

OBSERVABILIDADE EM WI-FI

GTER-53

Agenda

- Relevância & Cenário do Wi-Fi
- Conceitos Essenciais de Wi-Fi
- Observabilidade

Relevância do Wi-Fi



Relevância do Wi-Fi

Aumento significativo nos últimos 5 anos:

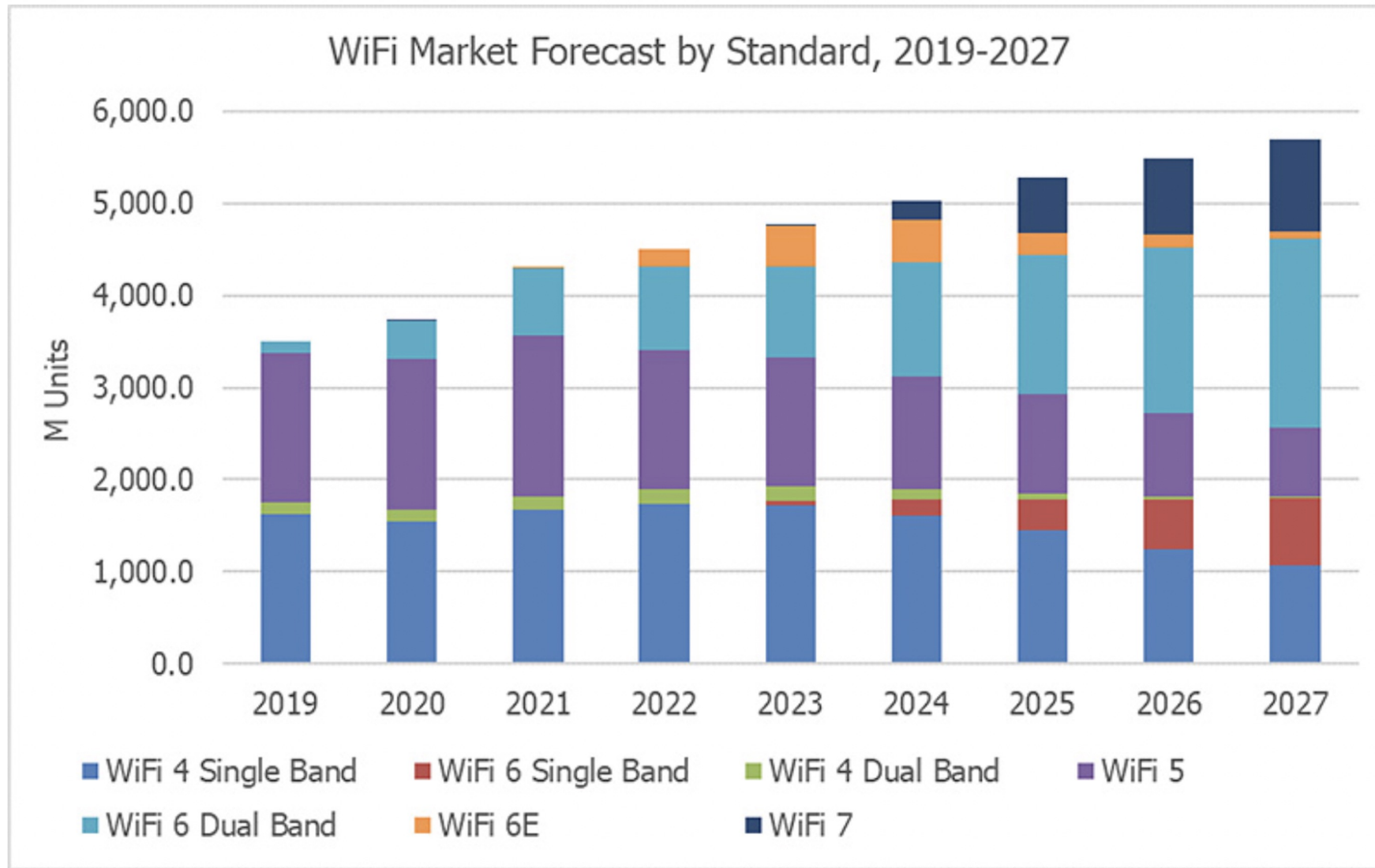
- Força de trabalho híbrida (home/office)
- Wifi no escritório mandatório, sem posições de trabalho fixas
- Uso massivo de colaboração online / video conferência
- Demanda por banda corporativa aumentou 52% em 5 anos

Em resumo:

- Mais densidade / cobertura / banda / concorrência
- Menor latência / jitter



Cenário Atual & Futuro



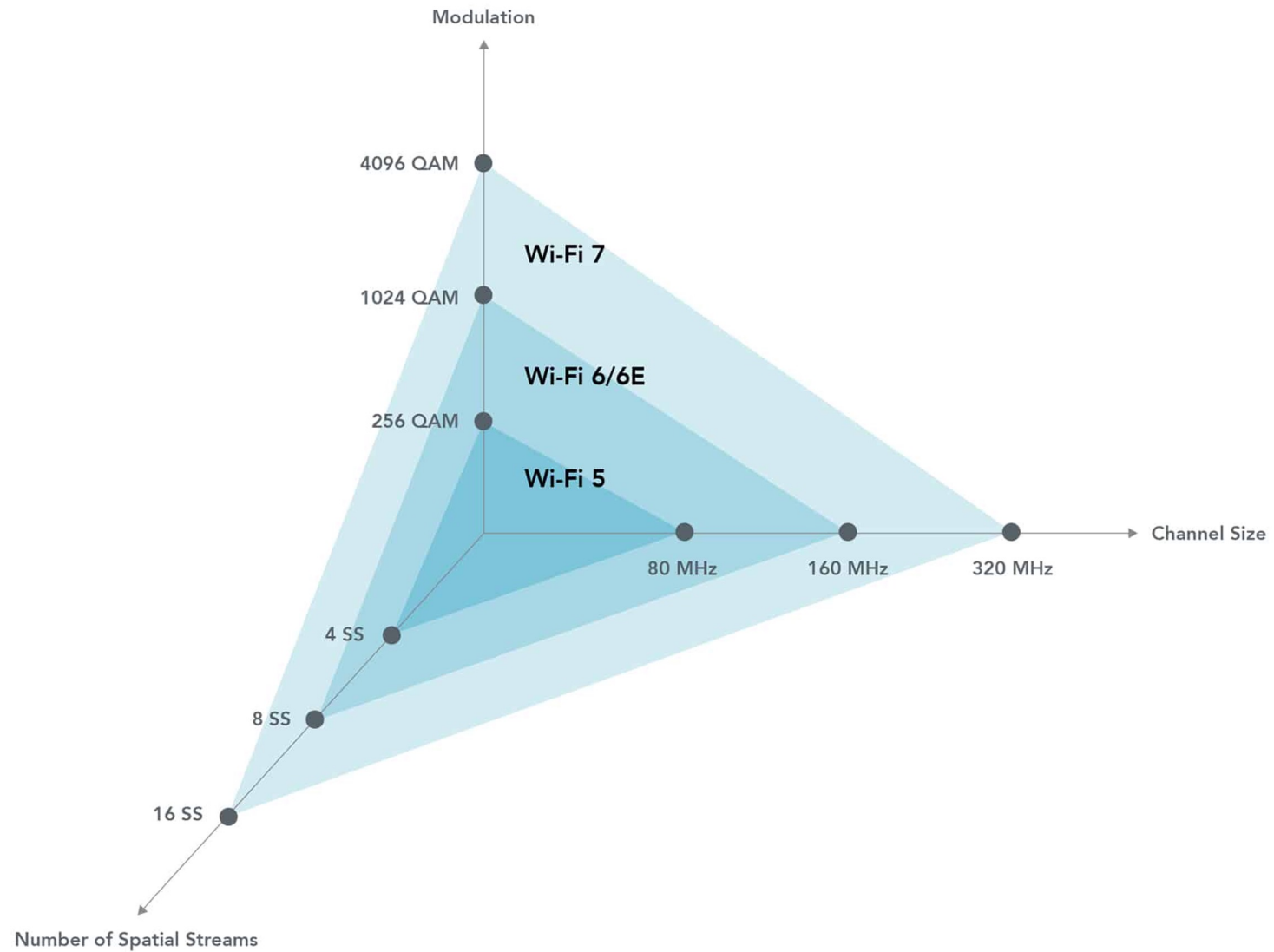
Fonte: <https://iotbusinessnews.com/2022/08/09/48205-new-wifi-6e-and-wifi-7-standards-market-and-applications/>





Conceitos Wi-Fi

Maiores Data Rates



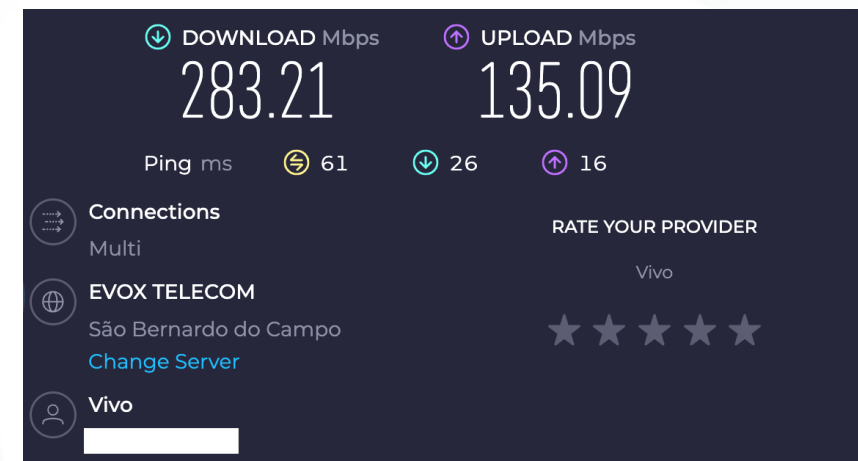
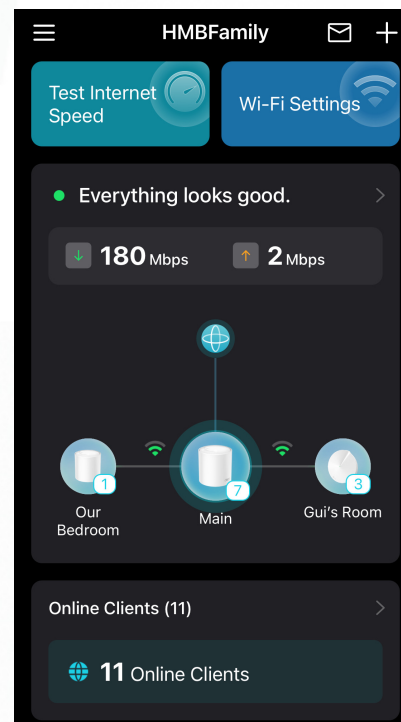
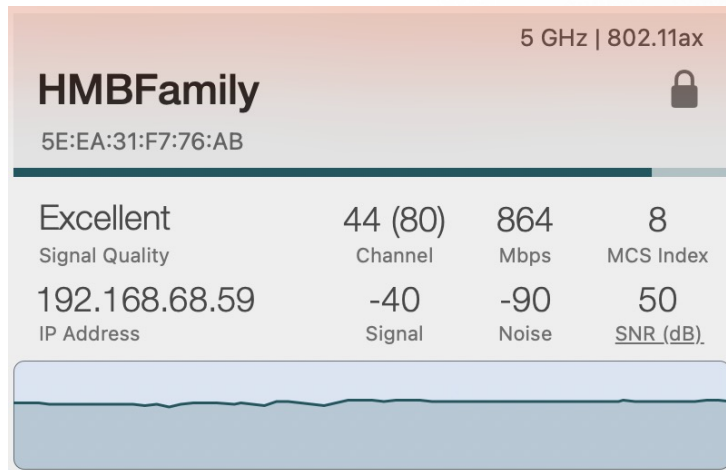
Constraints da Tecnologia

- Meio Compartilhado
- Half Duplex
- CSMA-CA
- Banda = Largura do Canal + Streams + SNR



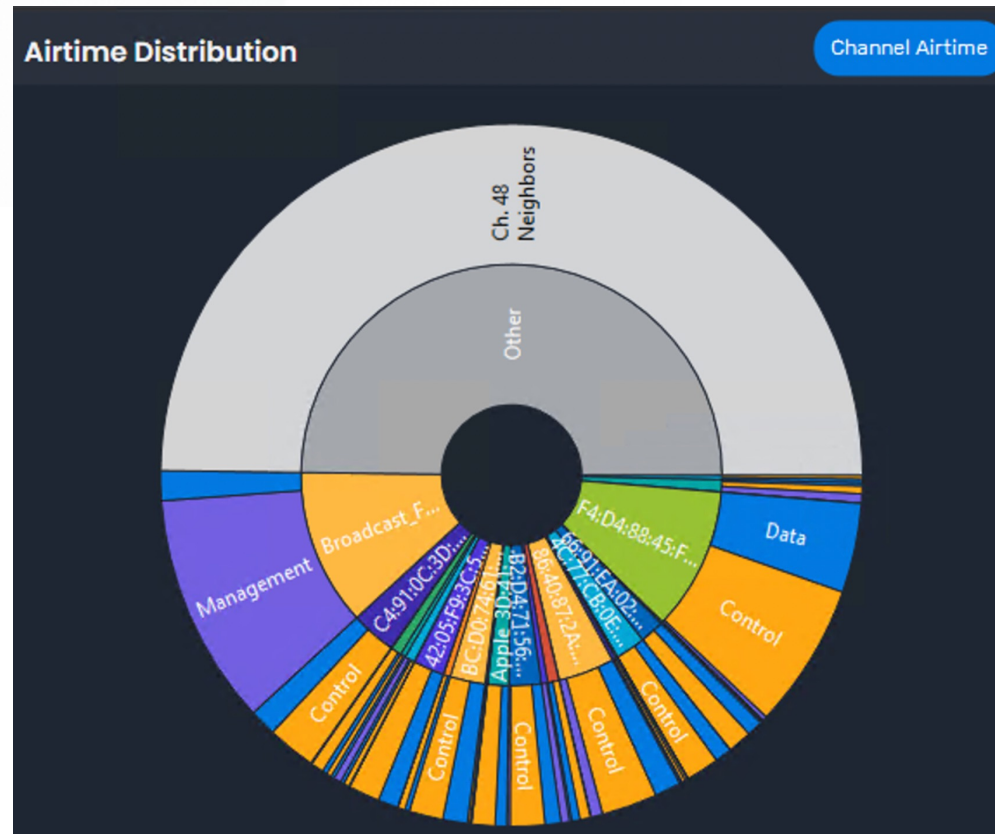
Concorrência & Contenção

Data Rates <> Throughput real



Concorrência & Contenção

Clientes x Throughput



Concorrência & Contenção

Advertised AP data rates are only half the equation!

Examples: What 1 AP can support with clients at -67 dBm, 5 GHz, 20 MHz

**Note: 75-80% airtime utilization is maximum, 100% not achievable due to overhead*

3SS Laptops

3 Mbps (ea)

100 Mbps Total



34 Laptops, 77% total airtime utilization



2SS Tablets

3 Mbps (ea)

65 Mbps Total



21 Tablets, 75% total airtime utilization



1SS Smartphones

3 Mbps (ea)

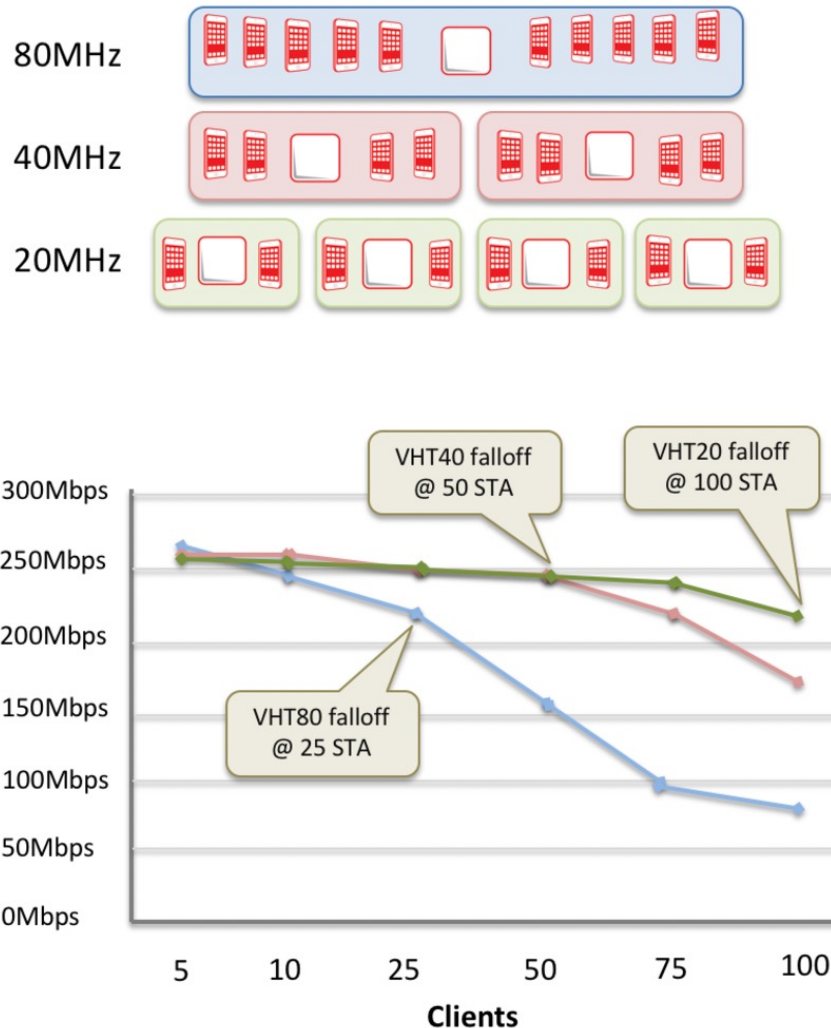
30 Mbps Total



10 Smartphones, 77% total airtime utilization



Concorrência & Contenção



VHT80 (1 AP)

100 clients – 1x1:1

Data Rate: 433Mbps

Aggregate Throughput: 80Mbps

Per-client Throughput: **0.8Mbps**

VHT40 (2 APs)

100 clients – 1x1:1

Data Rate: 200Mbps

Aggregate Throughput: 175Mbps

Per-client Throughput: **1.75Mbps**

VHT20 (4 APs)

100 clients – 1x1:1

Data Rate: 87Mbps

Aggregate Throughput: 220Mbps

Per-client Throughput: **2.2Mbps**



Interferência

- Wi-Fi & Non-Wi-Fi
- SSIDs
- Co-Channel



Interferência

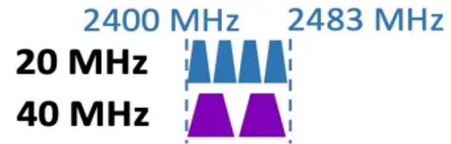
SSID Overhead

Amount of Overhead:		0-10% Low	10-20% Medium	20-50% High	>50% Very High					
Number of APs on Channel*	Number of SSIDs									
	1	2	3	4	5	6	7	8	9	10
1	3.22%	6.45%	9.67%	12.90%	16.12%	19.35%	22.57%	25.80%	29.02%	32.25%
2	6.45%	12.90%	19.35%	25.80%	32.25%	38.70%	45.14%	51.59%	58.04%	64.49%
3	9.67%	19.35%	29.02%	38.70%	48.37%	58.04%	67.72%	77.39%	87.06%	96.74%
4	12.90%	25.80%	38.70%	51.59%	64.49%	77.39%	90.29%	100.00%	100.00%	100.00%
5	16.12%	32.25%	48.37%	64.49%	80.62%	96.74%	100.00%	100.00%	100.00%	100.00%
6	19.35%	38.70%	58.04%	77.39%	96.74%	100.00%	100.00%	100.00%	100.00%	100.00%
7	22.57%	45.14%	67.72%	90.29%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
8	25.80%	51.59%	77.39%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
9	29.02%	58.04%	87.06%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
10	32.25%	64.49%	96.74%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
11	35.47%	70.94%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
12	38.70%	77.39%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

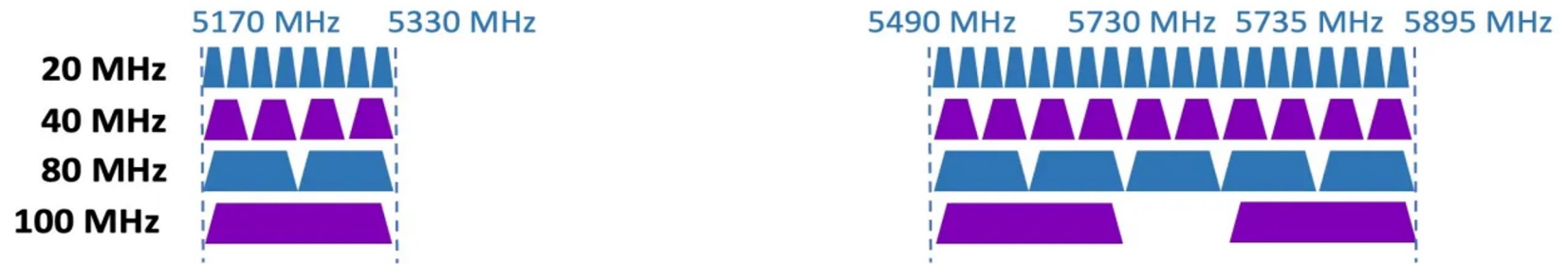


Interferência

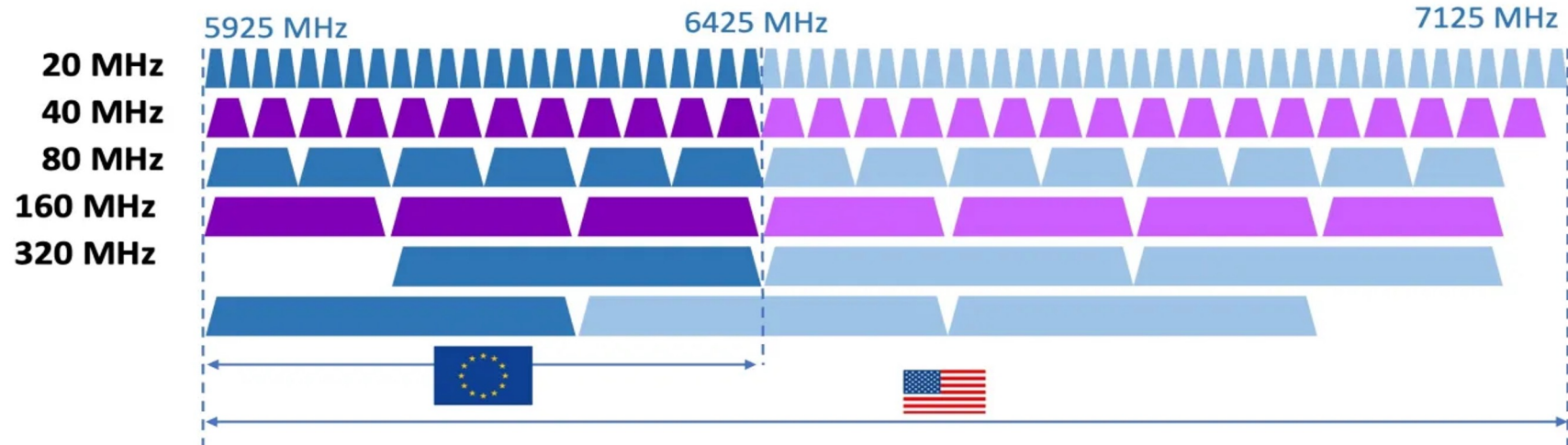
2.4 GHz



5 GHz

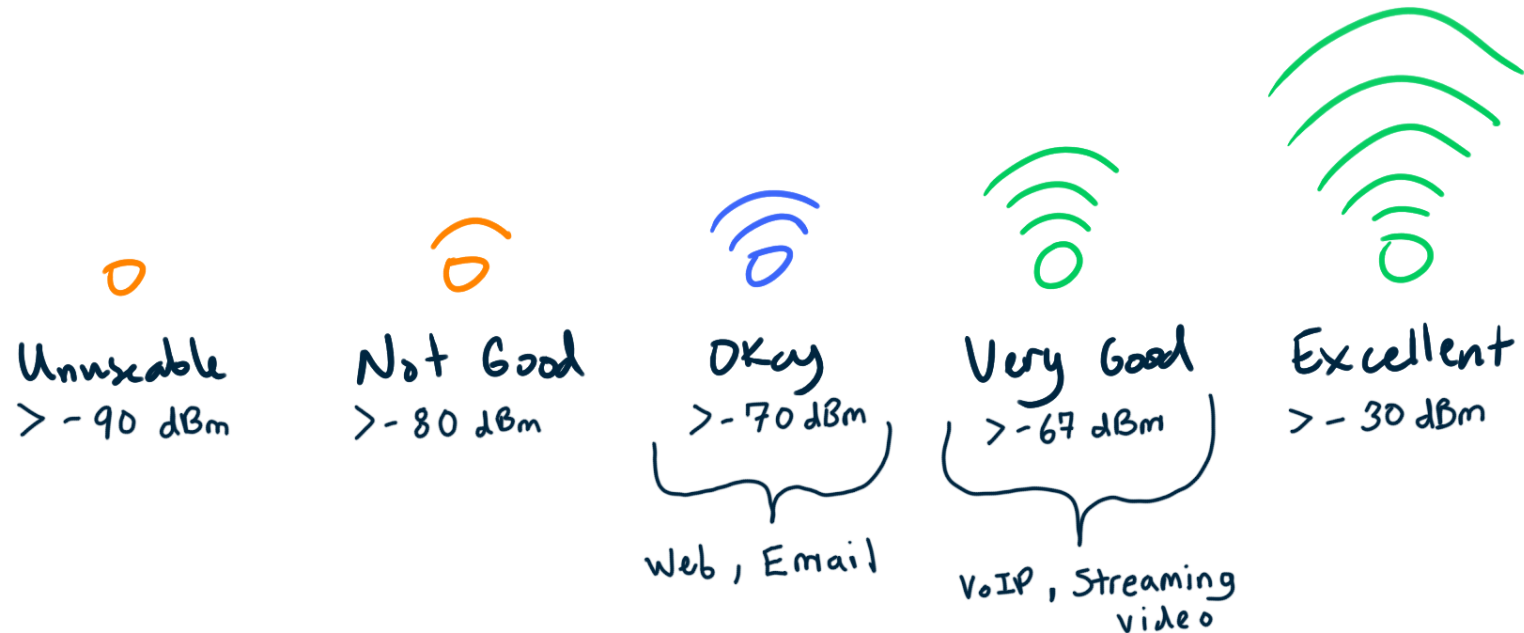


6 GHz

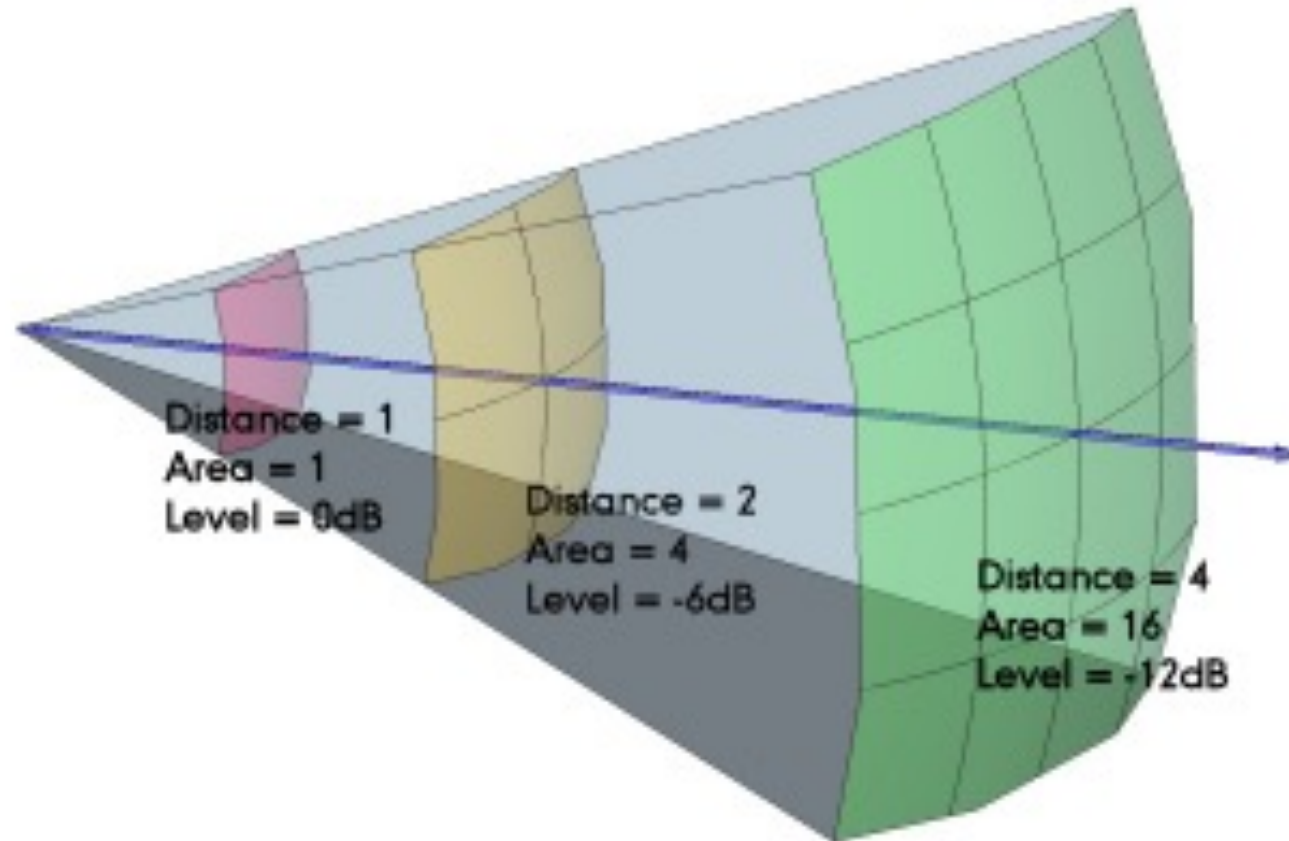


Cobertura / Sinal

WiFi Signal Strength Values



Cobertura / Sinal





Observabilidade Wi-Fi

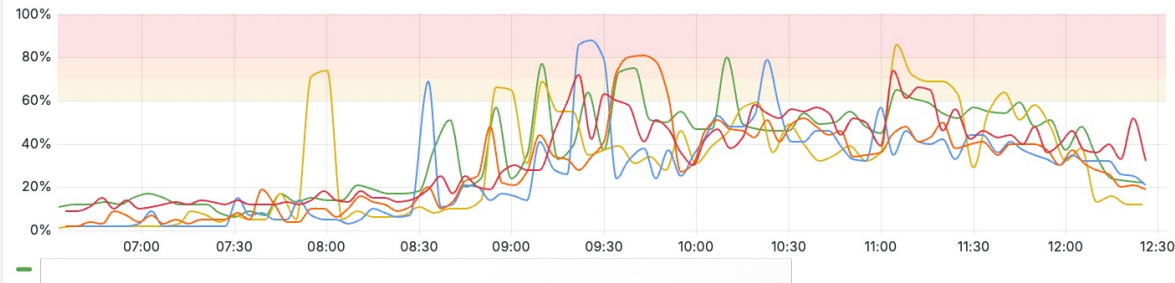
Airtime / Utilization

- Total de Utilização do Canal
- Interferência - # de SSIDs, Co-Channel, % Interf.
- Tráfego
- Clientes por AP/Rádio

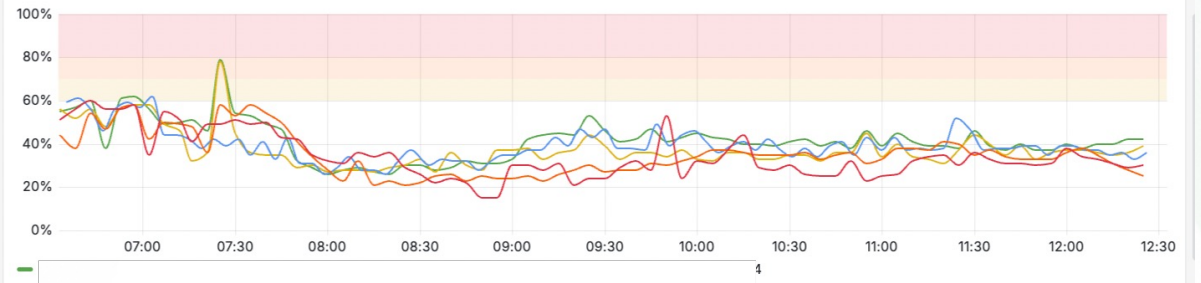


Airtime / Utilization

TOP 5 APs by Channel Util. on 5.0 Ghz



TOP 5 APs by Channel Util. on 2.4 Ghz



5.0 Ghz - Ch. Utilization Statistics (Last Hour)

AP	Clients 95th	Ch.Util 95th	Utilization %
AP05			64%
AP04			58%
AP05			58%
AP03			55%
AP05			54%

1 - 5 of 45 rows

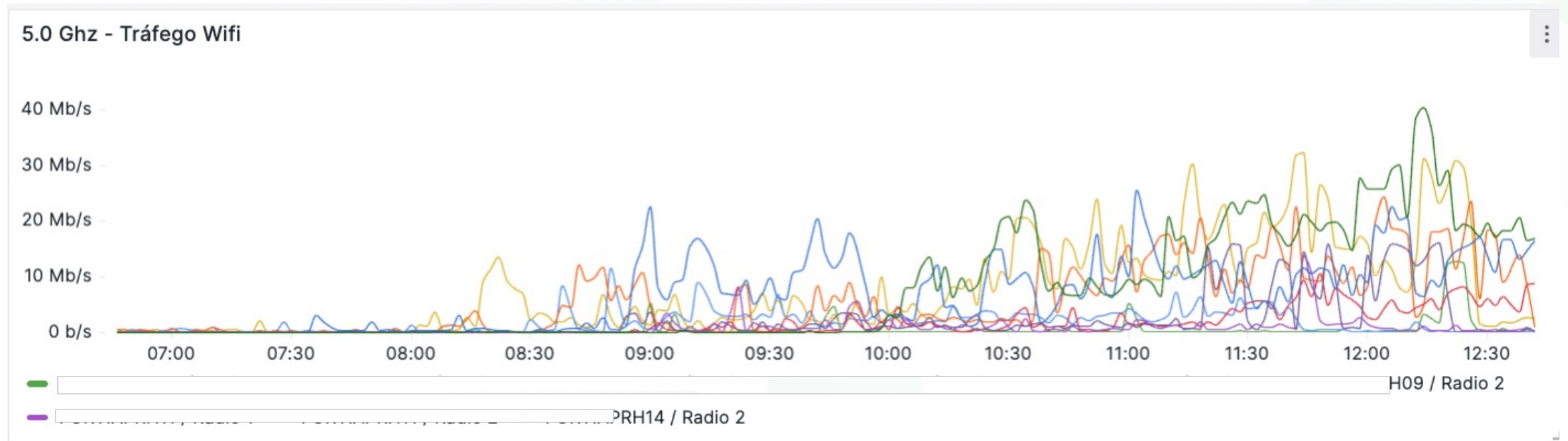
2.4 Ghz - Ch. Utilization Statistics (Last Hour)

AP	Clients 95th	Ch.Util 95th	Utilization %
JAP03			52%
JAP05			51%
JAP06			47%
JAP02			46%
JAP04			46%

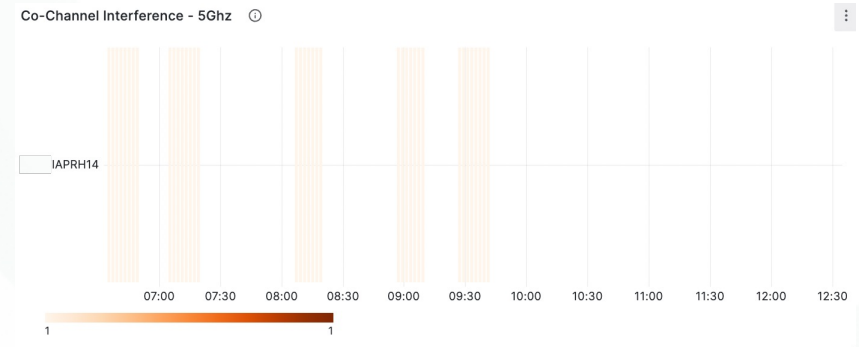
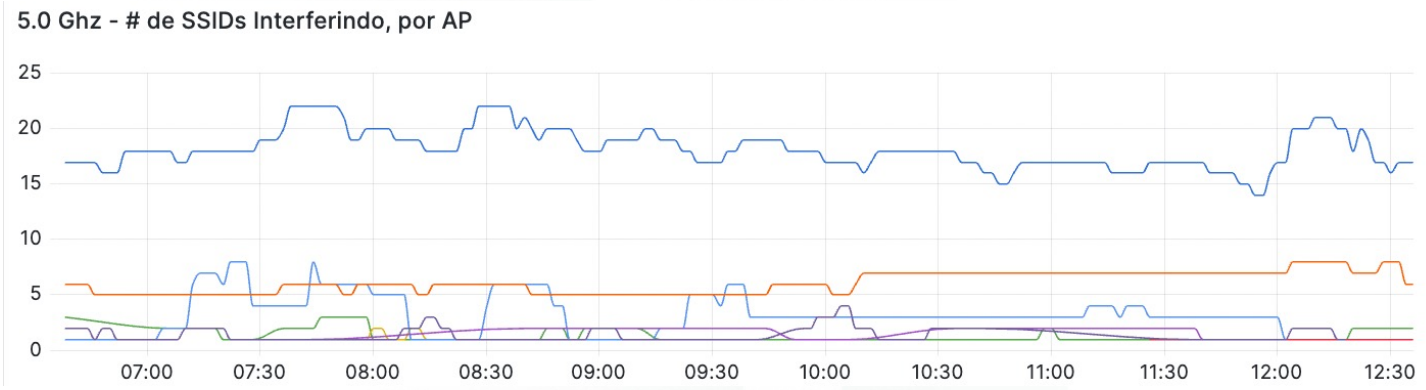
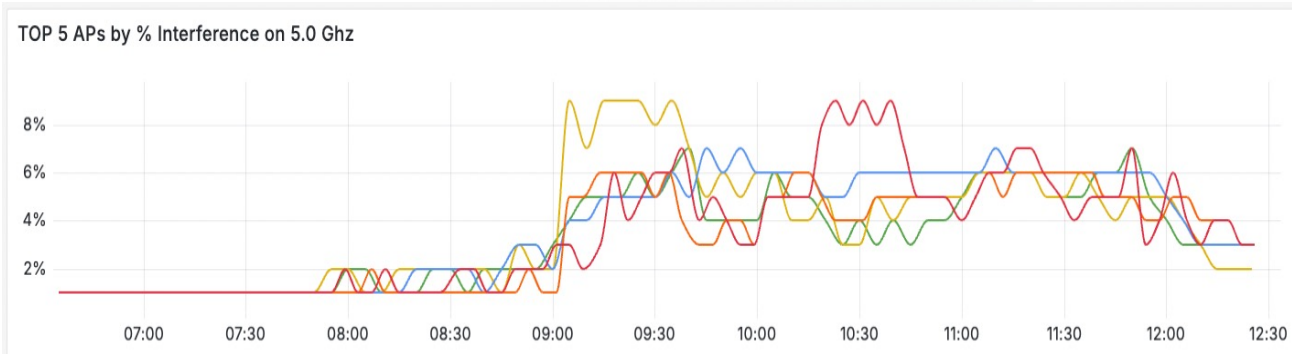
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Airtime / Utilization



Airtime / Utilization



Airtime / Utilization

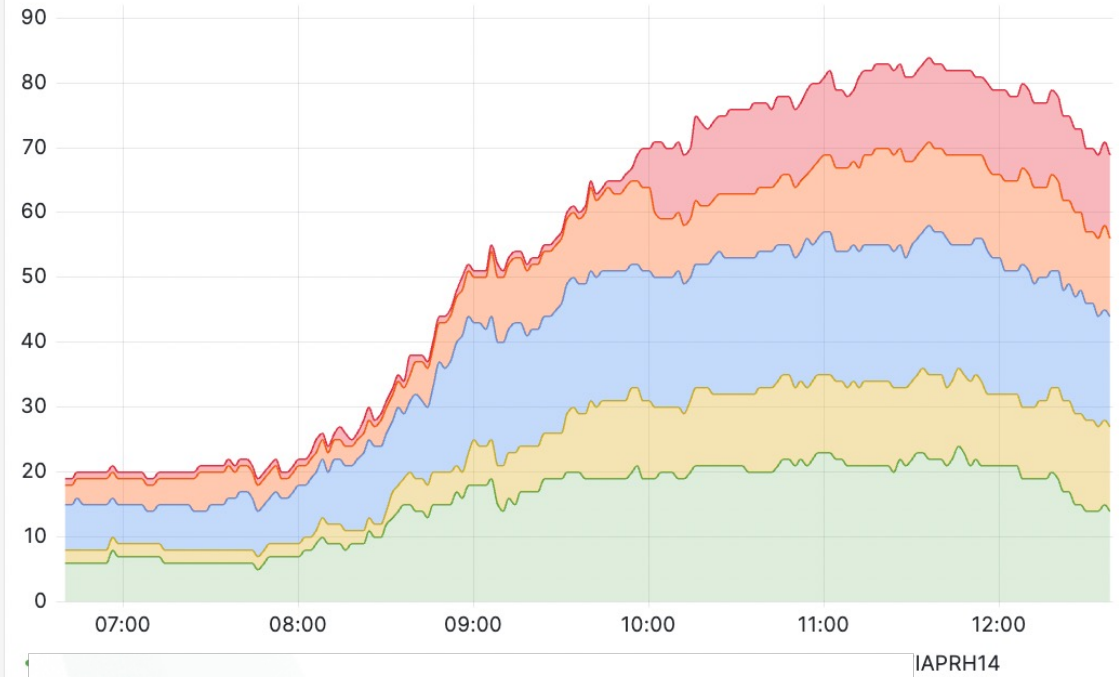
Top 5 APs/Radios por # Clientes

AP Name	Radio	Channel	# Of Clients
APRH06	2	149	11
APRH08	1	44	10
APRH14	2	124	9
APRH04	1	40	8
APRH08	2	108	8

Total

46

Clientes por AP - TOP 5



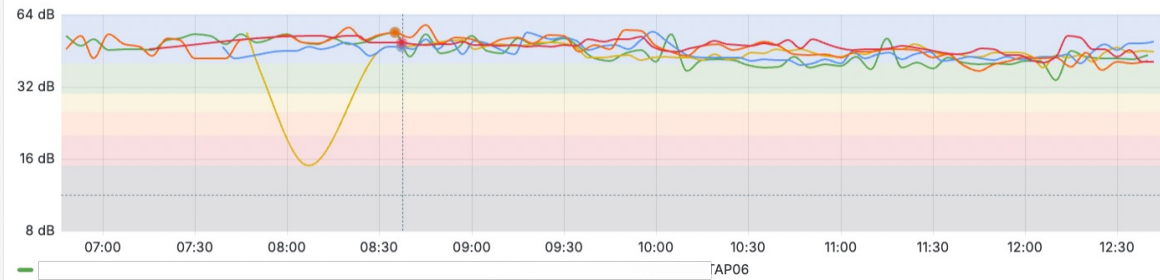
Cobertura

- SNR
- Poor Clients
- Data Rates

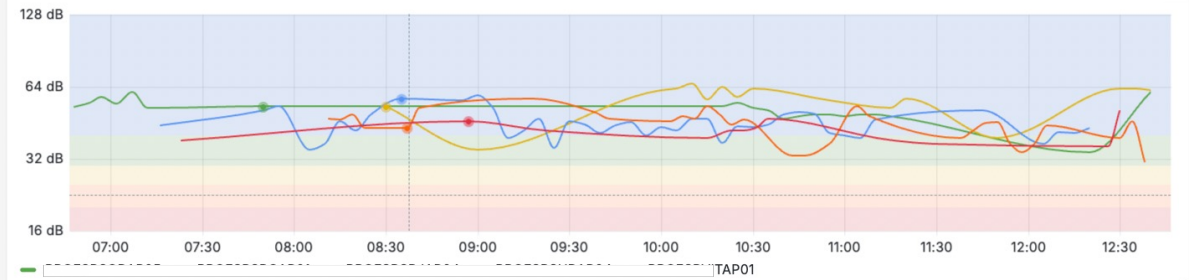


Cobertura

TOP 5 APs by SNR on 5.0 Ghz



TOP 5 APs by SNR on 2.4 Ghz



5.0 Ghz - Análise de SNR por AP (Last Hour)

AP	SNR Médio	SNR Median
AP05	40.9 dB	42 dB
DAP01	41.1 dB	39 dB
DAP04	43.2 dB	43 dB
RAP04	43.5 dB	42 dB

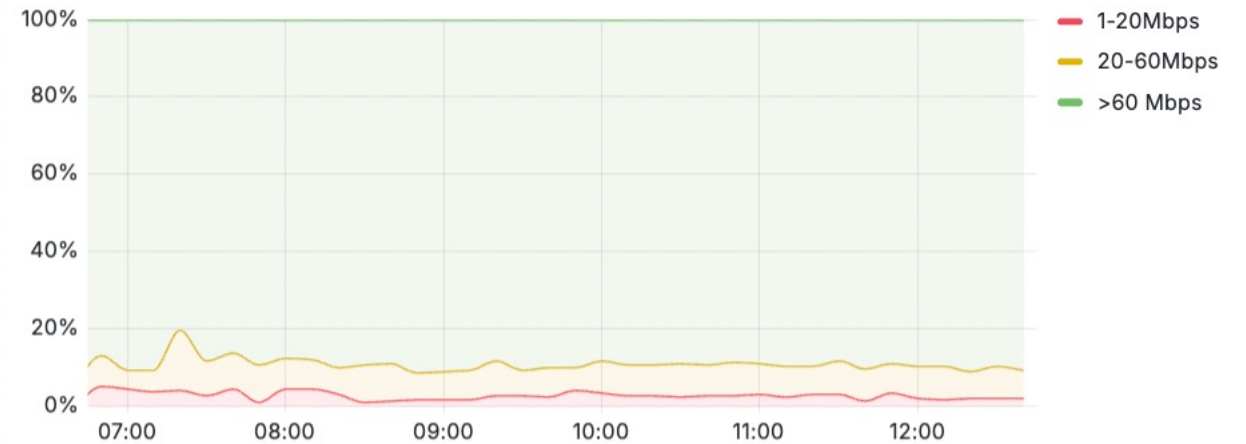
2.4 Ghz - Análise de SNR por AP (Last Hour)

AP	SNR Médio	SNR Median
AP02	36 dB	36 dB
AP04	39.6 dB	38 dB
AP04	40.2 dB	41 dB
AP03	41.5 dB	37 dB



Cobertura

% Distribution - Clients by Data Rates



Clients to watch (SNR < 25dB in 30m)

SNR	Client	SSID	AP	Band
8 dB	04:56:E5:23:CE:68	Corp	AP04	5GHz
16 dB	6C:F6:DA:7A:10:20	Corp	AP12	5GHz
20 dB	Random MAC Address	Guest	AP01	5GHz

Count 6



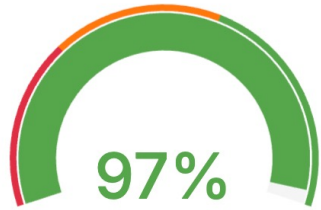
Clientes

- Clientes por AP/Rádio
- Por SSID, Data-Rate, etc
- Banda, Canal, etc
- Excessive Roaming, Desconexões, Retrans, etc



Clientes

Overall AP Health Score (now)



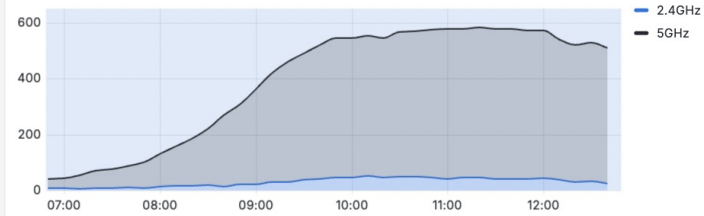
Total Clients

510

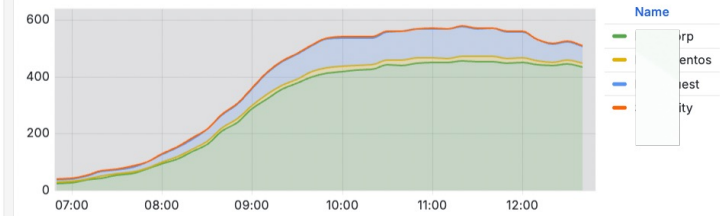
Poor Clients - 30m

0

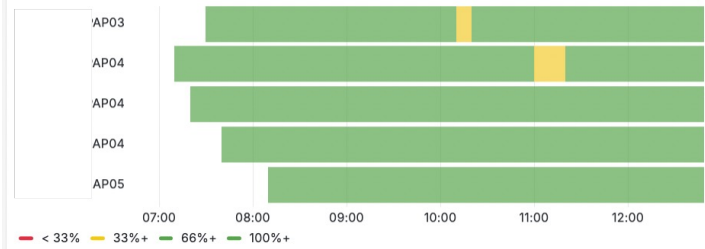
Clients Connected by Band



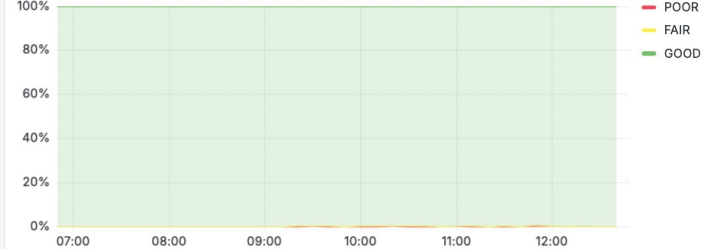
Clients Connected by SSID



BOTTOM 5 APs - Health



% Distribution - Clients by Health Score



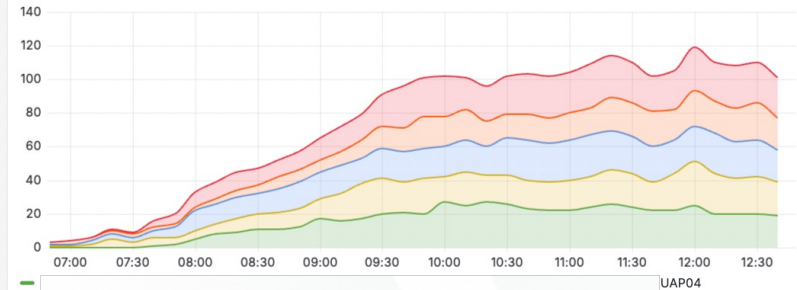
% Distribution - Clients by Data Rates



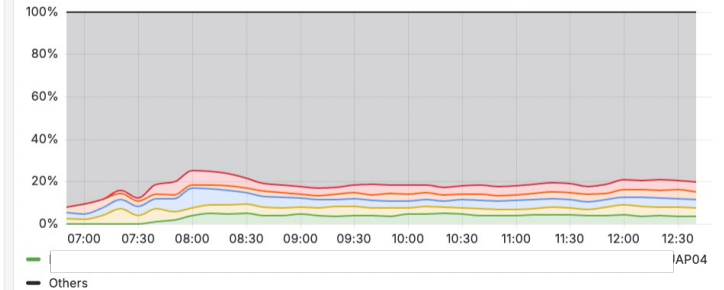
Top 5 APs by # of Clientes

AP Name	Users
AP04	24
AP02	20
AP02	19
AP04	19
AP01	19
Total	101

TOP 5 - APs by # of Clients



% Distribution - Clients by TOP 5 APs

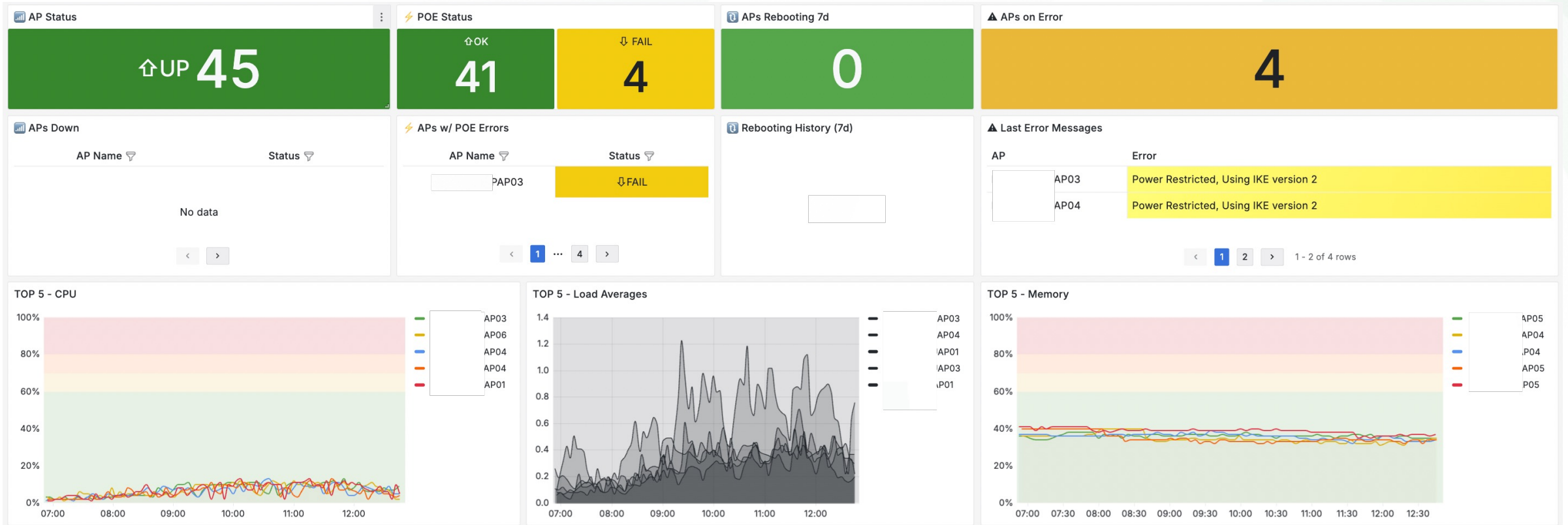


Infra

- UP/Down, Reboots, Registro
- POE
- CPU, MEM, Load



Infra



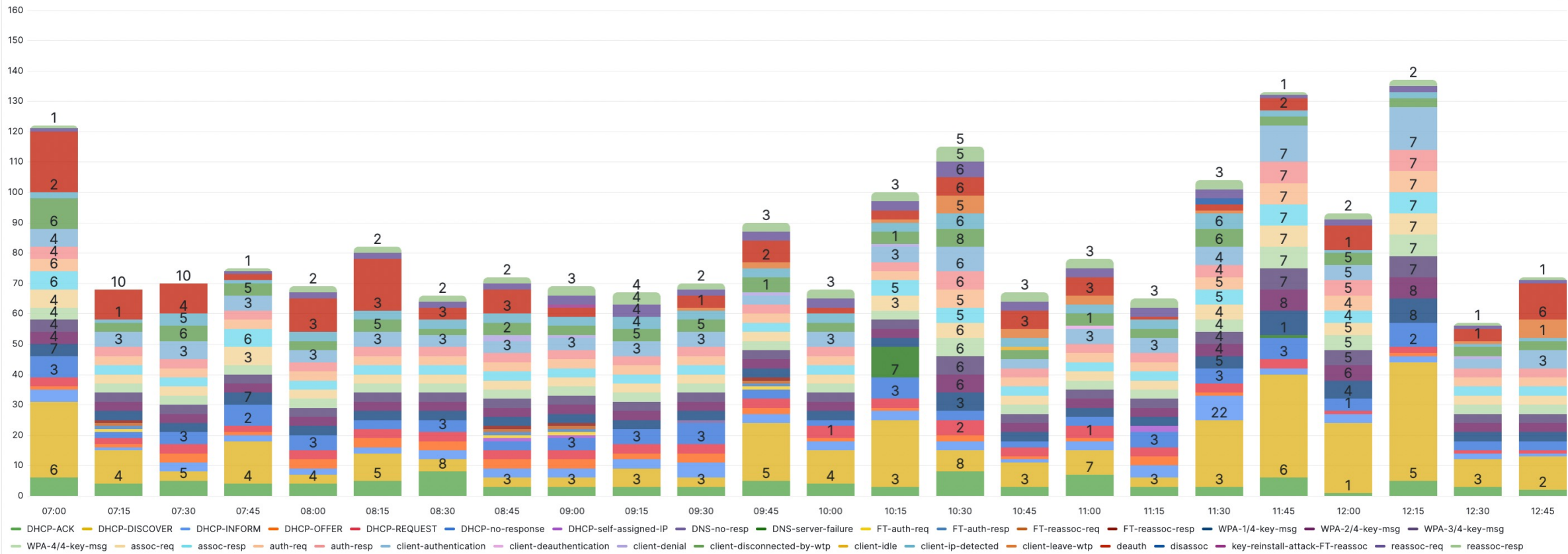
Eventos

- Associação
- Autenticação
- DHCP
- DNS
- Outros eventos Wi-Fi



Eventos

Event Log (5m bucket)





Perguntas?