7. Coverage, RvR, and RvRvO:

7.1 Coverage:

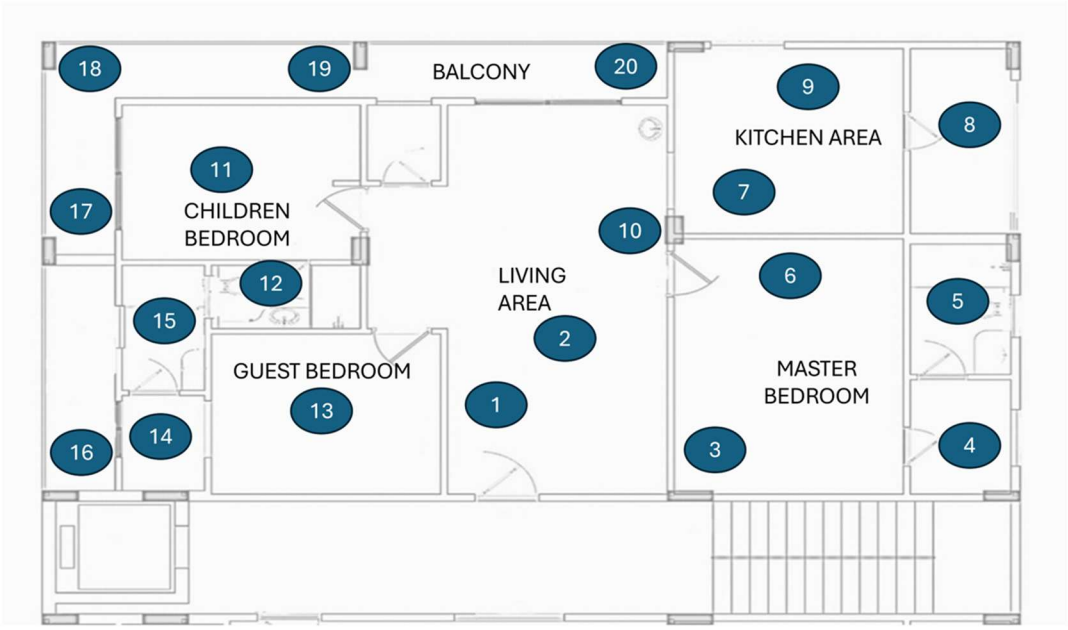
Test Description:

- Turn on both the GW and Leaf nodes.
- Mark 20 test points evenly distributed across the 2,500 sq. ft. area.
- At each point, connect the test client to the AP.
- Record the RSSI at the test point using a Wi-Fi analyzer or AP management tool.
- Perform TCP uplink and downlink throughput tests (e.g., iperf) for a fixed duration (e.g., 60s).
- Note down the results for each point.
- Check for any coverage dead zones or weak areas

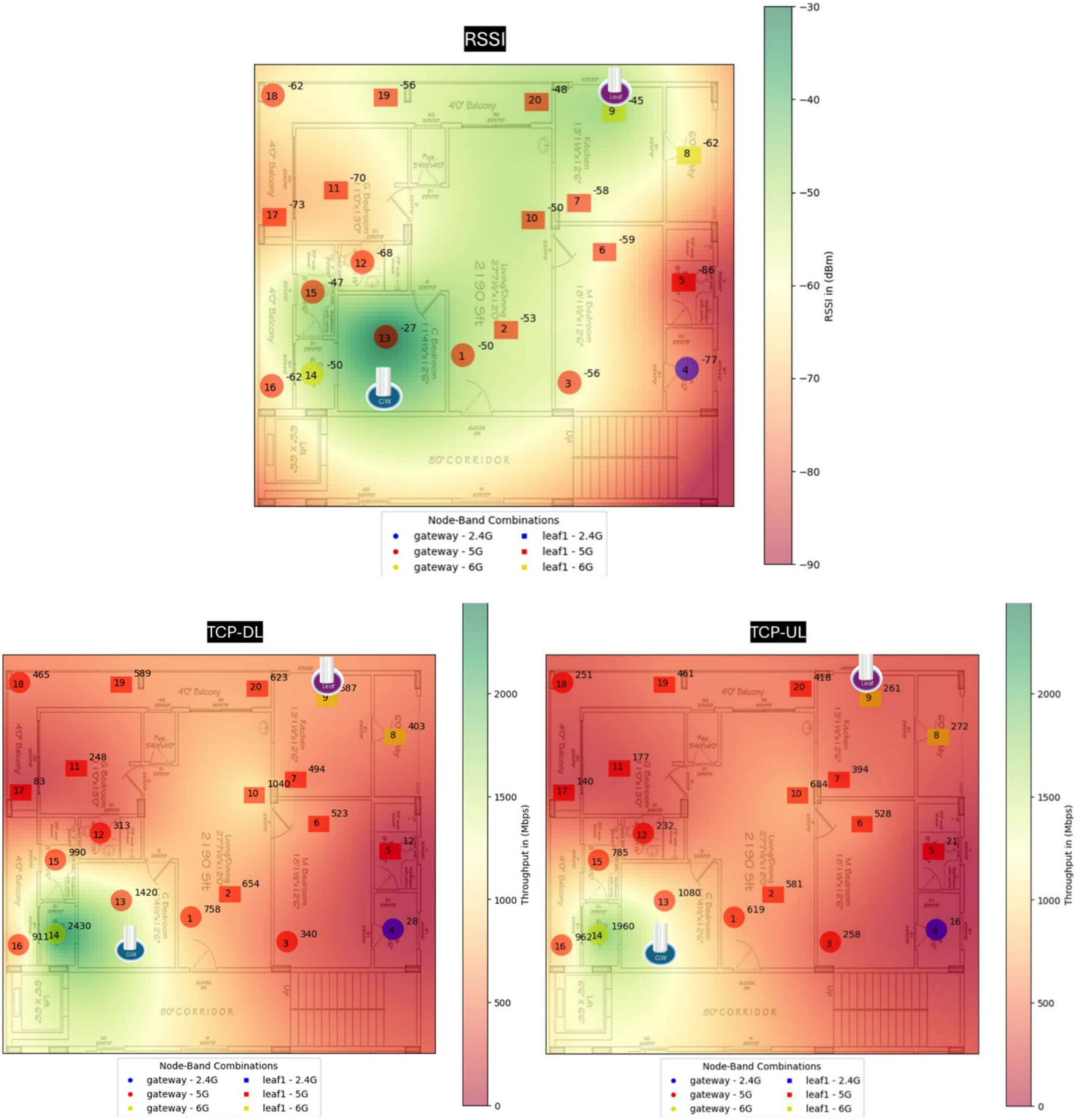
Client Device Specifications:

Hostname	DESKTOP-EBISV9S
Model	Dell-Latitude 3410
Platform	Windows 11 Pro 64-bit
Wifi-Supports	Intel(R) Wi-Fi 7 BE200 320MHz
CPU	Intel(R) Core(TM) i5-10310U CPU @ 1.70GHz (8 CPUs), ~2.2GHz
GPU	Intel(R) UHD Graphics
RAM	16GB
Storage	256 GB SSD (Geonix M.2)

Coordinates Position:



Test Results:



Position	TCP-UL (Mbps)	TCP-DL (Mbps)	RSSI (dBm)	Connected node	Channel	Band	PHY rate UL	PHY rate DL
1	619	758	-50	GW	44	5GHz	1297	1297
2	581	654	-53	GW	44	5GHz	1297	1153
3	258	340	-56	Leaf	157	5GHz	432	721
4	15.6	28	-77	Leaf	11	2.4GHz	29	115
5	21.1	12	-86	Leaf	157	5GHz	59	34
6	528	523	-59	GW	44	5GHz	865	1729
7	394	494	-58	GW	44	5GHz	865	865
8	272	403	-62	GW	165	6GHz	2882	3458
9	261	587	-45	Leaf	165	6GHz	4803	4803
10	684	1040	-50	GW	44	5GHz	1729	1922

11	177	248	-70	Leaf	157	5GHz	272	432
12	232	313	-68	Leaf	157	5GHz	432	576
13	1080	1420	-27	GW	44	5GHz	2402	2402
14	1960	2430	-50	GW	165	6GHz	3843	4803
15	785	990	-47	GW	44	5GHz	1729	1922
16	962	911	-62	GW	44	5GHz	1441	1297
17	140	82.9	-73	GW	44	5GHz	368	288
18	251	465	-62	Leaf	157	5GHz	432	721
19	461	589	-56	Leaf	157	5GHz	721	865
20	418	623	-48	Leaf	157	5GHz	961	1081

Observations for Coverage Test:

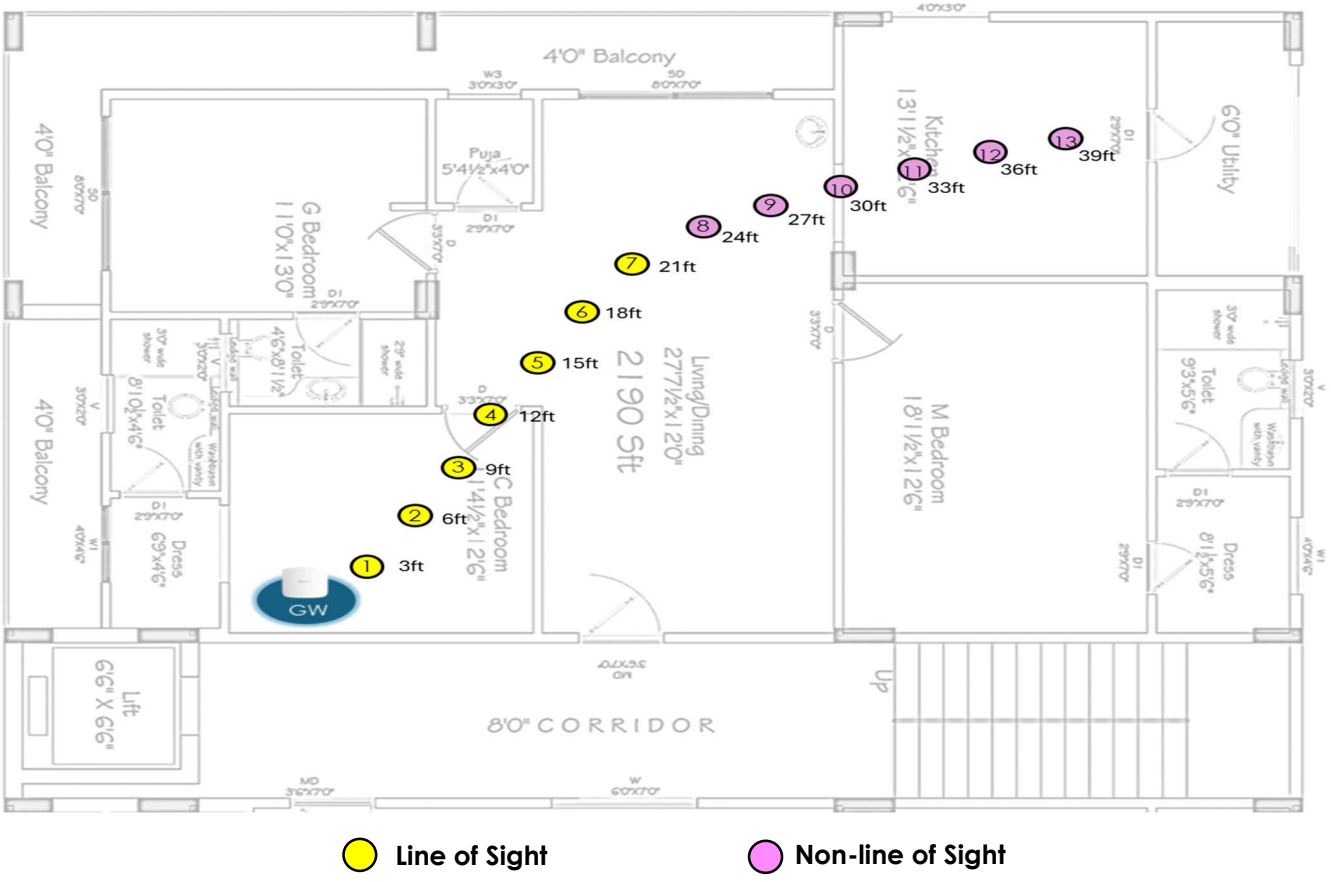
- Mesh nodes are providing good coverage as there were no dead zones in the 2500 sq ft floor.
- Observed less throughput at coordinates 4 and 5.
- Obtained the highest throughput at coordinate 14 near GW.

7.2 Rate Versus Range (RvR):

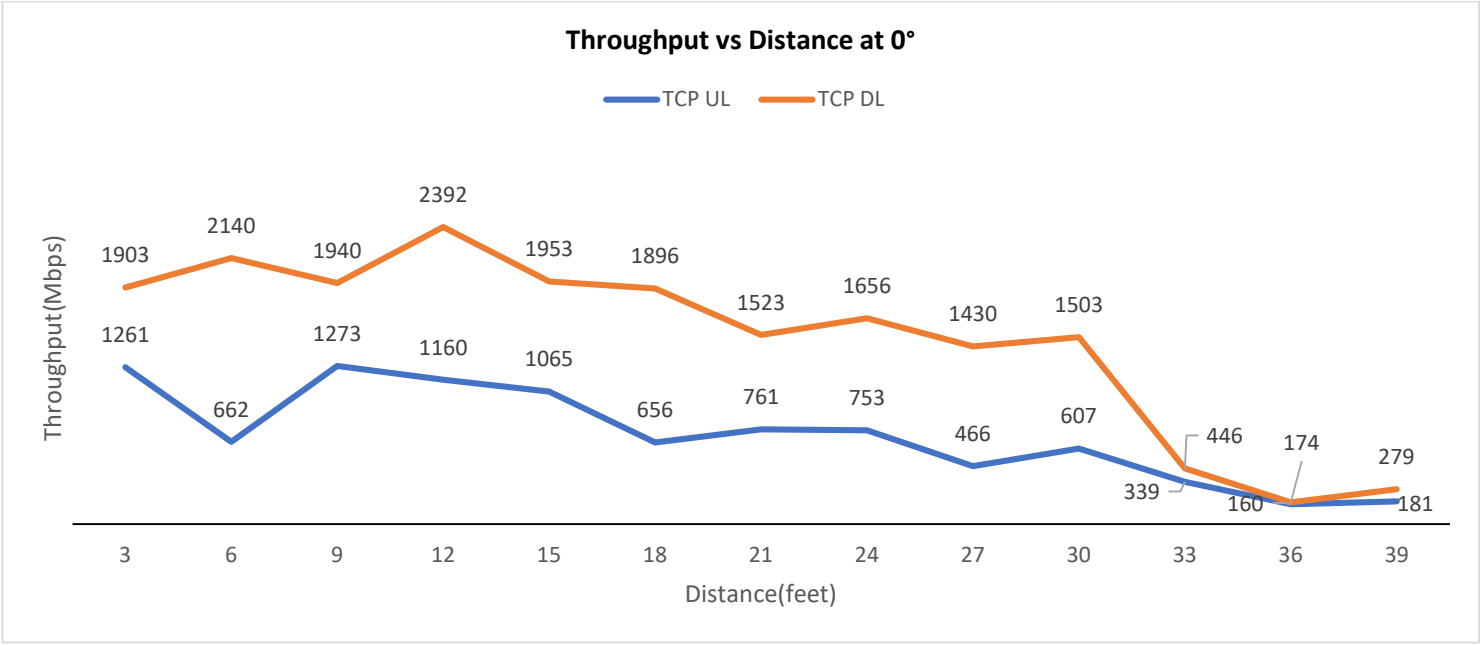
Test Description:

- Place the client at 3 ft from the AP in LOS conditions.
- Measure RSSI and perform TCP throughput tests at 3-ft incremental distances until the signal drops below a usable threshold.
- Repeat the same test in NLOS conditions (e.g., through walls/obstructions).
- Record distance, RSSI, and throughput for each point.

Coordinates Position:



Test Results:



Position	Distance (ft)	Connected Band(GHZ)	Channel	RSSI (dBm)	PHY Rate (Mbps)	TCP UL (Mbps)	PHY Rate (Mbps)	TCP DL (Mbps)	Line-of-Sight (LoS)
1	3	6	165	-43	5188	1261	5764	1903	Yes
2	6	6	165	-46	4803	662	5188	2140	Yes
3	9	6	165	-52	3843	1273	4803	1940	Yes
4	12	6	165	-54	3843	1160	4803	2392	Yes
5	15	6	165	-55	3843	1065	4323	1953	yes
6	18	6	165	-55	3458	656	4323	1896	yes
7	21	6	165	-59	2882	761	3843	1523	yes
8	24	6	165	-65	1729	753	3458	1656	no
9	27	6 (Band Toggling)	165	-68	1297	466	2882	1430	no
10	30	6	165	-62	1729	607	2882	1503	no
11	33	5	157	-57	721	339	961	446	no
12	36	5	157	-65	288	160	576	174	no
13	39	5	157	-68	432	181	576	279	no

Observations for RvR Test:

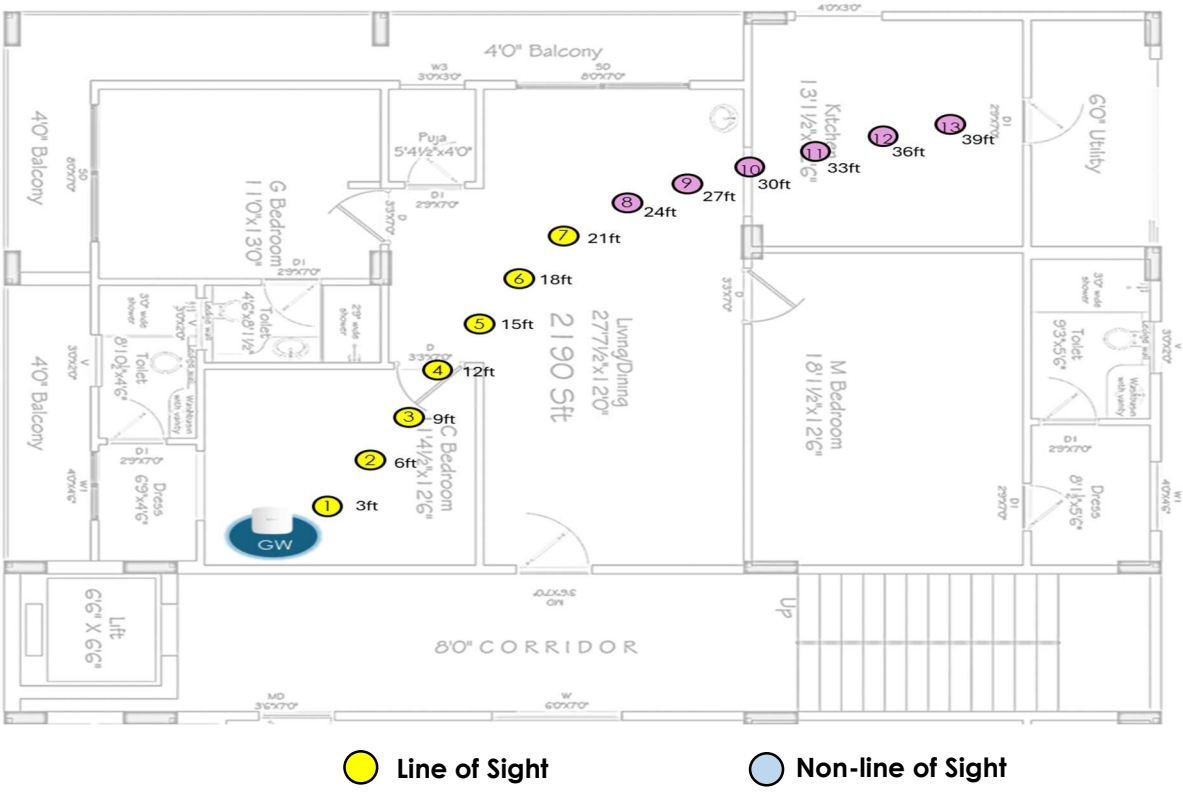
- In LoS, better throughputs were observed compared to non-LoS.
- In TCP DL, throughputs decreased with the increase in distance except at 12ft and 30ft distances.
- Till 30ft distance TCP DL is > 1Gbps.
- At 27 ft distance observed the client is toggling between 6GHz and 5GHz bands.
- With the increase in distance, the client steered from 6GHz to 5GHz as expected.

7.3 Rate Versus Range Versus Orientation (RvRvO):

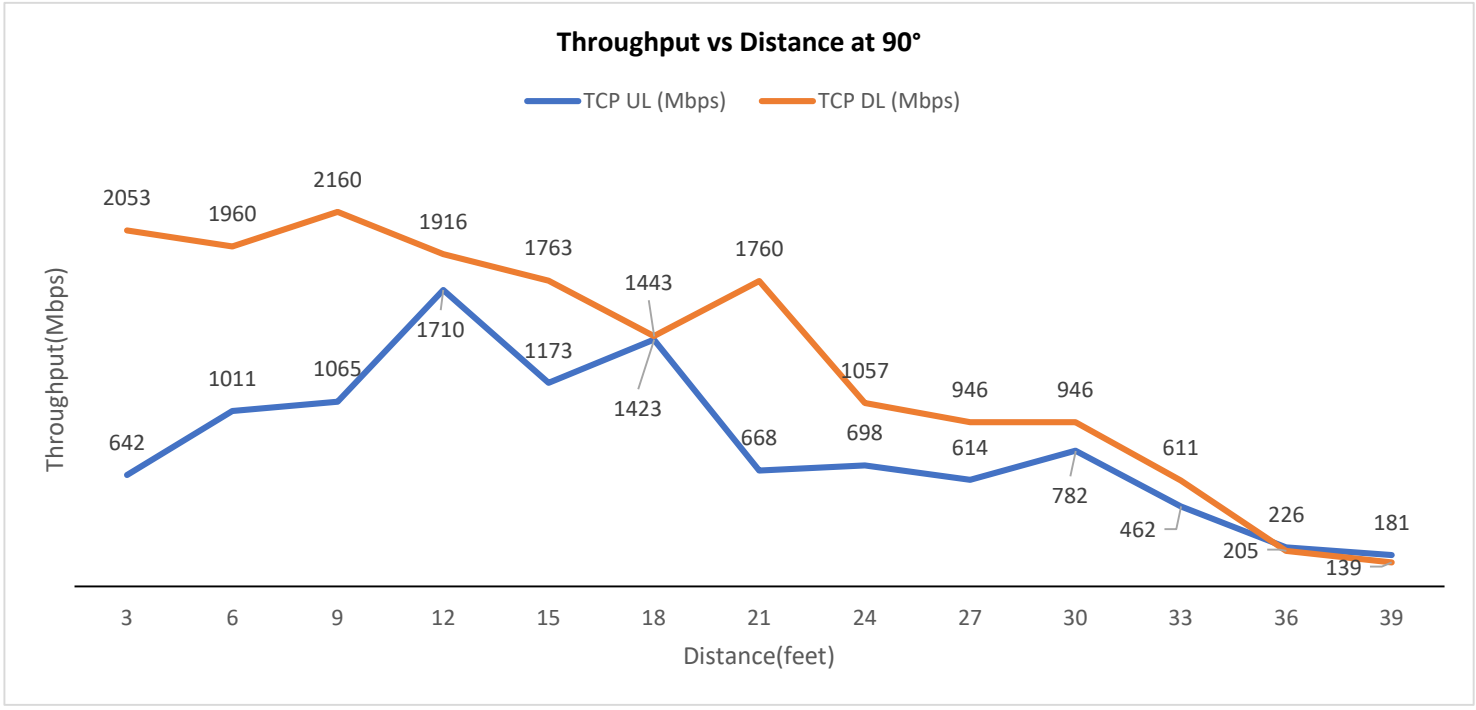
Test Description:

- Repeat the LOS and NLOS RvR test with AP rotated at 90°, 180°, and 270°.
- At each orientation, record distance, RSSI, and throughput for every test point.
- Compare orientation results to determine the impact on performance.

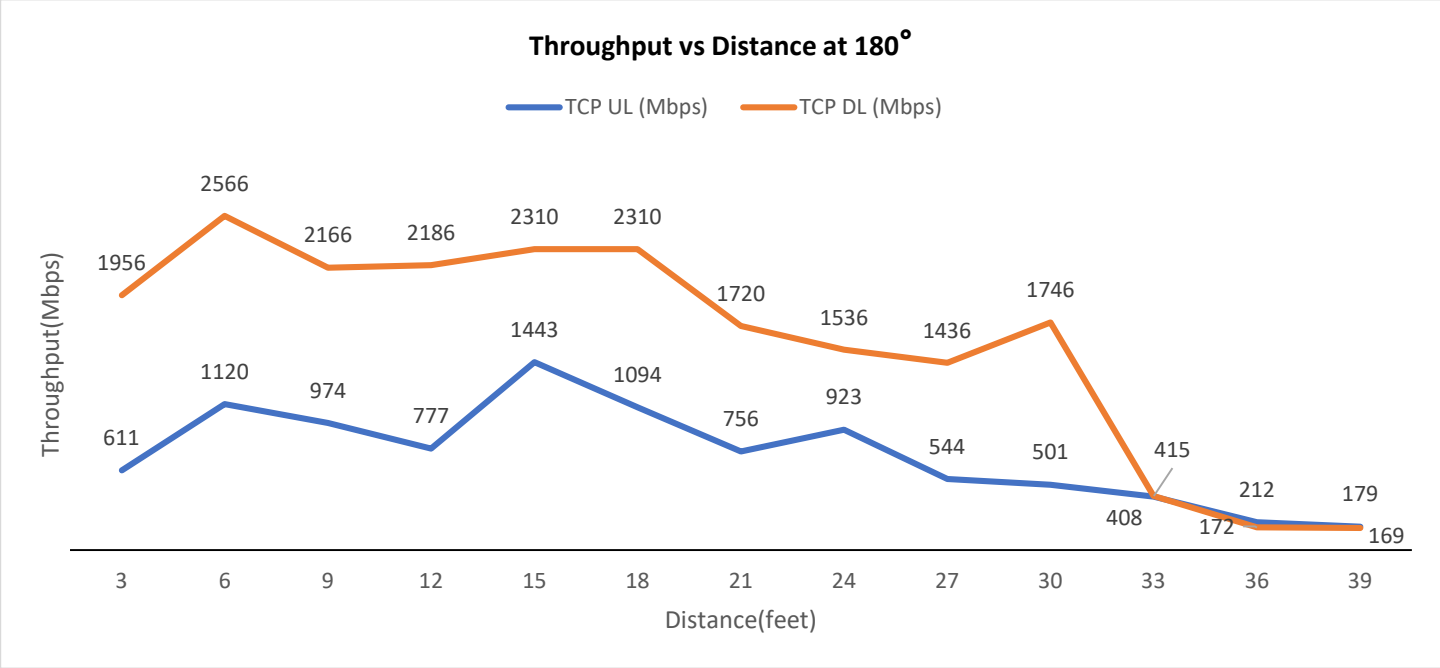
Coordinates Position:



Test Results:

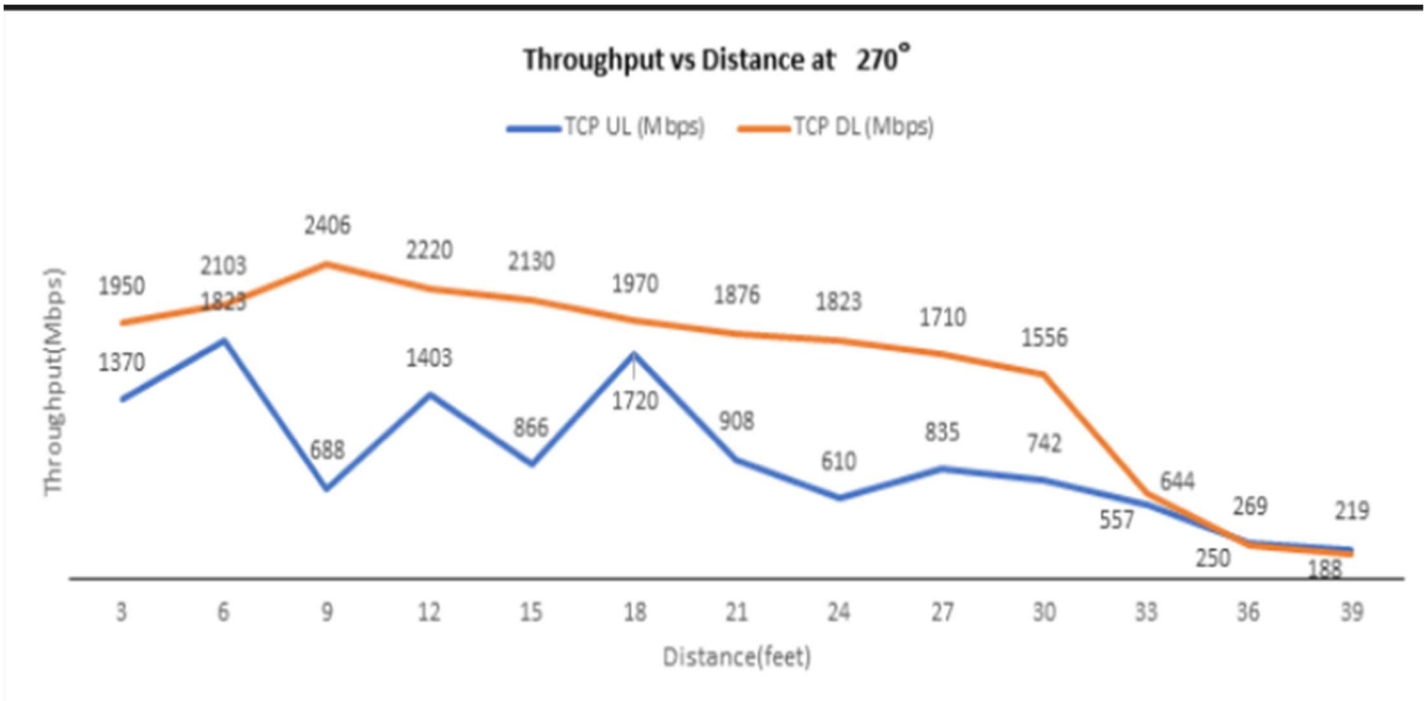


Position	Distance (ft)	Connected Band (GHZ)	Channel	RSSI (dBm)	PHY Rate (Mbps)	TCP UL (Mbps)	PHY Rate (Mbps)	TCP DL (Mbps)	Line-of-Sight (LoS)
1	3	6	101	-42	5188	642	5188	2053	Yes
2	6	6	101	-45	4803	1011	5188	1960	Yes
3	9	6	101	-48	4323	1065	4803	2160	Yes
4	12	6	101	-52	3843	1710	4803	1916	Yes
5	15	6	101	-55	2882	1173	4323	1763	yes
6	18	6	101	-57	2882	1423	3843	1443	yes
7	21	6	101	-58	2882	668	3843	1760	yes
8	24	5 (Band Toggling)	44	-46	2042	698	1922	1057	no
9	27	5	44	-50	1922	614	1922	946	no
10	30	5	44	-51	1922	782	1922	946	no
11	33	5	44	-59	1153	462	1153	611	no
12	36	5	44	-72	432	226	432	205	no
13	39	5	44	-67	432	181	288	139	no



Position	Distance (ft)	Connected Band (GHZ)	Channel	RSSI (dBm)	PHY Rate (Mbps)	TCP UL (Mbps)	PHY Rate (Mbps)	TCP DL (Mbps)	Line-of-Sight (LoS)
1	3	6	101	-42	5188	611	5188	1956	Yes
2	6	6	101	-45	4803	1120	5188	2566	Yes
3	9	6	101	-49	4803	974	5188	2166	Yes
4	12	6	101	-53	4323	777	4803	2186	Yes
5	15	6	101	-55	3843	1443	4803	2310	yes
6	18	6	101	-57	3843	1094	4803	2310	yes
7	21	6	101	-58	3458	756	4323	1720	yes
8	24	6	101	-64	1729	923	3458	1536	no
9	27	6	101	-63	2305	544	3458	1436	no
10	30	6 (Band Toggling)	101	-64	2305	501	3458	1746	no

11	33	5	44	-59	865	408	865	415	no
12	36	5	44	-75	432	212	544	172	no
13	39	5	44	-70	432	179	432	169	no



Position	Distance (ft)	Connected Band (GHZ)	Channel	RSSI (dBm)	PHY Rate (Mbps)	TCP UL (Mbps)	PHY Rate (Mbps)	TCP DL (Mbps)	Line-of-Sight (LoS)
1	3	6	101	-40	5188	1370	5188	1950	yes
2	6	6	101	-43	4803	1823	5188	2103	yes
3	9	6	101	-47	4803	688	5188	2406	yes
4	12	6	101	-50	3843	1403	4803	2220	yes
5	15	6	101	-54	3843	866	4803	2130	yes
6	18	6	101	-55	3843	1720	4803	1970	yes
7	21	6	101	-57	3458	908	4323	1876	yes
8	24	6	101	-61	2882	610	3843	1823	no
9	27	6	101	-63	2305	835	3458	1710	no
10	30	6	101	-63	2305	742	3458	1556	no
11	33	5	44	-59	1153	557	1297	644	no
12	36	5	44	-66	576	269	576	250	no
13	39	5	44	-70	432	219	432	188	no

Observations for RvRvO Test:

- In LoS, better throughputs were observed compared to non-LoS.
- At 90° orientation, the client steered down to 5 GHz from 24 ft, however in other orientations client steered from 33ft distance.
- Across all orientations, a slight peak in TCP UL throughput was observed at some test points.