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# Commit ac7ff52



u3s committed on Mar 18 · 23 / 27 · Verified

public\_key: Verify designated OCSP responder certificate signature

A designated OCSP responder (Case 2 in RFC 6960 §4.2.2.2) must hold a certificate issued directly by the CA. The existing check verified the issuer DN match and id-kp-OCSPSigning EKU but did not verify the CA's cryptographic signature on the responder certificate.

An attacker could forge a self-signed certificate with the CA's subject DN and OCSPSigning EKU, and it would be accepted as a valid designated responder.

Add public\_key:pkix\_verify/2 call to Case 2 in is\_authorized\_responder/3 to verify the responder certificate was actually signed by the CA.

Add designated\_responder test case covering both legitimate (CA-signed) and forged (self-signed) designated responder certificates.

[GHSA-gxrm-pf64-99xm](#)

master (#10873) · OTP-29.0-rc3 ... OTP-28.4.2

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2 files changed

+148 -2

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lib/public\_key/src/pubkey\_ocsp.erl

```

@@ -231,7 +231,9 @@ is_authorized_responder(CombinedResponderCert =
#cert{otp = ResponderCert},
231 231      %%      issue OCSP responses for that CA (id-kp-OCSPSigning)
232 232      fun() ->
233 233          public_key:pkix_is_issuer(ResponderCert, IssuerCert) andalso
234 -          designated_for_ocsp_signing(ResponderCert)
+          designated_for_ocsp_signing(ResponderCert) andalso
235 +          public_key:pkix_verify(CombinedResponderCert#cert.der,
236 +          get_public_key_rec(IssuerCert))
235 237      end,
236 238      Case3 =
237 239      %% a Trusted Responder whose public key is trusted by the requestor

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lib/public\_key/test/pubkey\_ocsp\_SUITE.erl

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@@ -107,7 +107,7 @@
107 107      %% Common Test interface functions -----
108 108      %%-----
109 109      all() ->
110 -      [ocsp_test].
110 +      [ocsp_test, designated_responder].
111 111
112 112      groups() ->
113 113      [].
@@ -213,3 +213,147 @@ ocsp_test(Config) when is_list(Config) ->
213 213          ?ISSUER_CERT,
214 214          IsTrustedReponderFun),
215 215          ok.
216 +
217 +      %%-----
218 +      designated_responder() ->
219 +      [{doc, "Test Case2 (designated responder) in is_authorized_responder/3. "
220 +          "Verifies that a legitimate designated responder cert signed by the CA "
221 +          "is accepted, and a forged self-signed cert with the same subject DN "

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222 +     "is rejected (GHSAs-gxrm-pf64-99xm)."}].
223 + designated_responder(Config) when is_list(Config) ->
224 +     %% Generate self-signed root CA (issuer = subject). A single CA is
225 +     %% sufficient because is_authorized_responder/3 Case 2 only checks
226 +     %% DN match, OCSPSigning EKU, and pkix_verify – no chain validation.
227 +     CAKey = public_key:generate_key({namedCurve, ?'secp256r1'}),
228 +     CAPubKey = ec_public_key(CAKey),
229 +     CASubject = cn_subject(<<"Test CA">>),
230 +     CACertDer = public_key:pkix_sign(ca_tbs(CASubject, CAPubKey), CAKey),
231 +     CACert = public_key:pkix_decode_cert(CACertDer, otp),
232 +
233 +     %% Legitimate designated responder cert (signed by CA)
234 +     ResponderKey = public_key:generate_key({namedCurve, ?'secp256r1'}),
235 +     {ResponderCertDer, ResponderCert} =
236 +         sign_responder_cert(2, CASubject, ec_public_key(ResponderKey), CAKey),
237 +
238 +     %% Forged designated responder (self-signed, same subject DN)
239 +     ForgedKey = public_key:generate_key({namedCurve, ?'secp256r1'}),
240 +     {ForgedCertDer, ForgedCert} =
241 +         sign_responder_cert(9999, CASubject, ec_public_key(ForgedKey),
242 + ForgedKey),
243 +
244 +     %% Build OCSP responses and verify
245 +     Nonce = crypto:strong_rand_bytes(8),
246 +     NonceExt = <<4, 8, Nonce/binary>>,
247 +     IsNotTrustedFun = fun(_) -> false end,
248 +
249 +     %% Positive: legitimate designated responder accepted
250 +     LegitResponse = build_ocsp_response(CASubject, CAKey, NonceExt,
251 + ResponderKey),
252 +     {ok, [_], _} =
253 +         pubkey_ocsp:verify_response(
254 +             LegitResponse,
255 +             [#cert{otp = ResponderCert, der = ResponderCertDer}],
256 +             NonceExt, CACert, IsNotTrustedFun),
257 +
258 +     %% Negative: forged responder (same DN, not signed by CA) rejected
259 +     ForgedResponse = build_ocsp_response(CASubject, CAKey, NonceExt,
260 + ForgedKey),
261 +     {error, ocsp_responder_cert_not_found} =

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259 +     pubkey_ocsp:verify_response(
260 +         ForgedResponse,
261 +         [#cert{otp = ForgedCert, der = ForgedCertDer}],
262 +         NonceExt, CACert, IsNotTrustedFun),
263 +     ok.
264 +
265 + %%-----
266 + %% Helpers -----
267 + %%-----
268 +
269 + ec_public_key('#ECPrivateKey'{publicKey = PubKey}) ->
270 +     #'ECPoint'{point = PubKey}.
271 +
272 + cn_subject(CN) ->
273 +     {rdnSequence,
274 +      [[#'AttributeTypeAndValue'{
275 +          type = ?'id-at-commonName',
276 +          value = {utf8String, CN}}]]}.
277 +
278 + ec_subject_pubkey_info(PubKey) ->
279 +     #'OTPSubjectPublicKeyInfo'{
280 +         algorithm = #'PublicKeyAlgorithm'{
281 +             algorithm = ?'id-ecPublicKey',
282 +             parameters = {namedCurve, ?'secp256r1'}},
283 +         subjectPublicKey = PubKey}.
284 +
285 + ca_tbs(Subject, PubKey) ->
286 +     make_tbs(1, Subject, PubKey,
287 +             [#'Extension'{extnID = ?'id-ce-basicConstraints',
288 +                 critical = true,
289 +                 extnValue = #'BasicConstraints'{CA = true}},
290 +             #'Extension'{extnID = ?'id-ce-keyUsage',
291 +                 critical = false,
292 +                 extnValue = [keyCertSign, cRLSign]})}.
293 +
294 + ocsp_responder_tbs(Serial, Issuer, PubKey) ->
295 +     make_tbs(Serial, Issuer, PubKey,
296 +             [#'Extension'{extnID = ?'id-ce-basicConstraints',
297 +                 critical = false,
298 +                 extnValue = #'BasicConstraints'{CA = false}},

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299 +         #'Extension'{extnID = ?'id-ce-keyUsage',
300 +             critical = false,
301 +             extnValue = [digitalSignature]},
302 +         #'Extension'{extnID = ?'id-ce-extKeyUsage',
303 +             critical = false,
304 +             extnValue = [?'id-kp-OCSPSigning']}}).
305 +
306 + sign_responder_cert(Serial, Issuer, PubKey, SigningKey) ->
307 +     Der = public_key:pkix_sign(ocsp_responder_tbs(Serial, Issuer, PubKey),
308 +     SigningKey),
309 +     {Der, public_key:pkix_decode_cert(Der, otp)}.
310 +
311 + make_tbs(Serial, Subject, PubKey, Extensions) ->
312 +     #'OTPTBSCertificate'{
313 +         version = v3,
314 +         serialNumber = Serial,
315 +         signature = #'SignatureAlgorithm'{
316 +             algorithm = ?'ecdsa-with-SHA256',
317 +             parameters = asn1_NOVALUE},
318 +         issuer = Subject,
319 +         validity = #'Validity'{
320 +             notBefore = {utcTime, "240101000000Z"},
321 +             notAfter = {utcTime, "340101000000Z"}},
322 +         subject = Subject,
323 +         subjectPublicKeyInfo = ec_subject_pubkey_info(PubKey),
324 +         extensions = Extensions}.
325 +
326 + build_ocsp_response(IssuerName, IssuerKey, NonceExt, SignKey) ->
327 +     IssuerNameHash = crypto:hash(sha, public_key:der_encode('Name',
328 +     IssuerName)),
329 +     IssuerKeyHash = crypto:hash(sha, IssuerKey#'ECPrivateKey'.publicKey),
330 +     ResponseData = #'ResponseData'{
331 +         version = v1,
332 +         responderID = {byName, IssuerName},
333 +         producedAt = "20250101000000Z",
334 +         responses =
335 +             [ #'SingleResponse'{
336 +                 certID = #'CertID'{

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337 +         parameters = {asn1_OPENTYPE, <<5,0>>}},
338 +         issuerNameHash = IssuerNameHash,
339 +         issuerKeyHash = IssuerKeyHash,
340 +         serialNumber = 100},
341 +         certStatus = {good, 'NULL'},
342 +         thisUpdate = "20250101000000Z",
343 +         nextUpdate = asn1_NOVALUE,
344 +         singleExtensions = asn1_NOVALUE}},
345 +     responseExtensions =
346 +         [#'Extension'{
347 +             extnID = ?'id-pkix-ocsp-nonce',
348 +             critical = false,
349 +             extnValue = NonceExt}}],
350 +     ResponseDataDer = public_key:der_encode('ResponseData', ResponseData),
351 +     Signature = public_key:sign(ResponseDataDer, sha256, SignKey),
352 +     #'BasicOCSPResponse'{
353 +         tbsResponseData = ResponseData,
354 +         signatureAlgorithm =
355 +             #'BasicOCSPResponse_signatureAlgorithm'{
356 +                 algorithm = ?'ecdsa-with-SHA256',
357 +                 parameters = asn1_NOVALUE},
358 +         signature = Signature,
359 +         certs = asn1_NOVALUE}.
```

## Comments 0



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