

# Online Certificate Status Protocol

The Online Certificate Status Protocol (OCSP) was created as an alternative to [certificate revocation lists](#) (CRLs). Similar to CRLs, OCSP enables a requesting party (eg, a web browser) to determine the revocation state of a certificate.

When a CA signs a certificate, they will typically include an OCSP server address (eg, `http://ocsp.example.com`) in the certificate. This is similar in function to `crlDistributionPoints` used for CRLs.

As an example, when a web browser is presented with a server certificate, it will send a query to the OCSP server address specified in the certificate. At this address, an OCSP responder listens to queries and responds with the revocation status of the certificate.

## ❗ Note

It's recommended to use OCSP instead where possible, though realistically you will tend to only need OCSP for website certificates. Some web browsers have deprecated or removed support for CRLs.

## Prepare the configuration file

To use OCSP, the CA must encode the OCSP server location into the certificates that it signs. Use the `authorityInfoAccess` option in the appropriate sections, which in our case means the `[ server_cert ]` section.

```
[ server_cert ]  
# ... snipped ...  
authorityInfoAccess = OCSP;URI:http://ocsp.example.com
```

## Create the OCSP pair

The OCSP responder requires a cryptographic pair for signing the response that it sends to the requesting party. The OCSP cryptographic pair must be signed by the same CA that signed the certificate being checked.

Create a private key and encrypt it with AES-256 encryption.

```
# cd /root/ca  
# openssl genrsa -aes256 \\  
    -out intermediate/private/ocsp.example.com.key.pem 4096
```

Create a certificate signing request (CSR). The details should generally match those of the signing CA. The **Common Name**, however, must be a fully qualified domain name.

```
# cd /root/ca  
# openssl req -config intermediate/openssl.cnf -new -sha256 \\  
    -key intermediate/private/ocsp.example.com.key.pem \\  
    -out intermediate/csr/ocsp.example.com.csr.pem
```

Enter pass phrase for intermediate.key.pem: secretpassword  
You are about to be asked to enter information that will be incorporated into your certificate request.  
-----  
Country Name (2 letter code) [XX]:GB  
State or Province Name []:England  
Locality Name []:  
Organization Name []:Alice Ltd  
Organizational Unit Name []:Alice Ltd Certificate Authority  
Common Name []:ocsp.example.com

Email Address []:

Sign the CSR with the intermediate CA.

```
# openssl ca -config intermediate/openssl.cnf \  
-extensions ocspace -days 375 -notext -md sha256 \  
-in intermediate/csr/ocsp.example.com.csr.pem \  
-out intermediate/certs/ocsp.example.com.cert.pem
```

Verify that the certificate has the correct **X509v3 extensions**.

```
# openssl x509 -noout -text \  
-in intermediate/certs/ocsp.example.com.cert.pem  
  
X509v3 Key Usage: critical  
    Digital Signature  
X509v3 Extended Key Usage: critical  
    OCSP Signing
```

## Revoke a certificate

The OpenSSL `ocsp` tool can act as an OCSP responder, but it's only intended for testing. Production ready OCSP responders exist, but those are beyond the scope of this guide.

Create a server certificate to test.

```
# cd /root/ca  
# openssl genrsa -out intermediate/private/test.example.com.key.pem  
# openssl req -config intermediate/openssl.cnf \  
-key intermediate/private/test.example.com.key.pem \  
-new -sha256 -out intermediate/csr/test.example.com.csr.pem  
# openssl ca -config intermediate/openssl.cnf \  
-extensions server_cert -days 375 -notext -md sha256 \  
-in intermediate/csr/test.example.com.csr.pem
```

```
-out intermediate/certs/test.example.com.cert.pem
```

Run the OCSP responder on `localhost`. Rather than storing revocation status in a separate CRL file, the OCSP responder reads `index.txt` directly. The response is signed with the OCSP cryptographic pair (using the `-rkey` and `-rsigner` options).

```
# openssl ocspl -port 127.0.0.1:2560 -text -sha256 \  
-index intermediate/index.txt \  
-CA intermediate/certs/ca-chain.cert.pem \  
-rkey intermediate/private/ocsp.example.com.key.pem \  
-rsigner intermediate/certs/ocsp.example.com.cert.pem \  
-nrequest 1
```

Enter pass phrase for ocsp.example.com.key.pem: `secretpassword`

In another terminal, send a query to the OCSP responder. The `-cert` option specifies the certificate to query.

```
# openssl ocspl -CAfile intermediate/certs/ca-chain.cert.pem \  
-url http://127.0.0.1:2560 -resp_text \  
-issuer intermediate/certs/intermediate.cert.pem \  
-cert intermediate/certs/test.example.com.cert.pem
```

The start of the output shows:

- whether a successful response was received (`OCSP Response Status`)
- the identity of the responder (`Responder Id`)
- the revocation status of the certificate (`Cert Status`)

```
OCSP Response Data:  
OCSP Response Status: successful (0x0)  
Response Type: Basic OCSP Response  
Version: 1 (0x0)
```

```
Responder Id: ... CN = ocsp.example.com
Produced At: Apr 11 12:59:51 2015 GMT
Responses:
Certificate ID:
  Hash Algorithm: sha1
  Issuer Name Hash: E35979B6D0A973EBE8AEDED75D8C27D67D2A0334
  Issuer Key Hash: 69E8EC547F252360E5B6E77261F1D4B921D445E9
  Serial Number: 1003
Cert Status: good
This Update: Apr 11 12:59:51 2015 GMT
```

## Revoke the certificate.

```
# openssl ca -config intermediate/openssl.cnf \
    -revoke intermediate/certs/test.example.com.cert.pem

Enter pass phrase for intermediate.key.pem: secretpassword
Revoking Certificate 1003.
Data Base Updated
```

As before, run the OCSP responder and on another terminal send a query. This time, the output shows `Cert Status: revoked` and a `Revocation Time`.

```
OCSP Response Data:
  OCSP Response Status: successful (0x0)
  Response Type: Basic OCSP Response
  Version: 1 (0x0)
  Responder Id: ... CN = ocsp.example.com
  Produced At: Apr 11 13:03:00 2015 GMT
  Responses:
  Certificate ID:
    Hash Algorithm: sha1
    Issuer Name Hash: E35979B6D0A973EBE8AEDED75D8C27D67D2A0334
    Issuer Key Hash: 69E8EC547F252360E5B6E77261F1D4B921D445E9
    Serial Number: 1003
  Cert Status: revoked
  Revocation Time: Apr 11 13:01:09 2015 GMT
```

This Update: Apr 11 13:03:00 2015 GMT

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