

Architecture for Issuing DoD Mobile Derived Credentials

David A. Sowers

Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Master of Science
In
Computer Engineering

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Sandeep Shukla
Luiz A. DaSilva

May 2, 2014
Falls Church, Virginia

Keywords: Derived Credentials, Public Key Infrastructure, Common Access Card, Department
of Defense, x509, Mobile Phone

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Virginia Tech ETD Fair Use Analysis Results

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Name: David Sowers

Description of item under review for fair use: Table 2.1: Authentication of Logical Access; NIST FIPS 201. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 17:09:51

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.2: Relationship Between PIV and E-Authentication Assurance Levels; NIST FIPS 201. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 19:36:36

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.3: PIV Card Application Authentication and Key Reference; NIST SP 800-73-3. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 19:38:28

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.4: Algorithm and Key Size Requirements; NIST SP 800-78-3. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 19:40:53

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.5: Key Reference Values; NIST SP 800-78-3.
Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 21:26:36

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

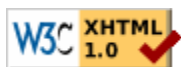
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.6: Algorithm Identifiers; NIST SP 800-78-3.
Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 21:27:47

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

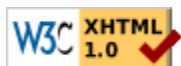
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Table 2.7: PIV Card Keys: Key Reference and Algorithms; NIST SP 800-78-3. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 21:29:26

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Figure 2.2.1: Use of Derived Credentials; NIST SP 800-157. Available at <http://csrc.nist.gov/>. Used under fair use, 2014

Report generated on: 06-30-2014 at : 21:30:58

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Figure 2.3.2: Public Key Data Encryption; Understanding Public Key Cryptography. Available at [http://technet.microsoft.com/en-us/library/aa998077\(v=exch.65\).aspx](http://technet.microsoft.com/en-us/library/aa998077(v=exch.65).aspx). Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:32:14

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Report generated on: 06-30-2014 at : 21:35:04

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

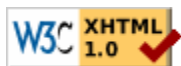
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Description of item under review for fair use: Figure 2.3.4: Digitally Signing a Message; Microsoft Exchange. Understanding Public Key Cryptography. Available at [http://technet.microsoft.com/en-us/library/aa998077\(v=exch.65\).aspx](http://technet.microsoft.com/en-us/library/aa998077(v=exch.65).aspx). Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:36:10

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

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Factor 3

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Factor 4

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Name: David Sowers

Description of item under review for fair use: Figure 2.3.5: Verifying a Digital Signature; Microsoft Exchange. Understanding Public Key Cryptography. Available at [http://technet.microsoft.com/en-us/library/aa998077\(v=exch.65\).aspx](http://technet.microsoft.com/en-us/library/aa998077(v=exch.65).aspx). Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:37:09

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

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Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

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Description of item under review for fair use: Figure 2.3.6: Digitally Signing and Encrypting a Message; Microsoft Exchange. Understanding Public Key Cryptography. Available at [http://technet.microsoft.com/en-us/library/aa998077\(v=exchg.65\).aspx](http://technet.microsoft.com/en-us/library/aa998077(v=exchg.65).aspx). Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:38:02

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

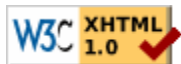
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

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Report generated on: 06-30-2014 at : 21:39:02

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

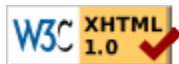
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Figure 2.4.1: X.509 Certificate; Microsoft Tech Net. Digital Certificates. <http://technet.microsoft.com/en-us/library/cc962029.aspx>. Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:41:22

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Figure 3.1.1: Sample Common Access Card; DoD Common Access Card. Available at <http://cac.mil/>. Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:45:24

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

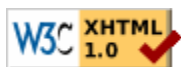
Factor 4

Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: ***in favor of fair use***

Based on the information you provided, your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Sowers

Description of item under review for fair use: Figure 3.2.1: DoD Root CA 2 Hierarchy; Military CAC.
Available at <http://militarycac.com>. Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:47:02

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: ***in favor of fair use***

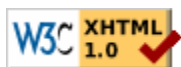
Factor 4

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Name: David Sowers

Description of item under review for fair use: Figure 4.3.1: Motorola CRYPTR Micro SD Card; 21. Motorola CRYPTR MICRO. MicorSD Encryption Unit for Mobile Devices. Product Spec Sheet. Available at http://www.motorolasolutions.com/web/Business/Products/Two-Way%20Radios%20-%20Public%20Safety/Encryption/AME1000/CRYPTR_micro_Encryption_Unit/CRYPTR_micro_spec_sheet.pdf. Used under fair use, 2014.

Report generated on: 06-30-2014 at : 21:51:53

Based on the information you provided:

Factor 1

Your consideration of the purpose and character of your use of the copyright work weighs: ***in favor of fair use***

Factor 2

Your consideration of the nature of the copyrighted work you used weighs: ***in favor of fair use***

Factor 3

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