Dr. Tom Leighton

Co-Founder & Chief Scientist, Akamai

Akamai

Trends and Challenges in the Hyperconnected World

Tom Leighton, Co-Founder and Chief Scientist, Akamai Technologies

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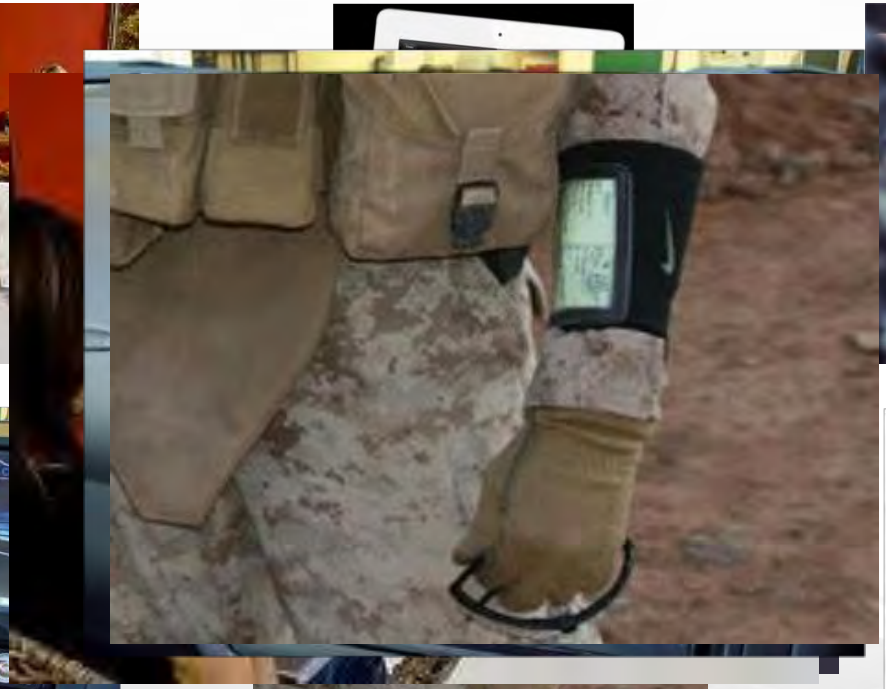
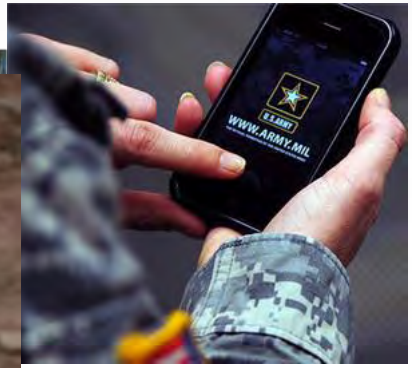
The Hyperconnected World





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The Hyperconnected World is Changing Everything

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Global Internet Users

2006 2007 2008 2009 2010 2011

1.2 Billion

2 Billion

Source: 2006 internet World Stats; 2011 ITU

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Number of Connected Devices Worldwide

2006 2007 2008 2009 2010 2011

1.7 Billion

6 Billion

Sources: Akamai estimates

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Global eCommerce Spend

2006 2007 2008 2009 2010 2011

$273 Billion

$680 Billion

Source: JP Morgan

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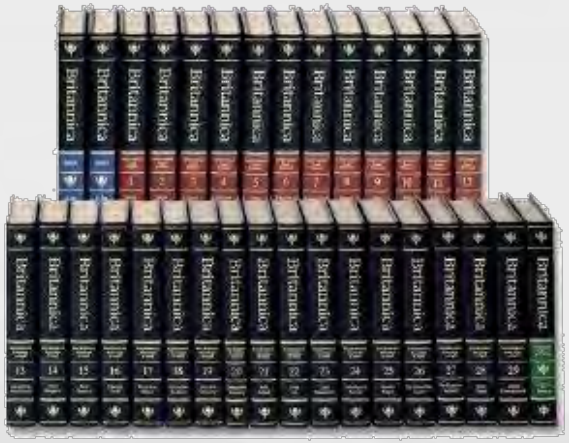
Daily Traffic for Large U.S. Gov't Site

2006 2007 2008 2009 2010 2011

1 TB



17 TB

Contents of 4,000 volumes per day

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Peak Attack Traffic

2006 2007 2008 2009 2010 2011

24 Gbps

>200 Gbps

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Can this Growth Continue?

	2006	2011	2016
Global Internet Users:	1.2 B	2 B	3.3 B
Number of Connected Devices:	1.7 B	6 B	21 B
Global eCommerce Spend:	$273 B	$680 B	$1,700 B
U.S. Gov't Site Traffic per day:	1 TB	17 TB	290 TB
Peak Attack Traffic:	24Gbps	200 Gbps	1,600 Gbps

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Challenges in the Hyperconnected World

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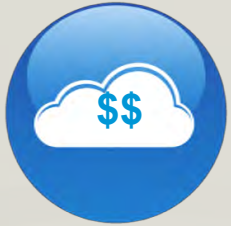
Effectiveness and Efficiency



Optimize Business Transformation to the Cloud

Mobility

Ensure Fast and Reliable Experiences

Security

Protect Data and Defend Against Attacks

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Managing a Web Presence in the Hyperconnected World

- Web servers
- Local load balancers
- Application servers
- SSL and authentication servers
- Video streaming infrastructure
- Managing third party content
- Compression & connection management servers
- IDS & IPS servers
- DNSSec & IPv6 support
- Mobile app infrastructure
- Redundant data centers & failover

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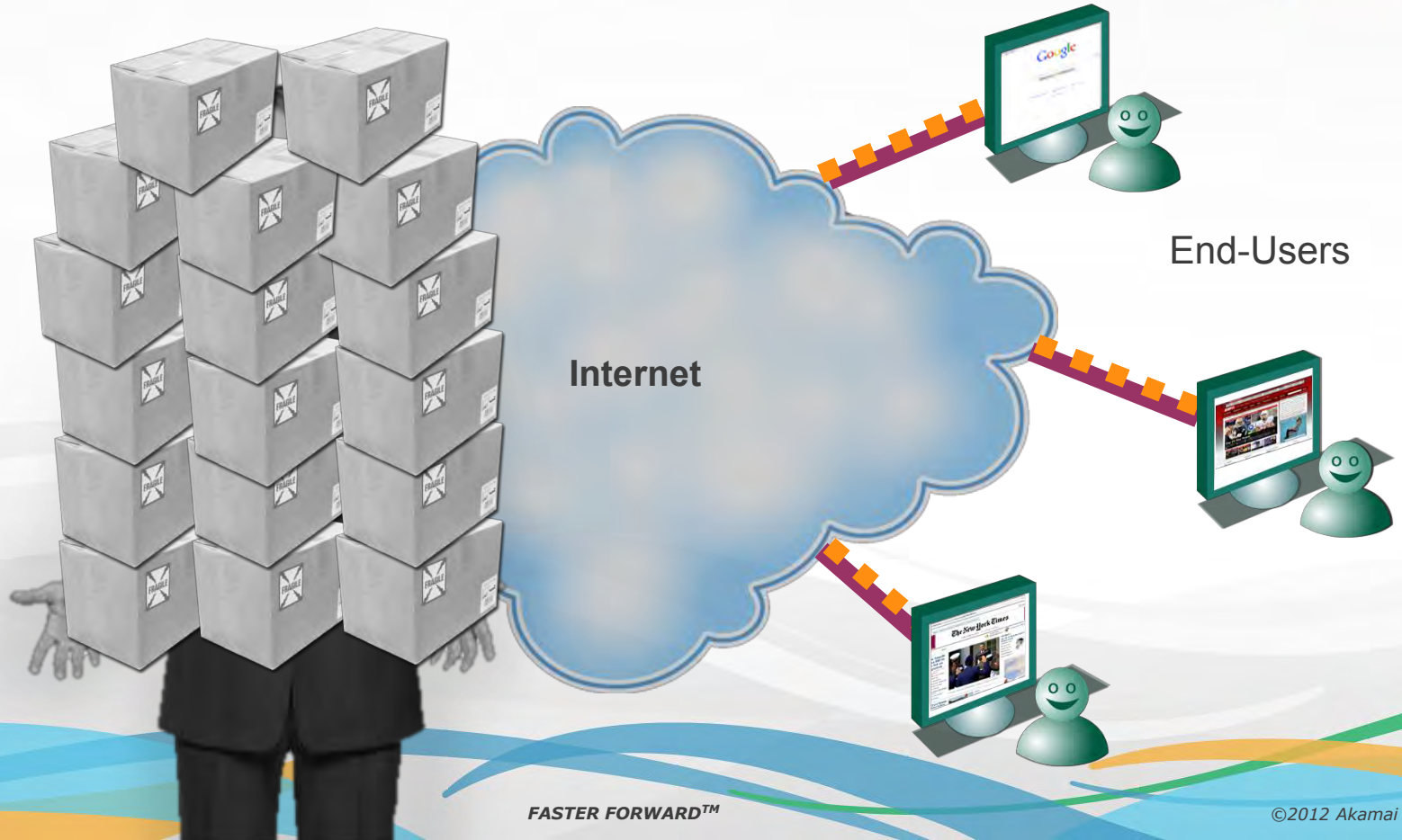
The Web: Simple on the Outside…



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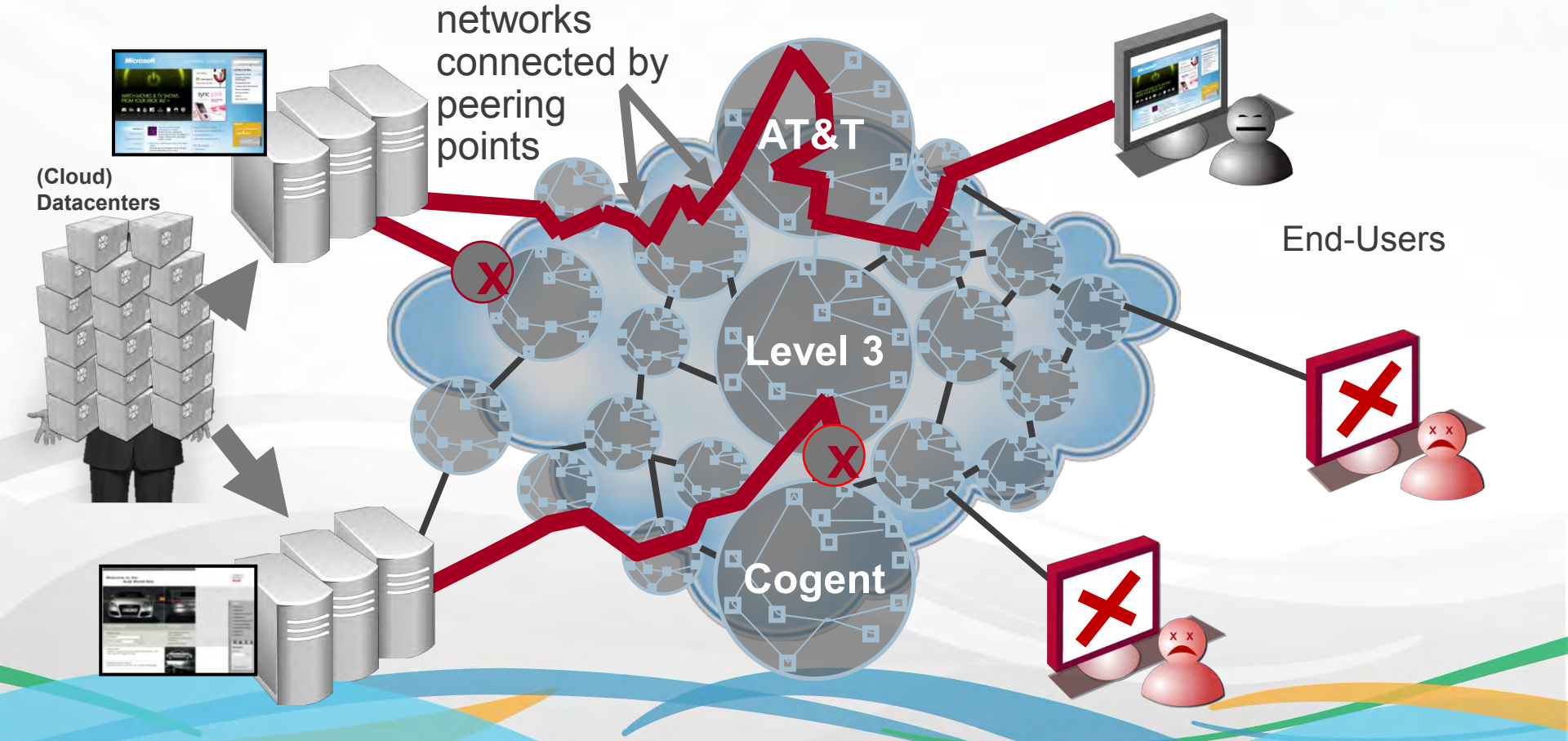
…but Problematic on the Inside



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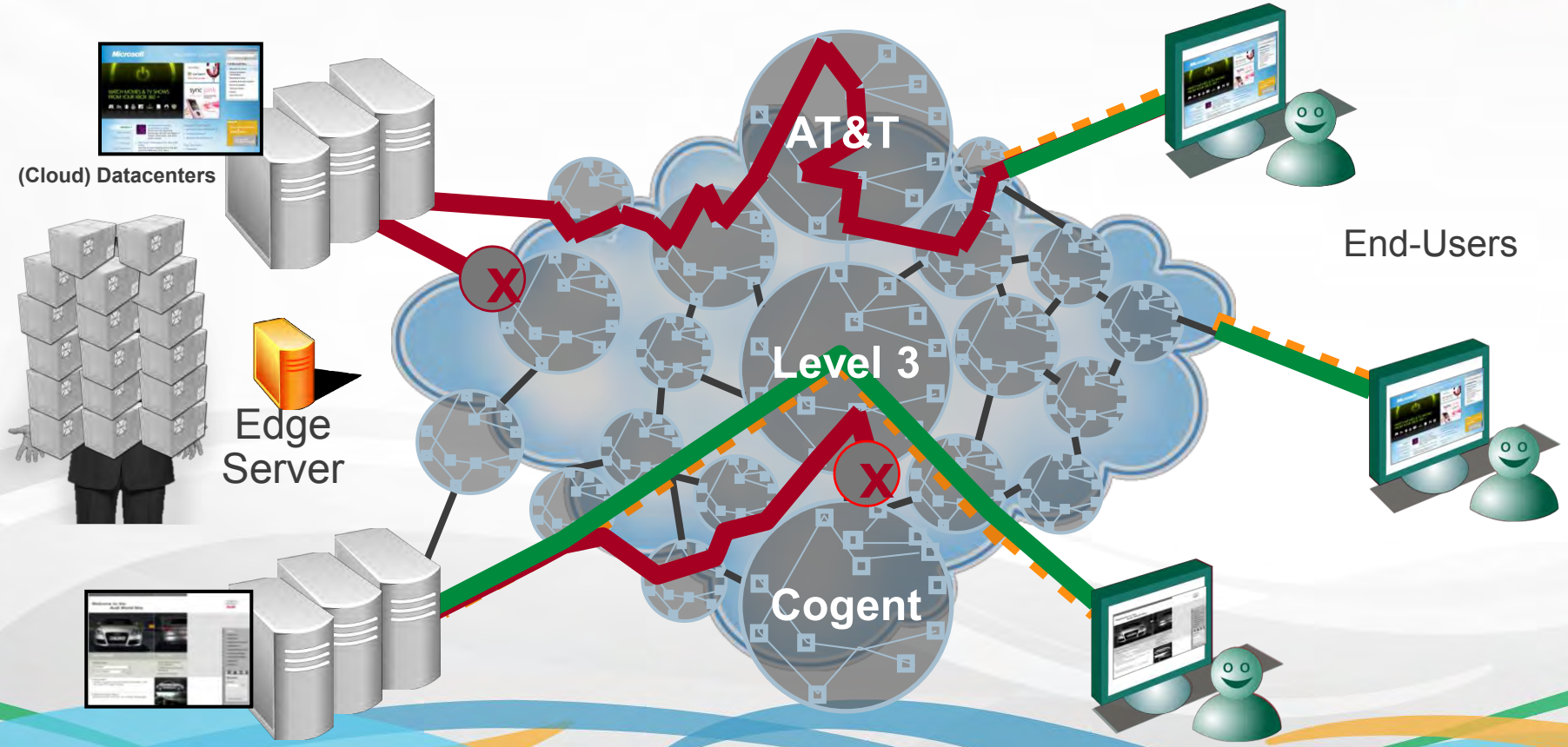
The Distributed Approach



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Our Cloud

A Global Platform:

- 100,000+ Servers
- 2,000+ Locations
- 1,000+ Networks
- 650+ Cities
- 78 Countries

Delivering 250,000+ Domains

- All top 60 eCommerce sites
- All top 30 M&E companies
- 9 of the top 10 banks
- All of the top Internet portals
- All branches of the U.S. Military

Accelerating Daily Traffic of:

- 7+ Tbps
- 20+ million hits per second
- 1.5+ trillion deliveries/day
- 50+ petabytes/day
- 10+ million concurrent streams

15–30+% of Web Traffic

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Download the GNET App!

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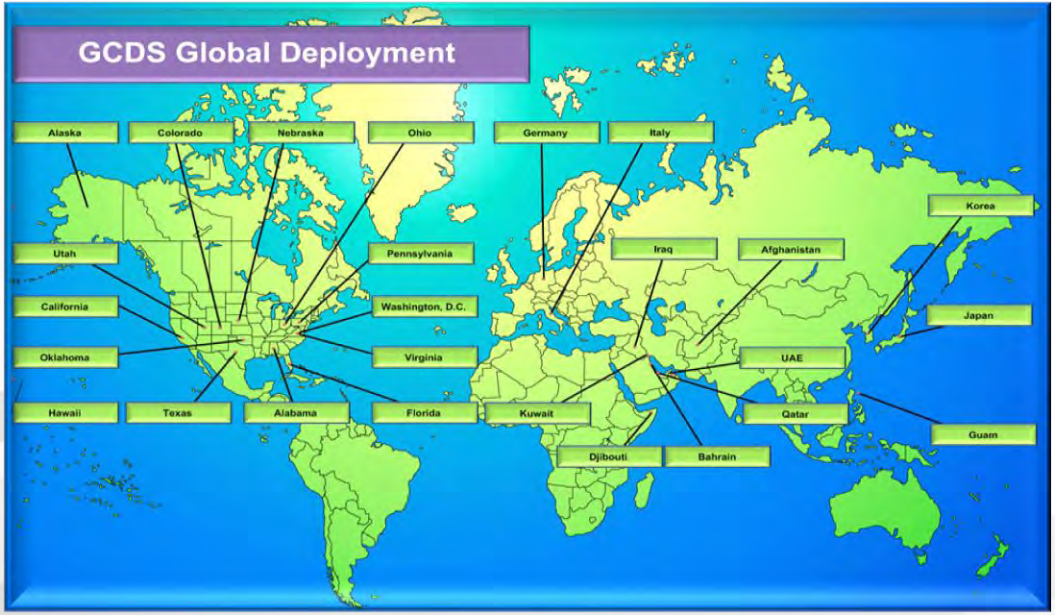
GIG Content Delivery Service (GCDS)



- 30 NIPRNet regions and 23 SIPRNet regions
- 82 web applications and portals across all services
- Fully “Type Accredited” w/ Authority To Operate (ATO) on NIPRNet & SIPRNet

Come visit GCDS in front of the DISA Pavilion (area 725)

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GCDS Customers

SharePoint Portal	
Custom Service Portal	
Geospatial Application	
Mission Support Applications	
eLearning Application	
Large File Downloads	

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The Power of a Distributed Platform

BEST BUY

80% faster delivery for dynamic content and applications

ROSS + SIMONS

Increased online revenue from $40 to **over $60 Million**

VICTORIA'S SECRET

Saved $1 Million in infrastructure investments

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way it was for
scale bullet

Special Needs for Video

- High Quality for any device, anywhere
- Varying Formats
- Varying Bitrates
- Managing Costs
- Analytics
- Security
- Scale

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Primetime Video Is Moving Online

©2012 Akamai

Let’s Do Some Math…

Bitrate	10X
Viewing Time	100X
TRAFFIC	**1,000X**

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Challenges in the Hyperconnected World

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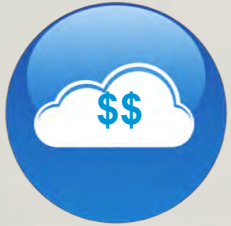
Effectiveness and Efficiency



Optimize Business Transformation to the Cloud

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Protect Data and Defend Against Attacks

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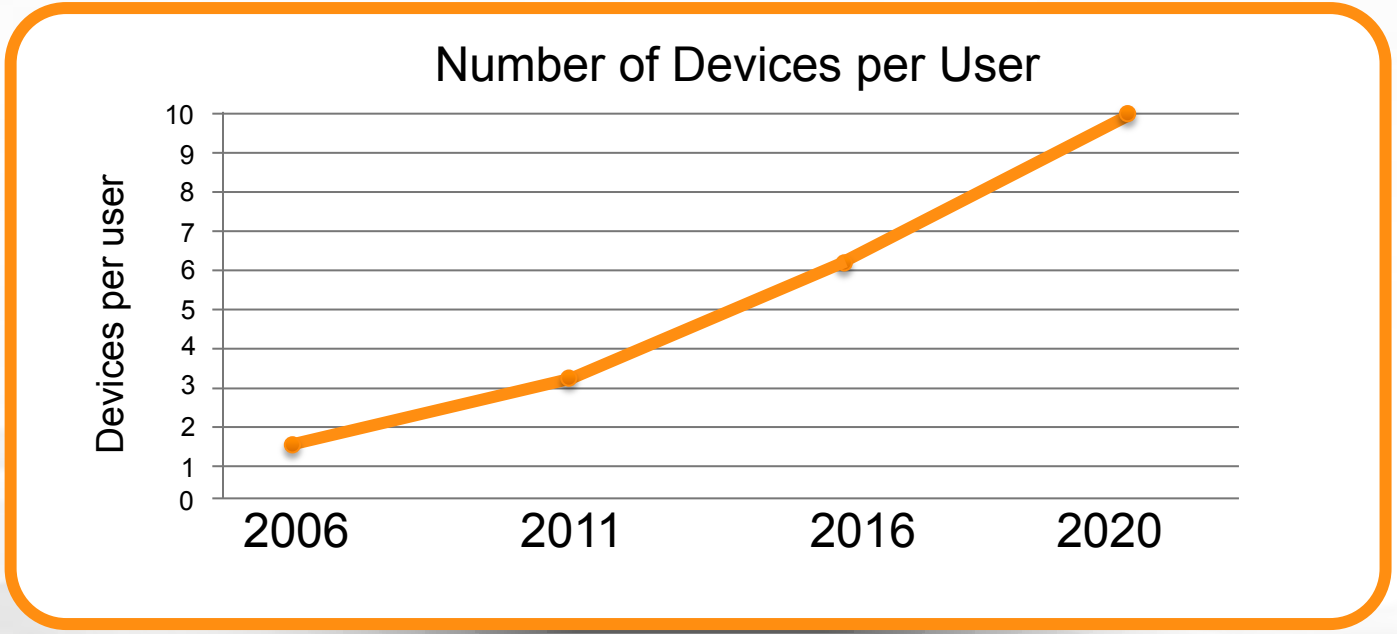
Explosive Growth in Mobile



Average Internet user will have 10 connected devices by 2020

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Challenge: Mobile Internet Access is **SLOW** because…

…the mobile network architecture was not designed for the Web

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Mobile Performance: Expectation vs. Reality

The Expectation

- 71% of users expect m-sites to load as quickly as desktop sites
- 60% will only wait 3 seconds for a page to load

The Reality

- Leading m-sites take 9 seconds on average to load
- 57% of users have problems accessing m-sites

The Result

- 43% of users are unlikely to return to a slow-loading m-site
- 57% will not recommend the site

Source: Compuware, "What Users Want from Mobile," 2011

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Test Results: Mobile Acceleration

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52%

Faster over the air

71%

Faster over WiFi

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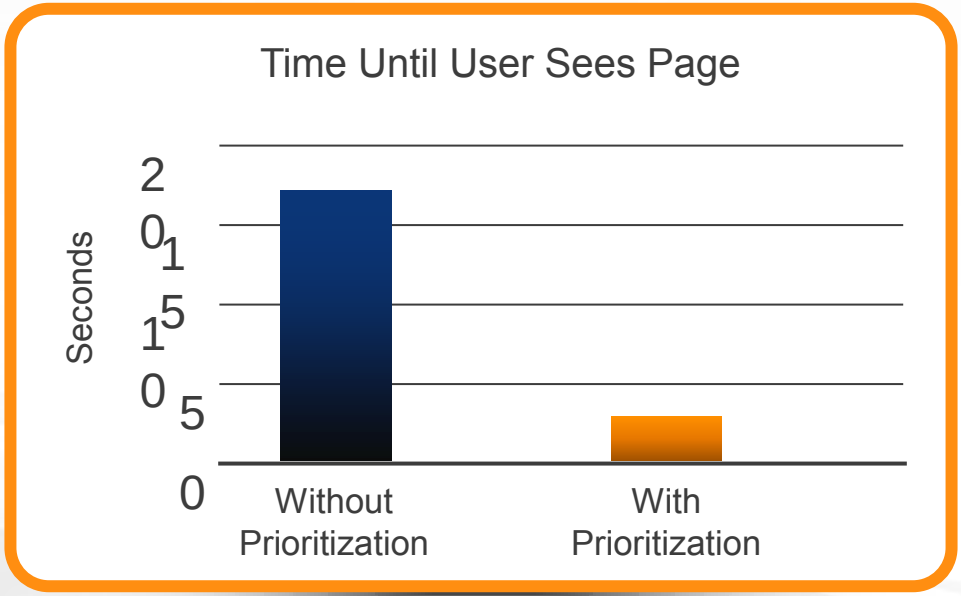
What's Coming: Bandwidth Prioritization



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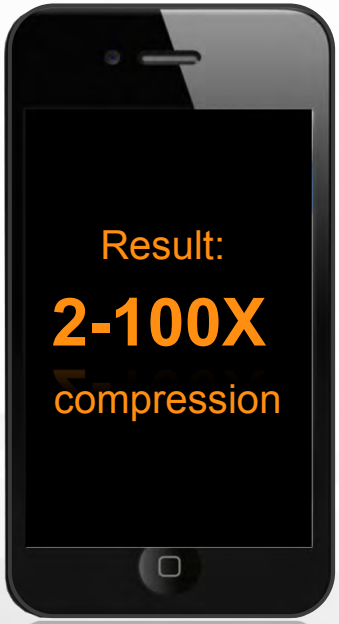
What's Coming: Bandwidth Reduction for Mobile



- Image compression
- Deliver below-the-fold on-demand
- JavaScript consolidation
- Header compression
- Deduplication for dynamic content

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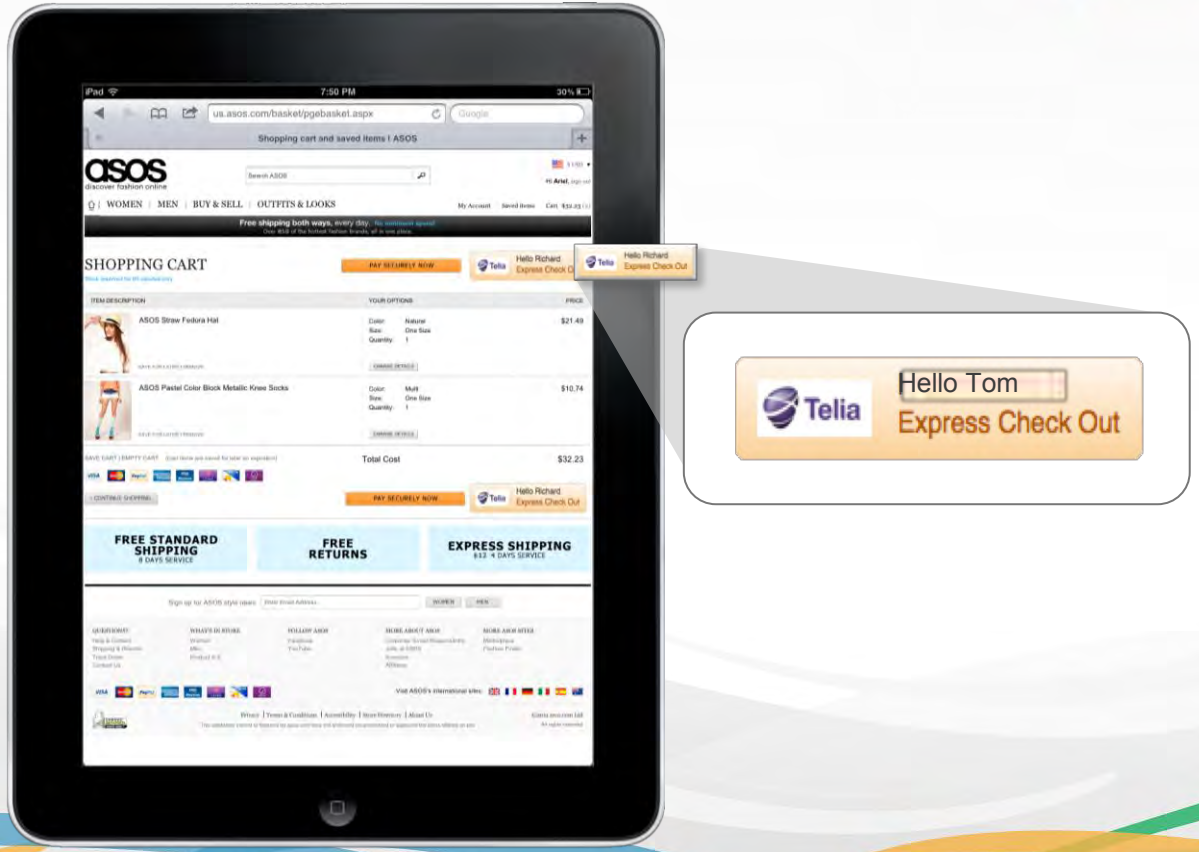
Future World: SIM-based User Authentication

Could enable:

- One-click checkout without signing in
- Credit card billing without touching the card
- Billing through your phone account



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Challenges in the Hyperconnected World

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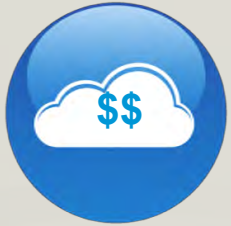
Effectiveness and Efficiency



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The State of Internet Security

- Cybercrime costs global businesses ~$1 trillion/year.[1]
- Cyber attacks downtime for large eCommerce sites can exceed $100,000/min.[1]
- USCERT responded to 10,000+ incidents, opens & releases 5,000+ more actionable cybersecurity alerts in FY11 in FY
- DHS National Cybersecurity Division sees 4-fold annual increase in requests for assistance critical infrastructure in FY11[4]
- 3 Billion malware were released in 10 – a 10% annual increase in Web-based intrusions.
- Even critical utilities are being targeted.[1]

VERY BAD

[1] McAfee [2] Internet Crime Complaint Center [3] Gartner [4] Janet Napolitano

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Security Challenges

Attackers Take your Site Down

The FBI's error screen from FBI.gov.
(Credit: CNET)

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Security Challenges

Attackers Steal your Sensitive Data

Fox News | Fox Business | Small Business Center | Fox News Radio | Fox News Latino | Fox Nation

FOX NEWS .com
Fair & Balanced

Search

ON AIR NOW »
Your World w/ Neil Cavuto (cc)
From Main Street to Wall Street

FULL COVERAGE Rise of Freedom • Fox News-Google GOP Debate

Home | Video | Politics | U.S. | Opinion | Entertainment | SciTech | Health | Travel

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TECHNOLOGY - SCITECH

Sony PlayStation Users' Personal Information Compromised After Hack Attack

Published April 27, 2011 | NewsCore

Print | Email | Share | Recommend 1K | Tweet 135 | +1 0

Sony

TOKYO – Sony Corp. said Tuesday that some users' personal information had been compromised in a hacker attack as the outage of its global PlayStation Network entered a seventh day.

The company confirmed that an "external intrusion" by hackers disrupted the service, affecting more than 75 million users worldwide who use it to play video games against friends, stream movies and shop online.

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Security Challenges

Attackers Corrupt your Site

THE Sun

Tuesday, 19 July 2011

▸ Log in to comment

HOME
NEWS
Weather
Forces
Sun City
Captain Crunch
Sun Says
Malaria No More
VIDEO
SPORT
Football
Dream Team
Cricket
F1 & Motorsport
SHOWBIZ
Bizarre
Film
Music

News

GOT A STORY? EMAIL : TALKBACK@THE-SUN.CO.UK

Media moguls body discovered

By STAFF REPORTER

Published: Today

Rupert Murdoch, the controversial media mogul, has reportedly been found dead in his garden, police announce.

Murdoch, aged 80, has said to have ingested a large quantity of palladium before stumbling into his famous topiary garden late last night, passing out in the early hours of the morning.

"We found the chemicals sitting beside a kitchen table,

Media Mogul ... Rupert Murdoch

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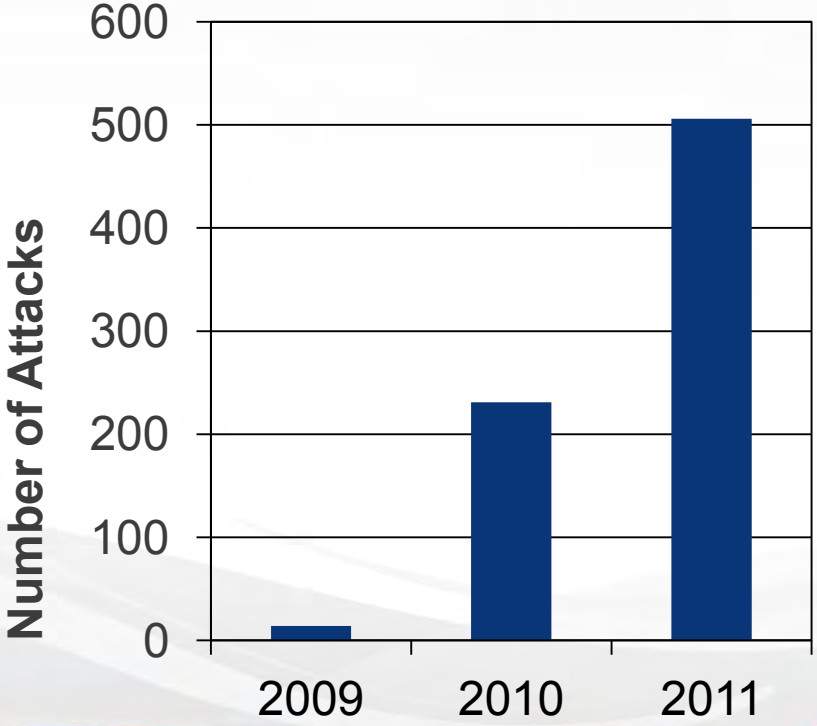
Attacks on Akamai Customers

- Typical Attack Size: 3-10 Gbps
- Large Attack Size: 100-200 Gbps
- Attacks are originating from all geographies and are moving between geographies during the attack



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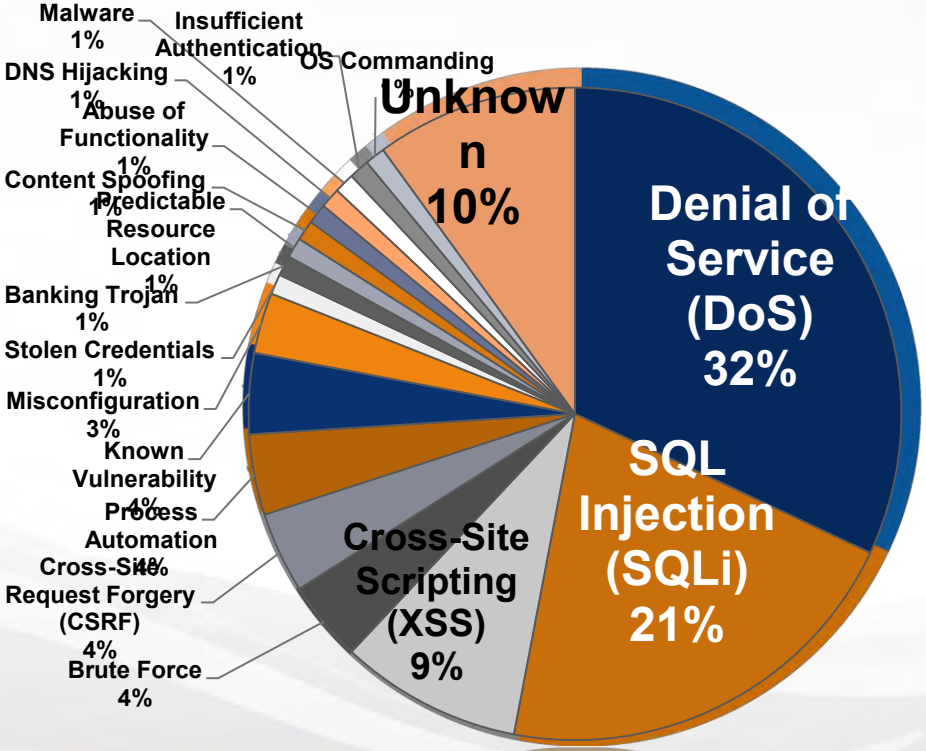
The Threat is Varied

74% of companies experienced one or more DDoS attacks in the past year.

31% of these attacks resulted in service disruption.

Attack Methods



Source: TrustWave - 2010 - Web Hacking Incident Database

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The Low Orbit Ion Cannon (LOIC)

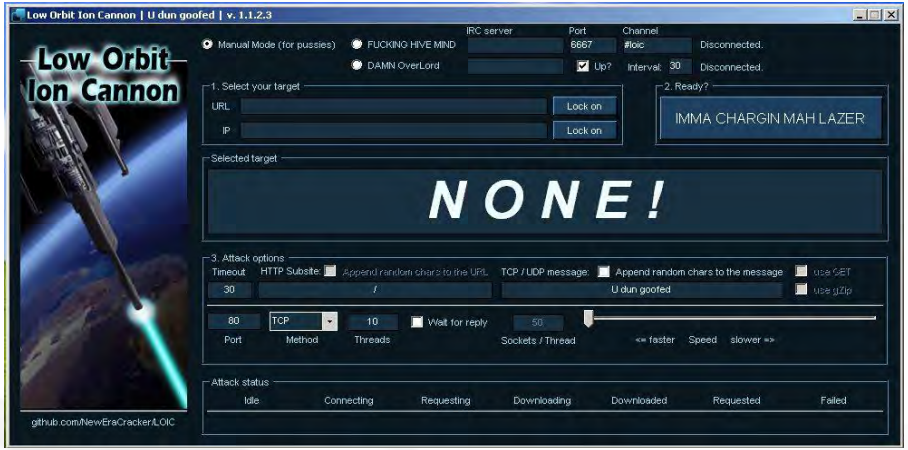
Attack tool developed for Operation Payback

- Continues to be developed today

Range of attack capabilities:

- TCP (SYN Flood)
- UDP packet floods
- HTTP request floods

Users download the tool, insert the target URL or IP and press GO!



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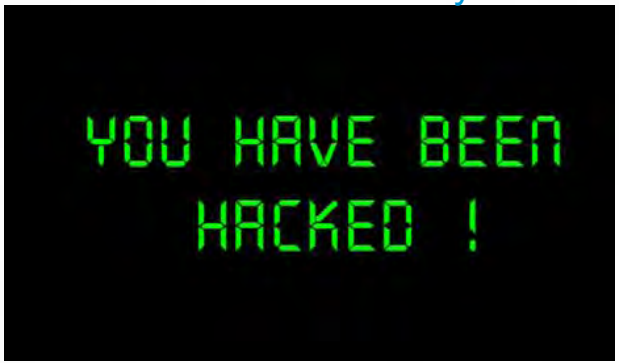
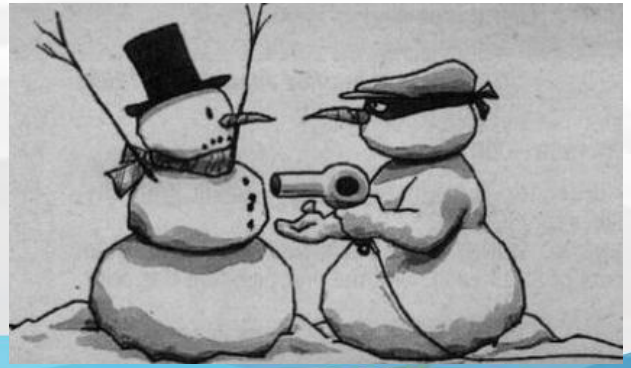
Why?

Traditional Hackers: Glory Hounds



Political Hacktivism

Profit



State Sponsored

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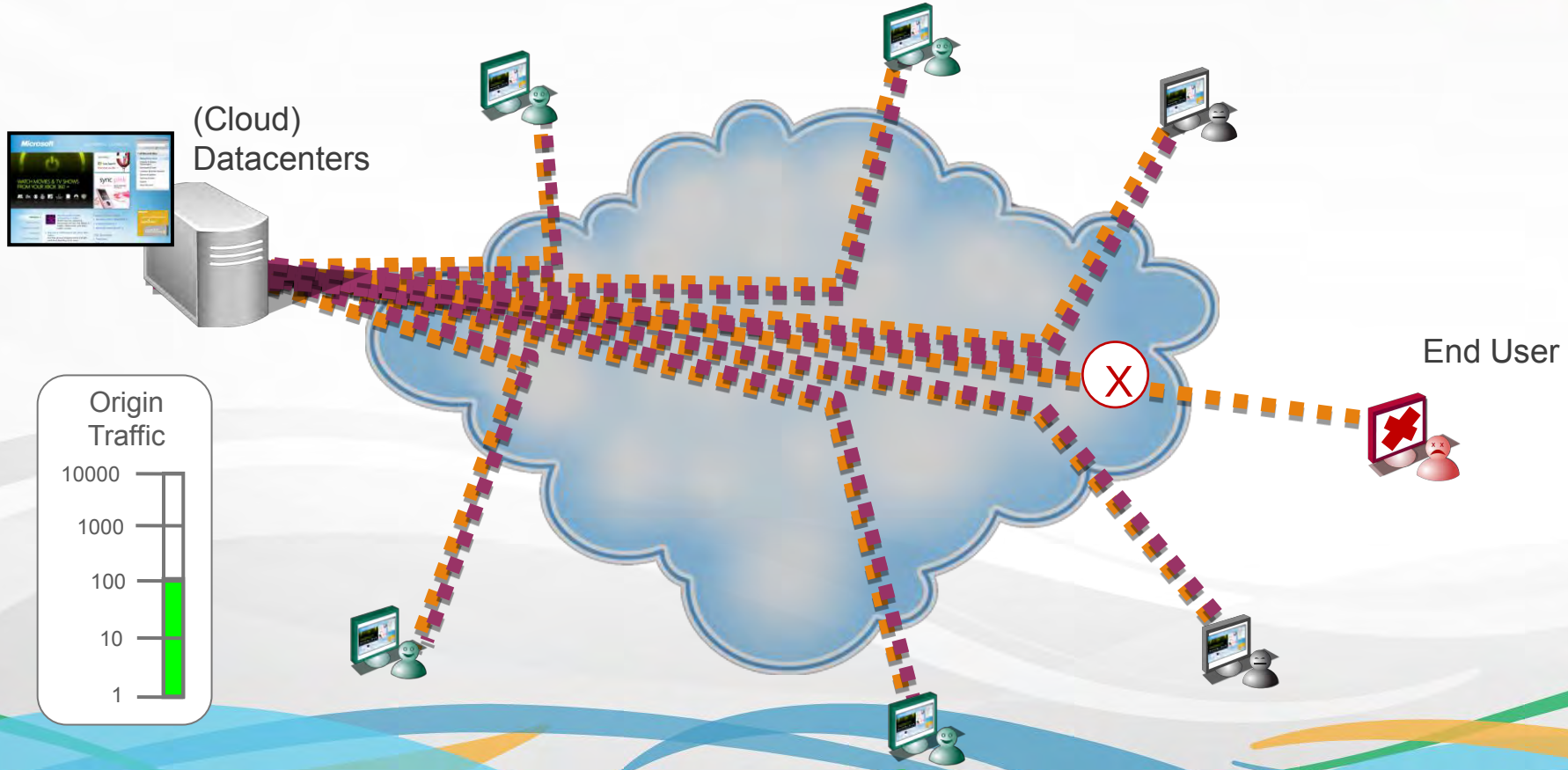
Web Application Without a Perimeter Defense



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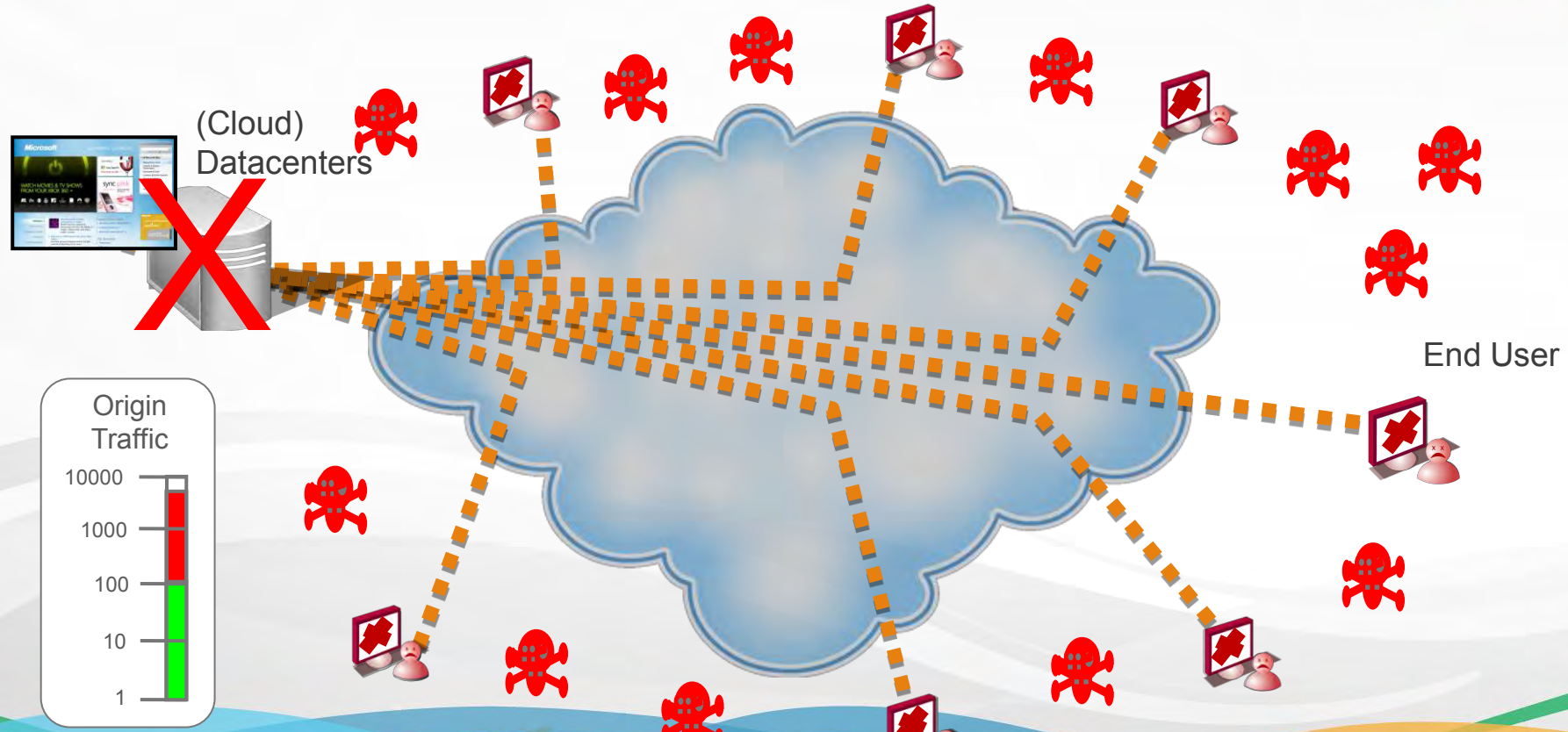
Web Application Without a Perimeter Defense



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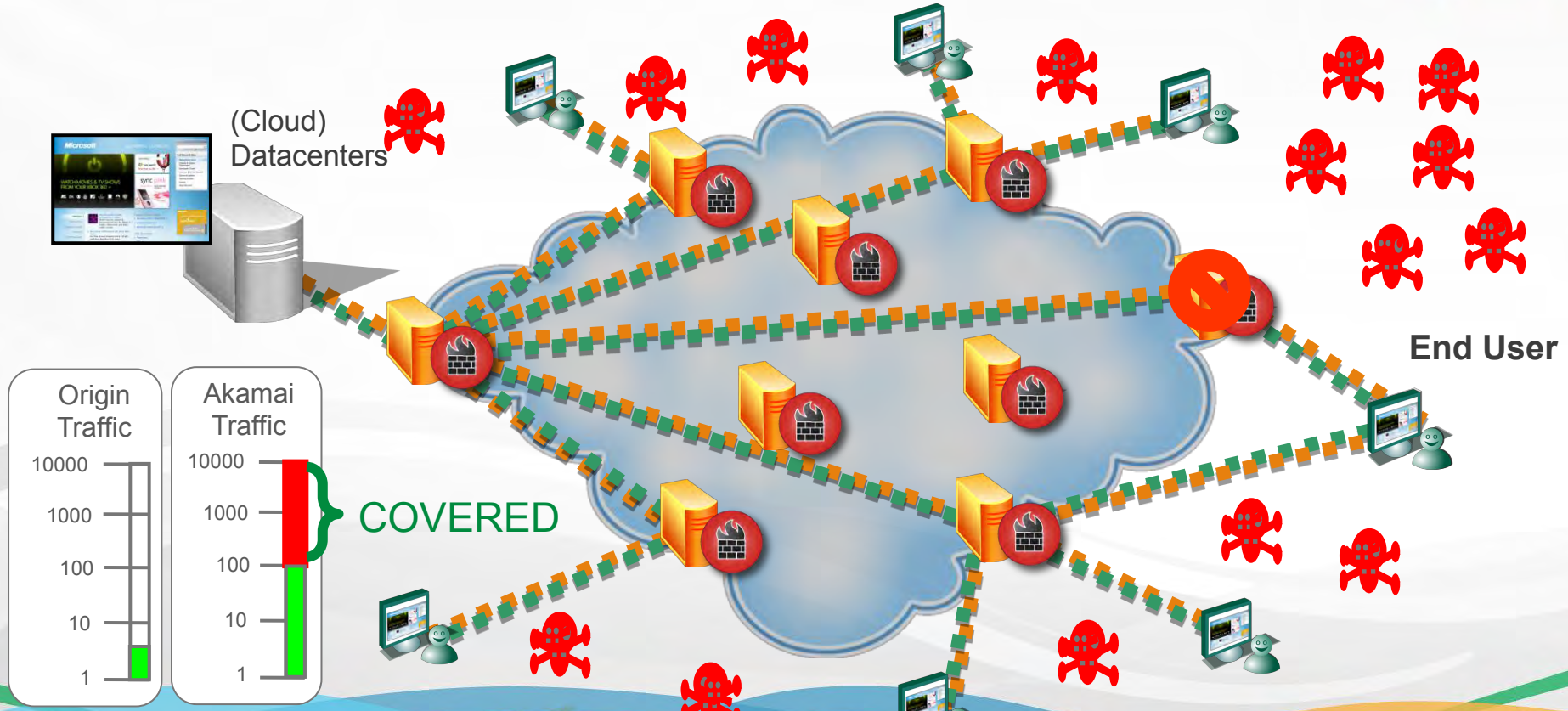
Web Application With a Perimeter Defense



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July 4th – 7th 2009 DDoS Attack

400,000 Korean Bots Attack Key U.S. Government Web Sites

Customer – PROTECTED	Peak Traffic	Times Above Normal Traffic
U.S. Government Customer 1	124 Gbps	598x
U.S. Government Customer 2	32 Gbps	369x
U.S. Government Customer 3	9 Gbps	39x
U.S. Government Customer 4	9 Gbps	19x
U.S. Government Customer 5	2 Gbps	9x
U.S. Government Customer 6	1.9 Gbps	6x
New U.S. Government Customer	0.7 Gbps	SITE DOWN before Akamai

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Next Generation Malicious Threats

(January 2012)

Whitehouse is like Akamai and therefore waste of time

Whitehouse.gov can't down…just hack it

D'you think you'll get whitehouse.gov down?

ddosing a federal government site is like throwing rockets at an army tank

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Attempt to Steal Sensitive Government Data
(Summer 2011)

- FBI advisory to a government agency:

  Intelligence reveals adversaries planning on exploiting Web site vulnerabilities to exfiltrate sensitive data using SQL Injection Vulnerability

- Response:

  Customer deployed a Perimeter Firewall in Deny Mode

- Attack Failed

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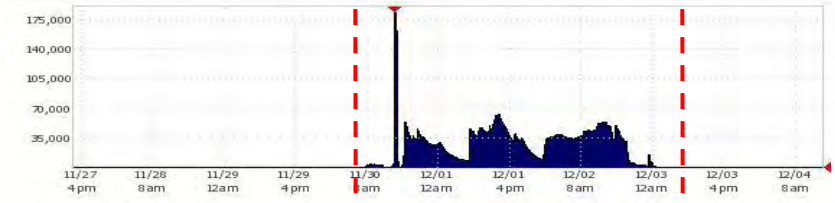
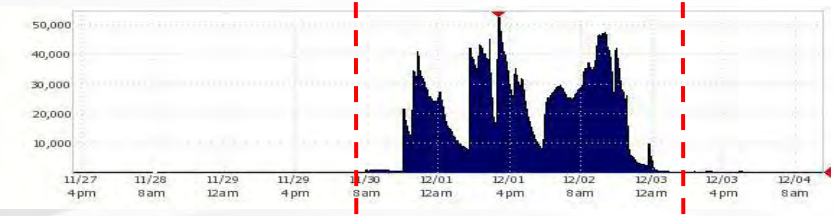
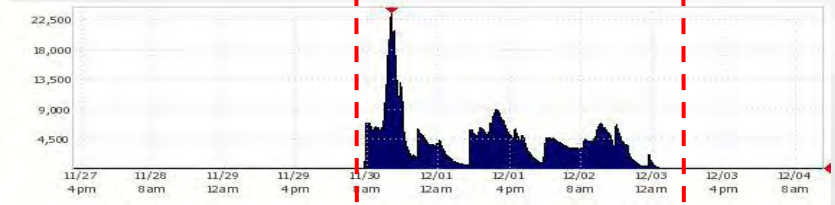
Holiday Season Cyber Extortion DDoS Attacks



Customer 1



Customer 2



Customer 3

Averted $15M in Lost Revenue

PROTECTED	Times Above Normal Traffic	Peak Attack Time (GMT)
US Customer #1	9,095x	11/30 2PM
US Customer #2	5,803x	12/1 2PM
US Customer #3	3,115x	11/30 2PM
US Customer #4	2,874x	12/1 1PM
US Customer #5	1,807x	12/1 1PM

Highly distributed international DDoS attacks from Asia-Pac, South America and Middle East

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One Last Example: Anonymous Announces Operation FoxHunt for November 5, 2011

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What The Infinitive (Anonymous) Hackers Said

Greetings from -The Infinitives-

Alright so as of the past few pastes we have found nothen, no ports are open, they have load

They are a tough nut to crack and some of us are working on it. They were prepared for us it seems because they have a proxy set up all over the country and in Europe so targeting the right IP is a little tricky. There are other Anons working on it but we are trying folks…hang in there.

websites.. [redacted] sites like that and see if u find anything.. we will scan the other redirects and try to find somethign but for the mean time we just need to wait and see what pops up..

but lets not give up!

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What One Experienced Attacker Said…

(1 day ago) Spam

I and other reliable anons hit [redacted] with HTTP/UDP/TCP/SYN attacks all night last night yet it wasn't enough. I and a few of us only noticed a little lagtime in [redacted] site but that was it. i am disappointed that this was an epic fail and it is embarrassing because it makes Anonymous seem phony. I know what some of us actually did do and I can stand by my own words. I am considering quitting this Anon bull**** . I did this because as a 9-11 1st responder, I wanted to exact revenge on the very system that let me down and turned its back on me.

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Q&A

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