



ATIS Open Web Alliance

Jim McEachern

Senior Technology Consultant

ATIS

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OWA: Registered Participants

Biholar, Ken	Alcatel-Lucent	Militeau, Christian	Intrado
Fossati, Thomas	Alcatel-Lucent	Parayil, Shibby	Intrado
Gurbani, Vijay	Alcatel-Lucent	Matwijec, Tom	Leidos
Druta, Dan	AT&T	Moran, Tim	Leidos
Sullivan, Bryan	AT&T	Kuwahara, Takeshi	NTT
Fargano, Michael	CenturyLink	Wills, Fergus	Openwave Mobility
Fraser, Barbara	Cisco	Dadas, Mohammed	Orange
Geller, Michael	Cisco	Abubaker, Muhammad	Rogers
Graybeal, John	Cisco	Markman, Alex	Rogers
Shatzkamer, Kevin	Cisco	Huang, Shan	Time Warner Cable
Wing, Dan	Cisco	Capita, Cathie	T-Mobile
Bhatt, Yogesh	Ericsson	Chung, Jae Won	Verizon
Brunner, Richard	Ericsson	Joachimpillai, Damascene	Verizon
Spaak, Hans	Ericsson	Mishra, Sanjay	Verizon
Welsh, Matt	Google	Nawrocki, Michael	Verizon
Lajos, Istvan	GSMA	Lepeska, Peter	ViaSat
Warren, Dan	GSMA	Lerner, David	ViaSat
Lenart, Joe	Hitachi	Cao, Roger	TDS
Border, John	Hughes		
Su, Chi-Jiun	Hughes		
Kiewel, Shelby	iconectiv		
Gavrilidis, Constantine	IET		

OWA Leadership

Co-conveners:

Sanjay Mishra

*Distinguished Member of the Technical Staff
Network Infrastructure Planning
Corporate Technology
Verizon*

Kevin Shatzkamer

*Distinguished Architect
Mobility, Web and Media
Cisco*

Objectives

- Provide an overview of the work that led to the formation of the Open Web Alliance.
- Summarize the perspective of selected stakeholders:
 - Service Providers
 - Satellite Internet access providers
- Outline proposed work plan for OWA
 - Open Service Optimization Proxy

OWA Context & Background

Jim McEachern

Senior Technology Consultant

ATIS



Overview

- In December, ATIS was asked to prepare a white paper for the CTIA CTO group, analyzing the implications of SPDY.
- A team of experts was invited to participate.
 - Active participation from 12 companies
 - Drew on significant analysis by several participants
- ATIS completed *An Analysis of the SPDY Protocol and the SPDY Proxy* early this year.
 - Available, free of charge, in the ATIS document center

SPDY Protocol

- SPDY was introduced by Google to reduce webpage load times.
 - “An experimental protocol for a faster web”
 - SPDY includes mandatory encryption for all traffic
- SPDY accepted by the IETF as the basis for HTTP/2.0.
 - IETF undecided on mandatory encryption for all HTTP/2.0 traffic
- Target date for HTTP/2.0 is November 2014.

SPDY Protocol and SPDY Proxies

- SPDY proxies have been deployed to help implement the SPDY protocol for communications with non-SPDY servers.
- The SPDY protocol and SPDY proxies have implications for network management:
 - The problem is bundling multiple flows inside a single opaque (encrypted) tunnel
 - Limits reasonable network management, content distribution and network services

Open Web Alliance

- ATIS launched the Open Web Alliance to initiate a broad engagement across the Internet business ecosystem, recognizing that:
 - Changes are required to optimize user experience for the reality of the Internet today
 - All parties have been reacting independently, in many cases impacting other stakeholders
 - OWA is founded on the belief that these issues require open, multi-stakeholder collaboration
 - OWA is focused on the best user experience, while balancing the objectives of all stakeholders

OWA Scope

- Three parallel tracks:
 - **Technology/Business:** Develop solutions that do not infringe on trust relationships with the user (initial focus of OWA, providing a foundation for broader engagement)
 - **Privacy:** Collaborate with privacy advocacy groups to promote the use of secure communications and educate the user community
 - **Regulatory:** Consult with regulatory bodies in realignment of the requirements with the current Internet reality

Service Provider Perspective

Sanjay Mishra

Distinguished Member of the Technical Staff

Network Infrastructure Planning

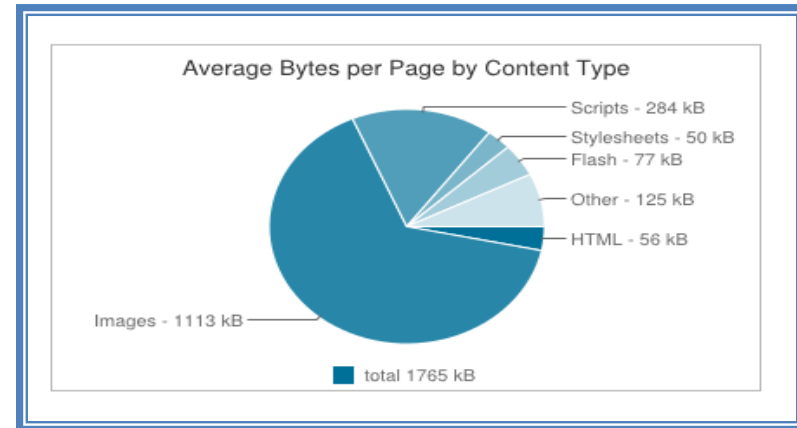
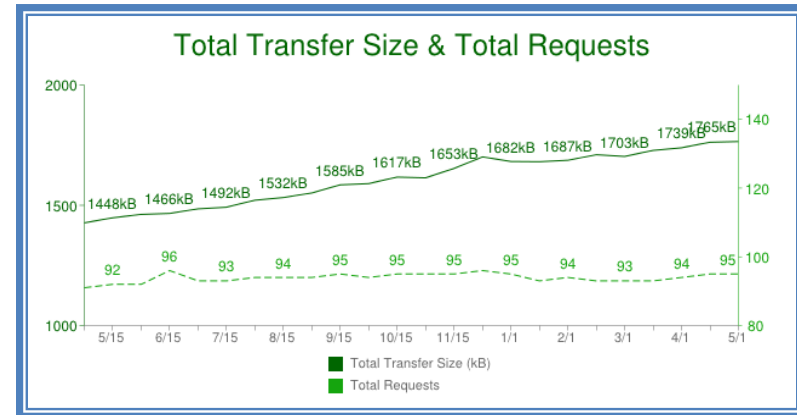
Corporate Technology

Verizon



Drivers for Speedier Web

- Web pages are becoming more complex and content-rich
- Web pages are increasingly being delivered to mobile devices over more constrained - bandwidth and latency - wireless networks.
- Protocols like HTTP (application level request/response) and TCP (reliable transport) not designed to handle today's larger, composite web pages.



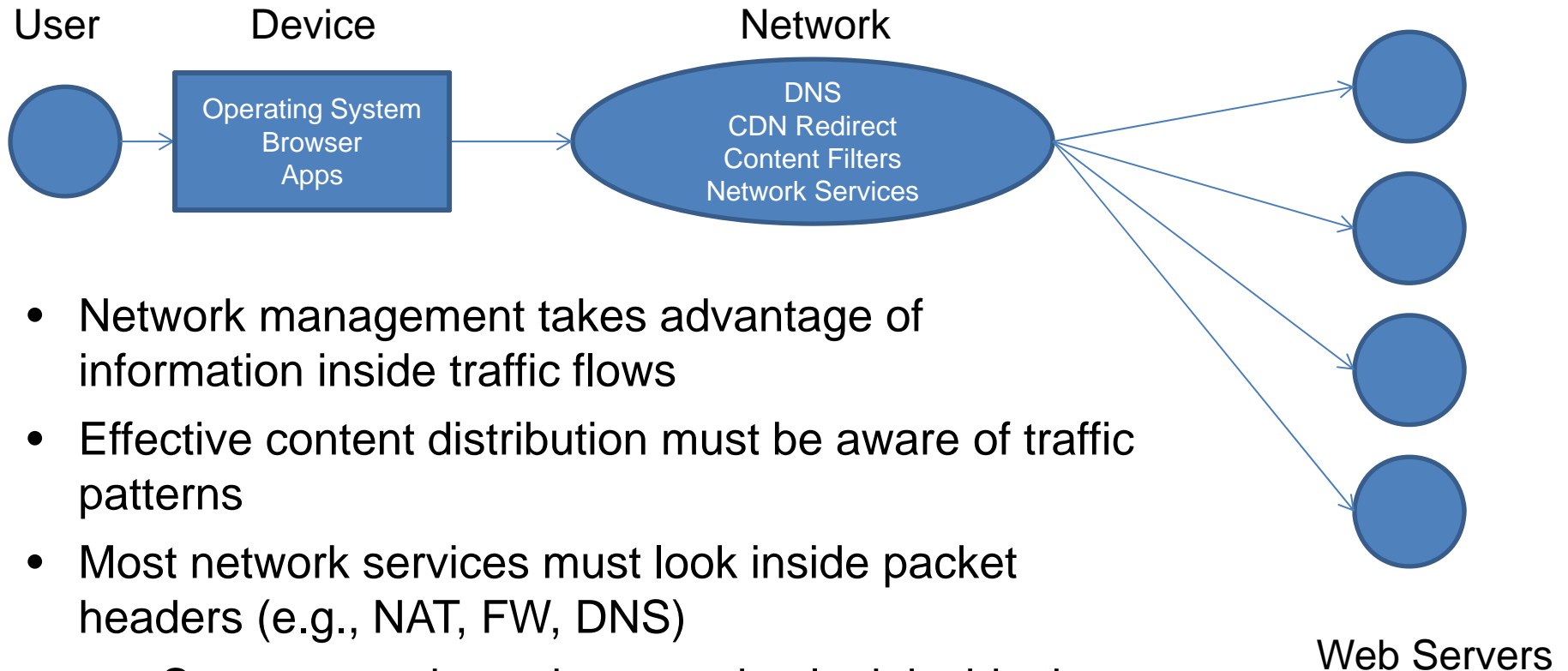
web page size and # requests for top 100 (May 2014)

Source: httparchive.org

Web optimization is necessary

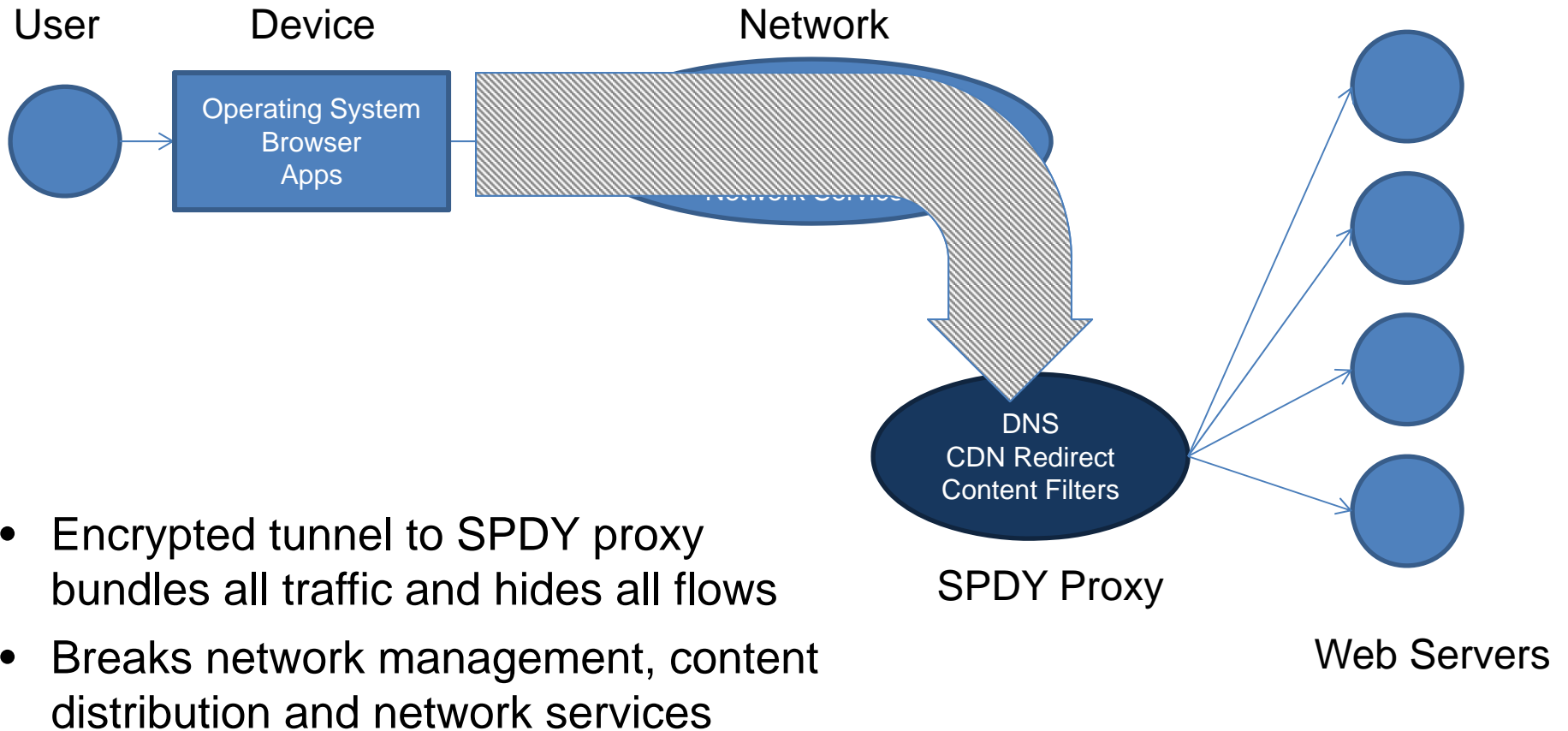
- Rich multimedia web usage provide motivation for finding and implementing techniques that speed up the web (web performance optimization), especially to mobile devices.
- Increases in network bandwidth and improvements to latency performance such as the evolution from 3G to 4G certainly help. However, such improvements alone will not be sufficient to keep up with demand.
- Additional improvements in the areas of content compression and protocol optimization have the potential to offer significant additional improvements in mobile Web performance.
- Web page delivery optimization, in conjunction with the evolution of the underlying network performance, is generally believed to be necessary to continue to deliver quality user experiences on the mobile web.

Network Services



- Network management takes advantage of information inside traffic flows
- Effective content distribution must be aware of traffic patterns
- Most network services must look inside packet headers (e.g., NAT, FW, DNS)
 - Some network services need to look inside the packets to analyze the content (e.g., parental controls)

SPDY Proxy



Potential Impacts to the Internet Ecosystem

- Congestion at Peering Points, if a large percentage of web traffic is moved to a single destination (i.e., a proxy server) it may significantly alter the traffic flow on the operator network.
- Latency, a proxy could have significant performance impacts when the content being sought by the user is within carrier's network
- Network management and service enablement functions including RAN-triggered congestion management, UIDH (unique client identifier) insertion, data collection for analytics, and content caching
- Detecting code snippets embedded in the web page HTML content
- The use of an encrypted SSL/TLS connection between the client browser and SPDY proxy server limits the ability of network providers to protect customers from web attacks
- DNS late-binding further reduces the visibility of the network provider to monitor for and react to potential security events.
- The SPDY protocol introduces new server-side controls, which if misused, could force a customer device to take unintended actions
- Limit value-add services that are based on access to header and payload content from individual sessions

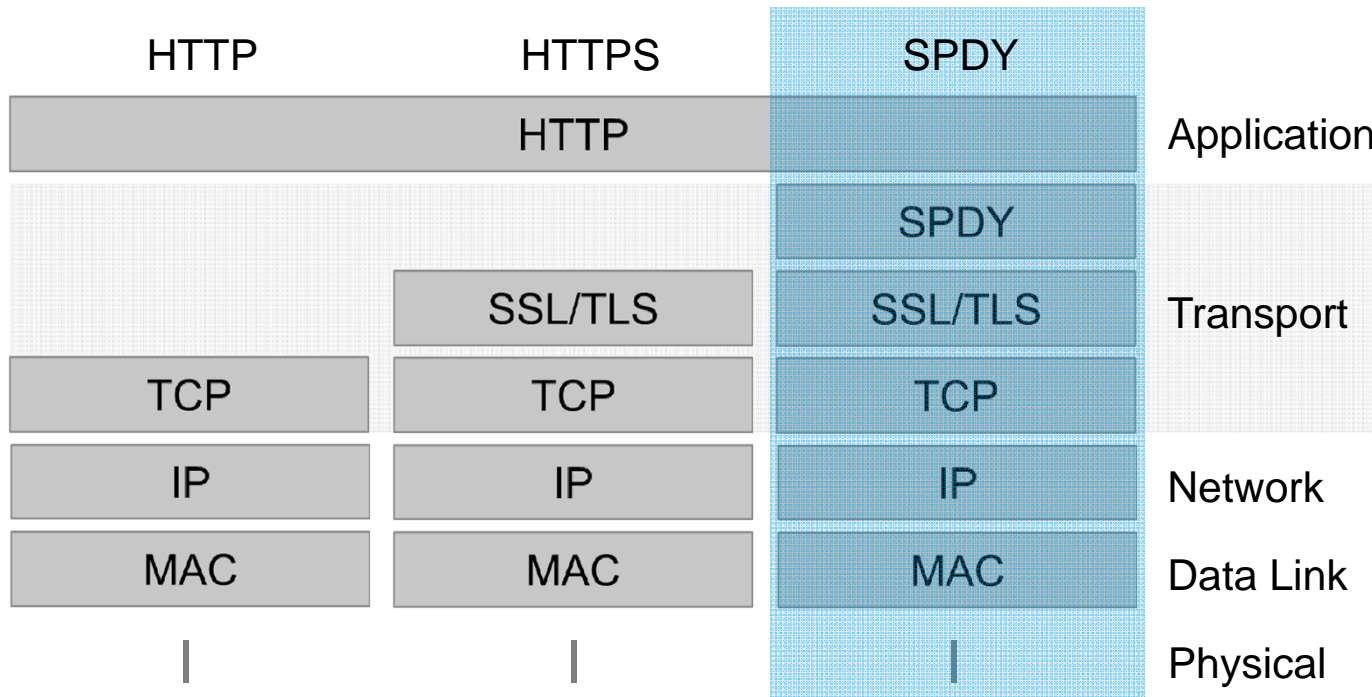
First and foremost, there appears to be a benefit from deployment of SPDY - *expected to be interim until availability of adoption of HTTP/2* - in terms of web-page load time, allow websites an increase in response (performance) and allow mobile-based websites better use of bandwidth. At the same time, the perceived end-user benefits require thorough study and research engaging broader ecosystem (end-user group, browser vendors, app developers and network infrastructure vendors) to ensure network management visibility and network functions can seamlessly coexist with potential end-user benefits.

Kevin Shatzkamer

Distinguished Architect
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Cisco



What is SPDY?



Google Protocol to replace HTTP(S) that forms the foundation for HTTP 2.0

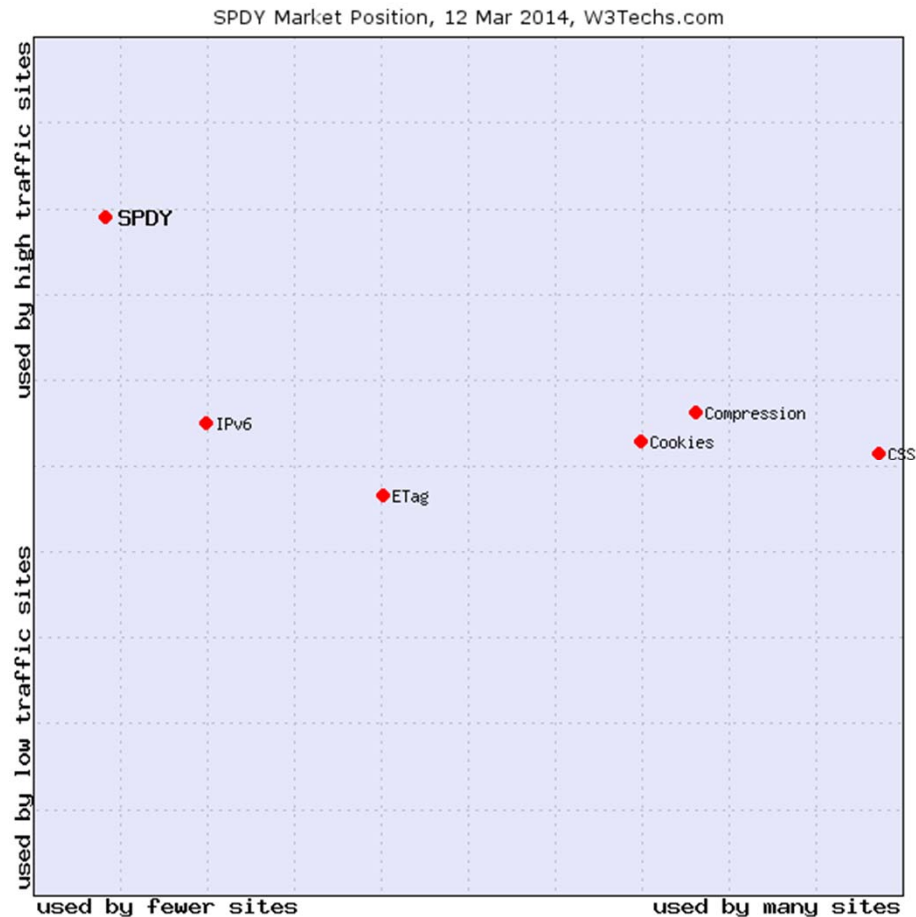
- Goals: Improve page load time, content protection and consumer privacy
- Implementation: Combination of TCP INTCWIND modification, request multiplexing, SSL encryption

Foundation for HTTP 2.0 (IETF HTTPBIS Working Group)

Source: Cisco, *State of the Mobile Service Provider: "Middleboxes & SPDY"*

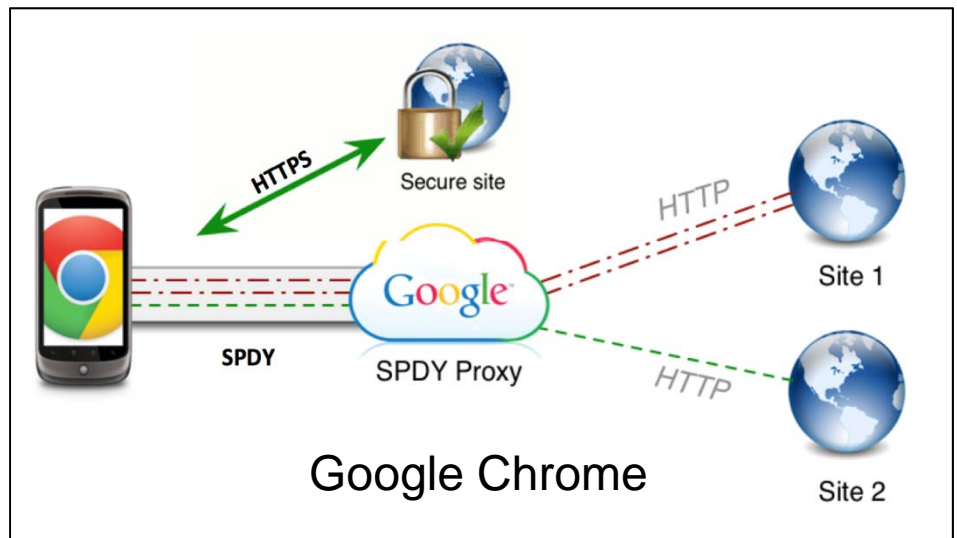
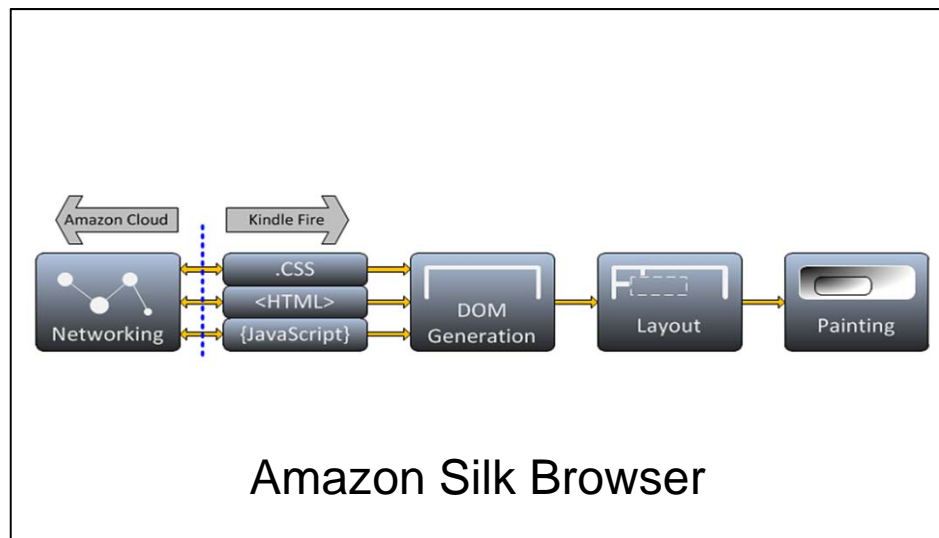
SPDY Market Position

Low number of destinations, High Impact



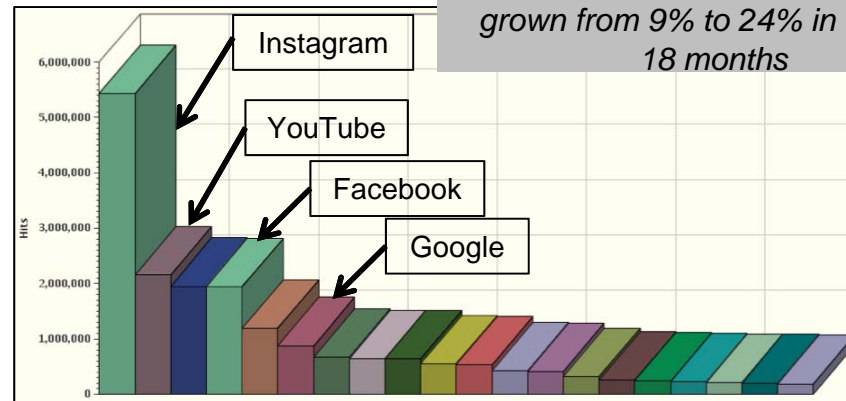
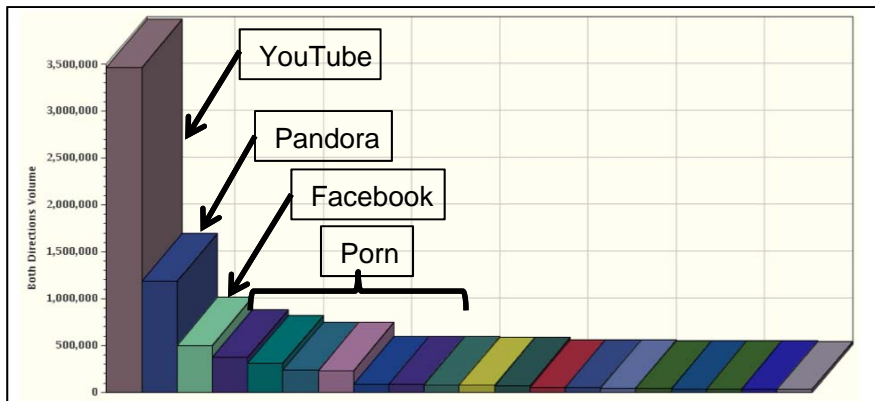
- **Used by few (~0.7%) websites**
 - Compare to IPv6 (3.8% of websites)
- **Websites include**
 - Google/YouTube (2012) - #1 / #3
 - Twitter (2012) - #11
 - Wordpress (2012) - #18
 - Facebook (Mar 2013) - #2
 - Tumblr (2014)
- **Functional in most devices and browsers**
 - Android / Kindle
 - Chrome (All OS)
 - Firefox (All OS)
 - Internet Explorer (Win8)
 - **Absent in Safari (All OS)*

SPDY Proxies and Impacts

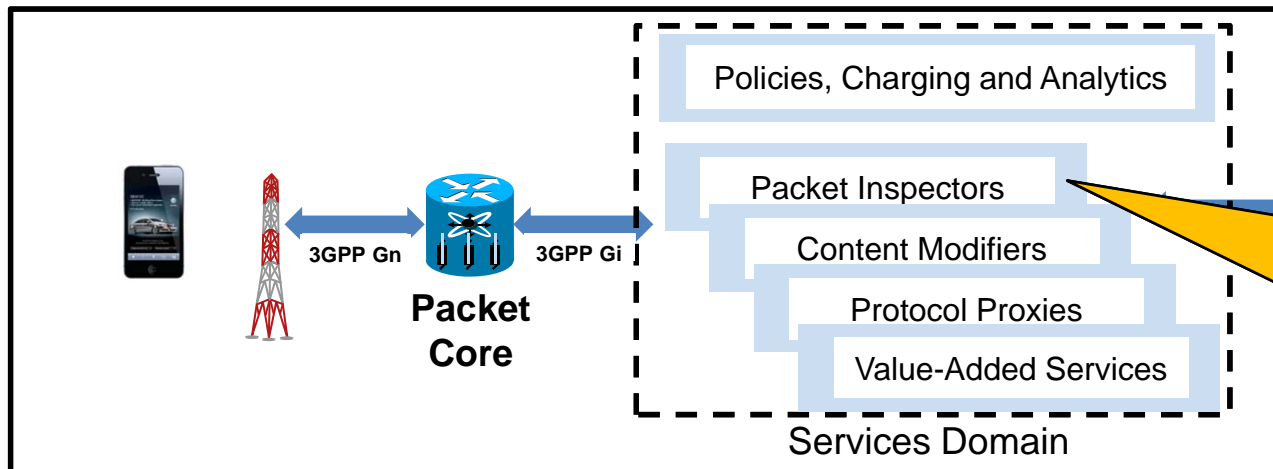


- **Dramatically changes traffic flows, infrastructure scaling, and peering relationships:**
 - Changes flow size and duration (fewer, higher-bandwidth flows)
 - Increasing inbound traffic from proxy owner (to end users)
 - Increasing outbound traffic to proxy owner (from other CSP, ASP)
- **Eliminates visibility into traffic flows**
 - Lost visibility into individual flows (5-tuples)
 - Lost visibility into DNS requests (clients don't resolve DNS)
- **Changes VAS paradigm**
 - Bypasses carrier VAS services
 - Couples caching, video optimization, image compression, web acceleration with proxy
 - Enables co-processing model for HTTP (networking, HTML, page rendering, etc.)

Impact on Mobile Middleboxes



Encrypted traffic on the Internet has grown from 9% to 24% in the last 18 months



SP losing visibility into content and applications running across their infrastructure
 Impacts ability to manage traffic, improve subscriber experience, and drive new revenue models

SPDY Encryption: Impact

European T1s:
25% of Mobile traffic is encrypted

India T1s:
15% of Mobile is encrypted, but growing

North America T1s:
25-30% of Mobile is encrypted

Service Node Impact	Services Impacted	Use-Case / VAS Impacted
Packet Inspectors	Deep Packet Inspection IPFix Network Probes Network Firewalls Web Application Firewalls Network Security (IPS, DDoS Detectors)	Traffic/Activity monitoring Data analytics L2-L7 Load-balancing Behavioral Analysis Anomaly Detection DoS/DDoS Protection Malware Detection
Content Modifiers	Content Optimizers Protocol Optimizers Compressors	Transrate/Compress Video Image Compression Optimize TCP Slow-start
Protocol Proxies	Network Address Translators DNS Cache SIP Proxy Session Border Controller HTTP Proxy WebRTC Gateway TCP Proxy	Modifying IP address information Communications Control Content Caching ABR Index Modification Performance Enhancing Proxy L7 Application Functions
Value-Added Services	Ad Insertion Engine Header Insertion	Advanced Advertising In-stream header enrichment URL Filtering Parental Control

Source: Cisco, *State of the Mobile Service Provider: "Middleboxes & SPDY"*



Satellite Internet Access Provider Perspective

Peter Lepaska

CTO

Acceleration Research and Technology

Viasat, Inc.



Who is Viasat?

- Vertically-integrated satellite equipment manufacturer, network service operator, and ISP
- Includes advanced web acceleration to mitigate the high latency of satellite
- As an ISP, we sell residential broadband access over satellite and wholesale to partners...



In-flight Broadband

20+ million passengers



jetBlue®
Fly-Fi™
POWERED BY **exede**
internet

Satellite Needs Acceleration

- Web is unusably slow without the acceleration proxy
- Encryption disables acceleration
 - HTTP2 migration
 - Increased privacy sensitivity (Snowden, etc.)
 - Google page ranking
 - Google Data Compression Proxy (GCP)

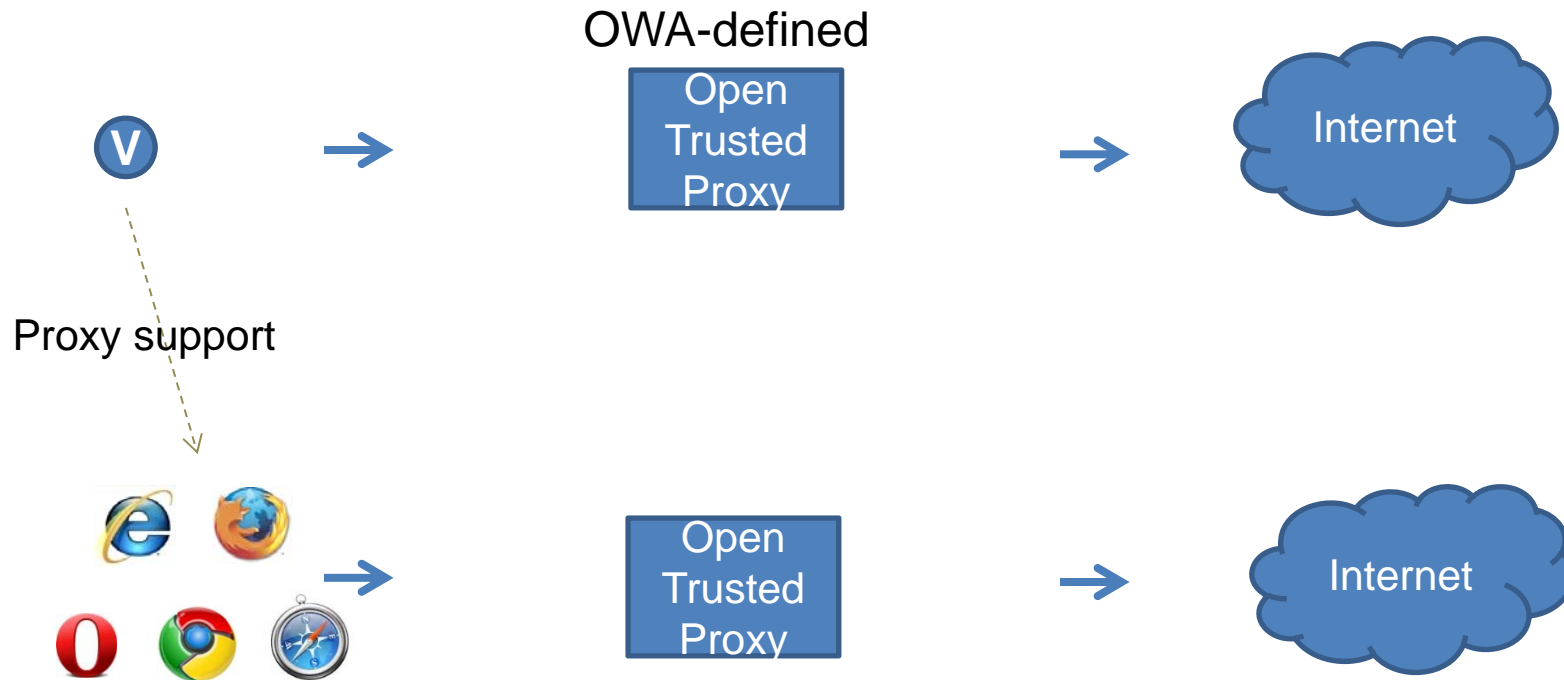
Event	Plain text	Encrypted
Yahoo switch to HTTPS	~4 seconds	~16 seconds
CNN via GCP	~6 seconds	~9 seconds

Note: CNN is 50% slower with GCP in spite of using SPDY plus compression, plus object minimization

Our Solution: “Trusted Open Proxy”

- Involve the user: Obtain user consent to trust service provider to decrypt select HTTPS
- Modify the browser: Needs to support consent model.
- Interoperate with the open proxy: Acceleration will plug into the open proxy
- Evangelize change: We will deploy our browser and use it to demonstrate trusted open proxy value to mainstream browser developers.

Trusted Proxy Adoption



Work Plan & Next Steps

Jim McEachern

Senior Technology Consultant

ATIS



Scope

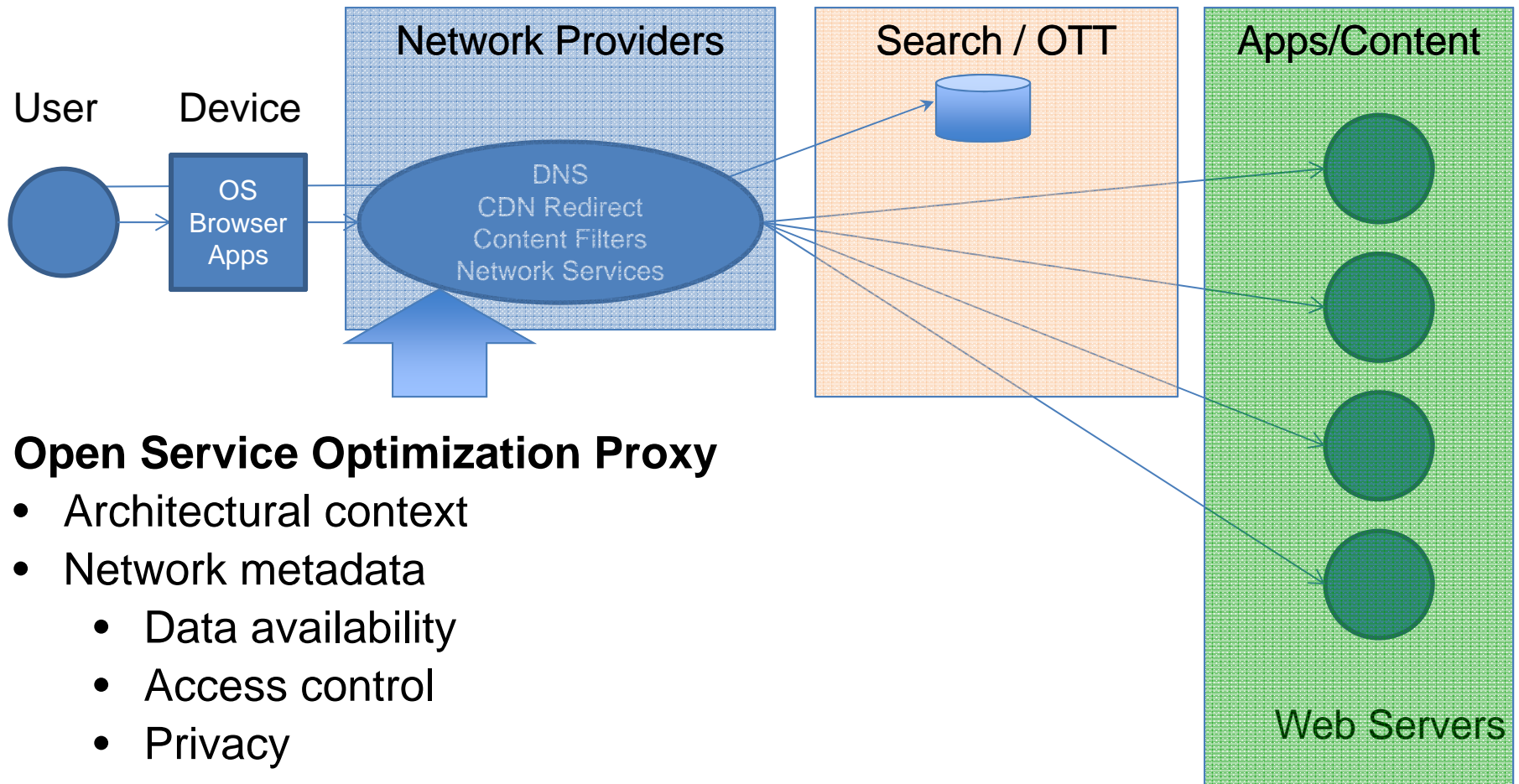
- Analysis of Open Service Optimization Proxy:
 - Technology impact (clients, applications, DNS, CDN)
 - Business model impact (peering, CDN, VAS)
 - How to subscribe to a SPDY proxy from client browser/application (Search / Discover, Beacon, DNS)
 - Relationship to mobile OS
 - Architecture for supporting localization of traffic during roaming and handovers (mobile)

Objective

Open Service Optimization Proxy:

- Formally document the high level characteristics of a trusted open service optimization proxy.
 - Use Cases
 - Architectural context
 - Requirements
 - Value proposition
 - Related work
 - Open issues
- Publish requirements document (in IETF) before the completion of HTTP/2.0 (November 2014).

Open Service Optimization Proxy



Open Service Optimization Proxy

- Architectural context
- Network metadata
 - Data availability
 - Access control
 - Privacy
- Requirements to protect trust relationships with user

In Summary

- SPDY is an indication of a broader emerging trends:
 - Split browsers
 - The role of proxies
 - Opportunistic encryption of all traffic
- One size does not fit all.
- The user should be involved in making trade-offs.
 - Proxy can bypass intermediate services the user may want to access
- Open Web Alliance objective is to begin the dialog.

Next Steps

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Senior Technology Consultant

ATIS



Next Steps

- OWA is open to all:
 - No fee to participate
- Structure and working procedures:
 - Mailing list
 - Contribution database access
 - Contribution format
- Meetings:
 - Virtual meetings every two weeks
 - *Thursday, May 29th 11:00 AM – 1:00 PM EDT*
 - F2F meeting if/when required