Activity: Analyze Network Layer Communication

Scenario

You are a cybersecurity analyst working at a company that specializes in providing IT services for clients. Several customers of clients reported that they were not able to access the client company website www.yummyrecipesforme.com, and saw the error “destination port unreachable” after waiting for the page to load.

You are tasked with analyzing the situation and determining which network protocol was affected during this incident. To start, you attempt to visit the website and you also receive the error “destination port unreachable.” To troubleshoot the issue, you load your network analyzer tool, tcpdump, and attempt to load the webpage again. To load the webpage, your browser sends a query to a DNS server via UDP to retrieve the IP address for the website's domain name. It uses this IP address as the destination IP for sending an HTTPS request to the web server to display the webpage The analyzer shows that when you send UDP packets to the DNS server, you receive ICMP packets containing the error message: “udp port 53 unreachable.”

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13:24:32.192571 IP 192.51.100.15.52444 > 203.0.113.2.domain: 35084+ A?
yummyrecipesforme.com. (24)
13:24:36.098564 IP 203.0.113.2 > 192.51.100.15: ICMP 203.0.113.2
udp port 53 unreachable length 254

13:26:32.192571 IP 192.51.100.15.52444 > 203.0.113.2.domain: 35084+ A?
yummyrecipesforme.com. (24)
13:27:15.934126 IP 203.0.113.2 > 192.51.100.15: ICMP 203.0.113.2
udp port 53 unreachable length 320

13:28:32.192571 IP 192.51.100.15.52444 > 203.0.113.2.domain: 35084+ A?
yummyrecipesforme.com. (24)
13:28:50.022967 IP 203.0.113.2 > 192.51.100.15: ICMP 203.0.113.2
udp port 53 unreachable length 150
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In the DNS and ICMP log, you find the following information:

1. The first two lines of the log file show the initial outgoing request from your computer to the DNS server requesting the IP address of yummyrecipesforme.com. This request is sent in a UDP packet.

2. The second and third lines of the log show the response to your UDP packet. In this case, the ICMP 203.0.113.2 line is the start of the error message indicating that the UDP packet was undeliverable to port 53 of the DNS server.
3. In front of each request and response, you find timestamps that indicate when the event happened. In the log, this is the first sequence of numbers displayed: 13:24:32.192571. This means the time is 1:24 p.m., 32.192571 seconds.
4. After the timestamps, you will find the source and destination IP addresses. In the first line, where the UDP packet travels from your browser to the DNS server, this information is displayed as: 192.51.100.15.52444 > 203.0.113.2.domain. The IP address to the left of the greater than (>) symbol is the source address, which in this example is your computer's IP address. The IP address to the right of the greater than (>) symbol is the destination IP address. In this case, it is the IP address for the DNS server: 203.0.113.2.domain
5. After the source and destination IP addresses, there can be a number of additional details like the protocol, port number of the source, and flags. In the first line of the error log, the query identification number appears as: 35084. The plus sign after the query identification number indicates there are flags associated with the UDP message. The "A?" indicates a flag associated with the DNS request for an A record, where an A record maps a domain name to an IP address. The third line displays the protocol of he response message to the browser: "ICMP," which is followed by an ICMP error message
6. The error message, "udp port 53 unreachable" is mentioned in the last line. Port 53 is a port for DNS service. The word "unreachable" in the message indicates the UDP message requesting an IP address for the domain "www.yummyrecipesforme.com" did not go through to the DNS server because no service was listening on the receiving DNS port.
7. The remaining lines in the log indicate that ICMP packets were sent two more times, but the same delivery error was received both times.

Now that you have captured data packets using a network analyzer tool, it is your job to identify which network protocol and service were impacted by this incident. Then, you will need to write a follow-up report.

As an analyst, you can inspect network traffic and network data to determine what is causing network-related issues during cybersecurity incidents. Later in this course, you will demonstrate how to manage and resolve incidents. For now, you only need to analyze the situation.

This event, in the meantime, is being handled by security engineers after you and other analysts have reported the issue to your direct supervisor.

Cybersecurity Incident Report: Network Traffic Analysis

Part 1: Provide a summary of the problem found in the DNS and ICMP traffic log in the tcpdump log.
The UDP protocol reveals that: it was used to contact the DNS server to retrieve the IP address of the domain name “yummyrecipiesforme.com”. This is based on the results of the network analysis, which show that the ICMP echo reply returned the error message: which indicates issues pertaining to contacting with the DNS server. The port noted in the error message is used for: DNS protocol traffic, as port 53 was the one associated with the error message “udp port 53 unreachable”. The most likely issue is: the DNS server is not responding, which is supported by the use of the ICMP protocol as well as port 53 being unreachable. Moreover, the “+” after the query identification number 35084 suggests the presence of flags with UDP message while the “A?” symbol indicates flags with performing DNS protocol operations.

Part 2: Explain your analysis of the data and provide at least one cause of the incident.
Time incident occurred: 1:24 pm Explain how the IT team became aware of the incident: Customers attempting to visit the website yummmyrecipiesforme.com received the message “destination port unavailable” and notified the organization’s IT Team promptly. Explain the actions taken by the IT department to investigate the incident: The IT Team conducted packet sniffing tests using tcpdump. Next, the team decided to identify whether the DNS server was down or the firewall in place was blocking the unreachable port. Note key findings of the IT department's investigation (i.e., details related to the port affected, DNS server, etc.): Log reports of the tests revealed that DNS port 53 was unreachable.

Note a likely cause of the incident: A likely cause would be a successful Denial of Service attack, which is when multiple packets are flooded to the destination server to overwhelm the server and disrupt regular functioning of the server.

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