



PENETRATION TEST  
REPORT - BYTEGUARD

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# EXECUTIVE SUMMARY

Welcome to ByteGuard, your trusted partner in cybersecurity and programming consulting. At ByteGuard, we specialize in protecting your digital assets and enhancing your technological capabilities with cutting-edge solutions. Our expert team delivers comprehensive services, from threat assessment and incident response to custom software development and system integration. Secure your future with ByteGuard – where technology meets trust.

Byteguard (CLIENT) engaged IOSINT, LLC to conduct penetration testing against the security controls within their information environment to provide a practical demonstration of those controls' effectiveness as well as to provide an estimate of their susceptibility to exploitation and/or data breaches. The test was performed in accordance with IOSINT Information Security Penetration Testing Method.

IOSINT's Information Security Analyst (ISA) conducted all testing in coordination with CLIENTs Information Technology (IT) staff members to ensure safe, orderly, and complete testing within the approved scope.

CLIENT's information environment is NOT protected by endpoint antivirus and administrative, putting the CLIENT at great risk to compliance violation and potentially subject to large fines and/or loss of business reputation.

**This report presents the findings of an exercise conducted to evaluate the impact of firewall activation on a Windows XP machine with respect to external service scans in a LAN network. The primary objective was to understand how enabling the firewall influences the visibility and accessibility of network services from an external perspective.**

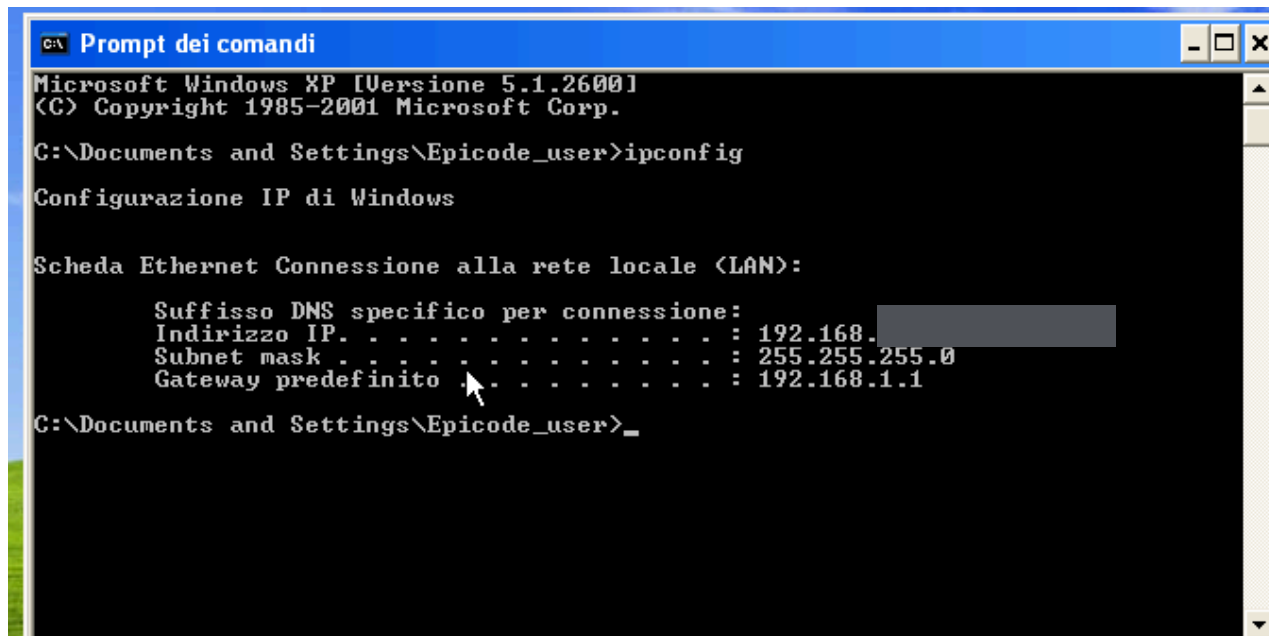
# Penetration Test Estimate

Project Duration: 1 week (5 working days)
Team: 3 people
Hourly Rate: 100 euros/hour
Work Hours:
Each team member: 40 hours
Total team hours: 120 hours
Labor Cost: 12,000 euros
Tools Used:
Total tool cost: 450 euros/10 days
Total Project Cost: 12,450 euros
-----
Cost Breakdown:
1. Labor Cost: 12,000 euros
2. Tool Costs: 450 euros
-----
<b>Total Estimate: 12,450 euros</b>

# PENTEST - LOCAL AREA NETWORK

## LAN NETWORK

Windows XP address byteguard host:



```
C:\> Prompt dei comandi
Microsoft Windows XP [Versione 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Epicode_user>ipconfig

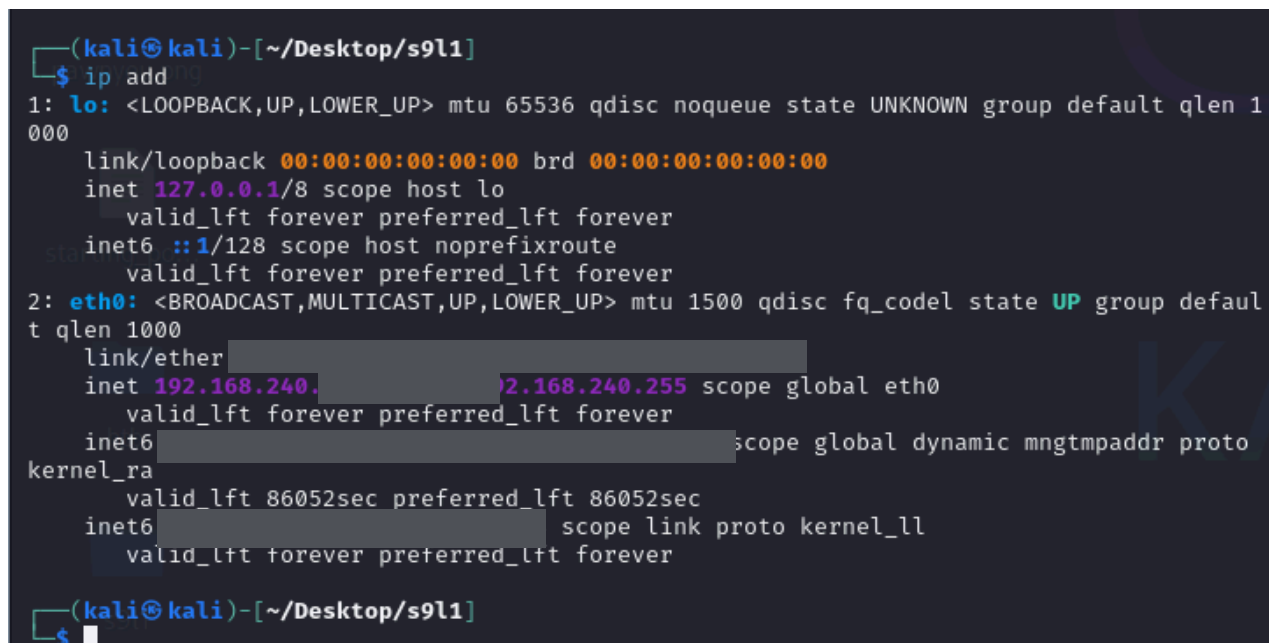
Configurazione IP di Windows

Scheda Ethernet Connessione alla rete locale (LAN):

    Suffisso DNS specifico per connessione:
    Indirizzo IP. . . . . : 192.168.1.1
    Subnet mask . . . . . : 255.255.255.0
    Gateway predefinito . . . . . : 192.168.1.1

C:\Documents and Settings\Epicode_user>
```

IOSINT host attacker

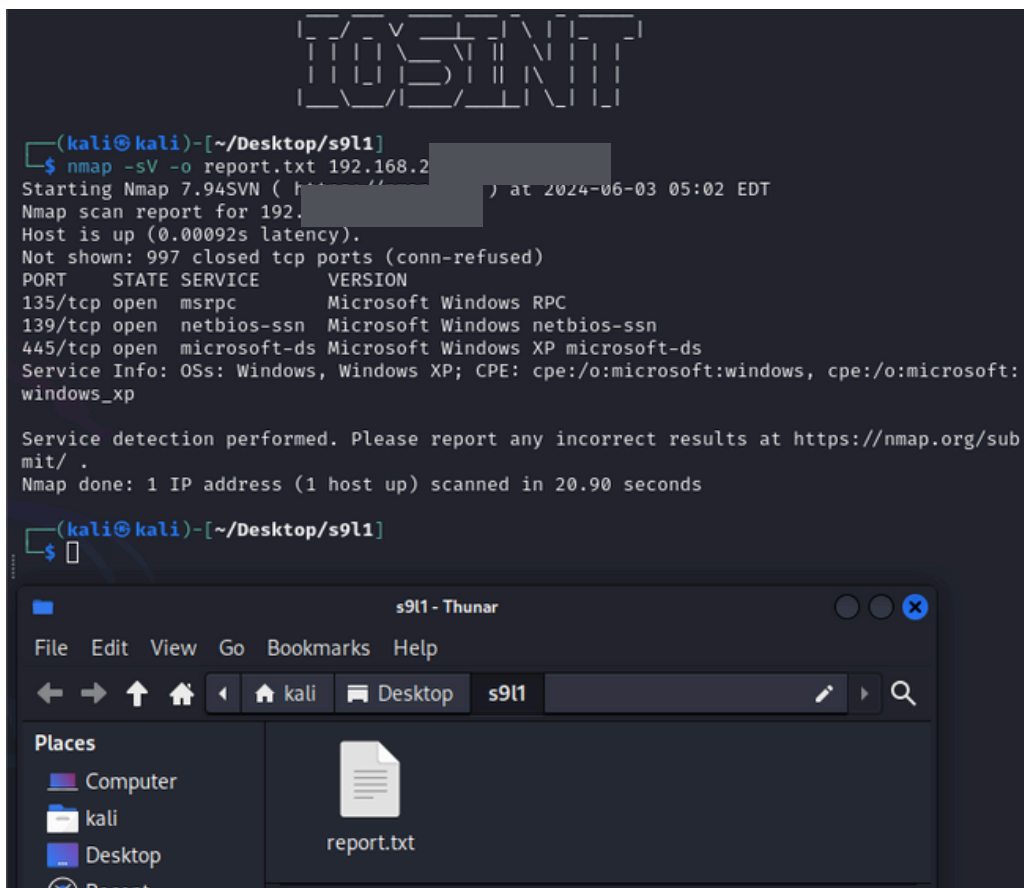
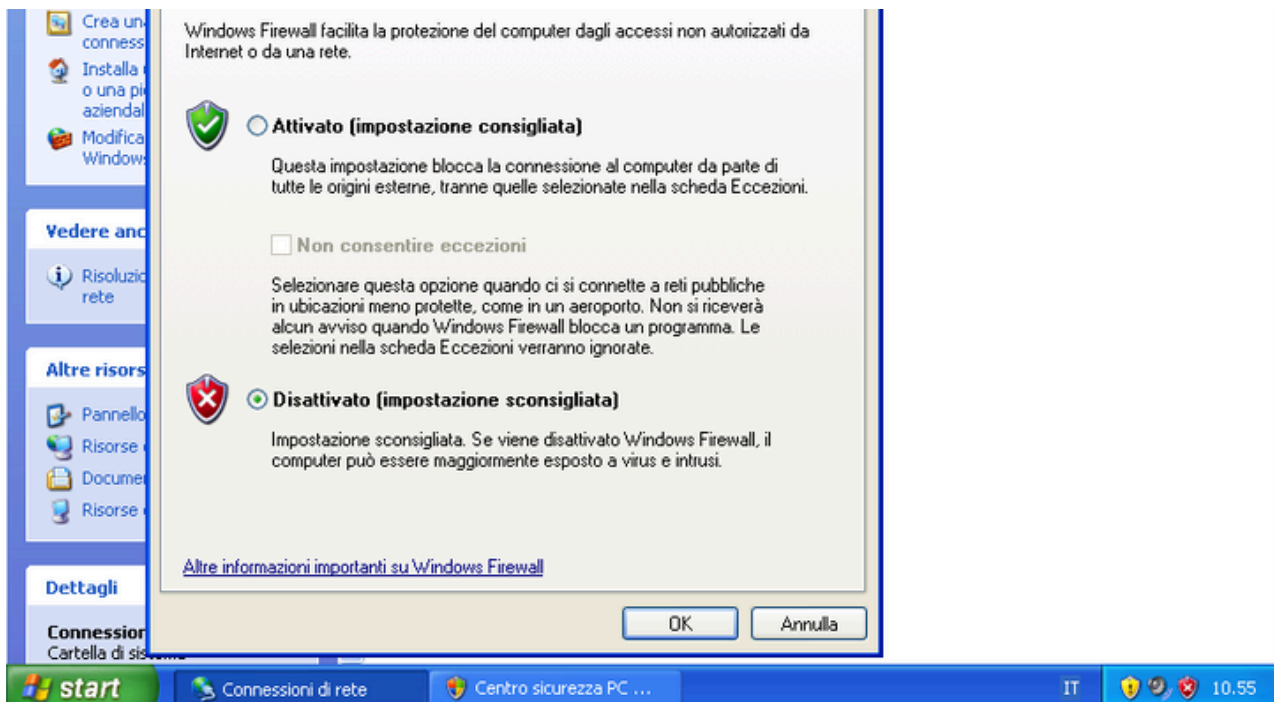


```
(kali@kali)-[~/Desktop/s9l1]
$ ip netns exec lo
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default
t qlen 1000
    link/ether 00:0c:29:14:00:00 brd ff:ff:ff:ff:ff:ff
    inet 192.168.240.1/24 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 2001:db8::1/64 scope global dynamic mngtmpaddr proto
kernel_ra
        valid_lft 86052sec preferred_lft 86052sec
    inet6 2001:db8::1/64 scope link proto kernel_ll
        valid_lft forever preferred_lft forever

(kali@kali)-[~/Desktop/s9l1]
$
```

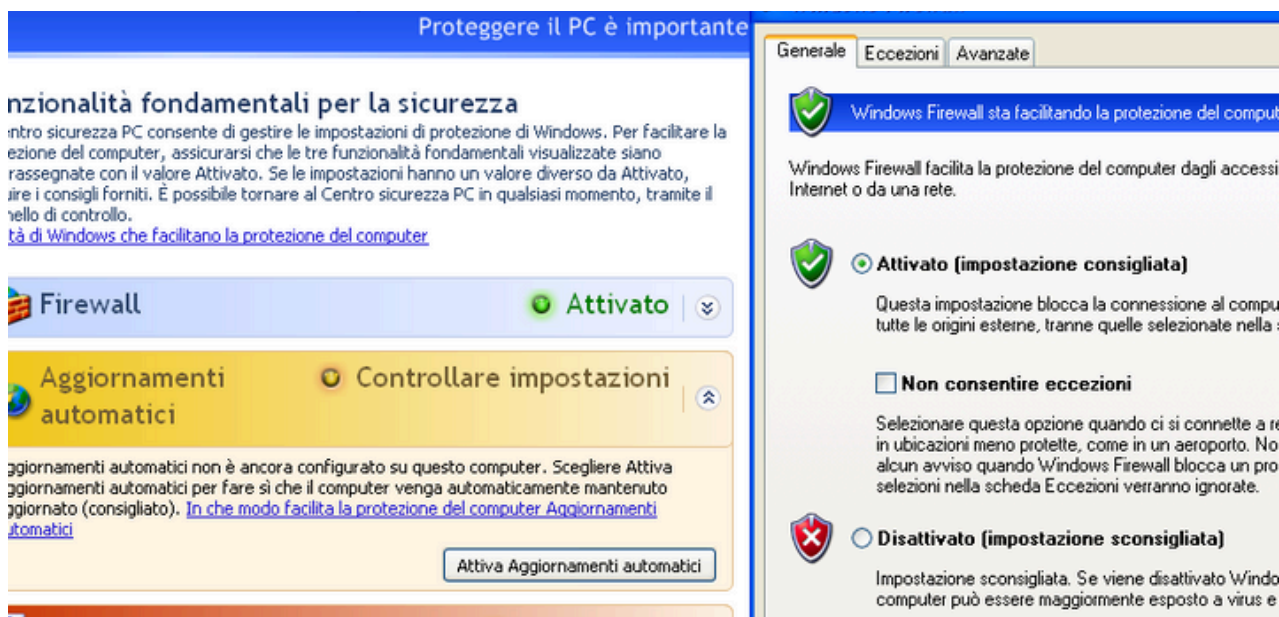
# PENTEST

## WINDOWS FIREWALL DISABLE

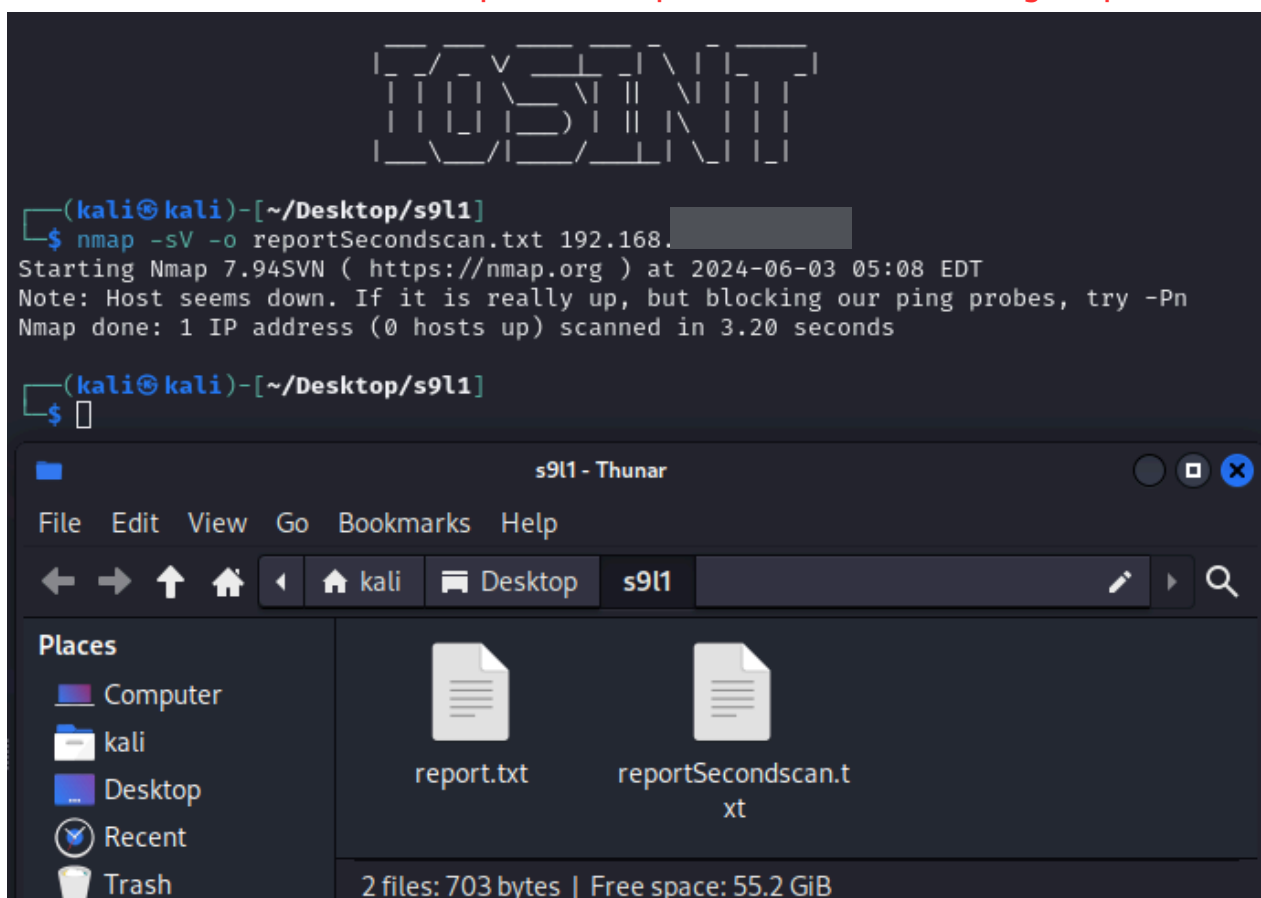


# PENTEST

## WINDOWS FIREWALL ENABLE



5. Perform a second scan - `nmap -sV -o reportSecondscan.txt <target ip>`



# PENTEST

Identify differences of reports:

Closed Ports: Ports that were previously open may now be closed.

Filtered Ports: Some ports may now appear as "filtered," meaning the firewall is blocking the scan attempts.

Service Inaccessibility: Certain services that were accessible before may now be inaccessible due to firewall rules.

## report.txt

```
# Nmap 7.94SVN scan initiated Mon Jun  3 04:21:55 2024 as: nmap -sV -o scanRep 192.168.1.100
Nmap scan report for 192.168.1.100
Host is up (0.0018s latency).
Not shown: 997 closed tcp ports (conn-refused)
PORT      STATE SERVICE      VERSION
135/tcp   open  msrpc        Microsoft Windows RPC
139/tcp   open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp   open  microsoft-ds Microsoft Windows XP microsoft-ds
Service Info: OSs: Windows, Windows XP; CPE: cpe:/o:microsoft:windows, cpe:/o:microsoft:windows_xp

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
# Nmap done at Mon Jun  3 04:22:15 2024 -- 1 IP address (1 host up) scanned in 19.89 seconds
```

## reportSecondscan.txt

```
# Nmap 7.94SVN scan initiated Mon Jun  3 04:27:55 2024 as: nmap -sV -o scanRepFirewallOn 192.168.1.100
# Nmap done at Mon Jun  3 04:27:58 2024 -- 1 IP address (0 hosts up) scanned in 3.42 seconds
```

## Results

### report.txt scan (Firewall Disabled)

- The initial scan detected several open ports and associated services, indicating that these services were accessible from an external network when the firewall was disabled.
- Example findings from report.txt:
  - Port 135/tcp (msrpc) - Microsoft Windows RPC
  - Port 139/tcp (NetBIOS-SSN) - Microsoft Windows netbios-scan
  - Port 445/tcp (microsoft-ds) - Microsoft Windows XP microsoft-ds

### reportSecondscan.txt (Firewall Enabled)

- The secondary scan suggests that the firewall is likely blocking ICMP echo requests (pings) and possibly other probes from Nmap. This can make the host appear offline or unreachable, even if it is actually up and running.



# PENTEST - BEST PRACTICE

The activation of the firewall on the Windows XP machine had a pronounced impact on the visibility and accessibility of network services. The initial scan with the firewall disabled revealed multiple open ports and services, which were subsequently blocked when the firewall was enabled. This exercise demonstrates the critical role of firewalls in network security, effectively preventing unauthorized access and potential attacks by controlling inbound and outbound traffic.

By leveraging firewall configurations, organizations can safeguard their networks against external threats, ensuring that only essential services are exposed while minimizing the risk of exploitation.

## Recommendations

- **Regular Firewall Audits:** Periodically review and update firewall rules to ensure optimal security configurations.
- **Service Minimization:** Disable or restrict access to non-essential services to reduce the attack surface.
- **Continuous Monitoring:** Implement continuous monitoring and logging to detect and respond to suspicious activities promptly.

By following these recommendations, organizations can enhance their network security and protect against evolving cyber threats.

# DISASTER IMPACT ANALYSIS REPORT

ByteGuard has undertaken a quantitative evaluation of the impact of specific disasters on its assets. This report calculates the annual loss the company would suffer in the event of:

Earthquake, fire and flood on the asset "primary building"

Earthquake, fire and flood on the asset "secondary building"

Earthquake, fire and flood on the asset "datacenter"

## Business Continuity and Disaster Recovery

Business continuity refers to the strategies and planning used by an organization to ensure that essential business functions can continue during and after a disaster. It involves proactive planning to avoid and mitigate risks associated with a disruption of operations.

Disaster recovery is a subset of business continuity focusing on the recovery of IT systems and data after a disaster. It involves specific steps and processes to restore normal operations as quickly as possible after an event that causes significant disruption.

## Calculating Annual Losses

To calculate the annual loss (ALE - Annualized Loss Expectancy), we use the formula:

$$ALE = SLE \times ARO$$

Where:

$$SLE \text{ (Single Loss Expectancy)} = AV \text{ (Asset Value)} \times EF \text{ (Exposure Factor)}$$

$$ARO \text{ (Annual Rate of Occurrence)} = 1 / \text{Expected number of years between occurrences}$$

	Primary Building	Single Loss Expectancy	Annualized Loss Expectancy
Earthquake	350000	280000	8400
Fire	350000	210000	10500
Flood	350000	192500	3850

	Secondary Building	Single Loss Expectancy	Annualized Loss Expectancy
Earthquake	150000	120000	3600
Fire	150000	75000	3750
Flood	150000	60000	1200

	Datacenter	Single Loss Expectancy	Annualized Loss Expectancy
Earthquake	100000	95000	2850
Fire	100000	60000	3000
Flood	100000	35000	700

## SUMMARY OF ANNUAL LOSSES

Earthquake on "primary building": €8400/year  
Fire on "primary building": €10500/year  
Flood on "primary building": €3850/year  
Earthquake on "secondary building": €3600/year  
Fire on "secondary building": €3750/year  
Flood on "secondary building": €1200/year  
Earthquake on "datacenter": €2850/year  
Fire on "datacenter": €3000/year  
Flood on "datacenter": €700/year

## BC / DC BEST PRACTICE FOR BYTEGUARD

### Business Continuity

- Hyperconvergence
- Multi-node Cluster
- Cold Site, Hot Site
- Dynamic Routing
- Multiple Internet Lines
- Clustered Firewall
- Asynchronous Replication
- Fault Tolerance
- HA (High Availability)
- VMware (example)

### Disaster Recovery

- Backup NAS/Storage
- Cloud
- Offline Disks
- Remote Disks/NAS
- Veeam (example)

Best practices for Business Continuity (BC) and Disaster Recovery (DR) include regular data backups, maintaining redundant systems, using cloud solutions, implementing multi-node clusters, ensuring dynamic routing, and testing recovery procedures frequently. Utilize reliable tools like Veeam, and adhere to the 3-2-1 backup rule for optimal data protection.

# WIRESHARK ANALYSIS

ByteGuard also requested us to analyze a Wireshark pcap file to understand if there are any specific activities or if there is an attacker present. Wireshark pcap files contain network traffic data, and analyzing them can reveal any suspicious or malicious activities occurring within the network. By examining the packet capture data, we can identify unusual patterns, unauthorized access attempts, or any other indicators of a potential security breach. This analysis helps us determine the presence of an attacker and take appropriate measures to safeguard the network and its assets.

To begin the intervention, we asked ourselves three main questions to conduct the analysis

## **1.- Identify eventually IOC:**

TCP requests

## **2.- Based on the found IOC's, make hypotheses about the potential attack vectors used:**

The attacker with the IP 192.168.200.100 is scanning the machine with IP address 192.168.200.150

## **3.- Recommend an action to reduce impacts of the attack:**

Change the firewall policy to block access to the machine with IP address 192.168.200.150 from the attacker with IP address 192.168.200.100

The capture reveals a high number of TCP (SYN) requests targeting various destination ports, suggesting that the host 192.168.200.100 might be scanning the host 192.168.200.150. This is evidenced by some lines in the capture showing [SYN+ACK] responses from the target, indicating open ports, and [RST+ACK] responses, indicating closed ports. To mitigate this, firewall rules could be implemented on the target host to block incoming requests from 192.168.200.100.

# WIRESHARK PCAP FILE SCREENSHOTS

Example of the attackers ip 192.168.200.100 scanning differents ports of the target ip 192.168.200.150

No.	Time	Source	Destination	Protocol	Len	Info
2	23.764214995	192.168.200.100	192.168.200.150	TCP	74	53860 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
3	23.764287789	192.168.200.100	192.168.200.150	TCP	74	33876 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
12	36.774143445	192.168.200.100	192.168.200.150	TCP	74	41304 → 23 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
13	36.774218116	192.168.200.100	192.168.200.150	TCP	74	56120 → 111 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
14	36.774257841	192.168.200.100	192.168.200.150	TCP	74	33878 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
15	36.774366305	192.168.200.100	192.168.200.150	TCP	74	58636 → 554 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
16	36.774405627	192.168.200.100	192.168.200.150	TCP	74	52358 → 135 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
17	36.774535534	192.168.200.100	192.168.200.150	TCP	74	46138 → 993 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
18	36.774614776	192.168.200.100	192.168.200.150	TCP	74	41182 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
29	36.775337800	192.168.200.100	192.168.200.150	TCP	74	59174 → 113 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
30	36.775386694	192.168.200.100	192.168.200.150	TCP	74	55656 → 22 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
31	36.775524204	192.168.200.100	192.168.200.150	TCP	74	53062 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
42	36.776179338	192.168.200.100	192.168.200.150	TCP	74	50684 → 199 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
43	36.776233880	192.168.200.100	192.168.200.150	TCP	74	54220 → 995 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
44	36.776330610	192.168.200.100	192.168.200.150	TCP	74	34648 → 587 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
45	36.776385694	192.168.200.100	192.168.200.150	TCP	74	33842 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
46	36.776402500	192.168.200.100	192.168.200.150	TCP	74	49814 → 256 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
49	36.776478201	192.168.200.100	192.168.200.150	TCP	74	46990 → 139 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
50	36.776496366	192.168.200.100	192.168.200.150	TCP	74	33206 → 143 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
51	36.776512221	192.168.200.100	192.168.200.150	TCP	74	60632 → 25 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
52	36.776568606	192.168.200.100	192.168.200.150	TCP	74	49654 → 110 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
53	36.776671271	192.168.200.100	192.168.200.150	TCP	74	37282 → 53 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
54	36.776720715	192.168.200.100	192.168.200.150	TCP	74	54898 → 500 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
56	36.776843423	192.168.200.100	192.168.200.150	TCP	74	51534 → 487 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
70	36.777143014	192.168.200.100	192.168.200.150	TCP	74	56990 → 707 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
71	36.777186821	192.168.200.100	192.168.200.150	TCP	74	35638 → 436 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
72	36.777302991	192.168.200.100	192.168.200.150	TCP	74	34120 → 98 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
73	36.777337934	192.168.200.100	192.168.200.150	TCP	74	49780 → 78 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
76	36.777473018	192.168.200.100	192.168.200.150	TCP	74	36138 → 580 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
77	36.777522494	192.168.200.100	192.168.200.150	TCP	74	52428 → 962 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
80	36.777645027	192.168.200.100	192.168.200.150	TCP	74	41874 → 764 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
81	36.777688898	192.168.200.100	192.168.200.150	TCP	74	51506 → 435 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
90	36.778179978	192.168.200.100	192.168.200.150	TCP	74	51450 → 148 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
91	36.778209161	192.168.200.100	192.168.200.150	TCP	74	48448 → 806 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
92	36.778307830	192.168.200.100	192.168.200.150	TCP	74	54566 → 221 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
96	36.778482791	192.168.200.100	192.168.200.150	TCP	74	42420 → 1007 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
97	36.778591226	192.168.200.100	192.168.200.150	TCP	74	34646 → 206 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105
98	36.778614095	192.168.200.100	192.168.200.150	TCP	74	54202 → 131 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=8105

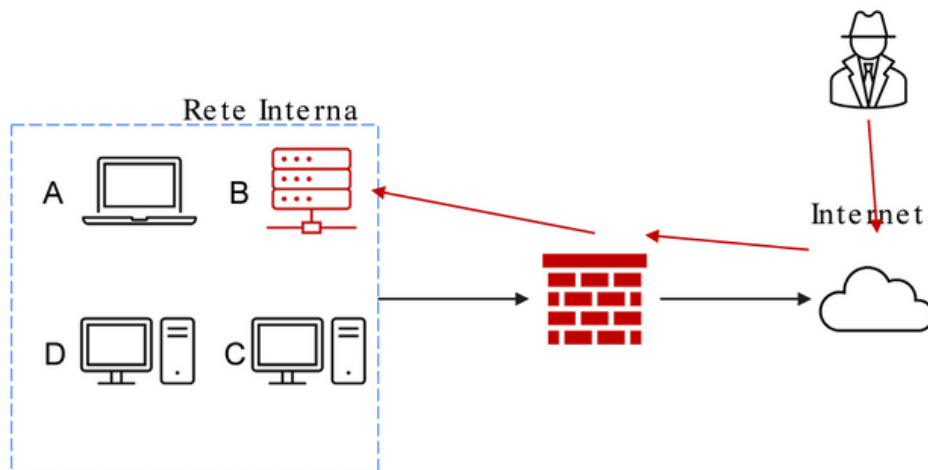
Example of an open port

No.	Time	Source	Destination	Protocol	Len	Info
18	36.774614776	192.168.200.100	192.168.200.150	TCP	74	41182 → 21 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=81053543
27	36.775141273	192.168.200.150	192.168.200.100	TCP	74	21 → 41182 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 SACK_PERM TSval=81053543
28	36.775174048	192.168.200.100	192.168.200.150	TCP	66	41182 → 21 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=810535438 TSecr=42949
39	36.775861964	192.168.200.100	192.168.200.150	TCP	66	41182 → 21 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0 TSval=810535439 TSecr=42949

Example of a closed door

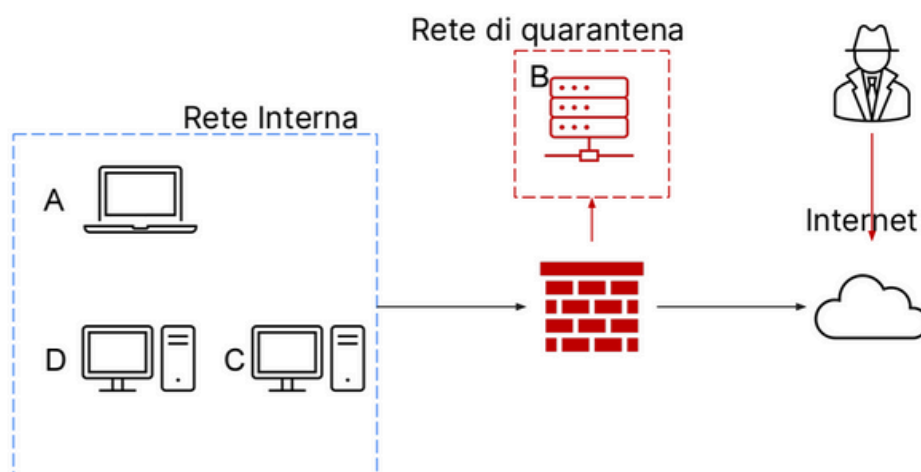
No.	Time	Source	Destination	Protocol	Len	Info
14	36.774257841	192.168.200.100	192.168.200.150	TCP	74	33878 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM TSval=81053543
21	36.774685696	192.168.200.150	192.168.200.100	TCP	60	443 → 33878 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0 TSval=810535438 TSecr=42949

# ISOLATION TECHNIQUES



To isolate the compromised system B, the following techniques can be adopted:

- 1.- Network Disconnection:** Immediately remove system B from the corporate network to prevent further lateral movement of the attacker and stop data exfiltration. This can be done physically or logically through network devices such as switches and routers.
- 2.- Creation of Isolated VLANs:** Move system B to a separate VLAN that is not connected to the main network to isolate network traffic and contain the damage.
- 3.- Limited Physical Access:** Restrict physical access to compromised servers to prevent further hardware tampering. This includes using physical locks and access controls to server rooms.

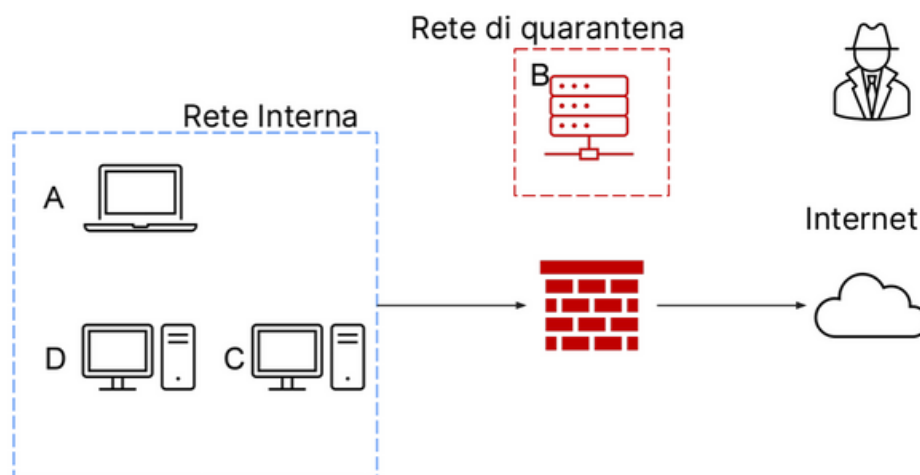


# COMPLETE REMOVAL FROM NETWORK AND INTERNET:

**1.- Shutdown System B:** If all other methods fail to secure System B, the final step is to completely remove it from the network and internet. Shut down the system to ensure it no longer poses a threat.

**2.- Remove Network Cables:** Physically remove any network cables and disable wireless connections to prevent any accidental reconnection to the network.

**3.- Power Down:** Turn off System B entirely to halt any ongoing malicious activities and prevent further damage.





# REMOVAL OF THE INFECTED SYSTEM B

To remove the infected system B, follow these steps:

- 1.- Data Backup:** Perform a complete backup of non-infected and uncompromised data, following data security guidelines to ensure data is stored securely.
- 2.- System Cleaning:** Use cleaning and malware removal software to eliminate any presence of malicious code. This may include the use of antivirus, anti-malware, and specialized removal tools.
- 3.- Restoration from Backup:** Restore the system using backups taken before the compromise, ensuring that restored data is free from malware. Verify and secure backups before restoration.
- 4.- Patches and Updates:** Apply all necessary patches and updates to address vulnerabilities that allowed the initial attack. Ensure the operating system and all applications are up to date.

## ELIMINATION OF SENSITIVE INFORMATION

Before disposing of compromised disks, it is essential to securely eliminate sensitive information. The main techniques are:

- 1.- Clear:** This process makes data unreadable through software means. It is usually performed by overwriting the data with zeros or random patterns. This method is recommended for less sensitive data where the media needs to be reused without the risk of simple recovery.
- 2.- Purge:** This method goes beyond Clear and makes data unrecoverable even with advanced data recovery tools. Common techniques include degaussing for magnetic disks and specific sanitization commands for solid-state drives. This method is used for highly sensitive data where a higher level of security is required compared to Clear.
- 3.- Destroy:** This is the most secure method and involves the physical destruction of storage media, making any form of data recovery impossible. Common techniques include shredding disks, hot fusion, or physical destruction using specialized machinery. This method is used when it is required that data can never be recovered in any way, and the media will not be reused.

# DIFFERENCE BETWEEN PURGE AND DESTROY

**1.- Purge:** Eliminates data making it irrecoverable through advanced cleaning or sanitization techniques. The physical media remains intact and can be reused if procedures allow.

**2.- Destroy:** Involves the physical destruction of storage media, ensuring data cannot be recovered in any way. This method is definitive and does not allow for the reuse of the media.