

VIRTUAL PRIVATE NETWORKS - II

Tunneling and Point-to-Point Protocol (PPP)

A tunnel is a connection that forms a virtual network on top of a physical network. In computer networking, a tunnel resembles a telephone line in a public switched telephone network. VPNs typically rely on tunneling to create a private network that reaches across a public network. Tunneling is a process of encapsulating packets and sending them over the public network. Employees who are located outside an organization's main building can use point-to-point connections to create tunnels through the Internet. Since tunneling connections normally run over the Internet, they need to be secure. A tunnel is a relatively inexpensive connection, since it uses the Internet as its primary form of communication. Besides Internet protocols, tunneling requires two other types of protocols:

1. Carrier protocols, through which information travels over the public network
2. Encapsulating protocols, through which data is wrapped, encapsulated, and secured One of the amazing implications of VPNs is that packets that use a protocol not supported on the Internet, such as NetBeui, can be placed inside an IP packet and sent safely over the Internet. VPNs can put a packet that uses a nonroutable IP address inside a packet to extend a private network over the Internet.

Consider the two LANs of the two organizations shown in [Figure 6.7](#). We want

to connect these two LANs through the Internet by using tunnels. Assume that the two LANs, as organization 1 and organization 2, want to use their own customized networking protocols, denoted by x , using connectionless datagram IP services. The IP resources can be at the scale of the Internet. Therefore, x -type packets cannot run over the Internet directly. The IP gateway R_1 listens for x -type packets on organization 1, encapsulates x -type packets in the transport-layer UDP datagrams, and transmits them over the Internet to R_2 . When R_2 receives the encapsulated x packets, it decapsulates and feeds them into organization 2. This connection in fact, a tunnel made through the Internet resembles a direct physical link between the two LANs.

Figure 6.7. A customized protocol packet tunneling through the Internet

