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What *Do* Your Users Need?

Data Driven Decision Making For ISPs

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Co-founder

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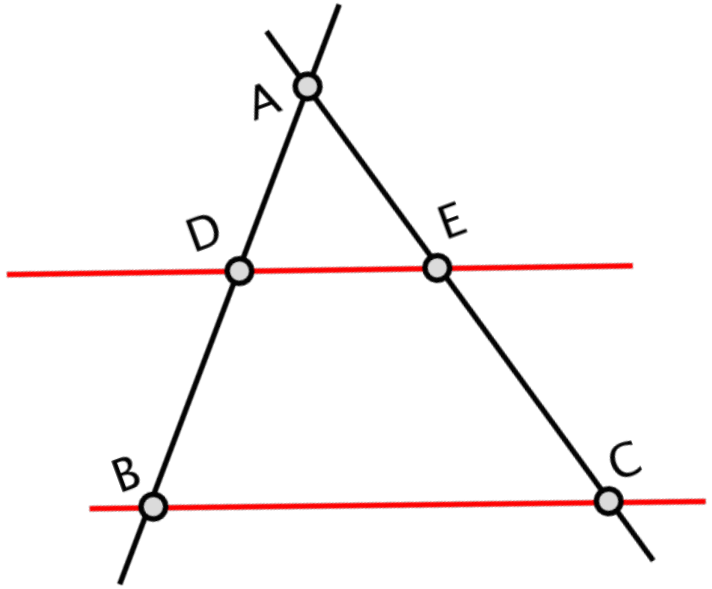
The Golden Age

Around 600 BC, Thales of Miletus ushered in the Data Age.



The Problem

FoW

You have $X

Fixed (sort of)

- Budget
- Unanticipated stuff

Users need Y

Guesstimate based on:

- Visionaries
- Instinct
- Qualitative surveys

The Solution

Real User Data

You have $X

Users need Y

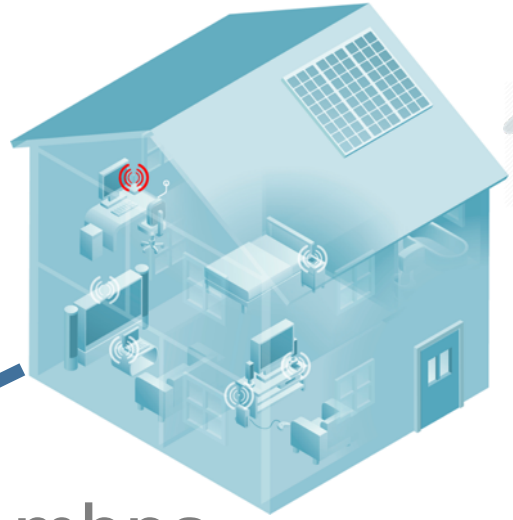
Fixed (sort of)

- Budget
- Prioritized stuff

Knowledge based on:

- Data
- Analytics
- Closed-loop fixes

Today



Few mbps @LAN

100 mbps @WAN

I have the 100mbps package, why is my internet slow?

Can you reset your modem?

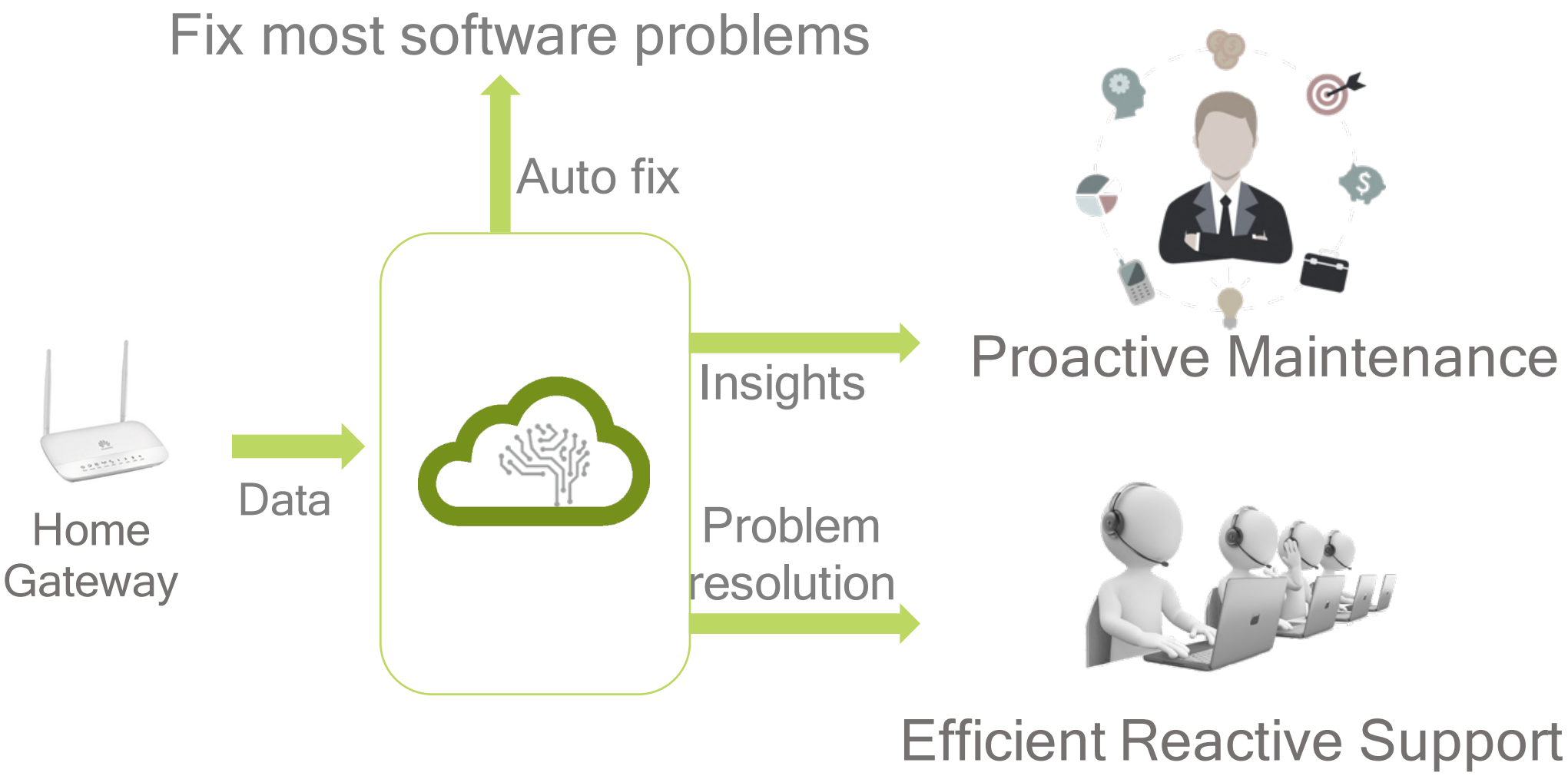
25 minutes call
Reset
Repeated call
CPE replaced
Line check
Field Tech visit
Unhappy customer
Churn

Unhappy User

Long support calls
Extra tech visits

Churn candidate

Tomorrow


Fix most software problems
Auto fix
Home Gateway
Data
Insights
Proactive Maintenance
Problem resolution
Efficient Reactive Support

The Dawn of AI

- In 2015, DeepMind's AlphaGo could beat a pro Go player
- In 2017, it beat the top ranked pro Go player
- AlphaGo uses a MC tree search of ANNs
- Still far from a "artificial **general** intellingence"

Levels of Magic

Simple rules (“find DoS attacks”)

Force multiplier for complex rules (“find other broken gateways”)

Force multiplier that can map across complex rules (“find other unhappy users”)

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Individual Decisions

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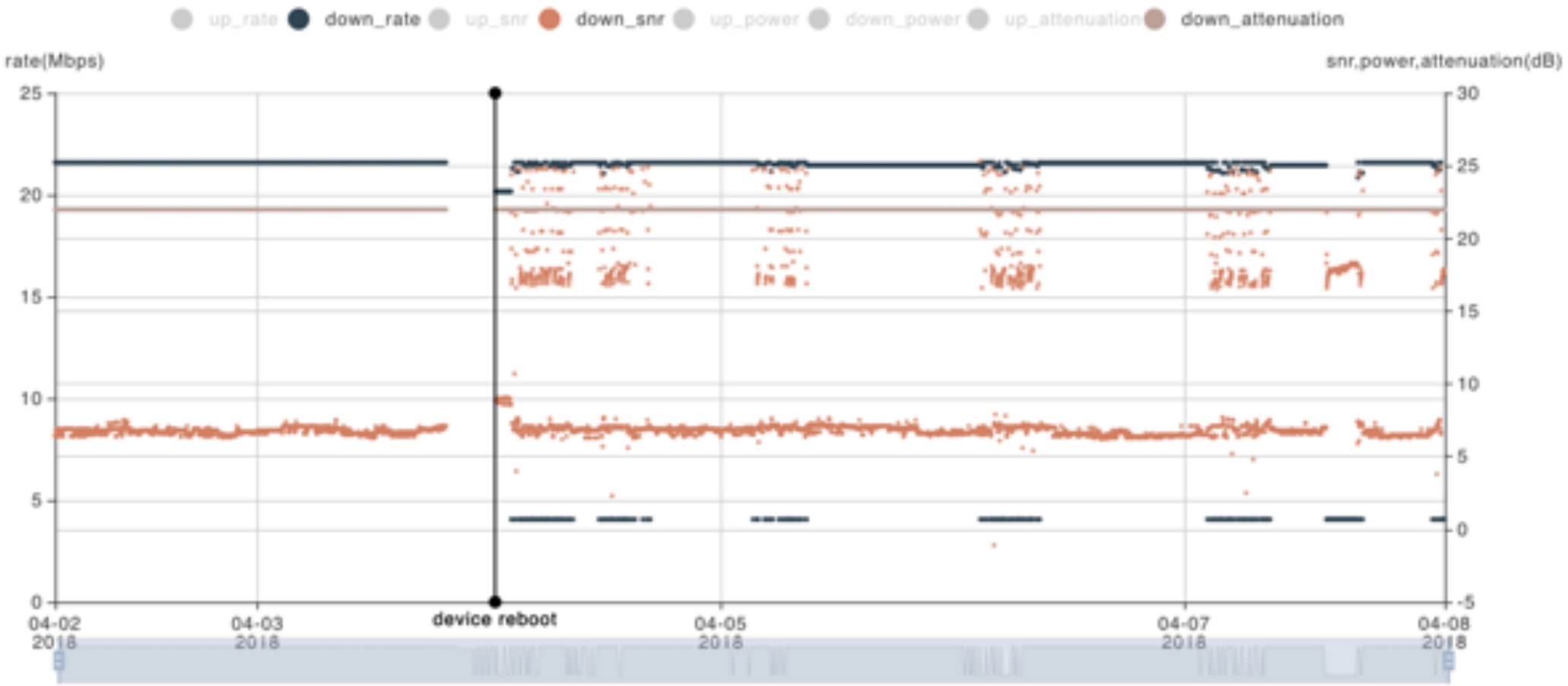
“It never works”

Problem: Mistaken Device Replacement

75% of replaced CPEs turn out to be non-defective

(You just wasted a CPE, and the problem **remains unsolved**)

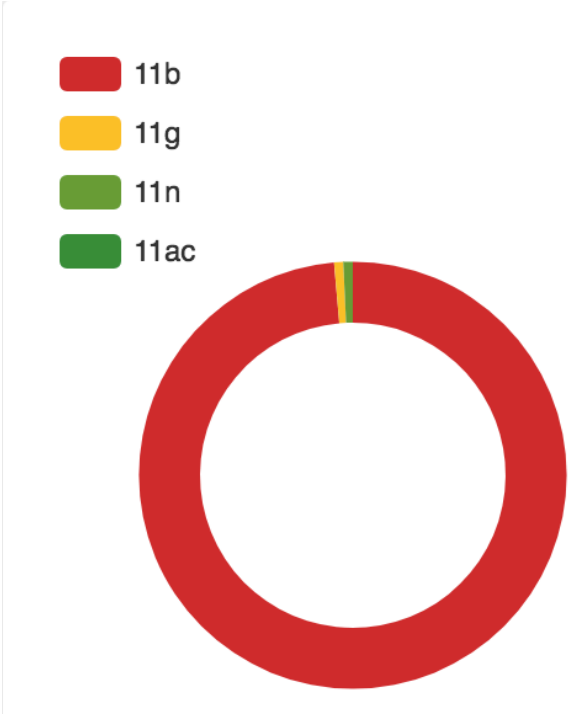
Could Be WAN

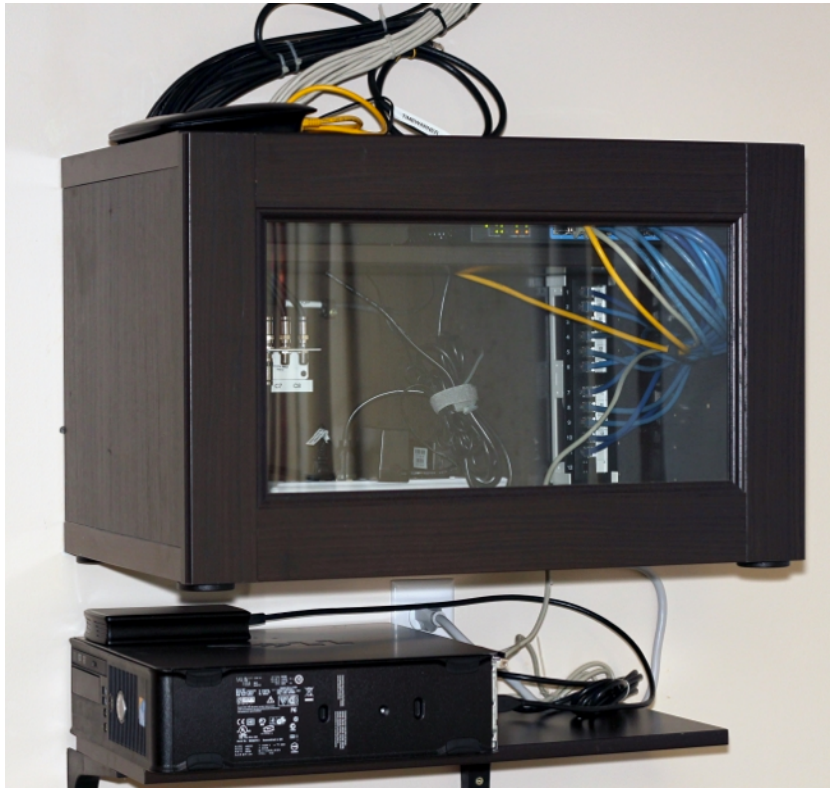


DSLAM bug.

Fix: DSLAM ticket ☺

Could Be Placement

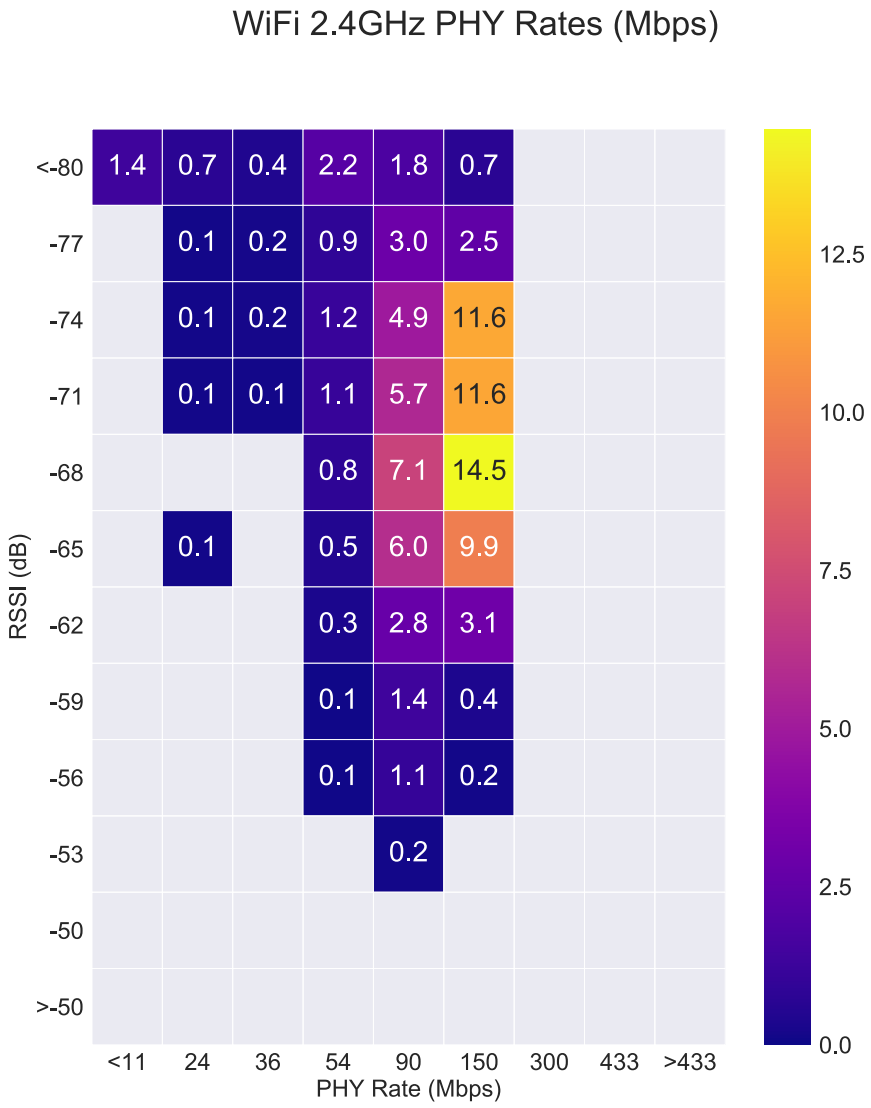


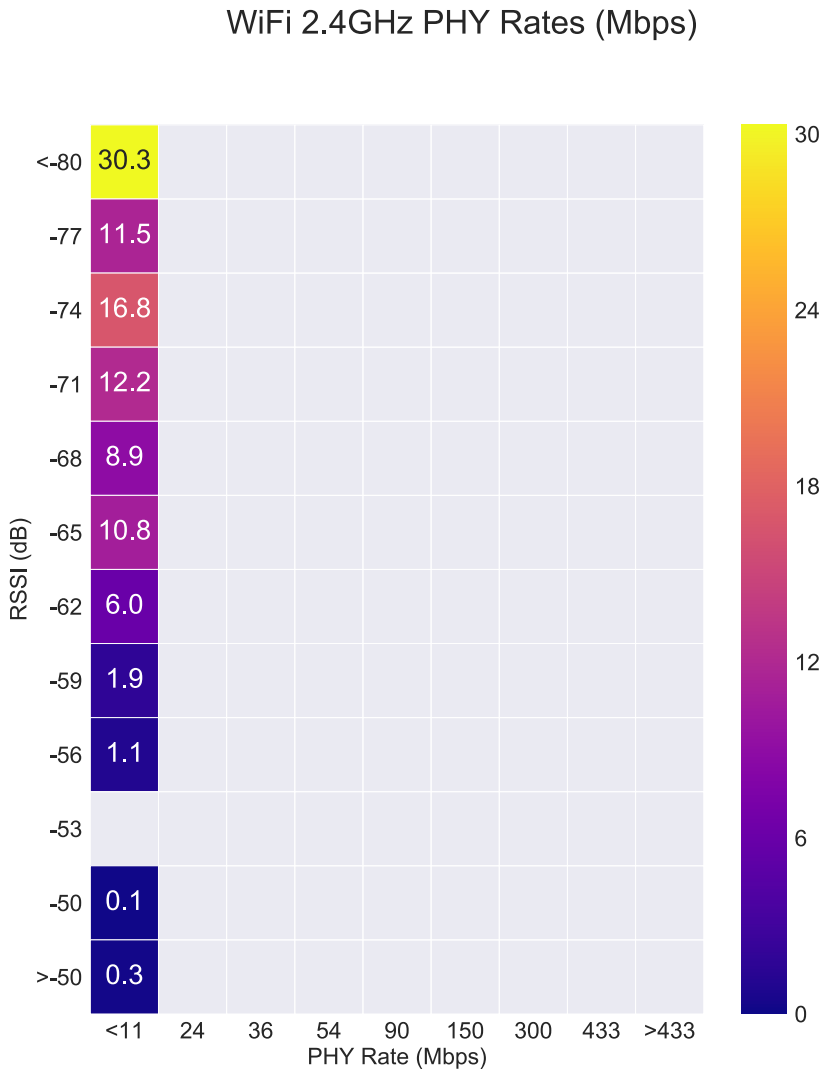


Gateways may be placed in cabinets or behind TV's, creating coverage "shadows"

Fix: move GW, or Ethernet AP

Solution: Identify Defective CPEs In Field





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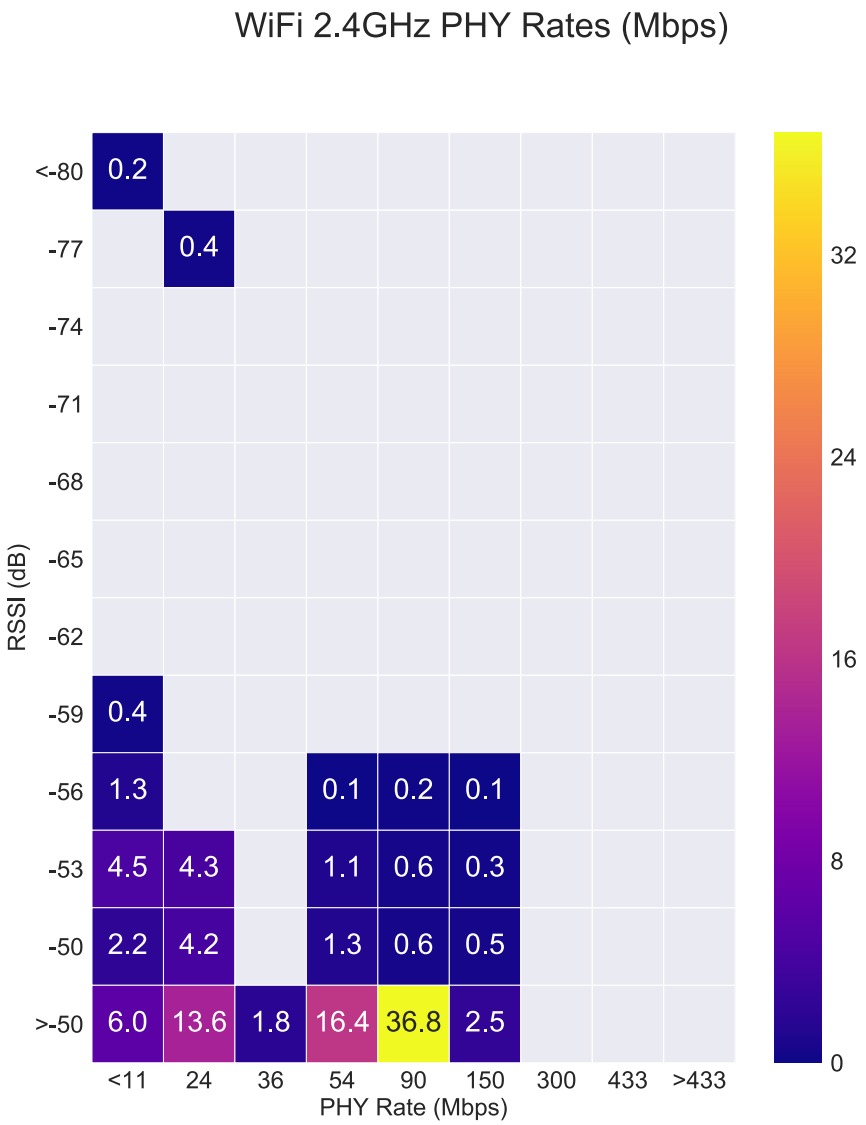
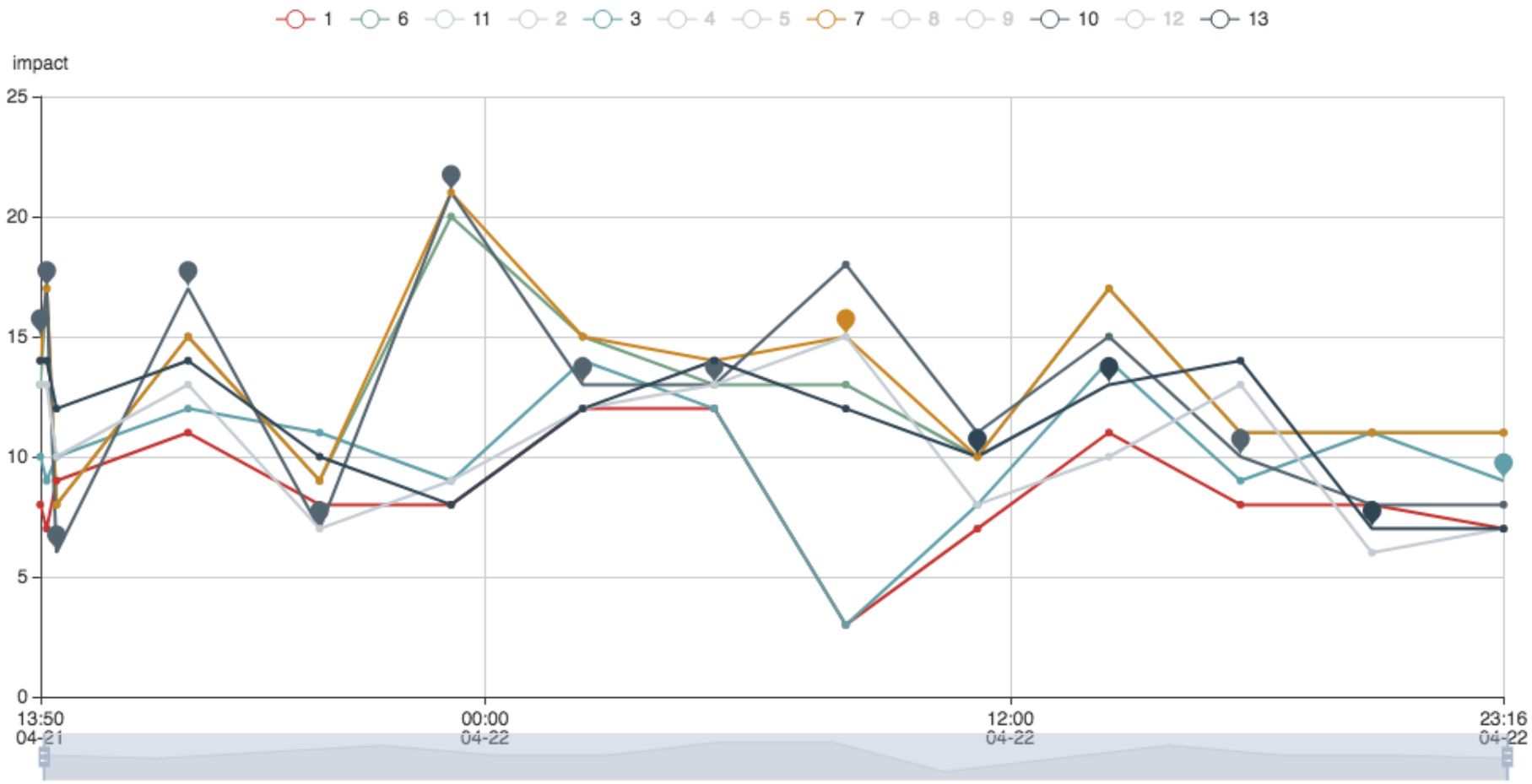
“It sometimes works”

Problem: 2G Interference

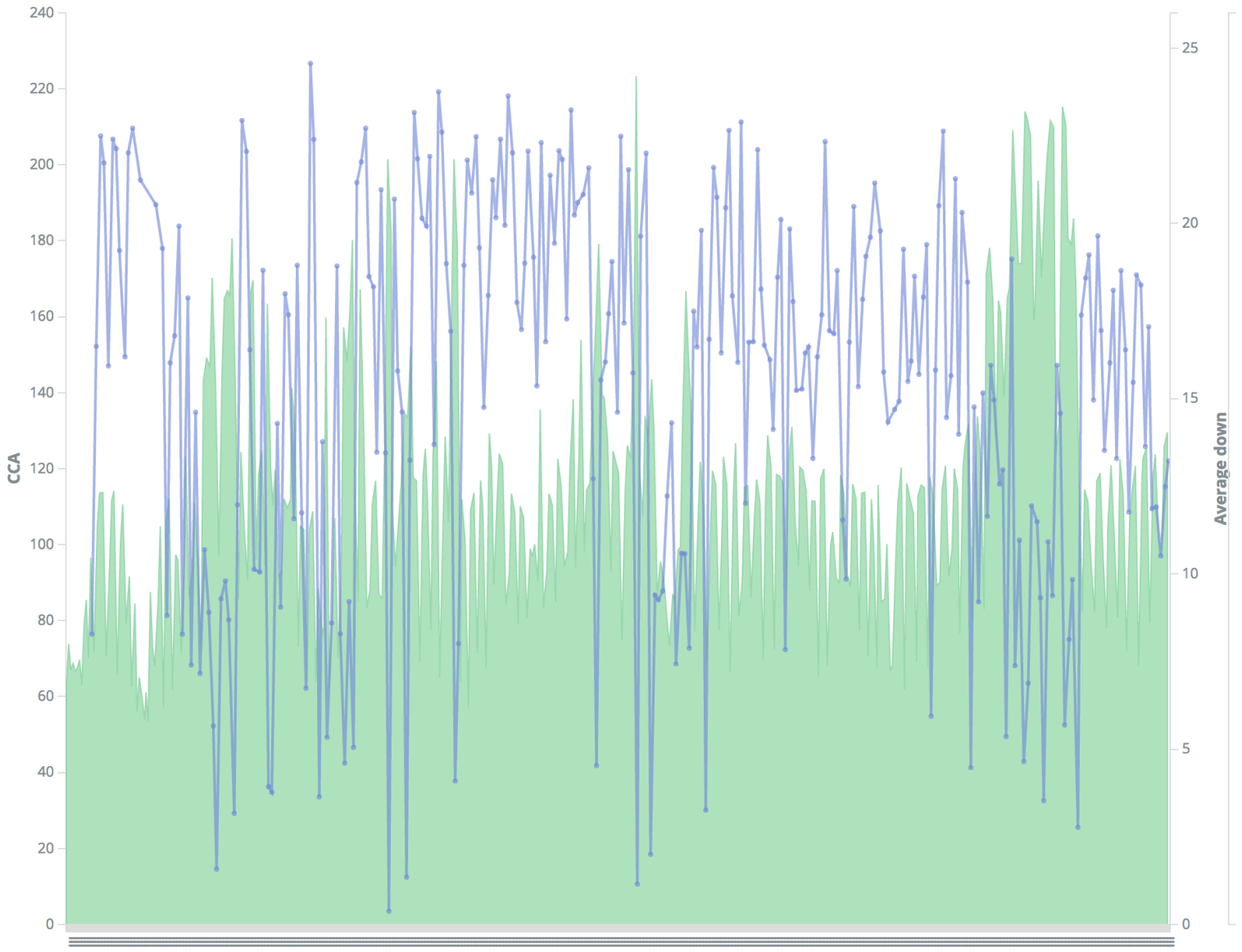


Could Be Congestion



Neighbors can cause both **contention** and **collision**

Effect Of Congestion



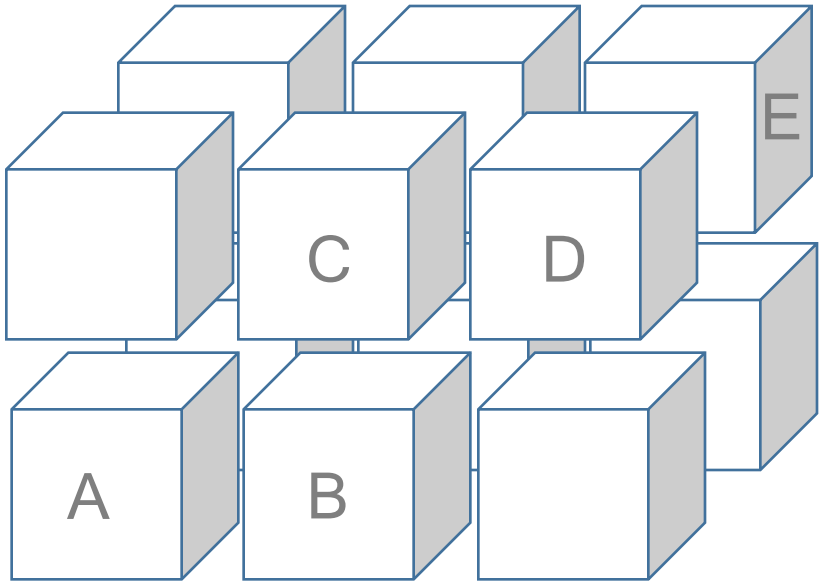
Busy channels can dramatically drop speeds from time to time

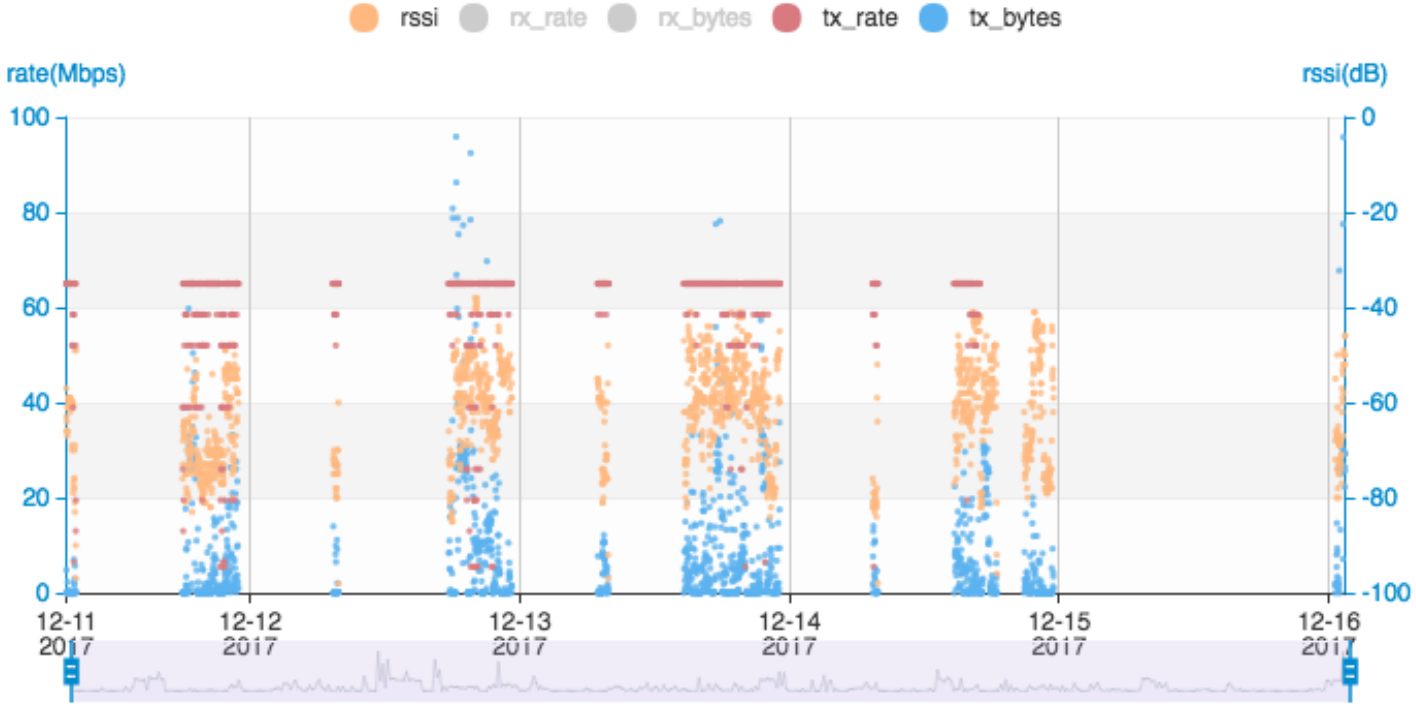
Could Be Hidden Nodes

= RSSI
↑ Packet losses
↑ Retransmissions
↓ PHY rate
↓ Throughput

Neighbors modem can't hear my modem, but their phone can - blindly sent packets collide

Solution: Very Smart Channel Planning





Dense urban areas need planning based on specific usage patterns – heavy users' peak times will be on different channels

Need to set:

- Frequency [activity]
- Power [coverage]
- RTS/CTS [efficiency]

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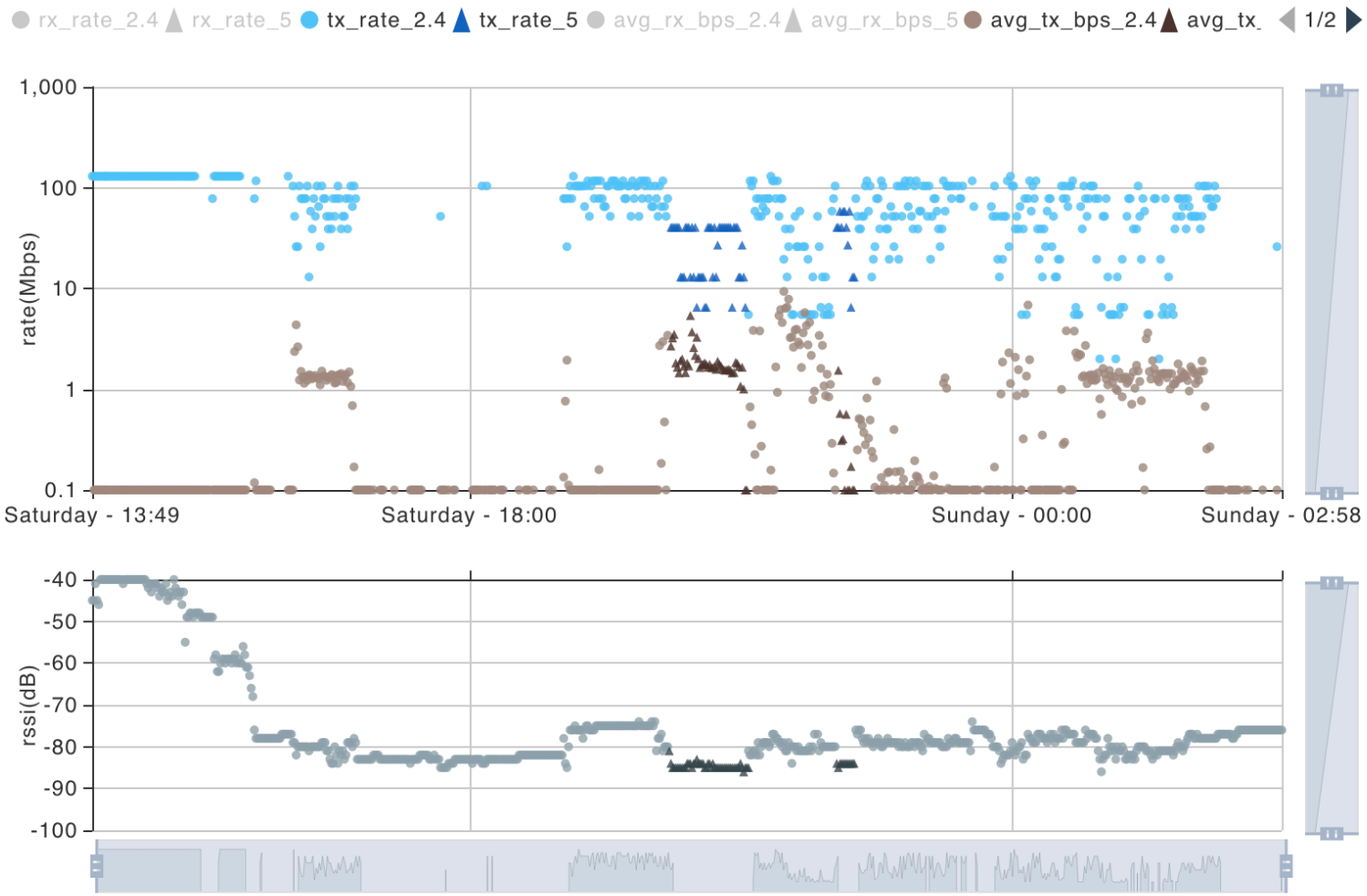
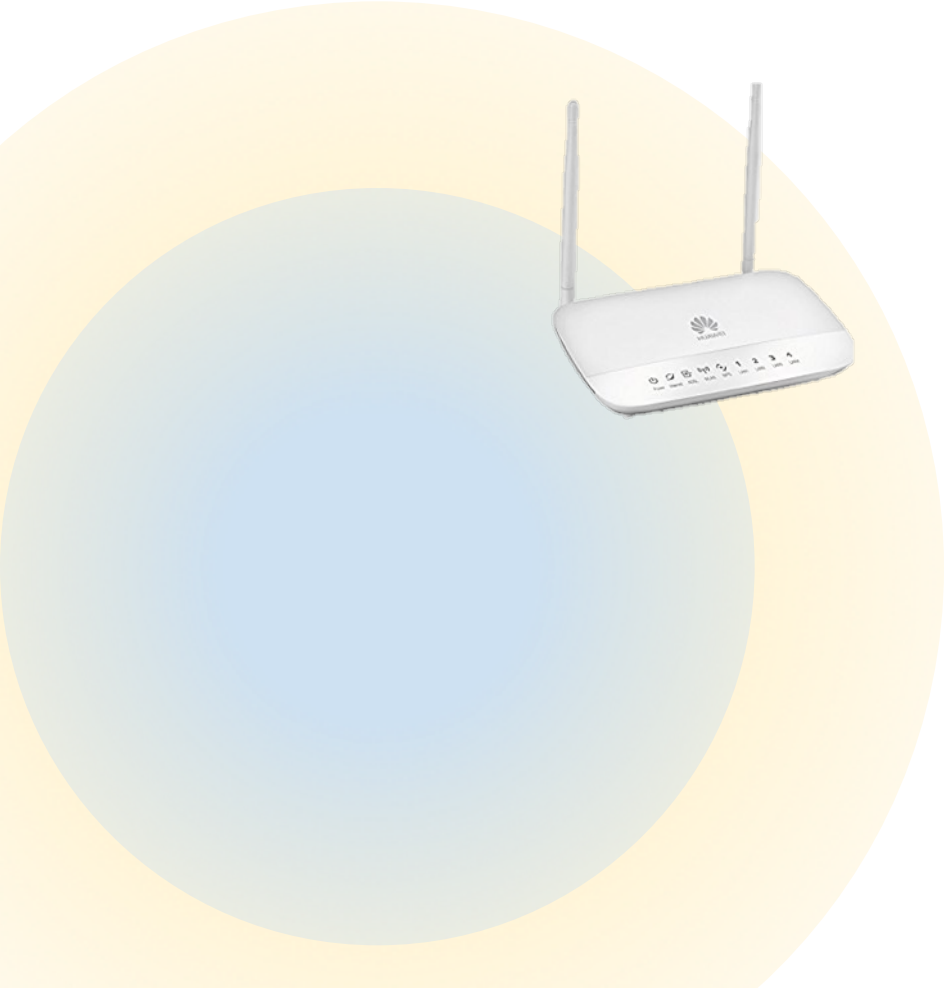
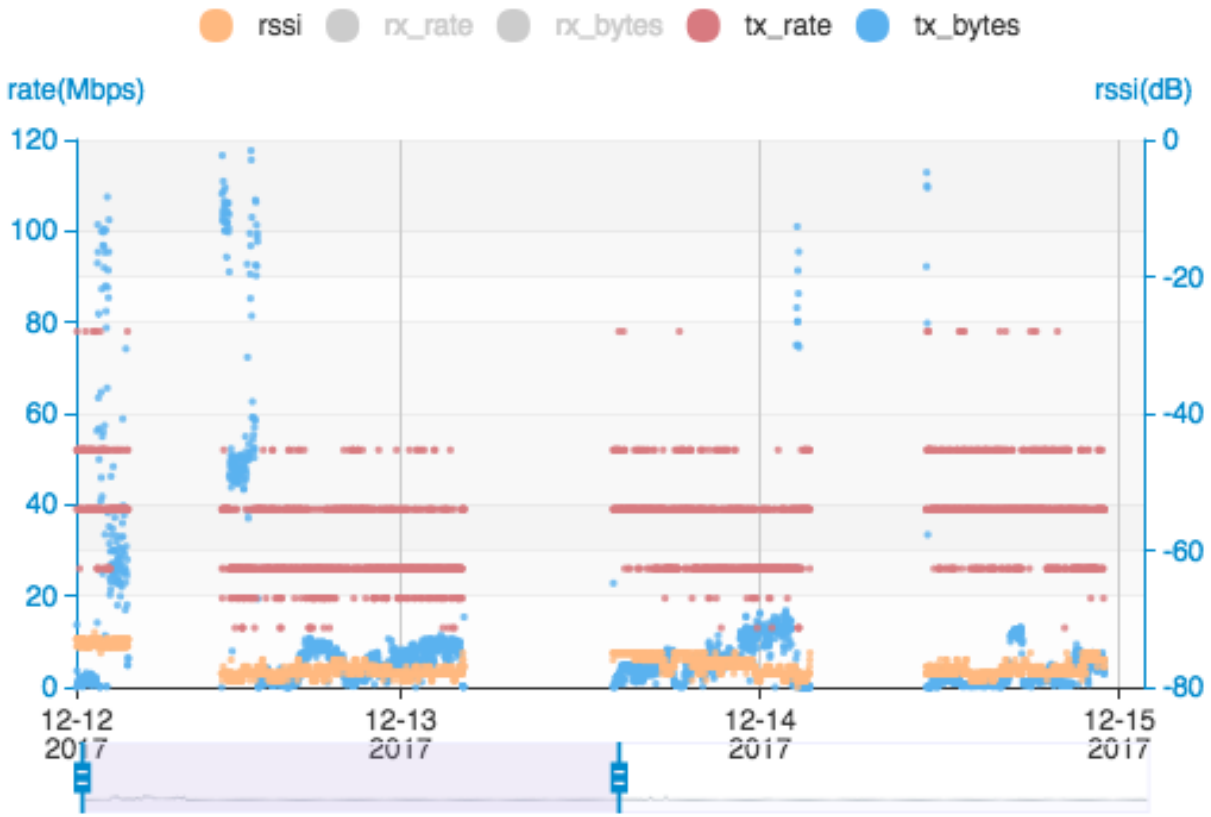
“It only works in the living room”

Problem: Poor Range Performance



Could Be A Distant Repeater



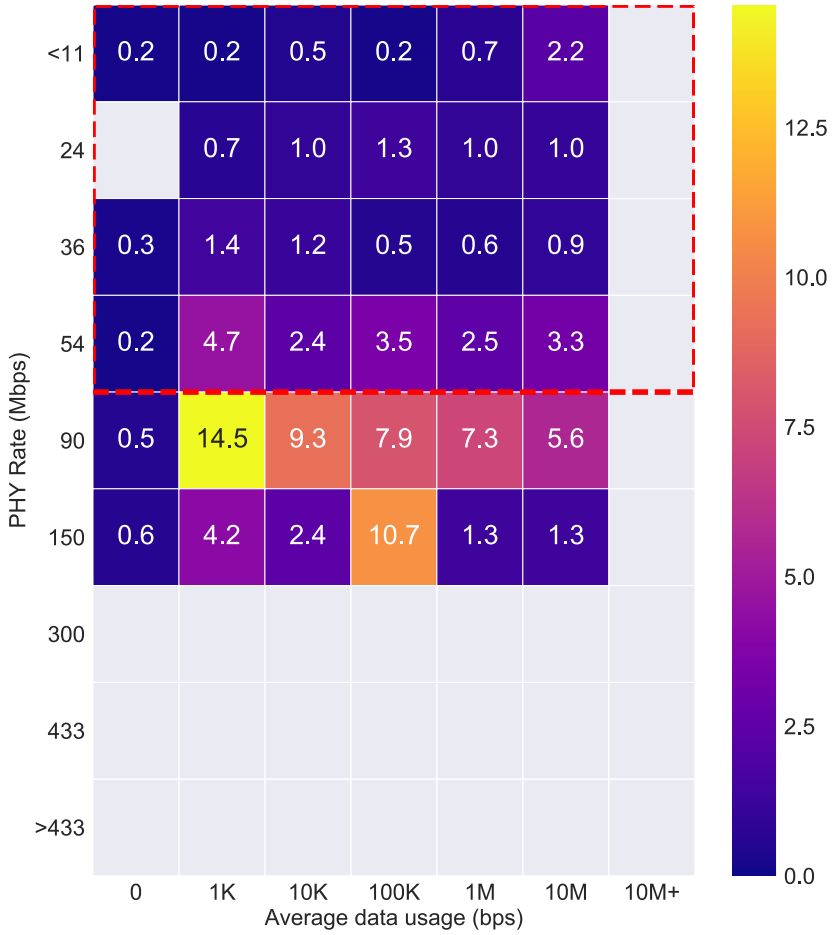


Many subscribers place repeaters where WiFi is weak, or too close to the GW

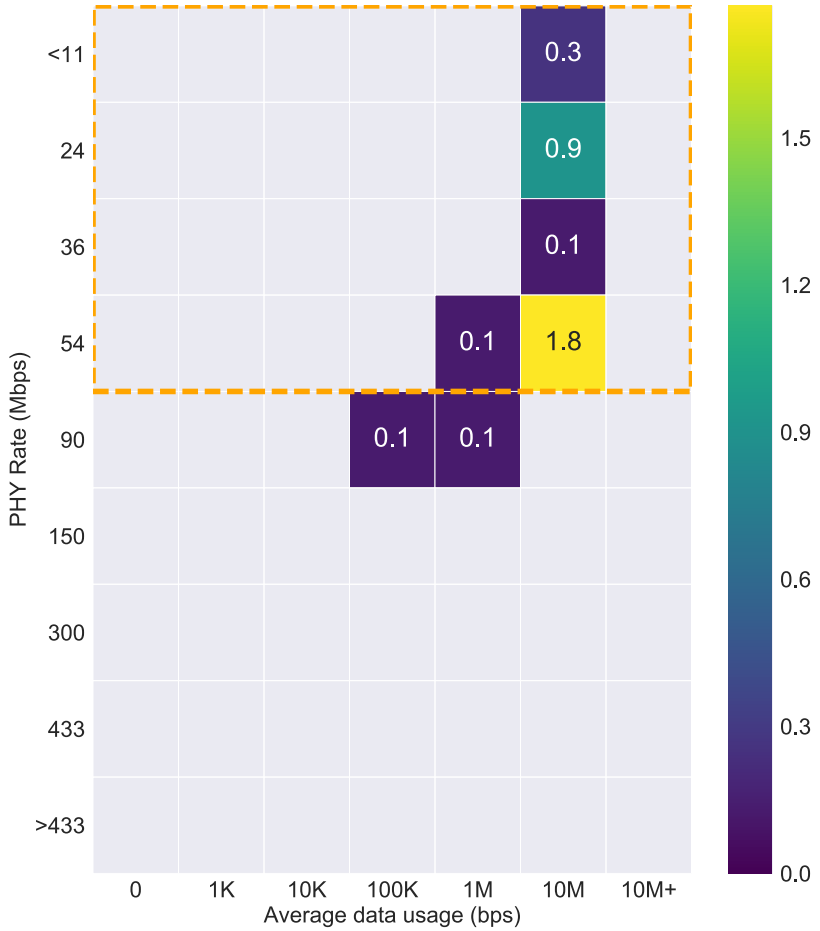
Fix: Tell user to move repeater 1 room

Could Be Plain Poor Coverage

96% of data used from 2.4 GHz



4% of data used from 5 GHz



Fix: Repeater of Multi-AP

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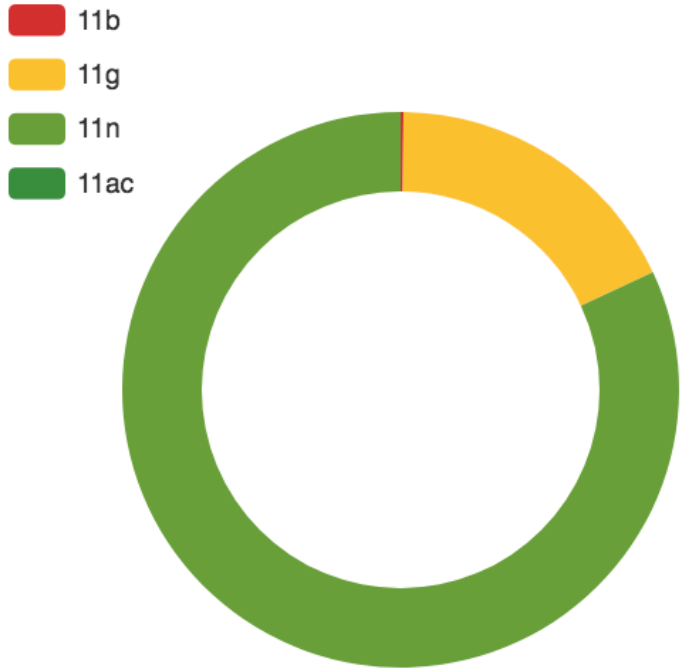
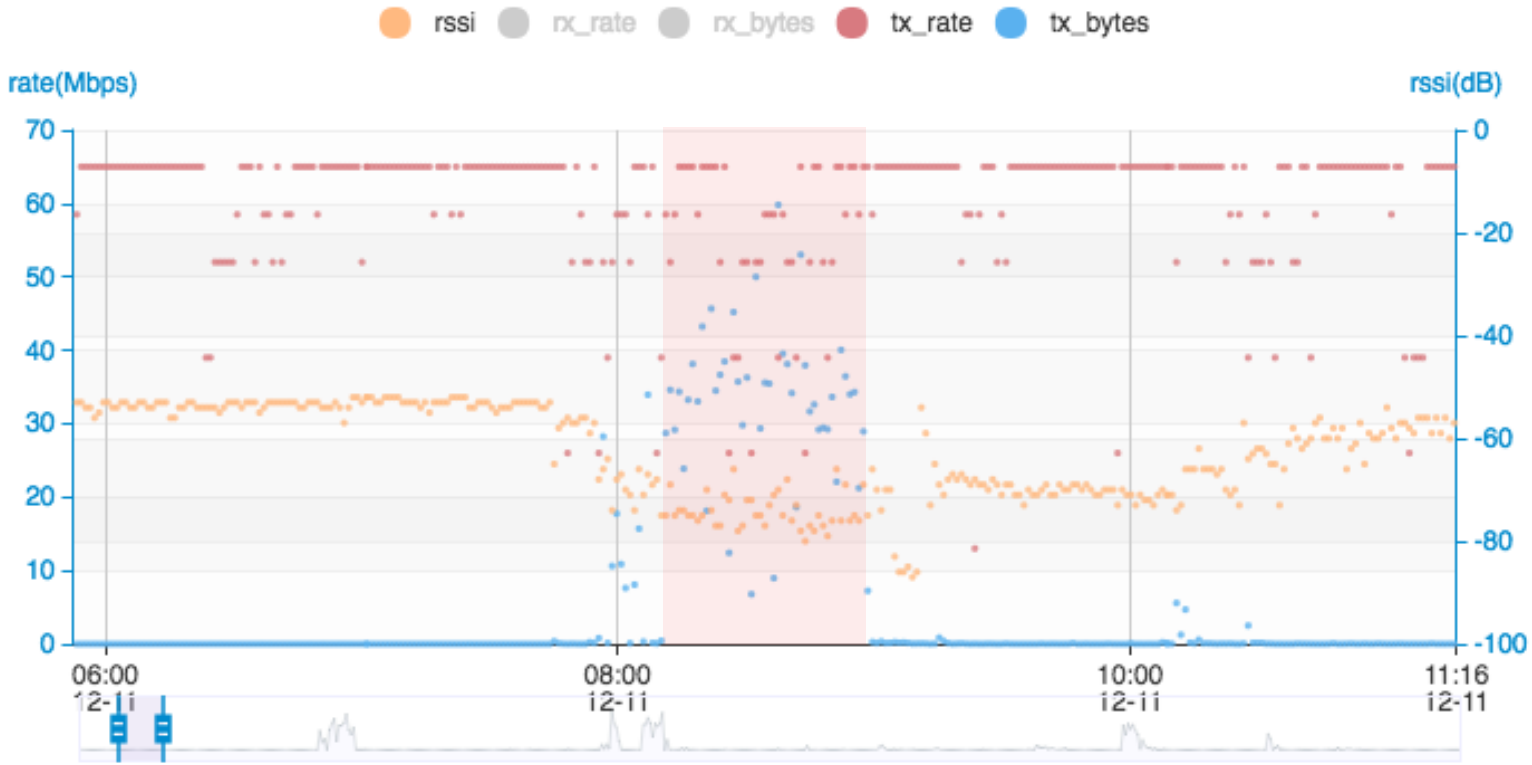
“My video looks awful”

The Problem: Roaming Video Viewing





User was watching video, but then a PHY rate dip caused a drop in streaming rate. Quality drops in video are more noticeable than constant low quality.

Fix: Better coverage.

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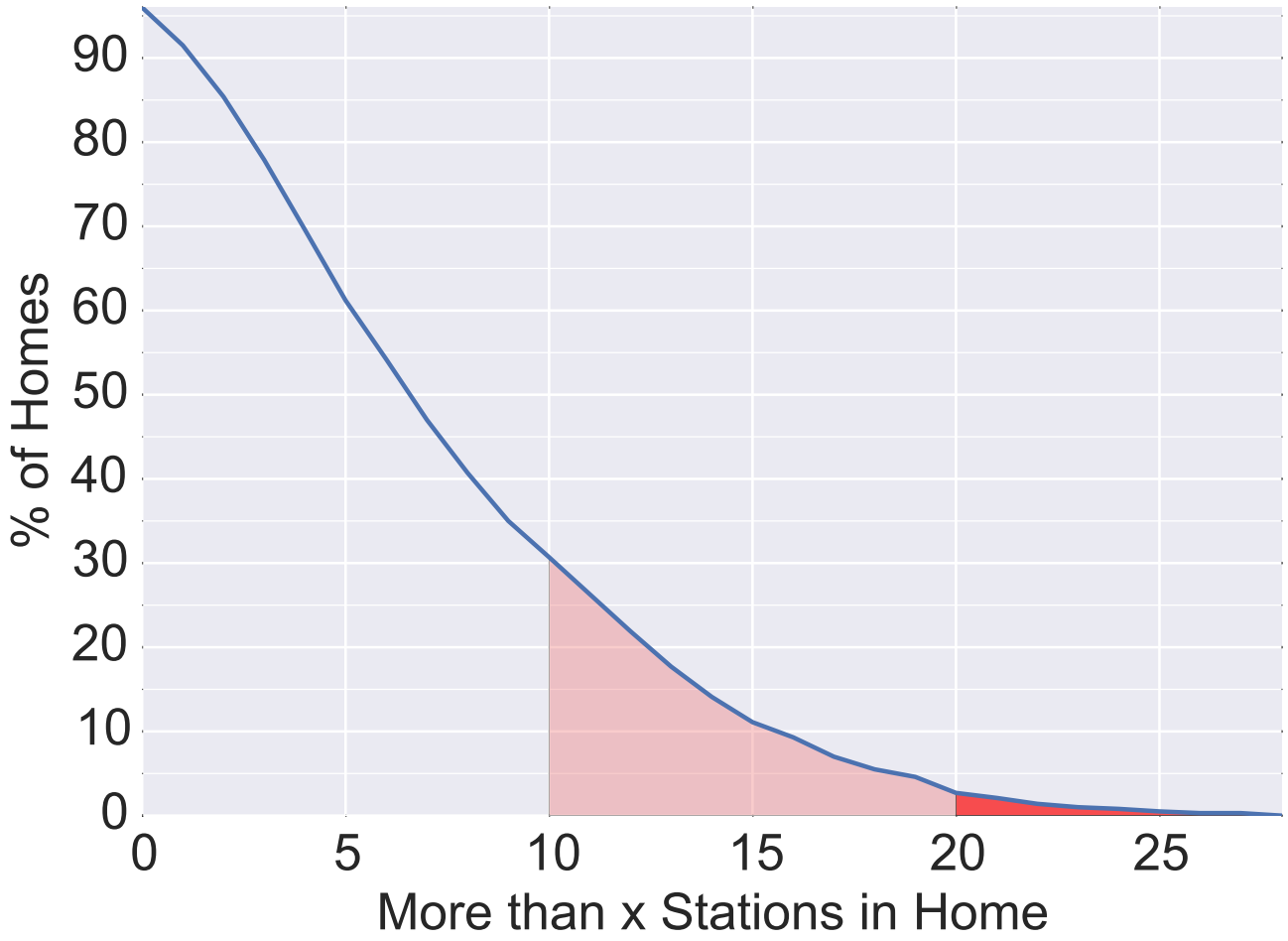
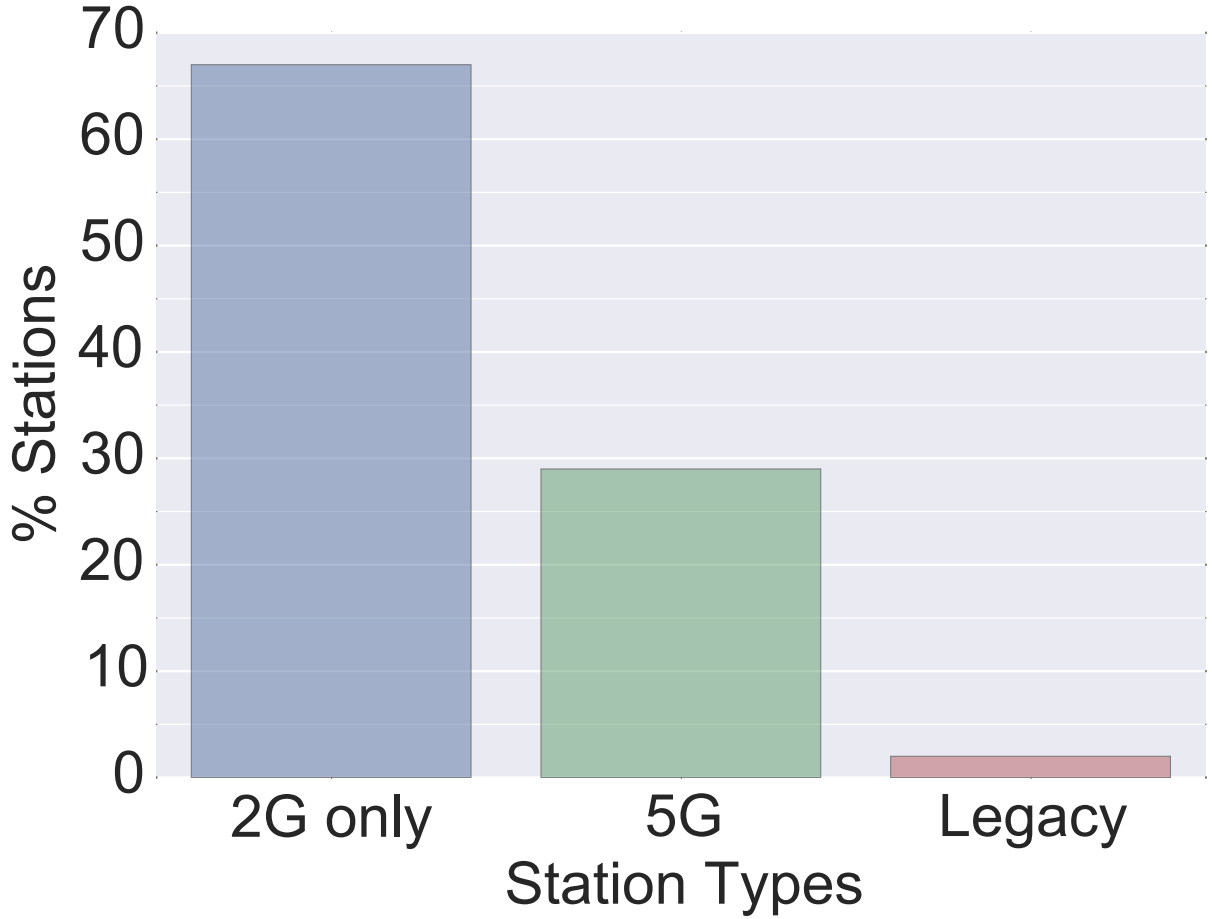
Population Analytics

Your Users



Action: Prioritize heavy users with many concurrent clients

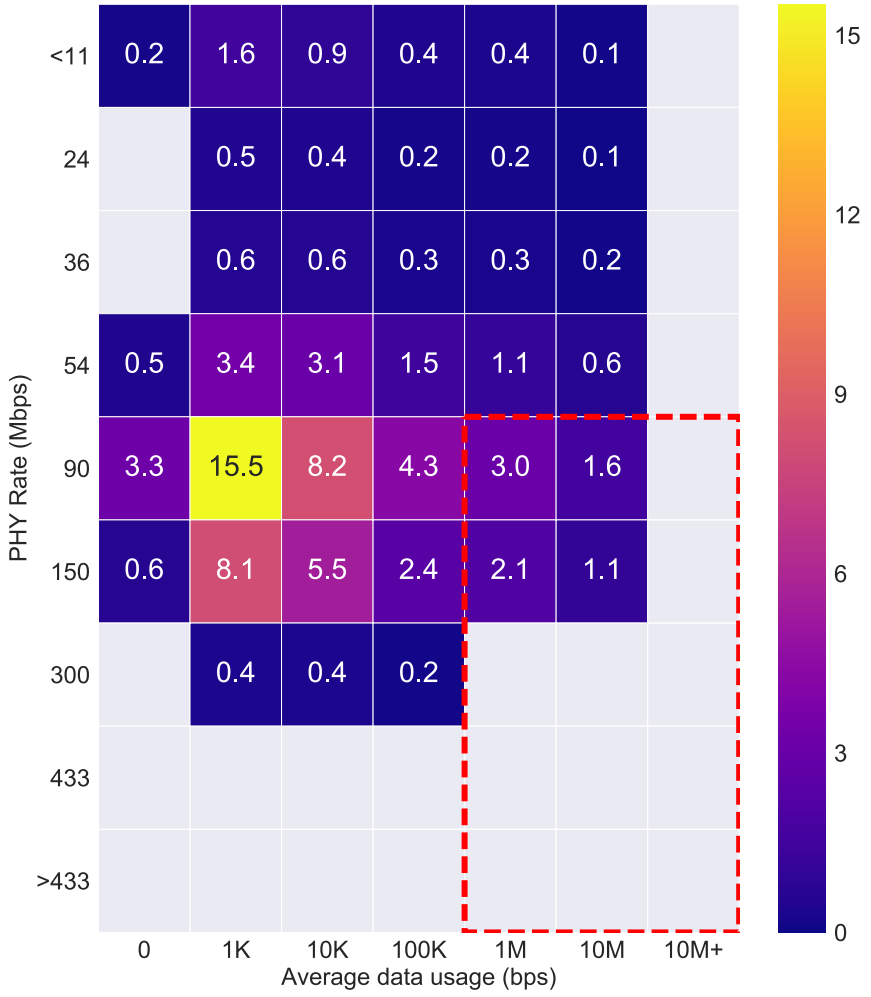
Your 5 GHz ROI



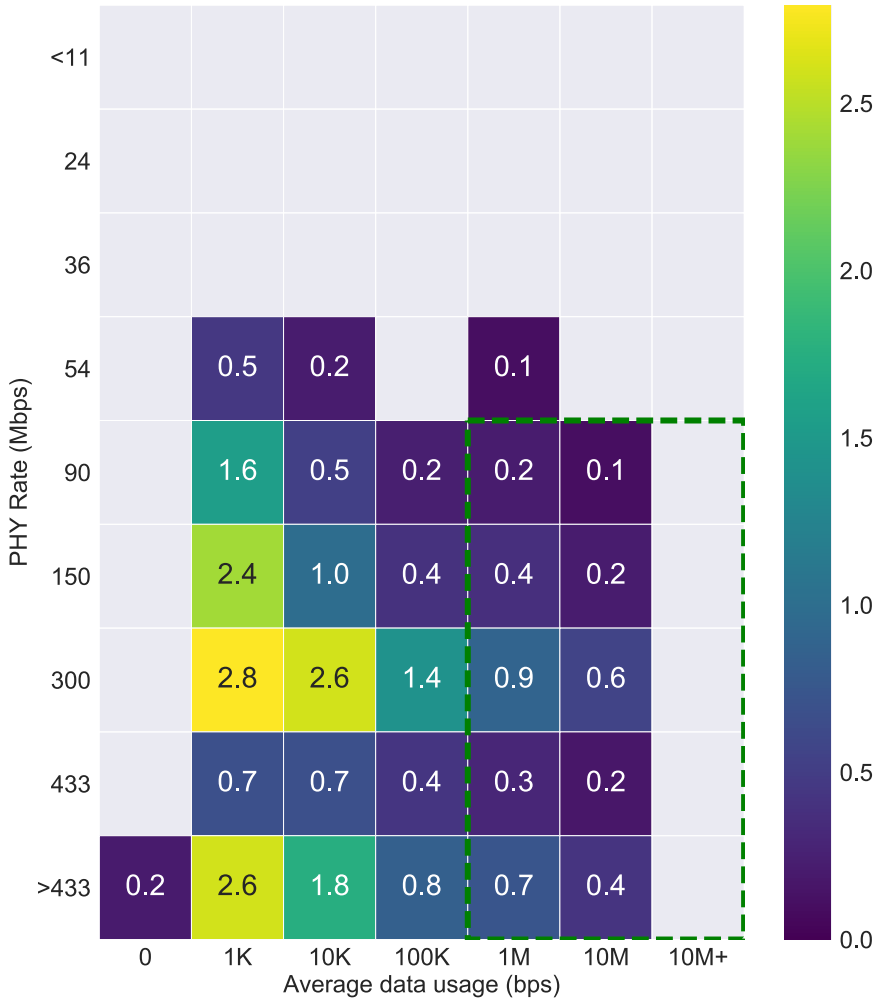
Action: Heavy users must be educated about 5 GHz

Your Future 5 GHz ROI

74% of data used from 2.4 GHz

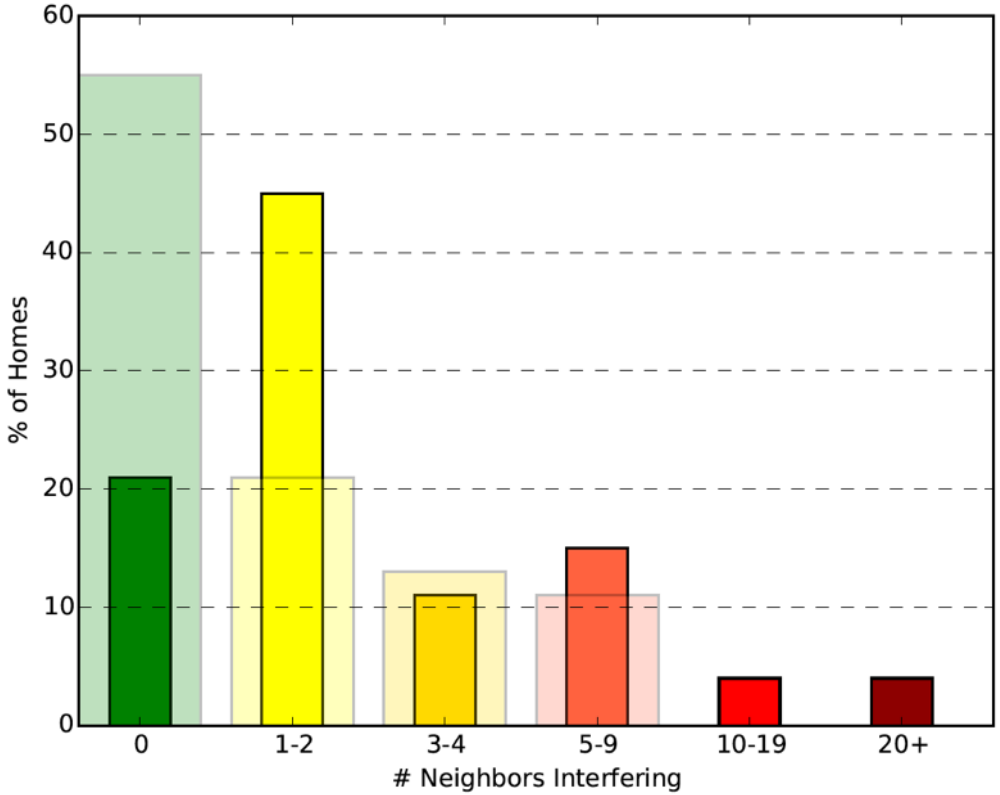


26% of data used from 5 GHz

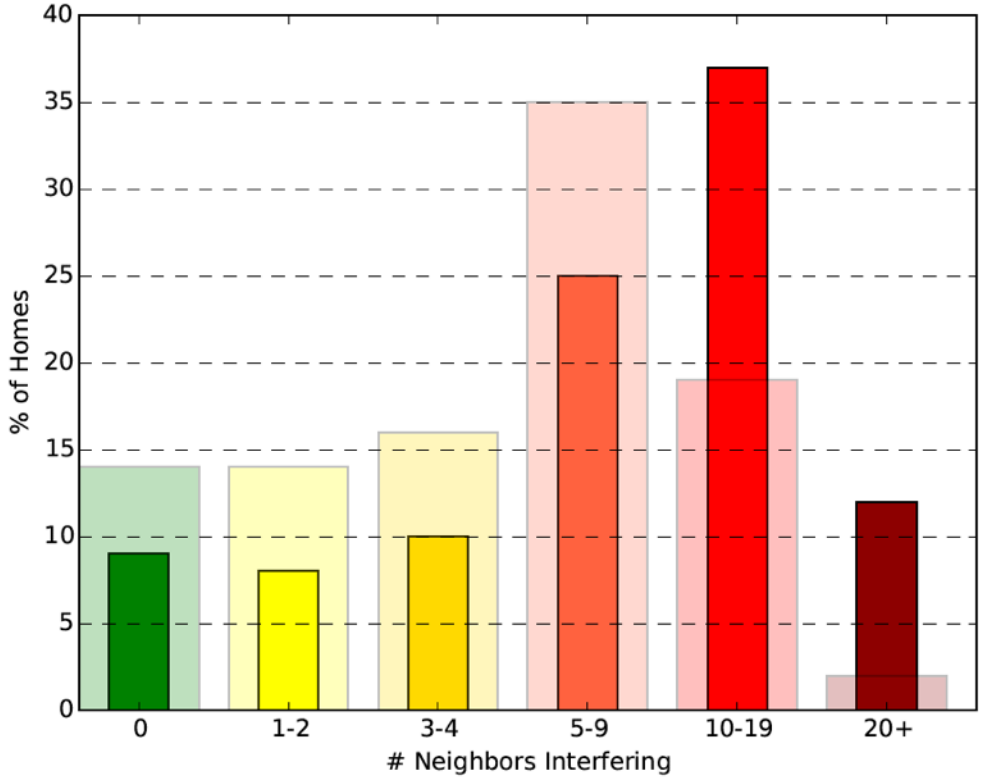


Future Action:
Soft Band Steering in good coverage homes

Your Urban Congestion



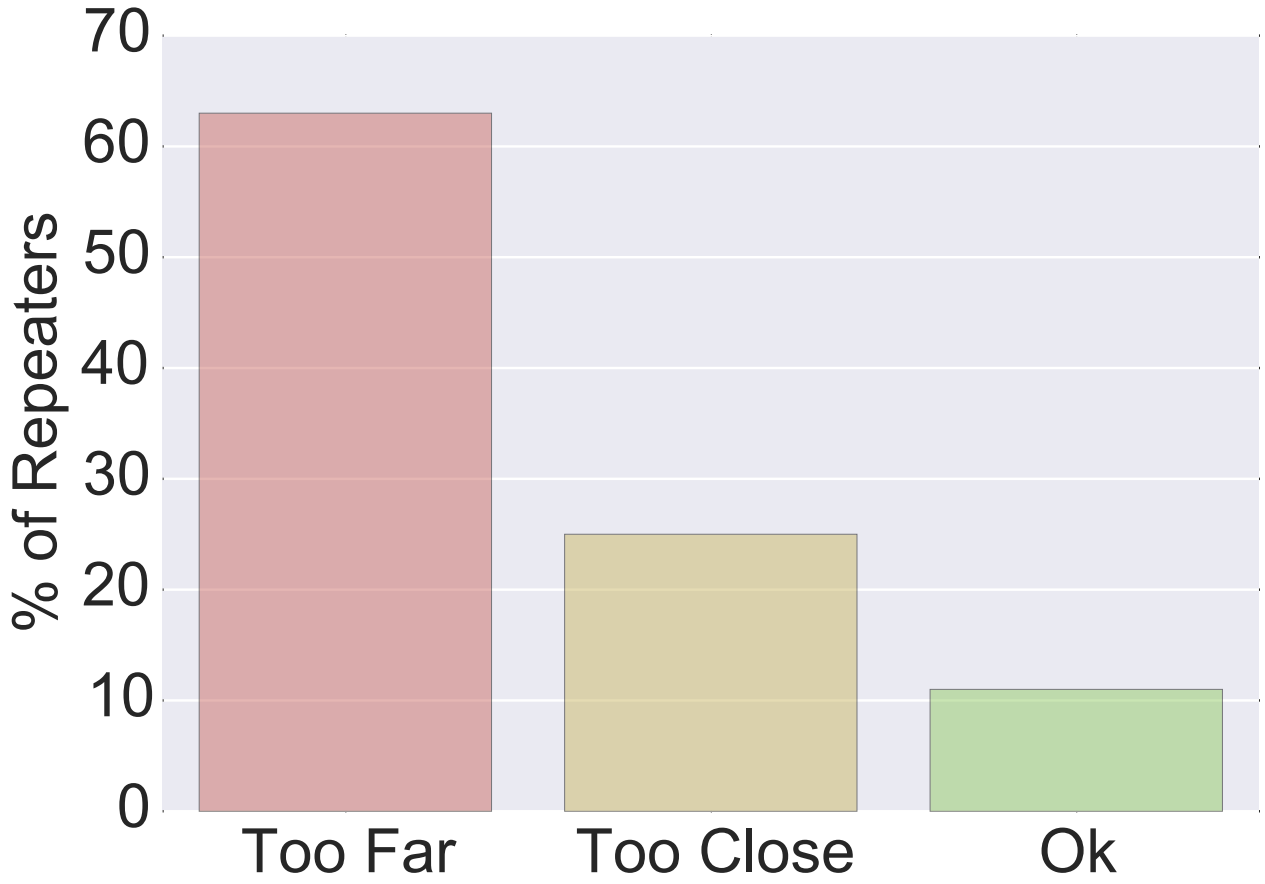
Rural



Urban

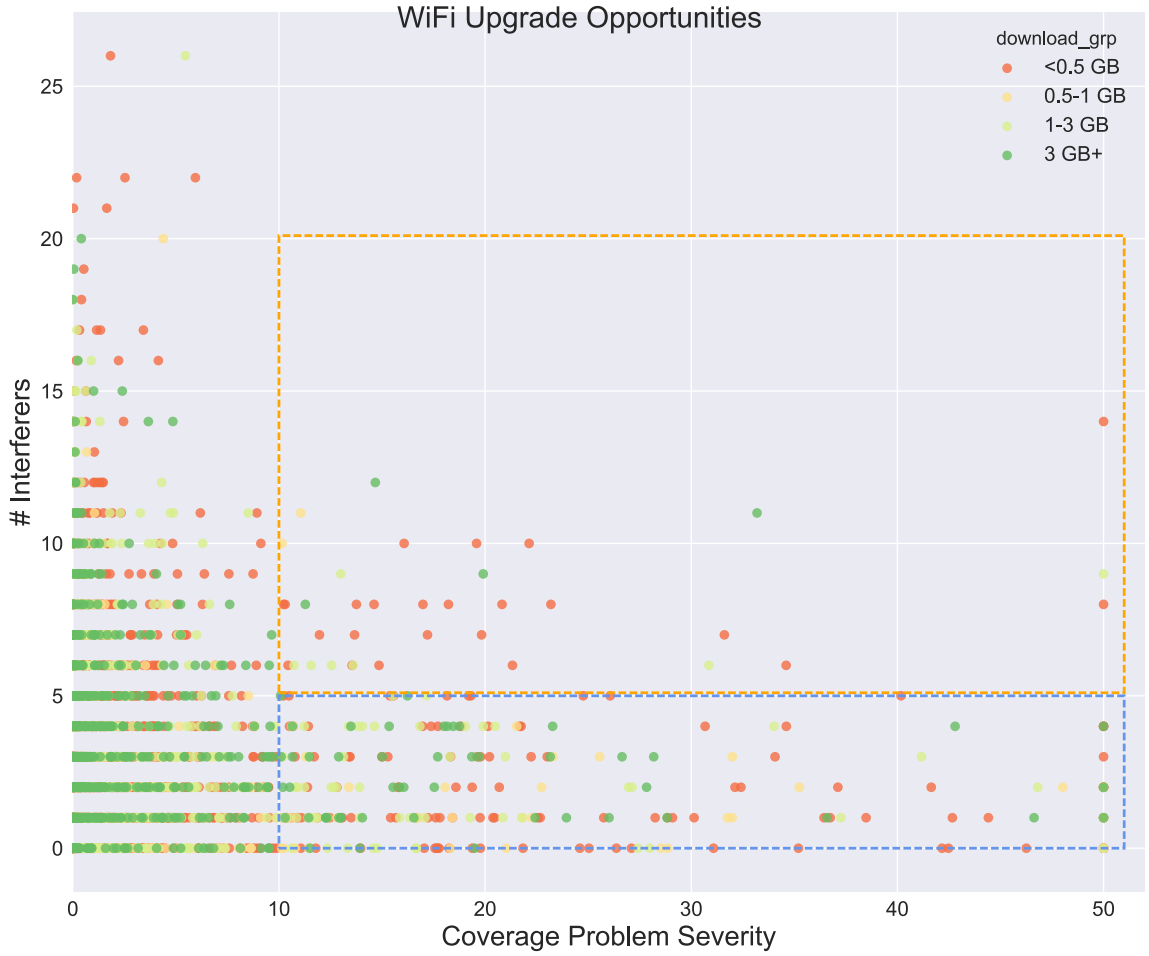
Action: Target urban deployments for Band Steering

Your Misplaced Repeaters



Action: Sell your own repeaters, and tell users when they've put them too far!

Your WiFi Coverage



Action: Heavy users with few neighbors get Repeaters, those with many neighbors get Multi-AP

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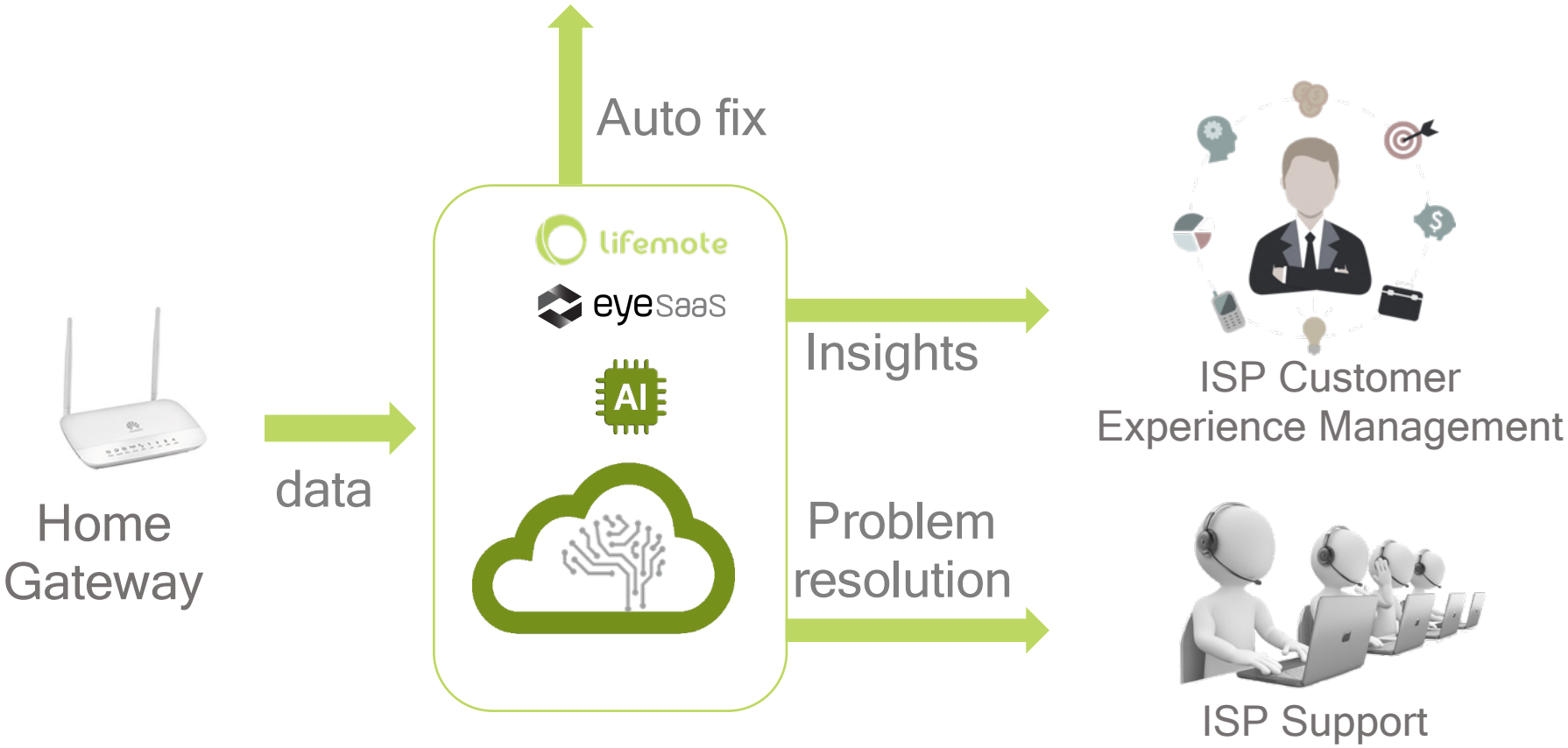
Thank you!

Wi-fix

Auto fix problems with AI



Reduce support cost & churn

Deployment Architecture

Dreamcatcher
[Gatherer]

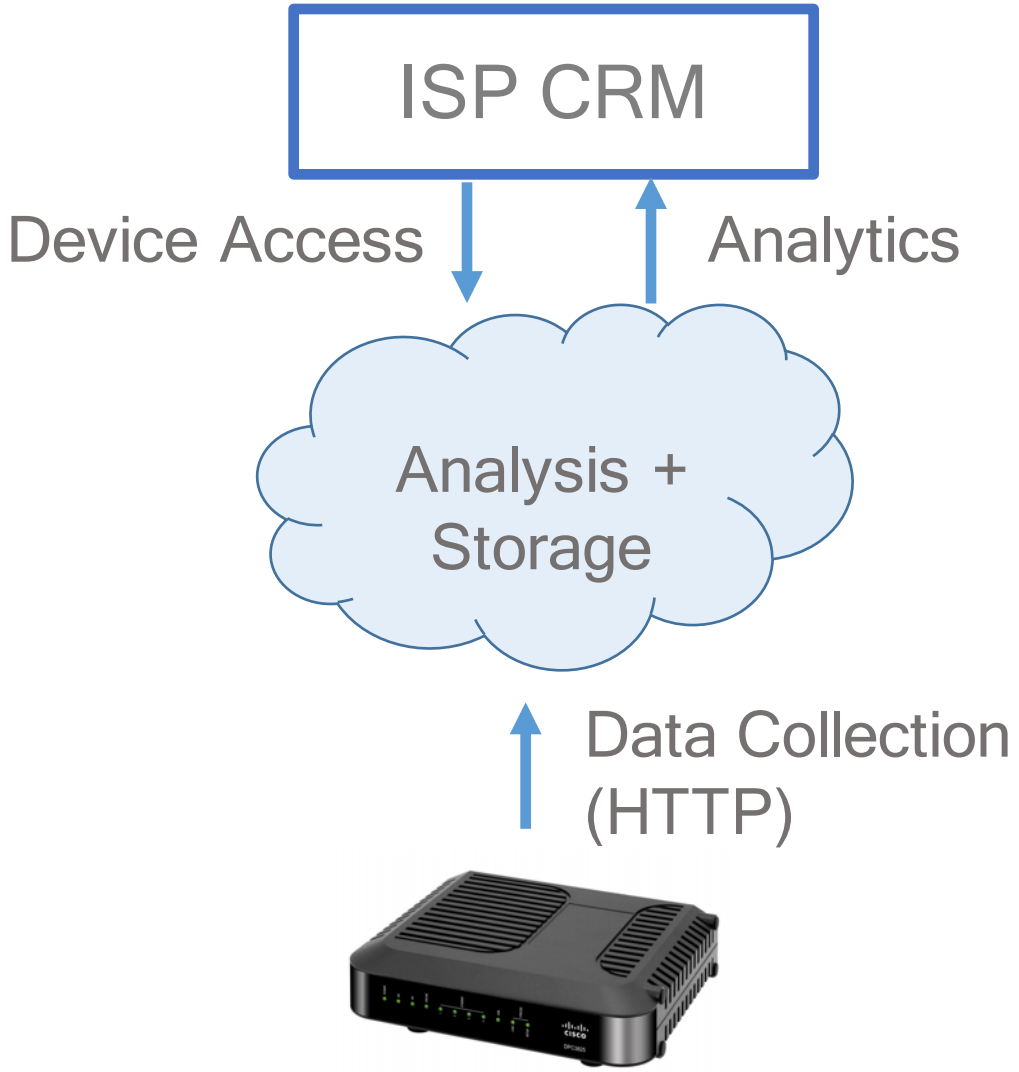
Soothsayer
[Analyzer]

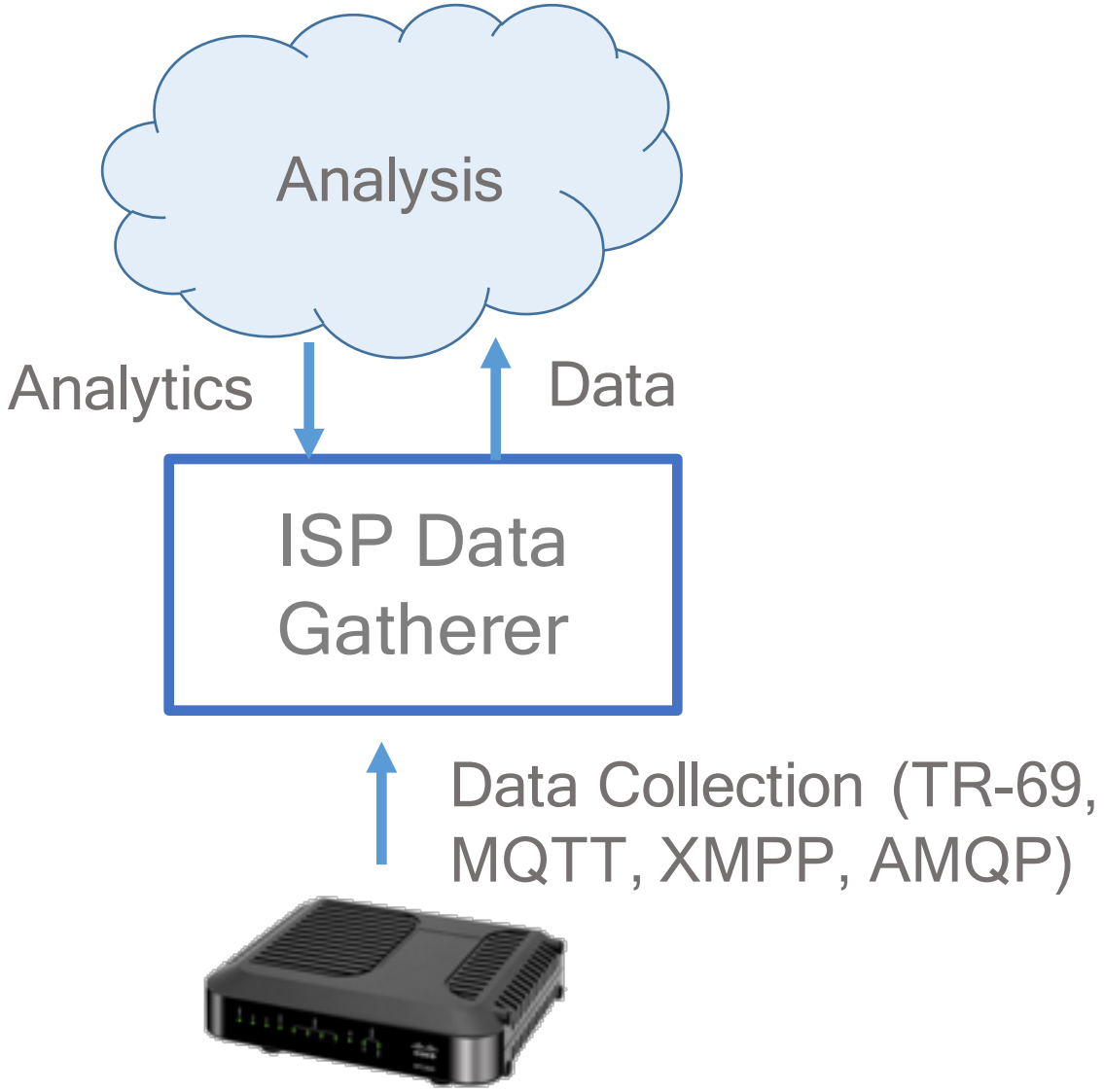
Kulning
[Deployer]

Skald
[Visualization]

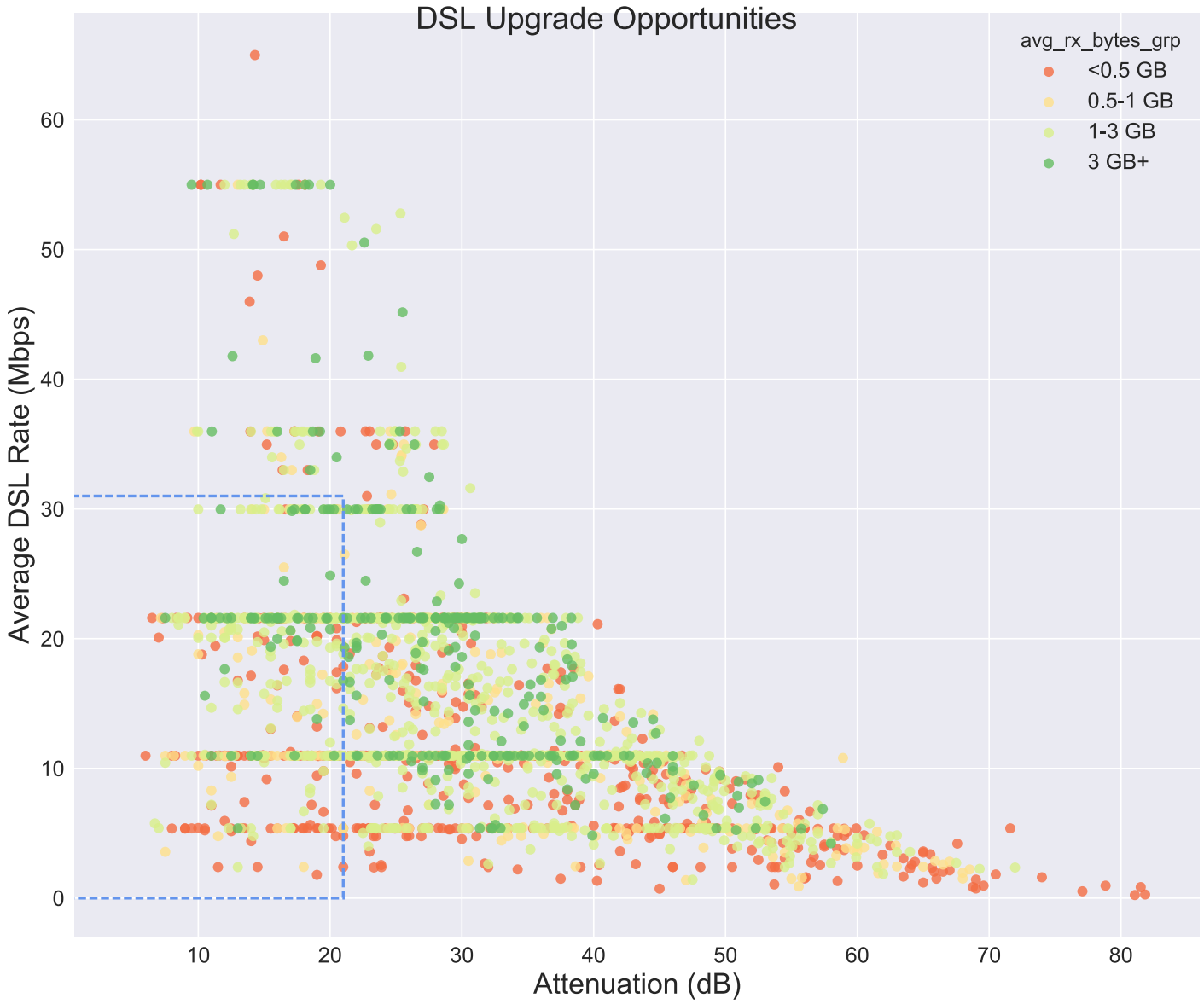
Microservice based architecture can scale and fragment for different scenarios

Full System vs Analyzer





DSL Actions



Action: Upsell DSL to heavy users without WiFi problems

Action: Investigate limited link heavy users with low attenuation