Name: _____ Date: _____ Score: _____

Best VPN for Linux Command Line Interface (CLI)

Managing secure VPN sessions and troubleshooting connections using Linux CLI tools.

LINUX CLI VPN SETUPS 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 Linux CLI VPN configurations. You will explore command line client interfaces, configuration files, systemd unit services, credential files, and resolvctl DNS settings.

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/best-vpn-for-linux-cli/

Your Linux CLI VPN Learning Roadmap

- Configure secure VPN connections using command-line interface utilities.
- Build firewall rules to prevent unencrypted public traffic leaks.
- Diagnose DNS resolution conflicts and enforce secure nameservers.

LINUX CLI VPN SETUPS 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 CLI command parameters and configuration files.

TERMINAL VPN CONTROL & CONFIG-BASED HANDSHAKES (INTRODUCTION)

Administering VPN connections via command line interfaces (CLI) is critical on headless Linux nodes. Users leverage dedicated client commands, configuration files, and systemd services to establish secure tunnels, prevent DNS leaks, and manage firewall killswitches.

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

Checkpoint 1: Multiple Choice Challenge

1 **What is NordVPN's maximum measured speed in the CLI Speed Lab?**

- ◯ A. 730 Mbps
- ◯ B. 580 Mbps
- ◯ C. 630 Mbps
- ◯ D. 695 Mbps

2 **Which VPN client supports connecting using server numbers (like us2435)?**

- ◯ A. ExpressVPN
- ◯ B. NordVPN
- ◯ C. ProtonVPN
- ◯ D. Mullvad

3 **Which provider features a proprietary protocol called Lightway?**

- ◯ A. ExpressVPN
- ◯ B. NordVPN
- ◯ C. Surfshark
- ◯ D. ProtonVPN

4 **Which privacy-first VPN does not require an email address or name to register?**

- ◯ A. NordVPN
- ◯ B. Mullvad
- ◯ C. ExpressVPN
- ◯ D. Surfshark

5 **What is the measured speed of ExpressVPN's CLI tool in speed tests?**

- ◯ A. 340 Mbps
- ◯ B. 580 Mbps
- ◯ C. 630 Mbps
- ◯ D. 730 Mbps

Checkpoint 2: True or False Challenge

6 Question 6

NordVPN operates over 6,400 servers across 111 countries.

◯ True ◯ False

7 Question 7

ExpressVPN relies on a full graphical interface for Linux installations.

◯ True ◯ False

8 Question 8

Mullvad charges a flat rate of $5.50 per month with no term discounts.

◯ True ◯ False

9 Question 9

ProtonVPN's Linux CLI client connects with protonvpn-cli.

◯ True ◯ False

10 Question 10

Surfshark allows only 5 simultaneous device connections.

◯ 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. Administrators launch VPN tunnels directly from the console using a dedicated _____.
2. Connection parameters and encryption keys are stored inside a localized _____.
3. Background connection management is automated by enabling the specific _____.
4. Usernames and passwords should be securely saved in a separate _____file.
5. A fail-safe killswitch is configured using netfilter rules in the local _____configuration.
6. Link-specific DNS server resolution parameters are audited with the _____tool.

VOCABULARY WORD BANK

CLIINTERFACE	CONFIGFILE	SYSTEMDSERVICE	CREDENTIALS
IPTABLES	RESOLVECTL	TUNNEL	DAEMON

Write your answers here:

1.
2.
3.
4.
5.
6.

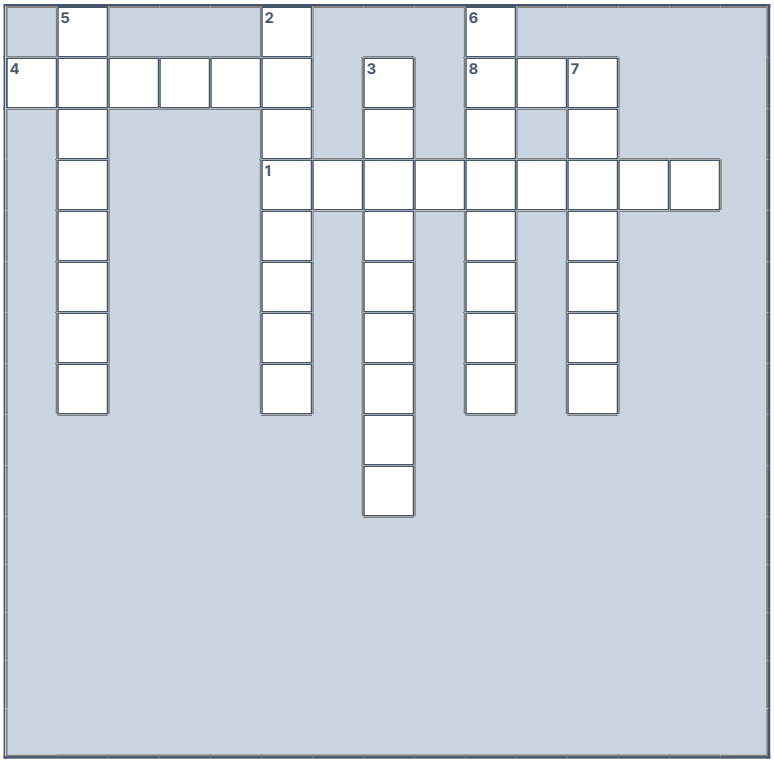
Checkpoint 4: VPN & Network Concept Match

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.

____	CLIINTERFACE	D	Protected token files containing user authentication values.
____	CONFIGFILE	A	Command-line environment used to execute client commands directly.
____	SYSTEMDSERVICE	F	Command-line utility querying link-specific DNS server scopes.
____	CREDENTIALS	G	Virtual point-to-point interface forwarding encrypted network packets.
____	IPTABLES	H	Background program process running independently to manage services.
____	RESOLVECTL	E	Netfilter framework managing packet drop and allow rules.
____	TUNNEL	B	Local disk file containing connection endpoints and keys.
____	DAEMON	C	Systemd unit managing background client execution lifetimes.

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: Secure encapsulation method that routes console packet traffic. (9) (9 letters):

4 Across: Remote gaming host node that you connect to for lobbies. (6) (6 letters):

8 Across: Broadband service provider whose throttling policies you bypass. (3) (3 letters):

DOWN CLUES

2 Down: Handshake rules (such as OpenVPN) running on a compatible router. (8) (8 letters):

3 Down: Data capacity limits monitored on your home router during play. (9) (9 letters):

5 Down: Regional restriction that prevents accessing specific marketplace items. (8) (8 letters):

6 Down: Network shield that can block game ports and cause strict NAT. (8) (8 letters):

7 Down: Freedom from DDoS threats and online packet tracking while online. (7) (7 letters):

Checkpoint 6: Hidden Word Search

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

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

VOCABULARY WORD LIST

CLIINTERFACE	CONFIGFILE	SYSTEMDSERVICE	CREDENTIALS
IPTABLES	RESOLVECTL	TUNNEL	DAEMON

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. CLIINTERFACE
B. CONFIGFILE
C. SYSTEMDSERVICE
D. CREDENTIALS
E. IPTABLES
F. RESOLVECTL
G. TUNNEL
H. DAEMON

DEFINITIONS & MATCH FIELDS

_____ 1. Command-line environment used to execute client commands.

_____ 2. Local disk file containing connection endpoints.

_____ 3. Systemd unit managing background client execution.

_____ 4. Protected token files containing user authentication values.

_____ 5. Netfilter framework managing packet drop and allow rules.

_____ 6. Command-line utility querying link-specific DNS server.

_____ 7. Virtual point-to-point interface forwarding packets.

_____ 8. Background program process running independently.

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. LIINTERFACEC

5. PTABLESI

2. ONFIGFILEC

6. ESOLVECTLR

3. YSTEMDSERVICES

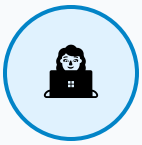
7. UNNELT

4. REDENTIALSC

8. AEMOND

Checkpoint 8: VPN & Network Case Studies

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



CASE STUDY 1: HEADLESS SERVER PROTECTION

Scenario: A Linux administrator needs to secure remote file backups from a headless terminal node located in a shared hosting datacenter.

Discussion Question: What tools and commands should be executed to launch the tunnel and check link DNS resolutions?

CASE STUDY 2: AUTOMATING EGRESS KILLSWITCH

Scenario: An administrator wants to ensure that a headless terminal connection drops all public traffic if the VPN tunnel goes offline.

Discussion Question: What specific firewall rules should be appended to create this fail-safe boundary?

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

___ ___ ___   ___ ___ ___   ___ ___ ___ ___ ___ ___ ___
3 12 9   22 16 14   20 21 14 14 5 12 19

___ ___ ___ ___ ___ ___   ___ ___ ___ ___ ___ ___ ___ ___
19 5 3 21 18 5   8 5 1 4 12 5 19 19

___ ___ ___ ___ ___   ___ ___ ___ ___ ___ ___ ___
12 9 14 21 24   19 5 18 22 5 18 19

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: What is a CLI VPN client?

A command-line program that establishes secure VPN tunnels without requiring a graphical desktop environment.

Q2: How do I check systemd VPN status?

Run systemctl status openvpn-client@profile to verify connection daemons are running in the background.

Q3: Where are VPN configs stored?

Usually under /etc/openvpn/ or /etc/wireguard/ directories on standard distributions.

Q4: What is the tun0 interface?

A virtual network tunnel interface created by the system kernel when a VPN connection is initialized.

Q5: How do I check VPN connection logs?

Use journalctl -u openvpn-client to view real-time logging and debug connection failures.

Checkpoint 10: Basic VPN FAQs (Part B)

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

Q6: What is resolvectl used for?

It is a utility that queries systemd-resolved DNS status and routing rules on active network links.

Q7: How do I start a VPN via CLI?

Execute sudo openvpn --config client.ovpn or wg-quick up wg0 depending on the protocol.

Q8: What is a headless server?

A server that operates without a monitor, keyboard, or local graphical user interface, managed remotely.

Q9: What is the config file format for WireGuard?

WireGuard uses simple ini-like configuration profiles, typically named wg0.conf.

Q10: Can I run multiple CLI VPNs simultaneously?

Yes, by configuring distinct routing tables and virtual tunnel interfaces for each client.

Checkpoint 11: Advanced VPN FAQs (Part A)

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

Q1: How do I automate VPN login on headless boot?

Reference a text credentials file in your .ovpn configuration using the auth-user-pass directive.

Q2: How do I set up policy-based routing via CLI?

Use ip route and ip rule commands to direct specific application traffic through the VPN gateway interface.

Q3: How do I fix DNS leaks on a headless node?

Configure systemd-resolved to prioritize the VPN link DNS by setting default domains in resolvectl.

Q4: What is the difference between tun and tap interfaces?

Tun operates at layer 3 (IP routing), while tap operates at layer 2 (ethernet bridging) on local systems.

Q5: How do I monitor live VPN bandwidth from console?

Use command-line bandwidth monitors like nload, vnstat, or iftop targeting the tun0 interface.

Checkpoint 11: Advanced VPN FAQs (Part B)

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

Q6: How do I configure nftables for a VPN killswitch?

Define rules that drop output packets on WAN interfaces unless the destination matches the VPN server IP.

Q7: How do I verify if my public IP has changed?

Run curl ifconfig.me or curl icanhazip.com from the shell prompt to display current gateway address.

Q8: What is wg-quick?

A command-line script wrapper that automates creating, configuring, and bringing up WireGuard interfaces.

Q9: How do I update DNS settings manually via shell?

Modify the /etc/resolv.conf symlink or add DNS directives directly to NetworkManager configs.

Q10: How do I send custom scripts on VPN connect?

Use the up and down configuration parameters in OpenVPN to trigger scripts on status changes.

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

Command-line VPN clients consume significantly fewer system resources than graphical app bundles.

2. VPN INSIGHT

WireGuard tunnels are managed directly via kernel modules using simple shell commands.

3. VPN INSIGHT

Systemd unit services automate tunnel launch and recovery policies during system startup.

4. VPN INSIGHT

resolvectl queries active DNS configurations on headless virtual networking adapters.

5. VPN INSIGHT

Headless nodes use iptables rules to drop all unencrypted outgoing network packets.

6. VPN INSIGHT

The tun0 device routes local virtual subnet requests directly into active tunnels.

7. VPN INSIGHT

Credential text paths enable unattended server setups without manual passphrase inputs.

8. VPN INSIGHT

journalctl monitors active connection errors and handshake timings in real-time.

9. VPN INSIGHT

Network interface statistics display exact upload and download volume metrics.

10. VPN INSIGHT

Custom routing tables allow traffic to be split between local networks and secure tunnels.

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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[2] WireGuard Protocol and Tooling Manual. Retrieved from https://www.wireguard.com/

[3] systemd-resolved System DNS Resolver Manual. Retrieved from https://www.freedesktop.org/software/systemd/man/latest/systemd-resolved.html

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[8] NIST SP 800-77: Guide to IPsec VPNs. Retrieved from https://csrc.nist.gov/publications/detail/sp/800-77/rev-1/final

[9] IETF RFC 768: User Datagram Protocol. Retrieved from https://datatracker.ietf.org/doc/rfc768/

[10] IETF RFC 793: Transmission Control Protocol. Retrieved from https://datatracker.ietf.org/doc/rfc793/

Answer Key: Checkpoint 1 - Multiple Choice

1 NordVPN Speed — 730 MBPS — Correct Answer: A

TEACHING NOTE

NordVPN recorded a top speed of 730 Mbps in CLI speed testing, making it the fastest client.
Citation: NordVPN CLI Speed [Ref 2].

2 Server Connect — NORDVPN CLI — Correct Answer: B

TEACHING NOTE

NordVPN allows direct connections to specific server numbers, such as connect us2435, in its CLI.
Citation: NordVPN CLI Guide [Ref 5].

3 Lightway Protocol — EXPRESSVPN — Correct Answer: A

TEACHING NOTE

ExpressVPN developed Lightway, a proprietary, lightweight connection protocol built for high speed.
Citation: ExpressVPN CLI [Ref 6].

4 Anonymous Account — MULLVAD — Correct Answer: B

TEACHING NOTE

Mullvad assigns a random 16-digit account number to users, requiring no email address or name.
Citation: Mullvad Privacy [Ref 2].

5 ExpressVPN Speed — 630 MBPS — Correct Answer: C

TEACHING NOTE

ExpressVPN delivers 630 Mbps download speeds through its terminal-based command-line client.
Citation: ExpressVPN Speed [Ref 6].

Answer Key: Checkpoint 2 - True or False

6 Server Network — 6,400 SERVERS — Correct Answer: True

TEACHING NOTE

NordVPN's expansive network features over 6,400 servers in 111 countries for global routing.

Citation: NordVPN Network [Ref 2].

7 CLI Only — NO LINUX GUI — Correct Answer: False

TEACHING NOTE

ExpressVPN on Linux does not ship a graphical client, running entirely via the CLI tool.

Citation: ExpressVPN CLI [Ref 6].

8 Flat Pricing — $5.50 MONTHLY — Correct Answer: True

TEACHING NOTE

Mullvad maintains a flat rate of $5.50 per month with no annual term discounts or upselling.

Citation: Mullvad Pricing [Ref 2].

9 Proton CLI — PROTONVPN-CLI — Correct Answer: True

TEACHING NOTE

ProtonVPN's open-source Linux client uses the protonvpn-cli command to establish connections.

Citation: ProtonVPN CLI [Ref 5].

10 Unlimited Links — NO DEVICE LIMIT — Correct Answer: False

TEACHING NOTE

Surfshark allows unlimited simultaneous device connections under a single user account.

Citation: Surfshark Devices [Ref 8].

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 CLIINTERFACE	B CONFIGFILE	C SYSTEMDSERVICE	D CREDENTIALS
E IPTABLES	F RESOLVECTL	G TUNNEL	H DAEMON

CHECKPOINT 3: KEY TERM KEY

1 CLIINTERFACE	2 CONFIGFILE	3 SYSTEMDSERVICE
4 CREDENTIALS	5 IPTABLES	6 RESOLVECTL

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.

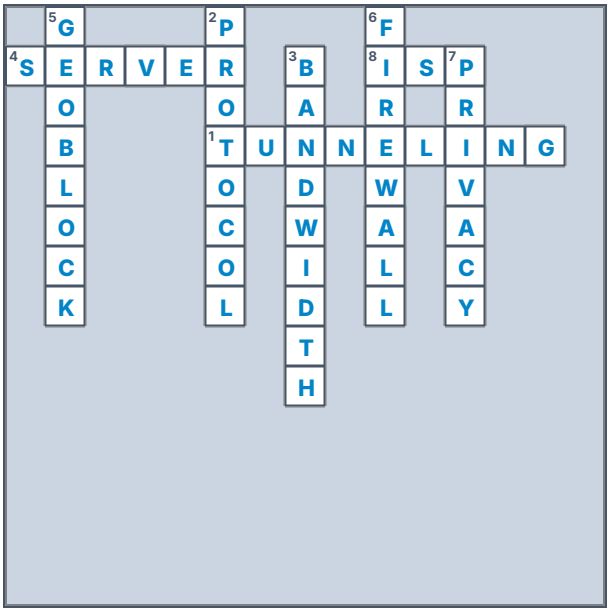
Stealth Representation:
Highlight the role of NDAs and third-party representation in preventing speculative price gouging during corporate procurement.

Puzzles Keys & Instructor Notes

WORD SEARCH SOLUTION

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

CROSSWORD SOLUTION



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. `LIINTERFACEC`
   CLIINTERFACE

2. `ONFIGFILEC`
   CONFIGFILE

3. `YSTEMDSERVICES`
   SYSTEMDSERVICE

4. `REDENTIALSC`
   CREDENTIALS

5. `PTABLESI`
   IPTABLES

6. `ESOLVECTLR`
   RESOLVECTL

7. `UNNELT`
   TUNNEL

8. `AEMOND`
   DAEMON

SECRET CIPHER CHALLENGE KEY

"CLI VPN TUNNELS SECURE HEADLESS LINUX SERVERS"

VPN & Network Case Studies Solution Key

A Case Study 1: Headless Server Protectic

Instructor Solution

GRADING GUIDELINE

Student answers should cover the following points:

- **Scenario Analysis:** A Linux administrator needs to secure remote file backups from a headless terminal node located in a shared hosting datacenter.
- **Recommended Strategy & Solution:** Configure the client settings file, execute the start command via systemd-ctl, and run resolvectl status to verify DNS is bound to the tun0 interface.

B Case Study 2: Automating Egress Killswitc

Instructor Solution

GRADING GUIDELINE

Student answers should cover the following points:

- **Scenario Analysis:** An administrator wants to ensure that a headless terminal connection drops all public traffic if the VPN tunnel goes offline.
- **Recommended Strategy & Solution:** Configure iptables rules to drop all traffic on eth0 except for packets destined to the VPN server port, and allow all traffic on the tun0 interface.