X.509 Certificate EKU for JOSE/COSE

draft-reddy-lamps-jose-eku-01
IETF116, March 2023

T. Reddy (Nokia)
J. Ekman (Nokia)
D. Migault (Ericsson)
Problem

• Restrict the purpose of EE certificate to prevent misuse
• No extended key purpose identifiers for
  ➢ Javascript Object Signing and Encryption: JSON Web Signature (JWS), JSON Web Encryption (JWE)
  ➢ CBOR Object Signing and Encryption: CBOR Web Signature (CWS), CBOR Web Encryption (CWE)
Use case

• Network Functions (NFs) as part of the service-based architecture within the 5G System.

• Certificate (issued by internal CA) can be misused for tasks that 5G NF is not entitled to perform.

  • Certificates for signing Client Credentials Assertion (CCA) tokens using JWS (Section 13.3.8.2 of [TS33.501])
  • Certificates for encrypting JSON objects in HTTP messages between Security Edge Protection Proxies (SEPPs) using (Section 13.2.4.4 of [TS33.501]) and Section 6.3.2 of [TS33.210])
  • Certificates for signing access tokens for service access authorization in intra-domain (within the PLMN) and/or inter-domain (in roaming scenarios) Service Based Architecture (SBA) scenarios using JWS (Section 13.4.1 of [TS33.501])
Solution

• Define extended key purpose identifiers for JWS, JWE, CWS and CWE.

\[
\text{id-kp} \quad \text{OBJECT IDENTIFIER} \ := \ \{ \\
\qquad \text{iso}(1) \ \text{identified-organization}(3) \ \text{dod}(6) \ \text{internet}(1) \\
\qquad \text{security}(5) \ \text{mechanisms}(5) \ \text{pkix}(7) \ \text{kp}(3) \ \} \\
\]

\[
\text{id-kp-jws} \quad \text{OBJECT IDENTIFIER} \ := \ \{ \ \text{id-kp} \ \text{TBD1} \ \} \\
\text{id-kp-jwe} \quad \text{OBJECT IDENTIFIER} \ := \ \{ \ \text{id-kp} \ \text{TBD2} \ \} \\
\text{id-kp-cws} \quad \text{OBJECT IDENTIFIER} \ := \ \{ \ \text{id-kp} \ \text{TBD3} \ \} \\
\text{id-kp-cwe} \quad \text{OBJECT IDENTIFIER} \ := \ \{ \ \text{id-kp} \ \text{TBD4} \ \} \\
\]
Discuss: Multiple EKU

• 2 EKU (JOSE, COSE) + keyUsage bits
• 4 EKU (JWS, JWE, CWS, CWE)
  ▪ RFC5280, key usage extension and extended key usage extension must be processed independently.
    ▪ The certificate can be used provided the purpose is consistent with both extensions.
  ▪ JWS and JWE are used for JWT claims
  ▪ No need to add a processing rule to check if both the extensions are consistent or not.
Next Step

• Presented in 3GPP SA3 meeting at Athens
  - TR (solution #10 of TR 33.876 v.0.6.0) which addresses the KI#7
  - KI#7: Investigate the possibility to adopt the extensions introduced in IETF draft-reddy-lamps-jose-eku-00, which is work in progress in IETF at the time of writing

• Comments and suggests are welcome

• Consider for WG adoption