

# Getting enterprise APs ready for deployment

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Product delivery to Customer



Tested and certified for  
delivery from Lab



Post Deployment

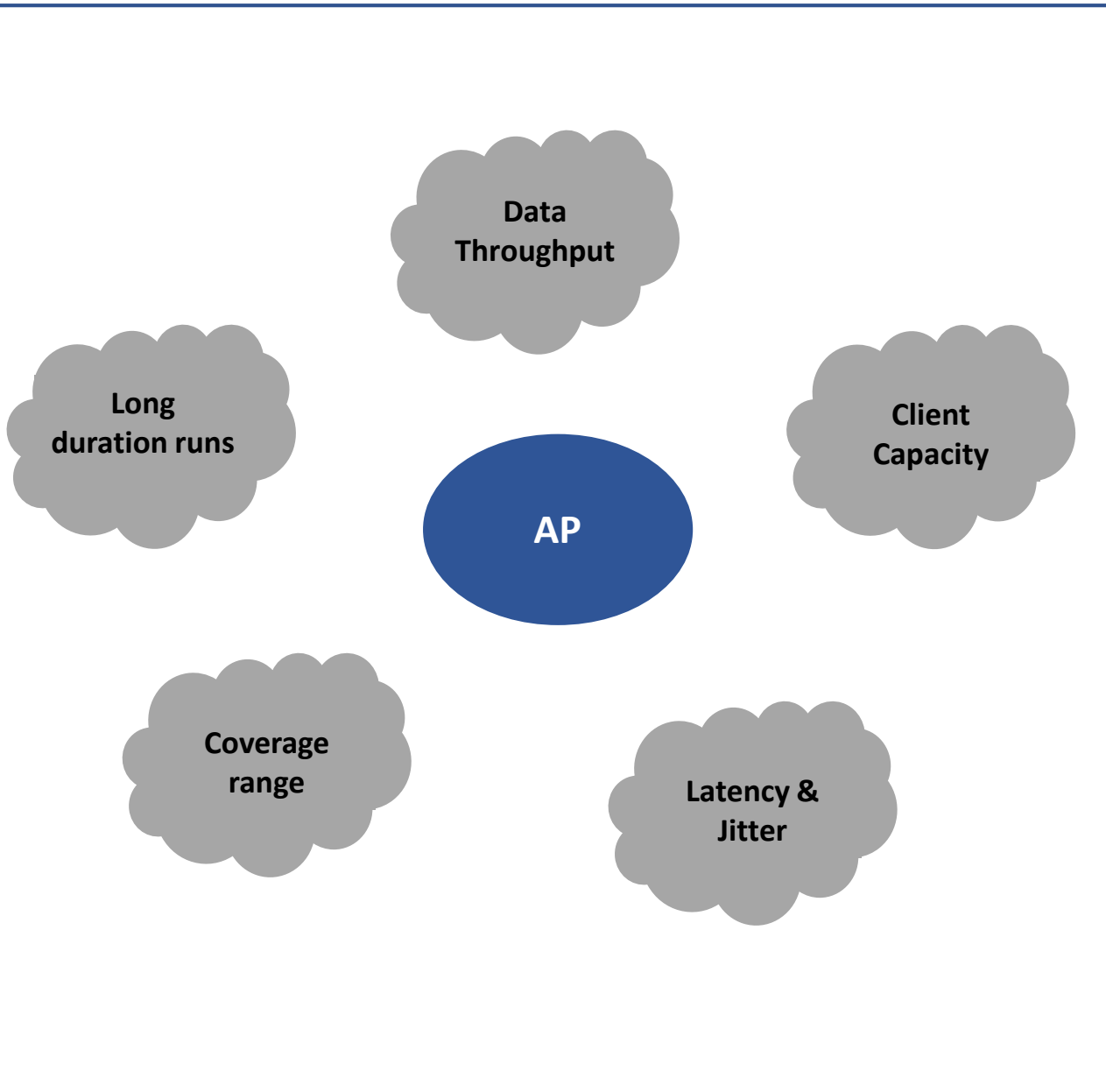


Why does this transition  
happen ????

# Agenda

- Typical Test Approach (Performance)
- Facts to consider

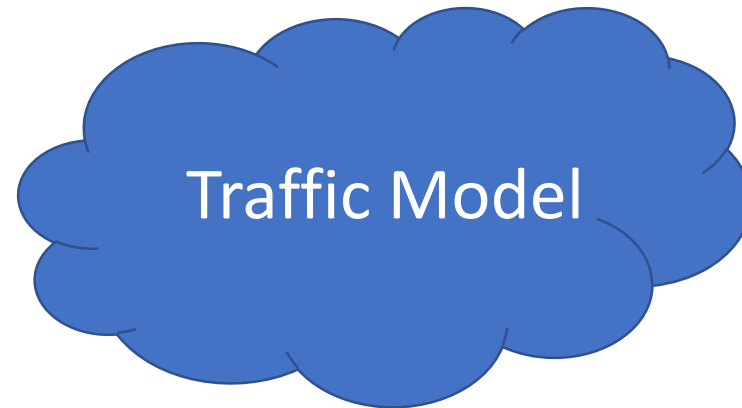
# Typical Test Approach (AP Performance)



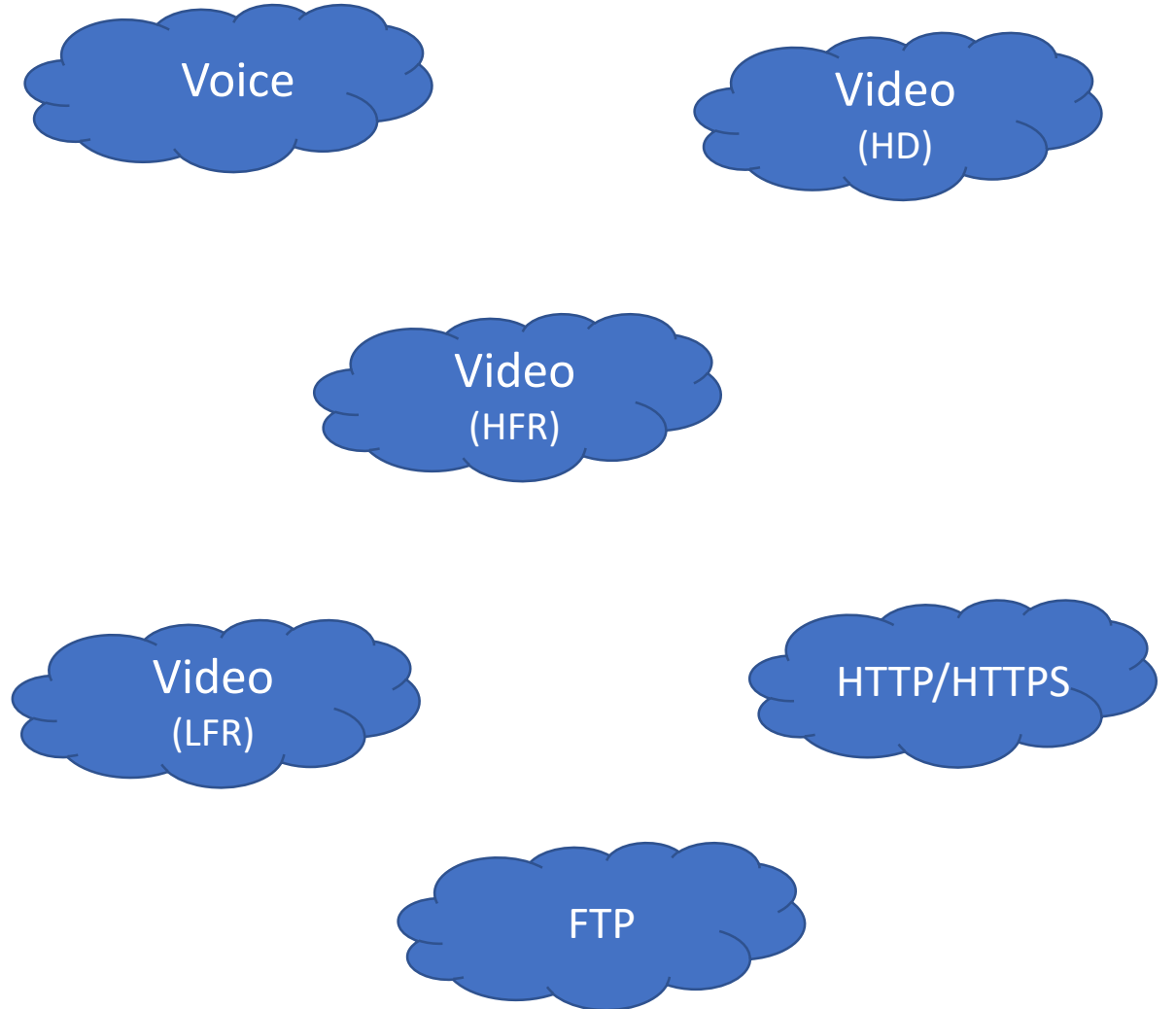
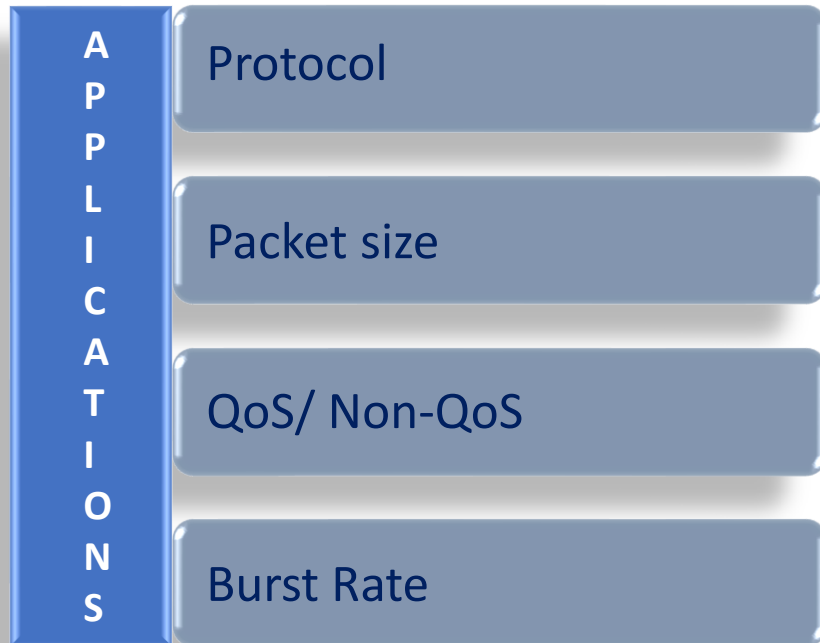
- DataThroughput
  - UDP, TCP, Max Byte size
- Client Capacity
  - Client Associations , minimal data transfer
- Latency & Jitter
  - For different packet size
- Coverage Range
  - Data rate at varying distances
- Long duration runs
  - Measure of stability

# Key facts to Consider

- Applications
- Bearer Type (LBO, L2oGRE, L2TPv3, IPSec)
- Client and its capabilities (BW, #SS, Radio etc)
- Deployment Location

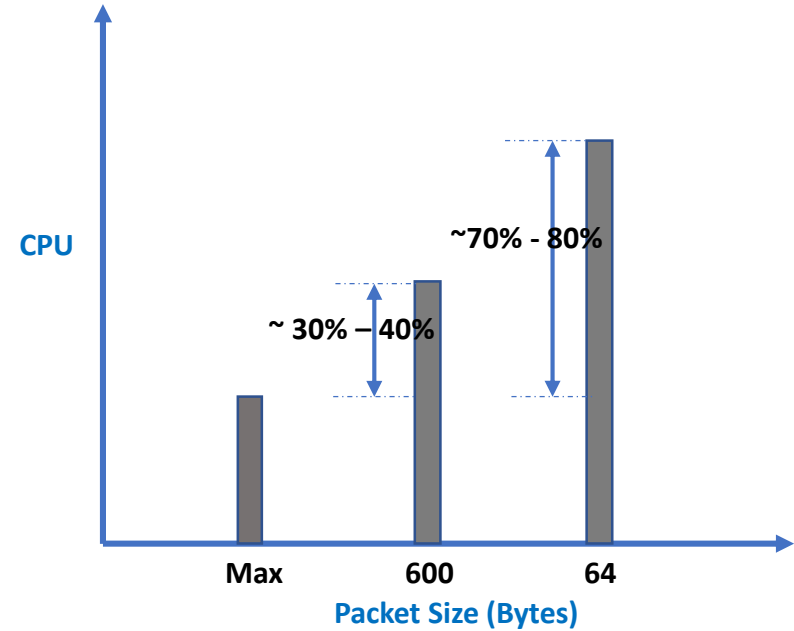


# Applications



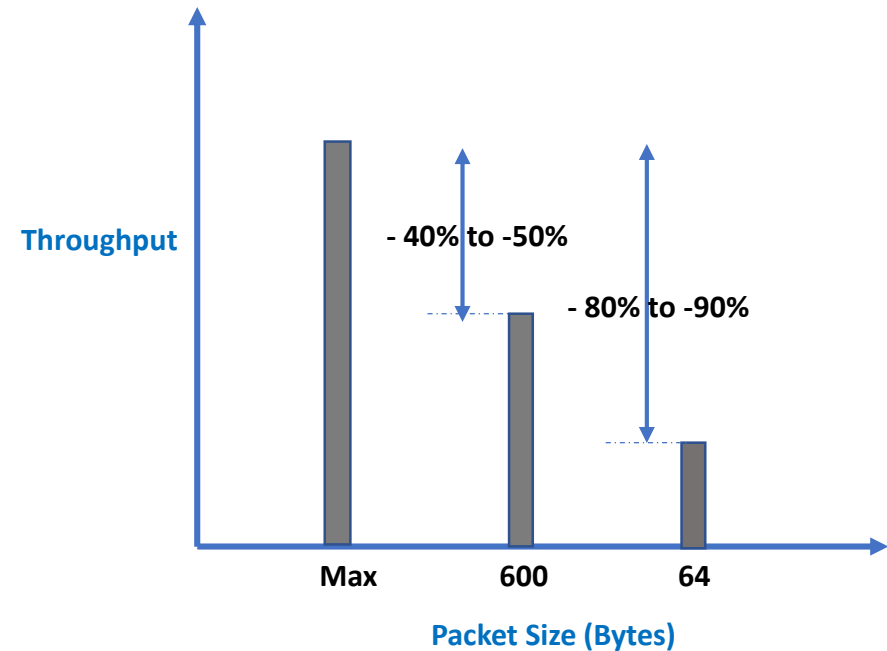
## Impact of Packet size on CPU

Significant variation in CPU as packet size reduces



## Impact of Packet size on Data Throughput

Significant variation in throughput as packet size reduces



Note: Values mentioned in the chart are indicative range of values that can be expected and not a reference to any specific vendor AP

## Impact of Burst Rate

CPU , Buffer handling,  
Data Throughput



Type of Service	QoS*	Data Rate (Mbps)	Encoding Types	Pattern
Voice	Y	~ 0.02 - 0.03	G723, G722	Periodic
Video Streaming - Mobile	Y	~ 0.8 - 5	TCP-H264 , HTTP	Sudden surge + constant stream
Video Streaming - Laptop	Y	~ 2 - 10	H264, MPEG2, H261,HTTP	Sudden surge + constant stream
HTTP	N	~ 0.5 - 1		Sudden surge

\* Dependency on device/app

## Impact of QoS/Non-QoS

CPU , Buffer handling,  
Data Throughput

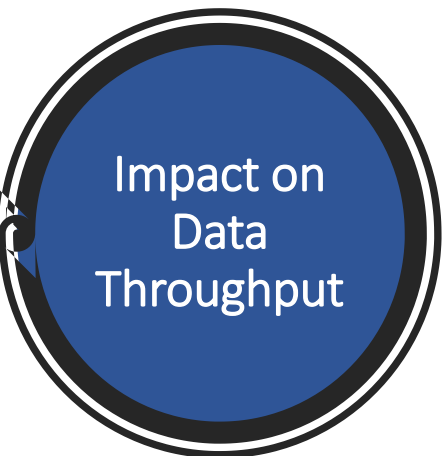
# Clients

Client Type



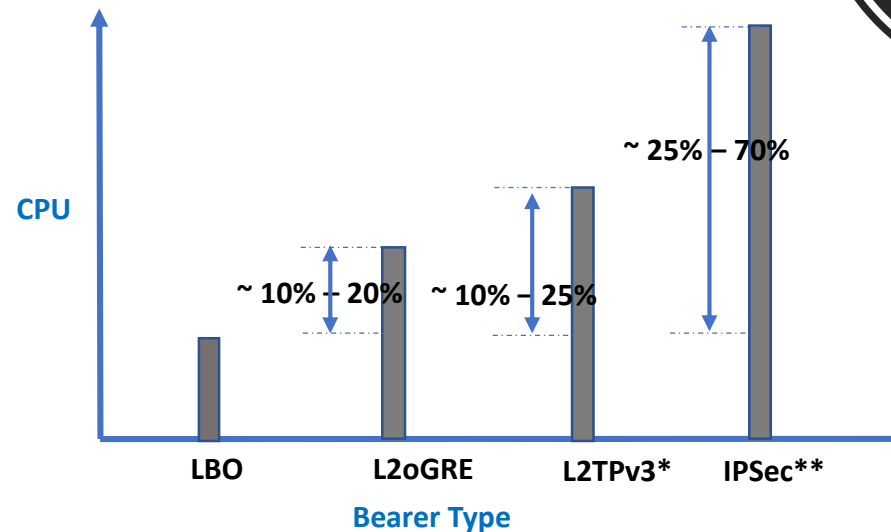
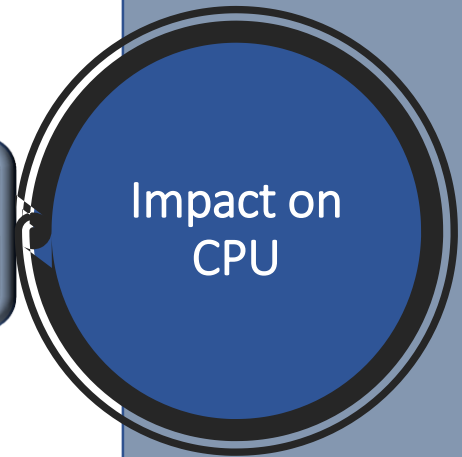
# Bearer Type

B E A R E R  T Y P E	Local Breakout (LBO)
	GRE (L2oGRE/L3oGRE/SoftGRE)
	L2TPv3
	IPSec



Significant variation in throughput with different bearer types

Significant variation in CPU with different bearer types



- \* Variations depend on usage of IP /UDP options
- \*\* Variations depend on encryption type, use of hardware accelerators etc

# Deployment Location - Campus

## Applications

- Internet usage
- Social Media
  - Whatsup, Facebook, Instagram etc
- Apps
  - Video streaming, Gaming etc
- Academic related
  - Web instructional, Tests etc
- File Sharing
- E-mail

## Environment

- Mix of clients
- Interference
  - Channel overlap
  - Hotspots , Bluetooth

## Locations

- Classrooms
- Dormitory
- Auditorium
- Office , Labs etc

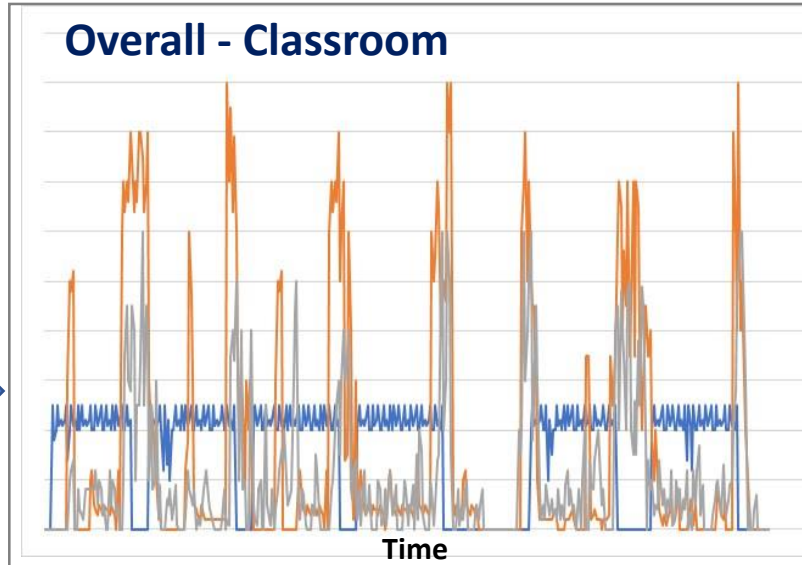
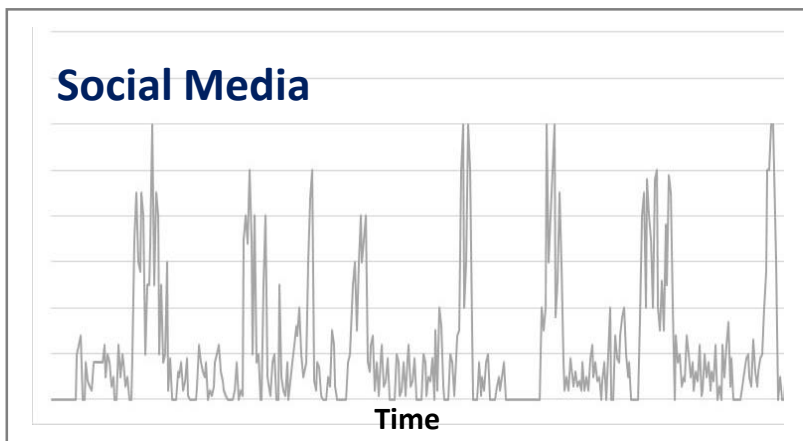
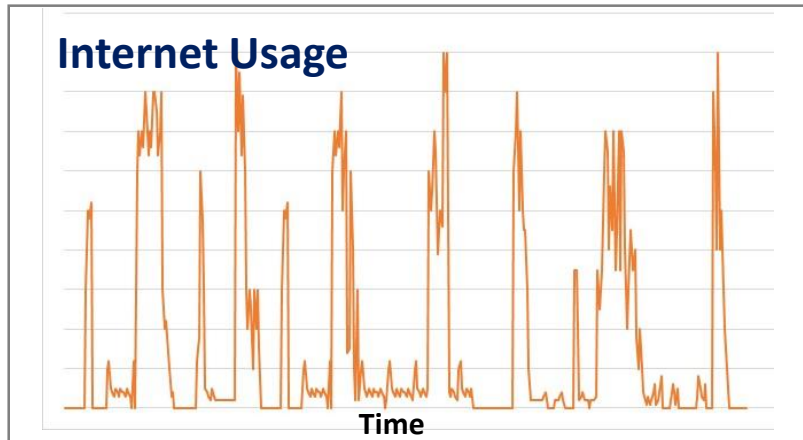
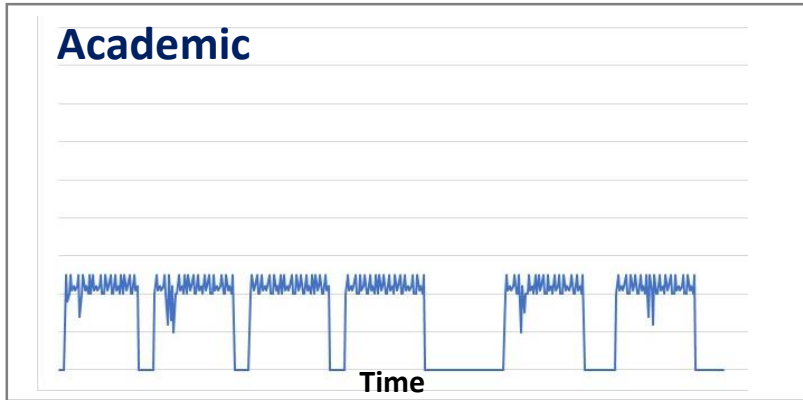
# Classroom

Applications	Usage Frequency	Type of Traffic
Academic Related	High	Multicast
Social Media	Moderate	Unicast
File Sharing	Low	Unicast
Internet Usage	Moderate	Unicast

Type of Devices	Technology Supported	# of SS	BW used	Percentage of Device(s)
Laptops	802.11n	2	40 MHz	60%
	802.11ac	2	40 MHz	40%
Mobile	802.11n	1	20 MHz	50%
	802.11n	2	40 MHz	10%
	802.11ac	1	20 MHz	30%
	802.11ac	2	40 MHz	10%

Environment	Probability	Impact
Hotspots	Low	Low
Bluetooth	Low	Low
Co-Channel	Low	Low

# Traffic usage pattern



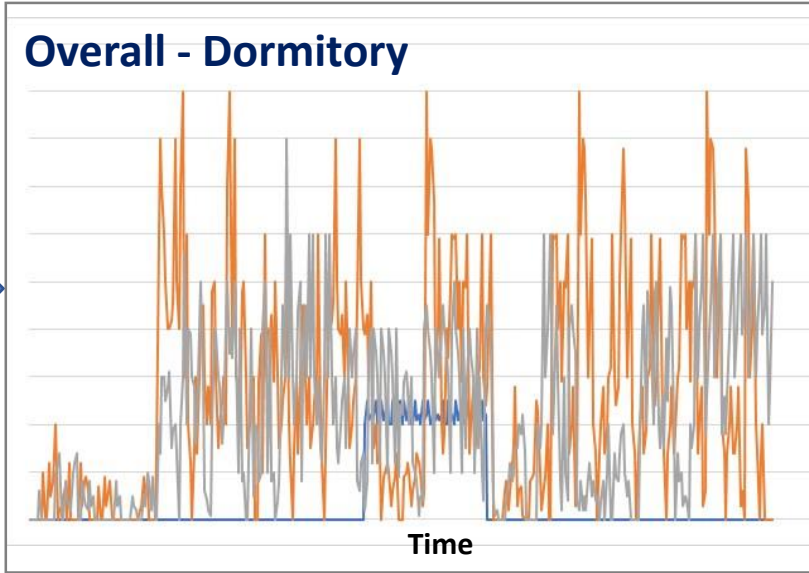
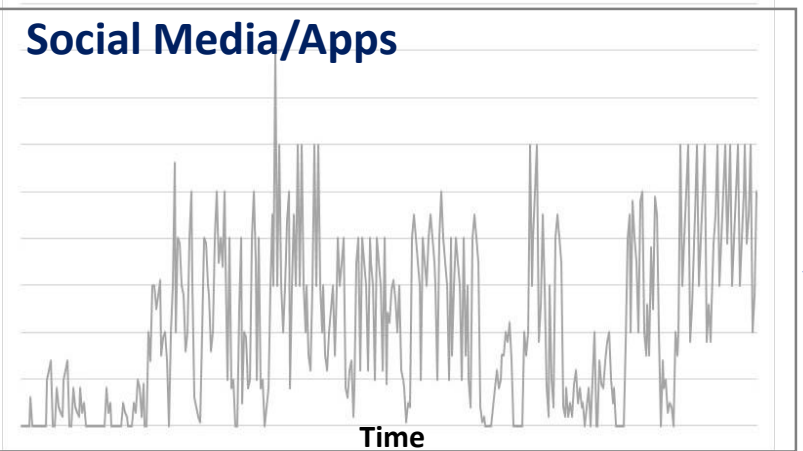
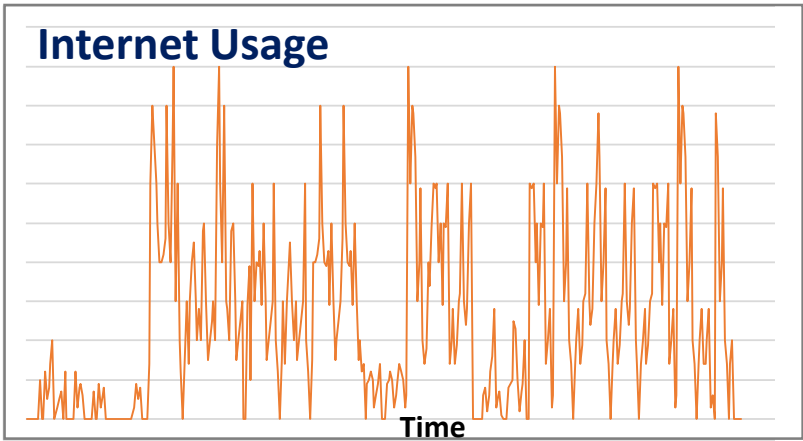
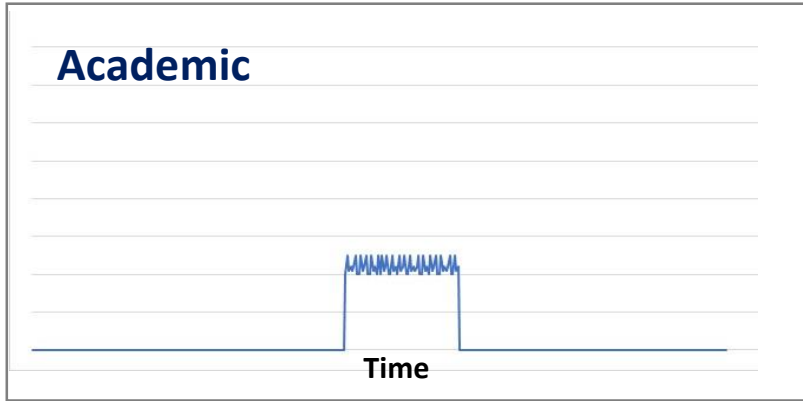
# Dormitory

Applications	Usage Frequency	Type of Traffic
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File Sharing	Low	Unicast
Apps	High	Unicast
Internet Usage	High	Unicast

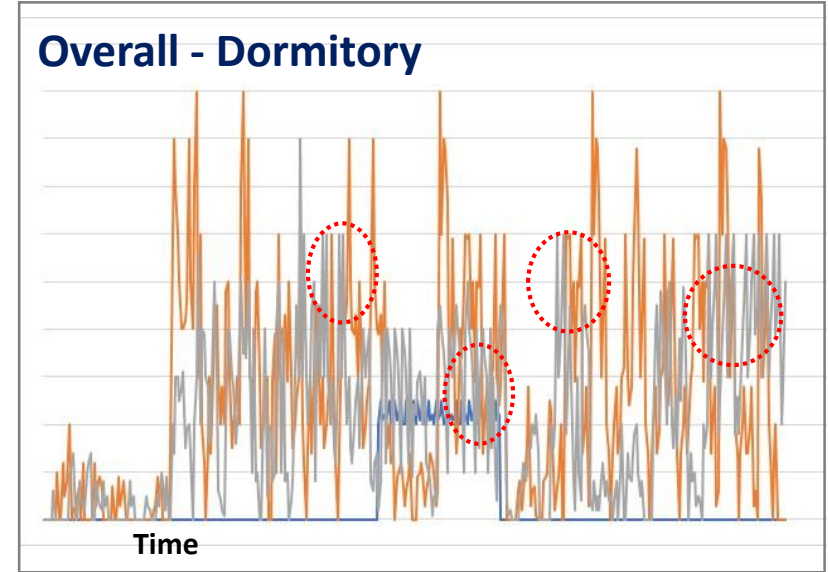
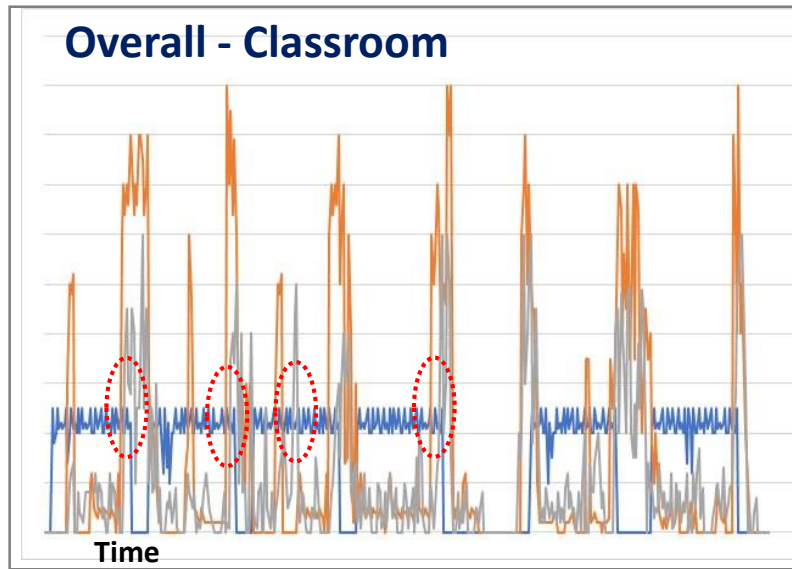
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	802.11n	2	40 MHz	10%
	802.11ac	1	20 MHz	30%
	802.11ac	2	40 MHz	10%
Tabs	802.11n	1	20 MHz	60%
	802.11ac	2	40 MHz	40%
Gaming devices	802.11n	1	20 MHz	70%
	802.11ac	1	20 MHz	30%

Environment	Probability	Impact
Hotspots	High	High
Bluetooth	Moderate	High
Co-Channel	Low	Low

# Traffic usage pattern



# Impacts



- AP reporting high CPU alarms
- AP hung and not processing calls
- AP reboot
- AP dropping bearer packets

