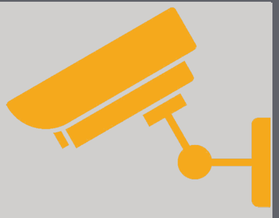
California State University Chico

FORENSICS

"Everything you touch leaves a trace"- Locard's Exchange Principle



What We Can Find for You?

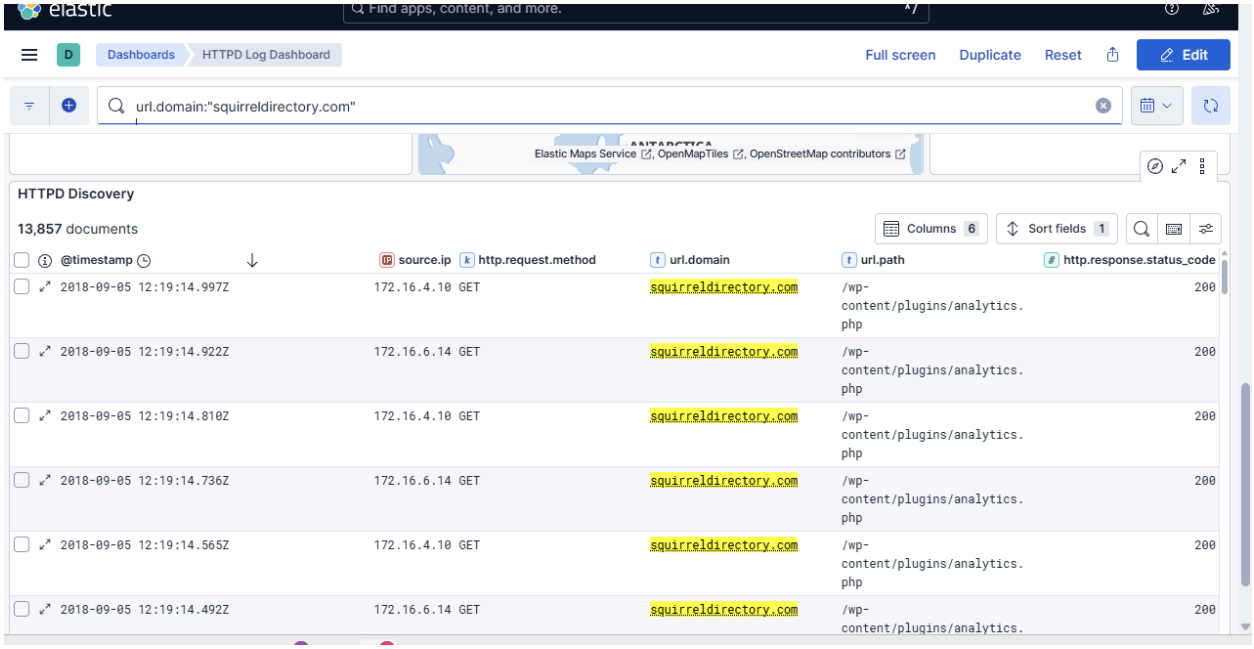
-> File & Document Activity: opened/modified/deleted files, recovered deleted files, download activity.
-> Application Usage: executed programs, first/last run times, frequency, detection of hacking tools.
-> User Account Activity: logins, remote access attempts, password changes, suspicious accounts.
-> Internet & Cloud Activity: browser history, search terms, cookies, cloud sync activity.
-> USB & External Devices: device identification, timestamps, drive letters, user association.
-> System Timeline Reconstruction: chronological sequence of system events.

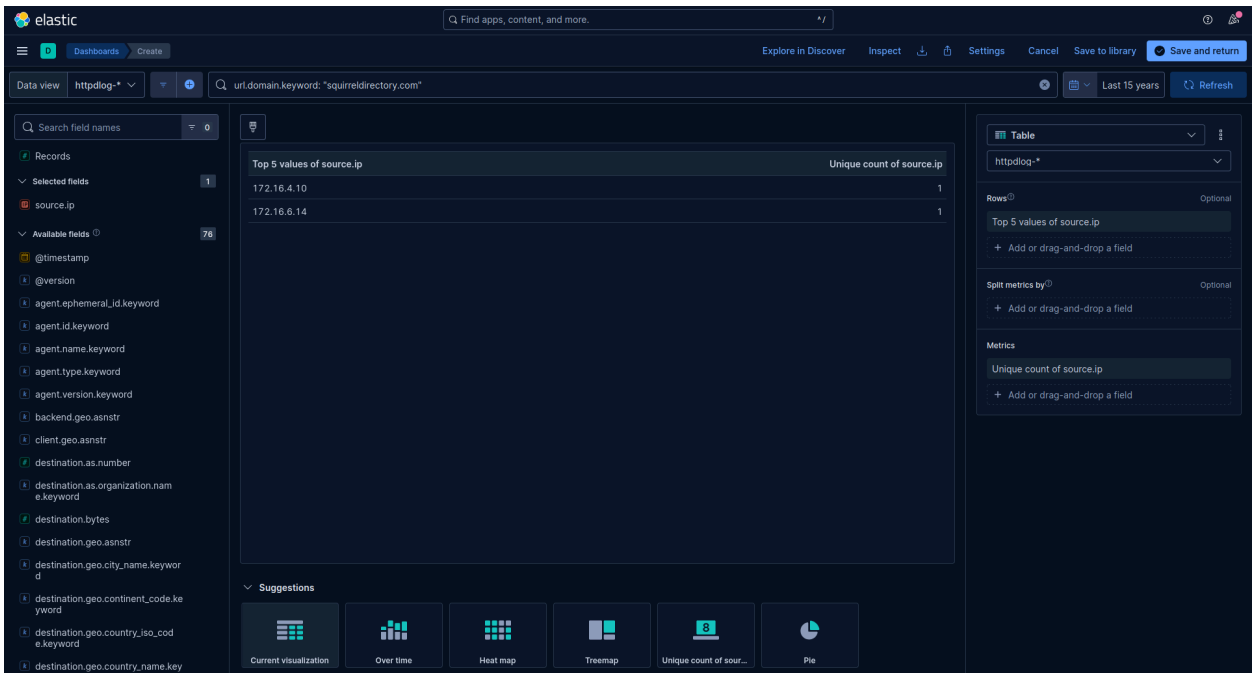
TECHNICAL CHEAT SHEET
Capabilities -> Tools -> Artifacts

Capability	Tool	Artifact
Recent file access	Registry Explorer	RecentDocs, OpenSaveMRU
Deleted file recovery	Recycle Bin parsing	$I/$R files
Browser downloads	Hindsight / Browser DBs	Chrome History, downloads.sqlite
Program execution	WinPrefetchView / PECmd	Prefetch files (.pf)
App install/uninstall	Registry Explorer	SOFTWARE Hive Uninstall Keys
User application activity	Registry Explorer	UserAssist, BAM/DAM
Local accounts/login times	Registry Explorer	SAM Hive
Remote Desktop activity	Event Log Explorer	IDs 4624, 4625, 4778, 4779
Browser activity	Hindsight, SQLite tools	History DBs
Cloud sync evidence	Registry tools	Cloud logs + registry entries
Folder browsing	Shellbag Explorer	Shellbags
Shortcut tracking	LNK parsers	.lnk files
Task/file access history	Jump List tools	AutomaticDestinations
USB device identification	Registry Explorer	USBSTOR
USB timestamps	Registry Explorer	GUID keys 0064/0066/0067
USB user association	Registry Explorer	NTUSER.DAT MountPoints2
Timeline creation	PECmd + Timeline Explorer	Prefetch timeline
Network usage	SRUM parser	SRUDB.dat
Wireless activity	Event Log Explorer	WLAN-AutoConfig log

Investigation 2

HTTP Analysis



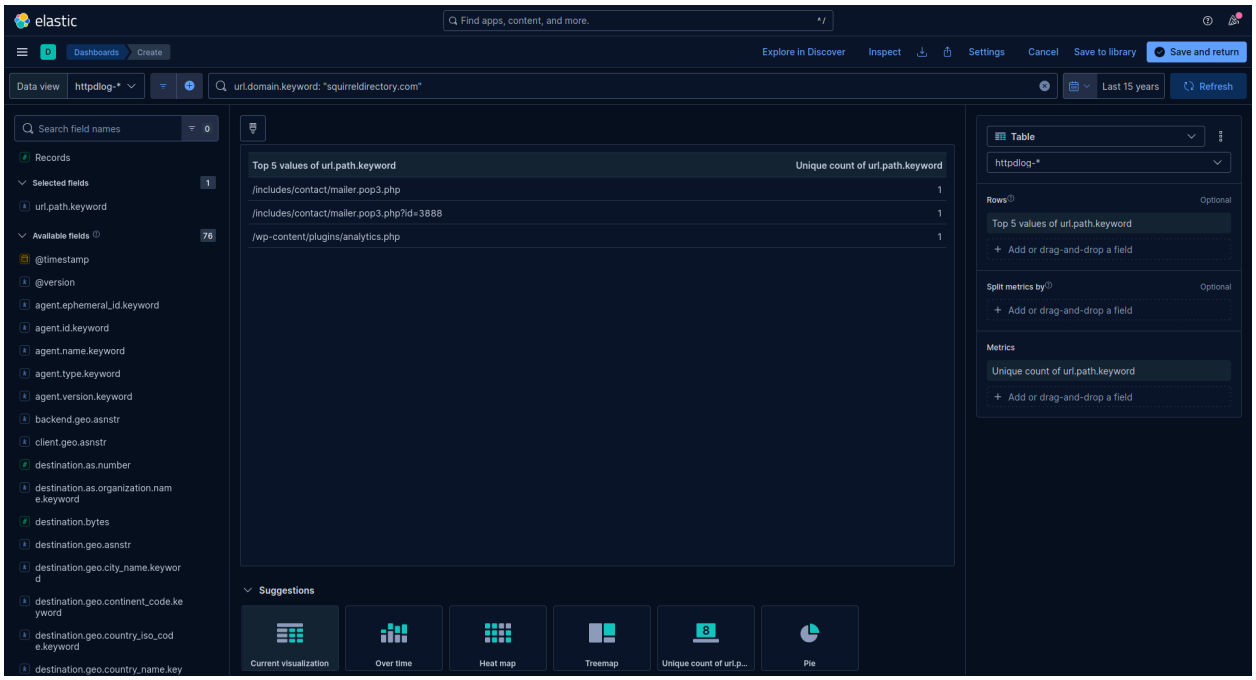


Internal Hosts contacting squirreldirectory.com

172.16.4.10

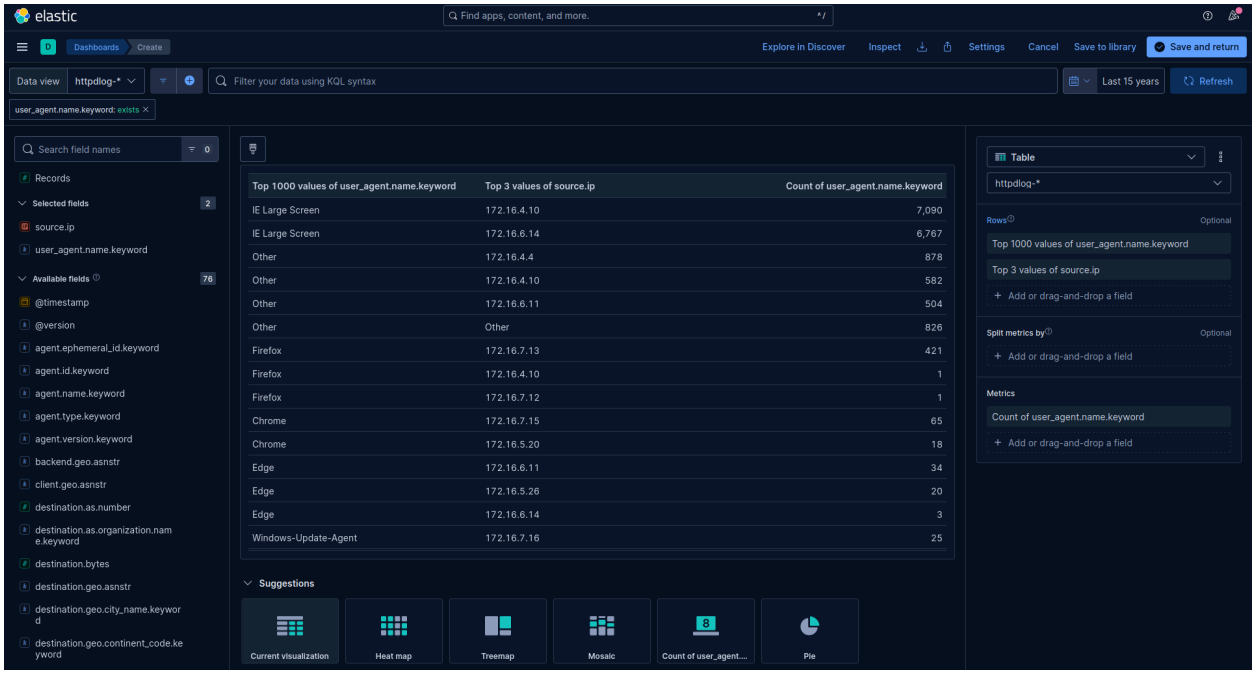
172.16.6.14

URLs accessed



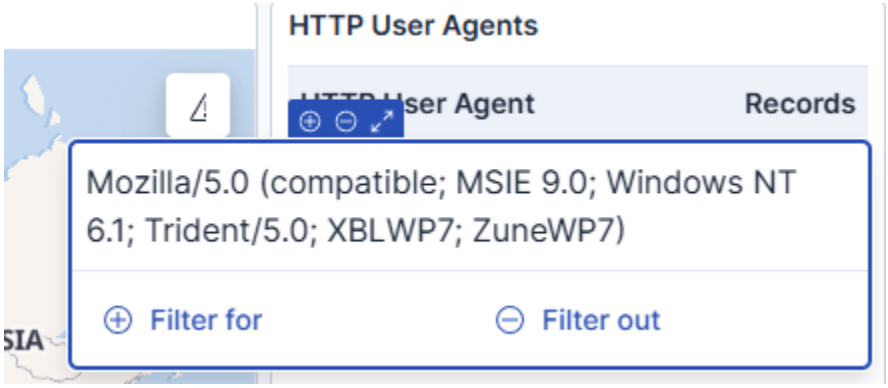
/wp-content/plugins/analytics.php
/includes/contact/mailer.pop3.php?id=3888
/includes/contact/mailer.pop3.php

User agent strings



IE Large screen was accessed by 172.16.4.10 and 172.16.6.14.

Status Codes

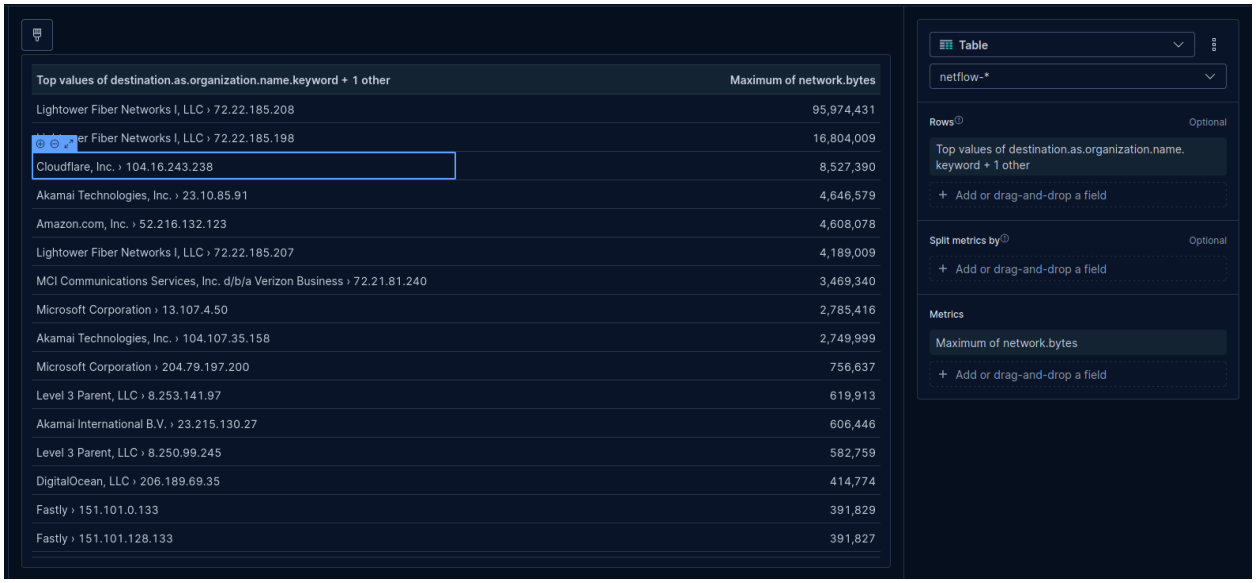


url.domain:"squirreldirectory.com"

NetFlow & Connection Analysis

Top talkers
The top 3 in terms of data volume are 172.16.4.10, 172.16.7.13 and 172.16.4.4. The top 3 in terms of packet count are 172.16.4.10, 172.16.6.14 and 172.16.5.26.

Source destination pairs

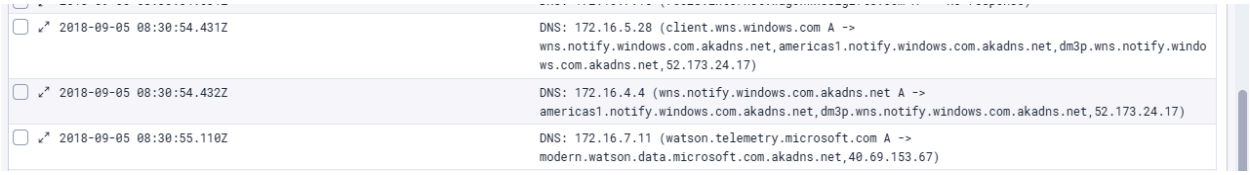


In addition to Akamai Cloudflare and DigitalOcean, internal hosts also talked to a number of other hosting companies. These include: fastly, Lighttower Fiber Networks, AppNexus, LeaseWeb, Rocket Fuel and around five others.

There was one record of an internal device talking to a DigitalOcean device in India. This seems a bit odd since all other traffic went to Northwestern Europe or East Asia.

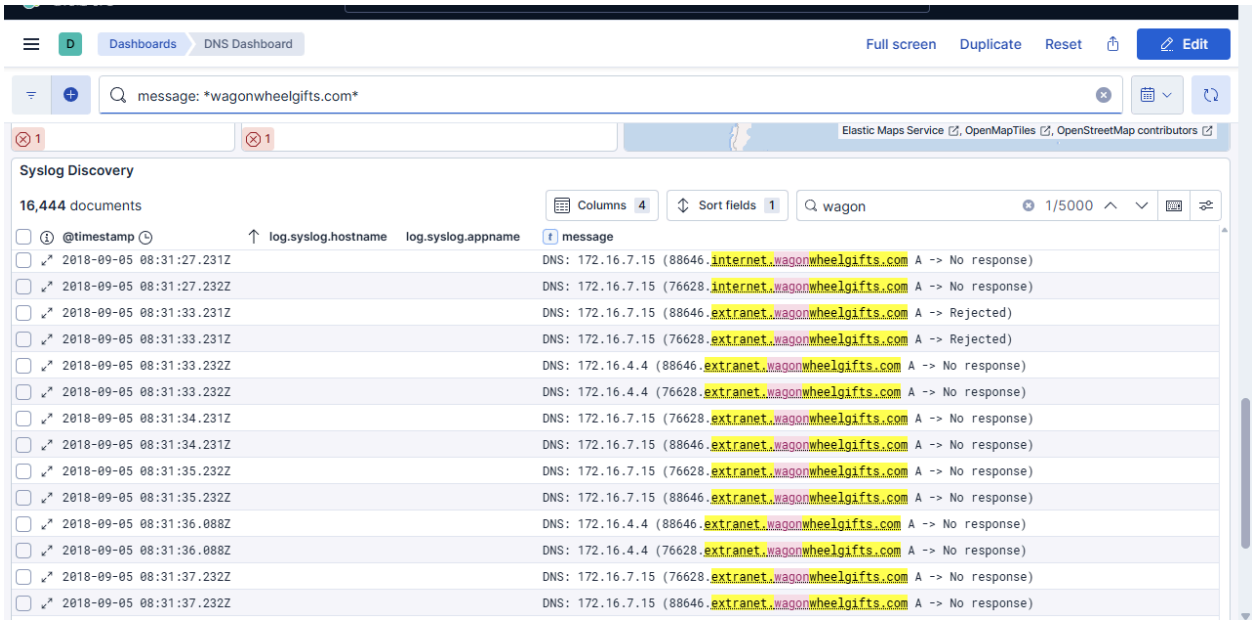
Aside from the ISP, the external host that received the most traffic from the organization was a Cloudflare host at 104.16.243.238. This may be the C2 center. An Akamai host was the runner up receiving about half the traffic. There doesn't appear to be any unencrypted HTTP traffic to either of these hosts.

DNS Analysis

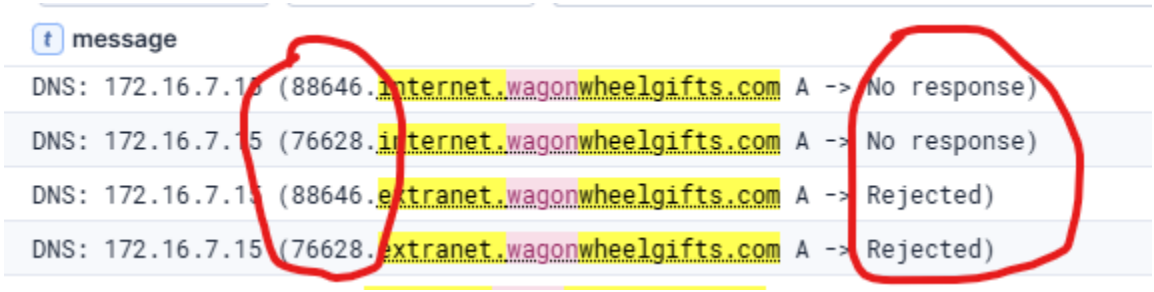


This is an example of legitimate DNS Traffic. The queries represent normal microsoft services and use akadns.net, which is Akamai's DNS infrastructure. There is also a clear response that is not "No response or Reject"

Here is the illegitimate traffic:

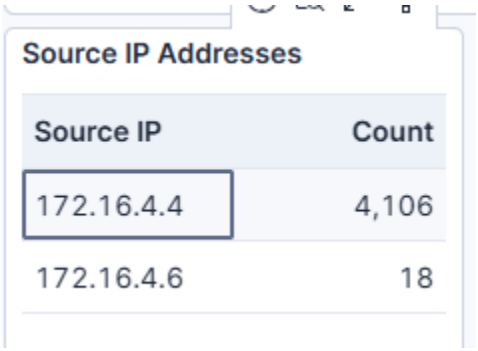


internal hosts such as l IPs 172.16.7.15 and 172.16.4.4 are generating the traffic.



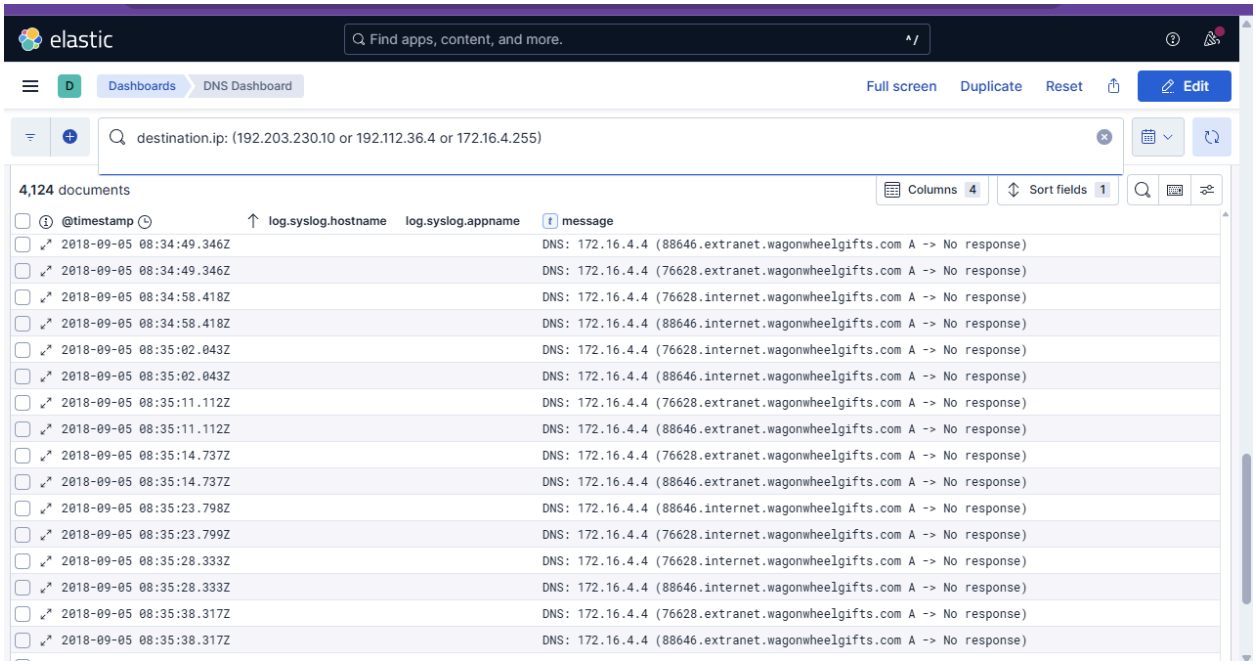
These queries all have random prefixes meaning they are likely generated. They also either say

“no response” or “rejected” meaning the DNS resolver couldn’t find a matching record. None of these subdomains actually exist.
This all points to an attacker using a Domain Generator Algorithm which can generate many potential domain names and periodically tries to connect to them until one is registered by its command and control server. This is an automated beaconing attack rather than a legitimate user activity.



Source IP Addresses

Source IP	Count
172.16.4.4	4,106
172.16.4.6	18



Host 172.16.4.4 sent over 4,000 DNS queries directly to root name servers (192.203.230.10, 192.112.36.4) and broadcast address (172.16.4.255). The queries targeted randomized subdomains of wagonwheelgifts.com. This is further evidence of malware beaconing which originated from host 172.16.4.4 (the domain controller).

Cross Log Correlation

Method

We correlated DNS, HTTP, and NetFlow data by matching client IPs (source.ip) and timestamps across logs.
This allowed us to trace each host's activity from DNS lookup → connection establishment → HTTP request.

Timeline and Key Findings

Between **08:30 and 12:20 UTC on 2018-09-05**, two distinct patterns appeared:

1. **High-volume DNS queries** from **172.16.4.4 (domain controller)** and **172.16.7.15 (Windows client)** directed at *.wagonwheelgifts.com subdomains, all returning "No response."

2. **HTTP and NetFlow spikes** beginning around **11:30**, peaking between **11:35–12:05**, mainly from **172.16.6.14 (Windows 10 host "Romanoff")** and **172.16.4.10 (proxy server)**.
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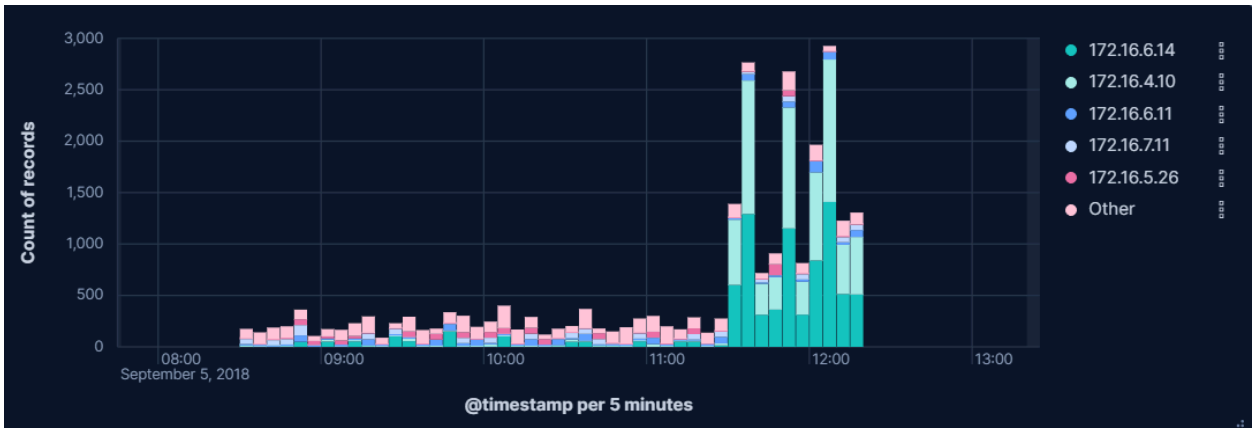
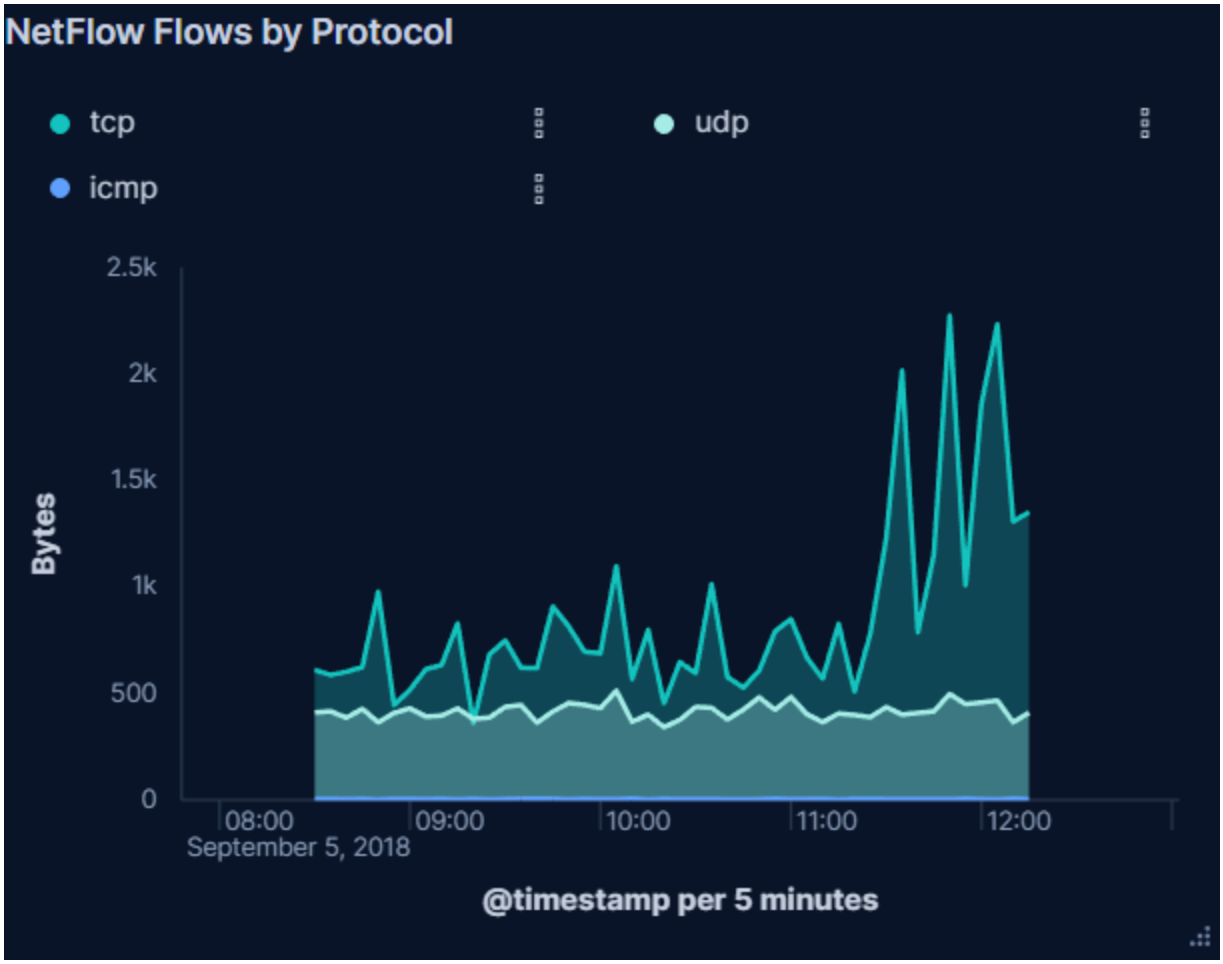


The NetFlow timeline (Figure 1) shows these hosts sharply increasing their outbound flows during that same window, while the protocol chart



(Figure 2) confirms the traffic consisted primarily of **TCP and UDP**, typical for HTTP and DNS activity.

Host Behavior Summary

Host	Role	Observed Services	Domains Queried / Contacted	Behavior Summary
172.16.4.4	Domain Controller / DNS resolver	DNS	wagonwheelgifts.com, random subdomains	Generated 13k DNS queries including direct root and broadcast requests

172.16.7.15	Segmented workstation	DNS	wagonwheelgifts.com subdomains	10k+ repetitive failed queries (“No response”), likely infected client generating DGA requests.
172.16.6.14	Windows 10 workstation (“Romanoff”)	HTTP / HTTPS	squirreldirectory.com	Spikes of HTTP traffic between 11:30–12:05; accessed suspicious PHP scripts using a non-standard user-agent.
172.16.4.10	Proxy / Squid server	HTTP, RSH (TCP 514)	squirreldirectory.com	Relayed outbound web traffic; user-agent {version:6.2.0.12026, platform:server_win, osversion:10}
172.16.5.x / 6.x	Misc. workstations	DNS / HTTP	Microsoft and Ubuntu domains (tile-service.weather.microsoft.com, daisy.ubuntu.com)	Normal background activity, legitimate update and telemetry traffic.

Summary

The DGA-like DNS behavior from 172.16.7.15 triggered corresponding load on the domain controller (172.16.4.4), which forwarded many of those requests externally.

Later, around 11:30 UTC, HTTP and NetFlow activity from 172.16.6.14 and 172.16.4.10 spiked, coinciding with connections to squirreldirectory.com, a known malicious host.

This correlation across DNS, HTTP, and NetFlow logs strongly indicates a malware infection using domain-generation and HTTP beaconing mechanisms for command-and-control communication.