Explore Network Impact on your App's Performance

March 15, 2016

Brought to you by

Hosted By

Petar Puskarich
Software Architect
NTT Innovation Institute, Inc.
Performance Engineering SIG Leader

Today's Speakers

Guy Rosenthal
NV Product Manager
Hewlett Packard Enterprise

Kristina Avrionova
Product Marketing- StormRunner Load/Network Virtualization
Hewlett Packard Enterprise

Housekeeping

- This “LIVE” session is being recorded
  Recordings are available to all Vivit members

- <u>Session Q&A:</u>
  Please type questions in the Questions Pane

Webinar Control Panel

Toggle View Window between Full screen/window mode.

Questions

Hewlett Packard Enterprise

Explore network impact on your app's performance

Kristina Avrionova and Guy Rosenthal

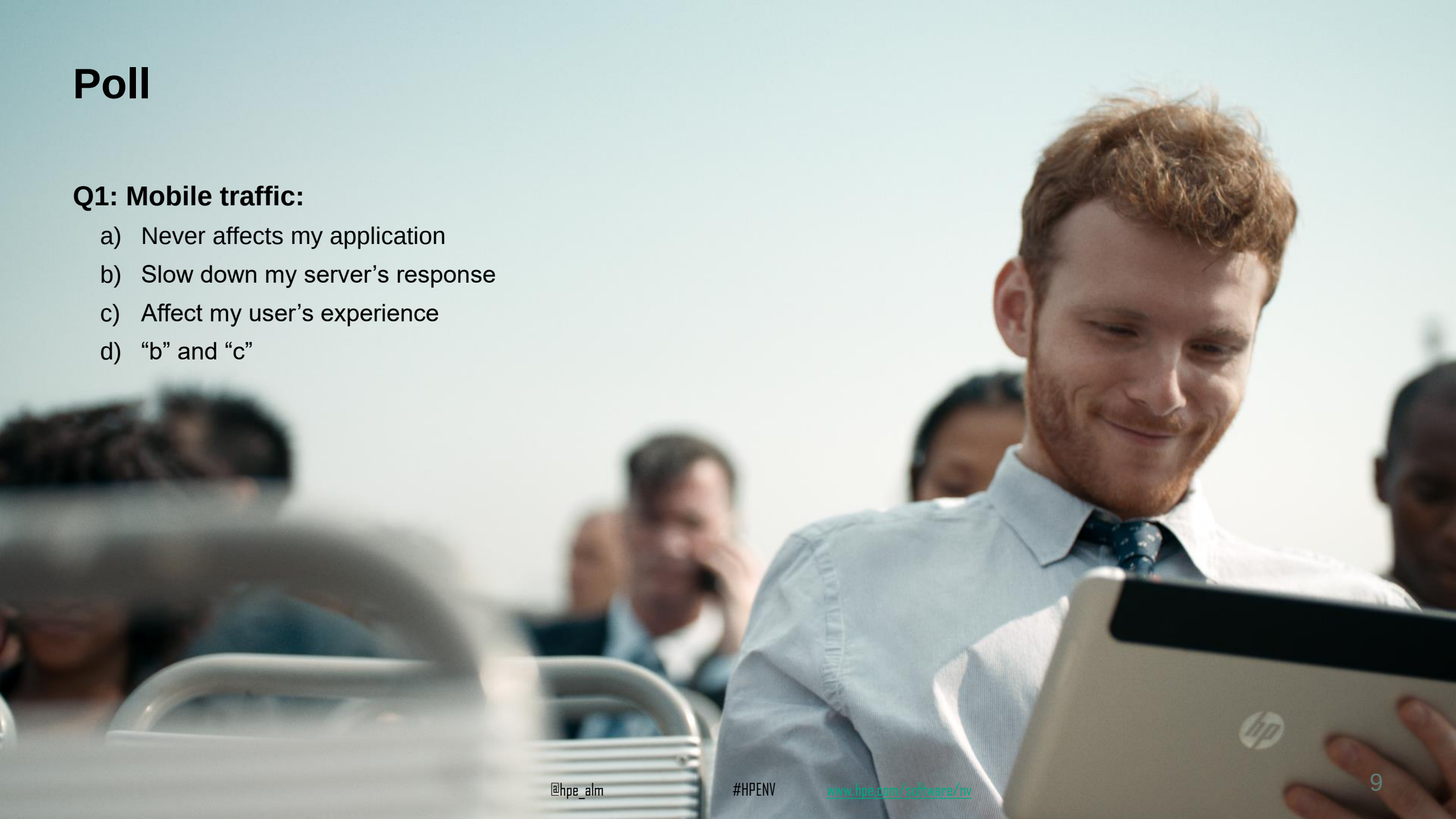
Agenda

- Introduction
- Network impact on your app’s performance
- What can you do? What should you consider?
- Demo
- Q&A

Poll

Q1: Mobile traffic:

a) Never affects my application
b) Slow down my server's response
c) Affect my user's experience
d) "b" and "c"



It’s a mobile world

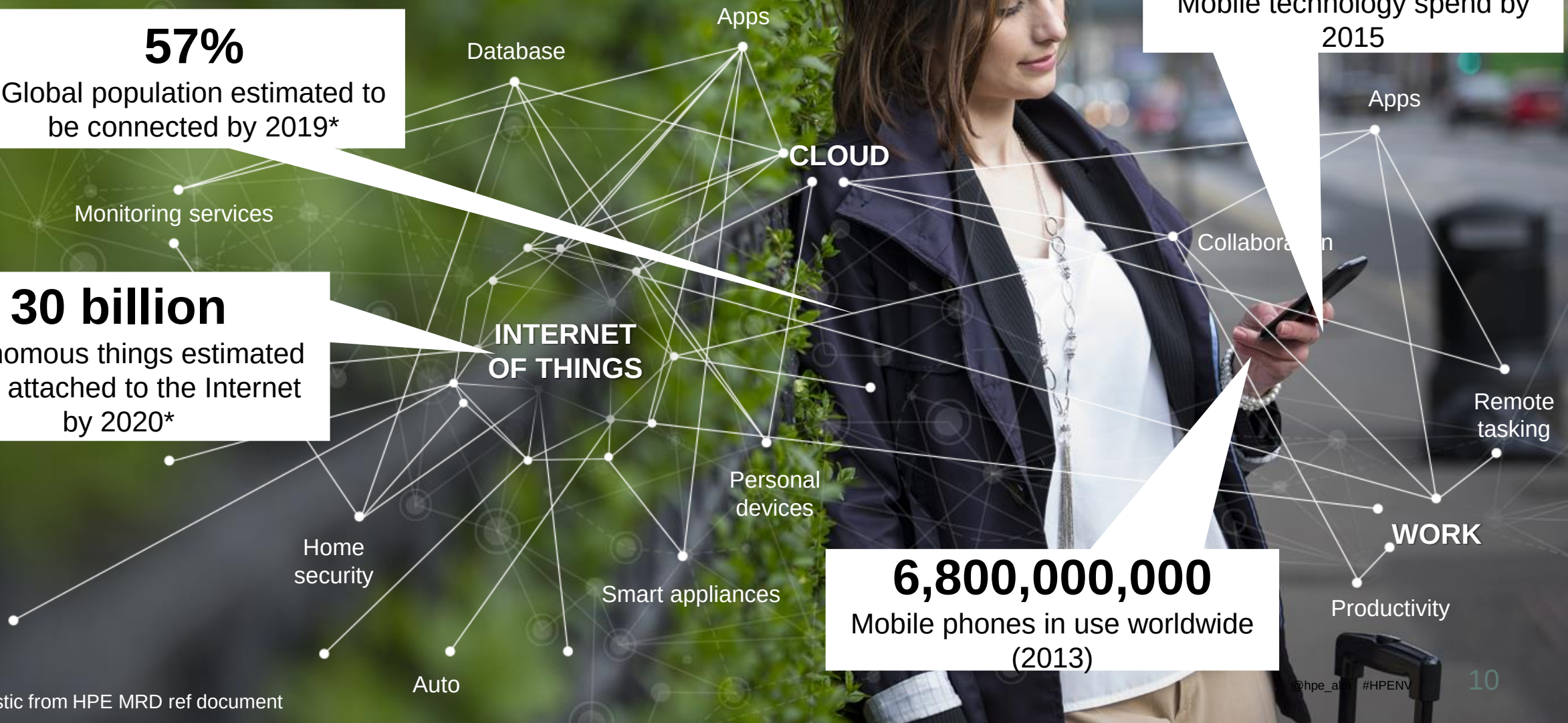
Daily activities reflect an explosion of traffic... globally

57%
Global population estimated to be connected by 2019*

30 billion
autonomous things estimated to be attached to the Internet by 2020*

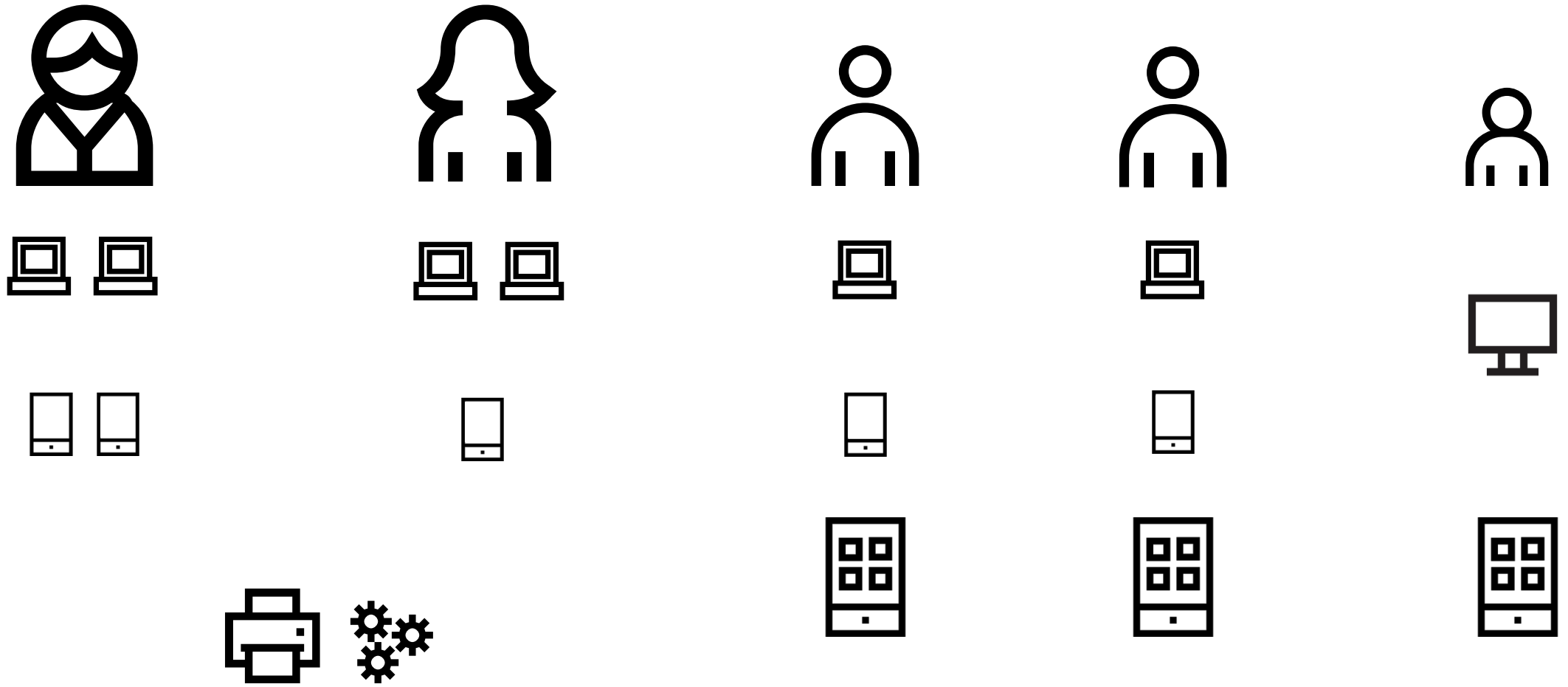
$1.3T
Mobile technology spend by 2015

6,800,000,000
Mobile phones in use worldwide (2013)



*IDC statistic from HPE MRD ref document

Connected state of mind



What loading means

A 500ms connection speed delay resulted in:

- up to a 26% increase in peak frustration
- up to an 8% decrease in engagement *(Radware)*

http://blog.radware.com/applicationdelivery/applicationaccelerationoptimization/2013/12/mobile-web-stress-the-impact-of-network-speed-on-emotional-engagement-and-brand-perception-report/

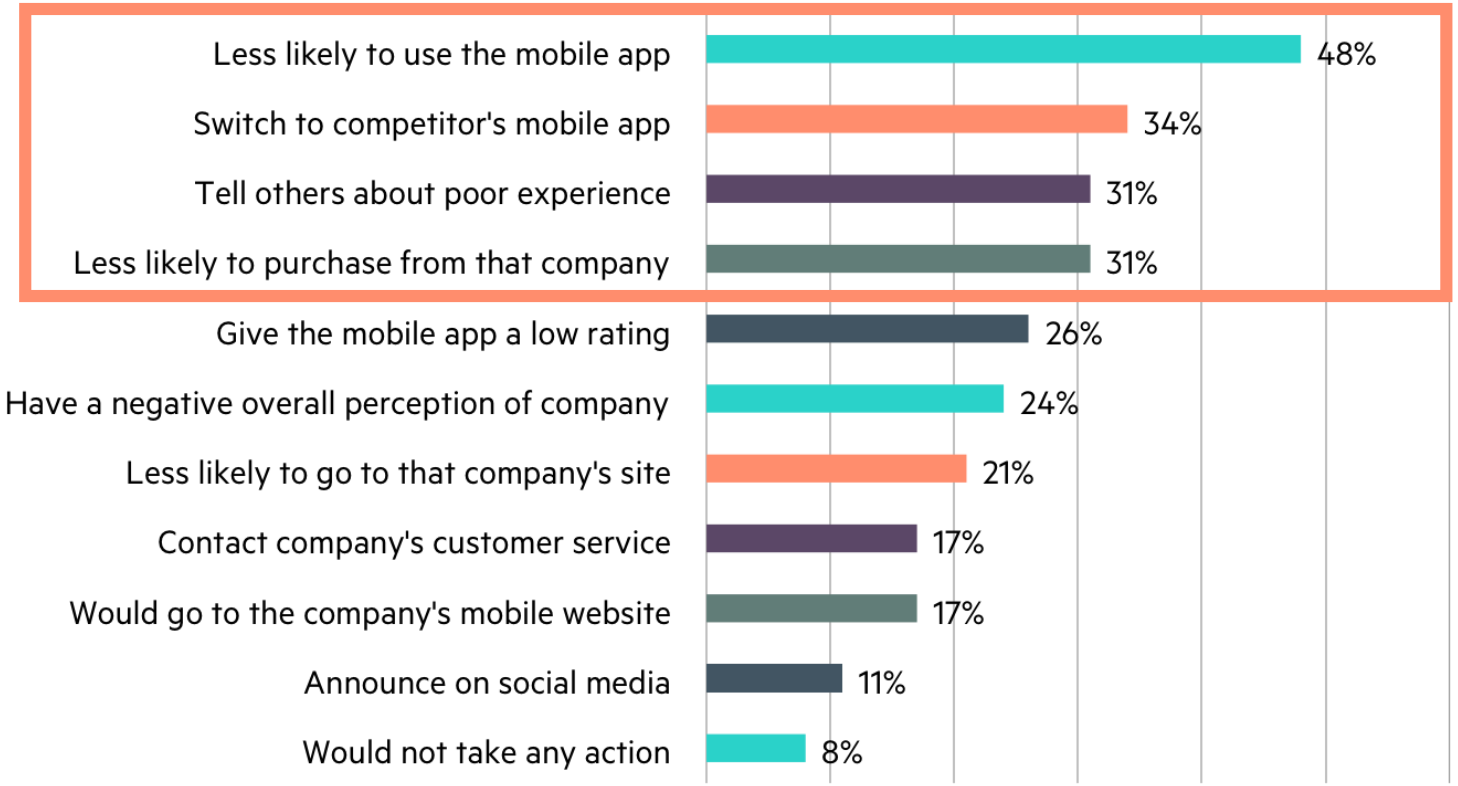
Network performance affects user experience

Every 100ms of latency costs **Amazon 1% of profit** *(O'Reilly)*

79% of mobile users will only retry an app once or twice if it failed to work the **first** time *(Dynatrace)*

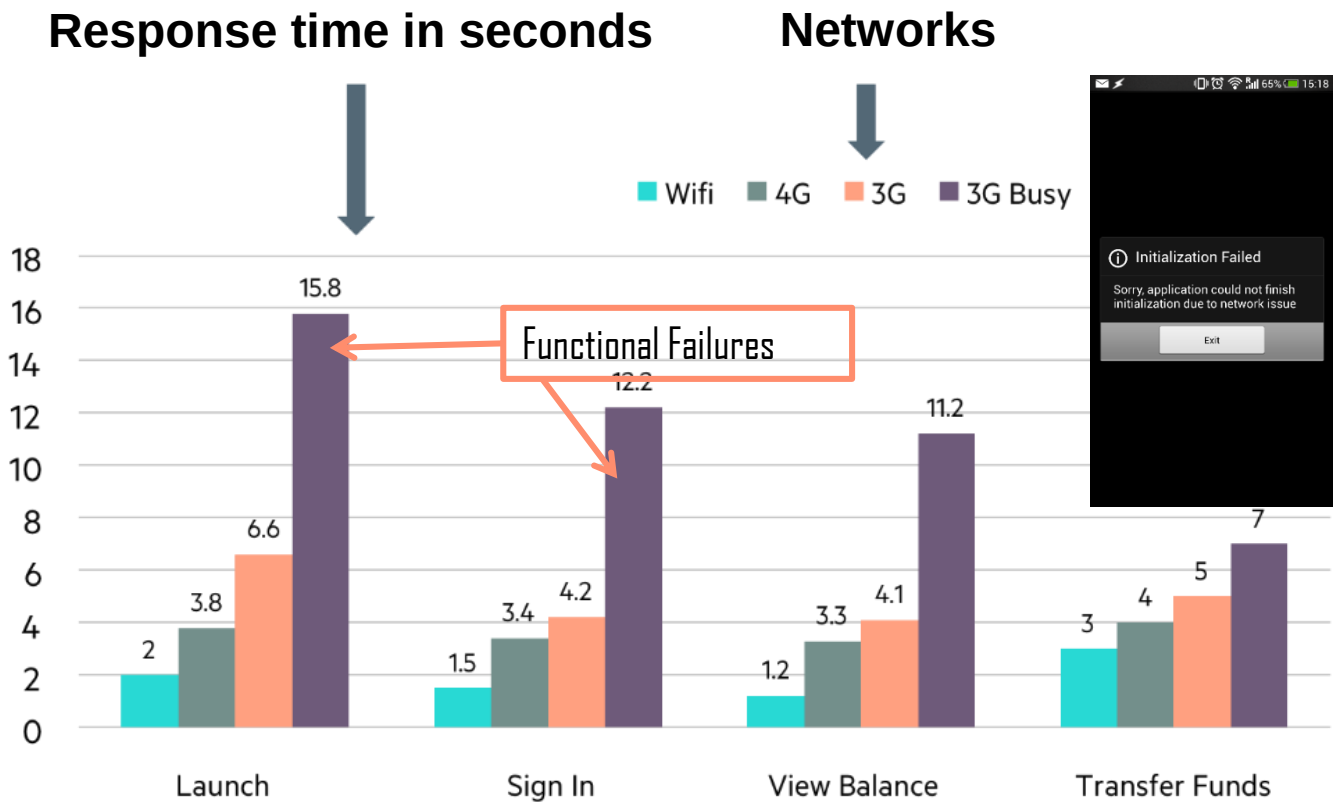
User experience is crucial

Consumer reaction to poor mobile app experiences



http://offers2.compuware.com/APM_13_WP_Mobile_App_Survey_Report_Registration.html

Different networks = different application behavior



The network affects everyone (or everything)

E-Commerce websites

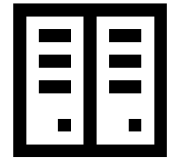
- Image heavy
- Pulling content from different internal and external sources
- Will often crash when massive number of users hit the site (Black Friday, Cyber Monday)
- Will often crash because server connections is always slowed down by remote users

Performance of web applications:
Customers are won or lost in **one second**

Some network traffic is expected, some is *unpredictable*

– Busy summer travel
– Bad weather winter travel

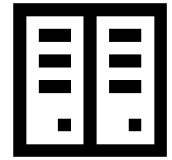
Last minute bookings



Servers overload at OTAs

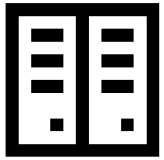
Financial markets volatility

Frantic search of news



Server overload at news media websites

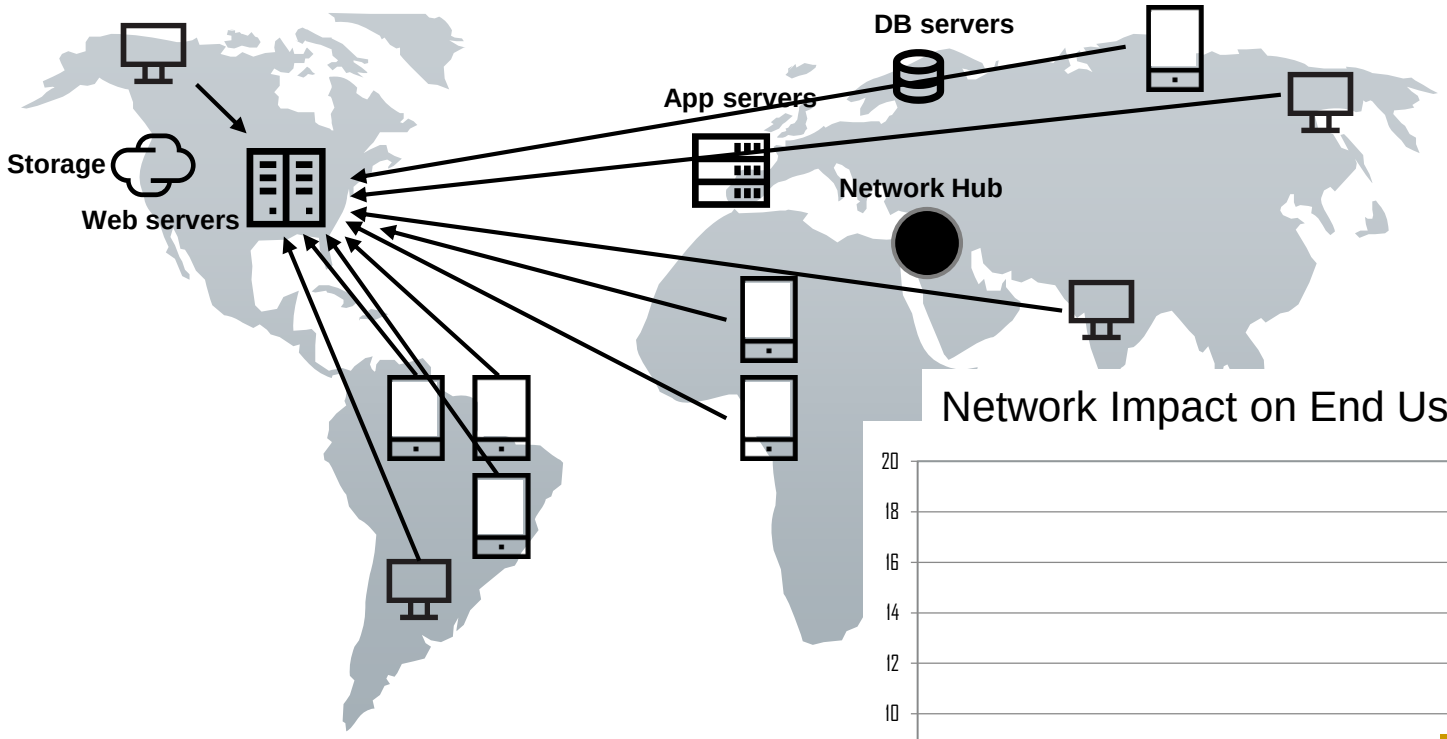
Sell off frenzy

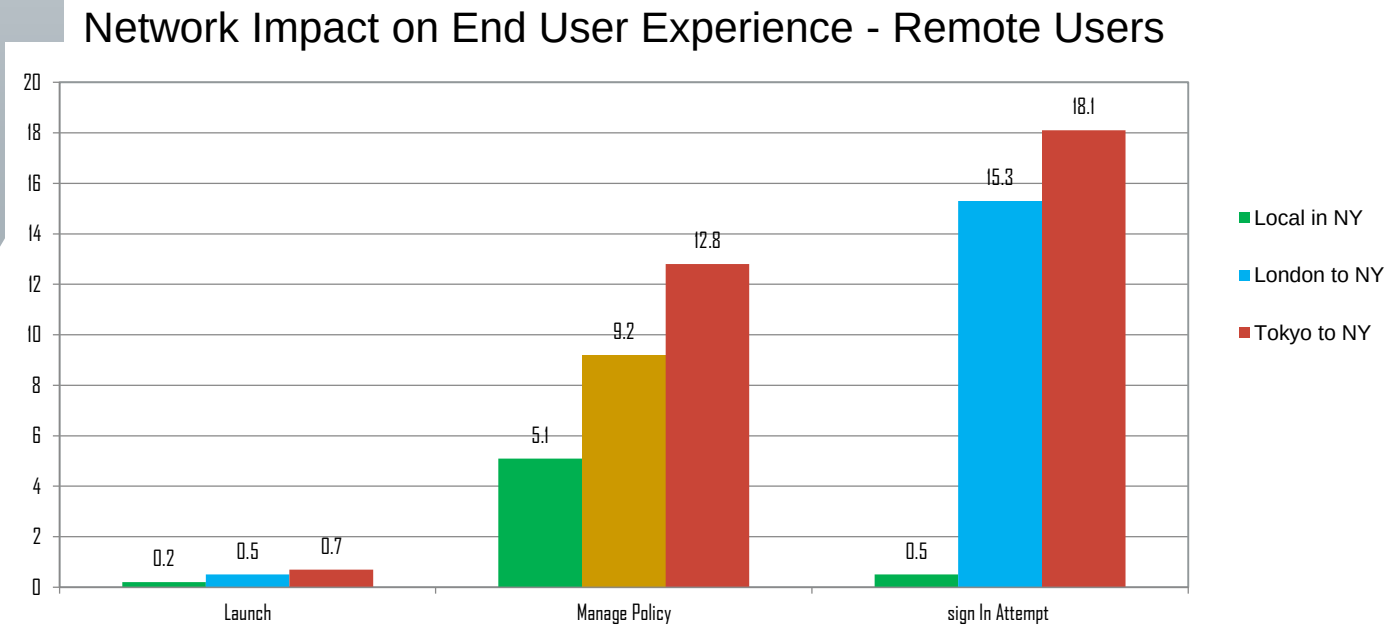


Servers overload at financial institutions

Hewlett Packard Enterprise

Complex IT: Data centers, frontend-backend systems and users that are all over the globe





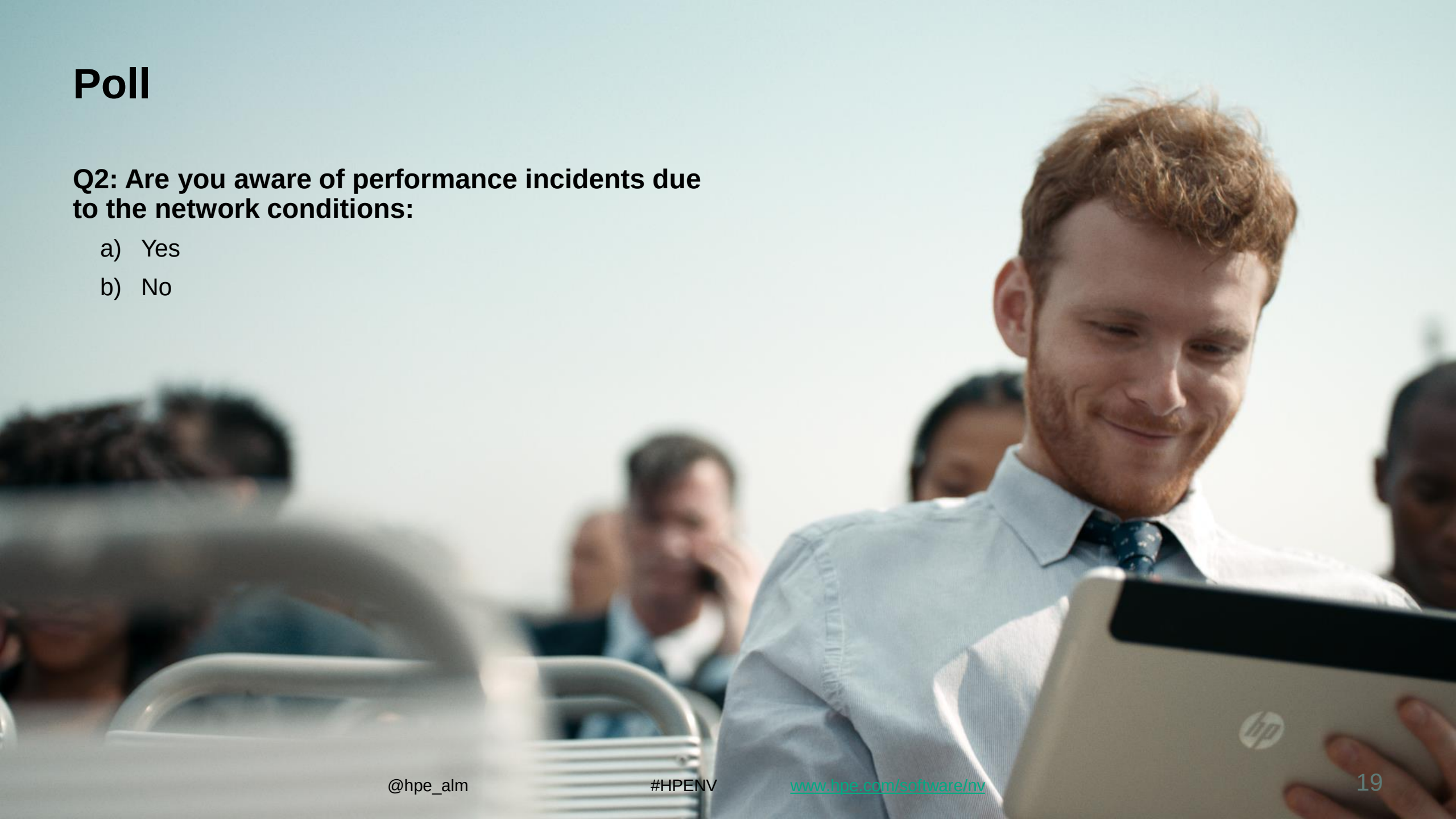
Hewlett Packard Enterprise

Poll

Q2: Are you aware of performance incidents due to the network conditions:

a) Yes

b) No



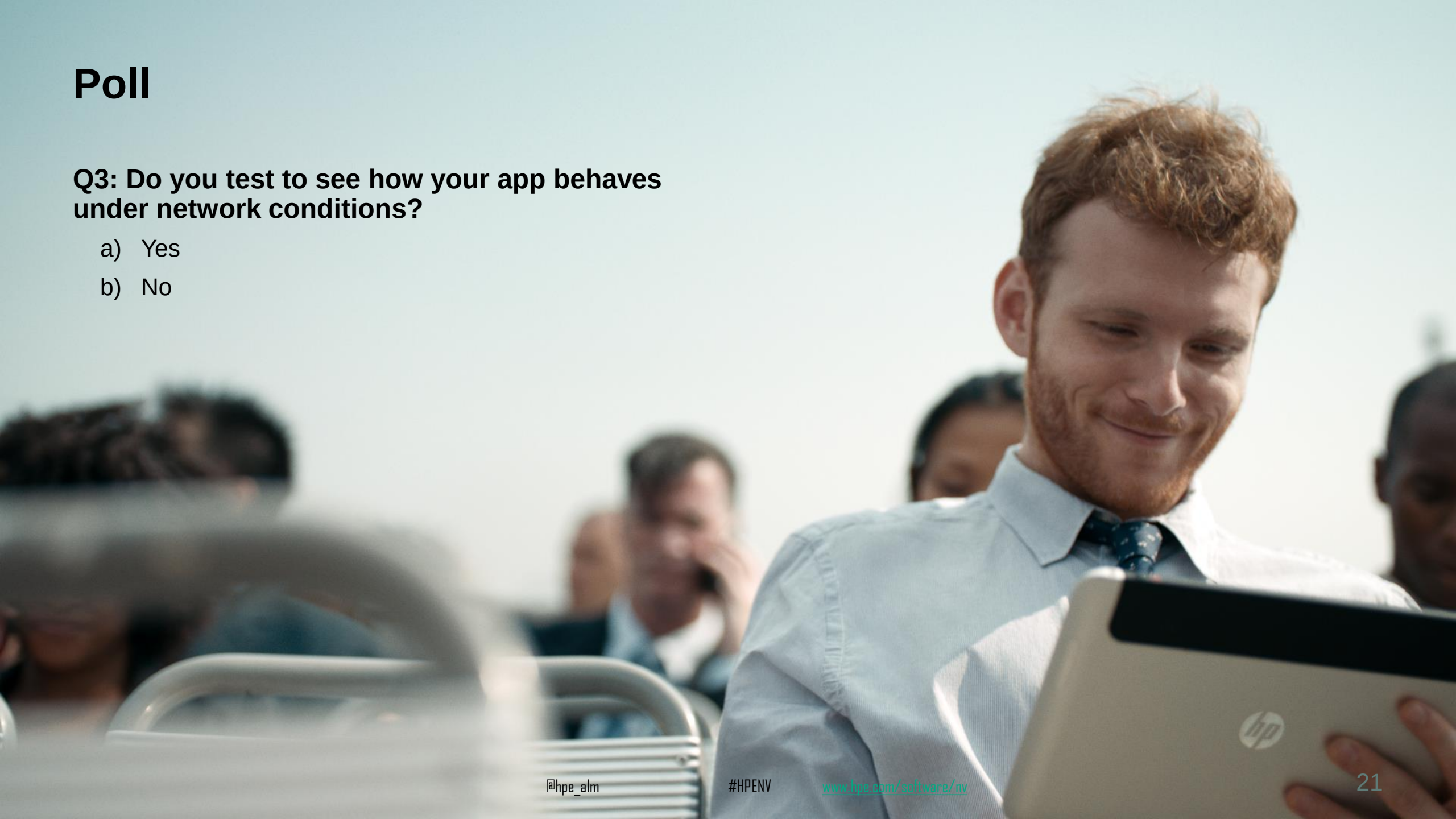
What can you do?
What should you consider?

Poll

Q3: Do you test to see how your app behaves under network conditions?

a) Yes

b) No



Network basics

Latency (milliseconds)

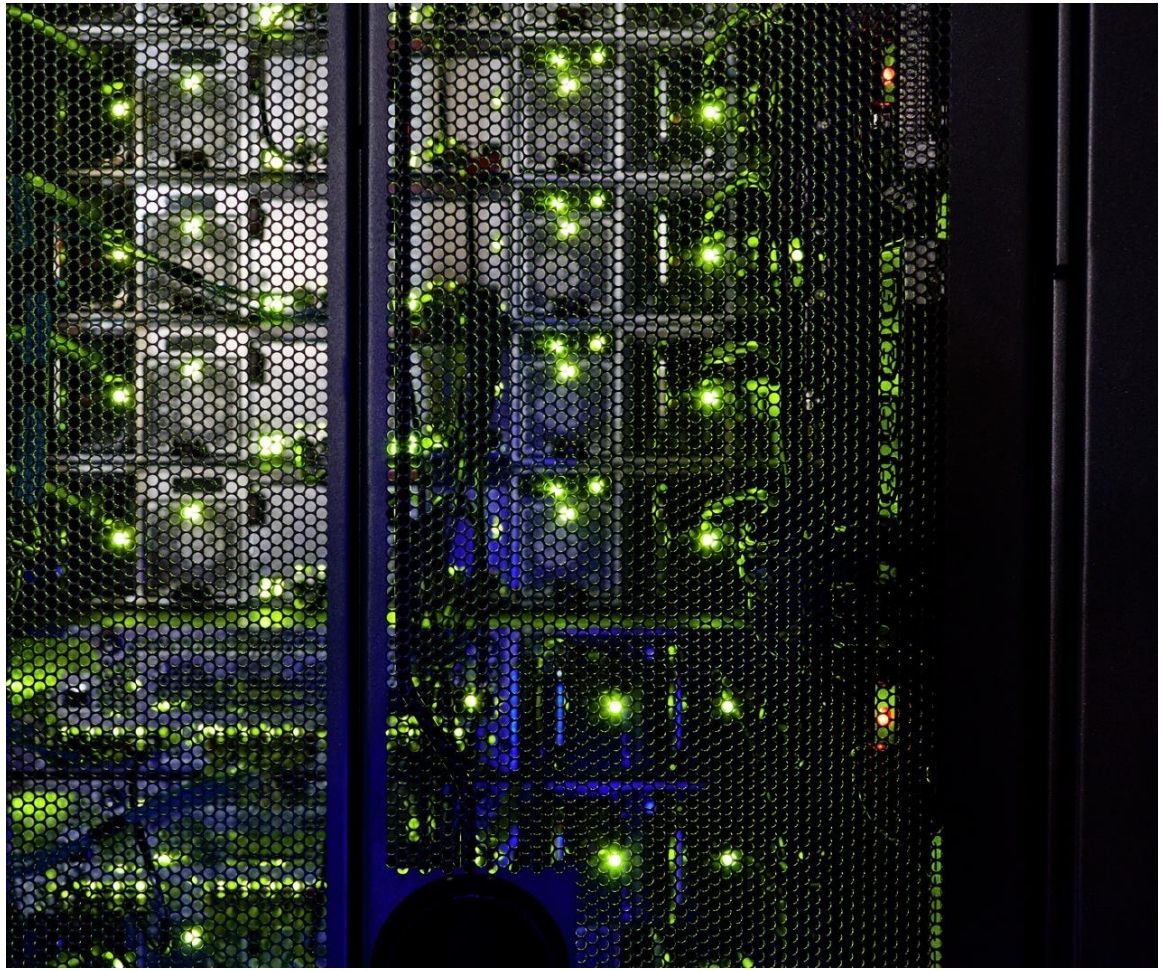
The **time** from the source sending a packet to the destination receiving it

Bandwidth (data per second)

Maximum **throughput** of a logical or physical communication path

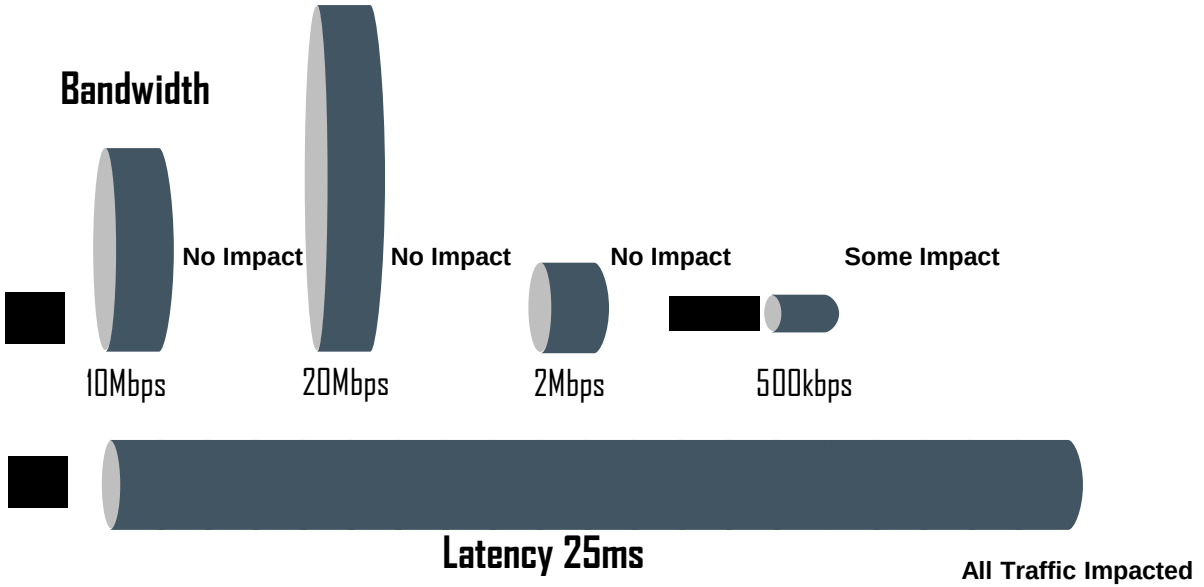
Packet loss (percentage)

Occurs when one or more packets of data travelling across a computer **network fail to reach their destination**



Latency effects all data…

Route	Distance	Time, light in vacuum	Time, light in fiber	Round-trip time (RTT) in fiber
New York to San Francisco	4,148 km	14 ms	**21 ms**	42 ms
New York to London	5,585 km	19 ms	**28 ms**	56 ms
New York to Sydney	15,993 km	53 ms	**80 ms**	160 ms
Equatorial circumference	40,075 km	133.7 ms	**200 ms**	200 ms



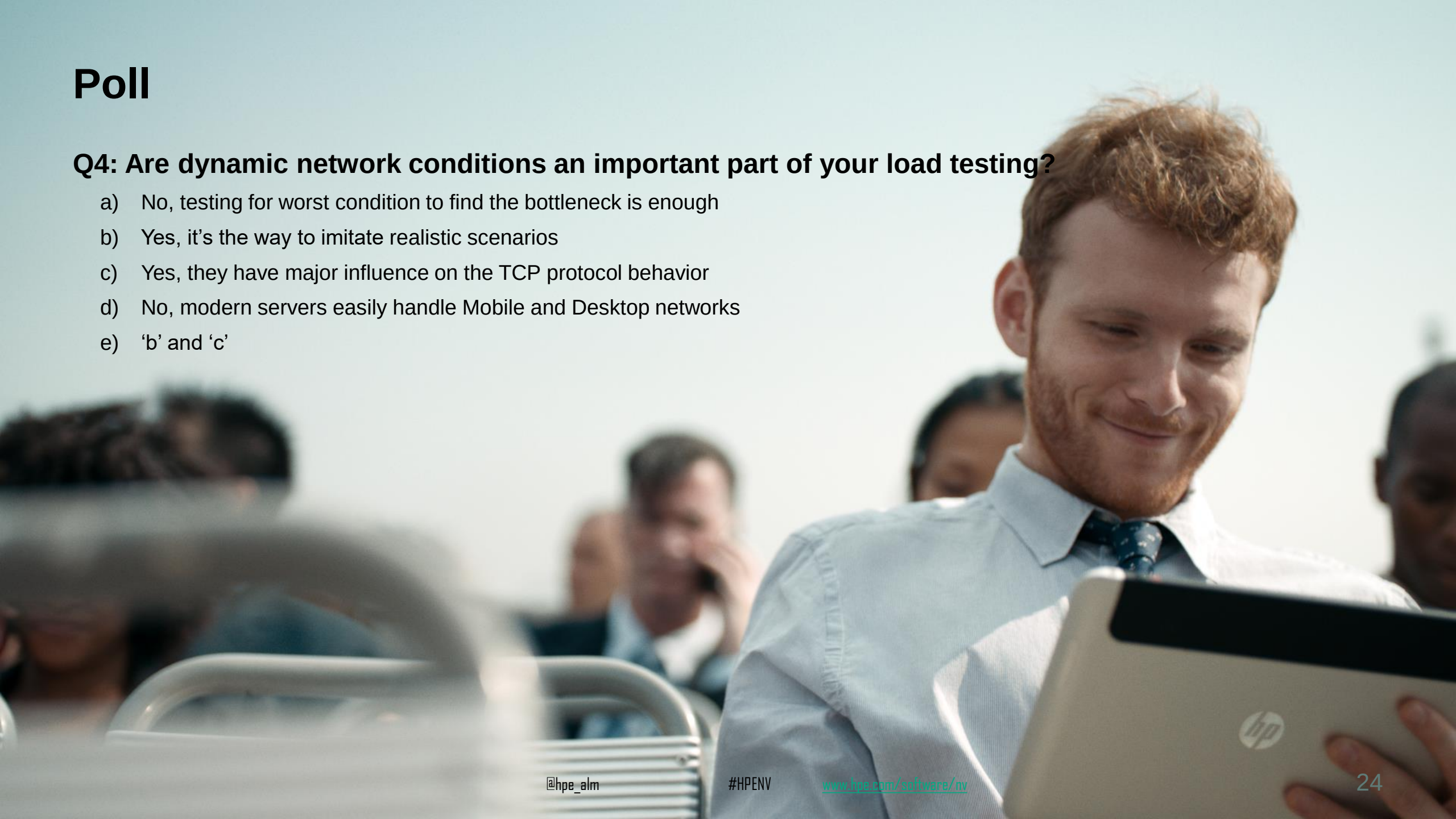
Packet loss = further impact

http://chimera.labs.oreilly.com/books/1230000000545/index.html

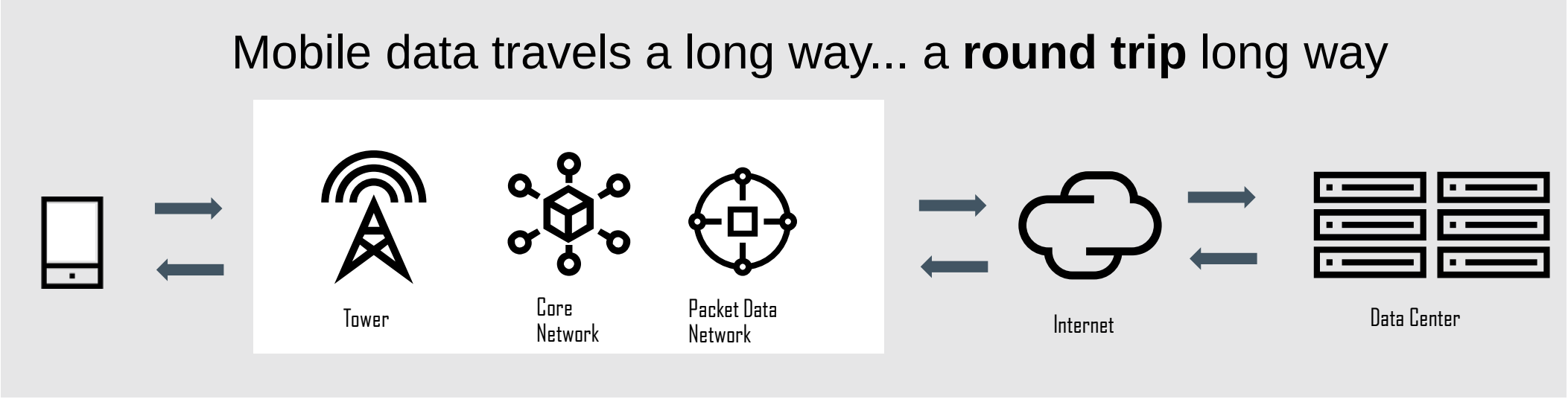
Poll

Q4: Are dynamic network conditions an important part of your load testing?

a) No, testing for worst condition to find the bottleneck is enough
b) Yes, it's the way to imitate realistic scenarios
c) Yes, they have major influence on the TCP protocol behavior
d) No, modern servers easily handle Mobile and Desktop networks
e) 'b' and 'c'



Mobile networks are dynamic and challenging…



1. **Network type –** e.g. 3G vs. 4G or even 2G…
2. **Carrier** – e.g. Verizon vs. T-Mobile
3. **Device state** - traveling, in an elevator, time of day…

Dynamic network conditions

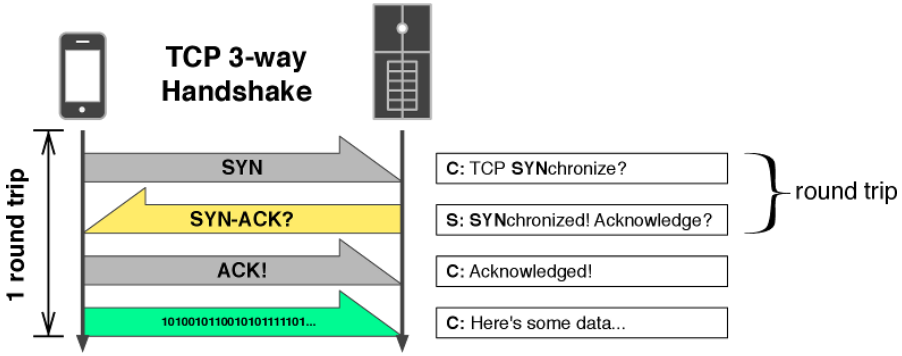
Pay attention to dynamic conditions…

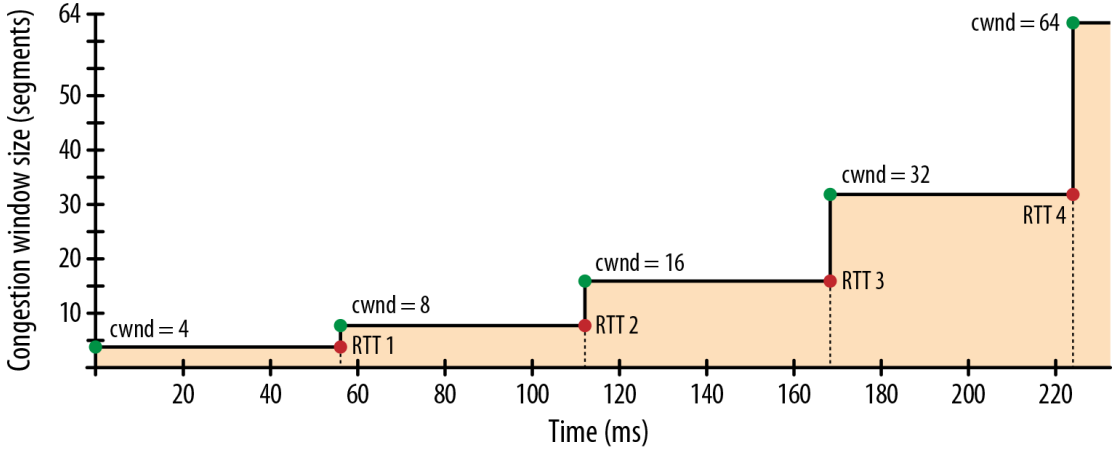
TCP is an **adaptive** protocol with internal mechanisms to avoid **congestion**, ensure **reliability** and **maximize** the network flow based on a given **conditions**

http://chimera.labs.oreilly.com/books/1230000000545/index.html
http://www.aosabook.org/en/posa/secrets-of-mobile-network-performance.html

Pay attention to dynamic conditions…

- TCP **3-way handshake** introduces a full roundtrip of latency
- TCP **slow-start** is applied to every new connection
- TCP **flow and congestion** control regulate throughput of all connections
- TCP throughput is regulated by current **congestion window size**





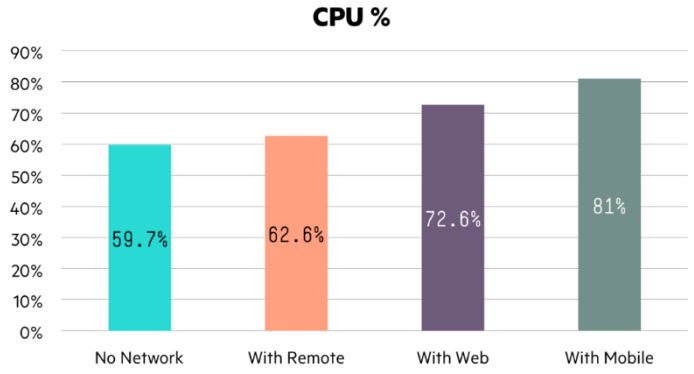
http://chimera.labs.oreilly.com/books/1230000000545/index.html
http://www.aosabook.org/en/posa/secrets-of-mobile-network-performance.html

What is the performance impact?

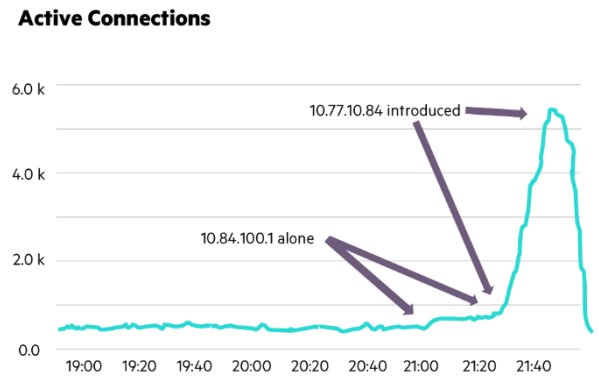
Server performance

1. "Slow users" – Mobile or remote
2. Network resources are not released
3. Server working harder – CPU, connections and Memory increase
4. Server exhaustion accelerates
5. Scalability and user experience issues (TRT)

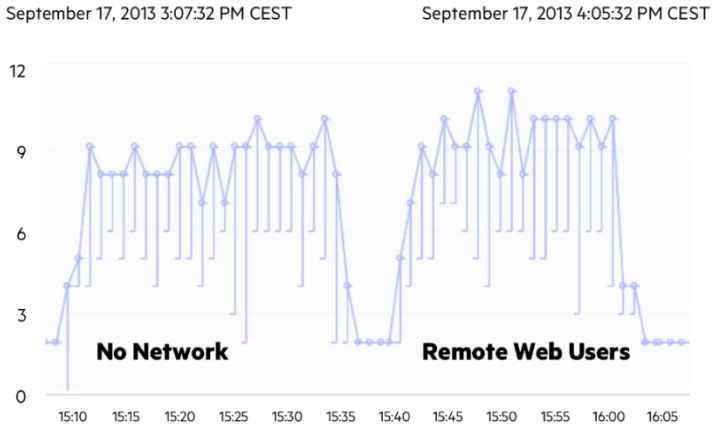
50% CPU Increase



Active Connections Increase



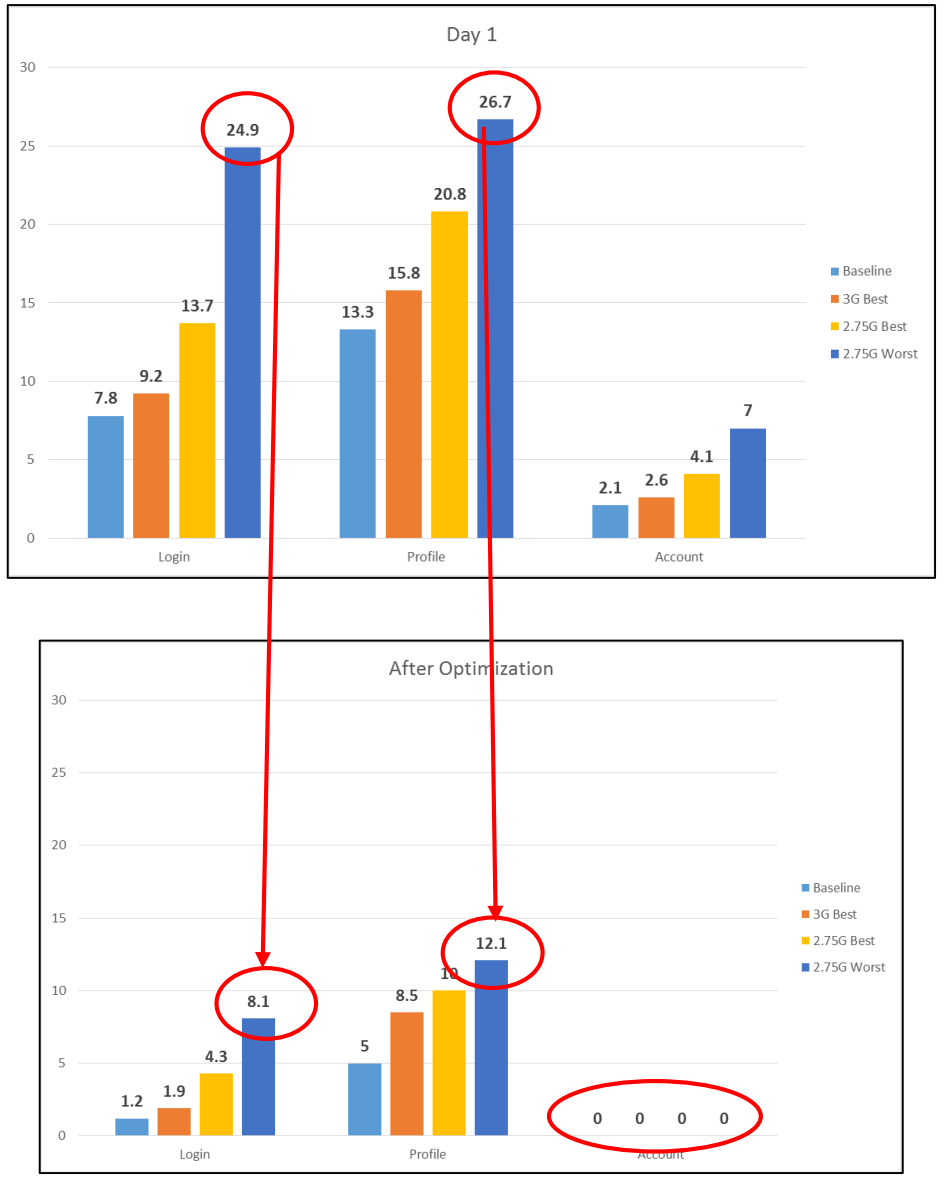
22% Thread Count Increase



What is the performance impact?

Single user performance

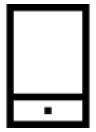
1. **Application is not network optimized**
2. **Expensive and unneeded network roundtrips occur**
3. **Bad user experience – sluggish behaviour**



What is the performance impact?

Server performance

1. “Slow users” – Mobile or remote
2. Network resources are not released
3. Server working harder – CPU, connections and Memory increase
4. Server exhaustion accelerates
5. Scalability and User experience issues (TRT)



Single user performance

1. Application is not network optimized
2. Expensive and unneeded network roundtrips occur
3. Bad user experience – sluggish behaviour

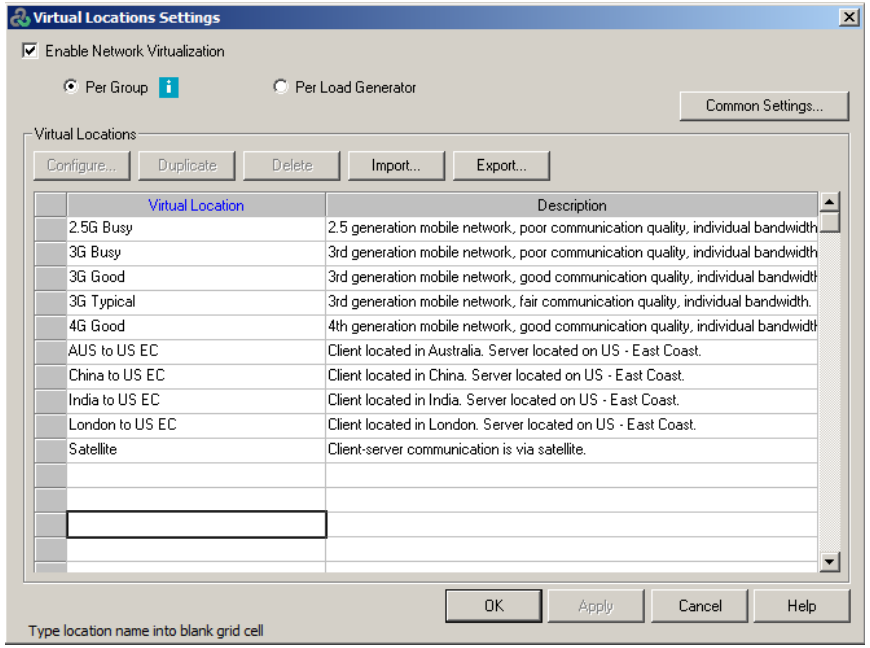
Impact

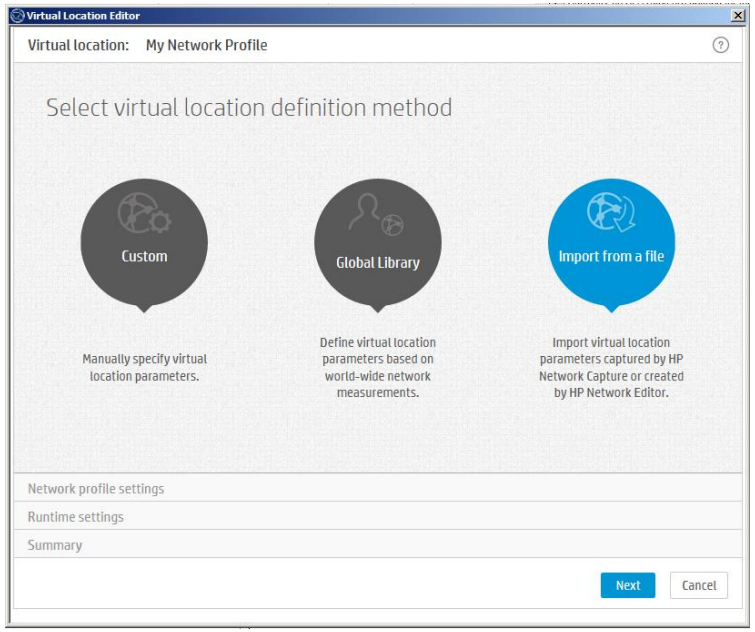
- False performance results
- Failures in production
- Negative sentiments
- Negative press
- Negative sales
- Brand damage

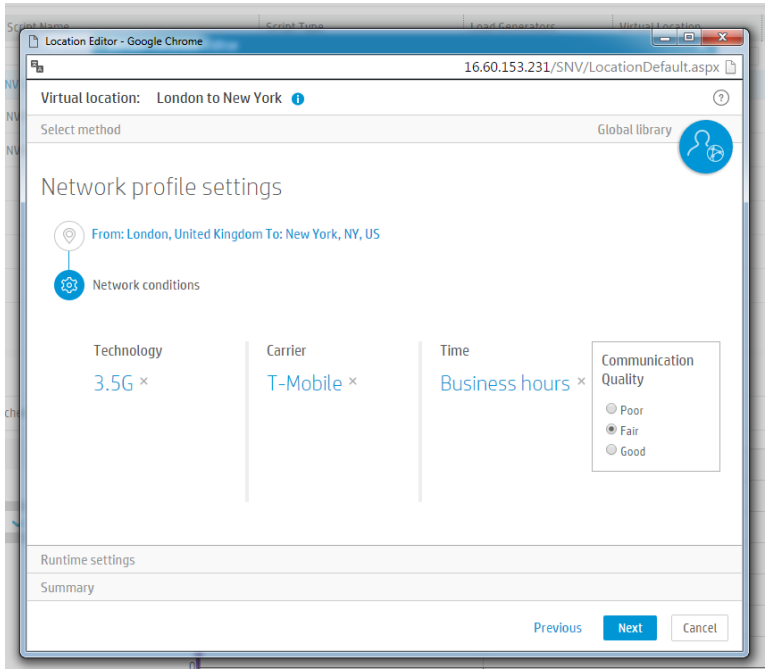
How to minimize the network impact on your app's performance?

Challenge 1: Testing Lab implies on perfect network conditions, unlike in production

Solution: Emulate “slow users” – use HPE NV infinite means, literally create or use any network condition for your tests. Run your virtual users with mobile/remote network conditions for realistic results.

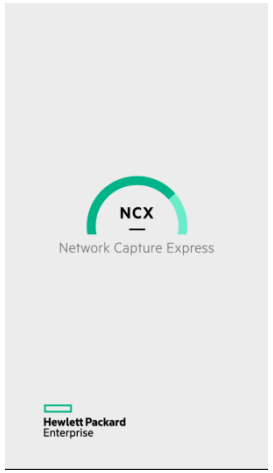


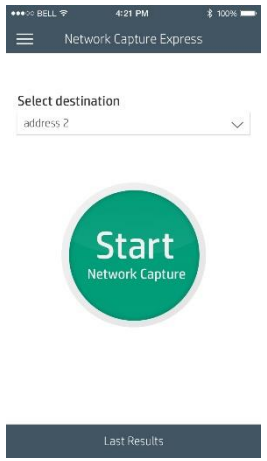


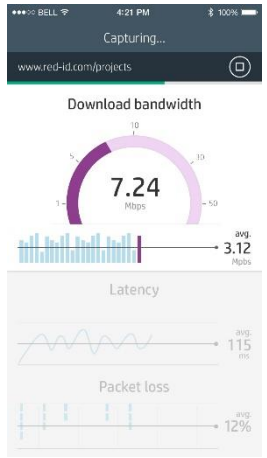


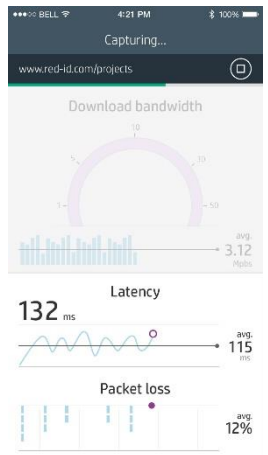
Challenge 2: Mobile / remote users implies on dynamic network conditions - can impact the underlying network protocols (e.g. TCP)

Solution: Use HPE NV Dynamic capturing tools –
Network Capture Server and Network Capture Express (Mobile app)



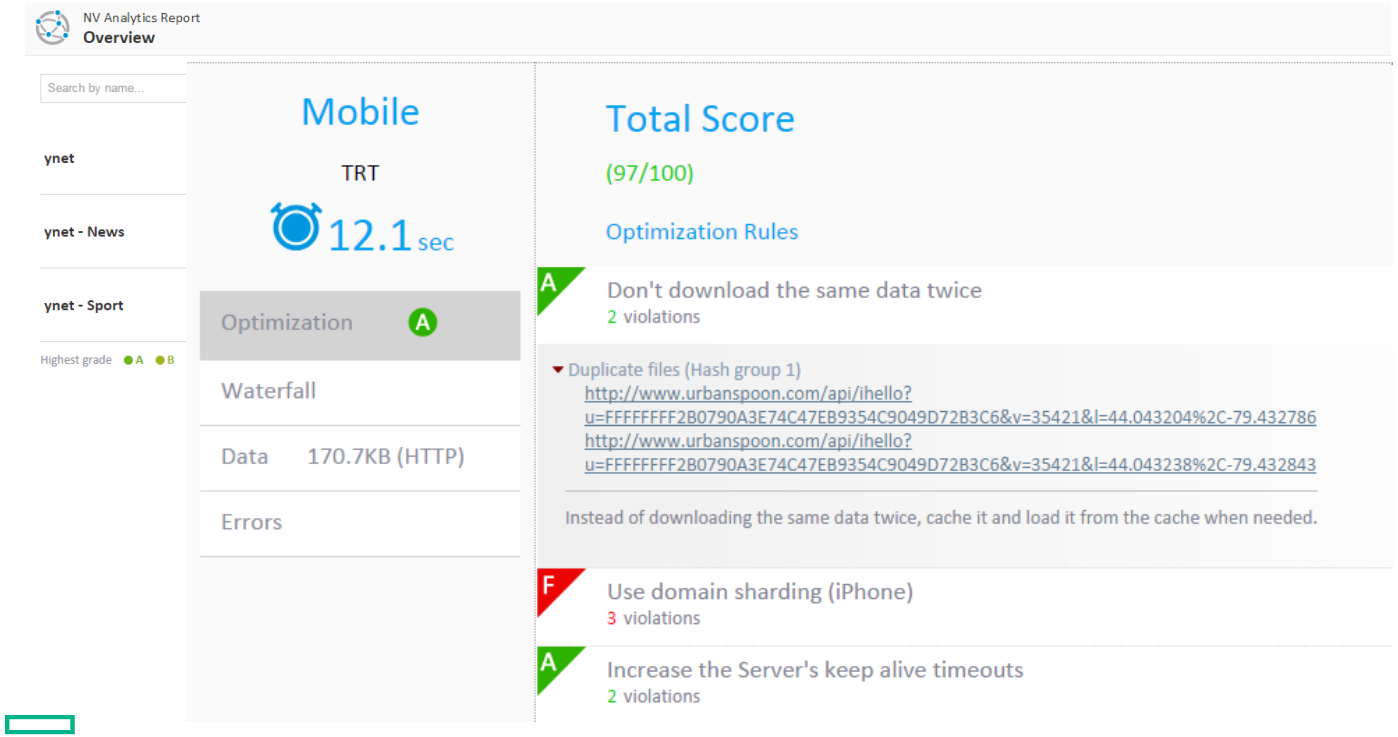


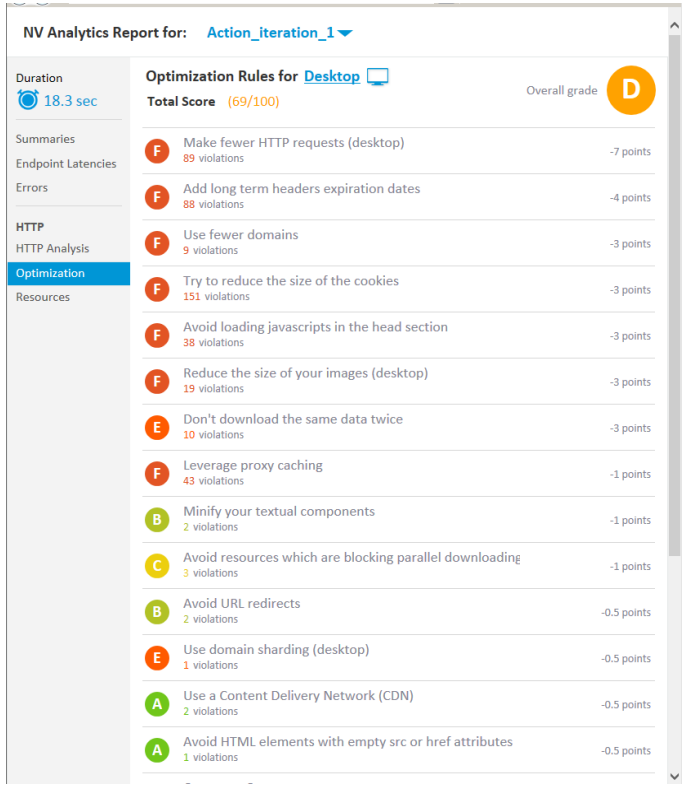




Challenge 3: 70% of Mobile/Web app's TRT is spent on the network – network optimization is essential

Solution: Use End User Network Analytics tools to understand your application's bottlenecks and areas for improvements.
Use NV as a best practice item in your CI/Automation – performance testing.



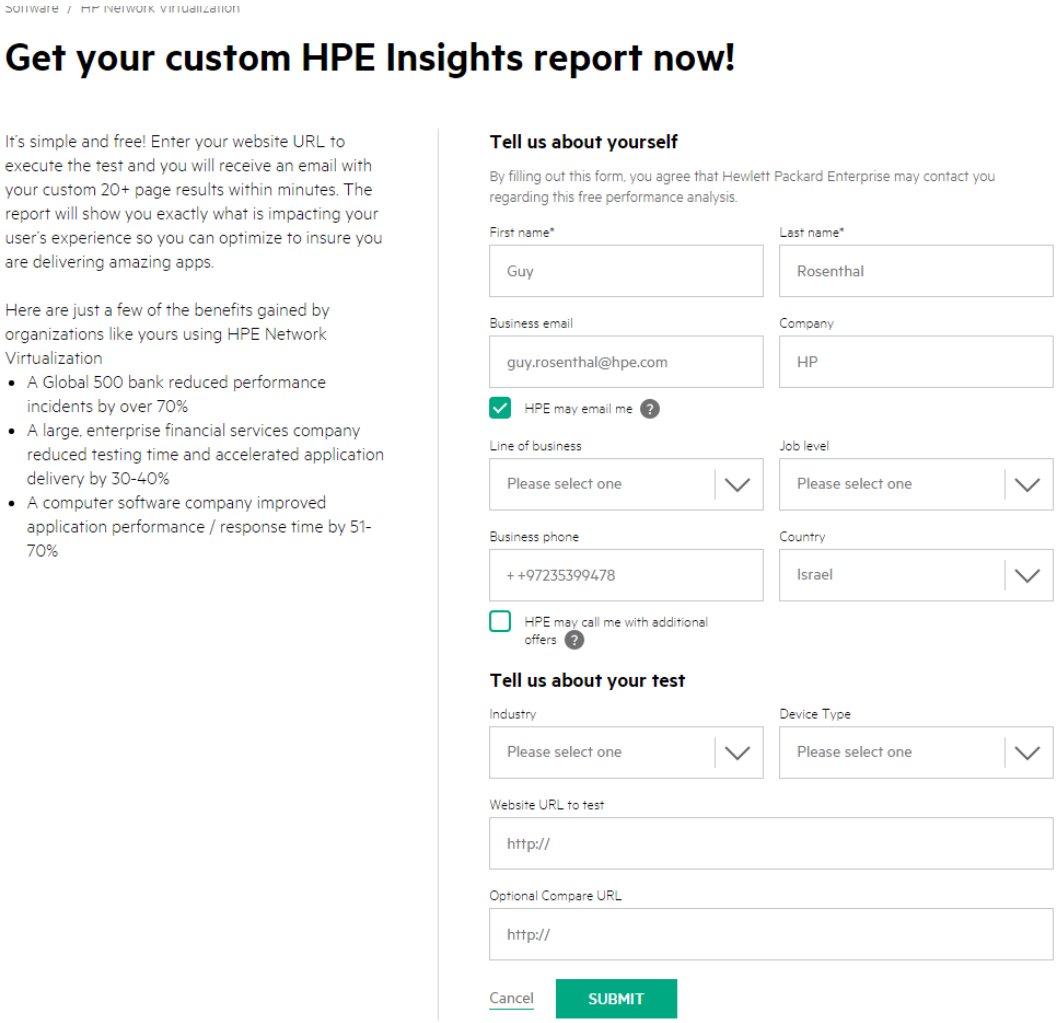


Hewlett Packard Enterprise

Demo

Insights Report- input your URL, get instant performance results

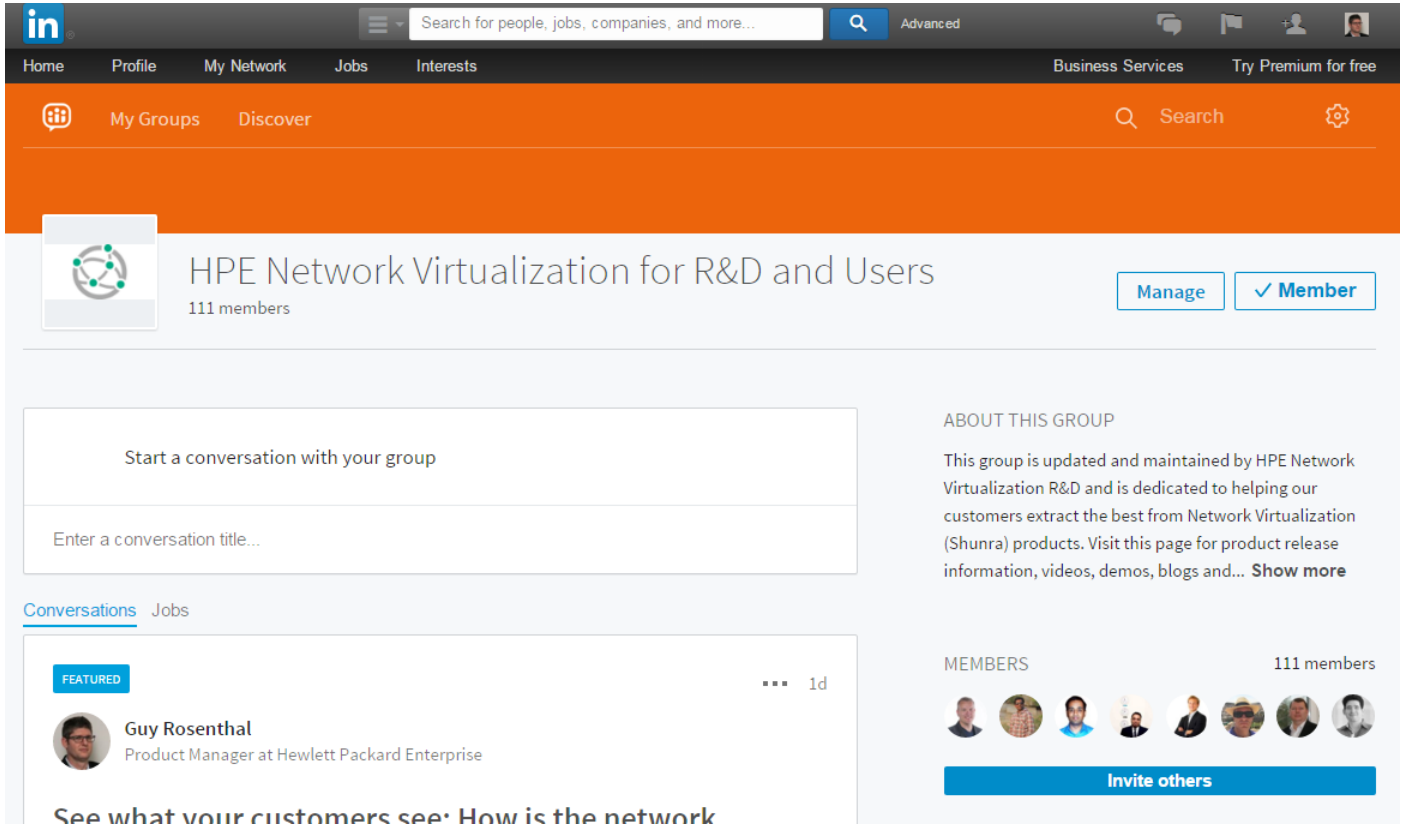
HPE NV Insights
http://www.hpe.com/software/Insights



HPE NV – R&D User Group

Join our HPE NV R&D Group

- Maintained by HPE NV R&D
- Product release information, videos, demos, blogs and Webinar postings
- Interact with other NV users for best practices and/or any other technical issue



Q&A

Hewlett Packard
Enterprise

Thank you

www.hpe.com/software/nv

Hewlett Packard Enterprise

Discover 2016

Las Vegas June 7–9

Discover 2016 is Hewlett Packard Enterprise's must-attend global customer and partner event. Why attend?

- Explore how Hewlett Packard Enterprise is delivering IT solutions for the New Style of Business to help you go further, faster
- Network with 10,000+ attendees, including C-level executives, IT directors, engineers and HPE experts
- Find content for you, choosing from our broad array of technical and business sessions
- Explore the latest innovations from HPE in the Transformation Zone
- Find thousands of experts on hand to answer your questions and address your challenges
- Exchange ideas, information and best practices with other IT professionals and industry leaders

Register Now and receive your member discount with this

Vivit registration link:
https://www.hpe.com/events/discoverSWVivit

YOUR INDEPENDENT HPE SOFTWARE COMMUNITY
VIVIT™

Thank you

- Complete the short survey and opt-in for more information from Hewlett Packard Enterprise

www.HPE.com

www.vivit-worldwide.org