Malware Traffic Investigation Using Wireshark (PCAP Analysis)

Case Overview

This investigation analyzes a packet capture file **(2023-02-03.pcap)** to identify suspicious activity, Indicators of Compromise (IOCs), and evidence of malware infection within a local network.

The objective was to examine network traffic, trace malicious downloads, observe post-infection behavior, and determine the overall security impact.

Lab Environment & Tools Used

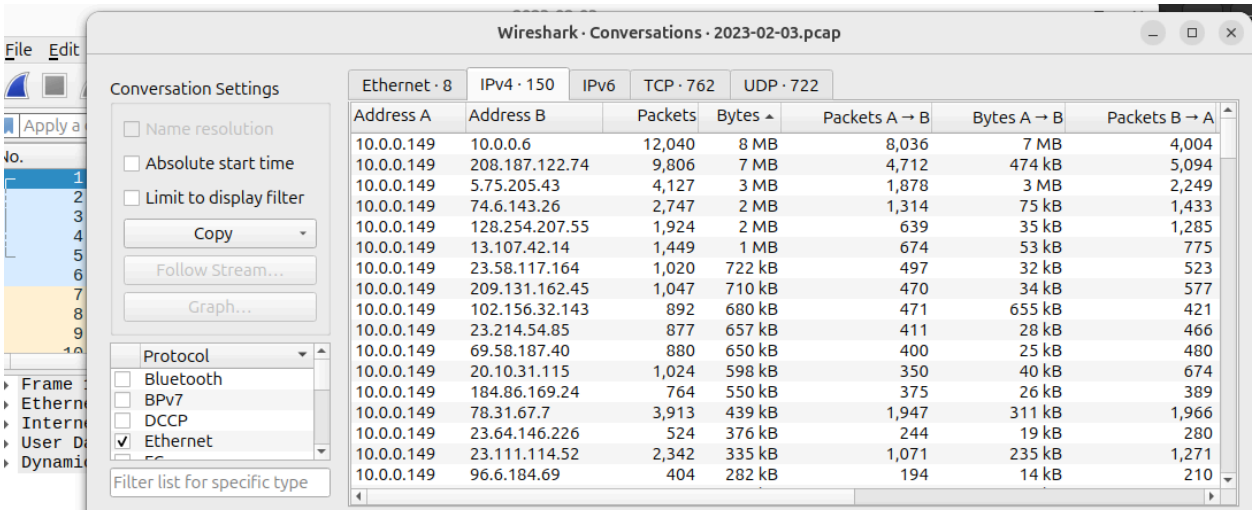
Category	Tools
Traffic Analysis	**Wireshark**
Threat Intelligence	**VirusTotal**, OSINT research
Packet Filtering	Wireshark Display Filters
File Analysis	Hash extraction, file signature inspection
Decoding Tool	**CyberChef** (Base64 decoding)
Protocols Investigated	HTTP, ARP, ICMP, SMTP, SMB

Initial Traffic Review

After loading the PCAP into Wireshark:

- Total packets captured: **~55,000**
- Capture duration: **2 hours 50 minutes**

Using **Statistics** → **Conversations**, one internal host stood out:

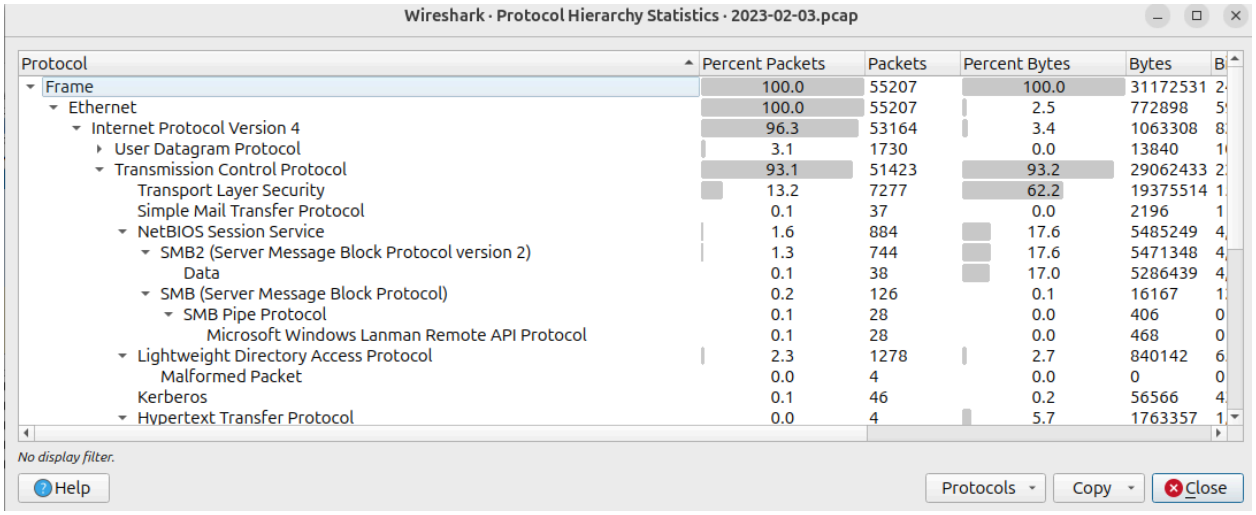


Suspicious Host: `10.0.0.149`
This system had an unusually high number of conversations with both internal and external IP addresses.

Protocol Analysis

From **Statistics** → **Protocol Hierarchy**, the following protocols were observed:

- HTTP
- SMTP
- SMB
- ARP



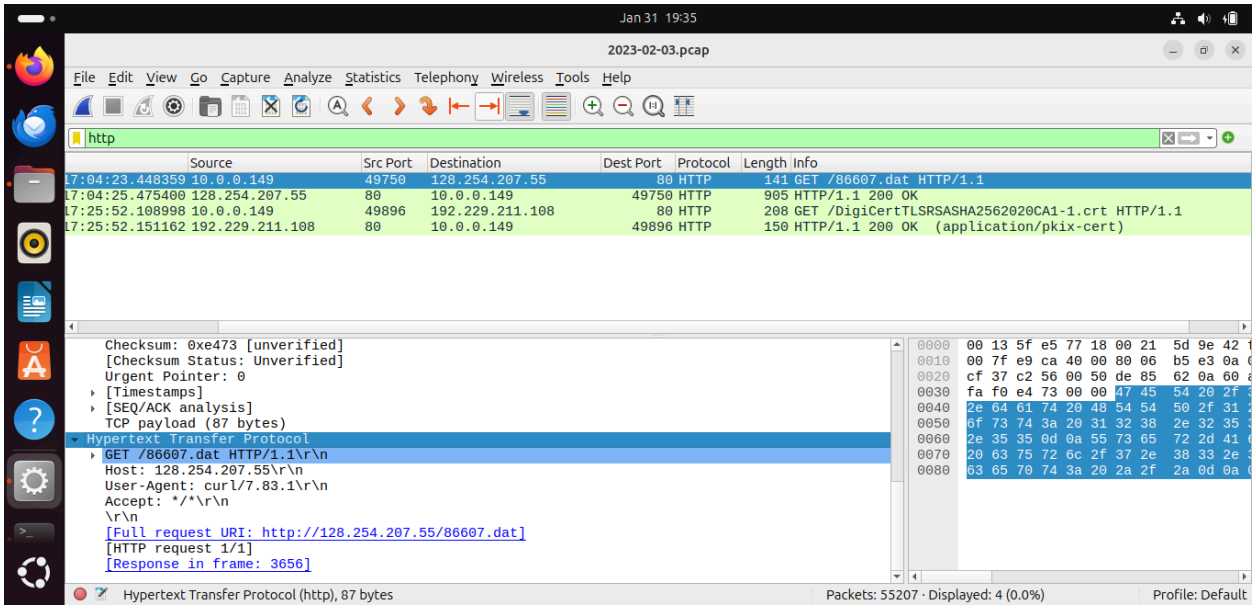
Since HTTP traffic is unencrypted and had fewer packets, it was analyzed first.

Malicious File Download via HTTP

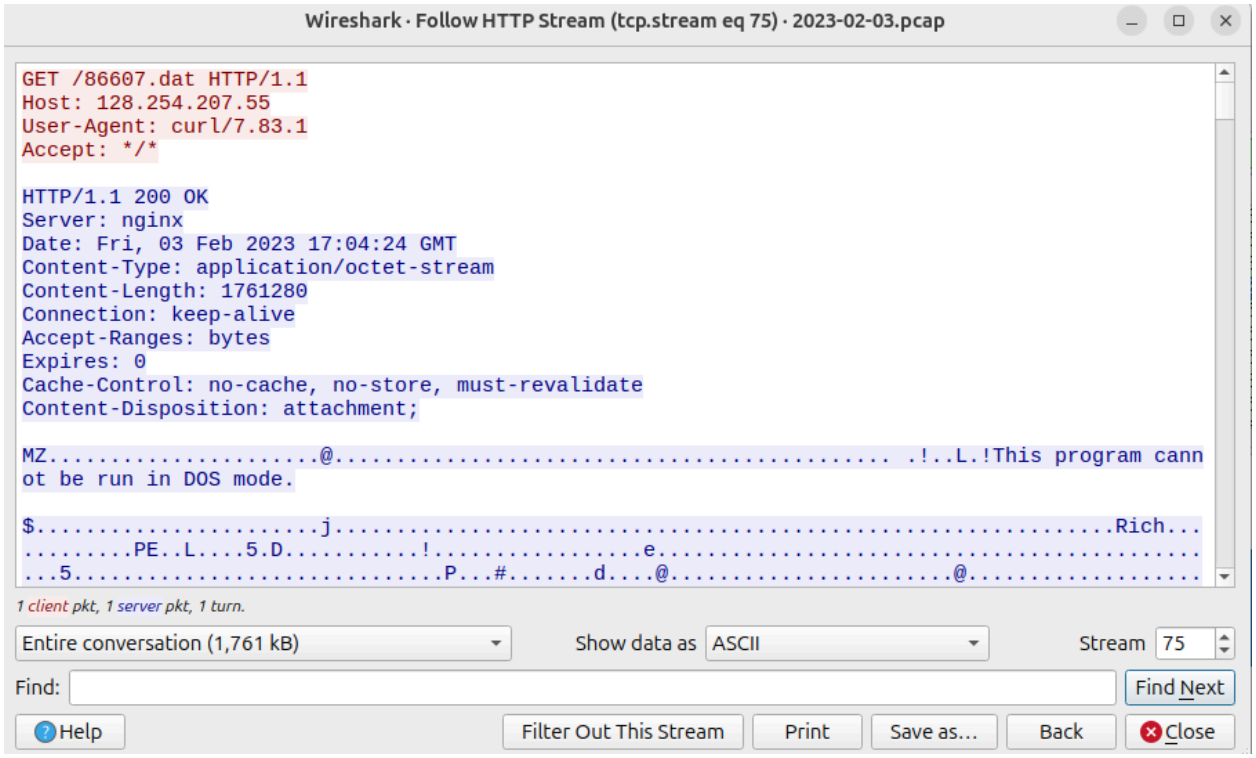
Filtering for HTTP traffic revealed **4 packets**.

Following the HTTP stream showed:

- **Source:** `10.0.0.149`
- **User-Agent:** `curl`
- **Request Type:** HTTP GET
- **Requested File:** `86607.dat`
- **Host field:** IP address 128.254.207.55 instead of a domain name (suspicious behavior)



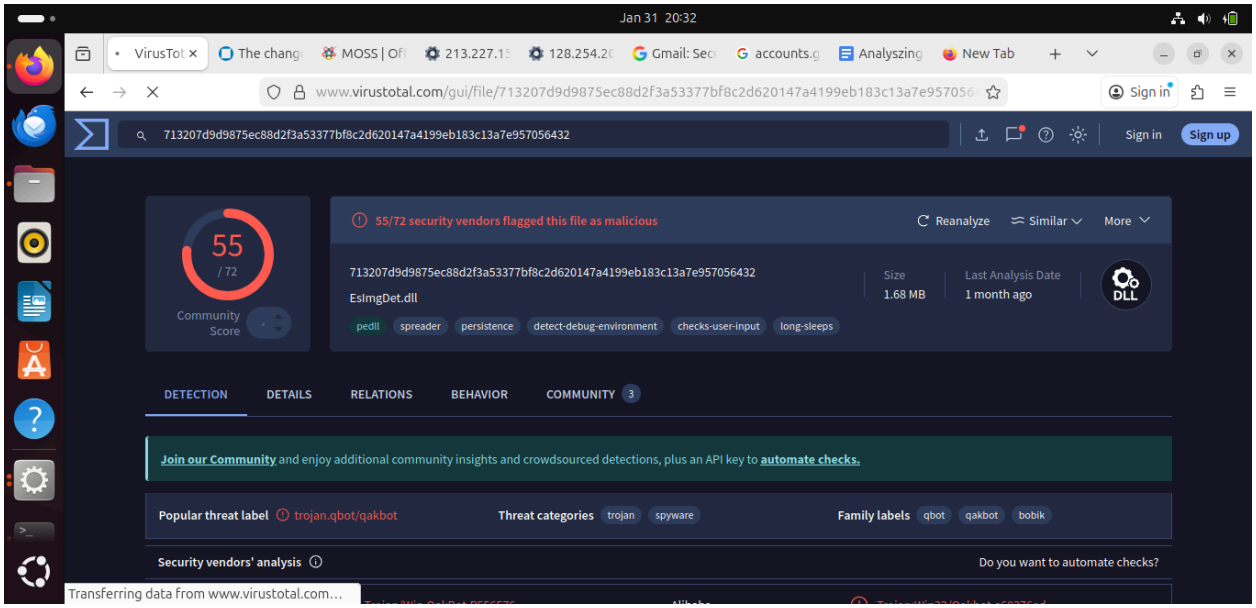
Inspection of the file contents revealed the **“MZ”** file signature, indicating the `.dat` file is actually a **Windows executable**.



Malware Confirmation

The file was exported and hashed.
VirusTotal results showed:

- Flagged by **50+ security vendors**
- Identified as **Qakbot malware**



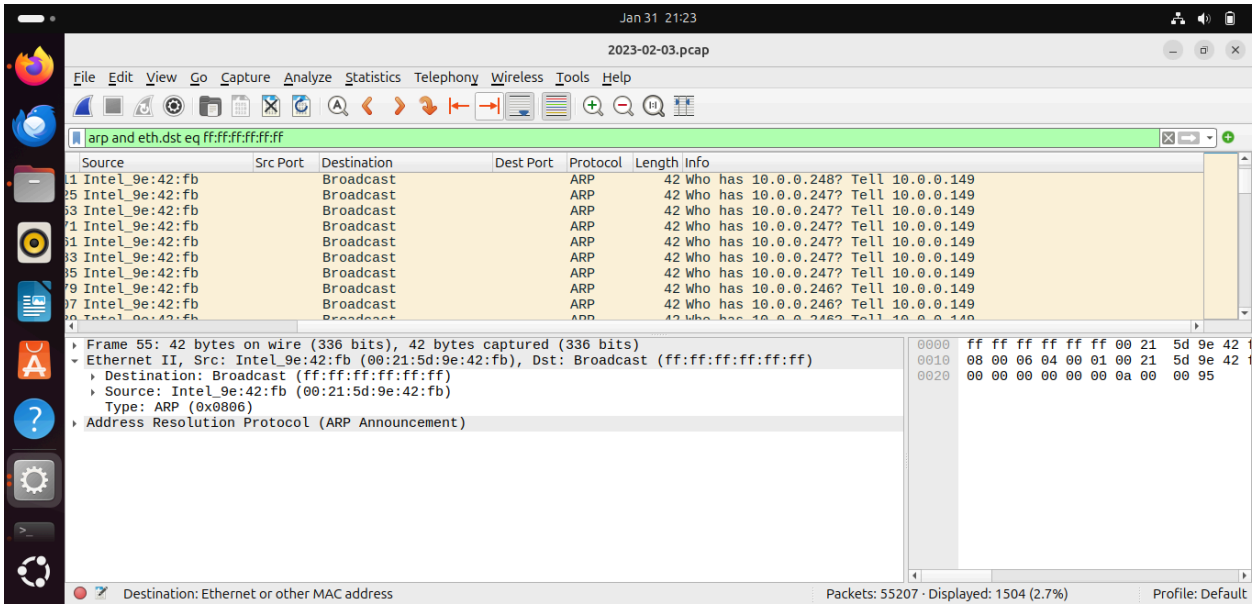
Post-Infection Behavior — ARP Scanning

Qakbot is known for network discovery and lateral movement.

Filter used:

```
arp && eth.dst == ff:ff:ff:ff:ff:ff
```

Host **10.0.0.149** generated numerous ARP broadcast requests, indicating **network scanning activity**.

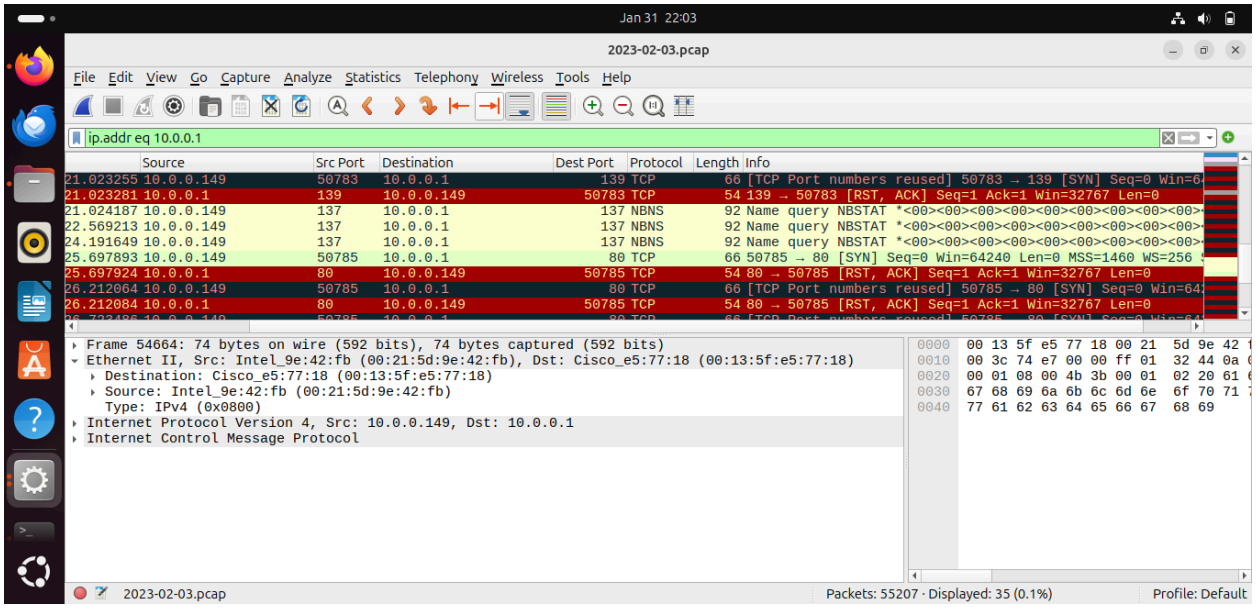


ICMP & Port Scanning Activity

Two systems responded to network probing:

- `10.0.0.1`
- `10.0.0.6`

Filtering traffic for these IPs revealed multiple **TCP SYN packets**, indicating **port scanning attempts**.



SMTP Credential Exposure

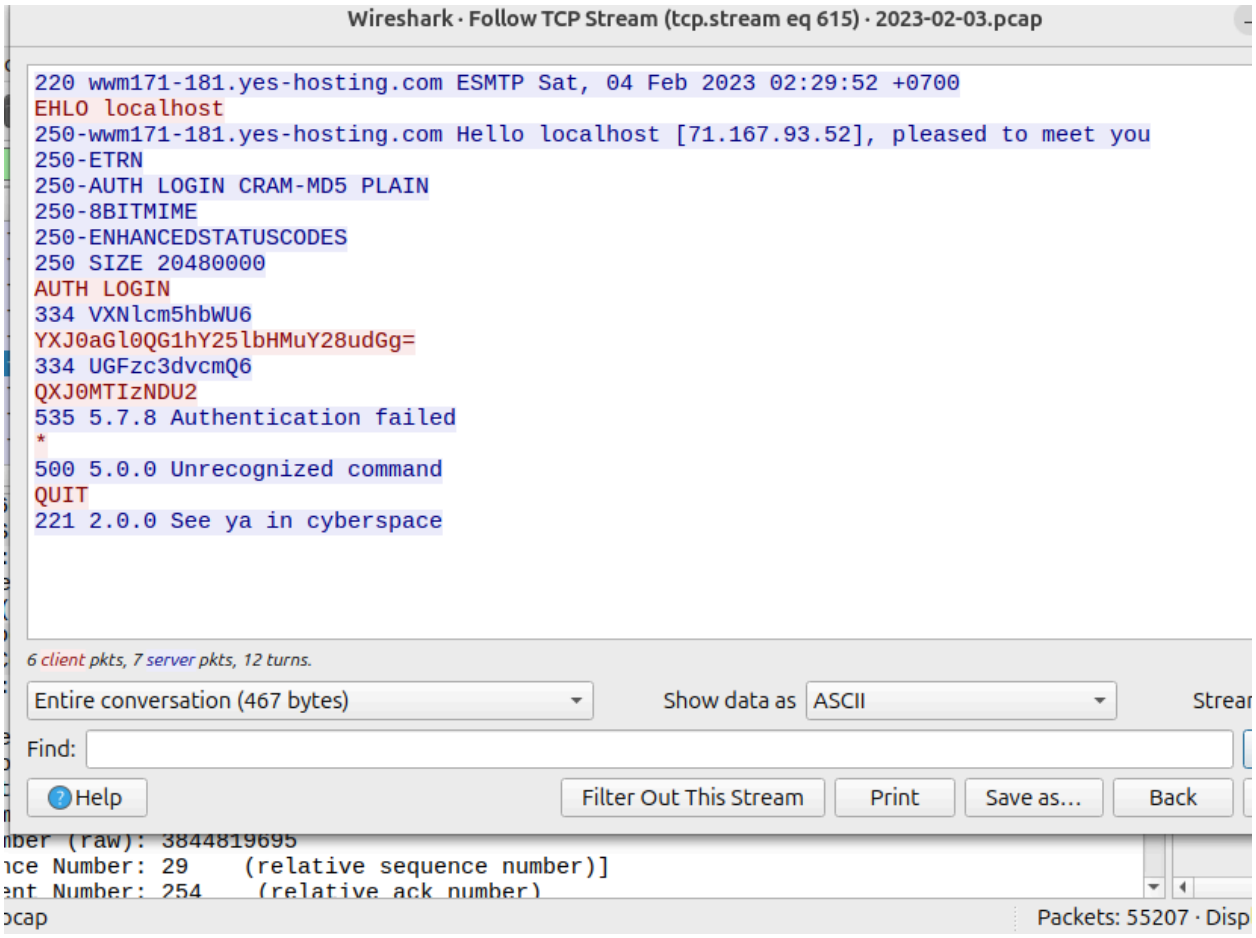
SMTP traffic analysis showed:

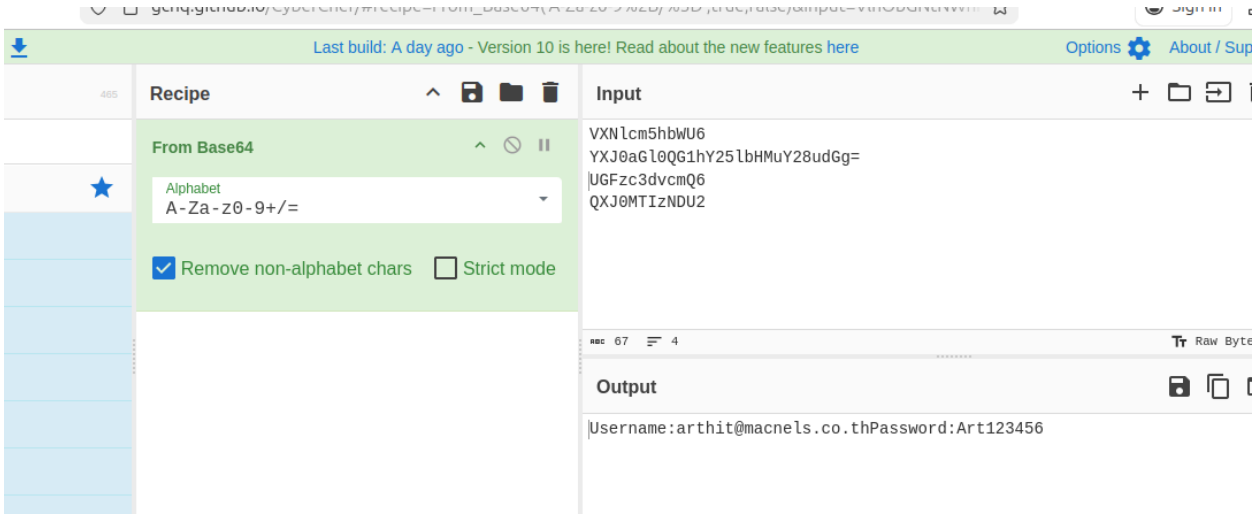
- AUTH LOGIN attempts
- Base64 encoded credentials transmitted in plaintext

Decoded credentials:

- **Username:** arthit@macnels.co.th
- **Password:** Art123456

Although authentication failed, the credentials were exposed and may be compromised.

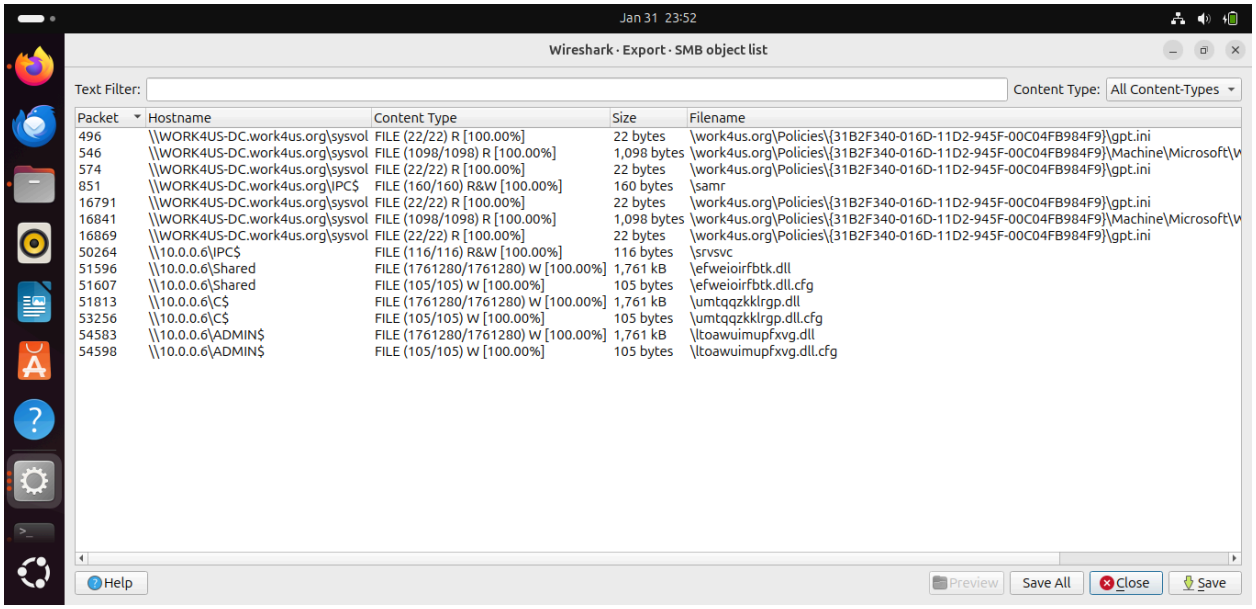

Wireshark · Follow TCP Stream (tcp.stream eq 615) · 2023-02-03.pcap
220 wwm171-181.yes-hosting.com ESMTP Sat, 04 Feb 2023 02:29:52 +0700
EHLO localhost
250-wwm171-181.yes-hosting.com Hello localhost [71.167.93.52], pleased to meet you
250-ETRN
250-AUTH LOGIN CRAM-MD5 PLAIN
250-8BITMIME
250-ENHANCEDSTATUSCODES
250 SIZE 20480000
AUTH LOGIN
334 VXNlcm5hbWU6
YXJ0aGl0QG1hY25lbHMuY28udGg=
334 UGFzc3dvcmQ6
QXJ0MTIzNDU2
535 5.7.8 Authentication failed
*
500 5.0.0 Unrecognized command
QUIT
221 2.0.0 See ya in cyberspace
6 client pkts, 7 server pkts, 12 turns.
Entire conversation (467 bytes)
Show data as ASCII
Find:
Help
Filter Out This Stream
Print
Save as...
Back
ber (raw): 3844819695
nce Number: 29 (relative sequence number)]
ent Number: 254 (relative ack number)
pcap
Packets: 55207 · Disp

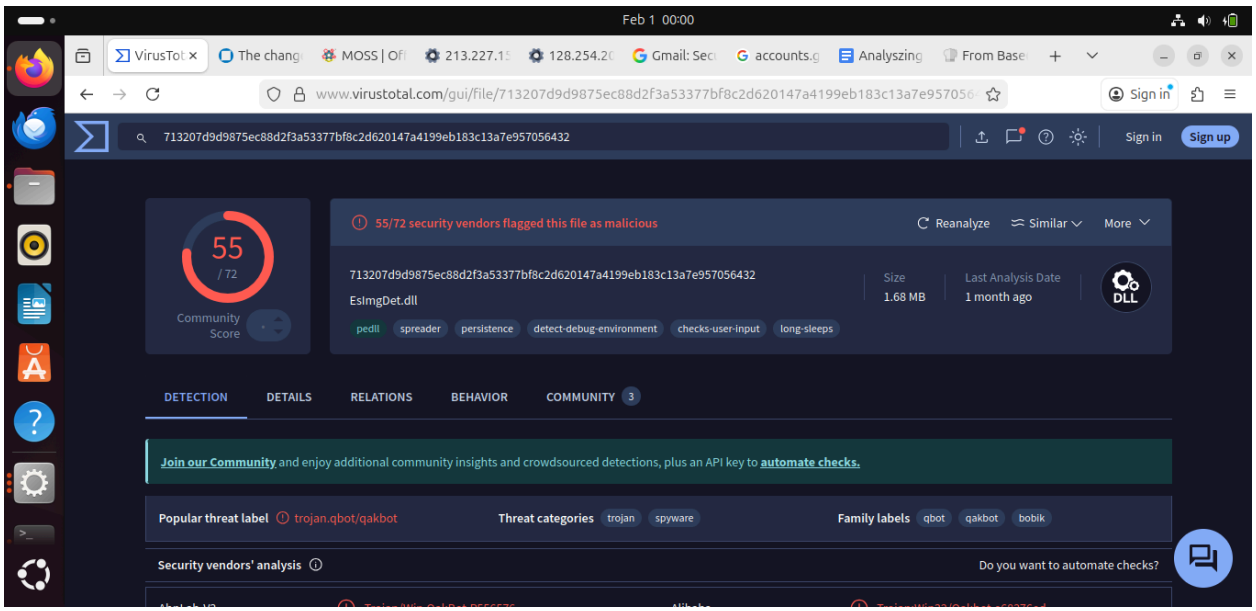

Last build: A day ago - Version 10 is here! Read about the new features here
Options
About / Sup
Recipe
From Base64
Alphabet
A-Za-z0-9+/=
Remove non-alphabet chars
Strict mode
Input
VXNlcm5hbWU6
YXJ0aGl0QG1hY25lbHMuY28udGg=
UGFzc3dvcmQ6
QXJ0MTIzNDU2
Output
Username:arthit@macnels.co.thPassword:Art123456

SMB Malware Propagation

SMB traffic analysis showed file transfers. Exported files revealed:

- Suspicious DLL files with random naming patterns
- Hash analysis matched **Qakbot malware**





Indicators of Compromise (IOCs)

Type	Value
Infected Host	10.0.0.149
Malware Family	Qakbot
Malicious File	86607.dat
Protocol Used	HTTP
Post-Infection Activity	ARP scanning, Port scanning, SMB propagation
Compromised Credentials	arthit@macnels.co.th / Art123456

Recommended Mitigations

- Immediately isolate host **10.0.0.149** from the network
- Reset and invalidate exposed credentials
- Block the malicious external IP address at firewall level
- Scan all network hosts for Qakbot-related indicators
- Monitor SMB traffic for abnormal file transfers
- Implement email security controls to prevent credential exposure
- Enforce HTTPS and encrypted protocols where possible

Conclusion

This investigation uncovered a full malware infection lifecycle:

1. Malicious file download via HTTP
2. Execution of disguised executable
3. Network reconnaissance via ARP scanning
4. Port scanning of internal hosts
5. Credential exposure through SMTP
6. Malware propagation using SMB

The observed behavior strongly aligns with **Qakbot infection patterns**, demonstrating the importance of traffic analysis in detecting and responding to network-based threats.