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A Cellular Industry View of IPng

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Abstract

This memo is a response to RFC 1550, "IP: Next Generation (IPng) White Paper Solicitation". The statements in this paper are intended as input to the technical discussions within IETF, and do not represent any endorsement or commitment on the part of the cellular industry, the Cellular Digital Packet Data (CDPD) consortium of service providers or any of its constituent companies.

Introduction

This is a draft of the requirements for IPng as envisioned by representatives of the Cellular Digital Packet Data (CDPD) consortium of service providers. As the leading service providers for this nascent technology, which will provide the capability for mobility of native mainstream connectionless network layer-based applications it is our intention to support whatever form IPng takes. However, there are several requirements which we feel IPng must meet.

Mobility

Since we will offer mobile services, our primary requirement is that IPng not inhibit our support of mobility. IPng must not impede devices from being able to operate anywhere anytime. Applications on these mobile devices must look and feel the same to the user regardless of location. NPDUs should be self-contained and not disallow the redirection inherent to our mobility solution, i.e., IPng must be connectionless.

Further, since IPng provides an opportunity for design enhancements above and beyond IPv4, we propose that native support for mobility be regarded as an explicit IPng requirement. Local area and wide area wireless technology creates new opportunities for both TCP/IP and the Internet. Although the capability for mobility is orthogonal to the wired or wireless nature of the data link in use, the rapid

deployment wireless technology amplifies the requirement for topological flexibility.

As a by-product of mobility, the significance of "occasionally-connected hosts" increases. The ability to accommodate occasionally-connected hosts in IPng is a requirement.

Scale

In terms of scale, we envision some 20 to 40 million users by the year 2007. In this context a "user" can be anything from a vending machine to a "road warrior". These numbers are for North America alone. Worldwide, we anticipate that IPng should be able to support billions of "users". Of course, the sparseness of network address assignments which is necessary for subnetting, etc., dictates that IPng should support at least tens or hundreds of billions of addresses.

Addressing

In terms of addressing, we would expect addresses to be hierarchical. In addition, a node with multiple links should require only a single address although more than one address should also be possible. The mapping of names to addresses should be independent of location; an address should be an address, not a route. Variable-length addressing is also required to ensure continued protocol (IPng) extensibility. Administration of address assignments should be distributed and not centralized as it is now.

Security

IPng should also support security mechanisms which will grow increasingly important on the proverbial "information highway" for commercial users. Security services which may optionally be expected from a Layer 3 entity such as IPng include peer entity authentication, data confidentiality, traffic flow confidentiality, data integrity and location confidentiality.

Accounting

The ability to do accounting at Layer 3 is a requirement. The CDPD specification can be used as a model of the type of accounting services that we need.

Route Selection

In the voice communications arena, "equal access" and choice of an "interexchange carrier (IXC)" are issues that must be addressed. Similar requirements for data may also exist.

Source- and policy-based routing for inter-domain traffic can address this requirement. IPng must allow the selection of at least the first transient network service provider based on the source host.

Data Efficiency

The bandwidth of wide area wireless networks is a precious resource, the use of which must be optimized. IPng must allow optimal use of the underlying Layer 2 medium. Layer 3 Protocol Control Information (PCI) should be as condensed as possible. The protocol should be optimized for data efficiency.

Packet prioritization must also be supported by IPng in order to optimize the use of low speed networks. This requirement includes both class and grade of service definitions for flexibility.

Transition

The final requirement for IPng is that it must interoperate with IP for the foreseeable future. Bridging mechanisms must be supported and a strategy for the transition from IPv4 to IPng must be defined. Use of options fields, etc., are one mechanism to support the requirement for IPng protocols to support IP addresses and headers.

Security Considerations

See section on Security.

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