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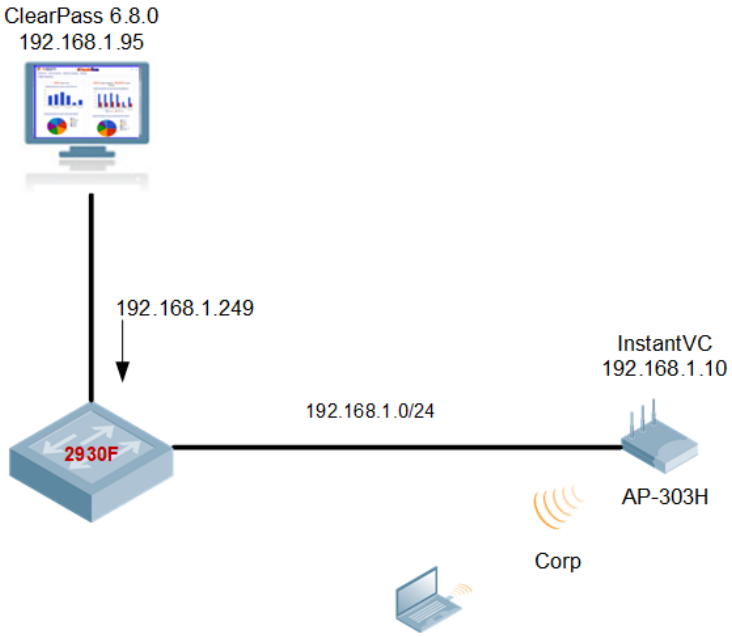
1.1 Revision History

DATE	VERSION	EDITOR	CHANGES
08 May 2019	0.1	Ariya Parsamanesh	Initial creation

2 Time Based Services

Instant APs back in 6.4.x days supported enabling or disabling a SSID for clients at a particular time of the day. With the 8.4.x version you can now use a time range profile which can be particularly useful to restrict user access during a specific time period and gives much more flexibility.



2.1 Things you need

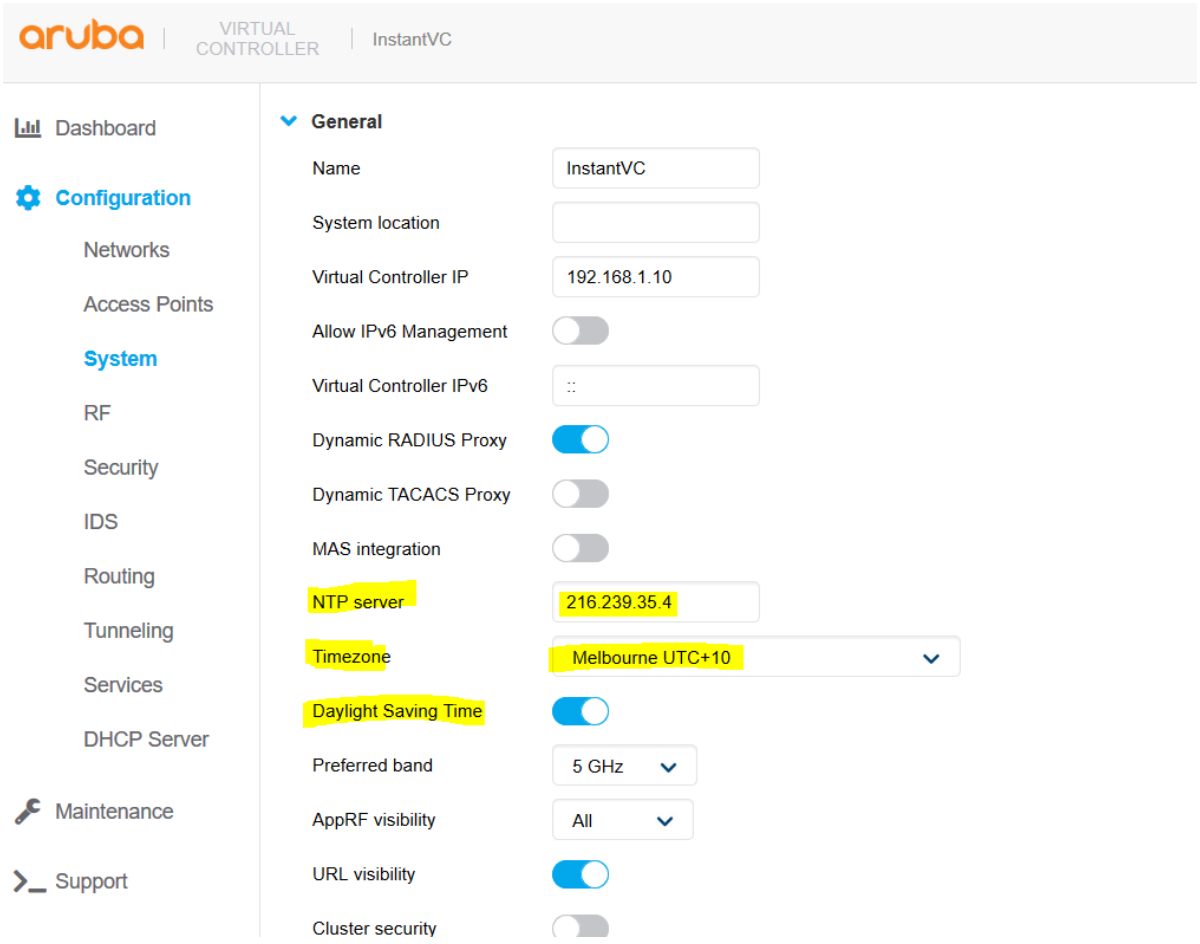
- Aruba Instant version 8.4.0.0 or later
- NTP source
- Aruba ClearPass or any authentication server
- A Layer three switch and some WiFi clients

3 Instant AP Configuration

Instant APs support the configuration of both absolute and periodic time range profiles. You can configure an absolute time range profile to execute during a specific timeframe or create a periodic profile to execute at regular intervals based on the periodicity specified in the configuration.

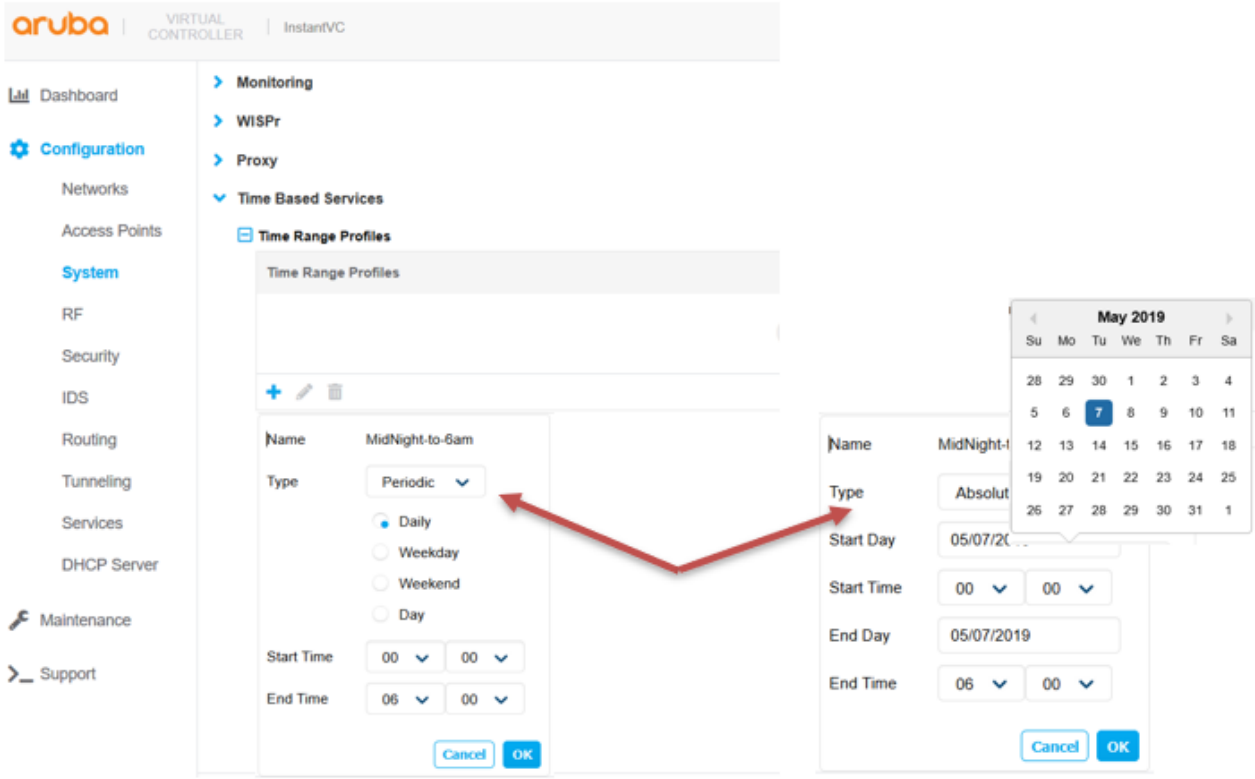
3.1 Network Time Protocol Configuration

The Time based services are dependent on Network Time Protocol (NTP), so first we need to configure it.

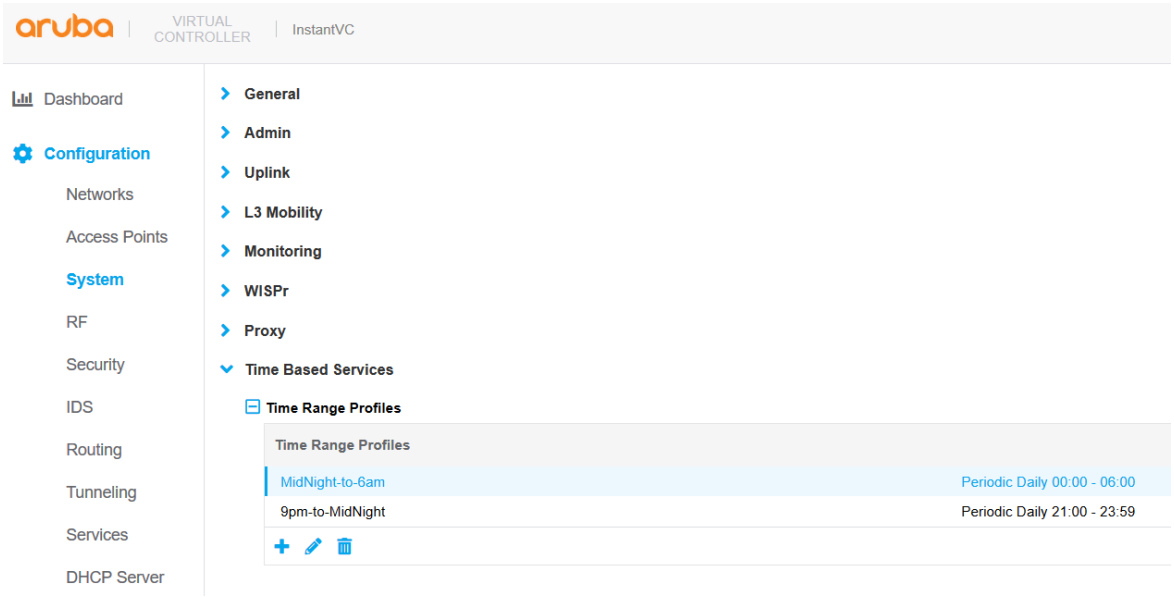


3.2 Time Base Service Configuration

First we need to create a few Time Range profiles that we can reference in the user roles. We'll start with a specific time range that we want to deny access.



Here you can use Period or absolute type. Now we have created two time range profiles to deny access during after hours periods as shown below.

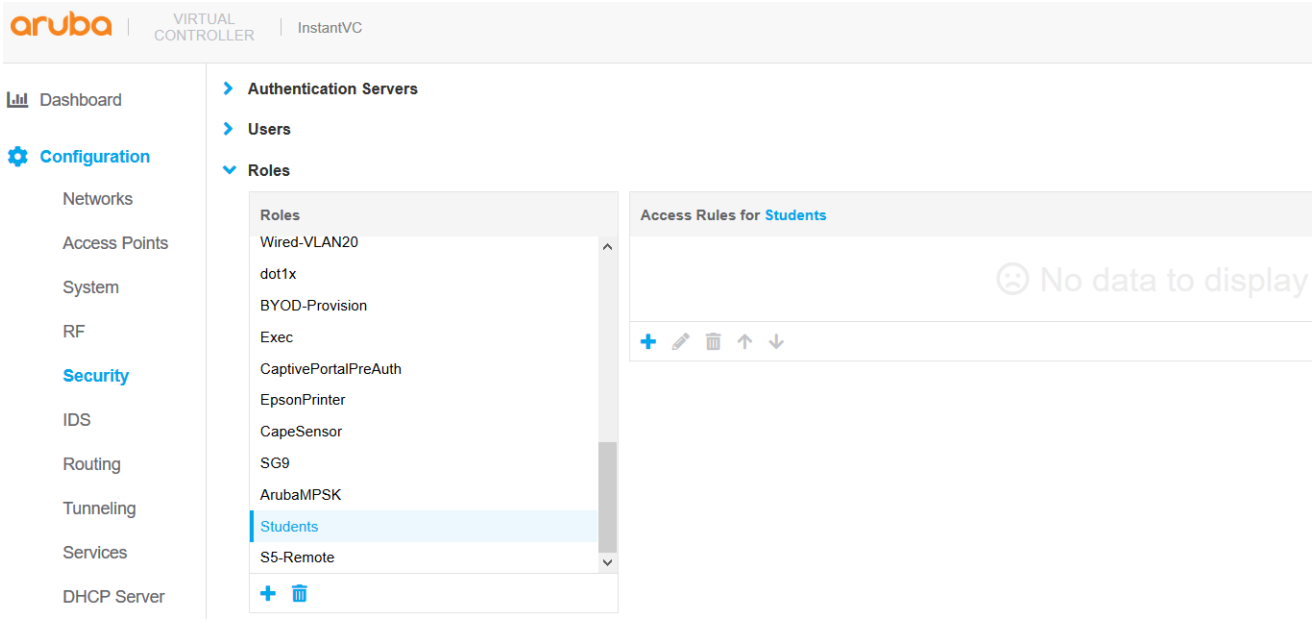


Once you have saved it you can assign it to

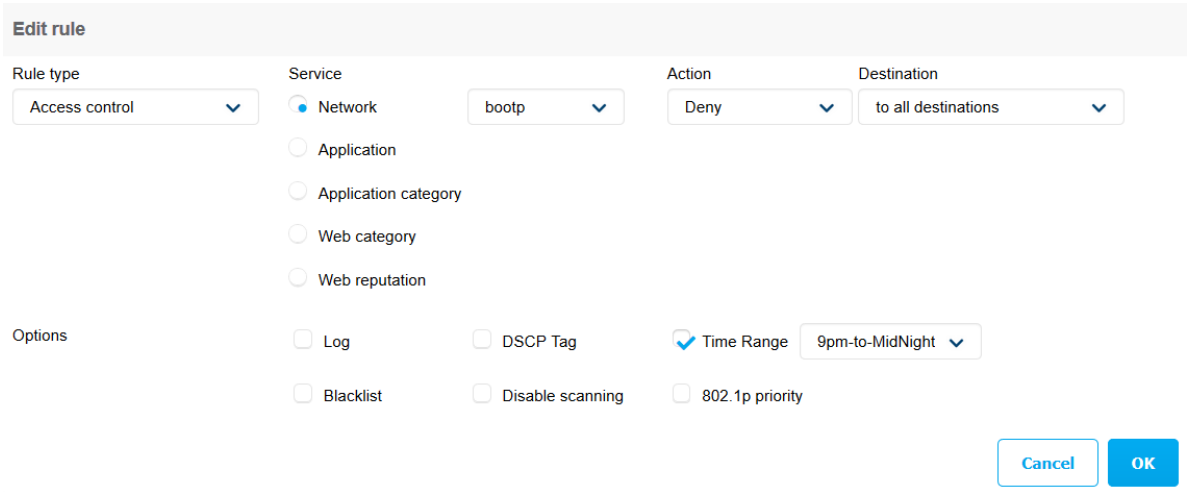
1. various user roles. Here we'll add it to "students" use role
2. or a number of SSIDs

3.3 Assigning Time range Profiles to User Roles

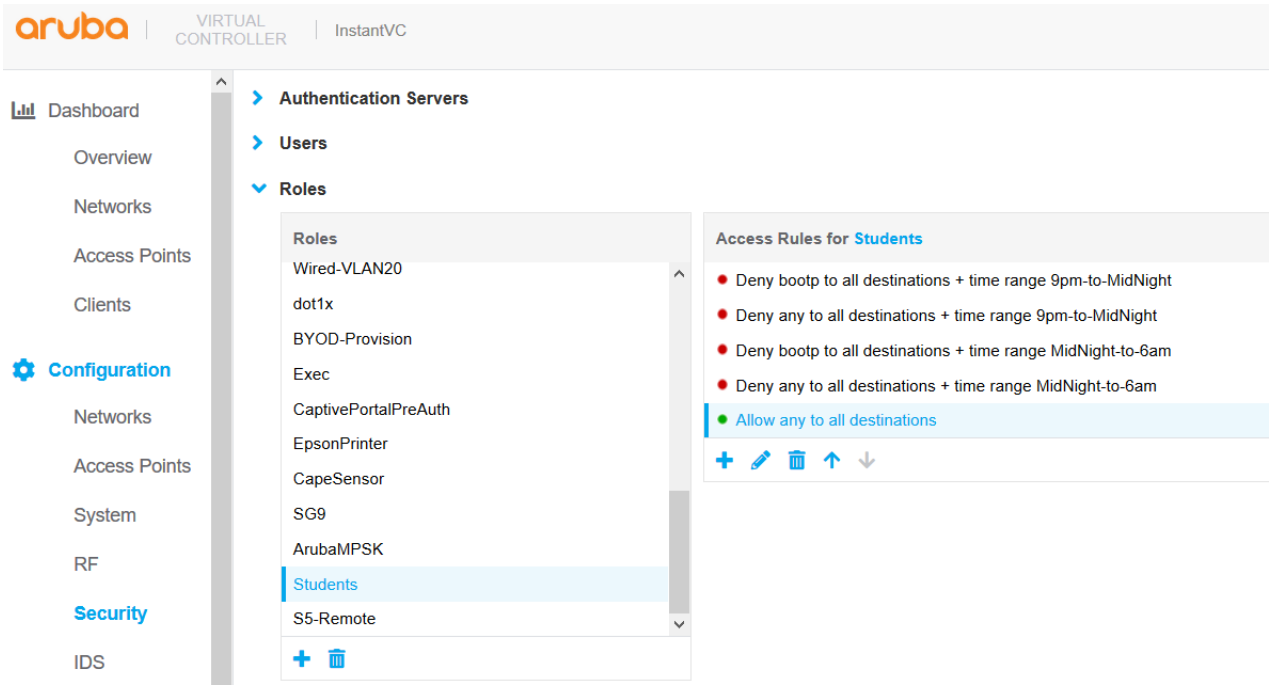
Here we'll add it to "students" use role



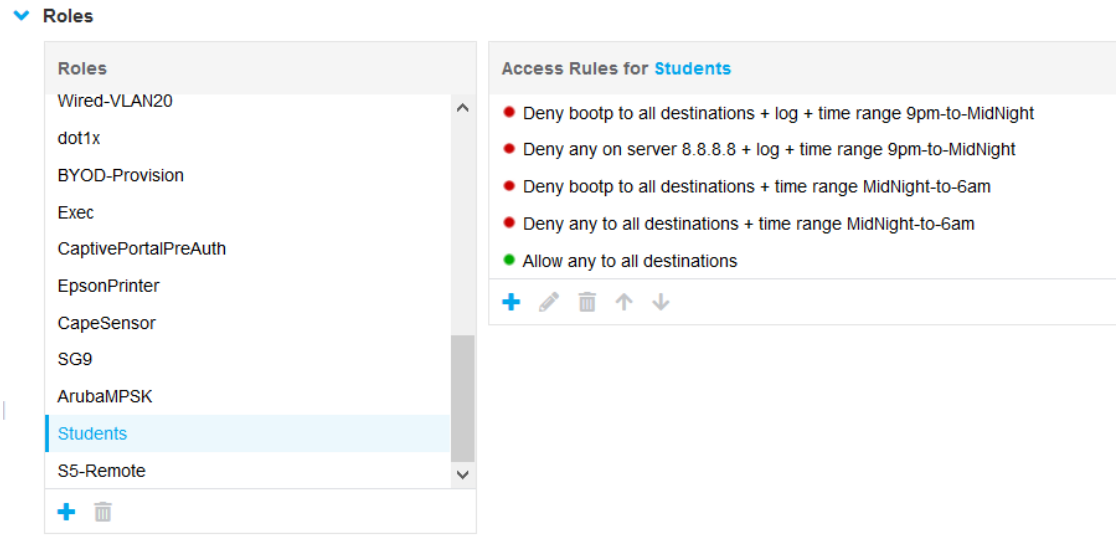
Here we are editing the first rule denying DHCP services from 9pm to mid night.



The final configuration looks as shown below.

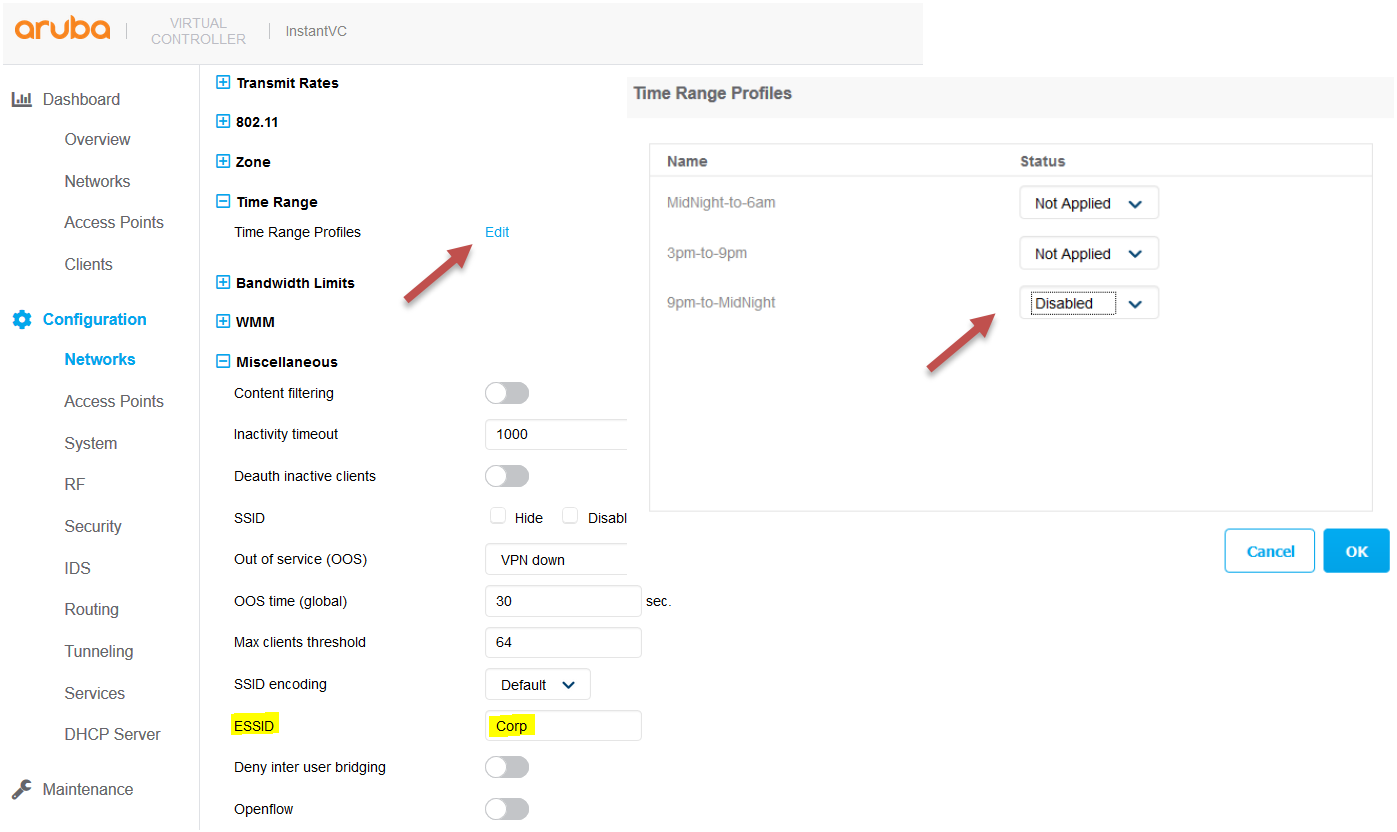


But for our testing which will be after 9pm, we'll change it so that the the client is permitted to get an IP address but will deny all traffic to 8.8.8.8 and log it.



3.4 Assigning Time range Profiles to SSIDs

We are going to asign the time range profiles to Corp SSID.



You should note that, for the “Disabled” action, if the current time is greater than the start time and lesser than the end time, the SSID will not be broadcast by the AP in the list of available networks. If an ACL rule is linked to the time profile, it is re-programmed and the rule which is time-based is not applied. All the user sessions having this role assigned will be deleted.

3.5 Testing Time Range Profile for SSIDs

This is the current BSS table. Note that Corp ESSID is enabled and broadcasting.

```
BLDG-A-ATV1# sh clock

Current Time     :2019-05-07 16:46:54
BLDG-A-ATV1#
BLDG-A-ATV1# sh ap bss-table

Aruba AP BSS Table
------------------
bss                ess        port  ip             phy    type  ch/EIRP/max-EIRP  cur-cl  ap name
in-t(s)  tot-t    flags
---                ---        ----  --             ---    ----  ----------------  ------  -------
-------  -----    -----
24:f2:7f:d5:fa:d0  SG1        ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     6       BLDG-A-
ATV1  0        28m:42s
24:f2:7f:d5:fa:d1  Corp       ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     0       BLDG-A-
ATV1  0        28m:41s
24:f2:7f:d5:fa:d2  SG9        ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     0       BLDG-A-
ATV1  0        28m:24s  W3M
24:f2:7f:d5:fa:d3  ArubaMPSK  ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     0       BLDG-A-
ATV1  0        28m:24s
24:f2:7f:d5:fa:c0  SG1        ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       1       BLDG-A-
ATV1  0        28m:41s
24:f2:7f:d5:fa:c1  Corp       ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       0       BLDG-A-
ATV1  0        28m:33s
24:f2:7f:d5:fa:c2  SG9        ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       0       BLDG-A-
ATV1  0        28m:24s  W3M
24:f2:7f:d5:fa:c3  ArubaMPSK  ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       0       BLDG-A-
ATV1  0        28m:23s

Channel followed by "*" indicates channel selected due to unsupported configured channel.
"Spectrum" followed by "^" indicates Local Spectrum Override in effect.

Num APs:8
Num Associations:7

Flags:       K = 802.11K Enabled; W = 802.11W Enabled; 3 = WPA3 BSS; O = OWE Transition mode OWE
BSS; o = OWE Transition mode Open BSS; M = WPA3-SAE mixed mode BSS
BLDG-A-ATV1#
```

Now after 9:00pm we don't see the Corp ESSID.

```
BLDG-A-ATV1# sh clock

Current Time     :2019-05-07 21:07:50
BLDG-A-ATV1# sh ap bss-table

Aruba AP BSS Table
------------------
bss                ess        port  ip             phy    type  ch/EIRP/max-EIRP  cur-cl  ap name
in-t(s)  tot-t       flags
---                ---        ----  --             ---    ----  ----------------  ------  -------
-------  -----       -----
24:f2:7f:d5:fa:d0  SG1        ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     4       BLDG-A-
ATV1  0        4h:52m:16s
24:f2:7f:d5:fa:d2  SG9        ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     0       BLDG-A-
ATV1  0        4h:51m:58s  W3M
24:f2:7f:d5:fa:d3  ArubaMPSK  ?/?   192.168.1.121  a-VHT  ap    36E/23.0/23.0     0       BLDG-A-
ATV1  0        4h:51m:58s
24:f2:7f:d5:fa:c0  SG1        ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       1       BLDG-A-
ATV1  0        4h:52m:15s
```

```
24:f2:7f:d5:fa:c2  SG9        ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       0       BLDG-A-
ATV1  0        4h:51m:58s  W3M
24:f2:7f:d5:fa:c3  ArubaMPSK  ?/?   192.168.1.121  g-HT   ap    11/9.0/23.0       0       BLDG-A-
ATV1  0        4h:51m:57s

Channel followed by "*" indicates channel selected due to unsupported configured channel.
"Spectrum" followed by "^" indicates Local Spectrum Override in effect.

Num APs:6
Num Associations:5

Flags:       K = 802.11K Enabled; W = 802.11W Enabled; 3 = WPA3 BSS; O = OWE Transition mode OWE
BSS; o = OWE Transition mode Open BSS; M = WPA3-SAE mixed mode BSS
BLDG-A-ATV1#
```

3.6 Testing Time Range Profile for User roles

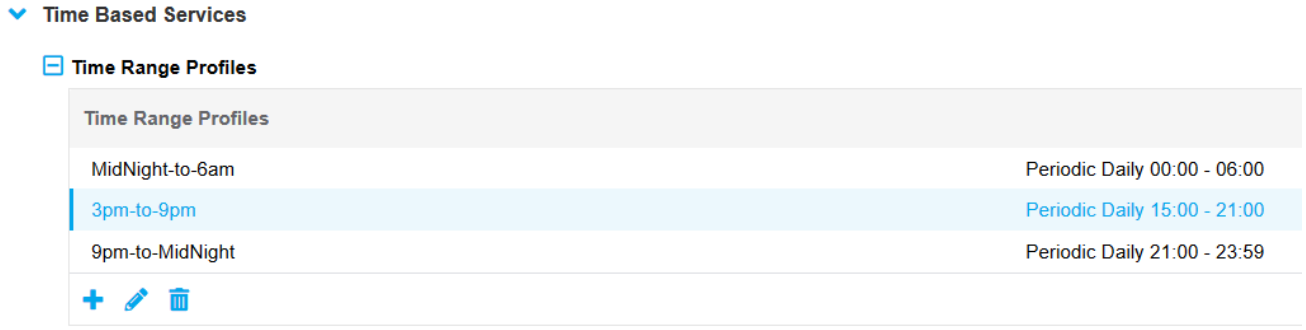
First we need to check if our time ranges are correct and valid. Note that even though we the "valid" column is set to "No", that does not necessarily means that the configuration will not work. It simply stating that the time ranges are not valid since it is 3:43 pm.

```
BLDG-A-ATV1# sh clock

Current Time     :2019-05-07 15:43:42
BLDG-A-ATV1#
BLDG-A-ATV1# sh time-range

Current Time     :2019-05-07 15:43:55
Time Range Summary
------------------
Profile Name     Type      Start Day  Start Time  End Day  End Time  Valid
------------     ----      ---------  ----------  -------  --------  -----
MidNight-to-6am  Periodic  daily      00:00       -        06:00     No
9pm-to-MidNight  Periodic  daily      21:00       -        23:59     No
BLDG-A-ATV1#
```

Now lets add another time range called 3pm-to-9pm



Now we should get a valid time range profile.

```
BLDG-A-ATV1# sh time-range

Current Time     :2019-05-07 15:45:02
Time Range Summary
------------------
Profile Name     Type      Start Day  Start Time  End Day  End Time  Valid
------------     ----      ---------  ----------  -------  --------  -----
```

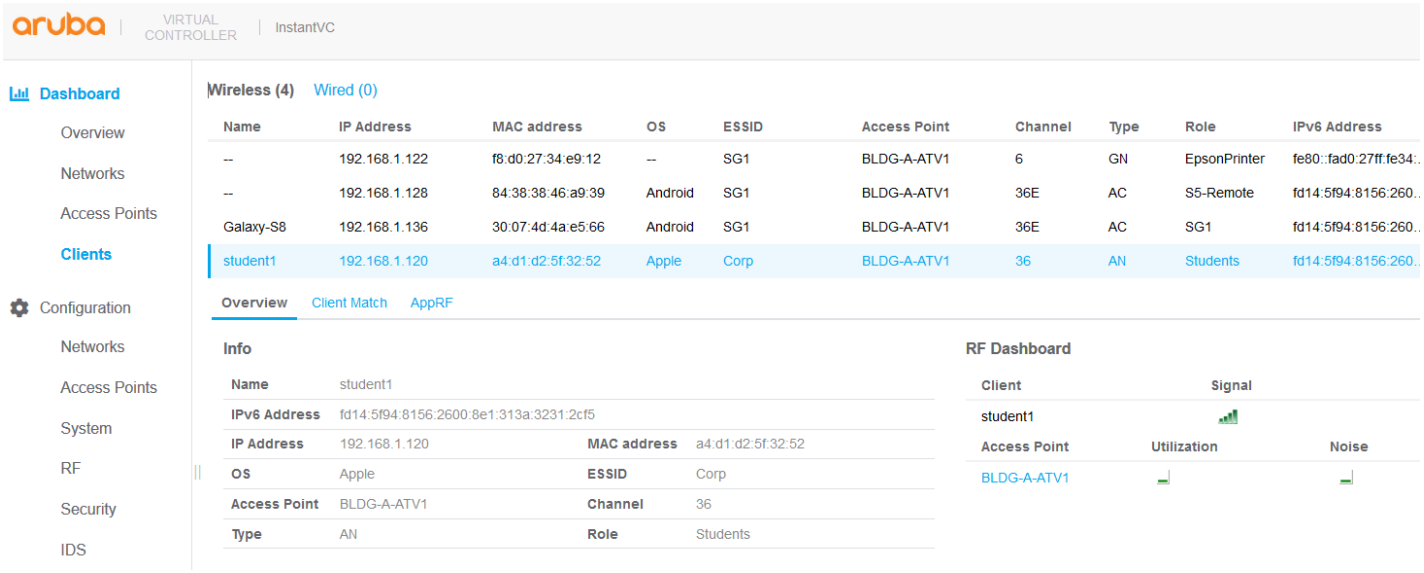
```
MidNight-to-6am   Periodic  daily      00:00        -         06:00      No
3pm-to-9pm        Periodic  daily      15:00        -         21:00      Yes
9pm-to-MidNight   Periodic  daily      21:00        -         23:59      No
BLDG-A-ATV1#
```

We can also check which time profile is added to a user role or SSID profile. Note that the SSID profile is dot1x and the ESSID is “Corp”

```
BLDG-A-ATV1# sh time-profile

Time Range SSID Profile
-----------------------
Time Profile Name  SSID profile Name  Enable/Disable
-----------------  -----------------  --------------
9pm-to-MidNight    dot1x              Disable
Time Range ACL Profile
----------------------
Time Profile Name  Access Role Name  Rule
-----------------  ----------------  ----
MidNight-to-6am    Students          any any match udp 67 69 deny time-range MidNight-to-6am
MidNight-to-6am    Students          any any match any any any deny time-range MidNight-to-6am
9pm-to-MidNight    Students          8.8.8.8 255.255.255.255 match any any any deny time-range
9pm-to-MidNight
BLDG-A-ATV1#
```

We will get a client to connect the “Corp” SSID before 9pm and the user connects fine.



And now from the client we’ll ping 8.8.8.8, as you can see, the traffic will get through.

```
BLDG-A-ATV1# sh datapath session | incl 192.168.1.120
17.252.252.42     192.168.1.120   6    5223  55983 0    0    0    1    dev8        2d   1        34     FCA
17.252.252.85     192.168.1.120   6    5223  56003 0    0    0    1    dev26       2f   b        107c
1.1.1.1           192.168.1.120   17   53    59929 0    0    0    1    dev26       46   0        0      FIA
192.168.1.120     192.168.1.1     17   54640 53    0    0    48   1    dev26       47   0        0      FCIA
192.168.1.120     8.8.8.8         1    1     2048  0    0    0    1    dev26       1e   0        0      FYCI
192.168.1.120     8.8.8.8         1    0     2048  0    0    0    1    dev26       23   0        0      FYCI
192.168.1.120     8.8.8.8         1    3     2048  0    0    0    0    dev26       14   0        0      FYCI
192.168.1.120     8.8.8.8         1    2     2048  0    0    0    0    dev26       19   0        0      FYCI
192.168.1.120     8.8.8.8         1    5     2048  0    0    0    0    dev26       a    0        0      FYCI
192.168.1.120     8.8.8.8         1    4     2048  0    0    0    0    dev26       f    0        0      FYCI
```

```
1.1.1.1           192.168.1.120   17   53    52141 0    0    0   1   dev26       4b   0       0     FIA
192.168.1.120     1.1.1.1         17   55048 53    0    0    48  1   dev26       50   0       0     FCIA
1.1.1.1           192.168.1.120   17   53    51508 0    0    0   1   dev26       4b   0       0     FIA
8.8.8.8           192.168.1.120   1    1     0     0    0    0   1   dev26       1e   1       54    FI
8.8.8.8           192.168.1.120   1    0     0     0    0    0   1   dev26       23   1       54    FI
8.8.8.8           192.168.1.120   1    3     0     0    0    0   1   dev26       14   1       54    FI
8.8.8.8           192.168.1.120   1    2     0     0    0    0   1   dev26       19   1       54    FI
8.8.8.8           192.168.1.120   1    5     0     0    0    0   0   dev26       a    1       54    FI
8.8.8.8           192.168.1.120   1    4     0     0    0    0   1   dev26       f    1       54    FI
BLDG-A-ATV1#
```

Now after 9:00pm the client is still connected and had a valid IP address. Remember that in the time based ACL we also denied dhcp service. Now the client tries to ping 8.8.8.8, the ping is unsuccessful.

```
BLDG-A-ATV1# sh client

Client List
-----------
Name        IP Address      MAC Address         OS        ESSID  Access Point  Channel  Type  Role           IPv6
Address                              Signal    Speed (mbps)
----        ----------      -----------         --        -----  ------------  -------  ----  ----           ------
------                              ------    ------------

student1    192.168.1.120   a4:d1:d2:5f:32:52   Apple     Corp   BLDG-A-ATV1   36       AN    Students
fd14:5f94:8156:2600:8e1:313a:3231:2cf5    44(good)   58(good)
Number of Clients   :1
Info timestamp      :2744
BLDG-A-ATV1#
BLDG-A-ATV1# sh datapath sess | incl 192.168.1.120
------------------------------
Flags: F - fast age, S - src NAT, N - dest NAT
       D - deny, R - redirect, Y - no syn
       H - high prio, P - set prio, T - set ToS
       C - client, M - mirror, V - VOIP
       I - Deep inspect, U - Locally destined
       s - media signal, m - media mon, a - rtp analysis
       E - Media Deep Inspect, G - media signal
       A - Application Firewall Inspect
       L - ALG session
       O - Session is programmed through SDN/Openflow controller
       p - Session is marked as permanent
RAP Flags: 0 - Q0, 1 - Q1, 2 - Q2, r - redirect to master, t - time based
Source IP         Destination IP  Prot SPort Dport Cntr Prio ToS Age Destination TAge Packets Bytes  Flags
---------------   --------------  ---- ----- ----- ---- ---- --- --- ----------- ---- ------- ----- -----
192.168.1.120     192.168.1.1     17   54349 53    0    0    48  0   dev26       3f   0       0     FDCA
192.168.1.120     8.8.8.8         1    9     2048  0    0    0   0   dev26       25   0       0     FDYCA
192.168.1.120     8.8.8.8         1    8     2048  0    0    0   0   dev26       2a   0       0     FDYCA
192.168.1.120     8.8.8.8         1    11    2048  0    0    0   0   dev26       1b   0       0     FDYCA
192.168.1.120     8.8.8.8         1    10    2048  0    0    0   0   dev26       20   0       0     FDYCA
192.168.1.120     8.8.8.8         1    13    2048  0    0    0   0   dev26       11   0       0     FDYCA
192.168.1.120     1.1.1.1         17   54349 53    0    0    48  0   dev26       30   0       0     FDCA
192.168.1.120     1.1.1.1         17   54640 53    0    0    48  0   dev26       36   0       0     FDCA
192.168.1.120     1.1.1.1         17   59353 53    0    0    0   0   dev26       9    0       0     FDYCA
192.168.1.120     1.1.1.1         17   61636 53    0    0    0   0   dev26       9    0       0     FDYCA
BLDG-A-ATV1#
```

Here is the logs that we had configured.

```
BLDG-A-ATV1# sh log sec 10

May  9 21:19:31  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=63892 dstip=1.1.1.1 dstport=53, action=deny
May  9 21:19:32  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=59353 dstip=1.1.1.1 dstport=53, action=deny
May  9 21:19:32  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=54640 dstip=1.1.1.1 dstport=53, action=deny
May  9 21:19:32  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=64869 dstip=1.1.1.1 dstport=53, action=deny
May  9 21:19:32  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=64011 dstip=1.1.1.1 dstport=53, action=deny
```

```
May  9 21:19:32  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=192.168.1.120
srcport=64011 dstip=1.1.1.1 dstport=53, action=deny

BLDG-A-ATV1#
```

Now we get the client to release and renew its IP address and it will never gets a valid IP address since the time based ACL denies this traffic.

```
BLDG-A-ATV1# sh log sec 10

May  9 21:37:03  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=0.0.0.0 srcport=68
dstip=255.255.255.255 dstport=67, dhcp msgtype=1(discover) clientip=0.0.0.0 clientmac=a4:d1:d2:5f:32:52,
action=deny
May  9 21:37:03  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  ICMPv6
srcip=fe80::1016:5191:c8f2:7703 dstip=ff02::2, type=133, code=0, action=deny
May  9 21:37:05  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=0.0.0.0 srcport=68
dstip=255.255.255.255 dstport=67, dhcp msgtype=1(discover) clientip=0.0.0.0 clientmac=a4:d1:d2:5f:32:52,
action=deny
May  9 21:37:07  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  ICMPv6
srcip=fe80::1016:5191:c8f2:7703 dstip=ff02::2, type=133, code=0, action=deny
May  9 21:37:12  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=0.0.0.0 srcport=68
dstip=255.255.255.255 dstport=67, dhcp msgtype=1(discover) clientip=0.0.0.0 clientmac=a4:d1:d2:5f:32:52,
action=deny
May  9 21:37:23  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  proto = igmp
srcip=169.254.156.14 dstip=224.0.0.22, action=deny
May  9 21:37:29  stm[6213]: <124006> <WARN> |AP BLDG-A-ATV1@192.168.1.121 stm|  UDP srcip=0.0.0.0 srcport=68
dstip=255.255.255.255 dstport=67, dhcp msgtype=1(discover) clientip=0.0.0.0 clientmac=a4:d1:d2:5f:32:52,
action=deny
BLDG-A-ATV1#
```

Here is another show command that can be helpful that shows the rules for a given rule name along with the hits.

```
BLDG-A-ATV1# show datapath acl-rule Students
Datapath SSID: Students ACL Entries
-------------------------------------------------------------------
Flags: P - permit, L - log, E - established, M/e - MAC/etype filter
       S - SNAT, D - DNAT, R - redirect, r - reverse redirect m - Mirror
       I - Invert SA, i - Invert DA, H - high prio, O - set prio, C - Classify Media
       A - Disable Scanning, B - black list, T - set TOS, t - time based, o - tunnel only
       K - App Throttle, s - Domain SA, d - Domain DA, 4 - IPv4, 6 - IPv6
-------------------------------------------------------------------
ACL Name {Students 0} Number {195}
 1:  any  any  17 0-65535 8209-8211  P4
 2:  any  any  17 0-65535 4434-4434  P4
 3:  any  any  17 0-65535 67-69  Lt6
 4:  any  any  17 0-65535 67-69  Lt4  hits 37
 5:  any  8.8.8.8 255.255.255.255  any  Lt4  hits 15
 6:  any  any  any  Lt6  hits 8
 7:  any  any  any  Lt4  hits 8
 8:  any  any  any  P6
 9:  any  any  any  P4
10:  any  any  any  Pe4  hits 14
-------------------------------------------------------------------
ACL Name {Students 1} Number {196}
 1:  any  any  17 0-65535 8209-8211  P4
 2:  any  any  17 0-65535 4434-4434  P4
 3:  any  any  17 0-65535 67-69  LTt6
 4:  any  any  17 0-65535 67-69  LTt4
 5:  any  8.8.8.8 255.255.255.255  any  LTt4
 6:  any  any  any  LTt6
 7:  any  any  any  LTt4
 8:  any  any  any  PT6
 9:  any  any  any  PT4
10:  any  any  any  Pe4
-------------------------------------------------------------------
BLDG-A-ATV1#
```