关于 Cobalt Strike 检测方法与去特征的思考

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人云亦云

关于检测 Cobalt Strike 的方法有很多，而网上有一些文章会告诉大家如何修改所谓的特征值，但是这些方法实际上存在一定的误导和盲区

一般发现 Cobalt Strike 服务器的途径有以下几种（简单分类，不准确，勿喷）

样本分析

中马回连

黑客连主控端

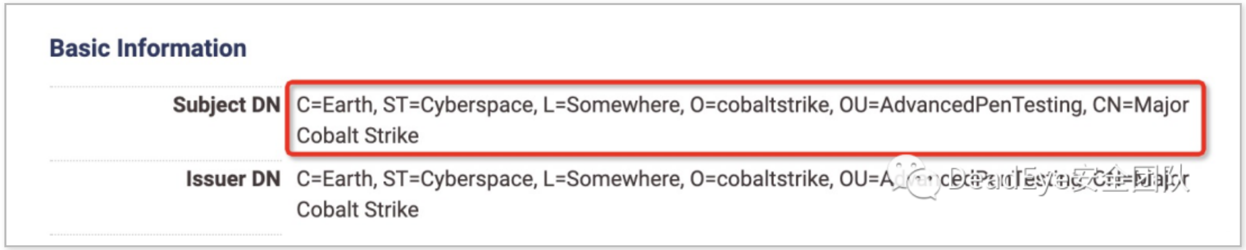
扫描发现

这里被使用的比较多的就是扫描发现，同时网上一些文章提到 Cobalt Strike 默认的 SSL/TLS 证书是固定的，所以一般都是使用这个证书作为特征值来发现 Cobalt Strike 服务器

所以，今天我们主要讨论这个默认 SSL/TLS 证书的问题

证书修改

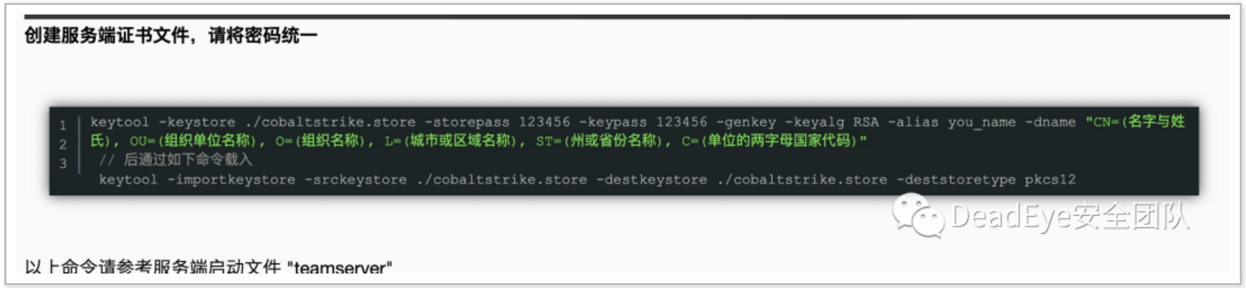
现在让我们提取这个证书的相关信息



Basic Information

Subject DN	C=Earth, ST=Cyberspace, L=Somewhere, O=cobaltstrike, OU=AdvancedPenTesting, CN=Major Cobalt Strike
Issuer DN	C=Earth, ST=Cyberspace, L=Somewhere, O=cobaltstrike, OU=AdvancedPenTesting, CN=Major Cobalt Strike

根据网上一些文章的修改方法，我们需要使用 keytool 修改证书信息，方法如下



创建服务端证书文件，请将密码统一

```
keytool -keystore ./cobaltstrike.store -storepass 123456 -keypass 123456 -genkey -keyalg RSA -alias you_name -dname "CN=(名字与姓氏), OU=(组织单位名称), O=(组织名称), L=(城市或区域名称), ST=(州或省份名称), C=(单位的两字母国家代码)"
 // 后通过如下命令载入
 keytool -importkeystore -srckeystore ./cobaltstrike.store -destkeystore ./cobaltstrike.store -deststoretype pkcs12
```

以上命令请参考服务端启动文件 "teamserver"

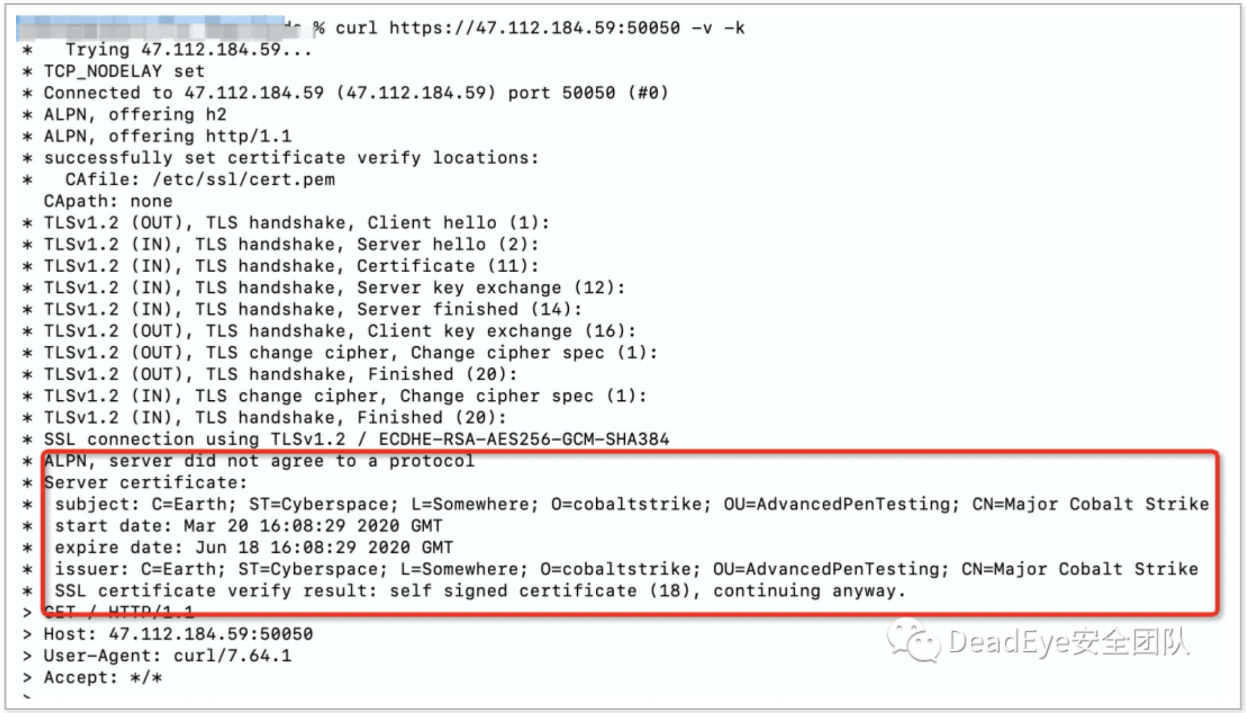
默认的证书具有很明显的特征，例如

```
O=cobaltstrike, OU=AdvancedPenTesting, CN=Major Cobalt Strike
```

我们拿这个信息去检索就可以发现许多 Cobalt Strike 服务器

但是这里忽略了一个问题，你到底修改的是什么证书，是主机上线的时候使用的吗?

这个证书是 teamserver 主控端使用的加密证书（默认端口 50050)



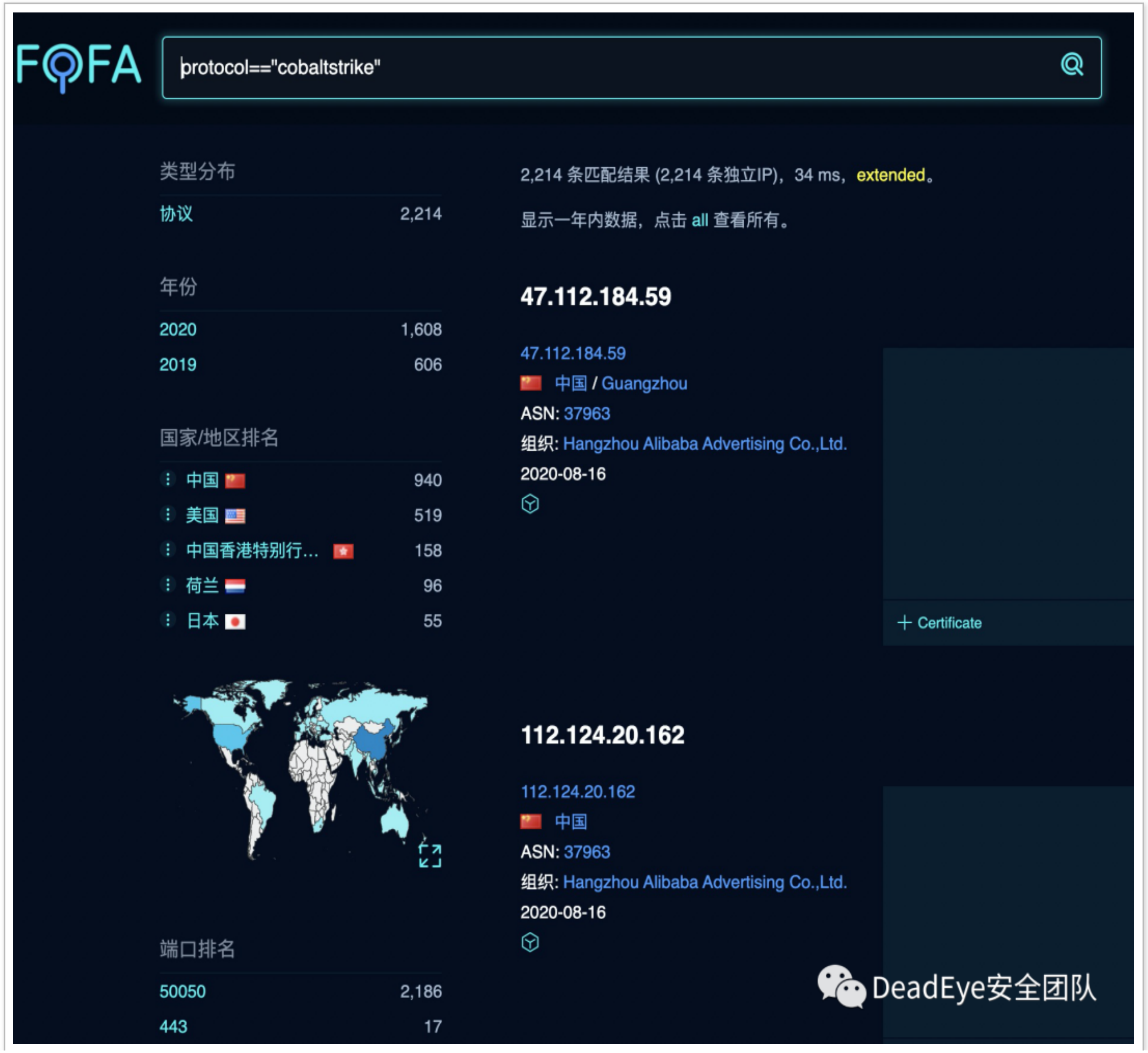
```
[redacted] % curl https://47.112.184.59:50050 -v -k
*   Trying 47.112.184.59...
* TCP_NODELAY set
* Connected to 47.112.184.59 (47.112.184.59) port 50050 (#0)
* ALPN, offering h2
* ALPN, offering http/1.1
* successfully set certificate verify locations:
*   CAfile: /etc/ssl/cert.pem
  CApath: none
* TLSv1.2 (OUT), TLS handshake, Client hello (1):
* TLSv1.2 (IN), TLS handshake, Server hello (2):
* TLSv1.2 (IN), TLS handshake, Certificate (11):
* TLSv1.2 (IN), TLS handshake, Server key exchange (12):
* TLSv1.2 (IN), TLS handshake, Server finished (14):
* TLSv1.2 (OUT), TLS handshake, Client key exchange (16):
* TLSv1.2 (OUT), TLS change cipher, Change cipher spec (1):
* TLSv1.2 (OUT), TLS handshake, Finished (20):
* TLSv1.2 (IN), TLS change cipher, Change cipher spec (1):
* TLSv1.2 (IN), TLS handshake, Finished (20):
* SSL connection using TLSv1.2 / ECDHE-RSA-AES256-GCM-SHA384
* ALPN, server did not agree to a protocol
* Server certificate:
*  subject: C=Earth; ST=Cyberspace; L=Somewhere; O=cobaltstrike; OU=AdvancedPenTesting; CN=Major Cobalt Strike
*  start date: Mar 20 16:08:29 2020 GMT
*  expire date: Jun 18 16:08:29 2020 GMT
*  issuer: C=Earth; ST=Cyberspace; L=Somewhere; O=cobaltstrike; OU=AdvancedPenTesting; CN=Major Cobalt Strike
*  SSL certificate verify result: self signed certificate (18), continuing anyway.
> GET / HTTP/1.1
> Host: 47.112.184.59:50050
> User-Agent: curl/7.64.1
> Accept: */*
>
```

修改这个证书以后 teamserver 服务器主控端的特征是没了

之前有一些人 hunting C2 服务器使用的就是这个规则

例如在 fofa.so 中，就有一条规则叫

```
protocol=="cobaltstrike"
```



protocol=="cobaltstrike"

类型分布

协议	2,214

年份

2020	1,608
2019	606

国家/地区排名

中国	940
美国	519
中国香港特别行...	158
荷兰	96
日本	55

端口排名

50050	2,186
443	17

2,214 条匹配结果 (2,214 条独立IP)，34 ms，extended。

显示一年内数据，点击 all 查看所有。

47.112.184.59

47.112.184.59
中国 / Guangzhou
ASN: 37963
组织: Hangzhou Alibaba Advertising Co.,Ltd.
2020-08-16

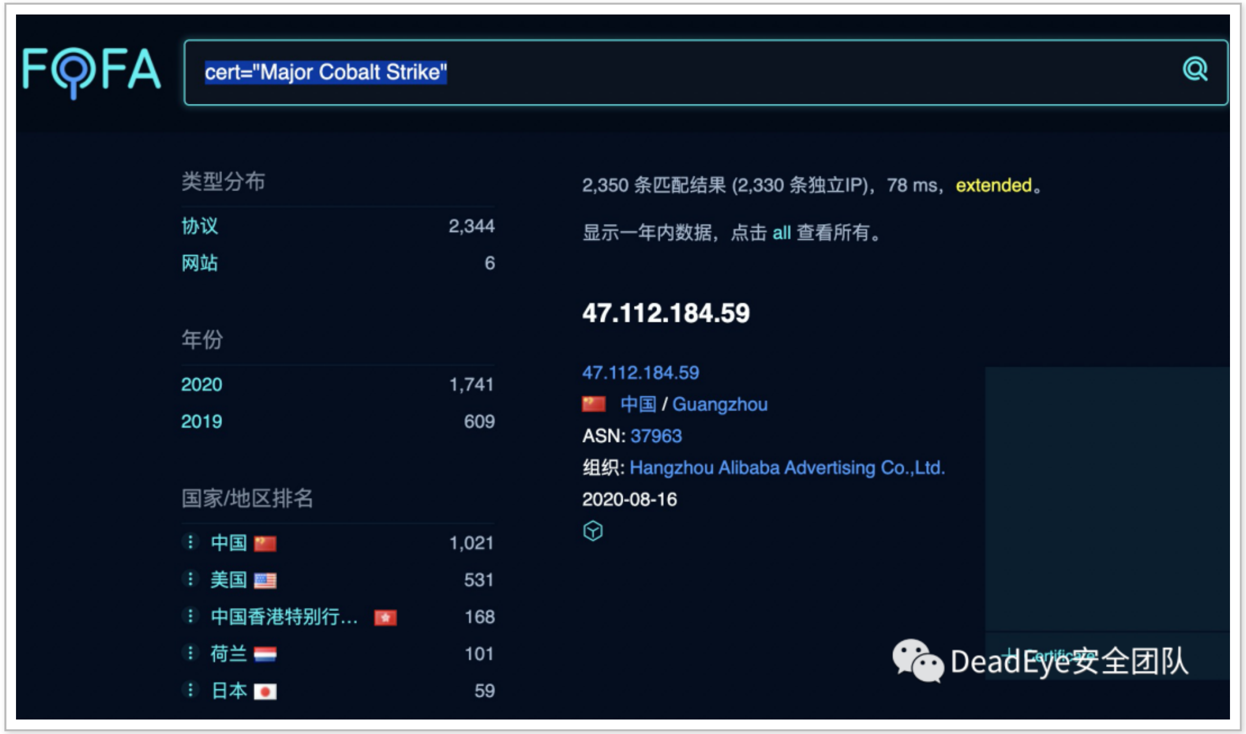
112.124.20.162

112.124.20.162
中国
ASN: 37963
组织: Hangzhou Alibaba Advertising Co.,Ltd.
2020-08-16

当然，我们也可以使用

```
cert="Major Cobalt Strike"
```

直接搜索



cert="Major Cobalt Strike"

类型分布

协议	2,344
网站	6

年份

2020	1,741
2019	609

国家/地区排名

中国	1,021
美国	531
中国香港特别行...	168
荷兰	101
日本	59

2,350 条匹配结果 (2,330 条独立IP)，78 ms，extended。

显示一年内数据，点击 all 查看所有。

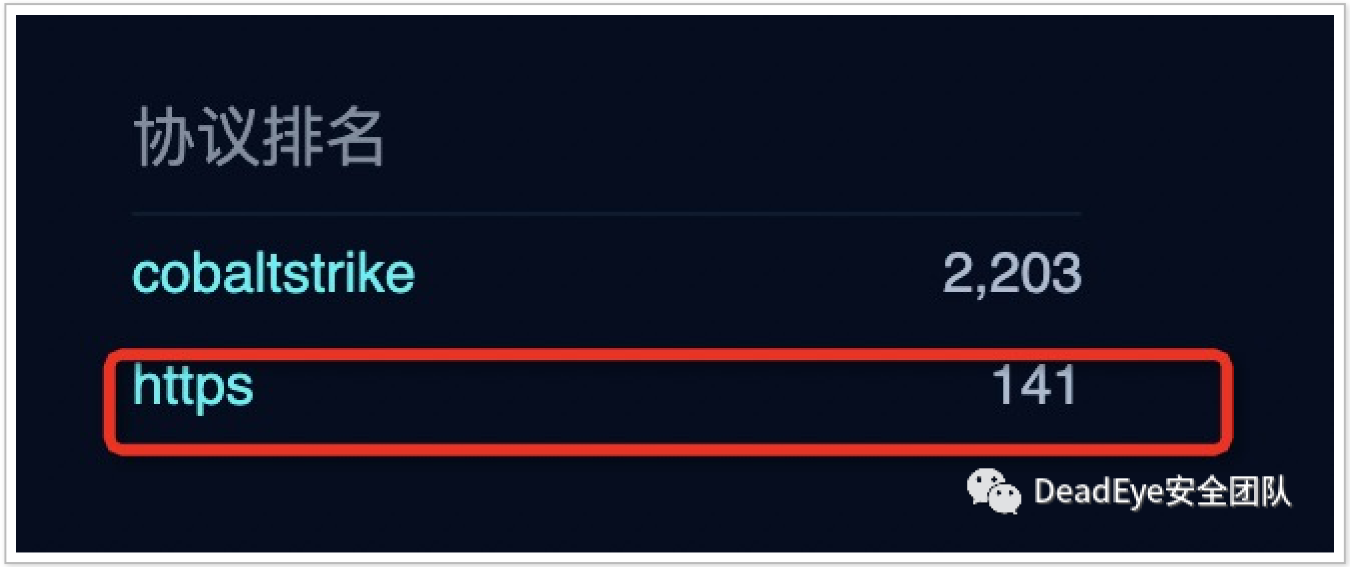
47.112.184.59

47.112.184.59
中国 / Guangzhou
ASN: 37963
组织: Hangzhou Alibaba Advertising Co.,Ltd.
2020-08-16

这里需要注意，使用

```
cert="Major Cobalt Strike"
```

搜索会发现有一些主机并没有被标注为 Cobalt Strike 服务器



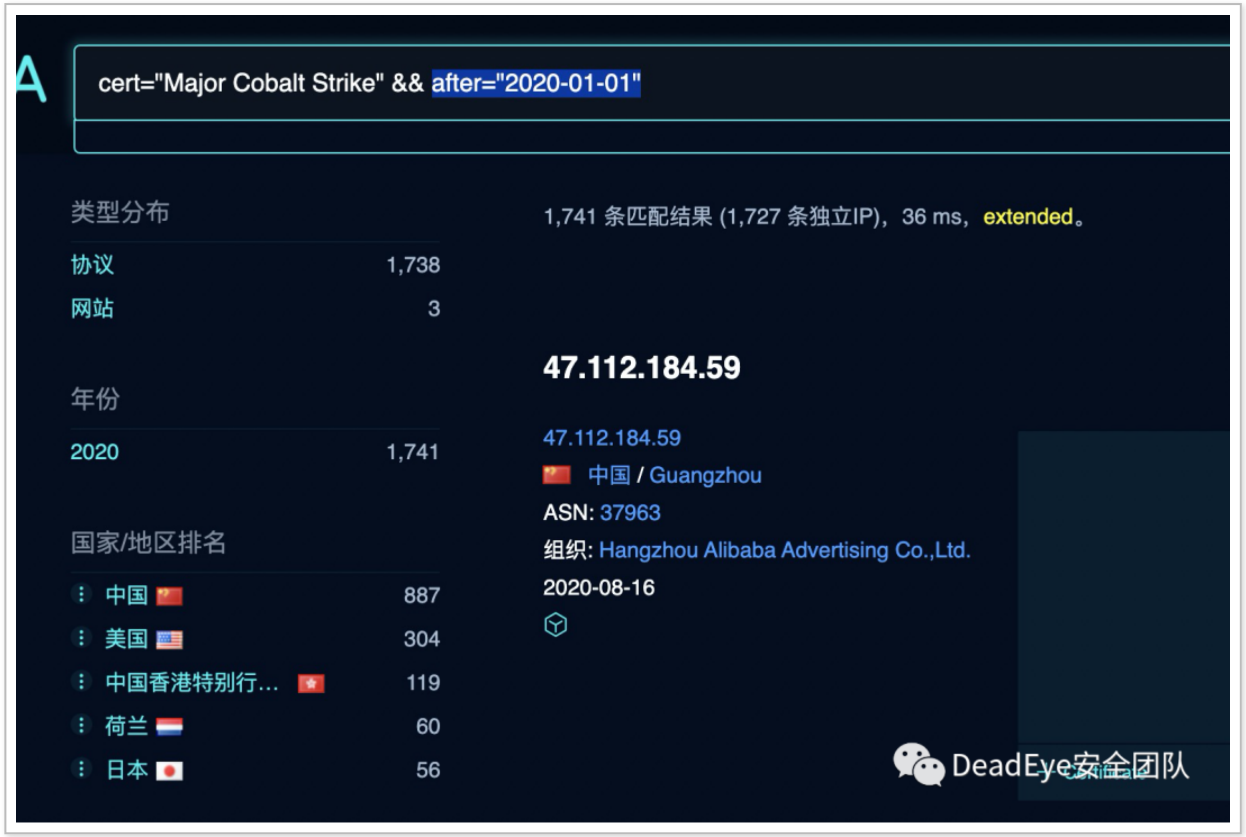
协议排名

cobaltstrike	2,203
https	141

（存在漏网之鱼

当然为了保证数据的时效性，我们在 fofa.so 搜索的时候最好加上

```
after="2020-01-01"
```



cert="Major Cobalt Strike" && after="2020-01-01"

类型分布

协议	1,738
网站	3

年份

2020	1,741

国家/地区排名

中国	887
美国	304
中国香港特别行...	119
荷兰	60
日本	56

1,741 条匹配结果 (1,727 条独立IP)，36 ms，extended。

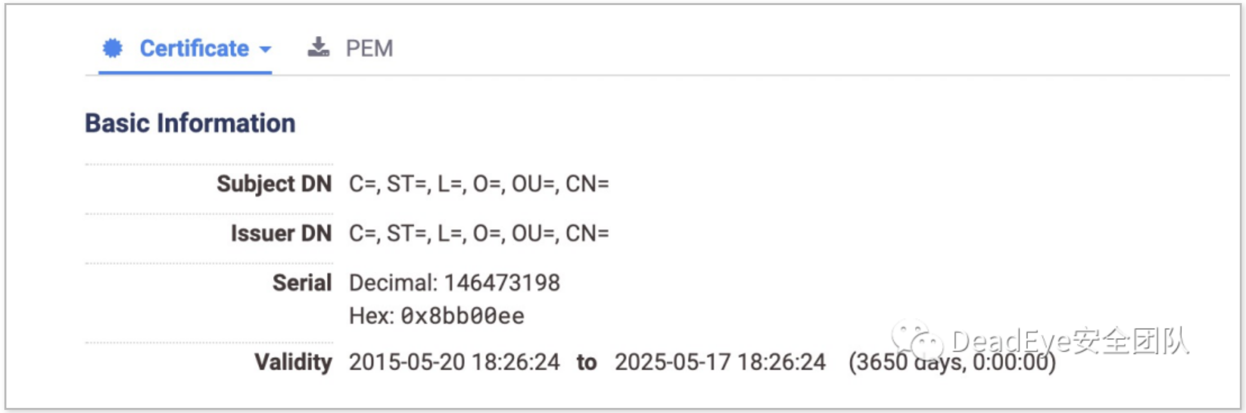
47.112.184.59

47.112.184.59
中国 / Guangzhou
ASN: 37963
组织: Hangzhou Alibaba Advertising Co.,Ltd.
2020-08-16

重要的分割线！！！！注意！！！！

但是！https 上线使用的证书，并不是上边我们修改的那一个，并且这个证书也是默认的...

证书信息如下图：



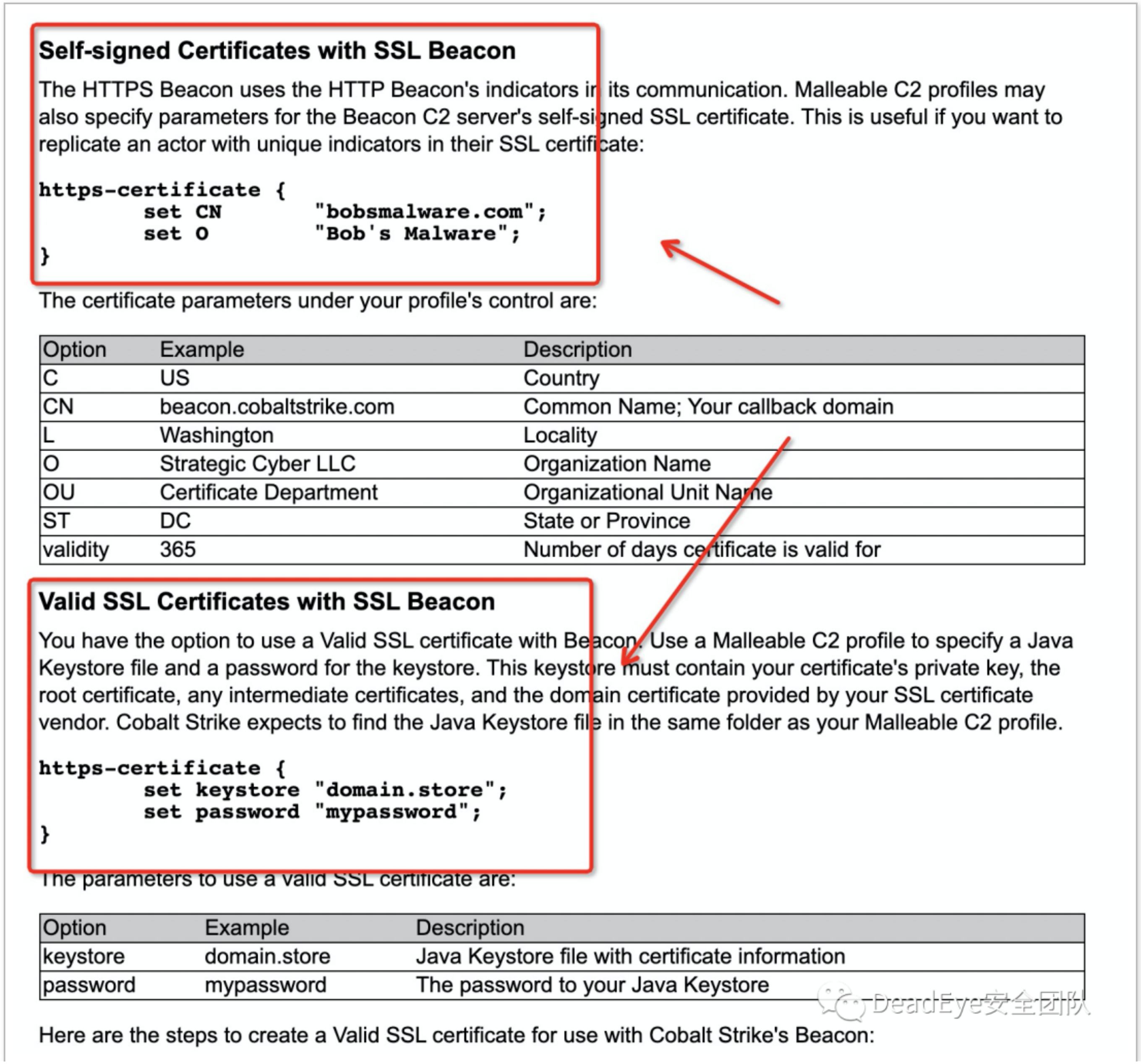
Basic Information

Subject DN	C=, ST=, L=, O=, OU=, CN=
Issuer DN	C=, ST=, L=, O=, OU=, CN=
Serial	Decimal: 146473198 Hex: 0x8bb00ee
Validity	2015-05-20 18:26:24 **to** 2025-05-17 18:26:24 (3650 days, 0:00:00)

如果想要修改这个证书，需要修改 Malleable C2 profile

查看官方文档

https://www.cobaltstrike.com/help-malleable-c2



Self-signed Certificates with SSL Beacon

The HTTPS Beacon uses the HTTP Beacon's indicators in its communication. Malleable C2 profiles may also specify parameters for the Beacon C2 server's self-signed SSL certificate. This is useful if you want to replicate an actor with unique indicators in their SSL certificate:

```
https-certificate {
        set CN       "bobsmalware.com";
        set O        "Bob's Malware";
}
```

The certificate parameters under your profile's control are:

Option	Example	Description
C	US	Country
CN	beacon.cobaltstrike.com	Common Name; Your callback domain
L	Washington	Locality
O	Strategic Cyber LLC	Organization Name
OU	Certificate Department	Organizational Unit Name
ST	DC	State or Province
validity	365	Number of days certificate is valid for

Valid SSL Certificates with SSL Beacon

You have the option to use a Valid SSL certificate with Beacon. Use a Malleable C2 profile to specify a Java Keystore file and a password for the keystore. This keystore must contain your certificate's private key, the root certificate, any intermediate certificates, and the domain certificate provided by your SSL certificate vendor. Cobalt Strike expects to find the Java Keystore file in the same folder as your Malleable C2 profile.

```
https-certificate {
        set keystore "domain.store";
        set password "mypassword";
}
```

The parameters to use a valid SSL certificate are:

Option	Example	Description
keystore	domain.store	Java Keystore file with certificate information
password	mypassword	The password to your Java Keystore

Here are the steps to create a Valid SSL certificate for use with Cobalt Strike's Beacon:

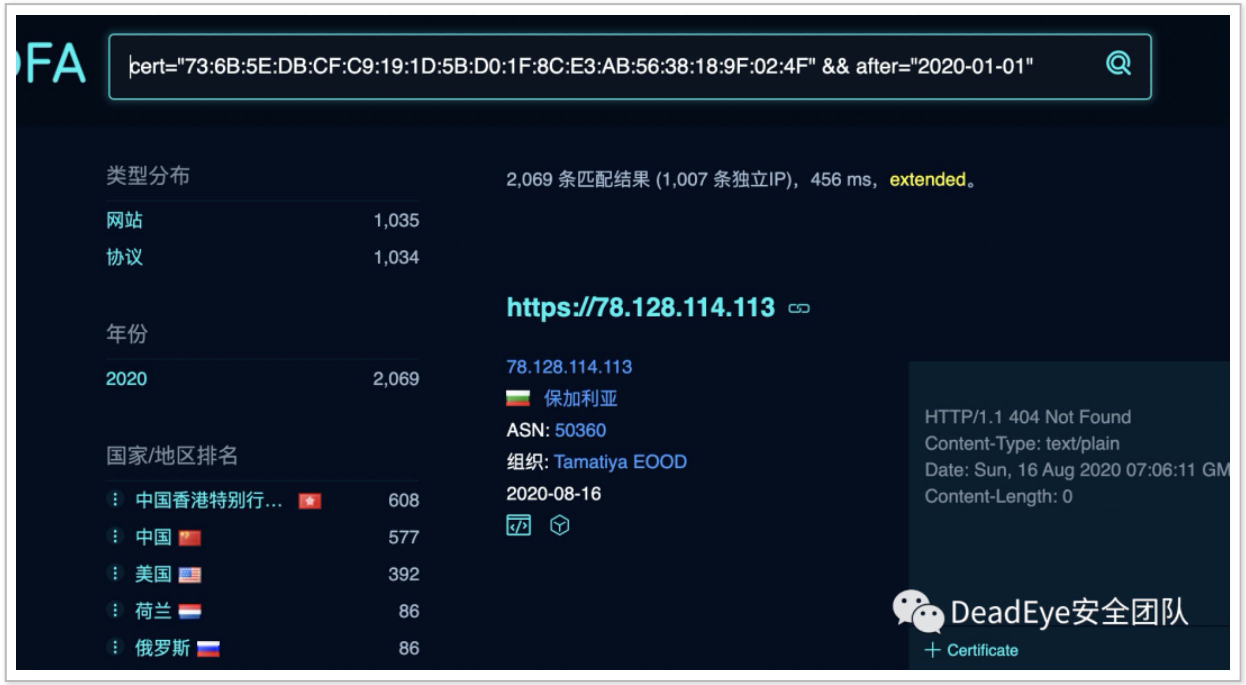
其中 Self-signed Certificates with SSL Beacon 和 Valid SSL Certificates with SSL Beacon 是用来修改 https 上线使用的证书的，Self-signed Certificates with SSL Beacon 根据字母意

思理解，就是自己设定的自签名证书，还有如果使用了 Valid SSL Certificates with SSL Beacon，我们在之前通过 keytool 设置的证书也可以用的上，但是这里应该让我们使用的是真实的证书，不管是偷来的还是买来的，用就完了

Let's Hunt!

使用 fofa.so 搜索相关证书信息

```
cert="73:6B:5E:DB:CF:C9:19:1D:5B:D0:1F:8C:E3:AB:56:38:18:9F:02:4F" && after="2020-01-01"
```



cert="73:6B:5E:DB:CF:C9:19:1D:5B:D0:1F:8C:E3:AB:56:38:18:9F:02:4F" && after="2020-01-01"

类型分布

网站	1,035
协议	1,034

年份

2020	2,069

国家/地区排名

中国香港特别行...	608
中国	577
美国	392
荷兰	86
俄罗斯	86

2,069 条匹配结果 (1,007 条独立IP)，456 ms，extended。

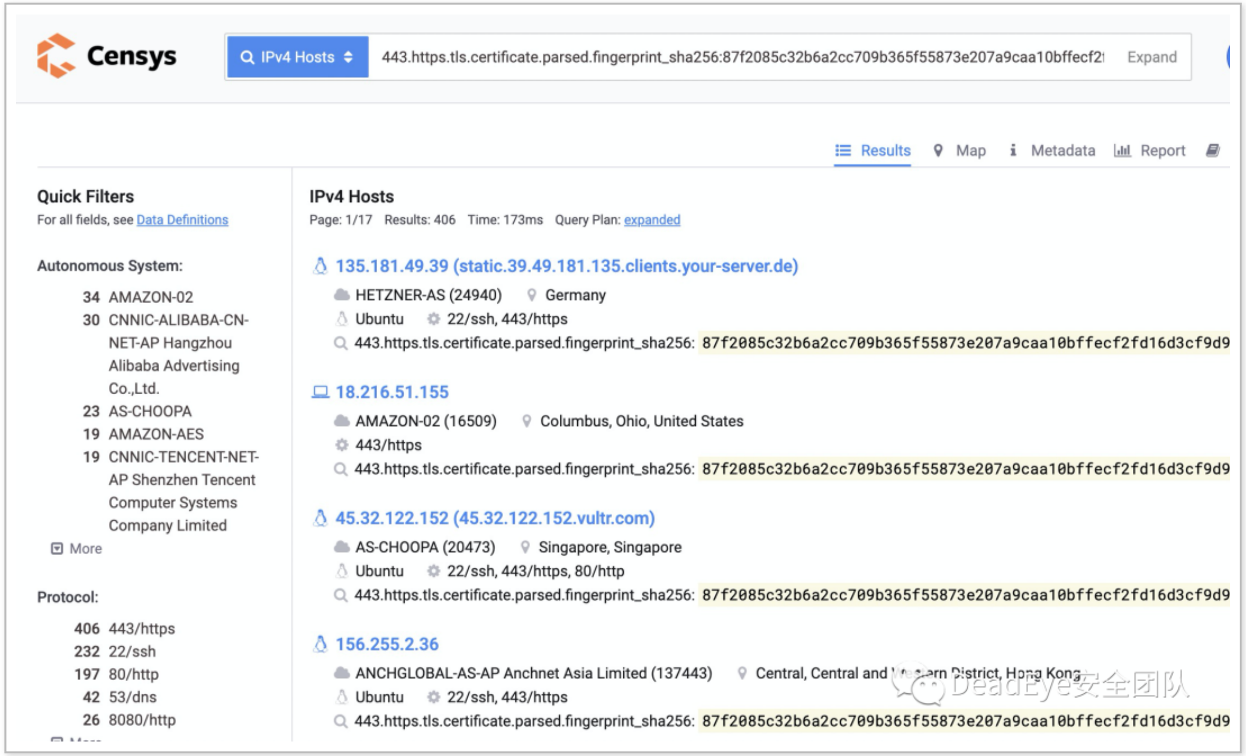
https://78.128.114.113

78.128.114.113
保加利亚
ASN: 50360
组织: Tamatiya EOOD
2020-08-16

```
HTTP/1.1 404 Not Found
Content-Type: text/plain
Date: Sun, 16 Aug 2020 07:06:11 GM
Content-Length: 0
```

使用 censys.io 搜索相关信息

```
443.https.tls.certificate.parsed.fingerprint_sha256:87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2fd16d3cf9d94d390c
```



443.https.tls.certificate.parsed.fingerprint_sha256:87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2

Quick Filters
For all fields, see Data Definitions

Autonomous System:

34	AMAZON-02
30	CNNIC-ALIBABA-CN-NET-AP Hangzhou Alibaba Advertising Co.,Ltd.
23	AS-CHOOPA
19	AMAZON-AES
19	CNNIC-TENCENT-NET-AP Shenzhen Tencent Computer Systems Company Limited

More

Protocol:

406	443/https
232	22/ssh
197	80/http
42	53/dns
26	8080/http

IPv4 Hosts
Page: 1/17 Results: 406 Time: 173ms Query Plan: expanded

135.181.49.39 (static.39.49.181.135.clients.your-server.de)
HETZNER-AS (24940) Germany
Ubuntu 22/ssh, 443/https
443.https.tls.certificate.parsed.fingerprint_sha256: 87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2fd16d3cf9d9

18.216.51.155
AMAZON-02 (16509) Columbus, Ohio, United States
443/https
443.https.tls.certificate.parsed.fingerprint_sha256: 87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2fd16d3cf9d9

45.32.122.152 (45.32.122.152.vultr.com)
AS-CHOOPA (20473) Singapore, Singapore
Ubuntu 22/ssh, 443/https, 80/http
443.https.tls.certificate.parsed.fingerprint_sha256: 87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2fd16d3cf9d9

156.255.2.36
ANCHGLOBAL-AS-AP Anchnet Asia Limited (137443) Central, Central and Western District, Hong Kong
Ubuntu 22/ssh, 443/https
443.https.tls.certificate.parsed.fingerprint_sha256: 87f2085c32b6a2cc709b365f55873e207a9caa10bffecf2fd16d3cf9d9

这里我们可以发现一些有趣的现象，例如有些服务器的 50050 端口也开了，teamserver 主控端的证书确实也是修改了，这证明攻击者还是会看一下文章学习如何去特征，但不幸的是只修改了一个

仅仅是扫描 ip 就能拿到所有证书吗？不能，我们也需要扫描域名，还有就是 https 也不一定只开在 443 端口上

据我们了解，好多人搭建 C2 服务器的方法都比较原始，比如在某云搭建 C2 服务器，不会使用 slb/elb 转发请求，不会使用 security group 控制访问，不会使用一些高明的隐藏 C2 的方法。

并且烂大街的 Domain fronting、CDN 上线、高信誉服务等等也不会使用，就是上线梭哈一把刷..... 真的是给蓝队兄弟们一条生路

等等，到这就完了吗?

检测加密流量

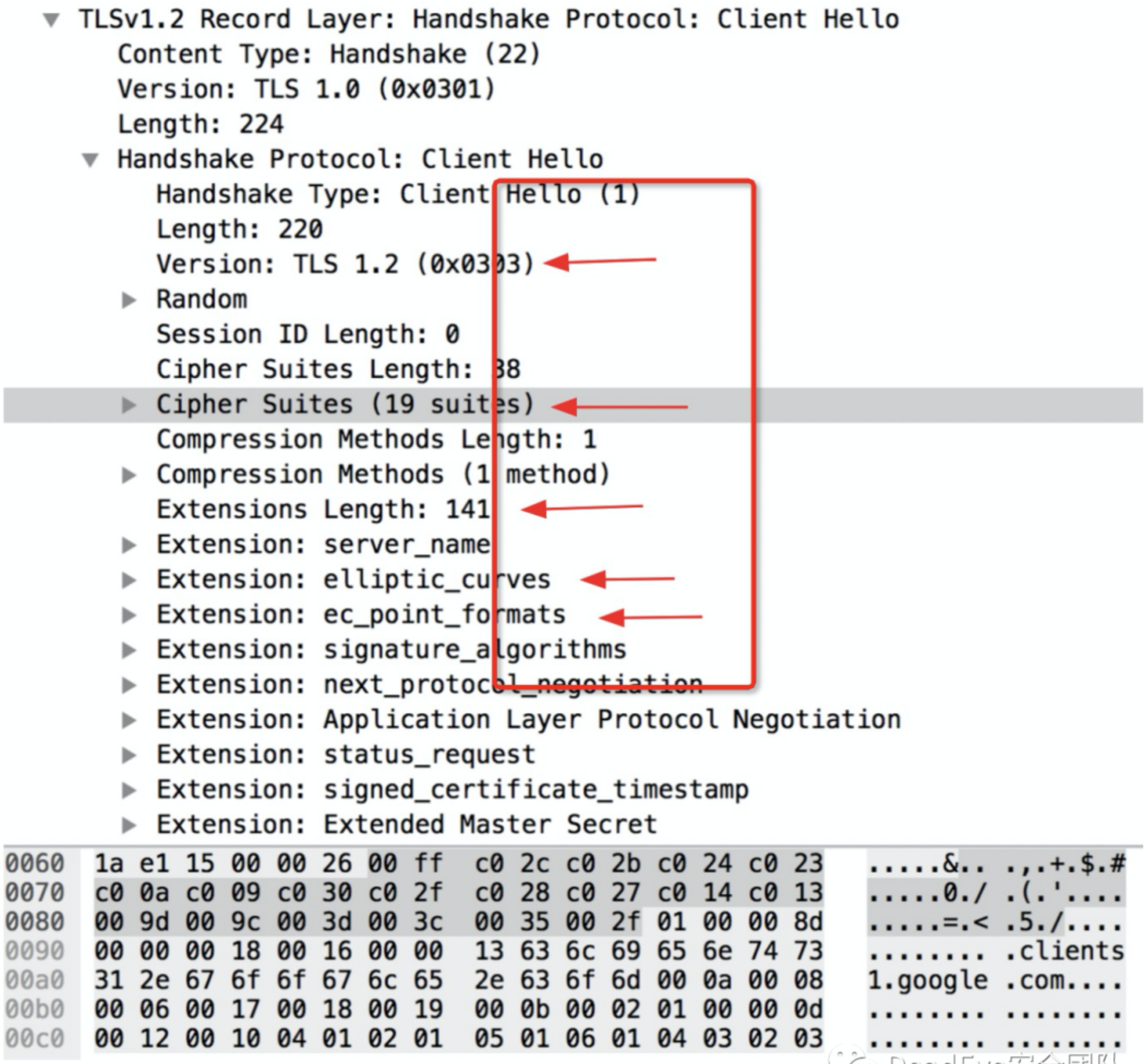
如果这些信息都修改了我们该怎么办那?

实际上还是有方法去检测的

我们可以参考 https://github.com/salesforce/ja3 这个项目

简单科普一下 JA3

JA3 方法用于收集 Client Hello 数据包中以下字段的十进制字节值：版本、可接受的密码、扩展列表、椭圆曲线密码和椭圆曲线密码格式。然后，它将这些值串联在一起，使用 “,” 来分隔各个字段，同时，使用 “-” 来分隔各个字段中的各个值。



```
▼ TLSv1.2 Record Layer: Handshake Protocol: Client Hello
    Content Type: Handshake (22)
    Version: TLS 1.0 (0x0301)
    Length: 224
  ▼ Handshake Protocol: Client Hello
      Handshake Type: Client Hello (1)
      Length: 220
      Version: TLS 1.2 (0x0303)
    ▶ Random
      Session ID Length: 0
      Cipher Suites Length: 38
    ▶ Cipher Suites (19 suites)
      Compression Methods Length: 1
    ▶ Compression Methods (1 method)
      Extensions Length: 141
    ▶ Extension: server_name
    ▶ Extension: elliptic_curves
    ▶ Extension: ec_point_formats
    ▶ Extension: signature_algorithms
    ▶ Extension: next_protocol_negotiation
    ▶ Extension: Application Layer Protocol Negotiation
    ▶ Extension: status_request
    ▶ Extension: signed_certificate_timestamp
    ▶ Extension: Extended Master Secret
0060  1a e1 15 00 00 26 00 ff  c0 2c c0 2b c0 24 c0 23   .....&.. .,.+.$.#
0070  c0 0a c0 09 c0 30 c0 2f  c0 28 c0 27 c0 14 c0 13   .....0./ .(.'....
0080  00 9d 00 9c 00 3d 00 3c  00 35 00 2f 01 00 00 8d   .....=.< .5./....
0090  00 00 00 18 00 16 00 00  13 63 6c 69 65 6e 74 73   ........ .clients
00a0  31 2e 67 6f 6f 67 6c 65  2e 63 6f 6d 00 0a 00 08   1.google .com....
00b0  00 06 00 17 00 18 00 19  00 0b 00 02 01 00 00 0d   ........ ........
00c0  00 12 00 10 04 01 02 01  05 01 06 01 04 03 02 03   ........ ........
```

Example Client Hello packet as viewed in Wireshark

这里相当于把支持的 TLS 扩展信息，都收集起来当作一个特征值来用（除了客户端发起的，还有关于服务器的 JA3S）

这其实算一种降维打击，并且我们发现主流在线沙箱、主流 IDS 大都支持了 JA3/JA3S 指纹检测

因为本篇文章主要是讨论 Cobalt Strike 默认证书的问题，所以在这里就不过多介绍 JA3/JA3S 相关的信息了

IOCs:

2[.]56.212.165

3[.]106.130.137

3[.]11.62.87

3[.]121.32.171

3[.]128.154.6

3[.]129.110.164

3[.]129.19.175

3[.]130.5.32

3[.]130.75.203

3[.]135.199.11

3[.]16.137.85

3[.]218.141.232

3[.]22.141.197

3[.]22.195.74

3[.]234.252.217

3[.]234.255.7

3[.]236.183.143

3[.]25.149.16

3[.]25.162.235

3[.]25.177.162

3[.]25.180.21

3[.]80.164.184

3[.]95.136.233

3[.]95.159.27

5[.]149.253.199

5[.]180.99.65

5[.]188.206.219

5[.]39.216.203

5[.]39.217.115

5[.]39.221.60

5[.]45.64.36

5[.]8.18.50

8[.]210.152.83

8[.]210.52.10

13[.]124.92.145

13[.]211.161.113

13[.]211.170.37

13[.]211.180.107

13[.]229.222.207

13[.]236.208.125

13[.]54.198.47

13[.]59.192.233

13[.]91.4.128

18[.]130.144.147

18[.]130.155.157

18[.]163.206.98

18[.]163.46.190

18[.]166.31.113

18[.]215.167.27

18[.]216.51.155

18[.]217.19.176

18[.]217.54.127

18[.]224.234.85

23[.]101.204.40

23[.]106.215.179

23[.]248.162.142

23[.]254.202.217

23[.]254.228.89

23[.]254.229.35

23[.]254.230.60

23[.]82.185.91

23[.]82.185.96

23[.]83.248.105

27[.]102.118.181

27[.]102.118.187

27[.]102.118.190

31[.]14.40.230

31[.]210.91.217

31[.]220.43.160

31[.]44.184.125

31[.]44.184.131

31[.]44.184.48

31[.]44.184.49

31[.]44.184.50

31[.]44.184.51

31[.]44.184.53

31[.]44.184.55

34[.]204.3.10

34[.]209.40.26

34[.]212.83.227

34[.]221.2.201

34[.]224.157.70

34[.]230.68.206

34[.]238.192.43

34[.]67.180.214

34[.]80.144.150

34[.]84.39.173

34[.]87.76.219

34[.]92.237.246

34[.]92.57.181

34[.]94.33.19

34[.]96.129.197

34[.]96.245.66

34[.]97.55.204

35[.]164.172.115

35[.]176.207.20

35[.]201.164.132

35[.]203.173.196

35[.]225.244.45

35[.]234.156.244

35[.]235.89.222

35[.]241.125.159

36[.]133.35.7

39[.]100.119.37

39[.]100.233.99

39[.]100.65.99

39[.]100.72.108

39[.]101.174.86

39[.]101.207.137

39[.]101.207.158

39[.]102.37.102

39[.]102.40.225

39[.]102.52.75

39[.]104.162.182

39[.]105.106.14

39[.]105.202.243

39[.]105.229.27

39[.]105.23.21

39[.]105.24.37

39[.]105.55.133

39[.]105.59.107

39[.]105.69.107

39[.]106.107.82

39[.]106.144.55

39[.]106.205.34

39[.]106.21.92

39[.]106.219.95

39[.]106.223.146

39[.]106.81.105

39[.]106.85.139

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209[.]126.119.186

210[.]16.120.248

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212[.]129.150.253

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