



技术开启新“视”界  
Technology Bring New Vision

## 视频媒资版权保护技术发展

刘歧 OnVideo 联合创始人

- 从07年工作开始接触图形图像技术开发
- 后来接触 Linux 图像设备相关驱动技术
- 再后来深入接触流媒体技术
- 在蓝汛、高升、金山云任职流媒体技术专家
- 参与维护 FFmpeg 官方源代码
- 全球 FFmpeg 技术顾问
- 视频智能云创作平台 OnVideo 联合创始人



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需求来源

2

主流手段利弊

3

攘外安内共行

4

未来展望

视频盒子盗链

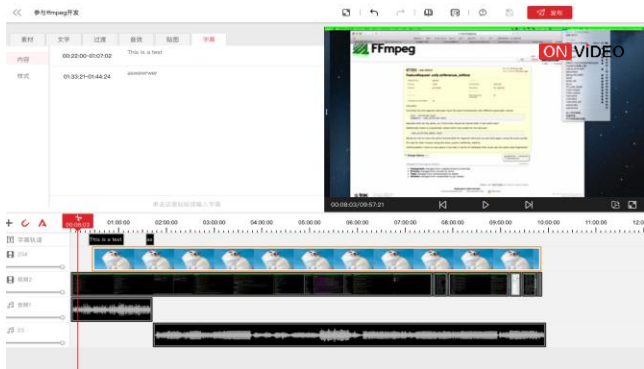
聚合APP盗链

收费节目保护

视频内容生产过程版权保护



电视猫  
MoreTV



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**Adobe**

ADOBE FLASH VIDEO FILE FORMAT

HTTP Dynamic Streaming

Real Time Messaging Protocol



HTTP Live Streaming (RFC8216)



Dynamic Adaptive Streaming over HTTP (ISO/IEC 23009)



HTTP + FLV(Token,Referer,User-Agent,ACL)

RTMP(Token,Referer,User-Agent,ACL , SWF防盗链)

	Token	Referer	UA	ACL	SWF
HTTP FLV	Y	Y	Y	Y	N
HDS	Y	Y	Y	Y	N
RTMP	Y	Y	Y	Y	Y

HEVC

AV1

Encryption



MPEGTS ( AES-128, SAMPLE-AES )

Fragment MP4 ( AES-128 , SAMPLE-AES [only CBCS] )

	Token	Referer	UA	ACL	Session
HLS	Y	Y	Y	Y	Y





MPEGTS ( AES-128, SAMPLE-AES )

Fragment MP4 ( AES-128 , SAMPLE-AES [ALL] )

	Token	Referer	UA	ACL	Session
DASH	Y	Y	Y	Y	Y

	CENC	CBC1	CENS	CBCS
DASH	Y	Y	Y	Y

cenc - AES-CTR mode full sample and video NAL Subsample encryption

cbc1 - AES-CBC mode full sample and video NAL Subsample encryption

cens - AES-CTR mode partial video NAL pattern encryption

cbcs - AES-CBC mode partial video NAL pattern encryption



	Gen	Codec	AES-128	CENC/CENS	CBC1	CBCS
FLV	Y	AVC	N	N	Y	Y
HDS	Y	AVC	N	N	Y	Y
RTMP	Y	AVC	RTMPE RTMPS	N	N	N
HLS	Y	AVC/HEVC	Y	N	N	Y
DASH	Y	AVC/HEVC	N	Y	Y	Y

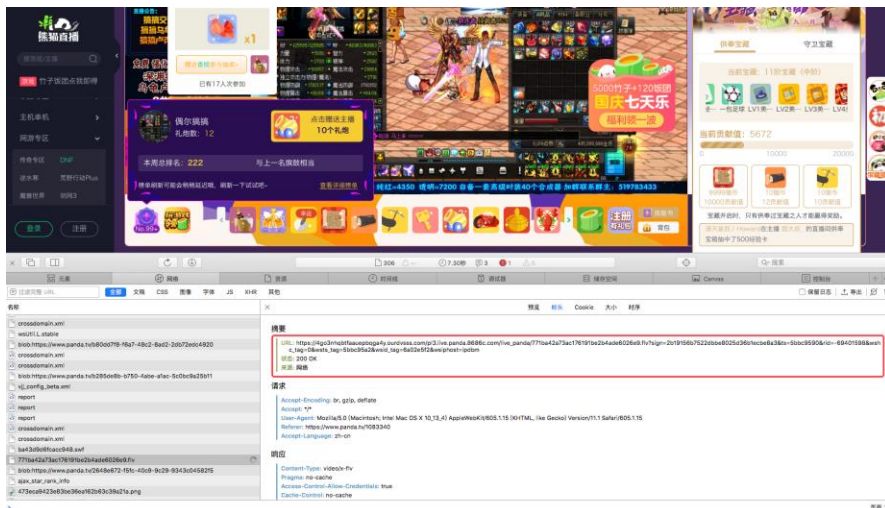




Wireshark

Firebug

WebBrowser



```
MacBook:xxx StevenLiu$ wget http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/index.m3u8
--2018-10-09 19:55:02-- http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/index.m3u8
Resolving cdn3.polaroidchina.com... 192.225.231.62, 192.225.231.167, 192.225.231.177
Connecting to cdn3.polaroidchina.com|192.225.231.62|:8091... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/index.m3u8 [following]
--2018-10-09 19:55:02-- http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/index.m3u8
Resolving cdn3.z2cy.com... 59.47.21.7
Connecting to cdn3.z2cy.com|59.47.21.7|:8091... connected.
HTTP request sent, awaiting response... 200 OK
Length: 95 [application/vnd.apple.mpegurl]
Saving to: 'index.m3u8'

100%[

2018-10-09 19:55:03 (1.00 KB/s) - 'index.m3u8' saved [95/95]

MacBook:xxx StevenLiu$ head -n 10 index.m3u8
#EXTM3U
#EXT-X-STREAM-INF:PROGRAM-ID=1,BANDWIDTH=600000,RESOLUTION=720x542
600kb/hls/index.m3u8MacBook:xxx StevenLiu$
MacBook:xxx StevenLiu$
MacBook:xxx StevenLiu$ wget http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/600kb/hls/index.m3u8
--2018-10-09 19:55:38-- http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/600kb/hls/index.m3u8
Resolving cdn3.polaroidchina.com... 192.225.231.167, 192.225.231.62, 192.225.231.177
Connecting to cdn3.polaroidchina.com|192.225.231.167|:8091... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/600kb/hls/index.m3u8 [following]
--2018-10-09 19:55:39-- http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/600kb/hls/index.m3u8
Resolving cdn3.z2cy.com... 59.47.21.7
Connecting to cdn3.z2cy.com|59.47.21.7|:8091... connected.
HTTP request sent, awaiting response... 200 OK
Length: 12412 (12K) [application/vnd.apple.mpegurl]
Saving to: 'index.m3u8.1'

100%[

2018-10-09 19:55:40 (67.8 KB/s) - 'index.m3u8.1' saved [12412/12412]

MacBook:xxx StevenLiu$ head -n 10 index.m3u8.1
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:3
#EXT-X-MEDIA-SEQUENCE:0
#EXT-X-KEY-METHOD=AES-128,URI="key.key"
#EXTINF:2.085000,
ADW66mqi8845000.ts
#EXTINF:2.085000,
ADW66mqi8845001.ts
#EXTINF:2.085000,
MacBook:xxx StevenLiu$
```

```
MacBook:xxx StevenLi$ wget http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/600kb/hls/ADW66mqi8845000.ts
--2018-10-09 19:58:32-- http://cdn3.polaroidchina.com:8091/20180709/ERZFFK0g/600kb/hls/ADW66mqi8845000.ts
Resolving cdn3.polaroidchina.com... 192.225.231.177, 192.225.231.167, 192.225.231.62
Connecting to cdn3.polaroidchina.com|192.225.231.177|:8091... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/600kb/hls/ADW66mqi8845000.ts [following]
--2018-10-09 19:58:33-- http://cdn3.z2cy.com:8091/20180709/ERZFFK0g/600kb/hls/ADW66mqi8845000.ts
Resolving cdn3.z2cy.com... 59.47.21.7
Connecting to cdn3.z2cy.com|59.47.21.7|:8091... connected.
HTTP request sent, awaiting response... 200 OK
Length: 171840 (168K) [video/mp2t]
Saving to: 'ADW66mqi8845000.ts'

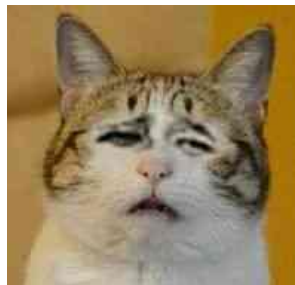
100%[-----]

2018-10-09 19:58:37 (58.6 KB/s) - 'ADW66mqi8845000.ts' saved [171840/171840]

MacBook:xxx StevenLi$ ffmpeg -hide_banner -i ADW66mqi8845000.ts
ADW66mqi8845000.ts: Invalid data found when processing input
```

```
MacBook:xxx StevenLi$ ffmpeg -allowed_extensions 'ALL' -hide_banner -i index.m3u8.1
[hls,applehttp @ 0x7f9db5800800] Opening 'key.key' for reading
[hls,applehttp @ 0x7f9db5800800] Opening 'crypto:ADW66mqi8845000.ts' for reading
Input #0, hls,applehttp, from 'index.m3u8.1':
  Duration: 00:00:02.09, start: 1.460422, bitrate: 0 kb/s
  Program 0
  Metadata:
    variant_bitrate: 0
  Stream #0:0 Video: h264 (High) ([27][0][0][0] / 0x001B), yuv420p, 720x542 [SAR 32249:32220 DAR 238:179], 23.98 fps, 23.98 tbr, 90k tbn, 47.95 tbc
  Metadata:
    variant_bitrate: 0
  Stream #0:1 Audio: aac (LC) ([15][0][0][0] / 0x000F), 44100 Hz, stereo, fltp
  Metadata:
    variant_bitrate: 0
At least one output file must be specified
```

限制次数，宁可错杀  
非标准协议定制  
类似3DES双边协定好





1

需求来源

2

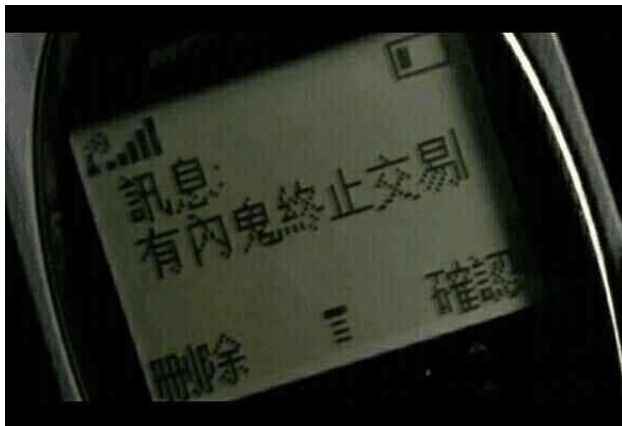
主流手段利弊

3

攘外安内技术

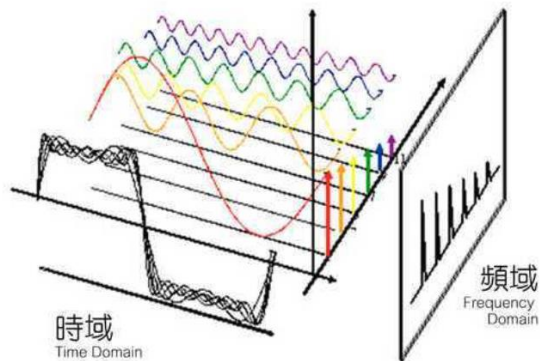
4

未来展望



傅里叶变换快速上手：

1. 从傅立叶变换到盲水印
2. 傅里叶分析之掐死教程



图像处理后结果



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未来展望



## 未来展望

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非标准封装

自定义传输协议

融合区块链技术做版权保护



# Thank you

