Ecole d'Ingénieurs du Canton de Vaud

VPN Solution

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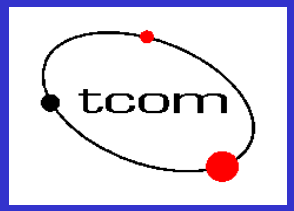
EIVD



VPN - Virtual Private Network

Start date : 01.02.2002
Duration : 1+1 years

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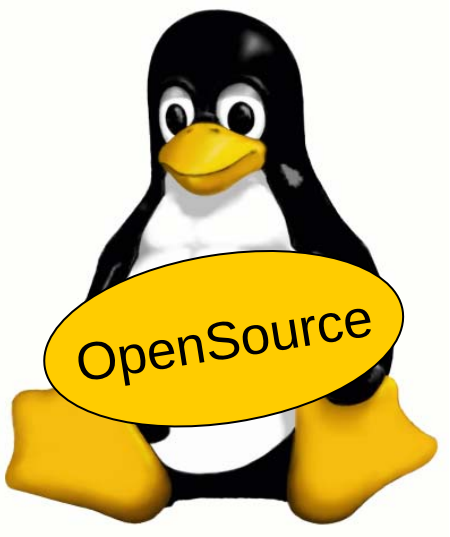
VPN - Goals Of The Project



VPN Project

Phase I
Protocols

Phase II
Authentication

Phase III
Deployment

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VPN - Goals Of The Project

- Phase I
  - Research and study of remote access solutions
  - Secure access on internal private network
  - Interoperability tests
  - Study of VPN protocols (L2TP, PPTP, IPSec)
  - LAN-to-LAN and HOST-to-LAN scenarios

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VPN - Goals Of The Project

- Phase I

  Protocols
  - PPTP point-to-point tunneling protocol
  - L2TP layer 2 tunneling protocol
  - IPSEC IP security protocols
    - IKE → authentication
    - AH → integrity
    - ESP → confidentiality, integrity

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VPN - Goals Of The Project

Phase II
Authentication

- Phase II
  - Research and study of secure authentication mechanisms
  - Study of Public Key Infrastructure (PKI)
  - Interoperability tests

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VPN - Goals Of The Project

- Phase III
  - Deployment
    - LAN-to-LAN between EIG and TCOM
    - HOST-to-LAN at EIVD

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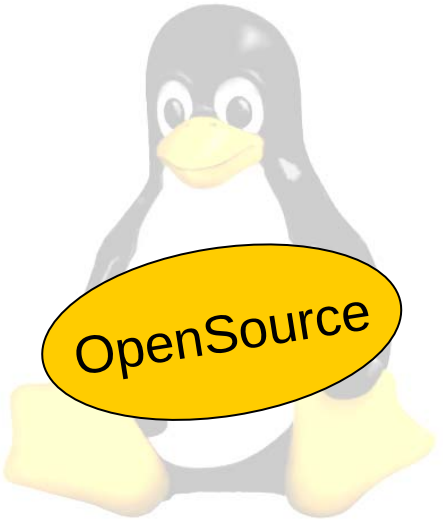
VPN – Open Source Software

Different solutions based on Open Source

- Server OS: Slackware Linux
- Firewall: Netfilter/iptables
- Gateway VPN: OpenSwan
- PKI Authority: OpenCA
- VPN Clients: Win2K: SSH Sentinel*
  Linux: OpenSwan



*Free License for universities

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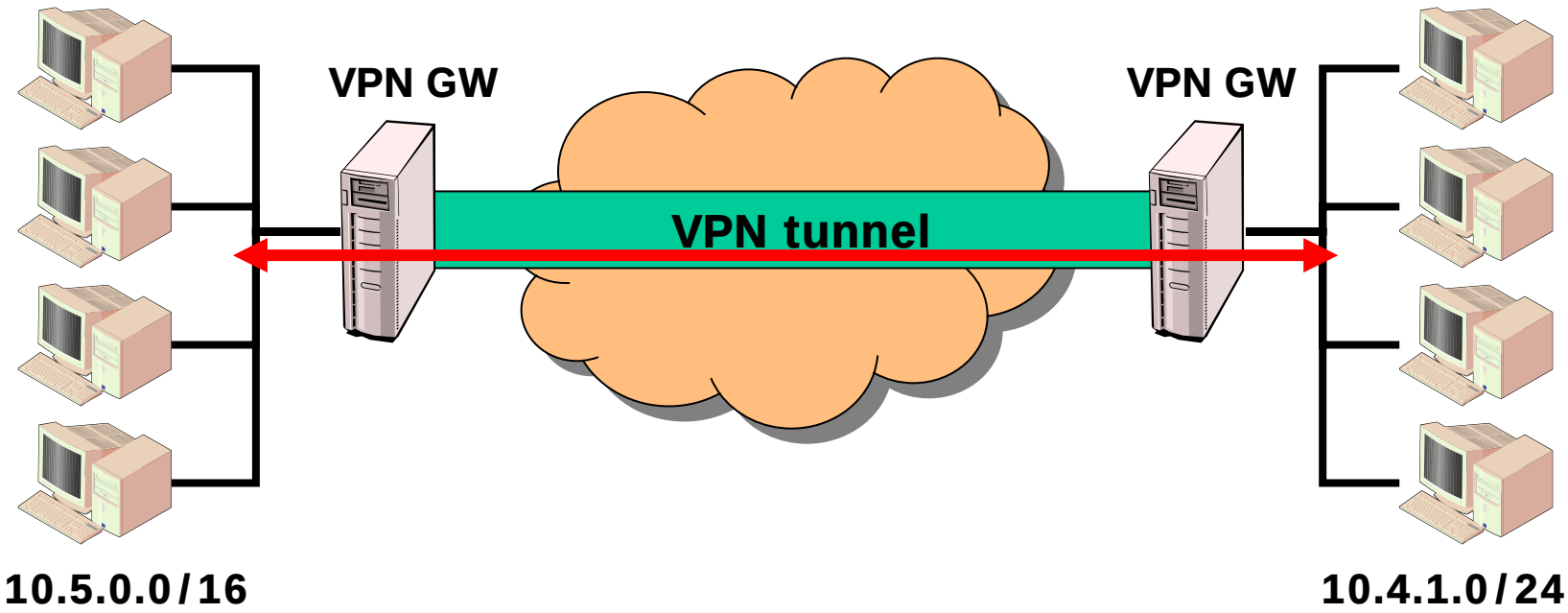
VPN – Scenario 1

EIG – Proprietary Solutions

EIVD – Open Source Solutions



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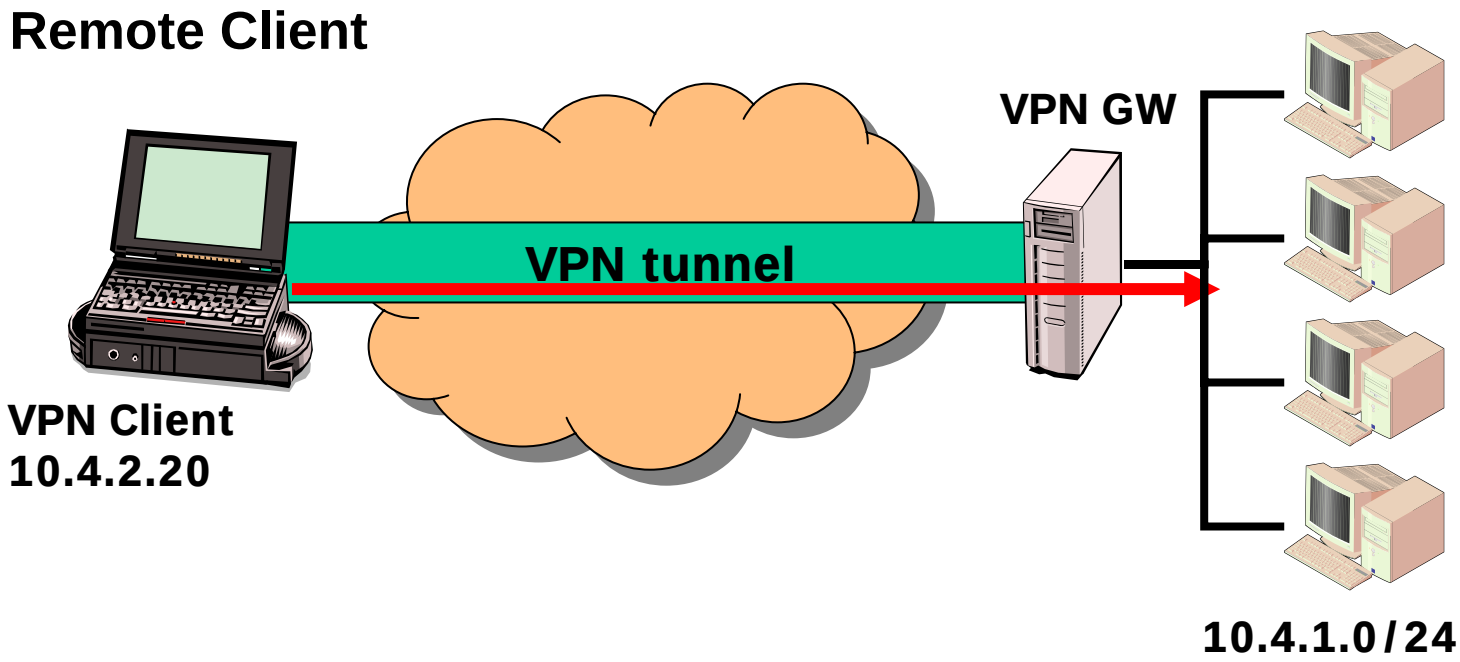
VPN – Scenario 2



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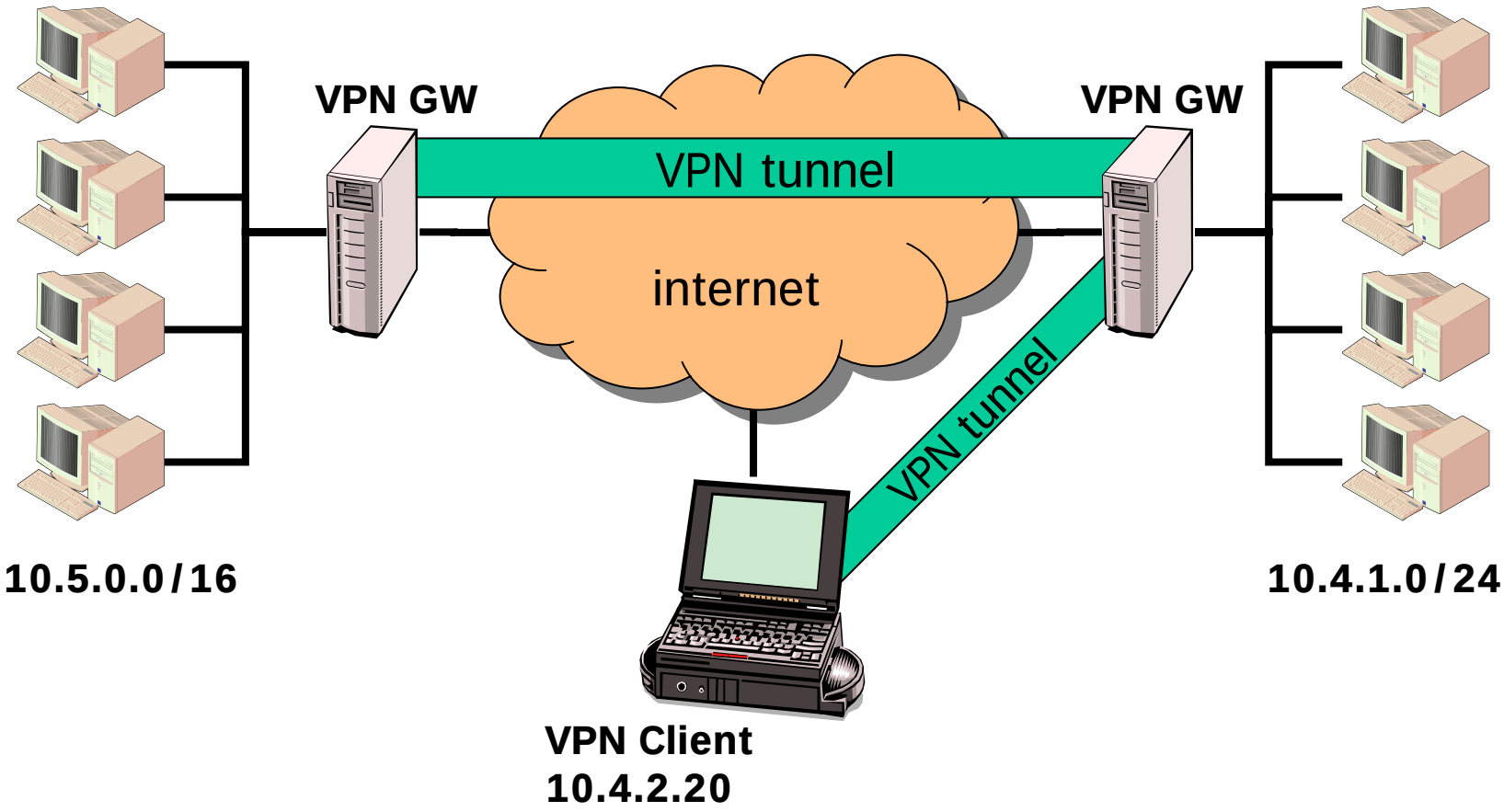
VPN – Scenario 3

EIG – Proprietary Solutions

EIVD – Open Source Solutions



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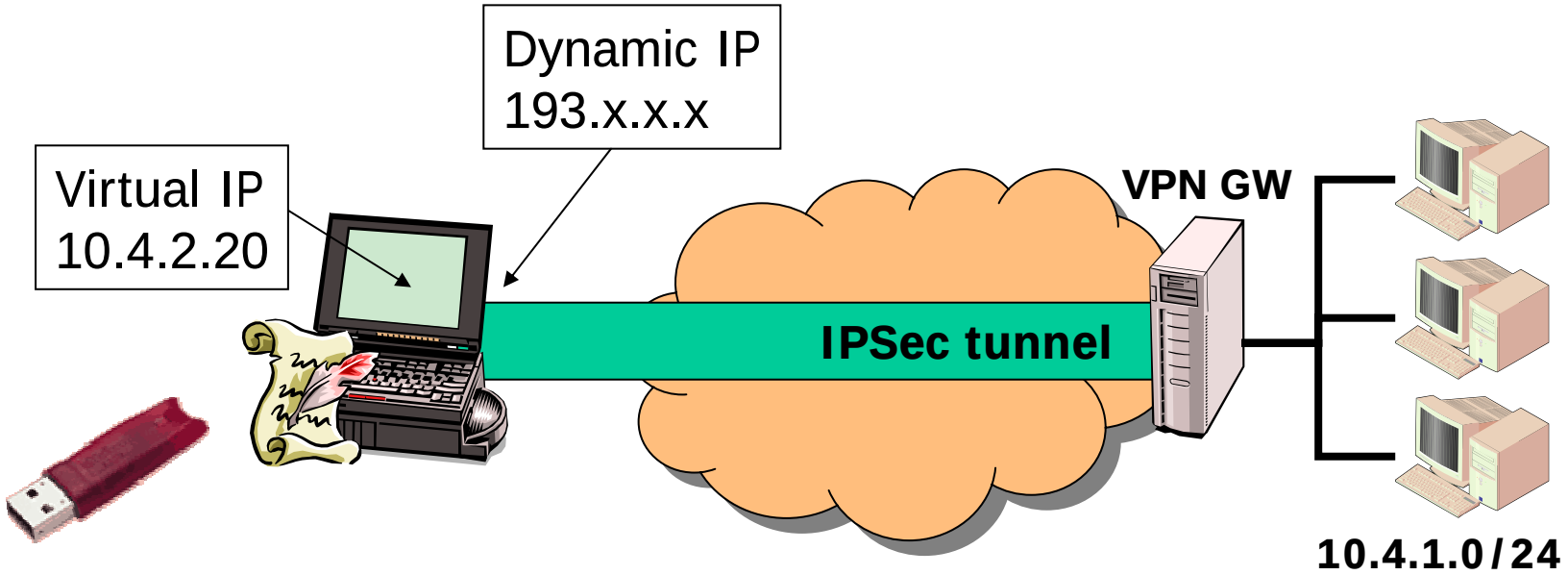
VPN – Remote Client Authentication



- The remote client authenticates himself on gw VPN
- The authentication is based on X.509 certificates
- The client acquire a private IP address with DCHP-over-IPSEC
- The remote client is part of the internal private network

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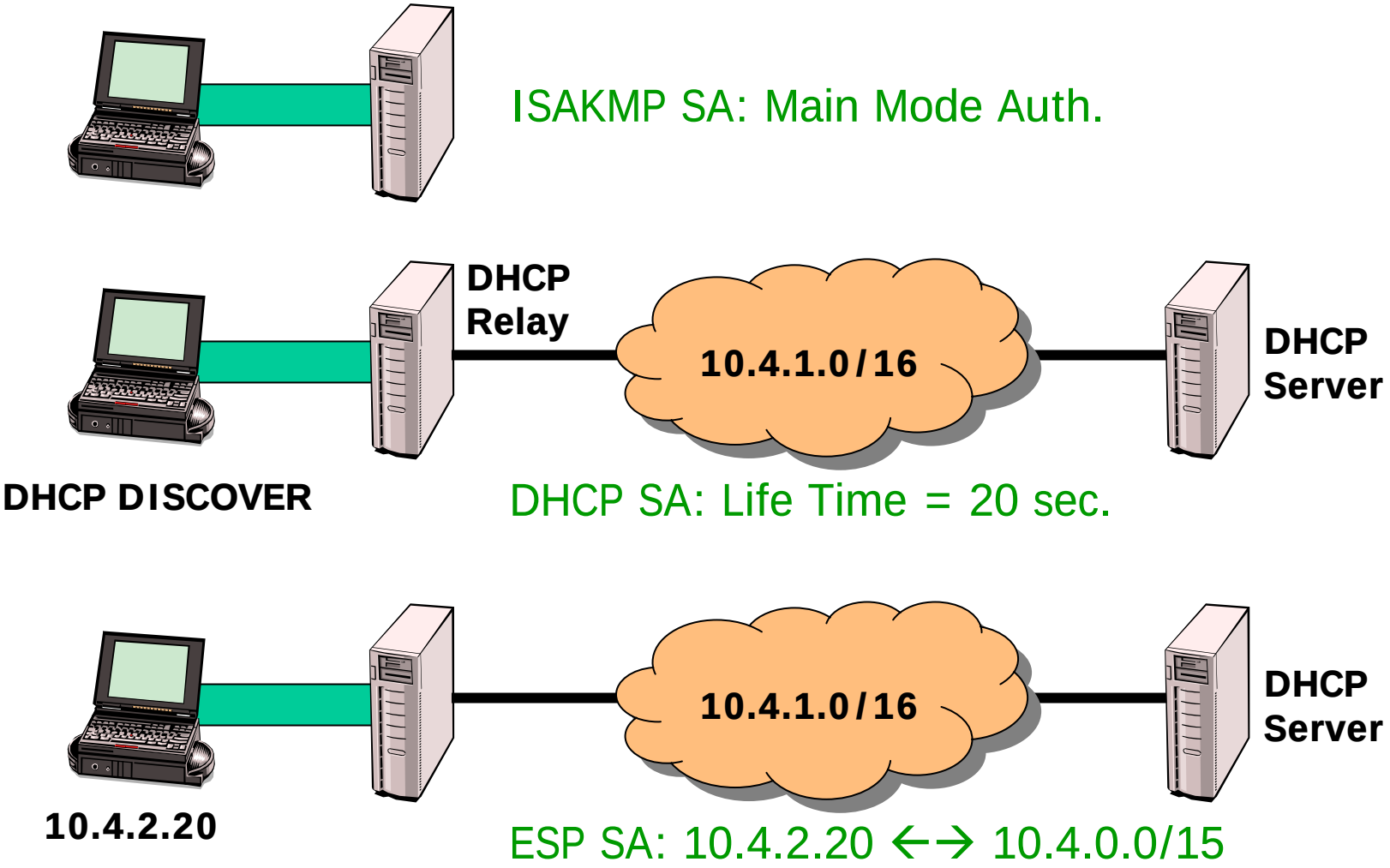
VPN – DHCP-over-IPSec

- Internet Draft: draft-ietf-ipsec-dhcp-13.txt



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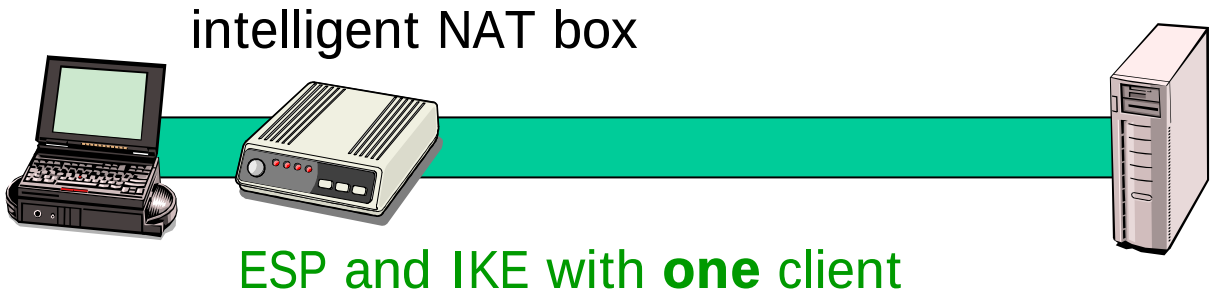
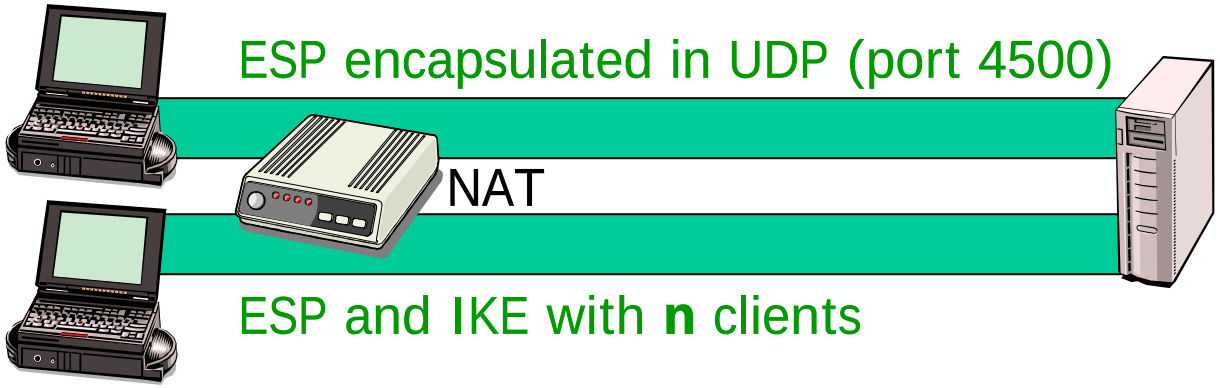
VPN – NAT-Traversal

- Internet Drafts: draft-ietf-ipsec-udp-encaps-03.txt
  draft-ietf-ipsec-nat-t-03.txt





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VPN – Encountered Problems

- PKI
  - Token Integration
- Internet Service Provider (ISP)
  - Firewalls
  - Routing
- NAT routers
  - Intelligent Box
  - Stupid Box
    - NAT-Traversal
    - ESP→UDP Encapsulation

VPN – Gateway VPN Capabilities

IKE:

Encryption algorithm:	aes-256bit
Integrity function:	SHA-2
DF Group:	MODP 1536 (group 5)
PKI authentication	OK

IPSEC – ESP (AH):

Encryption algorithm:	aes-256bit
Integrity function:	HMAC-SHA-2
DF Group:	MODP 1536 (group 5)

Other:

DHCP over IPSEC	OK
NAT-Traversal	OK

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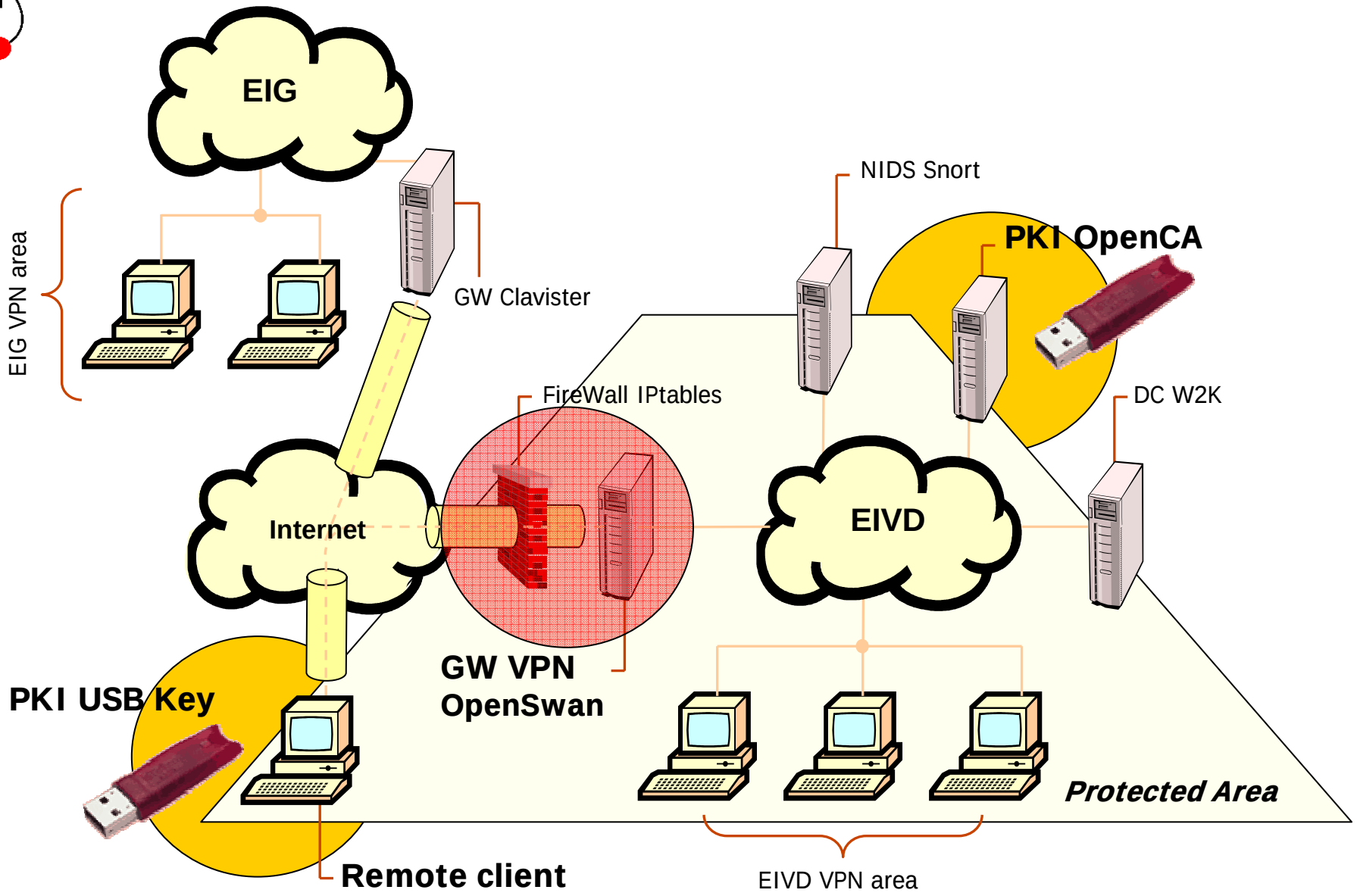
VPN – Final Architecture



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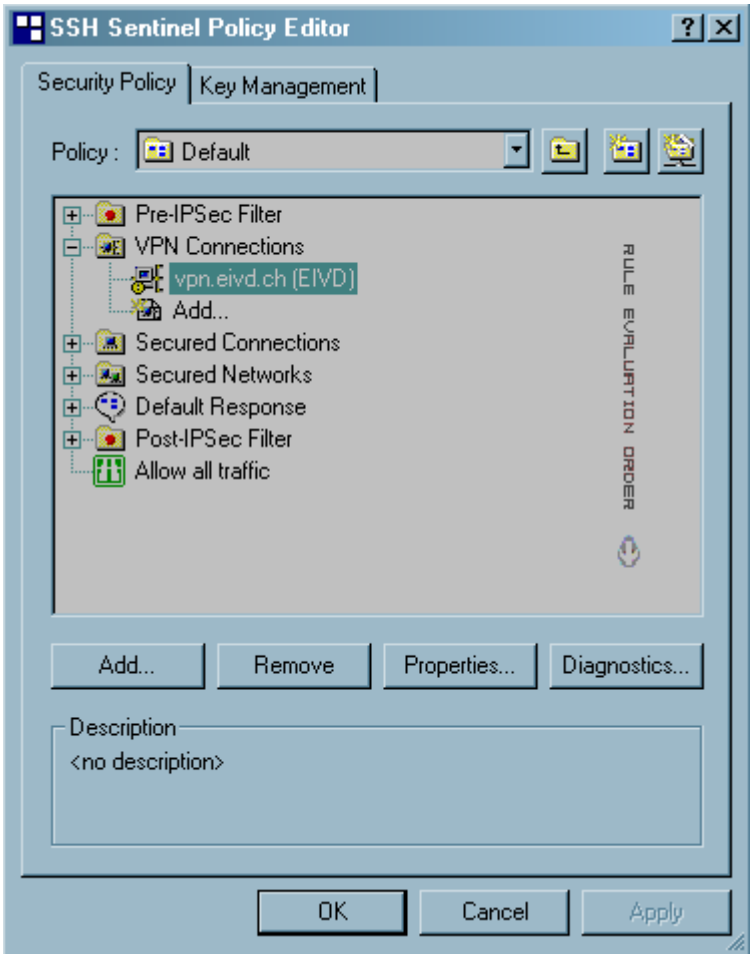
!!! Demonstration !!!

VPN – SSH Sentinell Configuration



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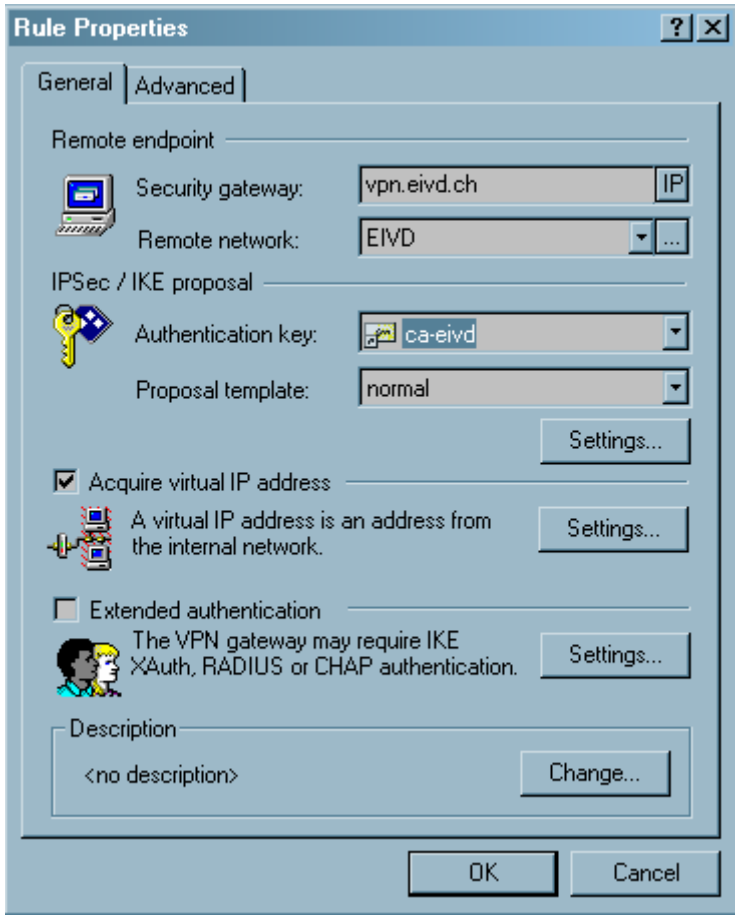
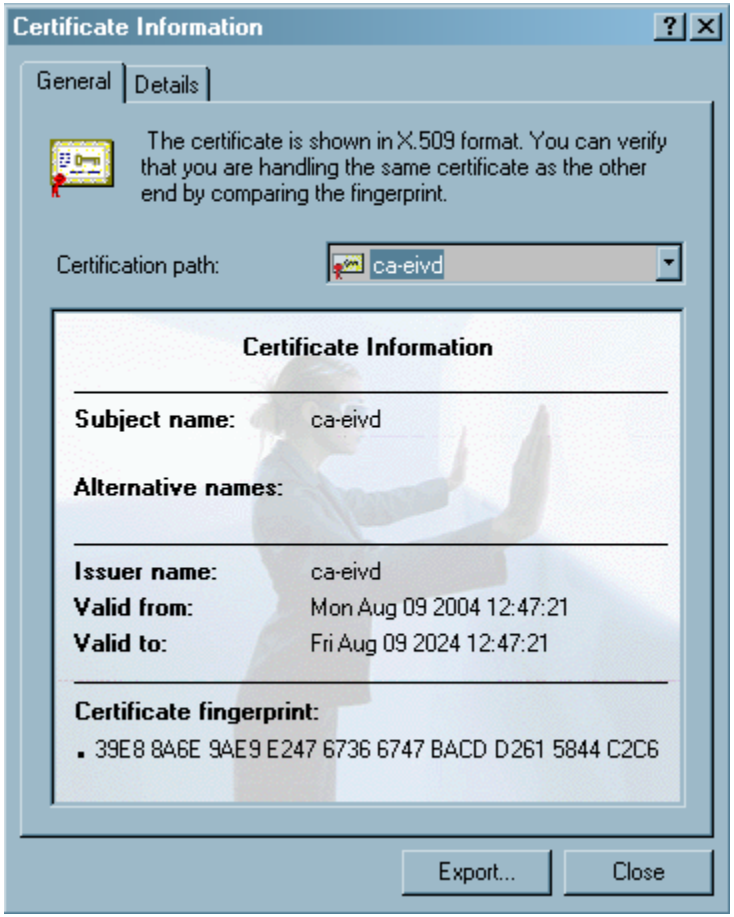
VPN – PKI Certificate Configuration





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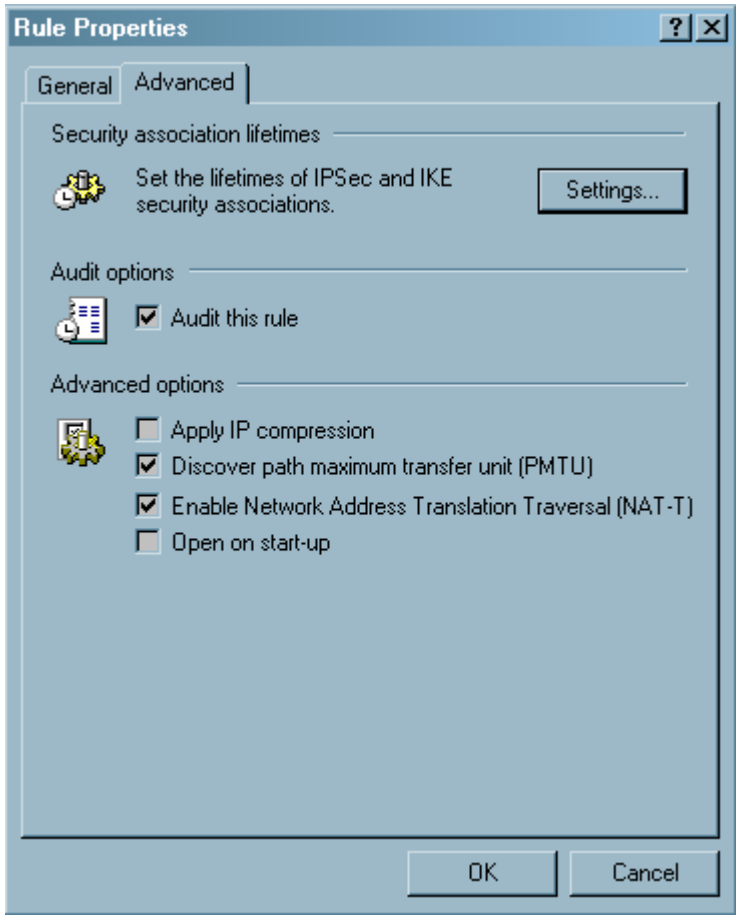
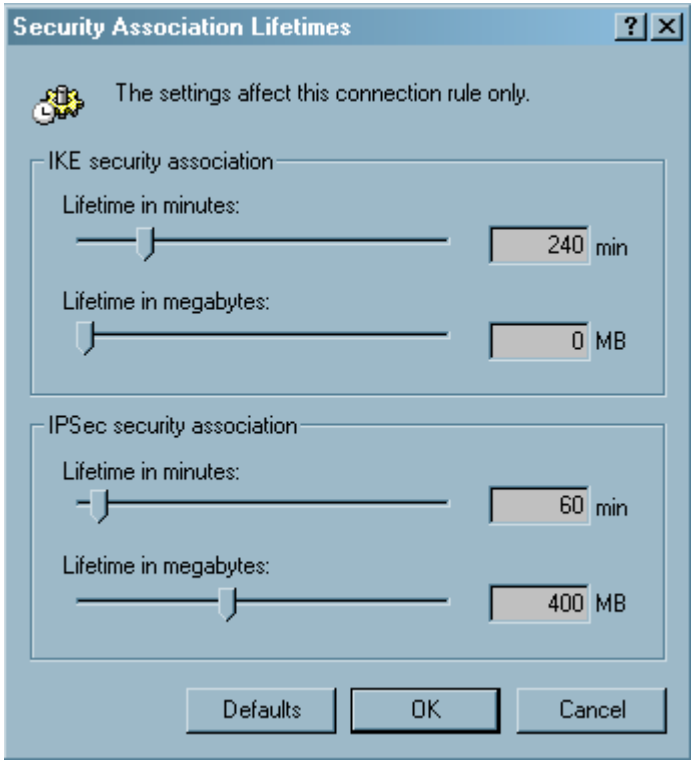
VPN – SA Life & NAT Configuration





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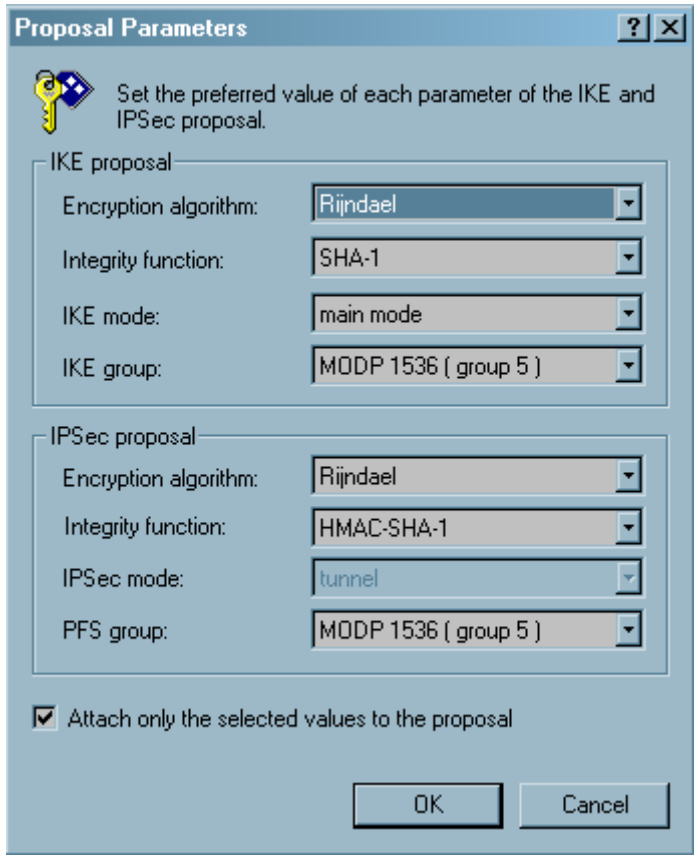
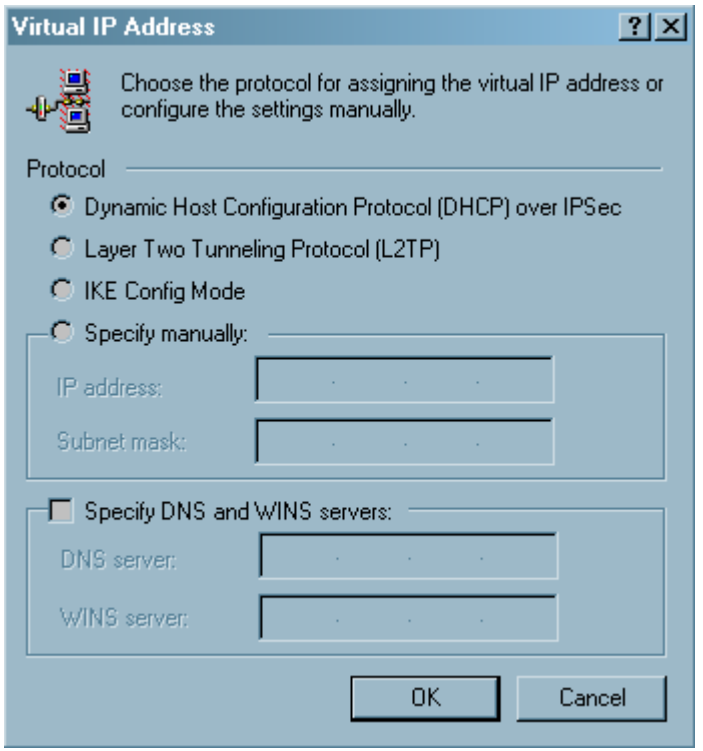
VPN – IKE & ESP Configuration





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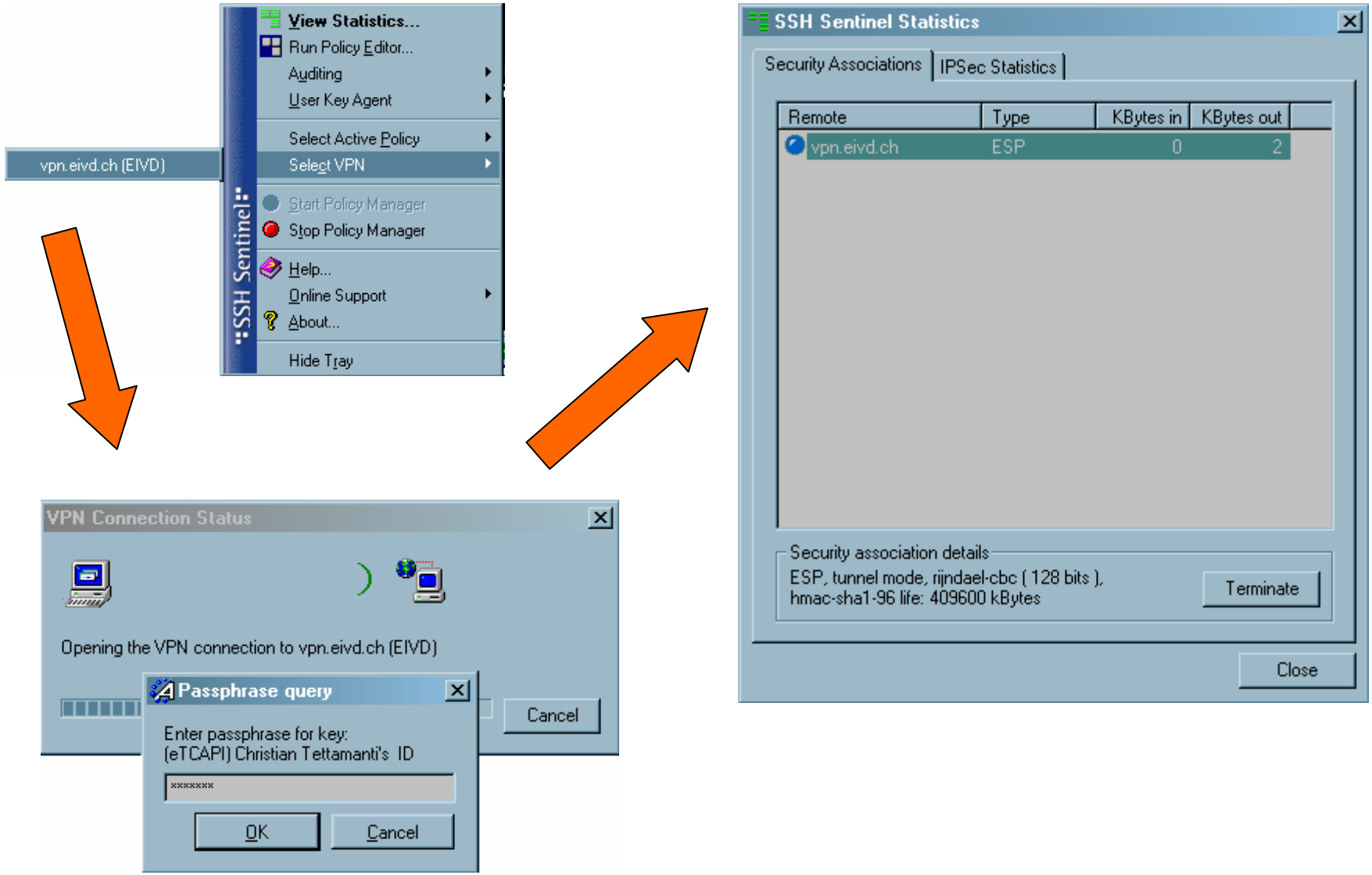
VPN – Connection example



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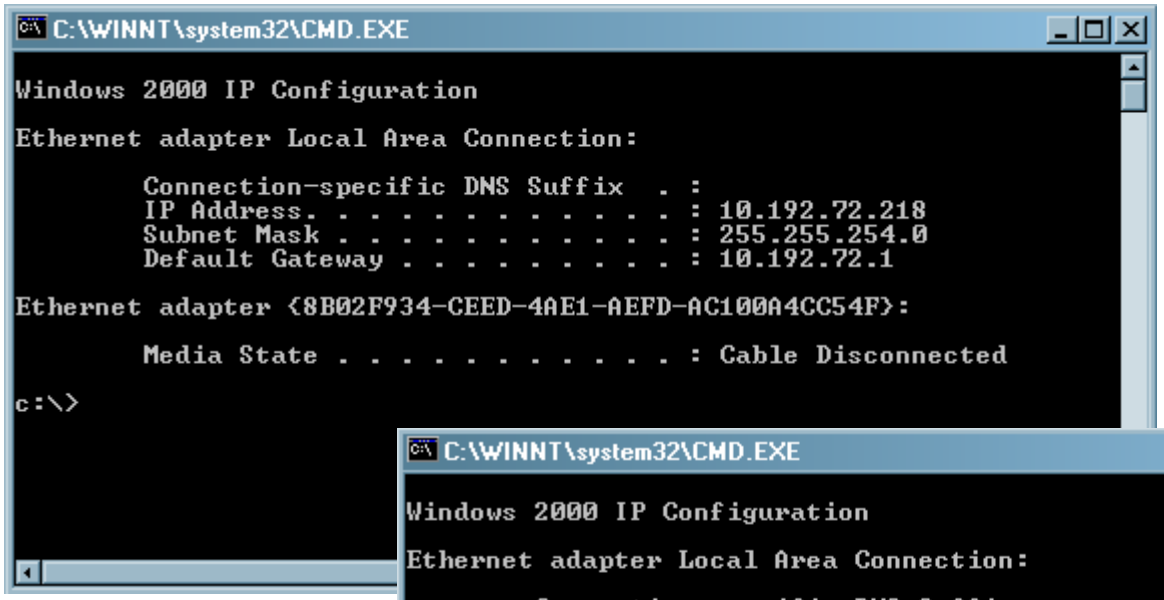
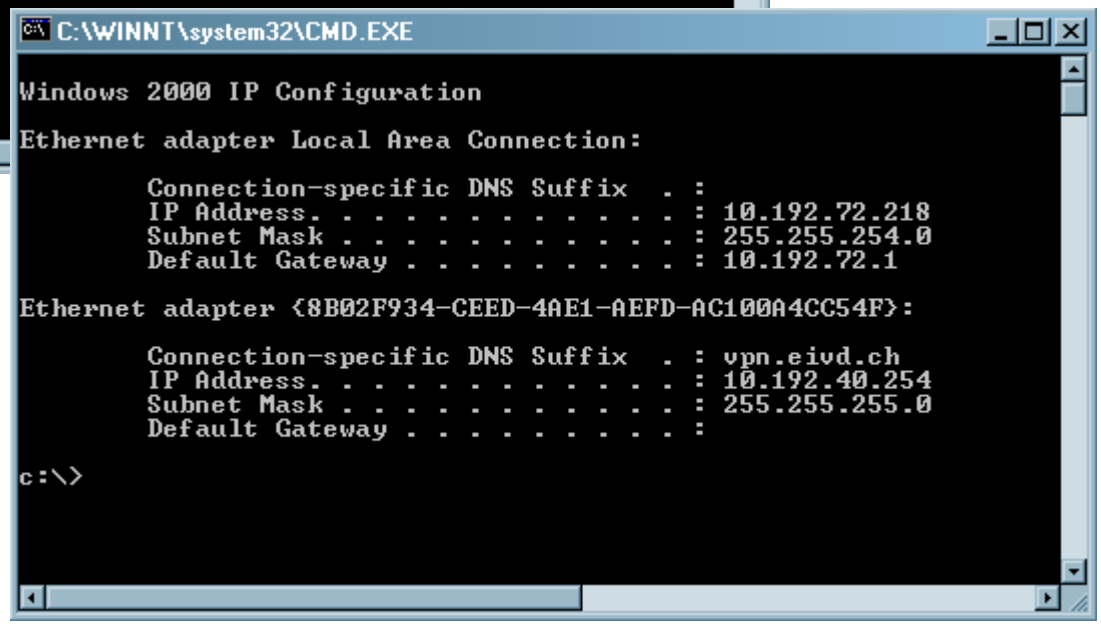
VPN – Network Interfaces



Before VPN Connection



After VPN Connection

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??? Questions ???