

Introduction to Network Security

Chapter 12

Network-Based Mitigation

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Topics

- Network-Based Mitigation
 - Network Firewalls
 - Intrusion Detection and Prevention
 - Data Loss Prevention

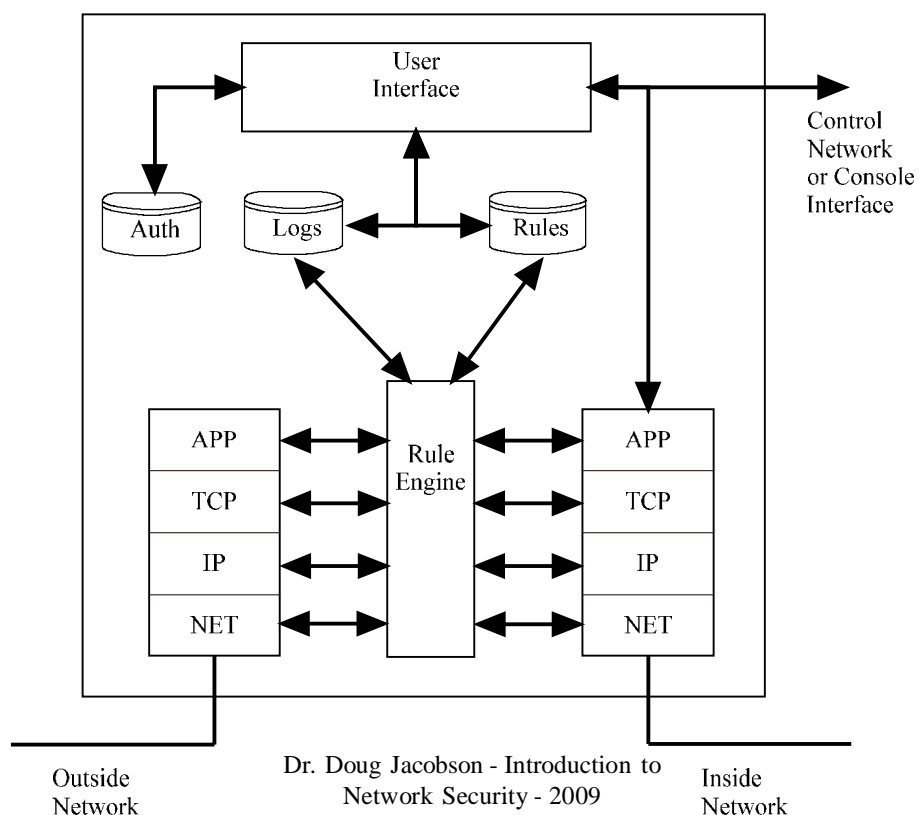
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Network Firewalls

- Designed to “look” at each packet on the network and decide if the packet should be allowed to pass through the firewall or not.
- Uses set of rules to decide if the packet should be blocked
- Rules are typically based on the packet headers (IP & TCP)
- Public domain versions are available

Firewall



Firewall Rules

- Stateless
 - Each packet is independent
 - Very fast and simple to implement
 - Only simple rules
 - Example: block all UDP but port 53
- Stateful
 - Deals with packet streams
 - Slower and requires more resources
 - Can implement complex rules
 - Example: Block all port 53 unless there is a pending request.

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User control

- GUI on the device
- Network based
 - Typically password protected
 - Only allows access to control interface from inside network
 - Can use a separate control network

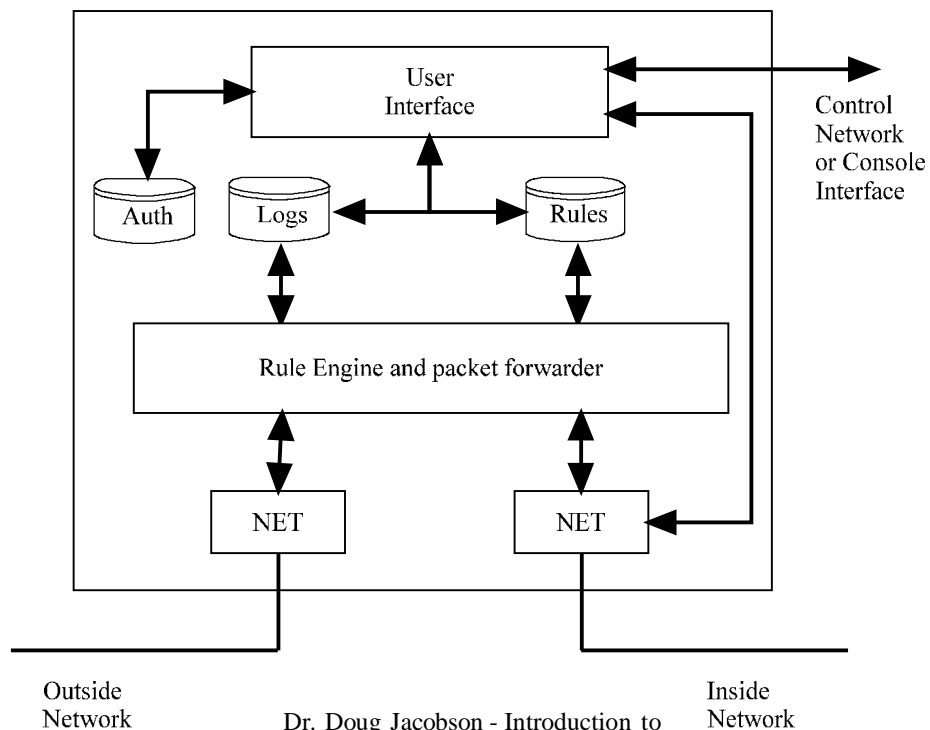
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Firewall types

- Transparent
- Router-based
- NAT-based
- Application

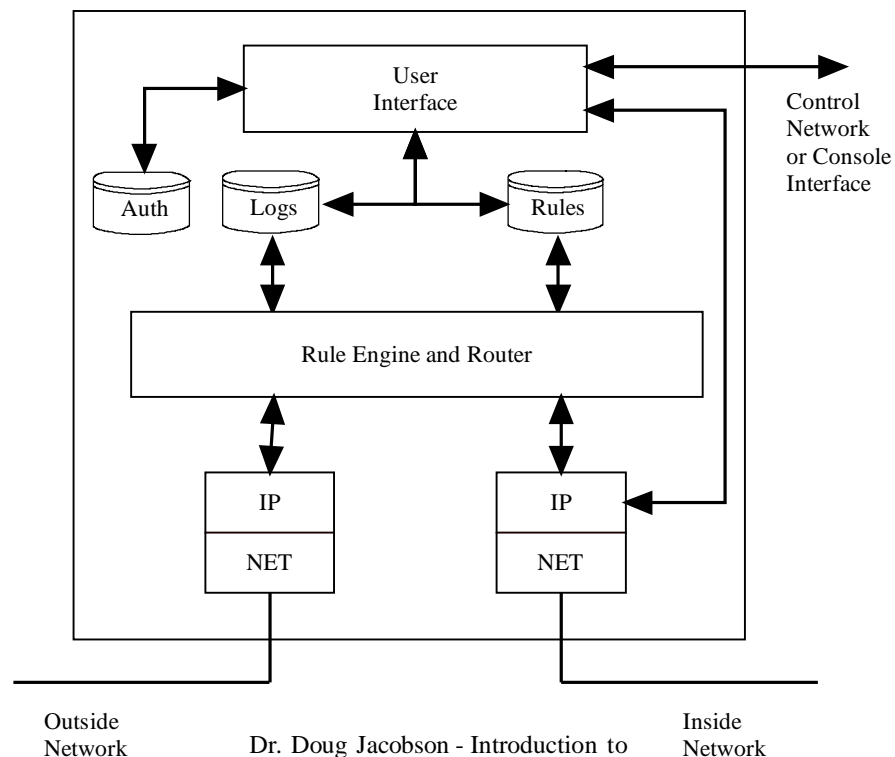
Transparent Firewall



Transparent Firewall

- Two network interfaces
- “sniff” traffic
- Does not have an IP layer for the packet flow
- No need to change network configuration
- Can be implemented as a single port firewall
- Typically simple rule set (mostly stateless)

Filtering Router



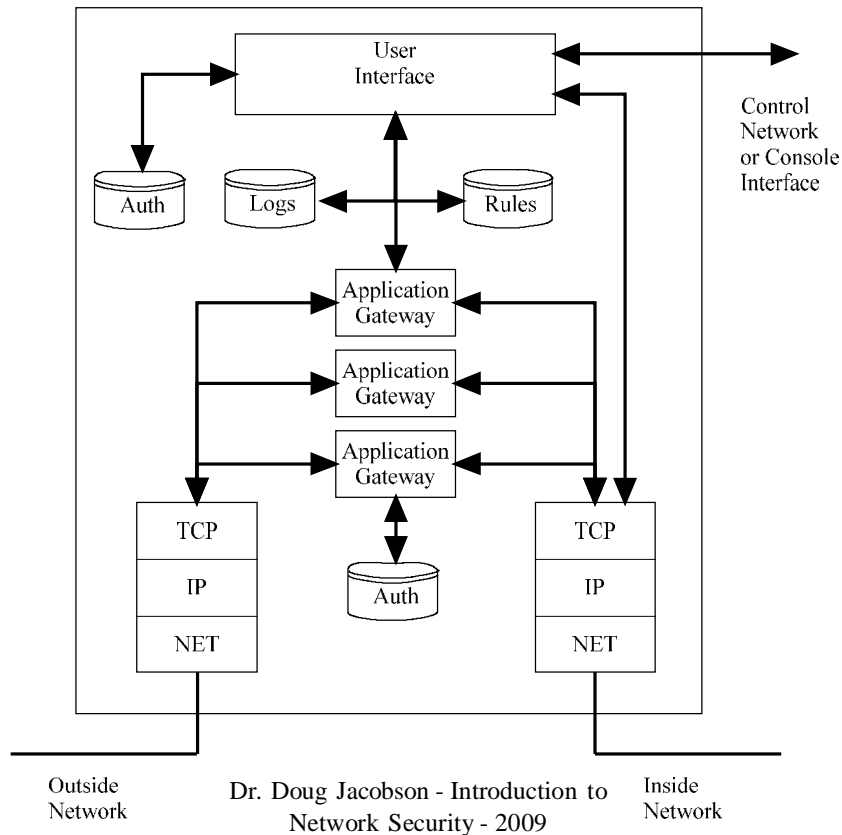
Filtering Router

- Acts like a normal router
- Both stateless and stateful (with simple rules)
- Often some stateless firewall functionality included in most routers

NAT-Based

- Implemented as part of a NAT
- Firewall rules can restrict traffic even more than a normal NAT

Application Firewall



Outside
Network

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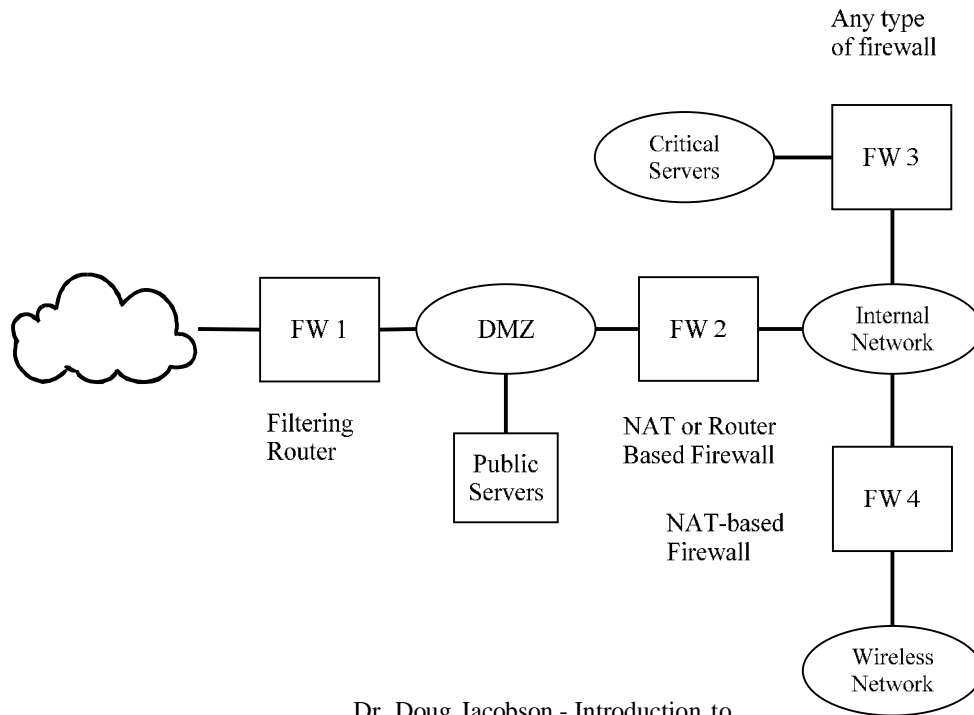
Inside
Network

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Application Firewall

- Uses application gateways to allow a user to gain access through the network.
- Application gateways look like an application and typically require user-based authentication to gain access through the firewall.
- Also typically supports NAT functionality for applications without a gateway

Firewall Deployment



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Firewall Deployment

- DMZ
 - Used to support public servers

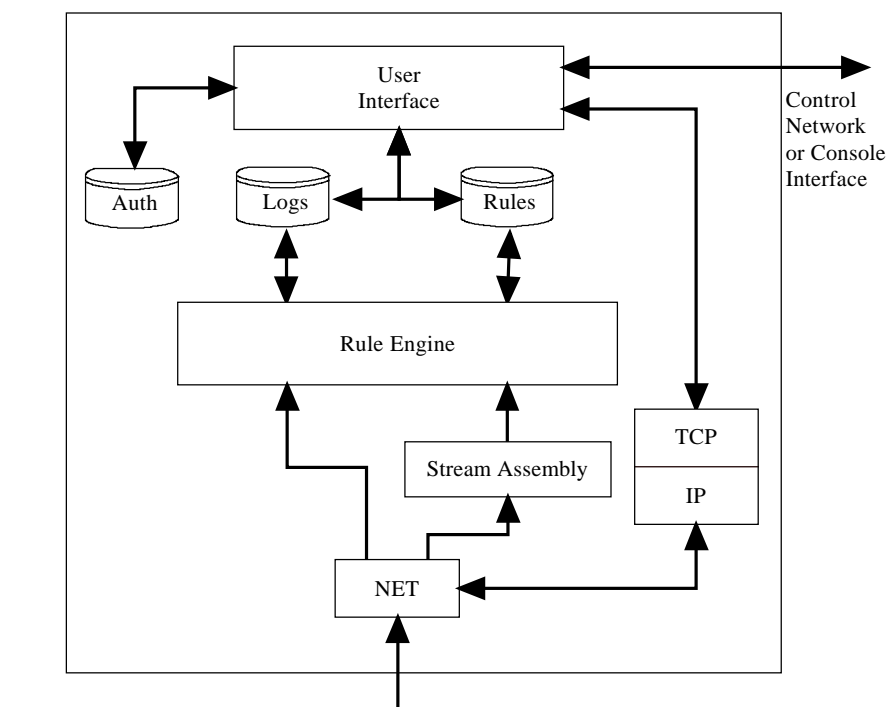
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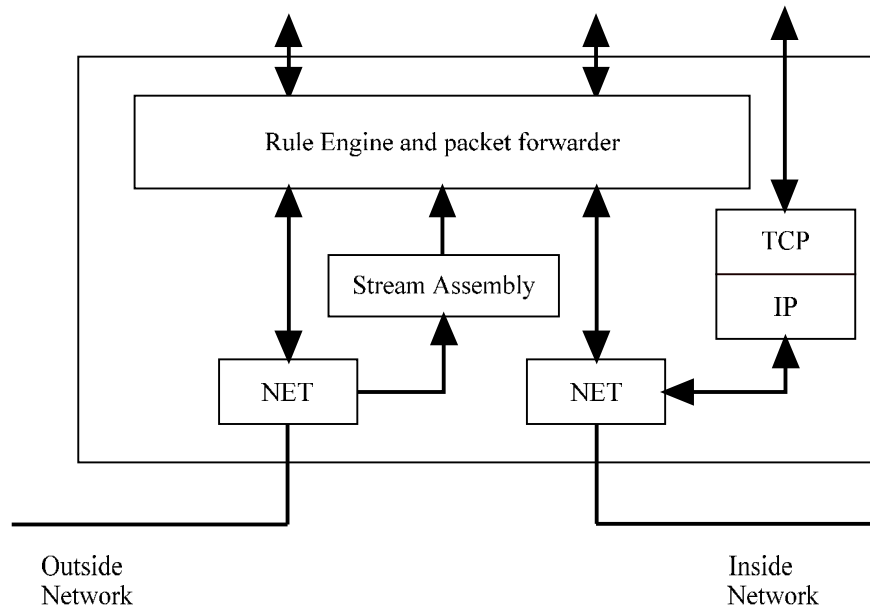
Intrusion Detection/ Prevention

- IDS
 - Watches the network traffic looking for traffic patterns that could be an attack
- IPS
 - Same as an IDS, but will also block traffic based on rules

Intrusion Detection



Intrusion Prevention



Intrusion Prevention

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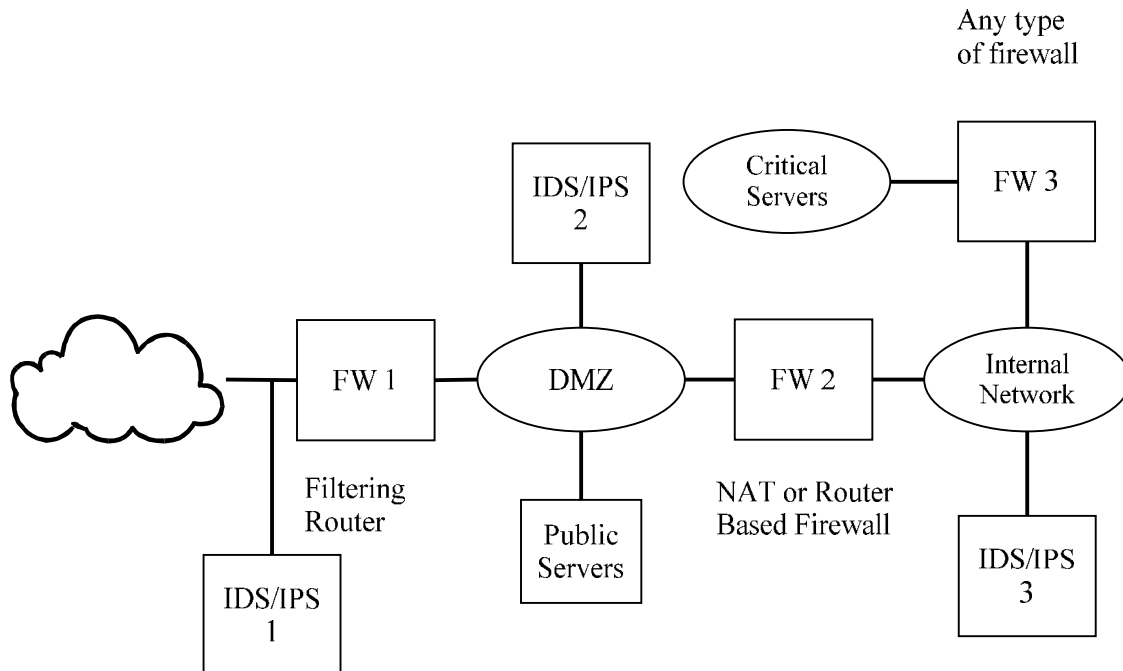
IDS/IPS rules

- Correctly identify the attack
- False Positives
 - Identifying an attack that is not there
- False Negative
 - Missing an attack
- Balance between the false positive and false negative rate is difficult
- Large log files are hard to deal with

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IDS/IPS Deployment



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Data Loss Prevention

- Stop data from leaving an organization
- Like an IDS/IPS except it looks at the payload
- Two data types
 - Structured: data that can be matched to a list like credit card numbers
 - Unstructured: data like letters or memos

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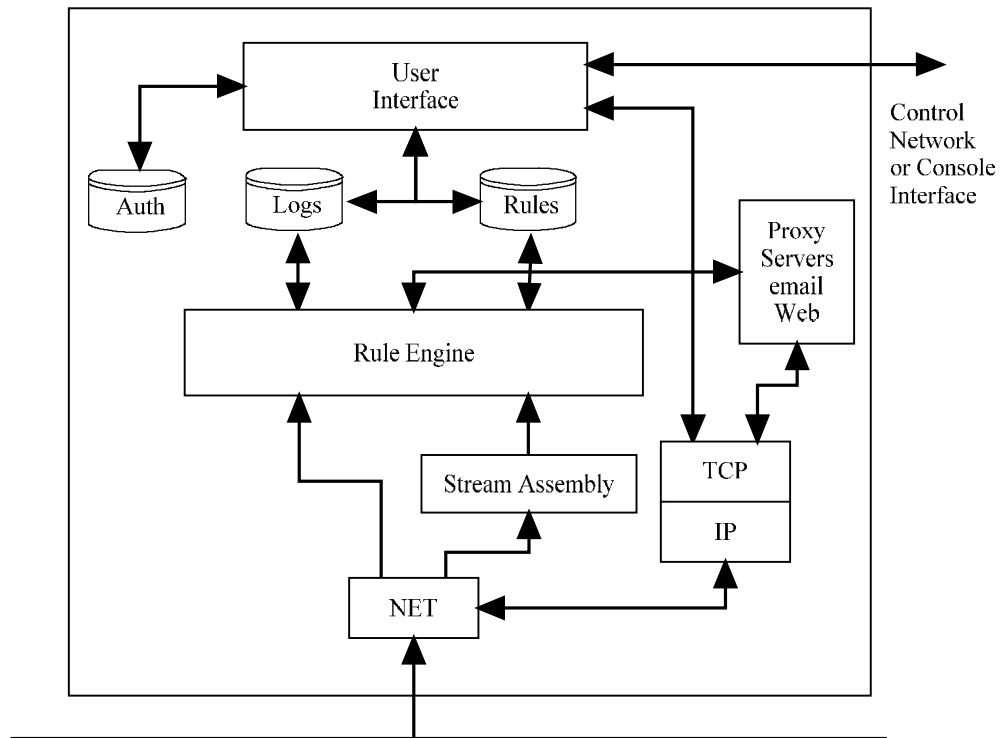
DLP

- Structured data
 - Pattern matching
- Unstructured
 - Fingerprinting
 - Lexical analysis

DLP

- What to do when you find data leaving
 - Block
 - Log
 - Redirect or quarantine

Single Port DLP



Dual port DLP

