Introduction to Pairing Friendly Curves Representation in JOSE and COSE Draft

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Why did we author this?

• Currently working in the Decentralized Identity space where my company (MATTR) has authored a method to sign Verifiable Credentials (or any arbitrary message) with BBS+ signatures

• We'd like to be able to represent the curve of our choice (BLS12-381) in JWK/CWK format inside of DID Documents

• We see benefits to pairing friendly curves and signature formats that rely on this elliptic curve property quite useful in the future for things like threshold signatures and attribute-based credential signatures
What's in the draft currently?

• Currently this draft builds upon draft-irtf-cfrg-pairing-friendly-curves-09[1]

• Includes all curves defined in 4.2 (128-bit security) and 4.3 (256-bit security)
  • Bn256G1 and Bn256G2 in JOSE and COSE representations (prohibited)
  • Bn462G1 and Bn462G2 in JOSE and COSE representations (optional)
  • Bls12381G1 and Bls12381G2 in JOSE and COSE representations (optional)
  • Bls48581G1 and Bls48581G2 in JOSE and COSE representations (optional)
Points to be considered

• What's the most pragmatic way to encode these keys? Need to remain aligned to JWK/CWK formatting.
  • Need to further consider impact for alignment with other use cases where these curves are already in use

• Should a signature format be co-registered to make use of the key formats within the JOSE/COSE suites right away?

• How should subgroups (G1/G2) be represented?
  • Would it be better to use the "crv" parameter or some other method?

• What would be the best path forward for this draft to get these registered in the JOSE/COSE IANA registries?

• Should Bn256G1 and Bn256G2 be registered but prohibited status?
Questions?

• Places I watch for discussion on the topic
  • This meeting (time permitting)
  • COSE WG Mailing list
  • Issues in github repo: https://github.com/mattrglobal/bls12381-jwk-draft
• My email: kyle.denhartog@mattr.global