

# Chanalyzer Pro Sample Report



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Prepared For: **Our Friends**

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# Report Introduction

This report was generated by MetaGeek's Chanalyzer Pro with a Wi-Spy DBx.

I will be reviewing the 2.4GHz band and the 5GHz band for possible sources of Wi-Fi interference.

## 2.4 GHz Overview

Most wireless networks and devices today use radio frequency (RF) technology to transmit data and certain types of devices use different sections or "bands" for transmission. Wi-Fi equipment has been allocated by international governing bodies to use certain unlicensed sections of the RF spectrum - specifically at 2.4 and at 5 GHz - for its operation. Being unlicensed, these bands are shared between many, many different kinds of devices and are the only section of spectrum where they are legally allowed to transmit RF signals. In environments like offices, warehouses or high-tech residences, where several wireless devices vie for the same spectrum space to communicate, interference can occur and networks become slow, drop connection or crash.

Why spectrum analysis?

Since RF signals are invisible to the naked eye, a spectrum analyzer (like Wi-Spy) is necessary to see into the wireless landscape to observe what is transmitting and where in the spectrum the "noise" is occurring. Sometimes the solution is to change the channel of the Wi-Fi network to avoid the other signals, and sometimes eliminating the offending wireless devices that "don't play well with others" is the answer. Occasionally, in situations where interference cannot be avoided or eliminated, the only solution is to switch Wi-Fi bands completely. Without spectrum analysis, implementing the proper solution is an expensive and time-consuming game of trial and error.

## Networks Table

SSID	RSSI	Channel	MAC Address	Privacy	Time	Vendor	Supported Rates	Max Rate	Network Type
MetaGeekGN4	-71	1	00:22:3f:a8:ec:84	RSNA-CCMP	14:31:14	Netgear Inc.	1/2/5.5/6/9/11/12/18/24/36/48/54	54	Infrastructure
Homestar	-66	1	00:22:3f:98:64:c1	RSNA-CCMP	14:31:14	Netgear Inc.	1/2/5.5/6/9/11/12/18/24/36/48/54	54	Infrastructure
MetaGeekGN2	-55	6	00:22:3f:a4:84:4a	RSNA-CCMP	14:31:14	Netgear Inc.	1/2/5.5/6/9/11/12/18/24/36/48/54	54	Infrastructure
MetaGeekGN	-72	11	00:1e:58:27:dc:4d	RSNA-TKIP	14:31:14	D-Link Corporation	1/2/5.5/6/9/11/12/18/24/36/48/54	54	Infrastructure

The Networks Table is a list of the Wi-Fi access points that are within range of the computer's wireless card. The names (or SSIDs) of the APs are given along with signal strength (RSSI), channel, Mac address and other identifiers. This table is used good for getting a snapshot of what Wi-Fi networks are in the area as well as correlating RF activity as shown in the spectrum views to known Wi-Fi networks.

The networks we are concerned about are:

MetaGeekGN  
MetaGeekGN2  
MetaGeekGN4

Homestar appears to be an unauthorized access point.

## Channels Table

Channel	Grade	Duty Cycle	Average	Current	Noise Floor	Access Points	Max
1	43.4	24.6%	-39.0	-71	-91.0	2	-24.0
2	48.9	21.8%	-39.0	-71	-91.5	0	-24.0
3	56.5	19.4%	-54.0	-68	-92.5	0	-34.5
4	59.0	18.5%	-53.5	-71	-92.0	0	-35.0
5	61.4	15.6%	-55.5	-71	-92.5	0	-35.0
6	59.4	16.1%	-55.0	-69	-92.5	1	-35.0
7	62.6	15.2%	-55.0	-74	-93.0	0	-34.5
8	69.5	13.1%	-56.5	-74	-94.5	0	-33.5
9	75.5	11.0%	-60.5	-74	-95.5	0	-34.5
10	80.0	8.9%	-64.0	-96	-96.5	0	-35.0
11	82.8	7.5%	-64.5	-99	-97.5	1	-35.0
12	87.1	5.7%	-64.0	-99	-98.0	0	-35.0
13	91.7	3.7%	-65.5	-99	-99.5	0	-36.0
14	98.7	0.4%	-67.5	-99	-100.5	0	-39.5

Channels 1-9 have relatively high duty cycles due to some potential interference. This will be discussed later in the report.

The following text describes the values in the table.

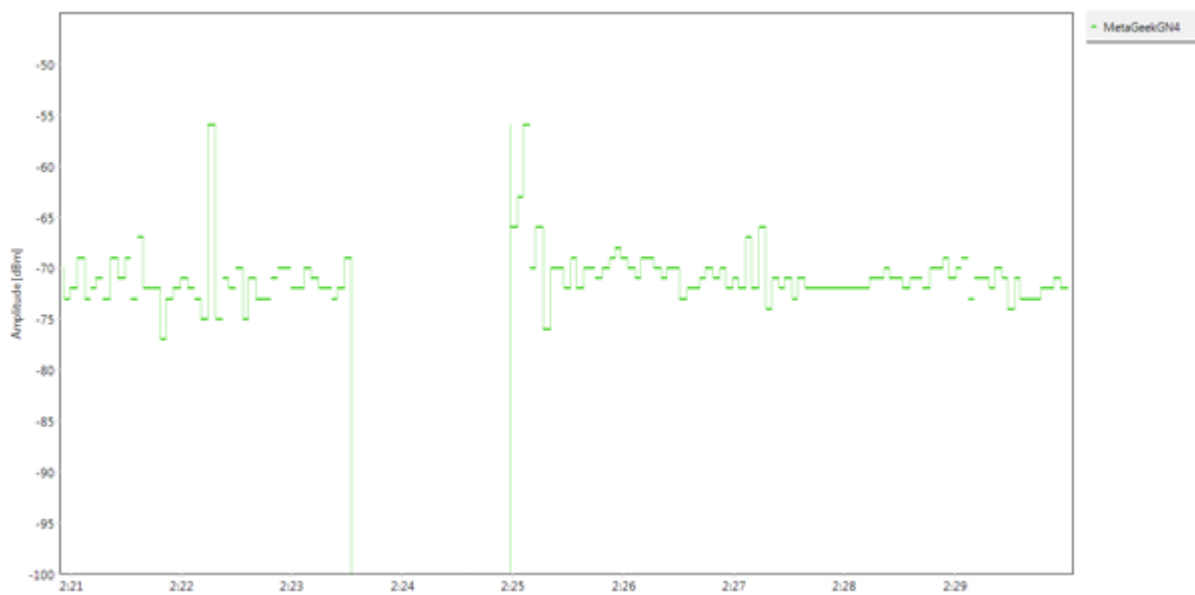
The Channel Table grades each Wi-Fi channel based on the RF activity within its given time span. This table is primarily used in pre-deployment of new wireless devices because it considers all RF noise occurring within Wi-Fi channels whether it is Wi-Fi or non-Wi-Fi.

The Channel Grade is a weight for each freq/amp point based on how close it is to the center of the channel and its amplitude.

The duty cycle is a relative score to help determine if a channel is usable or not. It measures how much RF activity is affecting the channel. It is weighted so that signals near the center of the channel have a greater effect on the duty cycle score.

The average is a measurement of the average power within the channel frequency range. The max value is the highest amplitude point captured within the Wi-Fi channel frequency range.

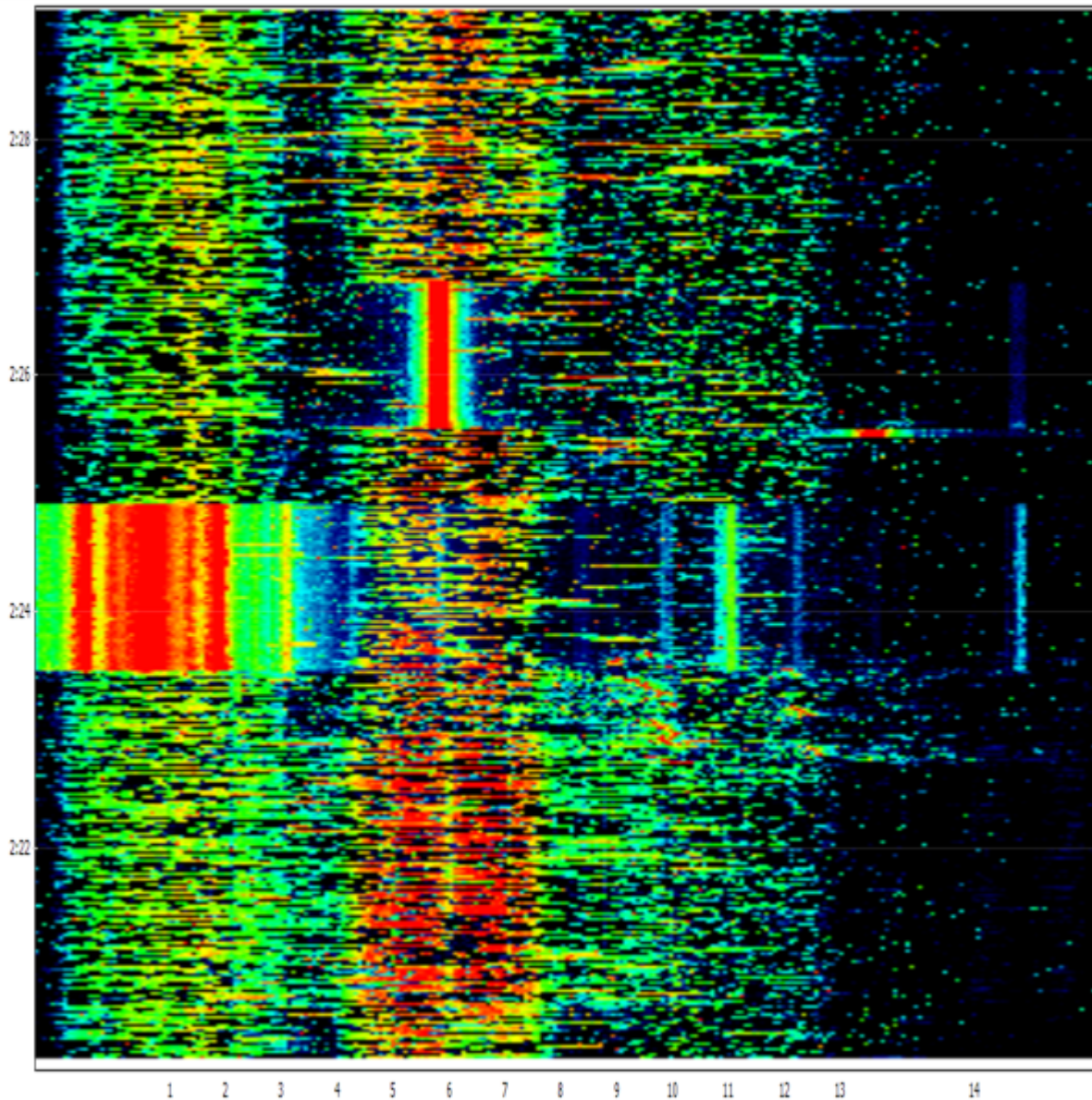
# Networks Graph



It looks like MetaGeekGN4 dropped out due to some interference.

The Networks Graph represents the Wi-Fi signal strength over time using data collected from the computer's Wi-Fi card. The signal strength represents the amplitude levels of transmit beacons received by the card. Drops in signal strength indicate poor signal coverage, and can be referenced against the spectrum data views (Waterfall and Density) to determine if interference is at fault.

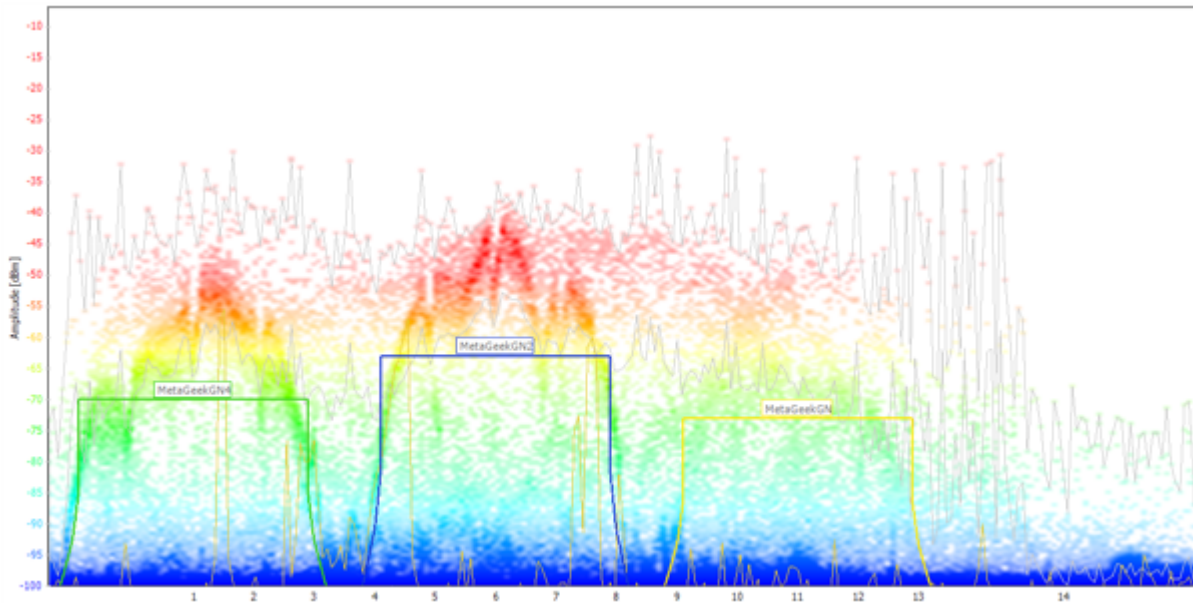
## Waterfall View



The Waterfall view shows amplitude over time for each frequency. Based on the timeframe, a row is added to the Waterfall view every X seconds or minutes. The color of each frequency/time coordinate represents the amplitude of that frequency, with dark blue representing low amplitudes and bright red representing high amplitudes as shown in the legend.

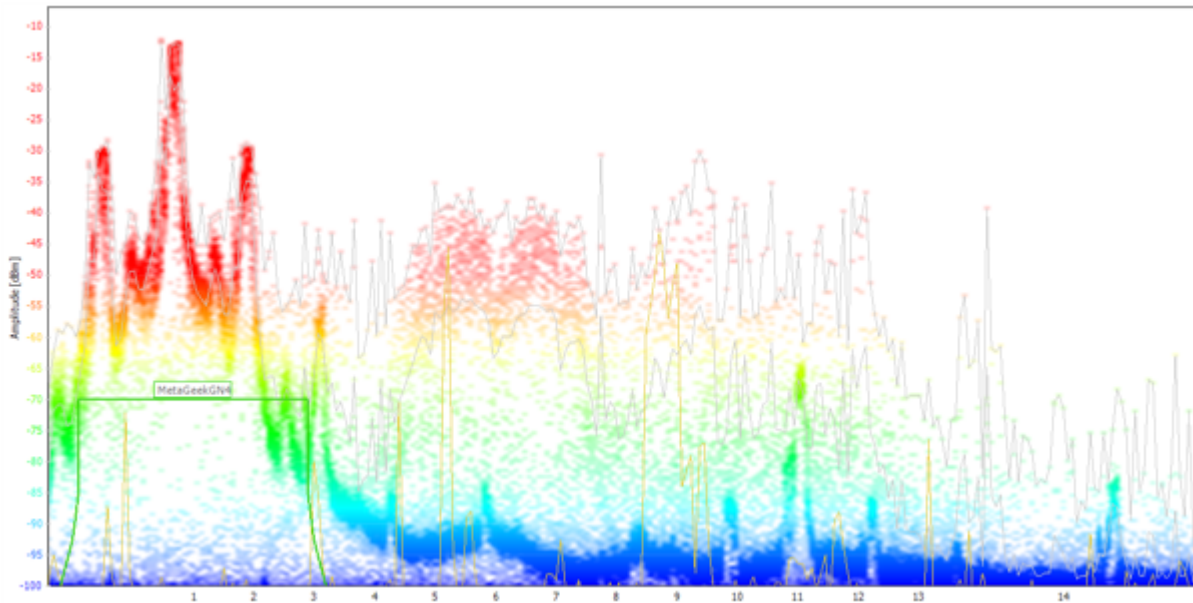
Here we see a few instances where the amplitude levels changed on Wi-Fi Channels 1 and 6 starting at about 2:23pm. By reviewing these higher amplitude ranges on Channel 1 we can determine what is causing the interference.

# Density View



This is a representation of interference-free Wi-Fi with the exception of some FHSS (frequency hopping) devices. The MetaGeekGN access point signals appear to have clean shapes. Below is an explanation of what this image is showing. The Density View maps and displays how often a frequency/amplitude point is being used. The less trafficked frequency ranges will appear more transparent. The colors represent amplitude height with reds indicating higher signals and darker blues lower power levels. An important feature of this view is that it picks up device-specific signatures which enables analysis of what types of electronics are emitting RF energy in the area.

# AV Transmitter Interference



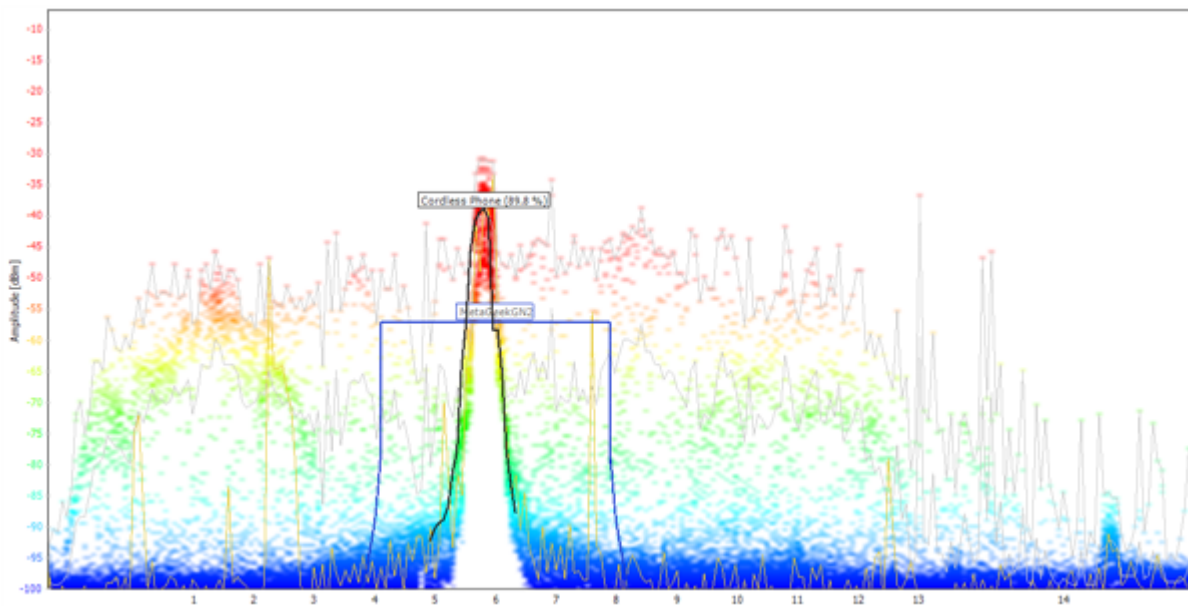
By narrowing in on the same range that MetaGeekGN4 dropped we can see that a AV transmitter turned on and caused the network to drop.

# AV Transmitter Interference Table.

Channel	Grade	Duty Cycle	Average	Current	Noise Floor	Access Points	Max
1	0.0	94.7%	-29.5	-29	-57.5	0	-24.0
2	0.0	74.9%	-30.0	-29	-63.5	0	-24.0
3	0.0	54.4%	-45.0	-46	-74.0	0	-35.5
4	20.4	36.1%	-46.5	-46	-81.0	0	-37.0
5	56.6	18.4%	-59.0	-58	-87.0	0	-36.5
6	70.6	11.3%	-58.5	-56	-90.5	1	-36.0
7	73.6	10.7%	-58.5	-56	-91.5	0	-36.5
8	81.1	7.8%	-61.0	-57	-93.0	0	-35.5
9	78.6	9.5%	-63.0	-58	-93.0	0	-36.0
10	79.3	8.1%	-66.0	-68	-93.5	0	-37.5
11	79.3	7.2%	-66.5	-80	-94.0	1	-36.5
12	83.3	6.4%	-68.5	-80	-94.5	0	-39.0
13	87.4	5.6%	-72.0	-79	-96.0	0	-42.0
14	97.9	0.2%	-79.5	-84	-99.5	0	-56.5

This Channels report is from when the AV Transmitter was on and broadcasting. It made Wi-Fi Channels 1-3 unusable. Please notice the low grade and high duty cycles it caused.

## Cordless Phone Interference



It appears a cordless phone turned on over MetaGeekGN2 and caused some interference as well.

## 5 GHz Overview

The 5 GHz band contains 24 non-overlapping channels which gives it a significant advantage over the 2.4 GHz band's three. With more channels to choose from, interference avoidance is as simple as choosing an unused channel. Additionally, fewer electronic devices use 5 GHz, meaning Wi-Fi access points operating in this frequency range have less RF signals to battle against.

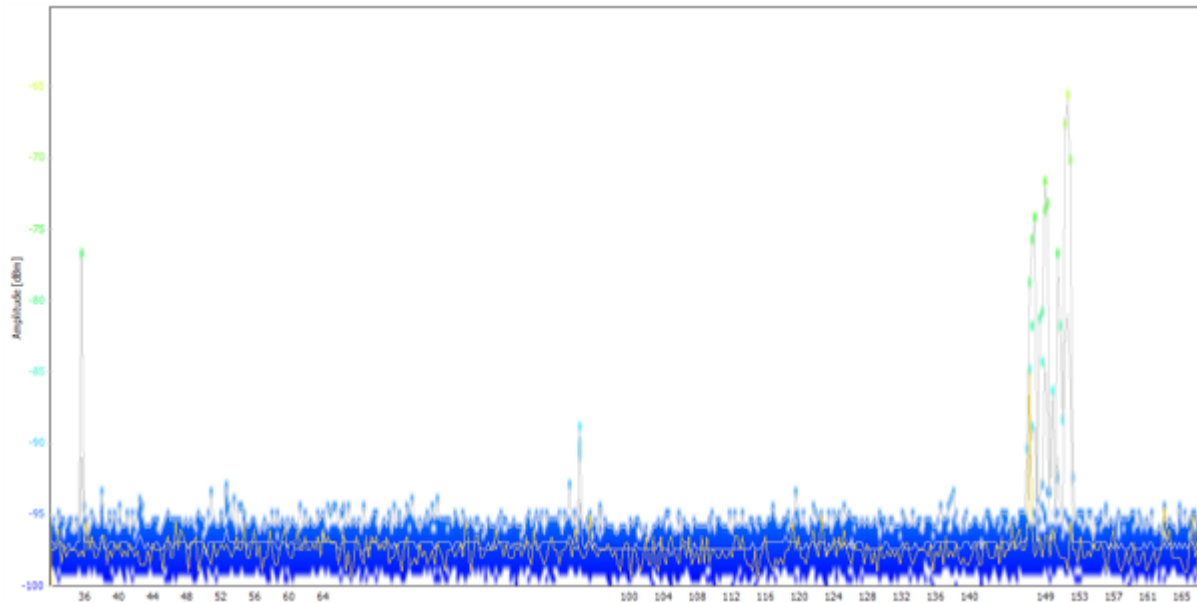
Even though 5 GHz has many more channels available and is relatively quiet, it is widely believed that it is just a matter of time before this band is highly congested much like the 2.4 GHz band.

## 5GHz Overview

Channel	Grade	Duty Cycle	Average	Current	Noise Floor	Access Points	Max
36	99.6	0.2%	-96.5	-97	-100.5	0	-87.5
40	100.0	0.0%	-97.0	-97	-100.5	0	-95.5
44	100.0	0.0%	-97.0	-98	-100.0	0	-95.5
48	100.0	0.0%	-97.0	-97	-100.5	0	-95.5
52	100.0	0.0%	-97.0	-97	-100.0	0	-95.0
56	100.0	0.0%	-97.0	-97	-100.5	0	-95.5
60	100.0	0.0%	-97.5	-97	-100.5	0	-95.5
64	100.0	0.0%	-97.0	-97	-100.0	0	-95.5
100	100.0	0.0%	-97.5	-98	-100.5	0	-96.0
104	100.0	0.0%	-97.5	-97	-100.5	0	-96.0
108	100.0	0.0%	-97.5	-97	-100.5	0	-96.0
112	100.0	0.0%	-97.5	-97	-100.5	0	-96.0
116	100.0	0.0%	-97.0	-98	-100.0	0	-95.5
120	100.0	0.0%	-97.0	-97	-100.5	0	-95.5
124	100.0	0.0%	-97.5	-97	-100.0	0	-95.5
128	100.0	0.0%	-97.5	-98	-100.5	0	-95.5
132	100.0	0.0%	-97.5	-98	-100.5	0	-95.5
136	100.0	0.0%	-97.0	-97	-100.0	0	-95.5
140	100.0	0.0%	-97.0	-98	-100.5	0	-95.5
149	96.1	1.6%	-90.5	-94	-99.5	0	-77.5
153	99.0	0.6%	-89.0	-97	-100.0	0	-74.5
157	100.0	0.0%	-97.5	-98	-100.5	0	-95.5
161	100.0	0.0%	-97.5	-98	-100.5	0	-96.0
165	100.0	0.0%	-97.5	-97	-100.0	0	-95.5

The Channels Table shows the 5GHz as almost entirely free.

## 5GHz is open.



If interference is causing a loss in productivity, the 5GHz is almost completely unused. There is only one 802.11a access point on channel 149.

## Report Conclusion

The AP named "Homestar" should be investigated and treated as a possible Rogue access point.

There are 2 devices that cause Wi-Fi interference. The AV transmitter brings down the MetaGeekGN4 access point on channel 1. The cordless phone appears to avoid other transmitters, but occasionally will cause Wi-Fi interference on all channels.

I recommend removing both of these devices or upgrading to a 802.11a/n network in the 5GHz band.