DDoS is Coming

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Verizon Digital Media Services
As an enterprise content delivery network provider, Verizon Digital Media Services helps its customers defend cyber attacks.

Although names have been withheld, the story in this presentation is based on our actual experience working with a customer to **mitigate a Bitcoin-DDoS extortion attempt**.

We deal with these types of attacks everyday.
The Rise of Cyber Extortion

In recent years, there has been an emergence of cybercriminal groups that threaten their targets with massive DDoS attacks unless they are paid a hefty Bitcoin ransom.

If left unaddressed, these attacks can disrupt business practices, damage branding and cause financial loss.
Day 1
It’s the holiday season in 2015. The busiest shopping season of the year.
A few ACME Corp employees receive a strange email.
Skeptical, they forward the email up the chain of command.

- Not knowing if the email is just a hoax or legitimate threat, the ACME employees forward it on.
- It eventually makes its way up to the CSO, and catches his attention.

One employee writes:

“Not sure if this is something I need to report or just spam but wanted to send it on just in case.”
Elements of the e-mail: We’ve seen this more and more.

<table>
<thead>
<tr>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comes from a location that doesn’t work well with U.S. authorities</td>
</tr>
<tr>
<td>Asks recipient to forward the email → attackers don’t know the decision makers, so they spam many people</td>
</tr>
<tr>
<td>Tries to establish credibility in some way</td>
</tr>
<tr>
<td>Requests payment in Bitcoins (very hard to trace)</td>
</tr>
<tr>
<td>Includes bold claims of attack abilities</td>
</tr>
<tr>
<td>Surges pricing</td>
</tr>
<tr>
<td>Will attack all IP addresses</td>
</tr>
<tr>
<td>Allows some time to provide payment</td>
</tr>
</tbody>
</table>
Day 2
Verizon, we have a problem.

Fortunately, ACME is a subscriber to Verizon Digital Media Services’ Security Service

ACME requested a call with our Security Professional Services team:

• Customer asked that we have our security professionals on the call.

• We had the full team present, including a Technical Account Manager and a Security Solution Architect.

• ACME had its information security manager and its web operations team present.
Step 1: Analyze the Vulnerabilities

• The “proof of concept attack” never came and the log does not show an attack.
Step 2: Red Alert! All hands to battle station ...

<table>
<thead>
<tr>
<th>Team</th>
<th>Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOC</td>
<td>Our 24x7 Network Operations Center (NOC) team were notified and given context. Specialized contact and escalation were designed.</td>
</tr>
<tr>
<td>Dedicated Security Professionals</td>
<td>Constant and direct (emails and mobile) lines of communication were initiated with relevant customer teams.</td>
</tr>
<tr>
<td>Engineering</td>
<td>We checked capacity and hardware to prepare for attack.</td>
</tr>
<tr>
<td>Management</td>
<td>Our CTO and General Counsel were notified so they could make quick decisions.</td>
</tr>
</tbody>
</table>
## Step 3: Putting a Plan in Place

<table>
<thead>
<tr>
<th>Attack Source</th>
<th>Mitigation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer 3 and 4 Attack</td>
<td>Verizon’s Edgecast Content Delivery Network (CDN) is accustomed to network layer attacks as part of running a CDN.</td>
</tr>
<tr>
<td></td>
<td>• We created a <strong>Proactive Ticket</strong> with our 24 x 7 Network Operations Center to expect an attack.</td>
</tr>
<tr>
<td></td>
<td>• We provided ACME origin IP to NOC enable a faster response to create more accurate signatures.</td>
</tr>
<tr>
<td>Layer 7 Attack</td>
<td>This has most potential for damage.</td>
</tr>
<tr>
<td></td>
<td>• We activated more restrictive <strong>Web Application Firewall</strong> rules to minimize the attack surface.</td>
</tr>
<tr>
<td></td>
<td>• We enabled more rules for alerts to create more visibility to possible attacks.</td>
</tr>
<tr>
<td></td>
<td>• We increased the frequency of log reviews to detect attacks.</td>
</tr>
<tr>
<td>Unprotected Origin</td>
<td>No time to migrate to Verizon solution.</td>
</tr>
<tr>
<td></td>
<td>• If attacked, ACME may take down origin to prevent layer 7 compromises, like SQL injection.</td>
</tr>
</tbody>
</table>
Step 4: Wait

BRACE YOURSELVES.

DDOS IS COMING
Day 3
Major Attack Expected
No Attack. Nothing.
Day 4
No Attack. Nothing.
Day 5
No Attack. Nothing.
Day 6
No Attack. Nothing.
Day 7
6:40 a.m.: DoS is Here

Verizon detects the attack (SYN Flood), which peaks at 80Gbps.
Attack Type: SYN Floods

- SYN Floods are a common form of DDoS.

- Attackers send a flood of fake server connection requests to their target’s system in order to overload the target’s servers and render the target unresponsive and unable to process legitimate requests.

- SYN Floods are considered L4 (Transport Layer) attacks.
What a SYN Flood Looks Like

SYNs 419,927/sec

SYN Flooding
Mitigated in Minutes

Verizon immediately reacts with countermeasures and the attack is blocked at the edge.
Really!
Secure by Design

**IP Anycast**  
Verizon’s Edgecast Content Delivery Network uses IP Anycast (where would the DDoS packet go?)

**Super PoPs with Massive Capacity**  
We place high-capacity PoPs in strategic global locations to handle massive surges in demand or attacks; 20 Tbps of global capacity and 95+ Super PoPs.

**Network Attack Mitigation**  
We have proprietary network attack detection and a response system codenamed *Stonefish*.

**Web Application Firewall**  
It has powerful protection, threat detection and virtual patching with over 2,000 rules.
Anycast CDN 101

$ host www.verizondigitalmedia.com
www.verizondigitalmedia.com is an alias for cs229.adn.alphacdn.net.
cs229.adn.alphacdn.net has address 72.21.92.7
Our Network

20 Tbps
Network Capacity

95+
PoPs

5
Continents

3,000+
Interconnects

North America
- Atlanta
- Boston
- Chicago
- Dallas
- Los Angeles
- Miami
- New York
- Philadelphia
- San Jose
- Seattle
- Washington, D.C.

Europe
- Amsterdam
- Copenhagen
- Frankfurt
- Helsinki
- London
- Madrid
- Milan
- Paris
- Stockholm
- Vienna
- Warsaw

Asia
- Bangalore
- Batam
- Beijing
- Chennai
- New Delhi
- Hong Kong
- Jakarta
- Mumbai
- Osaka
- Seoul
- Singapore
- Taiwan
- Tokyo

South America
- Buenos Aires 1
- Medellin
- Quito
- São Paulo

Upcoming
- Baranquilla
- Buenos Aires 2
- Lima
- Rio de Janeiro
- Santiago

Upcoming
- Denver
- Mexico City

Australia
- Melbourne
- Sydney
Layered Defense

Router → Director → Sailfish Webserver → Customer Firewall → Origin Server

Stonefish System
Countermeasures

Verizon immediately identifies the attack signature and creates rules to block malicious traffic. This effectively thwarts the attack.

<table>
<thead>
<tr>
<th>Threat ID</th>
<th>Start Time</th>
<th>End Time</th>
<th>Type</th>
<th>POP</th>
<th>POP %</th>
<th>Rate/sec</th>
<th>VIP</th>
<th>Attack Status</th>
<th>Rule Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLj6sF9...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>xVBoYJa...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>_maBLBb...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>bij5idj...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>fZBJ2DK...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
<tr>
<td>Dvqs704...</td>
<td></td>
<td></td>
<td>SYN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inactive</td>
</tr>
</tbody>
</table>
Staying Vigilant

- Despite thwarting the attack, Verizon stayed prepared for Round 2, in case the attackers tried a different approach.

- Other possible attack scenarios include a Layer 7 (Application) attack.

- We enabled restrictive rules and activated many alerts in anticipation.

- No Layer 7 observed.
Staying in Touch

We remained in communication with the customer throughout the attack.
Lessons Learned

...
Protect your origin IP:
Apply Origin Cloaking.
Don’t forget to protect apex domain:
http://yourdomainnamehere.com
You need a plan.
Does your employee know who to escalate to?
Do you know what your attack surface is?
You need on-demand scalability and capacity. Attacks won’t happen on schedule; you need to have massive capacity on standby, globally.
You need lots of bandwidth:
Average DDoS: 5.5Mbps or 2Mpps
Can your appliance handle that?
What is your DDoS breaking point?
You need agile WAF.

How fast can your WAF change rules
to create customized defense?
You need agile security service.
How fast can your vendor come to your aid?
The Sequel
Armada Collective?

FORWARD THIS MAIL TO WHOEVER IS IMPORTANT IN YOUR COMPANY AND CAN MAKE DECISION!

We are Armada Collective.

http://lmgtfy.com/?q=Armada+Collective

You will be DDoS-ed starting Thursday (April 21) if you don't pay protection fee - 20 Bitcoins @ 1KdDx

You will be DDoS-ed starting Thursday (April 21) if you don't pay protection fee - 20 Bitcoins @ 1HYak

You will be DDoS-ed starting Thursday (April 21) if you don't pay protection fee - 20 Bitcoins @ 15Zrn

Attacks never came.
Preface
Greetz everybody,

When I first go in DDoS industry, I wasn’t planning on staying in it long. I made my money, there’s lots of eyes looking at IOT now, so it...

So today, I have an amazing release for you. With Mirai, I usually pull max 380k bots from telnet alone. However, after the Kreb DDoS, shutting down and cleaning up their act. Today, max pull is about 300k bots, and dropping.

So, I am your senpai, and I will treat you real nice, my hf-chan.

To be continued ... ?
Thank you.

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