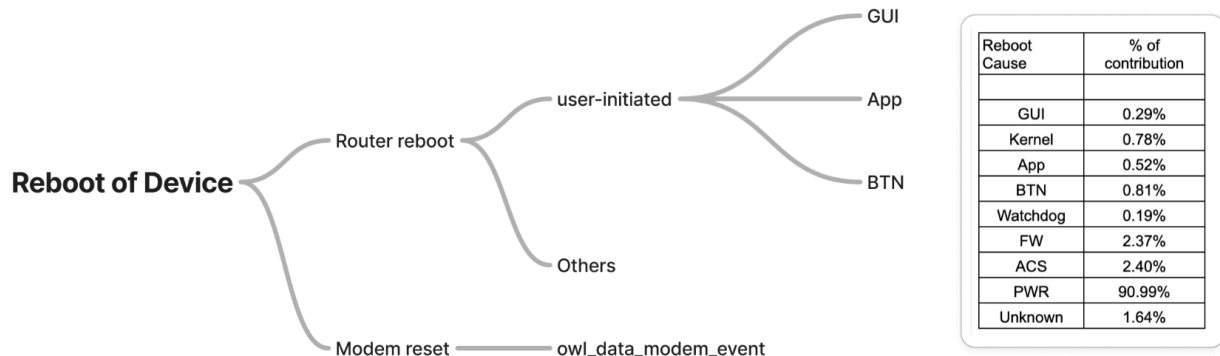


Reliability/Stability

Reboot:



Raw data

OWLHistory.Diag_Result_dev_restart

rowkey	lts	lDiag_Result_dev_restart
7145-ABV30117145_78670EE00AAC	1725498684508	{1725498658000, Reset, BTN, ABV30117145, 3.3.0.11}
5047-GRR21605047_C899827C9280	1725498788215	{1725498771000, Reset, BTN, GRR21605047, 3.1.1.17}
6898-ABG24216898_FC12632E797D	1725498853916	{1725498851000, Reset, BTN, ABG24216898, 3.3.0.6}
7795-AB234917795_DCF51B66C196	1725471583076	{1725471582000, Reboot, GUI, E302123111800986, 3.2.0.12}
4790-ABG25124790_FC12638BB689	1725474697869	{1725474709000, Reboot, APP, ABG25124790, 3.3.0.6}
8530-G401119081348530_04A222ED83E8	1725474748272	{1725474747000, Reset, BTN, G401119081348530, 3.2.0.15}

OWLHistory.owl_data_modem_event

Modem event

reason	linfo	ltimestamp	ltsd
EXCEPTION	[ASSERT] file:mcu/protocol/lte_sec/errc/assert/errc_el1_assert_mob.c line:97	1725367750000	null
EXCEPTION		1725367755000	null
EXCEPTION		1725367845000	null
EXCEPTION		1725367917000	null
EXCEPTION		1725367736000	null
EXCEPTION	[ASSERT] file:mcu/l1/el1/el1d/md95/src/tx/ltxpucch.c line:4901	1725367792000	null

Reboot Calculation Methodology:

- **Identify Number of Restarts:** Count the number of non-null records for each home or serial number, as these indicate a restart event.
- **Defined Period:** Consider a 30-day window to capture all **modem resets** for the calculation.
- **Categorization:** Classify the reboots into **three categories** based on the type of restart (e.g., user-initiated, automatic, or system-triggered).

	Reboot/Reset (rolling window 30 days)	Poor	Fair	Good	Excellent
1	Number of reboots per home	5+	4	2-3	>=1
2	Number of modem resets per home	5+	4	2-3	>=1
3	Number of reboots initiated via customer	3+	2	1	0

IP Changes Categorization

Methodology:

1. **Defined Period:** Track the number of IP changes over a specific period (**e.g., 10 days**), which is crucial for consistent performance evaluation.
2. **Number of IP Changes:** Monitor the frequency of IP changes for each home within the defined period. (Owl_Data_fwa_cpe_data.ipv4_ip)

l	snl	datetime	model_name	ipv4_ip	prev_ip4	lip_changes_flag	reason	Diag_Result_dev_restart
ABU23300021	2024-09-04 00:00:30	XCI55AX	75.196.219.189		null	0	null	null
ABU23300021	2024-09-04 00:05:30	XCI55AX	75.196.219.189	75.196.219.189		0	null	null
ABU23300021	2024-09-04 00:10:31	XCI55AX	75.196.219.189	75.196.219.189		0	null	null
ABU23300021	2024-09-04 00:15:30	XCI55AX	75.196.219.189	75.196.219.189		0	null	null
ABU23300021	2024-09-04 00:20:31	XCI55AX	75.196.219.189	75.196.219.189		0	null	null
ABU23300021	2024-09-04 00:25:32	XCI55AX	75.196.219.189	75.196.219.189		0	null	null

l	snl	datetime	model_name	ipv4_ip	prev_ip4	lip_changes_flag	reason	Diag_Result_dev_restart
ACR41800396	2024-09-04 14:33:48	ASK-NCM1100	97.176.229.239	97.149.125.192		1	null	null
ACL35003153	2024-09-04 13:15:56	ASK-NCM1100E	97.129.19.196	97.129.222.219		1	null	null
ACL40202099	2024-09-04 12:43:14	ASK-NCM1100E	72.107.64.52	72.111.191.45		1	null	null
ACL40202099	2024-09-04 13:06:19	ASK-NCM1100E	72.111.185.150	72.107.64.52		1	null	null
IACN40600315	2024-09-04 19:57:15	ASK-NCM1100E	97.213.86.6	75.241.62.15		1	null	null
IACN40600315	2024-09-04 20:12:15	ASK-NCM1100E	75.244.132.10	97.213.86.6		1	null	null
IACN40801799	2024-09-04 21:35:32	ASK-NCM1100E	72.111.177.110	75.236.242.119		1	null	null

3. **Performance Categories:** Classify the performance as "Poor," "Fair," "Good," or "Excellent" based on the number of IP changes.
4. **Reboot Consideration:** Use different thresholds for homes with and without reboots, as frequent IP changes without reboots can signal network issues.

	# of IP changes	Poor	Fair	Good	Excellent
1	# of IP changes without reboot	>6	4-6	1-3	0
2	# of IP change caused with reboot	>16	7-15	1-6	0

SON/Per Client Steering:

SON (Self-Optimizing Network) is a system that automatically optimizes a network's performance through two key actions:

- **Band Steering:** The client device (STA) is moved from one frequency band to another (e.g., **2.4 GHz to 5 GHz**) based on predefined conditions. This ensures the device gets the optimal balance between range and speed, depending on its location in the house.
- **AP Steering:** The client device is directed to switch between **network devices**, such as from a **router** to an **extender**, or vice versa, to maintain optimal connectivity.

Diag_Result_band_steer

ts	sn	rowkey	sta_type	orig_name	action	intend_band	orig_band	target_band
1725374811922	AA113600026 0026-AA113600026_...	1725374811922	2	NCQ1338	2	5G	2.4G	5G
1725374812199	AA113600026 0026-AA113600026_...	1725374812199	2	NCQ1338	1	5G	2.4G	5G
1725381027813	AA113600026 0026-AA113600026_...	1725381027813	2	NCQ1338	2	2.4G	5G	5G
1725381157990	AA113600026 0026-AA113600026_...	1725381157990	2	NCQ1338	3	2.4G	5G	5G
1725397051033	AA113600026 0026-AA113600026_...	1725397051033	2	NCQ1338	2	2.4G	5G	5G
1725397192282	AA113600026 0026-AA113600026_...	1725397192282	2	NCQ1338	3	2.4G	5G	5G
1725387737696	AA114400059 0059-AA114400059_...	1725387737696	2	NCQ1338E	2	5G	2.4G	5G
1725387992697	AA114400059 0059-AA114400059_...	1725387992697	2	NCQ1338E	4	5G	2.4G	5G
1725388291610	AA114400059 0059-AA114400059_...	1725388291610	2	NCQ1338E	2	5G	2.4G	5G
1725388480072	AA114400059 0059-AA114400059_...	1725388480072	2	NCQ1338E	1	5G	2.4G	5G
1725388998492	AA114400059 0059-AA114400059_...	1725388998492	2	NCQ1338E	2	5G	2.4G	5G

Diag_Result_ap_steer

ts	sn	rowkey	sta_type	orig_name	action	intend_band	orig_band	target_band
1725336000311	G402120100762576-G40212010076_...	1725336000311	2	G3100	2	2.4G	2.4G	5G
1725336000488	G401119120706970-G40111912070_...	1725336000488	2	G3100	0	2.4G	2.4G	2.4G
1725336000650	G402121082050383-G40212108205_...	1725336000650	2	E3200-04A222DFD76D	4	2.4G	2.4G	5G
1725336000723	AAY14111248 1248-AAY14111248_...	1725336000723	2	E3200-3CBDC5E7F518	4	2.4G	2.4G	5G
1725336000770	ABP23035159 5159-ABP23035159_...	1725336000770	2	E3200-3CBDC5F32780	3	2.4G	2.4G	5G

Methodology:

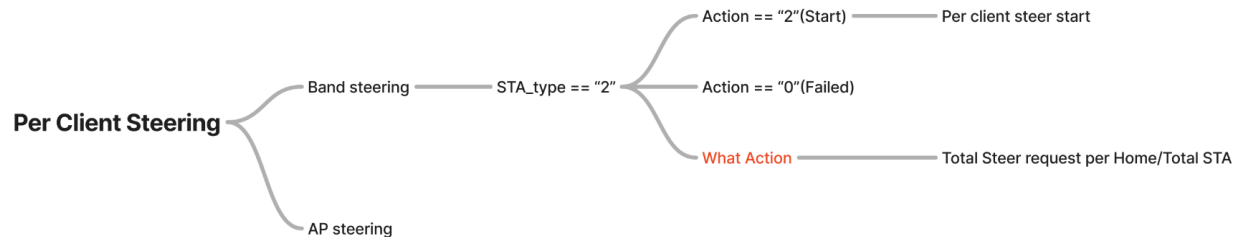
1. **Number of Steering:** Count records of Diag_Result_band_steer.intend
2. Time window, 1 day
3. Filter
 - a. STA_type == "2"
 - b. Action

action	count	
3	47574699	timeout
0	15041539	Failed
1	40875296	Succeed
4	52615049	cancel
2	156165390	Start

Items	Type	Description
station_mac	String	MAC address of station which was involved in this event
sta_type	String	Type of station: "1" - "LEGACY" "2" - "BTM"
type	String	Type of device events: "1" - Steering black list added "2" - AP steering "3" - Band steering "4" - Client device self AP steering "5" - Client device self band steering
reason	String	Reason of AP/band steering events: "1" - "RSSI_LOW" (for AP Steering) "2" - "RSSI_HIGH_TO_5G" (for Band Steering) "3" - "RSSI_LOW_TO_2G" (for Band Steering) "4" - "CH_OVERLOAD_TO_2G" (for Band Steering) "5" - "CH_OVERLOAD_TO_5G" (for Band Steering)
action	String	Action of AP/band steering events: "0" - "fail" "1" - "succeed" "2" - "start" "3" - "timeout" "4" - "cancel"

4. Categories:

	SON End Client	Poor	Fair	Good	Excellent
1	Per client steer start	>60	31-60	11-29	1-10
2	Per client steer failure				
3	Total Steer request per Home/Total STA	> 3.0	2.0 to 3.0	1.1 to 2.0	1 or < 1



Sudden drop of connection

In event of total number of clients disappearing from previous sample

	Sudden drop of connection	Poor	Fair	Good	Excellent
1	Stationary client	>2	1	0	0
2	Non-stationary client (minimum 2 or 3)	>2	1	0	0

Station_Data_connect_data.station_mac

Speed

Rssi

Data Structure:

Each station has multiple records over time, each with different connection types (2.4 GHz, 5 GHz, and 6 GHz).and signal strengths.

sn	rowkey	ts	connect_type	signal_strength
AB240807943	7943-AB240807943_...	1726113594000	5G	-62
ABH34100231	0231-ABH34100231_...	1726113599000	2_4G	-82
GRR23102625	2625-GRR23102625_...	1726113597000	5G	-81
ABU41904452	4452-ABU41904452_...	1726113596000	2_4G	-50

Methodology:

	RSSI Threshold per radio	Poor	Fair	Good	Excellent
1	2.4 GHz	<-78	-71 to -77	-56 to -70	< -55
2	5 GHz	<-75	-71 to -75	-56 to -70	< -55
3	6 Ghz	<-70	<-65 to -70	-56 to -65	< -55

1. RSSI Categorization at STA-Record level:

rowkey	ts	connect_type	signal_strength	signal_strength_2_4GHz	signal_strength_5GHz	signal_strength_6GHz	category_2_4GHz	category_5GHz	category_6GHz
0664-ABP22120664_12C45D02F1F6	1.72613E+12	5G	-43	null	-43	null	No Data	Excellent	No Data
0664-ABP22120664_12C45D02F1F6	1.72615E+12	5G	-63	null	-63	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-62	null	-62	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-55	null	-55	null	No Data	Excellent	No Data
0664-ABP22120664_12C45D02F1F6	1.7262E+12	5G	-71	null	-71	null	No Data	Fair	No Data
0664-ABP22120664_12C45D02F1F6	1.72613E+12	5G	-43	null	-43	null	No Data	Excellent	No Data
0664-ABP22120664_12C45D02F1F6	1.72615E+12	5G	-61	null	-61	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-58	null	-58	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72618E+12	5G	-51	null	-51	null	No Data	Excellent	No Data
0664-ABP22120664_12C45D02F1F6	1.72616E+12	5G	-67	null	-67	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-48	null	-48	null	No Data	Excellent	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-81	null	-81	null	No Data	Poor	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	5G	-59	null	-59	null	No Data	Good	No Data
0664-ABP22120664_12C45D02F1F6	1.72617E+12	2_4G	-62	-62	null	null	Good	No Data	No Data

2. RSSI Categorization at **STA-Connect type level**:

If more than 12 records in a specific connection type fall below the threshold for a given category, that STA is classified under that category for that connection type.

rowkey	poor_count_2_4GHz	poor_count_5GHz	poor_count_6GHz	fair_count_2_4GHz	fair_count_5GHz	fair_count_6GHz
0664-ABP22120664_12C45D02F1F6	0	7	0	1	11	0

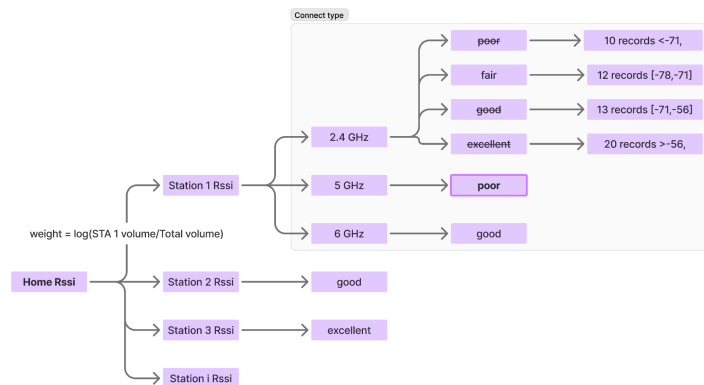
good_count_2_4GHz	good_count_5GHz	good_count_6GHz
1	13	0

3. RSSI Categorization at **STA level**:

```

+-----+-----+-----+
|sn      |rowkey      |final_category|
+-----+-----+-----+
|ABP22120664|0664-ABP22120664_12C45D02F1F6|Good      |
+-----+-----+-----+

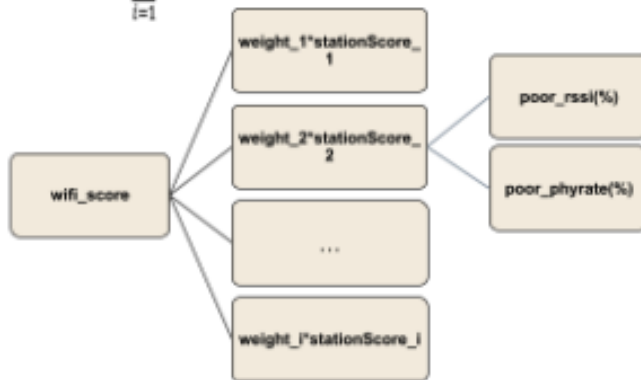
```



4. RSSI Categorization at **Serial Number level**:

$$stationScore_i = weight_{rssi} \times (1 - \%poor_{rssi}) + weight_{phyrate} \times (1 - \%poor_{phyrate})$$

$$wifiScore = \sum_{i=1}^n station_weight_i \times stationScore_i$$



Note: Weights based on Data Consumption & Mobility

Coverage

Airtime Utilization/Congestion

Key Points:

1. Congestion Indicator:

Higher airtime utilization values signal potential congestion in the network. The more the channel is utilized, the greater the likelihood of congestion, which can negatively impact performance.

2. Focus on 2.4GHz Band:

Although airtime utilization is measured for different radios (frequency bands) in a router, the current version of the Wi-Fi score focuses only on the 2.4GHz band for analysis.

Group_Diag_History_radio_wifi_info._2_4g.airtime_util

lsn	lts	lairtime_util	enable
ABU41507485	1726390794000	32.000000	1
AAY21516729	1726390797000	43.000000	1
G401119110718891	1726390799000	4.000000	1
G401119110801302	1726390801000	14.000000	1
G401119110801302	1726390801000	7.000000	1
GRR23283006	1726390794000	29.000000	1
AA122100213	1726390812000	27.000000	1

3. 1-Week Aggregation:

Over a 1-week period, the airtime utilization values are aggregated to assess overall network usage and identify patterns of congestion or ideal channel usage.

4. Threshold for Congestion:

For the initial analysis, an airtime utilization value of **70%** or higher is considered not ideal, indicating potential congestion.

Phy Rate (Data Rate) Overview:

The Phy rate or data rate is a crucial measure of the speed at which data is being delivered to each client in a WiFi network. It reflects the performance and quality of the connection a device (e.g., an iPhone or laptop) experiences when connected to either the 2.4GHz or 5GHz radio bands.

Key Concepts:

- Data Filtration:
Before calculating the score, certain data, such as **control channel** phy rates, needs to be filtered out as per current WiFi score logic.
- Phy Rate Thresholds:

	Phy Rate	Poor	Fair	Good	Excellent
1	2.4Ghz Radio	<80	100-80	101-120	120+
2	5Ghz Radio	<200	201-350	351-500	500+
3	6Ghz Radio				

Question:

Son_on_off

```
SELECT distinct tpls_data_sn, tpls_data_son
FROM "bhrdatabase"."bhrx_devices_version_001"
where date = ''
and tpls_data_son is not null
and tpls_data_model_name = ''
```

Ethernet not 1 Gig

```
SELECT sum( case when TROUBLE_TYPE_ALPHA_CD = 'INTR' then 1 else 0 end ) as INTR, sum(
case when TROUBLE_TYPE_ALPHA_CD = 'PCCR' then 1 else 0 end ) as PCCR, sum( case when
TROUBLE_TYPE_ALPHA_CD = 'SLOW' then 1 else 0 end ) as SLOW, sum( case when
TROUBLE_TYPE_ALPHA_CD = 'WIFI' then 1 else 0 end ) as WIFI, sum( case when
TROUBLE_TYPE_ALPHA_CD = 'CCON' then 1 else 0 end ) as CCON, sum( case when
DISPATCH_OUT_IND = '1.0' then 1 else 0 end ) as DISPATCH_OUT_IND, sum( case when
DROP_SHIP_IND = '1.0' then 1 else 0 end ) as DROP_SHIP_IND FROM
"ticketdatabase"."bhr_ticketdata" where receive_dt between '2024-06-01' and '2024-07-15'
```