ANDROID'S NEW NIGHTMARE:
Media Files

08.09.15

Oğuzhan Topgül
@oguzhantopgul
www.oguzhantopgul.com

NTV

İSTANBUL 27°

TÜRKİYE DÜNYA EKONOMİ SPOR SAĞLIK

MELO VE ALE... İNTER'E TRANSFER OLDU

Anasayfa > Tekn...

threatpost

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by Michael Mimoso

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How to Hack Millions of Android Phones Using Stagefright Bug, Without Sending MMS

Friday, July 31, 2015 Swati Khandelwal

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Earlier this week, security researchers at Zimperium revealed a high-severity vulnerability in Android platforms that allowed a single **multimedia text message to hack 950 Million Android** smartphones and tablets.

Forbes / Tech

JUL 27, 2015 @ 1:00 PM 127,030 VIEWS

Stagefright: It Only Takes One Text ...llion Android

2 FREE Issu...

...BES STAFF
...culture.

...ULL BIO

...per cent of Google GOOGL -1.70% Android ...a simple multimedia text, a mobile ...cases, where phones parse the attack ...l, the exploits are silent and the user ...eir data. The vulnerabilities are said to ...red.

...ho reported the bugs in April this year, ...o its partners, he believes most ...ble to protect their customers. "All ...le," Drake, vice president of platform ...old FORBES. He believes as many as ...ted, going on figures ...e. Only Android phones below

H#CK TRICK

OWASP Turkey

STAGEFRIGHT VULNERABILITY

- Result of a research conducted by **Joshua Drake** a.k.a **@jduck**
- Presented at 2015 BLACKHAT USA security conference with the title

Stagefright: Scary Code in the Heart of Android*

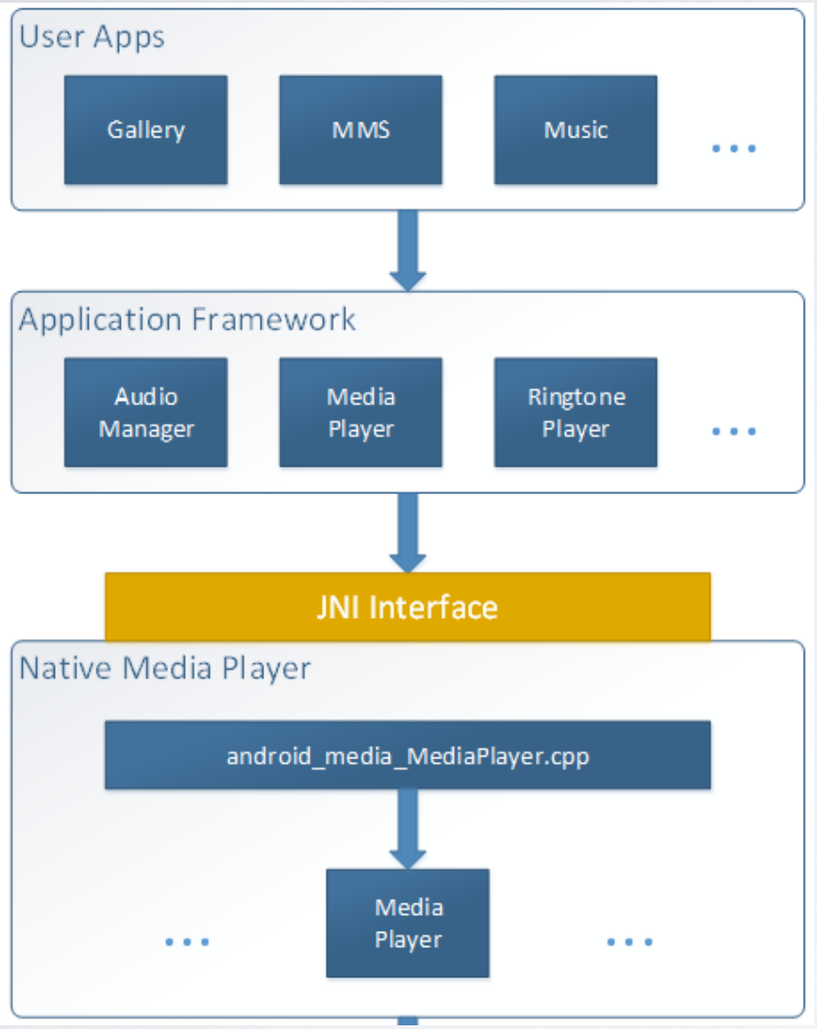
- Most of the Android devices are still vulnerable

* https://www.blackhat.com/us-15/briefings.html#stagefright-scary-code-in-the-heart-of-android

STAGEFRIGHT

- Android's Multimedia library
- Processes video and audio files
- Extracts meta-data of media files
- Added to AOSP with Android 2.0
- Runs inside MediaServer

STAGEFRIGHT

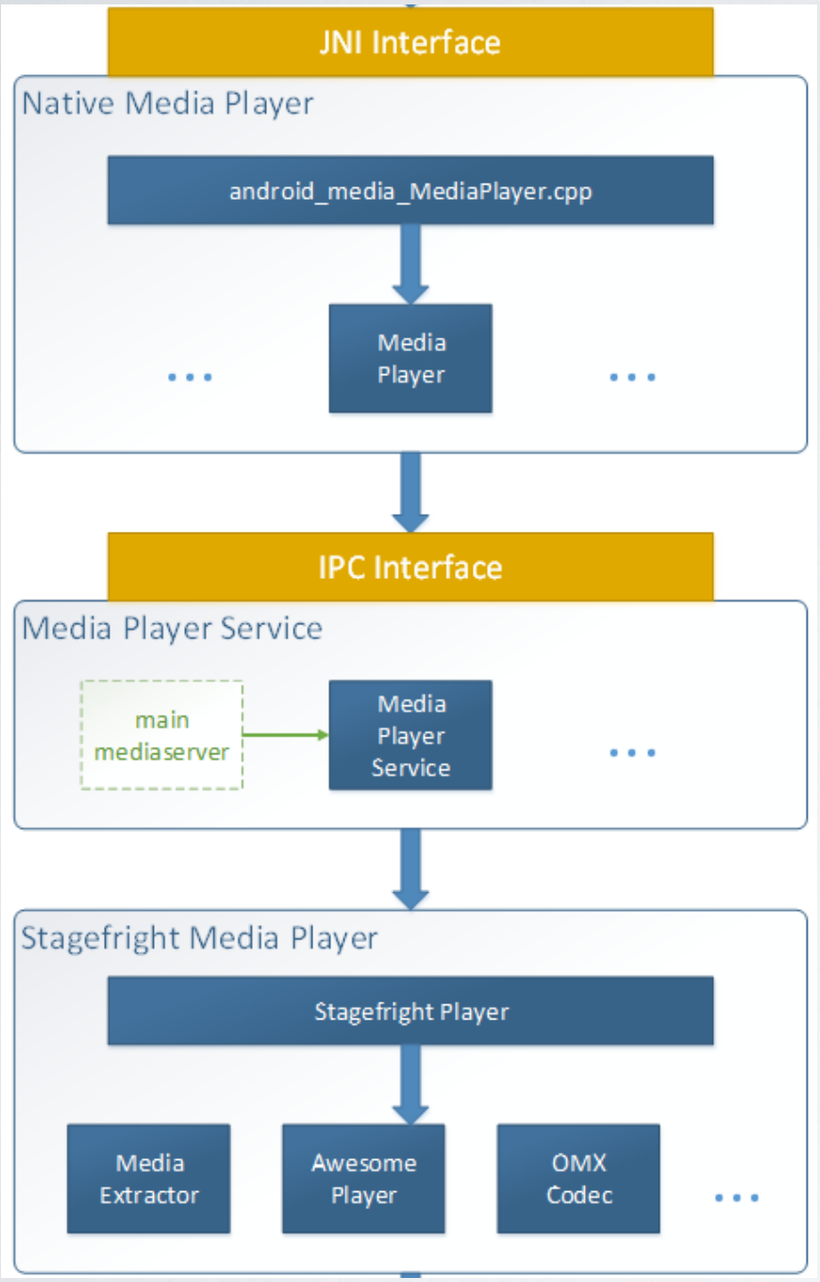


frameworks/base/media/java/android/media/**MediaPlayer.java**

frameworks/base/media/jni/**android_media_MediaPlayer.cpp**

* https://android.googlesource.com/platform/frameworks/base/+/master/media/

STAGEFRIGHT



frameworks/base/media/jni/**android_media_MediaPlayer.cpp**

frameworks/av/media/mediaserver/**main_mediaserver.cpp**

frameworks/av/media/libmediaplayerservice/**MediaPlayerService.cpp**

frameworks/av/media/libstagefright/**MediaSource.cpp**
frameworks/av/media/libstagefright/**MediaExtractor.cpp**
frameworks/av/media/libstagefright/**AwesomePlayer.cpp**

* https://android.googlesource.com/platform/frameworks/av/+/master/media

MEDIASERVER

mediaserver is run by **init** process

```
root@android:/ # ps | grep media
USER      PID   PPID  VSIZE   RSS     WCHAN    PC         NAME
media     310   1     49076   9112    ffffffff b7566dbe S /system/bin/mediaserver
```

It is a native service which is defined in **/init.rc** file

```
service media /system/bin/mediaserver
    class main
    user media
    group audio camera inet net_bt net_bt_admin net_bt_acct drmrpc
    ioprio rt 4
```

MEDIASERVER

mediaserver runs with high privileges

```
service media /system/bin/mediaserver
    class main
    user media
    group audio camera inet net_bt net_bt_admin net_bt_acct drmrpc
    ioprio rt 4
```

mediaserver restarts when crashes *

```
Services
--------
Services are programs which init launches and (optionally) restarts when they exit.
Services take the form of:

service <name> <pathname> [ <argument> ]*
   <option>
   <option>
   ...
```

* https://android.googlesource.com/platform/system/core/+/master/init/readme.txt

STAGEFRIGHT

- **libstagefright** processes media files inside **mediaserver** service

- **mediaserver** is a privileged native service

- In some devices it also runs even with **system** privileges

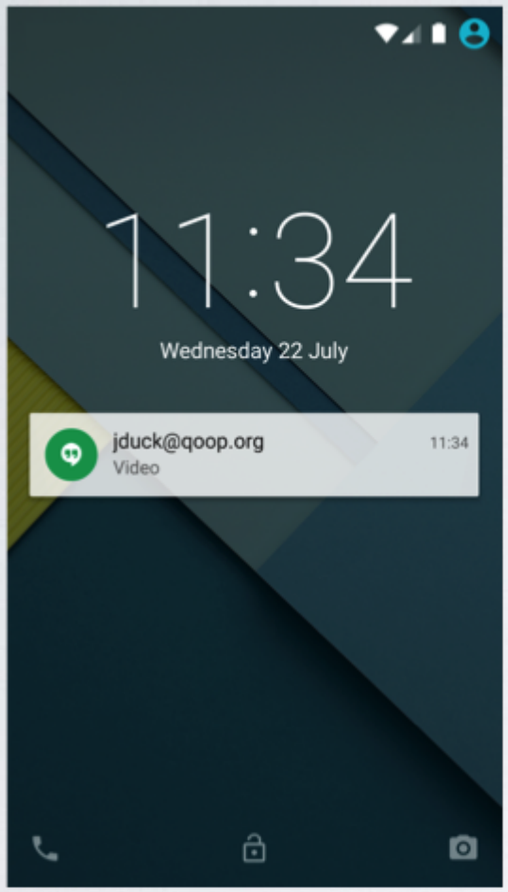
```
service media /system/bin/mediaserver
    class main
    user media
    group system audio camera inet net_bt net_bt_admin net_bw_acct drmrpc mediadrm sdcard_rw sdcard_r media_rw shell lgt_gid
    ioprio rt 4
```

* https://android.googlesource.com/platform/system/core/+/master/init/readme.txt

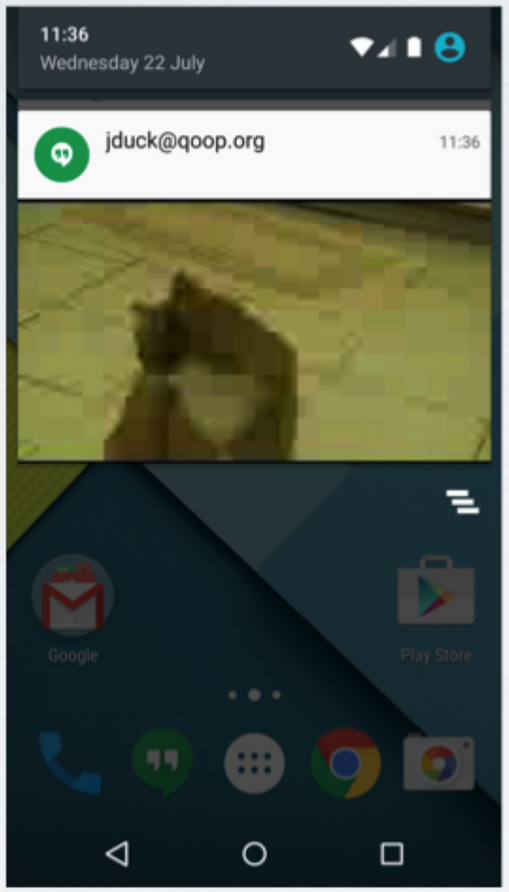
STAGEFRIGHT VULNERABILITY

- Lots of attack vectors present (11+)
  - MMS, <video> tag in a web page, downloaded the media file, e-mail, chat and messaging apps, NFC, Bluetooth, SDCard …
- Exploited via playback or meta-data parse
- Binary parsers are mostly vulnerable
  - It is possible to exploit with different media formats like MP4, 3GPP, etc…
- Can be triggered with different ways
  - Rotating the screen, opening up the chat app, browsing the Gallery etc…

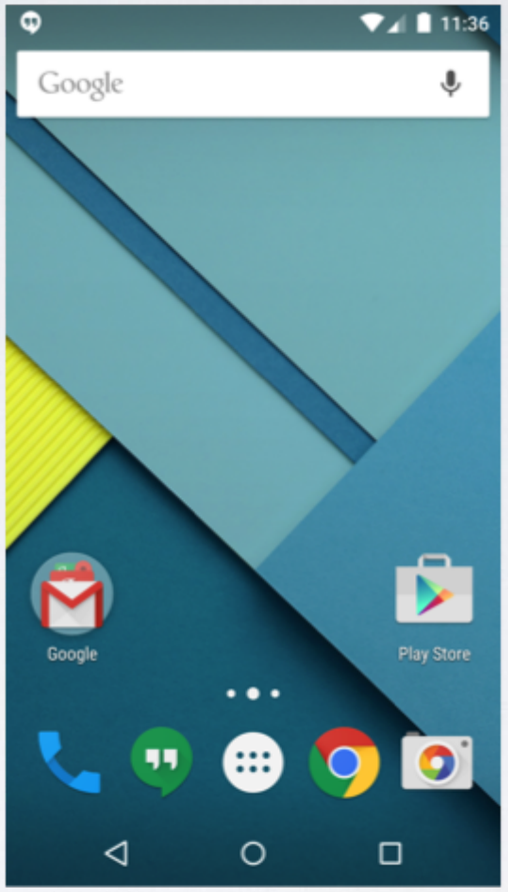
STAGEFRIGHT VULNERABILITY



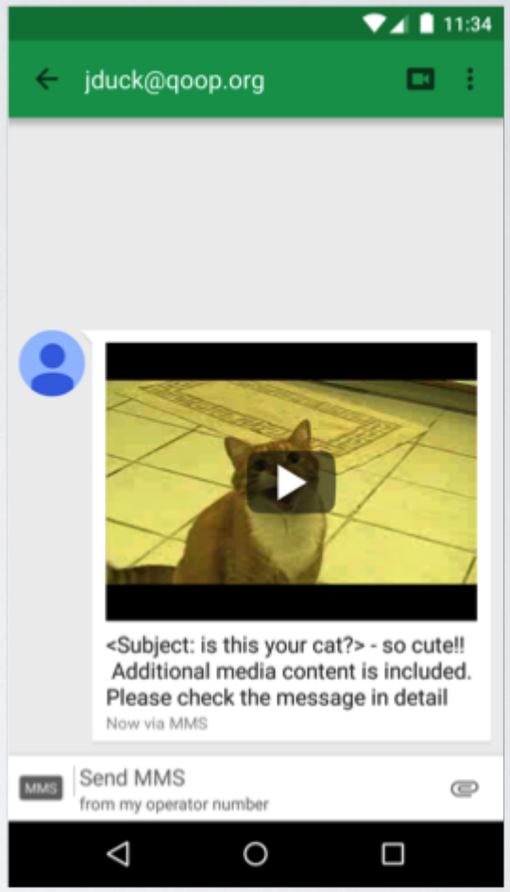
An MMS was received by Hangouts. At this point, an attacker may have already executed arbitrary code.



MMS notifications show a preview, which triggers the vulnerable code.



After unlocking the screen, no effects are apparent.



Viewing the MMS message triggers the vulnerable code again. Touching the video or rotating the screen triggers the vulnerable code again and again.

H#CK TRICK

OWASP Turkey

- **CVE-2015-1538**, P0006, Google Stagefright 'stsc' **MP4** Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright 'ctts' **MP4** Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright 'stts' **MP4** Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright 'stss' **MP4** Atom Integer Overflow Remote Code Execution
- **CVE-2015-1539**, P0007, Google Stagefright 'esds' **MP4** Atom Integer Underflow Remote Code Execution
- **CVE-2015-3827**, P0008, Google Stagefright 'covr' **MP4** Atom Integer Underflow Remote Code Execution
- **CVE-2015-3826**, P0009, Google Stagefright **3GPP** Metadata Buffer Overread
- **CVE-2015-3828**, P0010, Google Stagefright **3GPP** Integer Underflow Remote Code Execution
- **CVE-2015-3824**, P0011, Google Stagefright 'tx3g' **MP4** Atom Integer Overflow Remote Code Execution
- **CVE-2015-3829**, P0012, Google Stagefright 'covr' **MP4** Atom Integer Overflow Remote Code Execution

MPEG-4

- MPEG-4 files are made of units which are called **Atom** or **Box**

box		
Field	**Type**	**Comment**
Header	BOXHEADER	A consistent header that all boxes have
Payload	UI8[]	A number of bytes, the length of which is defined by the BOXHEADER

BOXHEADER		
Field	**Type**	**Comment**
TotalSize	UI32	The total size of the box in bytes, including this header
BoxType	UI32	The type of atom
ExtendedSize	If TotalSize equals 1 UI64	The total 64-bit length of the box in bytes, including this header

* http://www.adobe.com/content/dam/Adobe/en/devnet/flv/pdfs/video_file_format_spec_v10.pdf

MPEG-4

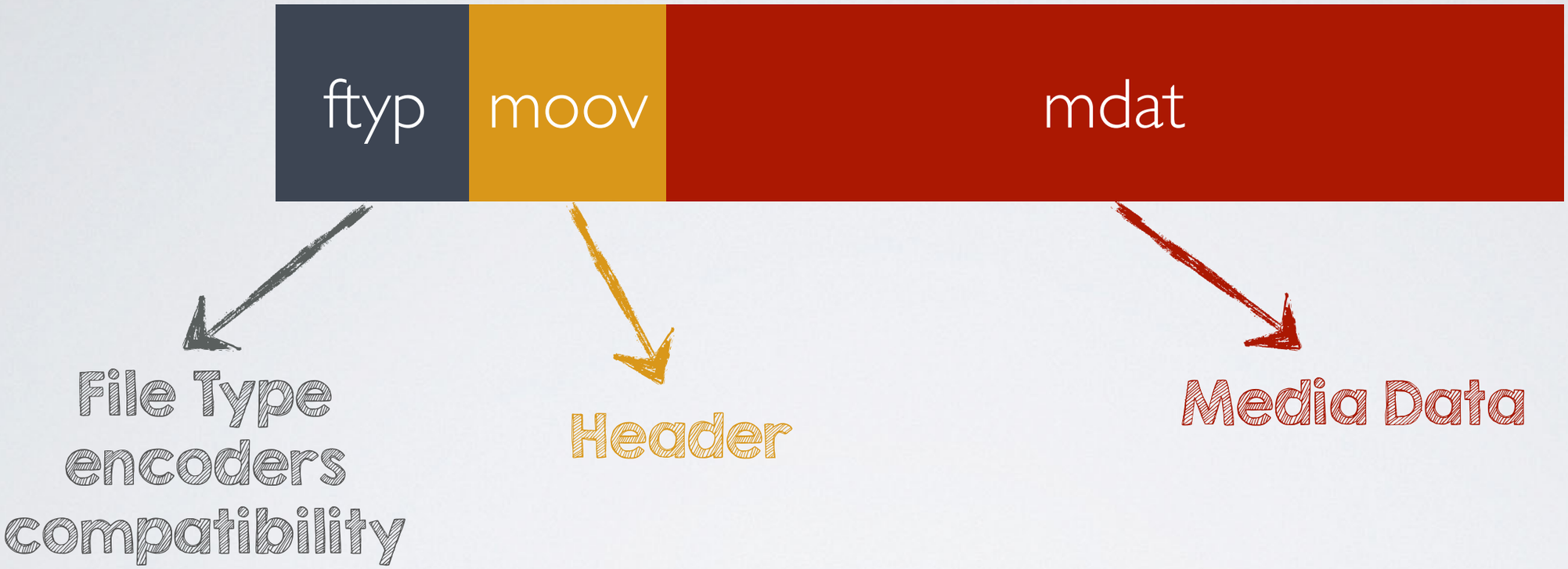
BOXHEADER

Field	Type	Comment
TotalSize	UI32	The total size of the box in bytes, including this header
BoxType	UI32	The type of atom
ExtendedSize	If TotalSize equals 1 UI64	The total 64-bit length of the box in bytes, including this header

- Atom type (BoxType) is a value which contains 4 characters (4 Byte):
  - E.g. : ftyp, moov, trak, covr, esds, mvhd…
- This 4 byte value is called FourCC (**Four C**haracter **C**ode)

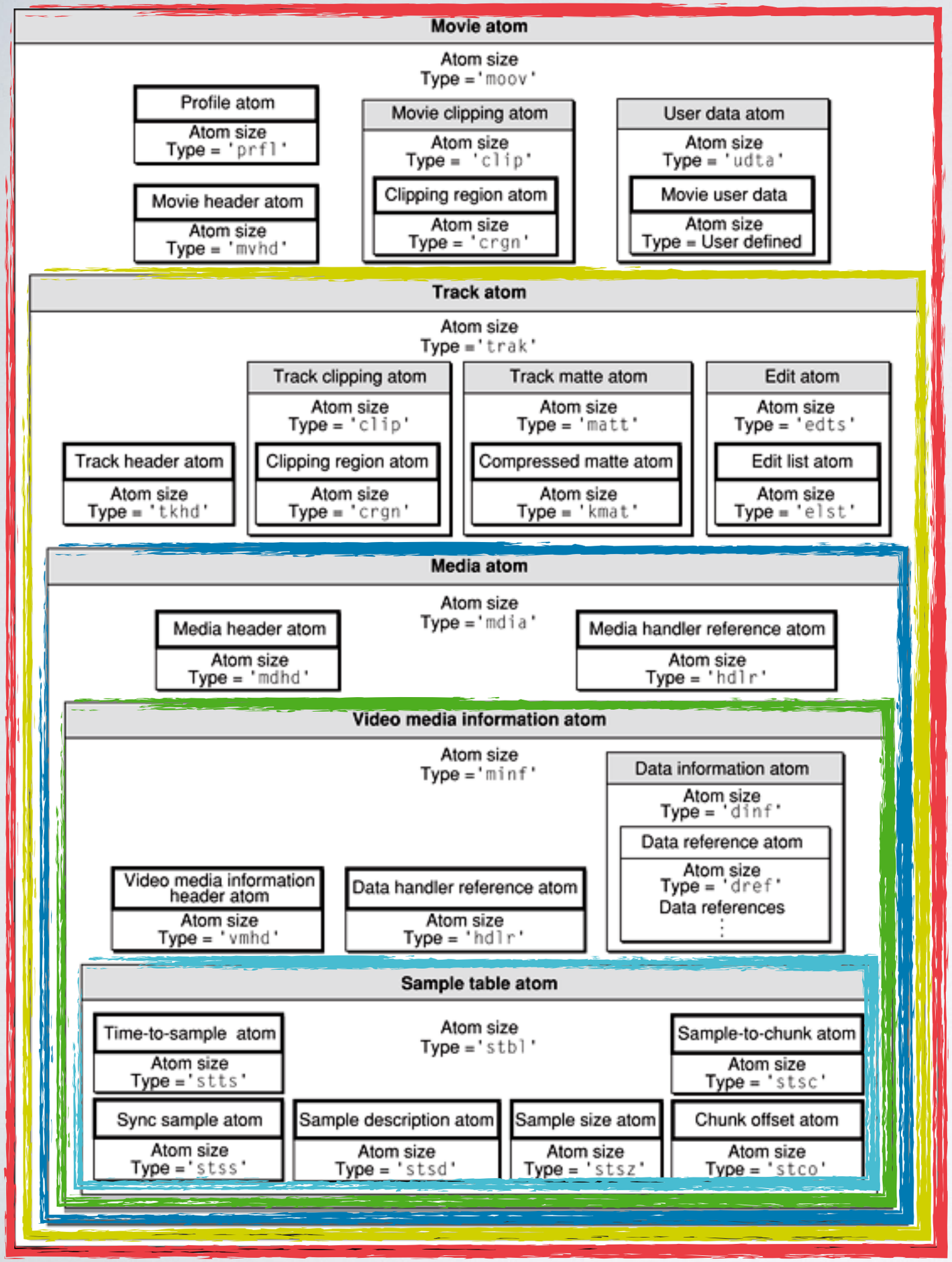
* http://www.adobe.com/content/dam/Adobe/en/devnet/flv/pdfs/video_file_format_spec_v10.pdf

MPEG-4



- moov atom contains some nested atoms

* http://www.adobe.com/content/dam/Adobe/en/devnet/flv/pdfs/video_file_format_spec_v10.pdf



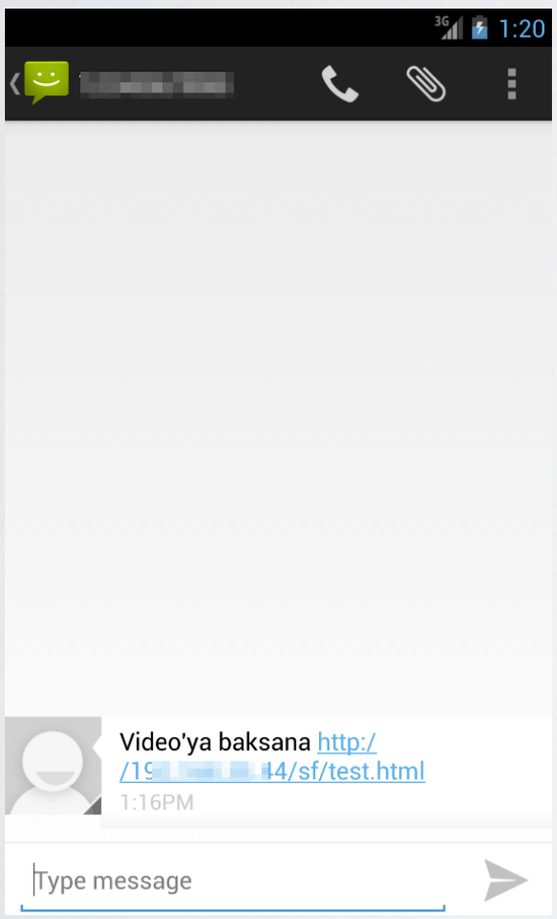
MOOV ATOM

- struct File
  - struct FileTypeBox ftyp
  - struct FreeBox free
  - struct MediaDataBox mdat[0]
  - struct MediaDataBox mdat[1]
  - struct MovieBox moov
    - uint32 size
    - BoxType type
    - struct MovieHeaderBox mvhd
    - struct TrackBox trak[0]
      - uint32 size
      - BoxType type
      - struct TrackHeaderBox tkhd
      - struct MediaBox mdia
        - uint32 size
        - BoxType type
        - struct MediaHeaderBox mdhd
        - struct HandlerBox hdlr
        - struct MediaInformationBox minf
          - uint32 size
          - BoxType type
          - struct VideoMediaHeaderBox vmhd
          - struct DataInformationBox dinf
          - struct SampleTableBox stbl
            - uint32 size
            - BoxType type
            - struct SampleDescriptionBox stsd
            - struct TimeToSampleBox stts
            - struct SyncSampleBox stss
            - struct SampleToChunkBox stsc

- **CVE-2015-1538**, P0006, Google Stagefright '**stsc**' MP4 Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright '**ctts**' MP4 Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright '**stts**' MP4 Atom Integer Overflow Remote Code Execution
- **CVE-2015-1538**, P0004, Google Stagefright '**stss**' MP4 Atom Integer Overflow Remote Code Execution
- **CVE-2015-1539**, P0007, Google Stagefright '**esds**' MP4 Atom Integer Underflow Remote Code Execution
- **CVE-2015-3827**, P0008, Google Stagefright '**covr**' MP4 Atom Integer Underflow Remote Code Execution
- **CVE-2015-3826**, P0009, Google Stagefright 3GPP Metadata Buffer Overread
- **CVE-2015-3828**, P0010, Google Stagefright 3GPP Integer Underflow Remote Code Execution
- **CVE-2015-3824**, P0011, Google Stagefright '**tx3g**' MP4 Atom Integer Overflow Remote Code Execution
- **CVE-2015-3829**, P0012, Google Stagefright '**covr**' MP4 Atom Integer Overflow Remote Code Execution

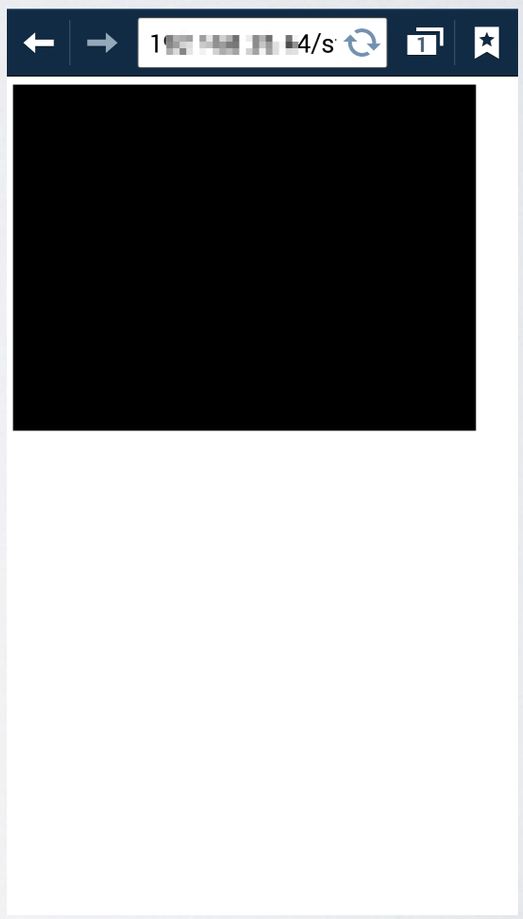
‘STTS’ ATOM INTEGER OVERFLOW

- PoC mp4 files: https://s3.amazonaws.com/zhafiles/Zimperium-Handset-Alliance/ZHA-Crash-PoC.zip
- sf-003.mp4 PoC mp4 file triggers ‘stts’ integer overflow.



<video> tag is introduced with HTLM5

```
<html>
<video width="320" height="240" autoplay>
    <source src="sf-003.mp4" type="video/mp4">
</video>
</html>
```



‘STTS’ ATOM INTEGER OVERFLOW

- Crash Logs are sent to **logcat** and recorded under **/data/tombstones/** directory with the naming **tombstone_xx**
- Attack vector in sf-003.mp4 file is Meta-data parsing

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
Build fingerprint: 'samsung/ja3gxx/ja3g:4.4.2/KOT49H/I9500XXUGNH2:user/release-keys'
Revision: '10'
pid: 7300, tid: 7300, name: mediaserver  >>> /system/bin/mediaserver <<<
signal 11 (SIGSEGV), code 1 (SEGV_MAPERR), fault addr 30da7f20
    r0 0000149a  r1 30da2cb8  r2 b82cda30  r3 47f62c91
    r4 00000b64  r5 00000000  r6 b82d2c50  r7 b6eff384
...

backtrace:
    #00  pc 000a4b92  /system/lib/libstagefright.so (android::SampleTable::setTimeToSampleParams(long long, unsigned int)+169)
    #01  pc 00084b91  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+3024)
    #02  pc 00084861  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+3008)
    #03  pc 00084737  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+2710)
    #04  pc 00083f6b  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+714)
    #05  pc 00083f6b  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+714)
    #06  pc 00083f6b  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+714)
    #07  pc 00083f6b  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+714)
    #08  pc 00083f6b  /system/lib/libstagefright.so (android::MPEG4Extractor::parseChunk(long long*, int)+714)
    #09  pc 00085c99  /system/lib/libstagefright.so (android::MPEG4Extractor::readMetaData()+48)
    #10  pc 0008600d  /system/lib/libstagefright.so (android::MPEG4Extractor::getMetaData()+8)
    #11  pc 000a6655  /system/lib/libstagefright.so (android::StagefrightMetadataRetriever::parseMetaData()+36)
    #12  pc 000a6c43  /system/lib/libstagefright.so (android::StagefrightMetadataRetriever::extractMetadata(int)+18)
...
```

‘STTS’ ATOM INTEGER OVERFLOW

StageFrightMetadataRetriever.cpp

```
const char *StagefrightMetadataRetriever::extractMetadata(int keyCode) {
    if (mExtractor == NULL) {
        return NULL;
    }
    if (!mParsedMetaData) {
        parseMetaData();
        mParsedMetaData = true;
    }
...
```

```
void StagefrightMetadataRetriever::parseMetaData() {

    sp<MetaData> meta = mExtractor->getMetaData();
    if (meta == NULL) {
        ALOGV("extractor doesn't publish metadata, failed to initialize?");
        return;
    }
...
```

‘STTS’ ATOM INTEGER OVERFLOW

MPEG4Extractor.cpp

```
sp<MetaData> MPEG4Extractor::getMetaData() {
    status_t err;

    if ((err = readMetaData()) != OK) {
        return new MetaData;
    }
    return mFileMetaData;
}
```

```
status_t MPEG4Extractor::readMetaData() {
    if (mInitCheck != NO_INIT) {
        return mInitCheck;
    }
    off64_t offset = 0;
    status_t err;
    while (true) {
        err = parseChunk(&offset, 0);
        if (err == OK) {
            continue;
        }
```

‘STTS’ ATOM INTEGER OVERFLOW

MPEG4Extractor.cpp

```
status_t MPEG4Extractor::parseChunk(off64_t *offset, int depth) {
    ALOGV("entering parseChunk %lld/%d", *offset, depth);
    uint32_t hdr[2];
    if (mDataSource->readAt(*offset, hdr, 8) < 8) {
        return ERROR_IO;
    }

    ...
    ...

    switch(chunk_type) {
        case FOURCC('m', 'o', 'o', 'v'):
        case FOURCC('t', 'r', 'a', 'k'):
        case FOURCC('m', 'd', 'i', 'a'):

        ...
        ...

        case FOURCC('s', 't', 't', 's'):
        {
            status_t err = mLastTrack->sampleTable->setTimeToSampleParams(data_offset, chunk_data_size);
            if (err != OK) {
                return err;
            }
            *offset += chunk_size;
            break;
        }

        ...
        ...
```

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

```
status_t SampleTable::setTimeToSampleParams(off64_t data_offset, size_t data_size) {
    if (mTimeToSample != NULL || data_size < 8) {
        return ERROR_MALFORMED;
    }
    uint8_t header[8];
    if (mDataSource->readAt(data_offset, header, sizeof(header)) < (ssize_t)sizeof(header)) {
        return ERROR_IO;
    }
    if (U32_AT(header) != 0) {
        // Expected version = 0, flags = 0.
        return ERROR_MALFORMED;
    }

    mTimeToSampleCount = U32_AT(&header[4]);

    mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

    size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

    if (mDataSource->readAt(data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
        return ERROR_IO;
    }
    for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {mTimeToSample[i] = ntohl(mTimeToSample[i]);
    }
    return OK;
}
```

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

Attacker Controlled

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);
mTimeToSample = new uint32_t[mTimeToSampleCount * 2];
size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;
```

Memory allocation for the array

Allocated memory for the array is

mTimeToSampleCount * 2 * sizeof(uint32_t)

mTimeToSampleCount * 2 * 4

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

Fill the array

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

Endian Swapping

‘STTS’ ATOM

stts box

Field	Type	Comment
Header	BOXHEADER	BoxType = 'stts' (0x73747473)
Version	UI8	Expected to be 0
Flags	UI24	None defined, set to 0
Count	UI32	The number of STTSRECORD entries
Entries	STTSRECORD[Count]	An array of STTSRECORD structures

A regular mp4 file

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                  data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

mTimeToSampleCount = 1

Allocated memory for mTimeToSample
1 * 2 * 4 = 8

Loop bound
mTimeToSampleCount * 2
= 2

So, **mTimeToSampleCount < Loop Bound < Array size**

‘STTS’ ATOM

stts box

Field	Type	Comment
Header	BOXHEADER	BoxType = 'stts' (0x73747473)
Version	UI8	Expected to be 0
Flags	UI24	None defined, set to 0
Count	UI32	The number of STTSRECORD entries
Entries	STTSRECORD[Count]	An array of STTSRECORD structures

sf-003.mp4 PoC file

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

mTimeToSampleCount = 0x40000002

Allocated memory for mTimeToSample
0x40000002 * 4 *2 = 0x20000010

Loop bound
0x40000002 * 2 = 0x80000004

Lets check: **mTimeToSampleCount < Loop Bound < Array size** ✔

‘STTS’ ATOM INTEGER OVERFLOW

‘STTS’ ATOM INTEGER OVERFLOW

… **if you multiply two 32-bit integers, you get a 32-bit integer again**, losing the upper 32 bits of the result

mTimeToSampleCount = 0x40000002

Allocated memory for mTimeToSample

0x40000002 * 4 *2

= 0x100000010

= 0x000000010

* http://www.fefe.de/intof.html

‘STTS’ ATOM INTEGER OVERFLOW

… **if you multiply two 32-bit integers, you get a 32-bit integer again**, losing the upper 32 bits of the result

mTimeToSampleCount = 0x40000002

Allocated memory for mTimeToSample = 0x000000010

Loop bound 0x40000002 * 2 = 0x80000004

Check again: **mTimeToSampleCount < Loop Bound < Array size** ✗

* http://www.fefe.de/intof.html

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

< Android 4.4

```
mTimeToSampleCount = U32_AT(&header[4]);

mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

if (mDataSource->readAt(
                data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
    return ERROR_IO;
}

for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
    mTimeToSample[i] = ntohl(mTimeToSample[i]);
}
```

Loop bound is too high, but size of the array is too small

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‘STTS’ ATOM INTEGER OVERFLOW

Maximum value of a 32bit Unsigned Integer: 0xFFFFFFFF

If

mTimeToSampleCount >= 0x20000000

integer overflow occurs

0x20000000 * 4 * 2 = 0

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‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

Android 5.0

```
    mTimeToSampleCount = U32_AT(&header[4]);

+   uint64_t allocSize = mTimeToSampleCount * 2 * sizeof(uint32_t);
+
+   if (allocSize > SIZE_MAX) {
+       return ERROR_OUT_OF_RANGE;
+   }

    mTimeToSample = new uint32_t[mTi  oSampleCount * 2];

    }

    for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
        mTimeToSample[i] = ntohl(mTimeToSample[i]);
    }
```

This check fails to catch Integer Overflow

‘STTS’ ATOM INTEGER OVERFLOW

SampleTable.cpp

Android 5.1.1 r5

```
    mTimeToSampleCount = U32_AT(&header[4]);                    Android 5.0
-   uint64_t allocSize = mTimeToSampleCount * 2 * sizeof(uint32_t);
+   uint64_t allocSize = (uint64_t)mTimeToSampleCount * 2 * sizeof(uint32_t);
    if (allocSize > SIZE_MAX) {                                 Android 5.1.1 r5
        return ERROR_OUT_OF_RANGE;
    }

    mTimeToSample = new uint32_t[mTimeToSampleCount * 2];

    size_t size = sizeof(uint32_t) * mTimeToSampleCount * 2;

    if (mDataSource->readAt(
                    data_offset + 8, mTimeToSample, size) < (ssize_t)size) {
        return ERROR_IO;
    }

    for (uint32_t i = 0; i < mTimeToSampleCount * 2; ++i) {
        mTimeToSample[i] = ntohl(mTimeToSample[i]);
    }
```

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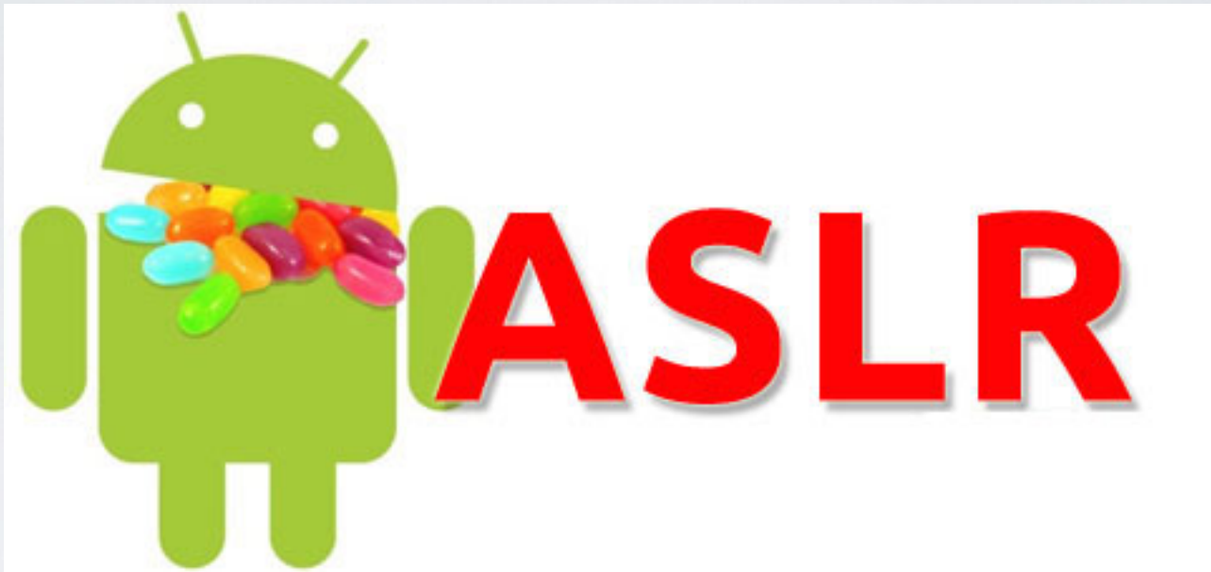
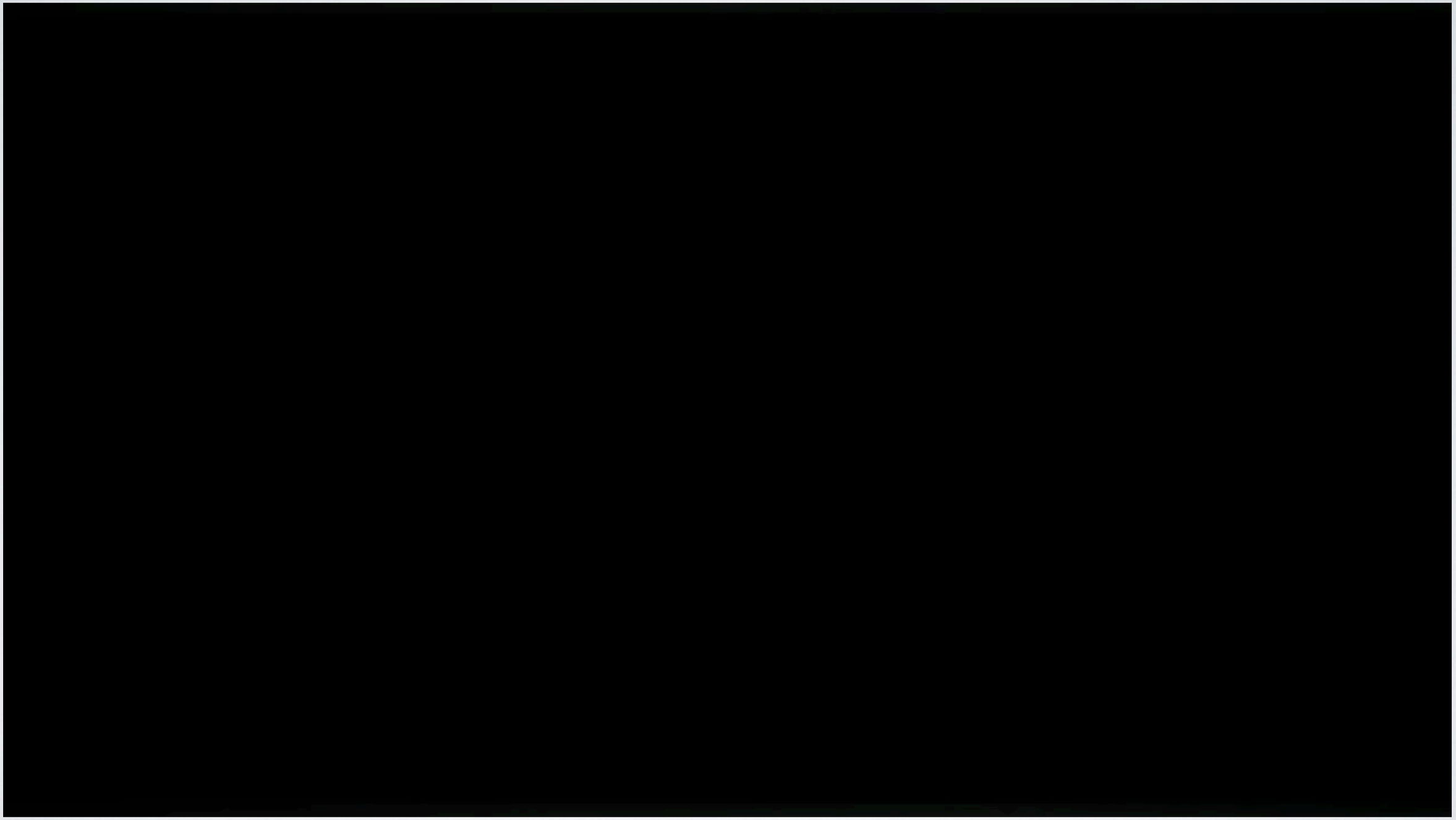
STAGEFRIGHT VS ASLR



- ASLR is introduced with Android 4.0 Ice Cream
  - Stagefright can be successfully exploited for Ice Cream Sandwich
  - ASLR Bypass is required for the versions >= Android 4.0

STAGEFRIGHT VULNERABILITY




ARE YOU
VULNERABLE?

stagefright detector - Google

https://play.google.com/store/search?q=stagefright%20detector

Google play

stagefright detector

Store

Apps

Movies & TV

Music

Books

Newsstand

Devices

My Play activity

My wishlist

Search All results

Apps

Stagefright Detecto
Lookout Mobile Securit
FREE

Stagefright Detecto
Zimperium INC.
FREE

ESET Stagefright De
ESET
FREE

22:58

Stagefrig

Stagefright Detector

Your d
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When
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If you
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auto-re
SMS a

Learn m

Share you

Download

Your device is **vulnerable** to Stagefright

HOW CAN I PROTECT?

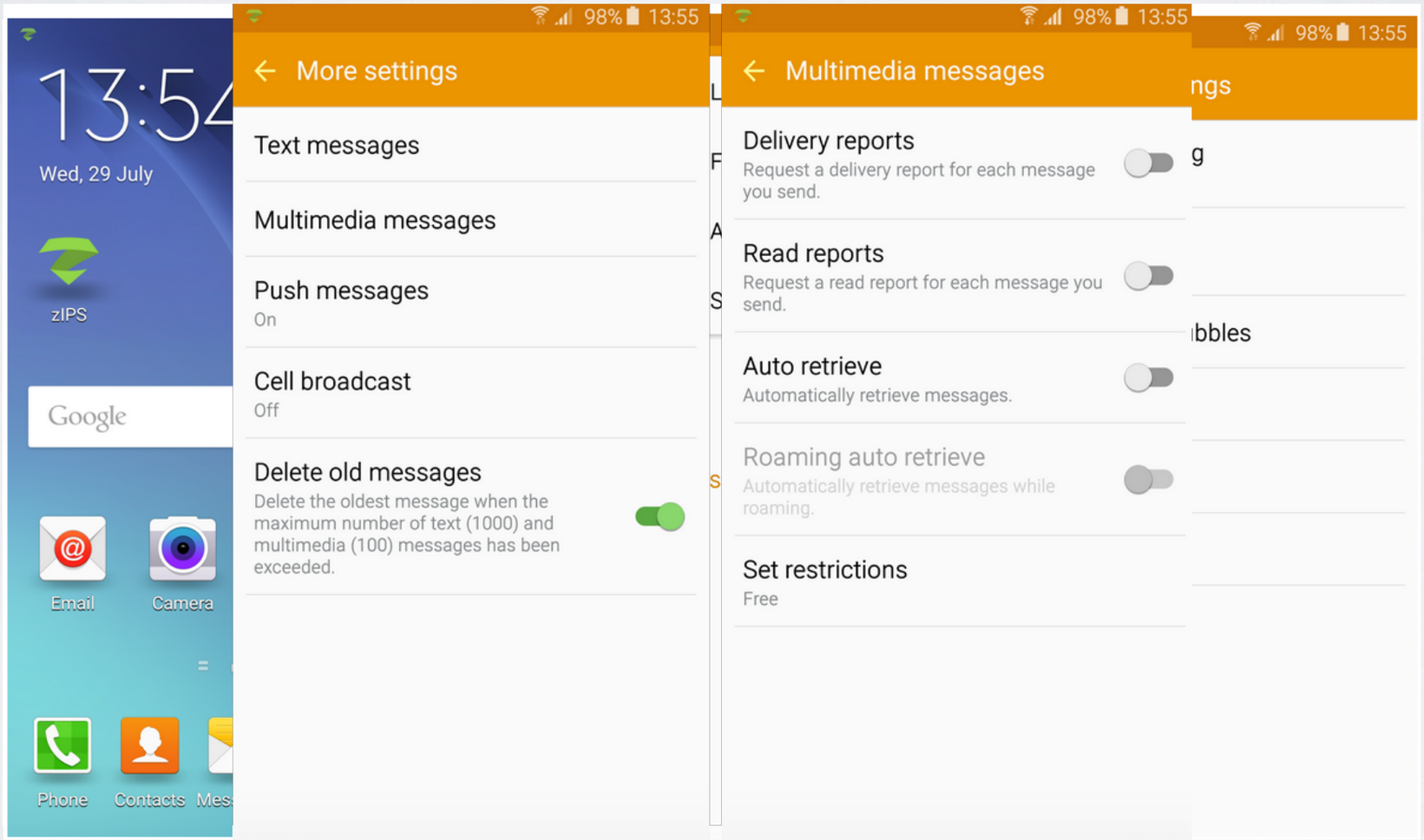
Increase your protection against other threats on Android

DOWNLOAD ESET MOBILE SECURITY

HOW TO PROTECT

- Update your device for the latest Android version which must be >= 5.1.1_r5
- Disable MMS auto-fetch feature (For Hangouts and Messages)

HANGOUT
OPTIONS
SETTINGS
SMS



MESSAGES
MORE
SETTINGS
MORE
SETTINGS
MMS

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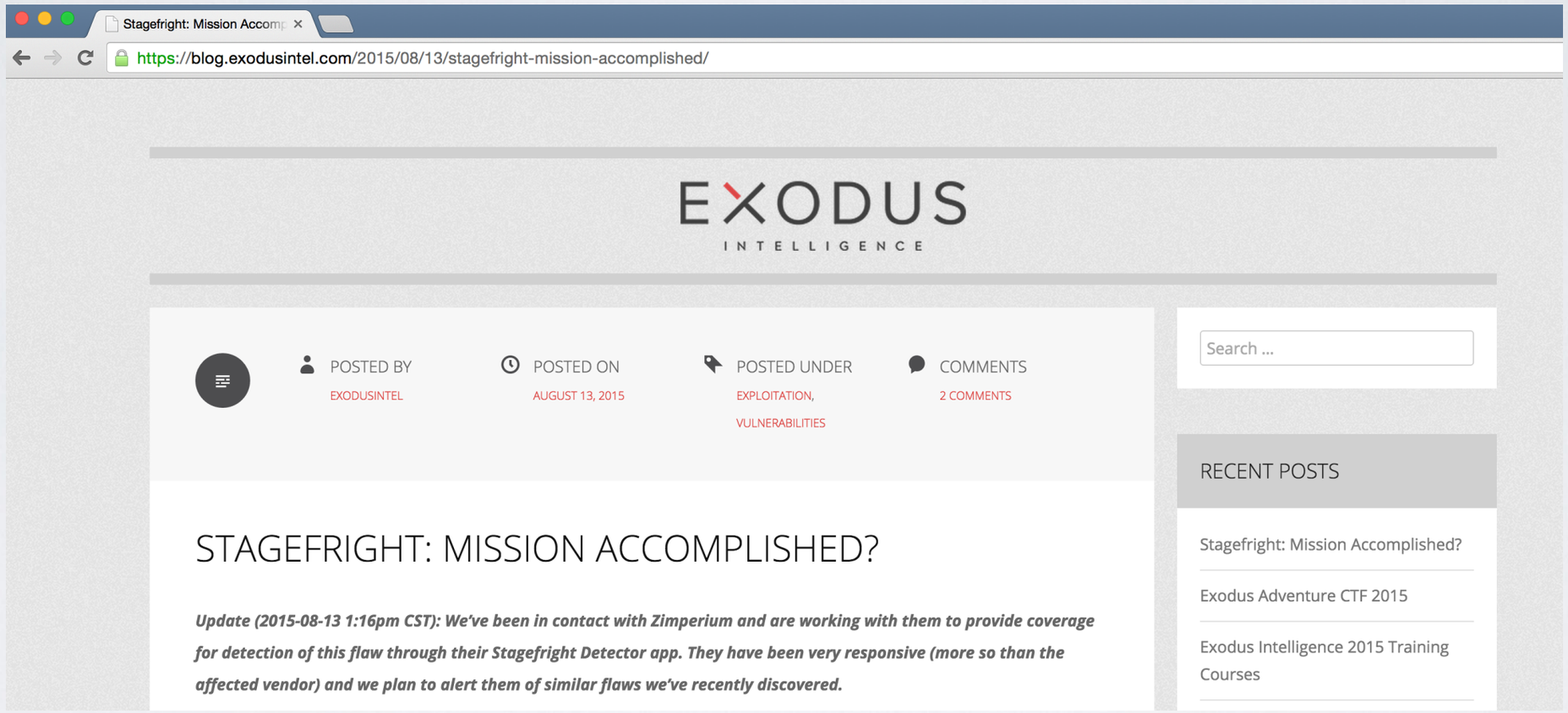
UPDATES REALLY SOLVE THE PROBLEM?

- EXODUS Intelligence does not agree with that



- Problem related to "**CVE-2015-3824**, P0011, Google Stagefright '**tx3g**' MP4 Atom Integer Overflow Remote Code Execution" remained unfixed

* https://blog.exodusintel.com/2015/08/13/stagefright-mission-accomplished/

STAGEFRIGHT PUBLIC EXPLOIT?

- **@jduck** put the PoC Exploit code in his private repo and…

Joshua J. Drake
@jduck

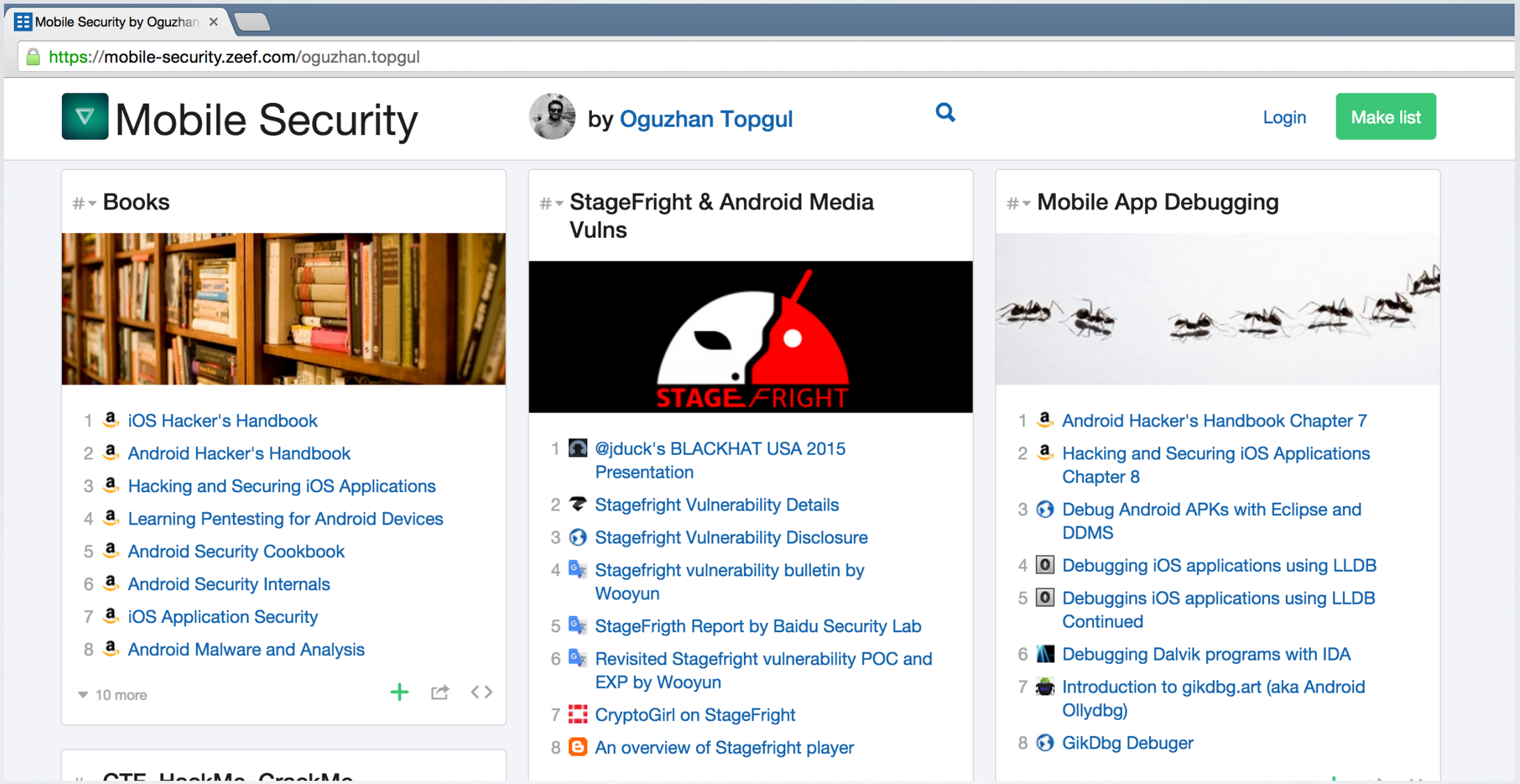
The #Stagefright public exploit release is held up by marketing. I'm doing a FrienNDA beta github.com/jduck/cve-2015…, tell me your github!

02/09/15 13:33

- **Update 09.09.15:** @jduck's private repo is publicly available

https://github.com/jduck/cve-2015-1538-1

MORE READING ON STAGEFRIGHT

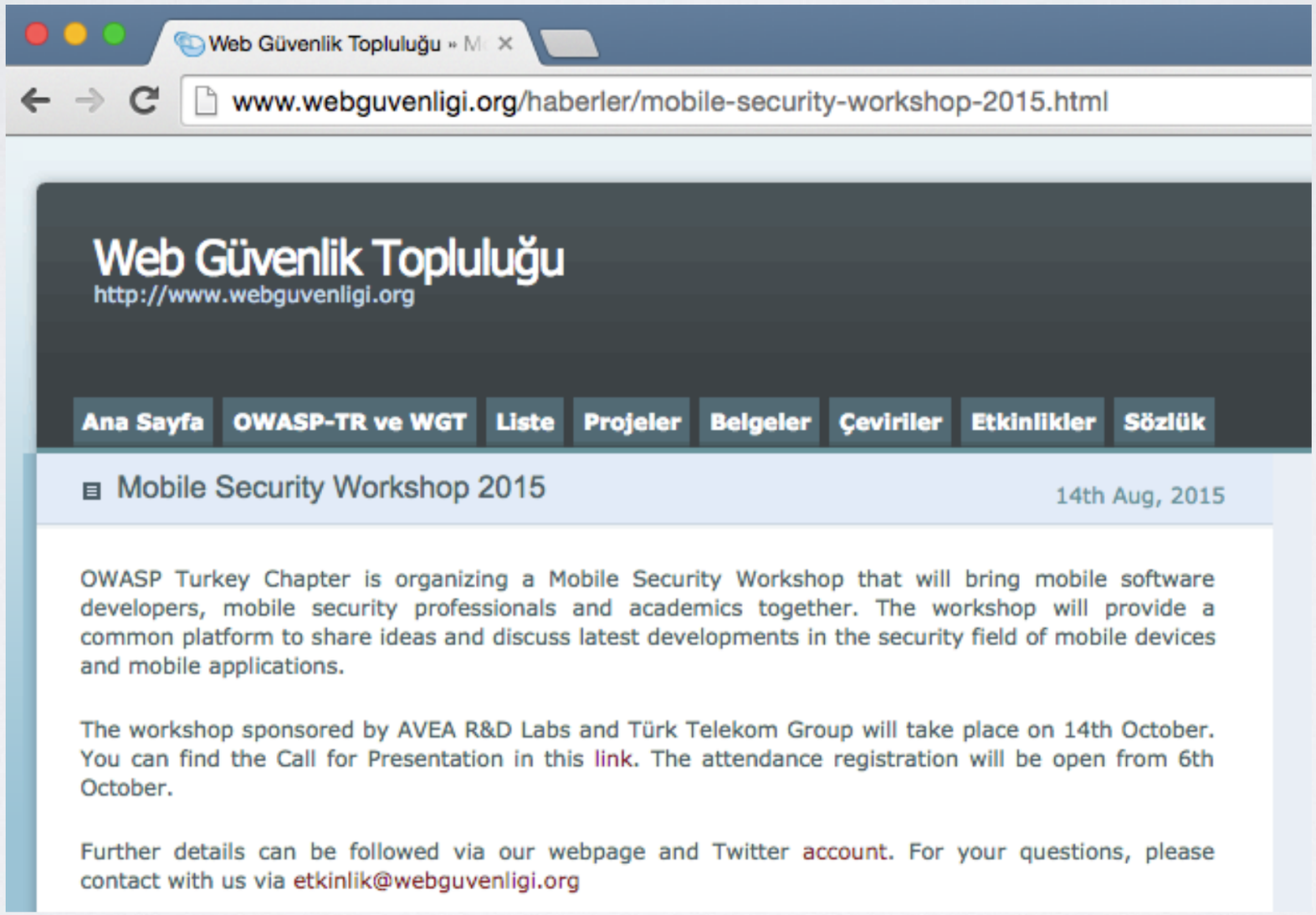


https://mobile-security.zeef.com/oguzhan.topgul


One more thing...

OWASP TURKEY MOBILE SECURITY WORKSHOP

- 14 October 2015

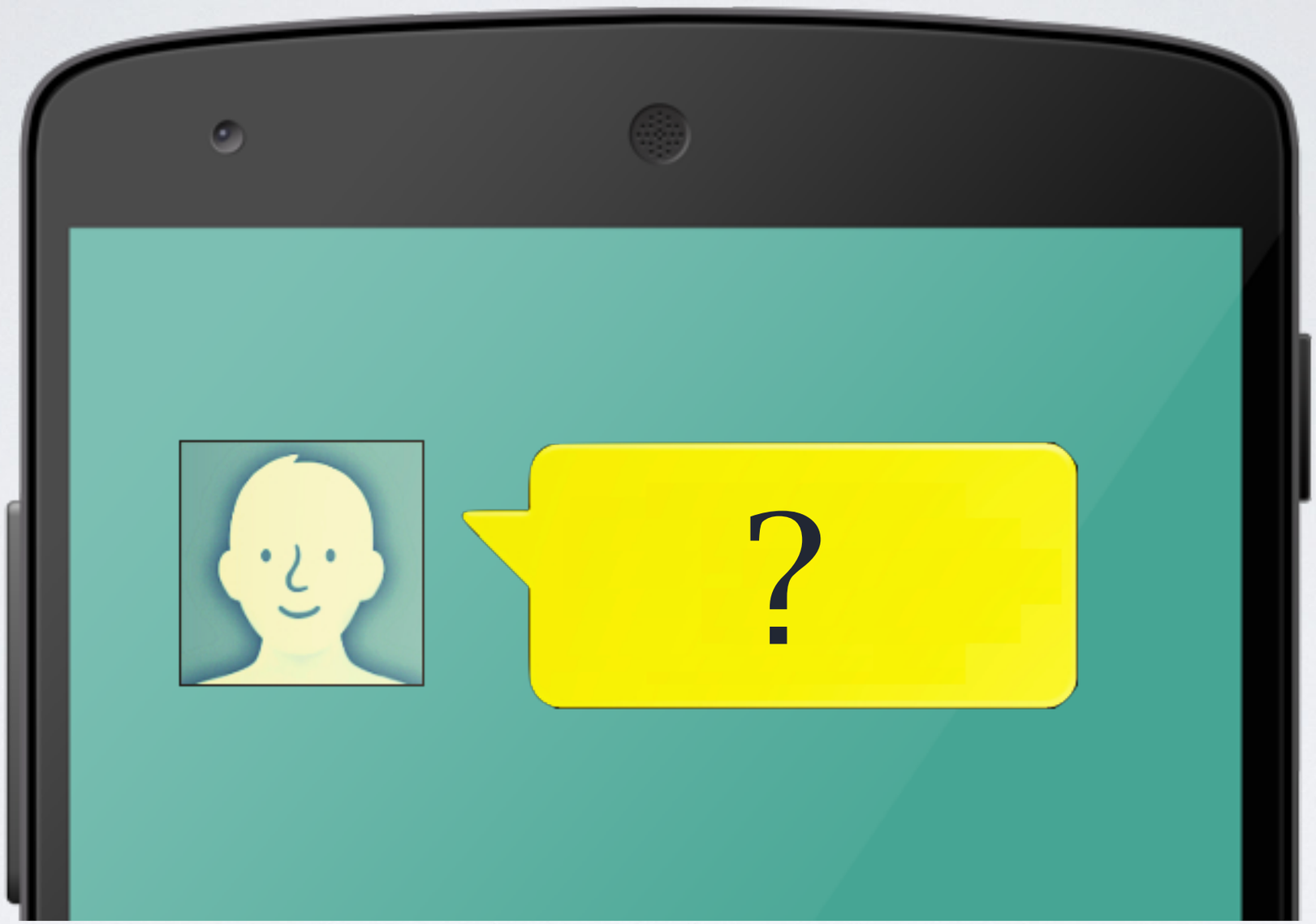


* http://www.webguvenligi.org/haberler/mobile-security-workshop-2015.html

RERERENCES

- **StageFright - Zimperium Blog:** https://blog.zimperium.com/experts-found-a-unicorn-in-the-heart-of-android/
- **StageFright Vulnerability Details:** https://blog.zimperium.com/stagefright-vulnerability-details-stagefright-detector-tool-released/
- **Stagefriht Detailed Explanation:** http://blog.fortinet.com/post/cryptogirl-on-stagefright-a-detailed-explanation
- **FTYP Atom:** http://www.ftyps.com/what.html
- **F4V/MP4 File Format:** http://www.adobe.com/content/dam/Adobe/en/devnet/flv/pdfs/video_file_format_spec_v10.pdf
- **StageFrightMetadataReceiver.cpp:** https://android.googlesource.com/platform/frameworks/av/+/android-4.4.2_r2.0.1/media/libstagefright/StagefrightMetadataRetriever.cpp
- **MPEG4Extractor.cpp:** https://android.googlesource.com/platform/frameworks/av/+/android-4.4.2_r2.0.1/media/libstagefright/MPEG4Extractor.cpp
- **SampleTable.cpp:** https://android.googlesource.com/platform/frameworks/av/+/android-4.4.2_r2.0.1/media/libstagefright/SampleTable.cpp
- **Android 5.0 Integer Overflow Fix :** https://android.googlesource.com/platform/frameworks/av/+/f106b19%5E!/
- **Android's StageFright Media Player Architecture:** https://quandarypeak.com/2013/08/androids-stagefright-media-player-architecture/

THANKS



Oğuzhan Topgül
@oguzhantopgul
www.oguzhantopgul.com

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