SNDSS ‘98

The Multilayer Firewall

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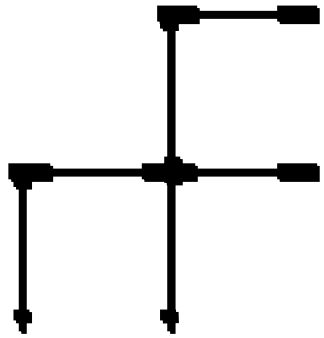


Usual Disclaimer

This talk describes a prototype

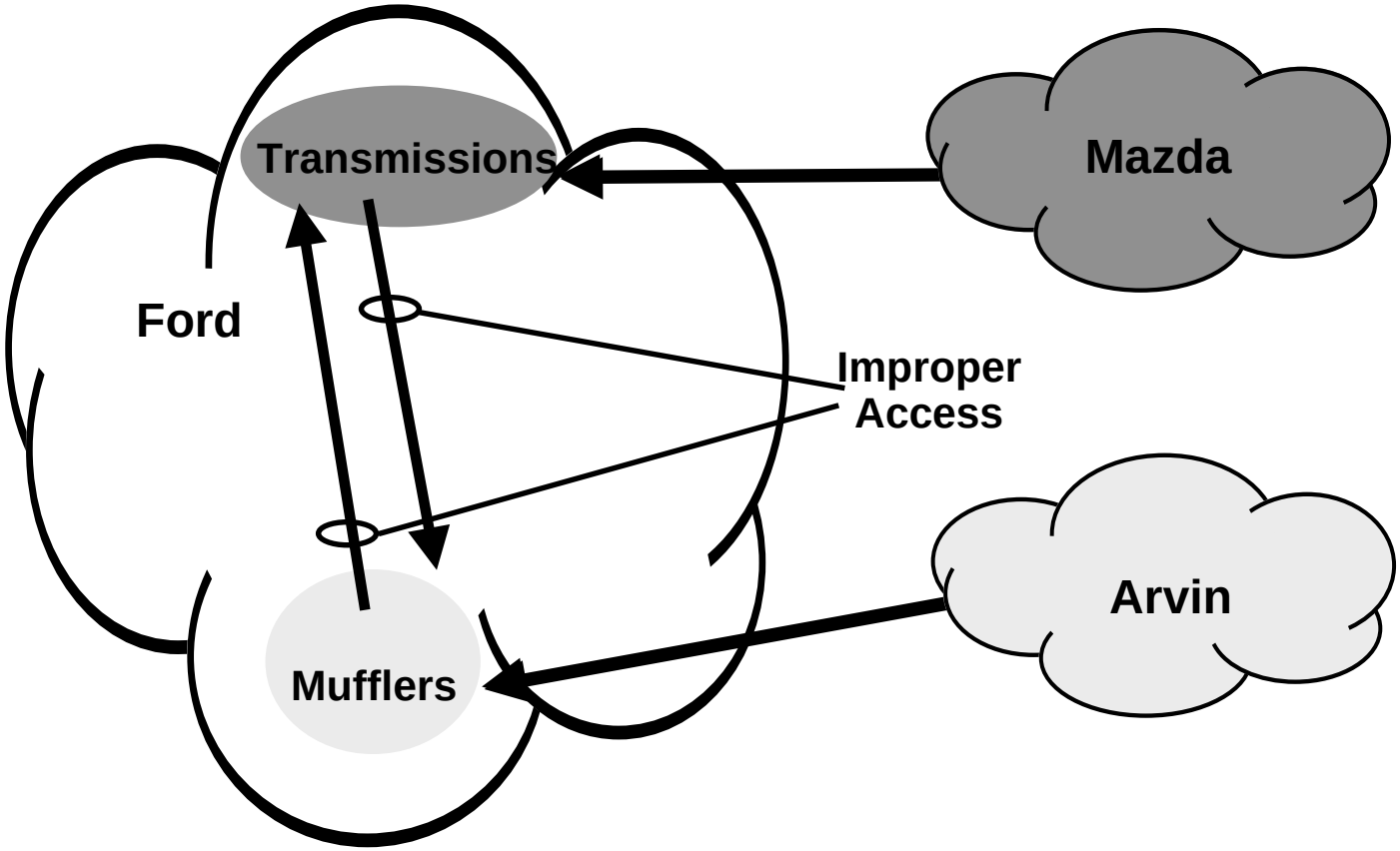
- **No commitment by 3Com to turn it into product.**
- **No commitment by 3Com to do anything with technology described in this talk.**

Motivation

Partnering arrangements are a problem

- **Survey of 35 fortune 1000 companies shows 46% give business partners corporate intranet access (Forrester Report - Partners on the Internet).**
- **Ineffective controls for containing partner accesses.**

Hypothetical Example



Motivation

Another problem is insider threat

- **Estimate 50-70% of security incidents are by insiders (FBI/CSI report; ASIS Intellectual Property Report).**
- **Insiders may violate security for various reasons:**
  - **Disgruntled employee**
  - **Criminal activity**
  - **The “thrill of hacking”**

What to do?

Need a set of tools :

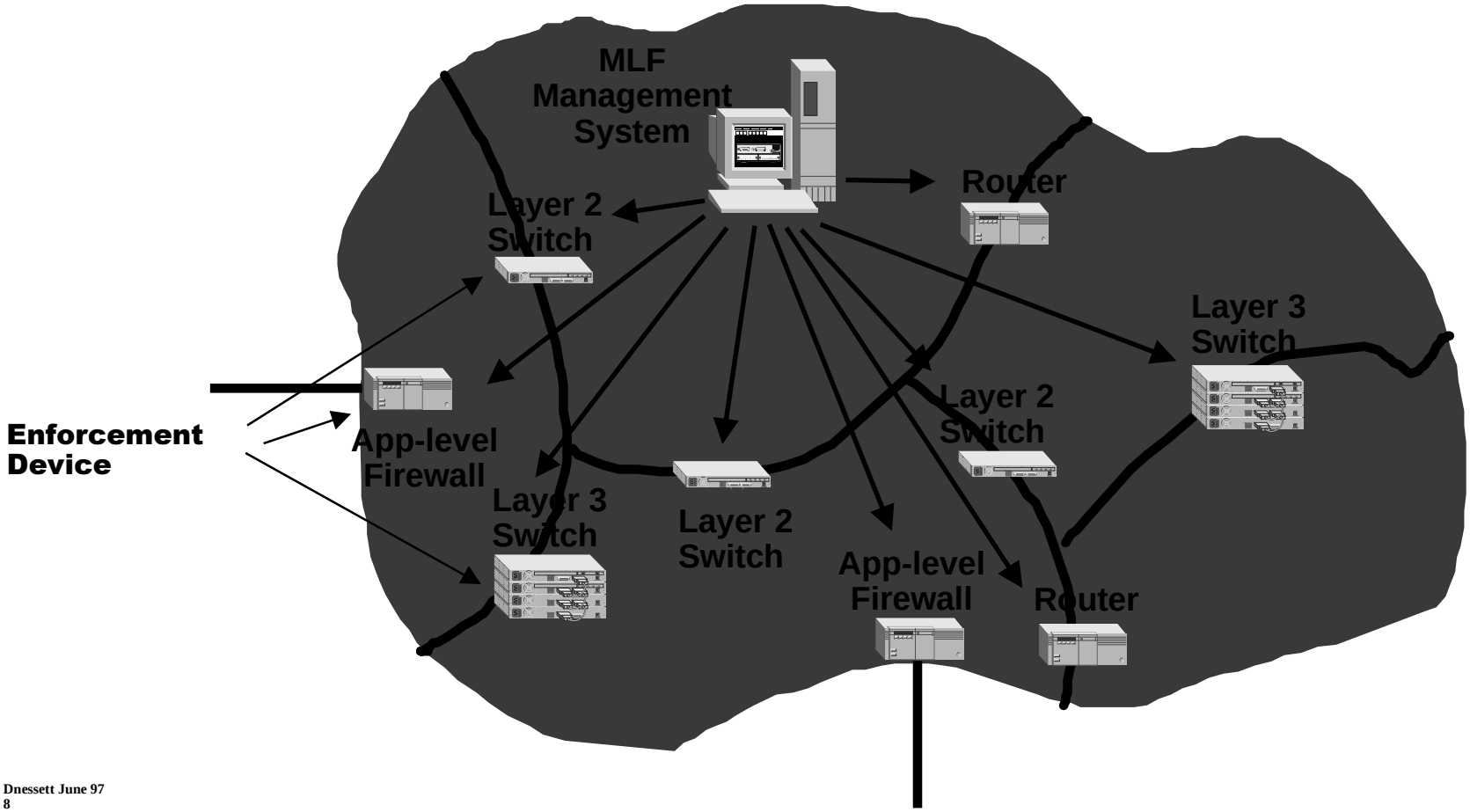
- **Application level - GSSAPI mechanisms, CORBAsec, PKI (credentials management), ...**
- **Session level - TLS (protection of legacy apps/systems)**
- **Network level - IPSEC, Firewalls, Routing security (traffic containment/protection)**

Part of the solution

Extend notion of Firewall into network

- **Control traffic in network with network device (router, switch) filtering.**
- **Create filter information on central management system.**
- **Distribute to network (enforcement) devices.**

Multilayer Firewall (MLF)



System Architecture

Enforcement devices :

- **Filters must have sufficient reach (e.g., at least to TCP/UDP port information).**
- **Should support “fast” filtering (e.g., tens to hunderds of thousands of packets/sec).**
- **Need not support same filtering “language”.**

System Architecture

Enforcement devices :

- **Routers (NB2)**
  - > **85K pps (no filtering);**
    47K pps (filtering)
- **Switch (CB 2500 - 1/3 cost of NB2)**
  - > **148K pps (no filtering);**
    75K pps (filtering)
- **Switch (CB 3500 L3 switch - 1/2 cost)**
  - > **4 Mpps (no filtering);**
    not yet released (filtering)

System Architecture

MLF Management Station :

- **Groups hosts according to administrative view, not physical connectivity.**
- **Define firewall rules between host groups (e.g., src/dst/protocol/allow:disallow).**
- **For each rule, compute which enforcement devices get filters.**
- **Compile high-level rule into low-level filtering commands based on device type.**

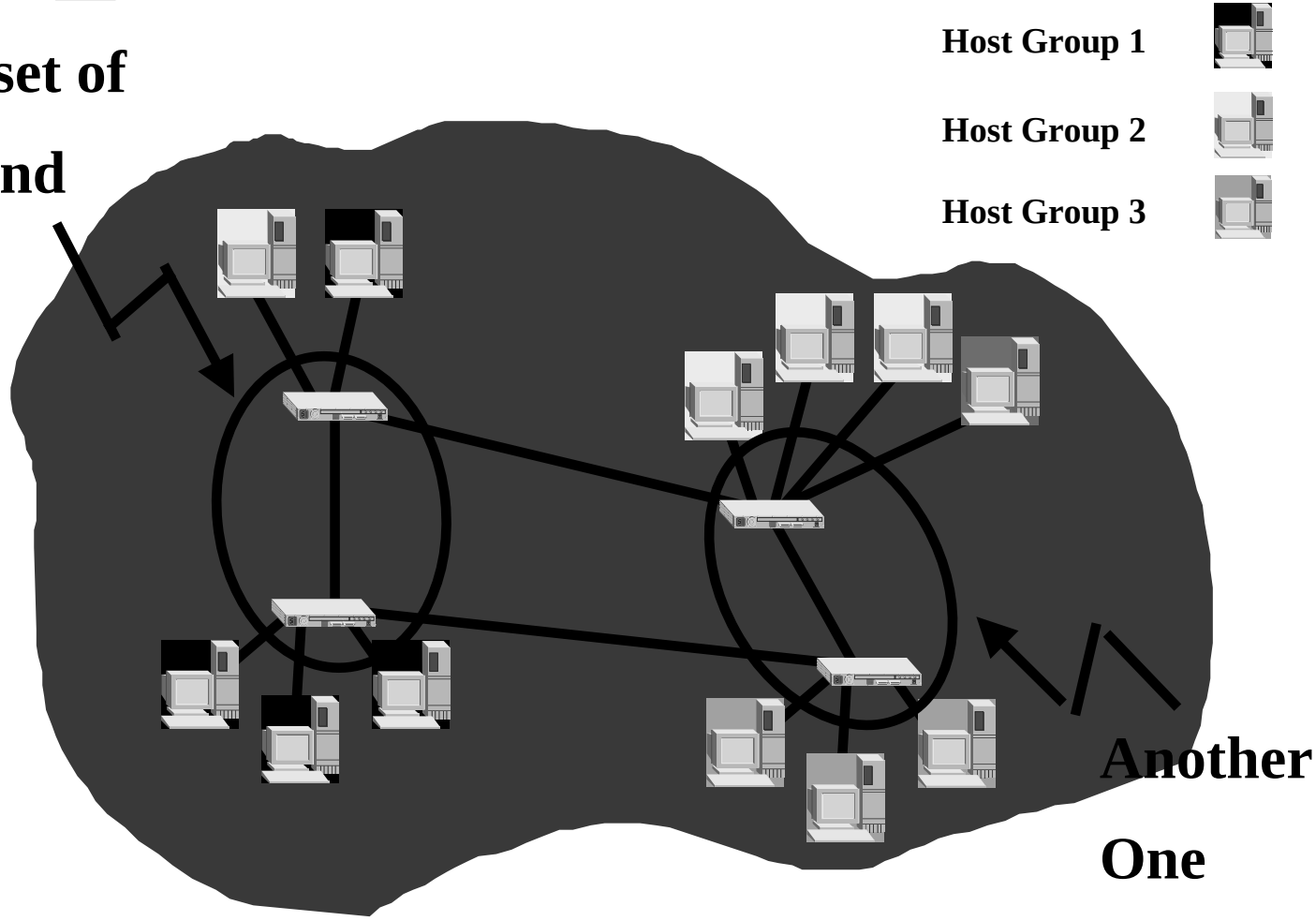
Filter Rule Generation

Key idea in MLF:

- **Use the physical topology of the network to drive filter rule computation.**
- **Each end system is “behind” one or more enforcement devices.**
- **For each firewall rule, compute a cut-vertex set (of enforcement devices) that isolates the src hosts from the dst hosts.**

Filter Rule Generation

A Cut-set of HG 1 and HG 3



Filter Rule Generation

Some details

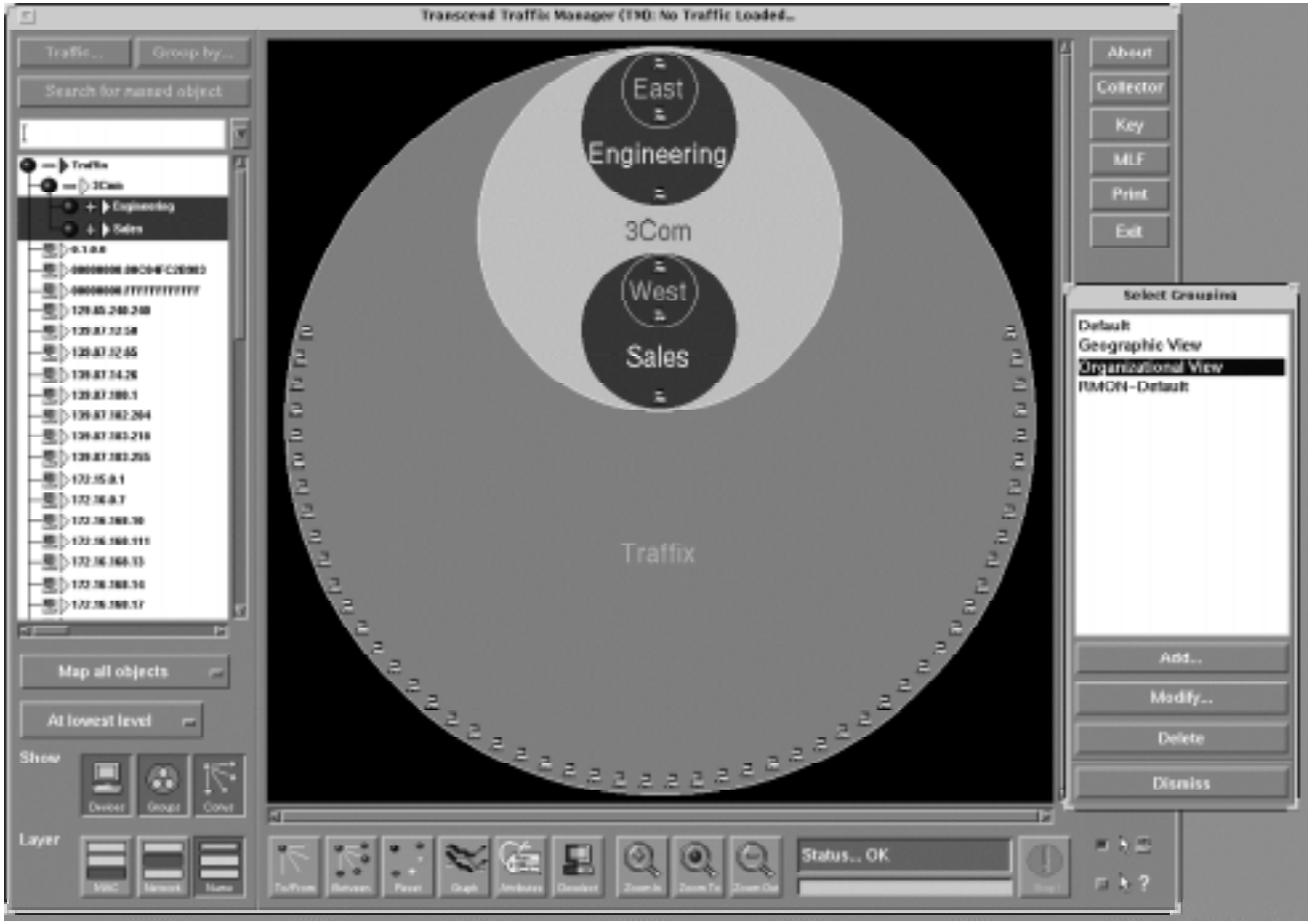
- **Cut-set need not be minimum.**
- **There may be different device types in cut-set, each with own filtering language.**
- **Translate firewall rule into filters expressed in each filtering language**
- **Download filters to enforcement devices in cut-set. Iterate over all firewall rules.**

Prototype Implementation

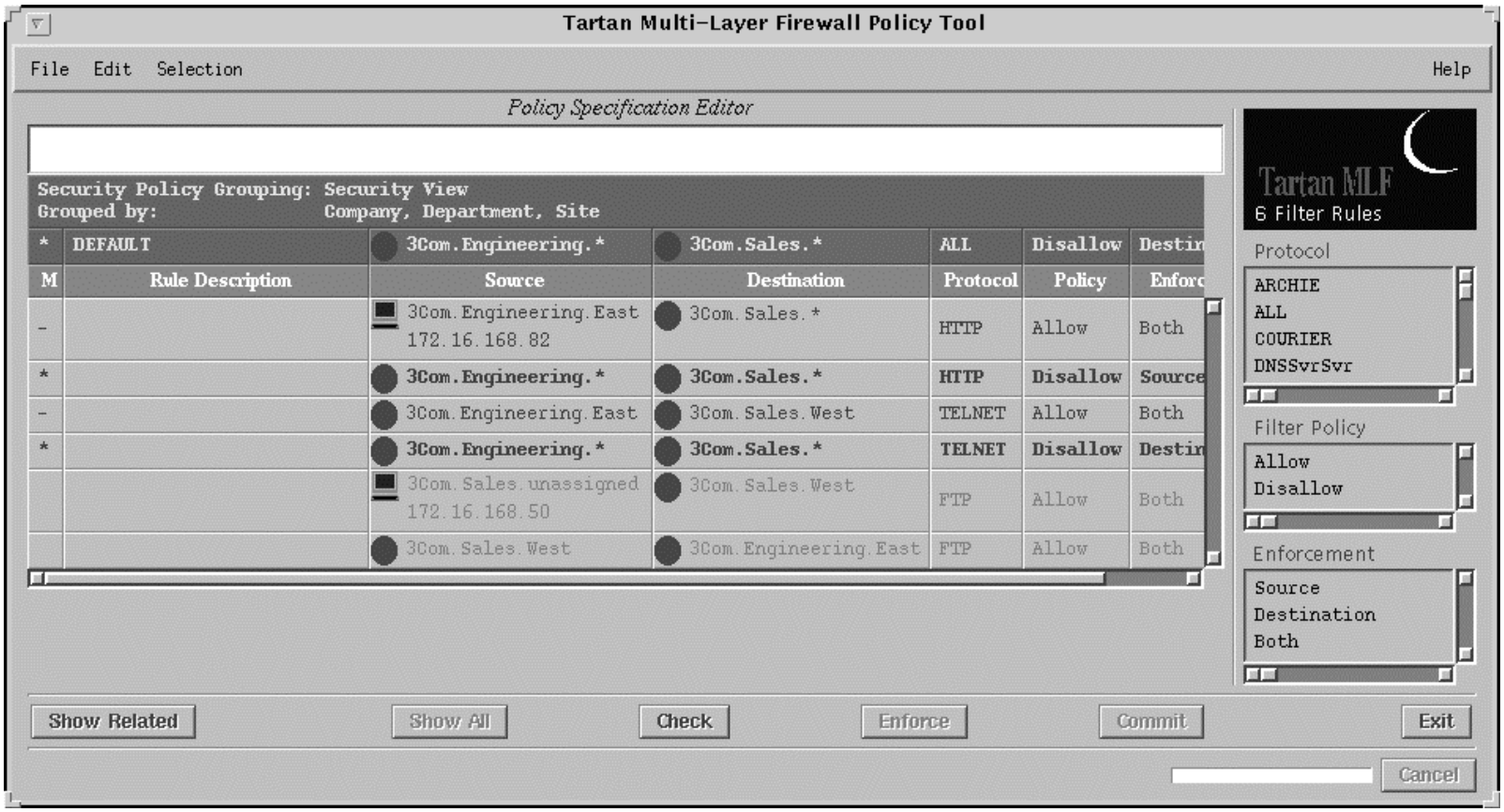
Architecture

- **Host groups defined by ‘traffix’ - RMON2 monitor app.**
- **Once src & dst host groups are selected, policy editor called.**
- **Policy editor works on rule table (similar to traditional FW table).**

Traffix Console

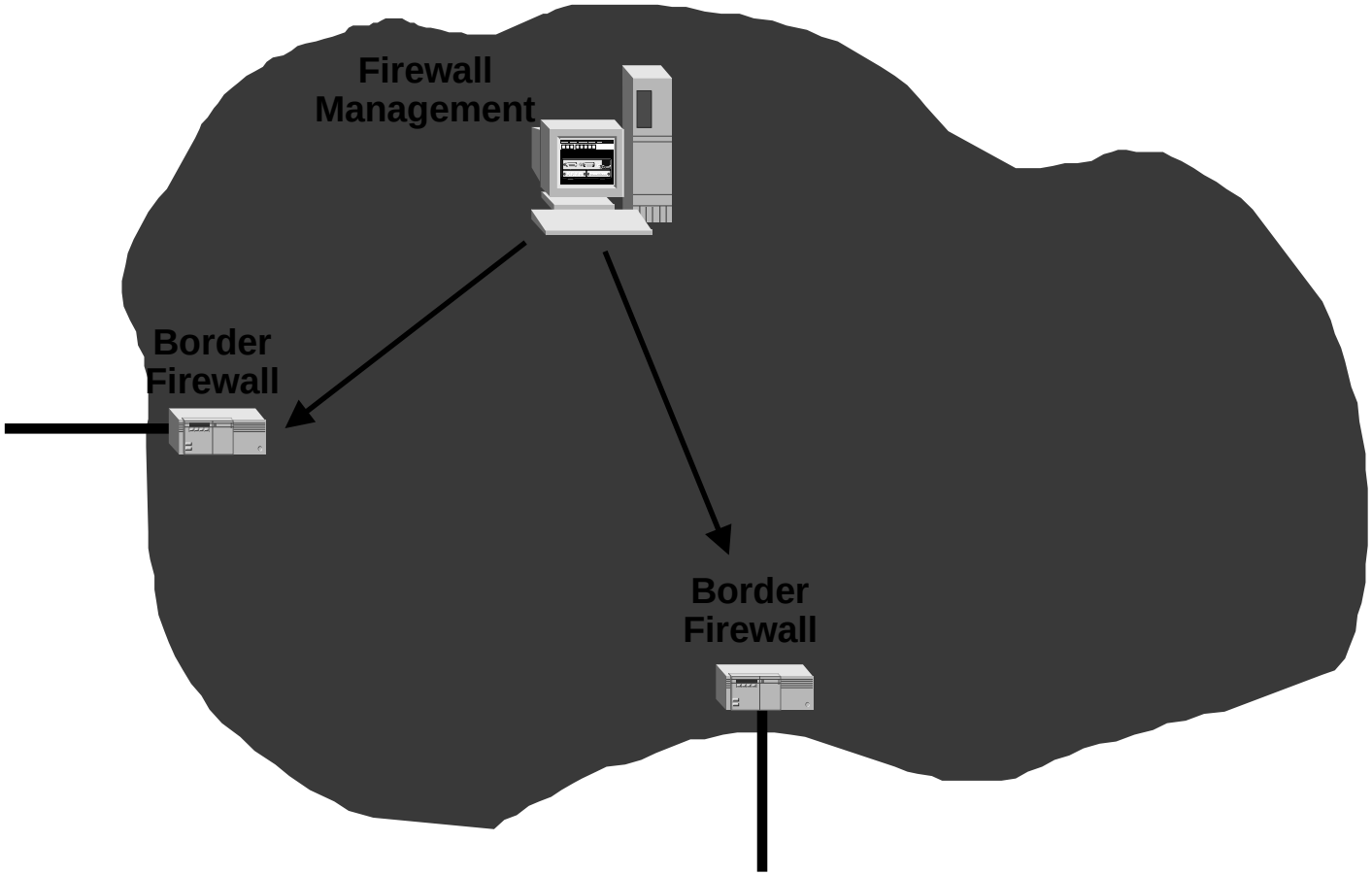


Policy Editor

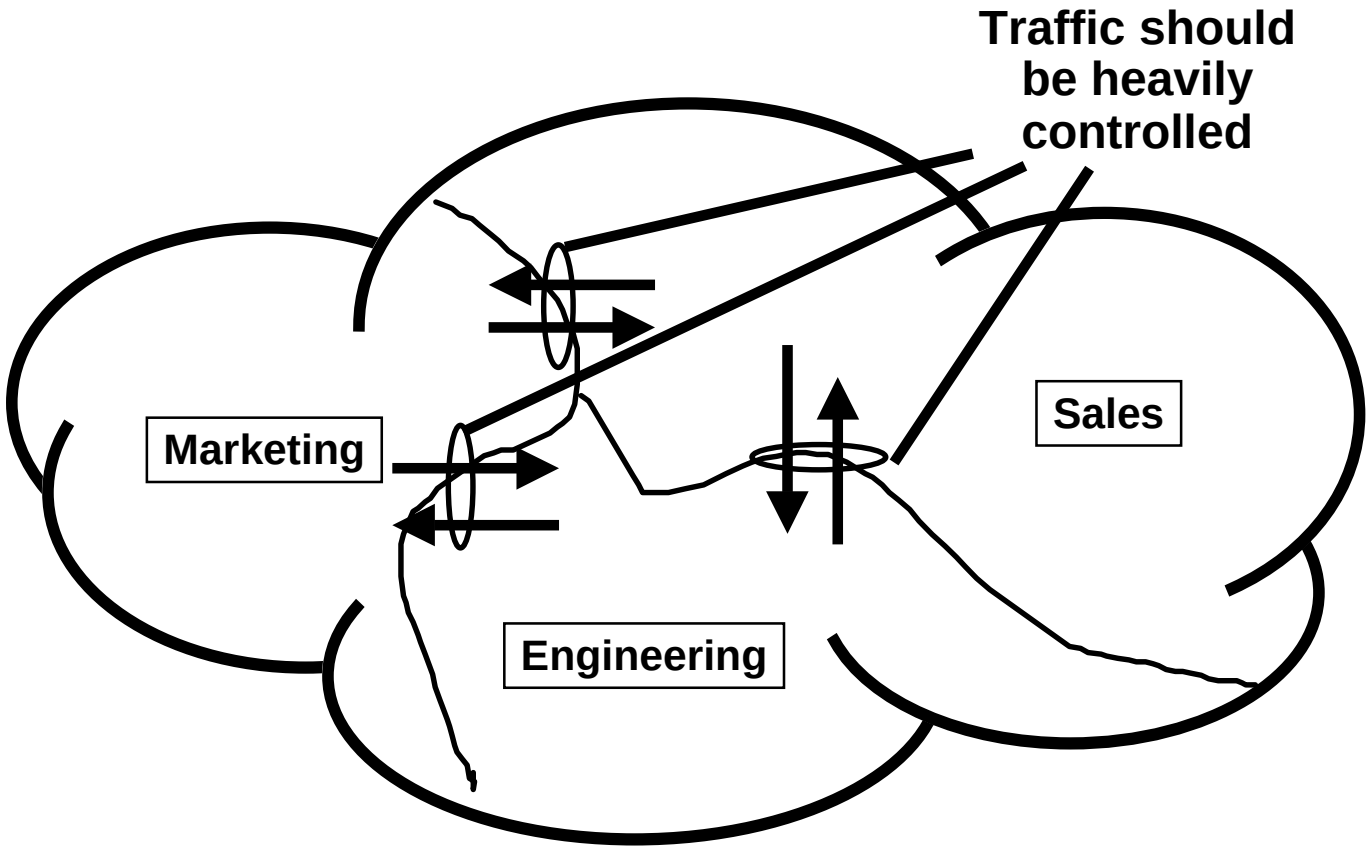


Backup Slides

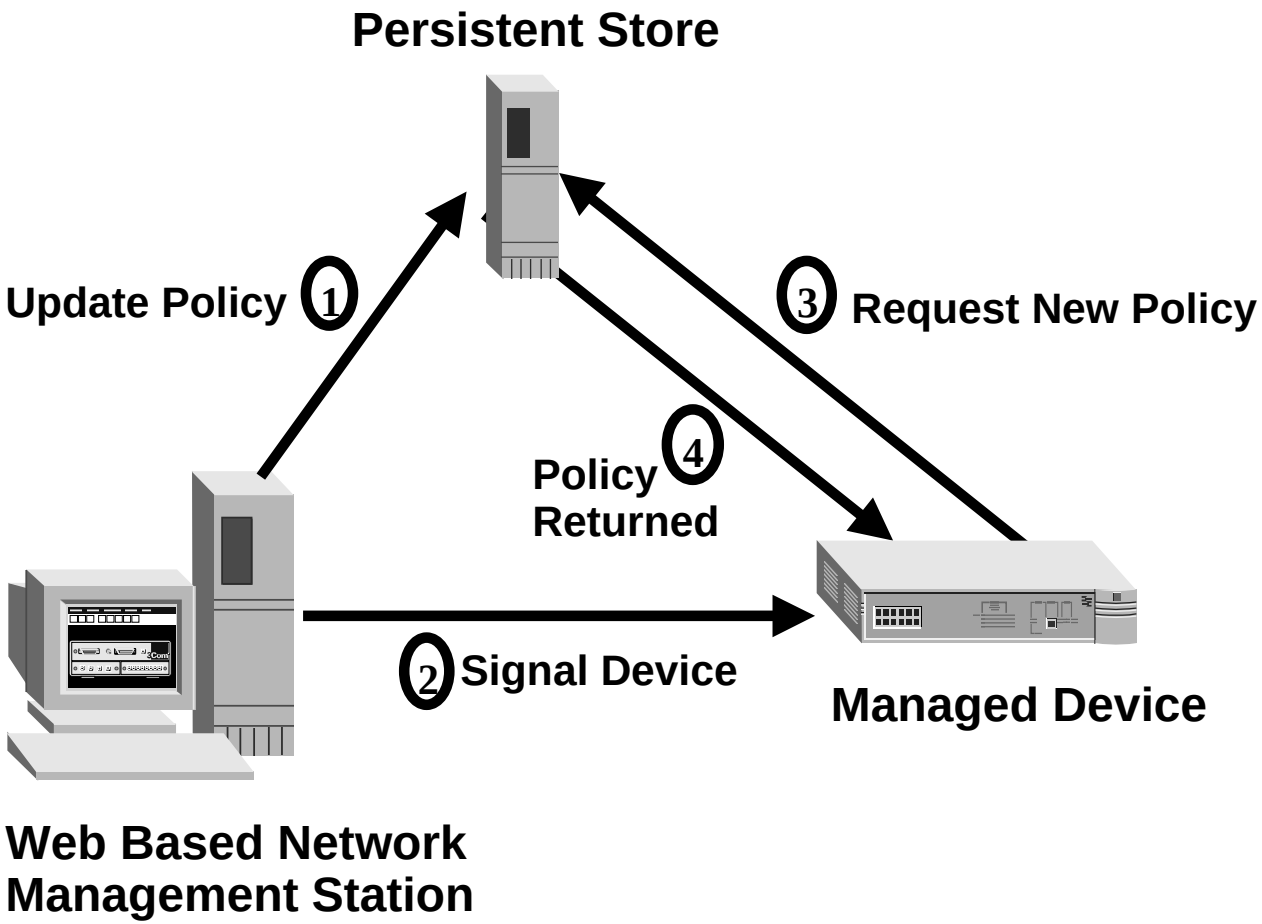
Traditional Firewall



Internal Threats



Multilayer Firewall Architecture



Multilayer Firewall Architecture

Special Case