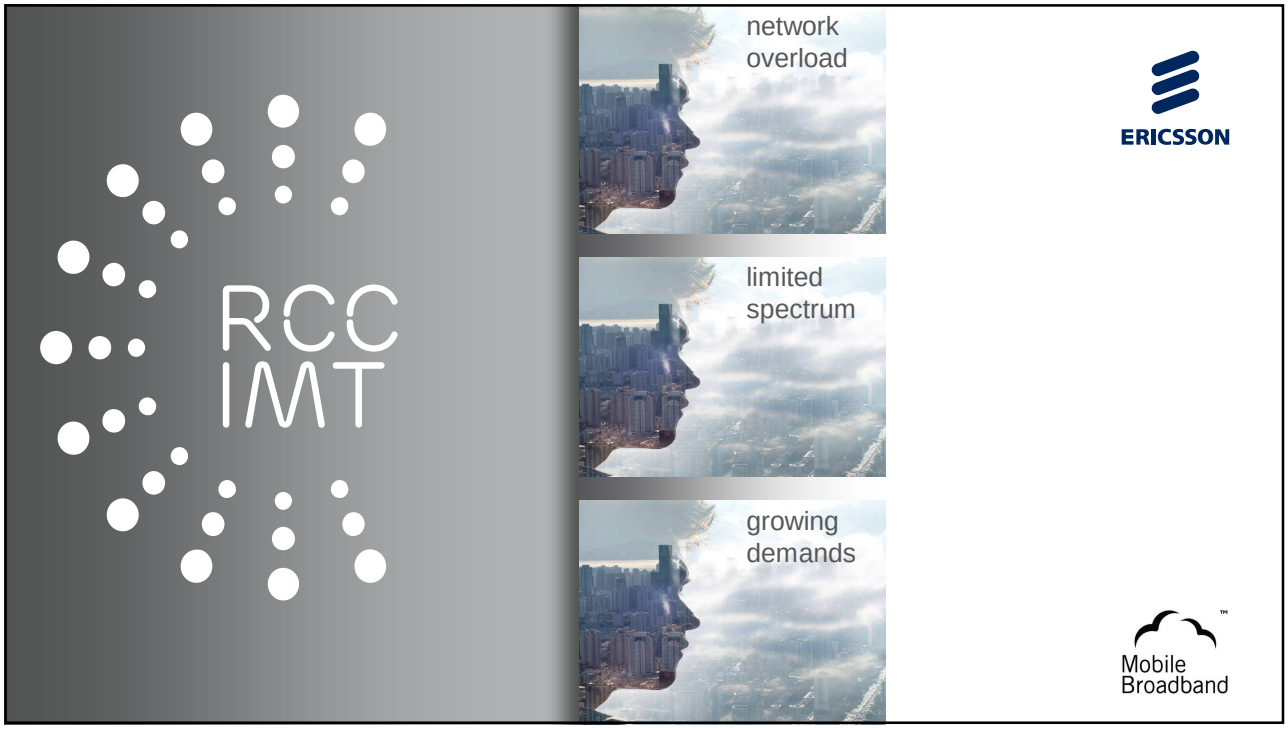
RCC
IMT
network
overload
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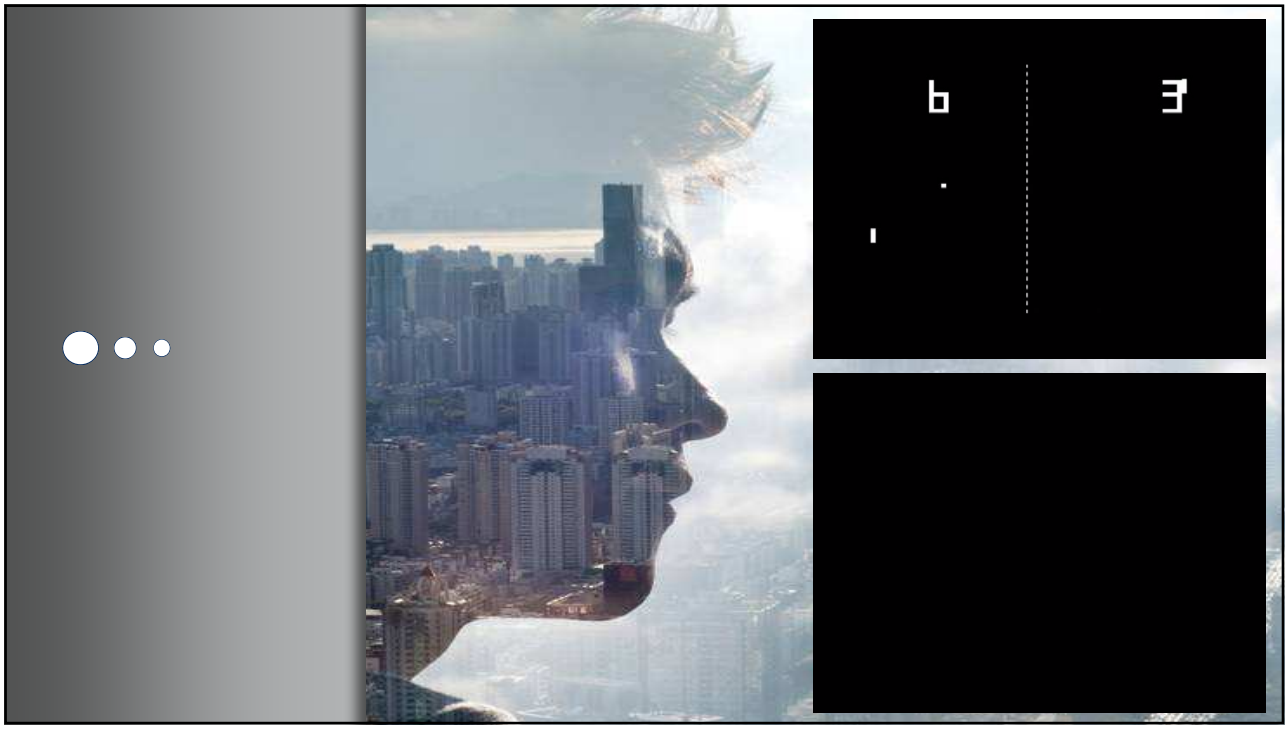
ERICSSON
Mobile
Broadband



AGENDA

- Introduction
- Convergence of the communication landscape, services and applications
- IMT and spectrum aspects
- New spectrum for IMT

IMT DRIVING NATIONAL ECONOMIES

Broadband access significantly affects how people live and work. **It is a key driver of economic growth and national competitiveness, and it contributes to social and cultural development.**

ITU-R IMT.UPDATE

IMT IS CHANGING THE WORLD

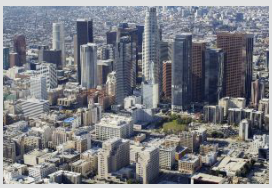
- **fundamentally changed** societies, politics, businesses, the way **people interact** and stay in touch
- advanced technologies enable further **economies of scale** and **affordability for all**
- **serving consumers globally**, as **coverage** is further extending
- richer **capabilities** and higher **capacity**
- **benefit** of both **developing** and **developed** economies
- therefore, **competition for the limited "right" spectrum** is increasing significantly

IMT IN CITIES OF THE FUTURE

Urbanization is accelerating - huge demographic challenges

- **India** has 10, of the 30, fastest growing urban areas in the world, a population of the size of Europe could live in these cities alone
- In **China**, an estimated 400 million people could move to cities over the next 20 years
- **Moscow** is the most populated city in Europe, and the 6th largest city in the world, with about 17 million, including suburbs

Cities of the future need to be efficient on energy, water, food, waste, heating and cooling, **but also in communications**

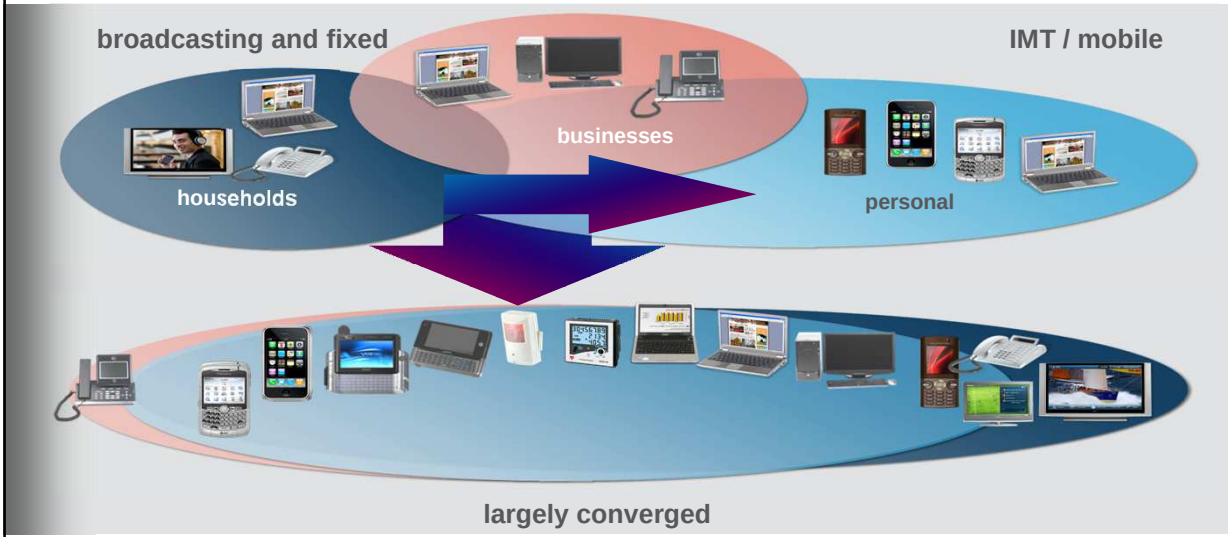


Advanced mobile communication solutions provide the fundament for efficiently managed cities - **everybody and everything connected**

Already in **2017** about **60 % of traffic** to be generated from **metro and urban** areas, where **30 % of population** will reside

Will **25 000 pop/km²** enough when estimating communication needs ?

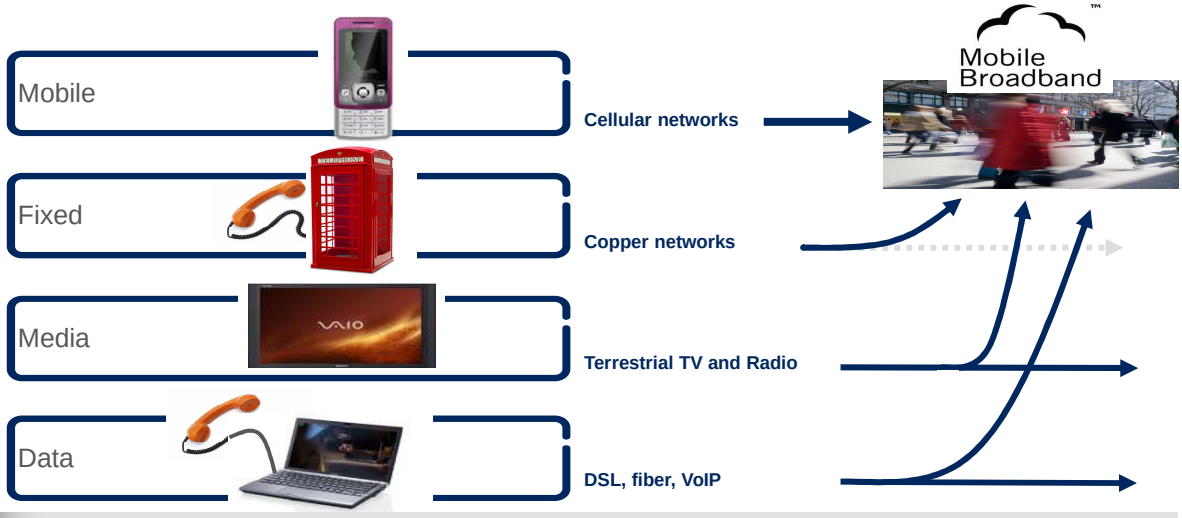
CONVERGENCE OF LANDSCAPES



CHANGING VIEWING BEHAVIORS

change - driven largely by the expansion of mobile broadband – **60 % now video based content**

CONVERGENCE OF COMMUNICATIONS



driven by the need for more individual and flexible communications, and availability of ecosystems

BROADCASTING - DEFENITLEY

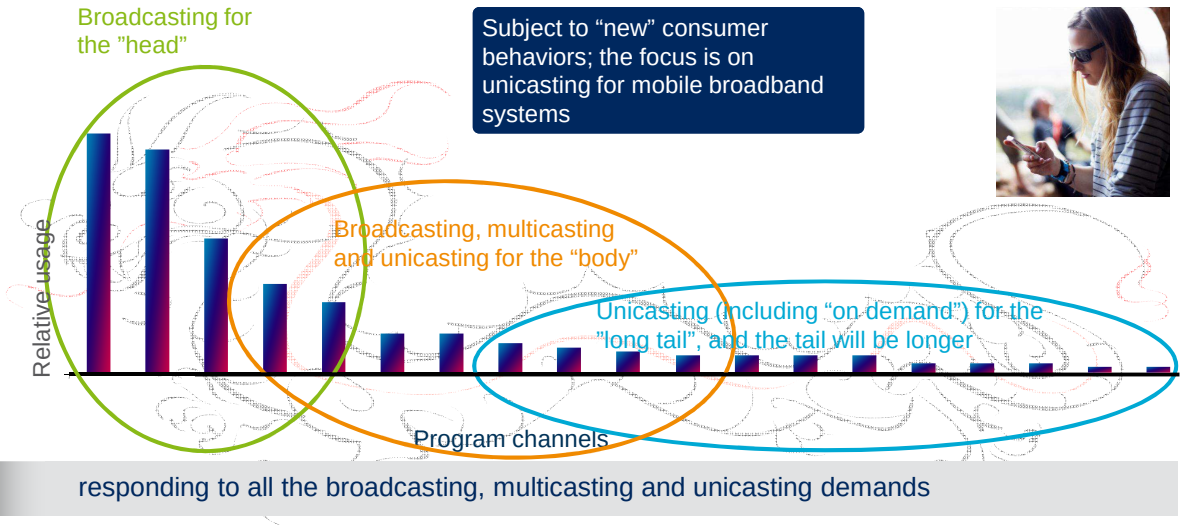
…. and unicasting on-demand (streaming)

- **> 90 %** watch broadcasting on a weekly basis
- **70 %** watch unicasting on-demand on a weekly basis
  - not having access to on-demand, consumers feel crippled
- **both are needed**; for broadcasting live TV is important, and for unicasting on-demand content is increasing
- consumers want **limitless access** – any media, on any device

Broadcasting live — Unicasting on-demand streaming

Source: Ericsson Consumer Lab

BROADCASTING AND UNICASTING



responding to all the broadcasting, multicasting and unicasting demands

THE IMT TECHNOLOGIES

The current flexible IMT technology properties

- **spectrum bands** in the range **450 MHz – 3.8 GHz**
- different **bandwidths**, up to **20 MHz**
- **carrier aggregation**, inter and intra band
- several access schemes, **FDD, TDD**, and soon **DL only**
- different applications, such as voice, data, broadcasting (TV and Radio), ENG/OB, positioning, location, PPDR, smart grid, M2M, etc.
- **the significant evolution of IMT is providing a true general purpose family of technologies for the future**

IMT AND LTE NETWORKS - GLOBALLY

GSA, Global mobile Suppliers Association; May 2012 a report on LTE

- **258** firm commercial **deployments** in **84 countries**
- another **61** service providers in **13** additional **countries** are engaged in LTE
- commercial LTE services are available today in **37 countries**
- forecast **134** networks in **57** countries **end of 2012**

- LTE commercial network launches per year
  - 2009 2 networks launched
  - 2010 15 networks launched (year-end cumulative total 17)
  - 2011 30 networks launched (year-end cumulative total 47)
  - 2012 25 networks launched (**May 8, cumulative total 72**)

Source: GSA, Evolution to LTE report

IMT SPECTRUM AND TECHNOLOGY

Harmonized spectrum is key for development of **individual communications** as well as for industry to be able to successfully **respond to national policy goals** by providing **standardized** and **affordable products**

- **economy of scale** (based on a mass market)
- **cross-border coordination** (simplified)
- **cross-border operation** (between countries)
- **global roaming** capabilities
- **interoperability** choice and convenience
- **efficient use** of spectrum (also in border areas)

Harmonized
Standardized
Licensed

providing high quality and affordable services and applications for all

SPECTRUM AND TECHNOLOGIES

Frequency band performance requirements, in order of priority

1. **coverage bands** – is fundamental (low frequency)
2. **capacity bands** – to satisfy the large majority of consumers (medium frequency)
3. **peak performance bands** – for the demanding peak data rate traffic requirements (high frequency)
4. **dynamic traffic bands** – to provide for different and changing traffic patterns in hot-spots using TDD

service providers need the combination of the properties of the different bands for optimal offerings

THE IMT SPECTRUM BOUQUET

For best practice services, operators need to be able to provide optimal services packages by selecting the right spectrum bouquet

Example 1

- 700 MHz or 800 MHz FDD
- 850 MHz or 900 MHz FDD
- 1900 MHz or 2100 MHz FDD
- 2500 MHz LTE TDD (center gap)
- 3.5 GHz FDD

Example 2

- 700 MHz or 800 MHz FDD
- 1700 MHz or 1800 MHz FDD
- 2300 MHz TDD
- 2500 MHz LTE FDD
- 3.7 GHz TDD

a sound combination of both frequency bands and access schemes is important for a cost efficient operations and advanced business offerings

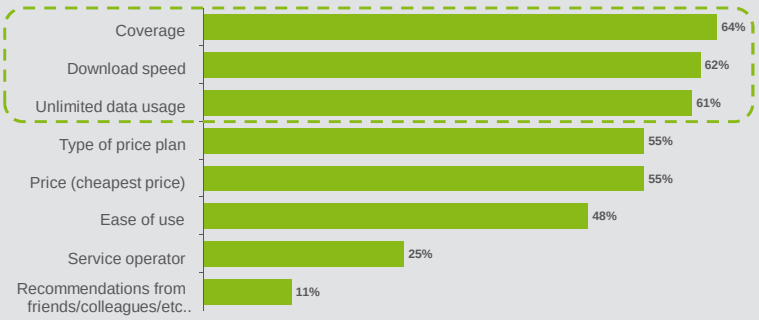
MOBILE BROADBAND VIEWS

Important for the mobile broadband experience (business consumers)

Notably, the three top rated aspects are directly dependent on spectrum

Coverage: is subject to the availability of lower spectrum bands, typically below 1 GHz

Download speed, and **Unlimited data use:** are subject to the available bandwidths and higher spectrum bands

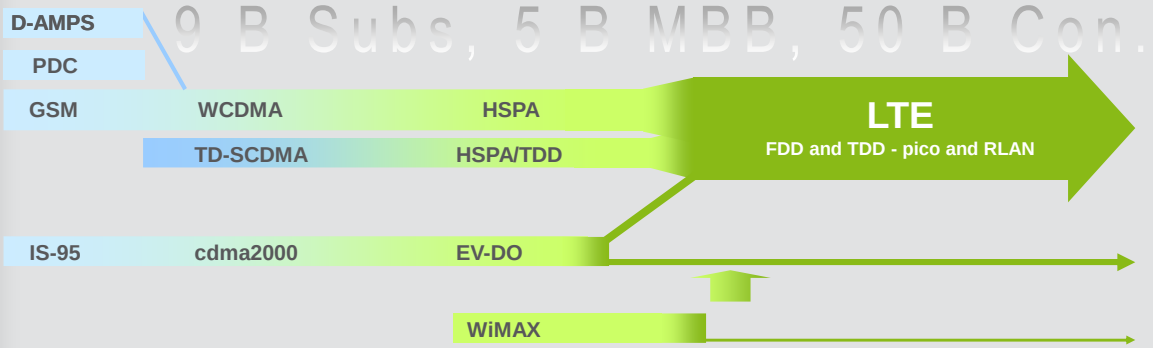


views of business consumers

Source: Ericsson Consumer Lab, Mobile Broadband business user study 2011

IMT TECHNOLOGIES OVER TIME

LTE is ***the*** future mobile broadband: convergence of technologies providing both FDD and TDD access, while increasing the use of pico cells, and including RLAN



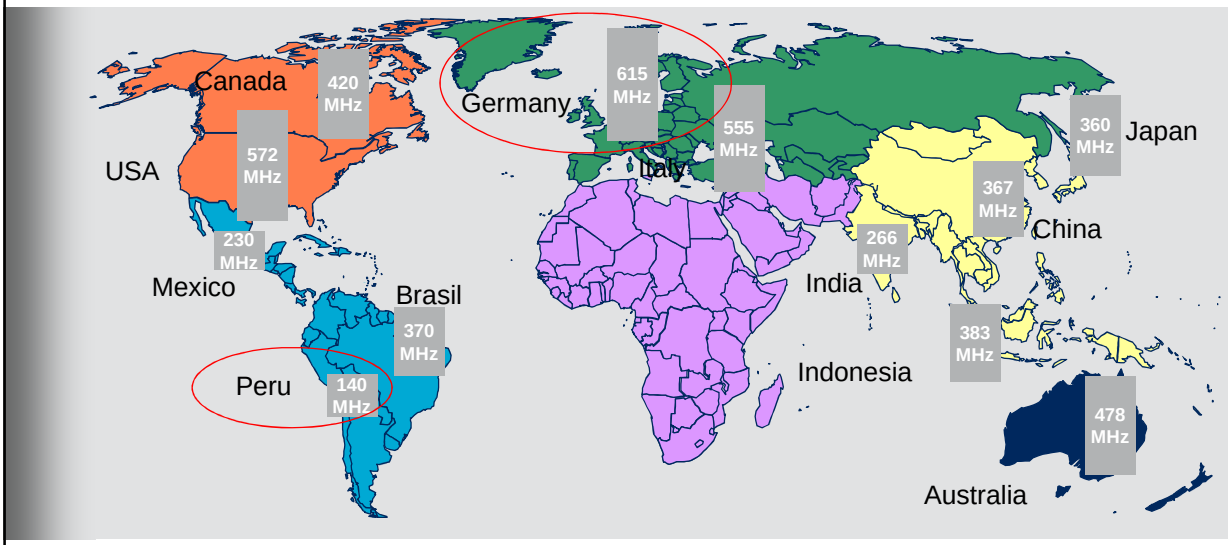
IMT-ADVANCED

Gigabit peak data rates now being developed and demonstrated in the mobile wide area environment

- driving in about 30 km/h
- providing > 1 Gbps peak data rate in the downlink
- on 2 x 60 MHz bandwidth, and
- using MIMO antennas

will **technological developments** alone be providing for increasing capacity needs, or **will ever more spectrum be needed** ?

LIMITED SPECTRUM IS LICENSED

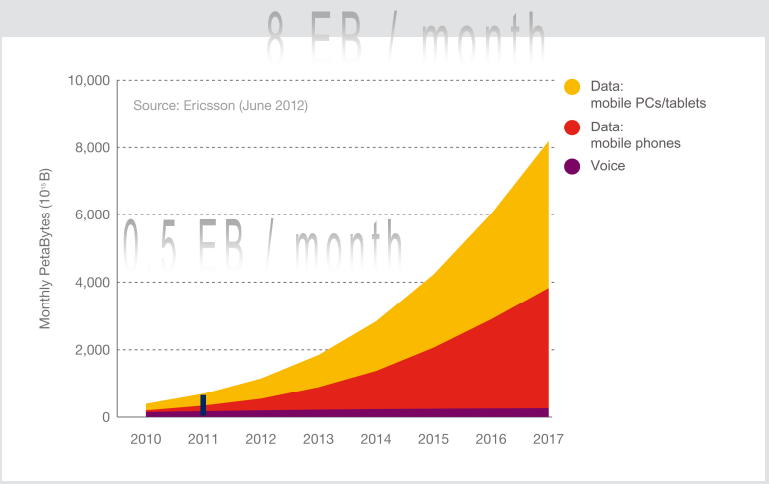


MOBILE TRAFFIC AND DEMAND

Aggregated traffic in mobile access networks

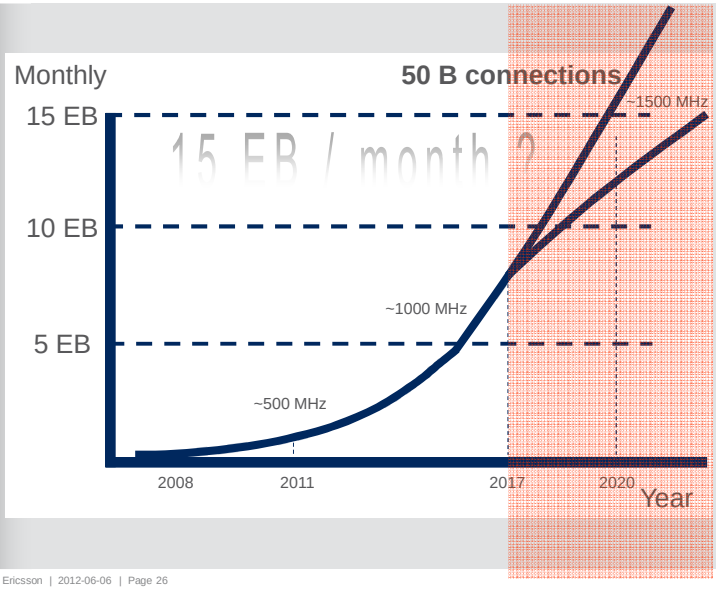
end 2017 the use of data will be about 8 Exabyte (10^{18}) per month on a global basis

Administrations should already now consider releasing more spectrum for IMT



Neither DVB-H, Mobile WiMAX, RLAN traffic nor the M2M traffic are included.

NETWORK OVERLOAD



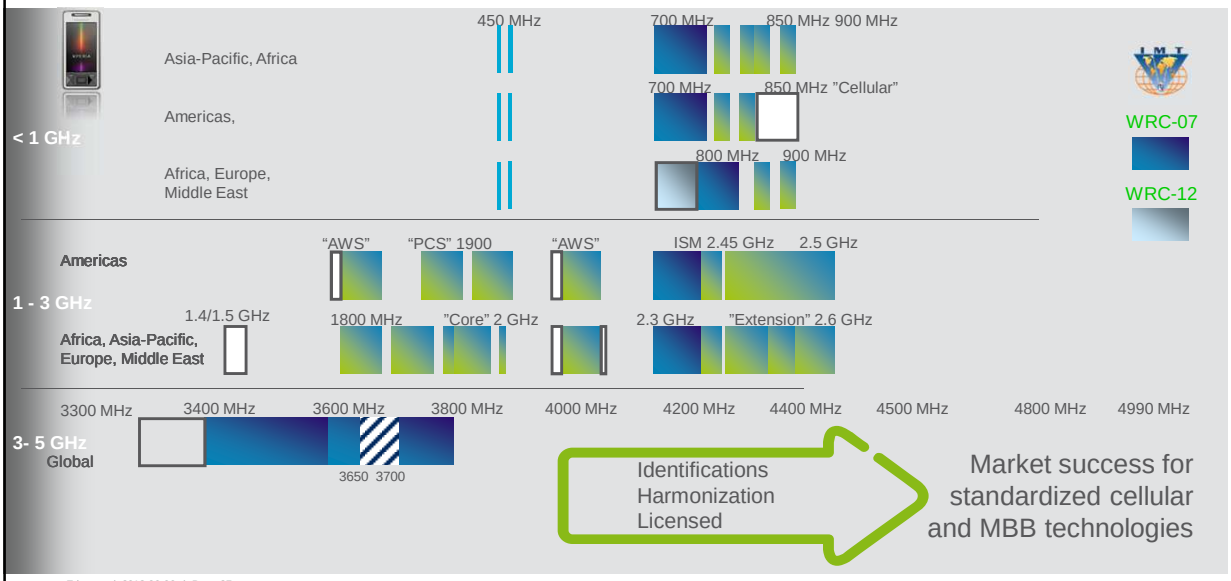
???? MHz

In 2020 about **20 - 30 times** the traffic compared with end of 2011
May suggest a possible deficit of the order of 1000 MHz in the timeframe 2015 – 2020, subject to traffic, subscriptions, and national circumstances

Also see ITU CPM Report to WRC-07 and Report ITU-R M.2078,
(total 1280 – 1720 MHz)

Unofficial and wild "gestimate".

IMT SPECTRUM MAP



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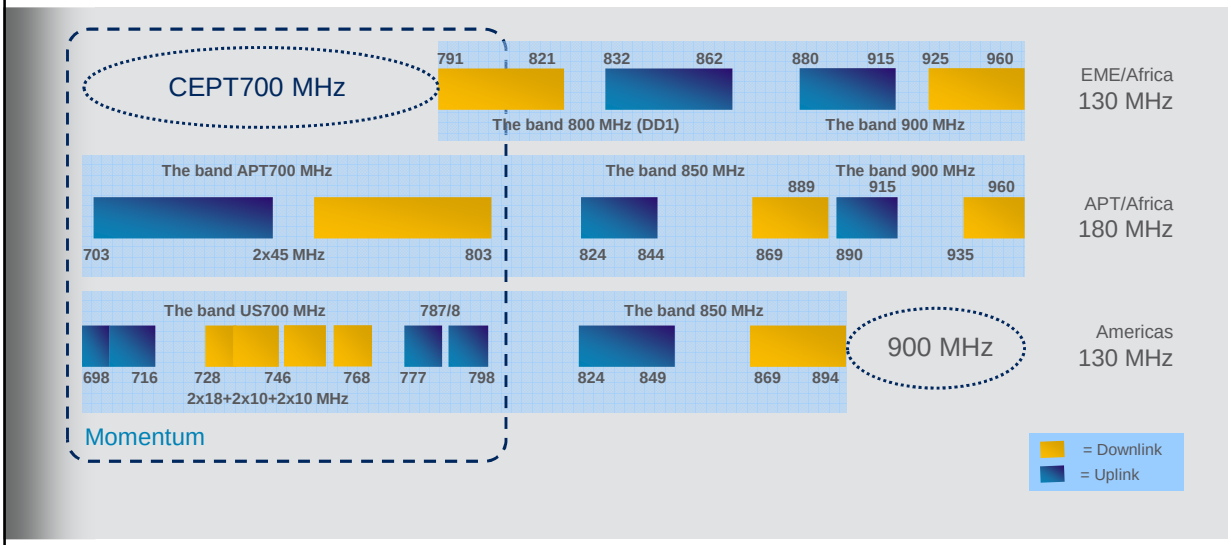
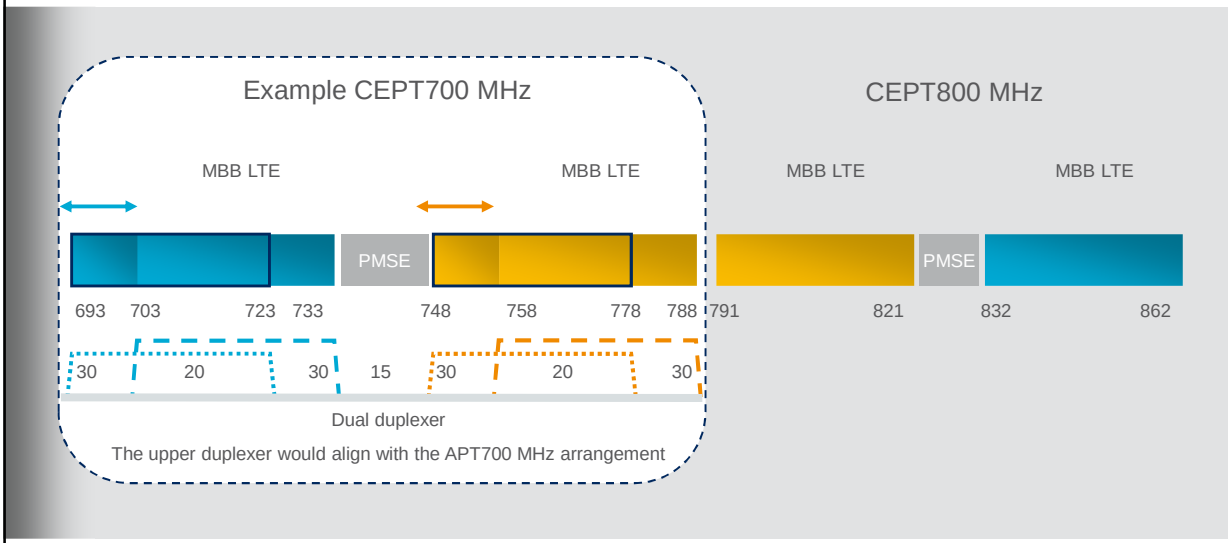
"UHF" FOR IMT



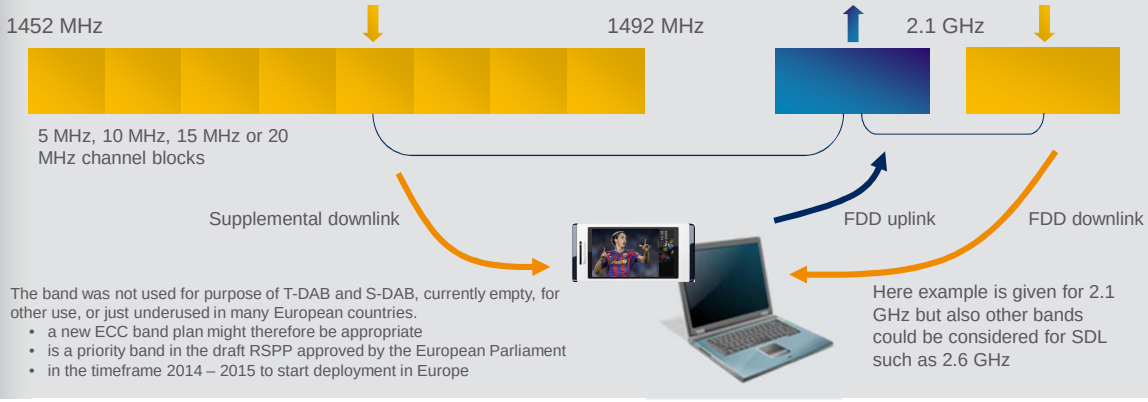
THE "UHF" RANGE IN REGION1 ?



SUPPLEMENTAL DOWNLINK ?

The band 1.4 GHz (1452 – 1492 MHz) is allocated to digital audio broadcasting (DAB)

Now suggested for supplemental downlink (SDL) uses carrier aggregation technology to bond the usual FDD downlink with a SDL, to provide a wider downlink channel



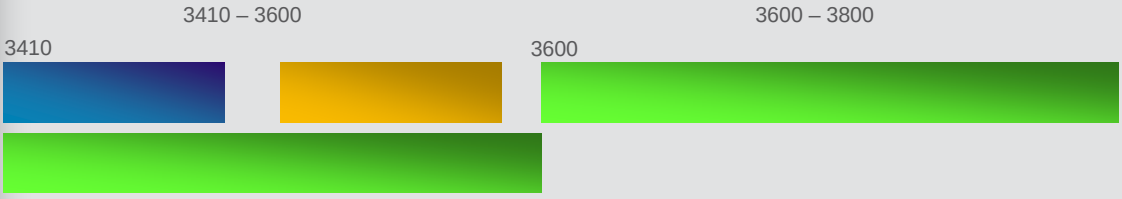
The band was not used for purpose of T-DAB and S-DAB, currently empty, for other use, or just underused in many European countries.

- a new ECC band plan might therefore be appropriate
- is a priority band in the draft RSPP approved by the European Parliament
- in the timeframe 2014 – 2015 to start deployment in Europe

Here example is given for 2.1 GHz but also other bands could be considered for SDL such as 2.6 GHz

THE RANGE 3410 – 3800 MHz

Currently this range used for RLS, FS and FSS, but also for IMT, BWA and FWA

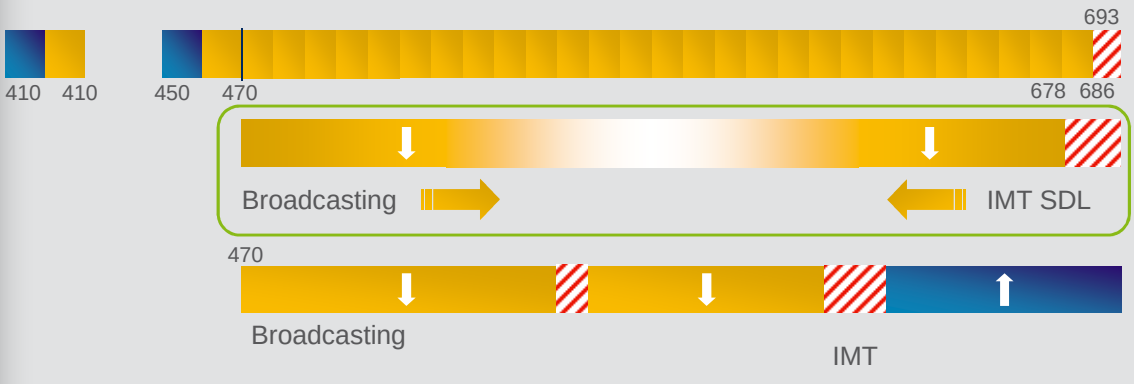


planned for the introduction of advancements of new IMT functionalities, including wider channels for the very high peak data rates

carrier aggregation would also be important to develop further to be able to use both bands with the aim of optimizing service provisions

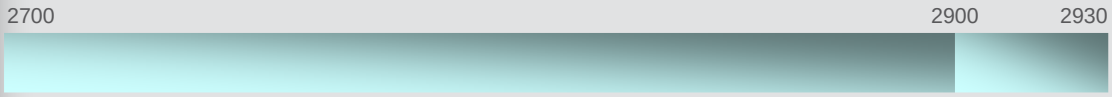
CANDIDATE RANGE < 6xx MHz ?

The candidate range 410 – 68x MHz



THE BAND 2700 – 2930 MHz

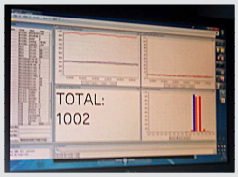
Currently used for ARNS and some weather radars



Partly and already used for testing of IMT-Advanced 2 x 60 MHz channel blocks demonstrating >1 Gbps using MIMO

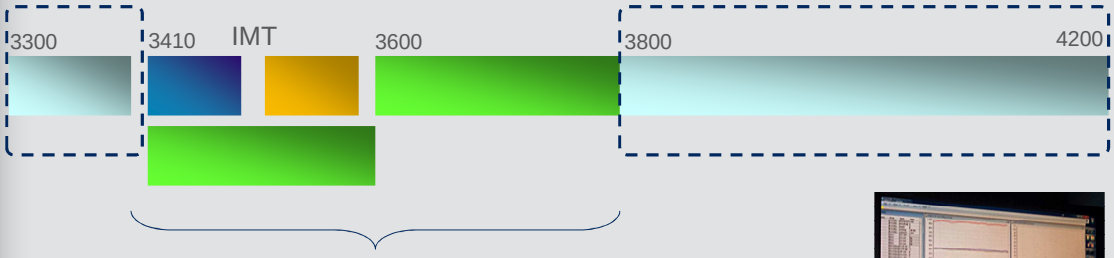
Close to the band 2500 – 2690 MHz (the Extension band)

Current radars could gradually be refarmed to above 3000 MHz



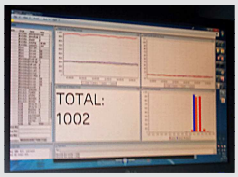
THE BAND 3300 – 4200 MHz

Currently this range used for RLS, FS and FSS as well as for IMT, BWA and FWA

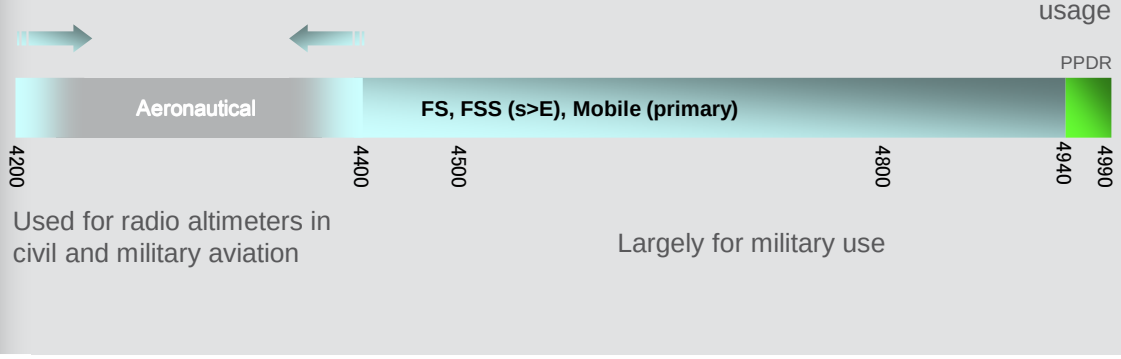


Designated spectrum in Europe (with restrictions)

The band 3800 – 4200 MHz partly and already used for developing of IMT-Advanced using channel blocks 2 x 100 MHz



THE RANGE 4200 – 4990 MHz

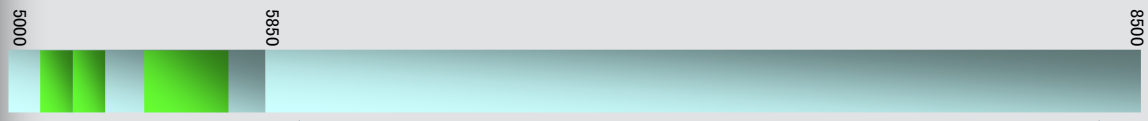


THE RANGE 5000 – 8500 MHz

The range 5000 MHz – 8500 MHz

› is largely globally harmonized

› still, 5000 – 5850 MHz is somewhat fragmented and the use is restricted



Closing the gap

WAS

ITS

Radars

FSS

FIXED, MOBILE

If there would be limited availability of spectrum bands below 6 GHz also the range up to about 8 GHz could be considered

Notably, the indoor penetration is still reasonable up to about 8 GHz


ERICSSON