排除WLC上的证书安装故障

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简介

本文档介绍在无线局域网控制器(WLC)上使用第三方证书导致的问题。

先决条件

要求

Cisco 建议您了解以下主题：

- 无线LAN控制器(WLC)
- 公用密钥基础结构 (PKI)
- X.509证书

使用的组件

本文档中的信息基于以下软件和硬件版本：

- 固件版本为8.10.105.0的3504 WLC
- 用于命令行工具的OpenSSL 1.0.2p
- Windows 10计算机
- 来自专用实验室证书颁发机构(CA)的证书链，包含三个证书（枝叶、中级、根）
- 用于文件传输的简单文件传输协议(TFTP)服务器。

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。

背景信息

在AireOS WLC上，您可以安装用于WebAuth和WebAdmin的第三方证书。安装时，WLC需要一个PEM(Privacy Enhanced Mail)格式化文件，文件链中的所有证书一直到根CA证书和私钥。有关此过程的详细信息记录在生成第三方证书的CSR并将链接证书下载到WLC中。

本文档将展开并更详细地显示最常见的安装错误，以及每个场景的调试示例和解决方案。本文档中使用的调试输出来自debug transfer all enable和debug pm pki enable，后者在WLC上启用。使用TFTP传输证书文件。

故障排除

场景 1.提供的用于解密私钥的密码不正确或未提供密码

<#root>

```
*TransferTask: Apr 21 03:51:20.737:

Add ID Cert: Adding certificate & private key using password check123


*TransferTask: Apr 21 03:51:20.737:

Add Cert to ID Table: Adding certificate (name: bsnSslWebauthCert) to ID table using password check123


*TransferTask: Apr 21 03:51:20.737: Add Cert to ID Table: Decoding PEM-encoded Certificate (verify: YES
*TransferTask: Apr 21 03:51:20.737: Decode & Verify PEM Cert: Cert/Key Length was 0, so taking string l
*TransferTask: Apr 21 03:51:20.737: Decode & Verify PEM Cert: Cert/Key Length 6276 & VERIFY
*TransferTask: Apr 21 03:51:20.741: Decode & Verify PEM Cert: X509 Cert Verification return code: 1
*TransferTask: Apr 21 03:51:20.741: Decode & Verify PEM Cert: X509 Cert Verification result text: ok
*TransferTask: Apr 21 03:51:20.741:

Add Cert to ID Table: Decoding PEM-encoded Private Key using password check123


*TransferTask: Apr 21 03:51:20.799:

Decode PEM Private Key: Error reading Private Key from PEM-encoded PKCS12 bundle using password check12


*TransferTask: Apr 21 03:51:20.799: Add ID Cert: Error decoding / adding cert to ID cert table (verifyC
*TransferTask: Apr 21 03:51:20.799: Add WebAuth Cert: Error adding ID cert
*TransferTask: Apr 21 03:51:20.799:

RESULT_STRING: Error installing certificate.
```

解决方案：确保提供正确的密码，以便WLC可以将其解码以进行安装。

场景 2：链中没有中间CA证书

<#root>

```
*TransferTask: Apr 21 04:34:43.319: Add ID Cert: Adding certificate & private key using password Cisco1
*TransferTask: Apr 21 04:34:43.319: Add Cert to ID Table: Adding certificate (name: bsnSslWebauthCert) 
*TransferTask: Apr 21 04:34:43.319: Add Cert to ID Table: Decoding PEM-encoded Certificate (verify: YES
*TransferTask: Apr 21 04:34:43.319: Decode & Verify PEM Cert: Cert/Key Length was 0, so taking string l
*TransferTask: Apr 21 04:34:43.319: Decode & Verify PEM Cert: Cert/Key Length 4840 & VERIFY
*TransferTask: Apr 21 04:34:43.321: Decode & Verify PEM Cert: X509 Cert Verification return code: 0
*TransferTask: Apr 21 04:34:43.321:
```

Decode & Verify PEM Cert: X509 Cert Verification result text: unable to get local issuer certificate

```
*TransferTask: Apr 21 04:34:43.321:
```

Decode & Verify PEM Cert: Error in X509 Cert Verification at 0 depth: unable to get local issuer certifi

```
*TransferTask: Apr 21 04:34:43.321: Add Cert to ID Table: Error decoding (verify: YES) PEM certificate
*TransferTask: Apr 21 04:34:43.321: Add ID Cert: Error decoding / adding cert to ID cert table (verifyC
*TransferTask: Apr 21 04:34:43.321: Add WebAuth Cert: Error adding ID cert
*TransferTask: Apr 21 04:34:43.321: RESULT_STRING: Error installing certificate.
```

解决方案：验证WLC证书中的颁发者和X509v3授权密钥标识符字段，以验证签署证书的CA证书。如果中间CA证书由CA提供，则可用于进行验证。否则，请向您的CA申请证书。

此OpenSSL命令可用于验证每个证书的以下详细信息：

<#root>

>

openssl x509 -in

wlc.crt

-text -noout

```
Certificate:
Data:
Version: 3 (0x2)
Serial Number:
50:93:16:83:04:d5:6b:db:26:7c:3a:13:f3:95:32:7e
Signature Algorithm: sha256WithRSAEncryption
```

Issuer: C=US, O=TAC Lab, CN=Wireless TAC Lab Sub CA

```
Validity
Not Before: Apr 21 03:08:05 2020 GMT
Not After : Apr 21 03:08:05 2021 GMT
Subject: C=US, O=TAC Lab, CN=guest.wirelesslab.local

...

X509v3 extensions:
```

X509v3 Authority Key Identifier:

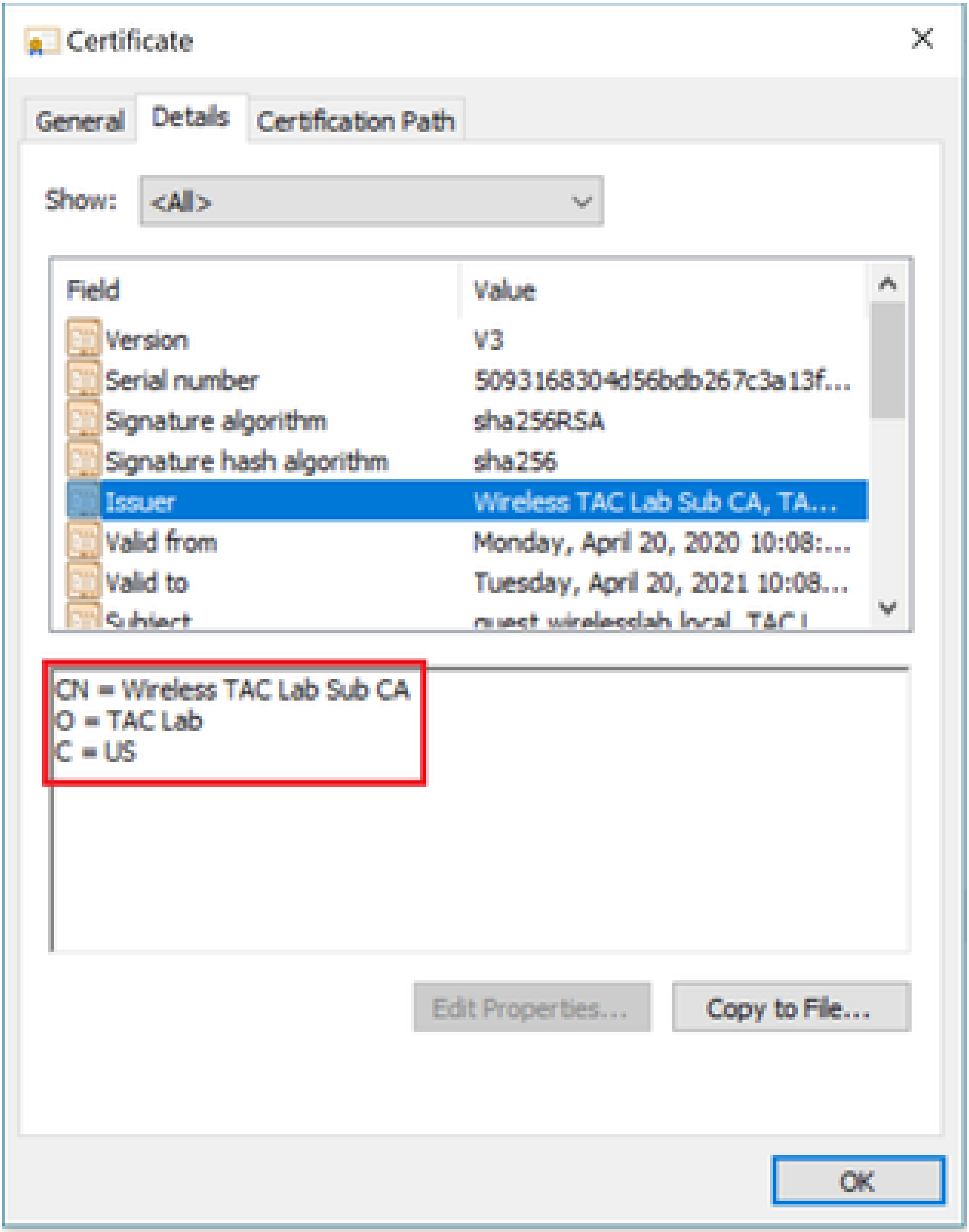
```
keyid:27:69:2E:C3:2F:20:5B:07:14:80:E1:86:36:7B:E0:92:08:4C:88:12
```

<#root>

```
>

 openssl x509 -in

int-ca.crt

 -text -noout



Certificate:
Data:
Version: 3 (0x2)
Serial Number:
d1:ec:26:0e:be:f1:aa:65:7b:4a:8f:c7:d5:7f:a4:97
Signature Algorithm: sha256WithRSAEncryption
Issuer: C=US, O=TAC Lab, CN=Wireless TAC Lab Root CA
Validity
Not Before: Apr 21 02:51:03 2020 GMT
Not After : Apr 19 02:51:03 2030 GMT

Subject: C=US, O=TAC Lab, CN=Wireless TAC Lab Sub CA



...

X509v3 Subject Key Identifier:



27:69:2E:C3:2F:20:5B:07:14:80:E1:86:36:7B:E0:92:08:4C:88:12
```

或者，如果使用Windows，请为证书提供.crt扩展名，然后双击以验证这些详细信息。

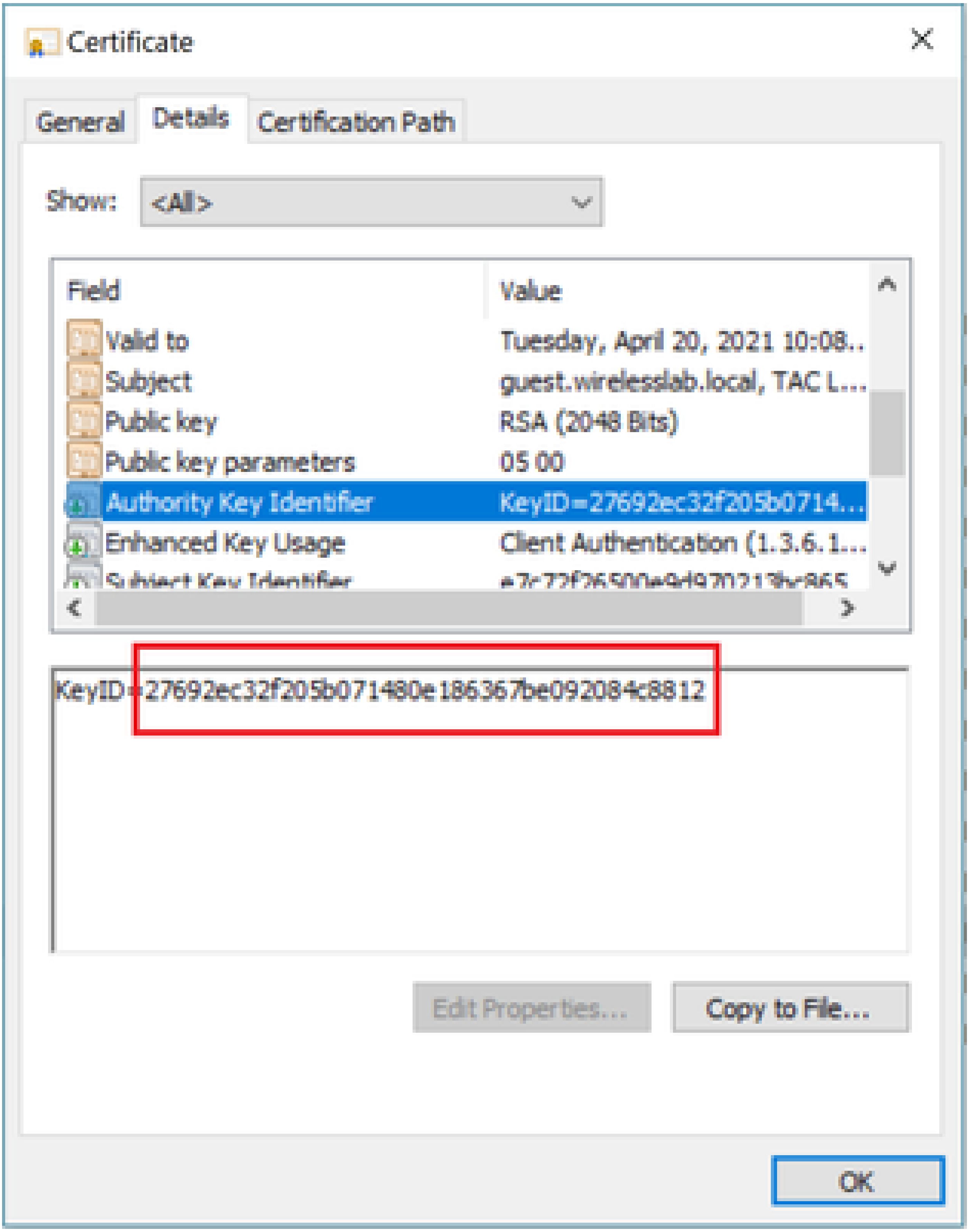
WLC证书：



Show: <All>

Field	Value
Version	V3
Serial number	509316830 4d56bdb267c3a13f...
Signature algorithm	sha256RSA
Signature hash algorithm	sha256
Issuer	Wireless TAC Lab Sub CA, TA...
Valid from	Monday, April 20, 2020 10:08:...
Valid to	Tuesday, April 20, 2021 10:08...
Subject	guest.wirelesslab.local, TAC L

CN = Wireless TAC Lab Sub CA
O = TAC Lab
C = US

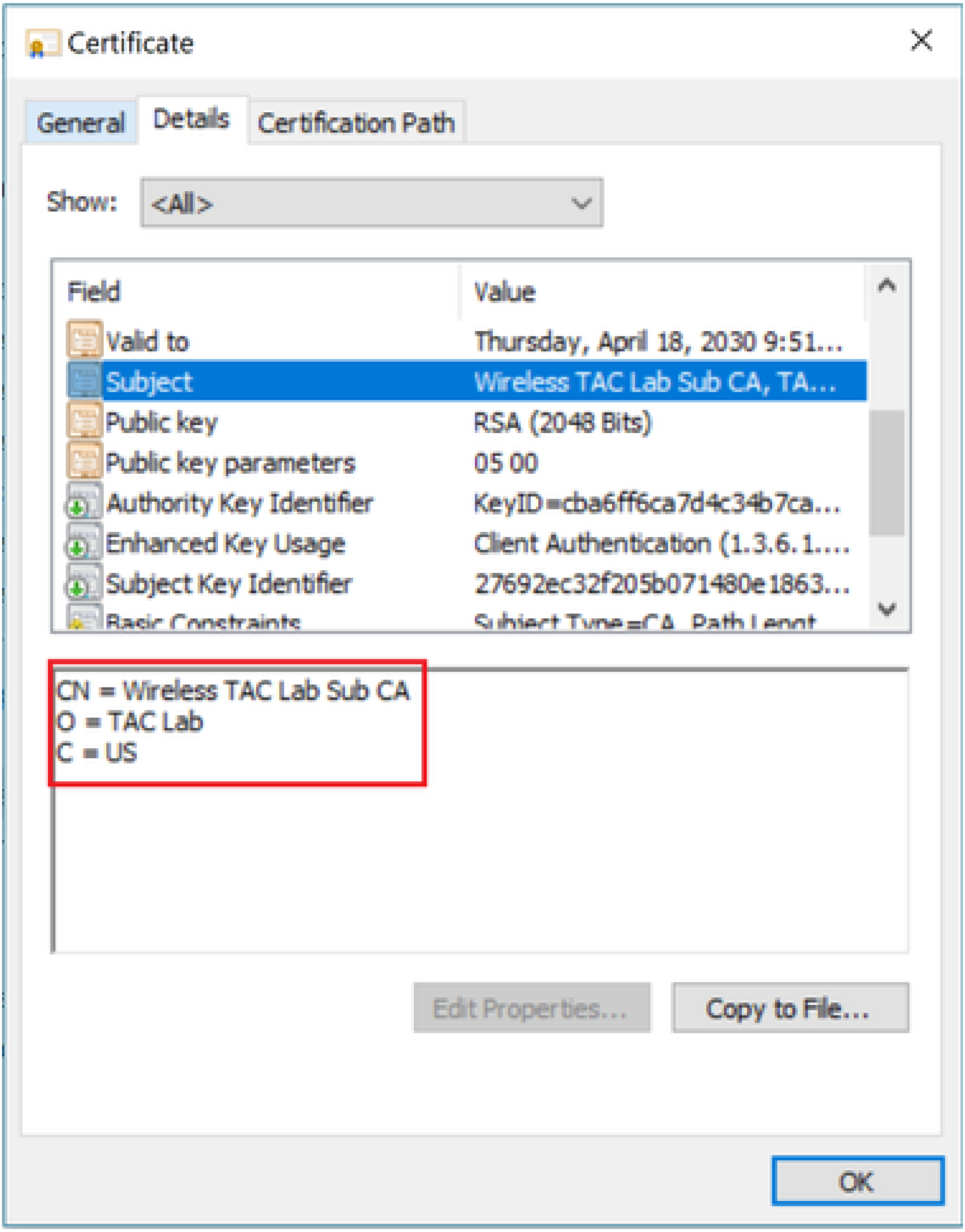


Show: <All>

Field	Value
Valid to	Tuesday, April 20, 2021 10:08...
Subject	guest.wirelesslab.local, TAC L...
Public key	RSA (2048 Bits)
Public key parameters	05 00
Authority Key Identifier	KeyID=27692ec32f205b0714...
Enhanced Key Usage	Client Authentication (1.3.6.1...
Subject Key Identifier	e7c72f26500e9d970213bc865

KeyID=27692ec32f205b071480e186367be092084c8812

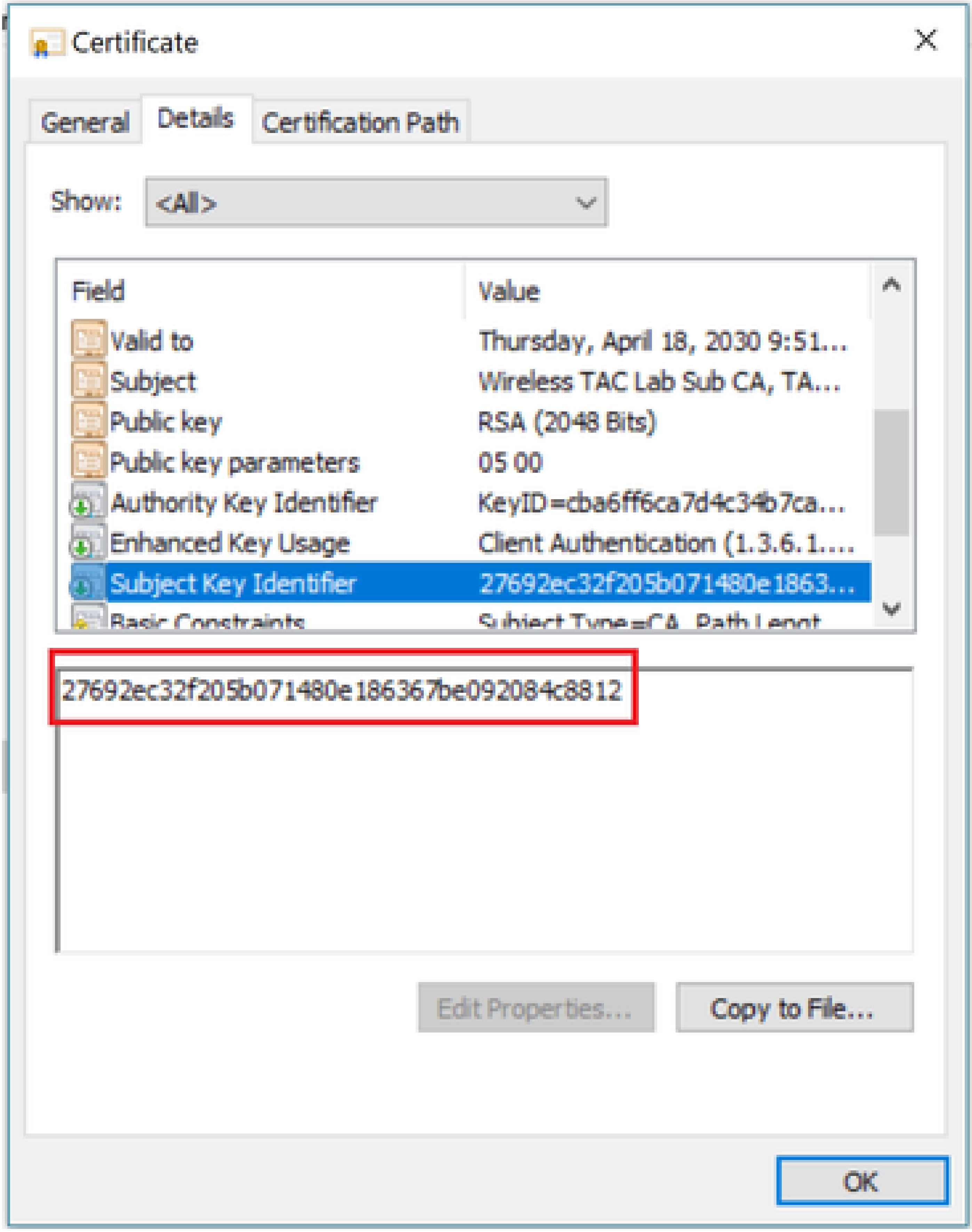
中间CA证书：



Show: <All>

Field	Value
Valid to	Thursday, April 18, 2030 9:51...
Subject	Wireless TAC Lab Sub CA, TA...
Public key	RSA (2048 Bits)
Public key parameters	05 00
Authority Key Identifier	KeyID=cba6ff6ca7d4c34b7ca...
Enhanced Key Usage	Client Authentication (1.3.6.1....
Subject Key Identifier	27692ec32f205b071480e1863...
Basic Constraints	Subject Type=CA, Path Lengt

CN = Wireless TAC Lab Sub CA
O = TAC Lab
C = US



Show: <All>

Field	Value
Valid to	Thursday, April 18, 2030 9:51...
Subject	Wireless TAC Lab Sub CA, TA...
Public key	RSA (2048 Bits)
Public key parameters	05 00
Authority Key Identifier	KeyID=cba6ff6ca7d4c34b7ca...
Enhanced Key Usage	Client Authentication (1.3.6.1....
Subject Key Identifier	27692ec32f205b071480e1863...
Basic Constraints	Subject Type=CA, Path Lengt

27692ec32f205b071480e186367be092084c8812

确定中间CA证书后，相应地继续链并重新安装。

场景 3：链中没有根CA证书

```
<#root>

*TransferTask: Apr 21 04:28:09.643: Add ID Cert: Adding certificate & private key using password Cisco1
*TransferTask: Apr 21 04:28:09.643: Add Cert to ID Table: Adding certificate (name: bsnSslWebauthCert)
*TransferTask: Apr 21 04:28:09.643: Add Cert to ID Table: Decoding PEM-encoded Certificate (verify: YES
*TransferTask: Apr 21 04:28:09.643: Decode & Verify PEM Cert: Cert/Key Length was 0, so taking string l
*TransferTask: Apr 21 04:28:09.643: Decode & Verify PEM Cert: Cert/Key Length 4929 & VERIFY
*TransferTask: Apr 21 04:28:09.645: Decode & Verify PEM Cert: X509 Cert Verification return code: 0
*TransferTask: Apr 21 04:28:09.645:

Decode & Verify PEM Cert: X509 Cert Verification result text: unable to get issuer certificate


*TransferTask: Apr 21 04:28:09.645:

Decode & Verify PEM Cert: Error in X509 Cert Verification at 1 depth: unable to get issuer certificate


*TransferTask: Apr 21 04:28:09.646: Add Cert to ID Table: Error decoding (verify: YES) PEM certificate
*TransferTask: Apr 21 04:28:09.646: Add ID Cert: Error decoding / adding cert to ID cert table (verifyC
```

解决方案：此方案与方案2类似，但这次针对的是验证颁发者（根CA）时的中间证书。在中间CA证书上执行Issuer和X509v3 Authority Key Identifier字段验证以验证根CA，可以遵循相同的说明。

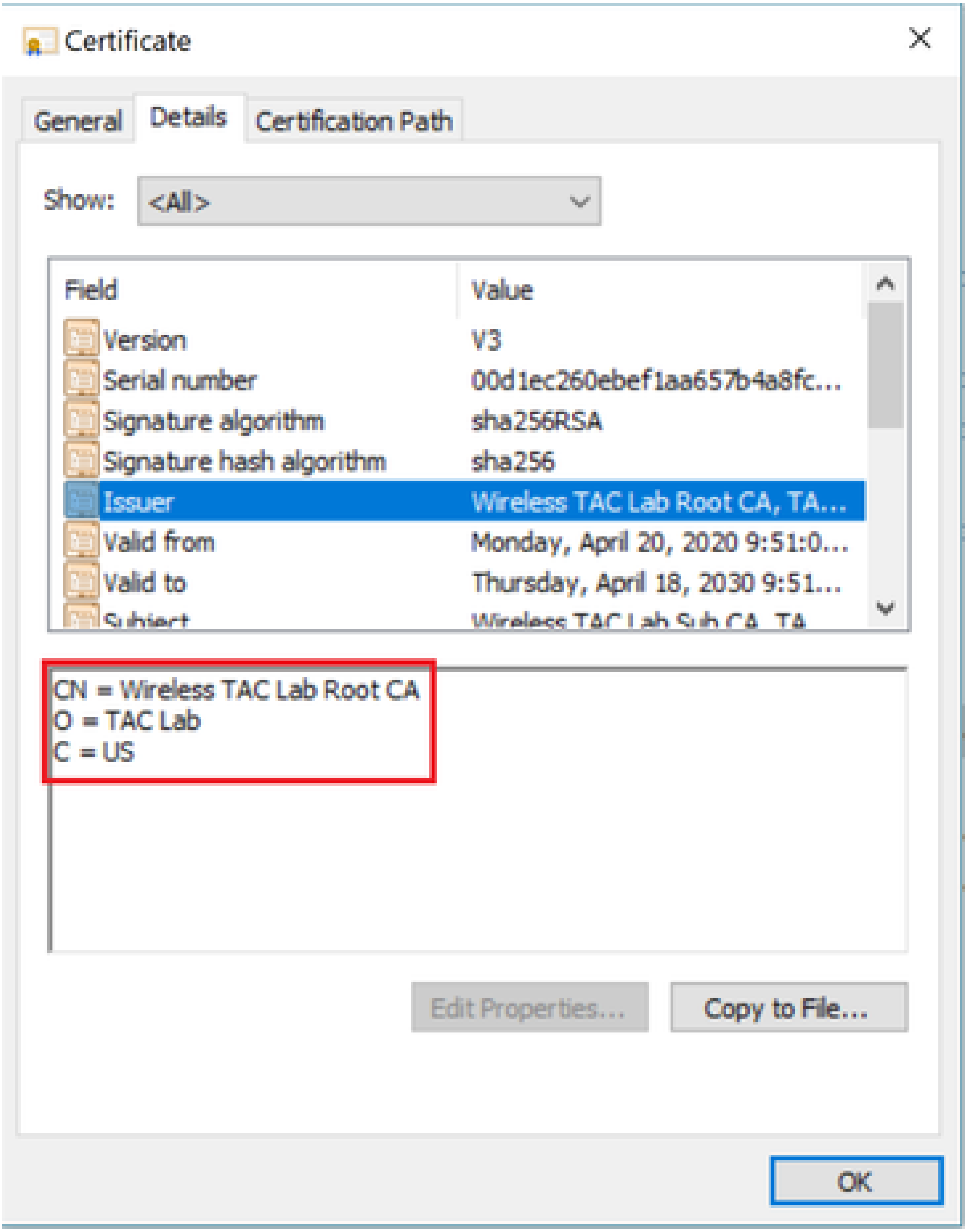
此OpenSSL命令可用于验证每个证书的以下详细信息：

```
<#root>

>

openssl x509 -in

int-ca.crt

 -text -noout



Certificate:
Data:
Version: 3 (0x2)
Serial Number:
d1:ec:26:0e:be:f1:aa:65:7b:4a:8f:c7:d5:7f:a4:97
Signature Algorithm: sha256WithRSAEncryption

Issuer: C=US, O=TAC Lab, CN=Wireless TAC Lab Root CA


Validity
Not Before: Apr 21 02:51:03 2020 GMT
Not After : Apr 19 02:51:03 2030 GMT
Subject: C=US, O=TAC Lab, CN=Wireless TAC Lab Sub CA

...

X509v3 extensions:

X509v3 Authority Key Identifier:



keyid:CB:A6:FF:6C:A7:D4:C3:4B:7C:A3:A9:A3:14:C3:90:8D:9B:04:A0:32
```

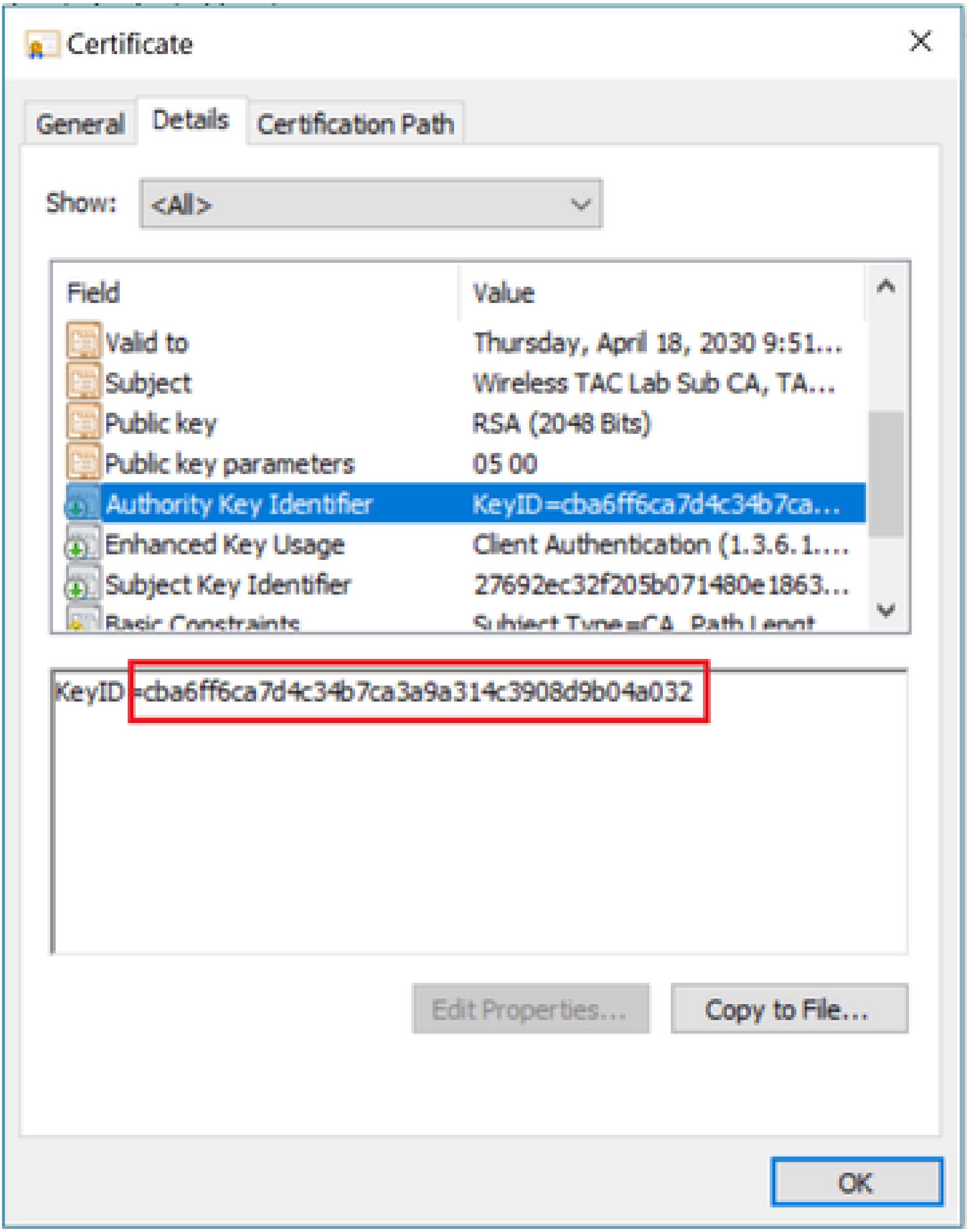
<#root>

```
>

openssl x509 -in

root-ca.crt

-text -noout



Certificate:
Data:
Version: 3 (0x2)
Serial Number:
d1:ec:26:0e:be:f1:aa:65:7b:4a:8f:c7:d5:7f:a4:96
Signature Algorithm: sha256WithRSAEncryption

Issuer: C=US, O=TAC Lab, CN=Wireless TAC Lab Root CA


Validity
Not Before: Apr 21 02:40:24 2020 GMT
Not After : Apr 19 02:40:24 2030 GMT

Subject: C=US, O=TAC Lab, CN=Wireless TAC Lab Root CA



...


X509v3 Subject Key Identifier:



CB:A6:FF:6C:A7:D4:C3:4B:7C:A3:A9:A3:14:C3:90:8D:9B:04:A0:32
```

中间CA证书



CN = Wireless TAC Lab Root CA
O = TAC Lab
C = US

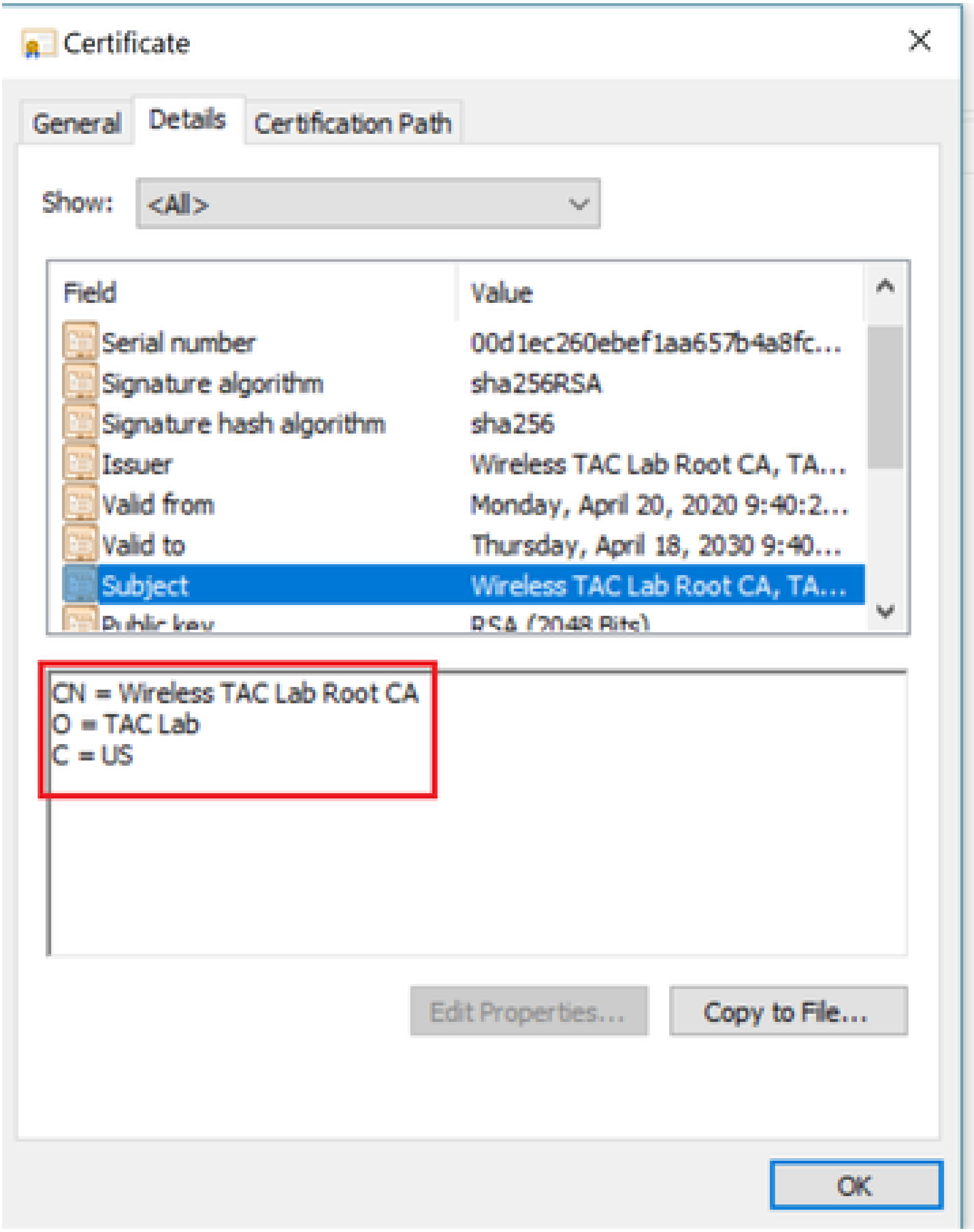


Show: <All>

Field	Value
Valid to	Thursday, April 18, 2030 9:51...
Subject	Wireless TAC Lab Sub CA, TA...
Public key	RSA (2048 Bits)
Public key parameters	05 00
Authority Key Identifier	KeyID=cba6ff6ca7d4c34b7ca...
Enhanced Key Usage	Client Authentication (1.3.6.1....
Subject Key Identifier	27692ec32f205b071480e1863...
Basic Constraints	Subject Type=CA, Path Lengt

KeyID=cba6ff6ca7d4c34b7ca3a9a314c3908d9b04a032

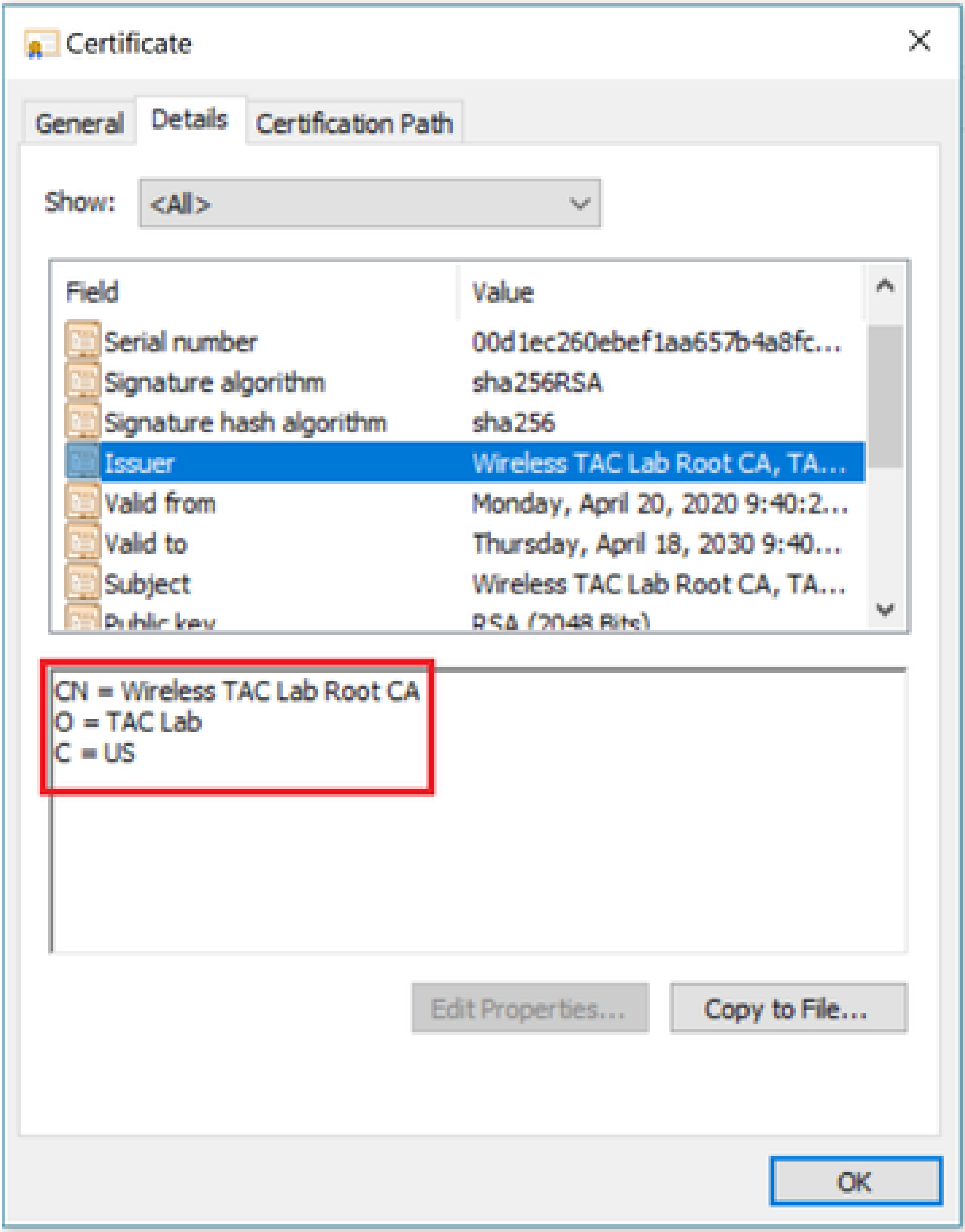
根CA证书：



Show: <All>

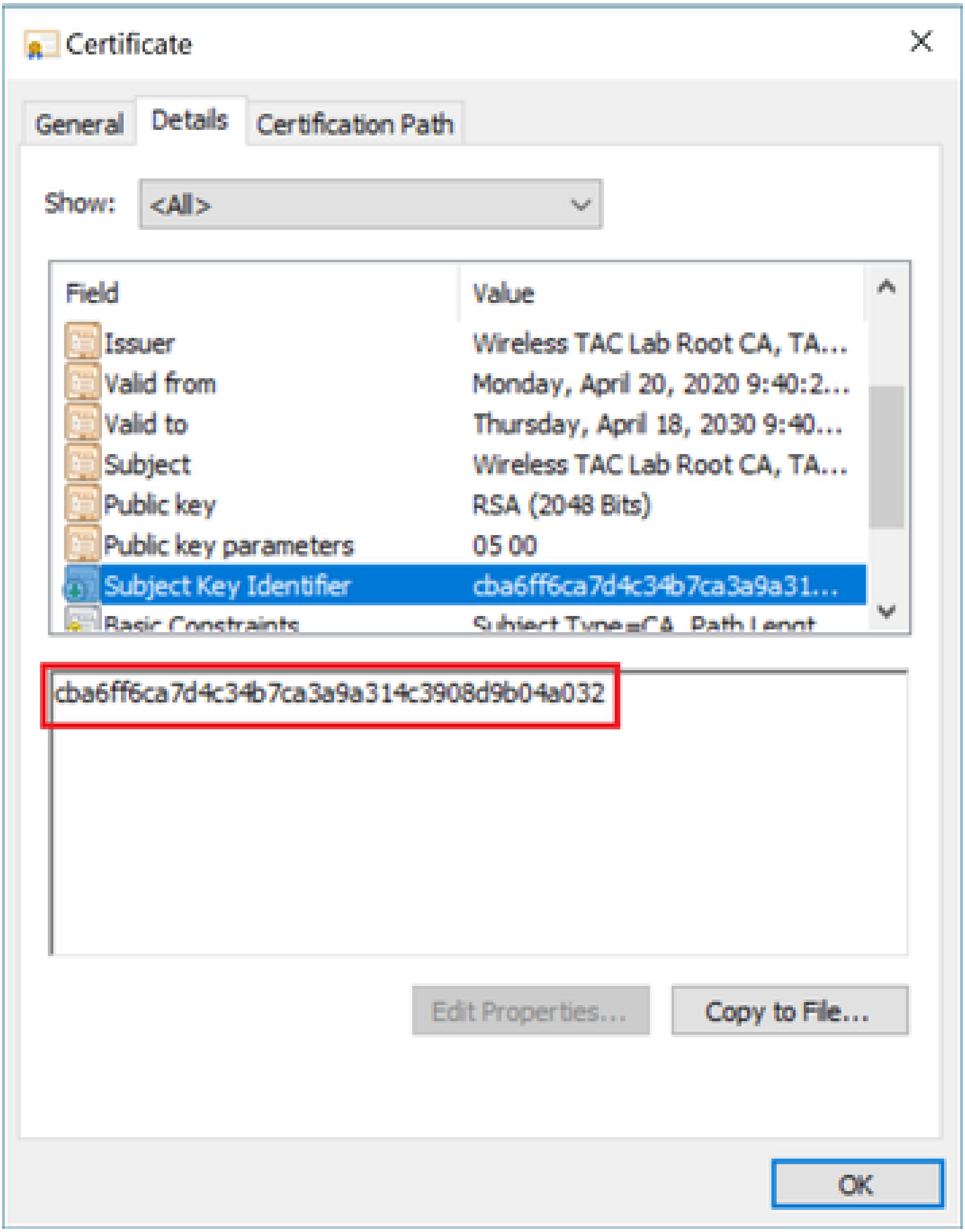
Field	Value
Serial number	00d1ec260ebef1aa657b4a8fc...
Signature algorithm	sha256RSA
Signature hash algorithm	sha256
Issuer	Wireless TAC Lab Root CA, TA...
Valid from	Monday, April 20, 2020 9:40:2...
Valid to	Thursday, April 18, 2030 9:40...
Subject	Wireless TAC Lab Root CA, TA...
Public key	RSA (2048 Bits)

CN = Wireless TAC Lab Root CA
O = TAC Lab
C = US



Field	Value
Serial number	00d1ec260ebef1aa657b4a8fc...
Signature algorithm	sha256RSA
Signature hash algorithm	sha256
Issuer	Wireless TAC Lab Root CA, TA...
Valid from	Monday, April 20, 2020 9:40:2...
Valid to	Thursday, April 18, 2030 9:40...
Subject	Wireless TAC Lab Root CA, TA...
Public key	RSA (2048 Bits)

CN = Wireless TAC Lab Root CA
O = TAC Lab
C = US



Field	Value
Issuer	Wireless TAC Lab Root CA, TA...
Valid from	Monday, April 20, 2020 9:40:2...
Valid to	Thursday, April 18, 2030 9:40...
Subject	Wireless TAC Lab Root CA, TA...
Public key	RSA (2048 Bits)
Public key parameters	05 00
Subject Key Identifier	cba6ff6ca7d4c34b7ca3a9a31...
Basic Constraints	Subject Type=CA, Path Lengt

cba6ff6ca7d4c34b7ca3a9a314c3908d9b04a032

确定根CA证书后（颁发者和主题相同），相应地继续链并重新安装。

注意：本文档使用三个证书链（枝叶、中间CA、根CA），这是最常见的场景。可能会出现涉

及2个中间CA证书的情况。在找到根CA证书之前，可以使用此方案的相同指南。

场景 4.链中没有CA证书

<#root>

```
*TransferTask: Apr 21 04:56:50.272: Add ID Cert: Adding certificate & private key using password Cisco1
*TransferTask: Apr 21 04:56:50.272: Add Cert to ID Table: Adding certificate (name: bsnSslWebauthCert)
*TransferTask: Apr 21 04:56:50.272: Add Cert to ID Table: Decoding PEM-encoded Certificate (verify: YES
*TransferTask: Apr 21 04:56:50.272: Decode & Verify PEM Cert: Cert/Key Length was 0, so taking string l
*TransferTask: Apr 21 04:56:50.272: Decode & Verify PEM Cert: Cert/Key Length 3493 & VERIFY
*TransferTask: Apr 21 04:56:50.273: Decode & Verify PEM Cert: X509 Cert Verification return code: 0
*TransferTask: Apr 21 04:56:50.273:

Decode & Verify PEM Cert: Error in X509 Cert Verification at 0 depth: unable to get local issuer certif


*TransferTask: Apr 21 04:56:50.274: Add Cert to ID Table: Error decoding (verify: YES) PEM certificate
*TransferTask: Apr 21 04:56:50.274: Add WebAuth Cert: Error adding ID cert
*TransferTask: Apr 21 04:56:50.274: RESULT_STRING: Error installing certificate.
```

解决方案：如果文件中除WLC证书外没有其他证书，验证在0深度处的验证失败。可在文本编辑器中打开该文件以进行验证。可以按照场景2和场景3的指导确定到根CA的整个链并相应地重新建立链并重新安装。

方案 5.无私钥

<#root>

```
*TransferTask: Apr 21 05:02:34.764: Add WebAuth Cert: Adding certificate & private key using password
*TransferTask: Apr 21 05:02:34.764: Add ID Cert: Adding certificate & private key using password
*TransferTask: Apr 21 05:02:34.764: Add Cert to ID Table: Adding certificate (name: bsnSslWebauthCert)
*TransferTask: Apr 21 05:02:34.764: Add Cert to ID Table: Decoding PEM-encoded Certificate (verify: YES
*TransferTask: Apr 21 05:02:34.764: Decode & Verify PEM Cert: Cert/Key Length was 0, so taking string l
*TransferTask: Apr 21 05:02:34.764: Decode & Verify PEM Cert: Cert/Key Length 3918 & VERIFY
*TransferTask: Apr 21 05:02:34.767: Decode & Verify PEM Cert: X509 Cert Verification return code: 1
*TransferTask: Apr 21 05:02:34.767: Decode & Verify PEM Cert: X509 Cert Verification result text: ok
*TransferTask: Apr 21 05:02:34.768: Add Cert to ID Table: Decoding PEM-encoded Private Key using passwo
*TransferTask: Apr 21 05:02:34.768:

Retrieve CSR Key: can't open private key file for ssl cert.


*TransferTask: Apr 21 05:02:34.768:

Add Cert to ID Table: No Private Key


*TransferTask: Apr 21 05:02:34.768: Add ID Cert: Error decoding / adding cert to ID cert table (verifyC
*TransferTask: Apr 21 05:02:34.768: Add WebAuth Cert: Error adding ID cert
*TransferTask: Apr 21 05:02:34.768: RESULT_STRING: Error installing certificate.
```

解决方案：如果证书签名请求(CSR)是在外部生成的，并且需要在文件中链接，则WLC期望在文件中包含私钥。如果CSR是在WLC中生成的，请确保在安装之前不会重新加载WLC，否则会丢失私钥。

相关信息

- 思科技术支持和下载

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