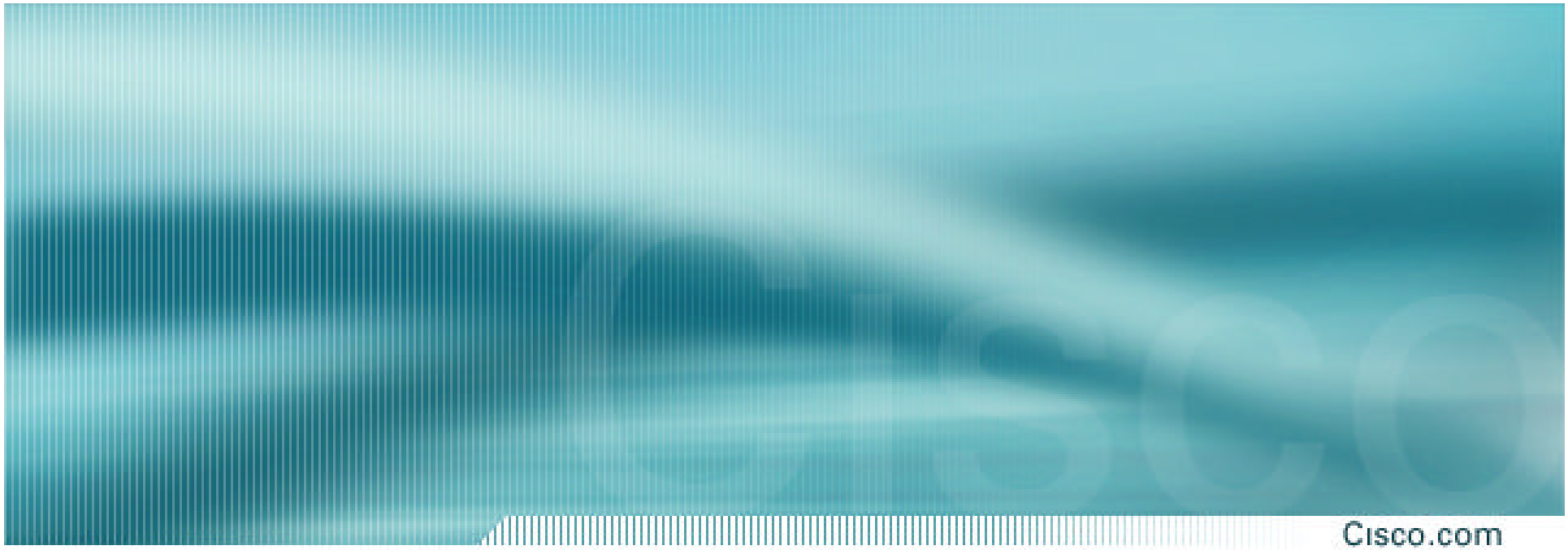

IPv6 @ Cisco

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Cisco IOS IPv6 Product Manager

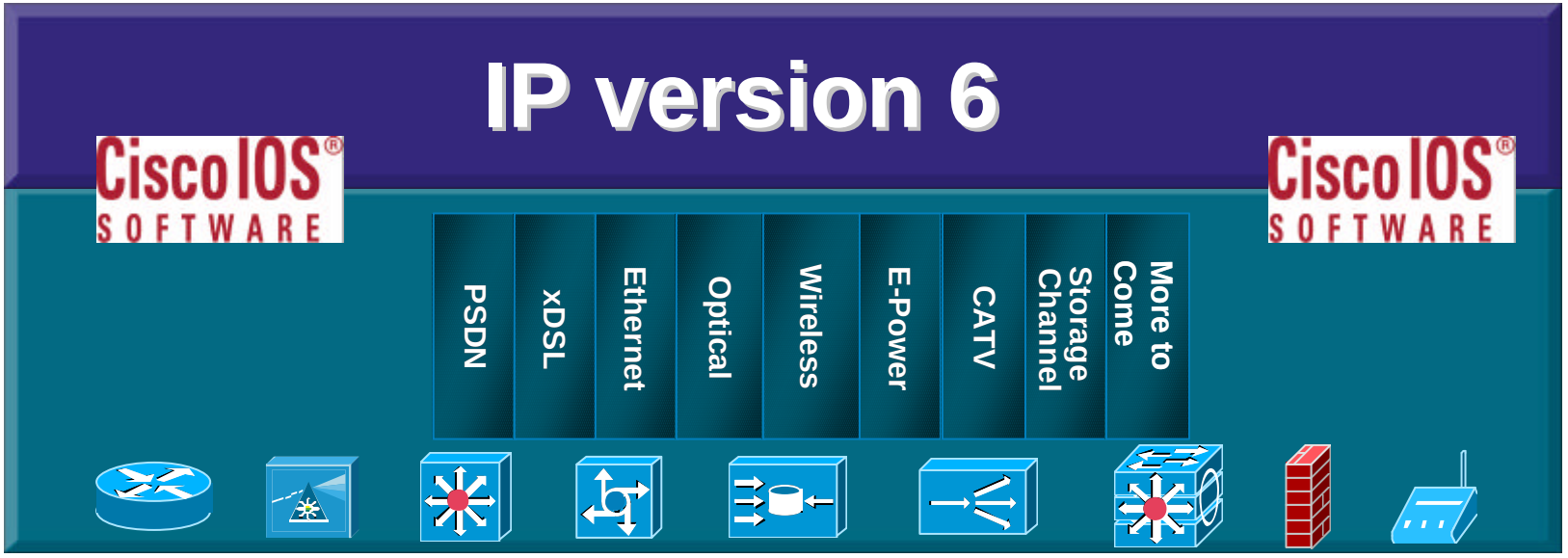
pgrosset@cisco.com

Agenda

- **IPv6 Business Case**
- **IPv6 Protocols & Standards**
- **Integration and Transition**
- **Cisco IOS IPv6 Roadmap**
- **IPv6 Deployment scenarios**

IP – The Application's Convergence Layer

With millions of new devices becoming IP aware, the need for increased addressing and plug & play networking is only met with the implementation of IPv6



A need for IPv6?

- **IETF IPv6 WG began in early 90s, to solve addressing growth issues, but**
  - **CIDR, NAT,… were developed**
- **IPv4 32 bit address = 4 billion hosts**
  - **~37% of the IPv4 address space is still unallocated (08/02)**
- **General perception is that "*IPv6 has not yet taken hold strongly*"**
  - **IPv4 Address shortage is not [yet] true for all regions**
  - **Private sector requires a business case**
  - **Data on Wireless infrastructure emerges recently**
- **But reality looks far better for the coming years!!! To sustain the *Internet growth!!!***

IP Address Allocation History

1981 - IPv4 protocol published

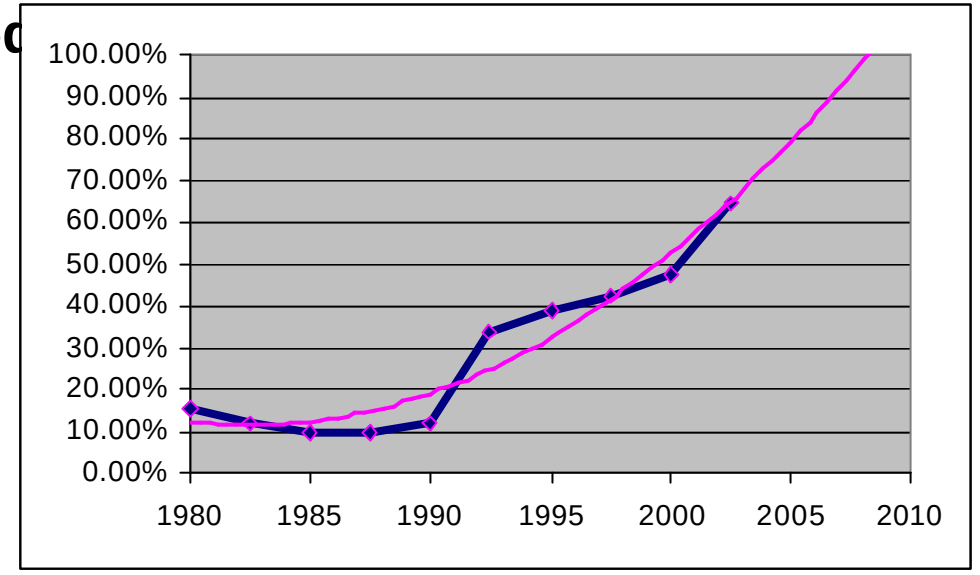
1985 ~ 1/16 of total space

1990 ~ 1/8 of total space

1995 ~ 1/3 of total space

2000 ~ 1/2 of total space

2002.5 ~ 2/3 of total space



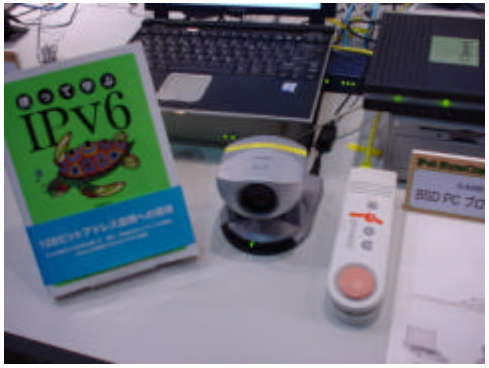
- **This despite increasingly intense conservation efforts**
  - **PPP / DHCP address sharing**
  - **NAT (network address translation)**
  - **CIDR (classless inter-domain routing)**
  - **plus some address reclamation**
- **Theoretical limit of 32-bit space: ~4 billion devices**
  Practical limit of 32-bit space: ~250 million devices (RFC 3194)

Do We Really Need a Larger Address Space?

Cisco.com

- **Internet Population**
  - **~600M users in Q4 CY2002, ~945M by end CY 2004 – only 10-15%**
  - **How to address the future Worldwide population? (~9B in CY 2050)**
  - **Emerging Internet countries need address space, eg: China uses nearly 2 class A (11/2002), ~20 class A needed if every student (320M) has to get an IP address**
- **Mobile Internet introduces new generation of Internet devices**
  - **PDA (~20M in 2004), Mobile Phones (~1.5B in 2003), Tablet PC**
  - **Enable through several technologies, eg: 3G, 802.11,…**
- **Transportation – Mobile Networks**
  - **1B automobiles forecast for 2008 – Begin now on vertical markets**
  - **Internet access on planes, eg. Lufthansa – train, eg. Narita express**
- **Consumer, Home and Industrial Appliances**

Explosion of New Internet Appliances



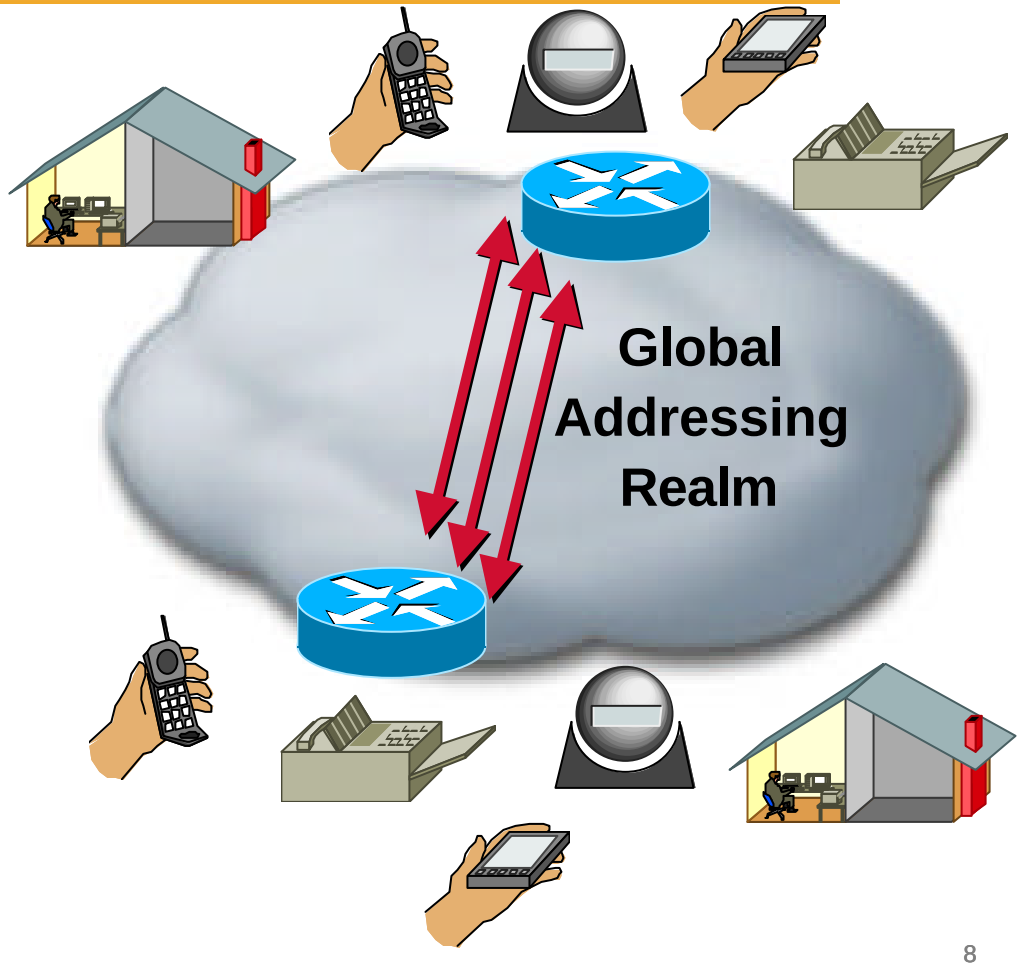
Source: N+I Tokyo, July 2002

Restoring an End-to-End Architecture

New Technologies/Applications for Home Users

'Always-on'—Cable, DSL, Ethernet-to-the-Home, Wireless,…

- **Internet started with end-to-end connectivity for any applications**
  - **Replacing ALG such as Decnet/SNA gateway**
- **Today, NAT and Application-Layer Gateways connect disparate networks**
- **Peer-to-Peer or Server-to-Client applications mean global adresses when you connect to**
  - **IP Telephony, Fax, Video Conf Mobile, Residential,…**
  - **Distributed Gaming**
  - **Remote Monitoring**
  - **Instant Messaging**



IPv6 Markets

- National Research & Education Networks (NREN) & Academia
- Geographies & Politics
- Wireless (PDA, 3G Mobile Phone networks, Car,...)
- Home Networking
  - Set-top box/Cable/xDSL/Ethernet-to-the-home
  - Eg. Japan Home Information Services initiative
  - Distributed Gaming
  - Consumer Devices
- Enterprise
  - Requires full IPv6 support on O.S. & Applications
- Service Providers

IPv6 O.S. & Applications support

- **All software vendors officially support IPv6 in their latest O.S. releases**

  Apple MAC OS X, HP (HP-UX, Tru64 & OpenVMS), IBM zSeries & AIX, Microsoft Windows XP, .NET, CE; Sun Solaris,…

  ***BSD, Linux,…**

- **2003 and beyond: *Call for Applications***

  Applications must be agnostic regarding IPv4 or IPv6.

  Successful deployment is driven by Applications

- **See playground.sun.com/ipv6 and www.hs247.com for latest update**

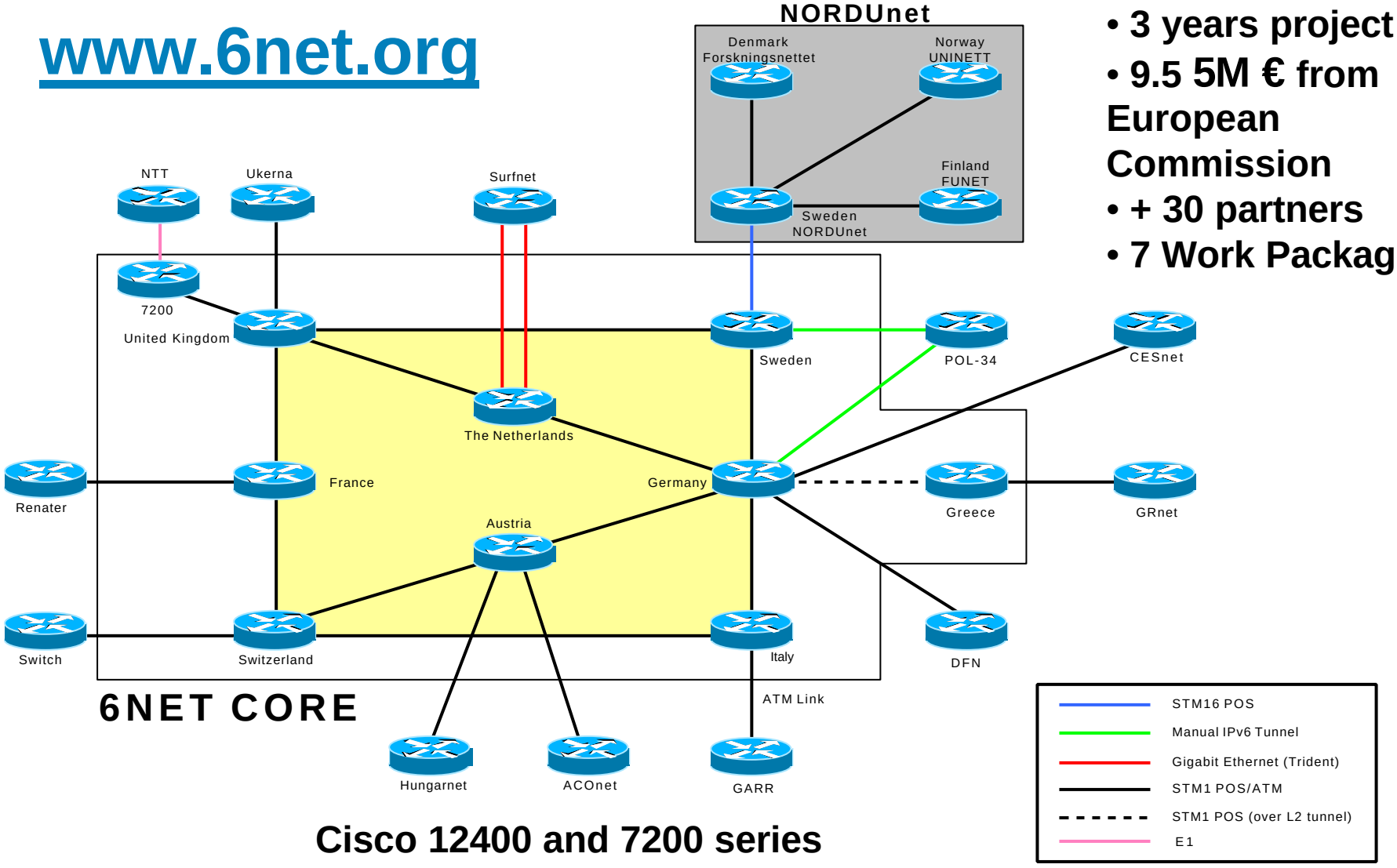
IPv6 Geo-Politics

- **Regional and Countries IPv6 Task Force**
  - **Europe - http://www.ipv6-taskforce.org/#**
    - **Belgium, France, Spain, Swiss, UK,…**
  - **North- America - http://www.nav6tf.org/**
  - **Japan IPv6 Promotion Council - http://www.v6pc.jp/en/index.html**
  - **China, Korea, India,…**
- **Relationship**
  - **Economic partnership between governments**
    - **China-Japan, Europe-China,…**
- **Recommendations and project's funding**
  - **IPv6 2005 roadmap recommendations – Jan. 2002**
  - **European Commission IPv6 project funding: 6NET & EuroIX**
- **Tax Incentives**
  - **Japan only – 2002-2003 program**

6NET Project Overview

Cisco.com

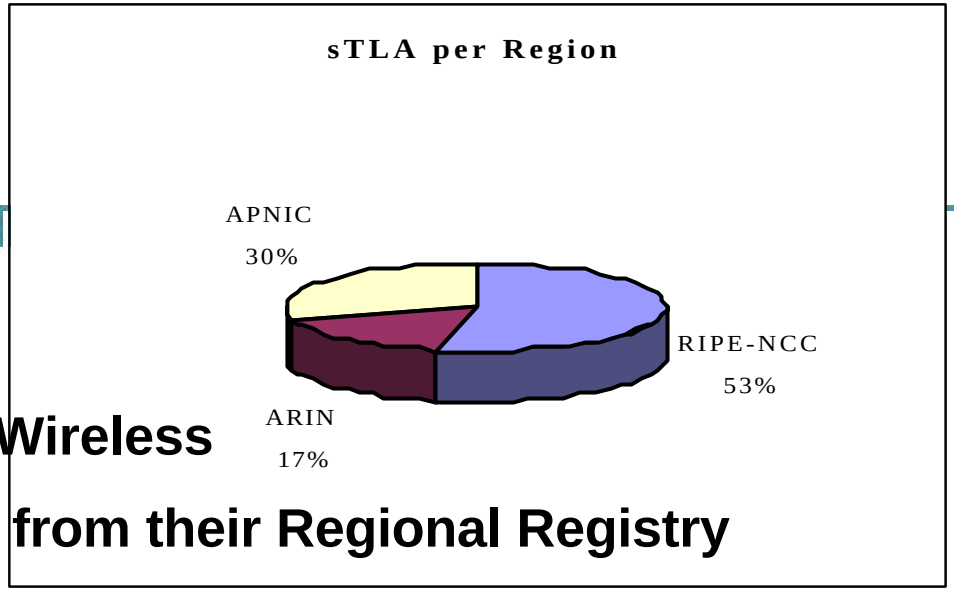
www.6net.org



- 3 years project
- 9.5 5M € from European Commission
- + 30 partners
- 7 Work Packages

Cisco 12400 and 7200 series

ISP Deployment Activities



- Several Market segments

  IX, Carriers, Regional ISP, Wireless
- ISP have to get an IPv6 prefix from their Regional Registry

  http://www.ripe.net/ripencc/mem-services/registration/ipv6/ipv6allocs.html
- Large carriers are running trial networks but

  Plans are largely driven by customer's demand
- Regional ISP focus on their specific markets

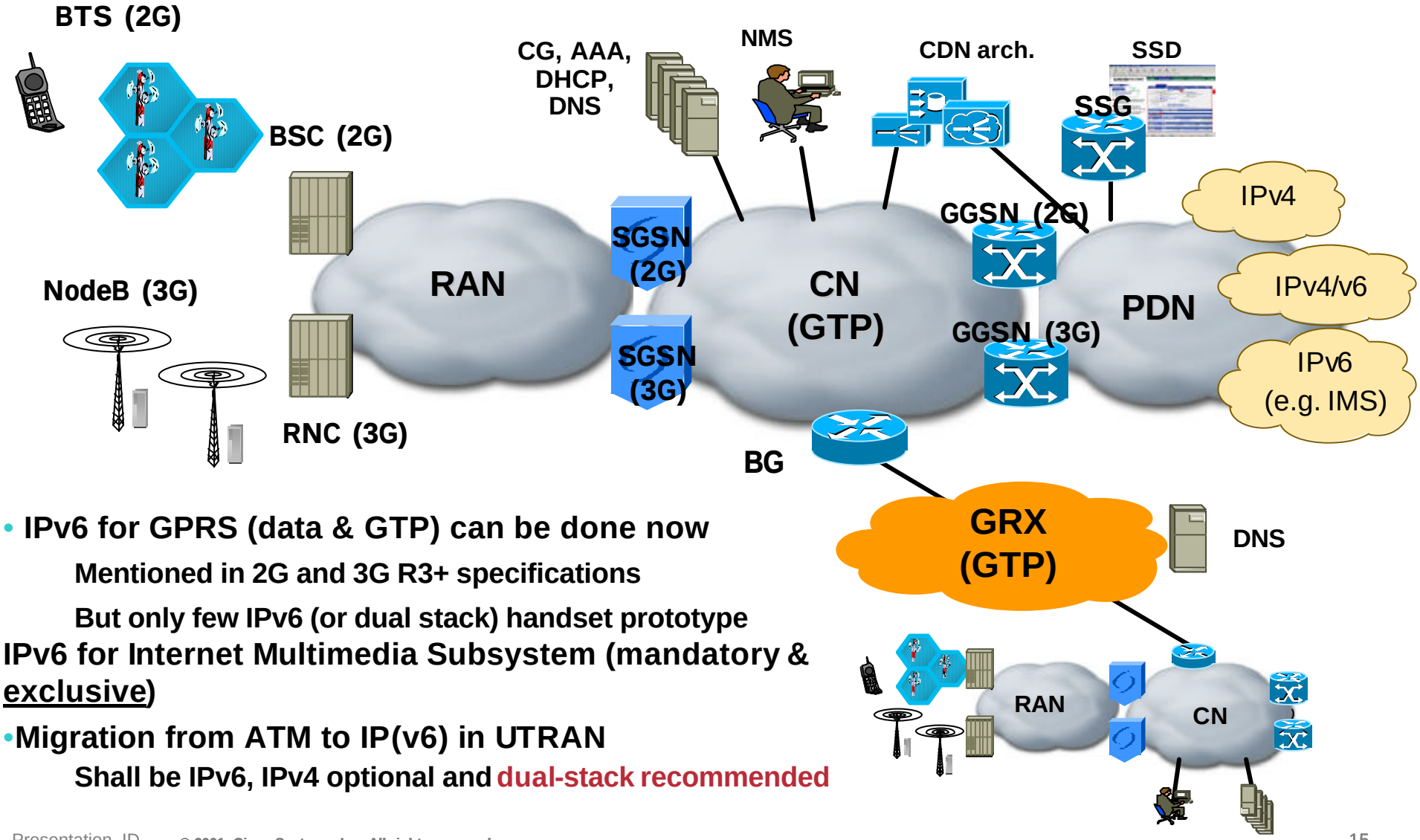
  Japan is leading the worldwide deployment

  Target is Home Networking services (dial, DSL, Cable, Ethernet-to-the-Home,…)
- No easy Return on Investment (RoI) computation

IPv6 & Wireless

- **Market segments**
  - **Mobile phone industry goes to IP: 3GPP/3GPP2/MWIF**
  - **Wireless service providers have had IPv4 address requests rejected for long term business plan**
  - **Vertical markets need the infrastructure: Police, Army, Fire Department, Transports**
  - **Some 802.11 Hot Spots already offer an IPv6 connectivity.**
- **Commercial services need a Phase approach**
  - **R&D (03), Trial (04-05), Deployment (06 & beyond)**
- **Key driver is the client's device & application**
  - **Symbian 7.0, Microsoft Pocket PC 4.1, Netfront 3.x,…**

3GPP Mobile Wireless Network Architecture

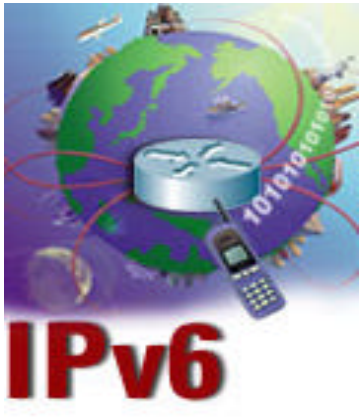


- IPv6 for GPRS (data & GTP) can be done now
  - Mentioned in 2G and 3G R3+ specifications
  - But only few IPv6 (or dual stack) handset prototype

IPv6 for Internet Multimedia Subsystem (mandatory & <u>exclusive</u>)

- Migration from ATM to IP(v6) in UTRAN
  - Shall be IPv6, IPv4 optional and dual-stack recommended

IPv6 – for an Ubiquitous Internet



- **Connect Everything to the Internet**
  - ***Simply (Plug & Play) and Safety***
- **Enjoy the Internet Everywhere & Anywhere**
  - ***Broadband, wireless,…***
  - ***China, India, Africa,…***
- **Play, Learn, and Live on the Internet for Everybody**
  - ***Peer to Peer & Client/Servers applications***
  - ***Global reachability as well as community of interest***
  - ***Home Information Services***
- **We need One Internet**
  - **Global communications enhances business, trade, research**

How to get an IPv6 Address?

- **How to get address space?**

  Real IPv6 address space now allocated by APNIC, ARIN and RIPE NCC to ISP

APNIC	**2001:0200::/23 & 2001:0C00::/23**
ARIN	**2001:0400::/23**
RIPE NCC	**2001:0600::/23 & 2001:0800::/23**

- **6Bone 3FFE::/16**
- **6to4 tunnels 2002::/16**
- **Enterprises get their IPv6 address space from their ISP.**
- **Further information on www.cisco.com/ipv6**

IPv6 Prefix Allocations: APNIC (I)
(whois.apnic.net) – April 2003 – Allocation = 103

Cisco.com

WIDE-JP-19990813 2001:0200::/35
NUS-SG-19990827 2001:0208::/35
CONNECT-AU-19990916 2001:0210::/35
NTT-JP-19990922 2001:0218::/32
KT-KR-19991006 2001:0220::/35
JENS-JP-19991027 2001:0228::/35
ETRI-KRNIC-KR-19991124 2001:0230::/32
HINET-TW-20000208 2001:0238::/32
IIJ-JPNIC-JP-20000308 2001:0240::/32
IMNET-JPNIC-JP-20000314 2001:0248::/35
CERNET-CN-20000426 2001:0250::/32
INFOWEB-JPNIC-JP-2000502 2001:0258::/32
BIGLOBE-JPNIC-JP-20000719 2001:0260::/32
DION6-JPNIC-JP-20000829 2001:0268::/32
DACOM-BORANET-20000908 2001:0270::/35Q
DN-JPNIC-JP-20000915 2001:0278::/32
KOLNET-KRNIC-KR-20000927 2001:0280::/32
TANET-TWNIC-TW-20001006 2001:0288::/32
HANANET-KRNIC-KR-20001030 2001:0290::/32
SONYTELECOM-JPNIC-JP-20001207 2001:0298::/32
POWEREDCOM-JPNIC-JP-20001208 2001:02A0::/32
CCCN-JPNIC-JP-20001228 2001:02A8::/35
KORNET-KRNIC-KR-20010102 2001:02B0::/35
NGINET-KRNIC-KR-20010115 2001:02B8::/32

INFOSPHERE-JPNIC-JP-20010208 2001:02C0::/32
OMP-JPNIC-JP-20010208 2001:02C8::/35
ZAMA-AP-20010320 2001:02D0::/35
SKTELECOMNET-KRNIC-KR-20010406 2001:02D8::/32
HKNET-HK-20010420 2001:02E0::/35
DTI-JPNIC-JP-20010702 2001:02E8::/32
MEX-JPNIC-JP-20010801 2001:02F0::/32
SINET-JPNIC-JP-20010809 2001:02F8::/32
PANANET-JPNIC-JP-20010810 2001:0300::/35
HTCN-JPNIC-JP-20010814 2001:0308::/32
CWIDC-JPNIC-JP-20010815 2001:0310::/32
STCN-JPNIC-JP-20010817 2001:0318::/32
KREONET2-KRNIC-KR-20010823 2001:0320::/32
MANIS-MY-20010824 2001:0328::/32
SAMSUNGNETWORKS-KRNIC-KR-20010920 2001:0330::/32
U-NETSURF-JPNIC-JP-20011005 2001:0338::/35
FINE-JPNIC-JP-20011030 2001:0340::/32
QCN-JPNIC-JP-20011031 2001:0348::/32
MCNET-JPNIC-JP-20011108 2001:0350::/32
MIND-JPNIC-JP-20011115 2001:0358::/35
V6TELSTRAINTERNET-AU-20011211 2001:0360::/32
MEDIAS-JPNIC-JP-20011212 2001:0368::/32
GCTRJP-NET-20011212 2001:0370::/35
THRUNET-KRNIC-KR-20011218 2001:0378::/35

IPv6 Prefix Allocations: APNIC (II)
(whois.apnic.net) – April 2003 – Allocation = 103

Cisco.com

OCN-JP-JPNIC-JP-20020115 2001:0380::/32
AARNET-IPV6-20020117 2001:0388::/32
HANINTERNET-KRNIC-KR-20020207 2001:0390::/32
HOTNET-JPNIC-JP-20020215 2001:0398::/32
MULTIFEED-JPNIC-JP-20020319 2001:03A0::/35
GNGIDC-KRNIC-KR-20020402 2001:03A8::/32
KMN-IPV6-JPNIC-JP-20020403 2001:03B0::/32
SO-NET-JPNIC-JP-20020409 2001:03B8::/32
TOCN-20020513 2001:03C0::/35
UNINET-TH-20020513 2001:03C8::/35
PTOP-JPNIC-JP-20020521 2001:03D0::/35
XEPHION-JPNIC-JP-20020523 2001:03D8::/32
FBDC-JPNIC-JP-20020524 2001:03E0::/32
INTEROP-JP-20020617 2001:03E8::/35
KCOM-V6-JPNIC-JP-20020704 2001:03F0::/32
BIIV6-CN-20020704 2001:03F8::/32
INET-TH-20020711 2001:0C00::/32
ASNET-TWNIC-TW-20020711 2001:0C08::/32
SINGTEL-IXV6-20020718 2001:0C10::/32
ARCNET6-20020723 2001:0C18::/32
SINGNET-V6-SG-20020724 2001:0C20::/32
ASAHI-NET-JPNIC-JP-20020730 2001:0C28::/32
JCNET-JPNIC-JP-20020801 2001:0C30::/32
CATIPV6-20020707 2001:0C38::/32
GCIX-JPNIC-JP-20020808 2001:0C40::/32

DREAMX-KRNIC-KR-20020812 2001:0C48::/32
TTN-TWNIC-TW-20020812 2001:0C50::/32
SIXREN-TWNIC-TW-20020827 2001:0C58::/32
TIARE-PG-20020827 2001:0C60::/32
CHINANET-20020830 2001:0C68::/32
CWJ-JPNIC-JP-20020910 2001:0C70::/32
NTTIP-AU-20020910 2001:0C78::/32
InterVia-JPNIC-JP-20020916 2001:0C80::/32
CYPRESS-NET6-JPNIC-JP-20020918 2001:0C88::/32
NTTEAST-JPNIC-JP-20020930 2001:0C90::/32
krline-krnic-kr-20020919 2001:0C98::/32
CHTTL-TW-20021002 2001:0CA0::/32
ESTEL-200201004 2001:0CA8::/32
PacNet-v6-20021011 2001:0CB0::/32
D-CRUISE-JPNIC-JP-20021011 2001:0CB8::/32
CSTNET-CNNIC-20021015 2001:0CC0::/32
AGCXNET-20021113 2001:0CC8::/32
SAISON-JPNIC-JP-20021205 2001:0CD0::/32
SEEDNET-IPv6-TWNIC-TW-20021209 2001:0CD8::/32
HARNET-IPV6-HK-20021224 2001:0CE0::/32
K-OPTICOM-JPNIC-JP-20030113 2001:0CE8::/32
SHINBIRO-KRNIC-KR-20030122 2001:0CF0::/32
APNIC-AP-V6-20030124 2001:0DC0::/32

IPv6 Prefix Allocations: APNIC (III)
(whois.apnic.net) – April 2003 – Allocation = 103

SSD-JPNIC-JP-20030206 2001:0CF8::/32

GUNMANET-JPNIC-JP-20030206 2001:0D00::/32

MAXISNET-MY-20030218 2001:0D08::/32

CBNNET-IPv6-APJII-ID-20030226 2001:0D10::/32

PREGINET-PH-20030407 2001:0D18::/32

TFN-TWNIC-TW-20030313 2001:0D20::/32

OTNS-JPNIC-JP-20030325 2001:0D28::/32

AI3 2001:0D30::/32

APNIC-AP-V6-20030124 2001:0DC0::/32

TWNIC-TW-v6-20030331 2001:0DC1::/32

IPv6 Prefix Allocations: ARIN
(whois.arin.net) – April 2003 – Allocation = 60

Cisco.com

ESNET-V6 2001:0400::/32
VBNS-IPV6 2001:0408::/32
CANET3-IPV6 2001:0410::/32
VRIO-IPV6-0 2001:0418::/32
CISCO-IPV6-1 2001:0420::/32
QWEST-IPV6-1 2001:0428::/32
DISN-LES-V6 2001:0430::/35
ABOVENET-IPV6 2001:0438::/35
SPRINT-V6 2001:0440::/32
UNAM-IPV6 2001:0448::/32
GBLX-V6 2001:0450::/35
STEALTH-IPV6-1 2001:0458::/35
NET-CW-10BLK 2001:0460::/35
ABILENE-IPV6 2001:0468::/32
HURRICANE-IPV6 2001:0470::/35
EP-NET 2001:0478::/32
DREN-V6 2001:0480::/35
AVANTEL-IPV6-1 2001:0488::/35
NOKIA-1 2001:0490::/35
ITESM-IPV6 2001:0498::/32

IPV6-RNP 2001:04A0::/32
AXTEL-IPV6-1 2001:04A8::/35
AOLTIMEWARNER 2001:04B0::/32
WAYPORT-IPV6 2001:04B8::/35
PROTEL-RED-1-V6 2001:04C0::/35
UNINET-NETV6-1 2001:04C8::/35
NASA-PCCA-V6 2001:04D0::/35
DOTNET-001 2001:04D8::/35
WISCNET-V6 2001:04E0::/32
SHAWIPV6 2001:04E8::/32
ENTERZONE-V6 2001:04F0::/32
ISC6-1 2001:04F8::/32
AISP-V6NET-1 2001:0508::/32
RISQ 2001:0510::/32
NAC-IPV6-01 2001:0518::/32
FLADMS-IPV6 2001:0520::/32
TELKOMSAV6 2001:0528::/32
CETLINK-IPV6-1 2001:0530::/32
SGNS-V6-BLK-1 2001:0538::/32
ICGV6INIT 2001:0540::/32

TENET-IPV6-1 2001:0548::/32
COGC-6NET-0001 2001:0550::/32
COMCAST6NET 2001:0558::/32
ISOMEDIA-IPV6 2001:0560::/32
TELUS-V6-0001 2001:0568::/32
WCOM-MAE-V6 2001:0570::/32
NETBLK-COXIPV6 2001:0578::/32
OR-GOV 2001:0580::/32
UU-IPV6-1-ZA 2001:0588::/32
NLYR-V6-1 2001:0590::/32
VDN-V6-1 2001:0598::/32
GLBE-V6-1 2001:05A0::/32
SONIC-V6BLK 2001:05A8::/32
SPACEWAYNET 2001:05B0::/32
HOST-IPV6 2001:05B8::/32
HEXAGO-V6-NET1 2001:05C0::/32
WARE-V6 2001:05C8::/32
NERICV6 2001:05D0::/32
SEMA-V6-1 2001:05D8::/32
NOANET-V6-BLK1 2001:05E0::/32

IPv6 Prefix Allocations: RIPE-NCC (I)
(whois.ripe.net) – April 2003 – Allocation = 186

EU-UUNET-19990810 2001:0600::/35
DE-SPACE-19990812 2001:0608::/32
NL-SURFNET-19990819 2001:0610::/32
UK-BT-19990903 2001:0618::/32
CH-SWITCH-19990903 2001:0620::/32
AT-ACONET-19990920 2001:0628::/35
UK-JANET-19991019 2001:0630::/32
DE-DFN-19991102 2001:0638::/32
RU-FREENET-19991115 2001:0640::/35
GR-GRNET-19991208 2001:0648::/35
DE-ECRC-19991223 2001:0650::/32
DE-TRMD-20000317 2001:0658::/32
FR-RENATER-20000321 2001:0660::/32
EU-NACNET-20000403 2001:0668::/32
FI-EUNET-20000403 2001:0670::/35
DE-JIPPII-20000426 2001:0678::/35
DE-XLINK-20000510 2001:0680::/35
FR-TELECOM-20000623 2001:0688::/32
PT-RCCN-20000623 2001:0690::/32
SE-SWIPNET-20000828 2001:0698::/32
PL-ICM-20000905 2001:06A0::/35
BE-BELNET-20001101 2001:06A8::/35
SE-SUNET-20001218 2001:06B0::/32
IT-CSELT-20001221 2001:06B8::/32
SE-TELIANET-20010102 2001:06C0::/35
DK-TELEDANMARK-20010131 2001:06C8::/32
RU-ROSNIIROS-20010219 2001:06D0::/35
PL-CYFRONET-20010221 2001:06D8::/32
NL-INTOUCH-20010307 2001:06E0::/35
FI-TELIVO-20010321 2001:06E8::/32
SE-DIGITAL-20010321 2001:06F0::/35
UK-EASYNET-20010322 2001:06F8::/32
NO-UNINETT-20010406 2001:0700::/32
FI-FUNET-20010503 2001:0708::/32
UK-INS-20010518 2001:0710::/35
CZ-TEN-34-20010521 2001:0718::/32
ES-REDIRIS-20010521 2001:0720::/32
UK-VERIO-20010717 2001:0728::/32
AT-TELEKABEL-20010717 2001:0730::/32
HU-HUNGARNET-20010717 2001:0738::/32
DE-VIAG-20010717 2001:0740::/32
DE-ROKA-20010817 2001:0748::/35
IT-EDISONTEL-20010906 2001:0750::/32
UK-NETKONECT-20010918 2001:0758::/35
IT-GARR-20011004 2001:0760::/32
DE-CYBERNET-20011008 2001:0768::/32
IE-HEANET-20011008 2001:0770::/35
LT-LITNET-20011115 2001:0778::/32
DE-NORIS-20011203 2001:0780::/32
FI-SONERA-20011231 2001:0788::/32
EU-CARRIER1-20020102 2001:0790::/35
EU-DANTE-20020131 2001:0798::/32
DE-TELEKOM-20020228 2001:07A0::/32
FR-NERIM-20020313 2001:07A8::/32
DE-COMPLETEL-20020313 2001:07B0::/35
NL-BIT-20020405 2001:07B8::/32
DE-BELWUE-20020411 2001:07C0::/32
IE-ISI-20020515 2001:07C8::/32
EE-ESTPAK-20020516 2001:07D0::/35
FI-KOLUMBUS-20020528 2001:07D8::/32
UK-OPALNET-20020530 2001:07E0::/32
LU-PT-20020605 2001:07E8::/32
EU-LAMBDANET-20020605 2001:07F0::/32
ES-TTD-20020705 2001:0800::/32
PL-POZMAN-20020710 2001:0808::/32
FR-SDV-20020710 2001:0810::/32
PT-TELECEL-20020711 2001:0818::/32
NO-WEBONLINE-20020712 2001:0820::/32
NL-PROSERVE-20020712 2001:0828::/32
DE-MAINLAB-20020724 2001:0830::/32
NL-CONCEPTS-20020724 2001:0838::/32
NO-POWERTECH-20020725 2001:0840::/32
IT-CSP-20020725 2001:0848::/32
AT-ATNET-20020725 2001:0850::/32
AT-SIL-20020725 2001:0858::/32
FR-GROLIER-20020725 2001:0860::/32
DE-IPHH-20020725 2001:0868::/32
AT-INS-20020725 2001:0870::/32

IPv6 Prefix Allocations: RIPE-NCC (II)
(whois.ripe.net) – April 2003 – Allocation = 186

DK-DENET-20020801 2001:0878::/32
DE-KOMPLEX-20020801 2001:0880::/32
NL-XS4ALL-20020807 2001:0888::/32
AT-TELEKOM-20020812 2001:0890::/32
NL-WIDEXS-20020812 2001:0898::/32
PT-TELEPAC-20020814 2001:08A0::/32
CH-CYBERLINK-20020816 2001:08A8::/32
UK-AA-20020820 2001:08B0::/32
FI-RSLCOM-20020822 2001:08B8::/32
NO-CATCHIP-20020823 2001:08C0::/32
YU-VERAT-20020829 2001:08C8::/32
DE-CELOX-20020829 2001:08D0::/32
DE-SCHLUND-20020910 2001:08D8::/32
CH-DOLPHINS-20020912 2001:08E0::/32
IT-ATRAGON-20020916 2001:08E8::/32
CY-CYTANET-20020917 2001:08F0::/32
AE-EMIRNET-20020920 2001:08F8::/32
LT-DELFI-20020924 2001:0900::/32
PL-BYDMAN-20020924 2001:0908::/32
FR-GITOYEN-20020924 2001:0910::/32
CH-UNISOURCE-20020927 2001:0918::/32
DE-COLT-20020930 2001:0920::/32
DE-D2VODAFONE 2001:0928::/32
TR-KOCNET-20021004 2001:0930::/32
AT-UTA-20021014 2001:0938::/32
DE-GENDORF-20021015 2001:0940::/32
SE-NORDUNET-20021016 2001:0948::/32
NL-MEGAPROVIDER-20021016 2001:0950::/32
UK-NORWEB-20021018 2001:0958::/32
NL-CYBERCOMM-20021021 2001:0960::/32
NL-HUBRIS-20021023 2001:0968::/32
TN-ATI-20021024 2001:0970::/32
DE-GATEL-20021025 2001:0978::/32
NL-DEMON-20021025 2001:0980::/32
FR-CGEONLINE-20021025 2001:0988::/32
NL-TOOFAST-20021028 2001:0990::/32
FI-HTC-20021029 2001:0998::/32
NL-INTERNED-20021030 2001:09A0::/32
NL-TRUESERVER-20021030 2001:09A8::/32
SE-BAHNHOF-20021031 2001:09B0::/32
NL-CISTRON-20021101 2001:09B8::/32
NL-LUNA-20021104 2001:09C0::/32
SE-DCS-20021104 2001:09C8::/32
AT-TSystems-20021107 2001:09D0::/32
ES-TELEFONICA-20021108 2001:09D8::/32
NL-SOLCON-20021108 2001:09E0::/32
DE-CNS-20021108 2001:09E8::/32
FI-VLP-20021112 2001:09F0::/32
AT-INODE-20021112 2001:09F8::/32
UK-DEFINITE-20021114 2001:0A00::/32
UK-CALADAN-20021115 2001:0A08::/32
PL-NASK-20021115 2001:0A10::/32
LU-RESTENA-20021118 2001:0A18::/32
DE-OSN-20021120 2001:0A20::/32
FR-CEGETEL-20021126 2001:0A28::/32
IT-INROMA-20021127 2001:0A30::/32
DE-TAXXUS-20021202 2001:0A38::/32
PT-EDINET-20021205 2001:0A40::/32
PL-WASK-20021212 2001:0A48::/32
ES-XTEC-20021217 2001:0A50::/32
IT-EURONEXUS-20021218 2001:0A58::/32
DE-MNET-20021223 2001:0A60::/32
FI-NETSONIC-20030107 2001:0A68::/32
FR-CLARA-20030107 2001:0A70::/32
DE-SCANPLUS 2001:0A78::/32
IT-EURNET-20030110 2001:0A80::/32
UK-CLARANET-20031301 2001:0A88::/32
NO-WAN-20030113 2001:0A90::/32
TR-ULAKBIM-20030114 2001:0A98::/32
DE-GTN-20030123 2001:0AA0::/32
DE-OPENIT-20030124 2001:0AA8::/32

IPv6 Prefix Allocations: RIPE-NCC (III)
(whois.ripe.net) – April 2003 – Allocation = 186

DE-NETZQUADRAT-20030124 2001:0AB0::/32
NL-COBWEB-20030127 2001:0AB8::/32
ES-BTTEL-20030129 2001:0AC0::/32
GB-WEBTAPESTRY-20030203 2001:0AC8::/32
EE-DATA20030203 2001:0AD0::/32
DE-ROCKENSTEIN-20030203 2001:0AD8::/32
DE-TEUTONET-20030205 2001:0AE0::/32
CZ-IPEXNET-20030205 2001:0AE8::/32
CZ-GTS-20030211 2001:0AF0::/32
AT-TELEPORT-20030207 2001:0AF8::/32
IT-FASTWEB-20030213 2001:0B00::/32
RU-RUNNET-20030214 2001:0B08::/32
PL-LODMAN-20030217 2001:0B10::/32
PT-NFSI-20030217 2001:0B18::/32
LU-DCLUX-20030218 2001:0B20::/32
PT-KPNQWEST-20030219 2001:0B28::/32
RO-EDU-20030219 2001:0B30::/32
ES-INTELIDEAS-20030224 2001:0B38::/32
IT-MEDIARAMA-20030224 2001:0B40::/32
SE-GAVLENET-20030225 2001:0B48::/32
SE-BITNET-20030227 2001:0B50::/32
SE-SANDNET-20030228 2001:0B58::/32
SE-SEVENLEVELS-20030303 2001:0B60::/32
HR-CARNET-20030305 2001:0B68::/32
UK-ANLX-20030311 2001:0B70::/32

BE-SKYNET-20030312 2001:0B78::/32
CZ-PRAGONET-20030314 2001:0B80::/32
NL-CASTELNET-20030317 2001:0B88::/32
ES-INTERHOST-20030317 2001:0B90::/32
UK-COMPULINK-20030319 2001:0B98::/32
ES-ARSYS-20030326 2001:0BA0::/32
UK-LEONET-20030401 2001:0BA8::/32
IE-TELECOM-20030401 2001:0BB0::/32
EE-EENET-20030403 2001:0BB8::/32
UK-LEGEND-20030415 2001:0BC0::/32
FR-NONE-20030415 2001:0BC8::/32
AT-EUNET-20030416 2001:0BD0::/32

IPv6 Prefix Allocations: IPv6 IX
April 2003 – Allocation = 33

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KINX6 2001:07FA:0000:0004::/64
JPNAP 2001:07FA:0000:0003::/64
SIX-KANET 2001:07FA:0000:0002::/64
HKIX-HK 2001:07FA:0000:0001::/64
JPIX 2001:07FA::/64
TW-TWIX-IPV6 2001:07FA:0001::/48
APJII-IIX-IPv6 2001:07FA:0002::/48

NIX-CZ-NET-IPv6-20030203 2001:07F8:0014::/48
TIX-LAN-20030217 2001:07F8:0015::/48
RIX-GH-20030314 2001:07F8:0016::/48
LoNAP-IPv6-20030327 2001:07F8:0017::/48
INEX-IPV6-NETBLK1-20030331 2001:07F8:0018::/48
BCIX-NET-20030404 2001:07F8:0019::/48

Also see www.6nap.net

DE-CIX-IXP-20010913 2001:07F8::/48
AMS-IX-20010913 2001:07F8:0001::/48
UK6X-IX-20011009 2001:07F8:0002::/48
UK-XCHANGEPOINT-20010913 2001:07F8:0003::/48
UK-LINX-IXP-20010913 2001:07F8:0004::/48
LIPEX-IXP-20011116 2001:07F8:0005::/48
BG-ONLINE-IX-20011218 2001:07F8:0006::/48
FICIX-V6-20020201 2001:07F8:0007::/48
BLNX-IX-20020730 2001:07F8:0008::/48
MANAP-IXP-20020910 2001:07F8:0009::/48
GIGAPIX-1-20020913 2001:07F8:000A::/48
MIX-NET6-BLOCK 2001:07F8:000B::/48
CH-TIX6-20021104 2001:07F8:000C::/48
SE-NETNODIX-20021108 2001:07F8:000D::/48
NDIX-V6 2001:07F8:000E::/48
ESPANIX-IXP-20030120 2001:07F8:000F::/48
NAMEX-IX-20030124 2001:07F8:0010::/48
LIX-IX-20030128 2001:07F8:0011::/48
NIX1-NIX2-IX-20030128 2001:07F8:0012::/48
NL-SIX-IXP-20030203 2001:07F8:0013::/48

IPv6 Forum

- **151 members (January 20023)**
  - **Created in 1999**
  - **Cisco is a founding member**

- **Mission is to promote IPv6 not to specify it (IETF)**
  - **www.ipv6forum.com**
- **IPv6 Forum OneWorld working group**
  - **Australian, India, Korea, Mexico, Russian, UK,…**
- **Held ‘IPv6 summit’ around the World**
  - **Madrid – May 2003, U.S. – June 2003**

Questions?

More Information

- CCO IPv6 - http://www.cisco.com/ipv6
- The ABC of IPv6

  http://www.cisco.com/en/US/products/sw/iosswrel/products_abc_ios_overview.html
- IPv6 e-Learning [requires CCO username/password]

  http://www.cisco.com/warp/customer/732/Tech/ipv6/elearning/
- IPv6 Access Services :

  http://www.cisco.com/warp/public/732/Tech/ipv6/docs/ipv6_access_wp_v2.pdf
- ICMPv6 Packet Types and Codes TechNote:

  http://www.cisco.com/warp/customer/105/icmpv6codes.html
- Cisco IOS IPv6 Product Manager – pgrosset@cisco.com