



# Build a Data Network

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**Controller and Server-based Authentication**

# Skills learned

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You'll be able to:

- > Set up 802.1x security
- > Create secured wireless networks

# Practice Description

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Lab will cover

- > Disconnect a user from your network
- > Integration with a RADIUS server
- > Creation of these networks
  - WPA2PSK
  - 802.1x (RADIUS)

# Security Comes in Layers

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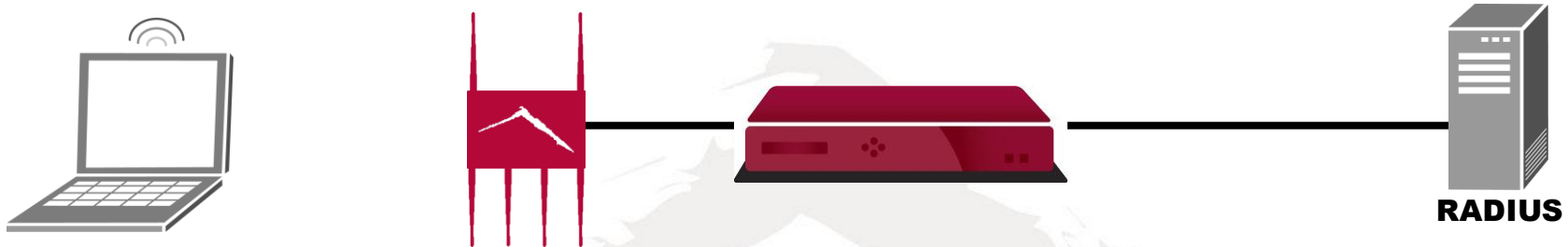
- > Need to protect data, but at what cost?
- > Methods
  - MAC filtering
  - WEP
  - WPA
  - WPA2
  - 802.1x

# WEP->WPA->WPA2

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- > WEP: First attempt at wireless security
  - Fundamentally flawed as keys are reused to about every hour
- > WPA:
  - Uses TKIP to change keys every packet
- > WPA2: Latest and Greatest
  - Strong encryption (AES) required in hardware

# RADIUS Protocol - 802.1X User



—— EAPOL Start ——>

<—— Identity request ——

—— Identify Response ——>

<—— EAP request ——

—— EAP Response ——>

<—— EAP success ——

<—— EAPOL key M1 ——

—— EAPOL key M2 ——>

<—— EAPOL key M3 ——

—— EAPOL key M4 ——>

<—— EAPOL key M5 ——

—— EAPOL key M6 ——>

—— Access request ——>

<—— Access challenge ——

—— Access request ——>

<—— Access Accept ——  
(with VLAN)

# Creating RADIUS Profiles

> On the Controller specify:

- Primary RADIUS authentication server
- Secondary RADIUS authentication server
- Primary RADIUS accounting server
- Secondary RADIUS accounting server

## RADIUS Profile Table - Add

RADIUS Profile Name	<input type="text"/>	Enter 1-16 chars., <b>Required</b>
Description	<input type="text"/>	Enter 0-128 chars.
RADIUS IP	<input type="text"/>	
RADIUS Secret	<input type="text"/>	
RADIUS Port	<input type="text" value="1812"/>	Valid range: [1024-65535]
MAC Address Delimiter	<input type="text" value="Hyphen (-)"/>	
Password Type	<input type="text" value="Shared Key"/>	

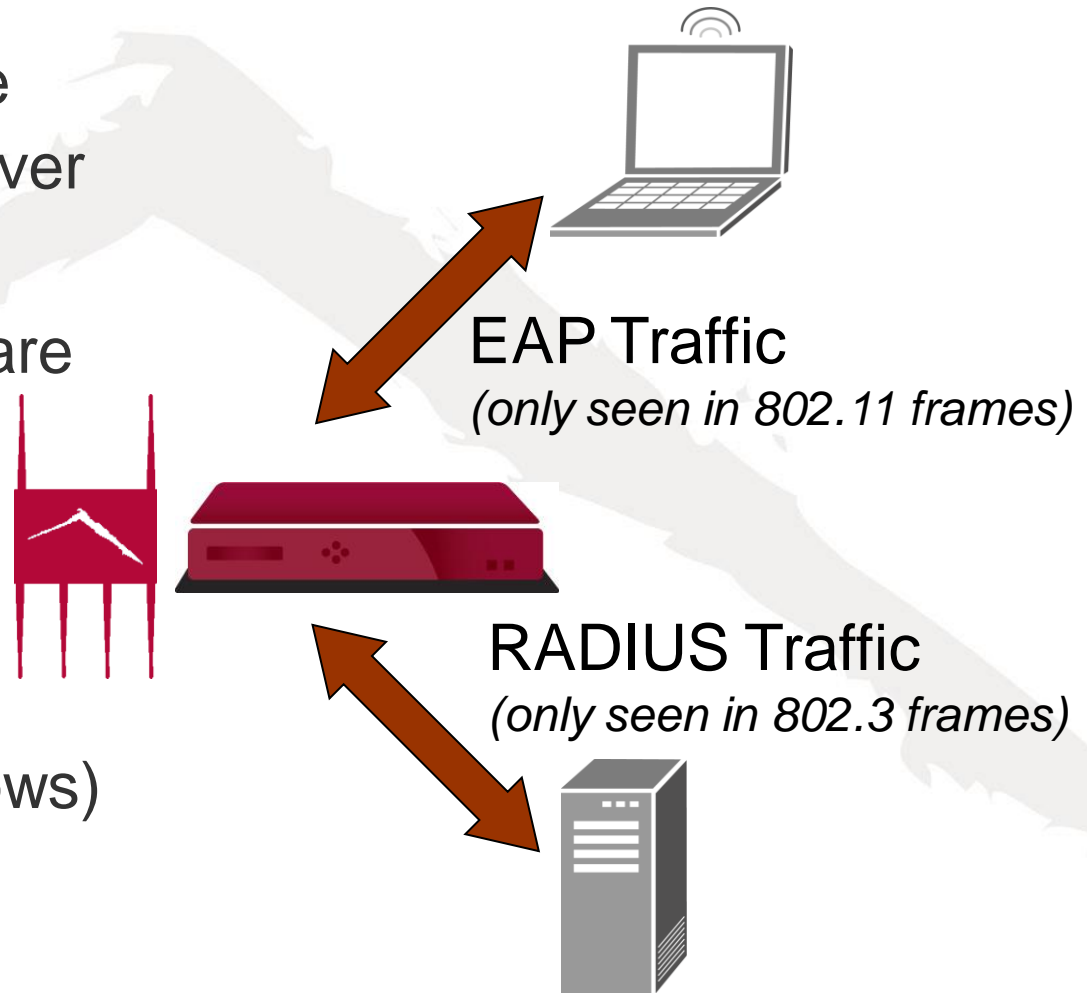
# Common RADIUS Configuration Problems

> Controller needs to be added to RADIUS server entries

> RADIUS parameters are misconfigured

- Port
- Secret

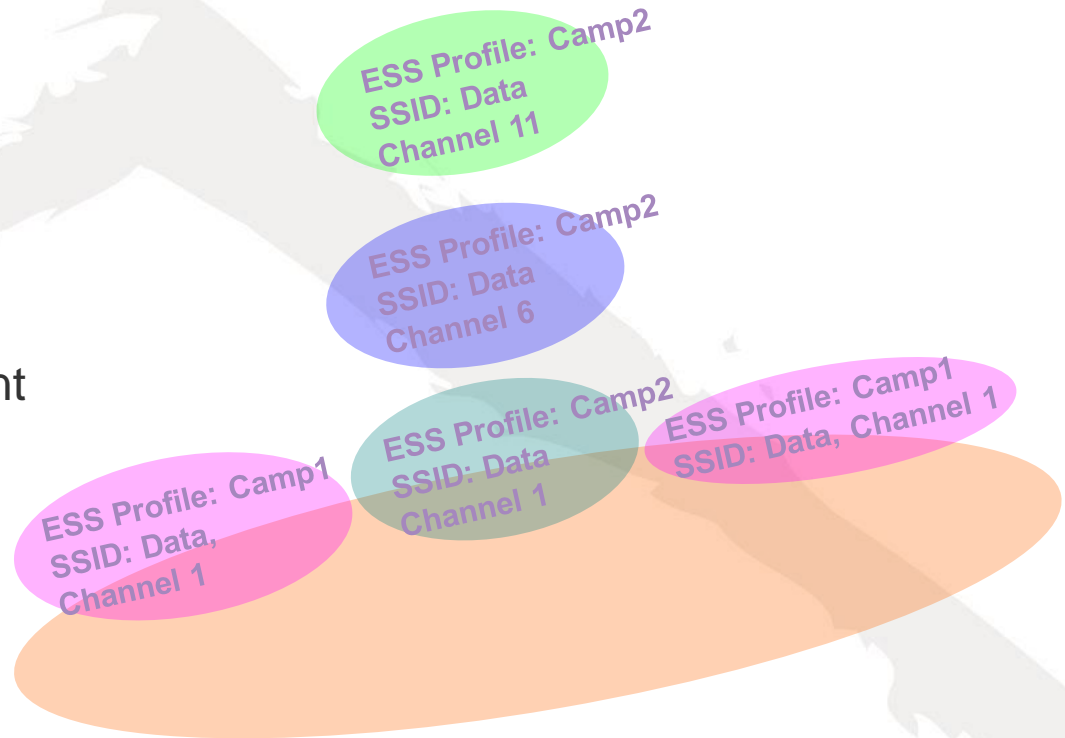
> Beware of cached credentials (on Windows)



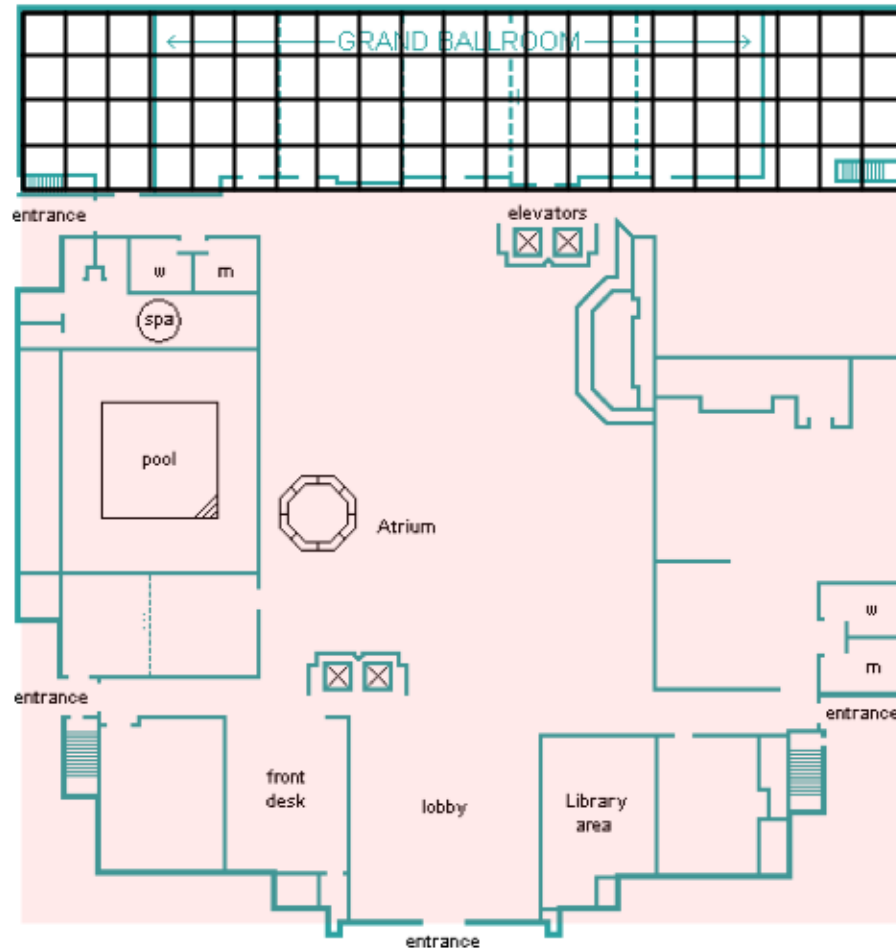


# Virtual Cell Domains

- > Create virtual cell domains on a per ESSID (ESS Profile) basis
  - Domains must be on different channels
  - Domains can be in different bands
- > Virtual Cell load balances between ESSIDs
  - Not between SSIDs
  - Not between bands
- > Set QoS Load Balance Overflow to On for layered ESSIDs



# Virtual Cell Domain Example



ESS Profile: Conf

SSID: Hotel

Channels 1/36

Channel 6/40

ESS Profile: Lobby

SSID: Hotel

Channel 1/36

ESS Profile Setting  
AP Setting

# Configuring Virtualization – Channel Layering

- > Set up separate ESSIDs for different Virtual Cell domains
  - Enable Virtual Cell **On**
  - Virtual Port **On**
- > Configure APs in each Virtual Cell domain to use a bootscript
  - Virtual Cell **On**
  - Channel, RF Band Settings, Channel Width, 802.11n only mode **all match**
- > For load balancing, configure APs in each Virtual Cell domain to use a bootscript

## ESS Profile - Add

Enable Virtual Cell

On

WMM Support

Off

DTIM Period (number of beacons)

1

Virtual Port

On

Dataplane Mode

Tunneled

## Wireless Interface Configuration - Update

Wireless Interface

Wireless Statistics

Antenna Property

### Summary Selection

AP ID

4

IfIndex

1

Interface Description

ieee80211-4-1

Administrative Status

Up

Channel

6

Short Preamble

On

RF Band Selection

802.11bgn

Antenna Selection

Left

Transmit Power High(dBm)

20

AP Mode

Normal Mode

Protection Mechanism

WMM-style TX

Protection Mode

Auto

Channel Width

20 MHz

MIMO Mode

2x2

802.11n only mode

Off

Virtual Cell

On

# Boot Scripts

> Small, special configuration programs

> Used for infrequent, highly tuned, configurations

> Labeled “AP Init Script”

AP Table - Update

AP Configuration	ESS-AP Table	Wireless Interface	Wireless Statistics	Ethernet
<u>Summary Selection</u>				
AP ID				
AP Name				
Serial Number				
Location				
Building				
Floor				
Contact				
LED Mode				
AP Init Script				
Dataplane Encryption				
AP Role				
Parent AP ID				
Link Probing Duration				
Power Supply Type				
AP Indoor/Outdoor type				
Show Detail Info...				

1

AP-1

00.0c.e6.04.ff.c

Normal

Off

access

0

120

802.3-af

Indoor AP

# Lab Break

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- > Removing a user from your network
  - MAC filtering
- > WPA2-PSK authenticated connection
- > RADIUS authenticated connection
  - RADIUS server configuration
  - Windows client configuration
  - Username / password