OpenSSL

eIDAS PSD2 Certificate Signing Request Profiles

Date: 12th March 2019

Issue: 2.0

Classification: Public

References			
Number	**Title**	**Link**	**Notes**
1	Electronic Signatures and Infrastructures (ESI); Sector Specific Requirements; Qualified Certificate Profiles and TSP Policy Requirements under the payment services Directive (EU) 2015/2366"	https://www.etsi.org/deliver/etsi_ts/119400_119499/119495/01.02.01_60/ts_119495v010201p.pdf	ETSI specification for QWAC and QSEAL certificates.

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1 PREFACE

1.1 PURPOSE OF THIS DOCUMENT

This document outlines the general procedure to generate Certificate Signing Requests (CSR) for Open Banking Public Key Infrastructure (PKI).

In particular, it concentrates on the method required to generate a CSR compliant with ETSI specification “Electronic Signatures and Infrastructures (ESI); Sector Specific Requirements; Qualified Certificate Profiles and TSP Policy Requirements under the payment services Directive (EU) 2015/2366” **[REF 1]**

2 X509 CERTIFICATE SIGNING REQUEST PROFILES

2.1 OBWAC AND OBSEAL

The OBWAC and/or OBSEAL certificates are signed by the Open Banking PKI once a client has generated a valid CSR. The ETSI specification **[REF 1]** requires specific, formatted entries for certain x509 certificate fields. In particular:

- QcStatement of type PSD2. One or more PSD2 statements MUST be in the certificate.
- QcStatement of type QCType. MUST be either QcType Web or QcType Seal.
- Organisational Identifier MUST be in subject name.

Both OBWAC and OBSEAL must contain these fields. In addition, OBWAC certificates are issued with the extended key usage field of id-kp-serverAuth and id-kp-clientAuth [RFC5280].

The QcStatements must be encoded correctly in the CSR submitted by the client. This following sections details an approach to do this.

Generally, QCStatement may optionally contain other QCStatement types defined by ETSI
such as QcCompliance, QcLimitValue etc. However, these QcStatement types are not mandatory for OBWAC or OBSEAL type certificates and are not discussed further.

2.2 PSD2 STATEMENT

As specified in [**REF 1]**

The PSD2 specific attributes shall be included in a QCStatement within the qcStatements extension as specified in clause 3.2.6 of IETF RFC 3739 [7].

The QCStatement shall contain the following PSD2 specific certificate attributes as required by RTS [i.3] article 34:

- *The role of the payment service provider, which maybe one or more of the following:*
    - *account servicing (PSP_AS);*
    - *payment initiation (PSP_PI);*
    - *account information (PSP_AI);*
    - *issuing of card-based payment instruments (PSP_IC).*
- *The name of the competent authority where the payment service provider is registered. This is provided in two forms:*
    - *the full name string (NCAName) in English and*
    - *an abbreviated unique identifier (NCAId).*

Generally, to encode the above information into a CSR requires generating a valid ASN.1 representation. This is discussed later in the document.

2.3 ORGANISATIONAL IDENTIFIER STATEMENT

As specified in [**REF 1]**

The PSD2 Authorization Number, or other identifier recognized by the NCA, shall be placed in organizationIdentifier attribute of the Subject Distinguished Name field in the certificate.

The organizationIdentifier "PSDGB-OB-Unknown0015800001041ReAAI" means a certificate issued to a TPP where the authorization number is Unknown0015800001041ReAAI, authorization was granted by UK Open Banking (identifier PSDGB-OB).

Other examples can include use of non-alphanumeric characters such as "PSDBE-NBB-1234.567.890", "PSDFI-FINFSA-1234567-8" and "PSDMT-MFSA-A 12345" (note space character after "A").

After consultations between European Banking Authority (EBA) and ETSI it was found that there are institutions which can request PSD2 certificates but have no authorization number. If the authorization number was not issued by the NCA, then another registration identifier recognized by the NCA is used from those defined in the standard ETSI EN/TS 319 412-1

2.4 CSR GENERATION - OPENSSL

There are many utilities to generate CSR's to submit to a certificate authority. This document uses OpenSSL to demonstrate how a valid CSR can is generated to submit to Open Banking to issue an OBWAC or OBSEAL x509 certificate that complies with ETSI certificate template.

OpenSSL does not offer an ASN.1 editor to natively generate PSD2 type statements out of the box although it does offer an ASN.1 parser. OpenSSL is supported on Windows and Unix platforms and the client is free to generate a CSR on the platform of their choice. **The client is reminded to protect the private key according to their security policies**.

OpenSSL does support embedding a valid DER encoded hexadecimal representation of a PSD2 statement in a CSR. Therefore, another tool is required to actually generate a valid PSD2 statement, which is DER, encoded.

This document is not intended to be a tutorial on OpenSSL. However, general usage is based on installing OpenSSL on your target operating system and generating a CSR as follows:

OBWAC CSR Generation

openssl req -new -config obwac.cnf -out obwac.csr -keyout obwac.key

OBSEAL CSR Generation

openssl req -new -config obseal.cnf -out obsealc.sr -keyout obseal.key

Example:

```
Generating a 2048 bit RSA private key
.....................................+++
..........+++
writing new private key to 'obwac.key'
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
-----
```

The obwac.key and/or obseal.key files must be protected by your security policies.

The obwac.csr and/or obseal.csr are submitted to Open Banking PKI for processing.

If successful, a signed certificate is returned associated with the appropriate key file generated above.

The contents of the obwac.cnf and obseal.cnf are dependent on what type of PSD2 service provider the client generating the CSR is, such as a PSP_AS .

Example OpenSSL cnf files are supplied for clients in the next chapter.

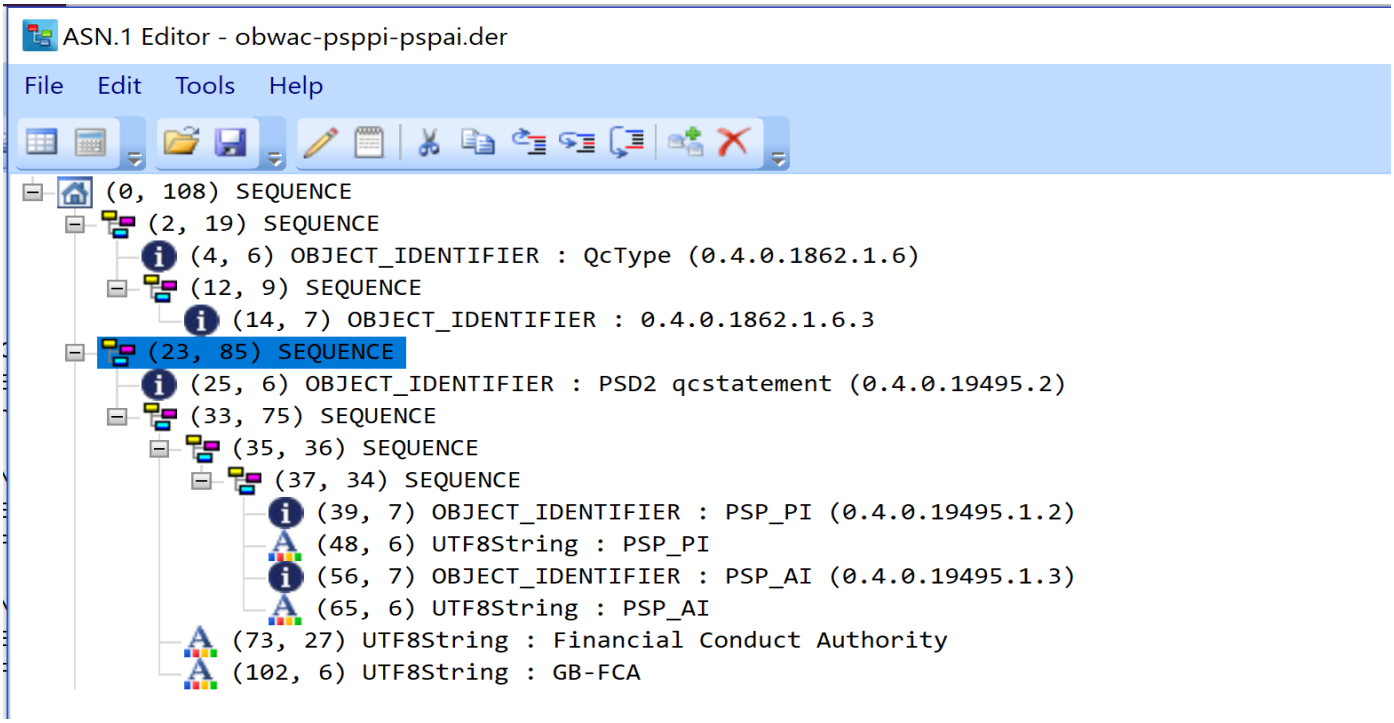
2.5 ASN.1 EDITOR

Vadims Podāns has created an excellent ASN.1 editor and parser. It is ONLY available on Microsoft Windows. However, the output can be used in OpenSSL cnf files on Windows or Unix

The following URL contains link to download the tool:

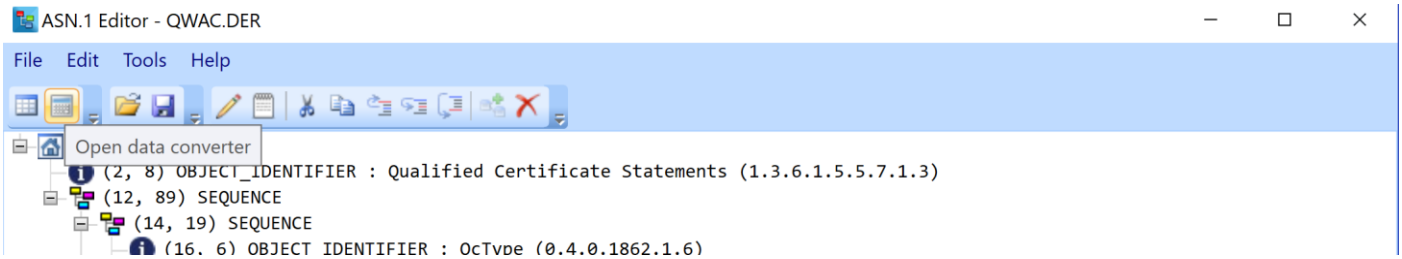
https://www.sysadmins.lv/projects/asn1editor/default.aspx

ASN.1 Editor is a tool that allows you to display, edit, format and convert ASN.1-encoded data.

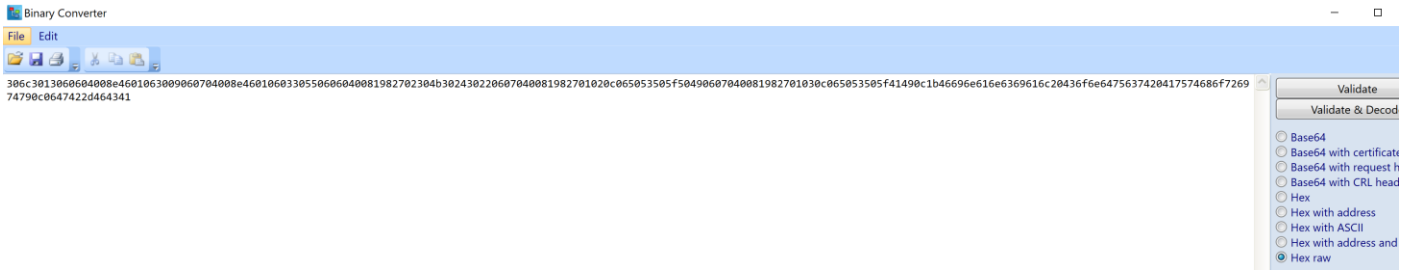


The tools allows a Qualified Certificate Statement with a PSD2 statement [OID= 0.4.0.19495.2] to be constructed as shown above. In the example, the organisation has a PSD2 roles of PSP_PI and PSP_AI, a nCAName of Financial Conduct Authority and a nCAId of GB-FCA.

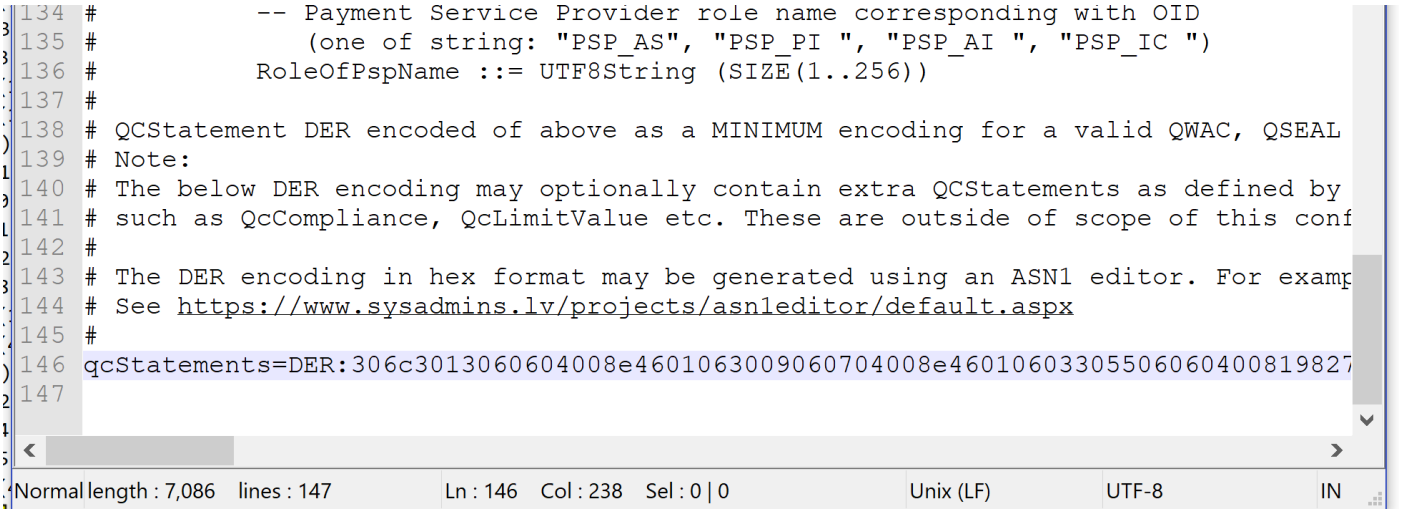
The above example also demonstrates a Qualified Certificate Statement with a Qualified Type of QcWeb (OID= 0.4.0.1862.1.6.3]. This indicates it is an OBWAC certificate.



The raw, hexadecimal encoding of the above settings are generated by pressing the “Open data converter” button as shown above.

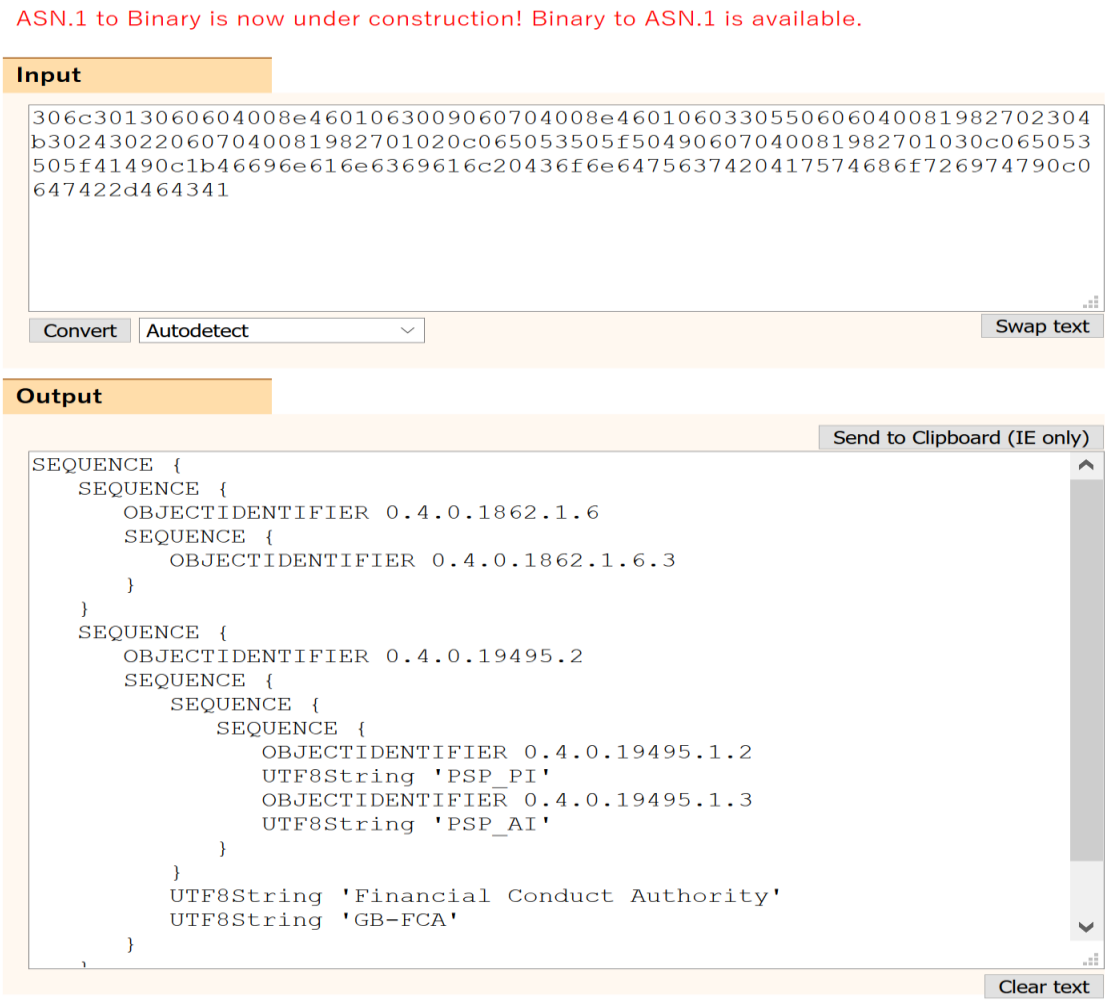


Selecting the “Hex Raw” radio button generates a long line of hexadecimal as shown above.



The hexadecimal string can be copied into the appropriate OpenSSL obwac.cnf or obseal.cnf file as shown above. This allows generation of a CSR with the appropriate encoding of client details.

2.6 VALIDATION OF QCSTATEMENT DER ENCODING



The following web site contains an ASN.1 DER decoder to validate the DER encoding is as expected. If not using OpenSSL, this is useful to look at the DER encoding before incorporating in the CSR.

http://www.geocities.co.jp/SiliconValley-SanJose/3377/asn1JS.html

3 OBWAC X509 CERTIFICATE SIGNING REQUEST PROFILE

3.1 INTRODUCTION

This chapter demonstrates how to generate a valid CSR by a client that requires an OBWAC x509 certificate issued to them.

3.2 OBWAC OPENSSL CNF FILE

The following configuration file is used to generate a CSR for an OBWAC certificate using OpenSSL.

All text highlighted in red must be changed by the client to specific data pertinent to them.

NB.

A client can use the OpenSSL cnf file below to generate a CSR which is subsequently signed using their own certificate authority. However, such a certificate will not be trusted by Open Banking.

obwac.cnf file for OpenSSL CSR request

```
#
# OPENSSL CSR REQUEST CONFIGURATION FILE
# ======================================
#
# OBWAC qualified client certificate request with PSD2 role: PSP_PI PSP_AI
# ------------------------------------------------------------------------
# See latest specification: ETSI TS 119 495 V1.2.1 (2018-11)
# https://www.etsi.org/deliver/etsi_ts/119400_119499/119495/01.02.01_60/ts_119495v010201p.pdf
#
oid_section           = new_oids


[ new_oids ]
organizationIdentifier  = 2.5.4.97              # OpenSSL may not recognize this OID so need to add.


[ req ]
default_bits            = 2048                  # RSA key size
encrypt_key             = yes                   # Protect private key: yes or no. yes recommended
default_md              = sha256                # MD to use. sha256 recommended
utf8                    = yes                   # Input is UTF-8.
string_mask             = utf8only              # Emit UTF-8 strings
prompt                  = no                    # Prompt for DN. yes or no.
distinguished_name      = client_dn         # DN template. Mandatory to include organizationIdentifier
req_extensions          = client_reqext         # Desired extensions. Mandatory to include PSD2 QCStatements


#
# Subject Distinguished Name format in certificate
# ------------------------------------------------
```

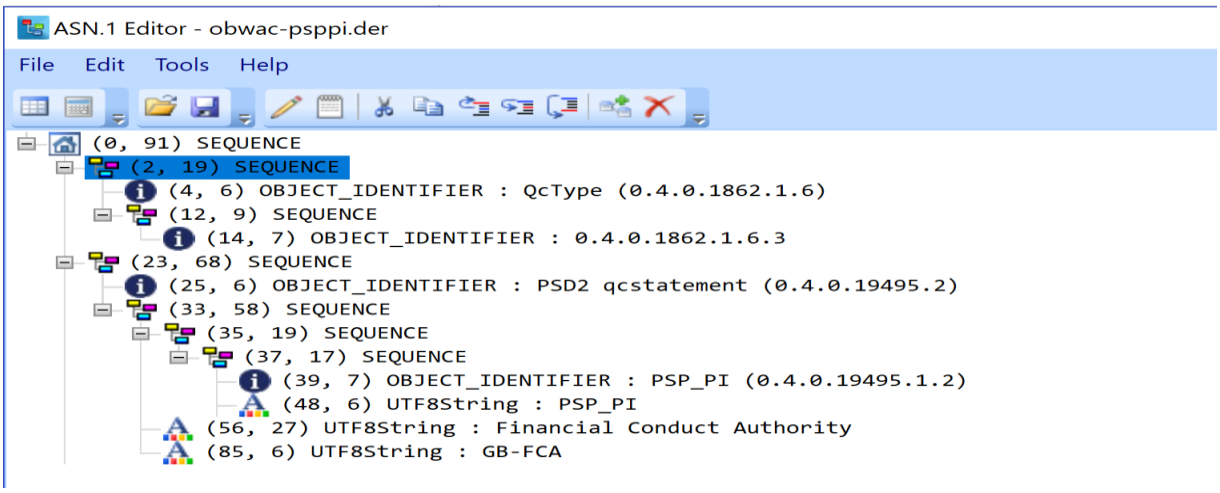
```
# EG: CN = 0015800001041ReAAI, 2.5.4.97 = PSDGB-OB-Unknown0015800001041ReAAI, O = Open Banking Limited (D), C
= GB
#
#
[ client_dn ]
countryName             = "GB"                          # Country code - see doc above
organizationName        = "Open Banking Limited (D)"    # Organizational name
#
#  organizationIdentifier
#  ----------------------
#  The organizationIdentifier shall be present in the Subject's Distinguished Name
#  and encoded with legal person syntax
#
#  EXAMPLE: The organizationIdentifier "PSDPL-PFSA-1234567890" means a certificate issued to a PSP where
#  the authorization number is 1234567890, authorization was granted by the Polish Financial
#  Supervision Authority (identifier after second hyphen-minus is decided by Polish numbering
#  system). Other examples can include use of non-alphanumeric characters such as "PSDBE-NBB-
#  1234.567.890" and "PSDFI-FINFSA-1234567-8" and "PSDMT-MFSA-A 12345" (note space character after "A")
#
organizationIdentifier  = "PSDGB-OB-Unknown0015800001041ReAAI"       # Must be in format as shown above
commonName              = "0015800001041ReAAI"                      # Subject common name
#
# Required specific extensions in certificate
#
[ client_reqext ]
keyUsage                = critical,digitalSignature                 # Must be critical
#
# NOTE: As stated in section 7.1.2.3 item f of the CA/Browser Forum Baseline Requirements [i.8]
# (as referenced in ETSI EN 319 412-4 [4]) "id-kp-serverAuth or id-kp-clientAuth [RFC5280] or both values
#  MUST be present". If the certificate is intended to be used as the client certificate in
#  mutual authentication then both values of extKeyUsage certificate extension will need to be present.
#  It is not intended that certificates issued under this profile are used just as client certificates.
#
extendedKeyUsage        = clientAuth, serverAuth                    # Must be defined as shown above
subjectKeyIdentifier    = hash                                      # Hash value to calculate SKI
#
#
#   QC-STATEMENT
#
#      FROM PKIXqualified97 {iso(1) identified-organization(3) dod(6)
#      internet(1) security(5) mechanisms(5) pkix(7) id-mod(0) id-mod-qualified-cert-97(35)};
#      [OID = 1.3.6.1.5.5.7.1.3]
```

```
#
#       Qualified Electronic Certificate Type Statement: QSIGN, QWAC, QSEAL
#       ---------------------------------------------------------------------
#       0.4.0.1862.1.6, QcType
#       0.4.0.1862.1.6.1, esign
#       0.4.0.1862.1.6.2, eseal
#       0.4.0.1862.1.6.3, web
#
#
#       PSD2 Qualified Statement
#       ------------------------
#       NOTE:
#       PSP can be authorized by its national competent authority (NCA) to act in one or more PSD2 roles
#
#       etsi-psd2-qcStatement QC-STATEMENT ::= {SYNTAX PSD2QcType IDENTIFIED BY id-etsi-psd2-qcStatement }
#       id-etsi-psd2-qcStatement OBJECT IDENTIFIER ::=
#       {
#         itu-t(0) identified-organization(4) etsi(0) psd2(19495) qcstatement(2) }
#         [OID = 0.4.0.19495.2]
#         PSD2QcType ::= SEQUENCE {rolesOfPSP RolesOfPSP, nCAName NCAName, nCAId NCAId}
#       }
#
#       The NCAName shall be plain text name in English provided by the NCA itself for purpose
#       of identification in certificates
#       NCAName ::= UTF8String (SIZE (1..256))
#
#       The NCAId shall contain information using the following structure in the presented order:
#            2 character ISO 3166-1 [8] country code representing the NCA country;
#            hyphen-minus "-" (0x2D (ASCII), U+002D (UTF-8)); and
#            2-8 character NCA identifier without country code (A-Z uppercase only, no separator).
#       NCAId ::= UTF8String (SIZE (1..256))
#
#       RolesOfPSP ::= SEQUENCE OF RoleOfPSP
#
#         RoleOfPSP ::= SEQUENCE{ roleOfPspOid RoleOfPspOid,roleOfPspName RoleOfPspName}
#
#          RoleOfPspOid ::= OBJECT IDENTIFIER
#          -- Object Identifier arc for roles of payment service providers defined in the present document
#
#          etsi-psd2-roles OBJECT IDENTIFIER ::=
#
```

```
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) }
#           [OID = 0.4.0.19495.1]
#
#           -- Account Servicing Payment Service Provider (PSP_AS) role
#           [OID = 0.4.0.19495.1.1]
#           id-psd2-role-psp-as OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 1 }
#
#           -- Payment Initiation Service Provider (PSP_PI) role
#           [OID = 0.4.0.19495.1.2]
#           id-psd2-role-psp-pi OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 2 }
#
#           -- Account Information Service Provider (PSP_AI) role
#           [OID = 0.4.0.19495.1.3]
#           id-psd2-role-psp-ai OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 3 }
#
#           -- Payment Service Provider issuing card-based payment instruments (PSP_IC) role
#           [OID = 0.4.0.19495.1.4]
#           id-psd2-role-psp-ic OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 4 }
#
#           -- Payment Service Provider role name corresponding with OID
#              (one of string: "PSP_AS", "PSP_PI ", "PSP_AI ", "PSP_IC ")
#           RoleOfPspName ::= UTF8String (SIZE(1..256))
#
# QCStatement DER encoded of above as a MINIMUM encoding for a valid QWAC, QSEAL or QSIG issued certificate
# Note:
# The below DER encoding may optionally contain extra QCStatements as defined by ETSI
# such as QcCompliance, QcLimitValue etc. These are outside of scope of this configuration.
#
# The DER encoding in hex format may be generated using an ASN1 editor. For example:
# See https://www.sysadmins.lv/projects/asn1editor/default.aspx
#
qcStatements=DER:306c3013060604008e4601063009060704008e460106033055060604008198270204b3024302206070400819827
01020c065053505f5049060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f72697
4790c0647422d464341
```

3.3 PSP_PI ROLE

The PSD2 statement can contain a single PSD2 role as shown below for role PSP_PI.

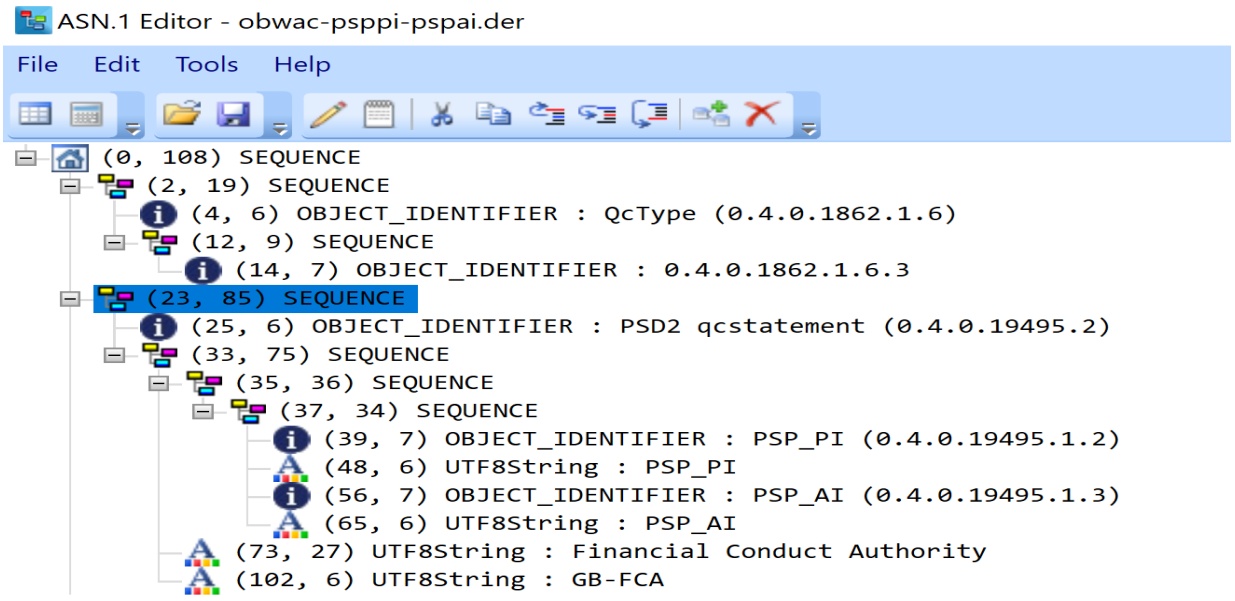


The OpensSSL der encoded QcStatement is shown below which can be used with the OpenSSL obwac.cnf file to generate a CSR for Open Banking PKI to sign

qcStatements=DER:305b3013060604008e46010630090607040081982702303a3013301106070400819827010 20c065053505f50490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

3.4 PSP_PI AND PSP_AI ROLES

The PSD2 statement can contain a list of PSD2 roles. An example is shown below for roles PSP_AI and PSP_AI.



The OpenSSL der encoded QcStatement is shown below which can be used with the OpenSSL obwac.cnf file to generate a CSR for Open Banking PKI to sign

qcStatements=DER:306c3013060604008e46010630090607040081982702304b3024302206070400819827010 20c065053505f5049060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

3.5 COMBINATIONS OF ALL 4 PSP_XX ROLES: PSP_AS + PSP_PI + PSP_AI + PSP_IC

PSP_AS

qcStatements=DER:305b3013060604008e46010630090607040008e460106033044060604008198270230 3a3013301106070400819827010 10c065053505f41530c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI

qcStatements=DER:305b3013060604008e46010630090607040008e460106033044060604008198270230 3a3013301106070400819827010 20c065053505f50490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AI

qcStatements=DER:305b3013060604008e46010630090607040008e460106033044060604008198270230 3a3013301106070400819827010 30c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_IC

qcStatements=DER:305b3013060604008e46010630090607040008e460106033044060604008198270230 3a3013301106070400819827010 40c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_PI

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270102 0c065053505f50490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_AI

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270104 0c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI PSP_AI

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010 20c065053505f5049060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010 20c065053505f5049060704008198270104 0c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AI PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e460106033055060604008198270230 4b3024302206070400819827010300c065053505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_AI

qcStatements=DER:307d3013060604008e46010630090607040008e460106033066060604008198270230 5c3035303306070400819827010100c065053505f41530607040081982701020c065053505f50490607040081982701030c065053505f41490c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e460106033066060604008198270230 5c3035303306070400819827010100c065053505f41530607040081982701020c065053505f50490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_AI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e460106033066060604008198270230 5c3035303306070400819827010100c065053505f41530607040081982701030c065053505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_PI PSP_AI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e460106033066060604008198270230 5c3035303306070400819827010200c065053505f50490607040081982701030c065053505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_AI PSP_IC

qcStatements=DER:30818e3013060604008e46010630090607040008e460106033077060604008198270230 6d3046304406070400819827010100c065053505f41530607040081982701020c065053505f50490607040081982701030c065053505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

3.6 EXAMPLE OBWAC CSR CREATION USING OPENSSL FOR ROLES PSP_AS, PSP_AI AND PSP_IC

vi obwac.cnf

```
<replace qcStatements=DER:xxxx with qcStatements listed above for PSP_AS PSP_AI PSP_IC>
<save file>
```

openssl req -new -config obwac.cnf -out obwac.csr -keyout obwac.key

cat obwac.csr

```
----BEGIN CERTIFICATE REQUEST-----
MIIDuTCCAqECAQAwgYIxCzAJBgNVBAYTAkdCMSEwHwYDVQQKDBhPcGVuIEJhbmtp
bmcgTGltaXRlZCAoRCkxLzAtBgNVBGEMJlBTREdCLU9CLVVua25vd25pOWtzSHNI
Vndtc0xlbGpPTTJjZTdQMR8wHQYDVQQDDBZpOWtzSHNIVndtc0xlbGpPTTJjZTdQ
MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEA55jgXVkeaQoyX/8KtgDb
5EjHUlaLTaKIxxUwBdTwDEATFv4ghi5yZHkpVpDexnG6NDcNxwTnwRZSsyl64sGp
Ttg5U4qWeh3aqjYUswxCyZTbLgrsSGCZKZ7Xq3mcdDuUMtGlc2bkcZW5Yz5qSL+U
3+4G+6Ns36qOMxMtMIGmnOPKXucRE1X78bJFzznbwvrKtoXLdW92YnH5gpvDciHn
ggSmn5GQO9VVcTpf1FvNrG8ZIFwSd/L7QYLzHgaGy+k54lhJtXy7U5KfqRsFi+lf
LjegdiH321HhkSWcX3zcvdpP7PUp7rYYhvof4Tc/LhAOfkdvZsMoeqp7l8p+NvM3
```

```
1QIDAQABoIHwMIHtBgkqhkiG9w0BCQ4xgd8wgdwwDgYDVR0PAQH/BAQDAgeAMB0G
A1UdJQQWMBQGCCsGAQUFBwMCBggrBgEFBQcDATAdBgNVHQ4EFgQU/tRHGsElM5sy
XoiicoHRPAK+NNAwgYsGCCsGAQUFBwEDBH8wfTATBgYEAI5GAQYwCQYHBACORgEG
AzBmBgYEAIGYJwIwXDA1MDMGBwQAgZgnAQIMBlBTUF9QSQYHBACBmCcBAwwGUFNQ
X0FJBgcEAIGYJwEEDAZQU1BfSUMMG0ZpbmFuY2lhbCBDb25kdWN0IEF1dGhvcml0
eQwGR0ItRkNBMA0GCSqGSIb3DQEBCwUAA4IBAQClGE2mOpmgah/Cz1o99QrhehN9
8L41s1NezlJJt6m5xFZRrAMU8edeIHmPcUGAQ+SNfwlht2/0E1cM4cVHVSnuI2mQ
/Dhp+r6x3eWf3+NFgFflHgOJhOaO+vvxlst02wtAWjgXWfgQLs2aEdi2DUUYLk72
o6rne+SXXtWB1EMH7fYMZOxfJM6THuTCvBXXYFgu1MQY28PiM8XFwTXqtr6ntNVg
XuKJnRfDyUY4LnQI6cuyoTmj3LoU8q0a+WENgKRzwQVMay7sVZzvjBrgktrgHX57
slzeMQTqWM4NTcUcRKfQ725DmJ2z3sQoe3spEpPLAhDlKQrvFKWw1Wf+TWpM
-----END CERTIFICATE REQUEST-----
```

openssl asn1parse -in obwac.csr -inform PEM

```
    0:d=0  hl=4 l= 953 cons: SEQUENCE
    4:d=1  hl=4 l= 673 cons: SEQUENCE
    8:d=2  hl=2 l=   1 prim: INTEGER           :00
   11:d=2  hl=3 l= 130 cons: SEQUENCE
   14:d=3  hl=2 l=  11 cons: SET
   16:d=4  hl=2 l=   9 cons: SEQUENCE
   18:d=5  hl=2 l=   3 prim: OBJECT            :countryName
   23:d=5  hl=2 l=   2 prim: PRINTABLESTRING   :GB
   27:d=3  hl=2 l=  33 cons: SET
   29:d=4  hl=2 l=  31 cons: SEQUENCE
   31:d=5  hl=2 l=   3 prim: OBJECT            :organizationName
   36:d=5  hl=2 l=  24 prim: UTF8STRING        :Open Banking Limited (D)
   62:d=3  hl=2 l=  47 cons: SET
   64:d=4  hl=2 l=  45 cons: SEQUENCE
   66:d=5  hl=2 l=   3 prim: OBJECT            :2.5.4.97
   71:d=5  hl=2 l=  38 prim: UTF8STRING        :PSDGB-OB-Unknowni9ksHsHVwmsLeljOM2ce7P
  111:d=3  hl=2 l=  31 cons: SET
  113:d=4  hl=2 l=  29 cons: SEQUENCE
  115:d=5  hl=2 l=   3 prim: OBJECT            :commonName
  120:d=5  hl=2 l=  22 prim: UTF8STRING        :i9ksHsHVwmsLeljOM2ce7P
  144:d=2  hl=4 l= 290 cons: SEQUENCE
  148:d=3  hl=2 l=  13 cons: SEQUENCE
  150:d=4  hl=2 l=   9 prim: OBJECT            :rsaEncryption
  161:d=4  hl=2 l=   0 prim: NULL
  163:d=3  hl=4 l= 271 prim: BIT STRING
  438:d=2  hl=3 l= 240 cons: cont [ 0 ]
  441:d=3  hl=3 l= 237 cons: SEQUENCE
```

```
444:d=4  hl=2 l=   9 prim: OBJECT            :Extension Request
455:d=4  hl=3 l= 223 cons: SET
458:d=5  hl=3 l= 220 cons: SEQUENCE
461:d=6  hl=2 l=  14 cons: SEQUENCE
463:d=7  hl=2 l=   3 prim: OBJECT            :X509v3 Key Usage
468:d=7  hl=2 l=   1 prim: BOOLEAN           :255
471:d=7  hl=2 l=   4 prim: OCTET STRING      [HEX DUMP]:03020780
477:d=6  hl=2 l=  29 cons: SEQUENCE
479:d=7  hl=2 l=   3 prim: OBJECT            :X509v3 Extended Key Usage
484:d=7  hl=2 l=  22 prim: OCTET STRING      [HEX DUMP]:301406082B06010505070302060 82B06010505070301
508:d=6  hl=2 l=  29 cons: SEQUENCE
510:d=7  hl=2 l=   3 prim: OBJECT            :X509v3 Subject Key Identifier
515:d=7  hl=2 l=  22 prim: OCTET STRING      [HEX DUMP]:0414FED4471AC125339B325E88A27281D13C02BE34D0
539:d=6  hl=3 l= 139 cons: SEQUENCE
542:d=7  hl=2 l=   8 prim: OBJECT            :qcStatements
552:d=7           hl=2      l=      127      prim:      OCTET      STRING                                  [HEX
      DUMP]:307D3013060604008E46010630090607040 08E460106033066060604008198270230 5C3035303306070400819827010
      20C065053505F5049060704008198270103 0C065053505F4149060704008198270104 0C065053505F49430C1B46696E616E63
      69616C20436F6E6475637420417574686F726974790C0647422D464341
681:d=1  hl=2 l=  13 cons: SEQUENCE
683:d=2  hl=2 l=   9 prim: OBJECT            :sha256WithRSAEncryption
694:d=2  hl=2 l=   0 prim: NULL
696:d=1  hl=4 l= 257 prim: BIT STRING
```

The CSR may be uploaded to Open Banking PKI to issue an OBWAC public certificate associated with your private key.

4 OBSEAL X509 CERTIFICATE SIGNING REQUEST PROFILE

4.1 INTRODUCTION

This chapter demonstrates how to generate a valid CSR by a client that requires an OBSEAL x509 certificate issued to them.

4.2 OBSEAL OPENSSL CNF FILE

The following configuration file is used to generate a CSR for an OBSEAL certificate using OpenSSL

All text highlighted in red must be changed by the client to specific data pertinent to them.

NB.

A client can use the OpenSSL cnf file below to generate a CSR which is subsequently signed using their own certificate authority. However, such a certificate will not be trusted by Open Banking.

obseal.cnf file for OpenSSL CSR request

```
#
# OPENSSL CSR REQUEST CONFIGURATION FILE
# ======================================
#
# OBSEAL qualified client certificate request with PSD2 role: PSP_PI PSP_AI
# -------------------------------------------------------------------------
# See latest specification: ETSI TS 119 495 V1.2.1 (2018-11)
# https://www.etsi.org/deliver/etsi_ts/119400_119499/119495/01.02.01_60/ts_119495v010201p.pdf
#
oid_section           = new_oids

[ new_oids ]
organizationIdentifier  = 2.5.4.97           # OpenSSL may not recognize this OID so need to add.

[ req ]
default_bits            = 2048                  # RSA key size
encrypt_key             = yes                   # Protect private key: yes or no. yes recommended
default_md              = sha256                # MD to use. sha256 recommended
utf8                    = yes                   # Input is UTF-8.
string_mask             = utf8only              # Emit UTF-8 strings
prompt                  = no                    # Prompt for DN. yes or no.
distinguished_name      = client_dn       # DN template. Mandatory to include organizationIdentifier
req_extensions          = client_reqext         # Desired extensions. Mandatory to include PSD2 QCStatements

#
# Subject Distinguished Name format in certificate
# ------------------------------------------------
```

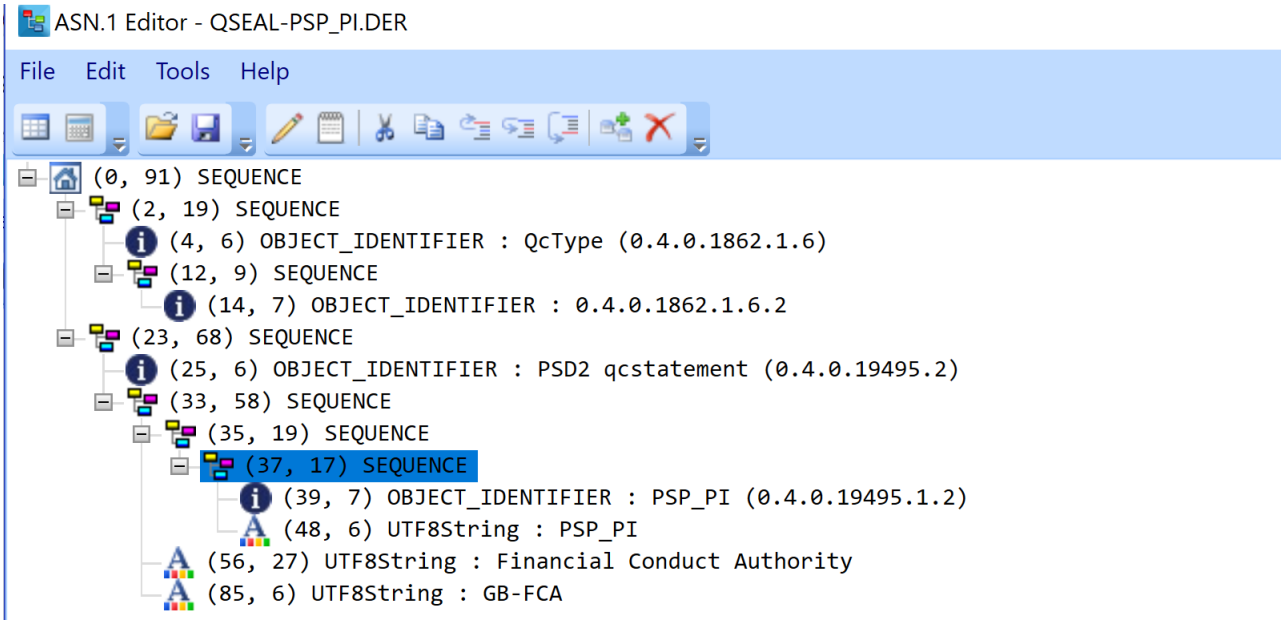
```
# EG: CN = 0015800001041ReAAI, 2.5.4.97 = PSDGB-OB-Unknown0015800001041ReAAI, O = Open Banking Limited (D), C
= GB
#
#
[ client_dn ]
countryName             = "GB"                          # Country code - see doc above
organizationName        = "Open Banking Limited (D)"    # Organizational name
#
#  organizationIdentifier
#  ----------------------
#  The organizationIdentifier shall be present in the Subject's Distinguished Name
#  and encoded with legal person syntax
#
#  EXAMPLE: The organizationIdentifier "PSDPL-PFSA-1234567890" means a certificate issued to a PSP where
#  the authorization number is 1234567890, authorization was granted by the Polish Financial
#  Supervision Authority (identifier after second hyphen-minus is decided by Polish numbering
#  system). Other examples can include use of non-alphanumeric characters such as "PSDBE-NBB-
#  1234.567.890" and "PSDFI-FINFSA-1234567-8" and "PSDMT-MFSA-A 12345" (note space character after "A")
#
organizationIdentifier  = "PSDGB-OB-Unknown0015800001041ReAAI" # Must be in format as shown above
commonName              = "0015800001041ReAAI"              # Subject common name
#
# Required specific extensions in certificate
#
[ client_reqext ]
keyUsage                = critical,digitalSignature,nonRepudiation  # Must be critical
#
#
# extendedKeyUsage        = critical, document-signing               # Not used
subjectKeyIdentifier    = hash                                     # Hash value to calculate SKI
#
#
#   QC-STATEMENT
#
#      FROM PKIXqualified97 {iso(1) identified-organization(3) dod(6)
#      internet(1) security(5) mechanisms(5) pkix(7) id-mod(0) id-mod-qualified-cert-97(35)};
#      [OID = 1.3.6.1.5.5.7.1.3]
#
#       Qualified Electronic Certificate Type Statement: QSIGN, QWAC, QSEAL
#       ---------------------------------------------------------------------
#       0.4.0.1862.1.6, QcType
#       0.4.0.1862.1.6.1, esign
```

```
#       0.4.0.1862.1.6.2, eseal
#       0.4.0.1862.1.6.3, web
#
#
#       PSD2 Qualified Statement
#       ------------------------
#       NOTE:
#       PSP can be authorized by its national competent authority (NCA) to act in one or more PSD2 roles
#
#       etsi-psd2-qcStatement QC-STATEMENT ::= {SYNTAX PSD2QcType IDENTIFIED BY id-etsi-psd2-qcStatement }
#       id-etsi-psd2-qcStatement OBJECT IDENTIFIER ::=
#       {
#         itu-t(0) identified-organization(4) etsi(0) psd2(19495) qcstatement(2) }
#         [OID = 0.4.0.19495.2]
#         PSD2QcType ::= SEQUENCE {rolesOfPSP RolesOfPSP, nCAName NCAName, nCAId NCAId}
#       }
#
#       The NCAName shall be plain text name in English provided by the NCA itself for purpose
#       of identification in certificates
#       NCAName ::= UTF8String (SIZE (1..256))
#
#
#       The NCAId shall contain information using the following structure in the presented order:
#            2 character ISO 3166-1 [8] country code representing the NCA country;
#            hyphen-minus "-" (0x2D (ASCII), U+002D (UTF-8)); and
#            2-8 character NCA identifier without country code (A-Z uppercase only, no separator).
#       NCAId ::= UTF8String (SIZE (1..256))
#
#       RolesOfPSP ::= SEQUENCE OF RoleOfPSP
#
#         RoleOfPSP ::= SEQUENCE{ roleOfPspOid RoleOfPspOid,roleOfPspName RoleOfPspName}
#
#          RoleOfPspOid ::= OBJECT IDENTIFIER
#          -- Object Identifier arc for roles of payment service providers defined in the present document
#
#          etsi-psd2-roles OBJECT IDENTIFIER ::=
#
#          { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) }
#          [OID = 0.4.0.19495.1]
#
#          -- Account Servicing Payment Service Provider (PSP_AS) role
```

```
#           [OID = 0.4.0.19495.1.1]
#           id-psd2-role-psp-as OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 1 }
#
#           -- Payment Initiation Service Provider (PSP_PI) role
#           [OID = 0.4.0.19495.1.2]
#           id-psd2-role-psp-pi OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 2 }
#
#           -- Account Information Service Provider (PSP_AI) role
#           [OID = 0.4.0.19495.1.3]
#           id-psd2-role-psp-ai OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 3 }
#
#           -- Payment Service Provider issuing card-based payment instruments (PSP_IC) role
#           [OID = 0.4.0.19495.1.4]
#           id-psd2-role-psp-ic OBJECT IDENTIFIER ::=
#           { itu-t(0) identified-organization(4) etsi(0) psd2(19495) id-roles(1) 4 }
#
#           -- Payment Service Provider role name corresponding with OID
#              (one of string: "PSP_AS", "PSP_PI ", "PSP_AI ", "PSP_IC ")
#           RoleOfPspName ::= UTF8String (SIZE(1..256))
#
# QCStatement DER encoded of above as a MINIMUM encoding for a valid QWAC, QSEAL or QSIG issued certificate
# Note:
# The below DER encoding may optionally contain extra QCStatements as defined by ETSI
# such as QcCompliance, QcLimitValue etc. These are outside of scope of this configuration.
#
# The DER encoding in hex format may be generated using an ASN1 editor. For example:
# See https://www.sysadmins.lv/projects/asn1editor/default.aspx
#
qcStatements=DER:306c3013060604008e4601063009060704008e460106023055060604008198270201020c065053505f504906070400819827010
30c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341
```

4.3 PSP_PI ROLE

The PSD2 statement can contain a single PSD2 role as shown below for role PSP_PI.

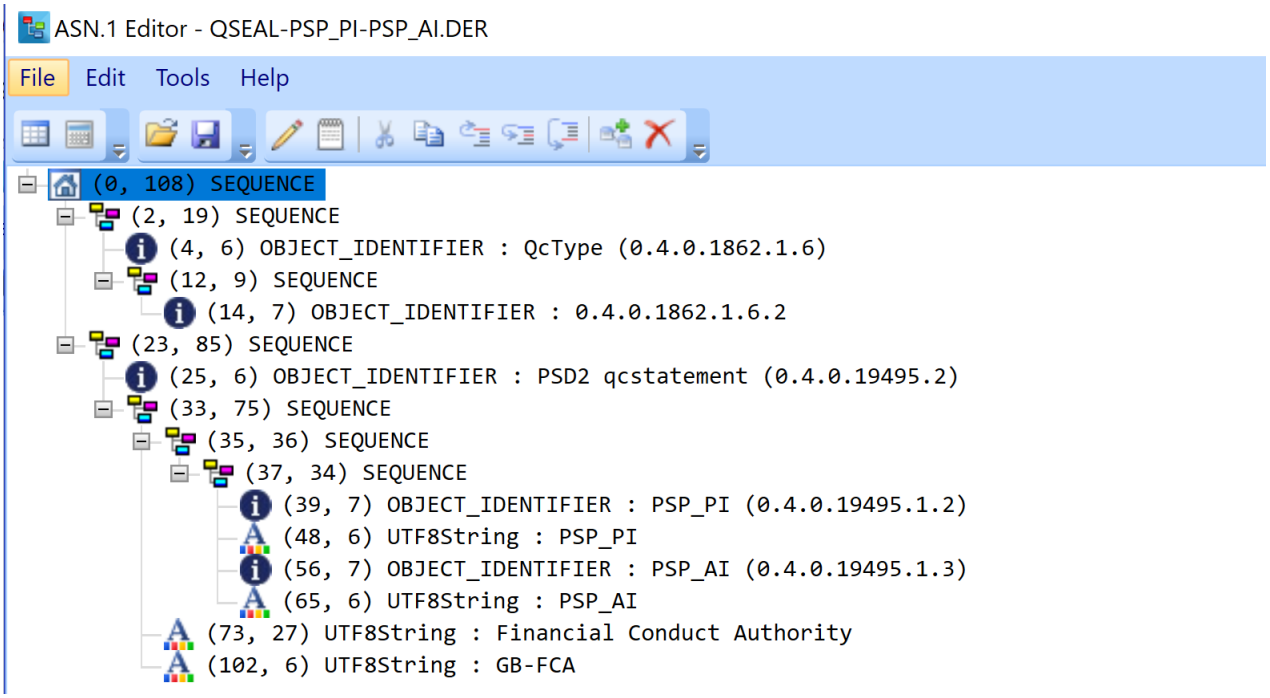


The OpensSSL der encoded QcStatement is shown below which can be used with the OpenSSL obseal.cnf file to generate a CSR for Open Banking PKI to sign

qcStatements=DER:305b3013060604008e46010630090607040081982702303a3013301106070400819827010 20c065053505f50490c1b46696e616e6369616c20436f6e64756374204175746861726974790c0647422d464341

4.4 PSP_PI AND PSP_AI ROLES

The PSD2 statement can contain a list of PSD2 roles. An example is shown below for roles PSP_AI and PSP_AI.



The OpenSSL der encoded QcStatement is shown below which can be used with the OpenSSL obseal.cnf file to generate a CSR for Open Banking PKI to sign

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 20c065053505f5049060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

4.5 COMBINATIONS OF ALL 4 PSP_XX ROLES: PSP_AS + PSP_PI + PSP_AI + PSP_IC

PSP_AS

qcStatements=DER:305b3013060604008e46010630090607040008e460106023044060604008198270230 3a3013301106070400819827010 10c065053505f41530c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI

qcStatements=DER:305b3013060604008e46010630090607040008e460106023044060604008198270230 3a3013301106070400819827010 20c065053505f50490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AI

qcStatements=DER:305b3013060604008e46010630090607040008e460106023044060604008198270230 3a3013301106070400819827010 30c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_IC

qcStatements=DER:305b3013060604008e46010630090607040008e460106023044060604008198270230 3a3013301106070400819827010 40c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_PI

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270102 0c065053505f50490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_AI

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AS PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 10c065053505f4153060704008198270104 0c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI PSP_AI

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 20c065053505f5049060704008198270103 0c065053505f41490c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_PI PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e460106023055060604008198270230 4b3024302206070400819827010 20c065053505f5049060704008198270104 0c065053505f49430c1b46696e616e6369616c20436f6e6475637420417574686f726974790c0647422d464341

PSP_AI PSP_IC

qcStatements=DER:306c3013060604008e46010630090607040008e46010602305506060400819827023040b30243022
06070400819827010300c065053505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436
f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_AI

qcStatements=DER:307d3013060604008e46010630090607040008e46010602306606060400819827023050c30353033
06070400819827010100c065053505f41530607040081982701020c065053505f50490607040081982701030c0650535
05f41490c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e46010602306606060400819827023050c30353033
06070400819827010100c065053505f41530607040081982701020c065053505f50490607040081982701040c0650535
05f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_AI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e46010602306606060400819827023050c30353033
06070400819827010100c065053505f41530607040081982701030c065053505f41490607040081982701040c0650535
05f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_PI PSP_AI PSP_IC

qcStatements=DER:307d3013060604008e46010630090607040008e46010602306606060400819827023050c30353033
06070400819827010200c065053505f50490607040081982701030c065053505f41490607040081982701040c0650535
05f49430c1b46696e616e6369616c20436f6e647563742041757468 6f726974790c0647422d464341

PSP_AS PSP_PI PSP_AI PSP_IC

qcStatements=DER:30818e3013060604008e46010630090607040008e46010602307706060400819827023060d304630
44060704008198270101 0c065053505f41530607040081982701020c065053505f50490607040081982701030c06505
3505f41490607040081982701040c065053505f49430c1b46696e616e6369616c20436f6e647563742041757468 6f72
6974790c0647422d464341

4.6 EXAMPLE OBSEAL CSR CREATION USING OPENSSL FOR ROLES PSP_AS, PSP_IC

vi obseal.cnf

```
<replace qcStatements=DER:xxxx with qcStatements listed above for PSP_AS PSP_IC>
<save file>
```

openssl req -new -config obseal.cnf -out obseal.csr -keyout obseal.key

cat obseal.csr

```
-----BEGIN CERTIFICATE REQUEST-----
MIIDfzCCAmcCAQAwejELMAkGA1UEBhMCR0IxITAfBgNVBAoMGE9wZW4gQmFua2lu
ZyBMaW1pdGVkIChEKTErMCkGA1UEYQwiUFNER0ItT0ItVW5rbm93bjAwMTU4MDAw
MDEwNDFSZUFBSTEbMBkGA1UEAwwSMDAxNTgwMDAwMTA0MVJlQUFJMIIBIjANBgkq
hkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAvs4MQkihHuTA0yX84gcd+A256cQKwg4K
2kS1wEFp/8VuHK/iS2hj13AP0DCsunbLb1AlYvqbauH/c0u2xbwxFy+QJL1VADgV
XPtXNGHeA87xGqBpjdg1lo3JLdiSiyj7q4F13ePaVoF6MTE3AuR1aG7VjL5/LbLK
99gMMdjI8x3g7bBHPnsOYUYYgGevmGwZwX5N2PPTB2ypkgcFBs11jhZqFY0xsv75
```

```
NWJCyvjMTQtlbnWBikLaUFeTdKk8BS1ykELYXL44E1NCY4FwB58OexL/zsJu3Gdc
QAZPfgZNQANqGazEjyUSkRTu+5T4HIjiBvVOfWtNv2xnKSONzI993QIDAQABoIG/
MIG8BgkqhkiG9w0BCQ4xga4wgaswDgYDVR0PAQH/BAQDAgbAMB0GA1UdDgQWBBSQ
GivWx5KoPDIs9KMvi2Vsq5acDDB6BggrBgEFBQcBAwRuMGwwEwYGBACORgEGMAkG
BwQAjkYBBgIwVQYGBACBmCcCMEswJDAiBgcEAIGYJwEBDAZQU1BfQVMGBwQAgZgn
AQQMBlBTUF9JQwwbRmluYW5jaWFsIENvbmR1Y3QgQXV0aG9yaXR5DAZHQi1GQ0Ew
DQYJKoZIhvcNAQELBQADggEBACZxs7pMd/sv+KJt48wLkfkqcnB1/YeP6AoNIqJN
0cDrMsA9nw4clmYaZOPUdUrQqo6gZVjGyh2TZv1kQx3NccK06/cmTnEVSUGR7A0g
vUHr/9dcH5G5kubxxzhpO6J+pR8xcidU8JZFS0BKrA5ntPmUZeTn4sA0cukk0rFz
Z1XzgueheZA+saaytsZvgbwOq2mfsOjtufpf3U4s3JFQLlpCaI/ASM+2RBebSyld
QaKHqJdlDhwD6XMzuBh/syslAOOn/vpOrQ/+tJB5pq0shBY6QkJOnlqvV1Uc5FnT
qxtgvRv1OQXKuqnueTFeCAGYGw1dB7n/x+e4eEQlNL1d5qQ=
-----END CERTIFICATE REQUEST-----
```

openssl asn1parse -in obseal.csr -inform PEM

```
    0:d=0  hl=4 l= 895 cons: SEQUENCE
    4:d=1  hl=4 l= 615 cons: SEQUENCE
    8:d=2  hl=2 l=   1 prim: INTEGER           :00
   11:d=2  hl=2 l= 122 cons: SEQUENCE
   13:d=3  hl=2 l=  11 cons: SET
   15:d=4  hl=2 l=   9 cons: SEQUENCE
   17:d=5  hl=2 l=   3 prim: OBJECT            :countryName
   22:d=5  hl=2 l=   2 prim: PRINTABLESTRING   :GB
   26:d=3  hl=2 l=  33 cons: SET
   28:d=4  hl=2 l=  31 cons: SEQUENCE
   30:d=5  hl=2 l=   3 prim: OBJECT            :organizationName
   35:d=5  hl=2 l=  24 prim: UTF8STRING        :Open Banking Limited (D)
   61:d=3  hl=2 l=  43 cons: SET
   63:d=4  hl=2 l=  41 cons: SEQUENCE
   65:d=5  hl=2 l=   3 prim: OBJECT            :2.5.4.97
   70:d=5  hl=2 l=  34 prim: UTF8STRING        :PSDGB-OB-Unknown0015800001041ReAAI
  106:d=3  hl=2 l=  27 cons: SET
  108:d=4  hl=2 l=  25 cons: SEQUENCE
  110:d=5  hl=2 l=   3 prim: OBJECT            :commonName
  115:d=5  hl=2 l=  18 prim: UTF8STRING        :0015800001041ReAAI
  135:d=2  hl=4 l= 290 cons: SEQUENCE
  139:d=3  hl=2 l=  13 cons: SEQUENCE
  141:d=4  hl=2 l=   9 prim: OBJECT            :rsaEncryption
  152:d=4  hl=2 l=   0 prim: NULL
  154:d=3  hl=4 l= 271 prim: BIT STRING
  429:d=2  hl=3 l= 191 cons: cont [ 0 ]
  432:d=3  hl=3 l= 188 cons: SEQUENCE
```

```
  435:d=4  hl=2 l=   9 prim: OBJECT            :Extension Request

  446:d=4  hl=3 l= 174 cons: SET

  449:d=5  hl=3 l= 171 cons: SEQUENCE

  452:d=6  hl=2 l=  14 cons: SEQUENCE

  454:d=7  hl=2 l=   3 prim: OBJECT            :X509v3 Key Usage

  459:d=7  hl=2 l=   1 prim: BOOLEAN           :255

  462:d=7  hl=2 l=   4 prim: OCTET STRING      [HEX DUMP]:030206C0

  468:d=6  hl=2 l=  29 cons: SEQUENCE

  470:d=7  hl=2 l=   3 prim: OBJECT            :X509v3 Subject Key Identifier

  475:d=7  hl=2 l=  22 prim: OCTET STRING      [HEX DUMP]:0414901A2BD6C792A83C322CF4A32F8B656CAB969C0C

  499:d=6  hl=2 l= 122 cons: SEQUENCE

  501:d=7  hl=2 l=   8 prim: OBJECT            :qcStatements

  511:d=7           hl=2      l=      110      prim:      OCTET      STRING                                  [HEX
DUMP]:306C3013060604008E46010630090607040008E460106023055060604008198270230 4B3024302206070400819827010 10C06505
3505F41530607040081982701040C065053505F49430C1B46696E616E6369616C20436F6E6475637420417574686F726974790C064742
2D464341

  623:d=1  hl=2 l=  13 cons: SEQUENCE

  625:d=2  hl=2 l=   9 prim: OBJECT            :sha256WithRSAEncryption

  636:d=2  hl=2 l=   0 prim: NULL

  638:d=1  hl=4 l= 257 prim: BIT STRING
```

The CSR may be uploaded to Open Banking PKI to issue an OBSEAL public certificate associated with your private key.