

**Understanding Cisco Cybersecurity Fundamentals (210-250)**

**Exam Description:** The Understanding Cisco Cybersecurity Fundamentals (SECFND) exam (210-250) is a 90-minute, 60−70 question assessment that is associated with the Cisco CCNA Cyber Ops certification. Candidates can prepare for this exam by taking the Understanding Cisco Cybersecurity Fundamentals (SECFND) v1.0 course. This exam tests a candidate's understanding of cybersecurity basic principles, foundational knowledge, and core skills needed to grasp the more associate-level materials in the second required exam, Implementing Cisco Cybersecurity Operations (SECOPS).

The following topics are general guidelines for the content likely to be included on the exam. However, other related topics may also appear on any specific delivery of the exam. In order to better reflect the contents of the exam and for clarity purposes, the guidelines below may change at any time without notice.

# 12% 1.0 Network Concepts

* 1. Describe the function of the network layers as specified by the OSI and the TCP/IP network models
  2. Describe the operation of the following
     1. IP
        + Stands for Internet Protocol, provides end-to-end delivery of packets through an internetwork.
     2. TCP
        + Layer 4 protocol responsible for providing reliable, full-duplex, communications by use of a three-way handshake to begin communications (syn, syn-ack, ack). TCP uses packet sequence numbers to ensure full data delivery. Error recovery is provided. Uses 5-tupple metadata for ensuring session management.
     3. UDP
        + IP protocol 17. Layer 4 protocol that provides connectionless communications for real-time applications such as live voice and video conferencing. Simplified header and best-effort network delivery ensures fast communications. Responsibility of higher-layer to provide error checking and recovery.
     4. ICMP
        + Internet Control Message Protocol – Provides method to communicate that an error occurred during the routing of packets.
  3. Describe the operation of these network services
     1. ARP
        + Service used to request the Layer 2 MAC of a host using its IP address. ARP requests are started by the device sending a broadcast query. The intended device will respond to the ARP request with an ARP reply containing its MAC address.
     2. DNS
        + System to resolve human readable domain names to its IP address equivalent. Primarily uses UDP port 53 but may also use TCP port 53.
     3. DHCP
        + Provides dynamic network configuration information to the requesting host, primarily an IP address. A four-step process for requests: Discovery, Offer, Request, and ACK. Both Discovery and Request are broadcast messages intended for the subnets DHCP server. May also contain additional information such as the default gateway, DNS servers, and NTP servers. Uses UDP port 67 for the DHCP server, and UDP port 68 for the DHCP client.
  4. Describe the basic operation of these network device types
     1. Router
        + Layer 3 device that delivers packets between two networks. Breaks up broadcast and collision domains. Works by creating a routing table consisting of connected interfaces, static routes, dynamic routes, and default routes. Interior routing protocols are divided into two main categories: distance vector (routers advertise all connected routers and their distance, RIP and EIGRP) and link state (the router learns the complete topology of the network, OSPF and IS-IS). There is a single Exterior Gateway Protocol in use today, BGP.
     2. Switch
        + A layer 2 device used to forward frames and separates each interface into its own collision domain. Switches can be separated into two major categories, layer 2 and layer 3 switches. Layer 3 switches add the capability of providing routing functionality through the use of VLANs.
     3. Hub
        + Layer 1 device that regenerates the outbound signal across all ports except sender. Half-duplex communications and uses CSMA/CD to mitigate collisions. All interfaces part of same collision and broadcast domain.
     4. Bridge
        + A bridge is a layer 2 device with functionally similar to a switch. The network bridge predates switches. Bridges separate interfaces into their own collision domains.
     5. Wireless access point (WAP)
        + Defined by 802.11, half-duplex communications using CSMA/CA to avoid collisions. Standalone. CSMA/CA can use a physical carrier sense to ensure the medium is clear or a virtual carrier sense to predict how long the medium will be busy based on the estimated time the current frame will take to transmit based on a value in the 802.11 frame. Frames must be acknowledged by the receiver on a WLAN unlike an Ethernet LAN.
     6. Wireless LAN controller (WLC)
        + A WLAN controller provide management functions to control Lightweight Access Points. WLC’s provide the ability to monitor and provide real-time signal shaping to ensure maximum coverage. Some benefits of using a WLC include Dynamic channel assignment, transmit power optimization, self-healing wireless coverage, flexible client roaming, dynamic client load balancing, security management, and wireless intrusion protection system
  5. Describe the functions of these network security systems as deployed on the host, network, or the cloud:
     1. Firewall
        + Protects the trusted, inside network and the untrusted outside network. Firewalls connected to the Internet are often called Internet Edge Firewalls. May also provide Network Address Translation services, filtering, and application inspection. Perimeter security is accomplished by simple packet-filtering techniques, application proxies, NAT, stateful inspection, and next-gen context aware firewalls.
     2. Cisco Intrusion Prevention System (IPS)
        + An IPS can both detect and eliminate network threats. They can be deployed inline with network traffic to actively stop attacks. Intrusion Prevention Systems can network-based or host-based. The different detection methodologies include: pattern matching and stateful pattern matching, protocol analysis, heuristics, anomaly, and global threat correlation.
     3. Cisco Advanced Malware Protection (AMP)
        + Next-generation protection using telemetry from big data, continuous analysis, and advanced. Protection monitors possible attacks while they are in progress to provide alerts during all stages of system compromise. Connectors are created for networks, endpoints, and content security appliances to provide greater monitoring and system remediation.
     4. Web Security Appliance (WSA) / Cisco Cloud Web Security (CWS)
     5. Email Security Appliance (ESA) / Cisco Cloud Email Security (CES)

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|  | 1.6 | Describe IP subnets and communication within an IP subnet and between IP subnets |
| 1.7 | Describe the relationship between VLANs and data visibility |
| 1.8 | Describe the operation of ACLs applied as packet filters on the interfaces of network devices |
| 1.9 | Compare and contrast deep packet inspection with packet filtering and stateful firewall operation |
| 1.10 | Compare and contrast inline traffic interrogation and taps or traffic mirroring |
| 1.11 | Compare and contrast the characteristics of data obtained from taps or traffic mirroring and NetFlow in the analysis of network traffic |
| 1.12 | Identify potential data loss from provided traffic profiles |
| **17%** | **2.0** | **Security Concepts** |
|  | 2.1 | Describe the principles of the defense in depth strategy |
|  | 2.2 | Compare and contrast these concepts |

* + 1. Risk
    2. Threat
    3. Vulnerability
    4. Exploit
  1. Describe these terms
     1. Threat actor
     2. Run book automation (RBA)
     3. Chain of custody (evidentiary)
     4. Reverse engineering
     5. Sliding window anomaly detection
     6. PII
     7. PHI
  2. Describe these security terms
     1. Principle of least privilege
     2. Risk scoring/risk weighting
     3. Risk reduction
     4. Risk assessment
  3. Compare and contrast these access control models
     1. Discretionary access control
     2. Mandatory access control
     3. Nondiscretionary access control
  4. Compare and contrast these terms
     1. Network and host antivirus
     2. Agentless and agent-based protections
     3. SIEM and log collection
  5. Describe these concepts
     1. Asset management
     2. Configuration management
     3. Mobile device management
     4. Patch management
     5. Vulnerability management

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| **12%** | **3.0** | **Cryptography** |
|  | 3.1 | Describe the uses of a hash algorithm |
|  | 3.2 | Describe the uses of encryption algorithms |
|  | 3.3 | Compare and contrast symmetric and asymmetric encryption algorithms |
|  | 3.4 | Describe the processes of digital signature creation and verification |
|  | 3.5 | Describe the operation of a PKI |
|  | 3.6 | Describe the security impact of these commonly used hash algorithms |

* + 1. MD5
    2. SHA-1
    3. SHA-256
    4. SHA-512
  1. Describe the security impact of these commonly used encryption algorithms and secure communications protocols
     1. DES
     2. 3DES
     3. AES
     4. AES256-CTR
     5. RSA
     6. DSA
     7. SSH
     8. SSL/TLS
  2. Describe how the success or failure of a cryptographic exchange impacts security investigation
  3. Describe these items in regards to SSL/TLS
     1. Cipher-suite
     2. X.509 certificates
     3. Key exchange
     4. Protocol version
     5. PKCS

# 19% 4.0 Host-Based Analysis

* 1. Define these terms as they pertain to Microsoft Windows
     1. Processes
     2. Threads
     3. Memory allocation
     4. Windows Registry
     5. WMI
     6. Handles
     7. Services
  2. Define these terms as they pertain to Linux
     1. Processes
     2. Forks
     3. Permissions
     4. Symlinks
     5. Daemon
  3. Describe the functionality of these endpoint technologies in regards to security monitoring
     1. Host-based intrusion detection
     2. Antimalware and antivirus
     3. Host-based firewall
     4. Application-level whitelisting/blacklisting
     5. Systems-based sandboxing (such as Chrome, Java, Adobe reader)
  4. Interpret these operating system log data to identify an event
     1. Windows security event logs
     2. Unix-based syslog
     3. Apache access logs
     4. IIS access logs

# 19% 5.0 Security Monitoring

* 1. Identify the types of data provided by these technologies
     1. TCP Dump
     2. NetFlow
     3. Next-Gen firewall
     4. Traditional stateful firewall
     5. Application visibility and control
     6. Web content filtering
     7. Email content filtering
  2. Describe these types of data used in security monitoring
     1. Full packet capture
     2. Session data
     3. Transaction data
     4. Statistical data
     5. Extracted content
     6. Alert data
  3. Describe these concepts as they relate to security monitoring
     1. Access control list
     2. NAT/PAT
     3. Tunneling
     4. TOR
     5. Encryption
     6. P2P
     7. Encapsulation
     8. Load balancing
  4. Describe these NextGen IPS event types
     1. Connection event
     2. Intrusion event
     3. Host or endpoint event
     4. Network discovery event
     5. NetFlow event
  5. Describe the function of these protocols in the context of security monitoring
     1. DNS
     2. NTP
     3. SMTP/POP/IMAP
     4. HTTP/HTTPS

# 21% 6.0 Attack Methods

* 1. Compare and contrast an attack surface and vulnerability
  2. Describe these network attacks
     1. Denial of service
     2. Distributed denial of service
     3. Man-in-the-middle
  3. Describe these web application attacks
     1. SQL injection
     2. Command injections
     3. Cross-site scripting
  4. Describe these attacks
     1. Social engineering
     2. Phishing
     3. Evasion methods
  5. Describe these endpoint-based attacks
     1. Buffer overflows
     2. Command and control (C2)
     3. Malware
     4. Rootkit
     5. Port scanning
     6. Host profiling
  6. Describe these evasion methods
     1. Encryption and tunneling
     2. Resource exhaustion
     3. Traffic fragmentation
     4. Protocol-level misinterpretation
     5. Traffic substitution and insertion
     6. Pivot
  7. Define privilege escalation
  8. Compare and contrast remote exploit and a local exploit