Fully Specified Algorithms for JOSE and COSE

(proposed specification)

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The IANA algorithm registries for JOSE and COSE contain two kinds of algorithm identifiers:

- **Fully Specified** – Those that fully determine the cryptographic operations to be performed
  - Including any Curve, KDF, Hash Function, etc.
  - Examples: RS256, ES256K, ES256 (in JOSE)

- **Polymorphic** – Those requiring info beyond the identifier to determine the cryptographic operations to be performed
  - Such as the cryptographic key with a curve
  - Examples: EdDSA, ES256 (in COSE)
Why It Matters

Many protocols negotiate supported operations using just “alg”

- RFC 8414 (AS Metadata) uses negotiation parameters like:
  "token_endpoint_auth_signing_alg_values_supported": ["RS256", "ES256"]
- OpenID Connect negotiates using “alg” and “enc” values
- WebAuthn and FIDO2 negotiate using COSE “alg” numbers

This doesn’t work for polymorphic algorithms:

- With “EdDSA”, you don’t know which of Ed25519 or Ed448 are supported!
- WebAuthn contains this definition as a result:
  -8 (EdDSA), where crv is 6 (Ed25519)
Proposed Solution

Create spec registering fully specified algorithm values for all algorithms currently using polymorphic values, such as:

- “ES25519” - Edwards-curve Digital Signature with Ed25519 curve
- “ES448” - Edwards-curve Digital Signature with Ed448 curve
- “ESP256” - ECDSA using P-256 curve and SHA-256 (for COSE)
- “ESP384” - ECDSA using P-384 curve and SHA-384 (for COSE)
- etc.
Updating Polymorphic RFCs

The spec would add “Updated by” to existing RFCs registering polymorphic algorithm identifiers

- RFC 8037: CFRG Elliptic Curve Diffie-Hellman (ECDH) and Signatures in JSON Object Signing and Encryption (JOSE)
- RFC 9053: CBOR Object Signing and Encryption (COSE): Initial Algorithms
- etc.

Gives implementers notice of fully specified alg choices
The RFC would also update the instructions to the designated experts for the JOSE and COSE algorithm registries.

It would instruct the experts not to approve any more polymorphic algorithm identifier registrations.

This would prevent the problem from getting worse.
Should it be a BCP?

- Should this specification be a Best Current Practices document?
- It would make using fully specified algorithm identifiers a Best Current Practice