

# **Industry (Trends and evolution)**

**Khalid Raza**

**Distinguished Engineer**

**Cisco Systems**

# Trends and Evolution

- **Evolution of network**
  1. **Production:** During 80's to early 90's it was all about office automation, manufacturing, supply chain
  2. **Transaction:** From mid to late 90's it was about the web, Google search, on line orders, check status of an order
  3. **Interaction:** Rich multi-media application, voice, file sharing

# Trends and Evolution

- **Internet traffic has doubled every year since 1997**
- **Two applications were always considered as killer apps for internet, web and email,**
- **Peer to peering has taken over**

# Trends and Evolution

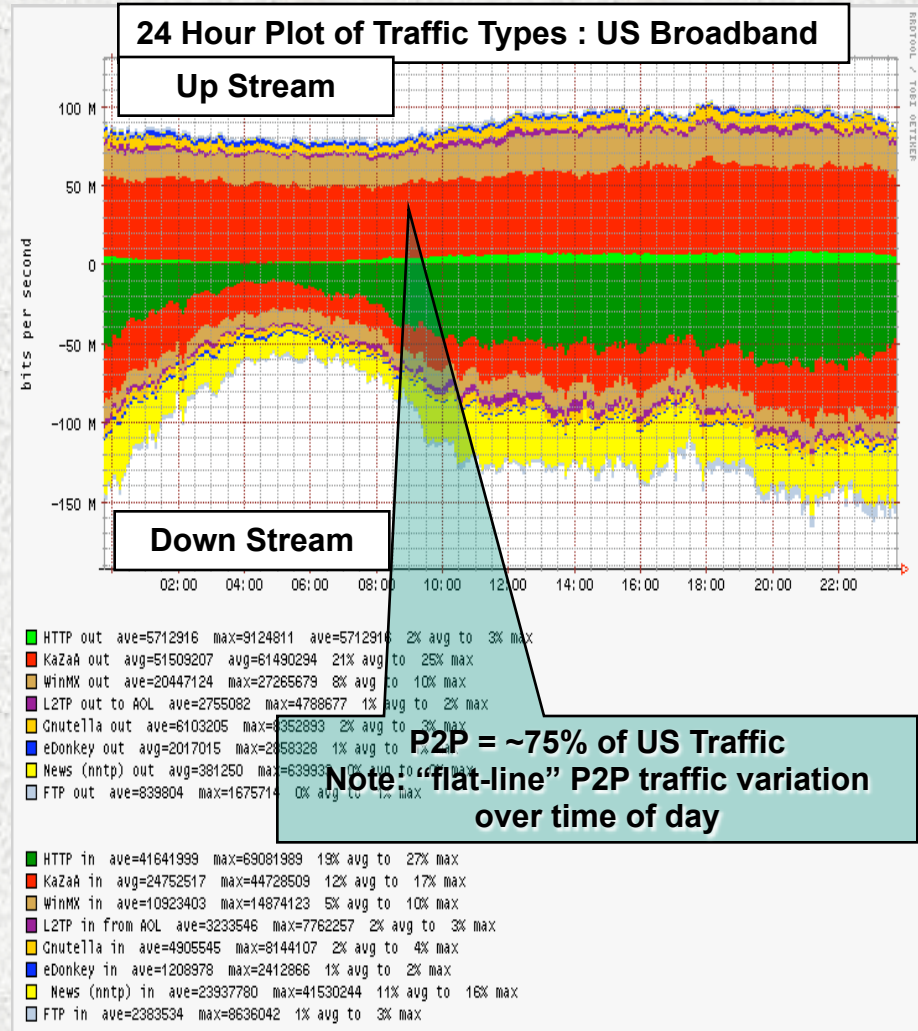
Source:  
Andrew M.  
Odlyzko,  
University of  
Minnesota,  
Minneapolis  
In GB/day

Year	Total	Web	Other (P-P)	Mail
1994	1.6	0.0	0.4	0.2
1995	3.7	0.9	0.7	0.3
1996	11.5	5.4	2.1	0.6
1997	18.1	11.2	3.6	0.7
1998	33.9	21.5	6.8	1.2
1999	65.7	37.2	17.9	1.8
2000	97.9	54	32.2	2.6
2001	129.0	65.3	48.9	4.5
2002	237.0	110.0	111.0	3.7
2003	362.0	173.0	175.0	5.3

# Trends and Evolution

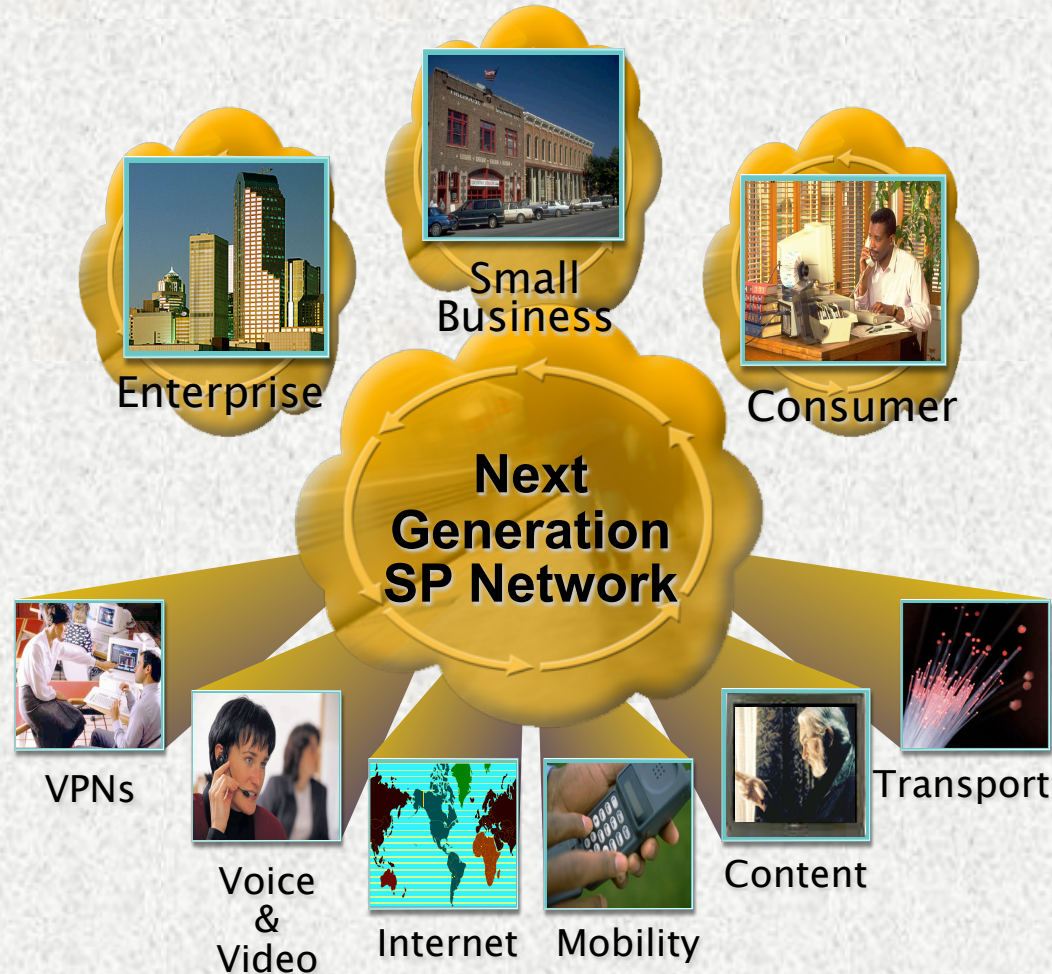
## Key Trends

- Rapid adoption of Broadband technologies changing the traffic model at the SP edge
- “Triple-play” services (Video, Voice & Data) a requirement
- Peer-to-Peer dominant traffic type in the Consumer network
- Boundaries between PC, Phones & TV are blurring : Integrated Multimedia portals
- Differentiated User Profile & Experience on the network



# Trends and Evolution

- Rapid adoption of **Broadband** changing traffic patterns
- Digitization of traffic types driving **convergence of diverse networks**
- **Mobile Technology** dramatically changing the network access model



# Trends and Evolution

**Mobility**



**Ubiquity of the Internet**



**Security and Privacy of a Network**



**Next Generation Networks**

**Simplicity of Access Technologies**



**Content Richness of Multimedia**

# Converge networks

- **Networks services traditionally have been offered by service providers over separate circuit switch and packet switch networks**
- **Voice over PSTN**
- **VPN over packet switch network such as Frame, ATM and lately both L2 and L3 over MPLS**
- **Separate private and public networks**
- **Migration towards common multi service IP/ MPLS is driven by necessity to reduce both capex and opex**



# Convergence

- **Applications demands have changed from best effort to specific application requirements**

- **Requirements**
  - QOS**
  - IP Fast convergence**
  - High availability**
  - Network resiliency**
  - Service convergence**
  - Security**

# A Need for IPv6?

- **Internet Population**

**~600M users in Q4 CY2002, ~945M by end CY 2004 – only 10-15% of the total population**

**How to address the future Worldwide population? (~9B in CY 2050)**

- **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**



# Summary

- **IP takes the rigidity out of the system**
- **Networks are becoming more intelligent and flexible**
- **The Internet is “highly decentralized” – Regional modes of adoption**
  - IP impacts the overall infrastructure**
- **Education**
  - Next generation’s graduates are key for internet expansion and innovation**
  - IP knowledge represents job’s opportunity for tomorrow**

A sepia-toned photograph of a person's hands holding binoculars, positioned on the left side of the slide. The binoculars are held up to the eyes, and the person's face is partially visible in the background, looking through them. The overall mood is one of exploration and discovery.

**Discover all  
that's possible  
on the Internet**