

IPv6 @ Cisco

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Agenda

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

Cisco IPv6 Technology Strategy

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Intelligent Services
Cisco IOS IPv6 Feature set

Innovation

Performance
IPv6 Hardware Assisted
Forwarding

**Evolutionary
Infrastructure**
IPv6 Solutions
Focusing on Integration
and Co-Existence

Cisco IPv6 Calendar

IPv6 – Integration & Co-Existence

- **October 1996**
Cisco IOS IPv6 Technology Preview software deployed on 6Bone
- **June 2000**
Cisco IOS IPv6 Statement of Direction 3 phases roadmap

- **March 2001**
Cisco IOS IPv6 Phase I announcement
- **May 2001**
Cisco 12.2(2)T FCS
- **October 2001**
Cisco 12.0(19)ST1 FCS on 12000 series

- **December 2001**
Cisco IOS Phase 2 announcement
- Cisco partners on 6NET project
- **October 2002**
IPv6 Hardware assisted forwarding on Cisco 12000 series

- **IPv6 is Production Ready – Cisco IOS 12.3**
- **Cisco IOS IPv6 Phase III deliverables**
 - **FCS: OSPFv3, QoS, ISATAP, Multi-Topology IS-IS**
 - **EFT: Netflow IPv6, DHCPv6 PD, Radius IPv6, IPv6 Multicast, ...**
- **IPv6 Hardware Assisted Forwarding**
 - **Cat.6K/7600 Sup720**
 - **Cat. 3750**

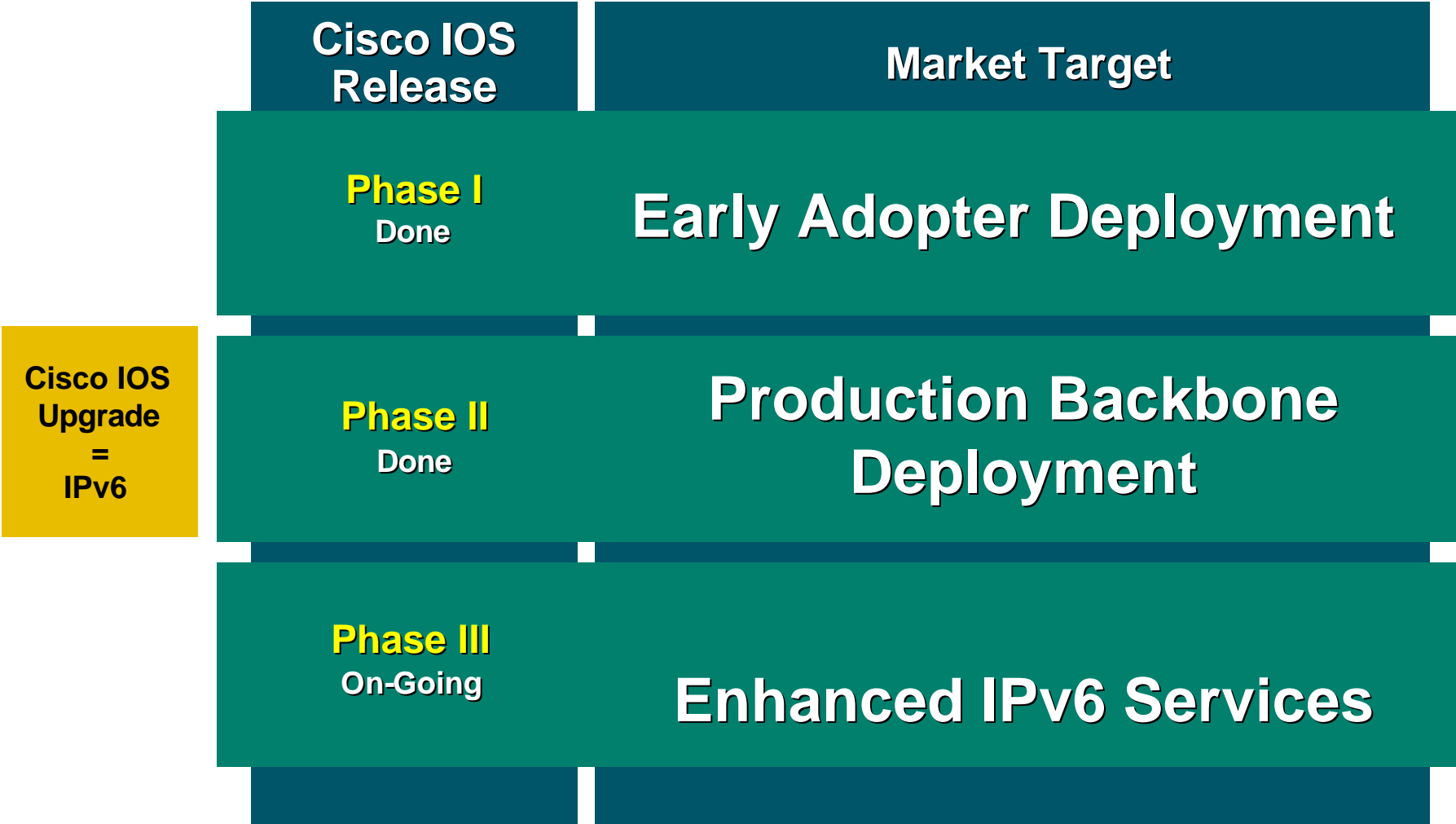
2000

2001

2002

2003

Cisco IOS Roadmap: The Confluence of IPv4/IPv6



Cisco IOS IPv6 Release Positioning

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- **General Production – Cisco IOS 12.3M**
- **Core ISP & NREN – Cisco 12.0S on Cisco 12000 series**
- **ISP and Enterprise Infrastructure – Cisco IOS 12.2S**
- **Broadband Access – Cisco IOS 12.2(15)B**
- **Technology development – Cisco IOS 12.3T**

Cisco IOS IPv6 Phase I – Early Adopters

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Done

Feature Set	12.2T Also 12.3M	12.0S/ST (*)	12.2S
IPv6 Basic specifications (RFC 2460)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
ICMPv6 (RFC 2463)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
Neighbor Discovery (RFC 2461)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
Stateless Auto-Configuration	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
RIPng (RFC 2080)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
MP-BGP4 (RFC 2545 & 2858)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
Configured & Automatic Tunnels	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
6to4 Tunnels (RFC 3056)	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
GRE Tunnels	12.2(4)T	N/A	12.2(14)S
Data Links (*) Ethernet, FDDI, PPP, HDLC ATM PVC & LAN-E, FR PVC	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
Applications Ping, Traceroute, Telnet, TFTP, DNA AAAA over IPv4, HTTP	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S
Standard Access Control List	12.2(2)T	12.0(22)S/(21)ST	12.2(14)S

Cisco IOS IPv6 Phase II – Infrastructure

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Feature Set	12.2T Also 12.3M	12.0S/ST (*)	12.2S
IS-IS for IPv6	12.2(8)T	12.0(22)S/(21)ST	12.2(14)S
CEFv6/dCEFv6	12.2(13)T	12.0(22)S/(21)ST	12.2(14)S
Extended Access Control List	12.2(13)T	12.0(23)S	12.2(14)S
IPv6 over MPLS – 6PE	12.2(15)T	12.0(22)S	12.2(14)S
NAT-PT (RFC 2766)	12.2(13)T	N/A	TBD
IPv6 MIBs	12.2(15)T	12.0(22)S	12.2(14)S
CDP IPv6 Address Family on Neighbor	12.2(8)T	N/A	12.2(14)S
Static ND Cache entry	12.2(8)T	12.0(22)S/(21)ST	12.2(14)S
Link-local Address for BGP4+ peering	12.2(4)T	12.0(22)S/(21)ST	12.2(14)S
Broadband Access Encapsulation, AAA, Prefix Pools	12.2(13)T	N/A	TBD
DNS AAAA over IPv6	12.2(8)T	12.0(22)S/(21)ST	12.2(14)S
SSH over IPv6	12.2(8)T	12.0(22)S	12.2(14)S

Extensive Platform Support

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Check latest release number & availability with your local Cisco team

Cisco IOS 12.2T

Cisco 800 series Routers

Cisco 1400 series Routers

Cisco 1600 series Routers

Cisco 1700 series Routers

Cisco 2500 series Routers
[12.2(4)T]

Cisco 2600 series Routers

Cisco 3600 series Routers

Cisco 3700 series Routers

Cisco 4500/4700 series
Routers [12.2(2)T only]

Cisco 7100 series Routers

Cisco 7200 series Routers

Cisco 7500 series Routers



Cisco IOS 12.2S

Cisco 7100 series Routers

Cisco 7200 series Routers

Cisco 7300 series Routers

Cisco 7400 series Routers

Cisco 7500 series Routers

Cisco 7600 series Routers

Catalyst 6500 series



Cisco IOS 12.0S

Cisco 12000 Series Routers

Cisco 10720

Cisco 12000 series router IPv6 Roadmap

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IPv6 Basics

- ICMPv6
- ND – including static entries
- Stateless Auto-config.
- ACL
- MIBs, SSH, Telnet
- DNS, TFTP

Routing protocols

- RIPng, IS-IS for IPv6, OSPFv3, MP-BGP4

IPv6 Tunnels

- distributed on Line cards or Tunnel Card

Switching

- dCEFv6
- 6PE (IPv6 over MPLS)

Feature set on 12.0(25)S

CY03

IPv6 Hardware Assistance

- Engine 3 Line Cards
 - 4 x GE
 - ATM OC-12
 - POS OC-3, OC-12, OC-48
- Standard & Extended ACL
 - Including simultaneous IPv6 Option Headers & UDP/TCP port parsing
- IPv6 Provider Edge (6PE) over MPLS
- up to 3.8Mpps per LC

- Multicast
- IS-IS MT

Target: 26S



Radar

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Cisco 7600/Cat. 6500 series IPv6 Roadmap

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IPv6 Basics

- ICMPv6
- ND – including static entries
- Stateless Auto-config.
- ACL
- MIBs, SSH, Telnet
- DNS, TFTP

Routing protocols

- RIPng, IS-IS for IPv6, MP-BGP4

IPv6 Tunnels

- Configured, automatic, GRE, 6to4, ISATAP

Switching

- CEFv6
- 6PE (IPv6 over MPLS)

Feature set on 12.2SX

FY04

IPv6 Hardware Assistance

- Supervisor Engine 720
 - IPv6 hardware assisted forwarding
 - native IPv6 - + 20Mpps
 - IPv6 over IPv4 tunnels - 10Mpps
- dCEF720 (PFC3) modules
 - ie: 10GE
 - +200 Mpps



- Multicast
- IS-IS MT
- OSPFv3

Sync with
12.2S RLS3



Sup.2/MSFC2
Software
Forwarding

Cisco Catalyst 3750 Series Switches Roadmap

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Feature set inherited from 12.2S in Q1 CY04

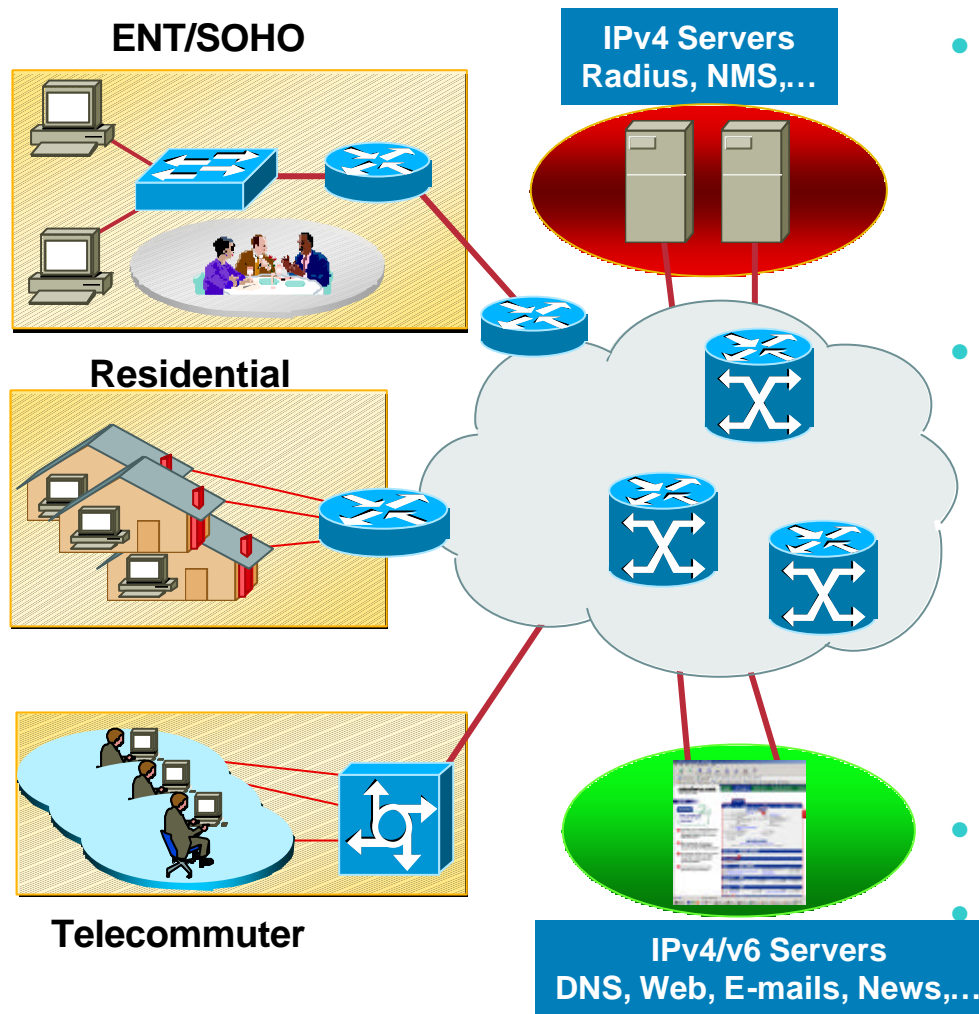
12.1E release based at FCS
Update to 12.2S later, adding IPv6 support

IPv6 Hardware Assistance
• Investment protection



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IPv6 on Broadband Infrastructure Overview



- **Data Link Layers**

 - PPPoA

 - PPPoE

 - RBE

- **AAA**

 - Cisco VSA

 - RFC 3162

 - 1/ Framed-IPv6-Prefix, Framed-IPv6-Route, Framed-IPv6-Pool

 - 2/ Framed-Interface-Id, Login-IPv6-Host

- **IPv6 Prefix Pools**

- **DHCPv6 Prefix Delegation**

 - Stateless DHCPv6**

Cisco IOS IPv6 Phase III Target – as 04/2003

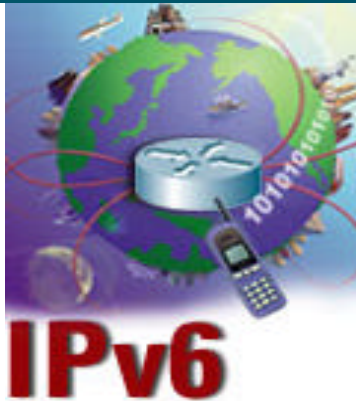
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	12.2T	12.0S/ST	12.2S
IPv6 QoS	12.2(13)T	12.0(27)S	TBD
OSPFv3	12.2(15)T	12.0(24)S	12.2(3 rd)S
MT IS-IS	12.2(15)T	12.0(26)S	12.2(3 rd)S
ISATAP	12.2(15)T	N/A	12.2(14)S
IPv6 Multicast	12.3(1st)T	12.0(26)S	12.2(3 rd)S

IPv6 @Cisco Systems

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Co-chair IETF IPv6 and NGTrans WG for several years
Cisco IOS IPv6 is largely deployed over the 6Bone since 1996



Cisco as an IPv6 pioneer

- 1996: 6Bone connection
- 2000: IPv6 Forum founding member
- IPv6 Statement of Direction on CCO
- May 2001: IPv6 fully supported on Cisco IOS 12.2T

Cisco innovation

Integration & Co-Existence strategy

MP-BGP, NAT-PT, IPv6 over MPLS (6PE)

DHCPv6 PD,... have been proposed

by Cisco Engineers

Cisco IT registered an IPv6 prefix to ARIN

Solutions focusing on Production

IPv6 e-Learning and IOS IPv6 class

IPv6 Solution Deployment guides

Partnering with Early Adopters, eg. 6NET

Questions?




More Information

- CCO IPv6 - <http://www.cisco.com/ipv6>
- The ABC of IPv6
http://www.cisco.com/en/US/products/sw/iosswrel/products_a_b_c_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

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INTERNET GENERATIONSM



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