SSL VPN

Virtual Private Networks based on Secure Socket Layer

Mario Baldi

Politecnico di Torino

Dipartimento di Automatica e Informatica

mario.baldi[at]polito.it

staff.polito.it/mario.baldi

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SSL VPN: What is that?

SSL as the central mechanism on which to base secure access

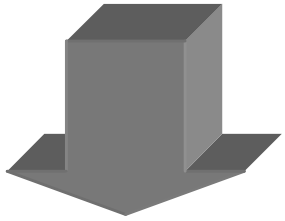
- **→Site-to-site VPN**
- **→Remote access VPN**
- **→Secure service access**
  - **→Loose interpretation of VPN**
    - **→SSL (pseudo)VPN**
- **→Tunneling based on TCP or UDP**

Why Not IPsec VPN?

- ➔IPsec too difficult and/or too expensive to use securely
  - ➔Too many options to be configured and administered
- ➔Operates in kernel space
  - ➔Failures potentially catastrophic
  - ➔Installation difficult and risky
  - ➔Concerns fade with maturity

Why SSL VPN

- ➔Lower complexity
  - ➔Installation
  - ➔Configuration
  - ➔Management
- ➔Non-interference with kernel
- ➔Most widely used



- ➔Higher, more robust security

Compared to IPsec VPN

- ➔No problem with NAT traversal
  - ➔No authentication of IP header
  - ➔ESP (encapsulation securty payload) IPsec to be used
- ➔Packets dropped at a higher level
  - ➔Critical with DOS attacks

Compared to PPTP

- ➔Initially proprietary (Microsoft)
- ➔Initially weak security
  - ➔Fixed later
- ➔Poor interoperability with non-Microsoft platforms
- ➔GRE (generic routing encapsulation) tunneling
  - ➔Possibly blocked by routers

SSL (pseudo)VPN

- IPsec VPNs connect networks
  - Or hosts to networks
- SSL VPNs connect
  - Users to services
  - Application clients to application servers

Why SSL (pseudo)VPN

- ➔No client code is to be installed
  - ➔Usable anywhere (kyosk)
- ➔Applications available through web browser
  - ➔Deploying HTTPS
- ➔Not a general security solution
  - ➔Specific solutions suitable to selected applications

In Summary

SSL VPNs have a good chance of working on any network scenario

➔TCP or UDP tunneling enable

➔NAT traversal

➔Firewall traversal

➔Router traversal

➔SSL (pseudo)VPN enable universal client (web browser)

SSL VPN Flavors

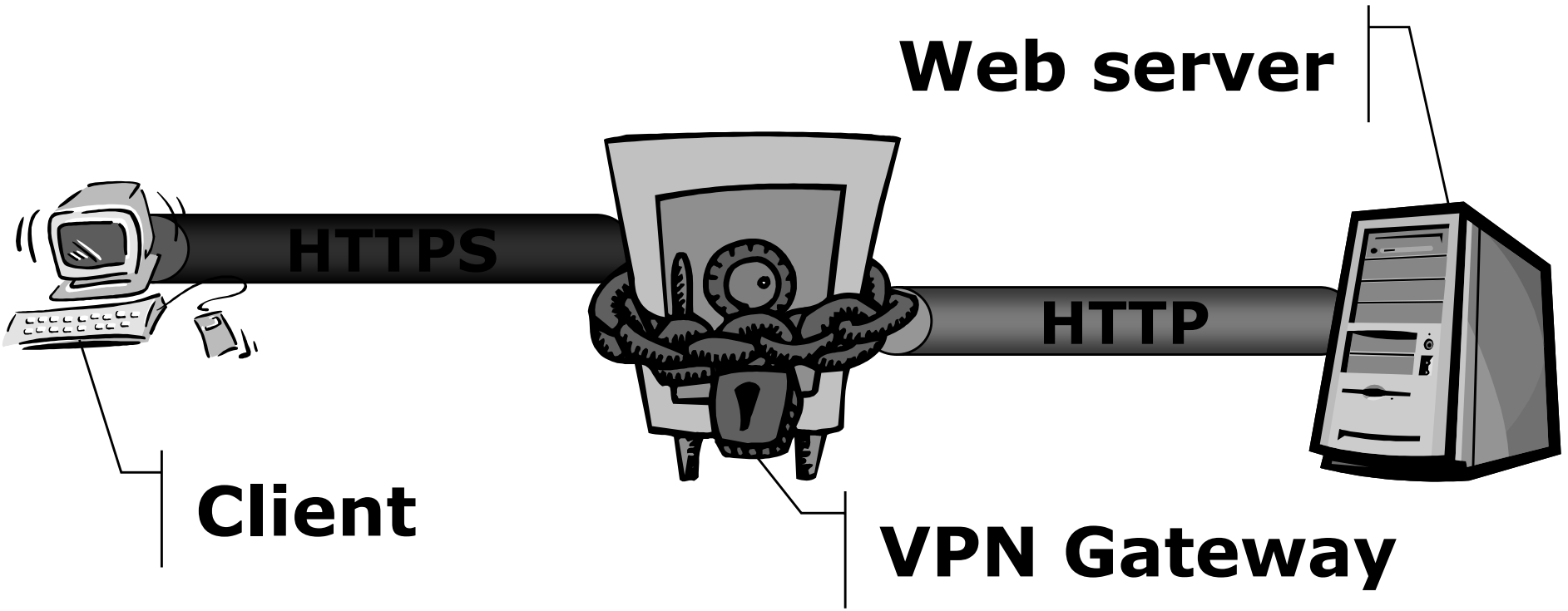
- ➔Web proxying
- ➔Application translation
- ➔Port forwarding
- ➔SSL'ed protocols
- ➔Application proxying
- ➔Network extension
  - ➔Site-to-site connectivity

Pseudo VPN

Proxying

➔VPN Gateway downloads web pages through HTTP

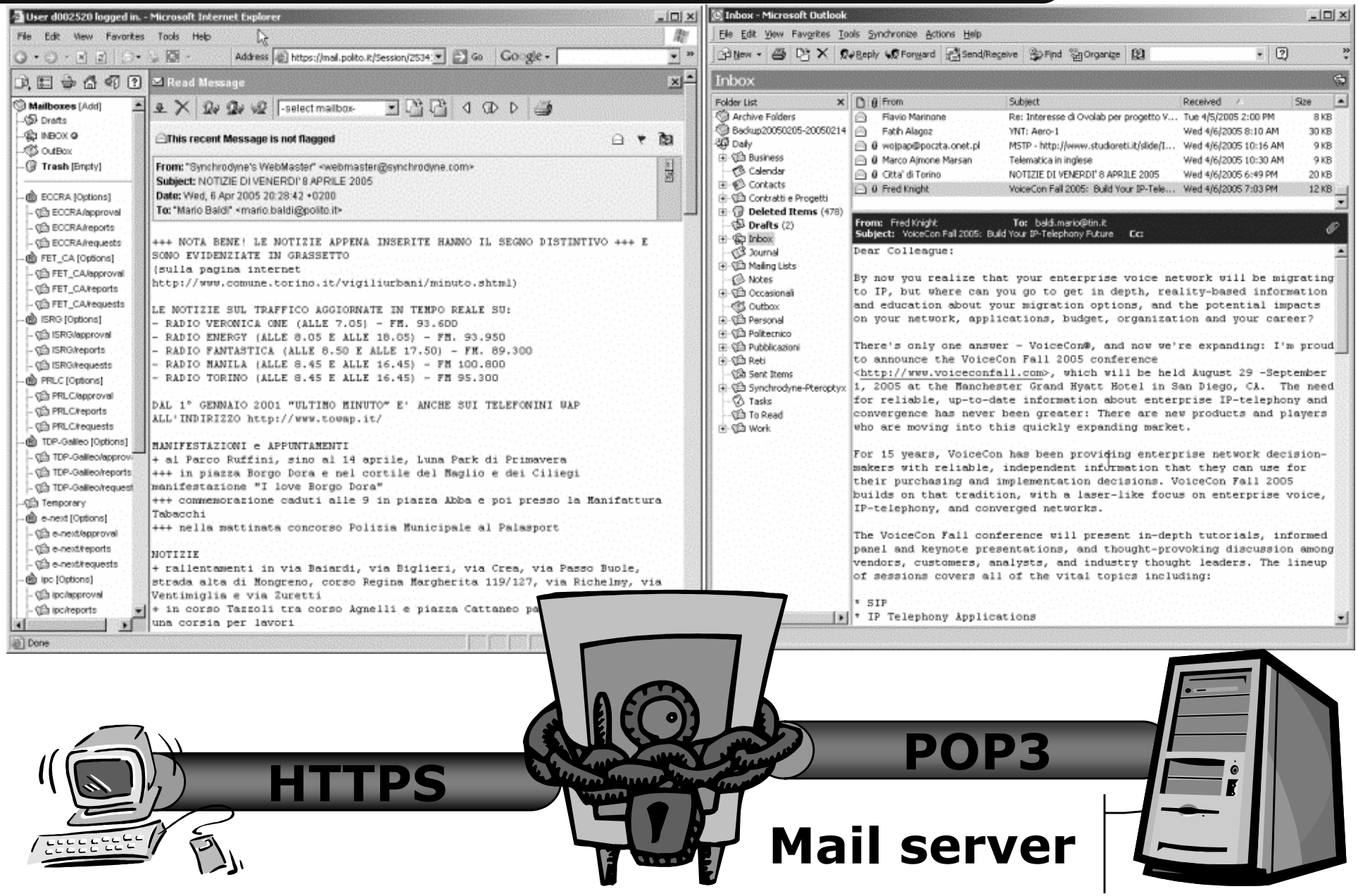
➔Ship them through HTTPS



Application Translation

- Native protocol between VPN server and application server
  - E.g., FTP, STMP, POP
- Application user interface as a web page
- HTTP(S) between VPN server and client
- Not suitable for all applications
  - Look&feel might be lost

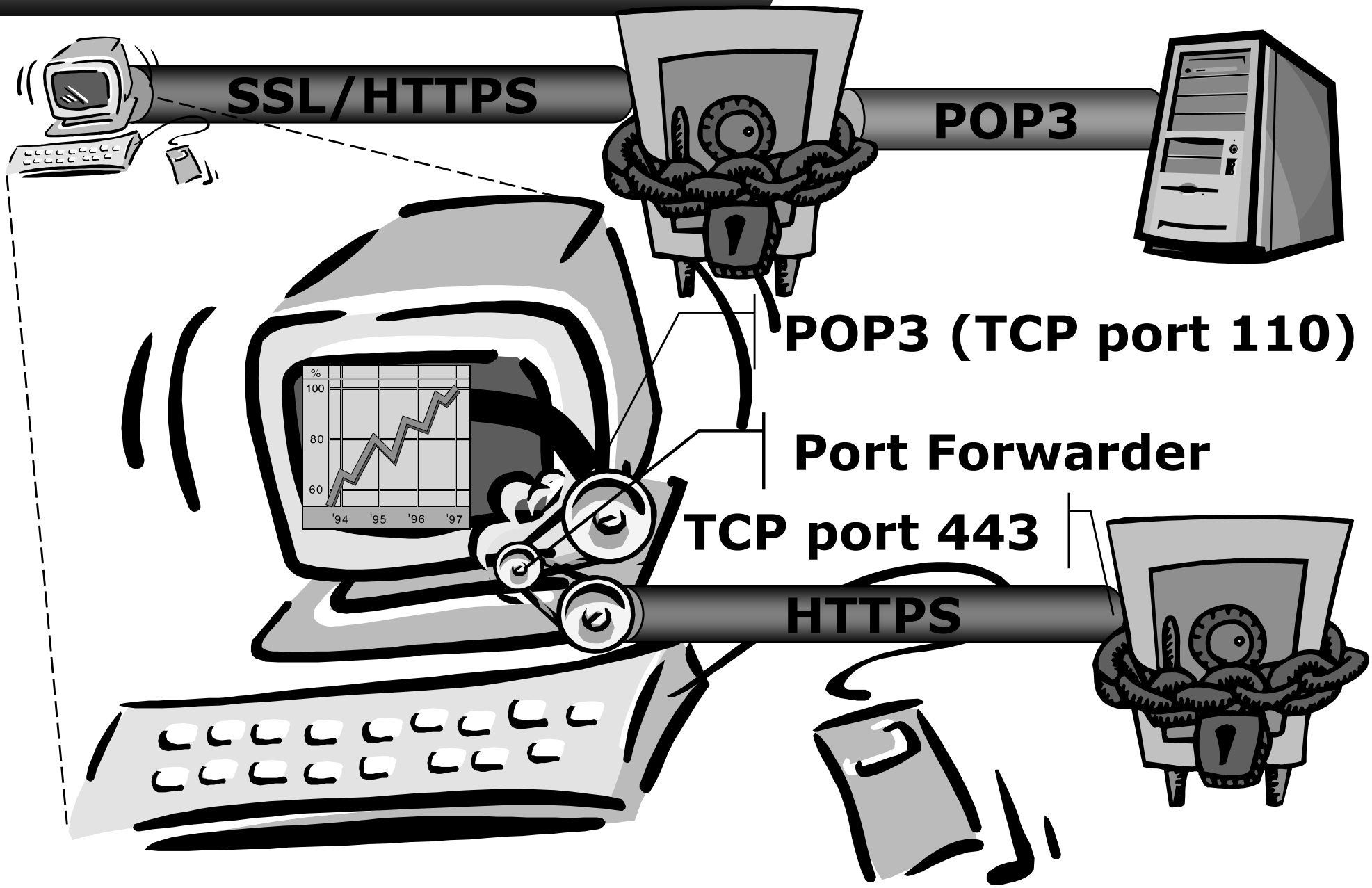
Application Translation



Port Forwarding

- Port forwarder on client
  - Additional software
  - Platform dependent
    - Unless Java or ActiveX
- Application points to `localhost`
  - To port X
  - Usual application port
    - E.g., TCP port 110 (POP3)

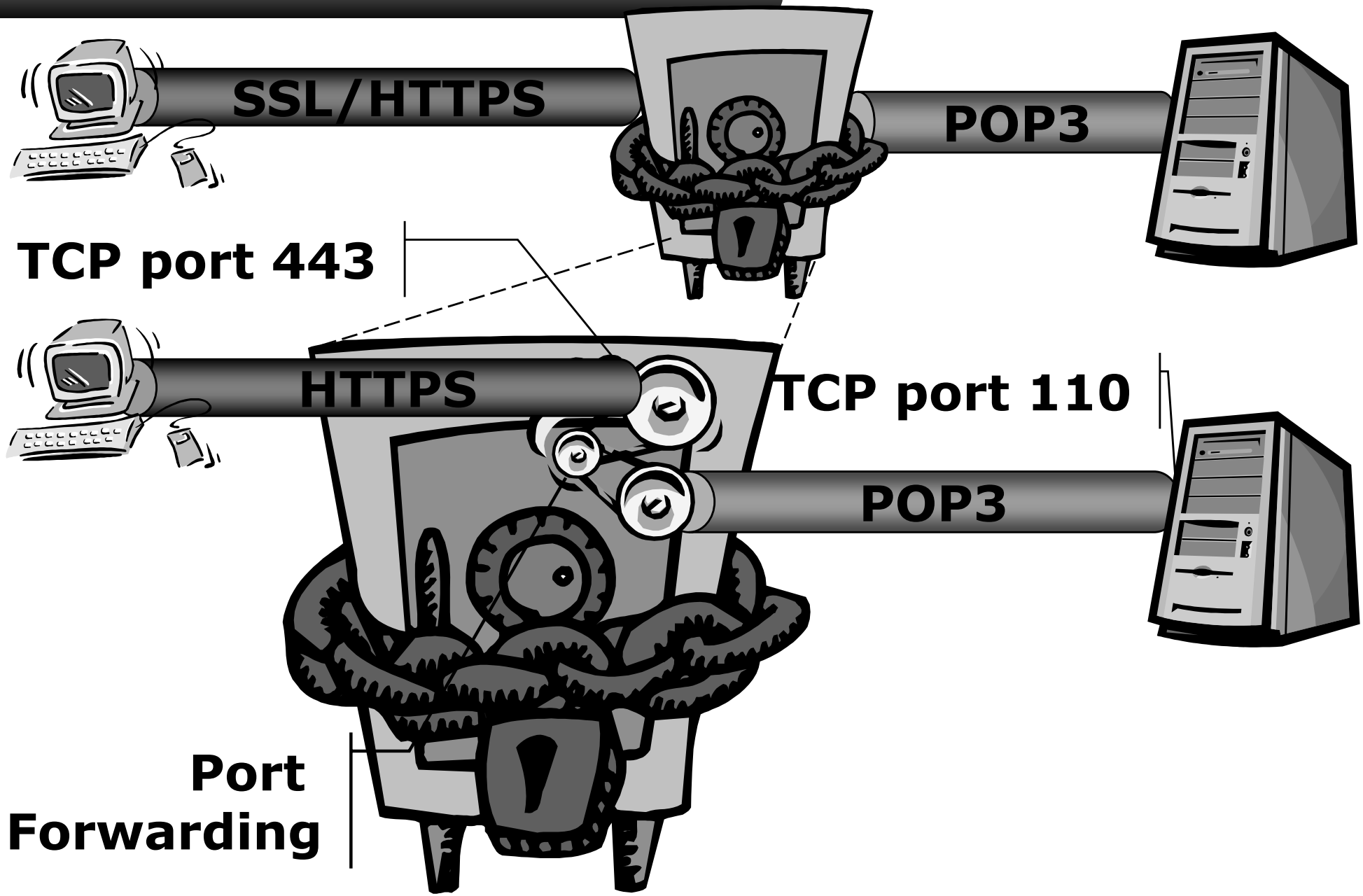
Port Forwarding



Port Forwarding

- Port forwarder sends data stream to SSL connection to VPN gateway
  - To port Y
  - Usually port 443 (HTTPS)
- VPN gateway forwards data stream to application server
  - To port X
    - E.g., TCP port 110 (POP3)

Port Forwarding



Port Forwarding

- ➔ Works only with fixed port protocols
- ➔ Problems with address and port in application layer protocol
  - ➔ SSL-VPN gateway must know application protocol to translate
  - ➔ Application layer gateway (ALG)

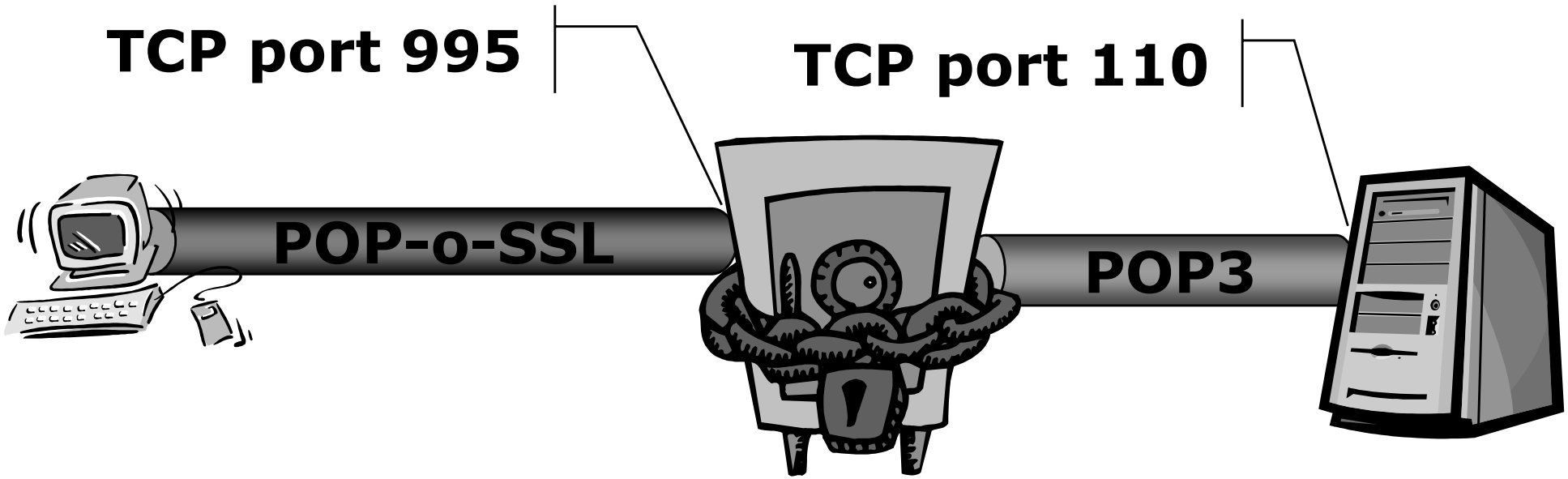
SSL'ed Protocols

- Secure application protocols
- Protocol-over-SSL
  - E.g., POP-over-SSL, IMAP-over-SSL, SMTP-over-SSL
- Client and server support required

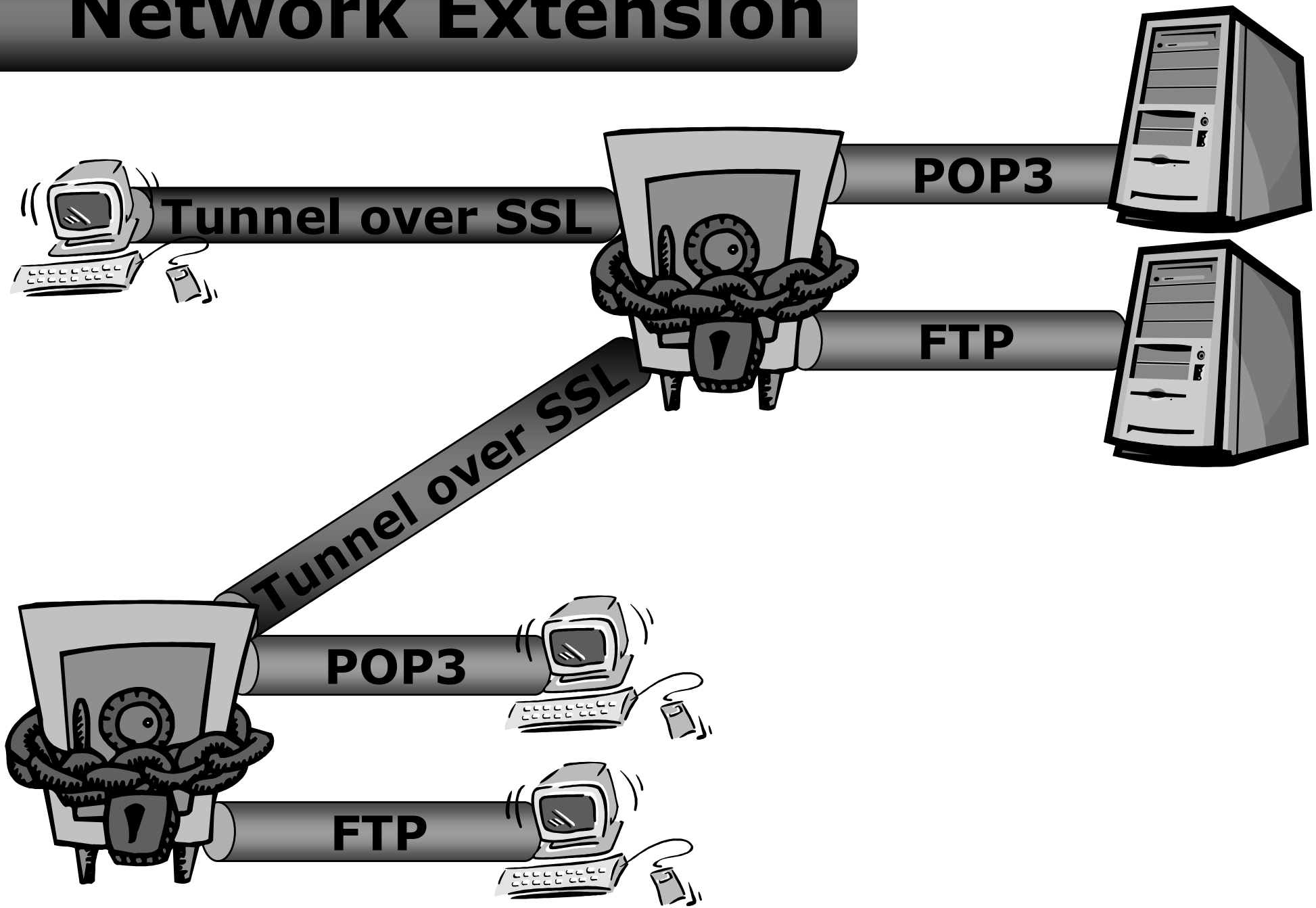
Application Proxying

➔Compatibility with older servers

➔Client points at SSL-VPN gateway



Network Extension



Products and Vendors

- Open VPN (openvpn.net)
- AEP
- F5 Networks
- NetScreen Technologies
- Netilla
- Nokia
- Symantec
- Whale Communications

Main Issues

- ➔Interoperability
- ➔Product specific features
- ➔Implementation weaknesses
- ➔Availability of client on specific platforms

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