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# Module 9 : 虛擬私有網路(VPN)

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# Module 9：虛擬私有網路(VPN)

Module 9-1：虛擬私有網路概念與類型(\*)

Module 9-2：建置虛擬私有網路(\*)

\* 初級(basic):基礎性教材內容

\*\*中級(moderate):教師依據學生的吸收情況，選擇性介紹本節的內容

\*\*\*高級(advanced):適用於深入研究的內容

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# Module 9-1：虛擬私有網路概念與類型(\*)

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# 什麼是 VPN?

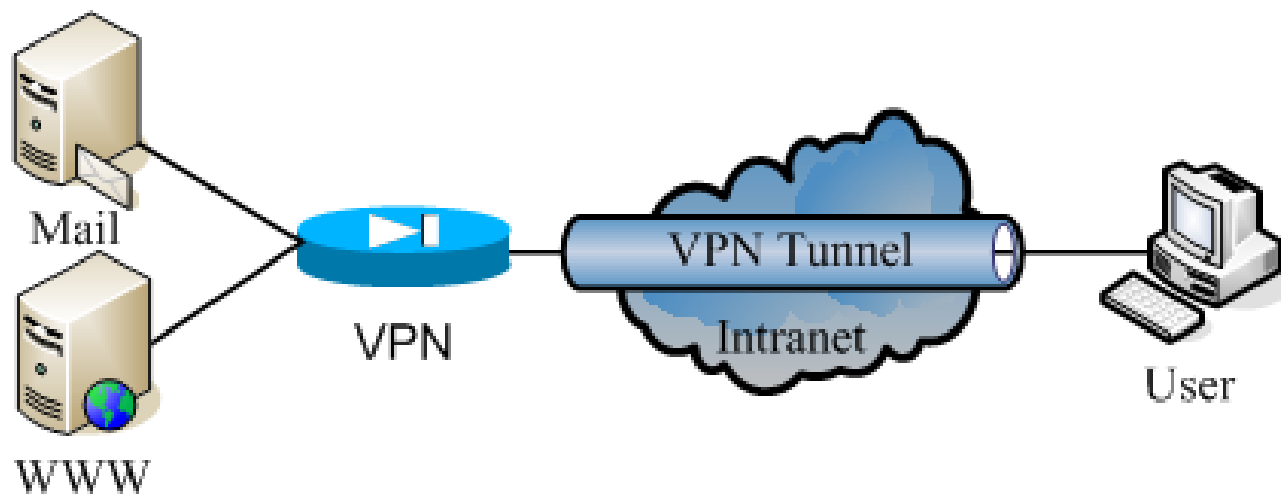
- VPN是私人網路的延伸
- 可透過Internet利用加密通道傳送資料
- 模擬點對點連線特性
  - 封裝後資料標頭加入了路由資訊
  - 建立通道後傳送的資料已被加密，無法竊聽破解

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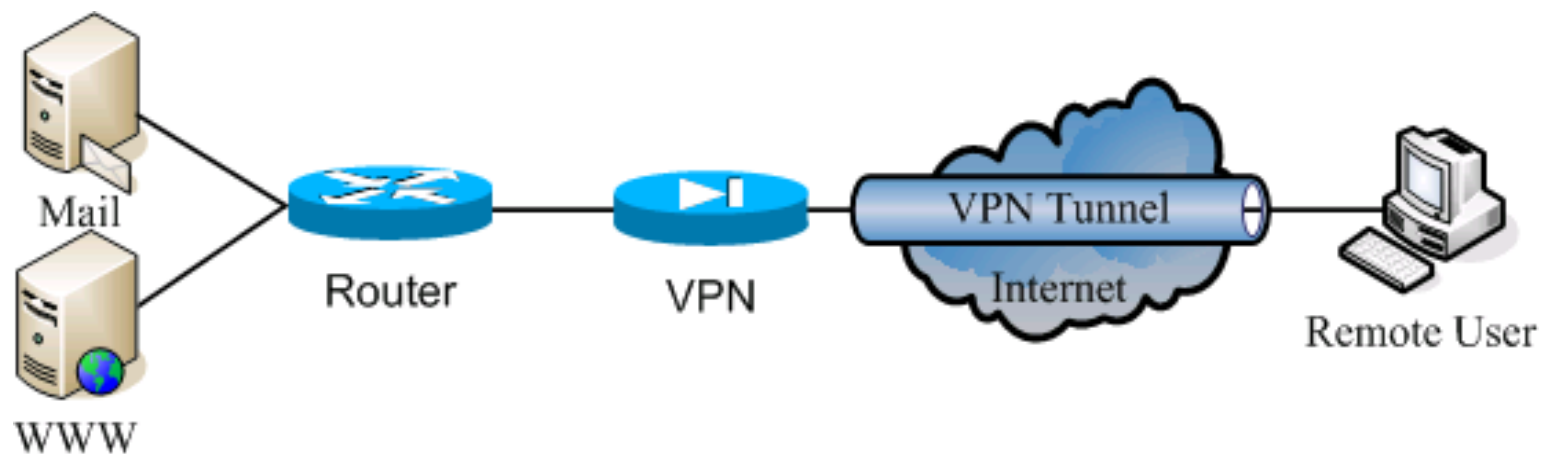
# 什麼是 VPN?

- Intranet VPN
- Remote Access VPN
- Site to Site VPN

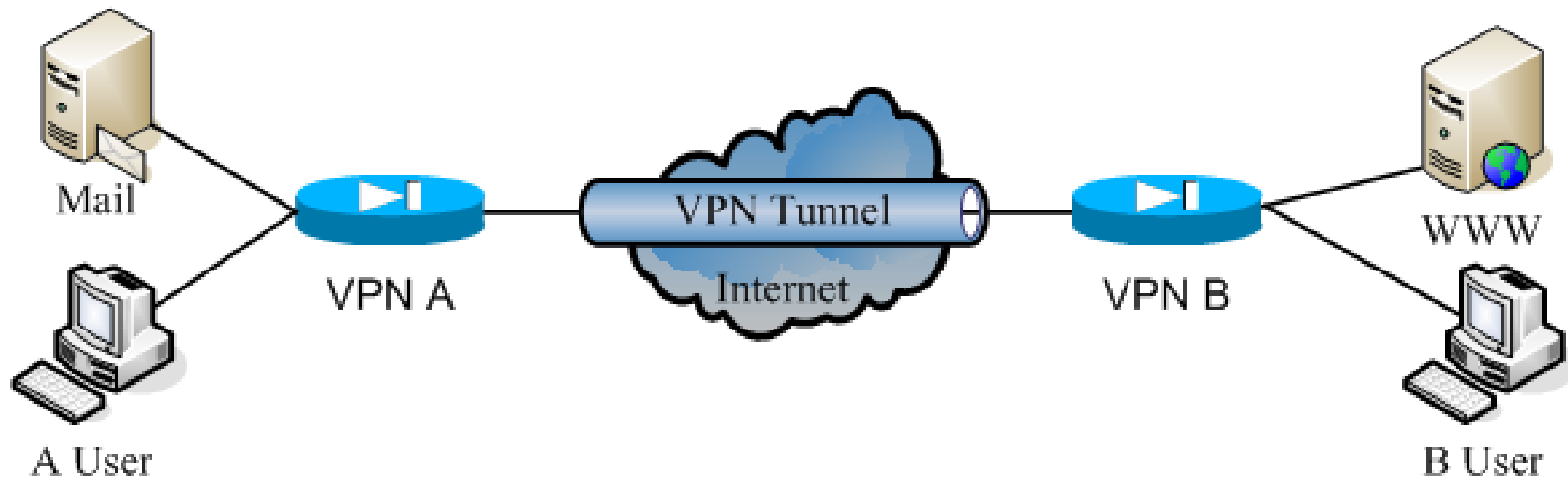
# Intranet VPN



# Remote Access VPN



# Site to Site VPN





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# 為什麼需要VPN?

- 透過Internet經由加密的VPN通道，可存取內部網路資源
- 公司與分公司間，利用Site to Site VPN節省電路費
- 公司內部存取內部重要資訊

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# VPN解決方案

- 使用者驗證(User Authentication)
- 位置管理(Address Management)
- 資料加密(Data Encryption)
- 金鑰管理(Key Management)

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# VPN通道技術

- 通道(Tunnel)
  - 使用中間網路基礎架構的方法
  - 被傳送資料(payload)的檔頭(header)已重新封裝(encapsulate)
  - 重新封裝後的內容提供路由資訊

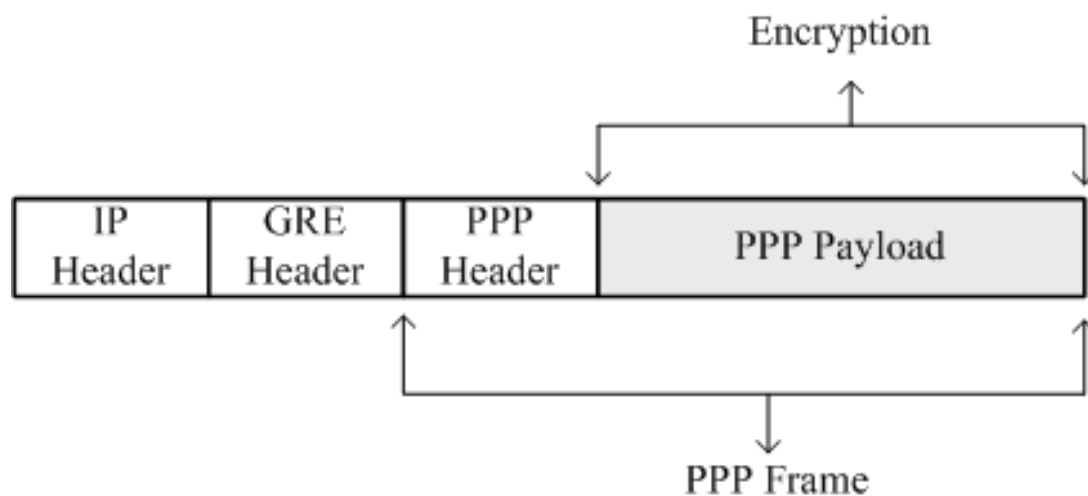
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# VPN通道技術

- PPTP (Point-to-Point Tunneling Protocol)
- L2TP (Layer Two Tunneling Protocol with Internet Protocol Security)
- L2TP/IPSec (Internet Protocol Security)

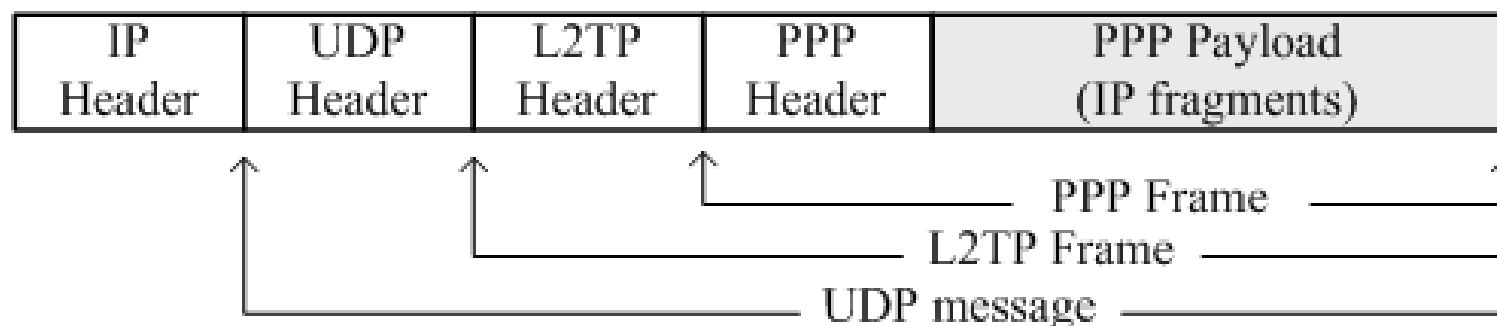
# PPTP

- RFC 2637
- 在IP資料段中封裝PPP框架
- 使用TCP連線作為通道管理
- 利用GRE (Generic Routing Encapsulation) 來封裝PPP框架



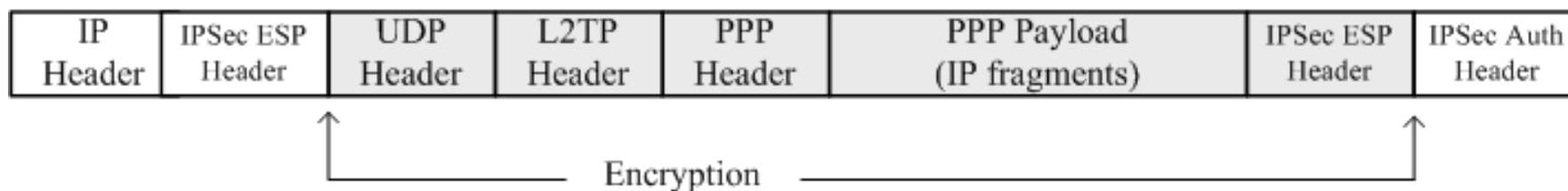
# L2TP

- RFC 2661
- L2TP由Cisco提出的L2TP是PPTP+L2F (Layer2 forwarding)
- 使用UDP連線作為通道管理
- L2TP封裝PPP框架，以便透過IP/X.25/Frame relay/ATM網路來傳送



# L2TP/IPSec

- RFC 3193
- 微軟的L2TP使用IPSec ESP (Encapsulating Security Payload)來加密L2TP的資料
- L2TP/IPSec擁有PPTP的功能，也提供IPSec安全性與控制性



# PPTP與L2TP/IPsec比較

- PPTP

- 加密金鑰是以使用驗證程序的密碼所產生的雜湊(hash)
- 資料加密是在PPP連線程序
- 容易遭受字典攻擊(dictionary attack)
- 使用MPPE，以RSA RC4加密演算法與40/56/128位元的加密金鑰為基礎
- 連線時只需使用者層級的驗證



# PPTP與L2TP/IPsec比較

- L2TP/IPsec
  - 透過憑證在取得密碼前便設定加密通道
  - 資料加密是在PPP連線程序之前
  - 需要憑證或是預先共用金鑰 (preshared secret key)
  - 使用56位元的DES，或是3DES做為加密基礎
  - 連線時需使用者層級與憑證的電腦層級驗證

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# VPN安全性

- 驗證安全性
  - 認證採用使用者名稱與密碼
  - 或是憑證的形式
- 授權安全性
  - 連接限制
  - 群組原則

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# VPN安全性

- 加密安全性
  - 加密演算法
  - 連線加密過程
- 封包過濾
  - 過濾不必要的封包

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# 驗證安全性-PAP

- 透過純文字密碼(clear-text)的證驗方法
- 可以截取
- 使用者密碼易被破解

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# 驗證安全性-CHAP

- CHAP, (Challenge-Handshake Authentication Protocol)
- 加密驗證機制
  - 可避免連線時實際密碼的傳輸
- 使用MD5加密回應傳輸

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# 驗證安全性-MS-CHAP

- 類似CHAP
- Use MD4
- MS-CHAP v2
  - 相互驗證

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# 驗證安全性-EAP

- EAP (Extensible Authentication Protocol), RFC 2284
- 任意的驗證方法
  - Smart Card
  - Token Cards
  - 指紋掃描

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# PPTP連接的安全驗證

- PPTP連線加密是使用MPPE為基礎
- 產生MPPE金鑰
  - MS-CHAP/MS-CHAPv2/EAP-TLS
  - 最好使用Smart Card



# L2TP/IPSec連接的安全驗證

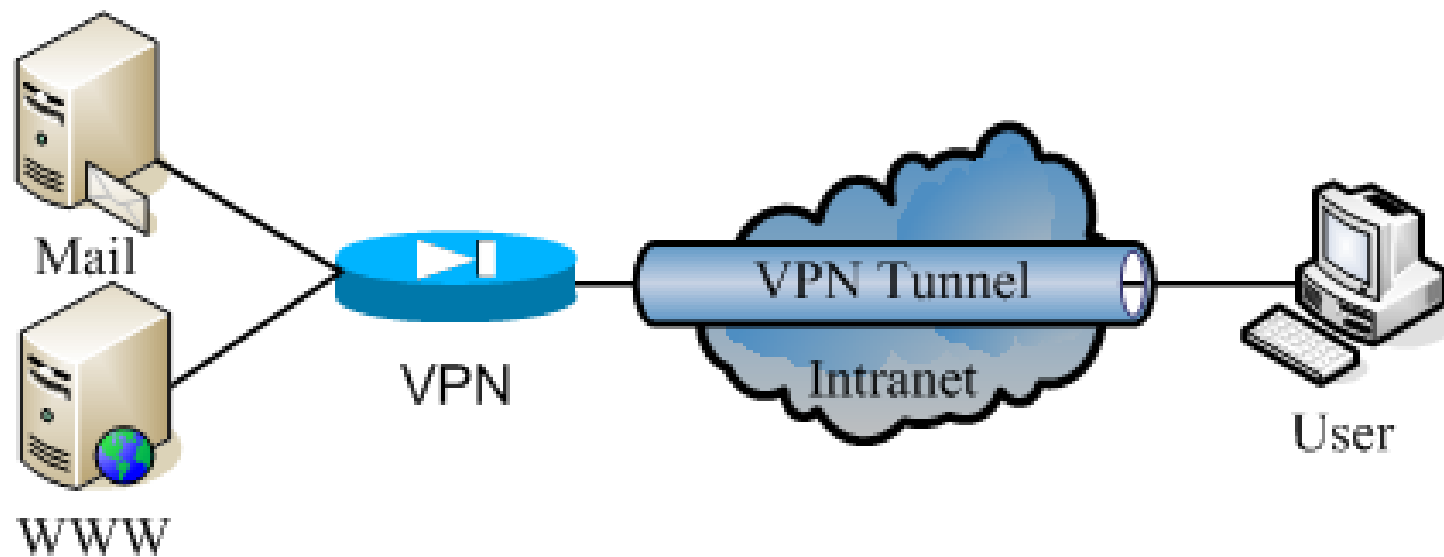
- IPSec電腦驗證
  - VPN用戶端與VPN伺服器相互電腦驗證
  - 建立IPSec ESP SA (Security Association)
- L2TP使用者層級驗證
  - IPSec通道已建立完成，於加密模式下運作
  - 使用者嘗試以PPP為基礎的認證協定(如EAP)建立L2TP連線

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# Module 9-2：建置虛擬私有網路 (\*)

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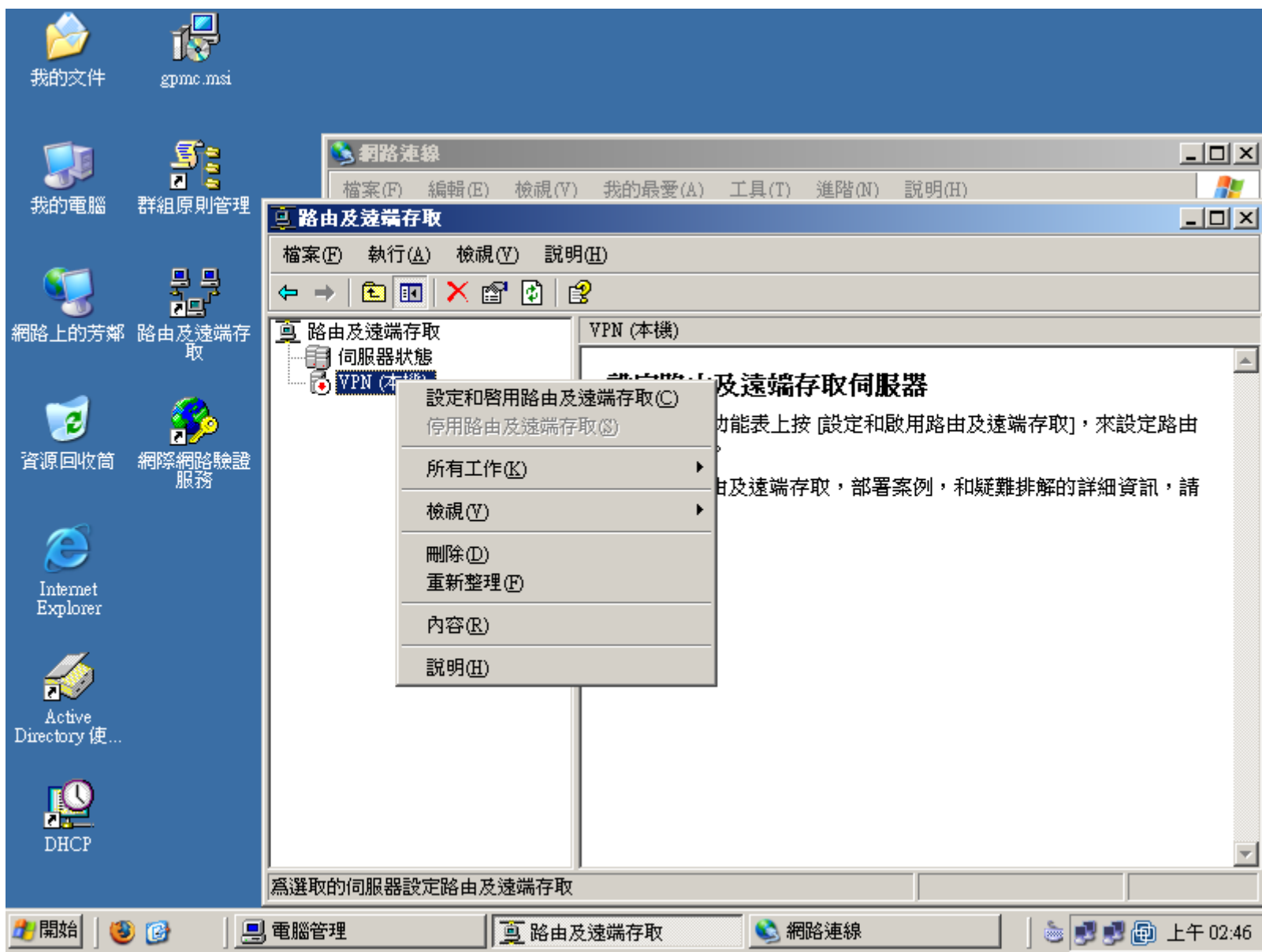
# Intranet VPN for Windows 2003

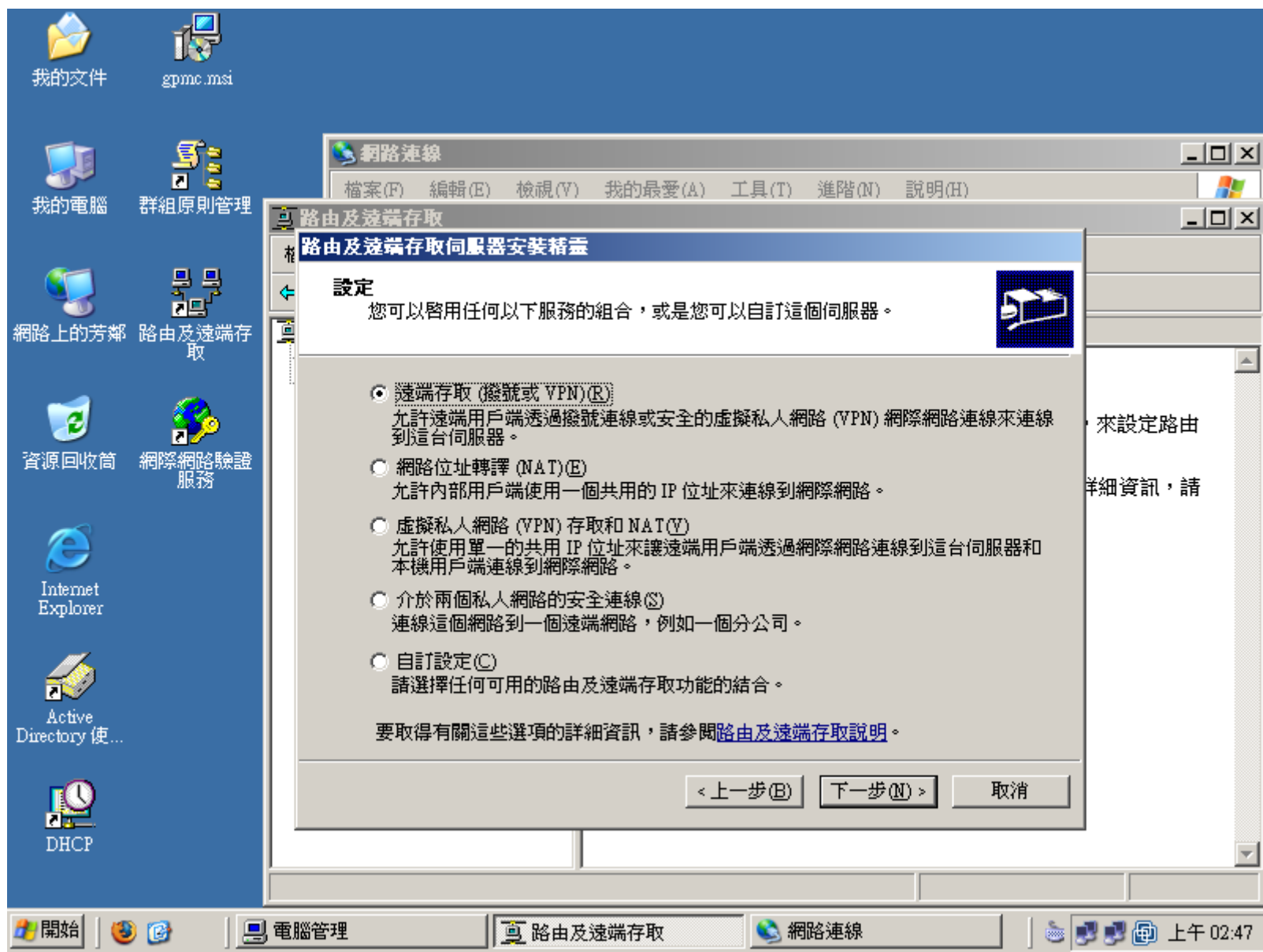


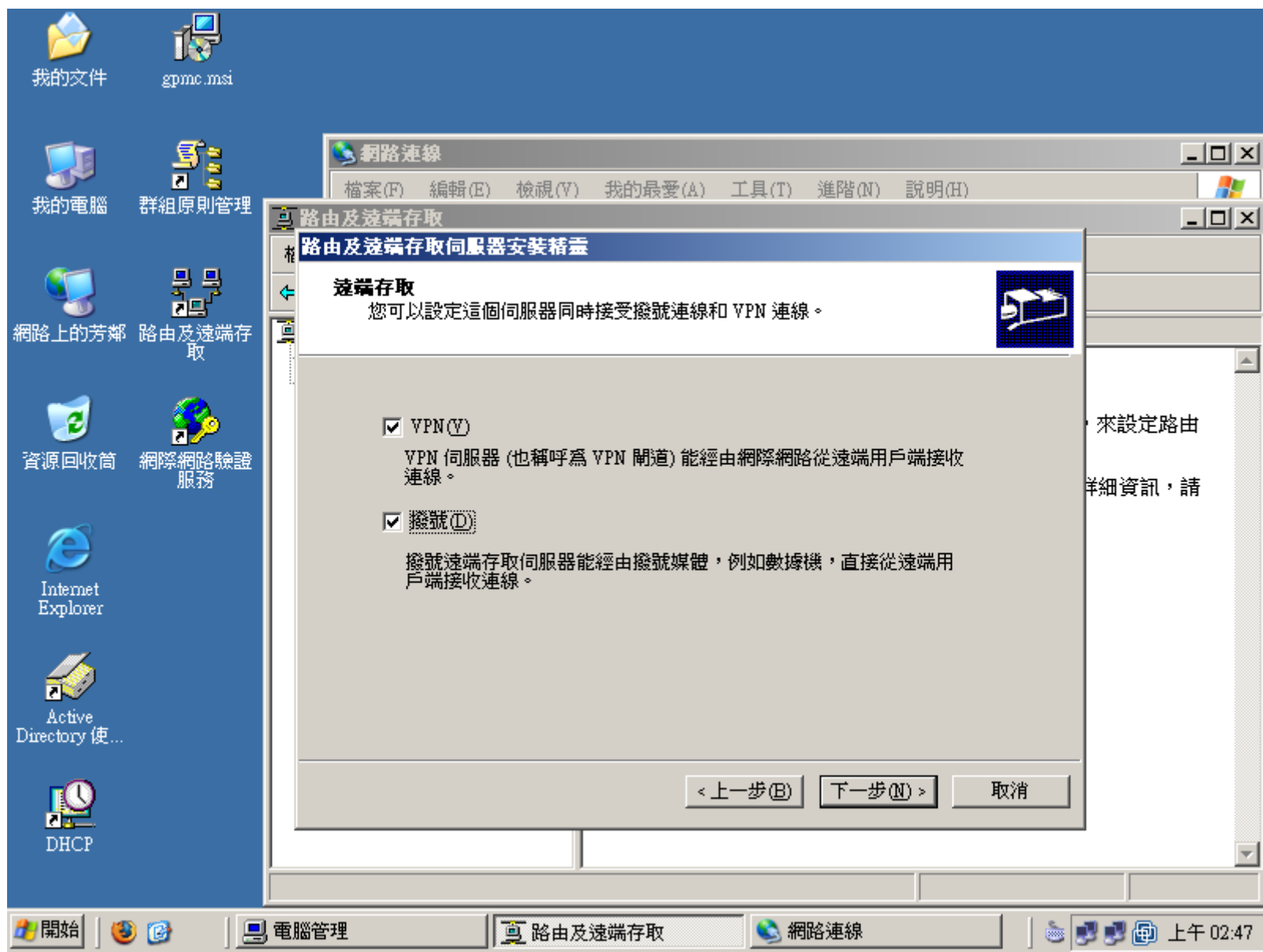
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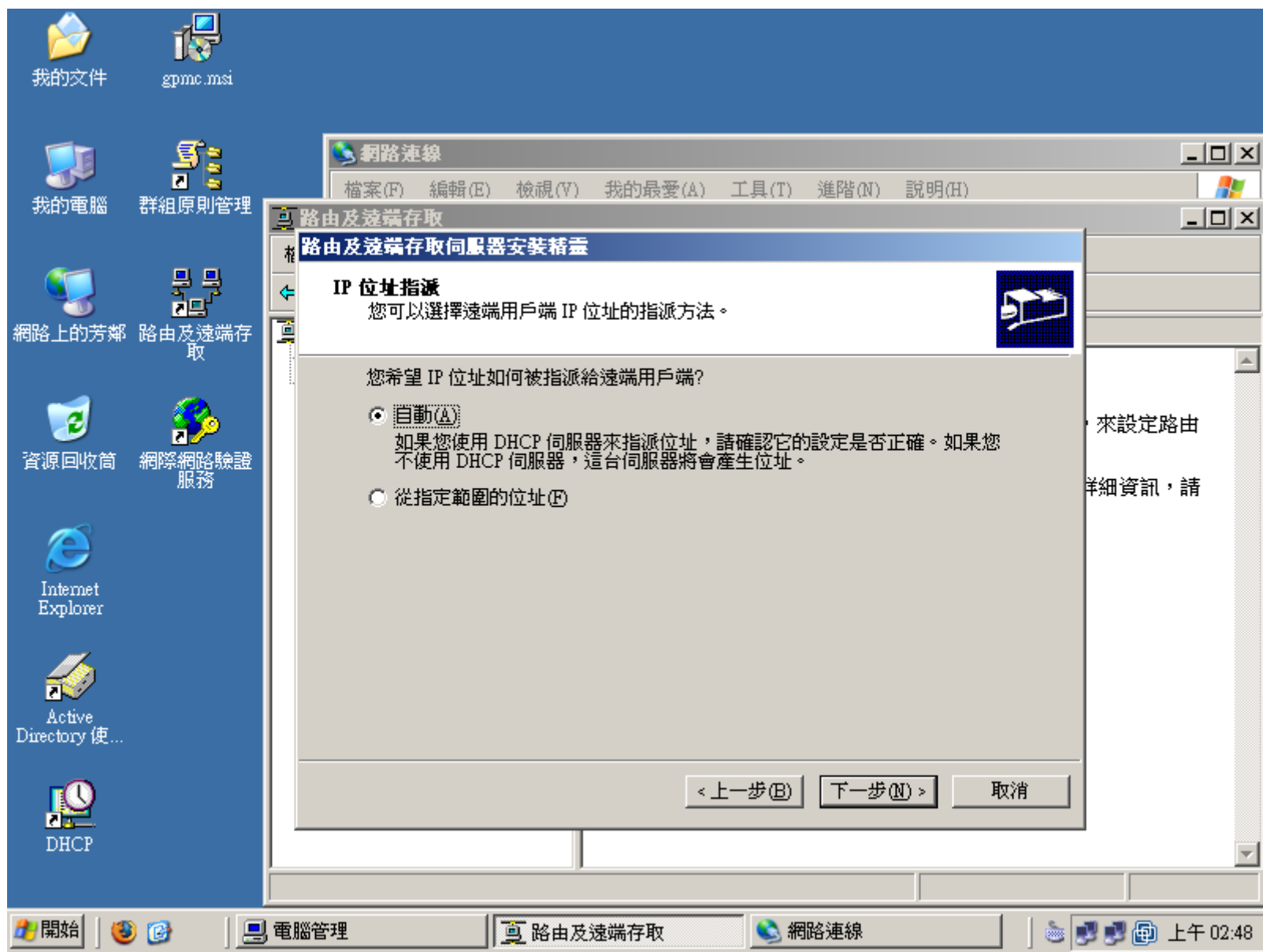
# Intranet VPN for Windows 2003

- VPN IP:210.71.4.7
- Intranet Mail:192.168.163.1
- Intranet WWW:192.168.163.2
- 只能對Intranet內的IP連線

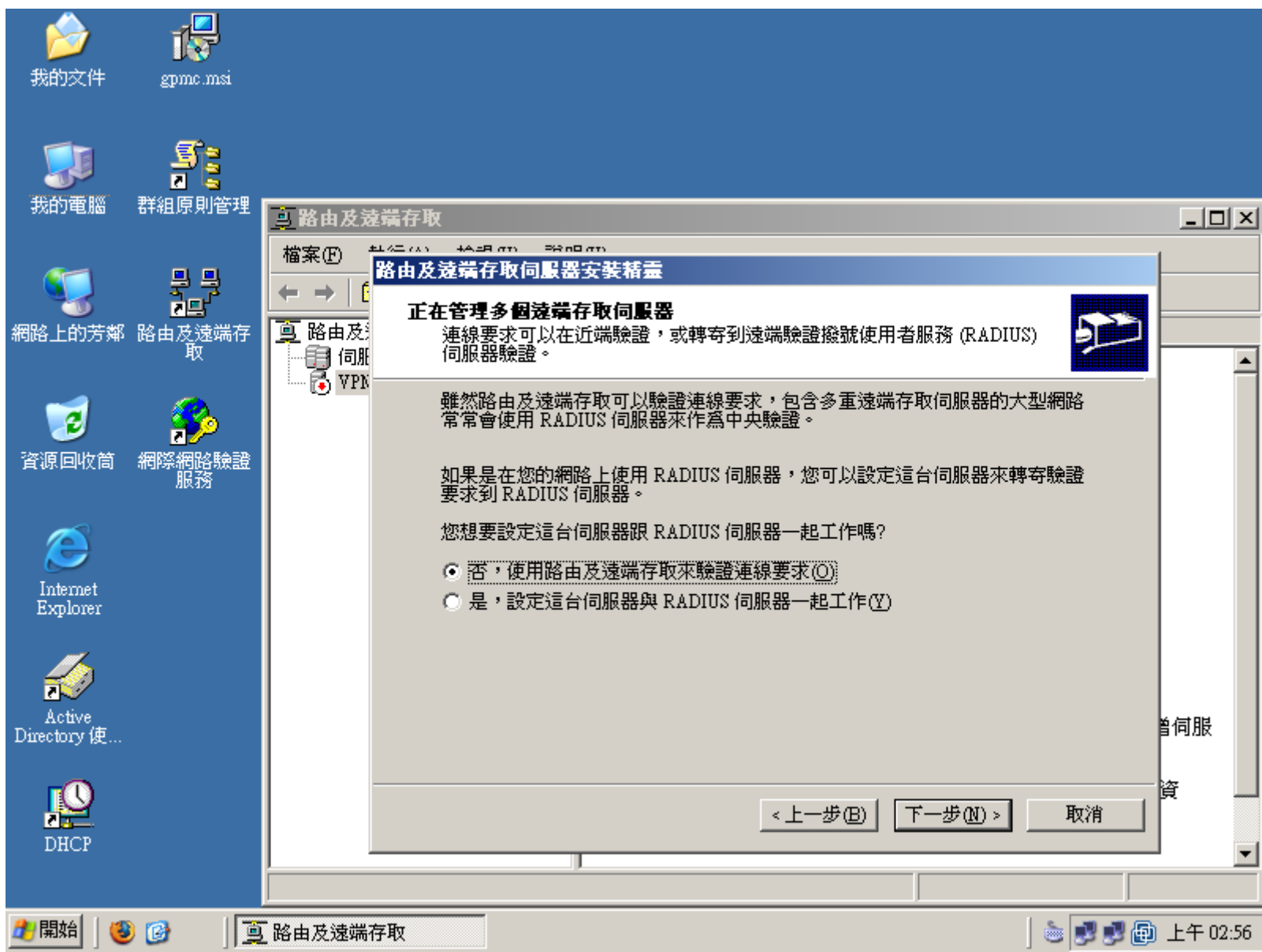


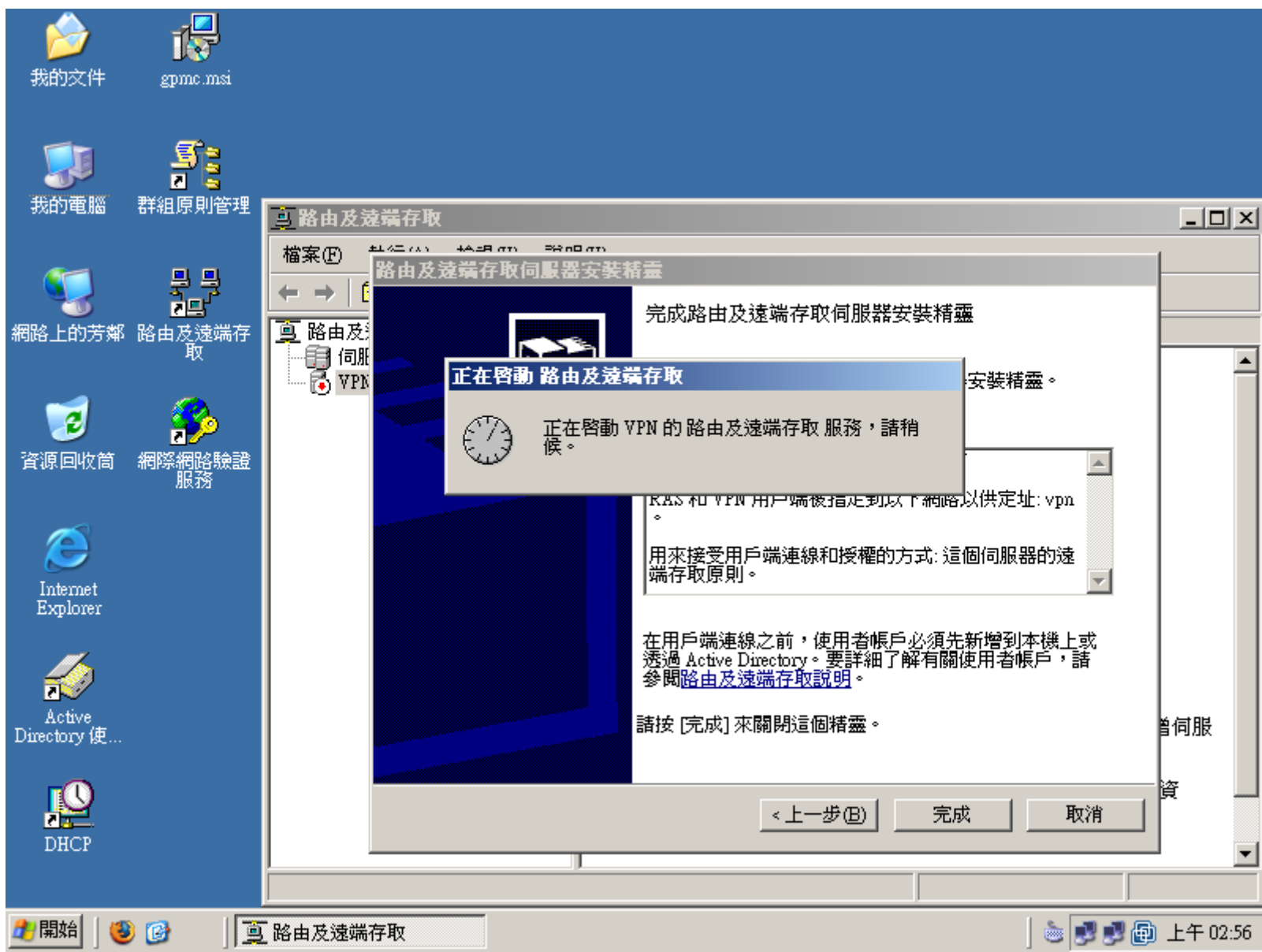




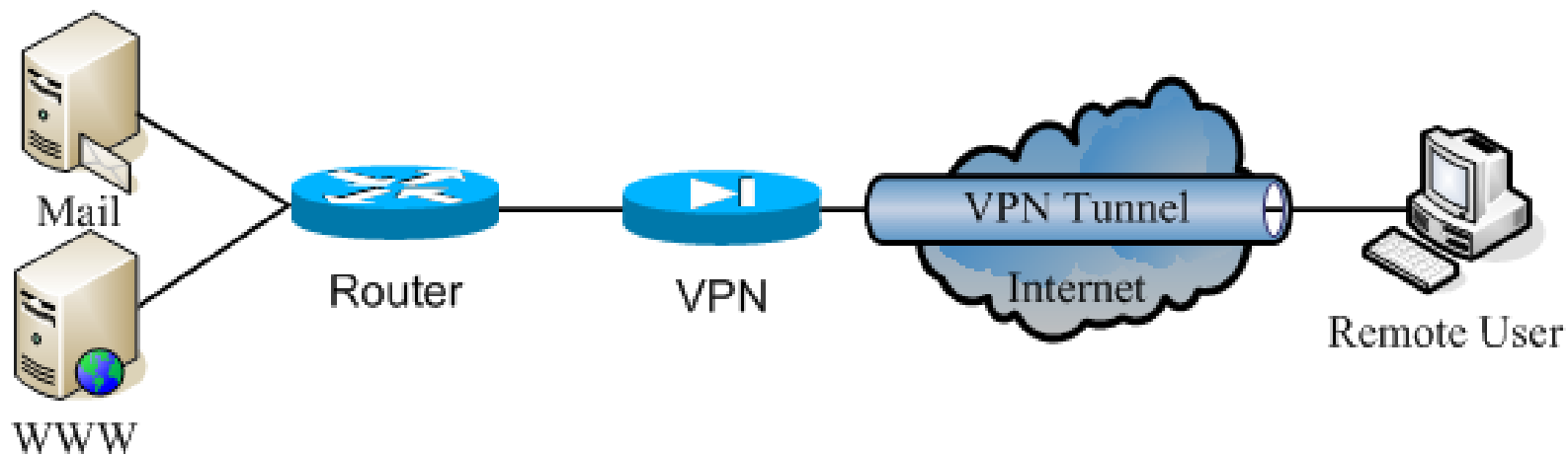








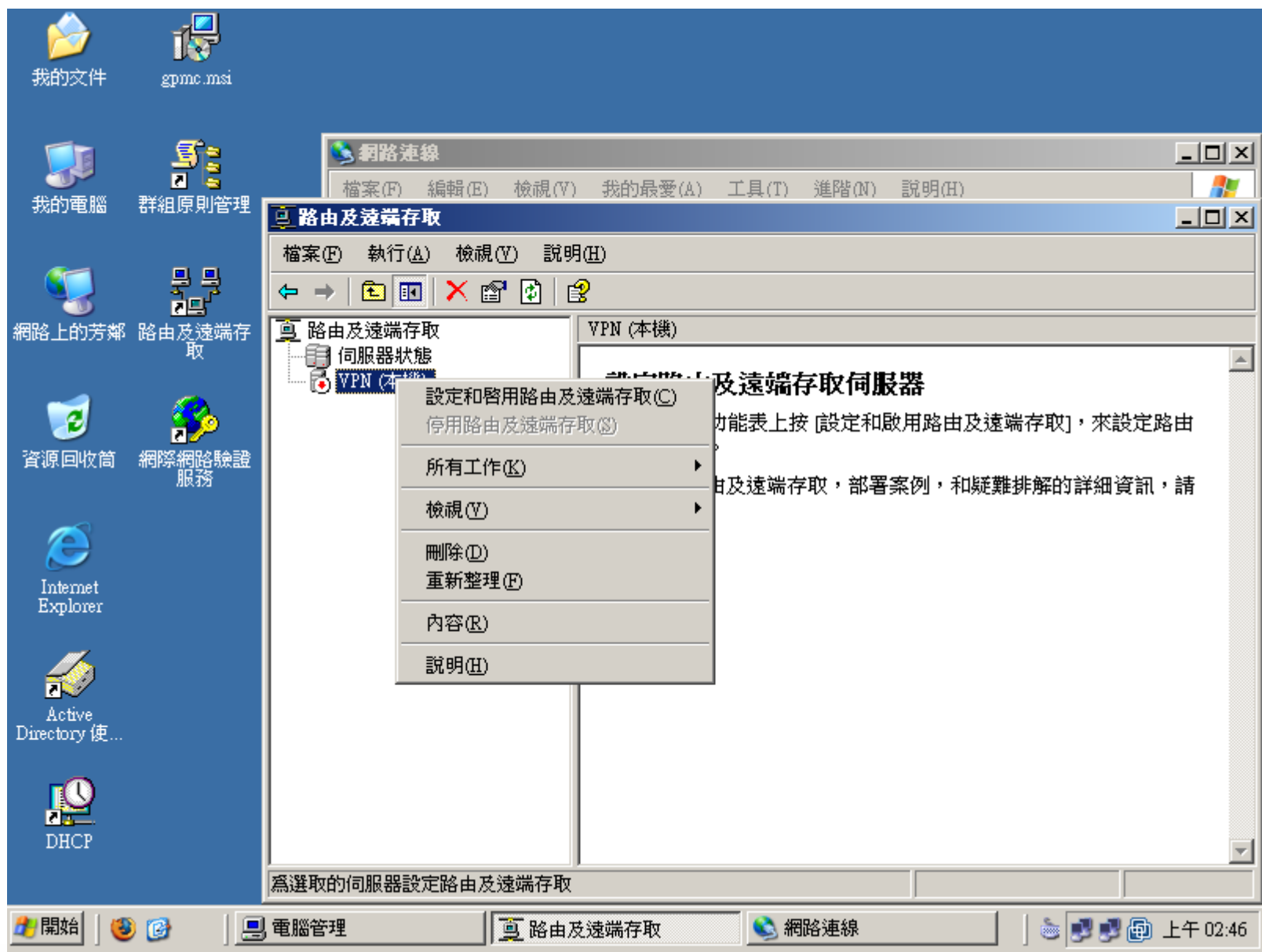
# Remote VPN for Windows 2003

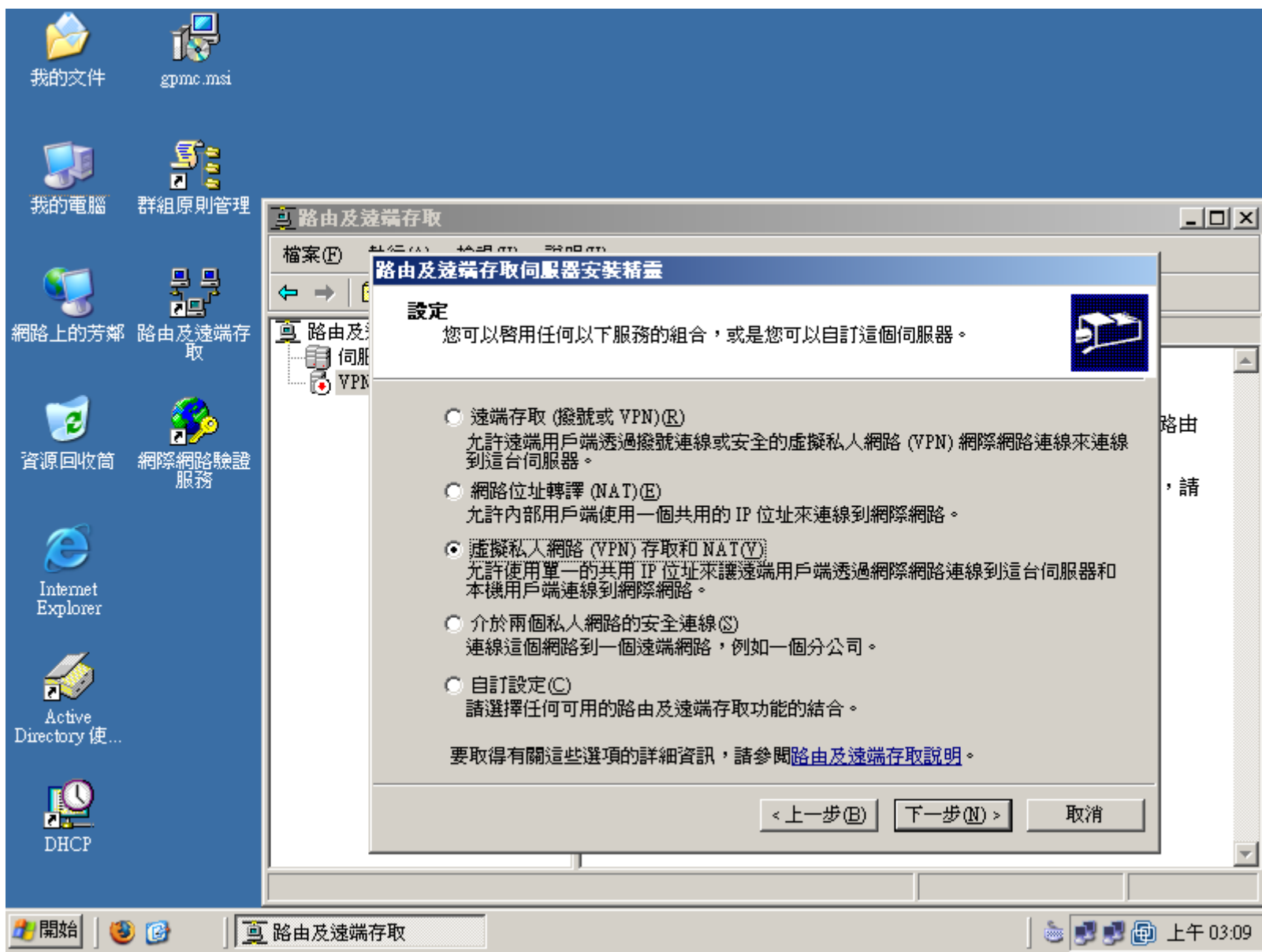


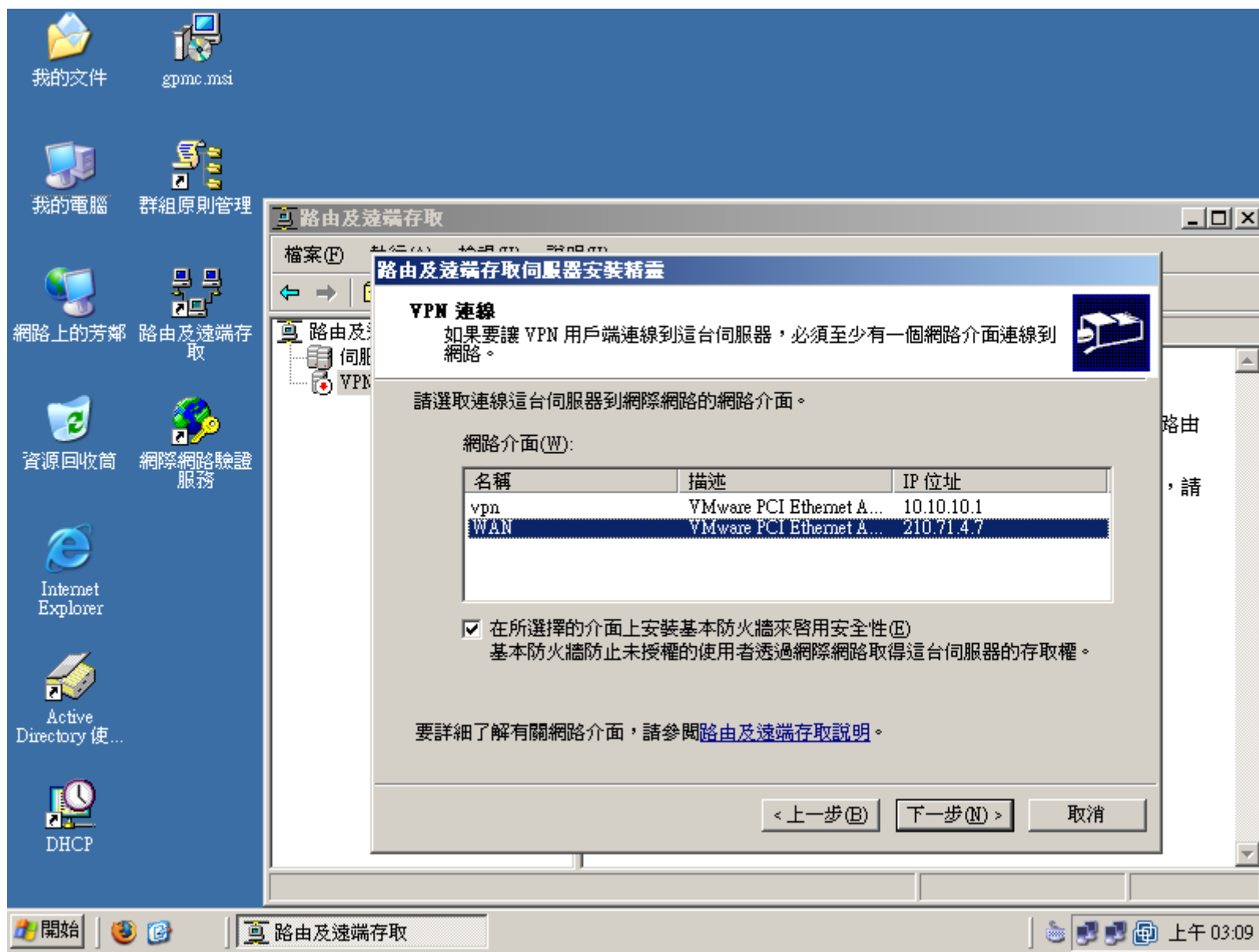
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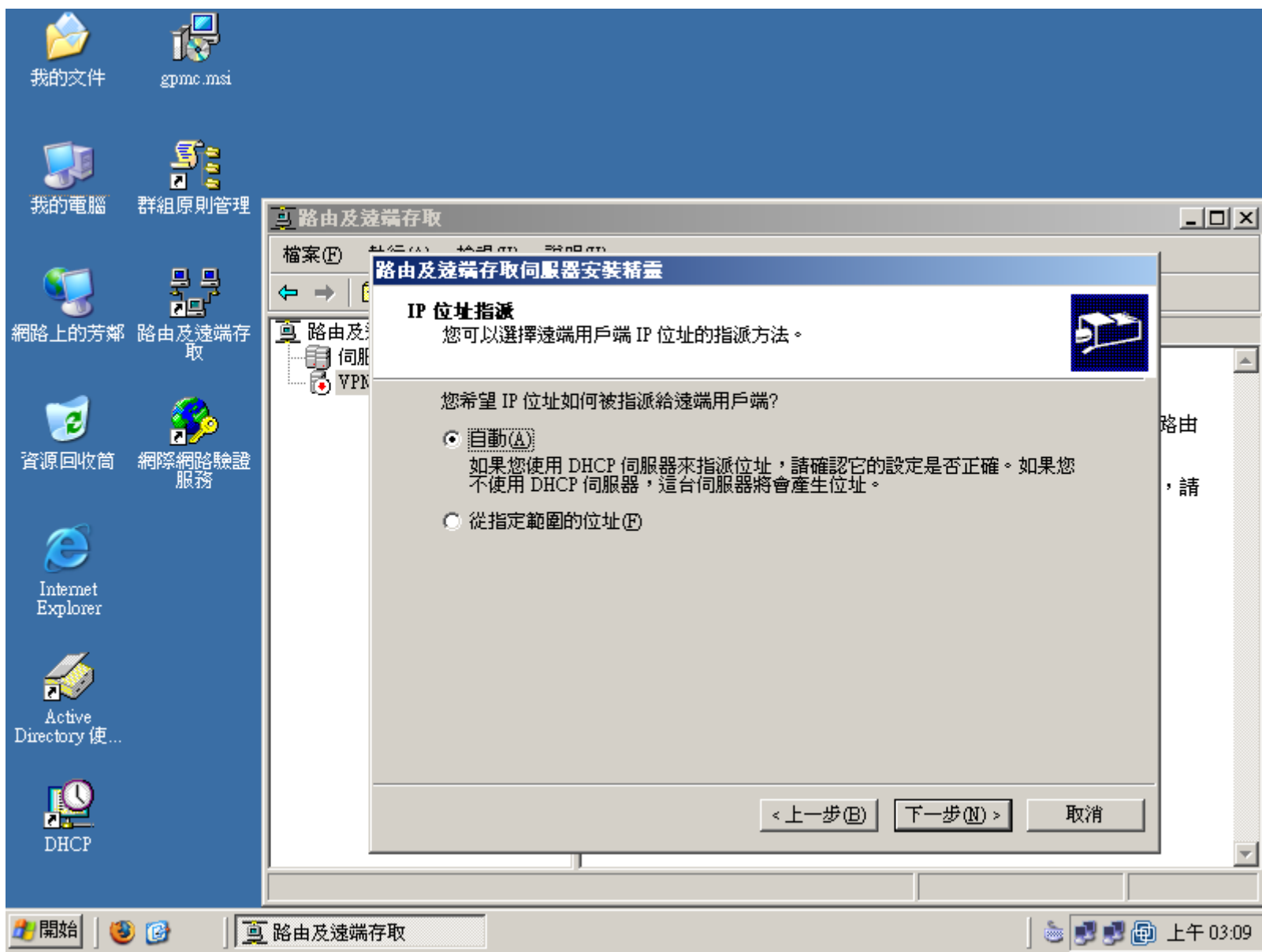
# Remote VPN for Windows 2003

- VPN IP:210.71.4.7
- Intranet Mail:192.168.163.1
- Intranet WWW:192.168.163.2
- 透過VPN撥號進來後，可連線至Intranet，也可透過NAT方式連線至Internet

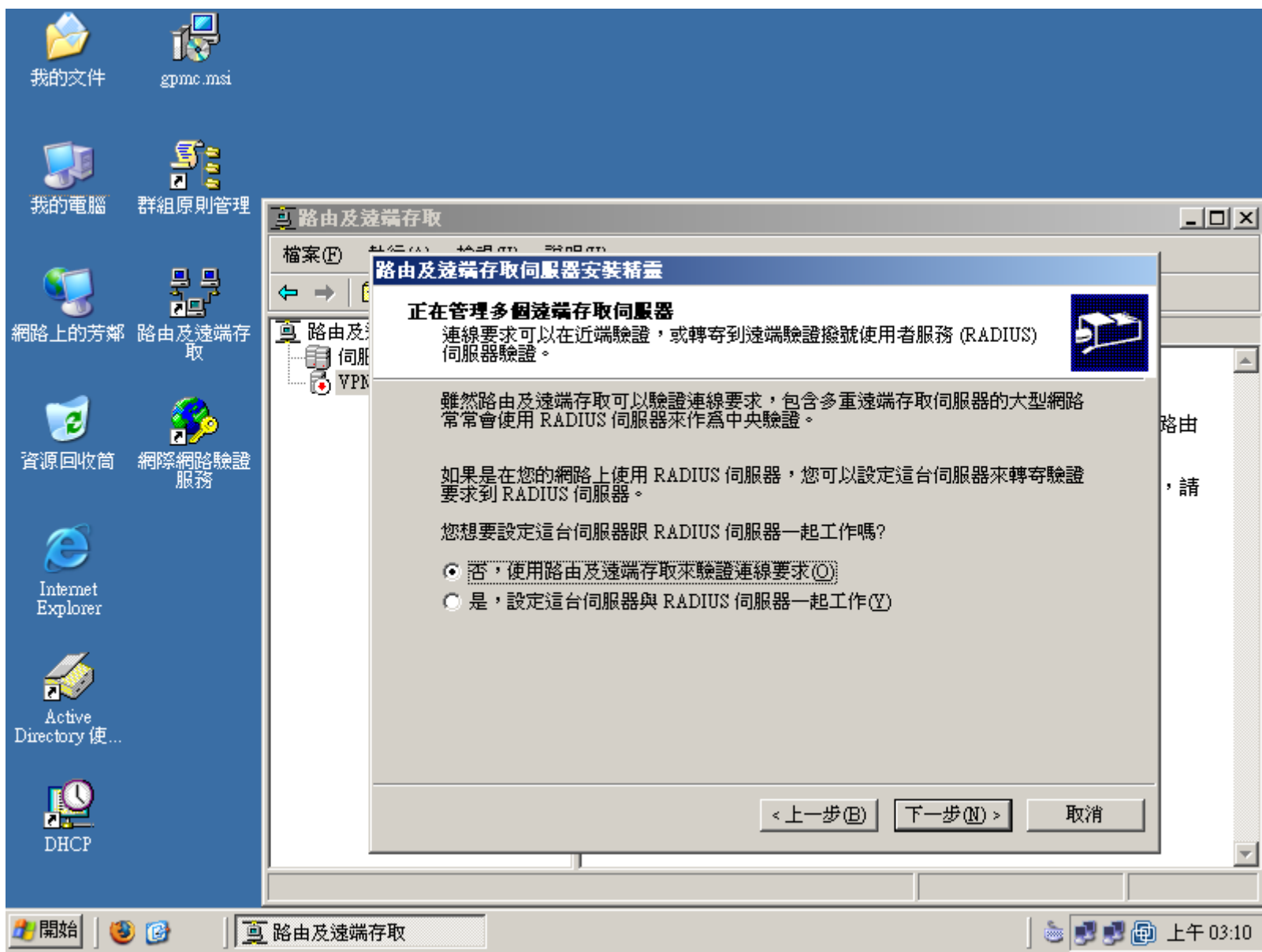


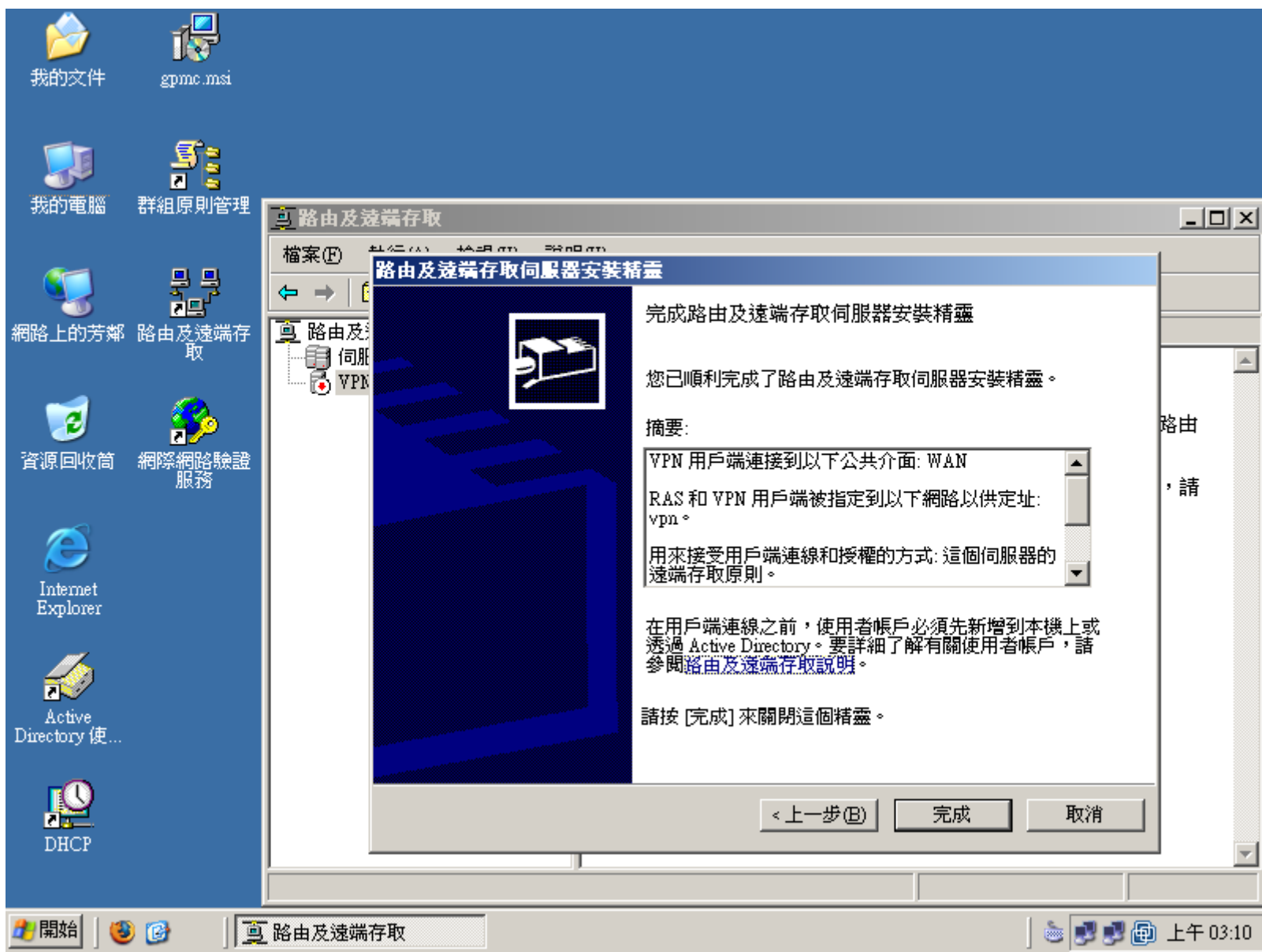










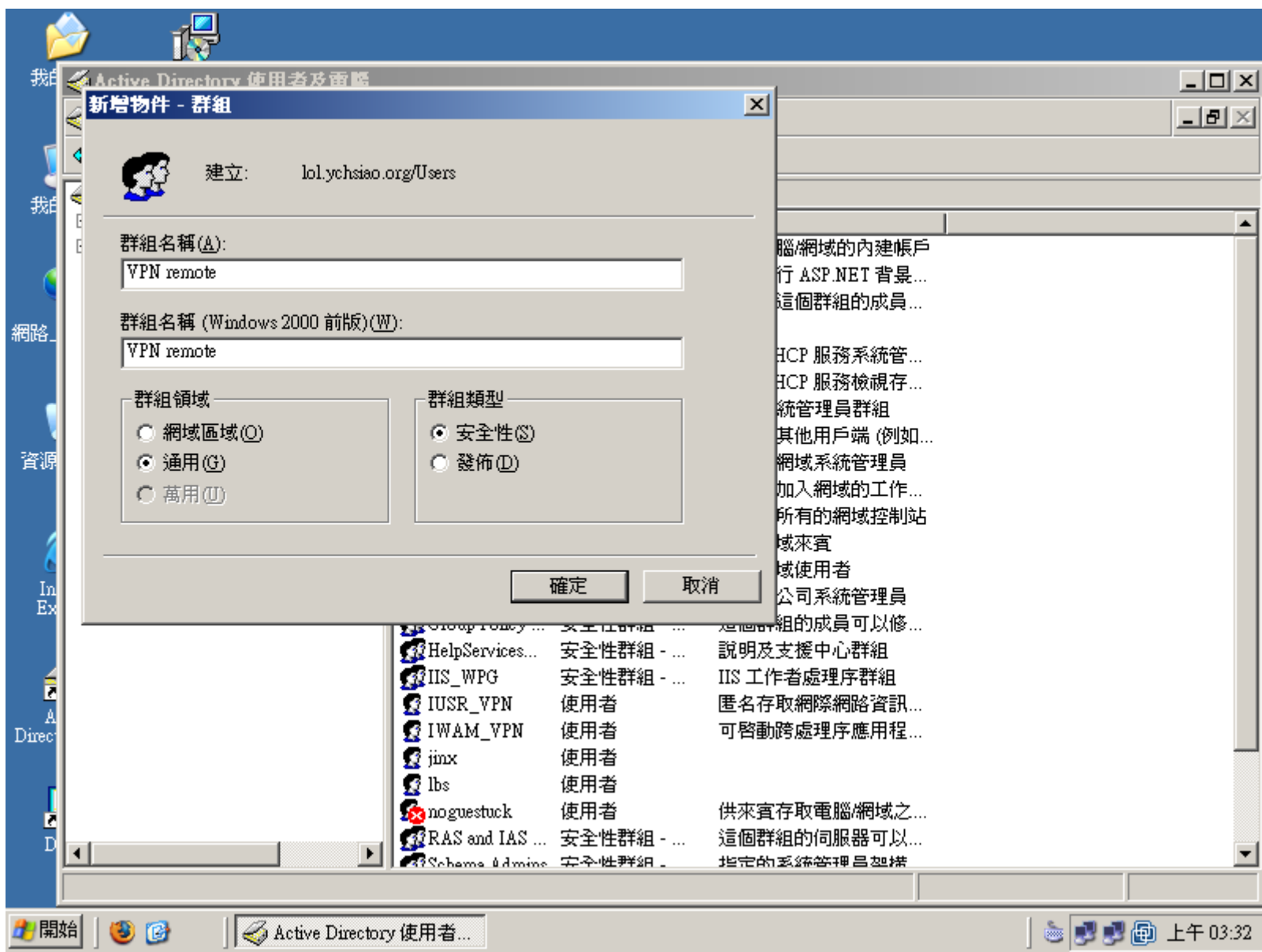


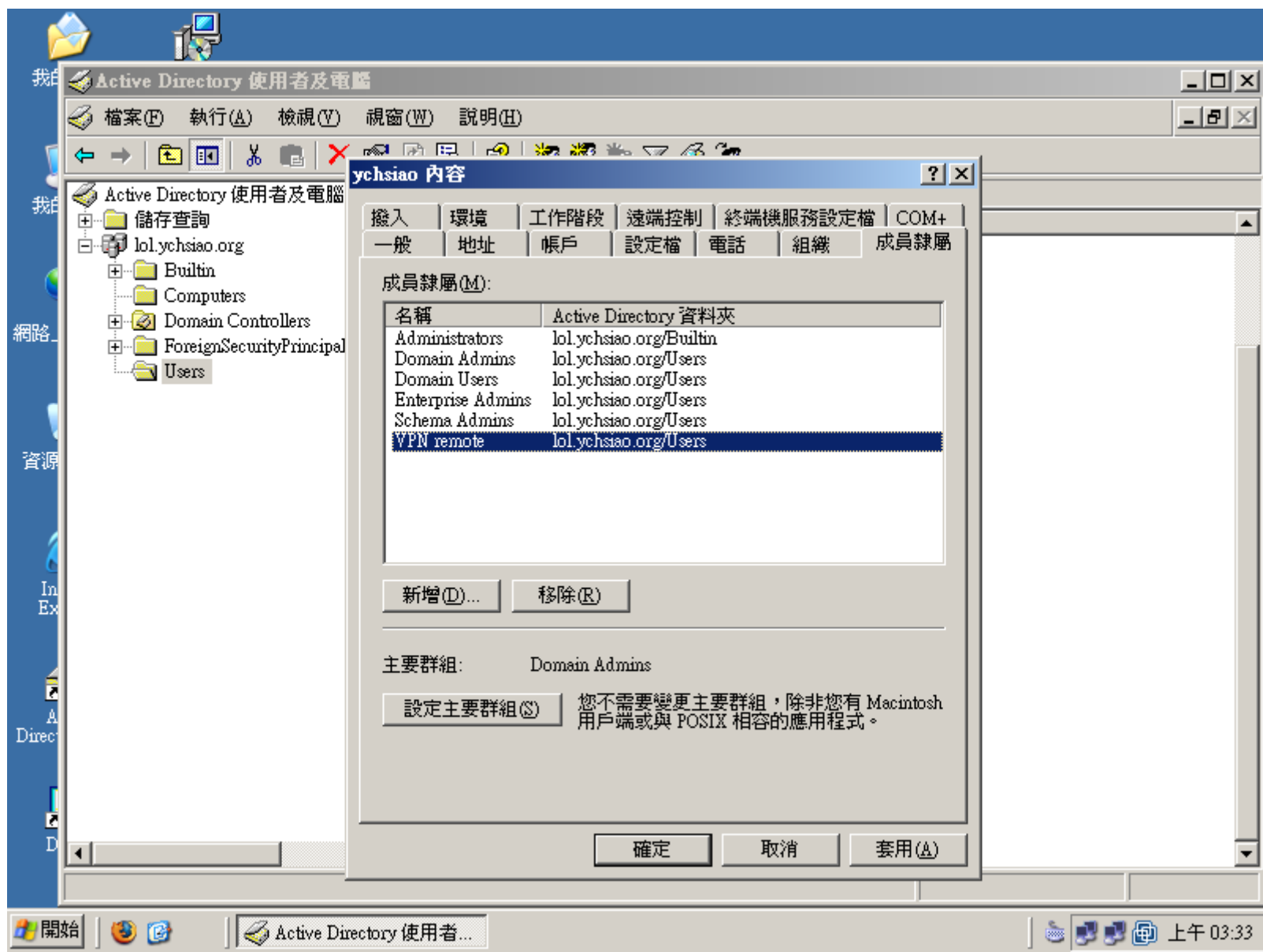
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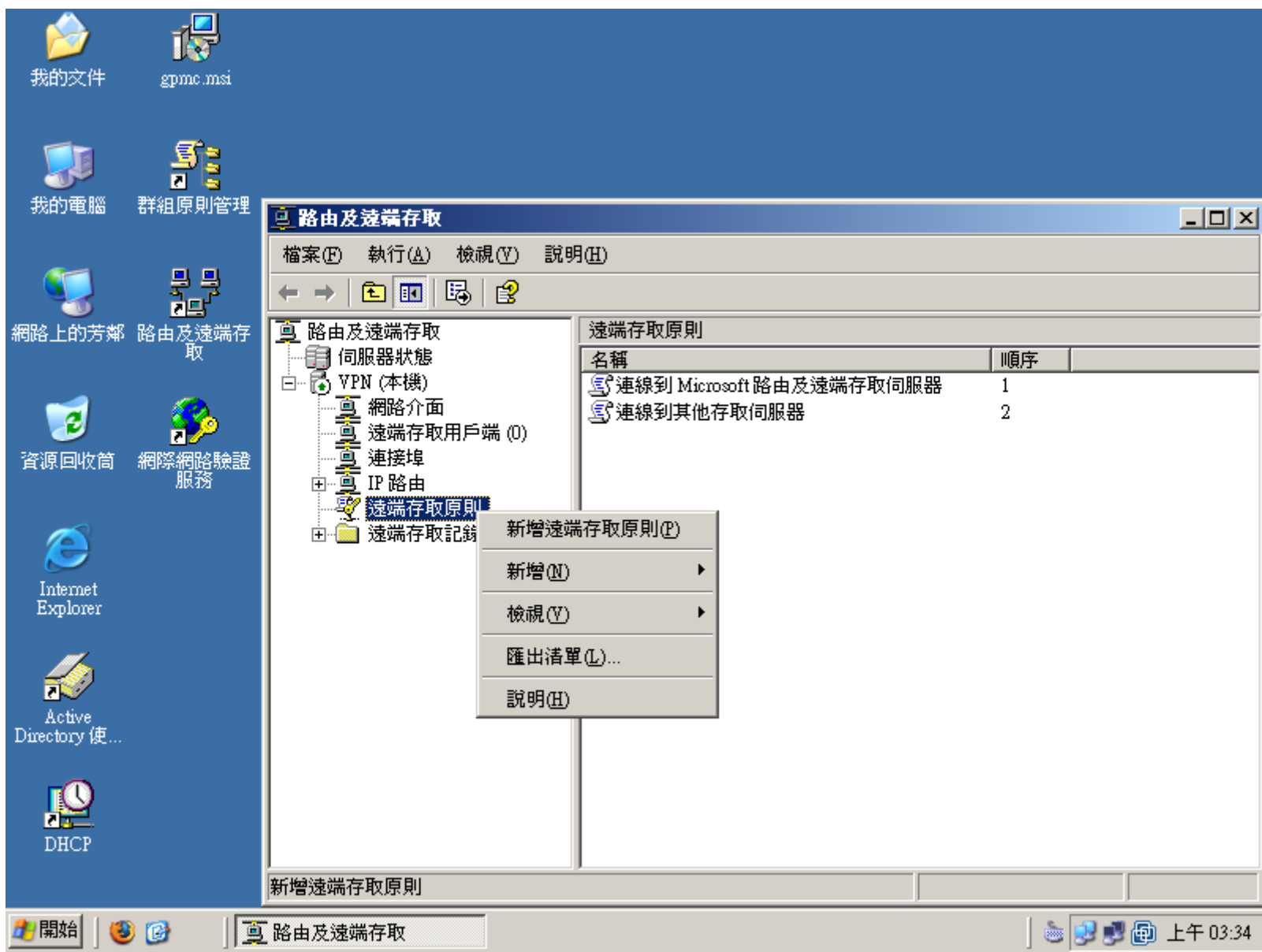
# Windows 2003使用者VPN權限

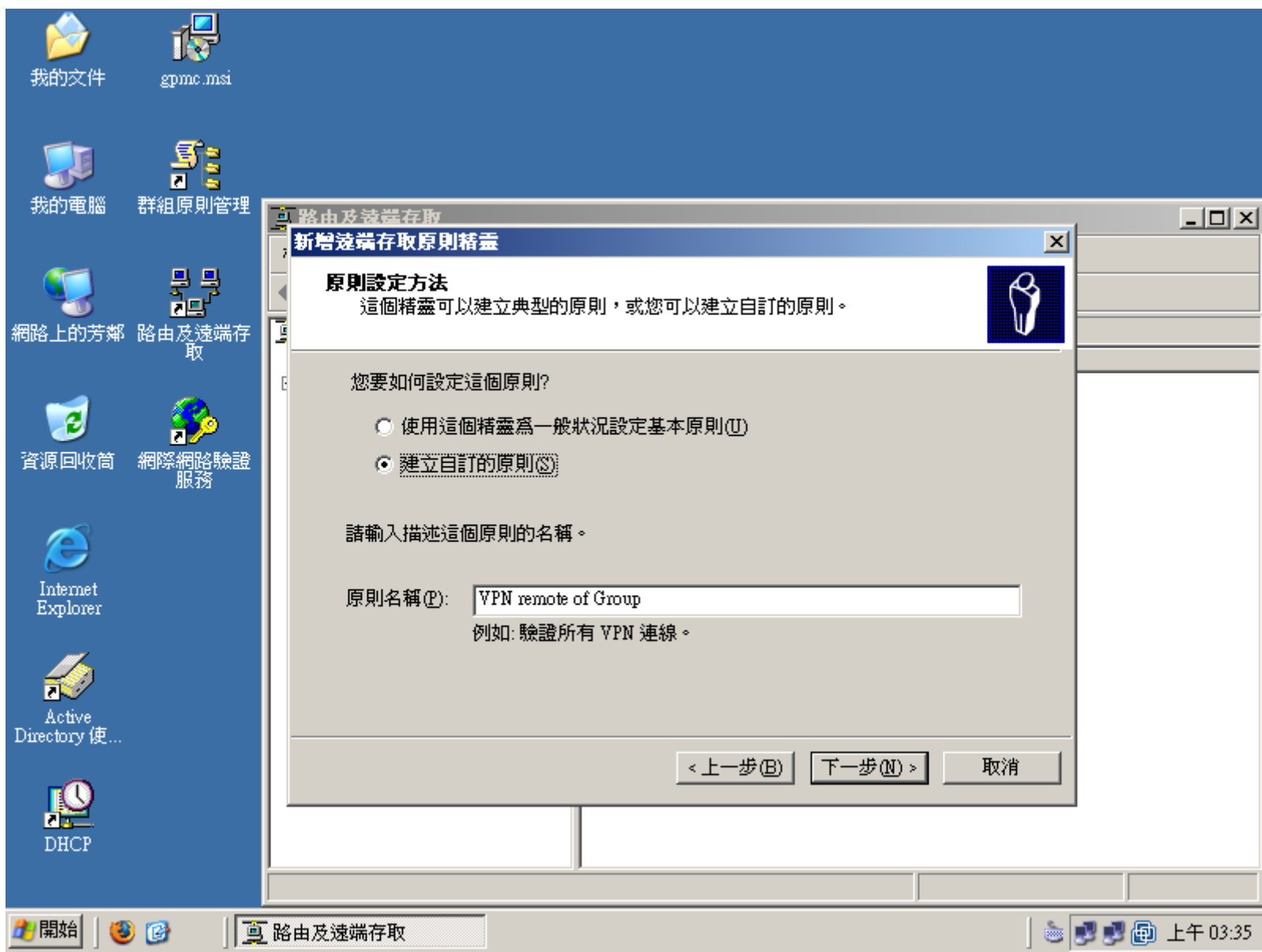
- 若使用Active Directory管理帳號
  - 可使用群組來管理使用VPN撥入權限
- 在VPN中新增一般遠端存取原則
  - 指定群組可以存取VPN連線



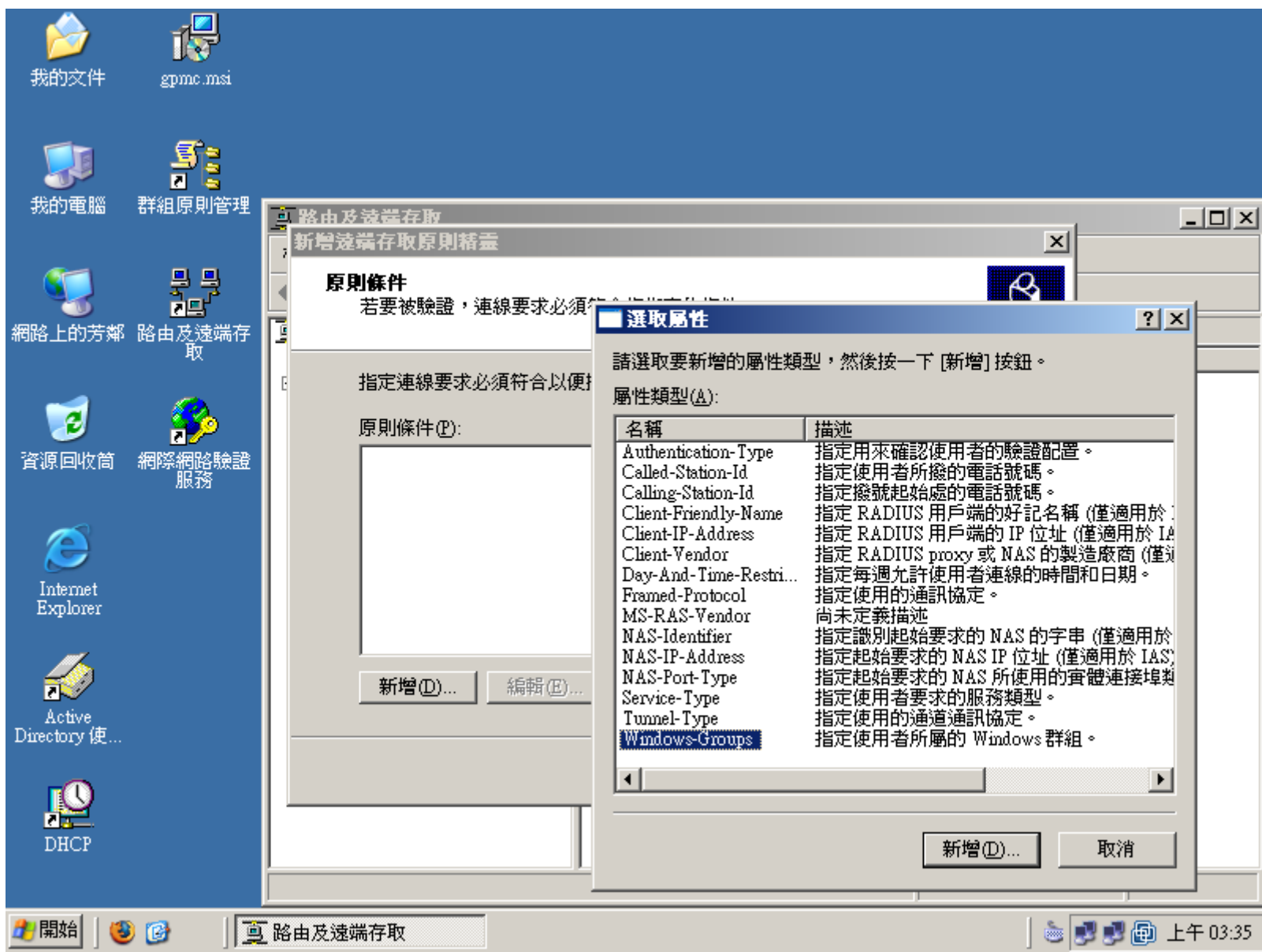


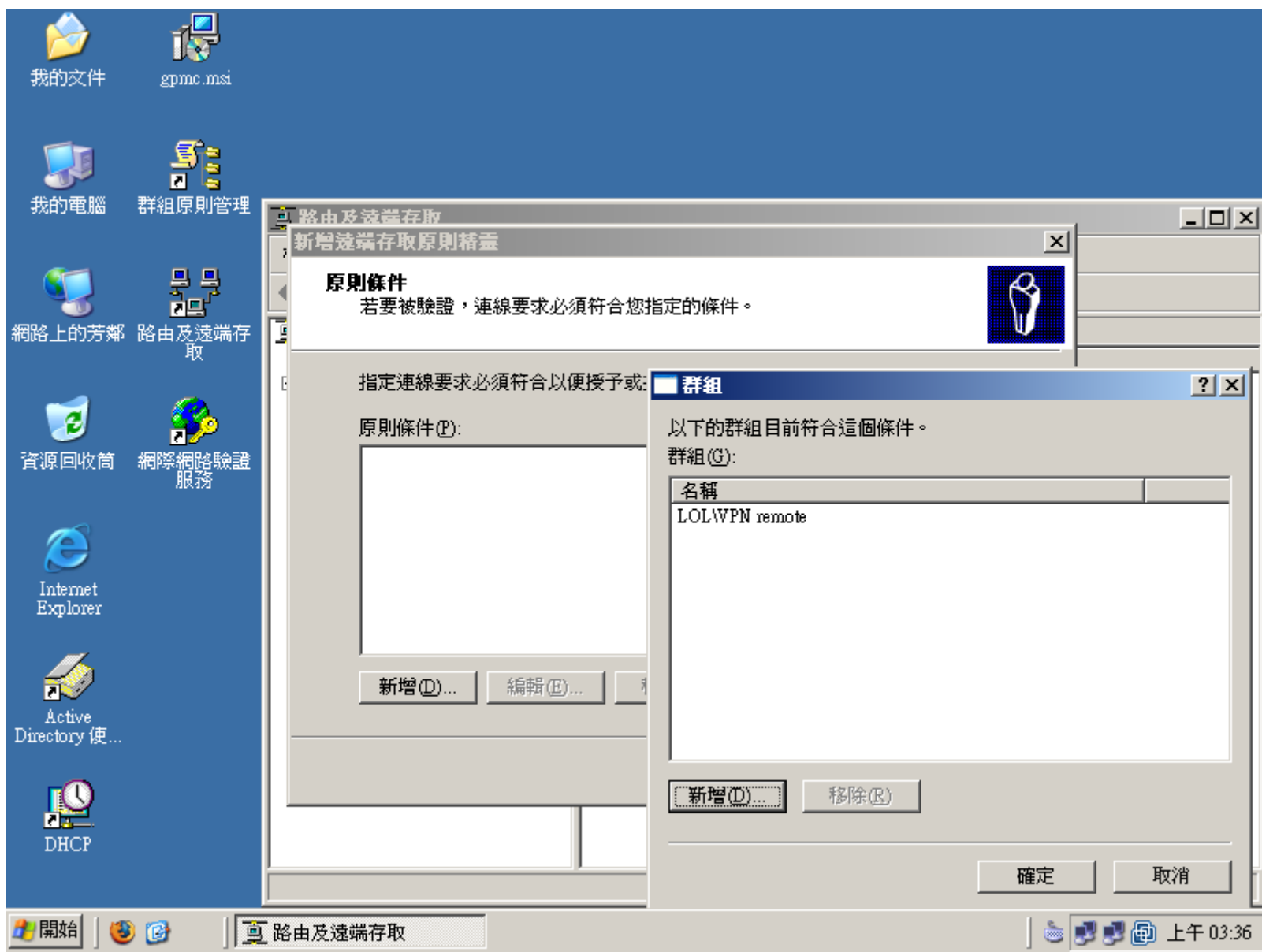


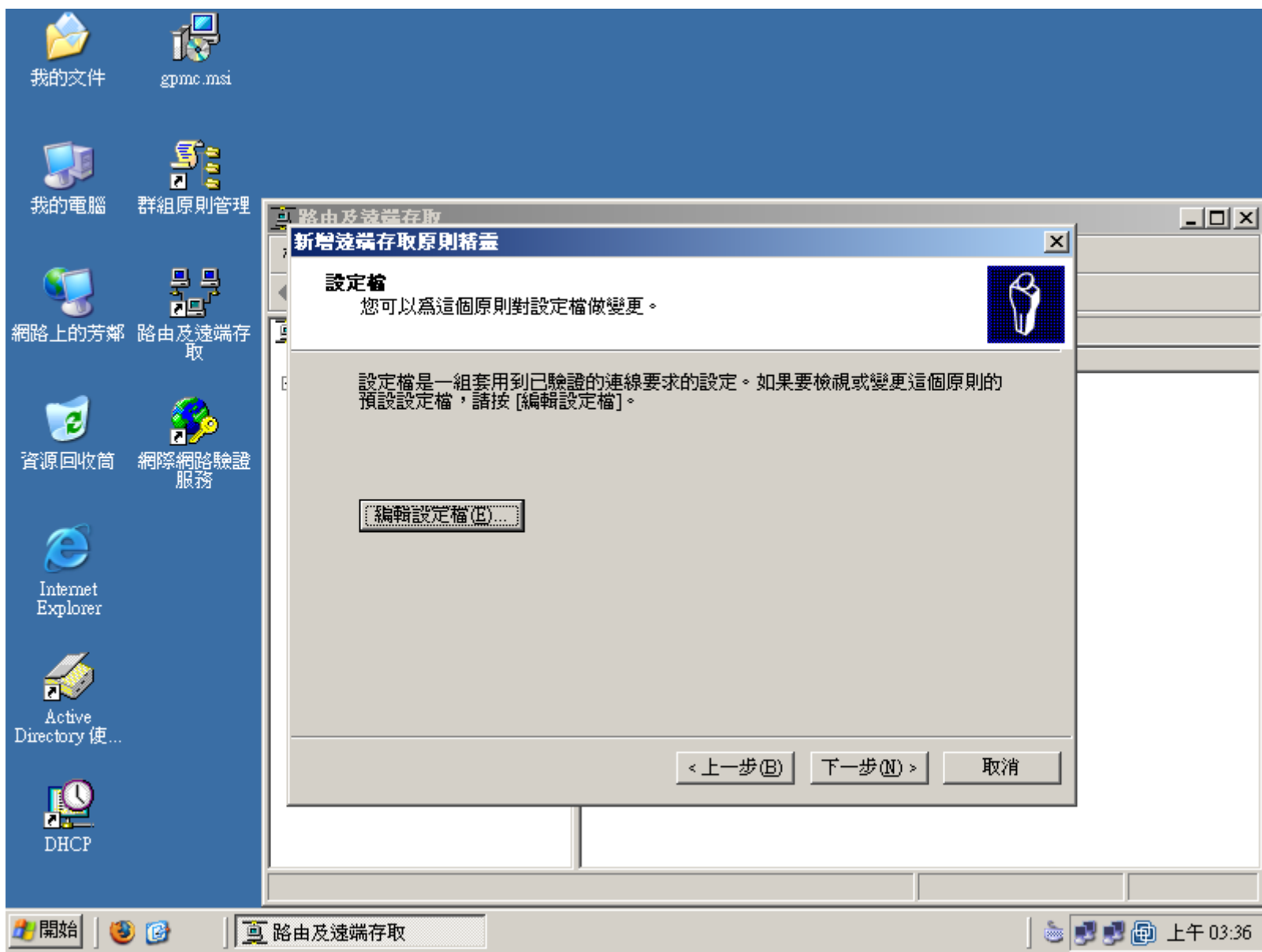


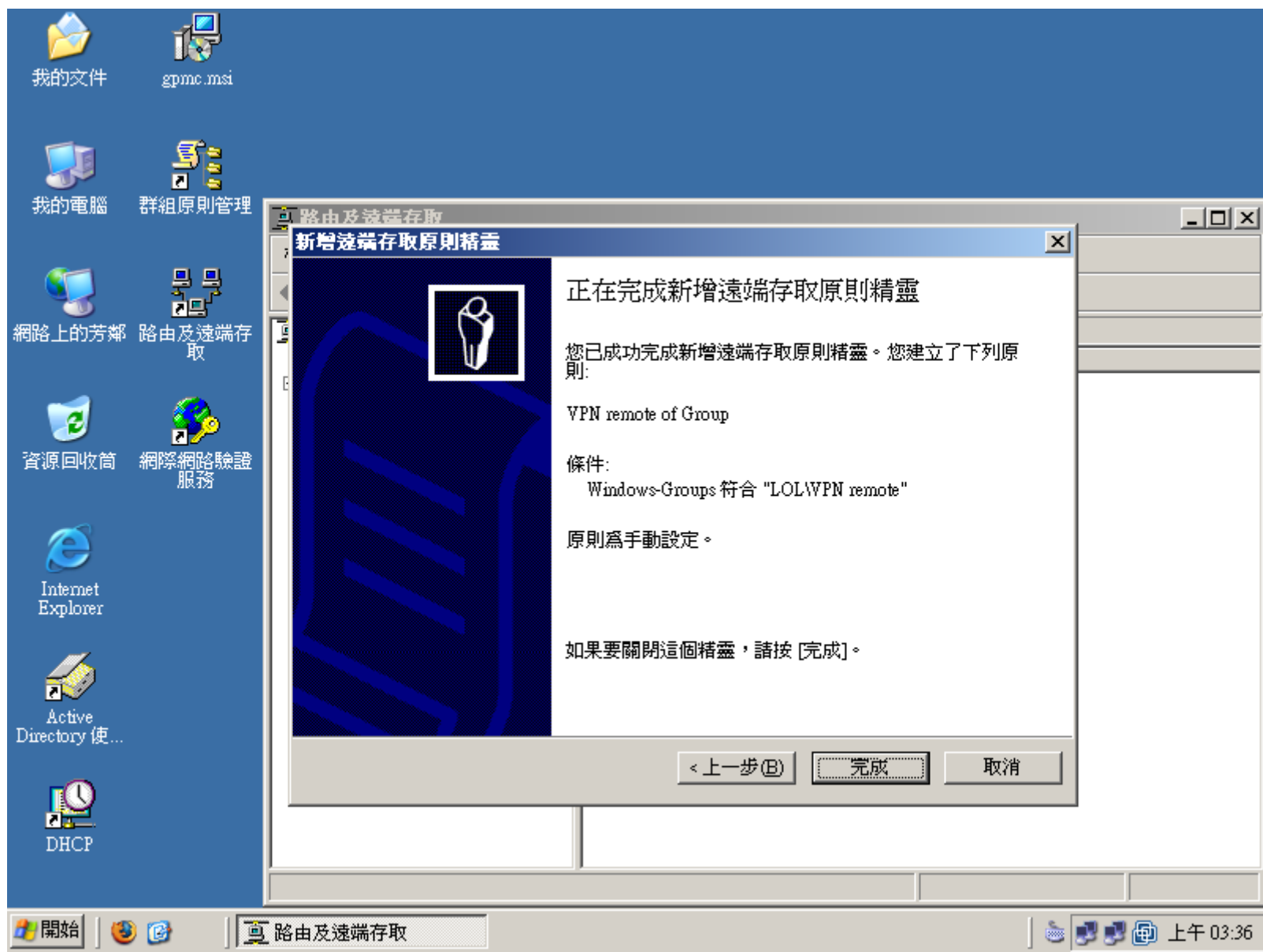


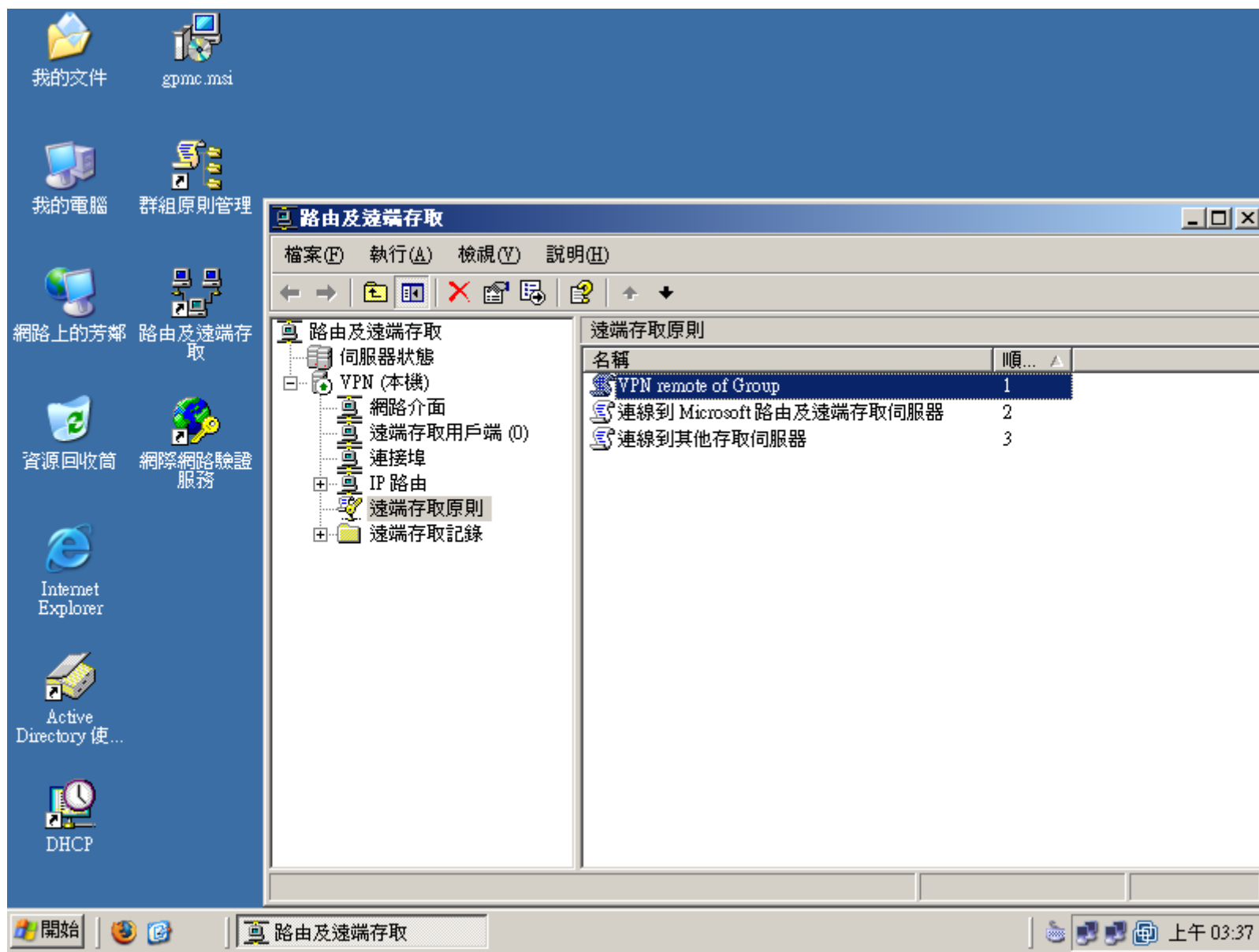


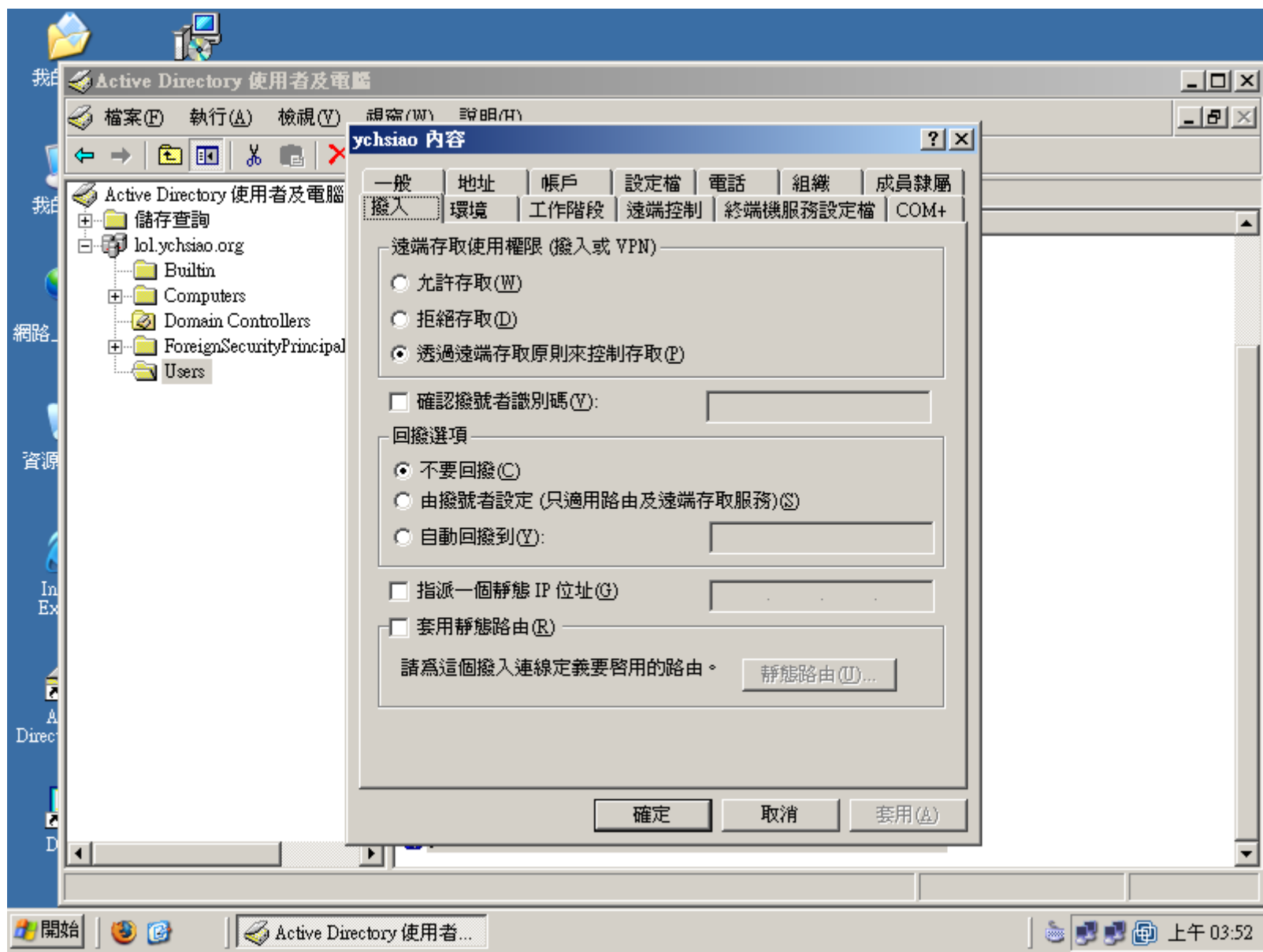




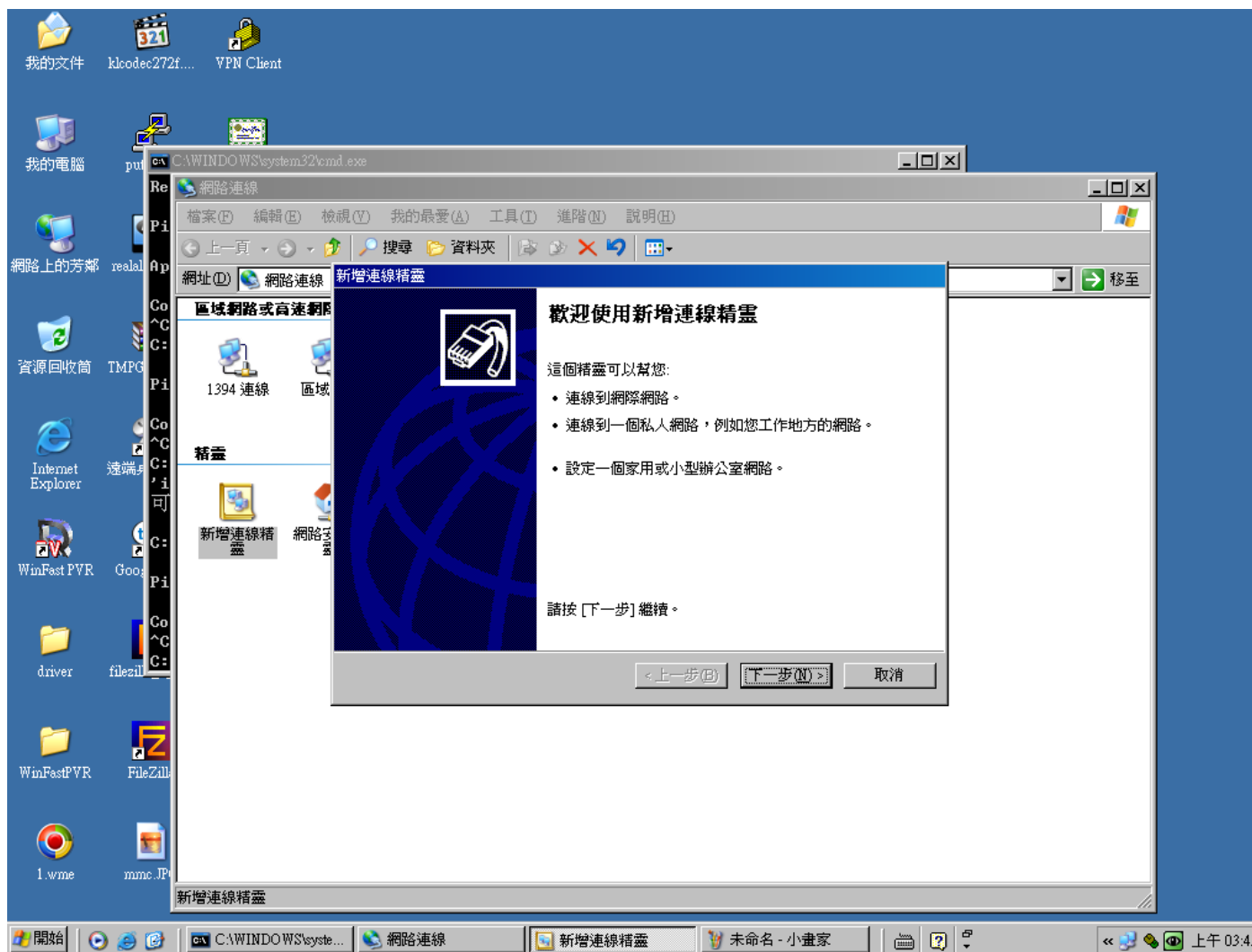






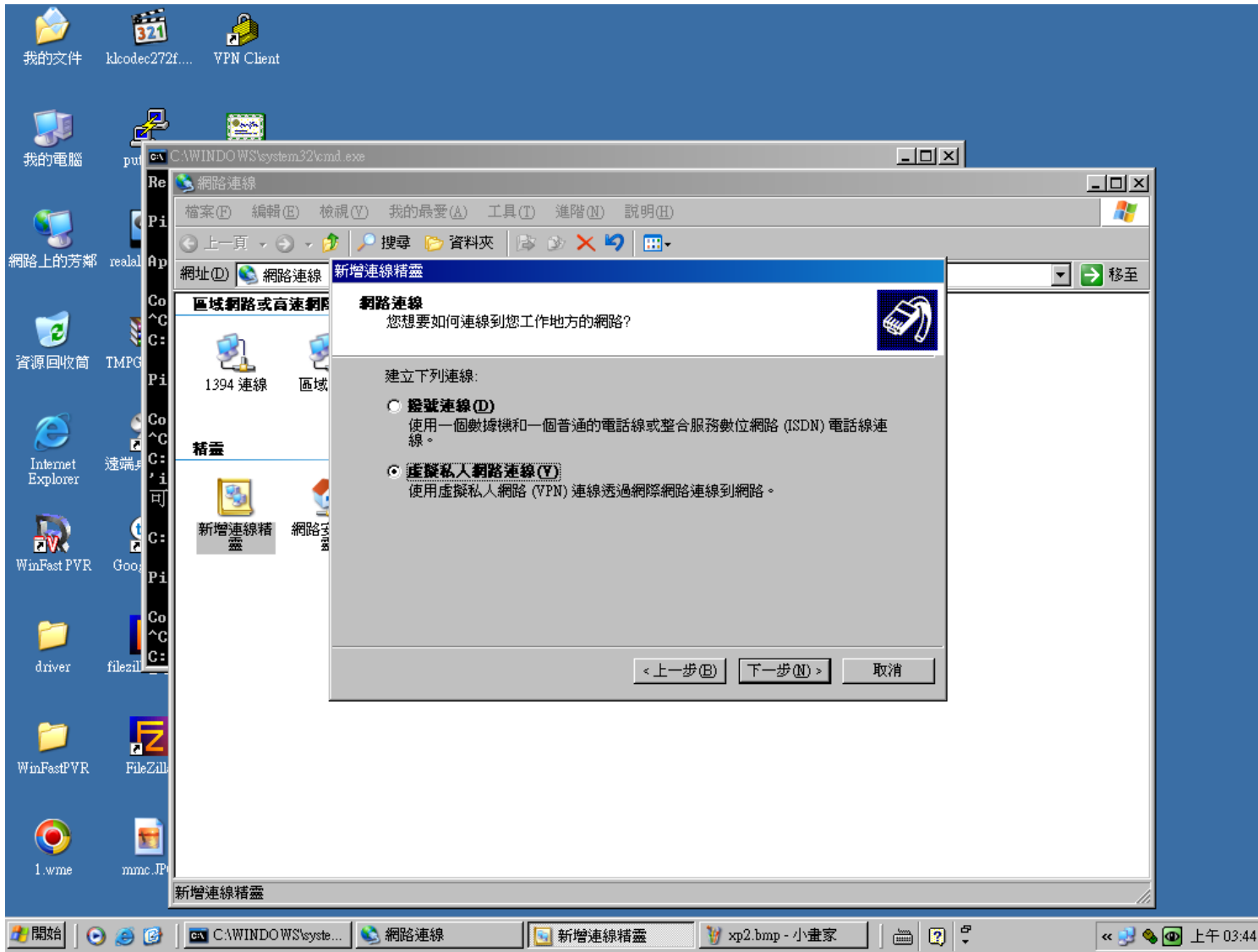


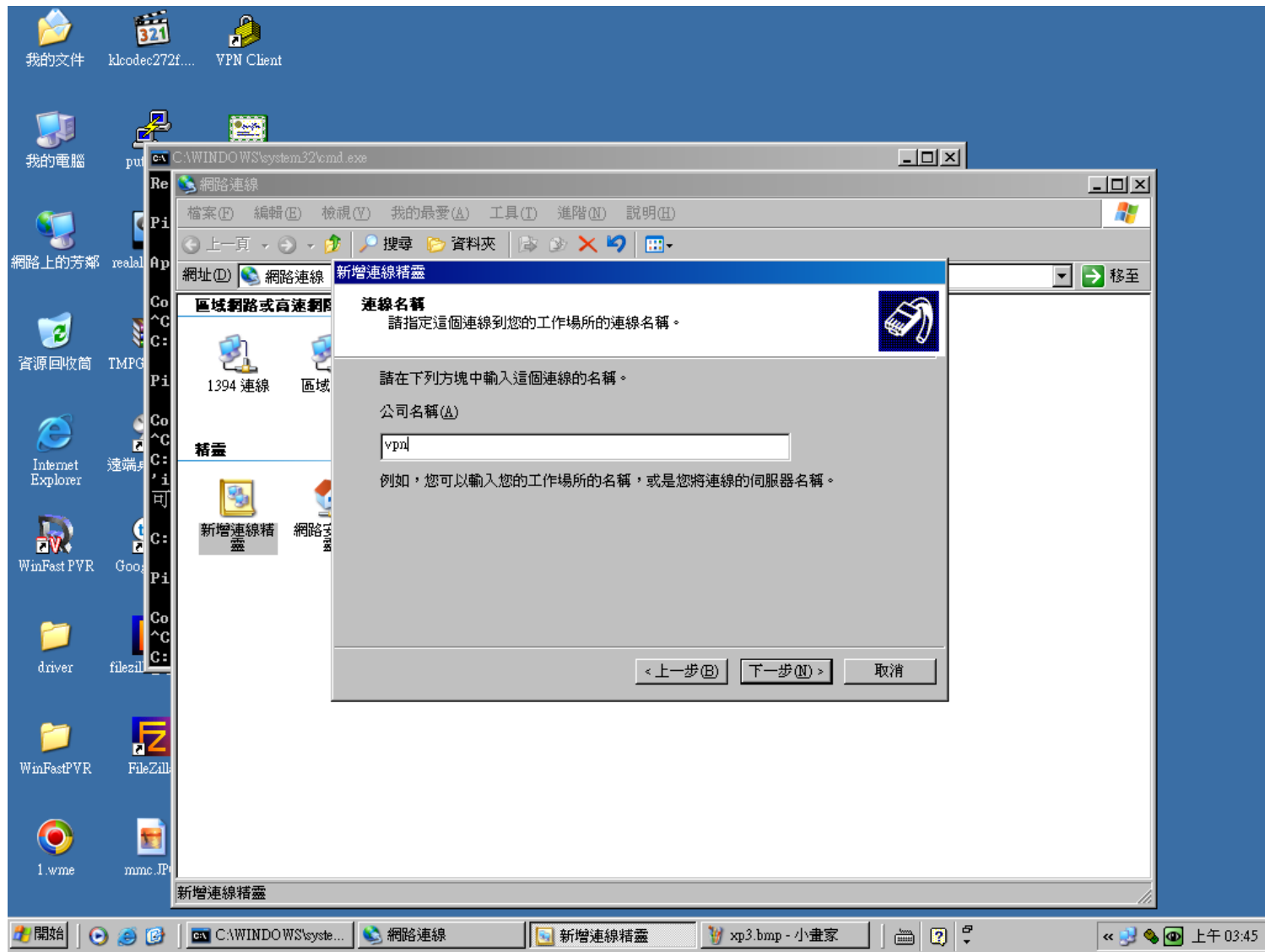
# Windows VPN Client設定

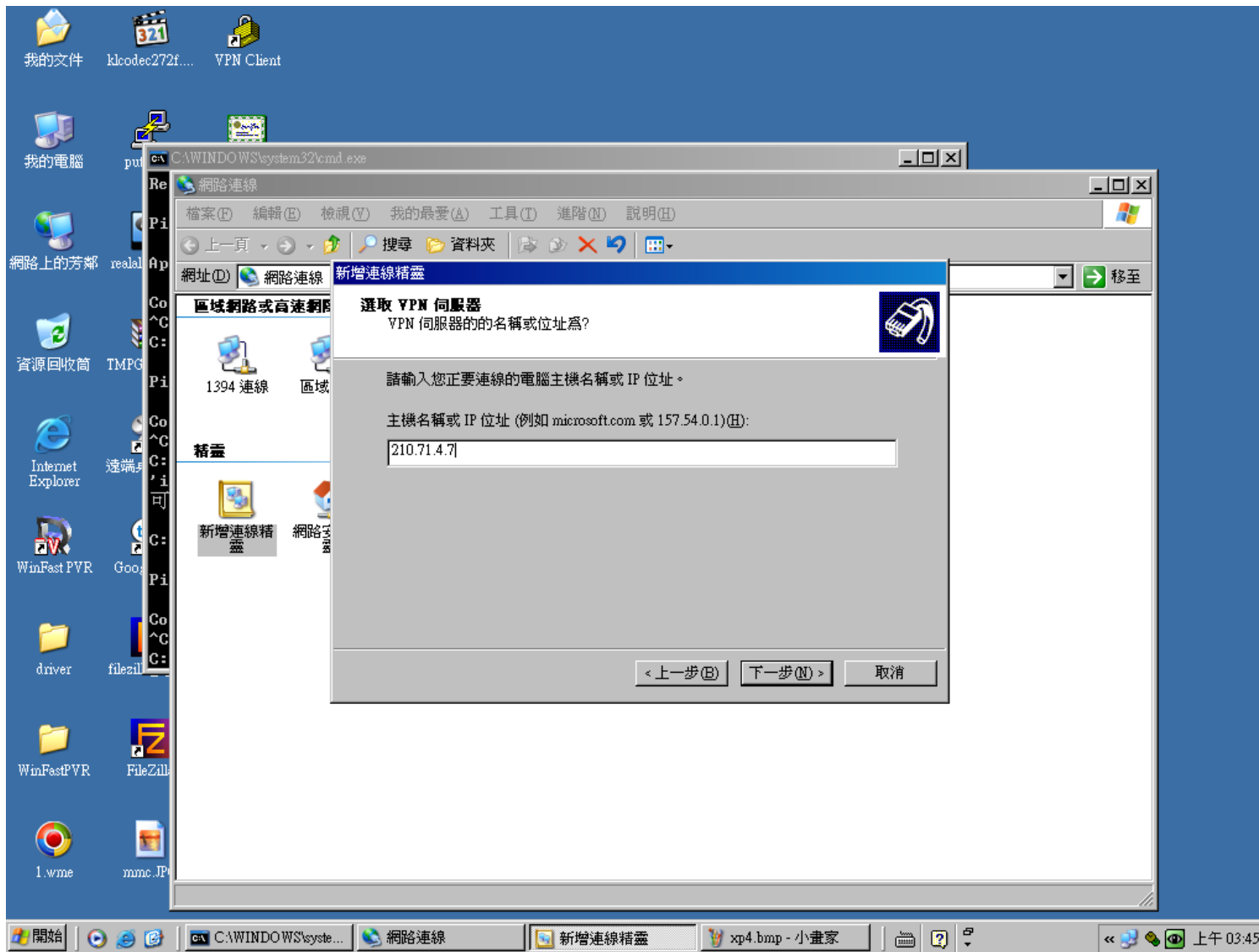


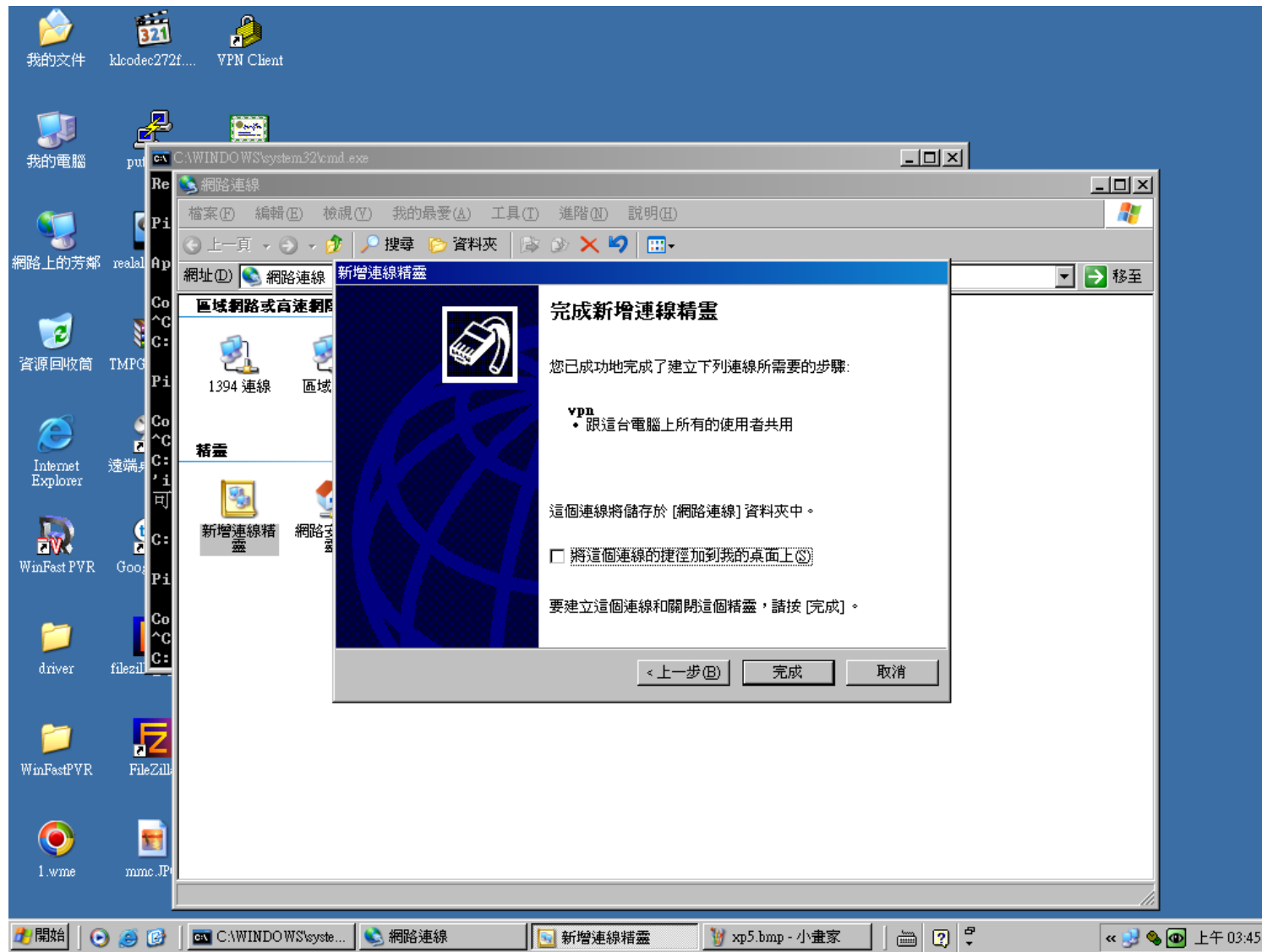


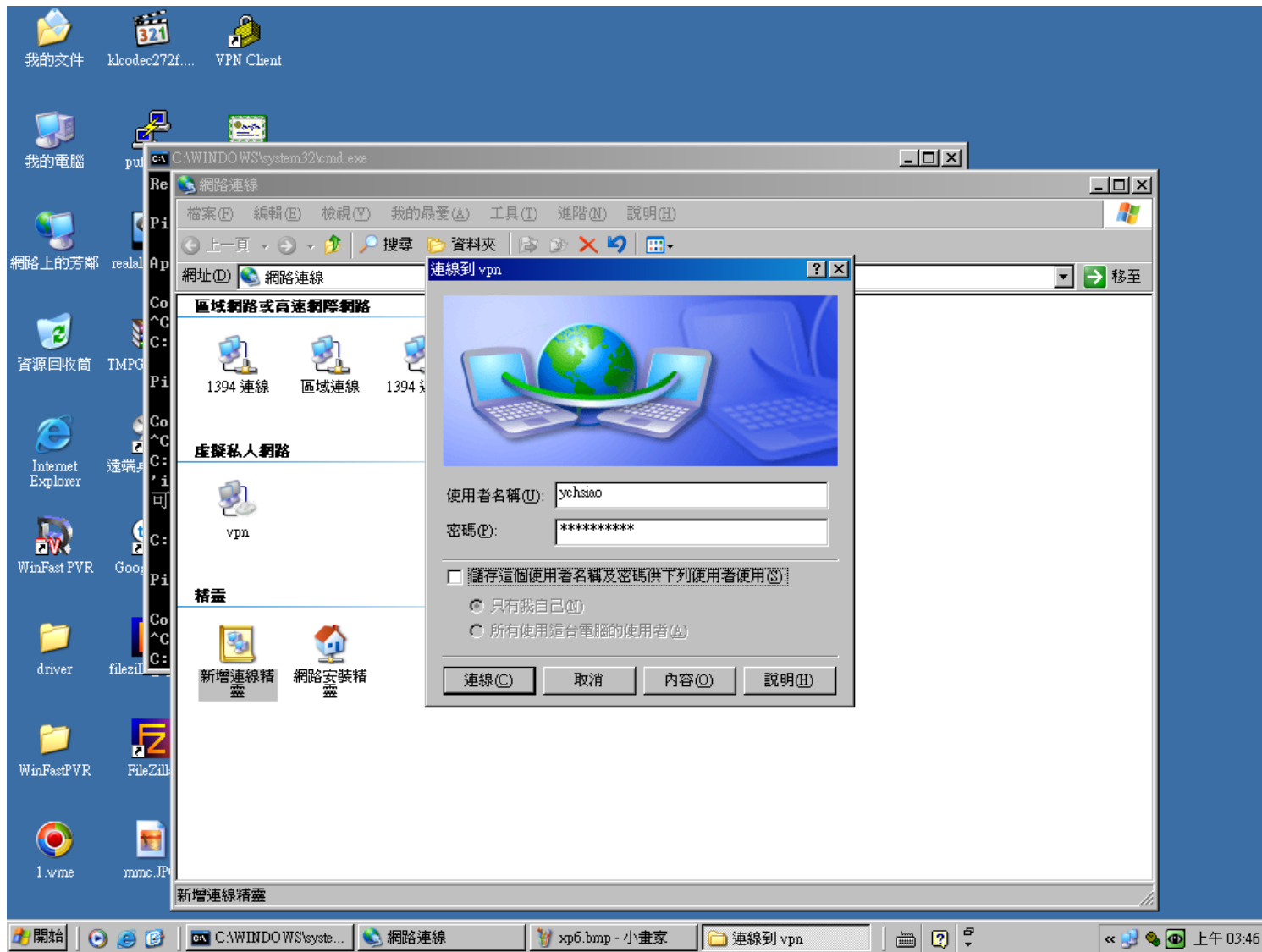


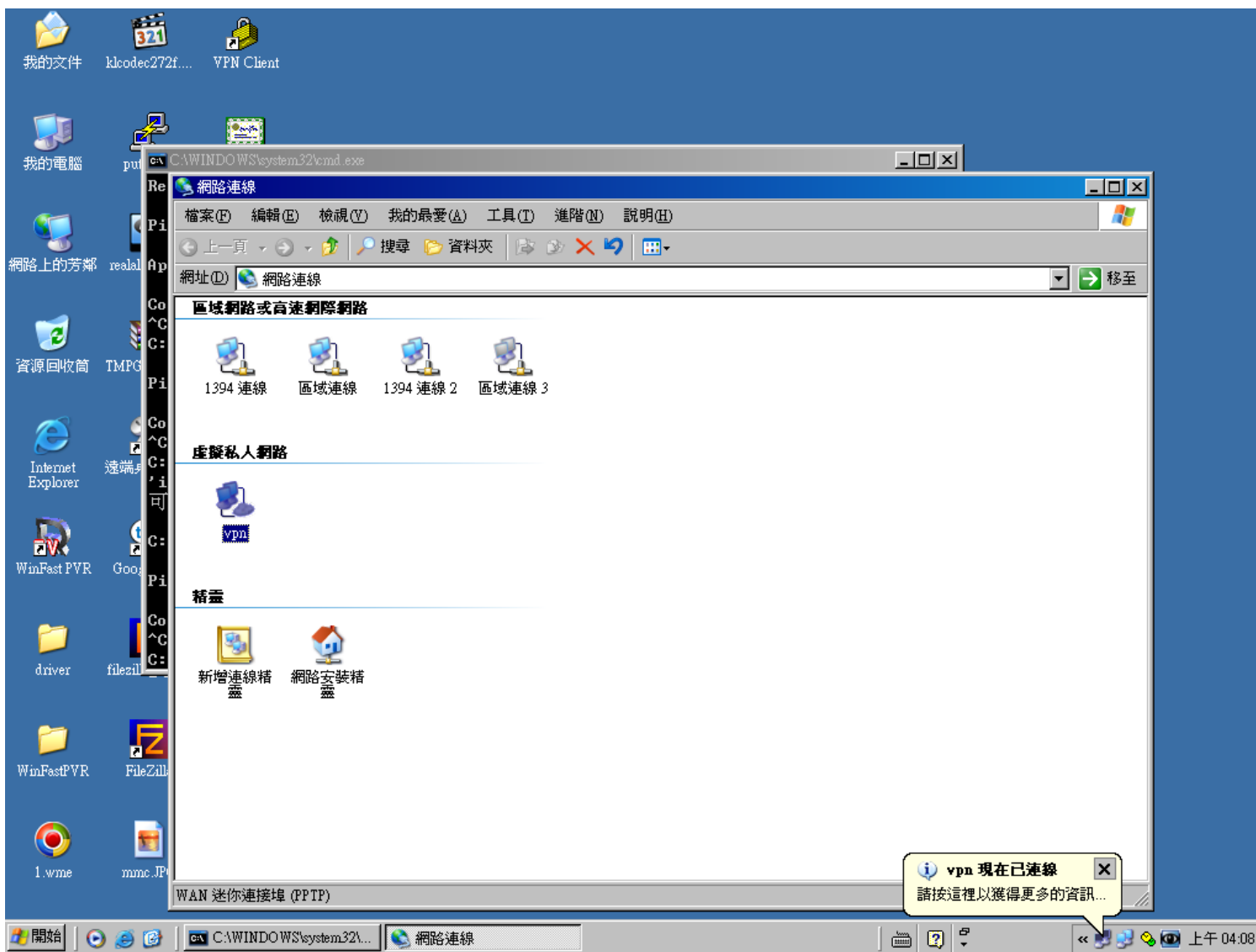




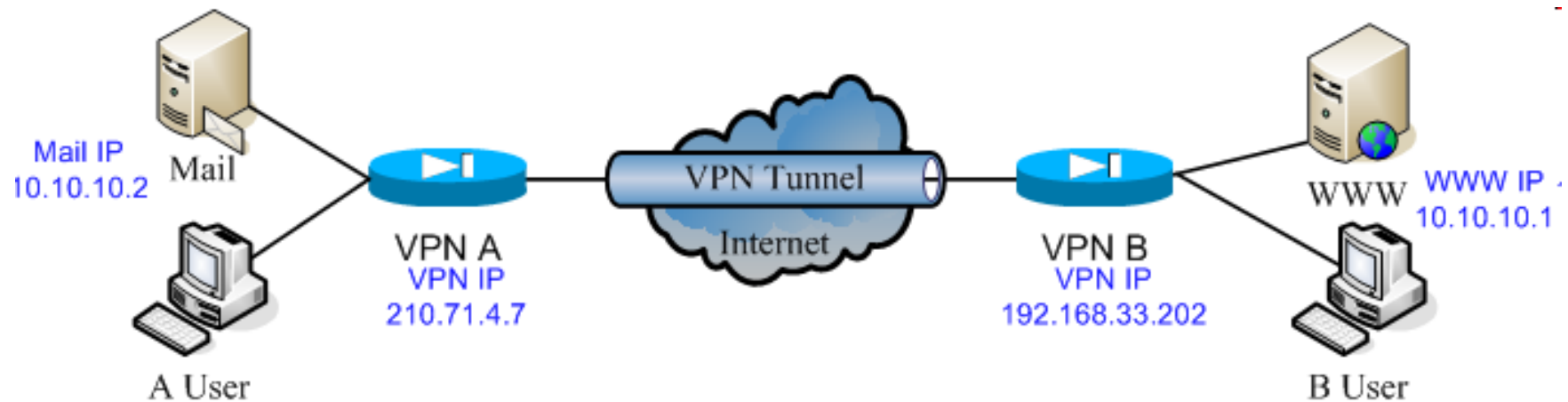








# Site to Site VPN



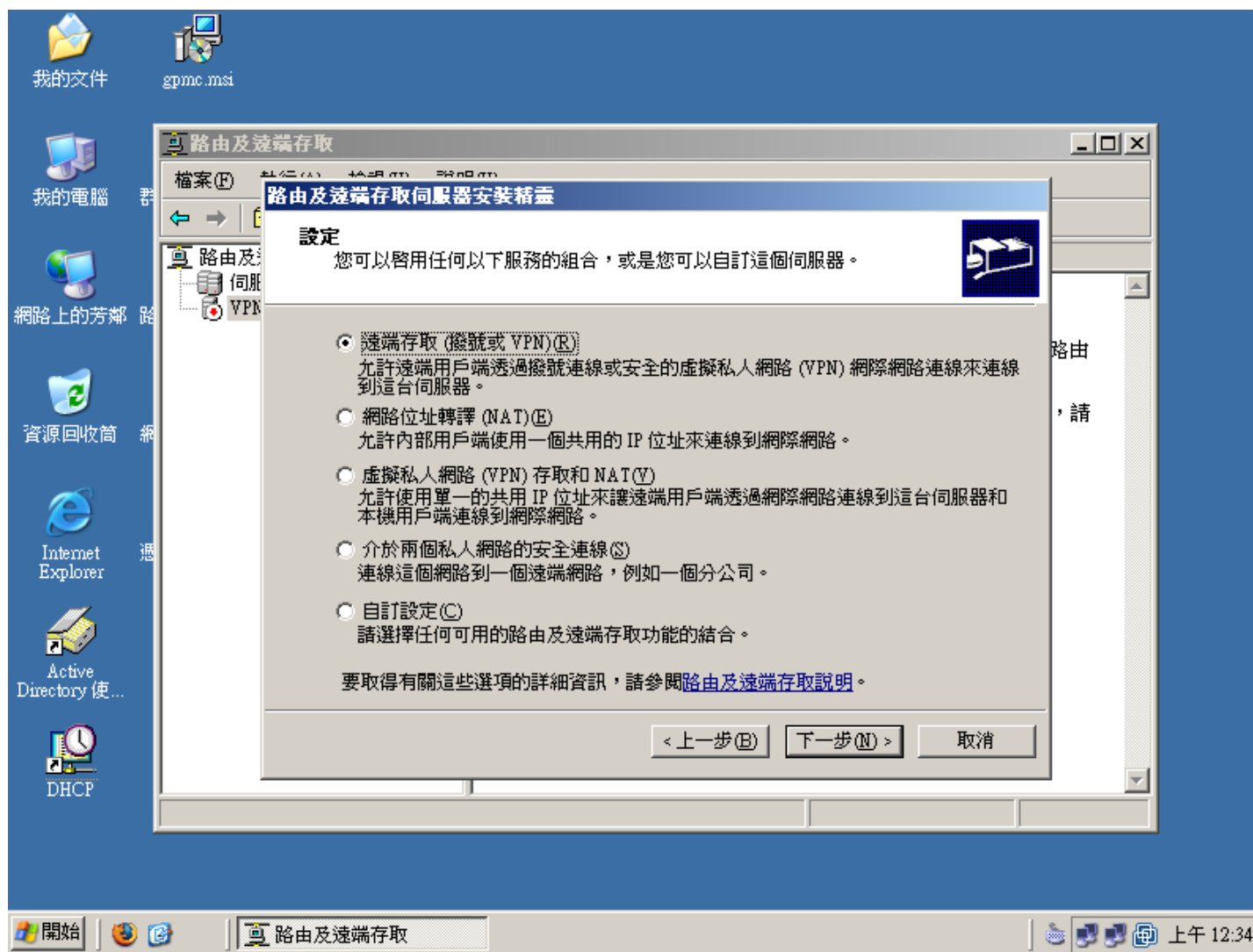
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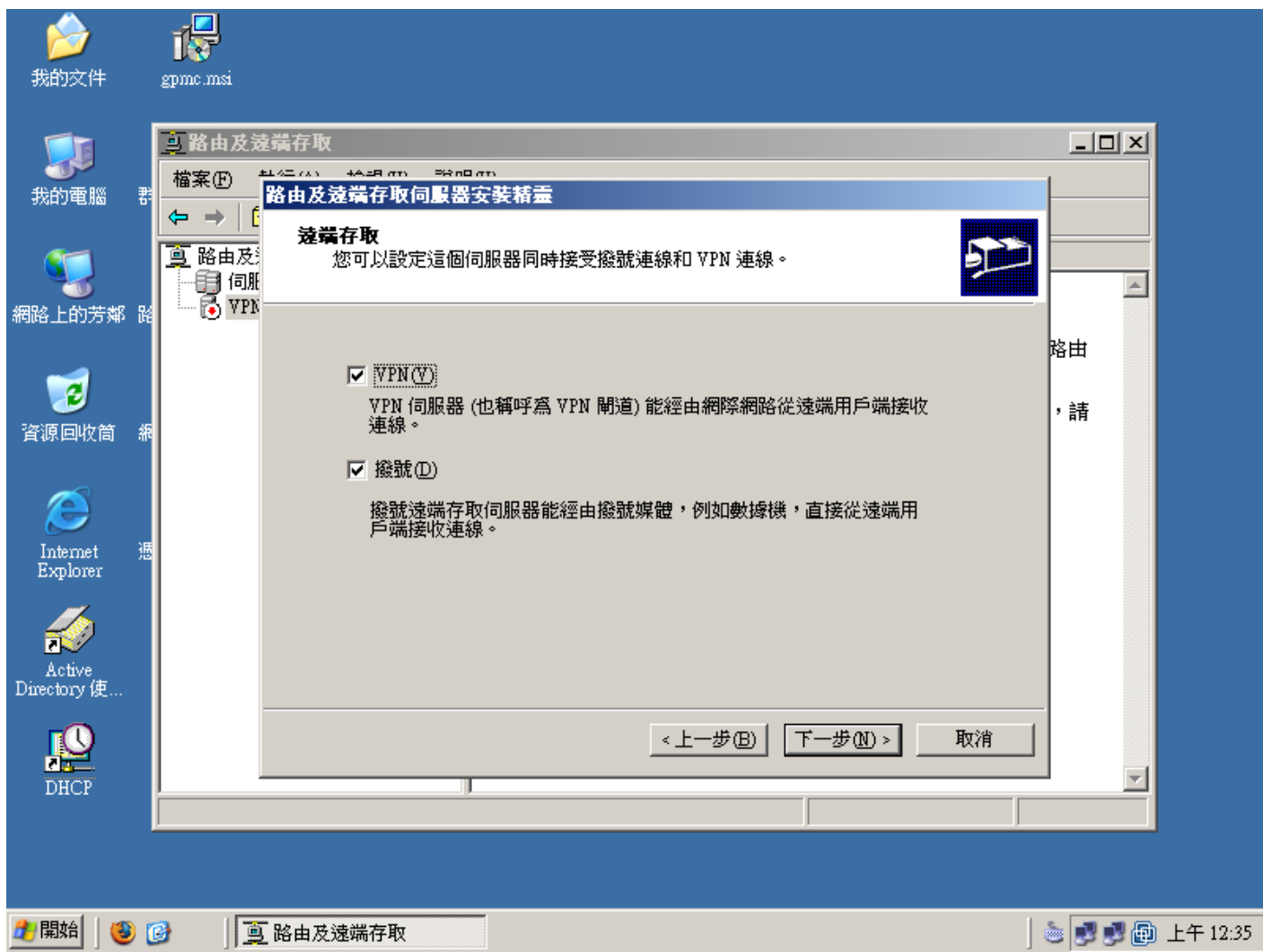
# Site to Site VPN

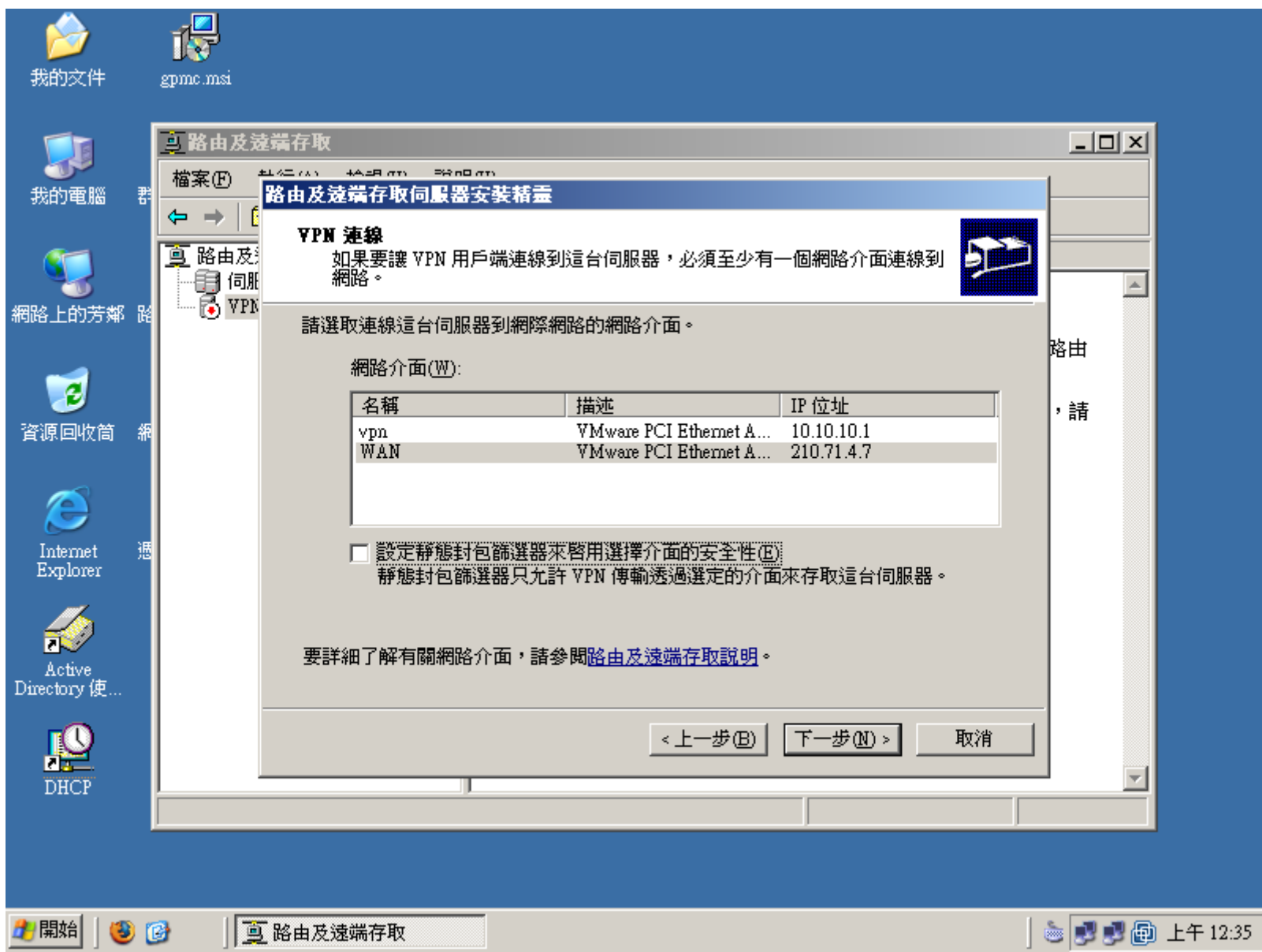
- Site A VPN IP:210.71.4.7
- Site B VPN IP:192.168.33.202
- Site B VPN透過PPTP撥號至Site A VPN進立Site to Site VPN

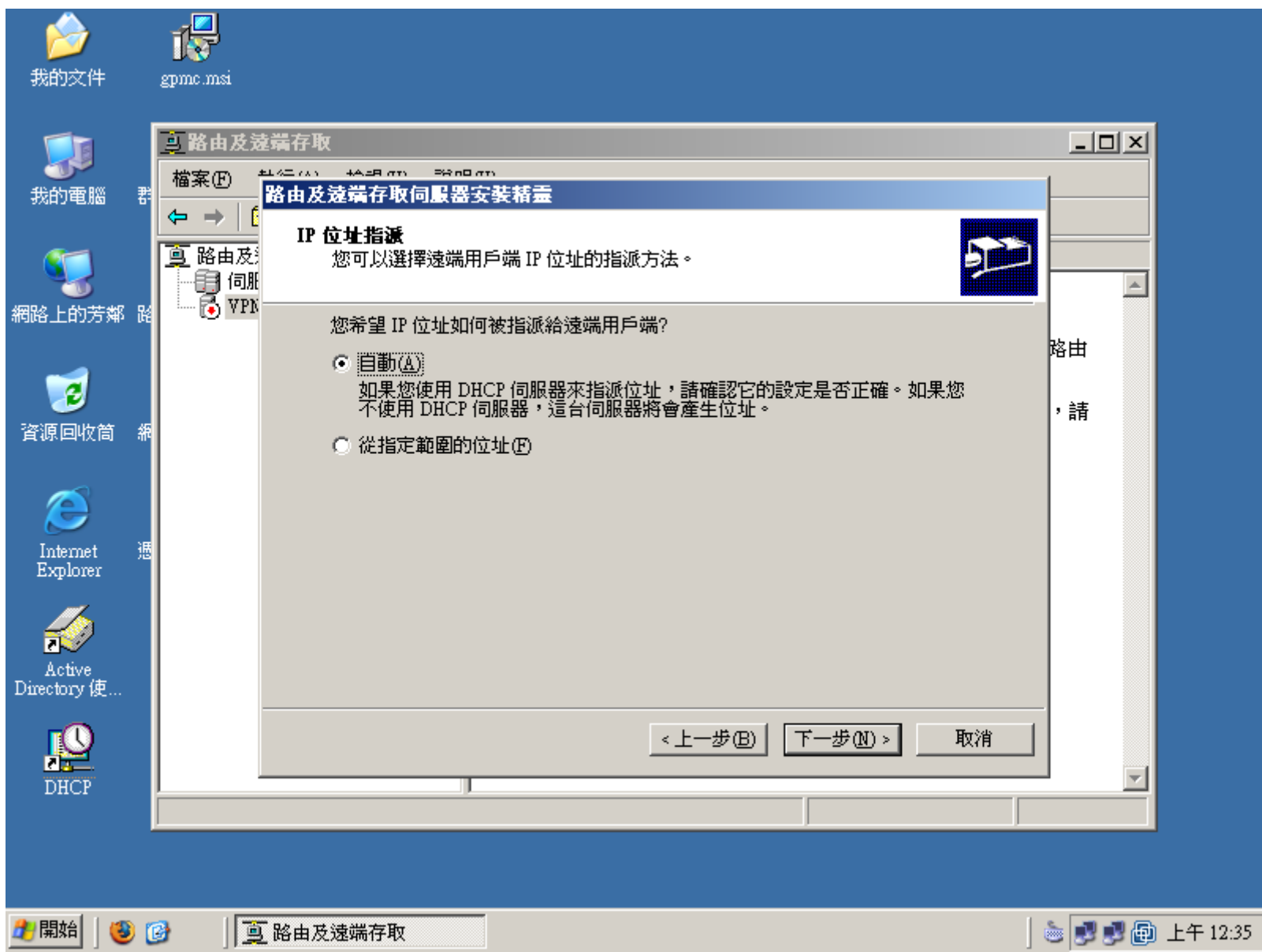


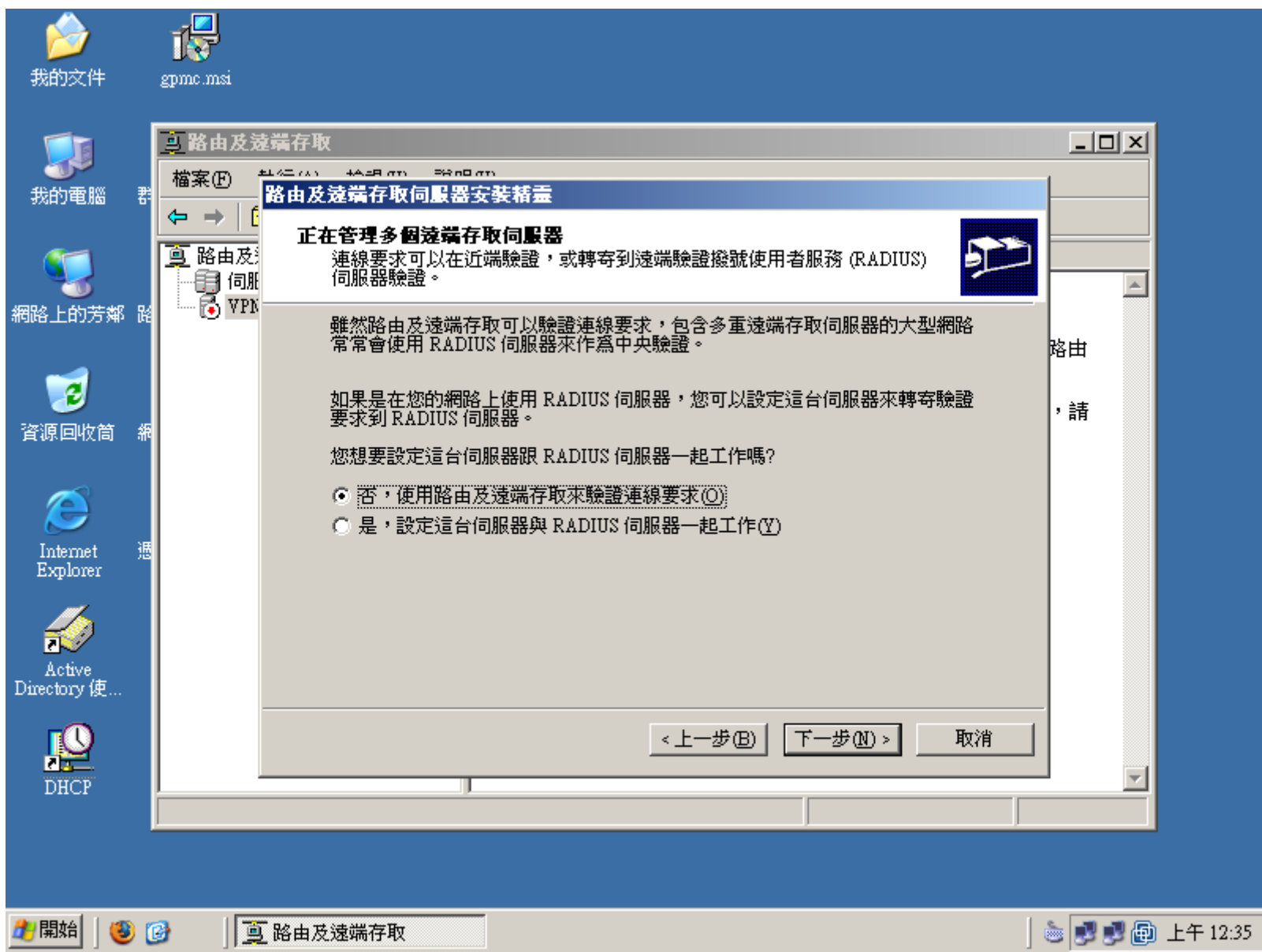
# Site A 設定

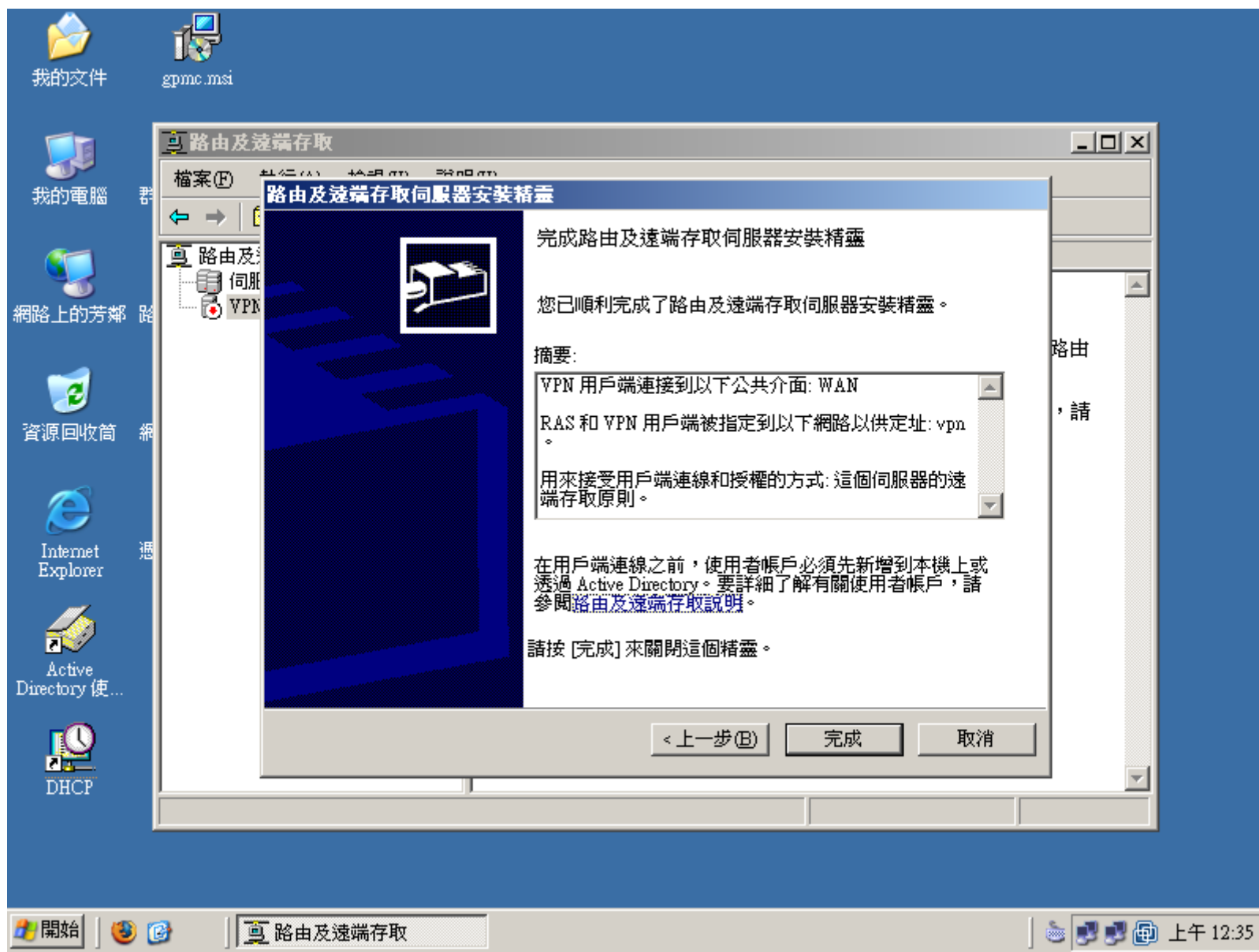












# Site B VPN設定

The screenshot shows a Windows XP desktop with a blue taskbar. The desktop background is blue with several icons on the left: '我的文件' (My Documents), '我的電腦' (My Computer), '網路上的芳鄰' (Network Places), '資源回收筒' (Recycle Bin), 'Internet Explorer', 'Active Directory 使...' (Active Directory Users and Computers), and 'DHCP'. The taskbar includes the Start button, several application icons, and the system tray showing the time as 12:39 on 上午 (AM).

The main window is titled '路由及遠端存取' (Routing and Remote Access). It contains a wizard for '路由及遠端存取伺服器安裝精靈' (Routing and Remote Access Server Installation Wizard). The current step is '設定' (Settings), with the instruction: '您可以啟用任何以下服務的組合，或是您可以自訂這個伺服器。' (You can enable any combination of the following services, or you can customize this server.)

The settings options are:

- 遠端存取 (撥號或 VPN)(R) (Remote Access (Dial-up or VPN)(R))  
允許遠端用戶端透過撥號連線或安全的虛擬私人網路 (VPN) 網際網路連線來連線到這台伺服器。  
(Allows remote clients to connect to this server through dial-up connections or secure virtual private network (VPN) Internet connections.)
- 網路位址轉譯 (NAT)(E) (Network Address Translation (NAT)(E))  
允許內部用戶端使用一個共用的 IP 位址來連線到網際網路。  
(Allows internal clients to use a shared IP address to connect to the Internet.)
- 虛擬私人網路 (VPN) 存取和 NAT(Y) (Virtual Private Network (VPN) Access and NAT(Y))  
允許使用單一的共用 IP 位址來讓遠端用戶端透過網際網路連線到這台伺服器和本機用戶端連線到網際網路。  
(Allows the use of a single shared IP address to let remote clients connect to this server and local clients connect to the Internet through Internet connections.)
- 介於兩個私人網路的安全連線(S) (Secure Connections Between Two Private Networks(S))  
連線這個網路到一個遠端網路，例如一個分公司。  
(Connects this network to a remote network, such as a branch office.)
- 自訂設定(C) (Custom Settings(C))  
請選擇任何可用的路由及遠端存取功能的結合。  
(Select any combination of available routing and remote access features.)

At the bottom of the wizard, there is a note: '要取得有關這些選項的詳細資訊，請參閱路由及遠端存取說明。' (For more information about these options, see Routing and Remote Access Help.)

Navigation buttons at the bottom of the wizard are: '< 上一步(B)' (Previous Step), '下一步(N) >' (Next Step), and '取消' (Cancel).

