

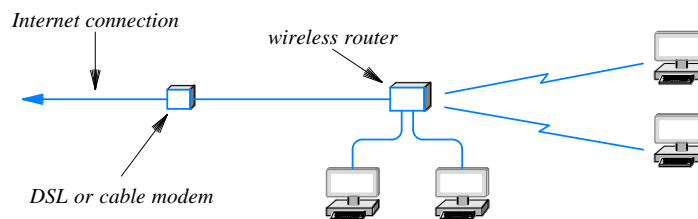
In the figure, the applications on two local computers are using local port 30000. NAT handles the situation without confusion by changing port numbers. In the example, NAT chooses port 40001 for one connection and 40002 for the other.

### 23.21 NAT And Servers

We said that a NAT system builds a translation table automatically by watching outgoing traffic and inserting a new mapping in the table whenever an application at the site initiates communication. Unfortunately, automatic table construction does not work well for communication initiated from the Internet to the site. For example, if multiple computers at a site each run a database server, the NAT device cannot know which computer should receive an incoming web connection. A variant of NAT called *Twice NAT* has been created to allow a site to run servers. Twice NAT arranges for the NAT system to interact with the site's Domain Name System server. When an application on the Internet looks up the domain name of a computer at the site, the DNS server at the site returns the valid IP address that has been assigned to the NAT device, and also creates a new entry in the NAT translation table. Thus, the translation table is initialized before the first packet arrives. Although it is not elegant, Twice NAT works for most cases. Twice NAT fails, however, if a client application uses the IP address directly without performing a domain name lookup, or if the client uses a DNS proxy to resolve domain names.

### 23.22 NAT Software And Systems For Use At Home

NAT is especially useful at a residence or small business that has a broadband connection because it allows a set of computers to share the connection without requiring the customer to purchase additional IP addresses from the ISP. In addition to software that allows a PC to act as a NAT device for additional PCs, dedicated NAT hardware systems are available at low cost. Such systems are usually called *wireless routers* because they allow computers to connect via Wi-Fi<sup>†</sup>. Figure 23.15 illustrates how a wireless router is connected.



**Figure 23.15** Illustration of the connections for a wireless router.

<sup>†</sup>The terminology is slightly misleading because such routers usually offer wired connections as well.