Chapter 12
Transition to IPv6–Based Networks

CHAPTER CONTENT

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- IPv6 Network Basics
- IPv6 Support for Net Centricity
- Federal Mandate for IPv6 Transition
- DoD IPv6 Standards Guidance
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CHAPTER FOCUS

This chapter addresses how the transition to the IPv6 protocol is part of the upcoming network and communications upgrade for enabling a net-centric environment. We discuss limitations of current IPv4 protocol, features of the IPv6 protocol and discuss IPv6 network basics. We then discuss IPv6 support for net centricity, and the federal mandate for IPv6 transition. DoD has developed a set of IPv6 guidance that provides IPv6-capable definition, IPv6 base requirements and IPv6 product classes. We discuss transition strategies from IPv4 to IPv6 and long term strategy challenges such as security implications. We provide data can be secured using the IPSec protocol and we go ahead and provide a review of mobile IPv6 networking.

THE NEED FOR A NEW IPv6 PROTOCOL

This chapter focuses on the crucial issue of the upcoming changes to network and communication links that is at the heart of Net-Centric transformation. We all know that the present state of the Internet needs to be fully upgraded to accommodate the ongoing communications growth rate. The need is there for a complete overhaul of the current Internet, based on the wide-scale adoption of the IPv6 Protocol.

The current network protocol for the Internet follows Internet Protocol (IP) Version 4, which has been around for the past 30 years. Even though IPv4 has proven to be robust, interoperable, and easily scalable, it still has faced a number of limitations due to the enormous increase in usage within the past three decades. There has been an exponential growth in Internet-enabled hardware devices, software operating systems, and an increasing demand in sending secure communications traffic that far exceeds the current capacities of the IPv4 protocol-based networks.

The following provides a set of limitations of the current IPv4 protocol that is in use in most countries throughout the world.

Limitations of IPv4 Protocol

- The Lack of Usable Address Space

The IPv4 protocol only allows a 32-bit capacity for static IP addresses. It forces a large organization such as a federal agency to use a technology called Network Address Translation (NAT). This allows network management personnel to map multiple private addresses to a single IP address. Even though this technology promotes conservation of address space, it does not support network layer security standards, and causes problems when one organization is trying to connect to other external organizations.

As the Internet has proliferated across the world, and address spaces have been parsed out, there are still large U.S. organizations such as the government and private universities which hold large sequences of addresses. However, these organizations have kept these addresses for their own use, causing greater scarcity for commercial organizations and their need for public IPv4 address space.