

iNOG 2016

WHY THE INTERNET SUCKS



AGENDA

- 1 WHY THE INTERNET SUCKS**
- 2 UNDERSTANDING THE INTERNET**
- 3 WHAT DID RIOT DO**
- 4 WHAT MORE CAN WE DO**

AGENDA

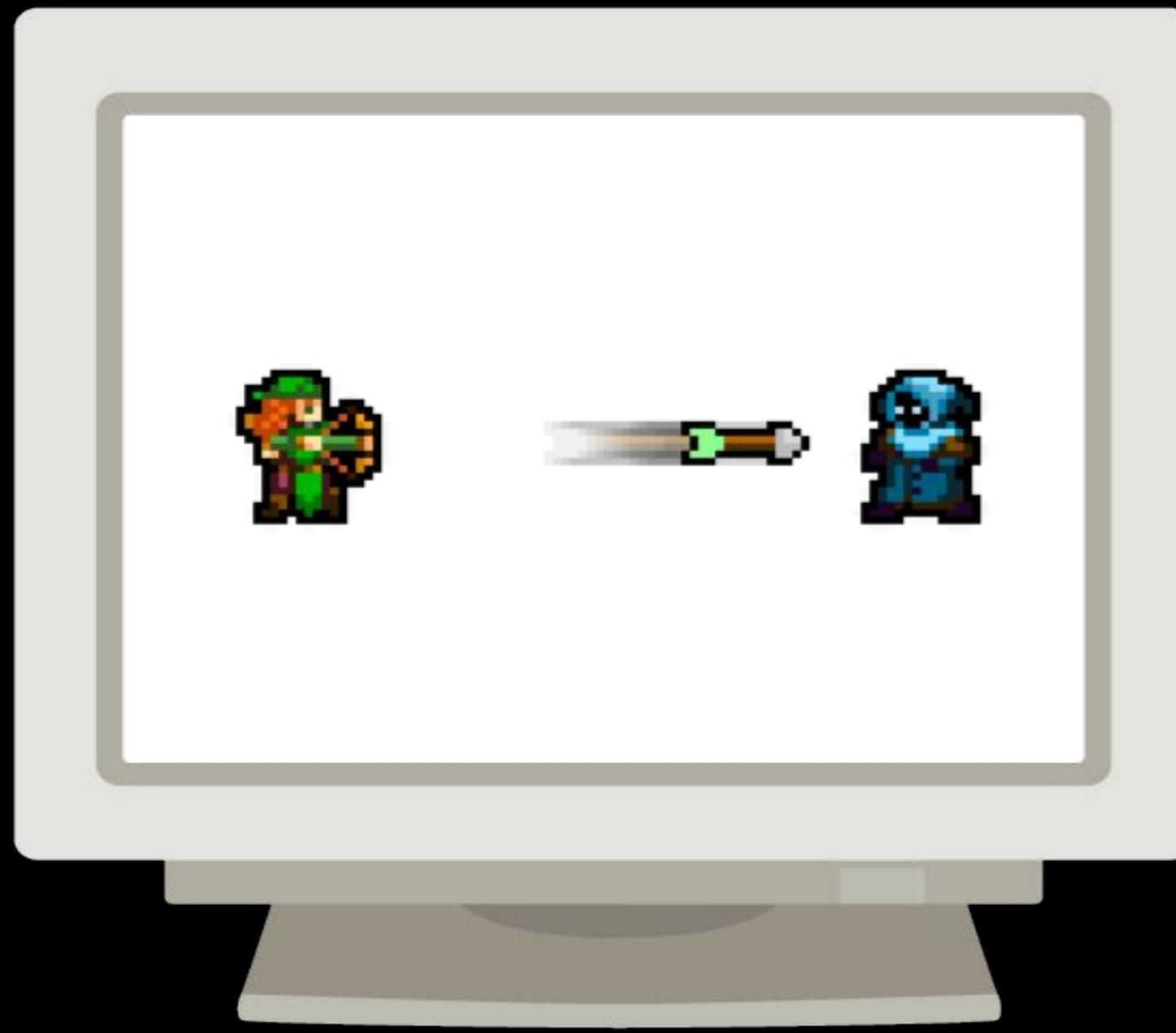
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WHY LATENCY IS IMPORTANT



On my computer:
Arrow can't miss you



On your computer:
You already dodged it

Image source:
<http://www.polygon.com/>

WHY LATENCY IS IMPORTANT



**On my computer:
The arrow hit you**

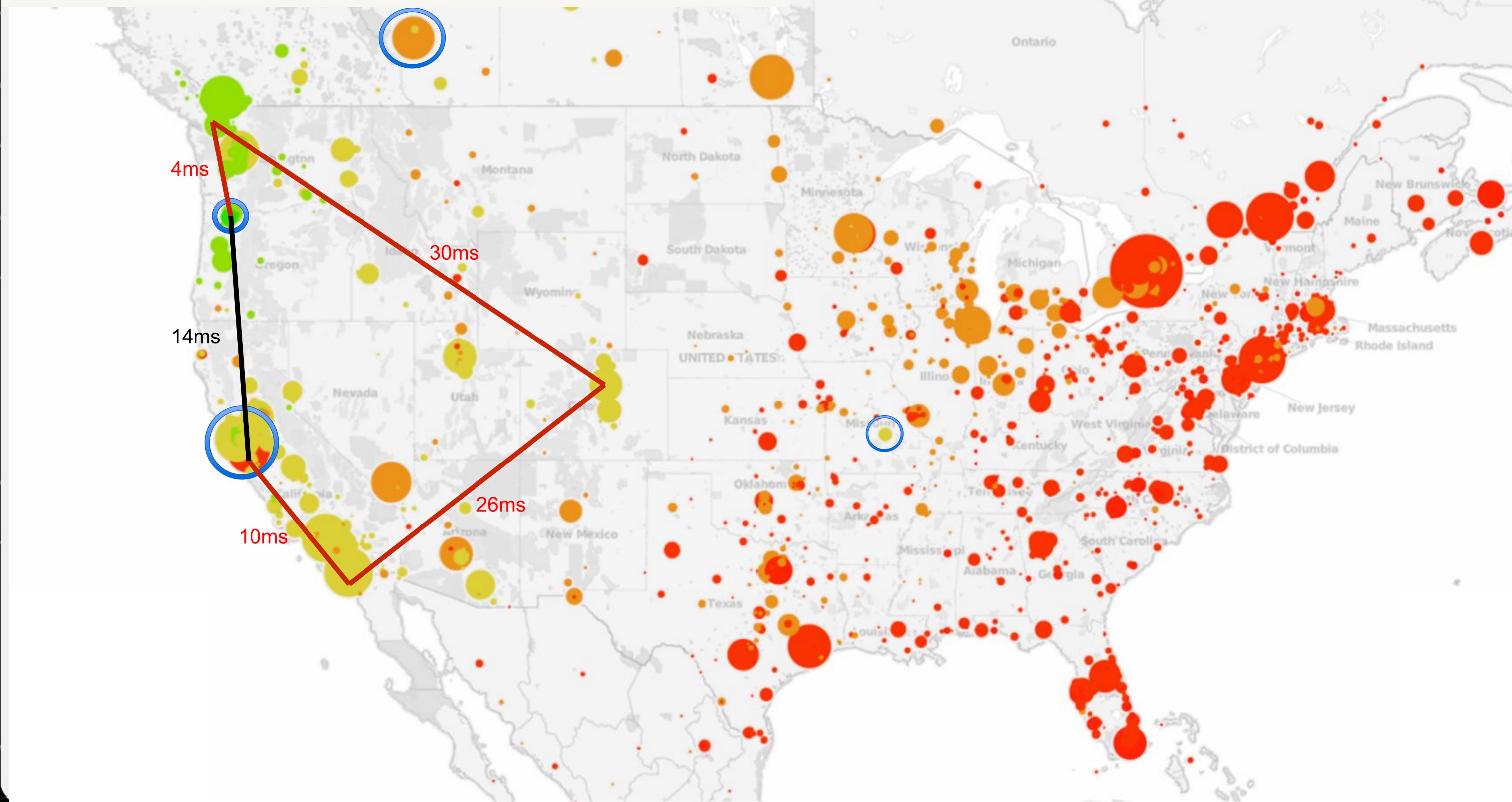


**On your computer:
You dodged but still got hit**

Image source:
<http://www.polygon.com/>

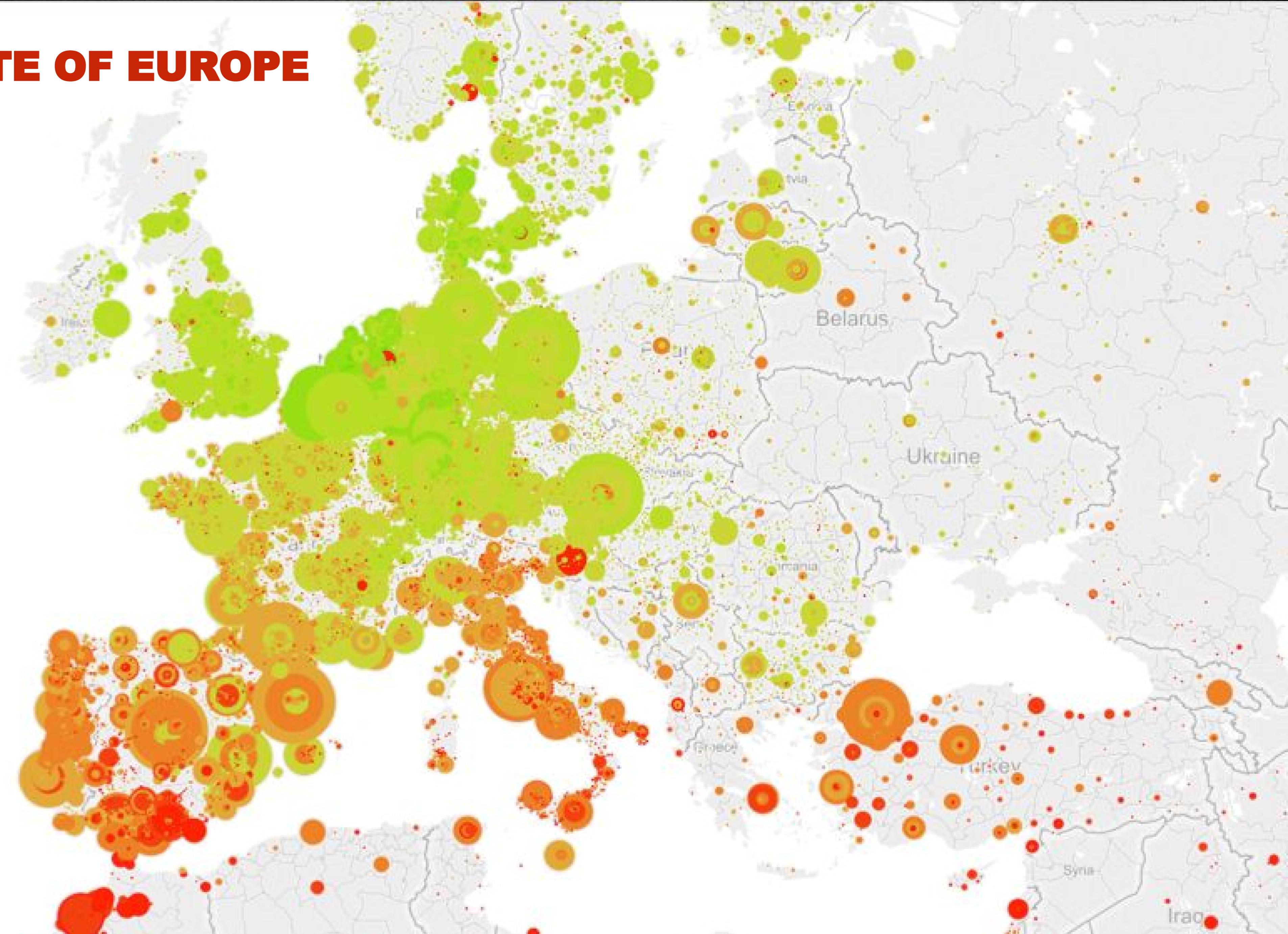
THE STATE OF NORTH AMERICA

NOVEMBER '14



THE STATE OF EUROPE

2014



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LET'S TALK ABOUT ROUTERS



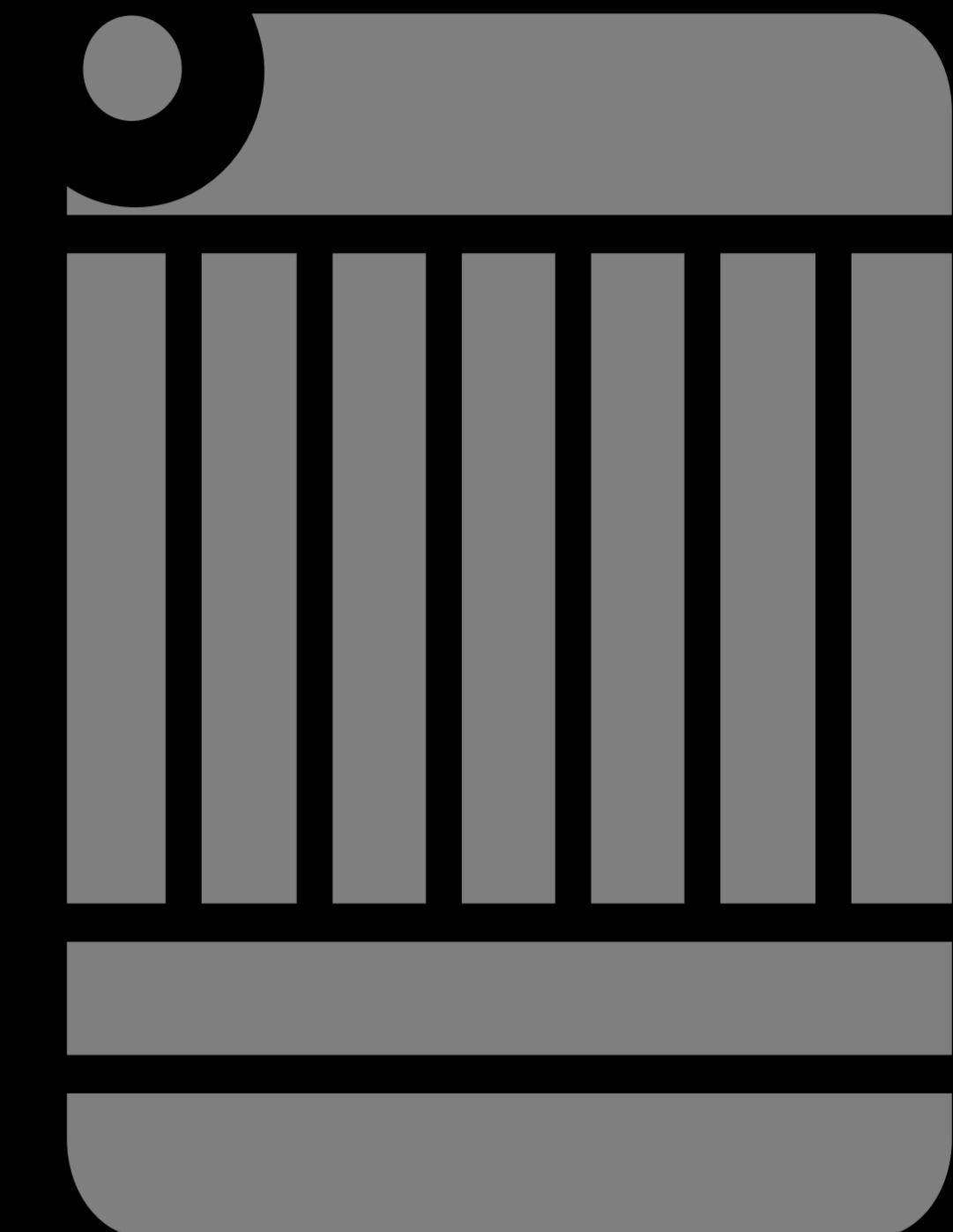
Routers are the workhorses of the Internet



Route Processors are extremely specialized



Routers have to process, or read, every single packet



ROUTER

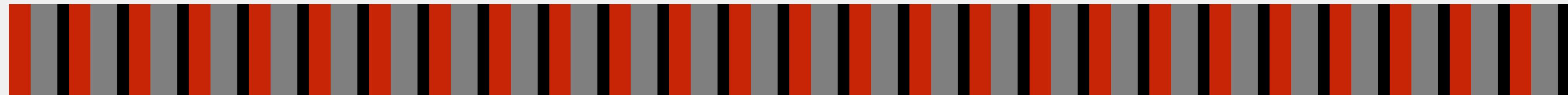
PACKET SIZE MATTERS

Standard Web Traffic



1500 Bytes

Standard Game Traffic



50ish Bytes

LET'S TALK ABOUT ROUTERS



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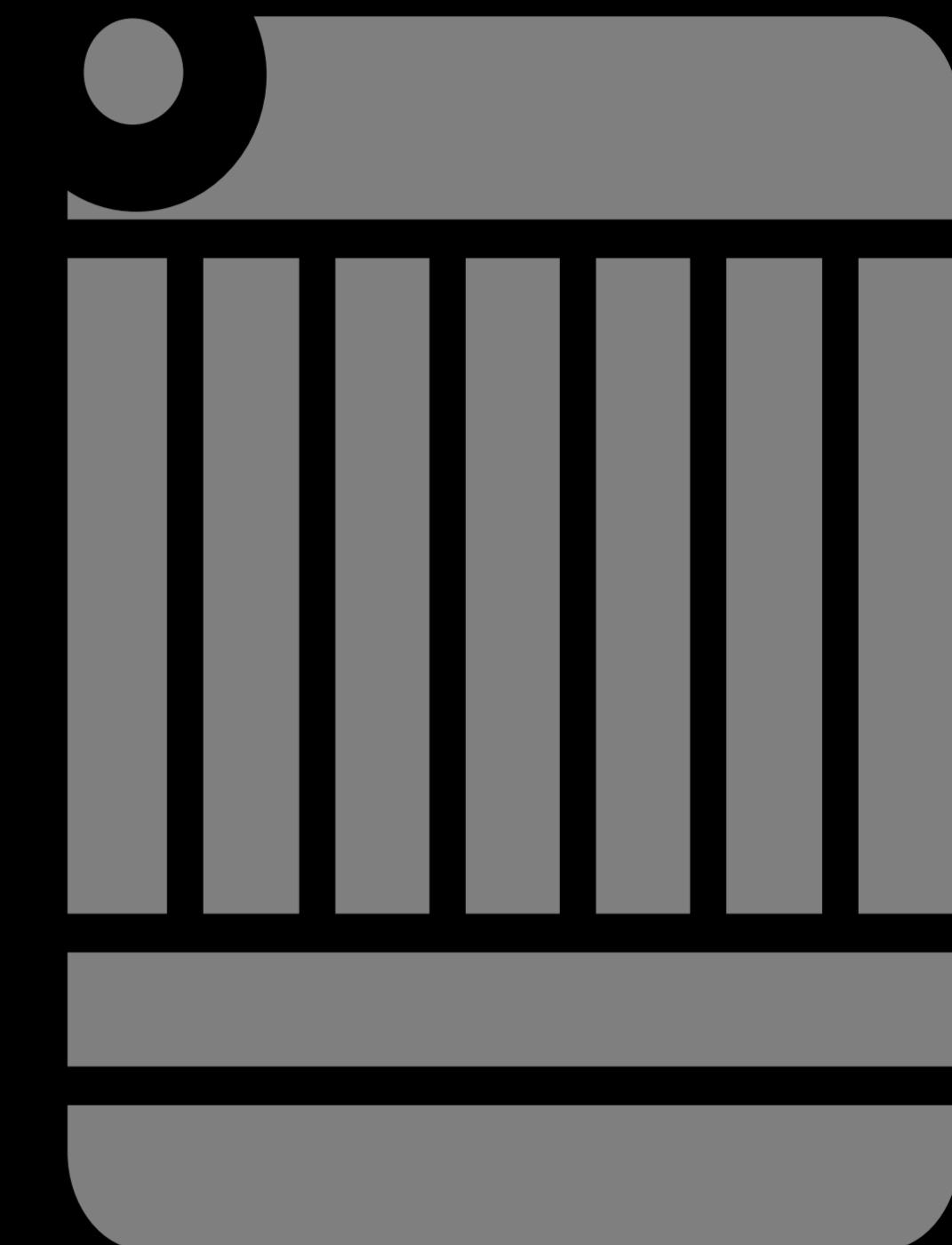
Routers have to process, or read, every single packet



Routers can be overwhelmed by our traffic

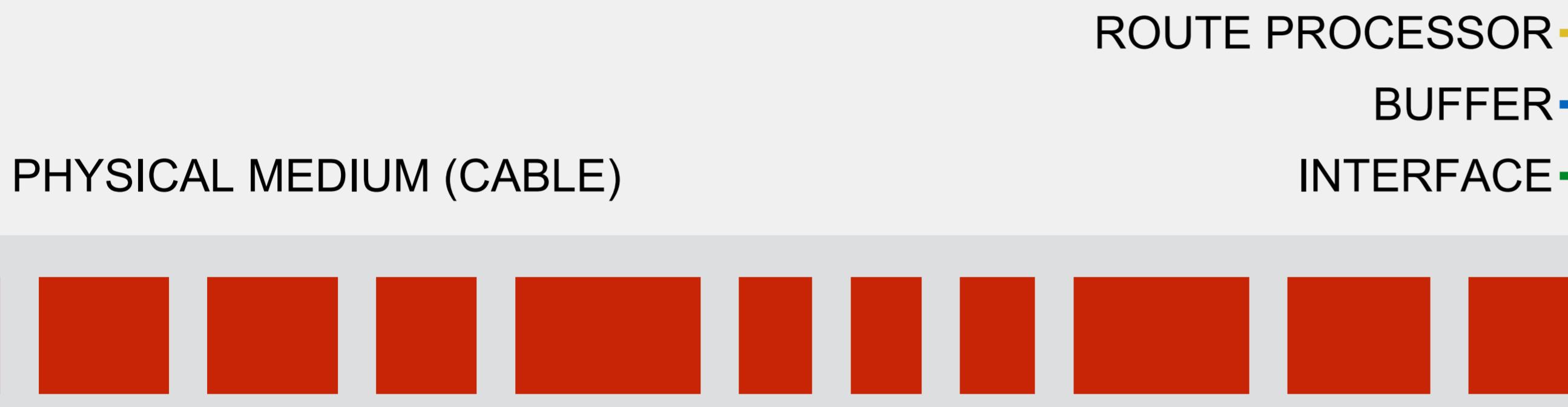


Routers Try and use Buffers to fix this—but this must be configured, and most ISPs don't configure buffer for UDP



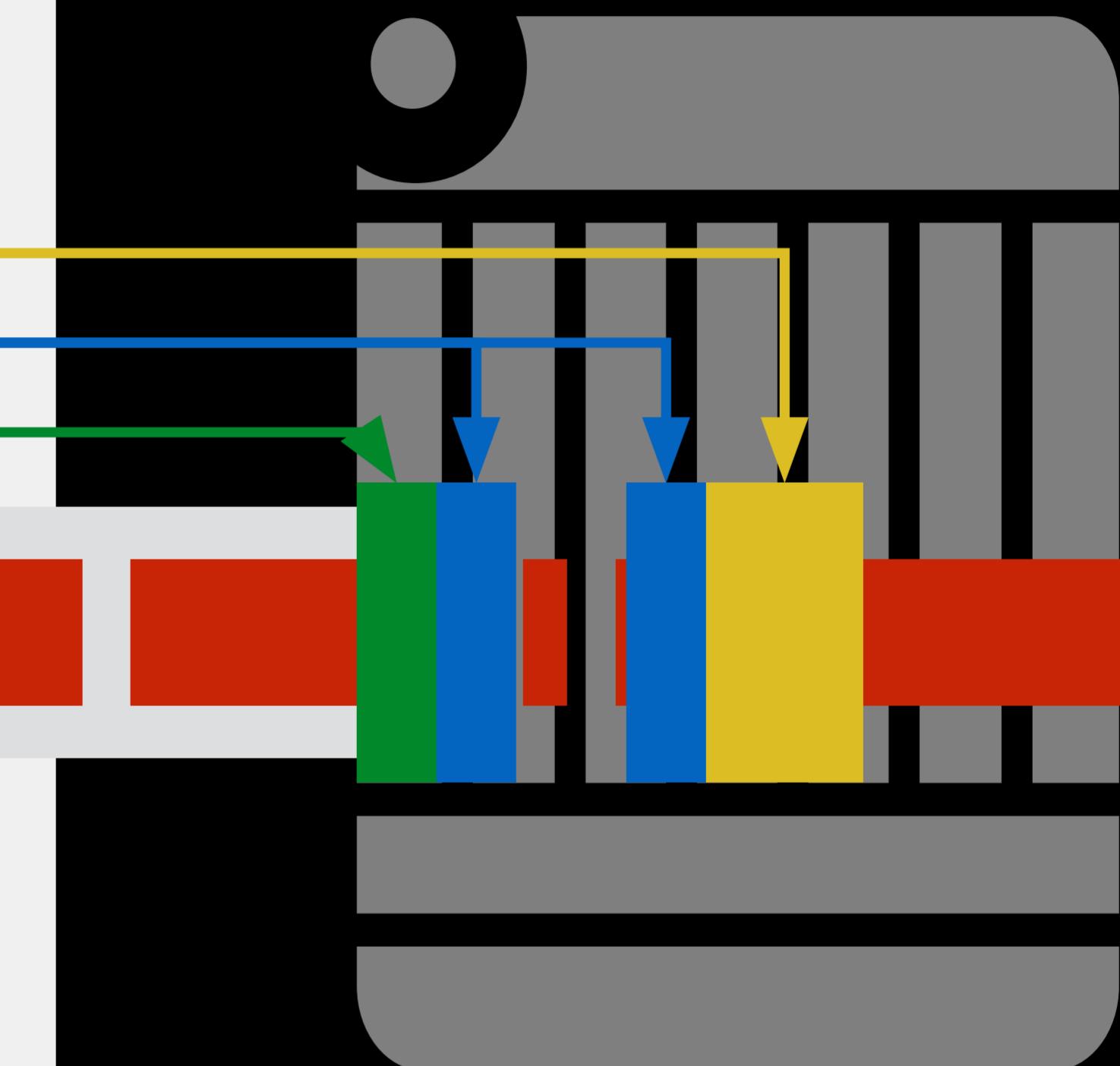
ROUTER

LET'S TALK ABOUT ROUTERS



If the Interface is over subscribed, the Packet will get dropped.

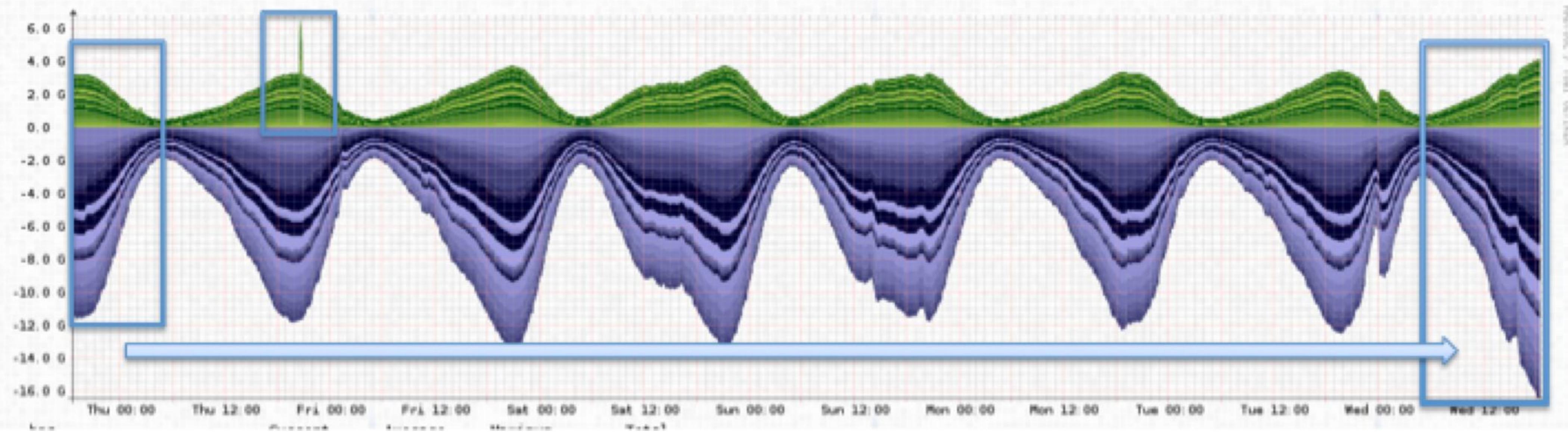
If the Processor is oversubscribed the system will see if it can buffer the Packet, but most ISPs don't buffer UDP.



ROUTER

ESPECIALLY WHEN WE DO THIS...

NEW GAME MODE INCREASED TRAFFIC BY **40%** INSTANTLY



LET'S TALK ABOUT ROUTERS



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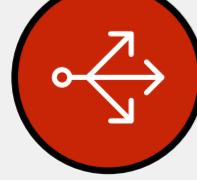
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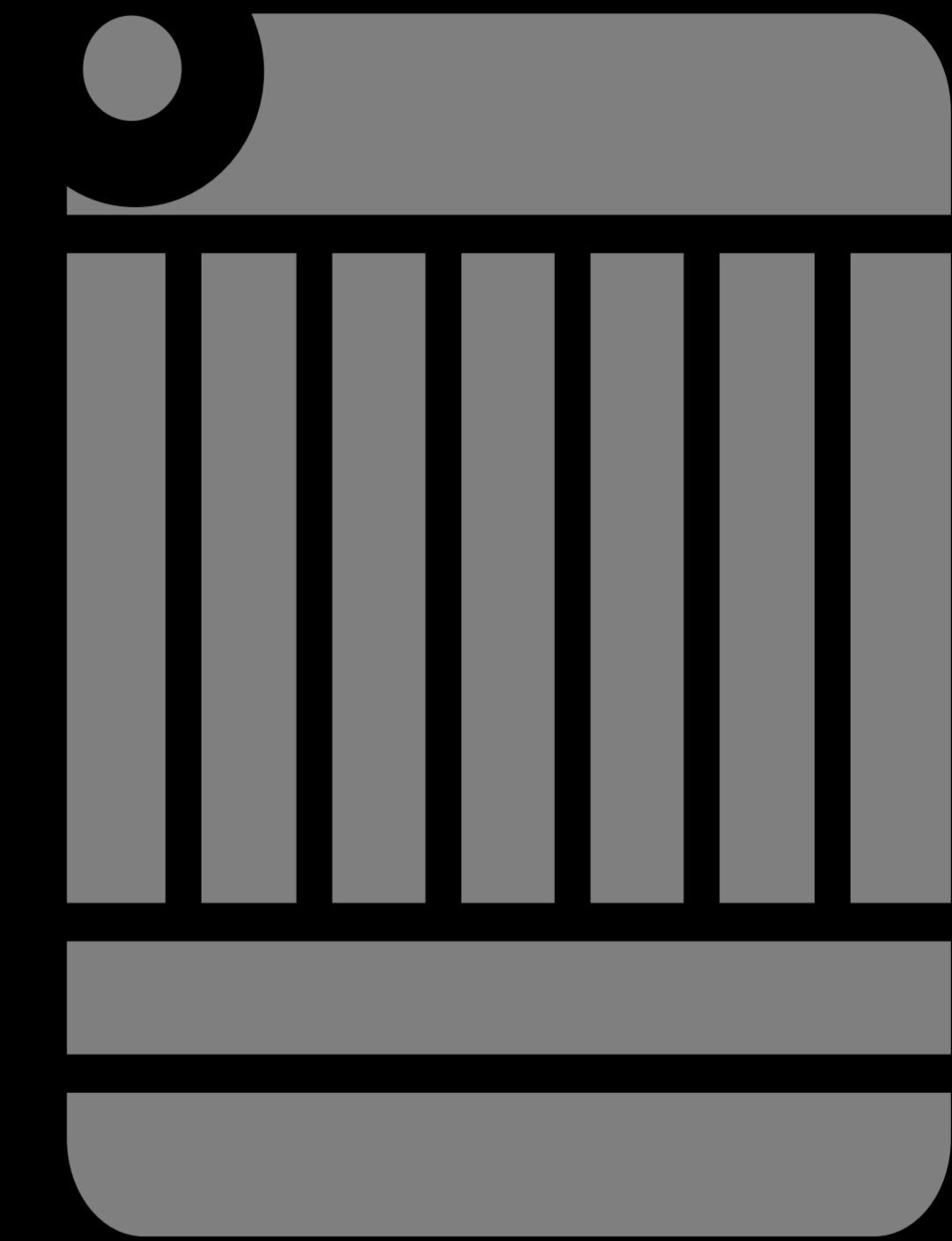
Routers can be overwhelmed by our traffic



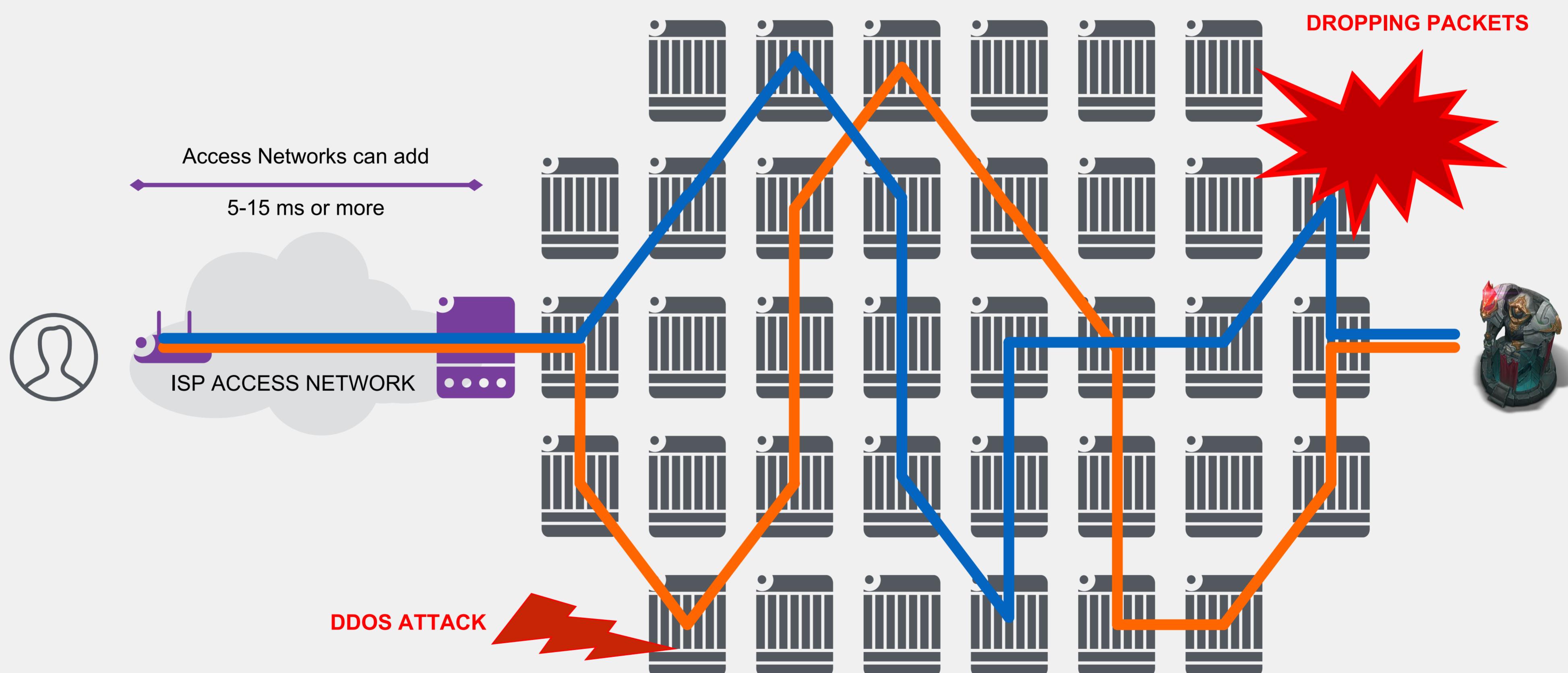
Routers Try and use Buffers to fix this—but this must be configured, and most ISPs don't configure buffer for UDP



Routers work in a vacuum and make all decisions singularly



WHAT DOES THIS MEAN?



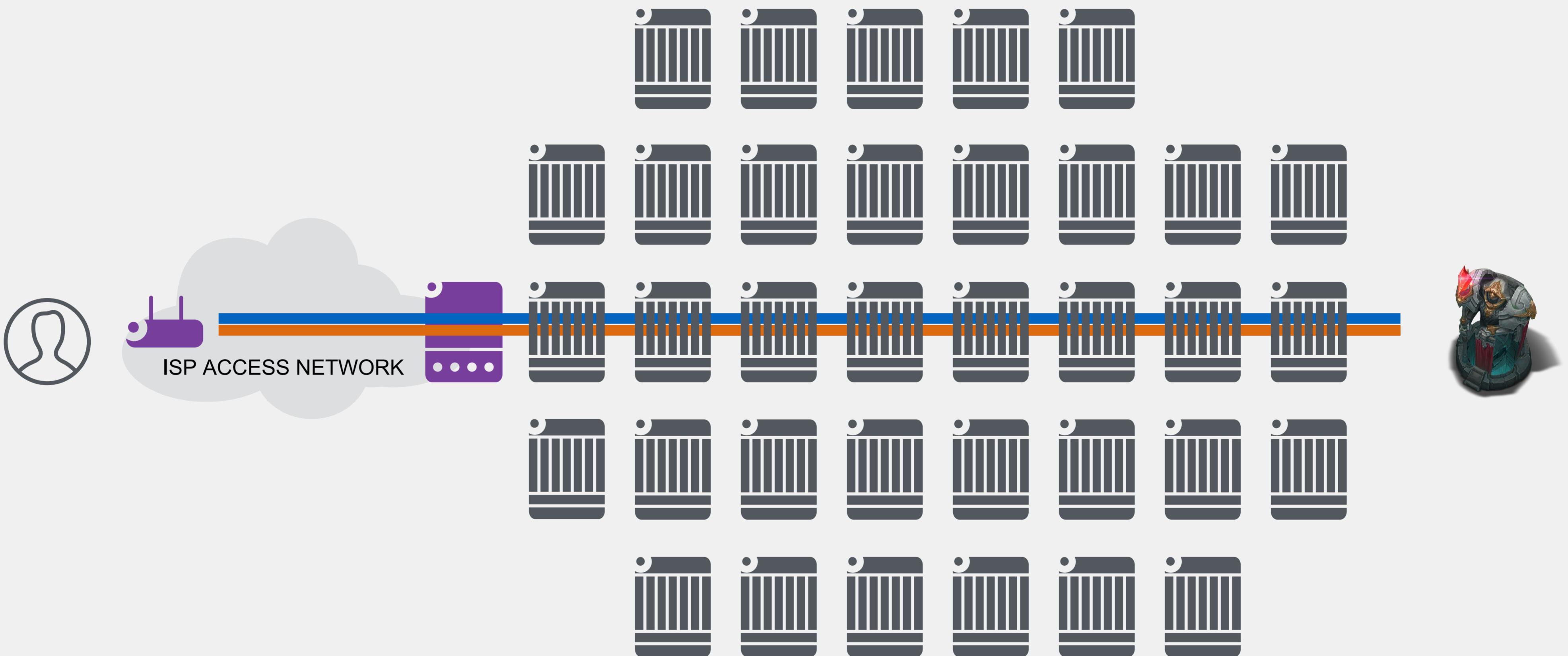
WHO DO WE COMPARE TO?



Goldman
Sachs



WHAT DOES THIS MEAN?



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OUR GOAL

80ms

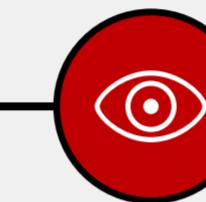
HOW DID WE COME UP WITH THAT?

WE TOOK LESSONS FROM



AUDIO TESTING

AND WE TOOK LESSONS FROM



VISUAL TESTING

LET'S WATCH A **MOVIE**

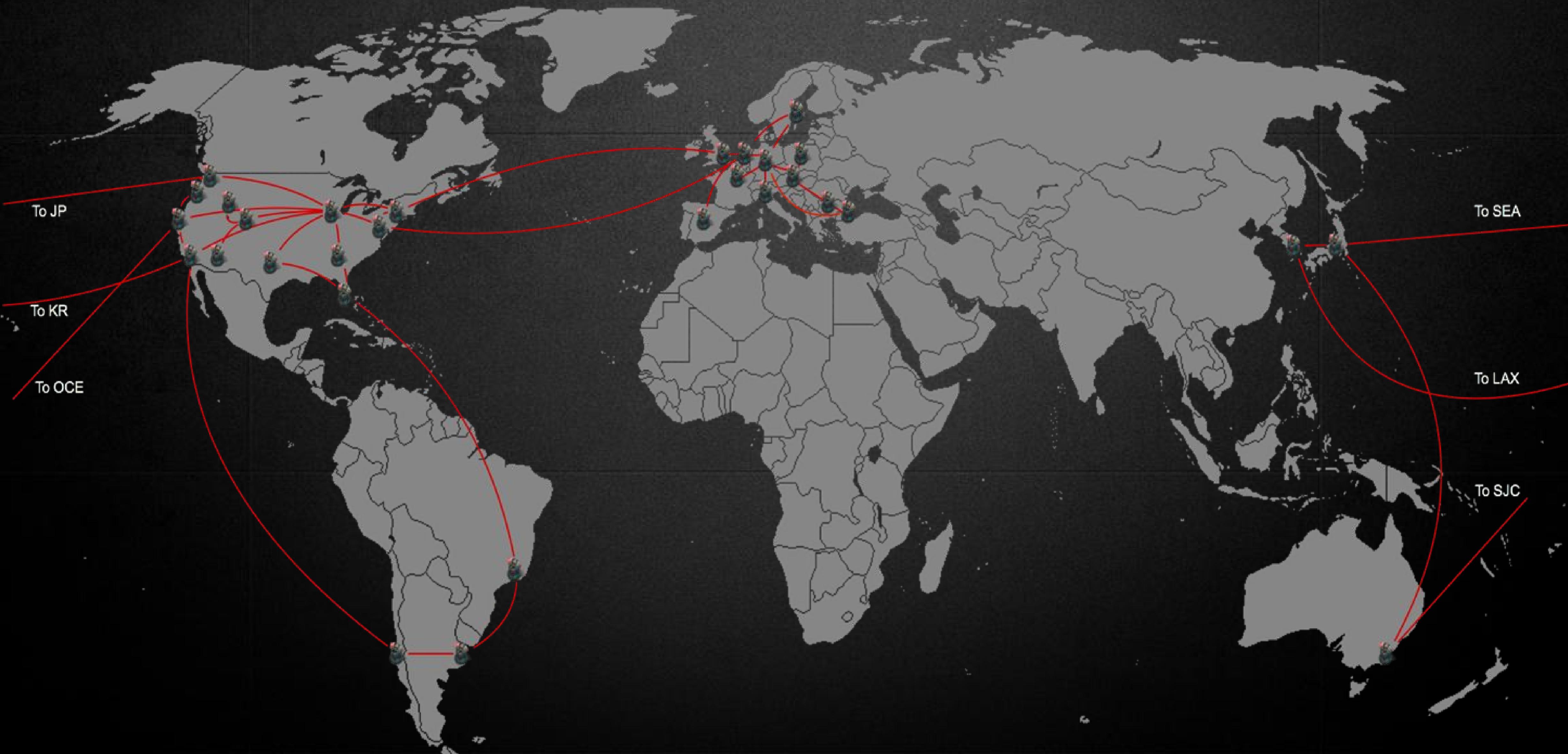
How did a Gaming company approach this problem?

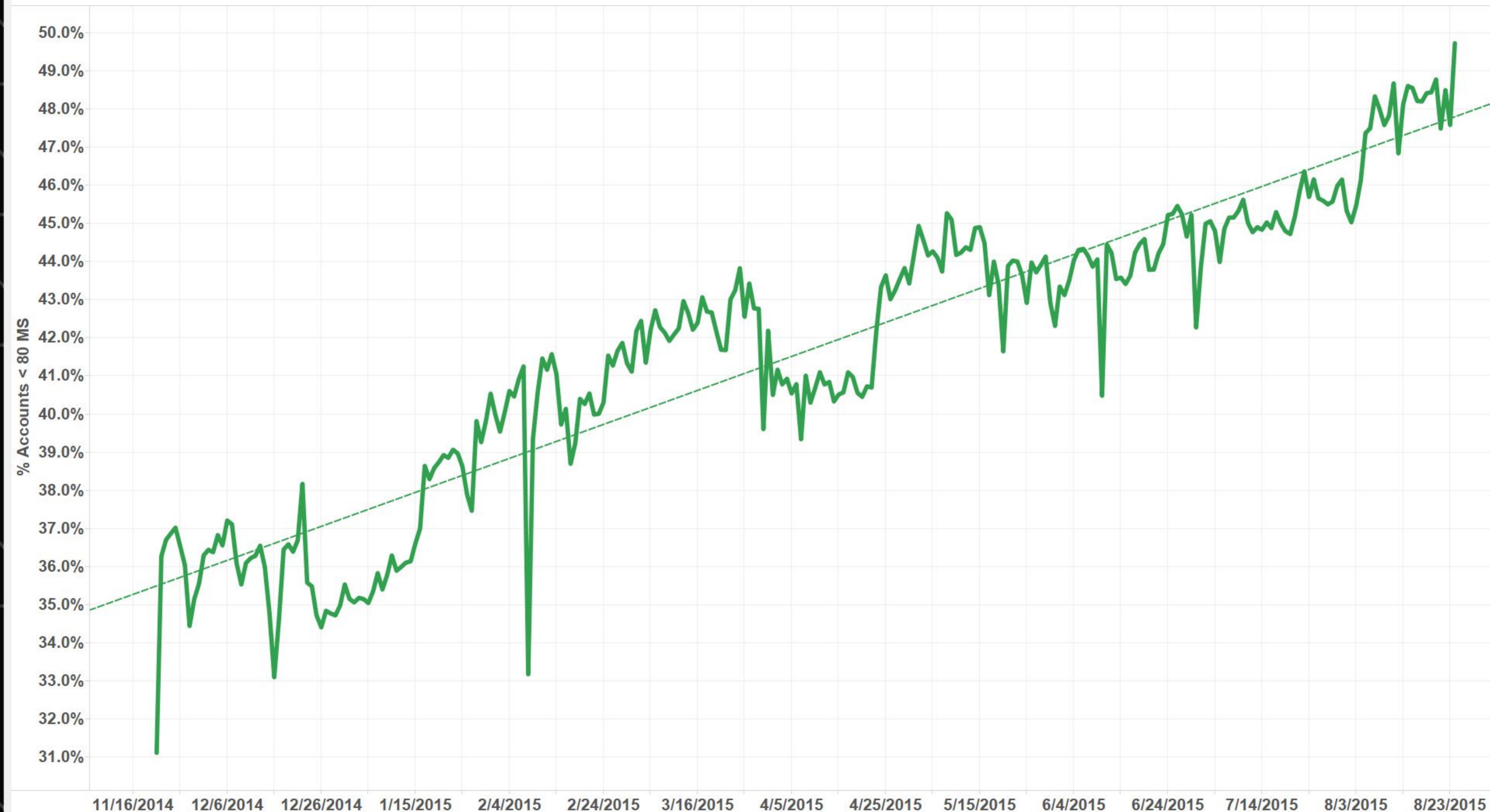
[Riot](#)

EU RiotDirect map

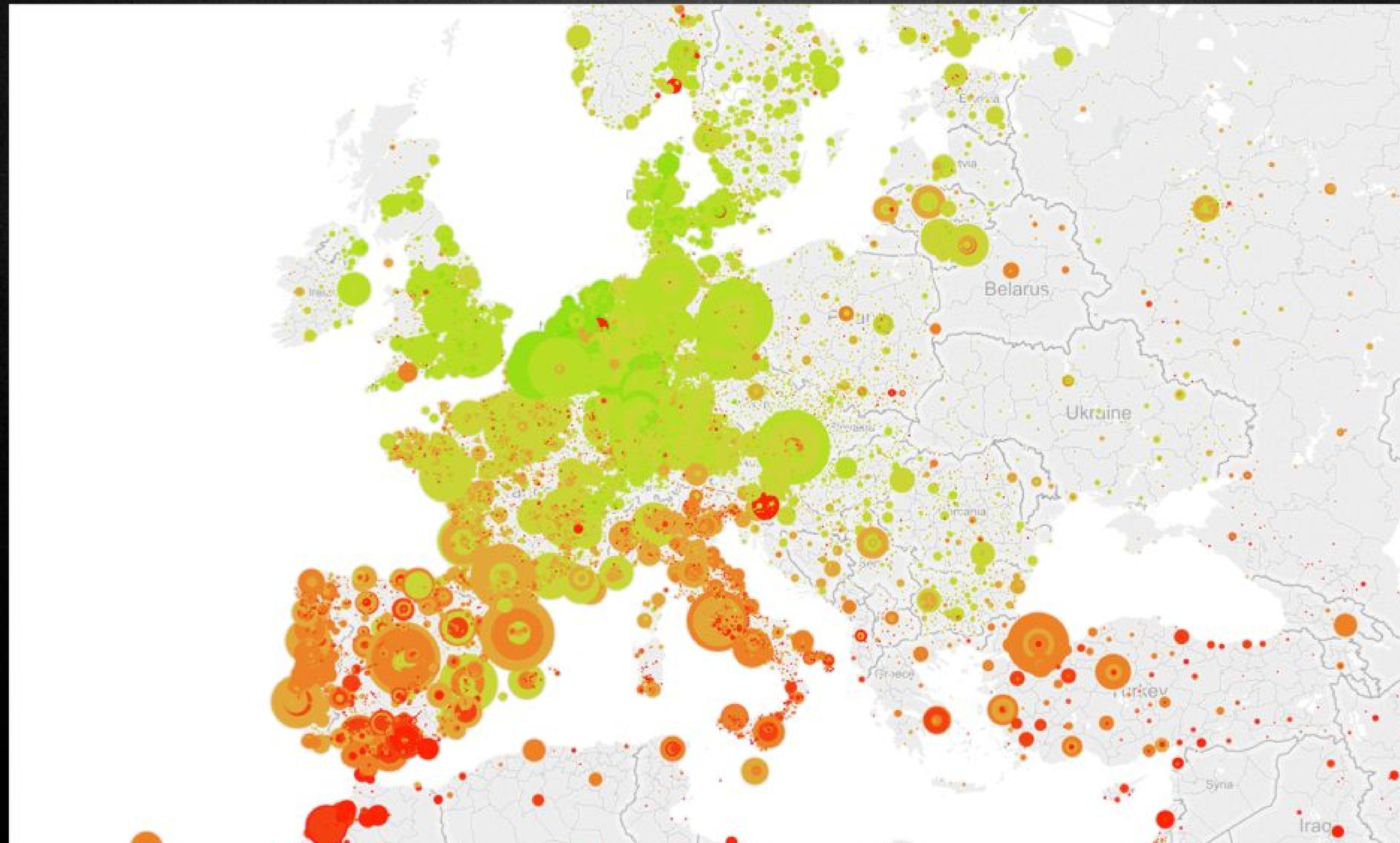


Worldwide RiotDirect map

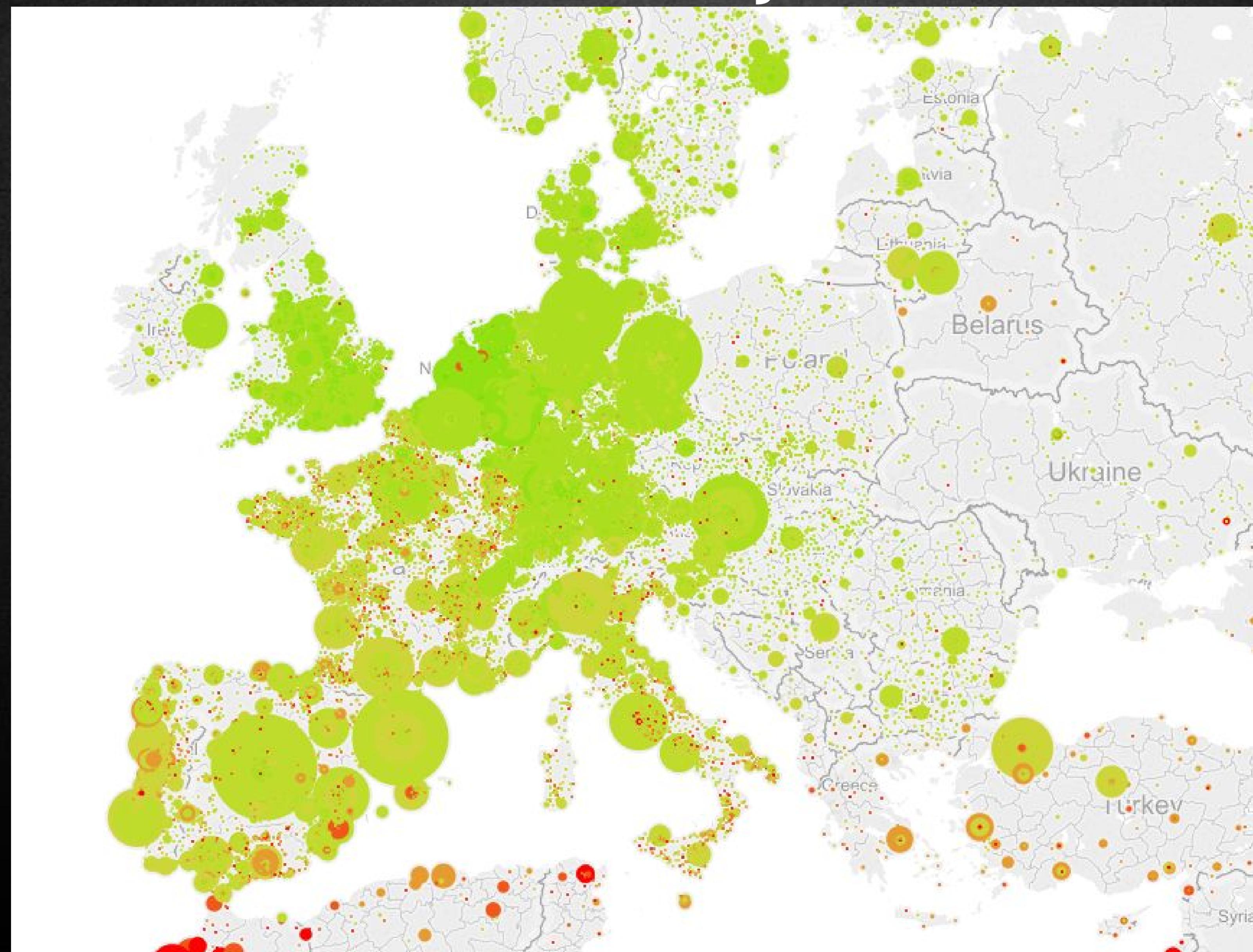




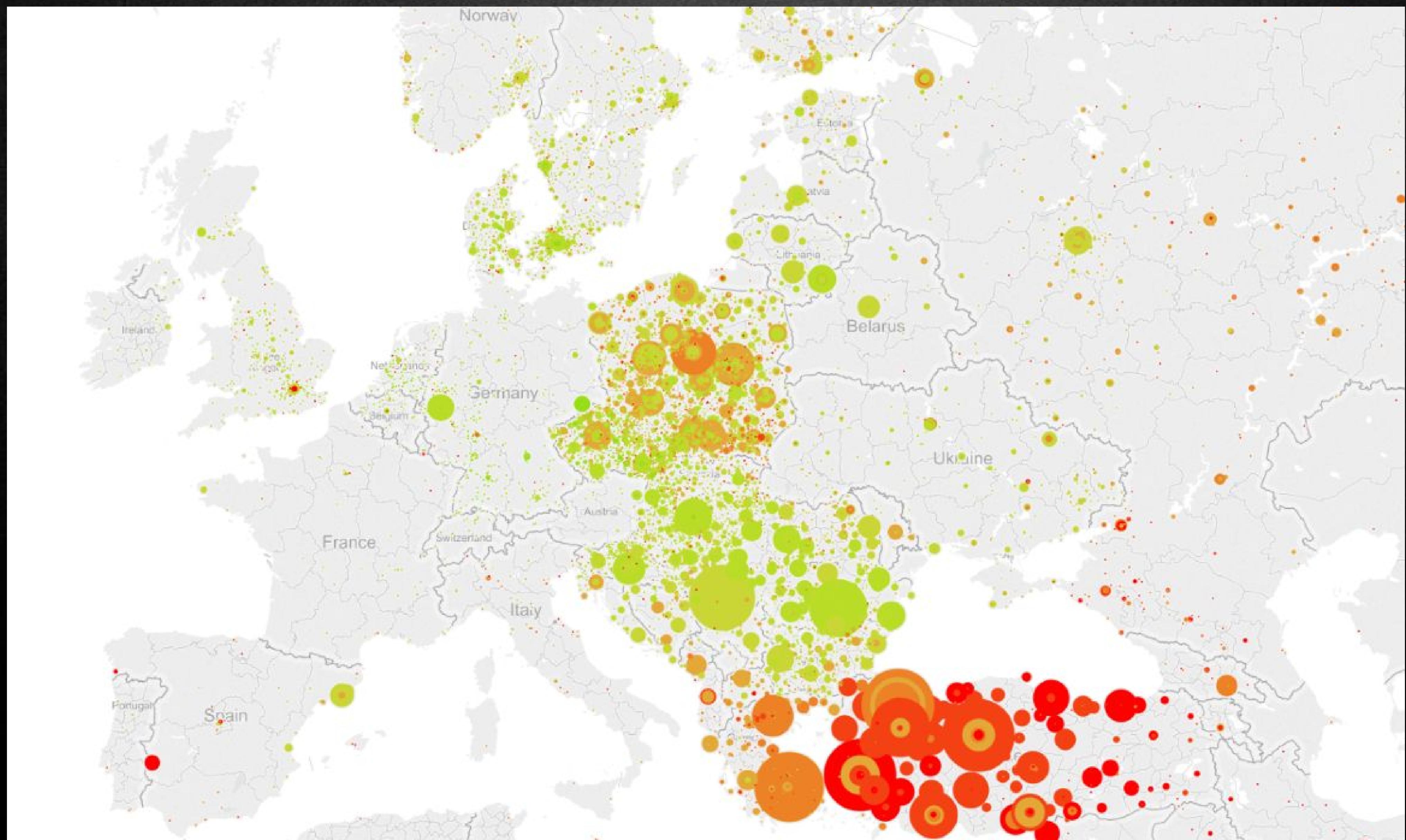
EUW Before (2014)



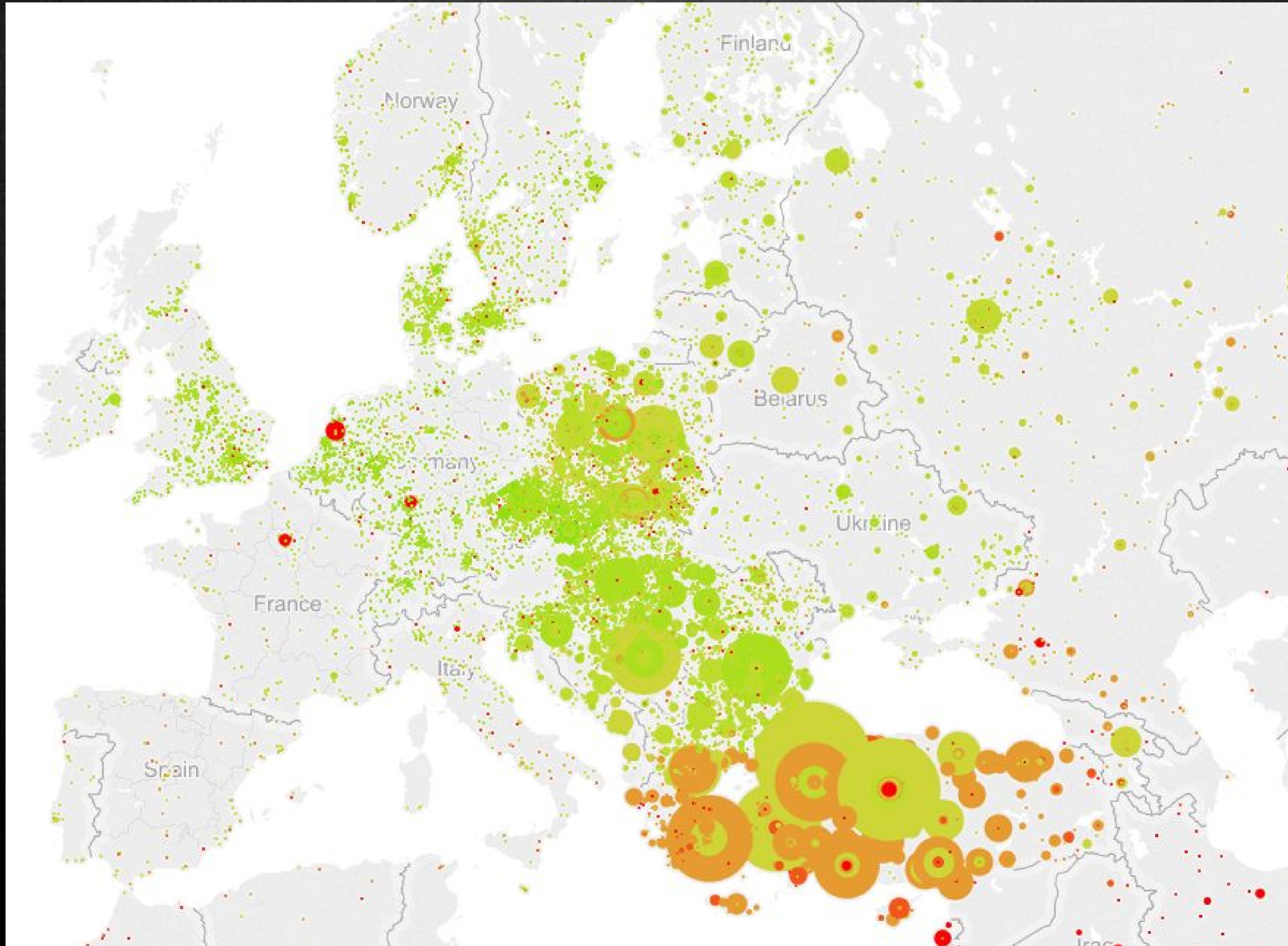
EUW After (May 2016)



EUNE Before (2014)



EUNE After (May 2016)



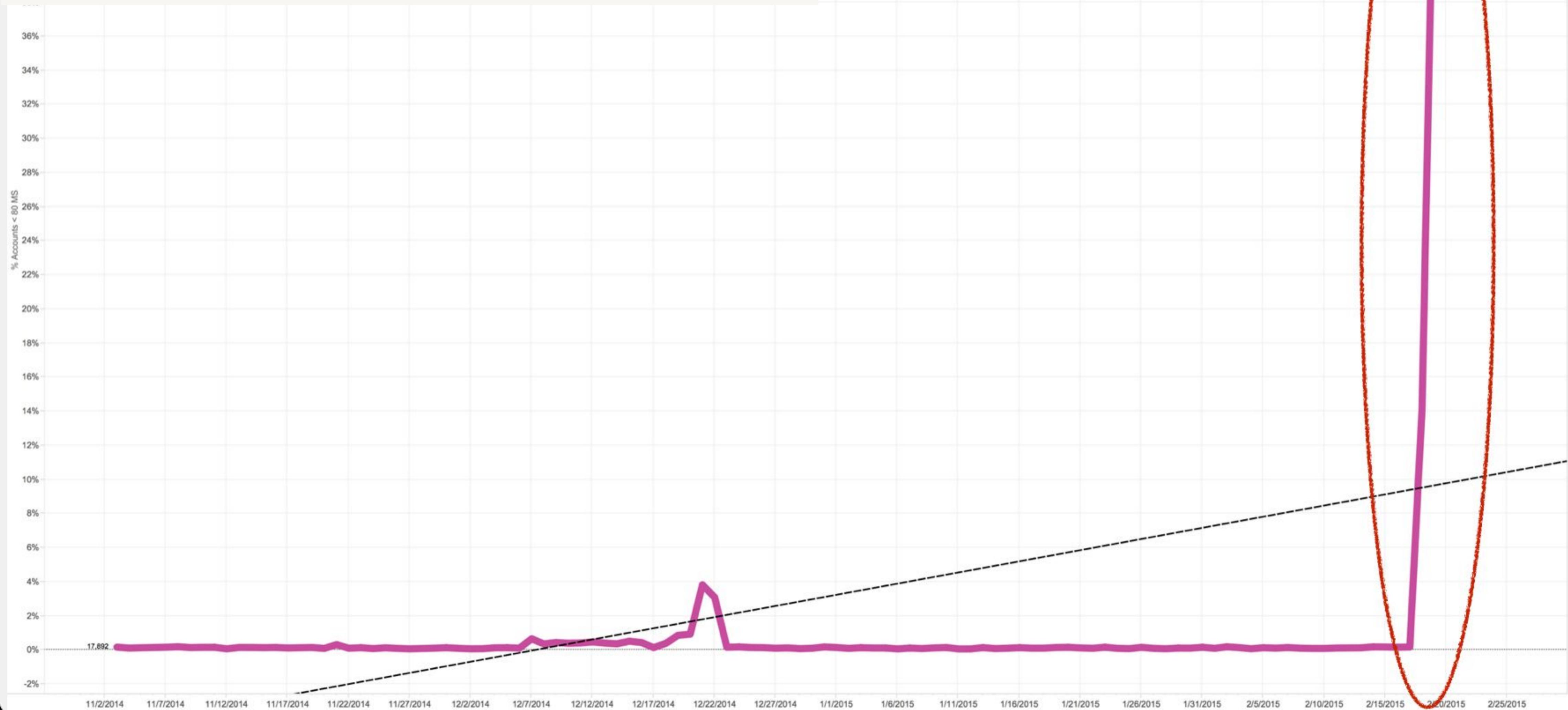


THREE WORDS TO DESCRIBE PEERING

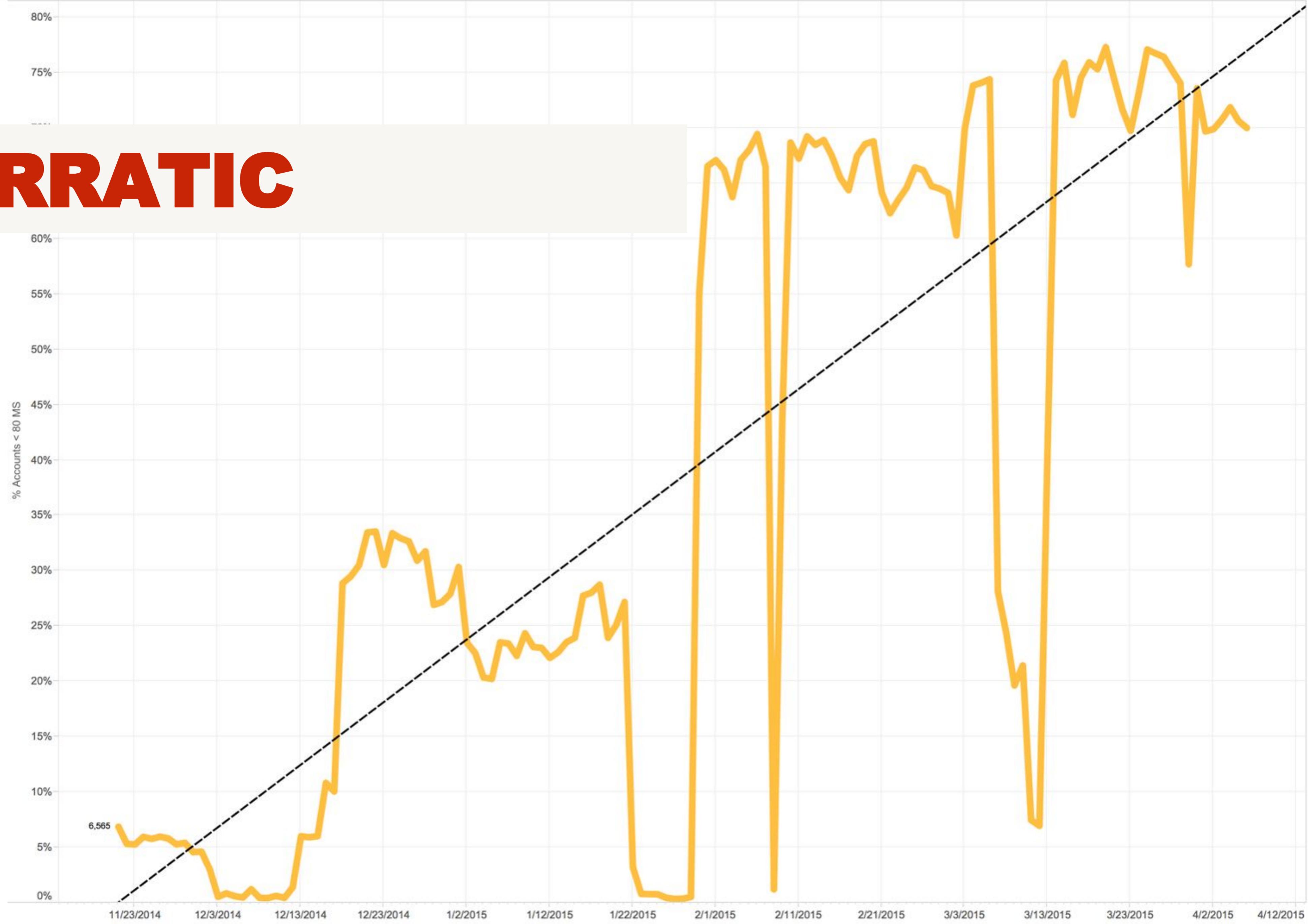


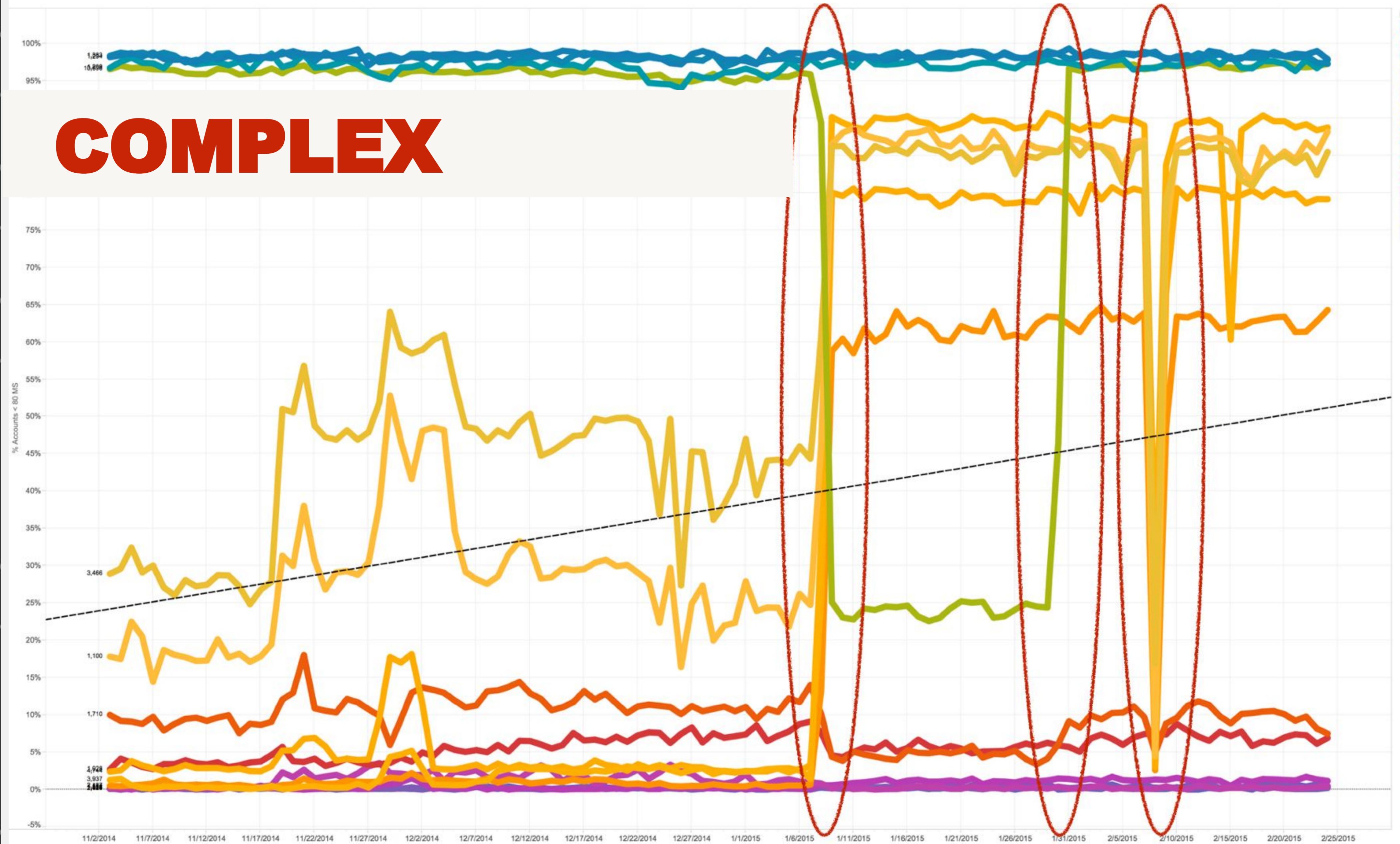
50%

DRAMATIC



ERRATIC





COMPLEX

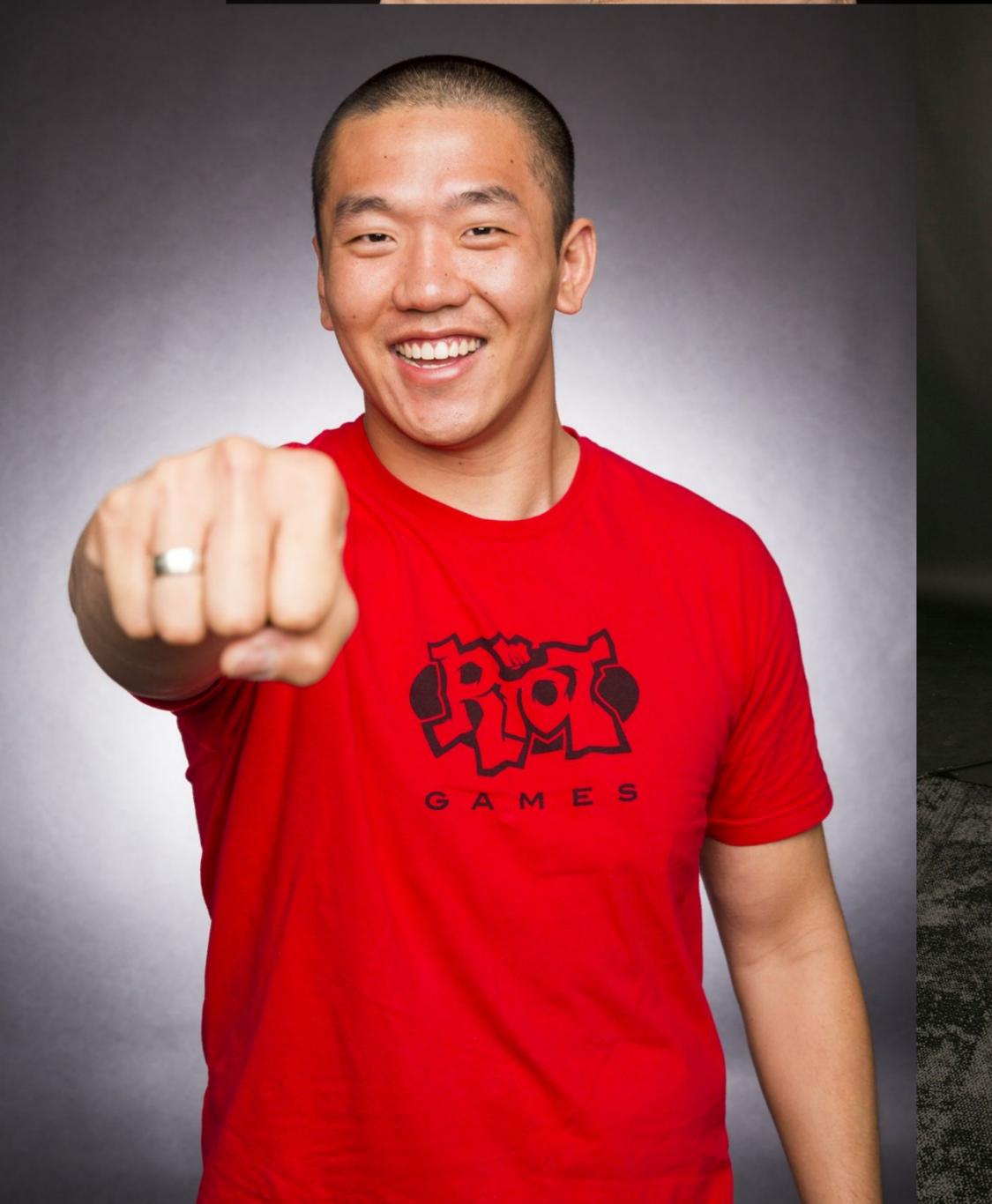
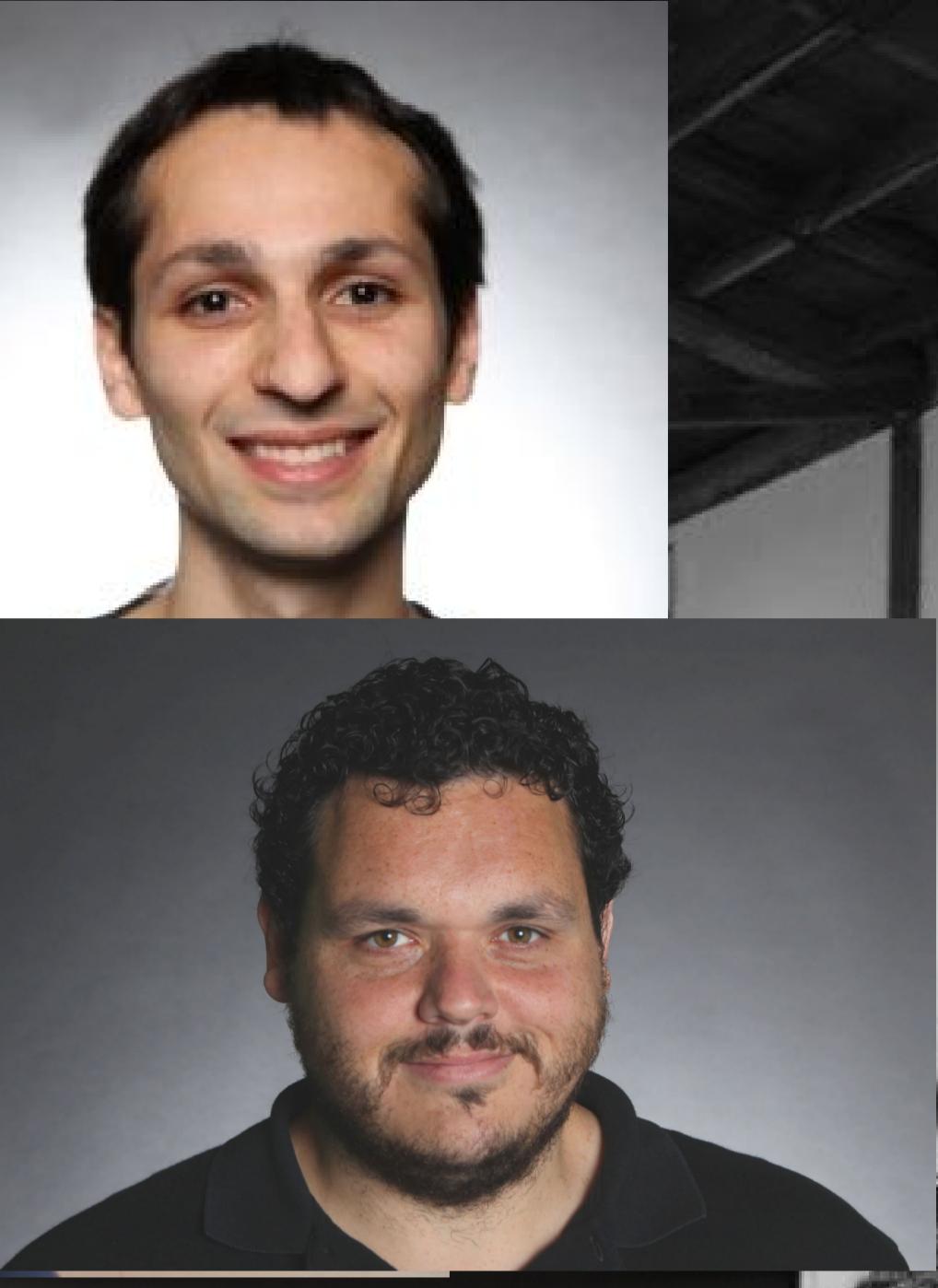
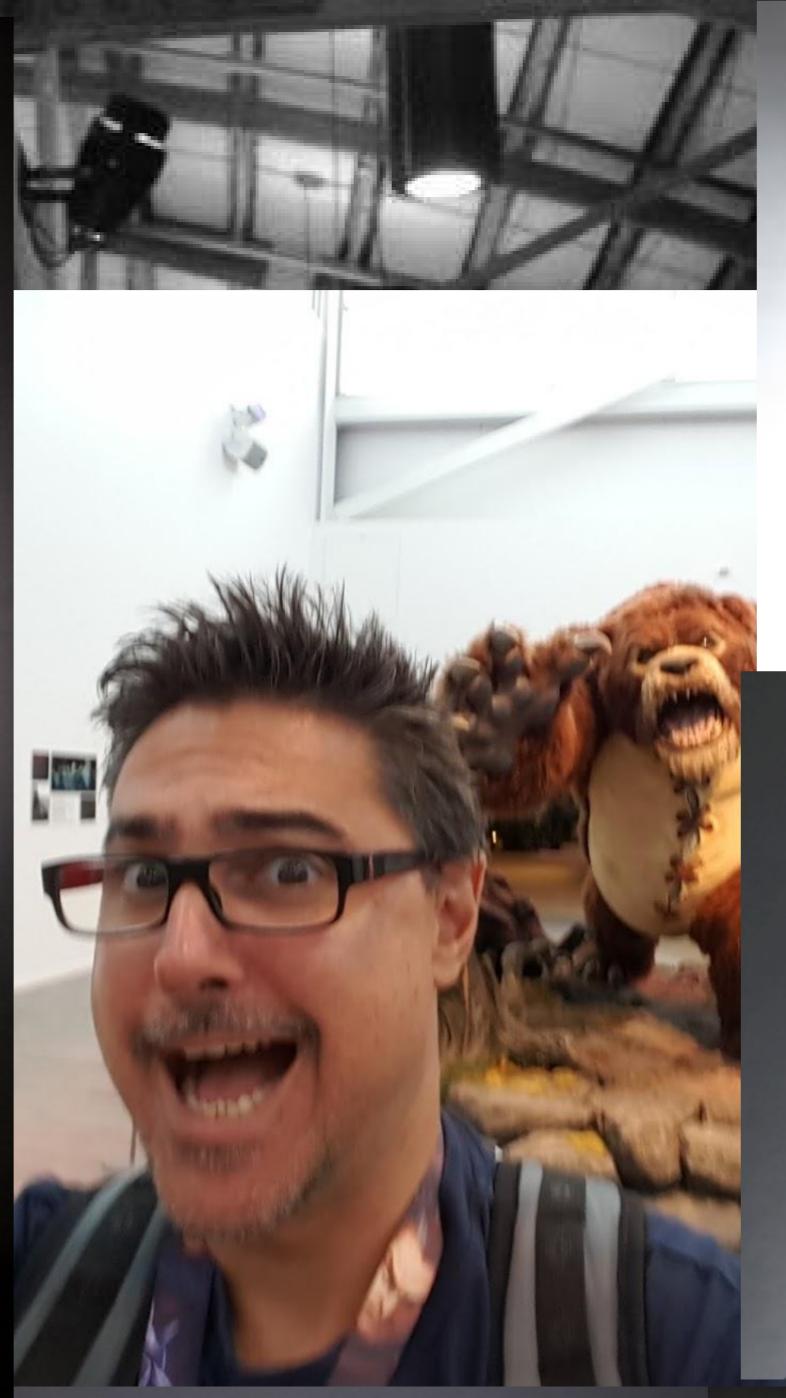
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WHAT **ELSE?**

- Faster Peering
- More Robust DDoS Mechanisms
- Dynamic and Scalable
- We **might** be building our own Routers

Q&A





THANK YOU

