Internet Security

Ing. Radovan Semančík

6. Linux weekend, Marec 2002, Bratislava

Agenda

- Úvod
- Access control
- Kryptografické protokoly
- VPN
- Záver

Bezpečnosť

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Úvod

Security - čo to vlastne je?

~~“Nehackniteľnosť”~~	Risk management
~~Akcia~~	Process
~~Len systémy~~	Aj ľudia, prostredie, ...

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Security goals

Ciele:

Confidentiality

Integrity

Availability

Metódy:

Access control

Organizational procedures

Cryptography

Physical security devices

Biometrics

….

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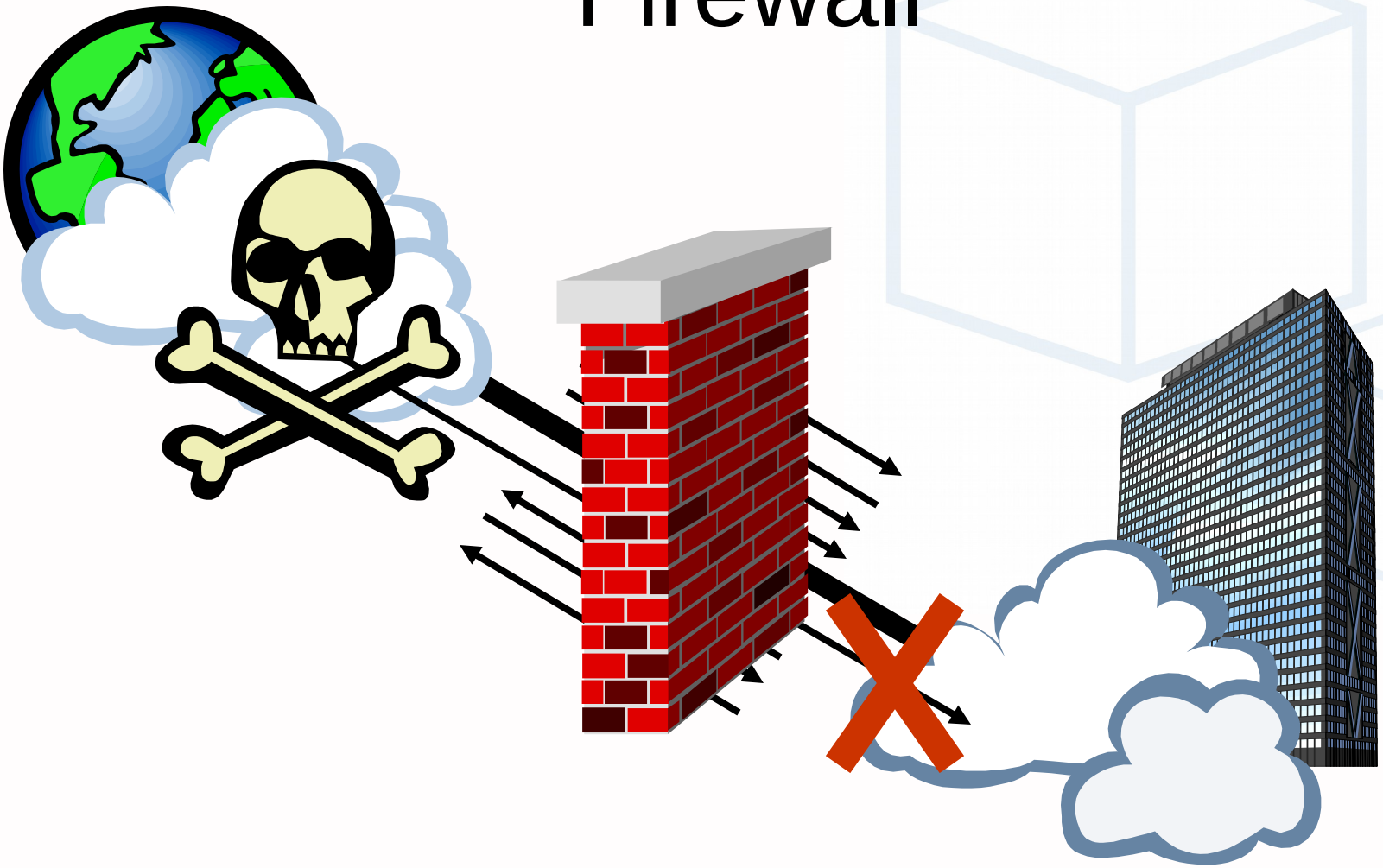
Agenda

- Úvod
- Access control
  - Authorizácia
  - Firewall
  - DMZ
- Kryptografické protokoly
- VPN
- Záver

Access control

- Autorizácia
  - Rozhodnutie kto má kam prístup
  - porovnaj: Autentifikácia - určovanie identity
- Na rôznych úrovniach
  - Komunikačná sieť
  - Operačný systém
  - Aplikácia

Firewall



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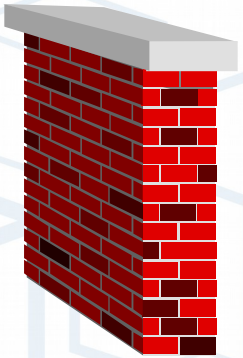
Firewall



TCP S=10.5.5.5 D=10.2.2.2 P=25

TCP S=212.15.18 D=10.2.2.2 P=23

10.5.5.5 → 10.2.2.2:25	ALLOW
10.2.2.* → *:80	ALLOW
* → *	DENY

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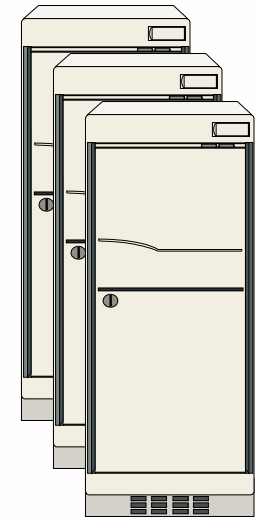
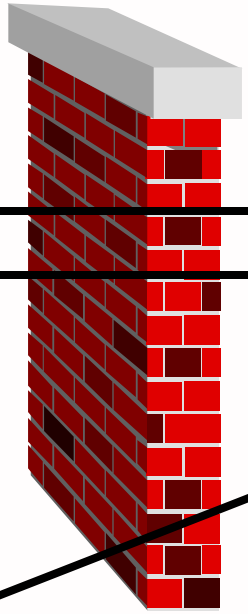
Druhy firewallov

- Bezstavový paketový filter
  - **+** Rýchle, lacné
  - **-** Zložité pravidlá, málo bezpečné
- Stavový firewall
  - **+** Vyšia bezpečnosť, ľahšia konfigurácia
  - **-** Drahé, náročné
- Aplikačné proxy
  - Závislé od aplikácie

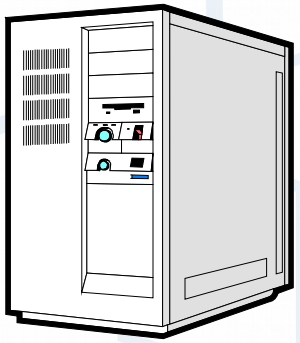
Bezstavový paketový filter



DNS server
10.10.10.10



DNS
port 53
(UDP)



10.1.1.10

#$%!@
port 53
(UDP)

UDP port 53 → *	ALLOW
* port 53 → 10.1.1.10	ALLOW
* → *	DENY

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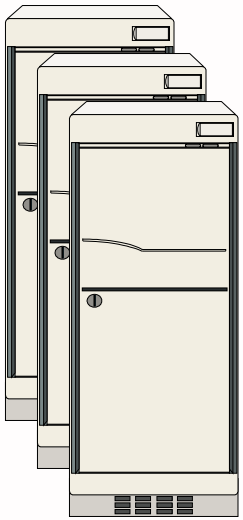
Stavový firewall



DNS server
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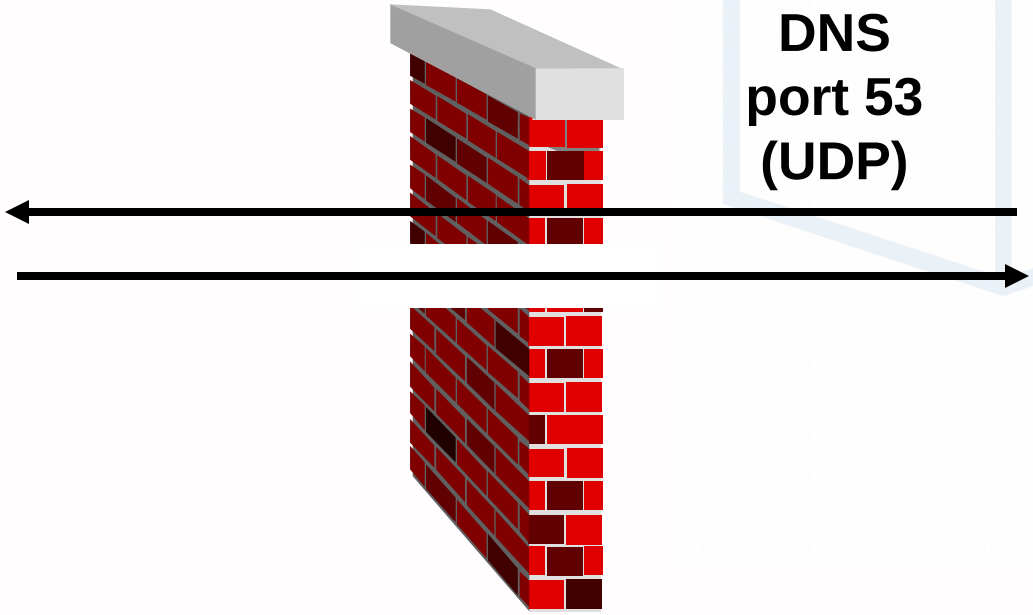
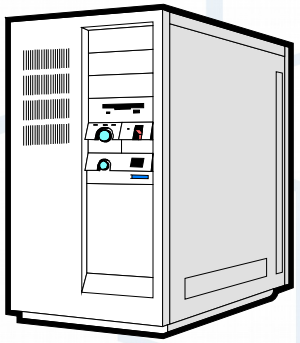


DNS
port 53
(UDP)



10.1.1.10

UDP port 53 → *	ALLOW
* port 53 reply→ 10.1.1.10	ALLOW
* → *	DENY

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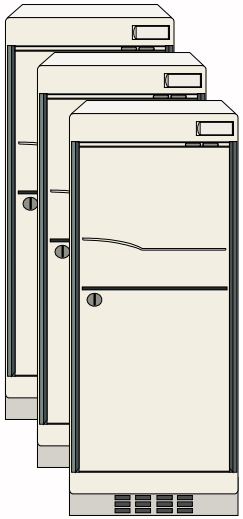
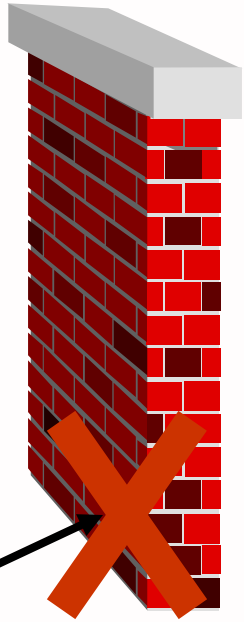
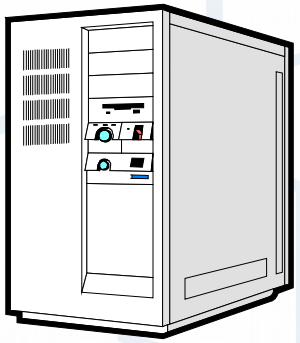
Stavový firewall



DNS server
10.10.10.10





10.1.1.10

#$%!@
port 53
(UDP)

UDP port 53 → *	ALLOW
* port 53 reply→ 10.1.1.10	ALLOW
* → *	DENY

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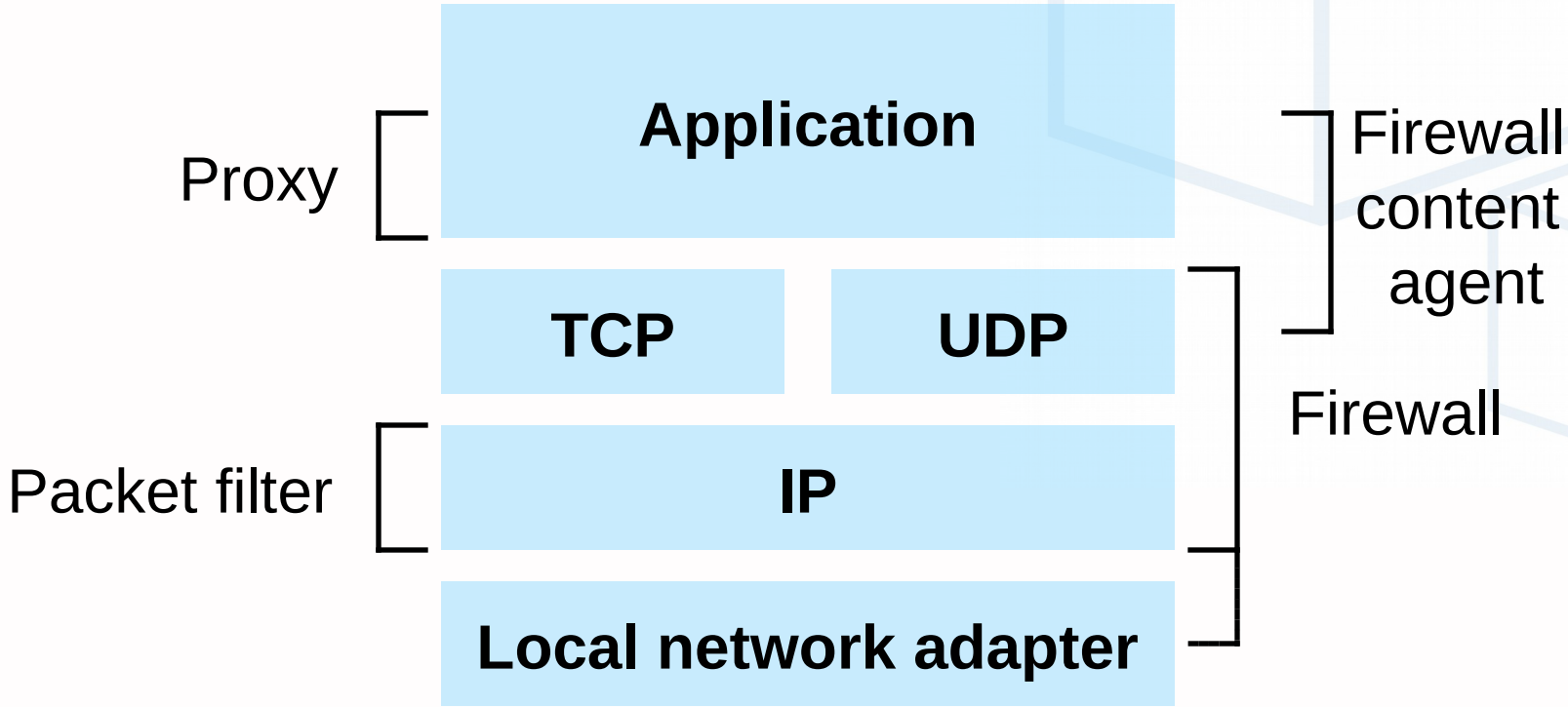
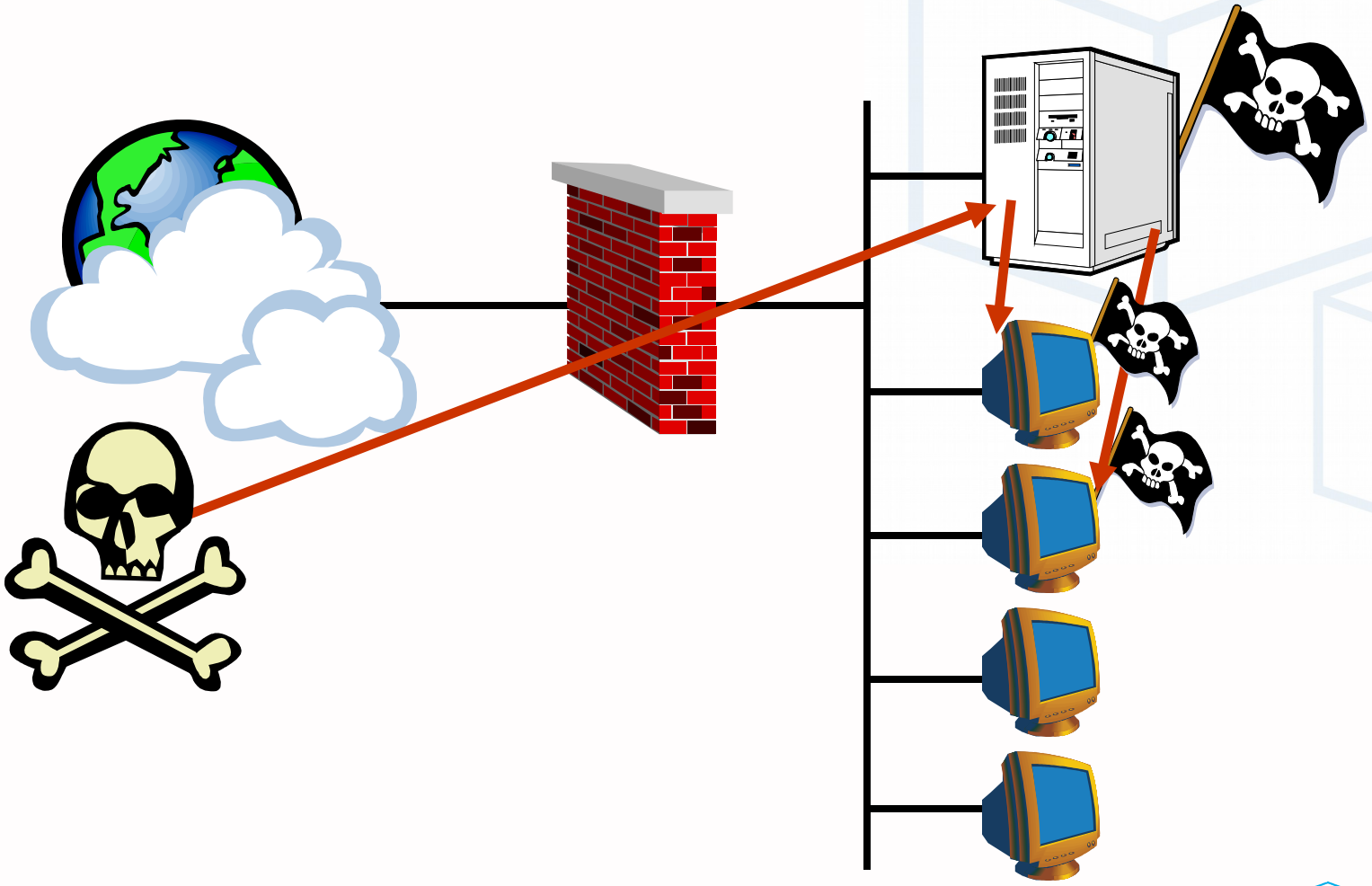
Stavový firewall

- TCP spojenia
  - tabuľka aktívnych spojení
- DNS, FTP, H.323 a spol.
  - Závislé pravidlá
- Aplikačný agenti (content agents)
  - Antivírová ochrana, URL blocking, ...

Firewalling a TCP/IP



Nasadenie firewallu



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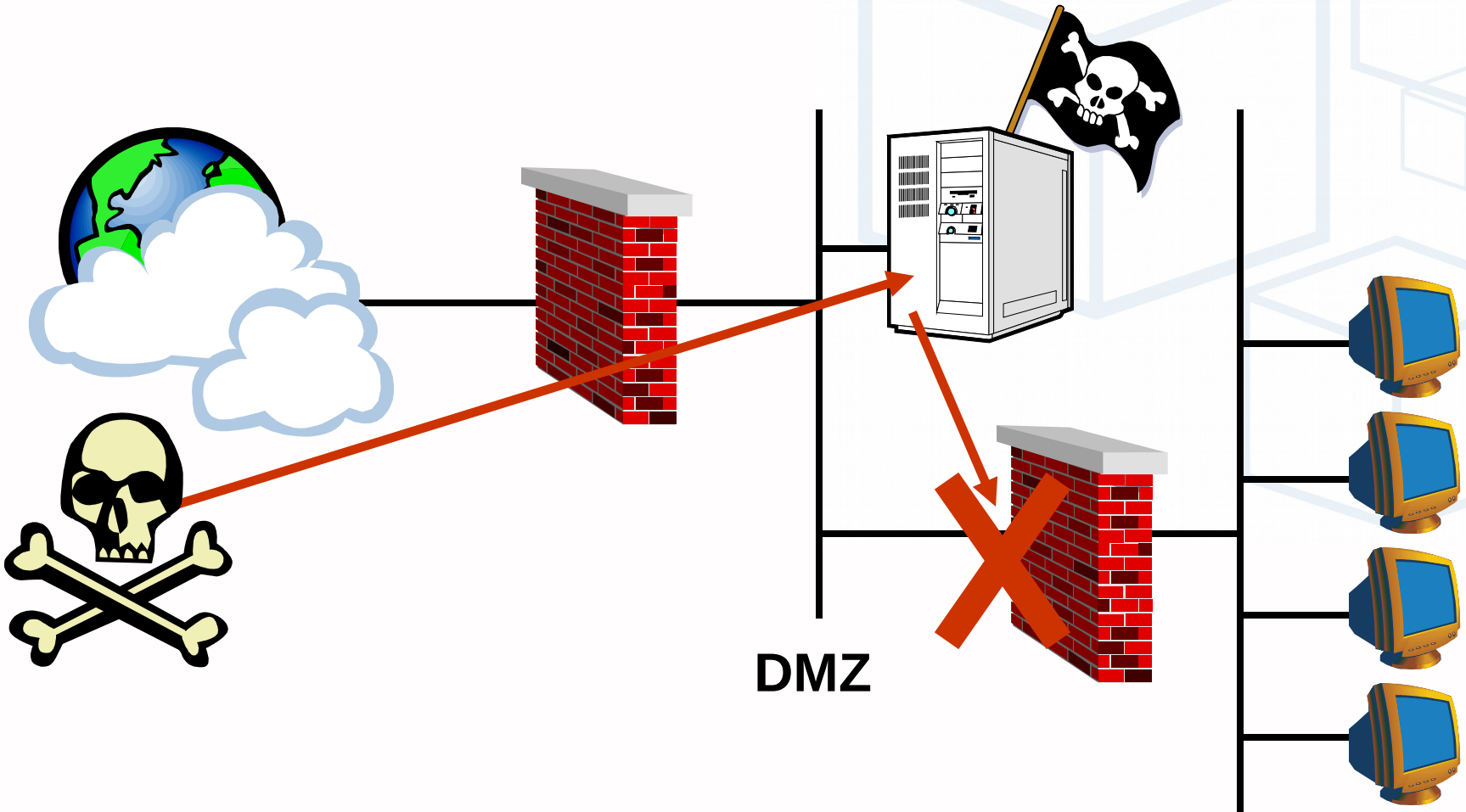
Demilitarized zone (DMZ)



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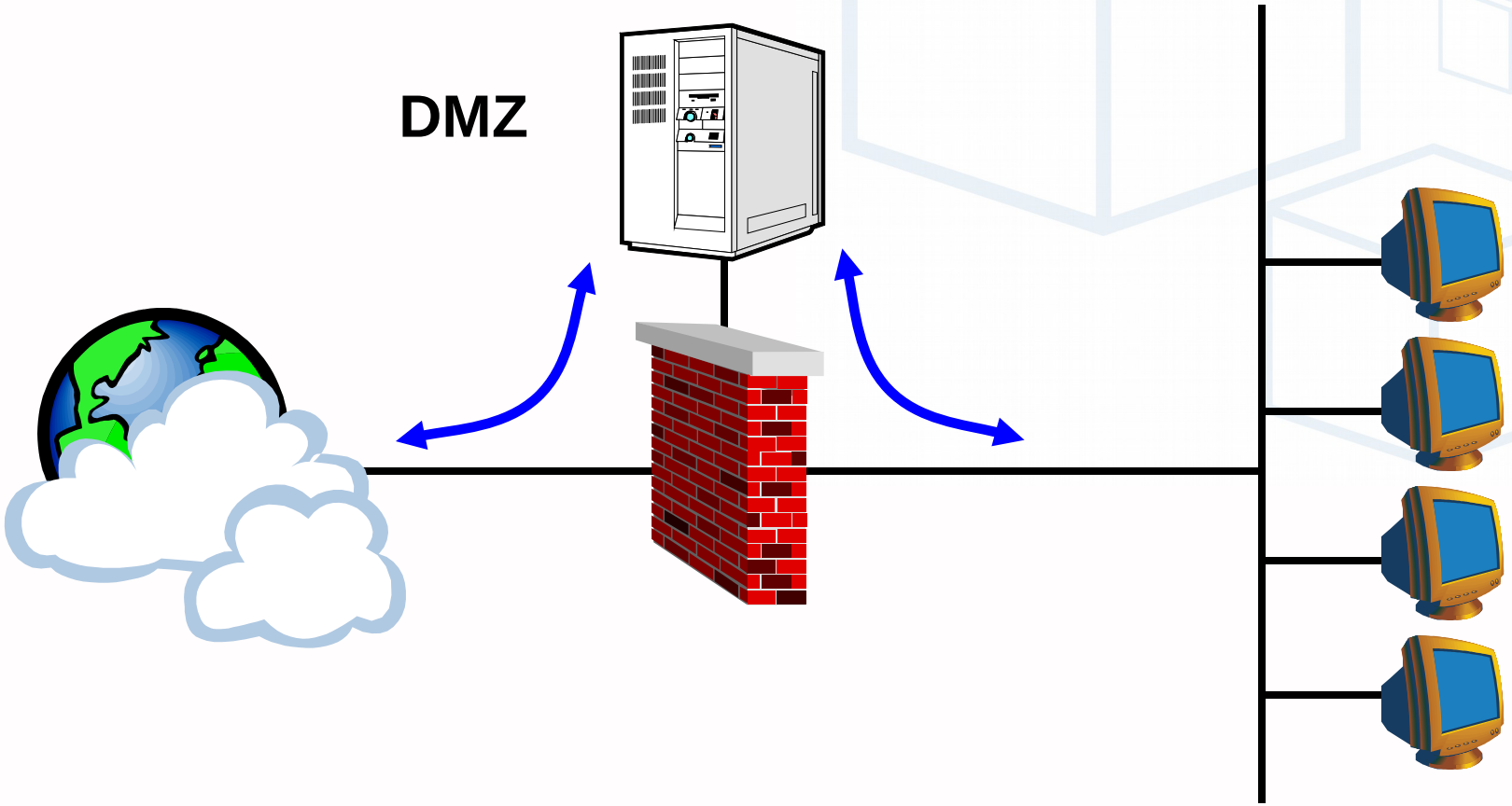
DMZ - úsporná verzia



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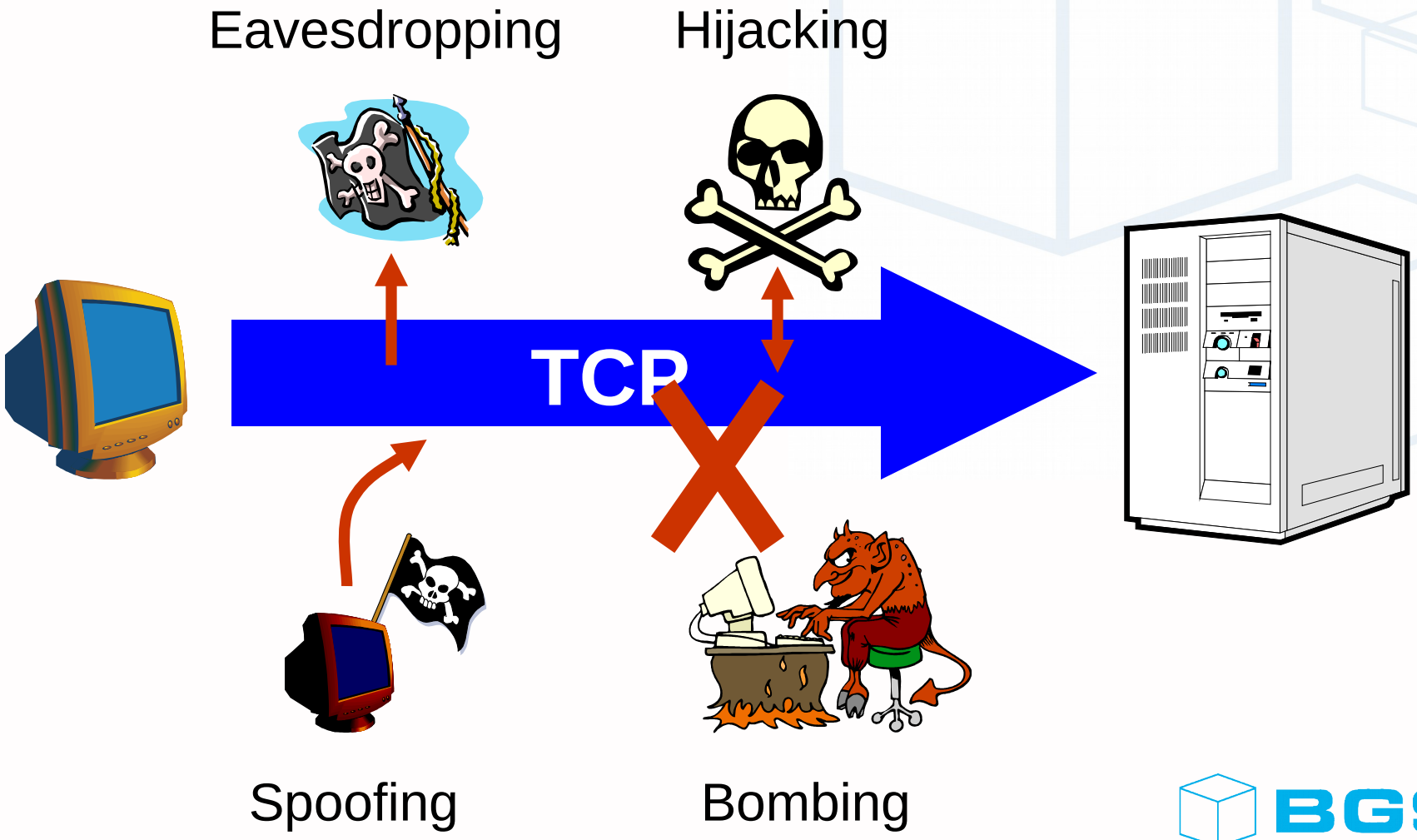
Agenda

- Úvod
- Access control
- Kryptografické protokoly
  - SSH, PGP
  - X.509
  - SSL, TLS, S/MIME
- VPN
- Záver

Na počiatku bola tma

telnet

Telnet insecurity



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“Strong” authentication

- S/Key, SecureID, ...
  - Kryptografické technológie autentifikácie
  - TCP kanál zostáva nezašifrovaný
  - Možný hijacking, odpočúvanie, …
  - V čase ITAR* použiteľné, teraz problém
  - Použiteľné ako “zlepšená” autentifikácia

* International Trade in Arms Regulation

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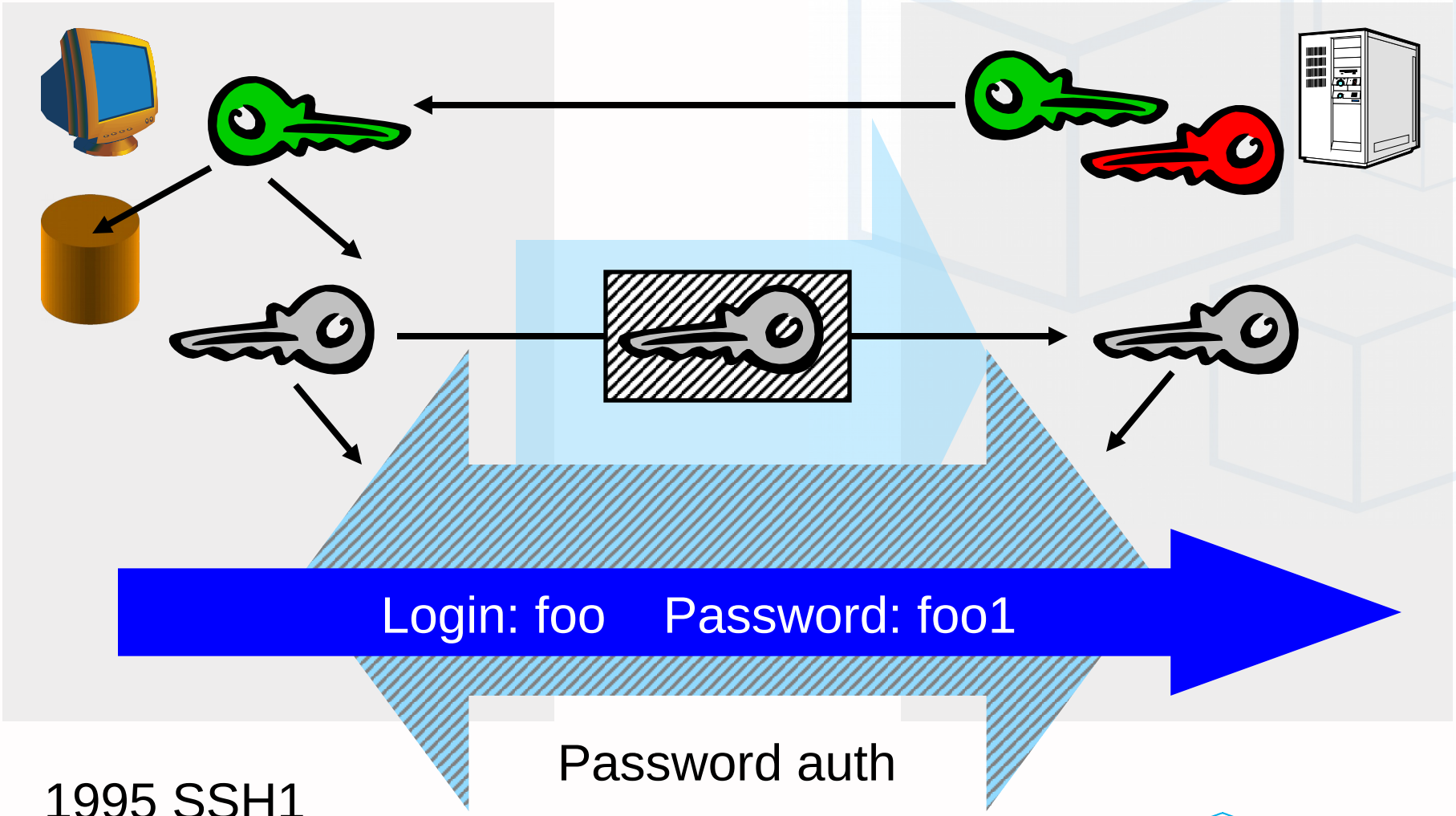
SSH - Secure shell



1995 SSH1
1997 SSH2 (IETF)

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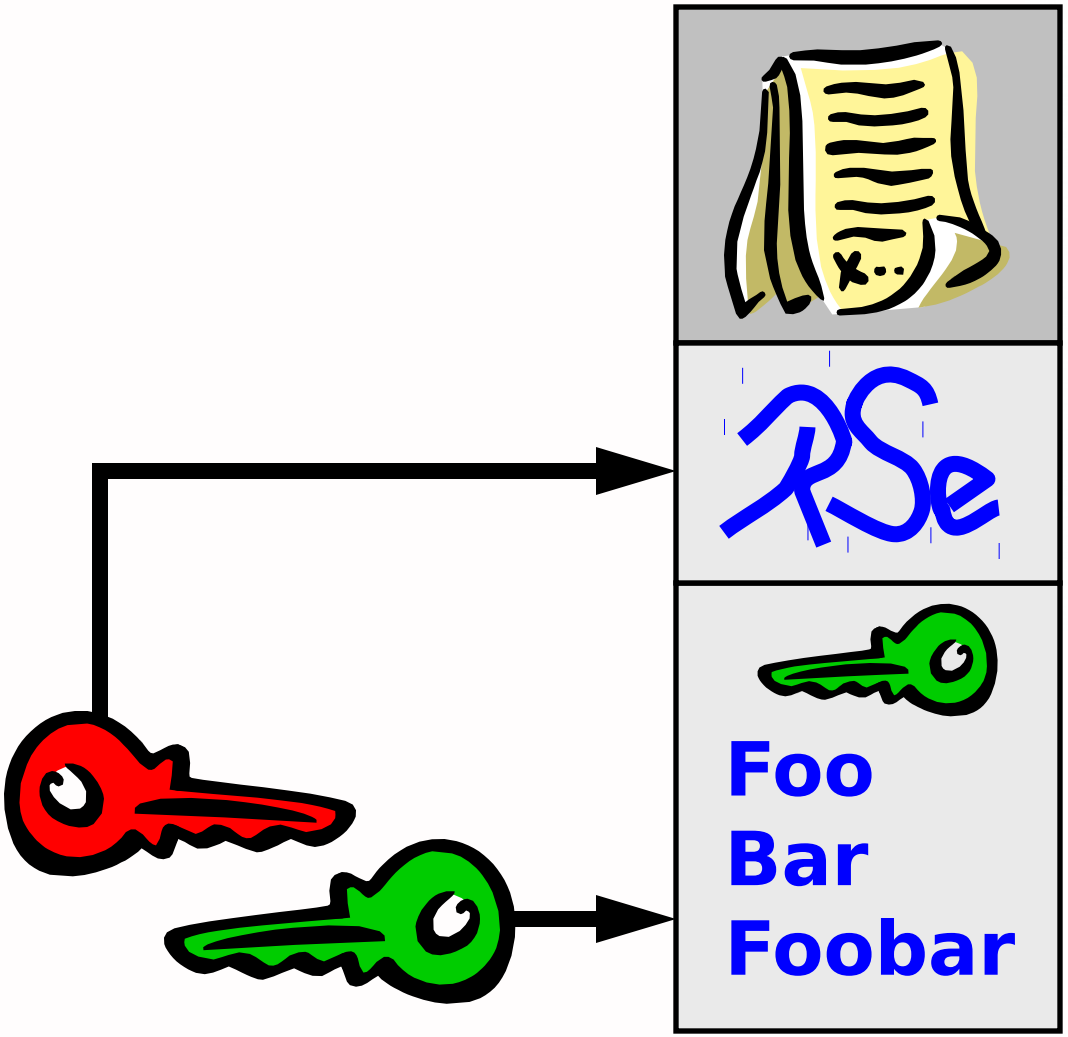
Pretty Good Privacy - PGP



Philip R. Zimmermann
1991: v1.0
1995: v2.62i
1997: v5.0 (5.0i)
1999: GnuPG 1.0

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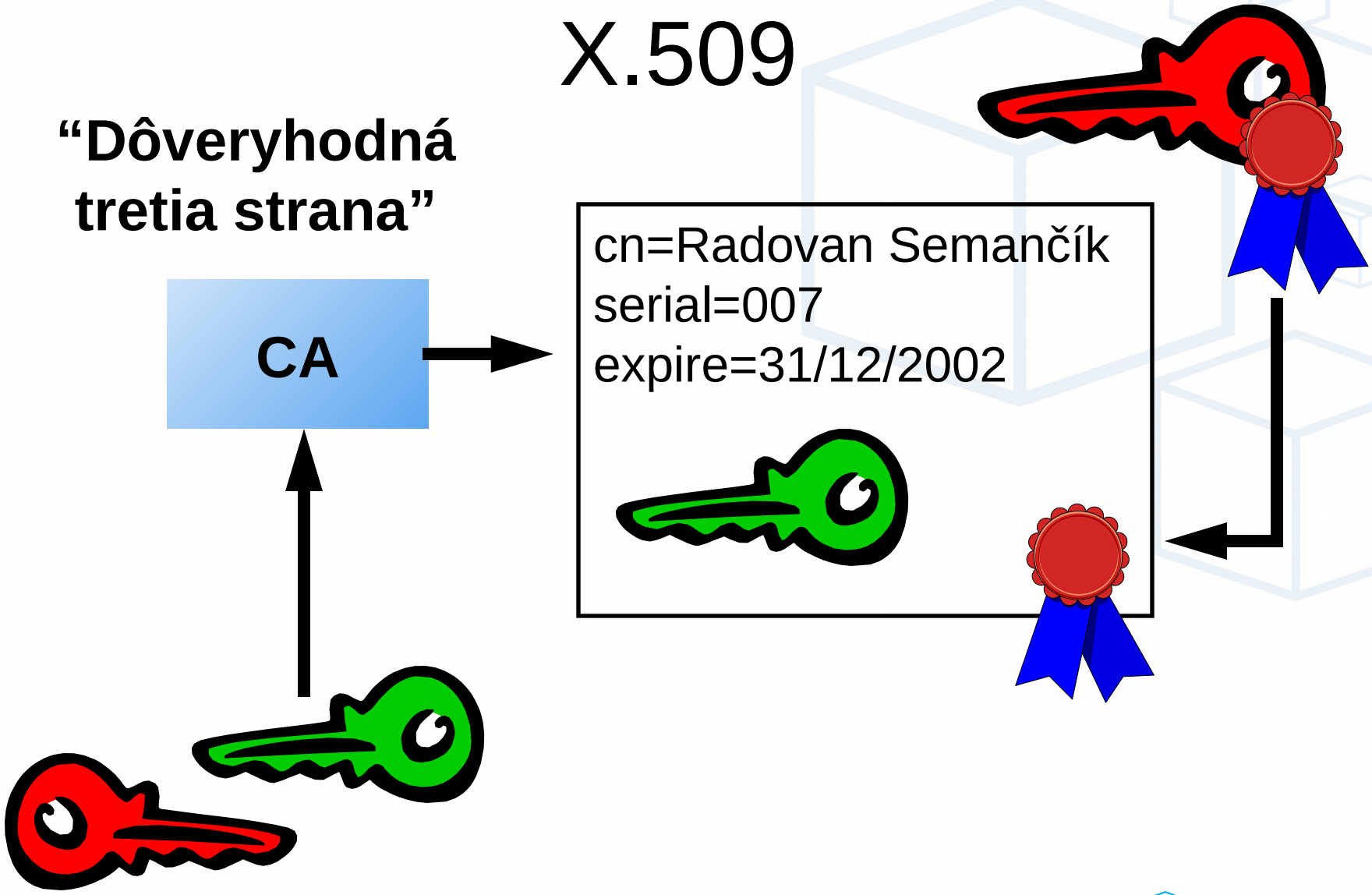
PGP & SSH problems

- Keys, keys, keys
  - SSH: uložené na lokálnom disku
  - PGP: Web of trust
- Štruktúra
  - SSH: žiadna, flat files
  - PGP: Web of trust, chaotická
- Vhodné pre malé systémy a nekomerčný Internet

X.509

“Dôveryhodná tretia strana”



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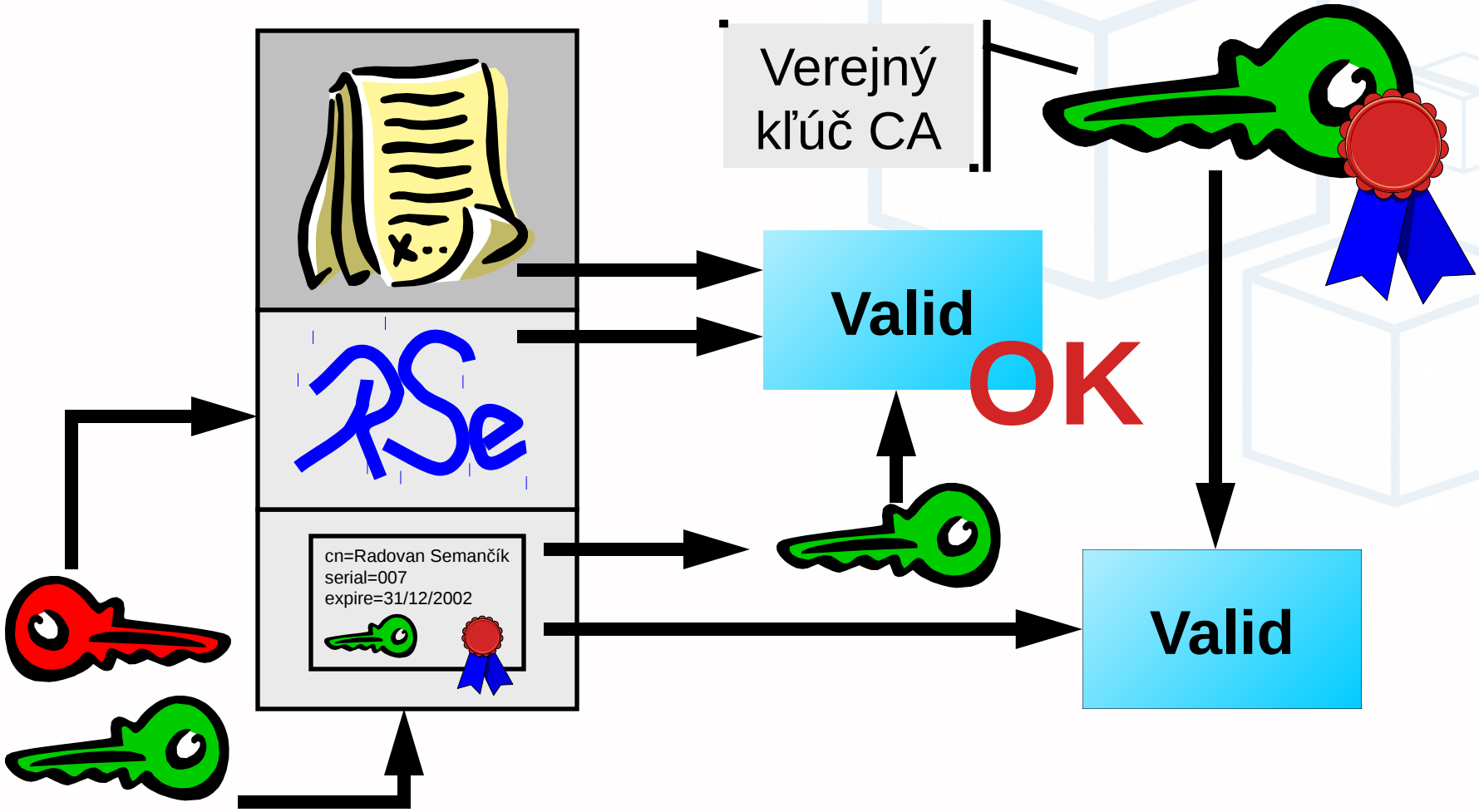
Overovanie certifikátu



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HTTPS

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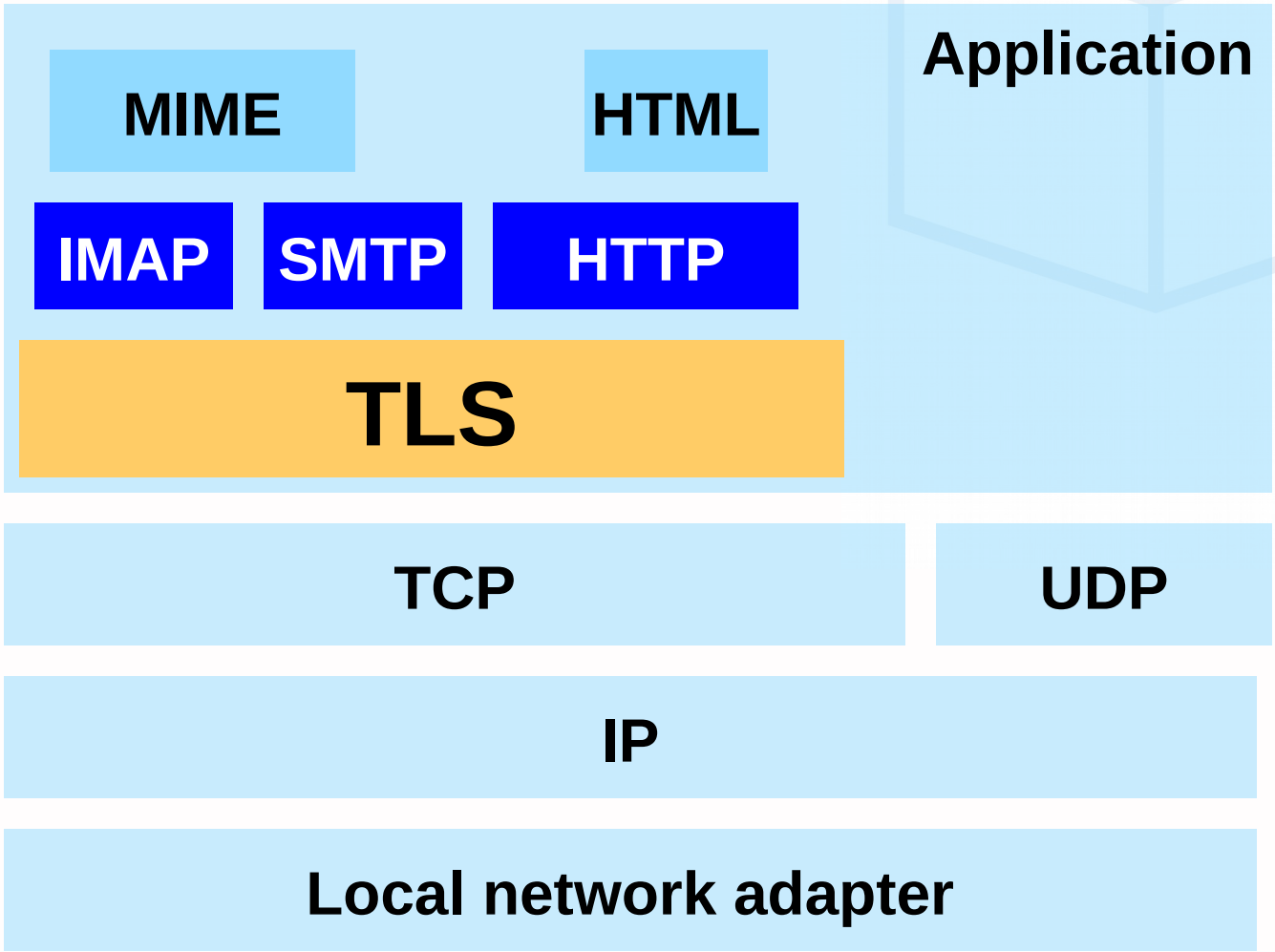
Transport Layer Security

- Pôvodne SSL - Secure Socket Layer
- 1994: Netscape SSL 1.0 (nenasadený)
- 1994: Netscape SSL 2.0
- 1996: Netscape SSL 3.0
  - Rieši problémové miesta SSL 2.0
- 1999: TLS 1.0 (RFC 2246)
- súčasnosť: RFC 2246bis (IETF)

TLS & TCP/IP



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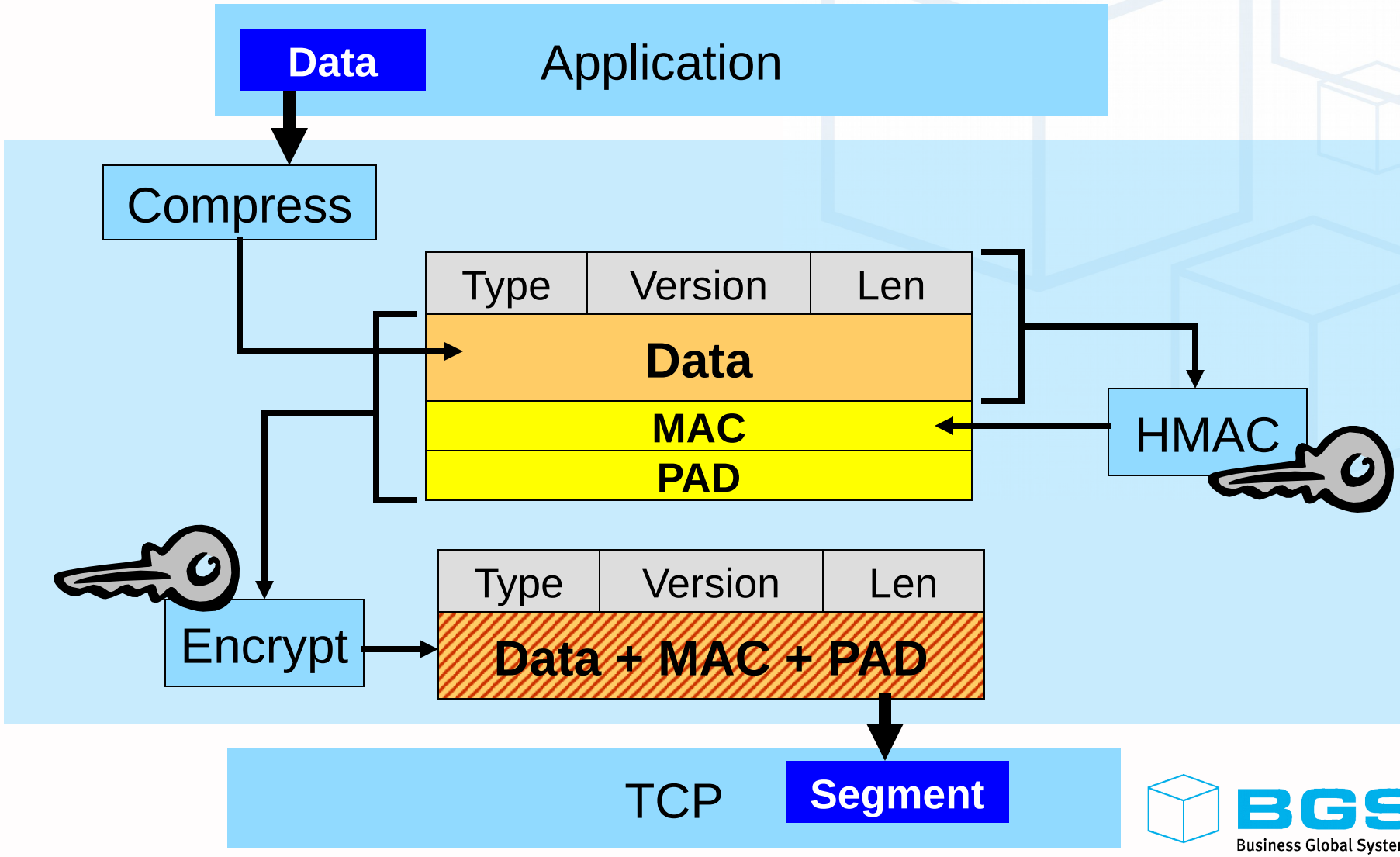
TLS record layer



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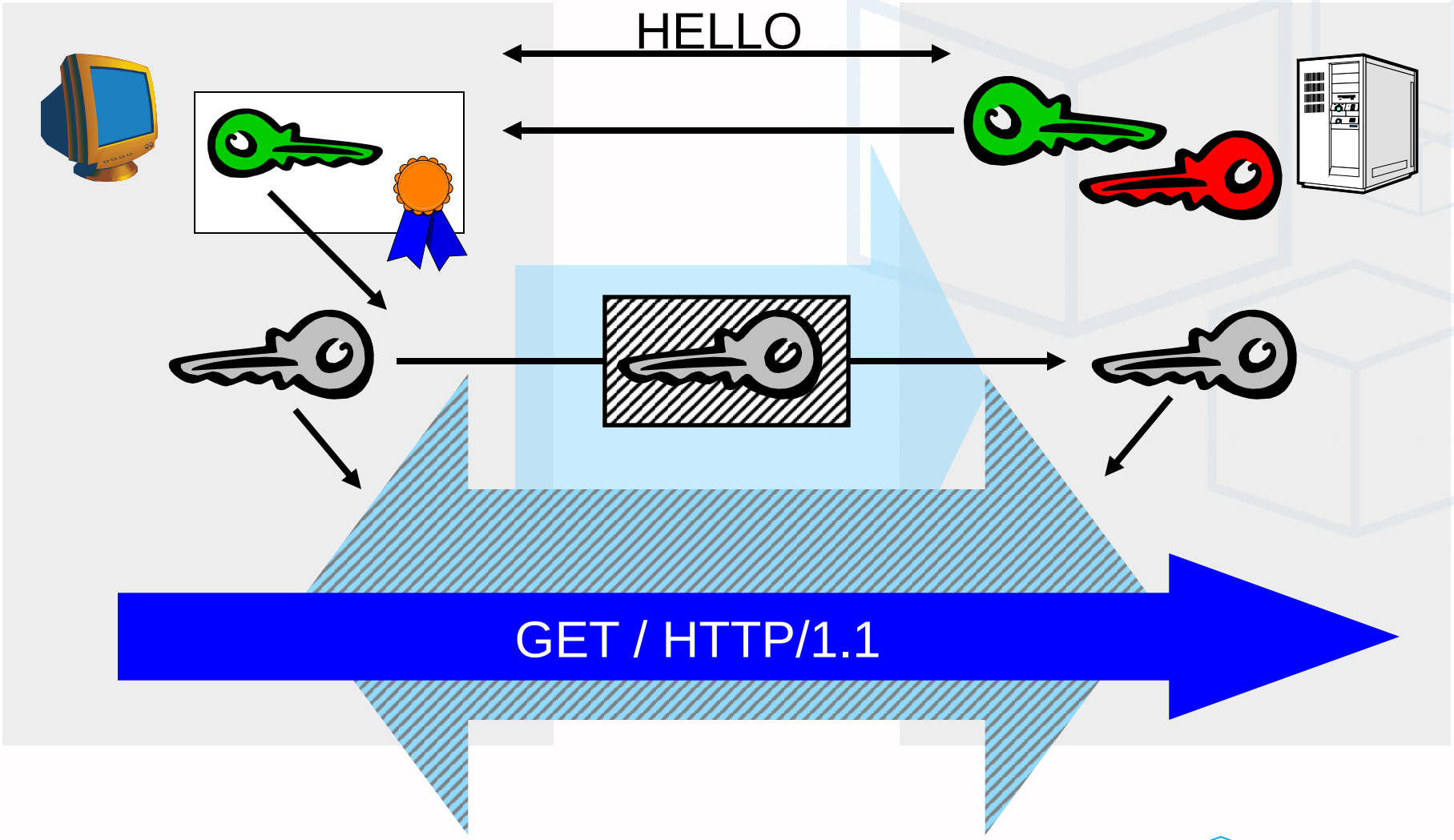
TLS handshake



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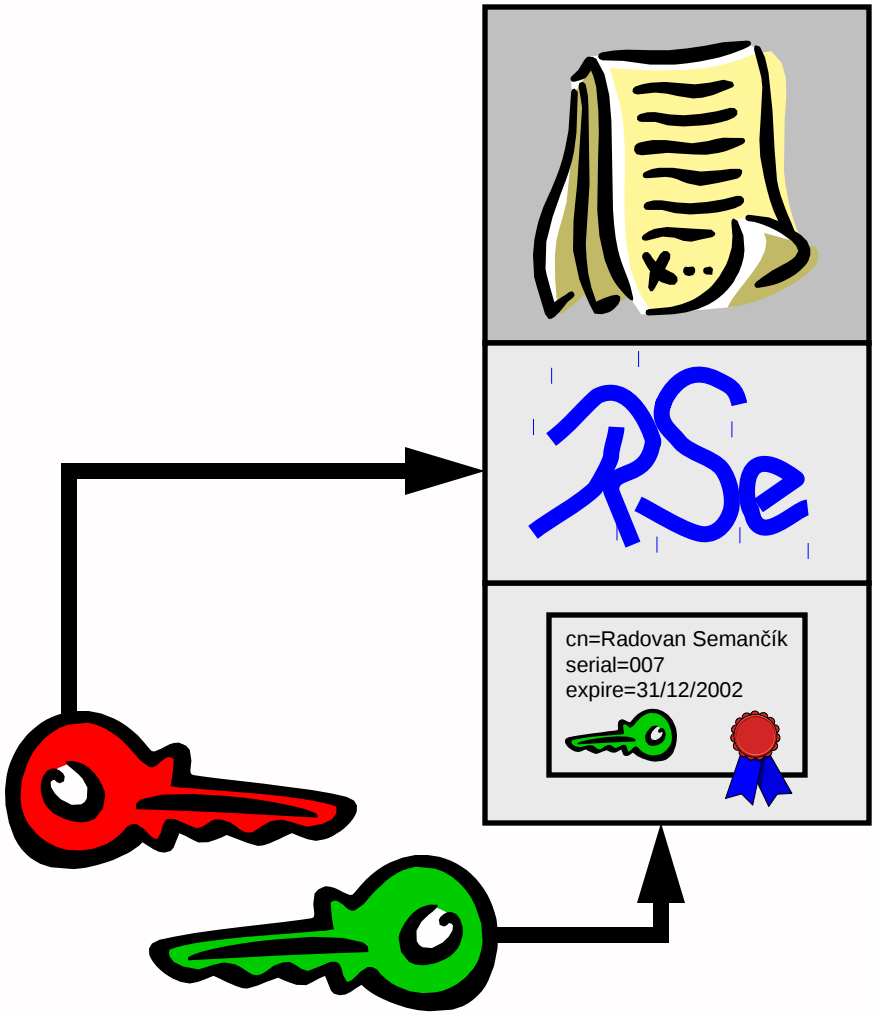
S/MIME



Nadstavba MIME

1995: RSA labs
1998: S/MIME v2 RFC 2311
1999: S/MIME v3 RFC 2633

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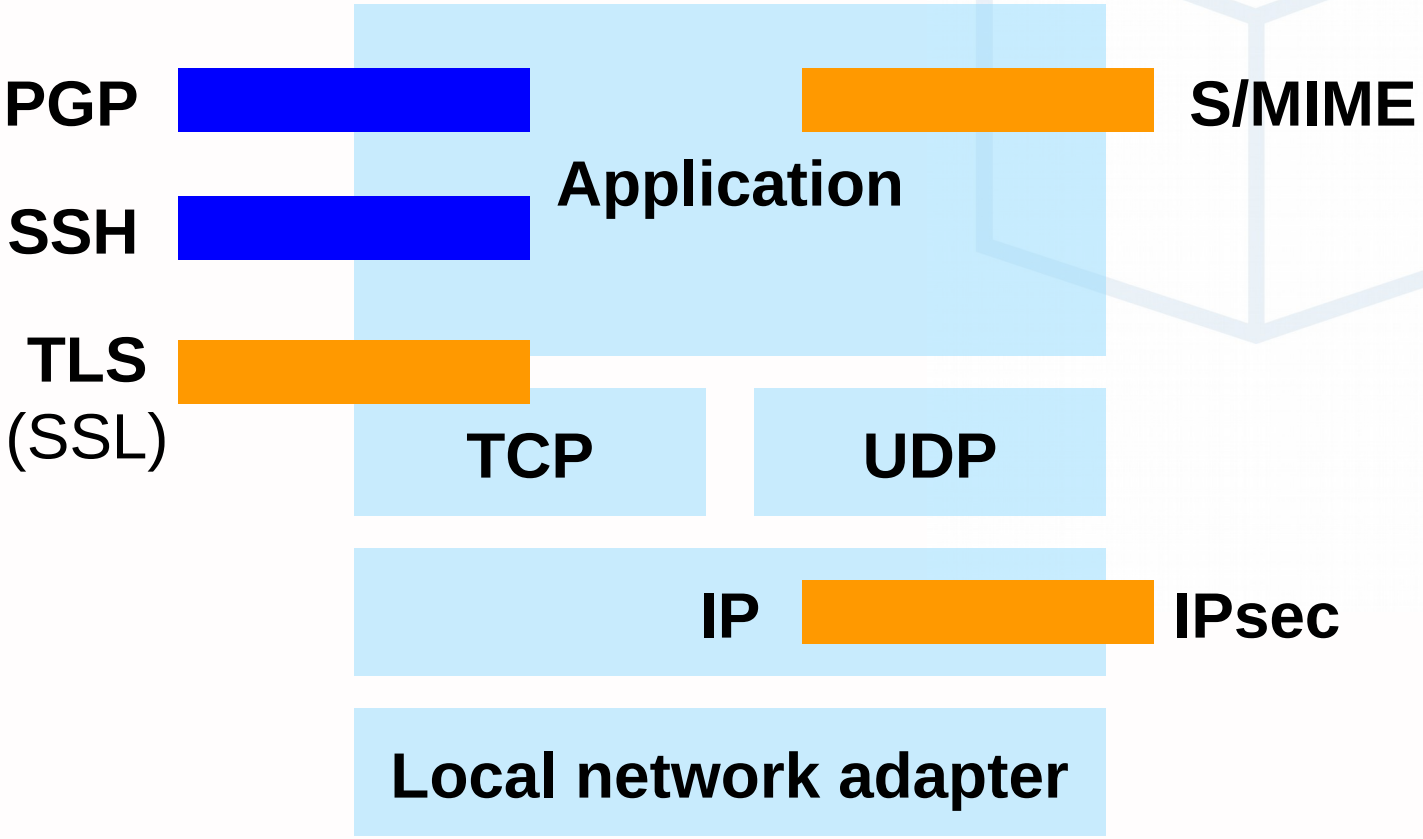
TCP/IP security options



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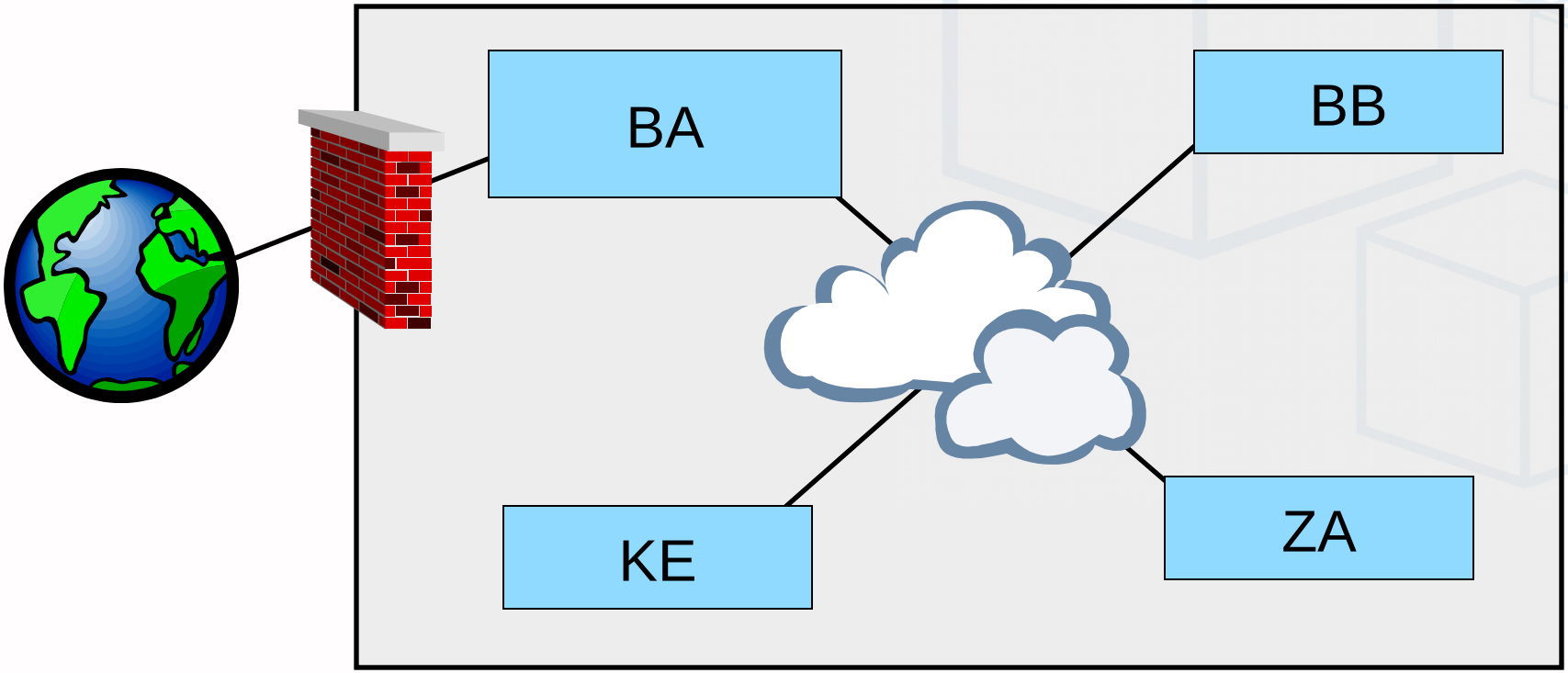
Prečo X.509?

- PGP, SSH, etc.
  - Prorietary key managemet
  - Infrastructure? Policy?
- TLS, IPsec, S/MIME, etc.
  - X.509 infrastructure, key management
  - CA controls the key policies
  - Key recovery (not only “escrow”)

Agenda

- Úvod
- Access control
- Kryptografické protokoly
- VPN
  - VPN koncept
  - IPsec
  - IKE
- Záver

Private Network



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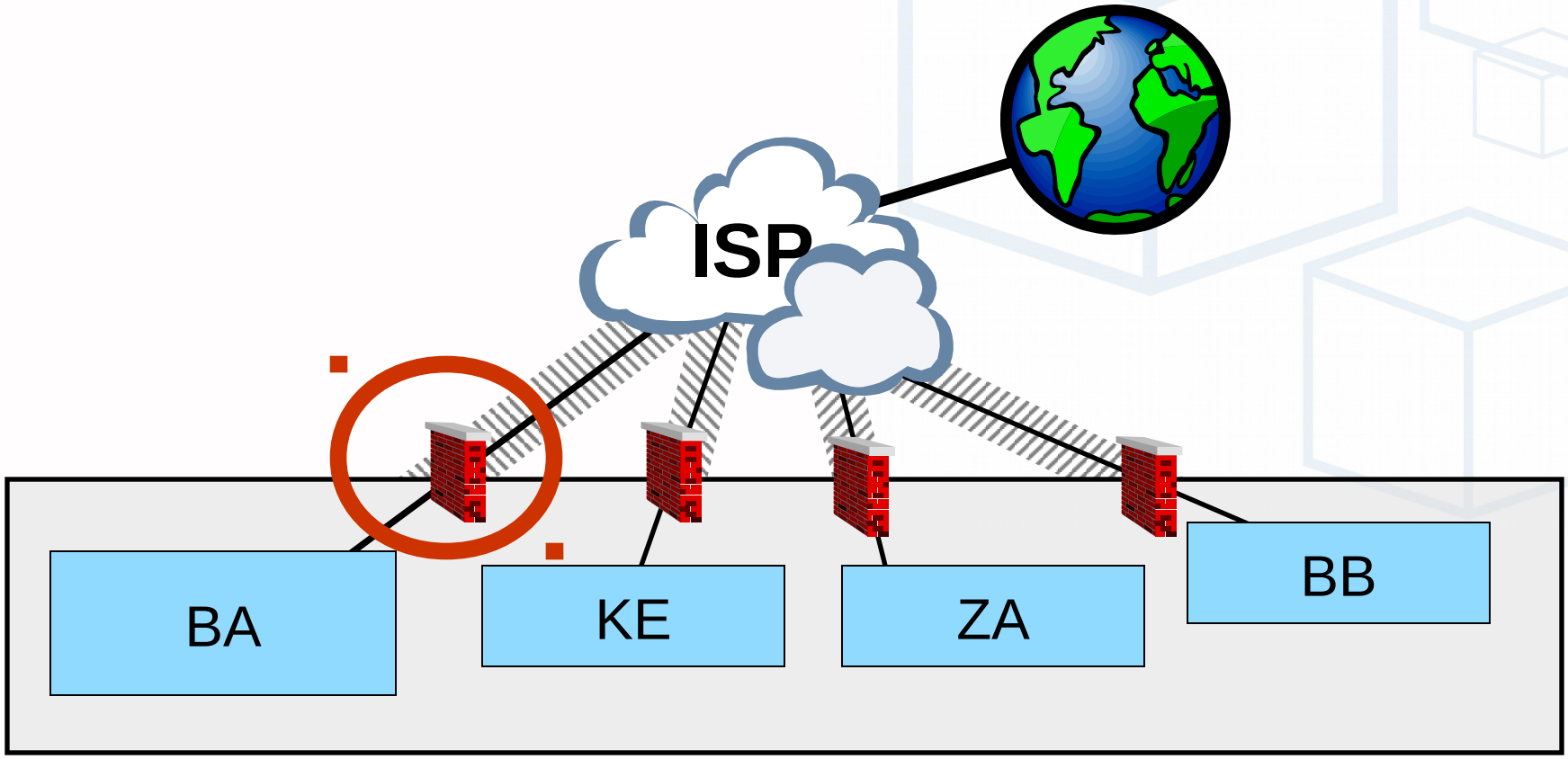
Virtual Private Network



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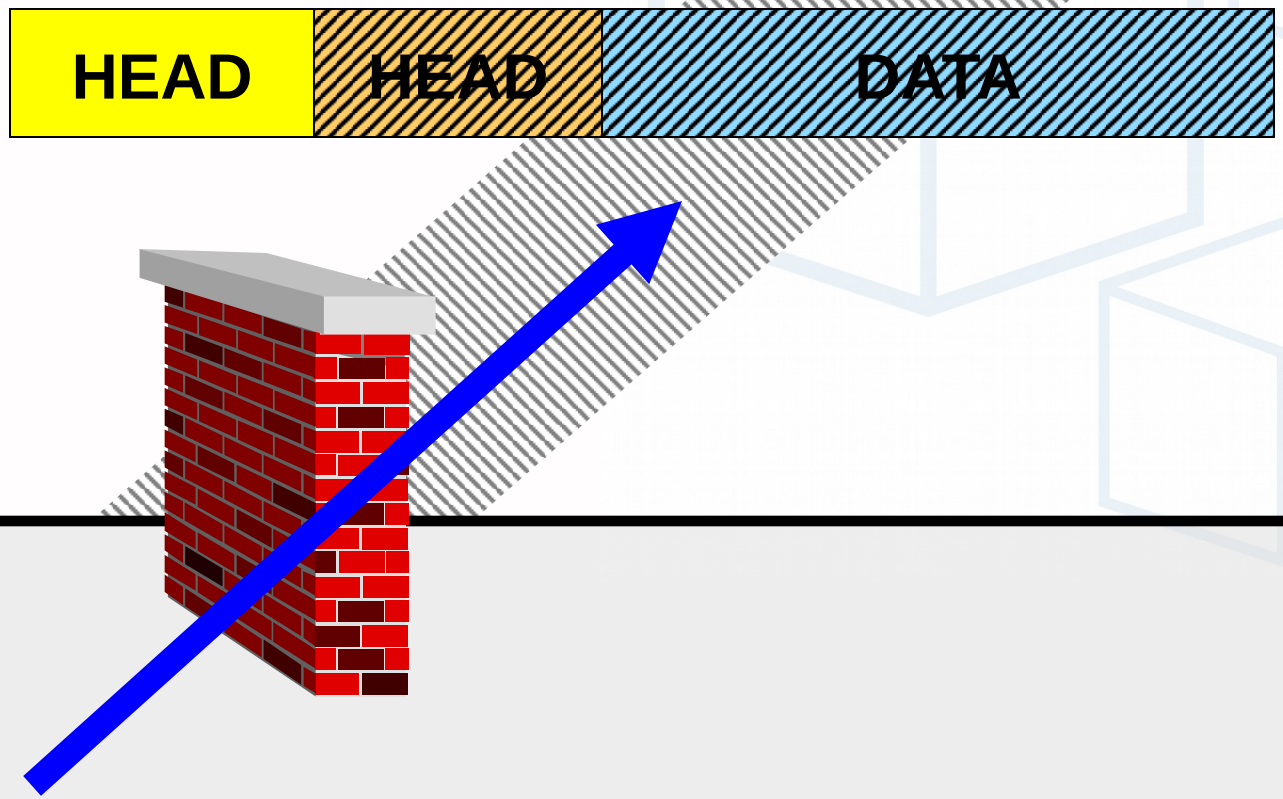
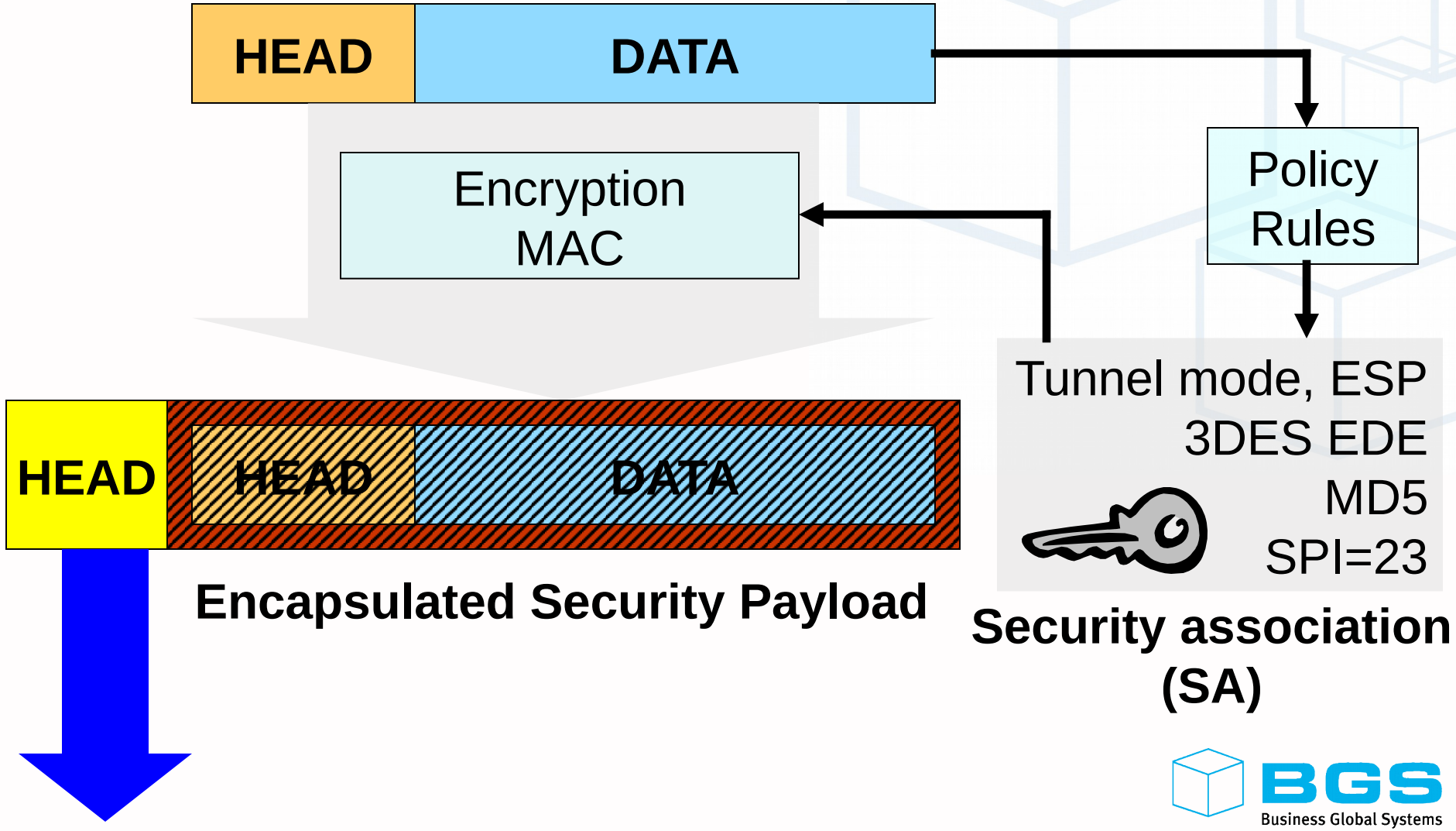
Security gateway



IPsec ESP



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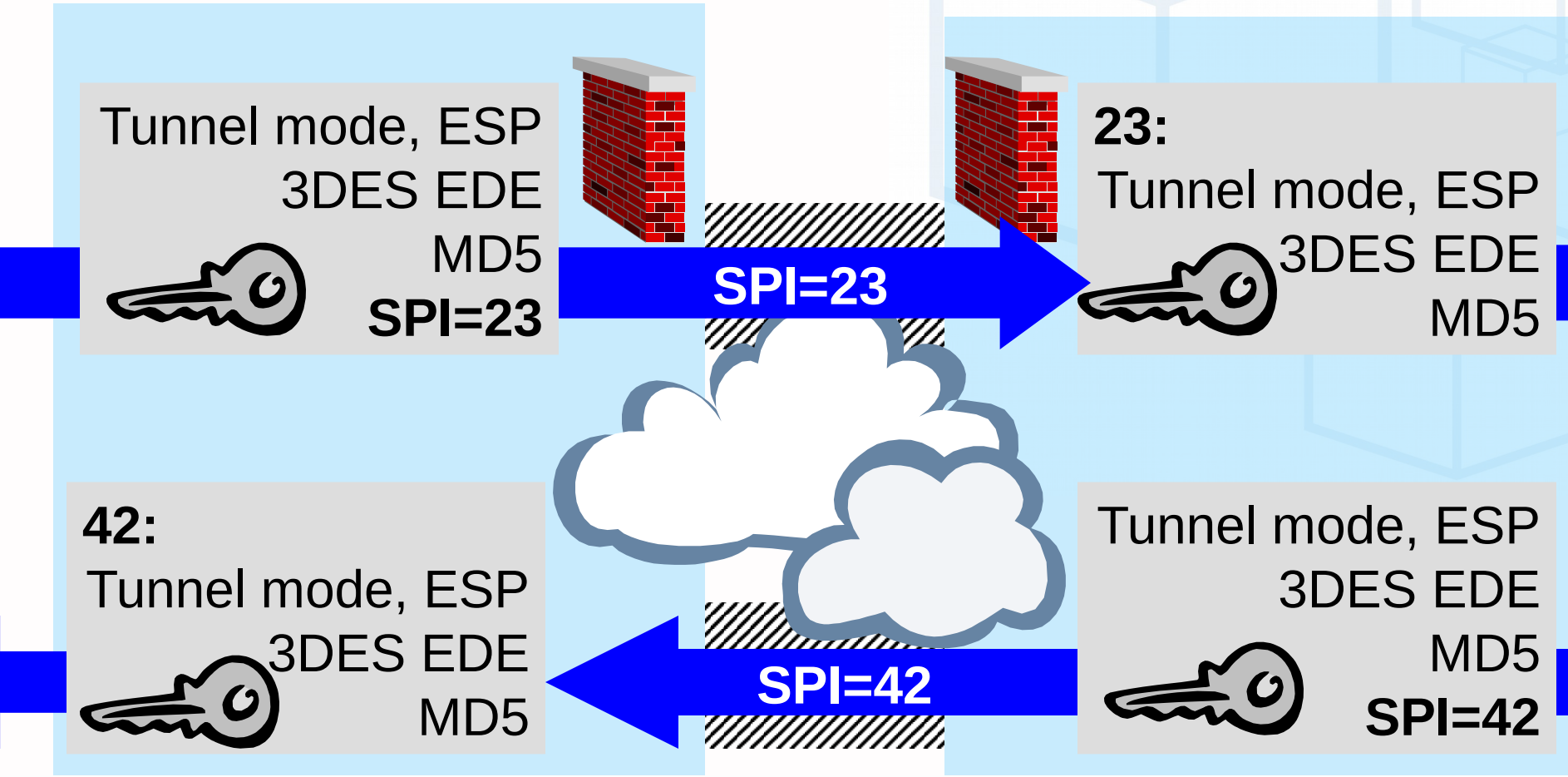
Security association



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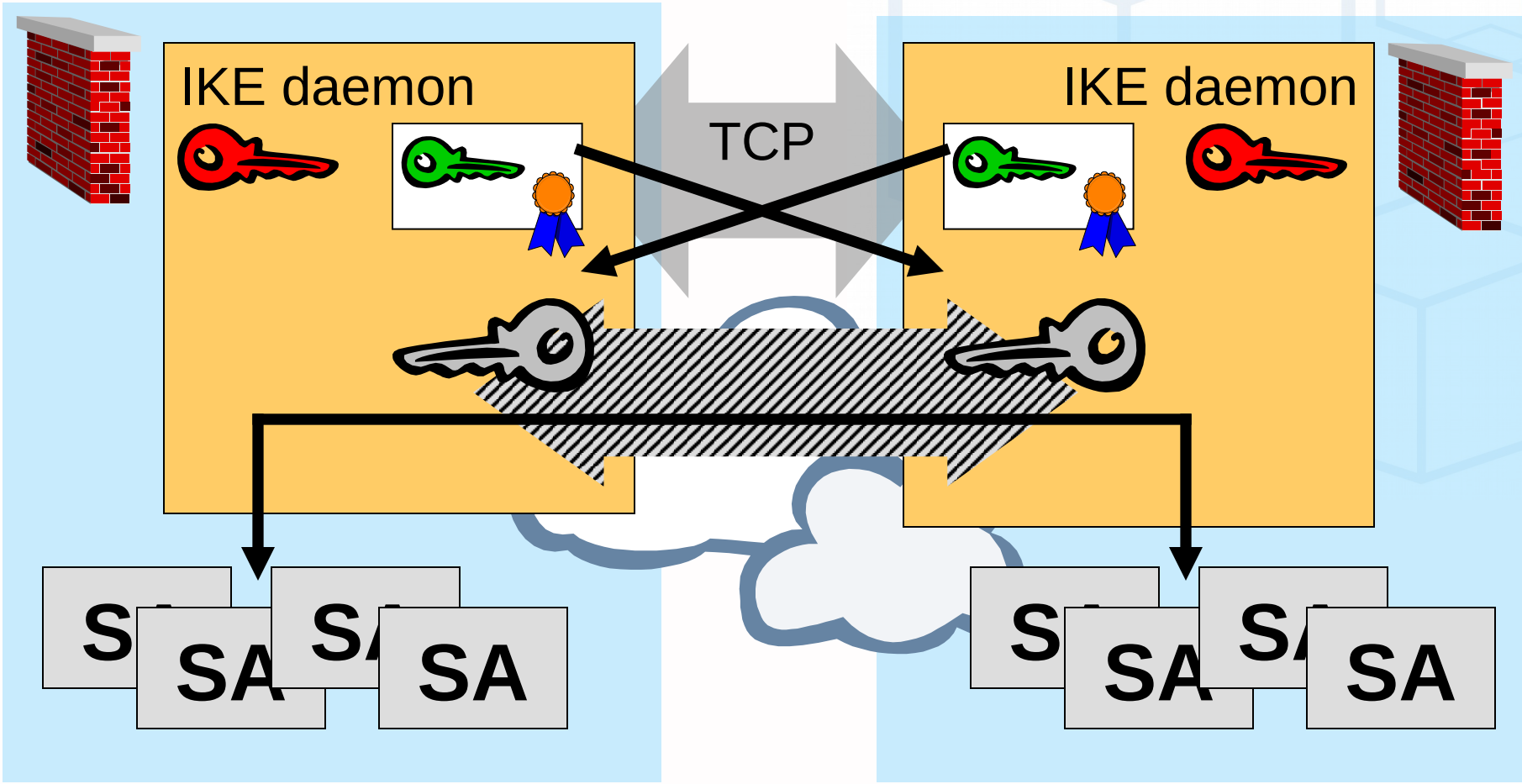
Internet Key Exchange



IPsec & IKE poznámky

- IPsec ESP & AH
  - ESP - Encapsulated Security Payload
  - AH - Authentication Header
  - ESP & AH processing in kernel
  - Symetric cryptography
- IKE - Internet Key Exchange
  - Asymetric cryptography
  - Processing in user space

IPsec future

- Cisco, Lucent, SUN, Microsoft, ….
  - interoperability
- IPv4 … optional
- IPv6 … integral part

Agenda

- Úvod
- Access control
- Kryptografické protokoly
- VPN
- Záver

(Konečne!)

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Záver

- Firewalling
  - užitočný nástroj, ale len sám nestačí
- Kryptografické protokoly
  - Veľa na výber, nie všetky rovnako vhodné
- X.509
  - Infraštruktúra, policy, poriadok
- No more Snake Oil, please ...

Otázky?

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Ďakujem za pozornosť

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