```
9  44 40 40  209.247.34.166  internap-ne.chicago1.level3.net
10 38 37 37  64.94.32.11     border6.po1-bbnet1.chg.pnap.net
11 49 40 41  64.94.34.74     mypoints10.border6.chg.pnap.net
12 45 40 40  209.87.127.111  -
13 42 40 43  209.87.112.90   www.united.com
```

Figure 1.1: The Linux command traceroute provides the IP addresses of intermediate points between your computer and hosts on the Internet, such as www.united.com. This is fragment of a traceroute to www.united.com, showing the last portion of the route to www.united.com. The fifth column is the IP address of the intermediate points along the way to www.united.com.

was roughly 4.5 billion, since only a handful of people had access to computers, and since only some of these had network access, this seem a reasonable number of addresses.

To connect to the Internet, a company such as United Airlines needs an IP address such as 209.87.112.90. Once it has an IP address, it can provide a variety of services, such as serving web pages describing flights between Chicago and Hawaii and offering airline tickets for sale.

Beginning in 1999, a new type of Internet address became available, called IPv6. An example of an IPv6 address is

```
1080:0:0:0:8:800:200C:417A.
```

IPv6 addresses are longer than IPv4 addresses. IPv4 addresses are 32 bits long, while IPv6 addresses are 128 bits long.

Today, not only can computers connect to the Internet, but so can mobile phones. This means that it is useful for a mobile phone to have an IP number. For over a decade it has been clear that there were not enough IPv4 addresses for each device, such as a mobile telephone, to have its own IPv4 number. The IPv6 addresses were introduced in part so that each device could have its own IP number and easily connect to the Internet.