



# **XML Cryptographic Security and Suite B**

National Security Agency  
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# Key Point



***The National Security Agency would like to see appropriate Suite B algorithms incorporated into XML Signature and XML Encryption.***



# The Case for Elliptic Curve Cryptography



| <b>Symmetric Key<br/>Size (bits)</b> | <b>RSA and Diffie-<br/>Hellman Key<br/>Size (bits)</b> | <b>Elliptic Curve<br/>Key Size (bits)</b> |
|--------------------------------------|--------------------------------------------------------|-------------------------------------------|
| <b>80</b>                            | <b>1024</b>                                            | <b>160</b>                                |
| <b>112</b>                           | <b>2048</b>                                            | <b>224</b>                                |
| <b>128</b>                           | <b>3072</b>                                            | <b>256</b>                                |
| <b>192</b>                           | <b>7680</b>                                            | <b>384</b>                                |
| <b>256</b>                           | <b>15360</b>                                           | <b>521</b>                                |

*NIST Recommended Key Sizes*



# The Case for Elliptic Curve Cryptography



- In general, elliptic curve cryptosystems:
  - Offer more security per bit increase in key size than first generation public key systems.
  - Are more computationally efficient than the first generation public key systems.
  - Require less channel overhead to perform key exchanges and digital signatures on a communications link.



# NSA's Suite B

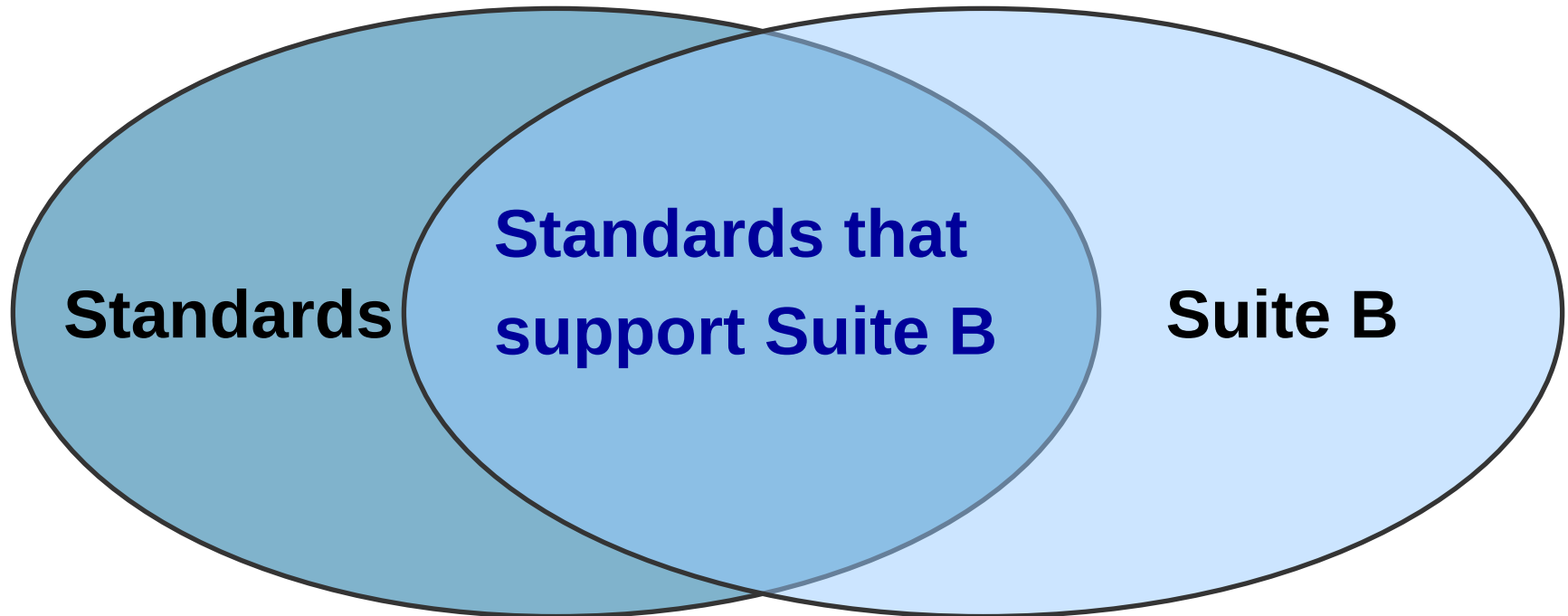


**Suite B is comprised of:**

|                          |                                                           |                                         |                                         |
|--------------------------|-----------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| <b>Encryption</b>        | <b>Advanced Encryption Standard (AES)</b>                 | <b>FIPS 197</b>                         | <b>Key sizes: 128 bits and 256 bits</b> |
| <b>Digital Signature</b> | <b>Elliptic Curve Digital Signature Algorithm (ECDSA)</b> | <b>FIPS 186-2</b>                       | <b>Curves: P-256 and P-384</b>          |
| <b>Key Exchange</b>      | <b>Elliptic Curve Diffie-Hellman</b>                      | <b>NIST Special Publication 800-56A</b> | <b>Curves: P-256 and P-384</b>          |
|                          | <b>Elliptic Curve Menzies-Qu-Vanstone (ECMQV)</b>         | <b>NIST Special Publication 800-56A</b> | <b>Curves: P-256 and P-384</b>          |
| <b>Hashing</b>           | <b>Secure Hash Algorithm</b>                              | <b>FIPS 180-2</b>                       | <b>SHA-256 and SHA-384</b>              |



# Suite B and Standards Convergence



- Current standards supporting Suite B include:
  - Suite B Cryptographic Suites for IPsec (RFC 4869)
  - Suite B Cipher Suites for TLS (Internet Draft)
  - Suite B in Secure/Multipurpose Internet Mail Extensions (S/MIME) (Internet Draft)



# Next Steps



- Next steps for incorporating appropriate Suite B algorithms into XML Signature and XML Encryption could include, but are not limited to:
  - XML Signature
    - Signature Algorithms: Define ECDSA integration with XML Signature
    - Digest: Define SHA-256 and SHA-384 integration with XML Signature
  - XML Encryption
    - Key Agreement: Define ECDH integration with XML Encryption
    - Message Digest: Define SHA-384 integration with XML Encryption



# Conclusion



***Incorporation of appropriate Suite B algorithms into XML Encryption and XML Signature is an important next step.***





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# References



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<http://csrc.nist.gov/cryptval/140-2.htm>
- FIPS 197, Advanced Encryption Standard:  
<http://csrc.nist.gov/publications/fips/fips197/fips-197.pdf>
- FIPS 186-2, Digital Signature Standard (Elliptic Curve Digital Signature Algorithm):  
<http://csrc.nist.gov/publications/fips/fips186-2/fips186-2-change1.pdf>
- Draft NIST Special Publication 800-56, Recommendation on Key Establishment Schemes (Elliptic Curve D-H or Elliptic Curve MQV): <http://csrc.nist.gov/CryptoToolkit/kms/keyschemes-Jan03.pdf>
- FIPS 180-2, Secure Hash Standard (SHA -256 and SHA-384):  
<http://csrc.nist.gov/publications/fips/fips180-2/fips180-2withchangenotice.pdf>
- NSA Suite B Fact Sheet:  
[http://www.nsa.gov/ia/industry/crypto\\_suite\\_b.cfm](http://www.nsa.gov/ia/industry/crypto_suite_b.cfm)