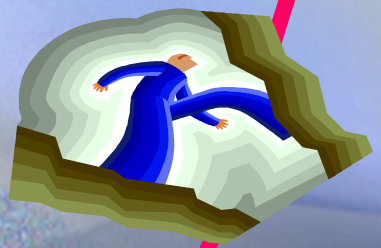
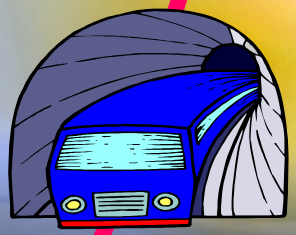
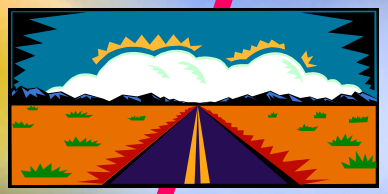

Next Generation
IPv6 FORCE
TASK

Technology & Progress Waves

Canals Railways Highways Telecommunications







1750 1800 1850 1900 1950 2000 2050

GOODS

PEOPLE

INFORMATION

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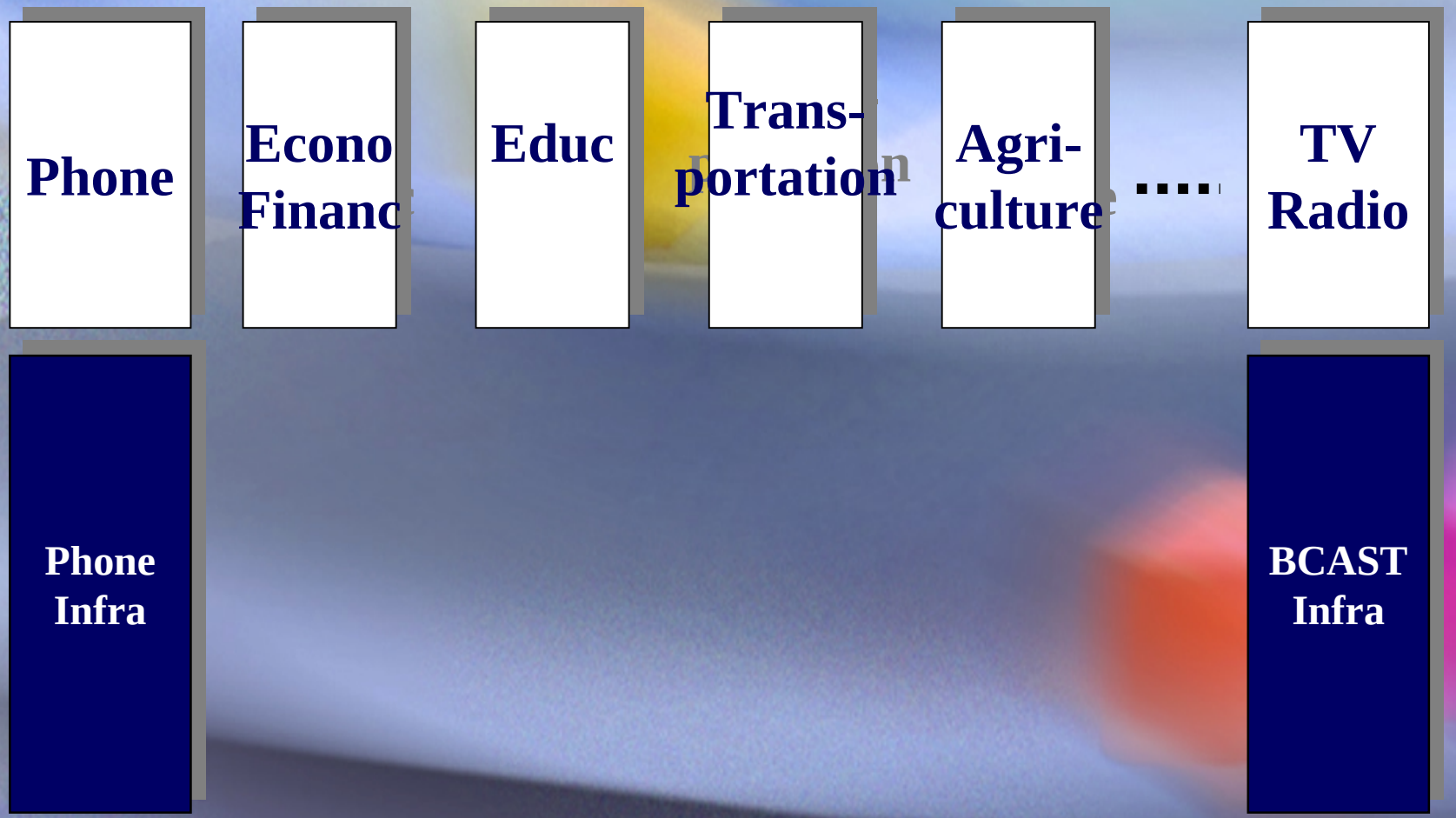
Analog Communication



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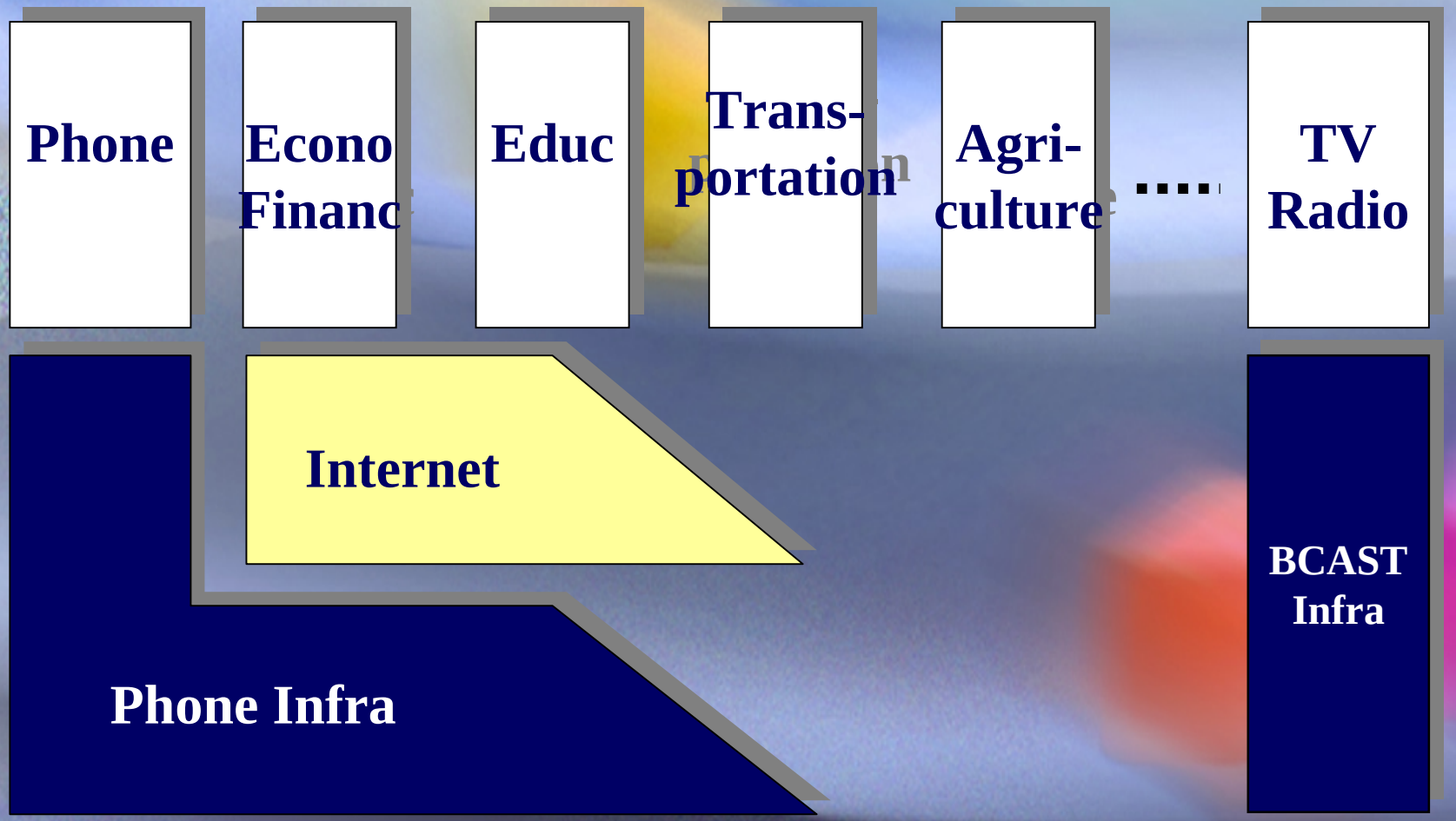
Internet: as of Yesterday



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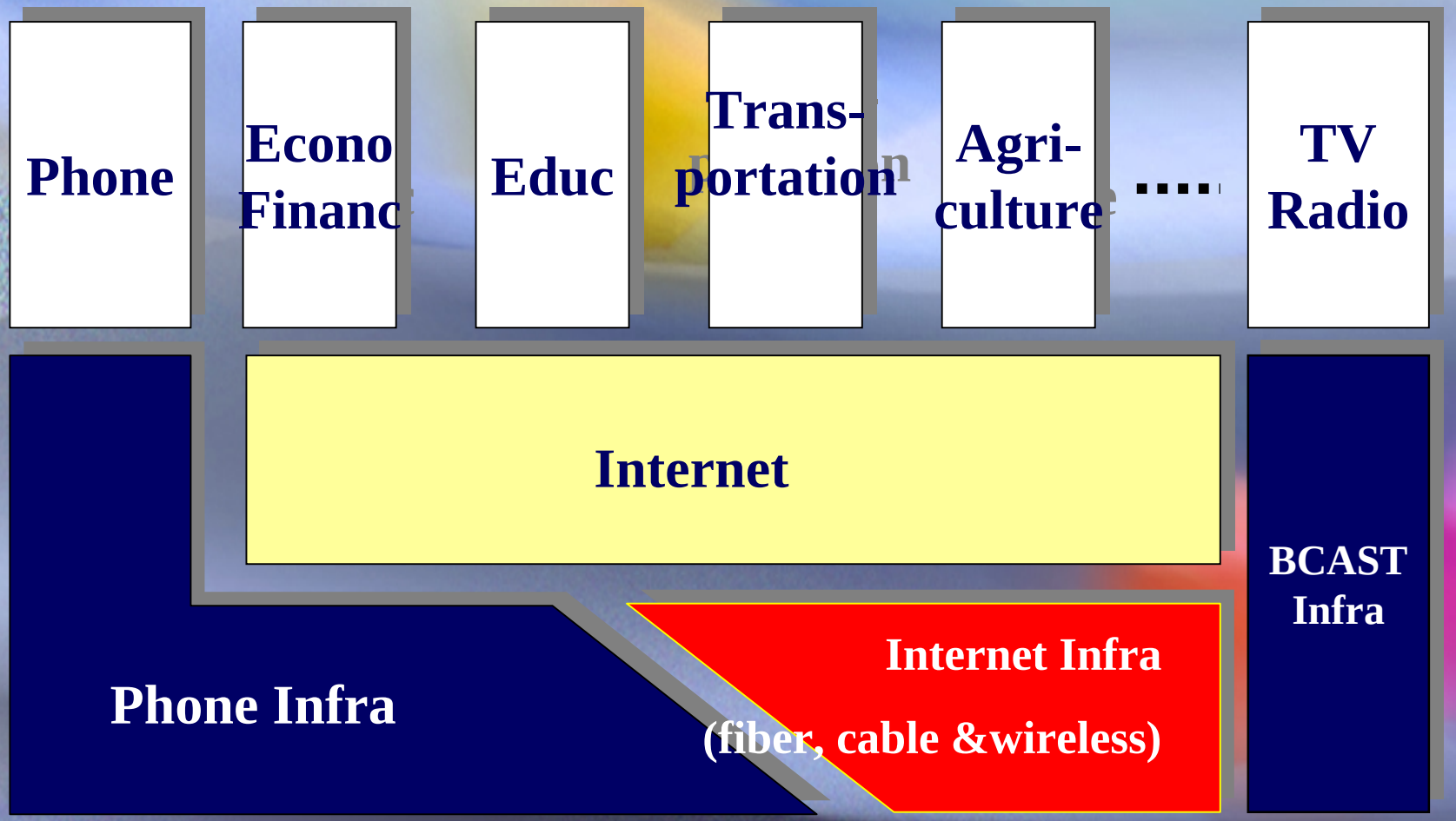
Internet: as of Today



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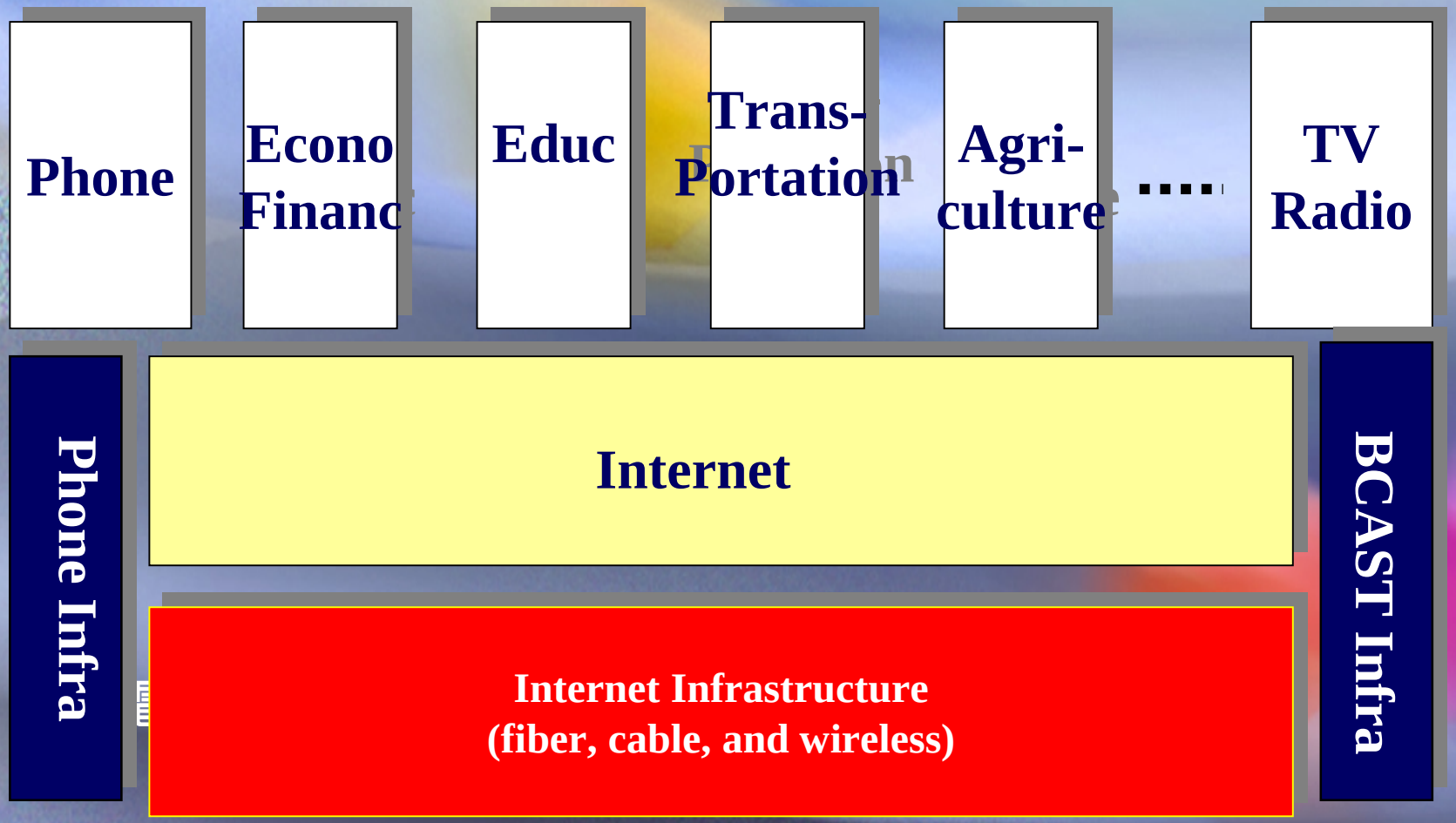
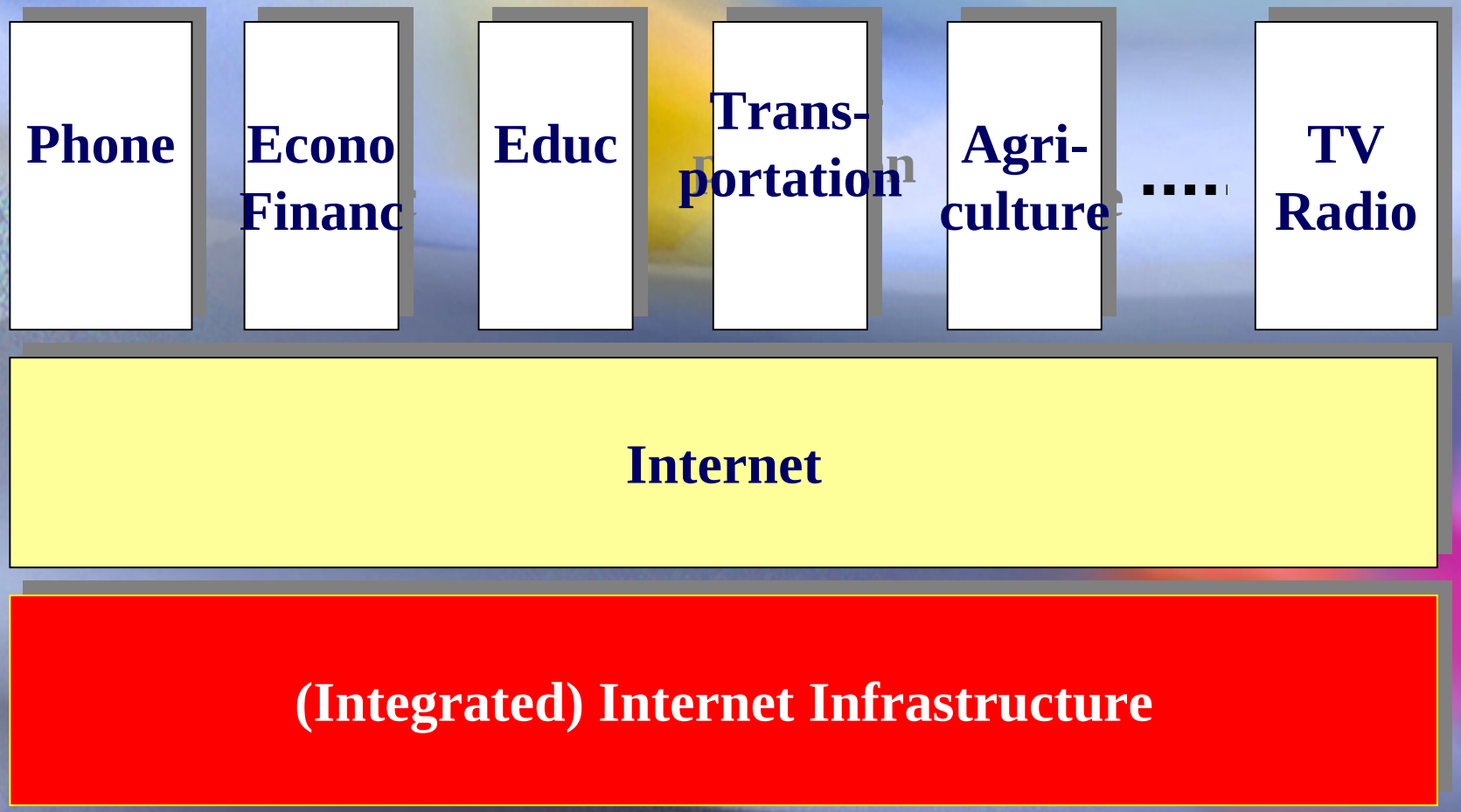
Internet: as of Tomorrow



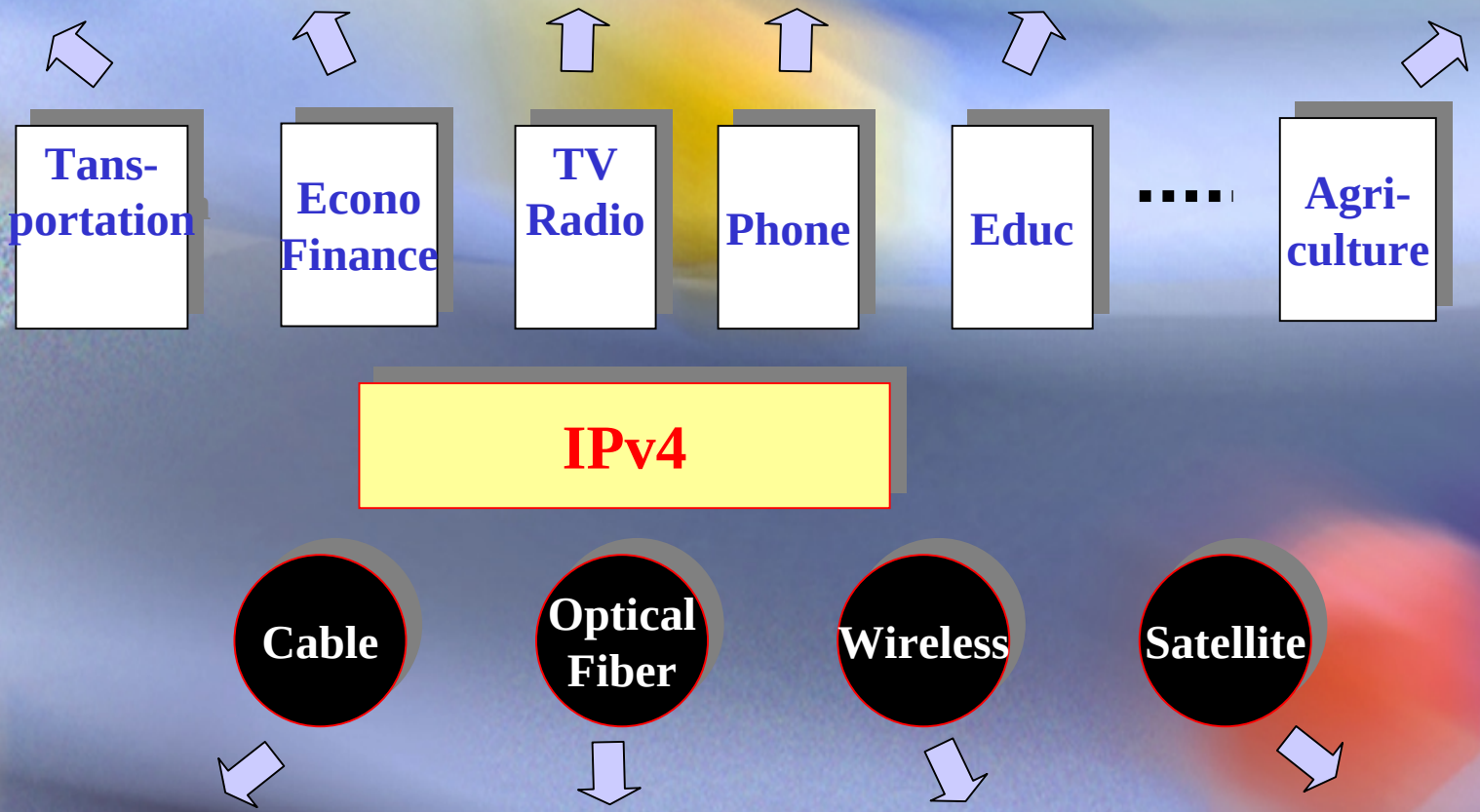
IPv6 TASK FORCE

Internet Infrastructure for digital communication society

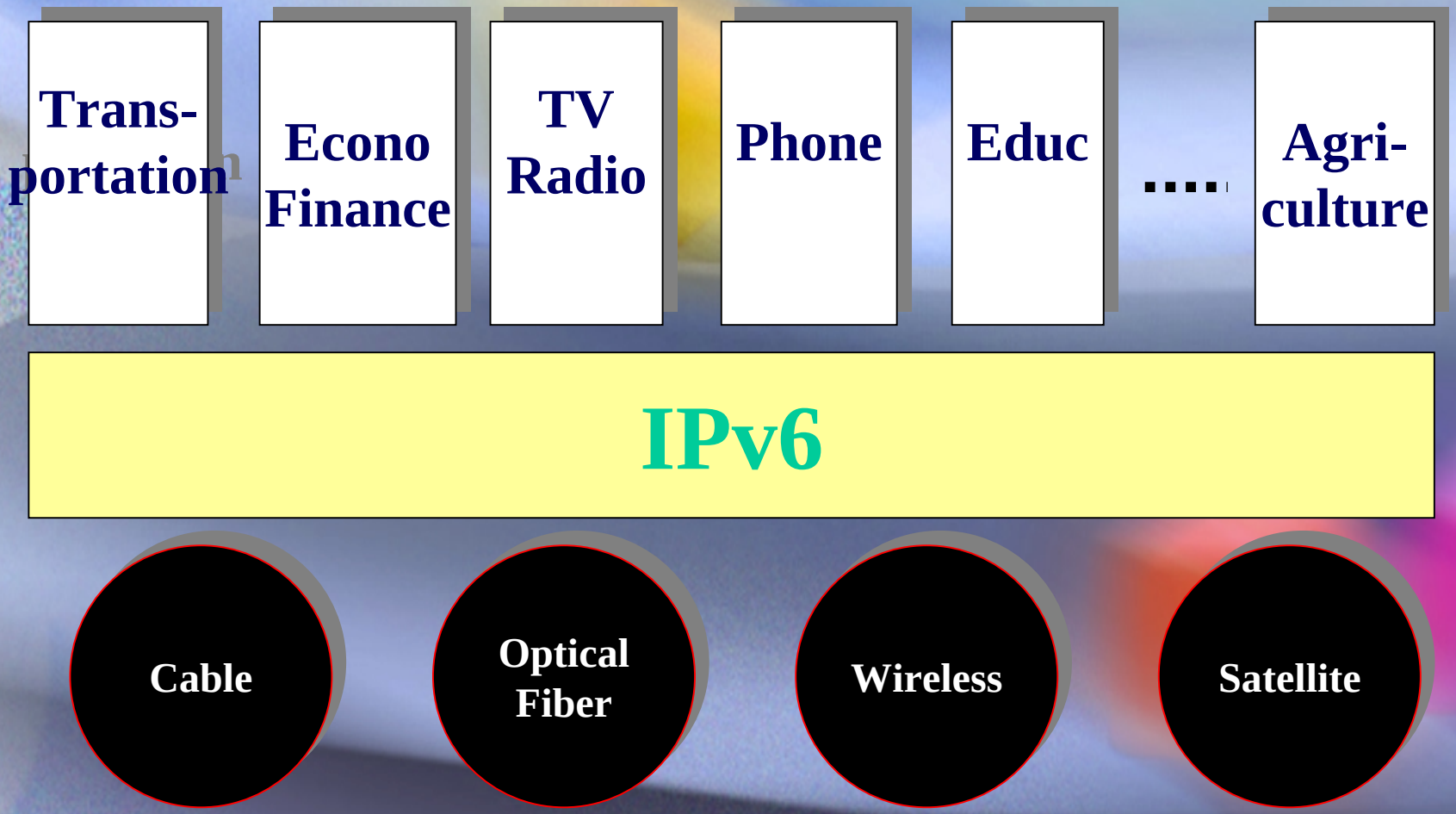


A testbed is VERY important!

IPv4: Not enough IP addresses and growing requirements



IPv6: The Internet Infrastructure



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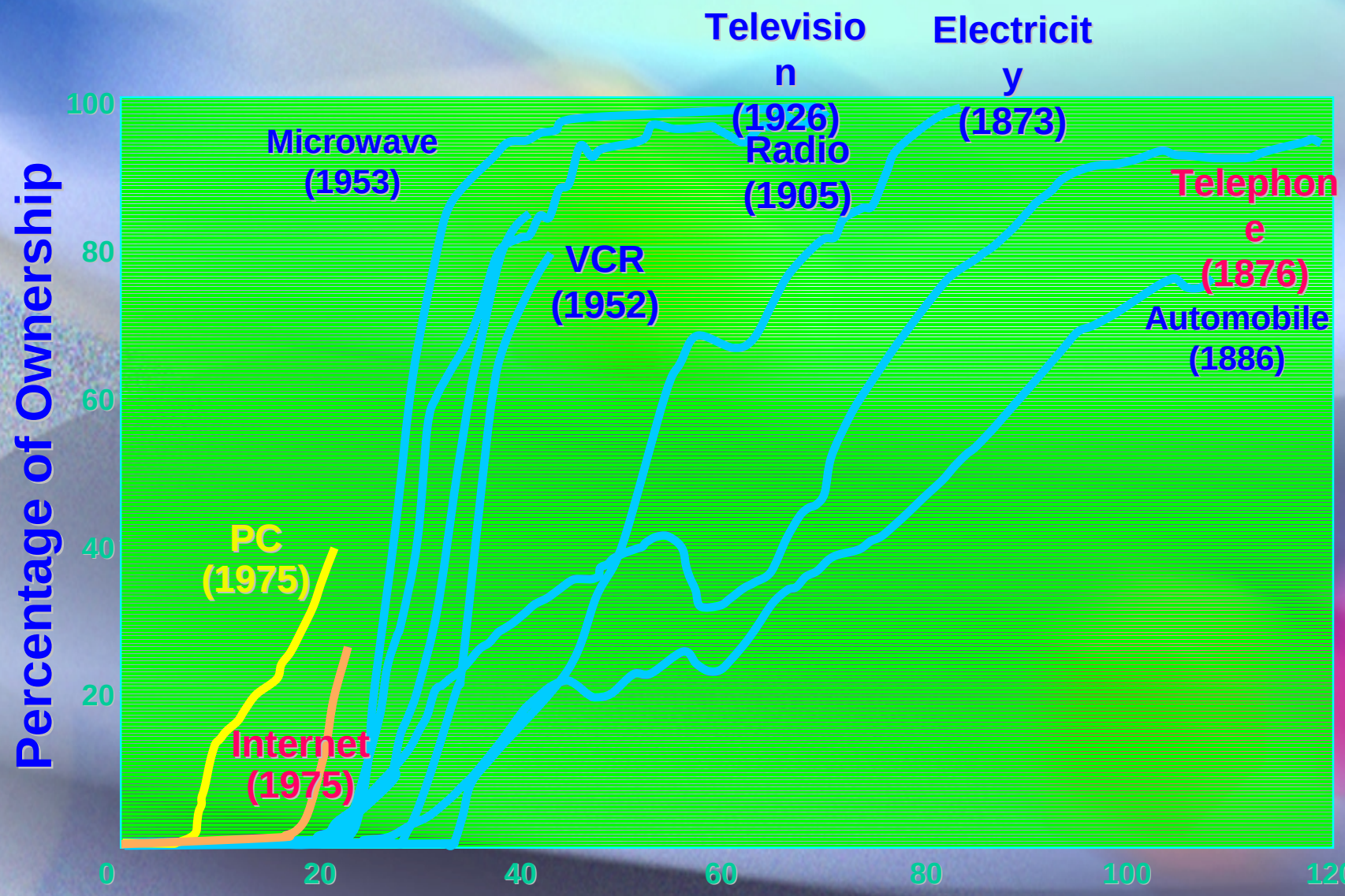
Industry Standards Drive Ubiquity



IPv6 TASK FORCE

IPv6 TASK FORCE

Internet Generations

1 G	
10 * 4	
Professionals	
Email, Ftp	
9.6 k	
Government Internet	

ARPANET

Internet Generations

1 G	2 G
10 * 4	10 * 8
Professionals	Innovators
Email, Ftp	WWW
9.6 k	56 k
Government Internet	Public Internet

Internet Generations

1 G	2 G	3 G
10 * 4	10 * 9	10 * 38
Professionals	Innovators	Everyone
Email, Ftp	WWW	Wireless, Streaming Media
DIAL-UP INTERNET		ALWAYS-ON
Government Internet	Public Internet	Global Internet
ARPANET	INTERNET	NEW INTERNET

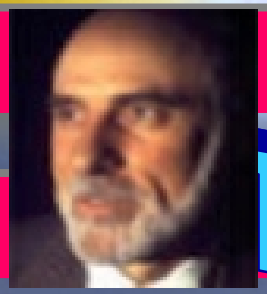
Internet TimeLine

- NCP Conception — 1961
- NCP Roll-Out — 1969

NCP 1969

ARPANET 1969 1982

- IP Conception — 1972
- IPv4 Roll-Out — 1983



IPV4 TERNE

32

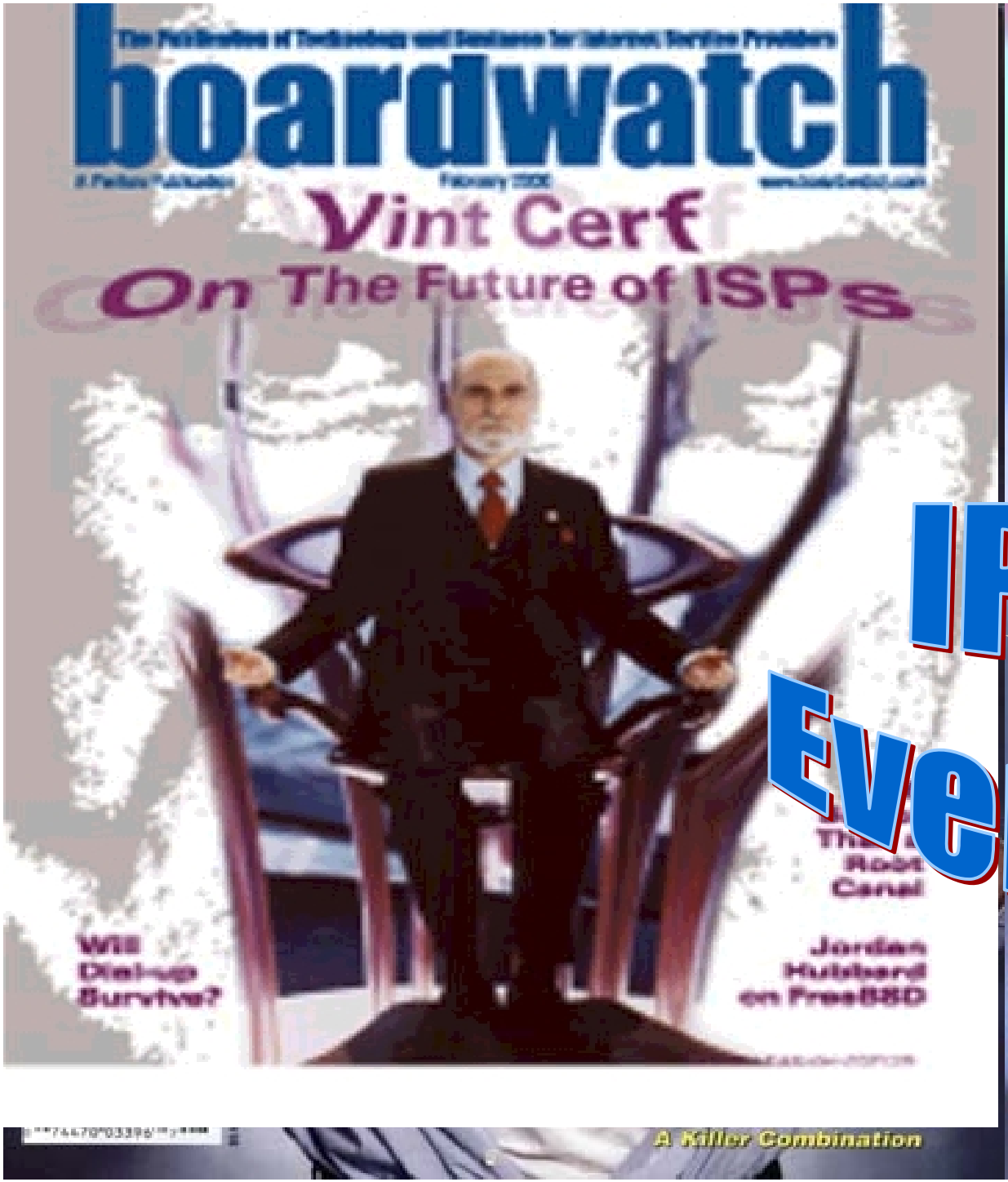
w!

- *IPv6 Conception* — 1991
- *IPv6 Roll-Out* — 2000

IPv6 99

NEW INTERNET

IPv6 TASK FORCE

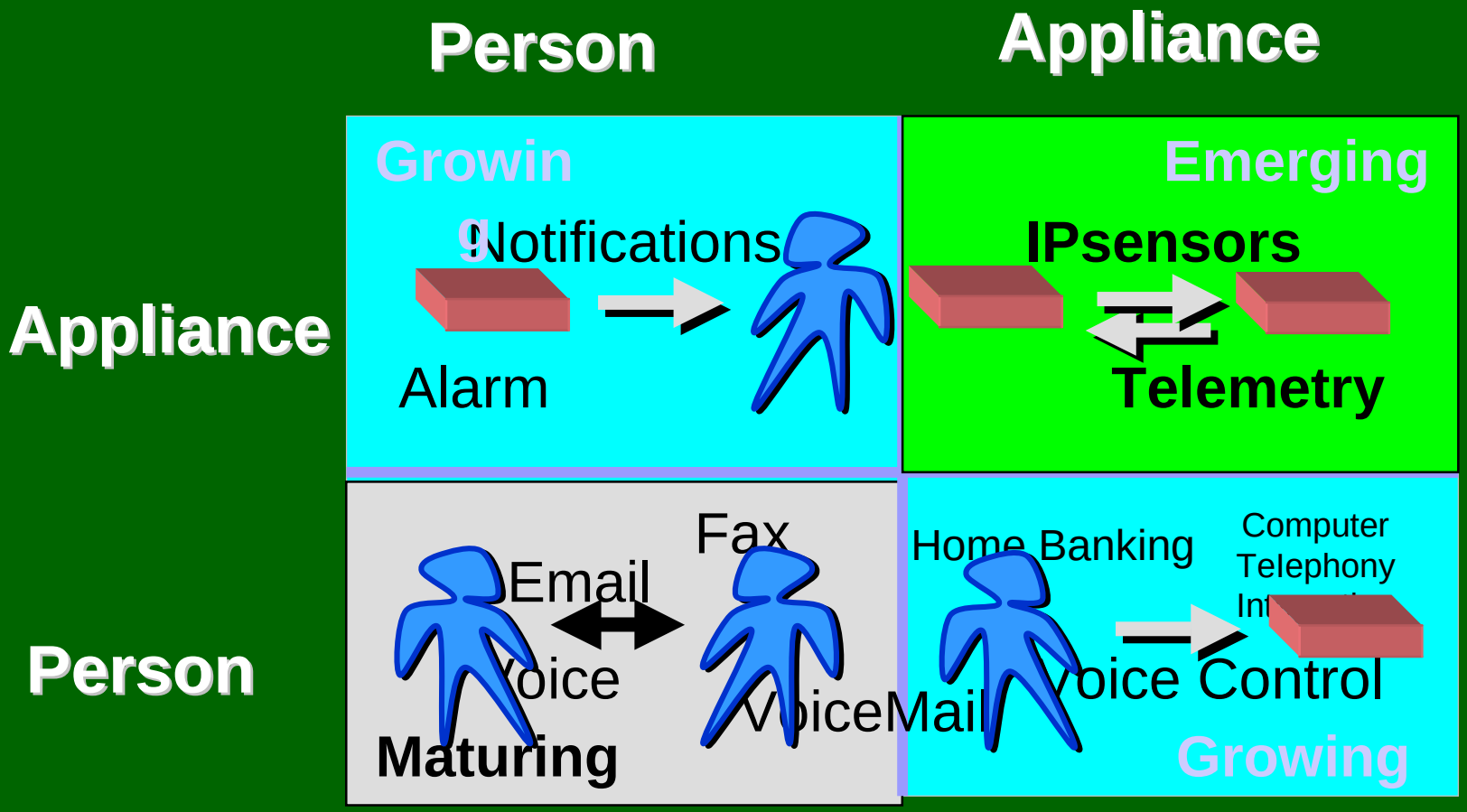


1996

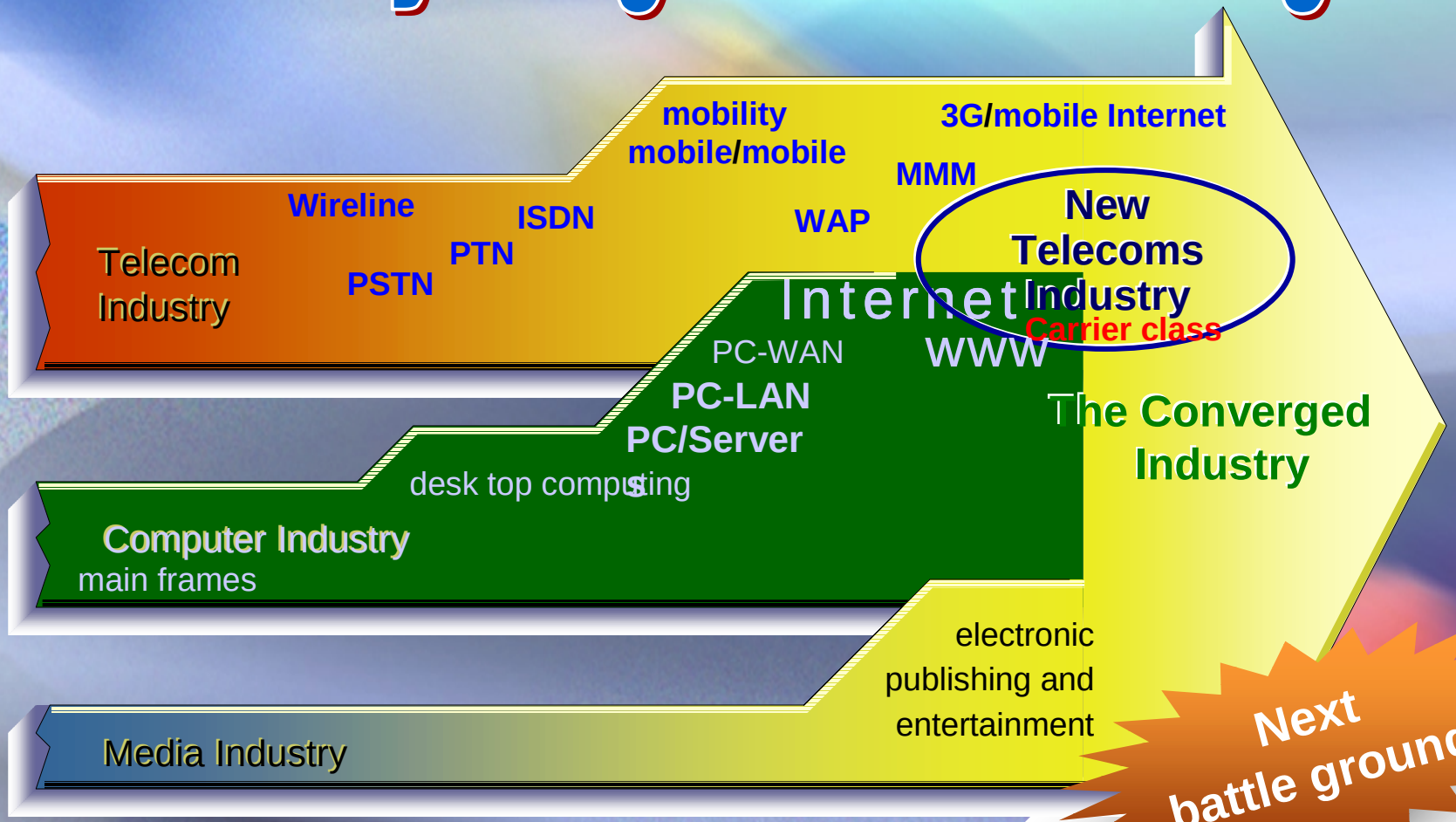
2002

IPv6 on Everything

InfoCom Application Areas



Industry Integration / Convergence



IP sensor Prototype
(Thermo Sensor Node)

Inside view

Outside view

IPv6 TASK FORCE

Network Appliances(on sale)

Cellular Phone with Internet Connectivity

© NTT DoCoMo

Digital Camera with Network Connectivity

© Cannon

Microwave with Network Connectivity

© Sharp

Digital Video Camera With A/V Network Connection

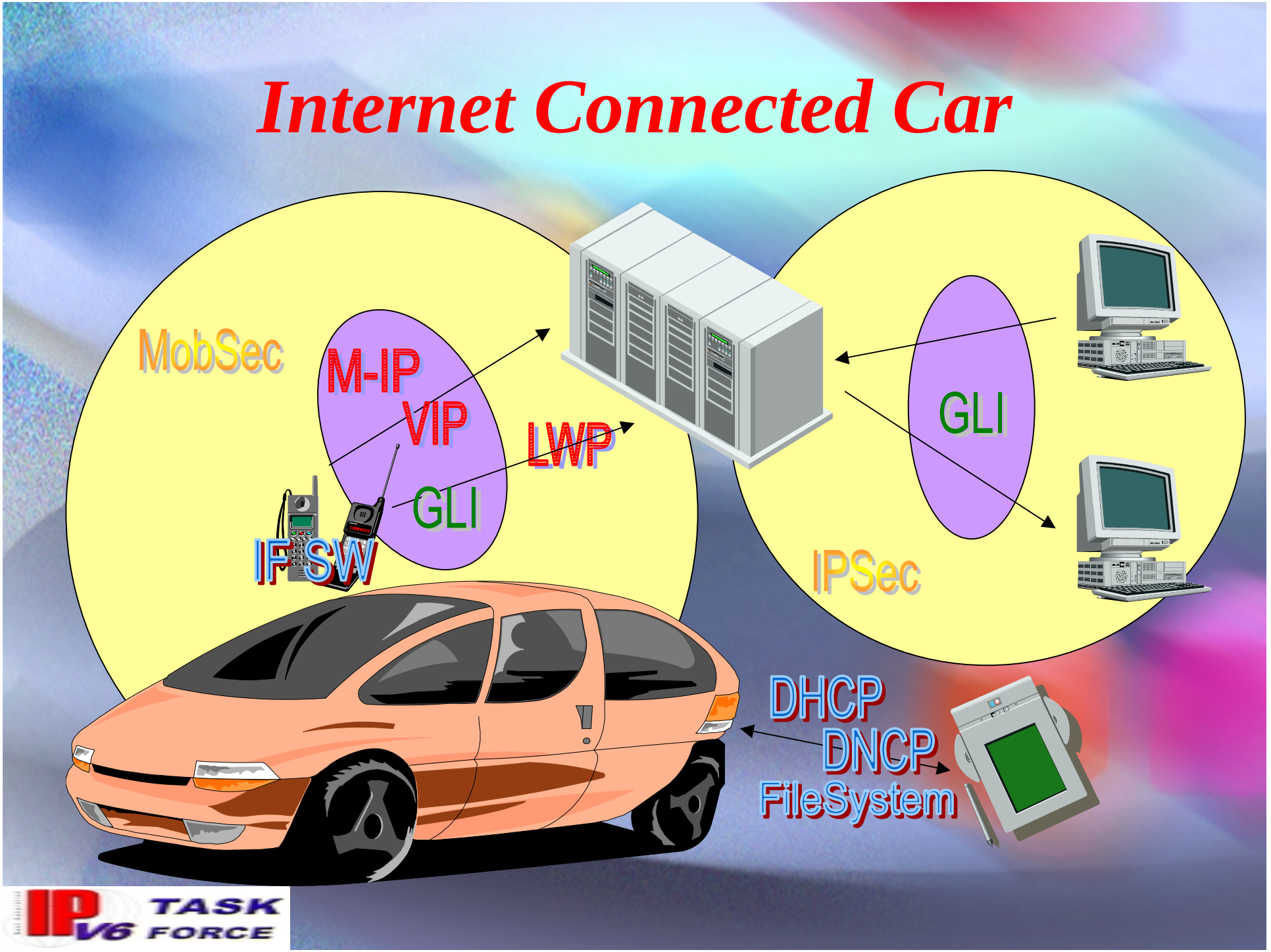
© Sony

IPv6 FORCE

Refrigerator Node

TASK FORCE

Internet Connected Car



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Joint Graduate Level Course on "Network Security" among 3 Universities, Dec 12, 2000 from San Diego U.S.A

NAIST

Students @ 3 universities in Japan

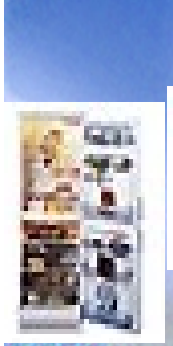
KEIO SFC

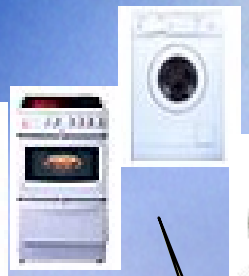
U-Tokyo

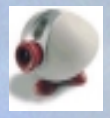
3 professors @ San Diego Super Computer Center

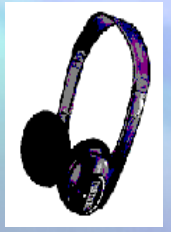
IPv6 TASK FORCE

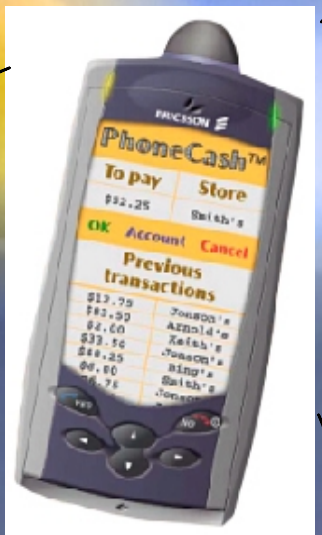
Vision: World at your fingertips











ADSL,
Cable TV,...

Service Gateway

IPv6 TASK FORCE

What is the Key Enabler for Mass Deployment of Mobile IP-Services ??

It must be

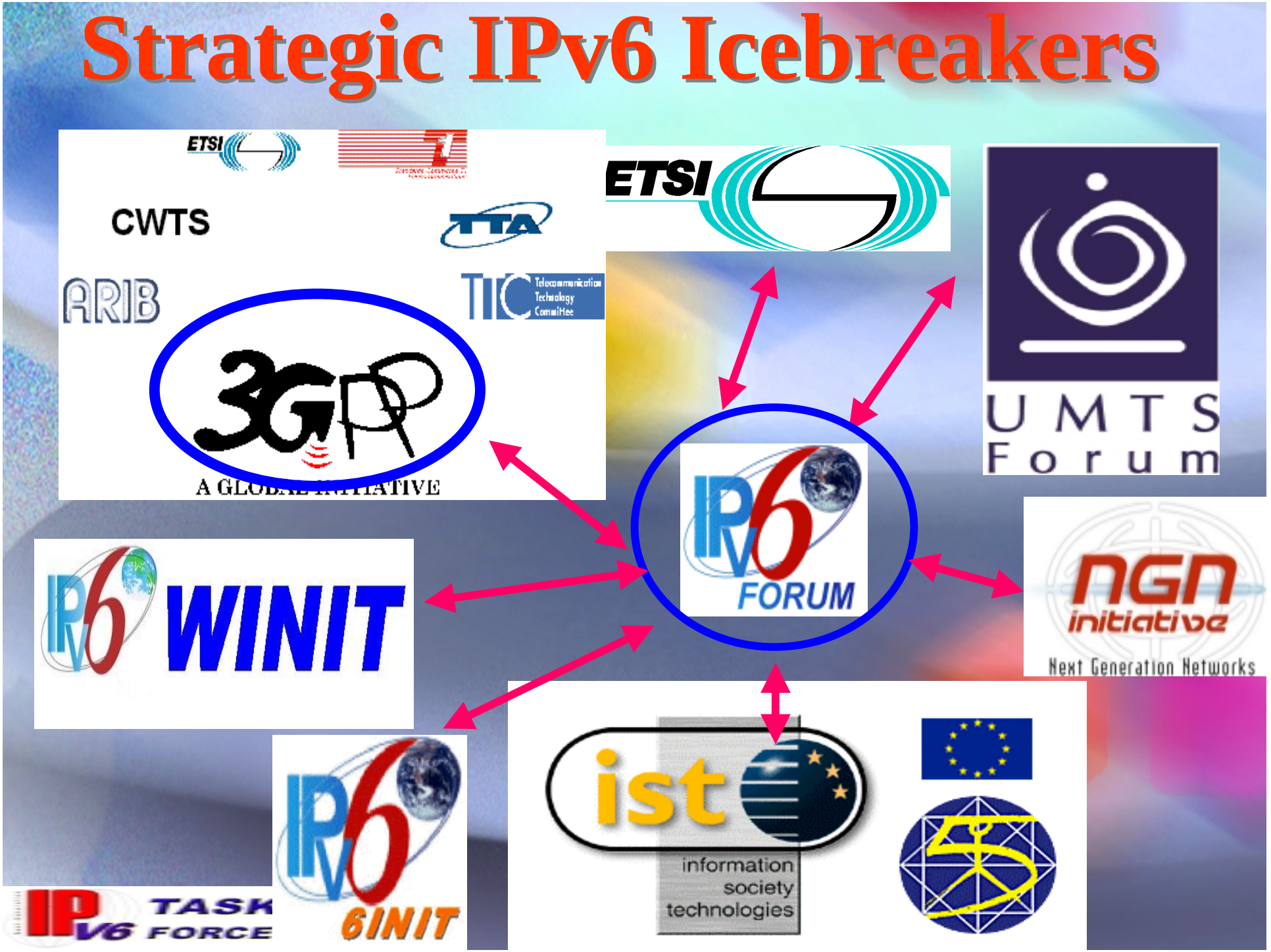
!! Cheap cheap Chea

Cheap Cheap Cheap Cheap Cheap Cheap Cheap Cheap

2000 2001 2002 2003 2004 2005 (1 Billion Users Forecast)

IPv6 TASK FORCE

Strategic IPv6 Icebreakers



100% IPv6 readiness by 2005

- Prime Mister of Japan Yoshiro Mori
- Korean MIC followed Japan Feb 23rdm 2001

IPv6 TASK FORCE

The Transparency of the Internet (Network Layer)

Why IPv6?

IPv6 TASK FORCE

Internet Scaling challenges

Great IP Address Crunch

QoS

Accurate system information

Security

Authentication and usage tracking

Maintain IS technical advantage

IPv6 TASK FORCE

IP Robustness & Scalability

IPv4 IPv6

Address Space Shortage
Security
QoS
Mobility
Cost of System Management
Lack of Capability needed for Next Generation Applications

\- ?

Add-on Built-in

Y? N

IPv4 NAT IPv6

1970 1980 1990 2000

IPv4 is in the same state as DOS/Windows 3.1!

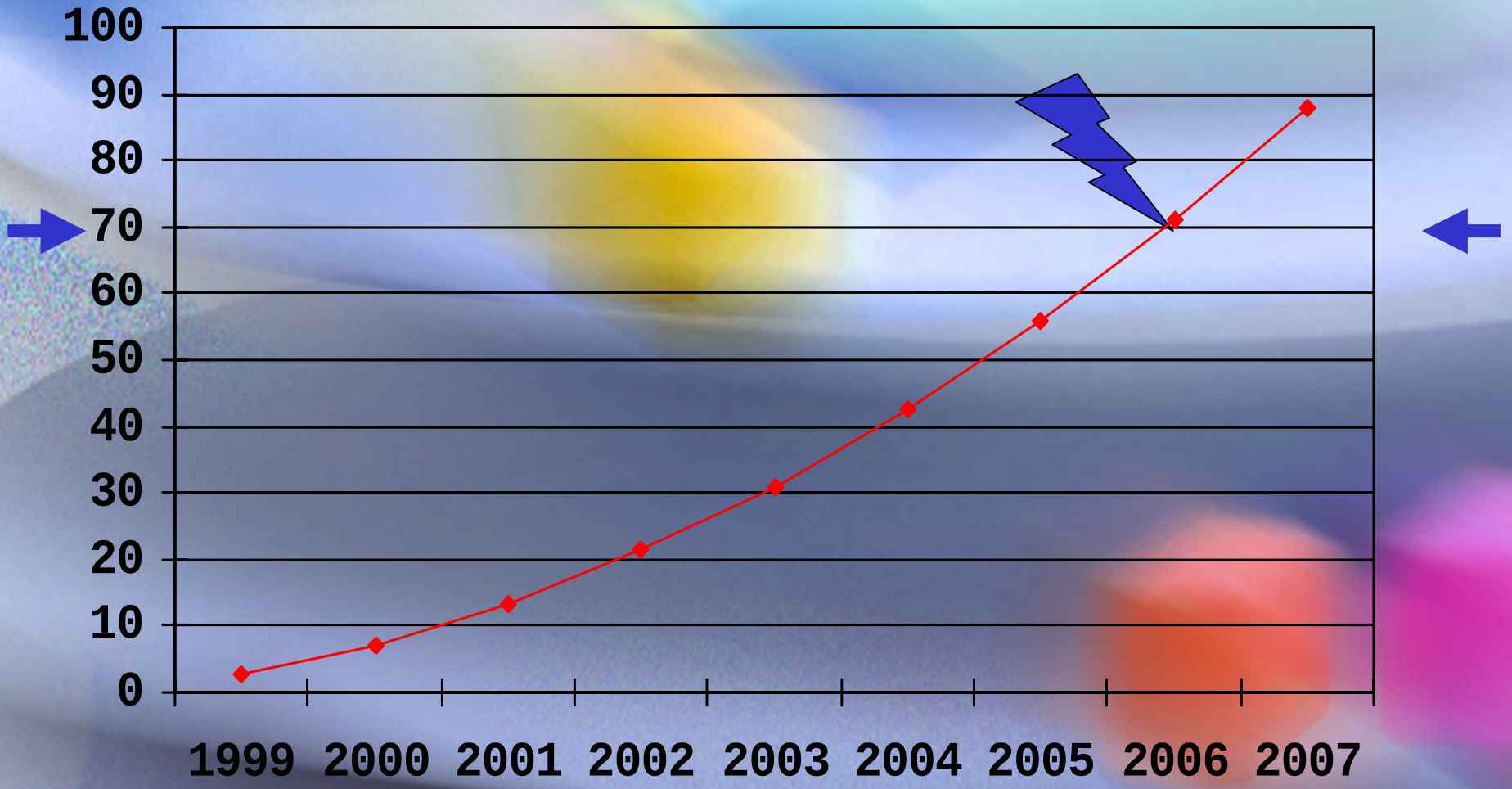
IPv6 TASK FORCE

IPv4 Address Usage Estimate

- Approximately 70 units are left = 27 %
  - Here one unit means 1/256 of the total IPv4 address space size, i.e. /8 (=equivalent size of Class A)
- Address Usage Rate (units per a year)

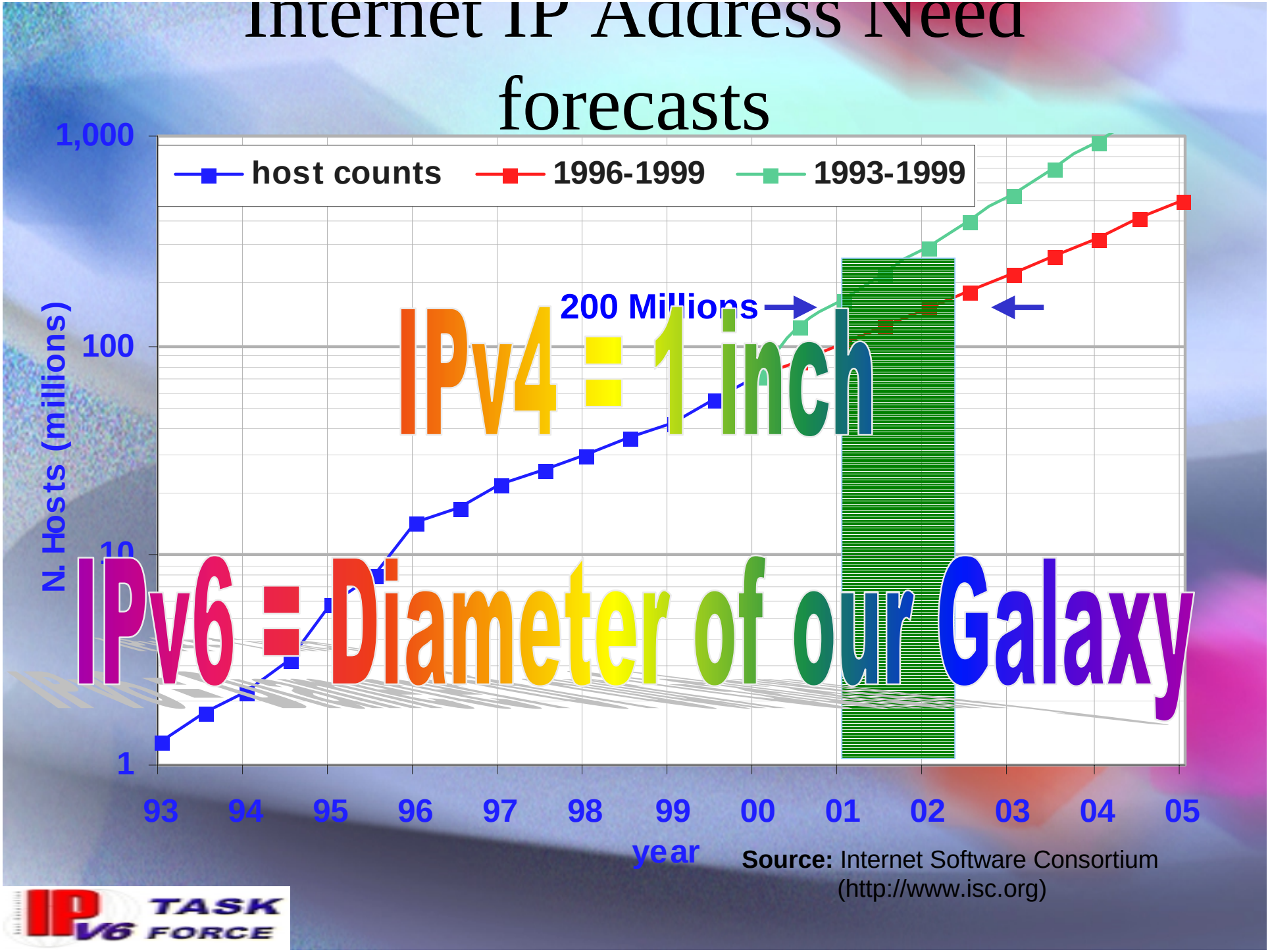
	RIPE/NCC (Europe)	APNIC (AsiaPacific)	ARIN (America)	Total
1998			0.77	
1999	0.8	0.58	1.29	2.67
2000	1.2	1.16	2.08	4.44
2001				??

IPv4 Address Usage Estimate



IPv6 TASK FORCE

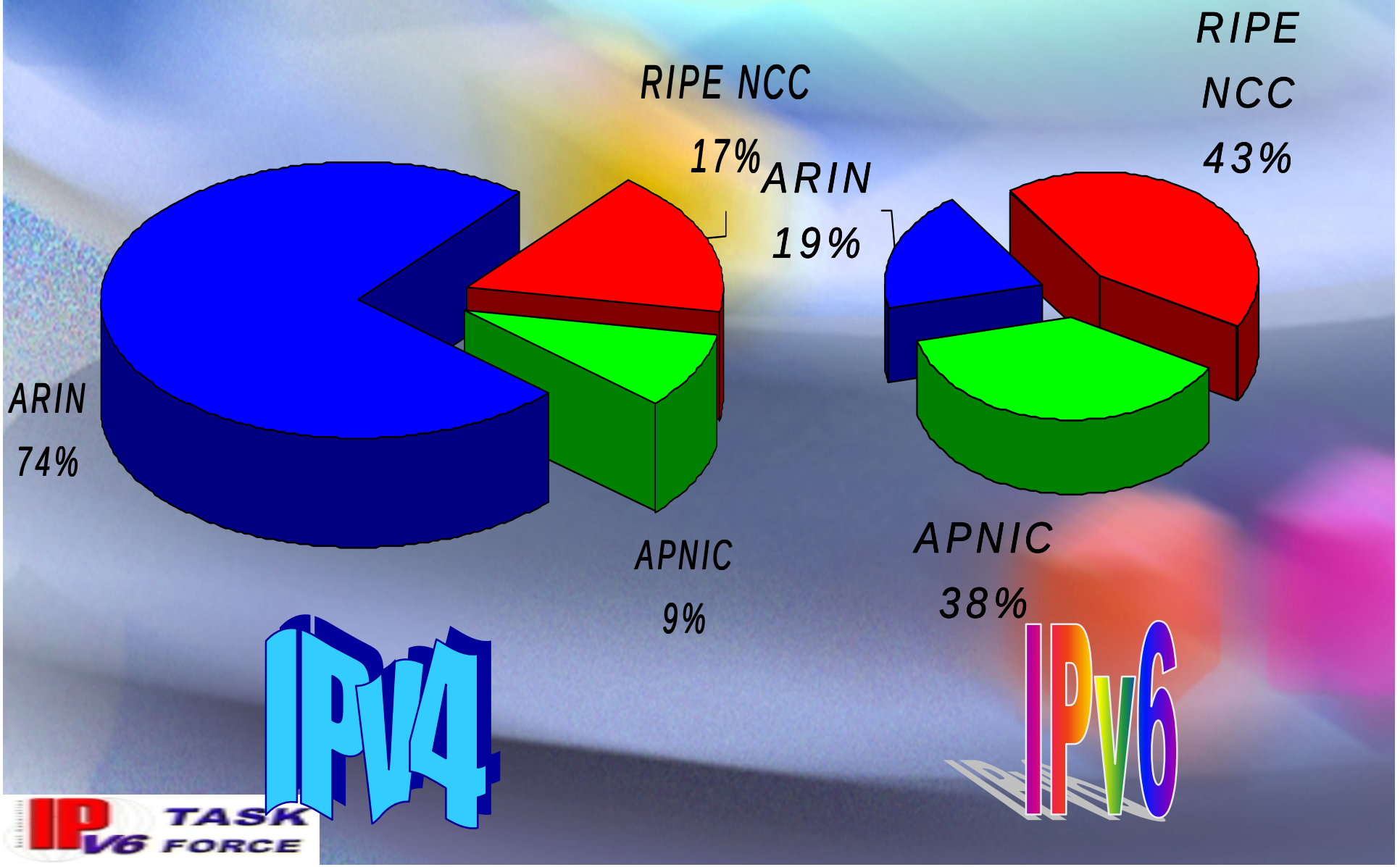
Internet IP Address Need forecasts



Source: Internet Software Consortium (http://www.isc.org)

IPv6 TASK FORCE

Comparison of IPv4 - v6 Resources



Wireless Mobility Neeed for Always-On IP Address Resource

Million	Year 2005	Year 2010
Mobile Phones	1500	3000
Mobile IP Phones	500	1000
1% Roaming	5	10
400 Wireless Networks	2000	4000

GRACEFULL TRANSITIONS

IPv4	**TB** **6to4** **6over4** **NAT-PT** **BIS** **SOCKS**	**NAT-PT** **BIS** **SOCKS**	**DSTM** **NAT-PT** **BIS** **SOCKS** **"4to6 ?"**	**IPv6**
Legacy IPv4 Internet	**Large IPv4 Ocean, Small IPv6 islands**	**A large IPv4 net, a large IPv6 net**	**IPv6 Ocean IPv4 Islands, legacy v4 apps**	**Legacy IPv6**
Phase 1	**2**	**3**	**4**	**5**

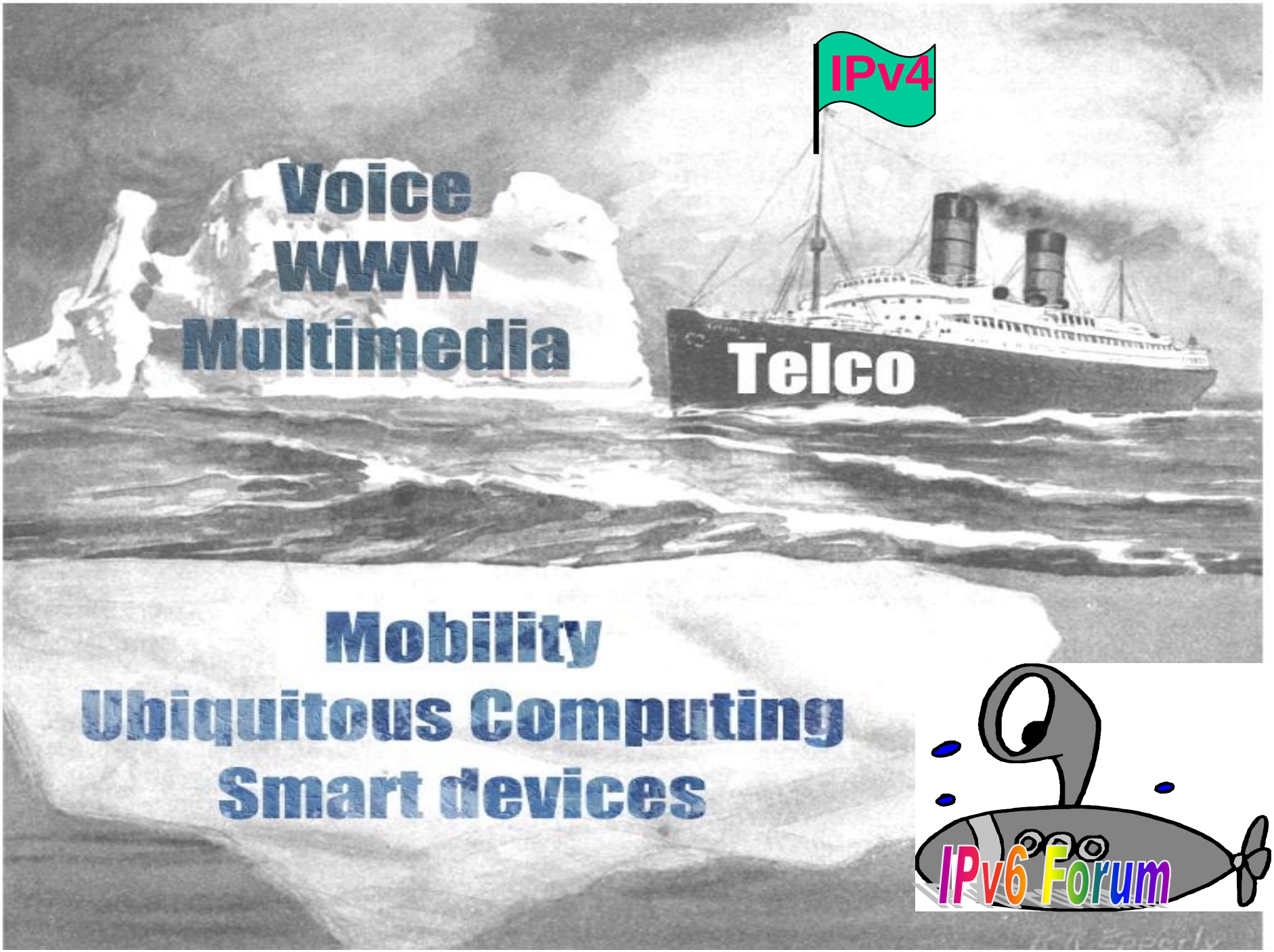
IPv6 - a small step for IP but a giant leap for Telcos

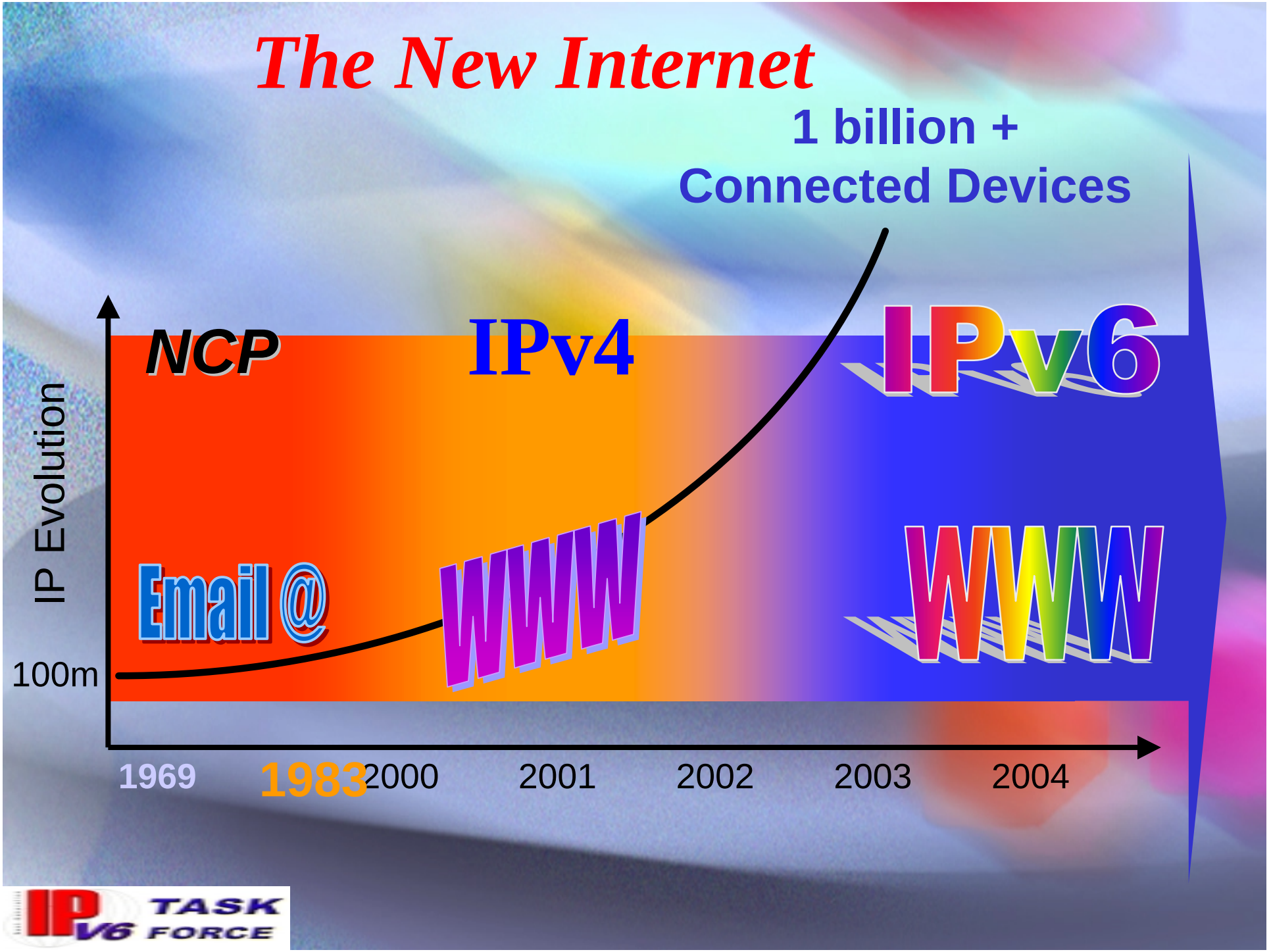
IPv6 : An e-Buisness Enabler

Critical Success Factor	Today with IPv4	*IPv6*
Cost Effectiveness	Costly workarounds	>1 billion addresses / person
Flexibility	Frequent renumbering as site grows	Simplified network planning and management
Reliability	Operational complexity	Return to simple and scalable architecture
Availability	Single points of failure	24x7 operation
Scalability	Client/server	Peer-to-peer
Accessibility	Obstacles to deploying next generation applications (e.g., VoIP)	Pervasive enabler Simplified application development
Security	Interferes with some applications	Enabler for end-to-end security

IPv6 TASK FORCE

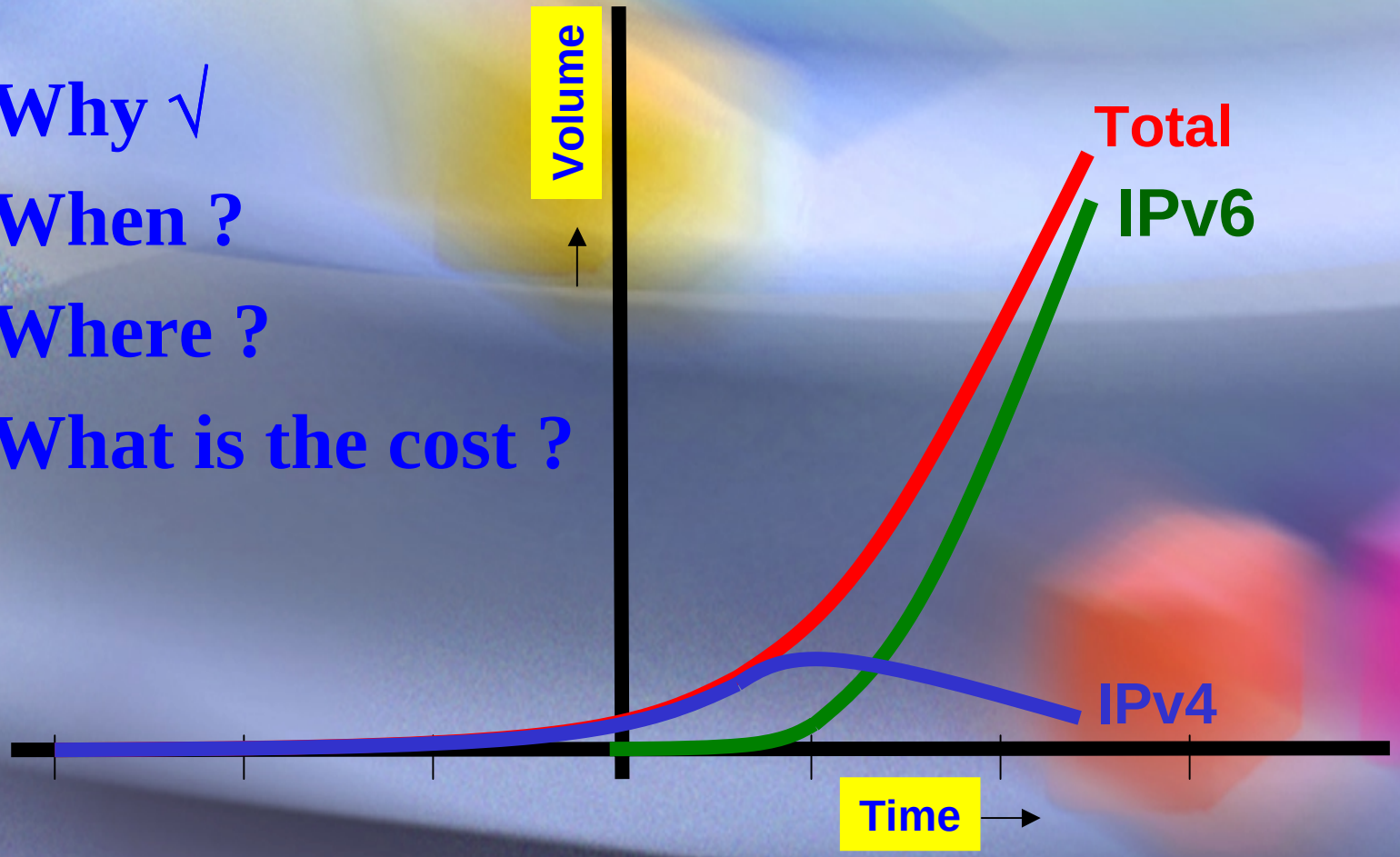

IPv6
the Internet Tidal Wave


IPv4
Voice
WWW
Multimedia
Telco
Mobility
Ubiquitous Computing
Smart devices
IPv6 Forum


The New Internet
1 billion +
Connected Devices
NCP
IPv4
IPv6
Email @
WWW
WWW
IP Evolution
100m
1969
1983
2000
2001
2002
2003
2004
IPv6 TASK FORCE

The BIG Questions!

- Why √
- When ?
- Where ?
- What is the cost ?



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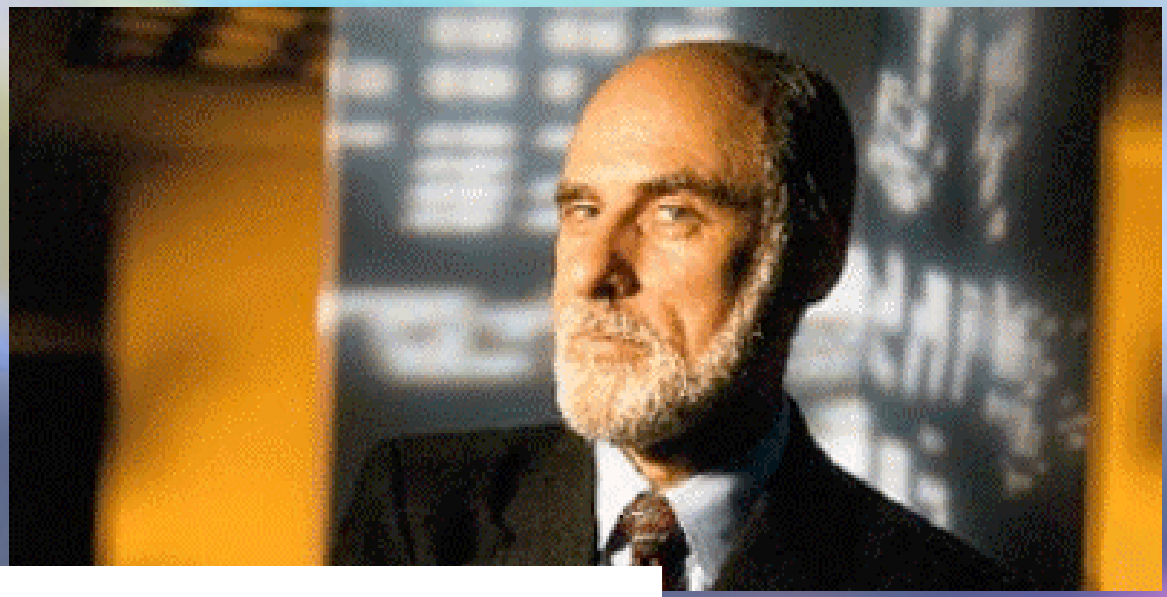
IPv6 FORUM



"IPv6 is here and now
So take the internet where no other network has gone before!"

Vint CERF

Honorary Chairman

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