

# Spectrum for IMT in WRC-07

Market growth calls for  
more mobile spectrum

Version: 8 January 2007



Alcatel-Lucent

Ericsson

Fujitsu

Huawei

Motorola

NEC

Nokia

Nortel



ZTE

Siemens

Samsung

Qualcomm

Panasonic





<http://standards.nortel.com/spectrum4IMT/>



# Vision for a global mobile society



is inspired by the ITU vision for a global mobile society, where every person has mobile access and is connected wirelessly.

Global spectrum availability is the key to realizing this vision.

Spectrum for the global mobile society: what usage could be more valuable and more important ?



# Content

- The market for mobile services continues to evolve and grow
- The growth of mobile communications is expected to follow patterns similar to fixed broadband
- Existing bands will not be enough for IMT services after the year 2015
  
- Key mib Messages for WRC-07

# ITU-R WP8F Spectrum deliverables

- ITU-R Working Party 8F has been executing a multi-year program to create the needed deliverables for WRC-07 Agenda Item 1.4, including the rationales and supporting materials
- These deliverables (Recommendations & Reports) include:
  - ✓ services and market estimations,
  - ✓ spectrum estimation methodology,
  - ✓ aspects of future radio technologies,
  - ✓ estimates of required spectrum,
  - ✓ identification of candidate frequency bands,
  - ✓ sharing studies,
  - ✓ CPM text and
  - ✓ other supporting rationale.

# Mobile market evolution and growth

## Report ITU-R M.2072 - World mobile telecommunication market forecast

- WP 8F developed market analysis and forecast of evolution of mobile market and derived market related parameters and forecasts for 2010, 2015, and 2020 for the mobile market.
- Parameters were essential inputs for spectrum estimate for the demand for future development of IMT-2000 and systems beyond IMT 2000 in preparation for WRC-07.
- Using extensive case studies from ITU Members, M.2072 highlights applications/services envisaged for the future development of IMT-2000 and systems beyond IMT-2000.
- Forecasts of usage (e.g., bit/s, duration) were developed for various service environments and service categories for 2010, 2015, 2020.

# Mobile market evolution and growth

The advanced mobile and wireless technologies will enable new applications which will dramatically increase the demand for bandwidth. Some of these applications include:

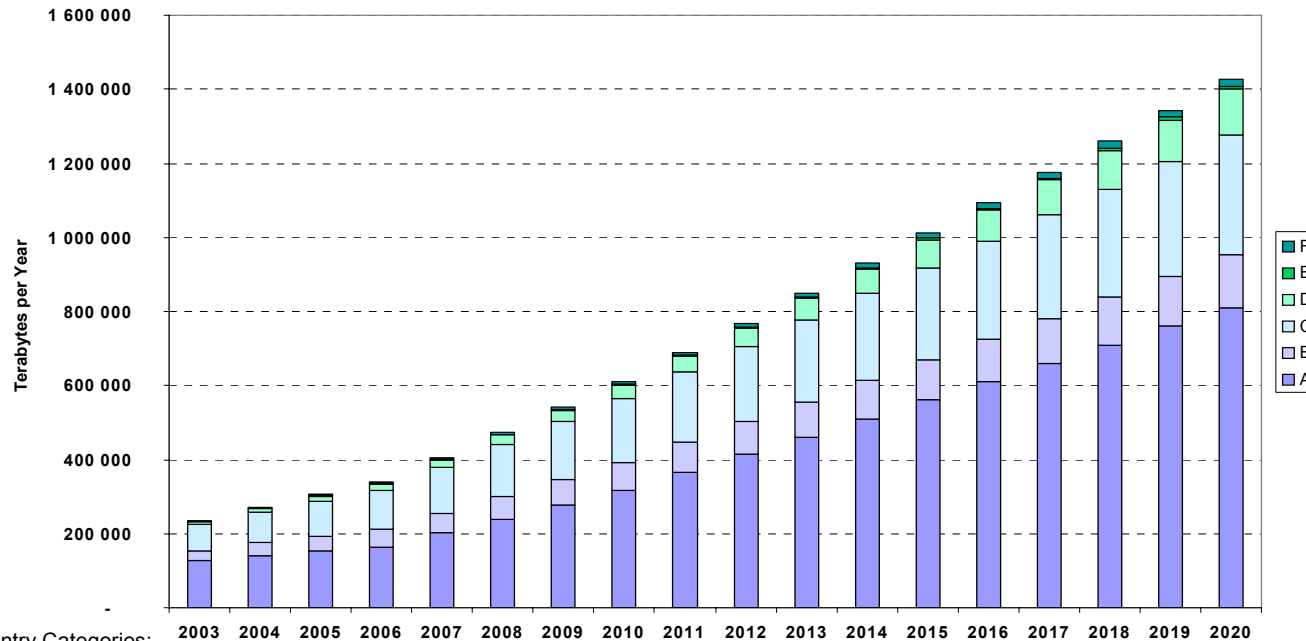
- **Rich Voice Services:** VoIP, video telephony, video-conference, collaborative work
- **Location-based services:** car navigation, maps, product and service finder
- **Machine-to-Machine:** sensor modes in products and electronic devices and home appliances
- **Mobile Internet Access:** e-mail, file transfer, streaming video/audio, Internet browsing
- **Multimedia Messaging:** e-mail, instant messaging, video messaging, telemetry
- **Entertainment:** multiplayer games, TV broadcasts
- **Mobile commerce:** banking, finance, promotions, m-payment
- **Mobile Intranet:** VPN, Intranet access
- **Mobile medicine:** health monitoring, mobile medical examination, medical record access
- **Mobile Education:** remote learning, network community school
- **Mobile Science:** virtual laboratory
- **Mobile Government**



# Mobile market evolution and growth

Total wireless traffic volume per user per day will increase substantially by 2020

Total World Usage Forecast - Voice and Data Services



Country Categories:

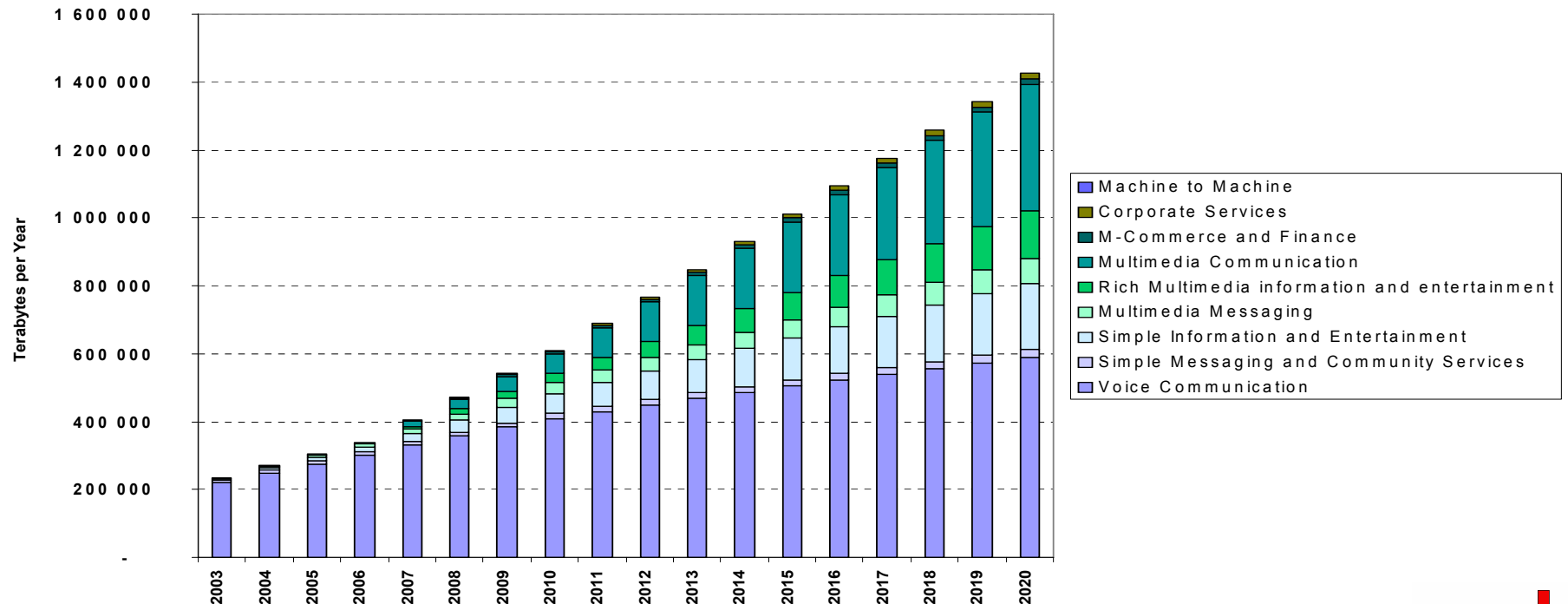
- A: most developed, current 65% penetration rate
- B: upper middle income, current telecom penetration 36%
- C: lower middle income, current telecom penetration 17-36%
- D: less wealthy among the middle income; current telecom penetration under 17%
- E: developing countries with long term growth capabilities
- F: least developed countries technologically marginalized

Source: Report ITU-R M.2072 - World mobile telecommunication market forecast, (chapter 6.2.3, results from France Telecom)

# Mobile market evolution and growth

Growing demand for data services will drive the higher usage and network resources

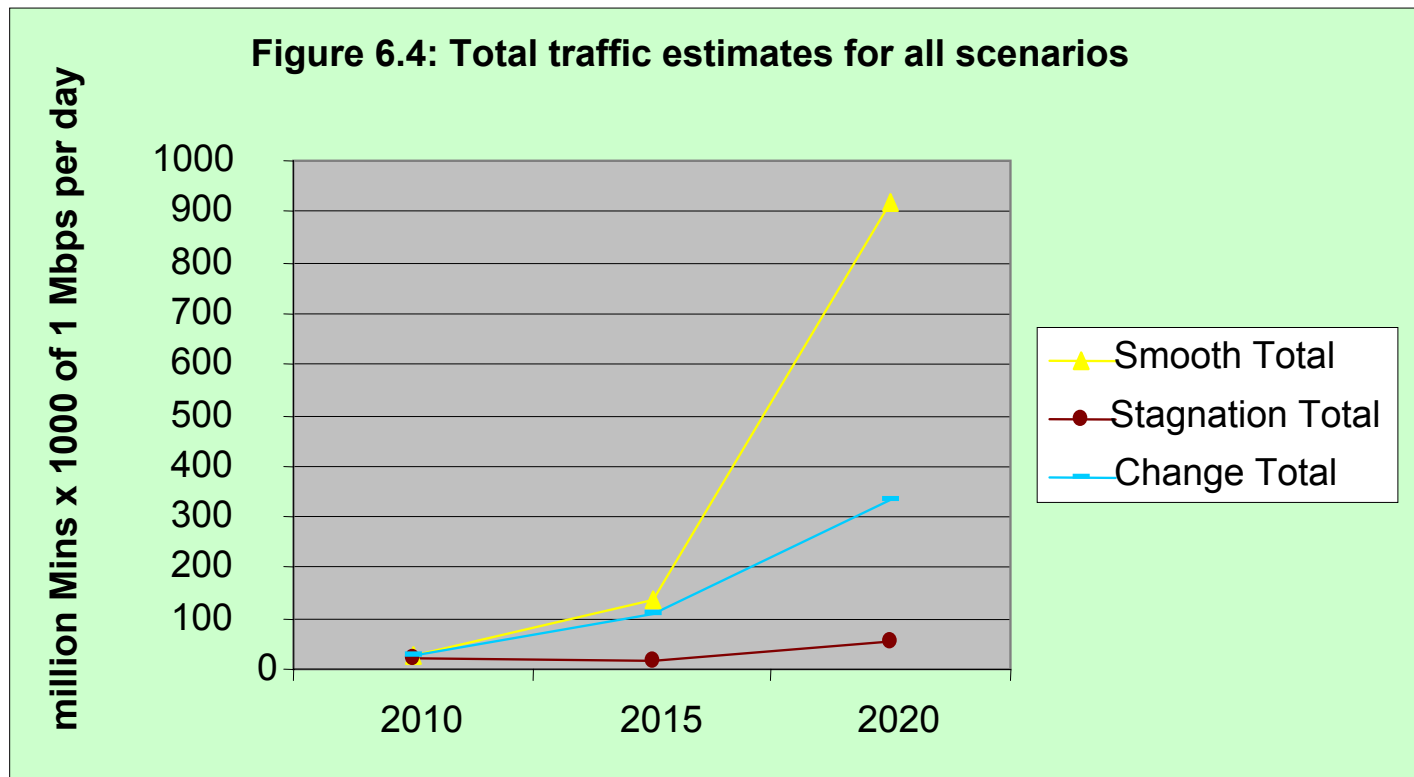
Total World Usage Forecast - Voice and Data Services



Source: Report ITU-R M.2072 - World mobile telecommunication market forecast, (chapter 6.2.3, results from France Telecom)

# Mobile market evolution and growth

FMS study predicts that total wireless traffic volume per user per day will increase substantially after year 2015



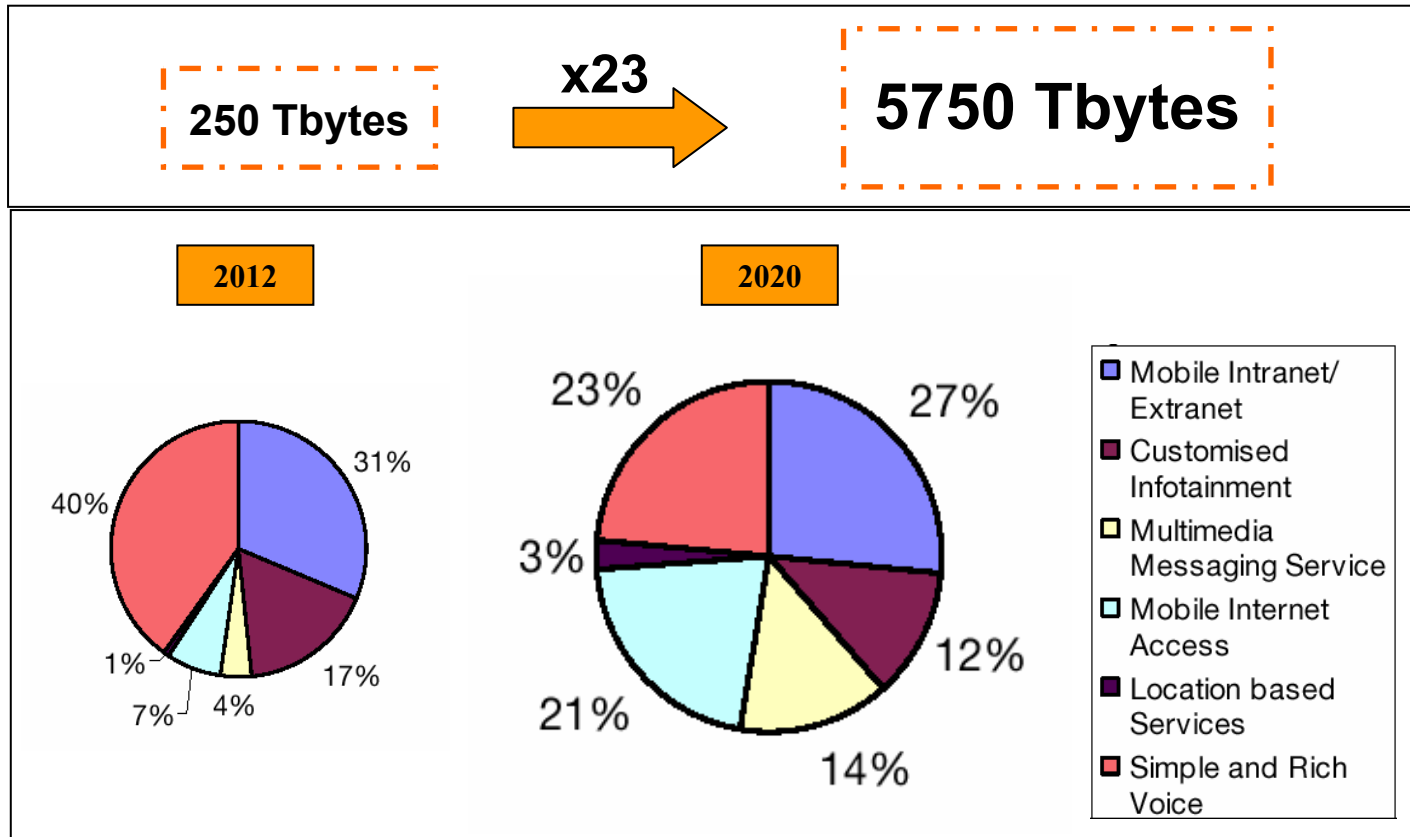
Sources:

- FMS, Future Mobile Services study (2005): <http://fms.jrc.es/pages/about.htm>
- Report ITU-R M.2072 - World mobile telecommunication market forecast, (chapter 6.2.1, results from CEPT)

# Mobile market evolution and growth

For a representative European country: Total daily traffic of 5750 Tbyte

→ Total traffic /subscriber/day of 495 Mbyte



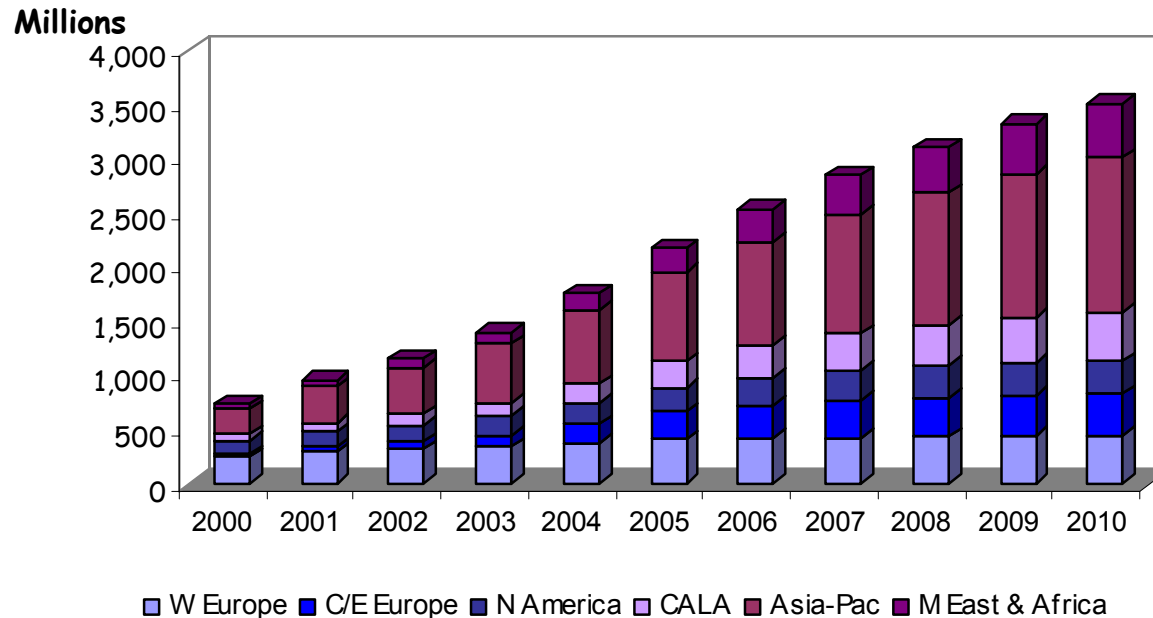
Source:

- UMTS Forum Report #37 (2005) "Magic Mobile Future 2010-2020"
- Source: Report ITU-R M.2072 - World mobile telecommunication market forecast, (chapter 6.2.6, results from UMTS Forum)

# Mobile market evolution and growth

Strong subscriber growth driven by emerging markets in Asia Pacific (India), Central and Latin America (Brazil, Mexico) and Central and Eastern Europe (Russia). Wireless subscribers will surpass 3.5 billion by 2010.

*Worldwide Subscribers by Region*



Sources: Strategy Analytics (Jan. 2006): Global Handset Sales Forecast(2005-2010)

# The growth of mobile communications is expected to follow patterns similar to fixed broadband

2001: “Internet traffic is likely to continue doubling each year for the next decade”

Table 1.3.

Traffic on Internet backbones in U.S. For each year, shows estimated traffic in terabytes during December of that year.

year TB/month

1990 1.0  
 1991 2.0  
 1992 4.4  
 1993 8.3  
 1994 16.3  
 1995 ?  
 1996 1,500  
 1997 2,500 - 4,000  
 1998 5,000 - 8,000  
 1999 10,000 - 16,000  
 2000 20,000 - 35,000

Table 5.1. Widespread deployment of WDM systems.

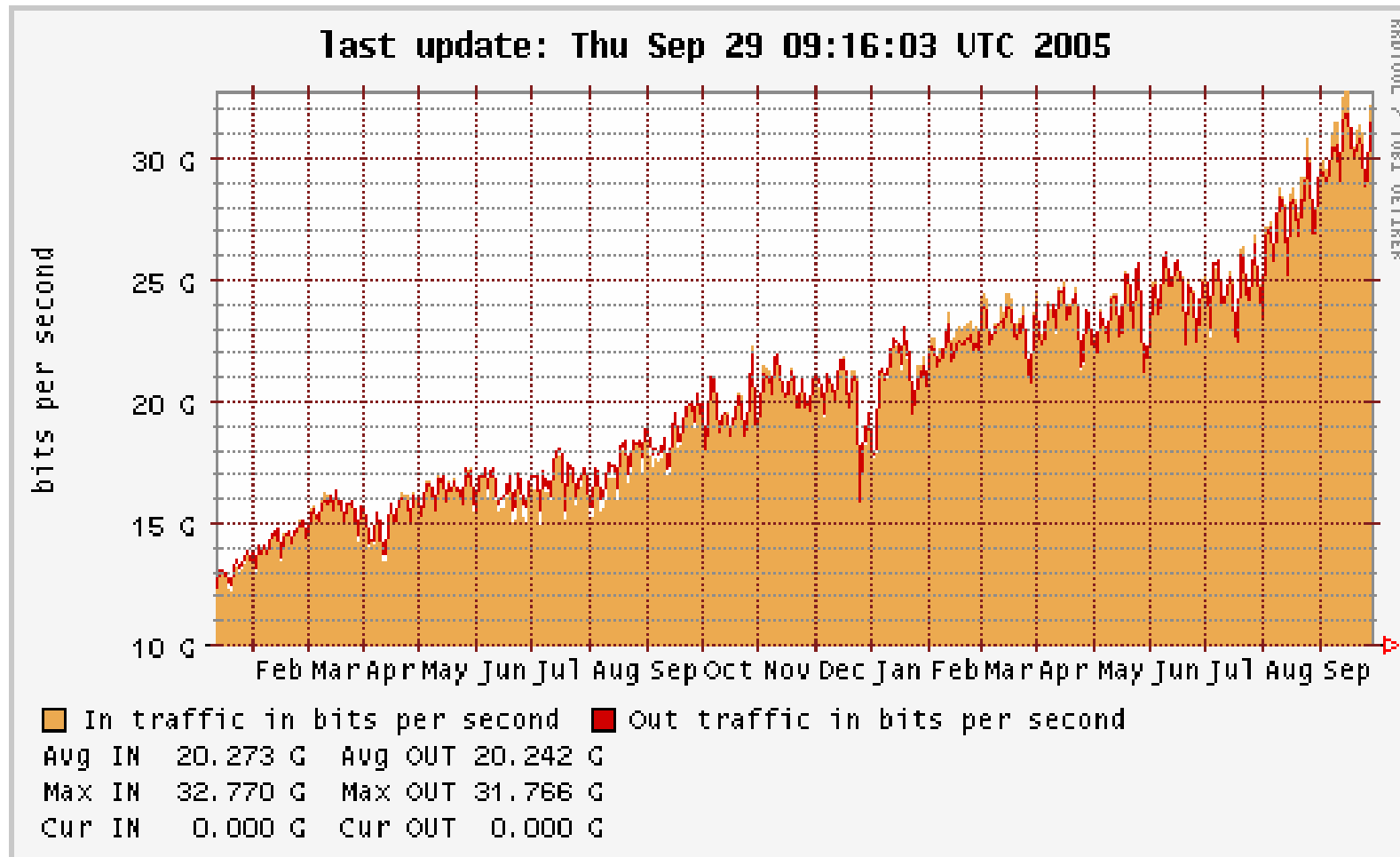
system description	fiber capacity	wide deployment
8 × 2.5 Gb/s	20 Gb/s	1996
16 × 2.5 Gb/s	40 Gb/s	1997
32 × 2.5 Gb/s	80 Gb/s	1999
80 × 2.5 Gb/s	200 Gb/s	2000
40 × 10 Gb/s	400 Gb/s	mid to late 2000
160 × 2.5 Gb/s	400 Gb/s	mid to late 2000
80 × 10 Gb/s	800 Gb/s	late 2001
160 × 10 Gb/s	1.6 Tb/s	late 2002
40 × 40 Gb/s	1.6 Tb/s	late 2002
80 × 40 Gb/s	3.2 Tb/s	late 2003 to early 2004
100 × 40 Gb/s	4 Tb/s	2005
160 × 40 Gb/s	6.4 Tb/s	2007

Source:

- Article "Is there a Moore's law for data traffic" Coffman and Odlyzko, AT&T Labs – Research, 2001



# The growth of mobile communications is expected to follow patterns similar to fixed broadband

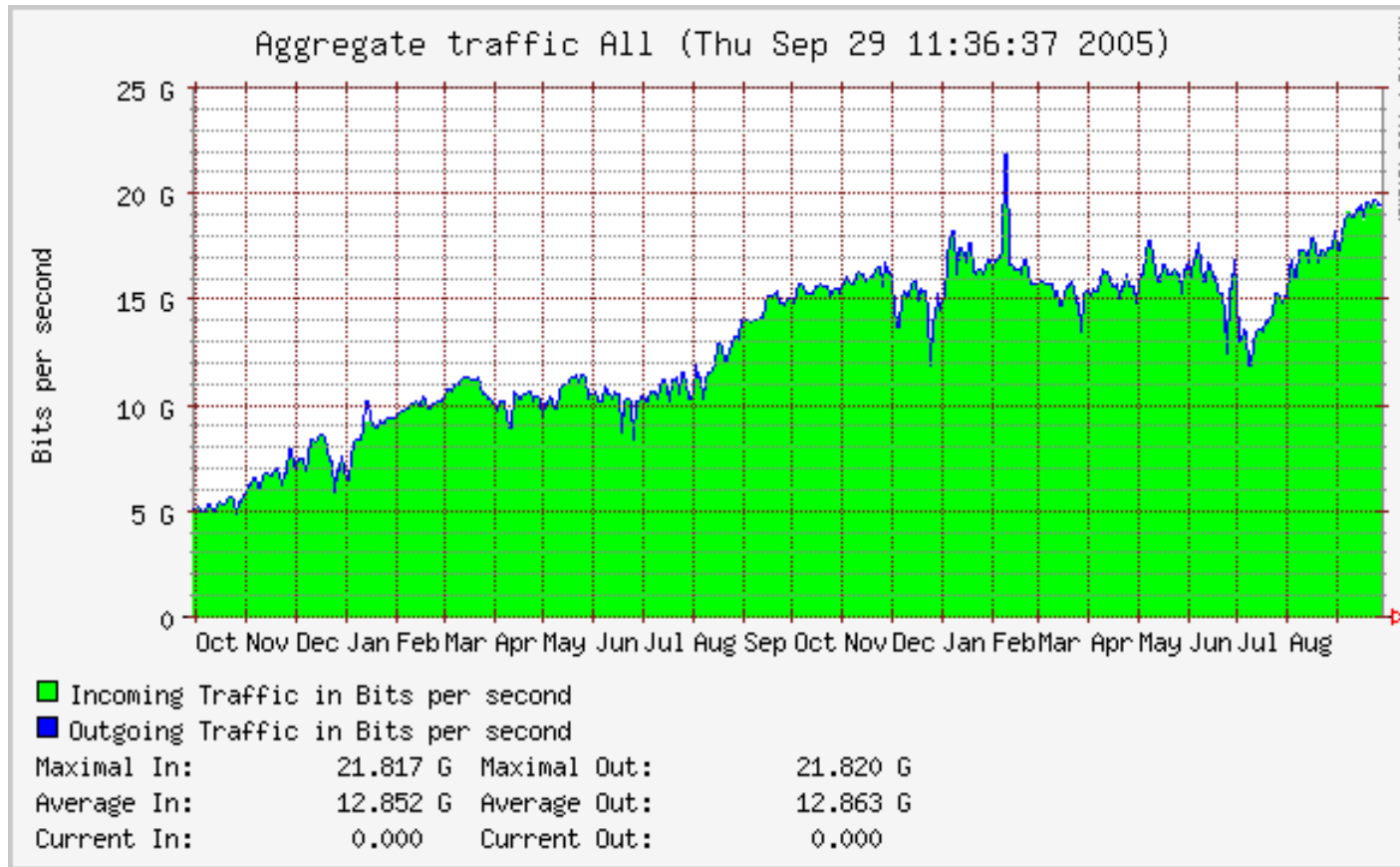


Source:

- Yearly statistic from German DE-CIX, Deutcher Commercial Internet Exchange

(<http://www.decix.de/info/traffic.html>)

# The growth of mobile communications is expected to follow patterns similar to fixed broadband



Source:  
- 2 year statistic from Swedish Netnod Internet Exchange  
(<http://stats.autonomica.se/mrtg/sums/All.html>)



# Existing bands will not be enough for IMT services after the year 2015

According to the **ITU-R Report M.2078 (IMT.ESTIMATE)**, by the year 2020,  
a total of

- 1280MHz is needed (areas of low market demand) and
- 1720 MHz (in high market demand)

→ Additional spectrum by regions, for example:

For Europe, additional need will be **695 MHz** in areas of low market and **1135 MHz** in areas of high market (existing IMT-2000 spectrum = 585MHz )

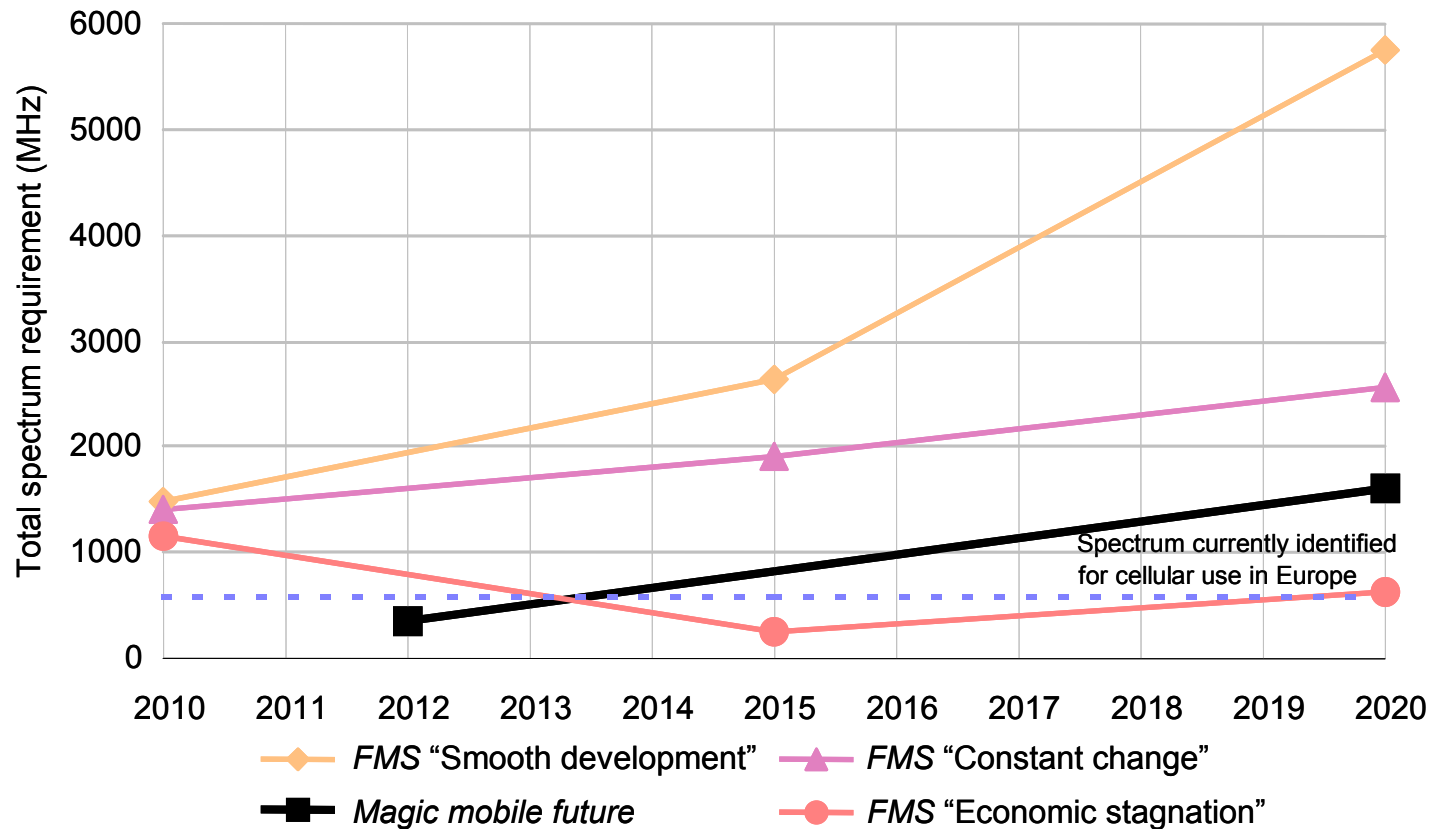
For Americas (Citel), additional need will be **721 MHz** in areas of low market and **1161 MHz** in areas of high market (existing IMT-2000 spectrum = 559 MHz as of PCCIII/Rec 70 (XXI-02))

For Region 3, additional need will be **531 MHz** in areas of low market and **971 MHz** in areas of high market (existing IMT-2000 spectrum = 749MHz as per IMT.Estimate)

---

Note: High and low market as in Report M.2078

# Existing bands will not be enough for IMT services after the year 2015



Source: UMTS Forum Report #40 (2006):  
 "Development of spectrum requirement forecasts for IMT-2000 and systems beyond IMT-2000 (IMT-Advanced)"

# Existing bands will not be enough for IMT services after the year 2015

- Using the traffic forecasts in the *Magic mobile future* study, the total demand for cellular spectrum will be

**1.6 GHz by year 2020** (additional need in Europe > 1GHz)

- Using the traffic forecasts from the "constant change" scenario in the *FMS* study (the scenario that was used in CEPT's contribution to the ITU-R as European Market Data), total demand will be

**2.6 GHz by year 2020** (additional need in Europe > 2GHz)

---

Source: UMTS Forum Report #40 (2006):  
"Development of spectrum requirement forecasts for IMT-2000 and systems beyond IMT-2000 (IMT-Advanced)"

# Key Messages

1. The market for mobile services continues to evolve and grow
  - Studies show that the amount of total traffic per user per day will rise almost 50 times from today by 2020 in some markets
2. The growth of mobile communications is expected to follow patterns similar to fixed broadband
3. Existing spectrum bands will not be sufficient to carry the predicted traffic for IMT services after the year 2015
4. More spectrum will be needed for IMT services in a response to increased traffic (1GHz by year 2020)
5. WRC-07 decision would enable IMT deployment in year 2015-2020 timeframe
6. WRC-07 is the right time to identify spectrum for IMT