

Networks in a Box



Objective

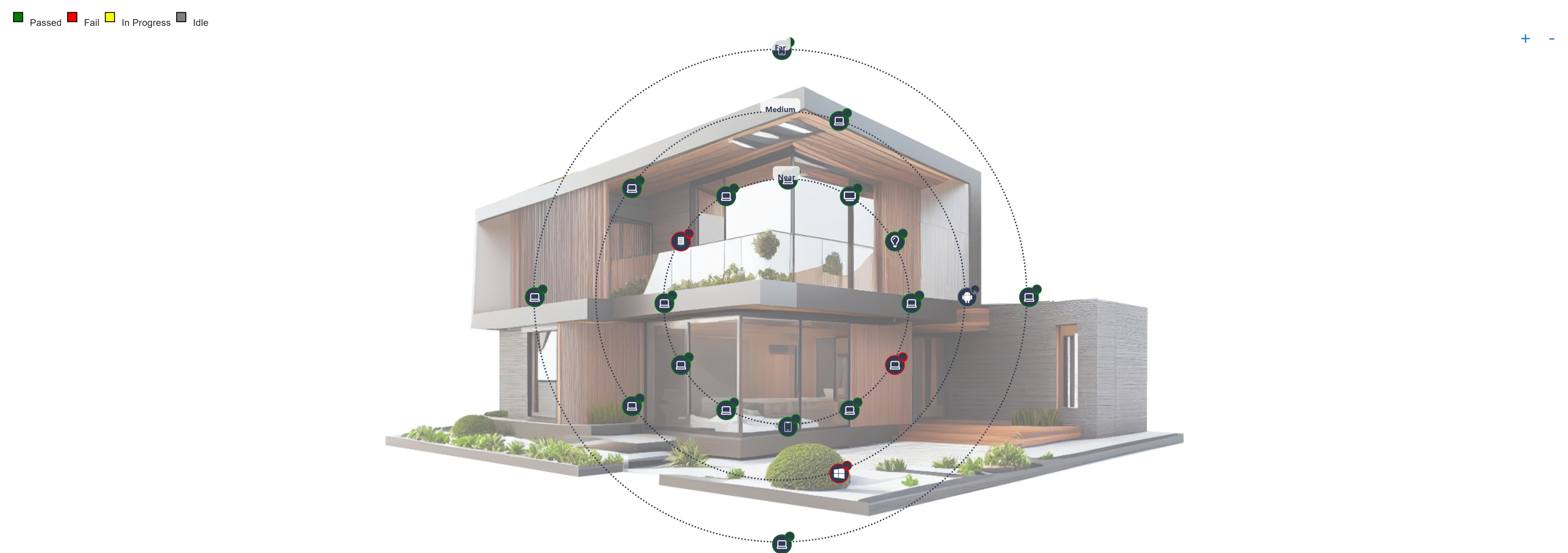
The objective of this test is to evaluate the performance and operational capabilities of access points in various real-world environments, including home, office, hospital, and stadium settings, using Candela's Networks in a Box solution. The test will involve emulating virtual devices and using real 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	Office in a Box
Name of the Test Scenario	Small Office
Test Duration (minutes)	10
No. of Devices in test	21
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	5e8c:b5:48: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.

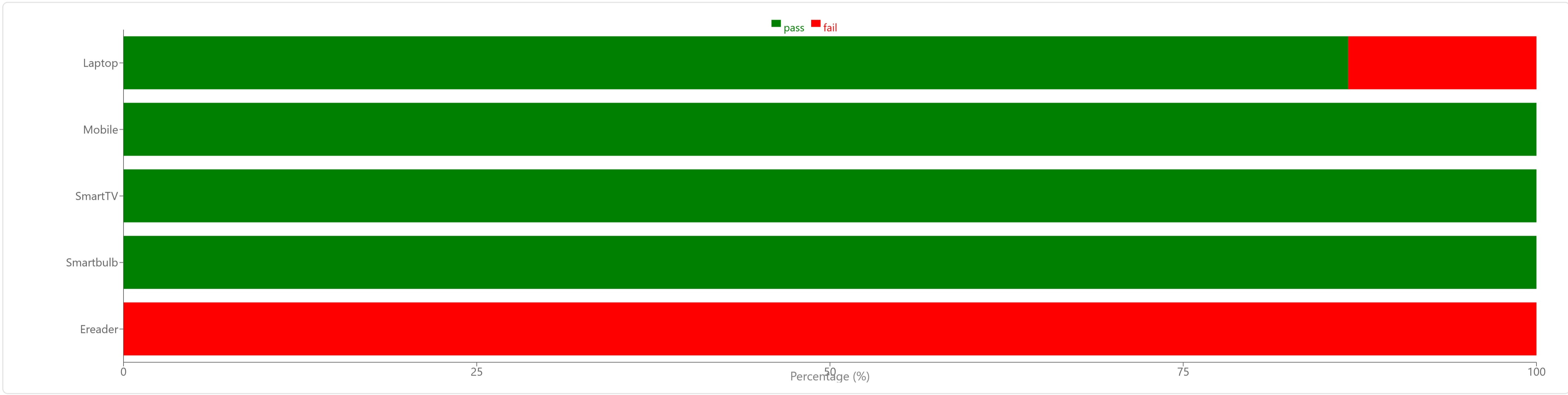


Device Information

Device Name	Traffic Profile	Distance	Device Type	Client Type	Bandwidth	Mac	Channel	Mode	RSSI
Medium_Samsung3	Chrome_Mobile_WebBrowsing	medium	Mobile	Real	5GHz	-	-	-	-
Dell	Alexa_AmazonEchoDot_Streamingaudio-TCP	medium	Laptop	Real	5GHz	40:1c:83:3c:81:15	36	802.11abgn-AX 20 1x1	-83 dBm
HP Pavilion	FileServer_BackupSync	far	Laptop	Virtual	2.4GHz	84:3e:1d:26:ba:a0	6	802.11bgn 20 2x2	-46 dBm
Dell XPS 13	VideoConf_Zoom	near	Laptop	Virtual	5GHz	38:f8:f6:95:3e:ba	36	802.11an-AX 80 4x4	-35 dBm
MacBook Pro Retina	Laptop_FileTransfer	near	Laptop	Virtual	5GHz	38:f8:f6:2c:3d:ba	36	802.11an-AC 80 4x4	-33 dBm
Lenovo	Intern_Browsing_Lite	near	Laptop	Virtual	2.4GHz	38:f8:f6:11:ca:b4	6	802.11bgn 40 4x4	-16 dBm
iPhone 13	Sales_WhatsApp_Calls	near	Mobile	Virtual	5GHz	38:f8:f6:13:12:ba	36	802.11an-AC 80 4x4	-33 dBm
Dell Latitude 3420	QA_Automation_ScriptUpload	near	Laptop	Virtual	5GHz	38:f8:f6:29:bd:ba	36	802.11an-AX 80 4x4	-34 dBm
ThinkPad T14	Finance_SecureBanking	near	Laptop	Virtual	2.4GHz	38:f8:f6:04:84:b4	6	802.11bgn 40 4x4	-16 dBm
Surface Pro	Teams_Laptop_VideoStreaming	near	Laptop	Virtual	5GHz	38:f8:f6:a7:f6:ba	36	802.11an-AX 80 4x4	-35 dBm
Kindle	Kindle_WebBrowsing	near	Ereader	Virtual	2.4GHz	38:f8:f6:a3:c1:b4	6	802.11bgn 40 4x4	-20 dBm
HP ProBook	IT_Admin_RDP_Connection	near	Laptop	Virtual	5GHz	38:f8:f6:cb:ba:ba	36	802.11an-AX 80 4x4	-35 dBm
Dell Inspiron 5518	ContentEditor_VimeoUpload	near	Laptop	Virtual	5GHz	38:f8:f6:17:22:ba	36	802.11an-AC 80 4x4	-33 dBm
Samsung QLED	SmartTV_Office	near	SmartTV	Virtual	5GHz	38:f8:f6:84:13:ba	36	802.11an-AC 80 4x4	-33 dBm
Wipro Bulb	SmartBulb_IOT_Controls1	near	Smartbulb	Virtual	2.4GHz	38:f8:f6:11:34:b4	6	802.11bgn 20 4x4	-23 dBm
Lenovo Flex 5	Intern_Browsing_Lite	medium	Laptop	Virtual	2.4GHz	84:3e:1d:75:d1:74	6	802.11bgn 20 2x2	-39 dBm
HP Pavilion	Legal_DocAccess_PDFViewer	medium	Laptop	Virtual	2.4GHz	84:3e:1d:f6:34:74	6	802.11bgn 20 2x2	-39 dBm
ThinkPad T14	Support_Tickets_ZohoCRM	medium	Laptop	Virtual	2.4GHz	84:3e:1d:0d:28:74	6	802.11bgn 40 2x2	-40 dBm
MacBook Pro M1	GitHub_Commits	far	Laptop	Virtual	5GHz	84:3e:1d:92:c0:9a	36	802.11an-AX 80 2x2	-60 dBm
HP Elitebook	Web_Access	far	Laptop	Virtual	5GHz	84:3e:1d:a2:1f:9a	36	802.11an-AC 80 2x2	-61 dBm
Moto G Stylus	GuestPhone_Browsing	far	Mobile	Virtual	2.4GHz	84:3e:1d:f6:0d:a0	6	802.11bgn 20 2x2	-46 dBm

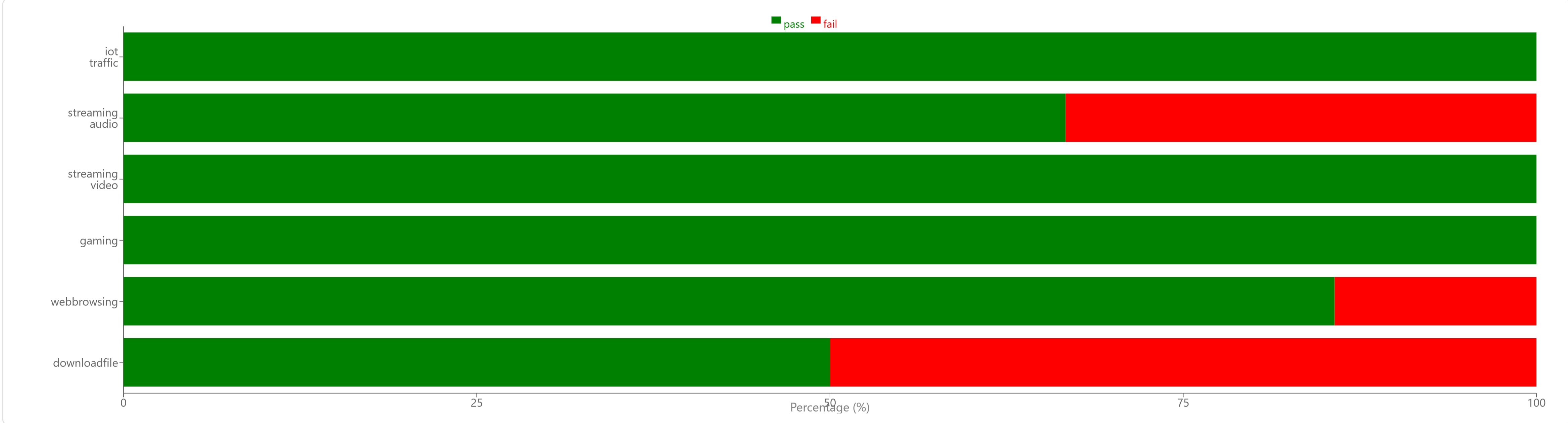
Performance with respect to device types

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.



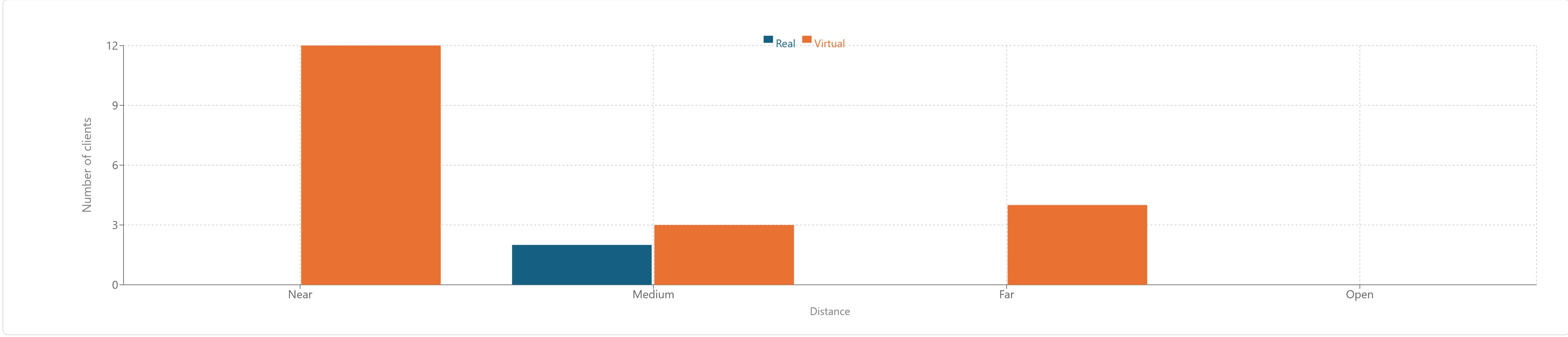
Performance with respect to traffic types

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.



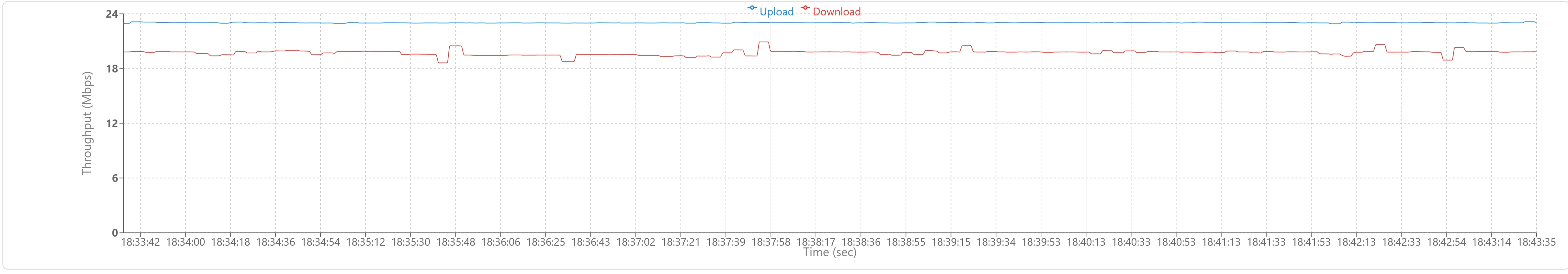
Number of Clients vs Distance

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



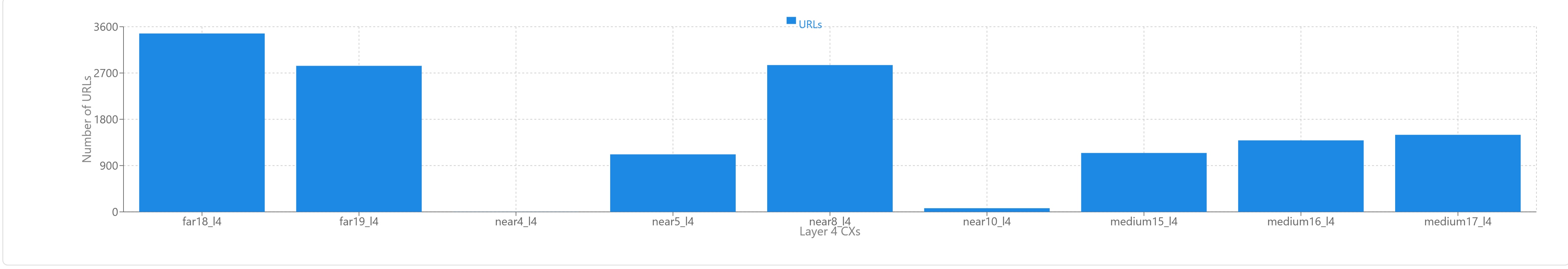
Realtime Graph of Layer-3 activity

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	DL SLA%	DL Rate	Avg DL Rate	Priority UL	UL SLA%	UL Rate	Avg UL Rate	Result
FileServer_BackupSync	far	HP Pavilion	Laptop	Virtual	IoT traffic	1500	TCP	BE	70%	5.00	5.00	BE	70%	5.00	5.00	Pass
GuestPhone_Browsing	far	Moto G Stylus	Mobile	Virtual	streaming audio	800	TCP	BE	70%	0.60	0.60	BE	70%	0.10	0.10	Pass
VideoConf_Zoom	near	Dell XPS 13	Laptop	Virtual	streaming video	1200	UDP	VI	70%	3.00	3.00	VI	70%	3.00	3.00	Pass
Sales_WhatsApp_Calls	near	iPhone 13	Mobile	Virtual	streaming audio	300	UDP	VO	70%	0.20	0.20	VO	70%	0.20	0.20	Pass
QA_Automation_ScriptUpload	near	Dell Latitude 3420	Laptop	Virtual	streaming video	1200	TCP	BE	70%	2.00	2.00	BE	70%	3.00	3.00	Pass
Teams_Laptop_VideoStreaming	near	Surface Pro	Laptop	Virtual	streaming video	1100	UDP	VI	70%	2.50	2.48	VI	70%	2.00	2.00	Pass
IT_Admin_RDP_Connection	near	HP ProBook	Laptop	Virtual	gaming	900	TCP	BE	70%	1.20	1.20	BE	70%	1.20	1.20	Pass
ContentEditor_VimeoUpload	near	Dell Inspiron 5518	Laptop	Virtual	gaming	1500	TCP	BE	70%	2.00	2.00	BE	70%	8.00	8.00	Pass
SmartTV_Office	near	Samsung QLED	SmartTV	Virtual	streaming video	1300	UDP	VI	70%	3.00	2.99	BE	70%	0.50	0.50	Pass
SmartBulb_IOT_Controls1	near	Wipro Bulb	Smartbulb	Virtual	IoT traffic	280	TCP	BE	70%	0.00	0.00	BE	70%	0.00	0.00	Pass
Alexa_AmazonEchoDot_Streamingaudio-TCP	medium	Dell	Laptop	Real	streaming audio	1575	TCP	BE	70%	0.35	0.27	BE	70%	0.03	0.02	Fail

Layer4-7														
Traffic Profile	Distance	Profile Name	Device Type	Client Type	Traffic Type	Protocol	Max Speed	File Size/URL				SLA URLs	Total URLs	Result
GitHub_Commits	far	MacBook Pro M1	Laptop	Virtual	webbrowsing	HTTPS	1.00	https://www.github.com/				80	3468	Pass
Web_Access	far	HP Elitebook	Laptop	Virtual	webbrowsing	HTTPS	1.00	https://www.yahoo.com/				80	2639	Pass
Laptop_FileTransfer	near	MacBook Pro Retina	Laptop	Virtual	downloadfile	HTTPS	3.00	100				80	2	Fail
Intern_Browsing_Lite	near	Lenovo	Laptop	Virtual	webbrowsing	HTTPS	0.50	https://www.amazon.com/				80	1118	Pass
Finance_SecureBanking	near	ThinkPad T14	Laptop	Virtual	webbrowsing	HTTPS	0.60	https://sandbox.paypal.com				80	2854	Pass
Kindle_WebBrowsing	near	Kindle	Ereader	Virtual	webbrowsing	HTTPS	0.12	https://openlibrary.org/works/OL7924103W/The_Eye_of_the_World_%28The_Wheel_of_Time_Book_1%29				80	71	Fail
Intern_Browsing_Lite	medium	Lenovo Flex 5	Laptop	Virtual	webbrowsing	HTTPS	0.50	https://www.amazon.com/				80	1145	Pass

Legal_DocAccess_PDFViewer	medium	HP Pavilion	Laptop	Virtual	webbrowsing	HTTPS	1.00	https://www.docs.google.com/	80	1390	Pass
Support_Tickets_ZohoCRM	medium	ThinkPad T14	Laptop	Virtual	downloadfile	HTTPS	0.80	https://www.zoho.com/	80	1498	Pass