IP Next Generation (IPng)

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TALK OVERVIEW

- **Background**
- **IPng Protocol**
- **Addressing**
- **Transition**

WHY IS A NEW IP NECESSARY

The Internet is Growing Exponentially

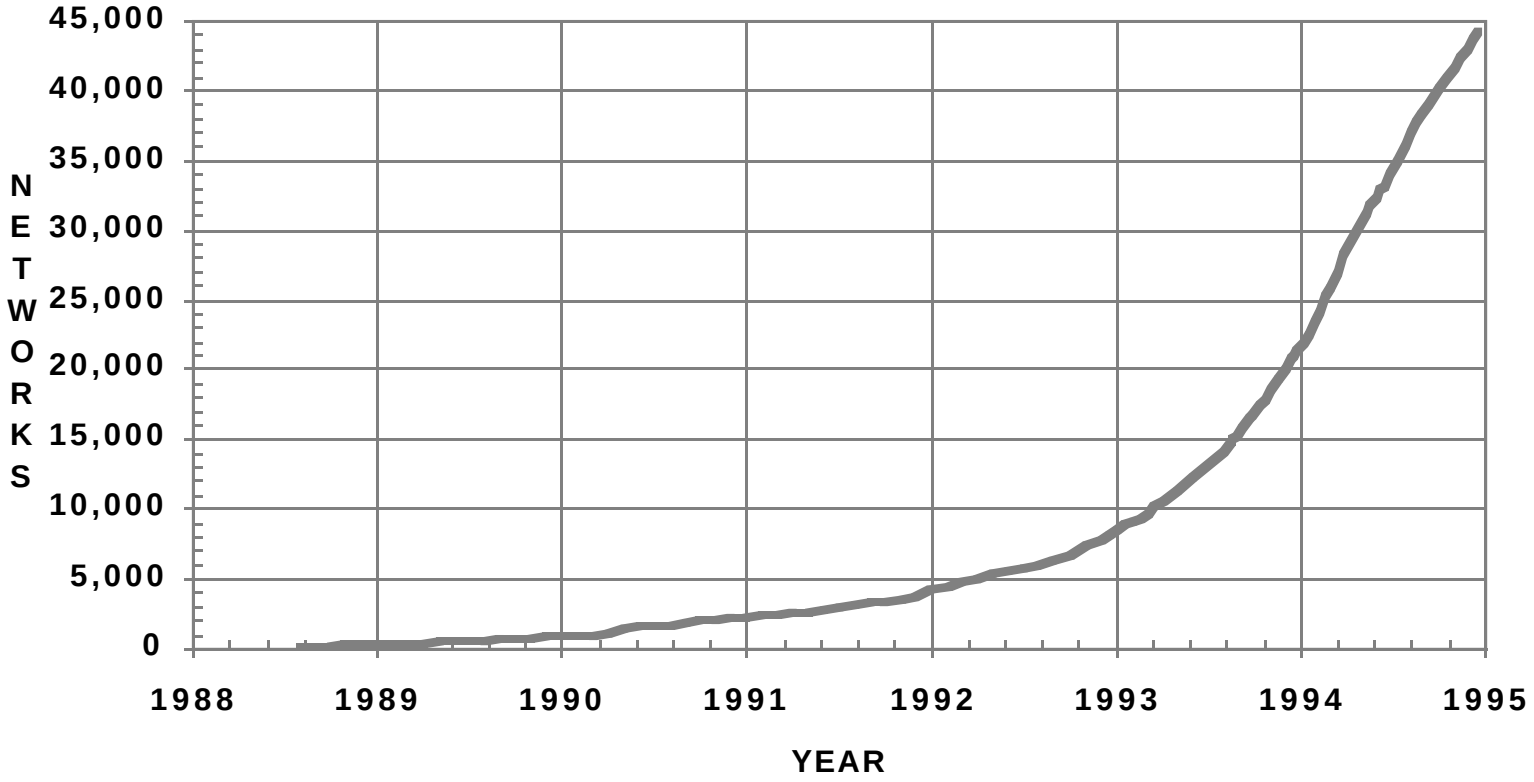
- **Currently Doubling Every 12 Months**
- **Now about ~ 45,000+ Networks, ~ Millions Hosts**

Problem is in Two Areas

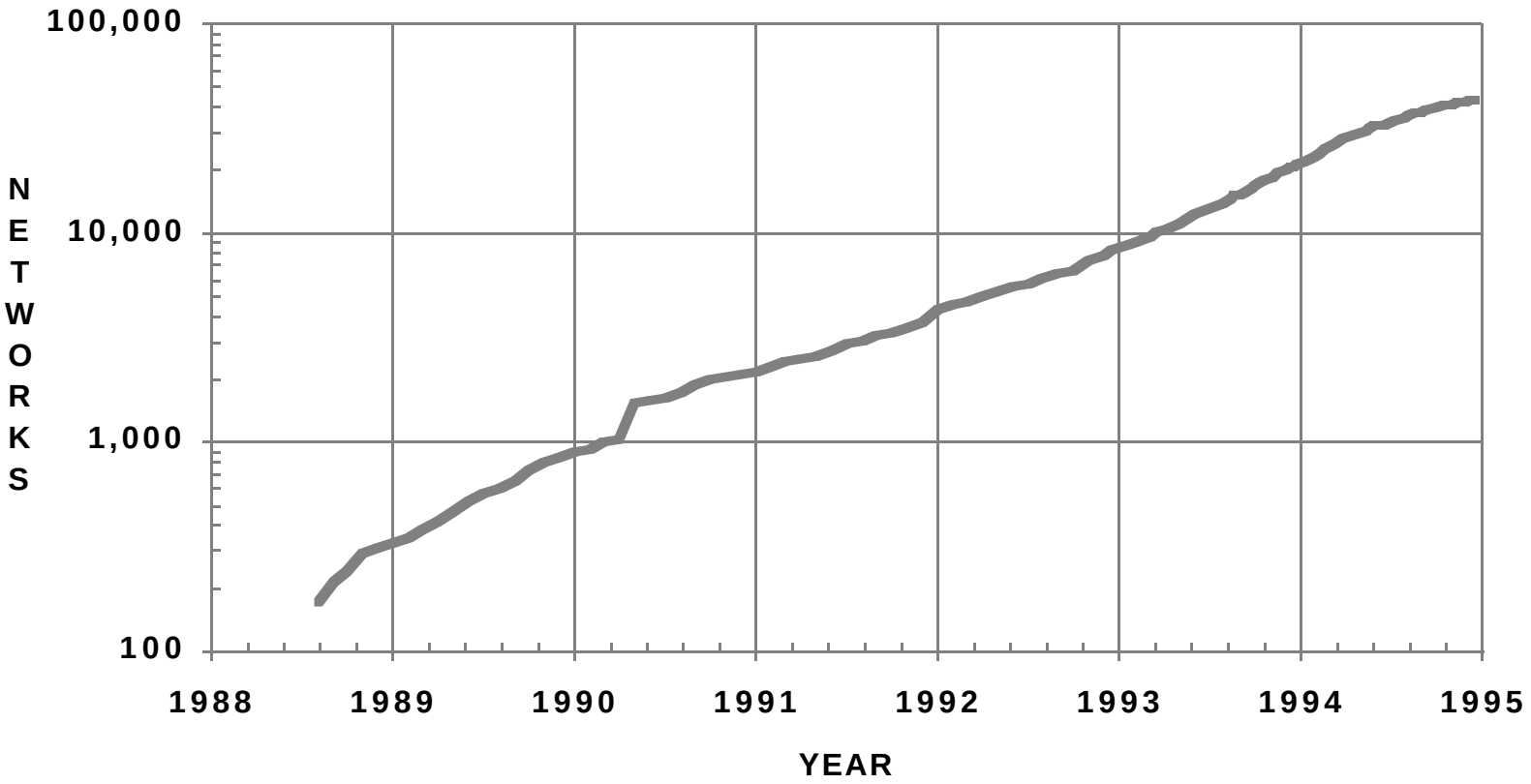
- **Routing Table Size and Computation**
- **IP Address Exhaustion**

IPng Provides for Expanded Addressing and Scalable Routing

INTERNET GROWTH



INTERNET GROWTH (LOG SCALE)



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IP NEXT GENERATION

New Version of the Internet Protocol

- **Assigned Version 6 (IPv6)**

Expands Scope of Routing and Addressing to Meet Internet Growth

Solves Next Set of Pressing Problems

May Facilitate Migration of IPX and OSI Internetworking to IPng

Good Example of Internet Technology Evolution

CHANGES FROM IP

Larger 128-bit Hierarchical Addresses

- **Supports Much Larger Internet**
- **Allows Embedded IEEE 802 MAC Address for Auto Configuration**

Simplified Header w/ 64bit Alignment

Flow Label for Real Time Support

Flexible Extension Header Mechanism

- **Security**
- **Route Selection**

NEW FEATURES

Flow Label Used to Identify Real Time Traffic for Special Handling

Authentication and Privacy Extensions

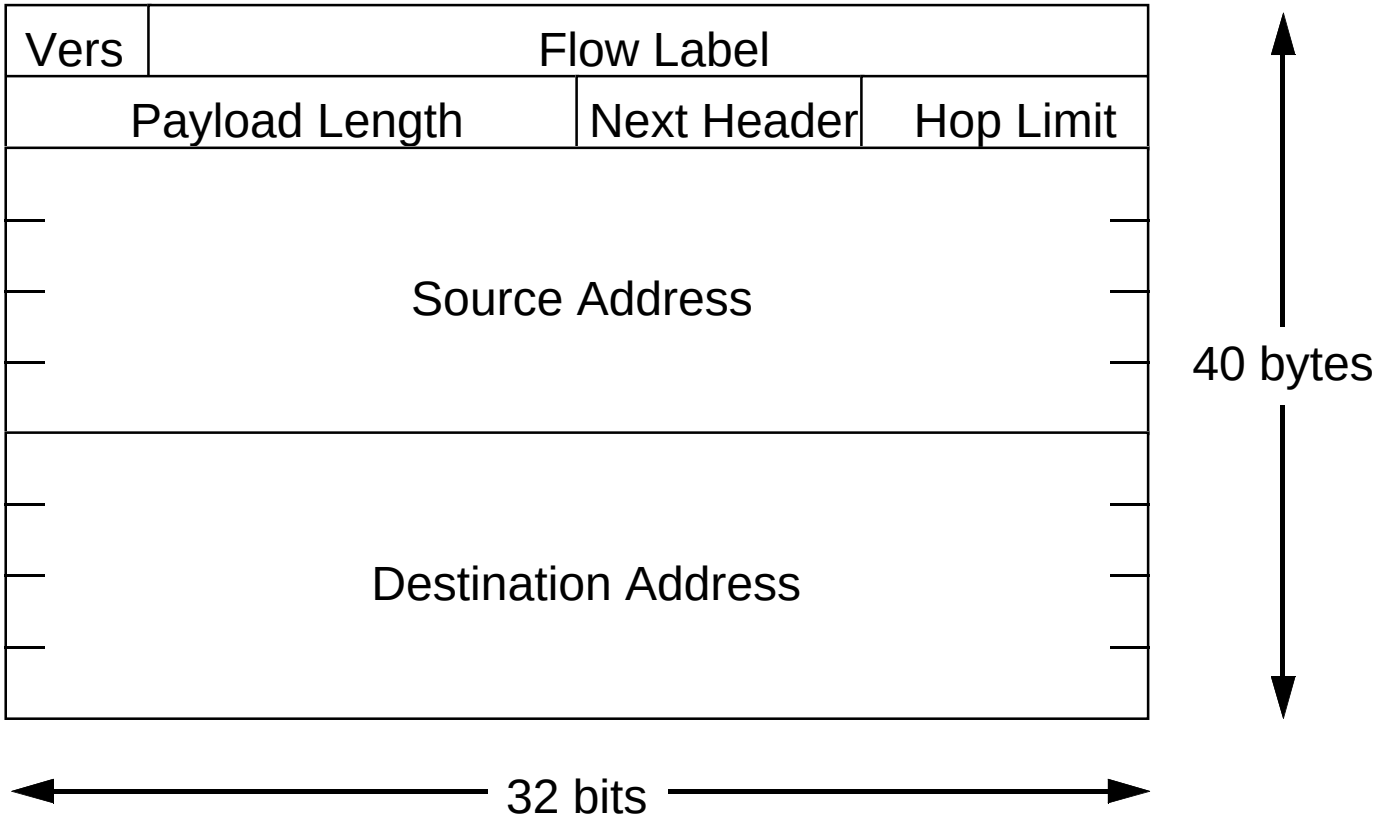
***Plug and Play* Auto Configuration**

Multicast Improved and Made Standard

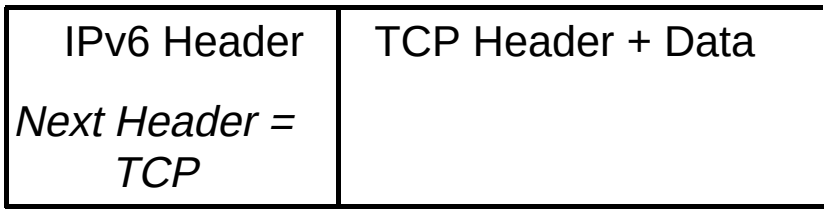
Routing Supports Generalized Route Selection

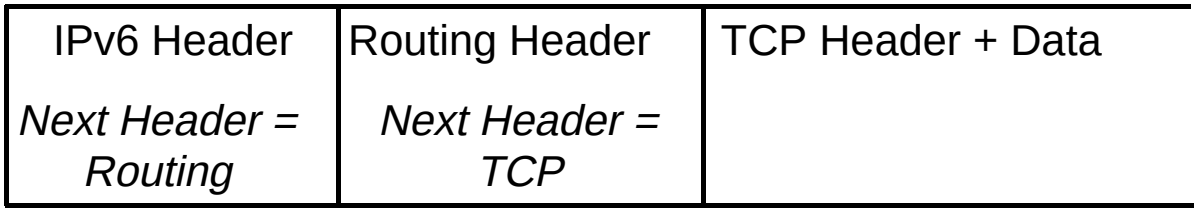
- **Allows Selection of Specific Network Providers**

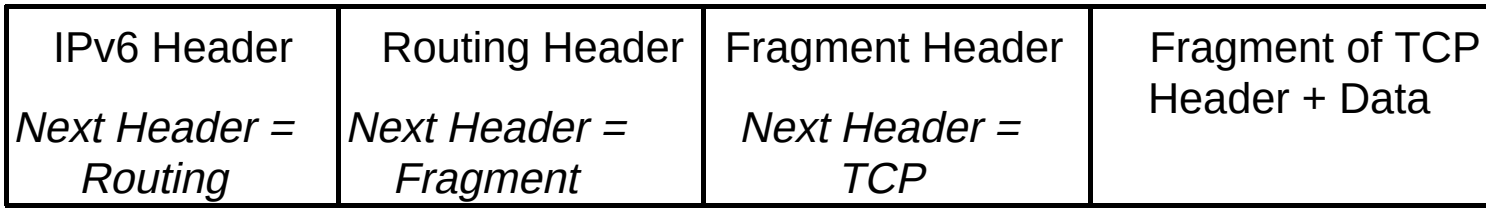
IPng HEADER FORMAT



EXTENSION HEADERS







IPng ADDRESSING

128 Bit Addresses can Identify Large Number of End Points

340,282,366,920,938,463,463,374,607,431,768,211,456

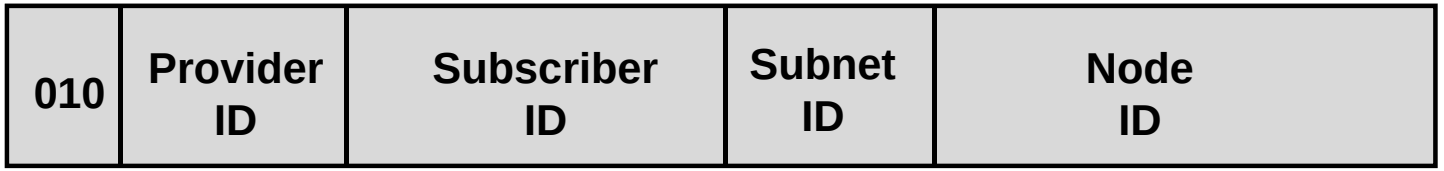
Address Space Initially Allocated

- **Provider Based Unicast**
- **ISO NSAP**
- **IPX**
- **Multicast**
- **Space Reserved for Geographic Addresses**

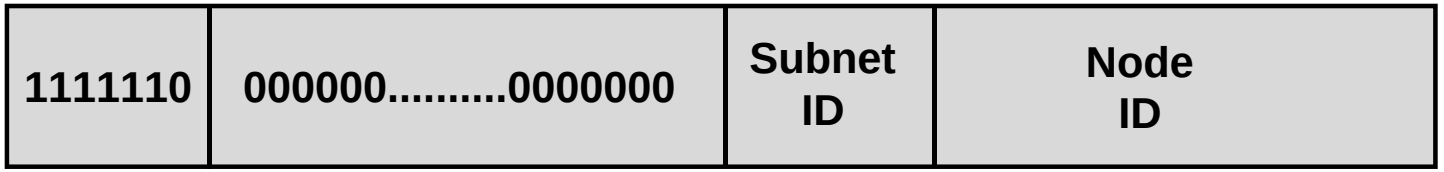
15% Initially Assigned, 85% Reserved for Future Growth

ADDRESS FORMATS

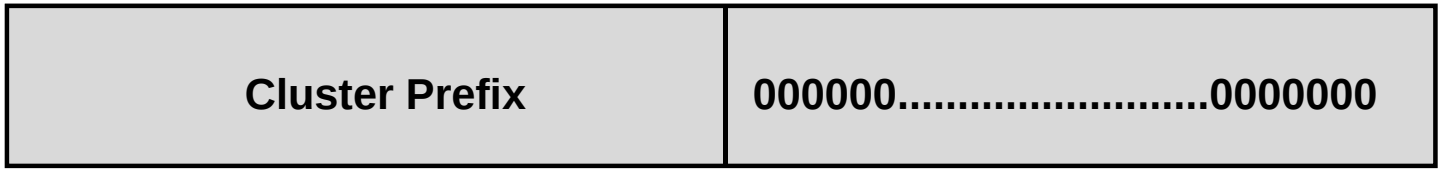
Provider Address



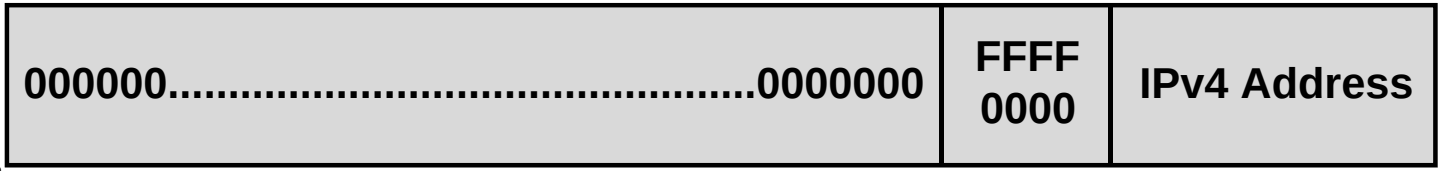
Local Use Address



Cluster Address



IPv4 Compatibility Address



IPng TRANSITION

Philosophy

- Make IPv6 Implementations Compatible with IPv4
- Make it Easy to Deploy
- Get Experience Early in Transition

Goals

- Allow Incremental Upgrade of Hosts and Routers to IPv6
- Few or No Upgrade Dependencies
- Complete Transition before IPv4 Addresses Run Out

GENERAL TRANSITION MODEL

TRANSITION TECHNIQUES

Dual IP Layer

– Nodes Support IPv4 and IPv6

IPv4 Compatibility Addresses

– IPv4 Addresses Embedded within IPv6 Address

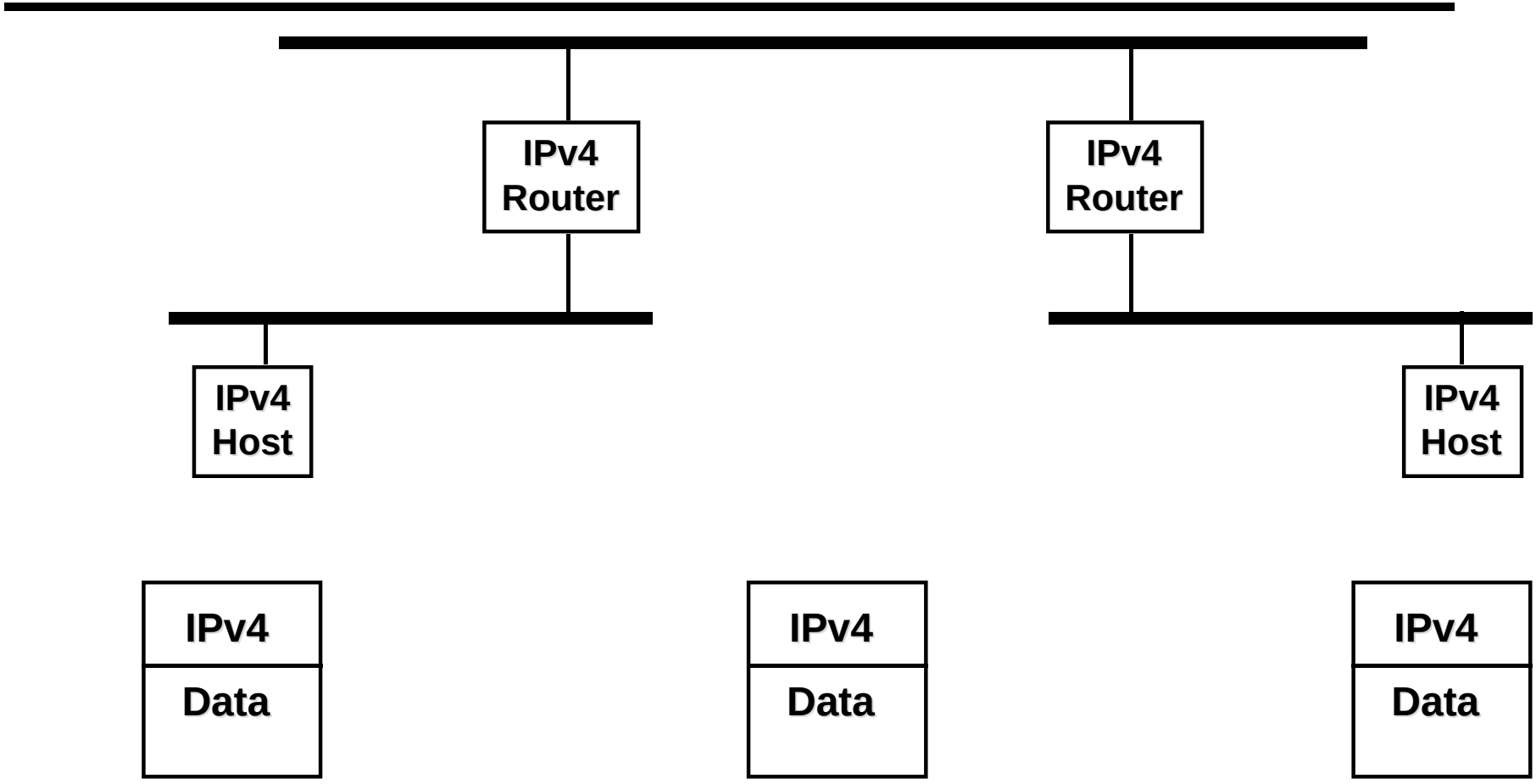
IPv6 in IPv4 Encapsulation

– Tunnel IPv6 Datagrams across IPv4 Infrastructure

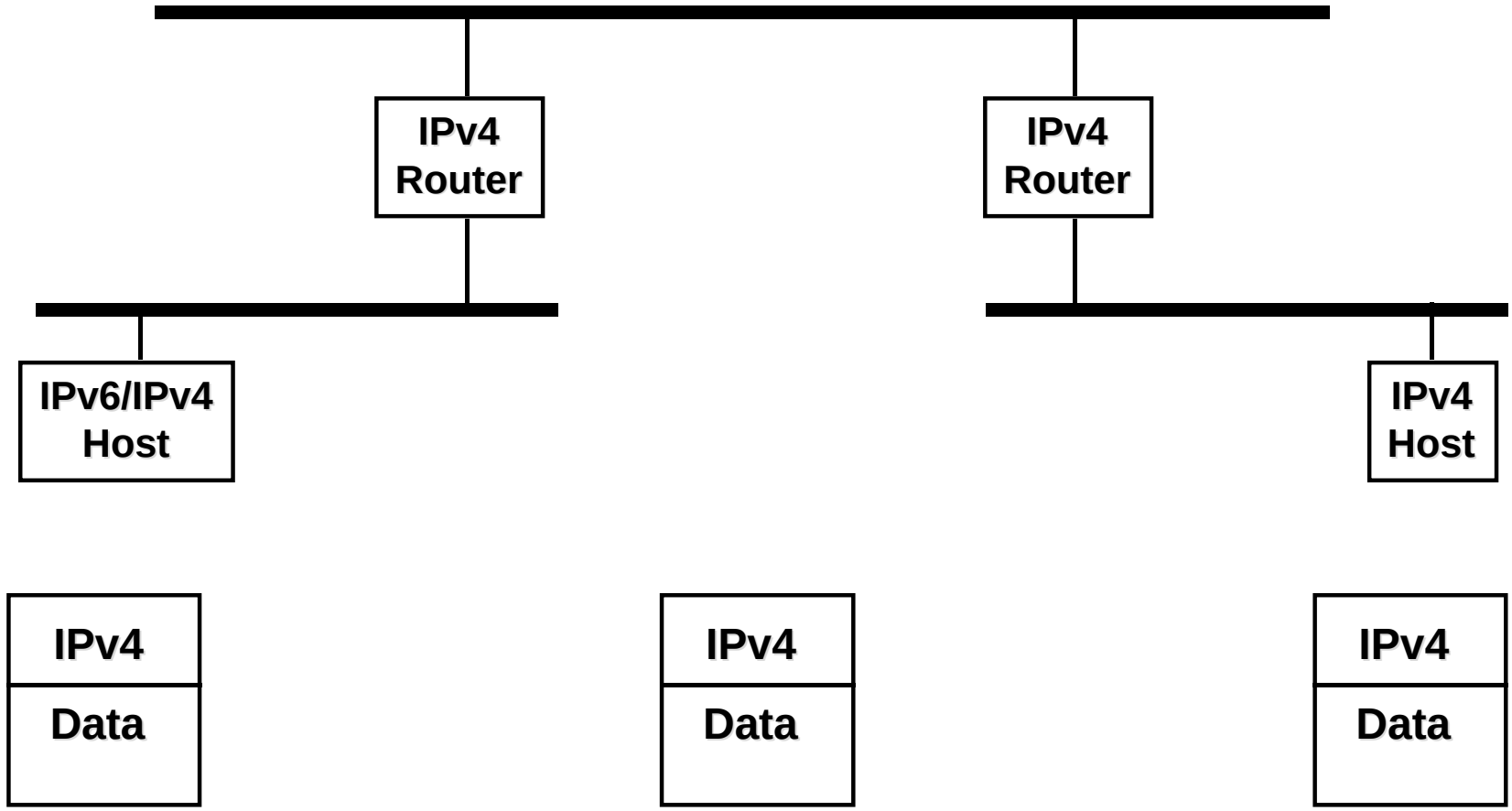
IPv4 <-> IPv6 Header Translation (Optional)

– Support Interoperation between IPv4-Only and IPv6-Only Hosts

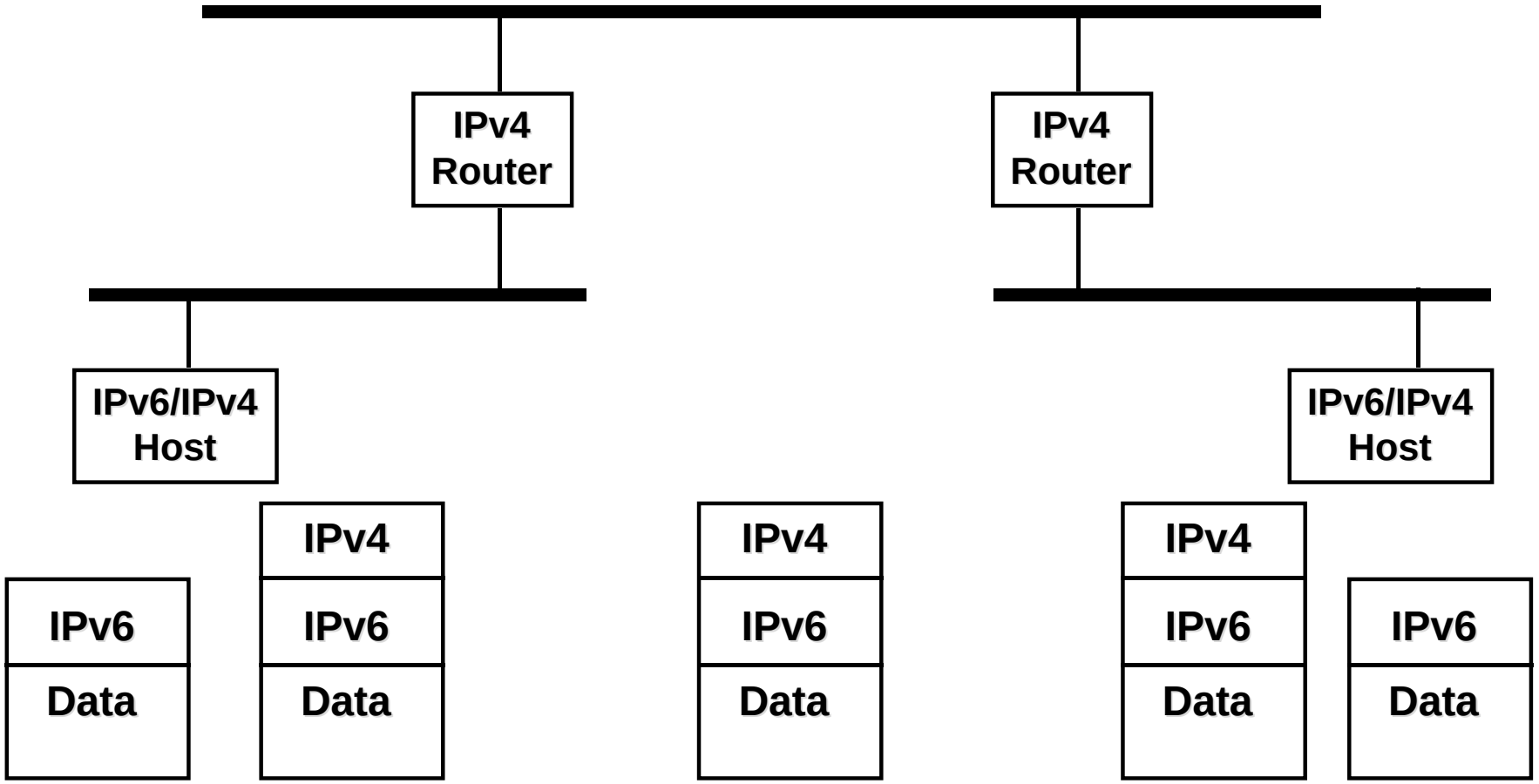
IPv4 OPERATION



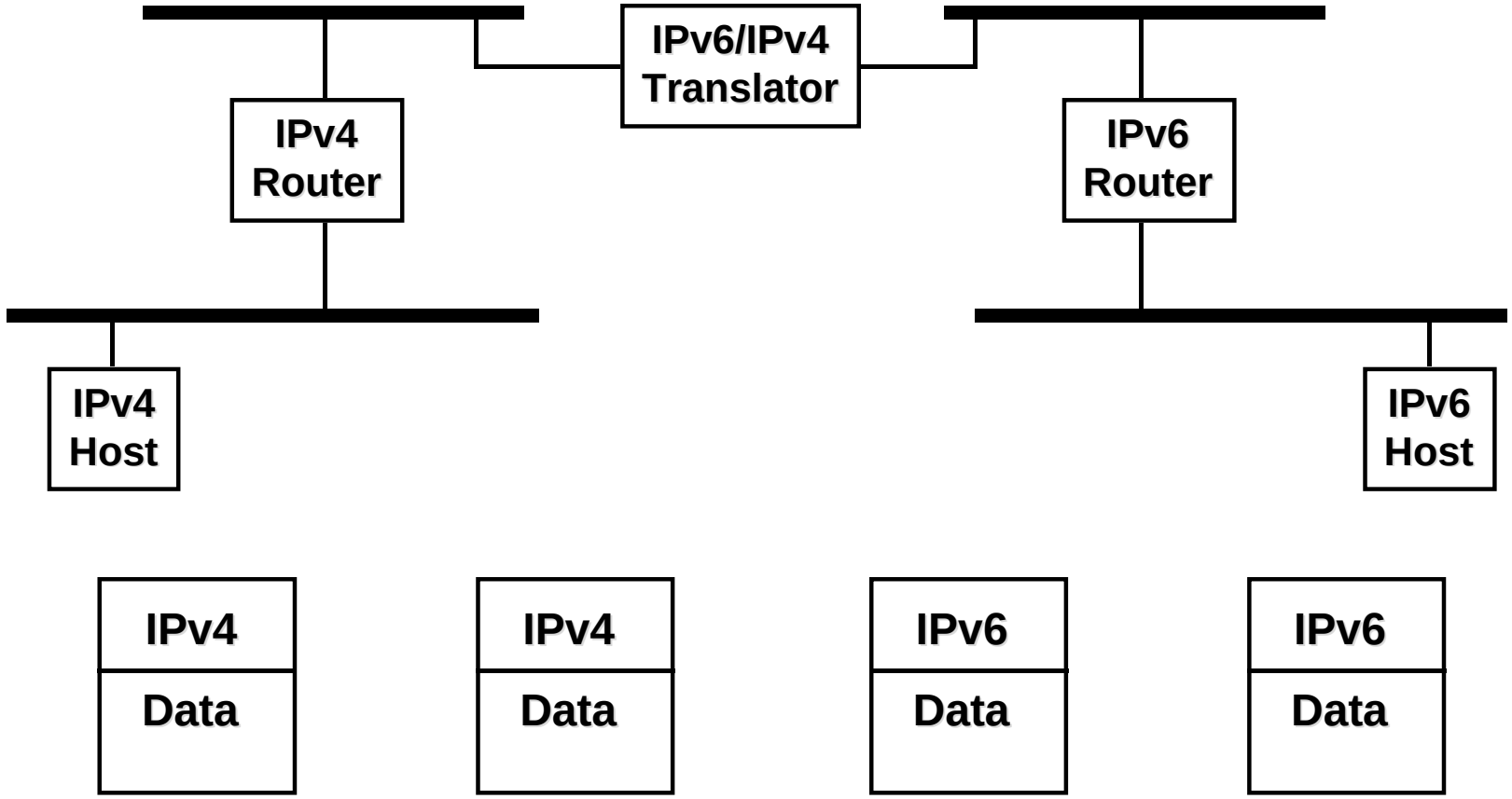
INTEROPERATION WITH IPv4



TUNNELING OVER IPv4



TRANSLATION BETWEEN IPv6 and IPv4



FOR MORE INFORMATION

Web Pages

http://playground.sun.com/pub/ipng/html/ipng-main.html

Document Archives

parcftp.xerox.com in pub/ipng

To Join Working Group Mailing List Send Message to:

majordomo@sunroof.eng.sun.com
with
subscribe ipng
in the body of the message.

SUMMARY

IPng is a New Version of IP

Solves Critical Current Problems

Compatible with IPv4

Improves IP in Many Areas

Builds a Strong Base for the Future