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VPN

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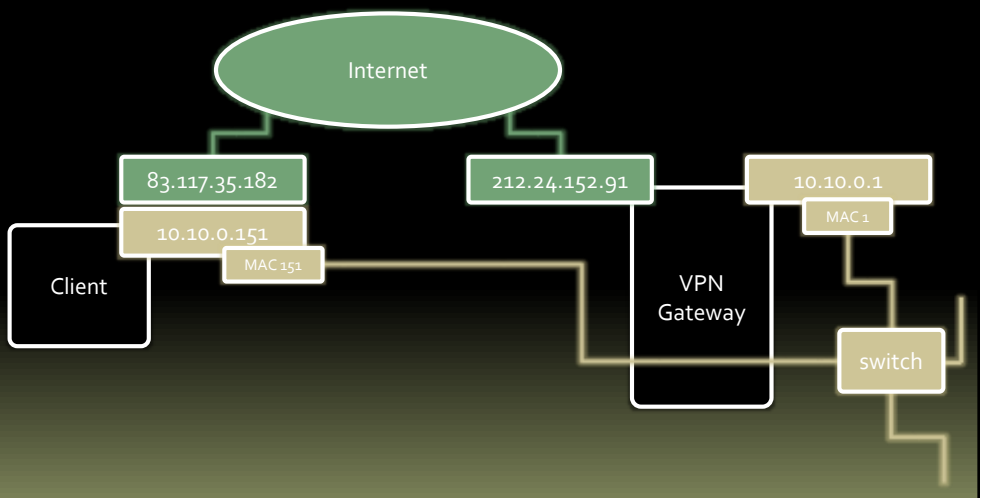
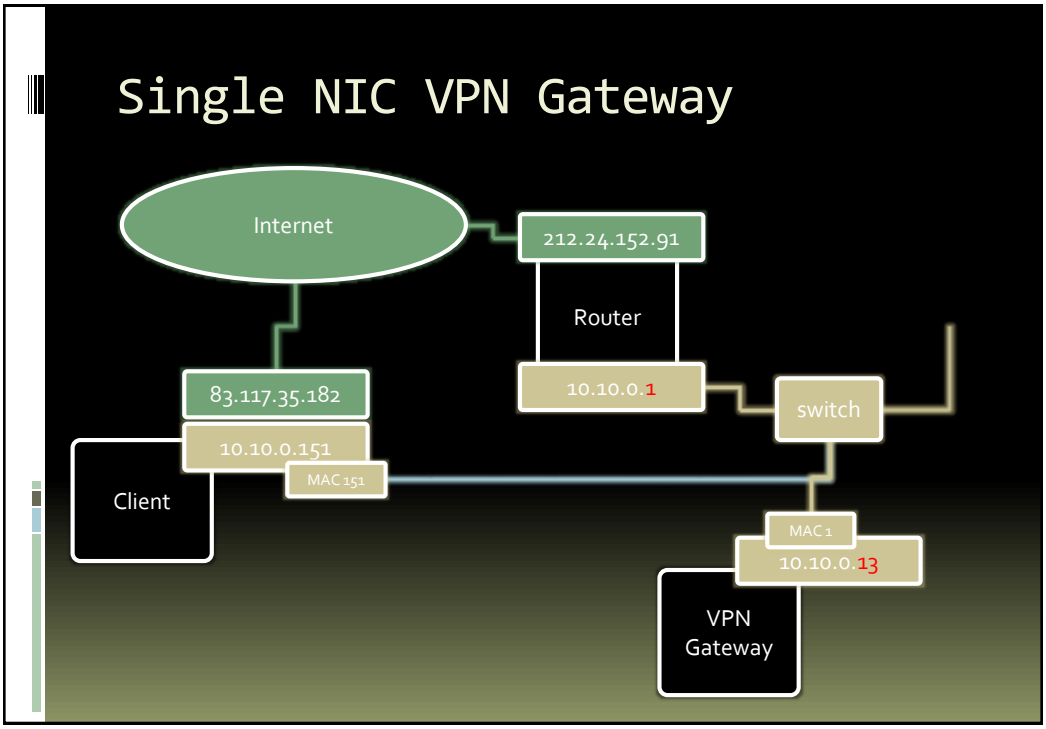
VIRTUAL PRIVATE NETWORKING

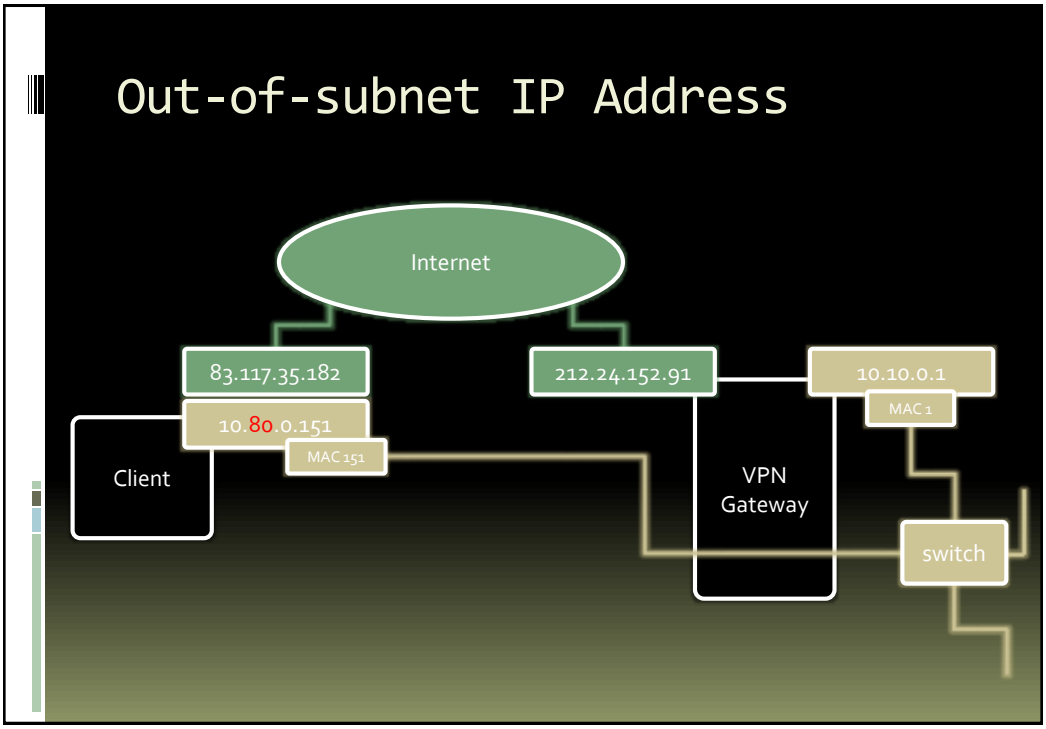
What is VPN?

- Remote connection over internet
- Authentication
  - User, sometimes computer authentication
- Encryption
- Private IP address assignment
  - not necessary with DirectAccess
- Quarantine
  - if required

IP Address Assignment




Single NIC VPN Gateway
Internet
212.24.152.91
Router
10.10.0.1
switch
83.117.35.182
10.10.0.151
MAC 151
Client
MAC 1
10.10.0.13
VPN
Gateway


Out-of-subnet IP Address
Internet
83.117.35.182
10.80.0.151
MAC 151
Client
212.24.152.91
VPN
Gateway
10.10.0.1
MAC 1
switch

Microsoft VPN

- Clients available on wide range of OS
- Private IP address assignment
  - some hardware VPNs do not assign private IP addresses and clients appear as public to internal servers
- Simple to use authentication with Active Directory accounts
  - others must use RADIUS or LDAP

VPN with TMG

- Is not itself a VPN server at all
- Configures RRAS as VPN server
  - you should not use the RRAS GUI at all
- Inspects the traffic only after decryption
  - can look inside completely as it was an intranet client

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CONNECTION SELECTION

Client Connections

VPN	Connection requirements	Logon	Client Availability	Authentic.
RDP	TCP 3389 server certificate (not required)	random keys (D-H) certificate private key (2048bit)	Windows XP	password smart card
RDS/TS Gateway	TCP 443 server certificate	random keys (D-H) certificate private key (2048bit)	Windows XP	password smart card
PPTP	GRE + TCP 1723	depends on password quality vulnerable to offline cracking	MS-DOS	password smart card
L2TP	IPSec ESP + UDP 500/4500 server certificate client computer certificate	random keys (D-H) certificate private key (2048bit)	Windows 98	password smart card
SSTP	TCP 443 server certificate	random keys (D-H) certificate private key (2048bit)	Windows Vista	password smart card

Link Characteristics

- Bandwidth
  - x Mbps
  - determines the speed of large up/downloads
- Latency (Round-Trip Time)
  - x ms
  - determines the speed of small downloads
  - affects "talky" protocols
- Packet Loss Rate
  - 1/n
  - often appear in chunks
  - affects double tunneled connection oriented protocols

SMB/CIFS/RPC/DCOM/SQL

- Talky protocol
- Require a lot of round-trips to transfer even small data
  - problematic/slow with latency higher than 50ms
- Do not require high bandwidth

Tunneling TCP

- TCP acknowledges every sent packet
  - retransmitted if lost in transmit
- PPTP and SSTP both do it as well
  - sensitive to packet loss
  - single packet loss generates several retransmissions on both layers
- IPSec do not use acknowledgements
  - better for TCP transmissions

Remote Access Recommendations

- Don't access SMB/CIFS/RPC/DCOM/SQL over latent links
  - use RDP instead
- Don't runnel TCP over PPTP/SSTP over high packet loss links
  - use RDP Gateway instead
  - use IPSec tunnel for site-to-site VPNs

VPN Security

- Usually opens full network access into internal network
- Usually can be dialed from insecure computers
  - home computers
  - internet cafes

VPN Security

- Decide whether VPN required at all
  - Use RDP Gateway instead
- Use L2TP to enforce client computer certificates
  - limits connections from non-corporate machines
- Implement VPN Quarantine or Network Access Protection
  - improves the health of network

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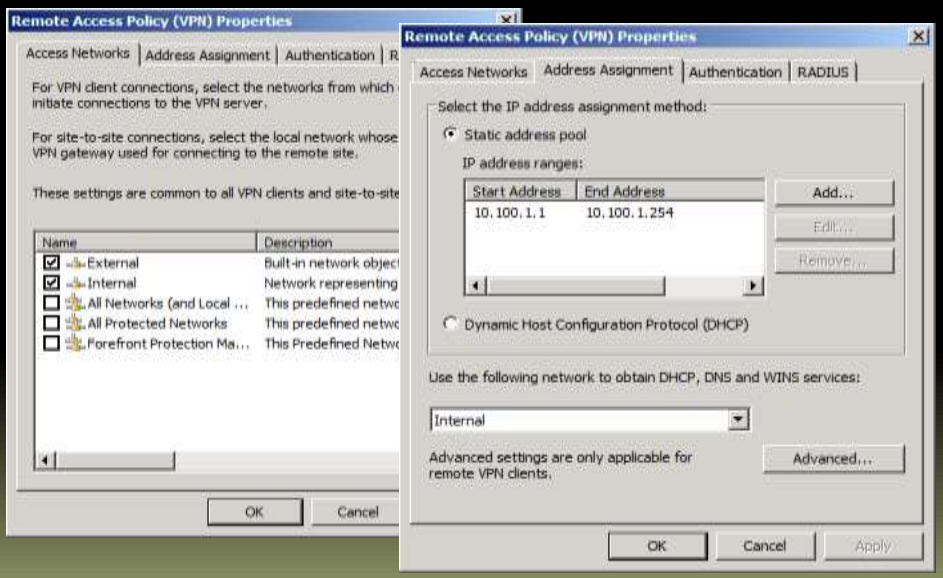
VPN CONFIGURATION

Windows 2008 RRAS

- Local RRAS and NPS
  - should not be configured directly
  - not supported
- Can do only what is configured inside TMG GUI console
- If you need more granular control and functionality, use remote NPS

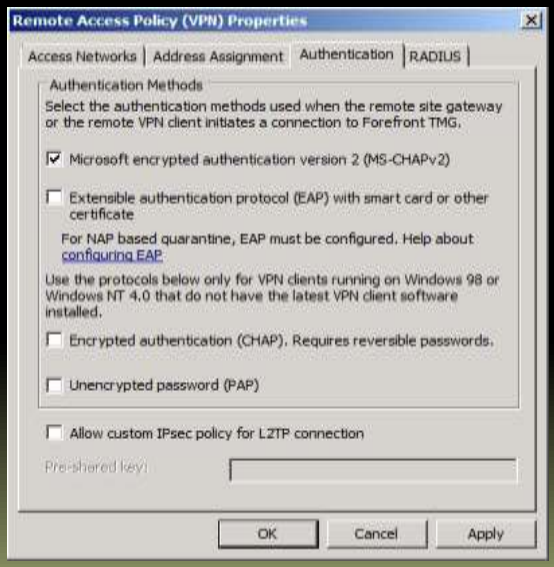
Step 1 and 2



Password Authentication

- MS-CHAPv2
  - uses Microsoft NTLM hashes (MD4)
  - clients at least Windows 95+
- Transferred inside the tunnel
  - When used with PPTP, the hashes are visible
  - Other VPNs encrypt them with own cryptography
- Vulnerable to keyloggers

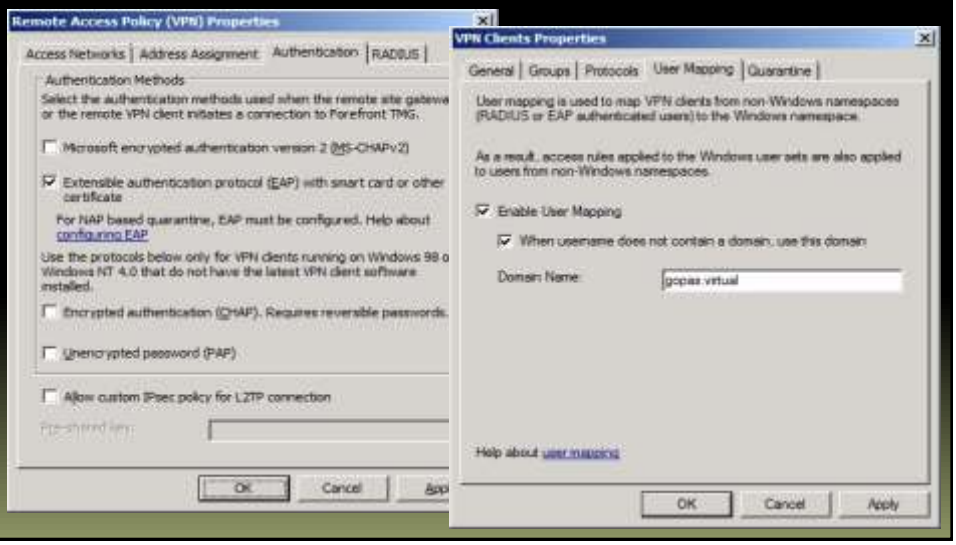
Password Authentication



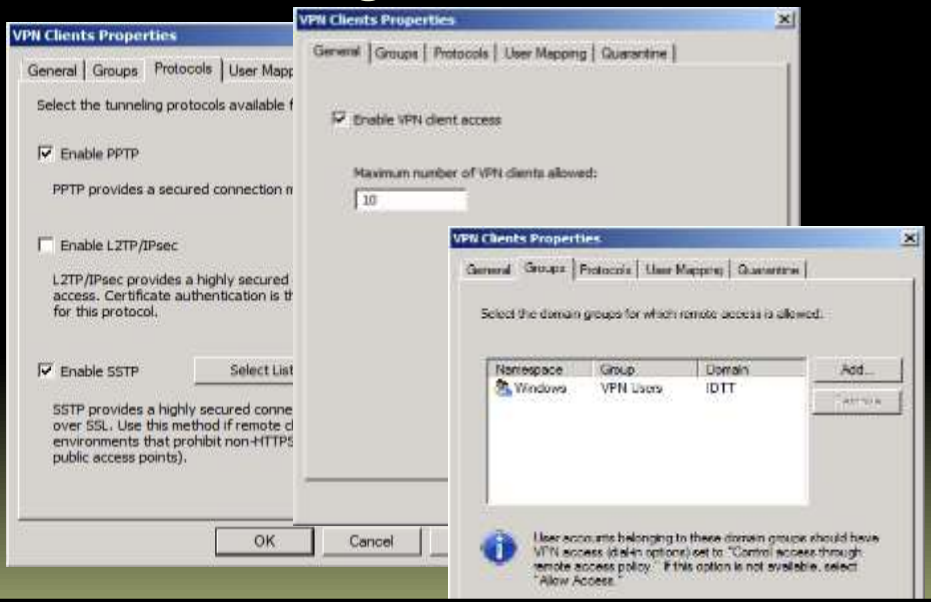
Client Certificate Authentication

- The most secure method
  - ideally stored on smart card
- The authenticated users belong to the RADIUS namespace
  - if you plan to use a user on a rule, it needs to be RADIUS user
- Or enable the user account mapping

Client Certificate Authentication



Other settings



Lab

- Add FW1 into RAS and IAS Servers group in Active Directory
  - restart the FW1 computer
- Enable VPN client access with password authentication
  - PPTP, VPN Users
- Create new Access Rule
  - Allow All outbound traffic from VPN Clients to Internal
  - Enable DCOM on the rule
- Move Seven1 computer to the Internet network
- Connect by using the VPN connection

Lab: Optional (if later doing NAP)

- On DC1 in Certification Authority console add User certificate template to be issued
- Reconfigure VPN to require EAP for authentication
- On Seven1 with VPN connected start certmgr.msc and Request new certificate based on the User template
- Reconfigure client and connect the VPN by using the client certificate

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SECURE SOCKET TUNNELING PROTOCOL

SSTP

- Clients starting with Windows Vista
- The best passing internet (just TCP 443)

SSTP Web Listener

- Requires Web Listener
- Will not authenticate users
  - the authentication settings do not apply
  - cannot be set to Require all users to authenticate
- SSL Certificate
  - the name must be that one used by the clients
  - CRL is always checked!

Lab

- Ensure that you have the following publishing rules for CRL
  - Web Listener
    - HTTP 80 on 81.0.0.178
  - Publishing rule
    - Public Name: ca.gopas.cz
    - Paths: /CertEnroll/*
    - To: dc1.gopas.virtual
    - Bridging: HTTP 80
    - Authentication Delegation: no delegation
- Confirm from the Seven1 client that the CRL is accessible from outside

Lab

- Ensure you the following web listener
  - HTTP 443 on 81.0.0.179
  - Certificate: *.gopas.cz
- Modify VPN settings to require SSTP using the web listener
- Confirm Seven1 can connect from the Internet

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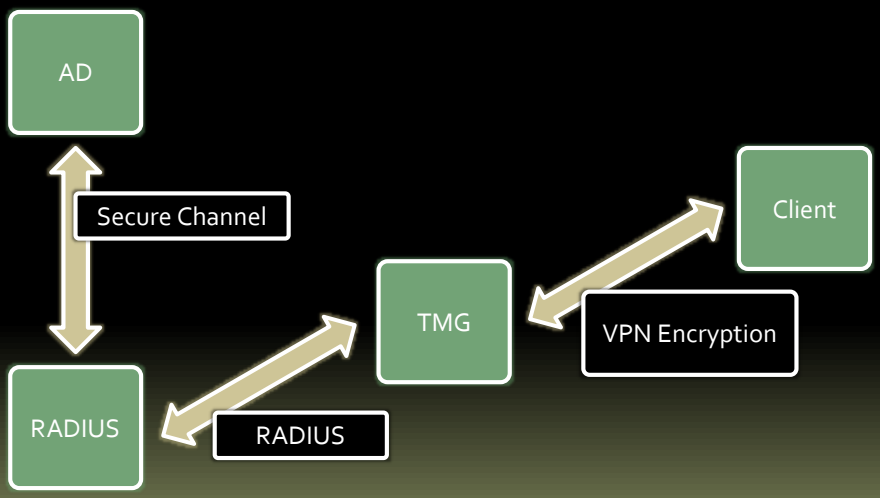
RADIUS

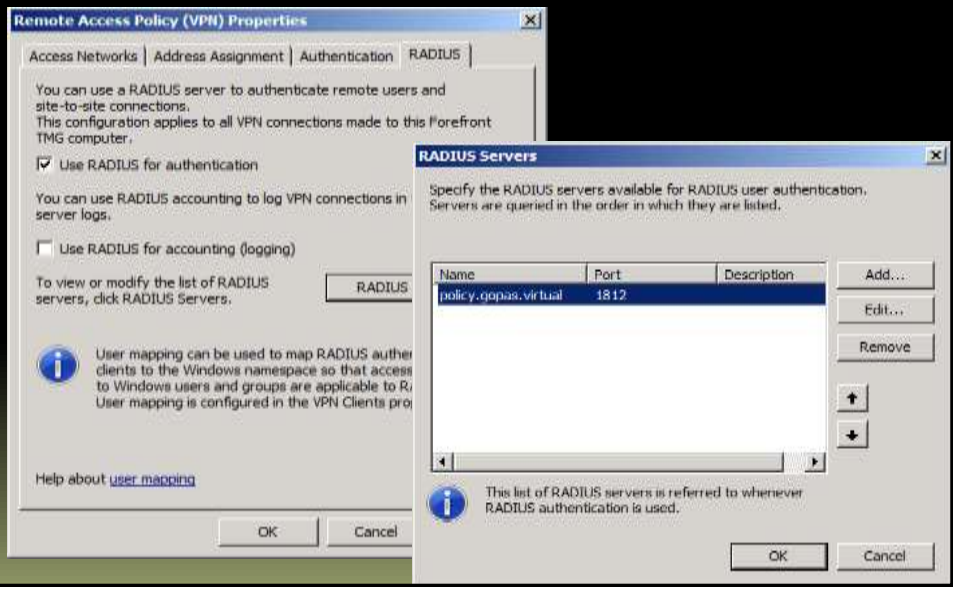
RADIUS Authentication

- Standard authentication server
  - UDP 1812
  - Internet Authentication Service (IAS)
  - Network Policy Server (NPS)
- Users not authenticated by TMG itself
- TMG needn't to be domain member
- Cannot use Windows user groups in firewall rules

Credentials Validation



RADIUS in TMG



Lab

- On POLICY enroll GOPAS Domain Server computer certificate
  - mmc
  - Add snap-in
  - Certificates – Local Computers
  - Request new certificate
  - GOPAS Domain Server
- Verify the certificate contains policy.gopas.virtual subject name with Server Authentication EKU

Lab

- On FW1 reconfigure VPN to authenticate users with RADIUS authentication
  - RADIUS server: POLICY
- On POLICY server configure FW1 as RADIUS client
- On POLICY server create Network Policy for VPN connections authenticated by EAP with Smart card or other certificate
  - or just password if you do not plan to do the NAP lab
- Test the VPN connectivity

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NETWORK ACCESS PROTECTION

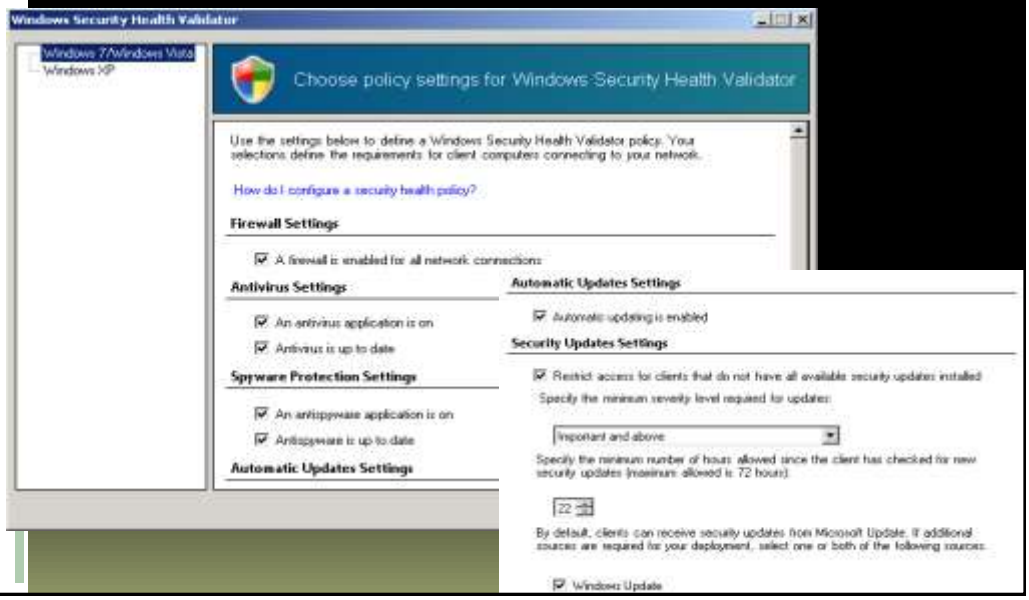
NAP

- Validates client health after actually connecting to the VPN server
  - client validates itself
  - not a security, just health test for not-infected clients
- Requires remote NPS server (RADIUS)
  - requires EAP authentication
- Allows for automatic remediation of the client settings
- Requires at least Windows XP SP3 client

Default Health Validator

- Is firewall enabled?
- Is antivirus/antispyware installed/enabled/up-to-date?
- Was the computer updated completely (to some severity) during several past days?

Default Health Validator



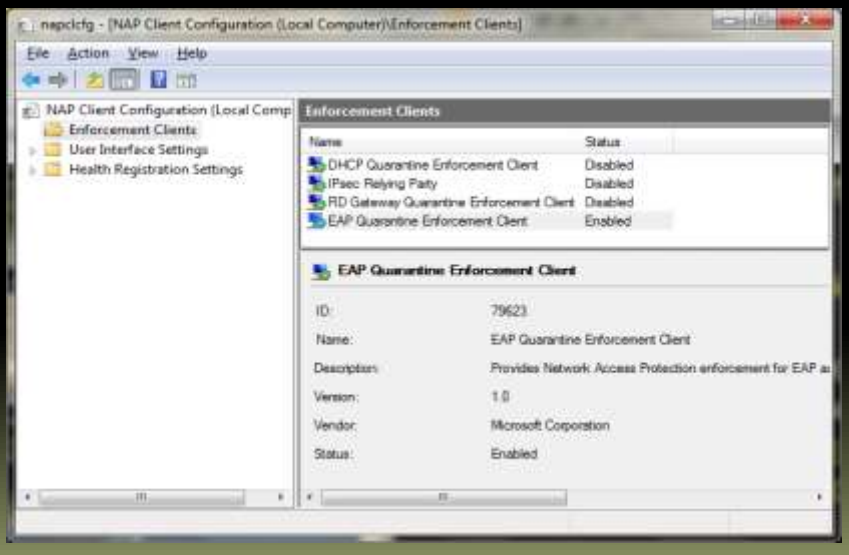
NAP in TMG

- Client connects to VPN and authenticates
- Client put into Quarantined VPN Clients network element
- Removed after successfully validates its health with NPS server

Client Configuration

- Enable and start Network Access Protection Agent service
- Ensure Security Center (XP, Vista) or Action Center (Windows 7) is enabled and running
- Enable EAP Quarantine Enforcement Client by using NAPCLCFG.MSC

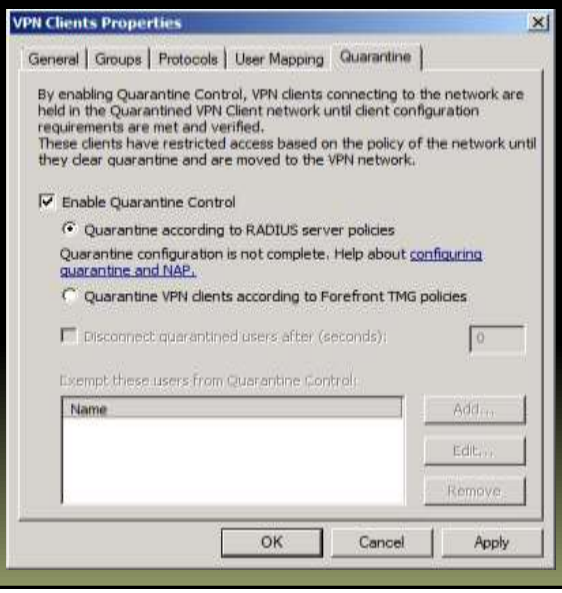
Client Configuration



TMG Configuration

- Manual reconfiguration of local NPS is not supported
- Remote NPS must be used instead
- TMG must quarantine the clients according to the NPS settings
  - client not removed until NPS leverages the quarantine

TMG Configuration



NPS Configuration

- Configure Health Validators
- Configure Network Access policy to require the health validation

Lab: Optional

- Reconfigure the NPS Network Policy and Health Validator to require Windows Firewall to be enabled on VPN clinets
- Reconfigure Seven1 client to have the NAP Enforcement Client enabled with EAP
- Test VPN connection with Windows Firewall disabled/enabled

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SITE-TO-SITE VPN

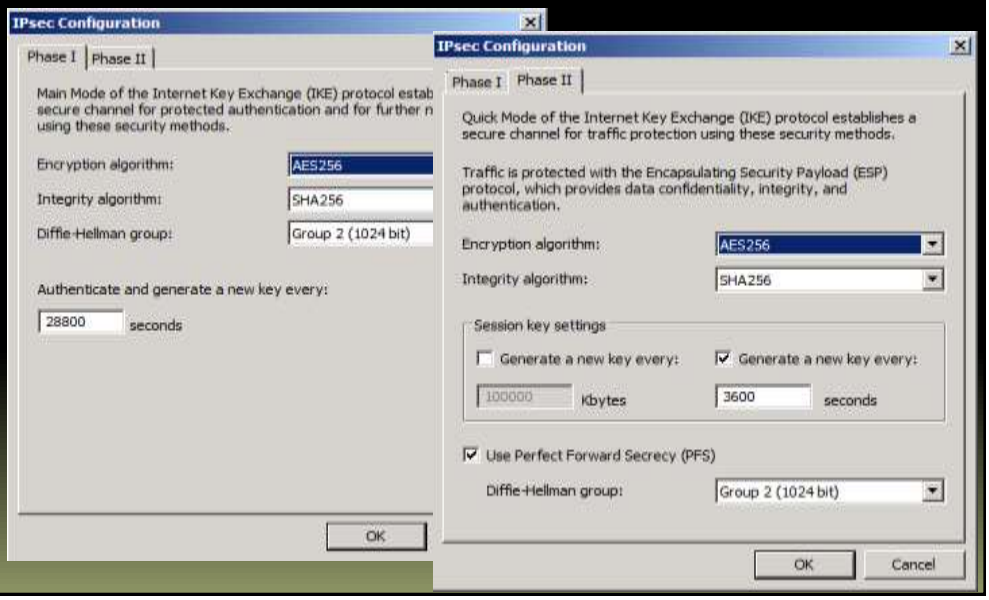
Protocol Selection

- PPTP, L2TP
  - requires user account to be used
  - PPTP insecure
- IPSec
  - standard method
  - compatible with various hardware devices

Default IPSec Parameters

- Usually must be adjusted
  - especially PFS
- Incompatible even with ISA 2006
  - uses AES/SHA-2

Default IPSec Parameters



Lab: Optional

- Configure IPSec tunnel between London office and the Prague central network
- You must test the connection from another computer (Seven1) placed in the London network
  - there wouldn't be a rule enabling FW2 traffic to Prague automatically

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THANK YOU