

# Voice Over IP Networks

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## Chapter 1

### An Overview of IPv4 and IPv6

IPv4 was developed in 1975 and provides for approximately 4.2 billion possible combinations. Although this sounds like more than enough addresses, the truth is that every machine as well as every interface on every machine requires a unique address. We therefore find ourselves in our current position of lacking capacity in addresses to cover the impending supply of users.

By the beginning of the new century, the Internet community will need enough IP addresses for the billions upon billions of new customers that it attracts as well as the possible new hosts being setup and connected to the Internet. IPv4 does have the capability for more than 4 billion addresses, but still is not adequate to handle the demand, not so much for the number of addresses it can handle, but because of the way it groups bits for its network/host numbering system. The problem here is that IPv4's numbering system wastes address assignments and suffers from excessive routing overhead.

### A Basic Overview of IPv4

IPv4 supports a fixed 32-bit field for addressing, which is no longer sufficient for the number of users on the Internet. Routing tables are growing exponentially and this has been causing a great deal of difficulty for many organizations. In addition, auto-configuration and scalable multicast are needed. Furthermore, there is a need to develop real-time flow for video conferencing, as we will be discussing throughout this book. These remain the key issues associated with the move toward a new protocol format.

IPv4 addresses are categorized according to the size of a network (number of IP addresses used). The categories are known as address classes. We are concerned with the first three categories; they maintain different number of bits for the networkID portions of their addresses. Class B, for example, has 14 bits for the networkID and 16 for the hostID combining to form 16,384 outcomes; each of these outcomes can accommodate 65,534 hosts.

A typical example of port-based VLANs; Source: 3Com, Steve Jumonville presentation

A typical example of MAC address-based VLANs; Source: 3Com, Steve Jumonville presentation

A typical example of Protocol-based VLANs; Source: 3Com, Steve Jumonville presentation

A protocol-based VLAN enables different protocols to be grouped together, eliminating the circulation to all machines of broadcast packets not addressed to other protocols.