

如何解码调制解调器卡滞状态诊断的DOCSIS证书

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简介

本文档介绍解码DOCSIS证书以诊断电缆调制解调器端接系统(CMTS)上电缆调制解调器为何处于拒绝(pk)或w-reject(pk)状态的步骤。

背景信息

在某些情况下，调制解调器最终处于拒绝(pk)状态。它可能由特定条件（例如，在CM证书中，CM颁发者与CA使用者名称不匹配）引起。

例如：

```
SLOT 5/0: May 10 10:13:48.272 CET: Got Issuer 0^A^A1^K0 ^F^CU^D^F^S^BTW1^\0^Z^F^CU^D
^S^SHitron Technologies1^00
^F^CU^D^K^S^FDOCSIS1C0A^F^CU^D^C^S:Hitron Technologies Cable Modem Root Certificate Authority
from Certificate.
SLOT 5/0: May 10 10:13:48.272 CET: Got a new Invalid CM cert from a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.272 CET: CA Cert Subject does not match CM Cert Issuer
SLOT 5/0: May 10 10:13:48.272 CET: BPI+ CM Cert Dump:

SLOT 5/0: May 10 10:13:48.272 CET: Failed CM Issuer not found. CMTS sent AUTH reject.
SLOT 5/0: May 10 10:13:48.272 CET: Sending KEK REJECT. Reason Code:6 Reason:16
SLOT 5/0: May 10 10:13:48.272 CET: BPI Authorization Reject Packet: a84e.3fdd.84c4
```

此输出没有清楚地显示问题的根本原因。

本文可用于生成可读证书（可由Mac上的openssl或KeyChain打开），以识别不匹配。

要求

Cisco 建议您了解以下主题：

- DOCSIS中的基线隐私(BPI)
- 电缆调制解调器端接系统(CMTS)

提示：为了更好地了解DOCSIS中的基线隐私，建议在Cisco CMTS文章中通过[DOCSIS 1.0基线隐私](#)。

使用的组件

本文档不限于特定的软件和硬件版本。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

解码过程

任务1.收集日志

在CMTS上，要获取证书十六进制转储，您需要启用日志。键入这些命令。

```
debug cable mac-address
```

Telnet至线卡，并从CMTS上的LINECARD收集日志。

```
CMTS#telnet 127.0.0.XY
Trying 127.0.0.XY ... Open
```

```
clc_X_Y>en
clc_X_Y#
clc_X_Y#show log
```

您可以获得与此类似的输出。

```
SLOT 5/0: May 10 10:13:48.260 CET: BPI+ Manufacturer Cert Dump: a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.260 CET: CA Certificate Dump:
SLOT 5/0: May 10 10:13:48.260 CET: 0x0000: 30 82 03 22 30 82 02 0A A0 03 02 01 02 02 10 43
SLOT 5/0: May 10 10:13:48.260 CET: 0x0010: 64 B5 50 E8 ED 7E E5 57 14 5A C0 A2 67 52 EC 30
SLOT 5/0: May 10 10:13:48.260 CET: 0x0020: 0D 06 09 2A 86 48 86 F7 0D 01 01 05 05 00 30 6F
SLOT 5/0: May 10 10:13:48.260 CET: 0x0030: 31 0B 30 09 06 03 55 04 06 13 02 42 45 31 1F 30
SLOT 5/0: May 10 10:13:48.260 CET: 0x0040: 1D 06 03 55 04 0A 13 16 74 43 6F 6D 4C 61 62 73
SLOT 5/0: May 10 10:13:48.260 CET: 0x0050: 20 2D 20 45 75 72 6F 2D 44 4F 43 53 49 53 31 15
SLOT 5/0: May 10 10:13:48.260 CET: 0x0060: 30 13 06 03 55 04 0B 13 0C 43 61 62 6C 65 20 4D
SLOT 5/0: May 10 10:13:48.260 CET: 0x0070: 6F 64 65 6D 73 31 28 30 26 06 03 55 04 03 13 1F
SLOT 5/0: May 10 10:13:48.260 CET: 0x0080: 45 75 72 6F 2D 44 4F 43 53 49 53 20 43 61 62 6C
SLOT 5/0: May 10 10:13:48.260 CET: 0x0090: 65 20 4D 6F 64 65 6D 20 52 6F 6F 74 20 43 41 30
SLOT 5/0: May 10 10:13:48.260 CET: 0x00A0: 1E 17 0D 30 34 30 38 31 33 30 30 30 30 30 30 5A
```

SLOT 5/0: May 10 10:13:48.260 CET: 0x00B0: 17 0D 32 34 30 38 31 32 32 33 35 39 35 39 5A 30

SLOT 5/0: May 10 10:13:48.260 CET: 0x00C0: 81 86 31 0B 30 09 06 03 55 04 06 13 02 54 57 31

SLOT 5/0: May 10 10:13:48.260 CET: 0x00D0: 1C 30 1A 06 03 55 04 0A 13 13 48 69 74 72 6F 6E

SLOT 5/0: May 10 10:13:48.260 CET: 0x00E0: 20 54 65 63 68 6E 6F 6C 6F 67 69 65 73 31 14 30

SLOT 5/0: May 10 10:13:48.260 CET: 0x00F0: 12 06 03 55 04 0B 13 0B 45 75 72 6F 2D 44 4F 43

SLOT 5/0: May 10 10:13:48.260 CET: 0x0100: 53 49 53 31 43 30 41 06 03 55 04 03 13 3A 48 69

SLOT 5/0: May 10 10:13:48.260 CET: 0x0110: 74 72 6F 6E 20 54 65 63 68 6E 6F 6C 6F 67 69 65

SLOT 5/0: May 10 10:13:48.260 CET: 0x0120: 73 20 43 61 62 6C 65 20 4D 6F 64 65 6D 20 52 6F

SLOT 5/0: May 10 10:13:48.260 CET: 0x0130: 6F 74 20 43 65 72 74 69 66 69 63 61 74 65 20 41

SLOT 5/0: May 10 10:13:48.260 CET: 0x0140: 75 74 68 6F 72 69 74 79 30 81 9F 30 0D 06 09 2A

SLOT 5/0: May 10 10:13:48.260 CET: 0x0150: 86 48 86 F7 0D 01 01 01 05 00 03 81 8D 00 30 81

SLOT 5/0: May 10 10:13:48.260 CET: 0x0160: 89 02 81 81 00 B8 47 DA 9D F1 F6 30 1B 8E 79 BE

SLOT 5/0: May 10 10:13:48.260 CET: 0x0170: BE 10 C3 2D 9F 7D D6 C7 B2 50 16 AB 85 5C 1C 8C

SLOT 5/0: May 10 10:13:48.260 CET: 0x0180: 9E 6B F7 15 60 B2 53 F4 2F 6D 49 0C 2C 3E 76 88

SLOT 5/0: May 10 10:13:48.260 CET: 0x0190: 8A 8A 23 6B 25 47 61 AE B9 DF A8 A7 8C 4D 51 FB

SLOT 5/0: May 10 10:13:48.260 CET: 0x01A0: E6 C2 0F D9 C7 27 DD F7 D8 CC F0 D8 70 F8 75 75

SLOT 5/0: May 10 10:13:48.260 CET: 0x01B0: F3 D8 B7 80 C2 36 B0 53 02 A4 E9 84 02 5F 66 AE

SLOT 5/0: May 10 10:13:48.260 CET: 0x01C0: E7 59 9A 17 4A A0 B1 B4 BA F3 3B 63 C4 75 05 11

SLOT 5/0: May 10 10:13:48.260 CET: 0x01D0: 40 F1 EB B3 C8 A0 E8 AD 6E 1B 59 CC 41 20 F8 94

SLOT 5/0: May 10 10:13:48.260 CET: 0x01E0: B3 94 23 A2 99 02 03 01 00 01 A3 26 30 24 30 12

SLOT 5/0: May 10 10:13:48.260 CET: 0x01F0: 06 03 55 1D 13 01 01 FF 04 08 30 06 01 01 FF 02

SLOT 5/0: May 10 10:13:48.264 CET: 0x0200: 01 00 30 0E 06 03 55 1D 0F 01 01 FF 04 04 03 02

SLOT 5/0: May 10 10:13:48.264 CET: 0x0210: 01 06 30 0D 06 09 2A 86 48 86 F7 0D 01 01 05 05

SLOT 5/0: May 10 10:13:48.264 CET: 0x0220: 00 03 82 01 01 00 09 DB 24 B9 46 76 D7 D0 9F 70

SLOT 5/0: May 10 10:13:48.264 CET: 0x0230: 86 59 ED 7F 9B AC 96 FD AE 19 DD B3 51 3B A5 C0

SLOT 5/0: May 10 10:13:48.264 CET: 0x0240: 98 DA 80 2B 53 26 42 FA 6A 11 9F 6D 16 6F 76 F8

SLOT 5/0: May 10 10:13:48.264 CET: 0x0250: 9A F3 81 53 E8 DB EF 22 DF AC 3F 57 78 0E 70 78

SLOT 5/0: May 10 10:13:48.264 CET: 0x0260: 07 30 1D FF 19 70 34 E5 7A 52 47 99 B0 EE 7F EA

SLOT 5/0: May 10 10:13:48.264 CET: 0x0270: 23 99 DF CB 72 FF 0D BE AB 68 20 9F 16 C0 7C 69

SLOT 5/0: May 10 10:13:48.264 CET: 0x0280: 88 2D 00 6A AF 4B FF 93 A5 07 D3 F2 A8 F9 5B C4

SLOT 5/0: May 10 10:13:48.264 CET: 0x0290: DD 9F BF 49 36 C4 12 8A 64 C8 35 41 BB E2 B9 9B

SLOT 5/0: May 10 10:13:48.264 CET: 0x02A0: 52 45 67 38 DC 92 55 E3 33 A4 70 68 FC E7 6E 54

SLOT 5/0: May 10 10:13:48.264 CET: 0x02B0: 96 CA 89 B4 65 8B 2C AA 58 24 FC 4D 68 D7 84 4E

SLOT 5/0: May 10 10:13:48.264 CET: 0x02C0: 36 3B B3 CA 9A 42 13 B1 FF 8C 66 D8 52 10 56 74

SLOT 5/0: May 10 10:13:48.264 CET: 0x02D0: C7 DD 58 C3 EE 9D E3 65 E6 C1 5D B9 75 C2 A8 C9

SLOT 5/0: May 10 10:13:48.264 CET: 0x02E0: 54 5B A1 85 38 3B E1 E1 DC 55 5D 3E DD 90 ED F8

SLOT 5/0: May 10 10:13:48.264 CET: 0x02F0: 3A B0 68 93 E9 4A C2 D4 7F DC 90 E3 86 E2 CF C3

SLOT 5/0: May 10 10:13:48.264 CET: 0x0300: F2 A3 92 84 B3 A3 9A F8 71 30 F8 24 71 C2 07 BD

SLOT 5/0: May 10 10:13:48.264 CET: 0x0310: E8 6C 3C F7 FC 82 08 86 84 84 1B C4 D8 97 D3 50

SLOT 5/0: May 10 10:13:48.264 CET: 0x0320: 59 72 2D D5 4C 0B

SLOT 5/0: May 10 10:13:48.264 CET: Found existing manufacturer certificate for a84e.3fdd.84c4 with subject cn=Hitron Technologies Cable Modem Root Certificate Authority,ou=Euro-DOCSIS,o=Hitron Technologies,c=TW

SLOT 5/0: May 10 10:13:48.264 CET: BPI: setting a84e.3fdd.84c4 caidx:3

SLOT 5/0: May 10 10:13:48.264 CET: Mfg serial no. from a84e.3fdd.84c4 certificate: 4364B550E8ED7EE557145AC0A26752EC

SLOT 5/0: May 10 10:13:48.264 CET: Finger print of a84e.3fdd.84c4 manufacturer certificate matched.

SLOT 5/0: May 10 10:13:48.264 CET: crl0k_clc_snmp_bpipplus_broadcast_cert() CA idx:3 state:Chained rowStatus:Active prov:0 len:1078 idx:3 state:Chained rowState:Active prov:0 learn:1 idx:3

SLOT 5/0: May 10 10:13:48.268 CET: BPI: Sent CA Cert to RP successfully.

SLOT 5/0: May 10 10:13:48.268 CET: Success in validating AUTH Info message from a84e.3fdd.84c4.

SLOT 5/0: May 10 10:13:48.268 CET: CMTS Received AUTH REQ from a84e.3fdd.84c4.

SLOT 5/0: May 10 10:13:48.268 CET: BPI Authorization Request Packet: a84e.3fdd.84c4

SLOT 5/0: May 10 10:13:48.268 CET: BPKM Attributes: a84e.3fdd.84c4

SLOT 5/0: May 10 10:13:48.268 CET: Found COMPOUND CM Identification (length = 173):

SLOT 5/0: May 10 10:13:48.268 CET: Found Serial Number (length = 12):

SLOT 5/0: May 10 10:13:48.268 CET: 32353331 36433030 38303433

SLOT 5/0: May 10 10:13:48.268 CET: Found Manufacturer ID (length = 3):

SLOT 5/0: May 10 10:13:48.268 CET: 0050F1

SLOT 5/0: May 10 10:13:48.268 CET: Found MAC Address (length = 6):

SLOT 5/0: May 10 10:13:48.268 CET: A84E3FDD 84C4

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SLOT 5/0: May 10 10:13:48.268 CET: Found RSA Public Key (length = 140):
SLOT 5/0: May 10 10:13:48.268 CET: 30818902 818100B0 D4F2B649 87FCE340
SLOT 5/0: May 10 10:13:48.268 CET: B21FB1E0 8CFE04DD DB3D05D5 34170886
SLOT 5/0: May 10 10:13:48.268 CET: 7623EE25 4E4A61FC 6D134830 55F402CF
SLOT 5/0: May 10 10:13:48.268 CET: 89B11B34 867B3EF7 D9FE6CBE 8B4C251F
SLOT 5/0: May 10 10:13:48.268 CET: DA5A2E47 D65C2120 8EFC72E2 238D5443
SLOT 5/0: May 10 10:13:48.268 CET: 786F151A A7FE6C21 371957DD 3FEB8435
SLOT 5/0: May 10 10:13:48.268 CET: 8AA1B7A2 181DAF7A 4F7DD4E9 128D953C
SLOT 5/0: May 10 10:13:48.268 CET: 146B77F4 51A9F868 5D1A253F A9590AC0
SLOT 5/0: May 10 10:13:48.268 CET: F69D24DF 2B84C102 03010001
SLOT 5/0: May 10 10:13:48.268 CET: Found CM Certificate (length = 652):
SLOT 5/0: May 10 10:13:48.268 CET: 30820288 308201F1 A0030201 02020C41
SLOT 5/0: May 10 10:13:48.268 CET: 38344533 46444438 34433430 0D06092A
SLOT 5/0: May 10 10:13:48.268 CET: 864886F7 0D010105 05003081 81310B30
SLOT 5/0: May 10 10:13:48.268 CET: 09060355 04061302 5457311C 301A0603
SLOT 5/0: May 10 10:13:48.268 CET: 55040A13 13486974 726F6E20 54656368
SLOT 5/0: May 10 10:13:48.268 CET: 6E6F6C6F 67696573 310F300D 06035504
SLOT 5/0: May 10 10:13:48.268 CET: 0B130644 4F435349 53314330 41060355
SLOT 5/0: May 10 10:13:48.268 CET: 0403133A 48697472 6F6E2054 6563686E
SLOT 5/0: May 10 10:13:48.268 CET: 6F6C6F67 69657320 4361626C 65204D6F
SLOT 5/0: May 10 10:13:48.268 CET: 64656D20 526F6F74 20436572 74696669
SLOT 5/0: May 10 10:13:48.268 CET: 63617465 20417574 686F7269 7479301E
SLOT 5/0: May 10 10:13:48.268 CET: 170D3137 30313031 30303030 30305A17
SLOT 5/0: May 10 10:13:48.268 CET: 0D333631 32323832 33353935 395A3081
SLOT 5/0: May 10 10:13:48.268 CET: 86310B30 09060355 04061302 5457311C
SLOT 5/0: May 10 10:13:48.268 CET: 301A0603 55040A13 13486974 726F6E20
SLOT 5/0: May 10 10:13:48.268 CET: 54656368 6E6F6C6F 67696573 313D303B
SLOT 5/0: May 10 10:13:48.268 CET: 06035504 0B13344E 6F2E2034 302C2057
SLOT 5/0: May 10 10:13:48.268 CET: 752D6B75 6E672035 74682052 642E2C20
SLOT 5/0: May 10 10:13:48.268 CET: 57752D6B 752C2054 61697065 69204873
SLOT 5/0: May 10 10:13:48.268 CET: 69656E2C 20546169 77616E31 1A301806
SLOT 5/0: May 10 10:13:48.268 CET: 03550403 13114138 3A34453A 33463A44
SLOT 5/0: May 10 10:13:48.268 CET: 443A3834 3A433430 819F300D 06092A86
SLOT 5/0: May 10 10:13:48.268 CET: 4886F70D 01010105 0003818D 00308189
SLOT 5/0: May 10 10:13:48.268 CET: 02818100 B0D4F2B6 4987FCE3 40B21FB1
SLOT 5/0: May 10 10:13:48.268 CET: E08CFE04 DDBB3D05 D5341708 867623EE
SLOT 5/0: May 10 10:13:48.268 CET: 254E4A61 FC6D1348 3055F402 CF89B11B
SLOT 5/0: May 10 10:13:48.268 CET: 34867B3E F7D9FE6C BE8B4C25 1FDA5A2E
SLOT 5/0: May 10 10:13:48.268 CET: 47D65C21 208EFC72 E2238D54 43786F15
SLOT 5/0: May 10 10:13:48.268 CET: 1AA7FE6C 21371957 DD3FEB84 358AA1B7
SLOT 5/0: May 10 10:13:48.268 CET: A2181DAF 7A4F7DD4 E9128D95 3C146B77
SLOT 5/0: May 10 10:13:48.268 CET: F451A9F8 685D1A25 3FA9590A C0F69D24
SLOT 5/0: May 10 10:13:48.268 CET: DF2B84C1 02030100 01300D06 092A8648
SLOT 5/0: May 10 10:13:48.268 CET: 86F70D01 01050500 03818100 08DFC2DA
SLOT 5/0: May 10 10:13:48.268 CET: 8C3ECCDA 98289410 E1B8657A 9A3F220D
SLOT 5/0: May 10 10:13:48.268 CET: AE368029 0E89923F 0DF09E06 8142BAB7
SLOT 5/0: May 10 10:13:48.268 CET: E8A6D5B3 6D7604FF 6A07A8B8 409D0B0B
SLOT 5/0: May 10 10:13:48.268 CET: 6D568AF4 F9395199 AB54126C E9C22F1B
SLOT 5/0: May 10 10:13:48.268 CET: 6390543A 3B67EFB8 FCF0E755 F642E1E0
SLOT 5/0: May 10 10:13:48.268 CET: 273A3853 F4DDBFF1 391E63CE 8BB7BBC0
SLOT 5/0: May 10 10:13:48.268 CET: 8AFC59FC 767C3FA5 A5EB255C 8878F4AB
SLOT 5/0: May 10 10:13:48.272 CET: 63665AA9 CDCF779A 3DFE0C4C
SLOT 5/0: May 10 10:13:48.272 CET: Found COMPOUND SA Capabilities (length = 13):
SLOT 5/0: May 10 10:13:48.272 CET: Found Crypto Suite List (length = 6):
SLOT 5/0: May 10 10:13:48.272 CET: 01000200 0300
SLOT 5/0: May 10 10:13:48.272 CET: Found BPI Version (length = 1):
SLOT 5/0: May 10 10:13:48.272 CET: 01
SLOT 5/0: May 10 10:13:48.272 CET: Found SAID (length = 2):
SLOT 5/0: May 10 10:13:48.272 CET: 0000
SLOT 5/0: May 10 10:13:48.272 CET: END BPKM Attributes: a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.272 CET: Get a CM Certificate.
SLOT 5/0: May 10 10:13:48.272 CET: Cable5/0/12: Auth-Req contains 1 SID(s).
SLOT 5/0: May 10 10:13:48.272 CET: Cable5/0/12: AuthReq with NULL SAID - D3.0 modem.
SLOT 5/0: May 10 10:13:48.272 CET: EAE_BPI_REQ: DISABLE a84e.3fdd.84c4 - OK

```

```

SLOT 5/0: May 10 10:13:48.272 CET: BPI_AES: Encryption priority is: aes128-des56-des40.
SLOT 5/0: May 10 10:13:48.272 CET: BPI_AES: AES is a candidate.
SLOT 5/0: May 10 10:13:48.272 CET: BPI Crypto Algorithm: sid:0 cfg_mod:1, cm_cap:0x7, assigned:3
aes_support:1
SLOT 5/0: May 10 10:13:48.272 CET: CMTS generated AUTH_KEY.
SLOT 5/0: May 10 10:13:48.272 CET: CMTS received 0 as primary SAID - D3.0
SLOT 5/0: May 10 10:13:48.272 CET: CM state:2050 MAC:a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.272 CET: Parsed/Matched MAC Address:a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.272 CET: Got Issuer 0^A^A1^K0 ^F^CU^D^F^S^BTW1^\0^Z^F^CU^D
^S^SHitron Technologies1^00
^F^CU^D^K^S^FDOCSIS1C0A^F^CU^D^C^S:Hitron Technologies Cable Modem Root Certificate Authority
from Certificate.
SLOT 5/0: May 10 10:13:48.272 CET: Got a new Invalid CM cert from a84e.3fdd.84c4
SLOT 5/0: May 10 10:13:48.272 CET: CA Cert Subject does not match CM Cert Issuer

```

您可以在这些日志中看到，有两个独立的十六进制转储。

1. CA证书的十六进制转储。它以粗体CA证书转储(Certificate Dump)中的一行开头：。
2. CM证书的十六进制转储。它以粗体“找到CM证书”(长度= 652)：开头。

任务2.清理证书

要正确处理证书转储，您需要删除所有额外信息并仅保留十六进制转储值。

注意：证书转储中的大小写(上/下)和空格与此过程无关。

提示：删除所有行标题(插槽编号、时间戳等)的一种快速而简单的方法是在文本编辑器中保留ALT键，如Sumble或Notepad++。

CA证书转储的示例。

```

30 82 03 22 30 82 02 0A A0 03 02 01 02 02 10 43
64 B5 50 E8 ED 7E E5 57 14 5A C0 A2 67 52 EC 30
0D 06 09 2A 86 48 86 F7 0D 01 01 05 05 00 30 6F
31 0B 30 09 06 03 55 04 06 13 02 42 45 31 1F 30
1D 06 03 55 04 0A 13 16 74 43 6F 6D 4C 61 62 73
20 2D 20 45 75 72 6F 2D 44 4F 43 53 49 53 31 15
30 13 06 03 55 04 0B 13 0C 43 61 62 6C 65 20 4D
6F 64 65 6D 73 31 28 30 26 06 03 55 04 03 13 1F
45 75 72 6F 2D 44 4F 43 53 49 53 20 43 61 62 6C
65 20 4D 6F 64 65 6D 20 52 6F 6F 74 20 43 41 30
1E 17 0D 30 34 30 38 31 33 30 30 30 30 30 5A
17 0D 32 34 30 38 31 32 32 33 35 39 35 39 5A 30
81 86 31 0B 30 09 06 03 55 04 06 13 02 54 57 31
1C 30 1A 06 03 55 04 0A 13 13 48 69 74 72 6F 6E
20 54 65 63 68 6E 6F 6C 6F 67 69 65 73 31 14 30
12 06 03 55 04 0B 13 0B 45 75 72 6F 2D 44 4F 43
53 49 53 31 43 30 41 06 03 55 04 03 13 3A 48 69
74 72 6F 6E 20 54 65 63 68 6E 6F 6C 6F 67 69 65
73 20 43 61 62 6C 65 20 4D 6F 64 65 6D 20 52 6F
6F 74 20 43 65 72 74 69 66 69 63 61 74 65 20 41
75 74 68 6F 72 69 74 79 30 81 9F 30 0D 06 09 2A
86 48 86 F7 0D 01 01 01 05 00 03 81 8D 00 30 81
89 02 81 81 00 B8 47 DA 9D F1 F6 30 1B 8E 79 BE
BE 10 C3 2D 9F 7D D6 C7 B2 50 16 AB 85 5C 1C 8C
9E 6B F7 15 60 B2 53 F4 2F 6D 49 0C 2C 3E 76 88
8A 8A 23 6B 25 47 61 AE B9 DF A8 A7 8C 4D 51 FB

```

E6 C2 0F D9 C7 27 DD F7 D8 CC F0 D8 70 F8 75 75
F3 D8 B7 80 C2 36 B0 53 02 A4 E9 84 02 5F 66 AE
E7 59 9A 17 4A A0 B1 B4 BA F3 3B 63 C4 75 05 11
40 F1 EB B3 C8 A0 E8 AD 6E 1B 59 CC 41 20 F8 94
B3 94 23 A2 99 02 03 01 00 01 A3 26 30 24 30 12
06 03 55 1D 13 01 01 FF 04 08 30 06 01 01 FF 02
01 00 30 0E 06 03 55 1D 0F 01 01 FF 04 04 03 02
01 06 30 0D 06 09 2A 86 48 86 F7 0D 01 01 05 05
00 03 82 01 01 00 09 DB 24 B9 46 76 D7 D0 9F 70
86 59 ED 7F 9B AC 96 FD AE 19 DD B3 51 3B A5 C0
98 DA 80 2B 53 26 42 FA 6A 11 9F 6D 16 6F 76 F8
9A F3 81 53 E8 DB EF 22 DF AC 3F 57 78 0E 70 78
07 30 1D FF 19 70 34 E5 7A 52 47 99 B0 EE 7F EA
23 99 DF CB 72 FF 0D BE AB 68 20 9F 16 C0 7C 69
88 2D 00 6A AF 4B FF 93 A5 07 D3 F2 A8 F9 5B C4
DD 9F BF 49 36 C4 12 8A 64 C8 35 41 BB E2 B9 9B
52 45 67 38 DC 92 55 E3 33 A4 70 68 FC E7 6E 54
96 CA 89 B4 65 8B 2C AA 58 24 FC 4D 68 D7 84 4E
36 3B B3 CA 9A 42 13 B1 FF 8C 66 D8 52 10 56 74
C7 DD 58 C3 EE 9D E3 65 E6 C1 5D B9 75 C2 A8 C9
54 5B A1 85 38 3B E1 E1 DC 55 5D 3E DD 90 ED F8
3A B0 68 93 E9 4A C2 D4 7F DC 90 E3 86 E2 CF C3
F2 A3 92 84 B3 A3 9A F8 71 30 F8 24 71 C2 07 BD
E8 6C 3C F7 FC 82 08 86 84 84 1B C4 D8 97 D3 50
59 72 2D D5 4C 0B

使用名称cacert.txt保存此文件。

CM证书转储的示例。

30820288 308201F1 A0030201 02020C41
38344533 46444438 34433430 0D06092A
864886F7 0D010105 05003081 81310B30
09060355 04061302 5457311C 301A0603
55040A13 13486974 726F6E20 54656368
6E6F6C6F 67696573 310F300D 06035504
0B130644 4F435349 53314330 41060355
0403133A 48697472 6F6E2054 6563686E
6F6C6F67 69657320 4361626C 65204D6F
64656D20 526F6F74 20436572 74696669
63617465 20417574 686F7269 7479301E
170D3137 30313031 30303030 30305A17
0D333631 32323832 33353935 395A3081
86310B30 09060355 04061302 5457311C
301A0603 55040A13 13486974 726F6E20
54656368 6E6F6C6F 67696573 313D303B
06035504 0B13344E 6F2E2034 302C2057
752D6B75 6E672035 74682052 642E2C20
57752D6B 752C2054 61697065 69204873
69656E2C 20546169 77616E31 1A301806
03550403 13114138 3A34453A 33463A44
443A3834 3A433430 819F300D 06092A86
4886F70D 01010105 0003818D 00308189
02818100 B0D4F2B6 4987FCE3 40B21FB1
E08CFE04 DDDB3D05 D5341708 867623EE
254E4A61 FC6D1348 3055F402 CF89B11B
34867B3E F7D9FE6C BE8B4C25 1FDA5A2E
47D65C21 208EFC72 E2238D54 43786F15
1AA7FE6C 21371957 DD3FEB84 358AA1B7
A2181DAF 7A4F7DD4 E9128D95 3C146B77
F451A9F8 685D1A25 3FA9590A C0F69D24
DF2B84C1 02030100 01300D06 092A8648
86F70D01 01050500 03818100 08DFC2DA

```
8C3ECCDA 98289410 E1B8657A 9A3F220D
AE368029 0E89923F 0DF09E06 8142BAB7
E8A6D5B3 6D7604FF 6A07A8B8 409D0B0B
6D568AF4 F9395199 AB54126C E9C22F1B
6390543A 3B67EFB8 FCF0E755 F642E1E0
273A3853 F4DDBFF1 391E63CE 8BB7BBC0
8AFC59FC 767C3FA5 A5EB255C 8878F4AB
63665AA9 CDCF779A 3DFE0C4C
```

使用名称cmcert.txt保存此文件。

任务3.为xxd实用程序准备文件

XXD是一个Linux/Mac实用程序，允许将十六进制转储转换为二进制文件，反之亦然。XXD需要十六进制数据具有特定的行头才能工作。使用以下添加必要报头的python脚本：

```
TVANEGRO-M-N1QP:Desktop tvanegro$ cat addoffset.py
import fileinput
import sys

i = 0
for line in fileinput.input():
    line=line.replace(" ", "")
    print("%06x: %s" % (i,line.strip()))
    i = i+int(len(line.strip())/2)
```

任务4.将证书从十六进制转换为二进制格式

运行此命令以转换CA证书。

```
python3.5 addoffset.py cacert.txt | xxd -r > cacert.crt
```

运行此命令以转换CM证书。

```
python3.5 addoffset.py cmcert.txt | xxd -r > cmcert.crt
```

现在，可以检查这些生成的CRT文件是否存在任何不匹配。

任务5.检查证书

要读取文件，请使用Openssl或Keychain实用程序。

CA证书的openssl实用程序示例。

```
TVANEGRO-M-N1QP:Desktop tvanegro$ openssl x509 -inform der -in cacert.crt -noout -text
Certificate:
Data:
Version: 3 (0x2)
Serial Number:
43:64:b5:50:e8:ed:7e:e5:57:14:5a:c0:a2:67:52:ec
Signature Algorithm: sha1WithRSAEncryption
Issuer: C=BE, O=tComLabs - Euro-DOCSIS, OU=Cable Modems, CN=Euro-DOCSIS Cable Modem Root CA
Validity
Not Before: Aug 13 00:00:00 2004 GMT
```

```
Not After : Aug 12 23:59:59 2024 GMT
Subject: C=TW, O=Hitron Technologies, OU=Euro-DOCSIS, CN=Hitron Technologies Cable Modem Root
Certificate Authority
Subject Public Key Info:
Public Key Algorithm: rsaEncryption
RSA Public Key: (1024 bit)
Modulus (1024 bit):
00:b8:47:da:9d:f1:f6:30:1b:8e:79:be:be:10:c3:
2d:9f:7d:d6:c7:b2:50:16:ab:85:5c:1c:8c:9e:6b:
f7:15:60:b2:53:f4:2f:6d:49:0c:2c:3e:76:88:8a:
8a:23:6b:25:47:61:ae:b9:df:a8:a7:8c:4d:51:fb:
e6:c2:0f:d9:c7:27:dd:f7:d8:cc:f0:d8:70:f8:75:
75:f3:d8:b7:80:c2:36:b0:53:02:a4:e9:84:02:5f:
66:ae:e7:59:9a:17:4a:a0:b1:b4:ba:f3:3b:63:c4:
75:05:11:40:f1:eb:b3:c8:a0:e8:ad:6e:1b:59:cc:
41:20:f8:94:b3:94:23:a2:99
Exponent: 65537 (0x10001)
X509v3 extensions:
X509v3 Basic Constraints: critical
CA:TRUE, pathlen:0
X509v3 Key Usage: critical
Certificate Sign, CRL Sign
Signature Algorithm: sha1WithRSAEncryption
09:db:24:b9:46:76:d7:d0:9f:70:86:59:ed:7f:9b:ac:96:fd:
ae:19:dd:b3:51:3b:a5:c0:98:da:80:2b:53:26:42:fa:6a:11:
9f:6d:16:6f:76:f8:9a:f3:81:53:e8:db:ef:22:df:ac:3f:57:
78:0e:70:78:07:30:1d:ff:19:70:34:e5:7a:52:47:99:b0:ee:
7f:ea:23:99:df:cb:72:ff:0d:be:ab:68:20:9f:16:c0:7c:69:
88:2d:00:6a:af:4b:ff:93:a5:07:d3:f2:a8:f9:5b:c4:dd:9f:
bf:49:36:c4:12:8a:64:c8:35:41:bb:e2:b9:9b:52:45:67:38:
dc:92:55:e3:33:a4:70:68:fc:e7:6e:54:96:ca:89:b4:65:8b:
2c:aa:58:24:fc:4d:68:d7:84:4e:36:3b:b3:ca:9a:42:13:b1:
ff:8c:66:d8:52:10:56:74:c7:dd:58:c3:ee:9d:e3:65:e6:c1:
5d:b9:75:c2:a8:c9:54:5b:a1:85:38:3b:e1:e1:dc:55:5d:3e:
dd:90:ed:f8:3a:b0:68:93:e9:4a:c2:d4:7f:dc:90:e3:86:e2:
cf:c3:f2:a3:92:84:b3:a3:9a:f8:71:30:f8:24:71:c2:07:bd:
e8:6c:3c:f7:fc:82:08:86:84:84:1b:c4:d8:97:d3:50:59:72:
2d:d5:4c:0b
```

CM证书的openssl实用程序示例。

```
TVANEGRO-M-N1QP:Desktop tvanegro$ openssl x509 -inform der -in cmcert.crt -noout -text
Certificate:
Data:
Version: 3 (0x2)
Serial Number:
41:38:34:45:33:46:44:44:38:34:43:34
Signature Algorithm: sha1WithRSAEncryption
Issuer: C=TW, O=Hitron Technologies, OU=DOCSIS, CN=Hitron Technologies Cable Modem Root
Certificate Authority
Validity
Not Before: Jan 1 00:00:00 2017 GMT
Not After : Dec 28 23:59:59 2036 GMT
Subject: C=TW, O=Hitron Technologies, OU=No. 40, Wu-kung 5th Rd., Wu-ku, Taipei Hsien, Taiwan,
CN=A8:4E:3F:DD:84:C4
Subject Public Key Info:
Public Key Algorithm: rsaEncryption
RSA Public Key: (1024 bit)
Modulus (1024 bit):
00:b0:d4:f2:b6:49:87:fc:e3:40:b2:1f:b1:e0:8c:
fe:04:dd:db:3d:05:d5:34:17:08:86:76:23:ee:25:
4e:4a:61:fc:6d:13:48:30:55:f4:02:cf:89:b1:1b:
```



```
34:86:7b:3e:f7:d9:fe:6c:be:8b:4c:25:1f:da:5a:
2e:47:d6:5c:21:20:8e:fc:72:e2:23:8d:54:43:78:
6f:15:1a:a7:fe:6c:21:37:19:57:dd:3f:eb:84:35:
8a:a1:b7:a2:18:1d:af:7a:4f:7d:d4:e9:12:8d:95:
3c:14:6b:77:f4:51:a9:f8:68:5d:1a:25:3f:a9:59:
0a:c0:f6:9d:24:df:2b:84:c1
Exponent: 65537 (0x10001)
Signature Algorithm: sha1WithRSAEncryption
08:df:c2:da:8c:3e:cc:da:98:28:94:10:e1:b8:65:7a:9a:3f:
22:0d:ae:36:80:29:0e:89:92:3f:0d:f0:9e:06:81:42:ba:b7:
e8:a6:d5:b3:6d:76:04:ff:6a:07:a8:b8:40:9d:0b:0b:6d:56:
8a:f4:f9:39:51:99:ab:54:12:6c:e9:c2:2f:1b:63:90:54:3a:
3b:67:ef:b8:fc:f0:e7:55:f6:42:e1:e0:27:3a:38:53:f4:dd:
bf:f1:39:1e:63:ce:8b:b7:bb:c0:8a:fc:59:fc:76:7c:3f:a5:
a5:eb:25:5c:88:78:f4:ab:63:66:5a:a9:cd:cf:77:9a:3d:fe:
0c:4c
```

您可以看到OU= (组织单位) 字段不匹配。在示例中，您看到DOCSIS 和Euro-DOCSIS。这就是CMTS拒绝证书的原因。

您可以在Mac OS中使用密钥链工具查看证书。

