Networks in a Box

Objective

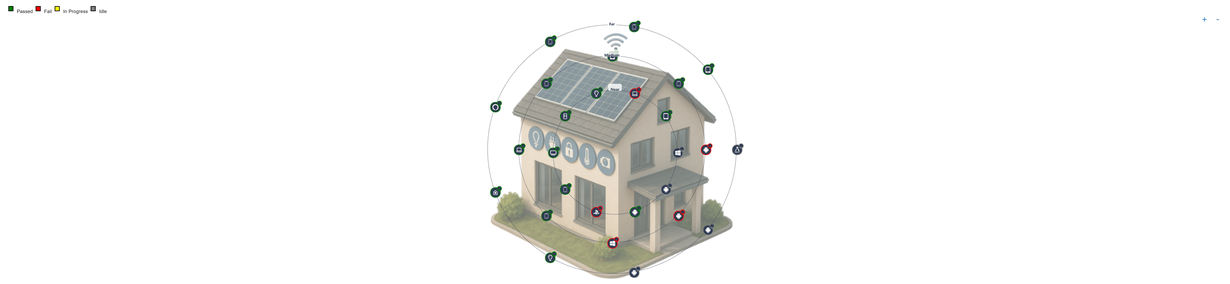
The objective of this test is to evaluate the performance and operational capabilities of access points in various real-world environments, including home, office, hospital, and stadium settings, using Candela's Networks in a Box solution. The test will involve emulating virtual devices and using real 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	Home in a Box
Name of the Test Scenario	Single Storey Home
Test Duration (minutes)	10
No. of Devices in test	27
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	WPA3
6GHz SSID	TPLINK_6G
6GHz BSSID	5e:8c: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.

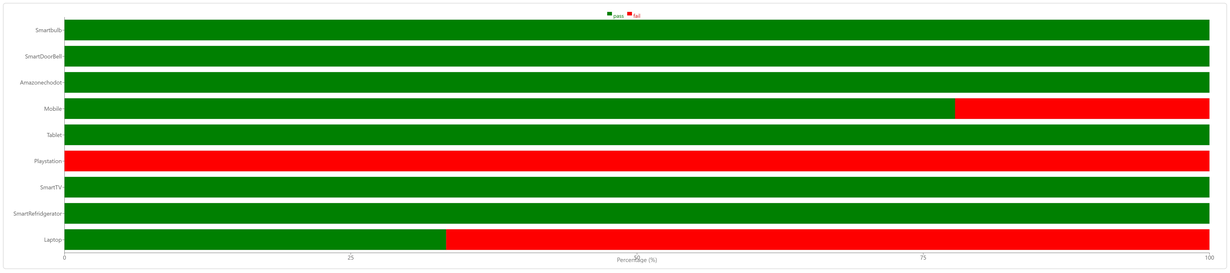


Device Information

Device Name	Traffic Profile	Distance	Device Type	Client Type	Bandwidth	Mac	Channel	Mode	RSSI
pakkirbhaskar	MSTeams_Laptop_Streamingvideo-UDP	far	Laptop	Real	5GHz	-	-	-	-
Fav_Oppo1893	Youtube_Mobile_Downloadvideo-UDP	far	Mobile	Real	5GHz	-	-	-	-
Far_samsung m3	Whatsapp_Mobile_Streamingvideo-UDP	far	Mobile	Real	2.4GHz	-	-	-	-
Medium_2307	Youtube_Mobile_Downloadvideo-UDP	medium	Mobile	Real	5GHz	da:73:74:f0:8c:27	36	802.11abgn-AC 80	-82
Medium_Samsung3	PrimeVideo_Mobile_Streamingvideo-TCP	medium	Mobile	Real	2.4GHz	f2:f6:55:9b:85:59	6	802.11abgn 40	-68
Dell	Youtube_Laptop_Streamingvideo-UDP	medium	Laptop	Real	5GHz	40:1c:83:3c:81:15	36	802.11abgn-AX 20 1x1	-83 dBm
DESKTOP-JQD135J	FileZilla_Laptop_DownloadFile-FTP	near	Laptop	Real	5GHz	-	-	-	-
Near_Samsung_M2	Spotify_Mobile_Streamingaudio-TCP	near	Mobile	Real	5GHz	-	-	-	-
Near_oppo5335	PrimeVideo_Mobile_Streamingvideo-TCP	near	Mobile	Real	2.4GHz	e2:82:64:0f:c7:58	6	802.11abgn 40	-40
IPhone 13	Chrome_Mobile_WebBrowsing	medium	Mobile	Virtual	5GHz	84:3e:1d:4e:38:d0	36	802.11an-AC 80 2x2	-53 dBm
PS5	Gaming_Playstation_Streamingvideo-UDP	near	Playstation	Virtual	5GHz	38:f8:f6:41:c6:ba	36	802.11an-AX 80 4x4	-35 dBm
IPhoneX	Spotify_Mobile_Streamingaudio-TCP	near	Mobile	Virtual	5GHz	38:f8:f6:a8:59:ba	36	802.11an-AC 80 4x4	-32 dBm
LG	Netflix_SmartTV_Streamingvideo-TCP	near	SmartTV	Virtual	2.4GHz	38:f8:f6:32:9c:b4	6	802.11bgn 40 4x4	-15 dBm
Samsung	SmartRefridgerator_Cloud_Controls	near	SmartRefridgerator	Virtual	2.4GHz	38:f8:f6:9f:d5:b4	6	802.11bgn 20 4x4	-16 dBm
Wipro Bulb	SmartBulb_IOT_Controls1	near	Smartbulb	Virtual	2.4GHz	38:f8:f6:33:66:b4	6	802.11bgn 20 4x4	-22 dBm
MACBook Pro	MSTeams_Laptop_Streamingvideo-UDP	near	Laptop	Virtual	5GHz	38:f8:f6:c7:b7:ba	36	802.11an-AX 80 4x4	-35 dBm
Samsung Tab	Zoom_Tablet_Streamingvideo-UDP	near	Tablet	Virtual	2.4GHz	38:f8:f6:1b:ac:b4	6	802.11bgn 40 4x4	-15 dBm
Lenovo	Zoom_Laptop_Streamingvideo-UDP	medium	Laptop	Virtual	2.4GHz	84:3e:1d:3a:62:74	6	802.11bgn 40 2x2	-60 dBm
Oneplus 10	Youtube_Mobile_Downloadvideo-UDP	medium	Mobile	Virtual	2.4GHz	84:3e:1d:87:27:74	6	802.11bgn 40 2x2	-60 dBm
Samsung Tab	Zoom_Tablet_Streamingvideo-UDP	medium	Tablet	Virtual	2.4GHz	84:3e:1d:50:6e:74	6	802.11bgn 40 2x2	-60 dBm
Xioami 5Pro	Spotify_Mobile_Streamingaudio-TCP	medium	Mobile	Virtual	2.4GHz	84:3e:1d:8d:03:74	6	802.11bgn 40 2x2	-60 dBm
Wipro Bulb	SmartBulb_IOT_Controls1	far	Smartbulb	Virtual	2.4GHz	84:3e:1d:60:61:a0	6	802.11bgn 20 2x2	-65 dBm
Amazon Ring	SmartDoorBell_Streamingvideo-UDP	far	SmartDoorBell	Virtual	2.4GHz	84:3e:1d:4d:bc:a0	6	802.11bgn 20 2x2	-66 dBm
Amazonecho	Alexa_AmazonEchoOut_Streamingaudio-TCP1	far	Amazonechodot	Virtual	5GHz	84:3e:1d:42:a5:9a	36	802.11an-AC 80 2x2	-62 dBm
Samsung523ultra	PrimeVideo_Mobile_Streamingvideo-TCP	far	Mobile	Virtual	5GHz	84:3e:1d:8c:ea:9a	36	802.11an-AX 80 2x2	-61 dBm
Vivo vY24	Whatsapp_Mobile_Streamingvideo-UDP	far	Mobile	Virtual	5GHz	84:3e:1d:b1:4f:9a	36	802.11an-AC 80 2x2	-62 dBm
iPad	Zoom_Tablet_Streamingvideo-UDP	far	Tablet	Virtual	5GHz	84:3e:1d:ae:ce:9a	36	802.11an-AC 80 2x2	-63 dBm

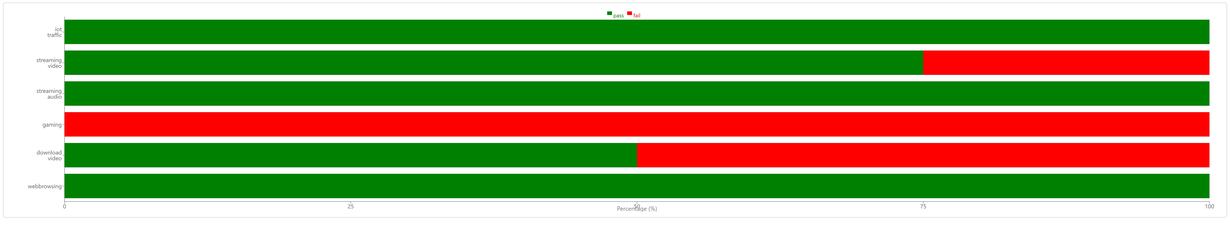
Performance with respect to device types

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.



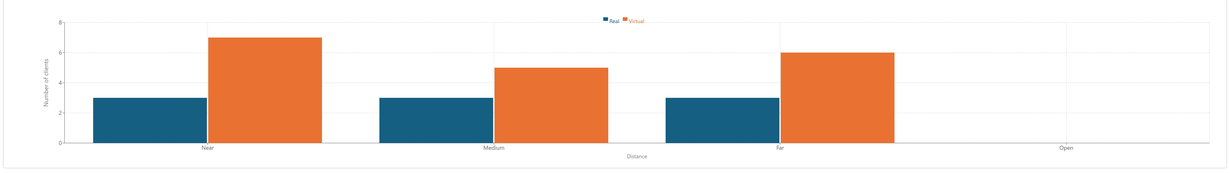
Performance with respect to traffic types

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.



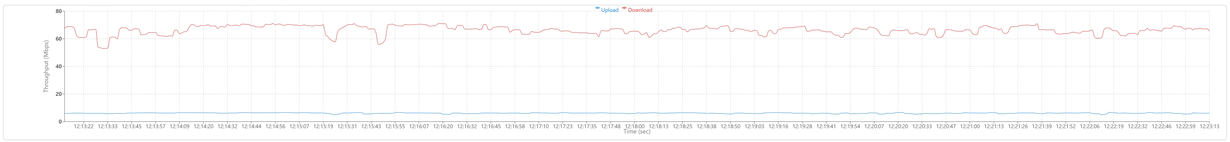
Number of Clients vs Distance

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
SmartBulb_IOT_Controls1	far	Wipro Bulb	Smartbulb	Virtual	iot traffic	280	TCP	BE	70%	0.00	0.00	BE	70%	0.00	0.00	Pass
SmartDoorBell_Streamingvideo-UDP	far	Amazon Ring	SmartDoorBell	Virtual	streaming video	256	UDP	BE	70%	0.21	0.21	BE	70%	3.00	2.50	Pass
Alexa_AmazonEchoOut_Streamingaudio-TCP1	far	Amazonecho	Amazonechodot	Virtual	streaming audio	1575	TCP	BE	70%	0.35	0.35	BE	70%	0.03	0.03	Pass
PrimeVideo_Mobile_Streamingvideo-TCP	far	Samsung523ultra	Mobile	Virtual	streaming video	1602	TCP	VI	70%	3.00	3.00	BE	70%	0.06	0.06	Pass
Whatsapp_Mobile_Streamingvideo-UDP	far	Vivo vY24	Mobile	Virtual	streaming video	110	UDP	VO	70%	1.50	1.50	BE	70%	0.63	0.63	Pass
Zoom_Tablet_Streamingvideo-UDP	far	iPad	Tablet	Virtual	streaming video	1170	UDP	BE	70%	1.00	1.00	BE	70%	0.50	0.50	Pass
PrimeVideo_Mobile_Streamingvideo-TCP	near	Near_oppo5335	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	2.57	BE	70%	0.06	0.06	Pass
Gaming_Playstation_Streamingvideo-UDP	near	PS5	Playstation	Virtual	gaming	1500	UDP	BE	70%	10.00	9.99	BE	70%	3.00	0.00	Fail
Spotify_Mobile_Streamingaudio-TCP	near	IPhoneX	Mobile	Virtual	streaming audio	790	TCP	VO	70%	0.50	0.50	BE	70%	0.10	0.10	Pass
Netflix_SmartTV_Streamingvideo-TCP	near	LG	SmartTV	Virtual	streaming video	1602	TCP	BE	70%	22.00	21.69	BE	70%	0.10	0.10	Pass
SmartRefridgerator_Cloud_Controls	near	Samsung	SmartRefridgerator	Virtual	iot traffic	1500	TCP	BE	70%	0.05	0.05	BE	70%	1.00	1.00	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
MSTeams_Laptop_Streamingvideo-UDP	near	MACBook Pro	Laptop	Virtual	streaming video	1600	UDP	BE	70%	5.00	5.00	BE	70%	5.00	0.00	Fail
Zoom_Tablet_Streamingvideo-UDP	near	Samsung Tab	Tablet	Virtual	streaming video	1170	UDP	BE	70%	1.00	1.00	BE	70%	0.50	0.50	Pass
Youtube_Mobile_Downloadvideo-UDP	medium	Medium_2307	Mobile	Real	download video	1402	UDP	BE	70%	8.00	2.72	BE	70%	0.01	0.01	Fail
PrimeVideo_Mobile_Streamingvideo-TCP	medium	Medium_Samsung3	Mobile	Real	streaming video	1602	TCP	VI	70%	3.00	1.63	BE	70%	0.06	0.00	Fail
Youtube_Laptop_Streamingvideo-UDP	medium	Dell	Laptop	Real	streaming video	1400	UDP	BE	70%	20.00	5.58	BE	70%	0.02	0.00	Fail
Zoom_Laptop_Streamingvideo-UDP	medium	Lenovo	Laptop	Virtual	streaming video	1170	UDP	BE	70%	0.11	0.11	BE	70%	0.02	0.02	Pass
Youtube_Mobile_Downloadvideo-UDP	medium	Oneplus 10	Mobile	Virtual	download video	1402	UDP	BE	70%	8.00	7.94	BE	70%	0.01	0.01	Pass
Zoom_Tablet_Streamingvideo-UDP	medium	Samsung Tab	Tablet	Virtual	streaming video	1170	UDP	BE	70%	1.00	1.00	BE	70%	0.50	0.50	Pass
Spotify_Mobile_Streamingaudio-TCP	medium	Xioami 5Pro	Mobile	Virtual	streaming audio	790	TCP	VO	70%	0.50	0.50	BE	70%	0.10	0.10	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

Chrome_Mobile_WebBrowsing	medium	iPhone 13	Mobile	Virtual	webbrowsing	HTTPS	1.70	https://www.yahoo.com/	80	2025	Pass