ARUBA S3500

TUNNELED NODE DEMO GUIDE

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VERSION 1.0

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WHO IS THE AUDIENCE FOR THIS DEMO GUIDE?

This demo guide is intended for System Engineers to demonstrate the tunneled node capability of S3500 series in conjunction with Aruba Mobility Controller to customers.

WHAT EXACTLY IS THE TUNNELED NODE?

The tunneled node is the one of the *key differentiators* of S3500 in the Enterprise access switch market. Previously known as *Mux* in earlier Aruba platforms and releases, the feature had been re-named as tunneled node. The tunneled node encapsulates incoming packets from end-host in GRE packets and forwards them to the Mobility Controller to be processed further. The controller, upon receiving the GRE packets, strips the GRE header and further processes the packet for additional purposes such as authentication, stateful firewall, and so on. This is how the tunneled node feature enables centralized security policy, authentication, and access control.

To allow additional flexibility, the tunneled node feature is enabled per-port basis. Any traffic coming from non-tunneled node interface will be forwarded "normally" without being tunneled to the controller.

WHAT DOES THIS DEMO COVER?

This demo covers a deployment scenario where a group of ports on the S3500 is enabled with tunneled node and differentiated role to the connected client/supplicant is assigned without any change necessary from the network administrator. A more application-centric way to describe this demo would be a *conference room* scenario. Think of a conference room in customer's network where both employees (customers) and guests/contractors need wired connectivity. A typical solution would be something similar to the following: blue-colored wall jacks are for employees (thus direct connectivity to internal network) while red-colored wall jacks are for the guests/contractors (for Internet access only). This solution obviously would lead to potential security issues as well as additional overhead for every employee to remember which port is set up for whom. The S3500 with tunneled node with Aruba Mobility Controller can authenticate end-hosts and still provide necessary level of security without requiring end-hosts to be connected to specific ports (blue or red). This will demonstrate how the controller can provide different authentication method (802.1X and Captive portal) depending on supplicant/client capability and assign appropriate role such as employee and guest.

WHAT DO I NEED FOR THE DEMO?

As this demo is designed to be quick-and-concise in a stand-alone format, efforts have been made to reduce the number of required devices to *absolute minimal* with concise configuration with *minimal amount of optional features*. This helps the discussion during the demo to stay focused on intended topics rather than moving the focus to other unrelated topics.

The following list can be referenced in terms of preparation:

- Aruba S3500 Mobility Access switch running the recommended software image. Current recommended image is 7.0.0.0 build 28198, which is the FCS release. The image name is `ArubaOS_S3500_7.0.0.0_28198`.

- Aruba Mobility Controller – this can be either 6000 chassis with M3 module, 3x00 series controller, or 6xx series controller running recommended software image for tunneled node server functionality (651 controller in the Demo kit for SEs can be used here). Current recommended image is 6.1.1.0 build 28288. The image name is `ArubaOS_MMC_6.1.1.0_28288` or `ArubaOS_6xx_6.1.1.0_28288` for 6xx series controller. If 6xx series controller is to be used, then scalability needs to be kept in mind in case this demo set-up is left on-site as an evaluation test-bed for customers. Refer to the appendix for scalability numbers.

- For this demo, AP license is required for the Mobility controller as each S3500 will consume one AP license. S3500 itself does not require any license for tunneled node feature. In addition, if there are any additional requirements, additional licenses such as PEF and WIP would be required.

- Laptop with 802.1X capability and a web browser for captive portal functionality. Ideally, two laptops could be used (one with 802.1X and the other without), but in order to reduce the number of required equipment, one laptop can be used by turning on/off the 802.1X supplicant functionality.

OVERVIEW OF CONFIGURATION

In terms of configuration, 802.1X and captive portal will be configured and enabled on the controller. The controller will have two roles defined for end-host: employee (authenticated) and guest (guest). Depending on the authentication method supported by the end-host, either method will be utilized to allow the user to get on the network with appropriate role:

Role	Authentication method
Employee (authenticated)	802.1X
Guest (guest)	Captive portal (Web)

Key Point *The S3500 needs to be configured for tunneled node only. All authentication process/configuration takes place on the controller. The S3500 is only providing the tunnel (GRE) functionality.*

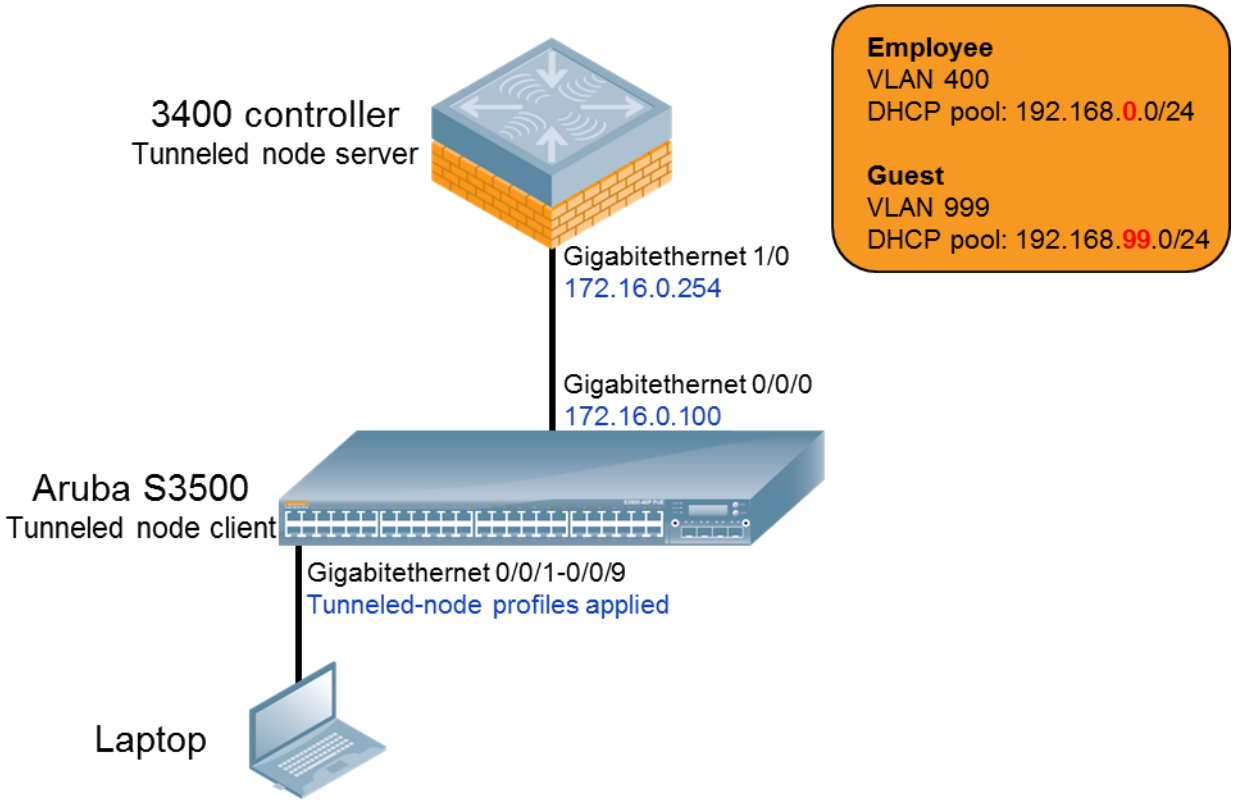
For testing the set-up, a laptop can be connected to the interface with tunneled node configured.

In terms of 802.1X, termination mode will be used on the controller to streamline the demo without requiring additional piece of equipment (i.e. external RADIUS server). If usage of external authentication server is desired, then non-termination mode can be used with external authentication server.

DHCP pool will also be configured on the controller for the end-host. To show differentiated roles, each role will be using a different DHPC pool (subnets).

Lastly, the configuration provided in this document can be modified to accommodate any necessary changes per customer requirements such as IP addressing, physical interface, etc. For additional information on the configuration, please refer to the ArubaOS 7.0 S3500 Mobility Access Switch User Guide.

TOPOLOGY


3400 controller
Tunneled node server
Gigabitethernet 1/0
172.16.0.254
Gigabitethernet 0/0/0
172.16.0.100
Aruba S3500
Tunneled node client
Gigabitethernet 0/0/1-0/0/9
Tunneled-node profiles applied
Laptop
Employee
VLAN 400
DHCP pool: 192.168.0.0/24
Guest
VLAN 999
DHCP pool: 192.168.99.0/24

CONFIGURATION STEPS

1. Configuration on S3500:

Step 0 (optional): Clearing the configuration on the S3500

This configuration assumes that the S3500 does not have any existing configuration (i.e. **`write erase`** had been performed). If this has not been done already, configuration can be erased by using **`write erase`** command, then rebooting the unit. Once the S3500 reboots, quick-setup can be skipped.

If **`write erase`** and reboot was performed, admin password needs to be changed in order to save the configuration. The admin password can be changed using the following password:

```
(ArubaS3500) (config) #mgmt-user admin root
Password:<password>
Re-Type password:<password>
```

Step 1: Basic configuration including IP address and VLAN

Start by configuring the IP address of VLAN for connectivity and the guest VLAN (999). We will use VLAN 1 for sole purpose to make the demo as simple as possible. Default gateway configuration is included as a reference and not required for this demo.

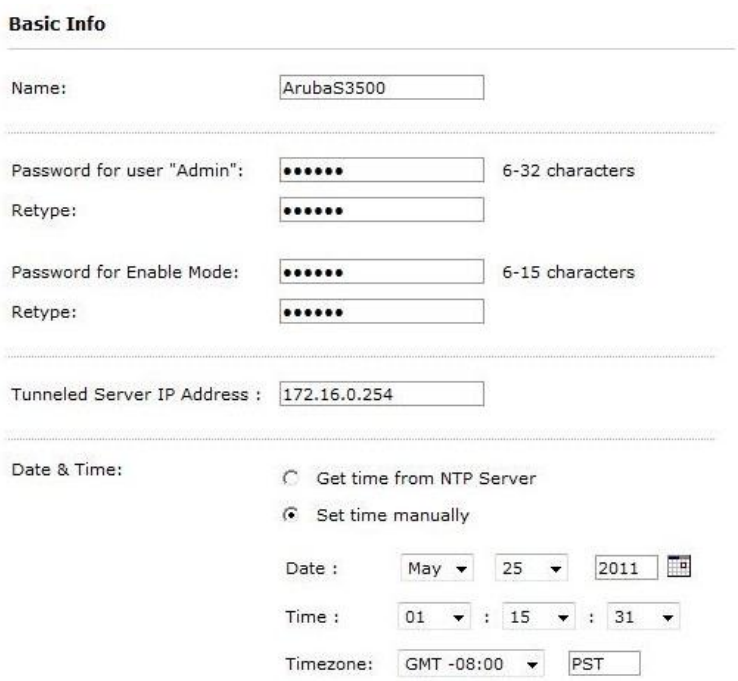
```
(ArubaS3500) (config) #interface vlan 1
(ArubaS3500) (vlan "1") #ip address 172.16.0.100 netmask 255.255.255.0
(ArubaS3500) (vlan "1") #exit

(ArubaS3500) (config) #ip-profile
(ArubaS3500) (ip-profile) #default-gateway 172.16.0.254
(ArubaS3500) (ip-profile) #exit

(ArubaS3500) (config) #vlan 999
(ArubaS3500) (VLAN "999") #description CONTROLLER_VLAN_999
(ArubaS3500) (VLAN "999") #exit
```

Optional: By default, all interfaces belong to VLAN 1. Following configuration is being provided as reference only:

```
(ArubaS3500) (config) #interface-profile switching-profile VLAN1
(ArubaS3500) (switching profile "VLAN1") #access-vlan 1
(ArubaS3500) (switching profile "VLAN1") #exit

(ArubaS3500) (config) #interface gigabitethernet 0/0/0
(ArubaS3500) (gigabitethernet "0/0/0") #switching-profile VLAN1
(ArubaS3500) (gigabitethernet "0/0/0") #exit
```

Step 2: Configuring the interface profiles for switching and tunneled node to be applied to the tunneled node interfaces

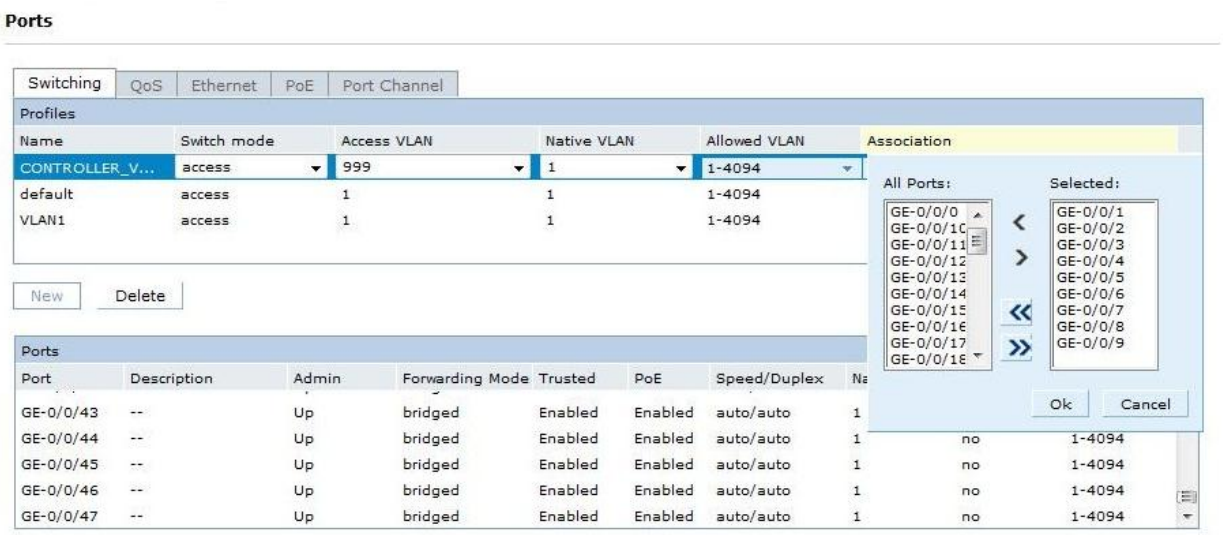
```
(ArubaS3500) (config) #interface-profile switching-profile
CONTROLLER_VLAN_999
(ArubaS3500) (switching profile "CONTROLLER_VLAN_999") #access-vlan 999
(ArubaS3500) (switching profile "CONTROLLER_VLAN_999") #exit

(ArubaS3500) (config) #interface-profile tunneled-node-profile TUNNELED_NODE
(ArubaS3500) (Tunneled Node Server profile "TUNNELED_NODE") #controller-ip
172.16.0.254
(ArubaS3500) (Tunneled Node Server profile "TUNNELED_NODE") #exit
```



Step 3: Applying the configured switching and tunneled node profiles

Define the interface group to include interfaces from 0/0/1 – 0/0/9 where end-host(s) will be connected during the actual demo, then apply the configured interface profiles.

```
(ArubaS3500) (config) #interface-group gigabitethernet TUNNELED_NODE_DEMO
(ArubaS3500) (gigabitethernet "TUNNELED_NODE_DEMO") #apply-to 0/0/1-0/0/9
(ArubaS3500) (gigabitethernet "TUNNELED_NODE_DEMO") #tunneled-node-profile TUNNELED_NODE
(ArubaS3500) (gigabitethernet "TUNNELED_NODE_DEMO") #switching-profile CONTROLLER_VLAN_999
```



Step 4 (optional): Verify the configuration is completed using `show run` and `show tunneled-node config` command

```
(ArubaS3500) #show tunneled-node config


Tunneled Node Client: Enabled
Tunneled Node Server: 172.16.0.254
Tunneled Node Loop Prevention: Disabled
```

Step 5: Save the configuration

```
(ArubaS3500) #write memory
Saving Configuration...


Configuration Saved.
```

2. Configuration on 3400 controller:

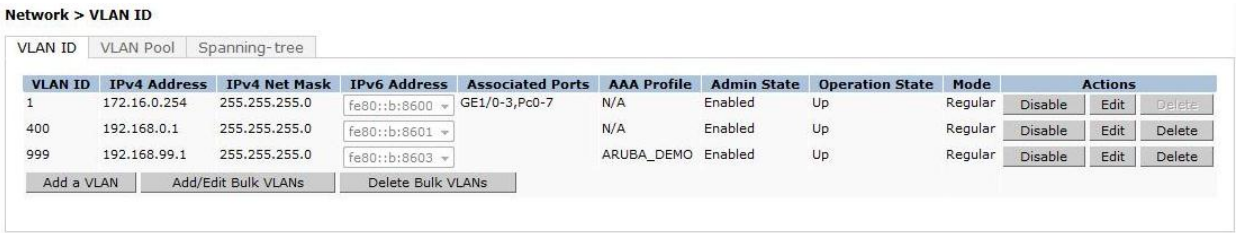
Step 0 (optional):

Similar to the S3500, the controller should have clean configuration with **`write erase`** performed. Since the initial set-up cannot be skipped on the controller, accept the default values given during the set-up such as the IP address (172.16.0.254) and the subnet mask.

Step 1: Basic configuration including IP address and VLAN

Create VLAN 400 for Employees and VLAN 999 for Guests. For this demo, the IP address of VLAN 1 is set to 172.16.0.254, which set by default by initial controller set-up (step 0).

```
(Aruba3400) (config) #vlan 400
(Aruba3400) (config) #interface vlan 400
(Aruba3400) (config-subif)#ip address 192.168.0.1 255.255.255.0
(Aruba3400) (config-subif)#exit

(Aruba3400) (config) #vlan 999
(Aruba3400) (config) #interface vlan 999
(Aruba3400) (config-subif)#ip address 192.168.99.1 255.255.255.0
(Aruba3400) (config-subif)#exit
```

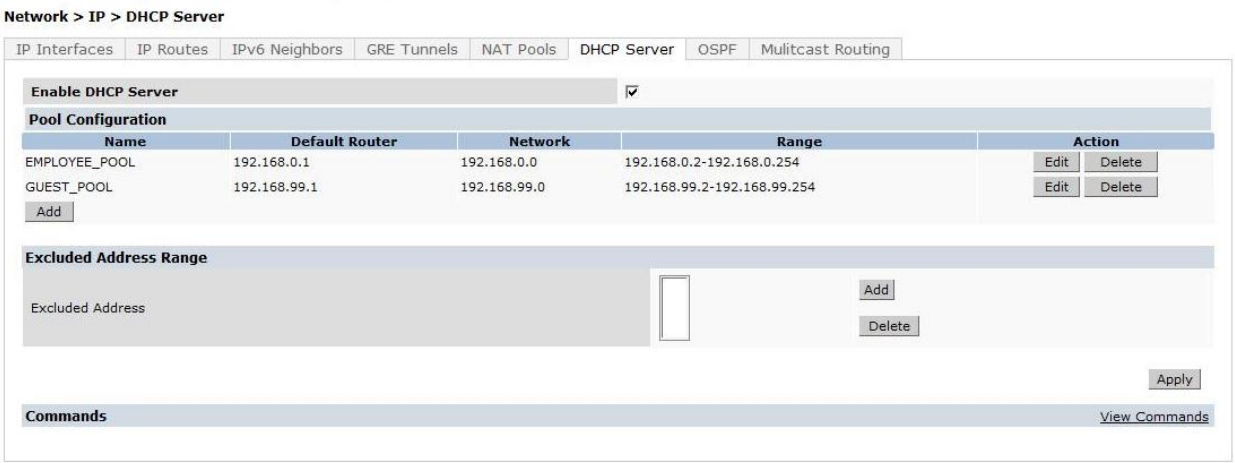


Step 2: DHCP pools for employee and guest roles

DHCP pools need to be created so that the IP address can to be given out to the end-host (laptop). The IP addressing (through DHCP) on the laptop can be used for verification purpose in case of employee laptop. For guest laptop, IP address is required in order to successfully start the captive portal authentication. The IP Address of the controller will be used for DNS server since this is a stand-alone demo.

```
(Aruba3400) (config) #ip dhcp pool EMPLOYEE_POOL
(Aruba3400) (config-dhcp)#default-router 192.168.0.1
(Aruba3400) (config-dhcp)#network 192.168.0.0 255.255.255.0
(Aruba3400) (config-dhcp)#dns-server 192.168.0.1
(Aruba3400) (config-dhcp)#exit

(Aruba3400) (config) #ip dhcp pool GUEST_POOL
(Aruba3400) (config-dhcp)#default-router 192.168.99.1
```

```
(Aruba3400) (config-dhcp)#network 192.168.99.0 255.255.255.0
(Aruba3400) (config-dhcp)#dns-server 192.168.99.1
(Aruba3400) (config-dhcp)#exit

(Aruba3400) (config) #service dhcp
```

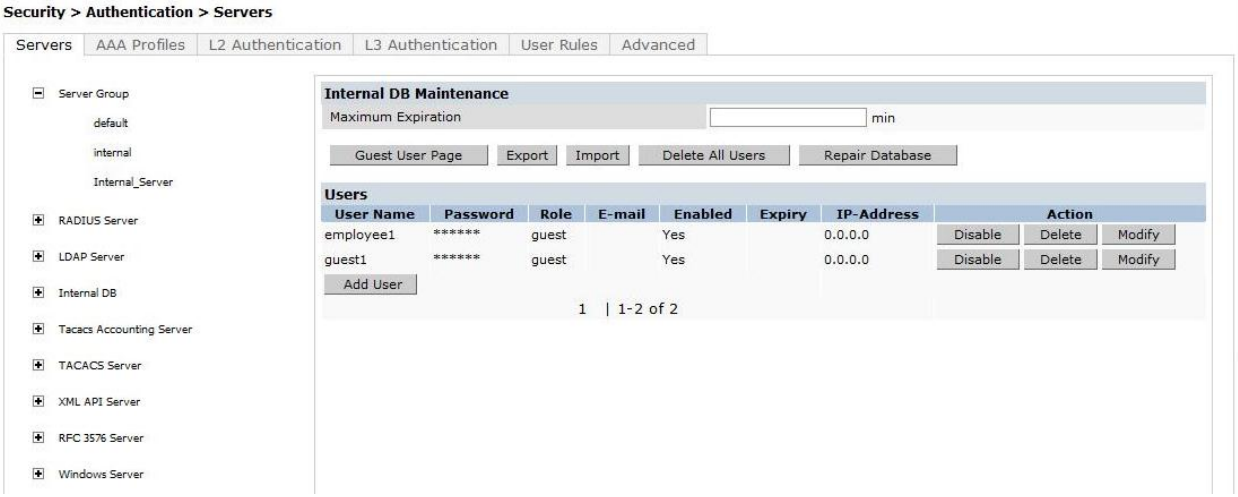


Step 3: Populating the Internal server database

Two entries need to be configured: one for employee and the other for guest. This is a part of the effort to reduce the number of necessary equipment for the demo (i.e. external RADIUS server).

```
(Aruba3400) #local-userdb add username employee1 password employee1
(Aruba3400) #local-userdb add username guest1 password guest1
```

(Optional) Use show local-userdb to verify the entries just created.

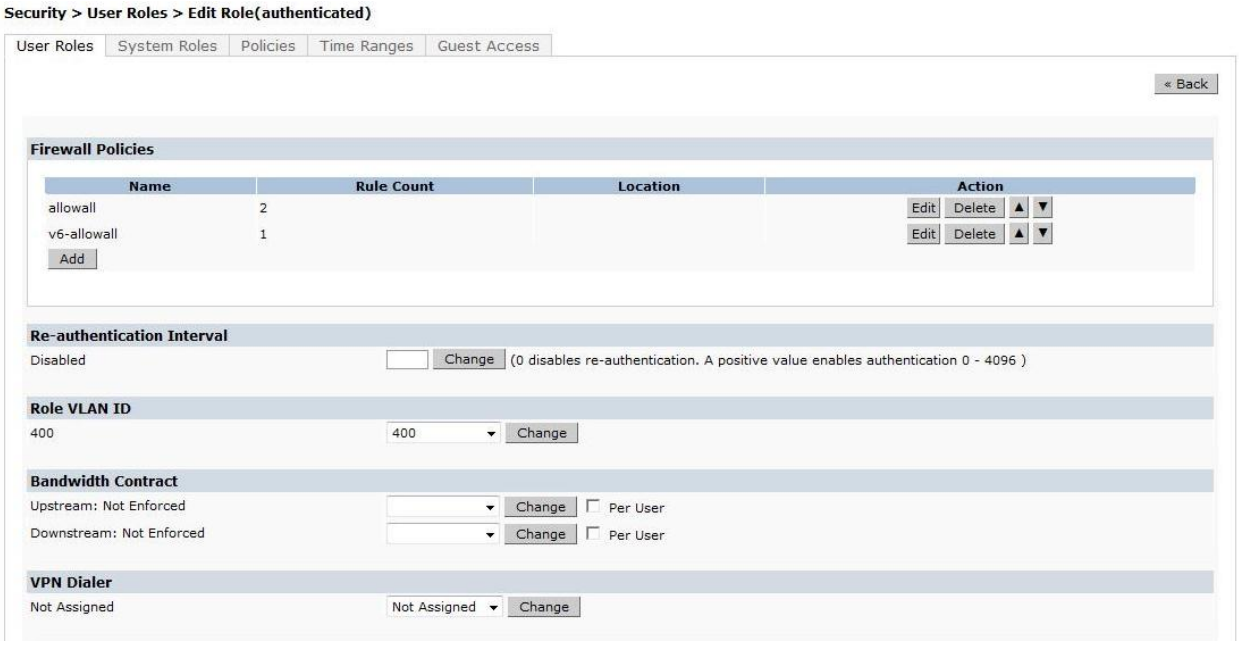


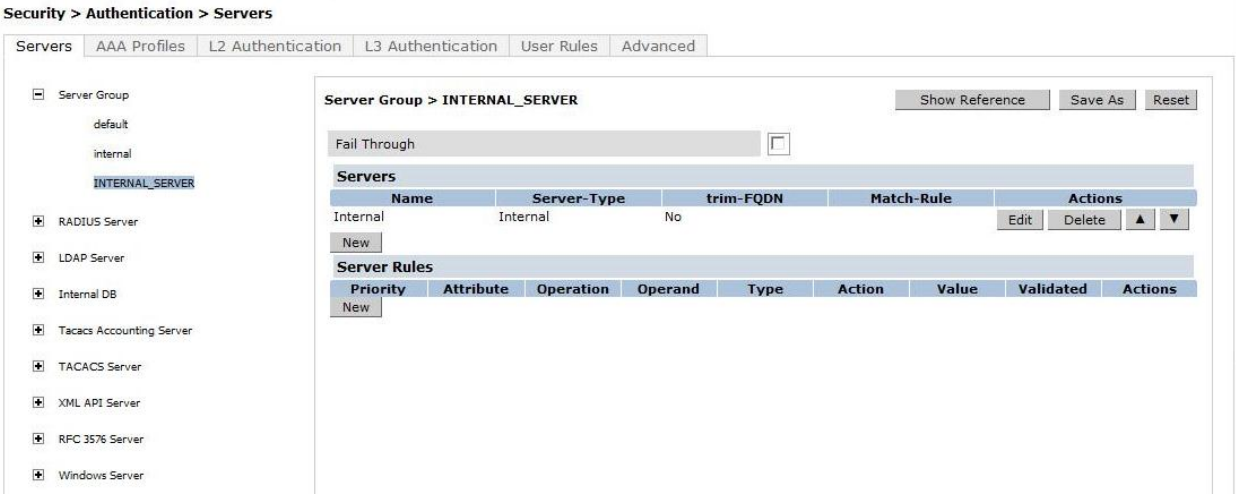
Step 4: Authentication for employee

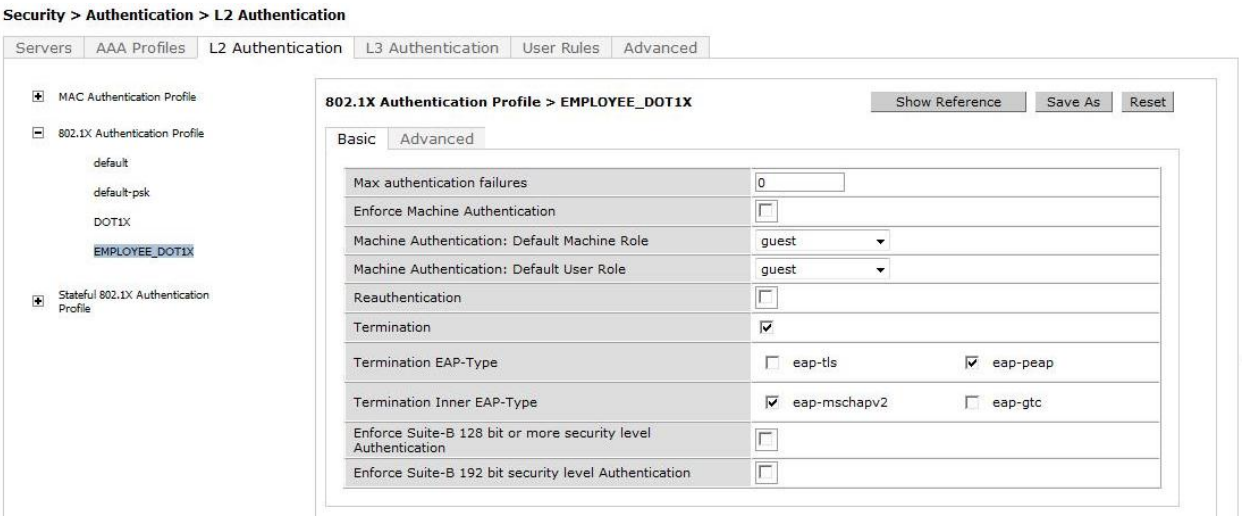
802.1X for employee role: we will use “authenticated role” that is already defined with addition of VLAN 400 for authenticated employees. Termination mode will be used with internal server so this demo can function as in stand-alone format. Since the demo will be utilizing a Windows-based laptop, EAP-type parameters are also configured to EAP-PEAP with MSChapV2.

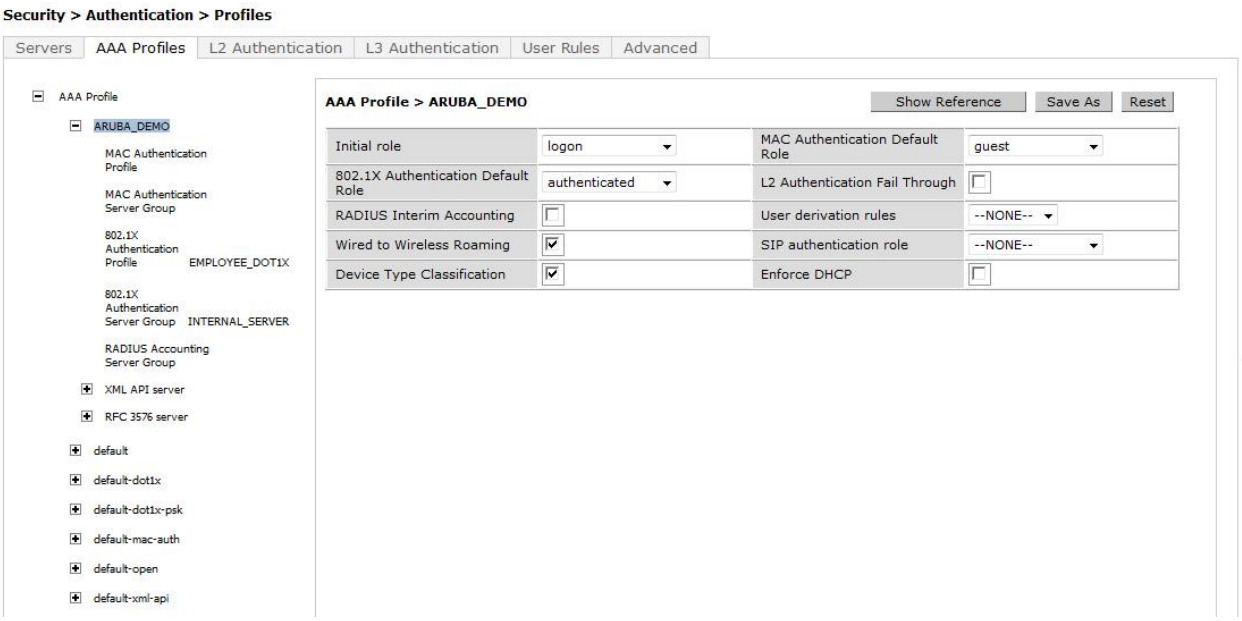
Some line(s) of configuration shown here are actually parts of the default configuration so it is not necessary to be configured. However, it has been included to help understanding of the demo configuration.

```
(Aruba3400) (config) #user-role authenticated
(Aruba3400) (config-role) #vlan 400
(Aruba3400) (config-role) #exit

(Aruba3400) (config) #aaa server-group INTERNAL_SERVER
(Aruba3400) (Server Group "Internal_Server") #auth-server Internal
(Aruba3400) (Server Group "Internal_Server") #exit

(Aruba3400) (config) #aaa authentication dot1x EMPLOYEE_DOT1X
(Aruba3400) (802.1X Authentication Profile "EMPLOYEE_DOT1X") #termination
enable
(Aruba3400) (802.1X Authentication Profile "EMPLOYEE_DOT1X") #termination
eap-type eap-peap
(Aruba3400) (802.1X Authentication Profile "EMPLOYEE_DOT1X") #termination
inner-eap-type eap-mschapv2
(Aruba3400) (802.1X Authentication Profile "EMPLOYEE_DOT1X") #exit

(Aruba3400) (config) #aaa profile ARUBA_DEMO
(Aruba3400) (AAA Profile "ARUBA_DEMO") #initial-role logon
(Aruba3400) (AAA Profile "ARUBA_DEMO") #authentication-dot1x EMPLOYEE_DOT1X
(Aruba3400) (AAA Profile "ARUBA_DEMO") #dot1x-default-role authenticated
(Aruba3400) (AAA Profile "ARUBA_DEMO") #dot1x-server-group INTERNAL_SERVER
(Aruba3400) (AAA Profile "ARUBA_DEMO") #exit
```


Security > User Roles > Edit Role(authenticated)
User Roles
System Roles
Policies
Time Ranges
Guest Access
« Back
Firewall Policies
Name
Rule Count
Location
Action
allowall
2
Edit
Delete
v6-allowall
1
Edit
Delete
Add
Re-authentication Interval
Disabled
Change
(0 disables re-authentication. A positive value enables authentication 0 - 4096)
Role VLAN ID
400
400
Change
Bandwidth Contract
Upstream: Not Enforced
Change
Per User
Downstream: Not Enforced
Change
Per User
VPN Dialer
Not Assigned
Not Assigned
Change


Security > Authentication > Servers
Servers
AAA Profiles
L2 Authentication
L3 Authentication
User Rules
Advanced
Server Group
default
internal
INTERNAL_SERVER
RADIUS Server
LDAP Server
Internal DB
Tacacs Accounting Server
TACACS Server
XML API Server
RFC 3576 Server
Windows Server
Server Group > INTERNAL_SERVER
Show Reference
Save As
Reset
Fail Through
Servers
Name
Server-Type
trim-FQDN
Match-Rule
Actions
Internal
Internal
No
Edit
Delete
New
Server Rules
Priority
Attribute
Operation
Operand
Type
Action
Value
Validated
Actions
New



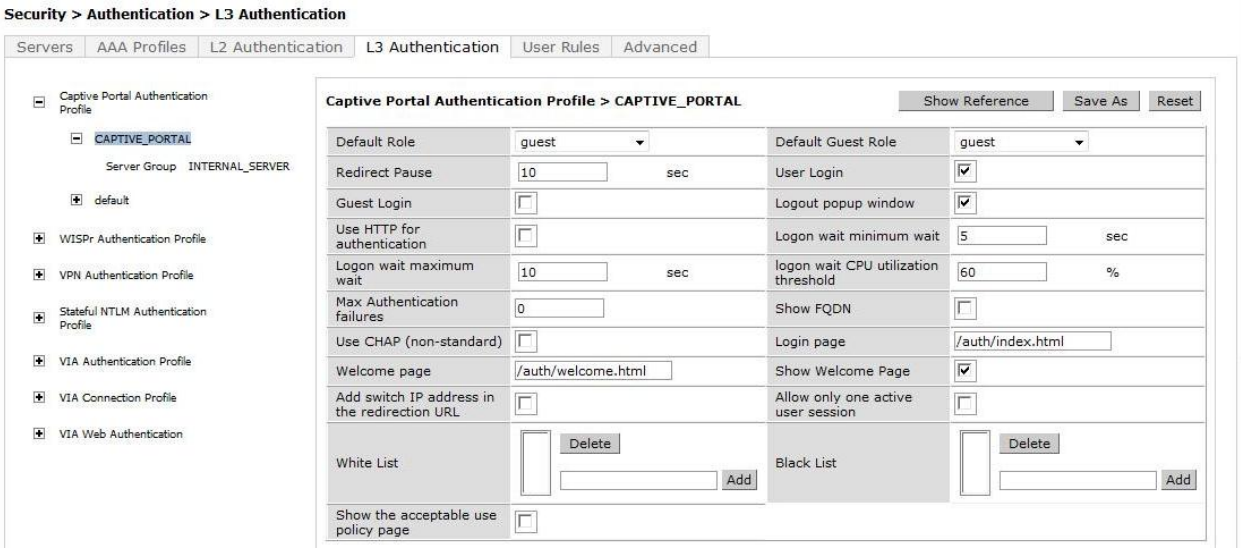


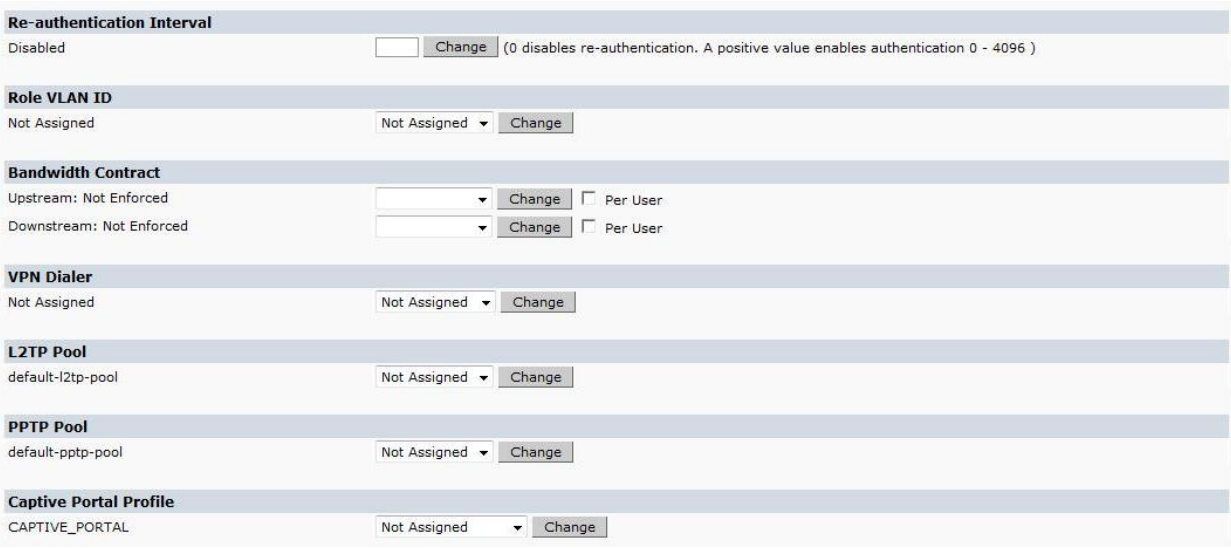
Step 5: Authentication for guest

Captive portal for guest: logon role will be used for captive portal. Again, some line(s) of configuration shown here are actually parts of the default configuration so they do not need to be configured.

```
(Aruba3400) (config) #aaa authentication captive-portal CAPTIVE_PORTAL

(Aruba3400) (Captive Portal Authentication Profile "CAPTIVE_PORTAL") #server-group INTERNAL_SERVER

(Aruba3400) (Captive Portal Authentication Profile "CAPTIVE_PORTAL") #user-logon

(Aruba3400) (Captive Portal Authentication Profile "CAPTIVE_PORTAL") #default-role guest
```

```
(Aruba3400) (Captive Portal Authentication Profile "CAPTIVE_PORTAL") #logout-popup-window
(Aruba3400) (Captive Portal Authentication Profile "CAPTIVE_PORTAL") #exit

(Aruba3400) (config) #user-role logon
(Aruba3400) (config-role) #captive-portal CAPTIVE_PORTAL
(Aruba3400) (config-role) #exit
```





Step 6: Apply the configured profile on the VLAN (999)

The configured AAA profile needs to be applied to the VLAN (999) so it will take effect.

```
(Aruba3400) (config) #vlan 999 wired aaa-profile ARUBA_DEMO
```

Step 7: Save the configuration

```
(Aruba3400) #write memory
Saving Configuration...

Configuration Saved.
```

DEMO STEPS

Once the configuration is completed, demo steps can take place.

Step 1: Verify Connectivity

From the S3500, ping the controller IP address to ensure connectivity. Or ping the S3500 IP address from the controller if more convenient.

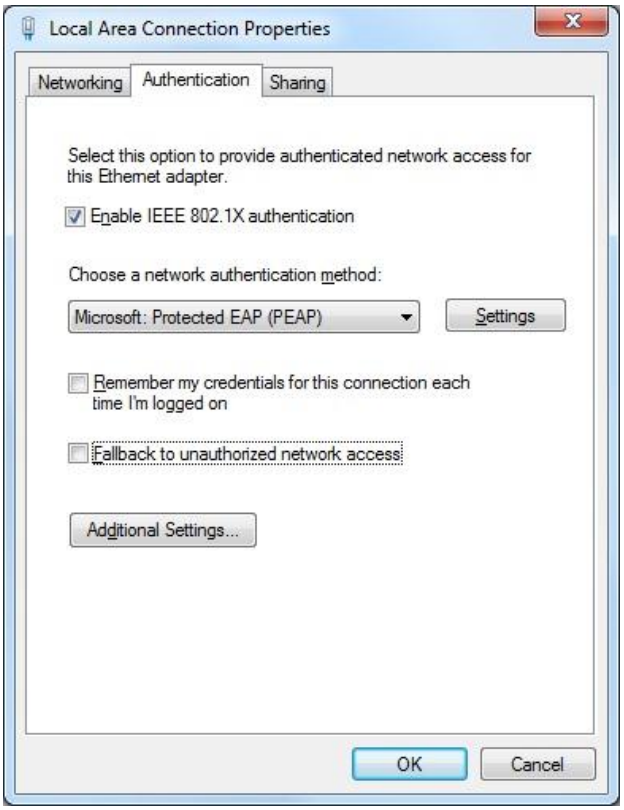
```
(ArubaS3500) #ping 172.16.0.254
Press 'q' to abort.
Sending 5, 100-byte ICMP Echos to 172.16.0.254, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1.799/1.823/1.839
ms


(ArubaS3500) #
```

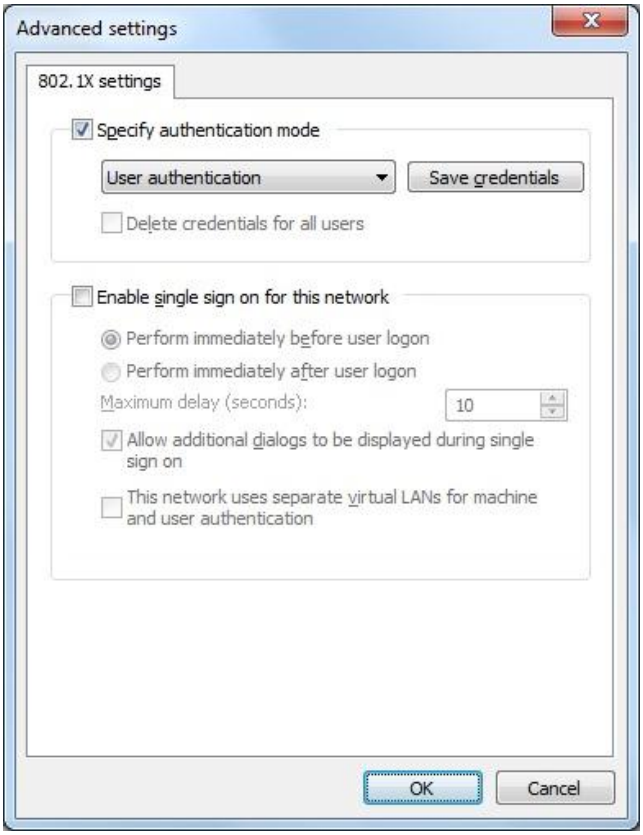
Step 2: Connect the laptop with 802.1X (as employee) capability

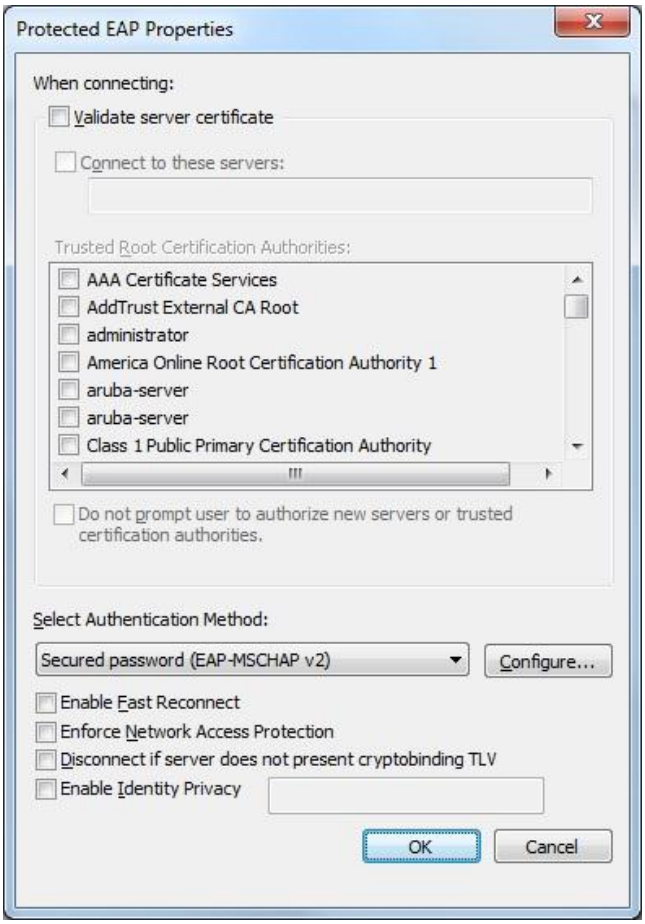
If you don't know how to enable 802.1X on a Windows laptop, follow the steps listed on this link:

http://windows.microsoft.com/en-US/windows-vista/Enable-802-1X-authentication

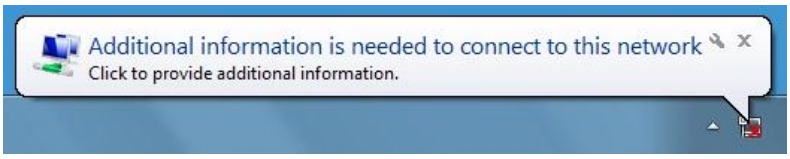
Once 802.1X functionality has been enabled, use the following figures as reference for settings. In particular, ensure that "Validate server certificate" and automatic use of Windows logon options have been unchecked, and *user authentication* is chosen for authentication mode:


Local Area Connection Properties
Networking
Authentication
Sharing
Select this option to provide authenticated network access for this Ethernet adapter.
Enable IEEE 802.1X authentication
Choose a network authentication method:
Microsoft: Protected EAP (PEAP)
Settings
Remember my credentials for this connection each time I'm logged on
Fallback to unauthorized network access
Additional Settings...
OK
Cancel

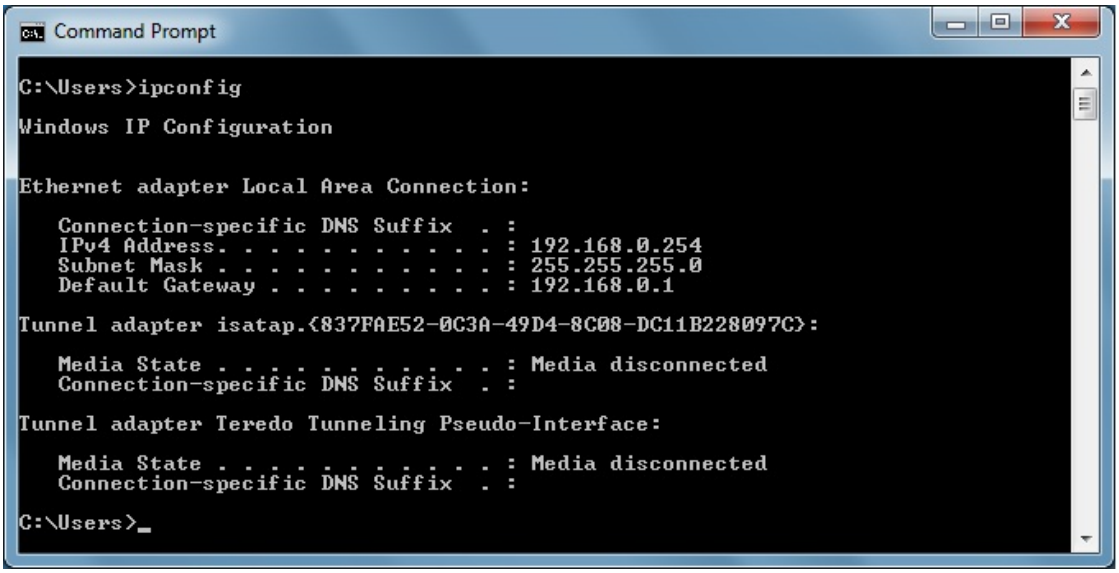

Advanced settings
802.1X settings
Specify authentication mode
User authentication
Save credentials
Delete credentials for all users
Enable single sign on for this network
Perform immediately before user logon
Perform immediately after user logon
Maximum delay (seconds):
10
Allow additional dialogs to be displayed during single sign on
This network uses separate virtual LANs for machine and user authentication
OK
Cancel



Step 3: Complete the authentication process by clicking the balloon message, then proving the username/password



Step 4: Verify that appropriate IP address (in 192.168.0.0/24 subnet) has been received from DHCP server



Step 5 (optional): Verify the tunneled node state on either S3500 or controller

```
(ArubaS3500) #show tunneled-node state


Tunneled Node State
-------------------
IP            MAC                Port     state        vlan  tunnel
inactive-time
--            ---                ----     -----        ----  ------  --------
-----
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/1  complete     0999  4094    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/2  not-started  0999  4093    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/3  not-started  0999  4092    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/4  not-started  0999  4091    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/5  not-started  0999  4090    0000
```

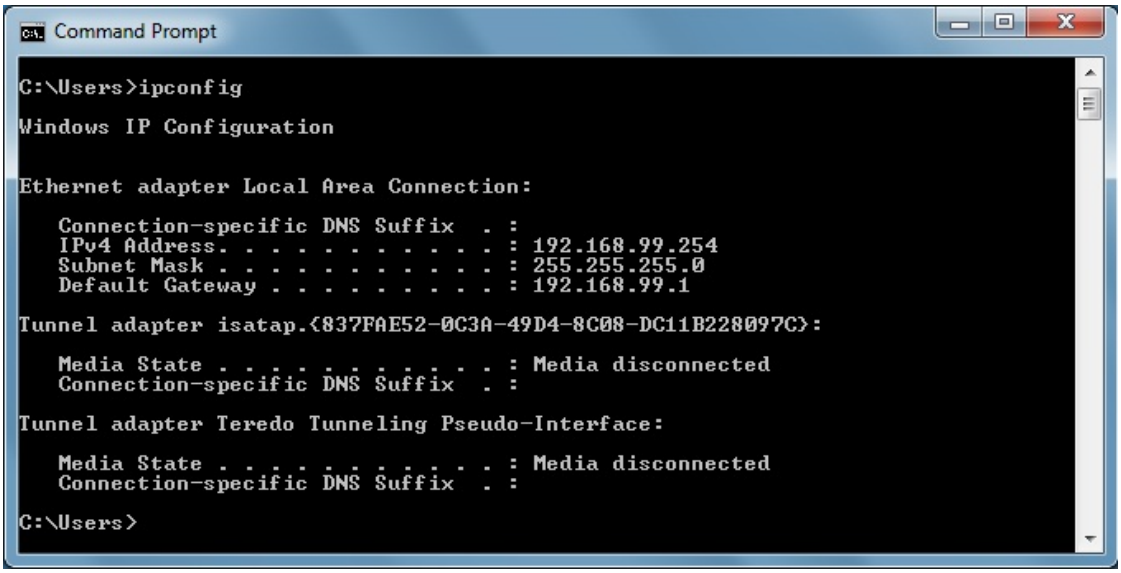
```
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/6  not-started  0999  4089    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/7  not-started  0999  4088    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/8  not-started  0999  4087    0000
172.16.0.254  00:0b:86:6a:31:c0  GE0/0/9  not-started  0999  4086    0000
```

```
(Aruba3400) #show user-table


Users
-----
    IP              MAC            Name      Role           Age(d:h:m)  Auth
VPN link  AP name   Roaming  Essid/Bssid/Phy
Profile     Forward mode  Type
----------     ------------       ------     ----           ----------  ----
--------  -------   -------  ---------------
-------     ------------  ----
192.168.0.254  2c:27:d7:be:6d:37  employee1  authenticated  00:00:00
802.1x-Wired            tunnel 9  Wired
172.16.0.100:gigabitethernet0/0/1/00:0b:86:6a:31:c0  ARUBA_DEMO  tunnel
Win 7


User Entries: 1/1


(Aruba3400) #show tunneled-node state


Tunneled Node State
-------------------
IP            MAC                s/p                  state     vlan  tunnel
inactive-time
--            ---                ---                  -----     ----  ------
-------------
172.16.0.100  00:0b:86:6a:31:c0  gigabitethernet0/0/1  complete  999   9
0
```

Step 6: Disconnect the laptop

Step 7: Turn off the 802.1X functionality on the laptop then reconnect (this time as guest)

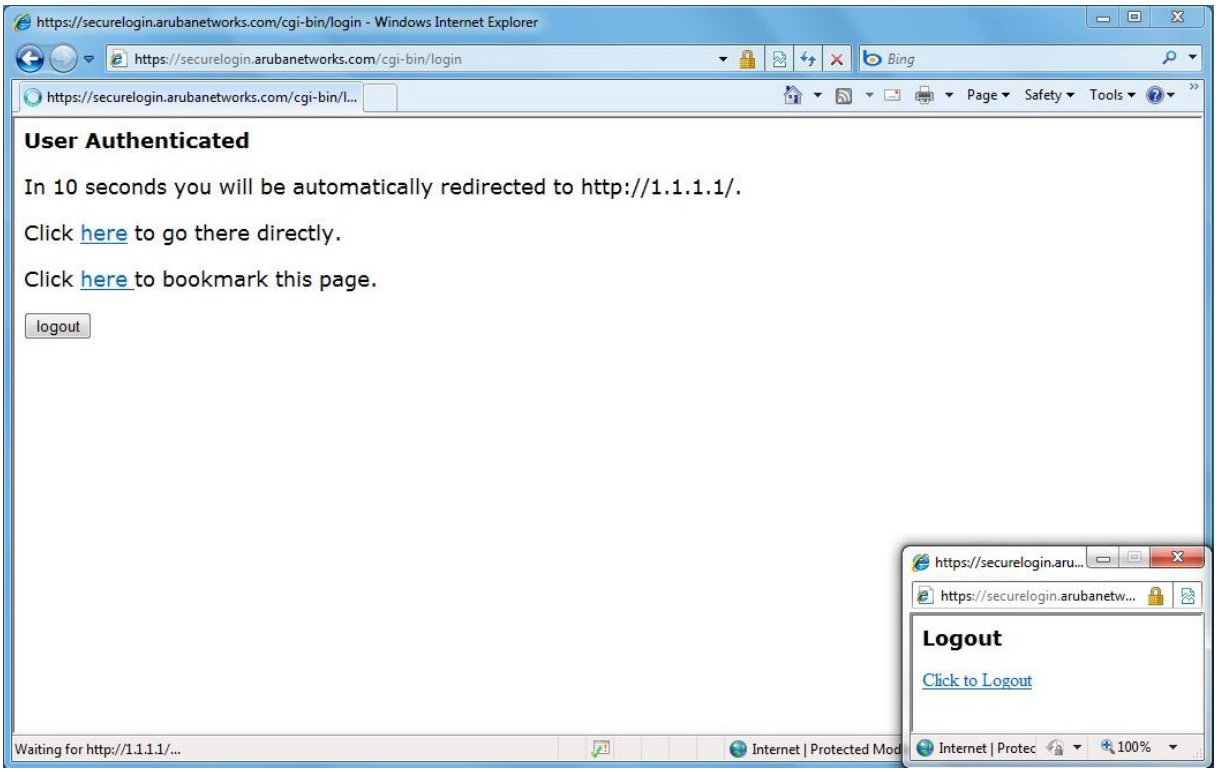
The laptop should obtain an IP address in 192.168.**99**.0/24 subnet



Step 8: Authenticate via web browser using http://1.1.1.1 as destination IP address

Note that for this demo to work, ***IP address needs to be used*** due to a bug in the controller software image used for this demo. Do not use domain name such as http://arubanetworks.com.

Step 9: Verify that authentication is successful as guest



Step 10 (optional): Verify the tunneled node state on either S3500 or controller

```
(ArubaS3500) #show tunneled-node state


Tunneled Node State
-------------------
IP              MAC                 Port      state        vlan  tunnel
inactive-time
--              ---                 ----      -----        ----  ------  --------
-----
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/1   complete     0999  4094    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/2   not-started  0999  4093    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/3   not-started  0999  4092    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/4   not-started  0999  4091    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/5   not-started  0999  4090    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/6   not-started  0999  4089    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/7   not-started  0999  4088    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/8   not-started  0999  4087    0000
172.16.0.254    00:0b:86:6a:31:c0   GE0/0/9   not-started  0999  4086    0000
```

```
(Aruba3400) #show user-table
```

```
Users
-----
    IP               MAC            Name     Role      Age(d:h:m)  Auth  VPN
link  AP name   Roaming  Essid/Bssid/Phy
Profile     Forward mode  Type
----------      ------------       ------    ----      ----------  ----  ----
----  -------   -------  ---------------
-------     ------------  ----
192.168.99.254  2c:27:d7:be:6d:37  guest1    guest     00:00:01    Web
tunnel 9  Wired    172.16.0.100:gigabitethernet0/0/1/00:0b:86:6a:31:c0
ARUBA_DEMO  tunnel        Win 7
User Entries: 1/1


(Aruba3400) #show tunneled-node state



Tunneled Node State
-------------------
IP            MAC                s/p                  state     vlan  tunnel
inactive-time
--            ---                ---                  -----     ----  ------
-------------
172.16.0.100  00:0b:86:6a:31:c0  gigabitethernet0/0/1  complete  999   9
0
```

You have successfully completed the S3500 tunneled node demo.

APPENDIX

Controller scalability numbers for tunneled node:

	6000 Chassis	M3 Module	3600	3400	3200	650/651	620
Device Capacity	4096	1024	512	256	128	64	32
# of Wired APs	512	128	32	16	8	2	1
# of Campus APs (WLAN)	2048	512	128	64	32	16/17	8
# of Remote APs	4096	1024	512	256	128	64	32
# of Tunnels	16384	4096	1024	512	256	96	48
Concurrent Users	32768	8192	8192	4096	2048	512	256

REFERENCE

S3500 configuration

```
version 7.0
enable secret "******"
hostname "ArubaS3500"
clock timezone PST -8
location "Building1.floor1"
controller config 1
ip cp-redirect-address disable
ip access-list eth validuserethacl
  permit any
!
netservice svc-https tcp 443
netservice svc-dhcp udp 67 68
netservice svc-telnet tcp 23
netservice svc-sip-tcp tcp 5060
netservice svc-kerberos udp 88
netservice svc-tftp udp 69
netservice svc-dns udp 53
netservice svc-h323-udp udp 1718 1719
netservice svc-h323-tcp tcp 1720
netservice svc-vocera udp 5002
netservice svc-http tcp 80
netservice svc-sip-udp udp 5060
netservice svc-natt udp 4500
netservice svc-ftp tcp 21
netservice svc-smtp tcp 25
netservice svc-sips tcp 5061
netservice svc-ntp udp 123
netservice svc-icmp 1
netservice svc-ssh tcp 22
ip access-list stateless dhcp-acl-stateless
  any any svc-dhcp permit
!
ip access-list stateless validuser
  network 169.254.0.0 255.255.0.0 any any deny
  any any any permit
!
ip access-list stateless https-acl-stateless
  any any svc-https permit
!
ip access-list stateless dns-acl-stateless
  any any svc-dns permit
!
ip access-list stateless logon-control-stateless
  user any udp 68 deny
  any any svc-icmp permit
  any any svc-dns permit
  any any svc-dhcp permit
  any any svc-natt permit
!
```

```
ip access-list stateless icmp-acl-stateless
  any any svc-icmp permit
!
ip access-list stateless allowall-stateless
  any any any permit
!
ip access-list stateless http-acl-stateless
  any any svc-http permit
!
user-role ap-role
!
user-role denyall
!
user-role guest-logon
!
user-role guest
 access-list stateless http-acl-stateless
 access-list stateless https-acl-stateless
 access-list stateless dhcp-acl-stateless
 access-list stateless icmp-acl-stateless
 access-list stateless dns-acl-stateless
!
user-role stateful-dot1x
!
user-role authenticated
 access-list stateless allowall-stateless
!
user-role logon
 access-list stateless logon-control-stateless
!
!


ip dhcp default-pool private


ssh mgmt-auth username/password
mgmt-user admin root e141f5db014bfad8e6d2fcaf9e02c947df64dcfebfa2c08ba6

ip igmp
!

no firewall attack-rate cp 1024

!
firewall cp

!
firewall cp
packet-capture-defaults tcp disable udp disable sysmsg disable other disable
!
ip domain lookup
!
```

```
country US
aaa authentication mac "default"
!
aaa authentication dot1x "default"
!
aaa server-group "default"
 auth-server Internal
 set role condition role value-of
!
aaa profile "default"
!
aaa authentication mgmt
!
aaa authentication wired
!
web-server
!
aaa password-policy mgmt
!
traceoptions
!
qos-profile "default"
!
policer-profile "default"
!
ip-profile
   default-gateway 172.16.0.254
!
lcd-menu
!
interface-profile switching-profile "CONTROLLER_VLAN_999"
   access-vlan 999
!
interface-profile switching-profile "default"
!
interface-profile switching-profile "VLAN1"
!
interface-profile tunneled-node-profile "TUNNELED_NODE"
   controller-ip 172.16.0.254
!
interface-profile poe-profile "default"
!
interface-profile poe-profile "poe-factory-initial"
   enable
!
interface-profile enet-link-profile "default"
!
interface-profile lldp-profile "default"
!
interface-profile lldp-profile "lldp-factory-initial"
   lldp transmit
   lldp receive
   med enable
```

```
!
interface-profile mstp-profile "default"
!
mstp
   enable
!
lacp
!
igmp-snooping-profile "default"
!
igmp-snooping-profile "igmp-snooping-factory-initial"
!
poemanagement member-id "0"
!
vlan "1"
   igmp-snooping-profile "igmp-snooping-factory-initial"
!
vlan "999"
   description "CONTROLLER_VLAN_999"
!
interface gigabitethernet "0/0/0"
   switching-profile "VLAN1"
!
interface vlan "1"
   ip address 172.16.0.100 netmask 255.255.255.0
!
interface mgmt
!
interface-group gigabitethernet "default"
   apply-to ALL
   lldp-profile "lldp-factory-initial"
   poe-profile "poe-factory-initial"
!
interface-group gigabitethernet "TUNNELED_NODE_DEMO"
   apply-to 0/0/1-0/0/9
   tunneled-node-profile "TUNNELED_NODE"
   switching-profile "CONTROLLER_VLAN_999"
!

snmp-server enable trap
end
```

3400 Mobility controller configuration

```
version 6.1
enable secret "******"
hostname "Aruba3400"
clock timezone PST -8
location "Building1.floor1"
controller config 2
ip NAT pool dynamic-srcnat 0.0.0.0 0.0.0.0
ip access-list eth validuserethacl
  permit any
!
netservice svc-netbios-dgm udp 138
netservice svc-snmp-trap udp 162
netservice svc-syslog udp 514
netservice svc-l2tp udp 1701
netservice svc-ike udp 500
netservice svc-https tcp 443
netservice svc-smb-tcp tcp 445
netservice svc-dhcp udp 67 68
netservice svc-pptp tcp 1723
netservice svc-sec-papi udp 8209
netservice svc-sccp tcp 2000
netservice svc-telnet tcp 23
netservice svc-lpd tcp 515
netservice svc-netbios-ssn tcp 139
netservice svc-sip-tcp tcp 5060
netservice svc-kerberos udp 88
netservice svc-tftp udp 69
netservice svc-http-proxy3 tcp 8888
netservice svc-noe udp 32512
netservice svc-cfgm-tcp tcp 8211
netservice svc-adp udp 8200
netservice svc-pop3 tcp 110
netservice svc-rtsp tcp 554
netservice svc-msrpc-tcp tcp 135 139
netservice svc-dns udp 53
netservice svc-h323-udp udp 1718 1719
netservice svc-h323-tcp tcp 1720
netservice svc-vocera udp 5002
netservice svc-http tcp 80
netservice svc-http-proxy2 tcp 8080
netservice svc-sip-udp udp 5060
netservice svc-nterm tcp 1026 1028
netservice svc-noe-oxo udp 5000 alg noe
netservice svc-papi udp 8211
netservice svc-natt udp 4500
netservice svc-ftp tcp 21
netservice svc-microsoft-ds tcp 445
netservice svc-svp 119
netservice svc-smtp tcp 25
netservice svc-gre 47
netservice svc-netbios-ns udp 137
netservice svc-sips tcp 5061
netservice svc-smb-udp udp 445
netservice svc-ipp-tcp tcp 631
netservice svc-esp 50
netservice svc-v6-dhcp udp 546 547
netservice svc-snmp udp 161
netservice svc-bootp udp 67 69
netservice svc-msrpc-udp udp 135 139
netservice svc-ntp udp 123
netservice svc-icmp 1
netservice svc-ipp-udp udp 631
netservice svc-ssh tcp 22
netservice svc-v6-icmp 58
netservice svc-http-proxy1 tcp 3128
netexthdr default
!
ip access-list session v6-icmp-acl
```

```
  ipv6  any any svc-v6-icmp  permit
!
ip access-list session control
  user any udp 68  deny
  any any svc-icmp  permit
  any any svc-dns  permit
  any any svc-papi  permit
  any any svc-sec-papi  permit
  any any svc-cfgm-tcp  permit
  any any svc-adp  permit
  any any svc-tftp  permit
  any any svc-dhcp  permit
  any any svc-natt  permit
!
ip access-list session allow-diskservices
  any any svc-netbios-dgm  permit
  any any svc-netbios-ssn  permit
  any any svc-microsoft-ds  permit
  any any svc-netbios-ns  permit
!
ip access-list session validuser
  network 169.254.0.0 255.255.0.0 any any  deny
  any any any  permit
  ipv6  any any any  permit
!
ip access-list session v6-https-acl
  ipv6  any any svc-https  permit
!
ip access-list session vocera-acl
  any any svc-vocera  permit queue high
!
ip access-list session icmp-acl
  any any svc-icmp  permit
!
ip access-list session v6-dhcp-acl
  ipv6  any any svc-v6-dhcp  permit
!
ip access-list session captiveportal
  user   alias controller svc-https  dst-nat 8081
  user any svc-http  dst-nat 8080
  user any svc-https  dst-nat 8081
  user any svc-http-proxy1  dst-nat 8088
  user any svc-http-proxy2  dst-nat 8088
  user any svc-http-proxy3  dst-nat 8088
!
ip access-list session v6-dns-acl
  ipv6  any any svc-dns  permit
!
ip access-list session allowall
  any any any  permit
  ipv6  any any any  permit
!
ip access-list session https-acl
  any any svc-https  permit
!
ip access-list session sip-acl
  any any svc-sip-udp  permit queue high
  any any svc-sip-tcp  permit queue high
!
ip access-list session ra-guard
  ipv6  user any icmpv6 rtr-adv  deny
!
ip access-list session dns-acl
  any any svc-dns  permit
!
ip access-list session v6-allowall
  ipv6  any any any  permit
!
ip access-list session tftp-acl
  any any svc-tftp  permit
!
```

```
ip access-list session skinny-acl
  any any svc-sccp  permit queue high
!
ip access-list session srcnat
  user any any  src-nat
!
ip access-list session vpnlogon
  user any svc-ike  permit
  user any svc-esp  permit
  any any svc-l2tp  permit
  any any svc-pptp  permit
  any any svc-gre  permit
!
ip access-list session logon-control
  user any udp 68  deny
  any any svc-icmp  permit
  any any svc-dns  permit
  any any svc-dhcp  permit
  any any svc-natt  permit
!
ip access-list session allow-printservices
  any any svc-lpd  permit
  any any svc-ipp-tcp  permit
  any any svc-ipp-udp  permit
!
ip access-list session cplogout
  user   alias controller svc-https  dst-nat 8081
!
ip access-list session v6-http-acl
  ipv6  any any svc-http  permit
!
ip access-list session http-acl
  any any svc-http  permit
!
ip access-list session dhcp-acl
  any any svc-dhcp  permit
!
ip access-list session captiveportal6
  ipv6  user   alias controller6 svc-https  captive
  ipv6  user any svc-http  captive
  ipv6  user any svc-https  captive
  ipv6  user any svc-http-proxy1  captive
  ipv6  user any svc-http-proxy2  captive
  ipv6  user any svc-http-proxy3  captive
!
ip access-list session ap-uplink-acl
  any any udp 68  permit
  any any svc-icmp  permit
  any host 224.0.0.251 udp 5353  permit
!
ip access-list session noe-acl
  any any svc-noe  permit queue high
!
ip access-list session svp-acl
  any any svc-svp  permit queue high
  user host 224.0.1.116 any  permit
!
ip access-list session ap-acl
  any any svc-gre  permit
  any any svc-syslog  permit
  any user svc-snmp  permit
  user any svc-snmp-trap  permit
  user any svc-ntp  permit
  user   alias controller svc-ftp  permit
!
ip access-list session v6-logon-control
  ipv6  user any udp 68  deny
  ipv6  any any svc-v6-icmp  permit
  ipv6  any any svc-v6-dhcp  permit
  ipv6  any any svc-dns  permit
!
```

```
ip access-list session h323-acl
  any any svc-h323-tcp  permit queue high
  any any svc-h323-udp  permit queue high
!
vpn-dialer default-dialer
  ike authentication PRE-SHARE ******
!
user-role ap-role
 access-list session control
 access-list session ap-acl
!
user-role default-vpn-role
 access-list session allowall
 access-list session v6-allowall
!
user-role voice
 access-list session sip-acl
 access-list session noe-acl
 access-list session svp-acl
 access-list session vocera-acl
 access-list session skinny-acl
 access-list session h323-acl
 access-list session dhcp-acl
 access-list session tftp-acl
 access-list session dns-acl
 access-list session icmp-acl
!
user-role default-via-role
 access-list session allowall
!
user-role guest-logon
 captive-portal "default"
 access-list session logon-control
 access-list session captiveportal
 access-list session v6-logon-control
 access-list session captiveportal6
!
user-role guest
 access-list session http-acl
 access-list session https-acl
 access-list session dhcp-acl
 access-list session icmp-acl
 access-list session dns-acl
 access-list session v6-http-acl
 access-list session v6-https-acl
 access-list session v6-dhcp-acl
 access-list session v6-icmp-acl
 access-list session v6-dns-acl
!
user-role stateful-dot1x
!
user-role authenticated
 vlan 400
 access-list session allowall
 access-list session v6-allowall
!
user-role logon
 captive-portal "CAPTIVE_PORTAL"
 access-list session logon-control
 access-list session captiveportal
 access-list session vpnlogon
 access-list session v6-logon-control
 access-list session captiveportal6
!
!

interface mgmt
        shutdown
!

dialer group evdo_us
```

```
  init-string ATQ0V1E0
  dial-string ATDT#777
!

dialer group gsm_us
  init-string AT+CGDCONT=1,"IP","ISP.CINGULAR"
  dial-string ATD*99#
!

dialer group gsm_asia
  init-string AT+CGDCONT=1,"IP","internet"
  dial-string ATD*99***1#
!

dialer group vivo_br
  init-string AT+CGDCONT=1,"IP","zap.vivo.com.br"
  dial-string ATD*99#
!



vlan 400
vlan 999 wired aaa-profile "ARUBA_DEMO"


interface gigabitethernet  1/0
        description "GE1/0"
        trusted
        trusted vlan 1-4094
!

interface gigabitethernet  1/1
        description "GE1/1"
        trusted
        trusted vlan 1-4094
!

interface gigabitethernet  1/2
        description "GE1/2"
        trusted
        trusted vlan 1-4094
!

interface gigabitethernet  1/3
        description "GE1/3"
        trusted
        trusted vlan 1-4094
!

interface vlan 1
        ip address 172.16.0.254 255.255.255.0
!

interface vlan 400
        ip address 192.168.0.1 255.255.255.0
!

interface vlan 999
        ip address 192.168.99.1 255.255.255.0
!

uplink disable

ap mesh-recovery-profile cluster Recovery3wcwFj9k+t3SQl8+ wpa-hexkey
e84864632f5f91b031905a687a9230c8bbb4fc65f7c838fc0aa695bcd64e4acaa3b2233b49ccd90b33bfc22fba8741
ab16518b16fdb070a4a9f3772dec4d30b7c5017eb468006e82c72f11d6be810cf1
wms
 general poll-interval 60000
 general poll-retries 3
 general ap-ageout-interval 30
 general adhoc-ap-ageout-interval 5
```

```
 general sta-ageout-interval 30
 general learn-ap disable
 general persistent-neighbor enable
 general propagate-wired-macs enable
 general stat-update enable
 general collect-stats disable
 general learn-system-wired-macs disable
!
wms-local system max-system-wm 1000
wms-local system system-wm-update-interval 8
crypto isakmp policy 20
  encryption aes256
!

crypto ipsec transform-set default-boc-bm-transform esp-3des esp-sha-hmac
crypto ipsec transform-set default-rap-transform esp-aes256 esp-sha-hmac
crypto ipsec transform-set default-aes esp-aes256 esp-sha-hmac
crypto dynamic-map default-dynamicmap 10000
  set transform-set "default-transform" "default-aes"
!

crypto isakmp eap-passthrough eap-tls
crypto isakmp eap-passthrough eap-peap
crypto isakmp eap-passthrough eap-mschapv2

vpdn group l2tp
!

ip dhcp pool EMPLOYEE_POOL
 default-router 192.168.0.1
 dns-server 192.168.0.1
 network 192.168.0.0 255.255.255.0
 authoritative
!
ip dhcp pool GUEST_POOL
 default-router 192.168.99.1
 dns-server 192.168.99.1
 network 192.168.99.0 255.255.255.0
 authoritative
!
service dhcp

!

vpdn group pptp
!

tunneled-node-address 0.0.0.0

adp discovery enable
adp igmp-join enable
adp igmp-vlan 0

voice rtcp-inactivity disable
voice sip-midcall-req-timeout disable


ssh mgmt-auth username/password
mgmt-user admin root 4613065e012eb7932a6d94ac1c2cf37b78fcb8e7b722ebf94b




no database synchronize
database synchronize rf-plan-data

ip mobile domain default
!

ip igmp
!
```

```
ipv6 mld
!

no firewall attack-rate cp 1024

!
firewall cp

!
firewall cp
packet-capture-defaults tcp disable udp disable sysmsg disable other disable
!
ip domain lookup
!
country US
aaa authentication mac "default"
!
aaa authentication dot1x "default"
!
aaa authentication dot1x "EMPLOYEE_DOT1X"
   termination enable
   termination eap-type eap-peap
   termination inner-eap-type eap-mschapv2
!
aaa server-group "default"
 auth-server Internal
 set role condition role value-of
!
aaa server-group "INTERNAL_SERVER"
 auth-server Internal
!
aaa authentication via connection-profile "default"
!
aaa authentication via web-auth "default"
!
aaa authentication via global-config
!
aaa profile "ARUBA_DEMO"
   authentication-dot1x "EMPLOYEE_DOT1X"
   dot1x-default-role "authenticated"
   dot1x-server-group "INTERNAL_SERVER"
!
aaa profile "default"
!
aaa authentication captive-portal "CAPTIVE_PORTAL"
   server-group "INTERNAL_SERVER"
!
aaa authentication captive-portal "default"
!
aaa authentication wispr "default"
!
aaa authentication vpn "default"
!
aaa authentication vpn "default-rap"
!
aaa authentication mgmt
!
aaa authentication stateful-ntlm "default"
!
aaa authentication stateful-kerberos "default"
!
aaa authentication stateful-dot1x
!
aaa authentication via auth-profile "default"
!
aaa authentication wired
!
web-server
!
papi-security
```

```
!
guest-access-email
!
voice logging
!
voice dialplan-profile "default"
!
voice real-time-config
!
voice sip
!
aaa password-policy mgmt
!
control-plane-security
!
ids management-profile
!
ids ap-rule-matching
!
valid-network-oui-profile
!
ap system-profile "default"
!
ap regulatory-domain-profile "default"
   country-code US
   valid-11g-channel 1
   valid-11g-channel 6
   valid-11g-channel 11
   valid-11a-channel 36
   valid-11a-channel 40
   valid-11a-channel 44
   valid-11a-channel 48
   valid-11a-channel 149
   valid-11a-channel 153
   valid-11a-channel 157
   valid-11a-channel 161
   valid-11a-channel 165
   valid-11g-40mhz-channel-pair 1-5
   valid-11g-40mhz-channel-pair 7-11
   valid-11a-40mhz-channel-pair 36-40
   valid-11a-40mhz-channel-pair 44-48
   valid-11a-40mhz-channel-pair 149-153
   valid-11a-40mhz-channel-pair 157-161
!
ap wired-ap-profile "default"
!
ap enet-link-profile "default"
!
ap mesh-ht-ssid-profile "default"
!
ap mesh-cluster-profile "default"
!
ap wired-port-profile "default"
!
ap mesh-radio-profile "default"
!
ids general-profile "default"
!
ids rate-thresholds-profile "default"
!
ids signature-profile "default"
!
ids impersonation-profile "default"
!
ids unauthorized-device-profile "default"
!
ids signature-matching-profile "default"
   signature "Deauth-Broadcast"
   signature "Disassoc-Broadcast"
!
ids dos-profile "default"
```

```
!
ids profile "default"
!
rf arm-profile "arm-maintain"
   assignment maintain
   no scanning
!
rf arm-profile "arm-scan"
!
rf arm-profile "default"
!
rf optimization-profile "default"
!
rf event-thresholds-profile "default"
!
rf am-scan-profile "default"
!
rf dot11a-radio-profile "default"
!
rf dot11a-radio-profile "rp-maintain-a"
   arm-profile "arm-maintain"
!
rf dot11a-radio-profile "rp-monitor-a"
   mode am-mode
!
rf dot11a-radio-profile "rp-scan-a"
   arm-profile "arm-scan"
!
rf dot11g-radio-profile "default"
!
rf dot11g-radio-profile "rp-maintain-g"
   arm-profile "arm-maintain"
!
rf dot11g-radio-profile "rp-monitor-g"
   mode am-mode
!
rf dot11g-radio-profile "rp-scan-g"
   arm-profile "arm-scan"
!
wlan dot11k-profile "default"
!
wlan voip-cac-profile "default"
!
wlan ht-ssid-profile "default"
!
wlan edca-parameters-profile station "default"
!
wlan edca-parameters-profile ap "default"
!
wlan ssid-profile "default"
!
wlan virtual-ap "default"
!
ap provisioning-profile "default"
!
ap spectrum local-override
!
ap-group "default"
!
logging level warnings security subcat ids
logging level warnings security subcat ids-ap

snmp-server enable trap

process monitor log
end
```