Routing

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2nd Level.
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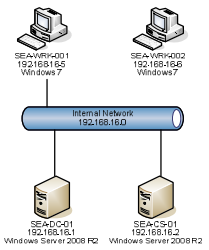
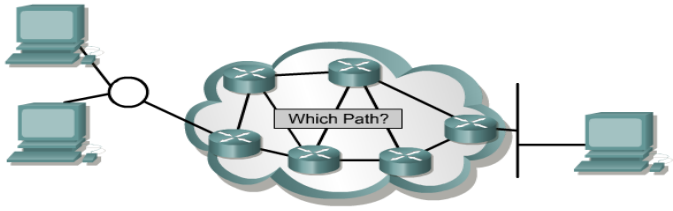


Routing

هي عملية إختيار أفضل مسار للبيانات للبيانات في رحلتها من المرسل إلى المستقبل



Routing Methods

a. Routing tables based on route

Destination	Route
Host B	R1, R2, host B

Routing table for host A

Destination	Route
Host B	R2, host B

Routing table for R1

Destination	Route
Host B	Host B

Routing table for R2

b. Routing tables based on next hop

Destination	Next hop
Host B	R1

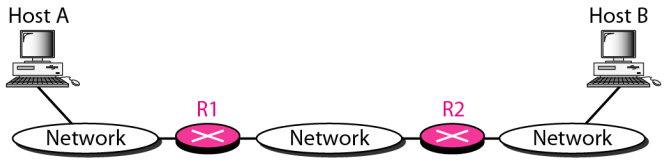
Routing table for host A

Destination	Next hop
Host B	R2

Routing table for R1

Destination	Next hop
Host B	---

Routing table for R2



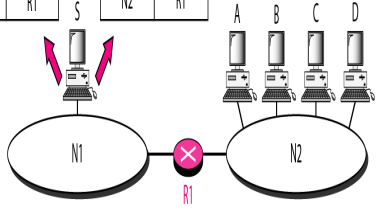
Routing Methods

Routing table for host S based on host-specific method

Destination	Next hop
A	R1
B	R1
C	R1
D	R1

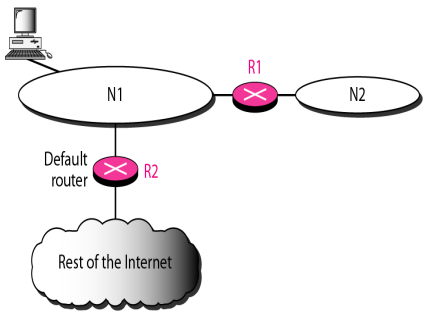
Routing table for host S based on network-specific method

Destination	Next hop
N2	R1



Destination	Next hop
N2 Any other	R1 R2

Routing table for host A



Routing Types

Static

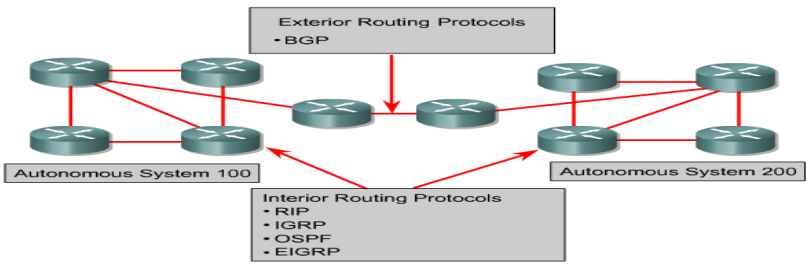
Uses a programmed route that a network administrator enters into the router

Dynamic

Uses a route that a routing protocol adjusts automatically for topology or traffic changes

Routing Protocols

- Protocols used by routers to build routing tables.
- Routing tables are used by routers to forward packets.
  - **RIP**
  - **IGRP** and **EIGRP**
  - **OSPF**
  - **IS-IS**
  - **BGP**



Routing Protocols

Open Shortest Path First (OSPF) is a nonproprietary link-state routing protocol.

- It is a **link-state** routing protocol.
- **Open standard** routing protocol described in RFC 2328.
- Uses the **SPF algorithm** to calculate the lowest cost to a destination.
- **Routing updates are flooded** as topology changes occur.

Intermediate System to Intermediate System (IS-IS)

- IS-IS is an Open System Interconnection (OSI) routing protocol originally specified by International Organization for Standardization (ISO) 10589.
- It is a **link-state** routing protocol.

Border Gateway Protocol (BGP) is an exterior routing protocol.

- It is a **distance vector** (or path vector) exterior routing protocol
- Used between **ISPs or ISPs and clients**.
- Used to **route Internet traffic** between autonomous systems.

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Routing Protocols

Routing Information Protocol (RIP) was originally specified in RFC 1058.

- It is a **distance vector** routing protocol.
- **Hop count** is used as the metric for path selection.
- If the hop count is **greater than 15, the packet is discarded**.
- Routing updates are broadcast **every 30 seconds**, by default.

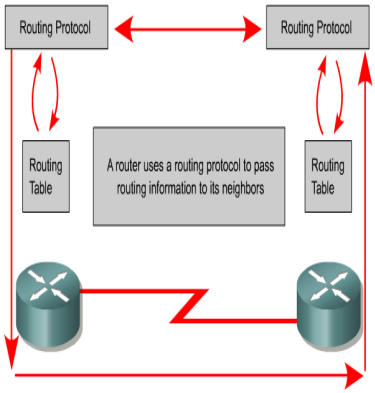
Interior Gateway Routing Protocol (IGRP) is a proprietary protocol developed by Cisco.

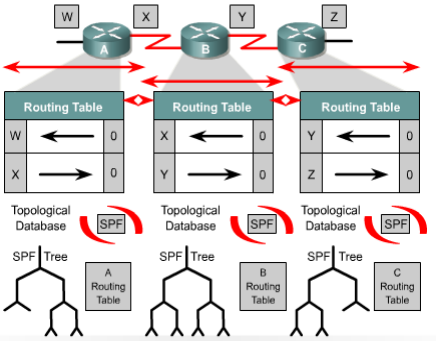
- It is a **distance vector** routing protocol.
- **Bandwidth, load, delay and reliability** are used to create a composite metric.
- Routing updates are broadcast **every 90 seconds**, by default.

EIGRP is a Cisco proprietary enhanced distance vector routing protocol.

- It is an **enhanced distance vector routing protocol**.
- Uses **unequal-cost and equal-cost** load balancing.
- Uses a combination of distance vector and link-state features.
- Uses **Diffused Update Algorithm (DUAL)** to calculate the shortest path.

Routing Tables





Each router has its own topological database on which the SPF algorithm is run.

Windows 2008 Server with Routing and Remote Access service

- **Routing and Remote Access Services (RRAS)**
  - Role service used to configure and manage network routing in Windows Server 2008
  - Recommended for use in small networks that require simple routing directions
  - Not recommended for large and complex environments
- **Routers**
  - Responsible for forwarding packets between subnets, or networks with differing IP addressing schemes

Figure 8-1 Routing two subnets

Routing Table in Windows Server 2008

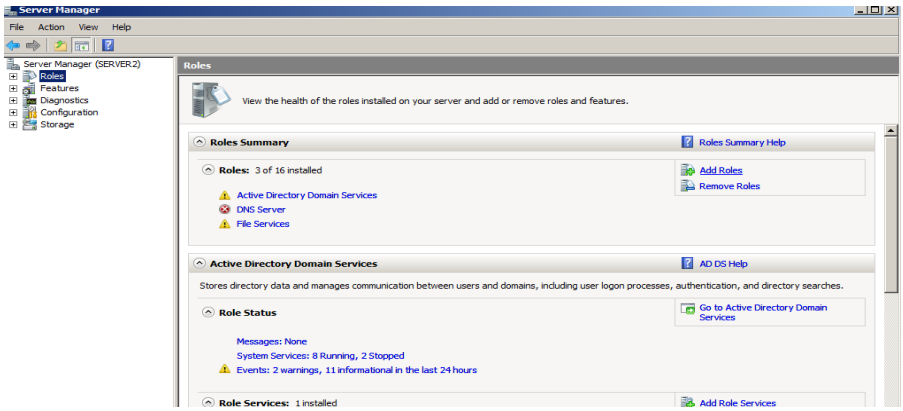
- Routing tables are composed of routes
- Routes
  - Direct data traffic to its destination based on the information it contains
- Routing tables
  - Can be managed in the RRAS console or from the command line using the route command

Table 9-1 Route command options

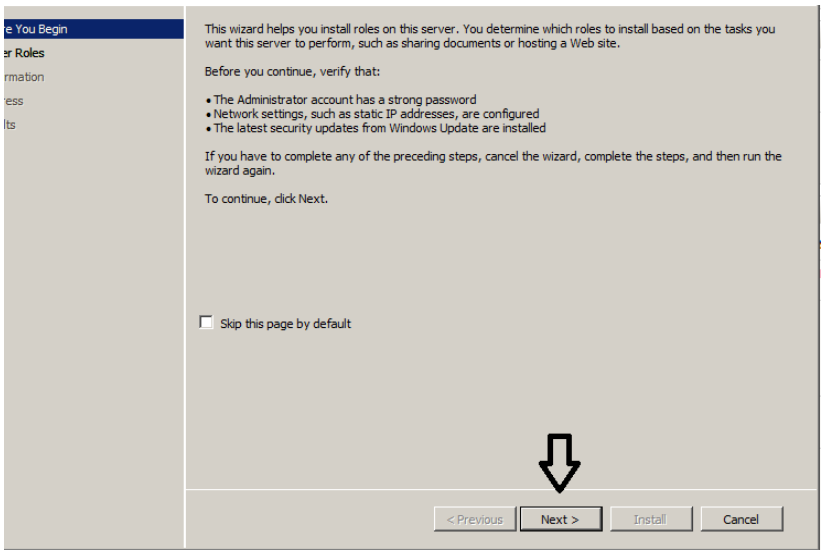
Command	Description	Example
Print	Prints the current routing table.	Route print
Add	Adds a route to a routing table for a RRAS server. -p can be used with the command to add a persistent route so that it will be available after a reboot.	Route -p add 192.168.200.0 mask 255.255.255.0 192.168.200.1
Change	Modifies an existing route in a routing table.	Route change 192.168.200.0 mask 255.255.255.0 192.168.200.254
Delete	Deletes an existing route from a routing table.	Route delete 192.168.200.0

Configure routing in Windows Server 2008

- قم بفتح شاشة **Server Manager**
- **Start > Administrative Tools > Server Manager**



Routing Configuration



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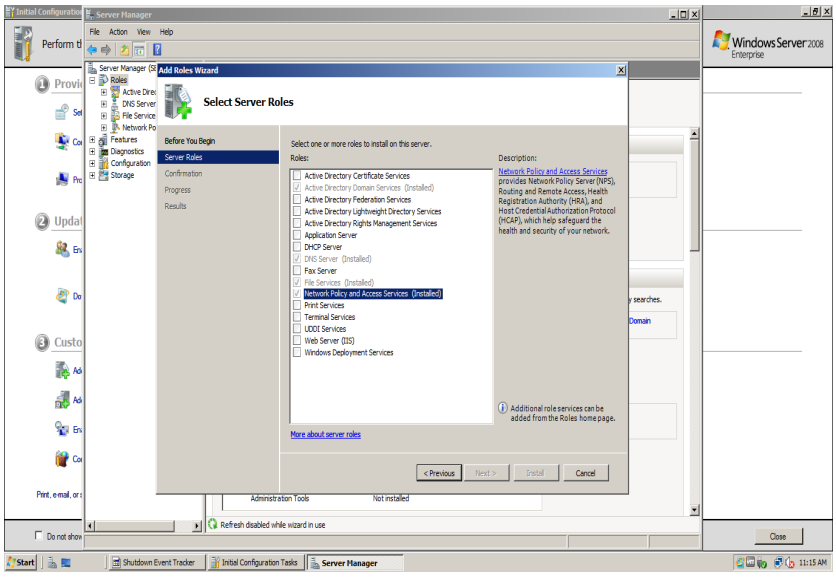

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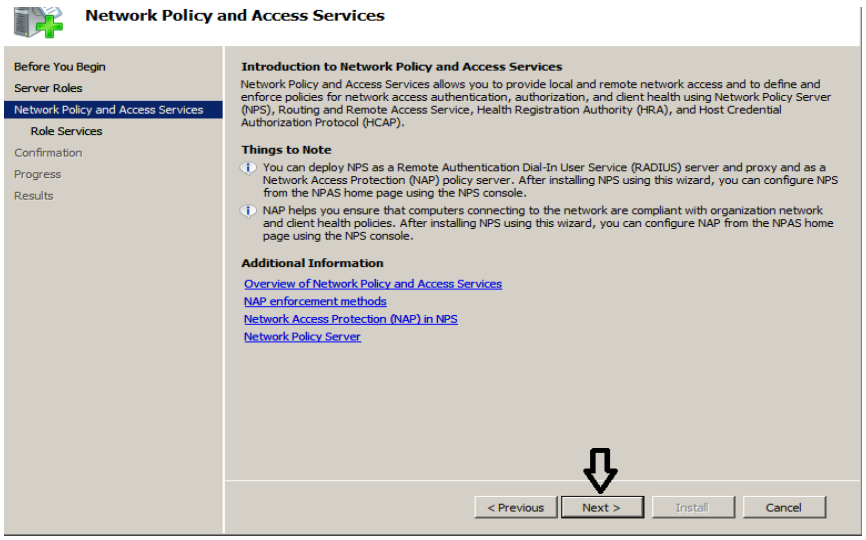

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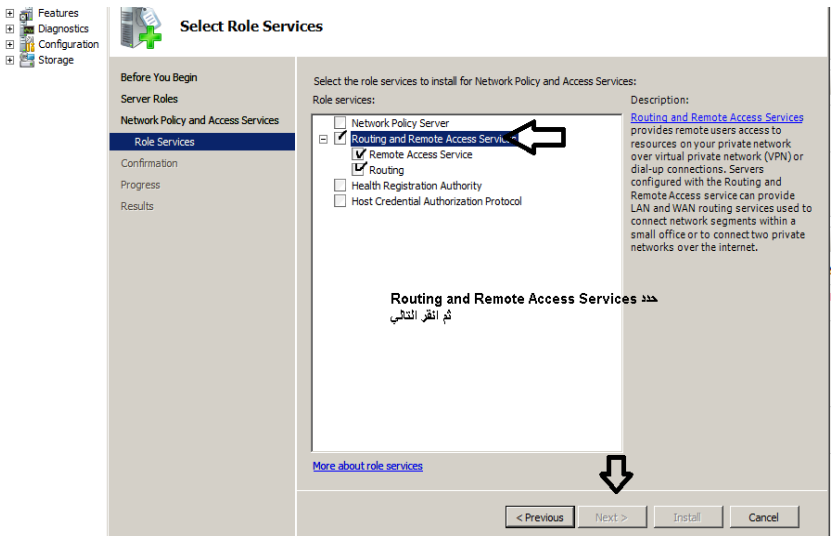

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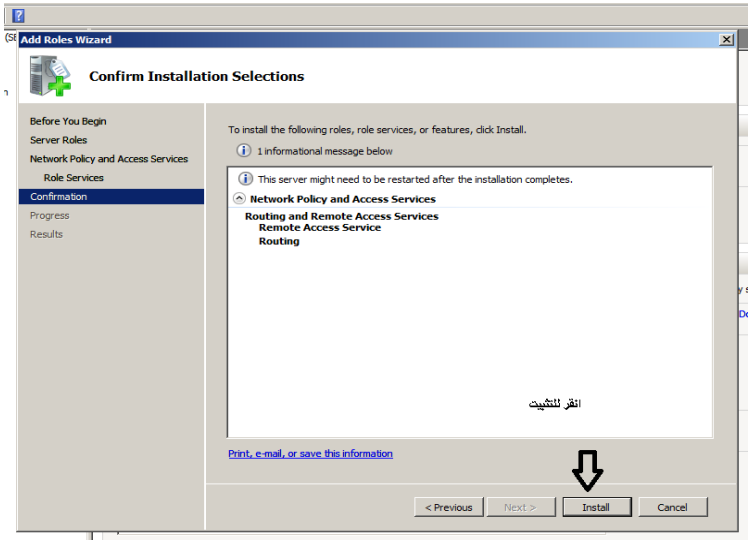

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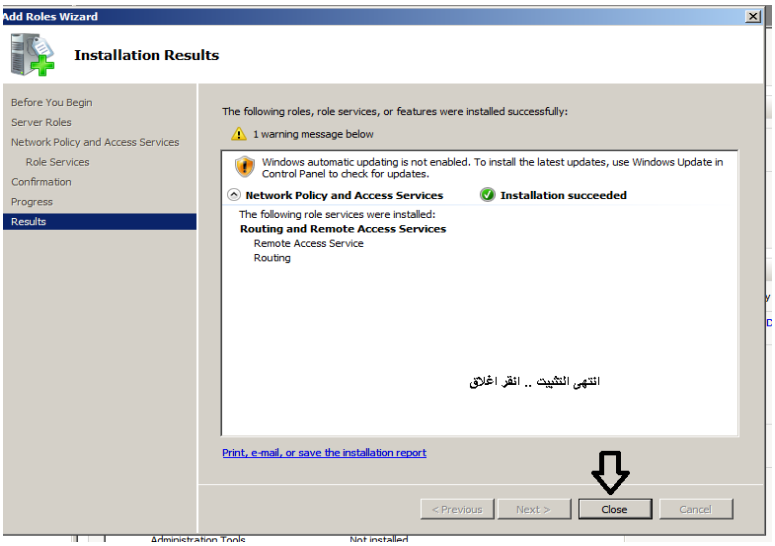

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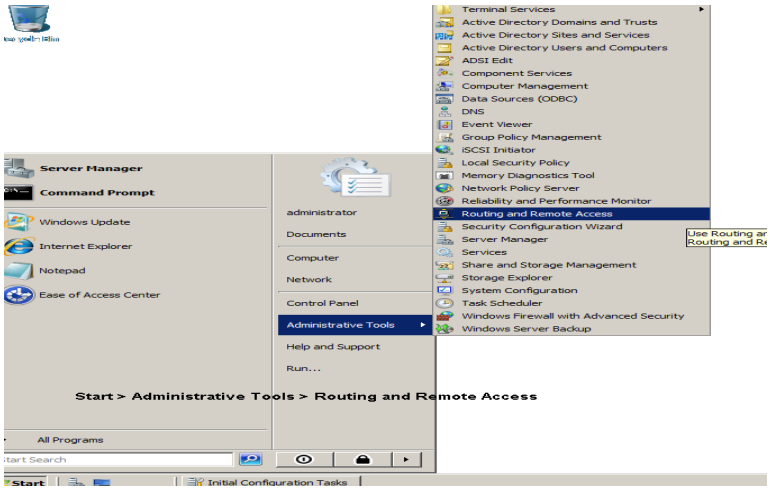

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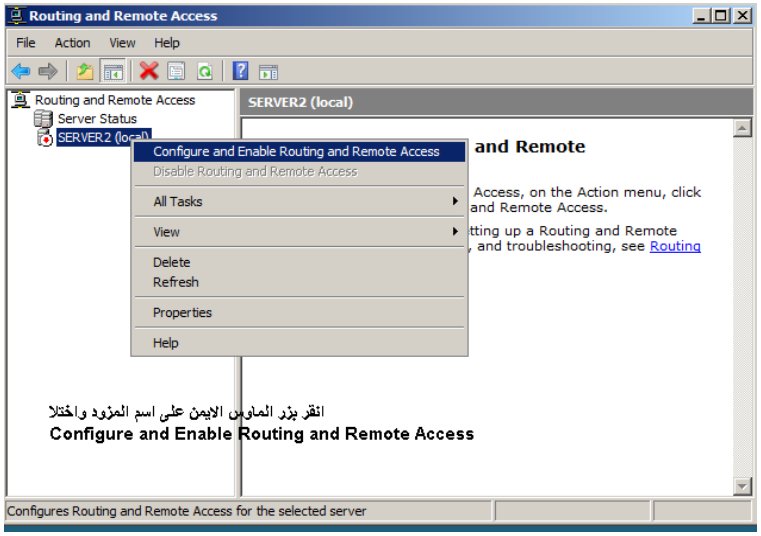

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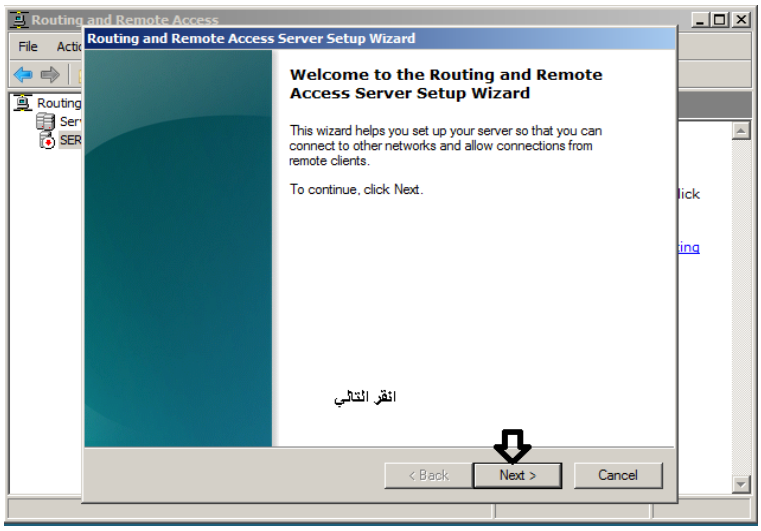

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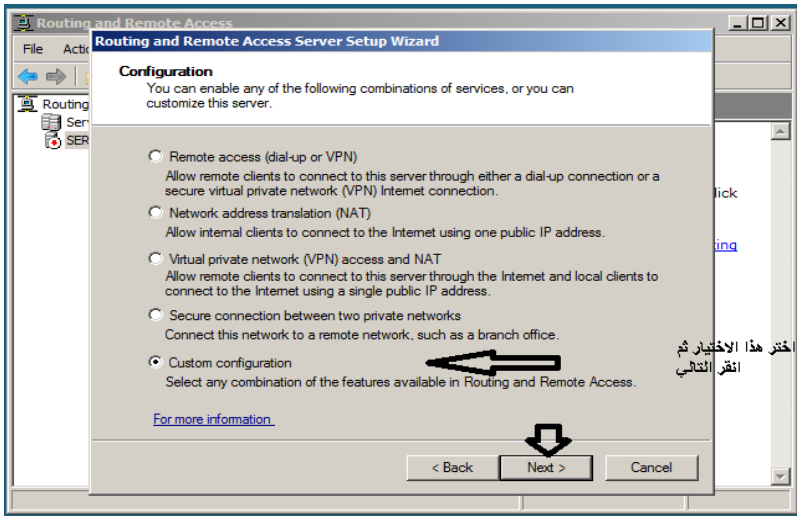

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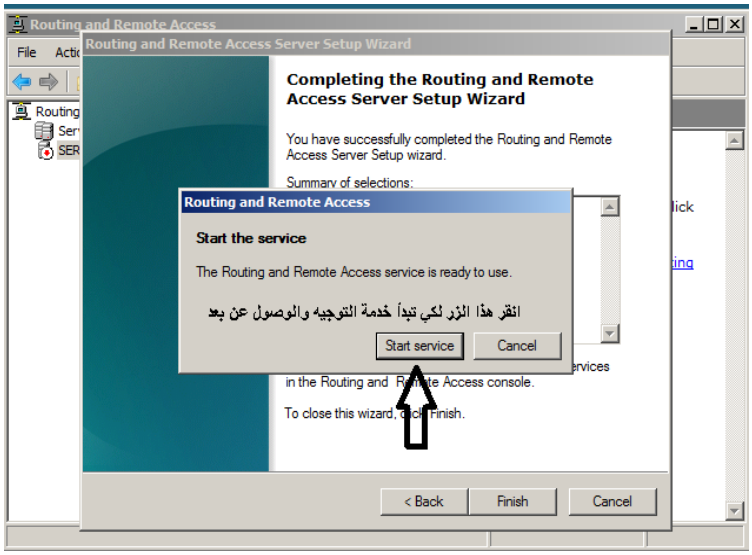

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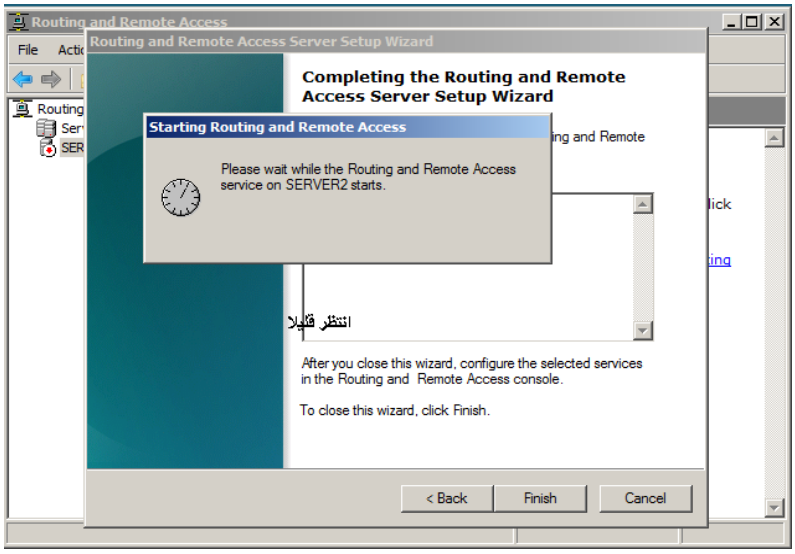

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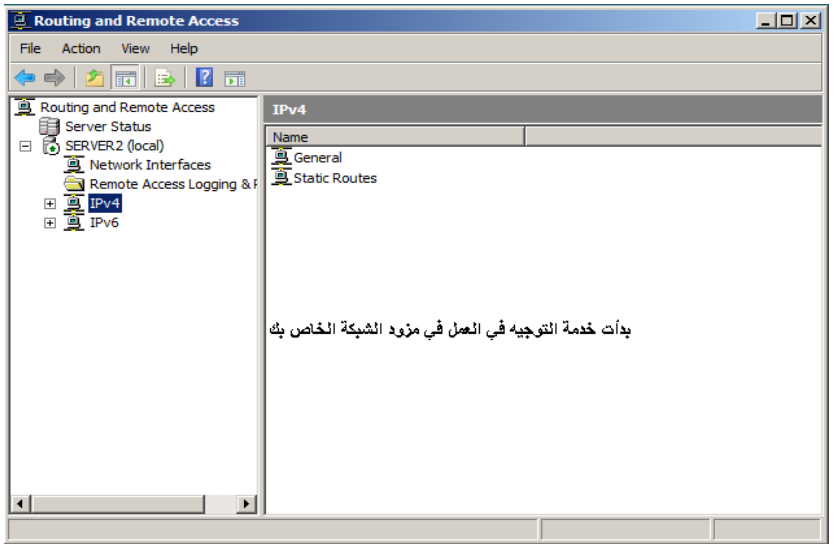

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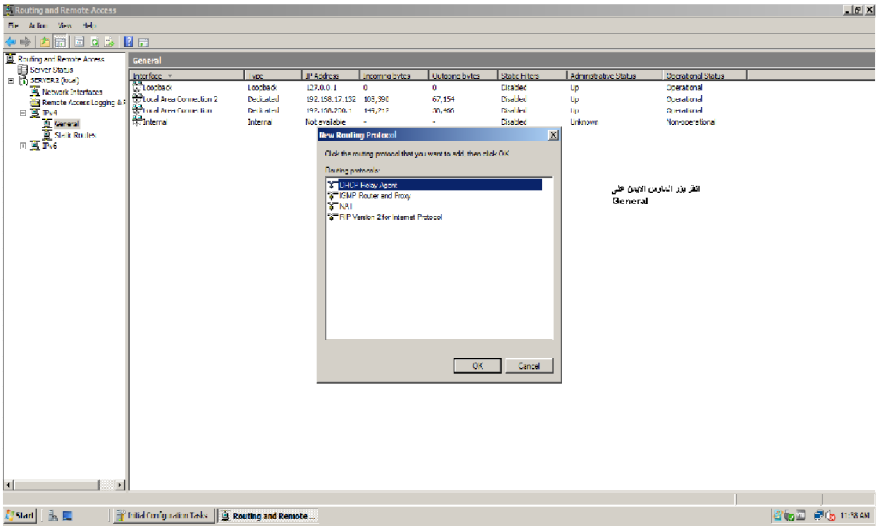

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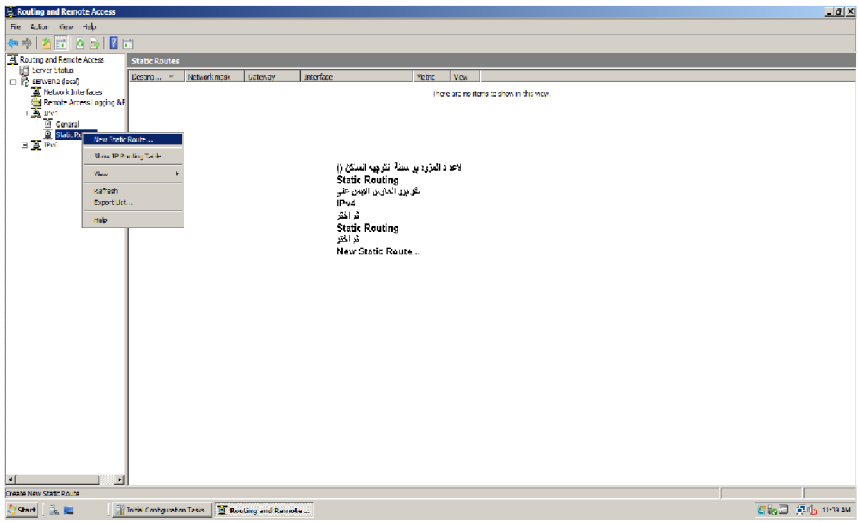

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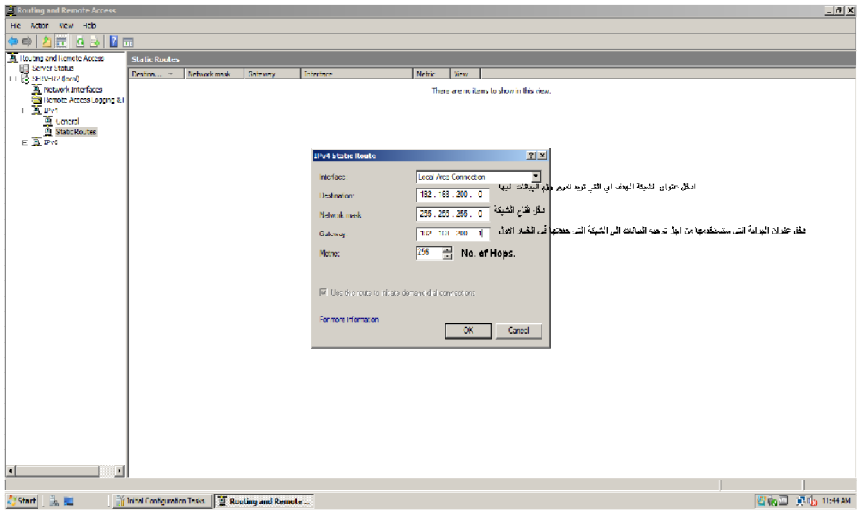

Any Questions ?