Session ES132

Implementing Firewalls & Proxy Servers

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Regardless of whether you are running a single Pentium with Microsoft RRAS and Proxy Server; or a major corporation with hundreds of routers, firewalls and servers, the Goal is the same —

survival.

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Software Installation Notes — General

- ***Keep Notes***
- ***Make Backups***
- ***Use a Test Environment***
- ***Use Blackboards***

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Software Installation Notes — WNT Specific

- ***GUI Managed — Keep Notes***
- ***Read ALL WWW pages FIRST***
- ***Make Backups***
- ***Make NEW Recovery Diskette OFTEN!***
- ***Significantly more fragile than OpenVMS***
- ***Registry Hazards***

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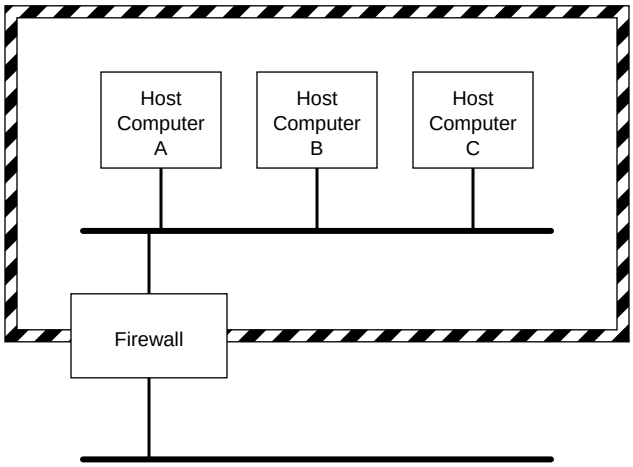
Common Corporate Model



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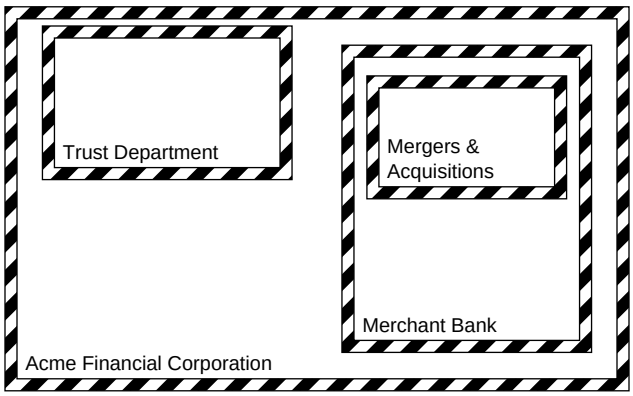
Common Corporate Reality



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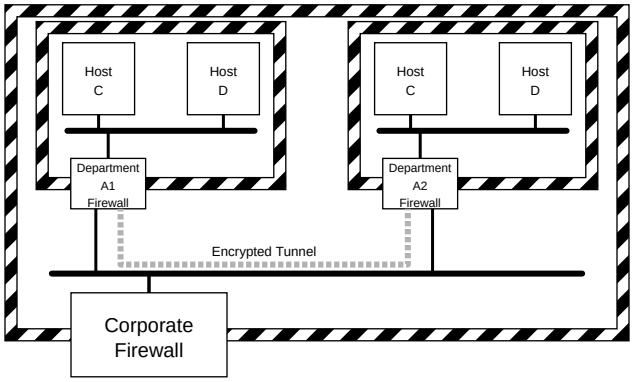
Common Corporate Model



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Introduction

Issues and Definitions

Terminology

Us/Them

Services

Topologies

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Goals

- ***What are Firewalls and Proxy Servers?***
- ***How to use a single IP address to serve the entire organization***
- ***Why caching is central to performance***
- ***Establish Channels and Controls***

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Terminology

- ***IP Address***
- ***Domain Name System DNS***
- ***Bridges***
- ***Routers***
- ***Firewalls***
- ***Proxy***

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ISO Open Systems Interconnect Model

Application
Presentation
Session
Transport
Network
Data Link
Physical

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IP Address

- ***32-bits (IPv4)***
- ***Written as ddd.ddd.ddd.ddd***
- ***Assigned by ISP/InterNIC***
- ***Address Classes: A, B, C***
- ***CIDR (Classless Inter Domain Routing)***
- ***Shortened OSI Implementation***

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Domain Name System

- ***Translates Name into IP Addresses***
- ***Distributed, cached database***
- ***Hierarchical Name Space***
- ***Security issues***
- ***Root Level Domains***
- ***Who controls your entries***

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Bridges

- ***Data Link level***
- ***LAN/LAN***
- ***Sometimes filtering***

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Routers

- ***Network Level***
- ***Can Screen Packets by address/protocol***
- ***No application knowledge***
- ***Stateless***
- ***Ownership***
- ***Access***

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Firewall

- ***Not Generally Defined Term***
- ***Intended as choke point***
- ***Point of control***
- ***Point of access***
- ***Access Control***
- ***Validation/Authentication***

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Proxy

- ***Not well defined***
- ***Can be Routing, or Application***
- ***May or may not include checking***
- ***Acts on behalf of***
- ***Can be simple or complex***

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The Gestalt of it All

- ***on the Internet; the nobody has "evolutionary dominance"***
- ***Hubris***
- ***Social Engineering II — Information Warfare***
- ***Like to Know/Need to Know***

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Us vs. Them

- ***Who NEEDS to know?***
- ***Who NEEDS to do what?***
- ***What is permissible?***
- ***What is safe?***
- ***Not black/white***
- ***VERY Gray!***

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Services

- ***FTP***
- ***Telnet***
- ***HTTP***
- ***Gopher***
- ***DNS***
- ***PING***
- ***FINGER, ...***

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Facilities

- ***Virtual Private Networks***
- ***Dial-up***
- ***Authentication***
- ***Credentials***

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Trust

Trust is the fundamental problem in the online connected world.

Today's environment requires a flexible trust model; including:

- ***colleagues***
- ***collaborators***
- ***competitors***

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Policies and Politics

- ***Company policies***
- ***Disclosure***
- ***Defamation/Harrassment***
- ***Access Control***
- ***Regulations***
- ***Auditing***
- ***Accountability***
- ***Monopoly on Force***

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Security Eco-system

A Firewall (or Firewalls) do not exist in a vacuum, they are part and parcel of the entire security plan.

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Security Eco-system

Before you can sit down to plan your configuration, you need to well understand your environment.

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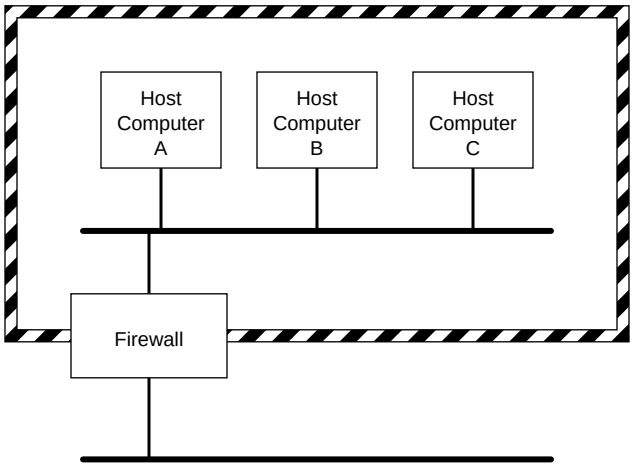
Common Corporate Model



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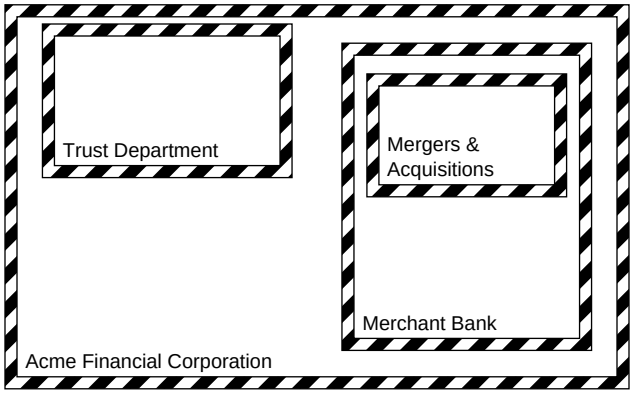
Common Corporate Reality



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Complementary Technologies/Strategies

- ***Hidden Subnets (RFC 1597)***
- ***Virtual Private Networks***
- ***Multi-level DNS***
- ***DHCP restrictions***

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Hidden Subnetworks ÑRFC 159

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"Overall, he judged it to be better to be invisible than agile ..."

– Red Storm Rising

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Routers filter packets based upon source and destination addresses and protocol type. Their efficacy is limited.

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Firewalls (bastion hosts) should be the exclusive "ports of entry" into your internal network.

Many assets are now addressable via IP, from printers to PBXes. It is highly undesireable that most of these resources be accessable from outside the security perimeter.

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These concerns also apply to nested security environments.

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Enter RFC 1597 –
Address Allocation for Private Internets

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RFC 1597 is a scheme which reserves a portion of the IPv4 address space for guaranteed internal use in non-publicly addressible networks.

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What is reserved by RFC 1597?

Guaranteed non-public allocation of:

- ***1 Class A Address Block (10.0.0.0 – 10.255.255.255)***
- ***16 Class B Address Blocks (172.16.0.0 – 172.131.255.255)***
- ***255 Class C Address Blocks (192.168.0.0 – 192.168.255.255)***

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RFC 1597 Intent

Permit the connection of large numbers of local devices to LANs via IP without requiring every LAN to hold a Class A address space. It is worth noting that even a private residence could easily overflow a Class C address space.

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Implications of RFC 1597

- ***Repeatedly sub-divideable***
- ***internal nodes (workstations, servers, PCs) cannot connect to outside servers EXCEPT through an approved application proxy on an outside addressable host.***
- ***inbound connections must go through approved proxies on the (externally visible) gateways***
- ***internal nodes need not be renumbered due to changes in externally visible address ranges caused by CIDR adjustments and/or access provider changes.***

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Router Configuration

- ***Access Providers should filter the RFC 1597 Address Blocks***
- ***Nested internal routers should filter addresses***
- ***Your router outside your firewall should filter RFC 1597 addresses***

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Router Implications

- ***Internal hosts (possibly nested) are invisible to systems outside the firewall***
- ***Even if your router fails, the from address is ambiguous***
- ***The previous note is not as safe as might be perceived, an attack on your link might be feasible.***

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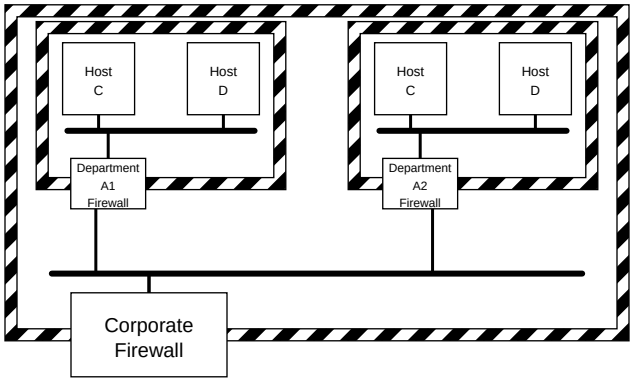
RFC 1597 and Domain Name Services

- ***Internal DNS serving***
- ***External DNS serving***
- ***Implications***



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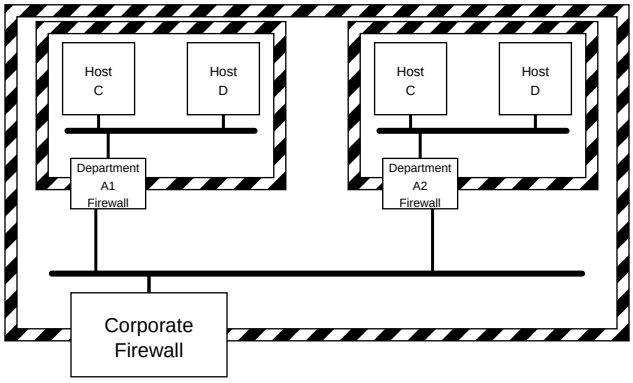
Internal DNS

- ***Final authority on nodes inside the firewall***
- ***Uses firewall to resolve external DNS***



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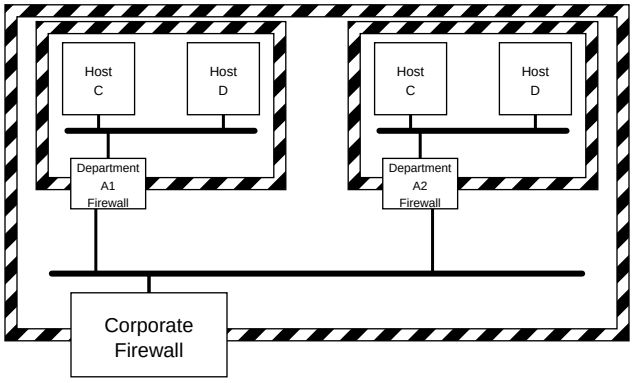
External DNS

- ***all internal mail targets are represented by MX records***
- ***Internal nodes which are not to be addressed may be totally absent from the External DNS***



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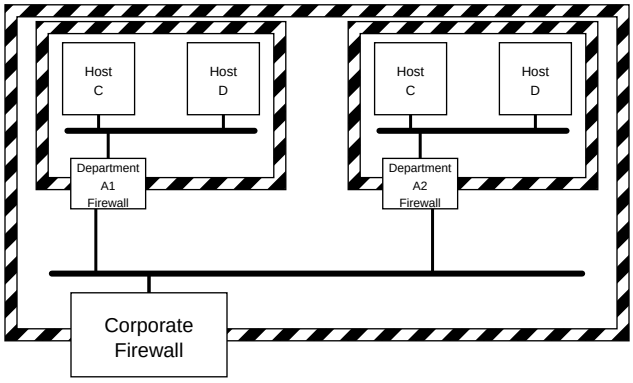
DNS Implications

- ***SMTP mail is forced to the route through the gateway***
- ***FTP, TELNET, HTTP cannot even resolve the address of interior systems.***



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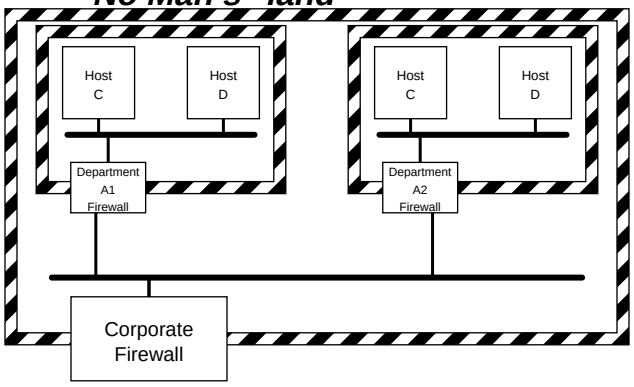
Relationship Connectivity

- ***RFC 1597 address can be used together with careful management to protect IP links with business and strategic partners***
- ***Mutual distrust***
- ***"No Man's" land***



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Summary

RFC 1597 provides and excellent framework for implementing an environment which enhances the safety support provided by your firewall(s)

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Corporate Strategy

- ***Keep things outside***
- ***Minimize Trust***
- ***Minimize Exposure***
- ***Minimize Firewall use***
- ***Public/Semipublic Outside***
- ***Nest Security/Access Domains***
- ***Parents AND Sibling Domains***

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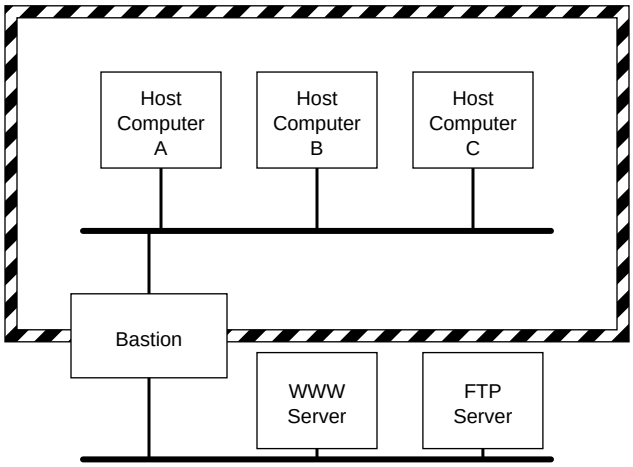
General Corporate Implementation



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Virtual Private Networks

- ***Use Encryption***
- ***Caution: Derived Trust***
- ***Efficient Solution***
- ***Ease of Use***
- ***Make it easy to be good***

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Multi-level DNS

- ***Keep inside invisible***
- ***Mail headers***
- ***Fake Authorities***
- ***Ambiguities***

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DHCP restrictions

- ***Within domain***
- ***Within physical department***
- ***DO NOT Proxy***
- ***Point of attack***
- ***Availability issues***

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NOTES

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