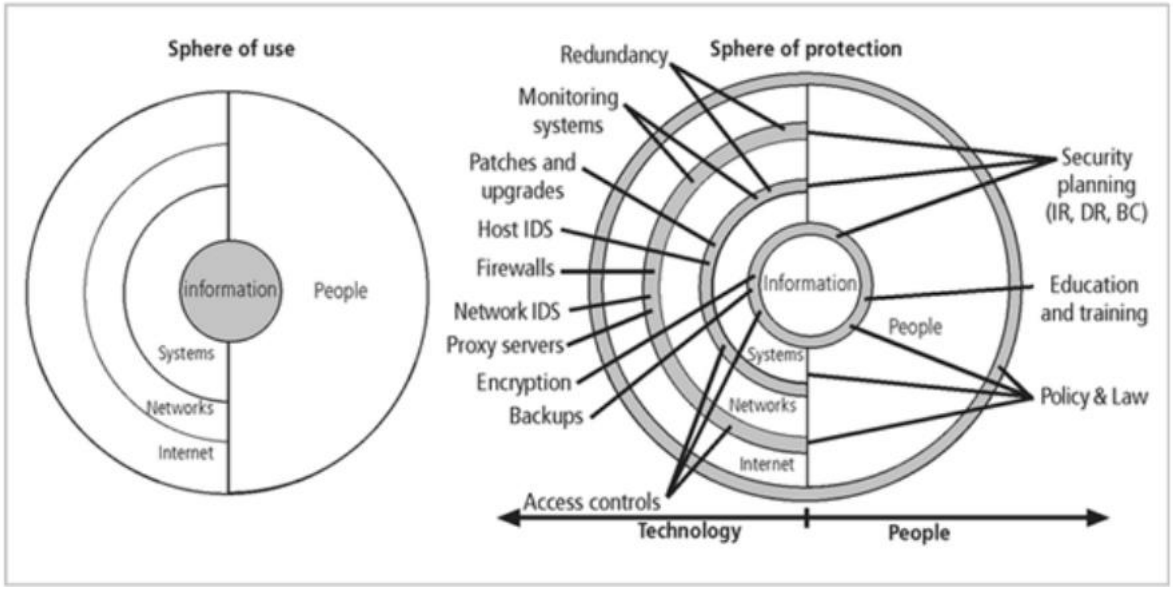
2. What is Sphere of protection, Defense in Depth and Security perimeter? What are the key technological components used for security implementation?

Explain in detail about design of security architecture. (Nov /Dec 2011, May/June 2015)

Sphere of Protection

- The "sphere of protection" overlays each of the levels of the "sphere of use" with a layer of security, protecting that layer from direct or indirect use through the next layer

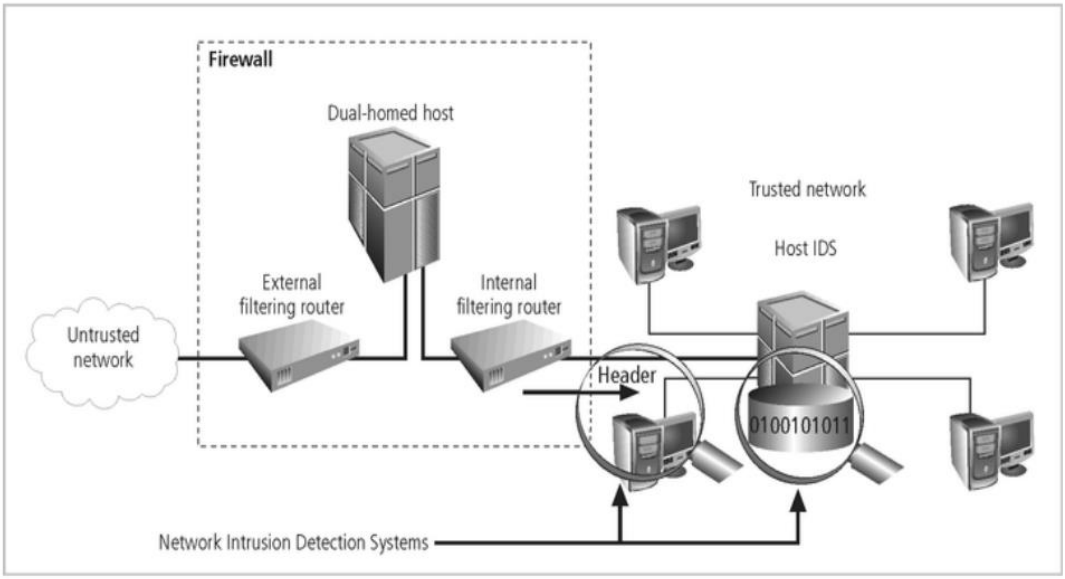
- The people must become a layer of security, a human firewall that protects the information from unauthorized access and use
- Information security is therefore designed and implemented in three layers
  - policies
  - people (education, training, and awareness programs)
  - technology



Defense in Depth

- One of the basic foundations of security architectures is the implementation of security in layers. This layered approach is called **defense in depth**.
- Defense in depth requires that the organization establish sufficient security controls and safeguards, so that an intruder faces multiple layers of controls.
- These layers of control can be organized into policy, training and education and technology as per the NSTISSC model.
- While policy itself may not prevent attacks, they coupled with other layers and deter attacks.
- Training and Education are similar.
- Technology is also implemented in layers, with detection equipment, all operating behind access control mechanisms.

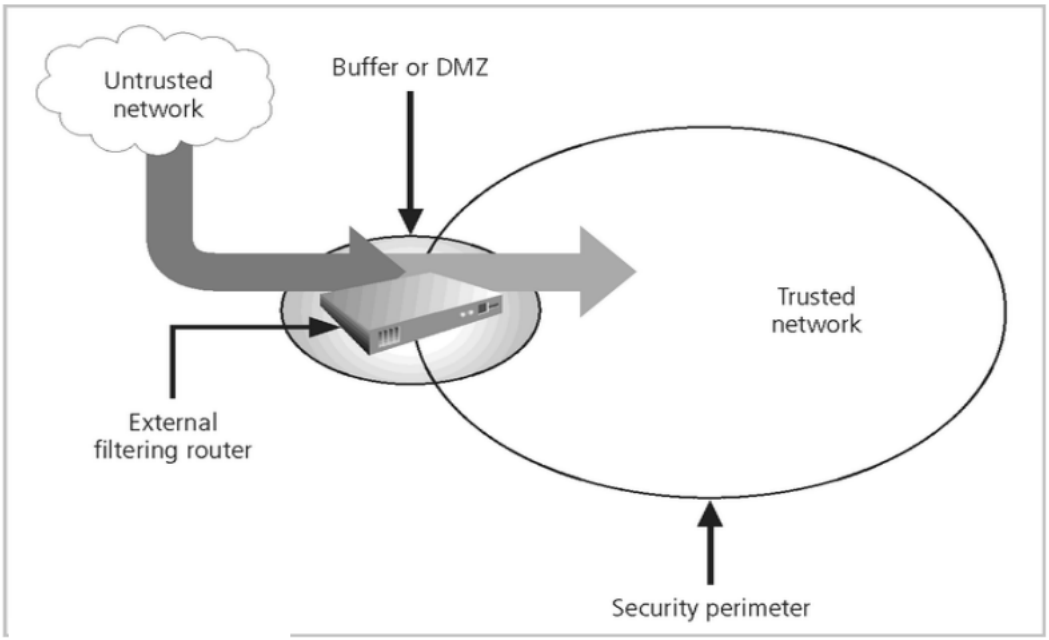
- Implementing multiple types of technology and thereby preventing the failure of one system from compromising the security of the information is referred to as **redundancy**.
- Redundancy can be implemented at a number of points throughout the security architecture, such as firewalls, proxy servers, and access controls.
- The figure shows the use of firewalls and intrusion detection systems (IDS) that use both packet-level rules and data content analysis.



efense in Depth

Security Perimeter

- The point at which an organization's security protection ends, and the outside world begins
- Referred to as the security perimeter
- Unfortunately the perimeter does not apply to internal attacks from employee threats, or on-site physical threats

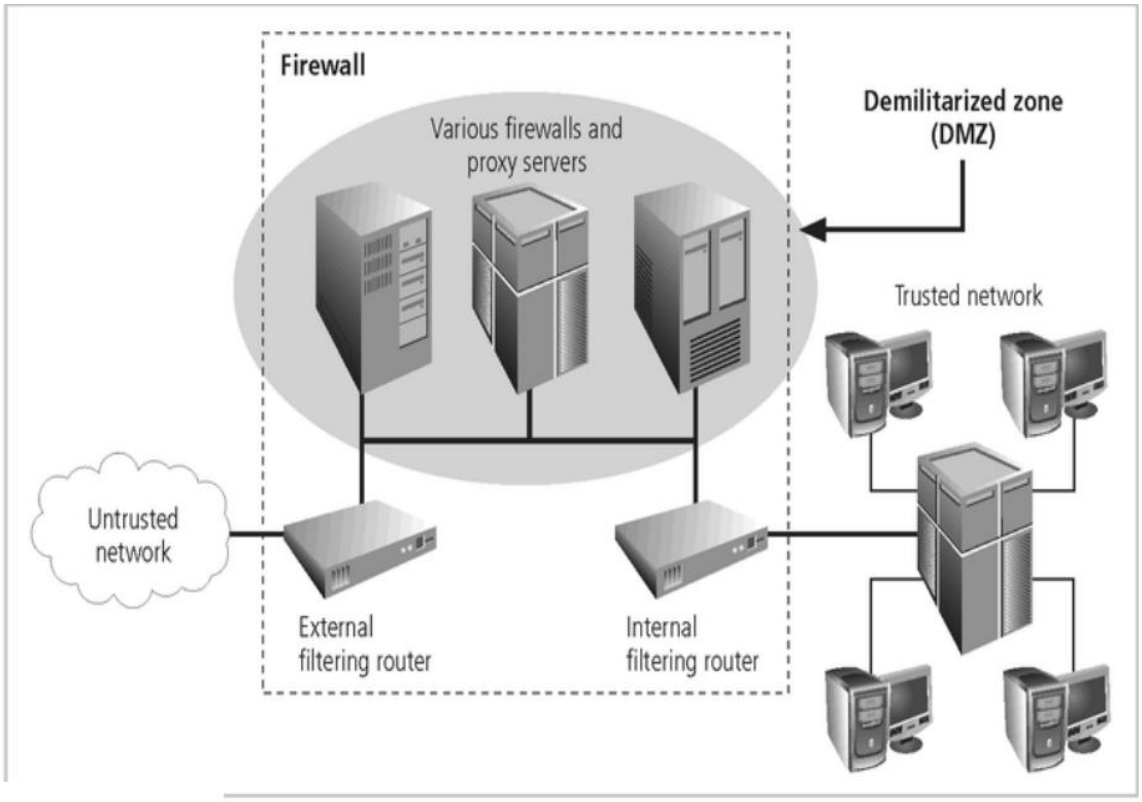


ecurity Perimeters and Domains

Key Technology Components

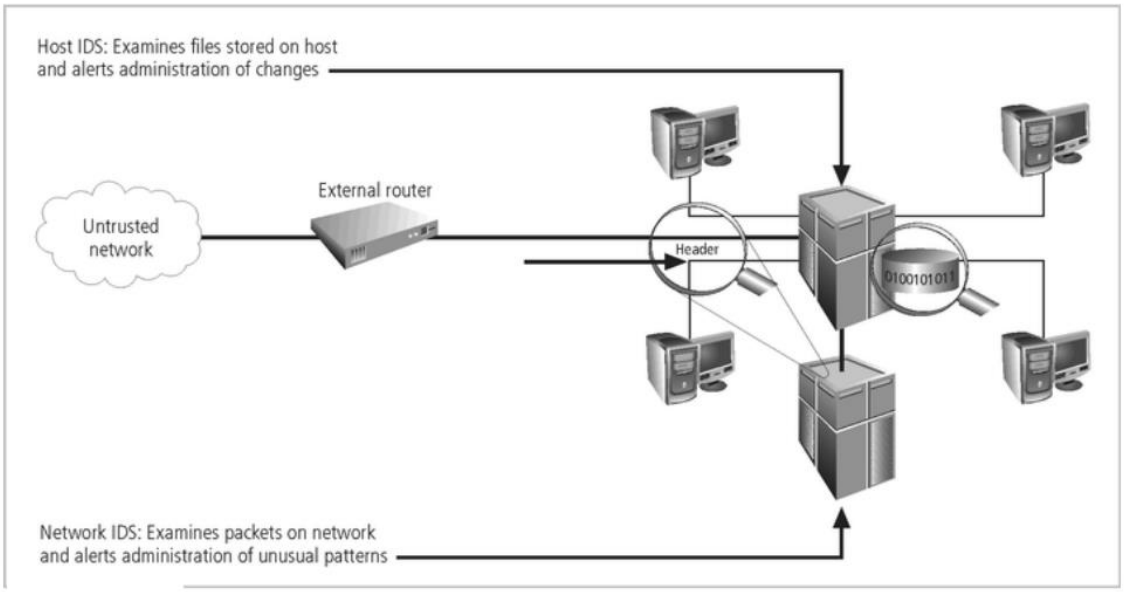
- Other key technology components

  - A **firewall** is a device that selectively discriminates against information flowing into or out of the organization.
  - Firewalls are usually placed on the security perimeter, just behind or as part of a **gateway router**.
  - Firewalls can be packet filtering, stateful packet filtering, proxy, or application level.
  - A Firewall can be a single device or a **firewall subnet**, which consists of multiple firewalls creating a buffer between the outside and inside networks.
  - The **DMZ** (demilitarized zone) is a no-man's land, between the inside and outside networks, where some organizations place Web servers
  - These servers provide access to organizational web pages, without allowing Web requests to enter the interior networks.
  - **Proxy server-** An alternative approach to the strategies of using a firewall subnet or a DMZ is to use a **proxy server**, or **proxy firewall**.
  - For more frequently accessed Web pages, proxy servers can cache or temporarily store the page, and thus are sometimes called **cache servers.**



irewalls, Proxy Servers, and DMZs

- **Intrusion Detection Systems (IDSs).** In an effort to detect unauthorized activity within the inner network, or on individual machines, an organization may wish to implement **Intrusion Detection Systems or IDS**.
- **IDs** come in two versions. Host-based & Network-based IDSs.
  - **Host-based IDSs** are usually installed on the machines they protect to monitor the status of various files stored on those machines.
  - **Network-based IDSs** look at patterns of network traffic and attempt to detect unusual activity based on previous baselines.
- This could include packets coming into the organization's networks with addresses from machines already within the organization (IP spoofing).
- It could also include high volumes of traffic going to outside addresses (as in cases of data theft) or coming into the network (as in a denial of service attack).
- Both host-and network based IDSs require a database of previous activity.


Host IDS: Examines files stored on host
and alerts administration of changes
External router
Untrusted
network
Header
0100101011
Network IDS: Examines packets on network
and alerts administration of unusual patterns