



YOUR INDEPENDENT HPE SOFTWARE COMMUNITY



# Explore Network Impact on your App's Performance

March 15, 2016

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# Hosted By



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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
- Session Q&A:  
Please type questions in the Questions Pane

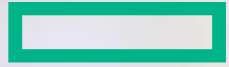


# Webinar Control Panel

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



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# 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)

Monitoring services

Database

Apps

CLOUD

INTERNET OF THINGS

Personal devices

Home security

Smart appliances

Auto

Collaboration

Apps

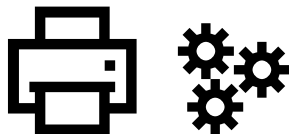
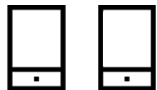
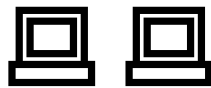
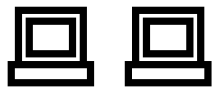
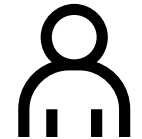
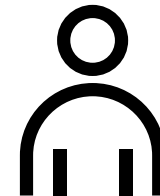
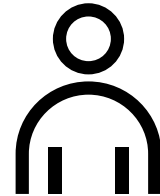
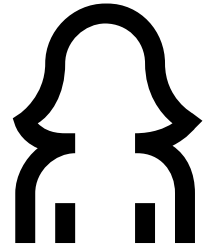
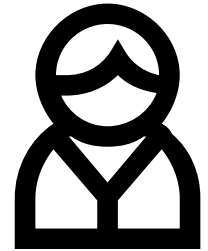
Remote tasking

WORK

Productivity

\*IDC statistic from HPE MRD ref document

# Connected state of mind



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# 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*)

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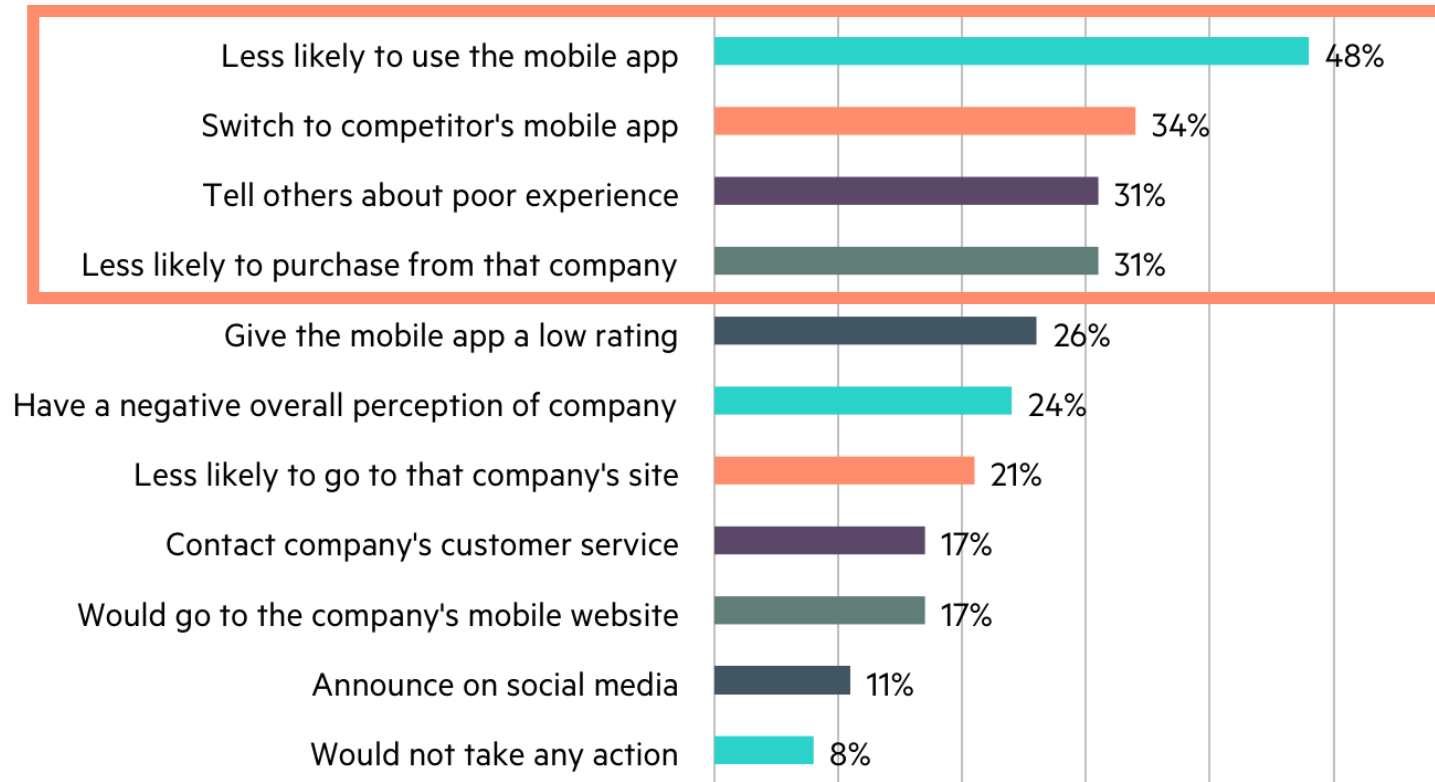
# Network performance affects user experience

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

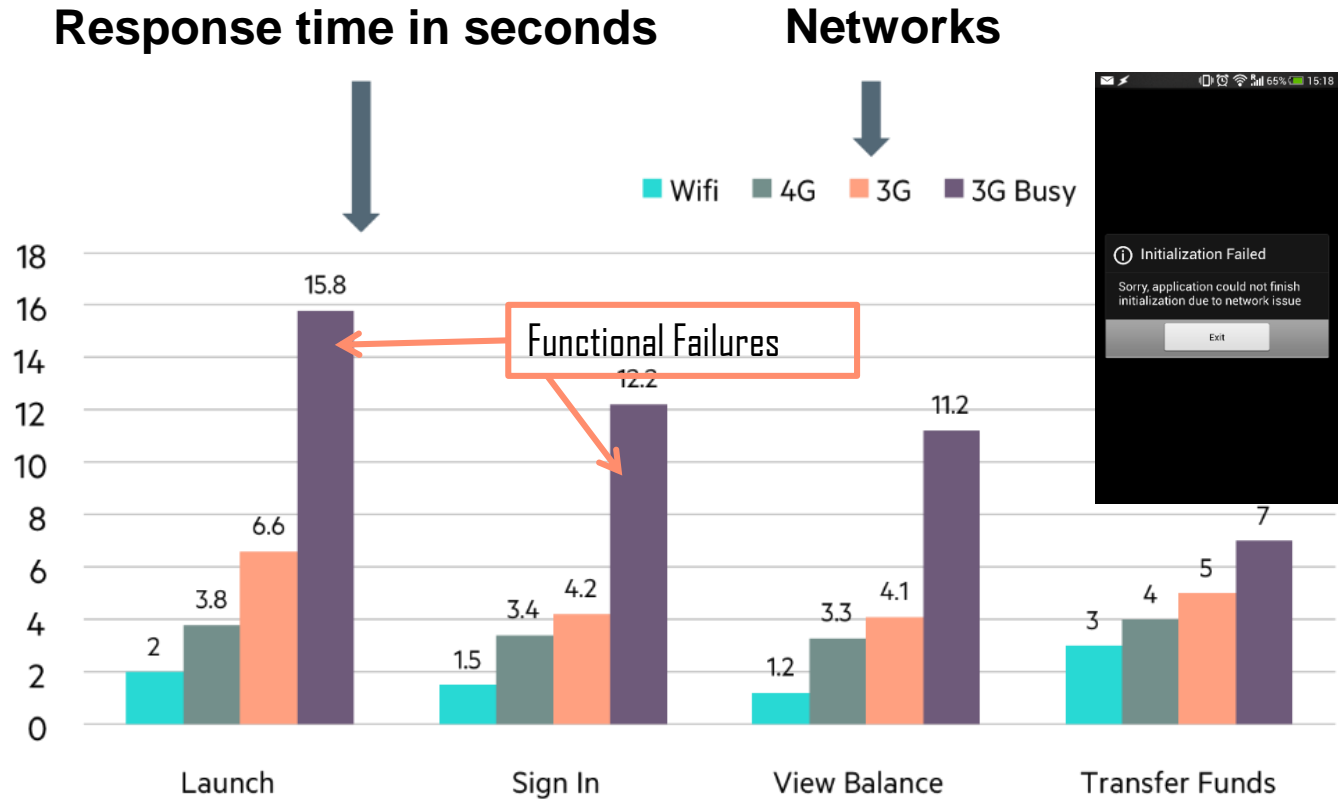
**79%** of mobile users will only retry an app once or twice if it failed to work the **first** time (*Dynatrace*)

# User experience is crucial

## Consumer reaction to poor mobile app experiences



# Different networks = different application behavior



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# 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**



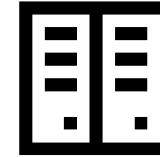
# Some network traffic is expected, some is *unpredictable*



- Busy summer travel
- Bad weather winter travel



Last minute bookings



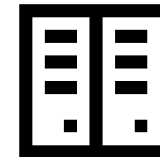
Servers overload at OTAs



Financial markets volatility



Frantic search of news



Server overload at news media websites

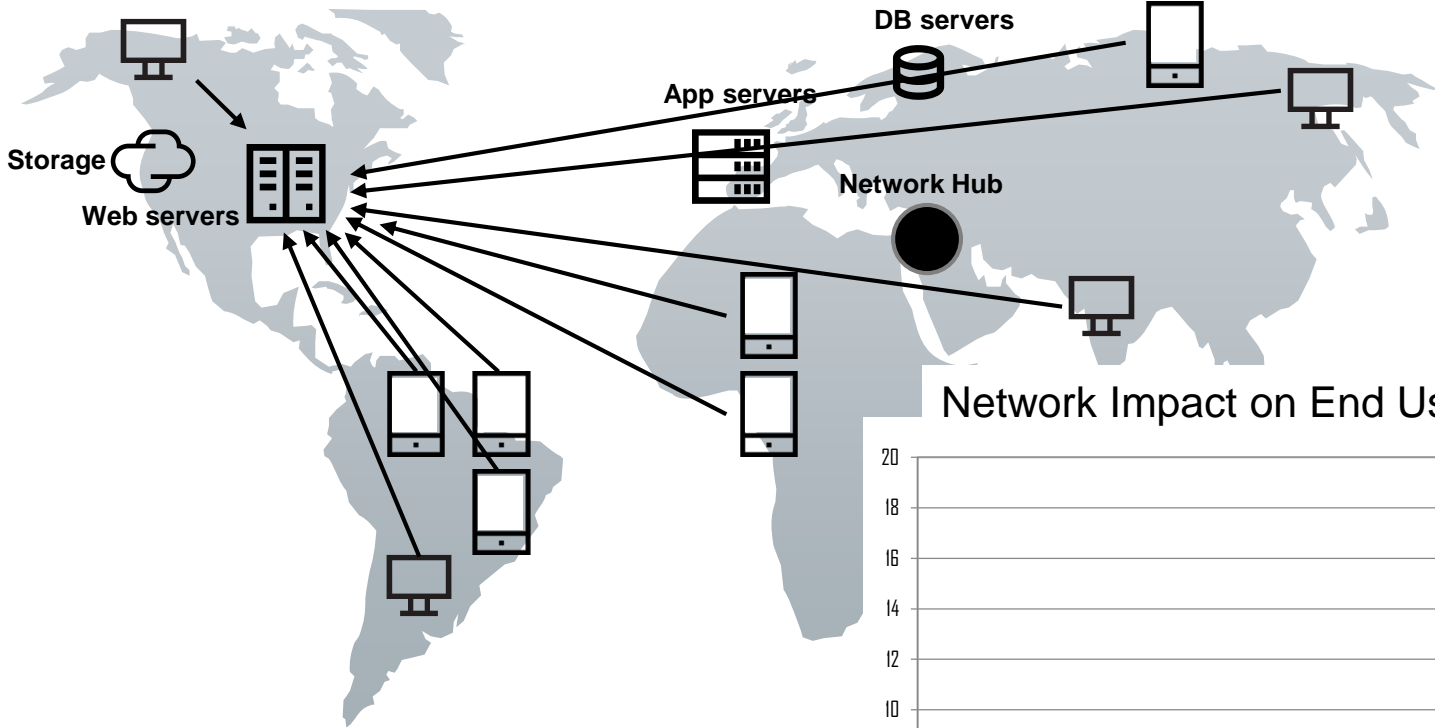


Sell off frenzy

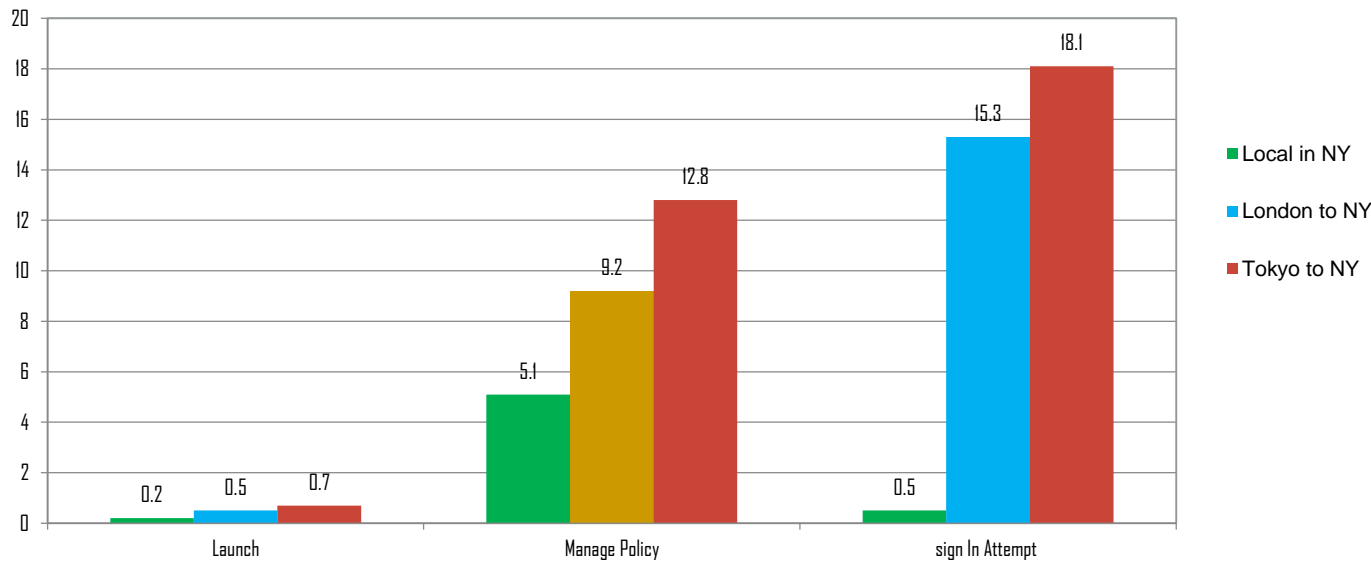


Servers overload at financial institutions

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




Network Impact on End User Experience - Remote Users



# Poll

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

- a) Yes
- b) No

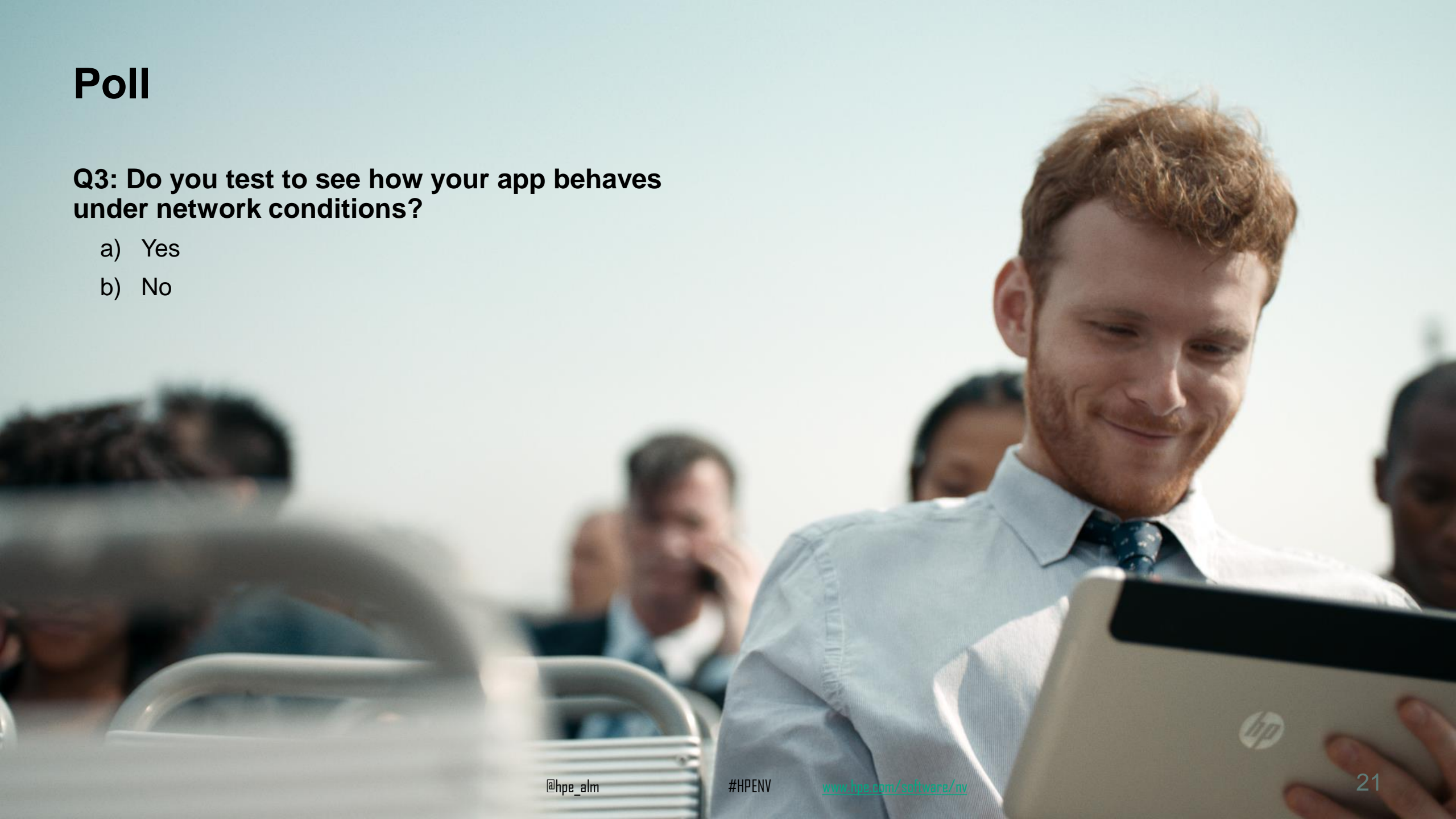


**What can you do?  
What should you consider?**

# Poll

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

- a) Yes
- b) No



# Network basics

## Latency (milliseconds)

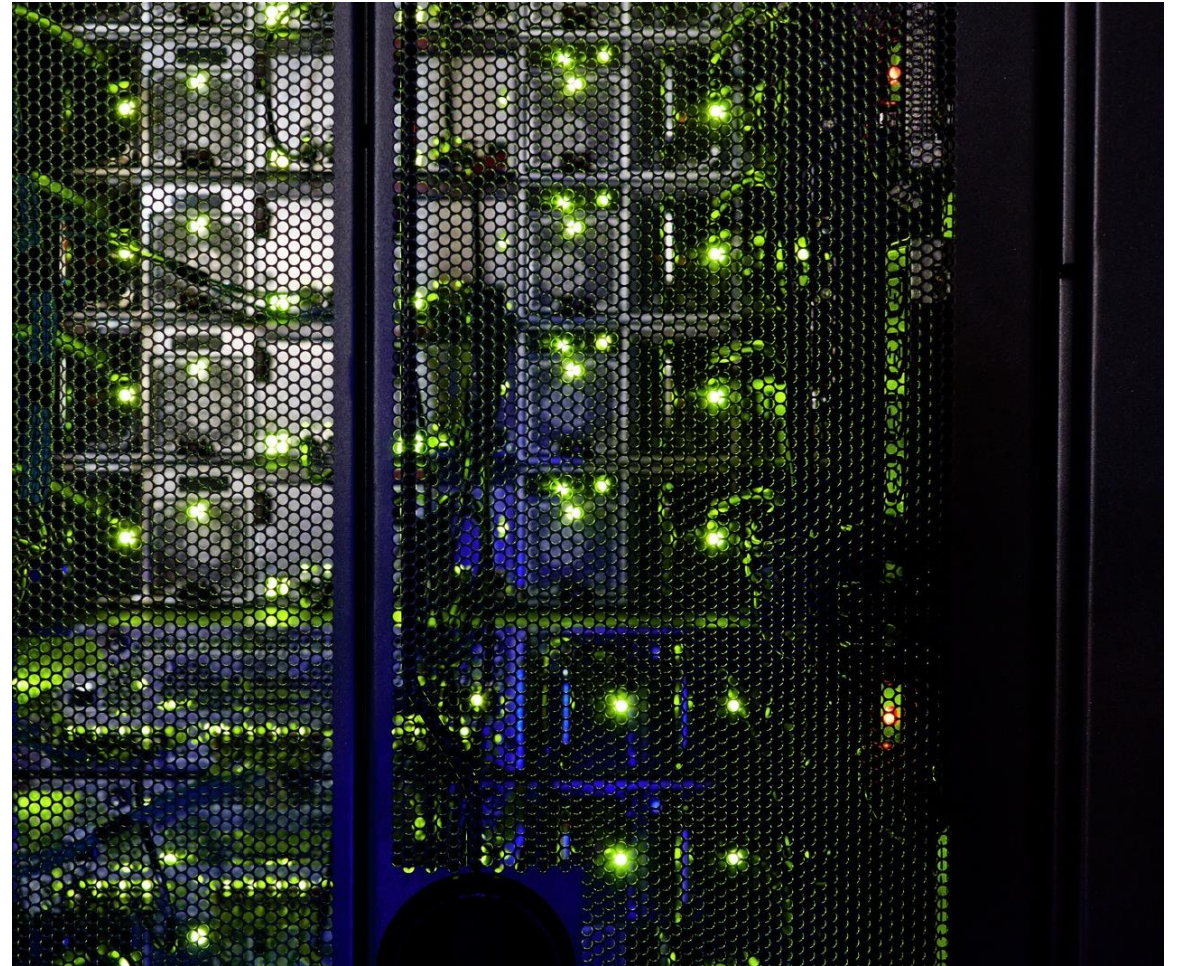
The **time** from the source sending a packet to the destination receiving it

## Bandwidth (data per second)

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

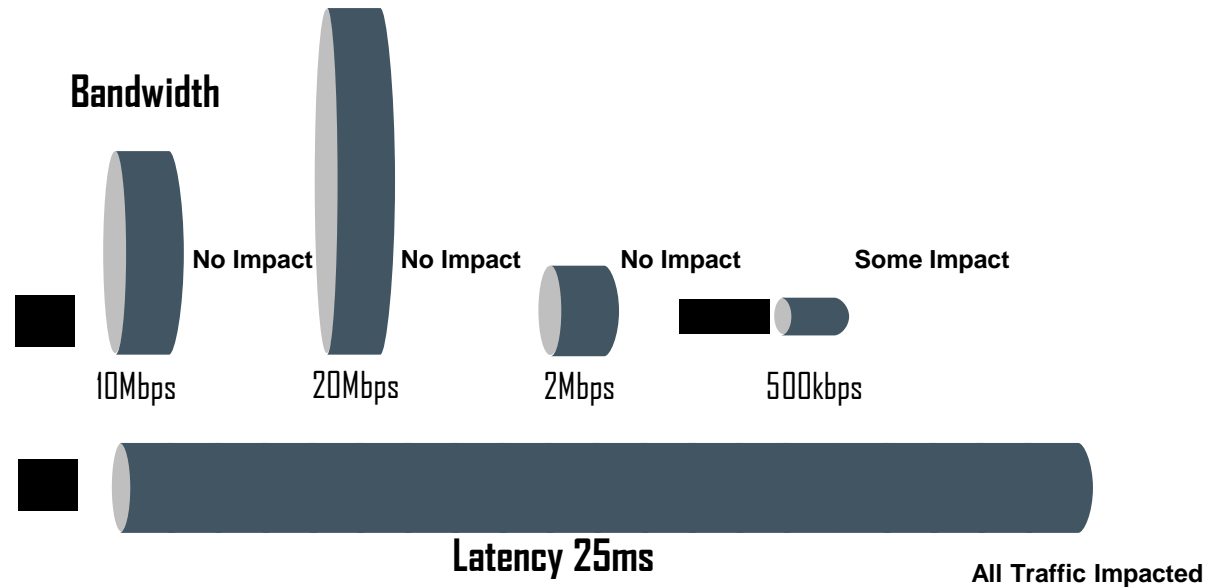
## Packet loss (percentage)

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	<b>21 ms</b>	42 ms
New York to London	5,585 km	19 ms	<b>28 ms</b>	56 ms
New York to Sydney	15,993 km	53 ms	<b>80 ms</b>	160 ms
Equatorial circumference	40,075 km	133.7 ms	<b>200 ms</b>	200 ms



**Packet loss = further impact**

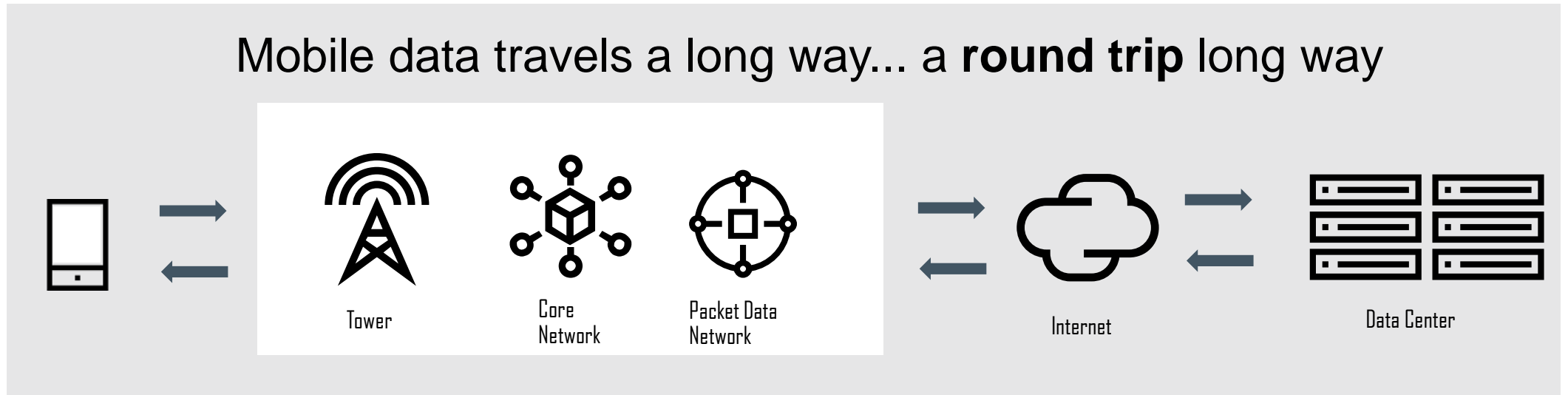
# Poll

**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**

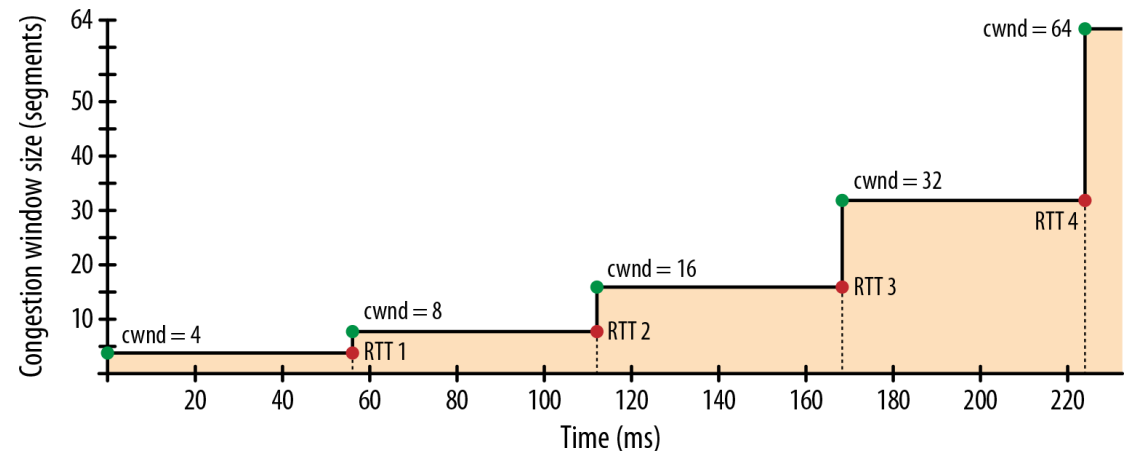
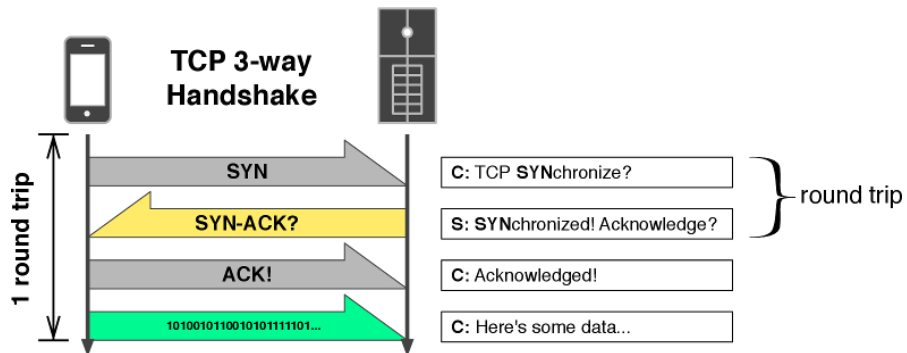
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# Pay attention to dynamic conditions...

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

# 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**



# 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

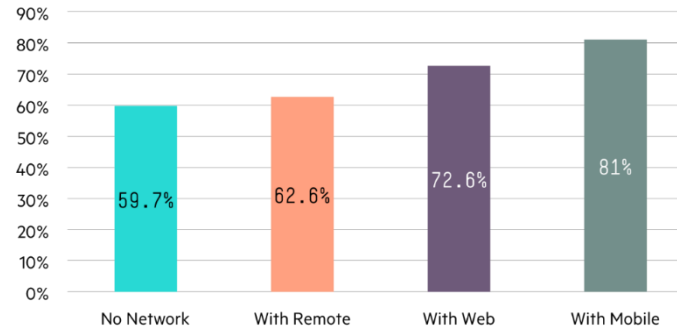
Server exhaustion accelerates

5

Scalability and user experience issues (TRT)

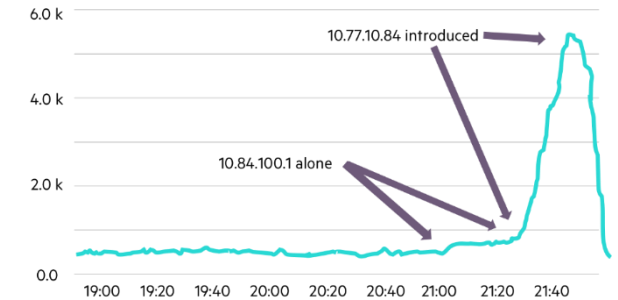
### 50% CPU Increase

CPU %



### Active Connections Increase

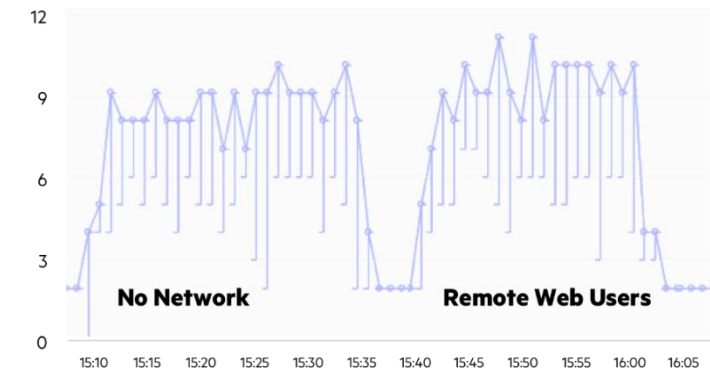
Active Connections



### 22% Thread Count Increase

September 17, 2013 3:07:32 PM CEST

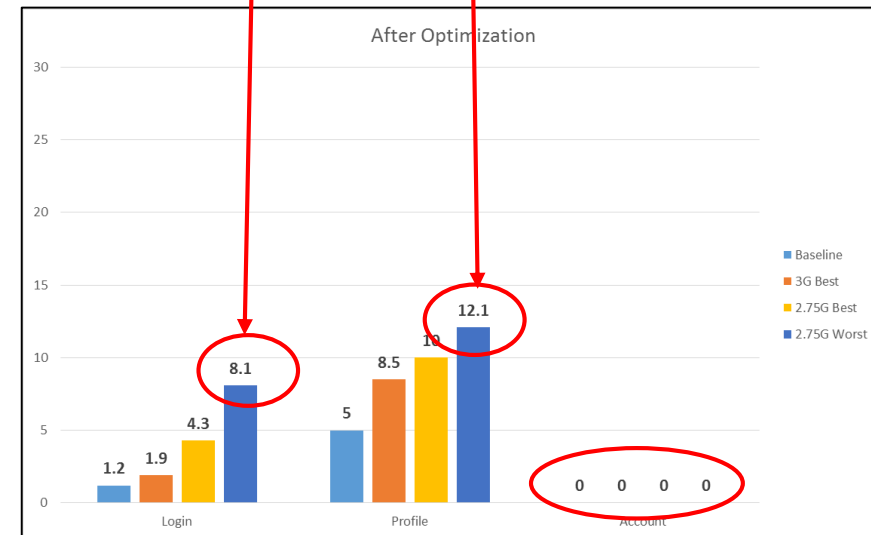
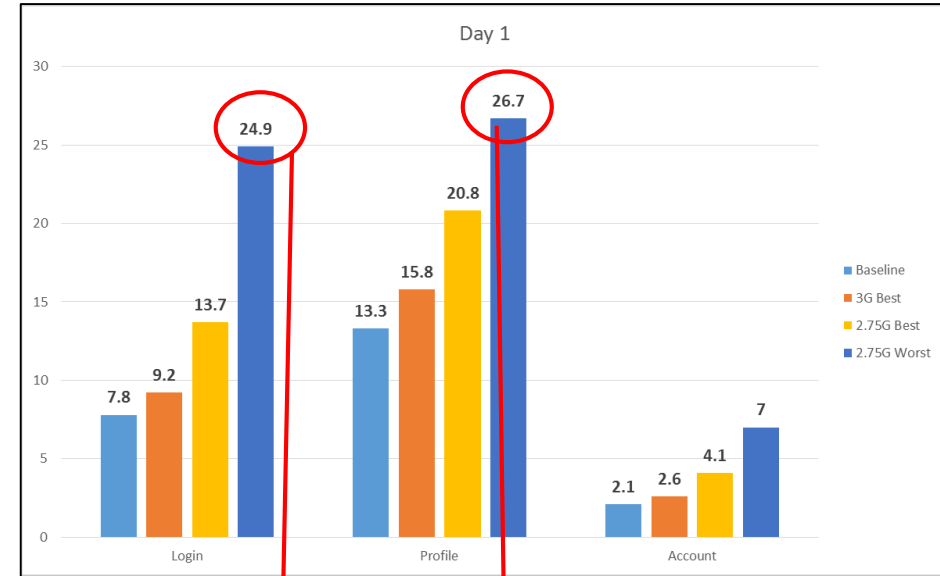
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# What is the performance impact?

## Single user performance

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

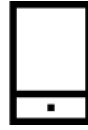


# What is the performance impact?



## 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

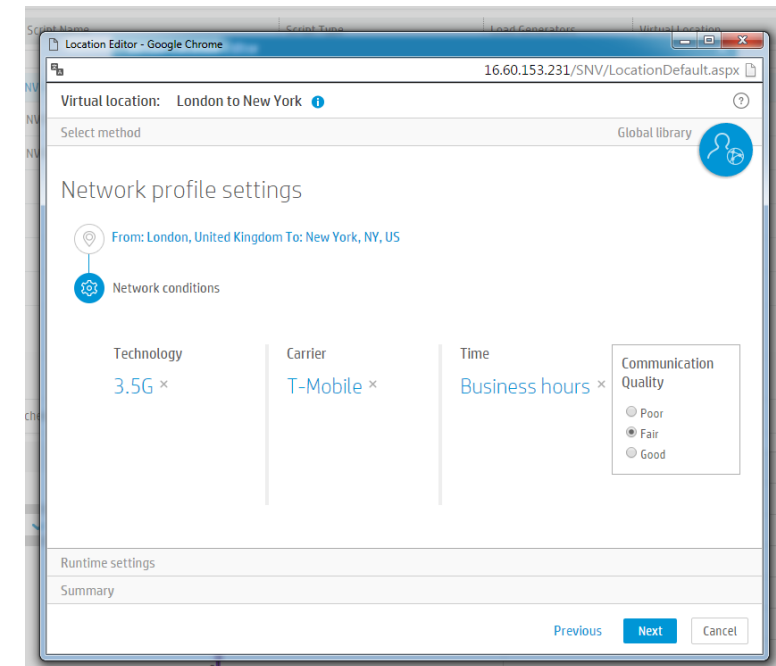
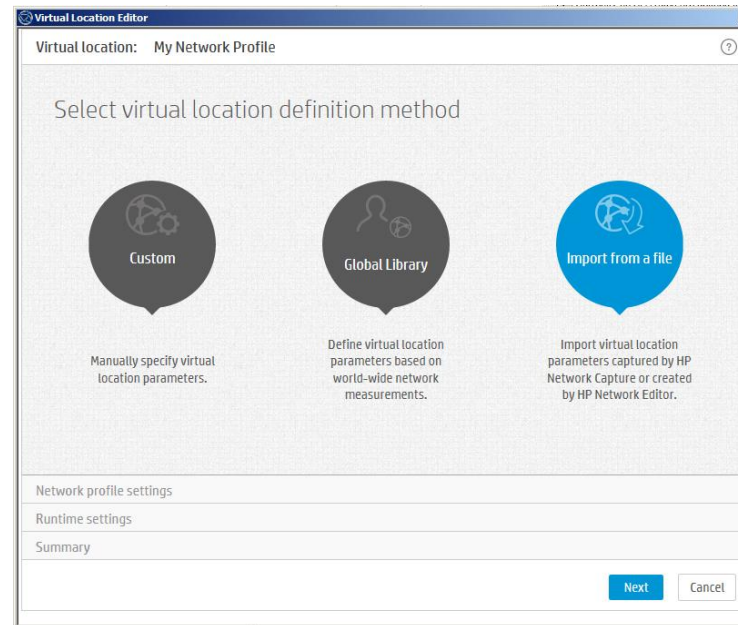
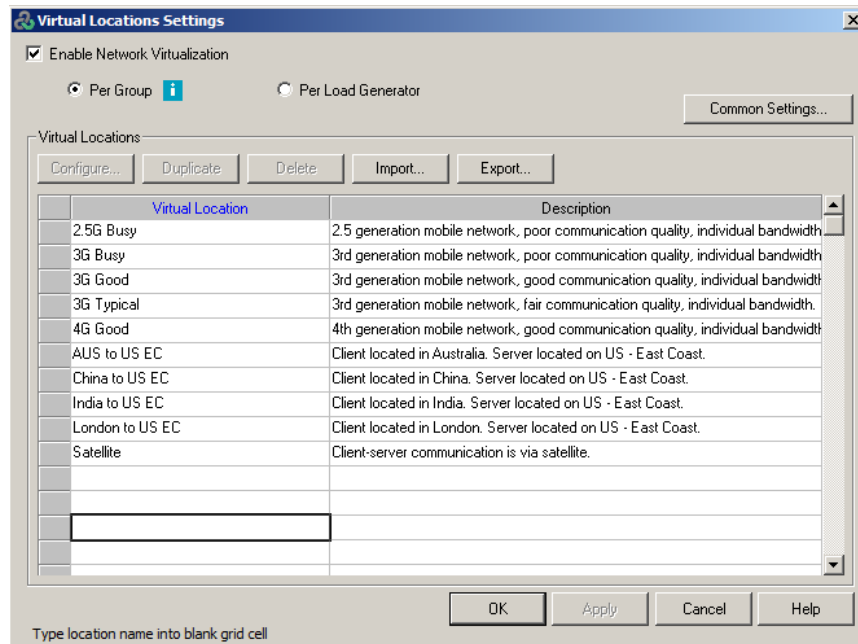
- False performance results
- Failures in production
- Negative sentiments
- Negative press
- Negative sales
- Brand damage



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

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

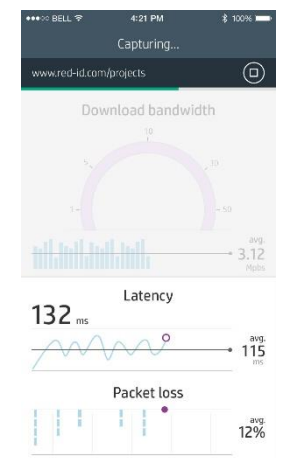
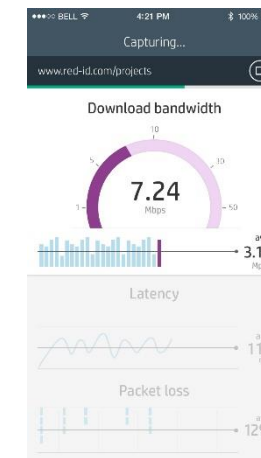
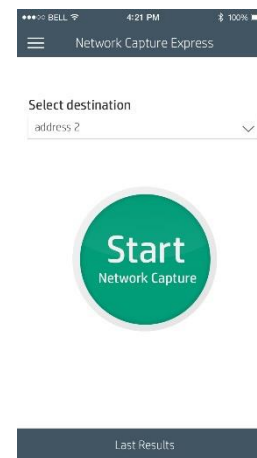
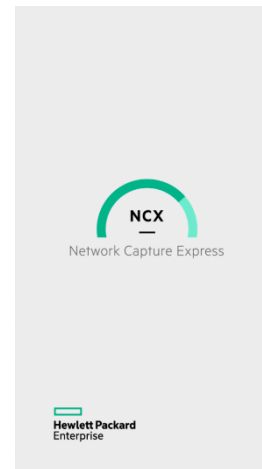
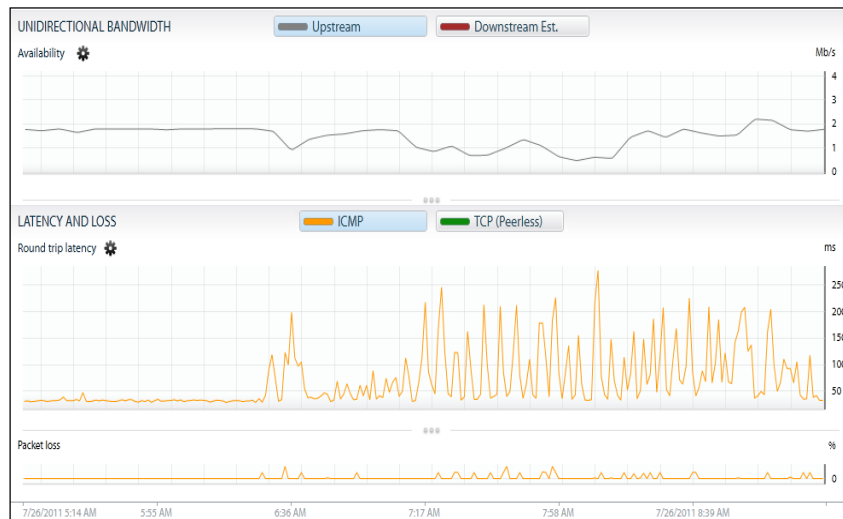
**Solution:** Emulate “slow users” – use HPE NV infinite means, literally create or use any network condition for your tests. Run your virtual users with mobile/remote network conditions for realistic results.





# 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.

NV Analytics Report Overview

Search by name...

y-net

y-net - News

y-net - Sport

Highest grade: ● A ● B

## Mobile

TRT

12.1 sec

Optimization **A**

Waterfall

Data 170.7KB (HTTP)

Errors

### Total Score

(97/100)

Optimization Rules

- A** Don't download the same data twice  
2 violations
- F** Duplicate files (Hash group 1)  
<http://www.urbanspoon.com/api/ihello?u=FFFFFFFF2B0790A3E74C47EB9354C9049D72B3C6&v=35421&l=44.043204%2C-79.432786>  
<http://www.urbanspoon.com/api/ihello?u=FFFFFFFF2B0790A3E74C47EB9354C9049D72B3C6&v=35421&l=44.043238%2C-79.432843>  
Instead of downloading the same data twice, cache it and load it from the cache when needed.
- F** Use domain sharding (iPhone)  
3 violations
- A** Increase the Server's keep alive timeouts  
2 violations

NV Analytics Report for: Action\_iteration\_1

Duration 18.3 sec

Summaries

Endpoint Latencies

Errors

HTTP

HTTP Analysis

Optimization

Resources

### Optimization Rules for Desktop

Total Score (69/100) Overall grade **D**

- F** Make fewer HTTP requests (desktop)  
89 violations -7 points
- F** Add long term headers expiration dates  
88 violations -4 points
- F** Use fewer domains  
9 violations -3 points
- F** Try to reduce the size of the cookies  
151 violations -3 points
- F** Avoid loading javascripts in the head section  
38 violations -3 points
- F** Reduce the size of your images (desktop)  
19 violations -3 points
- E** Don't download the same data twice  
10 violations -3 points
- F** Leverage proxy caching  
43 violations -1 points
- B** Minify your textual components  
2 violations -1 points
- C** Avoid resources which are blocking parallel downloading  
3 violations -1 points
- B** Avoid URL redirects  
2 violations -0.5 points
- E** Use domain sharding (desktop)  
1 violations -0.5 points
- A** Use a Content Delivery Network (CDN)  
2 violations -0.5 points
- A** Avoid HTML elements with empty src or href attributes  
1 violations -0.5 points



# Demo

# Insights Report- input your URL, get instant performance results

## HPE NV Insights

<http://www.hpe.com/software/Insights>

Software / HPE Network Virtualization

### Get your custom HPE Insights report now!

It's simple and free! Enter your website URL to execute the test and you will receive an email with your custom 20+ page results within minutes. The report will show you exactly what is impacting your user's experience so you can optimize to insure you are delivering amazing apps.

Here are just a few of the benefits gained by organizations like yours using HPE Network Virtualization

- A Global 500 bank reduced performance incidents by over 70%
- A large, enterprise financial services company reduced testing time and accelerated application delivery by 30-40%
- A computer software company improved application performance / response time by 51-70%

#### Tell us about yourself

By filling out this form, you agree that Hewlett Packard Enterprise may contact you regarding this free performance analysis.

First name*	Last name*
<input type="text" value="Guy"/>	<input type="text" value="Rosenthal"/>
Business email	Company
<input type="text" value="guy.rosenthal@hpe.com"/>	<input type="text" value="HP"/>
<input checked="" type="checkbox"/> HPE may email me	
Line of business	Job level
<input type="text" value="Please select one"/>	<input type="text" value="Please select one"/>
Business phone	Country
<input type="text" value="+97235399478"/>	<input type="text" value="Israel"/>
<input type="checkbox"/> HPE may call me with additional offers	

#### Tell us about your test

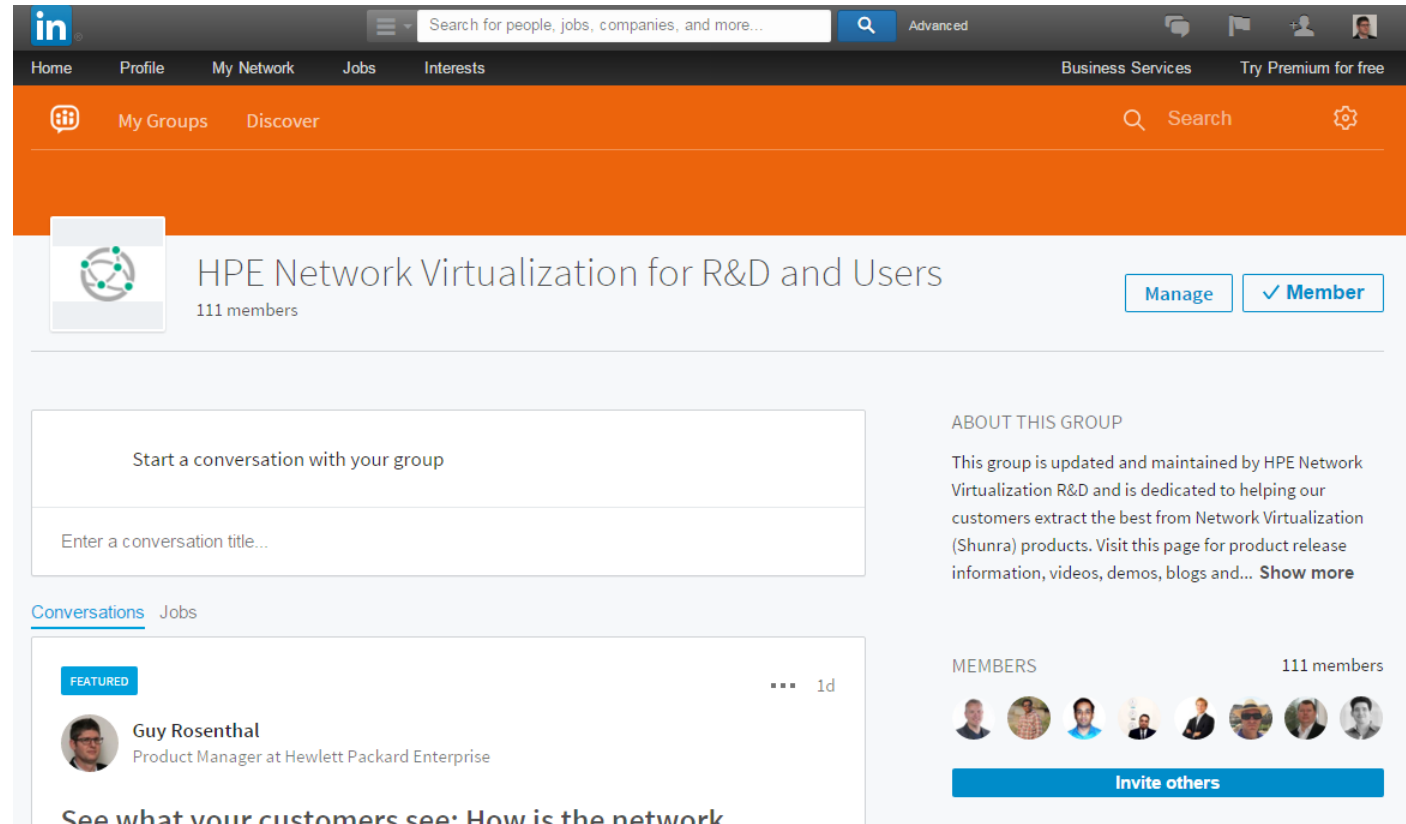
Industry	Device Type
<input type="text" value="Please select one"/>	<input type="text" value="Please select one"/>
Website URL to test	
<input type="text" value="http://"/>	
Optional Compare URL	
<input type="text" value="http://"/>	

[Cancel](#)

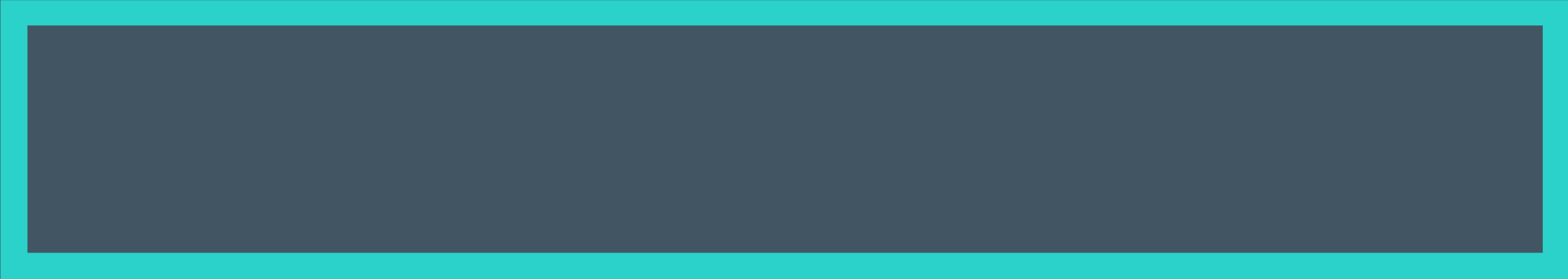
# HPE NV – R&D User Group

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



The screenshot shows the LinkedIn interface for the 'HPE Network Virtualization for R&D and Users' group. The group has 111 members and is managed by HPE. The page includes a search bar, navigation tabs (Home, Profile, My Network, Jobs, Interests), and a 'My Groups' section. The group description states it is updated and maintained by HPE Network Virtualization R&D, dedicated to helping customers extract the best from Network Virtualization (Shunra) products. A featured post by Guy Rosenthal, Product Manager at Hewlett Packard Enterprise, is visible. The page also features a 'Start a conversation with your group' section and a 'MEMBERS' list with an 'Invite others' button.



# Q&A



**Hewlett Packard**  
Enterprise

**Thank you**

[www.hpe.com/software/nv](http://www.hpe.com/software/nv)



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Las Vegas June 7-9



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- 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
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Register Now and receive your member discount with this

Vivit registration link:

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# Thank you

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

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