



NETFLIX

Open Connect

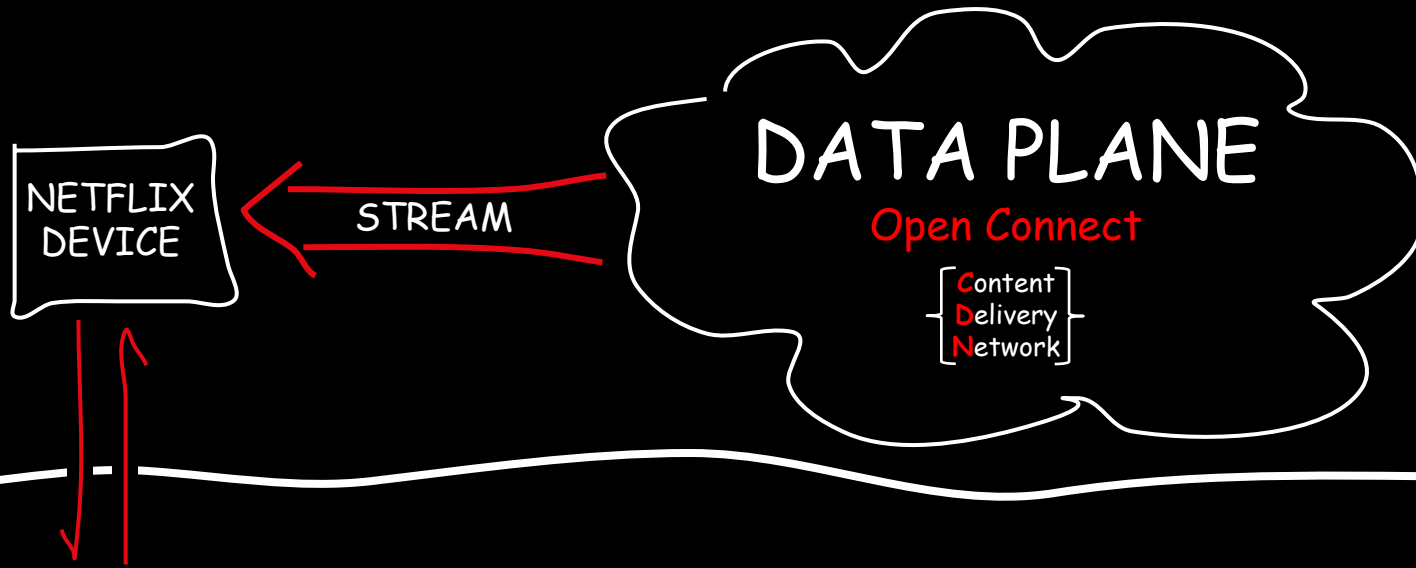
Nina Bargisen, AF-IX May 2017

NETFLIX

- 100+ million members
- > 190 countries
- > 125 million hours of TV shows and movies per day

A young man with long brown hair, wearing a green jacket over a striped shirt, is looking upwards with a surprised expression. He is standing in a room decorated with numerous strings of colorful Christmas lights (red, green, blue, yellow, and white) that are strung across the ceiling and walls. The room has a warm, cozy atmosphere. In the background, there is a window with white curtains and a bookshelf filled with books and other items. The overall scene suggests a holiday or festive setting.

How **NETFLIX** Works



CONTROL PLANE



NETFLIX ORIGINAL

STRANGER THINGS

★★★★★ 2016 TV-14 1 Season

Next Up

S1:E4 "Chapter Four: The Body"

Refusing to believe Will is dead, Joyce tries to connect with her son. The boys give Eleven a makeover. Nancy and Jonathan form an unlikely alliance.

 MY LIST

OVERVIEW

EPISODES

TRAILERS & MORE

MORE LIKE THIS

DETAILS



before streaming starts = control
plane =



NETFLIX ORIGINAL

STRANGER THINGS

★★★★★ 2016 TV-14 1 Season

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 MY LIST

OVERVIEW

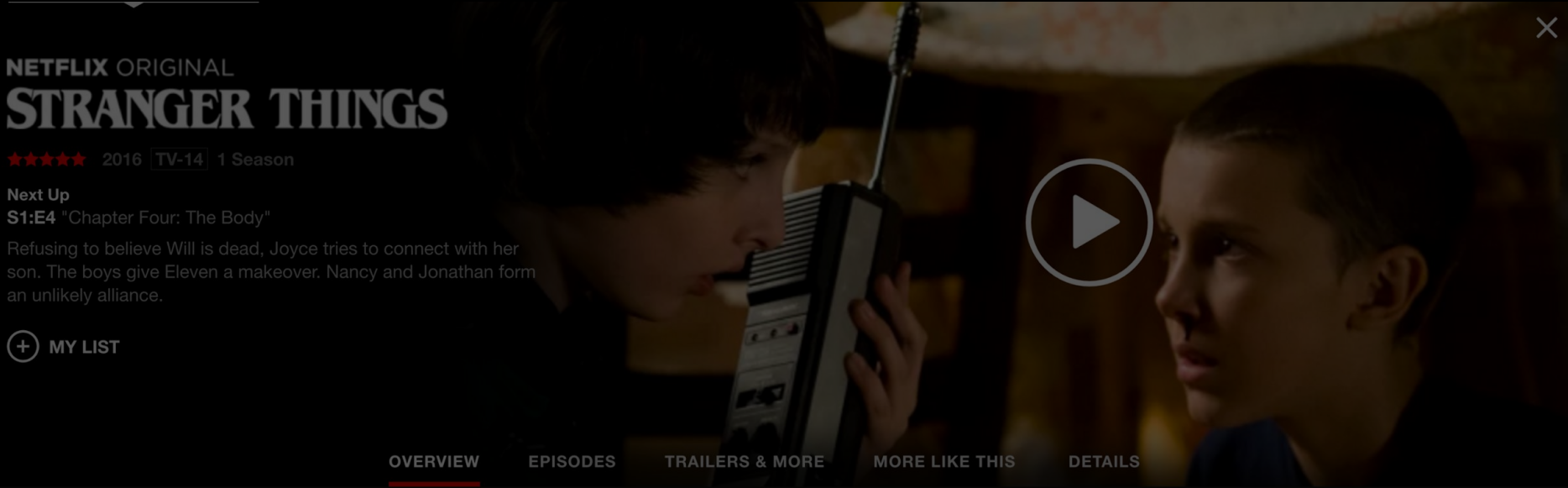
EPISODES

TRAILERS & MORE

MORE LIKE THIS

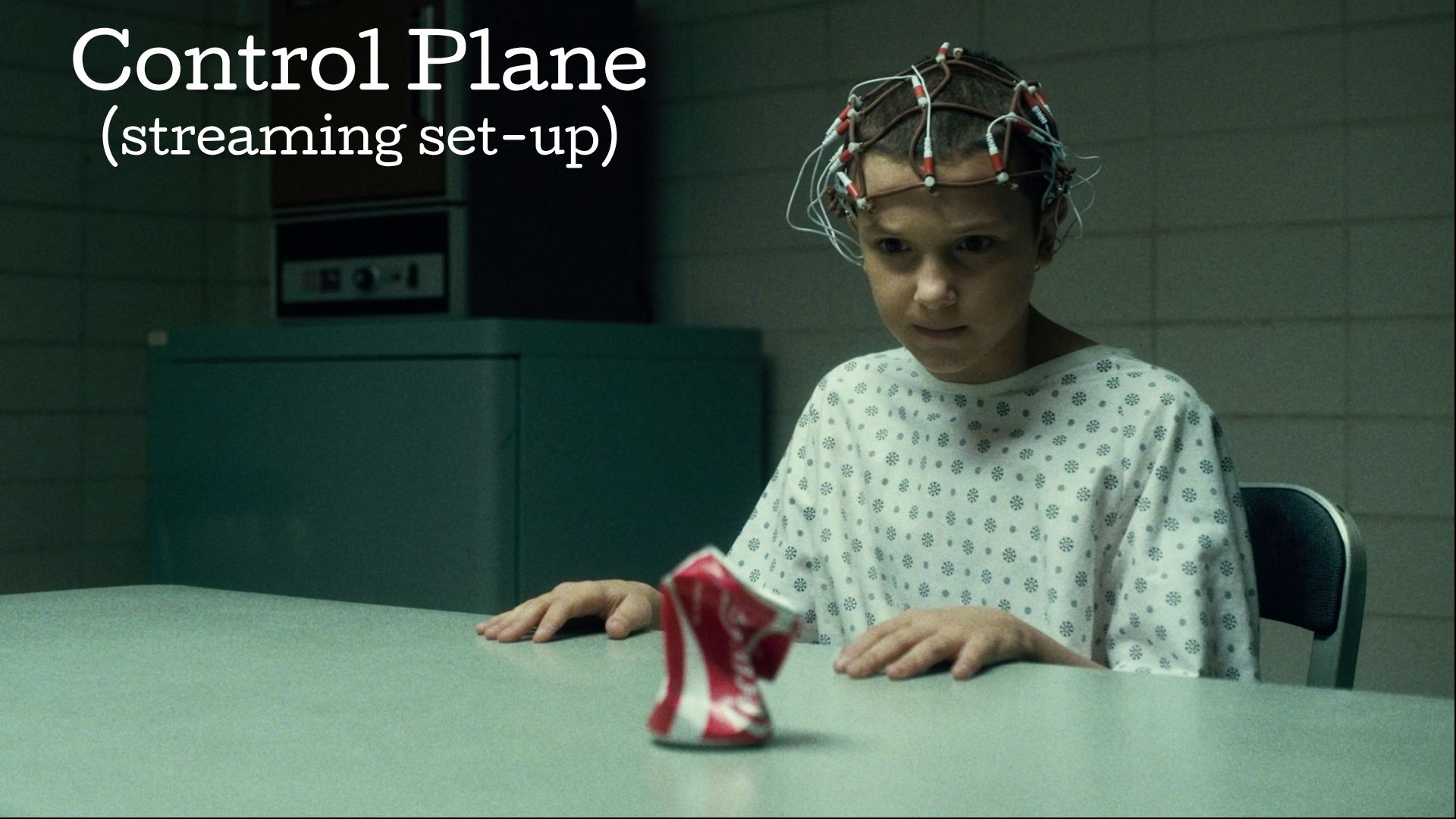
DETAILS

before streaming starts= control
plane =



streaming = data plane = Open Connect

Control Plane (streaming set-up)



NETFLIX

Browse ▾

Kids

DVD

Search



Emily ▾

NETFLIX ORIGINAL
STRANGER THINGS

★★★★★ 2016 TV-14 1 Season

Resume

S1:E8 "Chapter Eight: The Upside Down"

52 of 54m

Dr. Brenner holds Hopper and Joyce for questioning while the boys wait with Eleven in the gym. Back at Will's, Nancy and Jonathan prepare for battle.



MY LIST

OVERVIEW

EPISODES

TRAILERS & MORE

MORE LIKE THIS

DETAILS

Determine the preferred experience

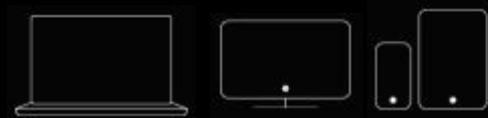
TITLE



LOCATION



DEVICE



LANGUAGE



- | | |
|--|------------------------------------|
| <input type="radio"/> Dansk | <input type="radio"/> Norsk bokmål |
| <input type="radio"/> Deutsch | <input type="radio"/> Português |
| <input checked="" type="radio"/> English | <input type="radio"/> Suomi |
| <input type="radio"/> Español | <input type="radio"/> Svenska |
| <input type="radio"/> Français | <input type="radio"/> 日本語 |
| <input type="radio"/> Nederlands | |

NETWORK



Broadband - wired or
wifi
Cellular - Edge, 3G,
LTE, ...

CONNECTIONS



HDCP support,
etc.

That's exactly what I want

...now
where
can I get
it?



PLAYBACK

GENERATE
PLAYBACK
MANIFEST

PLAYBACK
MANIFEST



PLAY

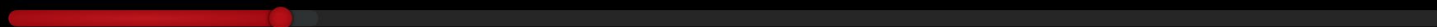
{ This is how we steer the request to the
correct server/network/location }



{ More on this later! }



STRANGER THINGS



39:13



Stranger Things Season 1: Ep. 1 Chapter One: The Vanishing Of Will Byers



A young girl with short brown hair, wearing a blue jacket over a light-colored patterned sweater, stands in a rocky, wooded area. She has a serious expression and is looking directly at the camera.

Data Plane

(streaming playback)

Q: What is a Content Delivery Network?

A: Geographically distributed content servers attached to
networks
+
a way of routing requests to the closest (and/or best
performing)
server / network path



A movie poster for the Netflix original 'Open Connect'. The central focus is a large, close-up face of a young boy with a serious expression. Surrounding him are other cast members: a woman with brown hair, a man in a fedora holding a walkie-talkie, and three children on bicycles with their headlights on. In the background, there's a dark, wooded area with a small building and a sign that reads 'RESTRICTED AREA NO TRESPASSING U.S. GOVERNMENT PROPERTY'. The overall tone is mysterious and suspenseful, with a dark blue and black color palette.

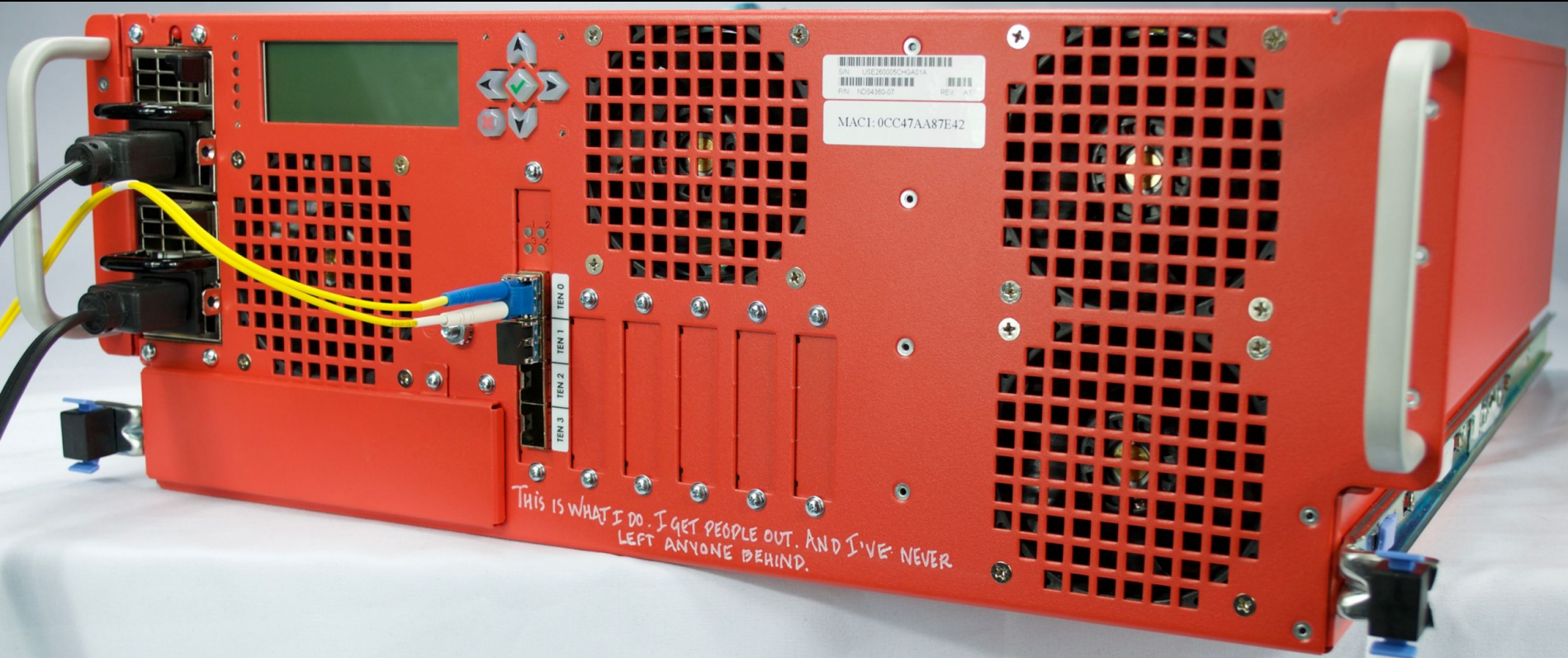
Open Connect

A NETFLIX
ORIGINAL

Hardware

Open
Connect
Appliances





MAC1-0CC47AA87E42
REV. 1.1

THIS IS WHAT I DO. I GET PEOPLE OUT. AND I'VE NEVER
LEFT ANYONE BEHIND.



A DVENTURE, EXCITEMENT... A JEDI
CRAVES NOT THESE THINGS.

The image shows a red metal plate with a grid of screws. A label with the text 'TEN 0', 'TEN 1', 'TEN 2', and 'TEN 3' is visible. The text 'A DVENTURE, EXCITEMENT... A JEDI CRAVES NOT THESE THINGS.' is written in white on the plate.

TEN 3 TEN 2 TEN 1 TEN 0

RODENTS OF UNUSUAL SIZE? I DON'T THINK THEY EXIST.





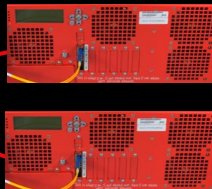




NETFLIX
DEVICE

STREAM

ISP
ROUTER



ISP DATA
CENTER

ISP
CO-LOCATION

NETFLIX
DEVICE

STREAM

ISP
ROUTER

ISP DATA
CENTER

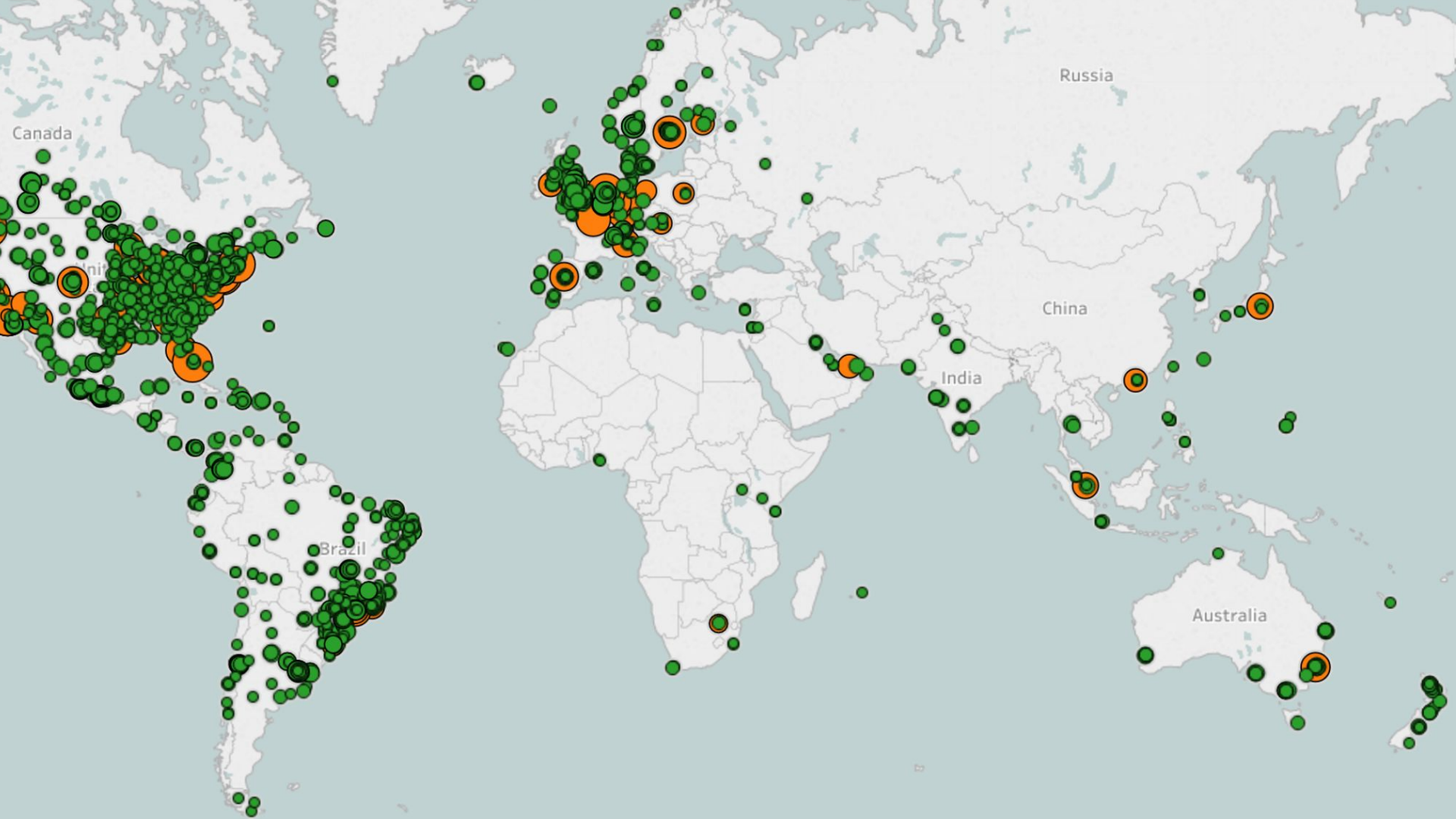
ISP
ROUTER

NFLX
ROUTER

IXP DATA
CENTER



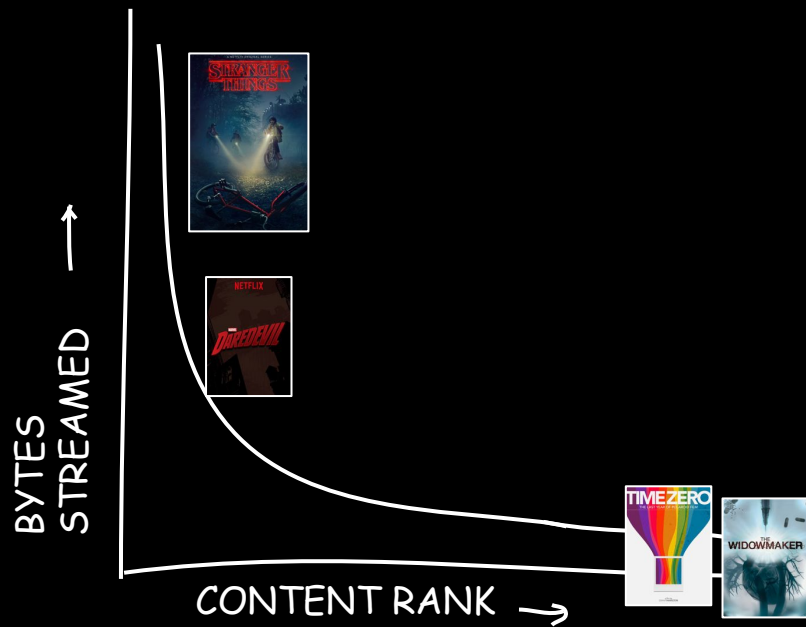
IXP
INTERCONNECTION



Content
Filling

pre-position
ing





PREDICTABLE VIEWING
PATTERNS

Caches fill
while you
sleep



c001.sfo001.google
Stanford - Forsythe Hall



Auto:Prod
LIVE

A

Content Region
US

Manifest / Fill Cluster
google.isp-sfo001-0

Hw Rev
RevA 1.1
Storage 2011

Firmware / Certification
r..201608301636
20160208.noS3

Health

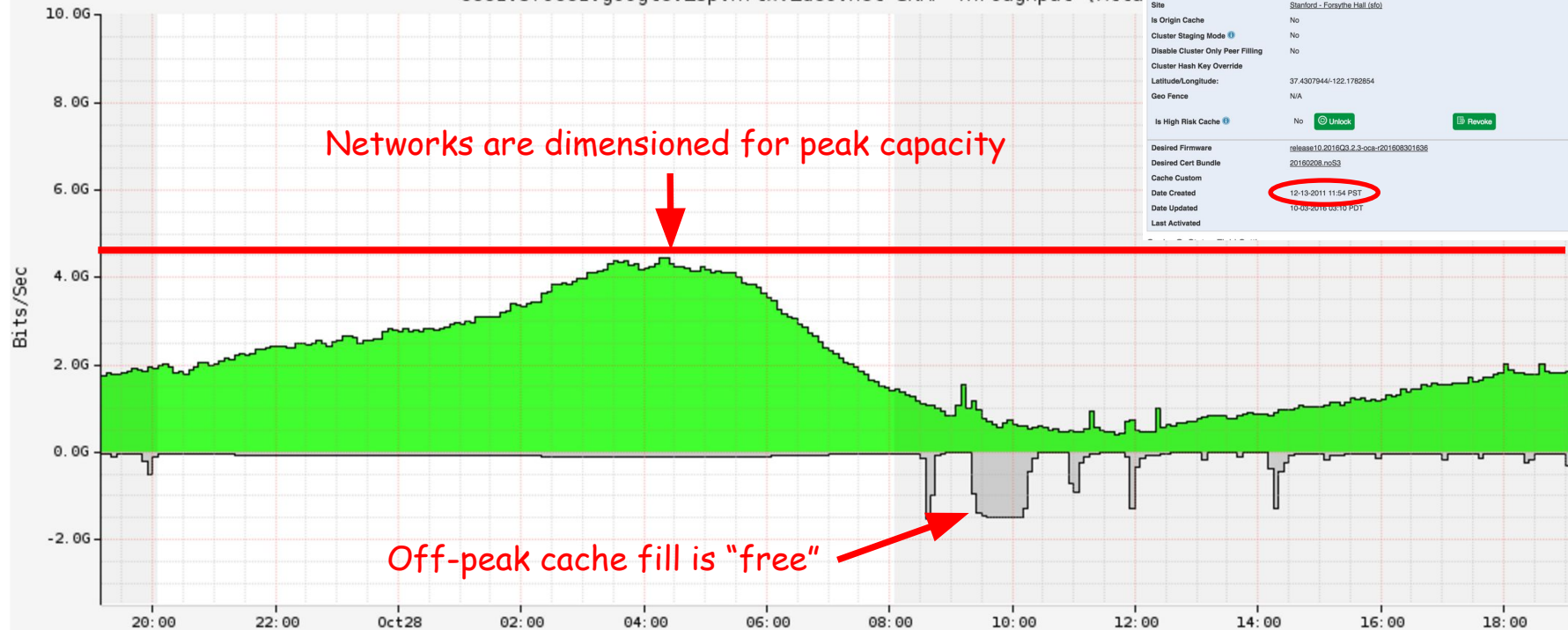
S 1
F 1
SO 0

Route Cluster

N/A
IPV4: 85 / IPV6: 2

SNMP Throughput - All (atlas) 

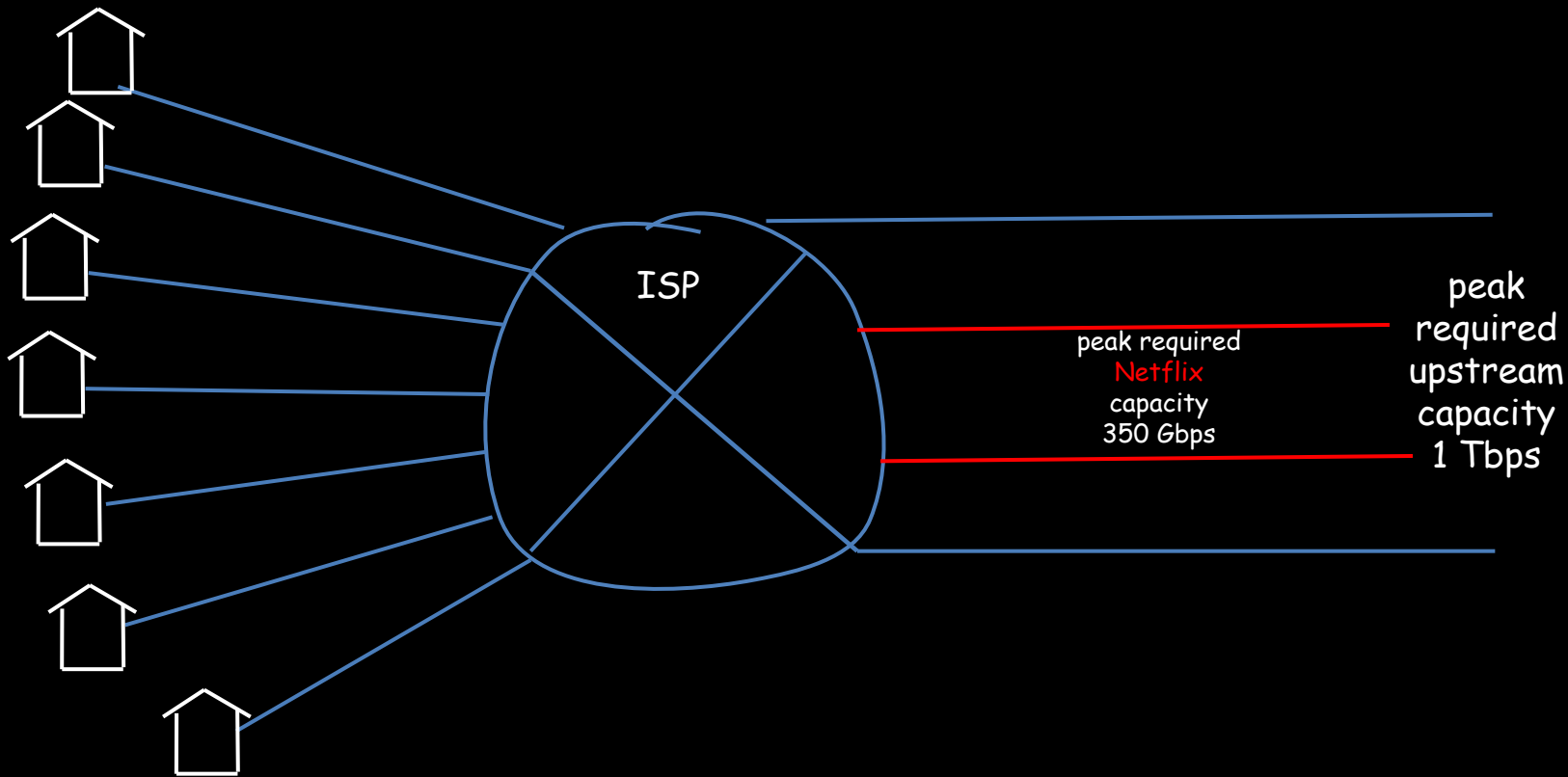
c001.sfo001.google.isp.nflxvideo.net SNMP Throughput (Atlas)



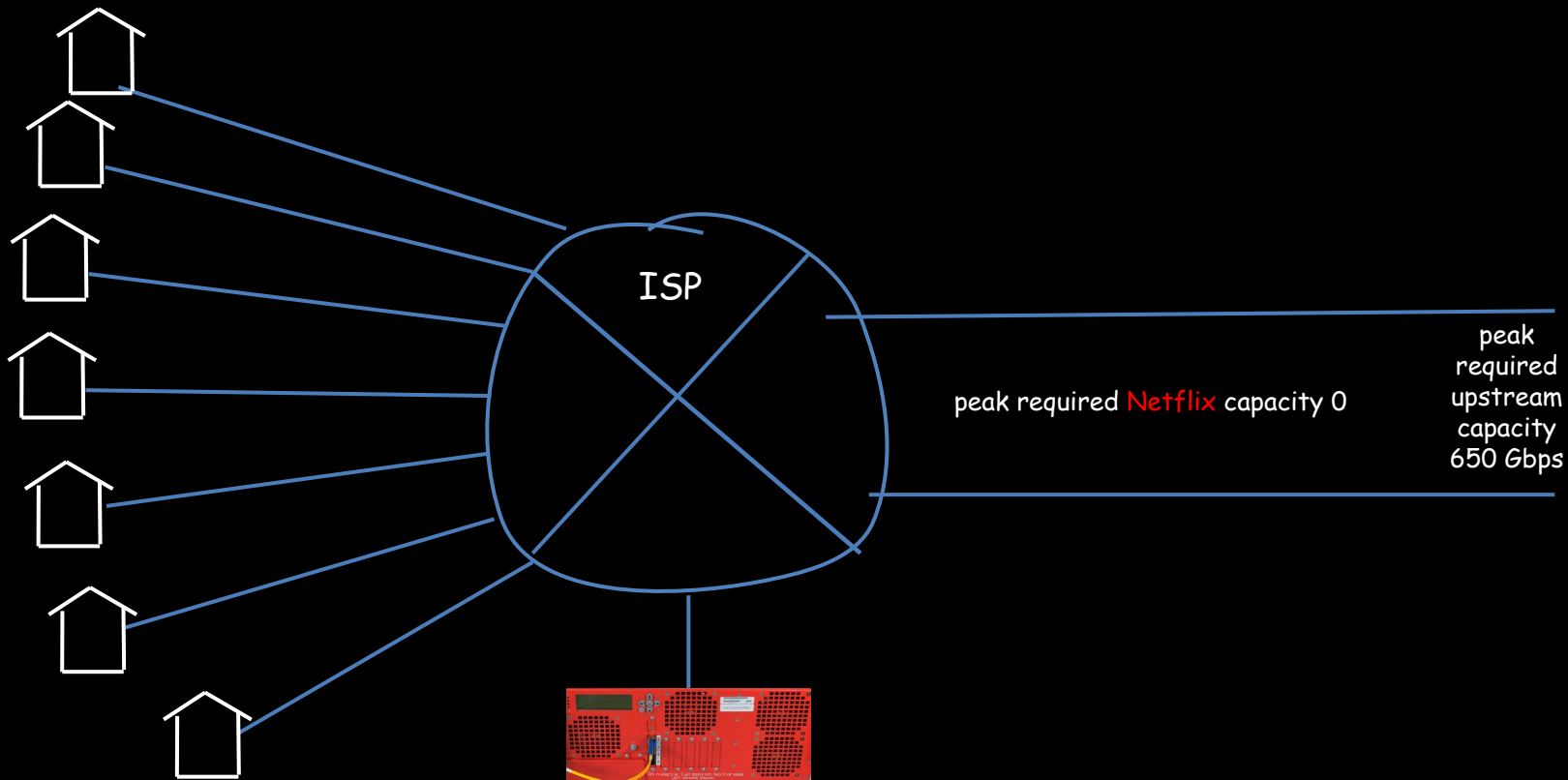
Cache Configuration

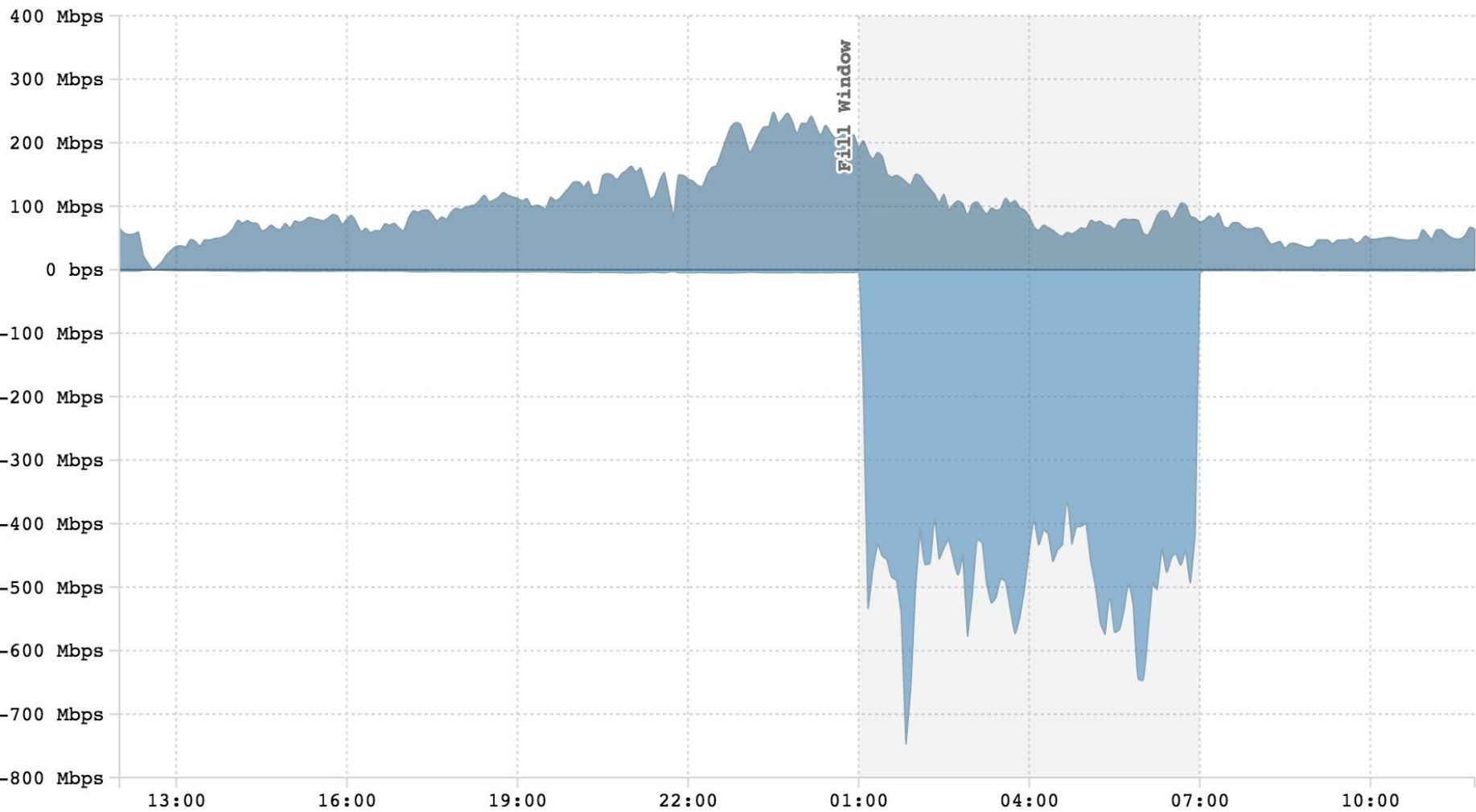
| | |
|-----------------------------------|--|
| Host Name | c001.sfo001.google |
| Hardware ID | 57902500-c288-0706-0025-90578bc20e0f |
| Purchase Order | |
| Org | Google (google) |
| Site | Stanford - Forsythe Hall (sfo) |
| Is Origin Cache | No |
| Cluster Staging Mode | No |
| Disable Cluster Only Peer Filling | No |
| Cluster Hash Key Override | |
| Latitude/Longitude | 37.4307944/-122.1782854 |
| Geo Fence | N/A |
| Is High Risk Cache | No Unlock Revoke |
| Desired Firmware | release10.2016Q3.2.3-ocsr:201608301636 |
| Desired Cert Bundle | 20160208.noS3 |
| Cache Custom | |
| Date Created | 10-19-2011 11:54 PST |
| Date Updated | 10-03-2016 03:10 PDT |
| Last Activated | |

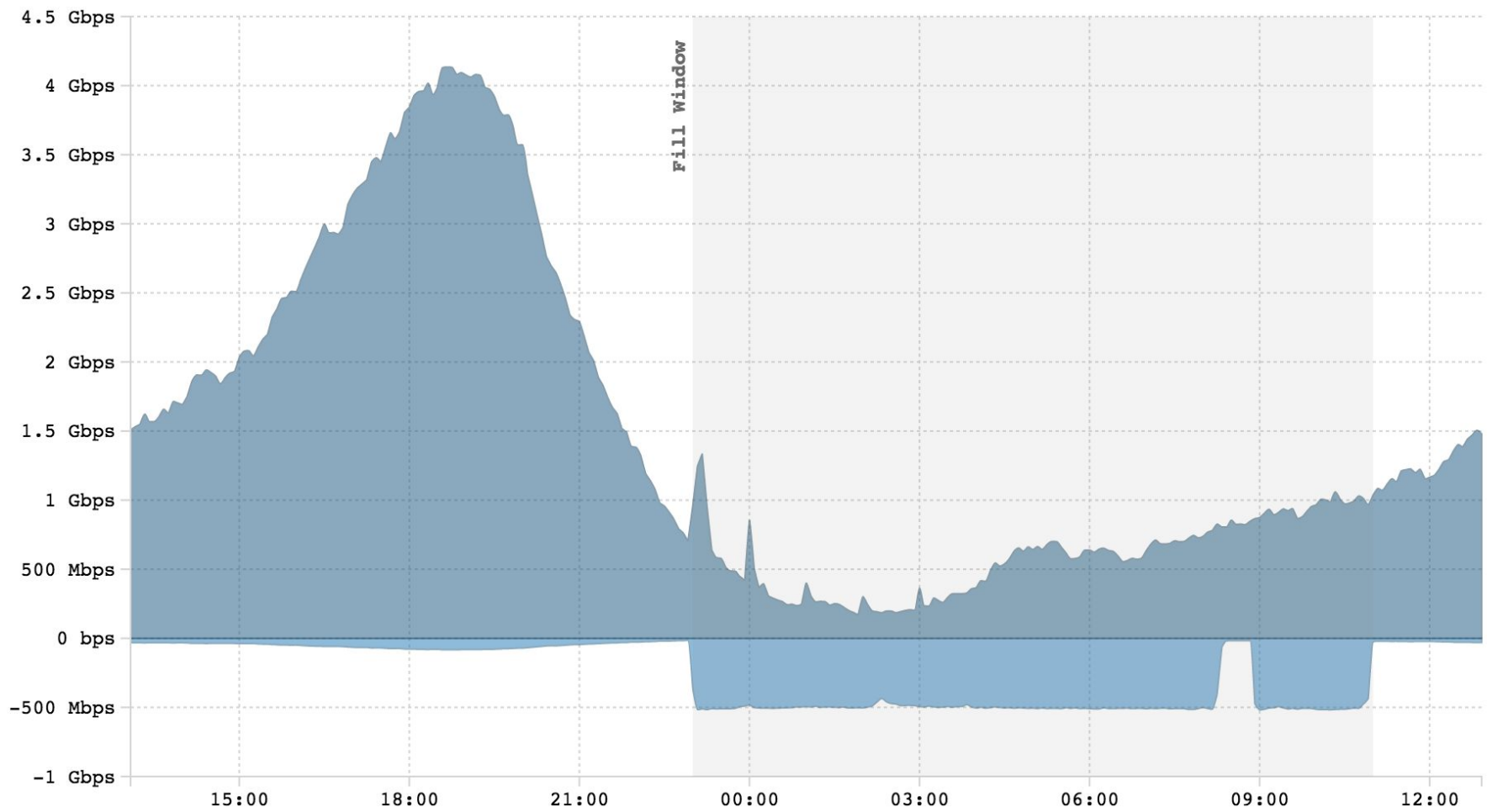
ISP customer homes

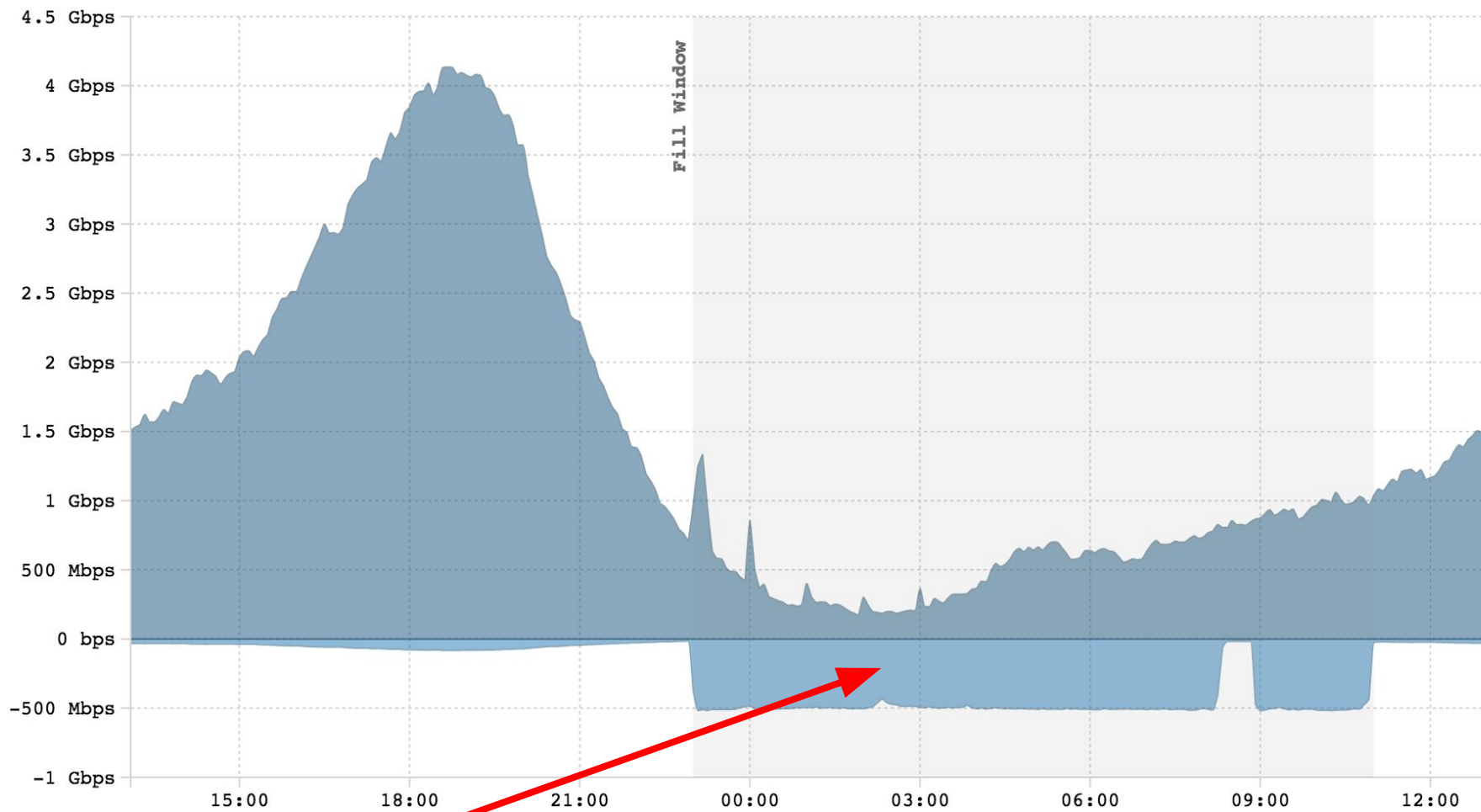


ISP customer homes









The Challenge



Ideas?