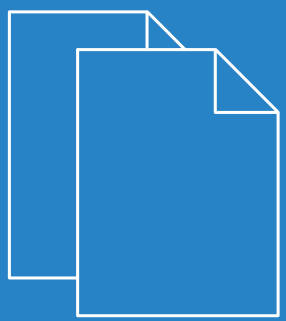
SECURE. NETWORKS.

LCOS FX 10.7

Addendum



11/2021

LANCOM Systems

Contents

Copyright

While the information in this manual has been compiled with great care, it may not be deemed an assurance of product characteristics. LANCOM Systems shall be liable only to the degree specified in the terms of sale and delivery.

The reproduction and distribution of the documentation and software supplied with this product and the use of its contents is subject to written authorization from LANCOM Systems. We reserve the right to make any alterations that arise as the result of technical development.

Windows® and Microsoft® are registered trademarks of Microsoft, Corp.

LANCOM, LANCOM Systems, LCOS, LANcommunity and Hyper Integration are registered trademarks. All other names or descriptions used may be trademarks or registered trademarks of their owners. This document contains statements relating to future products and their attributes. LANCOM Systems reserves the right to change these without notice. No liability for technical errors and/or omissions.

This product contains separate open-source software components which are subject to their own licenses, in particular the General Public License (GPL). If the respective license demands, the source files for the corresponding software components will be provided on request. Please send an e-mail to *gpl@lancom.de*.

Products from LANCOM Systems include software developed by the "OpenSSL Project" for use in the "OpenSSL Toolkit" (*www.openssl.org*).

Products from LANCOM Systems include cryptographic software written by Eric Young (*eay@cryptsoft.com*).

Products from LANCOM Systems include software developed by the NetBSD Foundation, Inc. and its contributors.

Products from LANCOM Systems contain the LZMA SDK developed by Igor Pavlov.

LANCOM Systems GmbH

Adenauerstr. 20/B2

52146 Wuerselen

Germany

www.lancom-systems.com

1 Addendum to LCOS FX version 10.7

This document describes the changes and enhancements in LCOS FX version 10.7 since the previous version.

2 Netmap

From LCOS FX version 10.7 it is possible to make SNAT and DNAT settings for entire networks. The previous option of NAT for individual services is of course still available.

For this purpose, the new tab **NAT** was added to in the Connection dialog:

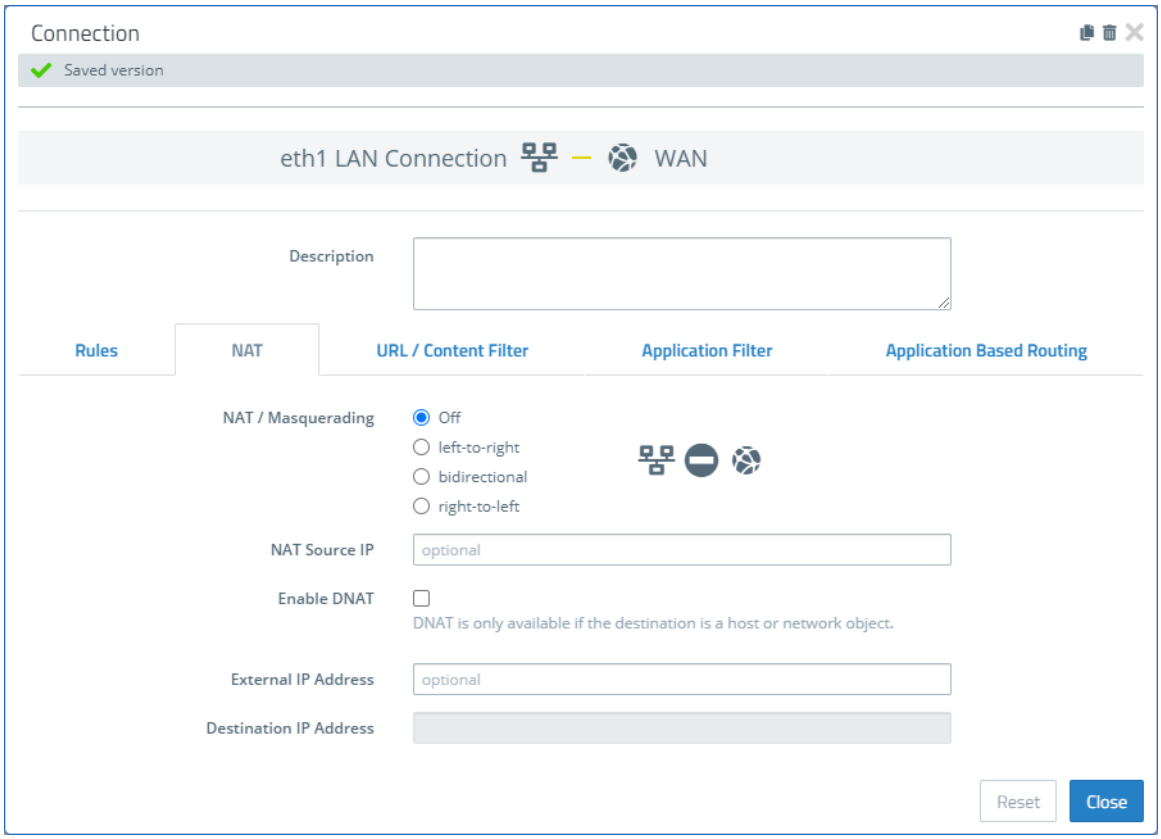


Figure 1: Connection dialog > NAT

Using the **NAT** tab it is possible to configure SNAT and DNAT for entire networks. The settings correspond to those for individual services except for the destination port, which is omitted from the NAT settings for the connection.

Input box	Description
NAT / Masquerading	Specify the desired direction for NAT/masquerading (**bidirectional**, **left-to-right**, or **right-to-left**), or disable the function for that rule (**Off**) by selecting the appropriate radio button. The default setting depends on the source and destination objects selected for the connection.
NAT Source IP	Optional: If you have multiple outgoing IP addresses, specify the IP address to use for the source NAT. If no IP address is specified, the system automatically selects the main IP address of the outgoing interface. If a connected object is a network, you can also enter a network here, provided that it has the same size as the object's network.
Enable DNAT	If a single host or network object is the destination, you can mark this check box to activate DNAT.

Input box	Description
External IP address	Optional: Enter the destination IP address of the data being processed. DNAT is applied to this data traffic only. This IP address has to be one of the IP addresses of the firewall. If a connected object is a network, you can also enter a network here, provided that it has the same size as the object's network.
Destination IP address	Optional: Enter the destination IP address of the data being processed.

The tab **Rules** now has an additional column **Connection NAT** to make it easier to switch NAT settings from connection-based to service-based and vice versa. By default, newly added services use the option to use the NAT settings for the connection. If you wish to use the service-specific settings described below, you must remove the checkmark here.

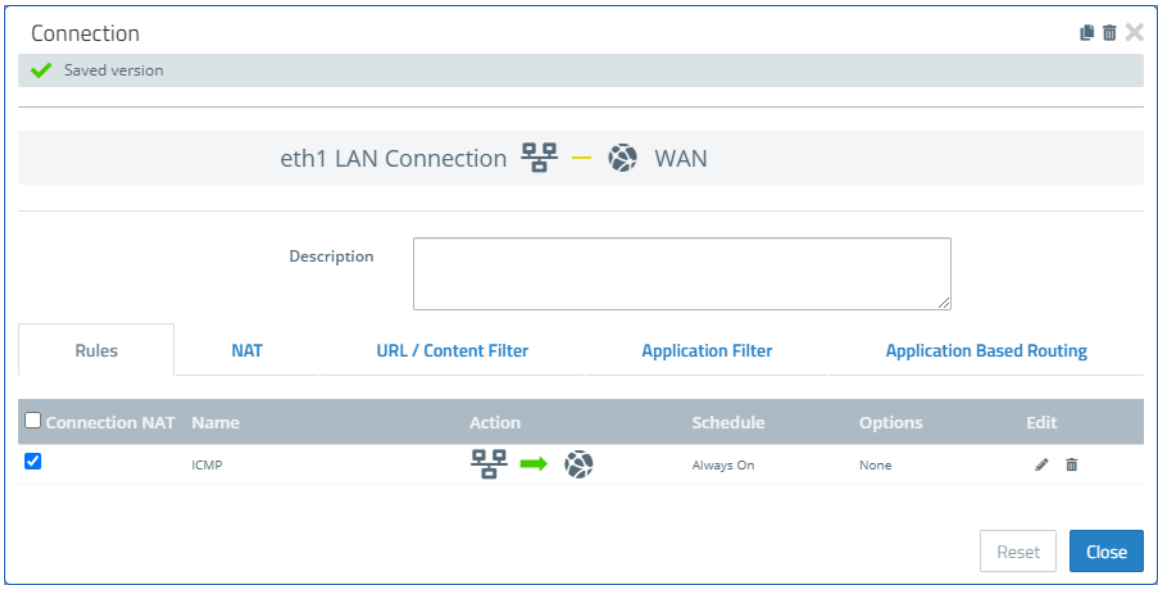


Figure 2: Connection dialog > Rules

In order to preserve the previous service-specific settings, you have to edit the rule and, in the dialog, use the tab **Advanced** to switch from the option **Use Connection Settings** to **Use Service Specific Settings**. In this way the familiar settings are displayed for editing again:

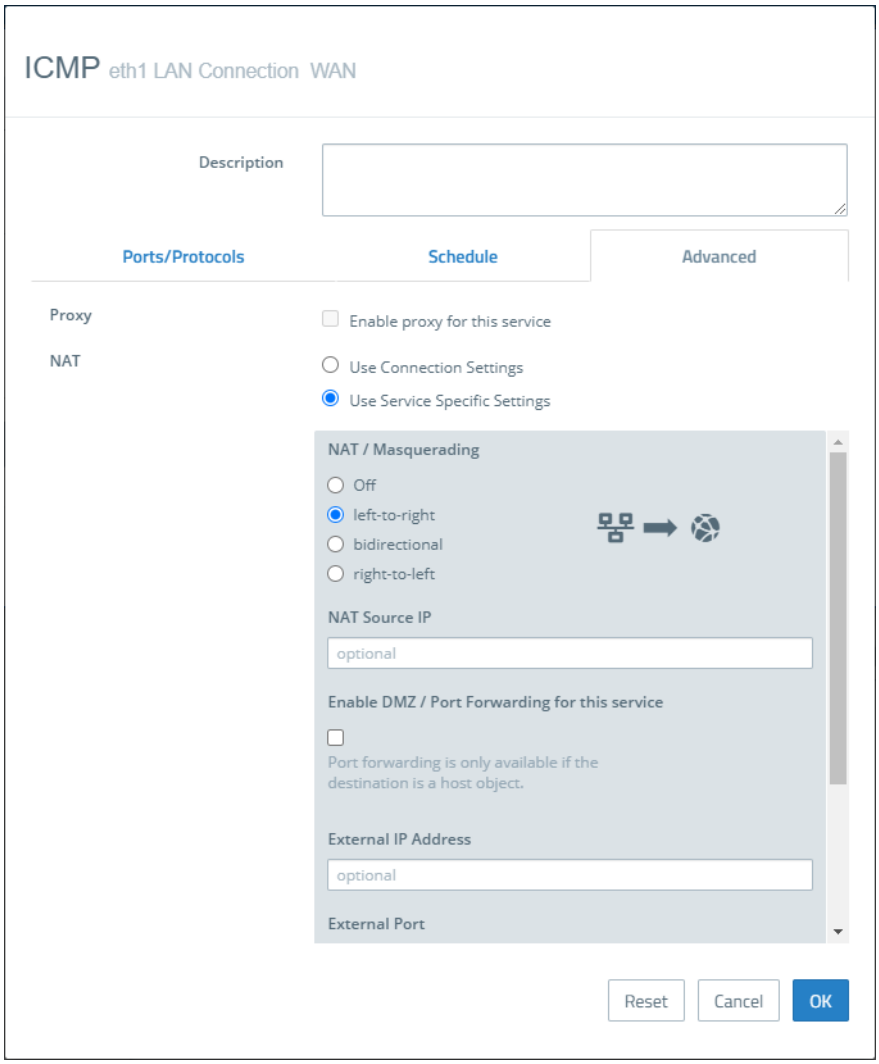


Figure 3: Service dialog > Advanced

3 Certificate Management

As of LCOS FX version 10.7, modifications to the **Certificate Management** resulted in, among other things, changes to the menu structure under Certificate Management. The items **Certificates** and **Templates** have retained their enhanced functionality, while the **Trustworthy CAs** have been supplemented by **Untrustworthy CAs**. The item **OCSP/CRL** has been removed completely. The certificate requests are now created under the item **Certificates**.

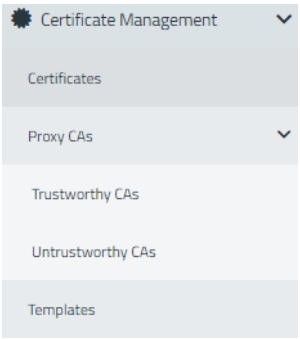


Figure 4: Certificate Management menu

The following is a full description of the modifications, making reference to modified or discontinued features where applicable.

3.1 Certificates

The **Certificates** configuration dialog allows you to manage the certificates used by the LANCOM R&S®Unified Firewall web client, the built-in SSL proxy and the OpenVPN server.

To secure encrypted connections, your LANCOM R&S®Unified Firewall uses digital certificates as per the X.509 standard.

The LANCOM R&S®Unified Firewall itself acts as a certification authority. Therefore, a so-called CA certificate is required. To centralize the management of the certificates, it is advisable to create a CA certificate on a central firewall and use it to sign every certificate used for the application directly. This is called a single-staged certification chain.

All certificates for applications have to be signed by the central firewall. If a certificate is needed for another firewall, you have to create a request on it. This request has to be signed by the central firewall. The signed request which you created has to be imported by the other firewalls to use it.

If the other firewalls require the ability to create certificates for mostly local purposes which are however recognized as valid to your whole organization, you can use multi-staged certification chains. Therefore, you need a so-called root CA certificate on your central firewall with which you sign the secondary CA certificates. You need to create requests for these secondary CA certificates on your other firewalls. After importing the signed CA certificates, the other firewalls themselves are able to sign certificates for applications. To display these hierarchies clearly, your LANCOM R&S®Unified Firewall shows them in a tree view.

3.1.1 Overview of certificates

Navigate to **Certificate Management** > **Certificates** to display a tree diagram listing the certificates available on the system as organized by certificate authority.

Use the buttons above the list to expand or collapse the branches, import a certificate from a file (), sign a certificate signing request, or create a new certificate.

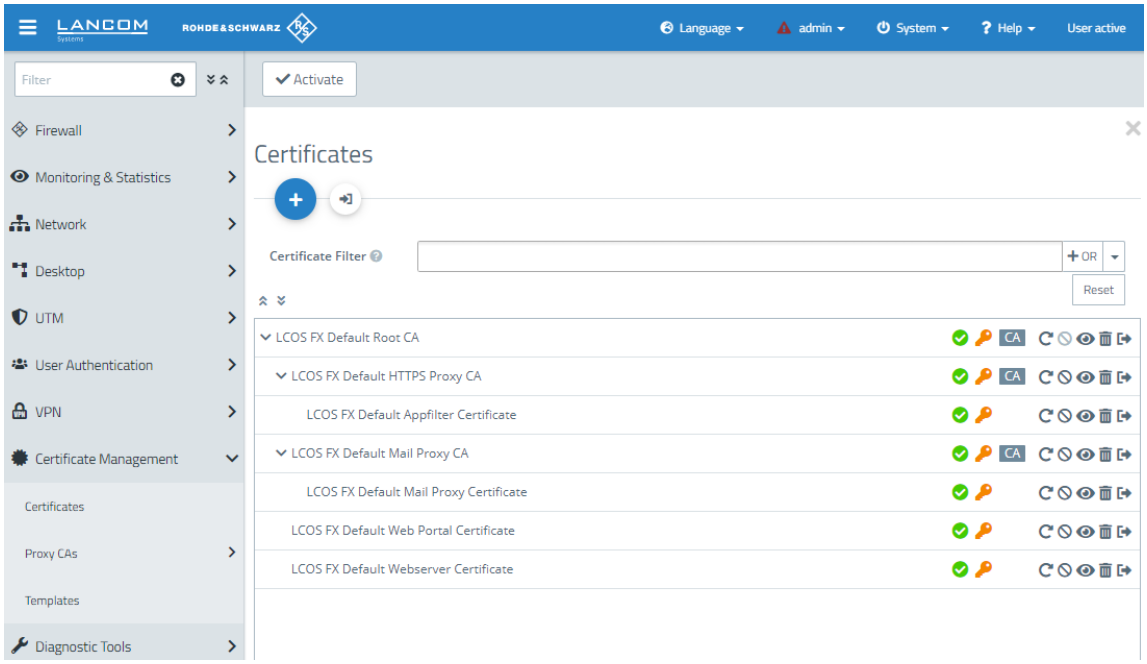


Figure 5: Certificate Management > Certificates

After the initial boot-up and following a new installation, the following certificates are created by default, although occasionally they first have to be selected in the setup wizard:

Table 1: Previously created certificates

Certificate name	Description
LCOS FX default root CA	Top-level certification authority used to create subordinate certification authorities and certificates.
LCOS FX default HTTPS proxy CA	Certification authority for creating subordinated certificates for use by the HTTPS proxy.
LCOS FX default app-filter certificate	Preconfigured certificate for application management.
LCOS FX default mail proxy CA	Certification authority for creating subordinated certificates for use by the mail proxy.
LCOS FX default mail proxy certificate	Preconfigured certificate for the mail proxy.
LCOS FX default web portal certificate	Preconfigured certificate for the web portal.
LCOS FX default web server certificate	Preconfigured certificate for the web server.

This list displays the name of the respective certificate and its dependencies as shown by the tree structure. The button behind each certificate indicate its validity:

- – certificate is valid
- – certificate expires in 8 to 30 days
- – certificate expires in one to 7 days
- -– certificate has expired

- – certificate has been revoked
- – certificate has been replaced

Also displayed is the availability of a private key for the certificate () and a "CA" shows whether the certificate is a certification authority. You can also use the buttons to display details of each certificate (), export a certificate (), temporarily suspend or renew the validity of a certificate (), revoke the certificate (), and delete the certificate or just its private key ().

Filtering the certificate overview

From LCOS FX version 10.7 the former simple text filter has been replaced by a filter similar to the one used for the alert log.

You can use **Certificate Filter** in the input field to narrow down the results by using different search criteria and options.

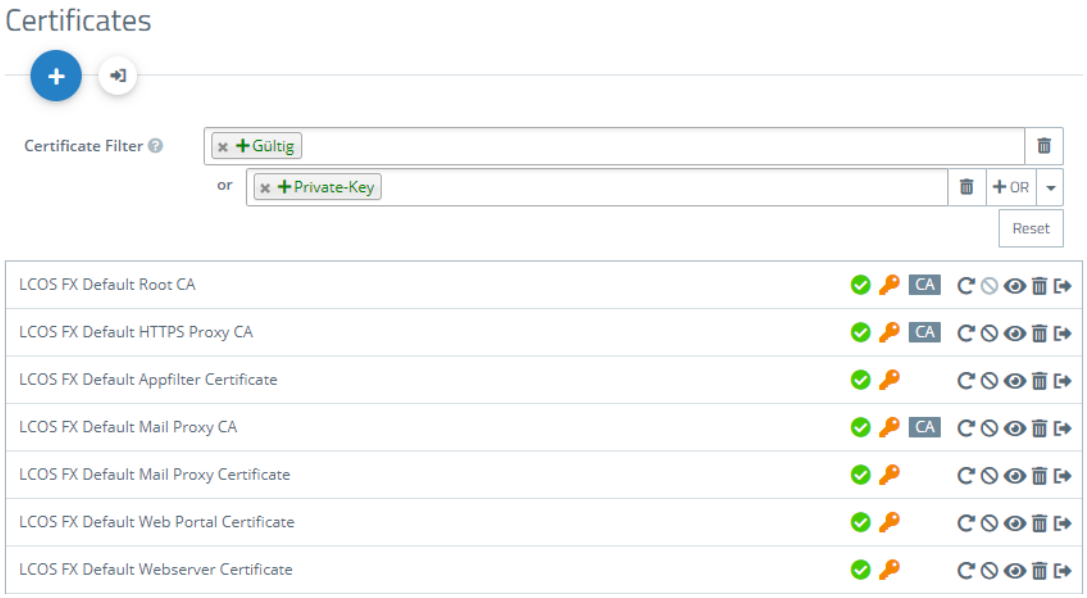


Figure 6: Certificates with applied filter

Proceed as follows to create a filter:

1. Click in the input field.

   The web client displays suggested filters.

2. Select one of the suggested filters from the drop-down list, or enter any search text to receive further suggestions. Predefined filters are:

   - Status
     - Valid certificates
     - Expired certificates
     - Revoked Certificates
     - Certificates valid for less than a week
     - Certificates valid for less than a month
     - Certificates not yet valid
   - Property
     - With private key
     - Is a certificate authority

- Is a request
- Was generated using one of the following key algorithms: RSA, NIST curves, ED448, ED25519
- NIST curve types: secp224r1, secp256r1, secp384r1, secp521r1, secp256k1
- Key size 1024, 1536, 2048, 3072, 4096, 6144 and 8192
- Key usage: Content commitment, CRL signature, data encryption, decryption only, digital signature, encryption only, key agreement, key certificate signature, key encryption
- Extended key usage: Any advanced key usage, client authentication, code signature, e-mail protection, OCSP signature, server authentication, time stamp
- Hash algorithms: sha1, sha224, sha256, sha384, sha512
- Reasons for revocation: Unspecified, key compromised, CA compromised, affiliation changed, replaced, business discontinuation, rights revoked, attribute authority compromised

Entering text shows new filter properties:

- Text
  - Common Name contains entered text
  - Subject contains entered text
  - Subject of the issuer contains entered text
- Hexadecimal notation (hyphens and colons are ignored, i.e. you can enter “dddd”, “dd-dd” or “dd: dd”, and all are considered valid)
  - Fingerprint contains entered text
  - Signature contains entered text

For each suggestion, you can specify whether to use this as an inclusion filter (+ / AND) or exclusion filter (⊘ / AND-NOT).

After selection, the suggested filter is inserted into the input field as a search criterion.

The list of certificates is adapted to the search query.

Repeat the above steps until you have added the desired filter criteria to your query.

Only entries that match all filter criteria are displayed.

To delete a filter criterion in a search query, click on ✖.

You can add multiple lines to your search by clicking on **+ OR** next to the input field. You can choose to insert a new blank line or to copy the last created line. Each line is a separate search query, which is ORed with the other lines.

Delete the line by clicking 🗑 next to the line.

Creating a certificate or certificate request

With the plus button ⊕ above the list with the elements you can create new certificates and signing requests. You can configure the following elements:

Input box	Description
Certificate Type	Choose between the options **Certificate** to create a certificate or a certification authority (CA) and a **Certificate Signing Request**. With the latter, you create a certification request for a certificate or for a subordinate CA, which then has to be signed by a higher-level CA to become valid. When selecting the option **Certificate Signing Request**, neither the **Validity** nor the **Signing CA** can be selected as these are specified when the certificate is signed.

Input box	Description
	The created request appears under the certificates in a separate branch of the certificate tree, **Outstanding Certificate Signing Requests**.
Common Name (CN)	Specify a name for this certificate.
Private Key Password	Required: Enter a password to secure the private key.
Show Password	Optional: Set a check mark in the check box to view the password.
Validity	Set the starting time for the certificate's validity period. The input boxes are already filled out with the current date as the creation date and the expiry date set to the same day one year later in the case of a certificate or 5 years later in the case of a certificate authority. To specify a different period, select one of the options provided or select the start and end date in the calendar that is displayed. The start and end dates are displayed in the following format: MM/DD/YYYY – MM/DD/YYYY (e.g. `04/18/2021 - 04/18/2031`).
Template	Optional: Choose one of the *Templates* on page 16 to fill-out the boxes in the section "Options" and "Subject and SAN" with values from the template. If you select a template, any settings you made previously are overwritten!
Signing CA	Select the signing CA.
CA Password	With a CA is selected this field is mandatory, unless it is one of the LCOS FX CAs listed in *Table 1: Previously created certificates* on page 9. Enter a password for the private key of the signing certification authority. The password is required because the public key of the new certificate is signed with the private key of the signing CA.
Show CA Password	Optional: Set a check mark in the check box to view the password.
Certificate Authority	This option determines whether or not the certificate being created can also be used as a certification authority to sign other certificates. **Caution**: There are different default periods of validity for certificates (1 year) and Certificate Authorities (5 years). Changing this property causes the validity period to be adjusted.
Path Length	Only available if **Certificate Authority** is selected. Here you determine how many sub-CA levels can be created with this CA. With a value of 0, no sub-CAs can be signed with this CA, i.e. only "normal" certificates can be signed with this CA. If the field is left blank, there is no limit.
Key Usage	Click in the box for a choice of preset property values, e.g. data encryption.
Encryption algorithm	The algorithm "DSA" was deprecated as of LCOS FX version 10.7. It was replaced with the "NIST curves", "ed448" and "ed25519" elliptic curve methods. Select the algorithm you require from the list of results. If you select the option "NIST curves", you have to select the type of NIST curve from the **Curve** field.
Curve	If you selected the option "NIST curves" under **Encryption algorithm**, you select the type of NIST curve here.
Key Size	If you selected the option "RSA" under **Encryption algorithm**, you select the key size here.
Hash Algorithm	Select one of the available hash algorithms.
Extended Key Usage	Here you can click in the box to add further predefined property values from a list, such as the timestamp, for example.

Input box	Description
Subject	Optional: From the drop-down list you can choose any number of subjects, such as **Country (C)**, **State (ST)**, **Organization (O)**, or **Organizational Unit (OU)**, and enter the content in the input box to the right. Click on ⊕ on the right-hand side to add an entry to the list. You can edit or delete any entry in the lists by clicking on the appropriate icon. When you edit a **Subject**, a checkmark will appear to the right of the entry. You first have to confirm your change with this checkmark before you can save the certificate settings.
Subject Alternative Name (SAN)	Optional: You can enter any number of custom names for different uses and select the appropriate types from the drop-down list. The following types are available: `E-Mail`, `DNS`, `DirName`, `URI`, `IP` and `RegID`. Click on ⊕ on the right-hand side to add a Subject Alternative Name (SAN) to the list. You can edit or delete any entry in the lists by clicking on the appropriate icon. When you edit a **Subject Alternative Name (SAN)**, a checkmark will appear to the right of the entry. You first have to confirm your change with this checkmark before you can save the certificate settings.

With the buttons in the lower right corner of the editing field, you can create a new certificate and add it to the list of available certificates, or cancel the creation of a new certificate (**Cancel**).

Importing a certificate or signing a certificate signing request

The ➔] button above the list allows you to import a certificate from a file or to sign a certificate signing request.

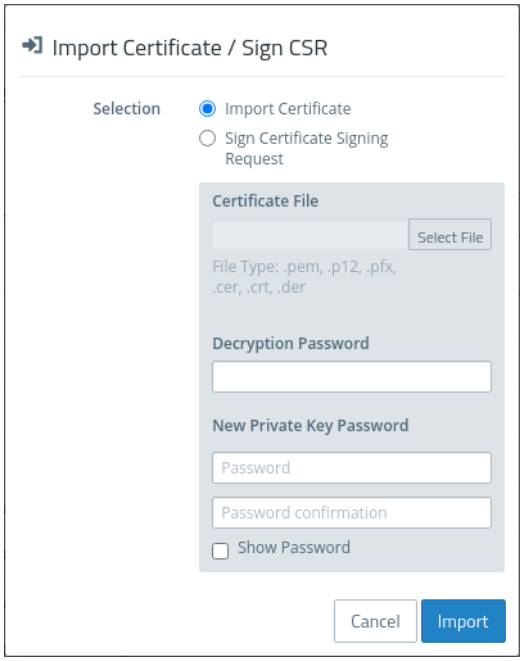


Figure 7: Importing a certificate / signing a certificate signing request

The radio buttons at the top allow you to chose between importing a certificate or signing a certificate signing request.

The import function supports certificate files in various formats (*.pem, *.p12, *.pfx, *.cer, *.crt, *.der). If the file contains a private key, a password must be entered to decrypt the private key, and a password must be entered to encrypt the private key again. You can optionally display the password.

In the case of a certificate signing request, select the associated file. The following file types are supported: * .pem, * .crt, * .cer, * .der. You select a signing CA and enter the associated password. The validity period must also be selected. Once signed successfully, the certificate is offered for download as a PEM.

With the buttons in the lower right corner of the editing field, you can import the selected certificate file and add it to the list of available certificates, sign the certificate signing request, or cancel the dialog (**Cancel**).

Renew certificate

The ↻ button for a certificate in the list prompts a new certificate to be created with a new validity period.

In the case of a simple certificate, select the new period under **Validity** and enter the **CA Password** of the relevant CA certificate. For certificates that are not self-signed, a completely different CA can be selected when renewing. This is not limited to the current CA. For certificates that are not self-signed, two passwords must be entered; the CA password and the private-key password of the certificate being renewed.

With a Certificate Authority (CA) you can also change the Common Name and assign a new validity period to the certificates signed by this CA.

Derived sub-CAs and certificates must be renewed manually.

The certificates due for renewal are no longer revoked automatically. You can optionally carry out the revocation after the renewal.

Use the buttons at the bottom right in the editing box to renew the validity period of the selected certificate or CA and, if necessary, the certificates signed by it, or to cancel the dialog (**Cancel**).

Revoke certificate

With the ⊘ button you can revoke a listed certificate. To do this, you must select a reason and enter the password of the private key of the certificate's parent CA.

Certificates cannot be revoked if

- the certificate was revoked already,
- the certificate is a CA and has been replaced,
- the certificate does not have a CA (first-level CA) or
- the CA of the certificate does not have a private key.

Use the buttons in the lower right-hand corner of the editing window to revoke the selected certificate or to cancel the dialog (**Cancel**).

Viewing certificate details

The button 👁 is used to view the details of a certificate in the list.

You can use the buttons in the lower right corner of the edit box to copy the public key and the certificate's fingerprint to the clipboard, or to close the dialog (**Close**).

Deleting a certificate or private key

The 🗑 button next to a certificate in the list allows you to delete the certificate or the private key that belongs to it. Unlike a revoked certificate, a deleted certificate is also removed from the certificate tree. No password is required to do this.

Use the buttons in the lower right-hand corner of the editing window to delete the certificate or the private key only, or to cancel the dialog (**Cancel**).

Exporting a certificate

The button next to a certificate in the list allows you to export the certificate in the format PEM, PKCS, or DER.

PEM

An export in the PEM format usually exports the public portion of the certificate only. Optionally, the related CAs can also be included in the PEM file. If available, the private key can be exported as well. This requires the current password to decrypt the private key and a new password to encrypt the exported private key. If the certificate has no private key, this option is not available.

PKCS

The PKCS format is only available for exporting certificates that have a private key. As with the PEM export, this requires the current password to decrypt the private key and a new password to encrypt the exported private key. Unlike PEM, the password is required to encrypt the entire container and not the private key.

DER

An export in the DER format involves the certificate being exported in the PEM format, in which case the PEM is Base64 coded. Here too the private key can optionally be exported by using the passwords. Since the DER format supports one certificate only, the certificate and the private key are stored separately and collected into a ZIP file. The private key is saved in the pkcs8 format.

Use the buttons in the lower right-hand corner of the editing window to export the certificate or to cancel the dialog (**Cancel**).

3.1.2 Private key password

From LCOS FX version 10.7, whenever a certificate with a private key is required, you must enter this password to decrypt the key if:

- the relevant settings are activated or
- the certificate is changed.

This behavior affects the following dialogs and settings:

- Command Center settings
- Web client settings
- Application Management settings
- HTTP proxy settings
- Mail proxy settings
- Reverse proxy front-end settings
- Settings for the external portal
- VPN profiles
- Settings for the internal portal
- IPsec connections with cert. or CA authentication
- VPN SSL settings

By contrast, there is no need to enter a private key password if it is one of the LCOS FX CAs listed in *Table 1: Previously created certificates* on page 9.

3.2 Templates

To simplify the creation of new certificates, you can use templates to automatically fill out the input boxes for a range of optional fields, e.g. the **Distinguished Name** and the **Subject Alternative Names**.

3.2.1 Templates overview

Navigate to **Certificate Management** > **Templates** to display the list of templates available on the system in the object bar. Two templates for certificates and certificate authorities are available after installing the LANCOM R&S®Unified Firewall.

In the expanded view, the table columns show the name and settings of the template. Use the buttons in the last column to view and modify a template's settings, create a new template based on a copy of an existing one, or delete a template from the system.

The two default templates cannot be deleted.

3.2.2 Settings for templates

In the **Templates** editing window you can specify additional certificate options, which can be used automatically when a certificate is created. The following elements can be specified:

Input box	Description
Name	Enter a name for this template. You can use this name to select the template when creating the certificate.
Certificate Authority	This option determines whether or not the certificate being created can also be used as a certification authority to sign other certificates. **Caution**: There are different default periods of validity for certificates (1 year) and Certificate Authorities (5 years). Changing this property causes the validity period to be adjusted.
Path Length	Only available if **Certificate Authority** is selected. Here you determine how many sub-CA levels can be created with this CA. With a value of 0, no sub-CAs can be signed with this CA, i.e. only "normal" certificates can be signed with this CA. If the field is left blank, there is no limit.
Key Usage	Click in the box for a choice of preset property values, e.g. data encryption.
Encryption algorithm	Select the algorithm you require from the list. If you select the option "NIST curves", you have to select the type of NIST curve from the **Curve** field.
Curve	If you selected the option "NIST curves" under **Encryption algorithm**, you select the type of NIST curve here.
Key Size	If you selected the option "RSA" under **Encryption algorithm**, you select the key size here.
Hash Algorithm	Select one of the available hash algorithms.
Extended Key Usage	Here you can click in the box to add further predefined property values from a list, such as the timestamp, for example.
Subject	Optional: From the drop-down list you can choose any number of subjects, such as **Country (C)**, **State (ST)**, **Organization (O)**, or **Organizational Unit (OU)**, and enter the content in the input box to the right. Click on ⊕ on the right-hand side to add an entry to the list. You can edit or delete any entry in the lists by clicking on the appropriate icon.

Input box	Description
	When you edit a **Subject**, a checkmark will appear to the right of the entry. You first have to confirm your change with this checkmark before you can save the certificate settings.
Subject Alternative Name (SAN)	Optional: You can enter any number of custom names for different uses and select the appropriate types from the drop-down list. The following types are available: `E-Mail`, `DNS`, `DirName`, `URI`, `IP` and `RegID`. Click on ⊕ on the right-hand side to add a Subject Alternative Name (SAN) to the list. You can edit or delete any entry in the lists by clicking on the appropriate icon. When you edit a **Subject Alternative Name (SAN)**, a checkmark will appear to the right of the entry. You first have to confirm your change with this checkmark before you can save the certificate settings.

The buttons available at the bottom right of the edit box depend on whether you are adding a new template or editing an existing one. For a newly configured template, click **Create** to add it to the list of available templates, or **Cancel** to discard your changes. To edit an existing template, click **Save** to save the newly configured template, or **Reset** to discard your changes.

3.3 Proxy CAs

The settings under **Proxy CA** are used to manage your CA certificates: For this purpose, they are arranged in trusted and untrusted lists.

3.3.1 Trusted proxy CAs

Navigate to **Certificate Management** > **Proxy CAs** > **Trustworthy CAs** for the object bar to display a list of the custom and system certificate authorities currently created in the system and that are trusted by the SSL proxy for external connections.

In the expanded view, the **Common Name** of the CA certificate is displayed in the first column of the table. Use the buttons in the last column to view the settings for a CA certificate or to mark a CA certificate as untrusted. This will place it in the list under **Certificate Management** > **Proxy CAs** > **Untrustworthy CAs**. You can also delete user-defined CA certificates.

To send a user-defined CA to your LANCOM R&S®Unified Firewall, click the ➔ (Import) button in the header of the object bar, select the desired PEM/CRT file, open it, and click **Import**. The imported user-defined certificate is added to the list of available trusted proxy CAs. Use the option **Show User Defined CAs Only** to reduce the displayed list to the Certificate Authorities you have added.

3.3.2 Untrusted proxy CAs

Navigate to **Certificate Management** > **Proxy CAs** > **Untrustworthy CAs** for the object bar to display a list of user-defined and system certification authorities currently created in the system and that are **not** trusted by the SSL proxy for external connections.

In the expanded view, the **Common Name** of the CA certificate is displayed in the first column of the table. Use the buttons in the last column to view the settings for a CA certificate or to mark a CA certificate as trusted. This will place it in the list under **Certificate Management** > **Proxy CAs** > **Trustworthy CAs**. You can also delete user-defined CA certificates.

Use the option **Show User Defined CAs Only** to reduce the displayed list to the Certificate Authorities you have added.