# Configure ASA VPN Posture with CSD, DAP and AnyConnect 4.0

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# Introduction

This document describes how to perform the posture for remote VPN sessions terminated on Adaptive Security Appliance (ASA).

# **Prerequisites**

## Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco ASA VPN configuration
- Cisco AnyConnect Secure Mobility Client

## **Components Used**

The information in this document is based on these software and hardware versions:

- Microsoft Windows 7
- Cisco ASA, Version 9.3 or Later
- Cisco Identity Services Engine (ISE) Software, Versions 1.3 and Later

- Cisco AnyConnect Secure Mobility Client, Version 4.0 and Later
- CSD, Version 3.6 or Later

The posture is performed locally by ASA with the use of Cisco Secure Desktop (CSD) with HostScan module.

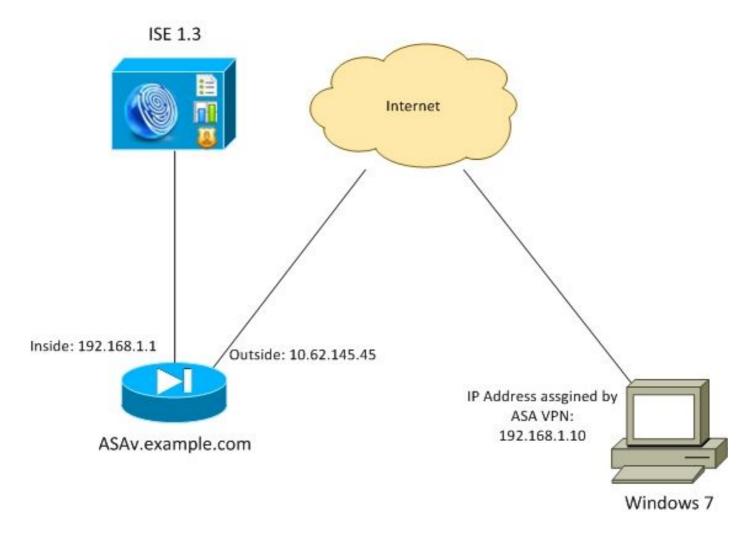
After VPN session is established, compliant station are allowed full network access whereas non-compliant station has limited network access.

Also, CSD and AnyConnect 4.0 provisioning flows are presented.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

# **Configure**

## **Network Diagram**



#### Corporate policy is as follows:

- Remote VPN users which has file c:\test.txt (compliant) must have full network access to inside company resources
- Remote VPN users which do not have file **c:\test.txt** (non-compliant) must have limited network access to inside company resources.

File existence is the simplest example. Any other condition (antivirus, antispyware, process, application, registry) can be used.

The flow is as follows:

- Remote users does not have AnyConnect installed. They access ASA web page for CSD and AnyConnect provisioning (along with the VPN profile)
- Once the connection via AnyConnect, non-compliant users are allowed with limited network access. Dynamic Access Policy (DAP) called **FileNotExists** are matched.
- User performs remediation (manually install file **c:\test.txt**) and connects again with AnyConnect. This time, full network access is provided (DAP policy called **FileExists** are matched).

HostScan module can be installed manually on the endpoint. Example files (hostscan-win-4.0.00051-pre-deploy-k9.msi) are shared on Cisco Connection Online (CCO). But, it could be also pushed from ASA. HostScan is a part of CSD which could be provisioned from ASA. That second approach is used in this example.

For older versions of AnyConnect (3.1 and earlier), there was a separate package available on CCO (example: hostscan\_3.1.06073-k9.pkg) which could have been configured and provisioned on ASA separately (with **csd hostscan image** command) - but that option do not exists anymore for AnyConnect version 4.0.

## **ASA**

### **Step 1. Basic SSL VPN Configuration**

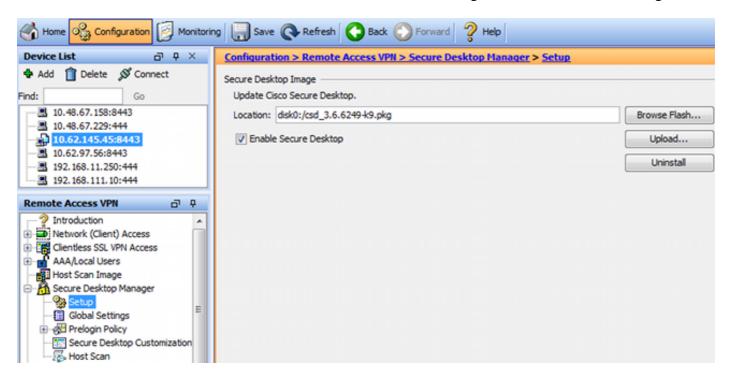
ASA is preconfigured with basic remote VPN access (Secure Sockets Layer (SSL)):

```
webvpn
enable outside
no anyconnect-essentials
 anyconnect image disk0:/anyconnect-win-4.0.00051-k9.pkg 1
anyconnect enable
tunnel-group-list enable
group-policy AllProtocols internal
group-policy AllProtocols attributes
vpn-tunnel-protocol ikev1 ikev2 ssl-client ssl-clientless
tunnel-group TAC type remote-access
tunnel-group TAC general-attributes
 address-pool POOL
authentication-server-group ISE3
default-group-policy AllProtocols
tunnel-group TAC webvpn-attributes
 group-alias TAC enable
ip local pool POOL 192.168.1.10-192.168.1.20 mask 255.255.255.0
aaa-server ISE3 protocol radius
aaa-server ISE3 (inside) host 10.1.1.100
kev *****
```

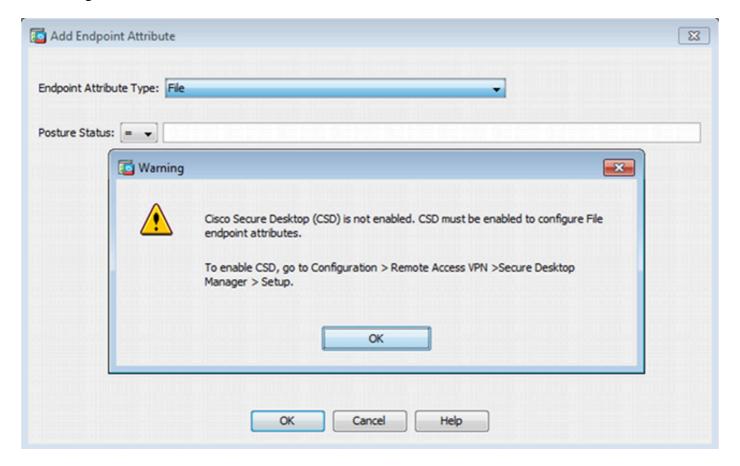
AnyConnect package has been downloaded and used.

#### **Step 2. CSD Installation**

Subsequent configuration is performed with Adaptive Security Device Manager (ASDM). CSD package needs to be downloaded in order to flash and take reference from configuration as shown in the image.

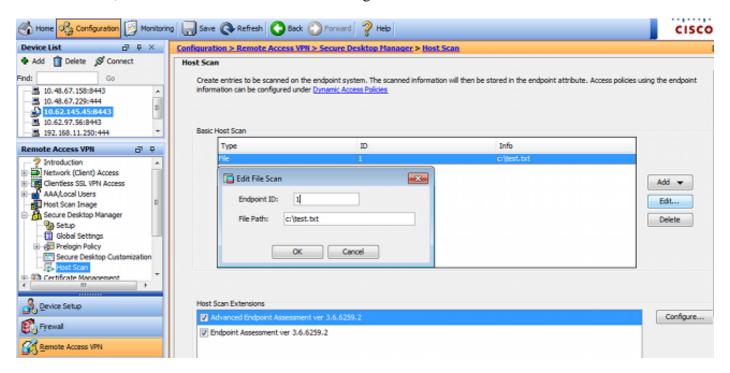


Without enabling Secure Desktop it would not be possible to use CSD attributes in DAP policies as shown in the image.

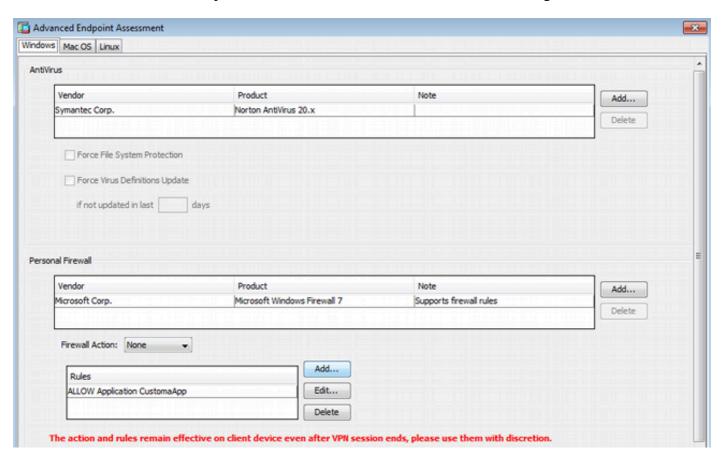


After you enable CSD, multiple options under Secure Desktop Manager appears.

Existence of **c:\test.txt** is verified as shown in the image.



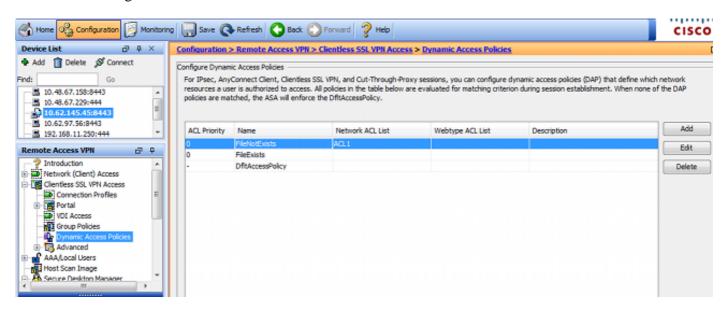
Also, additional Advanced Endpoint Assessment rule is added as shown in the image.



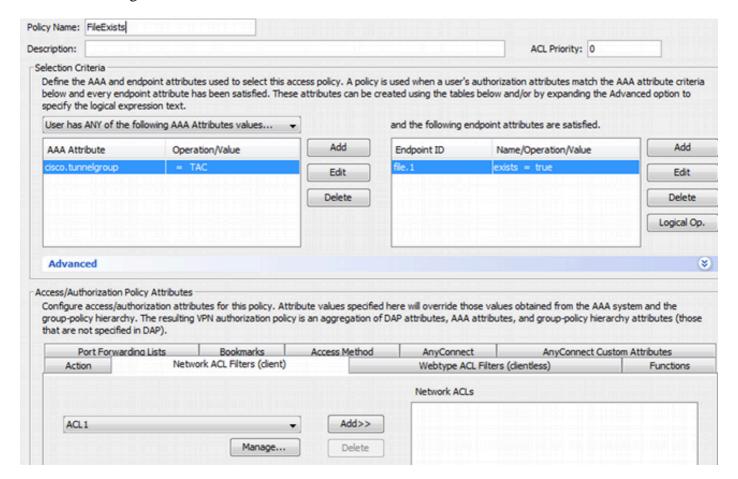
That one checks for the existence of Symantec Norton AntiVirus 20.x and Microsoft Windows Firewall 7. Posture module (HostScan) checks these values but there is no enforcement (DAP policy does not verify that).

#### Step 3. DAP Policies

DAP policies are responsible to use the data gathered by HostScan as conditions and apply specific attributes to the VPN session as a result. In order to create DAP policy from ASDM, navigate to Configuration > Remote Access VPN > Clientless SSL VPN Access > Dynamic Access Policies as shown in the image.



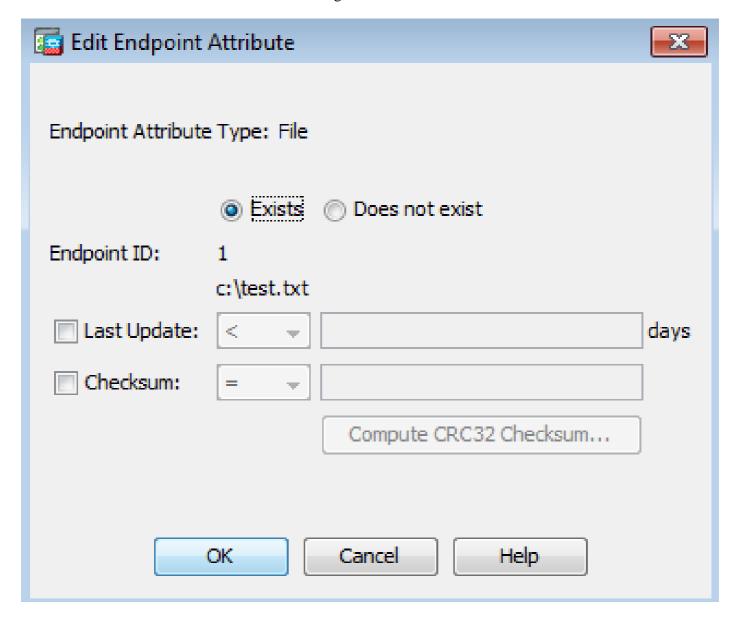
First policy (FileExists) checks tunnel-group name which is used by configured VPN profile (VPN profile configuration has been omitted for clarity). Then, additional check for the file **c:\test.txt** is performed as shown in the image.



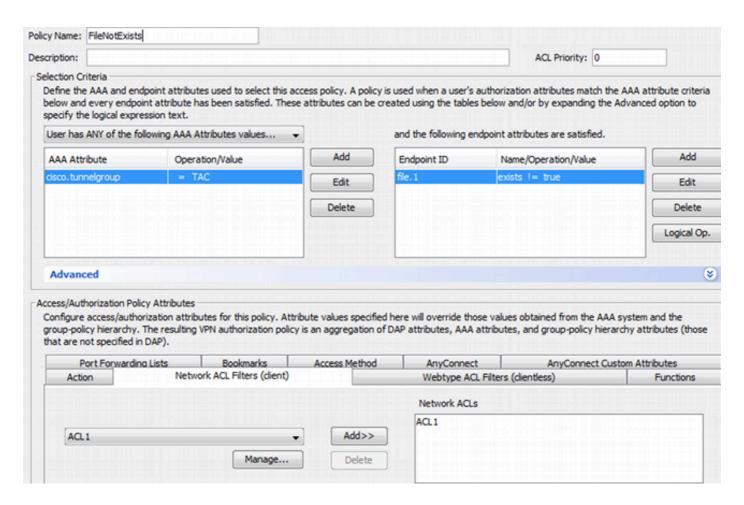
As a result, no actions are performed with the default setting in order to permit connectivity. No ACL is

used - full network access is provided.

Details for the file check are as shown in the image.

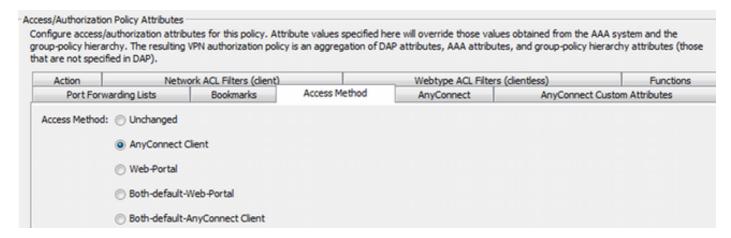


Second policy (FileNotExists) is similar - but this time condition is **if file is not existing** as shown in the image.



The result has access-list ACL1 configured. That is applied for non-compliant VPN users with the provision of limited network access.

Both DAP policies push for **AnyConnect Client** access as shown in the image.



#### **ISE**

ISE is used for user authentication. Only network device (ASA) and correct username (cisco) must be configured. That part is not covered in this article.

# Verify

Use this section in order to confirm that your configuration works properly.

## **CSD** and AnyConnect Provisioning

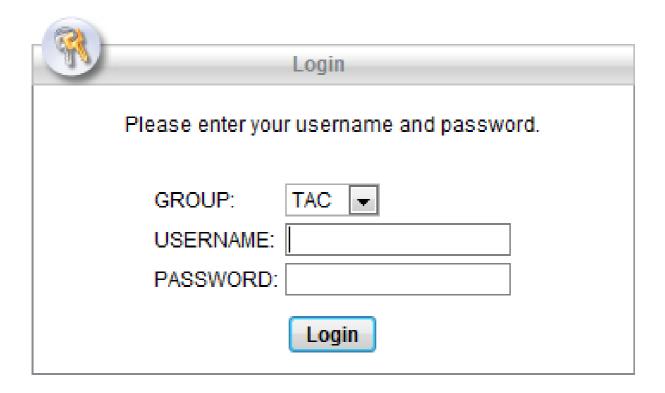
Initially, user is not provisioned with AnyConnect client. User is also not compliant with the policy (the **file c:\test.txt** does not exist). Enter <a href="https://10.62.145.45">https://10.62.145.45</a> and the user is immediately redirected for CSD installation as shown in the image.



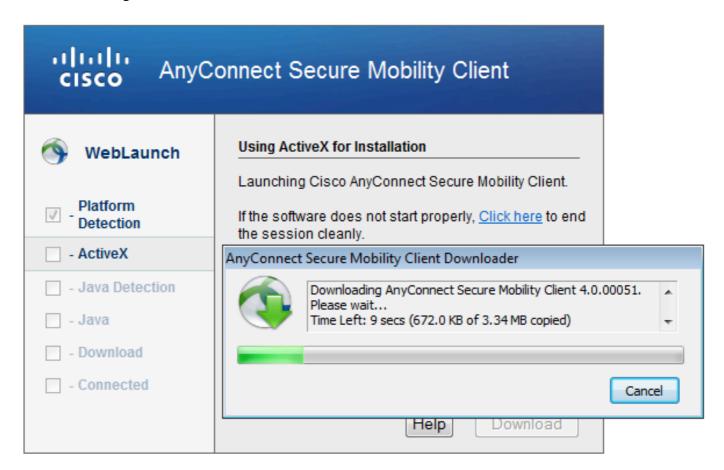
That can be done with Java or ActiveX. Once CSD is installed, it is reported as shown in the image.



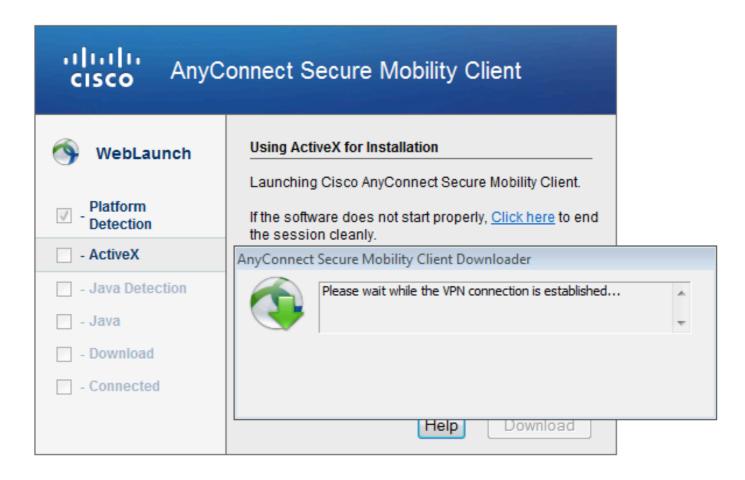
Then user is redirected for authentication as shown in the image.



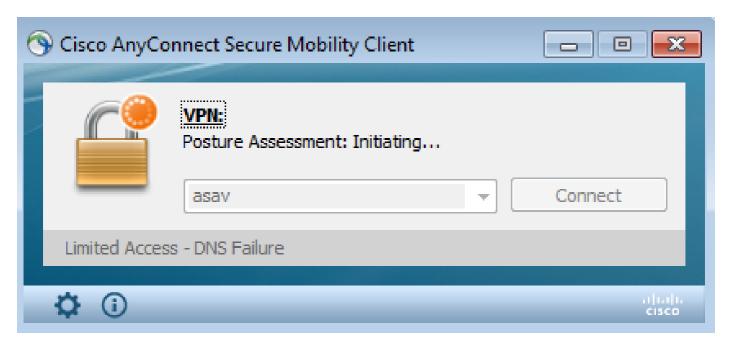
If successful, AnyConnect along with configured profile is deployed - again ActiveX or Java can be used as shown in the image.



And, the VPN connection is established as shown in the image.



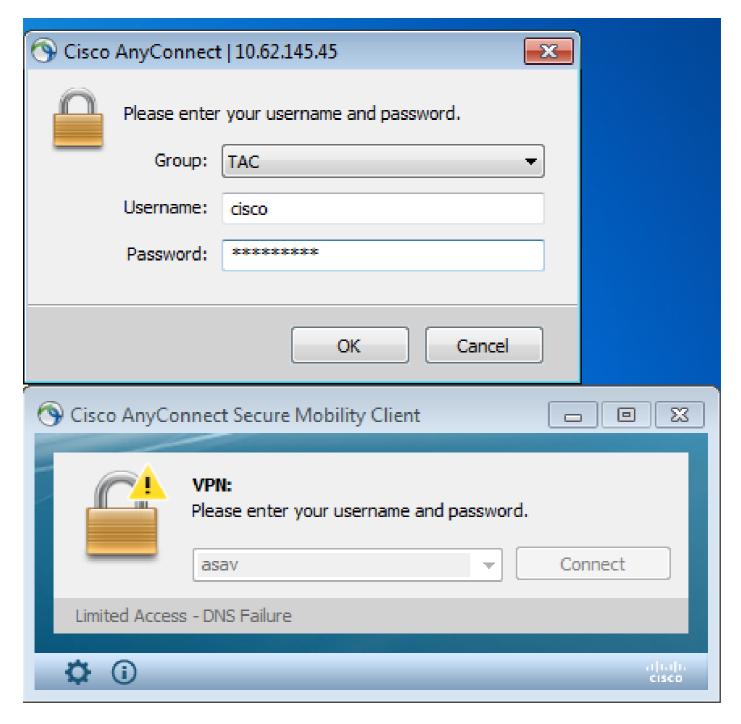
The first step for AnyConnect is to perform posture checks (HostScan) and send the reports to ASA as shown in the image.



Then, AnyConnect authenticates and finishes VPN session.

# **AnyConnect VPN Session with Posture - Non Compliant**

When you establish a new VPN session with AnyConnect, the first step is the posture (HostScan) as presented on the screenshot earlier. Then, authentication occurs and the VPN session is established as shown in the images.



ASA reports that HostScan report is received:

<#root>

%ASA-7-716603:

Received 4 KB Hostscan data

from IP <10.61.87.251>

Then performs user authentication:

<#root>

```
%ASA-6-113004:
```

```
AAA user authentication Successful
 : server = 10.62.145.42 : user = cisco
```

And starts authorization for that VPN session. When you have "debug dap trace 255" enabled, the information with regards to the existence of **c:\test.txt** file is returned:

```
<#root>
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.file["1"].
exists="false"
DAP_TRACE: endpoint.file["1"].exists = "false"
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.file["1"].path="
c:\test.txt
DAP_TRACE: endpoint.file["1"].path = "c:\\test.txt"
Also, information with regards to Microsoft Windows Firewall:
<#root>
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.fw["MSWindowsFW"].exists="false"
DAP_TRACE: endpoint.fw["MSWindowsFW"].exists = "false"
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.fw["MSWindowsFW"].description="Microsoft Wind
DAP_TRACE: endpoint.fw["MSWindowsFW"].description =
"Microsoft Windows Firewall"
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.fw["MSWindowsFW"].version="7"
DAP_TRACE: endpoint.fw["MSWindowsFW"].
version = "7"
DAP_TRACE[128]: dap_install_endpoint_data_to_lua:endpoint.fw["MSWindowsFW"].
enabled="failed"
DAP_TRACE: endpoint.fw["MSWindowsFW"].enabled = "failed"
And Symantec AntiVirus (as per HostScan Advanced Endpoint Assessment rules configured earlier).
```

As a result, the DAP policy is matched:

```
<#root>
DAP_TRACE: Username: cisco,
```

That policy forces to use AnyConnect and also applies access-list ACL1 which provides restricted network access for the user (not compliant with the corporate policy):

Logs also present ACIDEX extensions which can be used by DAP policy (or even passed in Radius-Requests to ISE and is used in Authorization Rules as conditions):

```
["0"] = "
08-00-27-7f-5f-64
endpoint.anyconnect.
useragent
= "
AnyConnect Windows 4.0.00051
";
As a result, VPN session is Up but with the restricted network access:
<#root>
ASAv2#
show vpn-sessiondb detail anyconnect
Session Type: AnyConnect Detailed
Username
cisco
                Index
                            : 4
Assigned IP :
192.168.1.10
          Public IP :
10.61.87.251
           : AnyConnect-Parent SSL-Tunnel DTLS-Tunnel
Protocol
            : AnyConnect Premium
License
Encryption : AnyConnect-Parent: (1)none SSL-Tunnel: (1)RC4 DTLS-Tunnel: (1)AES128
           : AnyConnect-Parent: (1)none SSL-Tunnel: (1)SHA1 DTLS-Tunnel: (1)SHA1
Hashing
Bytes Tx
           : 11432
                                     Bytes Rx : 14709
Pkts Tx
                                     Pkts Rx
            : 8
                                                 : 146
Pkts Tx Drop: 0
                                     Pkts Rx Drop: 0
                                     Tunnel Group : TAC
Group Policy : AllProtocols
Login Time : 11:58:54 UTC Fri Dec 26 2014
            : 0h:07m:54s
Duration
Inactivity : 0h:00m:00s
                                                 : none
VLAN Mapping: N/A
                                     VLAN
Audt Sess ID : 0add006400004000549d4d7e
Security Grp : none
AnyConnect-Parent Tunnels: 1
SSL-Tunnel Tunnels: 1
DTLS-Tunnel Tunnels: 1
```

macaddress

AnyConnect-Parent:

Tunnel ID : 4.1 Public IP : 10.61.87.251

Encryption : none Hashing : none TCP Src Port : 49514 TCP Dst Port: 443

Auth Mode : userPassword

Idle Time Out: 30 Minutes Idle TO Left : 22 Minutes

Client OS : win Client OS Ver: 6.1.7600 Client Type : AnyConnect

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051

Bytes Tx : 5716 Pkts Tx : 4 Bytes Rx : 764 Pkts Rx : 1 Pkts Tx Drop : 0 Pkts Rx Drop: 0

SSL-Tunnel:

Tunnel ID : 4.2

Assigned IP : 192.168.1.10 Public IP : 10.61.87.251

Encryption : RC4 Hashing : SHA1 Encapsulation: TLSv1.0 TCP Src Port: 49517

Auth Mode : userPassword TCP Dst Port: 443 Idle Time Out: 30 Minutes Idle TO Left: 22 Minutes

Client OS : Windows

Client Type : SSL VPN Client

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051

Bytes Tx : 5716 Bytes Rx : 2760 : 4 Pkts Tx Pkts Rx : 12 Pkts Tx Drop : 0 Pkts Rx Drop: 0

Filter Name : ACL1

DTLS-Tunnel:

Tunnel ID : 4.3

Assigned IP : 192.168.1.10 Public IP : 10.61.87.251

Encryption : AES128 Hashing : SHA1 Encapsulation: DTLSv1.0 UDP Src Port : 52749

UDP Dst Port: 443 Auth Mode : userPassword Idle Time Out: 30 Minutes Idle TO Left : 24 Minutes

Client OS : Windows

Client Type : DTLS VPN Client

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051 Bytes Tx Bytes Rx : 11185

Pkts Tx : 0 Pkts Rx : 133 Pkts Tx Drop: 0 Pkts Rx Drop: 0

Filter Name : ACL1

ASAv2#

show access-list ACL1

access-list ACL1; 1 elements; name hash: 0xe535f5fe

access-list ACL1 line 1 extended permit ip any host 1.1.1.1

(hitcnt=0) 0xe6492cbf

AnyConnect history shows detailed steps for the posture process:

```
<#root>
     12:57:47
                 Contacting 10.62.145.45.
     12:58:01
Posture Assessment: Required for access
     12:58:01
Posture Assessment: Checking for updates...
     12:58:02
Posture Assessment: Updating...
     12:58:03
Posture Assessment: Initiating...
     12:58:13
Posture Assessment: Active
     12:58:13
Posture Assessment: Initiating...
                 User credentials entered.
     12:58:37
     12:58:43
                 Establishing VPN session...
                 The AnyConnect Downloader is performing update checks...
     12:58:43
                 Checking for profile updates...
     12:58:43
     12:58:43
                 Checking for product updates...
     12:58:43
                 Checking for customization updates...
     12:58:43
                 Performing any required updates...
                 The AnyConnect Downloader updates have been completed.
     12:58:43
     12:58:43
                 Establishing VPN session...
     12:58:43
                 Establishing VPN - Initiating connection...
                 Establishing VPN - Examining system...
     12:58:48
     12:58:48
                 Establishing VPN - Activating VPN adapter...
                 Establishing VPN - Configuring system...
     12:58:52
                 Establishing VPN...
     12:58:52
     12:58:52
```

Connected to 10.62.145.45.

## **AnyConnect VPN Session with Posture - Compliant**

After you create **c:\test.txt** file, the flow is similar. Once new AnyConnect session is initiated, the logs indicate the existence of the file:

```
<#root>
%ASA-7-734003: DAP: User cisco, Addr 10.61.87.251: Session Attribute endpoint.file["1"].
exists="true"
```

```
%ASA-7-734003: DAP: User cisco, Addr 10.61.87.251: Session Attribute endpoint.file["1"].path="c:\test.txt"
```

And as a result another DAP policy is used:

<#root>

DAP\_TRACE: Username: cisco, Selected DAPs: ,FileExists

The policy does not impose any ACL as the restriction for the network traffic.

And the session is Up without any ACL (full network access):

<#root>

ASAv2#

show vpn-sessiondb detail anyconnect

Session Type: AnyConnect Detailed

Username :

cisco

Index : 5

Assigned IP :

192.168.1.10

Public IP

10.61.87.251

Protocol : AnyConnect-Parent SSL-Tunnel DTLS-Tunnel

License : AnyConnect Premium

Encryption : AnyConnect-Parent: (1)none SSL-Tunnel: (1)RC4 DTLS-Tunnel: (1)AES128 Hashing : AnyConnect-Parent: (1)none SSL-Tunnel: (1)SHA1 DTLS-Tunnel: (1)SHA1

Bytes Tx : 11432 Bytes Rx : 6298
Pkts Tx : 8 Pkts Rx : 38
Pkts Tx Drop : 0 Pkts Rx Drop : 0
Group Policy : AllProtocols Tunnel Group : TAC

Login Time : 12:10:28 UTC Fri Dec 26 2014

Duration : 0h:00m:17s
Inactivity : 0h:00m:00s

VLAN Mapping: N/A VLAN : none

Audt Sess ID: 0add006400005000549d5034

Security Grp : none

AnyConnect-Parent Tunnels: 1

SSL-Tunnel Tunnels: 1

```
DTLS-Tunnel Tunnels: 1
AnyConnect-Parent:
 Tunnel ID : 5.1
 Public IP
             : 10.61.87.251
```

Encryption : none Hashing : none TCP Src Port: 49549 TCP Dst Port: 443

Auth Mode : userPassword

Idle Time Out: 30 Minutes Idle TO Left: 29 Minutes

Client OS : win Client OS Ver: 6.1.7600 Client Type : AnyConnect

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051

: 5716 Bytes Rx : 764 Bytes Tx Pkts Tx Pkts Rx Pkts Tx Drop: 0 Pkts Rx Drop: 0

SSL-Tunnel:

Tunnel ID : 5.2

Assigned IP : 192.168.1.10 Public IP : 10.61.87.251

Encryption : RC4 Hashing : SHA1 Encapsulation: TLSv1.0 TCP Src Port: 49552

TCP Dst Port: 443 Auth Mode : userPassword Idle Time Out: 30 Minutes Idle TO Left : 29 Minutes

Client OS : Windows

Client Type : SSL VPN Client

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051

Bytes Tx : 37 : 5716 Bytes Rx : 1345 Pkts Rx : 6 Pkts Tx Drop : 0 Pkts Rx Drop: 0

DTLS-Tunnel:

Tunnel ID : 5.3

Public IP : 10.61.87.251 Assigned IP : 192.168.1.10

Encryption : AES128 Hashing : SHA1 Encapsulation: DTLSv1.0 UDP Src Port : 54417

UDP Dst Port: 443 Auth Mode : userPassword Idle Time Out: 30 Minutes Idle TO Left: 30 Minutes

Client OS : Windows

Client Type : DTLS VPN Client

Client Ver : Cisco AnyConnect VPN Agent for Windows 4.0.00051

Bytes Rx : 4189 Bytes Tx : 0 Pkts Tx : 0 : 31 Pkts Rx Pkts Tx Drop: 0 Pkts Rx Drop: 0

Also, Anyconnect reports that HostScan is idle and waiting for the next scan request:

13:10:15 Hostscan state idle

13:10:15 Hostscan is waiting for the next scan



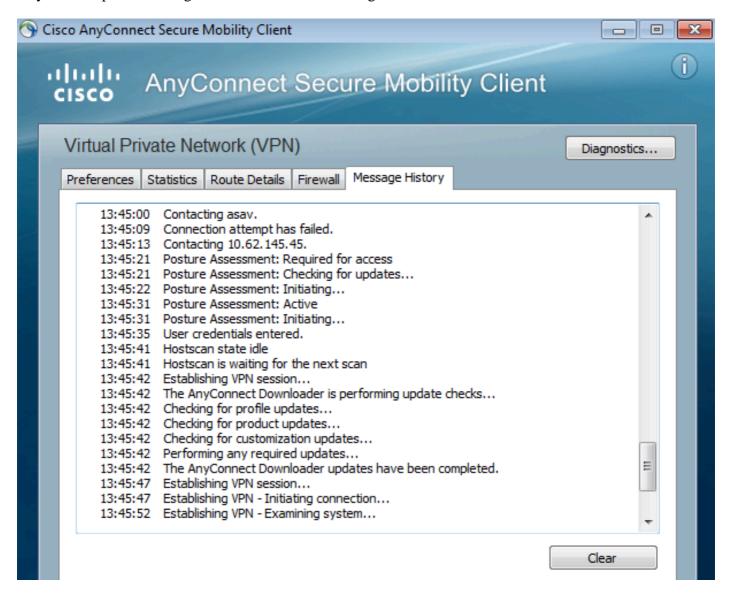
Note: For reassessment, it is advised to use posture module integrated with ISE. AnyConnect 4.0 integration with ISE 1.3 - configuration example

# **Troubleshoot**

This section provides information you can use in order to troubleshoot your configuration.

# **AnyConnect DART**

AnyConnect provides Diagnostics as shown in the image.



Which gathers and saves all the AnyConnect logs to a zip file on the desktop. That zip file includes the logs in Cisco AnyConnect Secure Mobility Client/Anyconnect.txt.

That provides the information about ASA and requests HostScan to gather data:

#### <#root>

Date : 12/26/2014
Time : 12:58:01
Type : Information
Source : acvpnui

Description: Function: ConnectMgr::processResponseString

File: .\ConnectMgr.cpp

Line: 10286

Invoked Function: ConnectMgr::processResponseString

Return Code: 0 (0x00000000)

Description: HostScan request detected.

Then, multiple other logs reveal that CSD is installed. This is the example for a CSD provisioning and subsequent AnyConnect connection along with posture:

<#root>

CSD detected, launching CSD

Posture Assessment: Required for access Gathering CSD version information.

Posture Assessment: Checking for updates...

CSD version file located

Downloading and launching CSD

Posture Assessment: Updating...

Downloading CSD update

CSD Stub located

Posture Assessment: Initiating...

Launching CSD

Initializing CSD

Performing CSD prelogin verification.

CSD prelogin verification finished with return code 0

Starting CSD system scan

CSD successfully launched

Posture Assessment: Active

CSD launched, continuing until token is validated.

Posture Assessment: Initiating...

Checking CSD token for validity Waiting for CSD token validity result CSD token validity check completed CSD Token is now valid

CSD Token validated successfully

Authentication succeeded

Establishing VPN session...

Communication between ASA and AnyConnect is optimized, ASA requests in order to perform only

specific checks - AnyConnect downloads additional data in order to be able to perform that (for example specific AntiVirus verification).

When you open the case with TAC, attach Dart logs along with "show tech" and "debug dap trace 255" from ASA.

# **Related Information**

- Configuring Host Scan and the Posture Module Cisco AnyConnect Secure Mobility Client Administrator Guide
- Posture services on Cisco ISE Configuration Guide
- Cisco ISE 1.3 Administrators Guide
- Technical Support & Documentation Cisco Systems