Evans munene.
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Discuss zoning in networks and how it enhances security in networks

Network zoning is the practice of dividing a computer network into separate, logical or physical segments (called zones) based on their function, trust level, or security requirements. Each zone is isolated from others by firewalls, routers, or access control mechanisms to regulate communication between them. In simple terms, zoning ensures that not every part of the network can freely communicate with every other part, thus enhancing control and protection.

Common Types of Network Zones

- **External / Untrusted Zone:** Represents the public internet or any untrusted network.
- **Demilitarized Zone (DMZ):** Hosts public-facing services that must be accessible externally but isolated from the internal network.
- **Internal / Trusted Zone:** Contains critical business systems and user workstations with strict access control.
- **Management Zone:** Used for network administration and monitoring. Access is highly restricted.
- **Guest Zone:** Provides limited, isolated access for visitors or temporary users, such as public Wi-Fi.

How Zoning Enhances Network Security

a) Limits Lateral Movement If an attacker gains access to one zone, such as a web server in the DMZ, they cannot easily move to sensitive internal systems because firewalls block unauthorized communication.

b) Enables Granular Access Control Each zone can have its own security rules, such as allowing only HTTP/HTTPS in the DMZ, database access in internal zones, and admin access via VPN in the management zone. This reduces the attack surface.

c) Improves Containment and Isolation If malware infects one zone, it is contained there and cannot spread to others, helping in quick recovery and minimizing damage.

d) Facilitates Monitoring and Auditing Different monitoring policies can be applied per zone, improving threat visibility and simplifying forensic analysis.

e) Supports Compliance Requirements Standards such as ISO 27001, PCI-DSS, and NIST require network segmentation to safeguard sensitive data.

Network zoning is a foundational cybersecurity measure that supports defense-in-depth. By isolating systems based on their trust level and purpose, organizations can prevent unauthorized access, contain potential breaches, and ensure effective enforcement of security policies across the entire network.