

# WiFi Network Design & Planning

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# Major Steps Involved in Deploying Wi-Fi



# Wi-Fi Use Cases



## Public WiFi

- Streets
- Malls
- Public areas (Parks, Stations, Airports etc)



## Enterprise and Campus Wi-Fi

Enterprise, College Campus



## Smart City Wi-Fi

Wi-Fi network that not only provides Internet to citizens but also connect Smart City infra



## Rural WiFi

Wireless Broadband Services for **Villages**

# Planning Phase

- Prepare the requirements for backhaul and Wi-Fi Access Network for the selected use case
- **Key information needed for network planning**
  1. Who will be the end customer?
  2. How will customer on-board the Wi-Fi?
  3. How will customer authenticate or will do KYC?
  4. How will customer be charged?
  5. What analytics are useful?

# Planning Phase: Key Steps

## 1. What is the coverage requirement?

Malls/Platforms



Carpet

Parks



Spotty

Stadiums/Auditorium



Dense

# Planning Phase: Key Steps

2. How many connections are expected at a point of time/place?
3. How much throughput is to be provided per user?

These requirements are inversely related to each other, i.e., if the no. of users increase at a point of time/place then the throughput may decrease and if we plan less bandwidth then we may not be able to support the desired no. of users with good throughput.





# Planning Phase: Key Steps

- 4. What applications will be used?



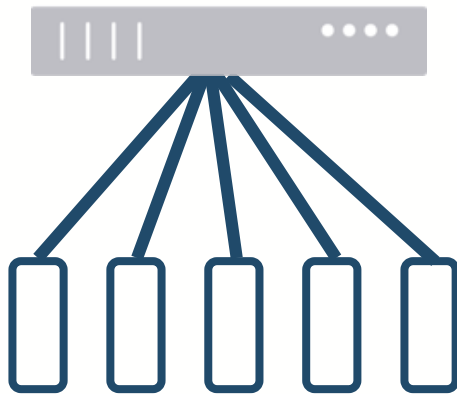
- 5. What type of clients will connect to the WiFi network?



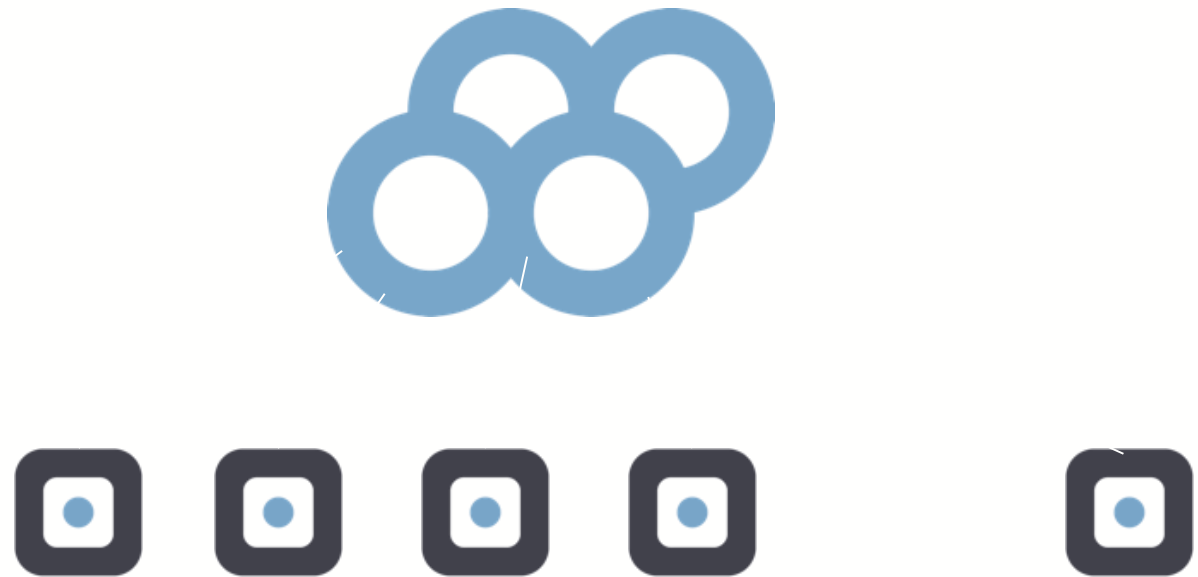
# Design Phase

- Choose the network architecture which is scalable, cost-effective and satisfies the technical requirements.

## Controller



## Cloud

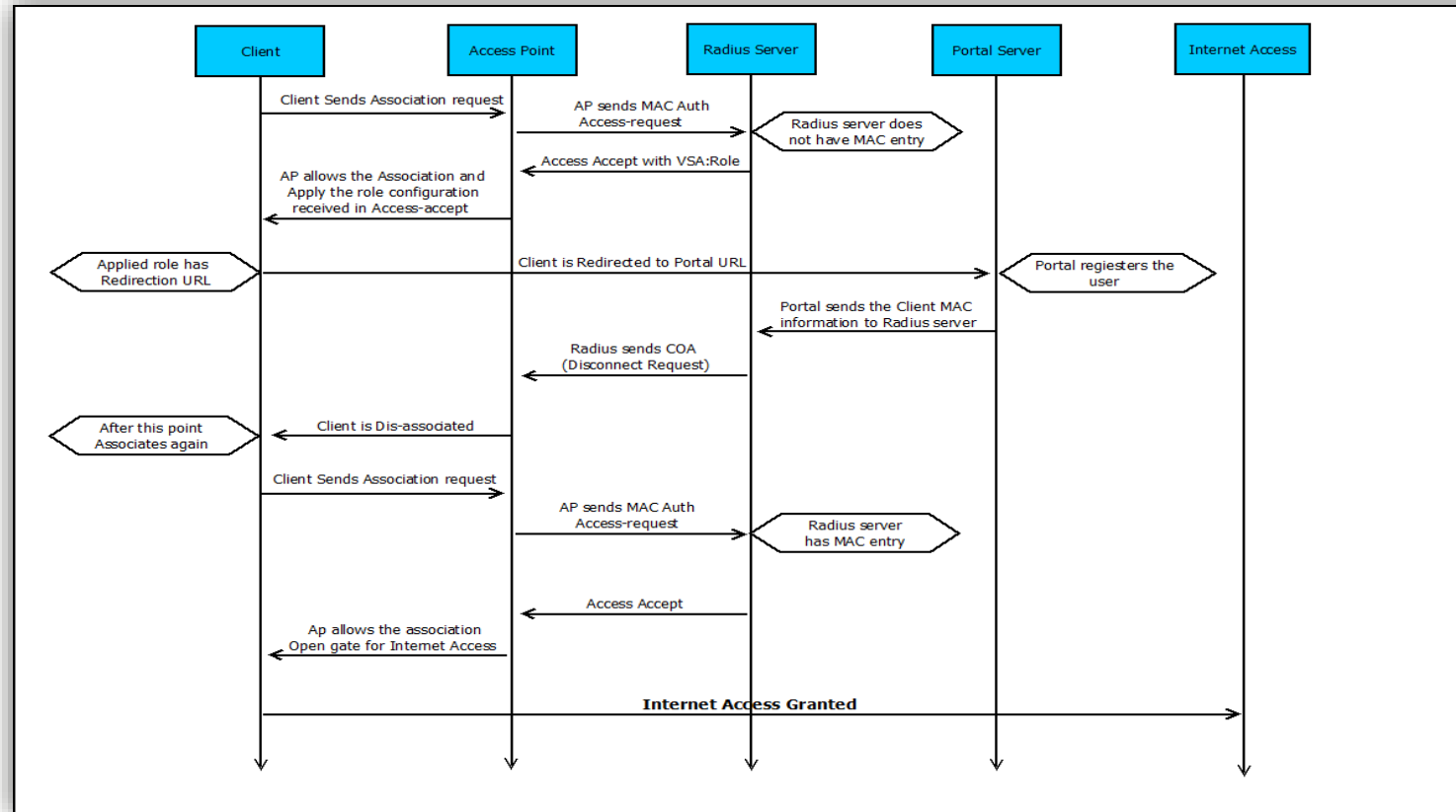




# Design Phase

- Identify all the hardware and software components required to meet the business and technical requirements (call flow, billing, analytics, event logging etc.)
- Identify the Access Point models which meet the requirement
  - Decision is based on the use case, capacity and coverage.
    - **Smart City deployment:** An outdoor, Omni-directional AP with IP67 compliance
    - **Enterprise, Colleges, Malls, Airports:** Indoor, Omni-directional AP, with good client capacity
    - **Stadium:** Outdoor, directional AP with IP67 compliance

# Design Phase



- End to end customer experience call flow and network diagram
- Site survey if required followed by predictive RF planning.

# Rollout Phase

- Rollout is based on final network design of and RF planning
- This phase involves following steps
  - Order the network components and Wi-Fi APs
  - Check last mile connectivity to the site (like fiber/DSL/Ethernet etc.)
  - Make the backend network ready
  - Install the APs as per planning
  - Integrate with Fault Management and Performance Management systems
  - Conduct acceptance testing
  - Go Live!

# Optimization Phase

- This phase is value addition to the live network to make it more efficient and productive
- Optimization involves two broad aspects
  - Backend Network Optimization
    1. Proper routes
    2. Reducing the number of broadcast and multicast in network
    3. Reducing the number for control or management traffic on core.
  - RF Network Optimization
    1. Reducing Interference
    2. Enabling certain RRM (Radio Resource Management) features
    3. Controlling the transmit powers etc.

# RF Planning

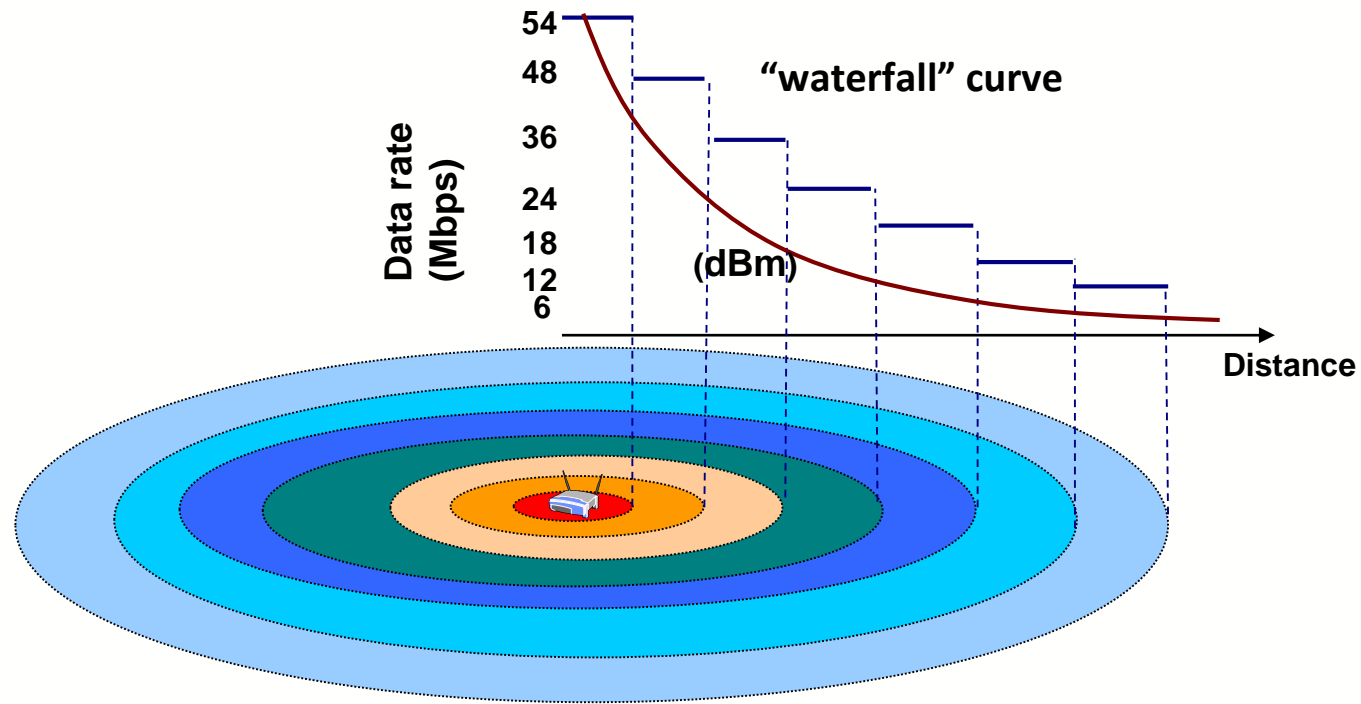
# RF Planning Goals





# RF Planning Goal: Coverage

- The objective is to ensure that a WLAN client can connect with at least one AP with RSSI above a defined threshold.

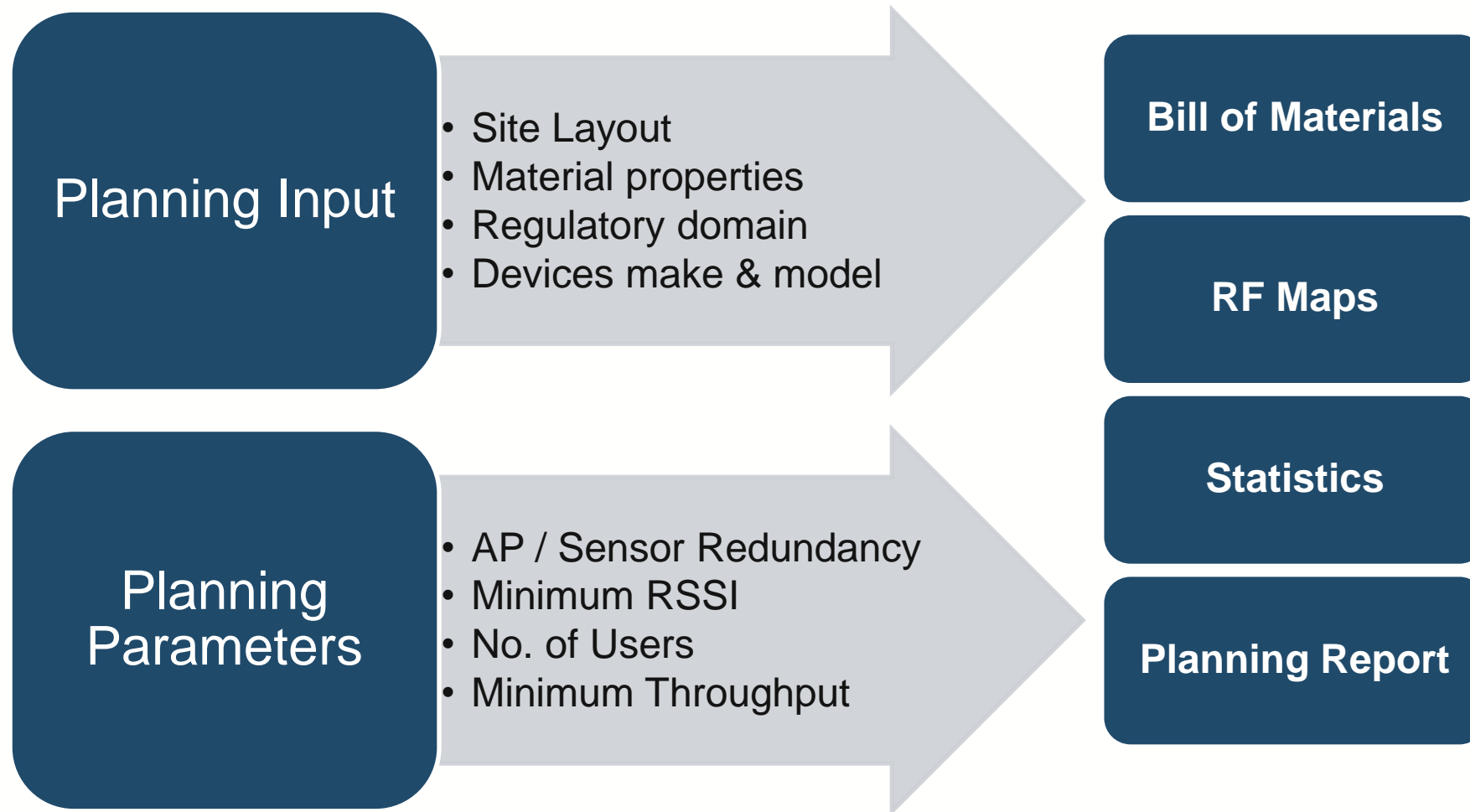


# RF Planning Goal: Capacity

- The objective is to ensure that each connected WLAN client is guaranteed a minimum throughput.
- The throughput requirement is based on the applications that clients are expected to use
- The no. of clients that an AP can support with the minimum throughput requirement depends on a no. of factors
  - AP model
  - Client capabilities
  - No. of channels and channel bandwidth



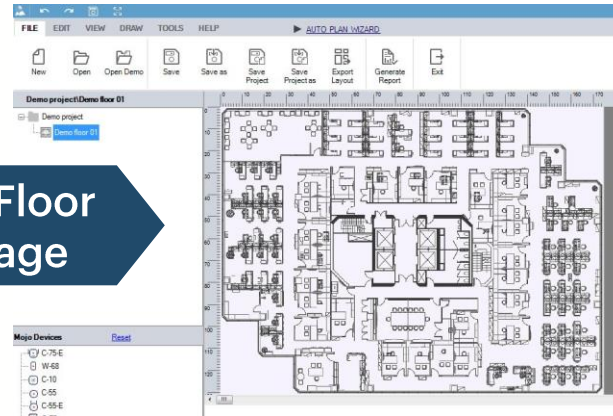
# RF Planning Input and Deliverables



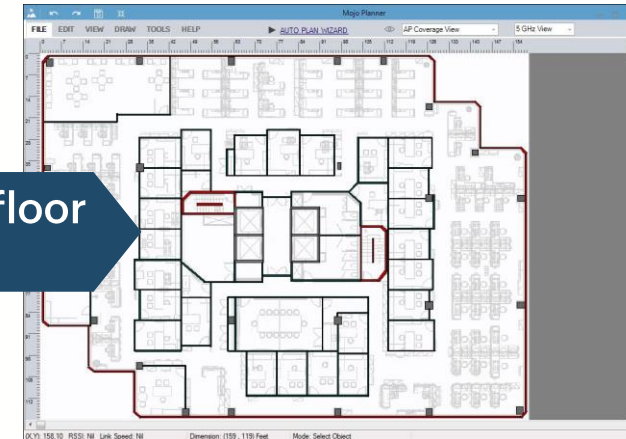
Maximize coverage & capacity  
Minimize device bill of material

# Planner Workflow

Import Floor  
Plan Image



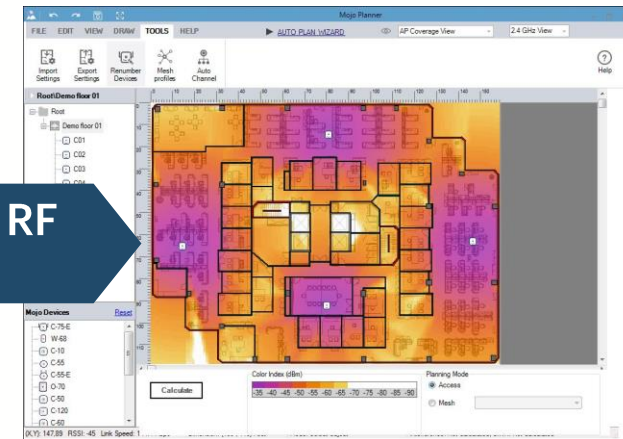
Prepare floor  
Model



Place Devices



Prepare RF  
Views



# RF Heatmap

