

Name: _____

Date: _____

Score: _____

Mullvad Security

Analyzing Mullvad VPN security architecture including diskless RAM-only servers, audited zero-logs policies, local key generation, WireGuard encryption, and quantum-resistant tunnel configurations.

MULLVAD SECURITY LEARNING OVERVIEW

LEARNER

STUDENT STATUS

Network Defender Track

SECURE

CONNECTION STATUS

Shielding data packets

100%

LEAK DEFENSE

DNS & IPv6 leak protection

Welcome! This activity packet guides you through the security architecture of Mullvad. You will explore diskless RAM-only servers, audited zero-logs policies, local key generation, and quantum-resistant tunnels.

WORKSHEET CHECKPOINTS

- ☐ **Part 1-4:** Master VPN and network security configurations.
- ☐ **Part 5-7:** Solve crossword & word search puzzles.
- ☐ **Part 8-9:** Solve case studies & cipher challenge.
- ☐ **Part 10:** Review basic & advanced FAQ pages.
- ☐ **Part 11:** Explore 10 interesting real-world facts.

Open the VPN.com Best VPNs Guide

URL: <https://www.vpn.com/vpn/mullvad-security/>

Your Mullvad Security Learning Roadmap

- Analyze the technical architecture and configuration rules of Mullvad Security.
- Configure client settings to prevent IP, DNS, and WebRTC traffic leaks.
- Compare custom pricing, trial, and performance features against standard models.

MULLVAD SECURITY GUIDE INSTRUCTIONS

Answer the multiple choice and true/false questions, complete the fill-in-the-blank sentences using the word bank, match definitions, and solve the crossword and word search puzzles. Apply your knowledge to Mullvad's privacy-first server controls.

EVALUATING ANONYMITY-FIRST INFRASTRUCTURE & RAM TIERS (INTRODUCTION)

Mullvad does not use standard accounts with passwords, relying on randomly generated 16-digit codes. Their infrastructure is engineered with diskless RAM-only nodes, WireGuard keys generated locally, and audited zero-retention policies.

READ EACH CHECKPOINT CAREFULLY AND SELECT OR WRITE THE CORRECT RESPONSE.

Checkpoint 1: Multiple Choice Challenge

1 Which tunneling protocol is default in Mullvad's app?

- ☐ A) OpenVPN
- ☐ B) WireGuard
- ☐ C) IKEv2
- ☐ D) PPTP

2 How long does Mullvad store generated account numbers?

- ☐ A) Indefinitely
- ☐ B) For 30 Days
- ☐ C) For 1 Year
- ☐ D) Zero Days

3 Which cryptographic tunnel protects against quantum computers?

- ☐ A) AES-256-GCM
- ☐ B) Quantum WireGuard
- ☐ C) RSA-4096
- ☐ D) SOCKS5 Proxy

4 What security mechanism blocks WebRTC leak hazards?

- ☐ A) Browser Extension
- ☐ B) Network Kill Switch
- ☐ C) Private DNS Routing
- ☐ D) Split Tunneling

5 Which multihop feature routes traffic through multiple nodes?

- ☐ A) Double NAT
- ☐ B) WireGuard Multihop
- ☐ C) Chameleon Protocol
- ☐ D) Bypasser

Checkpoint 2: True or False Challenge

6 Question 6

Mullvad requires an email address during account generation.

☐

True

☐

False

7 Question 7

SOCKS5 proxies can be configured inside Mullvad tunnels.

☐

True

☐

False

8 Question 8

Mullvad owns and operates all of their server hardware.

☐

True

☐

False

9 Question 9

The Network Kill Switch is always active by default.

☐

True

☐

False

10 Question 10

Cash payments sent by mail are completely non-refundable.

☐

True

☐

False

Checkpoint 3: Key Term Insertion

Read each sentence below and fill in the blank with the correct term from the Word Bank.

1. Mullvad relies on _____ as its primary high-speed secure tunnel protocol.
2. Routing data through two server locations is called _____ configuration.
3. To prevent data logs on disk, Mullvad deploys _____ dedicated nodes.
4. System traffic is blocked when a tunnel fails via the built-in _____ failsafe.
5. Audit statements confirm Mullvad maintains a strict, verified _____ architecture.
6. Internal application routing can be isolated using a custom _____ setup.
7. Post-quantum encryption algorithms secure data inside a _____ tunnel.
8. Private nameservers are deployed globally to eliminate dangerous _____ hazards.

VOCABULARY WORD BANK

WIREGUARD
NOELOGS

MULTIHOP
SOCKS5PR

RAMONLY
QUANTUMT

KILLSWRT
DNSLEAKS

Write your answers here:

- | | | | |
|----|----------------------|----|----------------------|
| 1. | <input type="text"/> | 2. | <input type="text"/> |
| 3. | <input type="text"/> | 4. | <input type="text"/> |
| 5. | <input type="text"/> | 6. | <input type="text"/> |

Checkpoint 4: VPN & Network Concept Match

DEFINITION MATCHING

Match each vocabulary term on the left with its correct definition on the right by writing the corresponding letter (A-H) in the fillable input box.

WIREGUARD

G Encryption mechanisms designed to resist quantum attacks.

MULTI HOP

E Zero-retention data standard verified by independent audits.

RAM ONLY

D A safety feature that cuts traffic when a VPN drops.

KILLSWRT

C Volatile memory server hardware that retains no data upon reboot.

NO LOGS

H Exposure of DNS query destinations outside the VPN tunnel.

SOCKS5 PR

A A lightweight, high-performance secure tunneling protocol.

QUANTUM T

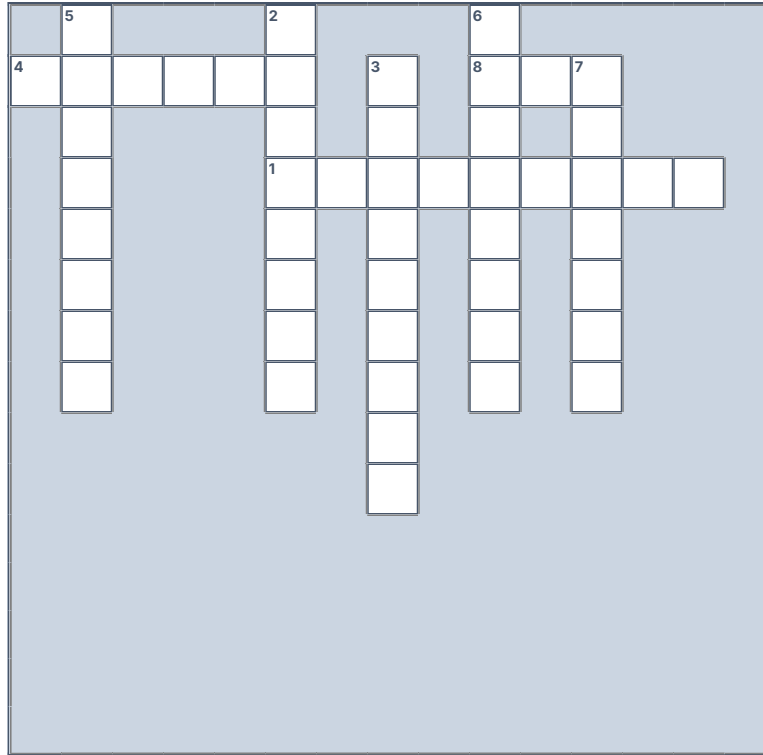
F An internal proxy protocol used to isolate client applications.

DNS LEAKS

B Routing traffic through an entry and exit server node.

Checkpoint 5: Crossword Puzzle

Solve the crossword puzzle by typing letters into the active white boxes. The numbers correspond to the clues below.



ACROSS

1. Process of wrapping data packets inside other packets (9)
4. Remote server that routes traffic and hides your IP (6)
8. Internet Service Provider, logs traffic unless encrypted (3)

DOWN

2. Rules determining how data is sent and encrypted (8)
3. Rate of data transfer across a path (9)
5. Blocking site access based on location (8)
6. Security system that monitors and blocks traffic (8)
7. State of being free from tracking or surveillance (7)

Checkpoint 5 Alternative: Accessible Crossword Clues

Screen-reader and keyboard users can type the crossword answers directly in the text fields below.

ACROSS CLUES

1 Across: A lightweight, high-performance secure tunneling protocol. (9 letters):

3 Across: Volatile memory server hardware that retains no data upon reboot. (7 letters):

5 Across: Zero-retention data standard verified by independent audits. (7 letters):

7 Across: Encryption mechanisms designed to resist quantum attacks. (8 letters):

DOWN CLUES

2 Down: Routing traffic through an entry and exit server node. (8 letters):

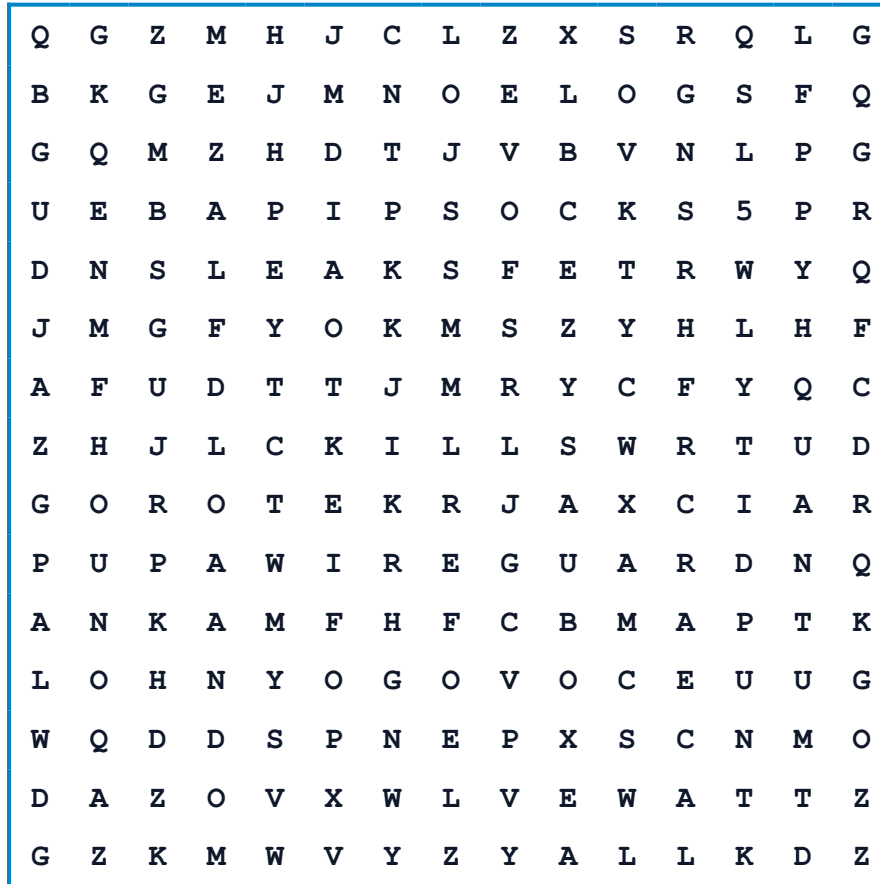
4 Down: A safety feature that cuts traffic when a VPN drops. (8 letters):

6 Down: An internal proxy protocol used to isolate client applications. (8 letters):

8 Down: Exposure of DNS query destinations outside the VPN tunnel. (8 letters):

Checkpoint 6: Hidden Word Search

Find the 8 key vocabulary terms hidden in the grid below. Words can be horizontal, vertical, or diagonal.



VOCABULARY WORD LIST

WIREGUARD
NOELOGS

MULTIHOP
SOCKS5PR

RAMONLY
QUANTUMT

KILLSWRT
DNSLEAKS

Checkpoint 6 Alternative: Accessible Vocabulary Matching

Match each of the 8 vocabulary terms from the Word Search to its correct definition by writing the letter (A-H) in the blank space.

VOCABULARY TERMS

- A. WIREGUARD
- B. MULTIHOP
- C. RAMONLY
- D. KILLSWRT
- E. NOELOGS
- F. SOCKS5PR
- G. QUANTUMT
- H. DNSLEAKS

DEFINITIONS & MATCH FIELDS

- 1. A lightweight, high-performance secure tunneling protocol.
- 2. Routing traffic through an entry and exit server node.
- 3. Volatile memory server hardware that retains no data upon restart.
- 4. A safety feature that cuts traffic when a VPN drops.
- 5. A strict data retention standard verified by external audits.
- 6. An internal proxy protocol used to isolate client applications.
- 7. Encryption mechanisms designed to resist quantum attacks.
- 8. Exposure of DNS query destinations outside the VPN tunnel.

Checkpoint 7: Scrambled Word Challenge

Unscramble the letters below to reveal key Virtual Private Network (VPN) concepts and terms. Write your answers in the input boxes provided.

1. IREGUARDW

5. OELOGSN

2. ULTIHOPM

6. OCKS5PRS

3. AMONLYR

7. UANTUMTQ

4. ILLSWRTK

8. NSLEAKSD

Checkpoint 8: VPN & Network Case Studies

Apply the concepts you have learned to solve the real-world scenarios below.



CASE STUDY 1: QUANTUM RESISTANCE INTEGRATION

Scenario: A financial company needs to secure file transfers against future quantum decryption.

Discussion Question: What tunnel configuration should they deploy within Mullvad's app?



CASE STUDY 2: STEALTH INVESTIGATIVE ROUTING

Scenario: An investigator wants to double route their network to mask their entry point.

Discussion Question: Which Mullvad feature should be enabled to achieve multi-server routing?

Final Challenge: Decrypting the Cipher

A network engineer secures routing channels and client tunnels. Use the Letter-to-Number key below to decrypt the message by writing the matching letters in the blank spaces.

LETTER-TO-NUMBER ENCRYPTION KEY

A=1	B=2	C=3	D=4	E=5	F=6	G=7	H=8	I=9	J=10	K=11	L=12	M=13
N=14	O=15	P=16	Q=17	R=18	S=19	T=20	U=21	V=22	W=23	X=24	Y=25	Z=26

13	21	12	12	22	1	4	1	3	3	15	21	14	20	19	21	19	5
14	15	16	1	19	19	23	15	18	4	15	18	5	13	1	9	12	

Decoded cybersecurity message:

TIP: EACH NUMBER REPRESENTS THE POSITION OF THAT LETTER IN THE ALPHABET (E.G. 1 = A, 2 = B, 26 = Z).

Checkpoint 10: Basic VPN FAQs (Part A)

Review the most common questions and answers regarding Virtual Private Networks (VPNs) and tunneling.

Q1: How does Mullvad secure accounts?

Mullvad uses a generated 16-digit account number with no password or email required.

Q2: What protocol does Mullvad prioritize?

Mullvad prioritizes WireGuard due to its speed, simplicity, and modern cryptography.

Q3: Are Mullvad servers audited?

Yes, third-party security firms perform regular infrastructure and code audits.

Q4: Does Mullvad support OpenVPN?

Yes, OpenVPN is supported as a fallback option for older setups.

Q5: What is the Mullvad kill switch?

It is an integrated firewall rule that prevents internet traffic if the VPN fails.

Checkpoint 10: Basic VPN FAQs (Part B)

Review the most common questions and answers regarding Virtual Private Networks (VPNs) and tunneling.

Q6: Is IPv6 supported by Mullvad?

Yes, Mullvad supports native IPv6 routing and leak protection.

Q7: Does Mullvad offer multihop?

Yes, WireGuard multihop allows chaining multiple server locations.

Q8: Can I use custom DNS resolvers?

Yes, custom DNS addresses can be configured inside the Mullvad client settings.

Q9: How are logs prevented?

System configurations disable logging and clean caches on all server daemons.

Q10: Where is Mullvad incorporated?

Mullvad is incorporated in Gothenburg, Sweden, under Swedish jurisdiction.

Checkpoint 11: Advanced VPN FAQs (Part A)

Explore advanced technical aspects of VPN tunneling protocols, mobile client integrations, and enterprise deployment.

Q1: How does key rotation work?

Mullvad rotates WireGuard keys automatically every 14 days to limit vulnerability windows.

Q2: What are quantum-resistant tunnels?

They combine Kyber algorithms with WireGuard to secure data against future quantum threats.

Q3: How are RAM-only nodes secure?

These nodes write no data to hard drives, rendering theft of physical servers useless.

Q4: What is the SOCKS5 proxy function?

It helps route specific app traffic within the tunnel, preventing leaks to external networks.

Q5: Does Mullvad protect against WebRTC leaks?

Yes, the app forces WebRTC queries through the VPN interface to shield local IPs.

Checkpoint 11: Advanced VPN FAQs (Part B)

Explore advanced technical aspects of VPN tunneling protocols, mobile client integrations, and enterprise deployment.

Q6: How does Mullvad handle police raids?

Mullvad holds zero user database logs, meaning no user information can be extracted.

Q7: What is the Swedish jurisdiction risk?

Sweden is a 14-Eyes member, but Mullvad's zero-logs architecture removes data risk.

Q8: Are client app audits open-source?

Yes, all Mullvad client applications are open-source and audited by Cure53.

Q9: How does split tunneling operate?

It uses operating system routing tables to exclude specific apps from VPN overhead.

Q10: How does Mullvad handle cash payments?

Cash is mailed with a token code, manually credited, and envelopes are shredded.

Part 11: 10 Real-World VPN Facts & Insights

Review real-world facts regarding VPN encryption speeds, protocol audits, mobile connectivity, and enterprise remote work.

1. VPN INSIGHT

Mullvad was founded in 2009 by Amagicom AB in Gothenburg, Sweden.

2. VPN INSIGHT

Account numbers are the sole identifier used to credit and access accounts.

3. VPN INSIGHT

No names, emails, passwords, or phone numbers are stored in the user DB.

4. VPN INSIGHT

WireGuard keys are generated locally on client devices to prevent server-side compromise.

5. VPN INSIGHT

A Cure53 audit confirmed zero logging in Mullvad's server infrastructure.

6. VPN INSIGHT

SOCKS5 proxies are active on all Mullvad exit nodes for application isolation.

7. VPN INSIGHT

Bridges can be configured using ShadowSocks to bypass restrictive firewalls.

8. VPN INSIGHT

Physical server host machines are progressively migrated to RAM-only hardware.

9. VPN INSIGHT

Kyber post-quantum preshared keys are combined with WireGuard for future safety.

10. VPN INSIGHT

Cash payment records are physically shredded immediately after credit validation.

Technical References & Sources

The study guide and interactive puzzles are compiled from global technical standards, specifications, and regulatory frameworks.

SCHOLARLY & INDUSTRY REFERENCES

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Answer Key: Checkpoint 1 - Multiple Choice

1 Network Check 1

VPN PROTECTION

Correct Answer: B

TEACHING NOTE

Which tunneling protocol is default in Mullvad's app?

Citation: IETF VPN RFC [Ref 3].

2 Network Check 2

VPN PROTECTION

Correct Answer: A

TEACHING NOTE

How long does Mullvad store generated account numbers?

Citation: IETF VPN RFC [Ref 3].

3 Network Check 3

VPN PROTECTION

Correct Answer: B

TEACHING NOTE

Which cryptographic tunnel protects against quantum computers?

Citation: IETF VPN RFC [Ref 3].

4 Network Check 4

VPN PROTECTION

Correct Answer: C

TEACHING NOTE

What security mechanism blocks WebRTC leak hazards?

Citation: IETF VPN RFC [Ref 3].

5 Network Check 5

VPN PROTECTION

Correct Answer: B

TEACHING NOTE

Which multihop feature routes traffic through multiple nodes?

Citation: IETF VPN RFC [Ref 3].

Answer Key: Checkpoint 2 - True or False

6 Network Rule 1

VPN PROTECTION

Correct Answer: False

TEACHING NOTE

Mullvad requires an email address during account generation.

Citation: IETF VPN RFC [Ref 3].

7 Network Rule 2

VPN PROTECTION

Correct Answer: True

TEACHING NOTE

SOCKS5 proxies can be configured inside Mullvad tunnels.

Citation: IETF VPN RFC [Ref 3].

8 Network Rule 3

VPN PROTECTION

Correct Answer: False

TEACHING NOTE

Mullvad owns and operates all of their server hardware.

Citation: IETF VPN RFC [Ref 3].

9 Network Rule 4

VPN PROTECTION

Correct Answer: True

TEACHING NOTE

The Network Kill Switch is always active by default.

Citation: IETF VPN RFC [Ref 3].

10 Network Rule 5

VPN PROTECTION

Correct Answer: True

TEACHING NOTE

Cash payments sent by mail are completely non-refundable.

Citation: IETF VPN RFC [Ref 3].

Vocabulary Keys & Grading Rubric

Instructor Grading Rubric: Award 1 point for each correct matching (8 points total) and context term (6 points total).

CHECKPOINT 4: CONCEPT MATCH KEY

A WIREGUARD

B MULTIROP

C RAMONLY

D KILLSWRT

E NOELOGS

F SOCKS5PR

G QUANTUMT

H DNSLEAKS

CHECKPOINT 3: KEY TERM KEY

1 WIREGUARD

2 MULTIROP

3 RAMONLY

4 KILLSWRT

5 NOELOGS

6 SOCKS5PR

7 QUANTUMT

8 DNSLEAKS

DISCUSSION NOTES FOR INSTRUCTORS

Valuation Accuracy:

Verify that students understand how domain length, extension (.com, .ai), and commercial search volume drive appraisal pricing.

Escrow Security:

Emphasize that funds are held in licensed third-party holding accounts prior to domain WHOIS transfer verification.

Stealth Representation:

Highlight the role of NDAs and third-party representation in preventing speculative price gouging during corporate procurement.

Puzzles Keys & Instructor Notes

WORD SEARCH SOLUTION

Q	G	Z	M	H	J	C	L	Z	X	S	R	Q	L	G
B	K	G	E	J	M	N	O	E	L	O	G	S	F	Q
G	Q	M	Z	H	D	T	J	V	B	V	N	L	P	G
U	E	B	A	P	I	P	S	O	C	K	S	S	P	R
D	N	S	L	E	A	K	S	F	E	T	R	W	Y	Q
J	M	G	F	Y	O	K	M	S	Z	Y	H	L	H	F
A	F	U	D	T	T	J	M	R	Y	C	F	Y	Q	C
Z	H	J	L	C	K	I	L	L	S	W	R	T	U	D
G	O	R	O	T	E	K	R	J	A	X	C	I	A	R
P	U	P	A	W	I	R	E	G	U	A	R	D	N	Q
A	N	K	A	M	F	H	F	C	B	M	A	P	T	K
L	O	H	N	Y	O	G	O	V	O	C	E	U	U	G
W	Q	D	D	S	P	N	E	P	X	S	C	N	M	O
D	A	Z	O	V	X	W	L	V	E	W	A	T	T	Z
G	Z	K	M	W	V	Y	Z	Y	A	L	L	K	D	Z

CROSSWORD SOLUTION

		5	G					2	P				6	F				
4	S	E	R	V	E	R				3	B			8	I	S	7	P
		O				O					A			R			R	
	B						1	T	U	N	N	E	L	I	N	G		
	L							O		D			W		V			
	O							C		W			A		A			
	C							O		I			L		C			
	K							L		D			L		Y			
										T								
										H								

INSTRUCTOR GUIDE FOR CROSSWORD SOLUTIONS

ACROSS CLUES

- 1 Across:** **TUNNELING** Process of wrapping data packets. (3, 5)
4 Across: **SERVER** Remote computer routing traffic. (1, 0)
8 Across: **ISP** Internet Service Provider. (1, 9)

DOWN CLUES

- 2 Down:** **PROTOCOL** Rules determining data transmission. (0, 5)
3 Down: **BANDWIDTH** Rate of data transfer. (1, 7)
5 Down: **GEOBLOCK** Location website restriction. (0, 1)
6 Down: **FIREWALL** Security monitor barrier. (0, 9)
7 Down: **PRIVACY** State of freedom from tracking. (1, 11)

Scrambled Words & Cipher Solution Key

Grading key for the vocabulary word unscramble activity and Secret Cipher Challenge.

WORD UNSCRAMBLE KEY

1. IREGUARDW

WIREGUARD

5. OELOGSN

NOELOGS

2. ULTIHOPM

MULTIHOP

6. OCKS5PRS

SOCKS5PR

3. AMONLYR

RAMONLY

7. UANTUMTQ

QUANTUMT

4. ILLSWRTK

KILLSWRT

8. NSLEAKSD

DNSLEAKS

SECRET CIPHER CHALLENGE KEY

"MULLVAD ACCOUNTS USE NO PASSWORD OR EMAIL"

VPN & Network Case Studies Solution Key

A Case Study 1: Quantum Resistance Integratic

[Instructor Solution](#)

GRADING GUIDELINE

Student answers should cover the following points:

- **Scenario Analysis:** A financial company needs to secure file transfers against future quantum decryption.
- **Recommended Strategy & Solution:** Deploy Quantum-resistant WireGuard tunnels using post-quantum preshared keys.

B Case Study 2: Stealth Investigative Routir

[Instructor Solution](#)

GRADING GUIDELINE

Student answers should cover the following points:

- **Scenario Analysis:** An investigator wants to double route their network to mask their entry point.
- **Recommended Strategy & Solution:** Enable Mullvad's WireGuard Multihop feature to cascade entry and exit nodes.