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Issuing very slooowwww HTTP POST connections results in major denial-of-service attack on Web-based servers and can build "agentless" botnet

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By Kelly Jackson Higgins *Darkreading*

A flaw in the HTTP protocol leaves the door open for attackers to wage a new form of distributed denial-of-service (DDoS) attack that floods Web servers with very slow HTTP "POST" traffic.

Researchers next week at the OWASP 2010 Application Security Conference will demonstrate the new attack, showing how online gaming could be used as a way to recruit bots in an "agentless" botnet that executes this slow HTTP POST DDoS attack. The bot does the bidding of the botnet without getting infected with bot malware.

Researcher Wong Onn Chee, who first discovered the attack in 2009 with a team of researchers in Singapore, says HTTP is "broken" and leaves all Web-based servers or systems with a Web interface vulnerable to this form of attack. "We believe that the fix is in the actual protocol as it is broken by design and affects everyone globally and anything using a Web application. This talk is very sensitive and should be highlighted for U.S. critical infrastructure," Onn Chee says of his upcoming presentation. "If it has a Web interface, we can knock it down [with this attack]: think SSL VPN and other critical systems accessed with a Web browser that you need to connect to by posting information."

He and Tom Brennan, a security researcher with Proactive Risk, at OWASP will present the research on the attack and solicit input on how to mitigate it.

DDoS attacks against websites have traditionally employed lower-layer attacks, but the researchers say this HTTP Layer 7-type attack is more difficult to stop because it's tough to distinguish between real HTTP traffic and malicious HTTP traffic. "We suspect that Layer 7 DDOS attack techniques will be the modus operandi for the next decade or more. This is primarily because Layer 7 DDOS attacks are difficult to differentiate from legitimate and nonmalicious connections," says Onn Chee, who is CTO with Resolvo Systems. "This 'slow' technique may also be applied to other protocols, such as SMTP and, to a lesser extent, DNS. Actually, my team believes any protocol [that] accepts large requests from users is susceptible."

The slow HTTP POST attack works like this: The attacker sends POST headers with a legitimate "content-length" field that lets the Web server know how much data is arriving. Once the headers are sent, the POST message body is transmitted at a slow speed to gridlock the connection and use server resources. Onn Chee says the attack can DDoS a Web server with just tens of thousands of slow HTTP POST connections and take it down within minutes.

The attack in some ways resembles the Slowloris HTTP DDoS attack tool created by RSnake that keeps connections open by sending partial HTTP requests and sends headers at regular intervals to prevent the sockets from closing. But the slow HTTP POST DDoS can't be mitigated by load-balancers like with Slowloris, Onn Chee says.

And unlike Slowloris, IIS servers are also vulnerable to the slow HTTP POST attack. Apache servers are also vulnerable, he says.

The agentless botnet the researchers will demonstrate uses a Java applet that runs an online game. Once the victim accepts the self-signed applet, the applet executes the DDoS with HTTP POSTs as the user plays the online game. "Once the user exits the game and shuts down the browser, the attack will stop, the applet removed, hence making it difficult to trace. Most online games have millions of concurrent users at any time of the day," he says. "Hence, if an online game is compromised, one will get an agentless botnet [that] has millions of attack nodes any time."

An agentless botnet-borne attack is difficult to trace because there's no permanent source of the attack: Once the victim closes his browser and clears his browser cache after his online gaming session, for example, it leave no trace for a forensics investigation, according to the research.

Onn Chee says he and his team have not seen this attack used outside of China thus far. "We suspect the hackers may still be upgrading their botnet," he says.

It could be used to take down any HTTP or HTTP-S service -- including some SCADA systems. "HTTP-based SCADA systems are also vulnerable. Internal clients can be exploited to launch the slow HTTP POST attacks to the SCADA systems via authorized HTTP connections and from authorized clients," he says. "One does not need millions of connections to bring down a Web server."