SHARKFEST '12

Wireshark Developer and User Conference

Understanding Encryption Services Using Wireshark

Sunday June 24th 2012

Larry Greenblatt

Jedi Knight | InterNetwork Defense

SHARKFEST '12
UC Berkeley
June 24-27, 2012

About me

Musician:

Gung Ho! - Lead Guitar / Vocals / Songwriter

- *Produced by Otto Capobianco*

Max Quasar & Lorenzo Verti - “” & Producer

The Swinging Johnsons – Vocals

Martial Artist:

Black Sash Taiji

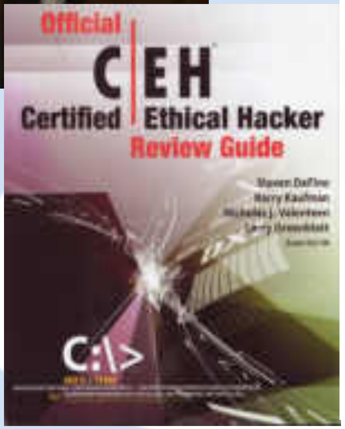
3rd Degree Black Belt JLFS

Hobbies (my day job):

Network nerd (& InfoSec geek) 1984

Consultant / Instructor / Author

CISM, CISSP, CEH, ECSA, Security+



Intro to Crypt0

with Bob & Alice

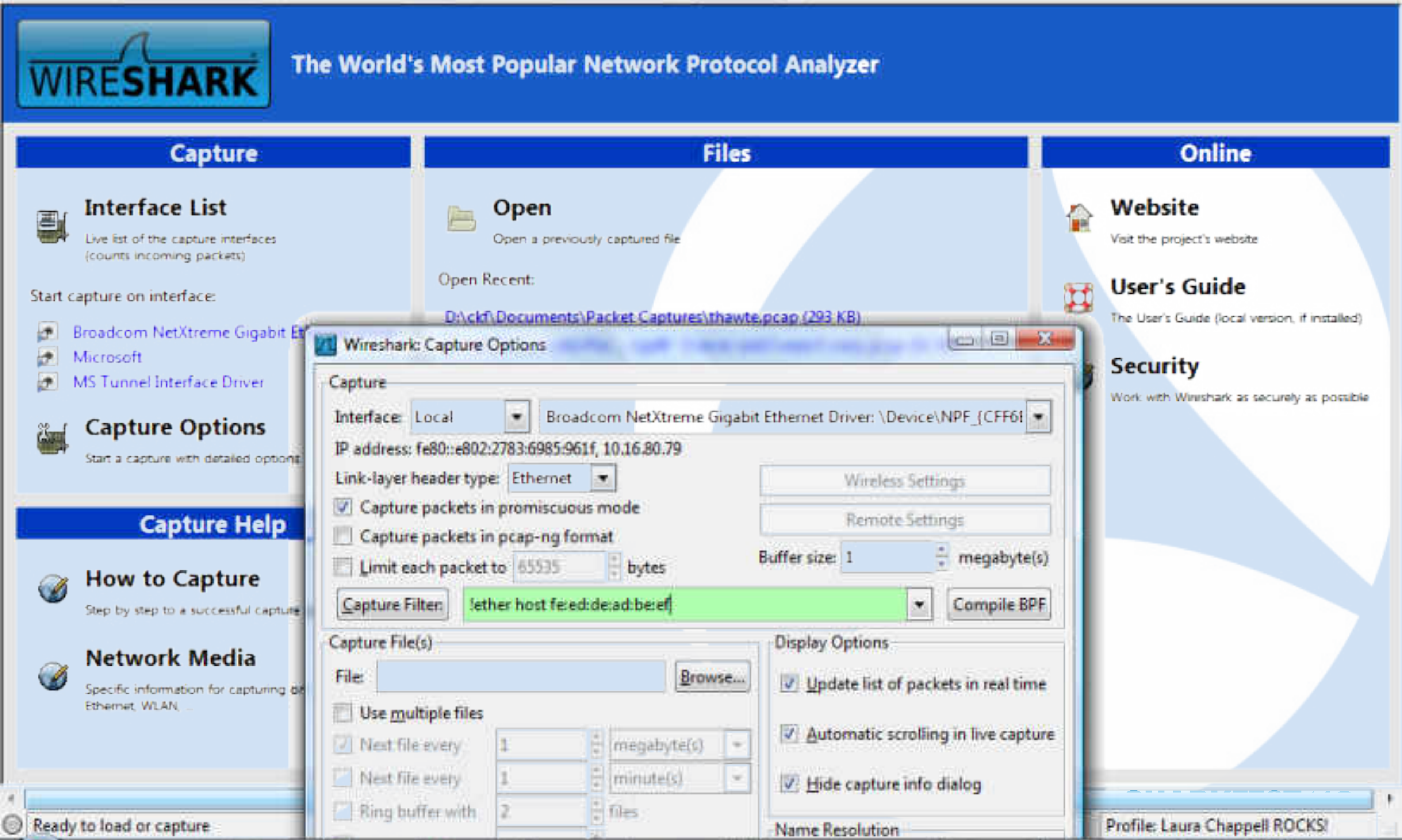
A Consumers Guide to:

1) Confidentiality
2) Authentication
3) Integrity
4) Non-Repudiation

By Employing:

Symmetric, Asymmetric and Hashing Algorithms

It is said that "Packets Do Not Lie"



Capture

Interface List
Live list of the capture interfaces (counts incoming packets)

Start capture on interface:
- Broadcom NetXtreme Gigabit Et
- Microsoft
- MS Tunnel Interface Driver

Capture Options
Start a capture with detailed options

Capture Help

How to Capture
Step by step to a successful capture

Network Media
Specific information for capturing on Ethernet, WLAN, ...

Files

Open
Open a previously captured file

Open Recent:
D:\ckf\Documents\Packet Captures\thawte.pcap (293 KB)

Online

Website
Visit the project's website

User's Guide
The User's Guide (local version, if installed)

Security
Work with Wireshark as securely as possible

Wireshark: Capture Options

Capture

Interface: Local | Broadcom NetXtreme Gigabit Ethernet Driver: \Device\NPF_{CFF6I

IP address: fe80::e802:2783:6985:961f, 10.16.80.79

Link-layer header type: Ethernet

☑ Capture packets in promiscuous mode

□ Capture packets in pcap-ng format

□ Limit each packet to 65535 bytes

Buffer size: 1 megabyte(s)

Capture Filter: !ether host fe:ed:de:ad:be:ef

Capture File(s)

File:

□ Use multiple files

☑ Next file every 1 megabyte(s)

□ Next file every 1 minute(s)

□ Ring buffer with 2 files

Display Options

☑ Update list of packets in real time

☑ Automatic scrolling in live capture

☑ Hide capture info dialog

Name Resolution

Ready to load or capture

Profile: Laura Chappell ROCKS!

The Intelligent Consumer

welcome to the Crypto-Mart

Aisle 1

Symmetric Algorithms (Shared Secret)

- RC4
- AES
- Twofish
- Blowfish
- DES &3DES
- E0

Aisle 2

Asymmetric Algorithms (Public/Private)

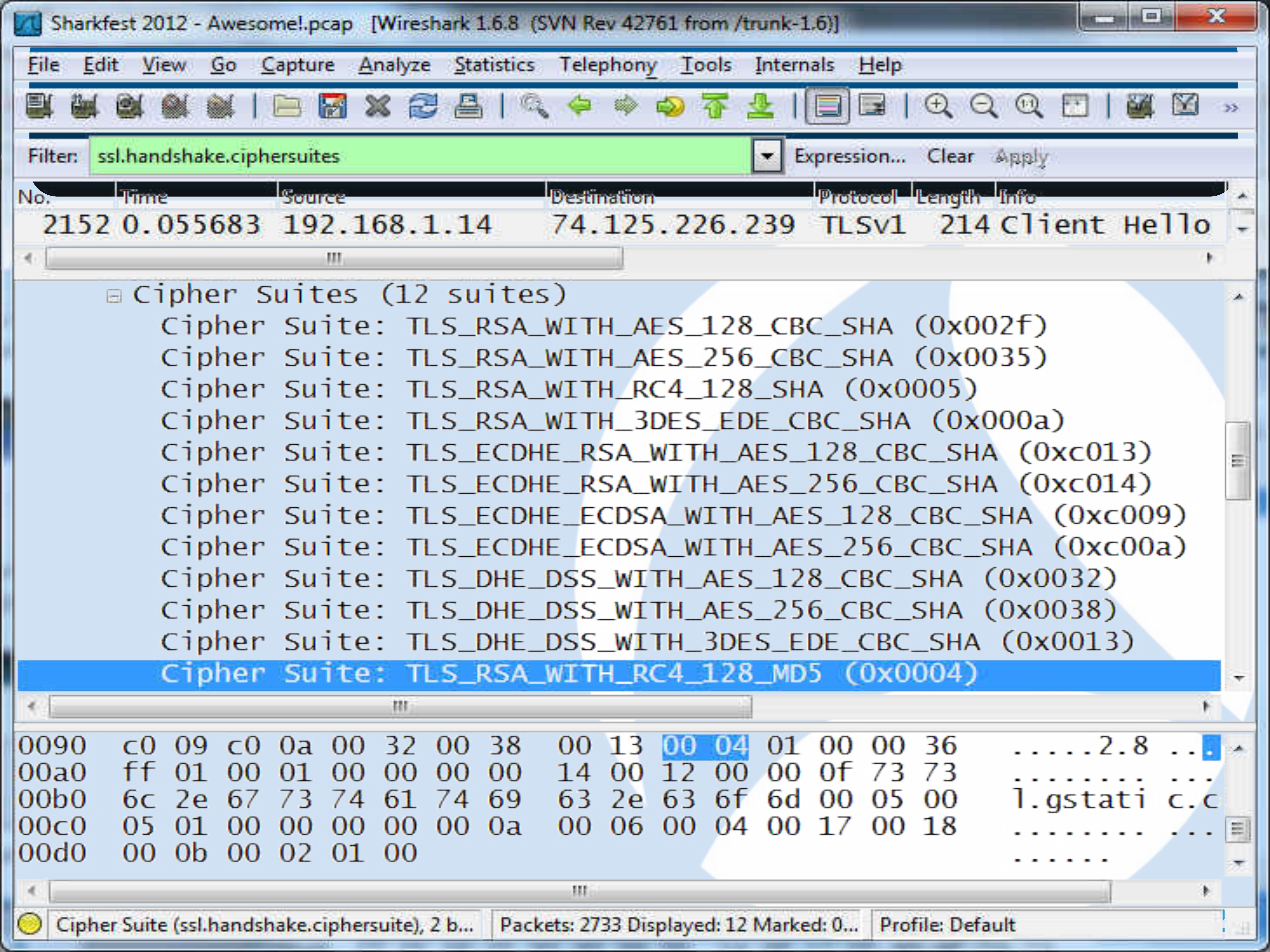
- Diffie-Hellman
- RSA
- ECC
- El Gamal

Aisle 3

Hashing Algorithms (Message Digests)

HASH

- MD5
- SHA1, SHA2 & SHA3
- Skein
- Whirlpool



Filter: ssl.handshake.ciphersuites

```
No.   Time      Source        Destination     Protocol Length Info
2152 0.055683 192.168.1.14   74.125.226.239  TLSv1    214 Client Hello
```

```
  ⊟ Cipher Suites (12 suites)
      Cipher Suite: TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
      Cipher Suite: TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
      Cipher Suite: TLS_RSA_WITH_RC4_128_SHA (0x0005)
      Cipher Suite: TLS_RSA_WITH_3DES_EDE_CBC_SHA (0x000a)
      Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA (0xc013)
      Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA (0xc014)
      Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA (0xc009)
      Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA (0xc00a)
      Cipher Suite: TLS_DHE_DSS_WITH_AES_128_CBC_SHA (0x0032)
      Cipher Suite: TLS_DHE_DSS_WITH_AES_256_CBC_SHA (0x0038)
      Cipher Suite: TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA (0x0013)
      Cipher Suite: TLS_RSA_WITH_RC4_128_MD5 (0x0004)
```

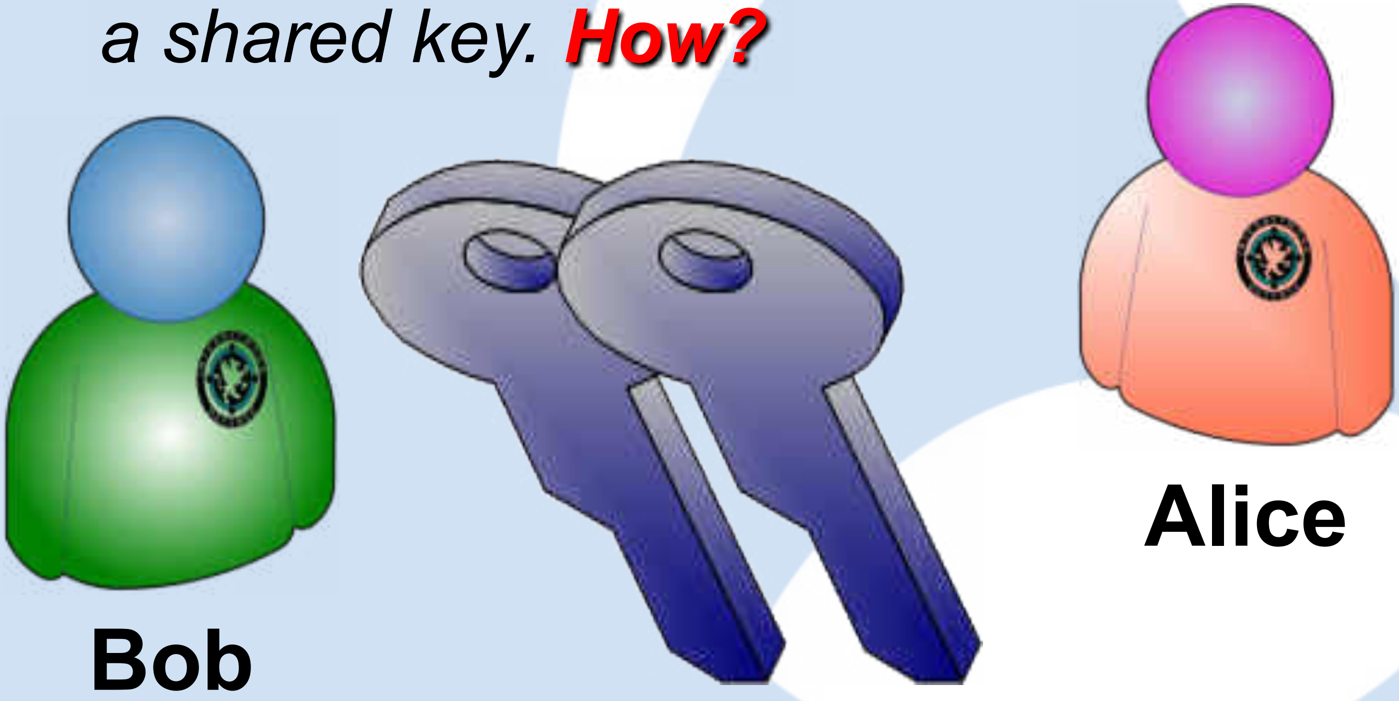
```
0090  c0 09 c0 0a 00 32 00 38  00 13 00 04 01 00 00 36   ......2.8 ...
00a0  ff 01 00 01 00 00 00 00  14 00 12 00 00 0f 73 73   ......... ...
00b0  6c 2e 67 73 74 61 74 69  63 2e 63 6f 6d 00 05 00   l.gstati c.c
00c0  05 01 00 00 00 00 00 0a  00 06 00 04 00 17 00 18   ......... ...
00d0  00 0b 00 02 01 00                                  ......
```

Cipher Suite (ssl.handshake.ciphersuite), 2 b... | Packets: 2733 Displayed: 12 Marked: 0... | Profile: Default

Part 1

Symmetric Encryption

- **Bob wants to share a secret with Alice**
  - *First they must both secretly agree on a shared key.* ***How?***



Symmetric Encryption

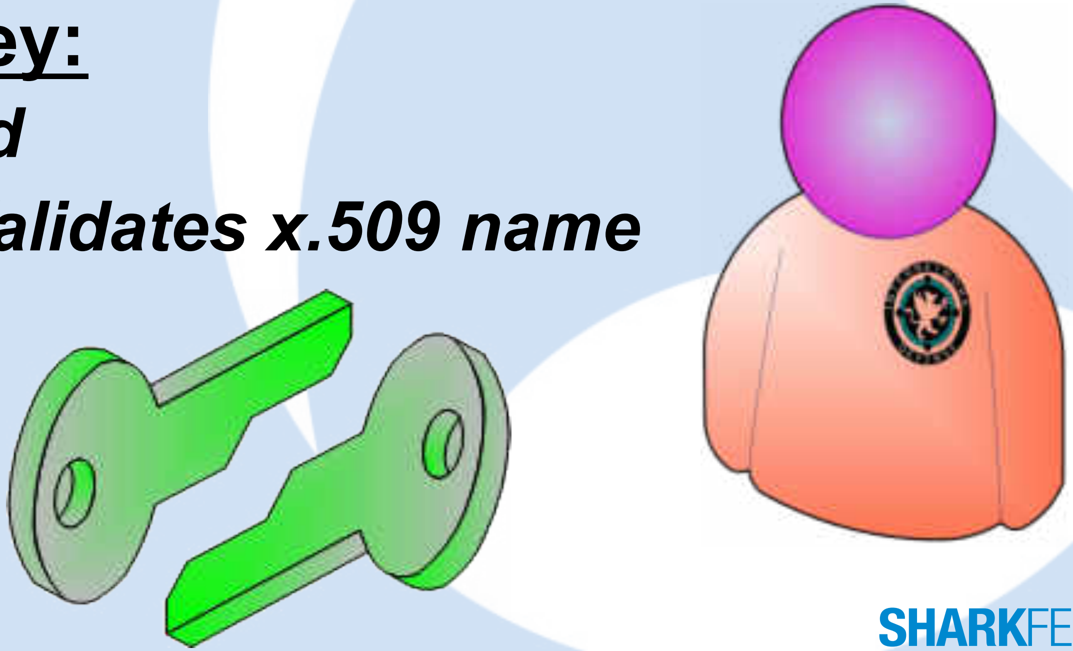
- **Strengths**
  - Fast
- **Challenges**
  - Key Agreement
  - Scalability
    - *N(N-1)/2*
- **Security Services:**
  - Confidentiality
  - Limited* authenticity

**Alice knows it is Bob, but she can't prove it!*

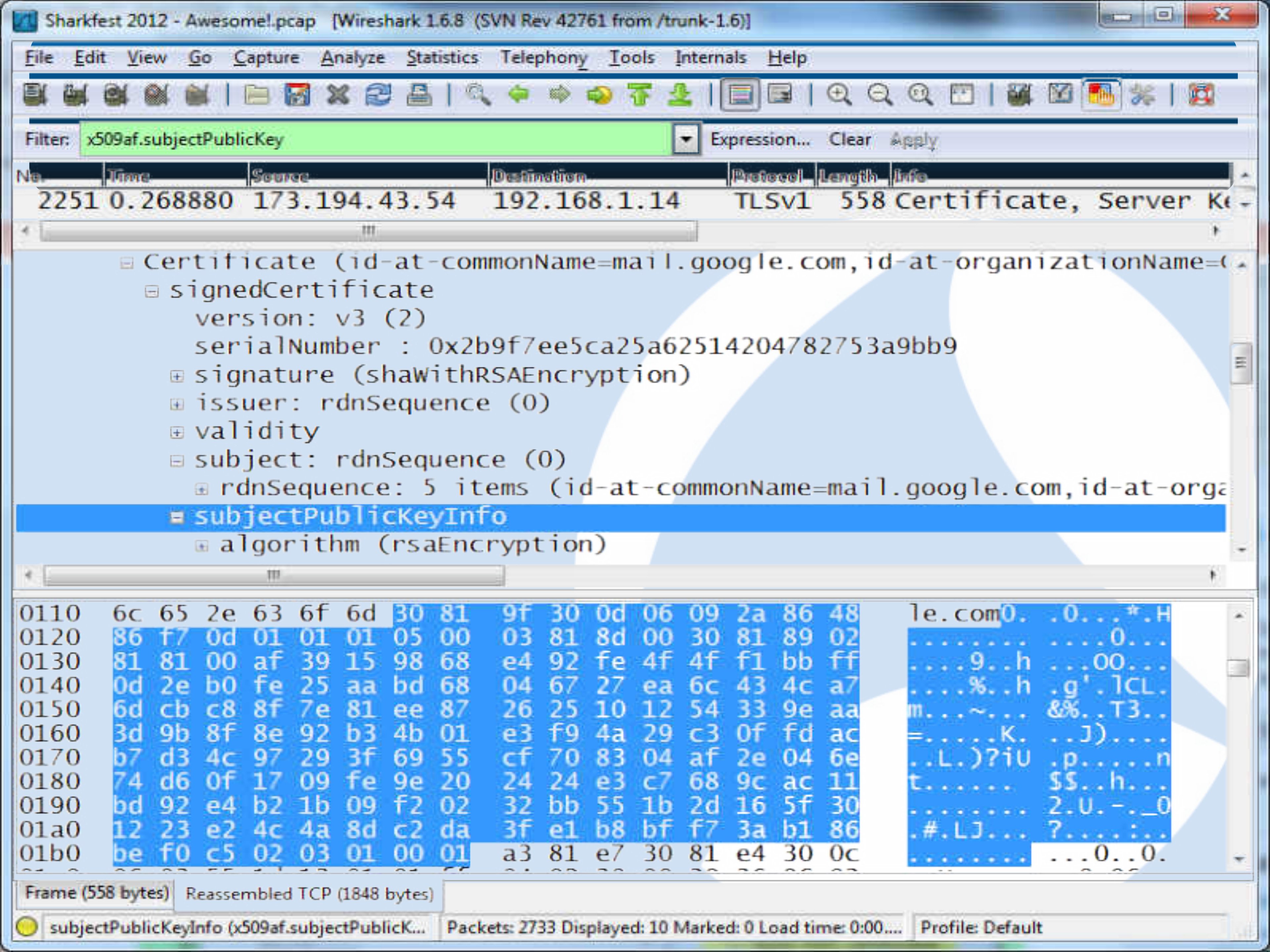
Part 2

Asymmetric Encryption

- **Alice creates a related key pair**
  - – She keeps one to herself *(private key will sign)*
  - – Gives the other to anyone who wants it *(public)*
    - **Public key:**
      - – ***ID card***
      - – ***PKI: Validates x.509 name***



Slide 9


Sharkfest 2012 - Awesome!.pcap [Wireshark 1.6.8 (SVN Rev 42761 from /trunk-1.6)]
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Filter:
Expression... Clear Apply
No. Time Source Destination Protocol Length Info
Frame (558 bytes)
Reassembled TCP (1848 bytes)

Filter: x509af.subjectPublicKey

```
2251 0.268880 173.194.43.54  192.168.1.14  TLSv1  558 Certificate, Server Ke
```

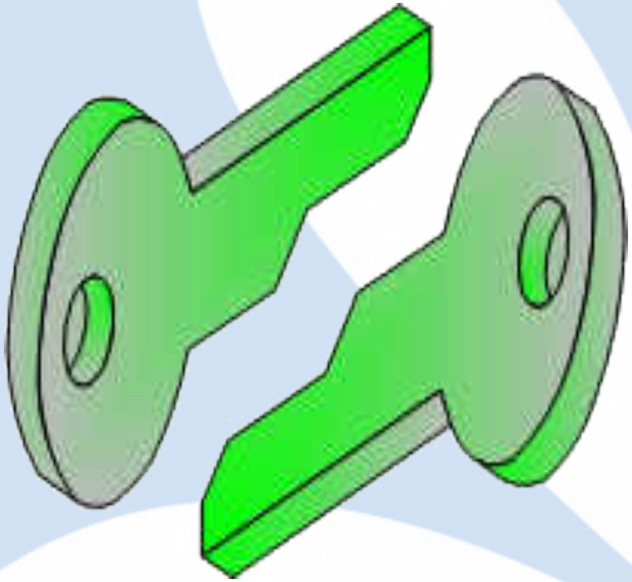
```
⊟ Certificate (id-at-commonName=mail.google.com,id-at-organizationName=(
  ⊟ signedCertificate
      version: v3 (2)
      serialNumber : 0x2b9f7ee5ca25a6251420478275 3a9bb9
    ⊞ signature (shaWithRSAEncryption)
    ⊞ issuer: rdnSequence (0)
    ⊞ validity
    ⊟ subject: rdnSequence (0)
      ⊞ rdnSequence: 5 items (id-at-commonName=mail.google.com,id-at-orga
    ⊟ subjectPublicKeyInfo
      ⊞ algorithm (rsaEncryption)
```

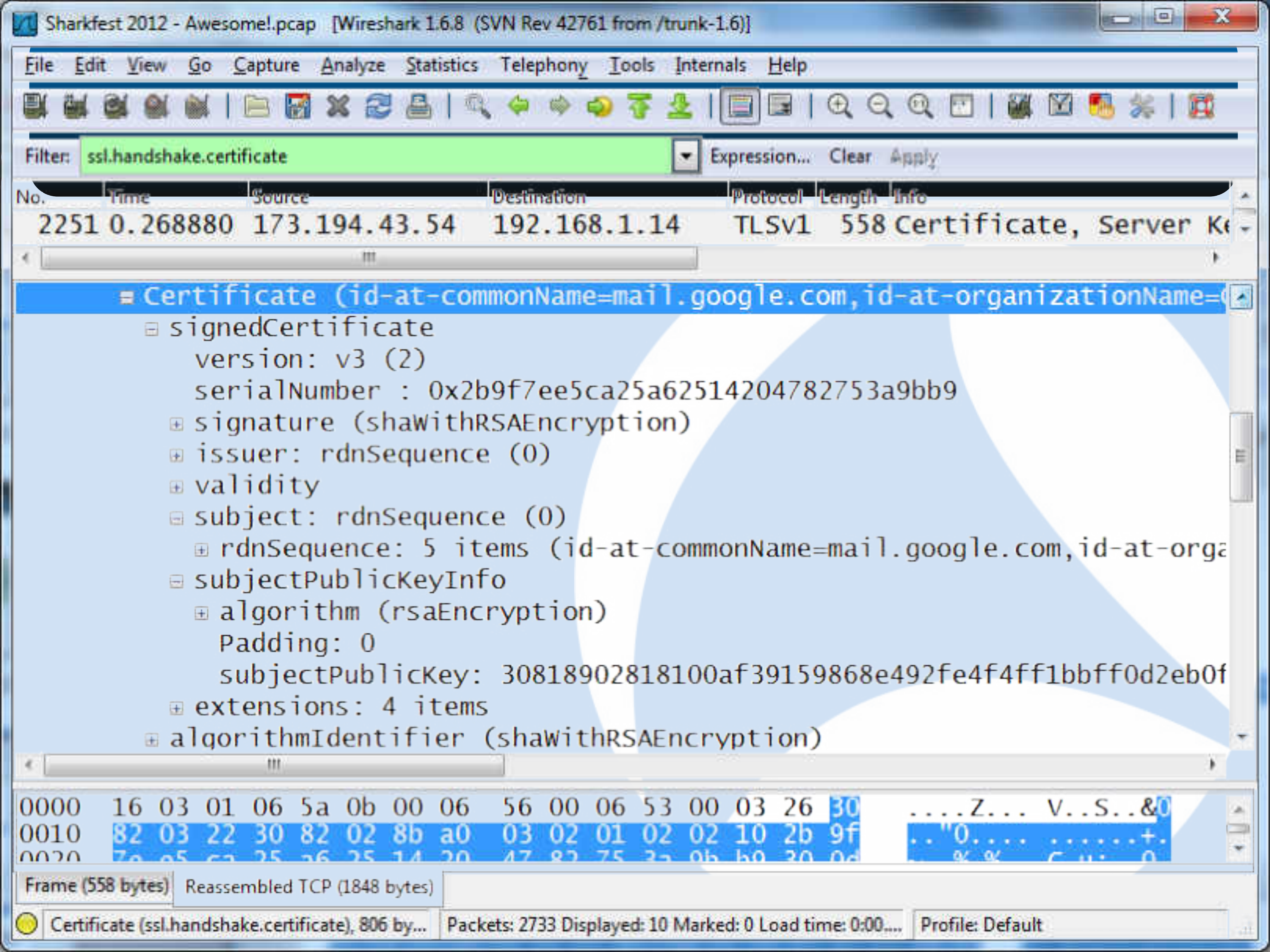
```
0110  6c 65 2e 63 6f 6d 30 81  9f 30 0d 06 09 2a 86 48   le.com0. .0...*.H
0120  86 f7 0d 01 01 01 05 00  03 81 8d 00 30 81 89 02   ........ ....0...
0130  81 81 00 af 39 15 98 68  e4 92 fe 4f 4f f1 bb ff   ....9..h ...OO...
0140  0d 2e b0 fe 25 aa bd 68  04 67 27 ea 6c 43 4c a7   ....%..h .g'.lCL.
0150  6d cb c8 8f 7e 81 ee 87  26 25 10 12 54 33 9e aa   m...~... &%..T3..
0160  3d 9b 8f 8e 92 b3 4b 01  e3 f9 4a 29 c3 0f fd ac   =.....K. ..J)....
0170  b7 d3 4c 97 29 3f 69 55  cf 70 83 04 af 2e 04 6e   ..L.)?iU .p.....n
0180  74 d6 0f 17 09 fe 9e 20  24 24 e3 c7 68 9c ac 11   t......  $$..h...
0190  bd 92 e4 b2 1b 09 f2 02  32 bb 55 1b 2d 16 5f 30   ........ 2.U.-._0
01a0  12 23 e2 4c 4a 8d c2 da  3f e1 b8 bf f7 3a b1 86   .#.LJ... ?....:..
01b0  be f0 c5 02 03 01 00 01  a3 81 e7 30 81 e4 30 0c   ........ ...0..0.
```

subjectPublicKeyInfo (x509af.subjectPublicK... Packets: 2733 Displayed: 10 Marked: 0 Load time: 0:00.... Profile: Default

Asymmetric Encryption

- **Advantages over symmetric**
  - Key Distribution
  - Scalability (2N)
  - Provides Non-Repudiation
- **Disadvantages**
  - Much slower
  - Requires Trusted 3rd Party
    - PKI Hierarchy
    - OpenPGP Web of Trust





Filter: ssl.handshake.certificate

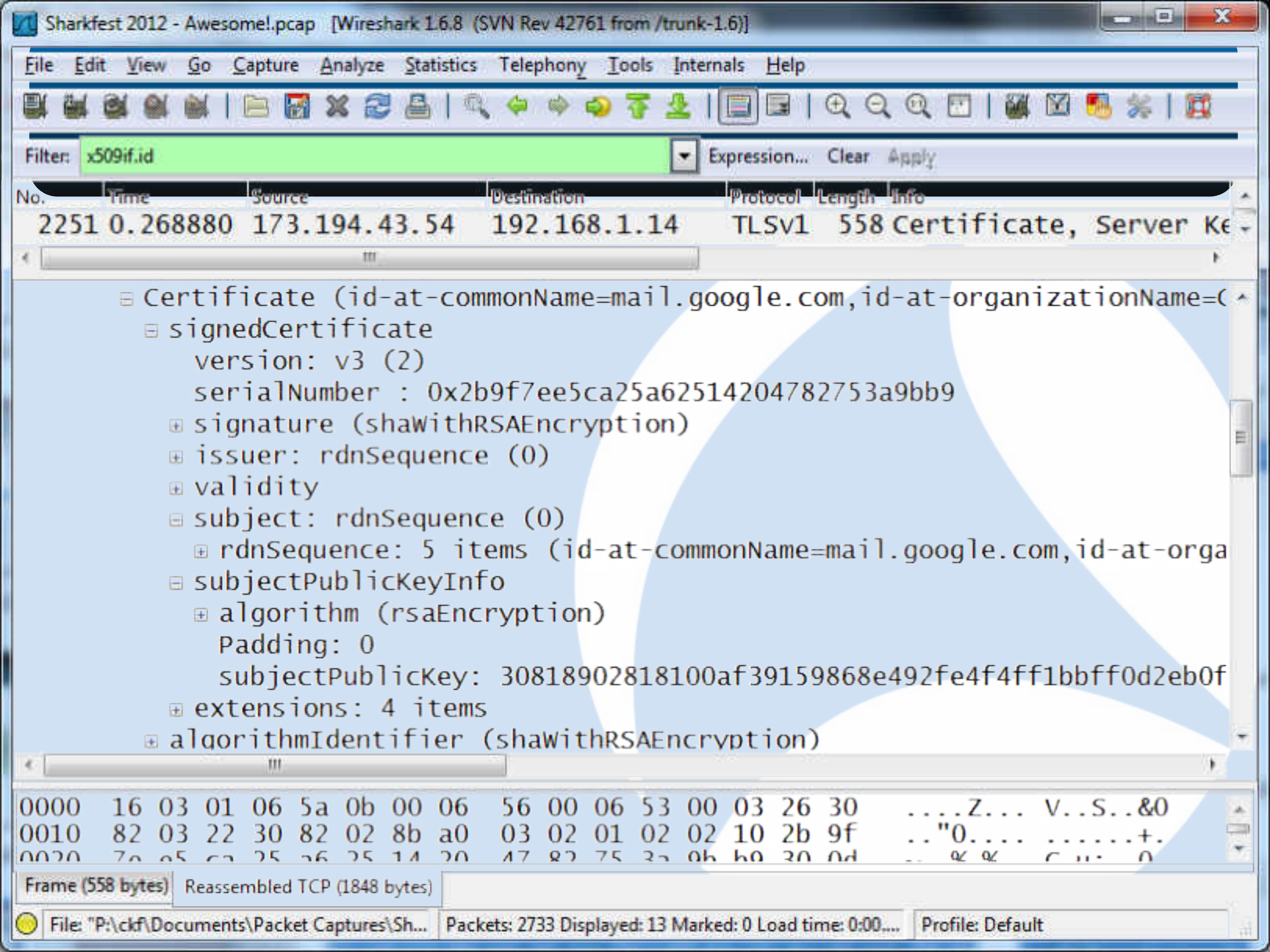
```
No.  Time     Source         Destination   Protocol Length Info
2251 0.268880 173.194.43.54  192.168.1.14  TLSv1    558    Certificate, Server Ke
```

```
⊟ Certificate (id-at-commonName=mail.google.com,id-at-organizationName=
  ⊟ signedCertificate
      version: v3 (2)
      serialNumber : 0x2b9f7ee5ca25a6251420478275 3a9bb9
    ⊞ signature (shaWithRSAEncryption)
    ⊞ issuer: rdnSequence (0)
    ⊞ validity
    ⊟ subject: rdnSequence (0)
      ⊞ rdnSequence: 5 items (id-at-commonName=mail.google.com,id-at-orga
    ⊟ subjectPublicKeyInfo
      ⊞ algorithm (rsaEncryption)
        Padding: 0
        subjectPublicKey: 30818902818100af39159868e492fe4f4ff1bbff0d2eb0f
    ⊞ extensions: 4 items
  ⊞ algorithmIdentifier (shaWithRSAEncryption)
```

```
0000  16 03 01 06 5a 0b 00 06  56 00 06 53 00 03 26 30   ....Z... V..S..&0
0010  82 03 22 30 82 02 8b a0  03 02 01 02 02 10 2b 9f   .."0.... ......+.
0020  7e e5 ca 25 a6 25 14 20  47 82 75 3a 9b b9 30 0d
```

Frame (558 bytes) | Reassembled TCP (1848 bytes)

Certificate (ssl.handshake.certificate), 806 by... | Packets: 2733 Displayed: 10 Marked: 0 Load time: 0:00.... | Profile: Default



Sharkfest 2012 - Awesome!.pcap [Wireshark 1.6.8 (SVN Rev 42761 from /trunk-1.6)]
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Expression... Clear Apply

Filter: x509if.id

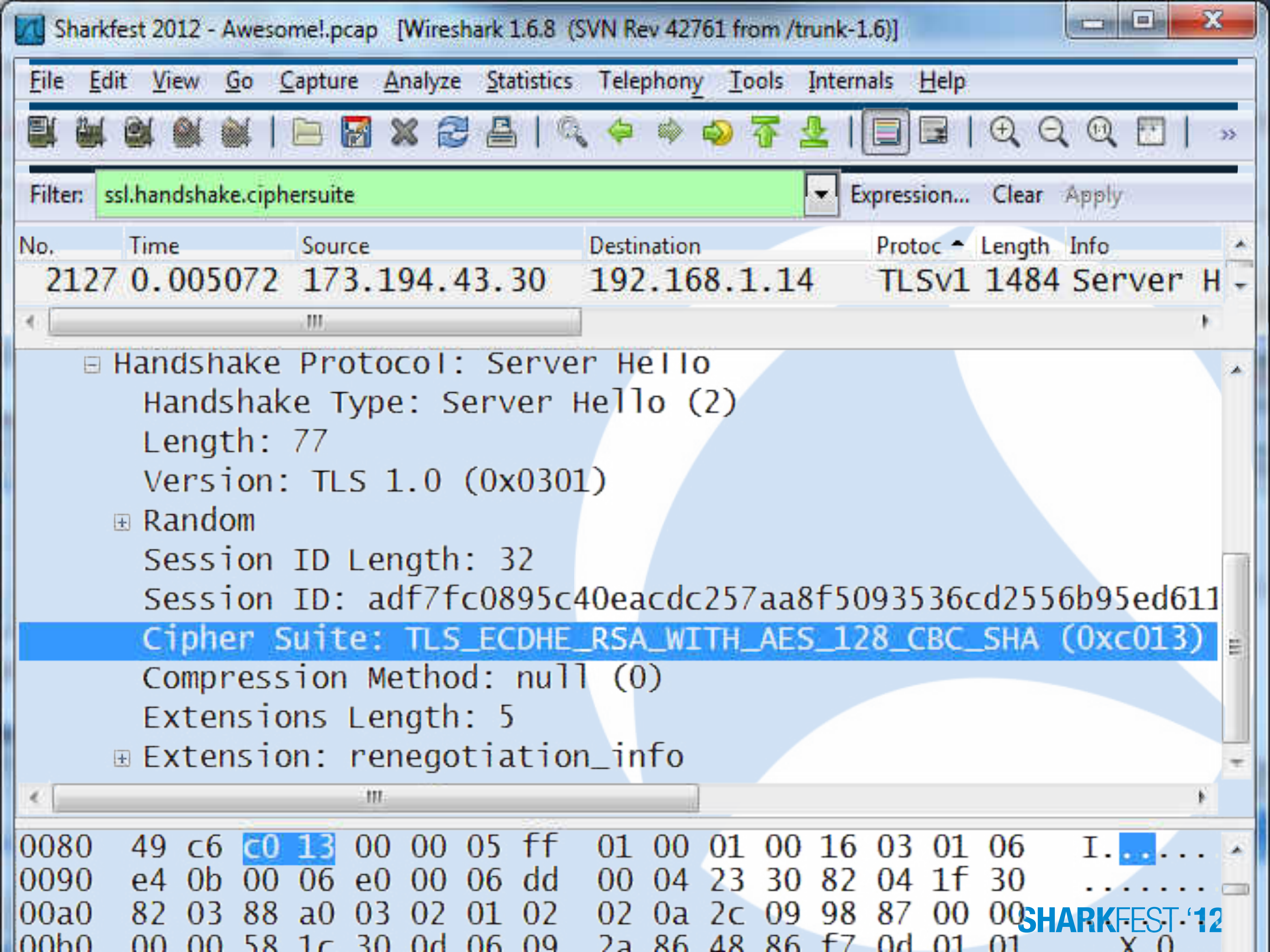
```
No.  Time     Source         Destination  Protocol Length Info
2251 0.268880 173.194.43.54  192.168.1.14 TLSv1    558    Certificate, Server Ke
```

```
⊟ Certificate (id-at-commonName=mail.google.com,id-at-organizationName=(
  ⊟ signedCertificate
      version: v3 (2)
      serialNumber : 0x2b9f7ee5ca25a62514204782753a9bb9
    ⊞ signature (shaWithRSAEncryption)
    ⊞ issuer: rdnSequence (0)
    ⊞ validity
    ⊟ subject: rdnSequence (0)
      ⊞ rdnSequence: 5 items (id-at-commonName=mail.google.com,id-at-orga
    ⊟ subjectPublicKeyInfo
      ⊞ algorithm (rsaEncryption)
        Padding: 0
        subjectPublicKey: 30818902818100af39159868e492fe4f4ff1bbff0d2eb0f
    ⊞ extensions: 4 items
  ⊞ algorithmIdentifier (shaWithRSAEncryption)
```

```
0000  16 03 01 06 5a 0b 00 06  56 00 06 53 00 03 26 30   ....Z... V..S..&0
0010  82 03 22 30 82 02 8b a0  03 02 01 02 02 10 2b 9f   .."0.... ......+.
0020  7e e5 ca 25 a6 25 14 20  47 82 75 3a 9b b9 30 0d   ~..%.%.  G.u:..0.
```

Frame (558 bytes) Reassembled TCP (1848 bytes)

File: "P:\ckf\Documents\Packet Captures\Sh... Packets: 2733 Displayed: 13 Marked: 0 Load time: 0:00.... Profile: Default


Sharkfest 2012 - Awesome!.pcap [Wireshark 1.6.8 (SVN Rev 42761 from /trunk-1.6)]
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Expression... Clear Apply
SHARKFEST '12

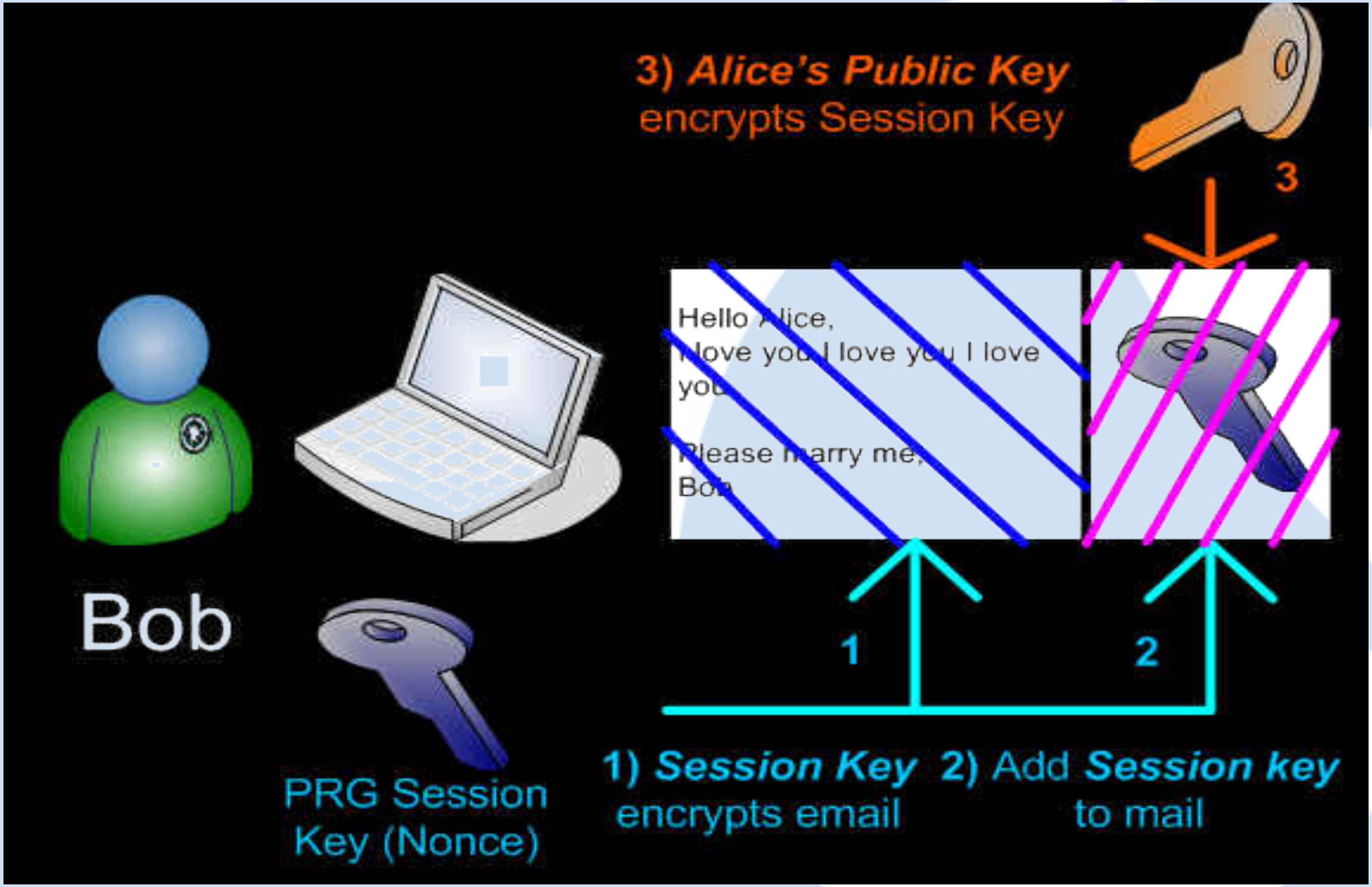
Filter: ssl.handshake.ciphersuite

```
No.   Time      Source          Destination    Protoc Length Info
2127  0.005072  173.194.43.30   192.168.1.14   TLSv1  1484   Server H
```

```
  ⊟ Handshake Protocol: Server Hello
      Handshake Type: Server Hello (2)
      Length: 77
      Version: TLS 1.0 (0x0301)
    ⊞ Random
      Session ID Length: 32
      Session ID: adf7fc0895c40eacdc257aa8f5093536cd2556b95ed611
      Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA (0xc013)
      Compression Method: null (0)
      Extensions Length: 5
    ⊞ Extension: renegotiation_info
```

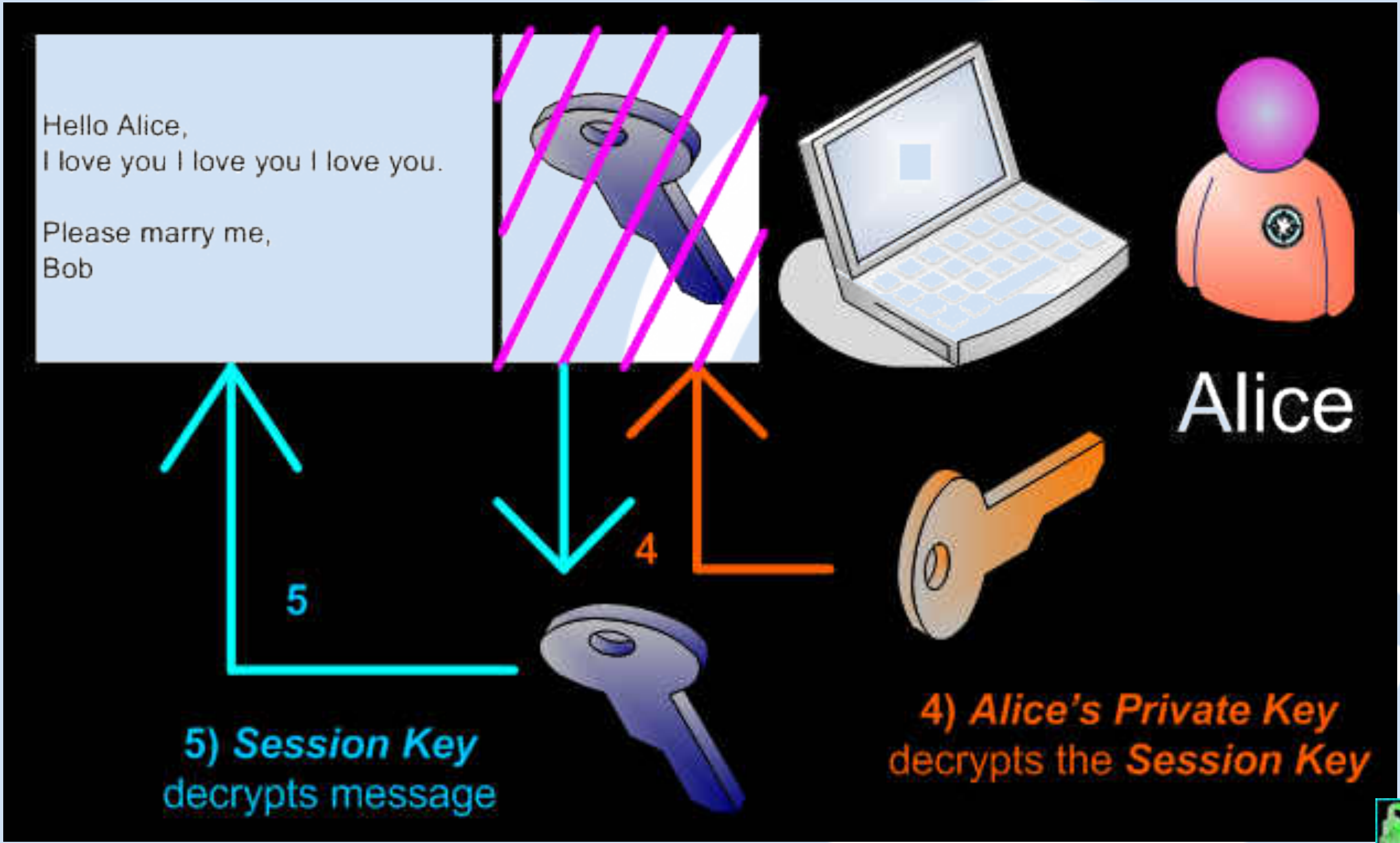
```
0080  49 c6 c0 13 00 00 05 ff  01 00 01 00 16 03 01 06   I.......
0090  e4 0b 00 06 e0 00 06 dd  00 04 23 30 82 04 1f 30   ........
00a0  82 03 88 a0 03 02 01 02  02 0a 2c 09 98 87 00 00
00b0  00 00 58 1c 30 0d 06 09  2a 86 48 86 f7 0d 01 01   ..X.0...
```

Encrypting eMail


3) Alice's Public Key encrypts Session Key
3
Hello Alice,
I love you I love you I love you
Please marry me,
Bob
Bob
1
2
PRG Session Key (Nonce)
1) Session Key encrypts email
2) Add Session key to mail

Slide 15

Decrypting eMail



Hello Alice,
I love you I love you I love you.

Please marry me,
Bob

4) ***Alice's Private Key*** decrypts the ***Session Key***

5) ***Session Key*** decrypts message

Part 3

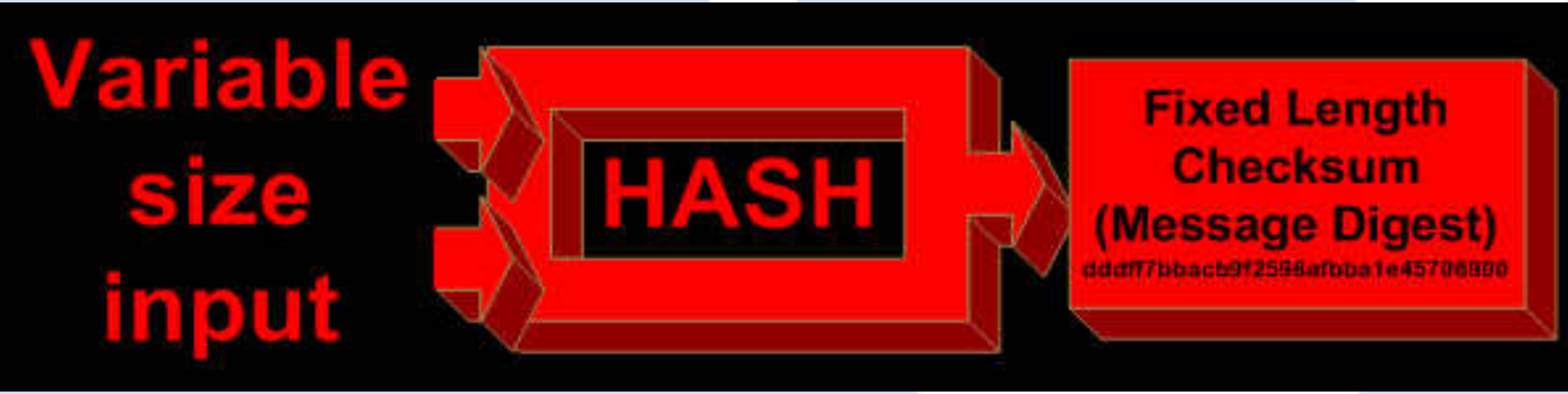
Hashing Algorithms

Understand Integrity checks with:

a) Message Digests

b) Message Authentication Codes

c) Digital Signatures



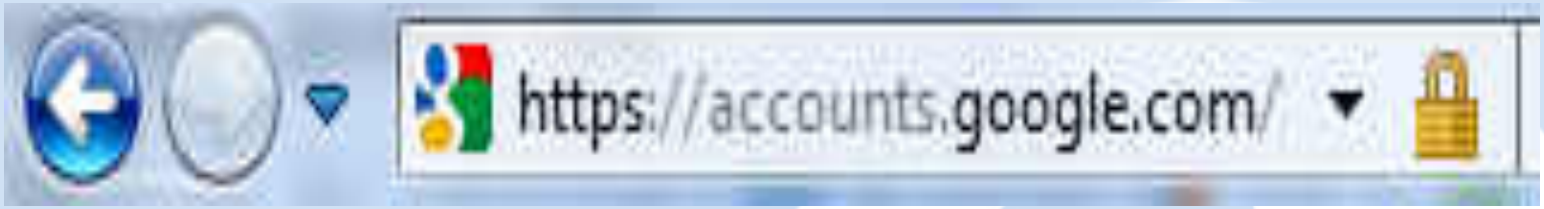
Variable size input

HASH

Fixed Length Checksum (Message Digest)

dddff7bbacb9f2598afbba1e45706900

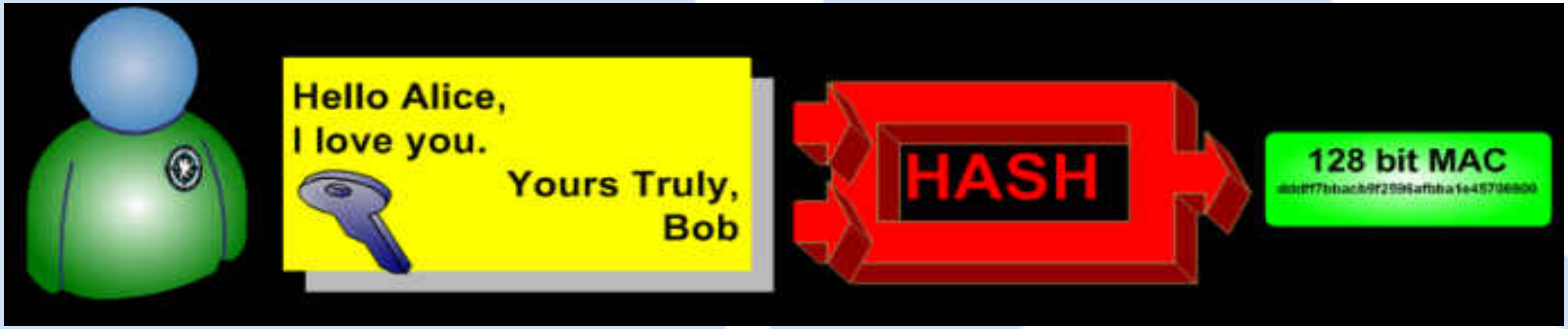
Authenticating the Hash



- **Message Digest**
  - Not-Authenticated
- **Message Authentication Code (MAC)**
  - Authenticated Symmetrically
    - Authentication only *(message can be repudiated)*
- **Digital Signatures**
  - Authenticated Asymmetrically
    - Authentication
    - Non-Repudiation

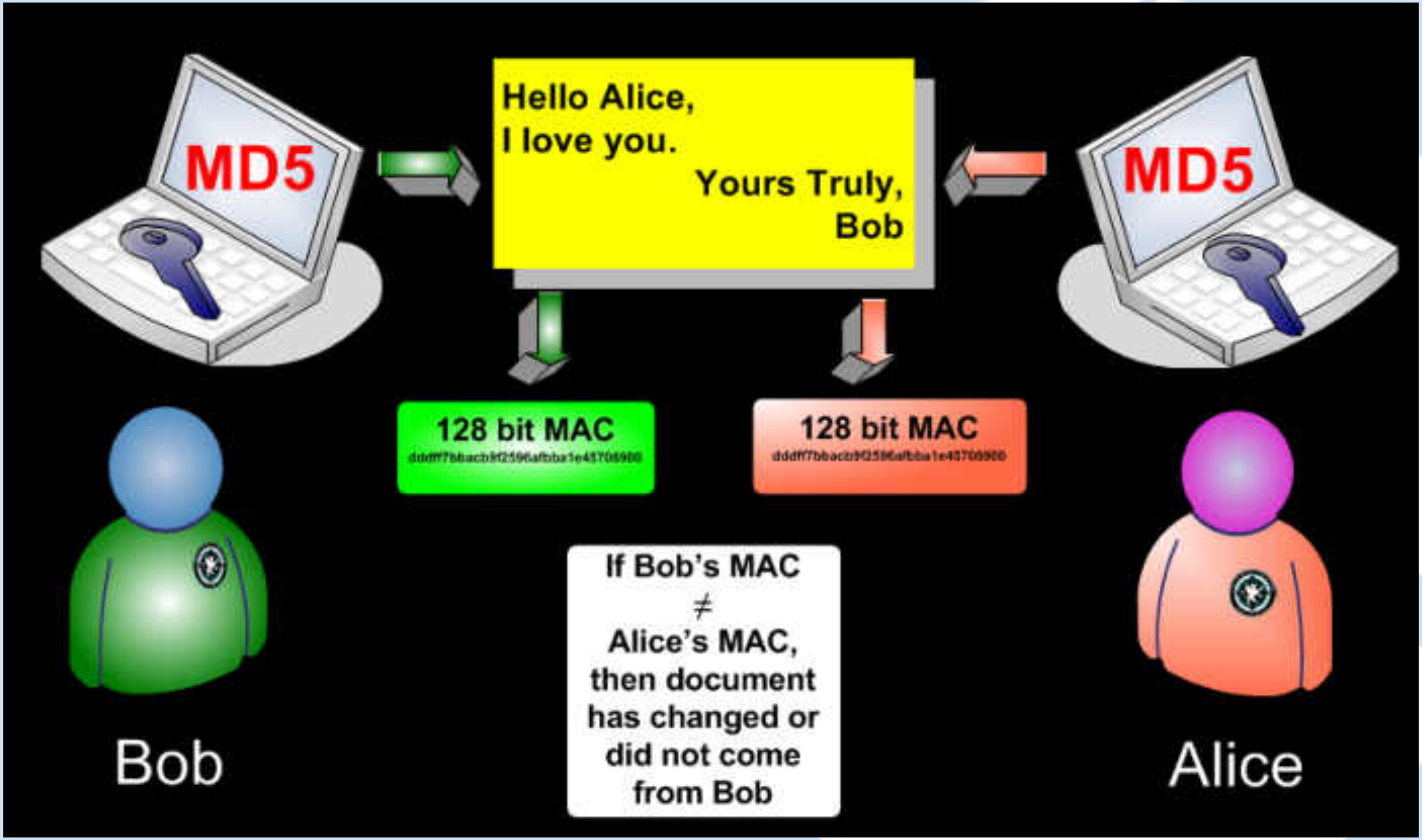
Message Authentication Codes

- Message digest is salted with symmetric key
  - Hash provides integrity
  - Symmetric key provides authenticity



- Bob Claims “Alice sent the message”

Message Authentication Codes

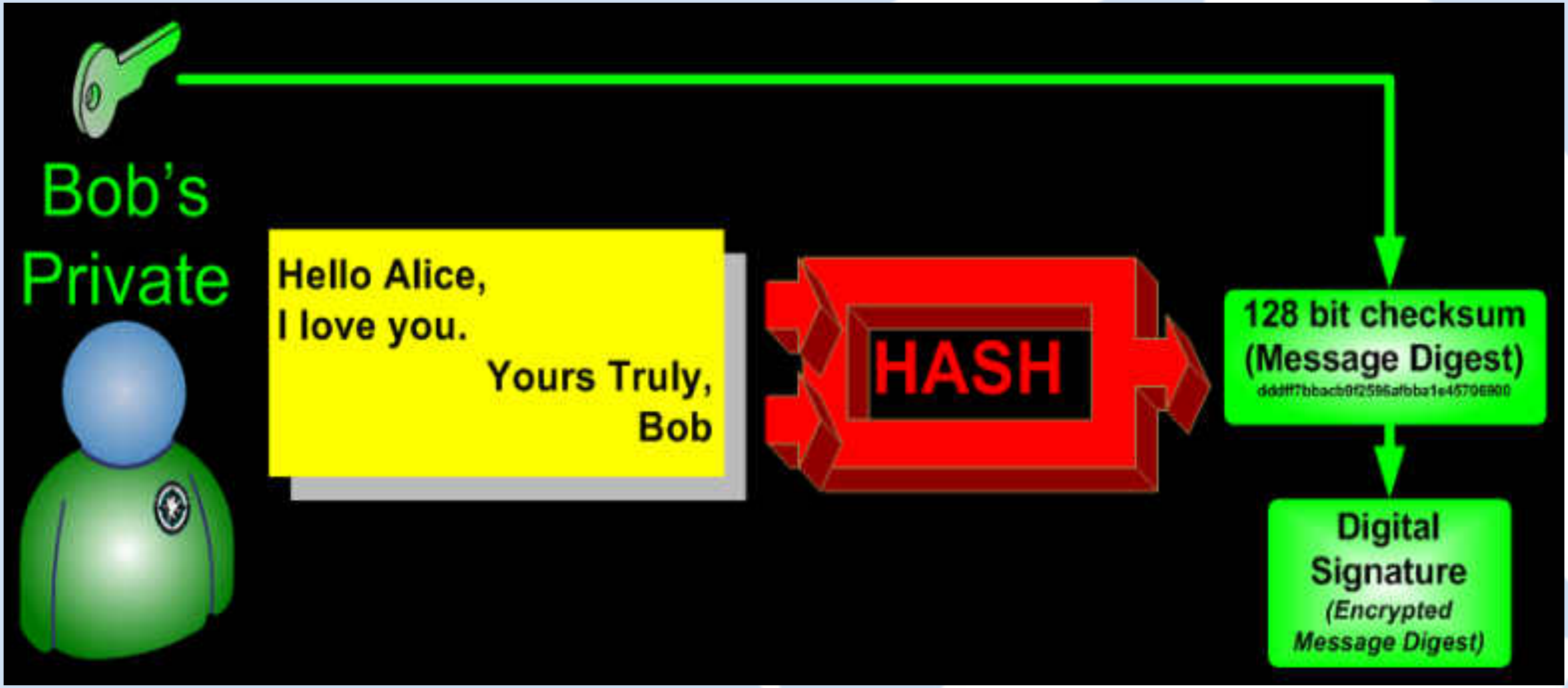


Hello Alice,
I love you.
Yours Truly,
Bob

If Bob's MAC
≠
Alice's MAC,
then document
has changed or
did not come
from Bob

MD5
MD5
128 bit MAC
dddff7bbacb9f2596afbba1e45708900
128 bit MAC
dddff7bbacb9f2596afbba1e45708900
Bob
Alice

Signing a message



Bob's Private

Hello Alice,
I love you.
Yours Truly,
Bob

HASH

128 bit checksum
(Message Digest)
dddff7bbacb9f2596afbba1e45706800

Digital Signature
(Encrypted Message Digest)

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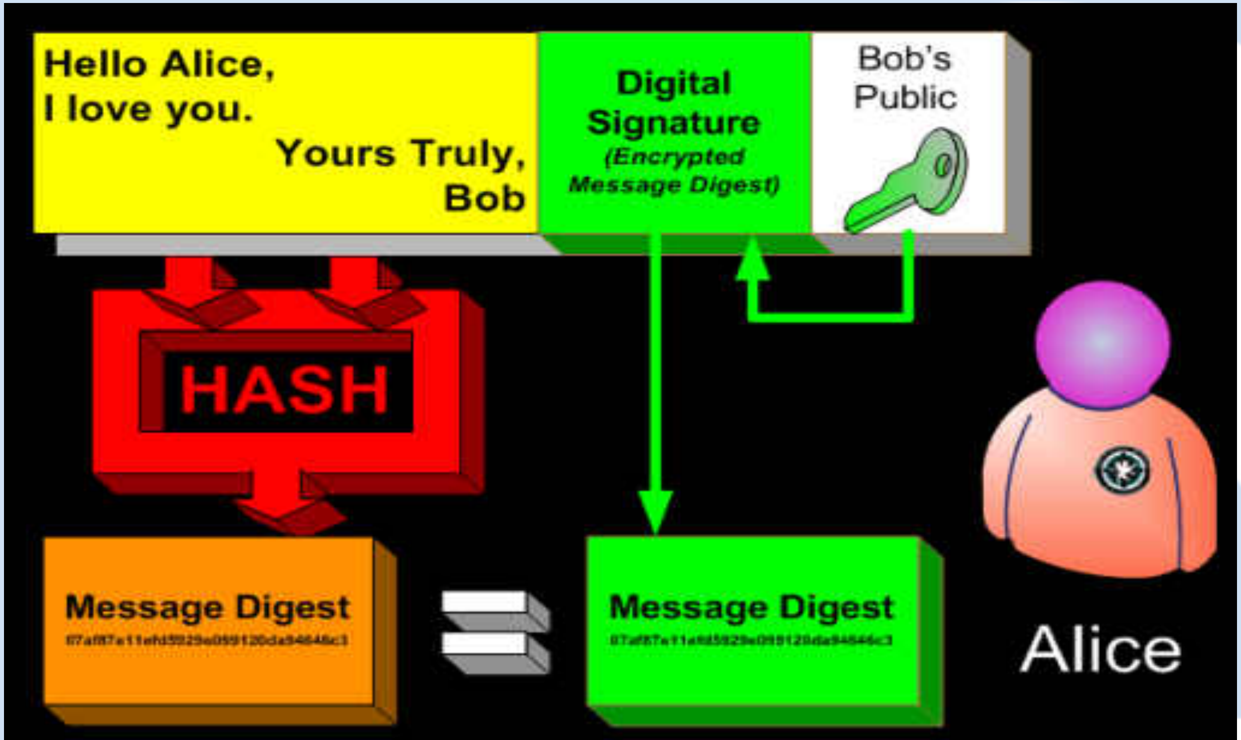
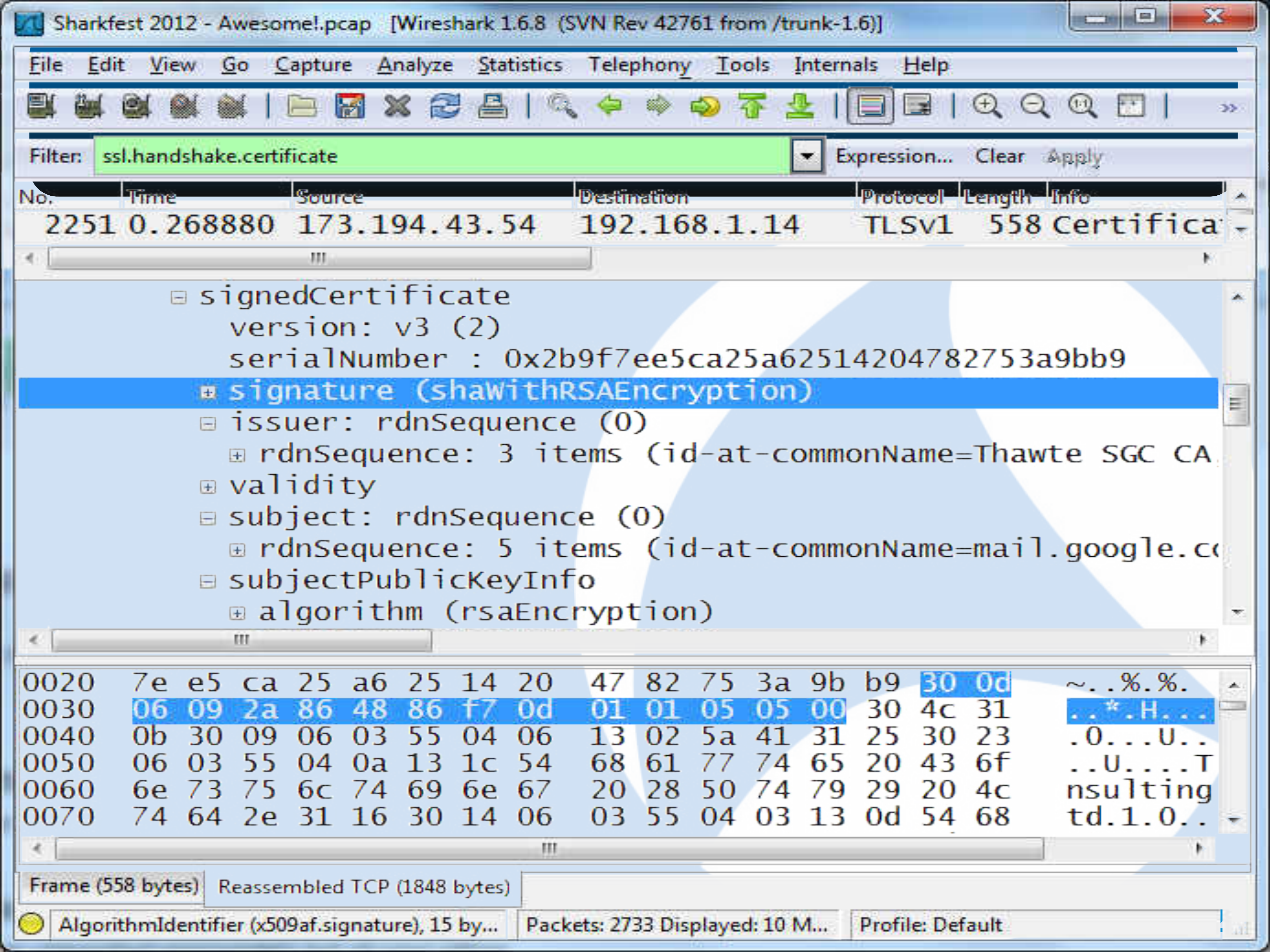
Validating the Signature



If Alice's Digest = Bob's Digest
then:

1) Document likely not changed – *(integrity)*
2) Came from Bob – *(authentication)*
3) Bob cannot deny sending - *(non-repudiation)*



Filter: ssl.handshake.certificate

```
No.   Time      Source         Destination   Protocol Length Info
2251 0.268880 173.194.43.54  192.168.1.14   TLSv1    558 Certifica
```

```
⊟ signedCertificate
    version: v3 (2)
    serialNumber : 0x2b9f7ee5ca25a62514204782753a9bb9
  ⊞ signature (shaWithRSAEncryption)
  ⊟ issuer: rdnSequence (0)
    ⊞ rdnSequence: 3 items (id-at-commonName=Thawte SGC CA
  ⊞ validity
  ⊟ subject: rdnSequence (0)
    ⊞ rdnSequence: 5 items (id-at-commonName=mail.google.c
  ⊟ subjectPublicKeyInfo
    ⊞ algorithm (rsaEncryption)
```

```
0020  7e e5 ca 25 a6 25 14 20  47 82 75 3a 9b b9 30 0d   ~..%.%.
0030  06 09 2a 86 48 86 f7 0d  01 01 05 05 00 30 4c 31   ..*.H...
0040  0b 30 09 06 03 55 04 06  13 02 5a 41 31 25 30 23   .0...U..
0050  06 03 55 04 0a 13 1c 54  68 61 77 74 65 20 43 6f   ..U....T
0060  6e 73 75 6c 74 69 6e 67  20 28 50 74 79 29 20 4c   nsulting
0070  74 64 2e 31 16 30 14 06  03 55 04 03 13 0d 54 68   td.1.0..
```

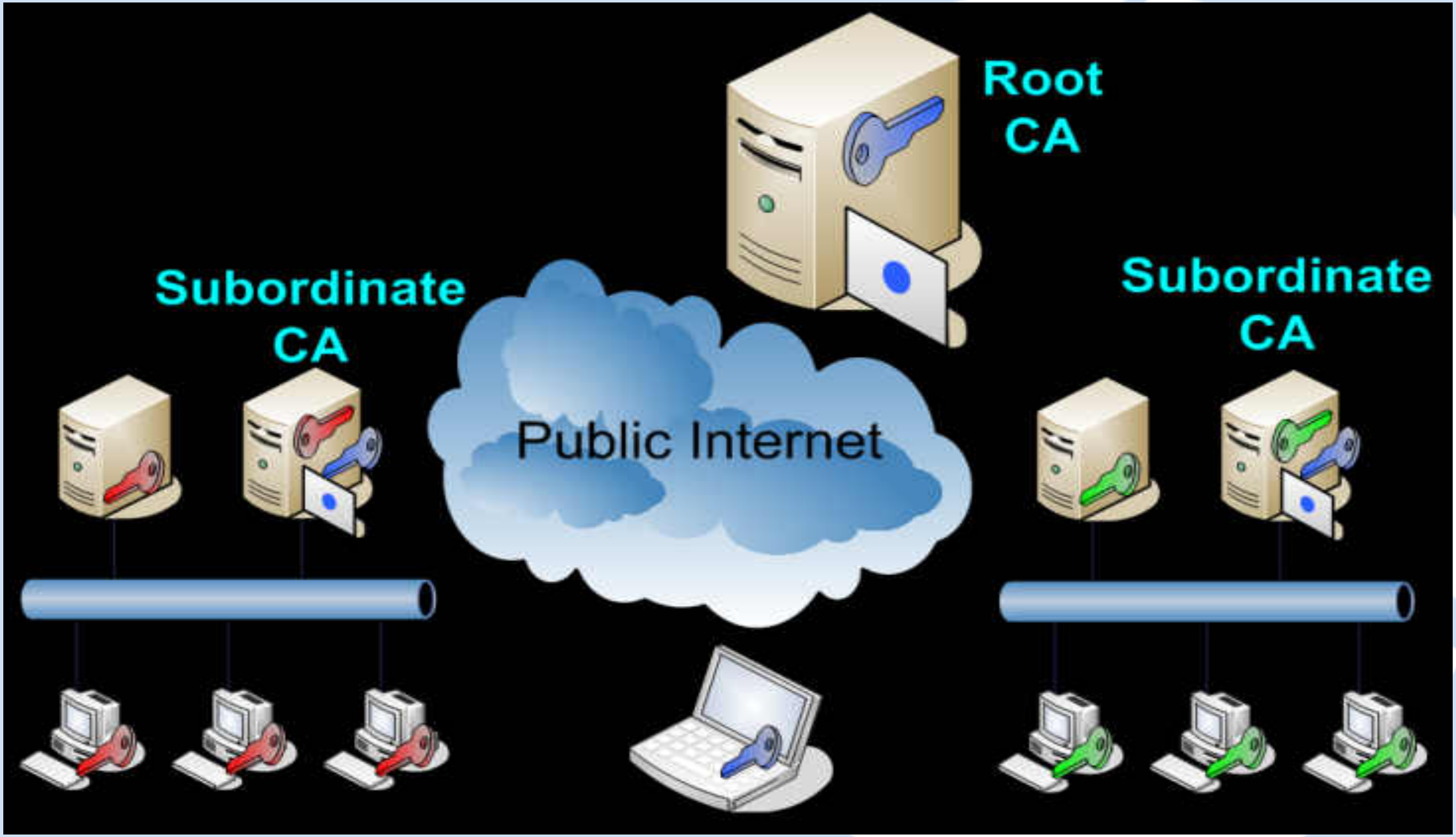
AlgorithmIdentifier (x509af.signature), 15 by... | Packets: 2733 Displayed: 10 M... | Profile: Default

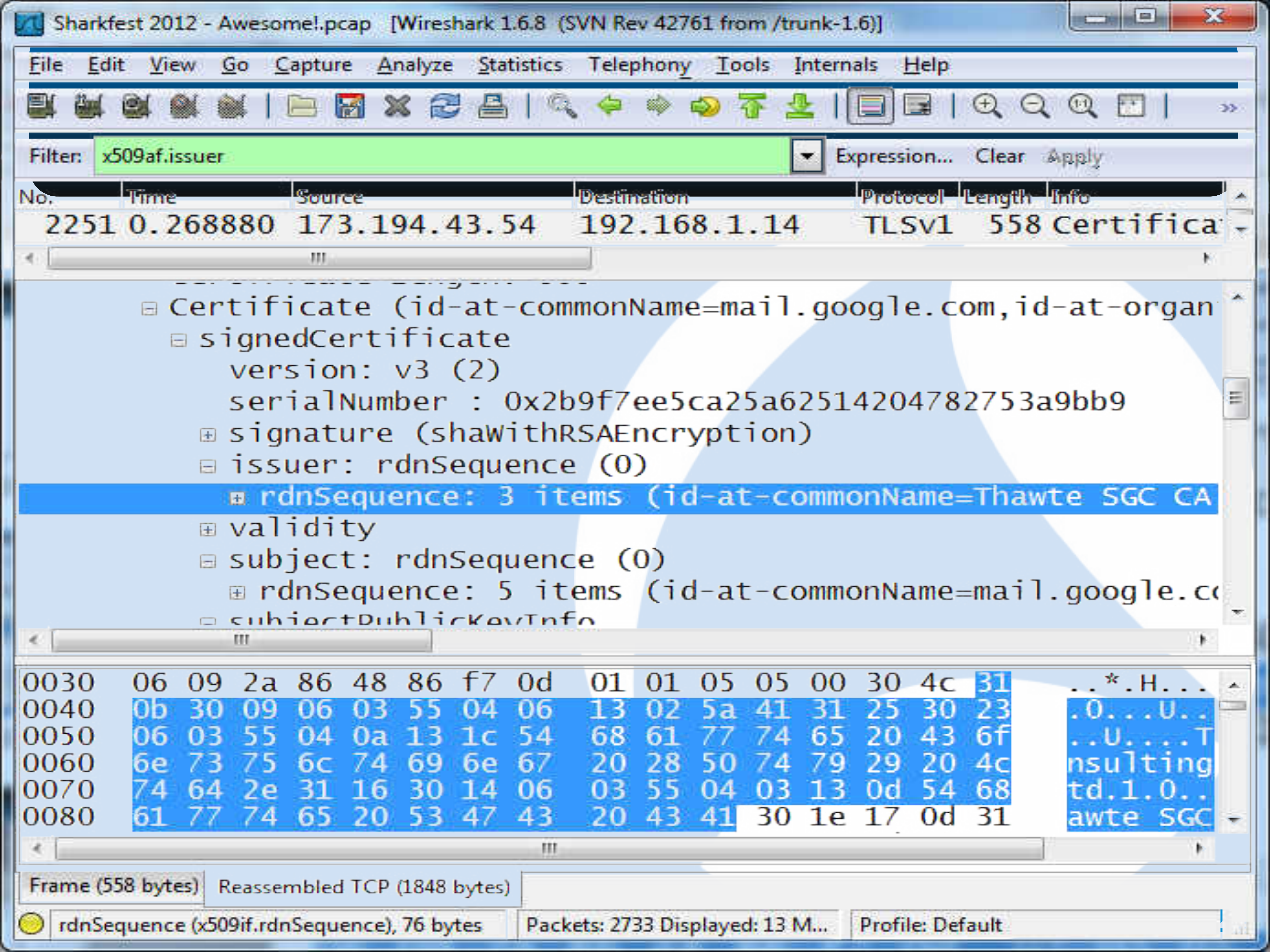
Who is a *“Trusted 3rd party”*

“Captain, the Federation's x.500 based hierarchical trust model of **PKI** is very logical. Perhaps we can trust the public **Certificate Authorities**”

“But Spock, I have never met **Thawte** or **Verisign**. I feel I can trust my friends. Call it a hunch, I trust OpenPGP more”

PKI Hierarchical Trust Model





Filter: x509af.issuer

```
No.   Time      Source          Destination    Protocol Length Info
2251 0.268880 173.194.43.54   192.168.1.14   TLSv1     558 Certifica
```

```
    ⊟ Certificate (id-at-commonName=mail.google.com,id-at-organ
      ⊟ signedCertificate
          version: v3 (2)
          serialNumber : 0x2b9f7ee5ca25a6251420478275 3a9bb9
        ⊞ signature (shaWithRSAEncryption)
        ⊟ issuer: rdnSequence (0)
          ⊞ rdnSequence: 3 items (id-at-commonName=Thawte SGC CA
        ⊞ validity
        ⊟ subject: rdnSequence (0)
          ⊞ rdnSequence: 5 items (id-at-commonName=mail.google.co
        ⊟ subjectPublicKeyInfo
```

```
0030  06 09 2a 86 48 86 f7 0d  01 01 05 05 00 30 4c 31   ..*.H...
0040  0b 30 09 06 03 55 04 06  13 02 5a 41 31 25 30 23   .0...U..
0050  06 03 55 04 0a 13 1c 54  68 61 77 74 65 20 43 6f   ..U....T
0060  6e 73 75 6c 74 69 6e 67  20 28 50 74 79 29 20 4c   nsulting
0070  74 64 2e 31 16 30 14 06  03 55 04 03 13 0d 54 68   td.1.0..
0080  61 77 74 65 20 53 47 43  20 43 41 30 1e 17 0d 31   awte SGC
```

Frame (558 bytes) | Reassembled TCP (1848 bytes)

rdnSequence (x509if.rdnSequence), 76 bytes | Packets: 2733 Displayed: 13 M... | Profile: Default

Why Trust a CA?

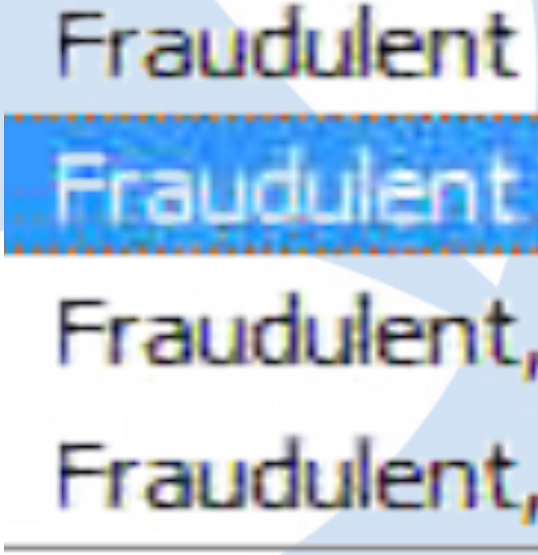
RFC-3280 (updated in 4630)

- **Top tier**
  - Internet Policy Registration Authority (IPRA)
    - *Internet PCA Registration Authority (MIT),?*
- **Second tier**
  - Policy Certification Authorities (PCAs)
    - *UNINETT, DFN-PCA, SURFnetPCA*
- **Third tier**
  - Certification Authorities (CAs)
    - *VeriSign, Duetsche Telekom, Thawte, etc.*

Certificate Revocation

Compromised Private Keys

- **Certificate Revocation Lists (CRL)**
- **Online Certificate Status Protocol (OCSP)**
- **Problems:**
  - Client checking may be disabled
  - Browsers configured to fail soft
  - Upstream servers may block CRL
  - Compromised CA certificates
  - Algorithms cracked
  - More...

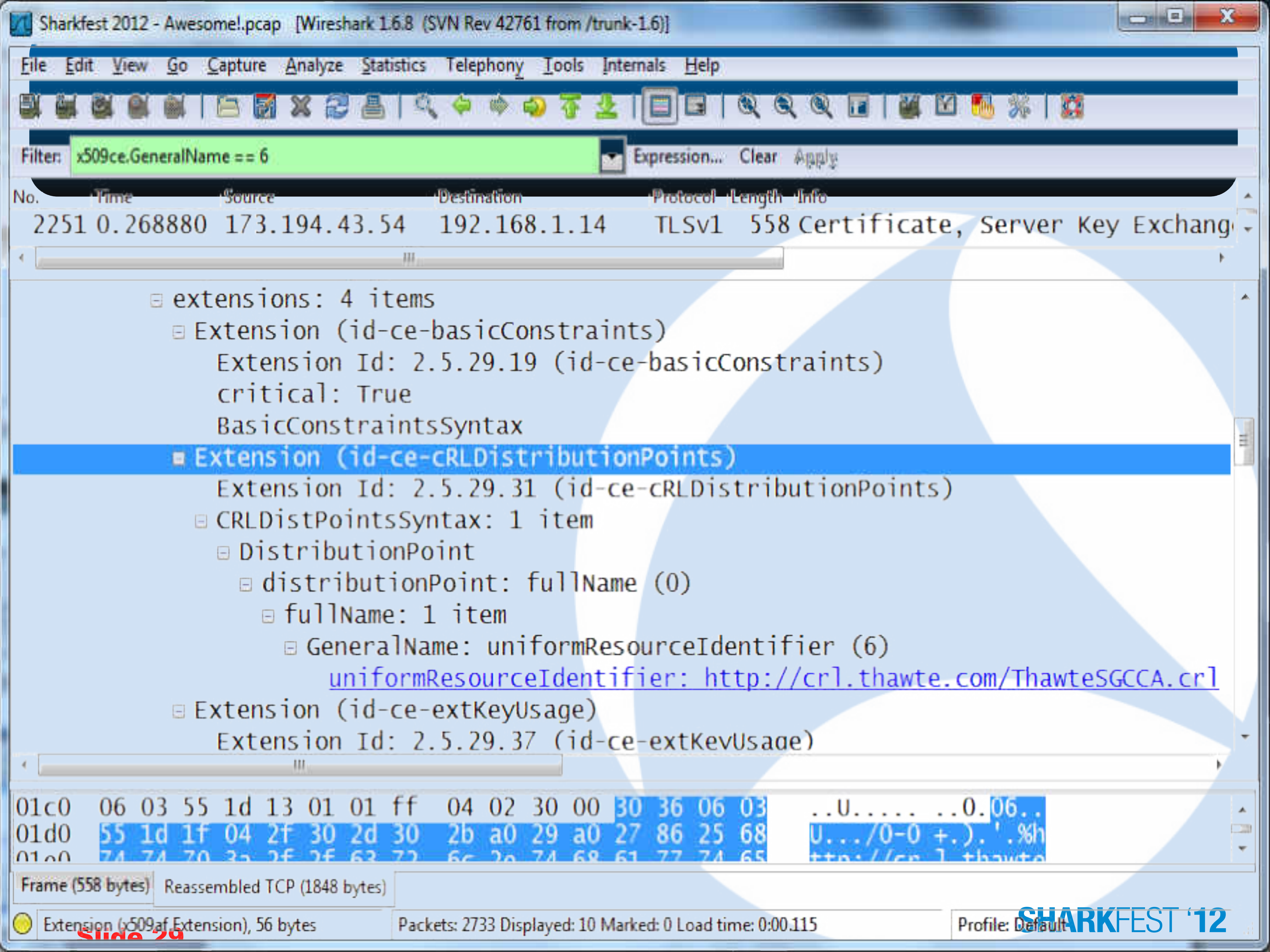


Fraudulent

Fraudulent

Fraudulent,

Fraudulent,


Sharkfest 2012 - Awesome!.pcap [Wireshark 1.6.8 (SVN Rev 42761 from /trunk-1.6)]
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Expression... Clear Apply
Frame (558 bytes)
Reassembled TCP (1848 bytes)

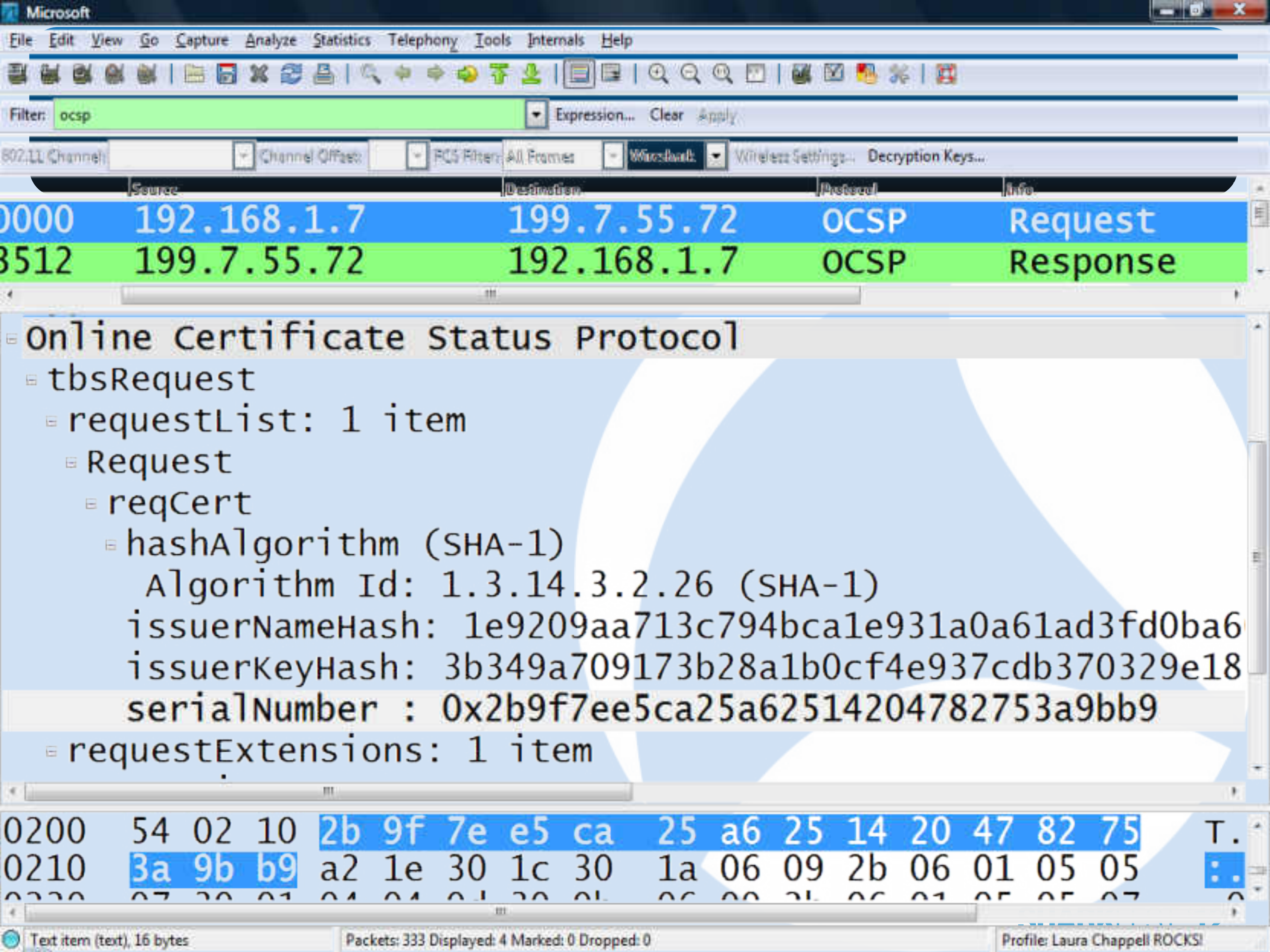
Filter: x509ce.GeneralName == 6

```
No.  Time     Source          Destination    Protocol Length Info
2251 0.268880 173.194.43.54   192.168.1.14   TLSv1    558    Certificate, Server Key Exchang
```

```
⊟ extensions: 4 items
  ⊟ Extension (id-ce-basicConstraints)
      Extension Id: 2.5.29.19 (id-ce-basicConstraints)
      critical: True
      BasicConstraintsSyntax
  ⊟ Extension (id-ce-cRLDistributionPoints)
      Extension Id: 2.5.29.31 (id-ce-cRLDistributionPoints)
    ⊟ CRLDistPointsSyntax: 1 item
      ⊟ DistributionPoint
        ⊟ distributionPoint: fullName (0)
          ⊟ fullName: 1 item
            ⊟ GeneralName: uniformResourceIdentifier (6)
                uniformResourceIdentifier: http://crl.thawte.com/ThawteSGCCA.crl
  ⊟ Extension (id-ce-extKeyUsage)
      Extension Id: 2.5.29.37 (id-ce-extKeyUsage)
```

```
01c0  06 03 55 1d 13 01 01 ff  04 02 30 00 30 36 06 03   ..U..... ..0.06..
01d0  55 1d 1f 04 2f 30 2d 30  2b a0 29 a0 27 86 25 68   U.../0-0 +.).'.%h
01e0  74 74 70 3a 2f 2f 63 72  6c 2e 74 68 61 77 74 65   ttp://cr l.thawte
```

Extension (x509af.Extension), 56 bytes | Packets: 2733 Displayed: 10 Marked: 0 Load time: 0:00.115 | Profile: Default



Microsoft
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Expression... Clear Apply
802.11 Channel: Channel Offset: FCS Filter: All Frames Wireshark Wireless Settings... Decryption Keys...
Source Destination Protocol Info

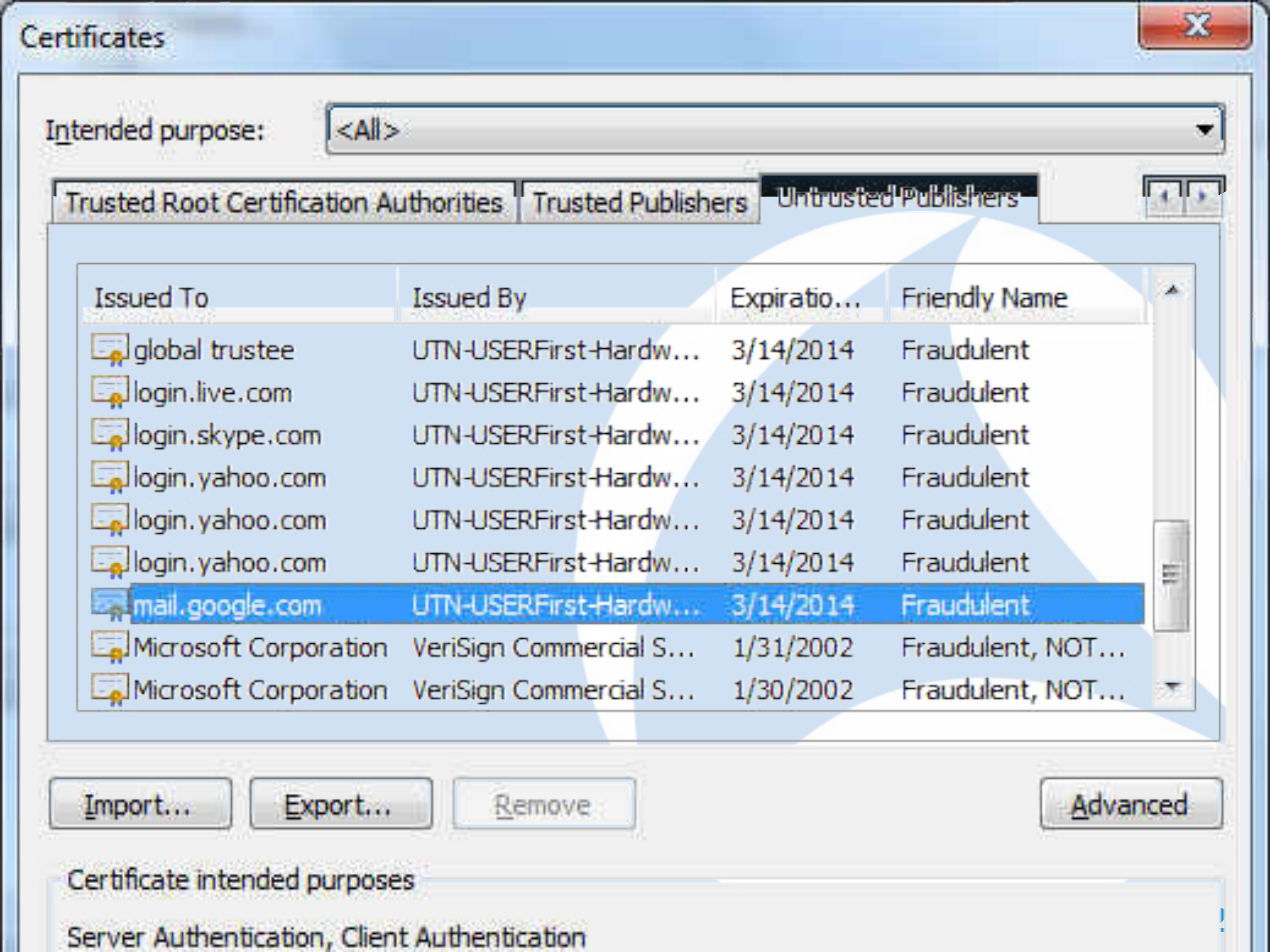
Filter: ocsp

```
0000   192.168.1.7    199.7.55.72    OCSP   Request
3512   199.7.55.72    192.168.1.7    OCSP   Response
```

```
Online Certificate Status Protocol
  tbsRequest
    requestList: 1 item
      Request
        reqCert
          hashAlgorithm (SHA-1)
           Algorithm Id: 1.3.14.3.2.26 (SHA-1)
          issuerNameHash: 1e9209aa713c794bca1e931a0a61ad3fd0ba6
          issuerKeyHash: 3b349a709173b28a1b0cf4e937cdb370329e18
          serialNumber : 0x2b9f7ee5ca25a62514204782753a9bb9
    requestExtensions: 1 item
```

```
0200   54 02 10 2b 9f 7e e5 ca  25 a6 25 14 20 47 82 75   T.
0210   3a 9b b9 a2 1e 30 1c 30  1a 06 09 2b 06 01 05 05   :.
```

Text item (text), 16 bytes | Packets: 333 Displayed: 4 Marked: 0 Dropped: 0 | Profile: Laura Chappell ROCKS!

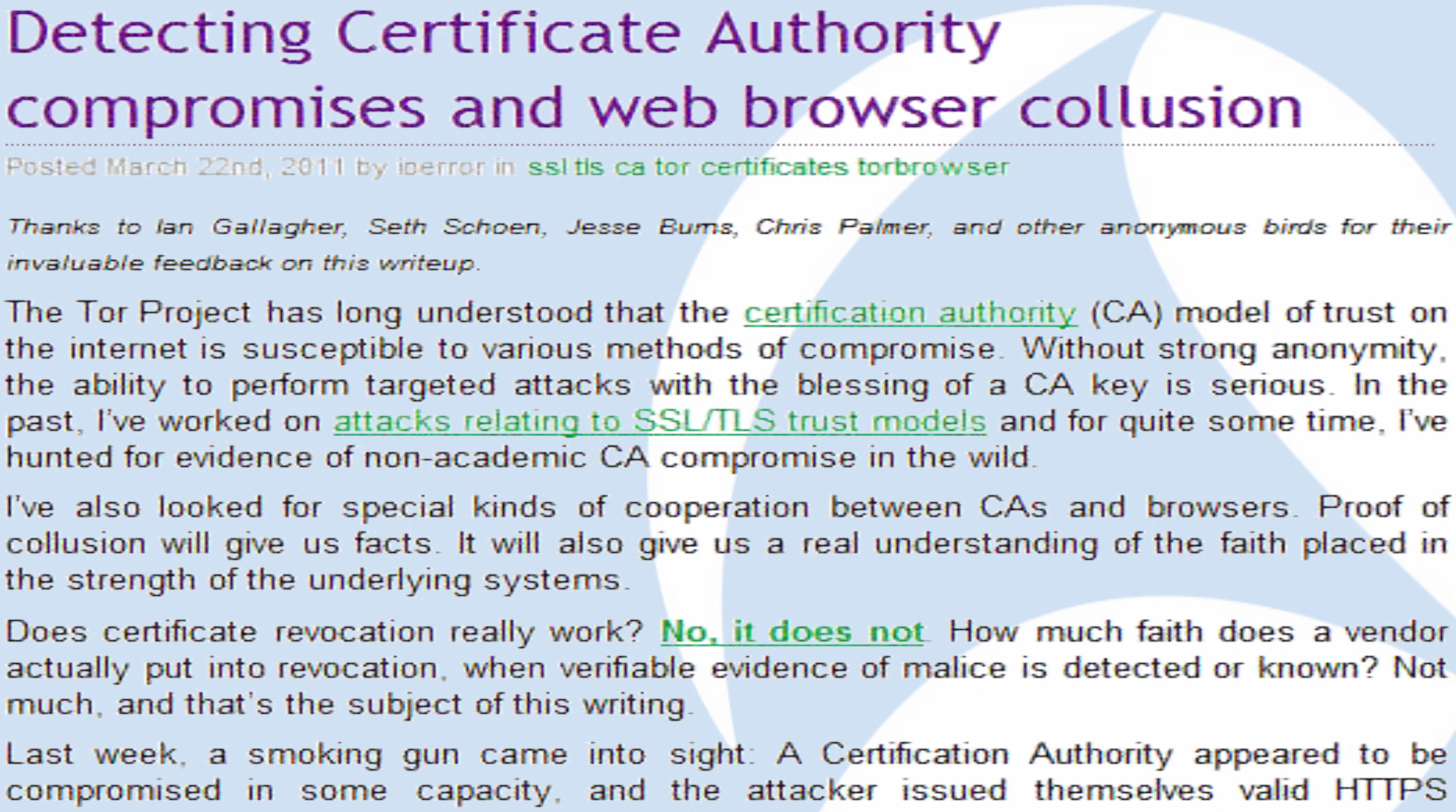


Issued To	Issued By	Expiratio...	Friendly Name
global trustee	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
login.live.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
login.skype.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
login.yahoo.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
login.yahoo.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
login.yahoo.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
mail.google.com	UTN-USERFirst-Hardw...	3/14/2014	Fraudulent
Microsoft Corporation	VeriSign Commercial S...	1/31/2002	Fraudulent, NOT...
Microsoft Corporation	VeriSign Commercial S...	1/30/2002	Fraudulent, NOT...

Certificate intended purposes

Server Authentication, Client Authentication

How Well Does Certificate Revocation Really Work?



Detecting Certificate Authority compromises and web browser collusion

Posted March 22nd, 2011 by ioerror in ssl tls ca tor certificates torbrowser

Thanks to Ian Gallagher, Seth Schoen, Jesse Burns, Chris Palmer, and other anonymous birds for their invaluable feedback on this writeup.

The Tor Project has long understood that the certification authority (CA) model of trust on the internet is susceptible to various methods of compromise. Without strong anonymity, the ability to perform targeted attacks with the blessing of a CA key is serious. In the past, I've worked on attacks relating to SSL/TLS trust models and for quite some time, I've hunted for evidence of non-academic CA compromise in the wild.

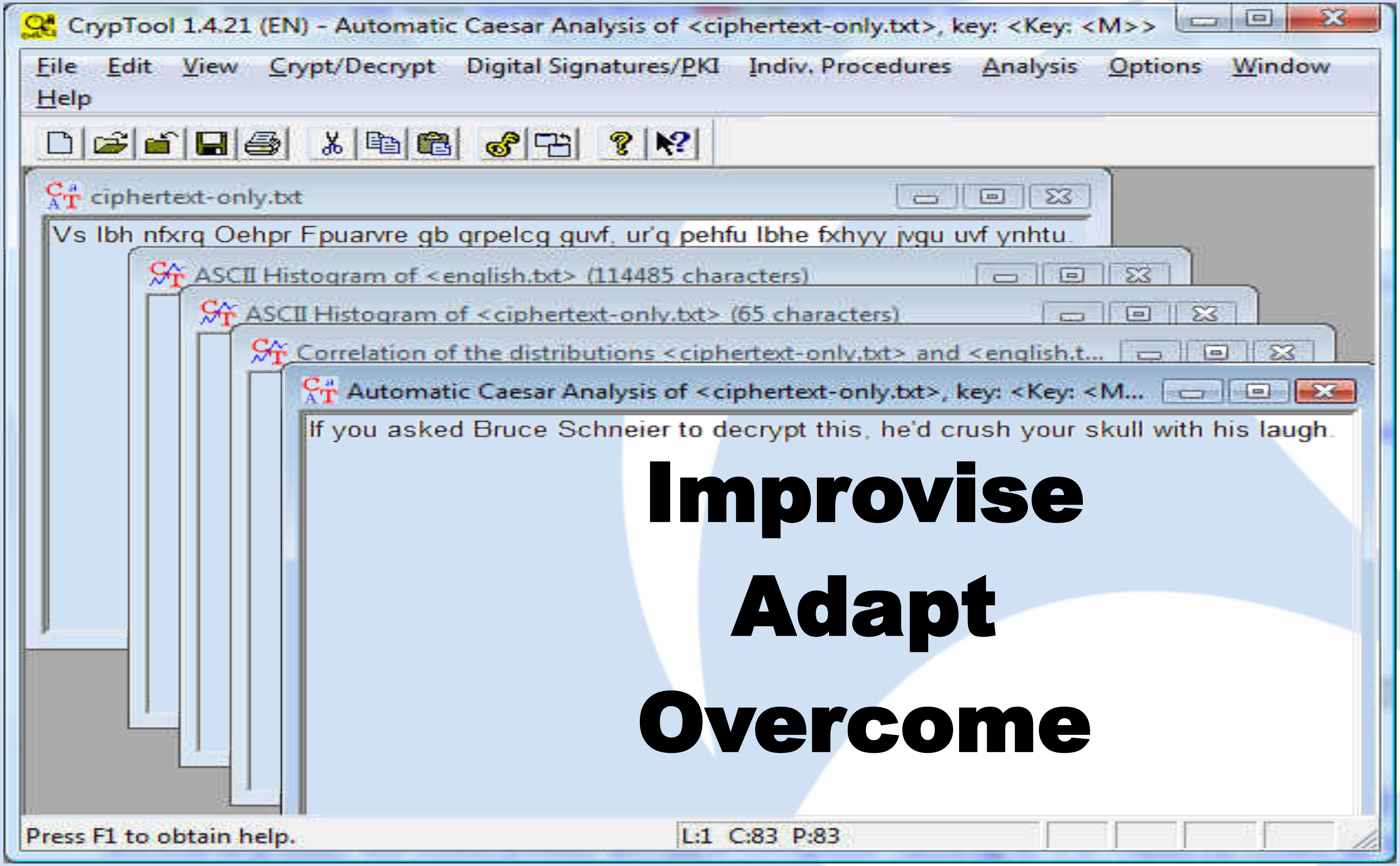
I've also looked for special kinds of cooperation between CAs and browsers. Proof of collusion will give us facts. It will also give us a real understanding of the faith placed in the strength of the underlying systems.

Does certificate revocation really work? No, it does not. How much faith does a vendor actually put into revocation, when verifiable evidence of malice is detected or known? Not much, and that's the subject of this writing.

Last week, a smoking gun came into sight: A Certification Authority appeared to be compromised in some capacity, and the attacker issued themselves valid HTTPS

https://blog.torproject.org/blog/detecting-certificate-authority-compromises-and-web-browser-collusion

Thank You!



CrypTool 1.4.21 (EN) - Automatic Caesar Analysis of <ciphertext-only.txt>, key: <Key: <M>>
File
Edit
View
Crypt/Decrypt
Digital Signatures/PKI
Indiv. Procedures
Analysis
Options
Window
Help
ciphertext-only.txt
ASCII Histogram of <english.txt> (114485 characters)
ASCII Histogram of <ciphertext-only.txt> (65 characters)
Correlation of the distributions <ciphertext-only.txt> and <english.t...
Automatic Caesar Analysis of <ciphertext-only.txt>, key: <Key: <M...
Press F1 to obtain help.
L:1 C:83 P:83

Vs Ibh nfxrq Oehpr Fpuarvre gb qrpelcg guvf, ur'q pehfu lbhe fxhyy jvgu uvf ynhtu.

If you asked Bruce Schneier to decrypt this, he'd crush your skull with his laugh.

Improvise

Adapt

Overcome