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MCI WORLDCOM

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ORIGINAL

May 1, 2000

EX PARTE

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

CC Docket No. 99-333

Dear Ms. Salas:

On May 1, 2000, Vint Cerf, Cristin Flynn and I of MCI WorldCom, Richard Metzger of Lawler, Metzger and Milkman and Keith Leiberthal of Covington and Burling along with Mike Jones of Wilkie, Farr and Gallagher met with Daniel Shiman, Christopher Libertelli, Jim Bird, Donald Stockdale, Henry Thaggert, Pieter van Leeuwen, Patrick DeGraba, Eric Einhorn, Helen Domenici, Lisa Choi and Michelle Carey regarding the above referenced matter.

In the meeting we discussed the evolution of the Internet. The attached presentation was used during this meeting.

In accordance with section 1.1206(b)(2) of the Commission's rules, 47 C.F.R. § 1.1206(b)(2), an original and one copy of this memorandum are being filed with your office.

Sincerely,

Bradley Stillman

cc: Daniel Shiman
Christopher Libertelli
Jim Bird
Donald Stockdale
Henry Thaggert
Pieter van Leeuwen
Patrick DeGraba
Eric Einhorn
Helen Domenici
Lisa Choi
Michelle Carey

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Internet 101

Vint Cerf

MCI WorldCom

May 2000

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Packet vs Circuit Switching

- Circuit (telephony) like reserving bicycle lanes from LA to NY!
- Packet (Internet) like sharing of the highway among high speed cars.

Protocols and Identifiers

- Protocols are procedures and formats that are used to enable computer to computer communication
- To support this, computers share common knowledge of identifiers to make clear which protocols are being used. For example, Internet Protocol version 4 is in use today; IPv6 is coming

Where did Internet come from?

ARPANET - 1969-1990

Packet Radio, Satellite, Ethernet - 1973

(strong European involvement from 1975)

Internet Dev't - 1973-1983

NSFNET - 1986-1995

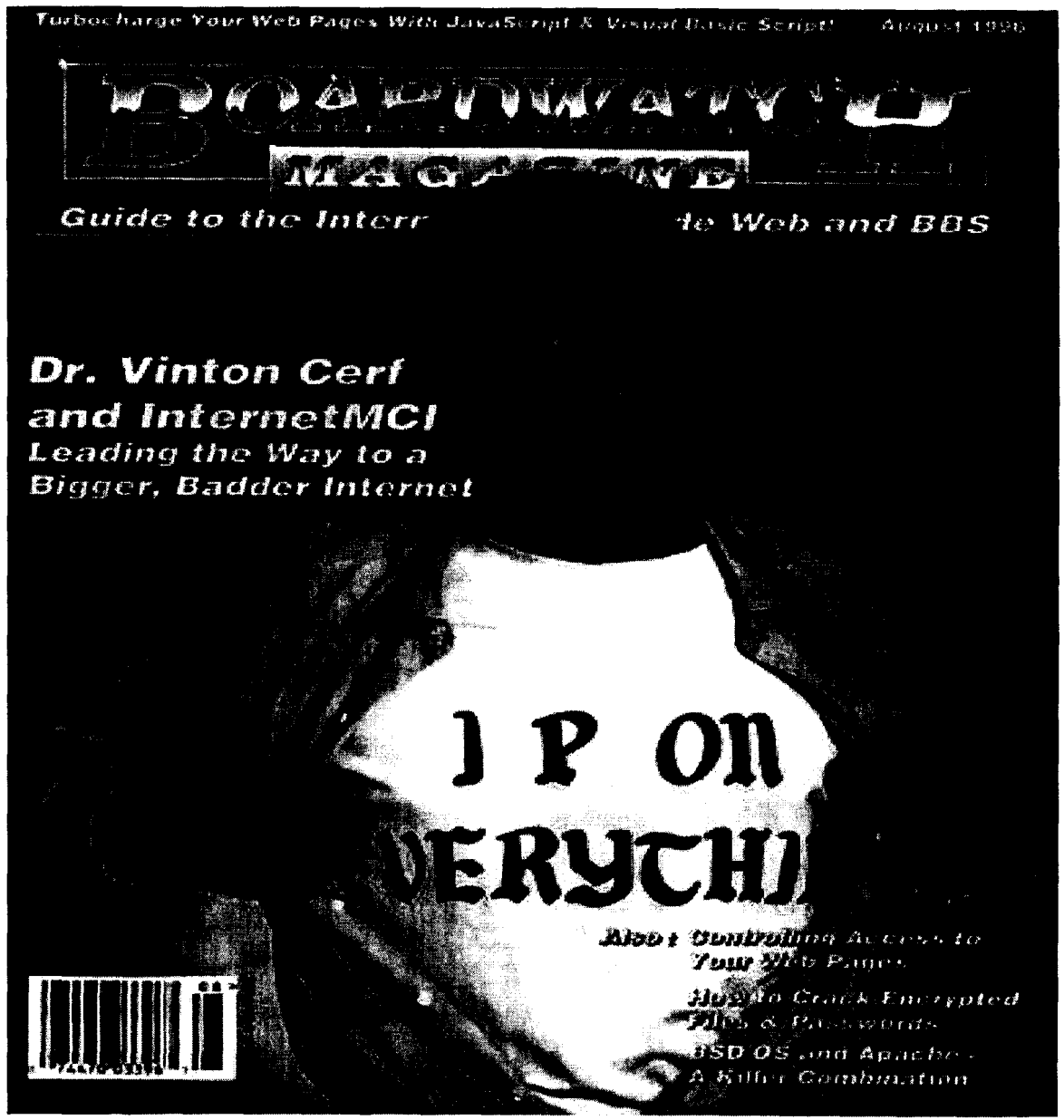
Early European Internet Work

- National Physical Laboratory (UK)
- University College London
- IRIA (Informatics and Automation Res.)
- Norwegian Defense Research Estab.
- DFVLR (German Space Agency)
- CNUCE (Italian Research Center)
- Int'l Network Working Group (INWG)

What is the Internet?

The largest network

Uses packet


Turbocharge Your Web Pages With JavaScript & Visual Basic Script!
August 1996
Guide to the Interr
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Dr. Vinton Cerf
and InternetMCI
Leading the Way to a
Bigger, Badder Internet
J P ON
ERYTHI
Also: Controlling Access to
Your Web Pages
How to Crack Encrypted
Files & Passwords
BSD OS and Apache:
A Killer Combination

How does Internet work?

Names and Addresses

- www.wcom.com is a “domain name”
  - “com” is the “commercial domain”
- 208.234.102.119 is an Internet address
  - this is really just a way to represent a 32 bit number which how Internet Protocol version 4 represents locations in the Internet, like telephone numbers in the telephone network

Internet Addressing

- IPv4 - 32 bits
- initially, 256 networks … then mix of:
  - Class A (128 with 16 M hosts)
  - Class B (16,384 with 65K hosts)
  - Class C (2M with 256 hosts)
- Now, Classless Inter-domain addresses
  - up to 4 Billion hosts, hundreds of thousands of networks

(80%/year growth since 1988)

Next Generation Internet

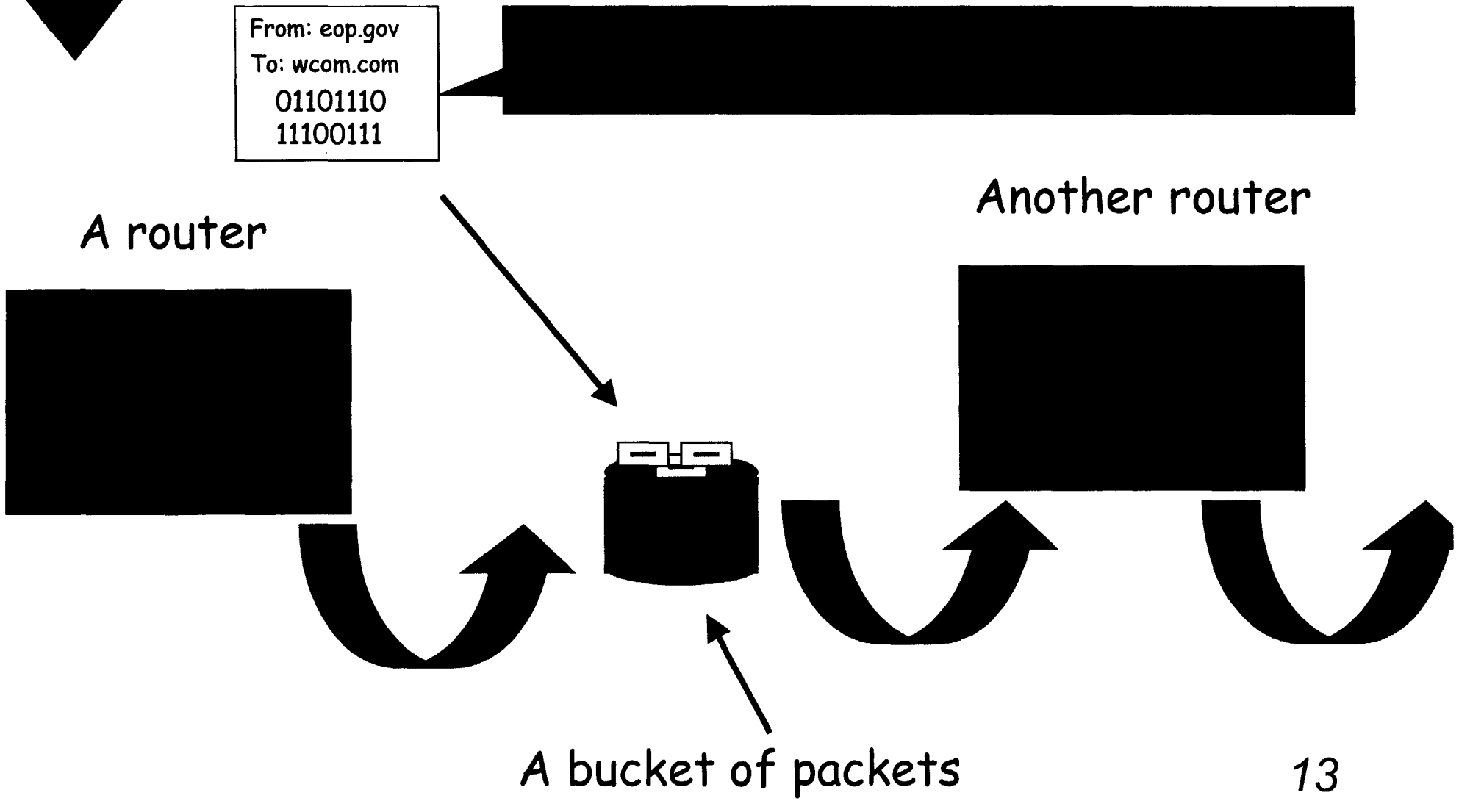
- IPv6 - 128 bits of addressing
- Theoretically 10^{38} hosts
- Significant transition effort needed (sort of like changing engines on aircraft while in flight)
- IANA officially announced IPv6 allocations on July 14, 1999

Internet Packet Formats

"from" address *"to" address* *Version number* *CONTENTS*

An Internet Packet

The Internet Bucket Brigade



How Does TCP Work?

- Like Sending a Novel on Postcards
  - Page numbering (ordering, duplicate detection)
  - Positive Acknowledgement
  - Retransmission on Timeout
  - Finite Mailbox

Some Major Milestones

- 1969 - 1985 Basic Packet Net Research
- 1974 - Internet design first published
- 1983 - first major deployment
- 1984 - first router companies
- 1989 - WWW; MCI Mail/Internet link; first commercial services (UUNET)
- 1990 - ARPANET retired; more comm'l services (PSINet)
- 1994 - commercial WWW (Netscape)
- 1995 - NSFNet retired, competitive backbone
- 1998 - New IANA/ICANN

Example European Milestones

- Late 1980s - NORDUNET
- 1989 -Coordinating Committee for Intercontinental Research Networking (CCIRN); WWW CERN
- 1992 - Information Society
- 1994 - Bangemann Report
- 1998 - GBD ecommerce
- 1999 - Prodi initiative

European Milestones, cont.

- Europe and the Global Information Society Report May 1994:

  Internet is a "market-driven revolution"

- 1999 eEurope Initiative:

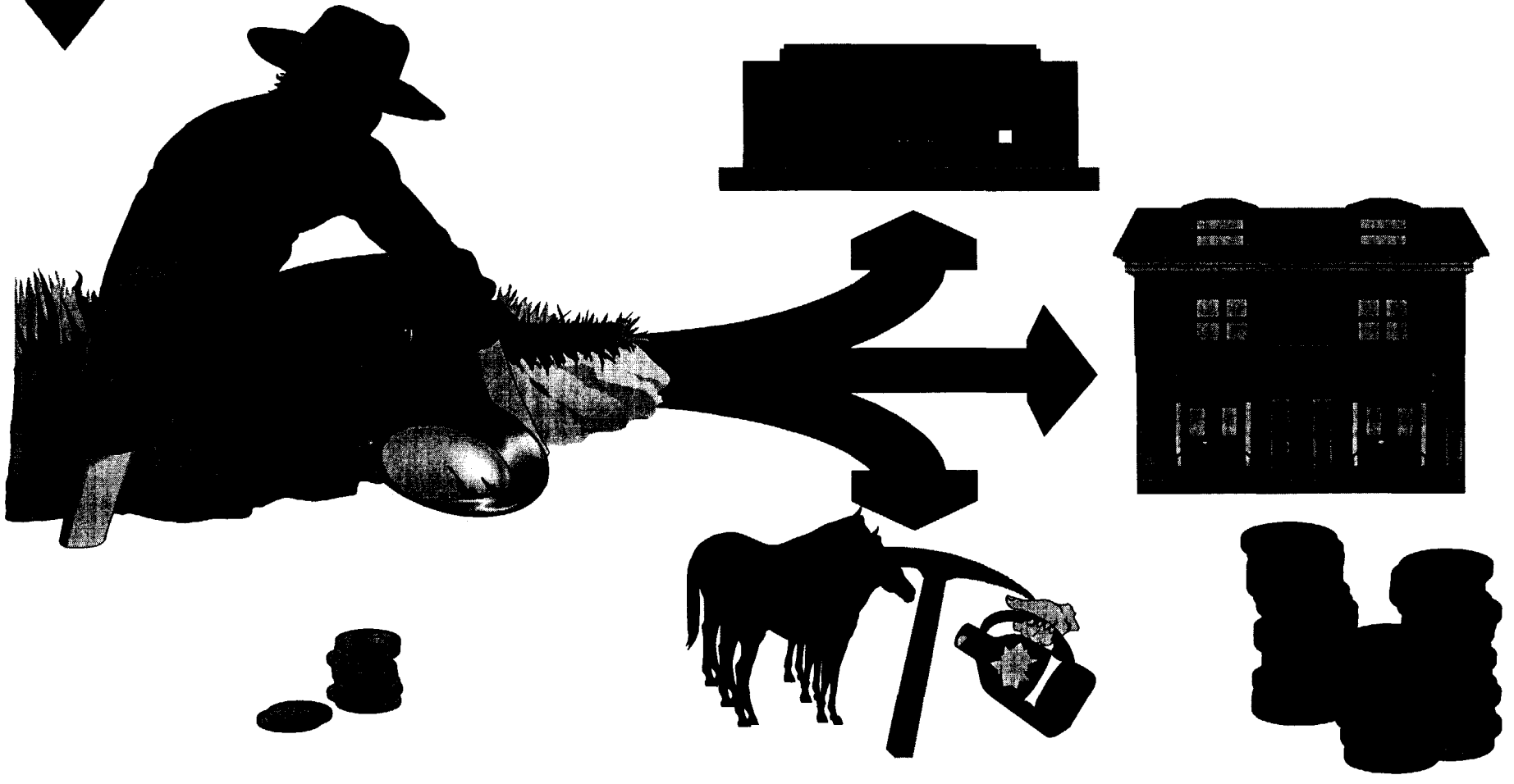
  "*Bringing every citizen, home and school, every business and administration into the digital age and online*"

Some philosophical analogies

- Electrical Power and fractional horsepower motors - doing work for us 24 hours/day.
- Internet and computers (processing power) doing work for us - distributing and processing information, performing logical tasks 24 hours/day

INTERNET "GOLDRUSH"

[California: 1848. It was gold.
150 years later…it's Internet and the stock market]



Internet - Global Statistics

[redacted]

[redacted]

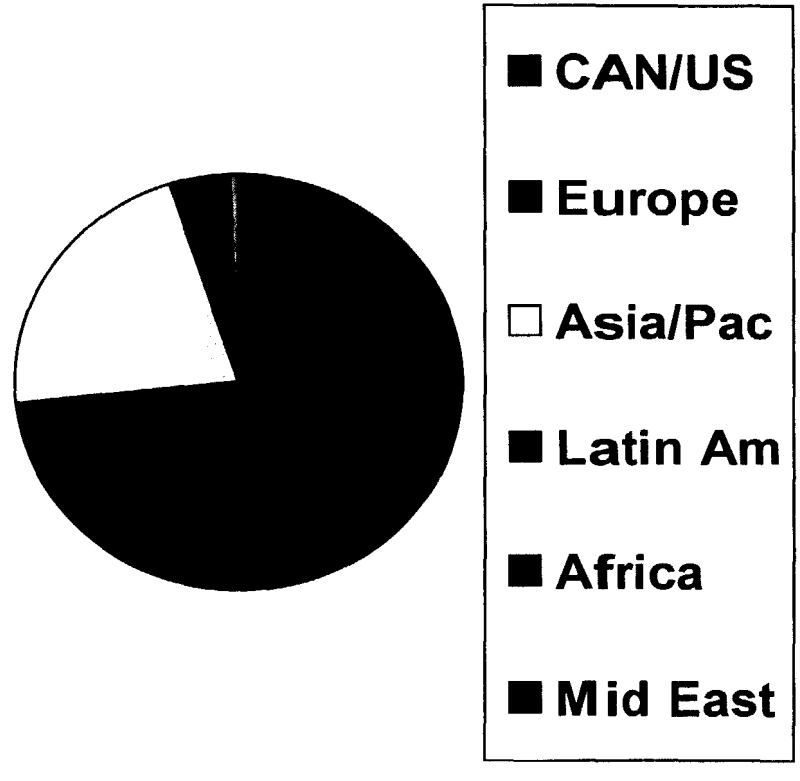
(950 Million Telephone Terminations)

Users on the Internet - Feb 2000

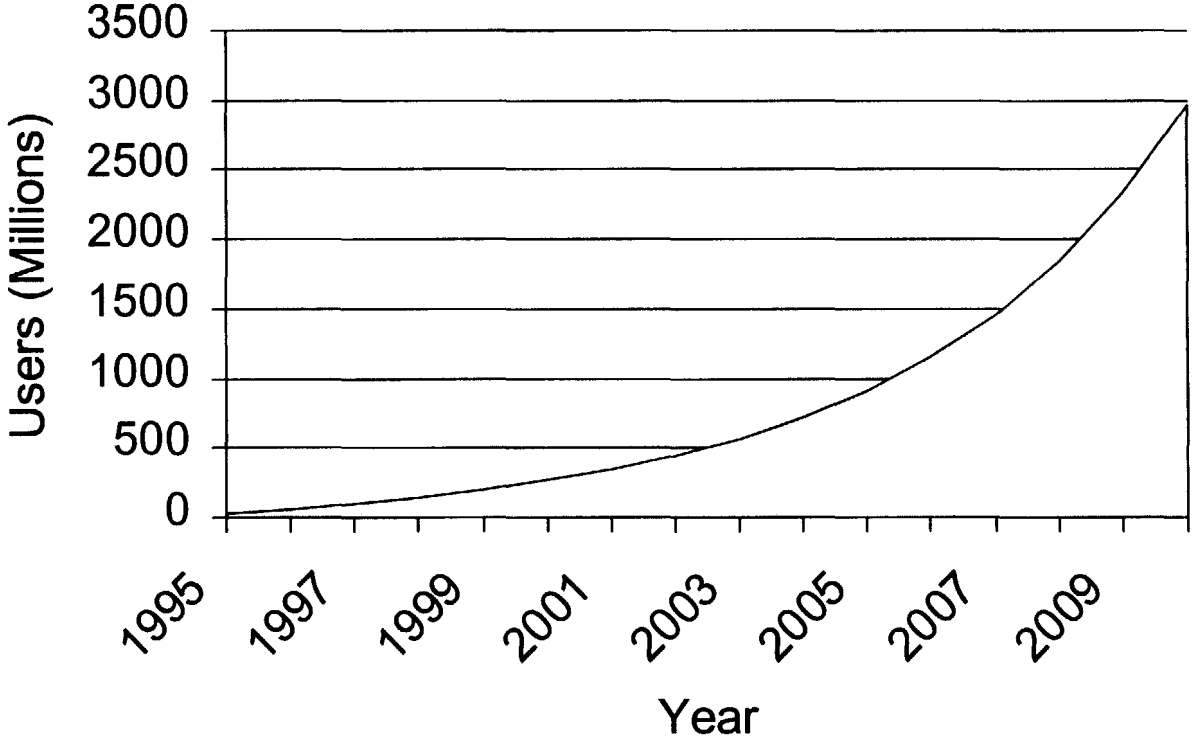
- CAN/US - 135.06M
- Europe - 71.99M
- Asia/Pac - 54.90M
- Latin Am - 8.79M
- Africa - 2.46M
- Mid-east - 1.29 M

- Total - 275.54M

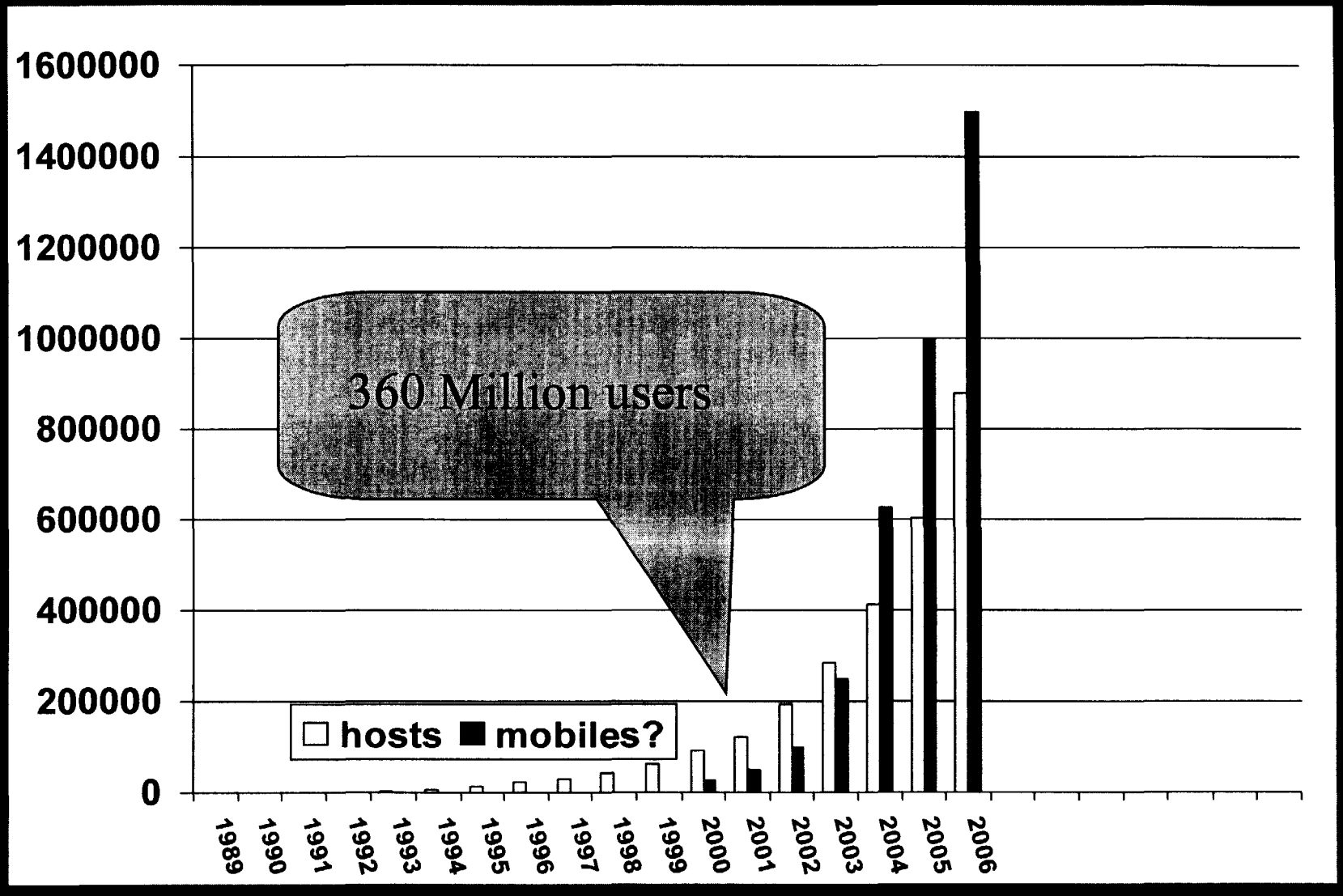
(Source www.nua.ie)



Internet User Trends



Source: Nua Internet Surveys



Source: Cerf, based on www.nw.com, Jan 2000

Domain Names

- .edu, .com, .org, .net, .mil, .gov and .int
- and country codes: .US, .UK, .FR, .DE…
- The domain name system is hierarchical and each name is unique: www.reston.mci.com
- Top level (e.g. .com) managed by a person assigned by the Internet Assigned Numbers Authority

Trademark and Domain Name Conflict

- Trademarks are NOT unique (MCI is trademarked by MCI WorldCom but also by a bus manufacturing company)
- Domain Names MUST BE UNIQUE in order for the Internet to work just like 800 numbers or postal addresses

Creation of ICANN

- Nov 1998 - the USG recognizes the Internet Corporation for Assigned Names and Numbers (ICANN)
- 1999 - ICANN organizes the many components specified in the White Paper (Board, Supporting Organizations, Membership, Advisory committees…)

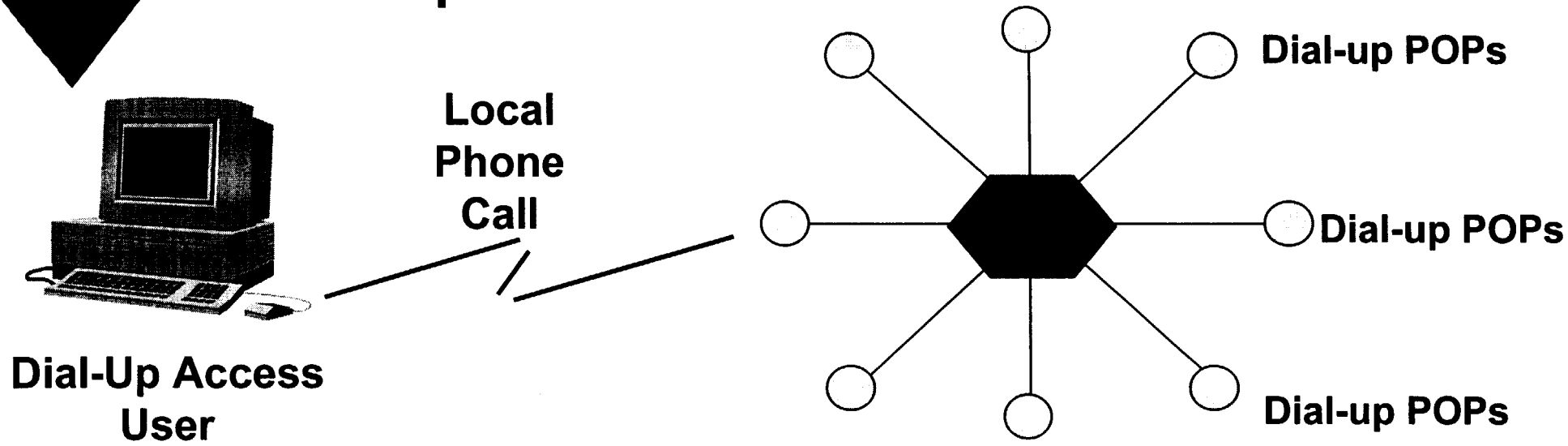
Why do we need ICANN?

- IANA acted for 30 years to mediate disputes and to assure proper technical function of all parts of the domain name and IP addressing systems.
- These functions are still critical to the successful operation of Internet which is now a GLOBAL and rapidly growing medium.

ICANN's IP Addressing Role

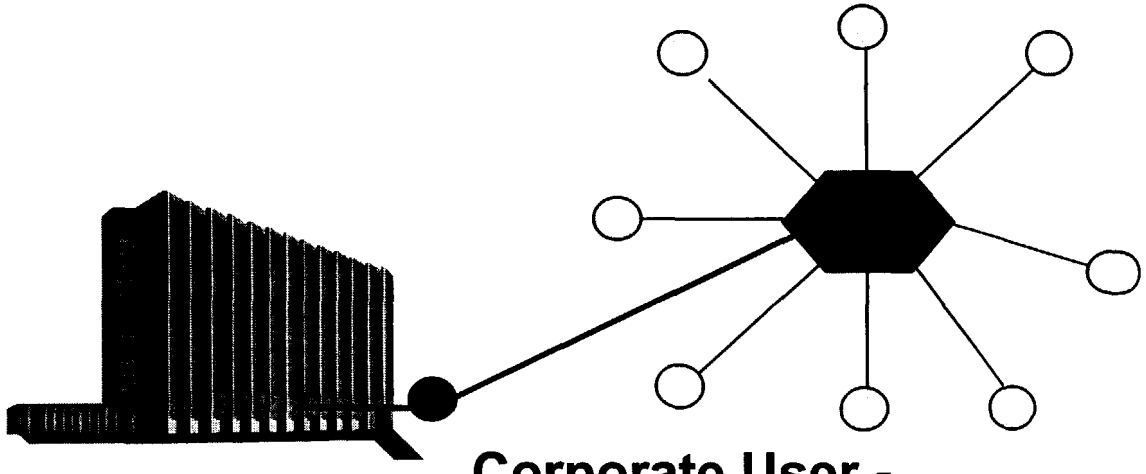
- ICANN oversees Regional Internet Registries (RIRs) for allocation and assignment of IP addresses
- ICANN just released guidance for IPv6 and allocated the first blocks

Dial-Up Access To The Internet



- Dial-up access POPs provide local phone call access to the Internet
- Caller connects to a modem port on a platform owned by an ISP or dial-up access network provider...
- Routers and switches owned by the ISP send the caller's packets to the appropriate destination .... through backbone networks....

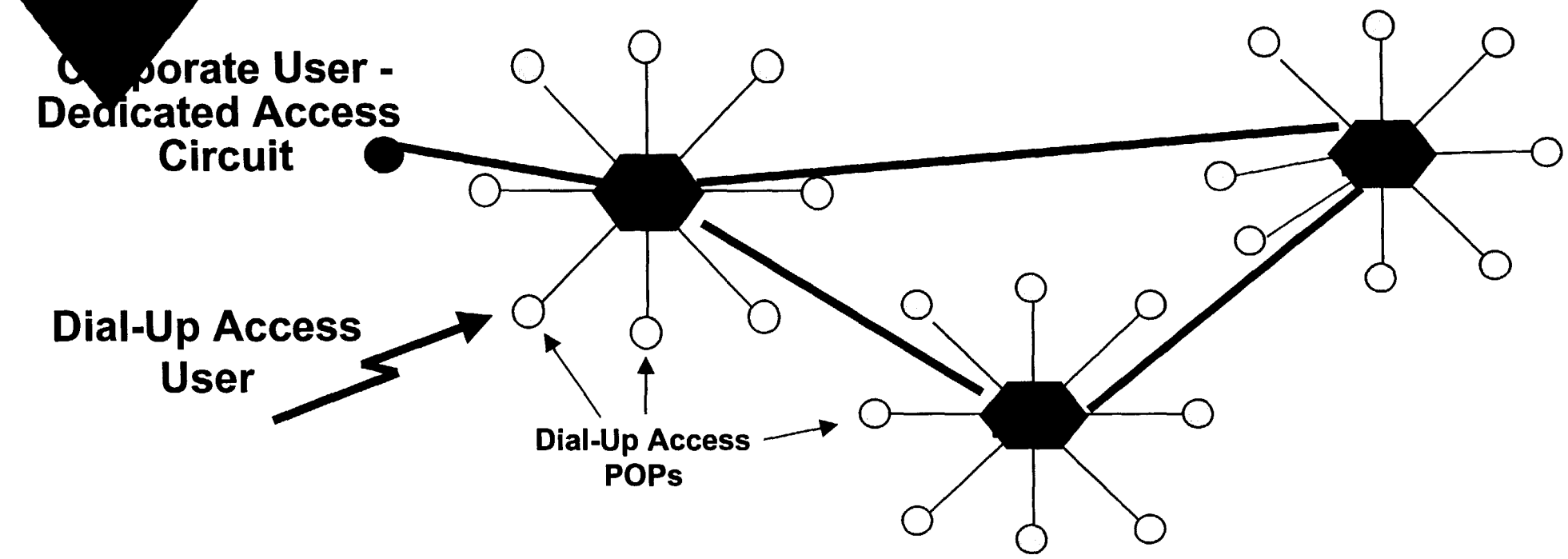
Dedicated Access to the Internet



Corporate User -
Dedicated Access Circuit

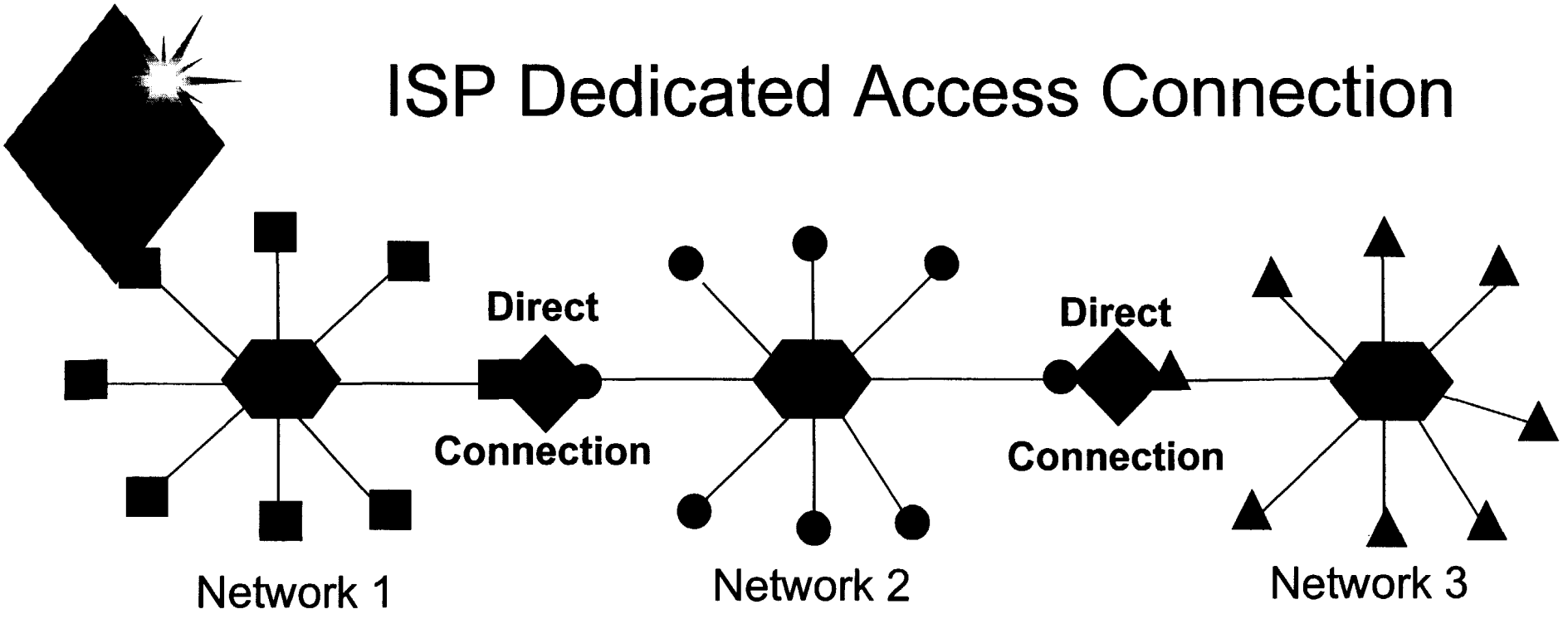
- Dial-up access “POPs” and “dedicated access” circuits connect to “high speed hubs”

Internet Backbone Network



- Dial-up access "POPs" and "dedicated access" circuits connect to "high speed hubs"
- Routers and switches owned by the ISP send the packets to the appropriate destination
- High speed circuits, leased from or owned by Telcos, interconnect the "high speed hubs" forming an "Internet backbone network"

ISP Dedicated Access Connection



- Network 1 and Network 3 pay Network 2 for Internet access and other services
- Charge is typically based on size of the connection (bandwidth) and may also be usage sensitive
- Dedicated access customers receive other services (SMTP mail, News, DNS, NOC support, provisioning assistance, etc.)
- Dedicated access agreements provide access and transit
- Dedicated access customers can reach any Internet destination on any Internet networks connected to provider (effectively all)

Customer ISPs get complete access to all Internet networks via dedicated access agreements with any backbone services provider