reason, you might need to restore the backup configuration (i.e. the file stored to your PC in step 7. above) to your FOX-61x. This is done by downloading the saved FOX61x R16B backup file to the NE.
>
>   → Before downloading the saved backup file make sure that the ESW files used in R16B system release are still available on the units. If required for any reason,

download all missing ESW files via the FOXCST menu function "File > Manage ESW … > Import".

→ Download the backup file via the FOXCST menu function "NE > Download Configuration …". Select the previously stored .tar file to be downloaded.

→ If the conditions remain that have led to an unsuccessful upgrade contact Hitachi Energy technical support (see section 6.2 Technical Support (on page 36)) for assistance.

4.2.4   Post-upgrade steps

In certain cases, some MPLS-TP services may appear as "Deployed Invalid" in ENP after the database has been restored and the FOXMAN-UN services are started. This may be the case e.g. if modifications to the MPLS-TP configuration made with FOXCST have not been loaded to the FOXMAN-UN database. The following steps will resolve this:

1 Execute a force poll on all nodes.

2 Check the services status again in ENP.

3 If there are still services with status "Deployed Invalid", execute a "Clear and Synchronize" in ENP by selecting the menu option "Network - Clear and Synchronize". This menu option requires Expert Mode to be active. To activate it, select "Options - Expert Mode" from the ENP menu.

"Clear and Synchronize" will clear the services from the database and load them again from all nodes in the network. Wait until this has been terminated. The services should now all have "Deployed Valid" status.

4 Align all ENP services (VPLS and VPWS) from the ENP main window that are not aligned.

4.2.5   SENC1 Software upgrade to R18

After the NE upgrade, the SENC1-4, SENC1F4, SENC1-8, SENC1F8 units still run r16b03_01 software and are not yet upgraded. To upgrade SENC1 software to system release R18, follow these steps:

1 Copy the R18 SENC1 software tar file to the folder "/opt/dirac/addon/ESW" on the FOXMAN-UN server (dirac user permissions are required for this).

2 Open the Ethernet Security Manager (ESM) in FOXMAN-UN.

3 Open the Functional Unit View.

4 Select a SENC1 FU (running app-416_r16b03_01 software) and click on the "Deploy Software" button.

5 Select the correct (r18a01) software from the drop-down list and mark the "Upload Software to Unit" and "Activate Software" checkboxes.

6 Enter the Maintainer Password.

7 Confirm the software installation.

8 Wait until the units are getting manageable again; this will take at least around 15 minutes since the units will reboot twice.

9 Once the FU upgrade is completed and the FU Communication Status will be "Manageable", select the FU from the Functional Unit View and click on the "Renew Credentials..." button.

10 Optional - Enter the Maintainer and Administrator passwords and click on the "OK" button. This will store the passwords for possible future software updates and make the content of the "Software Management" tab visible.

i	**Please note:** Steps 4 to 10 support batch operation given that the selected FUs have identical password. You can select several FUs at the same time and run steps 4 to 10 on all FUs in parallel.

i	**Please note:**
	In step 5 you can check "Upload Software to Unit" box without checking the "Activate Software" box. In networks with multiple SENC1 units it is recommended to first perform batch "Upload Software to Unit" on all FUs to be upgraded. Once the upload is successfully completed you can perform a batch "Activate Software" on all FUs to be upgraded. This can considerably reduce the upgrade time for all FUs.

5 Foreign Object (FO) Upgrade to R18

5.1 Introduction

For the upgrade of NEs of type "Foreign Object" (FO) from an R16B or R17A installation to R18, no special precautions need to be taken, provided the upgrade to R16B or R17A had been executed in accordance with the respective application note [1MRC000131] Application Note "FO Migration Step by Step".

6 Annex

6.1 Document History

Table 4: **Document history**

Document ID	FOXMAN-UN/ FOX61x Release	Rev.	Date	Changes since previous version
1KHW028779	R18	A	Oct 2025	First version for system release R18.

6.2 Technical Support

Please refer to the Hitachi Energy Collaborative Operations Portal COP, https://cop.hitachie-nergy.com, for support contact information. Note that a valid registration is required to access the COP.

6.3 References

[1KHW028777]   Release Note "FOX61x R18"

[1KHW002497]   Operating Instruction "Precautions and safety"

[1KHW002466]   User Manual "FOXCST" (FOX61x R18)

[1KHW028522]   User Manual "Management Communication" (FOX61x R18)

[1KHW029028]   User Manual "SENC1-4, SENC1F4, SENC1-8, SENC1F8"

[1KHW002499]   Release Note "FOXMAN-UN R18"

[1KHW002414]   User Manual "FOXMAN-UN under Linux"

[1KHW029183-FR17A] Application Note "Upgrade ERPS from R1D to R17A"

[1MRC000131]   Application Note "FO Migration Step by Step"

[1KHW029171]   Application Note "Access Control Lists (ACL)"

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