AS/400 Internet Security

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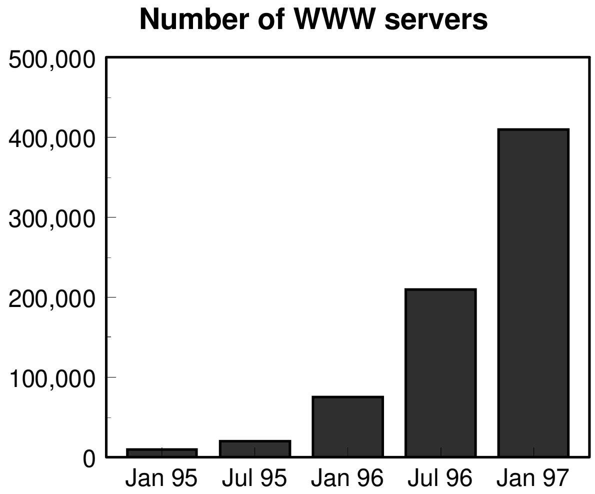
Internet Security Threat

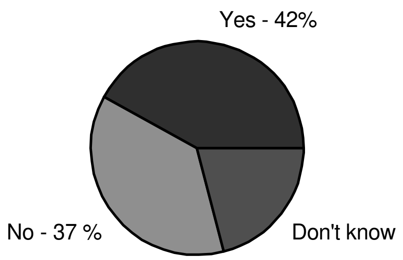


Explosive growth of the Internet

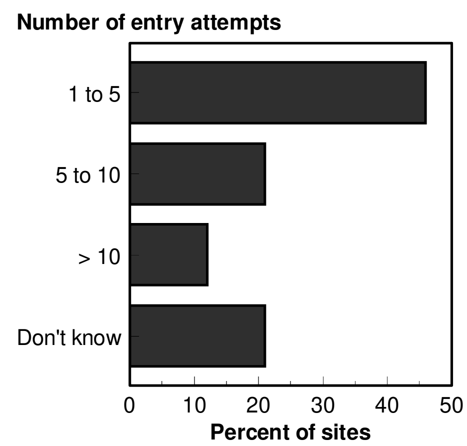
- Driven by world-wide web
- Change from research to commercial usage

Makes the Internet...

- Desirable place to do business
- Attractive place to steal from business



Percent whose computer systems had unauthorized use within the year.

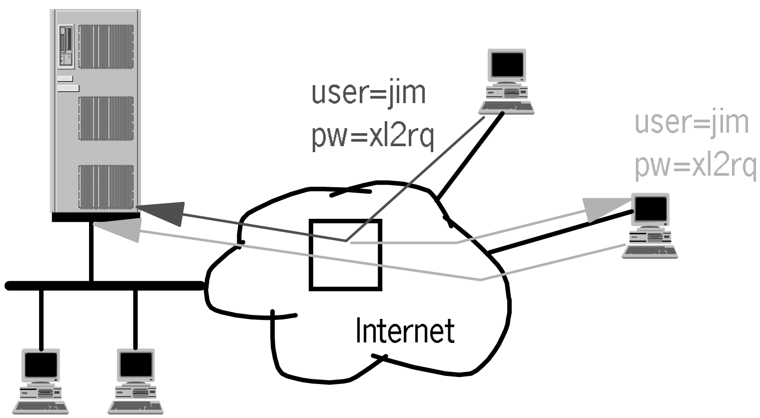


... and not just once.

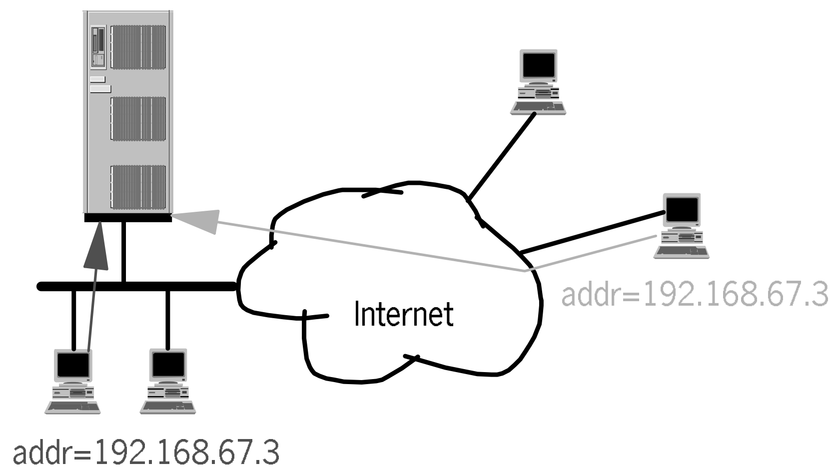
(from Computer Security Institute - May 96)

Example Internet Security Exposures

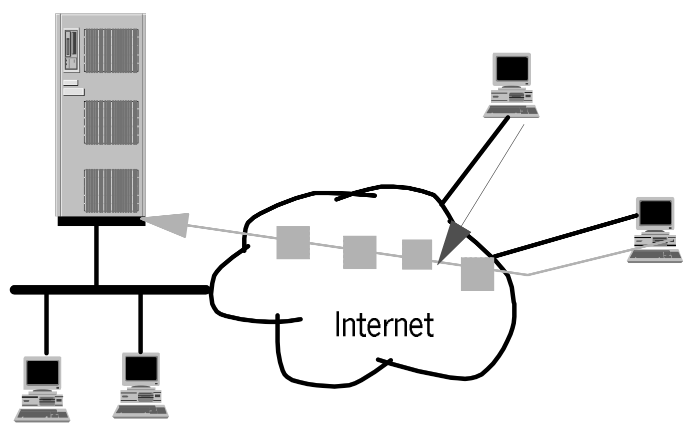
Sniffing



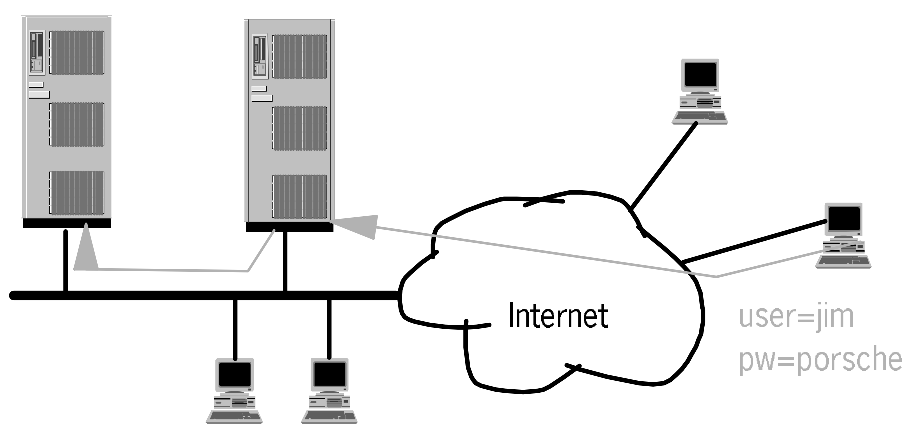
Spoofing



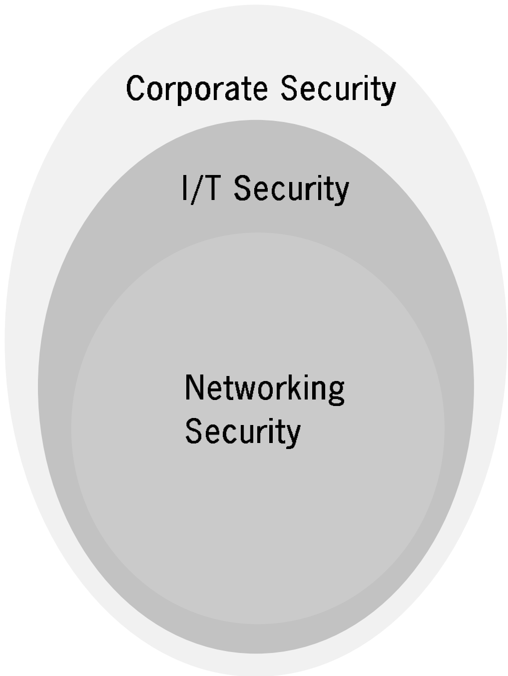
Denial of service



Trusted hosts

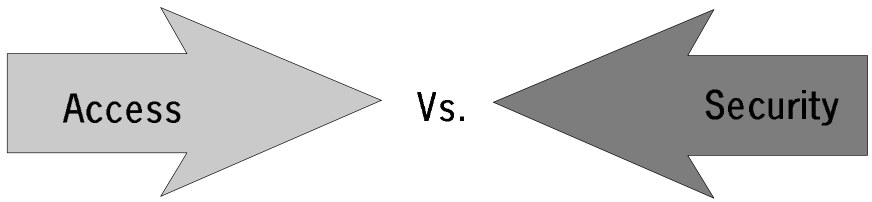


Internet Security Policy



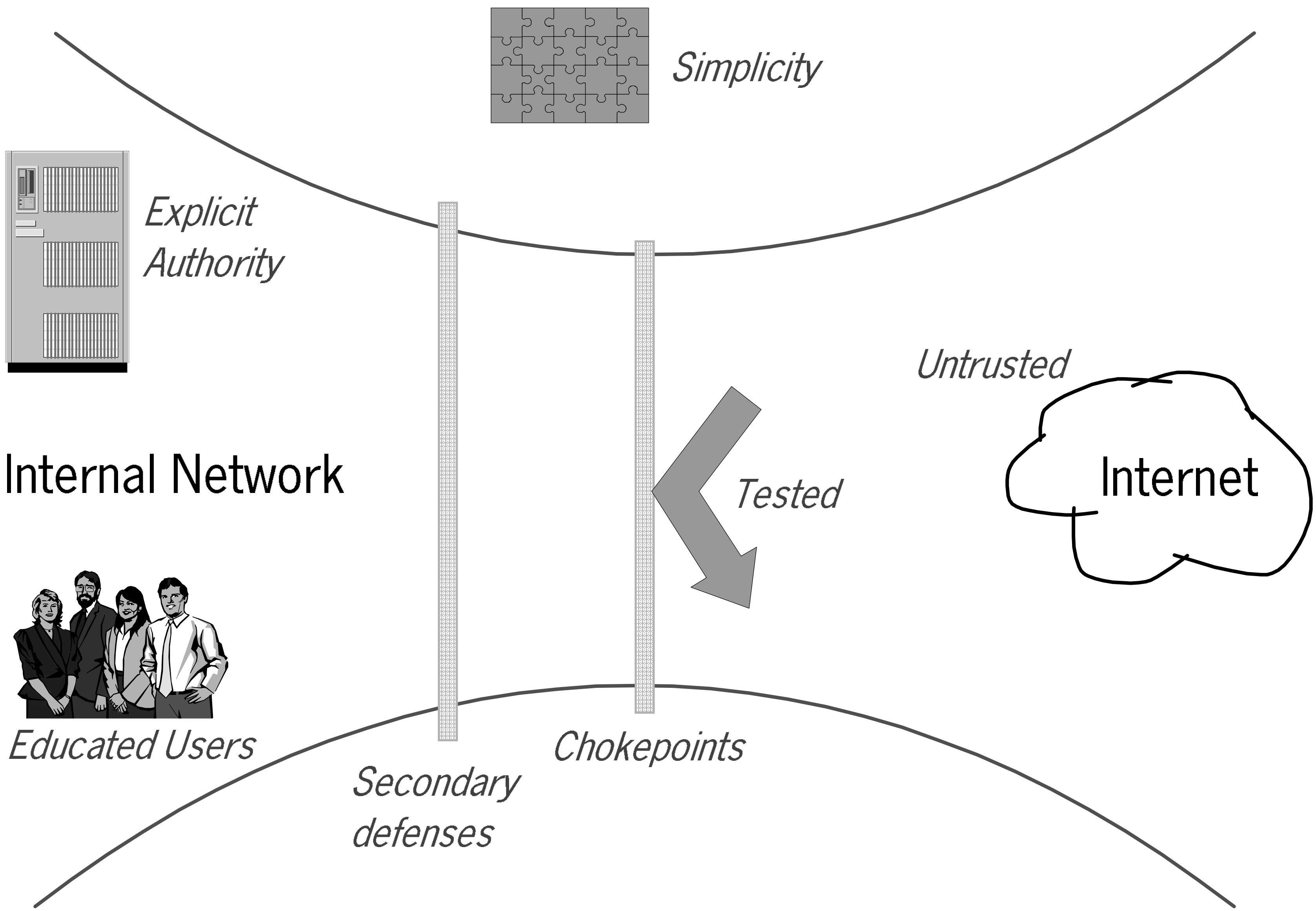
What are your security policies?

- What services are to be permitted (http, ftp, telnet...)?
- What Internet sites may be accessed?
- What may be accessed from the Internet?



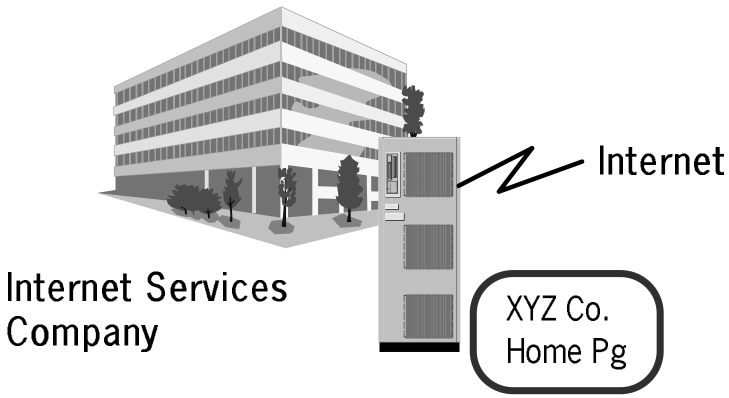
- FTP access<-> PC virus introduction
- Mail exchange<-> mail flooding
- Web server <-> web graffiti

Internet Security Principles

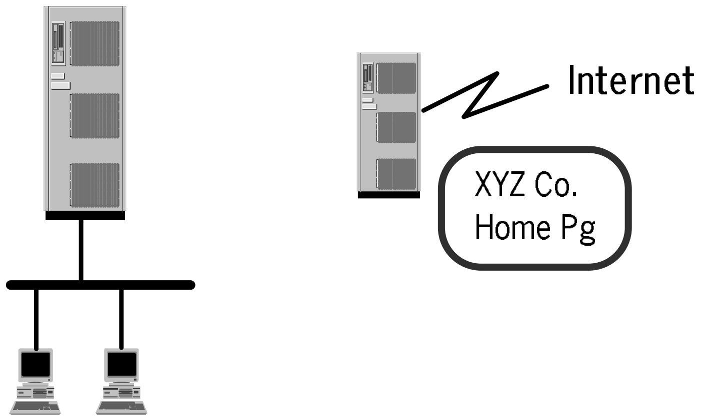


Connecting to the Internet

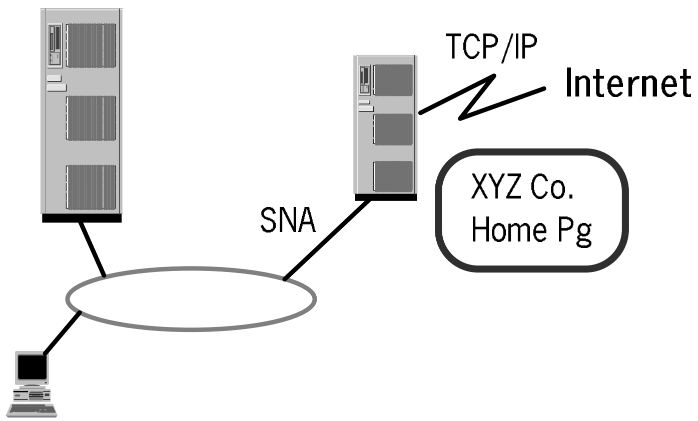
Hosting Services



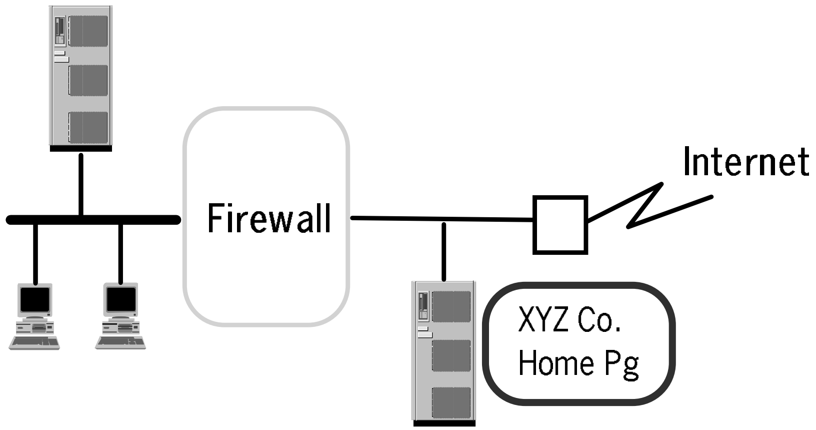
Isolated System



Partitioning by Protocol



Firewall

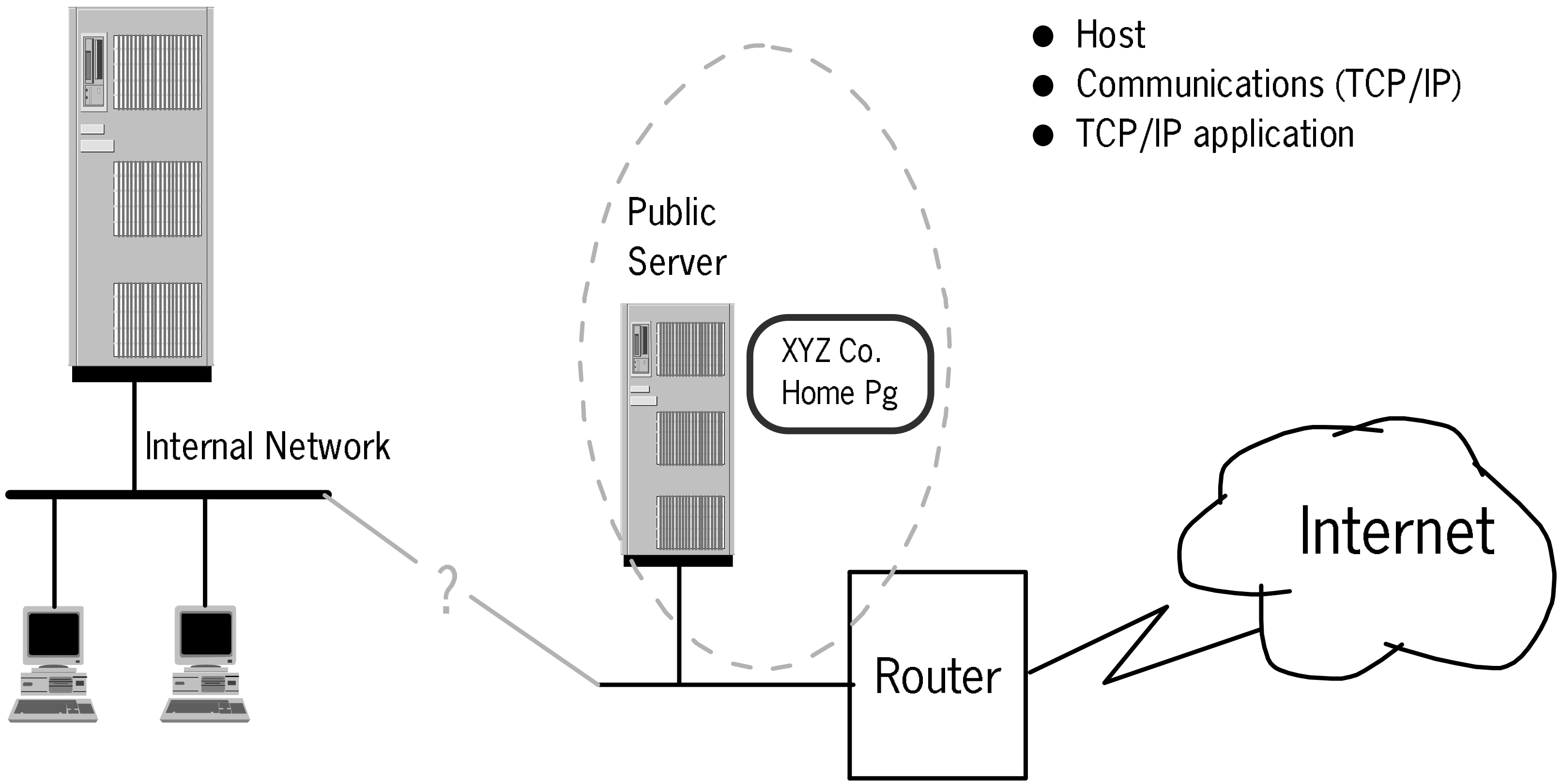


Protecting a Public Server

Public server must be secured even if it is isolated or if you have a firewall.

Layers of security

- Internet Service Provider
- Host
- Communications (TCP/IP)
- TCP/IP application

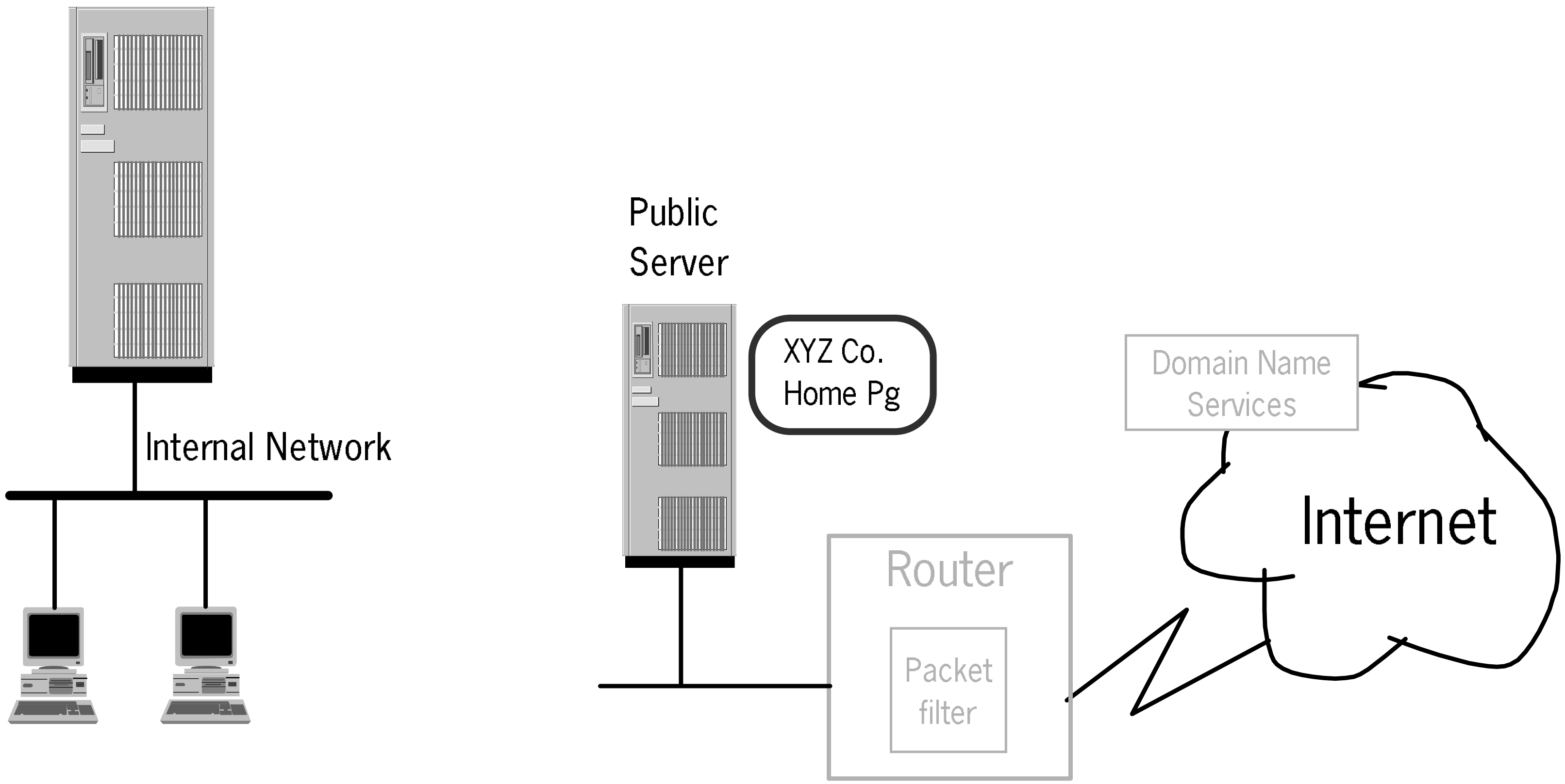


Internet Service Provider Security

Block incoming telnet connections

Block finger, snmp, ...

Provide Domain Name Services



AS/400 Host Security

Enable Resource Security

- QSECURITY >= 40

Password attack prevention

- QPWDMINLEN = 6 ...
- QMAXSGN = 3
- QMAXSGNACT = 3
- QAUTOVRT = 0

Tightly control "high-powered" profiles

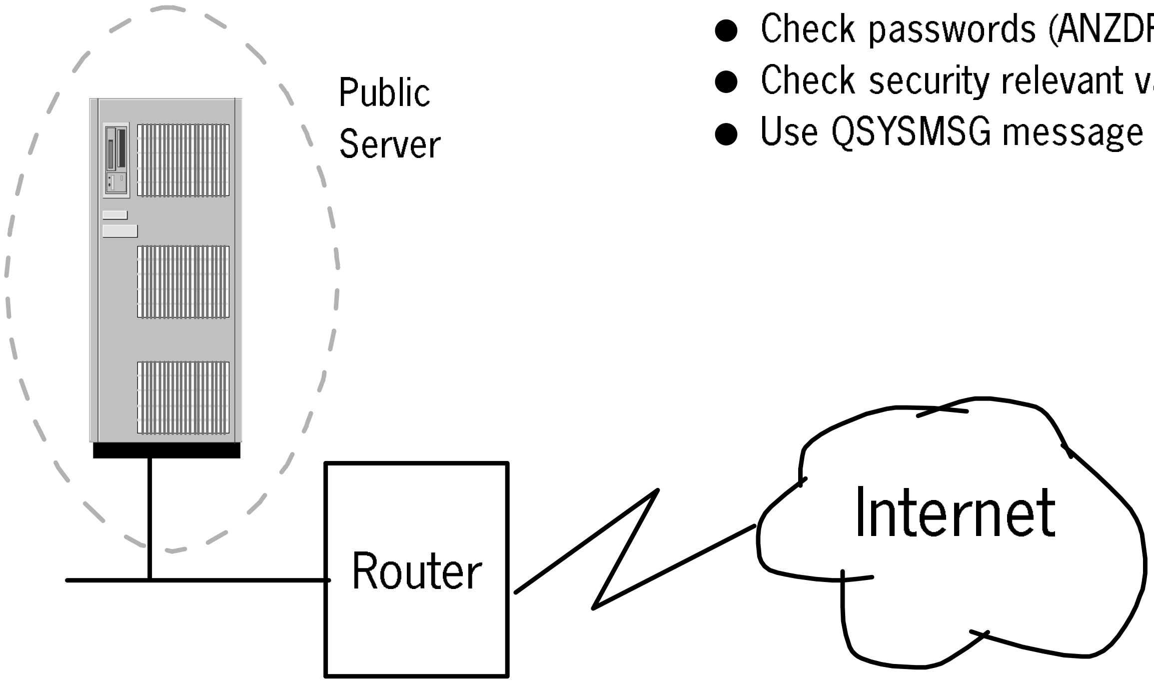
- QLMTSECOFR = 1
- Limit profiles with *ALLOBJ, *SECADM an *IOSYSCFG

Use Object Security

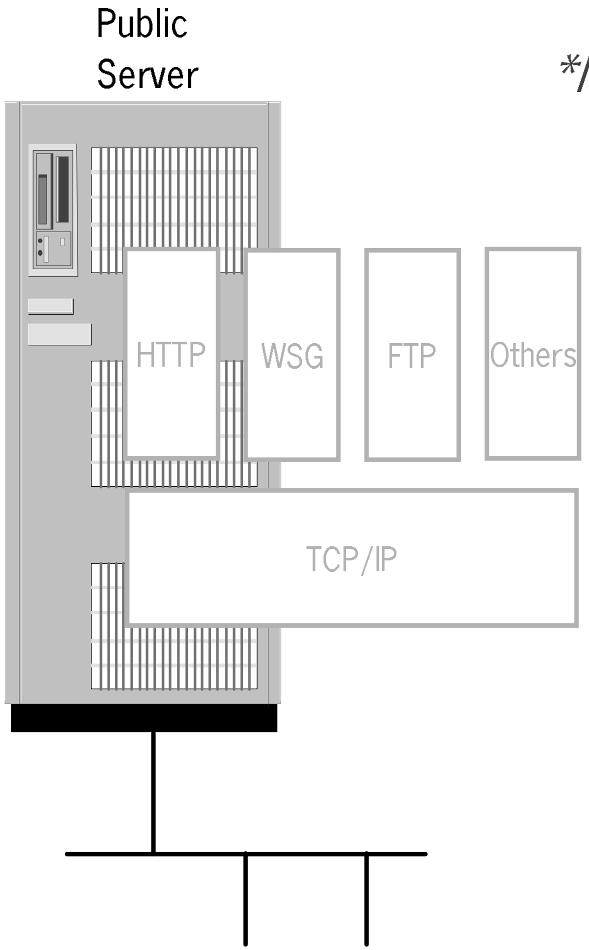
- The libraries you create should be PUBLIC(*EXCLUDE)

Verify and Monitor

- GO SECTOOLS or GO SECBATCH
- Check passwords (ANZDFTPWD)
- Check security relevant values (PRTSYSSEC)
- Use QSYSMSG message queue



TCP/IP Security



**IOSYSCFG authority controls who can make changes*

Only start TCP/IP applications you need

- CHGCMDDFT CMD(STRTCPSVR) NEWDFT('SERVER(*HTTP)')
- CHGTELNA AUTOSTART(*NO)
- CHGWSGA AUTOSTART(*NO)...

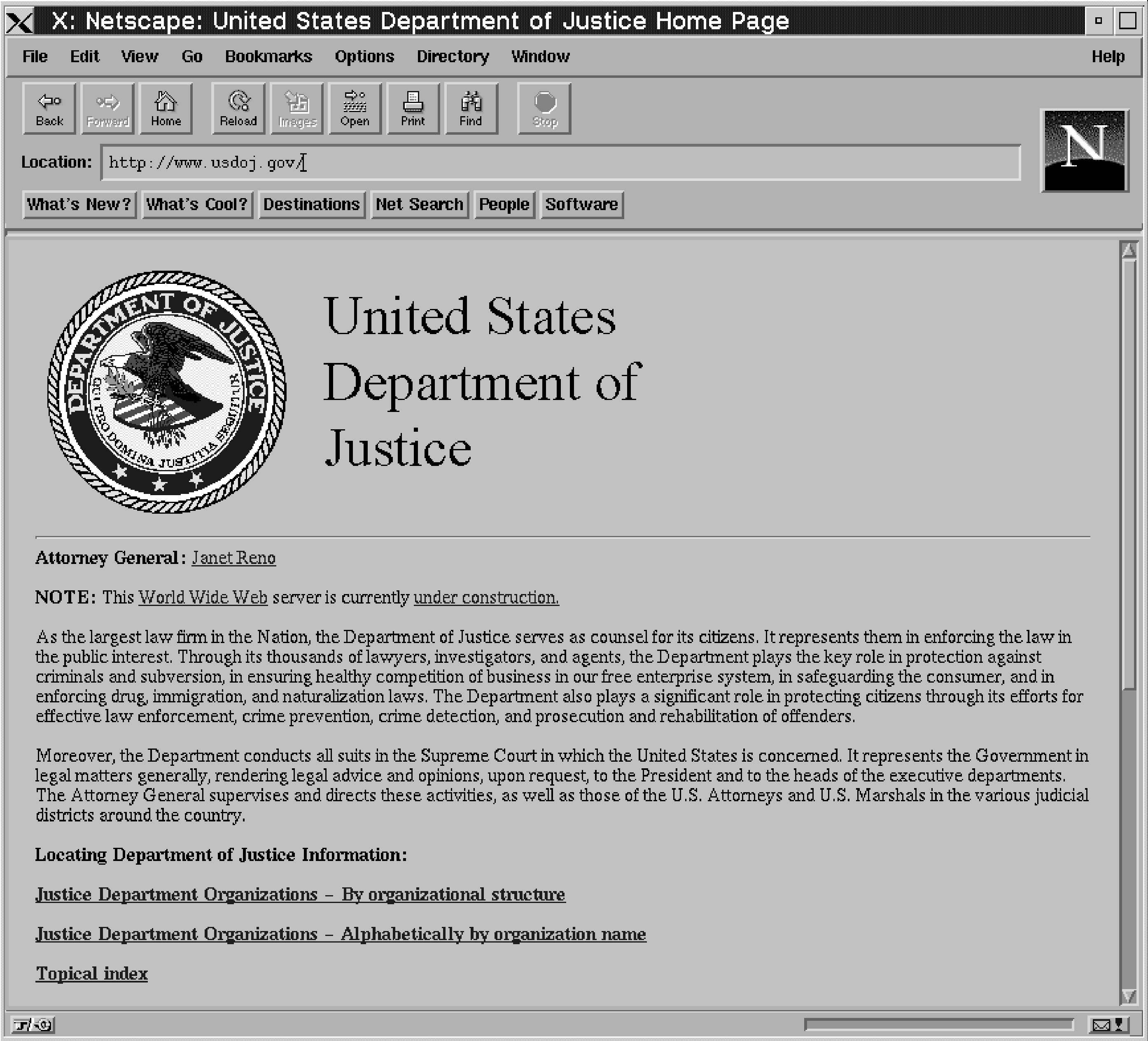
No IP forwarding

- CHGTCPA IPDTAGFWG(*NO)

Don't define host name of internal systems

Define only one route (default)

An HTTP Server Victim



Internet Connection Server (HTTP)

Server directives control which directories can be accessed

http://yourserver.com/App1/Main.htm

http://yourserver.com/App1/Pgm/UPDATE

requests from the Internet

```
Exec /App1/Pgm/*  /QSYS.LIB/APP1.LIB/*
Pass /App1/*      /www/html/App1/*
DirAccess   OFF
```

Libraries (QSYS.LIB)

APP1

QGPL

WEBTOOLS

Directories

/www

/html

/App1

/App2

- PASS controls which files can be accessed
- Use MAP and PASS to provide an alias for file locations
- EXEC controls which cgi-bin programs can be run
- Don't mix cgi-bin programs with other programs
- Don't put any sensitive data in directories accessible by URLs
- Don't allow directories to be viewed

Internet Connection Server (HTTP)

Server PROTECTION directives control who can access data

Example Security Models

Application #1 - public application

- No userid or password required
- Programs and data are accessed using a default profile (e.g. QTMHHTTP)

Application #2 - employees only

- AS/400 user profile and password required (basic authentication)
- Programs and data are accessed using the user profile

Application #3 - limited set of Internet users only

- "Internet userid" and password required (basic authentication)
- Userid are entries in a Validation List object
- Programs and data are accessed using a default profile (e.g. WEBAPP3)

Normal AS/400 object level security "backs up" the server directives

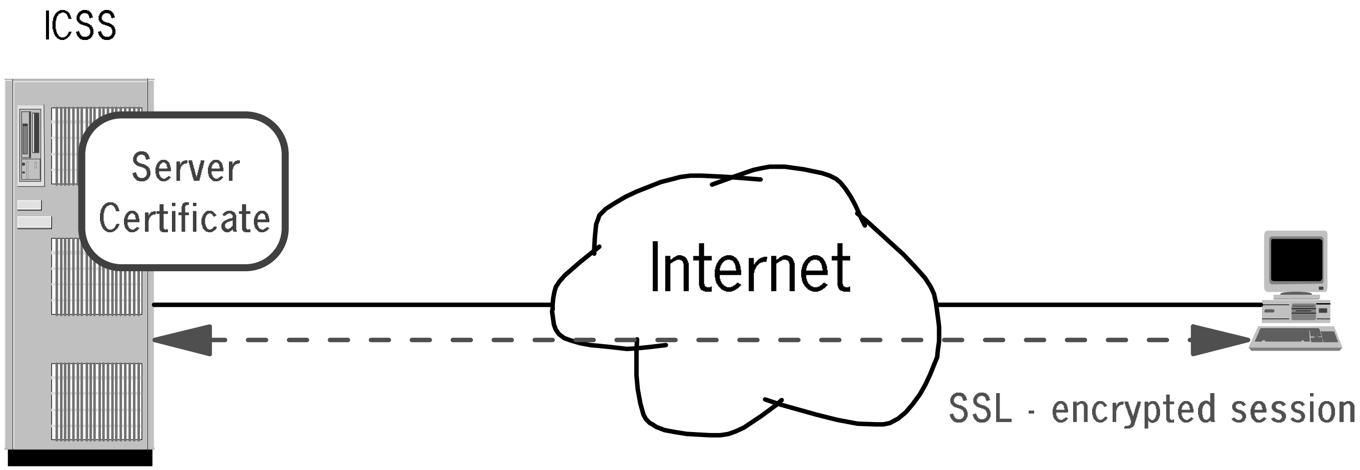
Internet Connection Secure Server

Securing the public server is not enough

- Internet users want secure communications (e.g. passwords)
- Internet users want secure transactions (e.g. credit card numbers)

Internet Connection Secure Server

- Provides encryption support for HTTP
- Secure Sockets Layer (SSL)
- Certificate identifies the server to the browser
- US/Canada and International versions



CGI-BIN Considerations

Validate form input - HTML can be changed

```
<p>Pick the flavor to order:
<form method="POST" action="update">
<select name="flavor">
<option>grape
<option>orange
<option>cherry
</select>
<input type="submit" value=OK">
</form>
```

What got sent →

← What came back

```
<form method="POST"
 action="http://yourserver.com/cgi-bin/update">
<select name="flavor">
<option selected>apple
</select>
<input type="submit" value=OK">
</form>
```

Hidden variables aren't really hidden

```
<form method="POST" action="/cgi-bin/query">
<input type="hidden" name=employeenum value="12345 ">
<input type="submit" value="Query current salary">
</form>
```

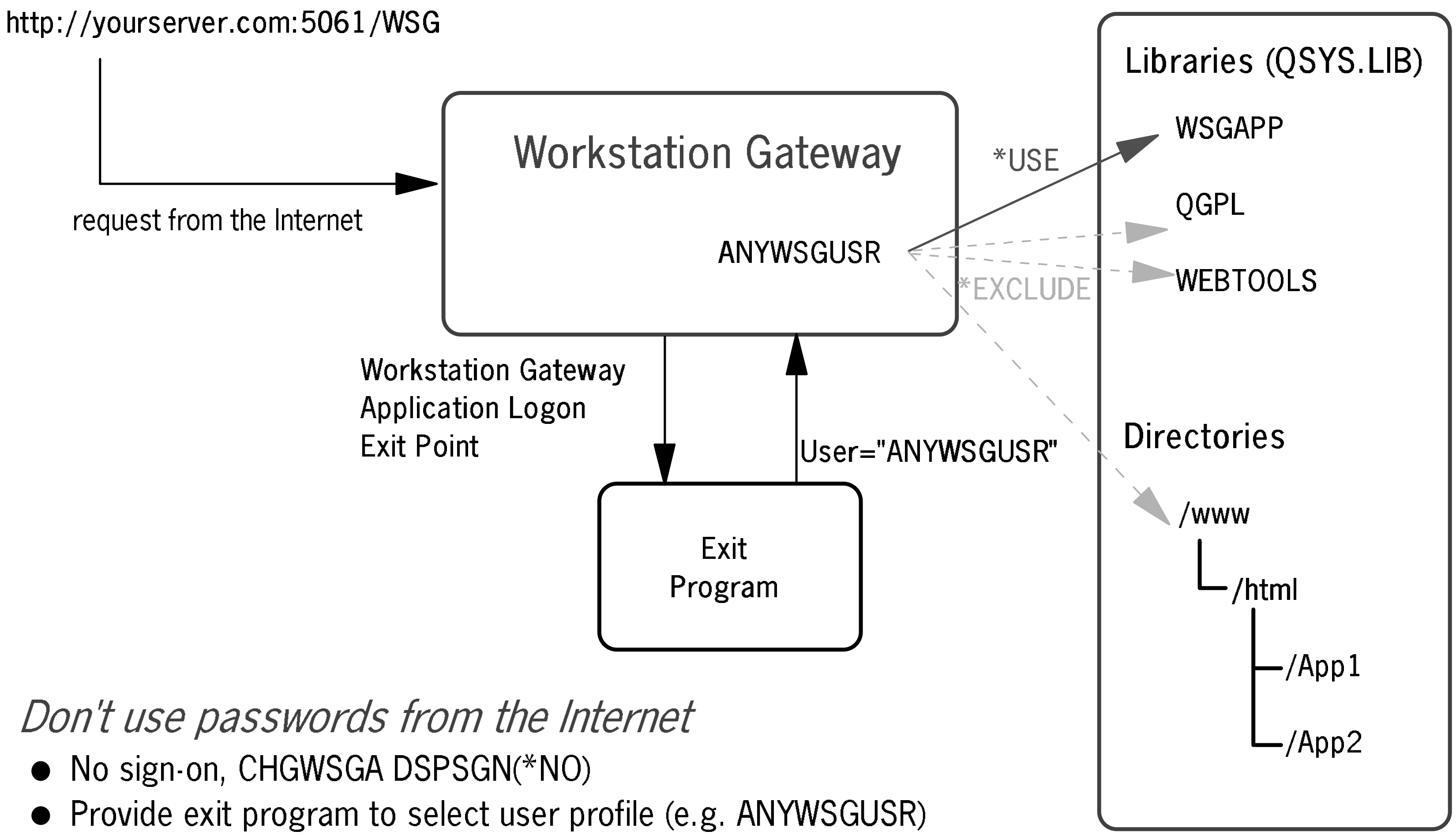
What got sent →

← What came back

```
<form ...
... value="09876 ">
...
</form>
```

Javascript field auditing can be disabled

Workstation Gateway

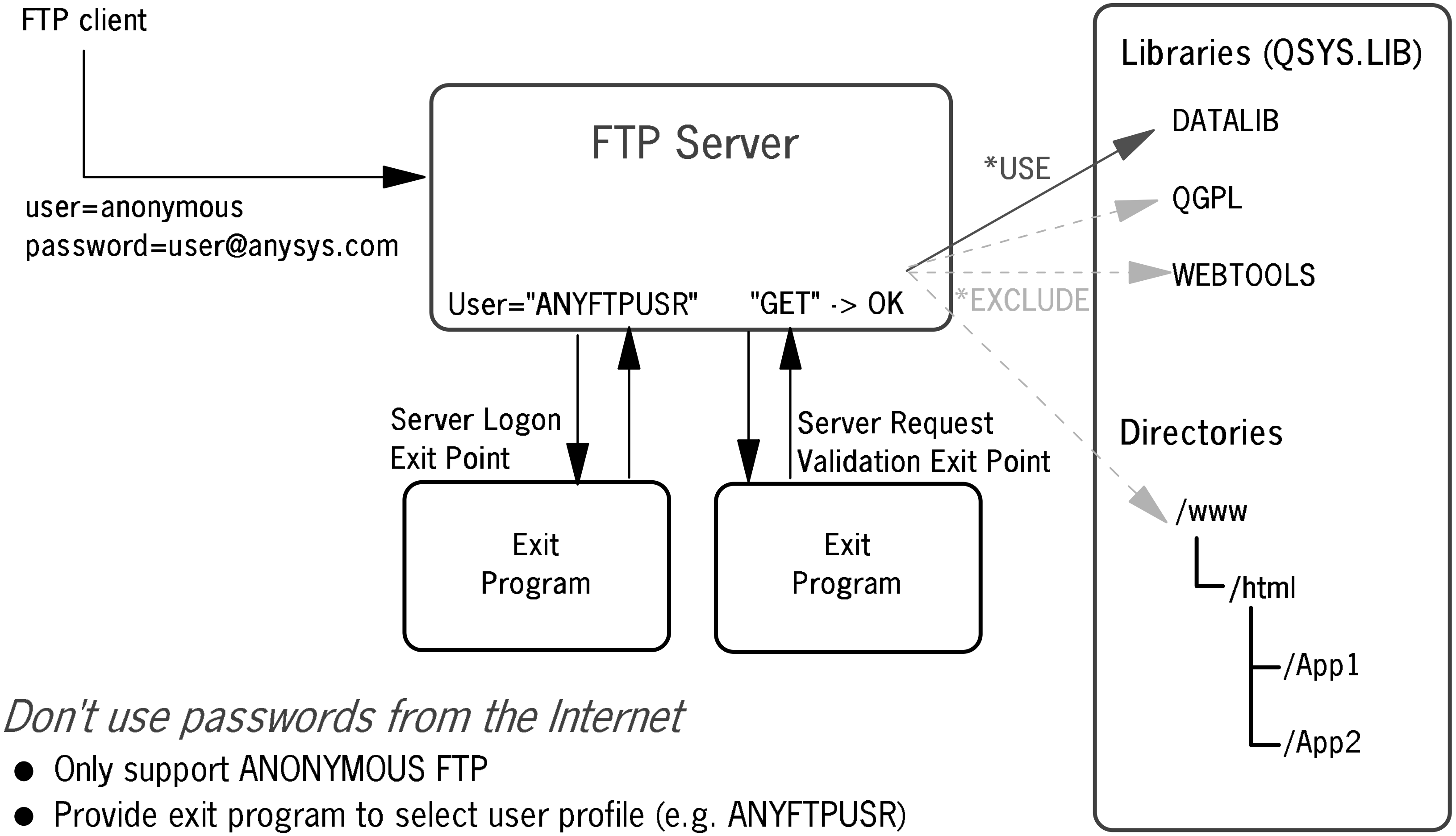


Don't use passwords from the Internet

- No sign-on, CHGWSGA DSPSGN(*NO)
- Provide exit program to select user profile (e.g. ANYWSGUSR)
- Strictly limit access of Workstation Gateway user
- Don't check client's IP address

Other vendors have similar products that are SSL-enabled

FTP



Don't use passwords from the Internet

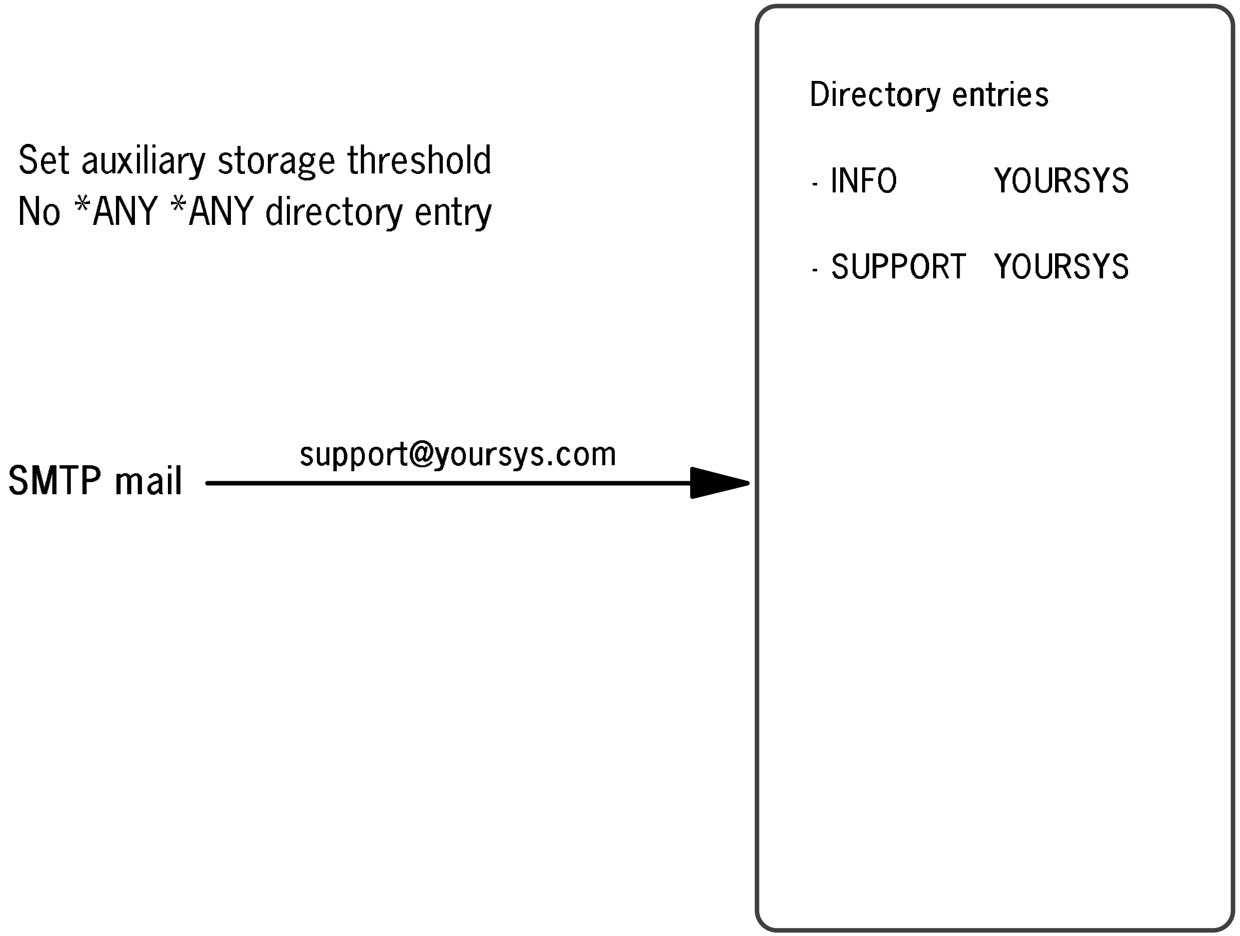
- Only support ANONYMOUS FTP
- Provide exit program to select user profile (e.g. ANYFTPUSR)
- Provide exit program to determine allowed operations (e.g. GET only)
- Strictly limit access of FTP user
- Don't check client's IP address

Mail

A public server should have limited or no mail support

- Don't want to store mail on system accessible by the public
- Not for general mail delivery

- Set auxiliary storage threshold
- No *ANY *ANY directory entry



Other TCP/IP Applications

When the AS/400 system is accessible from the Internet

Telnet

- Don't start it! But if you must...
- Set QLMTSECOFR, QMAXSIGN, QMAXSGNACT, QAUTOVRT
- Set maximum storage per user profile

SNMP

- Don't start it! But if you must...
- Set community name (like a password)
- Only allow GETs

LPD

- Don't start it!

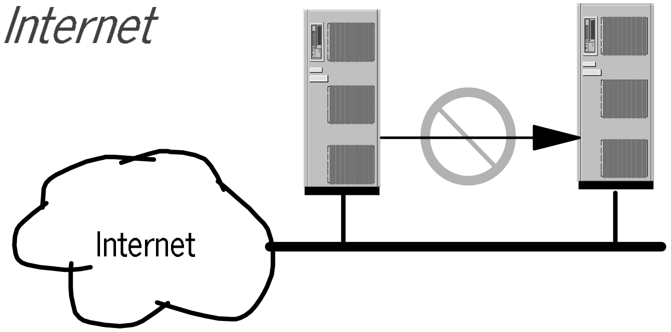
TCP/IP File Server

- Don't install it!

Preventing Hacker Written Applications

When the AS/400 system is accessible from the Internet

- Don't allow trojan-horse applications to be installed
- Don't allow your system to be used to attack others



- Don't install compilers
- Restrict usage of TCP/IP communications

TCP/IP port restrictions can limit usage of well known ports (ADDTCPPORT)

Lower port	Upper port	Protocol	User profile (deny/permit)
23 (telnet)	*only	*tcp	QUSER/--
20 (ftp)	21	*tcp	QUSER/QTCP
25 (smtp)	*only	*tcp	QUSER/--
80 (http)	*only	*tcp	QUSER/QTMHHTTP
5061 (wsg)	*only	*tcp	QUSER/QTMTWSG
161 (snmp)	*only	*tcp	QUSER/--
161 (snmp)	*only	*udp	QUSER/--

Restrict use of sockets APIs

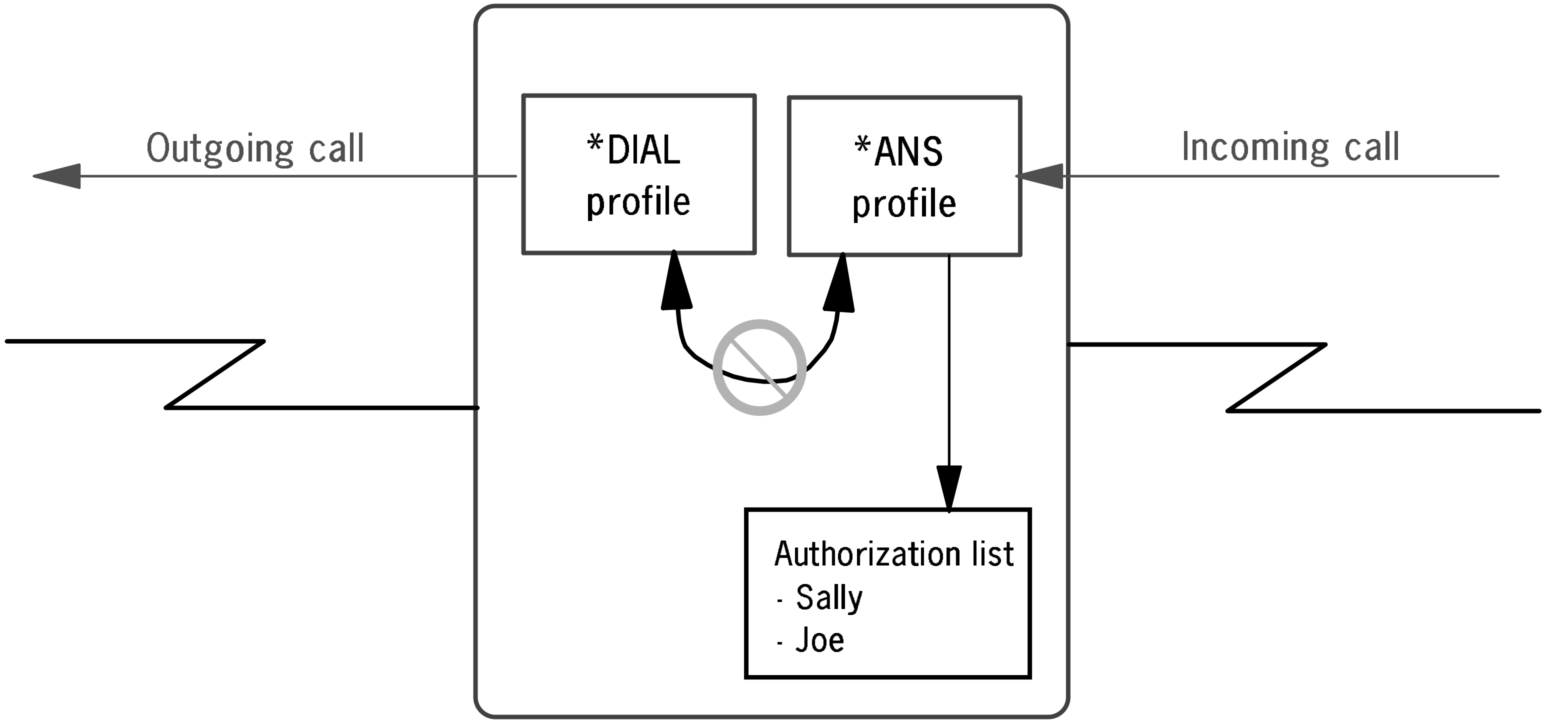
- Service programs QSOSRV1 and QSOSRV2 --> PUBLIC(*EXCLUDE)
- Authorize specific profiles to the service programs (QTCP, QTMHHTTP...)

Serial Link IP (SLIP)

SLIP provides dial-up connections which could be a "back door"

- Don't allow your system to be used to attack others

- Avoid having SLIP configuration profiles for both *ANS and *DIAL
- Disallow IP forwarding via SLIP configuration profiles
- Create special user profile to authenticate incoming connections
- Create authorization list to control who can use SLIP configuration profile



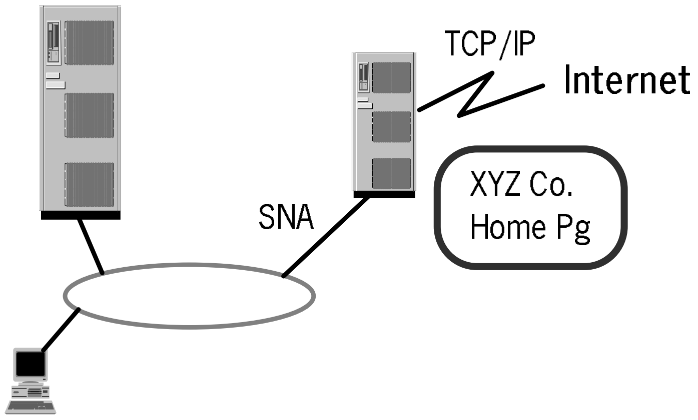
Connecting to the Internal Network

Securing the public server is not enough

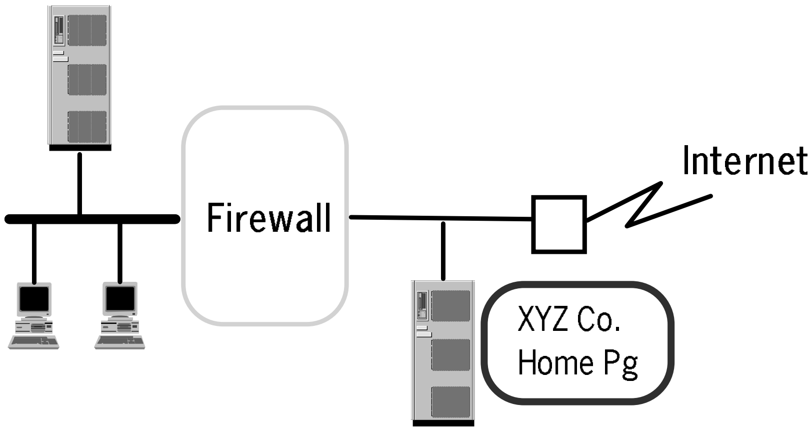
- Users want to send mail over the Internet
- Users want to use web browsers to access Internet web sites
- Up-to-the-minute data required on the web server

Access to the internal network must be protected

Partitioning by Protocol



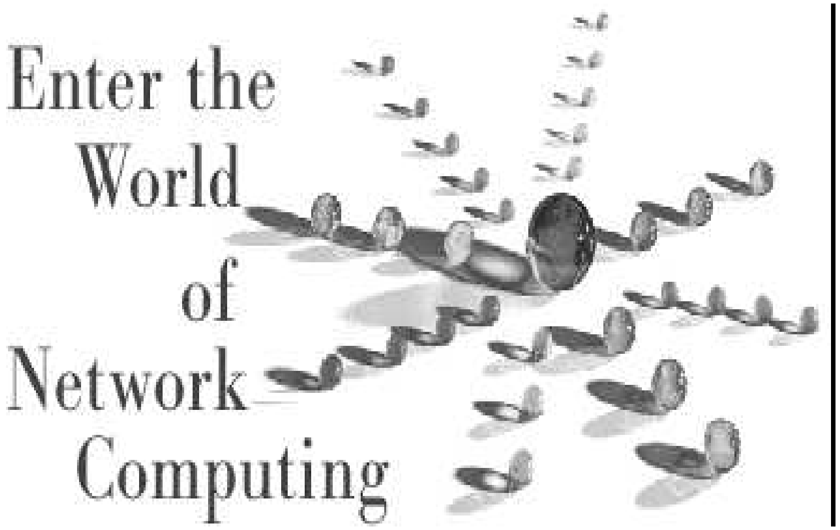
Firewall



AS/400 Internet Security Summary

AS/400 security features make it a good Internet Server

- Proven operating system integrity
- Excellent host level security
- Integrated communications security



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Resources

IBM SecureWay, AS/400 and the Internet, G325-6321

Tips and Tools for Securing Your AS/400, SC41-3300

http://www.ibm.com/Security