



# ENTRUST

## Entrust PKIaaS

### Customer Guide

**Doc release: 1.8**

**Release date: January 16, 2025**

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# 1 About this guide

This document provides a complete customer guide for Entrust PKIaaS (PKI as a Service).

- [Acronyms](#)
- [Revision information](#)
- [Other documents](#)
- [Documentation feedback](#)

## Acronyms

See below a definition of acronyms that may appear in this document.

Acronym	Definition
ACME	Automatic Certificate Management Environment
ADCS	Microsoft Active Directory Certificate Services
ADDS	Microsoft Active Directory Domain Services
AES	Advanced Encryption Standard
AIA	Authority Information Access
CA	Certification Authority
CAGW	Entrust CA Gateway (API)
CEG	Entrust Certificate Enrollment Gateway
CEP	Certificate Enrollment Policy
CLI	Command-line Interface
CLM	Certificate Lifecycle Management
CMC	Cryptographic Message Syntax
CMP	Certificate Management Protocol
CN	Common Name

<b>Acronym</b>	<b>Definition</b>
CPS	Certification Practice Statement
CRL	Certificate Revocation List
CSR	Certificate Signing Request (PKCS #10)
CSS	Certificate Status Server
CT	Certificate Transparency
DHCP	Dynamic Host Configuration Protocol
DN	Distinguished Name
DNS	Domain Name System
ECDSA	Elliptic Curve Digital Signature Algorithm
ECC	Elliptic Curve Cryptography
ECS	Entrust Certificate Services
EEE	End Entity Enrollment
EST	Enrolment over Secure Transport
FIPS	Federal Information Processing Standard
FQDN	Fully Qualified Domain Name
JDK	Java Development Kit
HSM	Hardware Security Module
LDAP	Lightweight Directory Access Protocol
LDAPS	Lightweight Directory Access Protocol over SSL



<b>Acronym</b>	<b>Definition</b>
LRA	Local Registration Authority
MDM	Mobile Device Management
MDMWS	Entrust's Mobile Device Management Web Service API
MS-XCEP	X.509 Certificate Enrollment Policy Protocol (CEP)
MS-WSTEP	WS-Trust X.509v3 Token Enrollment Extensions Protocol (WSTEP)
NIST	National Institute of Standards and Technology
PKIaaS	Public Key Infrastructure as a Service
OA	Operational Authority
OCSP	<a href="#">Online Certificate Status Protocol</a>
OID	Object Identifier
OTP	One-time Passcode
OVA	Open Virtual Appliance
P12	PKCS (Public Key Cryptography Standards) #12
PA	Policy Authority
PQ	Post-Quantum
PKCS	Public Key Cryptography Standards
PKI	Public Key Infrastructure
RA	Registration Authority
REST	Representational State Transfer

<b>Acronym</b>	<b>Definition</b>
RBAC	Role-Based Access Control
RDN	Relative Distinguished Name
RFC	Request for Comment
RHEL	Red Hat Enterprise Linux
RPO	Recovery Point Objective
RTO	Recovery Time Objective
SAN	Subject Alternative Names
SCEP	Simple Certificate Enrollment Protocol
SIEM	Security Information and Event Management
SHA	Secure Hash Algorithms
S/MIME	Secure/Multipurpose Internet Mail Extensions
TLS	Transport Layer Security
TPM	Trusted Platform Module
URL	Uniform Resource Locator
UEM	Unified Endpoint Management
V2G	Vehicle-to-Grid
VM	Virtual Machine
WHFB	Windows Hello for Business

## Revision information

See the below table for the issues of this document.

Issue	Date	Section	Changes
1.8	Dec 2024	<a href="#">Getting Certificate Enrollment Gateway settings for MDM</a>	Improve the URL format reference
1.7	Oct 2024	<a href="#">Revoking and removing certificates</a>	New section
		<a href="#">RDN Format</a>	Describe the automated renewal configuration
		<a href="#">RDN Variables</a>	Describe the automated renewal configuration
		<a href="#">User types with PKIaaS roles</a>	Add note on Requester user type limitations.
1.6	June 2024	<a href="#">Azure requirements for the PKIaaS Virtual Machine</a>	New section
		<a href="#">Configuring MDM automation in Ivanti Neurons MDM</a>	Update the configuration steps to reflect the changes from Ivanti MobileIron to Ivanti Neurons
1.5	February 2024	<a href="#">Automating Windows Auto Enrollment (WSTEP) with an Entrust-hosted Enrollment Gateway</a>	New section
1.4	October 2023	<a href="#">Role-Based Access Control</a>	New role-based access control feature
		<a href="#">Post-quantum Lab experimental region</a>	New region to test PQ key types
		<a href="#">Multiuse certificate profiles</a>	New certificate profiles

Issue	Date	Section	Changes
1.3	May 2023	<a href="#">Certification Authority instantiation</a>	Remove the region limitation per ECS account
		<a href="#">Getting the Intune Service URL</a> <a href="#">Getting Certificate Enrollment Gateway settings for MDM</a>	Add Intune and MDM URLs for the US and EU regions
		<a href="#">Subscriber certificate profiles</a>	Update the default validity from 3 to 1 year for most subscriber certificate profiles
		<a href="#">Migrating a customer-hosted Enrollment Gateway to Entrust-hosted</a>	Add this new section
1.2	March 2023	<a href="#">Automating Intune enrollment with an Entrust-hosted Enrollment Gateway</a> <a href="#">Automating MDM enrollment with an Entrust-hosted Enrollment Gateway</a> <a href="#">Integrating third-party tools with the Entrust CA Gateway API</a> <a href="#">Azure Firewall Intermediate CA certificate profile</a>	Add these new sections
1.1	November 2022	<a href="#">TLS Proxy CA certificate profile</a>	Add this new feature
		<a href="#">MDMWS certificate profiles</a>	Add the P12 and client authentication profiles
1.0	October 2021	All sections	Release the document

## Other documents

See the table below for other relevant documentation on Entrust PKIaaS.

Document	URL
PKIaaS Product Page	<a href="https://www.entrust.com/digital-security/certificate-solutions/products/pki/managed-services/pki-as-a-service">https://www.entrust.com/digital-security/certificate-solutions/products/pki/managed-services/pki-as-a-service</a>

<b>Document</b>	<b>URL</b>
PKIaaS Terms and Conditions	<a href="https://www.entrust.com/legal-compliance/terms-conditions/entrust-managed-pki">https://www.entrust.com/legal-compliance/terms-conditions/entrust-managed-pki</a>
PKIaaS Certification Practice Statement	<a href="https://api.managed.entrust.com/pkiaas/cps">https://api.managed.entrust.com/pkiaas/cps</a>

## Documentation feedback

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<https://go.entrust.com/documentation-feedback>

Any information you provide goes directly to the documentation team and is used to improve and correct the information in our guides.

## 2 Introduction to PKIaaS

Entrust PKI as a Service (PKIaaS) is a highly secure PKI that is quick to deploy, scales on-demand, and runs where you do business - the cloud.

As explained in the following sections, Entrust PKIaaS secures use cases through turnkey approaches, solving customer problems while maintaining simplicity by reducing the number of services, applications, and software they need to run on their premises.

- [PKIaaS benefits](#)
- [PKIaaS capabilities](#)
- [PKIaaS operation](#)
- [PKIaaS governance model](#)
- [PKIaaS quotas and limits](#)
- [Compliance frameworks](#)
- [Definitions](#)

See the following YouTube video playlist for a description of the main administration tasks.

<https://www.youtube.com/playlist?list=PLu4ev5P7cZ0IBmbH0iTWjWuNXH8OatwCM>

### PKIaaS benefits

Entrust PKIaaS provides the following benefits.

- [Scalability](#)
- [Speed](#)
- [Security](#)
- [Simplicity](#)

### Scalability

Modern use cases demand more and shorter-lived certificates. Entrust PKIaaS is a high-performing, cloud-native system that scales as needed with nearly limitless capacity, guided by Entrust experts. As a next-generation service built on today's technology, you will always have the capacity you need—when you need it.

### Speed

The speed of business is changing. Your PKI needs to operate swiftly wherever you conduct business. Entrust PKIaaS deploys and expands within minutes, providing a rapid solution to secure your business use cases. For example:

- You can create new issuing CAs in minutes to handle the next generation of use cases.
- You can use the Entrust-hosted automation service to deploy IT use cases, such as mobile device management and Windows auto-enrollment.

### Security

Maintaining your security posture matters. Entrust PKIaaS:

- Provides you with dedicated root and issuing Certification Authorities (CAs)
- Protects your keys in our Tier III data centers, secured by Entrust nShield HSMs running at FIPS 140-2 Level 3.

## Simplicity

As deployments diversify and use cases grow in complexity, they present a management challenge. With our PKIaaS, Entrust handles PKI management, relieving you of the burden. Use cases are easy to deploy and adaptable, ensuring they won't impede business operations. PKIaaS seamlessly interoperates with other Entrust PKI products, including :

- Entrust Certificate Services Enterprise Portal (ECS).
- Certificate Enrollment Gateway (CEG).
- Certificate Hub.

## PKIaaS capabilities

Entrust PKIaaS capabilities cover the following areas.

- [Certification Authority instantiation](#)
- [Certificate issuance](#)
- [Certificate management](#)
- [Certificate status checking](#)

## Certification Authority instantiation

PKIaaS provides the following CA instantiation capabilities.

- [CA types](#)
- [CA key and signature algorithms](#)
- [Secure CA key management](#)
- [CA creation time](#)
- [CA validity period](#)

## CA types

Each customer may have one or more subordinate issuing CAs. You can:


- Create an online root CA and add issuing CAs subordinate to this root CA.
- Add an issuing CA signed by an external root CA – for example, your on-premise Microsoft root CA.

## CA key and signature algorithms

The following CA key and signature algorithm pairs are supported.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption

Key algorithm	Signature algorithm
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## Secure CA key management


All CA private keys are stored in Entrust nShield Connect XC high HSMs FIPS140-2 level 3.

## CA creation time

CAs are automatically provisioned in ~60 seconds after submitting your request.

## CA validity period

CA certificates have a default validity period of 20 years for root CAs and 10 years for subordinate issuing CAs. You can select a different period when creating each CA.

 An issuing CA should have a **minimum lifespan of 3 years** to support some features. For example, to automate Intune/MDM enrollment using an Entrust Hosted Certificate Enrollment Gateway, an issuing CA must **have at least 3 years** of remaining lifespan when the Enrollment Gateway is created.

## Certificate issuance

PKIaaS capabilities for certificate issuance include the following.

- [Certificate profiles](#)
- [Subscriber key algorithms](#)
- [Validity period](#)
- [Enrollment by CSR](#)
- [Subject Alt Names](#)
- [Extensions](#)
- [Proof of possession](#)

## Certificate profiles

PKIaaS certificate issuance is always in the context of a certificate profile. These profiles are defined within the PKIaaS service and referenced by name in the certificate issuance requests. As described in [Subscriber certificate profiles](#), Entrust tunes the profiles to specific use cases:

- ECS Enterprise UI
- CA Gateway API
- On-premises Certificate Enrollment Gateway (CEG).



## Subscriber key algorithms

PKIaaS supports RSA and EC subscriber certificate key algorithms. PKIaaS is validated to sign certificates that use the following algorithms for their public key.

- ECDSA P-256
- ECDSA P-384
- ECDSA P-521
- RSA 2048
- RSA 3072
- RSA 4096

## Validity period

The certificate validity period cannot go beyond the expiry date of the issuing CA. The validity period value defaults to 3 years if it is not specified in the request.

## Enrollment by CSR

All certificate issuance requests are completed through CSR format. The calling application is responsible for the generation of the certificate's private key.

## Subject Alt Names

Subject Alt Names (SANs) are supplied in the request separate from the CSR. API requests to PKIaaS support the "subjectAltNames" field of the request.

Some third-party services such as Venafi require to automatically supply SANs using the common names for TLS server certificates. To automatically supply SANs using common names, PKIaaS offers two certificate profiles under [Private SSL \(ACMEv2\) certificate profiles](#).

- `privatessl-tls-client-server-supply-san`
- `privatessl-tls-server-supply-san`

## Extensions

Certificate extensions are supplied in the request separate from the CSR. Use the following API field to supply extensions.

```
optionalCertificateRequestDetails.extensions
```

## Proof of possession

The proof of possession check automatically validates that the caller has possession of the private key. The POP check is always performed during certificate request validation.

## Certificate management

To manage certificates, Entrust PKIaaS provides:

- The web portal described in [Managing certificates with Entrust Certificate Services Enterprise](#)
- The API described in <https://api.managed.entrust.com/doc/#operation/certificate-events>

## Certificate status checking

PKIaaS provides the following certificate status-checking functions.

- [Entrust PKIaaS Certificate Revocation Lists](#)
- [Entrust PKIaaS OCSP service](#)

### Entrust PKIaaS Certificate Revocation Lists

PKIaaS publishes Certificate Revocation Lists (CRLs) with the following settings.

Setting	Value
CRL validity	7 days
CRL extensions	crlNumber, invalidityDate, expiredCertsOnCRL
Signing key	CA key
CRL type	Full CRL
Maximum size	22 MB
CA type	Root and issuing CAs

Each CRL is updated:

- Automatically, every 24 hours.
- When including the "publish now" option on revocation requests to the API—this option results in the issuance of a new CRL within 15 minutes.
- When revoking an end-entity certificate using the ECS Enterprise UI or the Entrust Certificate Enrollment Gateway (CEG)—this type of revocation also results in the issuance of a new CRL within 15 minutes.

CRLs are available at the following URLs.

#### US region

`http://crl.pkiaas.entrust.com/crl/{accountId}/{caId}/crl.crl`

#### EU region

`http://crl.eu.pkiaas.entrust.com/crl/{accountId}/{caId}/crl.crl`

**PQ Lab region**

```
http://crl.pqlab.pkiaas.entrust.com/crl/{accountId}/{caId}/crl.crl
```

Where `{accountId}` is your account identifier, and `{caId}` is the Certification Authority identifier.

## Entrust PKIaaS OCSP service

The Online Certificate Status Protocol (OCSP) supports:

- Nonce extension
- Archive Cutoff extension
- Multiple OCSP certificates per request
- Signed/Unsigned requests
- Delegated keys
- OCSP may be configured for both roots and issuing CAs

OCSP services are available at the following URLs.

**US region**

```
http://ocsp.pkiaas.entrust.com/ocsp/{accountId}/{caId}
```

**EU region**

```
http://ocsp.eu.pkiaas.entrust.com/ocsp/{accountId}/{caId}
```

**PQ Lab region**

```
http://ocsp.pqlab.pkiaas.entrust.com/ocsp/{accountId}/{caId}
```

Where `{accountId}` is your account identifier, and `{caId}` is the Certification Authority identifier.

## PKIaaS operation

See below for a summary of the PKIaaS operational procedures.

- [Physical locations](#)
- [Access control and trusted roles](#)
- [CA key management](#)
- [Audit logging](#)
- [Disaster recovery](#)

 For the PKIaaS terms and agreements, see <https://www.entrust.com/legal-compliance/entrust-certificate-services-repository>

## Physical locations

In each region, Entrust has implemented two physical datacenters with failover between the two.

Region	Datacenters
US	Dallas (TX), Denver (CO)
EU	Munich (Germany), Frankfurt (Germany)

Cloud-based components use multiple availability zones for high availability and a second region for disaster recovery.

## Access control and trusted roles

The HSM and Activation Data are located in either Tier III, SSAE-18 datacenters or a two-person controlled safe located in a facility. The personnel in Trusted Roles with access:

- Can backup, store, and recover CA Private Keys using dual control in a physically secured environment.
- Receive alarm notifications on any violation of the rules for accessing the HSM or a CA.
- Are trained for their specific role and must undergo background investigations.
- Cannot change the product code.

## CA key management

When a customer requests to provision a new CA, an API-based process generates the CA key pair within HSMs in a physically secured environment.

## Audit logging

Significant security events in the CAs are automatically time-stamped and recorded as **internal** audit logs. Audit logs are:

- Periodically archived.
- Constantly monitored by the Entrust Security Information and Event Management (SIEM) system.

Additionally:

- The operations and security teams review the alerts generated by possible policy violations and other significant events.
- You can see the basic audit logs related to your PKIaaS account in the Enterprise UI using the Reports function.

## Disaster recovery

To mitigate the event of a disaster, PKIaaS utilizes:

- Two data centers in each region (US and EU) with highly available HSMs

- Secure on-site and off-site storage of backup HSMs containing copies of all CA private keys
- Database replication between primary and secondary cloud regions and maintained in real-time.
- Daily database backups within both the primary and secondary cloud regions and weekly backup of critical data to a secure off-site storage facility

## PKIaaS governance model

Defining the governance model for an enterprise-level PKI is a long and challenging process involving teams across the organization. To save you time and expense, and to ensure that you have a proper PKI, Entrust provides a pre-defined set of policies and practices governing these PKIs. See the following sections for a summary.

- [Entrust responsibilities](#)
- [Customer responsibilities](#)

See also:

- The [PKIaaS Certification Practices Statement \(CPS\)](#) for full documentation of these policies and practices.
- The [RFC 647](#) for a general description of the policy and practices framework.

## Entrust responsibilities

In PKIaaS, Entrust has the following responsibilities.

- [Root CA](#)
- [Issuing CAs](#)
- [Policy Authority](#)
- [Operational Authority](#)

### Root CA

The root CA serves as your PKI trust anchor. This CA is a dedicated root CA for your company alone to use. Root CAs are not shared. You define the common name of your root, though we ask for a naming relationship with your company so that we can support you more easily. Your root CAs will issue certificates to your issuing CAs and OCSP services.

### Issuing CAs

You may have one or more issuing CAs. PKIaaS will support any number of use cases (and associated certificate profiles) on one issuer, or you can split the responsibility to multiple issuing CAs.

You will define Registration Authorities (RAs) that can issue certificates for all use cases supported by the issuing CA, so if you wish to have some division of responsibility, you may want to set up more than one issuing CA. These issuing CAs are subordinate to your root and issue certificates for subscribers.

### Policy Authority

Entrust is the Policy Authority and is responsible for overseeing and setting policy and practices as applicable to the operation of the Certification Authorities.

### Operational Authority

Entrust manages all root and issuing CA systems hosted and operated on your behalf, as part of PKIaaS. These systems issue and manage

- Certificates

- Certificate Revocation Lists (CRLs)
- OCSP responses

As the Operational Authority (OA), Entrust is responsible for all the operations of the CAs per the CPS.

## Customer responsibilities


In PKIaaS, customers have the following responsibilities.

- [Registration Authority](#)
- [Subscribers](#)
- [Relying parties](#)

### Registration Authority

In PKIaaS, you and your company are the Registration Authority (RA). The RA is the person or entity that decides whether to issue a certificate in response to a Subscriber request. Specifically, RAs:


1. Verify the identity of applicants. They are responsible for the applicant registration, identification, and authentication processes.
2. Submit certificate issuance requests on their behalf.

 To perform RA tasks, you will typically use software applications, such as the Entrust Certificate Enrollment Gateway, that interface with the PKIaaS API.

### Subscribers


Subscribers are the end-users and entities that request and use certificates. Typical examples of Subscribers are

- Employees or contractors and their devices,
- Enterprise servers and infrastructure,
- IoT devices.

 As the RA, you are responsible for determining who may be a subscriber and determining which people, entities, and devices may receive certificates.

### Relying parties

A relying party is an entity that uses a certificate, for example, to verify and identity. PKIaaS is tuned to support enterprise-level privately trusted certificates. You are responsible for assuring that relying parties perform the necessary certificate validity and status checks.

 Entrust PKIaaS supports both CRL and OCSP checks.

## PKIaaS quotas and limits

Entrust PKIaaS enforces the following quotas and limits.

- [Region limits](#)
- [Rate limits](#)
- [Certificate issuance capping](#)

## Region limits

PKIaaS currently supports setting up your PKI in the US or EU regions.

- You can set up your whole trust chain (root CA and issuing CA) in the same region.
- PKIaaS does not support cross-region trust chains; you cannot sign an issuing CA using a root CA from another region.

## Rate limits

PKIaaS has two tiers of quotas based on your PKIaaS certificate inventory.

Quota	Purchased certificates
Standard quota	Less than 1 million
Premium quota	1 million or more

To protect against burst requests and prevent abuse, PKIaaS enforces a request rate limit based on **10-second** intervals.

Capability	Standard quota	Premium quota
Certificate creation	100 requests/10 seconds	1000 requests/10 seconds
OCSP	100 requests/10 seconds	1000 requests/10 seconds
CRL	100 requests/10 seconds	1000 requests/10 seconds
All others	100 requests/10 seconds	1000 requests/10 seconds

If the number of requests exceeds the allowed rate limit:

- The API access is temporarily blocked
- All requests return a 429 HTTP status code with a "TooManyRequests" error message.

## Certificate issuance capping

When the number of active certificates reaches the number of PKIaaS certificates purchased by your Entrust Certificate Service Enterprise account, PKIaaS blocks your account from issuing any additional certificates. To issue more PKIaaS certificates, you can either:

- Revoke some of the active certificates.
- Contact your sales representative to purchase more certificates.

## Compliance frameworks

See below for some of the certifications the Entrust corporation and the PKIaaS solution comply with.

- [Entrust headquarters certifications](#)

- [PKIaaS data center certifications](#)

## Entrust headquarters certifications

The Entrust headquarters comply with the following ISO certifications at an enterprise-wide level.

- ISO 27001 (Information Security Management Systems)
- ISO 27701 (Privacy Information Management Systems)
- ISO 9001 (Quality Management Systems)
- ISO 14001 (Environmental Management Systems)

For details on these certifications, check:

- <https://www.entrust.com/legal-compliance/iso-certifications>
- <https://www.entrust.com/legal-compliance/security>

## PKIaaS data center certifications

The Entrust PKIaaS solution is hosted by reputable data centers following the best security practices and complying with security and privacy certifications, including but not limited to:

- Type 1 Attestation HIPAA/HITECH
- SOC2 Type 2
- SOC3
- ISO 27001
- HITRUST
- PCI-DSS

## Definitions

See below for a definition of the main PKIaaS-related concepts.

### Applicant

A person, entity, or organization applying for the issuance or renewal of a certificate.

### Activation data

Data values, other than keys, that are required to operate cryptographic modules and that need to be protected – for example:

- PIN
- passphrases
- manually-held key share

### Agreement

A legally binding contract for PKIaaS comprising:

- The PKIaaS terms of use.
- The PKIaaS schedule.
- The Entrust General Terms and Conditions provided with the PKIaaS Schedule at <https://www.entrust.com/-/media/documentation/licensingandagreements/certificate-solutions-general-terms.pdf>



- An Order for PKIaaS as defined in the General Terms.

## CA certificate

A certificate for the public key of a CA (Certificate Authority).

## Certificate

A digital document issued by the CA that, at a minimum, meets the following:

- Identifies the CA issuing it.
- Names or otherwise identifies a Subject.
- Contains a Public Key of a Key Pair.
- Identifies its Operational Period.
- Contains a serial number and is digitally signed by a CA.

## Certificate revocation list (CRL)

A time-stamped list of the serial numbers of certificates that have been revoked before the expiration of their validity periods

## Certification authority (CA)

The technology to create, issue, manage, and revoke certificates.

## Certificate issuance

The act performed by a CA in creating a certificate listing with the CA as "Issuer".

## Certification practice statement (CPS)

A statement of the practices for a CA to issue, manage, revoke, renew, or re-key certificates.

## Cryptographic module

A software, device, or utility for:

- Generating key pairs,
- Storing cryptographic information.
- Performing cryptographic functions.

## Customer

The entity that has entered into a PKIaaS Agreement with Entrust.

## Digital signature

The transformation of an electronic record by one person using a private key and public key cryptography so that another person having the corresponding public key can determine:

- The record transformation was created using the private key corresponding to the public key.
- The record has been altered since the transformation was made.

## Distinguished name (DN)

The unique identifier for a subject so it can be located in a directory based on the ITU/CCITT X.500. PKIaaS has no restriction on distinguished names per certificate profile; all certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25

Alias	OID
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Issuing Certification Authority (Issuing CA)

In the context of a particular certificate, the issuing CA is the CA that issued the certificate.

## Key generation

The process of creating a key pair.

## Key pair

Two mathematically related cryptographic keys with the following properties.

- A message encrypted with one key can only be decrypted with the other.
- Even knowing one key, it is believed to be computationally infeasible to discover the other key.

## Public cloud

Computing services provided by third-party providers over the public Internet.

## Object identifier (OID)

A unique alphanumeric identifier registered under the ISO registration standard to reference a specific object or object class. In this document, OIDs uniquely identify certificates and cryptographic algorithms.

## Online certificate status protocol (OCSP)

A protocol to validate certificate statuses in real time.

## OCSP responder

A service that responds to certificate status requests with one of three responses.

- Valid
- Invalid
- Unknown

## PKI certificate

A certificate issued pursuant to the PKIaaS Certification Practice Statement.

## Private key

The sensitive key in the key pair protected by the subject and kept secret. The private key can:

- Create digital signatures.
- Decrypt data previously encrypted using the corresponding public key.

## Public key

The non-sensitive key in the key pair. This key:

- Is submitted as part of a certificate signing request by the subscriber
- Is disclosed in the subsequently-issued certificate.

The public key can:

- Verify digital signatures created using the corresponding private key.
- Encrypt data meant for decryption with the corresponding private Keyk

## Public key cryptography

A type of cryptography also known as asymmetric cryptography. This cryptography uses a key pair rather than a single key to secure data authentication and confidentiality.

## Public key infrastructure (PKI)

The architecture, technology, practices, and procedures supporting a security system that uses certificates and public key cryptography.

## Registration authority (RA)

An individual, organization or process responsible for verifying the identity of a subscriber.

## Relying party

An individual or legal entity that relies on a certificate or any digital signature verified using that certificate.

## Repository

An online system for storing and retrieving certificates and other information relevant to certificates, including certificate validity or revocation information.

## Certificate revocation

A permanent invalidation of a certificate from a specific time onward. Revocation includes:

- Listing the certificate in CRL.
- Preventing users from accessing the certificate once connected to the central infrastructure.

## Request for comments (RFC)

A document series for communicating information about the Internet. Some RFCs are designated by the IAB (Internet Architecture Board) as Internet standards. Most RFCs document protocol specifications such as Telnet and FTP.

## Root Certification Authority (Root CA)

A top-level CA. That is, a CA whose public key is not certified by another CA.

## Subject

The individual, legal entity, organization, or device identified in a certificate. The subject holds the private key corresponding to the public Key in the certificate.

## Subscriber

The person, legal entity, or organization that has applied for and has been issued a certificate. Before the identity verification and issuance of a certificate, a subscriber is an applicant.

## Trusted Role

An employee or contractor with authorized access to or control over PKIaaS.

## Validity period

The intended term of validity of a certificate, This period begins with the later of the following dates:

- The date of issuance stated in the "Issued On" certificate field.
- The date stated in the "Valid From" or "Activation" certificate fields.

The period ends with the earlier of two dates:

- The expiration date stated in the "Valid To" or "Expiry" certificate fields.
- The revocation date asserted in the CRL. This CRL is published in the distribution point within the certificate.

## X.500

A series of computer networking standards covering electronic directory services such as:

- Directory access protocol (DAP)
- Directory system protocol (DSP)
- Directory information shadowing protocol (DISP)
- Directory operational bindings management protocol (DOP)

## X.509

A standard issued by the ITU-T (Technical committee of the International Telecommunication Union) for public key certificates and certification path validation.

### 3 Ordering and activating PKIaaS

Follow the steps below to order and activate your PKIaaS account.

- [Placing an order](#)
- [Activating your Entrust Certificate Service Enterprise account](#)
- [Checking your PKIaaS inventory](#)
- [Activating Entrust TrustedCare \(optional\)](#)

#### Placing an order


Your Entrust Sales Representative usually helps you place orders based on your business needs. Alternatively, if you already have an Entrust Certificate Service Enterprise Account with eStore access, you can also order by yourself.

- [Purchasing enterprise bundles](#)
- [Purchasing services a la carte](#)

#### Purchasing enterprise bundles

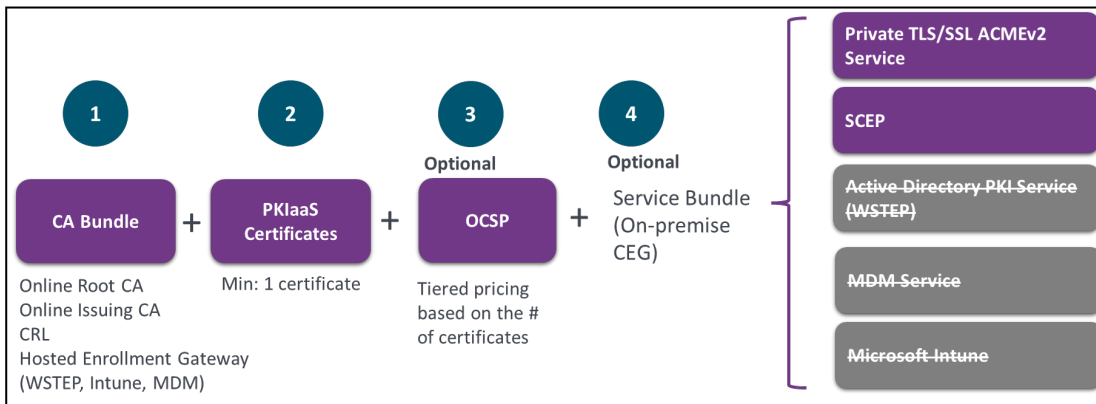
For most customers, we recommend buying the pre-packaged enterprise bundles according to the number of issuing CA and certificates, and whether an Entrust-managed offline root CA is required.

	Enterprise	Enterprise PRO
1k	<ul style="list-style-type: none"> <li>• 1,000 certs</li> <li>• 1 CA Bundle (Online root &amp; issuing)</li> <li>• Cloud Protocols (InTune, MDM, WSTEP, <b>ACME</b>)</li> <li>• 1 OCSP for 1,000 certs</li> <li>• Platinum Support</li> </ul>	<ul style="list-style-type: none"> <li>• +1 Offline Root</li> </ul>
10k	<ul style="list-style-type: none"> <li>• 1,000 certs</li> <li>• 2 CA Bundle (Online root &amp; issuing, Test/Prod)</li> <li>• Cloud Protocols (InTune, MDM, WSTEP, <b>ACME</b>)</li> <li>• 2 OCSP for 10,000 certs</li> <li>• Platinum Support</li> </ul>	<ul style="list-style-type: none"> <li>• +1 Offline Root</li> </ul>
100k	<ul style="list-style-type: none"> <li>• 1,000 certs</li> <li>• 2 CA Bundle (Online root &amp; issuing, Test/Prod)</li> <li>• Cloud Protocols (InTune, MDM, WSTEP, <b>ACME</b>)</li> <li>• 2 OCSP for 100,000 certs</li> <li>• Platinum Support</li> </ul>	<ul style="list-style-type: none"> <li>• +1 Offline Root</li> </ul>
1m	<ul style="list-style-type: none"> <li>• 1,000,000 certs</li> <li>• 2 CA Bundle (Online root &amp; issuing, Test/Prod)</li> <li>• Cloud Protocols (InTune, MDM, WSTEP, <b>ACME</b>)</li> <li>• 2 OCSP for 1,000,000 certs</li> <li>• Platinum Support</li> </ul>	<ul style="list-style-type: none"> <li>• +1 Offline Root</li> </ul>

 The cloud version of the ACME automation features has not yet been released.

## Purchasing services a la carte

You can also purchase each Entrust PKIaaS service *à la carte* instead of [Purchasing enterprise bundles](#).



Orders for PKIaaS generally consist of the following.

- [PKIaaS CA bundles](#)
- [PKIaaS certificate licenses](#)
- [OCSP \(optional & recommended\)](#)
- [Enrollment service bundles \(optional for on-prem Enrollment Gateway\)](#)

### PKIaaS CA bundles

Each PKIaaS CA bundle includes:

- A root CA license
- An issuing CA license
- An external root CA license for [Adding an issuing CA under an external root CA](#).
- A CRL instance for each CA
- All the pre-configured [Subscriber certificate profiles](#).
- Entrusted-hosted Enrollment Gateway for WSTEP, Intune, MDM,

You should purchase CA bundles based on how many issuing CAs you need. Specifically:

- PKIaaS only charges for the issuing CAs.
- An online root CA and a connection to an external root CA are free for each issuing CA purchased.

**i** See [Checking your PKIaaS inventory](#) for how to validate and track your inventory using the ECS Enterprise UI.

### PKIaaS certificate licenses

PKIaaS certificate licenses are reusable within the terms of your contract.

- Each "normal" and "held" certificate requires one certificate license.
  - "normal" means certificates issued but not expired, suspended, or revoked.
  - "held" means a suspended certificate.
- A revoked or expired certificate returns the license to the certificate license inventory (the inventory refresh might be delayed by up to 30 minutes).

Purchase certificate licenses based on the certificates you want to issue.



- If you are bulk-renewing certificates (issuing new certificates before existing certificates are revoked or expire), you must purchase **2 times** the certificate licenses.
- You can also renew the certificates by batch; that way, you only need surplus license inventory to issue new certificates while the existing certificates are still active.

### OCSP (optional & recommended)

If you want to use OCSP as your VA (Validation Authority) method, you must purchase the OCSP service for each CA that needs OCSP enabled. The pricing of the OCSP per CA is based on the volume of the certificates you purchased. A higher volume of certificates translates to a higher price for the OCSP service because the cost of the OCSP (queries and responses) is directly impacted by the number of certificates.

In many use cases, OCSP is not required or recommended; PKIaaS offers free CRL for each PKIaaS CA.

### Enrollment service bundles (optional for on-prem Enrollment Gateway)

You can automate the following enrollment mechanisms when using Certificate Enrollment Gateway (CEG) software that needs to be deployed on your premises.

- ACME (Private SSL/TLS)
- SCEP

For these services, you get:

- Access to <https://trustedcare.entrust.com> for downloading the Entrust Certificate Enrollment Gateway software.
- An enrollment service license per issuing CA to activate a use case on Entrust Certificate Enrollment Gateway. See [Automating enrollment with an on-premises Enrollment Gateway](#) for details.

For example, each **PKIaaS WSTEP Enrollment Service Bundle** includes:

- The TrustedCare access to download the Certificate Enrollment Gateway software as described in [Activating Entrust TrustedCare \(optional\)](#).
- A license to activate the WSTEP protocol on the Certificate Enrollment Gateway software



WSTEP, Intune, and MDM enrollment automation can be done directly on the ECS enterprise portal using Entrust Hosted Enrollment Gateway free of charge. A customer should only buy the on-premises Certificate Enrollment Gateway for the use case not supported by the Entrust-hosted solution yet, such as SCEP and ACME.

## Activating your Entrust Certificate Service Enterprise account

When purchasing an Entrust Certificate Service (ECS) Enterprise account, you will receive a mail from [auto-notice@entrust.com](mailto:auto-notice@entrust.com) with the credentials and instructions to activate your account. For example:

Dear John Smith

You have received this email because you have been added as an administrator on an Entrust Certificate Services account (ECS), where you can create and manage your digital certificates. To start:

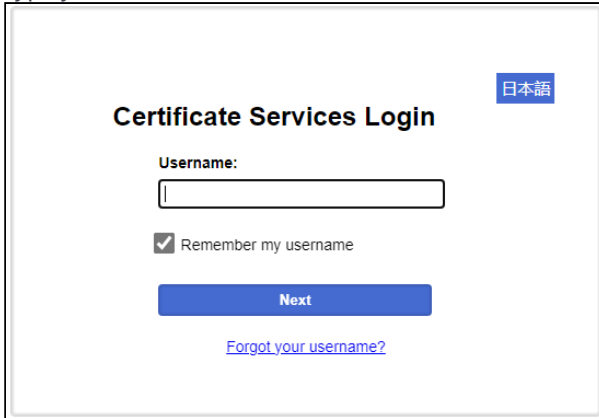
1. Log in to <https://cloud.entrust.net> with your username: john.smith@abc.com
2. Enter your temporary password: **XXXXXX**
3. Enter a new password.
4. Set up your second-factor authentication method and security questions.

5. Enter your One-Time Password (OTP) as sent to this email address.
6. Follow the directions on the ECS **Get Started** screen.

See below for how to activate your Entrust Certificate Service Enterprise account with these credentials.

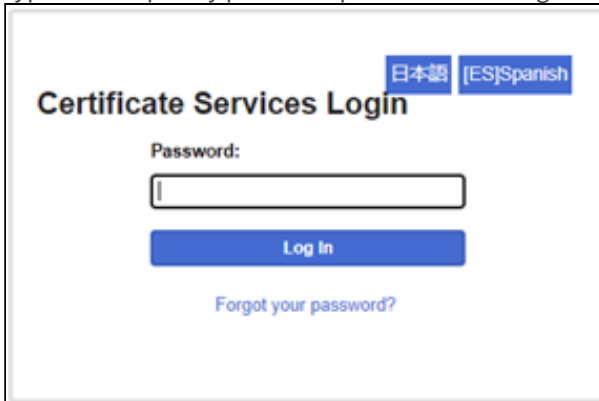
#### To activate an Entrust Certificate Service Enterprise account

1. Open your browser in the Entrust Certificate Services portal at [cloud.entrust.net](https://cloud.entrust.net)
2. Type your username and click **Next**.



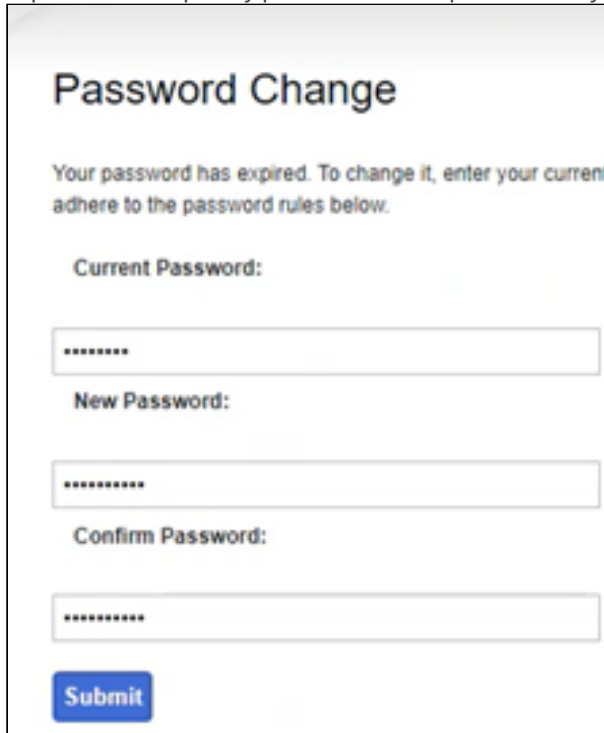
The screenshot shows the "Certificate Services Login" page. At the top right, there is a language selection button labeled "日本語". Below the title, there is a "Username:" label followed by a text input field. Underneath the input field is a checked checkbox labeled "Remember my username". A blue "Next" button is positioned below the checkbox. At the bottom of the form area, there is a blue link that says "Forgot your username?".

3. Type the temporary password provided in the registration email and click **Log In**.



The screenshot shows the "Certificate Services Login" page. At the top right, there are two language selection buttons: "日本語" and "[ES]Spanish". Below the title, there is a "Password:" label followed by a text input field. A blue "Log In" button is positioned below the input field. At the bottom of the form area, there is a blue link that says "Forgot your password?".

4. Replace the temporary password with a password of your choosing and click **Submit**.



**Password Change**

Your password has expired. To change it, enter your current password and a new password that adheres to the password rules below.

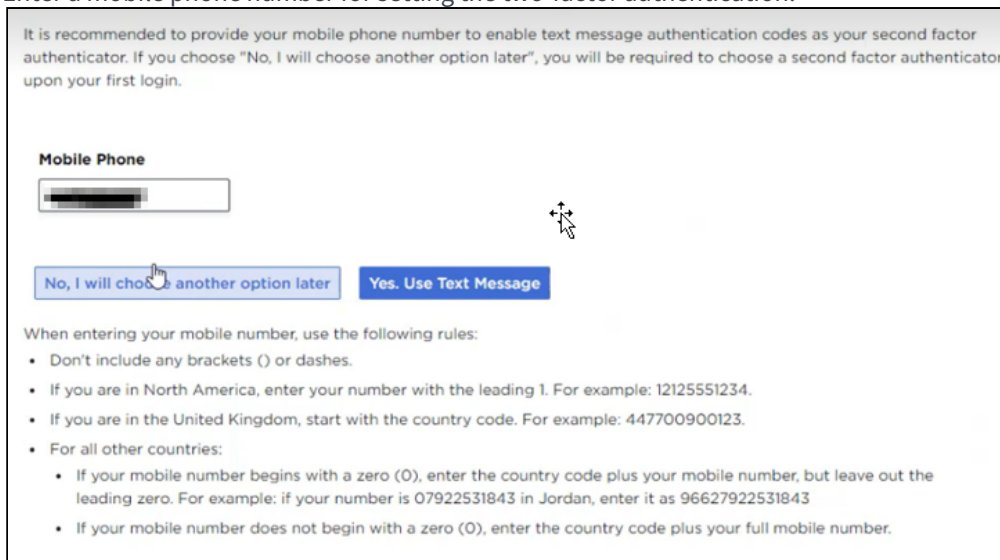
**Current Password:**

**New Password:**

**Confirm Password:**

**Submit**

5. Enter a mobile phone number for setting the two-factor authentication.



It is recommended to provide your mobile phone number to enable text message authentication codes as your second factor authenticator. If you choose "No, I will choose another option later", you will be required to choose a second factor authenticator upon your first login.

**Mobile Phone**

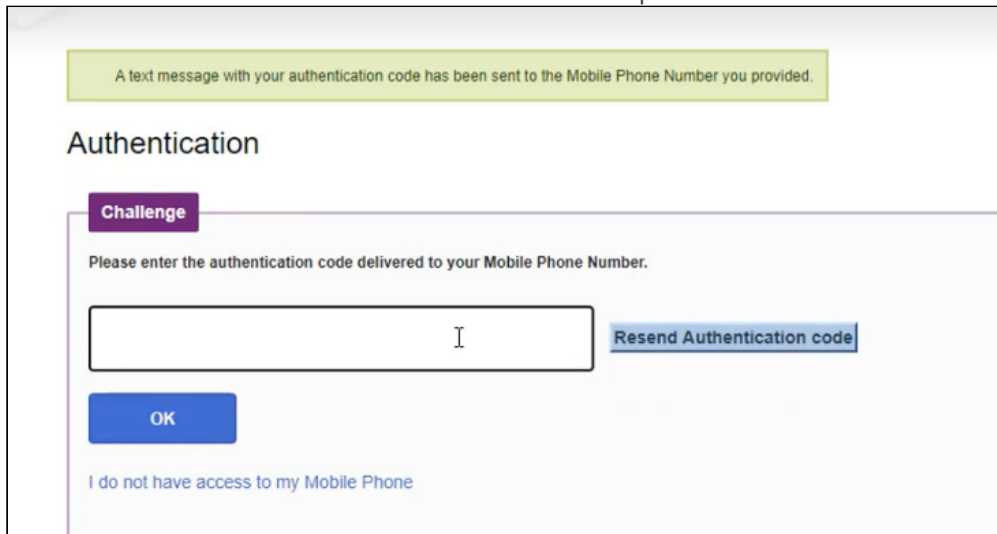
**No, I will choose another option later** **Yes. Use Text Message**


When entering your mobile number, use the following rules:

- Don't include any brackets () or dashes.
- If you are in North America, enter your number with the leading 1. For example: 12125551234.
- If you are in the United Kingdom, start with the country code. For example: 447700900123.
- For all other countries:
  - If your mobile number begins with a zero (0), enter the country code plus your mobile number, but leave out the leading zero. For example: if your number is 07922531843 in Jordan, enter it as 96627922531843
  - If your mobile number does not begin with a zero (0), enter the country code plus your full mobile number.

6. Click **Yes. Use Text Message**.

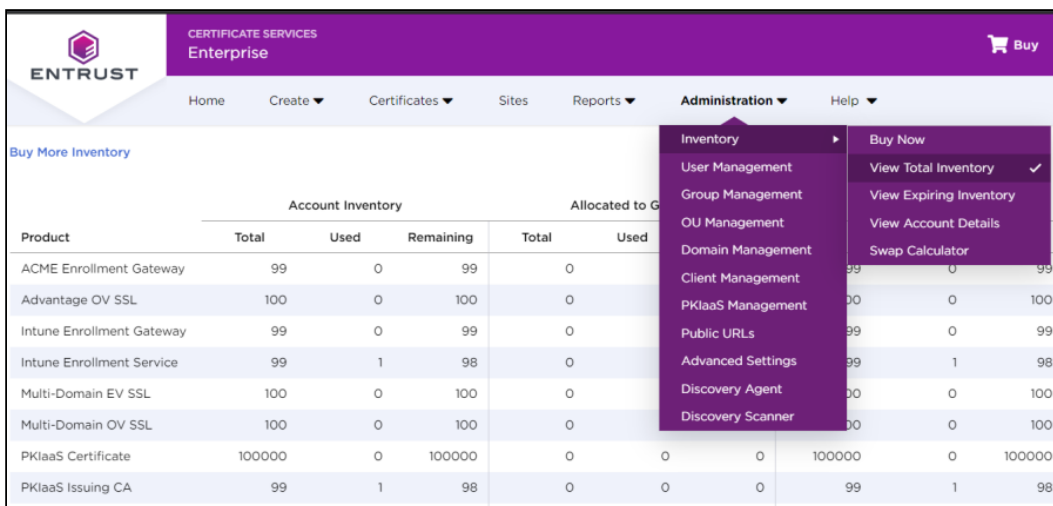
7. Enter the authentication code sent via SMS to the mobile phone and click **OK**.



 You will need the username, password, and a second-factor authentication code for your future Entrust Certificate Service Enterprise logins.


## Checking your PKIaaS inventory

To check your PKIaaS inventory in Entrust Certificate Services (ECS), navigate to **Administration > Inventory > View Total Inventory**.



Product	Account Inventory			Allocated to G		
	Total	Used	Remaining	Total	Used	
ACME Enrollment Gateway	99	0	99	0		
Advantage OV SSL	100	0	100	0		
Intune Enrollment Gateway	99	0	99	0		
Intune Enrollment Service	99	1	98	0		
Multi-Domain EV SSL	100	0	100	0		
Multi-Domain OV SSL	100	0	100	0		
PKIaaS Certificate	100000	0	100000	0	0	0
PKIaaS Issuing CA	99	1	98	0	0	0

The inventory view is refreshed every 30 minutes and might not reflect the license consumption changes made within the 30 minutes window.

 Check that you have all the required licenses as discussed in [Ordering and activating PKIaaS](#).

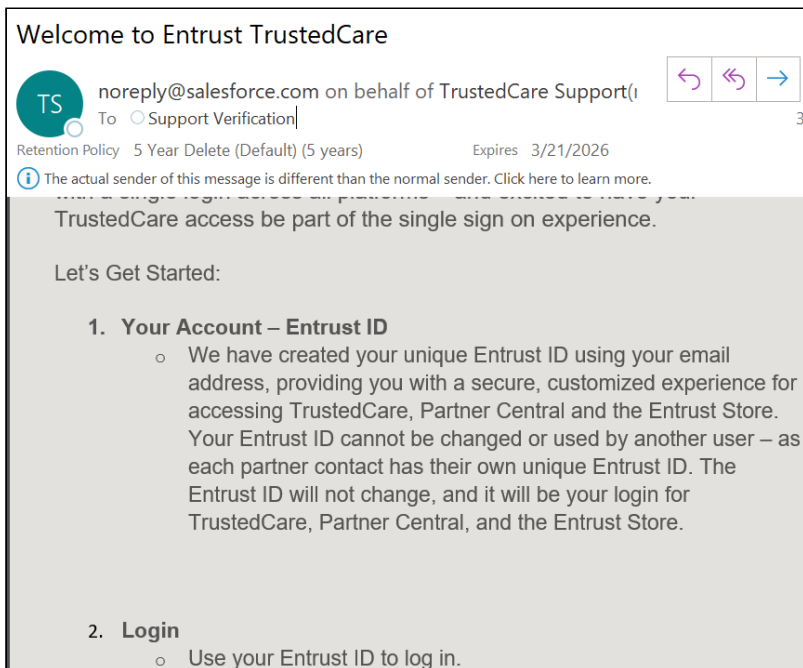
## Activating Entrust TrustedCare (optional)

You only need an Entrust TrustCare account when you purchase one of the on-premises Certificate Enrollment Gateway (CEG) enrollment services.

- [TrustedCare credentials](#)
- [Certificate Enrollment Gateway download license](#)

### TrustedCare credentials

TrustedCare allows you to download the purchased software and access detailed documentation. If you are a new customer and do not have access to Entrust TrustedCare, you will receive an email with instructions to set up your TrustedCare login at <https://trustedcare.entrust.com>.



The screenshot shows an email interface. At the top, it says "Welcome to Entrust TrustedCare". The sender is identified as "noreply@salesforce.com on behalf of TrustedCare Support(| Support Verification)". There are navigation icons (back, forward) and a "3" indicating more content. Below the header, it shows "Retention Policy 5 Year Delete (Default) (5 years) Expires 3/21/2026" and a note: "The actual sender of this message is different than the normal sender. Click here to learn more." The main body of the email is shaded and contains the following text:

TrustedCare access be part of the single sign on experience.


Let's Get Started:


- 1. Your Account – Entrust ID**
  - We have created your unique Entrust ID using your email address, providing you with a secure, customized experience for accessing TrustedCare, Partner Central and the Entrust Store. Your Entrust ID cannot be changed or used by another user – as each partner contact has their own unique Entrust ID. The Entrust ID will not change, and it will be your login for TrustedCare, Partner Central, and the Entrust Store.
- 2. Login**
  - Use your Entrust ID to log in.

### Certificate Enrollment Gateway download license

With the Certificate Enrollment Gateway purchase, you should also receive an email from [SoftwareDistribution@entrust.com](mailto:SoftwareDistribution@entrust.com) to notify you that you can access the Entrust Certificate Enrollment Gateway

software on TrustedCare.



**Software Distribution**  
To:  **James@Gaz**

[Reply](#) [Reply All](#) [Forward](#)

Retention Policy: 5 Year Default (Default) (5 years) Expires: 10/14/2025 Wed 10/15/2025

**Dear [REDACTED],**

Thank you for licensing Entrust software and continuing with the 'Layered Security' approach to enable success within your organization. We appreciate your business.

You have licensed the following Entrust software:

**CERTIFICATE SELF-ENROLLMENT USING PKI AND CONTROL CAPABILITY WITH ENROLLMENT CERTIFICATE ENROLLMENT**

You can download Entrust software using the following link:

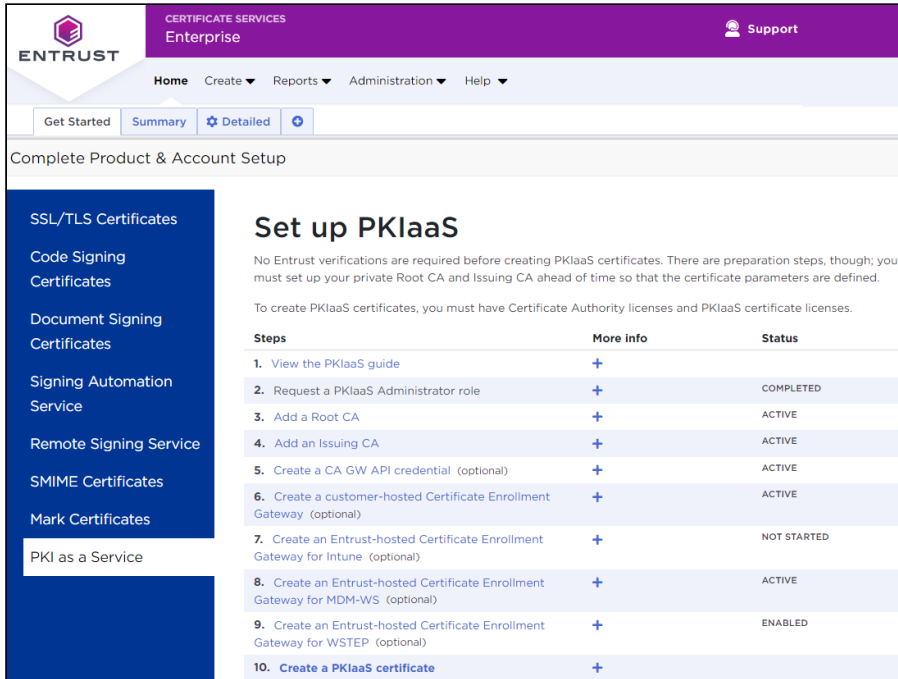
<https://trustedcare.entrust.com>

For any support issues please contact Entrust Support via telephone:  
**Platinum Customers:** 1-877-754-7878 in North America or +1-613-270-3700 elsewhere  
**Silver & Gold Customers:** 1-877-754-7878 in North America or +1-613-270-3715 elsewhere  
**Email:** [support@entrust.com](mailto:support@entrust.com)

Now you can create your PKI hierarchy using ECS Enterprise, including automating your PKI use case using Certificate Enrollment Gateway, if desired.

## 4 PKIaaS setup wizard

Entrust Certificate Services Enterprise provides a **Set up PKIaaS** wizard to perform the main PKIaaS setup operations.



**Set up PKIaaS**

No Entrust verifications are required before creating PKIaaS certificates. There are preparation steps, though; you must set up your private Root CA and Issuing CA ahead of time so that the certificate parameters are defined.

To create PKIaaS certificates, you must have Certificate Authority licenses and PKIaaS certificate licenses.

Steps	More info	Status
1. View the PKIaaS guide	+	
2. Request a PKIaaS Administrator role	+	COMPLETED
3. Add a Root CA	+	ACTIVE
4. Add an Issuing CA	+	ACTIVE
5. Create a CA GW API credential (optional)	+	ACTIVE
6. Create a customer-hosted Certificate Enrollment Gateway (optional)	+	ACTIVE
7. Create an Entrust-hosted Certificate Enrollment Gateway for Intune (optional)	+	NOT STARTED
8. Create an Entrust-hosted Certificate Enrollment Gateway for MDM-WS (optional)	+	ACTIVE
9. Create an Entrust-hosted Certificate Enrollment Gateway for WSTEP (optional)	+	ENABLED
10. Create a PKIaaS certificate	+	

To display this wizard:

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Click **Home** in the menu bar.
3. Select the **Get Started** tab.
4. Click **PKI as a Service** in the sidebar.

See below for the operations provided by this wizard.

#	Step	Section of this document
1	View the PKIaaS guide	All
2	Request a PKIaaS Administrator role	<a href="#">Role-Based Access Control</a>
3	Add a root CA	<a href="#">Creating an online root CA</a>
4	Add an issuing CA	<a href="#">Creating an issuing CA under an online root CA</a>
5	Create a CA Gateway API credential	<a href="#">Generating CA Gateway credentials</a>

#	Step	Section of this document
6	Create a customer-hosted Certificate Enrollment Gateway	<a href="#">Automating enrollment with an on-premises Enrollment Gateway</a>
7	Create an Entrust-hosted Certificate Enrollment Gateway for Intune	<a href="#">Automating Intune enrollment with an Entrust-hosted Enrollment Gateway</a>
8	Create an Entrust-hosted Certificate Enrollment Gateway for MDM-WS	<a href="#">Automating MDM enrollment with an Entrust-hosted Enrollment Gateway</a>
9	Create an Entrust-hosted Certificate Enrollment Gateway for WSTEP	<a href="#">Automating Windows Auto Enrollment (WSTEP) with an Entrust-hosted Enrollment Gateway</a>
10	Create a PKIaaS certificate	<a href="#">Issuing certificates</a>



## 5 Role-Based Access Control


See below for how to manage PKIaaS user roles in Entrust Certificate Services (ECS).

- [User types with PKIaaS roles](#)
- [Creating a user with PKIaaS roles](#)
- [Granting PKIaaS roles to existing users](#)

### User types with PKIaaS roles

Entrust Certificate Services (ECS) Enterprise offers various user types; however, only the following users can assume PKIaaS roles.

- [Super Admin](#)
- [Requester](#)

 Do not create Sub Admin or Singer users, as these users are only for public SSL service.


### Super Admin

Super Admin users can do the following.

- When granted the User Management role:
  - Add, remove, and manage users
  - Assign PKIaaS roles to users.
- Conduct all the activities for the public SSL service.

### Requester

As explained in the [Certificate Services Enterprise guide](#), Requester users can perform PKIaaS operations based on the roles granted to them by Super Admin users.

 At this moment, you can only create a Requester user if you have a public SSL certificate offering. Choose this user type if you use the Entrust public SSL certificate service and want to give an SSL requester the PKIaaS role to conduct private trust activities.

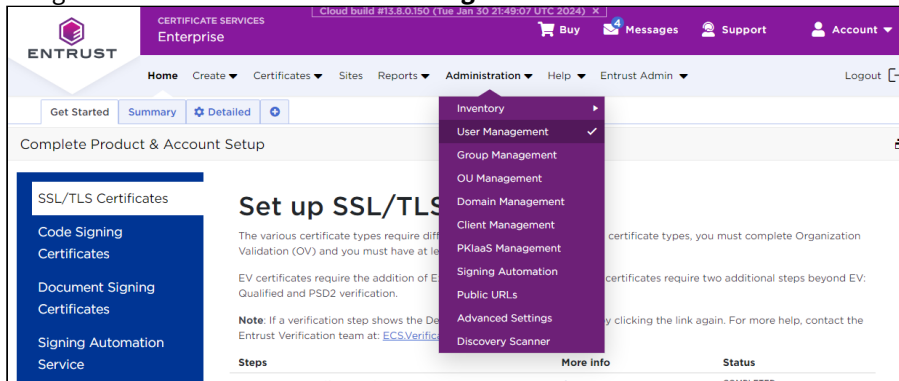
### Creating a user with PKIaaS roles

See below for adding a new user and granting the corresponding roles.

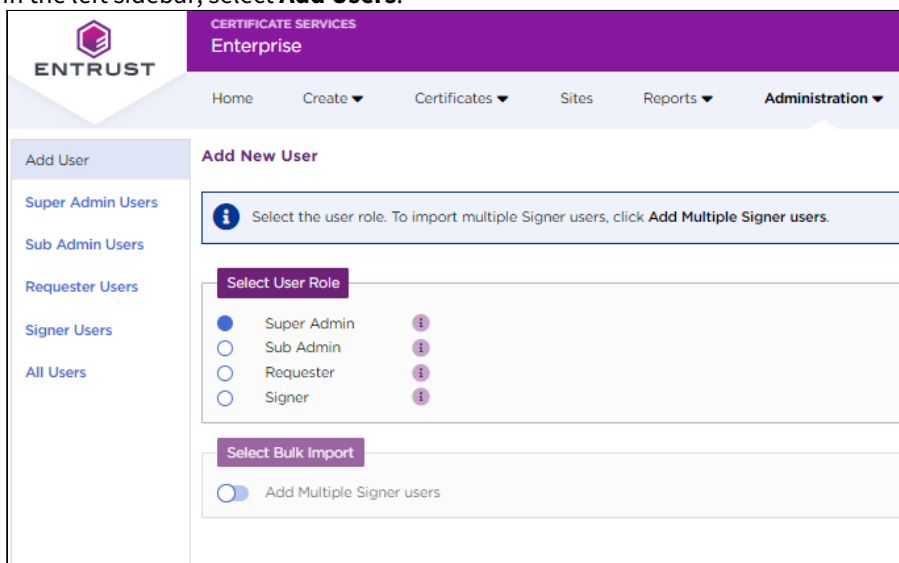
#### To add a new user with PKIaaS roles

1. Log into Entrust Certificate Services as a Super Admin with the User Management role.

2. Navigate to **Administration > User Management**.

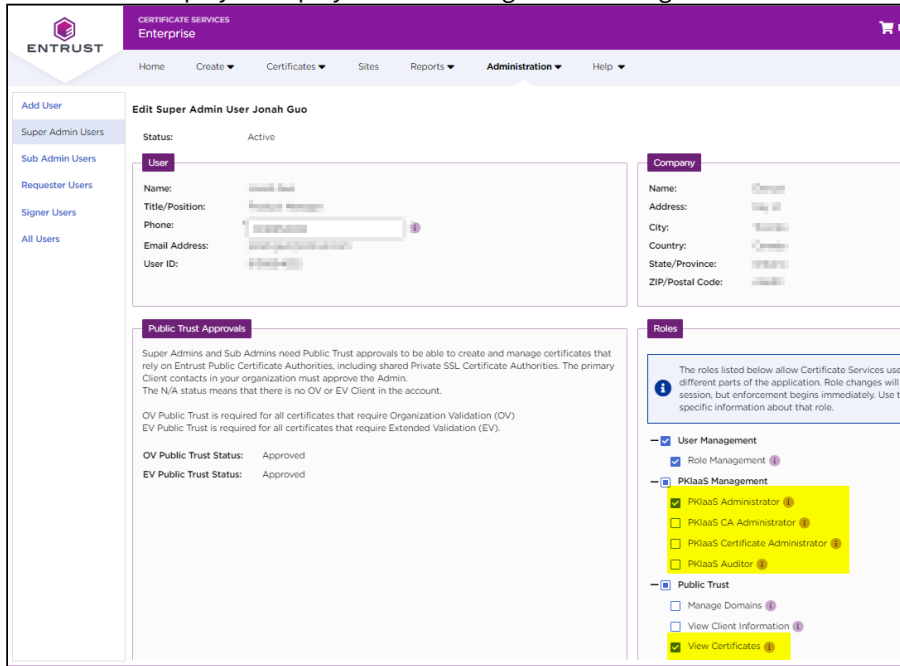


3. In the left sidebar, select **Add Users**.




4. Select the **Super Admin** or **Requester** user types described in [User types with PKIaaS roles](#).

5. Click **Next** to display to display the user configuration dialog.



6. Fill in the **User** and **Company** forms.
7. Under **Roles**, click **Public Trust** and ensure **View Certificates** is enabled so the user can access the **Certificate** tab and browse PKIaaS certificates.
8. Under **Roles**, click **PKIaaS Management** and select or deselect the PKIaaS roles.
  - PKIaaS Administrator
  - PKIaaS CA Administrator
  - PKIaaS Certificate Administrator
  - PKIaaS Auditor

See the below table for the permissions granted to each of these roles.

 The **Certificates** category requires enabling the **View Certificates** role as explained above.

Category	Permission	PKIaaS Administrator	PKIaaS CA Administrator	PKIaaS Certificate Administrator	PKIaaS Auditor
CA	View all private CAs	✓	✓	✓	✓
	Export to Excel	✓	✓	✓	✓
	Download CA Certificates	✓	✓	✓	✗
	Create CA	✓	✓	✗	✗
	Configure CA	✓	✓	✗	✗

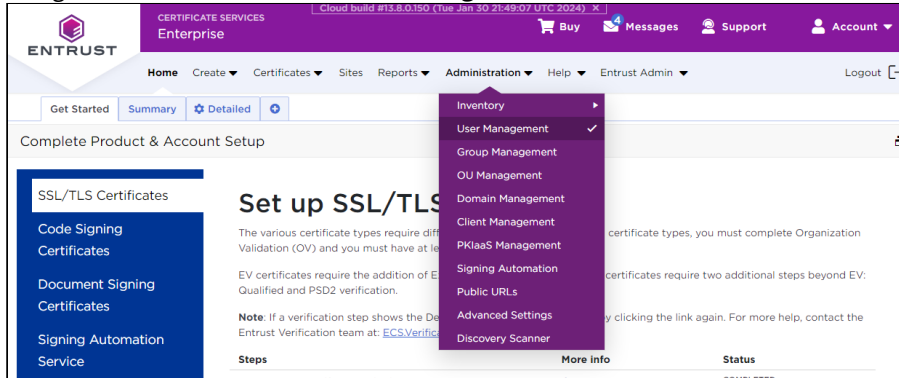
Category	Permission	PKIaaS Administrator	PKIaaS CA Administrator	PKIaaS Certificate Administrator	PKIaaS Auditor
	Delete CA	✓	✓	✗	✗
CA Gateway	View existing CA Gateway credentials	✓	✓	✓	✓
	Download CA Gateway credentials	✓	✗	✓	✗
	Generate CA Gateway credentials	✓	✗	✓	✗
	Remove CA Gateway credentials	✓	✗	✓	✗
Enrollment Gateway	View Enrollment Gateway	✓	✓	✓	✓
	Add Enrollment Gateway	✓	✓	✗	✗
	Update Enrollment Gateway	✓	✓	✗	✗
	Remove Enrollment Gateway	✓	✓	✗	✗
Certificates	Create certificates from root or issuing CA	✓	✗	✓	✗
	View PKIaaS certificates	✓	✓	✓	✓
	Export to Excel	✓	✓	✓	✓
	Export certificates	✓	✓	✓	✗
	Revoke PKIaaS certificates	✓	✗	✓	✗

## Granting PKIaaS roles to existing users

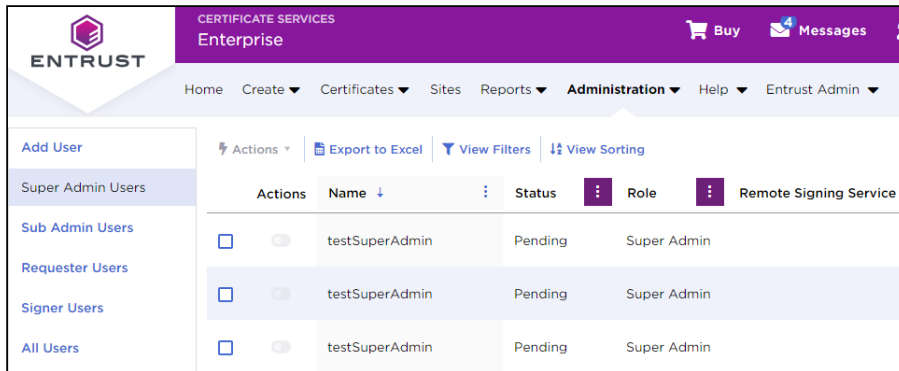
See below for granting roles to an existing PKIaaS user.

### To granting PKIaaS roles to an existing user

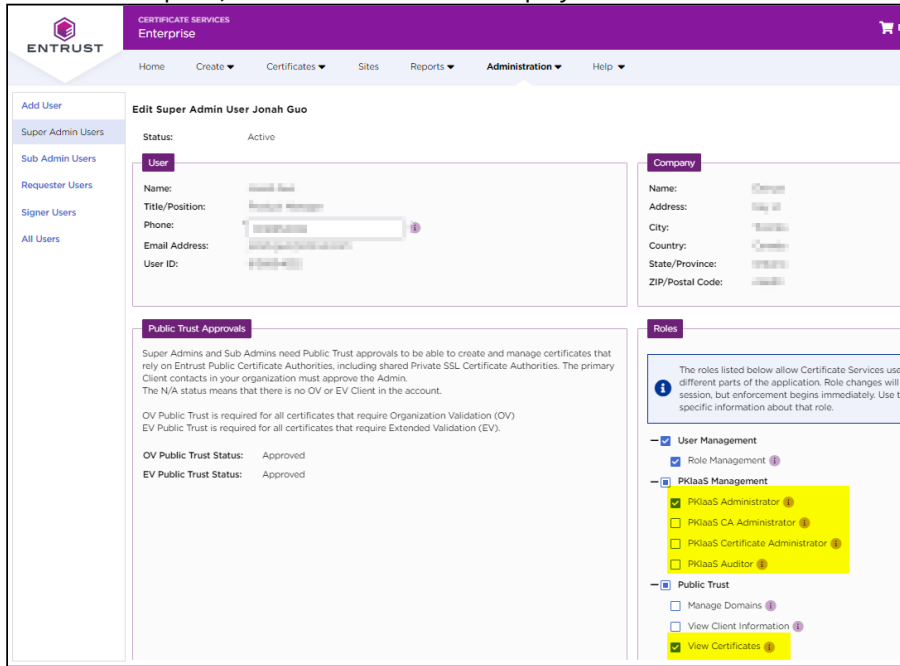
1. Log into Entrust Certificate Services as a Super Admin with the User Management role.
2. Navigate to **Administration > User Management**.



3. In the left sidebar, select **Super Admin Users** or **Requester Users** types described in [User types with PKIaaS roles](#).



- In the content pane, click on a user name to display the user details.



The screenshot shows the 'Edit Super Admin User Jonah Guo' page in the Entrust Certificate Services Enterprise Administration interface. The page is divided into several sections:


- User Information:** Includes fields for Name, Title/Position, Phone, Email Address, and User ID.
- Company Information:** Includes fields for Name, Address, City, Country, State/Province, and ZIP/Postal Code.
- Public Trust Approvals:** A section explaining that Super Admins and Sub Admins need Public Trust approvals to create and manage certificates. It lists the status for OV Public Trust (Approved) and EV Public Trust (Approved).
- Roles:** A section listing roles assigned to the user. The roles are:
  - User Management (checked)
  - Role Management (checked)
  - PKIaaS Management (expanded):
    - PKIaaS Administrator (checked)
    - PKIaaS CA Administrator (unchecked)
    - PKIaaS Certificate Administrator (unchecked)
    - PKIaaS Auditor (unchecked)
  - Public Trust (expanded):
    - Manage Domains (unchecked)
    - View Client Information (unchecked)
    - View Certificates (checked)

- Under **Roles**, select the **PKIaaS Management** and **Public Trust** roles already described in [Creating a user with PKIaaS roles](#).

## 6 Managing CAs with Entrust Certificate Services Enterprise


Once logged into Entrust Certificate Services (ECS) Enterprise, you can manage your Certification Authority (CA) hierarchy as follows.

- Creating an online root CA
- Creating an issuing CA under an online root CA
- Selecting the certificate profiles of a CA
- Creating an external subordinate CA
- Adding an external root CA
- Adding an issuing CA under an external root CA
- Downloading a CA certificate
- Deleting a CA

 Ensure you have enough inventory before creating a CA.

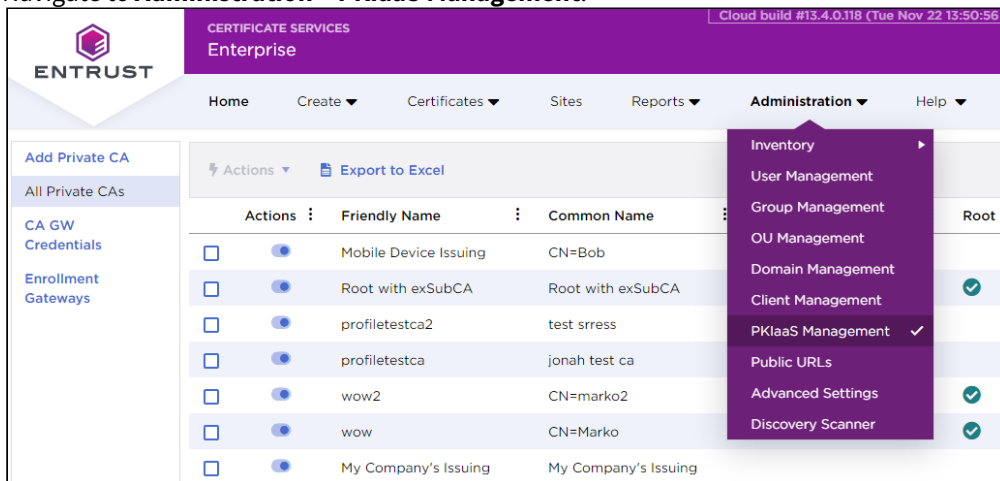
### Creating an online root CA

See below for how to create an online root CA for your PKIaaS CA hierarchy.

 Alternatively, you can add your own root CA as explained in [Adding an external root CA](#).

#### To create an online root CA

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration > PKIaaS Management**.

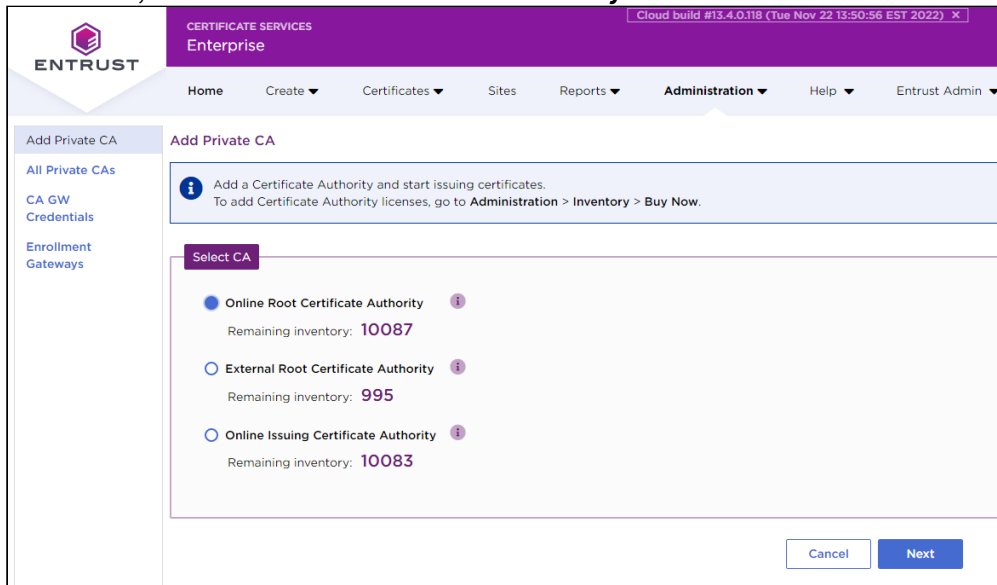


The screenshot shows the Entrust Certificate Services Enterprise Administration interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', and 'Help'. The 'Administration' dropdown menu is open, showing options like 'Inventory', 'User Management', 'Group Management', 'OU Management', 'Domain Management', 'Client Management', 'PKIaaS Management' (which is selected), 'Public URLs', 'Advanced Settings', and 'Discovery Scanner'. Below the menu, a table lists various CAs with columns for 'Actions', 'Friendly Name', and 'Common Name'. The table includes entries like 'Mobile Device Issuing', 'Root with exSubCA', 'profiletestca2', 'profiletestca', 'wow2', 'wow', and 'My Company's Issuing'.

Actions	Friendly Name	Common Name	Root
<input type="checkbox"/>	Mobile Device Issuing	CN=Bob	
<input type="checkbox"/>	Root with exSubCA	Root with exSubCA	
<input type="checkbox"/>	profiletestca2	test srress	<input checked="" type="checkbox"/>
<input type="checkbox"/>	profiletestca	jonah test ca	
<input type="checkbox"/>	wow2	CN=marko2	
<input type="checkbox"/>	wow	CN=Marko	
<input type="checkbox"/>	My Company's Issuing	My Company's Issuing	

3. In the side pane, click **Add Private CA**.

4. In **Select CA**, choose **Online Root Certificate Authority**.



**ENTRUST** CERTIFICATE SERVICES Enterprise Cloud build #13.4.0.118 (Tue Nov 22 13:50:56 EST 2022) X

Home Create Certificates Sites Reports Administration Help Entrust Admin

Add Private CA **Add Private CA**

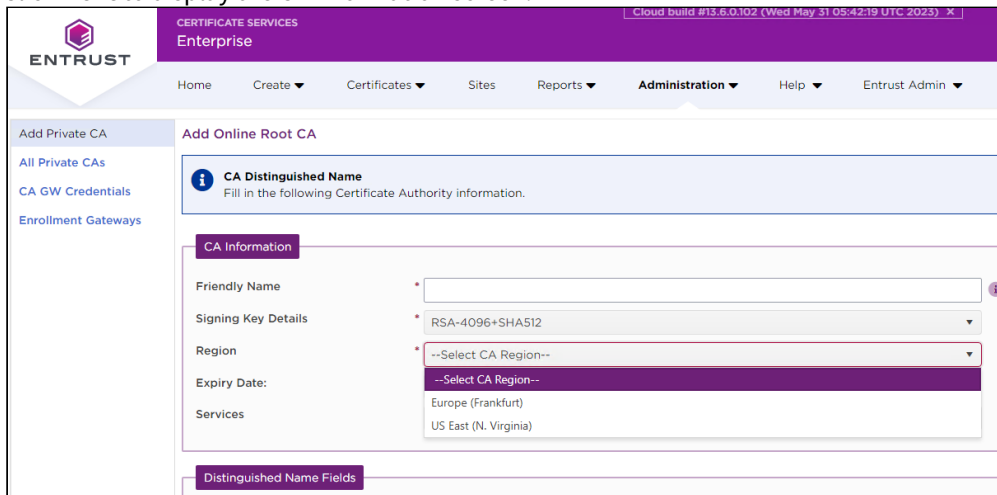
All Private CAs  
CA GW Credentials  
Enrollment Gateways

**Select CA**

- Online Root Certificate Authority** i  
Remaining inventory: **10087**
- External Root Certificate Authority** i  
Remaining inventory: **995**
- Online Issuing Certificate Authority** i  
Remaining inventory: **10083**

Cancel Next

5. Click **Next** to display the CA information screen.



**ENTRUST** CERTIFICATE SERVICES Enterprise Cloud build #13.6.0.102 (Wed May 31 05:42:19 UTC 2023) X

Home Create Certificates Sites Reports Administration Help Entrust Admin

Add Private CA **Add Online Root CA**

All Private CAs  
CA GW Credentials  
Enrollment Gateways

**CA Distinguished Name**  
Fill in the following Certificate Authority information.

**CA Information**

Friendly Name   
Signing Key Details RSA-4096+SHA512  
Region --Select CA Region--  
Expiry Date: --Select CA Region--  
Services Europe (Frankfurt)  
US East (N. Virginia)

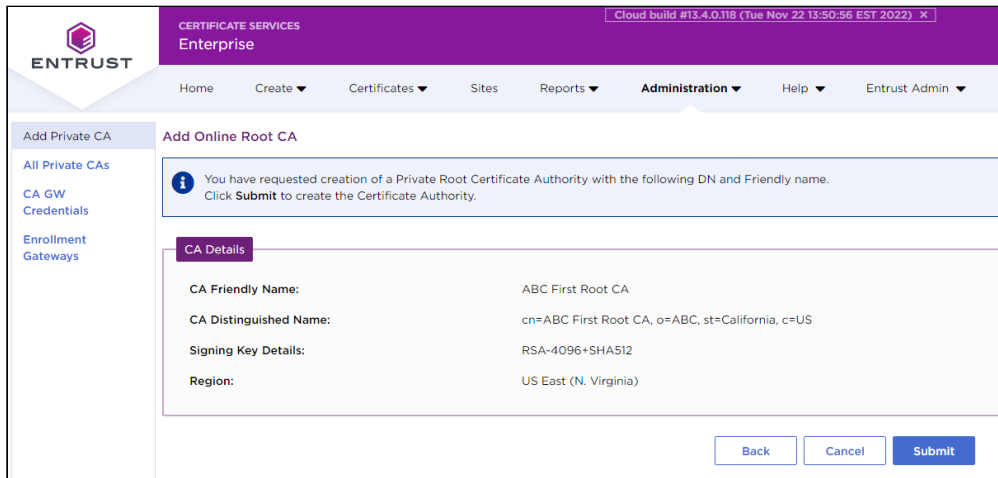
**Distinguished Name Fields**

6. Enter the values described below.

- Friendly Name
- Signing Key Details
- Region
- Expiry Date
- Services
- Service Profiles
- Distinguished Name Fields



7. Click **Next** and review the CA information.



8. Click **Submit**.
9. In the confirmation request, click **OK** to start the CA creation process.
10. When the CA creation completes, check the CA details in the CA grid view.
11. Refresh the grid. You will notice that the status changes to **Active**.

## Friendly Name

Enter an informal name for the new CA.

**Mandatory:** Yes.

## Signing Key Details

Select one of the algorithms described in [Certification Authority instantiation](#).

**Mandatory:** Yes.

## Region

Select the region in which the CA will be hosted.

 The region of the root CA decides the region of the issuing CA.

**Mandatory:** Yes.

## Expiry Date

Select the expiry date for the CA certificate. Use the date picker or enter a date in the following format.

mm/dd/yyyy

**Mandatory:** No. If you do not assign a specific expiry date, the expiry period defaults to 20 years for root CAs.

## Services

Select a predefined set of certificate profiles.

 For online root CAs, the current PKIaaS version only supports the **External Sub-CA** profile set.

**Mandatory:** No.

## Service Profiles

Select the certificate profiles you want to enable in the root CA. See the following table for the certificate profiles included in each service.

Service	Service Profiles
External Sub-CA	<a href="#">Authority profiles</a>

**Mandatory:** No.

## Distinguished Name Fields

Enter a value for each field in the Distinguished Name of the CA certificate.

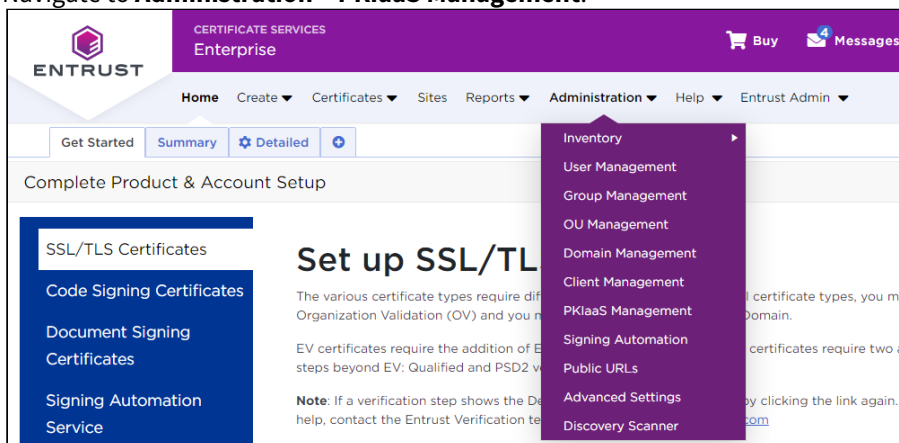
**Mandatory:** Only the **Common Name** certificate field.

## Creating an issuing CA under an online root CA

See below for how to create an issuing CA after [Creating an online root CA](#).

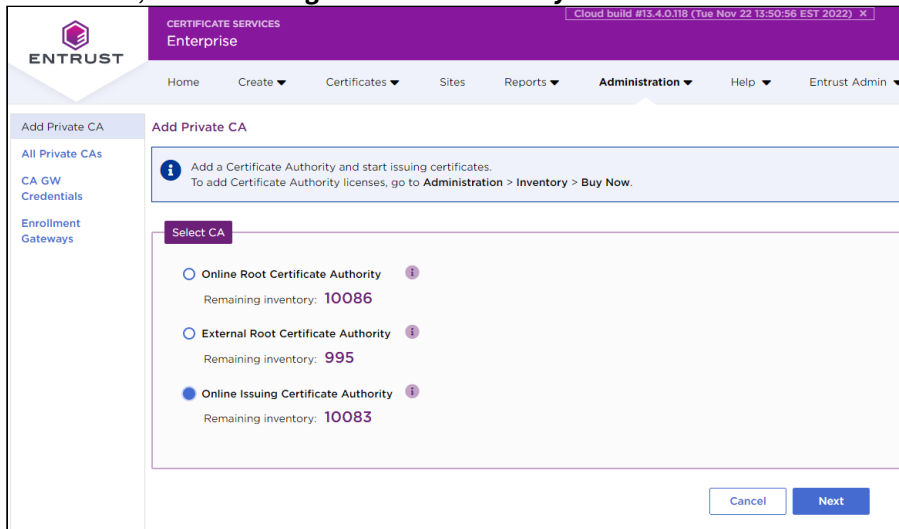
### To create an issuing CA

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration > PKIaaS Management**.

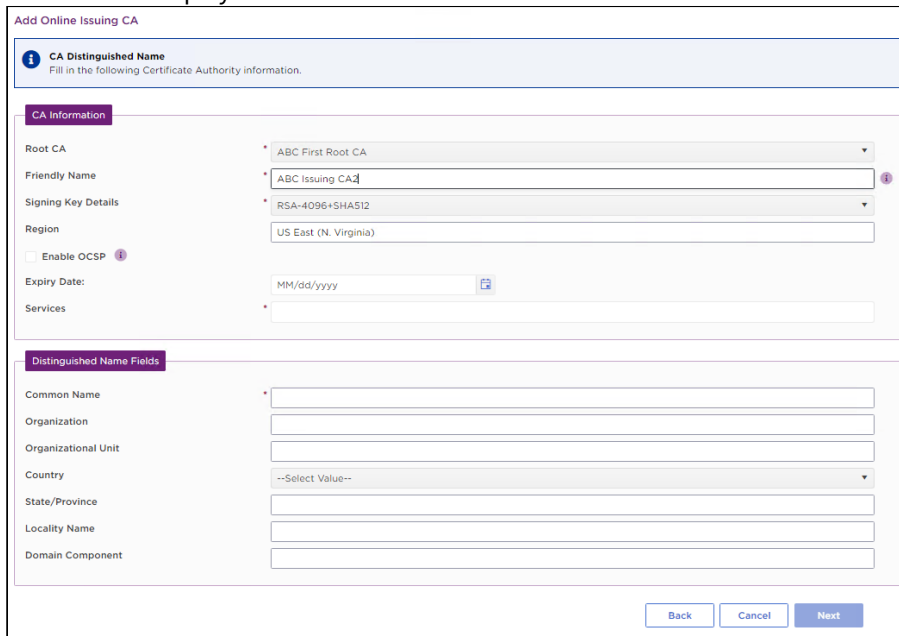


3. In the side pane, click **Add Private CA**.

4. In **Select CA**, choose **Issuing Certificate Authority**.



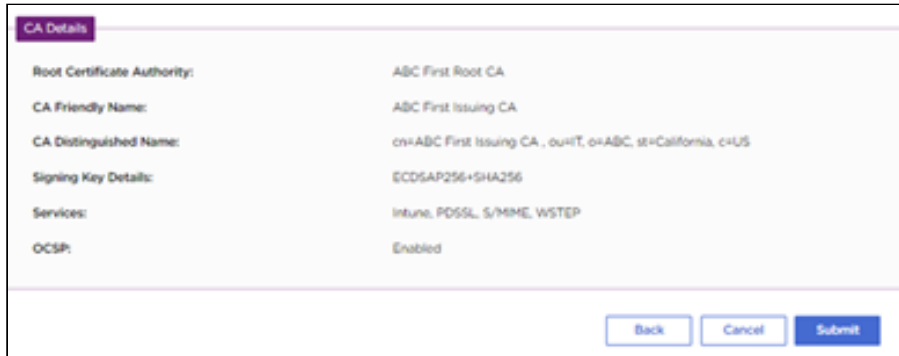
5. Click **Next** to display the **CA Information** screen.



6. Enter the values described below.

- Root CA
- Friendly Name
- Signing Key Details
- Region
- Enable OCSP
- Expiry Date
- Services
- Service Profiles
- Distinguished Name Fields

7. Click **Next** to review the CA information.



CA Details	
Root Certificate Authority:	ABC First Root CA
CA Friendly Name:	ABC First Issuing CA
CA Distinguished Name:	cn=ABC First Issuing CA, ou=IT, o=ABC, st=California, c=US
Signing Key Details:	ECDSA256+SHA256
Services:	Intune, PDSSL, S/MIME, WSTEP
OCSP:	Enabled

Buttons: Back, Cancel, Submit

8. Click **Submit**.
9. In the confirmation request, click **OK** to start the CA creation process.
10. When the CA creation completes, check the CA details in the CA grid view.
11. Refresh the grid. You will notice that the status changes to **Active**.

## Root CA

Select the CA created in [Creating an online root CA](#).

**Mandatory:** Yes.

## Friendly Name

Enter an informal name for the new CA.

**Mandatory:** Yes.


## Signing Key Details

Select one of the algorithms described in [Certification Authority instantiation](#).

**Mandatory:** Yes.

## Region

This view-only field displays the region of the root CA.

 You cannot change the region for an issuing CA. The region of the issuing CA will be decided by the region of the root CA that signs the issuing CA.

## Enable OCSP

Check box if you want to enable OCSP for this issuing CA.


 You cannot change this setting after provisioning the CA.

**Mandatory:** No.

## Expiry Date

Select the expiry date for the CA certificate. Use the date picker or enter a date in the following format.

mm/dd/yyyy

 The expiry date of an issuing CA must be earlier than the expiry date of the root CA.

**Mandatory:** No. If you do not assign a specific expiry date, the expiry period defaults to 10 years for issuing CAs.

## Services

Select a predefined set of certificate profiles. For example,

- Select **Intune** for [Automating Intune enrollment with an Entrust-hosted Enrollment Gateway](#).
- Select **Active Directory** for [Automating enrollment with an on-premises Enrollment Gateway and WSTEP](#).

## Service Profiles

In this field:

1. Click **+** to display the profiles supported by each service.
2. Activate or deactivate each profile by checking or unchecking the corresponding box.



Services Active Directory x Private SSL x Intune x

Service Profiles:

- Active Directory
  - wstep-digital-signature-key-encipherment
  - wstep-digital-signature
  - wstep-key-encipherment
  - wstep-non-repudiation
- Private SSL
  - privatessl-tls-client-server
  - privatessl-tls-server
  - privatessl-tls-client
- + Intune

See below for a reference of the supported profiles.

- [Active Directory \(WSTEP\) certificate profiles](#)
- [CMPv2 certificate profiles](#)
- [Code signing certificate profile](#)
- [eSIM certificate profiles](#)
- [EST certificate profiles](#)
- [Intune certificate profiles](#)
- [MDMWS certificate profiles](#)
- [Mobile device certificate profile](#)
- [Multiuse certificate profiles](#)
- [Private SSL \(ACMEv2\) certificate profiles](#)

- S\_MIME certificate profiles
- SCEP certificate profiles
- Smartcard certificate profiles
- V2G certificate profiles

**Mandatory:** No.

## Distinguished Name Fields

Enter a value for each field in the Distinguished Name of the CA certificate.

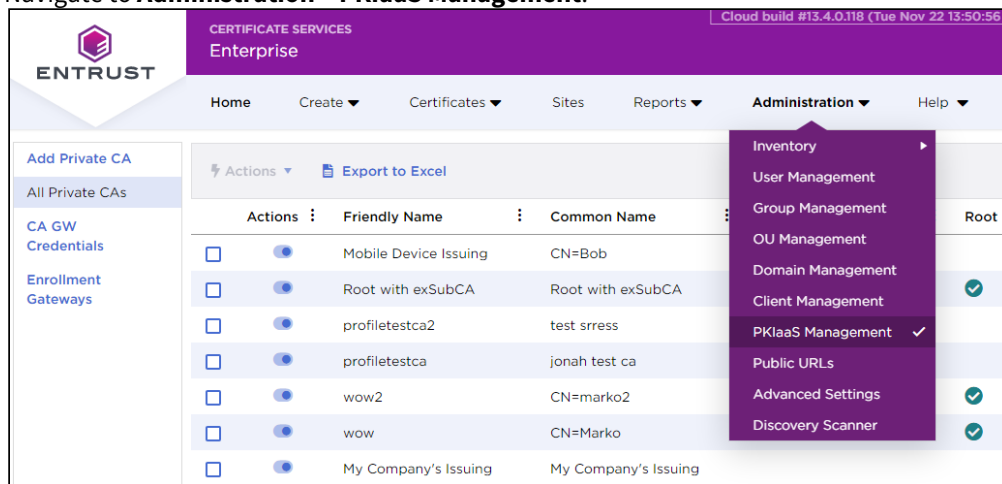
**Mandatory:** Only the **Common Name** certificate field.

## Selecting the certificate profiles of a CA

After [Creating an issuing CA under an online root CA](#), you can edit the CA settings to select or deselect certificate profiles.

### To select the certificate profiles of a CA

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration > PKIaaS Management**.

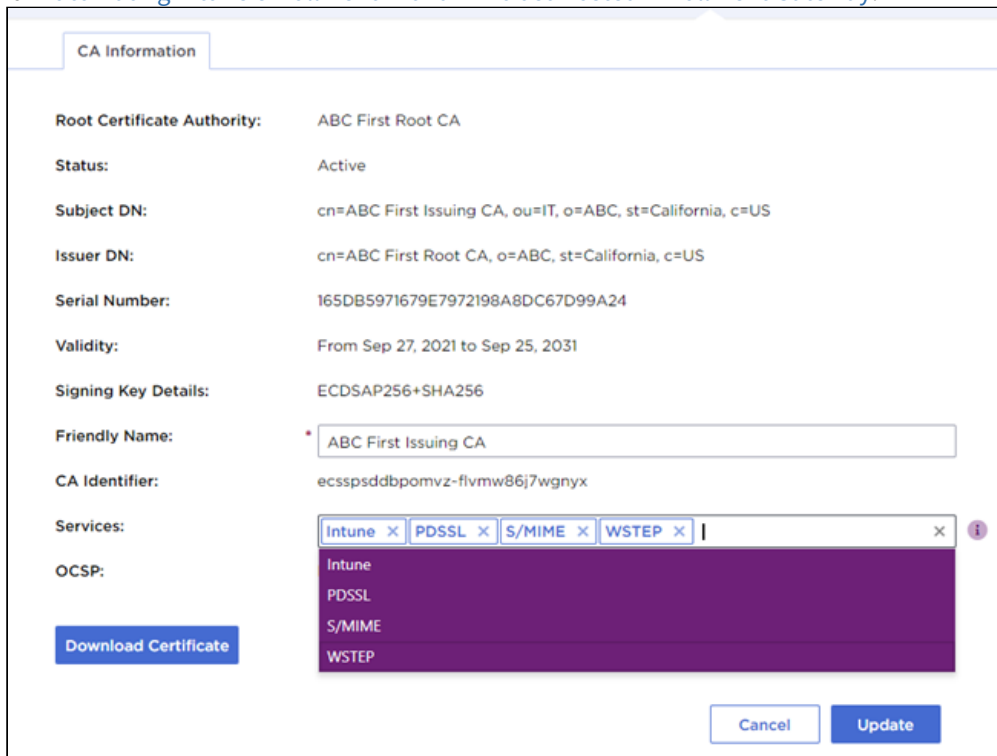


The screenshot shows the Entrust Enterprise Administration interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', and 'Help'. The 'Administration' dropdown menu is open, showing options like 'Inventory', 'User Management', 'Group Management', 'OU Management', 'Domain Management', 'Client Management', 'PKIaaS Management' (which is selected with a checkmark), 'Public URLs', 'Advanced Settings', and 'Discovery Scanner'. Below the navigation, there is a table of CA entries with columns for 'Actions', 'Friendly Name', and 'Common Name'. The table contains several rows, including 'Mobile Device Issuing', 'Root with exSubCA', 'profiletestca2', 'profiletestca', 'wow2', 'wow', and 'My Company's Issuing'.

Actions	Friendly Name	Common Name
<input type="checkbox"/>	Mobile Device Issuing	CN=Bob
<input type="checkbox"/>	Root with exSubCA	Root with exSubCA
<input type="checkbox"/>	profiletestca2	test srress
<input type="checkbox"/>	profiletestca	jonah test ca
<input type="checkbox"/>	wow2	CN=marko2
<input type="checkbox"/>	wow	CN=Marko
<input type="checkbox"/>	My Company's Issuing	My Company's Issuing

3. Click a CA row in the grid to open the CA details.

- In the **Services** field, select one or more predefined sets of certificate profiles. For example, select **Intune** for [Automating Intune enrollment with an Entrust-hosted Enrollment Gateway](#).



**CA Information**

Root Certificate Authority: ABC First Root CA

Status: Active

Subject DN: cn=ABC First Issuing CA, ou=IT, o=ABC, st=California, c=US

Issuer DN: cn=ABC First Root CA, o=ABC, st=California, c=US

Serial Number: 165DB5971679E7972198A8DC67D99A24

Validity: From Sep 27, 2021 to Sep 25, 2031

Signing Key Details: ECDSAP256+SHA256

Friendly Name:

CA Identifier: ecsspsddbpmvz-flvmw86j7wgnyx

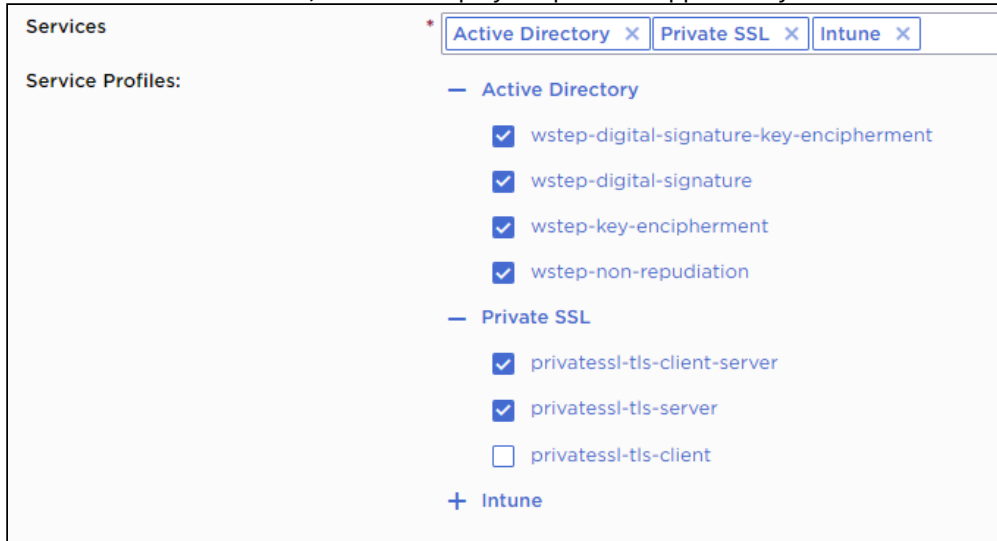
Services:  ⓘ

OCSP:

[Download Certificate](#)

[Cancel](#) [Update](#)

- In the **Service Profiles** field, click **+** to display the profiles supported by each service.



**Services**

**Service Profiles:**

- Active Directory
  - wstep-digital-signature-key-encipherment
  - wstep-digital-signature
  - wstep-key-encipherment
  - wstep-non-repudiation
- Private SSL
  - privatessl-tls-client-server
  - privatessl-tls-server
  - privatessl-tls-client
- + Intune

- Activate or deactivate each profile by checking or unchecking the corresponding box. See below for a profile reference.
  - [Active Directory \(WSTEP\) certificate profiles](#)
  - [CMPv2 certificate profiles](#)
  - [Code signing certificate profile](#)
  - [eSIM certificate profiles](#)
  - [EST certificate profiles](#)
  - [Intune certificate profiles](#)

- MDMWS certificate profiles
- Mobile device certificate profile
- Multiuse certificate profiles
- Private SSL (ACMEv2) certificate profiles
- S\_MIME certificate profiles
- SCEP certificate profiles
- Smartcard certificate profiles
- V2G certificate profiles

7. Click **Update** to finalize your changes.

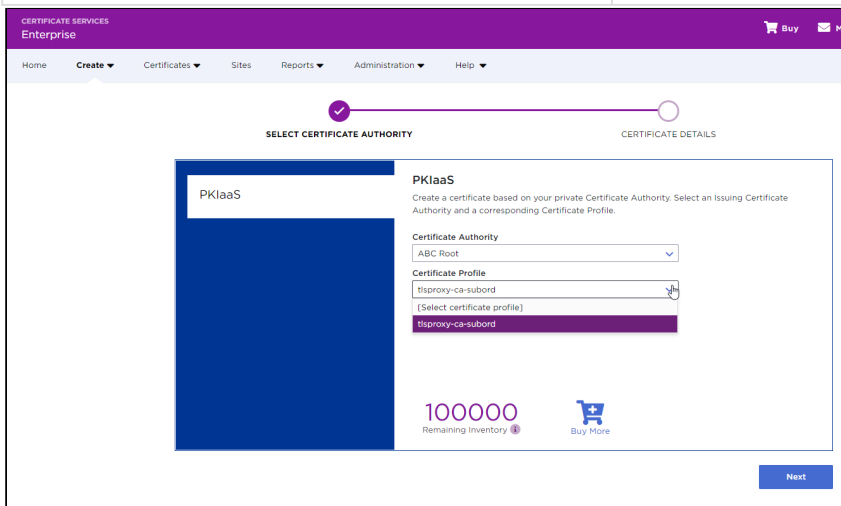
## Creating an external subordinate CA

PKIaaS root CA currently supports two types of subordinate Certification Authorities (CAs):

- TLS Proxy CA.
- Azure Firewall Subordinate CA.

To create an external subordinate CA, follow the steps described in [Issuing certificates](#). The only difference from creating an end-entity certificate is you should select the following values.

Field	Value
Certificate Authority	Select an online root CA with the <b>External Sub-CA</b> service. See <a href="#">Creating an online root CA</a> for how to create this CA.
Certificate Profile	Select one of the <a href="#">Authority profiles</a> .



**i** An external subordinate CA issued by a PKIaaS root CA only consumes one PKIaaS Certificate license. Entrust does not charge for the certificates issued by an external subordinate CA because those certificates are considered external and not using the PKIaaS infrastructure.



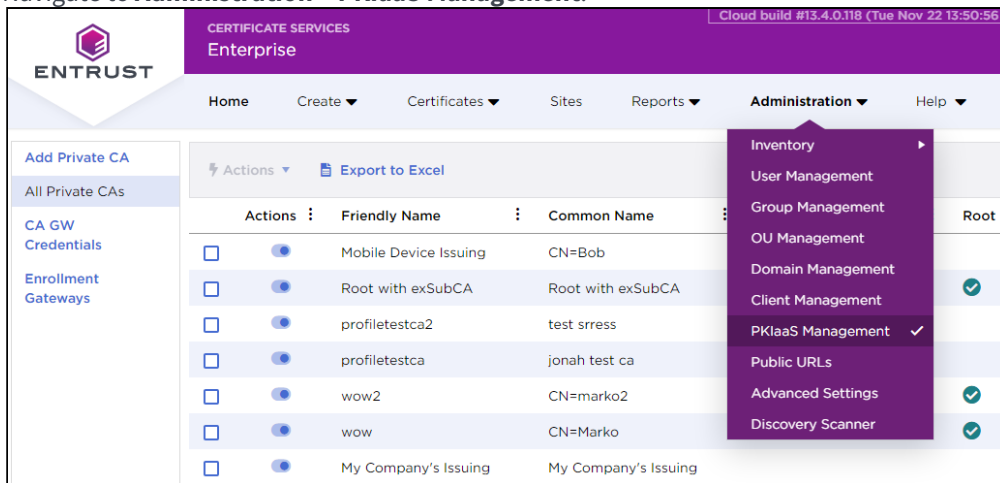
## Adding an external root CA

If you want to leverage PKIaaS issuing CAs while maintaining the root of trust within your organization, PKIaaS allows you to sign an issuing CA using a non-PKIaaS root CA you owned.

**i** For this use case, you must add your external root CA certificate in ECS Enterprise before adding an issuing CA (as explained in [Adding an issuing CA under an external root CA](#)).

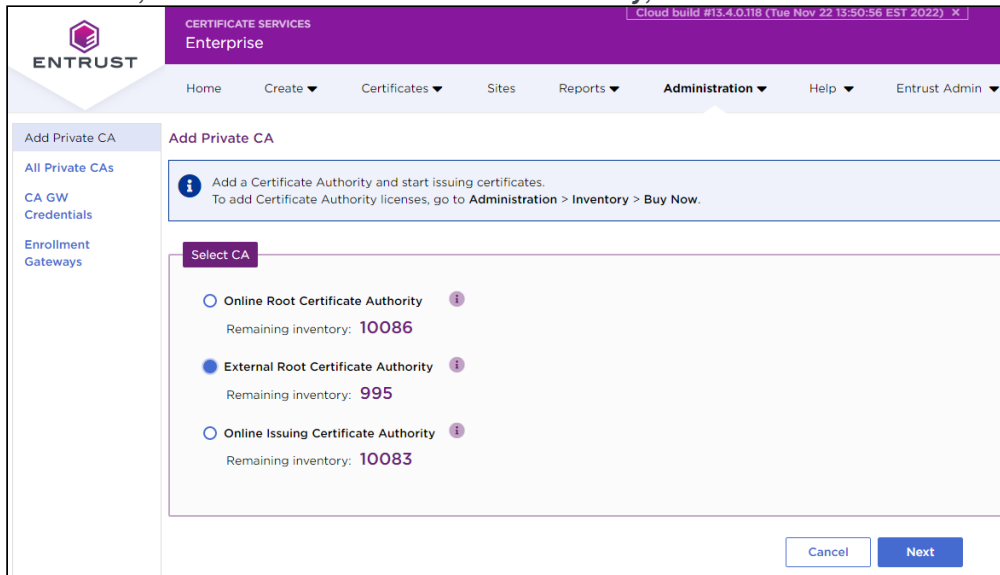
### To add an external root CA

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration > PKIaaS Management**.



The screenshot shows the Entrust Enterprise Administration interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', and 'Help'. The 'Administration' dropdown menu is open, showing options like 'Inventory', 'User Management', 'Group Management', 'OU Management', 'Domain Management', 'Client Management', 'PKIaaS Management' (which is selected with a checkmark), 'Public URLs', 'Advanced Settings', and 'Discovery Scanner'. Below the menu, a table lists various CA entries with columns for 'Actions', 'Friendly Name', and 'Common Name'. The table includes entries like 'Mobile Device Issuing', 'Root with exSubCA', 'profiletestca2', 'profiletestca', 'wow2', 'wow', and 'My Company's Issuing'.

3. In the side pane, click **Add Private CA**.
4. In **Select CA**, choose **External Root Certificate Authority**, and click **Next**.



The screenshot shows the 'Add Private CA' wizard. The top navigation bar is the same as in the previous screenshot. The 'Add Private CA' section is active, displaying an information message: 'Add a Certificate Authority and start issuing certificates. To add Certificate Authority licenses, go to Administration > Inventory > Buy Now.' Below this, the 'Select CA' section is visible, showing three radio button options:
 

- Online Root Certificate Authority (Remaining inventory: 10086)
- External Root Certificate Authority (Remaining inventory: 995)
- Online Issuing Certificate Authority (Remaining inventory: 10083)

 At the bottom right, there are 'Cancel' and 'Next' buttons.

5. Click **Next** to display the **CA Information** form.

**Add External Root CA**

✔ **CA Distinguished Name**  
 cn=CHIA-ROOT-CA

**CA Information**

**Friendly Name**

**Self-Signed Root Certificate**

**Region**

6. Enter the following information.

- [Friendly Name](#)
- [Self-Signed Root Certificate](#)
- [Region](#)

7. Click **Next** to review the external root CA information.

**Add External Root CA**

i You have requested import of an External Root Certificate Authority with the following details.  
 Click **Submit** to import the Certificate Authority.

**CA Details**

<b>CA Friendly Name:</b>	External MS Root
<b>Serial Number:</b>	12F0CA4A92069B8D42F23ECC012FC6BB
<b>Subject DN:</b>	cn=CHIA-ROOT-CA
<b>Validity:</b>	From Feb 25, 2020 to Feb 25, 2025
<b>Signing Key Details:</b>	RSA-2048+SHA256
<b>Region:</b>	US East (N. Virginia)

8. Click **Submit**.

9. When the CA creation completes, check the CA details in the CA grid view.

10. Refresh the grid. You will notice that the status changes to **Active**.

## Friendly Name

Enter an informal name for the new CA.

**Mandatory:** Yes.


## Self-Signed Root Certificate

Paste the base64-encoded (PEM) self-signed root CA certificate.

**Mandatory:** Yes.

## Region

Select the region in which the CA will be hosted.

 The region of the root CA decides the region of the issuing CA.

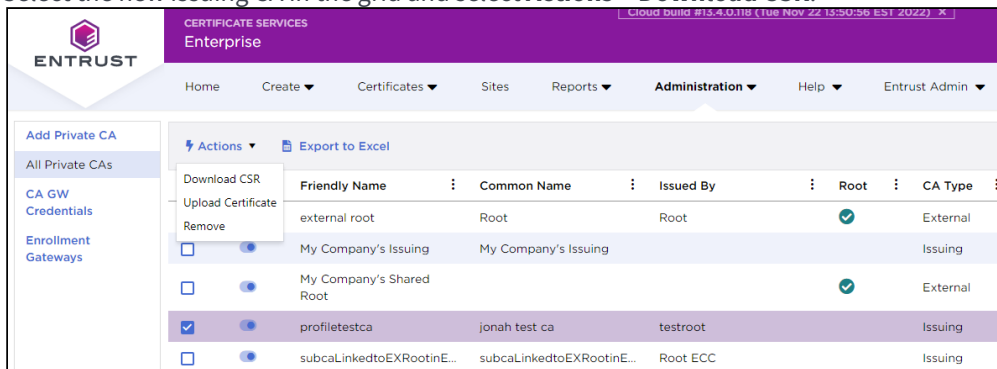
**Mandatory:** Yes.

## Adding an issuing CA under an external root CA

See below for how to add an issuing CA under the CA created in [Adding an external root CA](#).

### To add an issuing CA under an external root CA

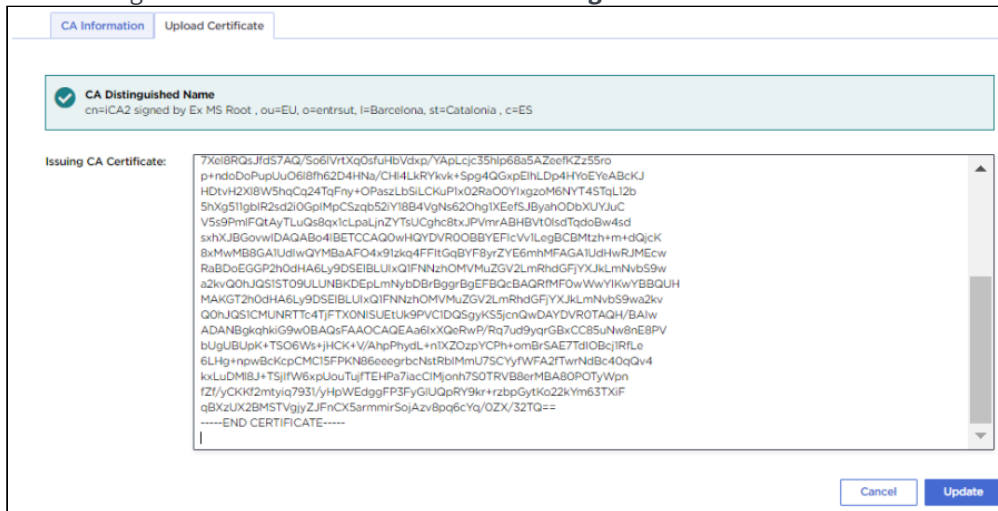
1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Add an issuing CA as explained in [Creating an issuing CA under an online root CA](#). In the **Root Certificate Authority** field, select the external root CA you added in [Adding an external root CA](#).
3. When the CA creation completes, check the CA details in the CA grid view.
4. Refresh the grid. You will notice that the status changes to **CSR Ready**.
5. Select the new issuing CA in the grid and select **Actions > Download CSR**.



		Friendly Name	Common Name	Issued By	Root	CA Type
Actions						
<input type="checkbox"/>	Download CSR	external root	Root	Root	<input checked="" type="checkbox"/>	External
<input type="checkbox"/>	Upload Certificate	My Company's Issuing	My Company's Issuing			Issuing
<input type="checkbox"/>	Remove	My Company's Shared Root			<input checked="" type="checkbox"/>	External
<input checked="" type="checkbox"/>		profiletestca	jonah test ca	testroot		Issuing
<input type="checkbox"/>		subcaLinkedtoEXRootinE...	subcaLinkedtoEXRootinE...	Root ECC		Issuing

6. Process the downloaded CSR with your external root CA to issue a CA certificate in base-64 format.
7. Select the new issuing CA in the grid and select **Actions > Upload Certificate**.

8. Paste the signed certificate base-64 text in the **Issuing CA Certificate** box.



CA Information Upload Certificate

CA Distinguished Name  
cn=iCA2 signed by Ex MS Root , ou=EU, o=entrust, l=Barcelona, st=Catalonia , c=ES

Issuing CA Certificate:

```

7XeI8RQsJfd57AQ/So6IVrtXq0sfuHbVdXp/YApLcj:35hp68a5AZeeFKZz55ro
p+ndoDoPupUuO6i8fh62D4HNa/CHi4LkRykvk+Spg4QGxpEiHLdP4HYoEYeABckJ
HDtvHzXl8W5hqCq24TqFny+OPaszLbSLCKuPfxO2RaOOYxgz0M6NYT45TqLJ2b
5hXg5I1gblR2s2d2OGplMpCSzqb52YI8B4VgN62OhglXEefSJByahODbxUYJuC
V5s9PmIFGtAyTLuGs8qxkLpaLjnZYTsUcGhc8bxJPVmrABHBVtOiscTqdoBw4sd
isvXJBGsoviwDAQaBc4IBETCCAQQ0wHQYDVR0OBByEFicWlLogBCBmfzH+mm+dQjck
BxMwMB8GAUuJdwQYMBaAFO4+9Izko4FFiGqBYF8yZYE6nmhMFAGA1UdIwRUMjEcw
RaBDeEGGP2h0dHA6Ly9DSEIBLlUxQlFNNnshOMVMjZGV2LmRhdGFjYXJkLmNvbn59w
a2kvQ0hJQSIST09ULUNBKEpLmNybDBrBgggrBgEFBQcBAQRIMFowWwYIKwYBBQUH
MAKGT2h0dHA6Ly9DSEIBLlUxQlFNNnshOMVMjZGV2LmRhdGFjYXJkLmNvbn59w2kv
Q0hJQSIST09ULUNBKEpLmNybDBrBgggrBgEFBQcBAQRIMFowWwYIKwYBBQUH
ADANBgkqhkiG9w0BAQsFAAOCACQEAa6lxXQeRwP/Rq7ud9yqrGbxCC85Uw8nEBPV
bUgLUbUpK+TSO6Ws+JHCK+V/AhpPhydl+nIXZOzpYCPH+omBrSAE7TdiOBcIRLLe
6LHg+npwBckKpCMC15FFKNB6eeegrbcNstRbImM7SUCyYVFA2FtwNdBc40qQv4
kxLuDM8J+TSjIfW6xpUouTujfTEHPa7iacCimJonh750TRVB8erMBA80POTyWpn
fZ/yCKKf2mtYiq7931/yHpwEdggFP3FyGIUQpRY9kr+rzbpGytKoz2kYm63TXiF
qBxLUX2BMSTVgijZJfFnCX5armmirSojAzv8p6cYq/OZX/32TQ==
-----END CERTIFICATE-----

```

Cancel Update

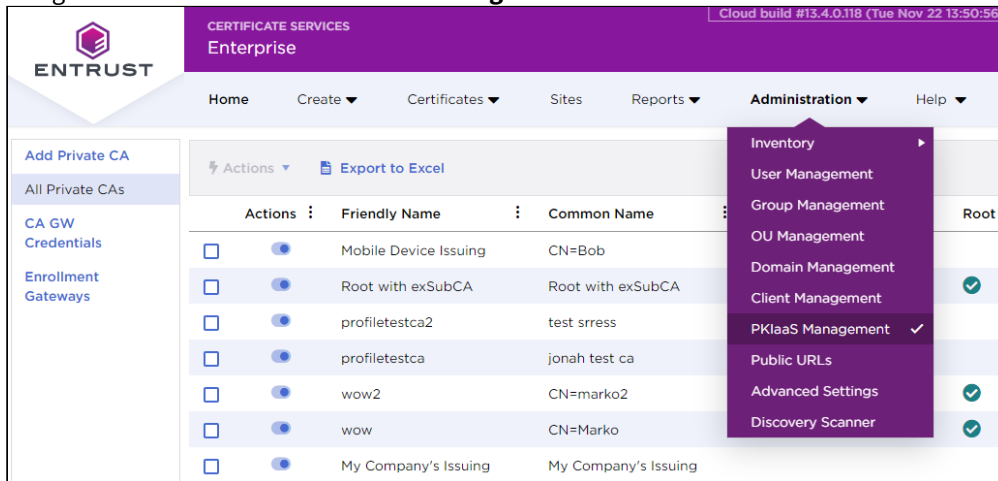
9. Click **Update**. In the CA grid, the issuing CA status will change to **Updating**.
10. Refresh the grid; the issuing CA is ready to use when the status changes to **Active**.

## Downloading a CA certificate

See below for how to download the CA certificate of a root or issuing CA.

### To download a CA certificate

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration > PKIaaS Management**.



CERTIFICATE SERVICES  
Enterprise

Home Create Certificates Sites Reports Administration Help

Add Private CA

All Private CAs

CA GW Credentials Enrollment Gateways

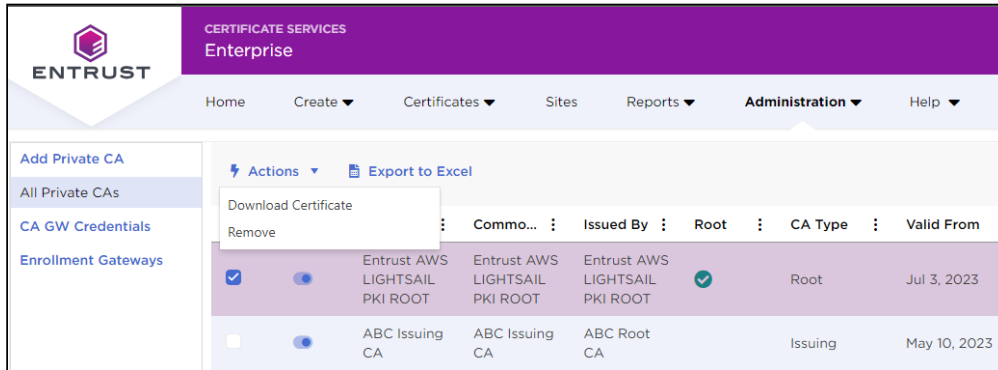
Actions Export to Excel

Actions	Friendly Name	Common Name	
<input type="checkbox"/>	Mobile Device Issuing	CN=Bob	
<input type="checkbox"/>	Root with exSubCA	Root with exSubCA	
<input type="checkbox"/>	profiletestca2	test srrss	
<input type="checkbox"/>	profiletestca	jonah test ca	
<input type="checkbox"/>	wow2	CN=marko2	
<input type="checkbox"/>	wow	CN=Marko	
<input type="checkbox"/>	My Company's Issuing	My Company's Issuing	

Inventory  
User Management  
Group Management  
OU Management  
Domain Management  
Client Management  
PKIaaS Management  
Public URLs  
Advanced Settings  
Discovery Scanner

3. In the left navigation sidebar select **All Private CAs**.

4. Check the box at the left of the CA name.




5. select **Actions** > **Download Certificate**.

## Deleting a CA

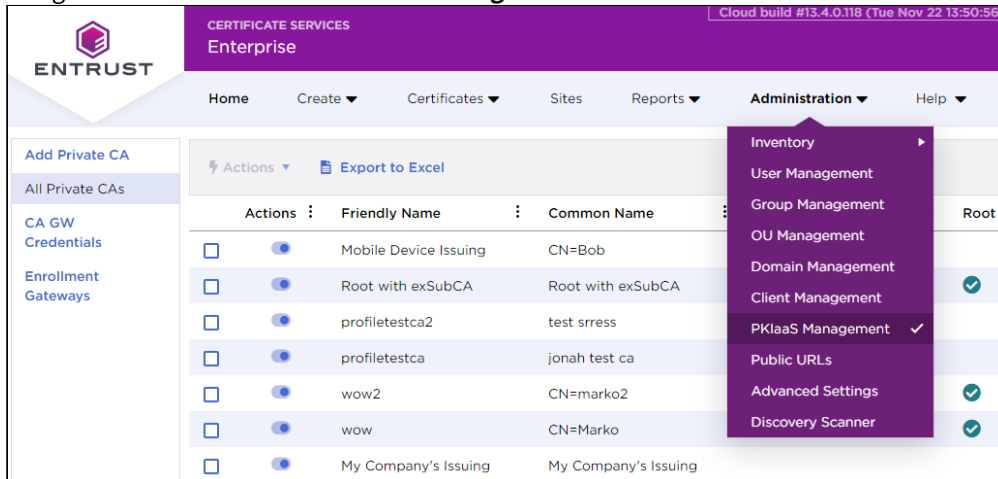
When deleting CAs take into account that:

- Before deleting a root CA, you must delete all issuing CAs under the root CA.
- Before deleting an issuing CA, you must first remove any CA Gateway Credential and Enrollment Gateway associated with this CA.
- When you delete an issuing CA, you also delete all the certificates you issued from this CA.
- After deleting a CA, the CA license returns to inventory, generally within 24 hours.

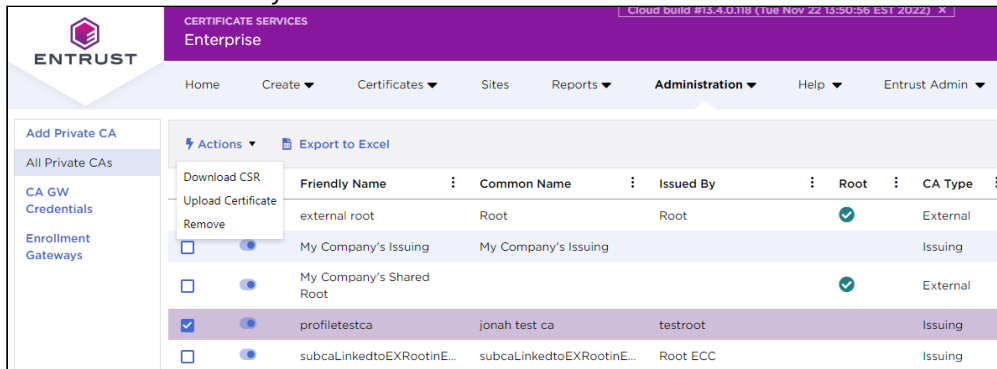
 CA deletion is not reversible.

### To delete a CA

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Navigate to **Administration** > **PKIaaS Management**.



3. Select the row of the CA you want to delete and select **Actions > Remove**.



The screenshot shows the Entrust Enterprise Administration interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', 'Help', and 'Entrust Admin'. The left sidebar has 'Add Private CA', 'All Private CAs', 'CA GW', 'Credentials', and 'Enrollment Gateways'. The main content area shows a table of Private CAs with columns: Friendly Name, Common Name, Issued By, Root, and CA Type. The 'Remove' action is selected for the row with Friendly Name 'profiletestca'.

	Friendly Name	Common Name	Issued By	Root	CA Type
<input type="checkbox"/>	external root	Root	Root	✓	External
<input type="checkbox"/>	My Company's Issuing	My Company's Issuing			Issuing
<input type="checkbox"/>	My Company's Shared Root			✓	External
<input checked="" type="checkbox"/>	profiletestca	jonah test ca	testroot		Issuing
<input type="checkbox"/>	subcaLinkedtoEXRootinE...	subcaLinkedtoEXRootinE...	Root ECC		Issuing

4. Review the information on the confirmation request before confirming the deletion.
5. In the CA grid view, the CA status becomes **Deleting** while the deletion is processed (usually ~60 seconds). Refresh the grid. You will notice that the deleted CA is no longer listed.

## 7 Managing certificates with Entrust Certificate Services Enterprise

Once logged into Entrust Certificate Services (ECS) Enterprise, you can manage your certificates as follows.

- [Issuing certificates](#)
- [Browsing and downloading certificates](#)
- [Revoking certificates](#)
- [Managing reports, alerts, and notifications](#)
- [Configuring auto-enrollment](#)

### Issuing certificates

Depending on the selected certificate profile, you can issue certificates on the following modes.

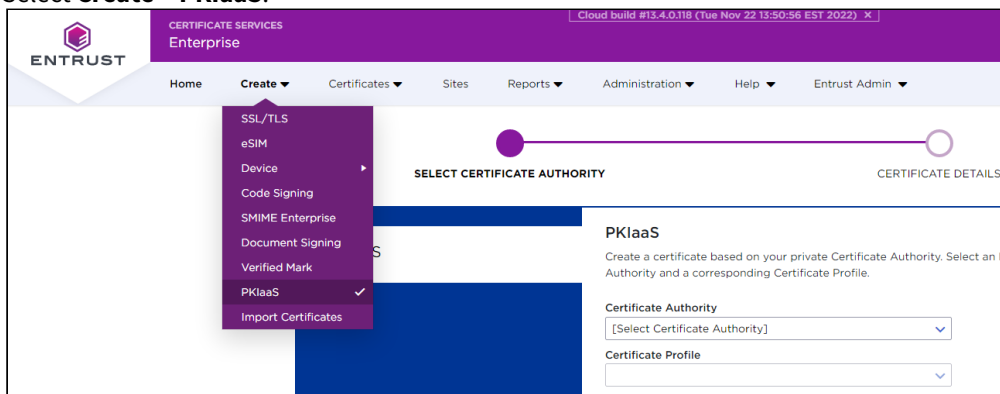
- [Processing a Certificate Signing Request](#)
- [Generating a PKCS #12](#)

### Processing a Certificate Signing Request

Issue a certificate by processing a Certificate Signing Request (CSR) for pre-generated keys.

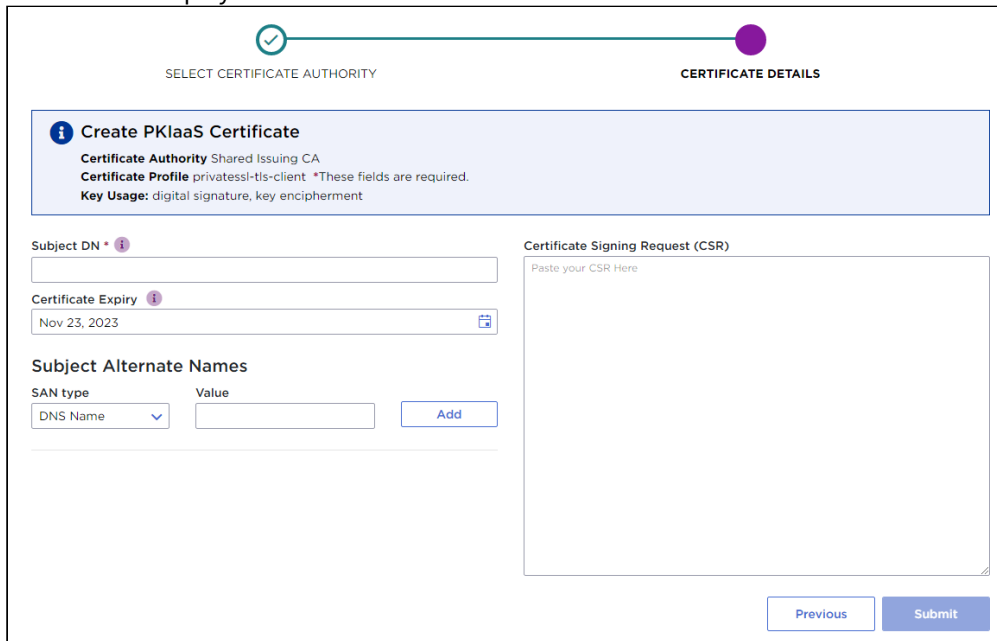
#### To process a Certificate Signing Request

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Select **Create > PKIaaS**.



3. Select the **Certificate Authority**.
4. Select a **Certificate Profile** configured to process Certificate Signing Requests.

5. Click **Next** to display the certificate form.



**Create PKIaaS Certificate**

**Certificate Authority** Shared Issuing CA  
**Certificate Profile** privatessl-tls-client \*These fields are required.  
**Key Usage:** digital signature, key encipherment

**Subject DN** i

**Certificate Expiry** i  
 Nov 23, 2023

**Subject Alternate Names**

SAN type	Value
DNS Name	<input type="text"/>

**Certificate Signing Request (CSR)**  
 Paste your CSR Here

Previous Submit

6. Configure the following settings:

- [Subject DN](#)
- [Certificate Expiry](#)
- [Subject Alternate Names](#)
- [Certificate Signing Request \(CSR\)](#)

7. Click **Submit** to issue the certificate.

8. On the confirmation page, click the link to download the issued certificate.

## Subject DN

Write the Distinguished Name (DN) of the certificate subject. For example:

```
CN=www.entrust.com, OU=PKIaaS, O=Entrust, c=CA
```

## Certificate Expiry

Select the certificate expiration date. Specifically, the certificate will expire at 23:59:59 on the selected date, calculated for the time zone set in your browser.

**⚠** Because of Daylight Savings Time (if applicable) and the time zone set in your browser, you may see a discrepancy between the actual certificate expiry date (the one you set) and the expiry date you will see in some system viewers or parsers. The Windows System Viewer, in particular, does not handle Daylight Savings Time correctly.

## Subject Alternate Names


Select optional Subject Alternate Names (SAN) for the certificate subject – for example:

- S/MIME email certificates require an **RFC822 Name** email address.




- Network device or web server certificates for TLS authentication require a **DNS Name** or **IP Address** value matching the URL used by the client.

See below for the supported types.


 The selected CA profile may forbid some Subject Alternate Names.

SAN Type	Sample value
DNS Name	<a href="http://server.example.com">server.example.com</a>
IP Address	192.168.1.1
RFC822 Name	<a href="mailto:john.doe@example.com">john.doe@example.com</a>
Directory Name	cn=john doe,o=example inc,c=us
Uniform Resource Identifier	<a href="http://example.com/">http://example.com/</a>
Registered ID	1.2.3.4.5.6.7.8
Other Name	oBgGCCsGAQUFBwgDoAwwCgwIMTIzNDU2Nzg=

 The **Other Name** value is a DER encoding because this type supports an unbounded number of possible subtypes which often cannot be represented as simple strings.

## Certificate Signing Request (CSR)

Paste the Certificate Signing Request (CSR) contents.

 PKIaaS currently does not support copying DNS or SANs from the CSR. You must manually input the DNS and SANs on the certificate creation page. As explained in [Private SSL \(ACMEv2\) certificate profiles](#), PKIaaS has two certificate profiles that use the CN (common name) input value to fill the DNS Name field.

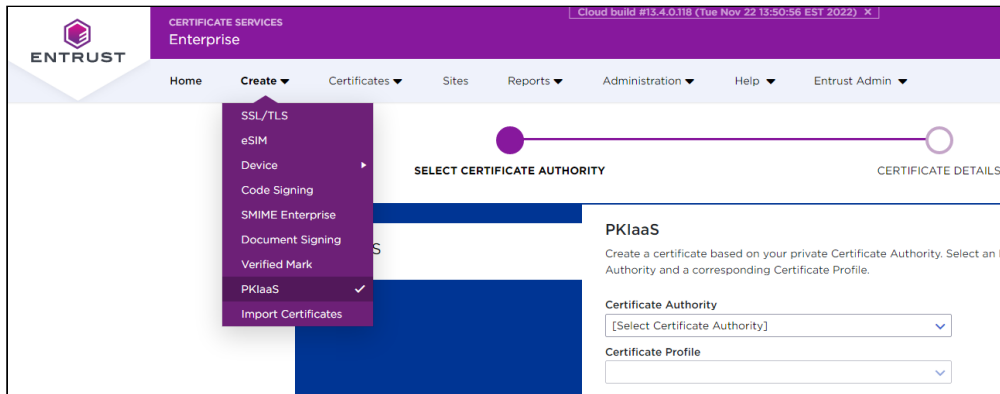
## Generating a PKCS #12

Generate a PKCS #12 file containing both a certificate and a key pair.

### To generate a PKCS #12

1. Log into [cloud.entrust.net](https://cloud.entrust.net)

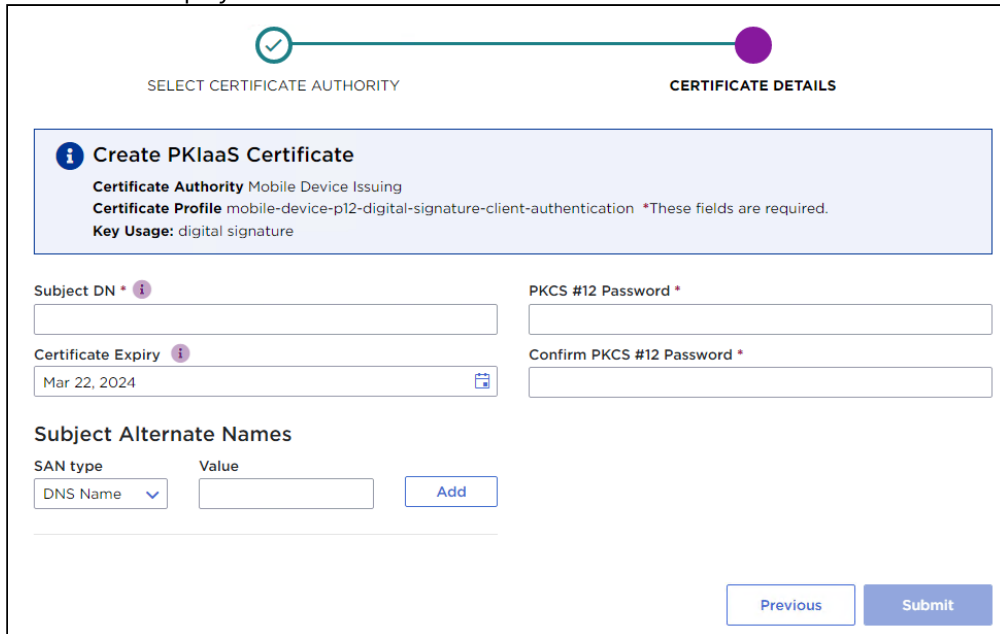
2. Select **Create > PKIaaS**.



3. Select the **Certificate Authority**.

4. Select a **Certificate Profile** configured to generate PKCS #12 files.

5. Click **Next** to display the certificate form.



6. Configure the following settings:

- [Subject DN](#)
- [Certificate Expiry](#)
- [Subject Alternate Names](#)
- [PKCS #12 Password](#)
- [Confirm PKCS #12 Password](#)

7. Click **Submit** to generate the certificate and the key pair.

8. On the confirmation page, click the link to download a PKCS #12 file containing the certificate and the key pair.

## Subject DN

Write the Distinguished Name (DN) of the certificate subject. For example:

CN=www.entrust.com, OU=PKIaaS, O=Entrust, c=CA

## Certificate Expiry

Select the certificate expiration date. Specifically, the certificate will expire at 23:59:59 on the selected date, calculated for the time zone set in your browser.

**⚠** Because of Daylight Savings Time (if applicable) and the time zone set in your browser, you may see a discrepancy between the actual certificate expiry date (the one you set) and the expiry date you will see in some system viewers or parsers. The Windows System Viewer, in particular, does not handle Daylight Savings Time correctly.

## Subject Alternate Names

Select optional Subject Alternate Names (SAN) for the certificate subject – for example:

- S/MIME email certificates require an **RFC822 Name** email address.
- Network device or web server certificates for TLS authentication require a **DNS Name** or **IP Address** value matching the URL used by the client.

See below for the supported types.

**✘** The selected CA profile may forbid some Subject Alternate Names.

SAN Type	Sample value
DNS Name	<a href="http://server.example.com">server.example.com</a>
IP Address	192.168.1.1
RFC822 Name	<a href="mailto:john.doe@example.com">john.doe@example.com</a>
Directory Name	cn=john doe,o=example inc,c=us
Uniform Resource Identifier	<a href="http://example.com/">http://example.com/</a>
Registered ID	1.2.3.4.5.6.7.8
Other Name	oBgGCCsGAQUFBwgDoAwwCgwIMTlzNDU2Nzg=

**i** The **Other Name** value is a DER encoding because this type supports an unbounded number of possible subtypes which often cannot be represented as simple strings.

## PKCS #12 Password

Type a password to protect the PKCS #12 contents.

## Confirm PKCS #12 Password

Retype the password.

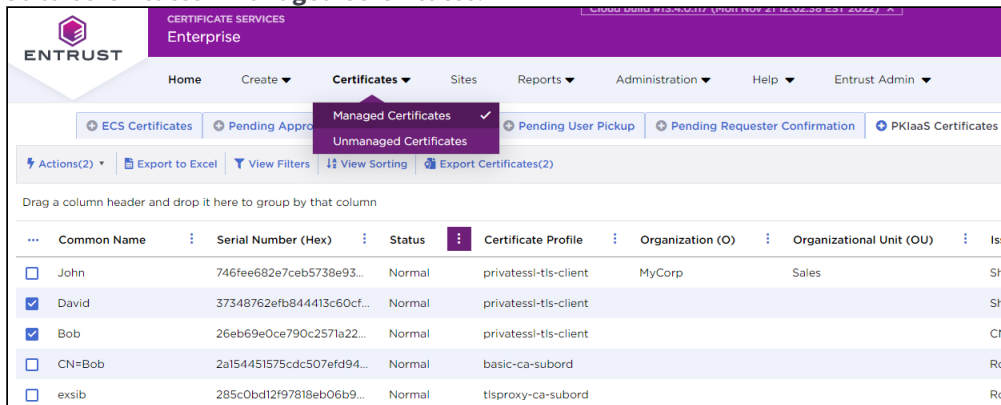
## Browsing and downloading certificates

Once issued as explained in [Issuing certificates](#), you can browse and download certificates in bulk.

**i** PKIaaS certificates issued via API or Enrollment Gateway might take up to 30 seconds to show up in the grid view.

### To browse and download certificates

1. Log into [cloud.entrust.net](https://cloud.entrust.net)
2. Go to **Certificates > Managed Certificates**.



The screenshot shows the Entrust Enterprise Certificates management interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', 'Help', and 'Entrust Admin'. Below the navigation bar, there are tabs for 'ECS Certificates', 'Pending Approvals', 'Managed Certificates' (selected), 'Unmanaged Certificates', 'Pending User Pickup', 'Pending Requester Confirmation', and 'PKIaaS Certificates'. Below the tabs, there are buttons for 'Actions(2)', 'Export to Excel', 'View Filters', 'View Sorting', and 'Export Certificates(2)'. The main content area displays a table of certificates with columns for 'Common Name', 'Serial Number (Hex)', 'Status', 'Certificate Profile', 'Organization (O)', 'Organizational Unit (OU)', and 'Issued'. The table contains five rows of certificate data.

...	Common Name	Serial Number (Hex)	Status	Certificate Profile	Organization (O)	Organizational Unit (OU)	Issu
<input type="checkbox"/>	John	746fee682e7ceb5738e93...	Normal	privatessl-tls-client	MyCorp	Sales	Sha
<input checked="" type="checkbox"/>	David	37348762efb84413c60cf...	Normal	privatessl-tls-client			Sha
<input checked="" type="checkbox"/>	Bob	26eb69e0ce790c2571a22...	Normal	privatessl-tls-client			CN
<input type="checkbox"/>	CN=Bob	2a154451575cdc507efd94...	Normal	basic-ca-subord			Rod
<input type="checkbox"/>	exsib	285c0bd12f97818eb06b9...	Normal	tlsproxy-ca-subord			Rod

3. Select the **PKIaaS Certificates** tab.
4. Select one or more certificates on the grid.
5. Click **Export Certificates** to download a ZIP file containing the certificates in DER format.

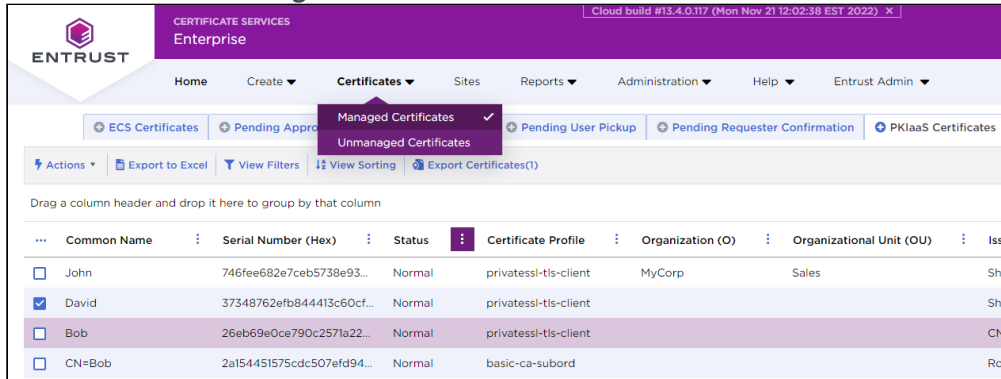
## Revoking certificates

You can revoke issued certificates to invalidate them before the expiry date.

### To revoke a certificate

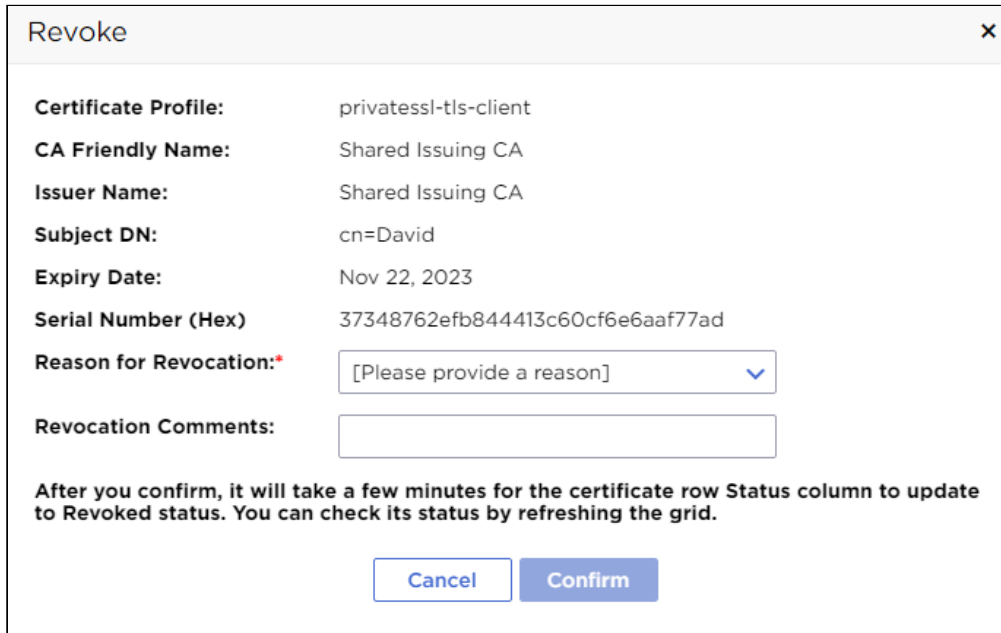
1. Log into [cloud.entrust.net](https://cloud.entrust.net)

2. Go to **Certificates > Managed Certificates**.



The screenshot shows the Entrust Enterprise web interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', 'Help', and 'Entrust Admin'. The 'Certificates' dropdown menu is open, showing 'Managed Certificates' (selected), 'Unmanaged Certificates', 'Pending User Pickup', 'Pending Requester Confirmation', and 'PKIaaS Certificates'. Below the navigation, there are action buttons like 'Export to Excel', 'View Filters', 'View Sorting', and 'Export Certificates(1)'. A table of certificates is visible with columns for Common Name, Serial Number (Hex), Status, Certificate Profile, Organization (O), and Organizational Unit (OU). The table contains four rows: John, David (selected), Bob, and CN=Bob.

3. Select the **PKIaaS Certificates** tab.
4. Select a certificate on the grid.
5. Select **Actions > Revoke**.
6. Select the **Reason for Revocation**.



The screenshot shows a 'Revoke' dialog box with the following fields and options:

- Certificate Profile:** privatesl-tls-client
- CA Friendly Name:** Shared Issuing CA
- Issuer Name:** Shared Issuing CA
- Subject DN:** cn=David
- Expiry Date:** Nov 22, 2023
- Serial Number (Hex):** 37348762efb844413c60cf6e6aaf77ad
- Reason for Revocation\*:** [Please provide a reason] (dropdown menu)
- Revocation Comments:** (text input field)

Below the fields, there is a message: "After you confirm, it will take a few minutes for the certificate row Status column to update to Revoked status. You can check its status by refreshing the grid." At the bottom, there are two buttons: 'Cancel' and 'Confirm'.

7. Click **Confirm**.
8. The revoked certificate will disappear from the **PKIaaS Certificate** grid view because the default filter only displays active certificates. Select **Status > Filter > Select All** to display also the revoked certificates.

CERTIFICATE SERVICES Enterprise Cloud build #13.4.0.117 (Mon N...

Home Create Certificates Sites Reports Administration

[+ ECS Certificates](#)
[+ Pending Approvals](#)
[+ Foreign Certificates](#)
[+ Pending User Pickup](#)
[+ Pending Reque](#)

[⚡ Actions](#)
[📄 Export to Excel](#)
[🔍 View Filters](#)
[⬇️ View Sorting](#)
[📄 Export Certificates](#)

Drag a column header and drop it here to group by that column

...	Common Name	Serial Number (Hex)	Status	Certificate Profile	Organization (O)
<input type="checkbox"/>	John	746fee682e7ceb5738e93...	Normal		MyCorp
<input type="checkbox"/>	David	37348762efb84413c60cf...	Normal		
<input type="checkbox"/>	Bob	26eb69e0ce790c2571a22...	Normal		
<input type="checkbox"/>	CN=Bob	2a154451575cdc507efd94...	Normal		
<input type="checkbox"/>	exsib	285c0bd12f97818eb06b9...	Normal	tlsproxy-ca-subord	
<input type="checkbox"/>	testcertificates.com	32bfee8973019a0b951aa8...	Normal	scep-digital-signature-	
<input type="checkbox"/>	testcertificates.com	1a0da534a666553a7c9df...	Normal	scep-key-enciphermen	
<input type="checkbox"/>	testcertificates.com	77d20b513bbaf84ef04fe5...	Normal	scep-digital-signature	

↑ Sort Ascending  
 ↓ Sort Descending  
 Columns  
 Filter  
 Set Column Position

Select All  
 Normal  
 Revoked  
 Held  
**3 items selected**  
 Filter Clear

## Managing reports, alerts, and notifications

Define reports based on the information your business needs, such as daily certificate issuance, revocation, and renewal activity. Select:

- **Reports > Report Center** to view reporting, notifications, and alerts.
- **Reports > Report Schedule** to schedule report.
- **Reports > Alerts** to program alerts, for example, based on certificate state.

## Configuring auto-enrollment

To set up Itune or MDM auto-enrollment, you need a Registration Authority (RA) certificate.

- Issuing this certificate requires one PKIaaS certificate license.
- Renewing this certificate requires an unused PKIaaS certificate in the inventory – to issue the new certificate before revoking the old one. The license of the revoked certificate returns to the inventory within half an hour of the revocation.

## 8 Automating Intune enrollment with an Entrust-hosted Enrollment Gateway

Configure an Entrust-hosted Enrollment Gateway to operate as SCEP Server and process Intune enrollment requests with PKIaaS Certification Authorities.

- [Intune integration requirements](#)
- [Creating an Intune application in Azure](#)
- [Configuring Intune automation in Entrust Certificate Services](#)
- [Configuring Intune profiles in Azure](#)
- [Enrolling user devices with the Intune Company Portal](#)
- [Renewing enrolled certificates](#)
- [Revoking and removing certificates](#)

See the following video for a quick guide on the required steps.

<https://www.youtube.com/watch?v=XH0pwhowK0Q>

See also the Microsoft documentation for details on the third-party SCEP integration with Intune.

<https://learn.microsoft.com/en-us/mem/intune/protect/certificate-authority-add-scep-overview>

### Intune integration requirements

You must meet the following requirements to automate Intune enrollment with an Entrust-hosted Enrollment Gateway.

- [Entrust Certificate Services](#)
- [Microsoft Azure](#)
- [Supported operating systems](#)
- [Supported encryption algorithms](#)

### Entrust Certificate Services

You need an Entrust Certificate Services (ECS) Enterprise account with privileges to create an issuing Certification Authority.

### Microsoft Azure

You need a Microsoft Azure account with privileges to create and configure an Intune application.

### Supported operating systems

This release of the Intune automated enrollment is tested with devices running the following operating systems.

OS	Tested versions
MacOS	Ventura 13.2.1
iPhone/iPad	16.3.1

OS	Tested versions
AndroidOS	13
Microsoft Windows	10 and 11
ChromeOS	—

For more details on the supported operating systems, please check the Microsoft documentation:

<https://learn.microsoft.com/en-us/mem/intune/fundamentals/supported-devices-browsers>

## Supported encryption algorithms

The Intune automated enrollment with an Entrust-hosted Enrollment Gateway supports the following encryption algorithms.

- aes128-CBC-PAD
- aes128-GCM
- aes256-CBC-PAD
- aes256-GCM
- desCBC
- des-ede3-cbc
- id-RSAES-OAEP
- rsaEncryption

## Creating an Intune application in Azure

In the Microsoft Azure portal, create an application for running the Intune service.

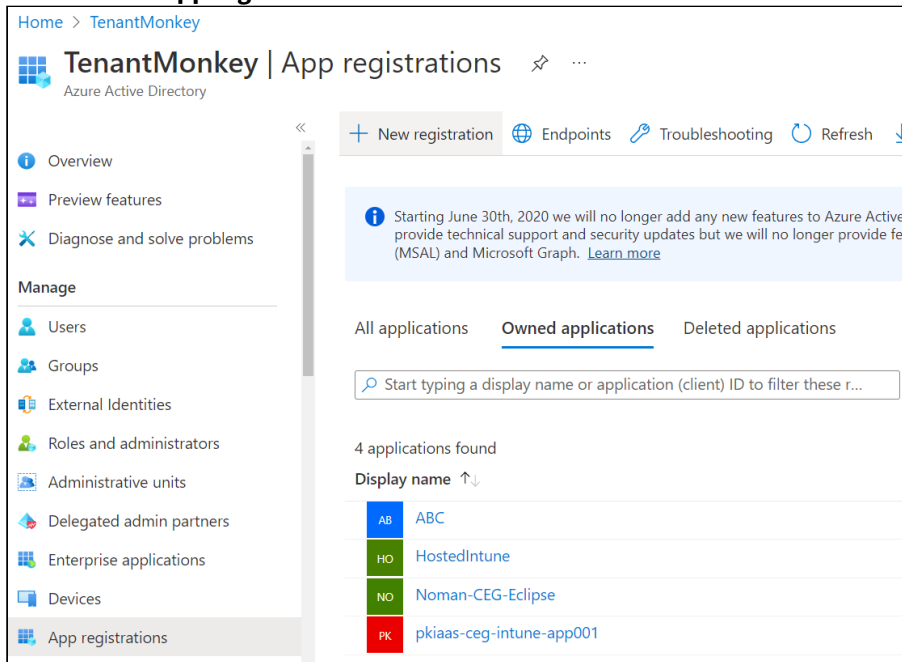
**i** At the end of this process, you should have the **Application (client) ID**, **Directory (tenant) ID**, and **Client secret** values required when [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#).

### To create an Intune application in Azure

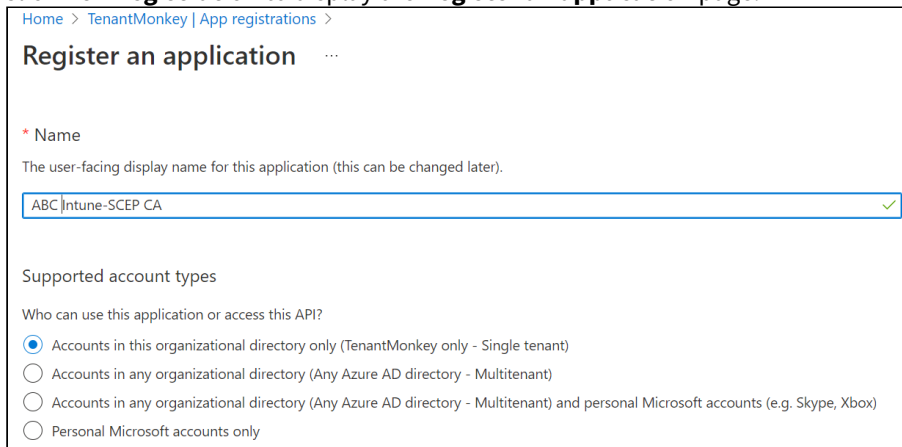
1. Log into [portal.azure.com](https://portal.azure.com) as a user with administrative permissions.



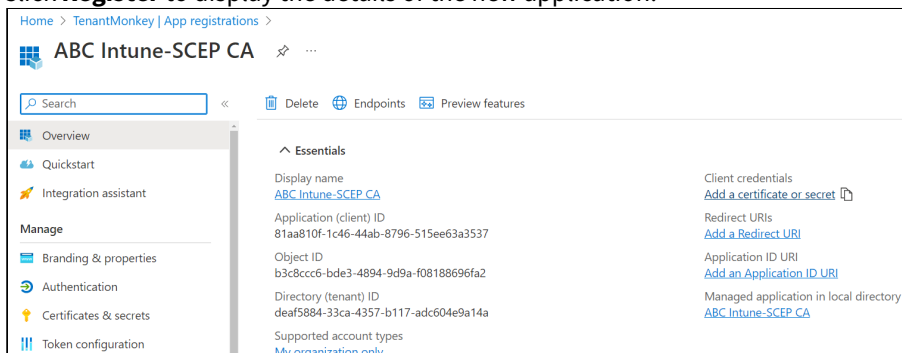
2. Go to **Home > App registrations**.



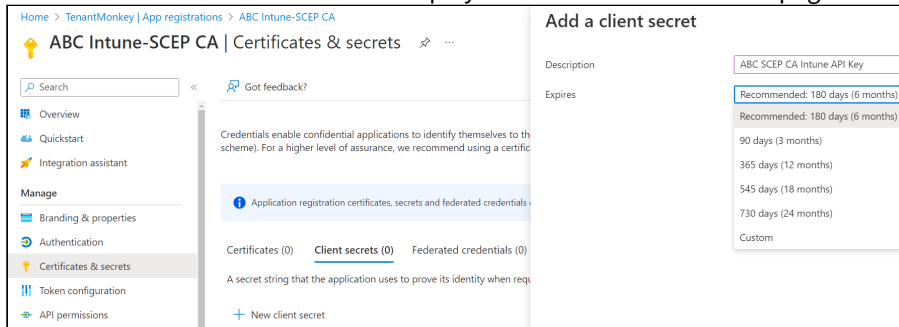
3. Click **New registration** to display the **Register an application** page.




4. In the **Name** field, type the name of the new Intune application.
5. In the **Supported account types** list, be sure that **Accounts in this organizational directory only (TenantMonkey only - Single tenant)** is selected.
6. Click **Register** to display the details of the new application.

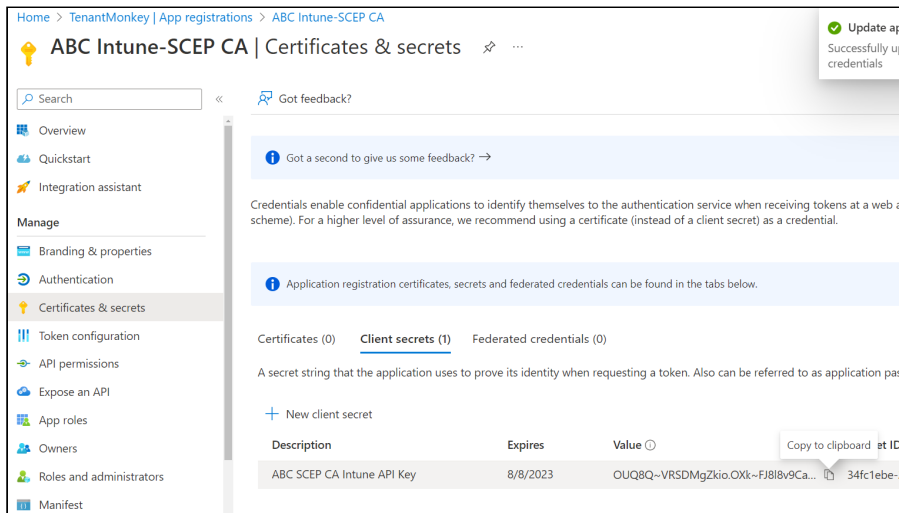


- Copy the **Application (client) ID** and **Directory (tenant) ID** values in a text file. You will use these values when [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#).
- Click **Add a certificate or secret** to display the **Certificates & secrets** page.

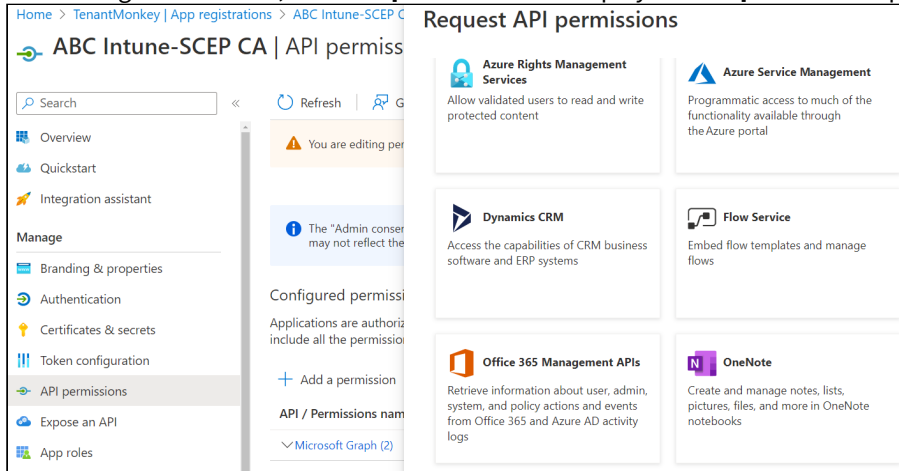


- Click **New client secret** to display the **Add a client secret** dialog.
- In the **Description** field, write a description of the new secret.
- In the **Expires** drop-down list, select the expiration date of the new secret.
- Click **Add** to add the new secret and close the **Add a client secret** dialog.
- On the **Certificates & secrets** page, copy the **Value** of the new secret in a text file. You will use this value when [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#).

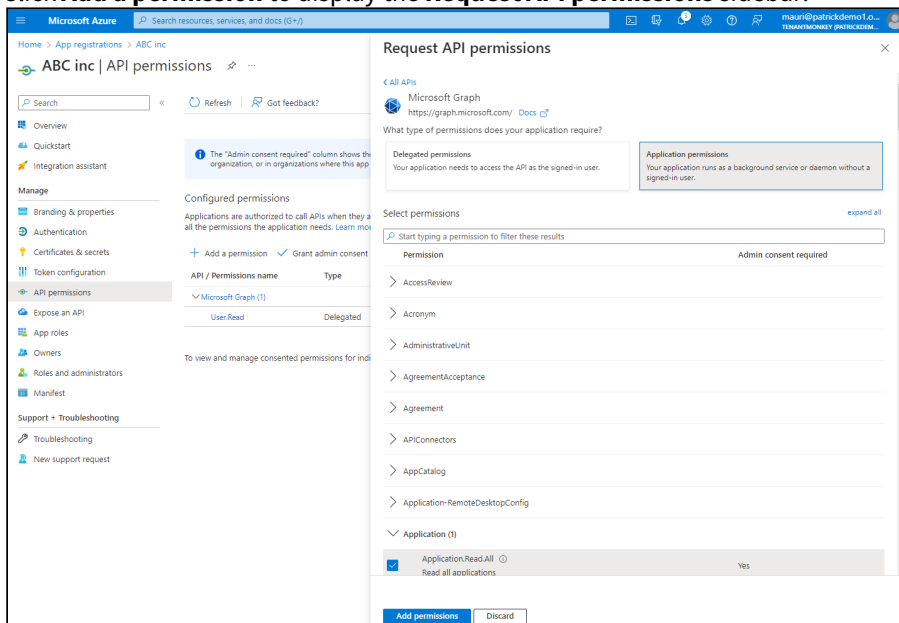
 The secret value will no longer be available after leaving this page.



14. In the navigation sidebar, click **API permissions** to display the **API permissions** page.



15. Click **Add a permission** to display the **Request API permissions** sidebar.



16. In the **Request API permissions** sidebar:
- Click **Microsoft Graph**.
  - Click **Application permissions**.
  - Under **Select permissions**, expand the **Application** list and select the **Application.ReadAll** permissions.
  - Click **Add permissions**.
17. Click **Add a permission** to display the **Request API permissions** sidebar again.
18. In the **Request API permissions** sidebar:
- Click **Intune**.
  - Click **Application permissions**.
  - Under **Select permissions**, select the **scep\_challenge\_provider** permission.
  - Click **Add permissions**.
19. On the **API permissions** page, click **Add admin consent for the TenantMonkey** for granting these permissions to the new Intune application.


## Configuring Intune automation in Entrust Certificate Services

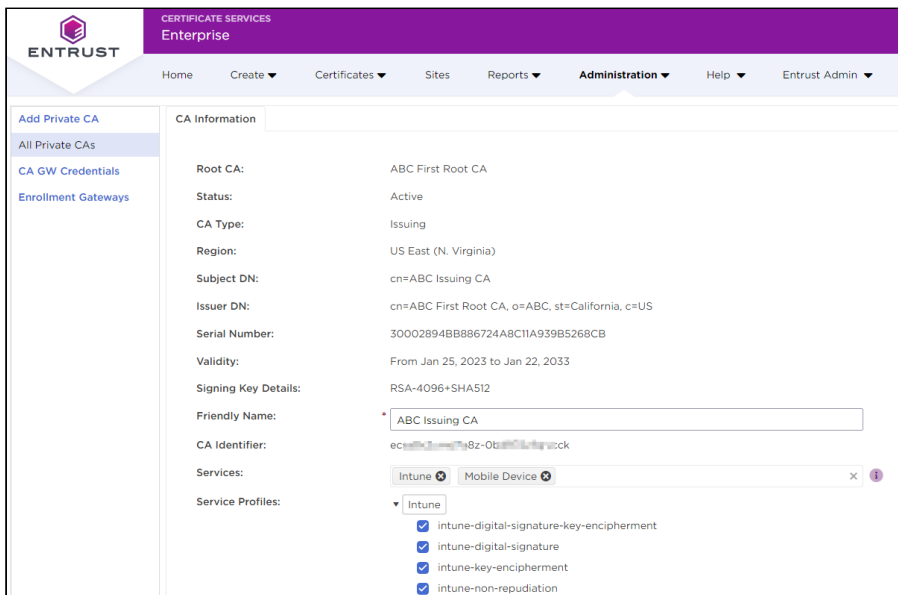
To configure an Entrust-hosted Enrollment Gateway for Intune enrollment, follow the below instructions on the Entrust Certificate Services Enterprise portal.

- [Configuring an Entrust PKIaaS issuing CA for Intune](#)
- [Downloading the Entrust PKIaaS CA certification chain for Intune](#)
- [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#)
- [Getting the Intune Service URL](#)

### Configuring an Entrust PKIaaS issuing CA for Intune

On the Entrust Certificate Services Enterprise portal, add the **Intune** service profile to either a new or an existing issuing CA.

 See [Creating an issuing CA under an online root CA](#) for how to create issuing CAs.



The screenshot shows the Entrust Certificate Services Enterprise portal interface. The main content area displays the configuration for an issuing CA. The 'CA Information' section includes the following details:

- Root CA: ABC First Root CA
- Status: Active
- CA Type: Issuing
- Region: US East (N. Virginia)
- Subject DN: cn=ABC Issuing CA
- Issuer DN: cn=ABC First Root CA, o=ABC, st=California, c=US
- Serial Number: 30002894BB886724A8C11A939B5268CB
- Validity: From Jan 25, 2023 to Jan 22, 2033
- Signing Key Details: RSA-4096+SHA512
- Friendly Name: ABC Issuing CA
- CA Identifier: ec...
- Services: Intune, Mobile Device
- Service Profiles: Intune
  - intune-digital-signature-key-encipherment
  - intune-digital-signature
  - intune-key-encipherment
  - intune-non-repudiation

### Downloading the Entrust PKIaaS CA certification chain for Intune

On the Entrust Certificate Services Enterprise portal, download the certificates for:

- The CA previously created in [Configuring an Entrust PKIaaS issuing CA for Intune](#).
- The root CA.

You will use these certificates when [Configuring Intune profiles in Azure](#).

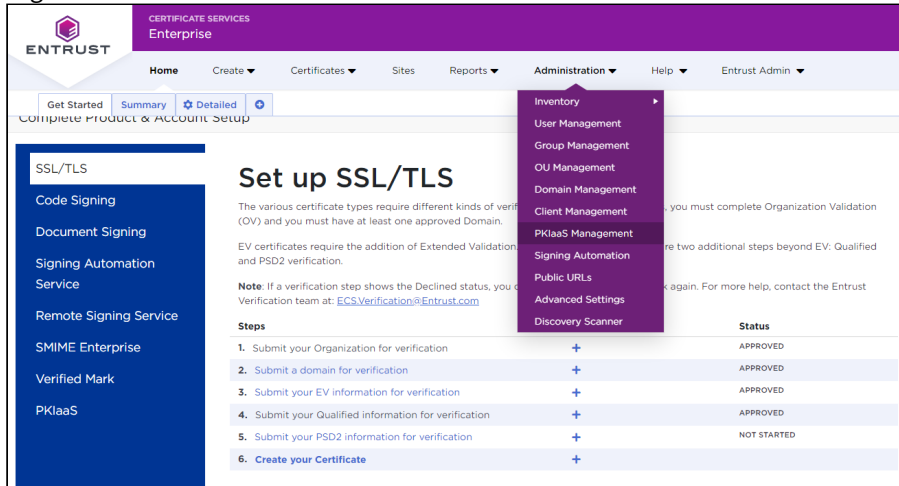
 See [Downloading a CA certificate](#) to download CA certificates from the Entrust Certificate Services Enterprise portal.

## Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune

On the Entrust Certificate Services portal, add and configure a Certificate Enrollment Gateway instance to process Intune requests.

### To configure Entrust Certificate Enrollment Gateway for Intune

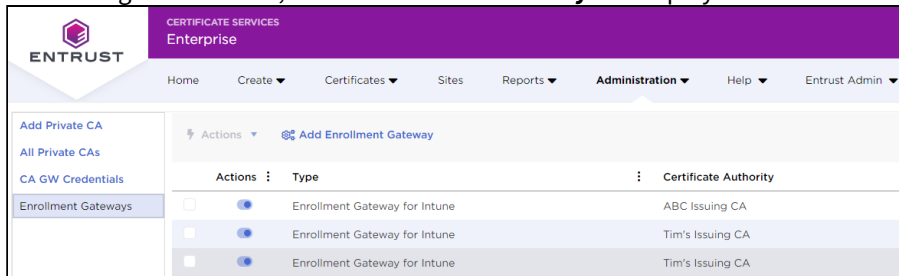
1. Log into [cloud.entrust.net](https://cloud.entrust.net)



The screenshot shows the 'Set up SSL/TLS' page in the Entrust Certificate Services Enterprise portal. The 'Administration' menu is open, and 'PKIaaS Management' is selected. The page displays a list of steps for setting up SSL/TLS, including submitting organization and domain information, EV information, and PSD2 information.

Steps	Status
1. Submit your Organization for verification	APPROVED
2. Submit a domain for verification	APPROVED
3. Submit your EV information for verification	APPROVED
4. Submit your Qualified information for verification	APPROVED
5. Submit your PSD2 information for verification	NOT STARTED
6. Create your Certificate	

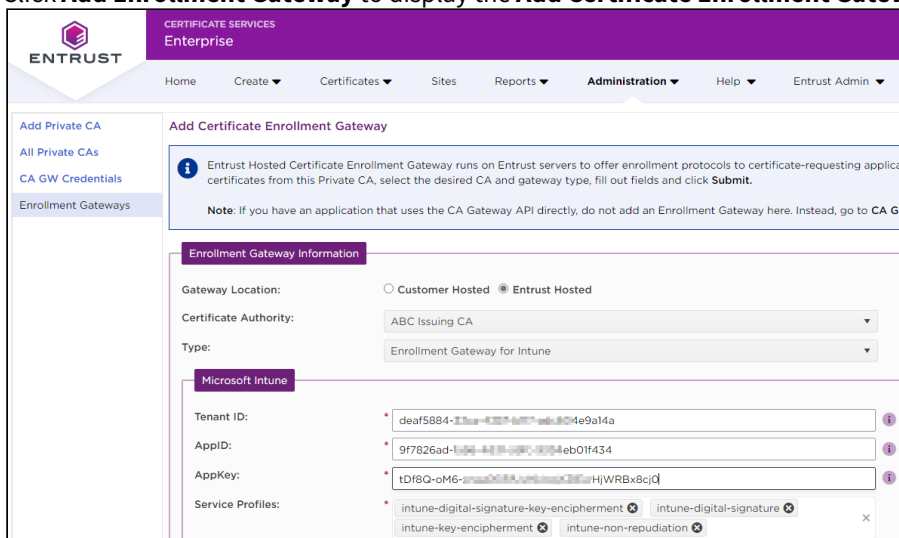
2. In the menu bar, select **Administration > PKIaaS Management**.
3. In the navigation sidebar, click **Enrollment Gateways** to display the Certificate Enrollment Gateway list.



The screenshot shows the 'Enrollment Gateways' list in the Entrust Certificate Services Enterprise portal. The list contains three entries, all of which are 'Enrollment Gateway for Intune' and are associated with different Certificate Authorities (ABC Issuing CA, Tim's Issuing CA, and Tim's Issuing CA).

Actions	Type	Certificate Authority
<input type="checkbox"/>	Enrollment Gateway for Intune	ABC Issuing CA
<input type="checkbox"/>	Enrollment Gateway for Intune	Tim's Issuing CA
<input type="checkbox"/>	Enrollment Gateway for Intune	Tim's Issuing CA

4. Click **Add Enrollment Gateway** to display the **Add Certificate Enrollment Gateway** page.



The screenshot shows the 'Add Certificate Enrollment Gateway' page in the Entrust Certificate Services Enterprise portal. The page includes a note about the Entrust Hosted Certificate Enrollment Gateway and a form for configuring the gateway. The form is set to 'Entrust Hosted' and includes fields for Certificate Authority, Type, and various Intune settings.

**Enrollment Gateway Information**

Gateway Location:  Customer Hosted  Entrust Hosted

Certificate Authority: ABC Issuing CA

Type: Enrollment Gateway for Intune

**Microsoft Intune**

Tenant ID: deaf5884-173a-4227-b077-6b004e9a14a

AppID: 9f7826ad-1a99-4489-9094-4eb01f434

AppKey: tDf8G-oM6-3m2a004A-4m2m2x3HjWRBx8cjQ

Service Profiles: intune-digital-signature-key-encipherment, intune-digital-signature, intune-key-encipherment, intune-non-repudiation

5. Configure the following settings.

- [Certificate Enrollment Gateway Information](#)
  - [Microsoft Intune](#)
6. Click **Submit**.
  7. Click **OK** in the **Add Enrollment Gateway Confirmation** dialog and wait while the Entrust Certificate Services provision the new Certificate Enrollment Gateway.
  8. Click **OK** on the **Enrollment Gateway Request Submitted** dialog.

## Certificate Enrollment Gateway Information

Add the following settings on the **Certificate Enrollment Gateway Information** section of the **Add Certificate Enrollment Gateway** page.

Setting	Value
Gateway Location	Select <b>Entrust Hosted</b> .
Certificate Authority	Select the Certificate Authority described in <a href="#">Configuring an Entrust PKIaaS issuing CA for Intune</a> .
Type	Select <b>Enrollment Gateway for Intune</b> .

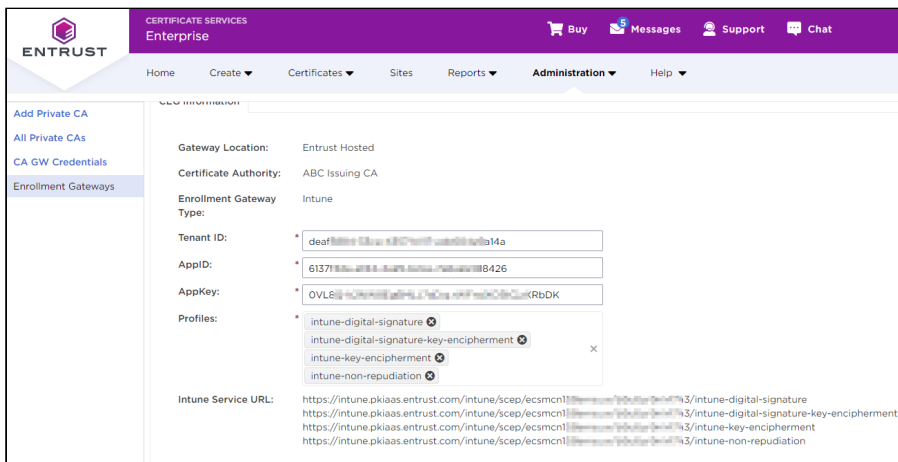
## Microsoft Intune

Add the following settings on the **Microsoft Intune** section of the **Add Certificate Enrollment Gateway** page.

Setting	Value
Tenant ID	Paste the <b>Directory (tenant) ID</b> value previously obtained when <a href="#">Creating an Intune application in Azure</a> .
AppID	Paste the <b>Application (client) ID</b> value previously obtained when <a href="#">Creating an Intune application in Azure</a> .
AppKey	Paste the secret value previously obtained when <a href="#">Creating an Intune application in Azure</a> .
Service Profiles	Select the desired Intune profiles.

## Getting the Intune Service URL

After [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#), click on the name of the new Certificate Enrollment Gateway.



On the **CEG Information** page, copy the **Intune Service URL** value to use later when [Configuring Intune profiles in Azure](#). The syntax of these URLs is the following.

### US region

```
https://intune.pkiaas.entrust.com/intune/scep/{accountId}/{caId}/{profileId}
```

### EU region

```
https://intune.eu.pkiaas.entrust.com/intune/scep/{accountId}/{caId}/{profileId}
```

Where:

- `{accountId}` is your account identifier.
- `{caId}` is the Certification Authority identifier.
- `{profileId}` is one of the profiles described in [Intune certificate profiles](#).

## Configuring Intune profiles in Azure

In the Microsoft Azure portal, create and configure the required profiles to automate Intune enrollment with an Entrust-hosted Enrollment Gateway.

- [Creating Intune profiles for Windows in Azure](#)
- [Creating Intune profiles for Android in Azure](#)
- [Creating Intune profiles for MacOS in Azure](#)
- [Creating Intune profiles for iOS and iPadOS in Azure](#)

See the following Microsoft guides for more details on Azure profile management.

- <https://learn.microsoft.com/en-us/mem/intune/protect/certificates-trusted-root>
- <https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep>
- <https://learn.microsoft.com/en-us/troubleshoot/mem/intune/certificates/troubleshoot-scep-certificate-profiles>

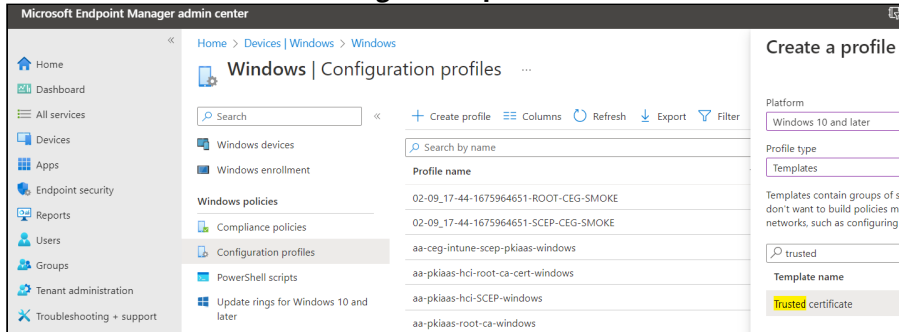
## Creating Intune profiles for Windows in Azure

Create the following profiles for enrolling Microsoft Windows devices with Intune.

- A root CA profile
- An issuing CA profile
- A SCEP profile

### To create a Windows profile for Intune

1. Log into [endpoint.microsoft.com](https://endpoint.microsoft.com) as a user with administrative privileges.
2. Go to **Devices > Windows > Configuration profiles**.



3. Click **Create profile**.
4. Configure the values described in the following sections.
  - [Create a profile](#)
  - [Basics](#)
  - [Configuration settings](#)
  - [Assignments](#)
  - [Applicability Rules](#)
  - [Review and create](#)

### Create a profile

In the **Create a profile** dialog, select the following values for each Windows profile.

Setting	root CA profile	issuing CA profile	SCEP profile
Platform	Windows 10 and later	Windows 10 and later	Windows 10 and later
Profile type	Templates	Templates	Templates
Template name	Trusted certificate	Trusted certificate	SCEP certificate

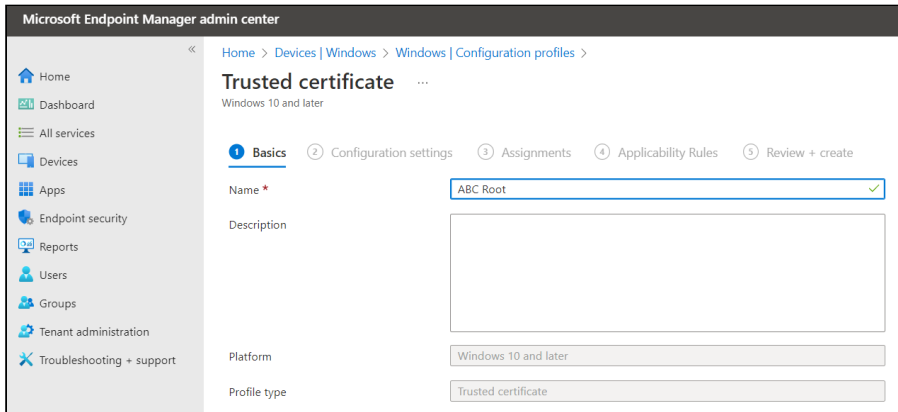
### Basics

In the **Name** field of the **Basics** page, type the name of the profile – for example:

- ABC Root
- ABC Issuing
- ABC Digital Signature SCEP Cert

Optionally, add a description of the profile purpose.





## Configuration settings

When creating a root or issuing CA profile for Windows, configure the following settings on the **Configuration settings** page.

Setting	Root CA profile	Issuing CA profile
Certificate file	The root Certification Authority certificate	The issuing Certification Authority certificate
Destination store	Computer certificate store - Root	Computer certificate store - Intermediate

 See [Downloading a CA certificate](#) to download CA certificates.

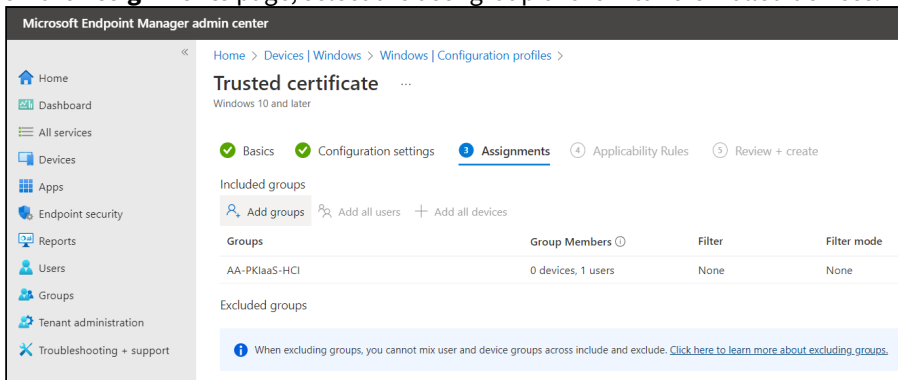
When creating a SCEP profile for Windows, configure the following settings on the **Configuration settings** page.

Setting	Value
Certificate type	Select <b>User</b> .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in <a href="https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep">https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep</a>
Subject alternative name	The value of each attribute in the certificate subject alternative name. Optional.
Certificate validity period	The validity period of the certificates.
Key storage provider (KSP)	Select <b>Enroll to Software KSP</b> for Windows 10 Intune enrollments; select any of the listed values for Windows 11.

Setting	Value
Key usage	The key usage of the enrolled certificates.
Key size (bits)	Select <b>2048</b> (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select <b>SHA-2</b> .
Root certificate	Select the root CA profile
Extended key usage	Select <b>Client Authentication</b> .
SCEP Server URLs	Paste one of the URLs obtained when <a href="#">Getting the Intune Service URL</a> .

## Assignments

On the **Assignments** page, select the user group of the Intune-enrolled devices.



Microsoft Endpoint Manager admin center

Home > Devices | Windows > Windows | Configuration profiles >

**Trusted certificate** ...  
Windows 10 and later

Basics Configuration settings **Assignments** Applicability Rules Review + create

Included groups  
Add groups Add all users Add all devices

Groups	Group Members	Filter	Filter mode
AA-PKIaaS-HCI	0 devices, 1 users	None	None

Excluded groups

When excluding groups, you cannot mix user and device groups across include and exclude. [Click here to learn more about excluding groups.](#)

## Applicability Rules

On the **Applicability Rules** page, select optional filters for the selected group – for example, the operating system of the devices.

## Review and create

On the **Review + create** page, check the settings of the new profile and click **Create** to confirm the profile creation.

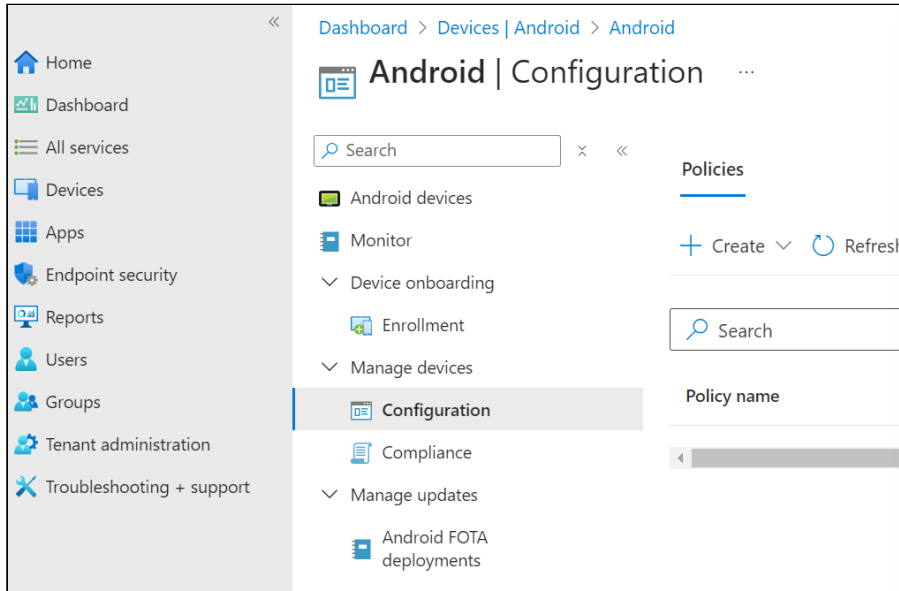
## Creating Intune profiles for Android in Azure

Create the following profiles for enrolling Android devices with Intune.

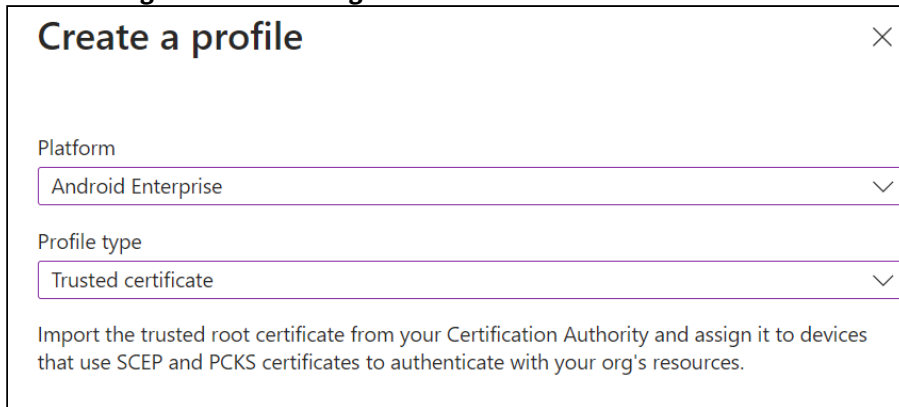
- A root CA profile
- An issuing CA profile
- A SCEP profile

### To create an Android profile for Intune

1. Log into [endpoint.microsoft.com](https://endpoint.microsoft.com) as a user with administrative privileges.
2. Go to **Devices > Android**.



3. Select **Manage devices > Configuration** and click **Create**.



4. In the **Create a profile** dialog, configure the settings described in the following sections.
  - [Create a profile](#)
  - [Basics](#)
  - [Configuration settings](#)
  - [Assignments](#)
  - [Review and create](#)

### Create a profile

In the **Create a profile** dialog, select the following fields for each Android profile.

Setting	Root CA profile	Issuing CA profile	SCEP profile
Platform	Android Enterprise	Android Enterprise	Android Enterprise

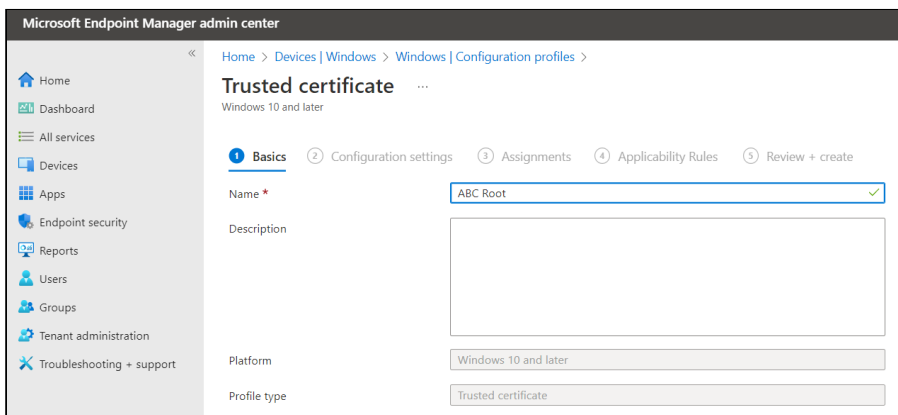
Setting	Root CA profile	Issuing CA profile	SCEP profile
Profile type	Trusted certificate	Trusted certificate	SCEP certificate

## Basics

In the **Name** field of the **Basics** page, type the name of the profile – for example:

- ABC Root
- ABC Issuing
- ABC Digital Signature SCEP Cert

Optionally, add a description of the profile purpose.



The screenshot shows the 'Microsoft Endpoint Manager admin center' interface. The breadcrumb path is 'Home > Devices | Windows > Windows | Configuration profiles > Trusted certificate'. The page title is 'Trusted certificate' for 'Windows 10 and later'. There are five tabs: 'Basics' (selected), 'Configuration settings', 'Assignments', 'Applicability Rules', and 'Review + create'. The 'Basics' tab contains the following fields: 'Name \*' with the value 'ABC Root', 'Description' (empty text area), 'Platform' with the value 'Windows 10 and later', and 'Profile type' with the value 'Trusted certificate'.

## Configuration settings

When creating root or issuing CA profiles, configure the following settings on the **Configuration settings** page.

Setting	Root CA profile	Issuing CA profile
Certificate file	The root Certification Authority certificate	The issuing Certification Authority certificate

 See [Downloading a CA certificate](#) to download CA certificates.

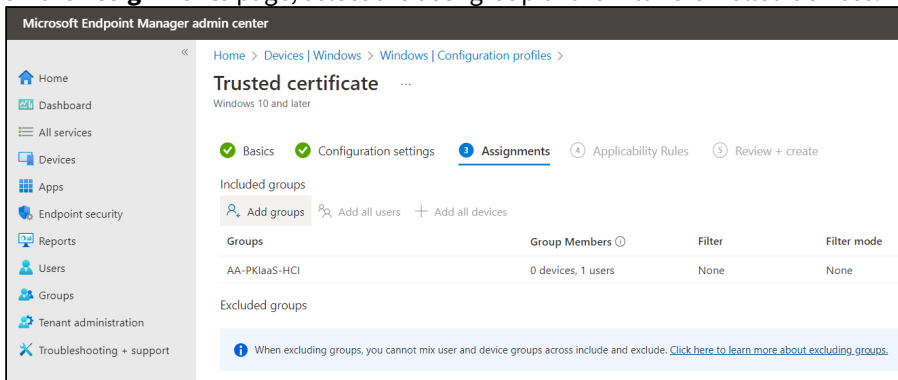
When creating a SCEP profile for Android, configure the following settings on the **Configuration settings** page.

Setting	Value
Certificate type	Select <b>User</b> .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in <a href="https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep">https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep</a>

Setting	Value
Subject alternative name	The value of each attribute in the certificate subject alternative name. Optional.
Certificate validity period	The validity period of the certificates.
Key usage	The key usage of the enrolled certificates.
Key size (bits)	Select <b>2048</b> or <b>4096</b> (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select <b>SHA-2</b> .
Root certificate	Select the root CA profile
Extended key usage	Select <b>Client Authentication</b> .
SCEP Server URLs	Paste one of the URLs obtained when <a href="#">Getting the Intune Service URL</a> .

## Assignments

On the **Assignments** page, select the user group of the Intune-enrolled devices.



The screenshot shows the Microsoft Endpoint Manager admin center interface. The breadcrumb trail is: Home > Devices | Windows > Windows | Configuration profiles >. The main heading is 'Trusted certificate' with a sub-heading 'Windows 10 and later'. There are five tabs: Basics (checked), Configuration settings (checked), Assignments (active), Applicability Rules, and Review + create. Under 'Included groups', there is a search bar and two buttons: 'Add groups' and 'Add all users'. Below this is a table with the following data:

Groups	Group Members	Filter	Filter mode
AA-PKIaaS-HCI	0 devices, 1 users	None	None

Under 'Excluded groups', there is a blue information box that says: 'When excluding groups, you cannot mix user and device groups across include and exclude. [Click here to learn more about excluding groups.](#)'

## Review and create

On the **Review + create** page, check the settings of the new profile and click **Create** to confirm the profile creation.

## Creating Intune profiles for MacOS in Azure

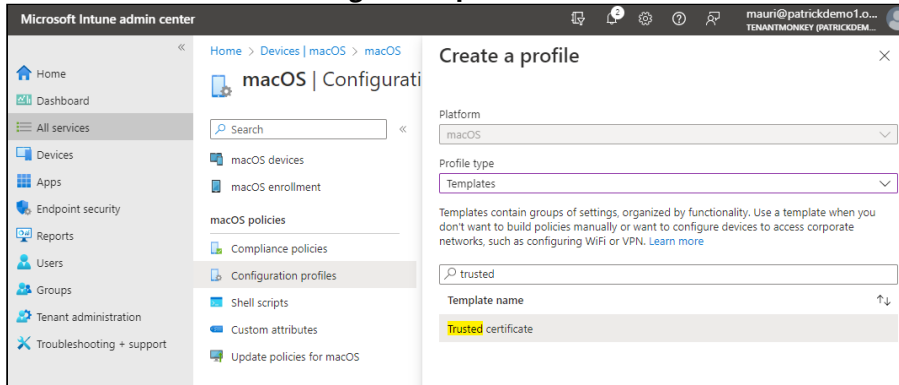
Create the following profiles for enrolling MacOS devices with Intune.

- A root CA profile

- An issuing CA profile
- A SCEP profile

### To create MacOS profile for Intune

1. Log into [endpoint.microsoft.com](https://endpoint.microsoft.com) as a user with administrative privileges.
2. Go to **Devices > MacOS > Configuration profiles**.



3. Click **Create profile**.
4. Configure the settings described in the following sections.
  - [Create a profile](#)
  - [Configuration settings](#)
  - [Assignments](#)
  - [Review and create](#)

### Create a profile

On the **Create a profile** dialog, select the following fields for the SCEP profile.

Setting	Root CA profile	Issuing CA profile	SCEP profile
Platform	MacOS Enterprise	MacOS Enterprise	MacOS Enterprise
Profile type	Templates	Templates	Templates
Template name	Trusted certificate	Trusted certificate	SCEP certificate

### Configuration settings

When creating root or issuing CA profiles, configure the following settings on the **Configuration settings** page.

Setting	Root CA profile	Issuing CA profile
Certificate file	The root Certification Authority certificate	The issuing Certification Authority certificate

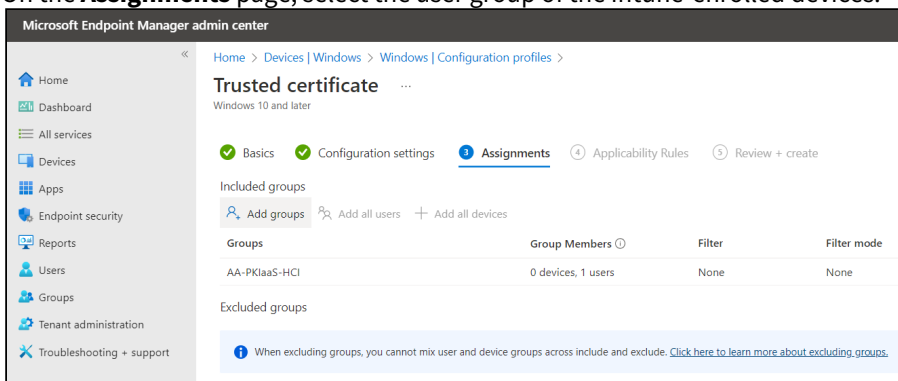
 See [Downloading a CA certificate](#) to download CA certificates.

When creating a SCEP profile, configure the following settings on the **Configuration settings** page.

Setting	Value
Certificate type	Select <b>User</b> .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in <a href="https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep">https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep</a>
Subject alternative name	The value of each attribute in the certificate subject alternative name. Optional.
Certificate validity period	The validity period of the certificates.
Key usage	The key usage of the enrolled certificates.
Key size (bits)	Select <b>2048</b> or <b>4096</b> (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select <b>SHA-2</b> .
Root certificate	Select the root CA profile.
Extended key usage	Select <b>Client Authentication</b> .
SCEP Server URLs	Paste one of the URLs obtained when <a href="#">Getting the Intune Service URL</a> .

## Assignments

On the **Assignments** page, select the user group of the Intune-enrolled devices.



The screenshot shows the Microsoft Endpoint Manager admin center interface. The breadcrumb path is: Home > Devices | Windows > Windows | Configuration profiles > Trusted certificate. The page title is "Trusted certificate" for Windows 10 and later. The "Assignments" tab is active, showing a table of included groups. The table has columns for "Groups", "Group Members", "Filter", and "Filter mode". One group is listed: "AA-PKIaaS-HCI" with 0 devices and 1 user. The filter is set to "None" and the filter mode is also "None". There are also "Add groups", "Add all users", and "Add all devices" options. A note at the bottom states: "When excluding groups, you cannot mix user and device groups across include and exclude. Click here to learn more about excluding groups."

## Review and create

On the **Review + create** page, check the settings of the new profile and click **Create** to confirm the profile creation.

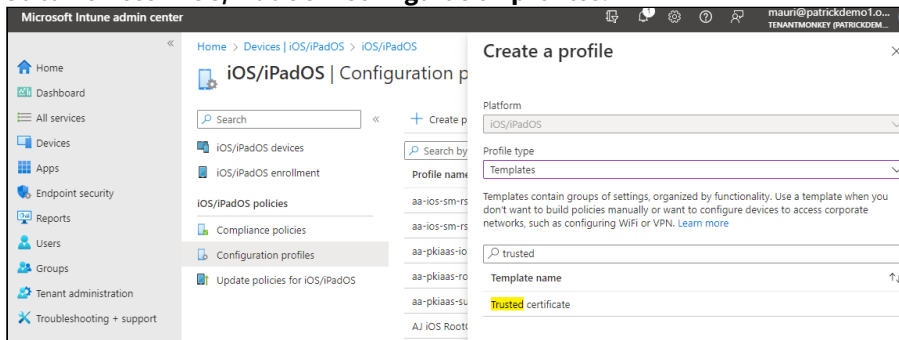
## Creating Intune profiles for iOS and iPadOS in Azure

Create the following profiles for enrolling iOS and iPadOS devices with Intune.

- A root CA profile
- An issuing CA profile
- A SCEP profile

### To create iOS/iPadOS profiles for Intune

1. Log into [endpoint.microsoft.com](https://endpoint.microsoft.com) as a user with administrative privileges.
2. Go to **Devices > iOS/iPadOS > Configuration profiles**.



3. Click **Create profile**.
4. Configure the settings described in the following sections.
  - [Create a profile](#)
  - [Configuration settings](#)
  - [Assignments](#)
  - [Review and create](#)

## Create a profile

On the **Create a profile** dialog, select the following fields for the SCEP profile.

Setting	Root CA profile	Issuing CA profile	SCEP profile
Platform	iOS/iPadOS	iOS/iPadOS	iOS/iPadOS
Profile type	Templates	Templates	Templates
Template name	Trusted certificate	Trusted certificate	SCEP certificate

## Configuration settings

When creating root or issuing CA profiles, configure the following settings on the **Configuration settings** page.



Setting	Root CA profile	Issuing CA profile
Certificate file	The root Certification Authority certificate	The issuing Certification Authority certificate

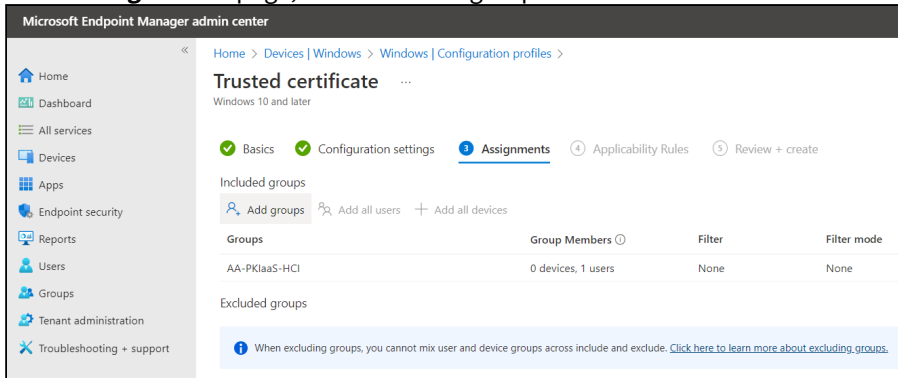
 See [Downloading a CA certificate](#) to download CA certificates.

When creating a SCEP profile, configure the following settings on the **Configuration settings** page.

Setting	Value
Certificate type	Select <b>User</b> .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in <a href="https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep">https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep</a>
Subject alternative name	The value of each attribute in the certificate subject alternative name. Optional.
Certificate validity period	The validity period of the certificates.
Key usage	The key usage of the enrolled certificates.
Key size (bits)	Select <b>2048</b> or <b>4096</b> (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select <b>SHA-2</b> .
Root certificate	Select the root CA profile.
Extended key usage	Select <b>Client Authentication</b> .
SCEP Server URLs	Paste one of the URLs obtained when <a href="#">Getting the Intune Service URL</a> .

## Assignments

On the **Assignments** page, select the user group of the Intune-enrolled devices.



## Review and create

On the **Review + create** page, check the settings of the new profile and click **Create** to confirm the profile creation.

## Enrolling user devices with the Intune Company Portal

When completing the Intune integration steps, download and install the Intune Company Portal to enroll your device.

- [Enrolling Windows devices with the Intune Company Portal](#)
- [Enrolling Android devices with the Intune Company Portal](#)
- [Enrolling iOS devices with the Intune Company Portal](#)
- [Enrolling MacOS devices with the Intune Company Portal](#)

For more details, check the Microsoft Intune documentation at [learn.microsoft.com/en-us/mem/intune/user-help](https://learn.microsoft.com/en-us/mem/intune/user-help)

## Enrolling Windows devices with the Intune Company Portal

Install the Intune Company Portal application to enroll your Windows device with Intune.

### To enroll a Windows device with Intune

1. Download the Intune Company Portal app from the Microsoft Store:  
<https://apps.microsoft.com/store/detail/company-portal/9WZDNCRFJ3PZ>
2. Log into the application with your Microsoft user credentials.
3. Follow the application instructions to enroll your device with Intune.
4. In the **Windows Settings** panel of your device, go to **User accounts > Sync your settings**.
5. Enable the device synchronization.

## Enrolling Android devices with the Intune Company Portal

Install the Intune Company Portal application to enroll your Android device with Intune.

### To enroll an Android device with Intune

1. Download the Intune Company Portal app from the Google Play Store:  
<https://play.google.com/store/apps/details?id=com.microsoft.windowsintune.companyportal>
2. Log into the application with your Microsoft user credentials.
3. Follow the application instructions to enroll your device with Intune.

4. Wait while the installation process adds the application to:
  - The **Personal** workspace.
  - The **Work** workspace.

## Enrolling iOS devices with the Intune Company Portal

Install the Intune Company Portal mobile application to enroll your iOS device with Intune.

### To enroll an iOS device with Intune

1. Download the Intune Company Portal application from the App Store:  
<https://apps.apple.com/us/app/intune-company-portal/id719171358>
2. Log into the application with your Microsoft user credentials.
3. Follow the application instructions to enroll your device and install the Certificate Management Profile.

## Enrolling MacOS devices with the Intune Company Portal

Enroll your MacOS device with the Intune Company Portal application as explained in the following guide.

<https://learn.microsoft.com/en-us/mem/intune/user-help/enroll-your-device-in-intune-macos-cp>

## Renewing enrolled certificates

When close to expiring, the Microsoft Intune protocol automatically renews certificates on Windows and Android devices. However, as reported in the Microsoft documentation, the iOS, iPadOS, and macOS devices have the following issue.

*Renewal behavior on iOS/iPadOS and macOS: Certificates can only be renewed during the renewal threshold phase. In addition, the device has to be unlocked while synching with Intune. If the renewal was not successful, the expired certificate will remain on the device and Intune does not trigger a renewal anymore. Also, Intune does not offer an option to redeploy expired certificates. Affected devices need to be excluded from the SCEP profile temporarily to remove the expired certificate and request a new one.*

 See <https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep> for details on this issue.


Therefore, to renew certificates on iOS, iPad, and macOS devices, you must:

1. Deselect the device on the Intune Company Portal application.
2. Reenroll the device on the Intune Company Portal.

## Revoking and removing certificates

Please refer to the Microsoft Intune documentation for the scenarios on which to remove or revoke certificates.

<https://learn.microsoft.com/en-us/mem/intune/protect/remove-certificates>

 PKIaaS Intune Integration supports SCEP certificates only. PKCS #10 and other PKCS certificates are not supported.

With a periodicity of 24 hours, PKIaaS invokes the Microsoft Intune API to:

1. Fetch the list of certificates that need to be revoked.
2. Revoke all certificates in the list.

3. Update the status of each processed certificate.

## 9 Automating MDM enrollment with an Entrust-hosted Enrollment Gateway

Configure an Entrust-hosted Enrollment Gateway to operate as SCEP Server and process MDM (Mobile Device Management) enrollment requests with PKIaaS Certification Authorities.

- [MDM integration requirements](#)
- [Configuring MDM automation in Entrust Certificate Services](#)
- [Configuring MDM automation in Ivanti Neurons MDM](#)
- [Configuring MDM automation in Jamf](#)
- [Configuring MDM automation in VMware Workspace ONE](#)

### MDM integration requirements

You must meet the following requirements to automate MDM enrollment with an Entrust-hosted Enrollment Gateway.

- [Entrust Certificate Services](#)
- [MDM providers](#)
- [Operating systems and devices](#)

### Entrust Certificate Services

You need an Entrust Certificate Services (ECS) Enterprise account with privileges to create an issuing Certification Authority.

### MDM providers

Enrollment integration is tested for this release with the following MDM providers.

- Jamf
- VMware Workspace One
- Ivanti

Other MDM vendors that leverage dynamic SCEP are not validated yet. Please get in touch with customer support if you run into any issues during integration.

**⚠** Static SCEP is not a secure protocol for a cloud service; therefore, PKIaaS does not support static-only solutions like Google Endpoint Management and Chromebook OS. See [Automating enrollment with an on-premises Enrollment Gateway](#) for how to connect these solutions with a generic SCEP server.

### Operating systems and devices

Enrollment integration for this release is tested and validated with the following devices and operating systems.

Provider	iPad	iPhone	MacOS	Windows	Android	ChromeOS
Jamf	16.6	16.6	Ventura 13.5.1	Not supported	Not supported	Not supported

Provider	iPad	iPhone	MacOS	Windows	Android	ChromeOS
Workspace ONE	16.6	16.6	Ventura 13.5.1	10 and 11	13	Not supported
Ivanti Neurons	17.5.1	17.5.1	Ventura 13.5.1	10	14	Not supported

Other devices and operating systems listed in the MDM vendor support documents should work but have not been tested.


## Configuring MDM automation in Entrust Certificate Services

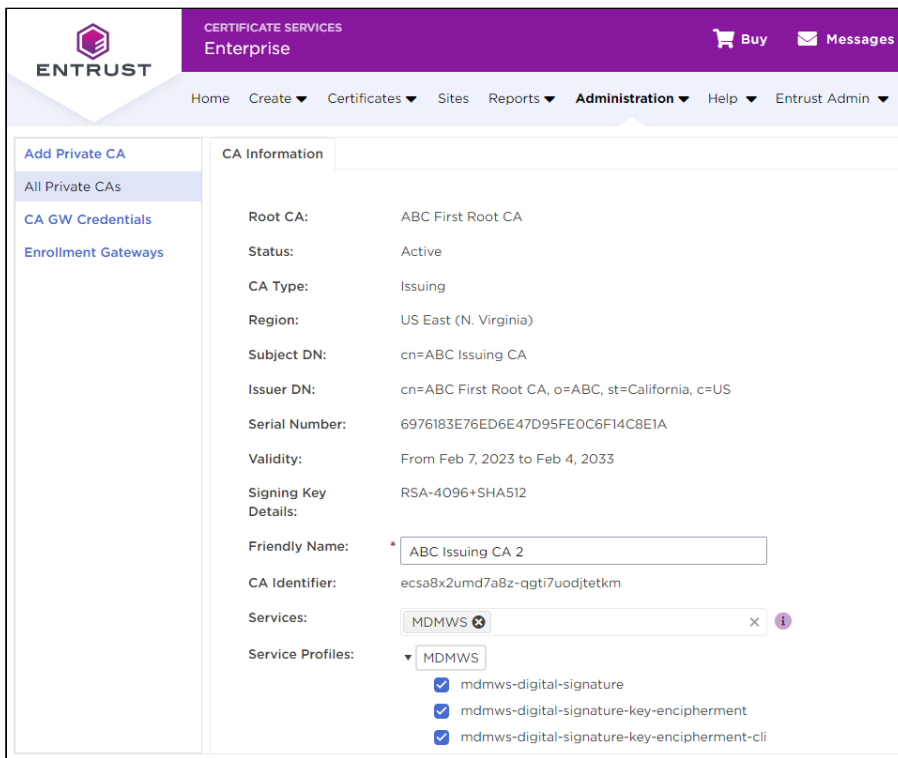
Configure an Entrust-hosted Enrollment Gateway for MDM enrollment.

- [Configuring an Entrust PKIaaS issuing CA for MDM](#)
- [Downloading the Entrust PKIaaS root CA certificate for MDM](#)
- [Configuring an Entrust-hosted Certificate Enrollment Gateway for MDM](#)
- [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#)
- [Getting Certificate Enrollment Gateway settings for MDM](#)

### Configuring an Entrust PKIaaS issuing CA for MDM

On the Entrust Certificate Services Enterprise portal, add the **MDMWS** service profile to either a new or an existing issuing CA.

 See [Creating an issuing CA under an online root CA](#) for how to create issuing CAs.



The screenshot shows the 'CA Information' page for 'ABC Issuing CA 2' in the Entrust Certificate Services Enterprise portal. The page includes a navigation menu with options like Home, Create, Certificates, Sites, Reports, Administration, Help, and Entrust Admin. The main content area displays the following details:

- Root CA:** ABC First Root CA
- Status:** Active
- CA Type:** Issuing
- Region:** US East (N. Virginia)
- Subject DN:** cn=ABC Issuing CA
- Issuer DN:** cn=ABC First Root CA, o=ABC, st=California, c=US
- Serial Number:** 6976183E76ED6E47D95FE0C6F14C8E1A
- Validity:** From Feb 7, 2023 to Feb 4, 2033
- Signing Key Details:** RSA-4096+SHA512
- Friendly Name:** ABC Issuing CA 2
- CA Identifier:** ecsa8x2umd7a8z-qgti7uodjtetkm
- Services:** MDMWS
- Service Profiles:** MDMWS
  - mdmws-digital-signature
  - mdmws-digital-signature-key-encipherment
  - mdmws-digital-signature-key-encipherment-cli

## Downloading the Entrust PKIaaS root CA certificate for MDM

After [Configuring an Entrust PKIaaS issuing CA for MDM](#), download the certificates of the root and issuing CAs. You will need these certificates when:

- [Configuring MDM automation in Ivanti Neurons MDM](#)
- [Configuring MDM automation in Jamf](#)
- [Configuring MDM automation in VMware Workspace ONE](#)

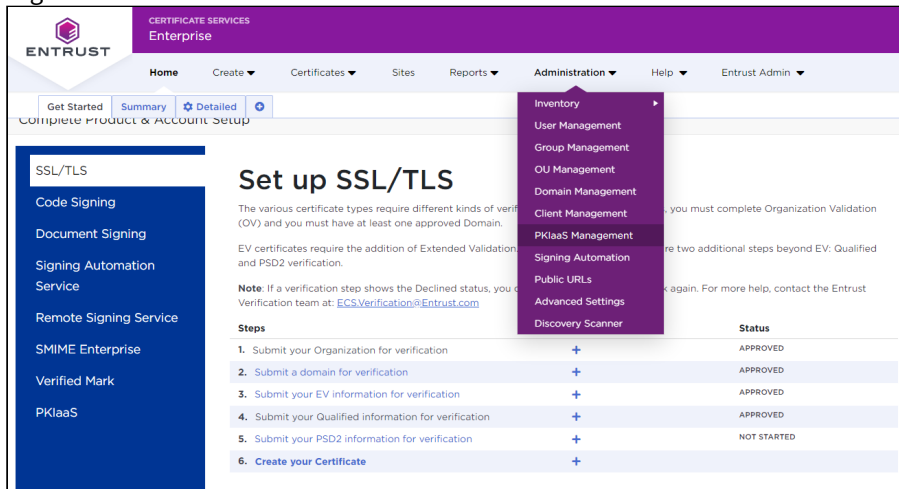
 See [Downloading a CA certificate](#) to download CA certificates from the Entrust Certificate Services Enterprise portal.

## Configuring an Entrust-hosted Certificate Enrollment Gateway for MDM

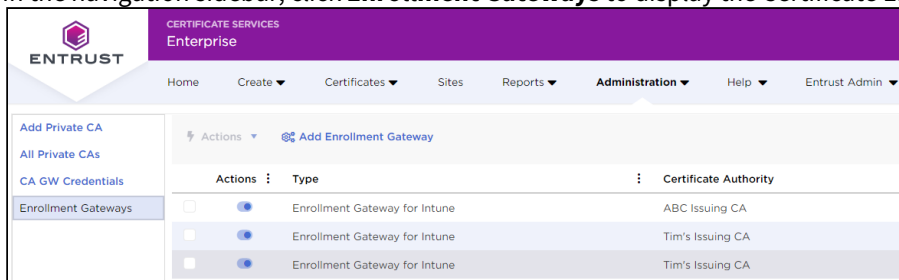
On the Entrust Certificate Services portal, add and configure a Certificate Enrollment Gateway instance to process MDM requests.

### To configure Entrust Certificate Enrollment Gateway for MDM

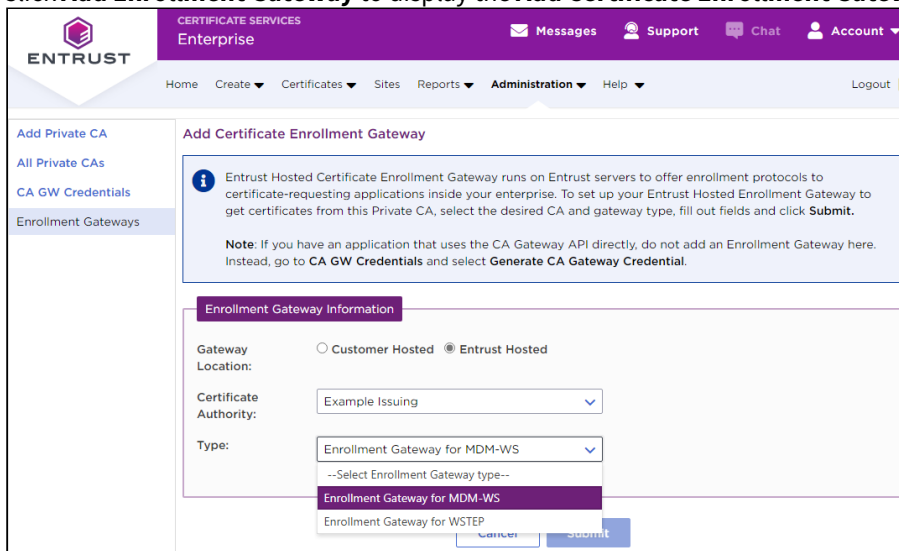
1. Log into [cloud.entrust.net](https://cloud.entrust.net)



- In the menu bar, select **Administration > PKIaaS Management**.
- In the navigation sidebar, click **Enrollment Gateways** to display the Certificate Enrollment Gateway list.



4. Click **Add Enrollment Gateway** to display the **Add Certificate Enrollment Gateway** page.

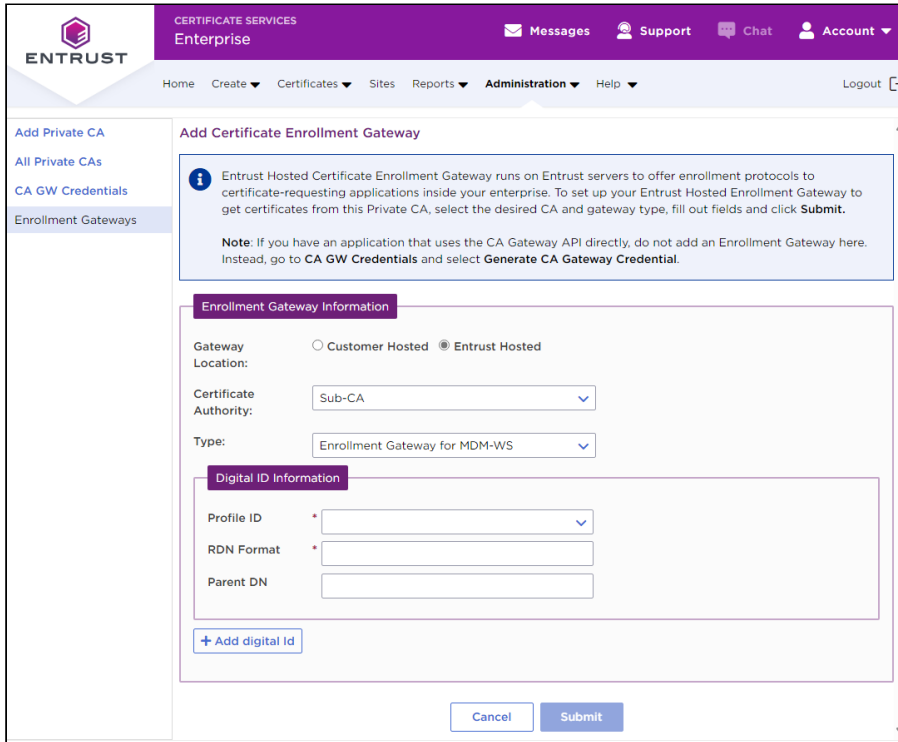


- Configure the following settings under **Enrollment Gateway Information**.
  - Gateway Location:** select **Entrust Hosted**.
  - Certificate Authority:** select the Certificate Authority described in [Configuring an Entrust PKIaaS issuing CA for MDM](#).
  - Type:** select **Enrollment Gateway for MDM-WS**.
- Add one or more digital identities as explained in [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#).



## Adding digital identifiers to a Certificate Enrollment Gateway for MDM

After [Configuring an Entrust-hosted Certificate Enrollment Gateway for MDM](#), complete the gateway configuration with at least one digital identifier.



### To add digital identifiers to an enrollment gateway

1. Configure the following settings under **Digital ID Information**.
  - [Profile ID](#)
  - [RDN Format](#)
  - [Parent DN](#)
2. Click **Add digital Id** to configure more digital identifiers.
3. Click **Submit**.
4. Click **OK** in the **Add Enrollment Gateway Confirmation** dialog and wait while the Entrust Certificate Services provision the new Certificate Enrollment Gateway.
5. Click **OK** on the **Enrollment Gateway Request Submitted** dialog.

### Profile ID

Select a profile of the CA previously selected when [Configuring an Entrust-hosted Certificate Enrollment Gateway for MDM](#).

### RDN Format

The Relative Distinguished Name (RDN) format to build certificate Subject Names.

- [Adding custom variables](#)
- [Configuring the profileid variable for automated renewal](#)
- [Adding Jamf preloaded variables](#)

### Adding custom variables

Subject Names support custom variable names using the `<variable>` syntax – for example:

```
CN=<var1> <var2> <var3> SampleStaticText
```

See [RDN Variables](#) for how to set the value of each variable in the Jamf portal.

✘ Entrust PKIaaS will only process enrollment requests containing values for all variables.

### Configuring the profileid variable for automated renewal

Add the `idprofile` variable to support automated certificate renewal – for example:

```
CN=<var1> <profileid>
```

See [RDN Variables](#) for how to set the value of this variable in the Jamf portal.

### Adding Jamf preloaded variables

Jamf enrollment requests will always contain values for the following RDN variables. You don't need to inform them in the Jamf portal.

Variable	Value
igusername	The name of the device user.
iggroup	The group of enrolled devices.
devicetype	The type of enrolled device.

For example:

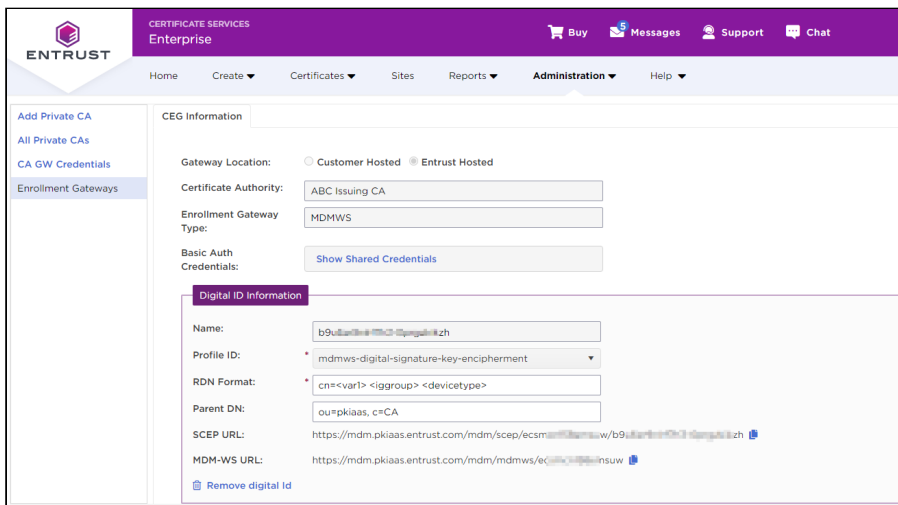
```
CN=<igusername> <iggroup> <devicetype>
```

### Parent DN

The parent Distinguished Name (DN) for building the RDN of a certificate. Specifically, the selected value is appended to the end of the Subject DN after the RDN Format variables have been processed.

## Getting Certificate Enrollment Gateway settings for MDM

After [Configuring an Entrust-hosted Certificate Enrollment Gateway for MDM](#), click on the name of the Certificate Enrollment Gateway to display the **CEG Information** page.



Copy the following values to use later when [Configuring MDM automation in Jamf](#).

- [Basic Auth Credentials](#)
- [Digital ID Information / Name](#)
- [Digital ID Information / SCEP URL](#)
- [Digital ID Information / MDM-WS-URL](#)

### Basic Auth Credentials

Click **Show Shared Credentials** to copy the **UserID** and the **Password**.

### Digital ID Information / Name

Copy your digital configuration name.

### Digital ID Information / SCEP URL

Copy the URL of the SCEP enrollment web service. This URL will have one of the following formats:

#### SCEP URL format for the US region

```
https://mdm.pkiaas.entrust.com/mdm/scep/{accountId}/{name}
```

#### SCEP URL format for the EU region

```
https://mdm.eu.pkiaas.entrust.com/mdm/scep/{accountId}/{name}
```

Where `{accountId}` is your account identifier and `{name}` is your digital configuration name.

### Digital ID Information / MDM-WS-URL

Copy the URL of the MDM enrollment web service. This URL will have one of the following formats:

**MDM-WS URL format for the US region**

```
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV11
```

**MDM-WS URL format for the EU region**

```
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV11
```

Where `{accountId}` is your account identifier.

For compatibility, the following MDM-WS URL formats are supported.

**Legacy MDM-WS URL formats for the US region**

```
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV8
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV9
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV11
```

**Legacy MDM-WS URL formats for the EU region**

```
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV8
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV9
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV11
```

## Configuring MDM automation in Ivanti Neurons MDM

When using Ivanti Neurons for MDM as a provider, the enrollment automation:

- Supports the PKI protocol for Entrust MDMWS PKCS #12 enrollment.
- Does not yet support the Simple Certificate Enrollment Protocol (SCEP). MobileIron Cloud is addressing the limitations in its SCEP implementation to ensure full support for all profiles.

See below the [MDMWS certificate profiles](#) currently supported by each protocol.

Profile	PKI	SCEP
mdmws-digital-signature	✘	✘
mdmws-digital-signature-key-encipherment	✘	✘

Profile	PKI	SCEP
mdmws-digital-signature-key-encipherment-clientauth	✗	✗
mdmws-key-encipherment	✗	✗
mdmws-non-repudiation	✗	✗
mdmws-p12-digital-signature	✓	✗
mdmws-p12-digital-signature-key-encipherment	✓	✗
mdmws-p12-digital-signature-key-encipherment-clientauth	✓	✗
mdmws-p12-key-encipherment	✓	✗
mdmws-p12-non-repudiation	✓	✗

Follow the steps below to automate MDM enrollment in MobileIron.

- [Adding Entrust as issuing certificate authority in Ivanti Neurons MDM](#)
- [Adding the PKIaaS issuing and root CA certificates in Ivanti Neurons MDM](#)
- [Adding an identity certificate in Ivanti Neurons MDM](#)

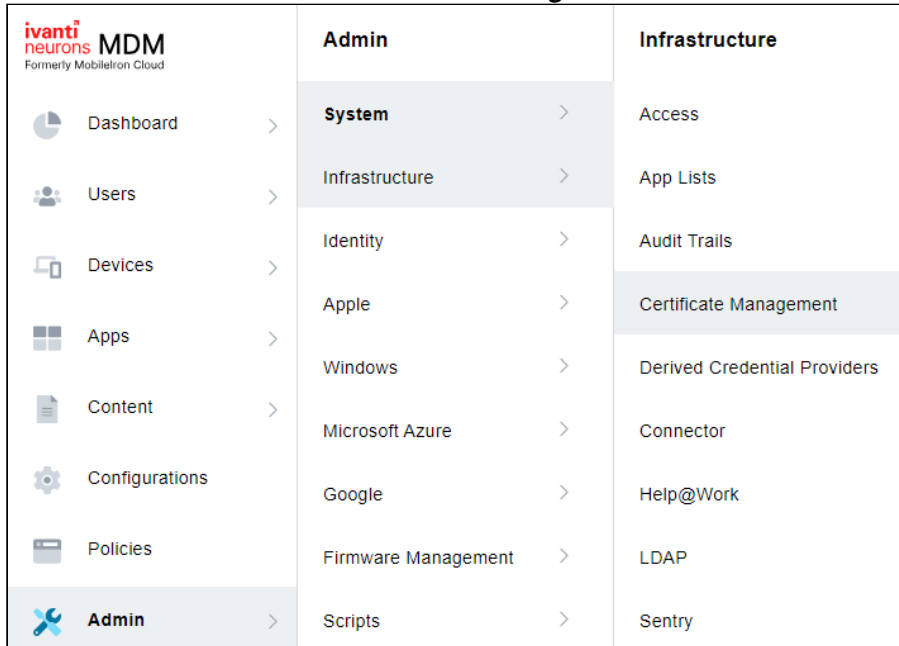
## Adding Entrust as issuing certificate authority in Ivanti Neurons MDM

Add and configure Entrust as an issuing certificate authority in Ivanti Neurons to automate MDM enrollment.

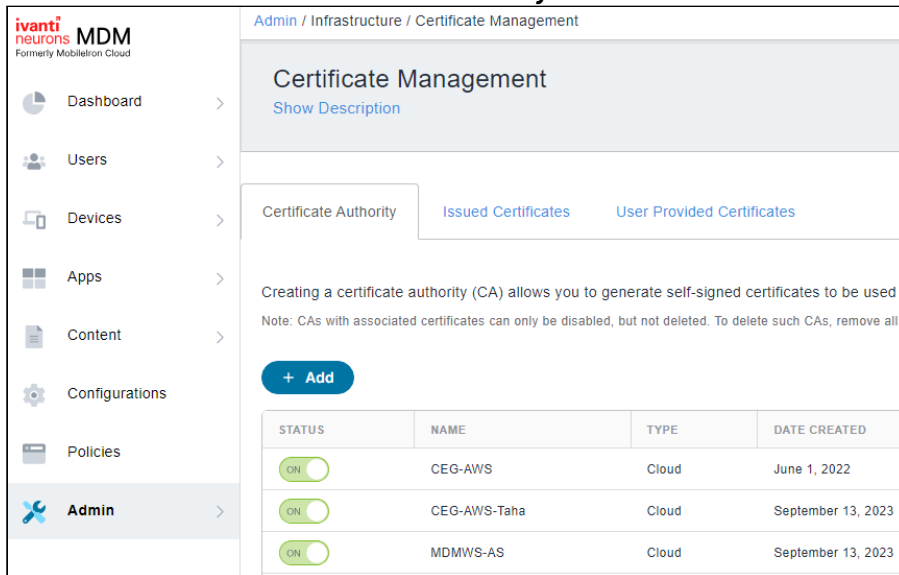
### To add Entrust as issuing certificate authority in Ivanti Neurons

1. Log into the Ivanti Neurons portal.

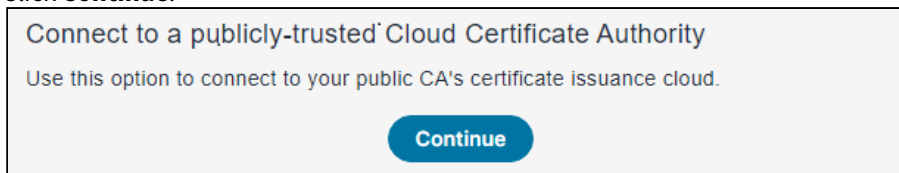
2. Go to **Admin > Infrastructure > Certificate Management**.



3. Click the **Add** button of the **Certificate Authority** tab.



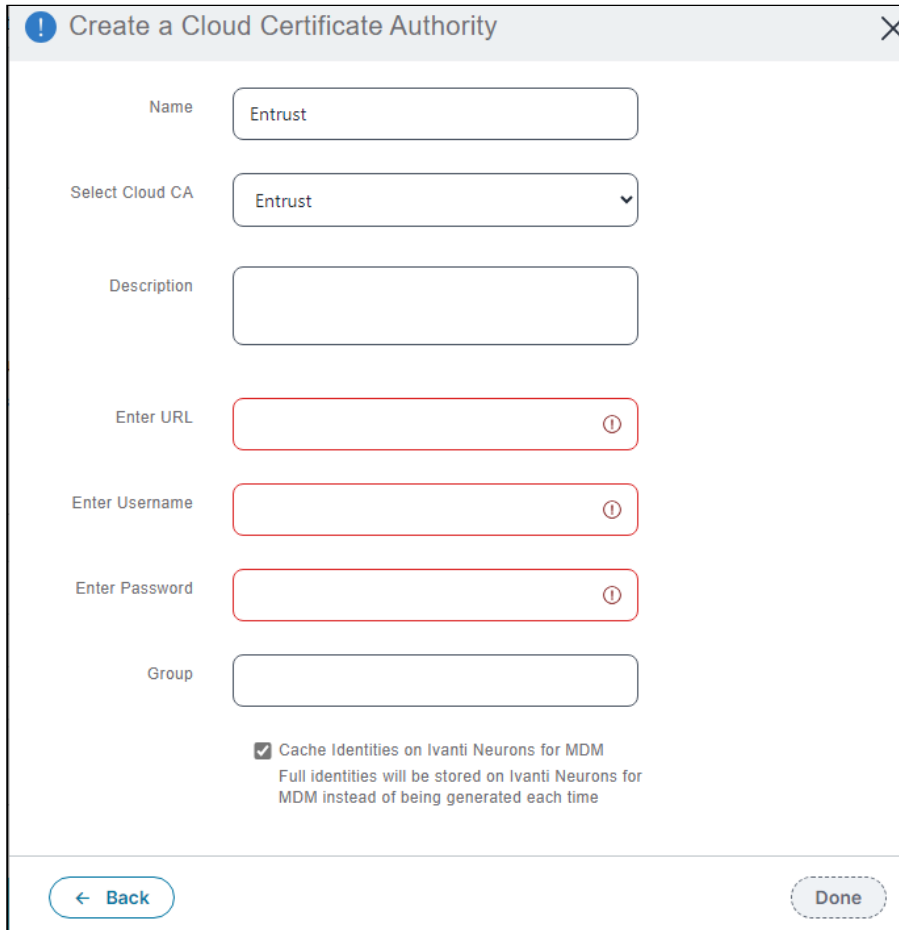
4. Click **Continue**.



5. Configure the following settings.

- Name
- Select Cloud CA
- Description
- Enter URL

- [Enter Username](#)
- [Enter Password](#)
- [Group](#)
- [Cache Identities on Ivanti Neurons for MDM](#)



**Create a Cloud Certificate Authority**

Name: Entrust

Select Cloud CA: Entrust

Description:

Enter URL: [Red border]

Enter Username: [Red border]

Enter Password: [Red border]

Group:

Cache Identities on Ivanti Neurons for MDM  
Full identities will be stored on Ivanti Neurons for MDM instead of being generated each time

← Back Done

### Name

Enter a friendly name used for Entrust CA within Ivanti Neurons MDM.

**Mandatory:** Yes.

### Select Cloud CA

Select **Entrust**.

**Mandatory:** Yes.

### Description

Add an optional description for the Entrust CA.

**Mandatory:** No

### Enter URL

Paste the **MDM-WS URL** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

### Enter Username

Paste the **UserID** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

### Enter Password

Paste the **Password** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

### Group

Skip this field, as groups are not evaluated for certificate authorities.

### Cache Identities on Ivanti Neurons for MDM

Keep this option enabled. Disabling this option will result in certificates being regenerated each time they are needed.

## Adding the PKIaaS issuing and root CA certificates in Ivanti Neurons MDM

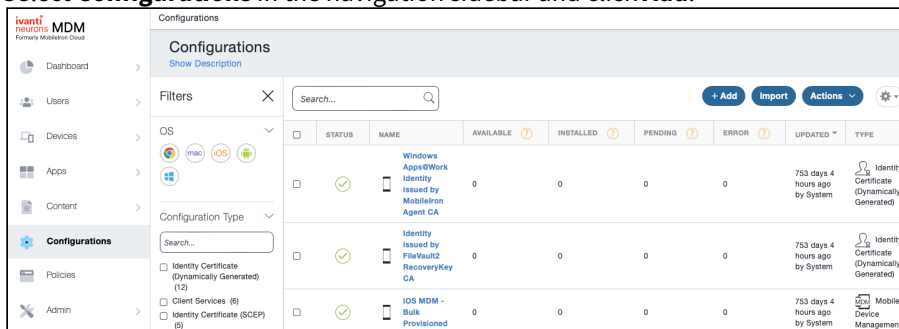
Repeat the steps below to add the certificates of the following certificate authorities.

- The issuing CA described in [Configuring an Entrust PKIaaS issuing CA for MDM](#).
- The root CA of this issuing CA.

 See [Downloading a CA certificate](#) for how to download both certificates.

### To add a CA certificate in Ivanti Neurons MDM

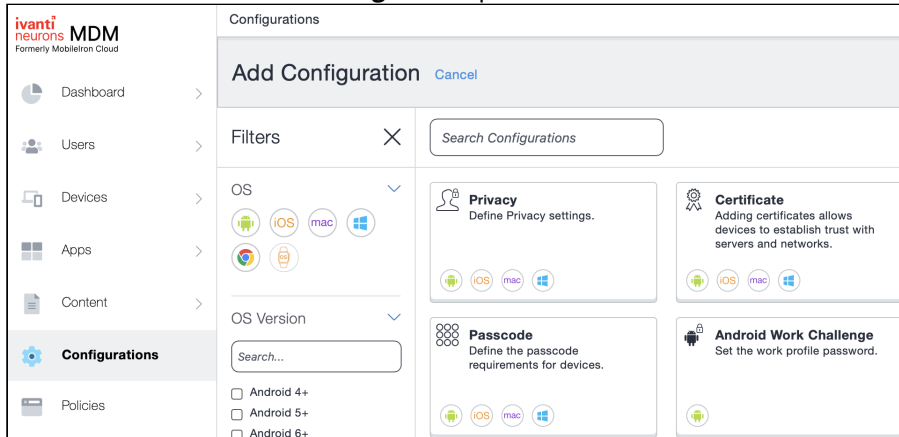
1. Log into the Ivanti Neurons portal.
2. Select **Configurations** in the navigation sidebar and click **Add**.



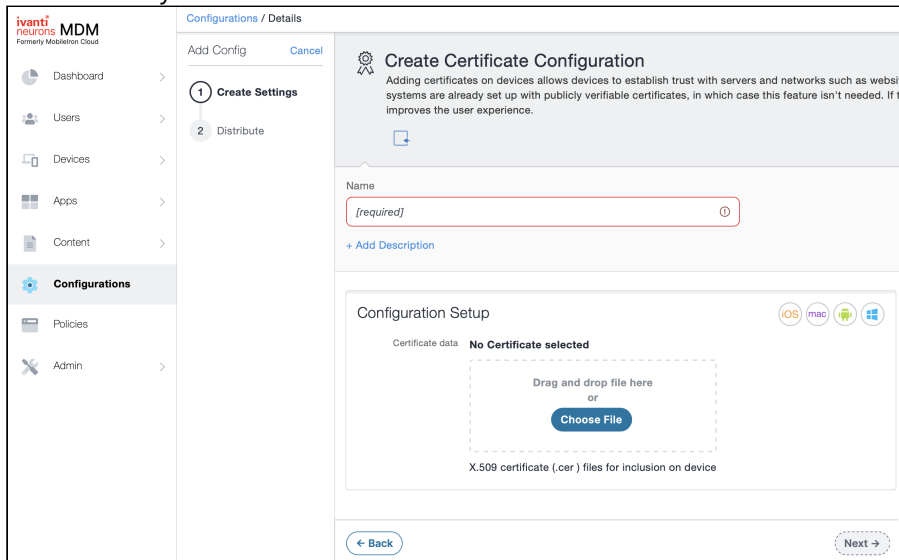
STATUS	NAME	AVAILABLE	INSTALLED	PENDING	ERROR	UPDATED	TYPE
<input checked="" type="checkbox"/>	Windows Apps@Work Identity Issued by MobileIron Agent CA	0	0	0	0	753 days 4 hours ago by System	Identity Certificate (Dynamically Generated)
<input checked="" type="checkbox"/>	Identity Issued by FileVault2 RecoveryKey CA	0	0	0	0	753 days 4 hours ago by System	Identity Certificate (Dynamically Generated)
<input checked="" type="checkbox"/>	iOS MDM - Bulk Provisioned	0	0	0	0	753 days 4 hours ago by System	Mobile Device Management



3. Click **Certificate** in the Add **Configuration** pane.

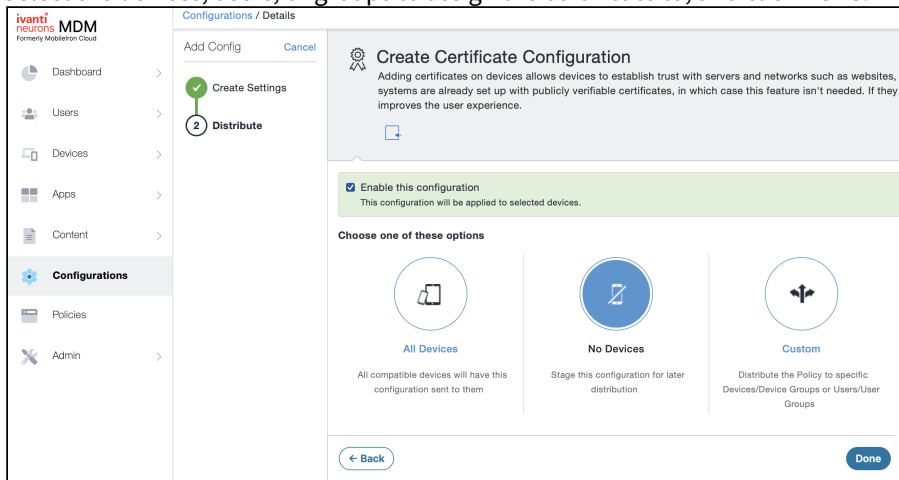


4. Enter a friendly name for the CA certificate in the **Name** field.



5. Click **Choose file** under **Configuration Setup**, import the certificate file, and click **Next**.

6. Select the devices, users, or groups to assign the certificate to, and click **Done**.

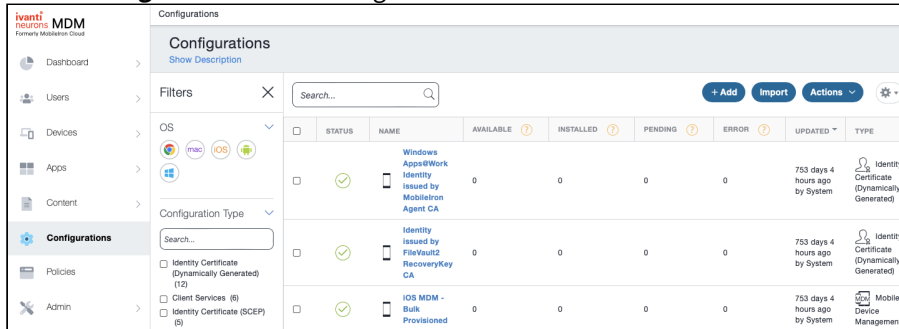


## Adding an identity certificate in Ivanti Neurons MDM

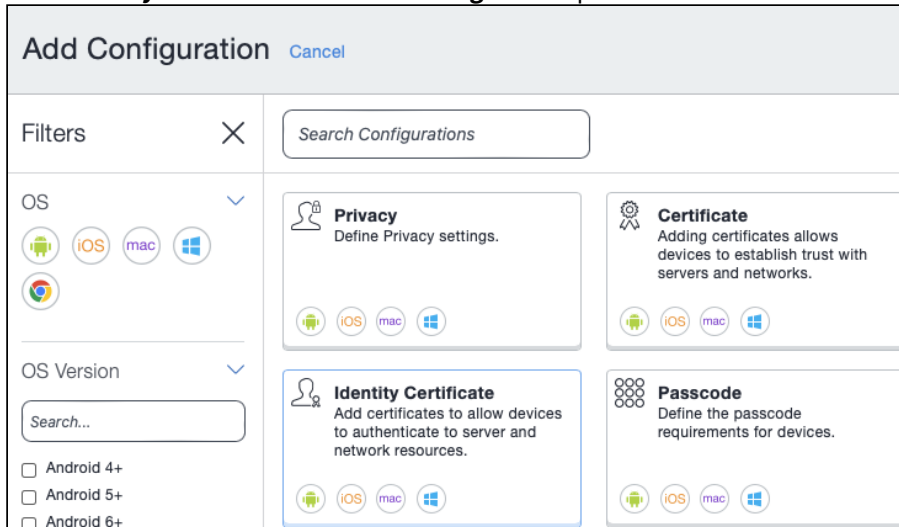
Add an identity certificate in Ivanti Neurons to automate MDM enrollment.

### To add an identity certificate in Ivanti Neurons

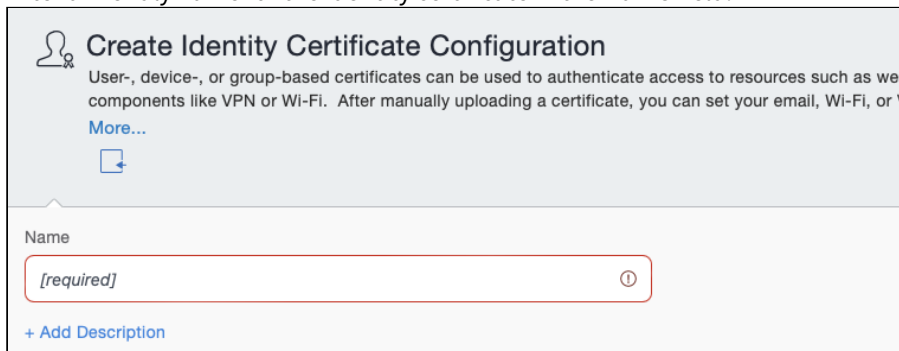
1. Log into the Ivanti Neurons portal.
2. Select **Configurations** in the navigation sidebar and click **Add**.



3. Click **Identity certificate** in the **Add Configuration** pane.







4. Enter a friendly name for the identity certificate in the **Name** field.



5. Select the following values under **Configuration Setup**.
  - [Certificate Distribution](#)
  - [Source](#)
  - [Profile ID](#)
  - [Profile description](#)

- Application description
- Subject Alternate Name Type
- Subject Alternative Name Value
- Target Certificate Store

**Configuration Setup** 





Certificate Distribution

**Dynamically Generated**

Source:

Profile ID:

Profile description:

Application description:

Subject Alternate Name Type:  ⊗


The type of a subject alternative name

Subject Alternate Name Value

Allow All Apps to access Private Key

Create configuration without issuing test certificate

---

**Windows only** 

Target Certificate Store:  Device Certificate  User Certificate

## Certificate Distribution

Select **Dynamically Generated**.

**Mandatory:** Yes

## Source

Select the certificate authority described in [Adding Entrust as issuing certificate authority in Ivanti Neurons MDM](#).

**Mandatory:** Yes

## Profile ID

Select the **Profile ID** value of the digital identifier.

 See [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#) for details on digital identifiers.

**Mandatory:** Yes

### Profile description

Enter a description of the enrollment profile.

**Mandatory:** No

### Application description

Enter a description of the intended application for the identity certificate.

**Mandatory:** No

### Subject Alternate Name Type

Select a format for the Subject Alternative Name field in the enrolled certificates.

**Mandatory:** Select **None** if the enrolled certificates do not require a Subject Alternative Name field.

### Subject Alternative Name Value

Enter a value for the Subject Alternative Name field in the enrolled certificates.

**Mandatory:** When selecting a value other than **None** in **Subject Alternate Name Type**.

### Target Certificate Store

When enrolling Windows devices, select the store for installing the certificates.

Option	Certificate store
Device Certificate	The store of the local machine
User Certificate	The store of the current user

**Mandatory:** When enrolling certificates for Windows devices.

## Configuring MDM automation in Jamf

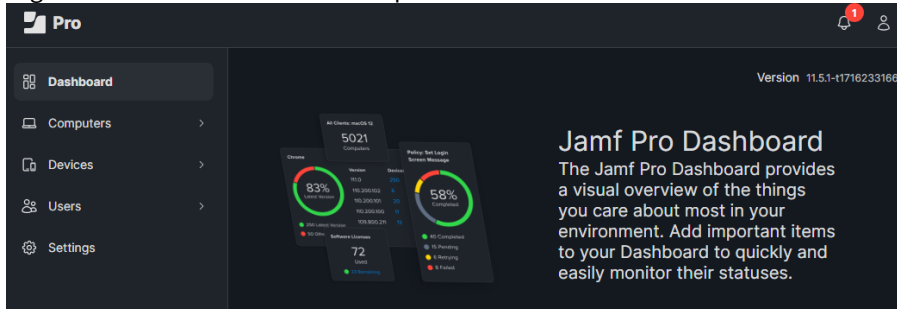
Jamf is a cloud service for managing Apple devices such as Mac, iPad, or iPhone. When enrolling these devices, the SCEP Payload must include the settings described in:

<https://support.apple.com/guide/deployment/scep-payload-settings-dep495a6d79/web>

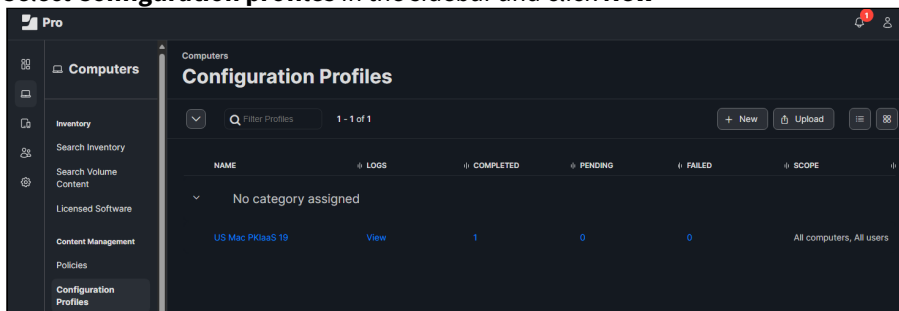
If using Jamf as MDM provider, configure and install a profile as described below.

**To configure and install a MDM profile in Jamf**

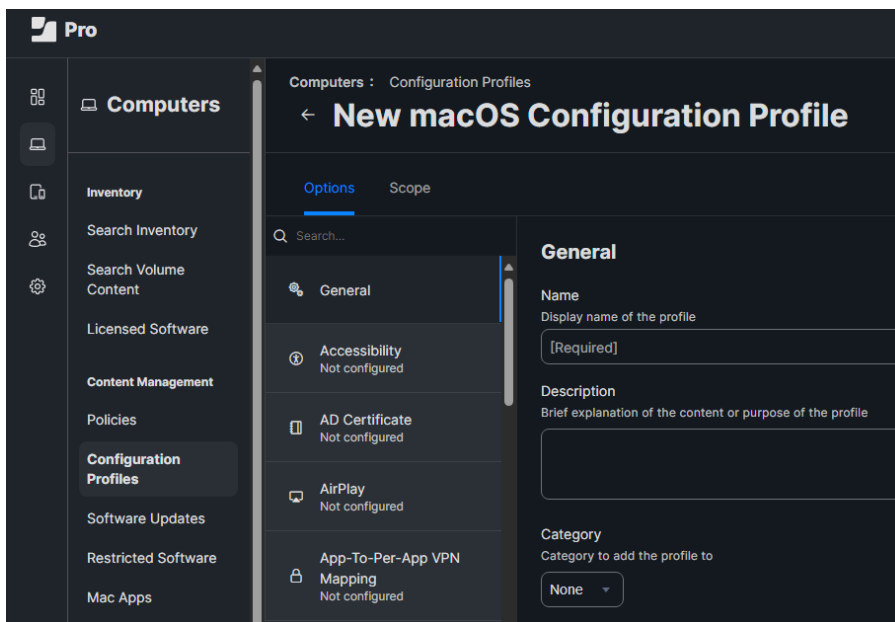
1. Login into the Jamf administration portal.



2. Select:
  - **Computers** to create a profile for enrolling Apple computers such as MacBooks.
  - **Devices** to create a profile for enrolling iPhones, iPads, etc.
3. Select **Configuration profiles** in the sidebar and click **New**



4. Configure the following settings in the **New macOS Configuration Profile** form.
  - [Options](#)
  - [Scope](#)



5. Click **Save**.
6. To enroll devices, users must login to Jamf and follow the prompts for enrollment.
  - Depending on how Jamf was configured, users may or may not be prompted to download and install CA Certificates.

- Users will be prompted to download and install a profile.
- Wait while the device is enrolled. Certificates will automatically be issued during enrollment.

## Options

Configure the following settings in the **Options** tab of the **New macOS Configuration Profile**.

- [General](#)
- [SCEP](#)
- [Certificate](#)

### General

Click **General** on the **Options** tab and configure the following settings.

Setting	Value	Mandatory
Name	Write a profile name to display on the device.	✓
Description	Write a description of the profile purpose.	✗
Category	Select a profile category.	✗
Level	Select <b>Device Level</b> .	✓
Distribution Method	Select <b>Install Automatically</b> .	✓

### Certificate

Click **Certificate** on the **Options** tab and configure the following settings.

Settings	Value	Mandatory
Certificate Name	Write a name for the certificate.	✓
Select certificate option	Click <b>Upload</b>	✓
Certificate	Upload the certificate file obtained when <a href="#">Downloading the Entrust PKIaaS root CA certificate for MDM</a> .	✓

### SCEP

Click **SCEP** on the **Options** tab and configure the following settings.

- [URL](#)

- Name
- Redistribute Profile
- Subject
- Subject Alternative Name Type
- Retries
- Retry delay
- Challenge type
- Entrust Web Service URL
- Administrator Username
- Administrator Password
- Verify Password
- Digital ID Configuration Name
- Group Name
- RDN Variables
- Key Size
- Use as digital signature
- Use for key encipherment
- Fingerprint

#### URL

Paste the **SCEP URL** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Name

Enter the name of the SCEP service to display on the device.

**Mandatory:** Yes.

#### Redistribute Profile

Select **Never**.

**Mandatory:** Yes.

#### Subject

Enter the Subject Distinguished Name to include in the Certificate Signing Requests (CSRs). The enrollment process will ignore this dummy value and use the digital identifier.

 See [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#) for details on digital identifiers.

**Mandatory:** Yes.

#### Subject Alternative Name Type

Select the type of Subject Alternative Name.

**Mandatory:** No.

#### Retries

Select the maximum number of retries after a PENDING response.

**Mandatory:** No.

#### Retry delay

Select the period between retries.

**Mandatory:** No.

#### Challenge type

Select **Dynamic Entrust**.

**Mandatory:** Yes.

#### Entrust Web Service URL

Paste the **MDM-WS-URL** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Administrator Username

Paste the **User ID** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Administrator Password

Paste the **Password** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Verify Password

Paste the **Password** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Digital ID Configuration Name

Paste the **Name** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

**Mandatory:** Yes.

#### Group Name

Enter a name for the group.

**Mandatory:** When the **RDN Format** of the digital identifier includes the `<iggroup>` variable. In this case, Jamf will automatically map this **Group Name** to the `<iggroup>` variable.



See [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#) for details on digital identifiers.

#### RDN Variables

Enter a value for each variable added to **RDN Format** in the Entrust Certificate Services.

- [Configuring the profileid variable for automated renewal](#)
- [Using Jamf payload variables](#)
- [Omitting Jamf preloaded variables](#)

**Mandatory:** Yes.



### Configuring the profileid variable for automated renewal

To support automated certificate renewal, add the following variable.

Variable name	Variable value
profileid	\$PROFILE_IDENTIFIER

Where `profileid` is the variable added to [RDN Format](#) in the Entrust Certificate Services.

### Using Jamf payload variables

RDN values support the following Jamf payload variables.

Variables	Jamf documentation
Payload Variables for Computer Configuration Profiles	<a href="https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Computer_Configuration_Profiles.html#ariaid-title2">https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Computer_Configuration_Profiles.html#ariaid-title2</a>
Payload Variables for Device Configuration Profiles	<a href="https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Mobile_Device_Configuration_Profiles.html#ariaid-title3">https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Mobile_Device_Configuration_Profiles.html#ariaid-title3</a>

### Omitting Jamf preloaded variables


Do not set the following variables, as Jamf requests always provide values for them.

Variable	Value
igusername	The name of the device user.
iggroup	The group of enrolled devices.
devicetype	The type of enrolled device.

### Key Size

Select one of the following values.

- 2048
- 4096

 Entrust PKIaaS does not support key sizes below 2048.

**Mandatory:** Yes.

Use as digital signature

Check to use the enrolled certificates for signing data.

**Mandatory:** No.

Use for key encipherment

Check to use the enrolled certificates for cipherring keys.

**Mandatory:** No.

Fingerprint

Paste the SHA-256 fingerprint (in hexadecimal format) of the whole root CA certificate in DER binary encoding (not in PEM). You can obtain this value from the certificate properties or run the following commands.

#### Windows

```
certutil -hashfile rootca.der SHA256
```

#### MacOS

```
openssl x509 -fingerprint -sha256 -noout -in rootca.crt | sed "s/[://g"
```

**Mandatory:** Yes. It is recommended to always configure this field when possible.

## Scope

Configure the following settings on the **Scope** tab of the **New macOS Configuration Profile**.

Setting	Value	Mandatory
Target Mobile Devices	Mobile devices to assign the profile to.	✓
Target Users	Users to distribute the profile to.	✓

## Configuring MDM automation in VMware Workspace ONE

When using VMware Workspace ONE as MDM provider, the enrollment automation supports the following protocols.

- The PKI protocol for Entrust MDMWS PKCS #12 enrollment.
- The Simple Certificate Enrollment Protocol (SCEP).

See below the [MDMWS certificate profiles](#) supported by each protocol.

Profile	PKI	SCEP
mdmws-digital-signature	✗	✓
mdmws-digital-signature-key-encipherment	✗	✓
mdmws-digital-signature-key-encipherment-clientauth	✗	✓
mdmws-key-encipherment	✗	✓
mdmws-non-repudiation	✗	✓
mdmws-p12-digital-signature	✓	✓
mdmws-p12-digital-signature-key-encipherment	✓	✓
mdmws-p12-digital-signature-key-encipherment-clientauth	✓	✓
mdmws-p12-key-encipherment	✓	✓
mdmws-p12-non-repudiation	✓	✓

See below for additional protocol differences.

	PKI	SCEP
Private key	Generated by the Entrust CA and delivered to Workspace One as a PKCS #12. Workspace One delivers the resulting private key and certificate to the managed device.	Generated along with the CSR by the managed device
Certificate information	Provided to the Entrust CA using the MDMWS API.	Contained within the CSR.

	PKI	SCEP
CSR challenge passwords	Not used.	<p>Workspace One:</p> <ol style="list-style-type: none"> <li>1. Requests challenge passwords from the MDMWS API of the Entrust CA.</li> <li>2. Provides the challenge password to the managed devices.</li> </ol> <p>The devices embed the challenge password into the CSR for SCEP enrollment.</p>
Enrollment request	Submitted by Workspace One.	Submitted by the managed devices to the SCEP endpoint of the Entrust CA. Optionally, you can use Workspace One as SCEP Proxy to perform SCEP against Workspace One instead of the Entrust CA.
Support status	Fully supported	<p>Temporarily broken because Workspace One:</p> <ul style="list-style-type: none"> <li>• Sends an incorrect SCEP URL to the managed devices</li> <li>• Ignores the custom variables of the <b>RDN Format</b> selected when <a href="#">Adding digital identifiers to a Certificate Enrollment Gateway for MDM</a>.</li> </ul> <p>We are working with Workspace One to fix this.</p>

Follow the steps below to automate MDM enrollment in VMware Workspace ONE.

- [Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE](#)
- [Adding a profile for trusted certificates in VMware Workspace ONE](#)
- [Adding a PKI profile for MDM automation in VMware Workspace ONE](#)
- [Adding a SCEP profile for MDM automation in VMware Workspace ONE](#)
- [Testing MDM automation in VMware Workspace ONE](#)

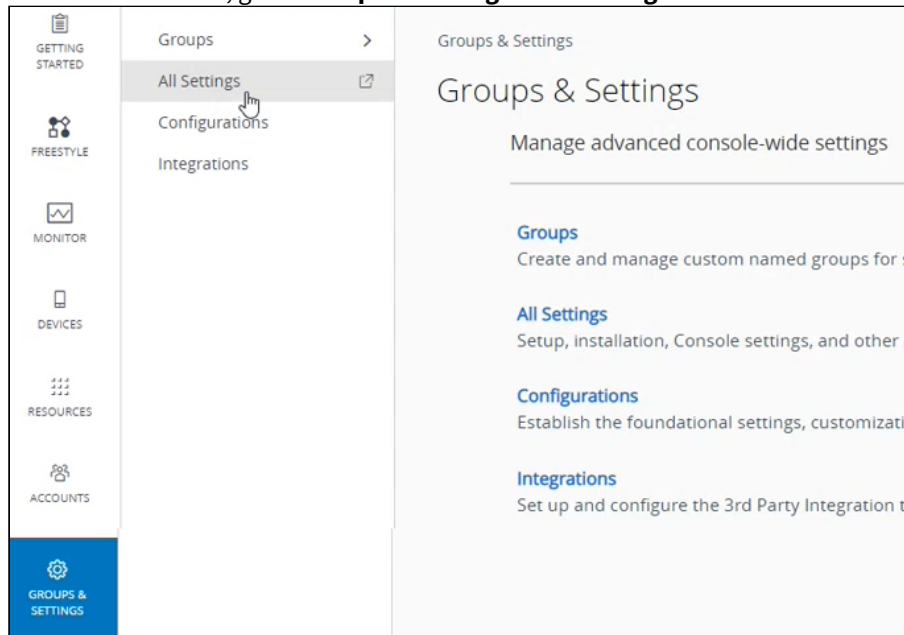
## Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE

Add a Certificate Authority and a request template for MDM automation in VMware Workspace ONE.

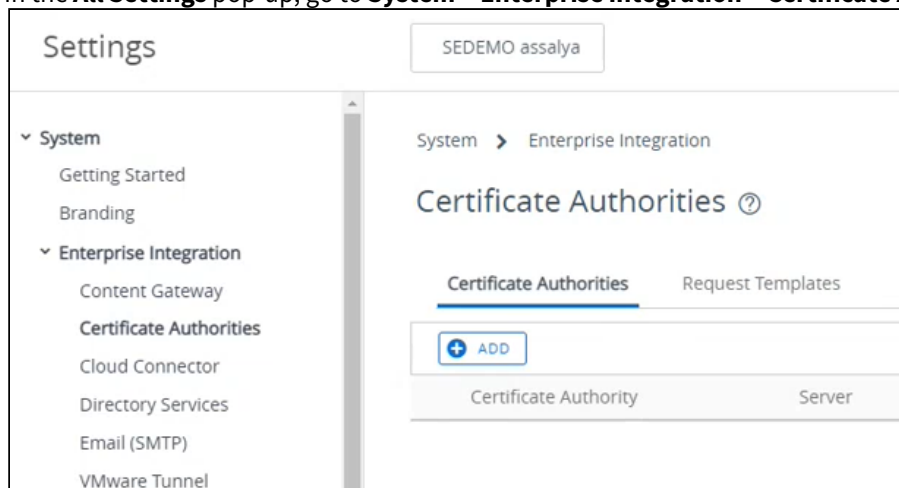
### To add a Certificate Authority and a request template

1. Log into your Workspace ONE UEM (Unified Endpoint Management).

- In the sidebar menu, go to **Groups & Settings > All Settings**.



- In the **All Settings** pop-up, go to **System > Enterprise integration > Certificate Authorities**.



- Configure the following settings.
  - [Certificate Authorities](#)
  - [Request Templates](#)

## Certificate Authorities

In the **Certificate Authorities** tab:

- Click **ADD**.
- Configure the following CA settings.
  - [Name](#)
  - [Description](#)
  - [Authority Type](#)
  - [Protocol](#)

- [Server URL](#)
- [Username](#)
- [Password](#)
- [SCEP Endpoint URL](#)

3. Click **TEST CONNECTION** to check the connection with the Entrust CA.
4. Click **SAVE** to save the new CA settings.

#### Name

Enter a name for the CA in the VMware environment.

#### Description

Enter an optional description for the CA in the VMware environment.

#### Authority Type

Select **Entrust**.

#### Protocol

Select the **SCEP** or **PKI** protocols described in [Configuring MDM automation in VMware Workspace ONE](#).

#### Server URL

Paste the **MDM-WS URL** value described in [Getting Certificate Enrollment Gateway settings for MDM](#). Specifically, use the following URL formats to support certificate revocation.

##### Supported URL format for the US region

```
https://mdm.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV9
```

##### Supported URL format for the EU region

```
https://mdm.eu.pkiaas.entrust.com/mdm/mdmws/{accountId}/AdminServiceV9
```

#### Username

Paste the **UserID** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

#### Password

Paste the **Password** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

#### SCEP Endpoint URL

When **Protocol** is **SCEP**, paste the **SCEP URL** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

#### Request Templates

In the **Request Templates** tab:

1. Click **ADD**
2. Configure a new template for the CA.
  - [Name](#)
  - [Description](#)
  - [Certificate Authority](#)
  - [Managed CA](#)
  - [Profile name](#)
  - [<field>](#)
3. Click **SAVE** to save the new template settings.

#### Name

Enter a name for the template in the VMware environment.

#### Description

Enter an optional description for the template in the VMware environment.

#### Certificate Authority

Select the name of the CA previously created in the **Certificate Authorities** tab.

#### Managed CA

Select the CA name described in [Getting Certificate Enrollment Gateway settings for MDM](#).

#### Profile name

Select the value of the **Digital ID Information / Name** value described in [Getting Certificate Enrollment Gateway settings for MDM](#).

#### <field>

Configure the **RDN Format** variables as explained in [Adding digital identifiers to a Certificate Enrollment Gateway for MDM](#). You can provide static text or click the **+** symbol and select a Workspace One variable.

Mandatory Field	Value Characters & = Not Allowed										
var1	{DevicePlatform} <input data-bbox="906 1355 933 1393" type="button" value="+"/>										
var2	{EmailAddress} <input data-bbox="906 1400 933 1438" type="button" value="+"/>										
<table border="1"> <tbody> <tr> <td>{EmailDomain}</td> <td>domain</td> </tr> <tr> <td>{EmailUserName}</td> <td>User Email Username</td> </tr> <tr style="background-color: #e0e0e0;"> <td>{EmailAddress}</td> <td>User Email Address</td> </tr> <tr> <td>{EnrollmentUser}</td> <td>Username</td> </tr> <tr> <td>{EnrollmentUserId}</td> <td>User ID</td> </tr> </tbody> </table>		{EmailDomain}	domain	{EmailUserName}	User Email Username	{EmailAddress}	User Email Address	{EnrollmentUser}	Username	{EnrollmentUserId}	User ID
{EmailDomain}	domain										
{EmailUserName}	User Email Username										
{EmailAddress}	User Email Address										
{EnrollmentUser}	Username										
{EnrollmentUserId}	User ID										

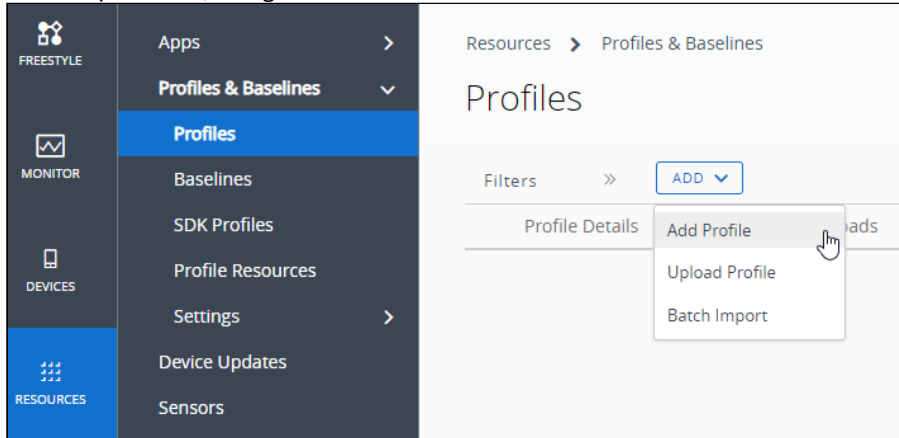
## Adding a profile for trusted certificates in VMware Workspace ONE

Profiles with the **User Profile** context do not support uploading certificates to the **Trusted Root** certificate store. Therefore, you must create a profile with the **Device Profile** context and the following settings.

**!** When creating a Workspace One profile with the **User Profile** context, assign them to the same **Smart Group**. This way, the devices managed by the user profile will trust the CA certificate chain of the device profile.

### To add a device profile in Workspace One

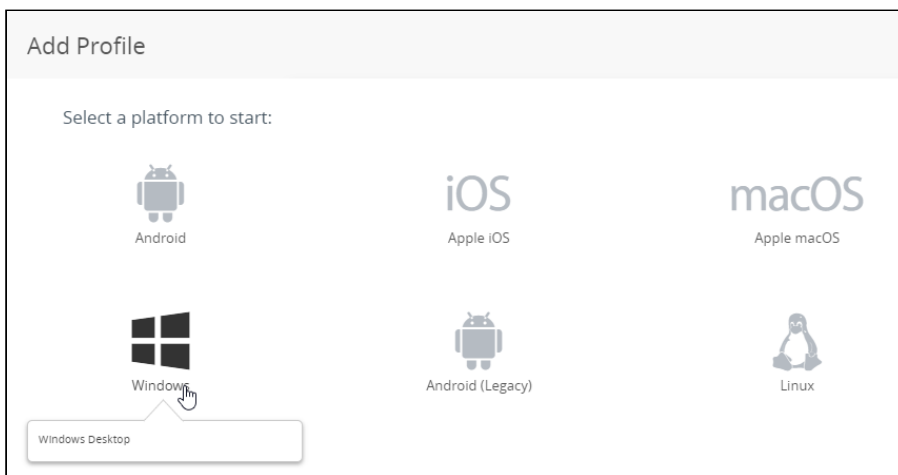
1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



2. In the content pane, click **Add > Add Profile**.
3. Follow the wizard pages described below.
  - [Add Profile](#)
  - [Select Device Type](#)
  - [Select Context](#)
  - [General](#)
  - [Credentials](#)

### Add Profile

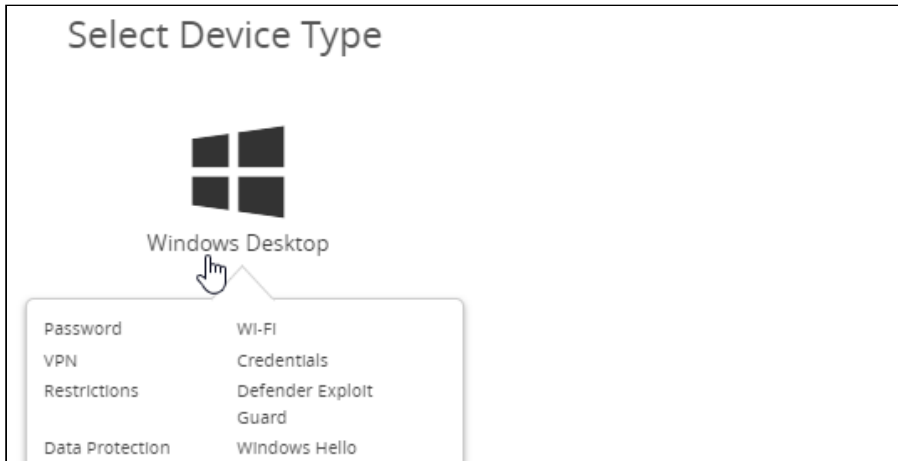
Click on the name of the platform running the enrollment device.



### Select Device Type

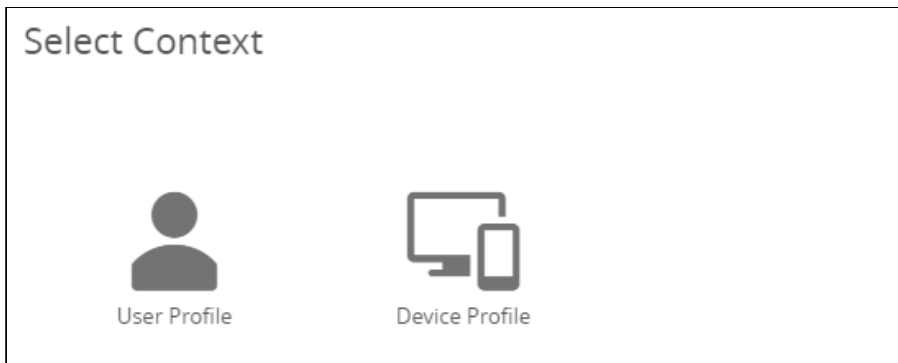
Click on the type of enrolled device.





### Select Context

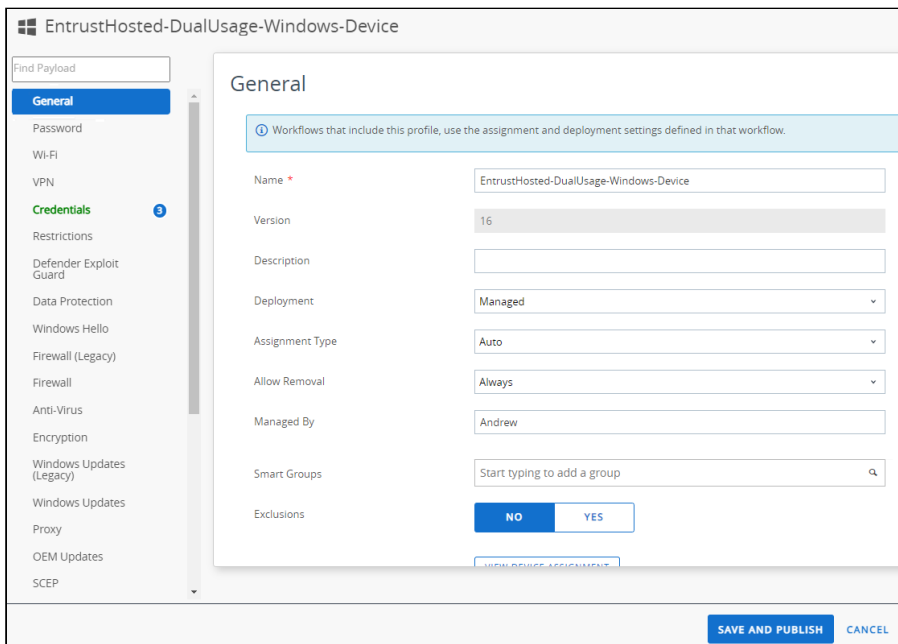
Click on **Device Profile** to enroll devices.



### General

Click **General** in the sidebar menu to configure the following settings in the content pane.

Field	Value
Name	Enter a name for the profile.
Smart Group	Select the smart group containing the managed users or devices.



## Credentials

Click **Credentials** in the sidebar menu to configure the user credentials.

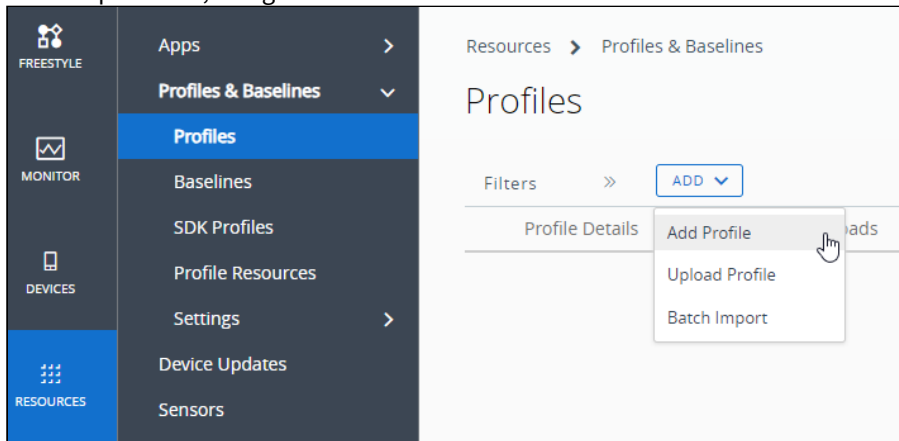
Field	Value
Credential Source	Select <b>Defined Certificate Authority</b> .
Certificate	Upload separately the certificates of the root and issuing CAs.
Certificate Store	Select <b>Trusted Root</b> .

## Adding a PKI profile for MDM automation in VMware Workspace ONE

See below for creating an MDM automation profile to issue certificates with the PKI protocol.

### To add a PKI profile in Workspace One

1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



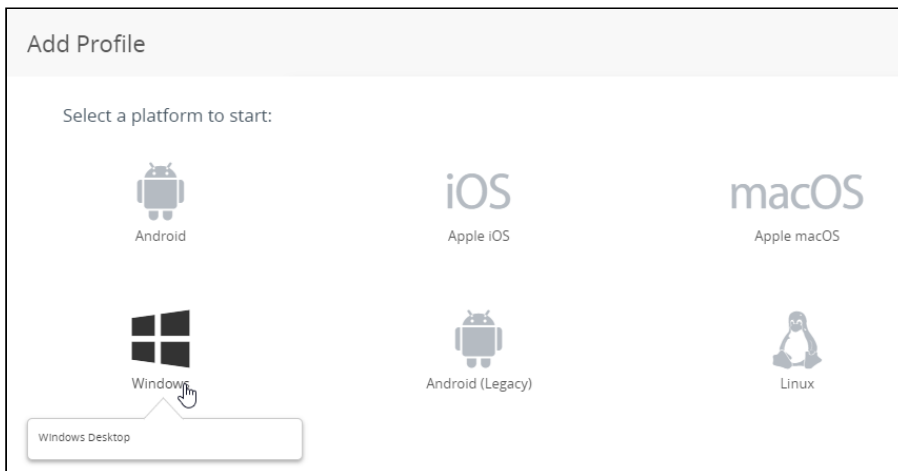
2. In the content pane, click **Add > Add Profile**.

3. Follow the wizard pages described below.

- [Add Profile](#)
- [Select Device Type](#)
- [Select Context](#)
- [General](#)
- [Credentials](#)

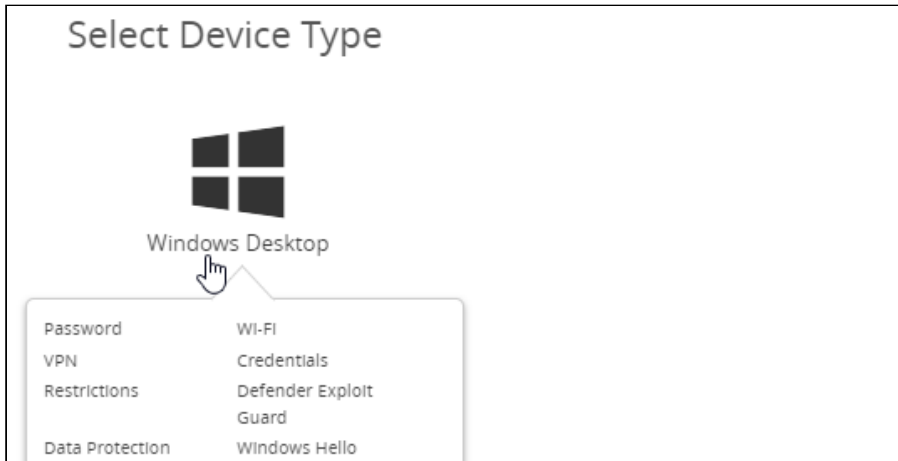
## Add Profile

Click on the name of the platform running the enrollment device.



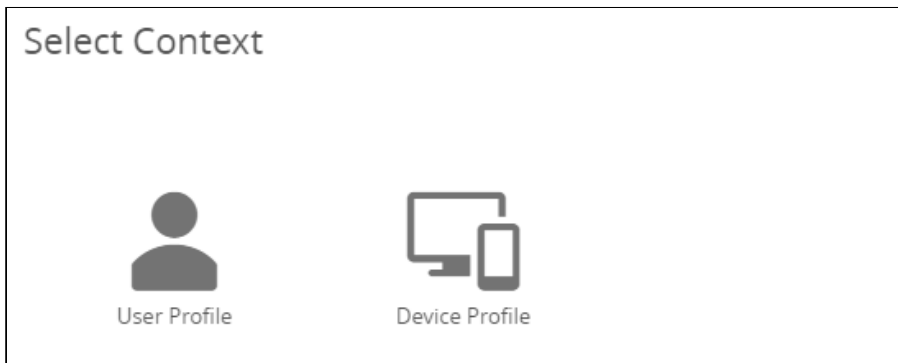
## Select Device Type

Click on the type of enrolled device.



### Select Context

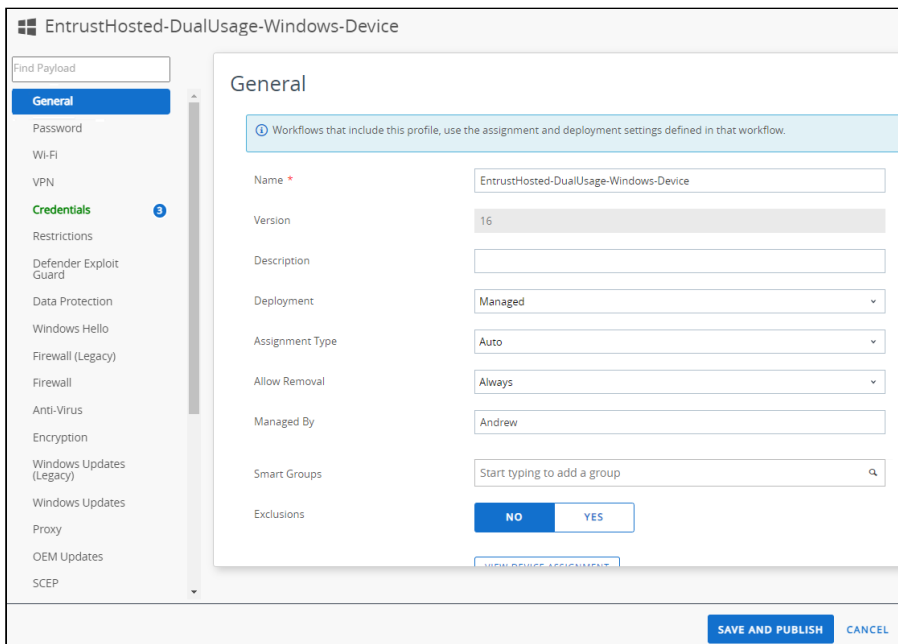
Click on **User Profile** to enroll users or **Device Profile** to enroll devices.



### General

Click **General** in the sidebar menu to configure the following settings in the content pane.

Field	Value
Name	Enter a name for the profile.
Smart Group	Select the smart group containing the managed users or devices.



EntrustHosted-DualUsage-Windows-Device

Find Payload

**General**

- Password
- Wi-Fi
- VPN
- Credentials** 3
- Restrictions
- Defender Exploit Guard
- Data Protection
- Windows Hello
- Firewall (Legacy)
- Firewall
- Anti-Virus
- Encryption
- Windows Updates (Legacy)
- Windows Updates
- Proxy
- OEM Updates
- SCEP

**General**

Workflows that include this profile, use the assignment and deployment settings defined in that workflow.

Name \* EntrustHosted-DualUsage-Windows-Device

Version 16

Description

Deployment Managed

Assignment Type Auto

Allow Removal Always

Managed By Andrew

Smart Groups Start typing to add a group

Exclusions  NO  YES

[VIEW DEVICE ASSIGNMENT](#)

**SAVE AND PUBLISH** CANCEL

## Credentials

Click **Credentials** in the sidebar menu to configure the user credentials.

Field	Value
Credential Source	Select <b>Defined Certificate Authority</b> .
Certificate	Upload separately the certificates of the root and issuing CAs.
Certificate Store	Select <b>Personal</b> or <b>Intermediate</b> for profiles with the <b>User Profile</b> context. Select <b>Trusted Root</b> for profiles with the <b>User Device</b> context.

Click the **+** symbol to create a new credential with the following settings.

Field	Value
Credential Source	Select <b>Defined Certificate Authority</b> .
Certificate Authority	Select the CA configured in <a href="#">Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE</a> .

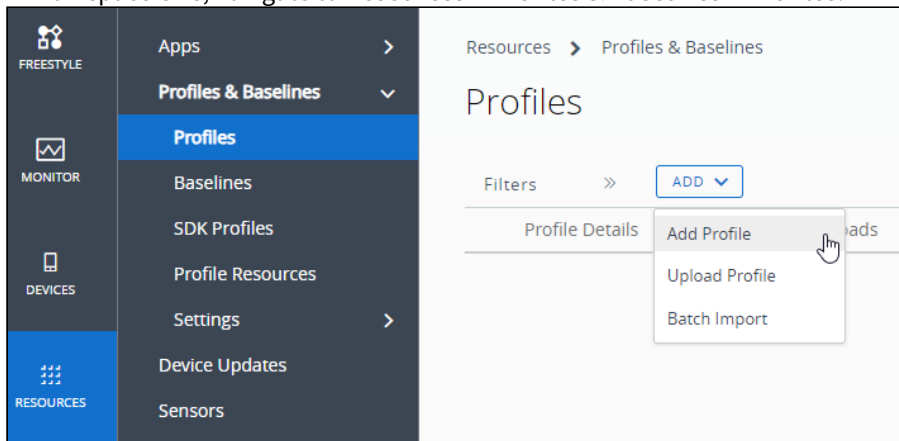
Field	Value
Certificate Template	Select the request template configured in <a href="#">Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE</a> .
Key Location	Specify the location for the issued certificate: <b>Software</b> or <b>Hardware</b> .
Certificate Store	Enter the name of the certificate store.

## Adding a SCEP profile for MDM automation in VMware Workspace ONE

See below for creating an MDM automation profile to issue certificates with the SCEP protocol.

### To add a SCEP profile in Workspace One

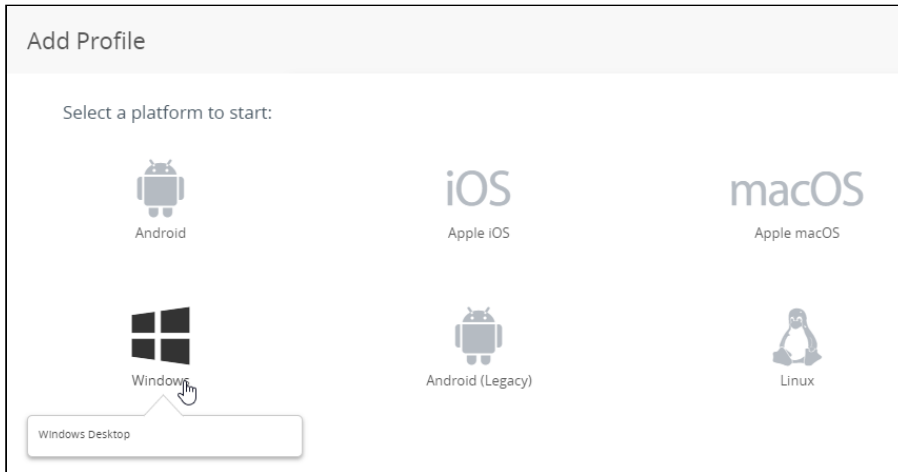
1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



2. In the content pane, click **Add > Add Profile**.
3. Follow the wizard pages described below.
  - [Add Profile](#)
  - [Select Device Type](#)
  - [Select Context](#)
  - [General](#)
  - [Credentials](#)
  - [SCEP](#)

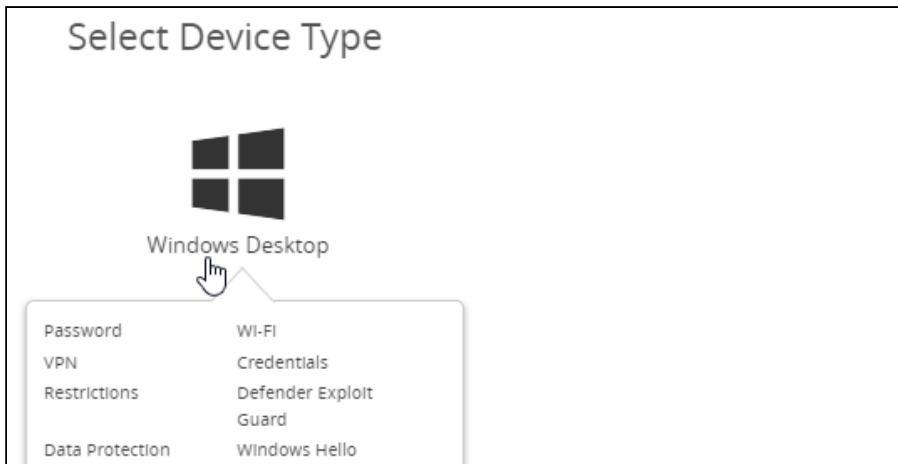
### Add Profile

Click on the name of the platform running the enrollment device.



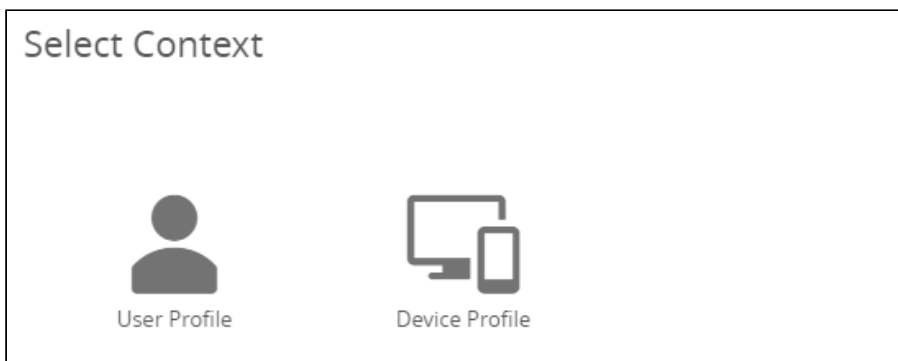
### Select Device Type

Click on the type of enrolled device.



### Select Context

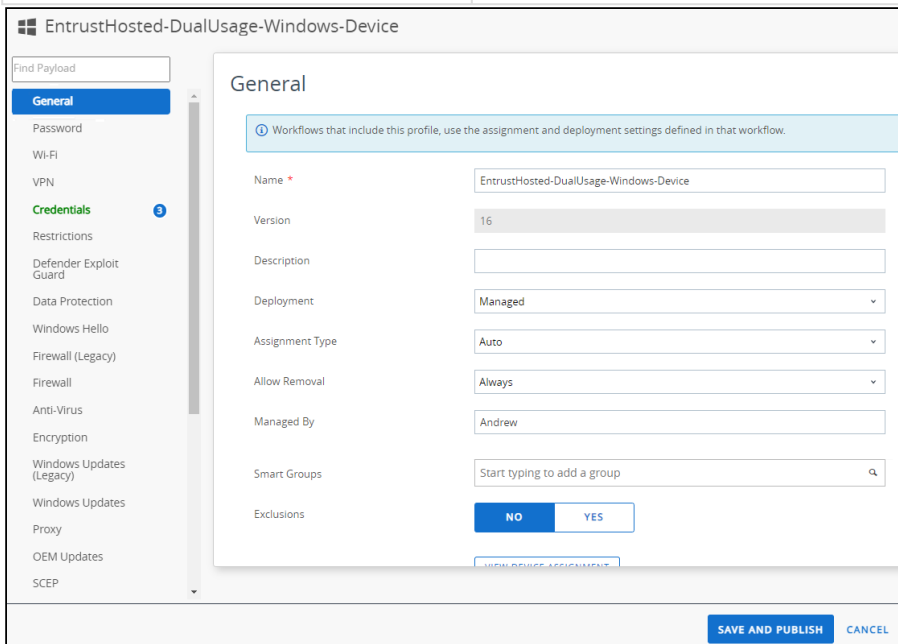
Click on **User Profile** to enroll users or **Device Profile** to enroll devices.



## General

Click **General** in the sidebar menu to configure the following settings in the content pane.

Field	Value
Name	Enter a name for the profile.
Smart Group	Select the smart group containing the managed users or devices.



The screenshot shows the configuration page for 'EntrustHosted-DualUsage-Windows-Device'. The 'General' tab is selected in the sidebar. The main content area displays the following settings:

- Name \***: EntrustHosted-DualUsage-Windows-Device
- Version**: 16
- Description**: (Empty text field)
- Deployment**: Managed (Dropdown menu)
- Assignment Type**: Auto (Dropdown menu)
- Allow Removal**: Always (Dropdown menu)
- Managed By**: Andrew (Text field)
- Smart Groups**: Start typing to add a group (Search field)
- Exclusions**: NO (Selected), YES (Button)

At the bottom of the form, there are buttons for 'SAVE AND PUBLISH' and 'CANCEL'.

## Credentials

Click **Credentials** in the sidebar menu to configure the user credentials.

Field	Value
Credential Source	Select <b>Defined Certificate Authority</b> .
Certificate	Upload separately the certificates of the root and issuing CAs.
Certificate Store	Select <b>Personal</b> or <b>Intermediate</b> for profiles with the <b>User Profile</b> context. Select <b>Trusted Root</b> for profiles with the <b>User Device</b> context.

## SCEP

Click **SCEP** in the sidebar menu to configure the following settings in the content pane.




Field	Value
Credential Source	Select <b>Defined Certificate Authority</b> .
Certificate Authority	Select the CA configured in <a href="#">Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE</a> .
Certificate Template	Select the request template configured in <a href="#">Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE</a> .
Key Location	Specify the location for the issued certificate: <b>Software</b> or <b>Hardware</b> .

## Testing MDM automation in VMware Workspace ONE

Test the MDM automation in VMware Workspace ONE after completing the configuration steps.


### To test MDM automation in VMware Workspace ONE

1. Open a browser at <https://getwsone.com>
2. Download the VMware Workspace ONE Intelligent Hub application.
3. Install the application on the device you want to enroll.
4. Log into the VMware Workspace ONE Intelligent Hub.

 The user must belong to the Smart Group selected when adding the profile.

5. Click **Sync Device**.

Workspace ONE Intelligent Hub



Basic

**Support**


[555-123-4567](#)

[Email Support](#)

[Collect Logs](#)

[Hub Status](#)

---



**DMSPCEGWS1AA03**

- Enrolled
- No compliance set

Sync Device

Sync has completed

Last Sync: 7/24/2023 12:13:45 PM

**Enrollment**

Enrolled server

Enrolled group ID

**Network**

Internet access

UEM server

**Device**

Serial number

Encryption

## 10 Automating Windows Auto Enrollment (WSTEP) with an Entrust-hosted Enrollment Gateway

Entrust PKIaaS integrates into Microsoft Active Directory environments to automate enrollment with the following Microsoft protocols.

Protocol	Purpose	See
X.509 Certificate Enrollment Policy Protocol (MS-XCEP)	Defines the interactions between a requesting client and a responding server to exchange a certificate enrollment policy, which is the collection of certificate templates and certificate issuers available to the requestor for X.509 certificate enrollment.	<a href="https://learn.microsoft.com/en-us/openspecs/windows_protocols/ms-xcep">learn.microsoft.com/en-us/openspecs/windows_protocols/ms-xcep</a>
WS-Trust X.509v3 Token Enrollment Extensions (MS-WSTEP)	Define the message formats and server behavior to manually or automatically enroll X.509 certificates for users and computers.	<a href="https://learn.microsoft.com/en-us/openspecs/windows_protocols/ms-wstep">learn.microsoft.com/en-us/openspecs/windows_protocols/ms-wstep</a>

See below for the required configuration steps.

- [Planning your WSTEP deployment](#)
- [WSTEP enrollment requirements](#)
- [Preparing the Active Directory forest for WSTEP](#)
- [Configuring an Entrust PKIaaS issuing CA for WSTEP](#)
- [Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP](#)
- [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#)
- [Installing a PKIaaS Virtual Machine](#)
- [Configuring PKIaaS Virtual Machines on the PKIaaS portal](#)
- [Enabling WSTEP for users and devices](#)
- [Managing Microsoft certificate templates in Active Directory](#)
- [Managing on-premises PKIaaS Virtual Machines](#)
- [Troubleshooting WSTEP enrollment issues](#)

See the following video for a quick guide on the required steps.

<https://www.youtube.com/watch?v=l6dDmpRRbyw>

### Planning your WSTEP deployment

WSTEP integration requires the on-premises installation of a PKIaaS Virtual Machine in the customer's LAN. Once installed, this PKIaaS Virtual Machine:

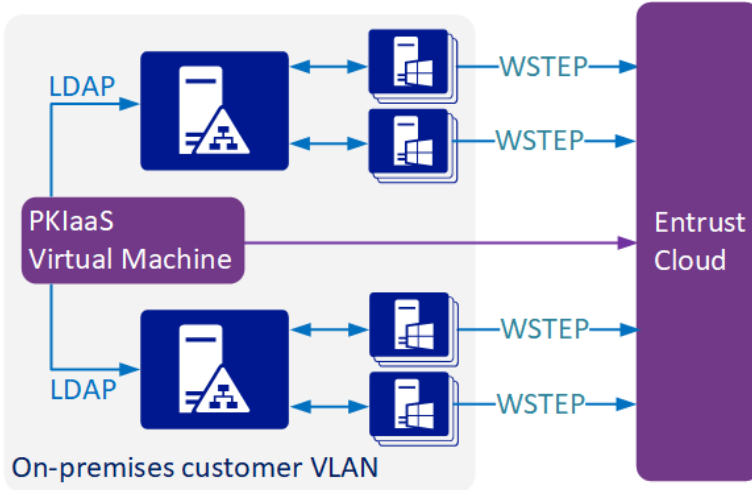
- Performs LDAPS queries against the Domain Controllers in an Active Directory forest.
- Establishes an outbound connection with the Entrust Cloud.

The Windows devices send WSTEP requests directly to the PKIaaS service hosted in the Entrust cloud. See below for the main integration scenarios.

- [Deploying a single PKIaaS Virtual Machine for multiple Active Directory forests](#)
- [Deploying multiple PKIaaS Virtual Machines for Active Directory forests in different networks](#)

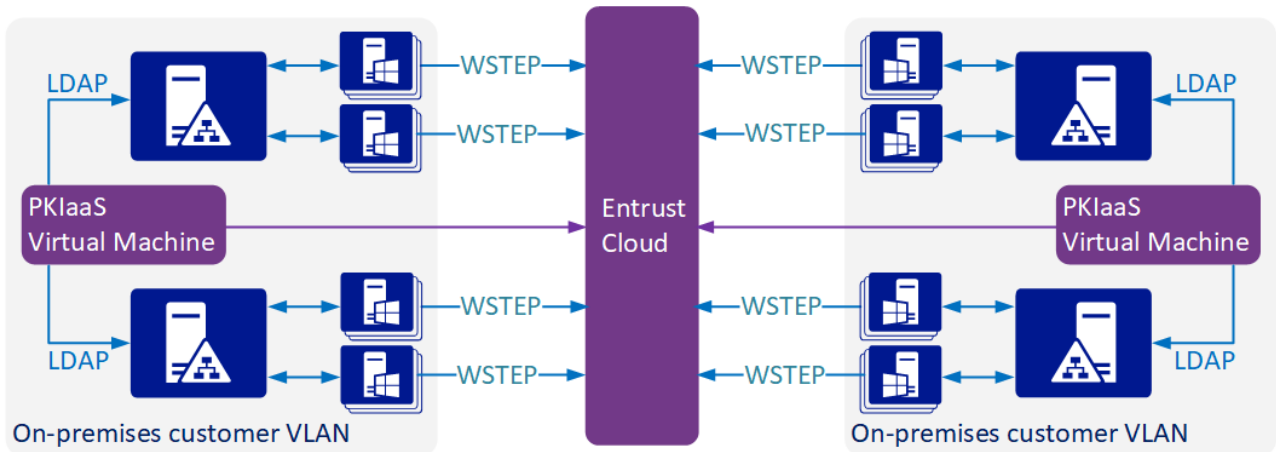
## Deploying a single PKIaaS Virtual Machine for multiple Active Directory forests

A single PKIaaS Virtual Machine can handle any number of Active Directory forests, provided the virtual machine can connect with each forest as explained in [Network requirements for the PKIaaS Virtual Machine](#).



## Deploying multiple PKIaaS Virtual Machines for Active Directory forests in different networks

When a single PKIaaS Virtual Machine cannot communicate with all forests, multiple PKIaaS Virtual Machines are required, as illustrated in the diagram below.



In any case, configuring multiple Active Directory forests:

- Requires the domain controllers of each Windows forest to be prepared as explained in this document.
- Requires the root domain of each Windows Forest to be added to the PKIaaS portal.
- Does not require two-way transitive trusts.

## WSTEP enrollment requirements

See below the requirements to automate WSTEP enrollment with an Entrust-hosted Enrollment Gateway.

- [ECS account requirements for WSTEP enrollment](#)

- [PKIaaS Virtual Machine requirements](#)
- [Windows requirements for WSTEP enrollment](#)

## ECS account requirements for WSTEP enrollment

Automating WSTEP enrollment requires creating an Entrust Certificate Services (ECS) Enterprise user account, as explained in [Creating a user with PKIaaS roles](#). Assign to this user one of the following roles.

- PKIaaS Administrator
- PKIaaS CA Administrator

Both roles grant permissions to:

- Create CA
- Add Enrollment Gateway

To enable the WSTEP certificate profiles, this user must add the Active Directory Service to an issuing CA, as later explained in [Configuring an Entrust PKIaaS issuing CA for WSTEP](#).

## PKIaaS Virtual Machine requirements

Automating WSTEP enrollment requires installing a PKIaaS Virtual Machine on your premises.

- [Network requirements for the PKIaaS Virtual Machine](#)
- [Virtualization platform requirements for the PKIaaS Virtual Machine](#)

### **Permitted use of the PKIaaS Virtual Machine**

You may use PKIaaS Virtual Machine for integrating the on-premises Windows infrastructure of a User with your cloud-based PKIaaS instance. You may only use PKIaaS Virtual Machine in connection with your validly licensed use of Entrust PKIaaS. You are expected to keep reasonable records relating to at least the number of copies of the software that you have made, used and distributed, and the environments where they have been deployed.

## Network requirements for the PKIaaS Virtual Machine

The PKIaaS Virtual Machine has the following network requirements.

- [PKIaaS Virtual Machine connection settings](#)
- [PKIaaS Virtual Machine outbound access to Active Directory](#)
- [PKIaaS Virtual Machine outbound access to the Oracle Yum server](#)
- [PKIaaS Virtual Machine outbound access to the PKIaaS package repository](#)
- [PKIaaS Virtual Machine outbound access to Entrust PKIaaS](#)

### PKIaaS Virtual Machine connection settings

The connection of the PKIaaS Virtual Machine requires a DHCP server with configured DNS.

### PKIaaS Virtual Machine outbound access to Active Directory

Grant the PKIaaS Virtual Machine the following outbound access to:

- The Active Directory DNS servers (to query SRV DNS records for the FQDN of Active Directory Domain controllers).
- The Active Directory LDAP or LDAPS service (to look up information on Microsoft certificate templates, Active Directory users, and Active Directory machines).

See below for the required outbound ports.

Target port	Protocol	Application	Target service
53	TCP/UDP	DNS	Active Directory DNS
389	TCP	LDAP	Active Directory secured with StartTLS
636	TCP	LDAPS	Active Directory

**!** If an attempted LDAPS connection fails, the PKIaaS Virtual Machine switches to LDAP port 389 and attempts to use StartTLS (because plaintext LDAP is not supported).

PKIaaS Virtual Machine outbound access to the Oracle Yum server

Grant the PKIaaS Virtual Machine the following outbound access to the Oracle Yum server.

yum.oracle.com			
Target port	Protocol	Application	
443	TCP	HTTPS	

PKIaaS Virtual Machine outbound access to the PKIaaS package repository

Grant the PKIaaS Virtual Machine access to the package repository.

EU region			
pkiaas-eu-prod-rpm.s3.eu-central-1.amazonaws.com			
US region			
pkiaas-prod-rpm.s3.us-east-1.amazonaws.com			
Target port	Protocol	Application	
443	TCP	HTTPS	

PKIaaS Virtual Machine outbound access to Entrust PKIaaS

Grant the PKIaaS Virtual Machine access to the Entrust PKIaaS services.

EU region		
idp.eu.pkiaas.entrust.com satellit.eu.pkiaas.entrust.com wstep.eu.pkiaas.entrust.com		
US region		
idp.pkiaas.entrust.com satellit.pkiaas.entrust.com wstep.pkiaas.entrust.com		
Target port	Protocol	Application
443	TCP	HTTPS

## Virtualization platform requirements for the PKIaaS Virtual Machine

The PKIaaS Virtual Machine supports the VMware and Azure virtualization platforms.

- [Azure requirements for the PKIaaS Virtual Machine](#)
- [VMware requirements for the PKIaaS Virtual Machine](#)

**i** Unlike the cloud-based PKIaaS WSTEP service, the PKIaaS Virtual Machine does not currently support high-availability deployments. See [Recovering a PKIaaS Virtual Machine from disaster](#) for details on disaster recovery.

### Azure requirements for the PKIaaS Virtual Machine

To run the PKIaaS Virtual Machine on Azure, use a dedicated machine with at least the following resources.

VM size	vCPUs	RAM (GiB)	Data disk	Max IOPS	Local storage (GiB)
B2s	2	4	4	1280	8 (SCSI)

### VMware requirements for the PKIaaS Virtual Machine

To run the PKIaaS Virtual Machine, a VMware virtualization platform must meet the following requirements.

- [VMware version for running the PKIaaS Virtual Machine](#)
- [VMware machine requirements for running the PKIaaS Virtual Machine](#)

### VMware version for running the PKIaaS Virtual Machine

You need an environment that supports Virtual Hardware version 14. The following VMware products are compatible with this version.

- ESXi 6.7
- Fusion 10.x
- Workstation Pro 14.x
- Workstation Player 14.x

VMware machine requirements for running the PKIaaS Virtual Machine

The OVA file of the PKIaaS Virtual Machine is configured to use the following resources:

- 2 cores
- 8 GB of RAM
- 10 GB of disk space

Make sure the VMware environment running the PKIaaS Virtual Machine provides these resources.

## Windows requirements for WSTEP enrollment

The Windows environment of the enrolled devices must meet the following requirements.

- [Windows user requirements for configuring WSTEP enrollment](#)
- [Network requirements for the Windows devices](#)
- [Active Directory requirements for WSTEP enrollment](#)

## Windows user requirements for configuring WSTEP enrollment

For [Installing the default set of Microsoft Certificate Templates](#), you will need to log into the root domain of the forest as a user belonging to the following groups.

- Domain Admins
- Enterprise Admins

## Network requirements for the Windows devices

See below for the network requirements for all Windows devices in an Active Directory forest.

- [Device outbound access to the Entrust WSTEP service](#)
- [Device outbound access to the Entrust certificate validation services](#)

**i** Connection to the Windows domain is not a requirement for certificate enrollment. When fulfilling the below requirements, domain-joined devices can enroll for certificates even when not connected to the same network as the Windows domain.

Device outbound access to the Entrust WSTEP service

Grant any device access to Entrust PKIaaS.

### EU region

wstep.eu.pkiaas.entrust.com



<b>US region</b>		
wstep.pkiaas.entrust.com		
<b>Target port</b>	<b>Protocol</b>	<b>Application</b>
443	TCP	HTTPS

Device outbound access to the Entrust certificate validation services

Grant any device access to the following Entrust certificate validation services

Target port	Protocol	Application	Target service
80	TCP	HTTP	See <a href="#">Entrust PKIaaS OCSP service</a>
80	TCP	HTTP	See <a href="#">Entrust PKIaaS Certificate Revocation Lists</a>

### Active Directory requirements for WSTEP enrollment

Each Windows Active Directory forest must meet the following requirements.

- [LDAPS TLS certificate requirements for Active Directory domain controllers](#)
- [SRV record requirements for Active Directory LDAP services](#)

LDAPS TLS certificate requirements for Active Directory domain controllers

In each Active Directory domain controller, the TLS certificate for LDAPS must meet the requirements described in:

<https://learn.microsoft.com/en-us/troubleshoot/windows-server/identity/enable-ldap-over-ssl-3rd-certification-authority#requirements-for-an-ldaps-certificate>

Specifically, this certificate:

- Must be stored in the NT Directory Services (NTDS) personal certificate store.
- Must contain the FQDN (Fully Qualified Domain Name) of the Domain Controller as a DNS SAN (Subject Alternative Name).
- Must use the RSA algorithm.
- Must include Server Authentication (1.3.6.1.5.5.7.3.1) as Enhanced Key Usage.

SRV record requirements for Active Directory LDAP services

Service Location (SRV) resource records for the LDAP Service must be valid for all domains in the forest. Verify this requirement as explained at:

<https://learn.microsoft.com/en-us/troubleshoot/windows-server/networking/verify-srv-dns-records-have-been-created>

**i** SRV records do not require extra configuration steps as Active Directory automatically creates and updates them.

## Preparing the Active Directory forest for WSTEP

To prepare for WSTEP enrollment, perform the following operations in the domain controller of the Windows Active Directory forest's root domain.

- [Creating a PKIaaS WSTEP Service Account](#)
- [Installing the default set of Microsoft Certificate Templates](#)
- [Downloading the certificate chain](#)
- [Setting up LDAPS on domain controllers](#)

## Creating a PKIaaS WSTEP Service Account

Create a PKIaaS WSTEP service account for the PKIaaS WSTEP agent and PKIaaS WSTEP server to authenticate all incoming requests from WSTEP clients.

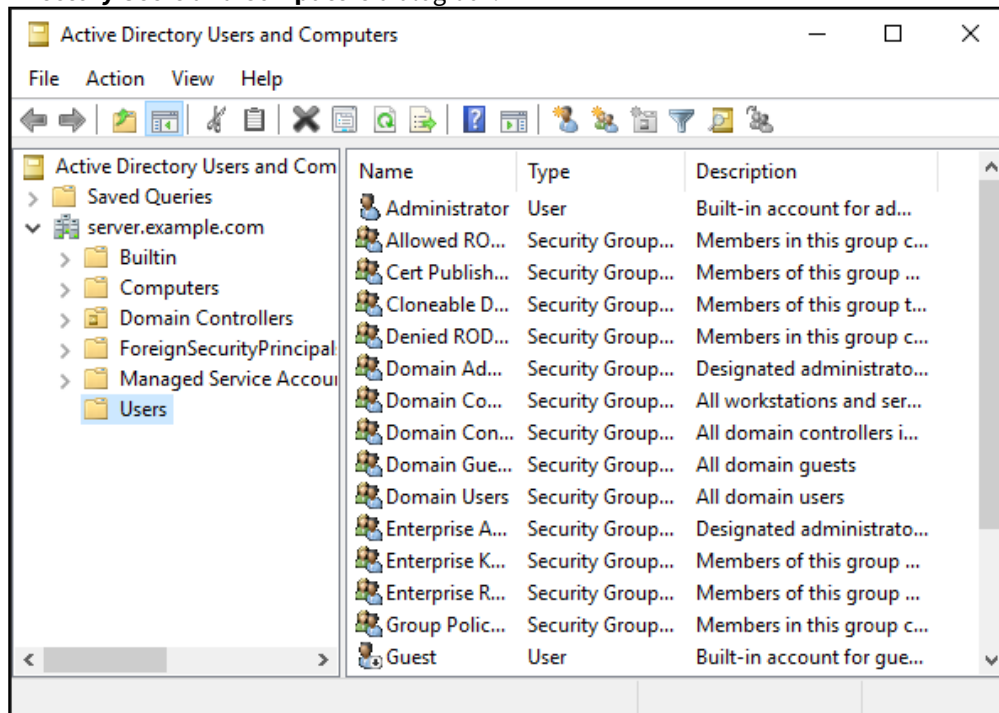
**i** Each root domain in the Active Directory forest requires a separate PKIaaS WSTEP service account, as each Active Directory forest must be configured separately.

### To create a PKIaaS WSTEP Service Account

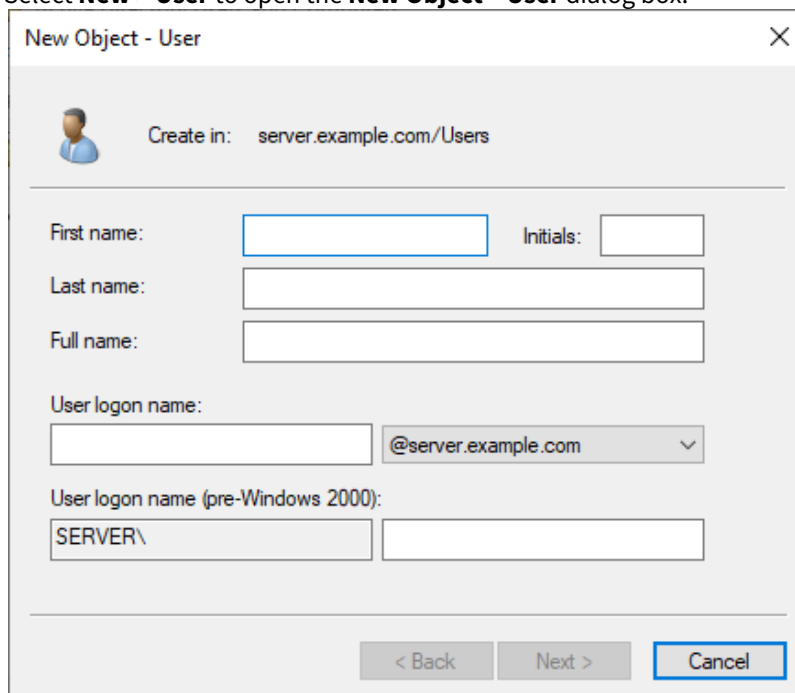
1. Log into a domain controller of the Active Directory forest's root domain as a user who is a member of both the Domain Admins and Enterprise Admins groups.

**!** The service account created for the PKIaaS Virtual Machine must have read permissions on certificate templates, user objects, and computer objects in LDAP.

2. Select **Start > Windows Administrative Tools > Active Directory Users and Computers** to open the **Active Directory Users and Computers** dialog box.



3. Right-click the folder where you want to create the new account
4. Select **New > User** to open the **New Object - User** dialog box.



**New Object - User**

Create in: server.example.com/Users

First name:  Initials:

Last name:

Full name:

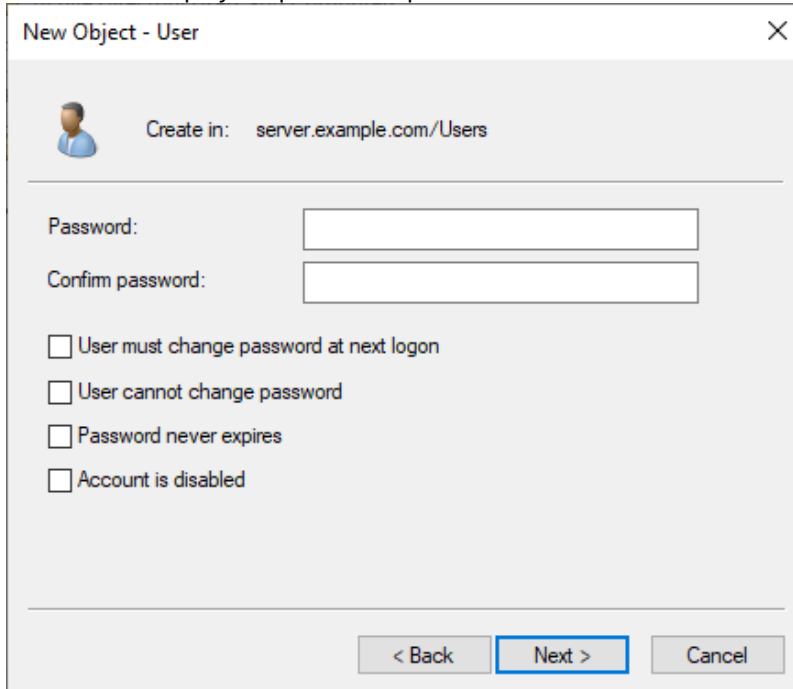
User logon name:  @server.example.com

User logon name (pre-Windows 2000): SERVER\

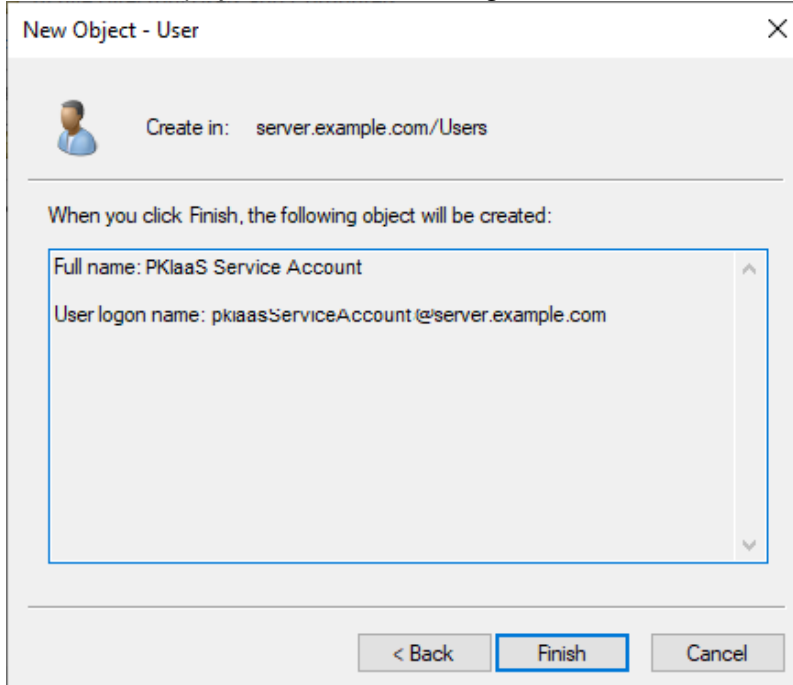
< Back Next > Cancel

5. Enter the **First name**, **Last name**, and **Full name** for the new user account.
6. Enter a Windows **User logon name** for the user account. Optionally, enter a **User logon name (pre-Windows 2000)** for pre-Windows 2000 computers.

- Click **Next** to display the password options.

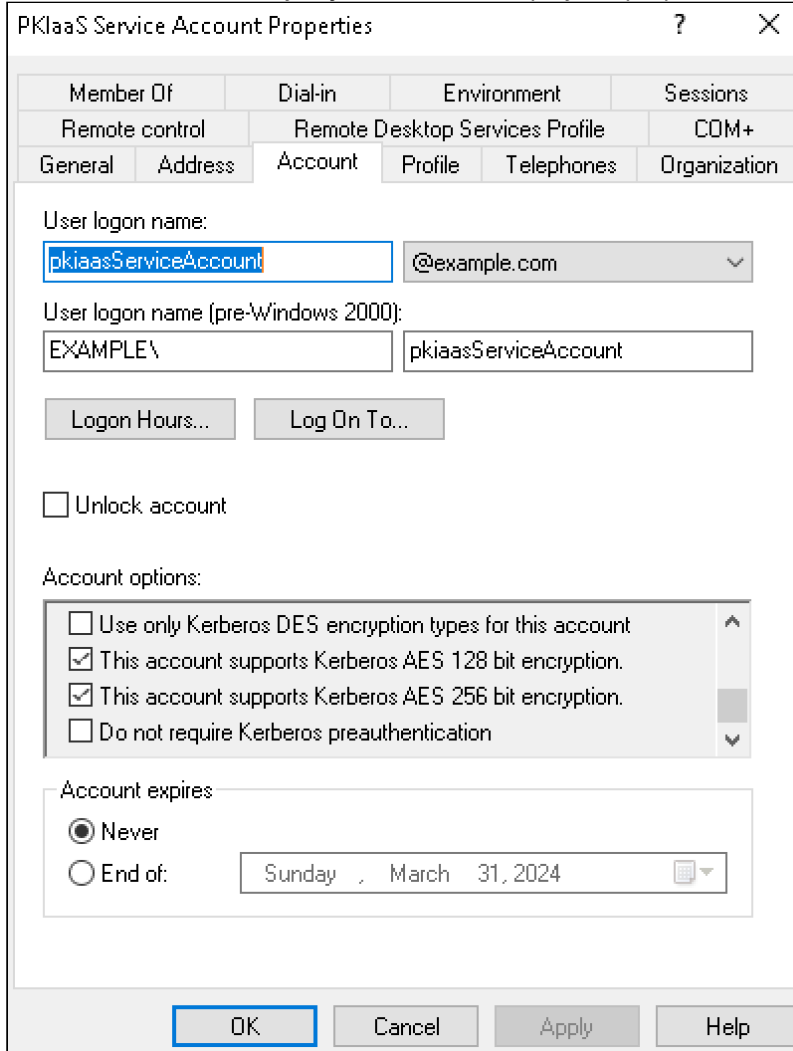


- Enter a **Password** for the user account.
- Enter the password again in the **Confirm password** field.
- Deselect **User must change password at next logon**.
- Click **Next** to display the confirmation dialog.



- Record the user logon name of the account. You will use this logon name later to add a Service Principal Name (SPN) mapping for Kerberos.
- Click **Finish**.

- Double-click the account you just created to display the properties dialog box.



PKIaaS Service Account Properties

Member Of	Dial-in	Environment	Sessions
Remote control	Remote Desktop Services Profile		COM+
General	Address	Account	Profile
		Telephones	Organization

User logon name:  
 @example.com

User logon name (pre-Windows 2000):

Logon Hours... Log On To...

Unlock account

Account options:

- Use only Kerberos DES encryption types for this account
- This account supports Kerberos AES 128 bit encryption.
- This account supports Kerberos AES 256 bit encryption.
- Do not require Kerberos preauthentication

Account expires:

Never

End of:

OK Cancel Apply Help

- In the **Account** tab, check the following boxes under **Account options**:
  - This account supports Kerberos AES 128 bit encryption.**
  - This account supports Kerberos AES 256 bit encryption.**
- Click **OK**.

## Installing the default set of Microsoft Certificate Templates

If not installed, install the default set of Microsoft certificate templates, as described in the following sections.

- [Enabling the Certificate Templates snap-in](#)
- [Installing the default set of Microsoft Certificate Templates using the snap-in](#)

**i** This section is mainly for new Microsoft Active Directory forests deployments as they do not include a set of Microsoft certificate templates.

## Enabling the Certificate Templates snap-in

Before Installing the default set of Microsoft Certificate Templates, you must enable the Certificate Templates snap-in. As explained below, you can perform this operation in either command or graphical mode.

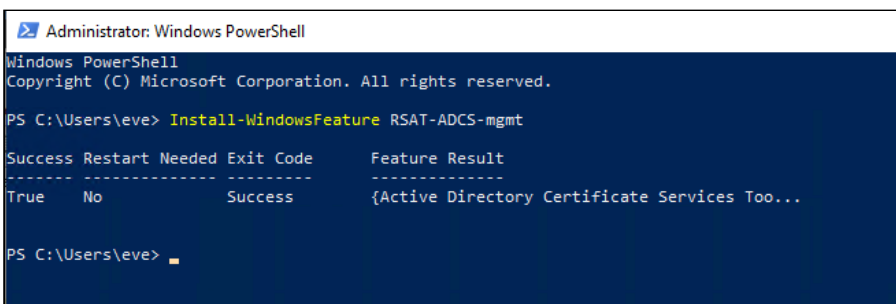
- [Enabling the Certificate Templates snap-in using PowerShell](#)
- [Enabling the Certificate Templates snap-in using the Windows Server Manager](#)

### Enabling the Certificate Templates snap-in using PowerShell

You can enable the Certificate Templates snap-in by simply running the following command on PowerShell.

```
Install-WindowsFeature RSAT-ADCS-mgmt
```

For example:



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\eve> Install-WindowsFeature RSAT-ADCS-mgmt

Success Restart Needed Exit Code      Feature Result
-----
True     No           Success      {Active Directory Certificate Services Too...

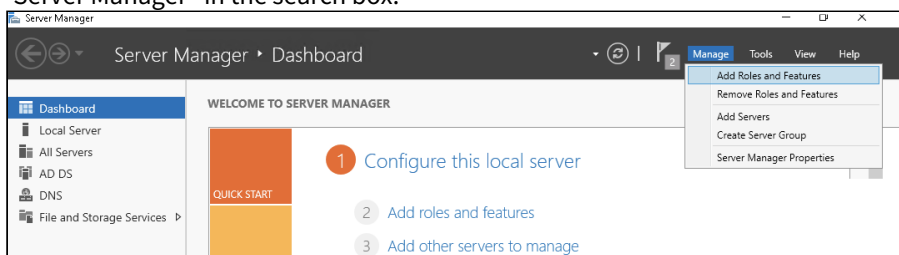
PS C:\Users\eve>
```

### Enabling the Certificate Templates snap-in using the Windows Server Manager

You can enable the Certificate Templates snap-in using the Windows Server Manager wizard.

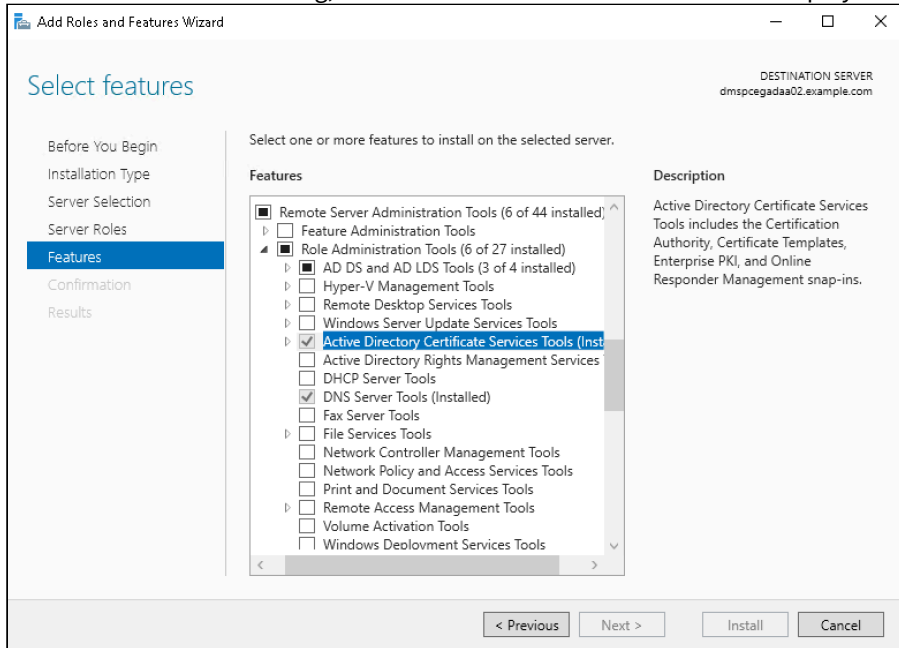
#### To enable the Certificate Templates snap-in using the Windows Server Manager

1. Open the Windows Server Manager – for example, by pressing the Windows key on the keyboard and typing "Server Manager" in the search box.



2. On the top-right of the window, click **Manage > Add Roles and Features**.

3. In the **Select Features** dialog, click **Next** until the **Features** section is displayed.




4. Check the following box: **Remote Server Administration Tools / Remote Administration Tools / Active Directory Certificate Services Tools**.
5. Click **Next** until the **Install** button appears, and click the **Install** button.
6. Wait while the installation completes before proceeding to the next step.

## Installing the default set of Microsoft Certificate Templates using the snap-in

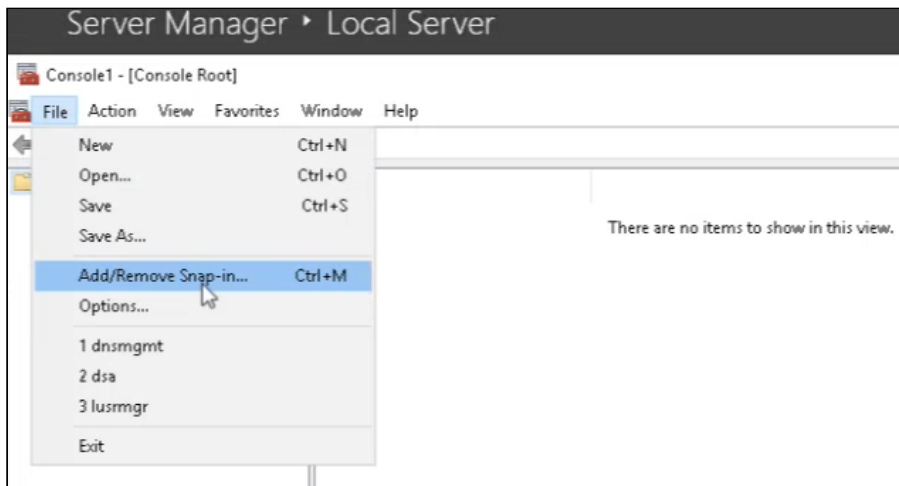
After [Enabling the Certificate Templates snap-in](#), add the snap-in to install the default set of Microsoft Certificate Templates.

### To install the default set of Microsoft Certificate Templates using the snap-in

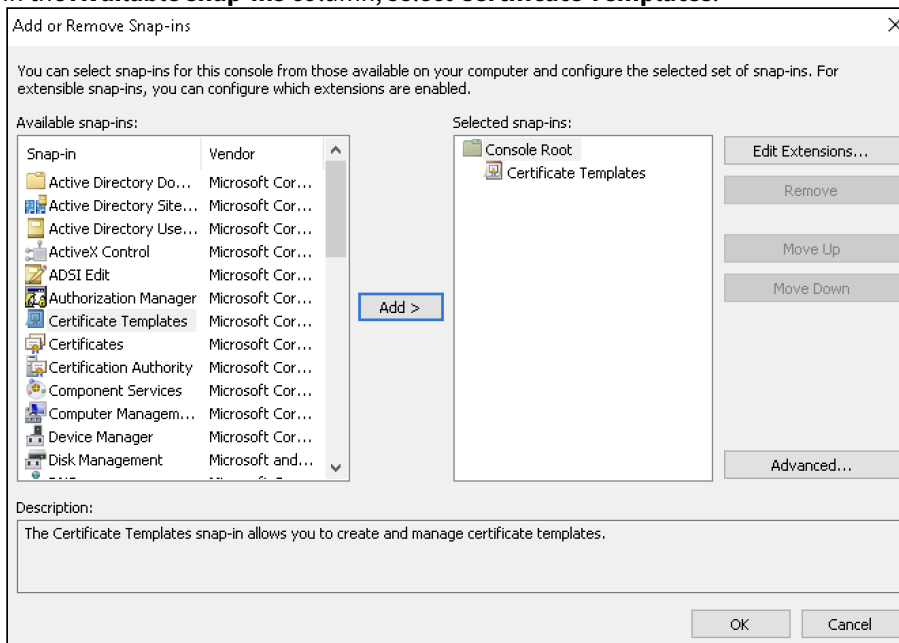
1. Log into the root Active Directory Domain of the Windows forest as a member of both the Enterprise Admins and Domain Admin groups.

 Users without these privileges cannot access the dialog options described in this section.

2. Open Microsoft Management Console (MMC) – for example, by pressing the Windows key on the keyboard and typing "MMC." (ending with a period) in the search box.



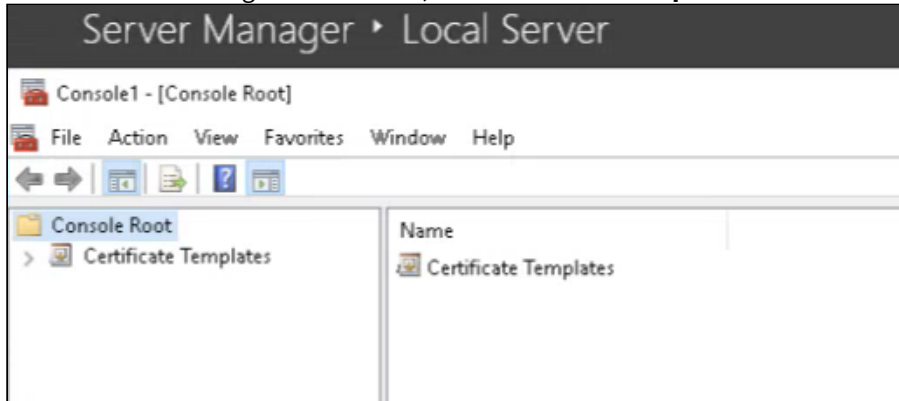
3. Select **File > Add/Remove Snap-in**.
4. In the **Available snap-ins** column, select **Certificate Templates**.



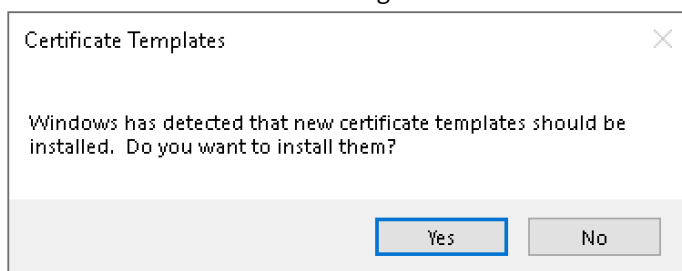
5. Click **Add** to move the **Certificate Templates** snap-in to the **Selected snap-ins** column.
6. Click **OK** to close the **Add or Remove Snap-ins** wizard and return to the Microsoft Management Console.



7. In the Microsoft Management Console, click **Certificate Templates** under **Console Root**.



8. Click **Yes** in the confirmation dialog.



❌ If you accidentally click **No** in the confirmation dialog, you must remove the Active Directory Certificate Services Tools and repeat all the steps explained in [Installing the default set of Microsoft Certificate Templates](#).

## Downloading the certificate chain

Log into [cloud.entrust.net](https://cloud.entrust.net) and follow the steps described in [Downloading a CA certificate](#) to download the certificate chain of the following certificates:

- The LDAPS TLS certificates.
- The WSTEP-enrolled certificates.

Specifically, you must download:

- The certificate of the issuing Certificate Authority.
- The certificate of the root Certificate Authority.

If the LDAPS TLS and WSTEP certificates are not issued by the same Certificate Authorities, you must download both certificate chains separately.

## Setting up LDAPS on domain controllers

If the LDAPS connections with the Active Directory domain controllers are not configured or you want to replace the current TLS certificates, follow the steps below.

- [Establishing trust of the LDAPS TLS chain](#)
- [Generating the LDAPS TLS certificates](#)
- [Installing the LDAPS TLS certificates](#)
- [Validating the LDAPS configuration](#)

If you want to maintain an existing LDAPS configuration, remember to add the root CA certificate of the LDAPS TLS certificates when [Configuring an Active Directory in the agent](#).

## Establishing trust of the LDAPS TLS chain

Before generating the LDAPS TLS certificates, configure the Active Directory Forest to trust the certificate chain. Otherwise, there is a risk of breaking the LDAP communications between the various domain controllers. As explained below, the recommended method to configure the LDAPS certificate chain trust is to create a GPO (Group Policy Object) linked to all domains in the Active Directory Forest.

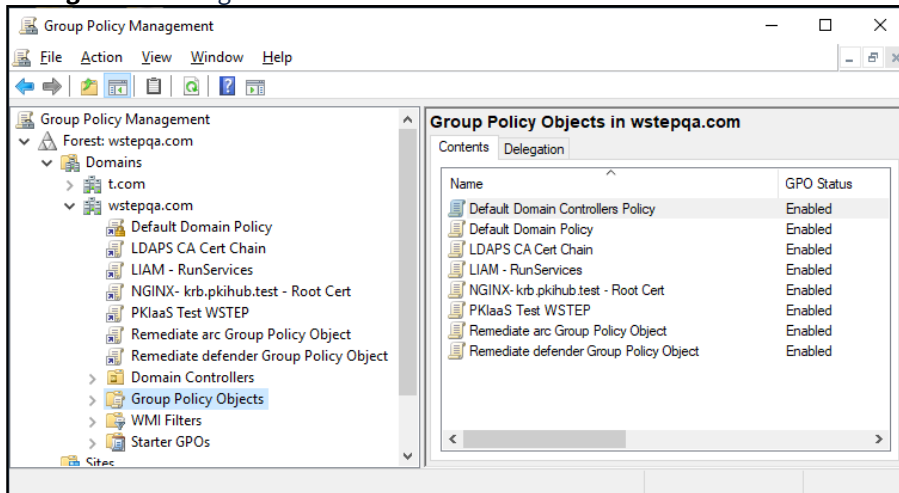
- [Creating a Group Policy Object for the LDAPS TLS certificate chain](#)
- [Importing the LDAPS TLS certificate chain into the Group Policy Object](#)
- [Linking the TLS LDAPS Group Policy Object to all domains](#)

### Creating a Group Policy Object for the LDAPS TLS certificate chain

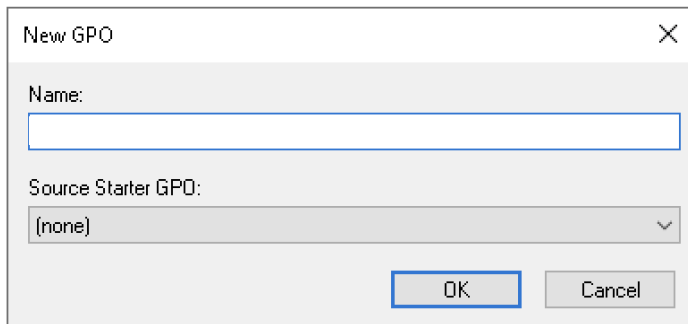
The recommended method to configure a certificate chain trust is to create a Group Policy Object (GPO) linked to all domains in the Active Directory forest.

#### To create a Group Policy Object

1. Log into the root Active Directory of the forest as an Active Directory administrator.
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.




3. Under the root domain, right click the **Group Policy Objects** folder and select **New** to display the **New GPO** dialog.



4. Provide a new **Name** for the GPO and click **OK**.

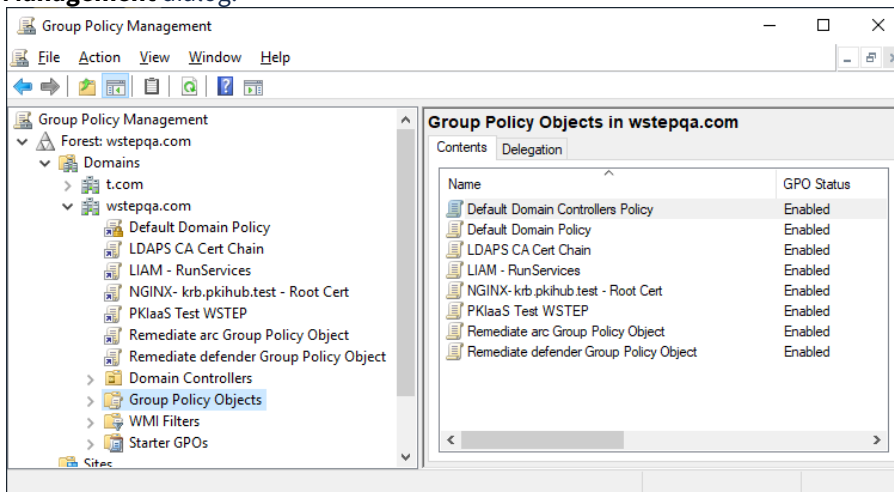
Importing the LDAPS TLS certificate chain into the Group Policy Object

Import the LDAPS TLS certificate chain into the GPO previously created in [Creating a Group Policy Object for the LDAPS TLS certificate chain](#).

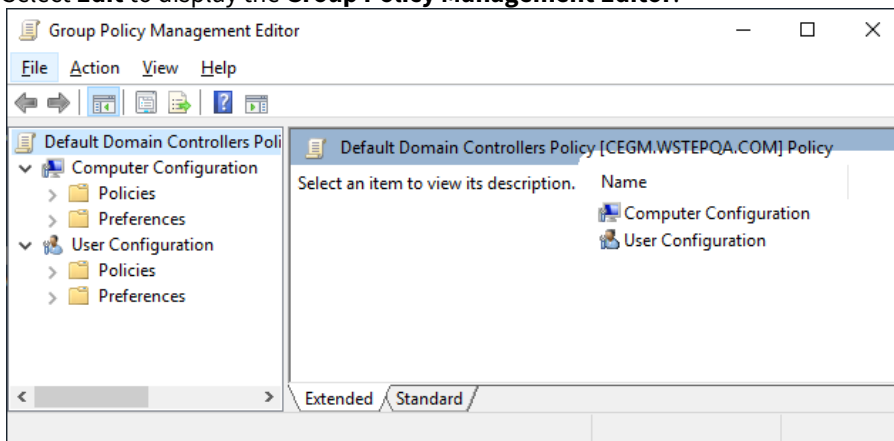
 See [Downloading the certificate chain](#) for how to download the required certificates.

### To import the certificate chain into the GPO

1. Log into the root Active Directory of the forest as an Active Directory administrator.
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.

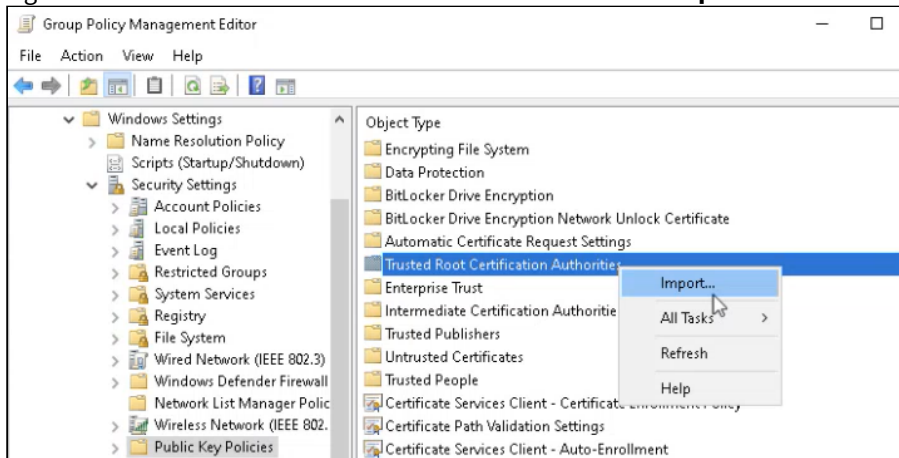


3. Right click the Group Policy Object.
4. Select **Edit** to display the **Group Policy Management Editor**.

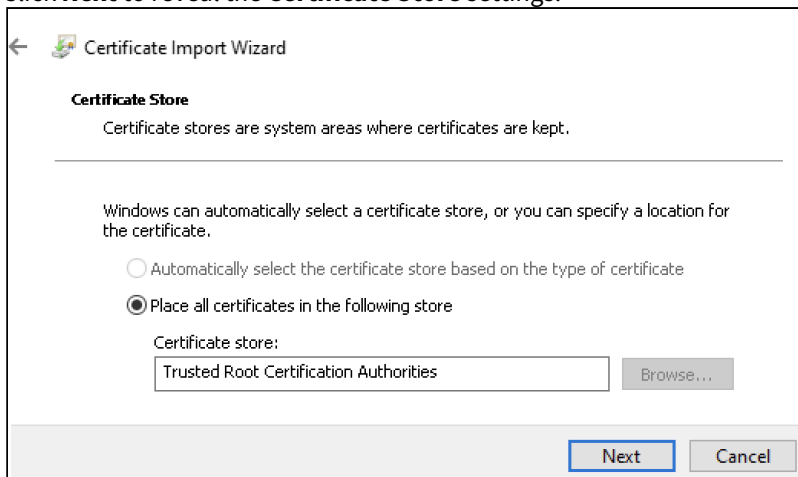


5. Navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.

- Right click **Trusted Root Certificate Authorities** and select **Import**.



- In the **Certificate Import Wizard**, click **Next** and select the root CA certificate file to import.
- Click **Next** to reveal the **Certificate Store** settings.



- Verify the selected certificate store is **Trusted Root Certification Authorities**.
- Click **Next** to display the **Completing the Certificate Import Wizard**.
- Click **Finish** to return to the **Group Policy Management** dialog.
- In the **Group Policy Management** dialog, navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
- Right-click **Intermediate Certificate Authorities** and select **Import** to display the **Certificate Import Wizard**.
- Click **Next** and select the issuing CA certificate file to import.
- Click **Next** to reveal the Certificate Store settings.
- Verify the selected certificate store is **Trusted Root Certification Authorities**
- Click **Finish**.
- Select **File > Exit** to close the **Group Policy Management Editor**.

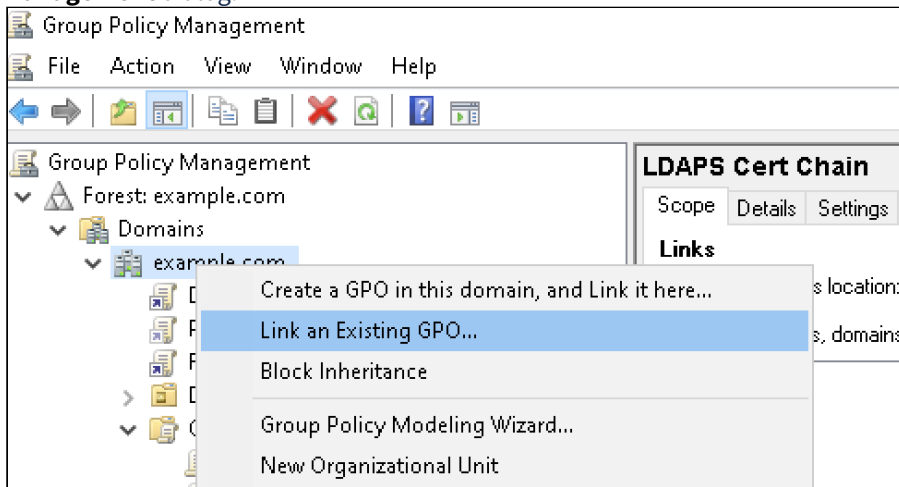
#### Linking the TLS LDAPS Group Policy Object to all domains

In each domain of the Active Directory forest, repeat the following procedure to link the Group Policy Object created for the LDAPS TLS certificate chain.

#### To link a Group Policy Object with a domain

- Log into the root Active Directory of the forest as an Active Directory administrator.

2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.




3. Right-click the domain name and select **Link an existing GPO...** to display the **Select GPO** dialog.
4. Select the Group Policy Object.
5. Click **OK**.

## Generating the LDAPS TLS certificates

You can use the Entrust Certificate Services (ECS) portal to generate LDAPS TLS certificates for each domain. Follow the steps in [Generating a PKCS #12](#) and select the following values.

Setting	Value for LDAPS TLS certificates
Certificate Authority	Select the issuing CA described in <a href="#">Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP</a> .
Certificate Profile	Select the <b>multiuse-p12-key-encipherment-client-server</b> certificate profile described in <a href="#">Multiuse certificate profiles</a> .
Subject DN	Enter a CN matching the FQDN of the Domain Controller (for example: <code>dc.example.com</code> ).
Certificate Expiry	Enter a period not exceeding 397 days.
Subject Alternate Names	All Subject Alternative Names must include a DNS matching the FQDN of the Domain Controller.

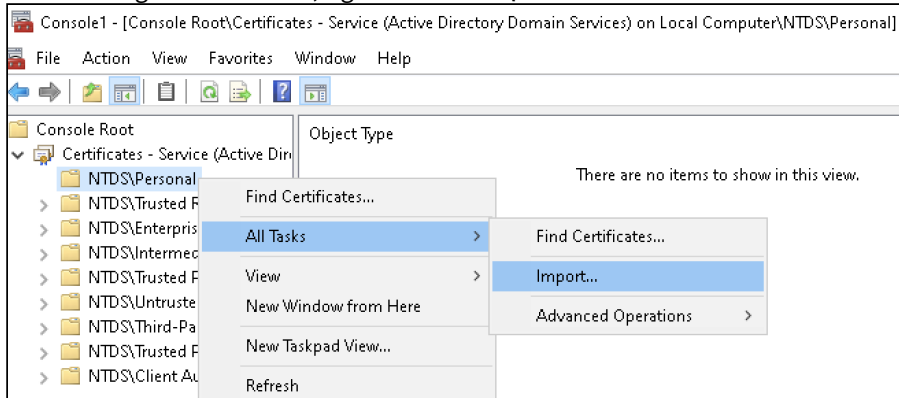
 If you generate the LDAPS TLS certificates with a non-ECS authority, ensure they are SHA-2, as SHA-1 certificates are not allowed due to their vulnerabilities.

## Installing the LDAPS TLS certificates

Repeat the following steps in each domain controller to install the LDAPS TLS certificate in the NTDS\Personal certificate store.

### To install the LDAPS TLS certificate in a Domain Controller

1. Copy in the Domain Controller machine the P12 file obtained when [Generating the LDAPS TLS certificates](#).
2. If not already installed, install the Certificate Templates snap-in as explained in [Enabling the Certificate Templates snap-in](#).
3. In the management console, right-click **NTDS\Personal** under **Certificates**.



4. Select **All Tasks > Import** to display the **Certificate Import Wizard**.
5. Follow the wizard instructions to import the certificate file, enter the password, and install the certificate in the **NTDS\Personal** certificate store.

## Validating the LDAPS configuration

After completing the LDAPS TLS configuration, open a command shell in any machine with OpenSSL installed and run the following command for each Domain Controller.

```
openssl s_client -connect <DOMAIN-FQDN>:636 -showcerts
```

Where **<DOMAIN-FQDN>** is the Fully Qualified Domain Name of the Domain Controller. For example:


```
openssl s_client -connect dc1.example.com:636 -showcerts
```


If LDAPS is configured properly, this command will display the LDAPS certificate for the selected domain controller.

## Configuring an Entrust PKIaaS issuing CA for WSTEP

On the Entrust Certificate Services Enterprise portal, add the following services to either a new or an existing issuing CA.

- The **Active Directory** service to issue WSTEP-enrolled certificates.
- The **Multiuse** service to issue LDAPS TLS certificates in P12 format.

 See [Creating an issuing CA under an online root CA](#) for how to create issuing CAs.


**ENTRUST**

**CERTIFICATE SERVICES**  
 Enterprise

Home
Create ▾
Certificates ▾
Sites
Reports ▾
**Administration ▾**
Help ▾

Add Private CA

All Private CAs

CA GW Credentials

Enrollment Gateways

CA Information

Root CA:	ABC Root CA
Status:	Active
CA Type:	Issuing
Region:	US East (N. Virginia)
Subject DN:	cn=ABC Issuing CA
Issuer DN:	cn=ABC Root CA
Serial Number:	EE20C15483B50DFBA4631B50E860BBE
Validity:	From Mar 1, 2024 to Mar 1, 2034
Signing Key Details:	RSA-4096+SHA512
Friendly Name:	<input type="text" value="ABC Issuing CA"/>
CA Identifier:	ecsmcn158emsuw-w6cnmjwmqnn5ie
Services:	<input type="text" value="Active Directory"/> <input type="text" value="Multiuse"/> <span style="float: right;">x ⓘ</span>
Service Profiles:	<ul style="list-style-type: none"> <li><input type="checkbox"/> Active Directory</li> <li><input checked="" type="checkbox"/> wstep-digital-signature</li> <li><input checked="" type="checkbox"/> wstep-digital-signature-key-encipherment</li> <li><input checked="" type="checkbox"/> wstep-key-encipherment</li> <li><input checked="" type="checkbox"/> wstep-non-repudiation</li> <li><input checked="" type="checkbox"/> wstep-non-repudiation-key-encipherment</li> <li><input type="checkbox"/> Multiuse</li> </ul>

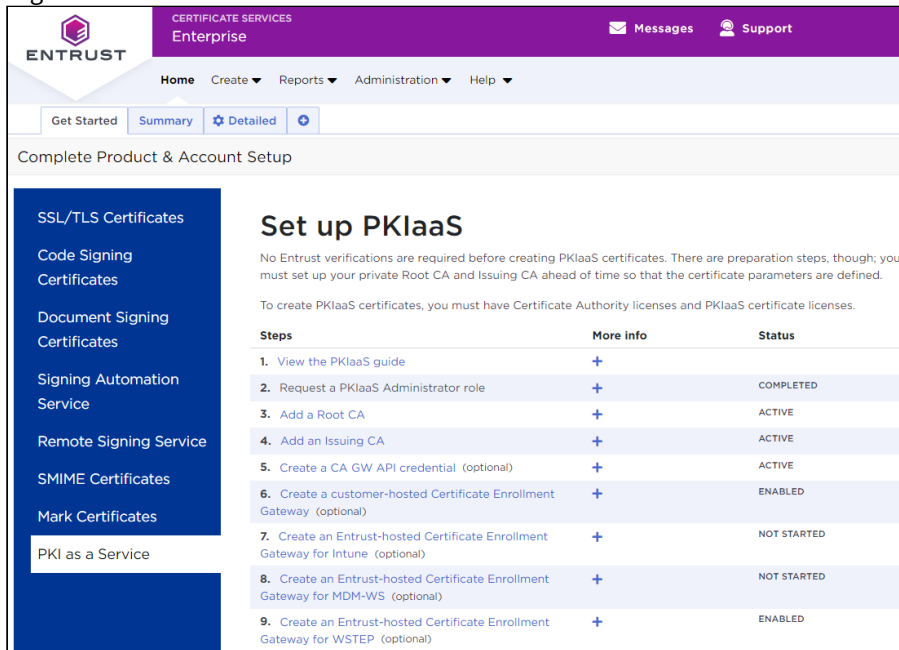
## Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP

On the Entrust Certificate Services portal, add and configure a Certificate Enrollment Gateway instance to process WSTEP requests.

✘ The new Certificate Enrollment Gateway will not be operational until completing the configuration in the Entrust PKIaaS portal. Specifically, this configuration will require deploying an on-premises agent to synchronize the Active Directory settings.

### To configure a Certificate Enrollment Gateway for WSTEP

1. Log into [cloud.entrust.net](https://cloud.entrust.net)



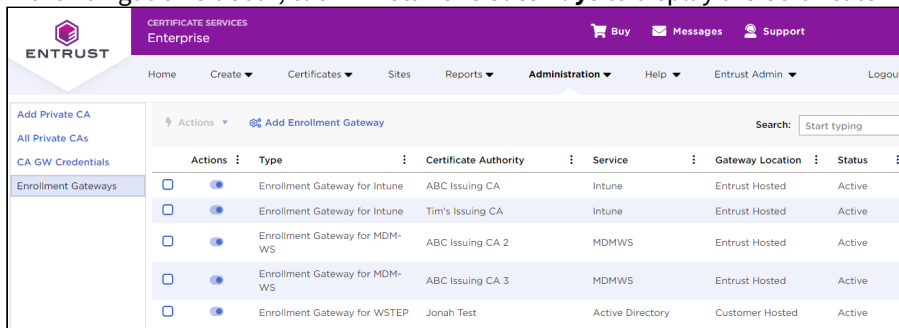
The screenshot shows the 'Set up PKIaaS' page in the Entrust Enterprise interface. The page title is 'Set up PKIaaS'. Below the title, there is a brief introduction and a list of steps to complete the setup. The steps are as follows:

Steps	More info	Status
1. View the PKIaaS guide	+	
2. Request a PKIaaS Administrator role	+	COMPLETED
3. Add a Root CA	+	ACTIVE
4. Add an Issuing CA	+	ACTIVE
5. Create a CA GW API credential (optional)	+	ACTIVE
6. Create a customer-hosted Certificate Enrollment Gateway (optional)	+	ENABLED
7. Create an Entrust-hosted Certificate Enrollment Gateway for Intune (optional)	+	NOT STARTED
8. Create an Entrust-hosted Certificate Enrollment Gateway for MDM-WS (optional)	+	NOT STARTED
9. Create an Entrust-hosted Certificate Enrollment Gateway for WSTEP (optional)	+	ENABLED

2. In the **Get Started** tab, click **PKI as a Service**.
3. In the **Set up PKIaaS** pane, click **Create an Entrust-hosted Certificate Enrollment Gateway for WSTEP**.

 Alternatively, you can select **Administration > PKIaaS Management** in the menu bar.

4. In the navigation sidebar, click **Enrollment Gateways** to display the Certificate Enrollment Gateway list.

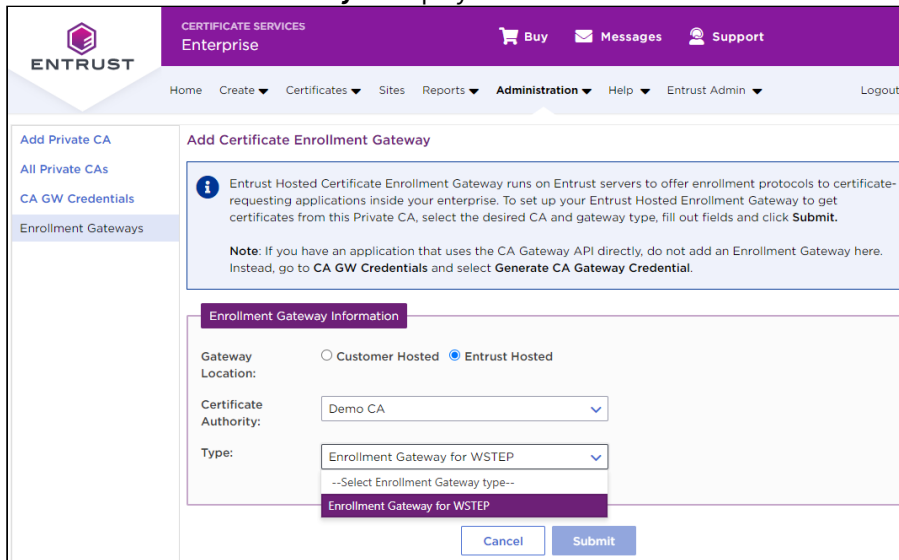


The screenshot shows the 'Enrollment Gateways' list in the Entrust Enterprise interface. The list contains the following entries:

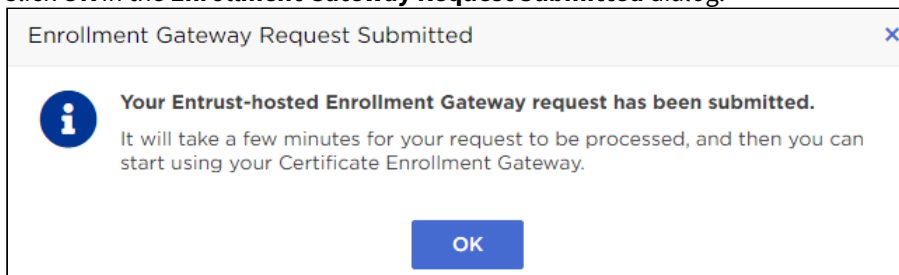
Actions	Type	Certificate Authority	Service	Gateway Location	Status
<input type="checkbox"/>	Enrollment Gateway for Intune	ABC Issuing CA	Intune	Entrust Hosted	Active
<input type="checkbox"/>	Enrollment Gateway for Intune	Tim's Issuing CA	Intune	Entrust Hosted	Active
<input type="checkbox"/>	Enrollment Gateway for MDM-WS	ABC Issuing CA 2	MDMWS	Entrust Hosted	Active
<input type="checkbox"/>	Enrollment Gateway for MDM-WS	ABC Issuing CA 3	MDMWS	Entrust Hosted	Active
<input type="checkbox"/>	Enrollment Gateway for WSTEP	Jonah Test	Active Directory	Customer Hosted	Active



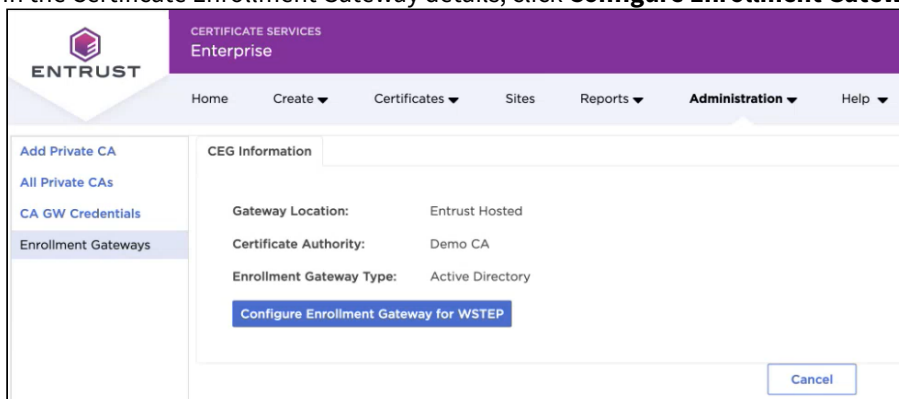
- Click **Add Enrollment Gateway** to display the **Add Certificate Enrollment Gateway** page.



- In **Gateway Location**, select **Entrust Hosted**.
- In **Certificate Authority**, select the Certificate Authority described in [Configuring an Entrust PKIaaS issuing CA for WSTEP](#).
- In **Type**, select **Enrollment Gateway for WSTEP**.
- Click **Submit**.
- Click **OK** in the **Add Enrollment Gateway Confirmation** dialog.
- Click **OK** in the **Enrollment Gateway Request Submitted** dialog.



- In the **Enrollment Gateways** view, click the name of the newly created Certificate Enrollment Gateway.
- In the Certificate Enrollment Gateway details, click **Configure Enrollment Gateway for WSTEP**.



- Wait while being redirected to the PKIaaS portal for [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#).

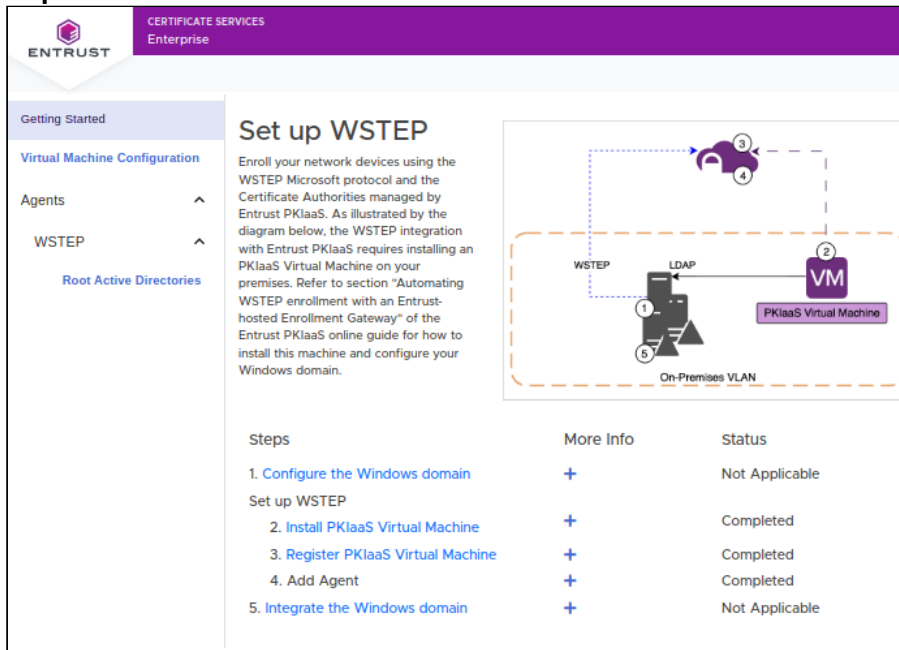
**i** If displayed, ignore the "You are not logged in" warning and wait until you are automatically logged in with your Entrust Certificate Services credentials.

## Downloading a PKIaaS Virtual Machine from the PKIaaS portal

After [Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP](#), you will be redirected to the Entrust PKIaaS portal to download a PKIaaS Virtual Machine.

### To download a PKIaaS Virtual Machine

1. Select **Getting Started** in the navigation sidebar and then click **2. Install PKIaaS Virtual Machine** under **Steps**.



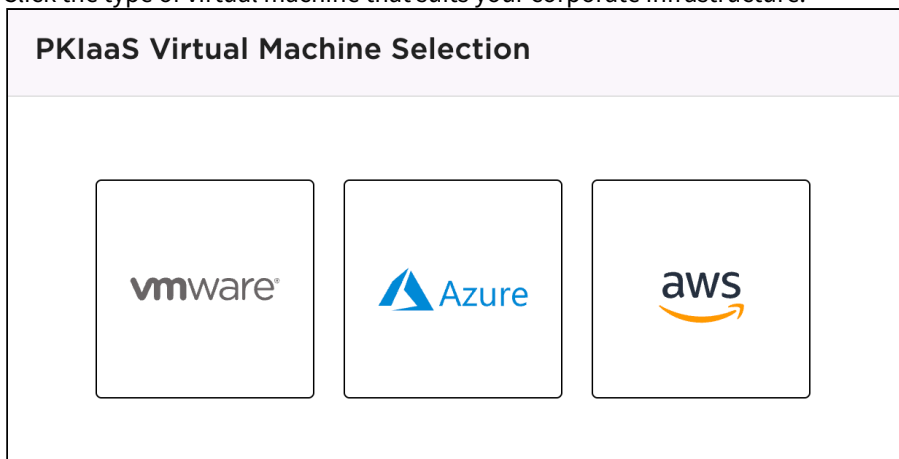
**Set up WSTEP**

Enroll your network devices using the WSTEP Microsoft protocol and the Certificate Authorities managed by Entrust PKIaaS. As illustrated by the diagram below, the WSTEP integration with Entrust PKIaaS requires installing an PKIaaS Virtual Machine on your premises. Refer to section "Automating WSTEP enrollment with an Entrust-hosted Enrollment Gateway" of the Entrust PKIaaS online guide for how to install this machine and configure your Windows domain.


**Steps**


Steps	More Info	Status
1. <a href="#">Configure the Windows domain</a>	+	Not Applicable
Set up WSTEP		
2. <a href="#">Install PKIaaS Virtual Machine</a>	+	Completed
3. <a href="#">Register PKIaaS Virtual Machine</a>	+	Completed
4. <a href="#">Add Agent</a>	+	Completed
5. <a href="#">Integrate the Windows domain</a>	+	Not Applicable


2. Click the type of virtual machine that suits your corporate infrastructure.



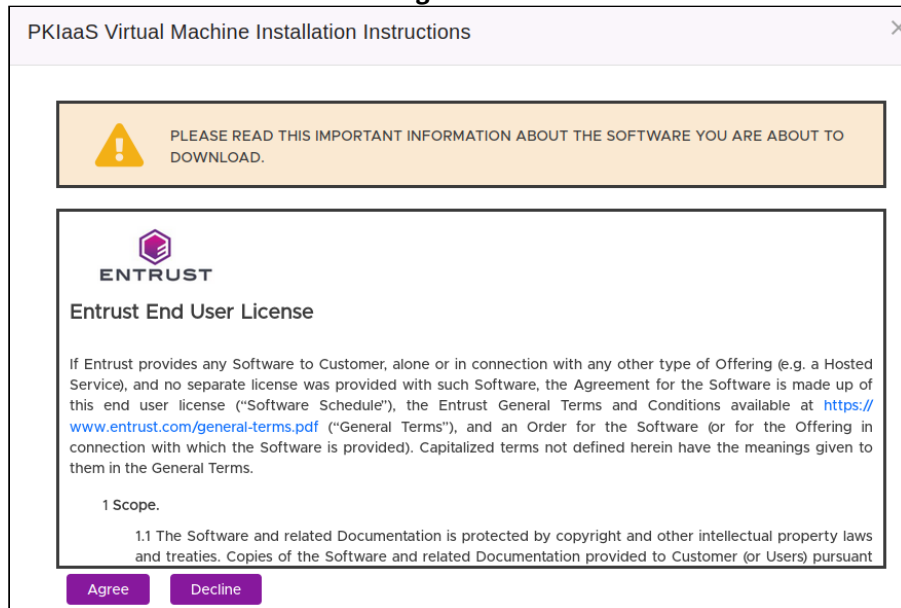
**PKIaaS Virtual Machine Selection**



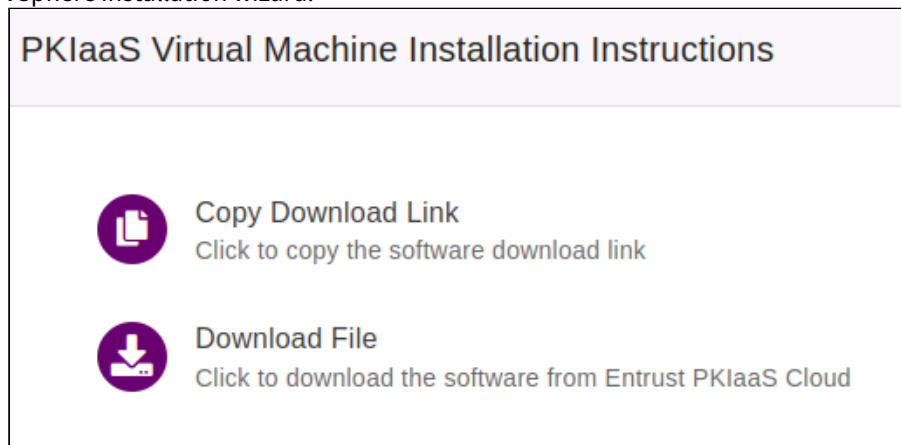




3. Read the end-user license and click **Agree**.



4. Click **Download File** to download a zipped image for the selected machine type. When selecting a VMware machine type, you can alternatively click **Copy Download Link** to copy a download URL for the VMware vSphere installation wizard.



5. If you have downloaded a zipped file, extract the file contents.

 Extracting the Azure zipped VHD image requires at least 11 GB of disk space.

## Installing a PKIaaS Virtual Machine

Once downloaded, install the PKIaaS Virtual Machine in your preferred virtualization infrastructure.

- [Installing a PKIaaS Virtual Machine on Amazon Web Services](#)
- [Installing a PKIaaS Virtual Machine on Azure](#)
- [Installing a PKIaaS Virtual Machine on VMware vSphere](#)

**i** The PKIaaS Virtual Machine is stateless and stores all configuration settings on the Entrust cloud.

## Installing a PKIaaS Virtual Machine on Amazon Web Services

See below for installing a PKIaaS Virtual Machine on the Amazon Web Services (AWS) cloud.

**i** Refer to [docs.aws.amazon.com](https://docs.aws.amazon.com) for advanced configurations not covered in this guide, such as selecting the machine DNS.

### To install a PKIaaS Virtual Machine on Amazon Web Services

1. Log into <https://console.aws.amazon.com> as a user with permission to:
  - Create and manage S3 buckets, roles, policies, snapshots, images, and EC2 instances.
  - Run AWS CLI commands using a locally installed AWS CLI or the AWS ShellCloud.
2. Perform the steps explained below.
  - [Creating an S3 bucket for the PKIaaS Virtual Machine](#)
  - [Configuring an IAM policy for the PKIaaS Virtual Machine](#)
  - [Creating an IAM role for the PKIaaS Virtual Machine](#)
  - [Uploading the OVA file of the PKIaaS Virtual Machine to AWS](#)
  - [Creating an AMI import configuration file](#)
  - [Preparing the command-line interface](#)
  - [Importing the AMI](#)
  - [Creating an EC2 instance for the PKIaaS Virtual Machine](#)
  - [Opening a PKIaaS Virtual Machine session on AWS](#)

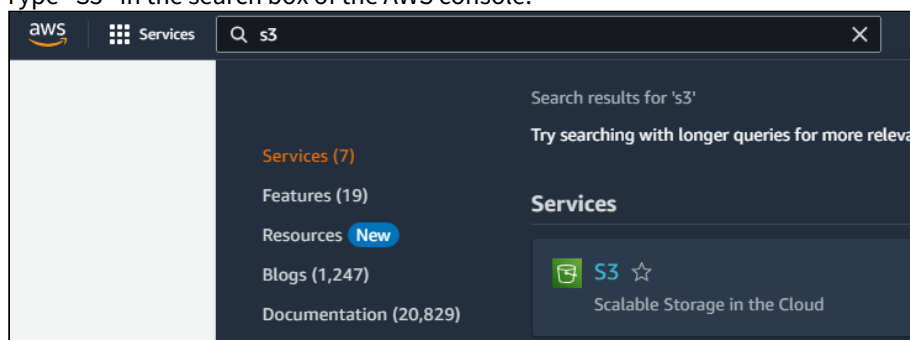
### Creating an S3 bucket for the PKIaaS Virtual Machine

If you don't have an S3 bucket, create a new one as explained below.

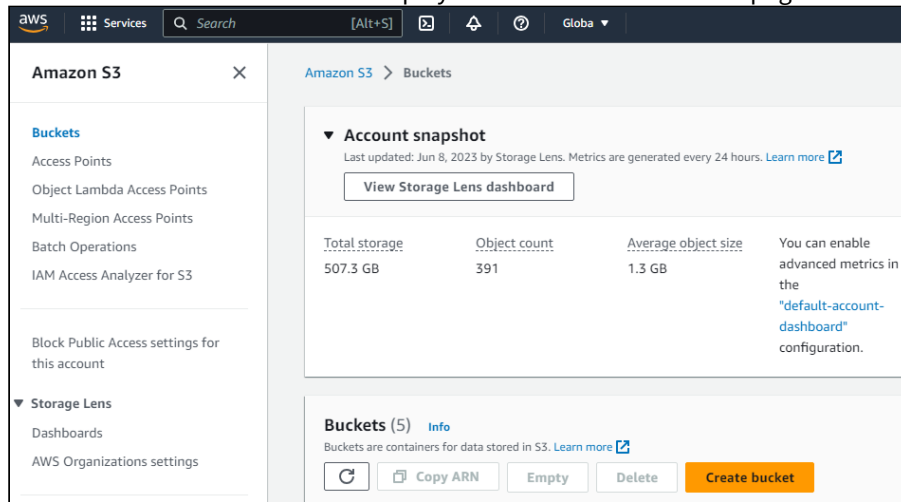
**i** Skip this step if the bucket was already created for a previous deployment.

### To create an S3 bucket


1. Type "S3" in the search box of the AWS console.



2. Select **S3** in the search results to display the **Amazon S3 > Buckets** page.



3. Click **Create a bucket**.
4. Enter a name for the new bucket.
5. Select an AWS region for the bucket.


 All the resources created to deploy the PKIaaS Virtual Machine in Amazon Web Service must share the same region.

6. For the other S3 settings, you can leave the default values.
  - Object Ownership
  - Block Public Access settings for this bucket
  - Bucket Versioning
  - Default encryption
  - Advanced settings
7. Click **Create bucket**.

## Configuring an IAM policy for the PKIaaS Virtual Machine

For granting permission to the S3 bucket, create an IAM (Identity and Access Management) policy or reuse an existing one.

- [Creating a new IAM policy](#)
- [Updating an existing IAM policy](#)

 Skip this step if the policy was already configured for a previous deployment.

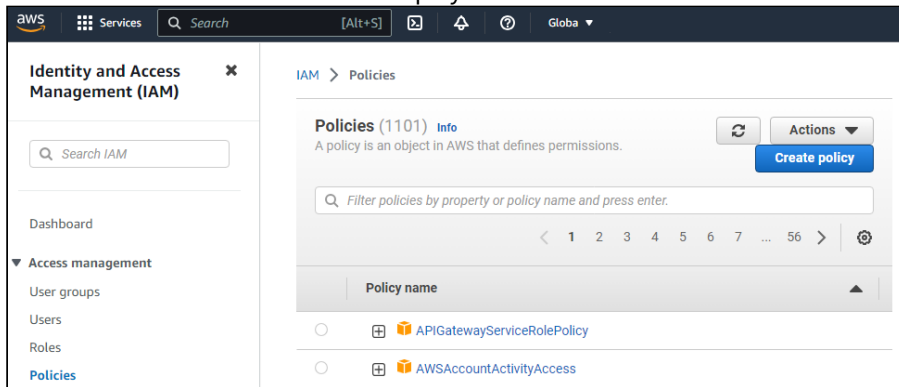
### Creating a new IAM policy

See below for creating an IAM policy granting permission to the S3 bucket.

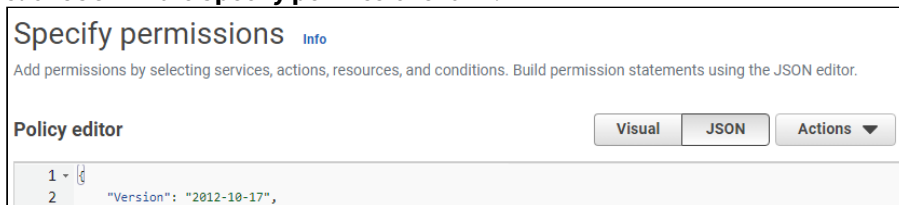
#### To create an IAM policy

1. Type "IAM" in the search box of the AWS console.

2. Select **IAM** in the search results to display the IAM dashboard.



3. Select **Access management > Policies** in the navigation sidebar.
4. In the content pane, click the name of an existing IAM policy or click **Create policy** to create a new one.
5. Click **JSON** in the **Specify permissions** form.



6. Paste the following JSON code in the **Policy editor** field.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "s3:GetBucketLocation",
        "s3:GetObject",
        "s3:ListBucket"
      ],
      "Resource": [
        "arn:aws:s3:::$S3_BUCKET_NAME",
        "arn:aws:s3:::$S3_BUCKET_NAME/*"
      ]
    },
    {
      "Effect": "Allow",
      "Action": [
        "ec2:ModifySnapshotAttribute",
        "ec2:CopySnapshot",
        "ec2:RegisterImage",
        "ec2:Describe*"
      ],
      "Resource": "*"
    }
  ]
}
```

```
}

```

7. In the JSON code, replace `$S3_BUCKET_NAME` with the name of the S3 bucket selected when [Creating an S3 bucket for the PKIaaS Virtual Machine](#).
8. Click **Next**.
9. Enter a name and an optional description for the new policy.
10. Click **Create policy**.

### Updating an existing IAM policy

See below for how to update an existing IAM policy for granting permission to the S3 bucket.

#### To update an IAM policy

1. Type "IAM" in the search box of the AWS console.
2. Select **IAM** in the search results to display the IAM dashboard.



3. Select **Access management > Policies** in the navigation sidebar.
4. In the content pane, click the **+** expand button for an existing IAM policy.
5. Click **Edit**.
6. In the policy editor field, add the following code to the `Resource` array.

```
"arn:aws:s3:::$S3_BUCKET_NAME",
"arn:aws:s3:::$S3_BUCKET_NAME/*"
```

7. In the code, replace `$S3_BUCKET_NAME` with the name of the S3 bucket selected when [Creating an S3 bucket for the PKIaaS Virtual Machine](#).
8. Click **Next**.
9. Click **Save changes**.

### Creating an IAM role for the PKIaaS Virtual Machine

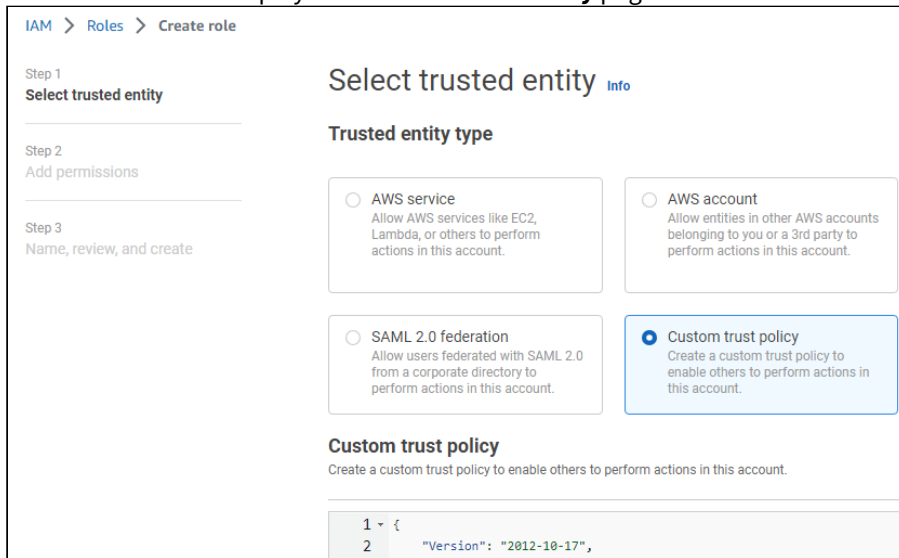
Create an IAM (Identity and Access Management) role for the policy described in [Configuring an IAM policy for the PKIaaS Virtual Machine](#).

**i** Skip this step if the role was already created for a previous deployment.

#### To create an IAM role

1. Type "IAM" in the search box.
2. Select **IAM** in the search results to display the IAM dashboard.
3. Select **Access management > Roles** in the navigation sidebar.

- Click **Create role** to display the **Select trusted entity** page.



IAM > Roles > Create role

Step 1  
Select trusted entity

Step 2  
Add permissions

Step 3  
Name, review, and create

### Select trusted entity Info

**Trusted entity type**

- AWS service**  
Allow AWS services like EC2, Lambda, or others to perform actions in this account.
- AWS account**  
Allow entities in other AWS accounts belonging to you or a 3rd party to perform actions in this account.
- SAML 2.0 federation**  
Allow users federated with SAML 2.0 from a corporate directory to perform actions in this account.
- Custom trust policy**  
Create a custom trust policy to enable others to perform actions in this account.

**Custom trust policy**  
Create a custom trust policy to enable others to perform actions in this account.

```

1 - {
2   "Version": "2012-10-17",

```

- Under **Trusted entity type**, click **Custom trust policy**.
- Paste the following code under **Custom trust policy**.

```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "vmie.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "sts:Externalid": "vmimport"
        }
      }
    }
  ]
}

```

- Click **Next**.
- In the **Add permissions** page, select the policy described in [Configuring an IAM policy for the PKIaaS Virtual Machine](#).
- Click **Next** to display the **Role details** page.
- In the **Role name** field, type `vmimport`.
- Click **Create role**.

## Uploading the OVA file of the PKIaaS Virtual Machine to AWS

Upload to Amazon Web Services the PKIaaS Virtual Machine image file with `.ova` extension.



 See [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#) to obtain this file.

### To upload the OVA file

1. Navigate to the **Amazon S3 page > Buckets** page of the AWS console.
2. Click the name of an S3 bucket. As explained in [Creating an S3 bucket for the PKIaaS Virtual Machine](#), you can select an existing bucket or create a new one.
3. In the S3 bucket details page, click **Upload**.
4. Select the PKIaaS Virtual Machine image file with `.ova` extension and wait while the file uploads.

### Creating an AMI import configuration file

In your local machine, create a `containers.json` file with the following contents.

```
[
  {
    "Description": "Entrust PKIaaS Virtual Machine AMI file",
    "Format": "ova",
    "UserBucket": {
      "S3Bucket": "$AWS_S3_BUCKET",
      "S3Key": "$OVA_FILE"
    }
  }
]
```

In the file contents, replace:

- `$AWS_S3_BUCKET` with the name of the S3 bucket described in [Creating an S3 bucket for the PKIaaS Virtual Machine](#).
- `$OVA_FILE` with the name of the OVA file selected when [Uploading the OVA file of the PKIaaS Virtual Machine to AWS](#).

For example:

```
[
  {
    "Description": "Entrust PKIaaS Virtual Machine AMI file",
    "Format": "ova",
    "UserBucket": {
      "S3Bucket": "pkiaas-vm",
      "S3Key": "pkiaas-vm-prod-us.ova"
    }
  }
]
```

### Preparing the command-line interface

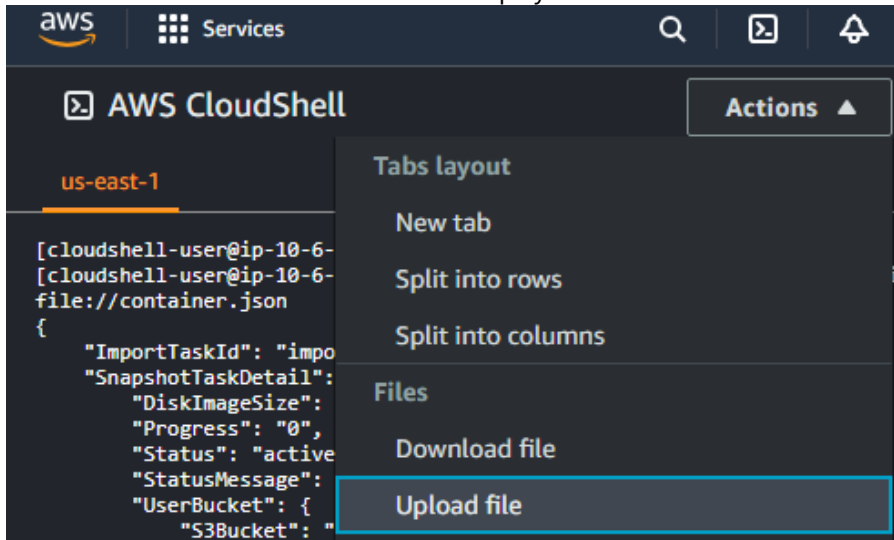
To run AWS commands on your machine, download and install the AWS CLI as explained in:

<https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html>

Alternatively, you can use the CloudShell provided by the AWS console. This option requires uploading the configuration file as explained below.

### To upload the AMI import configuration file

1. Type "shell" in the search box of the AWS console.
2. Select **CloudShell** in the search results to display the online AWS shell.



3. In the options menu, select **Actions > Upload file**.
4. Select the `containers.json` file described in [Creating an AMI import configuration file](#).
5. Click **Upload**.

### Importing the AMI

Run the following AWS command to import the Entrust PKIaaS Virtual Machine OVA as an EC2 AMI.

```
aws ec2 import-image --disk-containers file://containers.json
```

For example:

```
$ aws ec2 import-image --disk-containers file://containers.json
{
  "ImportTaskId": "import-ami-0c0ccaaab21ee1ce5",
  "Progress": "1",
  "SnapshotDetails": [
    {
      "Description": "Entrust PKIaaS Virtual Machine AMI file",
      "DiskImageSize": 0.0,
      "Format": "OVA",
      "Url": "s3://pkiaas-vm/pkiaas-vm-prod-us.ova",
      "UserBucket": {
        "S3Bucket": "pkiaas-vm",
        "S3Key": "pkiaas-vm-prod-us.ova"
      }
    }
  ],
}
```

```
"Status": "active",  
"StatusMessage": "pending"  
}
```

Use the value of the `ImportTaskId` field to check the status of the import process.

```
aws ec2 describe-import-image-tasks --import-task-ids <ImportTaskId>
```

For example:

```
{  
  "ImportImageTasks": [  
    {  
      "Architecture": "x86_64",  
      "ImageId": "ami-0844eae6801fff32a",  
      "ImportTaskId": "import-ami-0c0ccaaab21ee1ce5",  
      "LicenseType": "BYOL",  
      "Platform": "Linux",  
      "SnapshotDetails": [  
        {  
          "DeviceName": "/dev/sda1",  
          "DiskImageSize": 1538403840.0,  
          "Format": "VMDK",  
          "SnapshotId": "snap-0a6deaf4b94eb2b36",  
          "Status": "completed",  
          "Url": "s3://pkiaas-vm/pkiaas-vm-prod-us.ova",  
          "UserBucket": {  
            "S3Bucket": "pkiaas-vm",  
            "S3Key": "pkiaas-vm-prod-us.ova"  
          }  
        }  
      ],  
      "Status": "completed",  
      "Tags": []  
    }  
  ]  
}
```

In the command output, check the value of the `Status` field.

- If this value is `active`, rerun the command after 5 minutes to check the status again.
- If this value is `completed`, the import process has already finished. Copy the `ImageId` value you will later use for [Creating an EC2 instance for the PKIaaS Virtual Machine](#).

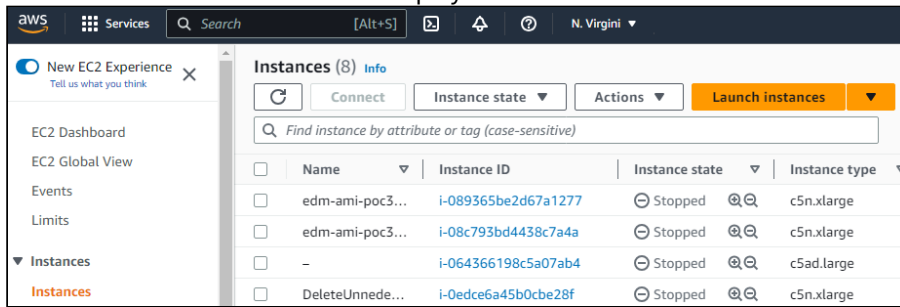
## Creating an EC2 instance for the PKIaaS Virtual Machine

Create an EC2 instance for running the PKIaaS Virtual Machine image.

### To create the EC2 instance

1. Type "EC2" in the search box.

2. Select **EC2** in the search results to display the EC2 dashboard.



3. Select **Instances > Instance** in the navigation sidebar.
4. Click **Launch instance** in the options menu.
5. Configure the following settings.
  - [Name and tags > Name](#)
  - [Application and OS Images \(Amazon Machine Image\)](#)
  - [Instance type](#)
  - [Key pair \(login\)](#)
  - [Network settings > Firewall \(security groups\)](#)
  - [Configure storage](#)
6. Click **Launch instance**.

[Name and tags > Name](#)

Enter a name for the new EC2 instance.

[Application and OS Images \(Amazon Machine Image\)](#)

Select the image previously imported in [Importing the AMI](#), under the My AMIs tab.

[Instance type](#)

Select an EC2 instance type. The instance type must be built on the AWS Nitro System: <https://docs.aws.amazon.com/ec2/latest/instancetypes/ec2-nitro-instances.html>

The minimum recommended instance type is **c5a.large**

[Key pair \(login\)](#)

Select "Proceed without a key pair" as the SSH connection won't be used.

[Network settings > Firewall \(security groups\)](#)

Select or create a security group with permission to open the ports described in [Network requirements for the PKIaaS Virtual Machine](#).

**i** See <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-security-groups.html> for how to create a security group.

[Configure storage](#)

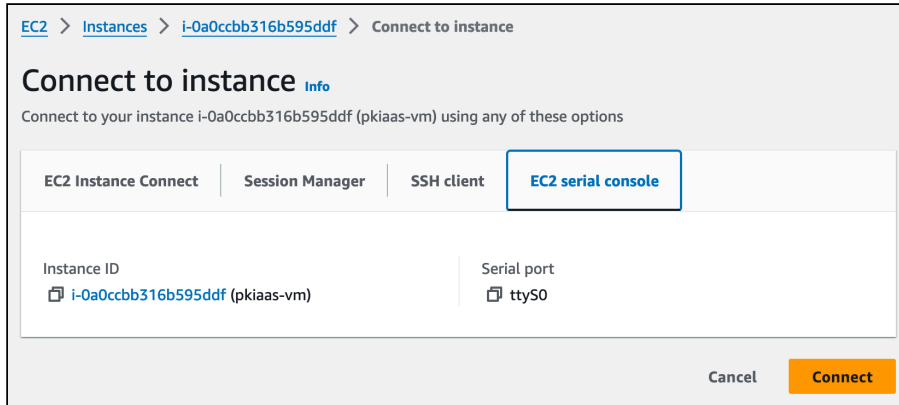
Select the default volume size.

## Opening a PKIaaS Virtual Machine session on AWS

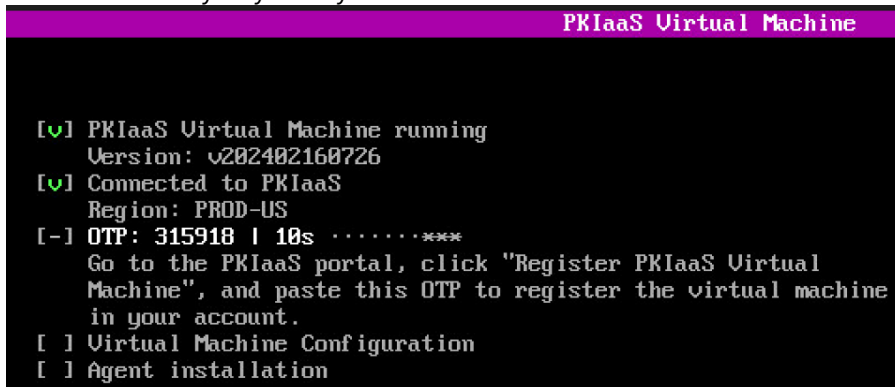
After [Creating an EC2 instance for the PKIaaS Virtual Machine](#), refresh the EC2 instance list until the instance status is **Running**, and then open a session into the PKIaaS Virtual Machine.

### To open a PKIaaS Virtual Machine session on AWS


1. Select the PKIaaS PKIaaS Virtual Machine in the instances list.
2. Click **Connect** in the options menu.
3. Navigate to the **EC2 serial console** tab.
4. Click **Connect**.



5. Wait a few seconds after the serial console appears.
6. Press the Enter key on your keyboard to launch the PKIaaS Virtual Machine interface.




7. Take note of the One-time Password (OTP) the PKIaaS Virtual Machine displays on start. You will need this OTP for [Registering a PKIaaS Virtual Machine](#).

 The PKIaaS Virtual Machine refreshes the OTP every 30 seconds.

## Installing a PKIaaS Virtual Machine on Azure

See below for installing a PKIaaS Virtual Machine on Microsoft Azure.

 Refer to [learn.microsoft.com/azure](https://learn.microsoft.com/azure) for advanced configurations not covered in this guide, such as selecting the machine DNS.


### To install a PKIaaS Virtual Machine in Azure

1. Log into <https://portal.azure.com> as a user with permission to create and manage:

- Storage accounts
  - Images
  - Network rules
  - SSH keys
  - Virtual machines
2. Perform the steps described below.
    - [Creating an Azure storage account for the PKIaaS Virtual Machine](#)
    - [Uploading the VHD image of the PKIaaS Virtual Machine file to Azure](#)
    - [Creating an Azure image for the PKIaaS Virtual Machine](#)
    - [Creating Azure network rules for the PKIaaS Virtual Machine](#)
    - [Creating the PKIaaS Virtual Machine on Azure](#)
    - [Opening a PKIaaS Virtual Machine session on Azure](#)

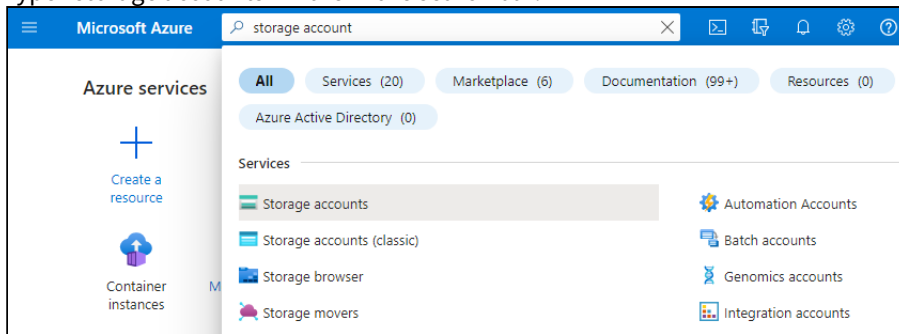
## Creating an Azure storage account for the PKIaaS Virtual Machine

Select an existing Azure storage account or create a new one as explained below.

 Skip this step if the storage was already created for a previous deployment.

### To create an Azure storage account

1. Type "storage accounts" in the Azure search bar.




2. Select **Storage accounts** in the search results.
3. Click **+ Create** on the **Storage accounts** page.
4. Configure the following settings on the **Create a storage account** page.
  - [Subscription](#)
  - [Resource group](#)
  - [Storage account name](#)
  - [Region](#)
5. Click **Review** to display the configured settings.
6. Click **Create** to create the storage account.

#### Subscription

Select your Azure user subscription.

#### Resource group

Select an existing resource group or create a new one.


 All the resources created to deploy a PKIaaS Virtual Machine in Azure must share the same resource group.

### Storage account name

Enter a name for the new storage account name.

### Region

Select a region for the new storage account.

 All the resources created to deploy Entrust PKI Enterprise Appliance in Azure must share the same region.

### Uploading the VHD image of the PKIaaS Virtual Machine file to Azure

Upload to Azure the PKIaaS Virtual Machine image file with `.vhd` extension.

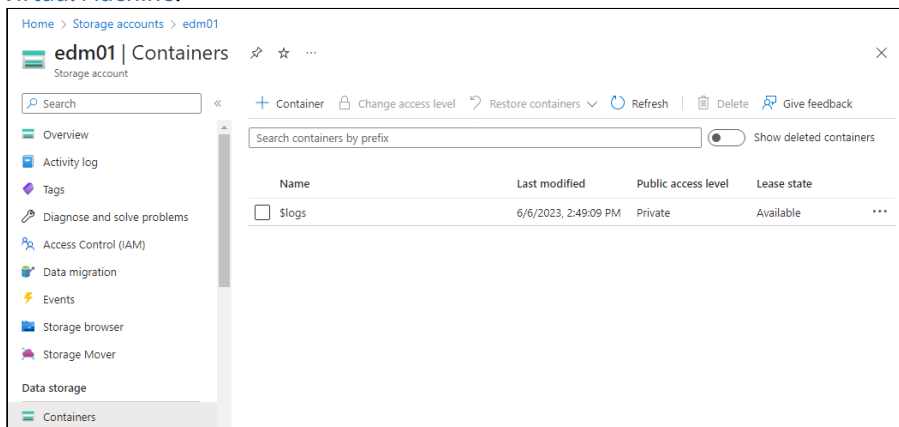
 See [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#) to obtain this file.

### To upload the VHD image file

1. Extract the contents of the Azure zipped image.

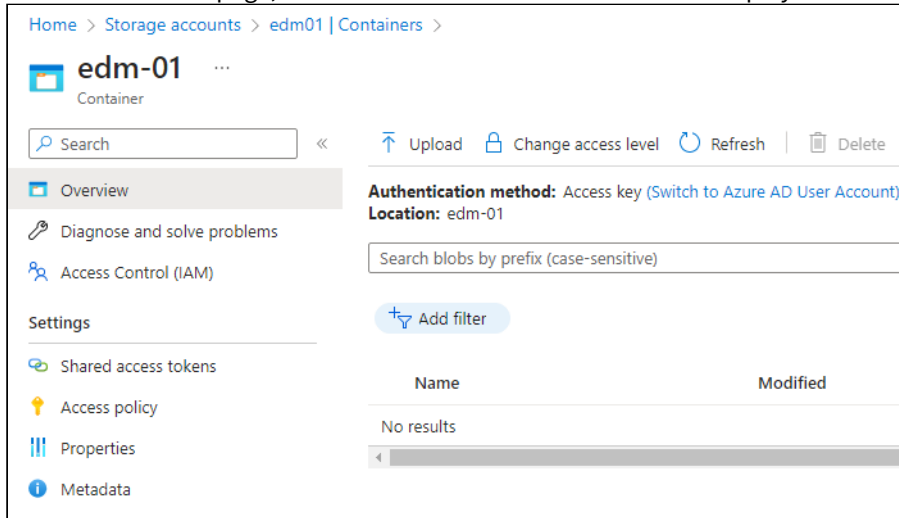
 Extracting the Azure zipped VHD image requires at least 11 GB of disk space.

2. In the Azure Portal, select the storage account described in [Creating an Azure storage account for the PKIaaS Virtual Machine](#).



3. In the sidebar menu of the storage settings page, select **Data storage > Containers**.
4. On the **Containers** page, click **+ Container**
5. Enter a name for the new container and click **Create**.

- On the **Containers** page, click the name of the new container to display the container details.



- On the container details page, click **Upload**.
- Select the Entrust PKIaaS Virtual Machine image file with `.vdh` extension and wait while the file uploads.

## Creating an Azure image for the PKIaaS Virtual Machine

See below for how to create the PKIaaS Virtual Machine image using the Azure Portal.

### To create the image in the Azure Portal

- Type "images" in the Azure Portal search bar.
- Click **Images** on the search results.
- Click **+ Create** on the **Images** page.
- Configure the following settings in the **Create an image** page.
  - [Project details](#)
  - [Instance details](#)
  - [OS disk](#)
- Click **Review + create** to validate the image settings.
- Click **Create** to create the new image.

#### Project details

Configure the following settings under **Project details**.

Setting	Value
Subscription	Select your Azure subscription.
Resource group	Select the same resource group selected when <a href="#">Creating an Azure storage account for the PKIaaS Virtual Machine</a> .

#### Instance details

Configure the following settings under **Instance details**.



Setting	Value
Name	Enter a unique name for the new image.
Region	Select the same region selected when <a href="#">Creating an Azure storage account for the PKIaaS Virtual Machine</a> .

#### OS disk

Configure the following settings under **OS disk**.

Setting	Value
OS type	Select <b>Linux</b> .
VM generation	Select <b>Gen 1</b>
Storage blob	Select the VHD image described in <a href="#">Uploading the VHD image of the PKIaaS Virtual Machine file to Azure</a> .
Account type	Select <b>Standard SSD</b> .
Host caching	Select <b>Read-only</b> .

#### Creating Azure network rules for the PKIaaS Virtual Machine

Create a Network Security Group with rules granting access to the ports listed in [Network requirements for the PKIaaS Virtual Machine](#).

#### Creating the PKIaaS Virtual Machine on Azure

Set the following configuration when creating the PKIaaS Virtual Machine on Azure.

- [Basics](#)
- [Disk](#)
- [Networking](#)

#### Basics

Set the following values in the **Basics** tab of the **Create a virtual machine** page.

Setting	Value
Project details / Subscription	Select your Azure subscription.

Setting	Value
Project details / Resource group	Select the resource group described in <a href="#">Creating an Azure storage account for the PKIaaS Virtual Machine</a> .
Instance details / Virtual machine name	Enter a name for the new virtual machine.
Instance details / Region	Select the region shared by the rest of Azure resources.
Instance details / Image	Select the image described in <a href="#">Creating an Azure image for the PKIaaS Virtual Machine</a> .
Instance details / Size	Minimum recommended size: <code>Standard_B2s</code> .
Administrator account / Authentication type	Select <b>SSH public key</b> .
Administrator account / SSH public key source	Generate a new one or use an existing one. This step is required by the Azure VM creation process, but the key won't be used at all in PKIaaS VM as there is no SSH connection.
Inbound port rules / Public inbound ports	Select <b>None</b> .
Licensing type / License type	Select <b>Other</b> .

#### Disk

Set the following values in the **Disk** tab of the **Create a virtual machine** page.

Setting	Value
OS disk / OS disk type	Select <b>Premium SSD (locally-redundant storage)</b> or higher.

#### Networking

Set the following values in the **Networking** tab of the **Create a virtual machine** page.

Setting	Value
NIC network security group	Select <b>Advanced</b> .

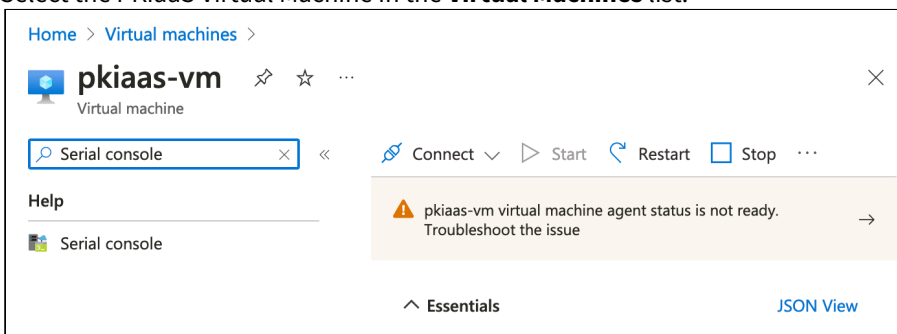
Setting	Value
Configure network security group	Select the network security group described in <a href="#">Creating Azure network rules for the PKIaaS Virtual Machine</a> .

## Opening a PKIaaS Virtual Machine session on Azure

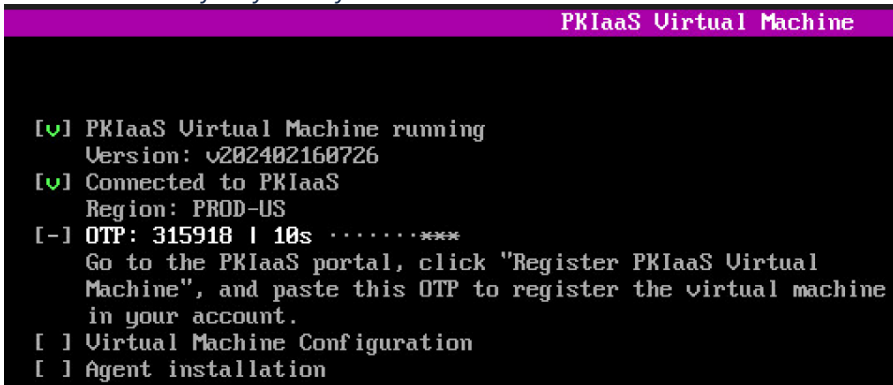
After [Creating the PKIaaS Virtual Machine on Azure](#), wait until the machine status changes from **Deployment is in progress** to **Your deployment is complete**, and open a session into the PKIaaS Virtual Machine.

### To open a PKIaaS Virtual Machine session on Azure


1. Select the PKIaaS Virtual Machine In the **Virtual Machines** list.



2. If displayed, ignore the "Agent status is Not ready" warning.
3. Type "Serial console" In the search box.
4. Click the **Serial console** result under the search box.
5. Wait until the serial connection is established and the "Press ENTER to continue" message appears.
6. Press the Enter key on your keyboard to launch the PKIaaS Virtual Machine interface.



7. Take note of the One-time Password (OTP) the PKIaaS Virtual Machine displays on start. You will need this OTP for [Registering a PKIaaS Virtual Machine](#).

 The PKIaaS Virtual Machine refreshes the OTP every 30 seconds.

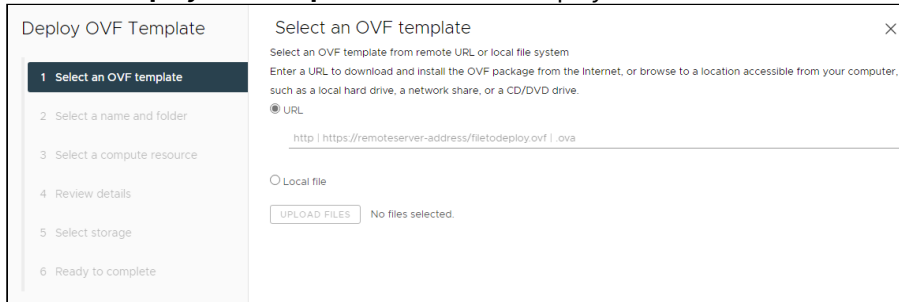
## Installing a PKIaaS Virtual Machine on VMware vSphere

Use either the download link or the `.ova` image file to install a PKIaaS Virtual Machine in VMware Workstation.

**i** See [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#) to obtain the download link or the installation file.

### To install a PKIaaS Virtual Machine in VMware vSphere

1. Log into your VMware vSphere portal.
2. Right-click on a folder of the navigation tree.
3. Select the **Deploy OVF Template** command to display the machine creation wizard.



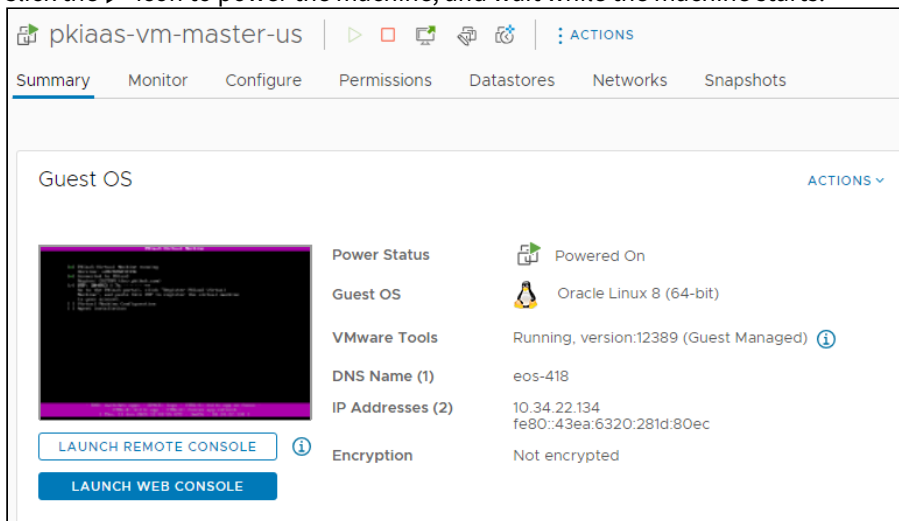
4. In the **Select an OVF template** page, click **URL** to paste the download link, or **Local** file to import the `.ova` image file.
5. In the **Select a name and folder** page, select a name and a folder for the new virtual machine.
6. In the **Select a compute resource** page, select a computing resource for the new virtual machine.
7. In the **Review details** page, review the settings already selected for the new virtual machine.
8. In the **Select storage** page, select a storage resource for the new virtual machine.

**⚠** Do not enable the **Encrypt this virtual machine** option.

9. In the **Select networks** page, select a network for the new virtual machine.

**i** See [Network requirements for the PKIaaS Virtual Machine](#) for the requirements of the selected network.

10. In the **Ready to complete** page, review all the machine settings.
11. Click **Finish** and wait while VMware vSphere creates the machine.
12. Select the newly created machine in the navigation tree.
13. Click the **▶** icon to power the machine, and wait while the machine starts.




14. Click **LAUNCH WEB CONSOLE** to display the machine prompt in your web browser.

```
PKIaaS Virtual Machine

[✓] PKIaaS Virtual Machine running
    Version: v202402160726
[✓] Connected to PKIaaS
    Region: PROD-US
[-] OTP: 315918 | 10s .....***
    Go to the PKIaaS portal, click "Register PKIaaS Virtual
    Machine", and paste this OTP to register the virtual machine
    in your account.
[ ] Virtual Machine Configuration
[ ] Agent installation
```

15. Take note of the One-time Password (OTP) the PKIaaS Virtual Machine displays on start. You will need this OTP for [Registering a PKIaaS Virtual Machine](#).

 The PKIaaS Virtual Machine refreshes the OTP every 30 seconds.

## Configuring PKIaaS Virtual Machines on the PKIaaS portal

Once installed on your corporate infrastructure, configure the PKIaaS Virtual Machine in the Entrust PKIaaS portal.

- [Registering a PKIaaS Virtual Machine](#)
- [Adding an agent to a PKIaaS Virtual Machine](#)
- [Linking additional Active Directories to an agent](#)
- [Managing PKIaaS Virtual Machine configurations](#)
- [Managing Active Directory configurations](#)

Once set, the final configuration must include:

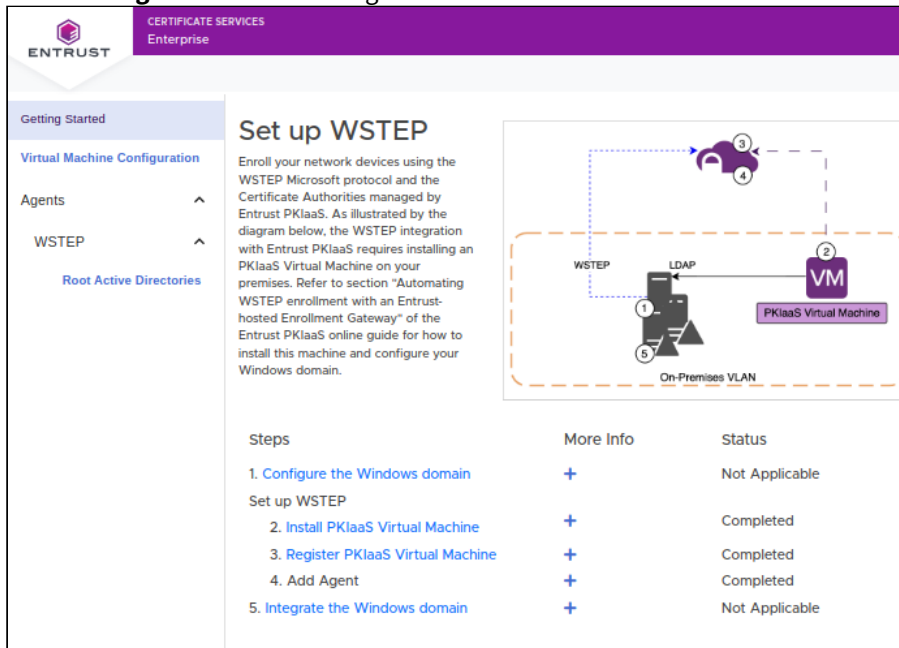
- An on-premises PKIaaS Virtual Machine linked to one PKIaaS Virtual Machine configuration.
- One WSTEP enrollment agent associated with the PKIaaS Virtual Machine configuration.
- One or more root Active Directory configurations linked with each WSTEP enrollment agent.

## Registering a PKIaaS Virtual Machine

Once installed on your premises, register the PKIaaS Virtual Machine in the Entrust PKIaaS portal.

### To register a PKIaaS Virtual Machine

1. Click **Getting Started** in the navigation sidebar.



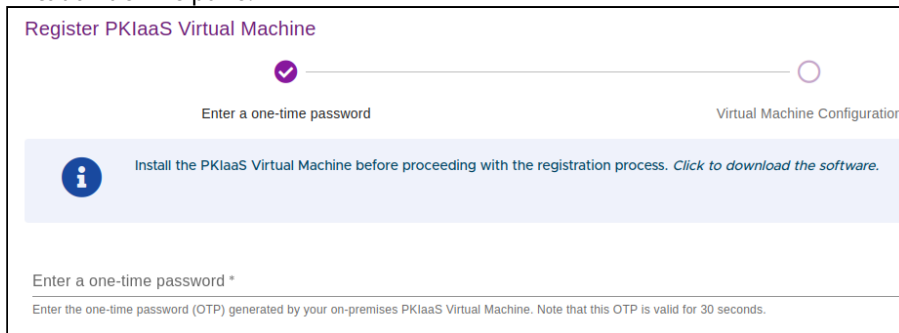
**Set up WSTEP**

Enroll your network devices using the WSTEP Microsoft protocol and the Certificate Authorities managed by Entrust PKIaaS. As illustrated by the diagram below, the WSTEP integration with Entrust PKIaaS requires installing an PKIaaS Virtual Machine on your premises. Refer to section "Automating WSTEP enrollment with an Entrust-hosted Enrollment Gateway" of the Entrust PKIaaS online guide for how to install this machine and configure your Windows domain.

**Steps**

Steps	More Info	Status
1. <a href="#">Configure the Windows domain</a>	+	Not Applicable
Set up WSTEP		
2. <a href="#">Install PKIaaS Virtual Machine</a>	+	Completed
3. <a href="#">Register PKIaaS Virtual Machine</a>	+	Completed
4. <a href="#">Add Agent</a>	+	Completed
5. <a href="#">Integrate the Windows domain</a>	+	Not Applicable

2. On the **Set up WSTEP** pane, click the **Register PKIaaS Virtual Machine** step to display the **Register PKIaaS Virtual Machine** pane.



**Register PKIaaS Virtual Machine**

Enter a one-time password

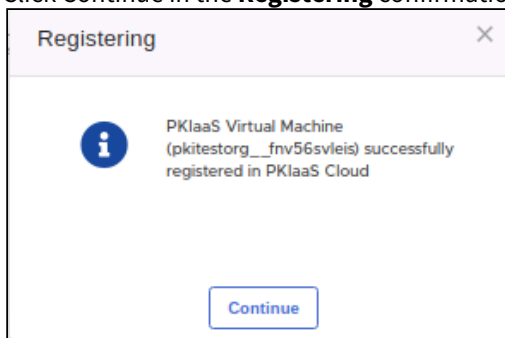
Virtual Machine Configuration

**i** Install the PKIaaS Virtual Machine before proceeding with the registration process. [Click to download the software.](#)

Enter a one-time password \*

Enter the one-time password (OTP) generated by your on-premises PKIaaS Virtual Machine. Note that this OTP is valid for 30 seconds.

3. In the **Enter one-time password** field, enter the one-time password you obtained when completing the installation on the selected platform.
  - [Opening a PKIaaS Virtual Machine session on AWS](#)
  - [Opening a PKIaaS Virtual Machine session on Azure](#)
  - [Installing a PKIaaS Virtual Machine on VMware vSphere](#)
4. Click **Next** and wait while Entrust PKIaaS registers the machine
5. Click **Continue** in the **Registering** confirmation dialog.

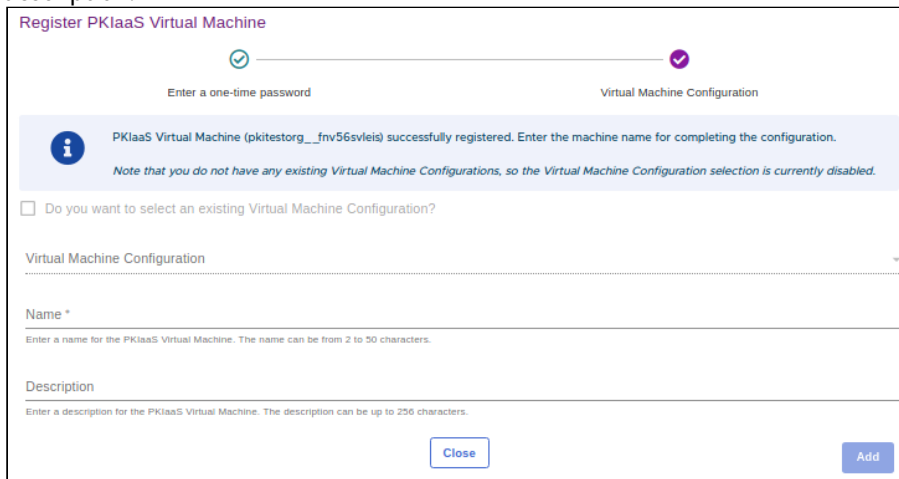


**Registering**

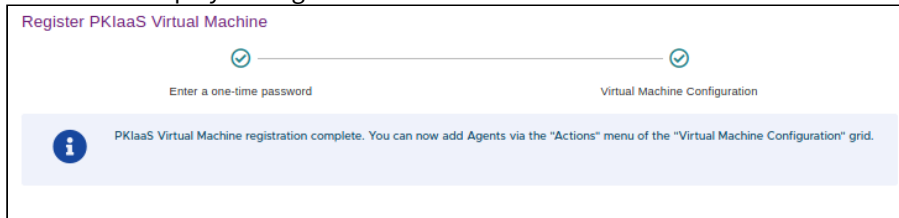
**i** PKIaaS Virtual Machine (pkitestorg\_\_fnv56svleis) successfully registered in PKIaaS Cloud

[Continue](#)

- In the **PKIaaS Virtual Machine Configuration** form, enter a unique name for the machine and an optional description.



- Click **Add** to display the registration confirmation.



- Click **Close**.

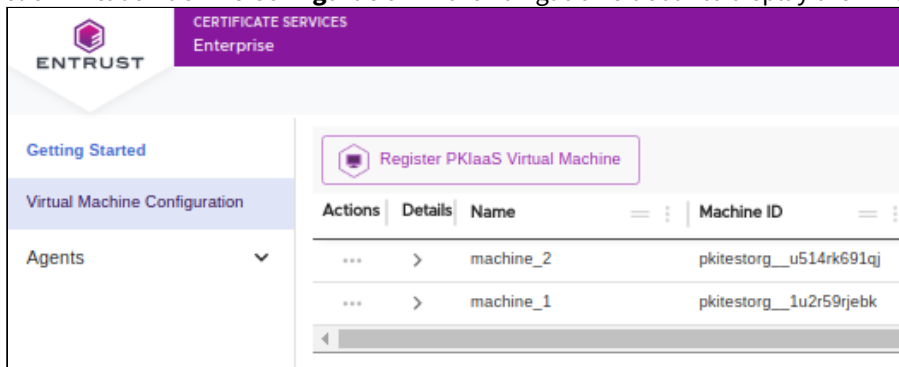
## Adding an agent to a PKIaaS Virtual Machine

Add an enrollment agent to the PKIaaS Virtual Machine you previously registered in [Registering a PKIaaS Virtual Machine](#).

**⚠** You cannot link the same Active Directory to different agents. However, you can link additional Active Directories to an agent as explained in [Linking additional Active Directories to an agent](#).

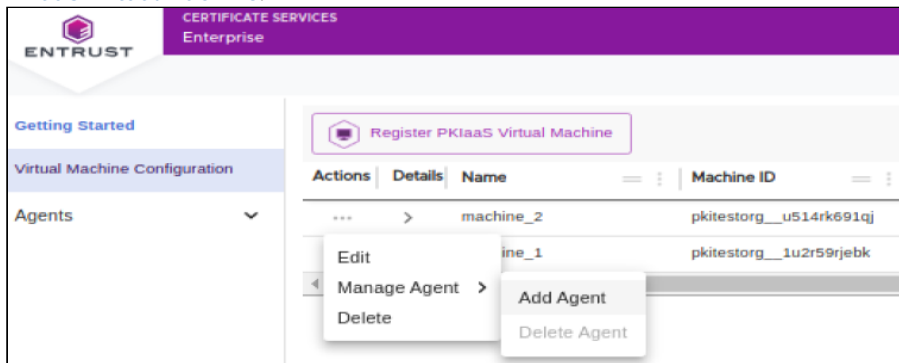
### To add an agent to a PKIaaS Virtual Machine

- Click **Virtual Machine Configuration** in the navigation sidebar to display the PKIaaS Virtual Machines grid.

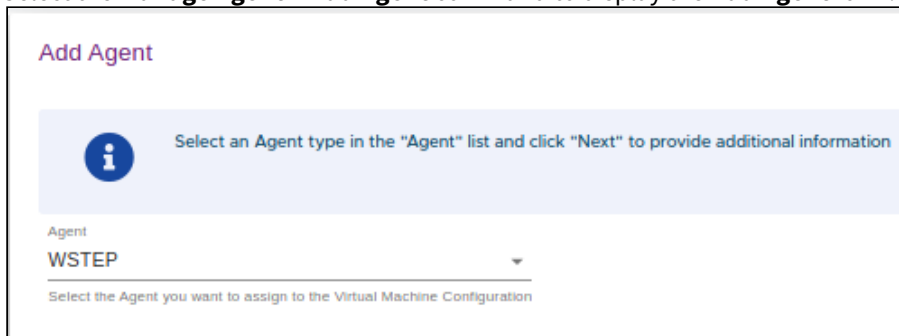


Actions	Details	Name	Machine ID
...	>	machine_2	pkitestorg__u514rk691qj
...	>	machine_1	pkitestorg__1u2r59rjebk

- In the PKIaaS Virtual Machines grid, click the ... three dots icon of the machine you registered in [Registering a PKIaaS Virtual Machine](#).



- Select the **Manage Agent > Add Agent** command to display the **Add Agent** form.



- Select **WSTEP** in the **Agent** list.
- Click **Next** and follow the steps below.
  - [Configuring an Active Directory in the agent](#)
  - [Preparing the service account for Kerberos](#)
  - [Synchronizing the agent with the root Active Directory](#)

## Configuring an Active Directory in the agent

Each agent must be associated with at least one Active Directory.



**Add Root Active Directory**

Password \*  
 ..... 👁

The service account password

DNS Server  
 10.34.22.55:53

The DNS server for the WSTEP Agent to query. Enter the IP and port (in IP:PORT syntax), or just the IP to assume the default port 53.

Certificate Authority  
**My Subordinate CA**

The default Certificate Authority for the root Active Directory certificate templates. You can later select a different Certificate Authority via the "Manage Certificate Templates" action in the "Root Active Directories" grid.

LDAPS Trusted Certificates Add Certificate

```
qRCf9Uq6T1ZF5rTamx508RppdLKip8cYh/
Wvc2xRgUZnWtWZA1R1u/E2p5C9c/yX
yWt1pRsQ0FnePXRni+CXvJRg+hmuJhPeo09RbGIpSA6PwxTLDLsnd
TJt4DiR4y
kmLTraKmxhBqqCgnzQR3lksbJ6MMkxE8VD9h29qnIVB5sFVJ0U17A
```

Paste the PEM or Base64 encoded certificate. To add more, click the Add Certificate button

<b>Distinguished Name</b>	CN=demoserver,O=Entrust,ST=Barcelona,C=ES
<b>Certificate Authority</b>	CN=demoserver,O=Entrust,ST=Barcelona,C=ES
<b>Serial (Hex)</b>	22200f5c85dad245c215099a736fd6fac9a0301b
<b>Valid From</b>	April 17, 2024 at 11:30 AM GMT+2
<b>Valid To</b>	April 17, 2025 at 11:30 AM

Close
Add

See below for the required parameters.

- [Domain Name](#)
- [Username](#)
- [Password](#)
- [DNS](#)
- [Certificate Authority](#)
- [LDAPS Trusted Certificates](#)

#### Domain Name

The name of the root domain of the Microsoft Active Directory forest that was used when [Preparing the Active Directory forest for WSTEP](#).

- If an Active Directory with the same name exists and is linked to another agent, the wizard will display an error message.
- If an Active Directory with the same name exists but is not linked to another agent, the wizard will display a confirmation request to load the Active Directory configuration.
- The value used for the domain name should not be an IP address, nor should it be the FQDN of a domain controller.

#### Username

The user logon name obtained when [Creating a PKIaaS WSTEP Service Account](#). This parameter supports the two formats described in:

<https://learn.microsoft.com/en-us/windows/win32/secauthn/user-name-formats>

For example:

mydomain\john.smith

john.smith@mydomain.com

#### Password

The password selected when [Creating a PKIaaS WSTEP Service Account](#).

#### DNS

The DNS of the Active Directory you configured in [Preparing the Active Directory forest for WSTEP](#). Use the following syntax to set this value.

<machine>:<port>

#### Where


- <machine> is the domain name or IP address of the DNS server.
- <port> is the port of the DNS service.

#### Certificate Authority

The Certificate Authority you configured in [Configuring an Entrust PKIaaS issuing CA for WSTEP](#).

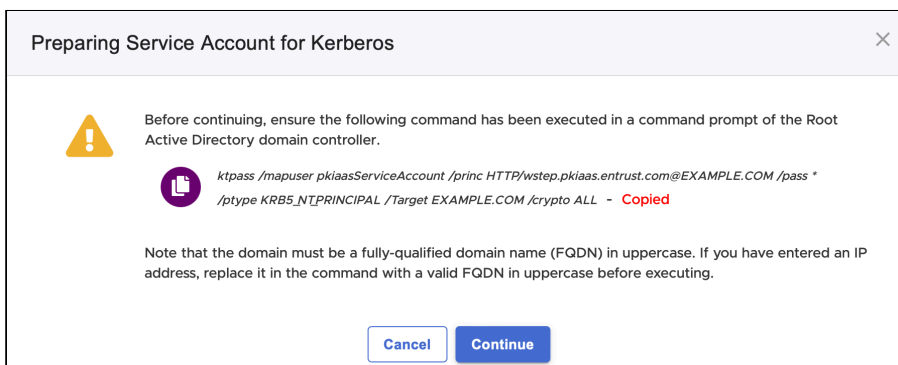
#### LDAPS Trusted Certificates

The root CA certificate of the LDAPS TLS certificates chain. The PKIaaS Virtual Machine will use this root CA certificate for validating connections with the Active Directory LDAPS service. Click **Add Certificate** to import one or more root CA certificates.

 See [Setting up LDAPS on domain controllers](#) for how to configure the LDAPS TLS certificates.

## Preparing the service account for Kerberos

After [Configuring an Active Directory in the agent](#), click **Next** to display the **Preparing Service Account for Kerberos** dialog.




If you have not yet executed the displayed command:

1. Click the icon to copy the command.
2. Log in to the server hosting the root Active Directory domain controller as either:
  - A domain administrator

- A user who is a member of the built-in Account Operators domain group.
3. Paste the command in the Windows PowerShell.
  4. Replace the value of the `/pass` option with the password entered when [Creating a PKIaaS WSTEP Service Account](#).
  5. Run the command.

Specifically, this `ktpass` command maps a Kerberos Principal to:

- The Service Principal Names (SPN).
- The User Principal Name (UPN).

 These mappings are necessary for compatibility with AES128 and AES256 algorithms in Kerberos Authentication.

See below for the command syntax.

```
ktpass /mapuser <USER> /princ HTTP/<PKIAAS-WSTEP-URL>@<UPPERCASE-DOMAIN-NAME> /pass <PASS> /ptype KRB5_NT_PRINCIPAL /Target <UPPERCASE-DOMAIN-NAME> /crypto ALL
```

Parameter	Value
<USER>	The name of the user described in <a href="#">Creating a PKIaaS WSTEP Service Account</a> .
<PKIAAS-WSTEP-URL>	The region-specific URL for Entrust PKIaaS WSTEP.
<UPPERCASE-DOMAIN-NAME>	The domain selected when previously <a href="#">Configuring an Active Directory in the agent</a> , in uppercase.
<USER-PASSWORD>	The password of the user described in <a href="#">Creating a PKIaaS WSTEP Service Account</a> .

## Synchronizing the agent with the root Active Directory

After [Preparing the service account for Kerberos](#), click **Continue** and wait while the agent connects with the root Active Directory. When the process completes, a confirmation dialog displays the URL of the enrollment service for the agent.

Link Root Active Directory

 **Important Information**  
 Agent successfully synchronized with the Root Active Directory (10.34.22.55). The discovered RootRealm Name is oscar.test.

Use the following URL when creating the Group Policy Object for the Certificate Enrollment Policy:  
<https://wstep.pki.entrust.com/wstep/pkitestorg/cep>

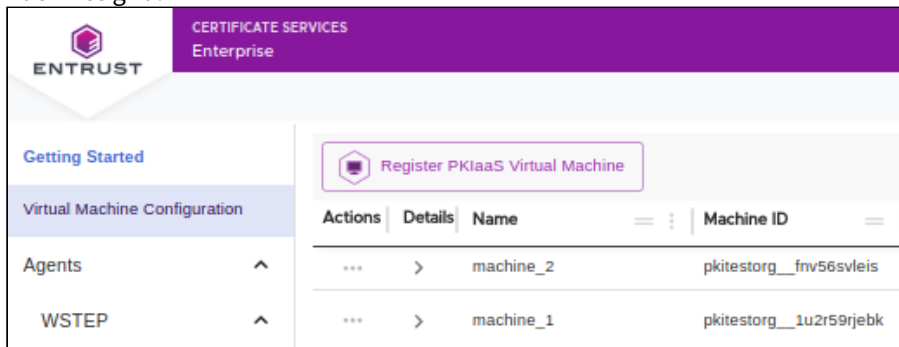
Copy the URL, you will need it when later [Enabling PKIaaS WSTEP for users](#) on your Windows domain.

## Linking additional Active Directories to an agent

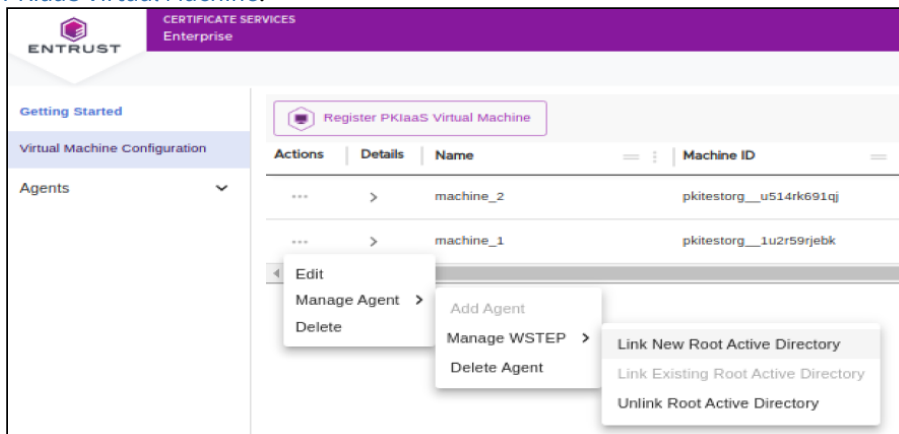
When [Adding an agent to a PKIaaS Virtual Machine](#), you are asked to enter configuration data for linking a first Windows root Active Directory. See this section for how to link additional Active Directories.

### To link an additional Active Directory to an agent

1. Click **PKIaaS Virtual Machine Configuration** in the navigation sidebar to display the PKIaaS Virtual Machines grid.



2. In the PKIaaS Virtual Machines grid, click the ... three dots icon of the machine you registered in [Registering a PKIaaS Virtual Machine](#).



3. Select the **Manage Agent > Manage WSTEP > Link New Root Active Directory** command.
4. Follow the steps already described in [Adding an agent to a PKIaaS Virtual Machine](#).
  - [Configuring an Active Directory in the agent](#)
  - [Preparing the service account for Kerberos](#)
  - [Synchronizing the agent with the root Active Directory](#)

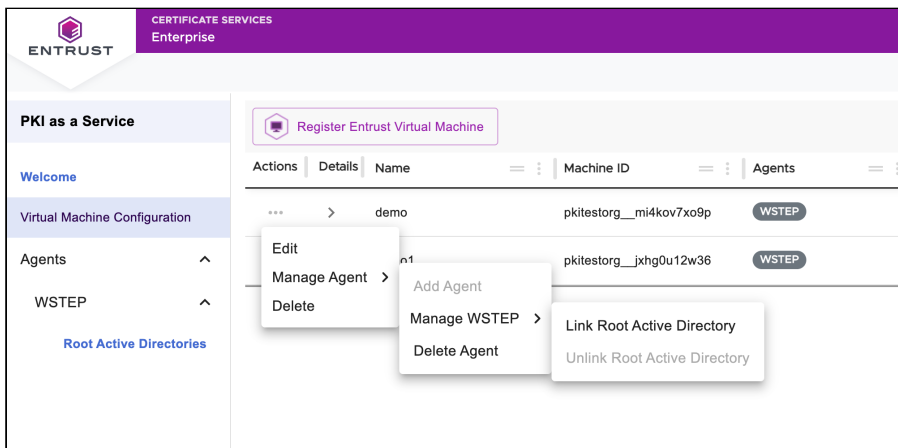
## Managing PKIaaS Virtual Machine configurations

To manage the configuration of the PKIaaS Virtual Machines registered in Entrust PKIaaS, click **Virtual Machine Configuration** in the navigation sidebar.

- [Selecting PKIaaS Virtual Machine actions](#)
- [Copying the enrollment URL](#)

### Selecting PKIaaS Virtual Machine actions

In the PKIaaS Virtual Machine grid, click the ... three dots line for a PKIaaS Virtual Machine



Select the following actions.

- [Edit](#)
- [Manage Agent / Add Agent](#)
- [Manage Agent / Manage WSTEP / Link Root Active Directory](#)
- [Manage Agent / Manage WSTEP / Unlink Root Active Directory](#)
- [Manage Agent / Delete Agent](#)
- [Delete](#)

Edit

Select this command to edit the following PKIaaS Virtual Machine Configuration settings.

Setting	Value
Machines	The identifiers of the PKIaaS Virtual Machines the configuration is applied to.
Name	The name selected when <a href="#">Registering a PKIaaS Virtual Machine</a> .
Description	The optional description added when <a href="#">Registering a PKIaaS Virtual Machine</a> .

Manage Agent / Add Agent

Select this command to add an agent to the PKIaaS Virtual Machine.

Manage Agent / Manage WSTEP / Link Root Active Directory

Select this command for linking an Active Directory with a WSTEP agent. See below for the required steps.

- [Configuring an Active Directory in the agent](#)
- [Preparing the service account for Kerberos](#)
- [Synchronizing the agent with the root Active Directory](#)

Manage Agent / Manage WSTEP / Unlink Root Active Directory

Select this command to unlink an Active Directory configuration from a WSTEP agent.

Manage Agent / Delete Agent

Select this command to delete the agent.

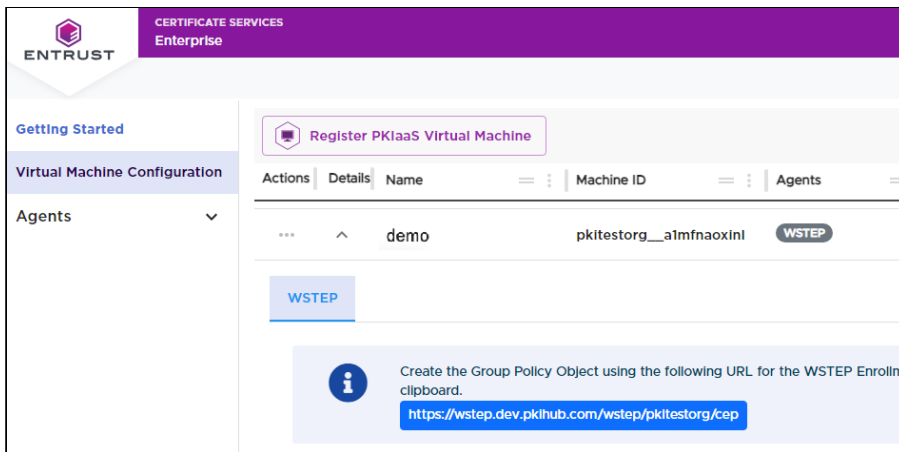
Delete

Select this command to delete the PKIaaS Virtual Machine configuration.

✘ Deleting a PKIaaS Virtual Machine configuration fails when it is still assigned to a machine. Click **Edit** and set **Machines** to **<Unassign>** to remove any machine assignment.

## Copying the enrollment URL

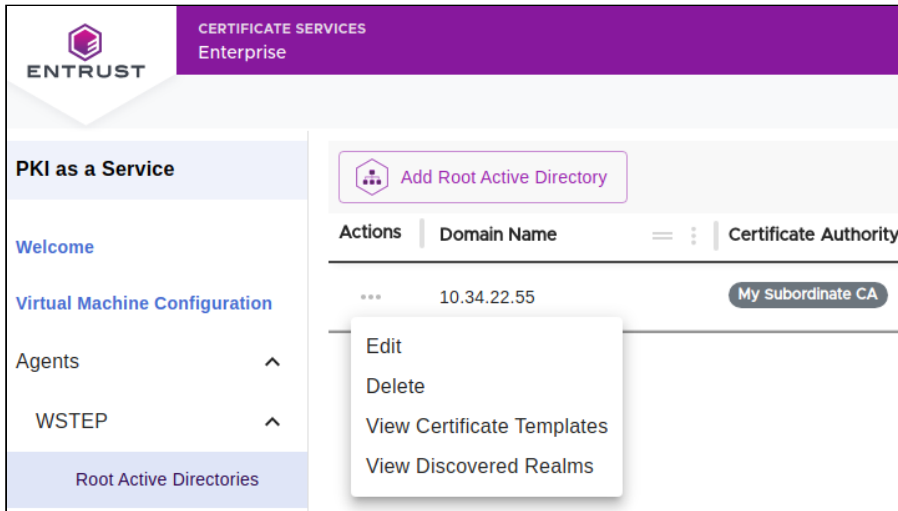
In the PKIaaS Virtual Machine grid, click the > arrow to unfold the details of a PKIaaS Virtual Machine configuration.



Click the **i** panel to copy the WSTEP enrollment URL. You will later need this URL when [Enabling PKIaaS WSTEP for users](#) on your Windows domain.

## Managing Active Directory configurations

To manage Windows root Active Directory configurations in Entrust PKIaaS, click **Agents > WSTEP > Root Active Directories** in the sidebar.



See below for the available configuration options.

- [Add Root Active Directory](#)
- [Edit Active Directory](#)
- [Delete Active Directory](#)
- [Manage Certificate Templates](#)
- [View discovered domains](#)

## Add Root Active Directory

See below for adding a new Active Directory to Entrust PKIaaS.

**i** You can later link this Active Directory to an agent as explained in [Adding an agent to a PKIaaS Virtual Machine](#) and [Linking additional Active Directories to an agent](#).

### To add an Active Directory configuration

1. Click **Agents > WSTEP > Root Active Directories** in the sidebar.
2. Click the **Add Root Active Directory** button.
3. Select a PKIaaS Virtual Machine configuration to add the Active Directory to.
4. Click **Next** and configure the following settings of a new Active Directory.
  - [Domain Name](#)
  - [Username](#)
  - [Password](#)
  - [DNS](#)
  - [Certificate Authority](#)
  - [LDAPS Trusted Certificates](#)

#### Domain Name

The name of the root domain of the Microsoft Active Directory forest that was used when [Preparing the Active Directory forest for WSTEP](#).

- If an Active Directory with the same name exists and is linked to another agent, the wizard will display an error message.
- If an Active Directory with the same name exists but is not linked to another agent, the wizard will display a confirmation request to load the Active Directory configuration.

- The value used for the domain name should not be an IP address, nor should it be the FQDN of a domain controller.

#### Username

The user logon name obtained when [Creating a PKIaaS WSTEP Service Account](#). This parameter supports the two formats described in:

<https://learn.microsoft.com/en-us/windows/win32/secauthn/user-name-formats>

For example:

```
mydomain\john.smith
```

```
john.smith@mydomain.com
```

#### Password

The password selected when [Creating a PKIaaS WSTEP Service Account](#).

#### DNS

The DNS of the Active Directory you configured in [Preparing the Active Directory forest for WSTEP](#). Use the following syntax to set this value.

```
<machine>:<port>
```

#### Where

- `<machine>` is the domain name or IP address of the DNS server.
- `<port>` is the port of the DNS service.

#### Certificate Authority

The Certificate Authority you configured in [Configuring an Entrust PKIaaS issuing CA for WSTEP](#).

#### LDAPS Trusted Certificates

The root CA certificate of the LDAPS TLS certificates chain. The PKIaaS Virtual Machine will use this root CA certificate for validating connections with the Active Directory LDAPS service. Click **Add Certificate** to import one or more root CA certificates.

 See [Setting up LDAPS on domain controllers](#) for how to configure the LDAPS TLS certificates.

#### Edit Active Directory

See below for editing the configuration of an Active Directory in Entrust PKIaaS.

##### To edit an Active Directory configuration

1. Click **Agents > WSTEP > Root Active Directories** in the sidebar.
2. Click the ... three dots line for an Active Directory and select **Edit**



3. Update the following configuration settings.

- [Domain Name](#)
- [Username](#)
- [Password](#)
- [DNS](#)
- [Certificate Authority](#)
- [LDAPS Trusted Certificates](#)

#### Domain Name

The name of the root domain of the Microsoft Active Directory forest that was used when [Preparing the Active Directory forest for WSTEP](#).

- If an Active Directory with the same name exists and is linked to another agent, the wizard will display an error message.
- If an Active Directory with the same name exists but is not linked to another agent, the wizard will display a confirmation request to load the Active Directory configuration.
- The value used for the domain name should not be an IP address, nor should it be the FQDN of a domain controller.

#### Username

The user logon name obtained when [Creating a PKIaaS WSTEP Service Account](#). This parameter supports the two formats described in:

<https://learn.microsoft.com/en-us/windows/win32/secauthn/user-name-formats>

For example:

```
mydomain\john.smith
```

```
john.smith@mydomain.com
```

#### Password

The password selected when [Creating a PKIaaS WSTEP Service Account](#).

#### DNS

The DNS of the Active Directory you configured in [Preparing the Active Directory forest for WSTEP](#). Use the following syntax to set this value.

```
<machine>:<port>
```

#### Where

- `<machine>` is the domain name or IP address of the DNS server.
- `<port>` is the port of the DNS service.

#### Certificate Authority

The Certificate Authority you configured in [Configuring an Entrust PKIaaS issuing CA for WSTEP](#).


## LDAPS Trusted Certificates

The root CA certificate of the LDAPS TLS certificates chain. The PKIaaS Virtual Machine will use this root CA certificate for validating connections with the Active Directory LDAPS service. Click **Add Certificate** to import one or more root CA certificates.

 See [Setting up LDAPS on domain controllers](#) for how to configure the LDAPS TLS certificates.

## Delete Active Directory

See below for removing an Active Directory from Entrust PKIaaS.


 Removing an Active Directory results in an error if the Active Directory is linked to a PKIaaS Virtual Machine configuration.

### To remove an Active Directory from Entrust PKIaaS

1. If still linked to a PKIaaS Virtual Machine configuration, unlink the Active Directory as explained in [Managing PKIaaS Virtual Machine configurations](#).
2. Click **Agents > WSTEP > Root Active Directories** in the sidebar.
3. Click the ... three dots line for an Active Directory and select **Delete**.

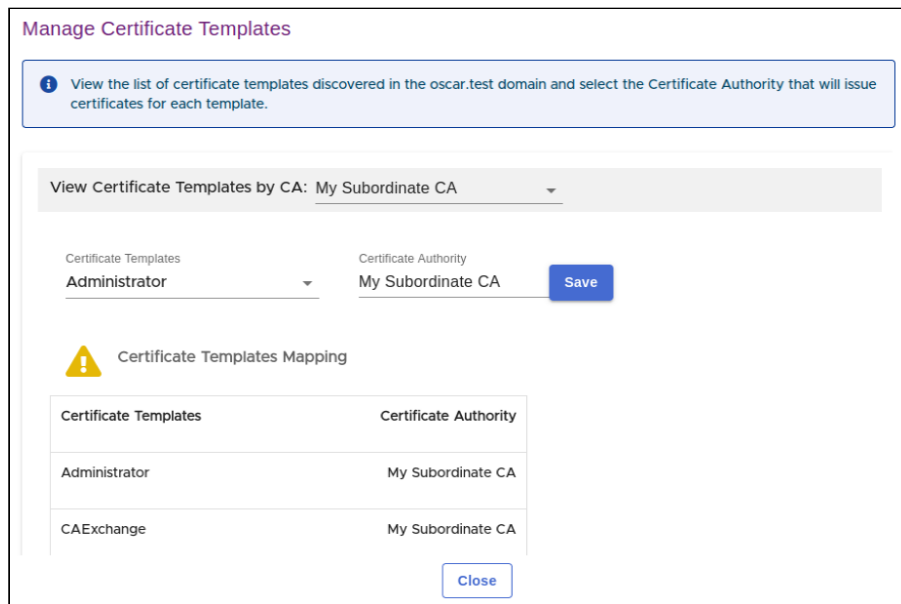
## Manage Certificate Templates

See below for how to browse and manage the Windows certificate templates enabled in an Active Directory for WSTEP enrollment.

 See [Managing Microsoft certificate templates in Active Directory](#) for how to add and configure certificate templates in your on-premises Windows environment.

### To manage certificate templates

1. Click **Agents > WSTEP > Root Active Directories** in the sidebar.
2. Click the ... three dots line for an Active Directory and select **View Certificate Templates** to display the **Manage Certificate Templates** pane.



3. In the **View Template by CA** list of the **Manage Certificate Templates** pane, select one of the Certificate Authorities added when [Configuring an Entrust PKIaaS issuing CA for WSTEP](#). Select **All** to list certificate templates for all Certificate Authorities.
4. In the **Certificate Templates** field, select a certificate template you want to assign or unassign to a certificate authority.
5. In the **Certificate Authority** field, select the certificate authority that will issue certificates for the selected certificate template. Click **<Unassign>** to assign no certificate authority.
6. Click **Save** to associate the certificate template with the certificate authority.

## View discovered domains

See below for how to list the domains managed by a root Active Directory.

### To list the domains managed by a root Active Directory

1. Click **Agents > WSTEP > Root Active Directories** in the sidebar.
2. Click the ... three dots line for an Active Directory and select **View Discovered Domains**.
3. Check the name of each domain managed by the Active Directory.

## Enabling WSTEP for users and devices

Enable PKIaaS WSTEP enrollment and autoenrollment for users and devices.

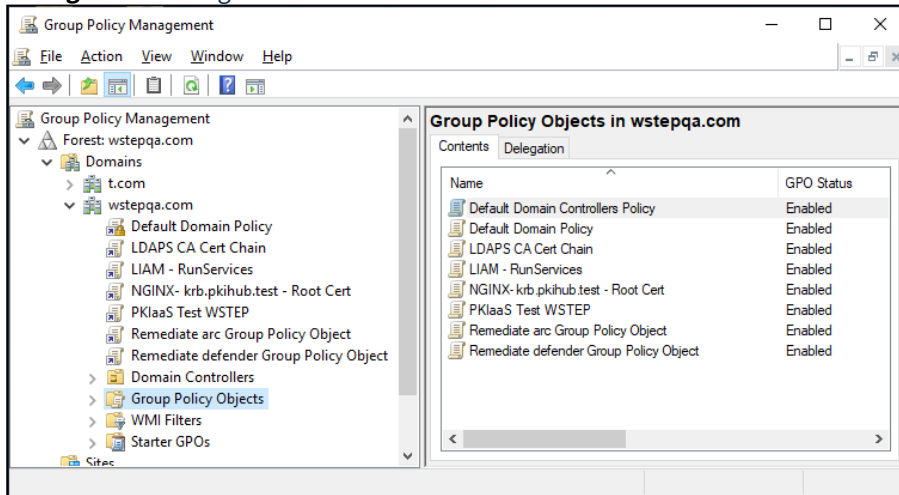
- [Creating a Group Policy Object for the WSTEP certificate chain](#)
- [Importing the WSTEP certificate chain into the Group Policy Object](#)
- [Enabling PKIaaS WSTEP for users](#)
- [Enabling autoenrollment for users](#)
- [Enabling PKIaaS WSTEP for devices](#)
- [Enabling autoenrollment for devices](#)
- [Linking the WSTEP Group Policy Object to all domains](#)

## Creating a Group Policy Object for the WSTEP certificate chain

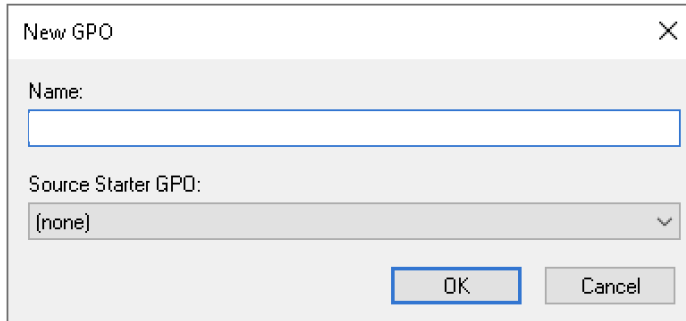
The recommended method to configure a certificate chain trust is to create a Group Policy Object (GPO) linked to all domains in the Active Directory forest.

### To create a Group Policy Object

1. Log into the root Active Directory of the forest as an Active Directory administrator.
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.




3. Under the root domain, right click the **Group Policy Objects** folder and select **New** to display the **New GPO** dialog.



4. Provide a new **Name** for the GPO and click **OK**.

## Importing the WSTEP certificate chain into the Group Policy Object

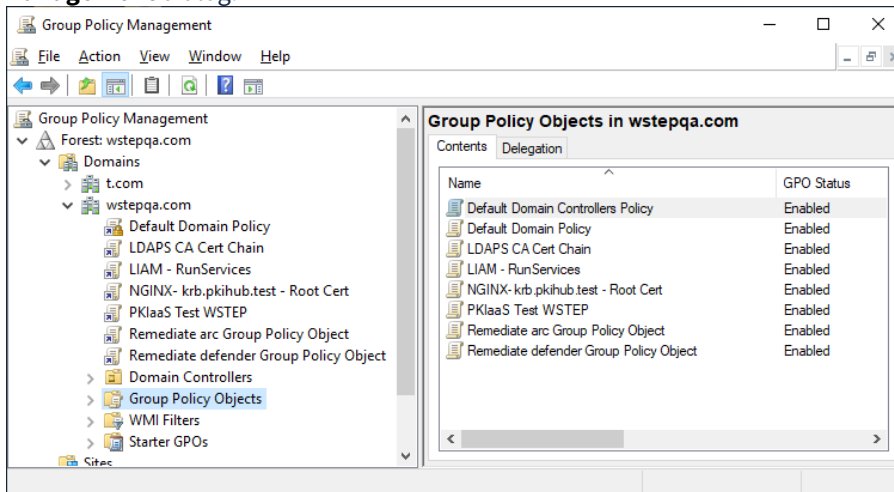
Import the WSTEP certificate chain into the GPO previously created in [Creating a Group Policy Object for the WSTEP certificate chain](#).

 See [Downloading the certificate chain](#) for how to download the required certificates.

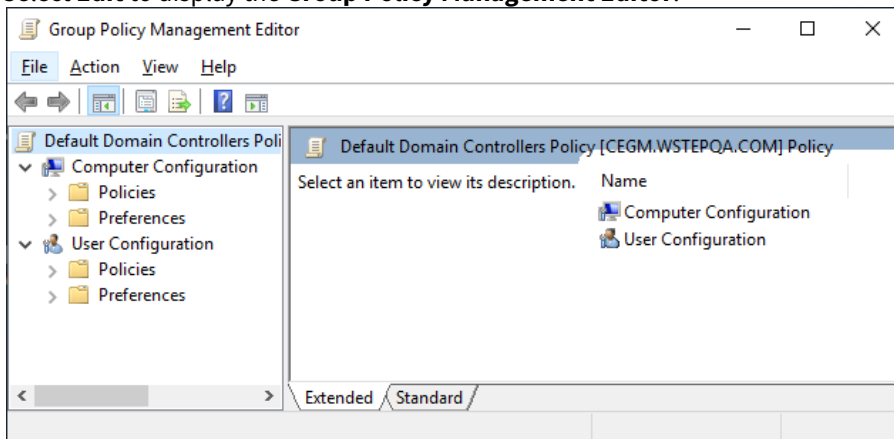
### To import the certificate chain into the GPO

1. Log into the root Active Directory of the forest as an Active Directory administrator.

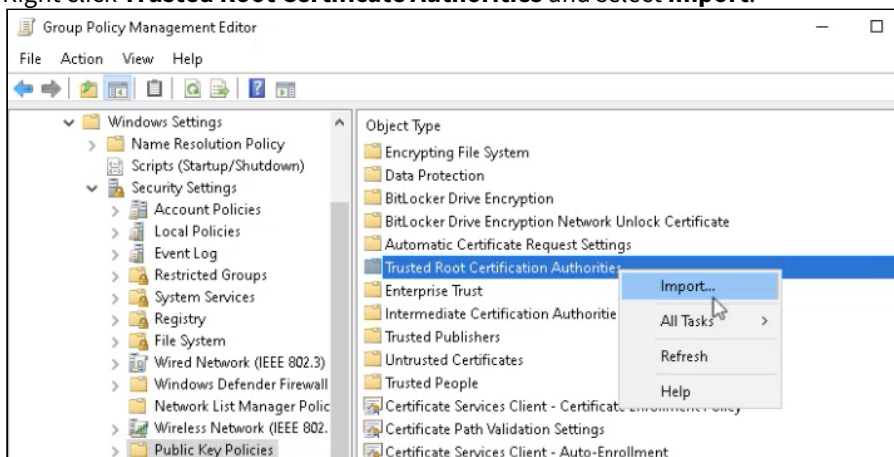
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.



3. Right click the Group Policy Object.
4. Select **Edit** to display the **Group Policy Management Editor**.

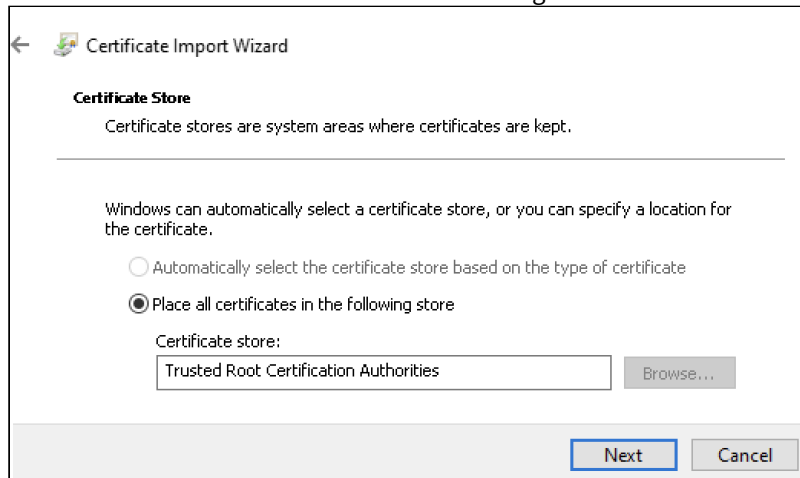


5. Navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
6. Right click **Trusted Root Certificate Authorities** and select **Import**.



7. In the **Certificate Import Wizard**, click **Next** and select the root CA certificate file to import.

8. Click **Next** to reveal the **Certificate Store** settings.



9. Verify the selected certificate store is **Trusted Root Certification Authorities**.
10. Click **Next** to display the **Completing the Certificate Import Wizard**.
11. Click **Finish** to return to the **Group Policy Management** dialog.
12. In the **Group Policy Management** dialog, navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
13. Right-click **Intermediate Certificate Authorities** and select **Import** to display the **Certificate Import Wizard**.
14. Click **Next** and select the issuing CA certificate file to import.
15. Click **Next** to reveal the Certificate Store settings.
16. Verify the selected certificate store is **Trusted Root Certification Authorities**
17. Click **Finish**.
18. Select **File > Exit** to close the **Group Policy Management Editor**.

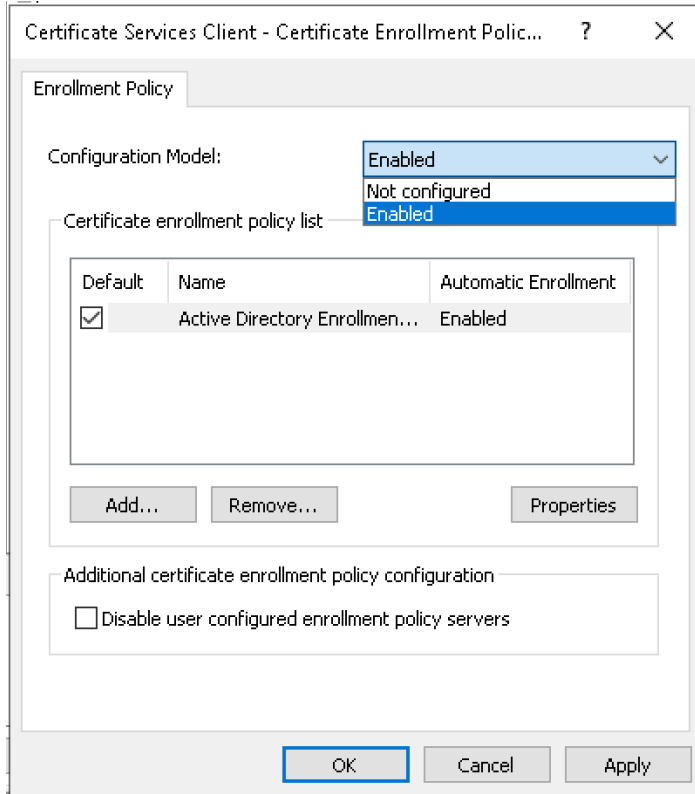
## Enabling PKIaaS WSTEP for users

Configure the PKIaaS WSTEP to enable WSTEP for users.

### To enable PKIaaS WSTEP for users

1. In the navigation tree of the new PKIaaS WSTEP Group Policy Object, expand **User Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
2. In the content pane, right-click **Certificate Services Client - Certificate Enrollment Policy** and select **Properties** to display the **Certificate Services Client - Certificate Enrollment Policy Properties** dialog

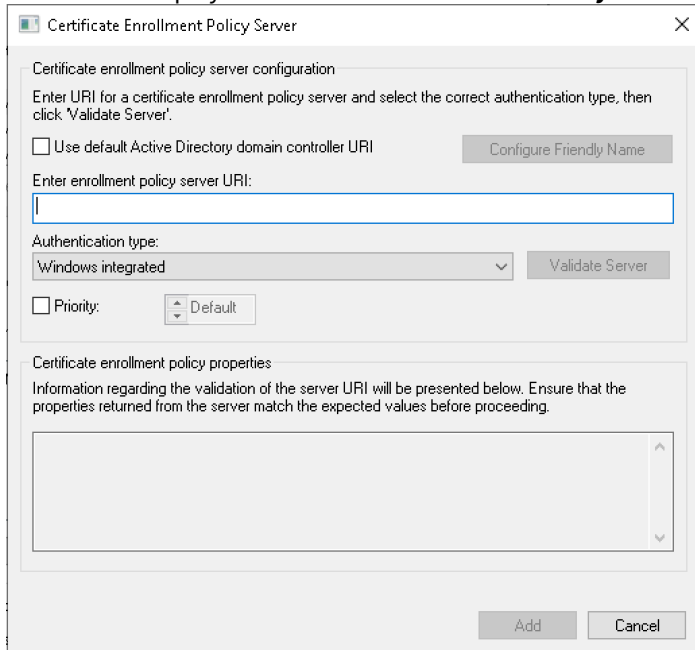
box.



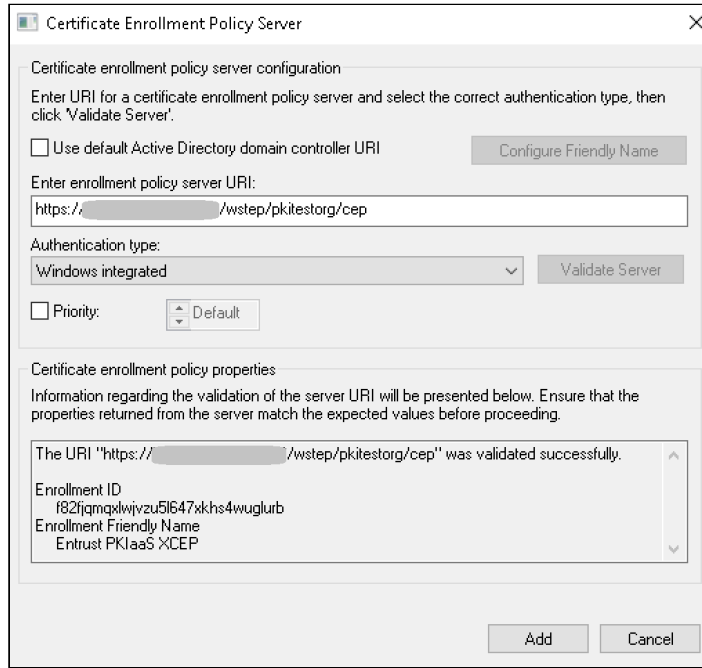
3. Select **Enabled** in the **Configuration Model** drop-down list.

**⚠** If you are not installing WSTEP alongside an existing Microsoft CA WSTEP, select **Active Directory Enrollment** in the **Certificate enrollment policy list** pane, and click **Remove**.

4. Click **Add** to display the **Certificate Enrollment Policy Server** dialog box.



5. In the **Enter enrollment policy server URI** field, enter the PKIaaS WSTEP URI you obtained in either:
  - [Synchronizing the agent with the root Active Directory](#)
  - [Copying the enrollment URL](#).
6. In the **Authentication type** drop-down list, select the same "Windows Integrated" option (should be selected by default).
7. Click **Validate Server** and check the URI validation results.



The screenshot shows a dialog box titled "Certificate Enrollment Policy Server" with a close button (X) in the top right corner. The dialog is divided into two main sections: "Certificate enrollment policy server configuration" and "Certificate enrollment policy properties".

**Certificate enrollment policy server configuration**

Enter URI for a certificate enrollment policy server and select the correct authentication type, then click 'Validate Server'.

Use default Active Directory domain controller URI Configure Friendly Name

Enter enrollment policy server URI:

Authentication type:  
Windows integrated Validate Server

Priority: Default

**Certificate enrollment policy properties**

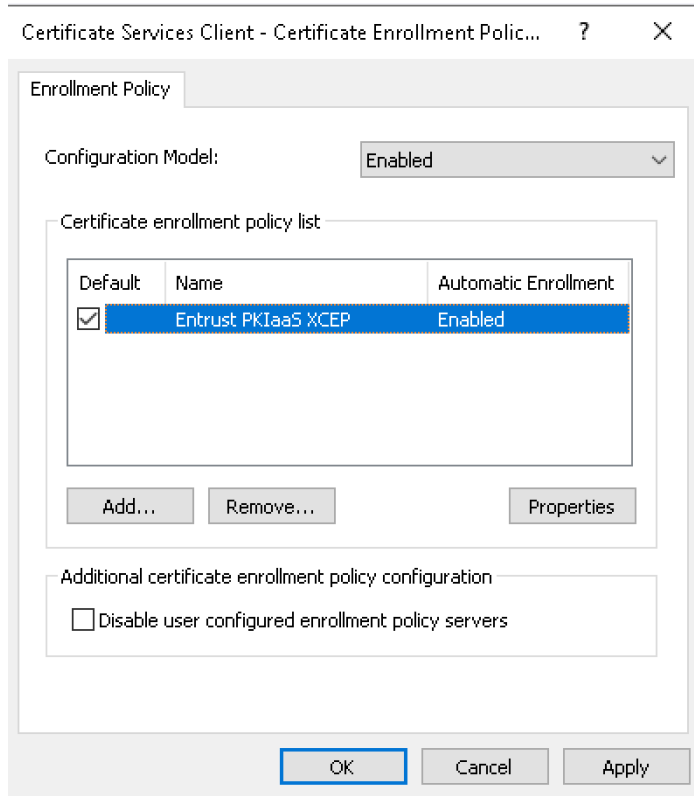
Information regarding the validation of the server URI will be presented below. Ensure that the properties returned from the server match the expected values before proceeding.

The URI "https://[redacted]/wstep/pkitestorg/cep" was validated successfully.

Enrollment ID  
f82fjqmqxlwvzv51647xkhs4wuglurb  
Enrollment Friendly Name  
Entrust PKIaaS XCEP



- Click **Add** to add the new PKIaaS WSTEP service to the **Certificate enrollment policy list** pane.



- In the **Certificate enrollment policy list** pane, check the box of the new **Entrust PKIaaS XCEP** certificate enrollment policy to make it the default one.
- Click **OK**.

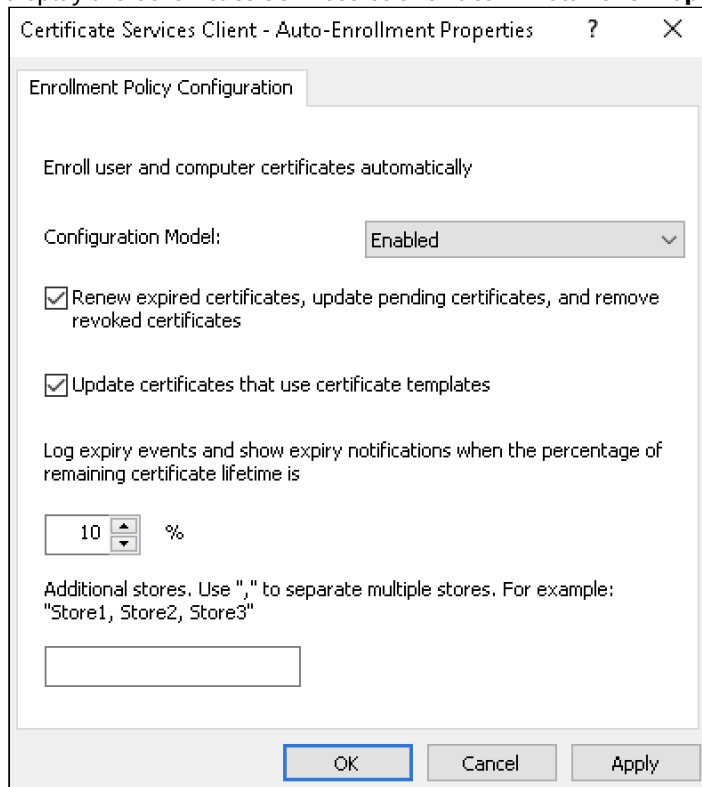
## Enabling autoenrollment for users

Configure the PKIaaS WSTEP Group Policy Object to enable autoenrollment for users.

### To enable autoenrollment for users

- In the navigation tree of the new PKIaaS WSTEP Group Policy Object, expand **User Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.

- In the content pane, right-click **Certificate Services Client Auto Enrollment** and select **Properties** to display the **Certificate Services Client Auto-Enrollment Properties** dialog box.



- Select **Enabled** in the **Configuration Model** drop-down list.
- Check the following boxes:
  - **Renew expired certificates, update pending certificates, and remove revoked certificates**
  - **Update certificates that use certificate templates**
- Optionally, change the percentage under **Log expiry events and show expiry notifications when the percentage of remaining certificate lifetime is**.
- Click **OK**.

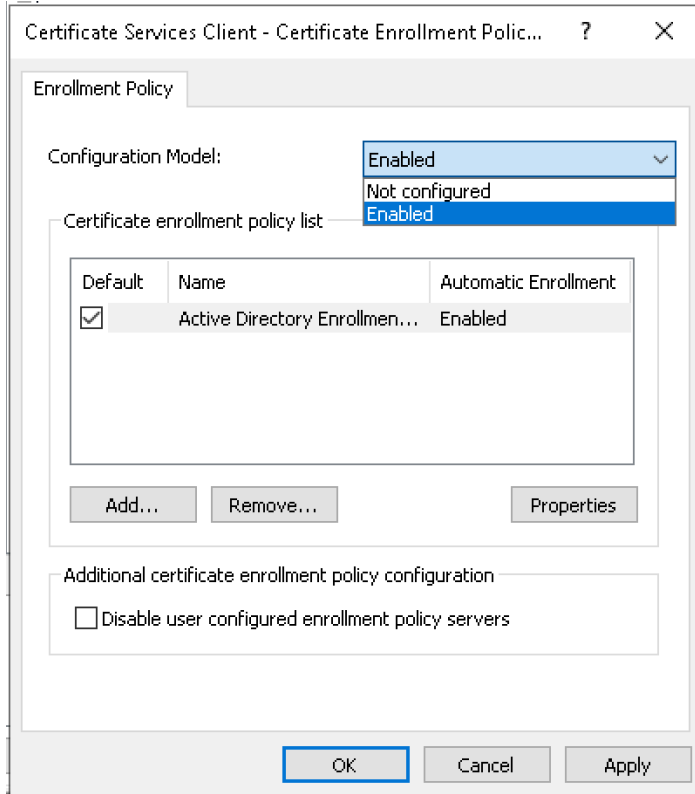
## Enabling PKIaaS WSTEP for devices

Configure the PKIaaS WSTEP to enable WSTEP for devices.

### To enable PKIaaS WSTEP for devices

- In the navigation tree of the new PKIaaS WSTEP Group Policy Object, expand **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
- In the content pane, right-click **Certificate Services Client - Certificate Enrollment Policy** and select **Properties** to display the **Certificate Services Client - Certificate Enrollment Policy Properties** dialog

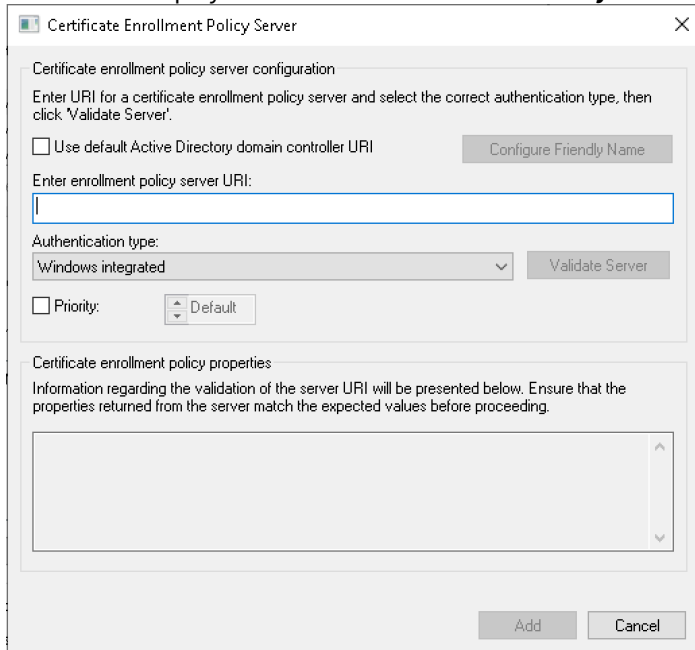
box.



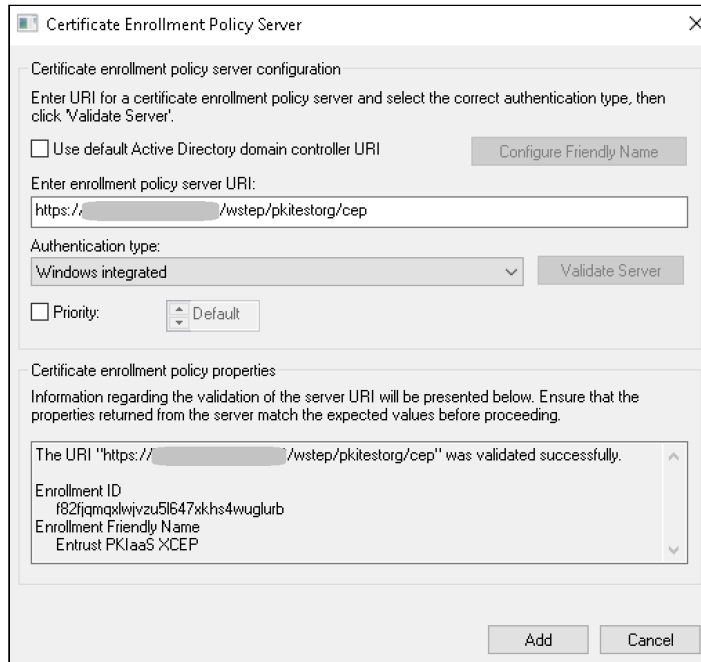
3. Select **Enabled** in the **Configuration Model** drop-down list.

**⚠** If you are not installing WSTEP alongside an existing Microsoft CA WSTEP, select **Active Directory Enrollment** in the **Certificate enrollment policy list** pane, and click **Remove**.

4. Click **Add** to display the **Certificate Enrollment Policy Server** dialog box.



5. In the **Enter enrollment policy server URI** field, enter the PKIaaS WSTEP URI provided on the Entrust Certificate Services portal for device enrollment.
6. In the **Authentication type** drop-down list, select the same "Windows Integrated" option (should be selected by default).
7. Click **Validate Server** and check the URI validation results.



**Certificate Enrollment Policy Server**

Certificate enrollment policy server configuration

Enter URI for a certificate enrollment policy server and select the correct authentication type, then click 'Validate Server'.

Use default Active Directory domain controller URI Configure Friendly Name

Enter enrollment policy server URI:

Authentication type:  
 Validate Server

Priority:

---

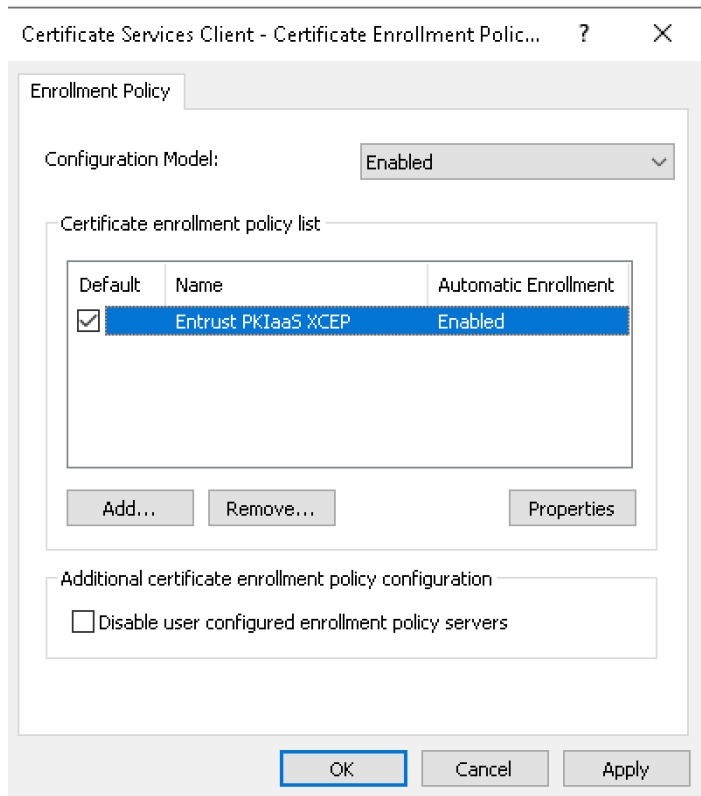
Certificate enrollment policy properties

Information regarding the validation of the server URI will be presented below. Ensure that the properties returned from the server match the expected values before proceeding.

The URI "https://[redacted]/wstep/pkitestorg/cep" was validated successfully.

Enrollment ID  
 f82jqmqxlwvzv51647xkhs4wuglurb  
 Enrollment Friendly Name  
 Entrust PKIaaS XCEP

8. Click **Add** to add the new PKIaaS WSTEP service to the **Certificate enrollment policy list** pane.



**Certificate Services Client - Certificate Enrollment Polic...**

Enrollment Policy

Configuration Model:

Certificate enrollment policy list

Default	Name	Automatic Enrollment
<input checked="" type="checkbox"/>	Entrust PKIaaS XCEP	Enabled

Additional certificate enrollment policy configuration

Disable user configured enrollment policy servers

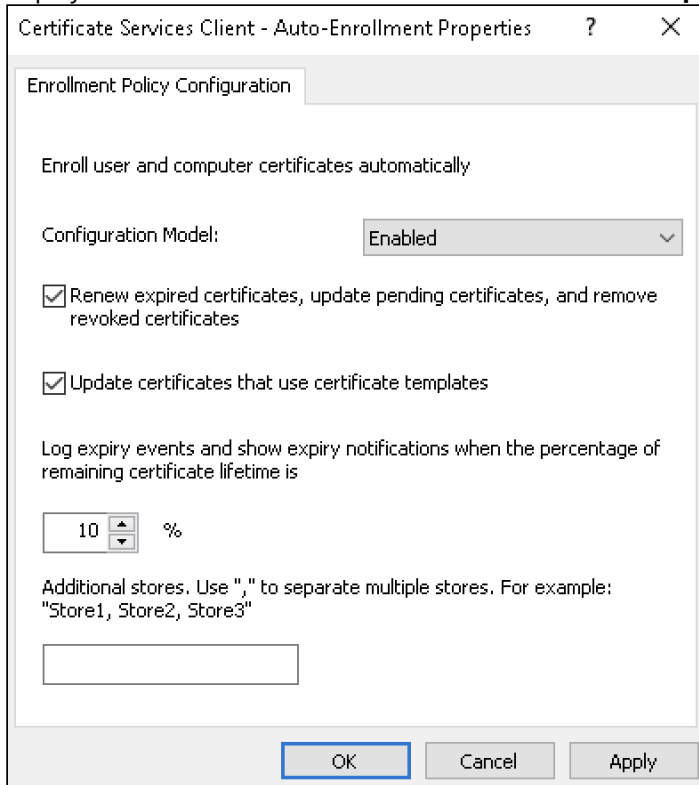
9. In the **Certificate enrollment policy list** pane, check the box of the new PKIaaS WSTEP service to make it the default Certificate Enrollment Policy.
10. Click **OK**.

## Enabling autoenrollment for devices

Configure the PKIaaS WSTEP Group Policy Object to enable autoenrollment for devices

### To enable autoenrollment for devices

1. In the navigation tree of the new PKIaaS WSTEP Group Policy Object, expand **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
2. In the content pane, right-click **Certificate Services Client Auto Enrollment** and select **Properties** to display the **Certificate Services Client Auto-Enrollment Properties** dialog box.



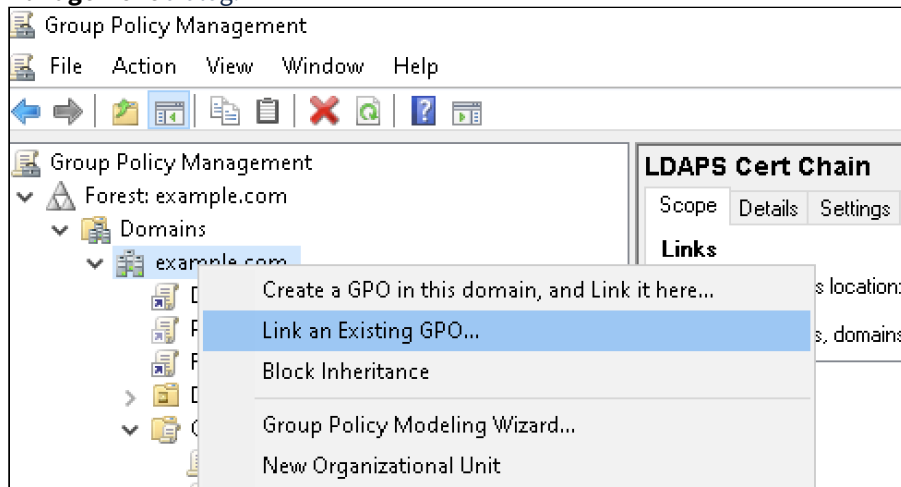
3. Select **Enabled** in the **Configuration Model** drop-down list.
4. Check the following boxes:
  - **Renew expired certificates, update pending certificates, and remove revoked certificates**
  - **Update certificates that use certificate templates.**
5. Optionally, change the percentage under **Log expiry events and show expiry notifications when the percentage of remaining certificate lifetime is**.
6. Click **OK**.

## Linking the WSTEP Group Policy Object to all domains

In each domain of the Active Directory forest, repeat the following procedure to link the Group Policy Object created for the WSTEP certificate chain.

### To link a Group Policy Object with a domain

1. Log into the root Active Directory of the forest as an Active Directory administrator.
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.



3. Right-click the domain name and select **Link an existing GPO...** to display the **Select GPO** dialog.
4. Select the Group Policy Object.
5. Click **OK**.

## Managing Microsoft certificate templates in Active Directory

See below for adding and managing the Microsoft certificate templates in Active Directory for WSTEP enrollment and autoenrollment.

- [Creating and configuring certificate templates](#)
- [Disabling a certificate template](#)

### Creating and configuring certificate templates

In your Active Directory, create and configure Windows certificate templates for WSTEP enrollment.

#### To create and configure a Windows certificate template

1. If not already installed, install the **Certificate Templates** snap-in as explained in [Installing the default set of Microsoft Certificate Templates using the snap-in](#).
2. Select the existing certificate template that most closely meets your desired specs.
3. Right-click on the existing template and select **Duplicate template**.
4. Configure settings in the following tabs in the **Properties of the New Template** dialog.
  - [Compatibility](#)
  - [Cryptography](#)
  - [Extensions](#)
  - [General](#)
  - [Issuance requirements](#)
  - [Key Attestation](#)
  - [Request Handling](#)
  - [Security](#)
  - [Server](#)
  - [Superseded Templates](#)
5. Click **OK**.

## Compatibility


Configure the following setting in the **Compatibility** tab of the **Properties of New Template** dialog.

### Compatibility Settings

Select the minimum Windows versions compatible with the following components.

- Certification Authority
- Certificate recipient

The selected values impact the schema version of the certificate template. See [Cryptography](#) for the **Provider Category** supported by each template version.

 After creating the template, these settings can be modified but not the template version.

## Cryptography


Configure the following settings in the **Cryptography** tab of the **Properties of the New Template** dialog.

- [Provider Category](#)
- [Algorithm name](#)
- [Minimum key size](#)

### Provider Category

Select one of the following providers.

Provider	Supported certificate template versions
Legacy Cryptograph Service Provider	1, 2, 3, 4
Key Storage Provider	3, 4

 See [Compatibility](#) for selecting the template version.

### Algorithm name

When the **Provider Category** value is **Key Storage Provider**, you can select one of the following algorithms.

- RSA
- ECDH\_P256
- ECDH\_P384
- ECDH\_P521

### Minimum key size


Do not modify this field unless the **Algorithm name** value is **RSA**. Supported key sizes are the following.

- 2048
- 3072
- 4096

## Extensions

Configure the following setting in the **Extensions** tab of the **Properties of the New Template** dialog.

- [Application Policies](#)
- [Key Usage](#)

 See [Active Directory \(WSTEP\) certificate profiles](#) for a full reference on the WSTEP certificate capabilities.

### Application Policies

Select this field and click **Edit** to choose the Extended Key Usages (EKUs) of the issued certificates. For example:

- Client Authentication
- Server Authentication

### Key Usage

Select this field and click **Edit** to choose supported key usage combinations.

- Digital Signature
- Digital Signature and Key Encipherment
- Digital Signature and Nonrepudiation
- Key Encipherment
- Key Encipherment and Digital Signature with Nonrepudiation

Specifically, any combination containing the following key usages is not supported.

- CRL Sign
- Decipher Only
- Encipher Only
- Key Agreement
- Key Cert Sign


## General

Configure the following settings in the **General** tab of the **Properties of New Template** dialog.

- [Template display name](#)
- [Template name](#)
- [Publish certificate in Active Directory](#)


### Template display name

Enter a friendly name for the template

 This setting must be configured during certificate template creation and cannot be modified later. The only way to change this setting value is to duplicate the certificate template.

### Template name

Enter the same name as the display name.

 This setting must be configured during certificate template creation and cannot be modified later. The only way to change this setting value is to duplicate the certificate template.



Publish certificate in Active Directory

Ensure this box is not checked, as PKIaaS WSTEP ignores this setting when enabled.

### Issuance requirements

Configure the following setting in the **Issuance requirements** tab of the **Properties of New Template** dialog.

CA certificate manager approval

Ensure this box is not checked, as PKIaaS WSTEP ignores this setting when enabled.

### Key Attestation

Configure the following setting in the **Key Attestation** tab of the **Properties of New Template** dialog.

Key Attestation

Select the **None** option, as WSTEP enrollment does not support this feature.

### Request Handling


Configure the following settings in the **Request Handling** tab of the **Properties of New Template** dialog.

- [Purpose](#)
- [Archive subject's encryption private key](#)

Purpose

Select a purpose for the enrolled certificates.

- Encryption
- Signature
- Signature and encryption
- Signature and smartcard logon

 The selected purpose alters the certificate key usage and application policies. See [Extensions](#) for how to check the key usage is among the supported combinations.

Archive subject's encryption private key

Ensure this box is not checked, as PKIaaS WSTEP ignores this setting when enabled.

### Security

Configure the following settings in the **Security** tab of the **Properties of New Template** dialog.

- [Groups or user names](#)
- [Permissions](#)

 Newly duplicated certificate templates inherit the security settings of the original templates.

Groups or user names

The names of the users and groups with permission to enroll and autoenroll certificates using the template.

### To add a user or group name

1. Click **Add** to display the **Select Users, Computers, Service Accounts or Groups** dialog.
2. Enter the user or group name in the **Enter the object names to select** field.
3. Click **Check Names** to verify the name is valid.
4. Click **OK**.

### Permissions

For each user or group in the **Groups or user names** list, ensure the following permissions are allowed.

- Enroll
- Autoenroll

### Server

Configure the following settings in the **Server** tab of the **Properties of New Template** dialog.

- [Do not include revocation information in issued certificates](#)
- [Do not store certificates and requests in the CA Database](#)

Do not include revocation information in issued certificates

Ensure this box is not checked, as PKIaaS WSTEP ignores this setting when enabled.

Do not store certificates and requests in the CA Database

Ensure this box is not checked, as PKIaaS WSTEP ignores this setting when enabled.

### Superseded Templates

If you want the new certificate template to replace an existing one:

1. Select the **Superseded Template** tab of the **Properties of the New Template** dialog.
2. Click the **Add** button.
3. Select the name of the existing certificate template.

### Disabling a certificate template

There may be some situations where you may not want to use or sync a particular certificate template for WSTEP enrollments. See the supported methods for disabling certificate templates below.

- [Disabling a certificate template by removing the read permission](#)
- [Disabling a certificate template by unassigning the CA](#)



While disabled, certificate templates remain defined in Active Directory but can no longer be used to enroll certificates.

### Disabling a certificate template by removing the read permission

To disable a certificate template, you can:

1. Select the [Security](#) tab in the certificate template properties dialog.
2. Disable the **Read** permission for the PKIaaS WSTEP service account.

**i** The performed changes will take effect on the next automatic synchronization.

## Disabling a certificate template by unassigning the CA

To disable a certificate template, you can unassign the associated CA as explained in [Manage Certificate Templates](#).

**i** Changes performed on the Entrust PKIaaS UI take effect instantly.

## Managing on-premises PKIaaS Virtual Machines

As explained in [Installing a PKIaaS Virtual Machine](#), the PKIaaS Virtual Machine prompts a registration OTP when launched. See below for additional information.

- [PKIaaS Virtual Machine keyboard shortcuts](#)
- [Browsing PKIaaS Virtual Machine logs](#)
- [Creating an additional PKIaaS Virtual Machine for disaster recovery](#)
- [Recovering a PKIaaS Virtual Machine from disaster](#)

**i** Press the tab key to switch between tabs.

## PKIaaS Virtual Machine keyboard shortcuts

The ribbon at the bottom displays information on the keyboard shortcuts for managing the PKIaaS Virtual Machine.

```
TAB: switches apps · SPACE: logs · CTRL+C: exits app on focus ·
· CTRL+K: kills app · CTRL+U: forces app refresh ·
[ Fri, 01 Mar 2024 13:28:13 UTC · 14m18s · 10.1.188.122 ]
```


As detailed in the following table, not all these shortcuts are currently supported by the Entrust PKIaaS Virtual Machine.

Shortcut	Action	Supported
TAB	Switch tab.	✓
Space	Display detailed logs on the current tab.	✓
CTRL+C	Restart the application running on current tab. Restarting the whole PKIaaS Virtual Machine can only be done from the VMware Host Client.	✓
CTRL+K	Kill the application running on the current tab.	✗
CTRL+U	Refresh the application running on the current tab.	✗

## Browsing PKIaaS Virtual Machine logs

Browse the following logs on the PKIaaS Virtual Machine prompt.

- [Browsing PKIaaS Virtual Machine startup logs](#)
- [Browsing WSTEP enrollment logs](#)

 The Entrust PKIaaS Virtual Machine does not currently support SIEM integration.

## Browsing PKIaaS Virtual Machine startup logs

The **PKIaaS Virtual Machine** tab of the PKIaaS Virtual Machine prompt displays information on each startup step.

```

WSTEP      PKIaaS Virtual Machine
[✓] PKIaaS Virtual Machine running
    Version: v202402160726
[✓] Connected to PKIaaS
    Region: PROD-US
[✓] PKIaaS Virtual Machine registered to your account
    Account ID:      ecsmcn158emsuw
    Machine ID:     ecsmcn158emsuw__iqfrj0tu.jzw
[✓] VM Config ID:   1e627351cb5077d50aa57d5c35b175483ceb9e04
    Friendly name:  ABC PKIaaS VM
[✓] Installed agents: wstep
  
```

Press the space bar to display more detailed logs.

```

WSTEP      PKIaaS Virtual Machine
PKIaaS Virtual Machine logs (4, offset:0 horizontal-offset:0):
Mar 01 13:14:07 Init StartConnectionCheck.OK Checking TCP connection to satellit.pki.entrust.com:443
Mar 01 13:14:13 Init ConnectionCheck.OK Connected to satellit.pki.entrust.com
Mar 01 13:14:13 Synchronization StartSync.OK Starting synchronization
Mar 01 13:14:17 Synchronization Sync.OK Synchronization done
  
```

See the following table for a description of each step.

Step	Step Information	Step completion
PKIaaS Virtual Machine Running	The version of the PKIaaS Virtual Machine	When the machine is running
Connected to PKIaaS	The region hosting the Entrust PKIaaS services.	When the machine is running
PKIaaS Gateway registered to your account	A registration confirmation message and details on the registered machine	After <a href="#">Registering a PKIaaS Virtual Machine</a>
Node ID	The internal Entrust PKIaaS identifier of the PKIaaS Virtual Machine	After <a href="#">Registering a PKIaaS Virtual Machine</a>

Step	Step Information	Step completion
Installed agents	The "WSTEP" name of the installed agent.	After <a href="#">Adding an agent to a PKIaaS Virtual Machine</a>

For each step, the prompt displays the following status symbols.

Symbol	Step status
[ ]	Not yet started
[N]	In progress
[v]	Completed
[x]	Failed

### Browsing WSTEP enrollment logs

When completing the startup process, press the tab key to switch to the **WSTEP** tab and browse logs on the WSTEP agent.

```

WSTEP          PKIaaS Virtual Machine
[✓] WSTEP Agent running
    Version: v202402160726
[✓] Reporter running
    Last Sync: Thu, 29 Feb 2024 12:53:01 UTC
[✓] Poller running
    Last Sync: Thu, 29 Feb 2024 12:53:15 UTC
[✓] LDAP Connectivity
    Connected to LDAP abc.corp
[✓] LDAP Authentication
    Authenticated to LDAP abc.corp
  
```

Press the space bar to display more detailed logs.

```

WSTEP          PKIaaS Virtual Machine
WSTEP logs (1485, offset:8 horizontal-offset:0):
Mar 01 13:23:01 Reporter SyncRootAD.OK Synced ABC.CORP in abc.corp
Mar 01 13:23:02 Reporter SyncRealm.OK Synced ABC.CORP in ABC.CORP
Mar 01 13:23:02 Reporter SyncRealm.OK Synced XYZ.ABC.CORP in ABC.CORP
Mar 01 13:23:02 Reporter SyncRealm.OK Synced FINANCE.ABC.CORP in ABC.CORP
Mar 01 13:23:02 Reporter SyncRealm.OK Synced tree.corp in ABC.CORP
Mar 01 13:23:02 Reporter GetWindowsCertTemplates.OK Found 36 windows cert templates in ABC.CORP
Mar 01 13:23:02 Reporter SyncWindowsTemplate.OK Synced Administrator in ABC.CORP
Mar 01 13:23:02 Reporter SyncWindowsTemplate.OK Synced AndrewAutoEnroll in ABC.CORP
Mar 01 13:23:02 Reporter SyncWindowsTemplate.OK Synced CA in ABC.CORP
  
```

The displayed WSTEP enrollment logs:

- Do not contain any sensitive information.
- Are stored alongside the PKIaaS WSTEP service in the cloud for troubleshooting purposes.
- Cannot be manually exported.

## Creating an additional PKIaaS Virtual Machine for disaster recovery

After completing the installation, registration and configuration of the PKIaaS Virtual machine, it is recommended to deploy an additional PKIaaS Virtual Machine for disaster recovery.

### To create an additional PKIaaS Virtual Machine for disaster recovery

1. Repeat the steps described in [Installing a PKIaaS Virtual Machine](#) to create a new PKIaaS Virtual Machine. Use the same file obtained when [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#).
2. Register the new PKIaaS Virtual Machine as explained in [Registering a PKIaaS Virtual Machine](#).
3. Keep the machine running.

## Recovering a PKIaaS Virtual Machine from disaster

To recover a PKIaaS Virtual Machine from disaster, you can:

1. Log into the Entrust PKIaaS portal.
2. In the PKIaaS Virtual Machine grid, click the ... three dots line for the initial PKIaaS Virtual Machine and select the **Edit** action as explained in [Selecting PKIaaS Virtual Machine actions](#).
3. Set the **Machine** setting to the registration name of the virtual machine described in [Creating an additional PKIaaS Virtual Machine for disaster recovery](#).

While a PKIaaS Virtual Machine goes offline, the PKIaaS WSTEP service:

1. Continues to accept enrollment requests.
2. Places the requests into a queue of pending requests.
3. Processes all the pending requests when the new PKIaaS Virtual Machine comes online.

## Troubleshooting WSTEP enrollment issues

See below for how to solve the main issues related to WSTEP enrollment configuration and execution.

- [Troubleshooting PKIaaS Virtual Machine onboarding issues](#)
- [Troubleshooting WSTEP agent configuration issues](#)
- [Troubleshooting Group Policy Object configuration issues](#)
- [Troubleshooting enrollment and certificate template issues](#)

## Troubleshooting PKIaaS Virtual Machine onboarding issues

If you are having problems connecting the on-premises PKIaaS Virtual Machine to the Entrust PKIaaS cloud:


1. Check the error log as explained in [Browsing PKIaaS Virtual Machine startup logs](#).
2. Take a screenshot of the error log.
3. Attach the screenshot to a support ticket.

## Troubleshooting WSTEP agent configuration issues

The steps described in [Configuring PKIaaS Virtual Machines on the PKIaaS portal](#) require adding and configuring a WSTEP agent. See below for how to solve possible issues you might encounter.

- [DNS Server unreachable](#)

- [Invalid LDAP credentials](#)
- [LDAP timeout](#)
- [TLS handshake failed](#)
- [Unknown LDAP host](#)

 See [Browsing WSTEP enrollment logs](#) for browsing logs in the **WSTEP** tab of the the on-premises PKIaaS Virtual Machine.

## DNS Server unreachable

While [Configuring an Active Directory in the agent](#), you may encounter the following error on the **WSTEP** tab of the on-premises PKIaaS Virtual Machine.

### ErrorDialURL

```
LDAP Result Code 200 "Network Error": dial tcp: lookup <DOMAIN-NAME>: i/o timeout
```

See below for a list of possible causes and the corresponding solutions.

- [Firewall rules blocking the access](#)
- [Invalid DNS settings in the Agent configuration](#)

### Firewall rules blocking the access

Firewall rules may block connections from the IP address of the PKIaaS Virtual Machine to the DNS server on port 53.

 See [Network requirements for the PKIaaS Virtual Machine](#) for all the port access requirements.

**Issue resolution:** Edit the firewall rules to allow access.

### Invalid DNS settings in the Agent configuration

The DNS server settings were not properly defined when [Configuring an Active Directory in the agent](#).

**Issue resolution:** Edit the agent configuration to update the DNS settings.

## Invalid LDAP credentials

While [Configuring an Active Directory in the agent](#), you may encounter the following error on the **WSTEP** tab of the on-premises PKIaaS Virtual Machine.

### ErrorLDAPAuthentication

```
LDAP Result Code 49 "Invalid Credentials": 80090308: LdapErr: DSID-0C090439, comment: AcceptSecurityContext error, data 52e, v4563
```

The cause of this error is an invalid LDAP username or password.

**Issue resolution:**

1. Edit the Active Directory as explained in [Edit Active Directory](#).
2. Enter a valid username and user password.

## LDAP timeout

While [Configuring an Active Directory in the agent](#), you may encounter the following error on the **WSTEP** tab of the on-premises PKIaaS Virtual Machine.

### ErrorDialURL

```
ldap://<DOMAIN-CONTROLLER>  
LDAP Result Code 200 "Network Error": dial tcp dc1.example.com:389: i/o timeout
```

See below for a list of possible causes and the corresponding solutions.

- [Domain Controller powered off](#)
- [Orphaned Domain Controller](#)
- [Incorrect IP address](#)

### Domain Controller powered off

The `<DOMAIN-CONTROLLER>` might be powered off.

**Issue resolution:** Power on the Domain Controller.

### Orphaned Domain Controller

The `<DOMAIN-CONTROLLER>` Domain Controller mentioned in the error might be orphaned. This might occur if the Domain Controller was accidentally or incorrectly removed from an Active Directory forest.

**Issue resolution:** Remove the orphaned Domain Controller as explained in <https://learn.microsoft.com/en-us/troubleshoot/windows-server/identity/remove-orphaned-domains>

### Incorrect IP address

The DNS Entry for the `<DOMAIN-CONTROLLER>` Domain Controller might point to an incorrect IP address. This can occur if:

- A Domain Controller was erroneously deployed using a DHCP-assigned IP address instead of a static IP address.
- Mistakes were made while deliberately changing the IP address of a Domain Controller.

### Issue resolution:

1. Check the `<DOMAIN-CONTROLLER>` DNS entry in the Microsoft DNS manager.
2. Verify that the IP Address listed is correct.
3. If the IP address in the Microsoft DNS Manager is correct and differs from the IP address in the logs, another DNS record must be fixed.

## TLS handshake failed

While [Configuring an Active Directory in the agent](#), you may encounter the following error on the **WSTEP** tab of the on-premises PKIaaS Virtual Machine.



**ErrorDialURL**

```
url: ldap://<DOMAIN-CONTROLLER-FQDN>LDAP Result Code 200 "Network Error": TLS handshake failed (tls: either ServerName or InsecureSkipVerify must be specified in the tls.Config)
```

See below for a list of possible causes and the corresponding solutions.

- [Missing LDAPS TLS certificate](#)
- [Invalid LDAPS TLS certificate](#)
- [LDAPS TLS certificate not trusted](#)
- [Incorrect DNS entries](#)

**Missing LDAPS TLS certificate**

The Domain Controller is missing a TLS certificate for LDAPS.

**Issue resolution:**

1. Run the command described in [Validating the LDAPS configuration](#)
2. If the output of the command does not contain an LDAPS TLS certificate, follow the steps described in [Setting up LDAPS on domain controllers](#).

**Invalid LDAPS TLS certificate**

The Domain Controller does not have a valid TLS certificate for LDAPS connections.

**Issue resolution:** Check the following.

- The certificate meets the requirements described in [Generating the LDAPS TLS certificates](#).
- The certificate chain has been imported as explained in [Creating a Group Policy Object for the LDAPS TLS certificate chain](#).

**LDAPS TLS certificate not trusted**

The root CA certificate of the LDAPS TLS certificate chain is not trusted.

**Issue resolution:** Verify the root CA certificate in the root Active Directory domain matches the root CA certificate imported when [Configuring an Active Directory in the agent](#).

**Incorrect DNS entries**

The DNS server on your network might have an incorrect IP address for the Active Directory domain controller.

**Issue resolution:** Verify the IP address of the Active Directory domain controller is properly configured in the DNS server.

**Unknown LDAP host**

While [Configuring an Active Directory in the agent](#), you may encounter the following error on the **WSTEP** tab of the on-premises PKIaaS Virtual Machine.

**ErrorDialURL**

```
ldap://<DOMAIN-CONTROLLER>  
LDAP Result Code 200 "Network Error": dial tcp lookup <DOMAIN-CONTROLLER> on <DNS-  
RESOLVER-IP-ADDRESS>:53 no such host
```

See below for a list of possible causes and the corresponding solutions.

- [Orphaned Domain Controller](#)
- [Missing DNS record](#)

#### Orphaned Domain Controller

The <DOMAIN-CONTROLLER> Domain Controller mentioned in the error might be orphaned. This might occur if the Domain Controller was accidentally or incorrectly removed from an Active Directory forest.

**Issue resolution:** Remove the orphaned Domain Controller as explained in <https://learn.microsoft.com/en-us/troubleshoot/windows-server/identity/remove-orphaned-domains>

#### Missing DNS record

The DNS server running on <DNS-RESOLVER-IP-ADDRESS>:53 does not have a DNS Record for <DOMAIN-CONTROLLER>. This error might occur after following the Microsoft documentation to solve the orphaned Domain Controller issue mentioned above.

**Issue resolution:** Adding the missing DNS record.

## Troubleshooting Group Policy Object configuration issues

Issues may arise while [Creating a Group Policy Object for the WSTEP certificate chain](#). See below for how to solve them.

- [Access denied by remote endpoint](#)
- [Remote endpoint not reachable.](#)

#### Access denied by remote endpoint

When [Enabling WSTEP for users and devices](#), the Windows machine can display the following error.

```
Error: Access was denied by the remote endpoint.  
080300005 (-2143485947 WS_E_ENDPOINT_ACCESS-DENIED)
```

See below for a list of possible causes and the corresponding solutions.

- [Invalid enrollment URL](#)
- [Invalid agent configuration](#)
- [Invalid root Active Directory username](#)

#### Invalid enrollment URL

The CEP URL provided to the Group Policy Manager may contain a typo.

**Issue resolution:** Check the entered URL matches the URL displayed on the welcome page of the Entrust PKIaaS UI.

### Invalid agent configuration

The WSTEP agent configuration is not valid.

**Issue resolution:** Check the following.

- The WSTEP agent runs with a valid configuration before the PKIaaS CEP URL can be defined in a Group Policy Object.
- The WSTEP agent on the PKIaaS Virtual Machine completes an initial synchronization of the Kerberos data (SPN, KVNO) from the root Active Directory before the Microsoft Group Policy Manager can validate the PKIaaS CEP URL.

See [Troubleshooting WSTEP agent configuration issues](#) for solving agent-related issues.

### Invalid root Active Directory username

The username defined on the Entrust PKIaaS UI for the root Active Directory RootAD does not have a properly configured SPN (Service Principal Name) or UPN (User Principal Name).

**Issue resolution:** Run the following command to fix the root Active Directory username.

```
ktpass -mapuser <USER> -princ HTTP/<PKIAAS-WSTEP-URL>@<UPPERCASE-DOMAIN-NAME> -pass <PASS> -ptype KRB5_NT_PRINCIPAL /Target <UPPERCASE-DOMAIN-NAME> /crypto ALL
```

### Remote endpoint not reachable.

When [Enabling WSTEP for users and devices](#), the Windows machine can display the following error.

```
Error: The remote endpoint was not reachable.  
0x005de01a (-2143485936 WS_E_ENDPOINT_UNREACHABLE)
```

See below for a list of possible causes and the corresponding solutions.

- [Invalid enrollment URL](#)
- [Network issues](#)

### Invalid enrollment URL

The CEP URL provided to the Group Policy Manager may contain a typo.

**Issue resolution:** Check the entered URL matches the URL displayed on the welcome page of the Entrust PKIaaS UI.

### Network issues

Network issues prevent the Microsoft server from accessing the PKIaaS WSTEP URLs.

**Issue resolution:** Verify the following.

- The entrust PKIaaS WSTEP URL is reachable.
- The firewall rules do not block traffic to the PKIaaS WSTEP URL.

## Troubleshooting enrollment and certificate template issues

See below for solving issues related to enrollment, autoenrollment and certificate template management.

- [Certificate template not enrolling or autoenrolling](#)

- [Missing certificate template](#)
- [Unexpected behavior of certificate enrollment](#)

## Certificate template not enrolling or autoenrolling

Once configured, a Windows certificate template may not enroll or autoenroll devices. See below for the possible causes and the corresponding solution.

- [Missing Group Policy Object](#)
- [Missing permissions](#)

### Missing Group Policy Object

The Group Policy Object to enable Autoenrollment may not have been created, or may not have been linked to the various domains in the Windows Active Directory forest.

**Issue resolution:** Configure a Group Policy Object as explained below.

- [Enabling autoenrollment for users](#)
- [Enabling autoenrollment for devices](#)
- [Linking the WSTEP Group Policy Object to all domains](#)

### Missing permissions

The user or group facing may not have permission to enroll or autoenroll.

**Issue resolution:** Select the [Security](#) to select the users and groups with permission to enroll and autoenroll.

## Missing certificate template

When browsing certificate templates as explained in [Manage Certificate Templates](#), a certificate template may be missing because it does contain an unsupported key usage.

**Issue resolution:** Verify the key usages as explained in [Extensions](#).

## Unexpected behavior of certificate enrollment

Certificate enrollment may not behave as expected when the Windows certificate template includes unsupported settings.

**Issue resolution:** Verify the certificate template matches the configuration described in [Creating and configuring certificate templates](#). Specifically, the configuration must not include any of the following unsupported settings.

Tab	Unsupported setting
<a href="#">Extensions</a>	Any key usage combination containing the following key usages: CRL Sign Decipher Only, Encipher Only, Key Agreement, Key Cert Sign
<a href="#">General</a>	Publish certificate in Active Directory
<a href="#">Issuance requirements</a>	CA certificate manager approval

---

<b>Tab</b>	<b>Unsupported setting</b>
Key Attestation	Required
Request Handling	Archive subject's encryption private key
Server	Do not include revocation information in issued certificates
	Do not store certificates and requests in the CA Database

## 11 Automating enrollment with an on-premises Enrollment Gateway

When hosted on-premises by the customer, Certificate Enrollment Gateway (CEG) supports the following automation integrations.

- Intune
- MDM Web Service (MDMWS)
- Private TLS/SSL(ACMEv2)
- Active Directory / WSTEP
- SCEP
- Google ChromeOS

See the following online guide for deploying Certificate Enrollment Gateway on the PKI Hub on-premises solution.

<https://api.managed.entrust.com/pkihub>

See in the following video an example of Google Chrome OS enrollment with an on-premises Entrust Certificate Enrollment Gateway and PKIaaS.

<https://www.youtube.com/watch?v=AuPrGduOwy4>

See below for instructions on the generic steps to set up an on-premises Entrust Certificate Enrollment Gateway with PKIaaS.

- [Adding an on-premises Enrollment Gateway to an issuing CA](#)
- [Activating an on-premises Certificate Enrollment Gateway](#)
- [Installing an on-premises Certificate Enrollment Gateway](#)
- [Deleting an on-premises Certificate Enrollment Gateway](#)

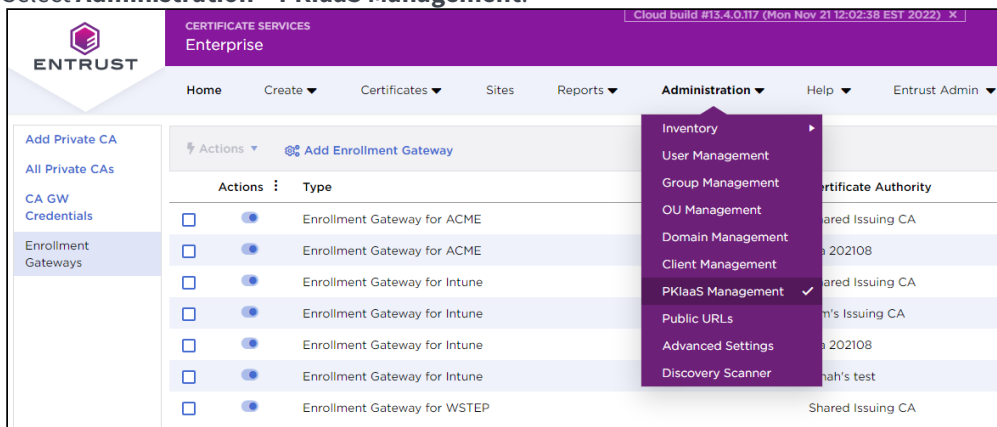
### Adding an on-premises Enrollment Gateway to an issuing CA

Add a Certificate Enrollment Gateway instance to an issuing PKIaaS CA.

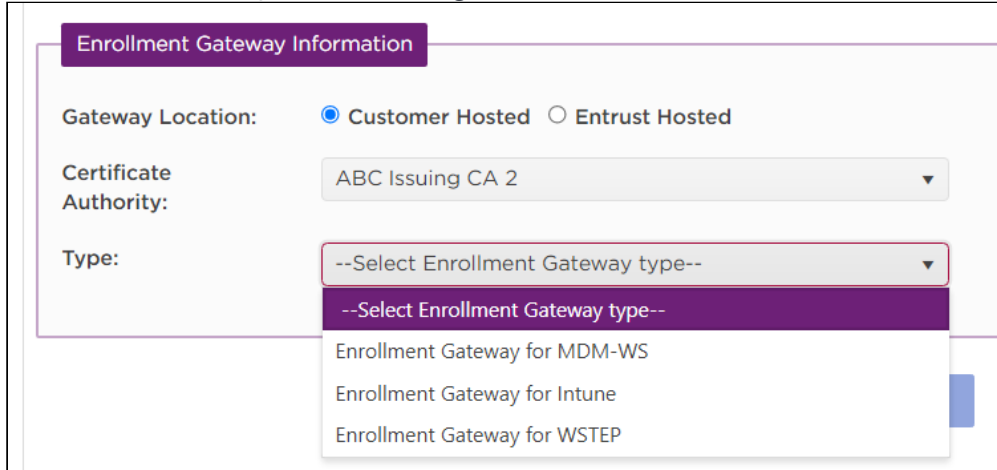
**⚠** As discussed in [Creating an issuing CA under an online root CA](#), please add the required service to the issuing CA. For example, add the SCEP service to your issuing CA before adding the Enrollment Gateway for SCEP.

#### To add a Certificate Enrollment Gateway service to an issuing CA

1. Select **Administration > PKIaaS Management**.



2. In the side pane, click **Enrollment Gateways**.
3. Click **Add Enrollment Gateway**.
4. In **Gateway Location**, select **Customer Hosted**
5. In **Certificate Authority**, select an issuing CA.



6. In **Type**, select one of the Certificate Enrollment Gateway services enabled in the issuing CA.

**⚠** The process will fail if the **Certificate Authority** already has a Certificate Enrollment Gateway instance with the same **Type**.

7. Click **Submit** and accept the confirmation request.

## Activating an on-premises Certificate Enrollment Gateway

The first time you add a Certificate Enrollment Gateway, you will receive an email containing license activation information.



**i** Subsequent Certificate Enrollment Gateway addition will not trigger a new email, including those added to a different issuing CA under the same account.

Activate your Certificate Enrollment Gateway software during the 14-day validity of the password.

- If the person managing the Enrollment Gateway is a different administrator, please forward the email as required.
- If you no longer have the original activation email or try to activate the software after 14 days, please contact Entrust Support to resend the activation email.

- If you have activated the software and need to reinstall Certificate Enrollment Gateway software, please contact Entrust Support to reset the license. You will receive the reset license via a new email.

## Installing an on-premises Certificate Enrollment Gateway

Entrust distributes the on-premises Certificate Enrollment Gateway solution as part of the PKI Hub platform. See the online guide at <https://api.managed.entrust.com/pkihub> to:

1. Download and install Entrust PKI Hub.
2. Deploy Certificate Enrollment Gateway on Entrust PKI Hub.

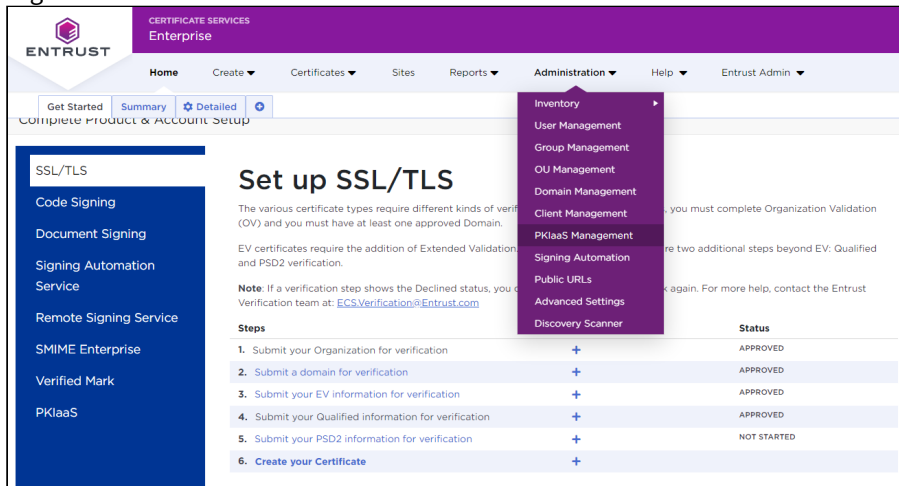
## Deleting an on-premises Certificate Enrollment Gateway

When deleting an on-premises Certificate Enrollment Gateway instance, the Certificate Enrollment Gateway license returns to inventory within 24 hours.

✘ Removing a Certificate Enrollment Gateway instance removes ALL the Certificate Enrollment Gateway instances from ALL the CAs in the account.

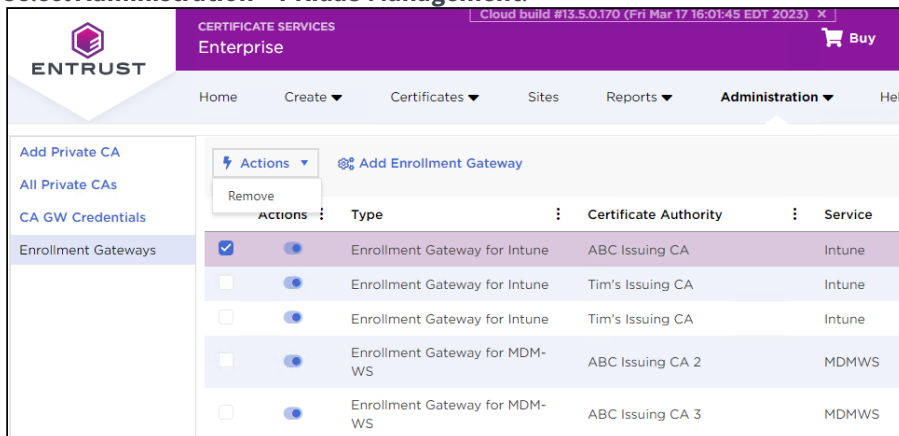
### To delete a Certificate Enrollment Gateway instance

1. Log into [cloud.entrust.net](https://cloud.entrust.net).



The screenshot shows the 'Set up SSL/TLS' page in the Entrust Enterprise interface. The 'Administration' dropdown menu is open, showing options like 'Inventory', 'User Management', 'Group Management', 'OU Management', 'Domain Management', 'Client Management', 'PKIaaS Management', 'Signing Automation', 'Public URLs', 'Advanced Settings', and 'Discovery Scanner'. The 'PKIaaS Management' option is highlighted.

2. Select **Administration > PKIaaS Management**.



The screenshot shows the 'PKIaaS Management' page in the Entrust Enterprise interface. The 'Administration' dropdown menu is open, showing 'PKIaaS Management' selected. Below the menu, there is a table of Enrollment Gateways.

actions	Type	Certificate Authority	Service
<input checked="" type="checkbox"/>	Enrollment Gateway for Intune	ABC Issuing CA	Intune
<input type="checkbox"/>	Enrollment Gateway for Intune	Tim's Issuing CA	Intune
<input type="checkbox"/>	Enrollment Gateway for Intune	Tim's Issuing CA	Intune
<input type="checkbox"/>	Enrollment Gateway for MDM-WS	ABC Issuing CA 2	MDMWS
<input type="checkbox"/>	Enrollment Gateway for MDM-WS	ABC Issuing CA 3	MDMWS



3. In the side pane, click **Enrollment Gateways**.
4. On the row grid, select a Certificate Enrollment Gateway instance.
5. Select **Actions > Remove**.
6. Click **OK** on the confirmation dialog.

## 12 Migrating a customer-hosted Enrollment Gateway to Entrust-hosted

Entrust PKIaaS supports the following migrations from a customer-hosted Certificate Enrollment Gateway to an Entrust-hosted one for the same CA and certificate profile.

- [Migrating an Intune on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway](#)
- [Migrating an MDM on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway](#)
- [Migrating a WSTEP on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway](#)

### Migrating an Intune on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway

See below for migrating Intune enrollment from a customer-hosted Enrollment Gateway to an Entrust-hosted Enrollment Gateway.

#### To migrate Intune enrollment to an Entrust-hosted Enrollment Gateway

1. Deploy an Entrust-hosted Enrollment Gateway as explained in [Configuring Intune automation in Entrust Certificate Services](#).
2. In Microsoft Endpoint, replace the **SCEP Server URLs** of all your Intune SCEP configuration profiles with the values described in [Getting the Intune Service URL](#).
3. Test and validate the new Entrust-hosted Intune service.
4. If the customer-hosted Enrollment Gateway was only used for Intune enrollment, remove it as explained in [Deleting an on-premises Certificate Enrollment Gateway](#). Otherwise, if still used for other enrollment protocols (such as ACME, SCEP, or WSTEP):
  - Disable Intune enrollment in the customer-hosted Enrollment Gateway configuration.
  - DO NOT remove the customer-hosted Enrollment Gateway from the Entrust Certificate Services portal.

### Migrating an MDM on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway

See below for migrating MDM enrollment from a customer-hosted Enrollment Gateway to an Entrust-hosted Enrollment Gateway.

#### To migrate MDM enrollment to an Entrust-hosted Enrollment Gateway

1. Deploy an Entrust-hosted Enrollment Gateway as explained in [Automating MDM enrollment with an Entrust-hosted Enrollment Gateway](#).
2. When [Configuring MDM automation in Jamf](#), go to **Options / SCEP** and update only the following parameters of your existing Jamf configuration.
  - In **URL**, paste the **SCEP URL** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).
  - In **Entrust Web Service URL**, paste the **MDM-WS-URL** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).
  - In **Administrator Username**, paste the **UserID** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).
  - In **Administrator Password**, paste the **Password** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).
  - In **Digital ID Configuration Name**, paste the **Name** value obtained when [Getting Certificate Enrollment Gateway settings for MDM](#).

3. Test and validate the new Entrust-hosted MDM service.
4. If the customer-hosted Enrollment Gateway was only used for MDM enrollment, remove it as explained in [Deleting an on-premises Certificate Enrollment Gateway](#). Otherwise, if still used for other enrollment protocols (such as ACME, SCEP, or WSTEP):
  - Disable MDM enrollment in the customer-hosted Enrollment Gateway configuration.
  - DO NOT remove the customer-hosted Enrollment Gateway from the Entrust Certificate Services portal.

## Migrating a WSTEP on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway

To configure the migration from an WSTEP on-premises Enrollment Gateway to an Entrust-hosted Enrollment Gateway, follow the steps under [Automating Windows Auto Enrollment \(WSTEP\) with an Entrust-hosted Enrollment Gateway](#). See below for specific considerations on each section.

**⚠** It is recommended to keep the on-premises WSTEP Enrollment Gateway running until the Entrust-hosted WSTEP Enrollment Gateway is fully deployed and integrated within the Microsoft Active Directory forest.

Section	Considerations for migrating an on-premises deployment
<a href="#">Planning your WSTEP deployment</a>	Determine the required number of PKIaaS Virtual Machines based on your current deployment.
<a href="#">WSTEP enrollment requirements</a>	Determine the networking requirements based on your current deployment. Make any necessary adjustment to the DNS server and the firewall rules.
<a href="#">Configuring an Entrust PKIaaS issuing CA for WSTEP</a>	You can skip this section as WSTEP is already configured for your on-premises deployment.
<a href="#">Preparing the Active Directory forest for WSTEP</a>	Repeat <a href="#">Creating a PKIaaS WSTEP Service Account</a> for each root Active Directory in every Microsoft Active Directory forest. It is recommended to create a new service account for the Entrust-hosted WSTEP Enrollment Gateway to allow the existing on-premises WSTEP Enrollment Gateway to continue functioning until decommissioned.
	You can skip <a href="#">Installing the default set of Microsoft Certificate Templates</a> as the certificate templates should already exist for each Microsoft Active Directory forest.
	Repeat <a href="#">Setting up LDAPS on domain controllers</a> across the entire Microsoft Active Directory forest. In contrast, the on-premises WSTEP Enrollment Gateway requires LDAPS TLS certificates to be configured only on the root Active Directory domain controllers.

Section	Considerations for migrating an on-premises deployment
<a href="#">Configuring PKIaaS Virtual Machines on the PKIaaS portal</a>	Complete all the steps. When <a href="#">Configuring an Active Directory in the agent</a> , ensure the selected Certificate Authority matches the one used for the on-premises WSTEP Enrollment Gateway.
<a href="#">Enabling WSTEP for users and devices</a>	Do not reuse the Group Policy Object (GPO) of the on-premises WSTEP Enrollment Gateway. Instead, complete all the steps to: <ol style="list-style-type: none"> <li>1. Create a new GPO.</li> <li>2. Apply the GPO to single a test user.</li> <li>3. Complete the migration testing.</li> <li>4. Apply the GPO across the entire forest.</li> <li>5. Unlink the the existing GPO for the on-premises WSTEP Enrollment Gateway.</li> </ol> This will allow rolling back the process, if needed.

When completing these configuration steps, perform the following cleanup steps.

- [Cleaning up the Windows domain after migrating WSTEP to an Entrust-hosted Enrollment Gateway](#)
- [Cleaning up Entrust Deployment Manager after migrating WSTEP to an Entrust-hosted Enrollment Gateway](#)

## Cleaning up the Windows domain after migrating WSTEP to an Entrust-hosted Enrollment Gateway

Perform the follow steps in your Windows domain to complete the migration.

### To clean up the Windows domain after migration

1. Remove all Group Policy Objects (GPOs) for the on-premises WSTEP Enrollment Gateway
2. Run the following command to force a group policy update.

```
gpupdate /force
```

3. In the root domains of the Microsoft Active Directory forests, delete the WSTEP Service account for the on-premises WSTEP Enrollment Gateway.
4. Turn off the Microsoft servers with the Certificate Enrollment Policy (CEP) service. If these are virtual machines, you can delete them.
5. Open the ADSI Edit console and remove the Enrollment Service for the on-premises WSTEP Enrollment Gateway.

## Cleaning up Entrust Deployment Manager after migrating WSTEP to an Entrust-hosted Enrollment Gateway

The required cleanup operations on Entrust Deployment Manager vary depending on the following situations.

- The on-premises Entrust Enrollment Gateway runs other enrollment protocols such as ACME, MDM, Intune or SCEP.
- The Entrust Deployment Manager cluster hosts other solutions such as Certificate Hub or CA Gateway.


See the table below for the required cleanup actions to be performed on every Entrust Deployment Manager cluster.

Enrollment protocols	Other solutions	Cleanup actions
WSTEP	✔	<p>Run the following command to delete the <code>ceg</code> namespace from Entrust Deployment Manager.</p> <pre>sudo kubectl delete namespace ceg</pre> <p>This operation will keep the configuration and the license in case you need to redeploy.</p>
WSTEP	✘	You can shut-down or delete the nodes of the Entrust Deployment Manager cluster.
WSTEP and other protocols	✔	Do nothing.
WSTEP and other protocols	✘	Do nothing.

## 13 Managing certificates with Entrust Certificate Hub

You can view and manage your issued certificates through the Entrust Certificate Hub product, which offers more advanced Certificate Lifecycle Management features.

- [Connecting your CA](#)
- [Dashboard](#)
- [Reporting on certificate activity](#)
- [Ad-hoc exploration](#)
- [Expiry notifications](#)

 Certificate Hub is not part of the PKIaaS offering and requires a separate license. Please contact your Entrust sales representative if you want to purchase Certificate Hub.

### Connecting your CA

Connect your issuing CA as a source using the credentials obtained in [Generating CA Gateway credentials](#). The URL will be the relevant one listed in the Entrust CA Gateway API. Once you set this up, Certificate Hub will check with your CA every 15 minutes and pull in any issued certificates through CEG or other applications. It will also update for any revocations.

Optionally, you can also connect your issuing CA as an Authority. The URL will be the same. Connecting your issuing CA as an authority will allow you to revoke and manually issue certificates for other applications supported by the certificate profiles assigned to your CA.

### Dashboard

The Certificate Hub dashboard provides a quick overview of all activities.

### Reporting on certificate activity

Certificate Hub provides an engine to define reports based on your business needs, such as daily certificate issuance, revocation, and renewal activities.

### Ad-hoc exploration

The certificate view allows you to filter and display certificates from your PKIaaS CA or any other CA that you have connected. Certificate Hub's "Single Pane of Glass" view gives you enterprise-wide visibility of all your PKI activity.

### Expiry notifications

You can define expiry notifications to inform certificate owners that certificates are about to expire and must be renewed. Such notifications are valuable in some scenarios, but notifications may be unnecessary if you are using Certificate Enrollment Gateway to automate the issuance and renewal of certificates. You may find that weekly reports of certificates about to expire are a better way to monitor that the overall system operation is working.

## 14 Integrating third-party tools with the Entrust CA Gateway API

Entrust CA Gateway provides the API described at:

<https://api.managed.entrust.com/doc>

Of the capabilities documented in this reference, PKIaaS supports natively the ones listed in:

<https://api.managed.entrust.com/doc/#operation/caCapabilities>

To implement the other capabilities, you must integrate a third-party tool as explained in this section.

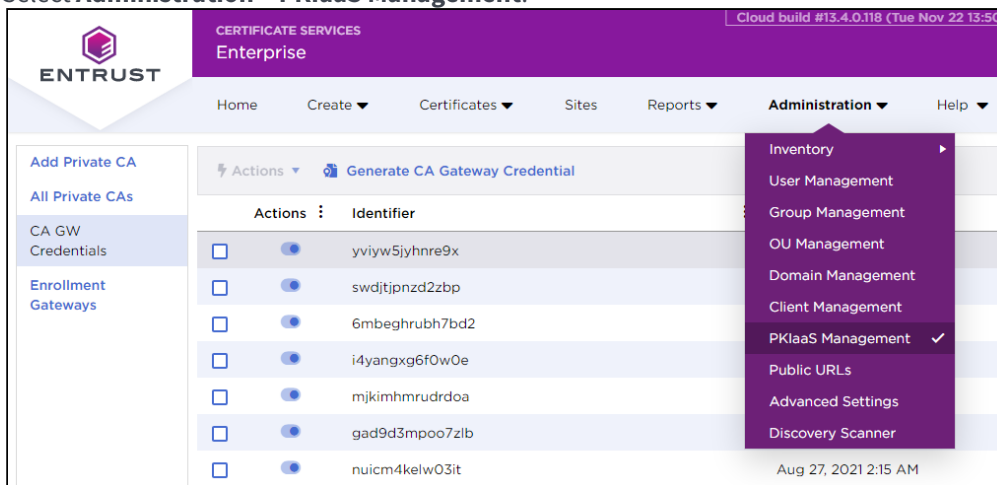
- [Generating CA Gateway credentials](#)
- [Accessing the CA Gateway API](#)
- [Integrating with Ansible](#)
- [Integrating with HashiCorp Vault](#)
- [Integrating with KeyFactor CLM](#)
- [Integrating with ServiceNow](#)
- [Integrating with Venafi](#)

### Generating CA Gateway credentials

Generate and download credentials to connect with the Entrust CA Gateway API.

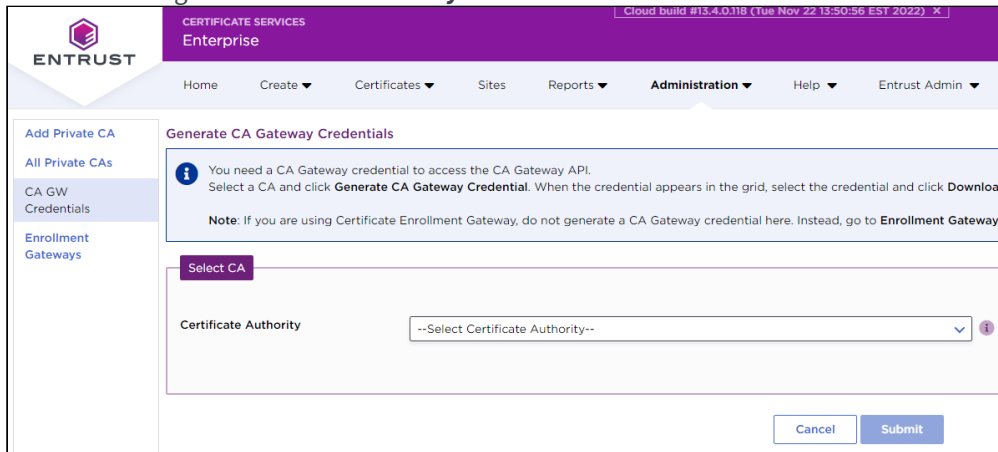
#### To generate and download CA Gateway credentials

1. Select **Administration > PKIaaS Management**.

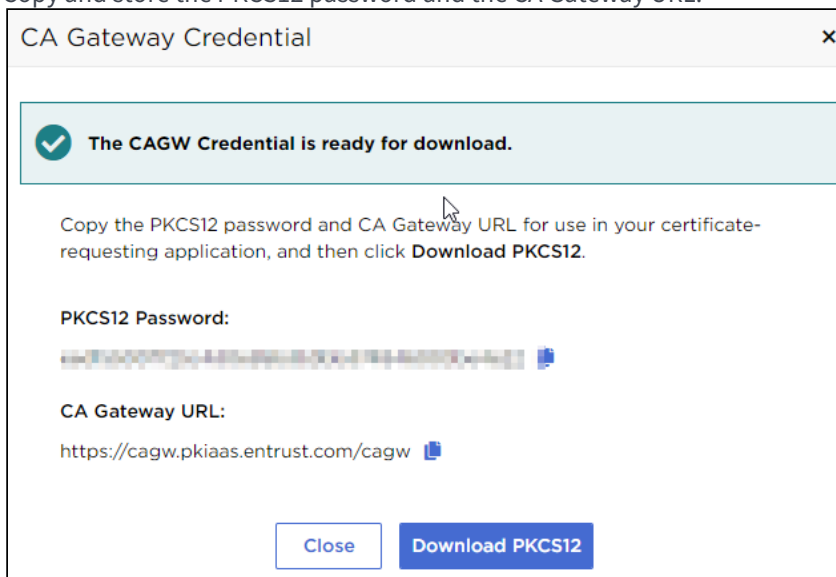


2. In the side pane, click **CA GW Credentials**.
3. Click **Generate CA Gateway Credential**.

4. Select an issuing **Certification Authority**.



5. Click **Submit** and accept the confirmation request. The credential will appear in the grid with the **Provisioning** status.
6. Refresh the grid to check completion.
7. When the credential status is **Active**, click the credential row and select **Actions > Download**.
8. Copy and store the PKCS12 password and the CA Gateway URL.



9. Click **Download PKCS12**.

## Accessing the CA Gateway API

After you have installed the Entrust CA Gateway credential on your local machine, you can access the API via Swagger UI using a web browser or the API client you prefer.

PKI region	CA Gateway endpoint
US	<a href="https://cagw.pkiaas.entrust.com/cagw">https://cagw.pkiaas.entrust.com/cagw</a>



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PKI region	CA Gateway endpoint
EU	<a href="https://cagw.eu.pkiaas.entrust.com/cagw">https://cagw.eu.pkiaas.entrust.com/cagw</a>

## Integrating with Ansible

To integrate Entrust PKIaaS with Ansible, use the open-source client:

<https://github.com/EntrustCorporation/entrust-ansible-collection>

## Integrating with HashiCorp Vault

To integrate Entrust PKIaaS with HashiCorp Vault, use the open-source plug-in:

<https://github.com/EntrustCorporation/cagw-vault-plugin>

## Integrating with KeyFactor CLM

To integrate Entrust PKIaaS with the KeyFactor CLM, use the CA Gateway connector:

<https://github.com/Keyfactor/entrust-cagateway>

## Integrating with ServiceNow

To integrate Entrust PKIaaS with the ServiceNow automation software, use Entrust CA Gateway as described in:

[https://store.servicenow.com/sn\\_appstore\\_store.do#!/store/application/dc1de8e30f1c3200de7a45ace1050e02](https://store.servicenow.com/sn_appstore_store.do#!/store/application/dc1de8e30f1c3200de7a45ace1050e02)

## Integrating with Venafi

To integrate PKIaaS with the Venafi certificate management software, add an Entrust CA as explained in:

<https://docs.venafi.com/Docs/current/TopNav/Content/Drivers/r-drivers-Entrust-CAGateway-ConfiguringCATemplateObject.php>

## 15 Revoking certificates in bulk

The user interface of the Entrust Certificate Service Enterprise portal does not currently support bulk revocation of certificates. Nevertheless, you can revoke certificates in bulk using the PKIaaS CA Gateway API and the following open-source utility:

<https://github.com/EntrustCorporation/pki-utilities/tree/main/bulk-revoke-shell>

## 16 Certificate profiles reference

Entrust provides the following set of certificate profiles for authorities and end-entities.

- [Authority profiles](#)
- [Subscriber certificate profiles](#)

### Authority profiles

Entrust authorities support the following profiles.

Profile set	Profiles
<a href="#">Azure Firewall Intermediate CA certificate profile</a>	azure-firewall-ca-subord
<a href="#">Basic authorities certificate profiles</a>	basic-ca-root basic-ca-subord basic-ocsp
<a href="#">TLS Proxy CA certificate profile</a>	tlsproxy-ca-subord

### Azure Firewall Intermediate CA certificate profile

The Azure Firewall Intermediate CA service provides a `azure-firewall-ca-subord` profile for root Certificate Authorities.

- [Azure Firewall Subordinate CA signing use cases](#)
- [Azure Firewall Subordinate CA request extensions](#)
- [Azure Firewall Subordinate CA certificate fields](#)
- [Azure Firewall Subordinate CA certificate extensions](#)
- [Azure Firewall Subordinate CA algorithm constraints](#)
- [Azure Firewall Subordinate CA distinguished names](#)

### Azure Firewall Subordinate CA signing use cases

The `azure-firewall-ca-subord` profile supports the following use cases.

- ECS Enterprise UI
- CA Gateway API

### Azure Firewall Subordinate CA request extensions

The `azure-firewall-ca-subord` profile supports the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32

**⚠** Follow the [Microsoft Azure Intermediate requirements](#) to generate the CSR before requesting the CA certificate from PKIaaS.

### Azure Firewall Subordinate CA certificate fields

The `azure-firewall-ca-subord` profile sets the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint
Validity period	Defaults to 1 year if not specified.

### Azure Firewall Subordinate CA certificate extensions

The `azure-firewall-ca-subord` profile sets the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA=True, pathLenConstraint=1
CRL Distribution Points	No	Always present
Key Usage	Yes	Certificate Signing, CRL Signing, Digital Signature
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### Azure Firewall Subordinate CA algorithm constraints

The `azure-firewall-ca-subord` profile supports the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

**i** NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### Azure Firewall Subordinate CA distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10


Alias	OID
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5

Alias	OID
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Basic authorities certificate profiles

Entrust provides the following basic profiles for root Certificate Authorities, issuing Certificate Authorities, and Validation Authorities (OCSP).

- basic-ca-root
- basic-ca-subord
- basic-ocsp

 These profiles are not exposed nor configurable. External root CAs are not covered by this profile.

See below a description of these profiles.

- [Key and signature algorithms](#)
- [Certificate fields](#)
- [Certificate critical extensions](#)
- [Certificate non-critical extensions](#)

## Key and signature algorithms

All authority basic profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512

Key algorithm	Signature algorithm
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

**i** NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## Certificate fields

The authority basic profiles set the following certificate fields.

Field	basic-ca-root	basic-ca-subord	basic-ocsp
Issuer	Self-signed	Customer's online root CA	Customer's online root/ issuing CA
Subject	No constraint	No constraint	No constraint
Validity period	Less than or equal to 20 years	Less than or equal to 10 years. The subordinate expiry cannot exceed the root validity.	30 days

## Certificate critical extensions

The authority basic profiles set the following certificate critical extensions.

Extension	basic-ca-root	basic-ca-subord	basic-ocsp
Basic Constraints	cA=True	cA=True, pathLenConstraint=0	cA = False
Extended Key Usage	Never present	Never present	OCSP Signing
Key Usage	digitalSignature, keyCertSign, cRLSign	digitalSignature, keyCertSign, cRLSign	digitalSignature, keyCertSign, cRLSign

## Certificate non-critical extensions

The authority basic profiles set the following non-critical certificate extensions.



Extension	basic-ca-root	basic-ca-subord	basic-ocsp
AIA	Never present	Supplied when the customer enables OCSP on CA creation	Always present
Authority Key Identifier	Never present	Matches subjectKeyIdentifier of the signing certificate	Matches subjectKeyIdentifier of the signing certificate
CRL Distribution Points	Never present (not applicable)	Always present	Always present
OCSP	Never present	Never present	No check
Subject Key Identifier	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## TLS Proxy CA certificate profile

The TLS Proxy CA service provides provides a `tlsproxy-ca-subord` certificate profile for root Certificate Authorities.

- [TLS Proxy CA use cases](#)
- [TLS Proxy CA request extensions](#)
- [TLS Proxy CA certificate fields](#)
- [TLS Proxy CA certificate extensions](#)
- [TLS Proxy CA algorithm constraints](#)
- [TLS Proxy CA distinguished names](#)

**i** Each external subordinate CA issued by a PKIaaS root CA only consumes one PKIaaS Certificate license. Entrust does not charge for certificates issued by external subordinate CAs because those certificates are considered external and not using the PKIaaS infrastructure.

## TLS Proxy CA use cases

The `tlsproxy-ca-subord` profile supports the following use cases.

- ECS Enterprise UI
- CA Gateway API

## TLS Proxy CA request extensions

The `tlsproxy-ca-subord` profile supports the following non-critical extensions in request.

Extension name	Extension OID
CertificatePolicies	2.5.29.32

## TLS Proxy CA certificate fields

The `tlsproxy-ca-subord` profile sets the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint
Validity period	Defaults to 1 year if not specified.

## TLS Proxy CA certificate extensions

The `tlsproxy-ca-subord` profile sets the following certificate extensions.


Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA=True, pathLenConstraint=0
CRL Distribution Points	No	Always present
Extended Key Usage	No	TLS server authentication (1.3.6.1.5.5.7.3.1), TLS client authentication (1.3.6.1.5.5.7.3.2)
Key Usage	Yes	Certificate Signing, CRL Signing, Digital Signature
Subject Alternative Name	No	No constraints

Extension	Critical	Value
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## TLS Proxy CA algorithm constraints

The `tlsproxy-ca-subord` profile supports the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## TLS Proxy CA distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6

Alias	OID
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3

Alias	OID
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Subscriber certificate profiles

Entrust provides the following certificate policies for end-entity subscribers

Title	Profiles
<a href="#">Active Directory (WSTEP) certificate profiles</a>	wstep-digital-signature wstep-digital-signature-key-encipherment wstep-key-encipherment wstep-non-repudiation wstep-non-repudiation-key-encipherment
<a href="#">CMPv2 certificate profiles</a>	cmp-digital-signature cmp-digital-signature-key-encipherment cmp-key-encipherment cmp-non-repudiation

Title	Profiles
Code signing certificate profile	codesigning-digital-signature
eSIM certificate profiles	esim-delivery-auth esim-delivery-binding esim-delivery-tls-server esim-discovery-auth esim-discovery-tls-server
EST certificate profiles	est-digital-signature est-digital-signature-key-encipherment est-key-encipherment est-non-repudiation
Intune certificate profiles	intune-digital-signature intune-digital-signature-key-encipherment intune-digital-signature-key-encipherment-clientauth intune-key-encipherment intune-non-repudiation
MDMWS certificate profiles	mdmws-digital-signature mdmws-digital-signature-key-encipherment mdmws-digital-signature-key-encipherment-clientauth mdmws-key-encipherment mdmws-non-repudiation mdmws-p12-digital-signature mdmws-p12-digital-signature-key-encipherment mdmws-p12-digital-signature-key-encipherment-clientauth mdmws-p12-key-encipherment mdmws-p12-non-repudiation
Mobile device certificate profile	mobile-device-p12-digital-signature-client-authentication
Multiuse certificate profiles	multiuse-p12-client multiuse-p12-client-server multiuse-p12-custom multiuse-p12-key-data-encipherment-non-repudiation-client multiuse-p12-key-data-encipherment-non-repudiation-client-server multiuse-p12-key-encipherment-client multiuse-p12-key-encipherment-client-server

Title	Profiles
	multiuse-p12-key-encipherment-custom multiuse-p12-key-encipherment-non-repudiation-client multiuse-p12-key-encipherment-non-repudiation-client-server multiuse-p12-key-encipherment-non-repudiation-custom multiuse-p12-key-encipherment-non-repudiation-server multiuse-p12-key-encipherment-server multiuse-p12-non-repudiation-client multiuse-p12-non-repudiation-client-server multiuse-p12-non-repudiation-custom multiuse-p12-non-repudiation-server multiuse-p12-server
Private SSL (ACMEv2) certificate profiles	privatessl-tls-client privatessl-tls-client-server privatessl-tls-client-server-data-encipherment privatessl-tls-client-server-supply-san privatessl-tls-server privatessl-tls-server-supply-san
S_MIME certificate profiles	smime-digital-signature-key-encipherment smime-key-encipherment smime-non-repudiation
SCEP certificate profiles	scep-digital-signature scep-digital-signature-key-encipherment scep-key-encipherment scep-non-repudiation
Smartcard certificate profiles	smartcard-card-authentication smartcard-digital-signature smartcard-domain-controller smartcard-key-management smartcard-piv-authentication smartcard-piv-content-signing
V2G certificate profiles	v2g-supply-equipment v2g-user-identity

## Active Directory (WSTEP) certificate profiles

Entrust provides the following Active Directory (WSTEP) certificate profiles.

- wstep-digital-signature
- wstep-digital-signature-key-encipherment
- wstep-key-encipherment
- wstep-non-repudiation
- wstep-non-repudiation-key-encipherment

These profiles support the following features.

- [WSTEP use cases](#)
- [WSTEP key usages](#)
- [WSTEP request extensions](#)
- [WSTEP certificate fields](#)
- [WSTEP certificate extensions](#)
- [WSTEP algorithm constraints](#)
- [WSTEP distinguished names](#)

### WSTEP use cases

All WSTEP profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API
- Entrust-hosted Enrollment Gateway
- On-prem Enrollment Gateway

### WSTEP key usages

See below the Key Usage extension values supported by each WSTEP profile.

Profile	Key Usage
wstep-digital-signature	Digital Signature
wstep-digital-signature-key-encipherment	Digital Signature, Key Encipherment
wstep-key-encipherment	Key Encipherment
wstep-non-repudiation	Digital Signature, Non-Repudiation
wstep-non-repudiation-key-encipherment	Digital Signature, Non-Repudiation, Key Encipherment

### WSTEP request extensions

All WSTEP profiles support the following non-critical extensions in request.



Extension name	Extension OID
Certificate Policies	2.5.29.32
Extended Key Usage	2.5.29.37
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

### WSTEP certificate fields

All WSTEP profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### WSTEP certificate extensions

All WSTEP profiles set the following certificate extensions.


Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate

Extension	Critical	Value
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### WSTEP algorithm constraints

All WSTEP profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### WSTEP distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3

Alias	OID
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8

Alias	OID
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## CMPv2 certificate profiles

Entrust provides the following CMPv2 certificate profiles.

- [cmp-digital-signature](#)
- [cmp-digital-signature-key-encipherment](#)
- [cmp-key-encipherment](#)
- [cmp-non-repudiation](#)

These profiles support the following features.

- [CMPv2 use cases](#)
- [CMPv2 key usages](#)
- [CMPv2 request extensions](#)

- [CMPv2 certificate fields](#)
- [CMPv2 certificate extensions](#)
- [CMPv2 algorithm constraints](#)
- [CMPv2 distinguished names](#)

## CMPv2 use cases

All CMPv2 profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

## CMPv2 key usages

See below the Key Usage extension values supported by each CMPv2 profile.

Profile	Key Usage
cmp-digital-signature	Digital Signature
cmp-digital-signature-key-encipherment	Digital Signature, Key Encipherment
cmp-key-encipherment	Key Encipherment
cmp-non-repudiation	Digital Signature, Non-Repudiation

## CMPv2 request extensions

All CMPv2 profiles support the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32
Extended Key Usage	2.5.29.37
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2

Extension name	Extension OID
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

### CMPv2 certificate fields

All CMPv2 profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### CMPv2 certificate extensions

All CMPv2 profiles set the following certificate extension.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Extended Key Usage	No	No constraints
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## CMPv2 algorithm constraints

All CMPv2 profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption



NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## CMPv2 distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9

Alias	OID
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4



Alias	OID
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Code signing certificate profile

Entrust provides the `codesigning-digital-signature` certificate profile for code signing.

- [Code signing use cases](#)
- [Code signing certificate fields](#)
- [Code signing certificate extensions](#)
- [Code signing algorithm constraints](#)
- [Code signing distinguished names](#)

### Code signing use cases

The `codesigning-digital-signature` profile supports the following use cases.

- ECS Enterprise UI
- CA Gateway API

### Code signing certificate fields

The `codesigning-digital-signature` profile sets the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA

Field	Value
Validity period	Less than or equal to the expiry of the issuing CA. Default to 1 year if not specified in the request.
Subject	No constraint

## Code signing certificate extensions

The `codesigning-digital-signature` profile sets the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Extended Key Usage	No	Code Signing (1.3.6.1.5.5.7.3.3)
Key Usage	Yes	Digital Signature
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## Code signing algorithm constraints

The `codesigning-digital-signature` profile supports the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256

Key algorithm	Signature algorithm
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

**i** NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### Code signing distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11

<b>Alias</b>	<b>OID</b>
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6

Alias	OID
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## eSIM certificate profiles

Entrust provides the following certificate profiles for eSIM end-entity users.

- esim-delivery-auth
- esim-delivery-binding
- esim-delivery-tls-server
- esim-discovery-auth
- esim-discovery-tls-server

These profiles support the following features.

- [eSIM use cases](#)
- [eSIM key usages and certificate policies](#)
- [eSIM certificate fields](#)
- [eSIM certificate extensions](#)
- [eSIM algorithm constraints](#)
- [eSIM distinguished names](#)

### eSIM use cases

All eSIM end-entity profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

### eSIM key usages and certificate policies

See below the Key Usage, Extended Key Usage (EKU), and Certificate Policy extension values supported by each eSIM profile.

Profile	Key Usage	Extended Key Usage	Certificate Policy
esim-delivery-auth	Digital Signature	—	id-rspRole-dp-auth (2.23.146.1.2.1.4)
esim-delivery-binding	Digital Signature	—	id-rspRole-dp-pb (2.23.146.1.2.1.5)
esim-delivery-tls-server	Digital Signature	TLS server authentication (1.3.6.1.5.5.7.3.1)	id-rspRole-dp-tls (2.23.146.1.2.1.3)
esim-discovery-auth	Digital Signature	—	id-rspRole-ds-auth (2.23.146.1.2.1.7)
esim-discovery-tls-server	Digital Signature	TLS server authentication (1.3.6.1.5.5.7.3.1)	id-rspRole-ds-tls (2.23.146.1.2.1.6)

### eSIM certificate fields

All eSIM profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 3 years if not specified in the request.

### eSIM certificate extensions

All eSIM profiles set the following certificate extensions.


Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate

Extension	Critical	Value
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### eSIM algorithm constraints

All eSIM profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### eSIM distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3

<b>Alias</b>	<b>OID</b>
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8



Alias	OID
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## EST certificate profiles

Entrust provides the following EST (Enrollment over Secure Transport) certificate profiles.

- est-digital-signature
- est-digital-signature-key-encipherment
- est-key-encipherment
- est-non-repudiation

These profiles support the following features.

- [EST signing use cases](#)
- [EST key usages](#)
- [EST request extensions](#)

- [EST certificate fields](#)
- [EST certificate extensions](#)
- [EST algorithm constraints](#)
- [EST signing distinguished names](#)

## EST signing use cases

All EST profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

## EST key usages

See below the Key Usage extension values each EST profile supports.

Profile	Key Usage
est-digital-signature	Digital Signature
est-digital-signature-key-encipherment	Digital Signature, Key Encipherment
est-key-encipherment	Key Encipherment
est-non-repudiation	Digital Signature, Non-Repudiation

## EST request extensions

All EST profiles support the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32
Extended Key Usage	2.5.29.37
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2

Extension name	Extension OID
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

### EST certificate fields

All EST profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### EST certificate extensions


All EST profiles set the following certificate extension values.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Extended Key Usage	No	No constraints
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## EST algorithm constraints

All EST profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## EST signing distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9

Alias	OID
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4

Alias	OID
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Intune certificate profiles

Entrust provides the following Intune certificate profiles.

- intune-digital-signature
- intune-digital-signature-key-encipherment
- intune-digital-signature-key-encipherment-clientauth
- intune-key-encipherment
- intune-non-repudiation

These profiles support the following features.

- [Intune use cases](#)
- [Intune key usages](#)
- [Intune request extensions](#)
- [Intune certificate fields](#)
- [Intune certificate extensions](#)
- [Intune algorithm constraints](#)
- [Intune distinguished names](#)

## Intune use cases

All Intune profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API
- Entrust-hosted Enrollment Gateway
- On-prem Enrollment Gateway

## Intune key usages

See below the Key Usage and Extended Key Usage (EKU) extension values supported by each Intune profile.

Profile	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
intune-digital-signature	Digital Signature	—	✓
intune-digital-signature-key-encipherment	Digital Signature, Key Encipherment	—	✓
intune-digital-signature-key-encipherment-clientauth	Digital Signature, Key Encipherment	TLS client authentication (1.3.6.1.5.5.7.3.2)	✗
intune-key-encipherment	Key Encipherment	—	✓
intune-non-repudiation	Digital Signature, Non-Repudiation	—	✓

## Intune request extensions

All Intune profiles support the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

## Intune certificate fields

All Intune profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### Intune certificate extensions

All Intune profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>


### Intune algorithm constraints

All Intune profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512



Key algorithm	Signature algorithm
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### Intune distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15

<b>Alias</b>	<b>OID</b>
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2

Alias	OID
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## MDMWS certificate profiles

Entrust provides the following MDMWS (Mobile Device Management Web Service) certificate profiles.

- mdmws-digital-signature
- mdmws-digital-signature-key-encipherment
- mdmws-digital-signature-key-encipherment-clientauth
- mdmws-key-encipherment
- mdmws-non-repudiation
- mdmws-p12-digital-signature
- mdmws-p12-digital-signature-key-encipherment
- mdmws-p12-digital-signature-key-encipherment-clientauth
- mdmws-p12-key-encipherment
- mdmws-p12-non-repudiation

These profiles support the following features.

- [MDMWS use cases](#)
- [MDMWS issuance modes and key usages](#)
- [MDMWS request extensions](#)
- [MDMWS certificate fields](#)
- [MDMWS certificate extensions](#)
- [MDMWS algorithm constraints](#)
- [MDMWS distinguished names](#)

### MDMWS use cases

All MDMWS profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API
- Entrust-hosted Enrollment Gateway
- On-prem Enrollment Gateway

### MDMWS issuance modes and key usages

MDMWS profiles support the following issuance modes:

- Issue the certificate from a CSR.
- Issue the certificate and an RSA2048 private key in a P12 file.

See below the issuance mode, Key Usage, and Extended Key Usage (EKU) values each MDMWSPROFILE supports.

Profile	CSR	P12	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
mdmws-digital-signature	✓	✗	Digital Signature	No constraints	✓
mdmws-digital-signature-key-encipherment	✓	✗	Digital Signature, Key Encipherment	No constraints	✓
mdmws-digital-signature-key-encipherment-clientauth	✓	✗	Digital Signature, Key Encipherment	TLS client authentication (1.3.6.1.5.5.7.3.2)	✗
mdmws-key-encipherment	✓	✗	Key Encipherment	No constraints	✓
mdmws-non-repudiation	✓	✗	Digital Signature, Non-Repudiation	No constraints	✓
mdmws-p12-digital-signature	✓	✓	Digital Signature	No constraints	✓
mdmws-p12-digital-signature-key-encipherment	✓	✓	Digital Signature, Key Encipherment	No constraints	✓
mdmws-p12-digital-signature-key-encipherment-clientauth	✓	✓	Digital Signature, Key Encipherment	TLS client authentication (1.3.6.1.5.5.7.3.2)	✗
mdmws-p12-key-encipherment	✓	✓	Key Encipherment	No constraints	✓
mdmws-p12-non-repudiation	✓	✓	Digital Signature, Non-Repudiation	No constraints	✓

## MDMWS request extensions

All MDMWS profiles support the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

## MDMWS certificate fields

All MDMWS profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

## MDMWS certificate extensions

All MDMWS profiles set the following certificate extension values.


Extension	OID
CertificatePolicies	2.5.29.32
ApplicationPolicies	1.3.6.1.4.1.311.21.10
SmimeCapabilities	1.2.840.113549.1.9.15

Extension	OID
MSTemplateOID	1.3.6.1.4.1.311.21.7
MSTemplateName	1.3.6.1.4.1.311.20.2
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

## MDMWS algorithm constraints

All MDMWS profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## MDMWS distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5

Alias	OID
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2

Alias	OID
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Mobile device certificate profile

Entrust provides the `mobile-device-p12-digital-signature-client-authentication` certificate profile for mobile devices.

- [Mobile device use cases](#)
- [Mobile device certificate issuance mode](#)
- [Mobile device certificate fields](#)
- [Mobile device certificate extensions](#)
- [Mobile device algorithm constraints](#)
- [Mobile distinguished names](#)

### Mobile device use cases

The `mobile-device-p12-digital-signature-client-authentication` profile supports the following use cases.

- ECS Enterprise UI



- CA Gateway API

## Mobile device certificate issuance mode

The `mobile-device-p12-digital-signature-client-authentication` profile supports the following issuance modes:

- Issue the certificate from a CSR.
- Issue the certificate and an RSA2048 private key in a P12 file.

## Mobile device certificate fields

The `mobile-device-p12-digital-signature-client-authentication` profile sets the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA
Validity period	Less than or equal to subordinate expiry of the issuing CA. Default to 1 year if not specified in the request.
Subject	No constraint

## Mobile device certificate extensions

The `mobile-device-p12-digital-signature-client-authentication` profile sets the following certificate extensions.


Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA=False
CRL Distribution Points	No	Always present
Extended Key Usage	No	TLS client authentication (1.3.6.1.5.5.7.3.2)
Key Usage	Yes	Digital Signature

Extension	Critical	Value
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### Mobile device algorithm constraints

The `mobile-device-p12-digital-signature-client-authentication` profile supports the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

### Mobile distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4

Alias	OID
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1

Alias	OID
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Multiuse certificate profiles

Entrust provides the following multiuse profiles.

- multiuse-p12-client
- multiuse-p12-client-server
- multiuse-p12-custom
- multiuse-p12-key-data-encipherment-non-repudiation-client
- multiuse-p12-key-data-encipherment-non-repudiation-client-server
- multiuse-p12-key-encipherment-client
- multiuse-p12-key-encipherment-client-server
- multiuse-p12-key-encipherment-custom
- multiuse-p12-key-encipherment-non-repudiation-client
- multiuse-p12-key-encipherment-non-repudiation-client-server
- multiuse-p12-key-encipherment-non-repudiation-custom
- multiuse-p12-key-encipherment-non-repudiation-server

- multiuse-p12-key-encipherment-server
- multiuse-p12-non-repudiation-client
- multiuse-p12-non-repudiation-client-server
- multiuse-p12-non-repudiation-custom
- multiuse-p12-non-repudiation-server
- multiuse-p12-server

These profiles support the following features.

- [Multiuse use cases](#)
- [Multiuse issuance modes](#)
- [Multiuse key usages](#)
- [Multiuse request extensions](#)
- [Multiuse certificate fields](#)
- [Multiuse certificate extensions](#)
- [Multiuse algorithm constraints](#)
- [Multiuse distinguished names](#)

### Multiuse use cases

All multiuse profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

### Multiuse issuance modes

All multiuse profiles support the following issuance modes:

- Issue the certificate from a CSR.
- Issue the certificate and an RSA2048 private key in a P12 file.

### Multiuse key usages

See below the Key Usage and Extended Key Usage (EKU) extension values each multiuse profile supports.

Profile Name	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
multiuse-p12-client	Digital Signature, Key Agreement	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✘
multiuse-p12-client-server	Digital Signature, Key Agreement	TLS client Authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)	✘

Profile Name	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
multiuse-p12-custom	Digital Signature, Key Agreement	No constraints	✓
multiuse-p12-key-data-encipherment-non-repudiation-client	Digital Signature, Non-Repudiation, Key Encipherment, Data Encipherment	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✗
multiuse-p12-key-data-encipherment-non-repudiation-client-server	Digital Signature, Non-Repudiation, Key Encipherment, Data Encipherment	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✗
multiuse-p12-key-encipherment-client	Digital Signature, Key Agreement, Key Encipherment	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✗
multiuse-p12-key-encipherment-client-server	Digital Signature, Key Agreement, Key Encipherment	TLS client Authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)	✗
multiuse-p12-key-encipherment-custom	Digital Signature, Key Agreement, Key Encipherment	No constraints	✓
multiuse-p12-key-encipherment-non-repudiation-client	Digital Signature, Key Agreement, Key Encipherment, Non-Repudiation	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✗
multiuse-p12-key-encipherment-non-repudiation-client-server	Digital Signature, Key Agreement, Key Encipherment, Non-Repudiation	TLS client Authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)	✗

Profile Name	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
multiuse-p12-key-encipherment-non-repudiation-custom	Digital Signature, Key Agreement, Key Encipherment, Non-Repudation	No constraints	✓
multiuse-p12-key-encipherment-non-repudiation-server	Digital Signature, Key Agreement, Key Encipherment, Non-Repudation	TLS server authentication (1.3.6.1.5.5.7.3.1)	✗
multiuse-p12-key-encipherment-server	Digital Signature, Key Agreement, Key Encipherment	TLS server authentication (1.3.6.1.5.5.7.3.1)	✗
multiuse-p12-non-repudiation-client	Digital Signature, Key Agreement, Non-Repudation	TLS client Authentication (1.3.6.1.5.5.7.3.2)	✗
multiuse-p12-non-repudiation-client-server	Digital Signature, Key Agreement, Non-Repudation	TLS client Authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)	✗
multiuse-p12-non-repudiation-custom	Digital Signature, Key Agreement, Non-Repudation	No constraints	✓
multiuse-p12-non-repudiation-server	Digital Signature, Key Agreement, Non-Repudation	TLS server authentication (1.3.6.1.5.5.7.3.1)	✗
multiuse-p12-server	Digital Signature, Key Agreement	TLS server authentication (1.3.6.1.5.5.7.3.1)	✗

### Multiuse request extensions

All multiuse profiles support the following non-critical extensions in request.

Extension	OID
ApplicationPolicies	1.3.6.1.4.1.311.21.10
CertificatePolicies	2.5.29.32

### Multiuse certificate fields

All multiuse profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### Multiuse certificate extensions

All multiuse profiles set the following certificate extensions.


Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA=False
CRL Distribution Points	No	Always present
Key Usage	Yes	Digital Signature, Key Encipherment
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>



## Multiuse algorithm constraints

All multiuse profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## Multiuse distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9

Alias	OID
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4

Alias	OID
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Private SSL (ACMEv2) certificate profiles

Entrust provides the following Private SSL (ACMEv2) certificate profiles.

- `privatessl-tls-client`
- `privatessl-tls-client-server`
- `privatessl-tls-client-server-data-encipherment`
- `privatessl-tls-client-server-supply-san`
- `privatessl-tls-server`
- `privatessl-tls-server-supply-san`

These profiles support the following features.

- [Private SSL use cases](#)
- [Private SSL key usages](#)
- [Private SSL fill\\_san\\_dns\\_with\\_cn](#)
- [Private SSL request extensions](#)
- [Private SSL certificate fields](#)
- [Private SSL certificate extensions](#)
- [Private SSL algorithm constraints](#)
- [Private SSL distinguished names](#)

## Private SSL use cases

All private SSL profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

## Private SSL key usages

See below the Key Usage and Extended Key Usage (EKU) extension values each private SSL profile supports.

Profile	Key Usage	Extended Key Usage
privatesl-tls-client	Digital Signature	TLS client authentication (1.3.6.1.5.5.7.3.2)
privatesl-tls-client-server	Digital Signature	TLS client authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)
privatesl-tls-client-server-data-encipherment	Digital Signature, Data Encipherment	TLS client authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)
privatesl-tls-client-server-supply-san	Digital Signature	TLS client authentication (1.3.6.1.5.5.7.3.2) TLS server authentication (1.3.6.1.5.5.7.3.1)
privatesl-tls-server	Digital Signature	TLS server authentication (1.3.6.1.5.5.7.3.1)
privatesl-tls-server-supply-san	Digital Signature	TLS server authentication (1.3.6.1.5.5.7.3.1)

## Private SSL fill\_san\_dns\_with\_cn

When the `fill_san_dns_with_cn` parameter is `True`, the profile copies in the `SubjectAltname` extension all the `CN` fields:

- included in the `Subject` extension, and
- not already in the `SubjectAltname` extension (to avoid duplicated entries).

See below the value of this parameter in each profile.

Profile	fill_san_dns_with_cn
privatesl-tls-client	False

Profile	fill_san_dns_with_cn
privatessl-tls-client-server	False
privatessl-tls-client-server-data-encipherment	False
privatessl-tls-client-server-supply-san	True
privatessl-tls-server	False
privatessl-tls-server-supply-san	True

### Private SSL request extensions

All private SSL profiles support the following non-critical extensions in request.

Extension Name	Extension OID
Application Policies	1.3.6.1.4.1.311.21.10
Certificate Policies	2.5.29.32

### Private SSL certificate fields

All Private SSL profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### Private SSL certificate extensions


All private SSL profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### Private SSL algorithm constraints

All private SSL profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## Private SSL distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1

Alias	OID
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## S/MIME Secure Email certificate profiles

Entrust provides the following S/MIME Secure Email certificate profiles.

- smime-digital-signature-key-encipherment
- smime-key-encipherment
- smime-non-repudiation

These profiles support the following features.



- [S/MIME use cases](#)
- [S/MIME key usages](#)
- [S/MIME certificate fields](#)
- [S/MIME certificate extensions](#)
- [S/MIME algorithm constraints](#)
- [S/MIME distinguished names](#)

## S/MIME use cases

All S/MIME Secure Email profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

## S/MIME key usages

See below the Key Usage and Extended Key Usage (EKU) extension values each profile supports.

Profile	Key Usage	Extended Key Usage
smime-digital-signature-key-encipherment	Digital Signature, Key Encipherment	TLS client authentication (1.3.6.1.5.5.7.3.2) Email Protection (1.3.6.1.5.5.7.3.4)
smime-key-encipherment	Key Encipherment	Email Protection (1.3.6.1.5.5.7.3.4)
smime-non-repudiation	Digital Signature, Non-Repudiation	Email Protection (1.3.6.1.5.5.7.3.4)

## S/MIME certificate fields

All S/MIME Secure Email profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

## S/MIME certificate extensions


All S/MIME Secure Email profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### S/MIME algorithm constraints

All S/MIME Secure Email profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

 NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## S/MIME distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1

Alias	OID
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## SCEP certificate profiles

Entrust provides the following SCEP (Simple Certificate Enrollment Protocol) certificate profiles.

- scep-digital-signature
- scep-digital-signature-key-encipherment
- scep-key-encipherment
- scep-non-repudiation

These profiles support the following features.

- [SCEP use cases](#)
- [SCEP key usages](#)
- [SCEP request extensions](#)
- [SCEP certificate fields](#)
- [SCEP certificate extensions](#)
- [SCEP algorithm constraints](#)
- [SCEP distinguished names](#)

### SCEP use cases

All SCEP profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

### SCEP key usages

See below the Key Usage extension values each profile supports.

Profile	Key Usage
scep-digital-signature	Digital Signature
scep-digital-signature-key-encipherment	Digital Signature, Key Encipherment
scep-key-encipherment	Key Encipherment
scep-non-repudiation	Digital Signature, Non-Repudiation

### SCEP request extensions

All SCEP profiles support the following non-critical extensions in request.

Extension name	Extension OID
Certificate Policies	2.5.29.32
Extended Key Usage	2.5.29.37
Application Policies	1.3.6.1.4.1.311.21.10
Smime Capabilities	1.2.840.113549.1.9.15
MSTemplateOID	1.3.6.1.4.1.311.21.7

Extension name	Extension OID
MSTemplateName	1.3.6.1.4.1.311.20.2
szOID_NTDS_CA_SECURITY_EXT	1.3.6.1.4.1.311.25.2

### SCEP certificate fields

All SCEP profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### SCEP certificate extensions

All SCEP profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA=False
CRL Distribution Points	No	Always present
Extended Key Usage	No	No constraints
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## SCEP algorithm constraints

All SCEP profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption



NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## SCEP distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9

Alias	OID
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4



Alias	OID
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## Smartcard certificate profiles

Entrust provides the following smartcard certificate profiles.

- smartcard-card-authentication
- smartcard-digital-signature
- smartcard-domain-controller
- smartcard-key-management
- smartcard-piv-authentication
- smartcard-piv-content-signing

These profiles support the following features.

- [Smartcard use cases](#)
- [Smartcard key usages and request extensions](#)
- [Smartcard certificate fields](#)
- [Smartcard certificate extensions](#)
- [Smartcard algorithm constraints](#)
- [Smartcard distinguished names](#)

### Smartcard use cases

All smartcard profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

### Smartcard key usages and request extensions

See below the Key Usage and Extended Key Usage (EKU) extension values each smartcard profile supports.

Profile	Key Usage	Extended Key Usage	Allowed in request
smartcard-card-authentication	Digital Signature	No constraints	PIV Interim Indicator (2.16.840.1.101.3.6.9.1) Security ID (1.3.6.1.4.1.311.25.2)
smartcard-digital-signature	Digital Signature, Non-Repudiation	No constraints	PIV Interim Indicator (2.16.840.1.101.3.6.9.1) Security ID (1.3.6.1.4.1.311.25.2)
smartcard-domain-controller	Digital Signature, Key Encipherment	TLS server authentication (1.3.6.1.5.5.7.3.1) TLS client authentication (1.3.6.1.5.5.7.3.2)	—
smartcard-key-management	Key Encipherment	No constraints	PIV Interim Indicator (2.16.840.1.101.3.6.9.1) Security ID (1.3.6.1.4.1.311.25.2)
smartcard-piv-authentication	Digital Signature	Any Extended Key Usage (2.5.29.37.0) Microsoft Smart Card Login (1.3.6.1.4.1.311.20.2.2) TLS client authentication (1.3.6.1.5.5.7.3.2)	PIV Interim Indicator (2.16.840.1.101.3.6.9.1) Security ID (1.3.6.1.4.1.311.25.2)
smartcard-piv-content-signing	Digital Signature, Non-Repudiation	No constraints	—

### Smartcard certificate fields

All smartcard profiles set the following certificate fields.

Field	Value
Issuer	Customer's subordinate issuing CA.
Subject	No constraint.

Field	Value
Validity period	Less than or equal to the expiry of the issuing CA. Defaults to 1 year if not specified in the request.

### Smartcard certificate extensions

All smartcard profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

### Smartcard algorithm constraints

All smartcard profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption
RSA 3072	sha256WithRSAEncryption

Key algorithm	Signature algorithm
RSA 4096	sha512WithRSAEncryption

**i** NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## Smartcard distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17
'givenName' 'G'	2.5.4.42

Alias	OID
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4

Alias	OID
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6

## V2G certificate profiles

Entrust provides the following V2G (Vehicle-to-Grid) certificate profiles

- v2g-supply-equipment
- v2g-user-identity

These profiles support the following features.

- [V2G use cases](#)
- [V2G key usages and validity periods](#)
- [V2G certificate fields](#)
- [V2G certificate extensions](#)
- [V2G algorithm constraints](#)
- [V2G distinguished names](#)

### V2G use cases

All V2G profiles support the following use cases.

- ECS Enterprise UI
- CA Gateway API

### V2G key usages and validity periods

See below the Key Usage, Extended Key Usage (EKU), and certificate validity period each profile supports.

Profile	Key Usage	Extended Key Usage	Validity period
v2g-supply-equipment	Digital Signature, Key Agreement	TLS server authentication (1.3.6.1.5.5.7.3.1)	1 year
v2g-user-identity	Digital Signature, Non-Repudiation	—	2 year

### V2G certificate fields

All V2G profiles set the following certificate fields.

Field	Value
Issuer	The customer's subordinate issuing-CA
Subject	No constraint

## V2G certificate extensions

All V2G profiles set the following certificate extensions.

Extension	Critical	Value
AIA	No	Supplied if the customer enables OCSP when creating the CA
Authority Key Identifier	No	Matches subjectKeyIdentifier of the signing certificate
Basic Constraints	Yes	cA =False
CRL Distribution Points	No	Always present
Subject Alternative Name	No	No constraints
Subject Key Identifier	No	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in <a href="#">RFC 7093 section 2</a>

## V2G algorithm constraints

All V2G profiles support the following key and signature algorithms.

Key algorithm	Signature algorithm
ECDSA P-256	ecdsa-with-SHA256
ECDSA P-384	ecdsa-with-SHA384
ECDSA P-521	ecdsa-with-SHA512
RSA 2048	sha256WithRSAEncryption

Key algorithm	Signature algorithm
RSA 3072	sha256WithRSAEncryption
RSA 4096	sha512WithRSAEncryption

**i** NIST will deprecate some algorithms after Dec 31, 2030. See <https://nvlpubs.nist.gov/nistpubs/ir/2024/NIST.IR.8547.ipd.pdf>

## V2G distinguished names

Entrust has no restriction on Distinguished Names (DNs) per certificate profile. All certificate profiles support the following identifiers.

Alias	OID
'CN' 'CommonName'	2.5.4.3
'SN' 'SurName'	2.5.4.4
'SERIALNUMBER' 'DeviceSerialNumber'	2.5.4.5
'C' 'Country'	2.5.4.6
'L' 'Locality'	2.5.4.7
'ST' 'S' 'State'	2.5.4.8
'STREET' 'StreetAddress'	2.5.4.9
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12
'BUSINESSCATEGORY'	2.5.4.15
'POSTALCODE'	2.5.4.17



<b>Alias</b>	<b>OID</b>
'givenName' 'G'	2.5.4.42
'I' 'Initials'	2.5.4.43
'ORGANIZATIONIDENTIFIER'	2.5.4.97
'UID'	0.9.2342.19200300.100.1.1
'DC' 'DomainComponent'	0.9.2342.19200300.100.1.25
'Email' 'E'	1.2.840.113549.1.9.1
'unstructuredName'	1.2.840.113549.1.9.2
'unstructuredAddress'	1.2.840.113549.1.9.8
'JurisdictionOfIncorporationLocalityName'	1.3.6.1.4.1.311.60.2.1.1
'JurisdictionOfIncorporationStateOrProvinceName'	1.3.6.1.4.1.311.60.2.1.2
'JurisdictionOfIncorporationCountryName'	1.3.6.1.4.1.311.60.2.1.3
'TrademarkOfficeName'	1.3.6.1.4.1.53087.1.2
'TrademarkCountryOrRegionName'	1.3.6.1.4.1.53087.1.3
'TrademarkRegistration'	1.3.6.1.4.1.53087.1.4
'LegalEntityIdentifier'	1.3.6.1.4.1.53087.1.5
'WordMark'	1.3.6.1.4.1.53087.1.6
'MarkType'	1.3.6.1.4.1.53087.1.13
'StatuteCountryName'	1.3.6.1.4.1.53087.3.2
'StatuteStateOrProvinceName'	1.3.6.1.4.1.53087.3.3

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<b>Alias</b>	<b>OID</b>
'StatuteLocalityName'	1.3.6.1.4.1.53087.3.4
'StatuteCitation'	1.3.6.1.4.1.53087.3.5
'StatuteURL'	1.3.6.1.4.1.53087.3.6


## 17 Post-quantum Lab experimental region

PKIaaS customers can test the algorithms listed in the post-quantum (PQ) cryptography standard of the NIST (National Institute of Standards and Technology).

<https://www.nist.gov/programs-projects/post-quantum-cryptography>

Specifically, Entrust provides a "PQ Lab" sandbox experimental region to create CA hierarchies (root CA + issuing CA). This region has the limitations described in the following table.

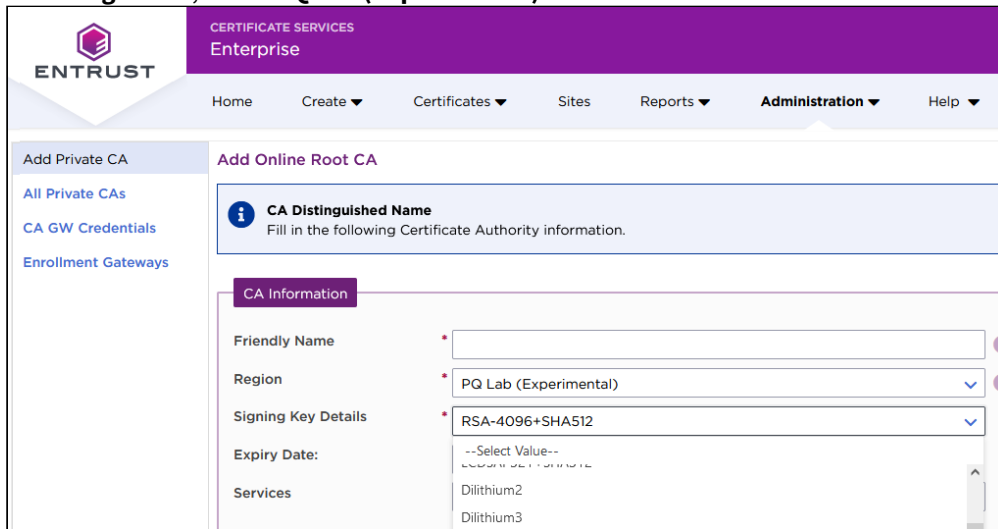
Feature	PQ Lab limitations
Key generation mechanism	liboqs ( <a href="https://openquantumsafe.org/liboqs">https://openquantumsafe.org/liboqs</a> ) open-source software library for post-quantum keys; Entrust nShield HSMs for RSA and ECDSA keys. In future releases, PKIaaS will support post-quantum key generation using Entrust nShield HSMs.
PKIaaS Certificate Practice Statement and associated terms	Do not apply.
CA validity	A maximum of 6 months.
External CAs onboarding	Not supported.
Region and Data availability	Not guaranteed.
Enrollment Gateway	Not supported. The PQ Lab region does not support customer-hosted (on-premises) or Entrust-hosted enrollment gateway features.
Licensing	CAs and Certificates issued under the PQ Lab region consume the same CA and certificate licenses as in the US and EU regions.

 Entrust might rebuild the PQ Lab region from time to time to reflect the latest changes from the post-quantum standards initiatives. On these occasions, your data in this region might be destroyed. We don't recommend deploying post-quantum CAs and certificates to your production environment.

### To test post-quantum algorithms with the PQ Lab region

1. Make sure you have unused licenses to issue an online root CA/issuing CA and certificates.

- In the **Region** list, select **PQ Lab (Experimental)**.



The screenshot shows the 'Add Online Root CA' form in the Entrust Certificate Services Enterprise interface. The form includes a sidebar with navigation options like 'All Private CAs', 'CA GW Credentials', and 'Enrollment Gateways'. The main form area has a section for 'CA Information' with the following fields:

- Friendly Name:** An empty text input field.
- Region:** A dropdown menu currently showing 'PQ Lab (Experimental)'.
- Signing Key Details:** A dropdown menu currently showing 'RSA-4096+SHA512'.
- Expiry Date:** A dropdown menu showing '--Select Value--'.
- Services:** A list of options including 'Dilithium2' and 'Dilithium3'.

- Select a post-quantum algorithm in the **Signing Key Details** list.
- Fill in the rest of the fields described in [Creating an online root CA](#).
- Follow the steps described in [Creating an issuing CA under an online root CA](#).
- Create a certificate request, for example, using the [openquantumsafe/oqs-openssl3](#) tool. Alternatively, you can copy one of the below sample requests.

- **Pure post-quantum algorithms**
  - Dilithium2 (1.3.6.1.4.1.2.267.7.4.4)
  - Dilithium3 (1.3.6.1.4.1.2.267.7.6.5)
  - Dilithium5 (1.3.6.1.4.1.2.267.7.8.7)
  - Falcon-512 (1.3.9999.3.6)
  - Falcon-1024 (1.3.9999.3.9)
  - SLH-DSA-SHA2-128f-ipd (1.3.9999.6.4.13)
  - SLH-DSA-SHA2-128s-ipd (1.3.9999.6.4.16)
  - SLH-DSA-SHA2-192f-ipd (1.3.9999.6.5.10)
  - SLH-DSA-SHA2-192s-ipd (1.3.9999.6.5.12)
  - SLH-DSA-SHA2-256f-ipd (1.3.9999.6.6.10)
  - SLH-DSA-SHA2-256s-ipd (1.3.9999.6.6.12)
- **Explicit composite algorithms**
  - Dilithium3-ECDSA-P256-SHA256 (2.16.840.1.114027.80.5.1.2)
  - Dilithium3-RSA3072-PKCS15-SHA256 (2.16.840.1.114027.80.5.1.1)
  - Dilithium5-ECDSA-P384-SHA384 (2.16.840.1.114027.80.5.1.5)
  - Falcon512-ECDSA-P256-SHA256 (2.16.840.1.114027.80.5.1.8)

**i** The Certificate Authorities of the PQ Lab region can also issue RSA and ECDSA certificates; use your existing tools to generate requests for these certificates.

- Issue end-entity certificates using either:
  - Entrust Certificate Services Enterprise, as explained in [Processing a Certificate Signing Request](#).
  - The API described in [Accessing the CA Gateway API](#).

**⚠** In the current version, PKIaaS does not support issuing post-quantum certificates in PKCS #12 format.

## Pure post-quantum algorithms

See below sample requests for the supported pure post-quantum algorithms.

- [Dilithium2 \(1.3.6.1.4.1.2.267.7.4.4\)](#)
- [Dilithium3 \(1.3.6.1.4.1.2.267.7.6.5\)](#)
- [Dilithium5 \(1.3.6.1.4.1.2.267.7.8.7\)](#)
- [Falcon-512 \(1.3.9999.3.6\)](#)
- [Falcon-1024 \(1.3.9999.3.9\)](#)
- [SLH-DSA-SHA2-128f-ipd \(1.3.9999.6.4.13\)](#)
- [SLH-DSA-SHA2-128s-ipd \(1.3.9999.6.4.16\)](#)
- [SLH-DSA-SHA2-192f-ipd \(1.3.9999.6.5.10\)](#)
- [SLH-DSA-SHA2-192s-ipd \(1.3.9999.6.5.12\)](#)
- [SLH-DSA-SHA2-256f-ipd \(1.3.9999.6.6.10\)](#)
- [SLH-DSA-SHA2-256s-ipd \(1.3.9999.6.6.12\)](#)

### Dilithium2 (1.3.6.1.4.1.2.267.7.4.4)

Use the following CSR and keys to test the Dilithium2 post-quantum algorithm with the 1.3.6.1.4.1.2.267.7.4.4 object identifier (OID).

- [Sample CSR to test the Dilithium2 post-quantum algorithm](#)
- [Sample public key to test the Dilithium2 post-quantum algorithm](#)
- [Sample private key to test the Dilithium2 post-quantum algorithm](#)

### Sample CSR to test the Dilithium2 post-quantum algorithm

Use the following CSR to test the Dilithium2 post-quantum algorithm.

#### **dil2csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
MIIPBjCCBXgCAQAwOzELMAkGA1UEBhMCQ0ExEDAOBgNVBAsTB0VudHJ1c3QxGjAY
BgNVBAMTEURpbG0aG1bTJFbmlvV2VvMIIIFNDANBgSRBgEEAQKCCwEBAOCBSEA
AZnPgDsGaAF4AerAeDZsYGG2dGtBweRC+DbUB9RepHQmHwq0CaIndIBkmfxzGn99
k/WwUkPozyL9IL2Y9aXYyMexUa1WqHY8XUidNgqii5Z/at/ljCinavF11xAZPALF
oDeJbCzKv78gCJuGjFfEVfVv22LWHJ4+OvK94FcSA8R6DXvCkATH5yQwnTS9xgTE
c0TbvKw2DbYfoqFX6A8LEEUfUqLuMAqU7ILXKkqT5Q/oBJn6zwwDFH8vJb0H7Tco
cJYQBku4Bn8kg2StQJ1RTLKqKjoakWIYSA0G7BoPATxxpBC8I+C3jjqk/3nwpFoZ
zN08mDVaserlp/mHnEpCmdfBJnGLpaoyKlNg9Y/z0uaGji4/r9LzXbenaPs4rkUV
GvvRccZzjmRAoGvA/Yyp9vceHw1E0pwAIHK3aDI86aZ52b42ql32HcxF3Pfm7v8
bJziS0c9E0bP786JvVPY/sXUHTdzw/xjRn16850dfI5KgKuKc2YEcDljWxoZ2gTs
dF76Kyjj5sePflurUl5wLbZbEsF04ziSJT18a+sm6nPDjXeiuPWhfTXqjXyxkk0
/z6if7W2Qmzqgru8kYd/E0xmfB0JGIDSP4onokzaPAj5Tt2j6hLFugZQAcIa3XGb
20ziUeQmo8Iz/o03mDqRIh/aNvSLZxHgi2P7KTLhBlvVmSdyvV3IoPT6kmlk0Sma
bUQLGaW5+UPLcvSey3fA671IH/L6d1+0/BDEVqnMMdyVeGrKEXex0flp0E9aI/rI
A4oa2kEY+vkxpkk/QSinU1eD3silJUsEfZbxhrc6NgJMdekZZNxZ7jLFEczFHknb
+sQnGRTLGuAIInE6AQ/I8o7meBNwXa2xwVmn7zb79flWAW+SKBD+1KNytEF2/F3Z+
gdYKtffXyJU2HsIXMIcaBXKQfQuMTHgA+UZqrS7IFNWEWm7dfAGIFaHhXqtmOFdt
hA6AbBQox+NyqsD8XeUWrTB28CF1C/Um5hjiClS+ifP5/wPEC9v9tSLsoozLRxDC
eSF45SVwPQ/AuP4NFB+jQD4g39tT00ZELsFAsdHcgX3272+CDVCBjxVv82hgZzyQ
```

6s/10u++hStcGkUuCy/8axGA08HswVV50759o339Y1mPXK//X58VNOiDl6MtySAi  
LYyQK5xMn8t0aZbq5fH6YcVjao/XUBhD6JX2m8gBbtTV7WQ4voExy8+FuwLABNpo  
0NFXgv4l7rAQ+jiAi9cn98SC44bsytBDDfSQL9gBpZ66aKpkOeiMmYwd4mz00fFv  
vYi0vZQff3JvQqAEyDyrvKx/wEUQdcNPT1rtLZ2THw3AzScgGER+0xM+XBeTRO  
fkyZ8FmX29TFS5X2lF4jPjvIlelBg/zVT0yqXkzXoq2CyDBZQPtimpmbSglK30I  
zFFrsTuUbtLvgs6cNUGXbS4QCcJX7JdxlPGx7ly8KjhWehdVr9w907fERYl348EO  
aIujSs51+7A2ZCjccfkQUUI/FZpkERjReVTmzGlbVGqTehaIaE5Hob8Qz4bv530L  
XpdVHPOyFALsJn1Iy60d90QgX6ppEDdeMPq/3rUy6Pa5CroF563DKk8d0KDYmWdd  
JxA0nqq49J7A4hD6vxH+fK7U89VdXtI4jInsyZDqNmntM76Eh/H/CO5V9ejXiyNj  
XefWrphhwTacEmVJcBjMNJ8GLmk5xMqnKPFUGBM+/7KfJ1pW8UbUPI98C4CR925E  
WBoIsHmjFuxhozpzRyuRzzAPBgsrBgEEAQKCCwEBAUAA4IJDQDm50UljS yJDtbl  
SEr3oDZzLxcoYgmKQ+WR7N8kPu8mou4bFlDnSjhUBwKM3MJ9z3BgKUFv6adPqi1m  
lMFQEOrMTuY88G5ZpE9M8juS+5UUaeHdZM5E0qjjMyLwuogLvpjJzn2cV9WRI1RO  
nECiLRutksxNRhLIzL9luXAWz9gB7H2Yr/eXr0t/a33w2ozu69vcqZCABfQjWt8w  
LLIG/rzMN2w4XAqlZjSf7oEG7ss9hMmKl0ur8zHadLst8j1RIio7NhLVBmtxVOFk  
nhsbp6KoVXjWRE3KqlZG72zrvawc7cLcWZF/9mwlsKX25NSq0NH2tV/CSCu2uDqp  
Ype41EV6yOz1maYRE/QHX302zVMA6nh8W1KS4d0no7Ly0Ve0PX4SAuV06uvk46xp  
s+2/5yfSgqhPE2izd/u10UzX7Ytv02byFEnFh/cUCS0q6lkeukWM+q1zkn71uCOt  
p0hikChmj0h70h00fRxtG7Bc2drh9FaVcC50EdtJJMvDpxQoE2BB5ySFEXLzmzGL9  
ZWR/T3I8dTvBT+CQPEhvp/huNxr8LnJlGdPop5LUUxqG46bQqNJI9+3TJ8B2s4LL  
XXXXId3u0PICMLEjUtIgiHiJaVNGIZHJOXJCxbPlzPzNoMQ245IaIiyEpLznA8H  
CdkN38psmDh0yz8+eYtb9u+bUkUcuFrgtBR7bN2/hrSf9Wks81sPes7ncTRhSZiy  
qIz71clkr3yHU5yapX1Wg0xn164XhKp8guJVte/qWoXCXX/BvcTObq9st1aDFKfd  
UPtDopJnvC/xPWUM3f2xcnSG/8rsUy1D3E6q/6yN7ydl1tn+xiSvnbbn8Y3rcrMw  
Ziel0MeLJJYtwveRvsE6E+WqpNYZRiNXFzyw7mkcMDJfLxL01U6HLV9dolLmnN0  
zXUfMyK696KH7b1x2ZYG09C28j2rin+6BnALhXfv2ySi1NDnU5deY4aalCwH+B  
Wp6/MYupU7GgJzWMq3pCGCO0mHmPAE4XDvh4oW4ddtLlxDmEV4J+6wAogPaQeH5L  
/RA5inw2ZhZVW0wLp1d8Y3ZlbtuC+sUOEHE5Ye3dEynO8tssCmud3aZ1hyZJEAu  
WdtJMDkV0XE1GQENi0Aaw9czIaX67UN1eLgXsBI/Ry7Q7iRFIYAf3wUk/XbWfqRb  
ccox+uZEZuIEBlod+ij28Ujb9Dpwk4avgedZhLj2ihIs1pBp8kAHqd/7bxj1TXm  
gigEQBDT9QSiAcD9Wd8/cIsLVK5ziqZKSsvsFHnW5deEeFakEchtOkzy9X5Snez  
7fb0vKmbAmA/gcQKJ02rzu8HqnPmpWazGBMFUULKSrXyqM28Q5TanhIYWgA4/rZ3  
ete+ornH3gs1829k+1Kqcl+LANfQMnqEPDFtpaMmNJ/q6hqNb30amrQfBf0rZP2G  
NEBScETyHqDjB0a1alezDFwA6zv5wN5rxPPA10uNiatoBLUrwaQdDkvB2ZqPAnkE  
N6yRs2yY7GIDSPLOETI+oiI9xmzt2Rt02c5SWKAKTWSFanmBDNH17Yruvz29LjOg  
qA06tXWzVdgcImLE/BIRgW0W9ajOTWQHMOyv9AHGLL0GrbIuFteje0iy5x/4VV  
74/bCLOiTyxeoNbF5pD0oELbs/3KD170h1i5lhaHlwxymJzrxjw4K0VpBVVXSW5N  
Nr6tWCvc0csh5qzaQbbL6bg8uY1zQ3++USE6Z0cf+SFN9imxBd5xYC78fgaJVlk+  
5u3NVjlnofbj1cUdPrLF0bDDYj0l82xhUg/T49Pps7he300fk4pAcrq5PxBmi5q  
dTm/CLJPGt2iFtCQLe7WwySpQpTe0zY2eqsuH7oYGsRX91/vTLQXx0cuPJ97lsr0  
AjPl1qAgFpPbljBxlvtkYSpU1EaMnowkkIH/ogH4PXm7TluycJX5fEbgp+3lgp1  
NQvGLlUwN2A879fCVtxyHo4HGCPg9qLIV9kf33Ns0o4LlowSYk4f93JdykaIW6qm  
YuI3hAbllSEji4VNz/kY1kWPDDrRYy1WxEkWd+K7wMk2tB58N6BJZI6tmAC8CNiR  
K9Ey0L99C6RZly0Q6ht9B3/rG1LdYOBGABaq9HBhh7cuUqZSvIIDUr9fCnkGD2Y  
kizkjHqKvarkFzXqbDrU0wZ0iowIKg/9CTwyMu6PqpQ5kwUEeQ7mh0ZC+UAd5Zf  
5eU7+X3ewxiDfDsIWUdRrasAqmwc8zBTtShA0At6yFj701CdhcyLYgP7JXXe88e  
xlHviTANSAFEktLwzE9vC4ifl0iCseRxRjoco3CJlnUe0QFUBnhy1Nv1wqJOPk0b  
7hcUVUNE7peIDmzMORsCP/9/Dq/b4xYpv/yqnC0aUz7d8yJ9F+KmKqz50+oFDRf  
KmQo8nmt+LBB0ed+J033jSyx4yImyg8VzqmQCYeRvMXN2AM05aYP1NkW3djbSkU  
fxfAjPCqy+krDJ4pfUzvcjlmE9VRorbP+3hYM00BljtL37/ZmpkGPLiChjgRy1ic  
+banoX9nP/n3P88zwSjHLG87MeRPGJG4eSLq6h9Et8wUESuiwx6QrsRAicDmcwst  
cMvgHvlqPupL+K9SVDGZ6aV01aGJTUKownKZkzAZw9SkIWJLVnqEnZkf5PjrKG9k

```
Ky+ONKtAQtxnqziDPjH60uAdb6tQGiv3mikzK/nprRGgc3PZGUwn2rxZYlovjTG
6scKstRMOxyFMqusjeUIvYLPiBEFaMm7+SMyzhaR0fs8f4ieLXJnh+yR8S59k/3p
8pRxa55/T/HRQSm1v5dqW/t3a2tRot6M6tmqJsh4aF780lev0U2CuhW+b2SPvVuI
hop+N8dWRgnIrX7EVx2RZIdVlyPKmJdQkibffk3T6vV/NggBz3XAKFxlQlvv78ge
A509Mb22nmmK00zcTtVDAsmJ02GJws+4son/3Fd40gi fKNGzAGuSwcwtgMddk2M
mMUTUn3luCvFRmUKb0kFXHLlqmWkz23kM69k6DDHSIvieZrWPQp1uLArMYKvh01P
Cafp6QLS8GrVkZmj6GmWHP+P9fcKyeAqr4Ba7M5pWT05PoZTP2lgem8l6IDg/wLU
H+AhXIefKO/AEx3x3s2Texo7I6a69RgBMExxip+hy/sXGjCKkqSp2dr/AgYqNTtH
SllbdoGJk5y4wMLH29r/BjA7Tl5mkJj7AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAChQpMg==
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the Dilithium2 post-quantum algorithm

Use the following public key to test the Dilithium2 post-quantum algorithm.

### dil2pub.pem

```
-----BEGIN PUBLIC KEY-----
MIIFNDANBgSrBgEEAQKCCwCEBAOCBSEAAZnPjDsGaAF4AerAeDZsYGG2dGtBweRC
+DbUB9RepHqMhwq0CaIndIBkmfxzGn99k/WwUkPozyl9IL2Y9aXYyMexUa1WqhY8
XUIdNgqii5Z/at/ljCinavF11xAZPALFoDeJbCzKv78gCJuGjFfEVfVv22LWHJ4+
OvK94FcSA8R6DXvCkATH5yQwnTS9xgTEc0TbvKw2DbYfoqFX6A8LEEUfUqLuMAQU
7ILXKkqT5Q/oBjN6zwwDFH8vJb0H7TcocJYQBku4Bn8kg2StQJ1RTLKqKjoakWIY
SA0G7BoPATxpxBC8I+C3jjqk/3nwpFoZzN08mDVaserlp/mHnEpCmdfBjNGLpaoy
KlNg9Y/z0uaGji4/r9LzXbenaPs4rkUVGvvRccZzjmRAoGvA/Yyp9vceHw1E0pwA
IHK3aId86aZ52b42qL32HcxF3Pfm7v8bJziS0c9E0bP786JvVPY/sXUHTdzw/xj
Rn16850dfI5KgKuKc2YecDljWxoZ2gTsdF76Kyjj5sePflurUl5wLbZbEsF04zIi
SJT18a+sm6nPDjXeiupWhfTXqjXyxkk0/z6if7W2Qmqzgru8kYd/E0xmfB0JGIDS
P4onokzaPAj5Tt2j6hLFUgZQAcIa3XGb20ziUeQmo8Iz/o03mDqRIh/aNvSLZxHg
i2P7KTLhLbVvmsdyvV3IoPT6kmlk0SmabUqLgaW5+UPLcvsEY3fA671IH/L6d1+0
/BDEVqnMMdyVeGrKEXex0flp0E9aI/rIA4oa2kEY+vKxpkk/QSinU1eD3silJUsE
fZbxhrc6NgJMdekZZNXZ7jLFEczFHknb+sQnGRTLGUAIInE6AQ/I8o7meBNwXa2xw
Vmn7zb79fLWAW+SKBD+1KNyTEF2/F3Z+gdYKtffXyJU2HsiXMIcaBXKQfQuMTHgA
+UZqrS7IFNWEmw7dfAGIFaHhxqtm0FdthA6AbBQox+NyqsD8XeUWrTB28CF1C/Um
5hjicls+ifP5/wPEC9v9tSLsoozLRxDceSF45SVwPQ/AuP4NFB+jQD4g39tT00ZE
LSfAsdHcgX3272+CDVCbjxVv82hgZzyQ6s/10u++hStcGkUuCy/8axGA08HswVv5
0759o339Y1mPXK//X58VN0idL6MtySAiLYyQK5xMn8t0aZbq5fH6YcVjao/XUBhD
6JX2m8gBbtTV7WQ4voExy8+FuwLABNpo0NFXgv4l7rAQ+jia9cn98SC44bsytBD
DfS QL9gBpZ66aKpk0eiMmYwd4mz00FfvvYii0vZQff3JvQqAEyDyrvKx/wEUQdc
NPT1rtLZ2THw3AzScgGER+0xM+XBeTROfkyZ8FmX29TFS5X2LF4jpJvIlelBbg/z
VT0yqXkzXoq2CyDBZQPtipmrbSglK30IzFFrsTuUbtLvgs6cNUGXbs4QCCJX7Jdx
lPGx7ly8KjhWehdVr9w907fERYl348E0aIujSs51+7A2ZCjqcFkQUUI/FZpkERjR
eVTmzGlbVGqTehaIaE5Hob8Qz4bv530LXpdVHPOYfALsjn1Iy60d90QgX6ppEDde
MPq/3rUy6Pa5CroF563DKk8d0KDYmWddJxA0nqq49J7A4hD6vxH+fk7U89VdXtI4
jInsyZDqNmntM76EH/H/C05V9ejXiyNjXefWrphhwTacEmVJcBjMnJ8GLmk5xMqn
KPFUGBM+/7KfJ1pW8UbuPI98C4CR925EWBoLsHmJfuXhozpzRyuRzw==
-----END PUBLIC KEY-----
```

## Sample private key to test the Dilithium2 post-quantum algorithm

Use the following private key to test the Dilithium2 post-quantum algorithm.

### dil2priv.pem

```
-----BEGIN PRIVATE KEY-----
MIIPFgIBADANBgsrBgEEAQKCCwcEBASCDwABmc+MOWzoAXgB6sB4NmxgYbZ0a0HB
5EL4NtQH1F6kdMgFSXm2uj60RF/TKX7V3nB1pHU30E5vcQWFbuVgqpd02Aha2Ryc
1FmKBC2IqTdGEibd/Yc4MJMMInmDjYnsYeTAiLMMEbRFGDLskjygmEgI46bMogC
GJGLICxaACHCJDEipoWdgiQIQ2QIoESEmIcQErUwiVjhAzIQFIbhHCYwm3SFOWA
QwnQKCSULCWMsIBQOGibwEEDBYwkEWmYakUKMGqJBmIiwVJomAjBSyhFCpAFgWI
BE1UKCoKA4nhBkmiBEDQKCoRggjRnPFQAIYJgYxCiHBjBm4KlLEMwwSZEmsSFDBU
qEUTApDbGFDAmFLDRJHYJi6ZMmpZmC3RqJESA4ERQ2QALSHKMM6QyGhIMCYJMIwL
QYbKmfCISFHMWIkSSSahkC2KfKEDhykbQSobky0TonHRQoUKMwUimWiKNmyblEwA
RGEIFoUbjAwcR2QAx43RkCVJtBETxiGmLiKlImGkEpEAsSRIiHEgME0jADFgRCnU
SGLDNCBMLDDKAKJAE5BgikKiCUDKDCUspEAEGAjM2LJNHJLxi3UBhEMmU3BEkSI
qABMSGEgQAEjORCiAGUjMarhsIgbBWWZAAEQnAjw2FYgnBaAkWctSEYNFIQFijT
Rg4cSVIZsgWgpgnJiCCDoCgbFgBEhIQgkwECQhDMKAYSkuHQImLLlpELJUKZniGS
OIRARjIBIQoTNCjApHFLuEgJIhIkeYUKkQ0AJy4jm05cFgERE4BhsDEcB47KpG0J
M4kZNorDiC0JE4EJMnLzooDBRkxUoAEYoizZGABMAAwZBAFAJCKhpDBRGJFBpHDQ
lkEgpAmUtmwLIIDLbikjRUSaAlDhAk3EMIiCoIyQhHBCMG3LJA2QhIkIBI3IhmFZ
oFCLogBLAGKCAI2gkCiTxoyJgBEDt4gjIyIkx2UTmYgaMgQAAJFJhJEZJXIKpgAS
Jg4jN1KiKCZckikMIJkNk4iIIJThnFRNIUQR0gQgIhIFE3awghLwCAiRyKMICEi
kgikJIXJpiBEomngAmKbhIzcAgkYxUGeImoCRIgkpsLCmI0cCYwhQVIEMwYkwGma
onAkKQrioA3EpAwglYgSEwHgoI3AREEj0FIHDnIjk9h1zRz98h03/p4CJi4ofP53
BYdiojQIUvDr727QsiFb+qg2kbWFP6NQC8N+yQMubpIBM1aLRKa9yewRVG1n1coy
JnSOUyZ5gCYdbBjHawpl1yr8b0U7nsZxFNxm4TtwzqKpGkCqp1Tu2onQnsG393Rl
itBiJZDLB2TsIzA9fNVUS5rP3Pfm4TsnYxT9TZSXvUAB5f0prYqBoYmXrZ+a3BVG
rKHCNVsDhOK4JLvtcz08xhqkIPJ6v6nz/YM1HnGuLaFQX3LH1IIL6nKyXFTN8J50
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-----END PRIVATE KEY-----
```

## Dilithium3 (1.3.6.1.4.1.2.267.7.6.5)

Use the following CSR and keys to test the Dilithium3 post-quantum algorithm with the 1.3.6.1.4.1.2.267.7.6.5 object identifier (OID).

- [Sample CSR to test the Dilithium3 post-quantum algorithm](#)
- [Sample public key to test the Dilithium3 post-quantum algorithm](#)
- [Sample private key to test the Dilithium3 post-quantum algorithm](#)

## Sample CSR to test the Dilithium3 post-quantum algorithm

Use the following CSR to test the Dilithium3 post-quantum algorithm.

**dil3csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
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tKcpZ41XmqPhnmDrEDL6k7B7YJqs7UeLfJU0SuuCV4uzNECXjxaPoVJgAVheKT+o
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U6PBwCyqcaGLW6aKSMs3sWRJraa80Z1DWqx4tccTmaiEfa3T9ACYgS3V3KSq6EPb
zQ48qNVrM+64eeNUEb6bryRomGiPYVE2J0ZxI7Jp13jJMyPLkeps8hi4UTmBjhoe
mUim37JWcX/RXDa98sIX2e+i1nAKKQpATaprDfIgfNnnpOKE0jkF/aXch3cAL4c
xoiV2qVqLlawLXKEEJaiC/YLPPg6tIodCiVBn8QfGnsp2Nj7IcFPrYDEJDXNGns
+wXnaaJ6ZiA7LwiRTE4LDbMctnW04kThLCzaw0eEIwp/PzVoLIL8nLqVPiD4ZQ
Pc9ZwlgZBSIUgtCLvg/FVda/7mgEUMHaELi+jBMjr5v3puzeJjR0RPMsrH1iNbsH
w6JEXpALpXMIK9Wh30SnNbNGohSQLwFdbt33t18xUrLkt2W0LgCxlBwYefublzv
LVYA531zpbYPHWhk3CtW8ARJ3D/xwA30E5cgIaPAU55x+w9WdYOGHqLrOItr2OK
rLxgcnaJjK07AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the Dilithium3 post-quantum algorithm

Use the following public key to test the Dilithium3 post-quantum algorithm.

### dil3pub.pem

```
-----BEGIN PUBLIC KEY-----
MIIHtDANBgSrBgEEAQKCCwCGBQOCB6EAv34yTsg/AqcN5EZUYq2hBwKWJePklfGc
hEndRiy/Sx5aCcriFVgTdufTD/6F4UKYX2IMwEJbgb0bYmQhvbzdQ8aJtYVKJn5F
4PGoe9VUsfYfK2WmB9WfBuHezeBwDaFF5G5rbiDya4B5EV3xWDTkIOKlg7VEE6fM
5ZfZ0wl3MZx5/Frt4FVxJ7nm184RsHD/vBg81z7LTLfDRKo8pPxAWYUuP1RwovAt
05ELnZy0mkpVKzs6qdUnAS1PT9Cx1D3SMoDGRJ/eCjAGCZmWcYUovf/CYgJ80SYR
ByJwI0jaAKFJAootFYsbMCQ3uM59M/yt4IdrtRa6jR0drNLQthsNZXHgv3H86SOE
aqFVEZm6ejSdYDqu10blMM+HKzTKJFWU1e7IYSuJlCMhF5tSPG6UTzwd0Khx51TZ
EtVUJNiA/ACCyX9x0geTUJ/y9+F7gb4CkdDbNE/4aw0Ys0wo1XkY5bedWwiTfxbL
Hd48n8fki/KOPEi8FZL4PPEjvXvPR/P6tC8uSM0FyvSuX44y1clVxAdCKmPgZpvz
7WrglKaFXsGEC6vfVxQBkZbDp3wBWXsMEvSAJhYifZ01EdqHXCypZL6iICt4FG
HUBkTIAhKv8I+mque0KGqaZrvDEvsrVzrM4YgRMGcdLNLljQeDIwgrDhuDi+GI dF
QOE4fXnpqPnVIsIQimrWioi/0h5fqsNmnikgamNGnCINNj0Lx5Q3nxREBD1a+oyz
gSD20D5bfTVXUyl9B0Utr6WoF05TpmJsfx+9KiIKss9VLTMr7UXi/t9+S01sCXPj
u1/5CG53dlBCKqe4dwpQShEPLU29sYexb6enD859QW/akk3WlhyIhEYl8Y4DABm
Y9KeLRnWbpdTrYmpjP1R7bR8NAwhiF3E6SNTXmDncC8ByS0lCtxqLk9gFMVr2QMb
gfr3bV53oRKUMvrzumpuwOvcCrbHzAf503tr0PVMUg1a4hD5rhnmbjBprkvFvJaN0
Z5aFi7L/c4t31L0fPw9ks5gZE2G/R/HJFno40MU+QWenhJbM0L5bKe5Wgf9qDf1T
6sIFrhvdwvzBiYwvubv403iaqUHHHHI/Dvy1Yu1Xqk/vN9/aARYYbuD/1KKQhjEr
8d0eh3bAofrrhsUwcQ6Qu8hBkAWXZ2kwic7YREXfxUpNpFlk2d/Q2A75Sg6ocf+N
rtEHI2telT2850aLskbFrdN9GD6xXZRLUZNeQiel525iAt6iGFrcZ30mE3CyLQmP
i6LRmVETooxkjj5e5VxXY/y15XDKFjphRo/fcE00SRbztG+ohpyV/AVGM4ACnvAB
UFGoiUmbtYLq9uFYVydE7uAkuuUa7kzAqLFxkZzyKmtKuzZrvX+N+T/Zu885GfvY
mSqDun0Cdxuk8t7EniKqgiVjftCJRyN1cTskU6PKq641q0Su1vN4Ho91uU3LPGR+
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F2P/FGmainXCxqEDHBMcmLdEaxGkhH0JP9W8shNJB1rvqbQwWjrrw7LUGSXGaaY
MYAlPLiASJa5A0+RgWHqtte0030+xyUdpXuIU0Xv/AtKHwUH99QG1+jPM6Lyvhp
GKcKBAyPgZwDXcxhDFU9iLR9PNDUE6tXws+YA8KFRcF5A+QaKby64F/PJGlb72vj
```

```
Efa1sPl+Yci6o3HStBdscftwxb1QdLfnWXRbEFn5kYXfgIxKmUbbZKdEjuaTYchX
gdWaHZYSnbVU7SynqQtm6uqPezwxbLDR1i6S1l0vVBj00E/mskaspQo8orx1p6Ay
SzWfGsrMw/SXXM9CiVbyd9skzhyKkofHoVezPYTMAR4pClK30Fetm7id6uaUtFcR
NcLTYVLefea10/BIfkAITFC0x3o465ghq1ZXSDb+Wo8NiPy+6ZYw/aTuupr1maK5
fff6shBVMjPvkDXfx0WLFgpxCk4QppTlqHQXNEz1w/KMThoyhAbKPS+Y1qb8mxK+
M7hxAky2rJ+CYxznCzGrFEogawWGAIcZw/BFNXw5BI1yhe6B6xgws i5SfBpPgIAP
Clqdf/6hM4ocRr6Xks7x/Hb5osps9u1sClvhDX75MJpJ1bAik1eaBnDA7e5cgnEf
lo1zjI25lW2vq42/z8Cw9kK2/EQ6wIOlmbR0CTrUQYSbQa0/LEkgSywhyZliBFST
s3ivm3Mo01e85fv/UoPWu5tyWvREuzu4YOrhrujv8U0g0YJJKrTvLsYTR4WU0eAl
FrLfaQ5X212Lj4DwooGfWkvwAPoGgqeyX7PXxnpk/SL8Tq5UE/evS46NkMLe0KDV
iKSUhOvg/Yw0uAl0BMvV0Y0bm3tED78k4d0yrc3tqWR6eZmd+tNr7jz7EoXIFTZM
U1PqPiDea3BQeaT0sTVzXWIH14iDgB5qZs6phv6KyIVD3pkCNs6L5ZtlnD2FVg26
LQ05lflkXsSWN0voCmJaM1bFRKFgU502NrsqduLFeW7HuDwQnJ0EtZrU0XjVEHmp
VlWzJSG83ZjpTed/wNo9KwZcUgVktQ2l6pHfQZabASg9GqfhQI8eZDsZjS4+VI fD
YH07ERED5xE=
-----END PUBLIC KEY-----
```

## Sample private key to test the Dilithium3 post-quantum algorithm

Use the following private key to test the Dilithium3 post-quantum algorithm.

### dil3priv.pem

```
-----BEGIN PRIVATE KEY-----
MIIXVgIBADANBgsrBgEEAQKCCwcGBQSCF0C/fjJ0yD8Cpw3kRlRiraEHApyL4+SV
8ZyESd1GLL9LHMqLX8uKBSWZ0zWQpNiWpH/7rfmZFUme4MDyDy5z2+VrmuDY0dEk
Z3z+0U+tIy04tdQFlcVaMUT5fQfl+Z2s8JVUVmNAIXN2AajcgNHJWNmBhJBFYQAW
VmB0aFBygSdWbXVUdzAncCMiFYJhJCMhRYd2gSFTSAhjBiEjZ2V1hkNkGBVHBhV1
ODU0VHAMuXICIFWEDY0gBdweCQ0RUckRiJhRkUASDQSIwJGYyFoIkUIAFIyIkUyHh
WARCFnZTgWBwZBIInaIFmiAZRJzVDcCd1VIGABWN0hghkh2A3g1BUcTdzcXqhfLEX
EocUZ2MwU3YQaIVWYmEQUHQEGFJXF2FwE1MVZVQiKEULFUeMNGQicCIgBwZ3NyVU
JkmJJBInhxgxCAMkGCQSNmQ0Qgd2ZRR2MzV0gyAjUiM3ZWglZGI4UkhYChQDNjKD
IEV1RDY3hgC3hjQEVUQjQIhHBQRlGFUwFDR4dwREFTZwdhcmJoMYZGFTciQWM4gg
QUQ4ZCRSIGJDKHdoVndjcXOFdiFYJ3aBRYJyVUMgcLcQMoNYADg2QnIoAVYYAQZU
F1QCUBJ0J0cTMXBRVdYUnNDRnQyMiOGVUZyCFIiH0M0hWYxhYEWhgUXeGNjQFaE
CAGQMRVVRQBxV0dDgYdUBmKDDHgBgAV1SDdjRTIzcgBD0HJoUHECQEGaZwMzERBV
E4IyBxQzJGBYIoYRBXILZgIYZYF3KCCFR1ckVHIiBzBAFYdiR3g4REIHKEhIITUn
JDYXRNVmWmAYMFZwaGNlNvcSYghkUAdGYQh1N1VjGDIkGxZHM0I4UogXZSNmQQNi
YmiIY3cjVCd3gxFFFgATFihXKFUTVRQYg0BiRlc0JYBSZUdoJgZnJiYiMicodmRT
gXgQSCQWiZr0dxFYc0ICQAgRiDYQJhc4UkIiAAEkRWYIgWhAcLGBIoRDRlgCVIdW
VWY0QWAHBF3NnVFNgImdTKDdSaCEXQUKCM0dgiGJzY4AkYLRDI4YTgFgQMzNBiA
gmV1QERiAR0AYUGhwU3gBZ4IHB0QQNzMMekULJDEWNHAjRiQoZGATgLezEkOCMW
NkcYcTYFEIZCglQFgSjGJQNAJ3V4VAJiNTNiY2MQY1EFZCCEcUBndmWGIAB3EUUy
NHE0AYI2V0cVNWEAN2gTNYMxEwiHdSYUEXg1gUYHJEg4E1cWZBRiRXGEWDYiIlgo
I1I0FwE3NWSgYfmdQggcUQFJoBlNWQTIIBIRHEXc0Q3VnVzQHVQIBBAbmgHZYQj
dIgdXvogXFGiEh2iGGCM0MmcAd0QFJmOASBdkCFQiF3GDcoUYAwUwcnJRACIARS
iHcTExdzRVYniDWCJBOFKAEQQmECFxQ1ZyMBOIcoY2ExNYSFImVnUxeDQgInEjNE
NBVyJmNURBUYNiEgFoUFRIB2cYWIXnhyZ0MTcwJwc3gAeHUKiIaBiANXhVCCdDAH
YUd0cRdFImcEEnIExeBeIdBUXh2hyR4ABE1iAFFCENxZyYgBmIGiGM3IDEWAUUH
```

VUNhdUYIBDcXBAl0hWZDmdicwUiAAImA3czQxQYECFFQVgQcYJBYDFRcCAkNUbh  
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N3E4dTWBByYXRzV4aAA2UFbWU10FdFRiOFRzAAMRI4d0NAA3EVBWg4IDdAQzAUN4  
VXcwSDACBAdSYWYXJkYwGkI3NgEgRAMCNWFUVzNhcXUmghFieIiACCeIBRhDATEh  
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WT2LqJ9WE7PpCUyFD/tU/T8p0nv1V66FZeT1drvt/DqCe8hSErr45eHeedF8ebG/  
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0hb7dndrVCdLgSmw2LGG7c0JLANPwBgmX0AriFCnI66rvjpk1RTyUwCJQAs1UI  
jd9VFePp/VkUXjsUTjWI4Nu3MooK4Z5wae2laULc07AbJTF41x4/TuEoqRZH1IrKQ  
RVfM5VFXatLo2NxlZCW6Rqh0aQyxv5YpBsrytaH7TyuejA2FDtF7GXCNniIhwg  
JSgBlJgRX/zDbY6BLjUrKZ/5oNz1pSqvXRaKDKbioCboYXXNQhQWG6UDGsJK8E8s  
8ZFUZpudjDpLRDhEI+lWzq6Le8VEMCTuOLlRt2b7L08zxeRC5s8XaZTaSFPI/aZg  
e9obhW0MC4GKpCQLGbE4bn9mSLeHHRjZVrGcEhin/61R8sBbh0am0BQvvPggUvU6  
MPCM0boCPFPmsJS1ndoPBPFKMD3DLSZL2ywYLCZZ60FjpnsgSnduj93ZsavfaL  
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zQ7GhqkqJq3QeFb0if7SfmS73Cp7ut4ndKdXutgjhjydfETUNNIXfQfPjg9EYEx  
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gbg9nKQDNAe1mAx93+0o6MjYt06fawKr33K3BUYyv0Gvs51RNV7Hm8xSwiBE/Ou  
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ZwqJh6E+iNkLkJgaGUimz4di8KgE47giHc6r6gQvAA05fI6fCSRpIXVaaq42LSyr  
bKDTKv6bx61HD0VDbQ08n9oG8jGNEYsUBo8xXcUZ9Iiknqabu46xpxnDbD6a+0g2  
BKKpUocSaHkuSfWImZ69Vkm00FqmgmVDjF3qIyQ5jQQL+wSKmgPZr/TPphv4jU1H  
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ayujmrNuMa1JxZgabyg6nSzRVQHEXjdGJ+1bW+8iYeNxAAnSSwd4SpGtHb+pjprYN  
vZM0+P09YLVMpWQSuQPtULsZE0I68fy3/Na97qdXHedsiwCOUPXFdgrj5QuvkkVo  
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Z3qlnN89HYnGI1N8zZpI7hQsfw91oLYCTvsuDtt45uKvJzbvye4EzPQ/boJhAlYD  
bdBwKXQ/RCMy2tSSu5afmhCrkxHzFCy5XK9o9ynz4pviTnbc4+xEf3z3LEzh28Pq

+00NNb6ebF24iqkIXdI8ldwEKm3QptWS7ssafSw8hQ7efDgLscR0lbryFbfImgcU  
Ufr7AVmzLEuuqphuwWmAtkQP1j/gbUJSotbAPwRF79yFp6p37L+6LLxet4hvw65  
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RXLiMLASL3f34tIGQiX5ruJ6UmaqrXHT/pFj2NVAD15xVnLT/iQaPGAvrkvh95rR  
zi8e39rLGPYhBVAWd+Xu1fCM8uu0bJX0ea5hlqLtud3vXQxrMUnWgRIWA+6L9D1A  
bvlf32VjPNUYhU554u0lclLklEjUiOuGDa2a64sL1NZ7PGtusgRM3M1egpUCRGfD  
BYVwftd7YX9nLUQVR5PRJHfHR+EgVBWvKG1IgBYtU53avZJqREpkId05v34yTsg/  
AqcN5EZUYq2hBwKWJePkLfgchEndRiy/Sx5aCcriFvgTdufTD/6F4UKYX2IMwEJb  
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a4B5EV3xWDTkIOklg7VEE6fM5ZFzOwL3MZx5/Frt4FVxJ7nm184RsHD/vBg81z7L  
TLfDRKo8PxAWYUuP1RwOVA05ELnZy0mkpVKzs6qdUnAS1PT9Cx1D3SMoDGRJ/e  
CjAGCZmwCYU0vf/CYGJ80SYRByJwI0jaAkFJAootFYsbMCQ3uM59M/yt4IdrtRa6  
jR0drNLQthsNZXHgv3H86S0EaqFVEZm6ejSdYDqu10blMM+HKzTKJFWU1e7IYSuJ  
lCMhF5tSPG6UTzwd0Khx51TZEtvUJNiA/ACCyX9x0geTUJ/y9+F7gb4CkdDbNE/4  
aw0YsOwo1XkY5bedWwiTfxbLhd48n8fki/KOPEi8FZL4PPEjvXvPR/P6tC8uSM0F  
yvSuX44y1clVxAdCKmPgZpvz7WrglKaFXsGEC6vfvXQBkZbDp3wBWXwsMEvSAJhY  
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cdLNLljQeDIWGRDhudi+GIdFQ0E4fXnpqPnVIsIQimrWioi/0h5fqsNmnikgamNG  
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9QW/akk3WlhyIhEYl8Y4DABmY9KeLRnWbpDTrYmpjP1R7bR8NAwhiF3E6SNTXmDn  
cC8ByS0LctxqLk9gFMvr2QMbgfr3bV53oRKUMvrzumpuw0vcCrbHzAf503tR0PVM  
Ug1a4hD5rhnjmjBprkvFvJaN0Z5aFi7L/c4t31L0fPw9ks5gZE2G/R/HJFno40MU+  
QWenhJbM015bKe5Wgf9qdf1T6sIFrhvdwvzBiYwvubv403iaqUHHHHI/Dvy1Yu1X  
qk/vN9/aARyYbuD/1KKQhjEr8d0eh3bAofrrhsUwcQ6Qu8hBkAWXZ2kwic7YREXF  
xUpNpFLk2d/Q2A75Sg6ocf+NrtEHI2telT2850aLskbFrdN9GD6xXZRLUZNeQiel  
525iAt6iGFrcZ30mE3CylQmPi6LRmVETooxkjj5e5VxXY/y15XDKFjphRo/fcE00  
SRbztG+ohpyV/AVGM4ACNvABUFGoIuMbtYLq9uFYVydE7uAkuuUa7kzAqLFxkZzy  
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-----END PRIVATE KEY-----

## Dilithium5 (1.3.6.1.4.1.2.267.7.8.7)

Use the following CSR and keys to test the Dilithium5 post-quantum algorithm with the 1.3.6.1.4.1.2.267.7.8.7 object identifier (OID).

- [Sample CSR to test the Dilithium5 post-quantum algorithm](#)
- [Sample public key to test the Dilithium5 post-quantum algorithm](#)
- [Sample private key to test the Dilithium5 post-quantum algorithm](#)

### Sample CSR to test the Dilithium5 post-quantum algorithm

Use the following CSR to test the Dilithium5 post-quantum algorithm.

#### dil5csr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
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```
NVxRXwqTXKiPS7T+rIYcZdqCDWoVZFAv+vD8odUgRSxNf7NsN4d7AIwDi/R2mjoK
owZaummCgkz0j9An8vziDU7mKa30tz3YLRPbF2ggE89ToUy5enph8/elYlbcMbIV
IvTs91feGZJmTlrBfI5HUbP8yGg21b7KXAvtpbxZGHX8NKI6oypi7oIDD8gUG0mF
ieZqx755kHYaVEXzWYMYHq10DPk3nJ71yXyPlt30Q3rWzKvTdrOPdtXqFFdju+xR
RPTcW9HHpGfBcqlSUcNUdVbQIb+L9H+BDqpweJRHSUXfIikGQ3v001W4MrMEXVaB
31rquYZeGQwutpTHiLeU2jwo1M007Lfx1/r1D3UGYc3w34I9tnsvxREeH+NTN12Q
/xtS9HtJ4f8ZkrKe2CnthCL63J+40YBdlahVLHbKvPESCcCwEbxpmjGZsvuY5qk4
V5quc/d0ypeG8Eq5mLttjc2Bbi/CVVw0X8HWk+iFxx/05RZTNgdnc43haqa/7wuZ
epqLVP7r3L7ooU1c0ltb/i6HrZ2sdUFU8IV9Y9Vu8HS+txtmGgMLiQ3DNiZwjypz
eUtU56vzs4B4LhT2VHuIYpHH14sGbsL4/cDCip45N38AsnhyY2NFrZLoS7d0xf6P
XC8VEj9EktQ5/7EGsPSPGkDwZ1RmtgSPwC6+yOS9fpQ/5F5QR5CaIRv19HDvrV2R
0y6U4C7NJPiR8PozKDFPV7gb62MDsxB/urvcCw4wZhd6pc/Q6xJCS5+/wjGRqrPA
3Xrb4/c6dqKtsLG90/HzDC5YgYai3o0Gucv6/wAAAAAAAAAAAAAAAAAAAAAAAAA
AAUPFRsfKTA2
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the Dilithium5 post-quantum algorithm

Use the following public key to test the Dilithium5 post-quantum algorithm.

### dil5pub.pem

```
-----BEGIN PUBLIC KEY-----
MIIKNDANBgsrBgEEAQKCCwciBWoCCiEA5kEhw5WzczX/ilsOgJtwUw66idEhojsF
LIJXdshIMUoj6E97yrHk2u+cZ/Pd1a7em74ga0bEcm6CeNq1rFtbvz2oj3nfaE+7
xQkWGfEjwdmI62uLUJseUMyEG1lhyaP5KM96qbsX1C9GSFjSrSiq4h5m8F3qPAAv
d0kKI/4QLKMuz4mDt29l1crUu4Lc0EkwfOMMQTknSE0lNsXyz2TQdkMqoBaGs3Vr
M1jC8f5oPuNzSFFmX+XP18MykeSM8jOMIO5NdsBQPX2QI/p/VbLcWmHZjS+UyJp7
J82p2g+Jk8m3C/QzLcWppIRALyKkH/UwNhJ/AyJDCBYGu4QCmIWlcyiHoxoWQ2+7E
AZZGuY9i2AQtjhEgHjDL+p67Z/0EeY6+0rwdAnXefNSi/dLux5UpWSaNKD8X+wYF
iGPbHctFl1nKKZ94sYHKGDu0U0jMcktfYKpm6/bI7TEUa4KNpf0QjcmxrJ0UgCAEL
yVp+YmBdaDoe95A4W3WxxZoDK1W0IASTCVqU7BjU8frOTprtVWRASX+cCzptwXUw
0YCE+SnpCH0otgYFJBIF0mEugWiHMM1MrG+roZrZN4ceJQ2HII8YLlwbXmLsZ3L9
eiwwurp/H32CLttCQiC5t1mTHodS4StALicfk0W9l8MvplZ8jv+bjStA9k53yjrP
VJ1+C9dXHDih/RV7QiFPnrVigMVnha02mAZf117NNm02GpmagW1XaAtgez0YTEXR
GAw0/RzacuP8T+9YaC/CwJRvao959afusvBAk/HLWNm503X0A1uxgFJ0BZ/4DuIT
FQULPQAQG58UDP4L2smz7UwmbD04J94P9seK/XCFeyFXMyR/5S0nHn0q4tRDJpA
5p4aYUgiNUJ0DwHWMKStb8MT3K8Pwtjk/2TKcltLabSb264oZxZTYzH6cdjIoT7Q
lkzXMBIVqxLvCn39xeYyCgfpFfnCjg71yqX+n7roiWTzET7qs2hA5BttkKyZS6nH
myc+L2jRU0UHq24eokuAwLJVk+5v7E5pKZcsEUwjyIzGClwP3ZbJLEZnkXEnsmkn
S3wUZjBTQELkAHFVUfVJzgtP0S1Xqrfq5/UHrqcm0CLnvLIL1ULlWj/0KVVG0x4d
wq2h8/IHONNF/AYFtygQKSkdkNWBISijFg677nw4psYT6u0Ft65VIZvx0hRq9g+j
+jm/dRqGkWhiS3G3DLyJSBCXxVFJqerAvEDP6MK+TwumJFPdCLEYAqvIlSoEQleM
lnnc0grW2BgyfBINjcxYgZJhG4YzGkhGz4Mt/LJ1ncIH83HzWLSRv6GrWVvvh3Eu
FJcVCNlRDxyLoXa0yX0s0f00dnFlX87eJnesDueUTH5+iYhyMH/A/KJSdH1pkoF0
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LnksUnTEhkceBIUIk0LD0koD0W69CJNEyCgaKc+KQeC6BwfwDCFCWYbDtnG0bNY
vangMY6yptkfl9ZyZrenLvv1PjGh22o6tnJfpg5uzyRsI/P8H/e80dagB9/HTIZY
```

```
DXwV4m198gS+DM1D+HPCymVEZdKPP/c2zfi9jU5FU8UX9EnK/4ySc1crAzJfwPRL
VYOZEAHym9KaqvYNYwk9Nwihy4LAGqqEmKvCA02G8jkoIoKHaInLjYxaLL7NjKaO
BCReLzYBm76VH4TPLLEp80D68q8L9UpXkP5490jnuYb7SN61jpcCz4mH7KDZmWxo
4flGmrvSYjJJo4grZs+XYh4C9lMu1kaM8VPyCkT6WYwe0M8X+hJjJKaJvwvgy+pF
9hzXasdm3VviZ/2pALpXiNl+dG9mFCNnYcxJRvksUPnWksDQ8XxiFPeMptEmIUlo
qy0YhrCdNStYsTsxBKA5w4PawzDGLRihDmFW+s8NeMyKMaxJFYLUz6BDwsk1pir4
gL3G9aA85LjPjI77fj9XdYhb/4Q8dEgU0/ptIZ/niZmlLATMUNN+3jnhFBachCX+
qabEfpYT1oOrpV9K8nb8FE2lvkQR72tqyeFFG6BEWM8+V70bq0/w3wkTZTpA3pnz
NbzXFIPdWAXsI9vfz6UuG3NMdyrcWML0yXHWUdILEBts9WPsNgFT7sKVUyGwTpcz
ISmZiSIigqu09h7vxSiOLVff1TkBmsi5mDx/cPjE5rRNarMbzGJquALTWgWLstJm
st9ql2GInuoztDPBt2sInkaqHnJOLYiicQ6ykJ2JAoxVAF2+VnRpv/a2m8bdJoI
MF2bD6m77FuUCnSLcRu41icZQ4angTWEgJALUSG59Q8lev1+ngS4aFTTWu+AVgcX
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BJ4AusgcNsKImr+lszJdyEwu+9UQU3ItYaSkTKrMx4FuhEAct+UYaHV3f8HSZsIs
QwzmUDZVwnfagyviOn7J8ChR5d3FHqAwuPu3TEntxL9pFn5A1ssRKEosGRwVt6Az
7c2bbtPK/Io15aGPMYlGLTnDjEiGDmEhoM0aXfJfOfmoNf1oPTPUD0uYIoZ0g1t
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NC3VYDWA2JRrDl9MAgQfUjTjy0/QZb7kg2gh4MjGp1l91ZMdybpGt6WearAZrCIUA
vrbDoYeo6m9YBbe0ahZ9Gdn3Y/X6z8oXm/J8LHAQlgDLKMK0eNNe27oMKU3KnUpi
Z4Bjly45yRCsEsIQysMv7VhJ/LEXdtvukp0p6nIX2pTgr1Ud0K7eWENgujz4pGHC
/Z615ArrnzaQz/zJEqi25iiF4D7gbbe/F+5mnDxU1uMr3fME7QU0Ckz7ziANf8xa
M40sSGYV65aywfdEylE+HisS6zHGrYlCGZdQdSjvUT2R70wDZCzfcKJWYR5oQFST
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RXl7tu00ek8JUI64D3a4VuIg/nuLwXmewSSfNMgE0ros51qUG3DFLiEzu84eni28
hKPaGNN6NkRIdU01unENbhC3zx5nHm2TzXjz9t1x9CJvfHKS08jOWigYEJzQohz/
IqrX8PqwdHbj7aU8xxfh8LDtNZvx3irr
-----END PUBLIC KEY-----
```

## Sample private key to test the Dilithium5 post-quantum algorithm

Use the following private key to test the Dilithium5 post-quantum algorithm.

### dil5priv.pem

```
-----BEGIN PRIVATE KEY-----
MIIdNgIBADANBgsrBgEEAQKCCwcIBwSCHSDmQSHDLbNzNf+Kww6Am3BTDrqJ0SGi
OwUsgld2yEgxSqfYuLEFNNEvakFOLQg/b/HLdmyiAW2ZaIE1MdtCDmcVUrayevwP
f7FCCi/jKNcboe7kfl5i fwdCHn0eb/OwzSfD0FEhEooQgWsyCFIIXEwLqC0aNU0Q
l1AZAWSgoonIACwaIA6MFg2jEmLRNoIaFJLREgKR0DAjgBAilYwJQXDjNCELN3BR
SAATIQTaqEJVJImWhGA5BwhGcGIqLJIgkPAxDIgwANCnBQFCgMDEjFmDjIIQQAREC
hUTJkJBuTG0gl3FLNmDUhkwiuChMuBGLJhIkA4xQEg3iwoAUIFJbwCkTCZEgqAga
giULsoQMogjBABIESBKcBFDSFmkDCUSUFE4CMSQICiWSEYkTIhAUhhDDpDCAfK7Q
JlAgACoEgzBipC3RgC0jNjGBImwbsSkbLYiMiRiNiichgnACIUCNm4Axw1DGE1Q
gIAbg4EatgzRIghUAgUt04XByAwIEkwyBAiUtEUjuG2RtiCaREqKILFBIYASEgJ
pAlSoAwhFAAcwAUYxk3iSCGACI5hpkikKCnaJIqbCFFk0CThxnASmWwAFm5ZsImE
QIEkM2KcFoHQkBFJMojaIkTcyHCY0AkLFgUkJS2ZApGCCGBKQo2SJIDSgAFgBlAB
```

SEiblk2CMIIEMHARwaQiCCEstG3cIkAIhLFkiG2MmGDZEIFaNDaEM4oikQjpw2C  
OILDSiziuDEQMkVkfAMkgBDbEmIbCQmKMoyDQk4gyU0Kok2YMGQhNA6Isg0cw4lh  
RGiRGARMJG0QuSjcFmibxG3JxInLskkTQ0QMwSGEFkzJEg1CQgVLIiKhsAhQfKfG  
smFjtmhJBAVZAnCbImAZNImStG0RECIYQ03IQAgRKSXhmfEsEwbkykRmSwjQhKK  
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KQAZpIikQo1gpk1ANGQQOSYCYgUiMYUYuQQAQWSYSACcFGJDKInROIqEgIHTQmBZ  
iCmMqGWZmHAJQJHkLCLSRUCUckQgkEyJJqIEkGYKUQIkAqATiFoFYxCWCwinBQooZ  
AgECOIBEMgECi0UhekJaLoABI4oSQ2EiJijUgmmYILCLAhKBqEBUBBDgQCQaJyKS  
NJGKAoKIFAgIEVHkxGwkMAxENE6aFEIAKFIhivAgMARMxiSBEGkBNLIRfK6SEAFK  
CEBLSGYkIyAUJ45bJiHKOI5CtoEan5CKLoAKpYwguZEYokwKM1CDoCkgIg5AFiwb  
gWgEuEmawACUgiASM2DEgk1YFIwSCBKghGecFULJIAqSEg4AgWXJwpHCIIFZuJAc  
JAARI2zkhBEJOEUbx12DQGEQoJGcIBKMFa1aCBFSBk0EEUzbNkQYAGRINmgAqSRM  
iGzg0CwjBIwCJiaCfKaZo0gcNkQLAgpUoBEgE4gBLUHLqGmQRmZjskFAuDELFXER  
qGXlwk0RCCYYIGrQFpEItixbGGKiKITSFgYiuGDJKGgSlgXQAKYaxZHZAkSGJHS  
CA7kkGzMJESChnFSCGwCSAgcR2qbGawCto0boQFTBo3QQgYKSW6KxJFbrilQRIJC  
liHyTJGBSJBkIHEIRmTcwkzBRGojNUYRgSVRMATryGwkqXAAyFFABg3aIAQYGAWL  
QhJQJgZiJnKMAkJCECrauIwQBhAJESxINjBEAggTCWwYRYzYsFAJmXDCBhBbGAoD  
NU2YIC4LEGGZekLRJEWMBJIEInmIcl00TFSEMfjFLiFATKRHDFjFDIoDgoEwEt0RR  
AGTjgELTpI1aKE5bFJLlNjKBfPIRwAnSBCxaNCEkhA0kqY0SFC7EwmLTsgxjiHCh  
LEXEGGUgBSLMSIFUNFCZknDSICESSE3LQIXRhhHTpgycRoxgsC2TQmQYyXJFo3a  
OGxBRogEA24Cl2zkkAIBoIzIQgxjAg0KkA0jZjx2Uw1InVIg9edN/1H7IkhC3kas  
/wvNfwG9nGsGkrk1EQ/87TviIKXteZAbSL0MawloFIytA+plZf1AVuhJg8DFXhk  
bF96Qd8NXD6gY0BUpMS7JKVCEESpU5tNjM9c54zHFS4Q8pHMxP1QvcQqhlDgB0Cz  
TuXDMTF/GmIWVprMxmOXrP300qLYXwqywwP3CR6kAqi1aM19XxHgkDUqxpsDU2HC  
fCJLfd42zcz2UcGIKnw70WHGkfxs+2Qj2TvlS2DMU5CkdTQYjbpRIDnxY2y/GrgC  
J2h5sz3X2mcBjE0JGHXG+v1ZKqU+334FVwk8JG74gJNAHGvR1rgEzBom7EQ0Hjqn  
Q3yTBwy8MrPtIoSGaNB8WM2rLYZQpEzjgEdcVw0hcI6ns9n/2DIW/uG2Thvqy35  
YWmiugwDfG0Rbv+xJMyiaY9G68uDPEbLeF3v4C6WUZYLUxctMuft5LqA3Dyla/ku  
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6hvJGXLmWdljldf3ZpE9BeYiofA+qF3apCHS69QUf894mCLMvt45L9sL2S3Uipx/  
myBsy6UgoJLZhAHB7bzMkIjRkGW2EXoYA0Zxju/zvoS8bLIg5E/Wbw/SWep9ZFuk  
ypBDUE9LZDFLAqtUaBYALnfNKRDNgwL/iGBisZJcojBkH6L0TehOUlk4H81JcPuA  
/5S3ZMULrZM9mB5sftKMKH1w4hIO29WZZ0K6ZZ/Z2tapsS2PIZkkav4lmJ0R9f4m  
Ap+IUwZrsgaFWAoDgVps6Dt4NXU+uCE7s2epr+pHm4W2LSb5crBwH1xNFMVwsjJ  
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8809LKF2+67r4iW4p097VXzFp5SwdpSj0vbj7fzPgVbHh1zquYeCKlhJM6qQyvzT  
ekHlwEk0tt1goPIsRUZ6tvLn3poLU/57n4TYKFTEiSwdUt2aParKye7vNwX61W7S  
WvN/E/DbzI8MHaA2LTade0LnmXHFSRc+7YrRELMBrigVwHGahGS8rDjB80cERKX2  
TySiB73eBZJswyPhUGwXhsq56Ujvw+a1LVBk1K8Ck00HkQGpmj4+cQR+C6YnuFX  
s1zz0fZqlU0d0I8yigvJfs6JF2V9BbZngysn8Mi2HMzSZoMMhHjP/YhVC7f3407a  
3spZ11RUAgcqMoR7uWum0SN0qw2+Gwf5SrDrPOuKM99M98ohjUVJGZSmKsutNgef  
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S4QbmV3XE01Bru0QTG6gIvxz40Zpkk9f3Gp4UZ8DbMjVsvEILi6GbdukybTup0EO

vEUgWceureY31ql14TW5PKo1P4sWSPCSJTjv/rufLKRil54lB5VPhCYXaGRXldC4  
BpKpPV4kSr/rrEE98Xime16HW6mjRTsLoo949p85rtU2S879NpVY7/6TLQtcZHPz  
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H7FwmWCKJmaWZG0ZPtKa2MUAeJo9CcDrvZMpoGDhOuLAp00wKHwMqWC8/DVlXYn5  
OZHkM0pp9Y0loVW5YjBRQacB7glKgdQqukPTLOcXdhGjzUodpWJzDpx2LIRCFdLG  
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M45SAUTS-i60jF/Uw+7NiIK8Z90toGJ3gFGfEEtLNsY0J65P8RD94Ff9KDSxJHFBC  
RfpFQcu50CHMjJZsd6+W/HhBLqXJ+BzbIJxLH59yqkBYoYSs6LOSWEots0pdNbWm  
3wSjVqhlGwE//sA7/XOC+2du9gBr6GAHud+XmRHrKLC6E+SRTghgn/JD8CtIaORI  
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FSnq0zZ7ARSztv6jCeB/ueKEIY7np+BfJl5ul/wM6XvAbY5nJzZRzvXpnsE+2R2f  
d9YmWkqTsLYuZaiJ4eY/KtIMhtEsEo248Nvyfu393xlB0M2Fqypvulzu8gQwjTtZ  
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Gsde/v0s94IH1Y00WW1Xs0khHlsTwmJqY9A1hYE7CF3hAo0a3vaQNHQZA+4XeIXX  
lfrWZ+F9M1jy/RjHm779Ku4j53QPju9Wy+E6+hsZed1pnBV5uUiHm6x+r4IJQuYV  
mhcVVcgDm8e+0voVz+Kr/9SA0suDfCGmIA7FPXpAISJfg7e+DA9p3KGvfty+Uz+z  
fQ/AvsZ73cKlZWBmmybA+KiLp5NKbTNOGG760sQ9fmPI6GPFi9zHI80y0VMIZ4L  
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KUT4iEiEtEMfow+b012cBq3pmzuNfnU69Z3JmjcKfOPC/445DCFutX+wD90xN6mh7  
CLl0z8rzb5Fgv5iAdBFwvh0zMzfujMbGDCsSNDlKAJ8VKRHNIwfl8eSnpHCJbytl  
eyBUt17kVsh6Q/ic97IWPNeB0rbWwG28rVlSauwjriabzJDXqRWR4s+uoZ5Igciv  
dAxWAV/Bhfmdd14Fypjs3AheezBE06W+fVb0U9Gd/Gw0qgmNdoLaRo4FLHdjfQy  
u8hDRjlesI4zCB+T+R2/VDye5QiBXtINl33E/OjCUBVbAu8kj8hn8y494ql9r8EN  
4LHBFMrCzcP78Xa+L7rte4qd5aDQCy6oUMj0147ODNosL7m1Ld0xEan9eP1DcT+5  
sFtAqULvhlM0RidZbSVRM00d0wuuo44LdlMa5d0asL46RA0SuymP00eAs/tV/Ae  
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9CJvfHKS08j0WigYEJzQohz/IqrX8PqwdHbj7aU8xXfh8LDtNZvx3irr
-----END PRIVATE KEY-----
```

## Falcon-512 (1.3.9999.3.6)

Use the following CSR and keys to test the Falcon-512 post-quantum algorithm with the 1.3.9999.3.6 object identifier (OID).

- [Sample CSR to test the Falcon-512 post-quantum algorithm](#)
- [Sample public key to test the Falcon-512 post-quantum algorithm](#)
- [Sample private key to test the Falcon-512 post-quantum algorithm](#)

## Sample CSR to test the Falcon-512 post-quantum algorithm

Use the following CSR to test the Falcon-512 post-quantum algorithm.

### **fal512csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
MIIGczCCA9ICAQAwOjELMAkGA1UEBhMCQ0ExEDAOBgNVBAsTB0VudHJ1c3QxGTAX
BgNVBAMTEEZhbGNvbjUxMkVuZGVzZXIwggOPMAcGBSvODwMGA4IDggAJd7omJsRY
l3WSx+TbIQxsgM/nrh/LImEvcuEMnA90h1k2R0WvgauAOesgY2WoS15RPDUQ90H4
X+mxTuknfg6Z0uIyKVaeLHD8NUQYjVSAaeUl7ydUmSKlg3vhYJ1UmKvkVMVeEQv1
uE3xAjTNpLTLI7eFA1nJXIwISD1jACR7AKY40RxFXIx51EyVsh9CsVx9hitTtAv
Wz1N+UAJNeaNKIIIfgk87DunhJyxCQfQb5YhsRHYKBgMike/U7605Ux3ky6fPwWSp
6cq0qG98+f/AYMqmkCa0dG6joltYtLj2APAAecoZIpEbSrUKjZuLiDplpZuihi
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UW4HLUbqWlZKEtnfACoSWRWAYijkPAYjgI5i03Cx2nfqYU01Hu7XYc8gIn59ljXT
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LUnLZ74oSq3rzYx5Cd7t+20TnLn0iKYhiAZm2Tz0sJV8M03JUBiLhCpVUAGprSpT
mCDn/iW0KeAU024hf30Jm8RsVAiWAgS6SodrmIWOBm7QbEMQ7gbMAF4ATkr5BRVm
ngIH8t0rbTl1zCJx53uoeMxiEWX+QMDkUhut2LAQQHmWRZuope4F1QJTf3EluhiK
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a28FYlVILqd5m60dW5EGsA/4tLriJGacVjMkrYpIP8Cwo0oEL06qpabs3zQ17rpn
HYKHBACoqLLOSUQNfSTZFpGnuPg6n8hEjGVrxRIPLhyBNnDaC0dj1nKrmah3aKHT
C2VHIVc9gINMKYALCh12Qa1ltw7WivDZrFQWqxTXwcy+GagaCGH1EfuUpwVYPj2I
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zcbvaZkZishfX/5DpCU65NvyrZWqMrcxla8qt8Ybzer3e29nldaxKEURMc7kEEds
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XklCktEQFn3T0GryuXMagqlRmBxSTW+DnU6TpeNGMYd5ZG8rcmRiAZGWc8zqMvLj
JtFB6exKtaJzNq1h+3pyIpPSGL1DybiPM21v6c1p0sVMTqVFLlMT1zH3D2Vt0apH
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rnX5capVyLmlffITcuH8NjJ2Gx0VgCA=
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the Falcon-512 post-quantum algorithm

Use the following public key to test the Falcon-512 post-quantum algorithm.



**fal512pub.pem**

```
-----BEGIN PUBLIC KEY-----
MIIDjzAHBgUrzg8DBgOCA4IACXe6JibEWJd1ksfk2yEMbIDP564fyyJhL3LhDJwP
TodZnkDfr4GrgDnrIGNlqEpeUTw7kPdBF/psU7pJ340mTrimilWnpRw/DVEGI1U
gGnlJe8nVJkipyN74WCdVJir5FTFXhEL9bhN8QI0zaS05S03hQNZyVyMCEg9YwAk
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G+WIbER2CgYDIpHv10+juVMd5Munz1sEeqnKtKhvfPn/wGDKppAmtHRuo6JU2LS4
5dgDwAHnKGSKRg0q1Co2bpSA6ZaWbooYouK0kg3YekKwwrgJa2FtBSSLTWHqTTxw
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k0db9AYoCJHJKPfeNDVs3JLGUn1vbTSbJicjajpCV3WuFUdguzuaZf+objV11hnM
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lCEK/nmKxVfGdi7Eg52+G+wtMTyBqYRm54iLwUWFOJx46CoLEGLxRbUBe376tHjP
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IYgGZtk89LCVfDNNyVAYpYQqVvABqa0qU5gg5/4ltCngFNNuIX9ziZvEbFQILgIL
OkqHa5iFjgZu0GxDE04GzABeAE5K+QUVZp4CB/LTq205dcwiced7qHjMYhFL/kDA
5FIbrdiEEB5lkWbqKXuBdUCU39xJboYinKvGmE4UgdISjmYgR/SS0gWi+fjymLD
Ek5LfhGt0jCJSf7LaXqoeCeSAQC+ZaG2a2tvBWJVSC6neZutHVuRBrAP+LZUYiRm
glYzJK2KSD/AlqNKBC90qqWm7N80Ne66Zx2CoQQAqkiyzklEDRUK2RaRp7j40p/I
RIxla8USdy4cgTZw2gjnY9Zyq5mod2ioUwtlRyFXPYCDTCmAJQoddkGtZbc01orw
2axUFqsU18HMvhmoGghh9RH1FKcFWD49iIonCRLxrb49VSmNYiZ9a2h+GeiZwod2
LmW5
-----END PUBLIC KEY-----
```

**Sample private key to test the Falcon-512 post-quantum algorithm**

Use the following private key to test the Falcon-512 post-quantum algorithm.

**fal512priv.pem**

```
-----BEGIN PRIVATE KEY-----
MIIIkGIBADAHBgUrzg8DBgSCCIJZDBD9+8//A7AC9FADC3F9+B/GBB/+6C/ICMBC
CAHC6/AGGBCCCF/5AA8FB8H+D+/DA6/F8DD+F9BAF8EBC/CE8F95H//BD9FF6C4E
/DA93A2AF/+8B7AC5D/G/CD9/7+/AD/CACCAB/CC+E9J3+GACH+DC98BBDE//D6G
I/++DCD75DBE7BB/A8DBDC8GB/FACDAEI77+9FADEF/89+62DBBE9AB+8CADD29F
/C/BCI/17B6BI7H/FAM/CA9GA+KDB//HE++ABC4D+FFE78CAB/6I9AC+8ACAEB/D
A8A5DCD+OABEC+DH+7DC+/8+F3GB3/5A86B+6C64C+8+/7C65AHDF+GE988A+DE/
E/A/A+FGCC7BAGC8CBEDDA+D/I1D+CCCA8IGAAGAAAF/C/AB1AFD/7H7BFC8FE+D
+/9GHJG64EI9/988AB9+8EBK4I/99FHJD/E++898/AGJ5+DF/C9BDC+/AG3DCEAD
CIB+BH9+8B5CGA7BGC8GIB8E36+9ABAFGB6597+HA9+/95EAC7B/F+BADE/+BB7B
DFEI6B+9D/9BAHD469B+D4C+DDA+G+9/96/69/DCB/G9AA/+79AA69BEI998+EB9
+CB/DAEAB1DB9AF+/E/+6D9889F+B8ABF/99A6BB4BGB8DB4FA7/EAB79/++8BB/
C839A/7EGA+BCB8GD877CC7/7CA8FE/FDEACG99FDEACGDCE+EF97/9HI/GBB9AB
ABC8B8GA9AB55C/B/5B/E759+A+EJC6B5BA9E//DCC8//CDDH8DBA+/868CCAC8+
BA/7BD6F+C55DFDJ+9D8DAF9/F/AAC9+GF+6A5H+BD7AFD+DH94+B79BBGC//EC
//A8/CDCHB8AEA/CE/+E+I+F6CE8GE882/99D+ICJC5AC+H/AFBAA5/4H49DA3CB
```

```
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7605Ux3ky6fPwWSp6cq0qG98+f/AYMqmkCa0dG6joLTYtLjL2APAAecoZIpEbSrU
KjZulIDplpZuIhii4o6SDdh6QrDCuAlrYW0FJItNYepNPFaiqCNfRKIV6l8pkXVY
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nb4b7C0xPIGphGbnIvBRyU4nHjokGsqYvFFtQF7fvq0eM8auCz+0/j740IWNshT
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UBilhCpVUAGprSpTmCdn/iW0KeAU024hf30Jm8RsVAiWAgS6SodrmIW0Bm7QbEMQ
7gbMAF4ATkr5BRVmngIH8tOrbTL1zCJx53uoeMxiEWX+QMDkUhut2LAQQHmWRZuo
pe4F1QJTf3EluhiKcq8aYThSB0hKOZiBH9JLSBaL5+PKaUMStkt+Ea06MIlJ/stp
eqh4J5IBAL5lobZra28FVLVILqd5m60dW5EGSA/4tLRiJGaCVjMkrYpIP8Cwo0eE
L06qpabs3zQ17rpnHYKhBACoQLLOSUQNFSTZFpGnuPg6n8hEjGvrxRIPLhyBNnDa
C0dj1nKrmah3aKhTC2VHIVc9gINMKYAlCh12Qa1ltw7WivDZrFQWqxTXwcy+Gaga
CGH1EfuUppwYYPj2IiicJGXGtvj1VKY1iJn1raH4Z6JnCh3YuZbk=
-----END PRIVATE KEY-----
```

## Falcon-1024 (1.3.9999.3.9)

Use the following CSR and keys to test the Falcon-1024 post-quantum algorithm with the 1.3.9999.3.9 object identifier (OID).

- [Sample CSR to test the Falcon-1024 post-quantum algorithm](#)
- [Sample public key to test the Falcon-1024 post-quantum algorithm](#)
- [Sample private key to test the Falcon-1024 post-quantum algorithm](#)

### Sample CSR to test the Falcon-1024 post-quantum algorithm

Use the following CSR to test the Falcon-1024 post-quantum algorithm.

**fal1024csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
```

MIIMVzCCB1MCAQAwOzELMAKGA1UEBHMCCQ0ExEDA0BgNVBAsTB0VudHJ1c3QxGjAYBgNVBAMTEUZhbG9nbjEwMjRfRmRvc2V2YmIiHDzAHBgUrzg8DCQOCBwIACHeueiJmb/6wEnWpDGYpdCq5JSXYDWCtdEZt7LU+NoI0wkWPM6L7oVAp81vp9UZDJzEDrGoAi4u1Bd3oejSIpJwo0KBIlC1GMG69WXXN2LhGxmSJS5A4QhivFb1fNkdBYQRfLY8c0Tcm6kyOMkiXYh19PcgLMffJWz18GBDzJsYesDFLLOUUVF+cxxXpaaktiCSwVaeoqBzcxVAg0w6x980Sma08mkYVIO/CsqVASEiM9khqLoWYUMpw4pHJN6VIQUkJR77JU6qiKoRNFoBaueLLbqs3Y/JXZIsoaKEcqNrDK3+Hcuph14Q1ojbip8AGLSP++uBvUMu08K2Di2mWLNgnadzViln00bIqCRBrCWjVB4P1b06qlfzHkQPWlHSGkiKArt/SHQVRlgSML3qHoCq0c4U0ryY3ZC6rVu4ISxnAh4sZ3K2l5YKmaeZZNICw4W04dBimJ4PS113JKqR5D+ic6W0wPVqlSFppGZ4X+6wp0peq6F6mBhCzG0oGEDWIC0knWIRgaTBraIE55u1HOR6WaxrVIElCL7/mots87PefiowFzR0ge0gSh+fN3YWSFNggWwAE41A4b+uZkUYEQtsAUC6f1jUWioNhHWJZLbexiu4DIleolVlTmFohw6YEiio374LsayCtJ7rFB3sKMcAKBLUlHmZgkAUKOG6mRdqGVJmReguxqGe2BLCGgB00DW3HCEIt/TDZsyM9n0Jogv2GGyA/pQTxu60rVTjdXRcipfRuPI7AK1i0B5Cws4MY3iu+hytLSuRjHOGwVJ6HXZnAdF0lra+48Np/a00MbJ9R+JDEX8rsyG5f4GJI1VNjDSCkKdqIKV2BW4A5hARXySoZ0aCEEUqSjofDaQe7ESHaorYvLTZ+e2DbwcQduDeE3Un3MsXWVCDKulhkt1VXz9cfZcjUwcHEmhAKGLVqEkyLuLcDb6isW00zu89uTLpFAHGwoQj+cLdJw15gDofRNkm2UDD0JJ8HQ3slddMfpjJiffwIWfBnCCoeoZXraAhauYB8Jf50DtbDbIIgAkp0cZGQE4WSU2nty3uWyYQ63CwJc0Bg9gkWWAF0IUibDb6qGZL40c5YnAJZh95Qvyk5Q5oCF5GsMRKWYp+PLuX6ebUAQXzehXHSFda0QhYSG8mDTi2Yu6/pEDxCdiP0KMo1YTCraWmTps5tk/HUt4UqVwSL5YvYsvQeKdZLHq8GcdnQwEZ4hn7xzuEMTJIFg2yWm5vF49e1p6+t4b7gJtx6EuBBNmbD6Kwm+8dk5PGzauaSAphqdgK/M1NRhCmyPwb6ngCLXcd5eRqcahk/QPBR0w5h6rAClxZ1ZbjzmCmWaQL9pIwo7gMhxkhWC91GuenbW1ZZR3UG98nVlabdo0SJrZqGFbV0+kJAqHD2Z04BnRuJIHg1ZxIYabn7AQp2dYxZmoTQL2a46hH0BZ1+9q/QPUHurVjxqjwmWRzAKOFJ2yUJrCFVUMHIqsUqN8YtTZkdA0fgLYI9wnwajs6HS8liWjvM/pve/1SazucTcN4jBi3tRLgMeI6GNaIKpBP7CbkiqthRV8qvgvhycuFJNBEMyBlbSZJxkhImctVWDbXp62CL7YImLpC+FrhT/s3RNsYStR3TGC0bcL0d70lp2egNLgAB70ixf+FvgEESoHpYLFoQB/sr6i84cCHKuczLFE2cMR+BTURHqL8fLCq0se5FKFpQB8BXch8C0UULFbYmQEDrHJ8KRq0FCBBFRF2y0Pu2Z8K6dqaCaNmns53rk2vCIBrg7qj5hC005vNWUacMwkjWunrb4YPIIdKLSr7SmfYeGalDksAnVJ2ktjjq6ayNuU15c7QdzzRtbl7mwUs0NA6UQ0njfpTqrKBiyMuzIT6GodYCutn7gqYesXFKW90IBlNF0KuAzoerBITsmXjvmEQsvTUjjaQ5+HSLzu32XPJ79o8kJPw4Bwah7+sDGjG0qG06LGr41QPuLGF+tldsDdqHBEj64Qlo1GTRepCm5o9xIVZVaAtFb+o/xlosmHhHQFsVagUm2AboREDDQ5E8ctcdVYm7EUCFPwSoigMeBV85ZdSjY0bpN2DXUePKxqpFyDc1oQSN0kK0BIIIRBpwKLKLxQ6iRVKtzjoADiwl6RujTGysQVKHgTP5DRvByAhJFPr2bijNG5LJ1DWZHC0ILII5HPh1juuqlg6eLJLpp8Gs0juKI6nowAJk0HNq8NNrh4QdW07uLHtKdml7hzhePJ0JDK2ZtTYCYYSXTFkxw+tWhVVNZfkQJqPV0FbTMIKGe5EGa6lhZB0Xjjogbw+g0HnIJnnjuEQdZ7dC6bQWygD07oxhKzAXFC0hiw0J0X08X3gmRn0785cQHdVIs0L0d1c2HqYZJeYA/KP6s1Bxe0jPMwCQYFK84PAwkFAAOCBPEA0tkfiZFz+C2m6M8HZaQAq4SLNJCCq60/UyU6fzL2Xfyb2Bnhli5sFbZCODiH/gV65DtbHFQ2vkHy0IcbBwid0FGGKxCiZlpfLi9RPupQ5+ZdeTKdNHn2kPTruGESaBaIwojlni3NliqnYSh4Lo0C3mzpX76uHarBzYwsZQ9wGDLCc5IF1Edv+cq0dH1vxt0ja2CEWV408YMaYsN4k7PuRWL2L9Ph+cYXZ7hZWw/8fiZQPFyFco9NLTYqC7u0n2VY/iyPraFPkjrL8onFv02aIvWcjboypuG0MboUD78lBptU98Lsb890Lo880zf/KrTAWq1wZSYZ2nr52Y5TusNa70cGgJYw7oKfI5mcrbYpZtmaJnvpP+5i5pIUd4rp7zccwZRokEiq0u5hoa00aVwfGimYUQ3D88enXTS2pBlaaJ8fvyvVqnu9ppIF3lFYwrHgZv3YIg+EkEYgEC17T7amdmQdoSU5PmhCqjP4rAOSqeizNCJLYbHjBjEBYw83aYLGs/ey6GLvgmVVXeqiotxq6Y0qn8xNwvC9SYZLb979dbom15dMMEZ/FdGAp91HjfnvwU12rXnzVCEwX0mKP0b6SWrz29b4bZqSxKwLEZbIvniHx3049Nkwm7mel+1bQBwtOudcI9051CtEu/km0/8GZZHWPdkn3bb2QzESp+ILYcohjhzS21mawkjHS1Jx6wjRAq2ie2RomHT07LRkzPrBrNLooWjXK5KZT2wNt3Hn0a0RbFpWsu9amwz/MobNyHEoUi4LWyWixyns1eWDoFnnbLuFW4d8

```
uvUPjxZ3d9EahgyHR+Q5TyRqFLY1L461HBd2bsmJX13d6922QVgfHlr5dnPsT22r
b0kZeAN/5u3W2s8258hWc3UXK68KvOV02UPI07acmwySH9+ZOIsptZ5kDWycp9pM
20Ekmk6k2SLPiK8hkjosULL8UW4N0IC/j4xyn8f/f6J666w3FPHOWN2r6lpSvvyh
E0JRxImIQzq18z1ozssQtus4qRDYFTkozmCwkI3aNJMSLDxb+KPBej1vrhupQEVh
isYBoLYte35fnSUnXZhFuJ4xDp1STLK/3hrKdZuKNIKmqwV0hK3dKcKeUo8Vsl+4
RESFgooy0709PhRsSayA/U0b3LwBPYAZaEQBLRNdpvE3jfoJEOR9pZjiGsJPINR
MQxE7bHOSHmPPKIAYUpPIaYzK+axsXzPVq+Vnq0ylfYLE4DzEJORsewiyMXPqrAY
RpmXotNyxEeTtsippqnZnEJpFRhONwVfJjPTFITQUQnnab6n6Yl8PYSZKzi5Ue1N
CAfWv800vXi4aXpk4MVnEvZSWUjigWlBj6xG4YnuKK70WibDZt9eZ9LpAkUI7c/1
3bGt8lzKnv7k2q2MKoXE0zULq0Vlorv3188WPFeeL4nVt6fxhZ14sMR/7HAZdbM
/h0NabAwZh+ZbKWuvVQqN/NyotB3burPHm5rZyHpfNKM1/N8EINpR2Q7GZbgz7C
EMyppMLBW06rQsUuv1gsPo9BhsVKNdJq8gnyqLS82tbLQIemNprXFVH+U0muhesh8
wMiQ7rGmELf6ZLDheEwXNcle+sSjLTyJJEHvi8Qc00UqRJCnfszbFc0LL9dbjFH0
h2xZCFU4n3zo0Ujj7segu0YswtiRbpQ2510uSYeDg7jWV+MGL55JILG29g==
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the Falcon-1024 post-quantum algorithm

Use the following public key to test the Falcon-1024 post-quantum algorithm.

### **fal1024pub.pem**

```
-----BEGIN PUBLIC KEY-----
MIIHDzAHBgUrzg8DCQOCBwIACHeueiJmb/6wEnWpDGYpdCq5JSXYDWCtdEZt7LU+
NoI0wkWPM6l7oVAp81vp9UZDJzEDrGoAi4u1Bd3oejSIpJwo0KBILcC1GMG69WXN
N2LhGxmSJS5A4QhivFb1fNkdBYQRfLYy8c0Tcm6kyOMkiXYh19PcglMffJWz18GBD
zJsYesDFLL0UUVWF+cxxXpaaktiCSwVaeoqBzcxVAg0w6x980Sma08mkYVIO/Csq
VASEiM9khqloWYUMpW4pHJN6VIQUkJR77JU6qiKoRNFoBaueLLbqs3Y/JXZIsoaK
EcqNrDK3+Hcuph14Q1ojbip8AGLSP++uBvUMu08K2D12mWLNgnadzViln00bIqCR
BrCwjVB4P1b06qlfzHkQPWLHskgiKArt/SHQVRlgSMl3qHoCq0c4U0ryY3ZC6rVu
4ISxnAh4sZ3K2l5YKmaeZZNICw4W04dBimJ4PS113JKqR5D+ic6W0wPVqLSFppGZ
4X+6wp0peq6F6mBhCzG0oGEDwIC0knWIRgaTBraIE55u1H0R6WaxrVieLCL7/mot
s87PefiowFzR0ge0gSh+fN3YWSFNggWwAE41A4b+uZkUYEQtsAUC6f1jUWioNhhWJ
ZLbexiu4DlIleolVlTmFohw6YEiio374LsayCtJ7rFB3sKMcAKBLUlhMzGkAUKOg
6mRdqGVJmReguxqGe2BLCGgB00DW3HCEIt/TDZsyM9n0Jogv2GGyA/pQTxu60rVT
jdXRcipfRuPI7AK1i0B5Cws4MY3iu+hytLSuRjH0GwVJ6HXZnAdF0lrA+48Np/a0
0MbJ9R+JDEX8rsyG5f4GJI1VNjDSCkKdQIKV2BW4A5hARXySoZ0aCEEUqSjofDaQ
e7EShaorYvltZ+e2DbwcQduDeE3Un3MsXWVCDKulhkt1VXz9cfZcjUwHEmhAKGL
VqEkyLuLcDb6isW00zu89uTlpfAHGwoQj+cLdJw15gDofRNkm2UDDOJJ8HQ3sldd
MfpjJiffwIWFbnCCoeoZXraAhauYB8Jf50DtDbIIgAkp0cZGQE4WSU2nty3uWyY
Q63CwJc0Bg9gkWWAF0IUibDb6qGZL40c5YnAJZh95QVyK5Q5oCF5GsMRKWyp+PLu
X6ebUAQXzehXHSFda0QhYSG8mDTi2Yu6/pEDxCdiPOKMo1YTCraWmTps5tk/HUt4
UqVWsLl5YvYSvQeKdZLHq8GcdnQwEZ4hn7xzuEMTJIFg2yWm5vF49e1p6+t4b7gJ
tx6EuBBNmbD6Kwm+8dk5PGzauaSAphqdgK/M1NRhCmyPwb6ngCLXCd5eRqcahk/Q
PBR0w5h6rAClxZ1ZbjzmCmWaQL9pIwo7gMhxkhWC91GuenbW1ZZR3UG98nVlabdo
OSJrZqGFbv0+kJAqHD2Z04BnRuJIHg1ZxIYabn7AQp2dYxZmoTQL2a46hH0BZ1+9
q/QPUHurVjxqjwmWRzAK0fJ2yUJRcFVUMHIqsUqN8YtTZkdA0fglyI9wnwajs6HS
8liWjvM/pve/1SazucTcn4jBi3tRLgMeI6GNaIKpBP7CbkiqthRV8qvgvhyCuFJN
BEMyBlbSjZxkhImctVWDbXp62CL7YImLpC+FrhT/s3RNsYStR3TGC0bcL0d70lp2
```

```
egNLgAB70iXf+FvgEESoHpYLFoQB/sr6i84cCHkcuzLFE2cMR+BTURHql8fLCq0s
e5FKFpQB8BXch8C0UULFbYMQEDrHJ8kRq0FCBBfRF2y0Pu2Z8K6dqaCaNmsn53rk
2vCIBrg7qj5hC005vNWUacMwkjWunrb4YPIIdKLSr7SmfYeGalDksAnVJ2ktjjq6a
yNuU15c7QdzzRtbl7mwUs0NA6UQ0njfpTqrKBIyMuzIT6GodYCutn7gqYesXFKW9
0IBlNF0KuAzoerBITsmXjvmEQsvTUjjjaQ5+HSLzu32XPJ79o8kJWp4Bwah7+sDGj
G0qG06LGr41QPuLGF+tlDsDdqHBEj64Qlo1GTREpCm5o9xIVZVaAtFb+o/xlosm
HhhQFsVagUm2AboREDDQ5E8tcdVYm7EUCFPwSoigMeBV85ZdSjYObpN2DXUePKxq
pFyDc1oQSN0kK0BIIIRBpwKLLxQ6iRVKtzjoADiwl6RujTGysQVKHgTP5DRvByA
hJFPr2bijNG5LJ1DZWZHC0ILII5HPH1juuqlg6eLJLpp8Gs0juKI6nowAJk0HNq8N
Nrh4QdW07uLHtKdml7hzhePJ0JDK2ZtTYCYYSXTfkxw+tWhVVNZfkQJqPVOfbTMI
KGe5EGa6LhzB0Xjjogbw+g0HnIJnnjuEQdZ7dC6bQWygD07oxhKzAXFC0hiw0JOX
08X3gmRn0785cQHDVIs0LOd1c2HqYZJeYA/KP6s1BxeOjPM=
-----END PUBLIC KEY-----
```

## Sample private key to test the Falcon-1024 post-quantum algorithm

Use the following private key to test the Falcon-1024 post-quantum algorithm.

### **fal1024priv.pem**

```
-----BEGIN PRIVATE KEY-----
MIIQIEgIBADAHBgUrzg8DCQSCEAJaF3vveB/ow9ADwsFBzohgF/nAf58HPfCIB088
H4B7ELogg+Lay9Kjx0+8If+/4MYA+F4PPA4AYCD5wPdC94YQE8AfvAwL4gB7rZQj
8YAfj6H4Ah/4W+G//vA+bwhg+DngDELXP+/8H/aEDvx+/0oNCJ0H/j8P3w+CEPg
d9/gghF34hg8HYUhaPxB9H8n+a/3gP//9A/AJ0YxhALw0d+HQRAH8As/D74jgFwI
C5L/ofB+UAQi6AIVdJ4owBEEQ+a+QYde8Hx0AD/owD8QH+C/zwSA+IIeCB8X0k58
geiAHXx67znwAIH3++CEPvgDoIQ8EP5BiD8nwfD4W/BB8fAg/0AhCAIvydEIzDB+
D3xj97gQ72H3g/D3wRg375PA+T3xcIIIf+F4A/gMMhABIX//D0QB/CH40h4PXCd
EQhChIH2088EIS89oXxd7/vjE5zwsD+XgPgGIW//2IPvAFwGwDKP4DcAL/xDH8vx
jFz/+k33ndl77QPD2EIPh4J0gBsvQcD7/u++DQ/f+fIQj/74PhD/+hf/8JfhIAQ
Q/B0of/ImgBA1/vve+MIfhClpC/50Ix60XwA74TwPC+MpvCAMY+C+IYfLET5Bd+D
vfAD0HAC+Mog8D7Ae8IH5A8CD+tA/4YAZ8EASASAwf9GH3Qj8AQeBCH/QhKEHxB/
sYxeHkQv790Qeh2EhPe+XegZAH/h9GAIvBCLwPB8MHgjD0vRAEQfhg8Xwf6AIWwg
IEfwg6EIA+L7IBCv4wkALoUE7/QeBCMR0c6MX/B8AYfB6P/uB8IfgCEIYRAB7vw
BJ7wyD+bPyCH3o+kF8BQ8CMHhdDz3Sj0IoA9KL4R72Evh7/wQhCEAAuf//4f8F0G
uABoYw/1v3wjH34hcF4QqGURNhF//BD/33v/4AQRALgvgB0XAB6MQCbMYXhDAI
IviEP5A+DwIyA+YYegIIAgB6fw/++MJB++AAfCF8Y+g/z+y7CAHBB8fwedD0ARDF
3wug/7oP8GAATm+QP/fKHpheCUQAAQqVGFvnwBL0JAd+D4gjIH5C9/8JRFJvRhD
EIfeA/wffDH8PfdJ8PwDB4Gf78Dlv+Kpv+BAAAU9/34vgCAnhjAMId76IHwgP0Q0
f8X4+gX4fFKMHfi+MQAd6IgwCMDoyBMf4f/EL4Qh/8Pxx2D39f+MHxf7/e9gCcP
/hCIIBBAAyt+IIgef97/ACKEHwCCL4QE6T4vdFvo+d6IG+h58P+kEARgg9vv+fCD
hwIKPfvhGIrKCYw+cF/4xcB7oe/Aef/F9nYAgF8QvG6EAfiv3/vAAEHidHwXvgC
YPRgefvdmET/ehH8PxFcAnwAH8gPg98Qek6AI/d2IQS76EgSg94IPACHgu/B4JSg
DsnheDoIgiAH4gA775f+0AW/D/3vi98fjhRwY/fAMRf6D/4gg74HwjKQHvb8Afv
7GH/BAID3CAD4IA/IAHSgAEIPl8AXP8EEA+hEP30cB7nwi8DgN+Fr/QgCAPB98n
ffLwfPYKH3hC935g/LrvG/CEAUbh7gjaD0AAjEXnh/6AABD2D/gFL8HgBzzheE/8
g0C6L4PgEEBAGAT/h978QPA6DwhChsBABIT3PkChxBAN7wBh+Hvv37ohFCEexdF
8o9g6L/+gB8HSf4D4wi8QXyAF4XtcEL+gDJzYggCUPwj/7ws9CAQ9hF4Q++AQZBe
8EAA8CEclRvhywTnCu4r9/33/fHs/vUPEevuJRLyFffye04EHCr4E+/k+QbpG+rd
```

wjz6HfooAUXSQ08fAzgXJOIW/Bgi+SEn+Br5FxiC603bAfczFxBt8r0rLy3RF/Dv  
A+wAAtz70u3RJAER3ykp8/QRLf02C+8R6toqwgUd8hw4C8zT2TsV1wnp/u0UGgQS  
BgMkHhhGJufm6wkwHBDs8wcbFPYfCu4H8wfr79sczgy0DwQs6/jqJAjy90LmLuo0  
Duq8Ddf6Q31F8z46fsMGwIICSYJCFQNCpv496rc2ht5APUG9BgAHRL34wTu9fPc  
NANLdAndGdf7IxLSHgP3DAn+ARMPEz3RKsMg8xPOIe4DAPb/9PXcJADY9ADc++UE  
CQn+LC/qzOzpEuDzEg/8CP39JgsIDEjzyBUL//v3B+7p/tDwB0cNDu8c/PsBDtgh  
EPHxJf4aCfffiEgBx9iMr0g4X8gvoHPsiBQQfBAE08dguEt002gb6F/cs2/H0BQ7c  
6P8u/fvMDuEaG+UrDw/nBPwJzdX59fsAGx8G8xIY6i3b49Imzu3i8/IK7QDN9iAN  
9P728QMC5es07voQ2/3u9+r4IxUN7Q261gbw9gcmJ03h8fH06xH31Rf6IO7v4xEx  
3/Yj5v/3FfgC5wr6Df8S4BcVz0f+FAfwDhKx1RDcKev2LhDfDfAGygf7+xHD/QL5  
6iL04+HtBCYiNw78LgPwFe/x/QP7/QX3+Bj2Ez4a4drWaiP+gj3300tIOsC+t8H  
/AH9E/78CNDVHB8MAd0P9ukhIg0KdGQEGr7u++LnEc0T6xH0G/QI/vr99wwPGOL/  
9wo9+egC9wzx+uD+FAgX/A4HHvrl1/MBLAWTMuWZ3foOKRQT4x8E99gm3fv+GAWJ  
7CXvEwP07C/LJP7xECC92BTr9Aj3+/YA5THW/M3yCwFz50bkET0kHQ0Y6CTZAC4S  
FSXl+PD90vr49x8SHQw9AsHR0cS9gP+K/0HEQHd/9/mGe7iRNftL+v+69IULSva  
GirN3BnX6QrrCOzP6RD2HP0MBBPPhd35CxmIAg8DBve8wFNGhr0GfsD/N7ouvYT  
IiT3FAQN/Ob3LB3MhtsZIBvj/9wWCfyiDvIYM9XbBwHnANcM8t74BfvsLhgf7yYA  
7P8P3QoF9xAt90AoFszq/hcR00386QMP3+8P6wcP8fIbDyAH4e7yBNsK3eAD+v4V  
9f3WDvft+ycKGFcm/ukw/OA0FPYbMBUN50QK8NcOExr98fY0Dv8MDeLl+gwU+S3t  
4g/5+yYbAdP1HQUBfGbpCgw270XRAzb+FCL0+gPv/8y7EvnqDPka+Br0/gL7Nd4B  
4ufUCRnnFjAMHf8EFCd5AuYA9ev+ChEueiJmb/6wEnWpDGYpdCq5JSXYDWCtdEZt  
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-----END PRIVATE KEY-----
```

## SLH-DSA-SHA2-128f-ipd (1.3.9999.6.4.13)

Use the following CSR and keys to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm with the 1.3.9999.6.4.13 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm](#)

## Sample CSR to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm.

### sp128fcsr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----

```

### Sample public key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm.

#### sp128fpub.pem

```

-----BEGIN PUBLIC KEY-----
MC0wCAYGK84PBgQNAyEADkCD2dkYjz fAsSh9DFz1TTzQ6VuYfmm9yNnMwaDD3ps=
-----END PUBLIC KEY-----

```

### Sample private key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA256-128f-simple post-quantum algorithm.

#### sp128fpriv.pem

```

-----BEGIN PRIVATE KEY-----
MG8CAQAwCAYGK84PBgQNBGBUjZGtLITEBX3TM64mBet0ph0rMuor/OAwkVh+/aYu
MQ5Ag9nZGI83wLEofQxc9U0800lbnH5pvcjZzMGgw96bDkCD2dkYjz fAsSh9DFz1
TTzQ6VuYfmm9yNnMwaDD3ps=
-----END PRIVATE KEY-----

```

## SLH-DSA-SHA2-128s-ipd (1.3.9999.6.4.16)

Use the following CSR and keys to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm with the 1.3.9999.6.4.16 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm](#)

## Sample CSR to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm.

### sp128scsr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----

```

### Sample public key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm.

#### sp128spub.pem

```

-----BEGIN PUBLIC KEY-----
MC0wCAYGK84PBgQQAyEAwjHSoqo63jA72arEqHu60gap6yp7sa/d20DvIIHmZug=
-----END PUBLIC KEY-----

```

### Sample private key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-128s-simple post-quantum algorithm.

#### sp128spriv.pem

```

-----BEGIN PRIVATE KEY-----

```

```
MG8CAQAwCAYGK84PBgQQBGAaYwScEF5RwmautTQ3MxjW++ezabe7LXPVsHaCdWY
hsIx0qKq0t4w09mqxKh7utIGesqe7Gv3djg7yCB5mbowjHSoqo63jA72arEqHu6
0gap6yp7sa/d20DvIIHmZug=
-----END PRIVATE KEY-----
```

## SLH-DSA-SHA2-192f-ipd (1.3.9999.6.5.10)

Use the following CSR and keys to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm with the 1.3.9999.6.5.10 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm](#)

## Sample CSR to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm.

### sp192fcsr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm.

**sp192fpub.pem**

```
-----BEGIN PUBLIC KEY-----
MD0wCAYGK84PBgUKAzEAKYNAQ2b5QPWsvVjEdJ1EaL+i6gYwod9qWSrIIPwn/bC
jGyLq6T2Aqwm+AFt+UtA
-----END PUBLIC KEY-----
```

### Sample private key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-192f-simple post-quantum algorithm.

**sp192fpriv.pem**

```
-----BEGIN PRIVATE KEY-----
MIGgAgEAMAgGBivODwYFCgSBkHHzWUKhenPqr fHDz/J8duR0p0h5mPueQ0NyUtpF
T41ZqgTLgbnwdDq5hJEpkq+2CmDQENm+UD1rFlb4xHSdRgi/ouoGMKHfalkqyCD
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8J/2woxs-i6uk9gKsJvgBbflLQA==
-----END PRIVATE KEY-----
```

### SLH-DSA-SHA2-192s-ipd (1.3.9999.6.5.12)

Use the following CSR and keys to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm with the 1.3.9999.6.5.12 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm](#)

### Sample CSR to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm.

**sp192scsr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
MII/+jCBhgIBADBCMQswCQYDVQQGEwJDQTEQMA4GA1UECXMHRW50cnVzdDEhMB8G
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```

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-----END CERTIFICATE REQUEST-----

```

### Sample public key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm.

#### sp192spub.pem

```

-----BEGIN PUBLIC KEY-----
MD0wCAYGK84PBgUMAZEA+irBFrQTtcqWTH1biT4hxl8xCilPNJhFRFQHwuOd1Dt+
6h+Zv8lRa0Gcgtnb1K7u
-----END PUBLIC KEY-----

```

### Sample private key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-192s-simple post-quantum algorithm.

#### sp192spriv.pem

```

-----BEGIN PRIVATE KEY-----
MIGAgEAMAgBiv0DwYFDASBkC9UTprKv3nHRWEiqmFtyyQg+C3ufj/LI9vySgLU
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ndQ7fuofmb/JUWtBnILZ29Su7g==
-----END PRIVATE KEY-----

```

## SLH-DSA-SHA2-256f-ipd (1.3.9999.6.6.10)

Use the following CSR and keys to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm with the 1.3.9999.6.6.10 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm](#)

## Sample CSR to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm.

### sp256fcsr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----

```

### Sample public key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm.

#### sp256fpub.pem

```

-----BEGIN PUBLIC KEY-----
ME0wCAYGK84PBgYKA0EAj05juJCOzaD0vkWxSu7ag7+mWrWUGwywdz1m/fSmfJwr
xRjcpz349JvFF/3efdwVHpUMvUpLhpn3FBU+sPLz9g==
-----END PUBLIC KEY-----

```

### Sample private key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm.

#### sp256fpriv.pem

```

-----BEGIN PRIVATE KEY-----
MIHQAgEAMAgGBiv0DwYGCgSBw05cCXlnr015+nIth9m6uKQH10kRUWwAPcwn4sH2
wsBduM0KZ1iZR9qClrLATqGFoTEq0Ej22ILn+//rZKzEoy00jm04kI7NoM6+RbFK
7tqDv6ZatZQbDLB3Pwb99KZ8nCvFGNynPj0m8UX/d593BUelQy9SkuGmfCUFT6w
8vP2j05juJCOzaD0vkWxSu7ag7+mWrWUGwywdz1m/fSmfJwrXRjcpz349JvFF/3e
fdwVHpUMvUpLhpn3FBU+sPLz9g==
-----END PRIVATE KEY-----

```

## SLH-DSA-SHA2-256s-ipd (1.3.9999.6.6.12)

Use the following CSR and keys to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm with the 1.3.9999.6.6.12 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm](#)

## Sample CSR to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm.

### sp256scsr.pem

```
-----BEGIN CERTIFICATE REQUEST-----
MIJ1CjCBlgIBADBCMqswCQYDVQQGEwJDQTEQMA4GA1UECXMHRW50cnVzdDEhMB8G
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ydFeMK1JgrAtrKHq0LE=
-----END CERTIFICATE REQUEST-----
```

### Sample public key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm.

#### sp256spub.pem

```
-----BEGIN PUBLIC KEY-----
ME0wCAYGK84PBgYMA0EAPEQFo8tfYEYYTke08AvLYQdkbWhQV/cCuTJ4FaEt7ssE
EQ558kj7cIZVwqAhH2nDX5oLT1S33RhuknoeN2ojA==
-----END PUBLIC KEY-----
```

### Sample private key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-256s-simple post-quantum algorithm.

#### sp256spriv.pem

```
-----BEGIN PRIVATE KEY-----
MIHQAgEAMAgBiv0DwYGDASBwP4lU4Saf09duWzWfzVD0/+0ALoS7gA+dJqTCGB9
Tj+fQcxBNF0evMG5ExT43uqz11anvYkHCN5jCL+UrvCVaM8RAWjy19gRhh0QQ7w
C+VhB2RtaFBX9wK5MngVoS3uywQRDnnyS0rtwhlXCoCEfacNfmiVPVLfdGG6Seh4
3aimPEQFo8tfYEYYTke08AvLYQdkbWhQV/cCuTJ4FaEt7ssEEQ558kj7cIZVwqA
hH2nDX5oLT1S33RhuknoeN2ojA==
-----END PRIVATE KEY-----
```

## Explicit composite algorithms

See below sample requests for the supported explicit composite algorithms.

- [Dilithium3-ECDSA-P256-SHA256 \(2.16.840.1.114027.80.5.1.2\)](#)
- [Dilithium3-RSA3072-PKCS15-SHA256 \(2.16.840.1.114027.80.5.1.1\)](#)
- [Dilithium5-ECDSA-P384-SHA384 \(2.16.840.1.114027.80.5.1.5\)](#)
- [Falcon512-ECDSA-P256-SHA256 \(2.16.840.1.114027.80.5.1.8\)](#)

### Dilithium3-ECDSA-P256-SHA256 (2.16.840.1.114027.80.5.1.2)

Use the following CSR and keys to test the id-Dilithium3-ECDSA-P256-SHA256 explicit composite algorithm with the 2.16.840.1.114027.80.5.1.2 object identifier (OID).

- [Sample CSR to test the id-Dilithium3-ECDSA-P256-SHA256 composite algorithm](#)
- [Sample public key to test the id-Dilithium3-ECDSA-P256-SHA256 post-quantum algorithm](#)
- [Sample private key to test the id-Dilithium3-ECDSA-P256-SHA256 post-quantum algorithm](#)

### Sample CSR to test the id-Dilithium3-ECDSA-P256-SHA256 composite algorithm

Use the following CSR to test the id-Dilithium3-ECDSA-P256-SHA256 explicit composite algorithm.

#### **dil3ec256csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
MIIIV2zCCCHUCAQAwQTElMAkGA1UEBhMCQ0ExEDAOBgNVBAsTB0VudHJ1c3QxIDAe
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AgOCCBgAMIIEzCCB7QdQYLKwYBBAECggsHBgUDggehAE33J5kwbwtK03uLAESu
QqsIDJ7TFNu7GUM6IPo2F03e9rD46AcGCZqbR+92Hx3NNny8K6mZu7oo8IrRueWx
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```

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zuoFKZCYvdEKDzhEWGq3Mjzf4/L8DBQYNkltfJnB5QAAAAAAAAAAAAAAAAAUL
ERgeKANJADBGaiEA5KPDpZ2sHCMfQ5vzcJd9T5MNCqt1TLMLfsx8xDLzz30CIQCo
4Esfz5y6Pf+LkoBOAbHj5fSI7PF8zk7WGpdw/00xjQ==
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the id-Dilithium3-ECDSA-P256-SHA256 post-quantum algorithm

Use the following public key to test the id-Dilithium3-ECDSA-P256-SHA256 explicit composite algorithm.

### dil3ec256pub.pem

```
-----BEGIN PUBLIC KEY-----
MIIIKzANBgtghkgBhvprUAUBAgOCCBgAMIIIEzCCB7QwDQYLKwYBBAECggsHBgUD
```

```
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iYsRbF6eemhf0rVsvyXgMDma0Q/a0Hvj1wvy23hK2+Y99Az5q3Q1SQUgmDOP2agA
M58wU0Rvy4IfoLTkn/YETKAvCHtAiXQm6BJGt9WHyr56NIV99QrpywBcd+WIWIP2
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dSDX0eCo/bzURHK1WppqXdDMFblnmzM4YimJ7hCecQ==
-----END PUBLIC KEY-----
```

## Sample private key to test the id-Dilithium3-ECDSA-P256-SHA256 post-quantum algorithm

Use the following private key to test the id-Dilithium3-ECDSA-P256-SHA256 explicit composite algorithm.

**dil3ec256priv.pem**

```
-----BEGIN PRIVATE KEY-----
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```



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-----END PRIVATE KEY-----

```

## Dilithium3-RSA3072-PKCS15-SHA256 (2.16.840.1.114027.80.5.1.1)

Use the following CSR and keys to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm with the 2.16.840.1.114027.80.5.1.1 object identifier (OID).

- [Sample CSR to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm](#)
- [Sample public key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm](#)
- [Sample private key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm](#)

### Sample CSR to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm

Use the following CSR to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm.

#### dil3rsacsr.pem

```

-----BEGIN CERTIFICATE REQUEST-----
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```

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-----END CERTIFICATE REQUEST-----
```

### Sample public key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm

Use the following public key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm.

#### dil3rsapub.pem

```
-----BEGIN PUBLIC KEY-----
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noZdut1o4/qY5Y3iREZ1xqJeirSuLaweG5KWC1zyvx+vwzHvQIDAQAB
-----END PUBLIC KEY-----
```

## Sample private key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm

Use the following private key to test the id-Dilithium3-RSA-PKCS15-SHA256 explicit composite algorithm.

### dil3rsapriv.pem

```
-----BEGIN PRIVATE KEY-----
MIICnGIBADANBgtgkghkghvprUAUBAQSCHCAwghwcMIIXVgIBADANBgsrBgEEAQK
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```

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-----END PRIVATE KEY-----
```

## Dilithium5-ECDSA-P384-SHA384 (2.16.840.1.114027.80.5.1.5)

Use the following CSR and keys to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm with the 2.16.840.1.114027.80.5.1.5 object identifier (OID).

- [Sample CSR to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm](#)
- [Sample public key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm](#)
- [Sample private key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm](#)

## Sample CSR to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm

Use the following CSR to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm.

**dil3ec384csr.pem**

```
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1WZrVLRQLRgVggvdm4PAIU4EBBDCzwa1dnUmNQBO7YACv0Tt3rWSqx43PNBjGUqF  
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Lvp8QsGIwid/tonegRTNghauYauL6FLhXIDCNBrejWHWG0gP28GZaQMqKiRJ0kK  
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z0jTJg9jtHghlV57MIpJI14othp+GbhicDTVvCHfBEmsnc2b2M4evjCzwa7ZcQ+V  
mvEMvtwa5fmxqxVrjHMzVXF2jIlcfXyY9RAYuSJ+ykdbefzce9K3xjK308n1y5Pd  
QdqP/mPDyUIeXOGT2mr+ShtUYOwlIyL7rLr90wqFdIjZaumHBjNAY7d9sXburng0  
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EoA8pQ0ELATLJWCxJee7fGSJX1qpBYuoyzCUnEfaghQYyVqvDE9qDzk0eGlmHQ  
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```
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FRsjKzM6QANnADBkAjBG0cB0heMQs1waJAq9/qqjsER2dXKwLT/ufpMR5gFio2Yr
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YJTxBcV0RD02h2rbU6DQg==
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm

Use the following public key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm.

### dil3ec384pub.pem

```
-----BEGIN PUBLIC KEY-----
MIIKyDANBgtgthkgBhvrUUAUBBQOCCrUAMIKsDCCCjQwDQYLKwYBBAECggsHCACd
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lFxWib5z4E7/xTSSL4nAuS7dHvDDUt30e/ot1Pme/GPAU2PcNSu4iitvirqxb1i
+z520I1I4L3oUJ6rJTzPaTxPw+LD83MmhsjzT7AHfuUEvCY2i/gL1cxyScWie/9j
ZD/70JefdSfgN+LJ4CYj0HFtIMJcCtuzQt7xxYDzMGUpPHRMgIQtoRdEjeTYZzqd
psnYJrZm65Bf0jluxpiBHENPrW5iGj+lFjbGv7ne7X5FuFIRkF+yeYalceTaJ5ii
Gg9f5QyliKeZH0YWiSMYSYHrk6NWqyqddPRsiWS/+C9W2c+8m0gPAeMIqeizc0CHF
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vNLC90i31ITbZwmPSntJh3q2A90X7e95UbN7boJ/jTaeUsZLC40EsdduDjUbnS1v
R1o0NMBGUqmSuyyg6uv/nmhNwgikIaBe3XuEZtBU58s4wEVESrx1jRc/W5g0Q3qT
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WVvk+x4RXrnSnjMLncbd7tB0xLcq993mtWwFv6/V446zqNU1te1IosCYd7fWmRx9
Bt+MgHXFmKjQ/TsTXH+8M/BXOVTJual4MTn2meCZKpGP3g+nF8VKiR8w/MHyupCn
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hIBH5Wm37SA0858k1DgIpPRTBt6WT7lt76c0NLwCIZEDCz5s/uIbRqIv6WvUR1Jo
CD5UjMKSihlnvLEIJCLAYavNjMQKBiWuUZUdez6Z/WyDAXY60FbMcb0SpD23ZGs
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HU6+w8UN/fl5/iKdXmOwoenFtSx3T1zSic1h80m0ztcaR6fxKagKQwNzV+IuTW8D
sE04K0c4+P90vWoBB9HLkuyAUyXo/23/fEQCDJ4s2f1hrqt/72MGVbtkRnrGcW0S
epqYlrTuDhHULoZ+LZdTTHN5sMvfxENS09KVDf0wtLTWdQY5XScgAPxrzppu1xCS
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LJH/aPPF2YmAArsWpan2BdN0PeW80LISE8qQUzFoMawrmjbnrORA95Isrghnyr3
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VupB0P8hmhSVoc0Vdwp6kgExN+YZDLqsx0Try6RGarsbkdxYwNhd2AkGN60xprIZ
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44JjpL4vYdHXKSqVQ5FNjBuFNTqBLFGwF0TmkB8yGF4s/mL8wTFUqaHZg0IdDFqU
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```
1GXlQQcbr0iS1V17WjYEkdN72mfN0ENNRmhrFVqnCW10hG+ceUHE4RrjvfTSLH0
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48p7on8grDU7gvwUru6emp/RqZktXL5K1mBQTpa7fvqc29xE4mB2436krODLH+ke
Dpec36q7UU+DBPZYXsGPeeq0W74s/W0uBgqppsMpT3xgVoiGwJ2aKes3VjOqLPWJ
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X6SvK10dsVXnByNpyzN+7sxWXShMXAkYjXmbwa4kJWstGsSar+MZrk6FCT1t0nEP
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9dg4Uvm9GAX75pwjR8PZF8gtfW75EPqjejur0lsVP4mZ4CAwLFbtAvuES129tr
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tmDYsKMz7eJMph9PekIU57/JUFViIjyW46DypbB/oi+THj+UY14UuTZXhixiYAT
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g4tMwyxX+nnUPAdH0h7jI2Yr+oM3ZYWUX99QMg==
-----END PUBLIC KEY-----
```

## Sample private key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm

Use the following private key to test the id-Dilithium5-ECDSA-P384-SHA384 explicit composite algorithm.

### dil3ec384priv.pem

```
-----BEGIN PRIVATE KEY-----
MIIdpAIBADANBgtghkgBhvprUAUBBQSCHY4wgh2KMIIIdNgIBADANBgsrBgEEAQC
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BIZDkjASJ3JMoESioEAikWgBNyoRSIxkmEkJOQFTBQCqHQLtitzJEC5BFBFUFmDA
poDBQLABIZHiFnAcBixhRImAMJJguCgQqEADMwZhlBGUKArIkkQKAmEBBAQAEjAj
BWoTFFGTRkURwQGrKEHcMkgMJ0yREhIiGGkRNAEIOYoUo5EGETABkpHEpgCcNGkQ
NZAKgWDRMGUKE0iMwAFbJCHUFiUjw4hJNiZhtiWMJAAZKJaiQUySSEQCQYBCpEQC
MwQbFSBjsETkRExBAmUEIUHBEpADSGkaIFARKQhBQJITFZGDMGiUhEwZsIELyA0g
l2ADGC7DAGUKSYgCB3KDOITrkk1cQJKgQBHBMpEig2QKwHGktoUhtUTQLECEJgyY
MgEaAYQLkVAACFETADBaAoLgAGbAAEVQImkbmYUDsESJFoZcFEokszHBsiTcQALE
BIgJSQgUSQzawmMtLBDBA6kNmpJwiESRU6LogAANAoBgoCgtCVKOGQBBYiCNi4K
BW2IEIjiImYmp3DLliELxAWiEgIjFAFDQioMBYZKAIxaJiCISOqkREFhNlCBNm1M
qHHblCVgQLGUFhJLQEzJBFHISAWaBkJYkJESF0UasQwBNW0LFAEBICLEMGIgrGqU
```

JjDkCCaSSAoTB1EIiUXAtJBKtGzRsEDgKIqkRmQSNyOTF4GSSGBiQGHZBEkBBQia  
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RhAJKSGgCYxJQk1BlgGBSIRCGEgYEwphMoLbQkShKAiTFFIIikTEE4JFmnIBoII  
o0hDFEoTwoUGBU3bQg2RwincAkzkFiXkCJCiBmShQkiTKGxYsihbmGgTOBBbnAB  
EkXMkkkbcQEaJi1jQCAMEGxKMOaKRHGYwmgSMVALASLQwFCLMkzKRFiFiwjRG0D  
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Ak6jBowQxgkLGCQLNUOEOEYMHmCRgoADMWIBJHDbJDJLgi1kwmGUILAUkHEjhUgK  
Ay0LgWwIiWSEMGaBtNAImBGJxjESiEiYBC0jkoyQMhHQpMkcuCWLpASDyGhJtCQT  
SA0ING6ZyIELNEbSNA6EpGCQwgCjhk2JEGVAmIggJJCaRQEGat20bI1GSBCYJACAT  
QkShIooRJApbBkWBBohaJBJSsAyKQg0YF2kYoIwRkSCBtmSAREXaBC2YAibrMEhL  
OA5awklZGG0kMCqJmEiEJDJgBEJTNcQkBDLjBEGAuAHDiAzJCCkQsIxLhoVTRkAZ  
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SN4dZqsEZIawrs0Kst8v29qa2yTMwyZSgEmZ0QSQxho8wzUyaR+kZRi0x00j+DDp  
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hyXhrfwZU+EBTOxH6Z1mcamLM/Qp5rj17NgaRtwZ09IFCFRKRkZYCK708LcXJ7pd  
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fVJ3GXsHbG5bmqcyYur9ILBWHfBTBKB5+Bw5WM5mQGqvdTyXmyi9haZHwMAiI78  
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YYtKU5L0StsuJeVqS4FXjxcerDMMxuzY2Q0WJAfzffg2IyVK3cbmfzSVzJEHa64G  
Z36gm0jEmCPEUsZfUst0zqXe95usr06hJiFMqDQ0pLE+MpSf+0bcciy8aPlc/HIg  
gF8gGkxW1Nu8r0jkVeuJBU8AhwzAh6ZON5R80v901Bp7yqWDcdJrJTKmNZgibgBQ  
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05j3KQ7+so59zIN2Qw1rgenTHz5k8Efz7etc52Q+NooeB/1IUjzaBXteJ4hN8U7s  
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dsMomtUT8xANLbtKgYa7MKXPawL3zLzq66vuuFa660qlgy9Vh550kXsPRXaQ0TX/  
sK/eTS67pnr1nZfQ8Y5qPPvb+7Fnq+2b3cA7Wy5K+3Ve7/68ioX5B2+0K/JsvtYg  
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```
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-----END PRIVATE KEY-----
```

## Falcon512-ECDSA-P256-SHA256 (2.16.840.1.114027.80.5.1.8)

Use the following CSR and keys to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm with the 2.16.840.1.114027.80.5.1.8 object identifier (OID).

- [Sample CSR to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm](#)
- [Sample public key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm](#)
- [Sample private key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm](#)

## Sample CSR to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm

Use the following CSR to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm.

### **fal512ec256csr.pem**

```
-----BEGIN CERTIFICATE REQUEST-----
MIIHYDCCBE8CAQAwQDELMAkGA1UEBhMCQ0ExEDAOBgNVBAsTB0VudHJ1c3QxHzAd
BgNVBAMTFkZhbGNvbjUxMkVudDI1NkVvZlVzZXIwggQGMA0GC2CGSAGG+mtQBQEI
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w4+vPch4GMTuLRMeULMCx1Vo1m8=
-----END CERTIFICATE REQUEST-----
```

## Sample public key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm

Use the following public key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm.

### **fal512ec256pub.pem**

```
-----BEGIN PUBLIC KEY-----
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SM49AwEHA0IABGJ8AKEahCurY45fqe7NUKW1ERY608v6si/LdTSODJ3pf3jXLMei
rmyHYPIlDMRtSINSKri89Q4WBYUs2DRf0UE=
-----END PUBLIC KEY-----
```

## Sample private key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm

Use the following private key to test the id-Falcon512-ECDSA-P256-SHA256 explicit composite algorithm.

### **fal512ec256priv.pem**


```
-----BEGIN PRIVATE KEY-----
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-----END PRIVATE KEY-----

## 18 Obtaining support

See below for getting support on your purchased products.

- [Contacting Entrust Certificate Services support](#)
- [Obtaining TrustedCare resources](#)

 To contact the Entrust sales department, fill in the form at <https://www.entrust.com/contact/sales>

### Contacting Entrust Certificate Services support

To contact Entrust Certificate Services support, email [ECS.Support@Entrust.com](mailto:ECS.Support@Entrust.com) or call the following phone numbers.

- North America: 1-866-267-9297
- Outside North America: 1-613-270-2680
- Toll-free support numbers for Silver & Gold customers outside of North America: <https://www.entrust.com/knowledgebase/ssl/contact-silver-gold-support-numbers>

As explained in the following document, the availability of the support team depends on your service plan: Silver vs. Platinum.

<https://www.entrust.com/-/media/documentation/licensingandagreements/entrust-certificate-solutions-hosted-support-schedule-lg.pdf>

### Obtaining TrustedCare resources

Entrust provides a comprehensive service and support program through the <https://trustedcare.entrust.com> online portal. This portal allows you to:

- Download software product updates for components you run on your premises or in your cloud.
- Browse product documentation, frequently asked questions, or technical bulletins.
- Open support cases.
- Check on the status of existing cases.