



Surprising Facts on ISP Visibility into Internet Activity

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Introduction

- A hot topic – role of ISPs in Internet, including what privacy rules should apply
- This research:
 - Description of the facts, not policy recommendations
 - Accurate description is key to good policy
 - Responds to questions raised by FCC when I testified in April hearing on broadband privacy
 - Detailed report expected within a month, with my colleagues Justin Hemmings & Alana Kirkland
 - If anyone sees mistakes in our facts (now or after publication), let us know and we will correct
 - I disagree with two factual statements in privacy groups' letter last week. I did not see the letter until after it was published, and so could not comment on it pre-publication.
 - I have worked closely with many of the signatories for years. I hope and expect to do so going forward.

Contrasting Views

- Letter last week:

**ISPs have
“comprehensive”
visibility into user
Internet activity**

- Our research:

- **No**
- **SSL encryption blocks content**
- **SSL encryption blocks detailed links**
- **Encryption is becoming predominant**

Contrasting Views - VPNs

- Letter last week:

“Nor is there any way for consumers to avoid data collection by the entities that provide Internet access service.”

- Our research:

- **VPNs block ISP access to content and detailed links.**
- **VPNs also block top-level URL.**
- **Consumers can use VPNs, and many do.**

The 1990s and ISPs

1. Desktop at home
2. Unencrypted communications
3. ISP does DNS look-up

All of that has changed, a lot:

1. Multiple devices, often logged in at Wifi spots
2. Encryption
3. VPNs and other proxy services

THE EFFECTS OF HTTPS:

With HTTP, ISPs see:



With HTTPS, ISPs see:

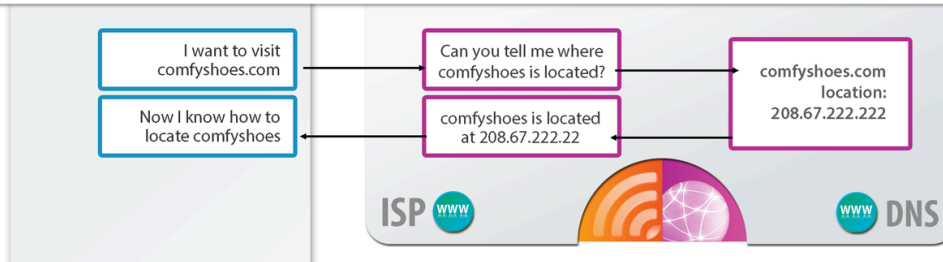


LEGEND

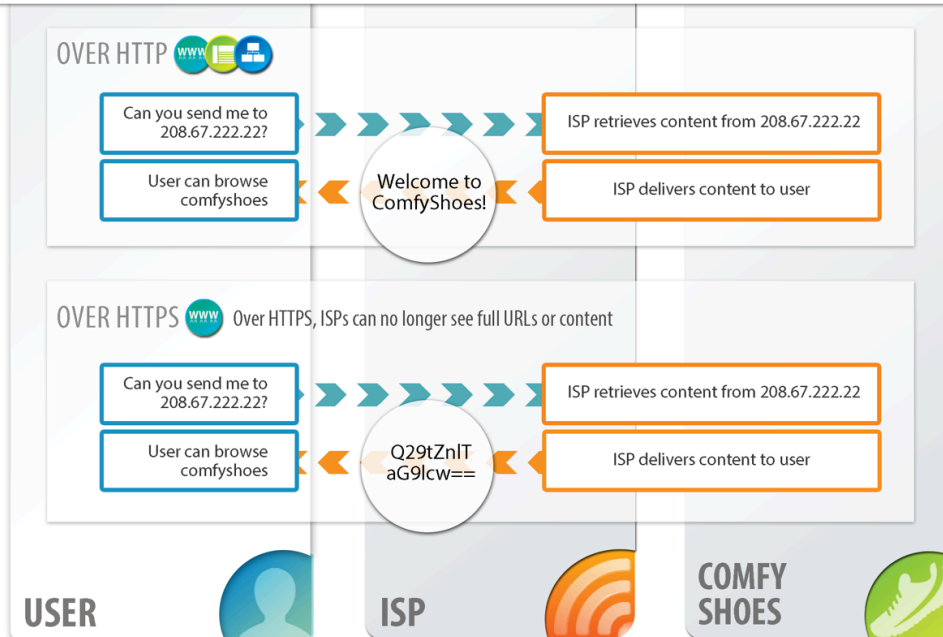
WHAT THEY
CAN SEE

	HOST NAME
	FULL URLS
	CONTENT

STEP 1 - DNS LOOKUP

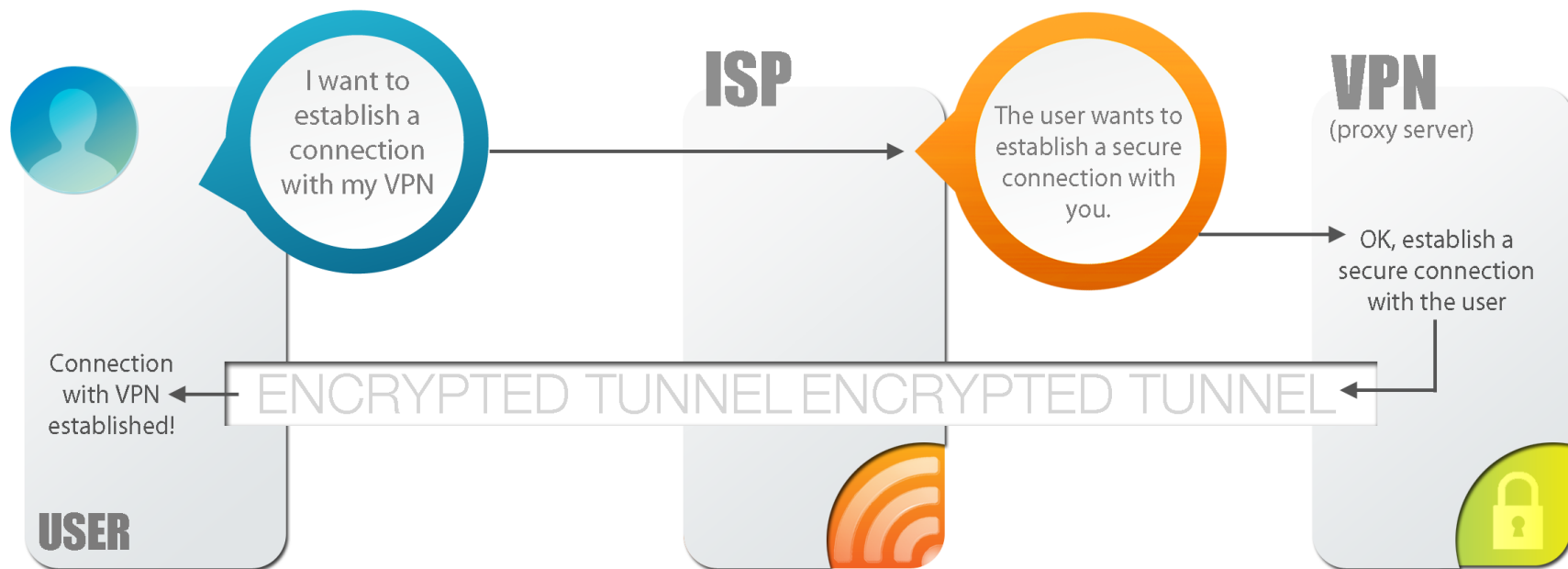


STEP 2 - CONTENT RETRIEVAL



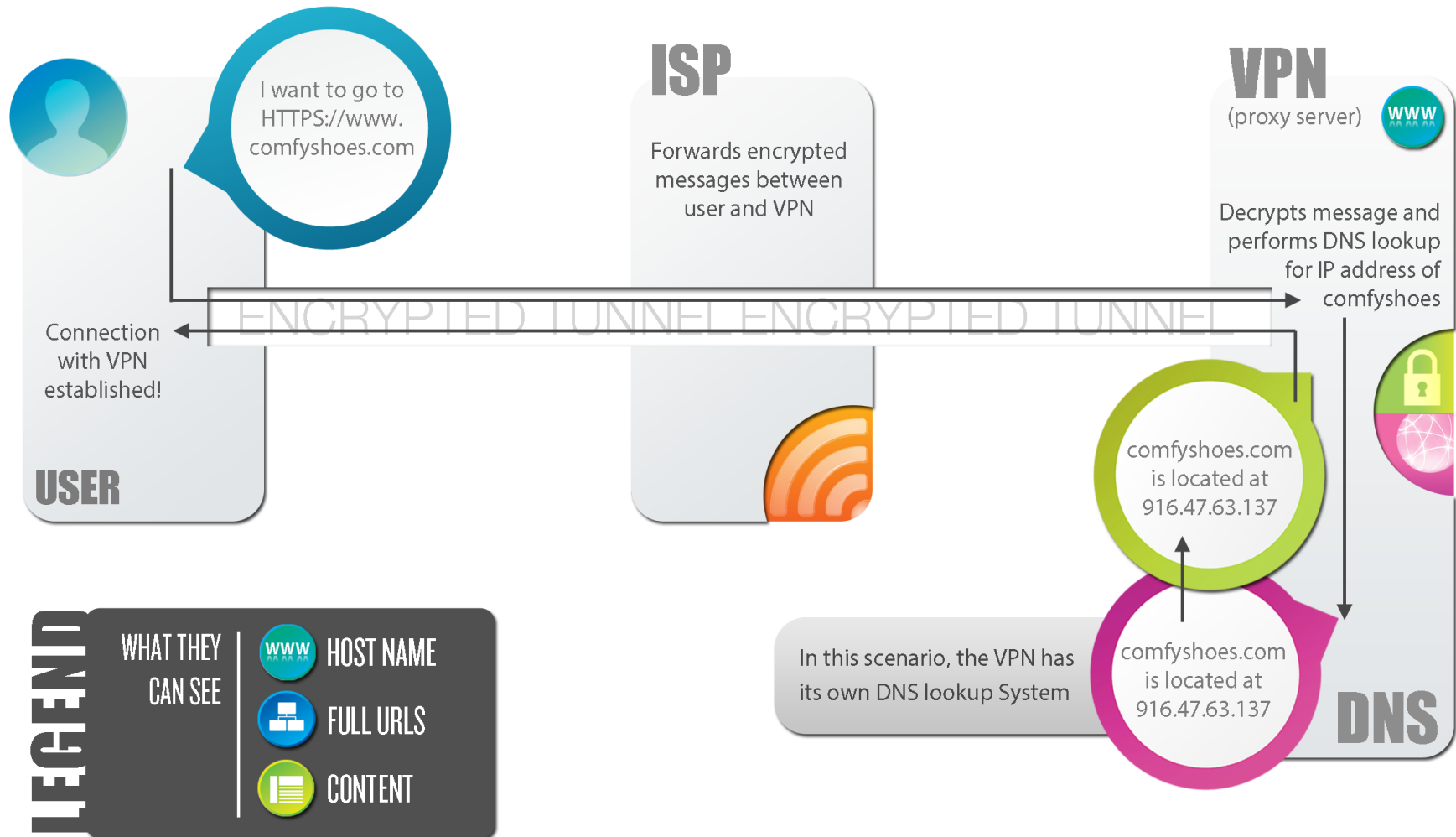
WITH VIRTUAL PRIVATE NETWORKS

1. Establishing a connection to a VPN



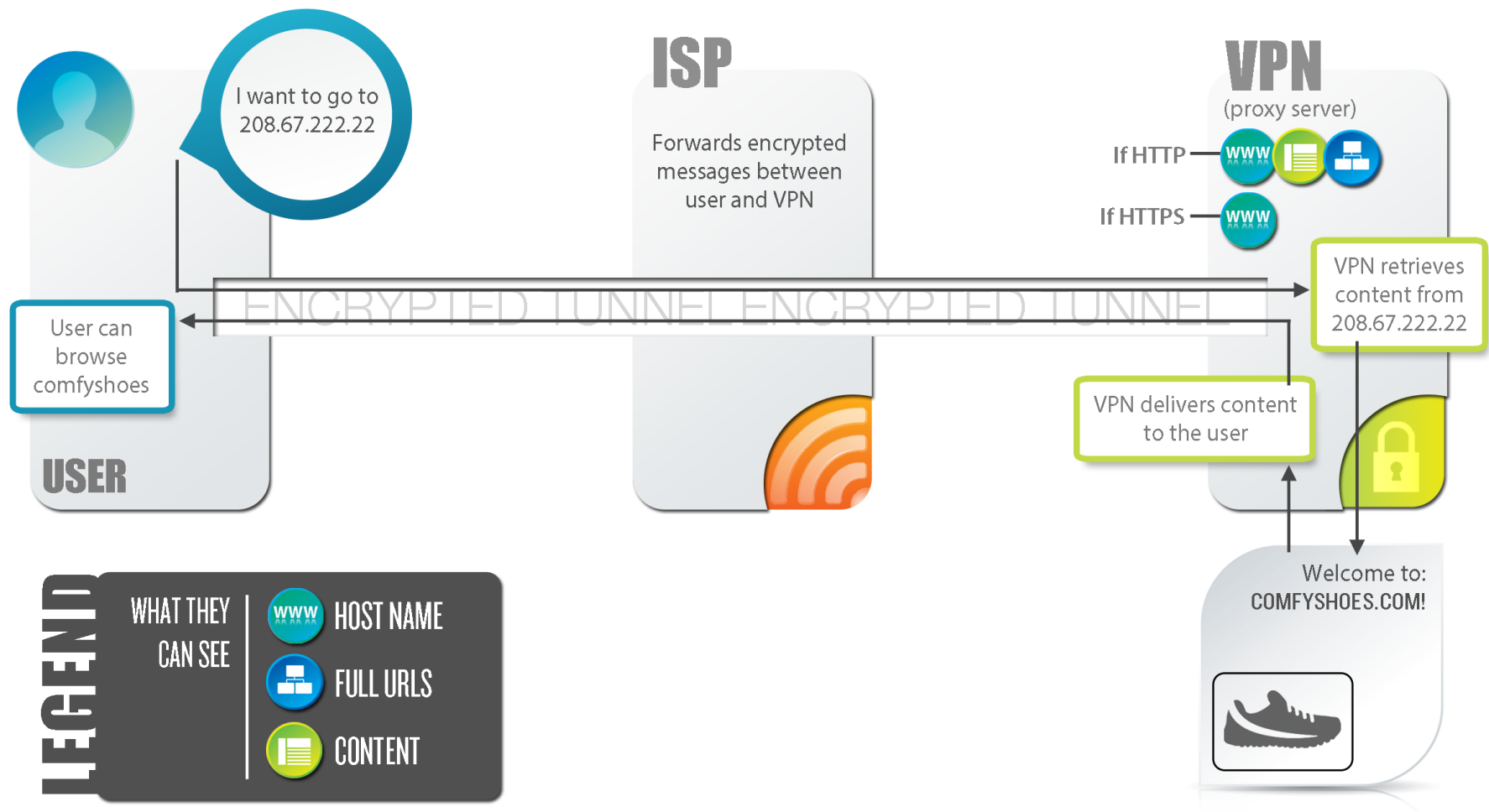
WITH VIRTUAL PRIVATE NETWORKS

2. DNS Lookup

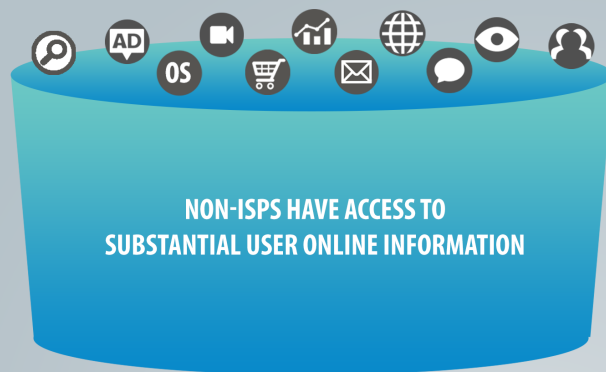


WITH VIRTUAL PRIVATE NETWORKS

3. Browsing a Website after the IP address has been retrieved



ISPs See Less Than You Think



+350M New photo uploads by Facebook users each day

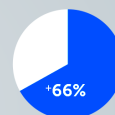
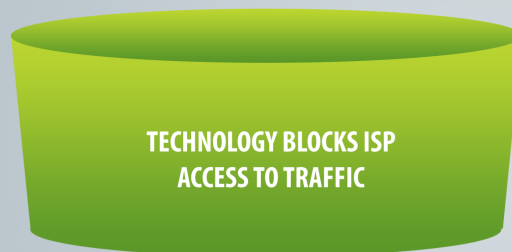
2M Websites reaching **90%** of Internet users worldwide = Google's display advertising network

17.3B Desktop search-engine searches in November 2015

\$87.5B Estimated quarterly e-commerce sales for third quarter of 2015

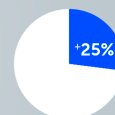
+85% People think voice search through digital assistants is the future

\$58.6B Projected digital-advertising spending in the U.S. for 2015

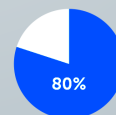
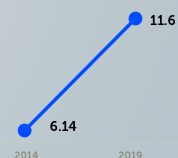


Increasing number of online adults (globally) have used a VPN or proxy server to connect to the Internet

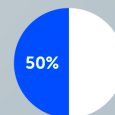
More than two-thirds of North American Internet traffic, including the leading online services, will be encrypted in 2016



Number of neworked devices per person in North America



Internet users with smartphones



Internet users with tablets



ISPs do not have unique visibility into users' online activity

MOBILE USAGE UP

60% Americans time spent online on mobile apps

WIRELESS ACCESS POINTS INCREASING

454,618 Number of unique U.S. Wi-Fi hotspots tested by Open Signal users in 2014

Conclusion

- These important policy issues should be founded on careful and accurate understanding of today's (and tomorrow's) technology and markets
- Encryption applies broadly today to key Internet activities, including:
 - E-commerce
 - Search
 - Social Networks
 - Text messaging (over the top = Internet)
 - Internet video (in 2016)
 - Webmail
- VPNs and other proxy servers are also large and growing
- Claims that ISP have “unique” or “comprehensive” access to user data must be tested against these important facts

Credits

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