

Networks in a Box

Candela
TECHNOLOGIES

Objective

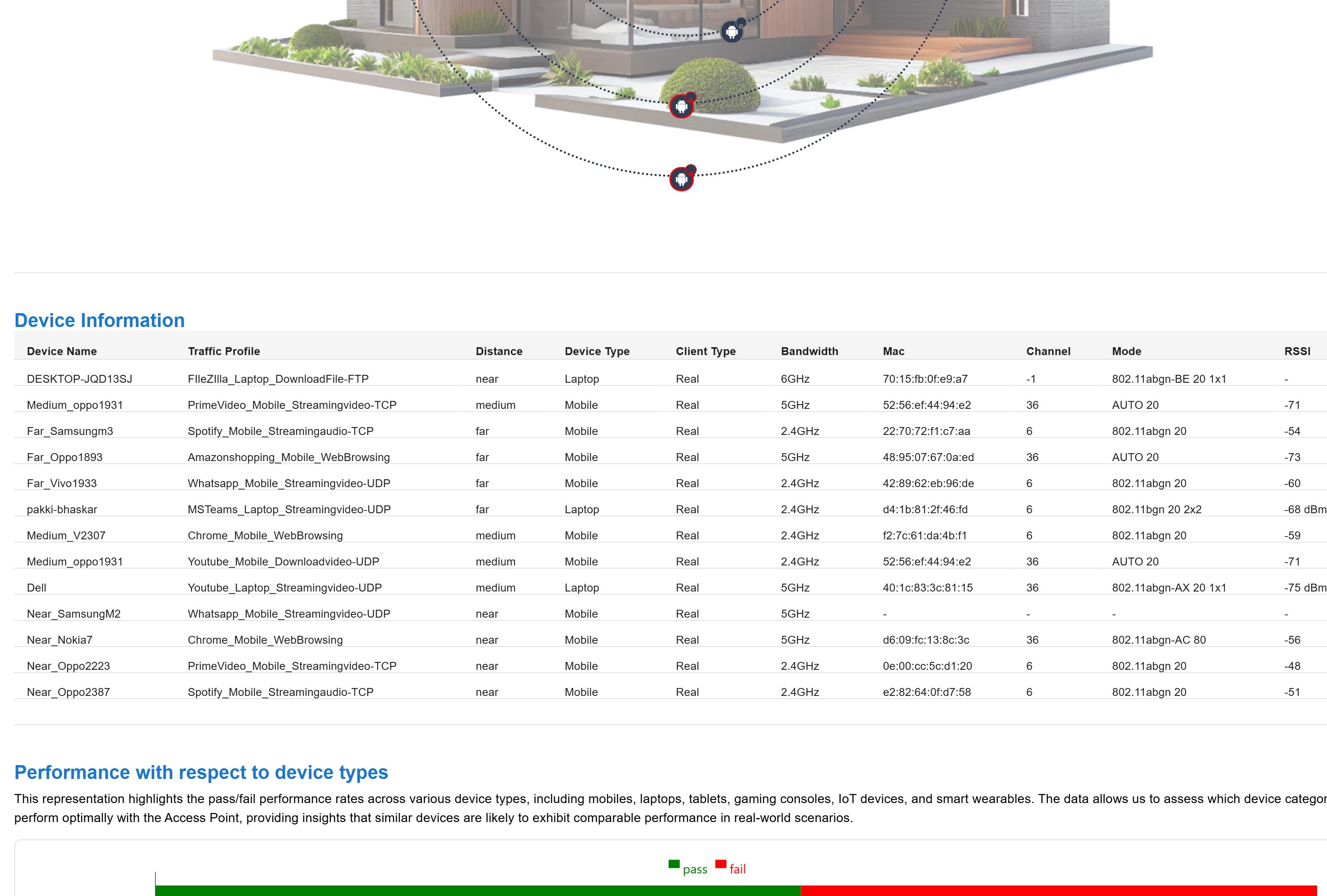
The objective of this test is to evaluate the performance and operational capabilities of access points in various real-world environments, including home, office, hospital, and stadium settings, using Candela's Networks in a Box solution. The test will involve emulating virtual devices and using real devices at different distances (near, medium, and far) and applying predefined traffic profiles to simulate activities such as video streaming, online gaming, browsing, file downloads, and application video streams (YouTube, Netflix, Zoom, etc.). Additionally, the performance of IoT devices connected to Alexa will be assessed. The aim is to identify key performance metrics and potential issues related to AP capacity, coverage, QoS, and device handling under typical usage scenarios.

DUT Configuration

Test Network	Home in a Box
Name of the Test Scenario	Small Home
Test Duration (minutes)	300
No. of Devices in test	13
2GHz SSID	TPLINK_2G
2GHz BSSID	78:8c:b5:48:d3:86
2GHz Security	WPA2
5GHz SSID	TPLINK_5G
5GHz BSSID	78:8c:b5:48:d3:87
5GHz Security	WPA2
6GHz SSID	TPLINK_6G
6GHz BSSID	5e:8c:B5:47:D3:88
6GHz Security	WPA3

Client Distributions and Pass/Fail Analysis

The distribution of clients across various distances—near, medium, and far can be seen in the below image. Each client's pass/fail status was determined based on SLA criteria, with green indicating pass and red indicating fail. This representation provides a clear summary of the test outcomes across various client distances.

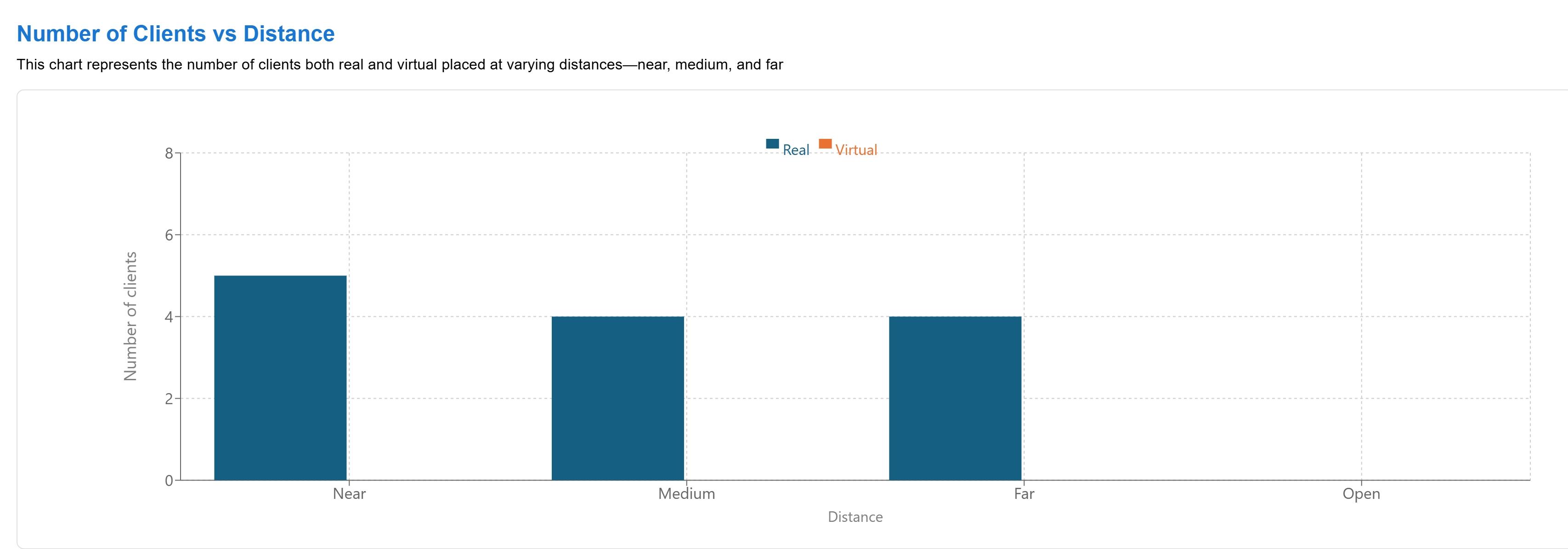


Device Information

Device Name	Traffic Profile	Distance	Device Type	Client Type	Bandwidth	Mac	Channel	Mode	RSSI
DESKTOP-JQD13SJ	FileZilla_Laptop_Downloadfile-FTP	near	Laptop	Real	6GHz	70:15:fb:0f:e9:a7	-1	802.11abgn-BE 20 1x1	-
Medium_oppo1931	PrimeVideo_Mobile_Streamingvideo-TCP	medium	Mobile	Real	5GHz	52:56:ef:44:94:e2	36	AUTO 20	-71
Far_Samsungm3	Spotify_Mobile_Streamingaudio-TCP	far	Mobile	Real	2.4GHz	22:70:27:11:c7:aa	6	802.11abgn 20	-54
Far_Oppo1893	Amazonshopping_Mobile_WebBrowsing	far	Mobile	Real	5GHz	48:95:07:67:0:aed	36	AUTO 20	-73
Far_Vivo1933	Whatsapp_Mobile_Streamingvideo-UDP	far	Mobile	Real	2.4GHz	42:89:62:eb:96:de	6	802.11abgn 20	-60
pakki-bhaskar	MSTeams_Laptop_Streamingvideo-UDP	far	Laptop	Real	2.4GHz	d4:1b:81:2f:46:fd	6	802.11bgn 20x2	-68 dBm
Medium_V2307	Chrome_Mobile_WebBrowsing	medium	Mobile	Real	2.4GHz	f2:7c:61:da:4b:f1	6	802.11abgn 20	-59
Medium_oppo1931	Youtube_Mobile_Downloadvideo-UDP	medium	Mobile	Real	2.4GHz	52:56:ef:44:94:e2	36	AUTO 20	-71
Dell	Youtube_Laptop_Streamingvideo-UDP	medium	Laptop	Real	5GHz	40:1c:83:3c:81:15	36	802.11abgn-AX 20 1x1	-75 dBm
Near_SamsungM2	Whatsapp_Mobile_Streamingvideo-UDP	near	Mobile	Real	5GHz	-	-	-	-
Near_Nokia7	Chrome_Mobile_WebBrowsing	near	Mobile	Real	5GHz	d6:09:fc:13:8c:3c	36	802.11abgn-AC 80	-56
Near_Oppo2223	PrimeVideo_Mobile_Streamingvideo-TCP	near	Mobile	Real	2.4GHz	0e:00:c5:c1:20:0	6	802.11abgn 20	-48
Near_Oppo2387	Spotify_Mobile_Streamingaudio-TCP	near	Mobile	Real	2.4GHz	e2:82:64:07:d7:58	6	802.11abgn 20	-51

Performance with respect to device types

This representation highlights the pass/fail performance rates across various device types, including mobiles, laptops, tablets, gaming consoles, IoT devices, and smart wearables. The data allows us to assess which device categories perform optimally with the Access Point, providing insights that similar devices are likely to exhibit comparable performance in real-world scenarios.



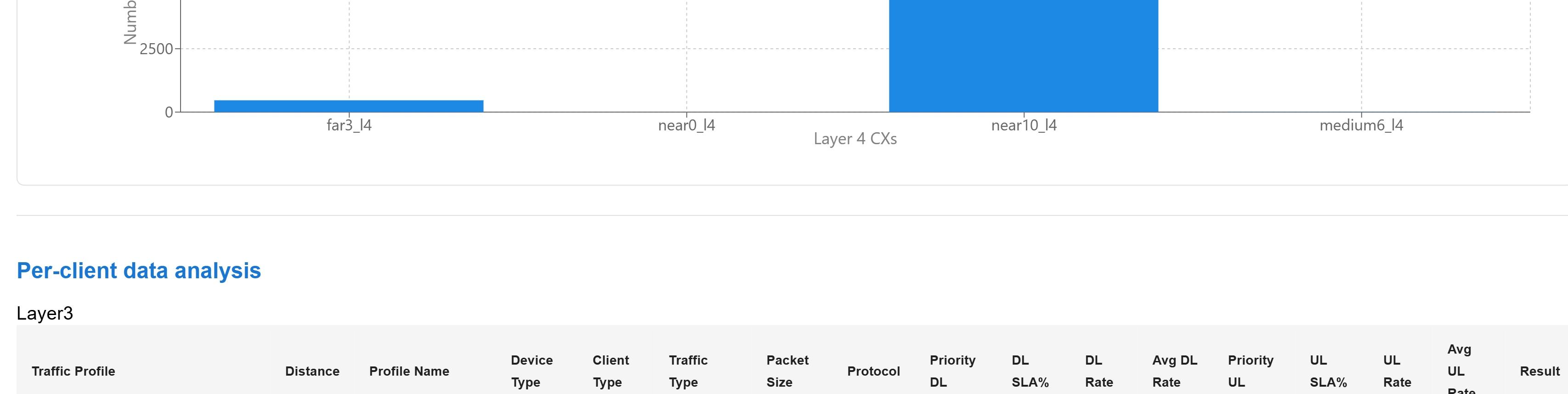
Performance with respect to traffic types

This representation presents the pass/fail performance rates across different traffic types, including video conferencing, audio/video streaming, gaming, and IoT applications. By examining these results, we can determine which traffic types perform better with the Access Point and infer that similar traffic can be effectively deployed in real-world scenarios.



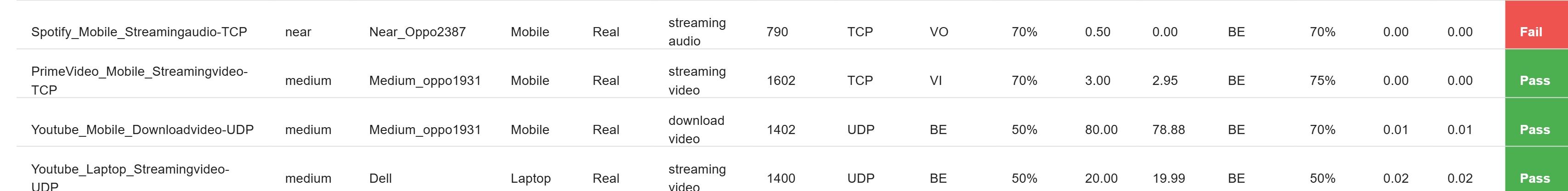
Number of Clients vs Distance

This chart represents the number of clients both real and virtual placed at varying distances—near, medium, and far.



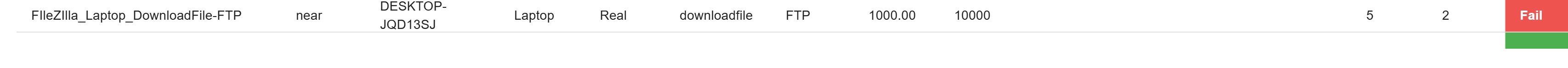
Realtime Graph of Layer-3 activity

This chart represents the complete aggregate real-time performance of all the clients that are doing layer-3 activity.



Realtime Graph of Layer-4 activity

This chart represents the complete aggregate real-time performance of all the clients that are doing layer-4 activity.



Per-client data analysis

Layer3

Traffic Profile	Distance	Profile Name	Device Type	Client Type	Traffic Type	Packet Size	Protocol	Priority	DL SLA%	DL Rate	Avg DL Rate	Priority	UL SLA%	UL Rate	Avg UL Rate	Result
Spotify_Mobile_Streamingaudio-TCP	far	Far_Samsungm3	Mobile	Real	streaming audio	790	TCP	VO	70%	0.50	0.33	BE	70%	0.00	0.00	Fail
Whatsapp_Mobile_Streamingvideo-UDP	far	Far_Vivo1933	Mobile	Real	streaming video	110	UDP	VO	70%	1.50	1.42	BE	70%	0.00	0.00	Pass
MSTeams_Laptop_Streamingvideo-UDP	far	pakki-bhaskar	Laptop	Real	streaming video	1600	UDP	BE	50%	5.00	3.32	BE	50%	5.00	0.09	Fail
PrimeVideo_Mobile_Streamingvideo-TCP	near	Near_Oppo2223	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	2.68	BE	75%	0.00	0.00	Pass
Spotify_Mobile_Streamingaudio-TCP	near	Near_Oppo2387	Mobile	Real	streaming audio	790	TCP	VO	70%	0.50	0.00	BE	70%	0.00	0.00	Fail
PrimeVideo_Mobile_Streamingvideo-TCP	medium	Medium_oppo1931	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	2.95	BE	75%	0.00	0.00	Pass
Youtube_Mobile_Downloadvideo-UDP	medium	Medium_oppo1931	Mobile	Real	download video	1402	UDP	BE	50%	80.00	78.88	BE	70%	0.01	0.01	Pass
Youtube_Laptop_Streamingvideo-UDP	medium	Dell	Laptop	Real	streaming video	1400	UDP	BE	50%	20.00	19.99	BE	50%	0.02	0.02	Pass

Layer4-7

Traffic Profile	Distance	Profile Name	Device Type	Client Type	Traffic Type	Protocol	Max Speed	File Size/URL	SLA URLs	Total URLs	Result
Amazonshopping_Mobile_WebBrowsing	far	Far_Oppo1893	Mobile	Real	webbrowsing	HTTPS	0.50	https://www.amazon.in/Samsung-Fully-Automatic-Ecobubble-WA80BG4545BYTL-technology/dp/B0B7JZGR1	5	466	Fail
FileZilla_Laptop_Downloadfile-FTP	near	DESKTOP-JQD13SJ	Laptop	Real	downloadfile	FTP	1000.00	10000	5	2	Fail

Layer3

Traffic Profile	Distance	Profile Name	Device Type	Client Type	Traffic Type	Packet Size	Protocol	Priority	DL SLA%	DL Rate	Avg DL Rate	Priority	UL SLA%	UL Rate	Avg UL Rate	Result
Spotify_Mobile_Streamingaudio-TCP	far	Far_Samsungm3	Mobile	Real	streaming audio	790	TCP	VO	70%	0.50	0.33	BE	70%	0.00	0.00	Fail
Whatsapp_Mobile_Streamingvideo-UDP	far	Far_Vivo1933	Mobile	Real	streaming video	110	UDP	VO	70%	1.50	1.42	BE	70%	0.00	0.00	Pass
MSTeams_Laptop_Streamingvideo-UDP	far	pakki-bhaskar	Laptop	Real	streaming video	1600	UDP	BE	50%	5.00	3.32	BE	50%	5.00	0.09	Fail
PrimeVideo_Mobile_Streamingvideo-TCP	near	Near_Oppo2223	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	2.68	BE	75%	0.00	0.00	Pass
Spotify_Mobile_Streamingaudio-TCP	near	Near_Oppo2387	Mobile	Real	streaming audio	790	TCP	VO	70%	0.50	0.00	BE	70%	0.00	0.00	Fail
PrimeVideo_Mobile_Streamingvideo-TCP	medium	Medium_oppo1931	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	2.95	BE	75%	0.00	0.00	Pass
Youtube_Mobile_Downloadvideo-UDP	medium	Medium_oppo1931	Mobile	Real	download video	1402	UDP	BE	50%	80.00	78.88	BE	70%	0.01	0.01	Pass
Youtube_Laptop_Streamingvideo-UDP	medium	Dell	Laptop	Real	streaming video	1400	UDP	BE	50%	20.00	19.99	BE	50%	0.02	0.02	Pass

Layer4-7

Chrome_Mobile_WebBrowsing	near	Near_Nokia7	Mobile	Real	webbrowsing	HTTPS	1000.00	https://www.google.com	5	9060	Pass
Chrome_Mobile_WebBrowsing	medium	Medium_V2307	Mobile	Real	webbrowsing	HTTPS	1000.00	https://www.google.com	5	12	Fail