

# **Emerging IPv6 Trends in Next Generation Networks**

**Tony Bates  
Routing Technologies Group  
Cisco Systems, San Jose, California**

**April 13, 2004  
Key note at Global IPv6 Summit, Beijing**

# Agenda

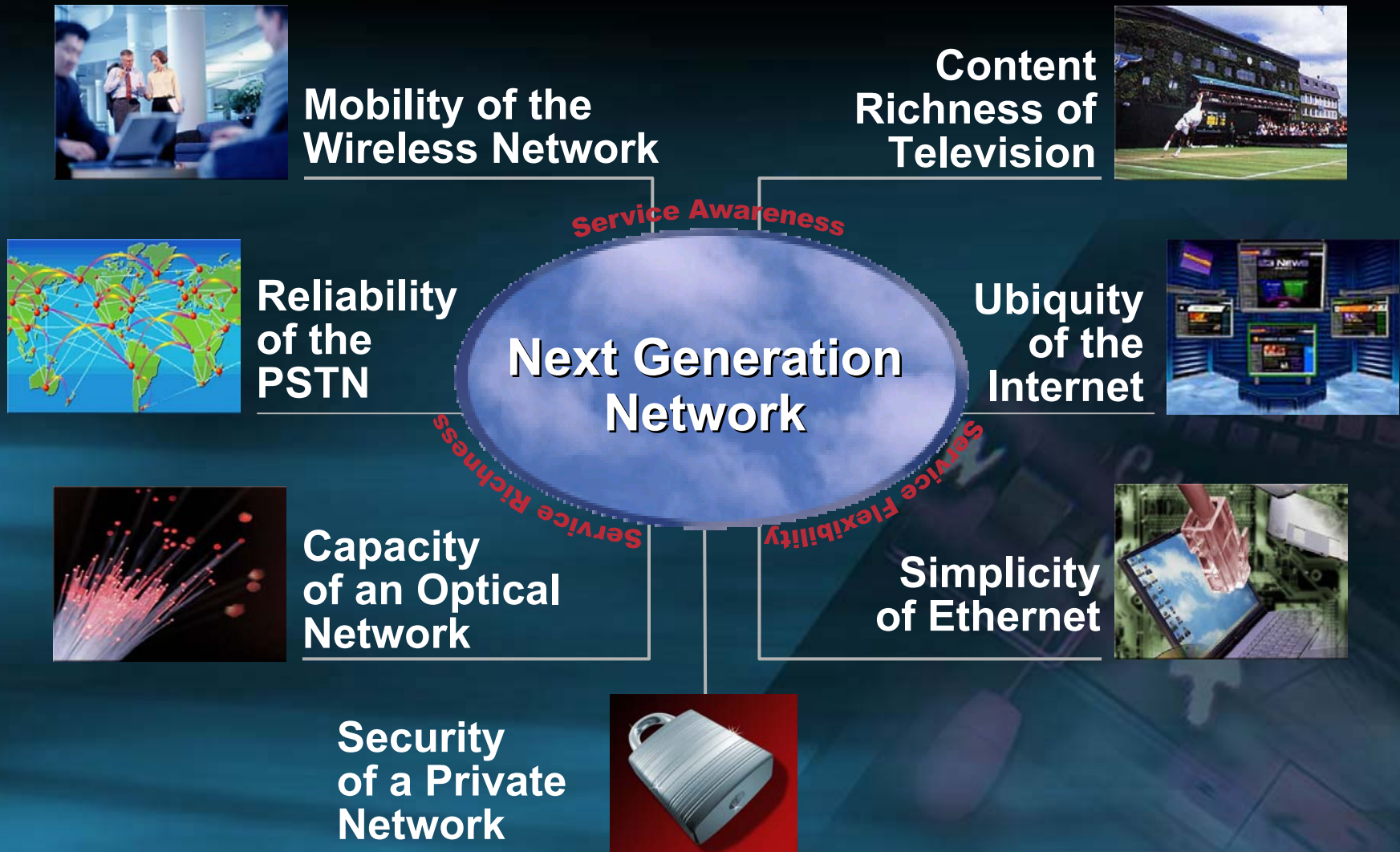
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- **Service Providers Trends**
  - **Broadband Internet Trends**
    - **Role of IPv6 in Broadband Internet**
  - **Mobile Internet Trends**
    - **Role of IPv6 in Mobile Internet**
- **NREN Trends**
  - Role of IPv6 in Grid networks**
- **Defense and Home Land Security**
  - Role of IPv6 in Home Land Security**
- **Evolution towards Ubiquitous Networking**

# Cisco's Network Vision

## Fusing the Best of Today's Networks and More

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# Evolution towards Ubiquitous Networking: Future of Broadband and Mobile

Availability and Flexibility of Commn.,

## Traditional Network

### Disparate Networks

- Disparate PSTN and IP network
- Emergence of VoIP

- Start of VoIP communication era

2000

## Network Convergence

### Ubiquity of Networks

- IP based Multi-service networks - Integration of Voice and data networks (both Wireline and wireless)

- Start of Multiservice Broadband packet based networks

2002-2004

## Communication Convergence

### Ubiquity of Communication/services

- Real time communication Based on SIP
- Unified Messaging
- Find me, Follow me Communication
- Intelligent Terminals

- Introduction of IP Multi-Media Systems (IMS) to 3G/4G

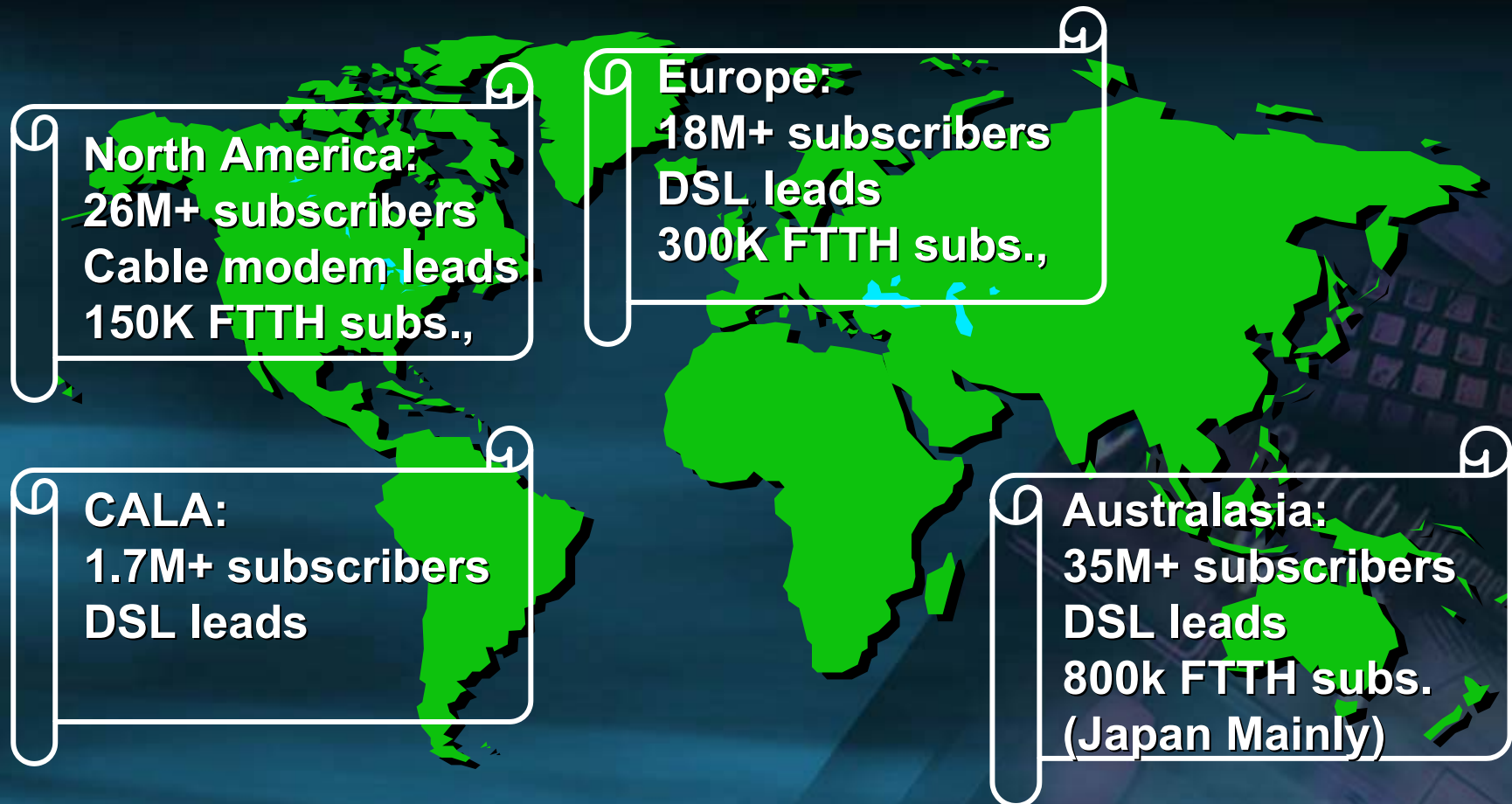
- IPv6

2005-2007

# Broadband Internet Trends

# Broadband Around the World

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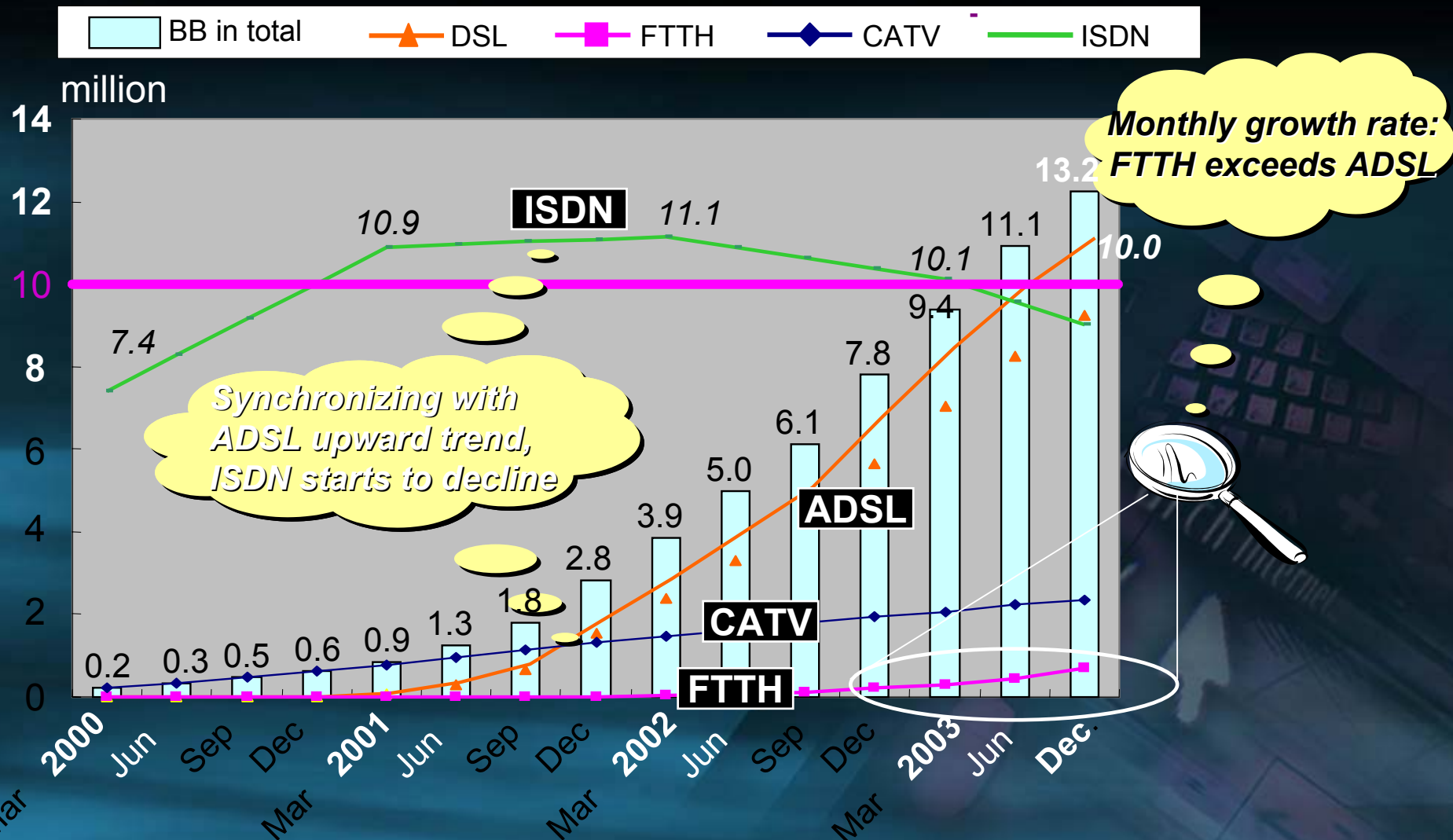
Source: RHK, Corning, Point topic Q2CY2003

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# Japanese Broadband market growth

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Source: Statistics from Ministry of Public Management, Home Affairs, Posts and Telecommunications

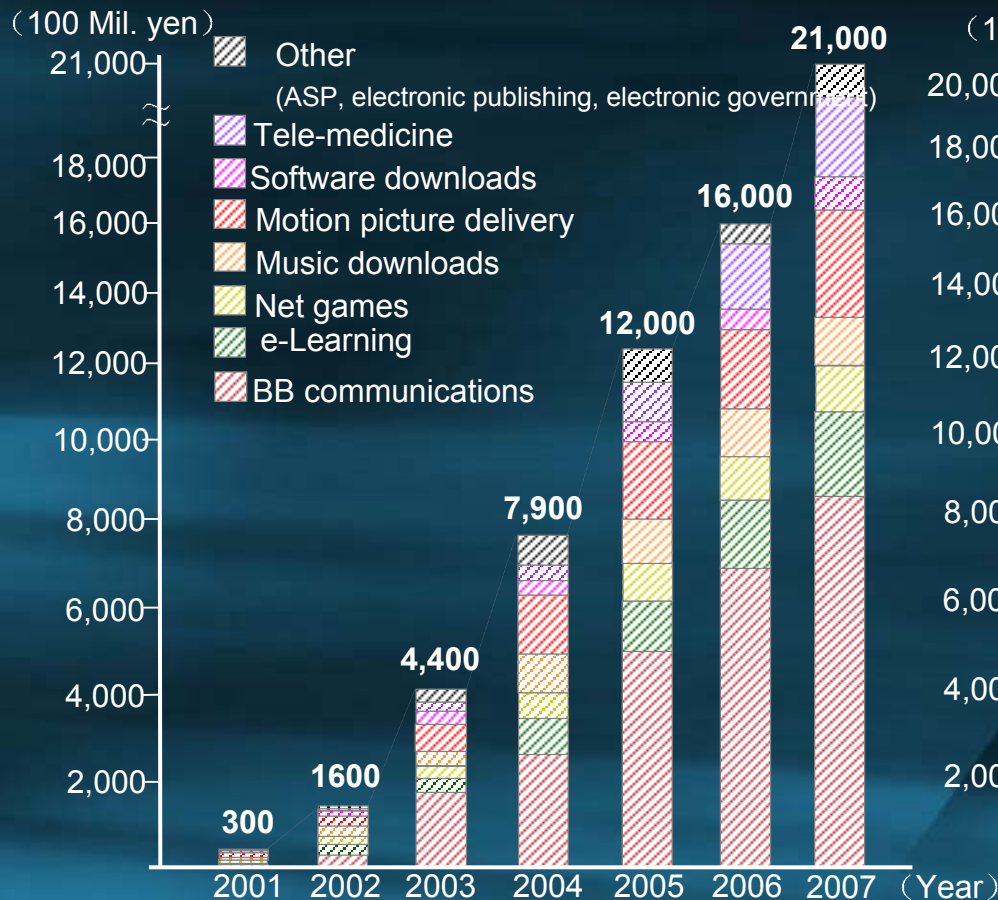
Exceeded 13 millions in total in Dec. 2003

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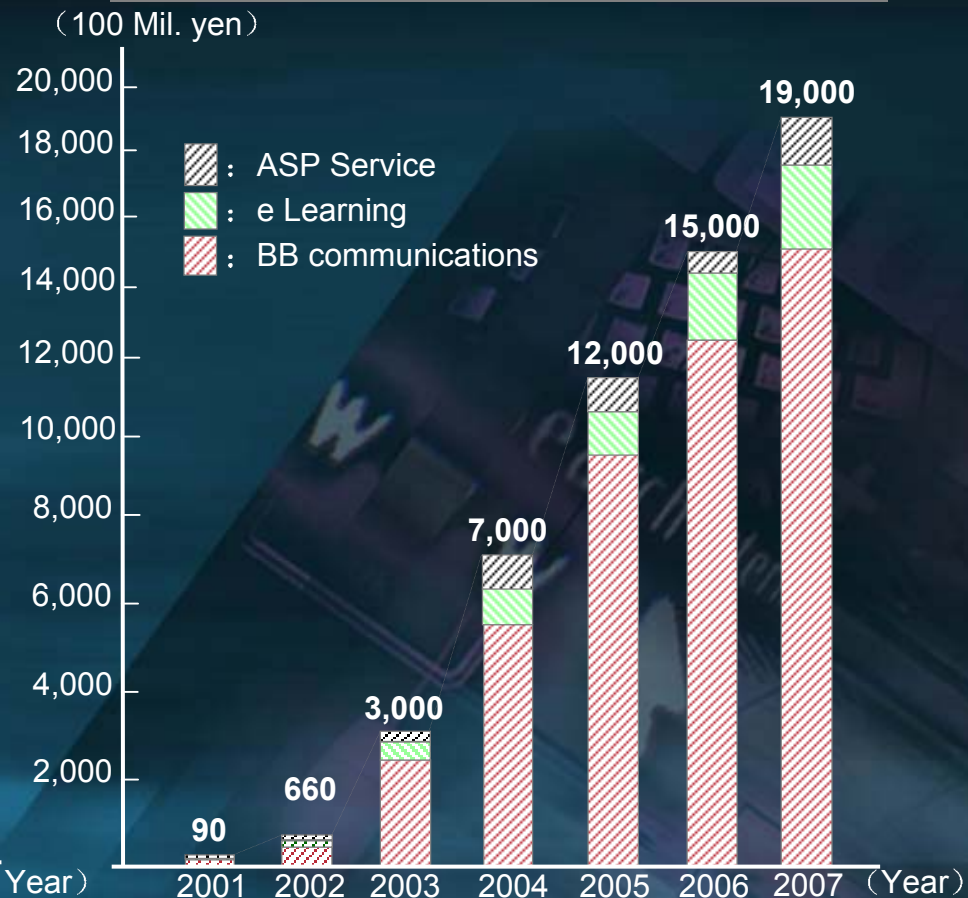
# Projections for Japan's Broadband Market - Service Contents

The broadband markets in Japan projected to expand to approx. 4 trillion Yen by fiscal 2007, with broadband communications representing 2.4 trillion Yen.

## Consumer Market



## Business Market

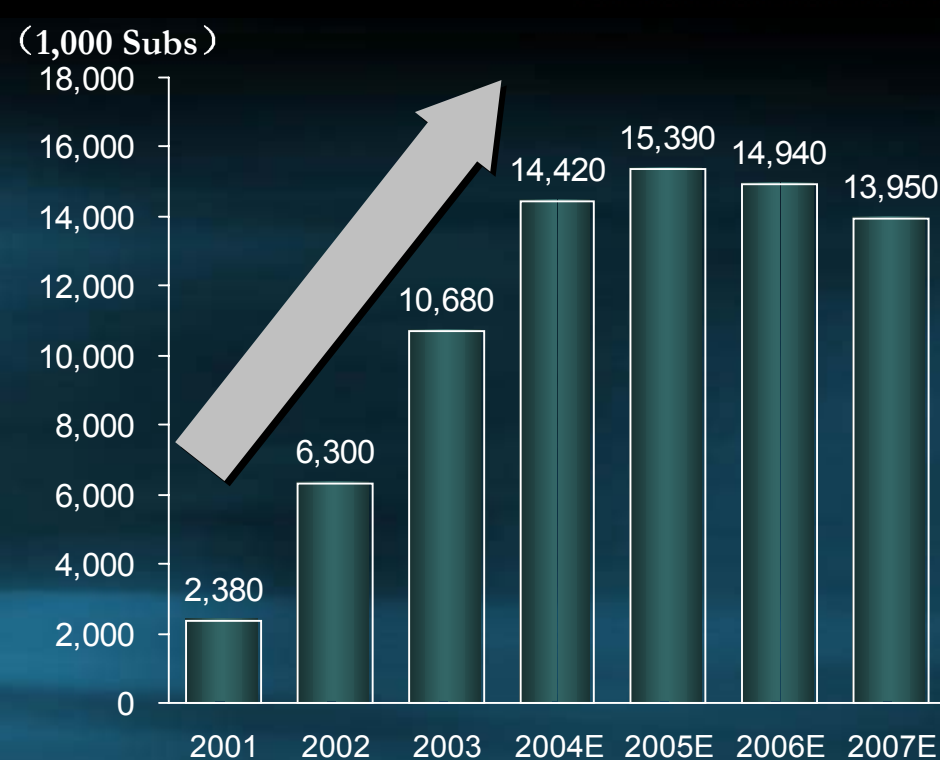


Source: EC Research.

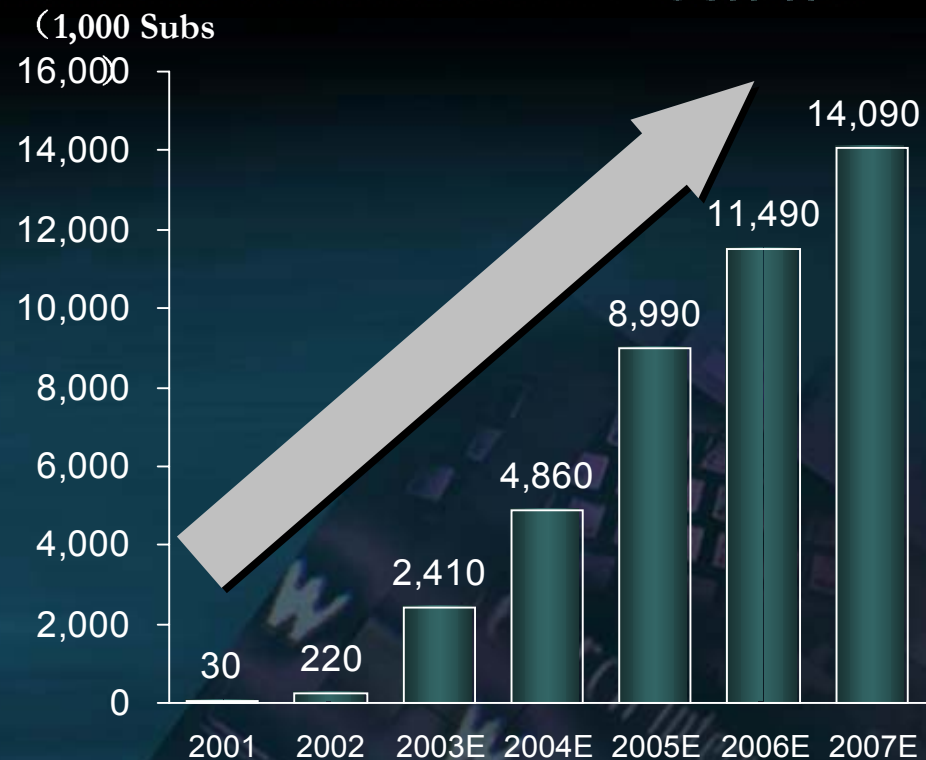


# Broadband Access Market projection in Japan

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**ADSL Subscribers**

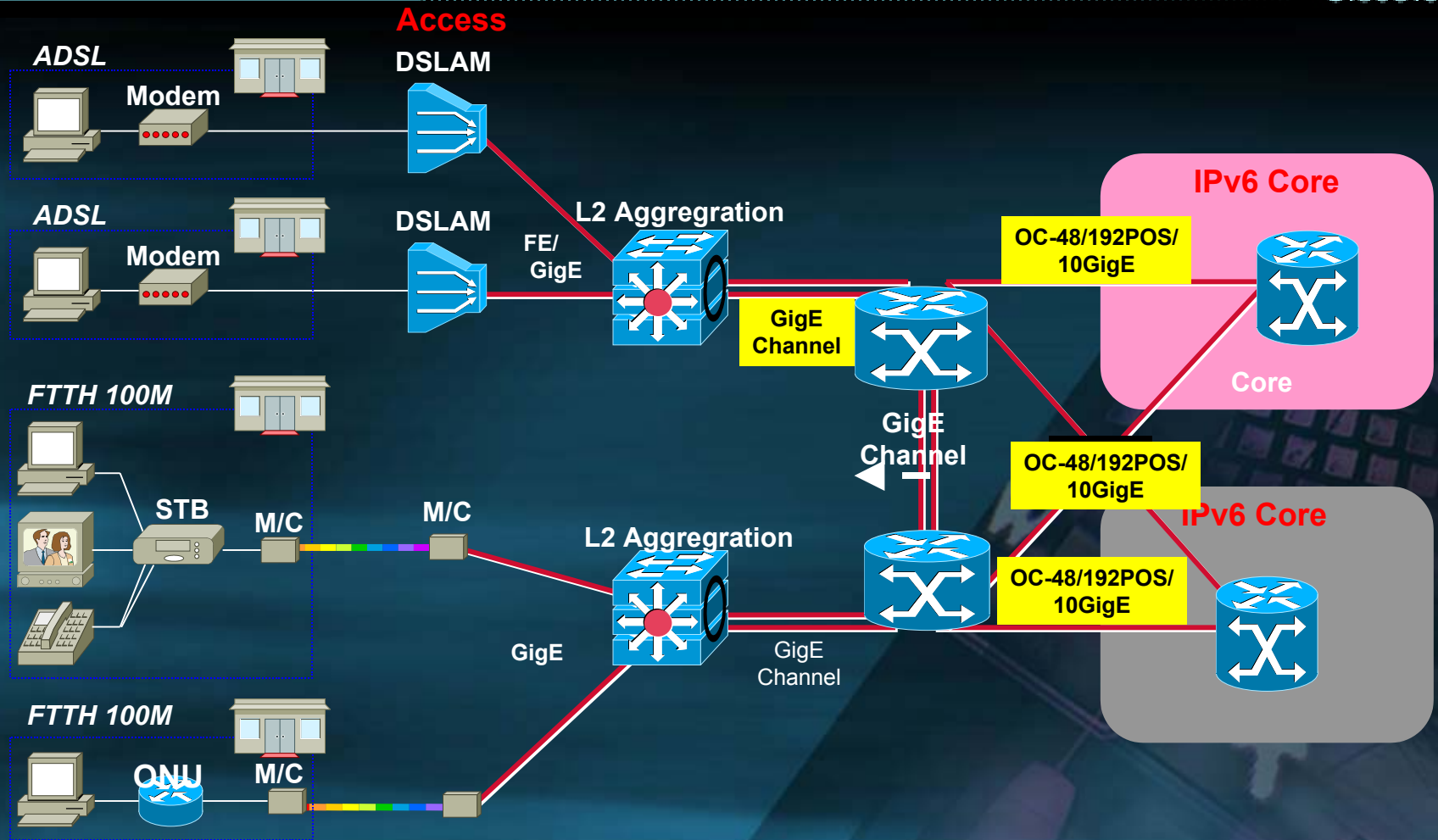


**FTTH Subscribers**

Source: InfoCom Research, Inc.

# IPv6 Based FTTH and ADSL Deployment Scenario

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Applications: Internet Access, Voice  
Content – VoD, Digital TV, On line gaming

# IPv6 based Broadband Internet Deployments by Japanese SPs

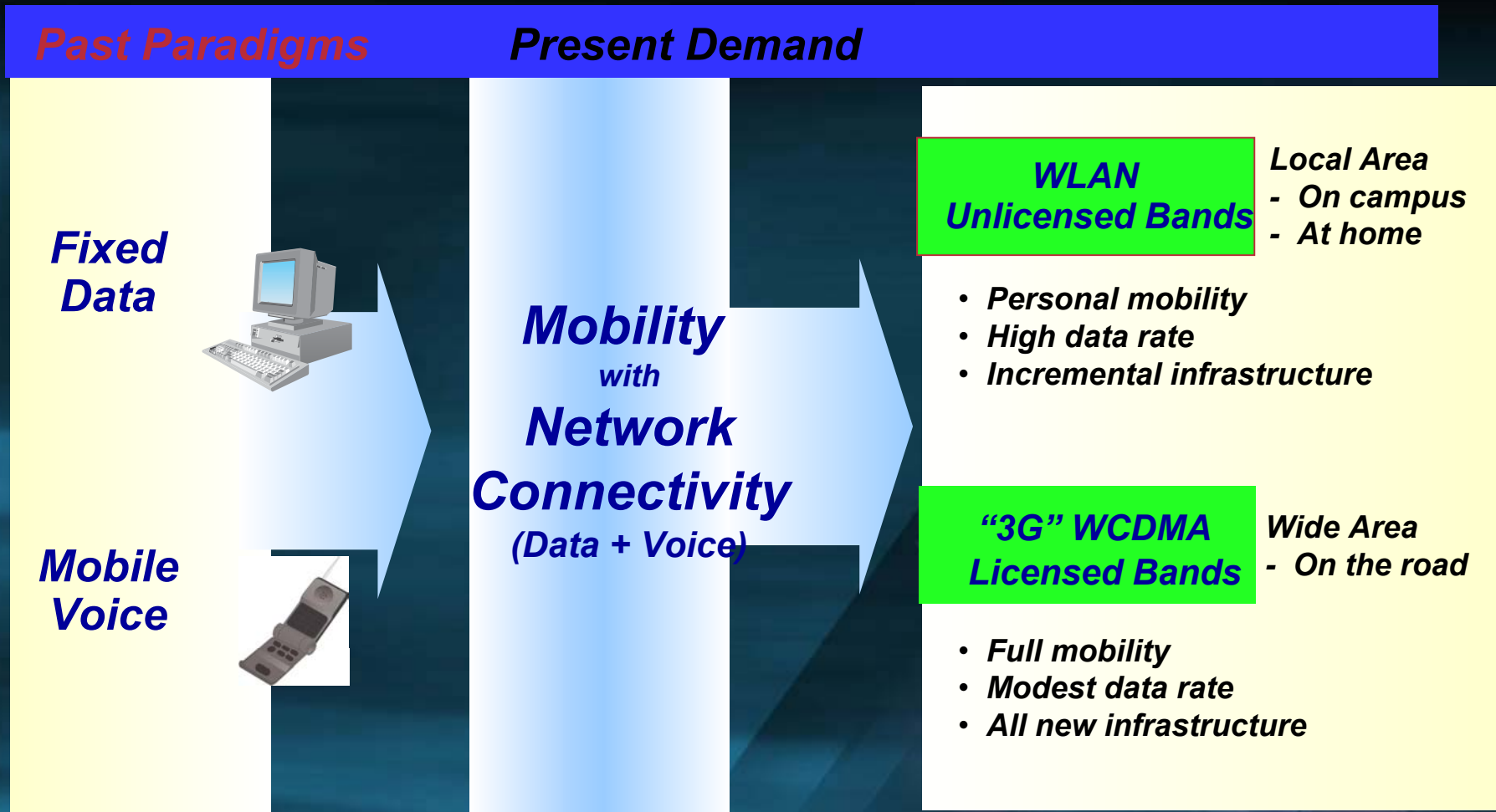
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- Japan Telecom adds SLAs to its IPv6 service  
[http://www.ipv6style.jp/en/news/2003/1226\\_japan-telecom.shtml](http://www.ipv6style.jp/en/news/2003/1226_japan-telecom.shtml)
- NTT-East to start IPv6 service  
[http://www.ipv6style.jp/en/news/2003/1219\\_ntt-east.shtml](http://www.ipv6style.jp/en/news/2003/1219_ntt-east.shtml)
- NTT Com to offer its dual stack service nationwide – 03/13/2003  
[http://www.ipv6style.jp/en/news/2003/0313\\_ntt.shtml](http://www.ipv6style.jp/en/news/2003/0313_ntt.shtml)
- NTT Unveils Next-Generation Services Based on New IP Networking Infrastructure  
<http://www.nikkeibp.asiabiztech.com/wcs/frm/leaf?CID=onair/asabt/news/219314>  
"the investment will not exceed 500 billion yen in the coming five years," Wada", NTT President added.
- New strategy of NTT Communications includes IPv6 – 03/18/2003  
[http://www.ipv6style.jp/en/news/2003/0318\\_nttcom.shtml](http://www.ipv6style.jp/en/news/2003/0318_nttcom.shtml)
- Nifty begins ADSL dual stack service – 03/17/2003  
[http://www.ipv6style.jp/en/news/2003/0317\\_nifty.shtml](http://www.ipv6style.jp/en/news/2003/0317_nifty.shtml)
- KDDI IPv6 trial includes mobile dual stack service – 03/17/2003  
[http://www.ipv6style.jp/en/news/2003/0317\\_kddi.shtml](http://www.ipv6style.jp/en/news/2003/0317_kddi.shtml)
- IPv6 Emerges as Key Part of NTT Com's Global Strategy, Company Exec. VP Says, Oct. 2002;  
<http://www.nikkeibp.asiabiztech.com/wcs/frm/leaf?CID=onair/asabt/intvw/213315>
- And many more.....

# Mobile Internet Trends

# Evolution of Wireless Networking

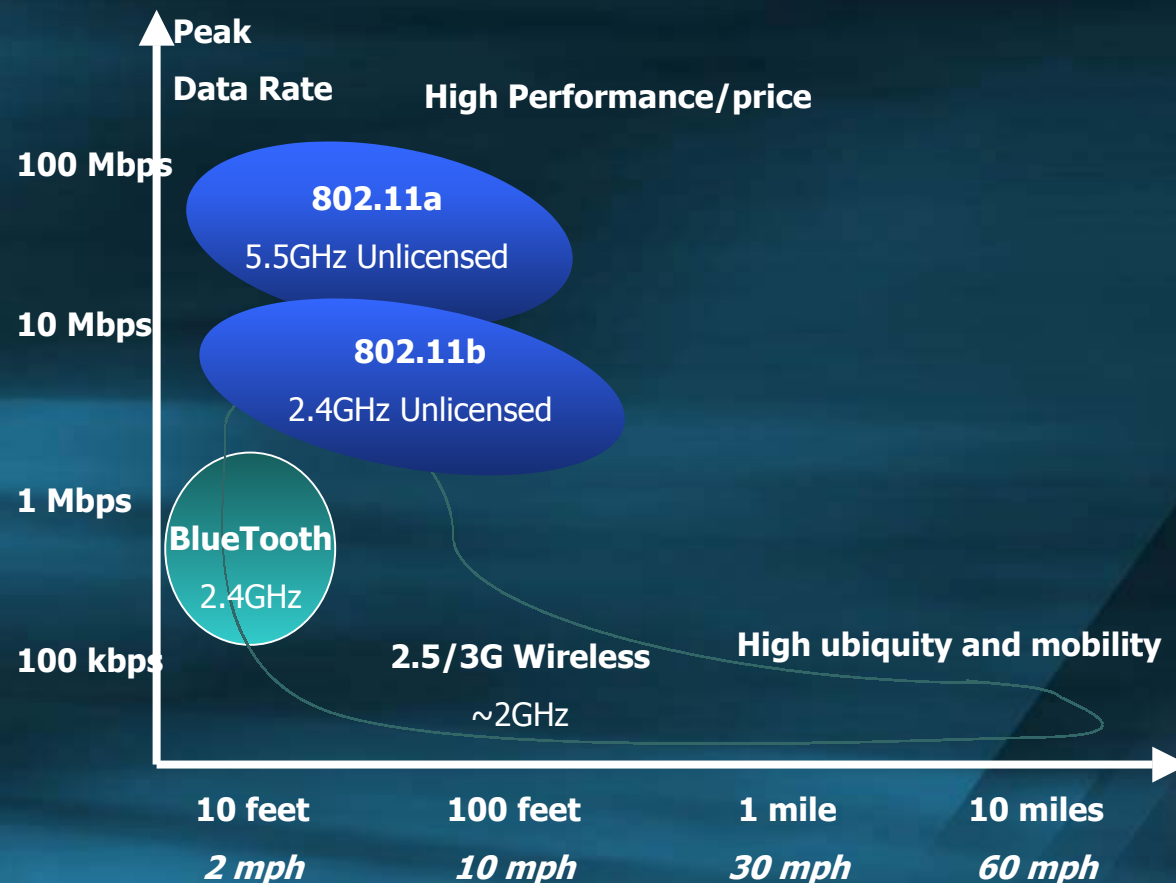
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# WLANs and Mobile Services

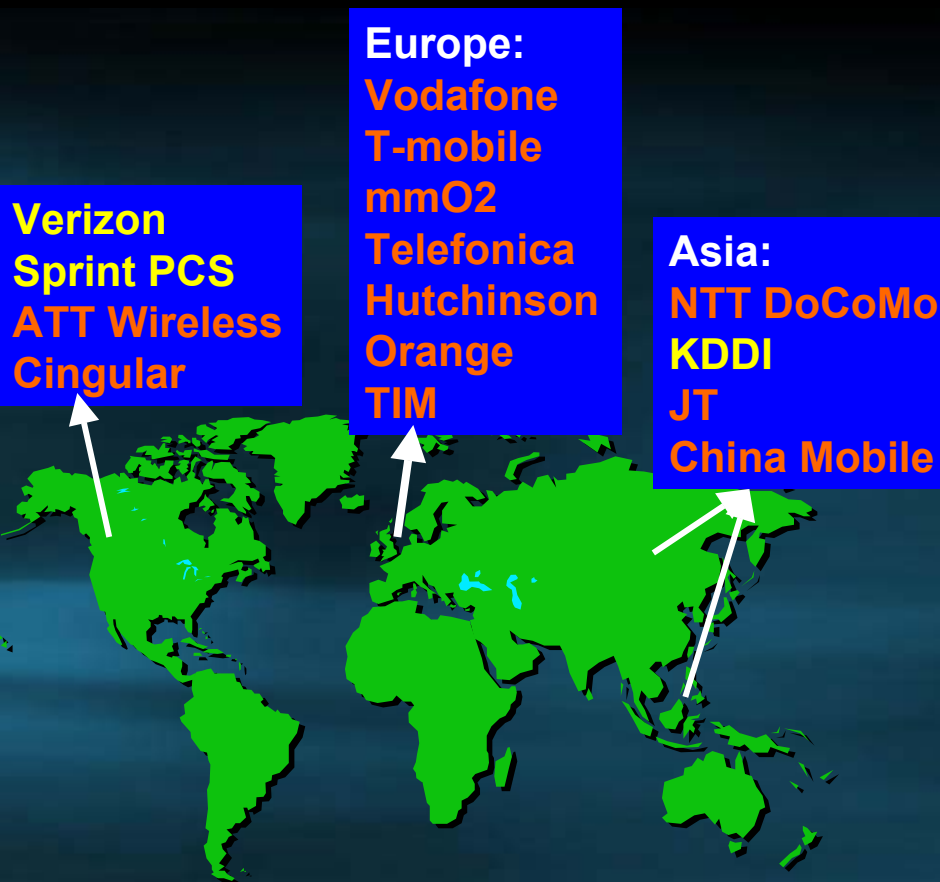
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CDMA 1xEV/DO	2400
W-CDMA stationary	2000
W-CDMA moving	384
CDMA 1xRTT	144
GPRS	114
CDMA	64
PDC-P	28.8
GSM/PDC	9.6

**Theoretical data transmission speed kbps**

# Key Worldwide Mobile Operators by Technology

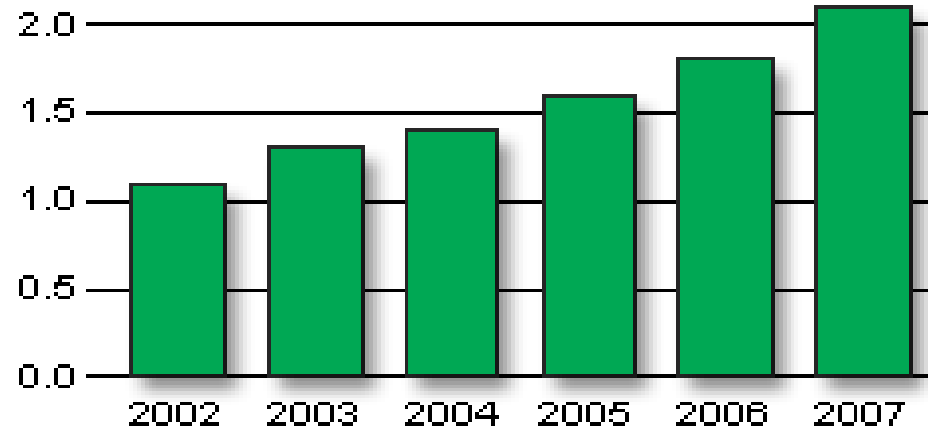


**3G Migration Strategy:**  
**GSM/PDC -> WCDMA**  
**CDMA -> CDMA2000**

## 3G Subscribers in Japan:

- KDDI 3G CDMA 1X: 9.5 Million Subs. by Aug. 03
- DoCoMo's 3G FOMA over 500,000 by June 2003
- J-Phone over 44,000 by May 2003

**Mobile Subscribers Forecast** (Units in Billions)

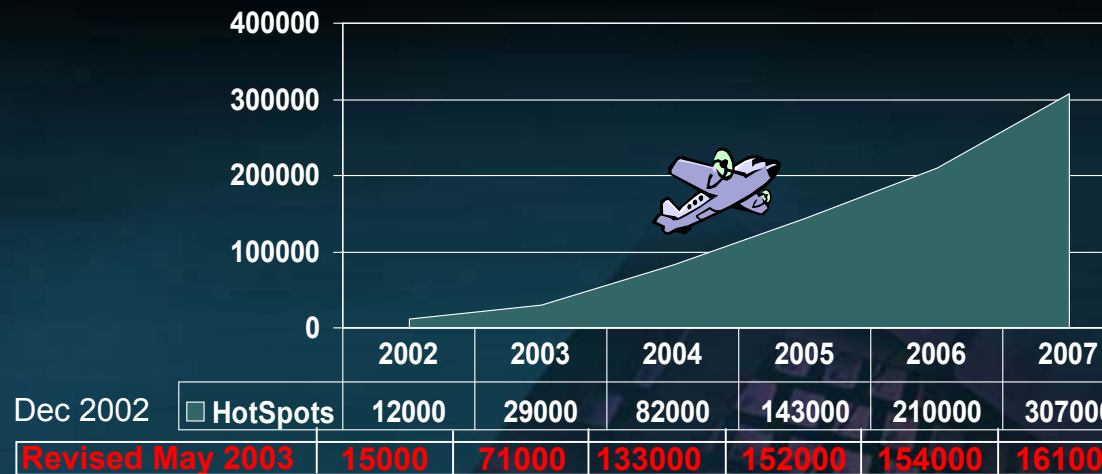
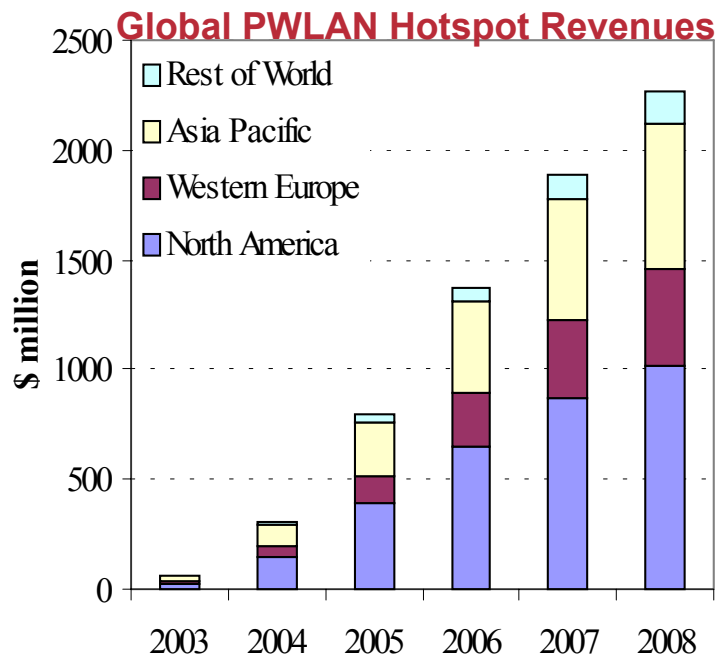


Source: In-Stat/MOR, 6/03

**CDMA contributes to this dramatic Mobile subscribers growth**

# Public WLAN Market Opportunity

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Source: Gartner, Worldwide Location

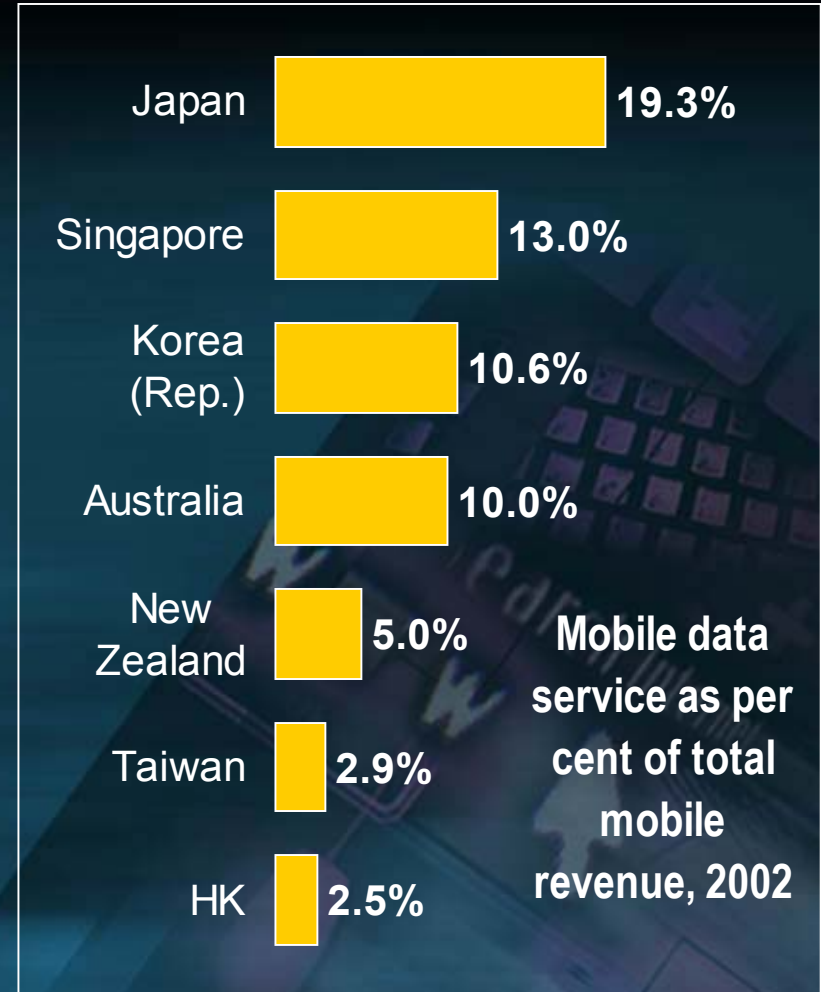
- New service opportunity
- Low rollout costs
- Value-added service

Higher ARPU & increased customer retention

# Mobile Internet Demand: Penetration and Revenue

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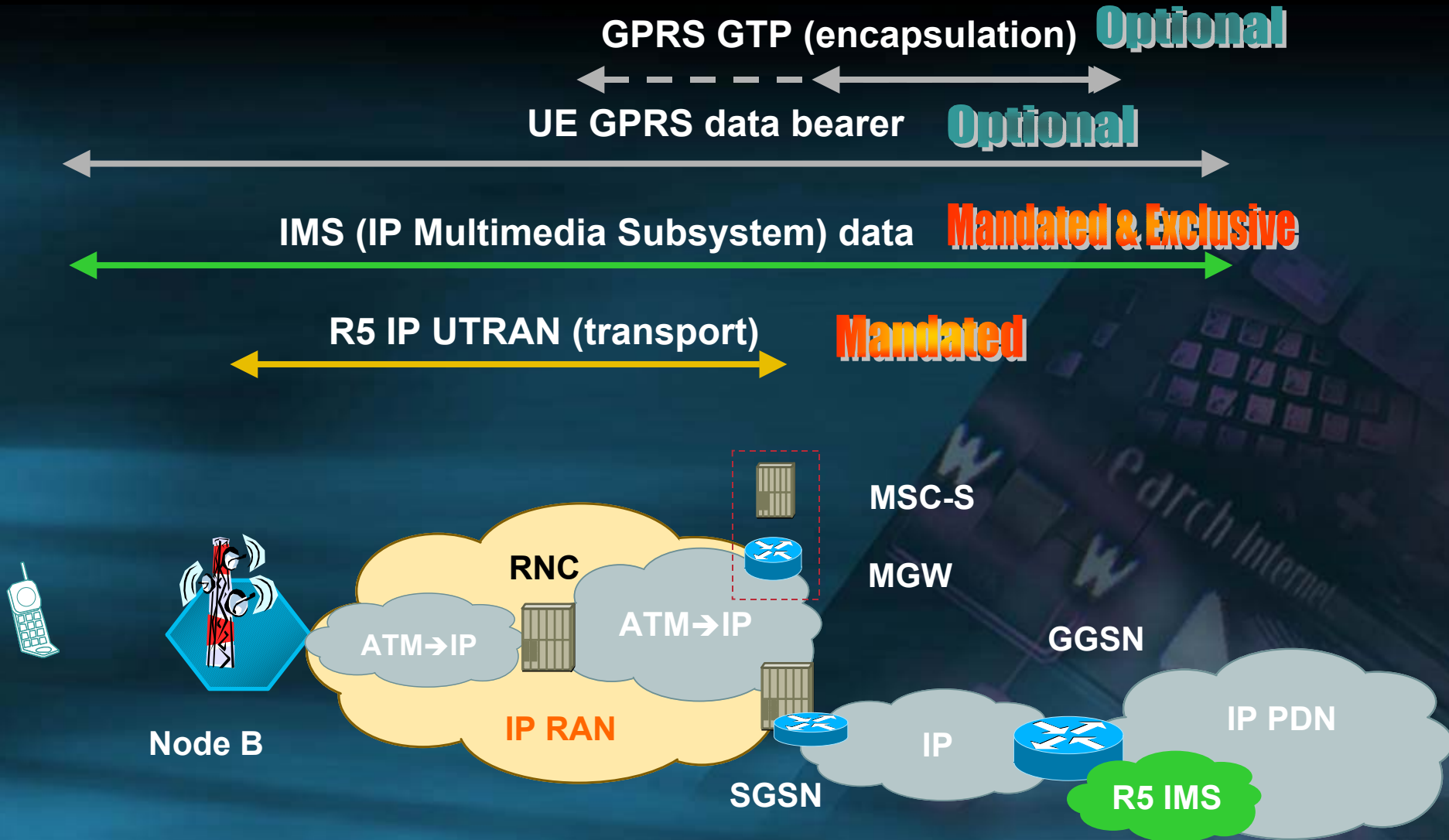
Subscribers browsing the Internet from their mobile phone



Source: ITU adapted from various sources

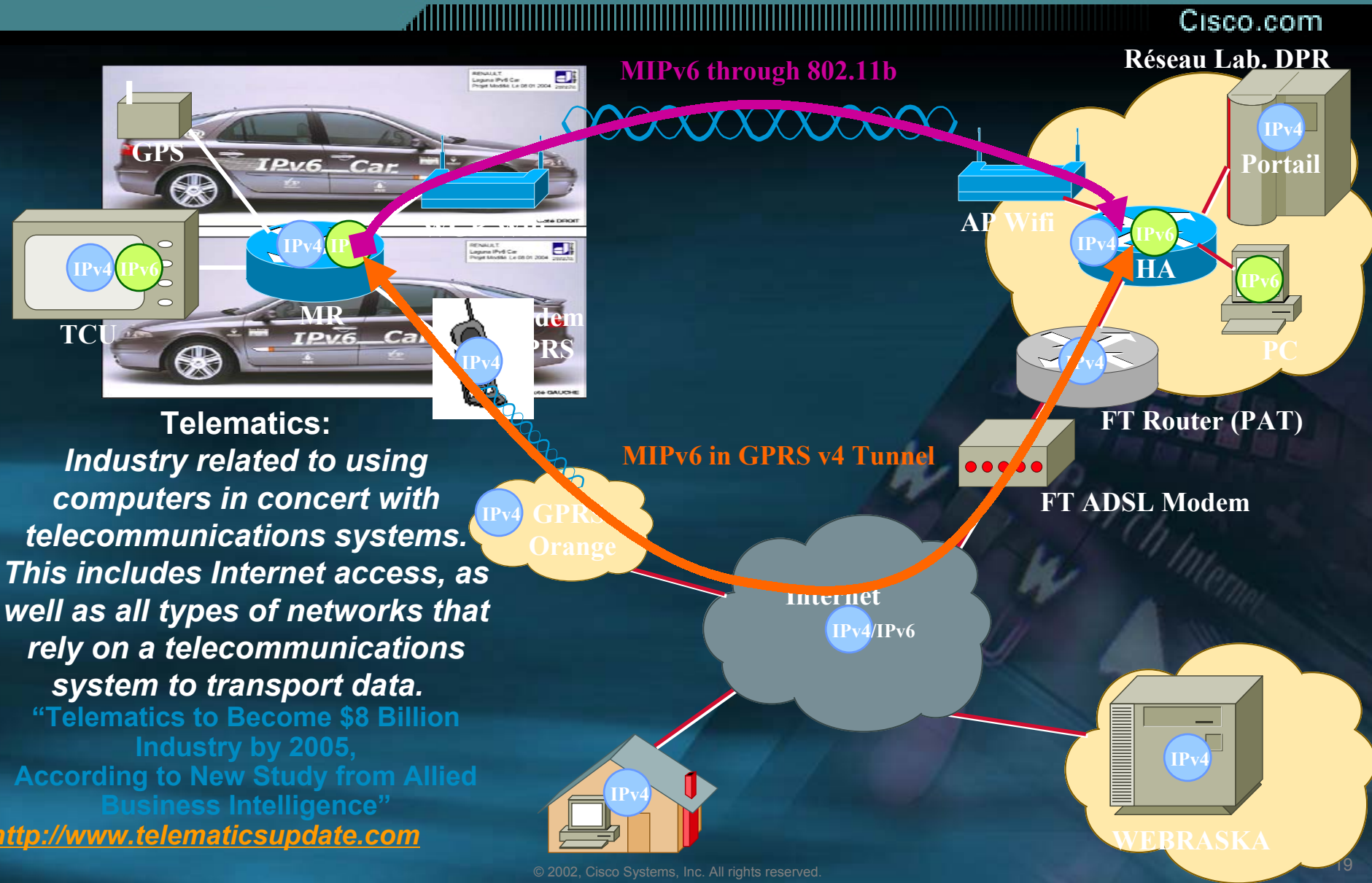
# Step-by-step migration towards all IPv6 based Mobile network

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# IPv6 Based Mobile Wireless Networking



**Telematics:**  
*Industry related to using computers in concert with telecommunications systems. This includes Internet access, as well as all types of networks that rely on a telecommunications system to transport data.*

*"Telematics to Become \$8 Billion Industry by 2005, According to New Study from Allied Business Intelligence"*

<http://www.telematicsupdate.com>

# IPv6 Networks in Motion Solutions

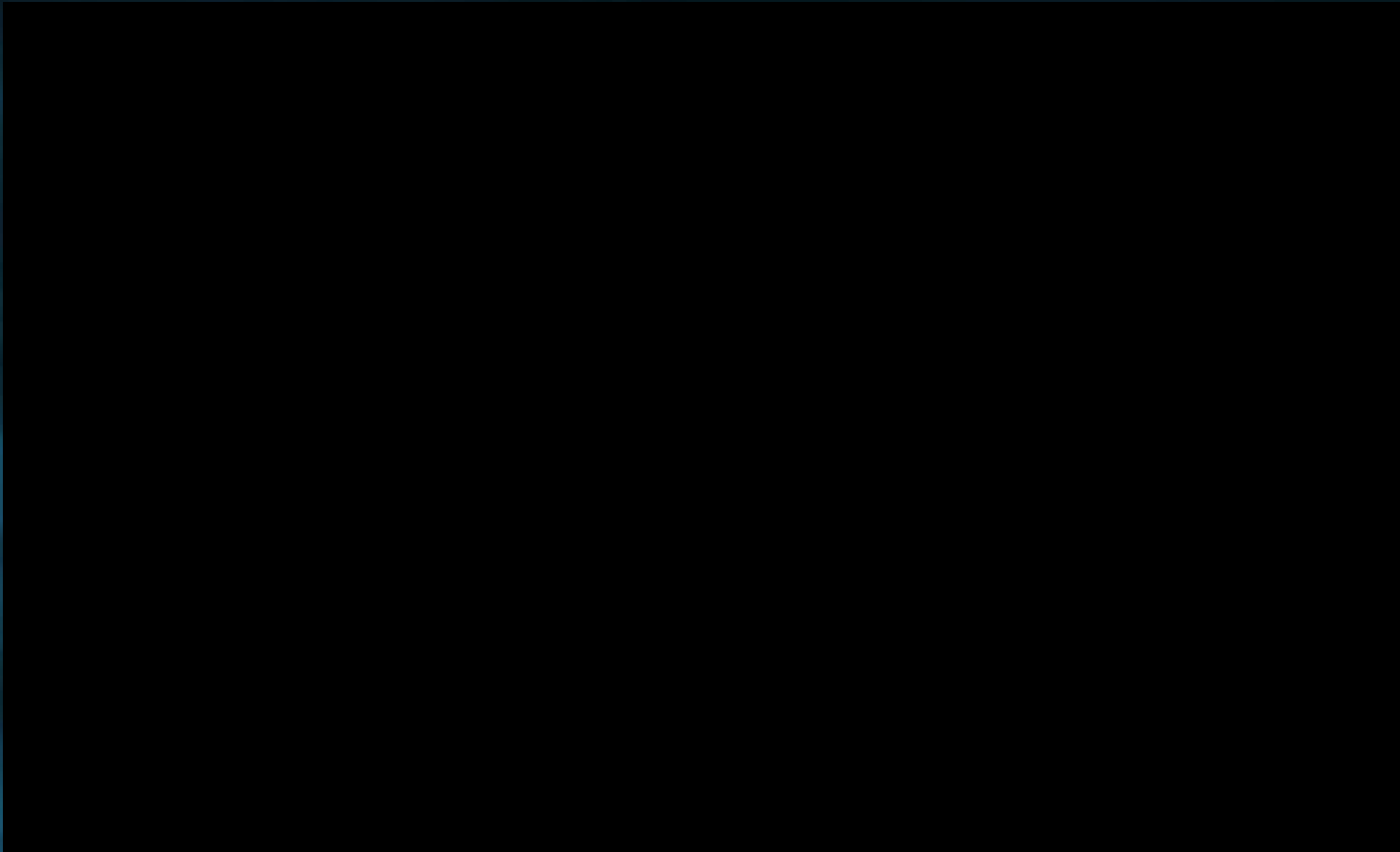
## Mobile Router & Home Agent

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# IPv6 Networks in Motion Solutions

## Mobile Router & Home Agent

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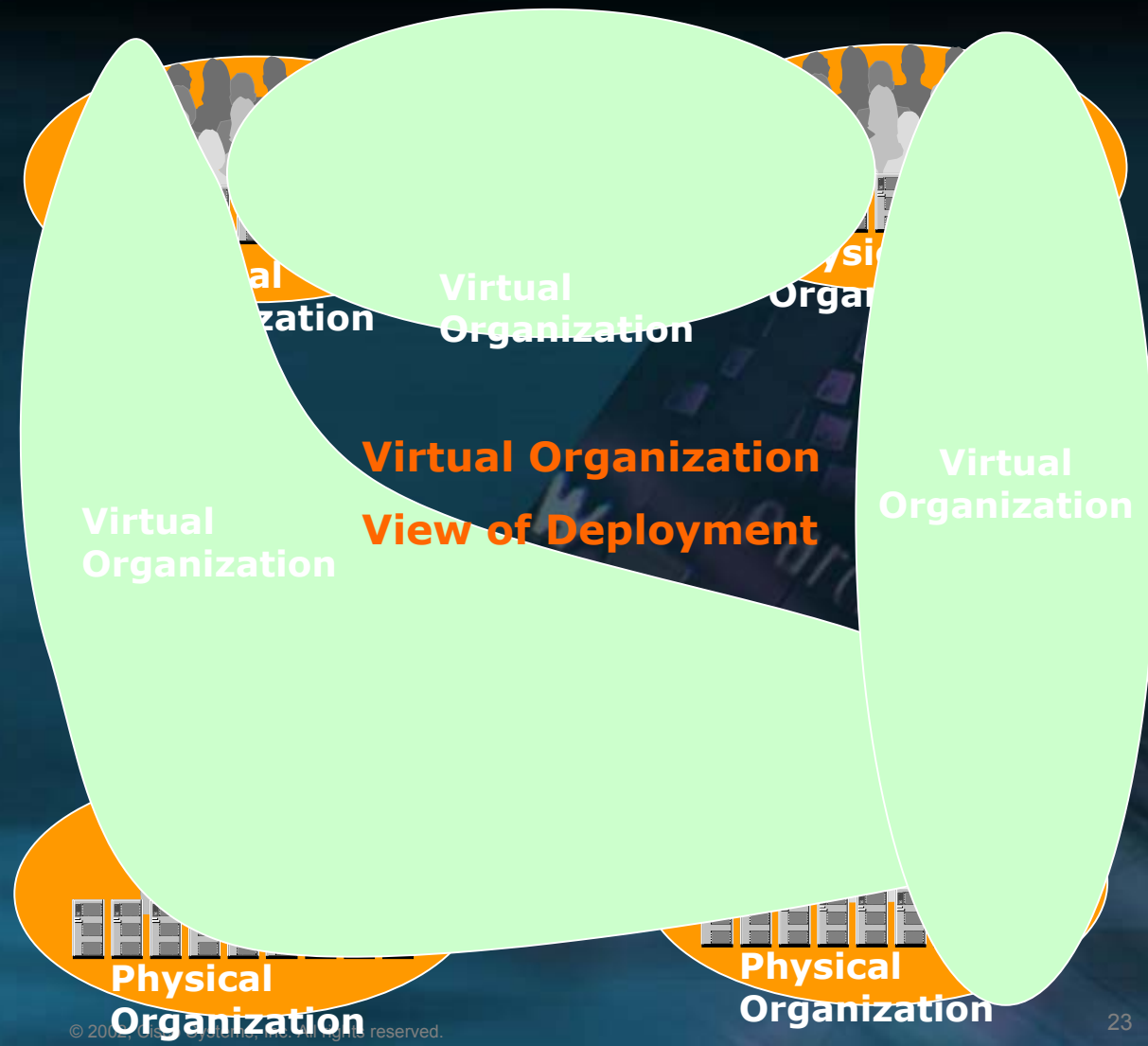
# NREN Trends

# NRENs – GRID Applications

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➤ GRIDs address the needs of virtual communities and fosters the efficient exploitation of the huge investments in research infrastructures:

- High Energy Physics
- Earth & Space Observation
- Environment
- Bio-sciences and Health
- Industrial design/simulation/visualization

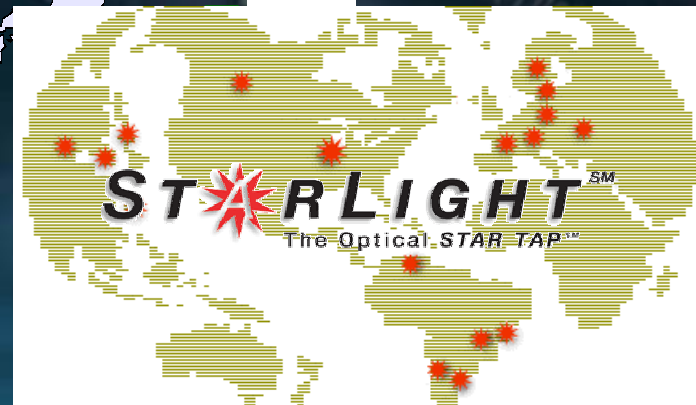
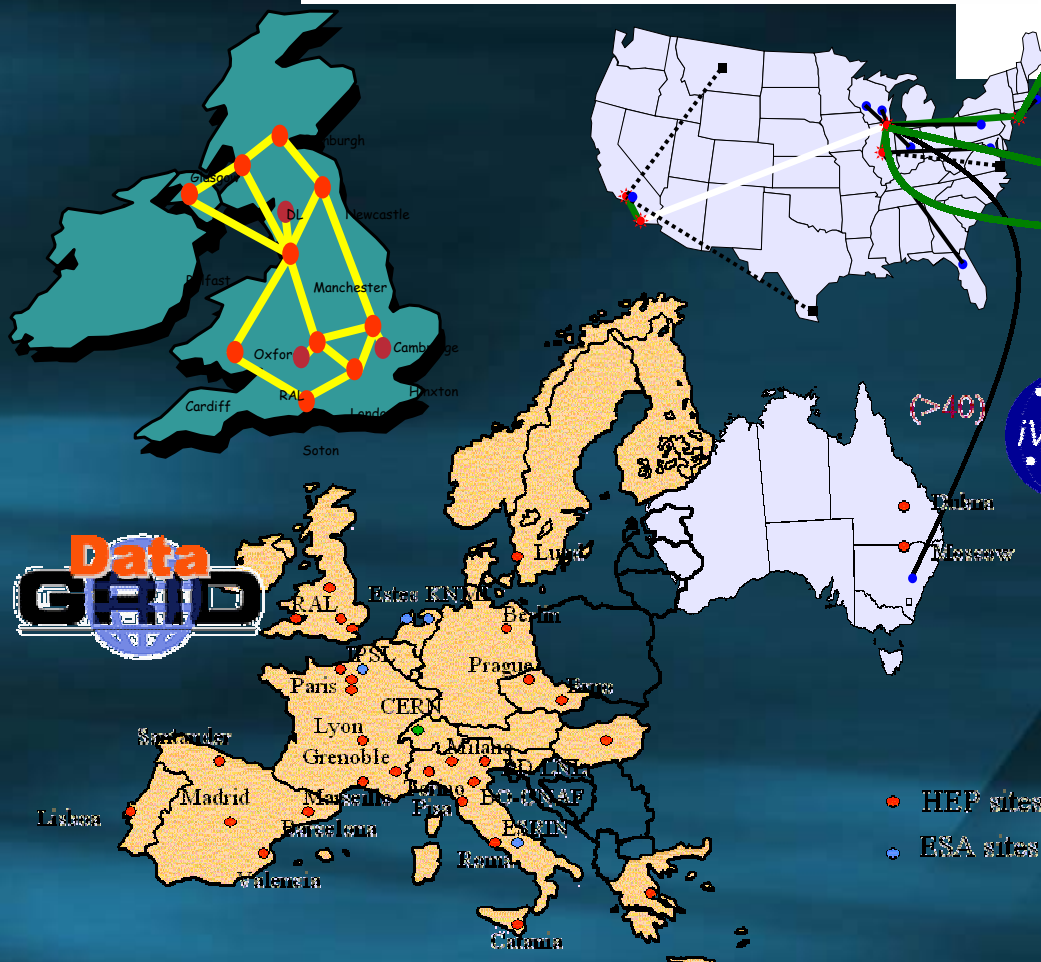




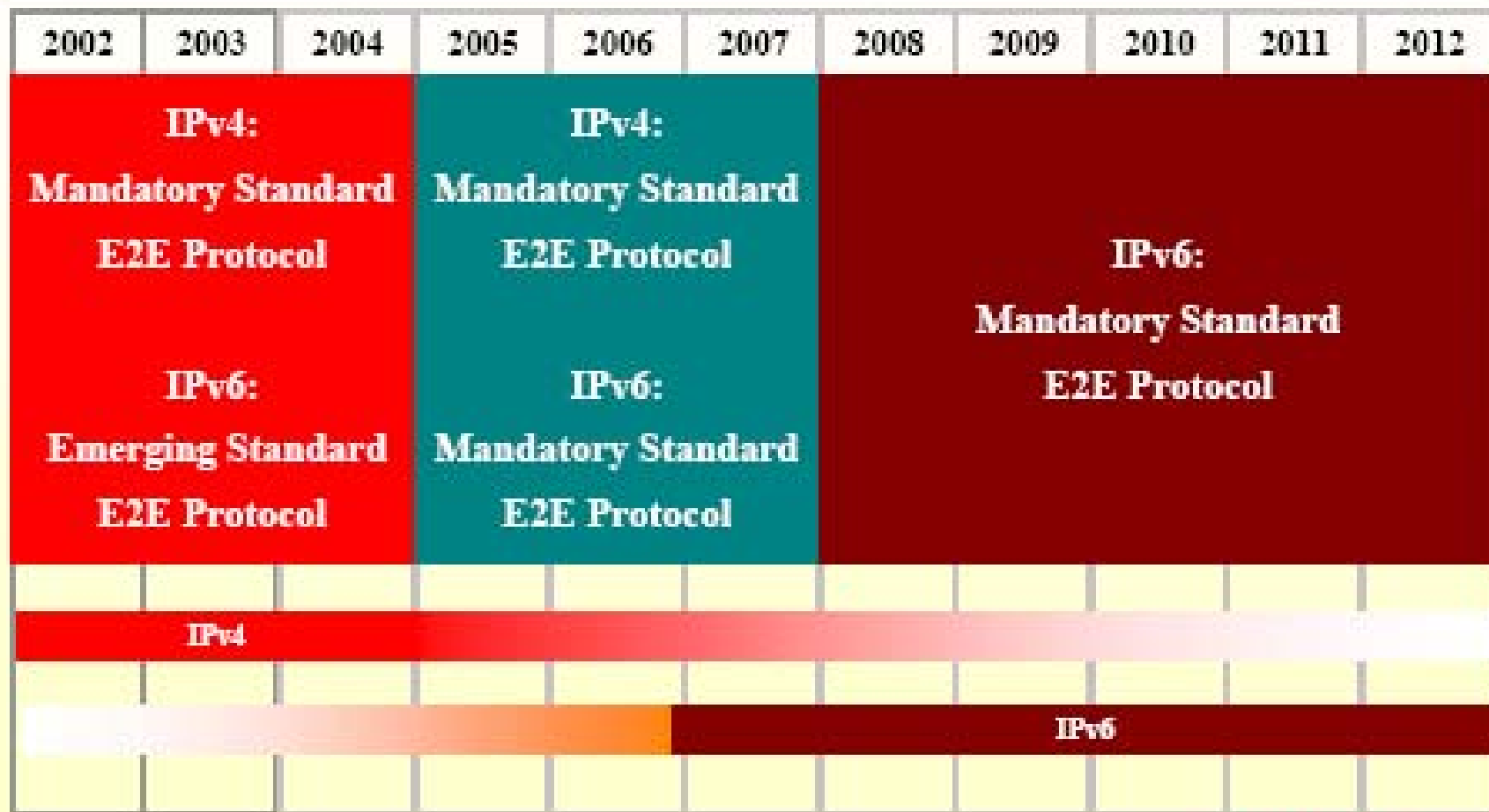
# Example Science Grids



# TERAGRID



# Projected Adoption Timelines for DoD

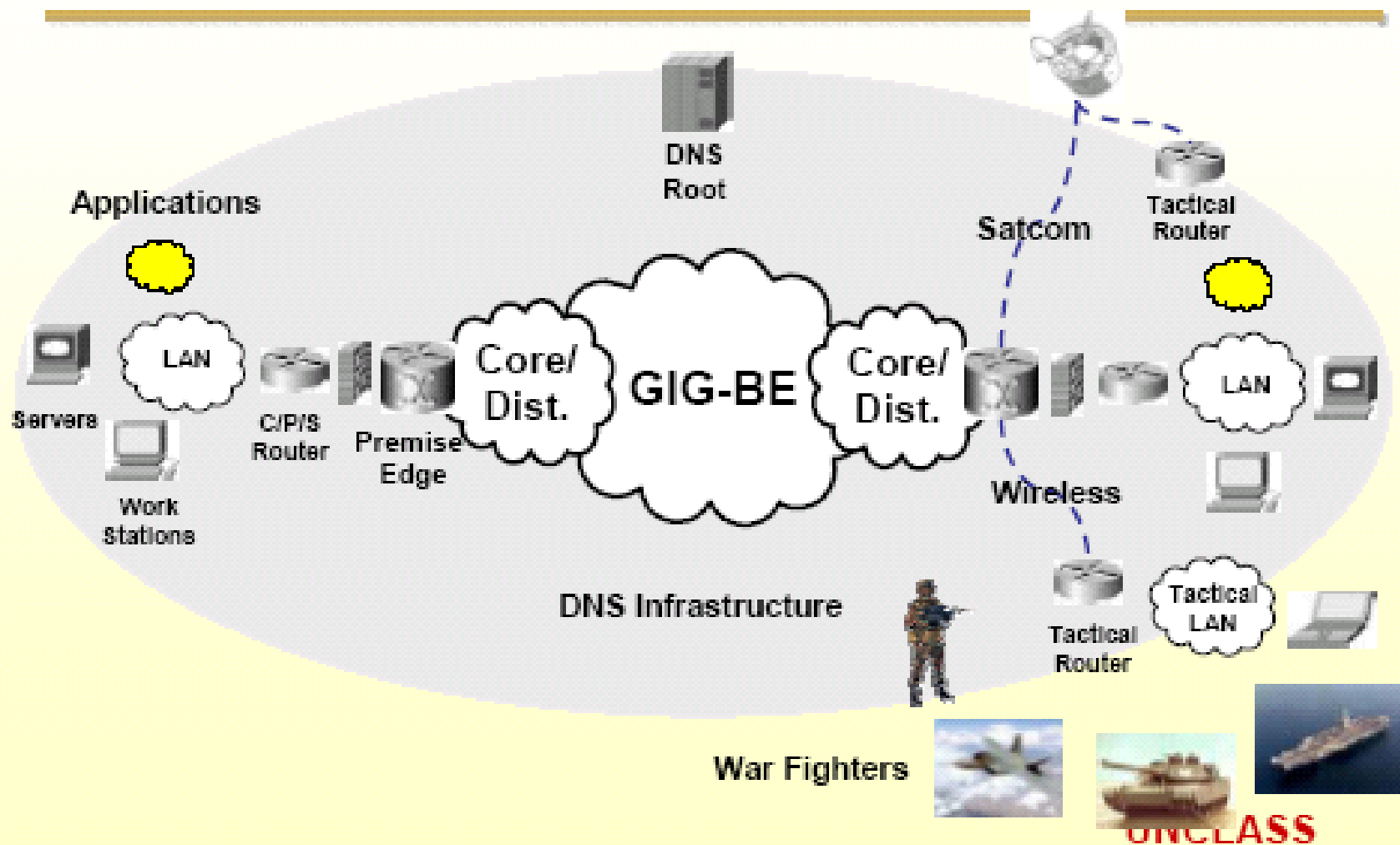


UNCLASS

Source: Capt. R.V Dixon, DISA, Natv6TF

# IPv6 Based DISA Network

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Source: Capt. R.V Dixon, DISA, Natv6TF

# Future Trends in Information and Communication Technology

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3 years from now

5 years from now

High Speed (in quantity)	Core network: Tb/s Access: 1Gb/s Wireless: 100Mb/s Memory: 50GB	Core network: 100s Tb/s Access: 10Gb/s Wireless: 1Gb/s Memory: 100GB
Advanced (more reality)	Quality Guarantee Real-time end-to-end communication	Intelligent Interface Autonomous Distributed Network
Seamless (Any where)	Seamless service within an Operator (Wired/Wireless)	Seamless service between Operators (wired/wireless)
Ubiquitous (Any thing)	Diversified Terminals (Non-PC terminal, Home Gateway)	Wide spread use of wireless Tags (RFIDs)
High Security (No Anxiety)	High performance Security and authentication For heterogeneous networks	Automatic Restoration type defense Tracking information source

**Thank You**

# CISCO SYSTEMS

