RSAConference2015

San Francisco | April 20-24 | Moscone Center

CHANGE

Challenge today's security thinking

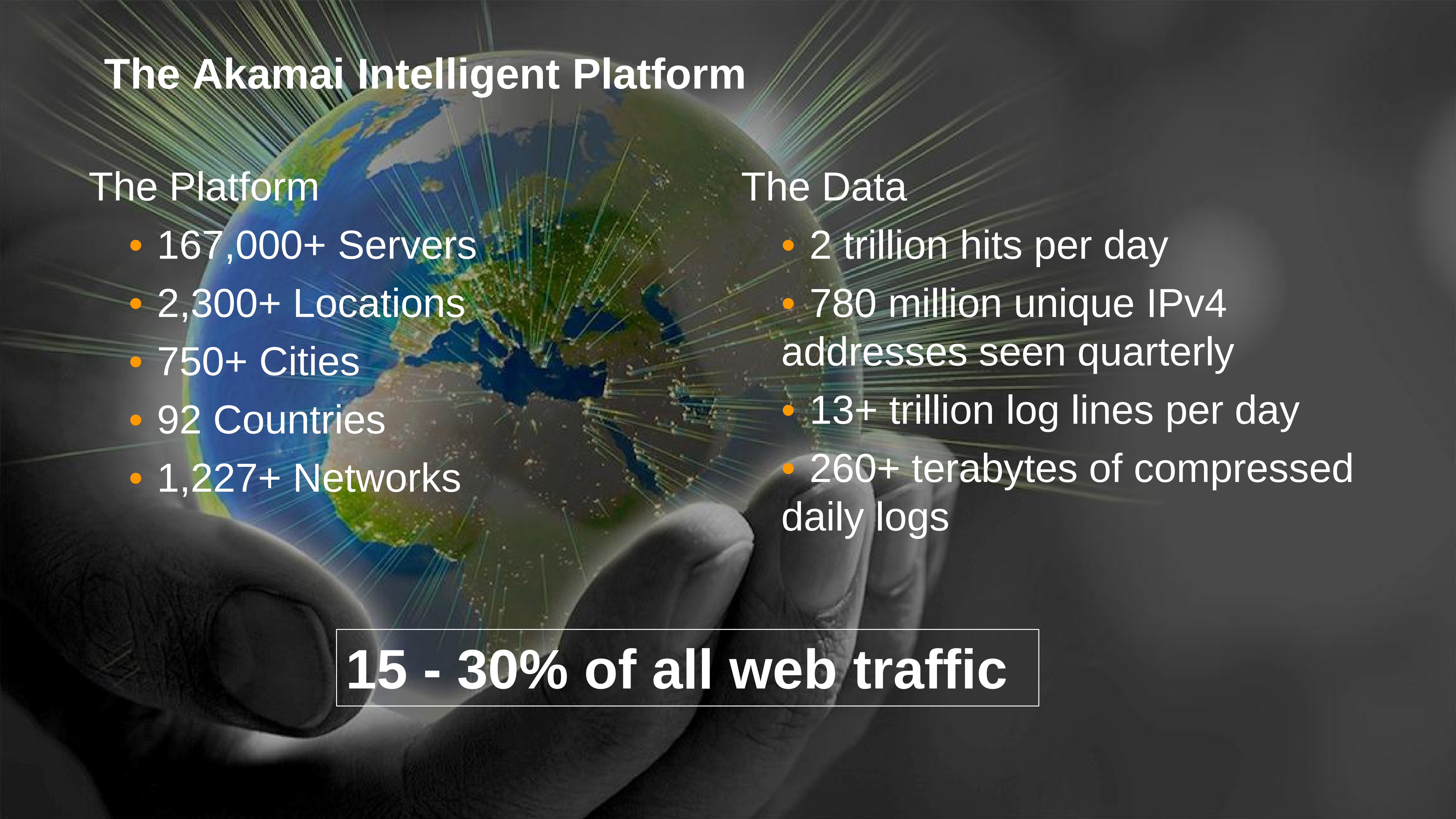
SESSION ID: SPO2-W04

Rise of the Machines: An Internet-Wide Analysis of Web Bots in 2014

John Summers

VP, Security Products

Akamai



The Akamai Intelligent Platform

The Platform

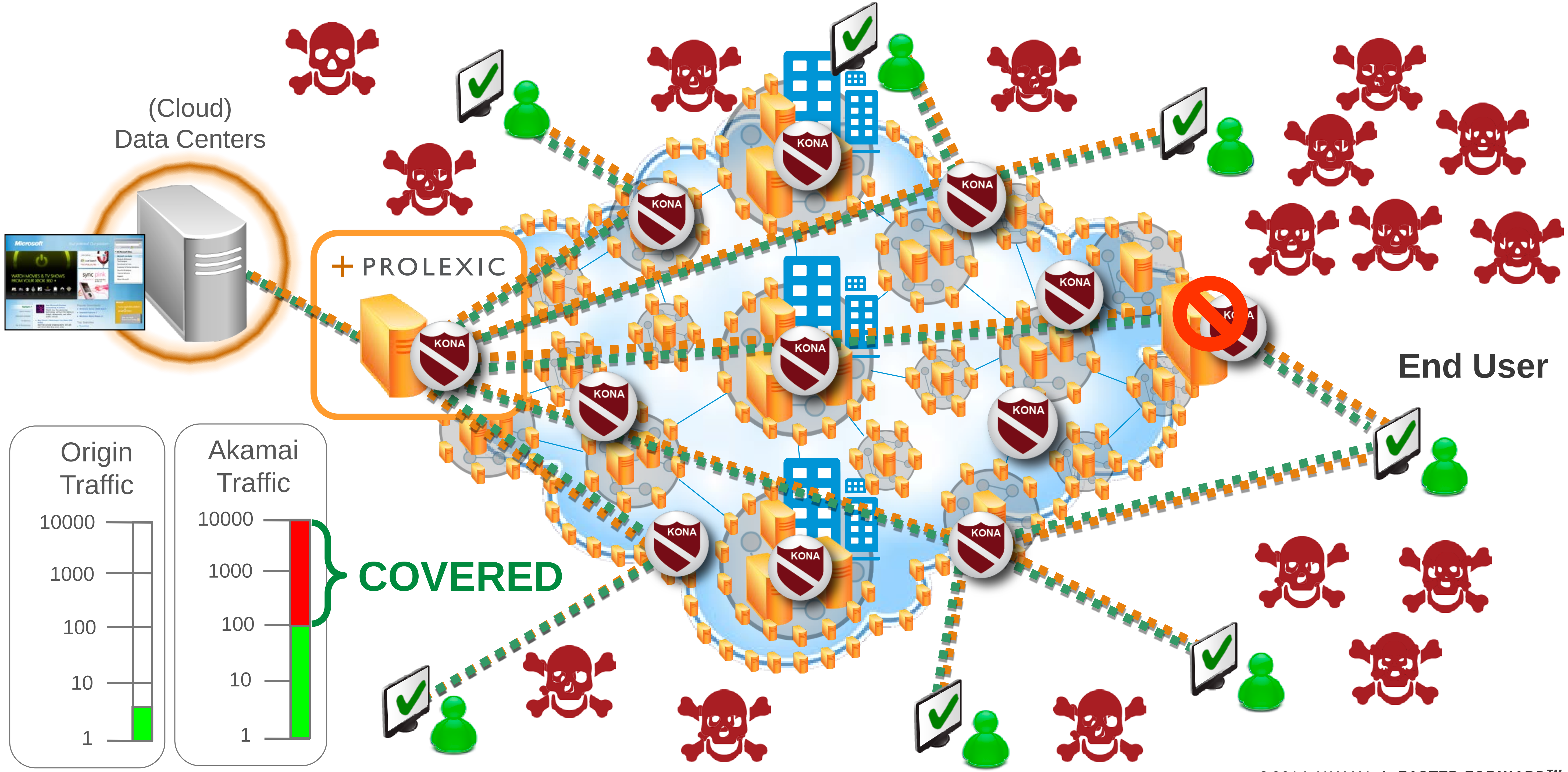
- 167,000+ Servers
- 2,300+ Locations
- 750+ Cities
- 92 Countries
- 1,227+ Networks

The Data

- 2 trillion hits per day
- 780 million unique IPv4 addresses seen quarterly
- 13+ trillion log lines per day
- 260+ terabytes of compressed daily logs

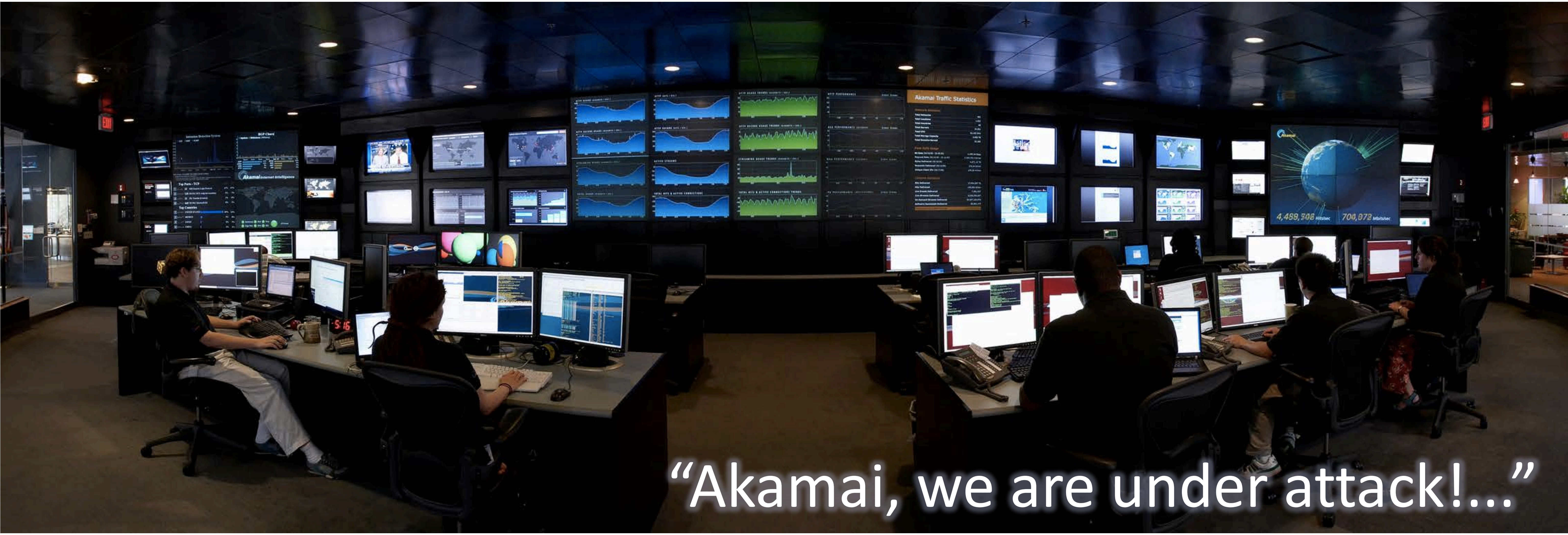
15 - 30% of all web traffic

The Akamai Solution – Kona Site Defender + Prolexic



Leveraging Big Data to Understand Attackers

The following slides are based on a real events on January 5th 2014….

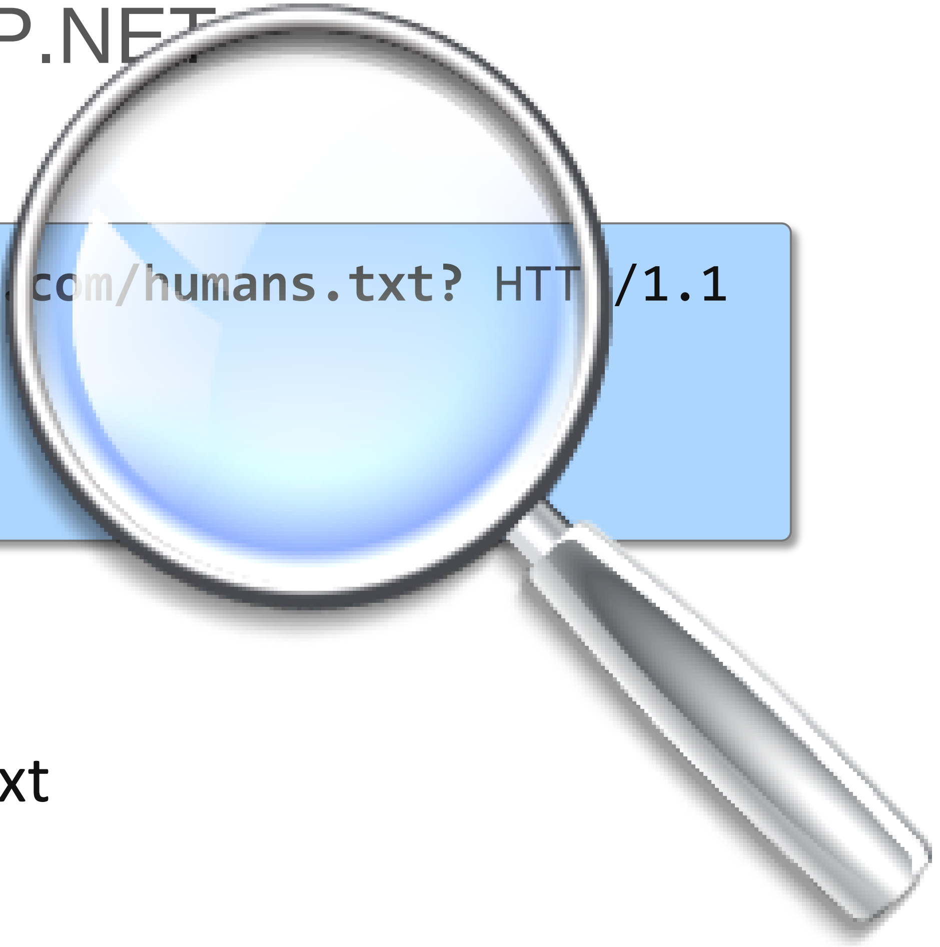


"Akamai, we are under attack!…"

Ad-Hoc Attack Analysis

An attempt to exploit an old (2007) WordPress Remote File Inclusion vulnerability. The victim application was running ASP.NET

```
GET /wp-content/wordtube-button.php?wpPATH=http://www.google.com/humans.txt? HTTP/1.1
Host: www.vulnerable.site
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_8_4)
```

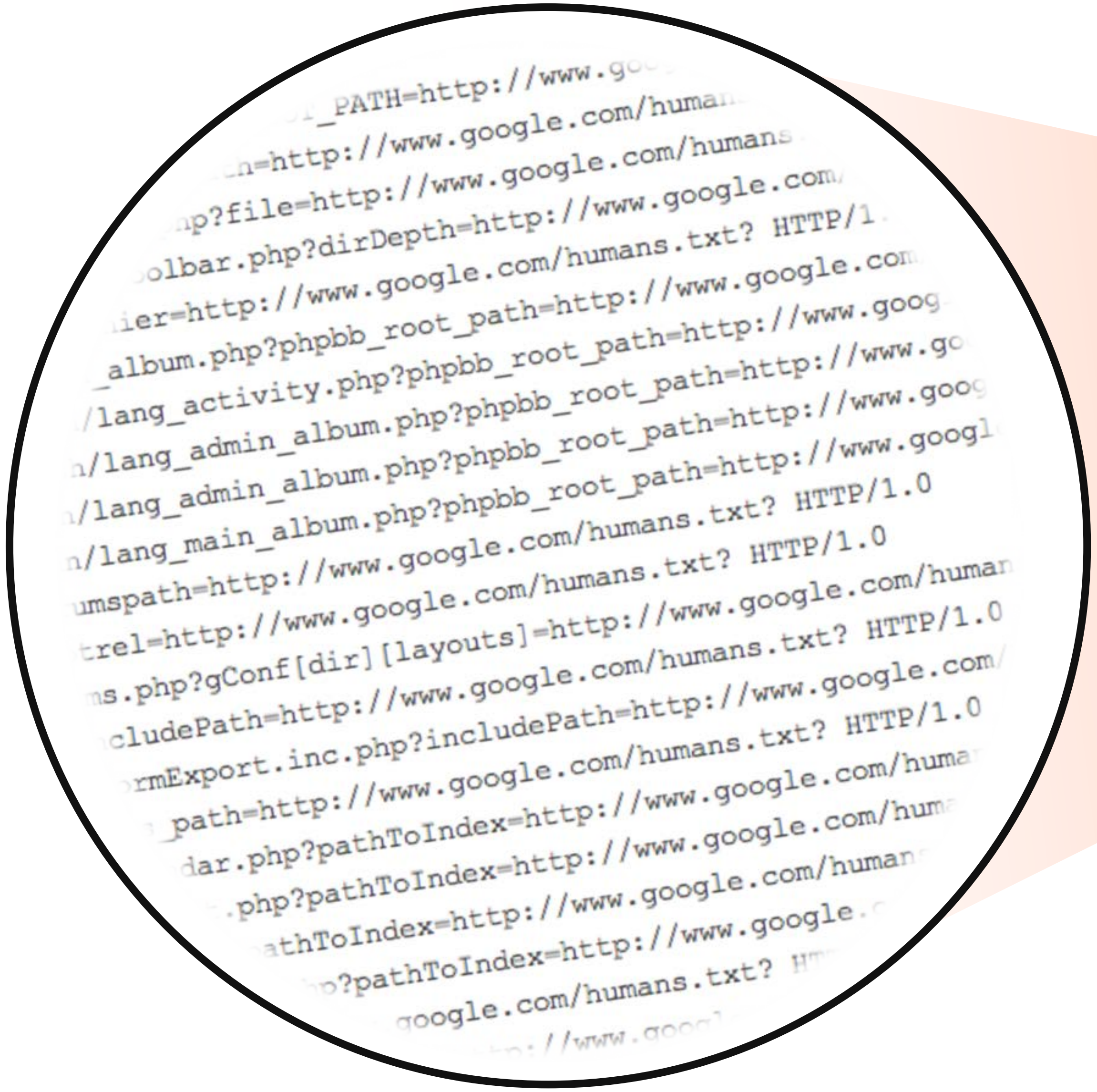


Attacked parameter : wpPATH

Malicious payload: http://www.google.com/humans.txt

What Else Did This Attacker Do On This Site?

Same attacker Sent 2122 different RFI exploit attempts



```
_PATH=http://www.go
h=http://www.google.com/human
p?file=http://www.google.com/humans
olbar.php?dirDepth=http://www.google.com/
ier=http://www.google.com/humans.txt? HTTP/1
_album.php?phpbb_root_path=http://www.google.com
/lang_activity.php?phpbb_root_path=http://www.goog
n/lang_admin_album.php?phpbb_root_path=http://www.go
/lang_admin_album.php?phpbb_root_path=http://www.goog
n/lang_main_album.php?phpbb_root_path=http://www.googl
umspath=http://www.google.com/humans.txt? HTTP/1.0
trel=http://www.google.com/humans.txt? HTTP/1.0
ns.php?gConf[dir][layouts]=http://www.google.com/human
cludePath=http://www.google.com/humans.txt? HTTP/1.0
rmExport.inc.php?includePath=http://www.google.com/
_path=http://www.google.com/humans.txt? HTTP/1.0
dar.php?pathToIndex=http://www.google.com/huma
.php?pathToIndex=http://www.google.com/hum
athToIndex=http://www.google.com/human
p?pathToIndex=http://www.google.
google.com/humans.txt? HT
//www.goo
```

34 different sites were attacked by the same attacker with a total of 24,301 attacks

Welcome to Facebook - Log In, Si...
Altoro Mutual
Gmail: Email from Google
Altoro Mutual
Akamai Technologies Web Login
wired.com
Layered web browser - Google S...
Debuggex: The online visual reg...
Debuggex: The online visual reg...
PHP: Manual Quick Reference
חדשות, ידיעות מהארץ והעולם - עית...
Add More Top Sites in Safari 7: A...
Apple - Start
iCloud
Twitter
Wikipedia, the free encyclopedia
Yahoo
Technology News & Computers,...
Amazon.com: Online Shopping fo...
BBC - Homepa...
דיסני. הבית של הסדרות, הסרטים, ה...
CNN.com International - Breakin...
Electronics, Cars, Fashion, Collec...

Was There Similar Activity Going On At The Same Time?

Attacks originated from a botnet containing 272 attacking machines

1696 victim applications were targeted

1,358,980 attacks were launched during the campaign

The campaign lasted for 2 weeks

Security Big Data at Akamai: Cloud Security Intelligence

20 Terabytes of daily attack data

2 Petabytes of security data stored

Up to 90 days retention

600K log lines/sec. indexed by 30 dimensions

8000 queries daily scanning terabytes of data

Benefits

Unrivaled Web Security visibility

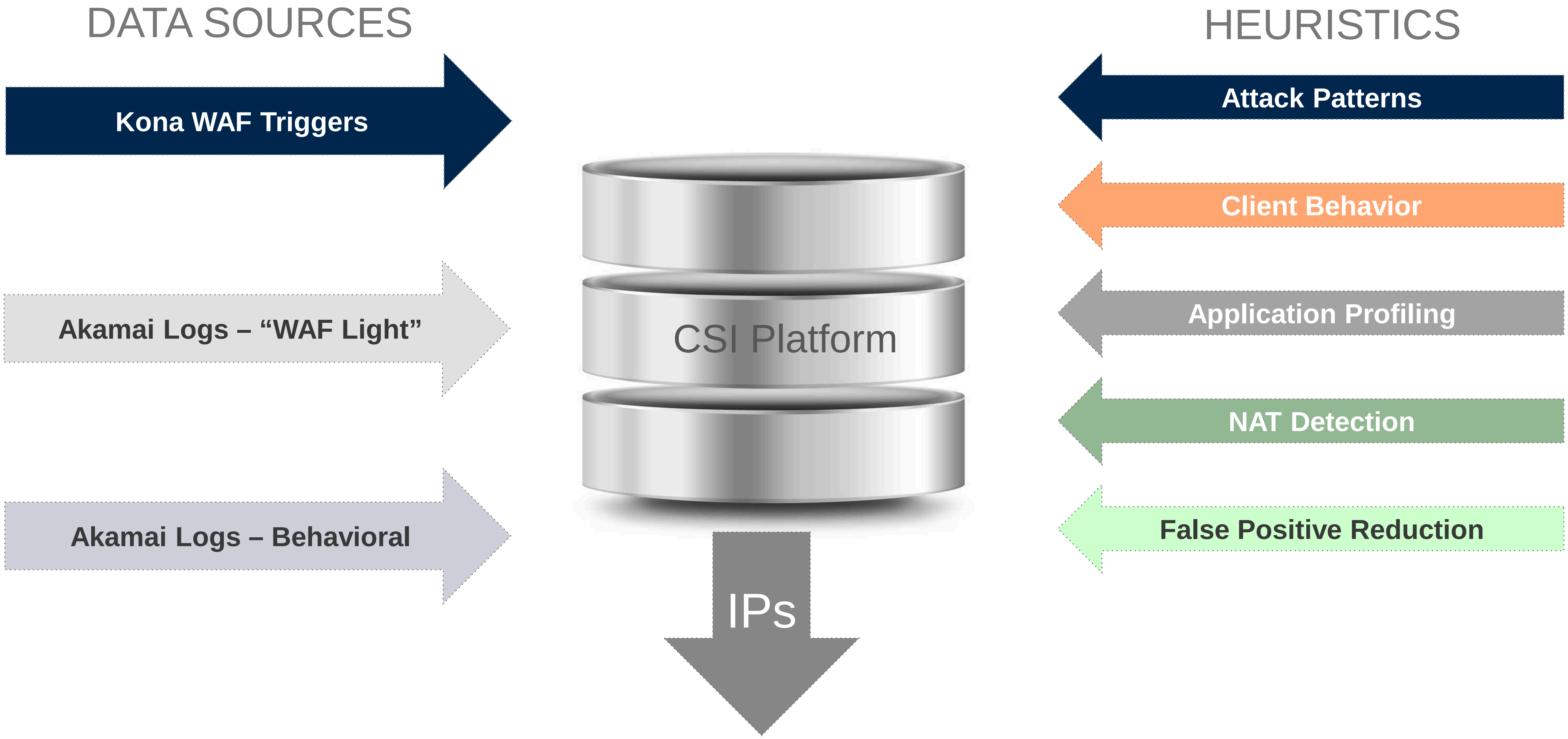
- Perform WAF accuracy analysis on any customer at any time
- Detect new attacks, including 0-day and quickly issue new protections

- A powerful web security research tool

- Improve WAF Accuracy

- Behavioral analytics platform

Behavioral Analytics & the Akamai Intelligent Platform



DATA SOURCES

HEURISTICS

Kona WAF Triggers

Akamai Logs – “WAF Light”

Akamai Logs – Behavioral

CSI Platform

IPs

Attack Patterns

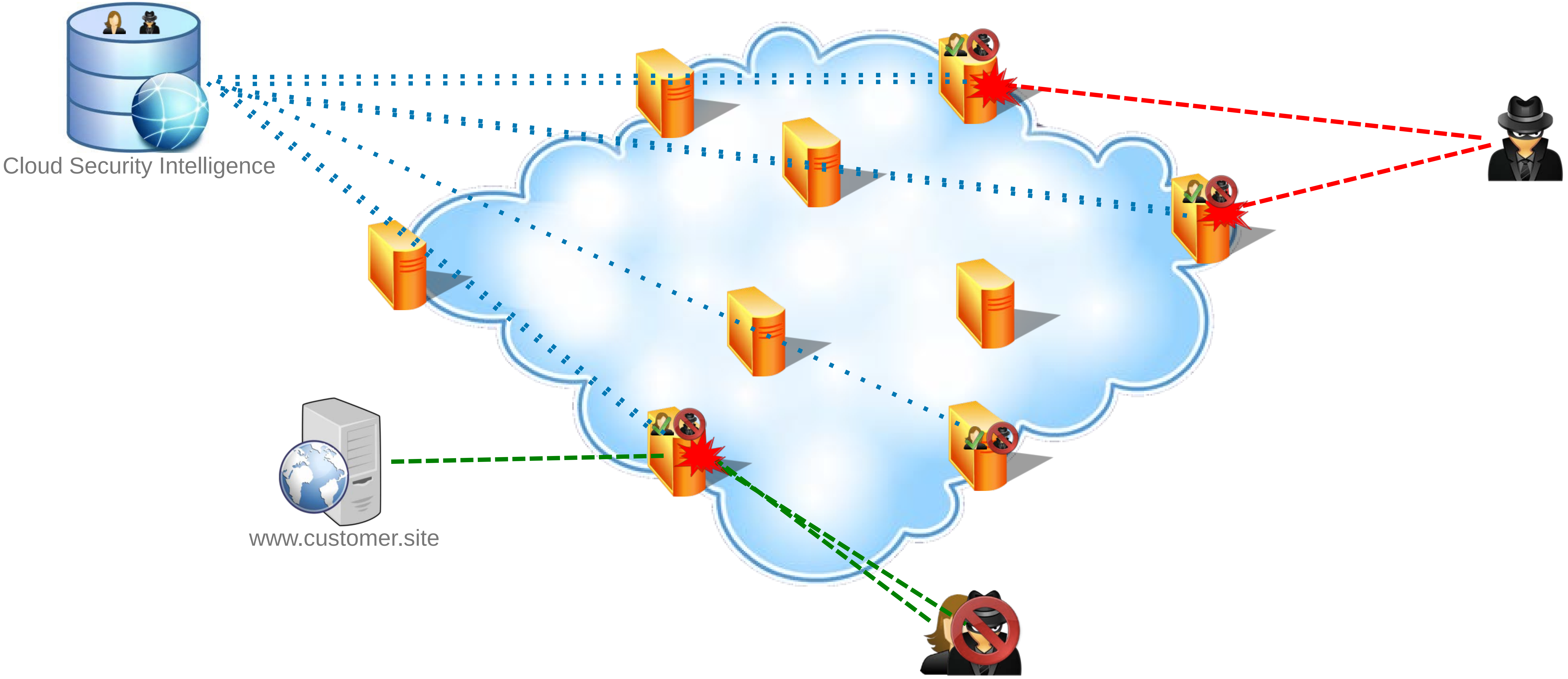
Client Behavior

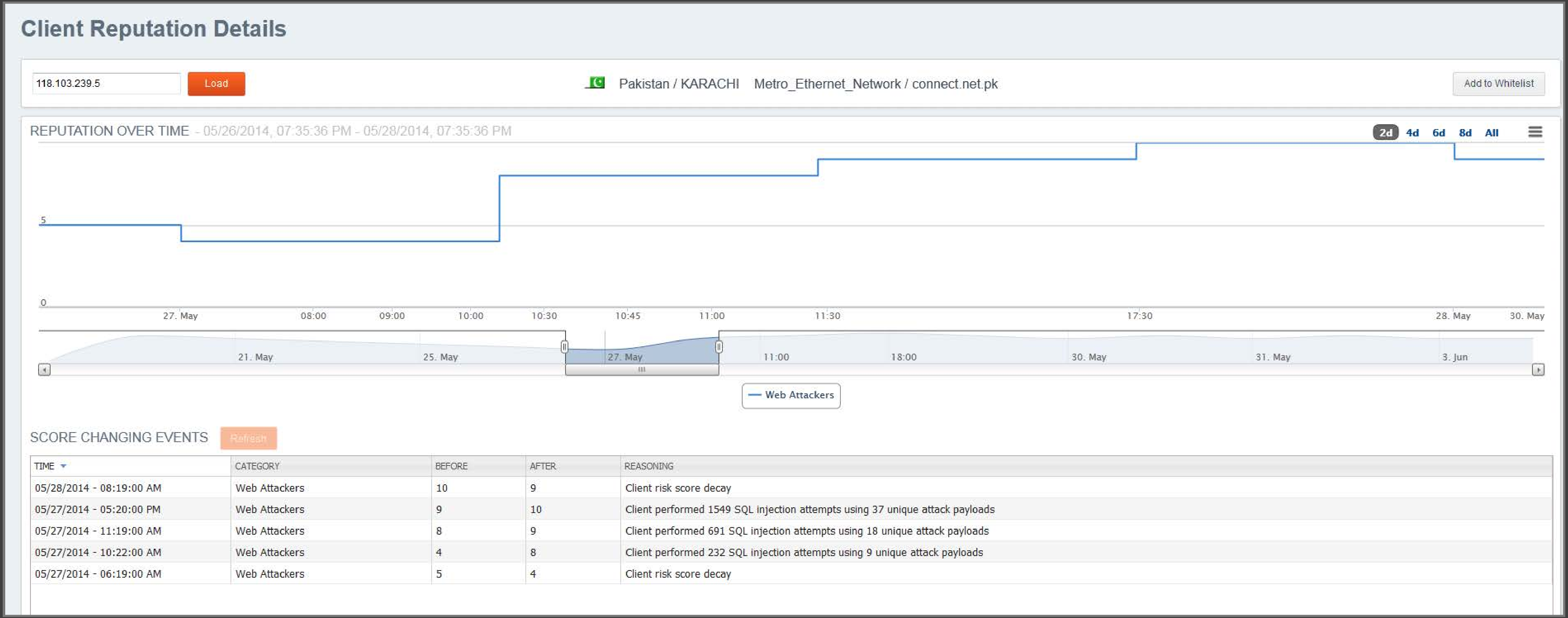
Application Profiling

NAT Detection

False Positive Reduction

Proactive Security using Behavioral Analytics





Client Reputation Details

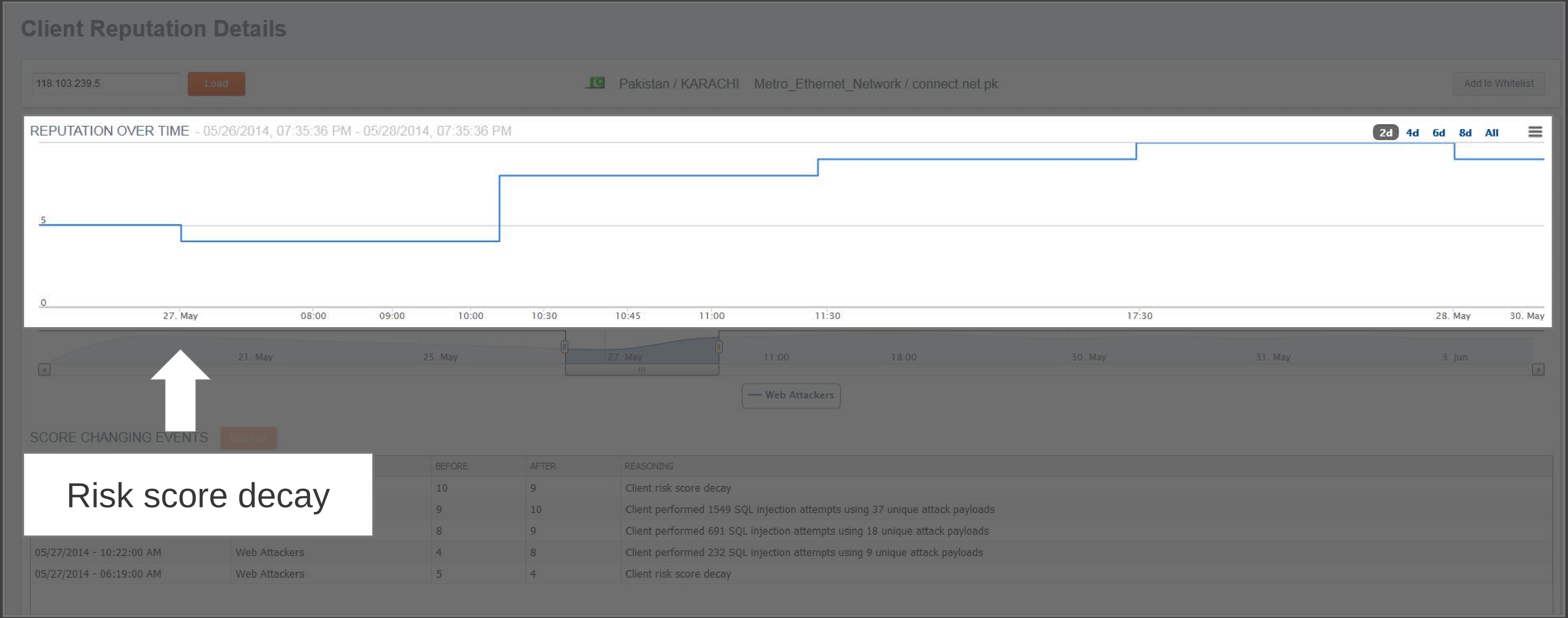
118.103.239.5

Pakistan / KARACHI Metro_Ethernet_Network / connect.net.pk

REPUTATION OVER TIME - 05/26/2014, 07:35:36 PM - 05/28/2014, 07:35:36 PM

SCORE CHANGING EVENTS

TIME	CATEGORY	BEFORE	AFTER	REASONING
05/28/2014 - 08:19:00 AM	Web Attackers	10	9	Client risk score decay
05/27/2014 - 05:20:00 PM	Web Attackers	9	10	Client performed 1549 SQL injection attempts using 37 unique attack payloads
05/27/2014 - 11:19:00 AM	Web Attackers	8	9	Client performed 691 SQL injection attempts using 18 unique attack payloads
05/27/2014 - 10:22:00 AM	Web Attackers	4	8	Client performed 232 SQL injection attempts using 9 unique attack payloads
05/27/2014 - 06:19:00 AM	Web Attackers	5	4	Client risk score decay



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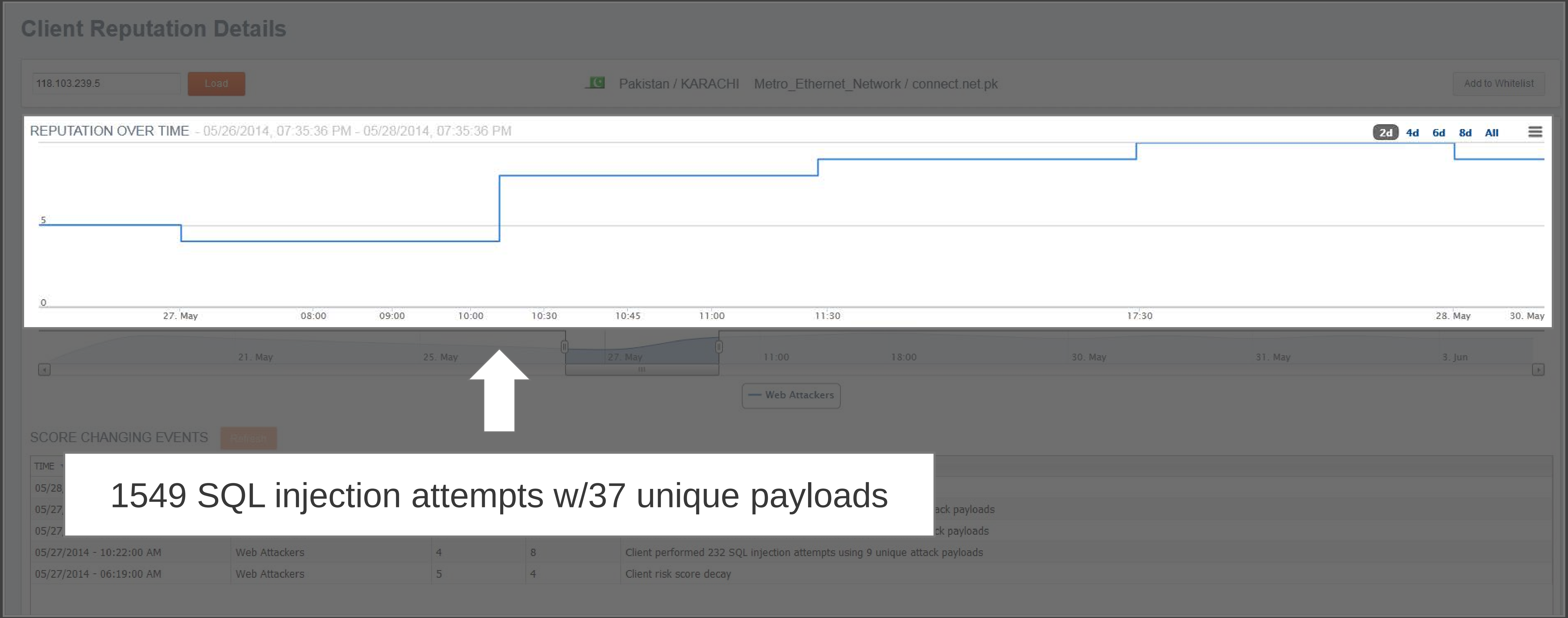
Risk score decay



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05/27				ck payloads
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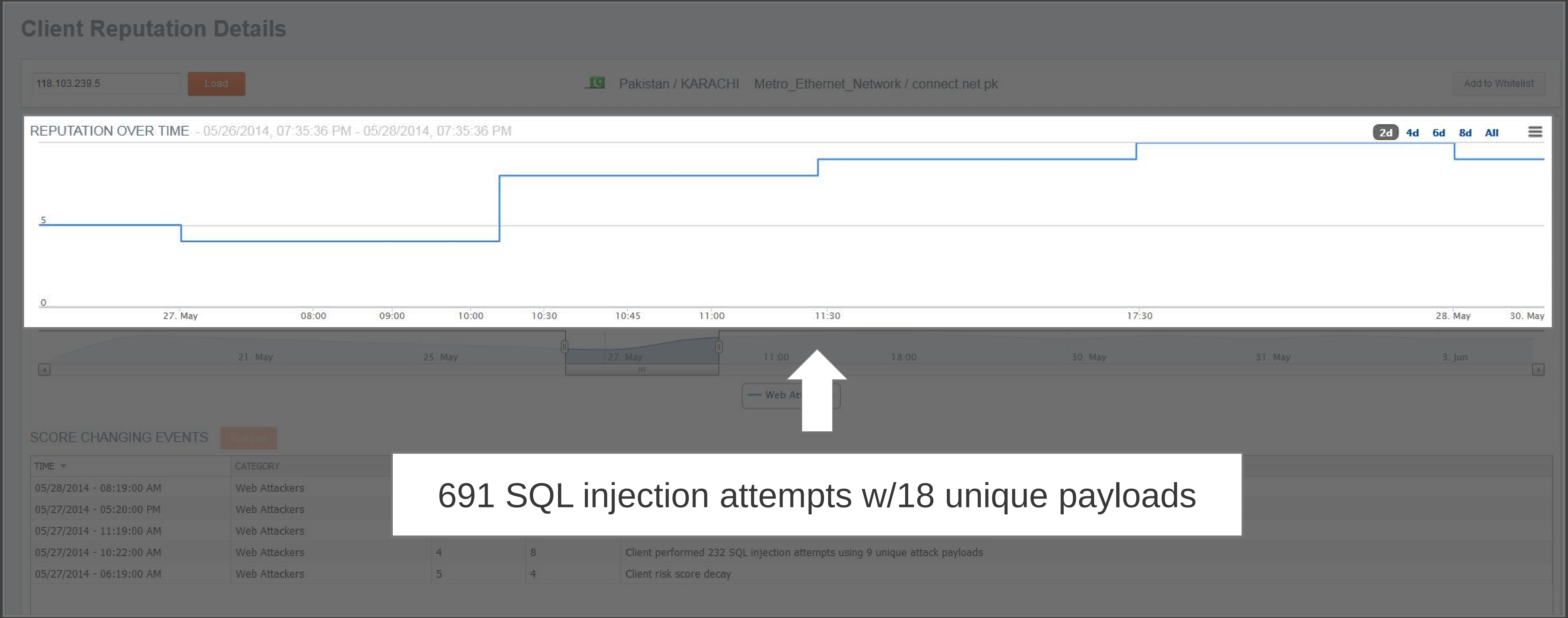
1549 SQL injection attempts w/37 unique payloads



Client Reputation Details

118.103.239.5 Load

Pakistan / KARACHI Metro_Ethernet_Network / connect.net.pk

Add to Whitelist

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SCORE CHANGING EVENTS Refresh

TIME	CATEGORY			
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05/27/2014 - 05:20:00 PM	Web Attackers			
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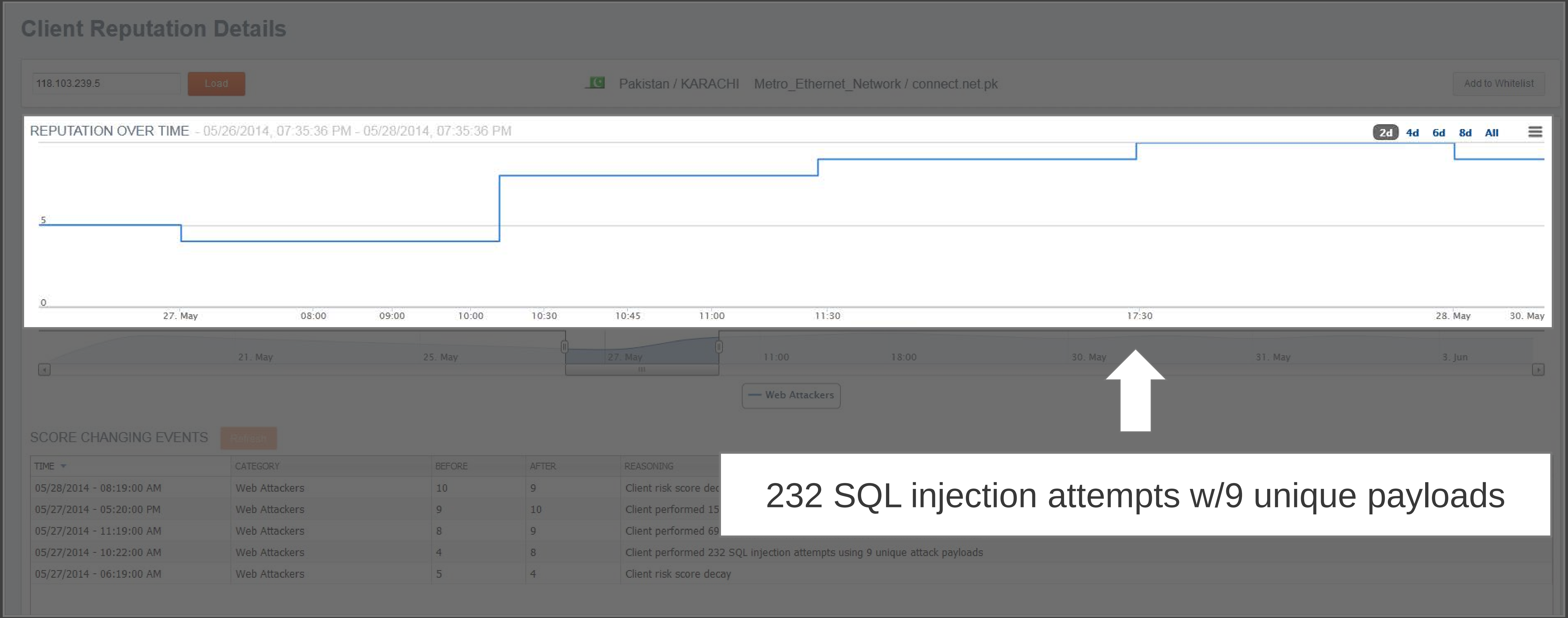
691 SQL injection attempts w/18 unique payloads



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05/27/2014 - 10:22:00 AM	Web Attackers	4	8	Client performed 232 SQL injection attempts using 9 unique attack payloads
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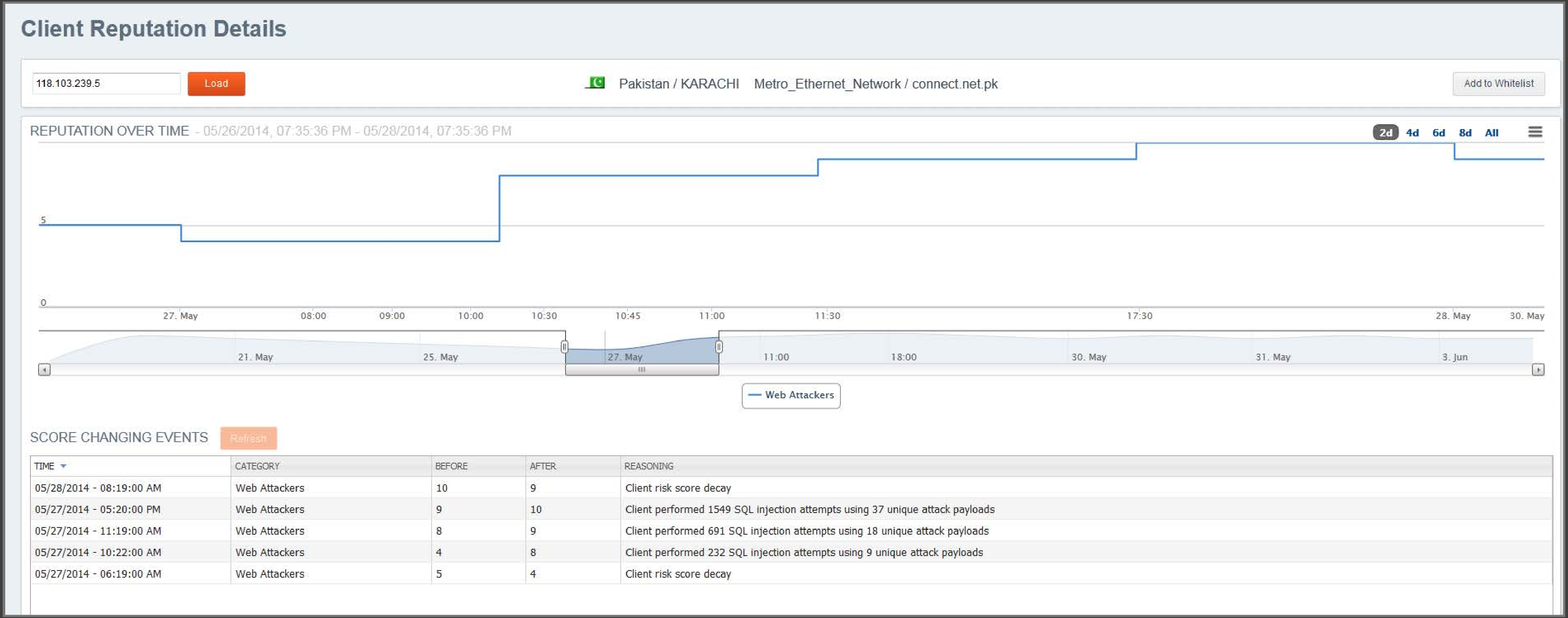
232 SQL injection attempts w/9 unique payloads



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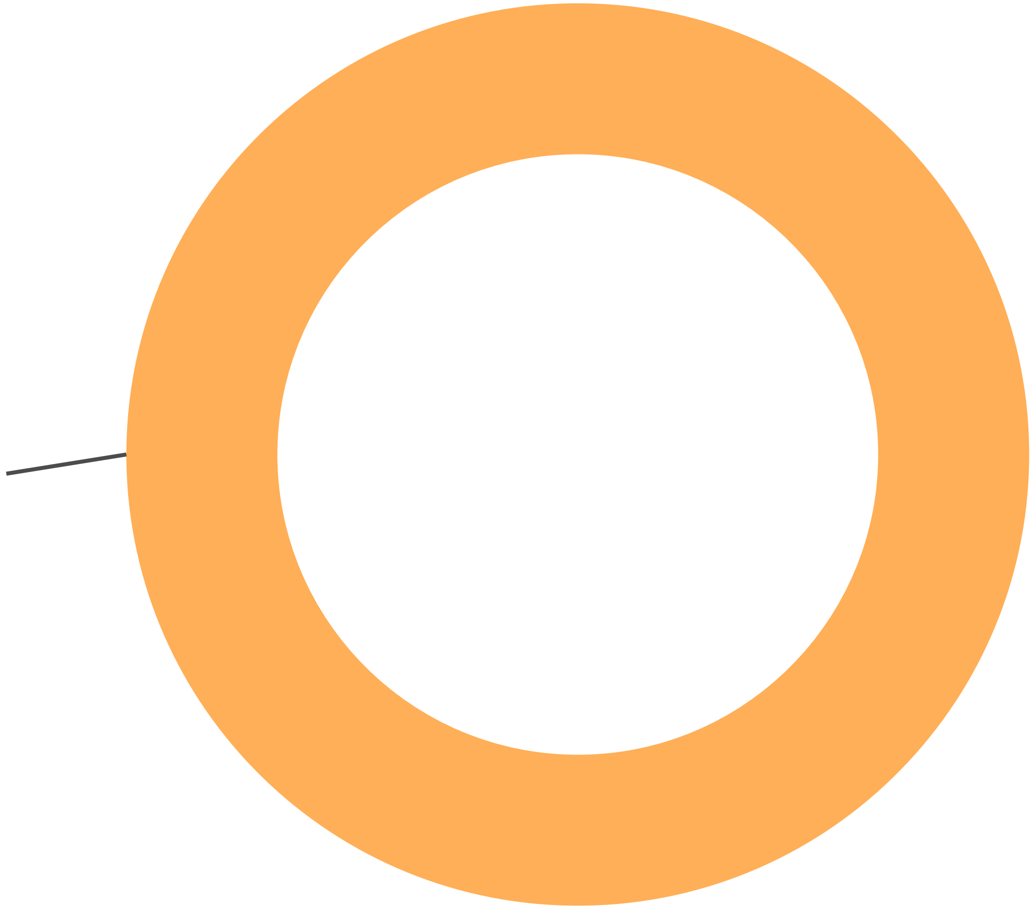
Bots on the Akamai Platform



8.01 BILLION

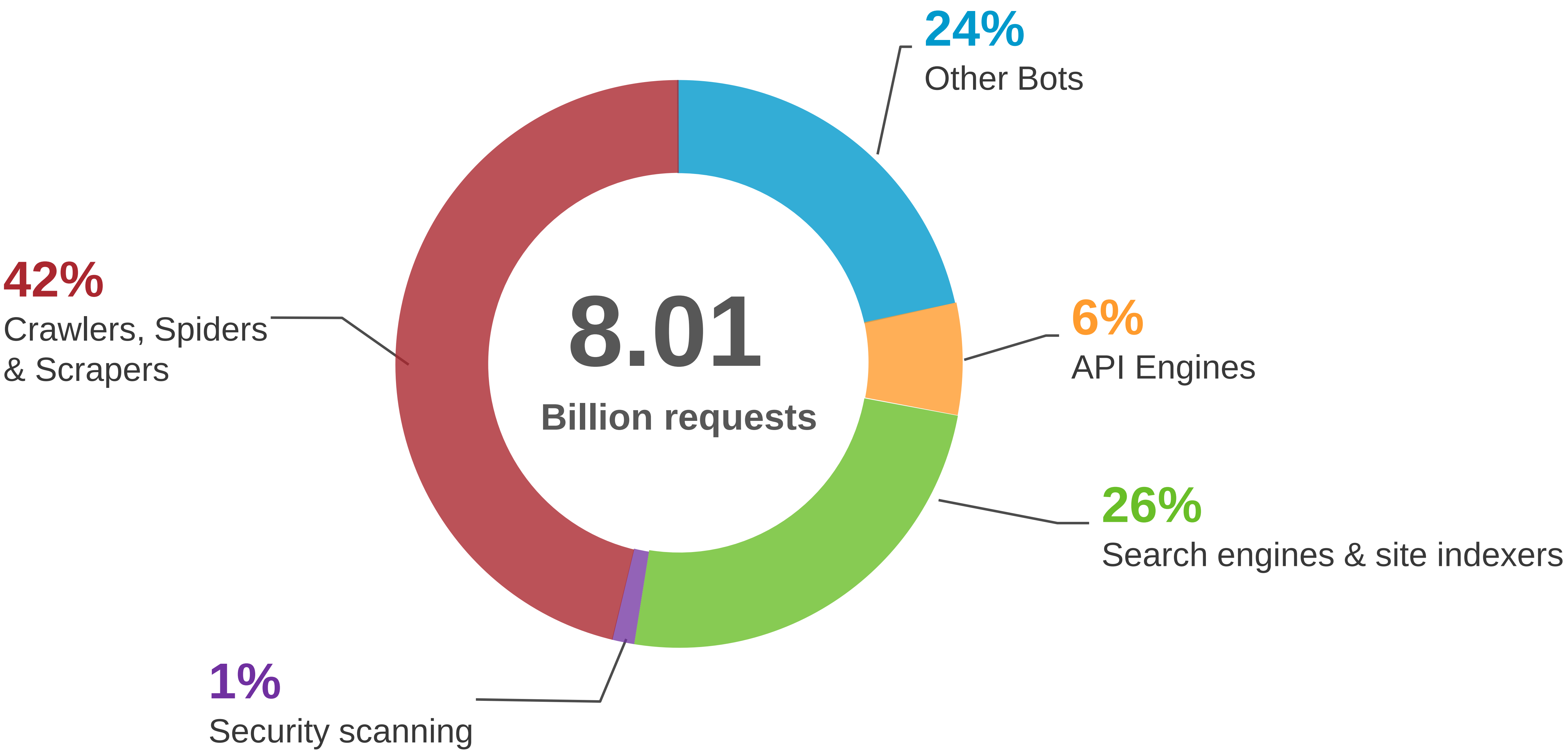
Bot requests in 24-hours

Data Collected
April 1-2, 2015

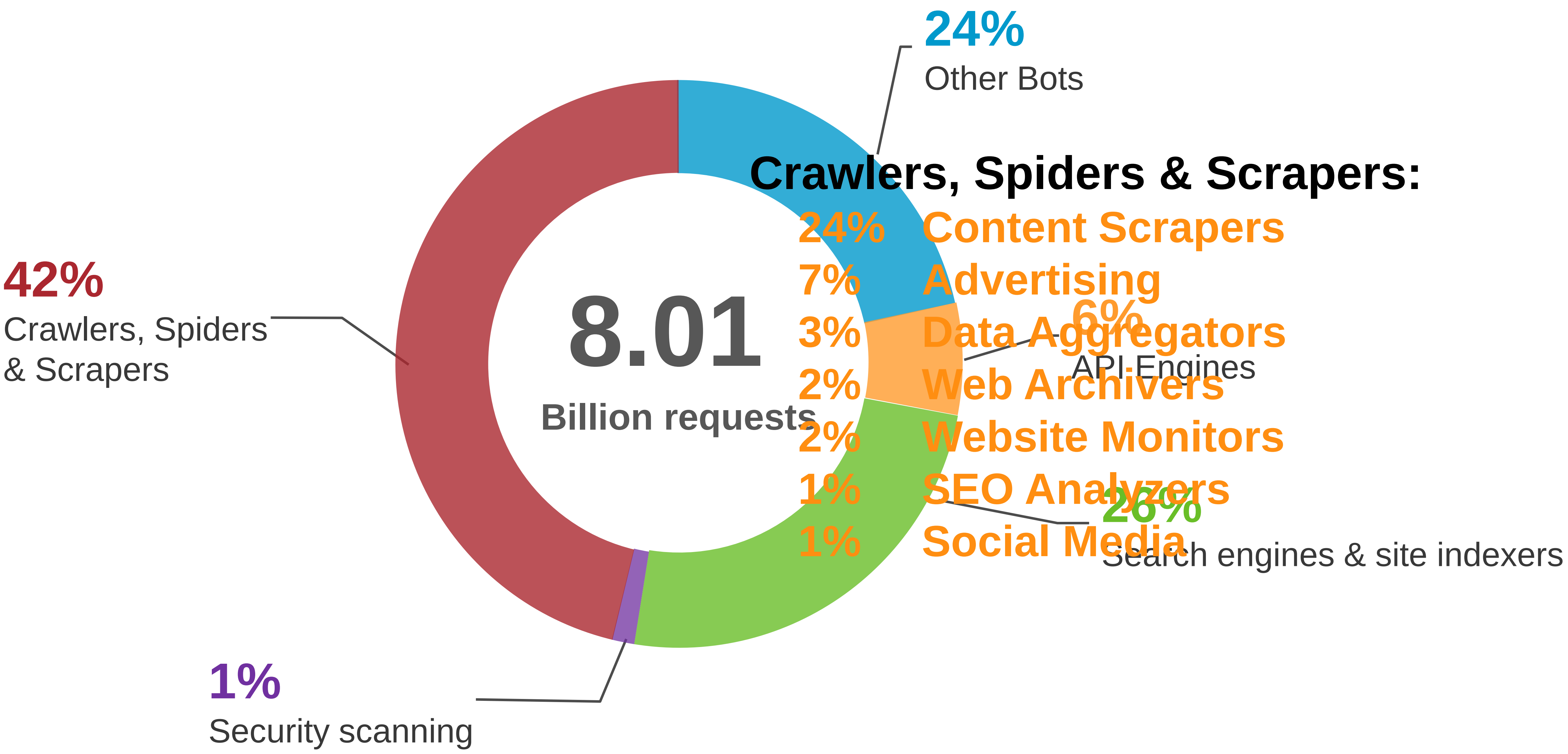
Total Requests:
85,475,034,620

Bots were 9.4% of all requests

Bots on the Akamai Platform



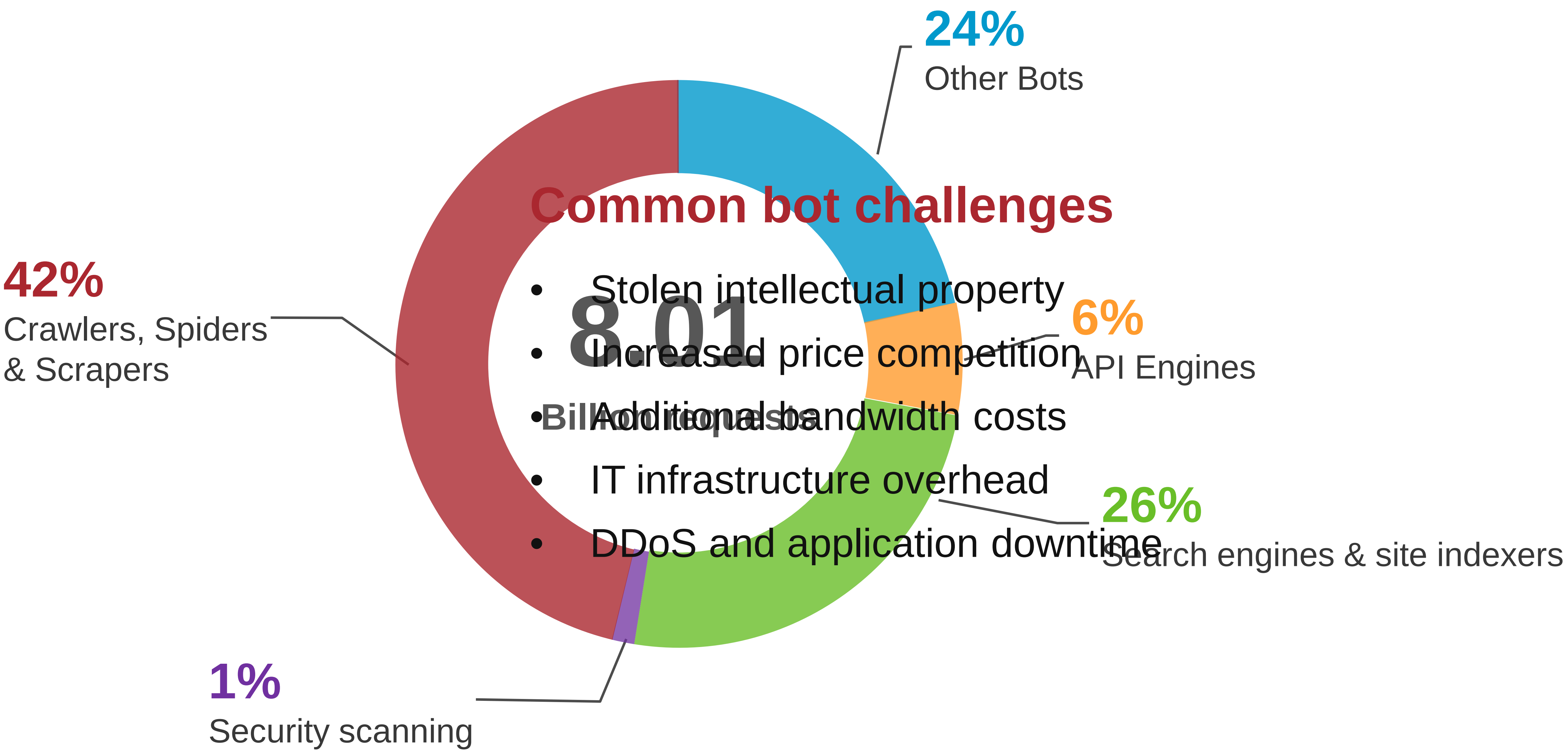
Bots on the Akamai Platform



Crawlers, Spiders & Scrapers:

24%	Content Scrapers
7%	Advertising
3%	Data Aggregators
2%	Web Archivers
2%	Website Monitors
1%	SEO Analyzers
1%	Social Media

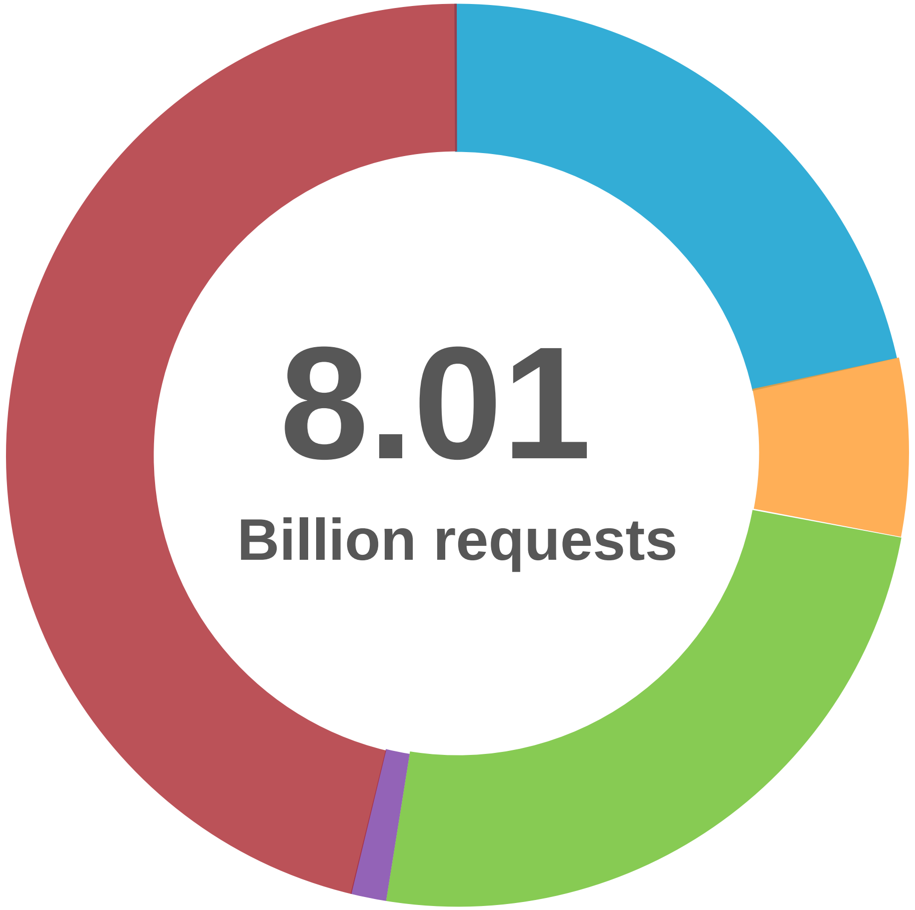
Bots – The Akamai Viewpoint



Common bot challenges

- Stolen intellectual property
- Increased price competition
- Additional bandwidth costs
- IT infrastructure overhead
- DDoS and application downtime

Bots – The Akamai Viewpoint



Bot management needs

- Bot detection and identification
- Advanced bot responses
- Report on bot activity and mitigations applied
- Policies to enable business-level protection

A Year in the Life of a Botnet

In January 2014 we published a blog on a global botnet:

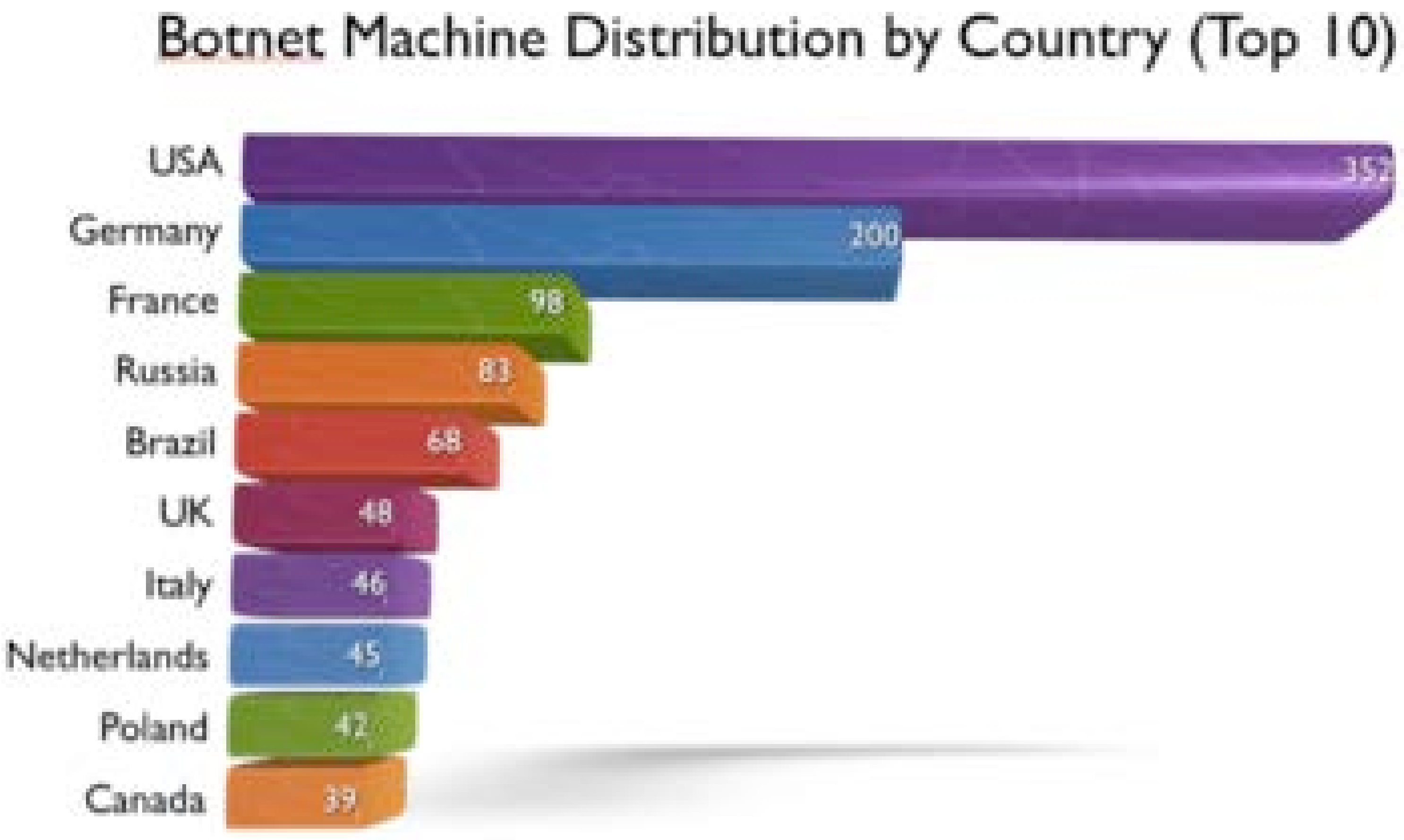
- https://blogs.akamai.com/2014/01/analyzing-a-malicious-botnet-attack-campaign-through-the-security-big-data-prism.html

Exploiting Joomla Content Editor vulnerability to install backdoors

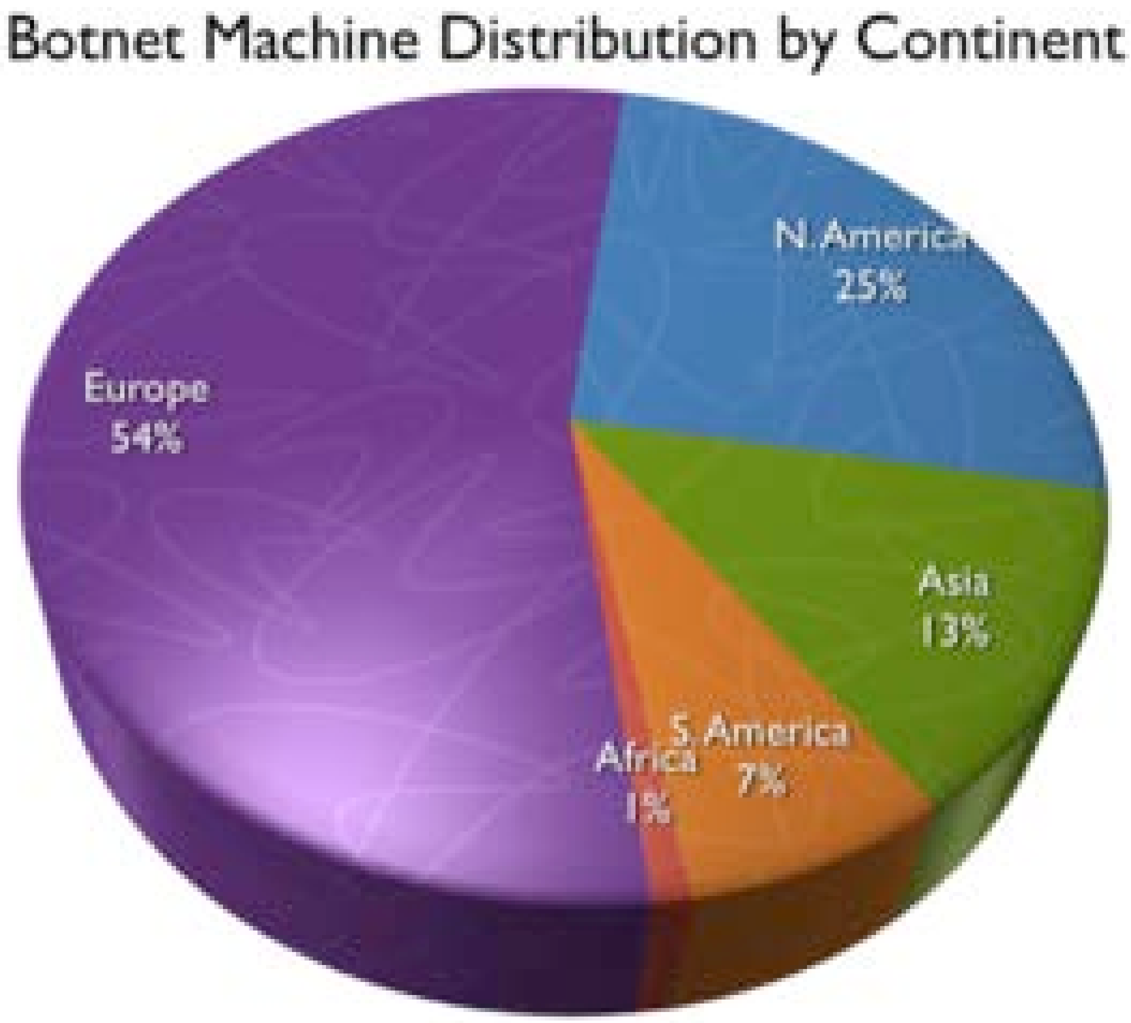
Began as a “single event” analysis of the exploit

“Zoomed out” and discovered an entire botnet mining the web for vulnerable Joomla servers

A Truly Global Botnet



Botnet Machine Distribution by Country (Top 10)

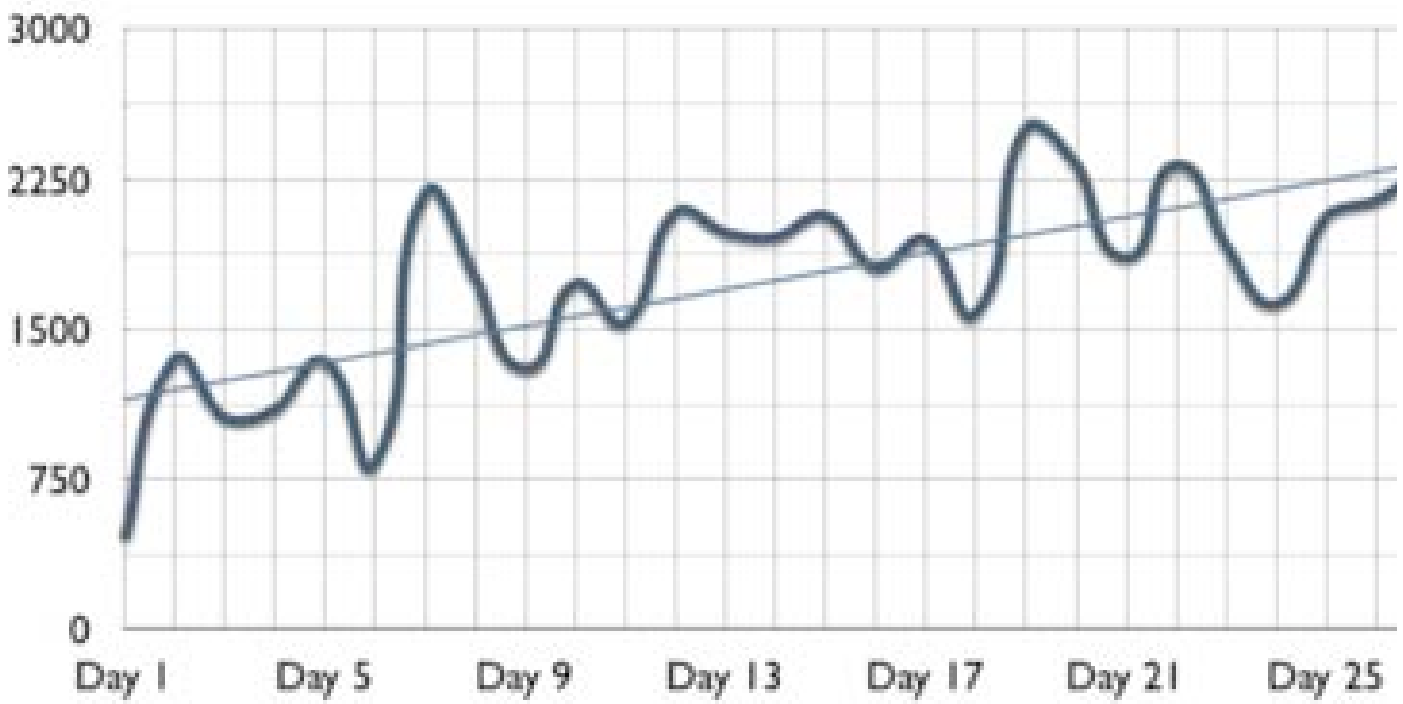


Botnet Machine Distribution by Continent

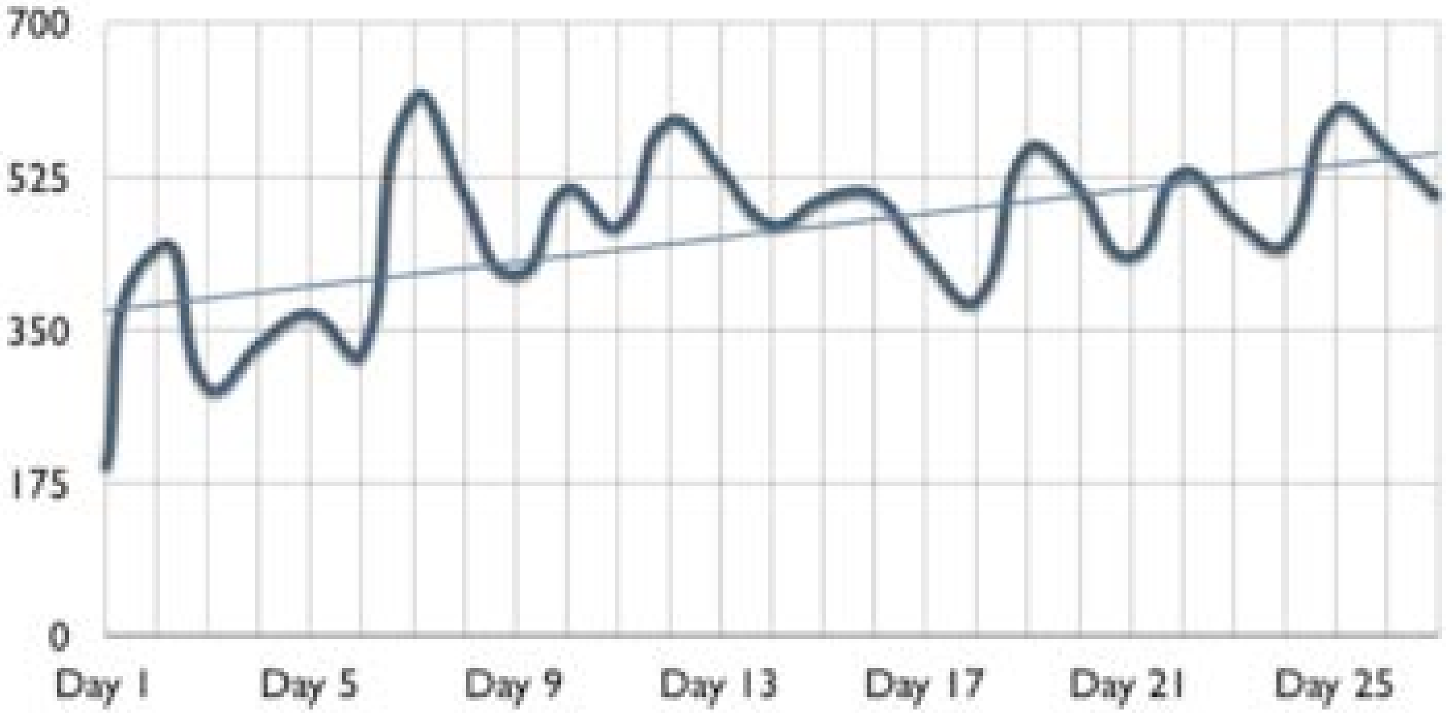
And a Very Active Botnet

- 43,000 malicious HTTP requests seen over the month
- 2008 different web applications were targeted

Number of Attacks Per Day



Number of Targets Per Day



10 months later, the Botnet lives on…

In Nov. 2014, the team began a 3 month follow on analysis

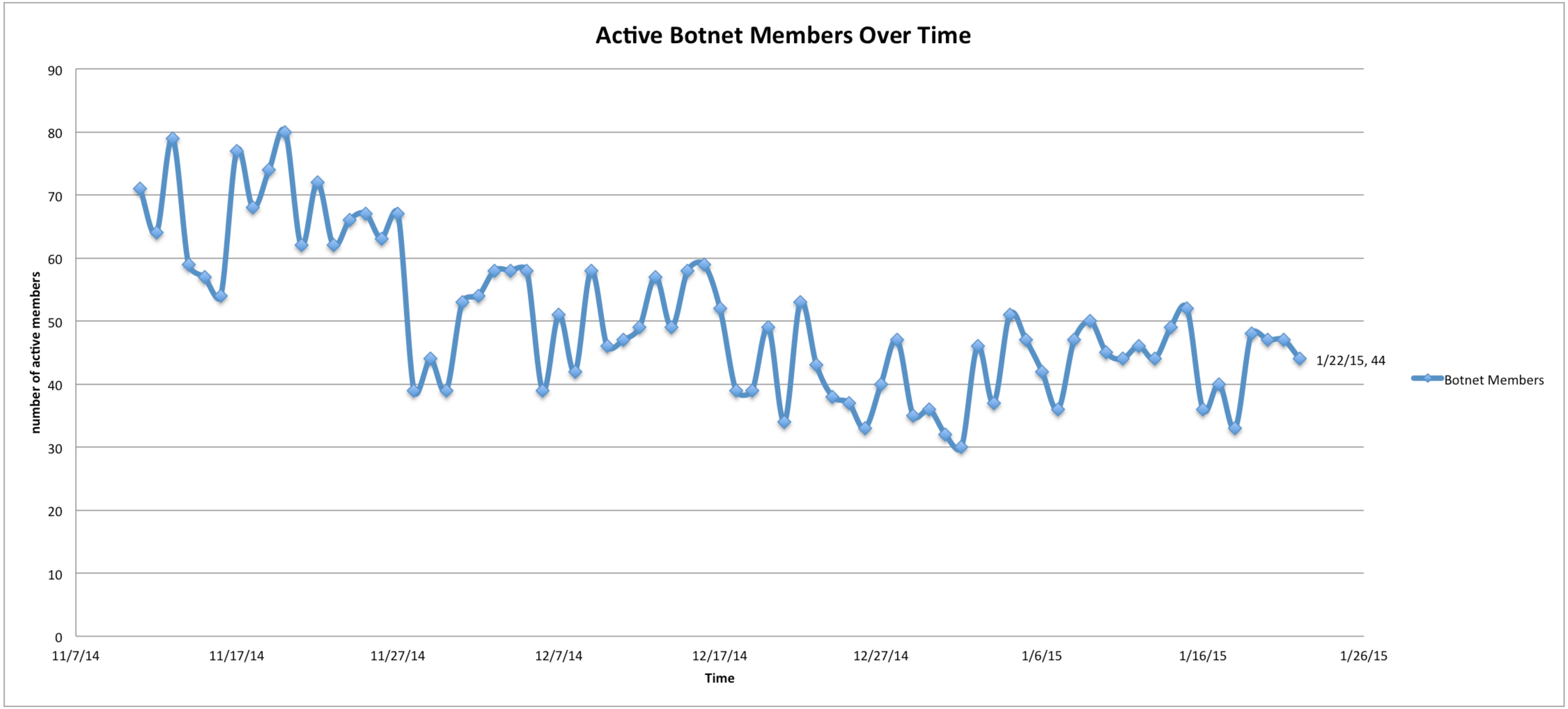
The botnet now contains 1037 members.

All members are compromised public Web servers, mostly running Joomla and WordPress CMS

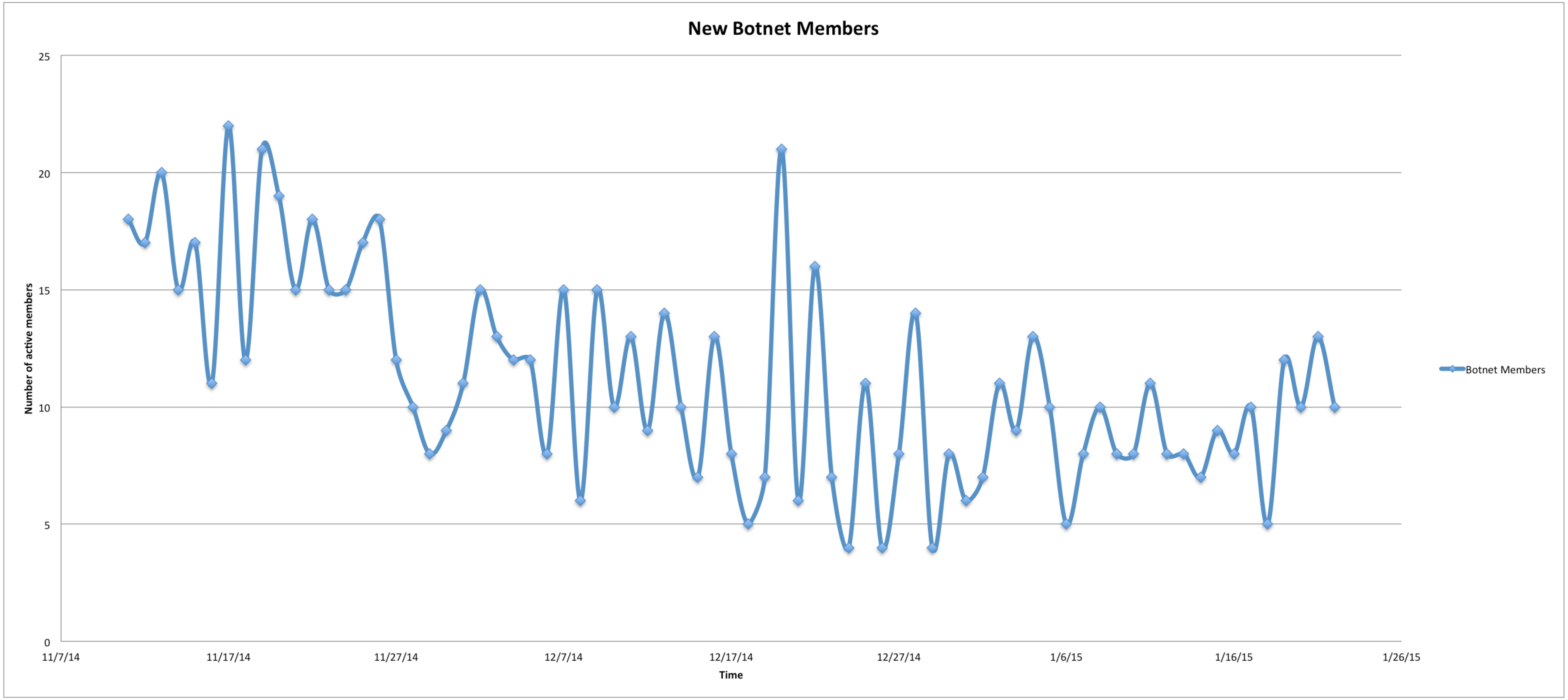
The Botnet has targeted more than 7800 applications over the period

Note – the data is only based on Akamai customers – probably targeted many more applications

Active Members Over Time



New Botnet Members Over Time



Activity Duration of Botnet Members and Evolution

On average, Joomla botnet members spurted malicious traffic over 29 days.

To compare, compromised web servers running other Web platforms, were maliciously active for 10 days on average.

- The reason for the difference between Joomla and the rest of the servers is unclear
- Likely related to the massive exploitation of the Joomla vulnerability

The Botnet evolved over time to attempt to also exploit other vulnerabilities:

- Remote File Inclusion (RFI) on the TimThumb image resizer WordPress module
- Remote Code Execution (RCE) on the Open Flash Chart library

Longevity of Members

Comparing the active Botnet members from 9 months ago to now

- 43 of the botnet members were also maliciously active 9 months ago.
- 4% of botnet members have not been “cleaned up” for 9 months

Surprising, given that:

- The botnet targets a 3-year old vulnerability. Vulnerable web servers should have been upgraded with newer software ages ago
- The awareness for the usage of this vulnerability in the wild. This is not the first publication of a JCE vulnerability exploitation
- The botnet activity is visible and loud, targeting many applications across the Internet, making it easy to be detected.

Closing Thoughts

Simply exposing a botnet and it’s tactics has little impact

Shutting down members of a Botnet only causes it to breed faster

Broad visibility across the web into these kinds of attacks is part of the solution

Effective mitigation requires a way to share actionable information about botnets and other repeat attackers

A risk scoring reputation system can provide such actionable data

FASTER FORWARD

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VP Security Products

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