



ENTRUST

Entrust PKIaaS

Customer Guide

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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

Acronym	Definition
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

Acronym	Definition
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	Online Certificate Status Protocol
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

Acronym	Definition
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
1.9	April 2025	Post-quantum Lab experimental region	Add support for the NIST ML-DSA PQC algorithms and deprecate the old Dilithium algorithms
1.8	Dec 2024	Getting Certificate Enrollment Gateway settings for MDM	Improve the URL format reference
1.7	Oct 2024	Revoking and removing certificates	New section
		RDN Format	Describe the automated renewal configuration
		RDN Variables	Describe the automated renewal configuration
		User types with PKIaaS roles	Add note on Requester user type limitations
1.6	June 2024	Azure requirements for the PKIaaS Virtual Machine	New section
		Configuring MDM automation in Ivanti Neurons MDM	Update the configuration steps to reflect the changes from Ivanti MobileIron to Ivanti Neurons
1.5	February 2024	Automating WSTEP with an Entrust-hosted Enrollment Gateway	New section
1.4	October 2023	Role-Based Access Control	New role-based access control feature
		Post-quantum Lab experimental region	New region to test PQ key types
		Multiuse certificate profiles	New certificate profiles

Issue	Date	Section	Changes
1.3	May 2023	Certification Authority instantiation	Remove the region limitation per ECS account
		Getting the Intune Service URL Getting Certificate Enrollment Gateway settings for MDM	Add Intune and MDM URLs for the US and EU regions
		Subscriber certificate profiles	Update the default validity from 3 to 1 year for most subscriber certificate profiles
		Migrating a customer-hosted Enrollment Gateway to Entrust-hosted	Add this new section
1.2	March 2023	Automating Intune enrollment with an Entrust-hosted Enrollment Gateway Automating MDM enrollment with an Entrust-hosted Enrollment Gateway Integrating third-party tools with the Entrust CA Gateway API Azure Firewall Intermediate CA certificate profile	Add these new sections
1.1	November 2022	TLS Proxy CA certificate profile	Add this new feature
		MDMWS certificate profiles	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	https://www.entrust.com/digital-security/certificate-solutions/products/pki/managed-services/pki-as-a-service
PKIaaS Terms and Conditions	https://www.entrust.com/legal-compliance/terms-conditions/entrust-managed-pki
PKIaaS Certification Practice Statement	https://api.managed.entrust.com/pkiaas/cps

Documentation feedback

You can rate and provide feedback about product documentation by completing the online feedback form:

<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](#)
- [Activation data](#)
- [Agreement](#)
- [CA certificate](#)
- [Certificate](#)
- [Certificate revocation list \(CRL\)](#)
- [Certification authority \(CA\)](#)
- [Certificate issuance](#)
- [Certification practice statement \(CPS\)](#)
- [Cryptographic module](#)
- [Customer](#)
- [Digital signature](#)
- [Distinguished name \(DN\)](#)
- [Issuing Certification Authority \(Issuing CA\)](#)
- [Key generation](#)
- [Key pair](#)
- [Public cloud](#)
- [Object identifier \(OID\)](#)
- [Online certificate status protocol \(OCSP\)](#)
- [OCSP responder](#)
- [PKI certificate](#)
- [Private key](#)

- Public key
- Public key cryptography
- Public key infrastructure (PKI)
- Registration authority (RA)
- Relying party
- Repository
- Certificate revocation
- Request for comments (RFC)
- Root Certification Authority (Root CA)
- Subject
- Subscriber
- Trusted Role
- Validity period
- X.500
- X.509

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

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

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

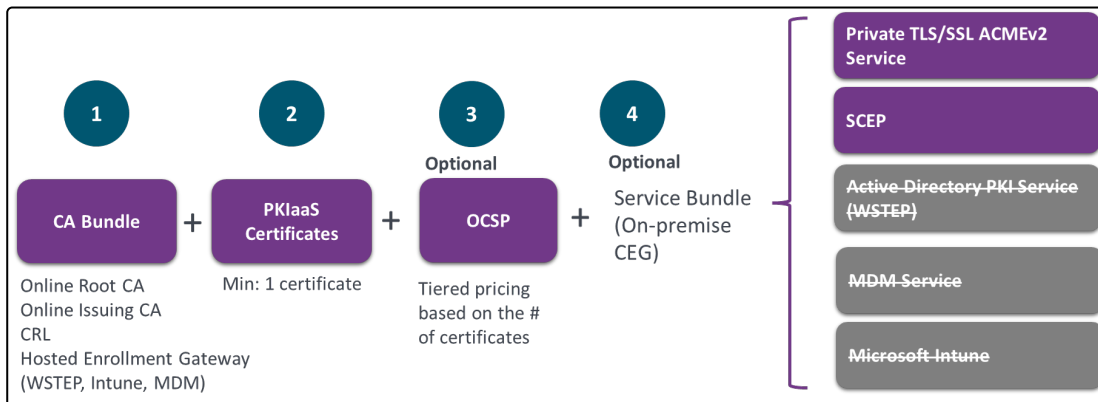
For most customers, we recommend buying the pre-packaged enterprise bundles according to the number of issuing CA and certificates, and whether an Entrust-managed offline root CA is required.

	Enterprise	Enterprise PRO
1k	• 1,000 certs • 1 CA Bundle (Online root & issuing) • Cloud Protocols (InTune, MDM, WSTEP, ACME) • 1 OCSP for 1,000 certs • Platinum Support	• +1 Offline Root
10k	• 1,000 certs • 2 CA Bundle (Online root & issuing, Test/Prod) • Cloud Protocols (InTune, MDM, WSTEP, ACME) • 2 OCSP for 10,000 certs • Platinum Support	• +1 Offline Root
100k	• 1,000 certs • 2 CA Bundle (Online root & issuing, Test/Prod) • Cloud Protocols (InTune, MDM, WSTEP, ACME) • 2 OCSP for 100,000 certs • Platinum Support	• +1 Offline Root
1m	• 1,000,000 certs • 2 CA Bundle (Online root & issuing, Test/Prod) • Cloud Protocols (InTune, MDM, WSTEP, ACME) • 2 OCSP for 1,000,000 certs • Platinum Support	• +1 Offline Root

 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 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:

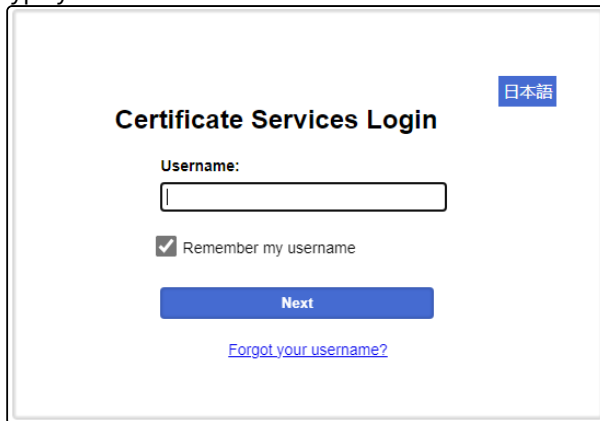
1. Log in to <https://cloud.entrust.net> with your username: john.smith@abc.com
2. Enter your temporary password: **XXXXXX**
3. Enter a new password.
4. Set up your second-factor authentication method and security questions.

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.

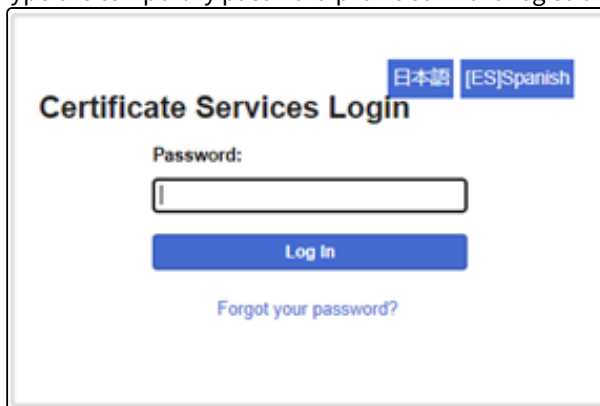
To activate an Entrust Certificate Service Enterprise account

1. Open your browser in the Entrust Certificate Services portal at cloud.entrust.net
2. Type your username and click **Next**.



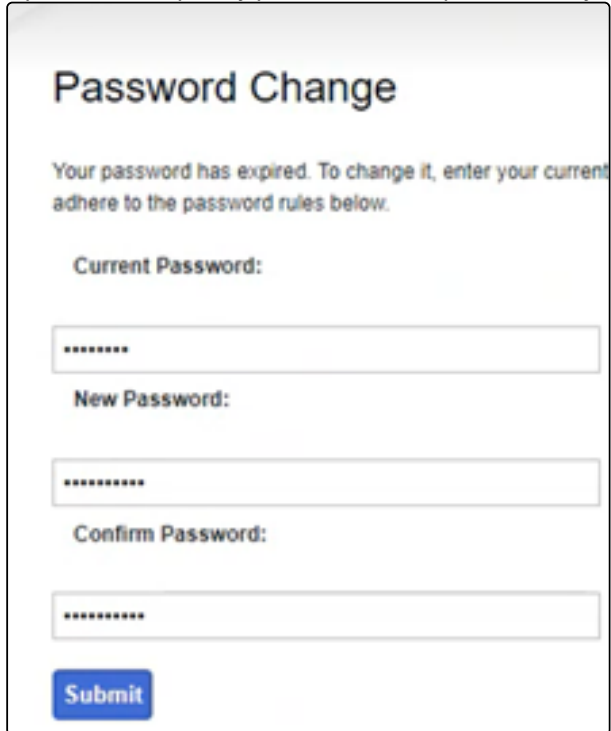
The screenshot shows the 'Certificate Services Login' page. In the top right corner, there is a language selection button labeled '日本語'. Below the title, there is a 'Username:' label followed by a text input field. Underneath the input field is a checked checkbox with the text 'Remember my username'. A blue 'Next' button is positioned below the checkbox. At the bottom of the form, 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. In the top right corner, 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, 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.

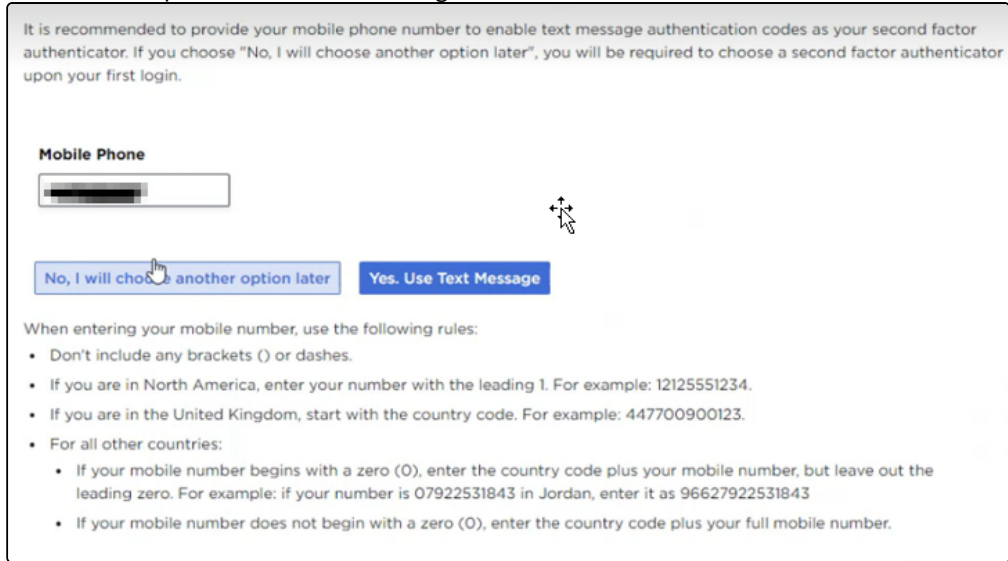
Current Password:

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

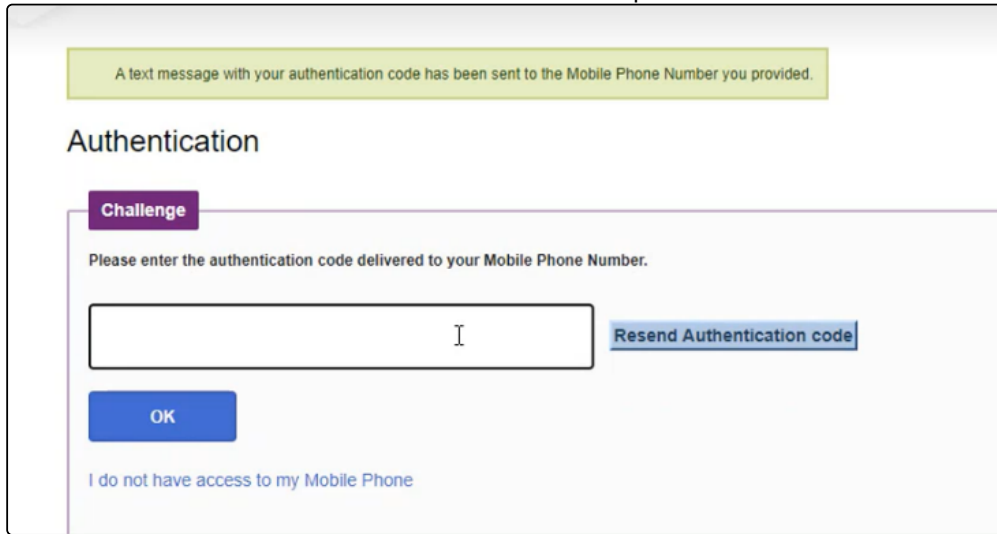
No, I will choose another option later **Yes. Use Text Message**

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**.

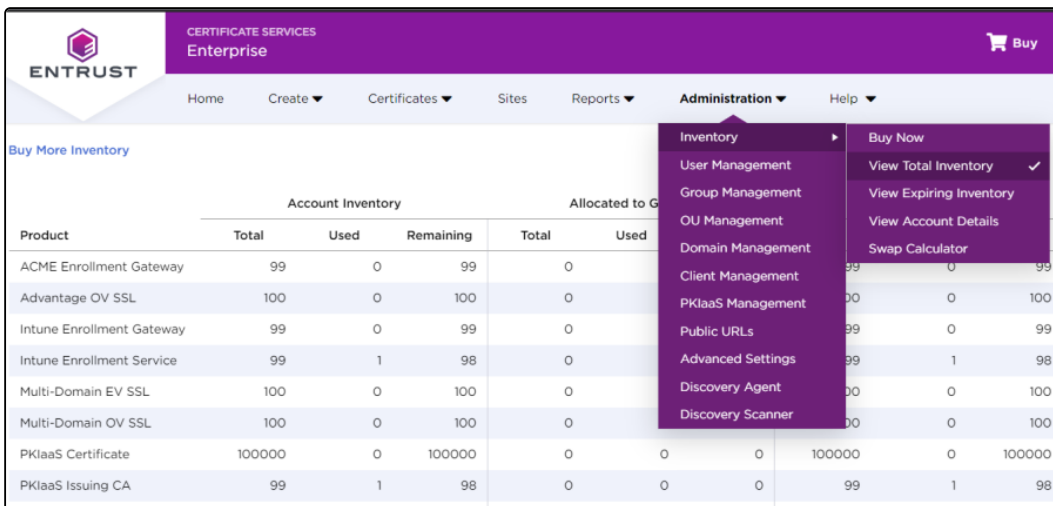
7. Enter the authentication code sent via SMS to the mobile phone and click **OK**.



 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
PKIaaS Issuing CA	99	1	98	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](#).

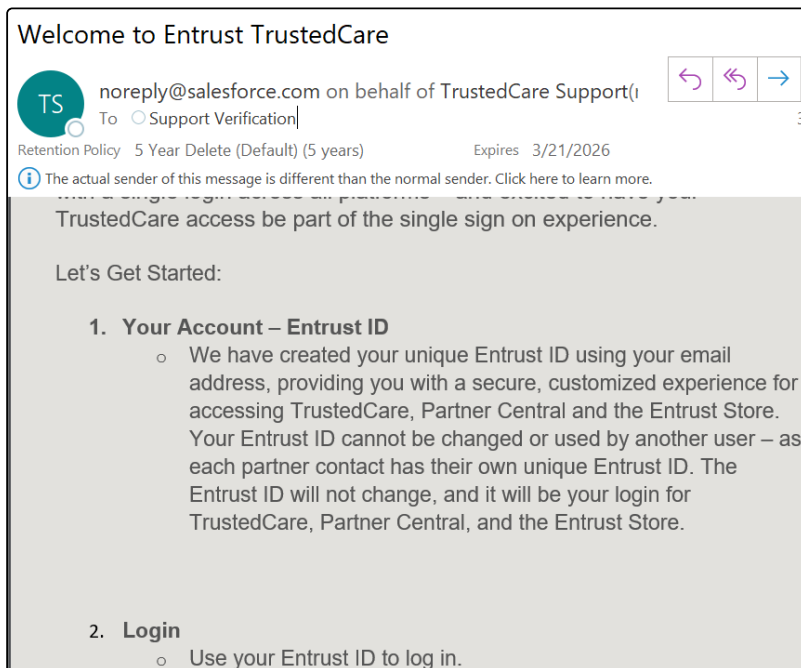
Activating Entrust TrustedCare (optional)

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

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

TrustedCare credentials

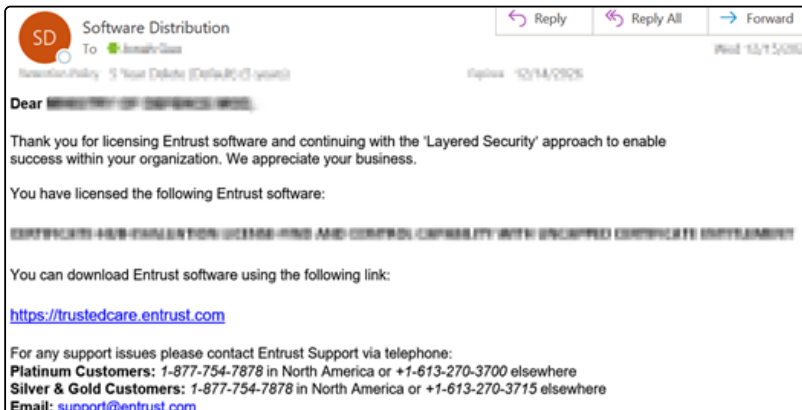
TrustedCare allows you to download the purchased software and access detailed documentation. If you are a new customer and do not have access to Entrust TrustedCare, you will receive an email with instructions to set up your TrustedCare login at <https://trustedcare.entrust.com>.



Certificate Enrollment Gateway download license

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

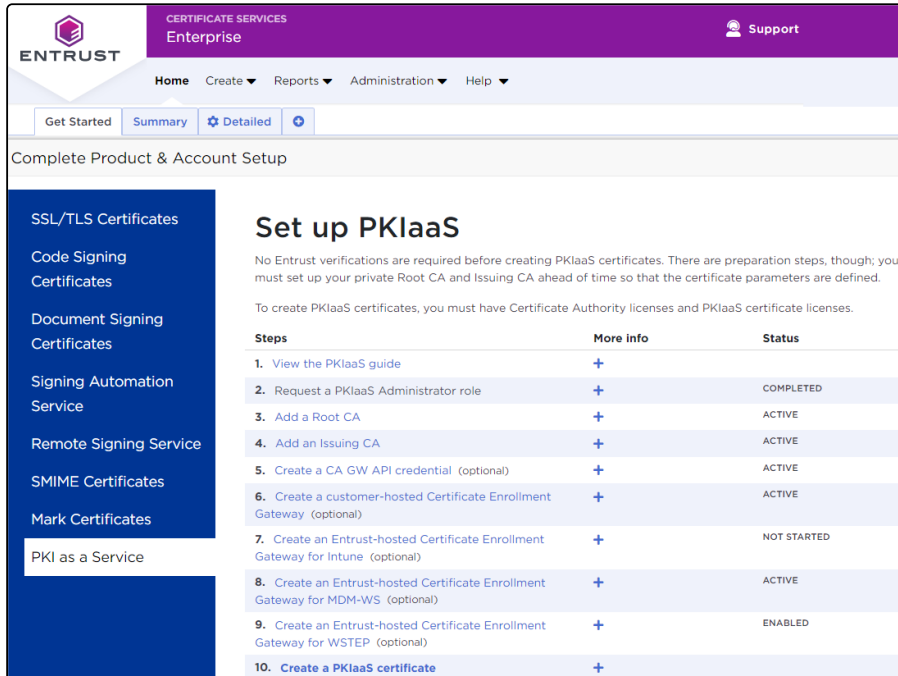
software on TrustedCare.



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
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	Role-Based Access Control
3	Add a root CA	Creating an online root CA
4	Add an issuing CA	Creating an issuing CA under an online root CA
5	Create a CA Gateway API credential	Generating CA Gateway credentials

#	Step	Section of this document
6	Create a customer-hosted Certificate Enrollment Gateway	Automating enrollment with an on-premises Enrollment Gateway
7	Create an Entrust-hosted Certificate Enrollment Gateway for Intune	Automating Intune enrollment with an Entrust-hosted Enrollment Gateway
8	Create an Entrust-hosted Certificate Enrollment Gateway for MDM-WS	Automating MDM enrollment with an Entrust-hosted Enrollment Gateway
9	Create an Entrust-hosted Certificate Enrollment Gateway for WSTEP	Automating WSTEP with an Entrust-hosted Enrollment Gateway
10	Create a PKIaaS certificate	Issuing certificates

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.

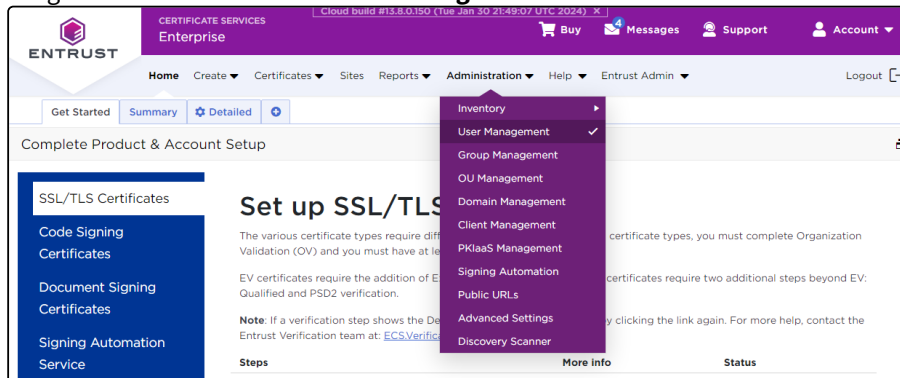
Creating a user with PKIaaS roles

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

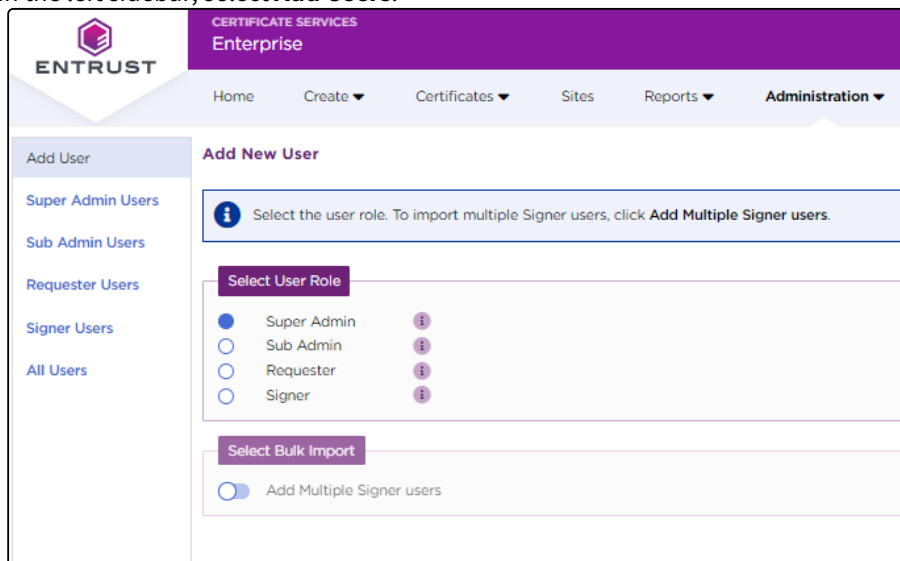
To add a new user with PKIaaS roles

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

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

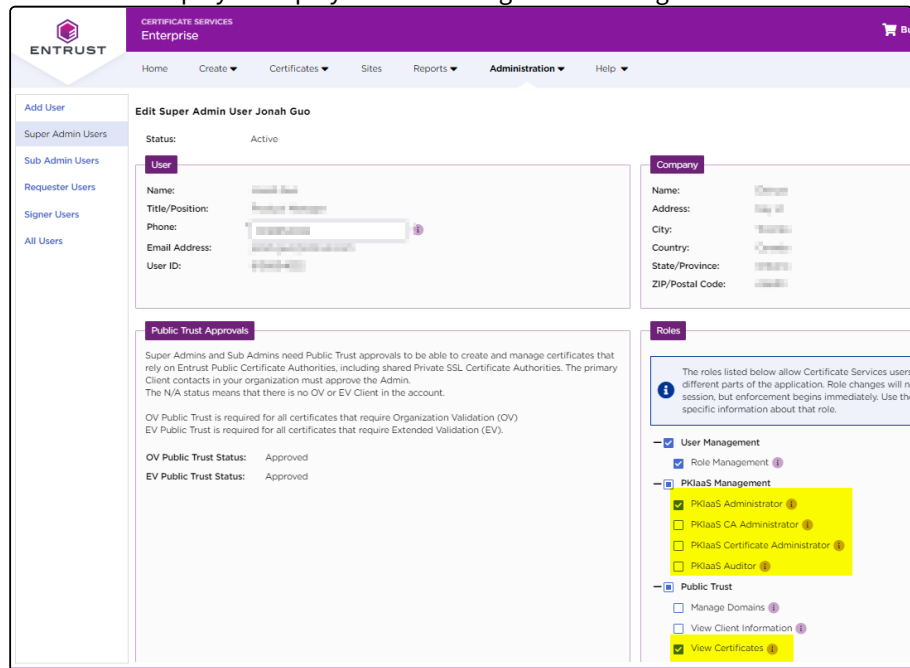


3. In the left sidebar, select **Add Users**.



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

5. Click **Next** to display 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	✓	✓	✓	✗

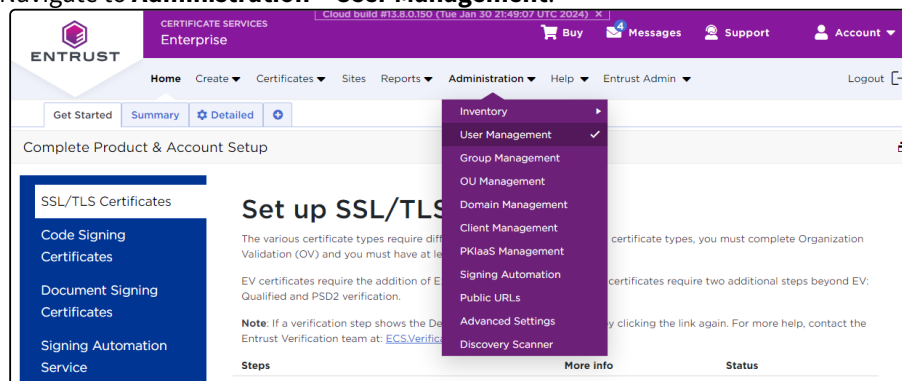
Category	Permission	PKIaaS Administrator	PKIaaS CA Administrator	PKIaaS Certificate Administrator	PKIaaS Auditor
	Revoke PKIaaS certificates	✓	✗	✓	✗

Granting PKIaaS roles to existing users

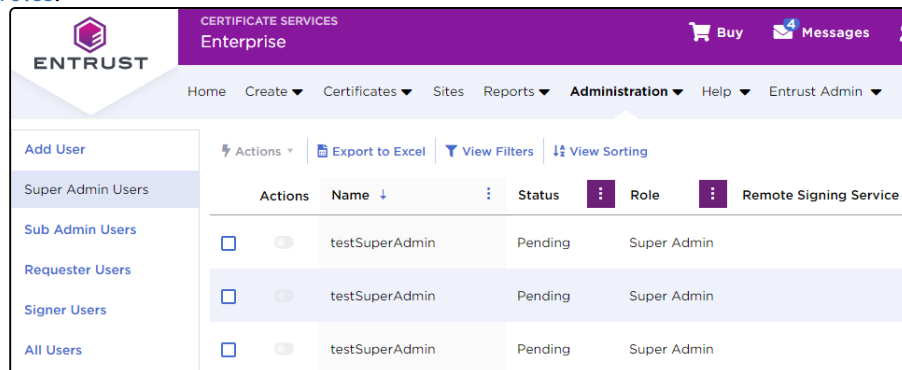
See below for granting roles to an existing PKIaaS user.

To granting PKIaaS roles to an existing user

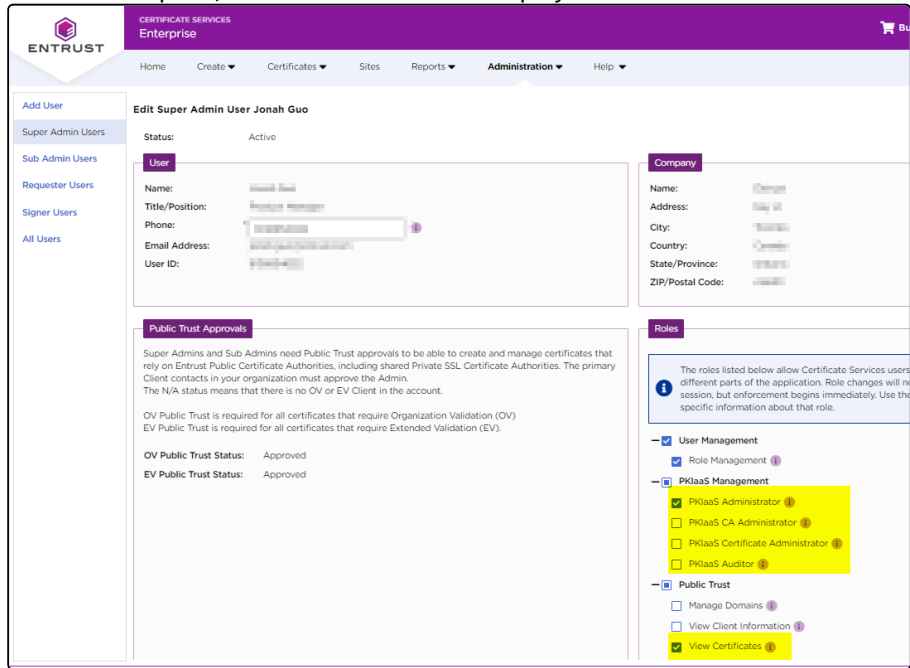
1. Log into Entrust Certificate Services as a Super Admin with the User Management role.
2. Navigate to **Administration > User Management**.



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 displays the 'Edit Super Admin User Jonah Guo' page in the Entrust Enterprise Administration console. The interface includes a sidebar with navigation links (Add User, Super Admin Users, Sub Admin Users, Requester Users, Signer Users, All Users) and a top navigation bar with tabs (Home, Create, Certificates, Sites, Reports, Administration, Help). The main content area is divided into several sections:

- User Information:** Fields for Name, Title/Position, Phone, Email Address, and User ID.
- Company Information:** Fields for Name, Address, City, Country, State/Province, and ZIP/Postal Code.
- Public Trust Approvals:** A section explaining the need for Public Trust approvals for Super Admins and Sub Admins, and the status of OV and EV Public Trust (both marked as 'Approved').
- Roles:** A list of roles assigned to the user, including 'User Management', 'Role Management', 'PKIaaS Management' (with sub-roles like PKIaaS Administrator, PKIaaS CA Administrator, PKIaaS Certificate Administrator, and PKIaaS Auditor), and 'Public Trust' (with sub-roles like Manage Domains, View Client Information, and View Certificates).

- 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.

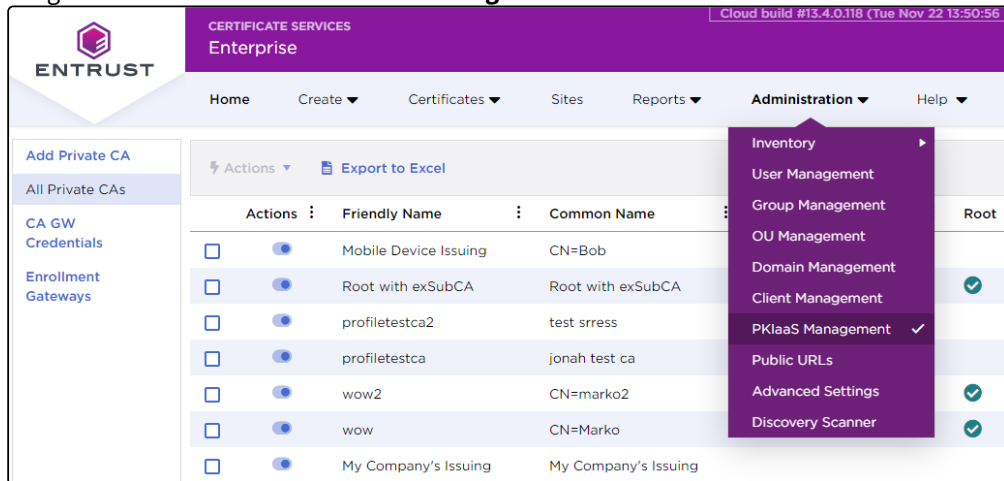
Creating an online root CA

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

ℹ 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
2. Navigate to **Administration > PKIaaS Management**.

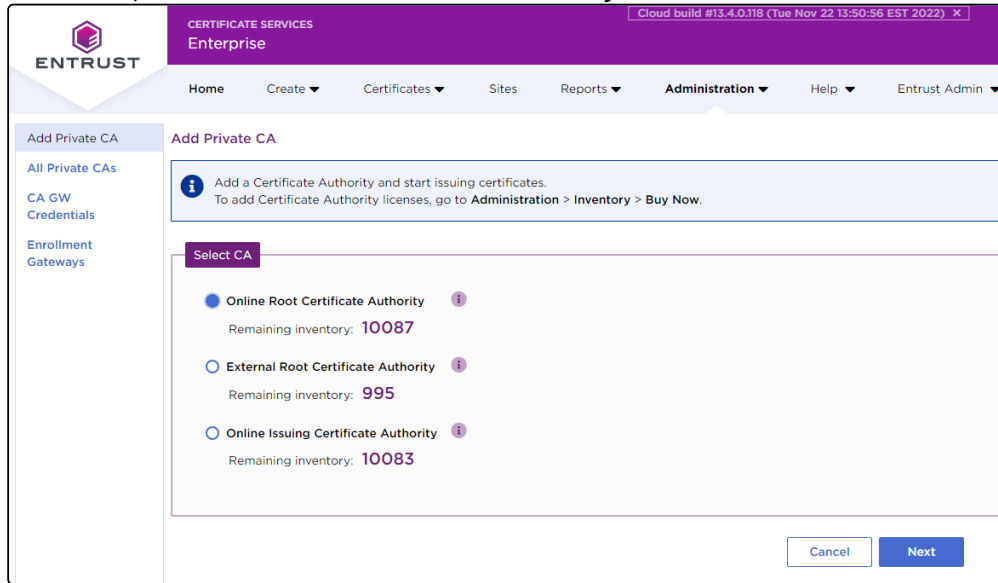


The screenshot shows the Entrust Certificate Services Enterprise web interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', and 'Help'. The 'Administration' dropdown menu is open, showing options like 'Inventory', 'User Management', 'Group Management', 'OU Management', 'Domain Management', 'Client Management', 'PKIaaS Management' (which is checked), 'Public URLs', 'Advanced Settings', and 'Discovery Scanner'. On the left sidebar, 'Add Private CA' is highlighted. The main content area shows a table of existing CAs with columns for 'Actions', 'Friendly Name', and 'Common Name'.

Actions	Friendly Name	Common Name	Root
☐	Mobile Device Issuing	CN=Bob	
☐	Root with exSubCA	Root with exSubCA	
☐	profiletestca2	test sress	
☐	profiletestca	jonah test ca	
☐	wow2	CN=marko2	
☐	wow	CN=Marko	
☐	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

All Private CAs
CA GW Credentials
Enrollment Gateways

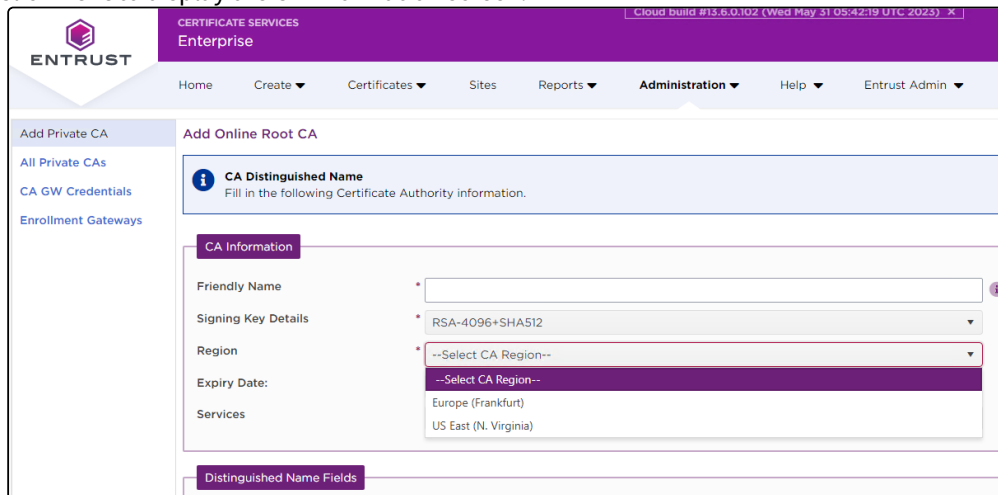
Add Private CA

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

All Private CAs
CA GW Credentials
Enrollment Gateways

Add Online Root CA

CA Distinguished Name
Fill in the following Certificate Authority information.

CA Information

Friendly Name *

Signing Key Details * RSA-4096+SHA512

Region * --Select CA Region--
--Select CA Region--
Europe (Frankfurt)
US East (N. Virginia)

Expiry Date: *

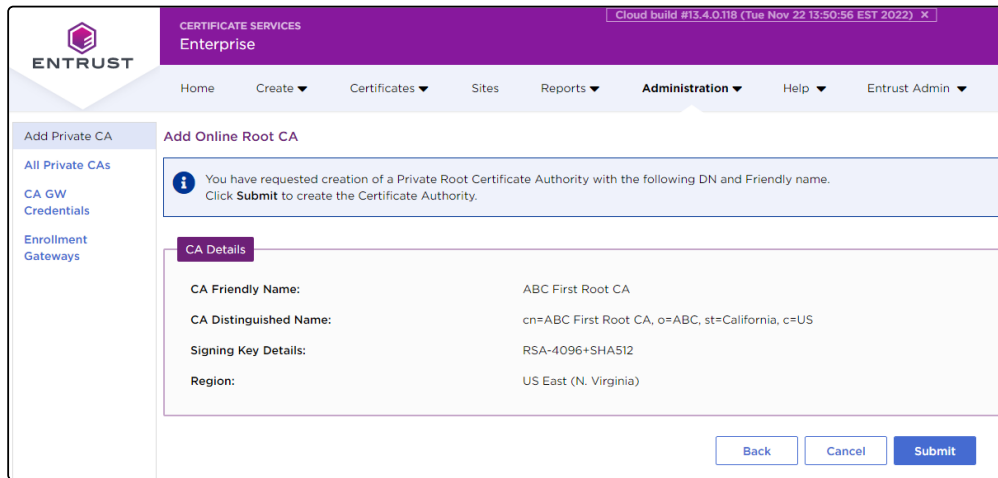
Services

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.



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 Online Root CA

All Private CAs
CA GW Credentials
Enrollment Gateways

CA Details

CA Friendly Name:	ABC First Root CA
CA Distinguished Name:	cn=ABC First Root CA, o=ABC, st=California, c=US
Signing Key Details:	RSA-4096+SHA512
Region:	US East (N. Virginia)

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**.

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	Authority profiles

Mandatory: No.

Distinguished Name Fields

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

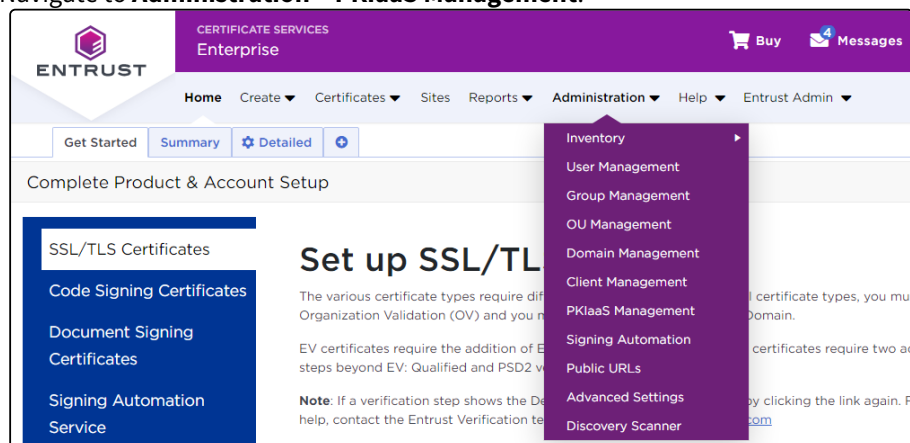
Mandatory: Only the **Common Name** certificate field.

Creating an issuing CA under an online root CA

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

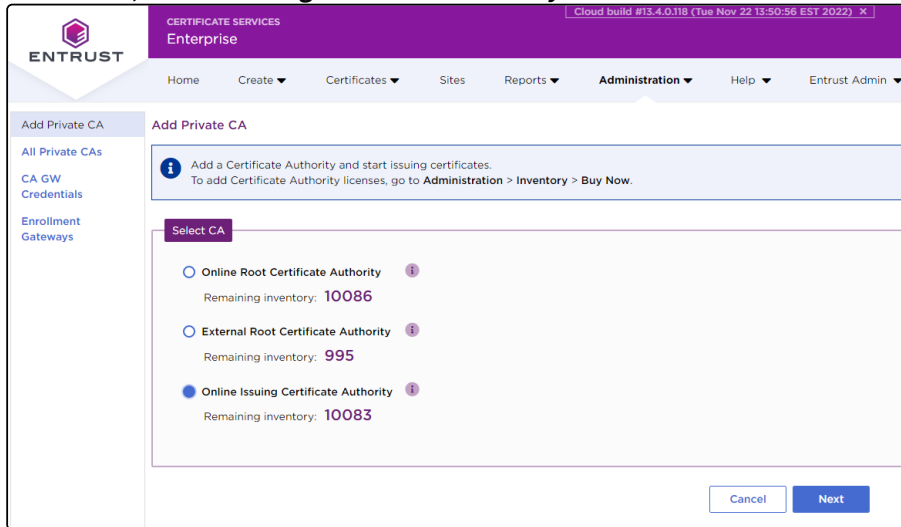
To create an issuing CA

1. Log into cloud.entrust.net
2. Navigate to **Administration > PKIaaS Management**.

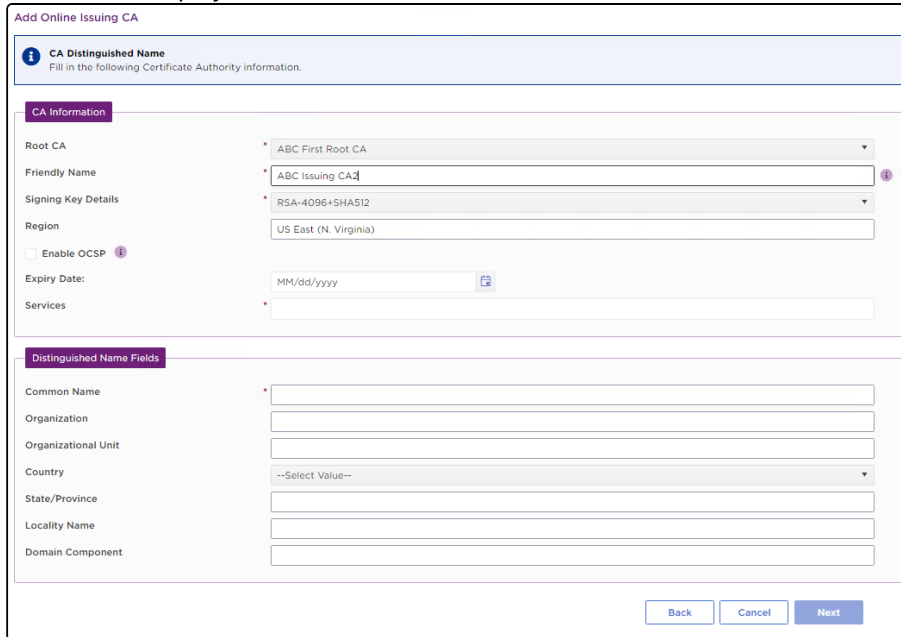


3. In the side pane, click **Add Private CA**.

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



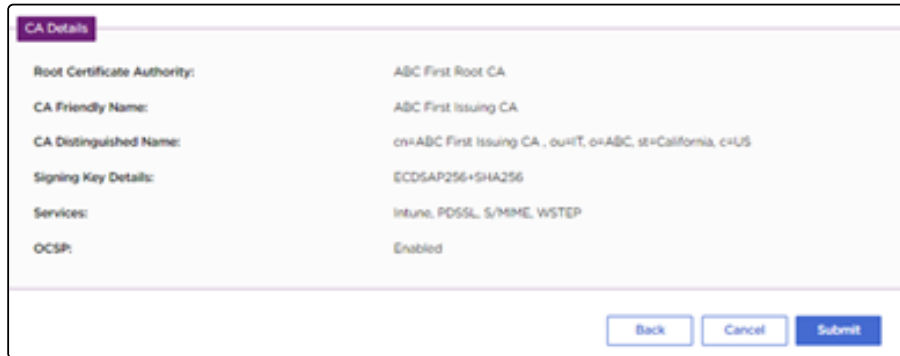
5. Click **Next** to display the **CA Information** screen.



6. Enter the values described below.

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

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



- Click **Submit**.
- In the confirmation request, click **OK** to start the CA creation process.
- When the CA creation completes, check the CA details in the CA grid view.
- 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

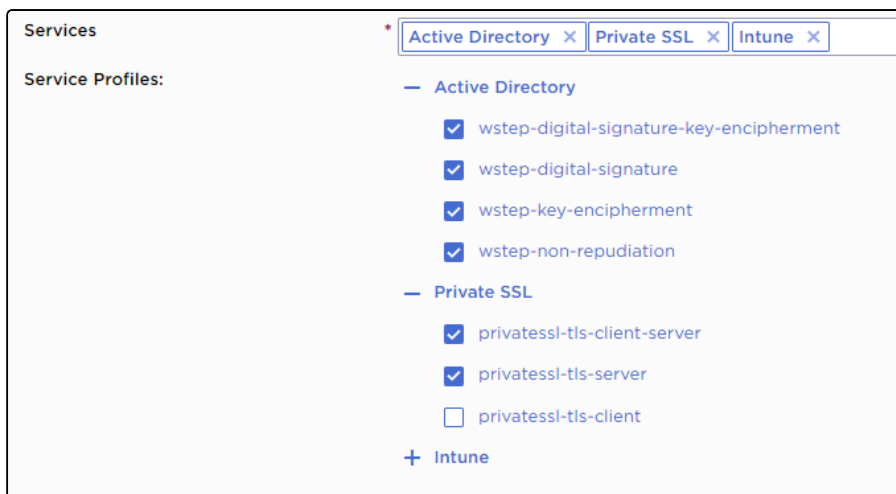
Select a predefined set of certificate profiles. For example,

- 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.

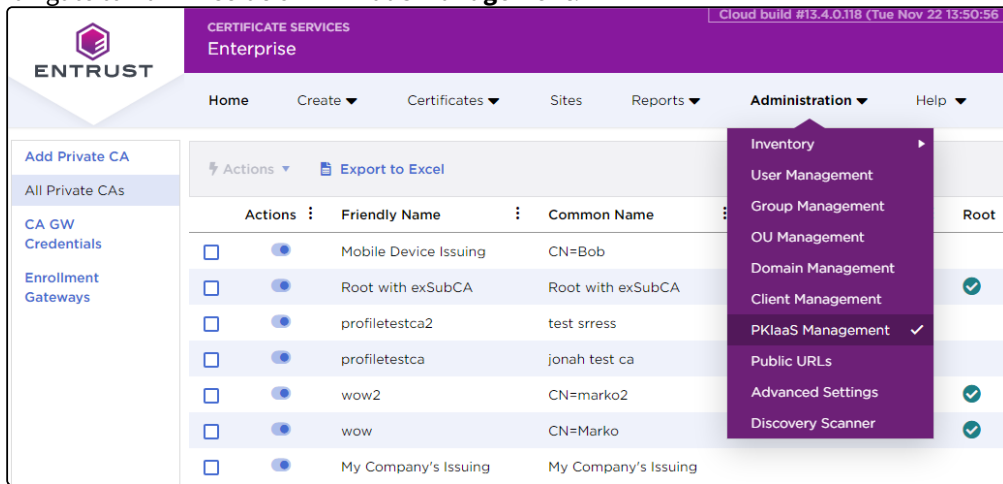
Mandatory: Only the **Common Name** certificate field.

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

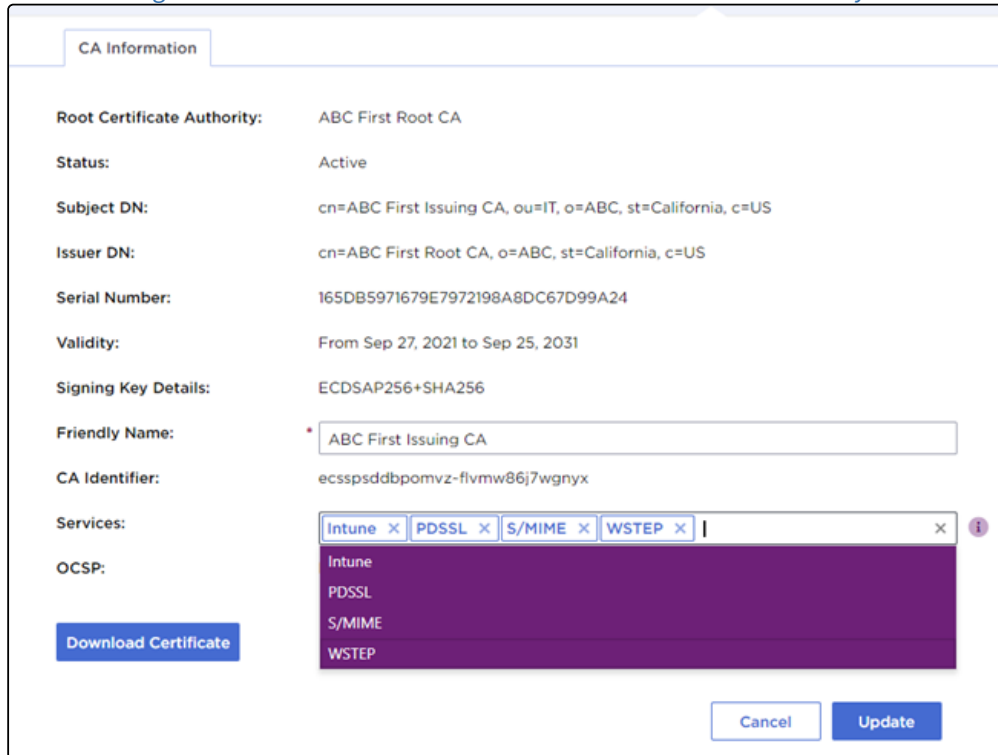
1. Log into cloud.entrust.net
2. Navigate to **Administration > PKIaaS Management**.



Actions	Friendly Name	Common Name	Root
☐	Mobile Device Issuing	CN=Bob	
☐	Root with exSubCA	Root with exSubCA	
☐	profiletestca2	test srress	
☐	profiletestca	jonah test ca	
☐	wow2	CN=marko2	☒
☐	wow	CN=Marko	☒
☐	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: ECDSA256+SHA256

Friendly Name: * ABC First Issuing CA

CA Identifier: ecsspsddbpmvz-flvmw86j7wgnyx

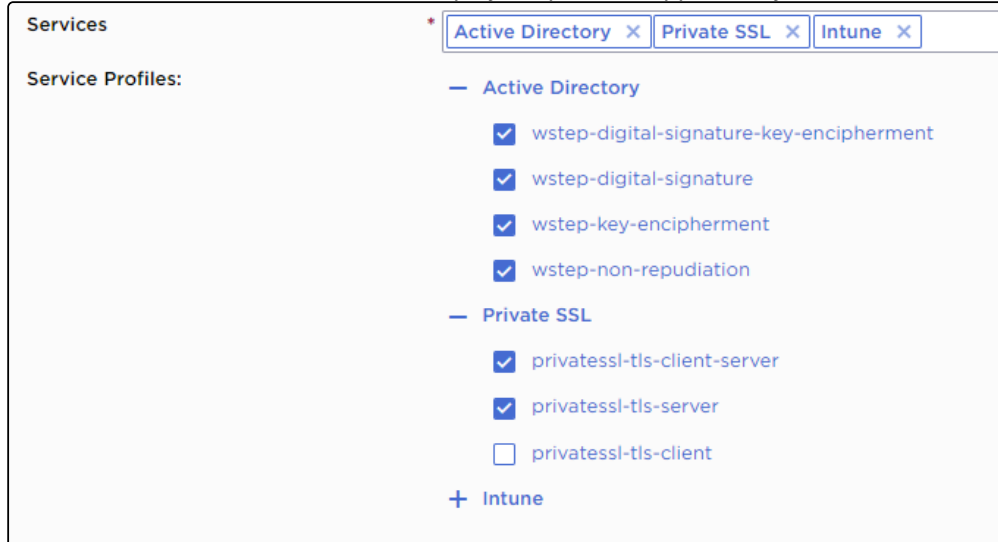
Services: Intune x PDSSL x S/MIME x WSTEP x

OCSP:

[Download Certificate](#)

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

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



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

- 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.

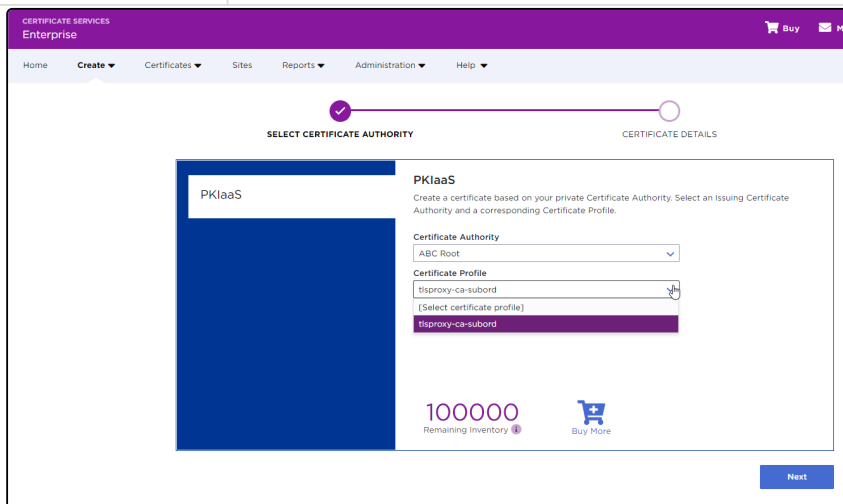
Creating an external subordinate CA

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 External Sub-CA service. See Creating an online root CA for how to create this CA.
Certificate Profile	Select one of the Authority profiles .



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.

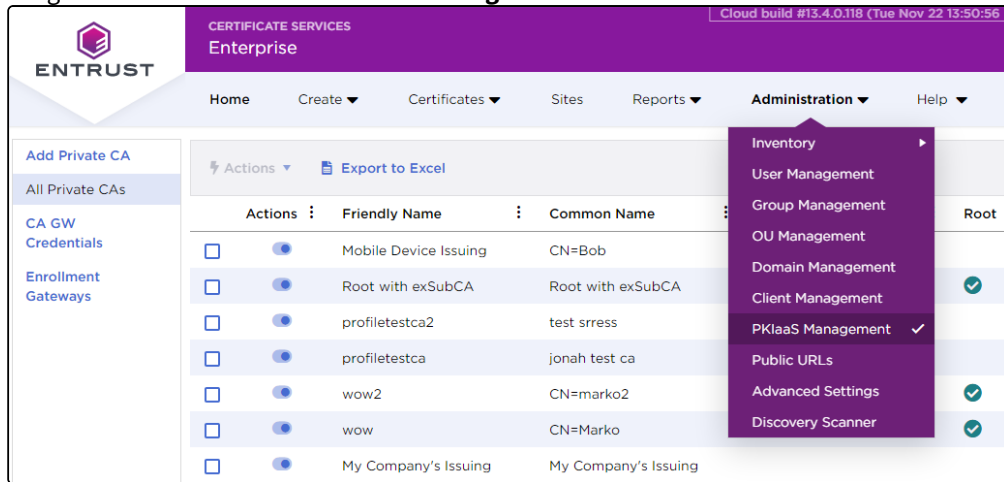
Adding an external root CA

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

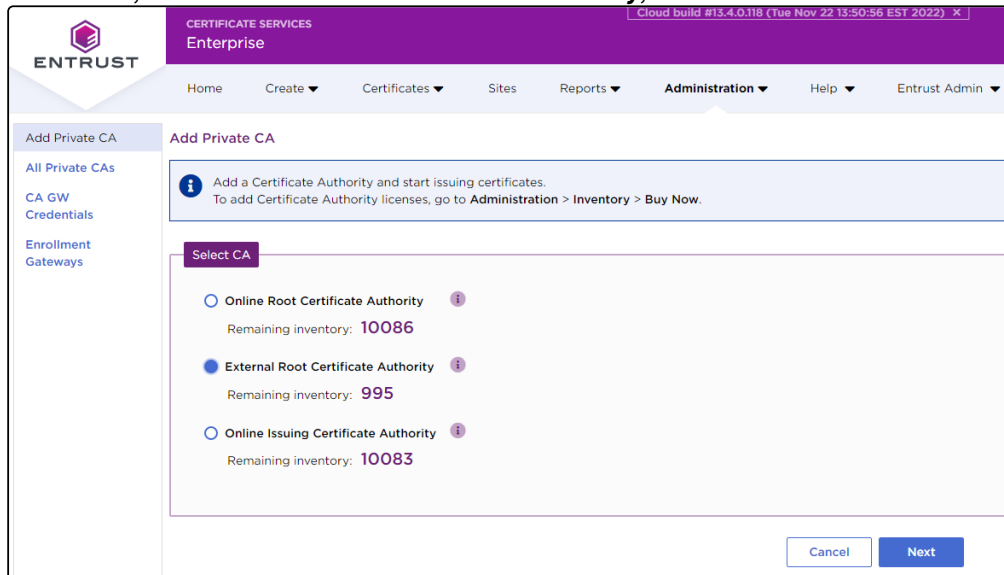
1. Log into cloud.entrust.net
2. Navigate to **Administration > PKIaaS Management**.



The screenshot shows the Entrust Enterprise Administration interface. The top navigation bar includes Home, Create, Certificates, Sites, Reports, Administration, and Help. The left sidebar has links for Add Private CA, All Private CAs, CA GW Credentials, and Enrollment Gateways. The main content area displays a table of Private CAs with columns for Actions, Friendly Name, and Common Name. A dropdown menu is open under the Administration tab, showing options like Inventory, User Management, Group Management, OU Management, Domain Management, Client Management, PKIaaS Management (which is checked), Public URLs, Advanced Settings, and Discovery Scanner.

Actions	Friendly Name	Common Name	Root
☐	Mobile Device Issuing	CN=Bob	
☐	Root with exSubCA	Root with exSubCA	
☐	profiletestca2	test sress	
☐	profiletestca	jonah test ca	✓
☐	wow2	CN=marko2	
☐	wow	CN=Marko	
☐	My Company's Issuing	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' dialog in the Entrust Enterprise Administration interface. The dialog has a title bar 'Add Private CA' and a message: 'Add a Certificate Authority and start issuing certificates. To add Certificate Authority licenses, go to Administration > Inventory > Buy Now.' Below the message is a 'Select CA' section with three radio button options: 'Online Root Certificate Authority' (Remaining inventory: 10086), 'External Root Certificate Authority' (Remaining inventory: 995, which is selected), and 'Online Issuing Certificate Authority' (Remaining inventory: 10083). At the bottom right are 'Cancel' and 'Next' buttons.

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

CA Distinguished Name

cn=CHIA-ROOT-CA

CA Information

Friendly Name

External MS Root

Self-Signed Root Certificate

```

-----BEGIN CERTIFICATE-----
MIDICTCAcGgAwIBAgIQEwvKSpIGm41C8j7MAS/GuzANBqkqhkiG9w0BAQsFADAX
MRUwEwYDVQQGEwxDSEIBLVJPTiQ0EwHhcNMjAwMjI0MDU0WWhcNMjUwMjI0
MTc1MDU0WjAxMRUwEwYDVQQGEwxDSEIBLVJPTiQ0EwggEIMA0GCqSgSlib3DQEB
AQUAAAIBDwAwggEKAoIBAQDNE4oXnkBt2xMlesO8MHhoeQ/txNdHYXZ8GIW6o7rl
PyDyOigAZ4GYBwBx4oVjTNMEF8XZ/IsXRyjNfL/22GDON/Rg7Q7KLYxrl5ILWnyUb
LCbbM97EC2DRqYH9r5F5A1UW8P8A1UW8P8A1UW8P8A1UW8P8A1UW8P8A1UW8P8
8p5QdDvqNnCL+xtUE-----
jQdQ2DIAnB+RB4nUYETAEH4FYX+
dkfIL6IEt/8IVJ/Wmly-----
U7qYCPldDvgoclOa8wCGiYmokp8
vV+SVTUO+JRceh80vHoInJKHvJJTTFE4nYRfc6BSNMBAGMBAAGTUBPMASGAIUd
DwQEAwIBhAPBgqNVHRMBAf8EBTADAQH/MB0GA1UdDgQWBBTtpbzOcIslQnKqYqZVK
iue3+ay9CjAQBgkrBgEEAYl3QEEAwIBADANBqkqhkiG9w0BAQsFAAOCAQEAIUJw
eeuhXlyUcSFwtCTyijN41DnNjXUrU3HMD0IeMBUaGvAa208tCjFXJfiZFxxpn+X
4pODf4+ekqOfp2c4raVT+Q8DCxFu+N3KvMvH/vjEj2SmVkJ/ZUoMVB5g2AKkCCVh
OpS6vAKBnTb9AKnLXq9FcI6qzeK6Op28vYjBVLOlrBktf/DB2YYqOmslgYcN3F
7Q/44qYDgNMvly+hdBKtHQh7CjFFPkn6Ktfa8Ccy7VggMC1JuEs2a8jNYoSMsakvW
oG65xmAskt+NlaX/xFHsX3it9JAVnPUSUfyv3lZQJKLoz7ZDWJ9hPL8OqXySgJ8b
voT9MP27sFQUbx7sHQ==
-----END CERTIFICATE-----

```

Region

US East (N. Virginia)

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



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

CA Details

CA Friendly Name:	External MS Root
Serial Number:	12FC0A4A92069B8D42F23ECC012FC6BB
Subject DN:	cn=CHIA-ROOT-CA
Validity:	From Feb 25, 2020 to Feb 25, 2025
Signing Key Details:	RSA-2048+SHA256
Region:	US East (N. Virginia)

Back

Cancel

Submit

- Click **Submit**.
- When the CA creation completes, check the CA details in the CA grid view.
- 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.

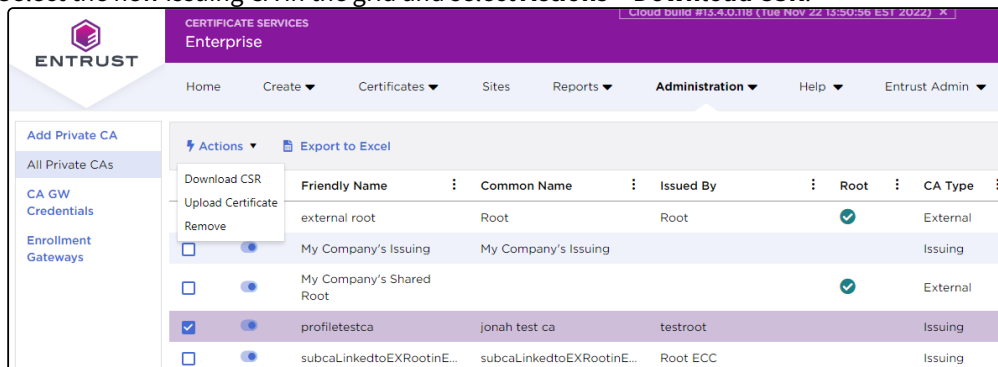
Mandatory: Yes.

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
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
☐	external root	Root	Root	☒	External
☐	My Company's Issuing	My Company's Issuing			Issuing
☐	My Company's Shared Root			☒	External
☒	profiletestca	jonah test ca	testroot		Issuing
☐	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**.

- 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:


```

7XeIBRQsJfId57AQ/5o6VrtXq0sufHbVdXp/YApLqC35hip68a5AZeeIKZz55ro
p+ndoDoPupUuO6I8fh62D4HNa/CH4LkRYkvk+Spq4GQxpEhLdp4HYoEYeABckJ
HDtvH2XIBWShqCq24TqFny+OPaszLbSILCKuPfx02Ra00YlxgoM6NYT4StqL2b
5hXg51lgbIR2sd2i0GplMpCs2qb52Y18B4VgNs62OhgIXEefSJByahODbXUYJuC
V5e9PmiFQtAyTLuGs8xlcLpAljNZYTsUCghc8xJPVmrABHBT10sdTqdoBw4sd
sxhKJBGowwDAQ8o4IBETCCAQ0owH2YDVR00B9YEFicVvILegBCBMTzh+m+dQicK
8xMwMB8GAlUdlwQYMBsAF04x9Izkq4FTitCqBYF8yZVE6mMFACAlUdhwRJMecw
RaBdcEGGP2h0dHA6Ly9DSEIBLUxQIFNlbnhOMVYMuZGV2LmRhdGFjYXJkLmNvbS9w
a2kwQ0hJQ51ST09ULUNBKEpLmNybDBBgggrBgEFBQcBAQRMFOWwWYlkwYBBQUH
MAKGT2h0dHA6Ly9DSEIBLUxQIFNlbnhOMVYMuZGV2LmRhdGFjYXJkLmNvbS9w
a2kwQ0hJQ51ST09ULUNBKEpLmNybDBBgggrBgEFBQcBAQRMFOWwWYlkwYBBQUH
Q0hJQ51ST09ULUNBKEpLmNybDBBgggrBgEFBQcBAQRMFOWwWYlkwYBBQUH
ADANBgkqhkiG9w0BAQsFAAOCQAQEAa6lxXQsRwP/Rq7ud9yqrGBXCC85Unw8nE8PV
blUgUBlUk+TSO6Ws+jHCK+V/AhpPhydl+nIXZOzpYCPH+omBrSAE7TdIOBcJRIle
6LHg+npwBcKcpCMCI5FPKN86eeegrbcNstRblMmU75CYfWFA2FTwrNdBc40qQv4
kxLuDM8J+TsJlFW6xpUouTuTTEHPa7lacCIImh7S0TRVB8erMBA80POTyWpn
fZl/yCKKf2mtylq7931/yHpWEdggFP3FyGiUQpRY9kr+rzbpGytK022kYm63TXf
qBXzUX2BMSTvgjyZJfncX5ammirSojAzv8pq6cYq/OZX/32TQ==
-----END CERTIFICATE-----

```

Cancel

Update

- Click **Update**. In the CA grid, the issuing CA status will change to **Updating**.
- 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

- Log into cloud.entrust.net
- Navigate to **Administration > PKIaaS Management**.

ENTRUST

CERTIFICATE SERVICES
 Enterprise

Cloud build #13.4.0.118 (Tue Nov 22 13:50:56 E

Home
 Create
 Certificates
 Sites
 Reports
 Administration
 Help

Add Private CA
 All Private CAs
 CA GW
 Credentials
 Enrollment Gateways

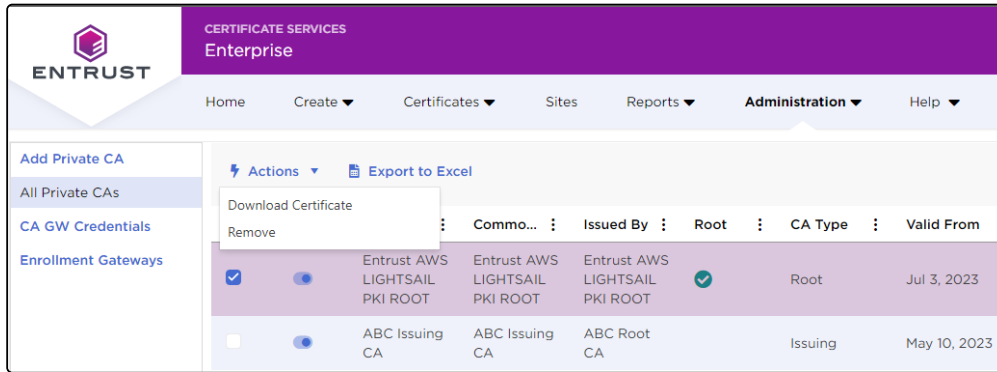
Actions
 Export to Excel

Actions	Friendly Name	Common Name	
☐	Mobile Device Issuing	CN=Bob	
☐	Root with exSubCA	Root with exSubCA	
☐	profiletestca2	test sress	
☐	profiletestca	jonah test ca	
☐	wow2	CN=marko2	
☐	wow	CN=Marko	
☐	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

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

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



Actions	Export to Excel	Download Certificate	Remove	Commo...	Issued By	Root	CA Type	Valid From
☒	☐	☐	☐	Entrust AWS LIGHTSAIL PKI ROOT	Entrust AWS LIGHTSAIL PKI ROOT	Entrust AWS LIGHTSAIL PKI ROOT	Root	Jul 3, 2023
☐	☐	☐	☐	ABC Issuing CA	ABC Issuing CA	ABC Root CA	Issuing	May 10, 2023

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

Deleting a CA

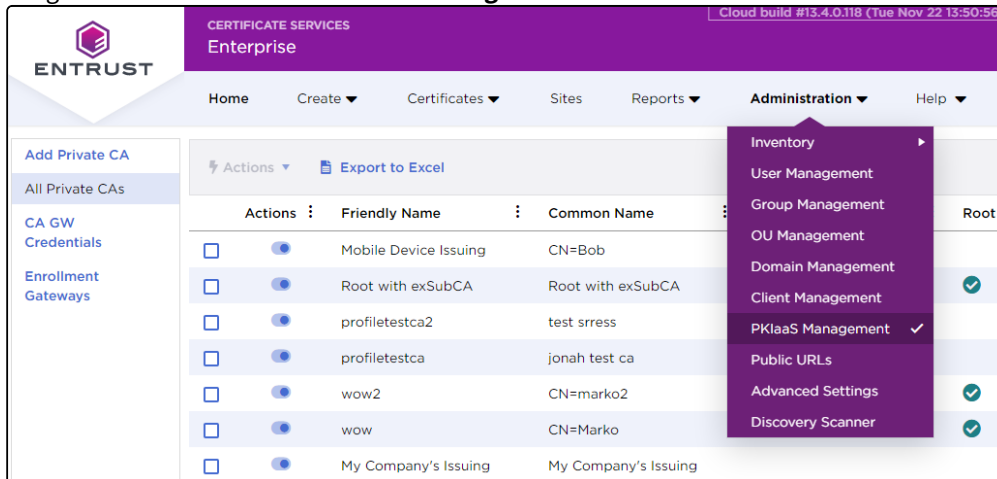
When deleting CAs take into account that:

- 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.

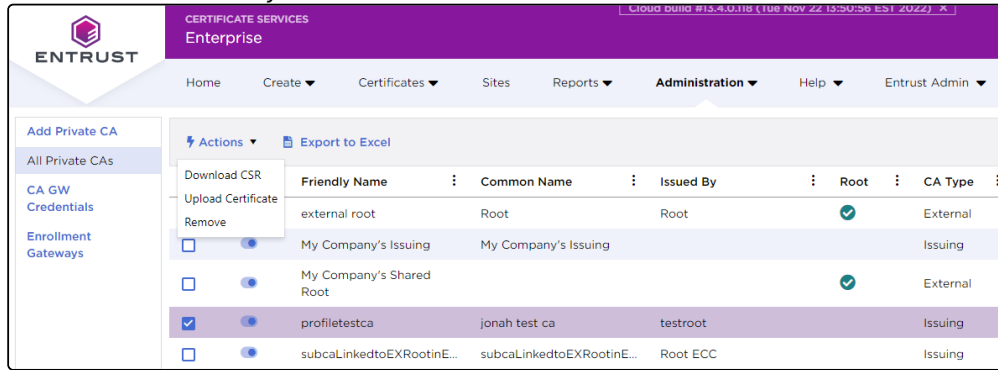
To delete a CA

1. Log into cloud.entrust.net
2. Navigate to **Administration** > **PKIaaS Management**.



Actions	Friendly Name	Common Name	Root
☐	Mobile Device Issuing	CN=Bob	
☐	Root with exSubCA	Root with exSubCA	
☐	profiletestca2	test sress	☒
☐	profiletestca	jonah test ca	
☐	wow2	CN=marko2	
☐	wow	CN=Marko	☒
☐	My Company's Issuing	My Company's Issuing	☒

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



The screenshot shows the Entrust Enterprise Administration interface. The left sidebar contains navigation links: Add Private CA, All Private CAs, CA GW, Credentials, Enrollment, and Gateways. The main content area displays a table of Certificate Authorities (CAs) with columns: Friendly Name, Common Name, Issued By, Root, and CA Type. The 'Actions' menu is open, showing options: Download CSR, Upload Certificate, Remove, and Export to Excel. The 'Remove' option is highlighted.

	Friendly Name	Common Name	Issued By	Root	CA Type
☐	external root	Root	Root	☒	External
☐	My Company's Issuing	My Company's Issuing			Issuing
☐	My Company's Shared Root			☒	External
☒	profiletestca	jonah test ca	testroot		Issuing
☐	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.

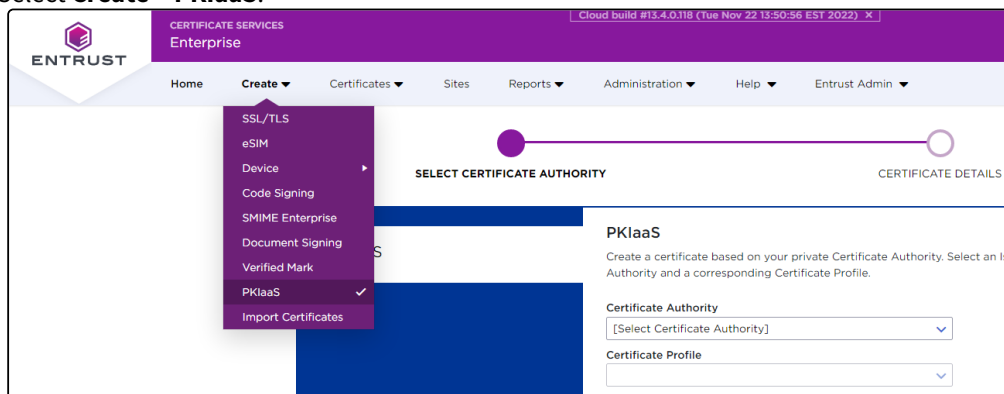
- [Processing a Certificate Signing Request](#)
- [Generating a PKCS #12](#)

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

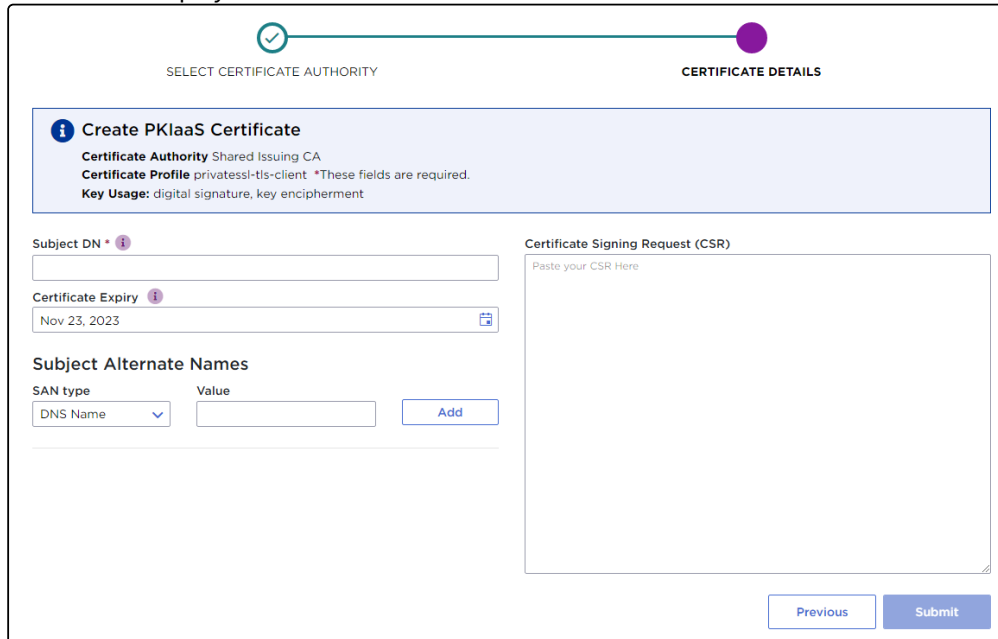
1. Log into cloud.entrust.net
2. Select **Create > PKIaaS**.



The screenshot shows the Entrust Certificate Services Enterprise web interface. The top navigation bar is purple with the Entrust logo and the text 'CERTIFICATE SERVICES Enterprise'. Below this is a secondary navigation bar with links: Home, Create, Certificates, Sites, Reports, Administration, Help, and Entrust Admin. The 'Create' dropdown menu is open, showing options: SSL/TLS, eSIM, Device, Code Signing, SMIME Enterprise, Document Signing, Verified Mark, PKIaaS (which is selected and has a checkmark), and Import Certificates. The main content area is titled 'SELECT CERTIFICATE AUTHORITY' and 'CERTIFICATE DETAILS'. The 'PKIaaS' section is active, showing a description: 'Create a certificate based on your private Certificate Authority. Select an Issuance Authority and a corresponding Certificate Profile.' Below this are two dropdown menus: 'Certificate Authority' with the placeholder '[Select Certificate Authority]' and 'Certificate Profile'.

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

- 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	

Add

Certificate Signing Request (CSR)
 Paste your CSR Here

Previous Submit

- Configure the following settings:
 - Subject DN
 - Certificate Expiry
 - Subject Alternate Names
 - Certificate Signing Request (CSR)
- Click **Submit** to issue the certificate.
- 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	server.example.com
IP Address	192.168.1.1
RFC822 Name	john.doe@example.com
Directory Name	cn=john doe,o=example inc,c=us
Uniform Resource Identifier	https://example.com/
Registered ID	1.2.3.4.5.6.7.8
Other Name	oBgGCCsGAQUFBwgDoAwwCgwIMTIzNDU2Nzg=

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.

Certificate Signing Request (CSR)

Paste the Certificate Signing Request (CSR) contents.

ℹ PKIaaS currently does not support copying DN's or SANs from the CSR. You must manually input the DN's 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.

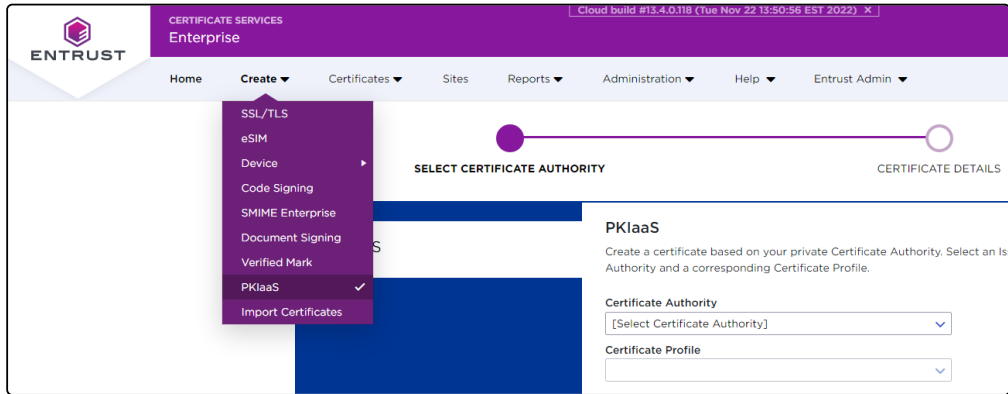
Generating a PKCS #12

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

To generate a PKCS #12

1. Log into cloud.entrust.net

2. Select **Create > PKIaaS**.

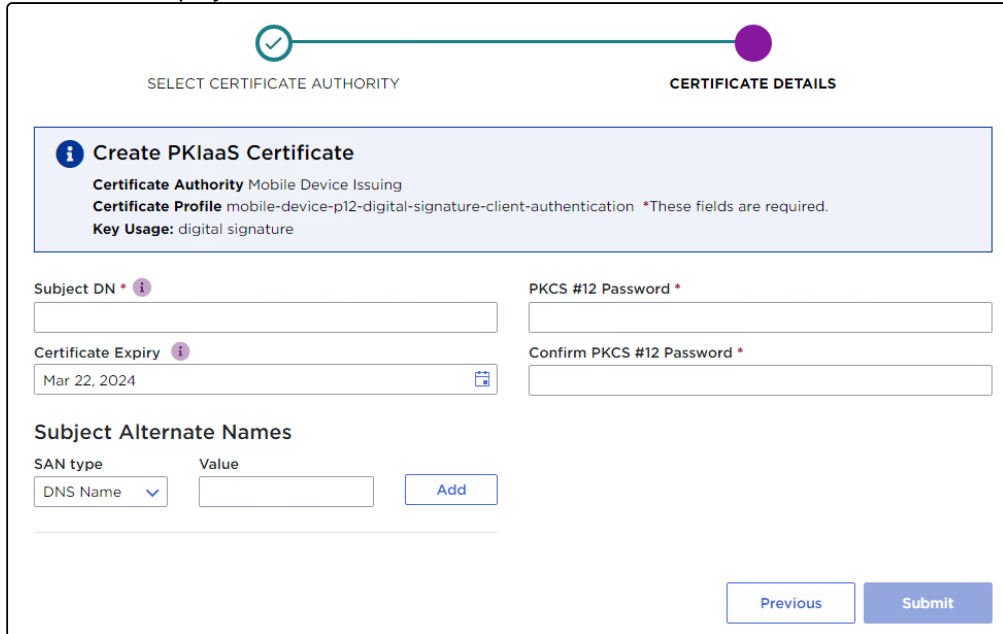


The screenshot shows the Entrust Enterprise web interface. The top navigation bar includes 'Home', 'Create', 'Certificates', 'Sites', 'Reports', 'Administration', 'Help', and 'Entrust Admin'. The 'Create' dropdown menu is open, showing options like 'SSL/TLS', 'eSIM', 'Device', 'Code Signing', 'SMIME Enterprise', 'Document Signing', 'Verified Mark', 'PKIaaS' (which is checked), and 'Import Certificates'. The main content area is titled 'SELECT CERTIFICATE AUTHORITY' and 'CERTIFICATE DETAILS'. The 'PKIaaS' section is active, showing instructions to create a certificate based on a private Certificate Authority. There are dropdown menus for 'Certificate Authority' and 'Certificate Profile'.

3. Select the **Certificate Authority**.

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

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



The screenshot shows the 'Create PKIaaS Certificate' form. At the top, there's a progress bar with two steps: 'SELECT CERTIFICATE AUTHORITY' (completed) and 'CERTIFICATE DETAILS' (current). The form title is 'Create PKIaaS Certificate'. Below it, there's information about the 'Certificate Authority' (Mobile Device Issuing) and 'Certificate Profile' (mobile-device-p12-digital-signature-client-authentication). A note says '*These fields are required.' and 'Key Usage: digital signature'. The form fields include: 'Subject DN' (required), 'Certificate Expiry' (set to Mar 22, 2024), 'Subject Alternate Names' (with a table for SAN type and Value), 'PKCS #12 Password' (required), and 'Confirm PKCS #12 Password' (required). At the bottom right, there are 'Previous' and 'Submit' buttons.

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	server.example.com
IP Address	192.168.1.1
RFC822 Name	john.doe@example.com
Directory Name	cn=john doe,o=example inc,c=us
Uniform Resource Identifier	https://example.com/
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.

PKCS #12 Password

Type a password to protect the PKCS #12 contents.

Confirm PKCS #12 Password

Retype the password.

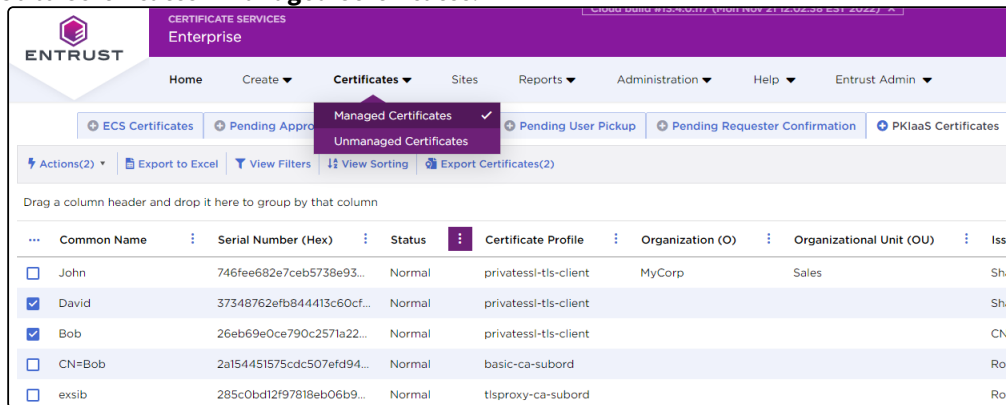
Browsing and downloading certificates

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



...	Common Name	Serial Number (Hex)	Status	Certificate Profile	Organization (O)	Organizational Unit (OU)	Issued
☐	John	746fee682e7ceb5738e93...	Normal	privatessi-tls-client	MyCorp	Sales	Sha
☒	David	37348762efb844413c60cf...	Normal	privatessi-tls-client			Sha
☒	Bob	26eb69e0ce790c2571a22...	Normal	privatessi-tls-client			CN
☐	CN=Bob	2a154451575cdc507efd94...	Normal	basic-ca-subord			Roc
☐	exsib	285c0bd12f97818eb06b9...	Normal	tlsproxy-ca-subord			Roc

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.

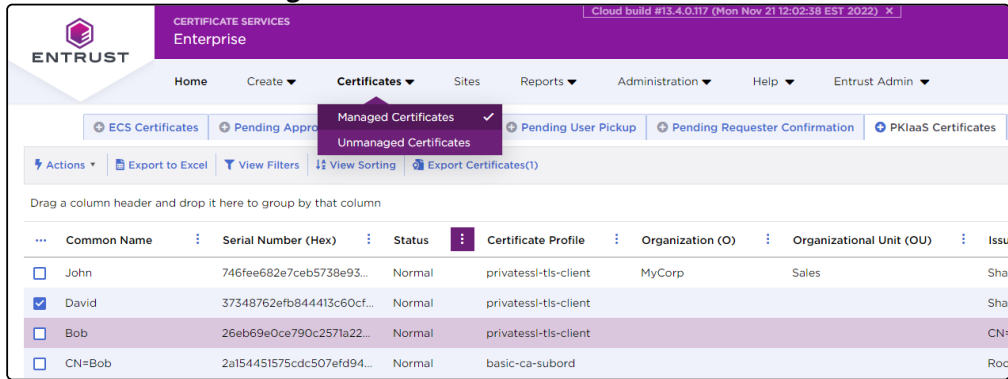
Revoking certificates

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

To revoke a certificate

1. Log into cloud.entrust.net

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



	Common Name	Serial Number (Hex)	Status	Certificate Profile	Organization (O)	Organizational Unit (OU)	Issuer
☐	John	746fee682e7ceb5738e93...	Normal	privatessl-tls-client	MyCorp	Sales	Sha
☒	David	37348762efb844413c60cf...	Normal	privatessl-tls-client			Sha
☐	Bob	26eb69e0ce790c2571a22...	Normal	privatessl-tls-client			CN=
☐	CN=Bob	2a154451575cdc507efd94...	Normal	basic-ca-subord			Roc

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

Revoke

Certificate Profile:

privatessl-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]

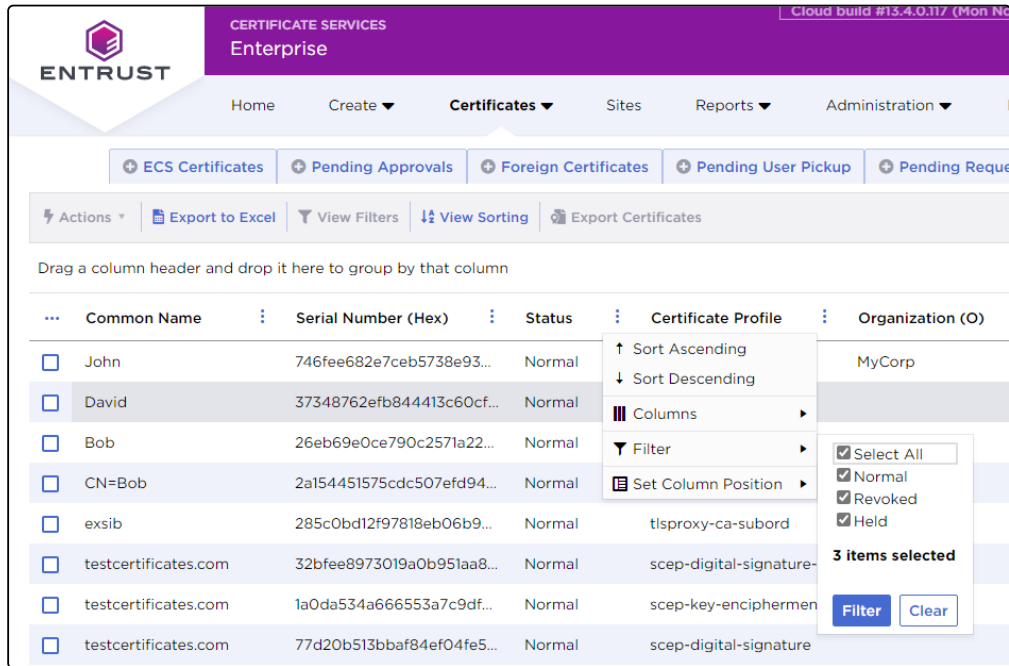
Revocation Comments:

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.

Cancel

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.



The screenshot shows the Entrust Enterprise Certificate Services interface. At the top, there's a navigation bar with 'Home', 'Create', 'Certificates', 'Sites', 'Reports', and 'Administration'. Below this, there are tabs for 'ECS Certificates', 'Pending Approvals', 'Foreign Certificates', 'Pending User Pickup', and 'Pending Request'. A toolbar includes 'Actions', 'Export to Excel', 'View Filters', 'View Sorting', and 'Export Certificates'. A message says 'Drag a column header and drop it here to group by that column'. The main table has columns: 'Common Name', 'Serial Number (Hex)', 'Status', 'Certificate Profile', and 'Organization (O)'. A dropdown menu is open on the 'Certificate Profile' column, showing options: 'Sort Ascending', 'Sort Descending', 'Columns', 'Filter', and 'Set Column Position'. The 'Filter' option is selected, showing a list of checkboxes: 'Select All', 'Normal', 'Revoked', and 'Held'. Three items are selected. The table data includes entries for 'John', 'David', 'Bob', 'CN=Bob', 'exsib', and 'testcertificates.com'.

...	Common Name	Serial Number (Hex)	Status	Certificate Profile	Organization (O)
☐	John	746fee682e7ceb5738e93...	Normal		MyCorp
☐	David	37348762efb844413c60cf...	Normal		
☐	Bob	26eb69e0ce790c2571a22...	Normal		
☐	CN=Bob	2a154451575cdc507efd94...	Normal		
☐	exsib	285c0bd12f97818eb06b9...	Normal	tlsproxy-ca-subord	
☐	testcertificates.com	32bfee8973019a0b951aa8...	Normal	scep-digital-signature-	
☐	testcertificates.com	1a0da534a666553a7c9df...	Normal	scep-key-enciphermen	
☐	testcertificates.com	77d20b513bbaf84ef04fe5...	Normal	scep-digital-signature	

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

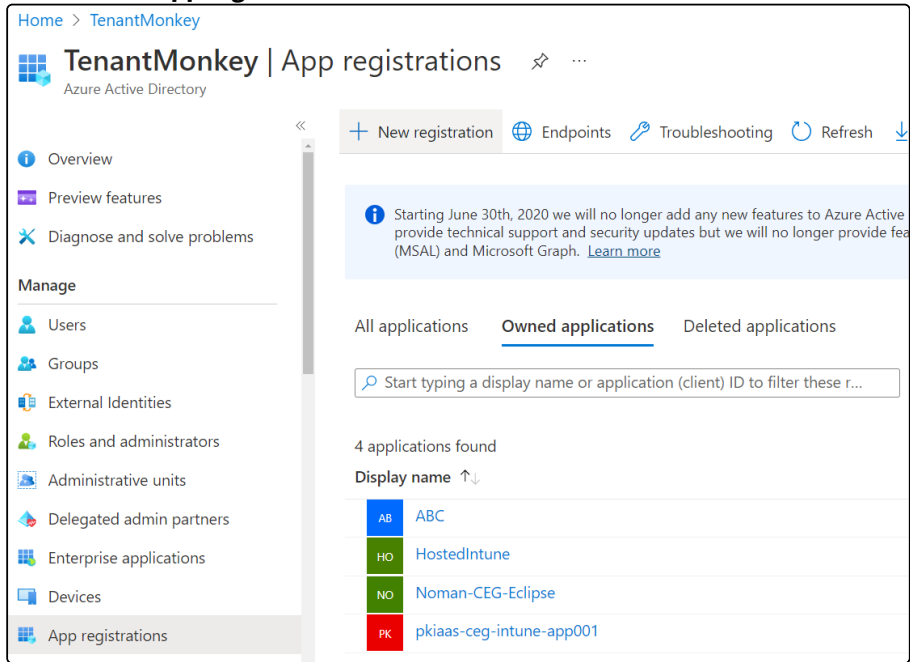
In the Microsoft Azure portal, create an application for running the Intune service.

 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](#).

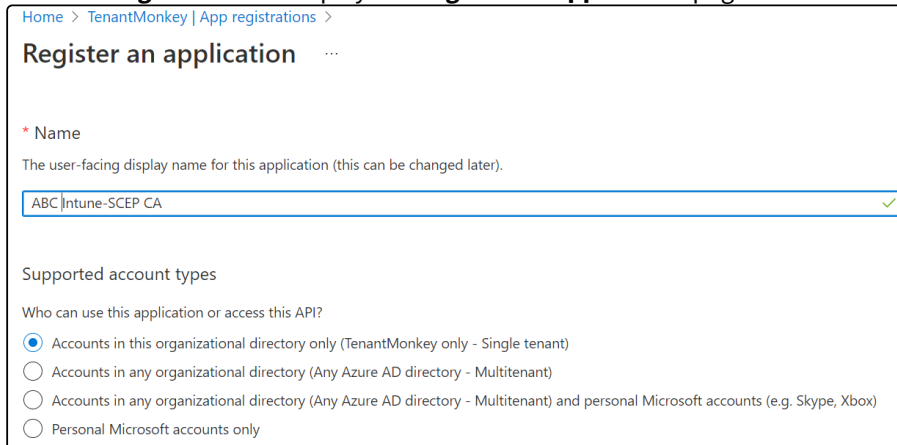
To create an Intune application in Azure

1. Log into portal.azure.com as a user with administrative permissions.

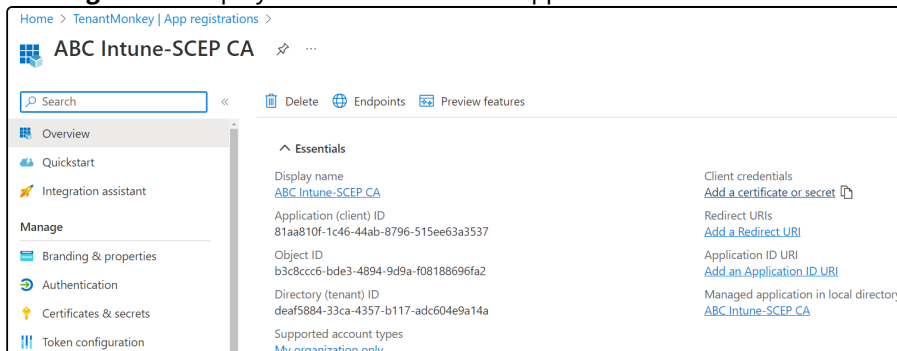
2. Go to **Home > App registrations**.



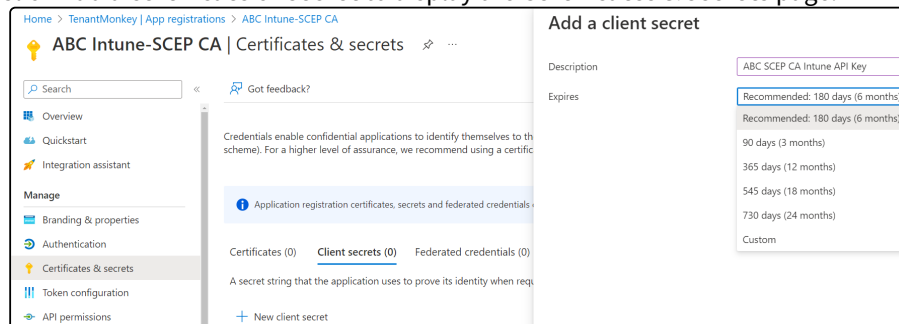
3. Click **New registration** to display the **Register an application** page.



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.

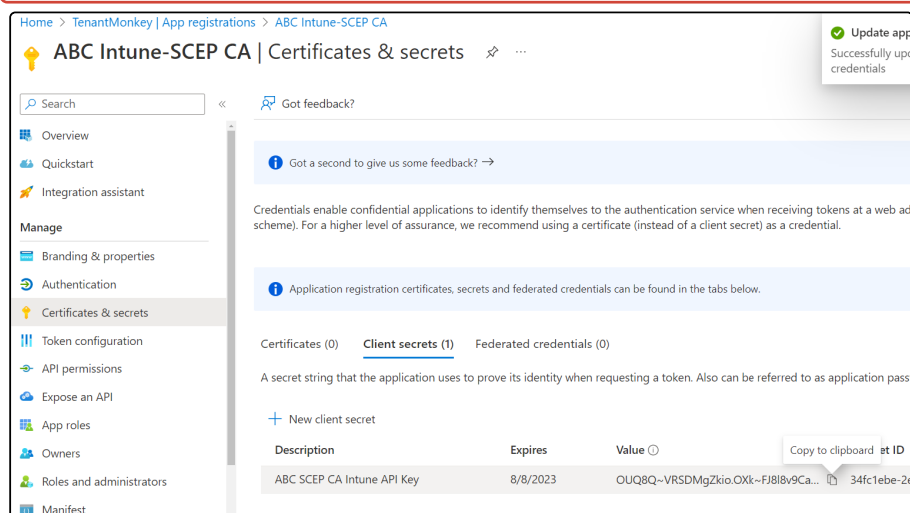


7. Copy the **Application (client) ID** and **Directory (tenant) ID** values in a text file. You will use these values when [Configuring an Entrust-hosted Certificate Enrollment Gateway for Intune](#).
8. Click **Add a certificate or secret** to display the **Certificates & secrets** page.

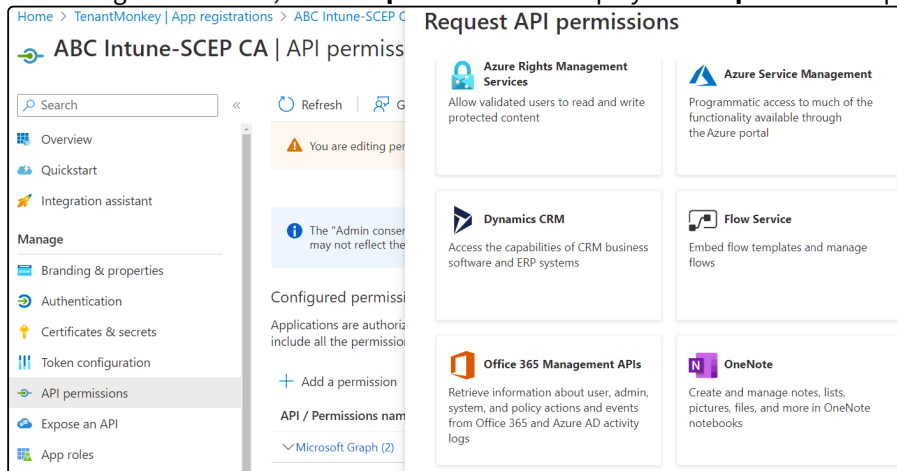


9. Click **New client secret** to display the **Add a client secret** dialog.
10. In the **Description** field, write a description of the new secret.
11. In the **Expires** drop-down list, select the expiration date of the new secret.
12. Click **Add** to add the new secret and close the **Add a client secret** dialog.
13. 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](#).

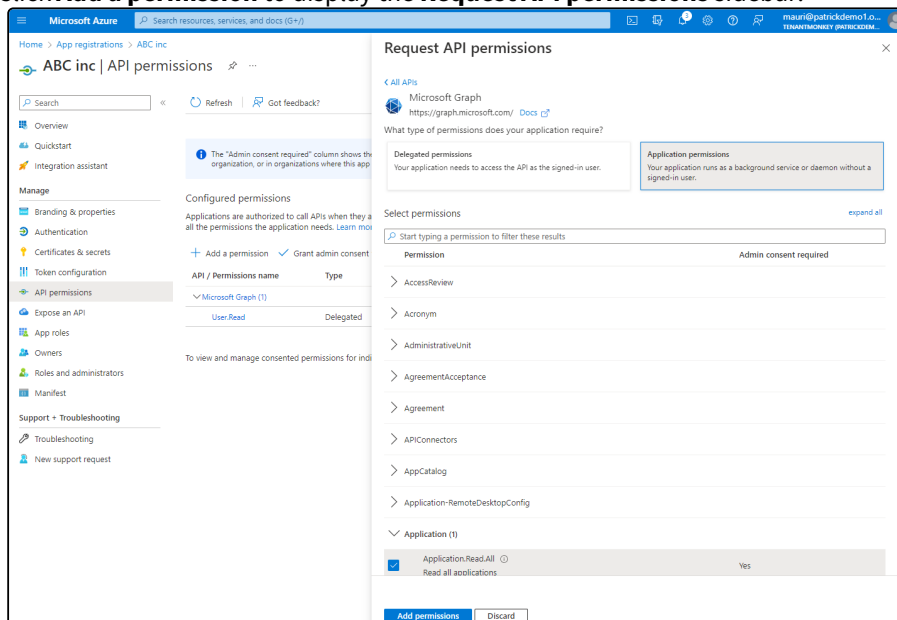
 The secret value will no longer be available after leaving this page.



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.



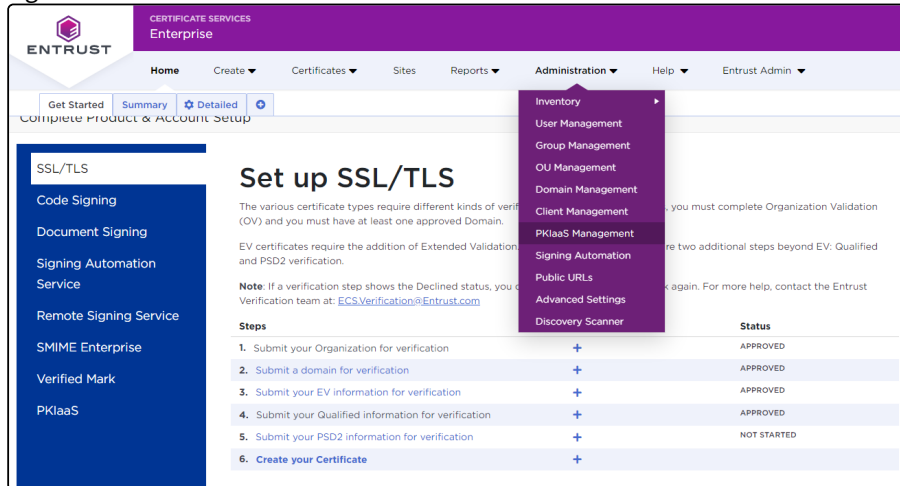
16. In the **Request API permissions** sidebar:
- Click **Microsoft Graph**.
 - Click **Application permissions**.
 - Under **Select permissions**, expand the **Application** list and select the **Application.ReadAll** permissions.
 - Click **Add permissions**.
17. Click **Add a permission** to display 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 an Entrust-hosted Certificate Enrollment Gateway for Intune

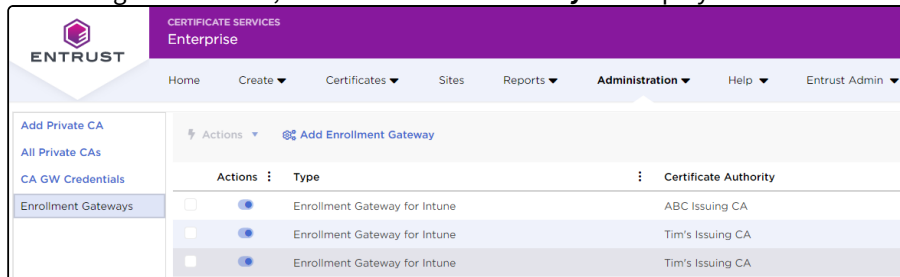
On the Entrust Certificate Services portal, add and configure a Certificate Enrollment Gateway instance to process Intune requests.

To configure Entrust Certificate Enrollment Gateway for Intune

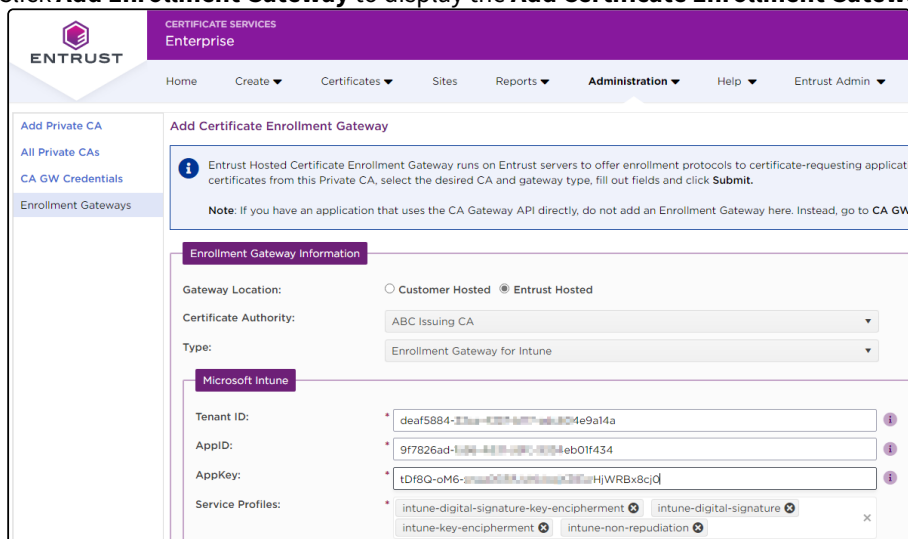
1. Log into cloud.entrust.net



2. In the menu bar, select **Administration > PKIaaS Management**.
3. 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.



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 Entrust Hosted .
Certificate Authority	Select the Certificate Authority described in Configuring an Entrust PKIaaS issuing CA for Intune .
Type	Select Enrollment Gateway for Intune .

Microsoft Intune

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

Setting	Value
Tenant ID	Paste the Directory (tenant) ID value previously obtained when Creating an Intune application in Azure .
AppID	Paste the Application (client) ID value previously obtained when Creating an Intune application in Azure .
AppKey	Paste the secret value previously obtained when Creating an Intune application in Azure .
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.

The screenshot displays the Entrust Enterprise Administration interface. The top navigation bar includes links for Buy, Messages, Support, and Chat. The main menu on the left lists options like Add Private CA, All Private CAs, CA GW Credentials, and Enrollment Gateways. The central panel shows the configuration for an enrollment gateway, including fields for Tenant ID, AppID, AppKey, Profiles, and Intune Service URL.

Field	Value
Gateway Location:	Entrust Hosted
Certificate Authority:	ABC Issuing CA
Enrollment Gateway Type:	Intune
Tenant ID:	deaf3d3e-333e-43c7-a01b-92da14a
AppID:	6137f83e-df33-4296-b090-f2eb98426
AppKey:	OVL6g...RbDK
Profiles:	intune-digital-signature intune-digital-signature-key-encipherment intune-key-encipherment intune-non-repudiation
Intune Service URL:	https://intune.pkiaas.entrust.com/intune/sccep/ecscmcn13/intune-digital-signature https://intune.pkiaas.entrust.com/intune/sccep/ecscmcn13/intune-digital-signature-key-encipherment https://intune.pkiaas.entrust.com/intune/sccep/ecscmcn13/intune-key-encipherment https://intune.pkiaas.entrust.com/intune/sccep/ecscmcn13/intune-non-repudiation

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>

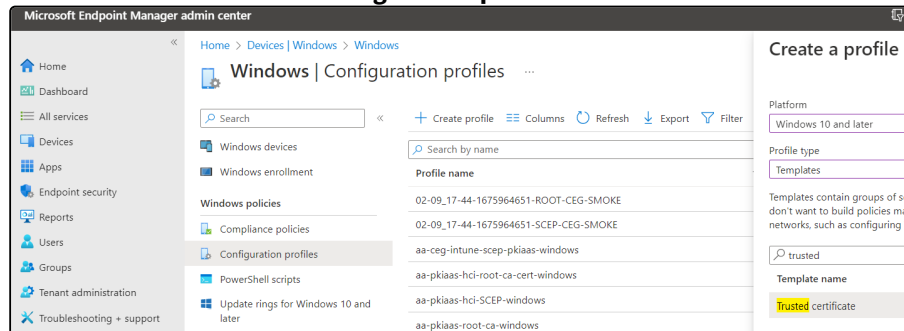
Creating Intune profiles for Windows in Azure

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 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.

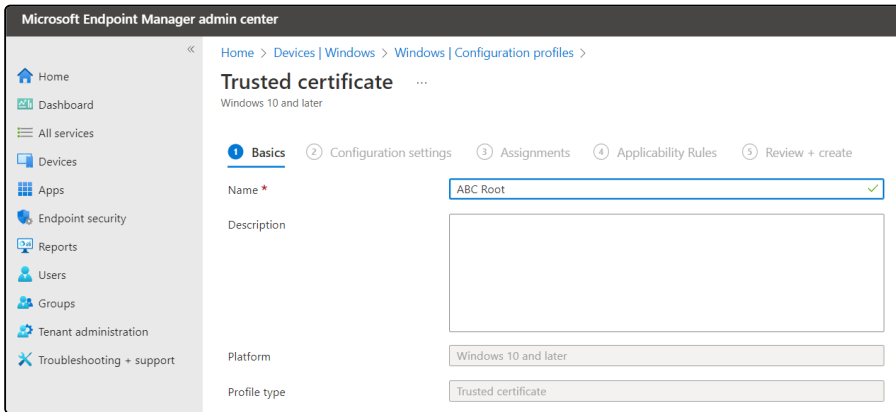
Setting	root CA profile	issuing CA profile	SCEP profile
Platform	Windows 10 and later	Windows 10 and later	Windows 10 and later
Profile type	Templates	Templates	Templates
Template name	Trusted certificate	Trusted certificate	SCEP certificate

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.

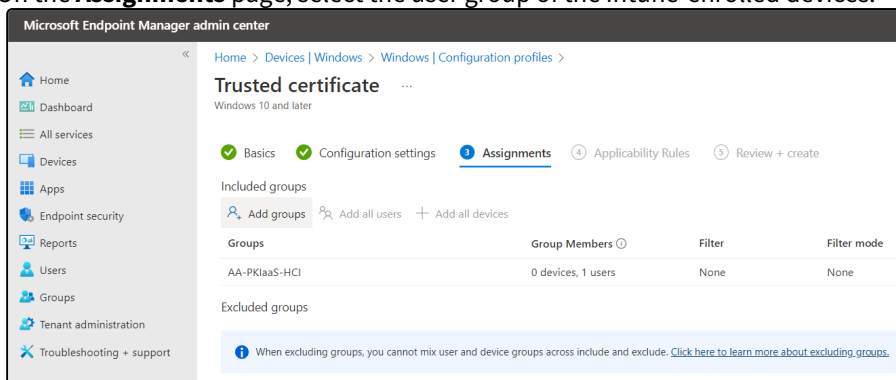
When creating a SCEP profile for Windows, configure the following settings on the **Configuration settings** page.

Setting	Value
Certificate type	Select User .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep
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 Enroll to Software KSP 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 2048 (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select SHA-2 .
Root certificate	Select the root CA profile
Extended key usage	Select Client Authentication .
SCEP Server URLs	Paste one of the URLs obtained when Getting the Intune Service URL .

Assignments

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



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.

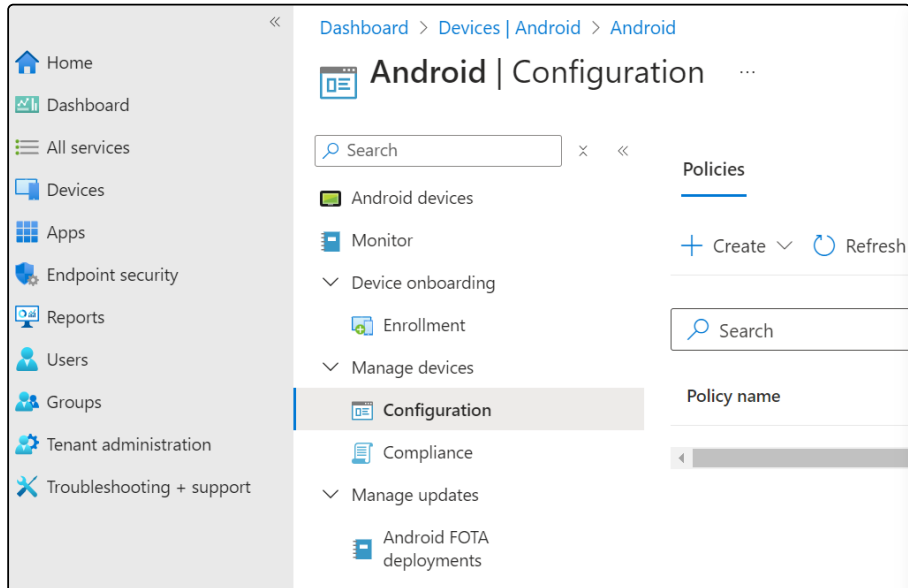
Creating Intune profiles for Android in Azure

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 as a user with administrative privileges.
2. Go to **Devices > Android**.



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

Create a profile

Platform
Android Enterprise

Profile type
Trusted certificate

Import the trusted root certificate from your Certification Authority and assign it to devices that use SCEP and PCKS certificates to authenticate with your org's resources.

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

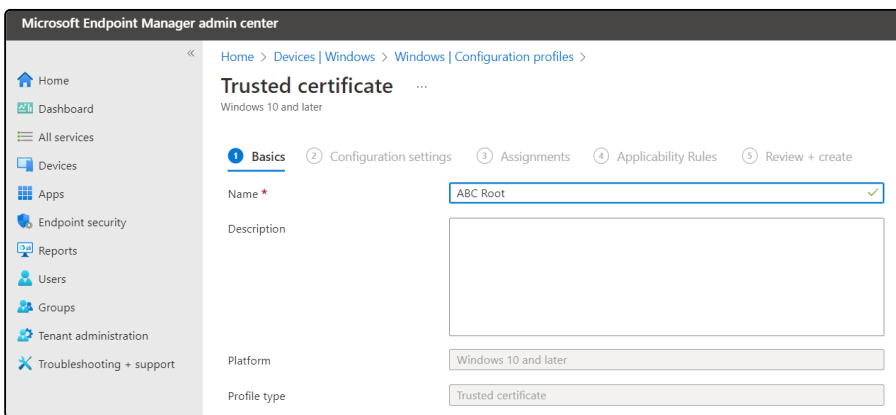
Setting	Root CA profile	Issuing CA profile	SCEP profile
Profile type	Trusted certificate	Trusted certificate	SCEP certificate

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.



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.

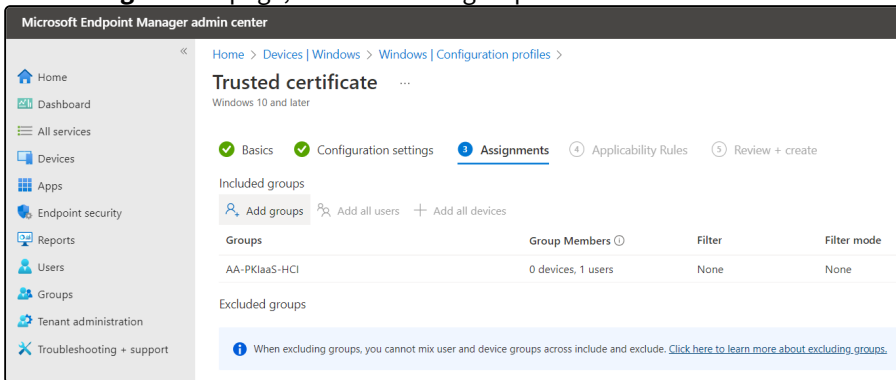
When creating a SCEP profile for Android, configure the following settings on the **Configuration settings** page.

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

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 2048 or 4096 (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select SHA-2 .
Root certificate	Select the root CA profile
Extended key usage	Select Client Authentication .
SCEP Server URLs	Paste one of the URLs obtained when Getting the Intune Service URL .

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
 3 Assignments
 4 Applicability Rules
 5 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.](#)

Review and create

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

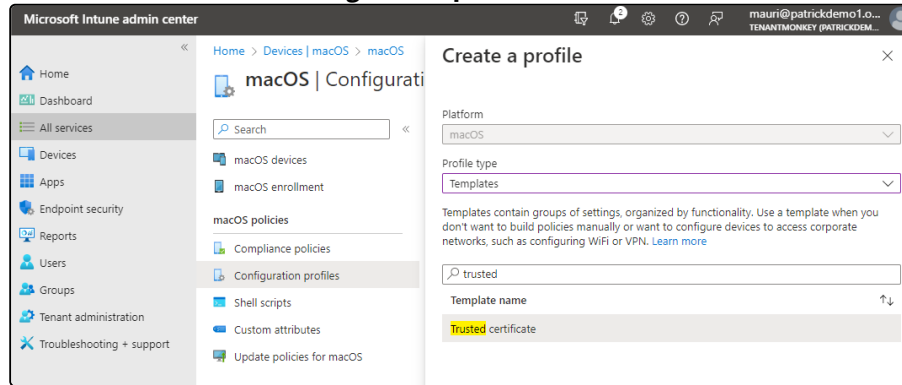
Creating Intune profiles for MacOS in Azure

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 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

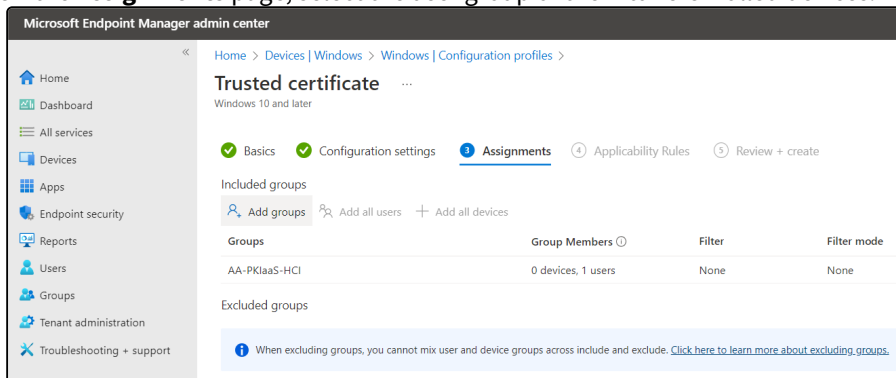
 See [Downloading a CA certificate](#) to download CA certificates.

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

Setting	Value
Certificate type	Select User .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep
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 2048 or 4096 (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select SHA-2 .
Root certificate	Select the root CA profile.
Extended key usage	Select Client Authentication .
SCEP Server URLs	Paste one of the URLs obtained when Getting the Intune Service URL .

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.](#)

Review and create

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

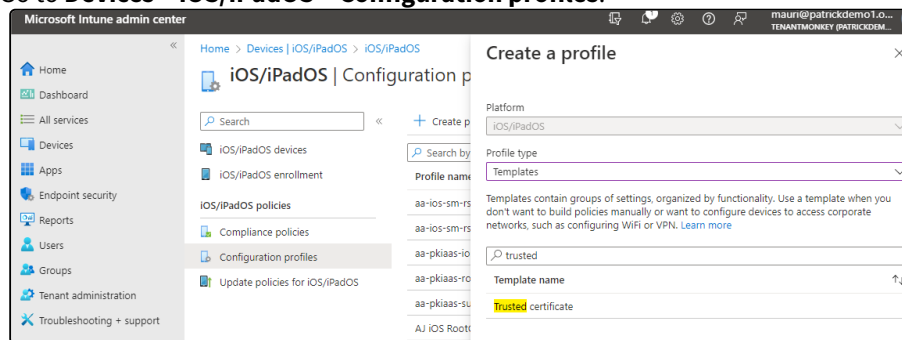
Creating Intune profiles for iOS and iPadOS in Azure

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 an iOS or iPadOS profile for Intune

1. Log into 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

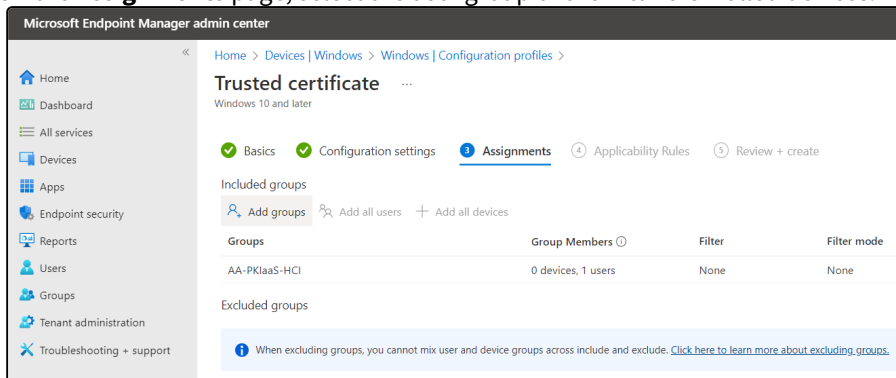
 See [Downloading a CA certificate](#) to download CA certificates.

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

Setting	Value
Certificate type	Select User .
Subject name format	The syntax of the certificate subject names. This field supports the variables described in https://learn.microsoft.com/en-us/mem/intune/protect/certificates-profile-scep
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 2048 or 4096 (Entrust PKIaaS does not support key sizes below 2048).
Hash algorithm	Select SHA-2 .
Root certificate	Select the root CA profile.
Extended key usage	Select Client Authentication .
SCEP Server URLs	Paste one of the URLs obtained when Getting the Intune Service URL .

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

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, if iOS, iPad, or macOS device certificates could not auto-renew during the renewal window, 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

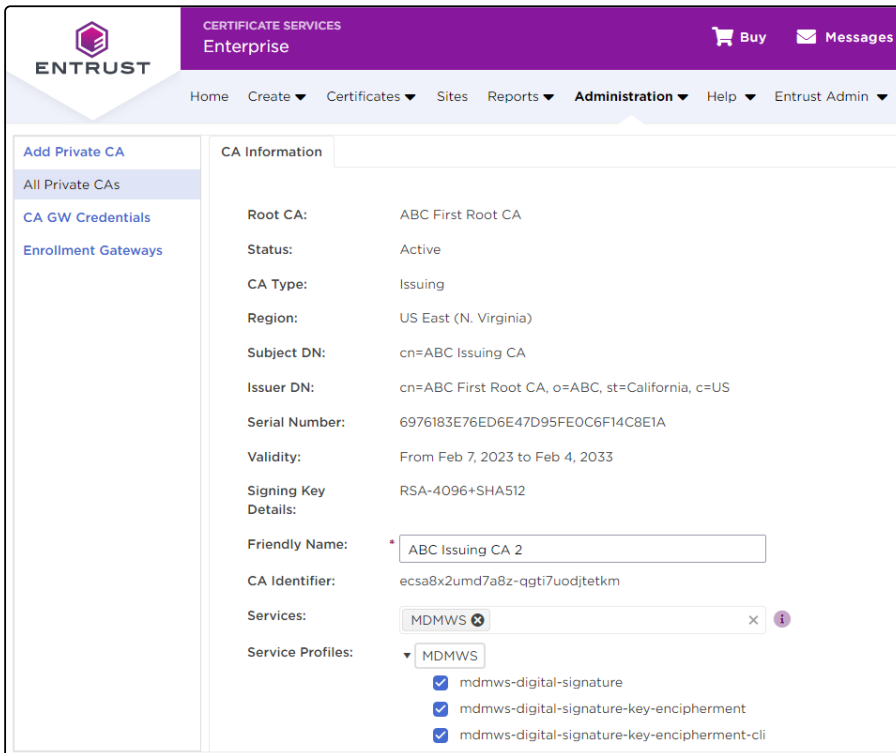
Configure an Entrust-hosted Enrollment Gateway for MDM enrollment.

- [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 Entrust Certificate Services Enterprise portal. The left sidebar contains links: **Add Private CA**, **All Private CAs**, **CA GW Credentials**, and **Enrollment Gateways**. The main content area is titled **CA Information** and displays the following details for a Private CA:

- 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-qgti7uodjdetkm
- Services:** MDMWS (with a dropdown arrow and an info icon)
- Service Profiles:**
 - ☒ mdmws-digital-signature
 - ☒ mdmws-digital-signature-key-encipherment
 - ☒ mdmws-digital-signature-key-encipherment-cii

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](#)

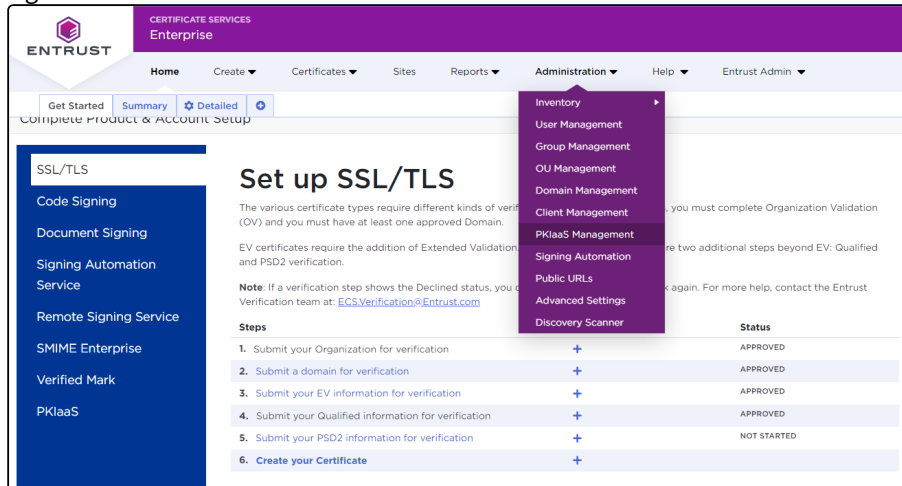
 See [Downloading a CA certificate](#) to download CA certificates from the Entrust Certificate Services Enterprise portal.

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.

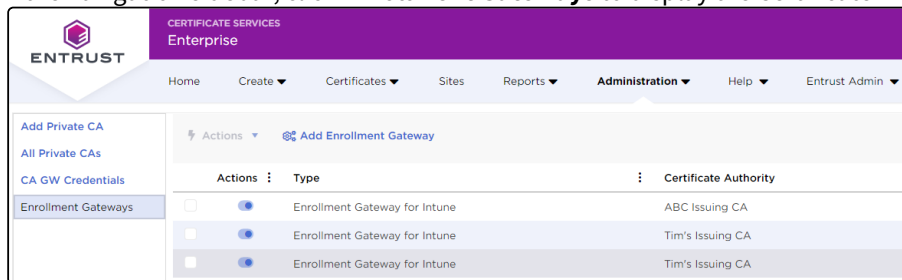
To configure Entrust Certificate Enrollment Gateway for MDM

1. Log into cloud.entrust.net



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 qualified information for verification. The status of each step is shown as 'APPROVED' or 'NOT STARTED'.

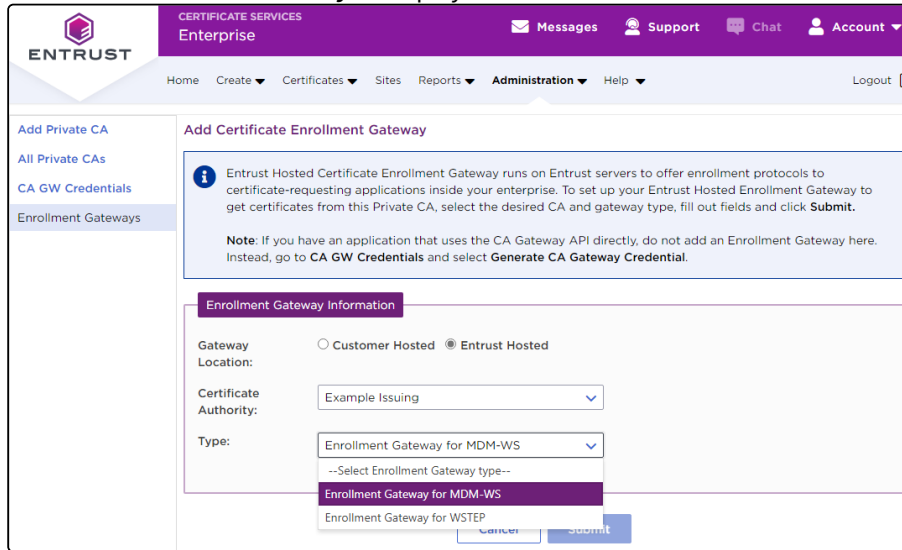
2. In the menu bar, select **Administration > PKIaaS Management**.
3. In the navigation sidebar, click **Enrollment Gateways** to display the Certificate Enrollment Gateway list.



The screenshot shows the 'Enrollment Gateways' list in the Entrust Certificate Services Enterprise portal. The list displays three enrollment gateway instances, all of which are 'Enrollment Gateway for Intune' and are associated with 'ABC Issuing CA', 'Tim's Issuing CA', and 'Tim's Issuing CA'.

Actions	Type	Certificate Authority
☐ 	Enrollment Gateway for Intune	ABC Issuing CA
☐ 	Enrollment Gateway for Intune	Tim's Issuing CA
☐ 	Enrollment Gateway for Intune	Tim's Issuing CA

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



ENTRUST CERTIFICATE SERVICES Enterprise

Home Create Certificates Sites Reports Administration Help Logout

Add Private CA
All Private CAs
CA GW Credentials
Enrollment Gateways

Add Certificate Enrollment Gateway

i Entrust Hosted Certificate Enrollment Gateway runs on Entrust servers to offer enrollment protocols to certificate-requesting applications inside your enterprise. To set up your Entrust Hosted Enrollment Gateway to get certificates from this Private CA, select the desired CA and gateway type, fill out fields and click **Submit**.

Note: If you have an application that uses the CA Gateway API directly, do not add an Enrollment Gateway here. Instead, go to **CA GW Credentials** and select **Generate CA Gateway Credential**.

Enrollment Gateway Information

Gateway Location: ☐ Customer Hosted ☒ Entrust Hosted

Certificate Authority:

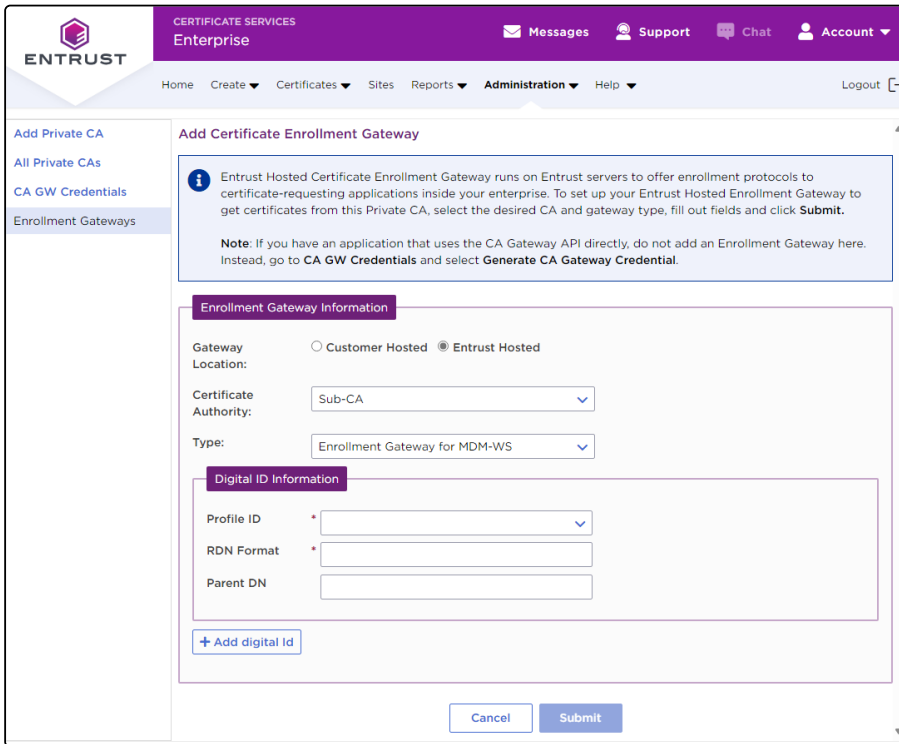
Type:

Enrollment Gateway for MDM-WS
Enrollment Gateway for WSTEP

- 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:

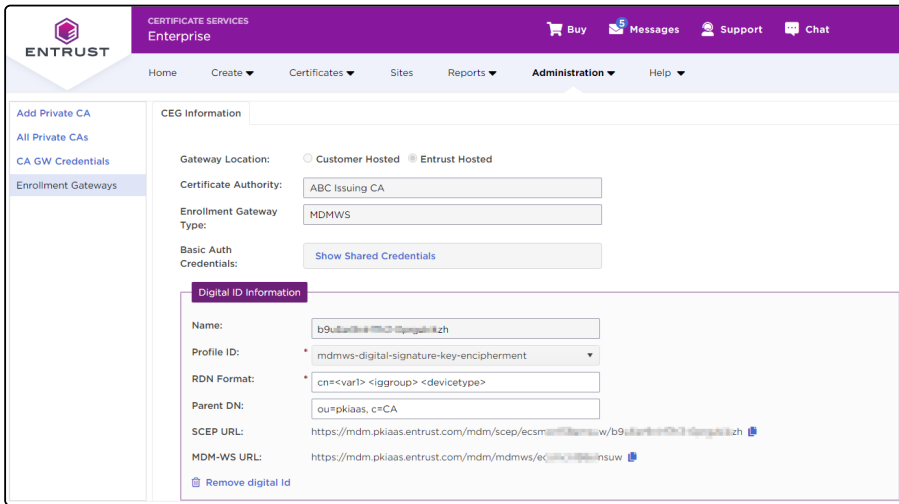
```
CN=<igusername> <iggroup> <devicetype>
```

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.



CERTIFICATE SERVICES Enterprise

Home Create Certificates Sites Reports Administration Help

Enrollment Gateways

CEG Information

Gateway Location: ☐ Customer Hosted ☒ Entrust Hosted

Certificate Authority: ABC Issuing CA

Enrollment Gateway Type: MDMWS

Basic Auth Credentials: [Show Shared Credentials](#)

Digital ID Information

Name: b9u4ar3e-3gpaibkzh

Profile ID: * mdmws-digital-signature-key-encipherment

RDN Format: * cn=<var> <iggroup> <devicetype>

Parent DN: ou=pkiaas, c=CA

SCEP URL: https://mdm.pkiaas.entrust.com/mdm/scep/ecsm/b9u4ar3e-3gpaibkzh

MDM-WS URL: https://mdm.pkiaas.entrust.com/mdm/mdmws/ecsm/b9u4ar3e-3gpaibkzh

[Remove digital Id](#)

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](#)

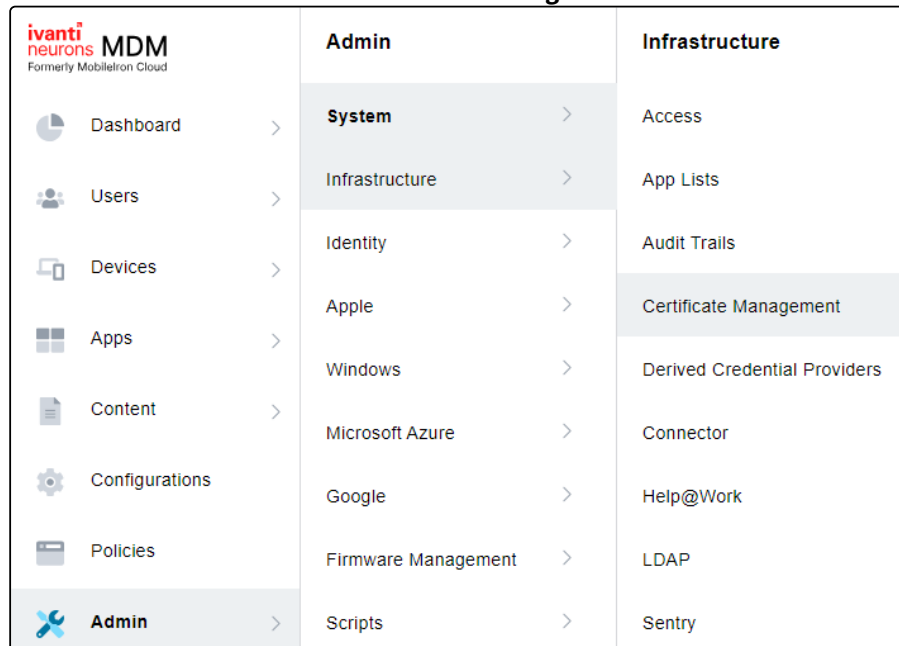
Adding Entrust as issuing certificate authority in Ivanti Neurons MDM

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

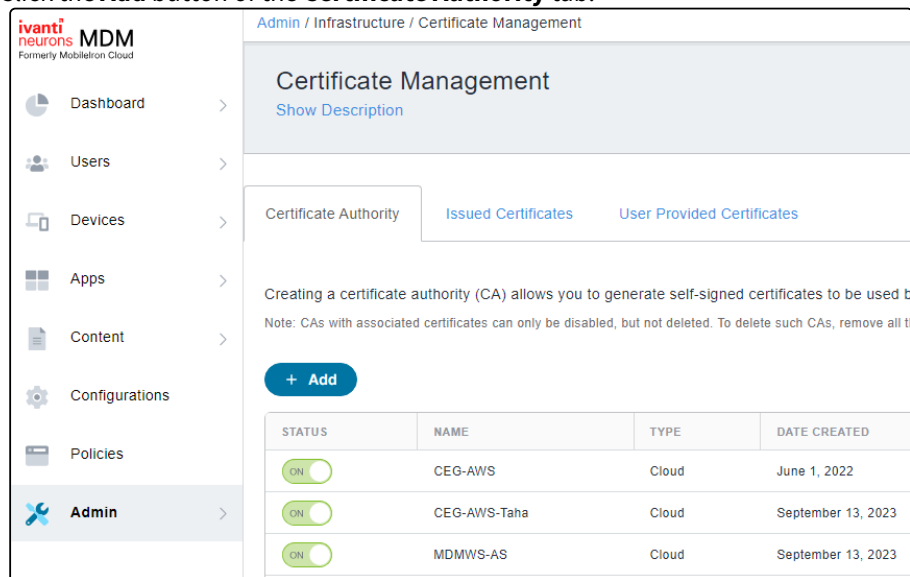
To add Entrust as issuing certificate authority in Ivanti Neurons

1. Log into the Ivanti Neurons portal.

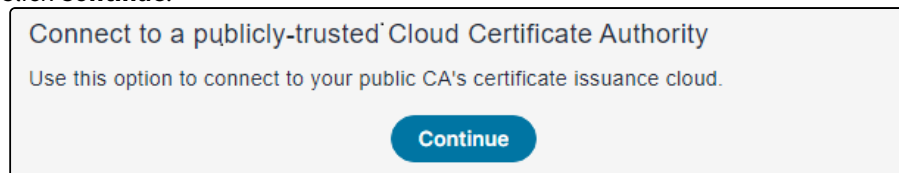
2. Go to **Admin > Infrastructure > Certificate Management**.



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

?

Enter Username

?

Enter Password

?

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

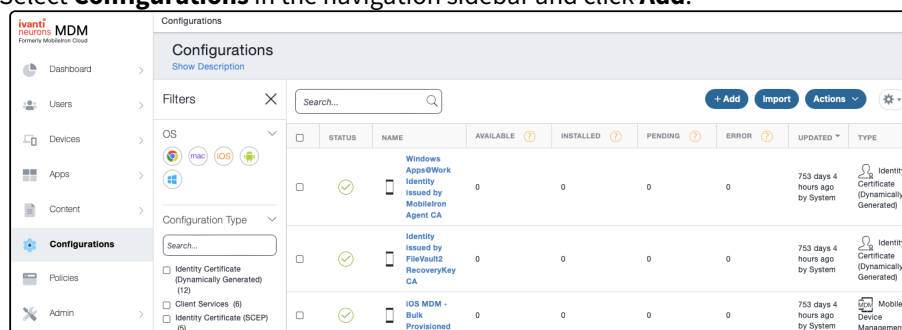
Repeat the steps below to add the certificates of the following certificate authorities.

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

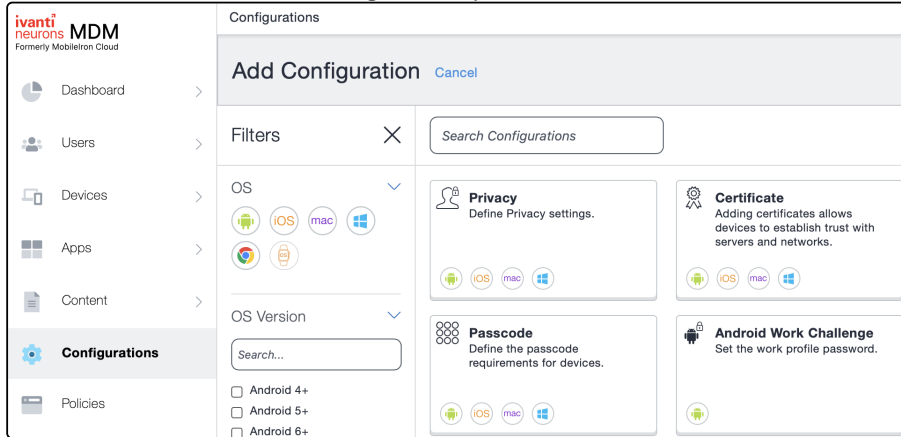
 See [Downloading a CA certificate](#) for how to download both certificates.

To add a CA certificate in Ivanti Neurons MDM

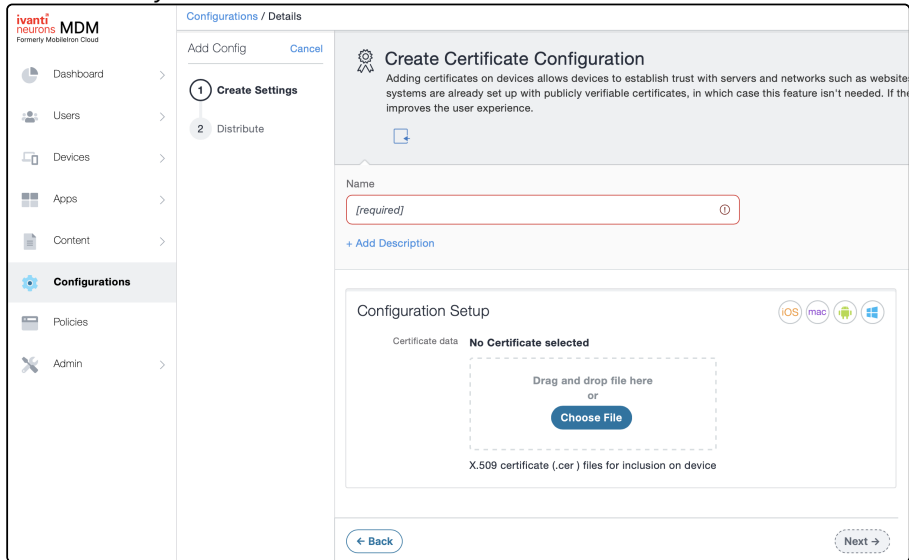
1. Log into the Ivanti Neurons portal.
2. Select **Configurations** in the navigation sidebar and click **Add**.



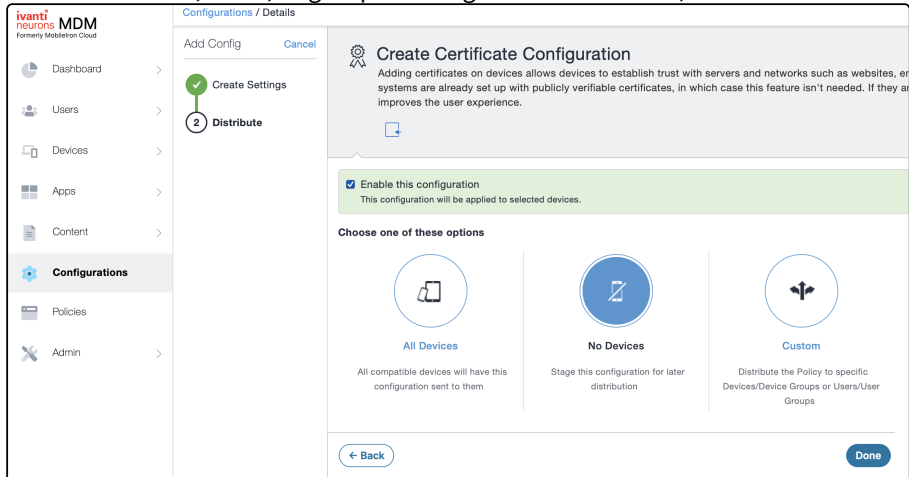
- Click **Certificate** in the Add **Configuration** pane.



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



- Click **Choose file** under **Configuration Setup**, import the certificate file, and click **Next**.
- Select the devices, users, or groups to assign the certificate to, and click **Done**.

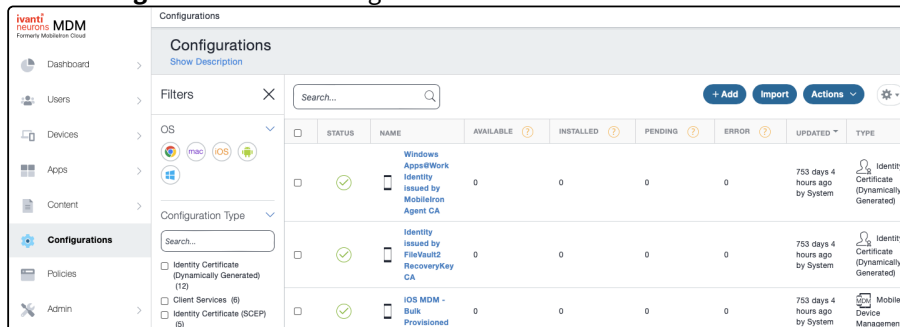


Adding an identity certificate in Ivanti Neurons MDM

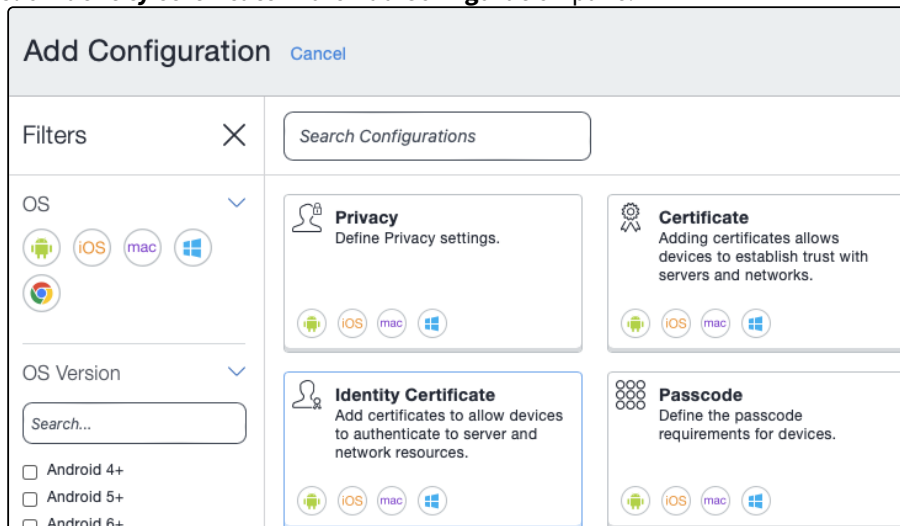
Add an identity certificate in Ivanti Neurons to automate MDM enrollment.

To add an identity certificate in Ivanti Neurons

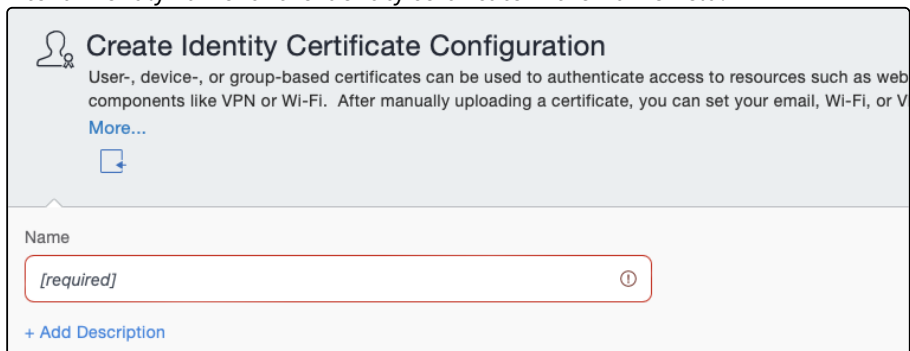
1. Log into the Ivanti Neurons portal.
2. Select **Configurations** in the navigation sidebar and click **Add**.



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

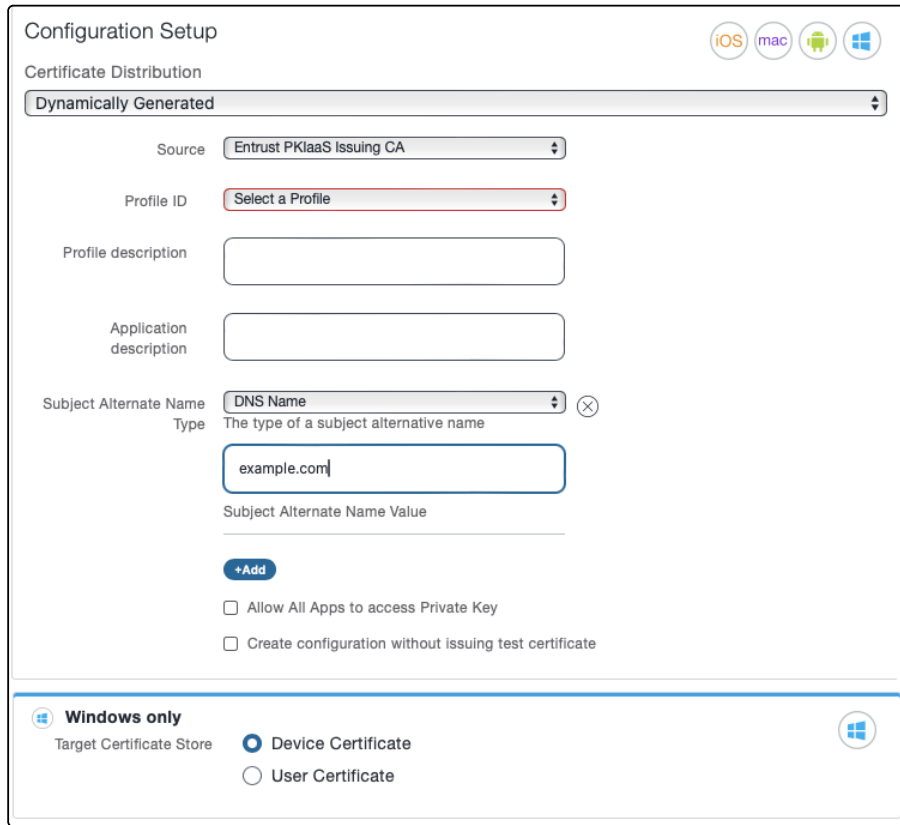


4. Enter a friendly name for the identity certificate in the **Name** field.



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: Entrust PKIaaS Issuing CA

Profile ID: Select a Profile

Profile description:

Application description:

Subject Alternate Name Type: DNS Name

The type of a subject alternative name

example.com

Subject Alternate Name Value

+Add

☐ 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

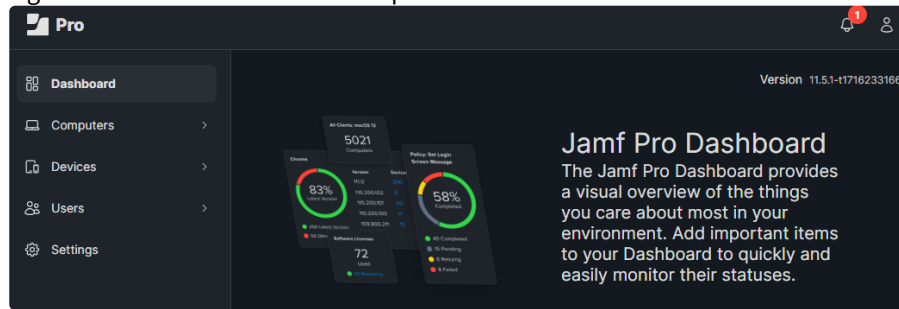
Jamf is a cloud service for managing Apple devices such as Mac, iPad, or iPhone. When enrolling these devices, the SCEP Payload must include the settings described in:

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

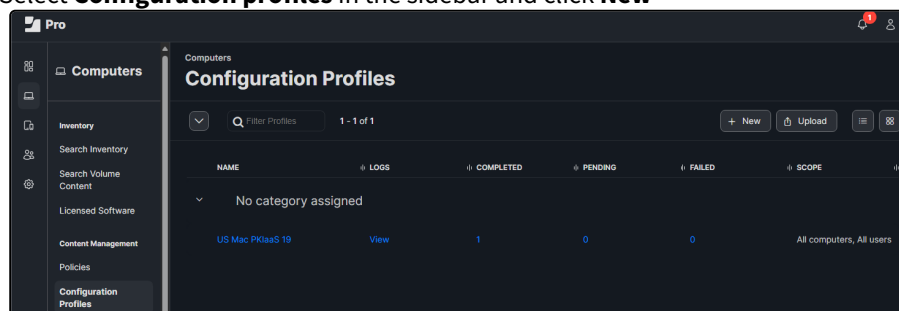
If using Jamf as MDM provider, configure and install a profile as described below.

To configure and install a MDM profile in Jamf

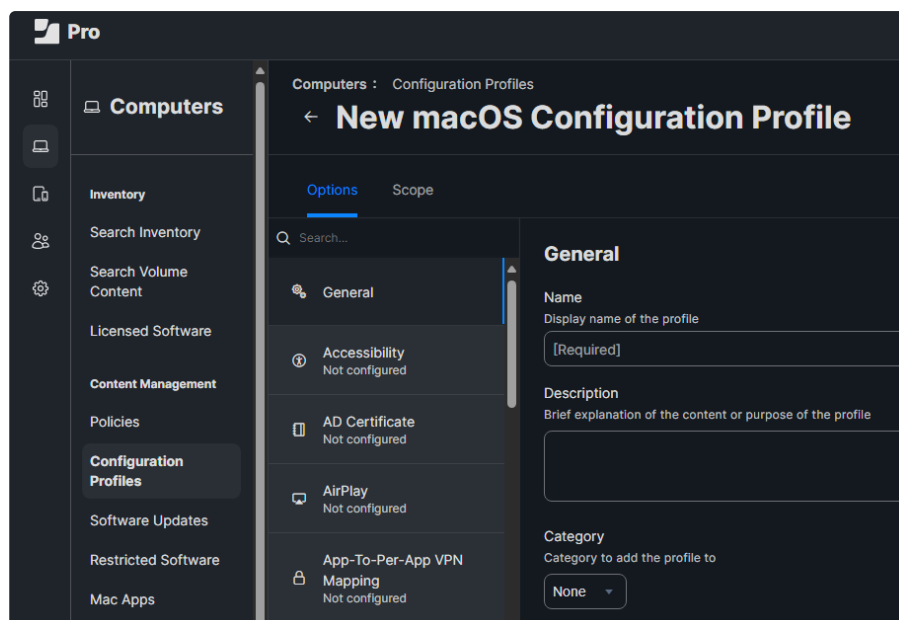
1. Login into the Jamf administration portal.



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 Device Level .	✓
Distribution Method	Select Install Automatically .	✓

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 Upload	✓
Certificate	Upload the certificate file obtained when Downloading the Entrust PKIaaS root CA certificate for MDM .	✓

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	https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Computer_Configuration_Profiles.html#ariaid-title2
Payload Variables for Device Configuration Profiles	https://learn.jamf.com/bundle/jamf-pro-documentation-current/page/Mobile_Device_Configuration_Profiles.html#ariaid-title3

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 ciphering 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.	Workspace One: 1. Requests challenge passwords from the MDMWS API of the Entrust CA. 2. Provides the challenge password to the managed devices. The devices embed the challenge password into the CSR for SCEP enrollment.
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	Temporarily broken because Workspace One: • Sends an incorrect SCEP URL to the managed devices • Ignores the custom variables of the RDN Format selected when Adding digital identifiers to a Certificate Enrollment Gateway for MDM. We are working with Workspace One to fix this.

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](#)

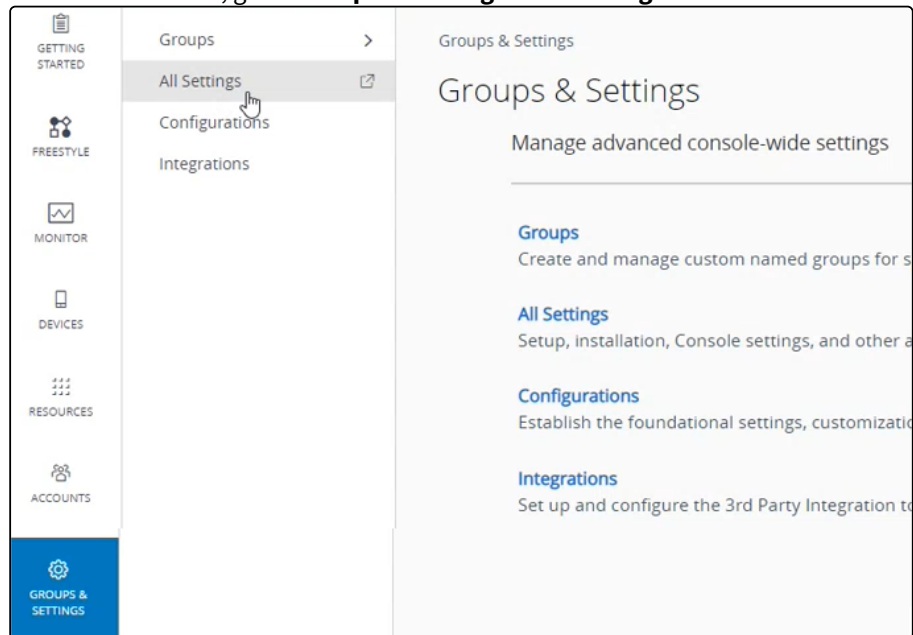
Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE

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

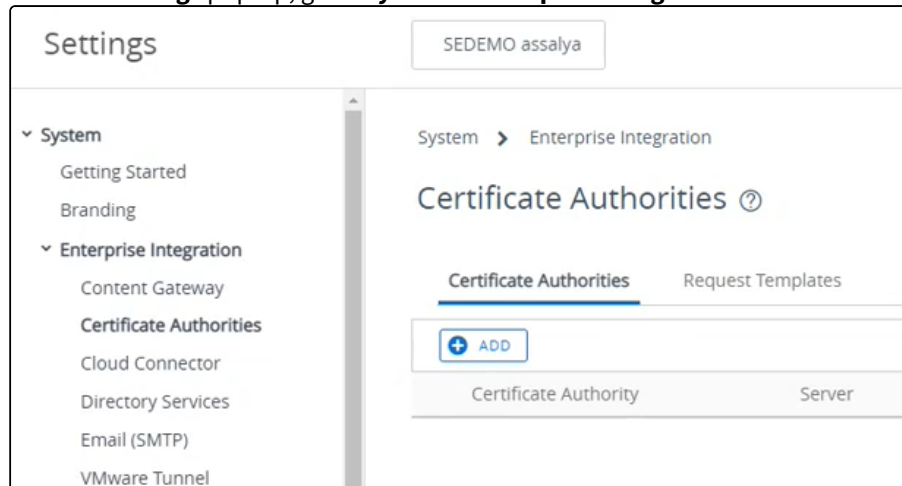
To add a Certificate Authority and a request template

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

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



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



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

Certificate Authorities

In the **Certificate Authorities** tab:

1. Click **ADD**.
2. 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} +
var2	{EmailAddress} +

{EmailDomain}	domain
{EmailUserName}	User Email Username
{EmailAddress}	User Email Address
{EnrollmentUser}	Username
{EnrollmentUserId}	User ID

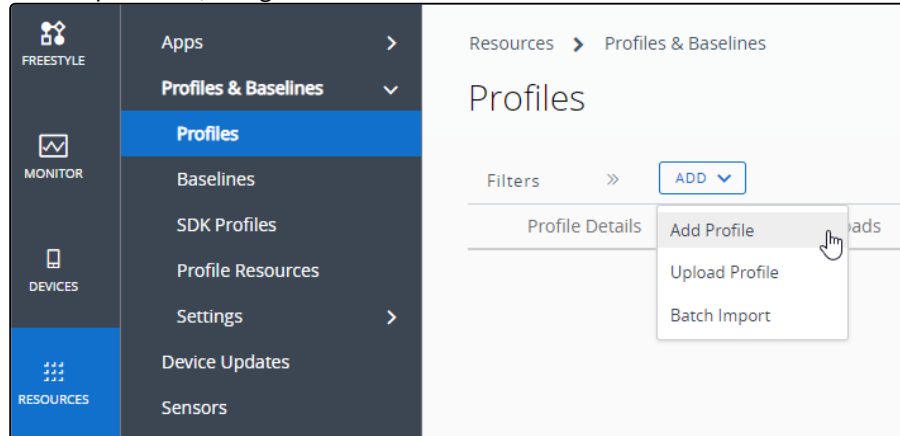
Adding a profile for trusted certificates in VMware Workspace ONE

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

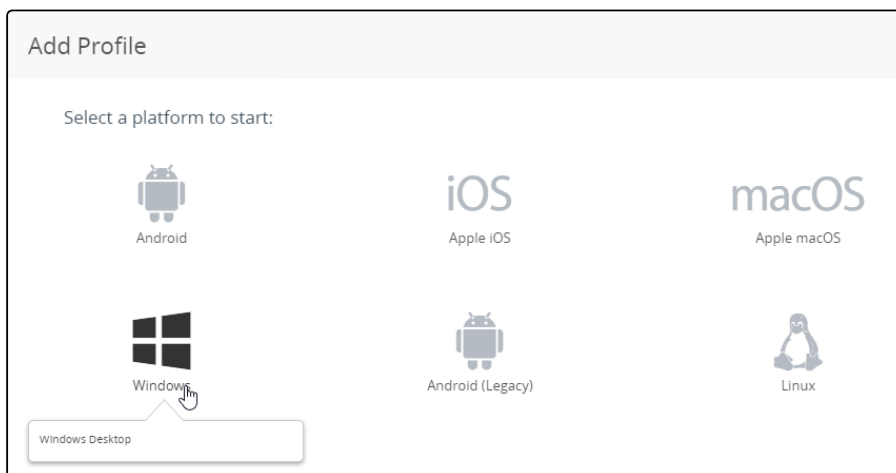
1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



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](#)

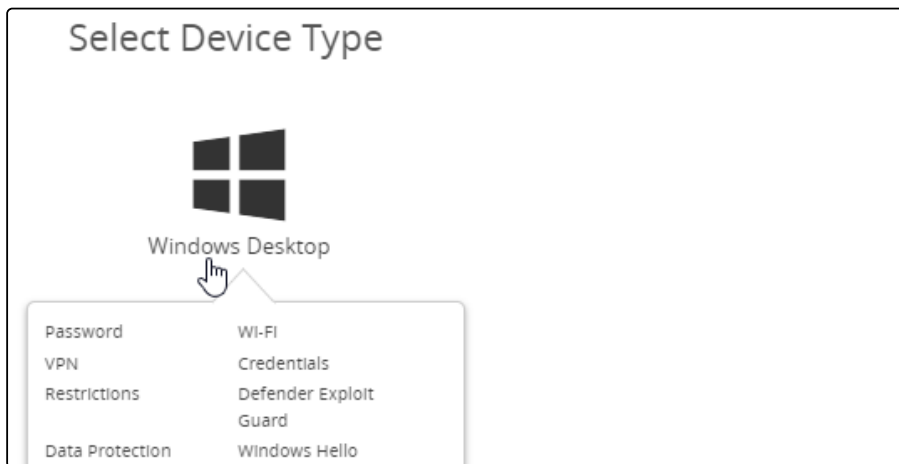
Add Profile

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



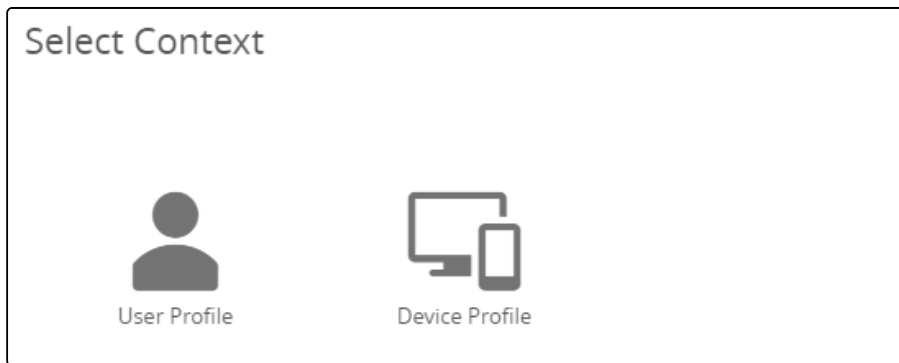
Select Device Type

Click on the type of enrolled device.



Select Context

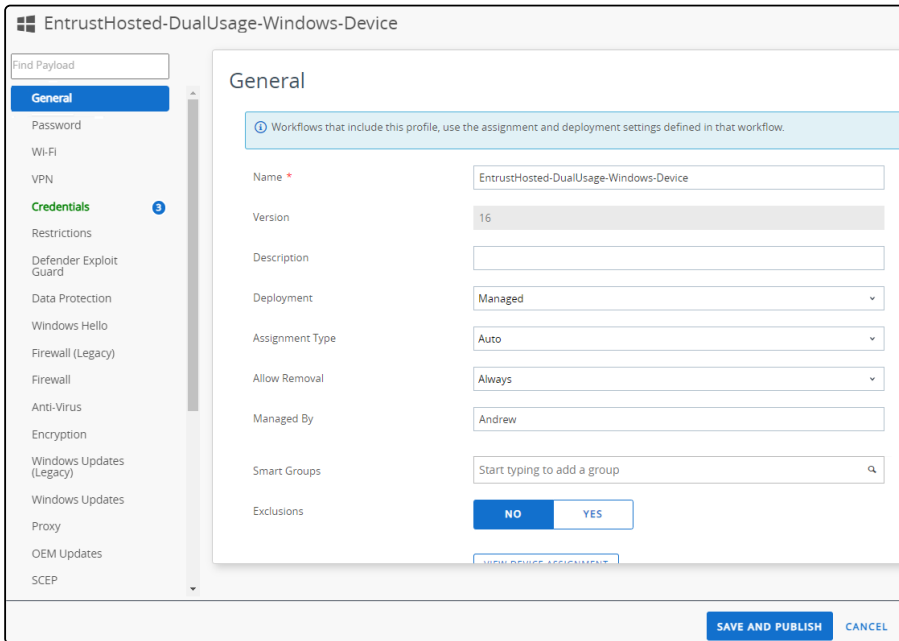
Click on **Device Profile** to enroll devices.



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.

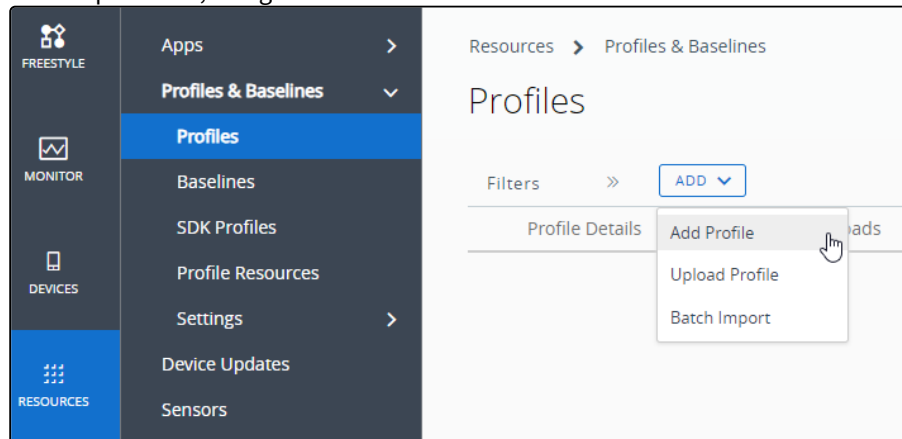
Field	Value
Credential Source	Select Defined Certificate Authority .
Certificate	Upload separately the certificates of the root and issuing CAs.
Certificate Store	Select Trusted Root .

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

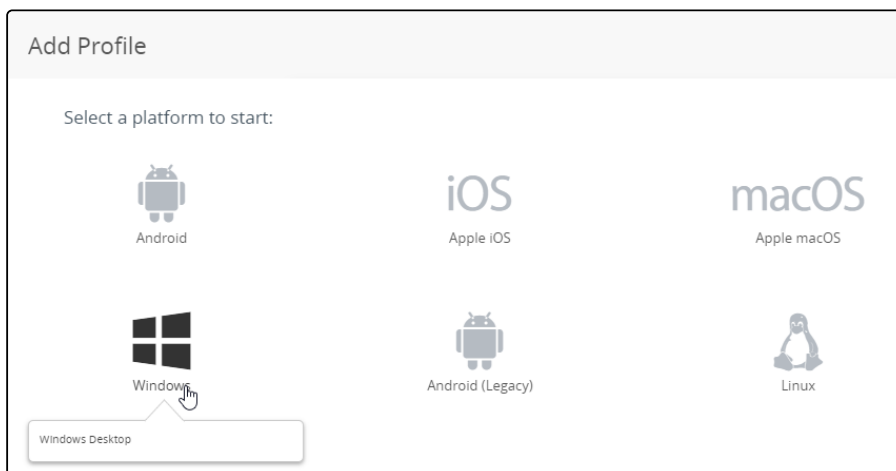
1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



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](#)

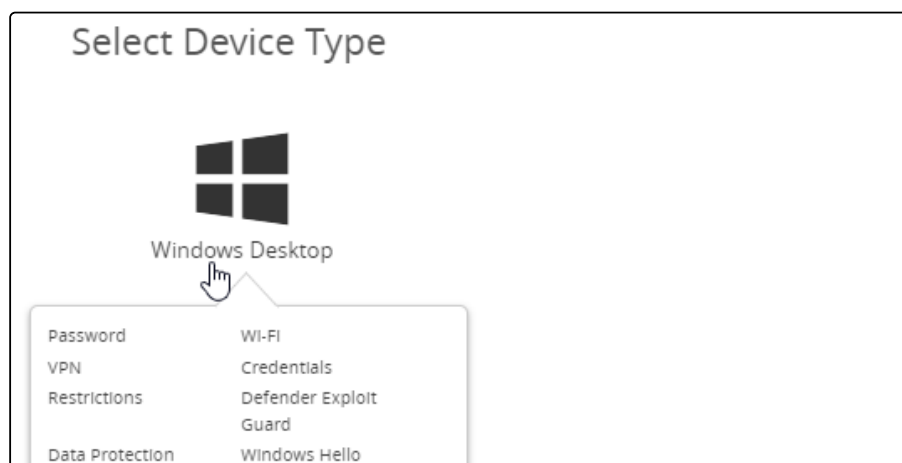
Add Profile

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



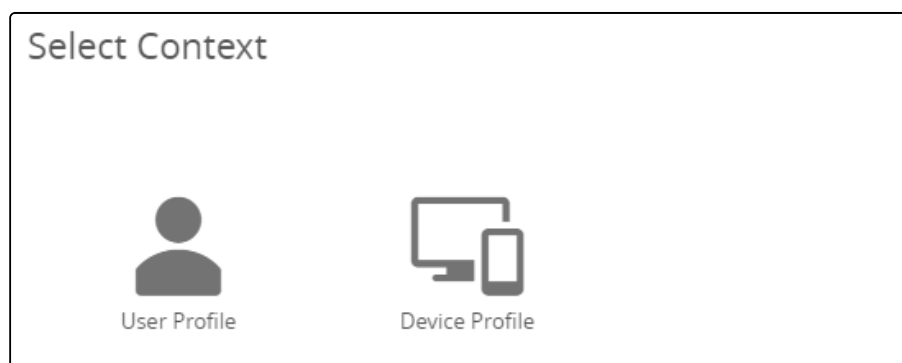
Select Device Type

Click on the type of enrolled device.



Select Context

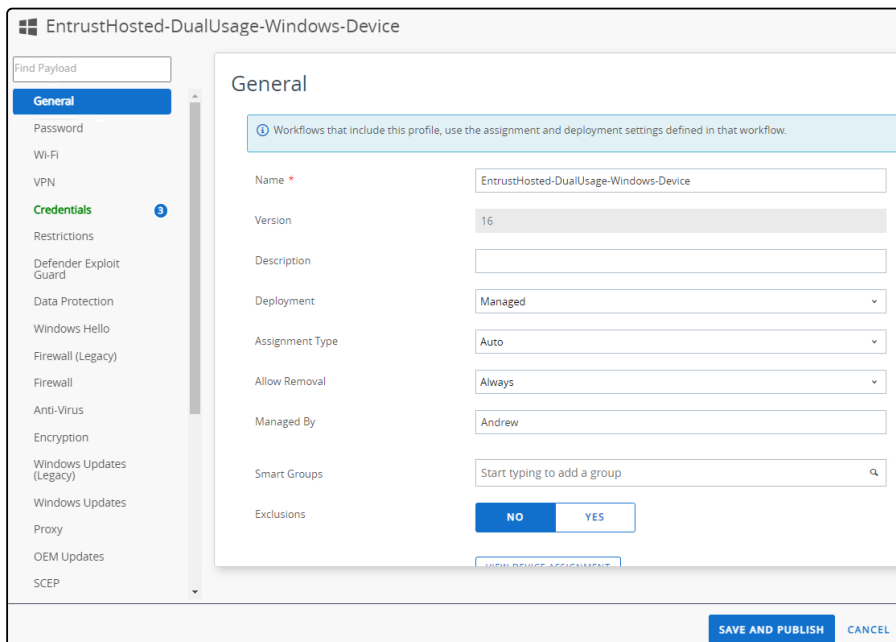
Click on **User Profile** to enroll users or **Device Profile** to enroll devices.



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.



Credentials

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

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

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

Field	Value
Credential Source	Select Defined Certificate Authority .
Certificate Authority	Select the CA configured in Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE .
Certificate Template	Select the request template configured in Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE .

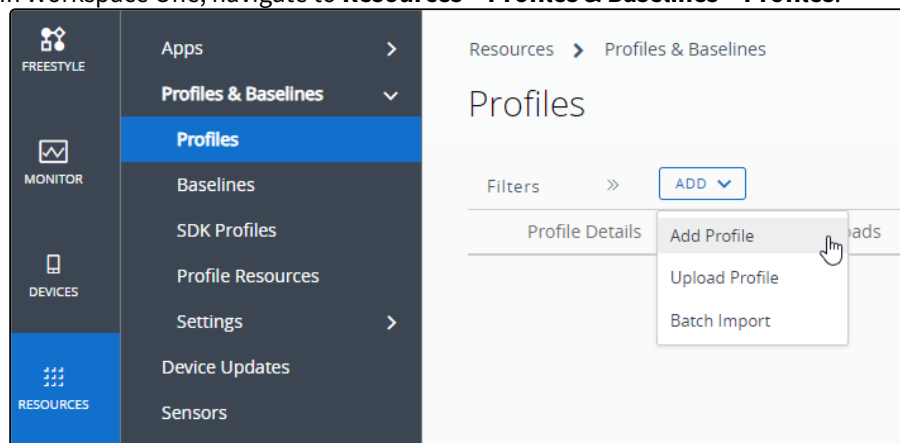
Field	Value
Key Location	Specify the location for the issued certificate: Software or Hardware .
Certificate Store	Enter the name of the certificate store.

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

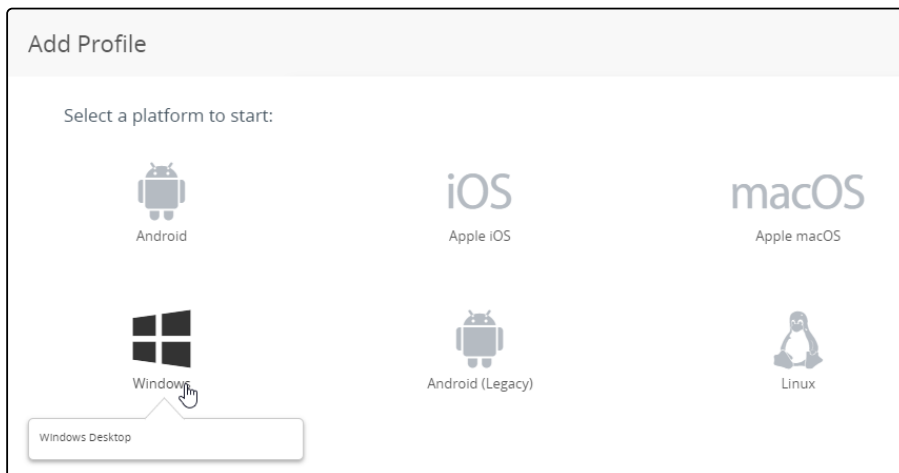
1. In Workspace One, navigate to **Resources > Profiles & Baselines > Profiles**.



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](#)

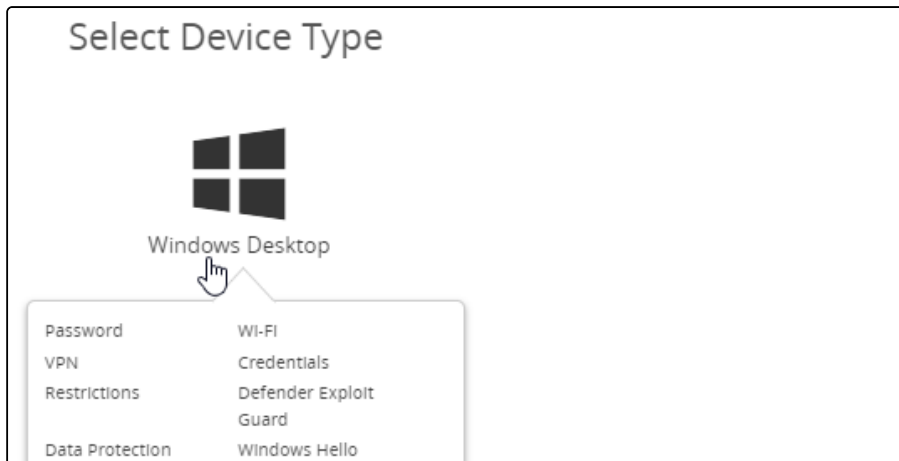
Add Profile

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



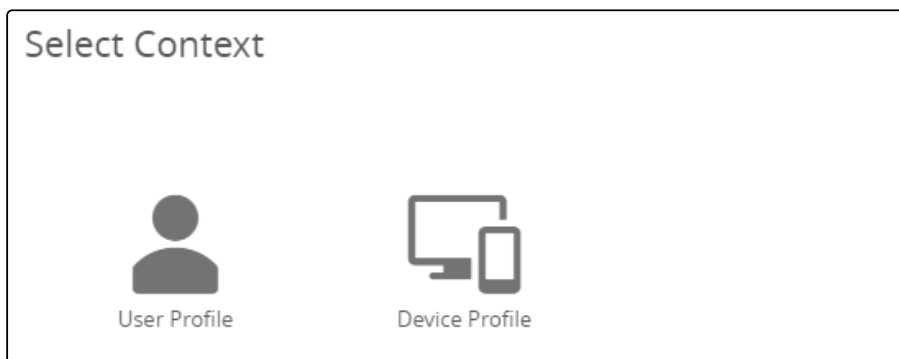
Select Device Type

Click on the type of enrolled device.



Select Context

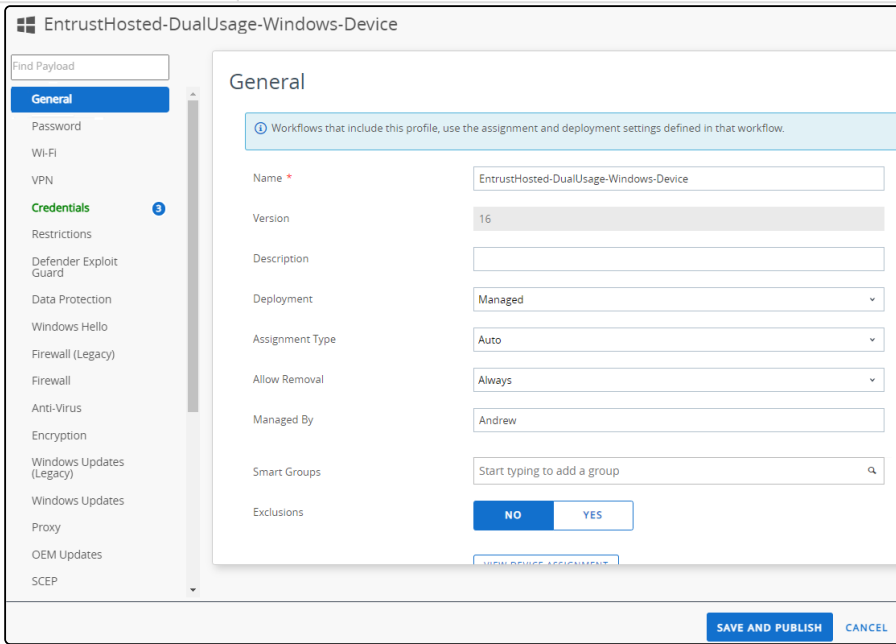
Click on **User Profile** to enroll users or **Device Profile** to enroll devices.



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 'General' configuration window for 'EntrustHosted-DualUsage-Windows-Device'. The sidebar on the left lists various settings: Password, Wi-Fi, VPN, Credentials (highlighted with a blue circle), Restrictions, Defender Exploit Guard, Data Protection, Windows Hello, Firewall (Legacy), Firewall, Anti-Virus, Encryption, Windows Updates (Legacy), Windows Updates, Proxy, OEM Updates, and SCEP. The main content area is titled 'General' and contains the following fields:

- Name:** EntrustHosted-DualUsage-Windows-Device
- Version:** 16
- Description:** (empty text box)
- Deployment:** Managed (dropdown menu)
- Assignment Type:** Auto (dropdown menu)
- Allow Removal:** Always (dropdown menu)
- Managed By:** Andrew
- Smart Groups:** Start typing to add a group (search box)
- Exclusions:** NO (selected) / YES (button)

At the bottom right, 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 Defined Certificate Authority .
Certificate	Upload separately the certificates of the root and issuing CAs.
Certificate Store	Select Personal or Intermediate for profiles with the User Profile context. Select Trusted Root for profiles with the User Device context.

SCEP

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

Field	Value
Credential Source	Select Defined Certificate Authority .
Certificate Authority	Select the CA configured in Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE .
Certificate Template	Select the request template configured in Adding a Certificate Authority and a Request Template for MDM automation in VMware Workspace ONE .
Key Location	Specify the location for the issued certificate: Software or Hardware .

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 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.	learn.microsoft.com/en-us/openspecs/windows_protocols/ms-xcep
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.	learn.microsoft.com/en-us/openspecs/windows_protocols/ms-wstep

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:

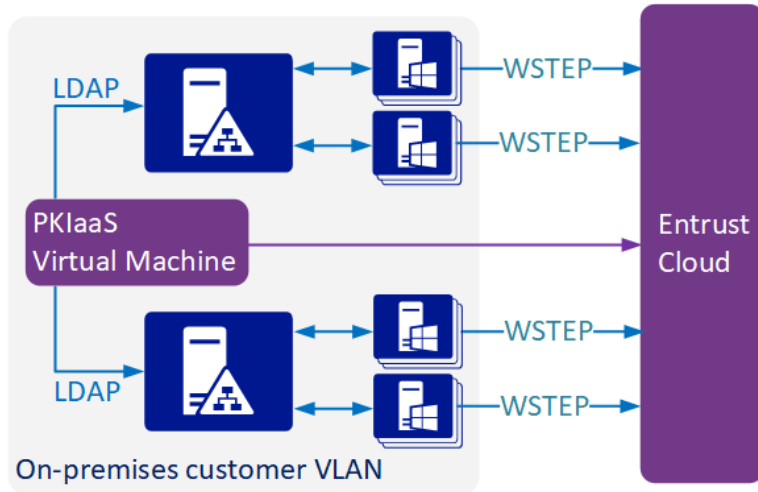
- Performs LDAPS queries against the Domain Controllers in an Active Directory forest.
- Establishes an outbound connection with the Entrust Cloud.

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](#)

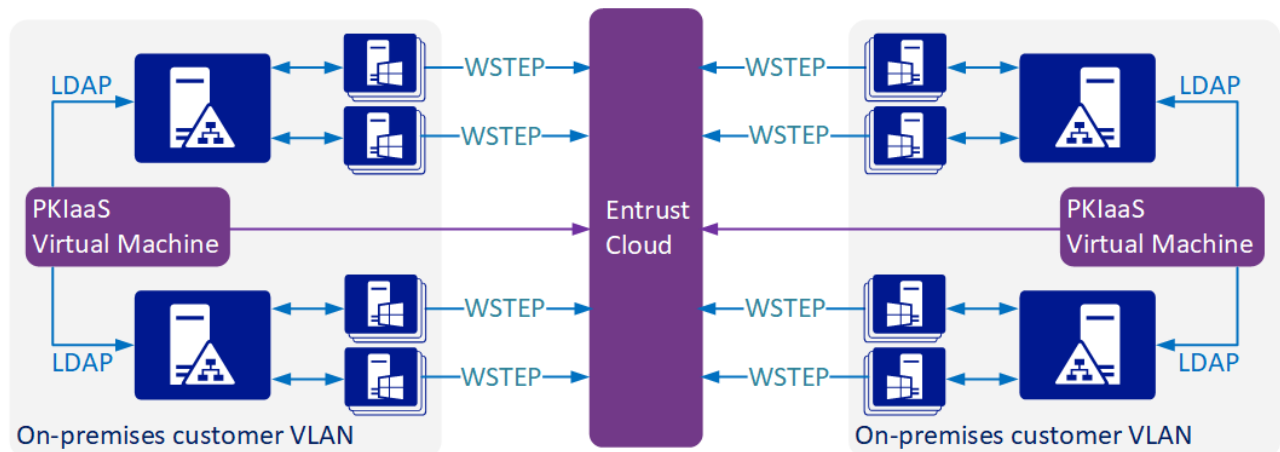
Deploying a single PKIaaS Virtual Machine for multiple Active Directory forests

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

US region		
wstep.pkiaas.entrust.com		
Target port	Protocol	Application
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 Entrust PKIaaS OCSP service
80	TCP	HTTP	See Entrust PKIaaS Certificate Revocation Lists

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>

 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.

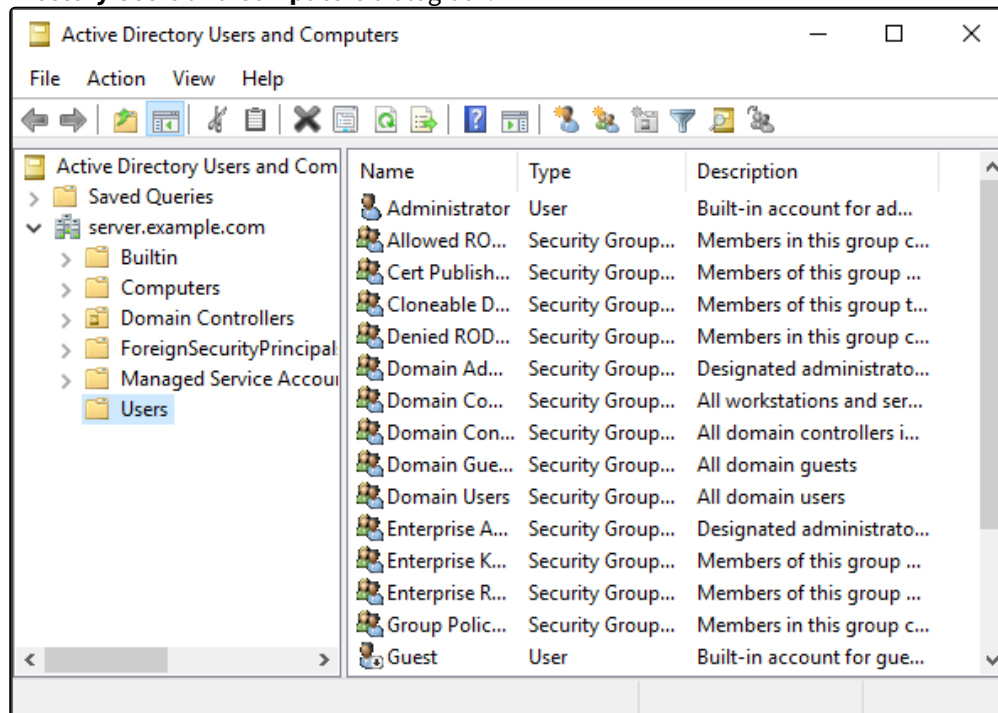
 Each root domain in the Active Directory forest requires a separate PKIaaS WSTEP service account, as each Active Directory forest must be configured separately.

To create a PKIaaS WSTEP Service Account

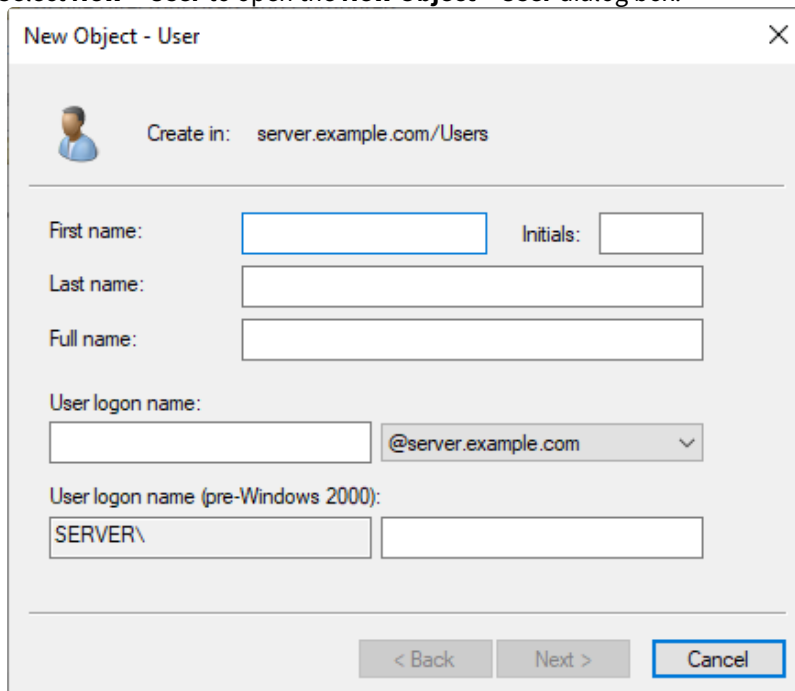
1. Log into a domain controller of the Active Directory forest's root domain as a user who is a member of both the Domain Admins and Enterprise Admins groups.

 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.



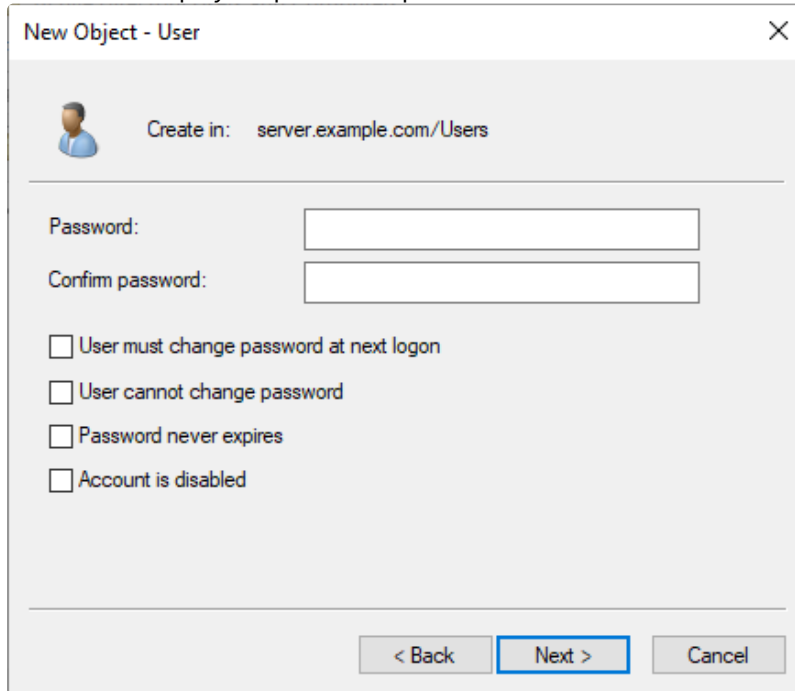
The screenshot shows the 'New Object - User' dialog box. The 'Create in:' field is set to 'server.example.com/Users'. The dialog contains the following fields:

- First name:** [Text box]
- Initials:** [Text box]
- Last name:** [Text box]
- Full name:** [Text box]
- User logon name:** [Text box] with a dropdown menu showing '@server.example.com'.
- User logon name (pre-Windows 2000):** [Text box] with 'SERVER\' entered.

At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

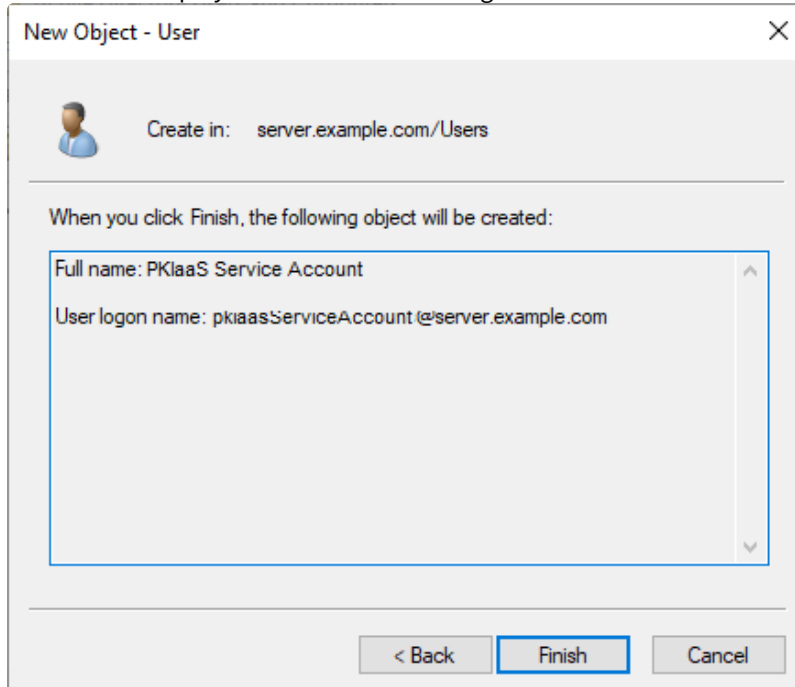
5. Enter the **First name**, **Last name**, and **Full name** for the new user account.
6. Enter a Windows **User logon name** for the user account. Optionally, enter a **User logon name (pre-Windows 2000)** for pre-Windows 2000 computers.

- Click **Next** to display the password options.



The dialog box is titled "New Object - User" and has a close button (X) in the top right corner. It features a user icon and the text "Create in: server.example.com/Users". Below this, there are two text input fields labeled "Password:" and "Confirm password:". Underneath the input fields are four unchecked checkboxes: "User must change password at next logon", "User cannot change password", "Password never expires", and "Account is disabled". At the bottom of the dialog are three buttons: "< Back", "Next >" (which is highlighted with a blue border), and "Cancel".

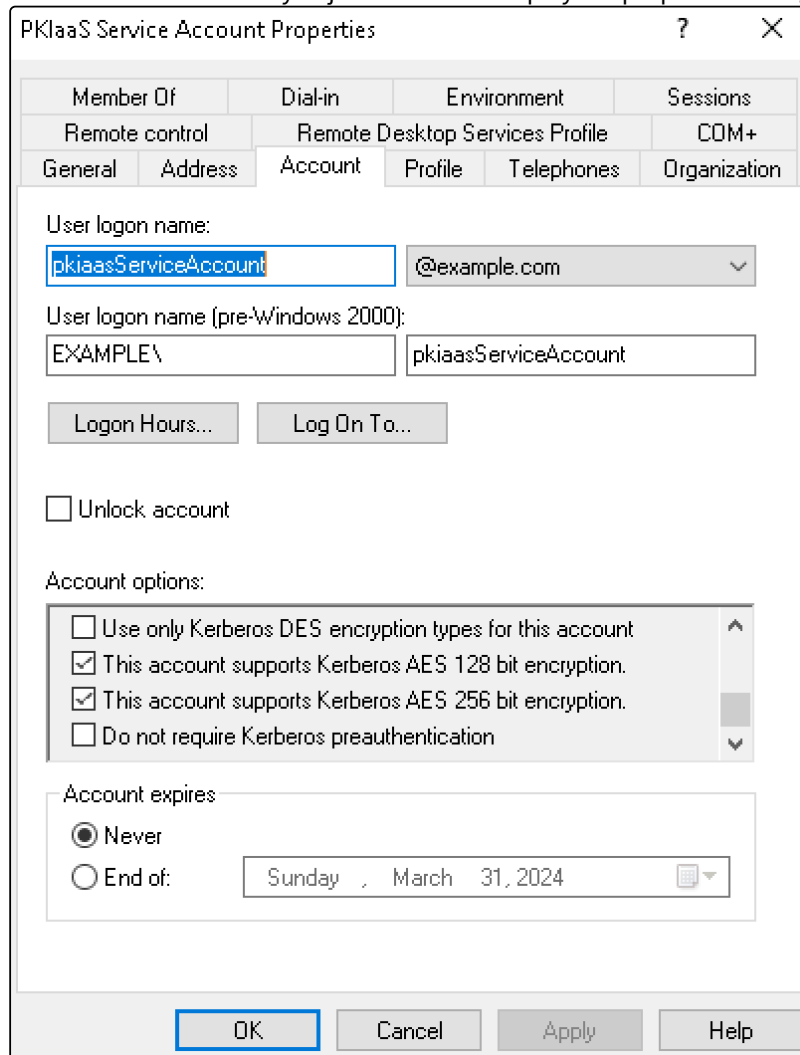
- Enter a **Password** for the user account.
- Enter the password again in the **Confirm password** field.
- Deselect **User must change password at next logon**.
- Click **Next** to display the confirmation dialog.



This dialog box is titled "New Object - User" and has a close button (X) in the top right corner. It features a user icon and the text "Create in: server.example.com/Users". Below this, it says "When you click Finish, the following object will be created:". A scrollable text area contains the following information: "Full name: PKIaaS Service Account" and "User logon name: pkiaaSServiceAccount@server.example.com". At the bottom of the dialog are three buttons: "< Back", "Finish" (which is highlighted with a blue border), and "Cancel".

- 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**.

14. 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 login name:
 @example.com

User login 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: Sunday, March 31, 2024

OK Cancel Apply Help

15. 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.**
16. 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.

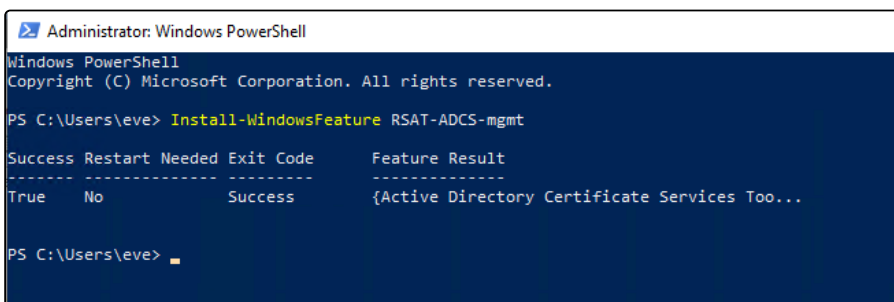
- [Enabling the Certificate Templates snap-in using PowerShell](#)
- [Enabling the Certificate Templates snap-in using the Windows Server Manager](#)

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

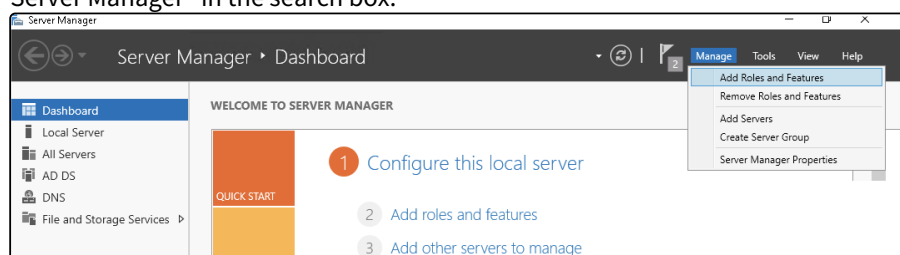
Success Restart Needed Exit Code      Feature Result
-----
True      No           Success      {Active Directory Certificate Services Too...
```

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.

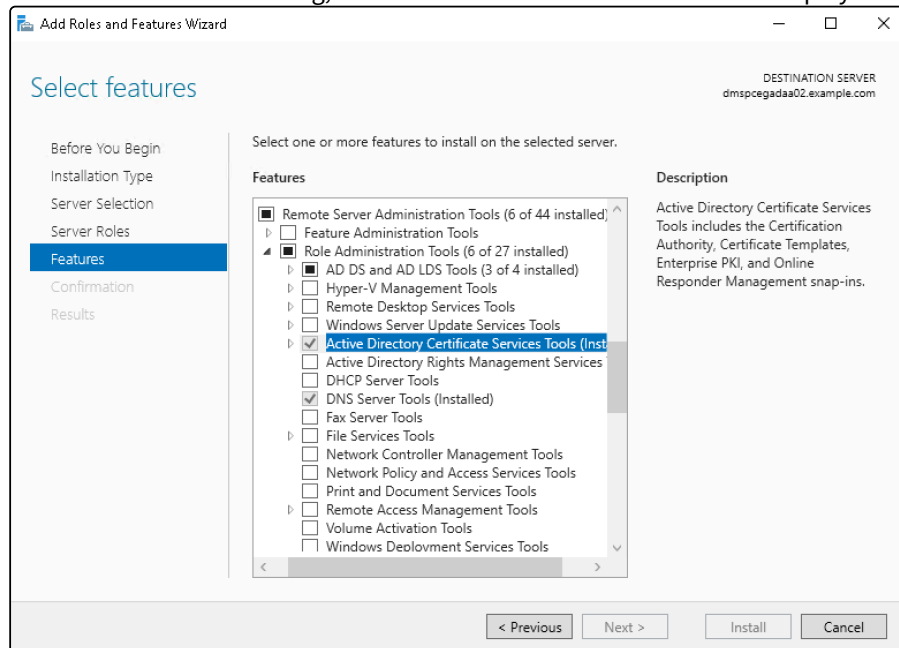
To enable the Certificate Templates snap-in using the Windows Server Manager

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

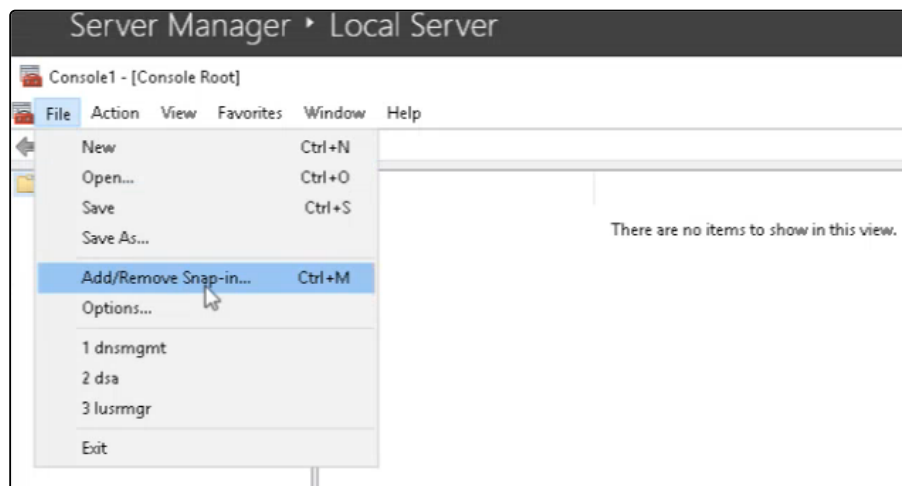
After [Enabling the Certificate Templates snap-in](#), add the snap-in to install the default set of Microsoft Certificate Templates.

To install the default set of Microsoft Certificate Templates using the snap-in

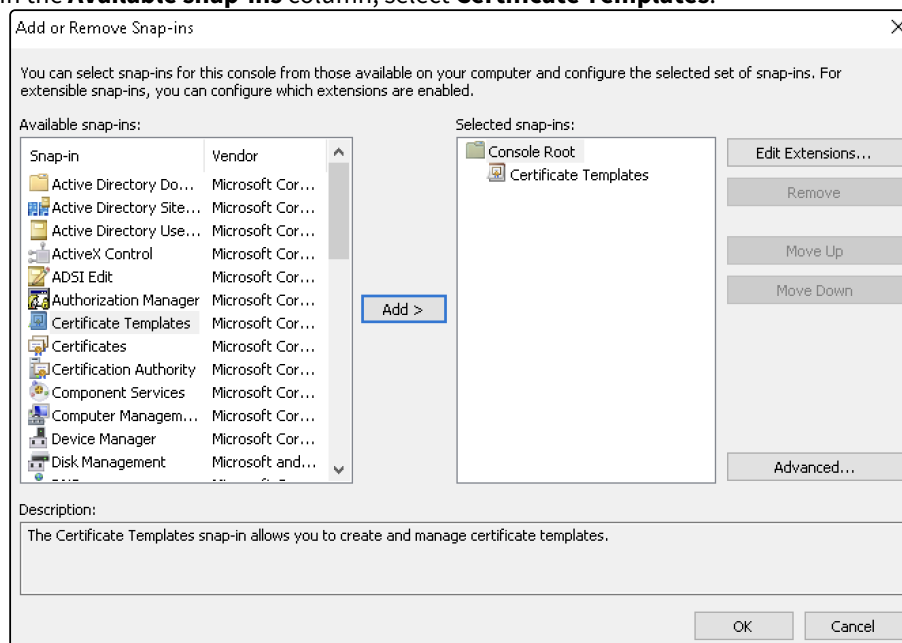
1. Log into the root Active Directory Domain of the Windows forest as a member of both the Enterprise Admins and Domain Admin groups.

 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.

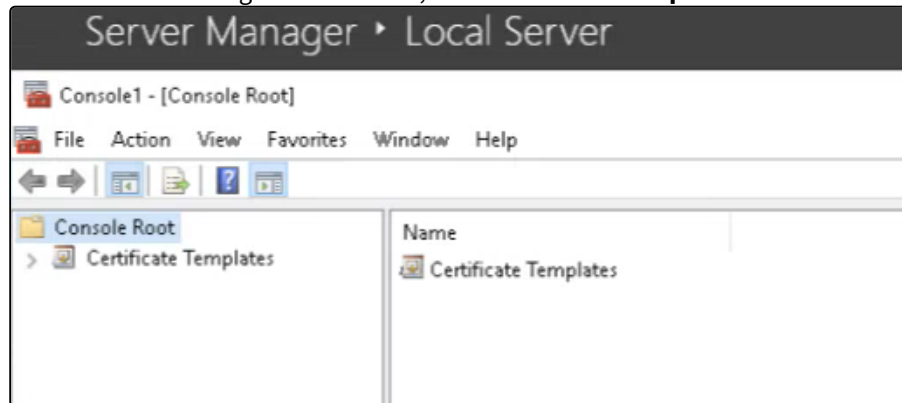


3. Select **File > Add/Remove Snap-in**.
4. In the **Available snap-ins** column, select **Certificate Templates**.

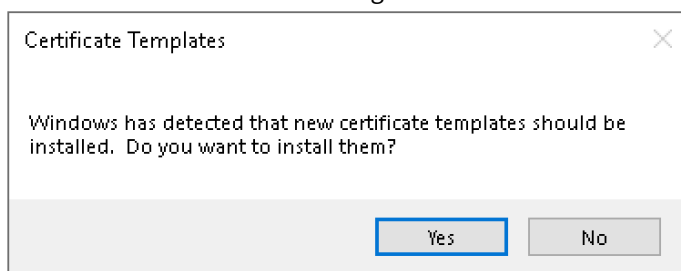


5. Click **Add** to move the **Certificate Templates** snap-in to the **Selected snap-ins** column.
6. Click **OK** to close the **Add or Remove Snap-ins** wizard and return to the Microsoft Management Console.

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 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.

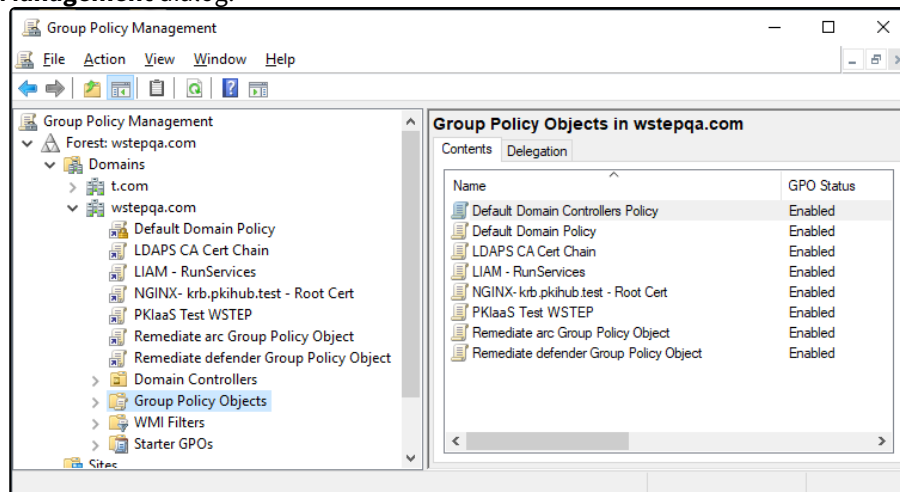
- [Creating a Group Policy Object for the LDAPS TLS certificate chain](#)
- [Importing the LDAPS TLS certificate chain into the Group Policy Object](#)
- [Linking the TLS LDAPS Group Policy Object to all domains](#)

Creating a Group Policy Object for the LDAPS TLS certificate chain

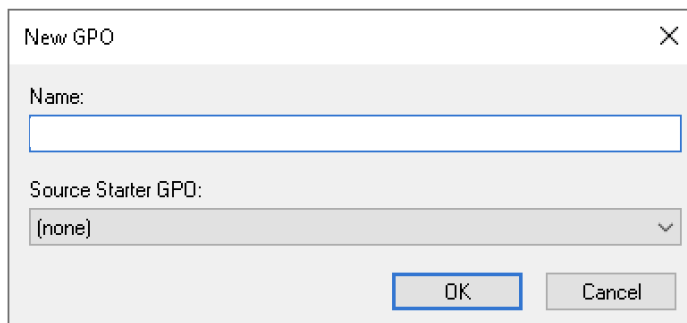
The recommended method to configure a certificate chain trust is to create a Group Policy Object (GPO) linked to all domains in the Active Directory forest.

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**.

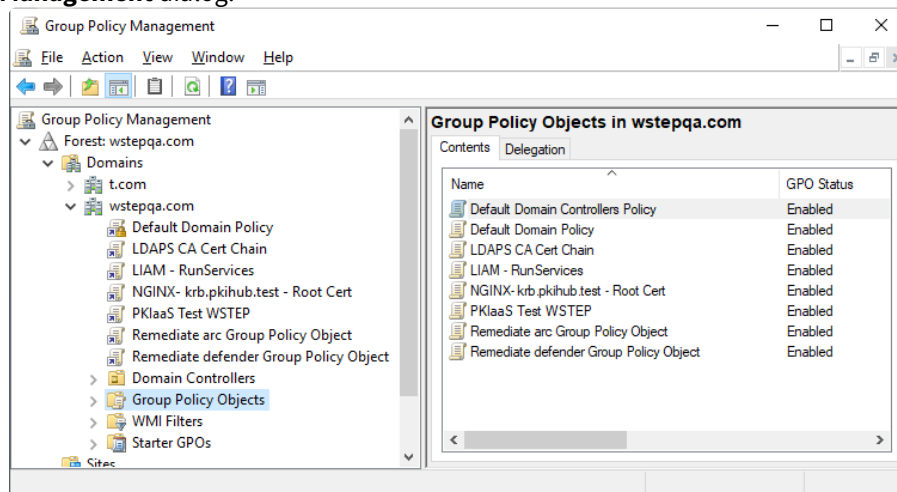
Importing the LDAPS TLS certificate chain into the Group Policy Object

Import the LDAPS TLS certificate chain into the GPO previously created in [Creating a Group Policy Object for the LDAPS TLS certificate chain](#).

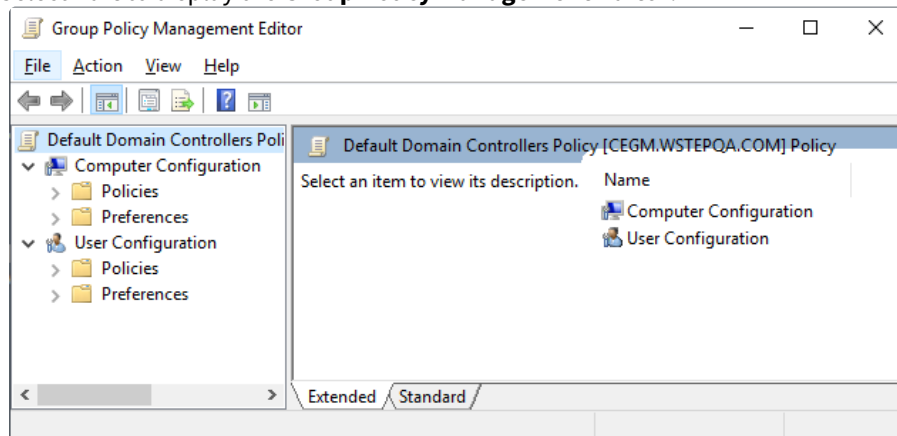
 See [Downloading the certificate chain](#) for how to download the required certificates.

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.

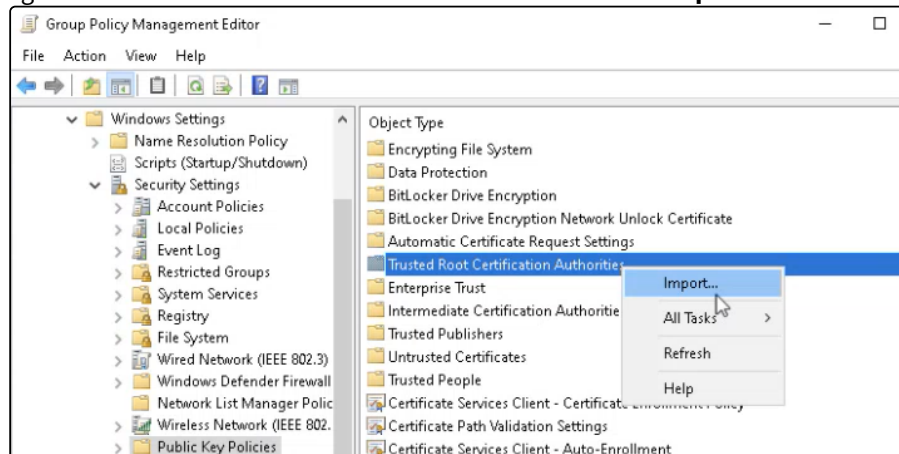


3. Right click the Group Policy Object.
4. Select **Edit** to display the **Group Policy Management Editor**.

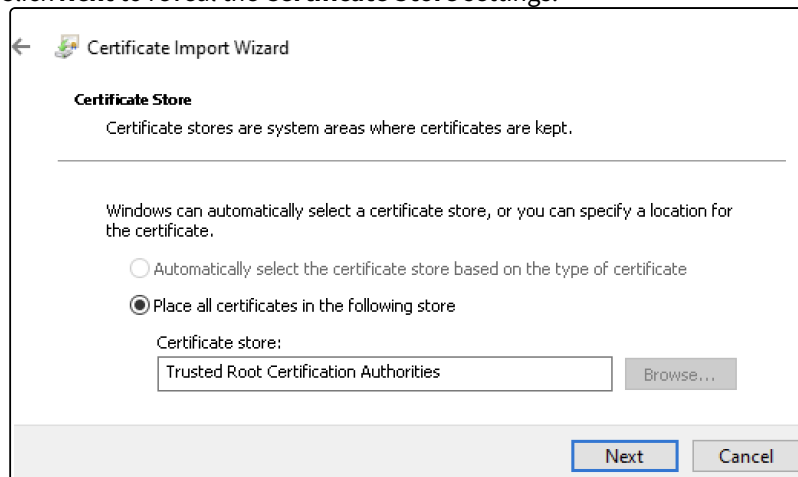


5. Navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.

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**.

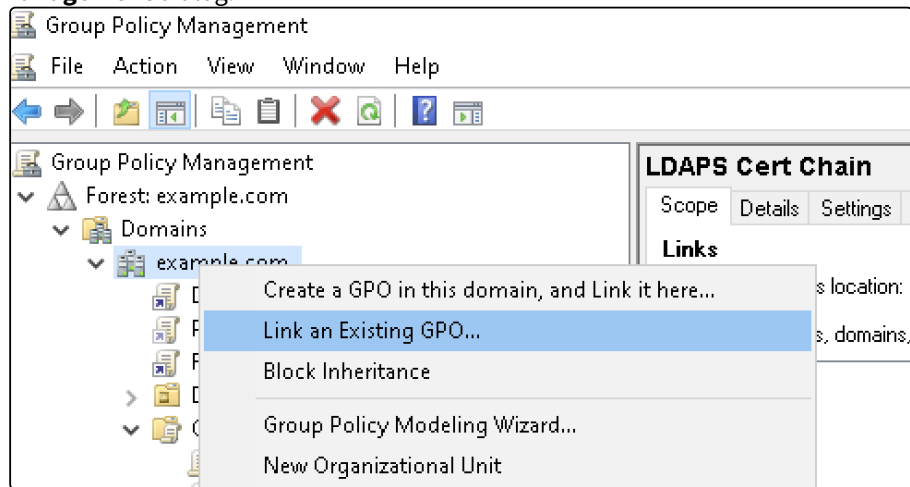
Linking the TLS LDAPS Group Policy Object to all domains

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

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**.

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 Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP .
Certificate Profile	Select the multiuse-p12-key-encipherment-client-server certificate profile described in Multiuse certificate profiles .
Subject DN	Enter a CN matching the FQDN of the Domain Controller (for example: dc.example.com).
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.

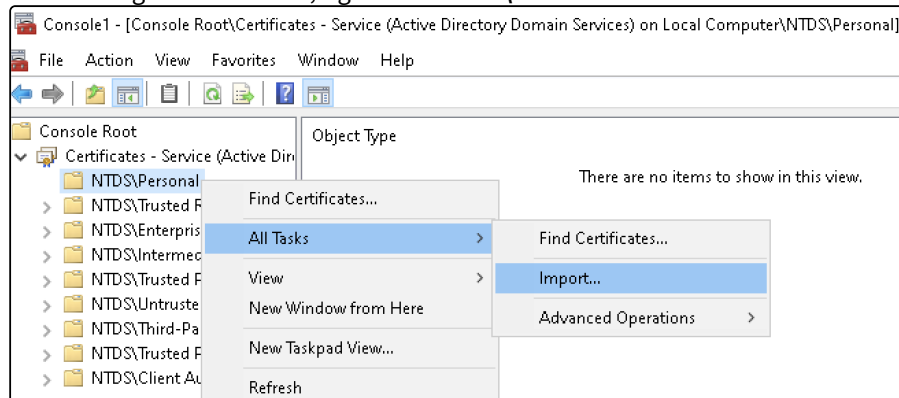
✗ If you generate the LDAPS TLS certificates with a non-ECS authority, ensure they are SHA-2, as SHA-1 certificates are not allowed due to their vulnerabilities.

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

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[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: * ABC Issuing CA

CA Identifier: ecsmcn158emsuw-w6cnmjwmqnn5ie

Services:

Active Directory

Multiuse

×

?

Service Profiles:

Active Directory

☒ wstep-digital-signature
 ☒ wstep-digital-signature-key-encipherment
 ☒ wstep-key-encipherment
 ☒ wstep-non-repudiation
 ☒ wstep-non-repudiation-key-encipherment

+ Multiuse

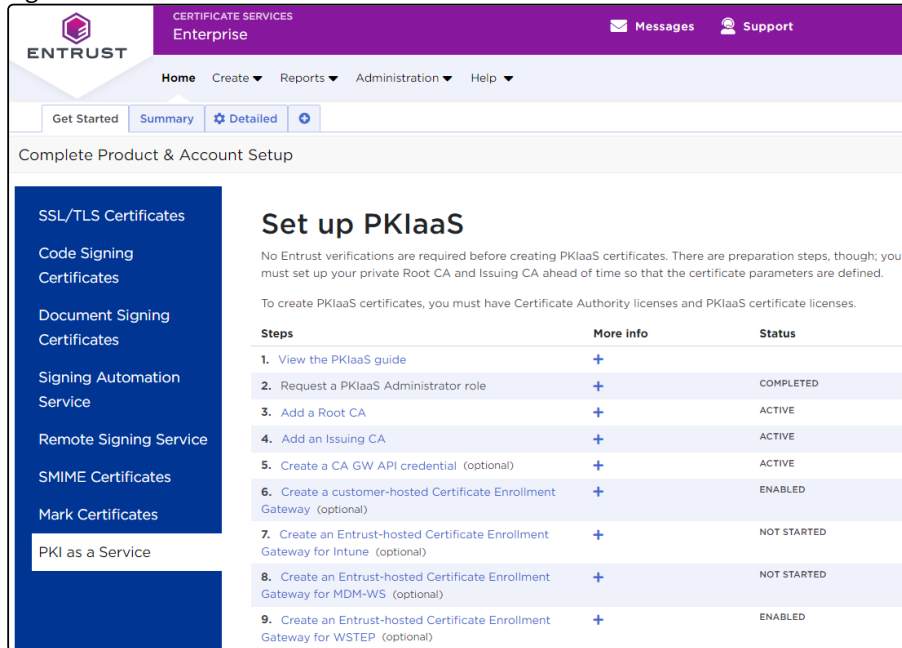
Creating an Entrust-hosted Certificate Enrollment Gateway for WSTEP

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



The screenshot shows the Entrust Enterprise dashboard. The left sidebar contains a navigation menu with options: SSL/TLS Certificates, Code Signing Certificates, Document Signing Certificates, Signing Automation Service, Remote Signing Service, SMIME Certificates, Mark Certificates, and PKI as a Service. The main content area is titled 'Set up PKIaaS' and includes a 'Complete Product & Account Setup' section. Below this, there is a table with steps for setting up PKIaaS.

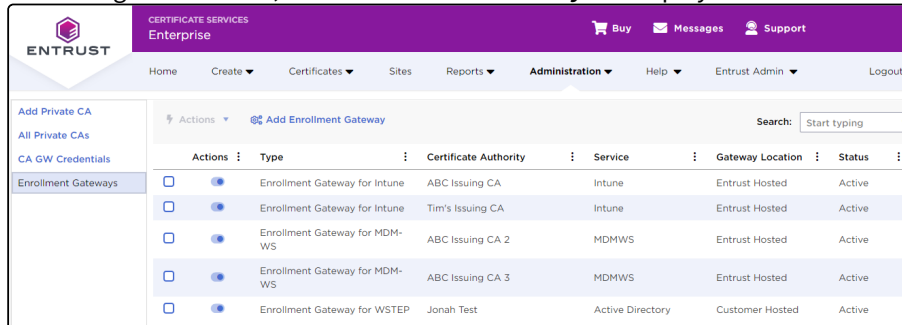
Steps	More info	Status
1. View the PKIaaS guide	+	
2. Request a PKIaaS Administrator role	+	COMPLETED
3. Add a Root CA	+	ACTIVE
4. Add an Issuing CA	+	ACTIVE
5. Create a CA GW API credential (optional)	+	ACTIVE
6. Create a customer-hosted Certificate Enrollment Gateway (optional)	+	ENABLED
7. Create 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**.

i Alternatively, you can select **Administration > PKIaaS Management** in the menu bar.

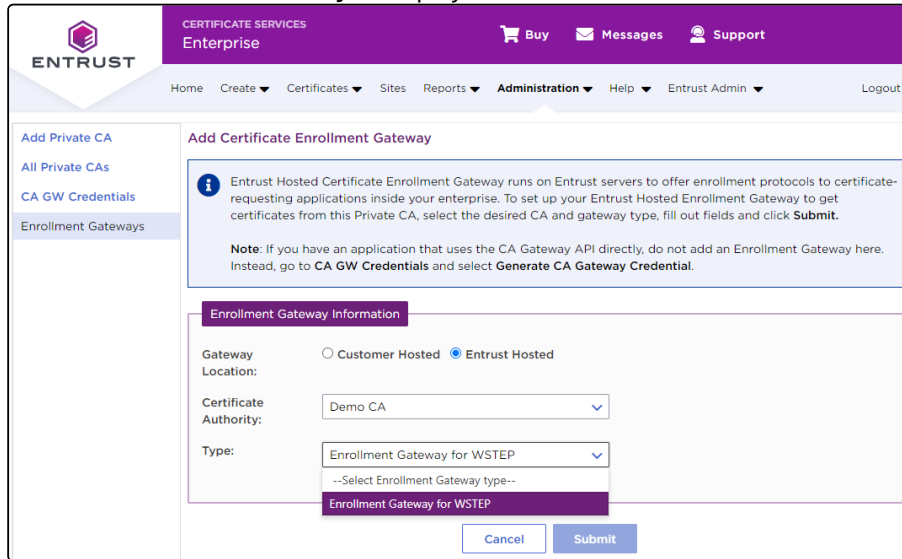
4. In the navigation sidebar, click **Enrollment Gateways** to display the Certificate Enrollment Gateway list.



The screenshot shows the Entrust Enterprise dashboard with the 'Administration' menu open. The 'Enrollment Gateways' option is selected, displaying a list of enrollment gateways. The list includes columns for Actions, Type, Certificate Authority, Service, Gateway Location, and Status.

Actions	Type	Certificate Authority	Service	Gateway Location	Status
☐	Enrollment Gateway for Intune	ABC Issuing CA	Intune	Entrust Hosted	Active
☐	Enrollment Gateway for Intune	Tim's Issuing CA	Intune	Entrust Hosted	Active
☐	Enrollment Gateway for MDM-WS	ABC Issuing CA 2	MDMWS	Entrust Hosted	Active
☐	Enrollment Gateway for MDM-WS	ABC Issuing CA 3	MDMWS	Entrust Hosted	Active
☐	Enrollment Gateway for WSTEP	Jonah Test	Active Directory	Customer Hosted	Active

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



ENTRUST CERTIFICATE SERVICES Enterprise Buy Messages Support

Home Create Certificates Sites Reports Administration Help Entrust Admin Logout

Add Certificate Enrollment Gateway

Enrollment Gateway Information

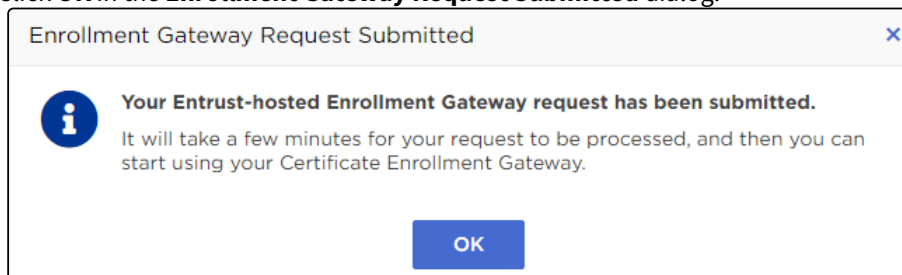
Gateway Location: ☐ Customer Hosted ☒ Entrust Hosted

Certificate Authority: Demo CA

Type: Enrollment Gateway for WSTEP

Cancel Submit

- 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.



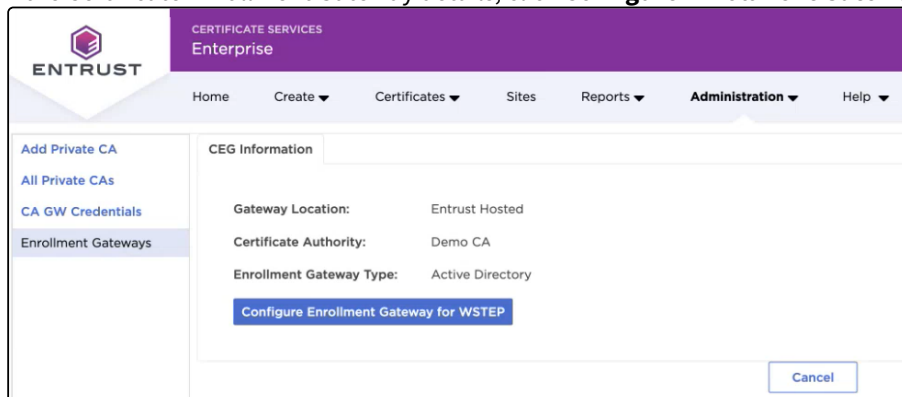
Enrollment Gateway Request Submitted

Your Entrust-hosted Enrollment Gateway request has been submitted.

It will take a few minutes for your request to be processed, and then you can start using your Certificate Enrollment Gateway.

OK

- 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**.



ENTRUST CERTIFICATE SERVICES Enterprise Home Create Certificates Sites Reports Administration Help

CEG Information

Gateway Location: Entrust Hosted

Certificate Authority: Demo CA

Enrollment Gateway Type: Active Directory

Configure Enrollment Gateway for WSTEP

Cancel

- Wait while being redirected to the PKIaaS portal for [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#).

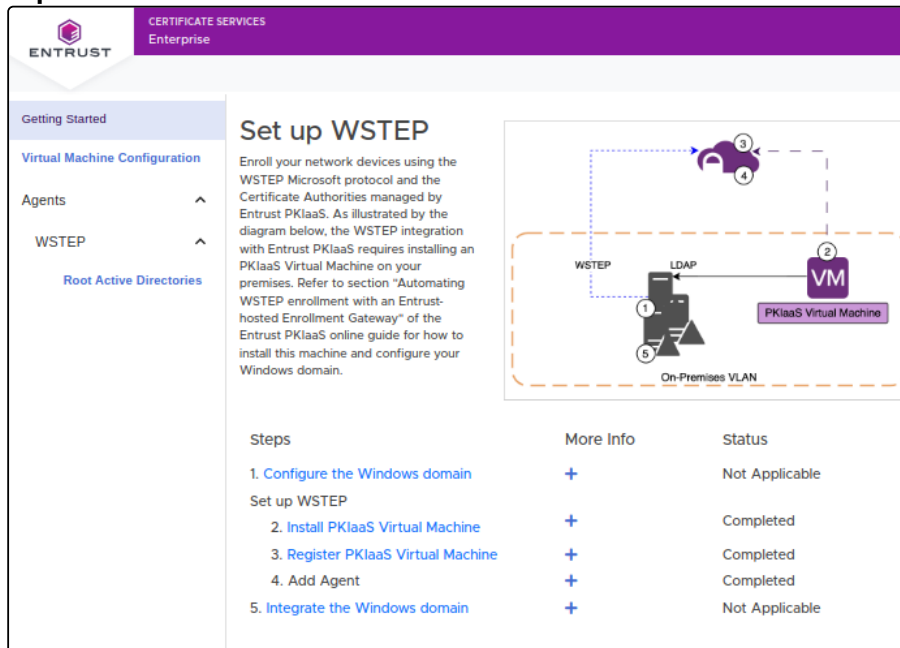
i If displayed, ignore the "You are not logged in" warning and wait until you are automatically logged in with your Entrust Certificate Services credentials.

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**.



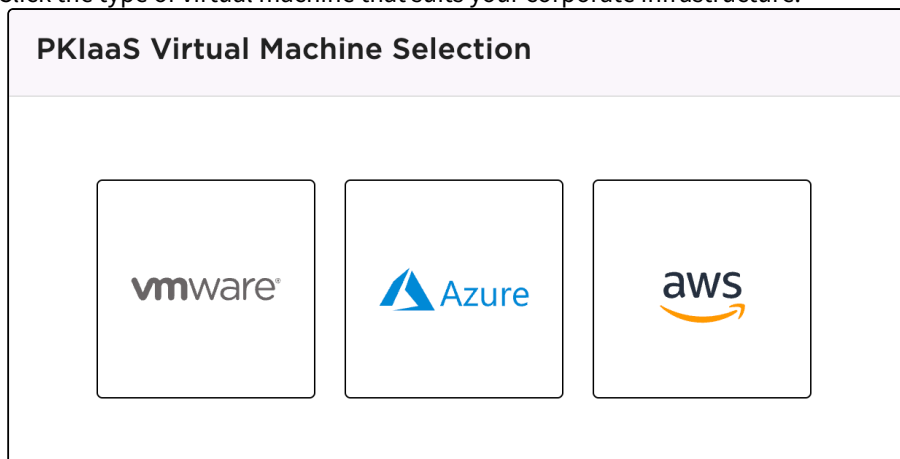
Set up WSTEP

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. Configure the Windows domain	+	Not Applicable
Set up WSTEP		
2. Install PKIaaS Virtual Machine	+	Completed
3. Register PKIaaS Virtual Machine	+	Completed
4. Add Agent	+	Completed
5. Integrate the Windows domain	+	Not Applicable

2. Click the type of virtual machine that suits your corporate infrastructure.

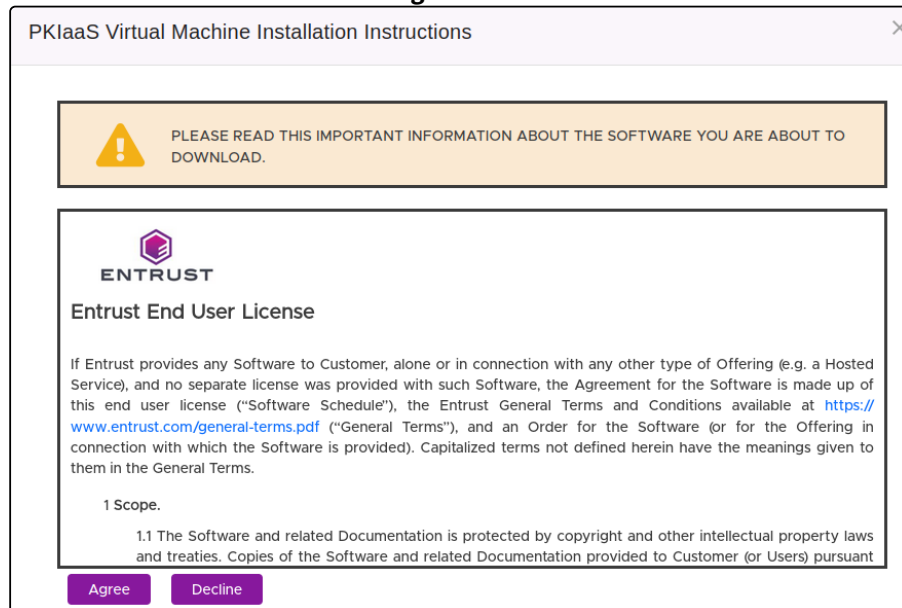


PKIaaS Virtual Machine Selection

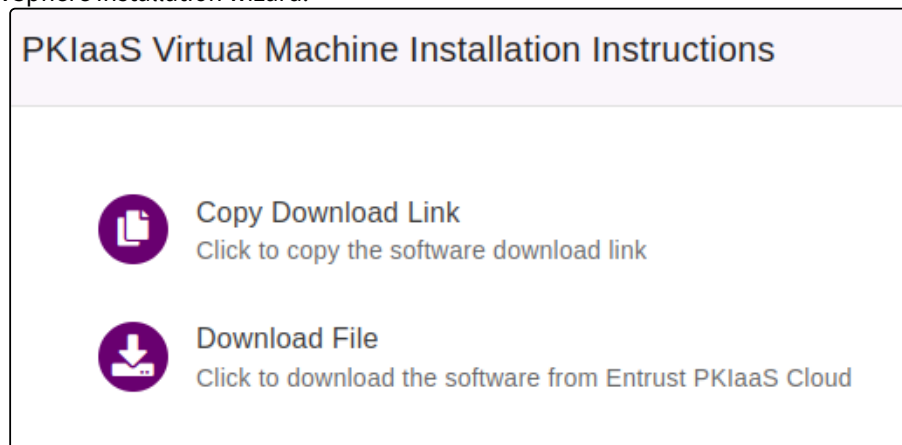




3. Read the end-user license and click **Agree**.



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 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](#)

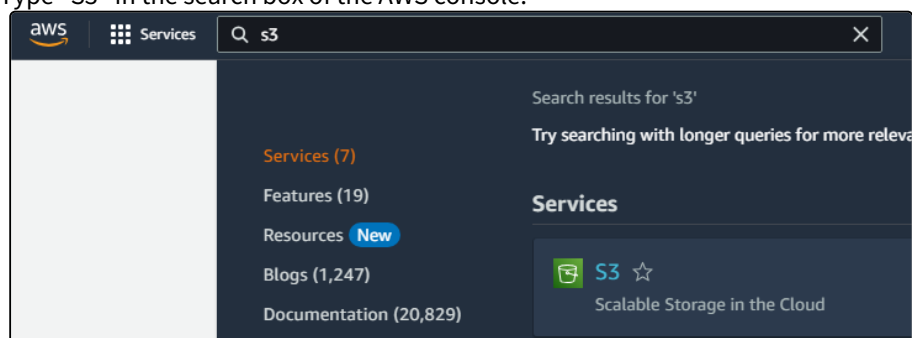
Creating an S3 bucket for the PKIaaS Virtual Machine

If you don't have an S3 bucket, create a new one as explained below.

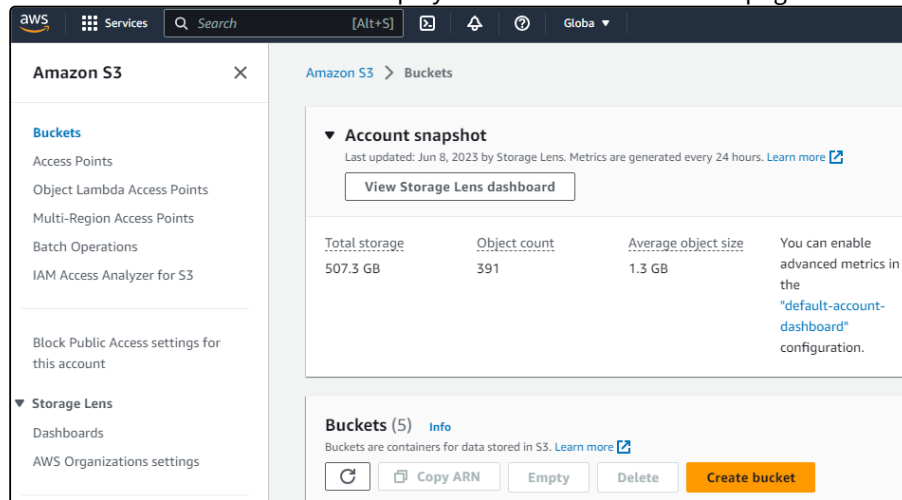
i Skip this step if the bucket was already created for a previous deployment.

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.

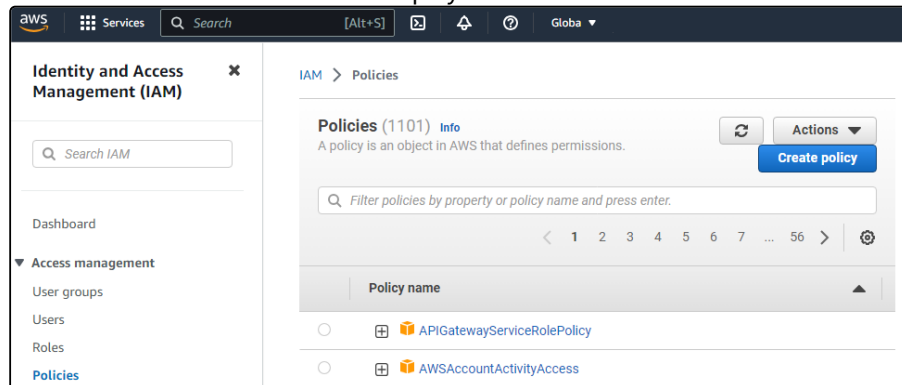
Creating a new IAM policy

See below for creating an IAM policy granting permission to the S3 bucket.

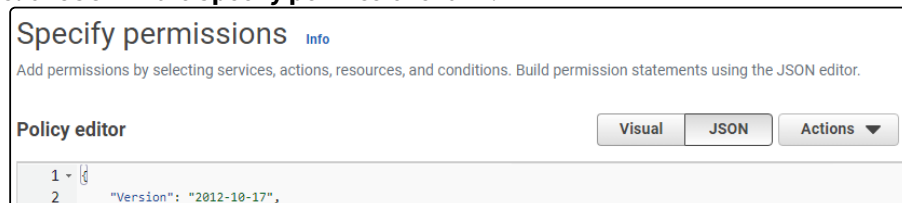
To create an IAM policy

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": "*"
    }
  ]
}
```

```
}
```

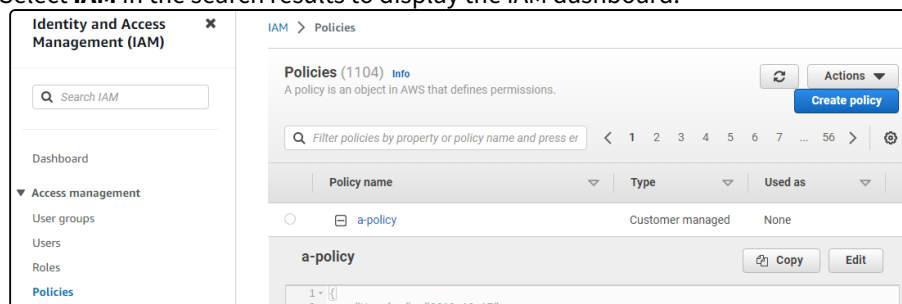
7. In the JSON code, replace `$S3_BUCKET_NAME` with the name of the S3 bucket selected when [Creating an S3 bucket for the PKIaaS Virtual Machine](#).
8. Click **Next**.
9. Enter a name and an optional description for the new policy.
10. Click **Create policy**.

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

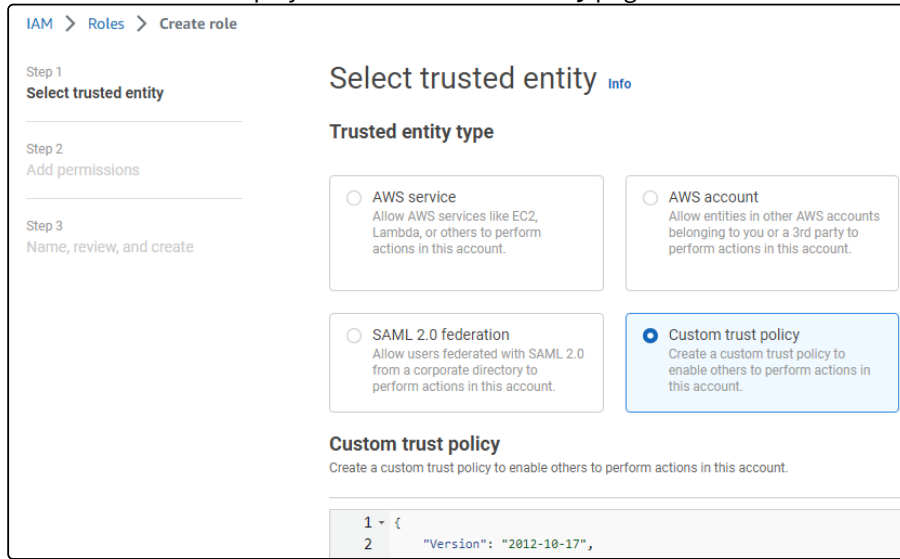
Create an IAM (Identity and Access Management) role for the policy described in [Configuring an IAM policy for the PKIaaS Virtual Machine](#).

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

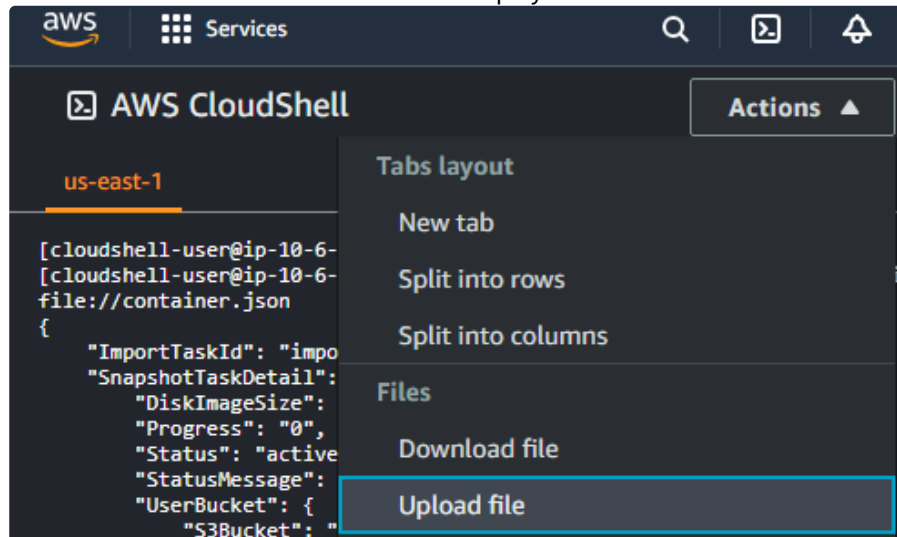
To run AWS commands on your machine, download and install the AWS CLI as explained in:

<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](#).

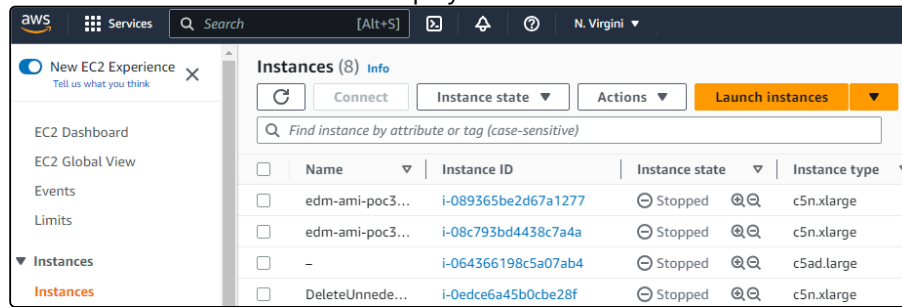
Creating an EC2 instance for the PKIaaS Virtual Machine

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

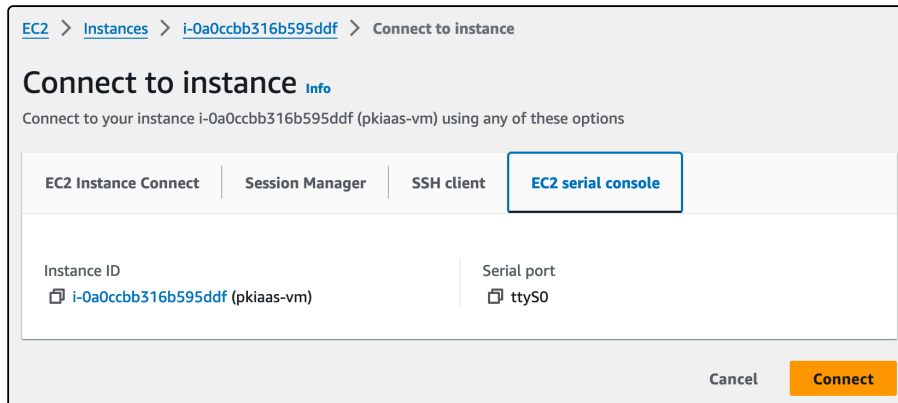
Select the default volume size.

Opening a PKIaaS Virtual Machine session on AWS

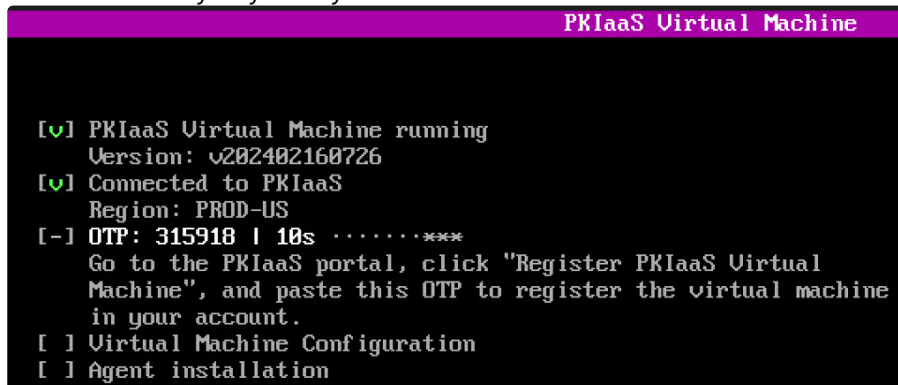
After [Creating an EC2 instance for the PKIaaS Virtual Machine](#), refresh the EC2 instance list until the instance status is **Running**, and then open a session into the PKIaaS Virtual Machine.

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 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](#)

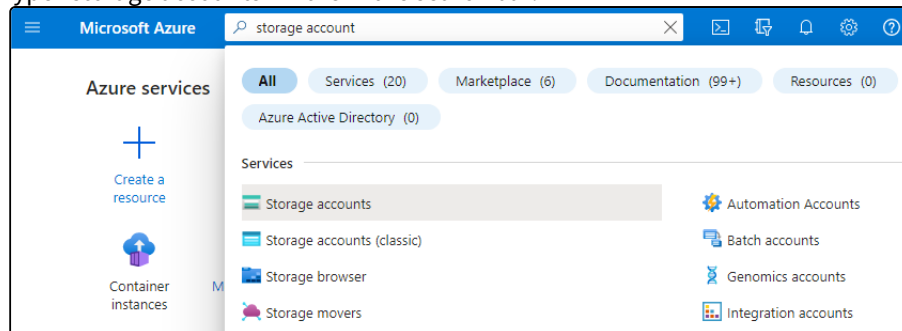
Creating an Azure storage account for the PKIaaS Virtual Machine

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.

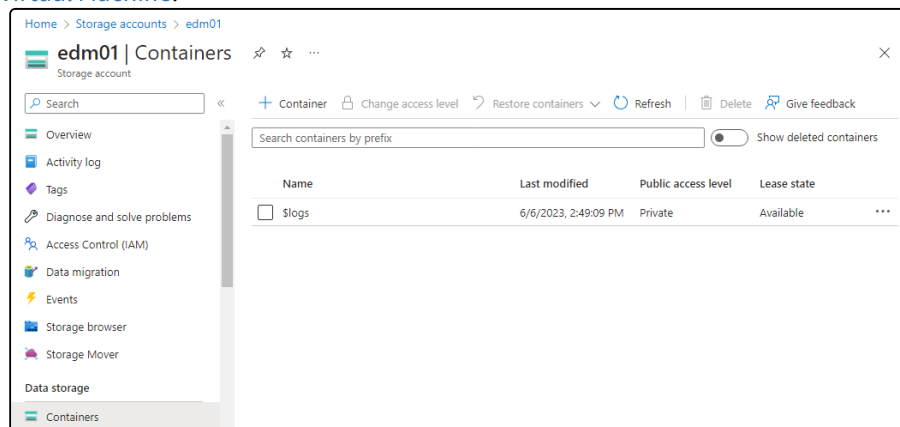
 See [Downloading a PKIaaS Virtual Machine from the PKIaaS portal](#) to obtain this file.

To upload the VHD image file

1. Extract the contents of the Azure zipped image.

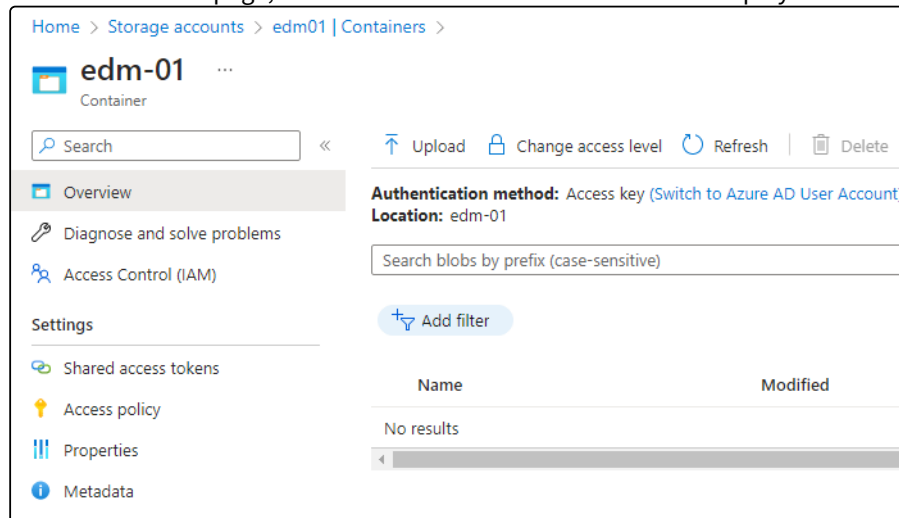
 Extracting the Azure zipped VHD image requires at least 11 GB of disk space.

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 Creating an Azure storage account for the PKIaaS Virtual Machine .

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 Creating an Azure storage account for the PKIaaS Virtual Machine .

OS disk

Configure the following settings under **OS disk**.

Setting	Value
OS type	Select Linux .
VM generation	Select Gen 1
Storage blob	Select the VHD image described in Uploading the VHD image of the PKIaaS Virtual Machine file to Azure .
Account type	Select Standard SSD .
Host caching	Select Read-only .

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 Creating an Azure storage account for the PKIaaS Virtual Machine .
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 Creating an Azure image for the PKIaaS Virtual Machine .
Instance details / Size	Minimum recommended size: <code>Standard_B2s</code> .
Administrator account / Authentication type	Select SSH public key .
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 None .
Licensing type / License type	Select Other .

Disk

Set the following values in the **Disk** tab of the **Create a virtual machine** page.

Setting	Value
OS disk / OS disk type	Select Premium SSD (locally-redundant storage) 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 Advanced .

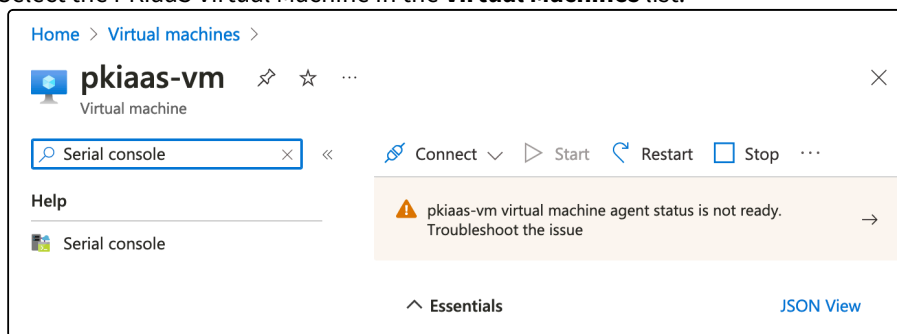
Setting	Value
Configure network security group	Select the network security group described in Creating Azure network rules for the PKIaaS Virtual Machine .

Opening a PKIaaS Virtual Machine session on Azure

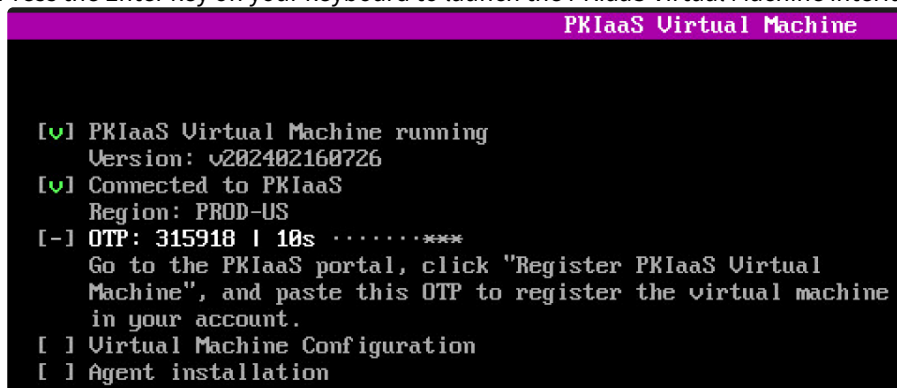
After [Creating the PKIaaS Virtual Machine on Azure](#), wait until the machine status changes from **Deployment is in progress** to **Your deployment is complete**, and open a session into the PKIaaS Virtual Machine.

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.

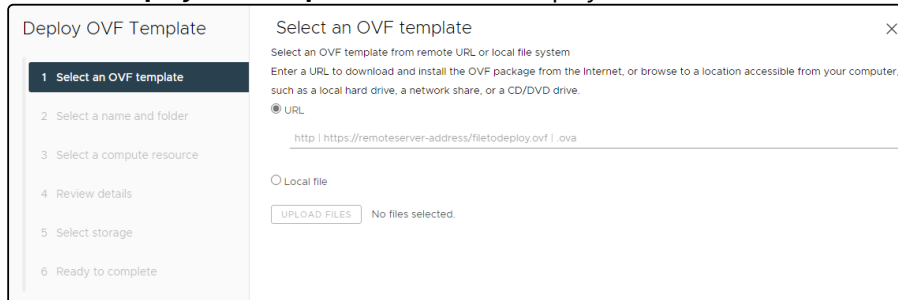
Installing a PKIaaS Virtual Machine on VMware vSphere

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.



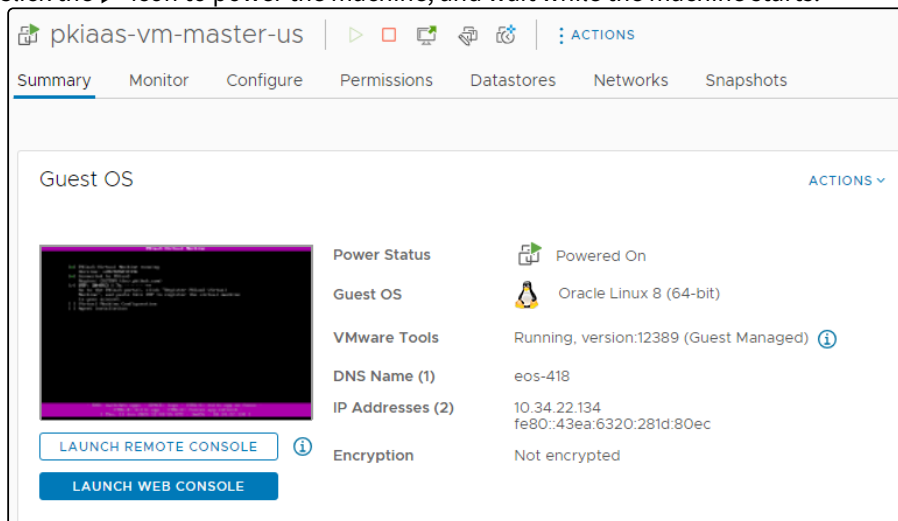
4. In the **Select an OVF template** page, click **URL** to paste the download link, or **Local** file to import the .ova image file.
5. In the **Select a name and folder** page, select a name and a folder for the new virtual machine.
6. In the **Select a compute resource** page, select a computing resource 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:

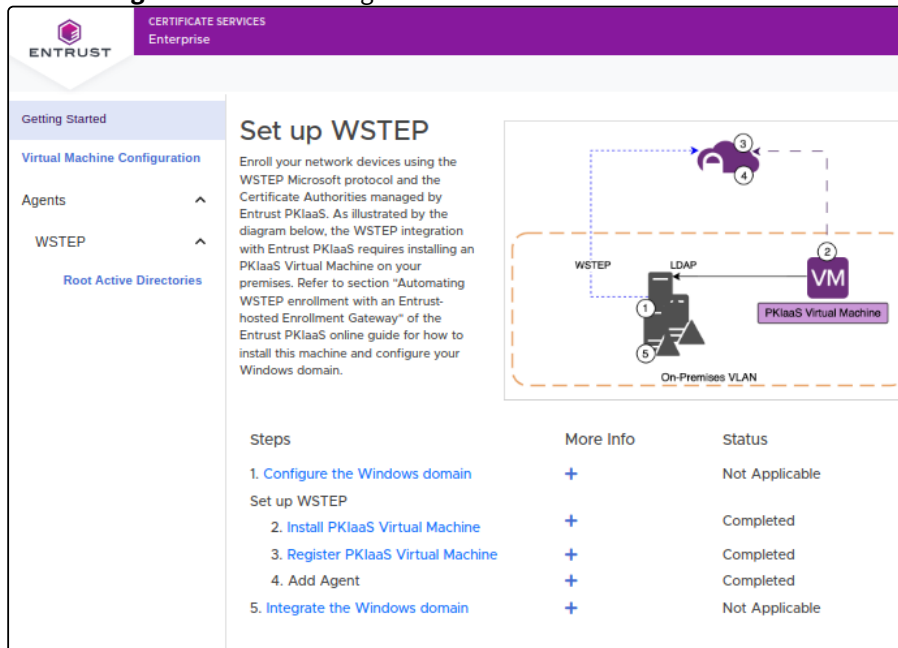
- An on-premises PKIaaS Virtual Machine linked to one PKIaaS Virtual Machine configuration.
- One WSTEP enrollment agent associated with the PKIaaS Virtual Machine configuration.
- One or more root Active Directory configurations linked with each WSTEP enrollment agent.

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.



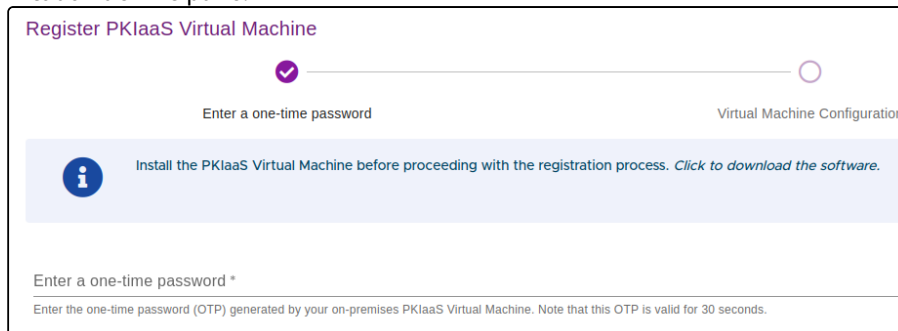
Set up WSTEP

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. Configure the Windows domain	+	Not Applicable
Set up WSTEP		
2. Install PKIaaS Virtual Machine	+	Completed
3. Register PKIaaS Virtual Machine	+	Completed
4. Add Agent	+	Completed
5. Integrate the Windows domain	+	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

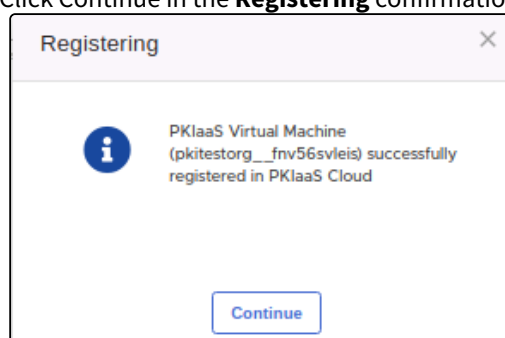
Virtual Machine Configuration

Information: Install the PKIaaS Virtual Machine before proceeding with the registration process. [Click to download the software.](#)

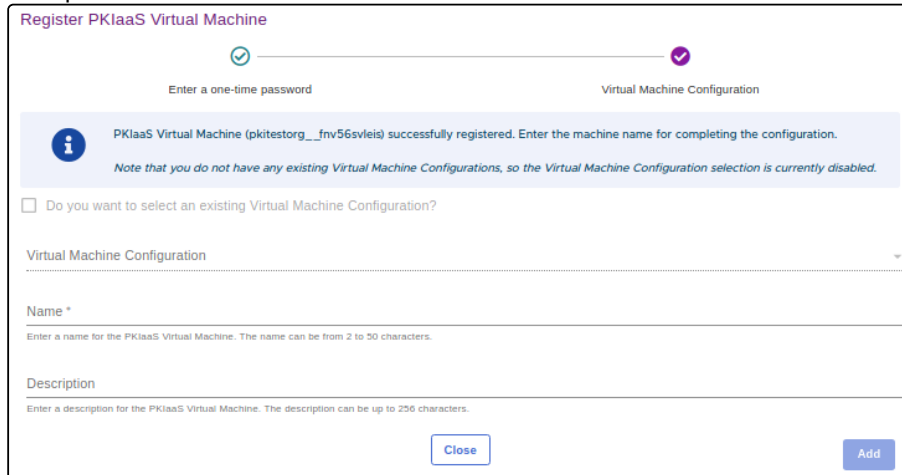
Enter a one-time password *

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.



6. In the **PKIaaS Virtual Machine Configuration** form, enter a unique name for the machine and an optional description.



Register PKIaaS Virtual Machine

Enter a one-time password Virtual Machine Configuration

PKIaaS Virtual Machine (pkitestorg__fnv56svleis) successfully registered. Enter the machine name for completing the configuration.
Note that you do not have any existing Virtual Machine Configurations, so the Virtual Machine Configuration selection is currently disabled.

☐ Do you want to select an existing Virtual Machine Configuration?

Virtual Machine Configuration

Name *

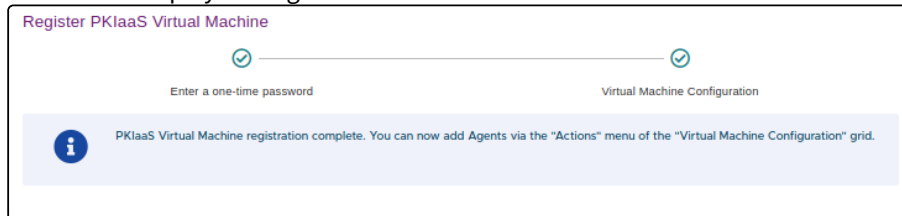
Enter a name for the PKIaaS Virtual Machine. The name can be from 2 to 50 characters.

Description

Enter a description for the PKIaaS Virtual Machine. The description can be up to 256 characters.

[Close](#) [Add](#)

7. Click **Add** to display the registration confirmation.



Register PKIaaS Virtual Machine

Enter a one-time password Virtual Machine Configuration

PKIaaS Virtual Machine registration complete. You can now add Agents via the "Actions" menu of the "Virtual Machine Configuration" grid.

8. Click **Close**.

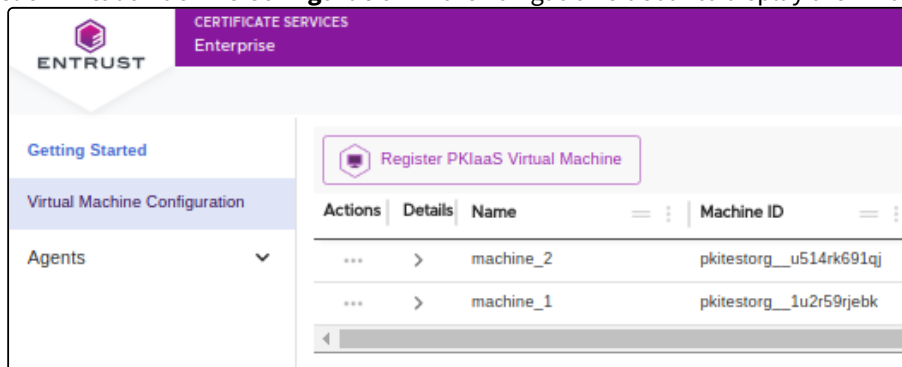
Adding an agent to a PKIaaS Virtual Machine

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

1. Click **Virtual Machine Configuration** in the navigation sidebar to display the PKIaaS Virtual Machines grid.



ENTRUST CERTIFICATE SERVICES Enterprise

Getting Started

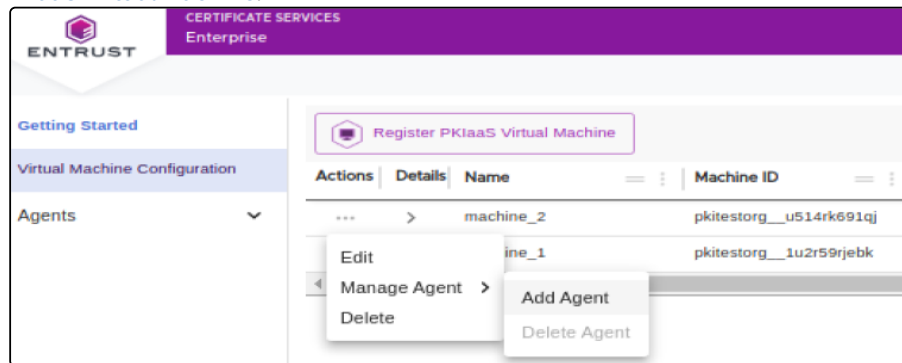
Virtual Machine Configuration

Agents

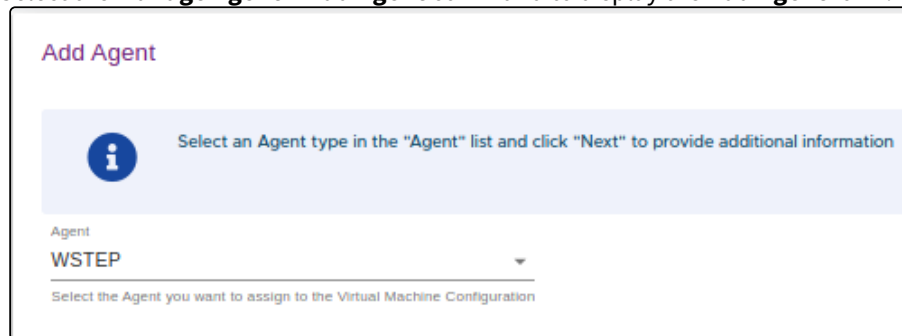
[Register PKIaaS Virtual Machine](#)

Actions	Details	Name	Machine ID
...	>	machine_2	pkitestorg__u514rk691qj
...	>	machine_1	pkitestorg__1u2r59rjebk

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 > Add Agent** command to display the **Add Agent** form.



4. Select **WSTEP** in the **Agent** list.
5. 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

```

qRCf9Uq6T1ZFSrTamx508RpqDLKip8cYh/
Wvc2xRgUzNtWZA1Rlu/E2p5C9c/yX
yWtLpRs00FnePXRNi+CXvJRg+hmuJhPee09RbGIpSA6PWxTLDLsnd
TrJt4DiR4Y
kmlTrakmxhBqqCgnzQR3lksbJ6MMkxE8VD9h29qnIVBSsFVJ0U17A
          
```

Paste the PEM or Base64 encoded certificate. To add more, click the Add Certificate button

Distinguished Name	CN=demoserver,O=Entrust,ST=Barcelona,C=ES
Certificate Authority	CN=demoserver,O=Entrust,ST=Barcelona,C=ES
Serial (Hex)	2220Of5c85dad245c215099a736fd6fac9a0301b
Valid From	April 17, 2024 at 11:30 AM GMT+2
Valid To	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](#).

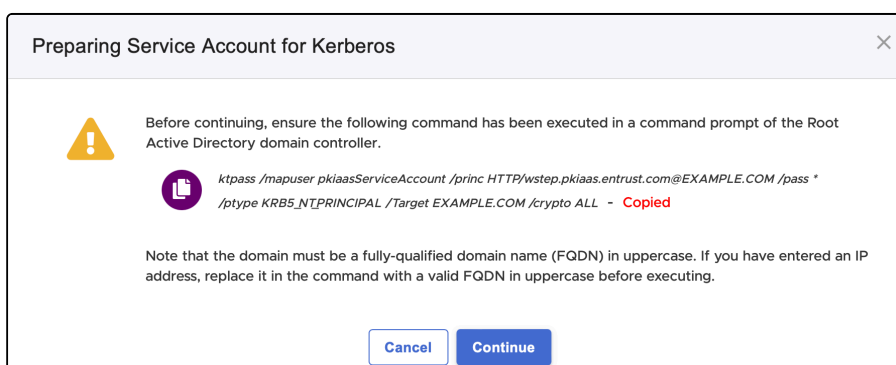
LDAPS Trusted Certificates

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 Creating a PKIaaS WSTEP Service Account .
<PKIAAS-WSTEP-URL>	The region-specific URL for Entrust PKIaaS WSTEP.
<UPPERCASE-DOMAIN-NAME>	The domain selected when previously Configuring an Active Directory in the agent , in uppercase.
<USER-PASSWORD>	The password of the user described in Creating a PKIaaS WSTEP Service Account .

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.pkiaas.entrust.com/wstep/pkitestorg/cep>

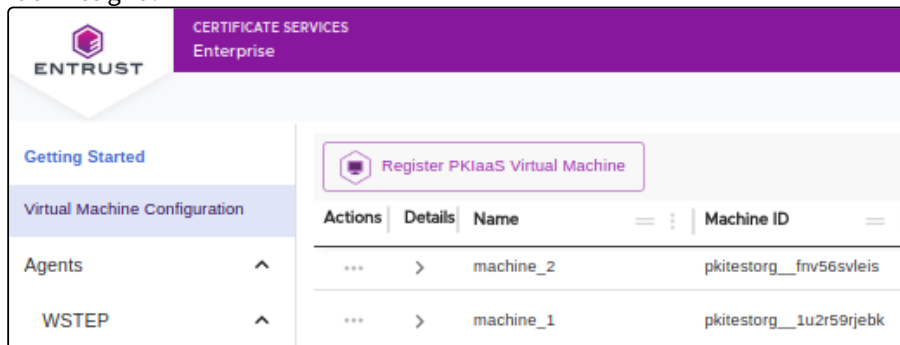
Copy the URL, you will need it when later [Enabling PKIaaS WSTEP for users](#) on your Windows domain.

Linking additional Active Directories to an agent

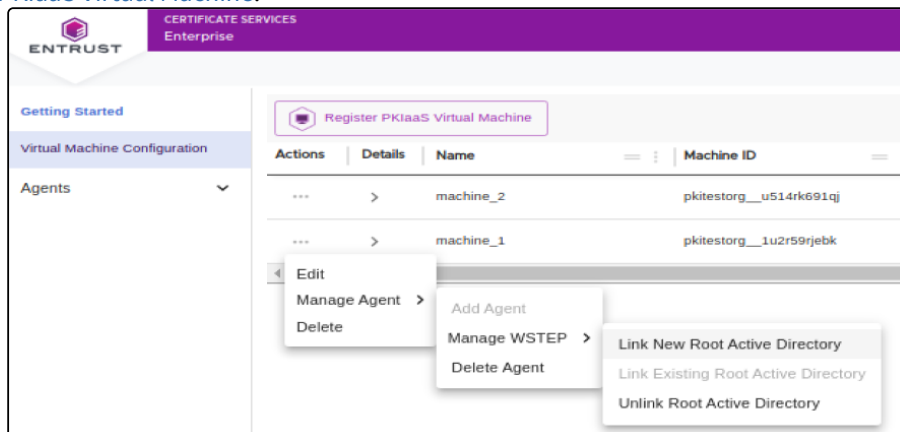
When [Adding an agent to a PKIaaS Virtual Machine](#), you are asked to enter configuration data for linking a first Windows root Active Directory. See this section for how to link additional Active Directories.

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](#)

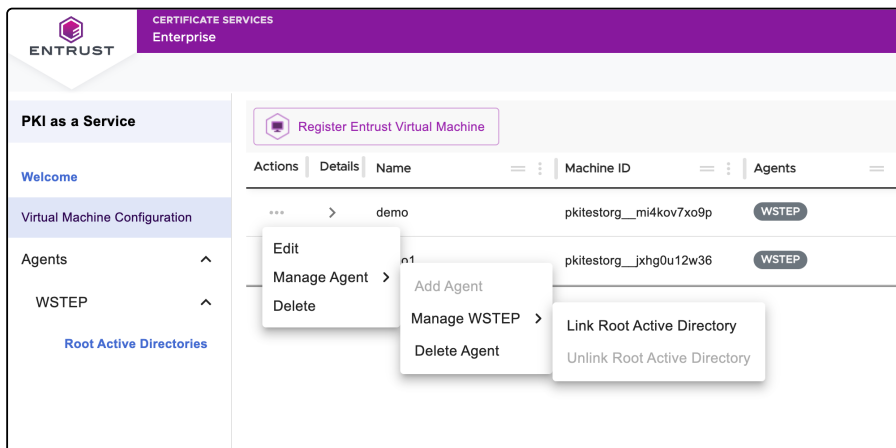
Managing PKIaaS Virtual Machine configurations

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 Registering a PKIaaS Virtual Machine .
Description	The optional description added when Registering a PKIaaS Virtual Machine .

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.

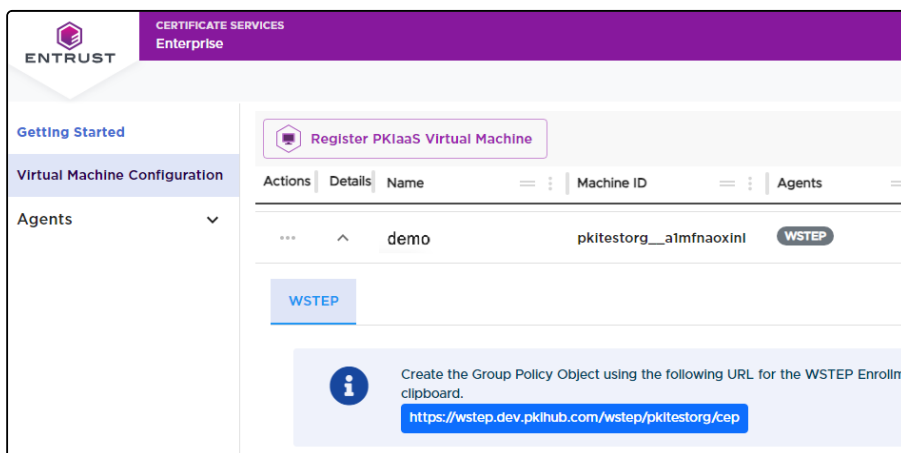
Delete

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

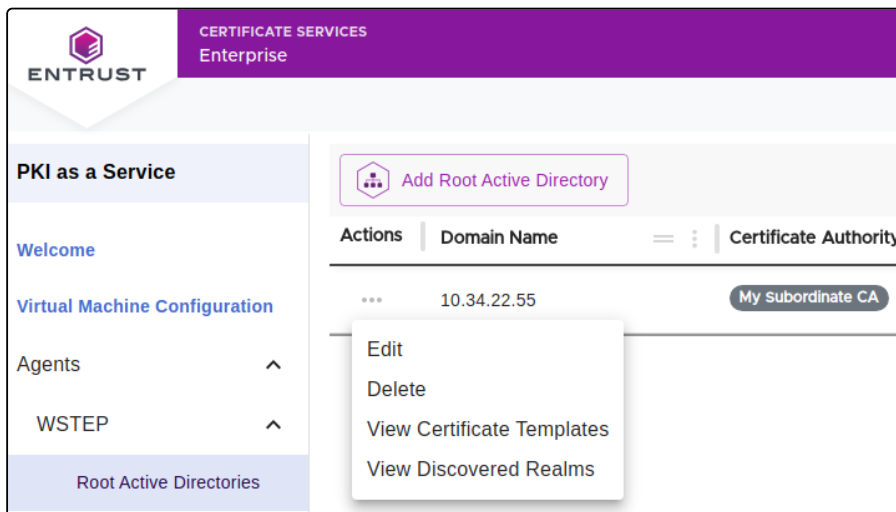
In the PKIaaS Virtual Machine grid, click the > arrow to unfold the details of a PKIaaS Virtual Machine configuration.



Click the ⓘ 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.

Manage Certificate Templates

View the list of certificate templates discovered in the oscar.test domain and select the Certificate Authority that will issue certificates for each template.

View Certificate Templates by CA: My Subordinate CA

Certificate Templates
Administrator

Certificate Authority
My Subordinate CA

Save

 Certificate Templates Mapping

Certificate Templates	Certificate Authority
Administrator	My Subordinate CA
CAExchange	My Subordinate CA

Close

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.

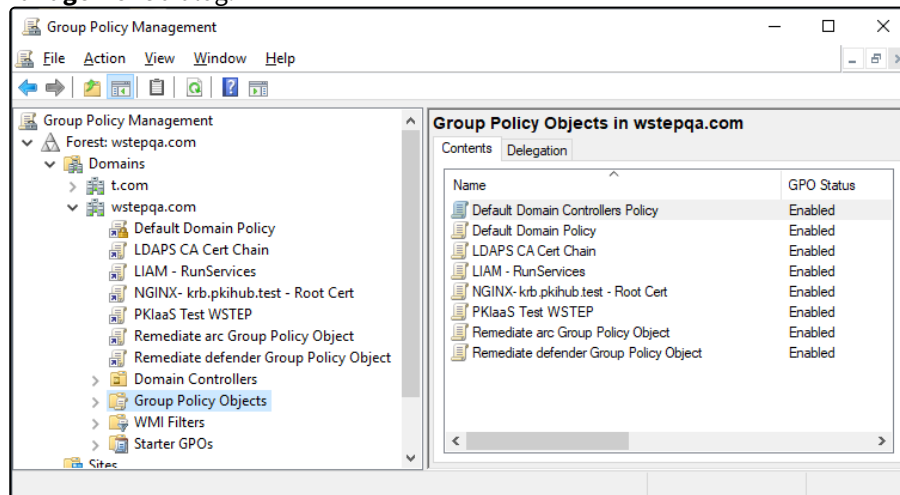
- [Creating a Group Policy Object for the WSTEP certificate chain](#)
- [Importing the WSTEP certificate chain into the Group Policy Object](#)
- [Enabling PKIaaS WSTEP for users](#)
- [Enabling autoenrollment for users](#)
- [Enabling PKIaaS WSTEP for devices](#)
- [Enabling autoenrollment for devices](#)
- [Linking the WSTEP Group Policy Object to all domains](#)

Creating a Group Policy Object for the WSTEP certificate chain

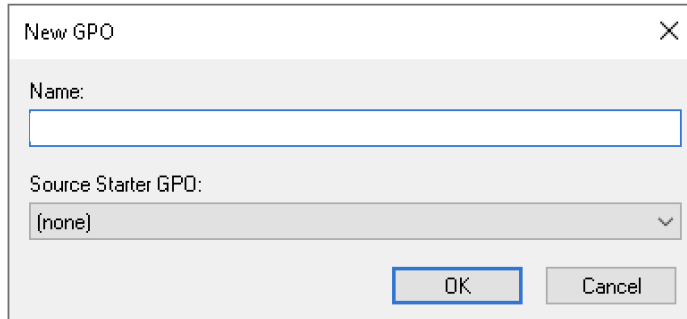
The recommended method to configure a certificate chain trust is to create a Group Policy Object (GPO) linked to all domains in the Active Directory forest.

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

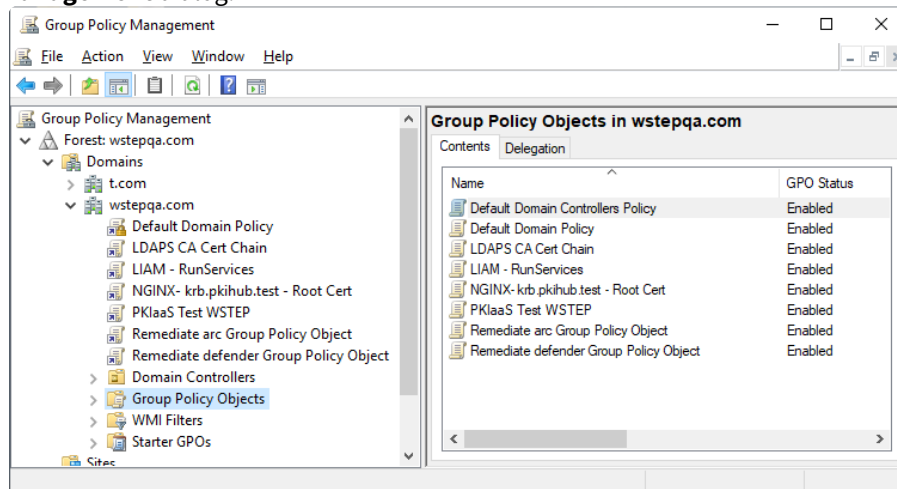
Import the WSTEP certificate chain into the GPO previously created in [Creating a Group Policy Object for the WSTEP certificate chain](#).

i See [Downloading the certificate chain](#) for how to download the required certificates.

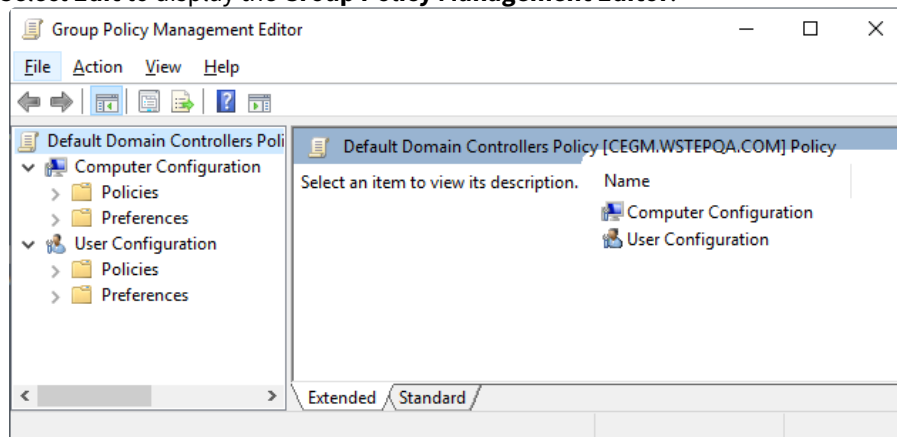
To import the certificate chain into the GPO

1. Log into the root Active Directory of the forest as an Active Directory administrator.

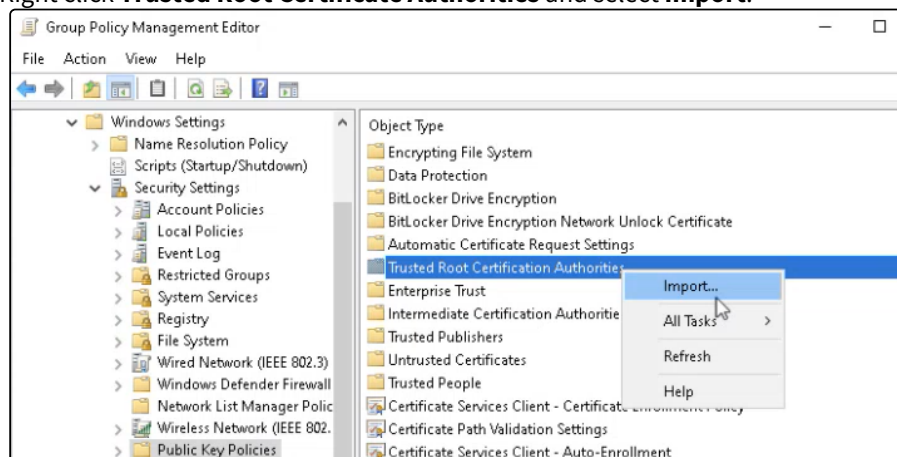
2. Select **Start > Windows Administrative Tools > Group Policy Management** to open the **Group Policy Management** dialog.



3. Right click the Group Policy Object.
4. Select **Edit** to display the **Group Policy Management Editor**.

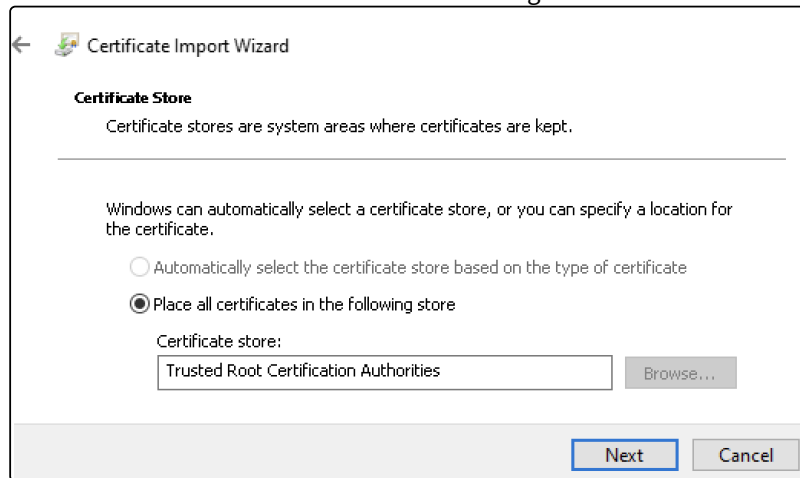


5. Navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies**.
6. Right click **Trusted Root Certificate Authorities** and select **Import**.



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**.

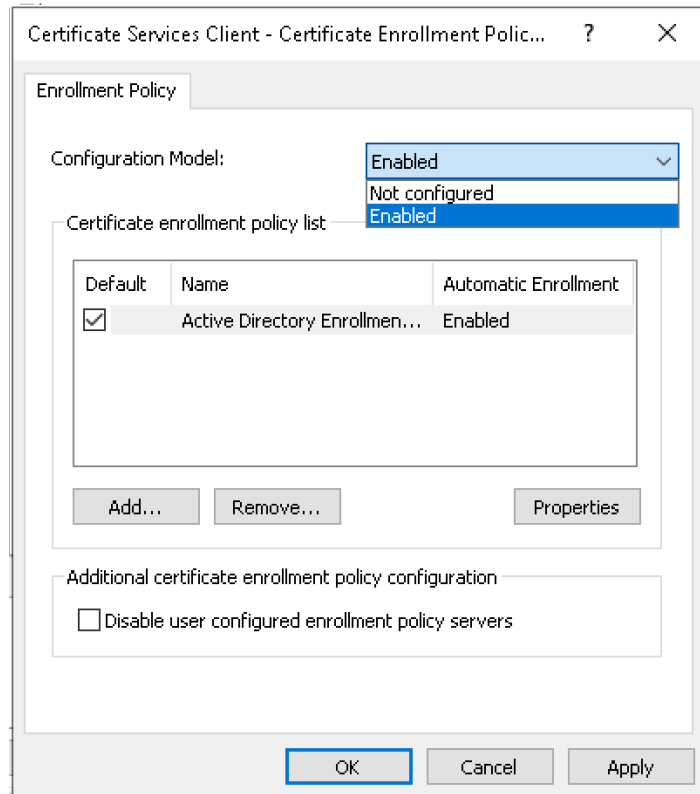
Enabling PKIaaS WSTEP for users

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.



The dialog box is titled "Certificate Services Client - Certificate Enrollment Policy Configuration". It has a tab labeled "Enrollment Policy".

Configuration Model: **Enabled** (dropdown menu with options: Enabled, Not configured, Enabled)

Certificate enrollment policy list:

Default	Name	Automatic Enrollment
☒	Active Directory Enrollment...	Enabled

Buttons: Add..., Remove..., Properties

Additional certificate enrollment policy configuration:

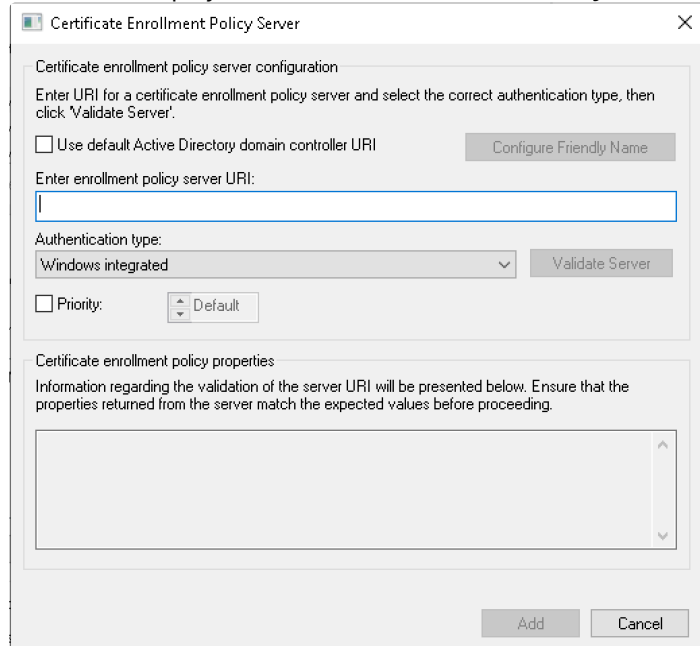
☐ Disable user configured enrollment policy servers

Buttons: OK, Cancel, Apply

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.



The dialog box is titled "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:

Windows integrated (dropdown menu) Validate Server

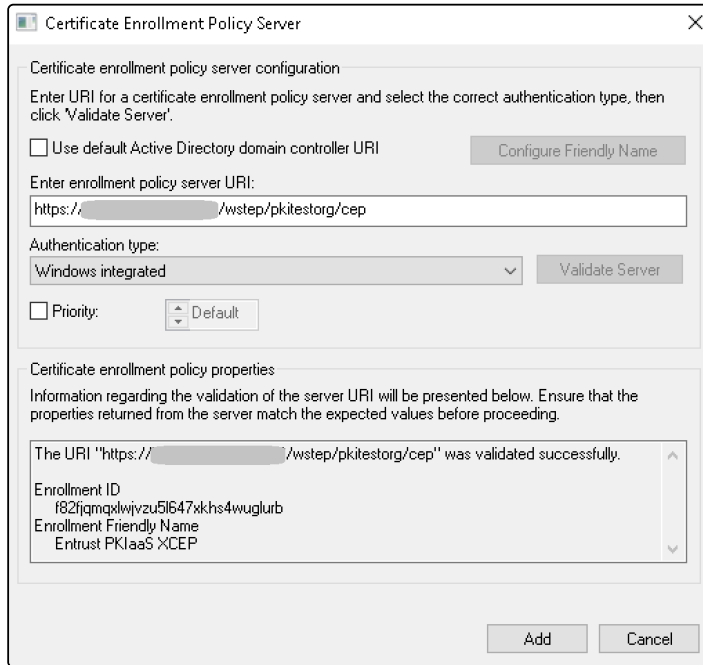
☐ Priority: Default

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.

Buttons: Add, Cancel

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.

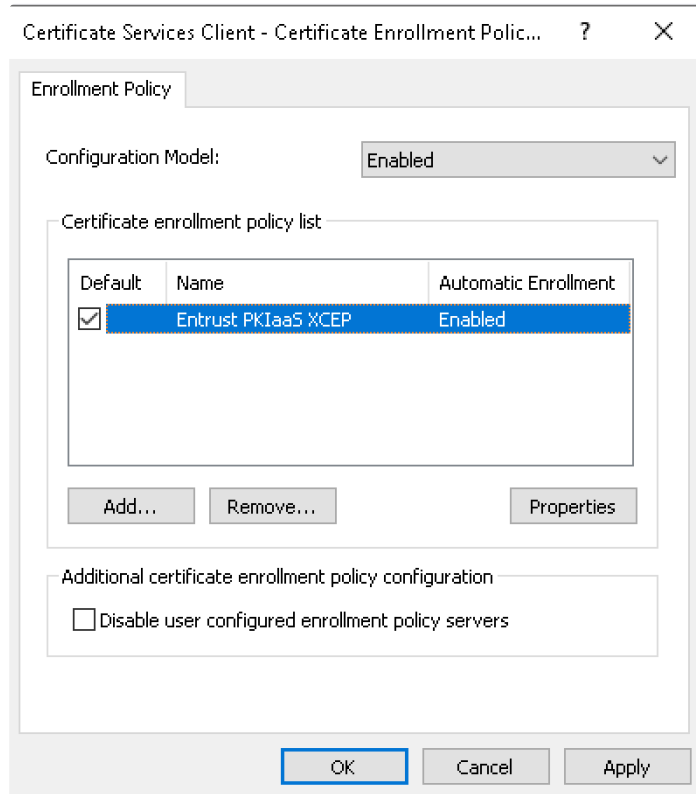


The screenshot shows a dialog box titled "Certificate Enrollment Policy Server". It contains the following sections:

- Certificate enrollment policy server configuration**
 - Text: "Enter URI for a certificate enrollment policy server and select the correct authentication type, then click 'Validate Server'."
 - Checkbox: "Use default Active Directory domain controller URI" (unchecked). A "Configure Friendly Name" button is to its right.
 - Text: "Enter enrollment policy server URI:" followed by a text box containing "https://[redacted]/wstep/pkitestorg/cep".
 - Text: "Authentication type:" followed by a dropdown menu showing "Windows integrated". A "Validate Server" button is to its right.
 - Text: "Priority:" followed by a dropdown menu showing "Default".
- Certificate enrollment policy properties**
 - Text: "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."
 - Text box showing validation results: "The URI 'https://[redacted]/wstep/pkitestorg/cep' was validated successfully."
 - Text: "Enrollment ID" followed by "f82f9mqxlvjvzu5i647xkhs4wuglurb".
 - Text: "Enrollment Friendly Name" followed by "Entrust PKIaaS XCEP".

At the bottom of the dialog are "Add" and "Cancel" buttons.

- 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**.

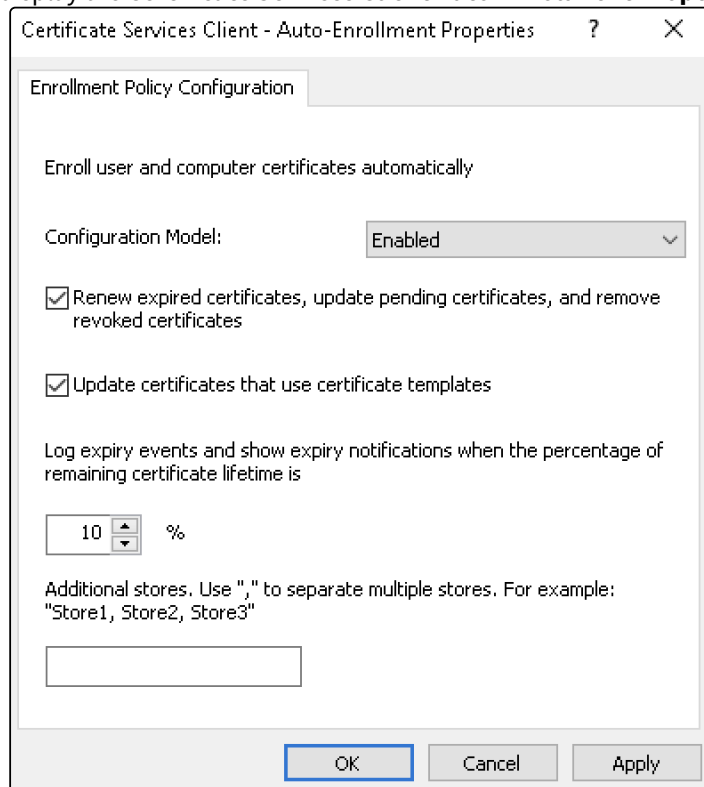
Enabling autoenrollment for users

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**.

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**.

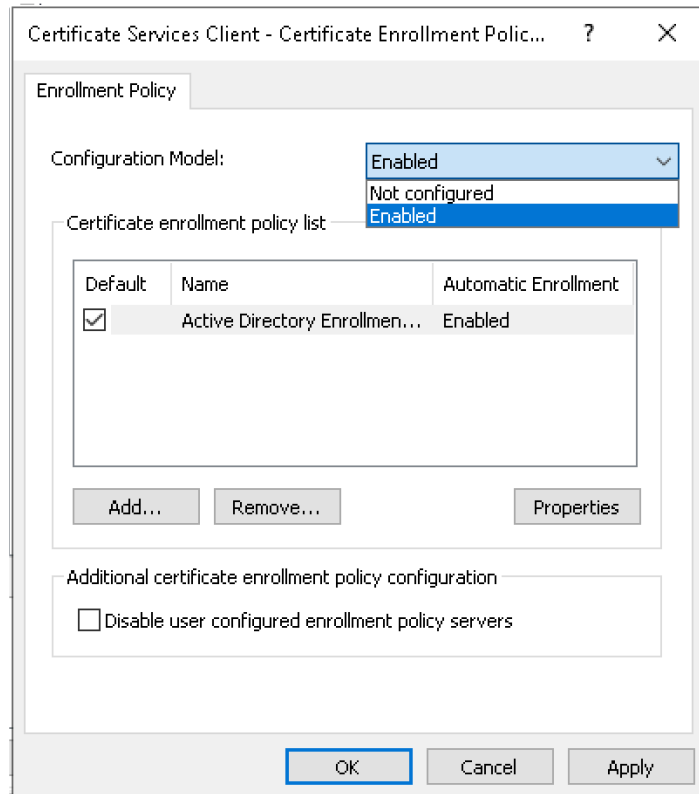
Enabling PKIaaS WSTEP for devices

Configure the PKIaaS WSTEP to enable WSTEP for devices.

To enable PKIaaS WSTEP 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 - Certificate Enrollment Policy** and select **Properties** to display the **Certificate Services Client - Certificate Enrollment Policy Properties** dialog

box.



The dialog box is titled "Certificate Services Client - Certificate Enrollment Policy Configuration". It has a tab labeled "Enrollment Policy".

Configuration Model: **Enabled** (dropdown menu with options: Enabled, Not configured, Enabled)

Certificate enrollment policy list:

Default	Name	Automatic Enrollment
☒	Active Directory Enrollment...	Enabled

Buttons: Add..., Remove..., Properties

Additional certificate enrollment policy configuration:

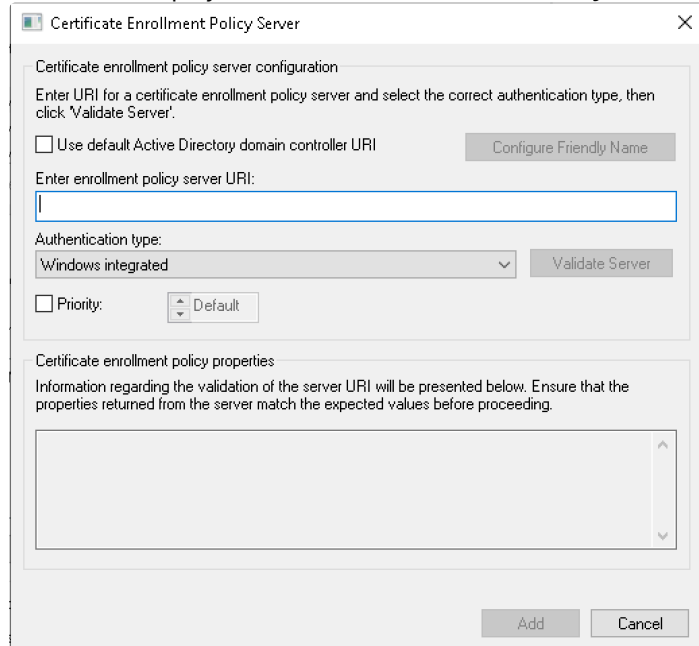
☐ Disable user configured enrollment policy servers

Buttons: OK, Cancel, Apply

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.



The dialog box is titled "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:

Windows integrated (dropdown menu) Validate Server

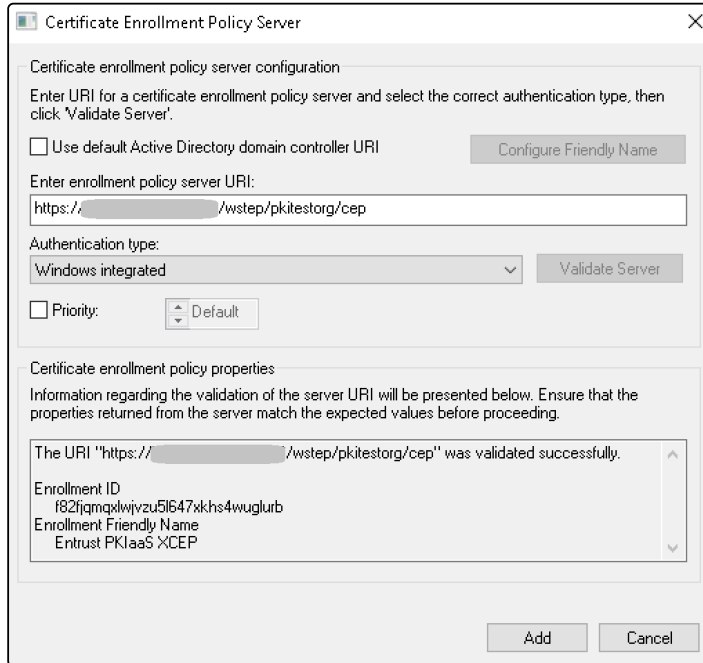
☐ Priority: Default

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.

Buttons: Add, Cancel

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

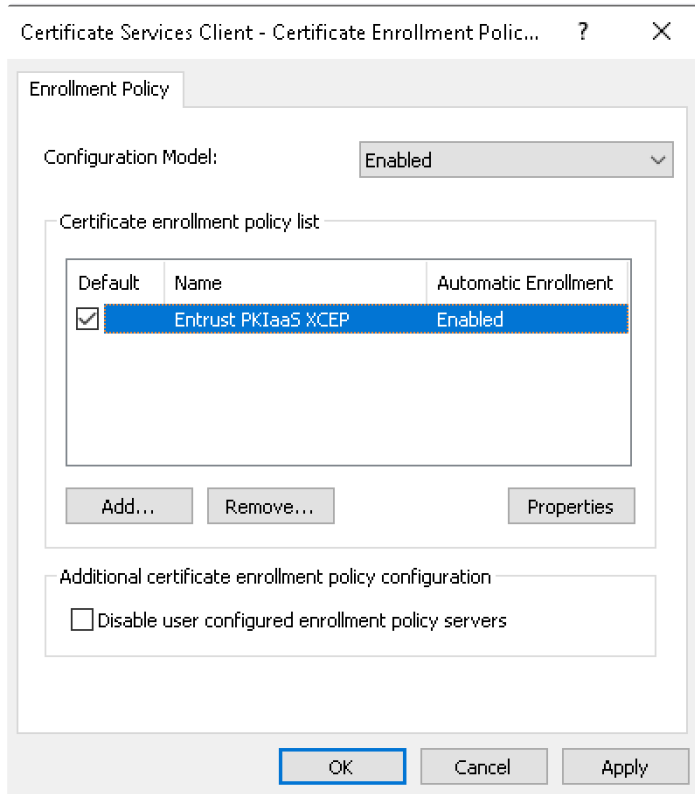
Information regarding the validation of the server URI will be presented below. Ensure that the properties returned from the server match the expected values before proceeding.

The URI "https://[redacted]/wstep/pkitestorg/cep" was validated successfully.

Enrollment ID
 f82fjgmqlwvzu5i647xkhs4wuglurb
 Enrollment Friendly Name
 Entrust PKIaaS XCEP

Add Cancel

8. Click **Add** to add the new PKIaaS WSTEP service to the **Certificate enrollment policy list** pane.



Certificate Services Client - Certificate Enrollment Policy...

Enrollment Policy

Configuration Model:

Certificate enrollment policy list

Default	Name	Automatic Enrollment
☒	Entrust PKIaaS XCEP	Enabled

Add... Remove... Properties

Additional certificate enrollment policy configuration

☐ Disable user configured enrollment policy servers

OK Cancel Apply

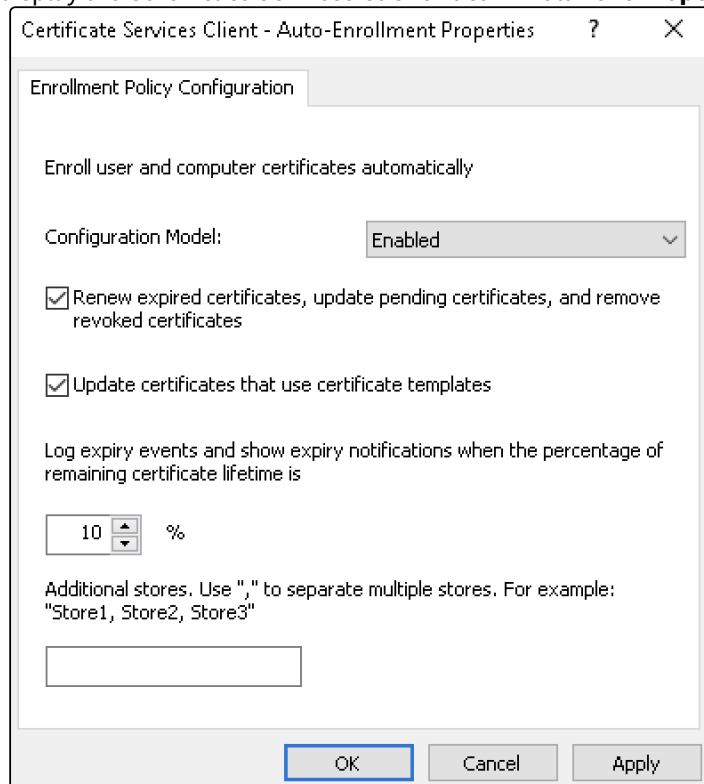
9. In the **Certificate enrollment policy list** pane, check the box of the new PKIaaS WSTEP service to make it the default Certificate Enrollment Policy.
10. Click **OK**.

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.



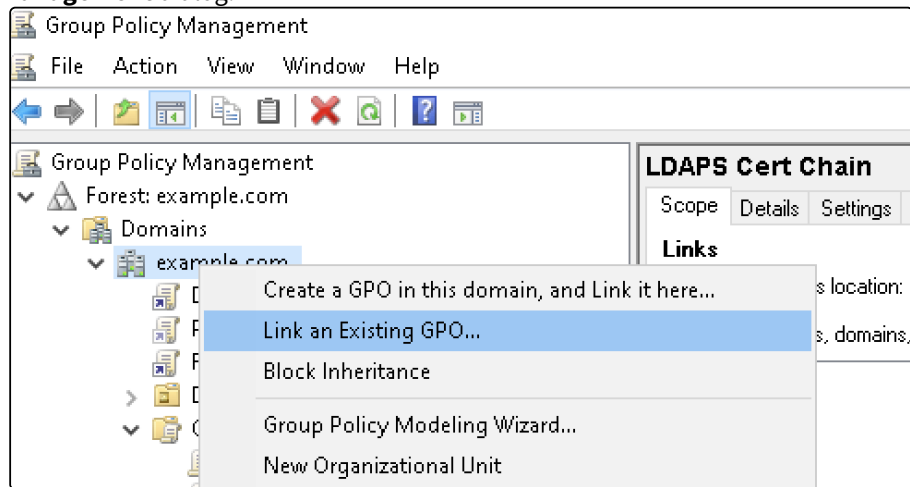
3. Select **Enabled** in the **Configuration Model** drop-down list.
4. Check the following boxes:
 - **Renew expired certificates, update pending certificates, and remove revoked certificates**
 - **Update certificates that use certificate templates.**
5. Optionally, change the percentage under **Log 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 a 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.pkiaas.entrust.com:443
Mar 01 13:14:13 Init ConnectionCheck.OK Connected to satellit.pkiaas.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 Registering a PKIaaS Virtual Machine
Node ID	The internal Entrust PKIaaS identifier of the PKIaaS Virtual Machine	After Registering a PKIaaS Virtual Machine
Installed agents	The "WSTEP" name of the installed agent.	After Adding an agent to a PKIaaS Virtual Machine

For each step, the prompt displays the following status symbols.

Symbol	Step status
[]	Not yet started
[\]	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

[ v ] WSTEP Agent running
      Version: v202402160726
[ v ] Reporter running
      Last Sync: Thu, 29 Feb 2024 12:53:01 UTC
[ v ] Poller running
      Last Sync: Thu, 29 Feb 2024 12:53:15 UTC
[ v ] LDAP Connectivity
      Connected to LDAP abc.corp
[ v ] LDAP Authentication
      Authenticated to LDAP abc.corp

```

Press the space bar to display more detailed logs.

```

WSTEP logs (1485, offset:0 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](#) tab 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
Extensions	Any key usage combination containing the following key usages: CRL Sign, Decipher Only, Encipher Only, Key Agreement, Key Cert Sign
General	Publish certificate in Active Directory
Issuance requirements	CA certificate manager approval
Key Attestation	Required

Tab	Unsupported setting
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 Cryptographic Security Platform on-premises solution.

<https://api.managed.entrust.com/csp>

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

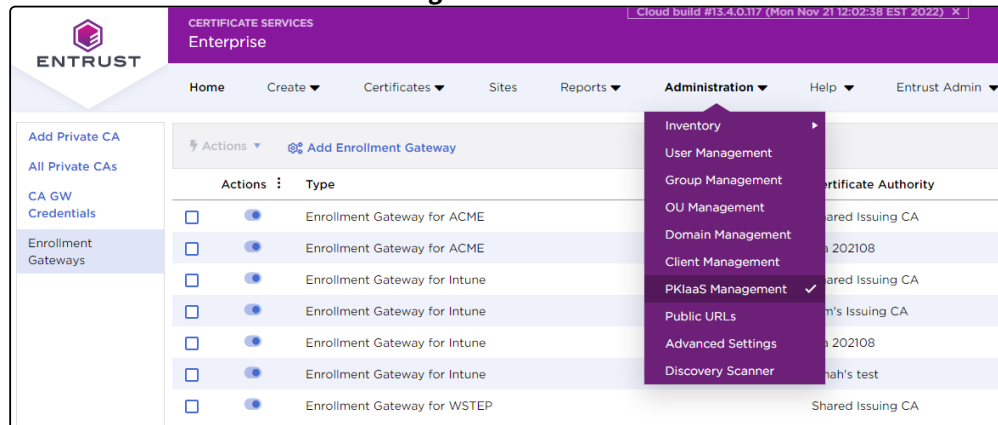
Add a Certificate Enrollment Gateway instance to an issuing PKIaaS CA.



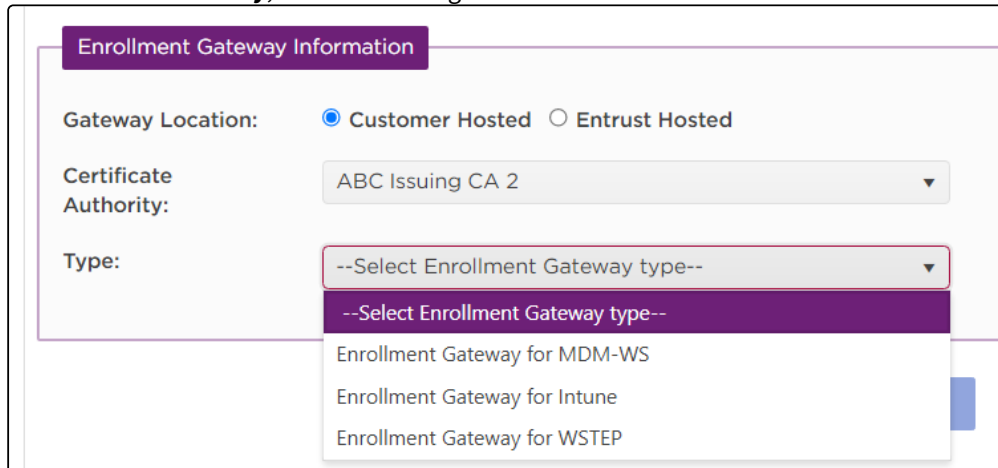
As discussed in [Creating an issuing CA under an online root CA](#), please add the required service to the issuing CA. For example, add the SCEP service to your issuing CA before adding the Enrollment Gateway for SCEP.

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.



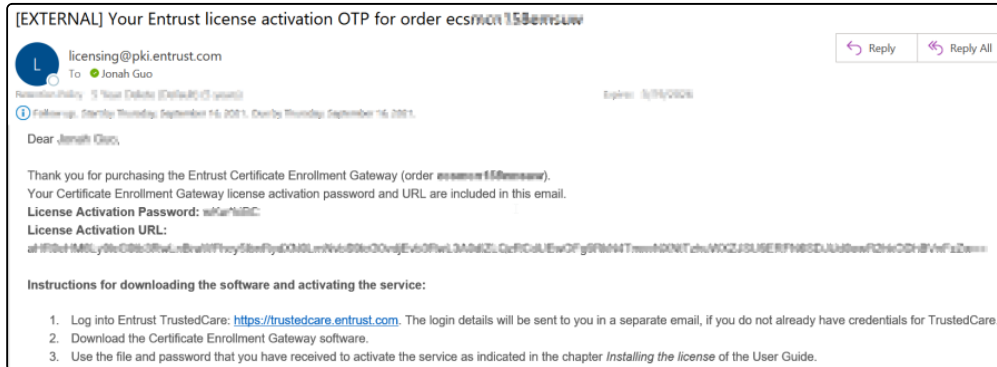
6. In **Type**, select one of the Certificate Enrollment Gateway services enabled in the issuing CA.

⚠ 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/csp> to:

1. Download and install the Cryptographic Security Platform.
2. Deploy Certificate Enrollment Gateway on the Cryptographic Security Platform.

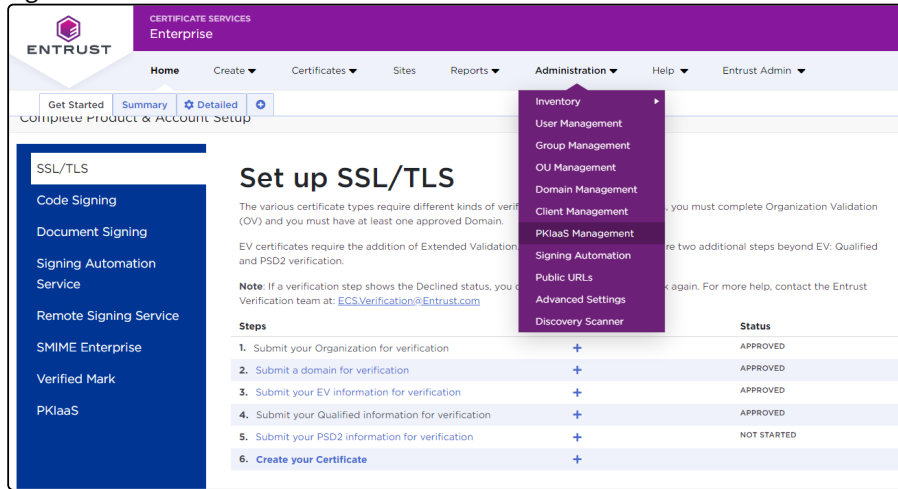
Deleting an on-premises Certificate Enrollment Gateway

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

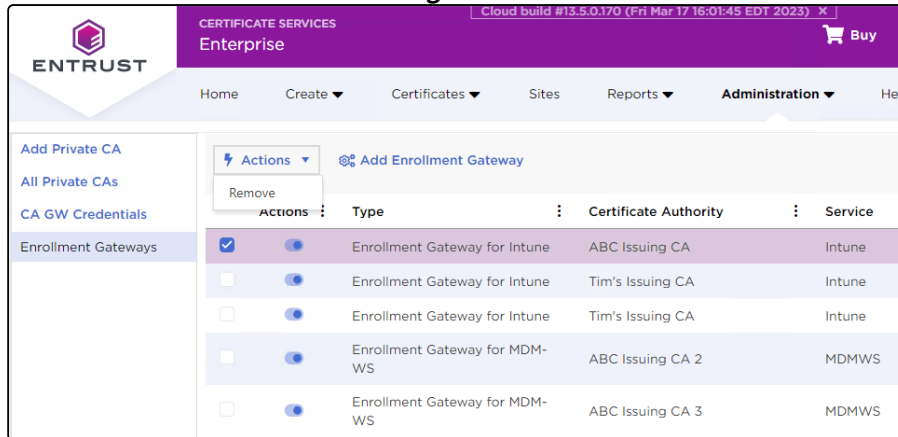
1. Log into cloud.entrust.net.



The screenshot shows the Entrust Enterprise dashboard. The left sidebar contains a list of services: SSL/TLS, Code Signing, Document Signing, Signing Automation Service, Remote Signing Service, SMIME Enterprise, Verified Mark, and PKIaaS. The main content area is titled 'Set up SSL/TLS' and includes a 'Steps' section with a table of verification steps.

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. Select **Administration > PKIaaS Management**.



The screenshot shows the 'Administration > PKIaaS Management' page. The left sidebar contains a list of services: Add Private CA, All Private CAs, CA GW Credentials, and Enrollment Gateways. The main content area is titled 'Add Enrollment Gateway' and includes a table of enrollment gateways.

ACTIONS	Type	Certificate Authority	Service
☒	Enrollment Gateway for Intune	ABC Issuing CA	Intune
☐	Enrollment Gateway for Intune	Tim's Issuing CA	Intune
☐	Enrollment Gateway for Intune	Tim's Issuing CA	Intune
☐	Enrollment Gateway for MDM-WS	ABC Issuing CA 2	MDMWS
☐	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 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
Planning your WSTEP deployment	Determine the required number of PKIaaS Virtual Machines based on your current deployment.
WSTEP enrollment requirements	Determine the networking requirements based on your current deployment. Make any necessary adjustment to the DNS server and the firewall rules.
Configuring an Entrust PKIaaS issuing CA for WSTEP	You can skip this section as WSTEP is already configured for your on-premises deployment.
Preparing the Active Directory forest for WSTEP	Repeat Creating a PKIaaS WSTEP Service Account 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 Installing the default set of Microsoft Certificate Templates as the certificate templates should already exist for each Microsoft Active Directory forest.
	Repeat Setting up LDAPS on domain controllers 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
Configuring PKIaaS Virtual Machines on the PKIaaS portal	Complete all the steps. When Configuring an Active Directory in the agent , ensure the selected Certificate Authority matches the one used for the on-premises WSTEP Enrollment Gateway.
Enabling WSTEP for users and devices	Do not reuse the Group Policy Object (GPO) of the on-premises WSTEP Enrollment Gateway. Instead, complete all the steps to: 1. Create a new GPO. 2. Apply the GPO to single a test user. 3. Complete the migration testing. 4. Apply the GPO across the entire forest. 5. Unlink the the existing GPO for the on-premises WSTEP Enrollment Gateway. 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	✓	Run the following command to delete the <code>ceg</code> namespace from Entrust Deployment Manager. <pre>sudo kubectl delete namespace ceg</pre> This operation will keep the configuration and the license in case you need to redeploy.
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.

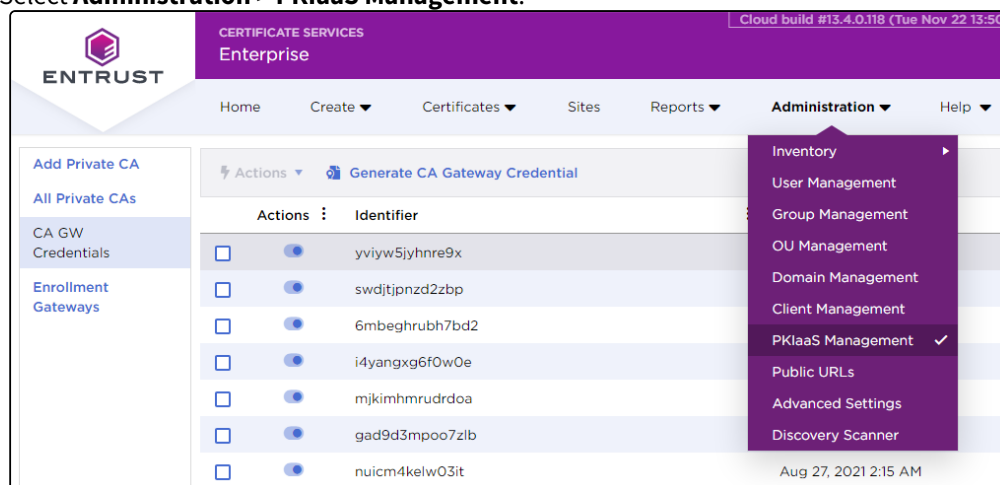
- [Generating CA Gateway credentials](#)
- [Accessing the CA Gateway API](#)
- [Integrating with Ansible](#)
- [Integrating with HashiCorp Vault](#)
- [Integrating with KeyFactor CLM](#)
- [Integrating with ServiceNow](#)
- [Integrating with Venafi](#)

Generating CA Gateway credentials

Generate and download credentials to connect with the Entrust CA Gateway API.

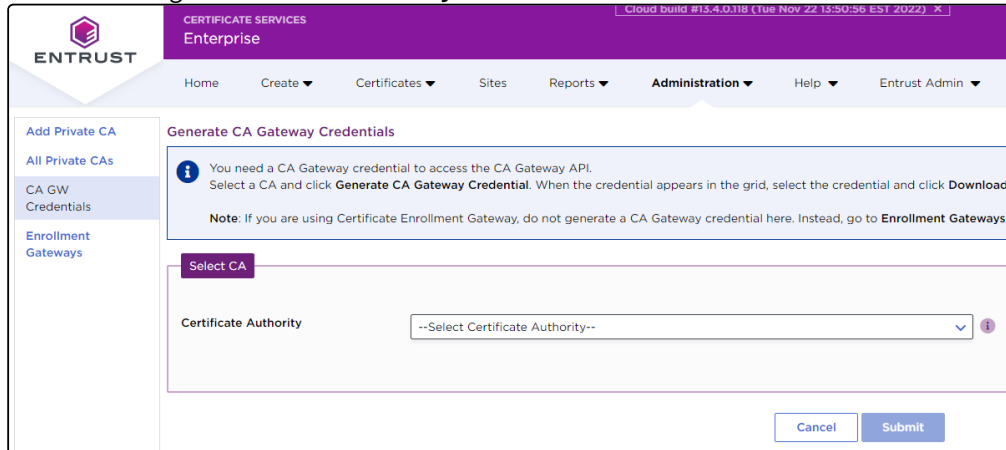
To generate and download CA Gateway credentials

1. Select **Administration > PKIaaS Management**.

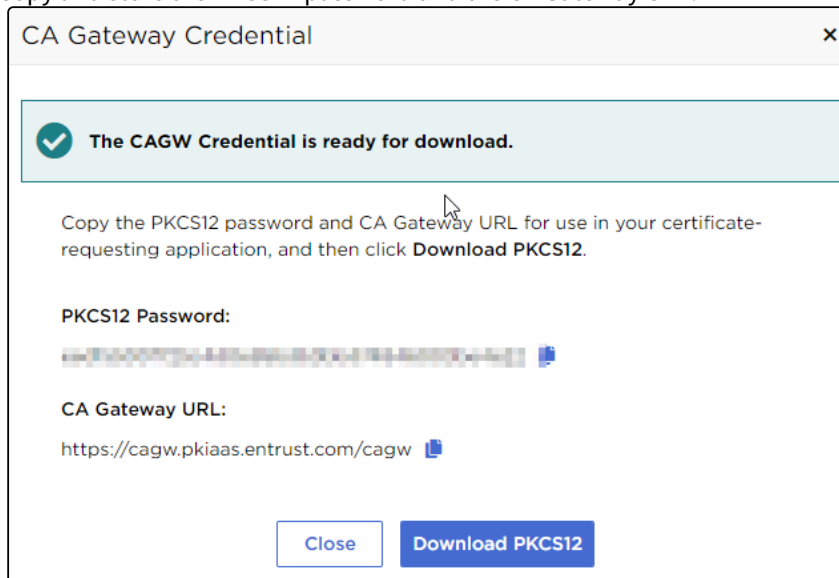


2. In the side pane, click **CA GW Credentials**.
3. Click **Generate CA Gateway Credential**.

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 following.

- [API endpoints](#)
- [Swagger UI](#)

API endpoints

Use the API endpoints for programmatic interaction with the API and integrations with third-party clients.

US region

<https://cagw.pkiaas.entrust.com/cagw/v1>

EU region

<https://cagw.eu.pkiaas.entrust.com/cagw/v1>

Swagger UI

Use the Swagger UI to manually interact with a web browser or generate curl commands for API endpoints.

US region

<https://cagw.pkiaas.entrust.com/cagw/swagger-ui>

EU region

<https://cagw.eu.pkiaas.entrust.com/cagw/swagger-ui>

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

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
Azure Firewall Intermediate CA certificate profile	azure-firewall-ca-subord
Basic authorities certificate profiles	basic-ca-root basic-ca-subord basic-ocsp
TLS Proxy CA certificate profile	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 RFC 7093 section 2

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 RFC 7093 section 2	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in RFC 7093 section 2	«The leftmost 160-bits of the SHA-256 hash of the value of the BIT STRING subjectPublicKey» as described in RFC 7093 section 2

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

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 RFC 7093 section 2

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

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

Subscriber certificate profiles

Entrust provides the following certificate policies for end-entity subscribers

Title	Profiles
Active Directory (WSTEP) certificate profiles	wstep-digital-signature wstep-digital-signature-key-encipherment wstep-key-encipherment wstep-non-repudiation wstep-non-repudiation-key-encipherment
CMPv2 certificate profiles	cmp-digital-signature cmp-digital-signature-key-encipherment cmp-key-encipherment

Title	Profiles
	cmp-non-repudiation
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 multiuse-p12-key-encipherment-custom

Title	Profiles
	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

Extension name	Extension OID
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
Basic Constraints	Yes	cA=False
CRL Distribution Points	No	Always present
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 RFC 7093 section 2

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
'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

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
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 RFC 7093 section 2

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

Key algorithm	Signature algorithm
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>

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
'O' 'Org' 'Organization'	2.5.4.10
'OU' 'OrganizationalUnit' 'OrganizationUnit' 'OrgUnit'	2.5.4.11
'T' 'Title'	2.5.4.12

Alias	OID
'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
'MarkType'	1.3.6.1.4.1.53087.1.13

Alias	OID
'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
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 RFC 7093 section 2

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
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
'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

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.

Field	Value
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
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 RFC 7093 section 2

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

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>

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
'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

Alias	OID
'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

Alias	OID
'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
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

Extension	Critical	Value
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 RFC 7093 section 2

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
'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

Alias	OID
'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

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

Extension name	Extension OID
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

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 RFC 7093 section 2

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
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

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

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	CS R	P1 2	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	✓

Profile	CS R	P1 2	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
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.

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.

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
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
'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

Alias	OID
'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
'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
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 RFC 7093 section 2

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

i 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
'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

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)	✗

Profile Name	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
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)	✗
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)	✗

Profile Name	Key Usage	Extended Key Usage	Allows Extended Key Usage in request
multiuse-p12-key-encipherment-non-repudiation-client-server	Digital Signature, Key Agreement, Key Encipherment, 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-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

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 RFC 7093 section 2

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

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

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
privatessl-tls-client	False
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 RFC 7093 section 2

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
'unstructuredName'	1.2.840.113549.1.9.2

Alias	OID
'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 RFC 7093 section 2

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
'unstructuredName'	1.2.840.113549.1.9.2

Alias	OID
'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
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

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 RFC 7093 section 2

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

i 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
'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

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 RFC 7093 section 2

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

 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 RFC 7093 section 2

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
RSA 3072	sha256WithRSAEncryption

Key algorithm	Signature algorithm
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>

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
'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

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.

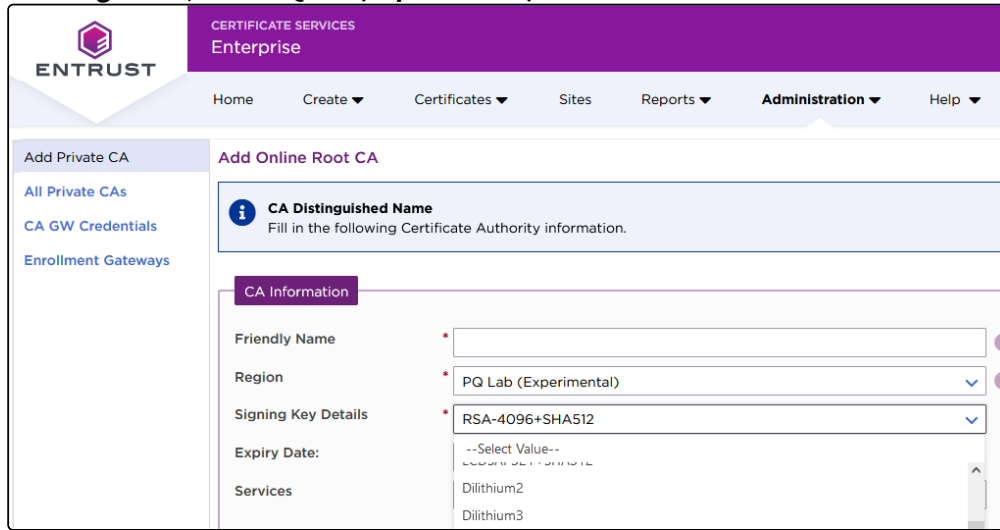
Feature	PQ Lab limitations
Key generation mechanism	liboqs (https://openquantumsafe.org/liboqs) open-source software library for post-quantum keys; Entrust nShield HSMs for RSA and ECDSA keys. In future releases, PKIaaS will support post-quantum key generation using Entrust nShield HSMs.
PKIaaS Certificate 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.

2. 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 has a sidebar on the left with links: 'Add Private CA', 'All Private CAs', 'CA GW Credentials', and 'Enrollment Gateways'. The main form area has a header 'Add Online Root CA' and a section 'CA Distinguished Name' with the instruction 'Fill in the following Certificate Authority information.' Below this is a 'CA Information' section with several fields: 'Friendly Name' (text input), 'Region' (dropdown menu set to 'PQ Lab (Experimental)'), 'Signing Key Details' (dropdown menu set to 'RSA-4096+SHA512'), 'Expiry Date' (dropdown menu set to '--Select Value--'), and 'Services' (list box with 'Dilithium2' and 'Dilithium3' selected).

3. Select a post-quantum algorithm in the **Signing Key Details** list.
4. Fill in the rest of the fields described in [Creating an online root CA](#).
5. Follow the steps described in [Creating an issuing CA under an online root CA](#).
6. Create a certificate request, for example, using the [openquantumsafe/oqs-openssl](#) tool. Alternatively, you can copy one of the below sample requests.

- Pure post-quantum algorithms
 - SPHINCS+-SHA2-128f-simple (1.3.9999.6.4.13)
 - SPHINCS+-SHA2-128s-simple (1.3.9999.6.4.16)
 - SPHINCS+-SHA2-192f-simple (1.3.9999.6.5.10)
 - SPHINCS+-SHA2-192s-simple (1.3.9999.6.5.12)
 - SPHINCS+-SHA2-256f-simple (1.3.9999.6.6.10)
 - SPHINCS+-SHA2-256s-simple (1.3.9999.6.6.12)
 - Falcon-512 (1.3.9999.3.6)
 - Falcon-1024 (1.3.9999.3.9)
 - ML-DSA-44 (2.16.840.1.101.3.4.3.17)
 - ML-DSA-65 (2.16.840.1.101.3.4.3.18)
 - ML-DSA-87 (2.16.840.1.101.3.4.3.19)
- Explicit composite algorithms
 - MLDSA44-ECDSA-P256 (2.16.840.1.114027.80.8.1.24)
 - MLDSA44-RSA2048-PKCS15 (2.16.840.1.114027.80.8.1.22)
 - MLDSA65-ECDSA-P384 (2.16.840.1.114027.80.8.1.28)
 - MLDSA65-RSA3072-PKCS15 (2.16.840.1.114027.80.8.1.27)
 - MLDSA65-RSA4096-PKCS15 (2.16.840.1.114027.80.8.1.35)
 - MLDSA87-ECDSA-P384 (2.16.840.1.114027.80.8.1.31)

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.

7. 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.

- [SPHINCS+-SHA2-128f-simple \(1.3.9999.6.4.13\)](#)
- [SPHINCS+-SHA2-128s-simple \(1.3.9999.6.4.16\)](#)
- [SPHINCS+-SHA2-192f-simple \(1.3.9999.6.5.10\)](#)
- [SPHINCS+-SHA2-192s-simple \(1.3.9999.6.5.12\)](#)
- [SPHINCS+-SHA2-256f-simple \(1.3.9999.6.6.10\)](#)
- [SPHINCS+-SHA2-256s-simple \(1.3.9999.6.6.12\)](#)
- [Falcon-512 \(1.3.9999.3.6\)](#)
- [Falcon-1024 \(1.3.9999.3.9\)](#)
- [ML-DSA-44 \(2.16.840.1.101.3.4.3.17\)](#)
- [ML-DSA-65 \(2.16.840.1.101.3.4.3.18\)](#)
- [ML-DSA-87 \(2.16.840.1.101.3.4.3.19\)](#)

SPHINCS+-SHA2-128f-simple (1.3.9999.6.4.13)

Use the following CSR and keys to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm with the 1.3.9999.6.4.13 object identifier (OID).

- [Sample CSR to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm](#)
- [Sample public key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm](#)
- [Sample private key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm](#)

Sample CSR to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm

Use the following CSR to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
MIJDWTCBhwIBADBRMRAwDgYDVQQKEwdFbnRydXN0MQ8wDQYDVQQLEwZQS0lIdWlX
LDAqBgNVBAMTI1NQSElQINQbHVzLVNIQTItMTI4Zi1zaW1wbGUgU2FtcGxlMC0w
CAYGK84PBgQNAyEAO6644sgf45+BYFEyuQLej72GY8YWNQ2sHEKTYz515v+gADAI
BgYrzg8GBA0DgkLBAB4LW908lqet6lCcYHVkj+5JmKPPMaoY3DNTgt3Vn5CIgrAB
rxKraRX3TEBwJv/n2tMmvHSGzF9nucBjsEuof+syStM3j8f1hbc0h8Bnq3tJCDNx
NuX8JnuXP3EywE+sDiyBQ5LcoEKcwnr3XNv1XZ2ZfOMy7DxcYxLRpRBbIic5RQMX
cQlRrVXnz8t4gJg1NmJNXfyFxb16kpeOmT4kl9ECMXLWjJEmgN1FcZ0nIqK43cHB
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so3M9zKJDufIwDexUqJ4UyYw9LHkBTkaC3E5Let0lgKr888b3tgkR5Uhz1C//Pq7
7cTaYioY4fBp1V7dC3MwYz10o02DZbxY76/2xZpU2DbuLQ6AzCbX20oLu9mKjLbL
Zht3VEYKtKT9Yf5+HdeI8uEx+SBzV9dHNNuexHZd30ig/DAGwdHS96C3Q6RtNCFB
TWQT2SAAfhVG4qpGVRUspM6aSF7GyaET5L0l6uZ0J0Dtus5+Ip0tP/gonuR64B/m
6DUXqwtZPHKCJm49EjEz40Hbcs0IWexrLAS0/CIzZkv12MLXY7H2FpX22hXebMg5
DWFipKGVCHCqYd4cG8QevvtUq8/5SVH/p0oBMRQnBNcIIBvVTI4VfFDVEa5Uqmmk
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0XfBhS2l1lfJ9o7CsmQ/6lkk0rel3j0IxLGrCeumN/829JpgZyJvudciMHYaqYGN
eMMN2uM/3edY3mX5+BzTqqT6GX5SpAf4rZ/FWQYkkzzyqg85Nx4GnhK7liU0eZXP
```

AB/uWgU3MYpwQuS/TSzF2q0e2y7Ll88x07uVadtQ1+hodRJyNN3QFzRbCGAsU1SB
EzUcWoXZQWdDxXF/Ab9bLNiL+KC/aJsRvV2gW2V0gtLBJEU4dZGhAVs6MEJj f6Y5
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We68hTkCgq943CeI9BnDREYLLTJAz55BcJut8LiCj8emzzAopbBAaH0JyQbaaBb+
w0FbFA5Lf+8N0GRnz9sJhvTOH+pv36MsP307CM4yDpKM38lHxQ1/CCjMQJ37ABtT
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eYsouM2JPBtIQB7ttRajl67gbDDtwNao00bERa/3BxvoY6Zk4d47J8JRHR2m+jnou
liXs58mjNhZC9jAq7dVAow3MX2hdB13HwS+Gdc2133Je05E/NLYENz2X7qctXM
jmaACzAaVzVSMELOnpYHVPjRgFmI/MDD8YKbMeyqt2x8NTIGlQqEHQzcQxTiv3fs
UX/9j258lyXtw63N5t6RFYfFAXAhXWV6B0cFqie63XKVbBiHTsAhLXTYs24A0aHZ
Bju+eciFmzUyTQKEW4pokIjPfMzhbpJAQ0DA/CKS64ow0uJpk+cipZbTWs6FXSH
dxv2esFPL8cnboH1t5LIMIPiaa/1grVZ5VFv6noZLBnPBbhfcc00MwRXZI+C++iE
wC79AUxPAM6jiWuzaVvADpVNgTB1po43n37TwLHBD9eCcaKwtJIAatqyLB5mskYE
LqRP1V22Pt0/MDZvQL6GYNF5ck3RSEmuLLmEFpD4TF8G8D8jff8+BEw48nT851Nh
X+2dd0nxuZGB4Yc5v0pX7ZVbvpwKeQtvFu+hCfcaMx6H1DYy8fh20BZQYLWeoyiY
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-----END CERTIFICATE REQUEST-----
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Sample public key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm

Use the following public key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm.

```
-----BEGIN PUBLIC KEY-----
MC0wCAYGK84PBgQNAyEAO6644sgf45+BYFEyuQLej72GY8YWNQ2sHEKTYz515v8=
-----END PUBLIC KEY-----
```

Sample private key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm

Use the following private key to test the SPHINCS+-SHA2-128f-simple post-quantum algorithm.

```
-----BEGIN PRIVATE KEY-----
MHECAQAwCAYGK84PBgQNBGIEYEgzEWffewdd8BZUPj7Dkt6gU1kqbc81gccq3y58
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-----END PRIVATE KEY-----
```

SPHINCS+-SHA2-128s-simple (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 theSPHINCS+-SHA2-128s-simple post-quantum algorithm](#)
- [Sample public key to test theSPHINCS+-SHA2-128s-simple post-quantum algorithm](#)
- [Sample private key to test theSPHINCS+-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.

```
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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.

```
-----BEGIN PUBLIC KEY-----
MC0wCAYGK84PBgQQAyEAXndonwKmchFM0uQUWLz2ib7+RmWyKljkb4Em6J2pnN0=
-----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.

```
-----BEGIN PRIVATE KEY-----
MHCAQAwCAYGK84PBgQQBGIEYBciTYZpFSPQ3Dm1MmkODG8YoTDTHfTu4JMxWg3q
beonXndonwKmchFM0uQUWLz2ib7+RmWyKljkb4Em6J2pnN1ed2ifAqZyEUw65BRy
vPaJvv5GZbIqW0RvgSbonamc3Q==
-----END PRIVATE KEY-----
```

SPHINCS+-SHA2-192f-simple (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.

```
-----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.

```
-----BEGIN PUBLIC KEY-----
MD0wCAYGK84PBgUKAzEA3C9QKtQNnTZRINo1ueM9SpptZbq/8Y839YR/JhjnSxFV
0m1HHN8ZZC5rfPHvYA/k
-----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.

```
-----BEGIN PRIVATE KEY-----
MIGjAgEAMAgGBivODwYFCgSBkwSBkA5u7nnDNrqioeDXfJzLEf88oIaM6XuHhPoT
SBCuL50WmNkYgufhh4pvxP0PKFbH59wvUCrUDZ02USDaNbnjPUqabWW6v/GPN/WE
fyYY50sRVTPtRxzfGWQua3zx72AP5NwvUCrUDZ02USDaNbnjPUqabWW6v/GPN/WE
fyYY50sRVTPtRxzfGWQua3zx72AP5A==
-----END PRIVATE KEY-----
```

SPHINCS+-SHA2-192s-simple (1.3.9999.6.5.12)

Use the following CSR and keys to test the SPHINCS+-SHA2-256f-simple post-quantum algorithm with the 1.3.9999.6.5.12 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.

```
-----BEGIN CERTIFICATE REQUEST-----
MIJACTCBlwIBADBRMRawDgYDVQQKEwdFbnRydXN0MQ8wDQYDVQQLEwZQS0lIdWIX
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```


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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.

```
-----BEGIN PUBLIC KEY-----
MD0wCAYGK84PBgUMAZEA5M7gViQs5zFAommoRgv00d6C0g1dJYIycRl3UNd7SWMi
fydoknPaAj6VT9/kYwuP
-----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.

```
-----BEGIN PRIVATE KEY-----
MIGjAgEAMAGBivODwYFDASBkwSBkLIVJ0Ly/zucZpnWwhktAFUzrPA2fLaQPtCv
hsZyra1MXeQ+q0yW8r/2AE0mRromZeT04FYkL0cxQKJpqEYLztHegtINXSWCMnEZ
d1DXe0ljIn8naJJz2gI+lu/f5GMLj+T04FYkL0cxQKJpqEYLztHegtINXSWCMnEZ
d1DXe0ljIn8naJJz2gI+lu/f5GMLjw==
-----END PRIVATE KEY-----
```

SPHINCS+-SHA2-256f-simple (1.3.9999.6.6.10)

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.

```
-----BEGIN CERTIFICATE REQUEST-----
MILDeTCBpwIBADBRMRAdgYDVQQKEwdFbnRydXN0MQ8wDQYDVQQLEwZQS0lIdWIx
LDAqBgNVBAMTI1NQSElOQ1NQbHVzLVNIQTItMjU2Zi1zaW1wbGUgU2FtcGxIME0w
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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.

```

-----BEGIN PUBLIC KEY-----
ME0wCAYGK84PBgYKA0EARx6ql5/SCS1BkE/R6nr2q1a4TrsEJfEQdER277IRvZl3
WPPxy7jSJ+z9XbFCVc7pYv185Dk1f53xYmhB43710g==

```

-----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.

```
-----BEGIN PRIVATE KEY-----
MIHTAgEAMAgGBivODwYGCgSBwwSBwGG8/voXg4JTpUDkfYZepMvbzddevaXjA9LC
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XbFCVc7pYv185Dk1f53xYmhB43710g==
-----END PRIVATE KEY-----
```

SPHINCS+-SHA2-256s-simple (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.

```
-----BEGIN CERTIFICATE REQUEST-----
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FW09zcbWbNr1a+7npDii9znnCsVierWieVGhkPsJH3fe01Vd0s0FHofY5vB9dKuFM
lF3fyDih00a27gp0MEBQbIOu2yIL+azbTJ++Zc/+hBzUe27V4WVvRyLtxD1HZ/F
oxJgBLnK14VGF6YKLQ8ba/V0T80+4LTllZqE/EYYyqUaDXVtkPlEwce3UccyJiwK
POFPt32aKNGX4WBSzcz2Zv0xmeMZPfm6FYlH+wSmMZDNUgYgB8988H4yECy55CT0x
LYnzo16ZSGh/dXWdmZq5yBvNsgy5a03SJfhltsC+dGkD6Gw4ad5dokZPrzHte6a4
ThT+UN4cyJikBeJkLlannjCuZC7evyCVHgfP9ukE0chILKJvbu5KPXbWLP1m5Yfe
sMwIg2r5/YUo/syM7xIQ5E98AdEhKSXbrjKqHCwflzws9gfUKo3RE2Yn9Fa4lU9T
MQ8Y0Efrh0dG1xeLwbphptAIYTTcQ02Tkm1WwBwkwclRPWec4Gtd//VzMnN1JODm
qV0gyu+EKXsgzEbbAzRaxTe63cLEXS9o+FommRqHVN4bZHRzEzF/gE8r9ujMOM8z
2uRAClBWRU5iGR28cQpkMt+McH1PCKVmiNV40/subgwSt0n+aHwxRMCzcIWDMTp
zHMvMPb17qHzcdiqrB+dbfsC0fa4jccwJGB0ikVb1nzqRXYJiVsu11FtnVsMp8dV
MQvQTBcPDybnTlVixWF5NheApS0TLrypP8yR+7kYqvXvZ4xD2DRKZmHBZW6ePNCs
kl+xUlrLuIdFQaYcxq43gGJWzzCyYVfx5GxoR0ZaUbJnzsw1YBTgJDCHHy05kpDx
q+FK/7FVce8ZmDhc1i3vdBQ1DPN60qSLtkABfdJkF1pPSgBpobNU29uIUeqd02zN
rjDbgu/V7NpISuzYF0ombEz3m0rncZLYDmPic8YnQweq9YncKRAC01qDt1gJgOK9
Flc9sPRI184Eik9EMSskstvPZ4RcgwC0k1AVS3eqiCd0VNoe8fg9+fHhNHIGSPjb
5F2rth9S6aItpkAJIrgirnHEmBDPahAVzbZFK31LxLwqiQZPVnE3Pjuskv4CQhiK
54MYyslsh0zF5hmnHA/BxbK4FdvH7w9fUQS1tktaycoiQvizes50Gi2901aQkzmo
YgkIK/8wF2b9PFvblQbfPFA/nF03LBEmFCpNK4uF0tIDqVIPerp0mYgcHX0QFSXH
rNmudJ0gsxP8Js0pQbiZRsCHc0F0fhK9MIInzMTS63Z/j0wKEWuYBvbtwwAAsZeA
mlkcyk/iQrMp/rflZQk68qMRJgEe+SMpoaI5Ssxqe/W1C5UDp8FgQoRHEXXwab4w
GKSyXax8rxxUHI1YJ085bLvWevz6P/J+mBSYEmsA58ipI0RBrKIIoB0jnX0XM0pd
DIuyM3Sqd4zxMGALNngINAYX3ZA4zqiPy+NgVbgY3tdYT3cBvk7pyC2zvFvqAbjU
nR8lkL6H5A5i2IbW0xg2eLUXjm5uKSy1thrpaiBqA93Tzgh4AQ0A6zsm6inh3Fwd
iZ5sArZtMg10tll13w11x420028qGtF3DfjwTfRvSySovp0cjtLE0MEDJIS/rv+cy
/5QvRDcV2eEKHA2Czcl7sYLLaM7JDTuPtIEZFFDK+4rxjiJTCsSNHyuzFBLJPMC
PyNrH1Fic+MeMJqtZd0LTtx205LklFizXpaqL/KQfCIiIb041mXy6/e4w+etXxxs
v09LY8u2yxaCUFKaoYilKUF15qCnJFWZIGdxZxlyjHtruMUZ9P9dGIQYcj6n/G0
BLYqgLQjFQtwqcX3/tQSJUDgFAFc+EVL47qTEIwTtMIF9w03JNrW/+GhILDF7hUj
4STEMb7mgheq8C5qVkeaXmxt493oZ/qGPNEbHX+oXxuHiXrcL/BF7Kq1miZWz4q4

```
TsyaKRReXo29AtSx9jc7k7DzZaq7hJKCp2mueRFV0LL0DV+jhpnNC5fYnDj/KFV5
1CGYiGzPQ72l0kRNBG/uAkbnxwFPmTuUgcSQZzW6rKtsoPVt7qxOG1EHniLfYVZn
Q4Z5uj0rkL0zMjsY3XDfEkb8wRYHJbLJFoqUsliMH4TxcX6qF16Qs/X0qHTC3Jvo
zyaWvs9IAPfcjz9loH1Ty2P1oT1VGmYpL9zj+So2Dm05Rjo+nuh0FWyiK3ZDZmig
/3Txg2LSb+WDfyZzvkgARo/FRQNmjGYHGI00VdPRBR/4KWxGXhxgtNN+DnQ/SiUT
hYCy4n5ncfmfLF7VvkK3npMrcFqi5/GLjzcPH2zkWMyF8rZ/hoWQk89h40NW+LxL
FJKuDRoSZJ3a4P3tkUrhmvZwFja+4GuLCKNKVDu/3wpaXw7luhyerW9pg6IIqLYk
W/LcPrfT+eMYsSvdXedI+K1CSMsDfqijAdGwaQ9JUgBylnbyeLuImQ+XTaRBKpXK
BStA9s6fWPG57fUcJbIC+l0k86hqI1MYa4o34WydKWHyGorzOPzWr/0HoXE0pRoJ
tFR1Qs30FhFV/LKLCQoVTLJyVFiof2utPinMz5MmdWBSrphum3hQtF/fqilQLxiG
SDiBdkagfjlbDVu+ghS21geQnH0M+JnFpW+xCYaUyTxQP/m/ZZYfZ77H4pNInc7
nT96atjaMr6yLWeWhTPTTHYTNGNOGR5a5jqQifjn40yuhoCZcerQ/b0zQjhCXPj1
RYUCkVeOFxfELoqmDFMPKDuGE6z6um+dxTLIXvZrQo9gL59hvPxDR+zM8C35zmg5
UJUHU0uLziJAjZyeWGL9D/p/e/sTFZ0cqXtk/lxKcMvFwizyFJu/euU2UYg0UTof3
sC3Wh9yszYvJEIWy6UtiCqDwIFkMJFp/kSU72URoZYyYw5TPb/e/YBLNSXgtJqXz
Z2hdXwIb1kkAqKL1C0oSCwjA0+6w93Fqco0yc/ejwiZcsJy3xc592gwqMpQQ0R6f
KxYxKZfjcxJVF9U3MLZ6Gc+0ZYfsbfCqBA/Zhe0munBrNlZ5U0gRfT5Ub2Zf04x1
g4aW5k08MpjIS/AuarmzsuiehkkYFAzhmeh/6i8CGId19FpY2SUUHp9/le+c3TAC
pFoXFhE1xB1R/LXz1mcUhlDXMH7D2BLGuiast1dWu2JRuiXeIGCRSig27fa7mLyn
aAc5tYUVjB1J5LUUW/n4SzD0M7n3rcMirEAlzl3nSxpReyd+aoixRYMBru5k2Fht
KE1+b+l0zg8c/W0nQljP3fNevIJ+gzr924Ta8tU=
-----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.

```
-----BEGIN PUBLIC KEY-----
ME0wCAYGK84PBgYMA0EAUCC2EqHM3A1hYoRDdmLUH0rBpbDoKnlfLnFbpInHjct
7cMX0vRd6hFzOfIC69yciXgk0LaYuyUGww3i4gxu+w==
-----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.

```
-----BEGIN PRIVATE KEY-----
MIHTAgEAMAgBivODWYGdASBwwSBwHXLajRuLYX40pNjA56PVWVrq3iR17koJWSc
jibx0U3q0a82jFnjEGKQwZLcwbnyFC7N+Y0ENN2+AgPJT+wB8S9QILYSoczcdWF
ihEN2YtQfSsGls0gqeV8ucVukiceNy3twxfS9F3qEXM58gLr3JyJeCQ4tpi7JQbD
DeLiDg77vUCC2EqHM3A1hYoRDdmLUH0rBpbDoKnlfLnFbpInHjct7cMX0vRd6hFz
OfIC69yciXgk0LaYuyUGww3i4gxu+w==
-----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.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIGfTCCA9kCAQAwPzEQMA4GA1UEChMHRW50cnVzdDEPMA0GA1UECzMGUETJSHV
iMR0wGAYDVQQDExFGYWxjb24tNTEyIFNhbXBsZTCCA48wBwYFK84PAwYDggOCAAmn
FJ0lb5xjjzVQ0bUEY0bozaLCCMuFAj5SPBn4QfCsu+XU5U15DphvG/qNHdMpHwIM
vsrfmWPVAgZ4su0BUGiQpLI1Hsk6gw2cUMCa2KzZjVWzidhLHqs3IYAwZt5uC9Gf
bYxNDKXV1Ls7QbS7+NMdEbablkfPsZIG+LFFohoeKCPZdCIVvw0SV62UiaaKfSdA
KahNmcSGnpOKfDBN0bsGkk2J+RljLM4g0sY0OFFqK+hRSzKW6T3eh1YZ7QKbYZUn
tJxOTTxja3kgZlzJ0oE8WLQm5Bz5FuNOX0y4mxfjUAniXvn9AUS1kgTyT9vyrmyj
I6yiq1o0wpiX4TsMGYKhNFRFFBwCopMNIARJE/OXjJNVoeu5j2kpKmg3p2AP3Hfx
XUBCeRpmelzCDxO/UWUgFXHKFUjdIKSNW1IC0EwbWEmXRjbxGyvqnHwMaKgqDCmi
GiLbNu72dYANIjUSyI/0pCWpXUsvIZABxIZ0jkl6aYXK9XISyIMaHZVbMvTAyo8Z
azlexehdJZ52g5WdYMc0HvDxDy85jvS1N8+PCVfk6Sai2E5FDT8ZDLctXzQTpwZD
+k0mqMTNg8Qdfuv6/y6rnoq4S3YAUE3pgfQRL0siMmT5MqyBg5ook4bfXXs9SbdB
hkhCsJVyNC7NliARVi0popFZtTPZnJUyRLv7GNJwMmxzIWqOLyqt2hrRk+RGfPk1
GkC1BtEfGbvTzawdEEMDDGC4dsCFBSDgbvC4qqoDZHWiDFNQzU1SMBt6M03dJ2U+
RS/dmmlupJpxrKU9hR6LRNBhTGGVcPCbdpKSVhFqKsIpQTY7tiIjd6ZLi1qXehB2
NbjTkcRGAGJGwx3fvS2oqS3RME01iRW0G0GZkvUg5c1XvwY2FoFYaiIMhLW9hjpJ
XnZ3hFjThmC2x5QX6x1abMGUa6krzke0jl4ksFFmpu7vmZqeKpe7bBdUUNU2n66g
P+pl2uPLEFXRPnkMDWWFptqyiwb/WOEb0fnZXJg9+5qDbna6LcLQsayHJw4vNRPO
s0q9W6GTD6VVref7QBQGI/6gmTYbVl3Yy2ktTNIKEZiTk+srQi0Z1bVqQEtdQiC
T/RKDRTx8uYLXtY9dbDBsLtlPlIY0mMJvEdy0Ivvum4pZwQQTv5BcvjAFE4mS8K
01AsPsJP2yJxSxCalGT1bJuN1ufmtac6jtrug6Hpf6AAMAcGBSvODwMGA4ICkwA5
BpW+Llwzampqt27/3rtgB0/HXLPe1YBuzZX7B0pqsmfT4duKoZnicppj23zLETU2
LBI1EkFZv8JCS MVPDPptIRteQUY6rioJyGrEZlErbCtXm5j8yLU923DsCwdW0w
XpvCwLX637rPybRh8zLfvFLSvGwF09hxJQ4rSkMRFJ1hbmP7kkJB3VNqzBiGro9B
wy270iexi0jUVN0TVVQ0L20vvkeQliaTslST9EnC2NLS+LWfFspT1/lySoGxanpU
iqze5KtLR7PL6Kg9nk5dGTM23KL7uboES5vUv1enyUCjeTaVE3cw70apCj465qI+
wyfoHAs0S1LZNdHRIBNL4MbB8QSh7ZckKHmagroJatpKEjwZAJRRGi5PMVbDxcW9
SJE1ppJFrirx6MxcuWlpeqh8GMN+PvqkUHUc38EzqNG6CZ02s7gwiNZBhX9sK450
mNG/eI1xr0cxyFOImFAyHR2CLQuUG60zX4EtBKpp3cRxWTPs6bCN8ViKXGSpOXau
Vb9y12M5jXVQL3skQDdZBu1R+JIHhFFkZWDLzTFigoakMZizNy2zq9immkGSi64Q
dcoPbtthedkJn+fWoSRs9I9VmZGvG8p3jfwU8nJNUq1nZJcU66AyOTckg7jxqQnr
93k5f1WmQ2Jn0Ny09xaQenckiL5v3DFaU+L0nHnPO9qYxc6hMWrwLMxQ7SZ2cFQ
L3fuggXRIvOCUqhp6dJDbvNGYzzicJ/5sgx9rsSJIpBNugA6C1INrEBj+LSj5sVv
Cr4/OTLb4WqowVJEUsI5EnG3CEyHK6ibXlV75NiEdT8ypkFfhDr17KRiN0L/qjT8
fejJP8hGgcSR/r1ubg8hzWjgYpjdkKbZcZ0kK7ND10pA
-----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.

-----BEGIN PUBLIC KEY-----

```
MIIDjzAHBgUrZg8DBgOCA4IACacUk6VvnG0PNVA5tQTLRujNosIIy4UCPLI8GfhB
8Ky75dTlSXk0mG8b+o0d0ykfAgy+yt+ZY9UCBniy44FQaJCKsjUdKTqDDZxQwJrY
rNmNVb0J2GUEqzchgDBm3m4L0Z9tjE0MpdXUuztBtLv40x0RtpuWR+mxkgb4sUWi
Gh4oI9l0Ihw/DRJXRZSJpop9J0ApqE2ZxIaek4p90E3RuwaSTYn5GWMszia6xjQ4
UWor6FFLMpbpPd6HVhntApthlSe0nE5NPGNreSBmXmk6gTxYtCbKHPKw405c7Lib
F+NQCeJe+f0BRLWSBPJP2/KuZiMjrKKrWjTCmJfhOwwZgqE0VEUUAHAKikw2ICskT
85eMk1Wh67mPaSkqaDenYA/cd/FdQFwRGmZ4vMIPE79RZSAVccoVSN0gpI1bUgLQ
TBtYSZdGNvEbK+qcFAxoqCoMKaIaIts27vZ1gA2ILRLij/SkJaIdSy8hkAHEhk60
SXpphcr1chLIgxodlVsy9MDKjxlrPV7F6F0lnnaDLYPIxzQe8PEPLzm09LU3z48J
UWTpJqLYtKUNPxxOUK1fNB0NBkP6TSaoxM2DxB1+6/r/LqueirhLdgC4TemB9BEv
SyIyZPkyrIGDmiITht9dez1Jt0GGSEKwLXI0Ls2WIBFWLSmikVm1M9mclRhEu/sY
0nAybHMHao4vKq3aGtGT5EZ+mTUaQLUG0R8ZtW1lrB0QQwMMYLh2wIUFI0Bu8LiQ
qgNkdaIMU1DNTVIwG3ozT0dnZT5FL92aaW6kmnGspT2FHous0GFMZYVw8Jt2kpJW
EwoqyKlBNju2IiN3pkuLWpd6EHY1uNORxEYCAkZbHd+9LaipLdEwTTWJFbQbQZmS
9SDlzVe/BjYwGvhqIgyEtb2G0kledneEWN0GYLbHLBfrHVpswZRrqSv0R7S0XiSw
UWam7u+Zmp4ql7tsF1RQ1TafrqA/6mXa4+UQVdE+eQwNZYwM2rKLBv9Y4RvR+dLc
mD37moNudrotwtCxrIcnDi8E86zSr1boZMPpVwt5/tAFCAj/qAy1htWXdjLaS1M
0goRmJ00r6ytCLRNvtWpAS00qIJP9EoNFPHY5gte1j11sMGyW0imUhjSYwm8R3LQ
i++6bilnBBAZO/kFy+MAUTiZLwo7UCw+wk+zbKNLEJouBPVsm43W5+a1pzq02u6D
oel/
```

-----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.

-----BEGIN PRIVATE KEY-----

```
MIIILgIBADAHBgUrZg8DBgSCCIYEggiCWSSAvfCAhfwfghf//0/gfw/gABbxf0/
QQQPvhAxf+w/PxfQx+wFA/v/exSCAAPBevwffgPAGfwxAghwP+QCguQgABQfQhAQ
uABfRvQwvPh0QAvgwwRe/gg//QA/QhXwQ/AAuBPfvAwu/fBAf+gPQgQRhQhRBQAg
wgxPgQ/AffQfxQ+OPSAASf0u+vAegu/wwPhg0/hywPx+/A/x//wAQSQRAPgvvh/w
wheyNXPQAxQABgefwwfwvwQuh0wAgB0w+Ru0AA0fgAhQQ/QueQ/utvxQew/QQgggx
gAt//vQfQgyAf/Q+uSP/PewgQvPPAgwvRQwAB//wu/ffwgAPQxACHewvP/wAfexP
ggv0uhPNPfgw//wfg///fHA/SfPggPSfg0uy0wgvABe+Ru/+gQPvAyAe9gARQBfR
ewAw/vgevfvvwuPffQvwe/AxPwBfx0gQAFgAgAPxAPu/AAv0u0vARAxA+PAAPARg
PA/xhQQBe+/hPRg/xfQufw/fgB0AxQPgQ+wPPvQwvww/QgP+vCxgPwQgA/ffgPwg
QPwAvAff/PwffQQAQhwRgxffgBxvvvg0wBQQ/w0iQPgRPFgARBPavhgfe/OAQgR
/ghiBQ0xRvwQPvQ+fWguzPghghfxv/uvhggrRiPufggvy/ggwuRRCaewRg+Q0/we
/gAfAxBOyPAPgfQe/tgvAAAiPxAAwvABA+u//BPwffRvhAAAREQftvtu+hPQgP
vxvvvQuugBPffwA0/Av/vPQ+/vBwfvPwvvgPwfi0v+gPxxAgfRPfP/RfRvAf0v/Q
hPeRBAQDPQfPw0Rff+fwwAwRfvP/weQA+egAgAAA0/ggfgAPffguxPwPQv0gP9
/eh+QwCfAQQvvhvfewQgwg0wPQePgfn+uwwweywgAfhfv0APyvgQd/BuwQvwQf//
/Av///BgQQu/uuQewP0w/RABvwwwSQxfwwfwxePgfhwgvvewv/wgfSSQ0PAQA0Q+
fxA/wBA/tBRfvABRwQhwQwAgBQvQPgQAASDs580DGBv66xDt9/YBfw4exinx90Pz
CyP8DucnDgHeAdLvCP3y9dsH6AEpCQAT+/oF+NkjzWdJDQIS1wr/8g4ECxHhByAH
EhDs5u7/F+z9HBUR2h7XCNAx+wbz8iLs8+8H7gkCDAUA7s5srU7w4dCSbj7yX0
1AgRC97gAeDs+fgdAAKHI+To9TMJ0gXXH0wU+08KGGL88erqHdzl2CCz8uTrCg7v
NyMS/yPYDeL06xYGKhhQ6AAAdAiTq6QHcEtwSBNbd/hTRwv8ZFwke1e7pATAHGvz4
HfYIUxXsK84K70TP58XuIQEayBD79AroG/8N5RUMARnAP3a6hg9HA7d/gDzAv27
```

```
9vsTCPjw69QTCEYIGRCi7hYJ8f4IIxvxGPkeHhQN4ujwBtLl1urw5ioAA+7s6u/4
A/XRBMzcGgcL3fwB8xLq+fb/8yIR8v3VJ+MQAQk+MyYUAYcY+h/2xBADBuwgF+ry
GBHLE8kiDuHn9/sJLA8A9Qg/KfL/MvUHERL+Abz43AD8FvcV6zEg2grh1dTn1f4D
GDEpFuU6Cv/w0hM0BhjzD0k5BSX5P9z42tIa/dgHFvr630Ed/Po0BzsK6BAw6eEB
8Afpw/b/3xYqDSPY+MoK6fr98h20LhUGFQgA8vsV2gMJBhHU+Ck3EOz3ChAVDvIb
Fuvo+fj//ugHCacUk6VvnG0PNVA5tQTLRujNosIIy4UCPLI8GfhB8Ky75dTlSXk0
mG8b+o0d0ykfAgy+yt+ZY9UCBniy44FQaJCksjUdKTqDDZxQwJrYrNmNVb0J2Gue
qzchgDBm3m4L0Z9tjE0MpdXUuztBtLv40x0RtpuWR+mxkgb4sUWiGh4oI9l0IhW/
DRJXrZSJpop9J0ApqE2ZxIaek4p90E3RuwaSTYn5GWMszia6xjQ4UWor6FFLMpbp
Pd6HVhntApthlSe0nE5NPGNreSBmXMk6gTxYtCbKHPKw405c7LibF+NQCeJe+f0B
RLWSBPJP2/KuZiMjrKKrWjTCmJfhOwwZgqE0VEUUAHAKikw2ICskT85eMk1Wh67mP
aSkqaDenYA/cd/FdQFwRgmZ4vMIPE79RZSAVccoVSN0gpI1bUgLQTBtYSZdGNvEb
K+qcfaXoqCoMKAiaIts27vZ1gA2iLRLIj/SkJaldSy8hkaHEhk60SXpphcr1chLI
gxodlVsy9MDKjxlRPV7F6F0lnnaDLYPIxzQe8PEPLzm09LU3z48JUWTPJqLYTKUN
Pxk0UK1fNB0nBkP6TSaoxM2DxB1+6/r/LqueirhLdgC4TemB9BEvSyIyZPkyrIGD
miitTh9dez1Jt0GGSEKwLXI0Ls2WIBFWLsmikVm1M9mclRhEu/sY0nAybHMhao4v
Kq3aGtGT5EZ+mTuaQLUG0R8ZtW1lrB0QQwMMYLh2wIUFIOBu8LiqqgNkdaIMU1DN
TVIwG3ozT0nZ5TL92aaW6kmnGspT2FHous0GFMYZVw8Jt2kpJWEwoqyKlBNju2
IiN3pkuLWpd6EHY1uNORxEYCAkZbHd+9LaipLdEwTTWJFbQbQZmS9SDlzVe/BjYW
gVhqIgyEtb2G0kledneEWN0GYLbHLBfrHVpswZRRqSvOR7SOXiSwUWam7u+Zmp4q
l7tsF1RQITafrqA/6mXa4+UQVdE+eQwNZYwM2rKLBv9Y4RvR+dLcmD37moNudrot
wtCxrIcnDf81E86zSr1boZMPpVWt5/tAFCAj/qAy1htWXdjLaS1M0goRmJ00r6yt
CLRnVtWpAS00QIJP9EoNFPHY5gte1j1lsMGyW0imUhjSYwm8R3LQi++6biLnBBAZ
O/kFy+MAUTiZLwo7UCw+wk+zbKNLEJouBPVsm43W5+a1pzq02u6Doel/
-----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.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIMZDCCB1oCAQAwQDEQMA4GA1UEChMRW50cnVzdDEPMA0GA1UECmMGUEtJSHVi
MRswGQYDVQQDExJGYWxjb24tMTAYNCBTYW1wbGUwggcPMACGBSvODwMJA4IHAgAK
fok/+3VjiJn00Nk0bjw5WVYh0Gn+pnEi5YnTab3cMXtPTIxnHTV1ru/aJNBs+jhC
eHWi30YxFFKxEc1qQBxWLKnZsECFyLISE/Pm1IkwaE7G4erUs3YvAzdhAmEEYbTj
mVmW/m8x6aLFvWTXpA1DAPUmwKrBrQiEZvRyyp6kdqQXI0St0ad9YQmDYgwN7HFI
omTTn/7LCKTqa2NVLZRCJ2MWGpAJDJKxvhnICVnPSbmQ4Gi03TNDvFgZ1Iybgfhm
Ik5q3H+0/WWTJkA7bC+bQM9Aaqg0yxFjwhFcNPhKLo1/rYdQqm5xpejB244sT62c
R2To7r9EJBsBLidkA/oKlK1Ya7MxotdfnaVhebJRfVI4M5pP8poCyBegeUALmCkD
DnBQdudXvQnLL3dR6LarQajR4SI+n3z9k4KIARR3cTNRPNZDUJAZ6DQdMYdJ8t
iDlC0rkXVjrt50TW4SNtoKF6d9REspY3FMRAxRo1z6FZUKyKClwkzkZvXWrnkHQZ
Q7BZlKAXLh5XhqMU0d8WCcj7IQdVg2KG5wo0XAFETASwVsMRiCCB/4nYJlYlXfL
```

3hqbdNtKBBwvPMXR2EHm5WeN30rAiJpxei4nbEzHH+nIZaIJSdC4NgGog62FkTa
E1paVSA19s1PTUGxYCsTrDVpZq0KiUeHo+Y6IiyQS1XZe0mjWD01eIALVahZN25M
Ca0QQ1w1gIR80SyjFLliwvLjDklVweRvzFZpaZcyRo/2kv66CUQPb3jUNDhol2C
t5CxTvyFgUJD2Q3TM1G4ggallg0k03Jvn8qGIUvQPMd9b0gEIUMRHD9aH7sJRS1z
Ed0kPKuvMbiqA/2giWBWkuRGzVmIkZwIF2Boh+VTcnghdEYk/JNUo3adkKwBGWey
Yp1C61verS5SjerP0+dBceGTD+J5nELyYfaoXJCxjEJva1RkQvzqgcpKIG6j0q+b
ewctfWjpA0wxrYNqy0QzmmwLv+LiQ64LkxAi/GDq3ER6lJ2RiUqIf5gq0cq8YmvQ/
jlKkieKrw6CRRi6AdGEMc5sF0zvnle9n/QQjXfW0knIeppGadq49QnqLKepS0Cf3
IQ4PerZmWfYi8mHix+TpJN+afKhEpih+DxxeQBMgupREbbC1j81mrs2bAlrHlRBV
ObfgsZsu8hnJ4H66lm9K6dcUvHbEU26WeTnawxeWGSaiRREFq6xFlxH8w0GsHiZ
WfDIKcsLedX5beS3Y3oeLrHsE5Q9tH0LpVWH0f4jBTMMH3wE0QG8yKdaYfqzix
sJPAvm+CqFYBAF9DbT4pnuqZUTmZqFS6y6PbP1nzCfoPSb90cbnQXtyKJpxbWRNS
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I0Qa/HGWznYhcsCD6U2oEyle1MZA5ABtMXofFr9nFQDTVQfKbcn6ZTzWTGaoHyX7
b5yaVKMX0KubijV5RxYf/jmcfiIsWPtWHIHpbIATRL0hShkPuUaIvBHQNGUze2X
F0CxNySJV3NhpU1F1MU3G9UB10T7c1xrNYZT5ozBxT6GFejxpu6r0TijhZZnATzq
+x/R6z1p4xM0jTnh+r3KEV3UWxoAKyWs9JZiWte5UwBTDJuI2cNHHemoE5KK4Tts
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2mTjxhiYF/F0h5tiLF/1vPed5T2hyPB0DQ9CPW2SIm9kpb8JfjFULF5wPRsQwLXD
VXHLqz4lExfhaADOVTQI5q3YM48Dd7rREIFXQGdxR6pRxNmUxadIcd81T8IYgKBB
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rz6DuX6WiaB2Jt0hSCfFq2HyT4VoR0mU6hLX5CvkvtbYC4WIrrCMXkYmJmAXuGTx
e97WFRu1U2GU2rF8UuJJTte4UFWLgSiCbH7mF7ZL43LIVkkZS3NW1UT3Eq4hBLzh
gDSpCzwqBHj8gEpKDB7EIMhrN6HGGJLvdpt9VomH1VP0p8e86CY+eCyFhs86VtHnV
HsJvk0eYDVCUuABpr/bNti1rmmnBeYKII24JUnLRWFLmcUzjAwLHLIsCImSN0P6t
IAb2VBbEBh6kAsalNna2qKewJ6JQtLB3qh0TQPI7drXLP53yK2rRB2NIeBik5ikr
dBtUypxbmy1mDcSTK/AVBURXSCwNjxJPKhvTc2puEZCGLMVL3jEr4hKuXQBTg58t
E4HLfKAATqkYaqUJkE6ltIIBBDMK0b3peParosuGac1ZEmwinknzJCQGrom25vGA
4vR5cny1941iLqTb8B0q6aAAMacGBSvODwMJA4IE+QA6kWIJRndOzcZwBN0ZPR/Z
Cx304j1uYxwVLdCcBnXxJmXyAdnbXI8s7vtBDhQQzsFon7K1t039EnQQYYia+TZF
Hxgk2GuS0qbWMBdJoNetxa0PhdxhmKoLxNg/Wlpusk6sTJgl40q4/Gk30vPztov7
p9mPgnXkfV3P04f+yBVNMxaVTws9cZdH1q/u+SI1qQU3VNriHq+hF0TP/UNyYuCN
YzFwvEcjvSMJKYulFxr6XVxkW0E5yTXOGKyq57T0T6V228Ks20mbDg8Kw5jHtuaF
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ARnZtntbbUZDzEIRR3Ur900Sie4iByyRvRwuJwKX6cIyUe8Wfkzz76TSF0JqkxZc
REVHdViNkIbZa86glIaKReuxyJcf/fIpmWvz+u+eRazNvL60FQ7tJC8TYZee06Po
i6w8CWjsKWwYNGPRX/sOUf+xrX57/wiZx/s32KaVyyqMLXl4jkGwy+YRxgpHqaTGI
JEB/RkVY5RfypVo0Pohn4qZEf+tkafRcdBvDkc1E1iHqYBQmjp7Nu8VG9K1w9DvZ
NBDGmE48WytXjWxP90EDPNayAErvVeqEkudey2eK7QmJmGhxEiYJyoLr43Erpy7m
wM5xSjt2wc8ZcyBRU2g2jV2X0F7Y09s6sDjtcGRMU7NDwh0mygW0sCKMWEjIttWb
GfTBS0iiPOjKcybk3W+xVeLQSZF1zk7R43sbbdSbUs5s6bJViyEQgxbSHdj+R2xx
GecpC2l06TclK/dXCxhvkQ7ZIKWhrsKlXMXiyyHWIfi1Ss208MBZSAox5KkqG4WH
QYhDNYXemtZfe0nL2xtQxZbI0r0r3nAnKlNduUHIlyCLdegQVdZ1h0UICItf31km
HkahJ8XvX48MIfJ15TISMb+rQ7nPxwL3724sC5NPuqVgUMd23oawW0dre69mkyb2
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6Se83M/mjpyC44n9PpbNviPsbh5PLnE+m67KVomlkrfqS42TsJDb+RPonTB0/IDf
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```
T3YKlaLU/blcI9TTwp6cANllN5q7p2XBw2mJFgiX0Ifauxh0Md0ySyRpVqjZr71m
NjUktW1l7nz5K08GaLQRq2NK5pxR93bVpNNfDkXEJU7GuC/5PuQdbUcydrC2iQuB
SrLmmRZx8YA=
-----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.

```
-----BEGIN PUBLIC KEY-----
MIIDHzAHBgUrzg8DCQOCBwIACn6JP/t1Y4iZzjjZNG480VlWIdBp/qZxIuWJ02m9
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MGnuxuHq1LN2LwM3YQJhBGG045LZlv5vMempRb1k16QNQwKVJsCqwa0IhGb0csqe
pHakFyNErTmfwEJg2IMDexxSKJk05/+y3Ck6mtjVS2UQidjFhqQCQyZF74ZyALZ
z0m5quBotN0zQ7xYGdSMm4H4ZiJOatx/tP1lkyZA02wvm0DPQGqoNMSRY8IRQpz4
Si6Nf62HUKpucaXowduOLE+tnEdk606/RCQbAS4nZAP6CpStWGuzMaLXX52LYXmy
UX1S0D0aT/KaAsGxOhLAC5gpAw5wUHb13VYkJ5S93Uei2q0Go0eEiPp98/Z0CiJQ
EUd3EzUT2TQ1CQM+g0HTGHSfLYg5QtK5F1Y67edE1uEjbaChenFURLKWNxTEQF0a
Nc+hWVCsigpcJM5Gb11q55IUGU0wWZSgFy4eV4ajFDnfFgnI+yEHVYNihucKNFwB
Xk0wEsFbDEYgnAf+J2CZWC135d4am3TbSgQcLzzF0dhB5uVnjd9KwIiacXouJ2xM
xx/pyGwPSVEnQuDYBqIOthZE2hNaWlUgNfbNT01BSwArE6w1aWatColHh6Pm0iIs
kEtV2XtJo1g9NXiAC1WoWtdUTAmjKENcNYCEfNEsoxS5YsKby43ZJVCkHb8xWaWm
XMkaP9pL+ugLED2941DQ4aJdgreQsU78hYFCQ9kN0zNRuIIGpZYDpDtyb5/KhiFL
0DzA/WzoBCFDERw/Wh+7CUUtcxHdJDyrrzG4qgP9oIlgVirKRs1ZiJGcCBdgaIfL
U3J4IXRGJPyTVKN2nZCsARlnsmKdQutb3q0uUo3qz9PnQXhHkw/ieZxC8mH2qfYQ
sYxCb2tUZEL86oHKSibuo9Kvm3lnLX1o6QNMMA2DastEM5sC7/i4k0uC5MQIvXg6
txEepSdKYLKiH+YKjnKvGJR0P45XConikcOgkUYugHRhDH0bBdM755XvZ/0EI1xc
DpJyHqaRmnaupUJ6iynqUtAn9yEOD3q2ZlhwIvJh4sfk6STfmnyoRKYofg8cXkAZ
oLqURG2wtY/NZq7NmWJax5UQVTm34LGBLvIZyeB+upZvSunXFLx2xFNuInk52sMX
lhkmokURBausRSC8R/MDhrB4mVhXSCnLC3nV+W3kt2N6Hpax7BOUEPbR9C6VVhzn
+IwUzDB98BNEBvMinWmH6qs4l7CT2i5vgqhWAQBfQ20+KZ7qmVE5mahUusuJ2z9Z
8wn6D0m/TnG50F7ciiacW1kTUiGVWBmbyXtQ/SB1Ke0Vp44p+PupCKahBwaNjdMu
nK2QUs3fh2q5gK4Jr7ikaFmz7SNEGvxxls52IXLAG+lnqBMpXtTGWuQAbTF6Hxa/
ZxUA01UHym3J+mU81kxmQB8l+2+cmLSjFzpLm4o1eUcRwf45nH4iLFj7VhyB6W4g
E0S9IUoZD7LIQCL2x0DRlM3tLxdAsTckiVdzYT1NRdTFNxxvVAdTk+3NcaZWm0+aM
wcU+hhXo8abuq9E4o4WWZwE86vsf0es9aeMTNI0zYfq9yhFd1FL6ACslrPSWYlrX
uVMAUwybiNnDR4RJqBOSiuE7bEmyh07ci3Y850GuKXLWEKXTLMqDUiIaLkCFJBSq
CsnYgRgVoZMzSnRzreTy2Vs4r9pk48YYmBfxDIebYixf9bz3neU9ocjwdA0PQj1t
kopvZKW/CRYxVJRecD0bEMJVw1Vx5as+JRMX4WgAzLU0C0at2D0PA3e60RCH10Bn
cUeqUcTzLMWnSHHfNU/CGICgQca00B6GoQxWpmmvmtpBoE0NEgst6RtMhNfDFp8W
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5L7W2AuFiK6wjF5GJiZgF7hk8Xve1ha1NVNhlNqxfFLiSU7XuFBVi4Eogmx+5he2
ZeNyyFZJGUtzVtVE9xKuIQS84YA0qQs8KgR4/IBKSGwexCDIazehxiZb3aU/VaJh
9VT9KfHvOgmPngshYbP0lbr51R7Cb5NHmA1QLLgAaa/2zbYta5ppwXmCiCNuCVJy
0VhS5nFM4wMCx5SLApZkjD+rSAG9lQWxAYepALGpTZWnqinsCeIUlSwd6odE0Dy
03a15T+d8itq0QdjSHgYp0YpK3QU7mKcW5stZg3EkyvwFW1EV0gsDY8STyob03Nq
bhGQhizFS94xK+ISrl0AU40fLROB5XygAE6pGGqlCZB0pbSCAQZCjm96Xj2q6LL
hmnNWRJsIp5J8yQkBq6Jtubxg0L0eXJ8oveNYi6k2/ATqk=
-----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.

```
-----BEGIN PRIVATE KEY-----
MIIQFgIBADAHBgUrzg8DCQSCEAYEghACWjECEPQBKQfxE935/eB3HwB98xQgARBA
C54WviB8P/9+EBAbHsAQj54QBcCLpQfGMIuhQfpQh6L/AdGQH6L7mxgBkPwB0EI
gdJ0A9H37/Q++TwC97wHRE+MBvj943h9F8A/hJzXe/94I/AEH4BFADW/D6H4Q+AA
JQ/KD40f+HnOg30fRiMAIwDID3fi8QIPjDwZAJ7wfgAH/4wi/8HAKFwQACDvoABD
8ACeCAoQBDwnvd6TgCf8TnehF/4xk8H3wBALwwbCH5QGED40gEH/f7+DXv/F4YRd
18nyAPwfPeD3Z0Ax73xDJ7XS8F7oSB8AIfk973QBAYACe103x++ARQgCMmei9sBf
AAE0xEB4oFF+EYR/38YPj38IBcxwYRDADwQBB4Qh9CFQSh9/4AAGPgAkATxBcIL4
uiB8XRk8YAP+CAo/AMP3geGQXAAB/YPg9wQR46FHx/+AvRAEUHw8CEATf6QfvCF0
Qu6CLwhD7/pQ+H/n++//qDd+D/g9J3+Bg5wAAgF04ie6MIP/uEHwk8bwgd8IIveF
72+h6Xvy++cX/CGAIgk+ABSCCAneb6IAPgCT/AA9sgw874HgA974f/D74/dB0nvg
D4Qu+8DYRf+EHeCCIgOE2Xwfb/74AE+IAfbAPvQfuUAcj+HvgB+YAwD+Iv/BGPvw
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g5934ge/0Pu9F7vg/4PpA+D7vfhB8gCZBsfvA2EHdC+LQxj9/nxg8AQx96DgBBB8
Gx/4P/hfEboAgAEXiDB8mwc93vuiAL4wi9wPgAKIOhA2Pw/jEEBBiGEPHgADQuAB
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9/hdIAH/vi18HvjJ4Q0+8Qgfc8L/yB8X5heEYPwgIMAwBB8fACAQIQ+8PvBC6DRu
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h+8IYABFv/u977wA++ABRAF/wQ977pAe+FAfF/gowe/8GggD7vfAHsOQ9F8AvfOI
PjAEX/g/AQ3ygIIAQBIQAAD8IhhB/4fwICE4v76PoF9EQIf978XPg4HwAg34gfCH
0vfdAEXyfcPwyfAUfQeEEY//AH4B/GDpBEH0Av+7wACeGPxDAOEnge/sXdjIHpO9
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+3wHQj980wcGIIRhCYIQcEMPzcKD/ve98AN8IMQia18nP+5/AQdB7wDC6AYh+KEX
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T4gj+MAdg/vQSC7w0fdAL/9j8YJue6IIBh8ICBcEEAvjB4gR7+UGvCIIgTbIP4u/
+IodFMDYSFADoS/94IBeF/ovfKPA4g6MoyeJ8Hg5F7/gg+AXSG+L4hjEbfgiGYIA
+F7wegEMnxd6EYei8IHwj6DwBCBvvv96HwddAAXx9GMAA76ERgf5/X/+CIYyBNwP
PcAMHe72DwR+7QDkJwj4Fj/QIvs6+fx1GCjvHw7740/nBe//AA8XFP30AuIn9/8U
Dfw3Cff05hflIwr56vU0Bu0C90byBS4ZKu3tDyXtBigoIPALJPLb+P8gC/EK5/3q
2tr2NQ7T/+bv4+IQHtUTACH9M/wqB/fjCRHYFecC4gQW5fkP/gv0BxvtHE4PG8kh
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9/8HIuYU6QYC/SP7EvM5LAXLMCAAEdb7D0PX09j+GgUN/9rqLej9+z0JDuv91iMC
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FxAfAPruH+EXCu0cFAf7CRAP7hAS6Pub7PMZiVx6+eEiGx27+h492ecC+wo6sx4t
50j7KRb1E/7lwu301SrbEBfi7hQK/xQ0C/b5MvoSAx7k+fsNIfoB2SMM/Nvk9kcX
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Fw0S6P4h+PgEGBEL/iInF53r4fba6AHbC/ETEPvgGfHnISPwAQYZA+0e/Q4QM+Db
Cv4b0gzmfwoe6/vwAtPh7gMM7+XzGvXd9AMUEM4SHCLj9gLoBP4i70cuEPS4yAUD
IwAU5PURERbeAwARI+PnLSXTFgnQ700T0xQD8P0XAO/+DgoALRYB9sQL4wT1Bh38
2xYYLQoS6ff7CAkIIWj3FP4NG/jY/hYiG/H5+wEWAHdPvEtMhBx3q8C8M3P8L6Rga
7Czq0g0UBecAvisW9PM4JiAGHgoQ2Qr4GDb15gAH/OoR6ej44PDtMw0H8vQX8/D2
Fw4a9hXU70GUaiITEyXt/twrGs7HFvUw2/DqAB/+It7mAtU0DwnOPAsexfLjDyI5
6xzQCB4cfFr89yQeAd7m+xpV9sD4IfQV6wsL0d8zBufzJQQC7/0I8wfcCeODEBTJ
HeIrNQgH90cg3/nN/hQRKu3vF+IhHv39HeUI8SES+fj90hC05xrOARwQ8Af9Itzn
3to9EHMK+A4B4CrR/Qf6GtwF1e4myeYB0DXfBv/+ByHR2kcH0BPY8Av37PMpAf76
DSrv1fzrEeD+Cvgc++c0JvYU8RPSA9wKJw4UNBAH/u7jHCjb2f3wDx8H3PT+D+zj
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BPIAABXm5vMuERbtBDEu9Qz0+u8ZAdX91fEOM+veDwUS3eYHBxQJGv0U0iojJsb3
B9z21/ULEC0V8gQB+H6B/sQ6wUhH0fpJgp+iT/7dW0Imc442TRuPDlZViHQaf6m
cSLlIdNpvdwxe09MjGcdNXWu79ok0Gz60EJ4daLFRjEUUrERzWpAFfAsqdmwQIXI
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-----END PRIVATE KEY-----

```

ML-DSA-44 (2.16.840.1.101.3.4.3.17)

Use the following CSR and keys to test the ML-DSA-44 post-quantum algorithm with the 2.16.840.1.101.3.4.3.17 object identifier (OID).

- [Sample CSR to test the ML-DSA-44 post-quantum algorithm](#)
- [Sample public key to test the ML-DSA-44 post-quantum algorithm](#)
- [Sample private key to test the ML-DSA-44 post-quantum algorithm](#)

Sample CSR to test the ML-DSA-44 post-quantum algorithm

Use the following CSR to test the ML-DSA-44 post-quantum algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIPBTCCBxsCAQAwPjEQMA4GA1UEChMHRW50cnVzdDEPMA0GA1UECxmGUETJSHVi
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-----END CERTIFICATE REQUEST-----
```

Sample public key to test the ML-DSA-44 post-quantum algorithm

Use the following public key to test the ML-DSA-44 post-quantum algorithm.

```
-----BEGIN PUBLIC KEY-----
MIIFMjAlBglgHkgBZQMEAxEDggUhAGJP3qXtI3xxFkcc6RczjTgaa1oZg4rhDSzu
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```
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-----END PUBLIC KEY-----
```

Sample private key to test the ML-DSA-44 post-quantum algorithm

Use the following private key to test the ML-DSA-44 post-quantum algorithm.

```
-----BEGIN PRIVATE KEY-----
MIIGKAIBADALBgIghkgBZQMEAxEEggoEBIIKAGJP3qXtI3xxFkcc6RczjTgaa1oZ
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-----END PRIVATE KEY-----

```

ML-DSA-65 (2.16.840.1.101.3.4.3.18)

Use the following CSR and keys to test the ML-DSA-65 post-quantum algorithm with the 2.16.840.1.101.3.4.3.18 object identifier (OID).

- [Sample CSR to test the ML-DSA-65 post-quantum algorithm](#)
- [Sample public key to test the ML-DSA-65 post-quantum algorithm](#)
- [Sample private key to test the ML-DSA-65 post-quantum algorithm](#)

Sample CSR to test the ML-DSA-65 post-quantum algorithm

Use the following CSR to test the ML-DSA-65 post-quantum algorithm.

```

-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----

Sample public key to test the ML-DSA-65 post-quantum algorithm

Use the following public key to test the ML-DSA-65 post-quantum algorithm.

-----BEGIN PUBLIC KEY-----

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-----END PUBLIC KEY-----

Sample private key to test the ML-DSA-65 post-quantum algorithm

Use the following private key to test the ML-DSA-65 post-quantum algorithm.

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-----END PRIVATE KEY-----
```

ML-DSA-87 (2.16.840.1.101.3.4.3.19)

Use the following CSR and keys to test the ML-DSA-87 post-quantum algorithm with the 2.16.840.1.101.3.4.3.19 object identifier (OID).

- [Sample CSR to test the ML-DSA-87 post-quantum algorithm](#)
- [Sample public key to test the ML-DSA-87 post-quantum algorithm](#)
- [Sample private key to test the ML-DSA-87 post-quantum algorithm](#)

Sample CSR to test the ML-DSA-87 post-quantum algorithm

Use the following CSR to test the ML-DSA-87 post-quantum algorithm.

-----BEGIN CERTIFICATE REQUEST-----

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-----END CERTIFICATE REQUEST-----

Sample public key to test the ML-DSA-87 post-quantum algorithm

Use the following public key to test the ML-DSA-87 post-quantum algorithm.

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B+syfujdRcJfXi6hYZT2136//ZNMHw==
-----END PUBLIC KEY-----
```

Sample private key to test the ML-DSA-87 post-quantum algorithm

Use the following private key to test the ML-DSA-87 post-quantum algorithm.

```
-----BEGIN PRIVATE KEY-----
MIITOAIBADALBglghkgBZQMEAxMEghMkBIITIM5xelVwAnBZd6BpAyyzJjPQjb/U
BhQ8CzT9GYNDRT3zkKZQL2gtwFz2Bz+sc/vtd+9G6KAFV07h2V6+7SpgK290stj
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2YCIgCGEG6Bo4LCFYxKMkkRE4qJlIgcTgABMCCiG0oBNJikFoCAqAceAwiiJGgRC
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-----END PRIVATE KEY-----
```

Explicit composite algorithms

See below sample requests for the supported explicit composite algorithms.

- [MLDSA44-ECDSA-P256 \(2.16.840.1.114027.80.8.1.24\)](#)
- [MLDSA44-RSA2048-PKCS15 \(2.16.840.1.114027.80.8.1.22\)](#)
- [MLDSA65-ECDSA-P384 \(2.16.840.1.114027.80.8.1.28\)](#)
- [MLDSA65-RSA3072-PKCS15 \(2.16.840.1.114027.80.8.1.27\)](#)
- [MLDSA65-RSA4096-PKCS15 \(2.16.840.1.114027.80.8.1.35\)](#)
- [MLDSA87-ECDSA-P384 \(2.16.840.1.114027.80.8.1.31\)](#)

MLDSA44-ECDSA-P256 (2.16.840.1.114027.80.8.1.24)

Use the following CSR and keys to test the MLDSA44-ECDSA-P256 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.24 object identifier (OID).

- [Sample CSR to test the MLDSA44-ECDSA-P256 explicit composite algorithm](#)
- [Sample public key to test the MLDSA44-ECDSA-P256 explicit composite algorithm](#)
- [Sample private key to test the MLDSA44-ECDSA-P256 explicit composite algorithm](#)

Sample CSR to test the MLDSA44-ECDSA-P256 explicit composite algorithm

Use the following CSR to test the MLDSA44-ECDSA-P256 explicit composite algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIPsTCCBdMCAQAwRzEQMA4GA1UEChMHRW50cnVzdDEPMA0GA1UECXMGUETJSHVi
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7uf/QzvGTfjZ3/+iZ4S3I43g0zIxziWpk9jPttSEWLxcDTvLxUJOAQFrLws8L/q
VtHLEuT952HxgAy2oyWAVpryS9/hHwQ/jrvNLyAtpyaxi/xdqx0lBaTgQhdA1B06
YFZyoPdthzoGALomzbA4AAbx6j8q2Ms1tBYrCSb0+o5jDui4b4uUsPBQ8zKQ1Q5F
FPxFzqnUHM+cunQNu0j6bm6XoJza5JpCAidraybqfQKvdkq/Xmakspxs3r1WsG
Qr0LskBuEaKjxBTTQ2QG7Ku/an6xq7A43Vjx5qS1AvAoZeoTL0P0qhTa+hSUxQ/a
Jl7DqUrGILgAKDUI0mWQkEkBVI48/ivB4a/C900smAX5FeayvJTD03oGIpfh29K
6+19kBwdZ6vu6CHJv0LfInrdd+LBAACn9a1GT+0W5yLL0MNGyMXWFOA1UwxCPRM
ZBTG5KMcDIBqY4/5VmIeiTuAKDzD5ck1Zs2/wykoLFLH59skKRAP6Ubm0acWBIO
f0xn+hzHgUDccAYMvjKPNXAx/vB702QFdp/Iwfgo6mHpTiVT/oxlTsStiBiWHWC3
e57kSDaMXtppWAomEkAu5PNsBqgV/3GfrQgBXAvoJv/Cn09kQ5G+oY6bCKsQr9ox
qsjjHLminrStVkbxd0WTrPQKFVQHL1Y980Sfoi6g2z306sAMtIw/IH/dgVI36nbW
u7vE5vHiaAcSNGrmedlq0j3QA92mWudMYFVl7DptSpUPqkfW0+gH3IHq23ZAcvQ
xdil/niu3vqlZEM2Pd0mjX0EM4Qhx+bhKLFn6vEy4LXBaq3jEI5+qMVZ1+ZBY+xy
gGXoKwB6WU5jX+tcLwn+p8R0FhyQhHSsYR9EYPnJKlCaWL0Kt8jTBe90a0kx02hk
DUhM0obuDv6EUqSiGIhXXFnxm0l0QwjPJzn+LW01bBNN+7JuA0AKd0lFDl58wNGf


```
uES8hFc9zmFhD38cmQLt4C0J3lFu+YNYAeTvyTv5nmzhqx3hnMT/gULfSc6Su5K
o1FHGiqfjktU+5iA32D6RB4W+sAF9vccCHKVra2TPiZUeGvlyVBNT4wtAdVbvcrrr
U0Kp/f0H4sIu9YBgeb2MceRbIP8LRgccMRsmVcPFyGuiEEPqs4m0ceD3vD6sRvdb
zYCwUD0jhEgVGGYI7UaDYsZr1l0zQsXhDfAUiNePFkbEDz8sdgzSSLpwS97GTE5C
0cI093IYjvYIQw9krfuKAiS/V7jP+J/bjpVncubzJbynLhWCdq1z5yv53EEz/bgA
lKe5dEuZxuXFVlloI+zZB7/m+m7ociIsZkovPddFibx3upaPC4g/Ty0TBkaqRex7
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GfLvF32Stf/5qNQStUKCbUGwZIOU9CU+tnToQuiDlepW5dK8fXk/Pc5T8hWGA+10
zWfoJd1vDsw5AdR/Ux/Ryw1SWUvCEeeqeXLAUnv//t68nYK0dld9mPnK5TuEBaWH
BZxohIbH3P51p7E8tIjZHZ2NWUQTWY3Sd/D5GIgTZAuau0/5QoE5w8Kqx6l/xQV4
XswStgJCeFopFfqcLDGx7La2VcWAT+XN9UrEJ8lR2cExqoN8z5MhLM4gPyVkJZTu0
FpVVntd3rWKhvhWQm24/qZLzu16K/zfaSvH2WunZ3ChyayVQEN6mG+Vnhn9p4TA7
0lW1JVTVCCEcSJBf0zKwrsFRWes0+gPrIn0Dpr1mXhNPSLsHMth6Uzzv5FY/g6H
+etb/h3SwMvWsdvV4LHX4BIUNduWwZAl80JXcAzVg89e78LFp2hTr6EIDg002d
endVCy3nZpM1nloNI4yzXK/NFRdzJpaZLSkb3h5lRpGXVSPH054AgT6rtSkRj3nj
+dckRP7NHM6zGR/+94VHKD8XjeHsN9DxT2c3fFg1ctfrpBuFBlsrU3Kr6j1XJZlt
Bfa3h0WiJTXuUz2Abynmj9sT+lzzkDf1Dr7zfI2eitTL410gPL1EQ2ceIqoPoWIY
eecr+FKcQkoIf6Lo9JD9g7chtnesnKjJBCwyYGmAs7S3uMPW4eL1/B01b3d7giP
nMXP3wgNF01gcIeWqcnc/gNJWF1sjKfFztUAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAQHCGyA0cAMEQCIF23GLOP8gk76vJtzMxvJ9k+C7doUSPS1/Hnk5Aa
ovXuAiBNkMABIoXNrpH9vc8v3bvzmBAqKvTCaysIl6sYggqkdA==
-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA44-ECDSA-P256 explicit composite algorithm

Use the following public key to test the MLDSA44-ECDSA-P256 explicit composite algorithm.

```
-----BEGIN PUBLIC KEY-----
MIIFgTANBgtghkgBhvprUAGBGA0CBW4AMIIFaQ0CBSEAJrtZiG9uxx9FNUIHqscf
ZKM2PFImp8mFb0oCQUD0US+891HsrMFALd93pynT3s0yRtFa6eCcg/+Ff5xJJN
NlvRLAEUD09Ngtn1r5DaAj0uLIHQIANJmVTS6liyrDldWcp9CA2hiuxBehU6fjUm
a9t4muP55GGWCzRrZKUW8BJ7+8sfnp5JrdnQdfyt/hwFTG004uszdgnJoPM+4Nki
Tkcz9ukJecV7rw0q88RJU7kNwCBjC09nc365sX83nqiVCEb/uQtcfRKT+wdp8GTL
twF6omx3wQsdGV0ko1TH0vY2wPhyMrtdWvwzQn4KZLTMVe870Z0HaqimUdm9LcP2
sqV9pT1ZvDTHWHDAaakLXIwUAMdoIAFnPvaDx7Hh6ptFvw5GAAL0GJzPU/5TgvQN
21HxzK0SgCz6+BX56/wjs3Zn2o7i6wwG5TAUg0PbG4otv74Rs/ZhiMPwSzRW+QQS
TQgICgAtNCcfezhZoEP+Khn7f07N3sxC8+iQWIKr9E0+3CkTJkyLkKMx9lh0cssU
SR/bSdKpotyy8st5BLUu4G96gMreaecmRMAoDe491ED3yHmKwnOk3wQHSxMVU1dT
fxor2vIhTUqT4auT82WN9qzPb0uJil1foTokvC9RGGXqChJ100Gh40h6IeDMEB7C
q8XR1oJ7LoR4BFMac/qxd40p+AS8FKKf7bZh7AK7vSdm0dfapQOUVEWMHEEYdV8k
sP7UWYBnPy9CXr2upMUh6kuu6nt7mni23KRBZYqEiKe3f0D+tRC7BQBDG2gJgtR9
y3H04A3roaOpYn4cvlWsaexYF+i0Sy0/9I0lKRukAjy3vfafwkT9Qw70/CuPqjW
JH/oAwHo9jc4I/oUrTc3DPVxSxGsU6ZwI26vx+UQeISVRjLjld4qVvem0KMc23Tg
Ojc+H1zd+riJixn8HP8NJI/a/4vz7KwQc/qeiw7yZOCgfkQHNfyoTcwuu0XF/K5s
diS0kmNCGMS+fxVwZjelSryVrY080SV+Hr0T8bN9CQxPMwAJnMDIibvqZMUUwUYS
dsQAGMB1u7+c+PrygwWazUdULNq+ZaaozgcFP9xe90JG2FbwfW9fhG7b7QdByFT1
QxyewWKUTf615NhVkBGuIIo3zQ7LIRxPvfSnMDugmlt4cka1tEunquWlFpq4cDIH
DG0EblsmWG3W8U50VTzb0STcKjsakI52yEwLNVbAKTFZoZeGxHh941WNK5A30lw
fFVZm0cYwRCB61JNITN0MKH6ZhG6XmEomwfyAsIVsRujVItIyZzPH+1MbMkoo1+s
yru/P6PeD9axpi3i0KiUb/FTLytpKY2SbVPY20MPCZJo27R3IX3MADKxfy2yv8ph
qPRB1z38wSB1FtKKXwim+51v5o+lv6ybnYs6AZ0VPfWe20+9ANW0HjMTV8ztNhtV
```

```
eSnfcizVS6k1u2UTGJGef5VRuLkELJQj0qx+qGohTYlVm9TFE4iaxLJZ95mf+fWP
CLCLhHiFdGmpz2cfm8ZOYhZaoYm96Rf5WI+D+QqqDpQMcx9BNV1a5R4g/cI3YzHL
qlNvHC61ajxBPLS8DbGhES/aVYWUL3NuEgrnc+Di4BKkPhKU9qZRJAV9RLnVjQTo
cJgAkNswMvp3Kuu/gHSqaWyFex+Uuts3Nlu3r+7yUC5EldzwTq+Jn+U7ILRqs2wo
hnFnjg3cABxXV7ii7F4qOPoTZhtWP+4KyKfqcggTPoV5clKqJTri8A0xv4qsIQHr
zgNCAARxy6iZUXq+x1siqMQcglLK2MnQ74X8Cj4KyJsEez2cGSevPzFDjPOhTmNL
Bn90o6iV77mDENhP2340oF5bb0W+
-----END PUBLIC KEY-----
```

Sample private key to test the MLDSA44-ECDSA-P256 explicit composite algorithm

Use the following private key to test the MLDSA44-ECDSA-P256 explicit composite algorithm.

```
-----BEGIN PRIVATE KEY-----
MIiKnQIBADANBgtghkgBhvprUAgBGASCCocwggqDBIiKBASCCgAmu1kiD27HH0U1
Qgeqxx9kozY8Uh+anyacVvSgJBQ0hQtygH0yva05rHa5fPZoxjx1e6w/2fVfo4+E
3uqJBXk+cRPHhqKNGv/26ezD7LS3F+b1A/P4iNjk0C3DHUUMFw2/WeBqIn1xIQ35
lm91h8VIMh68BhIEX4HbL1RC8M7A5gywSBIIKYiQCeMSKczEBKIUUZg2hQmHScpE
UKPIZOMyRISYAAuAKWGULULGYcmgQFK4ANsSURFBUhsykII2IpDCgdAEjRFFKcvG
bBGVRdsiJLICRQGTbAQJCBgyIhqVEVKEhNJEhkAScAopCAq5jYEgUgqxbSGmBBiU
KWQETpsgMEqYQSIDLVswSgqjhF02jCMIZsIYkeTAKNMabYrCTAg0KBoQLZAogS03
YNu4aVxEJgu5kYEojSuwDRAJaEMGEARGgRAHZZw0Jmk0jEJASSGnZZ0mSEM4EhyZ
kQs0CoC4ReSyafiCSUA4BdEEMGDEhSHDjROGiNyCEAm3Qdq0SSJGiMoSJU0ELIAI
ARhATdwQDcgoachCEQqYgOCycSCwhJKUKgCVKBtIBeAEQIAyIQCwbOCmhJE4bmMw
aaI2gMgQBgzBDcJAZYNccgEpCLNECoEEYEhCARCxcUQwEuCYjBqgbYImAvmwcMQA
gtikIVDgGIkDJCAGBJBSZIAUEkmUCelgtlGbpE0USM2jVgUKdMCIerCkYwCbhyS
kVAYYJgUzmQWdHA1IJMWAdw0gUnEbQlIjMwiYaK2bUpIZiMWDMS2KWAWSmARBhG
IckShFyIjRqIQAEltHmlJc04JKG4bJuYTUHCDBuCiBIjKhAjCduGCQQSMUHEiFEy
SFGicBSDBJFGQCFJRokmIqKEYCHHaCQCjBgUTeKiLaw1iICkDSQyINiyQeGGJBIG
EaNITIAyUBQRRhupaaMCjkgohYkoaRIVahslgSCjYcA2JhG4CNQAIvyyKYQoUBI5
gFQ0btBIhhEWKZA0JCIEUpMIDfk0hgSkTbmJMJAUCIwSMZMGZQIhaVkiBgEIBKSw
gAEtKtmWBBYlUIEiUIiYQAgQAhIlhuNEbJHCTBEwTcoWRBKGEAozagQDRNDSprE
ZQDBiYjIKMgCZZyoLCSncVgwUQkVbCLHSNq2jCRFRoMCRhujkcs0KAjGTAJFUYQQ
iAuIDaSQBdLIkdvICJCyhaGSBcgCaa3JyIu/8HR3n+5neE6TuMyTB8nTCJyk/6Y0
KidBTsm5I+LnguG/4ME6SdmHZfeU4QR8LQVSwDVEI84SAFzKpB/zwRHANrZ0DOx
JYVHwHv0b26Jyu0jvhmUJMWvs7Kxq/WnthiAjuvqSfQXvJLSgh38z6SuytNuG97g
+Sjo6As441A30ygTGYtypeVSfXycTVt0vZb4yKeCx0ioTTyph8+GF1kusxumooEqD
GktF4j0k5k+0cm3tr5b4Z7own4t629fblPpB9mP7q0zjt9C6TZoLwQkjuj30Ih9
/FkEN6hrP1B2BAPT+Mpaec2NwB8oBBU+u/OF5r4Wc1WSj0XlNBKHOwchg950ryy7
XLL9jpUo587NParE8zr233YuQGCh1ivKNnZVqQkiD67XrH9yyaWf/9AwmQcPYuQm
Lgznm7soPVyi1ZeZ3lsMzw0rSmeSM2qkhTzdIFPDXTZcwWPH30vdkZKDcvmAyDL
dDVSCtzY0umTWZSZy3FKvyjJ70i787HnLTC8StDrgh2MZEULcSwKXUIMmW3zn/2U
hq72j7Lbw6zktSs65KR1dquG0s+NLwAqIp1tu8IhB2Fdd4P2YhD1BRGrJrqzPlB
CCNznvhvMQk7WLI9/jiUoLGAUFedcaEL5+VwxTd9nUTCvpkzXvCIc05B6Al4nuNi3
KmEb92vLLm+ms0xZ8+spe2umZanD0oPTr66me25vHsGxJRAQQzjw4N01gEUcx5Lq
6hgE4/jEM9vT4PFZ2K0GXqu5L8iyAP5deccLA5UFLJXWyeH2ZEn+R7/HFwZ4bzjc
tKkDL++g0vG6eKeXH1gYypvLvFfheIgg+xsVi/ryS+x+Ameh6jjSpMaJuaXtEhNZ
Uc4eU/lRVyQe+g9oGHs0b+mMAJ6NuWjDwbav13jfeehEzt/BX/2W9ECYVYm9xFP4
MzhUzq/7FaG4dYk51s56vB33U8Eq9QNC70I1Qz/0H0YjCQnhWu2hFpDW5VH9wQAO
XCkKI4JL7GkpdVzJ7asVLDhc0gz9QELiLQy7GjEJHhdNKfJje8xr39UzjIUSW8GV
5dzYY2nN0YPDjz/j9Fqwc6kkcBGWJ/fy7u807Ar3ZJm01nnEpxrUmenMBv8yt47B
```

```
MFuWPD2RqK+wq94F47R22ilfcSVG5s1wWipYEPxtBWCzyvhe5ayykrd4z67zntAV
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/STpQg3hNoy8r8PnRJumERasB5kGKzSjU5vDYVvk8e+r4XBaLTQxQiUmTrzXupXLv
2SjvV7Fy1q1DnVf04EnGBqjZzm3qgc7XxSra80oz3NeoW4Jp2P2/fJ+P60JgGHX/
SVsrwxFlDtBeTmGA8wcVywkgHGivlTsGQIPM3wFD4m0D15XfVgQPvVrDWyvNr9fSg
7EhQT/BDQP3/Gv4/nuwFG84EHfs0a/rwmURLMsIS0fSjYs+FwvNfrnPOLTsYGDCh
q9eefka0hlPaYX/zwphWQetZo60UsSQeX3IWMF9k17BFw95Y9Stb76MMoe8iXVDE
UXmFBf1cPCX9TDBk01PjiB2mEUV5L0ygiIZBGSn09xg+sB7Eg0Co3GwxobXDpJT2
bV3Svs66CnSZYSkjzm086MRHEM/Agq6InWjJ/QyxJJ2iD5P71PU2r5g4VtgDwi8m
XYxZ0X3eCFHGgprYRNkYuZBV1sdiilYE3Ej52H0AbKdfsw/Kclbw4PX7VEi8WfQL
ZjX8hMAYI8orgzCvv4y/W20Ceg0lnNUbsAdJGgJaYn0B1DYnJ1Ar9Tcy1ScTnGA
1MhP93Zy85Wjn026PL9v7veyprxFMyzj/S+oCIXwygveXB/7mC6UiaXbVgBh6zX9
Zhg2dBUE/eoZecnn0JjsDMWewvs1PD+TLXpFy6hAF6Trd+841jajoN9bYvQib3cS
nCMv+SLV2oQHhY1ubfiA7dLhbg5de7+gEJLDB+eR+Q8bbjp0FnepMZ0ivi0ykVz
F8gIhSF/PSzPQXsLzLr2+/s40evL+SAnsY0Fb8cn6IQCS4TdXuvDKGqjuDrrBTq7
hqGmP1SZPsSsEEszIgzLrhRM86ISGdic0svUCpXDeZ/IFM1RAjvmpce/6+fQJU9R
5LEBz206GCS232X6dpLbUiudb7gALPx4Z8qARtWrPITeSp7nfsS7Pqwp4d7hLm7o
EFGPZxeIBHkwdwIBAQQgo/4BafVr5YW93S3cgyzCmvyHmwFyBXyR3Dosv86fkfyg
CgYIKoZiZj0DAQehRANCAARxy6iZUXq+x1siqMQcgllK2MnQ74X8Cj4KyJsEez2c
GSevPzFDjPOhTmNlBn90o6iV77mDENhP2340oF5bb0W+
-----END PRIVATE KEY-----
```

MLDSA44-RSA2048-PKCS15 (2.16.840.1.114027.80.8.1.22)

Use the following CSR and keys to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.22 object identifier (OID).

- [Sample CSR to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm](#)
- [Sample public key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm](#)
- [Sample private key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm](#)

Sample CSR to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm

Use the following CSR to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIRQDCCBqYCAQAwSzEQMA4GA1UEChMRW50cnVzdDEPMA0GA1UECmMGUETJSHVj
MSYwJAYDVQQDEx1NTERQTQT0LVJQTiWNDgtUETDUzE1IFNhbXBsZTCCB1AwDQYL
YIZIAYb6a1AIAARYDggY9ADCCBjgDggUhaEhgclCjE3jlkB8jHMLD7skD0+mGM4e
44uwa+K+EFgg73lj01vp2HBIuBEik5tEVAvL+/x/Dep1dAGeAXkTTvpLSNADfxIQ
YmUQwcYNGWYEdpwfWSFE8QS9sQurD5Gb14dvNWFbxeLVpR5uUal5cN90e4xqy4iA
pnh+n0kg0DM1oUD0FIOMzNMkf9KkcK4r5gP3v7bdCATdTUqsWR1KWboeE2WD9CSf
dvLEm3ENcpi2/VtAhlnsihFap8MfkwN+txe/5FvzsN5gZyKyiznR4a4anpH4XGFY
8dIu8Xv+mgZDWJ9kwQ5VeXY90I8lKYL2puk+FmkB85z53CZ6Jz0QNsferqqLoqC
e2YEK5Rl+sJjs8R5Ax+OQ0dugFV1NmojQheU0AXcGoxdFjEjZ+ssaCed41JadFW6
hLX9oc/weWsLs8Q3WygdrW4LgV90QQf7thYShSdxAPdT+ZrXH7bLNdSfsqX7H6Pj
humfSRD0SqYpMgsBBCKybBZCaihK5TXaZl5+HxMwld2kjftqoxL5UA4bo443wA
dJN0SGfSu4C4vl1hNcm7msHUuSR9bgm8uiiLaydiAaB9/NCMMVMOQm00aK01eJIm
K1do3r4QJkS1XgASIDJhgVvXfHsLB4xRocLIoYoJX/t9pGJJULCW18o+GE+iWSGL
skGndiIXE/7afaDMwA1SxrI+lG6xs3og66mSULQ0395VkbNHL0jiShj+zhAtgB/6
7fSc2RDGKC5jxMhqzNCD/A5N4qTHv3e1pd7Nv3FDH2S1qsM4hrUBtRi5SqNdLtwS
```

cVgM2W+3K1PKEVIRGNcomUqreqD9iXH6lInSvZg17WjwBvckj0lkgngMYkZ1wXFY
Bswa9aiNyGQ6XOT/SjqQM4nfJ1fNyrU2JTfGP6vTeYB1smsotCE5i5mWwfCSmquh
FuhsWlexJZamjTvGtZ/BGikzraPopytXodcvsndx/m6JE+lexV21AfM3rPJMMTae
o0Noru/dbOS2kzEXxBvG7KdCDqyi08AiWjW9HnmuiBmreLdpNDIGHHFiVXp6pw5A
G/qkfAtrRL4fv/YZTC4evE0ykohWSDVC+SABPp2jV+0DdTHCty0UT+CpWBncpGkp
plod5MRBLTsklj3kuytC0AKZuv/e9SAAQz7oDCFHSi+f0H0s3mcLhenk69UmkIbI
IdRUPvQxPpZAPAcq7sreJ96AnW/0XrrEorB1ACN/yUOGkcPH7BvW5TeMhMmfM2QW
tmFolZLVXrdmlzrBxFjeJHKc09p1up8PND6c+LGDfWmgEsLD+2jBEinsoRcsFis9
T4JD8FIb5COHY9KJmSbjwua4MmTjNUTHTq2WoRMNcp36eIdSj0Boo86hfSPtn9LL
XCrypDGrAKMI3JUG6Gp3+VtdKx88IjxOECBCYU+gFzrJ2urNfNFwc7ZZVrfjn6wA
/HFV/nrSdGZU71gbaxdS52hM9Xa75BvD01SVjJLsF2bbhccq5njUTCvU8Pewzn0i
fcv6ALz5urx6t9aLuFadCeAwcXr6mekrmn4NULda5MVry7060iORhJ2WgCbZa5yr
cL2CI80NagnI4owNesXf6xNkJewSh6MacqTOu1DNDUMolEpsgKcENENVXJsZ04Is
Axbj5UXR0gFUqwlDsgsHTBCNb5At8Q2uTgEEcFlqucXqRMyn5tp+r8WV97pE2c1i
Fr1KZfJEC4Wm3jE+54CbbV/34t/z5n0U+0HrFG57qzWUGKdF3IkoMk8DggEPADCC
AQoCggEBALrTY9cC4IAZkLXeHzCfWGuAWVZsKzPXmmqs/jEexm/ENZA4HJyRIMRf
M+59xBe+mQJxnBm0Fb0TjwJfRQuckt1KqkMGJ8bqjUBKZYBkk8FHMsLKlpQ79k8A
5mYovneBimZqPmd8s/oTkDrBGA+7fBBkONmbLgrvuGfK9QH6jatUgwpPK/zJ8Gn
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mL05qw==
-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm

Use the following public key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm.

```
-----BEGIN PUBLIC KEY-----
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-----END PUBLIC KEY-----
```

Sample private key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm

Use the following private key to test the MLDSA44-RSA2048-PKCS15 explicit composite algorithm.

```
-----BEGIN PRIVATE KEY-----
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frg=
-----END PRIVATE KEY-----

MLDSA65-ECDSA-P384 (2.16.840.1.114027.80.8.1.28)

Use the following CSR and keys to test the MLDSA65-ECDSA-P384 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.28 object identifier (OID).

- [Sample CSR to test the MLDSA65-ECDSA-P384 explicit composite algorithm](#)
- [Sample public key to test the MLDSA65-ECDSA-P384 explicit composite algorithm](#)
- [Sample private key to test the MLDSA65-ECDSA-P384 explicit composite algorithm](#)

Sample CSR to test the MLDSA65-ECDSA-P384 explicit composite algorithm

Use the following CSR to test the MLDSA65-ECDSA-P384 explicit composite algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
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-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA65-ECDSA-P384 explicit composite algorithm

Use the following public key to test the MLDSA65-ECDSA-P384 explicit composite algorithm.

```
-----BEGIN PUBLIC KEY-----
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9nySeeldvMW3eFw+uPP/6QU08M9b
-----END PUBLIC KEY-----
```

Sample private key to test the MLDSA65-ECDSA-P384 explicit composite algorithm

Use the following private key to test the MLDSA65-ECDSA-P384 explicit composite algorithm.

```
-----BEGIN PRIVATE KEY-----
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gBVnMxZBNgVTRARSMGM3ASIQAaJQh4YTNoE2V1Ngg0hjZ2GCRkGIZYBYU0MEJWci
RjESEnaFA2BUMGAxVQGIRDAoA0hhAzMCiAV0gzH4BkMWY3iLEhZkJXKCUHURE4Qx
UAdIEWmjNycDNBYyEiaFh2SEAXGDJxYwGTQFdYUQgCICFRFEVSB0FTUWENDhyZV
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gBKHgUCBEFVLbLE3QVMHM0EHUdFLJkQmYBaHVYf3hhMxZEQWdUFmACAANFY2RgBB
AoRicIEVU0IiBADWJ0JwdDODQxFzSCckNmE2ERRkGDIbCIBxMkUWhAQXJlNwhRQg
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VEUXE3J1cAInaEJIZSAXNQFnI3JAIid3UHGH4I2ISA1ATRnckcUMkNlvjg4c4B1
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MSY0ZIY3UTVmMB0HFnUGcVSGhYI1VWZgc10IhCiV2EwRgBkJYJwIXRR0EgnQBOC
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```

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XbzFt3hcPrjz/+kFDvDPWw==
-----END PRIVATE KEY-----
```

MLDSA65-RSA3072-PKCS15 (2.16.840.1.114027.80.8.1.27)

Use the following CSR and keys to test the MLDSA65-RSA3072-PKCS15 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.27 object identifier (OID).

- [Sample CSR to test the MLDSA65-RSA3072-PKCS15 composite algorithm](#)
- [Sample public key to test the MLDSA65-RSA3072-PKCS15 post-quantum algorithm](#)
- [Sample private key to test the MLDSA65-RSA3072-PKCS15 post-quantum algorithm](#)

Sample CSR to test the MLDSA65-RSA3072-PKCS15 composite algorithm

Use the following CSR to test the MLDSA65-RSA3072-PKCS15 explicit composite algorithm.

```
-----BEGIN CERTIFICATE REQUEST-----
MIiYOTCCCaYCAQAwSzEQMA4GA1UEChMHRW50cnVzdDEPMA0GA1UECXMGUETJSHVi
MSYwJAYDVQQDEx1TERTQTY1LVJQTmNzITUEtDUzE1IFNhbXBsZTCCCAwDQYL
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-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA65-RSA3072-PKCS15 post-quantum algorithm

Use the following public key to test the MLDSA65-RSA3072-PKCS15 explicit composite algorithm.

```
-----BEGIN PUBLIC KEY-----
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-----END PUBLIC KEY-----
```

Sample private key to test the MLDSA65-RSA3072-PKCS15 post-quantum algorithm

Use the following private key to test the MLDSA65-RSA3072-PKCS15 explicit composite algorithm.

```
-----BEGIN PRIVATE KEY-----
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-----END PRIVATE KEY-----
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MLDSA65-RSA4096-PKCS15 (2.16.840.1.114027.80.8.1.35)

Use the following CSR and keys to test the MLDSA65-RSA4096-PKCS15 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.35 object identifier (OID).

- [Sample CSR to test the MLDSA65-RSA4096-PKCS15 composite algorithm](#)
- [Sample public key to test the MLDSA65-RSA4096-PKCS15 post-quantum algorithm](#)
- [Sample private key to test the MLDSA65-RSA4096-PKCS15 post-quantum algorithm](#)

Sample CSR to test the MLDSA65-RSA4096-PKCS15 composite algorithm

Use the following CSR to test the MLDSA65-RSA4096-PKCS15 explicit composite algorithm.

-----BEGIN CERTIFICATE REQUEST-----

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-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA65-RSA4096-PKCS15 post-quantum algorithm

Use the following public key to test the MLDSA65-RSA4096-PKCS15 explicit composite algorithm.

```
-----BEGIN PUBLIC KEY-----
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```

```

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-----END PUBLIC KEY-----

```

Sample private key to test the MLDSA65-RSA4096-PKCS15 post-quantum algorithm

Use the following private key to test the MLDSA65-RSA4096-PKCS15 explicit composite algorithm.

```

-----BEGIN PRIVATE KEY-----
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MLDSA87-ECDSA-P384 (2.16.840.1.114027.80.8.1.31)

Use the following CSR and keys to test the MLDSA87-ECDSA-P384 explicit composite algorithm with the 2.16.840.1.114027.80.8.1.31 object identifier (OID).

- [Sample CSR to test the MLDSA87-ECDSA-P384 composite algorithm](#)
- [Sample public key to test the MLDSA87-ECDSA-P384 post-quantum algorithm](#)
- [Sample private key to test the MLDSA87-ECDSA-P384 post-quantum algorithm](#)

Sample CSR to test the MLDSA87-ECDSA-P384 composite algorithm

Use the following CSR to test the MLDSA87-ECDSA-P384 explicit composite algorithm.

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-----END CERTIFICATE REQUEST-----
```

Sample public key to test the MLDSA87-ECDSA-P384 post-quantum algorithm

Use the following public key to test the MLDSA87-ECDSA-P384 explicit composite algorithm.

```
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```
hhLYX754ThB0wg4ukwXzAajU0H0aeuLL5tqFE4kC2cugJbLMpA==  
-----END PUBLIC KEY-----
```

Sample private key to test the MLDSA87-ECDSA-P384 post-quantum algorithm

Use the following private key to test the MLDSA87-ECDSA-P384 explicit composite algorithm.

```
-----BEGIN PRIVATE KEY-----  
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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 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.