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# Internetdagarna 2001

# IPv6 in Hardware – next step in the evolution

*Gartner Group has predicted that, by 2006, 50% of all carriers in the Asia-Pacific region will be running IPv6 in their networks*

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# IPv6 Evolution

**1. Standardization**

- Core Specs in draft standard

**2. Commercialization**

- Product Development
- Trial Networks
- Early adopters

**3. Deployment**

- IPv6 in Production Network at Service Providers and Enterprises
- IPv6 in 3GPP networks
- IPv6 in ISP backbone

**4. IPv6 >> IPv4**

- IPv6 has surpassed IPv4 as the dominant network protocol

1994-1998 1998-2002 2002-2005/6 2005/8 -

# IPv6 Milestones

- IPv6 core specs reached draft standard in 98
- IPv6 forum started March 99
- 6bone has been operational since June 96
- IANA issues IPv6 addresses since July 99
- Cisco will have full IPv6 support. Both its software and hardware products will support IPv6.
- EU will drive IPv6
- Microsoft includes IPv6 in the Windows XP Professional in Oct 2001
- Nokia are building their 3rd Gen Products for both Voice and Data to run over IPv6
- 3GPP Mandated IPv6 for Release 00 of GPRS.
- MWIF mandated IPv6 in May 2000
- Telia has announced the first European commercial IPv6 network with the first stage completed in June 2001

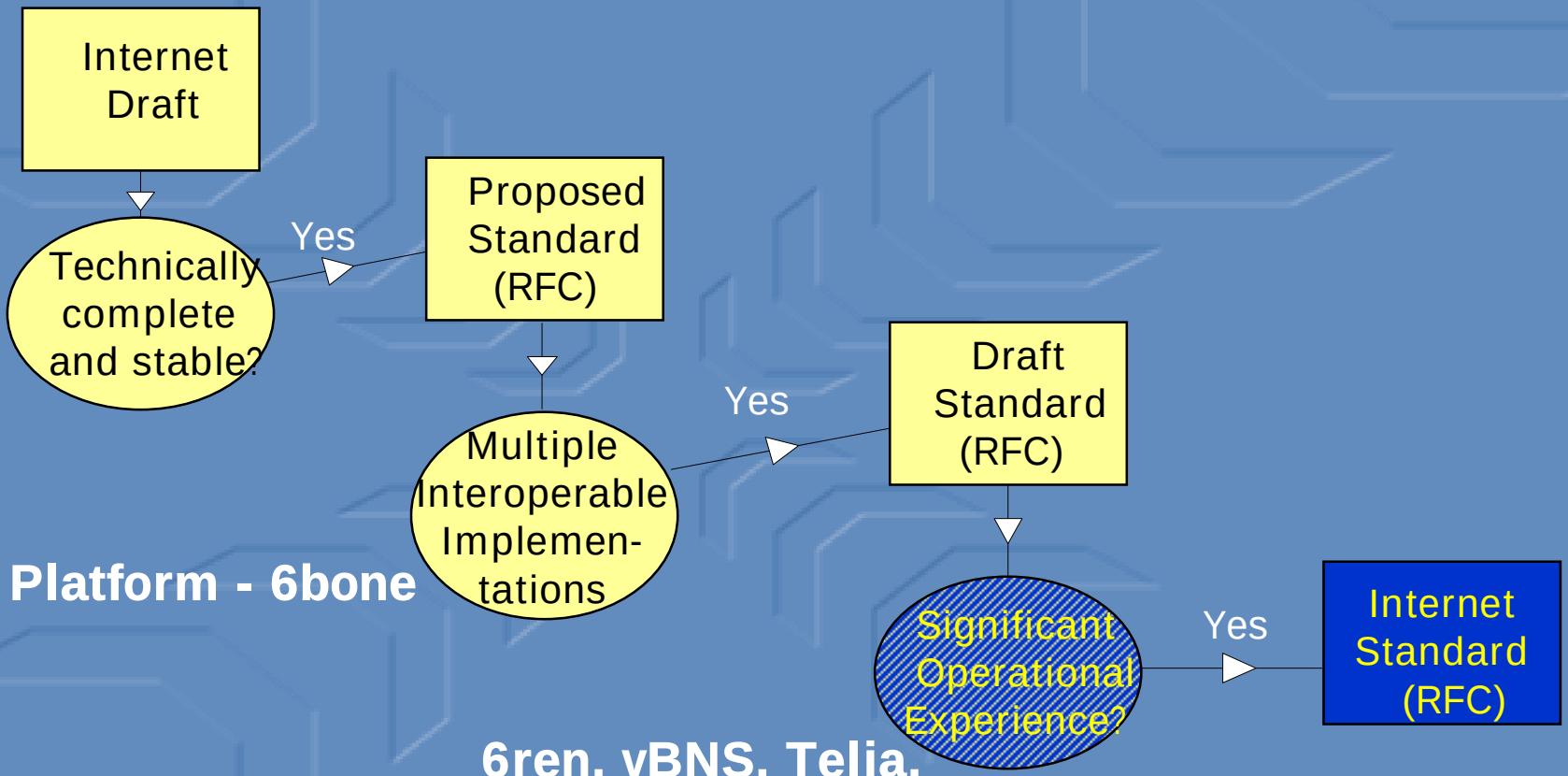
NTT

- Sony announces that all its future gaming and home equipment platforms will support IPv6
- Cisco together with HP, Motorola, Microsoft, SUN, IBM partners to push IPv6 development in Jul 2001

# 1. Standardization

*Key Message – The Core Specifications has been ready since 98*

# Where in the Standardization Process is IPv6?



# 2. Commercialization

*Products get on the market,*
*Production network with IPv6*
*starts getting deployed*

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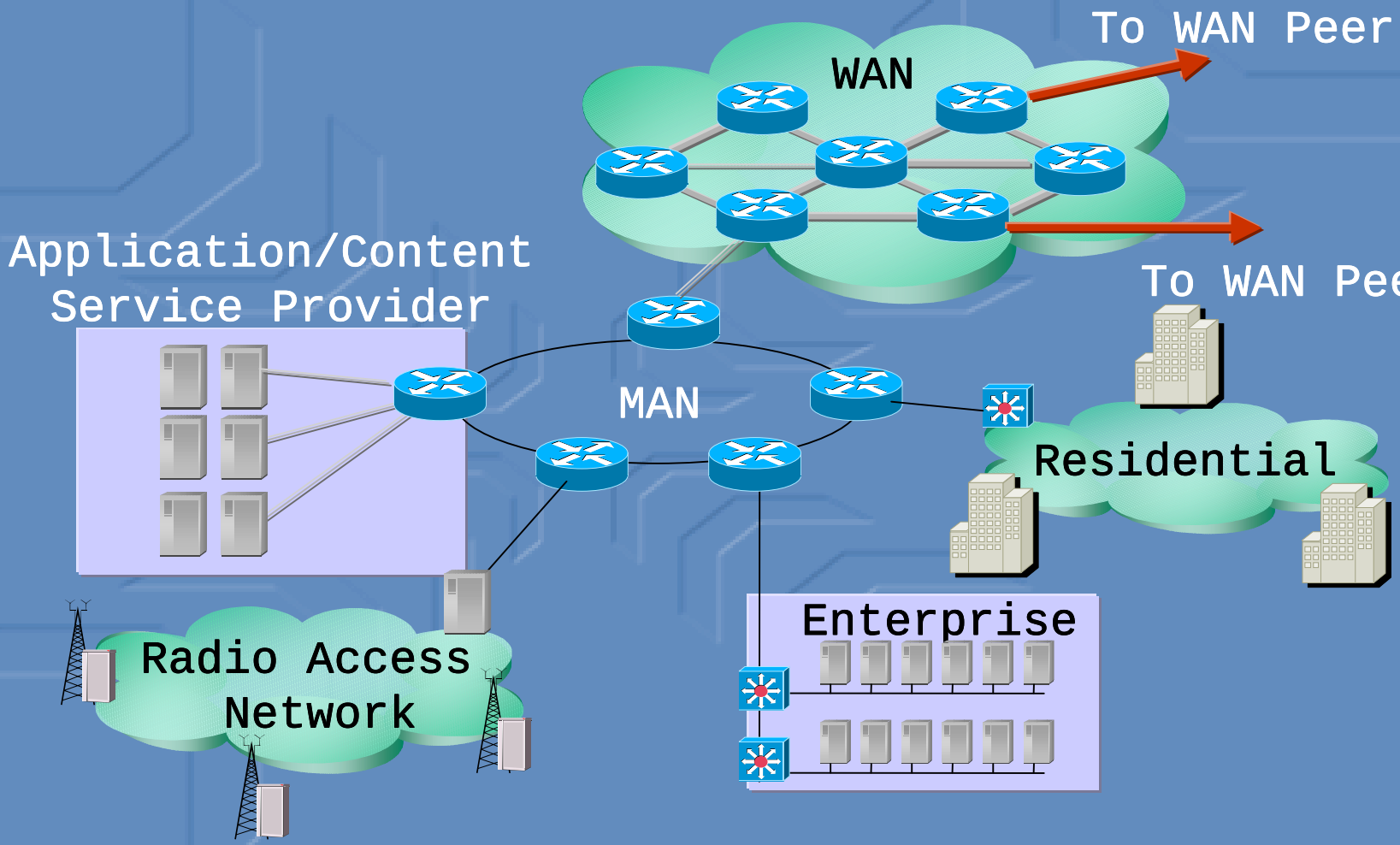
# Commercialization

- Commercial Products are made for IPv6
  - Routers and Switches
  - Servers
  - Handsets (PDA, cellphones, hosts etc)
  - RNC, SGSN, GGSN etc.
  - Operating Systems
  - RTOS
  - Network Processors
  - Etc.

# Things that need to be resolved

- Multihoming which scales – Multi6 WG
- Enterprises want to connect to more than one ISP to improve connectivity
  - Better Performance
  - Load Sharing among several ISP connections
  - Redudancy from several ISPs

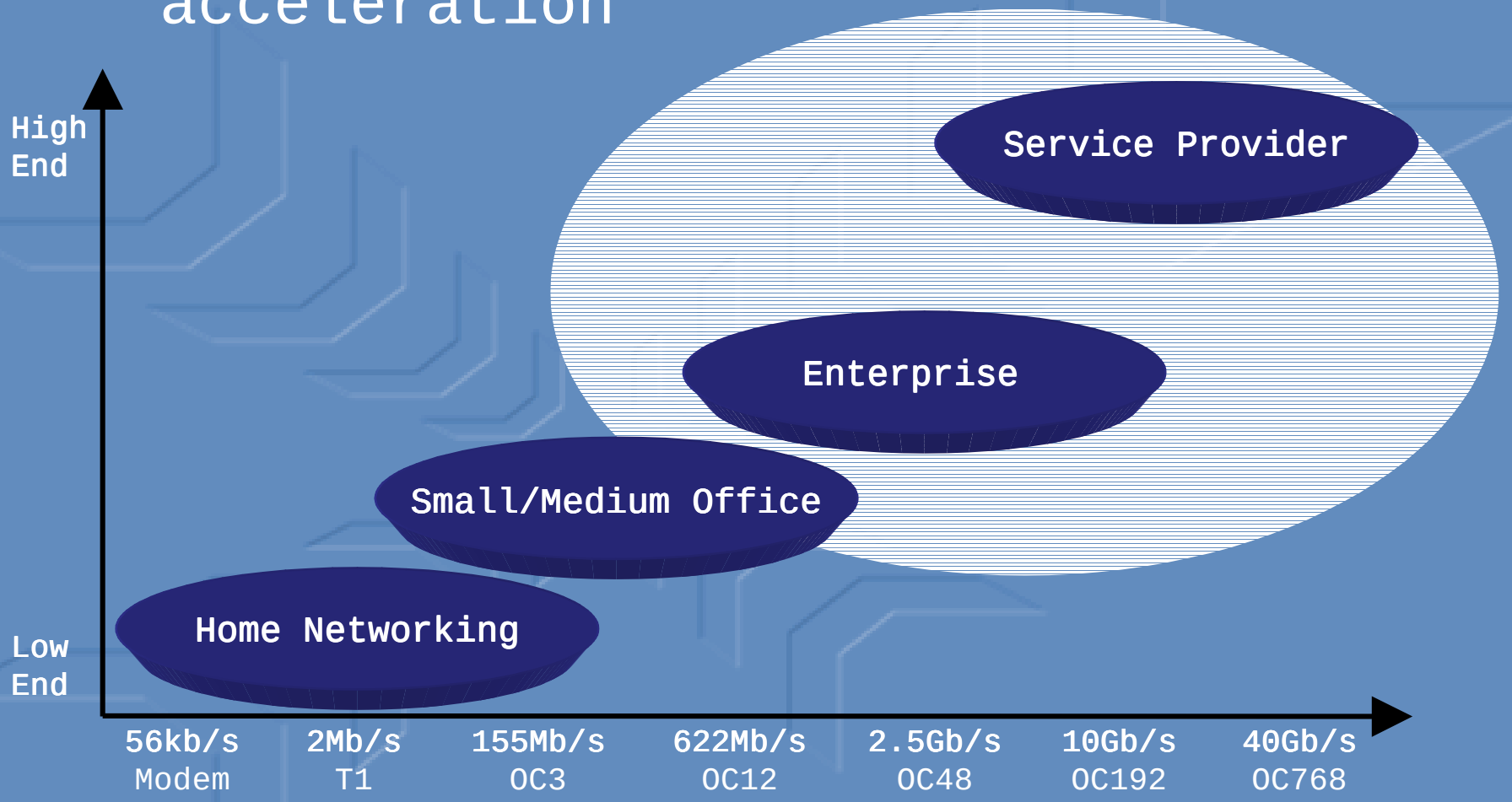
# All IP Service Provider Network



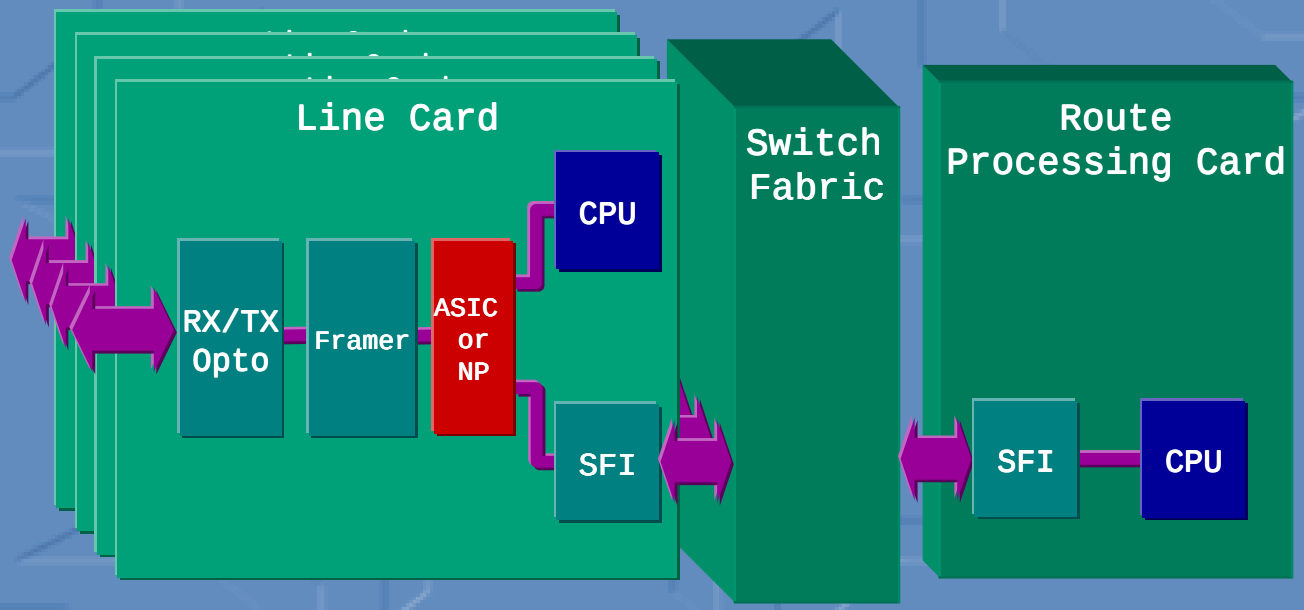
# Equipement that is not affected

- Euipment that is not affected
  - WDM/DWDM, Sonet/SDH ADM, OADM, Sonet Crossconnects
- Euipment that is affected but is easy to ugrade (e.g with SW)
  - CPE, Access Routers, SOHO Routers
- Euipment that is affected and where the upgrade is harder (e.g. In HW)
  - Core Routers, Edge Routers, MultiService Platforms, IP aggregation router, L2-L3 Switches, L4-L7 Switches, IP Service Switches, VoIP Gateway, Mobile Edge Router (GGSN), NAT, Firewall

# Equipement that needs HW acceleration



# Router System




SFI Switch Fabric Interface (CSIX, ATM or Custom)
Interfaces Network Interface (ATM, PoS or Ethernet)

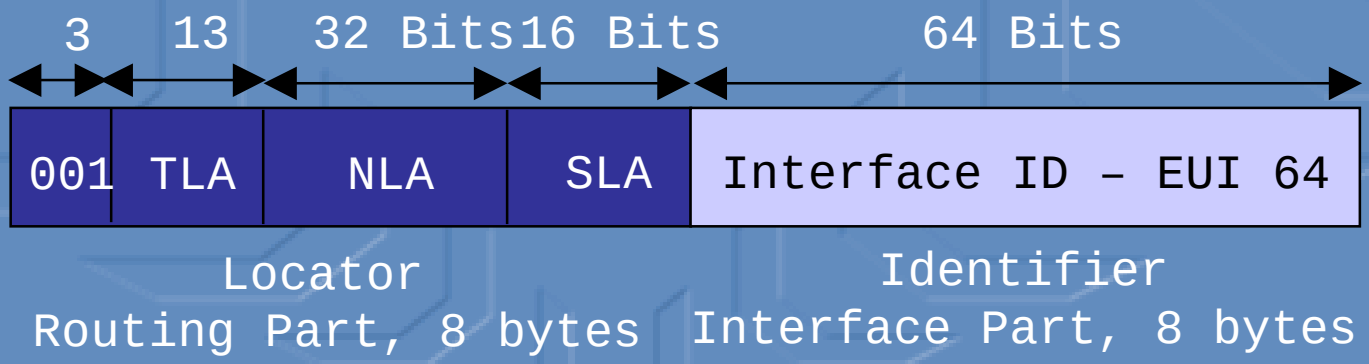
# Product Status – Routers and Switches components

- Software
  - RTOS – VxWorks, OSE-Delta, IOS supports IPv6
  - OS- BSD (FreeBSD, NetBSD, OpenBSD, BSDI), Solaris supports IPv6
- Hardware that is not affected
  - Tranceivers, Transponders, Framers, MAC, Mux/Demux, Serdes, PHY, Switchfabrics are not affected by IPv6
- Hardware that is affected
  - CAM/SRAM/Classification Co-Processors supports IPv6 based lookups and classifcation
  - Network Processors/Custom ASICs/ASSP (Packet Processors, Traffic Managers, Security Processors)

# IPv6 Challenges in HW

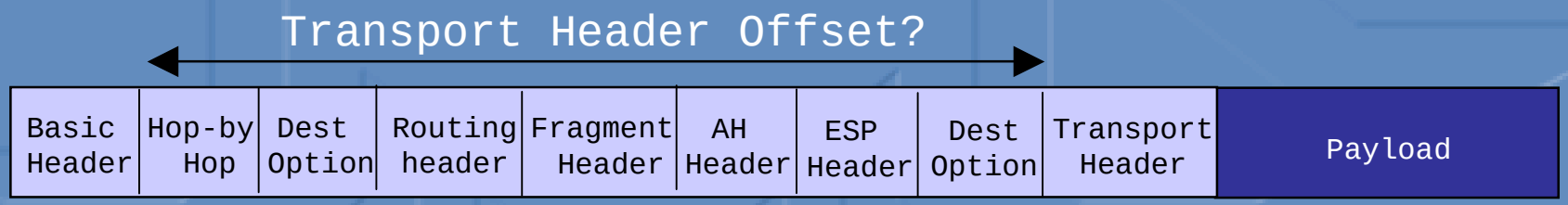
- IPv6 Adresses
- IPv6 Multicast
- Extension headers
- IPv6 Classification
- IPv4 to IPv6 NAT/PT

# IPv6 Adresses




- Routers needs only to store the Network Prefix which is 64 bits for unicast for next hop
- IPv6 Multicast needs to store 32 bits (or potentially bigger) (plus 128 bits for RPC (i.e. Full IPv6 address)

# Extension headers




- Good if you only would like to do L4 classification
- L4 classification is very expensive (L4-L7 switches, NAT, IP Service Switches, Firewall)
- What happens with IP sec encrypted packets?

# Xelerated’s Network Processors

*The only network processor that can be programmed to have full IPv6 support*

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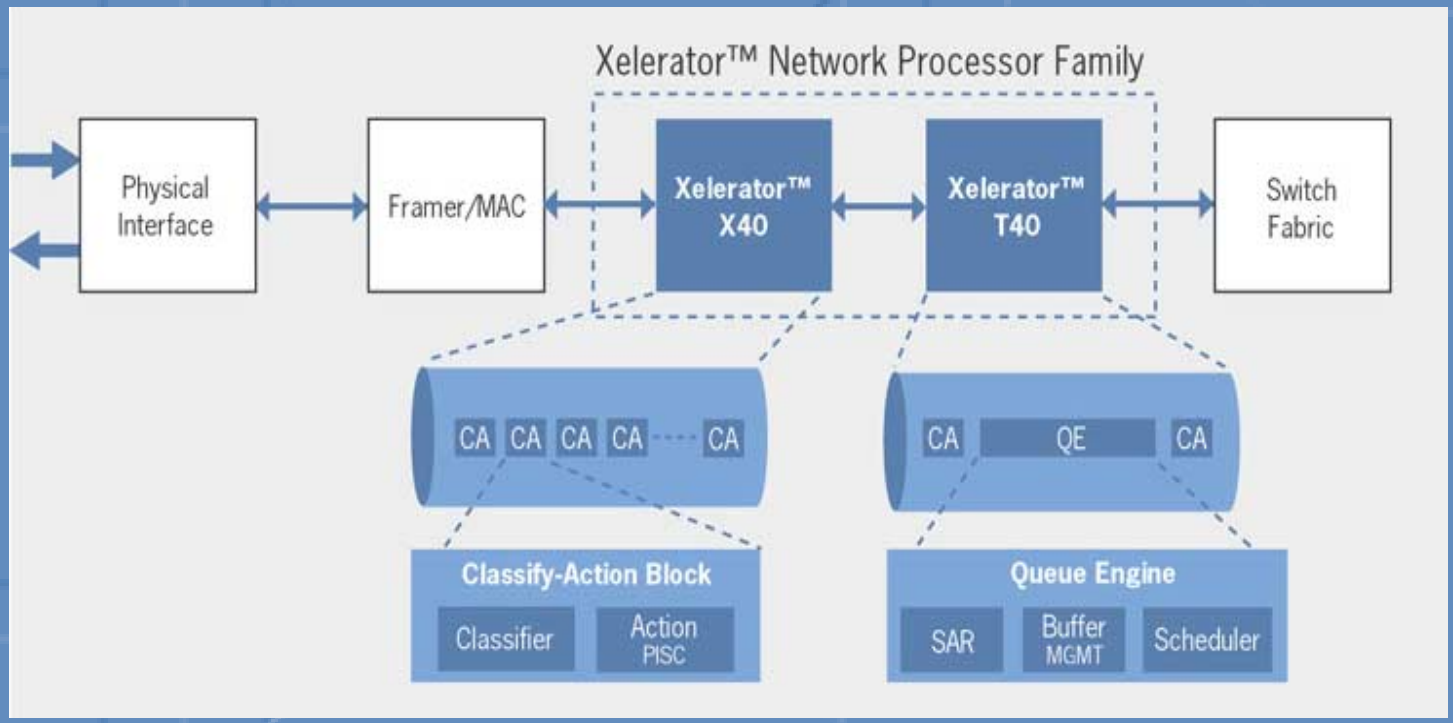
# Xelerated's Network Processors



# Xelerator Product Family – IPv6 ready

- **Xelerator™ X40 Packet Processor:** April 2002 Supports Edge and Core, 10-40 Gbps wire-speed, 8 SPI-4 Phase 2 ports, 3x over-clocked, Fully programmable
- **Xelerator™ T40 Traffic Manager:** Q3-2002 Supports Edge and Core, 10-40 Gbps wire-speed, 8 SPI-4 Phase 2 ports, Full Diffserv support, Advanced Buffer Management, SAR and Scheduling and Shaping
- **Development Tools:** December 2001
- **Forwarding Plane Apps:** December 2001
- **Engineering Services:** December 2001
- **Control Plane SW:** March 2002



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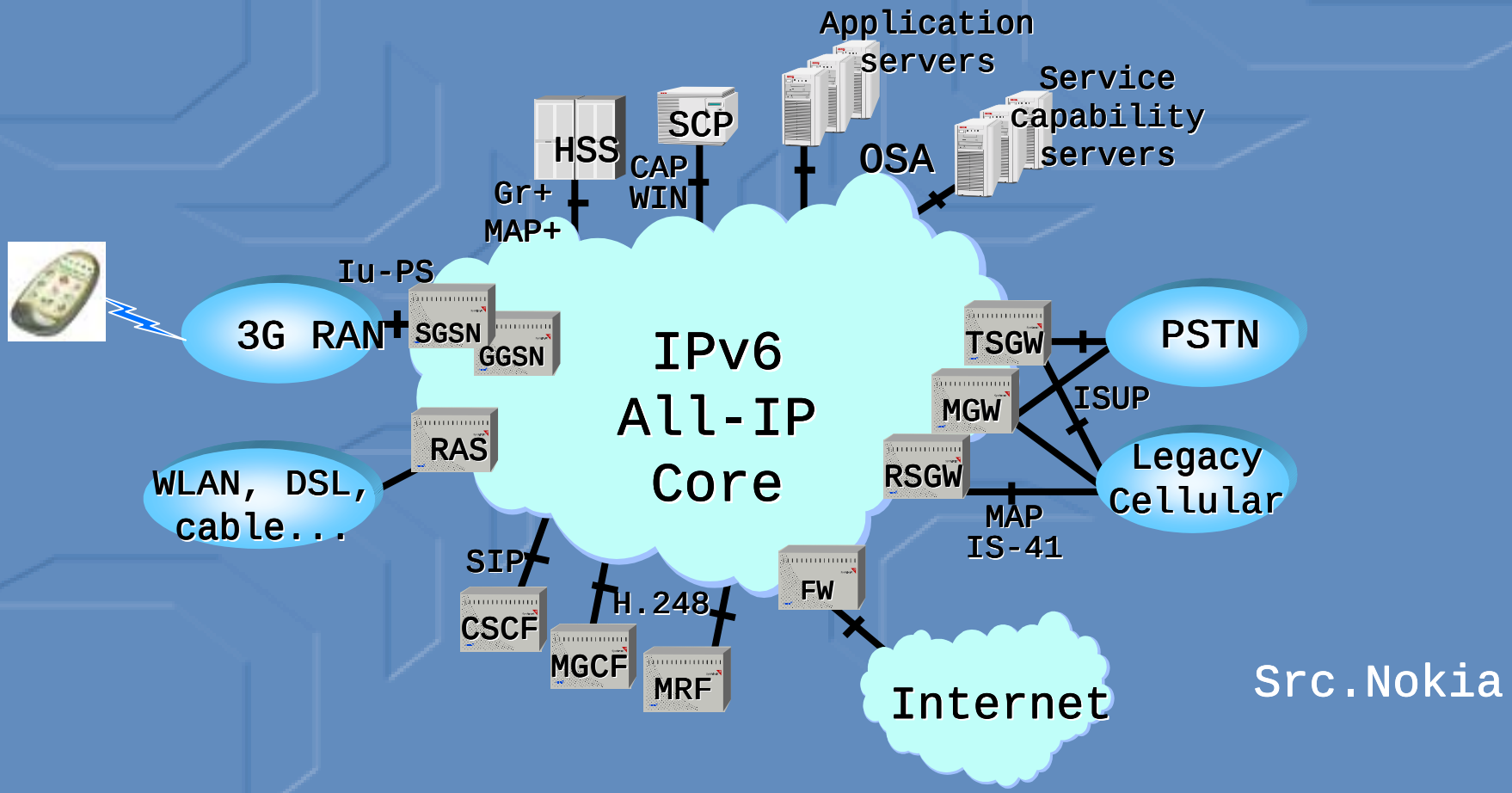
# Cisco Roadmap:
# The Confluence of IPv4/IPv6

IOS upgrade = Free IPv6

| IOS Release | Market Target |
|---|---|
| **Phase I**<br>IOS 12.2(1)T<br>May 2001 | **Early Adopter Deployment**<br>800, 1400, 1600, 1700, 2500, 2600, 3600, 4500, 4700, AS5300, AS5400, 7100, 7200, 7500 Series Routers |
| **Phase II**<br>H2 CY 2001 | **Production Backbone Deployment**<br>7600, 12000 Series Routers |
| **Phase III**<br>CY 2002 | **Enhanced IPv6 Services**<br>Hardware Acceleration |

Src: Cisco

# Nokia Roadmap:
## All-IP(v6) System Level Architecture




Src.Nokia

# Commercial Networks

- vBNS
- Telia
- NTT Communications
- IIJ
- Zama
- 6Ren

- Production sub TLA
  ARIN – 21 (US)
  RIPE-NCC – 45 (Europe)
  APNIC - 39

Thank You