

# Campus Wi-Fi Deployments: Lessons Learnt

Asvin M, Rachit S, Gopinath KN (Gopi)  
Mojo Networks

1 © Mojo Networks. Confidential Information.



## All Wireless Campus

- Mission critical applications – class lectures, exams, ...
- 2-3 number of devices per student





5 Lessons



2 Stories

## Lesson 1: Follow Deployment Best Good Practices

- RF & capacity planning (-65 dbm, 12/24 Mbps link-speed)
- Enable Radio Resource Management (RRM) features (but, with care)
  - Client Steering across 2.4/5 GHz bands & across APs
  - Client Load balancing
  - Auto channel selection
  - Auto Transmit Power Control
- Defaults should work (mostly), but, in large WLANs, configuration fine-tuning is strongly advised
- Basic validation of the system before production use customer – coverage, connectivity & throughput

## Lesson 1: Follow Deployment Best Good Practices

- For High density deployment, 20 or 40MHz channelization will help reduce channel utilization and improve overall network performance
- Use 5 Ghz DFS channels, 802.11r fast roaming (but, with caution as some client devices may not support them)
- 2.4GHz Efficiency – Eliminate lowest supported rates, eliminate 802.11b all together, if possible.

Wi-Fi almost always gets  
blamed!



But more often than not, it is not the  
direct cause of end-user issues.

## Story 1: Productivity, Jobs are at stake if Wi-Fi stops working

- IT Admin would love to have a “Go-No Go” type of expert advice before starting his day
- <https://www.youtube.com/watch?v=ze8S6YSPc04>

## Lesson 2: Proactive Monitoring

- Simulate WLAN connectivity & performance tests before start of day/exam to make sure basic things are working
- AP's acting as clients to check
  - WiFi association
  - RADIUS server
  - DHCP
  - WAN connectivity
  - Application availability
  - Basic throughput
  - Voice
- Proactive scheduled test – To compare network performance against baseline values.

## Using 3 Radios APs for Proactive Tests

The screenshot displays the Mojo Networks management console. On the left, a sidebar contains navigation menus for 'Dashboard', 'Access', and 'Management'. The main content area is titled 'Troubleshoot' and shows configuration for a test profile named 'Profile Name 123'. Below the configuration, there are two panels showing 'Client Connectivity Test Results' for the AP Mojo-90:6E:5F-Oct23-0945. The results are as follows:

Test Category	Status
Association	Success (Green)
Authentication	Success (Green)
DHCP	Success (Green)
Gateway	Failure (Red)
DNS	Success (Green)
Ping Test	Partial Success (Yellow)
WAN Latency	Success (Green)
VOIP Test	Failure (Red)
Throughput Test	Success (Green)

## Lesson 3: Clients MUST be Crazy

- No matter how perfect the AP deployment is, finally everything depends on WiFi clients
- Legacy clients – bring down the overall WLAN throughput
- Sticky clients – refuse to connect to nearby APs
- Non standard implementations

## Story 2: Multicast Storm



- (Category 5) Storm of Multicast frames
- Caused by a buggy router that was connected to wire network
- Possibly connected by a disgruntled student or an un-initiated techie

12 © Mojo Networks. Confidential Information.

mojo

## Lesson 4: Murphy's Law

- Scan you environment for un-authorized or Rogue devices – APs, Rogue DHCP servers, Buggy Routers
- Restrict unnecessary Broadcast and Multicast Traffic on your APs
  - Proxy ARP
  - Drop Broadcast and Multicast Traffic
  - Transmit multicast rate at highest possible basic rate or enable multicast to unicast flag.

13 © Mojo Networks. Confidential Information.

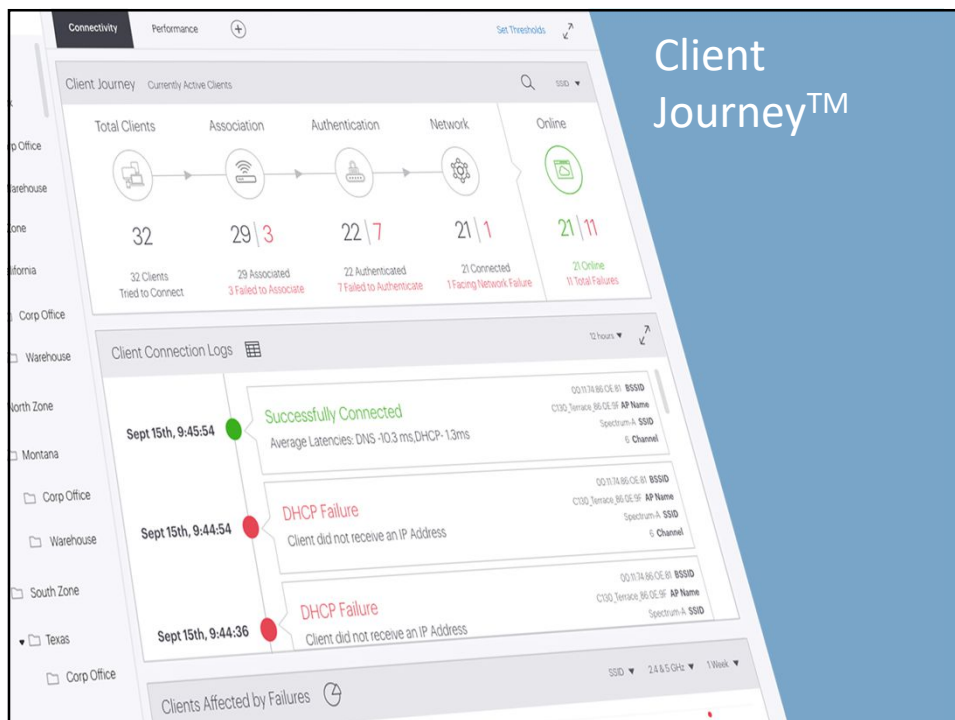
mojo

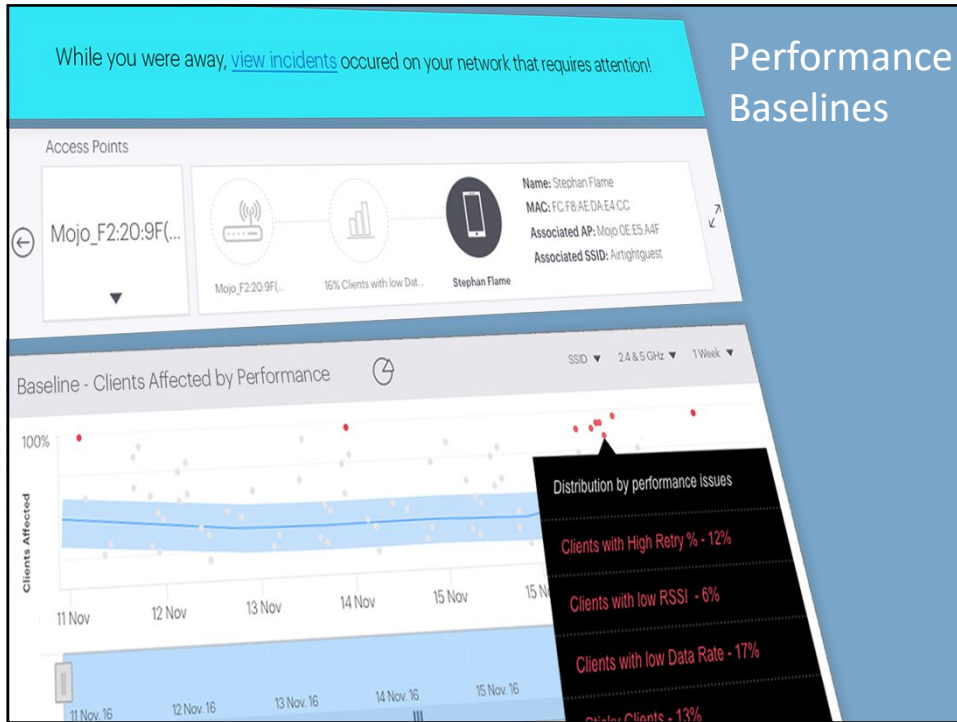
## Lesson 5: Need Intuitive WLAN Monitoring Tools

- Client Connectivity
- Client Performance
- Network usage
- Network Baselines
- Packet Trace Analysis

14 © Mojo Networks. Confidential Information.

mojo





## Mojo Cognitive WiFi

In-built intelligence to analyze Wi-Fi connections in real time and automate root cause analysis

Client Health	
Low RSSI	Low Data Rate
32	55
High Retry %	Sticky Clients
20	6

