

Incident Investigation Report

CyberDefenders CTF – *Poisoned Credentials*

1. Introduction

This report documents the investigation and analysis of the **Poisoned Credentials** challenge from CyberDefenders.

The objective of the challenge was to investigate a suspected network security incident involving **credential poisoning through name resolution protocols**, identify affected systems, determine compromised credentials, and understand the attacker's activity using network traffic analysis.

The investigation was conducted using a provided **PCAP file** and focused on identifying malicious abuse of Windows authentication mechanisms.

Key Concepts Covered

- . Blue Team Skills - Focuses on defending networks and analyzing attacks
 - . Network Forensics - investigating network traffic to find malicious activity
 - . PCAP Analysis - Analyze a packet capture (.pcap) file (Wireshark)
 - . Credential Theft Attacks - scenario simulates stealing credentials by poison
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2. What This Challenge Is About (In Simple Terms)

This challenge simulates a common real-world internal network attack where:

- A user or system mistypes a hostname
- DNS resolution fails
- Windows falls back to LLMNR or NBT-NS
- A rogue machine responds falsely
- The victim system sends NTLM authentication data
- The attacker captures and reuses credentials over SMB

This attack does not require malware and often goes unnoticed in enterprise environments.

3. Short Explanation of LLMNR and NBT-NS

3.1 What is LLMNR?

LLMNR (Link-Local Multicast Name Resolution) is a Windows protocol used to resolve hostnames when DNS fails. It sends multicast name resolution requests to all devices on the local network.

3.2 What is NBT-NS?

NBT-NS (NetBIOS Name Service) is an older Windows name resolution protocol that works similarly by broadcasting hostname queries on the local network.

3.3 Why Are They Dangerous?

If a hostname is mistyped or does not exist:

- Any machine can respond
- Attackers can impersonate legitimate hosts
- NTLM authentication data can be captured
- Credentials can be relayed or reused

3.4 Why They Were Used in This Attack

In this incident:

- A mistyped hostname triggered LLMNR/NBT-NS
- A rogue machine sent fake responses
- Victim machines sent NTLM authentication data
- The attacker captured credentials and accessed SMB services

4. Tools Used

- Wireshark – for packet capture analysis
- Wireshark display filters (LLMNR, SMB, NTLMSSP)
- Follow UDP Stream
- Follow TCP Stream

5. Evidence Provided

- A PCAP file containing internal network traffic
- Captured LLMNR, SMB, and NTLM authentication packets related to the poisoning attack

6. Investigation Methodology & Steps

Step 1: Identify Name Resolution Traffic

- Applied LLMNR and NBNS filters in Wireshark
- Focused on traffic involving 192.168.232.162
- Looked for suspicious or mistyped hostname queries

Step 2: Identify Rogue Responses

- Analyzed LLMNR response packets
- Identified machines responding to mistyped queries
- Determined the rogue (attacker) machine

Step 3: Identify Affected Machines

- Identified all victim systems receiving poisoned responses
- Tracked rogue responses to multiple IP addresses

Step 4: Analyze SMB Authentication (*Rewritten*)

- Identified SMB2 Session Setup Request packets in Wireshark
- Recognized SMB authentication attempts initiated after LLMNR poisoning
- Inspected SMB2 Session Setup traffic for NTLMSSP authentication
- Extracted usernames from NTLMSSP_AUTH messages within SMB2

Step 5: Identify Accessed Host (*Rewritten*)

- Located SMB2 Session Setup Request and Response packets
 - Used Follow TCP Stream on SMB2 traffic
 - Inspected NTLMSSP authentication blobs inside SMB2 streams
 - Extracted the target machine hostname from SMB authentication data
 - Identified the internal system accessed by the attacker
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Questions, Answers, and How They Were Found

Question 1

What was the mistyped query made by 192.168.232.162?

Answer:

FILESHAARE

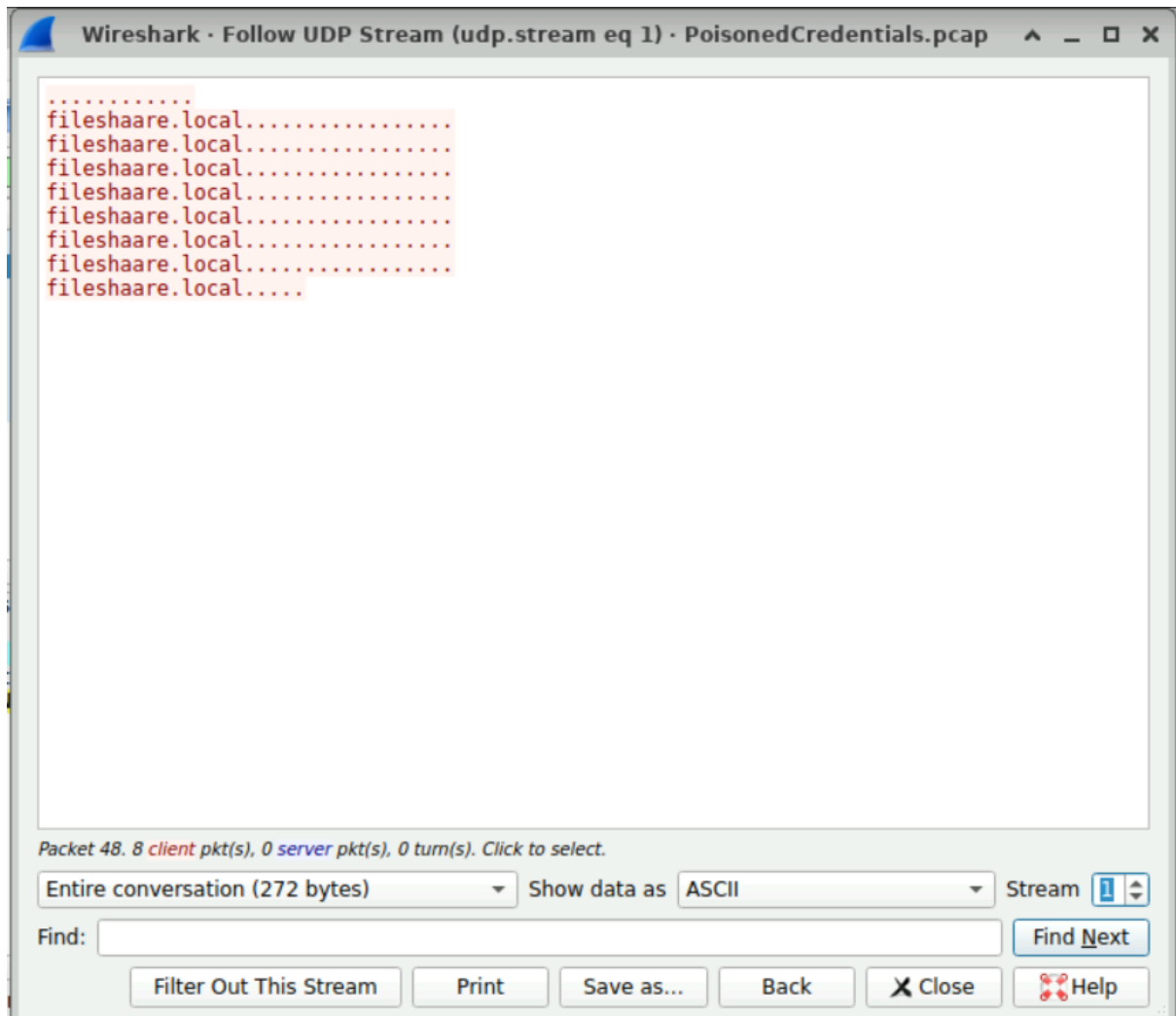
How it was found:

- Applied filter:

(llmnr || nbns) && ip.addr == 192.168.232.162

- Used Follow UDP Stream
- Observed a suspicious query for *fileshaare*
- Identified it as a mistyped version of *fileshare*
- The extra “a” confirmed a user/system typo

(llmnr nbns) && ip.addr == 192.168.232.162					
No.	Time	Source	Destination	Protocol	Length Info
47	74.354273	192.168.232.162	192.168.232.255	NBNS	92 Name query NB FILESHAARE<20>
51	74.355657	192.168.232.215	192.168.232.162	NBNS	104 Name query response NB 192.168.232.215
52	74.356170	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0xae2 A fileshaare
53	74.356581	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0x2ead AAAA fileshaare
55	74.360087	192.168.232.215	192.168.232.162	LLMNR	96 Standard query response 0xae2 A fileshaare A 192.168.
56	74.364501	192.168.232.215	192.168.232.162	LLMNR	108 Standard query response 0x2ead AAAA fileshaare AAAA fe
69	74.406407	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0x61e8 A fileshaare
70	74.407088	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0x9b15 AAAA fileshaare
71	74.409394	192.168.232.215	192.168.232.162	LLMNR	96 Standard query response 0x61e8 A fileshaare A 192.168.
72	74.413998	192.168.232.215	192.168.232.162	LLMNR	108 Standard query response 0x9b15 AAAA fileshaare AAAA fe
76	74.419239	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0xb281 A fileshaare
77	74.419852	192.168.232.162	224.0.0.252	LLMNR	70 Standard query 0x6108 AAAA fileshaare
79	74.422420	192.168.232.215	192.168.232.162	LLMNR	96 Standard query response 0xb281 A fileshaare A 192.168.
80	74.426719	192.168.232.215	192.168.232.162	LLMNR	108 Standard query response 0x6108 AAAA fileshaare AAAA fe
Frame 47: 92 bytes on wire (736 bits), 92 bytes captured (736 bits) on interface 0					
Ethernet II, Src: VMware fa:cb:e9 (00:0c:29:fa:cb:e9), Dst: Broadcast					
Internet Protocol Version 4, Src: 192.168.232.162, Dst: 192.168.232.255					
User Datagram Protocol, Src Port: 137, Dst Port: 137					
NetBIOS Name Service					
0000	ff ff ff ff ff 00 0c	29 fa cb e9 00 45 00)	
0010	00 4e c1 fb 00 00 80 11	22 b0 c0 a8 e8 a2 c0 a8	-N.....	"	
0020	eb ff 00 89 00 89 00 3a	6c 58 d2 9f 01 10 00 01	lX	
0030	00 00 00 00 00 00 20 45	47 45 4a 45 4d 45 46 46	E GE	
0040	44 45 49 45 42 45 42 46	43 45 46 43 41 43 41 43	DEIEBEBF	CEI	
0050	41 43 41 43 41 43 41 00	00 20 00 01	ACACACA	-	



Question 2

What is the IP address of the rogue machine?

Answer:

192.168.232.215

How it was found:

- Applied filter:

llmnr

- Identified packet number 56
- Observed LLMNR response from 192.168.232.215 to 192.168.232.162
- The rogue machine responded to the mistyped hostname *fileshaare*
- This unsolicited response confirmed rogue behavior

No.	Time	Source	Destination	Protocol	Length	Info
52	74.356170	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0xae2 A fileshaare
53	74.356581	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x2ead AAAA fileshaare
55	74.360087	192.168.232.215	192.168.232.162	LLMNR	96	Standard query response 0xae2 A fileshaare A 192.168.
56	74.364501	192.168.232.215	192.168.232.162	LLMNR	108	Standard query response 0x2ead AAAA fileshaare AAAA fe
69	74.406407	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x61e8 A fileshaare
70	74.407088	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x9b15 AAAA fileshaare
71	74.409394	192.168.232.215	192.168.232.162	LLMNR	96	Standard query response 0x61e8 A fileshaare A 192.168.
72	74.413998	192.168.232.215	192.168.232.162	LLMNR	108	Standard query response 0x9b15 AAAA fileshaare AAAA fe
76	74.419239	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0xb281 A fileshaare
77	74.419852	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x6108 AAAA fileshaare
79	74.422420	192.168.232.215	192.168.232.162	LLMNR	96	Standard query response 0xb281 A fileshaare A 192.168.
80	74.426719	192.168.232.215	192.168.232.162	LLMNR	108	Standard query response 0x6108 AAAA fileshaare AAAA fe
84	74.438101	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0xc4a3 A fileshaare
85	74.438618	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x1ce7 AAAA fileshaare

Question 3

What is the IP address of the second machine that received poisoned responses?

Answer:

192.168.232.176

How it was found:

- Continued analyzing LLMNR responses from 192.168.232.215
- Identified packet number 187
- Observed rogue response for mistyped hostname prinetr (*printer*)
- Destination IP was 192.168.232.176
- Confirmed as second victim machine

No.	Time	Source	Destination	Protocol	Length	Info
77	74.419852	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x6108 AAAA fileshaare
79	74.422420	192.168.232.215	192.168.232.162	LLMNR	96	Standard query response 0xb281 A fileshaare A 192.168.
80	74.426719	192.168.232.215	192.168.232.162	LLMNR	108	Standard query response 0x6108 AAAA fileshaare AAAA fe
84	74.438101	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0xc4a3 A fileshaare
85	74.438618	192.168.232.162	224.0.0.252	LLMNR	70	Standard query 0x1ce7 AAAA fileshaare
87	74.441497	192.168.232.215	192.168.232.162	LLMNR	96	Standard query response 0xc4a3 A fileshaare A 192.168.
88	74.445950	192.168.232.215	192.168.232.162	LLMNR	108	Standard query response 0x1ce7 AAAA fileshaare AAAA fe
168	254.179403	192.168.232.176	224.0.0.252	LLMNR	67	Standard query 0x4a65 A prinetr
169	254.179838	192.168.232.176	224.0.0.252	LLMNR	67	Standard query 0x5ae5 AAAA prinetr
171	254.182306	192.168.232.215	192.168.232.176	LLMNR	90	Standard query response 0x4a65 A prinetr A 192.168.232
172	254.186728	192.168.232.215	192.168.232.176	LLMNR	102	Standard query response 0x5ae5 AAAA prinetr AAAA fe80:
185	254.230440	192.168.232.176	224.0.0.252	LLMNR	67	Standard query 0x3188 A prinetr
186	254.230917	192.168.232.176	224.0.0.252	LLMNR	67	Standard query 0x567d AAAA prinetr
187	254.233162	192.168.232.215	192.168.232.176	LLMNR	90	Standard query response 0x3188 A prinetr A 192.168.232

Frame 171: 90 bytes on wire (720 bits), 90 bytes captured (720 bit	0000	00 0c 29 9c 01 34 00 0c	29 44	ca ef 08 00 45 00	..).4..)D
Ethernet II, Src: VMWare_44:ca:ef (00:0c:29:44:ca:ef), Dst: VMWare	0010	00 4c 21 be 40 00 40 11	c6 09	c0 a8 e8 d7 c0 a8	.L!:@.@..
Internet Protocol Version 4, Src: 192.168.232.215, Dst: 192.168.23	0020	e8 b0 14 eb e7 0f 00 38	2c 8f	4a 65 80 00 00 018..
User Datagram Protocol, Src Port: 5355, Dst Port: 59151	0030	00 01 00 00 00 00 07 70	72 69	6e 65 74 72 00 00p ri
Link-local Multicast Name Resolution (response)	0040	01 00 01 07 70 72 69 6e	65 74	72 00 00 01 00 01prin eti
	0050	00 00 00 1e 00 04 c0 a8	e8 d7	

Question 4

What is the username of the compromised account?

Answer:

janesmith

How it was found:

- Applied filter:

SMB2

- Identified packet number 242
- Observed SMB2 Session Setup with NTLMSSP_AUTH
- Extracted username from:

cybercactus.local\janesmith

- Confirmed credentials were sent to rogue machine

No.	Time	Source	Destination	Protocol	Length	Info
227	347.661133	192.168.232.176	192.168.232.148	SMbr2	126	T6 Ter Disconnect Request
228	347.661407	192.168.232.148	192.168.232.176	SMbr2	126	T6 Ter Disconnect Response
229	347.661671	192.168.232.176	192.168.232.148	SMbr2	126	Session Logout Request
230	347.661777	192.168.232.148	192.168.232.176	SMbr2	126	Session Logout Response
236	398.431475	192.168.232.176	192.168.232.215	SMbr2	386	Negotiate Protocol Response
238	398.436927	192.168.232.215	192.168.232.176	SMbr2	266	Negotiate Protocol Response
239	398.451663	192.168.232.176	192.168.232.215	SMbr2	388	Negotiate Protocol Response
240	398.465476	192.168.232.215	192.168.232.176	SMbr2	240	Session Setup Request, NTLMSSP NEGOTIATE
241	398.466646	192.168.232.176	192.168.232.215	SMbr2	453	Session Setup Response, Error: STATUS_MORE_PROCESSING_REQUIRED, NTLMSSP CHALLENGE
242	398.476397	192.168.232.215	192.168.232.176	SMbr2	598	Session Setup Request, NTLMSSP AUTH: cybercrack.local\jamesmith
250	398.591762	192.168.232.176	192.168.232.215	SMbr2	139	Session Setup Response
251	398.603958	192.168.232.215	192.168.232.176	SMbr2	238	Encrypted SMB3
252	398.605390	192.168.232.176	192.168.232.215	SMbr2	190	Encrypted SMB3
257	398.618720	192.168.232.215	192.168.232.176	SMbr2	178	Encrypted SMB3
258	398.619076	192.168.232.176	192.168.232.215	SMbr2	178	Encrypted SMB3

Question 5

What is the hostname of the machine accessed via SMB?

Answer:

ACCOUNTINGPC

How it was found:

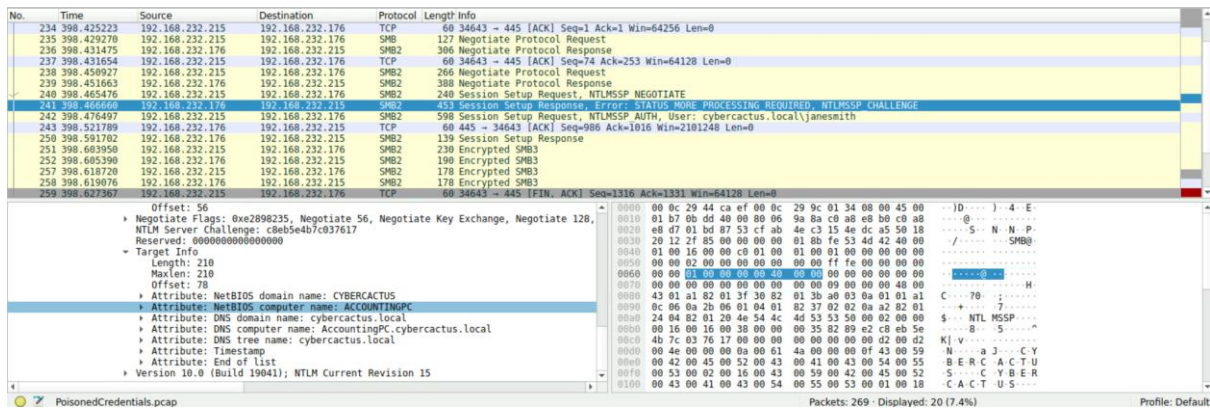
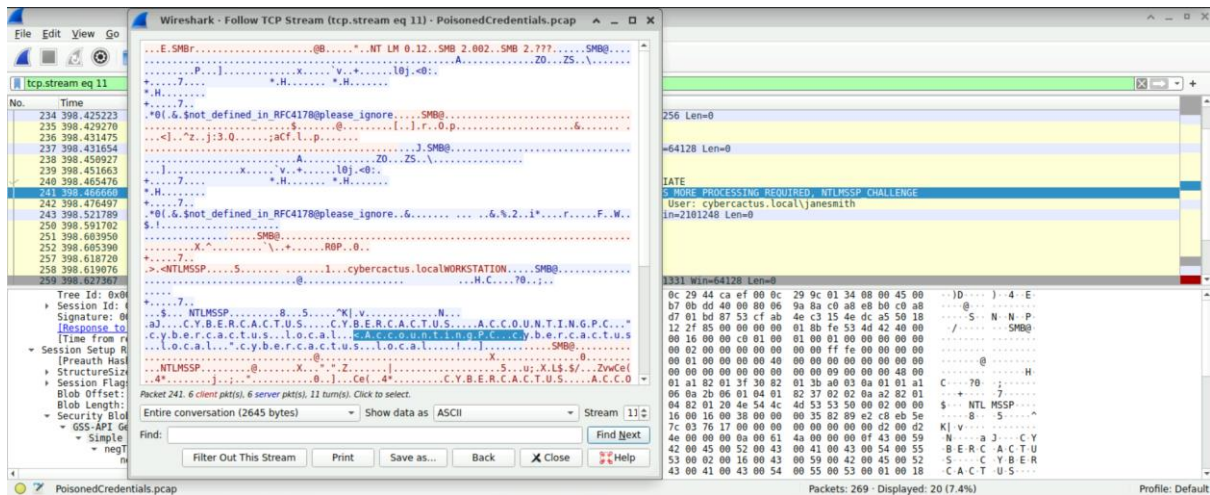
- Applied filter:

Smb2

- Followed TCP Stream of SMB 2 traffic
- Manually inspected NTLMSSP authentication data
- Extracted hostname string:

ACCOUNTINGPC

- Confirmed internal host accessed by attacker



8. Key Findings

- LLMNR was abused for name resolution poisoning
- A rogue machine (192.168.232.215) responded to mistyped queries
- Multiple victim machines were affected
- NTLM authentication data was captured
- Valid user credentials were exposed
- SMB access was performed using captured credentials
- The attacker accessed ACCOUNTINGPC

9. Conclusion

The investigation confirms a successful LLMNR poisoning attack within the internal network. The attacker exploited mistyped hostname queries to impersonate network resources and capture NTLM authentication data.

Using the captured credentials, the attacker was able to authenticate over SMB and access an internal system, demonstrating how insecure name resolution protocols can lead to serious compromises without deploying malware.

10. Lessons Learned

- LLMNR and NBT-NS are high-risk legacy protocols
- Mistyped hostnames can expose credentials
- NTLM authentication can be captured and abused
- Internal attacks may not trigger malware alerts
- Network monitoring is critical for detection
- Successful logins must be monitored

11. Recommendations

- Disable LLMNR and NBT-NS across the enterprise
 - Enforce SMB signing
 - Monitor NTLM authentication events
 - Use DNS exclusively for name resolution
 - Implement network segmentation
 - Educate users about internal network security risks
-