

Predictive 5 GHz Single-Channel Wireless Mesh Network Plan

Project Name: Project Name and Description

Date: February 16, 2017

Mesh Network Design

Selections

Mesh Access Point:	802.11ac Wave-2 2SS AP
5 GHz Mesh Backhaul Channel Width:	20 MHz
5 GHz Mesh Backhaul Data Rate:	Automatic (802.11a/n/ac)
RF Environment:	Outdoor Congested (Urban)
Mesh Node Received Power (dBm):	-65
Fade Margin (dB):	9
Resulting Link Budget (SNR):	16 dB
Frequency Reuse Factor (4 ch at 20 MHz):	1.0
Root APs Serve Clients (bypassing mesh):	Yes
Average Number of Mesh Hops:	1.50

Mesh Network Performance Requirements

- Determine Performance Requirements from Client Capacity Plan Results
- Client Capacity Plan Throughput Required:* 45.00 Mbps
- Client Capacity Plan Access Points Required:* 12
- Enter Minimum # APs Required for Coverage: 1

- Manually Enter Mesh Network Performance Requirements

Client Throughput Desired (Mbps):

Root Nodes Deployed:

Mesh Nodes Deployed:

Mesh Network Per-Hop Performance

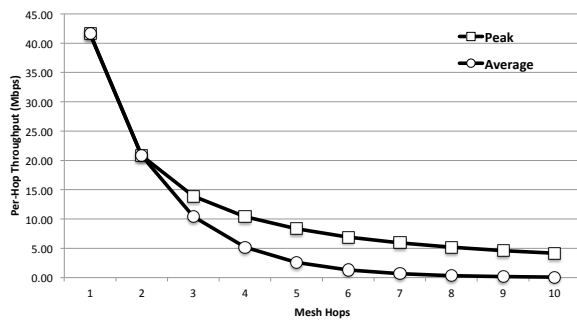
Number of Mesh Hops	Average Throughput	Peak Throughput
1 Mesh Hop	41.62 Mbps	41.62 Mbps
2 Mesh Hops	20.81 Mbps	20.81 Mbps
3 Mesh Hops	10.40 Mbps	13.87 Mbps
4 Mesh Hops	5.20 Mbps	10.40 Mbps
5 Mesh Hops	2.60 Mbps	8.32 Mbps
6 Mesh Hops	1.30 Mbps	6.94 Mbps
7 Mesh Hops	0.65 Mbps	5.95 Mbps
8 Mesh Hops	0.33 Mbps	5.20 Mbps
9 Mesh Hops	0.16 Mbps	4.62 Mbps
10 Mesh Hops	0.08 Mbps	4.16 Mbps

Mesh Network Aggregate Throughput

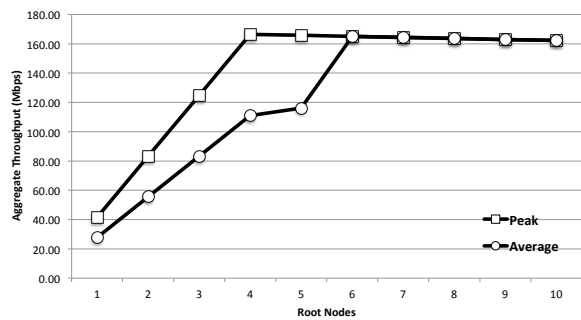
Number of Root Nodes	Avg. Hop Range	Average Throughput	Peak Throughput
1 Root (11 Mesh)	1.00 - 6.00	27.74 Mbps	41.62 Mbps
2 Root (10 Mesh)	1.00 - 4.60	55.48 Mbps	83.23 Mbps
3 Root (9 Mesh)	1.00 - 3.33	83.22 Mbps	124.85 Mbps
4 Root (8 Mesh)	1.00 - 2.25	110.96 Mbps	166.46 Mbps
5 Root (7 Mesh)	1.00 - 1.43	116.03 Mbps	165.76 Mbps
6 Root (6 Mesh)	1.00	165.08 Mbps	165.07 Mbps
7 Root (5 Mesh)	1.00	164.38 Mbps	164.37 Mbps
8 Root (4 Mesh)	1.00	163.68 Mbps	163.67 Mbps
9 Root (3 Mesh)	1.00	162.98 Mbps	162.97 Mbps
10 Root (2 Mesh)	1.00	162.28 Mbps	162.27 Mbps

Due to frequency reuse limits, deploying more than 4 root nodes will result in shared capacity, but may be beneficial in order to reduce the average number of mesh hops in the network.

Mesh Per-Hop Performance



Mesh Network Throughput



Mesh Network Capacity Results

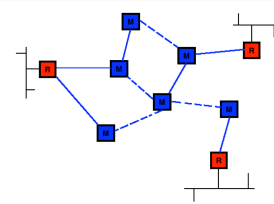
Client Throughput Required:	45.00 Mbps
Client Throughput Carried Directly by Root Nodes:	7.50 Mbps
Mesh Network Backhaul Throughput Required:	37.50 Mbps
Mesh Network Backhaul Throughput Capacity:	55.48 Mbps
Throughput Required per Mesh Node:	3.75 Mbps
Throughput per Mesh Node at 4 hops:	5.20 Mbps
Minimum Number of Root Nodes Required:	2
Additional Mesh Nodes Required:	10
Total Number of Root and Mesh APs:	12
Mesh Hop Limit (Do Not Exceed):	4

Mesh Topology

A web mesh topology is designed so that multiple mesh nodes are within radio range of each other to provide resilient traffic backhaul to one or multiple root nodes. This topology results in higher channel contention between mesh nodes on the same channel and lower average network capacity as compared to a linear mesh topology. Web mesh uses a conservative approach to per-hop performance with the average throughput value.

Select Mesh Topology

- Web Mesh
- Linear Mesh



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Notice: These results are only an estimate. This plan assumes that all or a portion of the 5 GHz frequency band is dedicated to mesh network backhaul traffic, clients are restricted to the 2.4 GHz frequency band or to 5 GHz channels not used for mesh backhaul, that each root AP operates on a non-overlapping 5 GHz channel unless frequency reuse is possible without interference, and that each root AP and all associated mesh APs operate on a single shared 5 GHz channel.