# Internet Storm Center Briefing:
# June 5th 2014 OpenSSL Patches

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# Summary

| CVE | Description | Versions | Client Rating | Server Rating |
|---|---|---|---|---|
| 2014-0224 | SSL/TLS MITM | Server: 1.0.1<br>Client: all | Critical | Important |
| 2014-0221 | DTLS recursion DoS | All | Important | Not Affected |
| 2014-0195 | DTLS invalid Fragment Code Exec. | All | Critical | Critical |
| 2014-0198 | SSL_MODE_RELEASE _BUFFERS DoS | 1.0.0, 1.0.1 | Important | Important |
| 2010-5298 | SSL_MODE_RELEASE _BUFFERS injection | 1.0.0, 1.0.1 | Important | Important |
| 2014-3470 | Anonymous ECDH DoS | 0.9.8, 1.0.0, 1.0.1 | Important | Not Affected |
| 2014-0076 | ECDSA Side Channel | 1.0.0, 0.9.8 (1.0.1) | Less Important | Less Important |

# Current Version

0.9.8 za

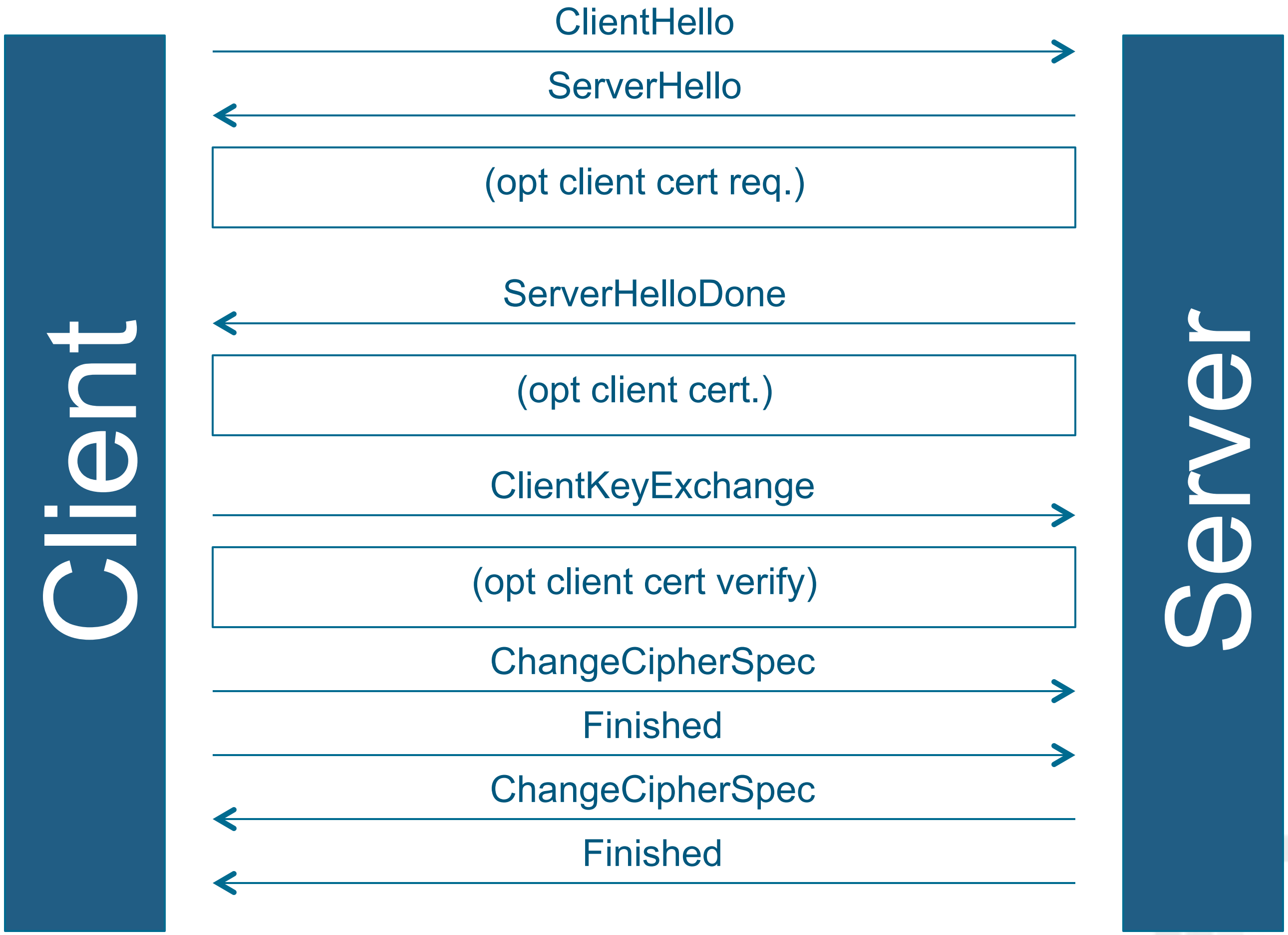
1.0.0m

1.0.1h

# 2014-0224

- Subtle SSL handshake timing bug
- Affects TLS and could allow for a MitM attack (not just DTLS)
- Root cause: Change Cipher Spec (CCS) message is accepted before all prerequisites have been processed
- Flaw existed in OpenSSL "since the beginning"
- Effect: an empty master secret is used

# SSL Handshake



ClientHello →

← ServerHello

(opt client cert req.)

← ServerHelloDone

(opt client cert.)

ClientKeyExchange →

(opt client cert verify)

ChangeCipherSpec →

Finished →

← ChangeCipherSpec

← Finished

# Who uses is Vulnerable?

- Who is not vulnerable?
  - Servers running OpenSSL = 1.0.1
  - Client AND Server have to be vulnerable

# 2014-0221

- An invalid DTLS handshake to vulnerable client can crash the client.
- Client is attacked
- DoS

# Who uses DTLS

- SSL over UDP protocols use DTLS. Typically found in:
  - VPNs (OpenVPN)
  - VoIP (e.g. Cisco telepresence)
  - WebRTC
  - LDAP over SSL
  - SNMPv3
  - Most video/voice over SSL

# 2014-0195

- Buffer overflow caused by invalid DTLS fragments.
- Can lead to arbitrary code execution
- Can be used against client and server
- PoC details available

# DTLS Fragments

- DTLS messages may be fragmented to avoid IP fragmentation
- Each DTLS fragment has three properties:
  - Total message length (“Length”)
  - Fragment Offset (“Offset”)
  - Fragment Size

# The way it is supposed to work

- First Fragment received (“Length”>”Fragment Length”)
- OpenSSL reserves “Length” bytes
- Then copies fragments into this buffer as they arrive

Assumption: All Fragments claim the same “Length” for the total message.

# Why we got a bug?

- OpenSSL FAILS to check the "Length" fragments claim for the full message
- Just checks if Length>Fragment Size

- First Fragment:
  - Length: 2
  - Fragment Size: 1
- Second Fragment
  - Length: 1000
  - Fragment Size: 999

# CVE-2014-0198
# CVE-2010-5298

- Can cause DoS or injection of unauthenticated data.
- Only vulnerable if SSL_MODE_RELEASE_BUFFERS is used to save memory (32k per idle connection)
- Not used by default, but many developers enable it to save memory (e.g. openvpn, Apache 2.4.1, nginx)
- Setting has no effect for DTLS/SSL2

# CVE-2014-3470

- Anonymous ECDH DoS Vulnerability
- Not a lot of details on exact nature of flaw
- Best practice: Disable anonymous cipher suites (e.g. in Apache !aNull enforces authentication)

# Where should I start?

- Start with the inventory of OpenSSL systems that you used to mitigate “Heartbleed”
- Expedite patches as vendors make them available
- Review SSL configuration
- Monitor for server crashes
- Apply IDS Signatures as necessary

# What Should I tell Management?

- This is not as bad as Heartbleed
- SSL is important because it protects our data and customer data in transit
- Accurate software inventory is critical
- OpenSSL is currently undergoing an intense review, which may lead to additional patches

# Thanks!

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DEV522: Defending Web Applications

SANSFIRE Baltimore June 21-30

SANS London July 14-21

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http://i5c.us/defwebapp