University of BRISTOL

Computer System- B Security

Introduction to Network Security

Firewalls

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Firewall Overview

- Introduction to Firewall
- Types of Firewalls
- Firewall configuration and deployment

Firewalls

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- Examples: Ipchain/Iptable, Cisco PIX, Juniper, MS ISA.

Firewall’s (in)capabilities

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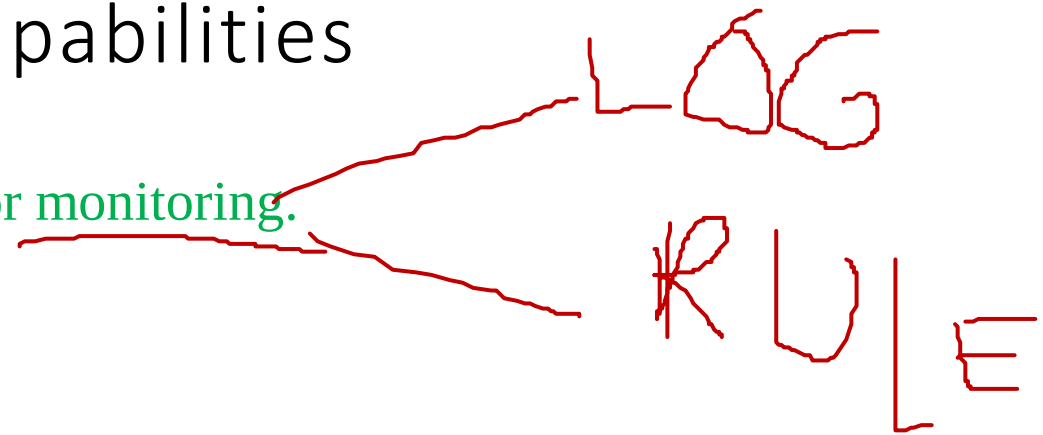

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✓ Limit the damage that a network security problem can do to the overall network.

✓ Protect against malicious insiders.

✓ Protect a connection that doesn't go through it!!

✓ Protect against completely new threats.

✓ Protect against viruses, Trojans etc.

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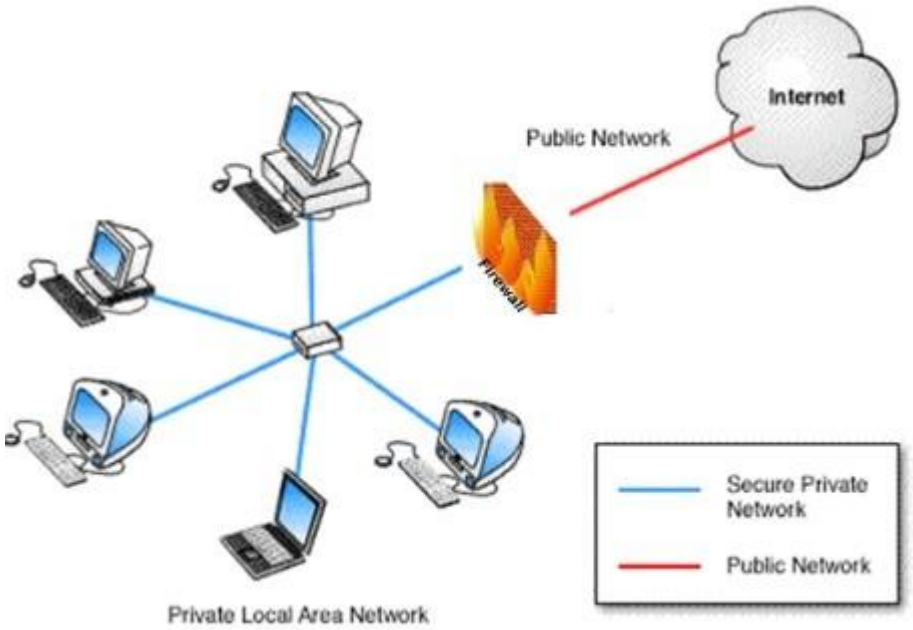
- Ideal Assumption: The firewall itself is immune to penetration. E.g. Cisco iOS vulnerabilities, Juniper Junos vulnerabilities.

Typical Deployment



All images are taken from doc at http://www.vicomsoft.com/learning-center/firewalls/

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- Direction control: Determines the direction in which particular service requests are allowed.
- User control: Controls access to a service according to which user is attempting to access it. IP based filtering or authentication with IPSec.

Types of firewalls

- Packet Filtering Firewall
- Stateful Inspection Firewall
- Application Level Gateway
- Circuit-level gateway

Packet filters

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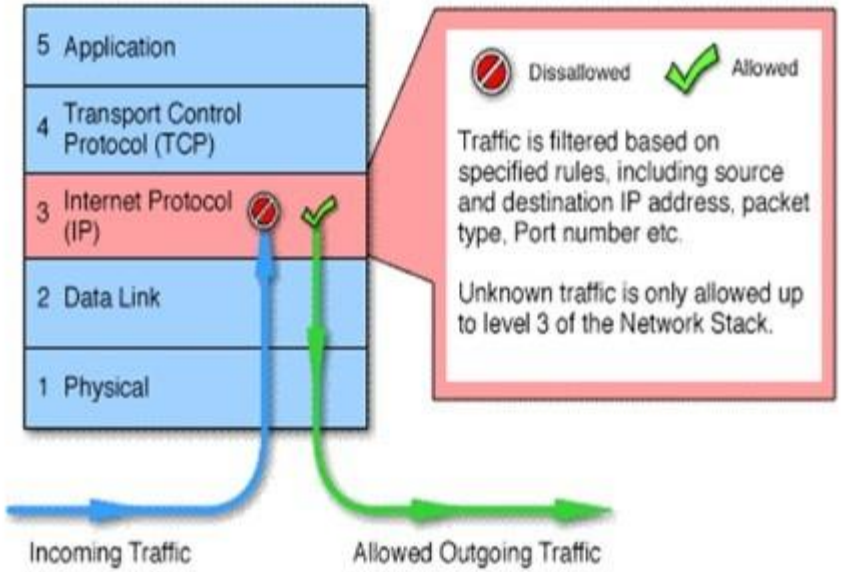


Example packet filters

Rule No	Action	Src IP	Dst IP	Src Port	Dst Port	Direction	Description
1	Block	IP1	*	*	*	IN	Block packets from IP1
2	Pass	*	IP_SMTP	*	25	IN	Allow packets to mail gateway
3	Pass	*	*	*	*	OUT	Allow outgoing
4	Block	*	*	*	*	IN	Block Everything Else

Problems with Packet filters

- Less visibility in the network stack -> less control.
- Hard to define rules as normal connections are request-response
  - Disallowing incoming traffic will prevent response!

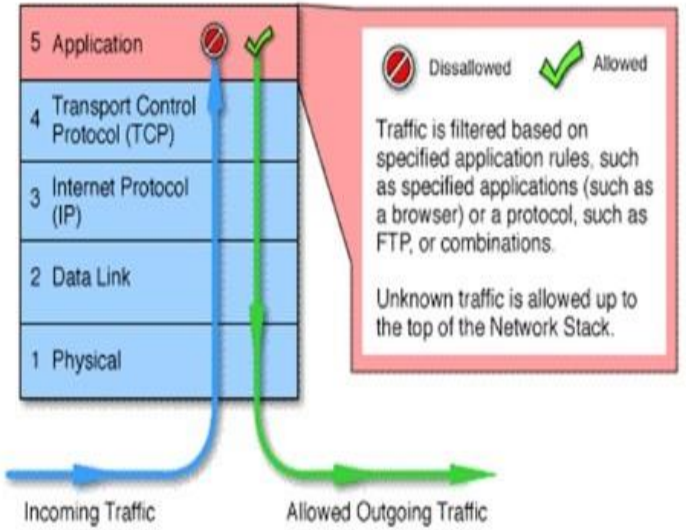
Stateful Inspection

- Keeps session information
- Decision is based on the established connections -> a table of established connection is maintained.
- Fast processing of subsequent packets.

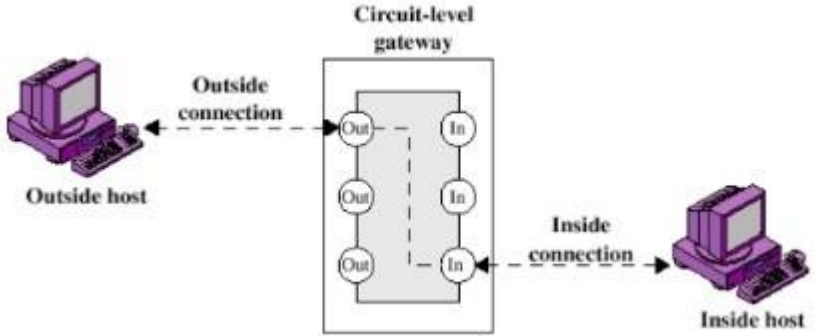
Application gateway (aka Proxy)

- Filters traffic at application layer
- Specific to applications which are configured.
- Works at client-server mode

- Offer High level of security
- Have impact on network performance



Circuit Level gateway



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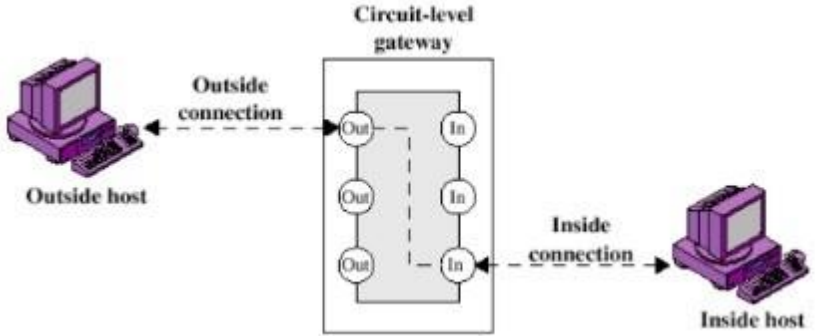

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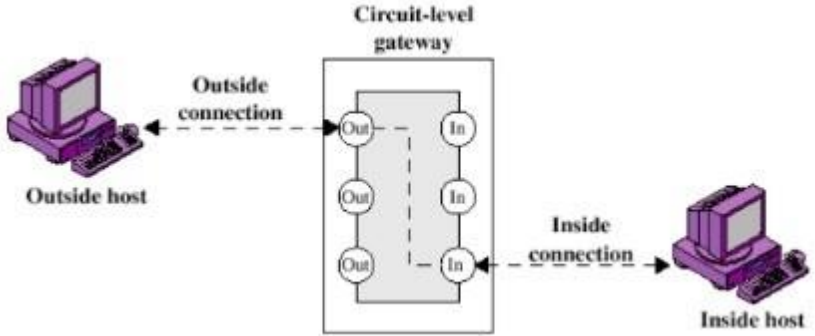

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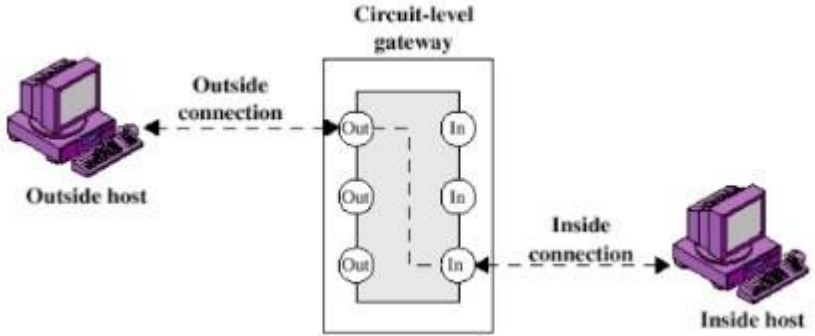

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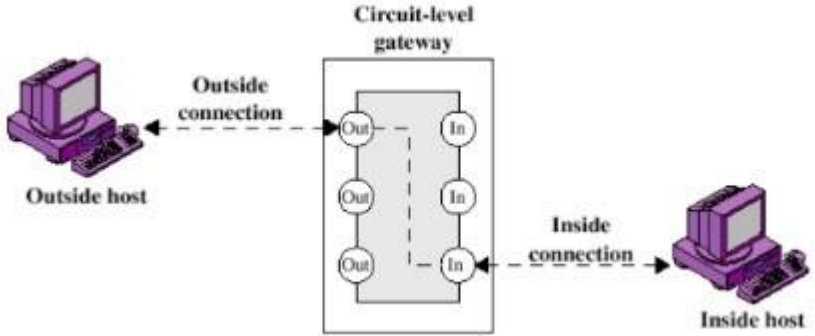

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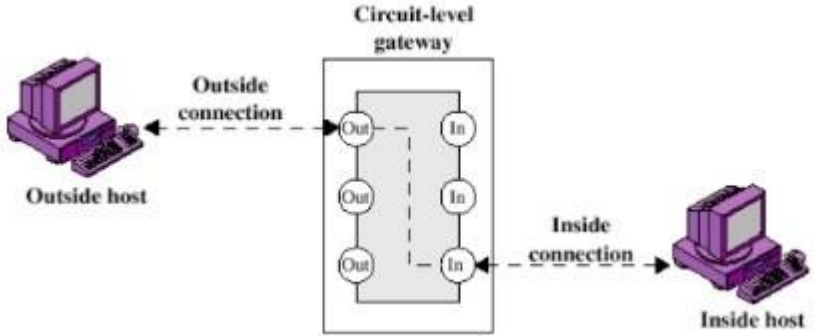

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- Uses SOCKS protocol for client server connection.
- Often used with application gateway.

Our generic design