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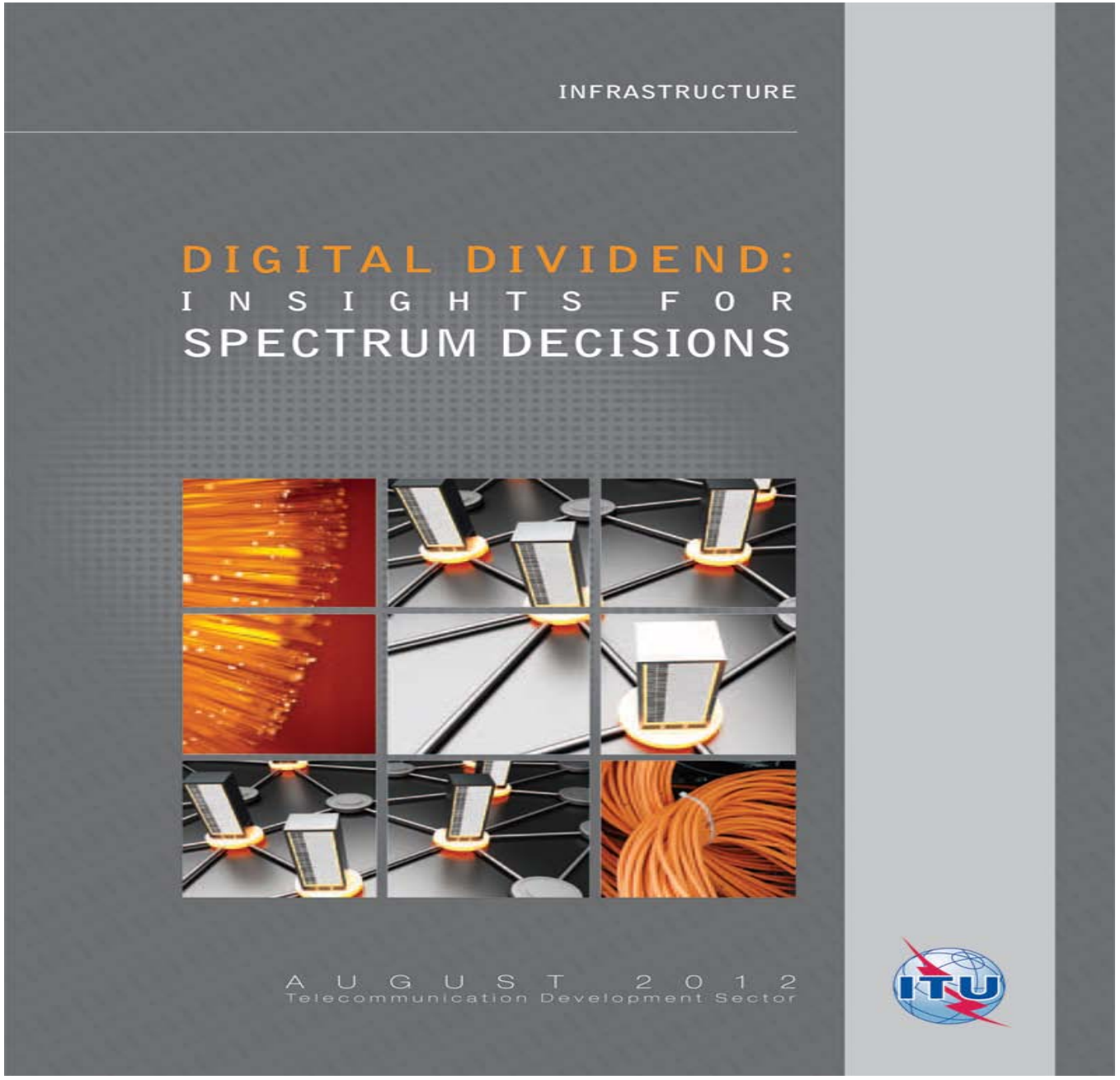
Introduction

- **Analogue terrestrial broadcasting uses significant parts of the frequency spectrum below 1 GHz**
  - VHF band (47-68 and 174-230 MHz) / UHF band (470-890 MHz)
  - total BW for terrestrial TV : 497 MHz, i.e. 48% on total spectrum below 1 GHz
  - large networks of primary transmitters and associated secondary transmitters towards roof-top/indoor antennas
  - since the eighties, challenged by cable and satellite television, and more recently by ADSL and internet television.
  - the share of terrestrial television broadcasting has generally decreased, in some cases below 5 per cent of the population
- **Transition from analogue to digital**
  - higher number of programmes, a better quality
  - much more spectrum efficient than analogue
  - spectrum made available by the transition of terrestrial television broadcasting from analogue to digital


INFRASTRUCTURE
DIGITAL DIVIDEND:
INSIGHTS FOR
SPECTRUM DECISIONS
AUGUST 2012
Telecommunication Development Sector

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Definition of the Digital Dividend

- **Spectrum efficiency gain due to the switchover to digital terrestrial television services**
- **Several parameters determine the overall spectrum required to permit this transition**
- **More advanced technologies become available – digital dividend will increase**
- **Analogue transmissions need to be switched-off**
- **Definition: *the digital dividend is the amount of spectrum made available by the transition of terrestrial television broadcasting from analogue to digital***

Potential usage of the Digital Dividend

- **Broadcasting services**
  - Provisions of more programs
  - HD, 3D, MTV
  - Frequency planning arrangements at national level and with neighbouring countries as part of the preparations for digital switchover may require modifications to make available additional spectrum resources.
- **Other services**
  - under the envelope of frequency assignments or allotments already planned for broadcasting, if no more interference is caused and more protection is claimed than the original ones
  - *white spaces* of the broadcasting frequency plan (without disrupting broadcasting services, such as wireless microphones used in theatres or during public events, WiFi or fixed wireless access
  - distinct, harmonized frequency allocation to enable ubiquitous service provision, universally compatible equipment and international roaming (e.g. International Mobile Telecommunications, IMT)
    - requires national decisions to move broadcasting out of the corresponding frequency band

Availability of the Digital Dividend

- **For broadcasting services (e.g. HDTV)**
  - as frequency channels in the UHF band become available through analogue switch-off.
  - at the time of frequency planning of digital television, which may also involve negotiations with neighbouring countries.
- **For mobile service (IMT systems)**
  - only after analogue switch-off in order to avoid interference with broadcasting services
  - the corresponding frequency band is freed from digital broadcasting and from other services to which it may be allocated
  - constraints arising from cross-border interference be waived.
  - requires regional harmonization decisions and the conclusion of regional and/or bilateral agreements.
- **Analogue broadcasting services in VHF**
  - parts of the digital dividend in UHF could be made available more easily, subject to cross-border coordination

Size of the Digital Dividend

- **Determined by the trade-offs underlying the choice of the basic parameters of digital transmissions**
  - the type of digital TV reception, the percentage of population to be covered, the quality required, the technology used, the respective use of MFN and SFN.
- **The VHF and UHF broadcasting bands are also allocated in a number of countries to services other than broadcasting**
  - e.g. to aeronautical radionavigation, radio astronomy, fixed services, or used by PMSE applications. Two situations may occur:
    - protection of these services may reduce the size of the digital dividend (e.g. aeronautical radionavigation and radio astronomy in some countries);
    - services need to be adapted to the new situation or re-allocated (e.g. PMSE applications in many countries), which may entail additional costs.
- **The size of the digital dividend will therefore vary from country to country. It may also be impacted by the situation in adjacent countries, as a result of the need to avoid, or limit interference.**

Importance of the Digital Dividend

- **The essence of the digital dividend is to open the possibility of re-allocating a large part of the radio spectrum**
  - It is about allocating scarce resources, no different to what spectrum managers normally do.
  - But one of the most important spectrum decisions expected to make for many years to come.
- **Digital dividend is not only about spectrum efficiency gains**
  - The process is closely related to the introduction of digital terrestrial television
  - This introduction of new digital television services will deliver other important benefits for:
    - Customers
    - Industry

Customer and industry benefits from the digital television

- **Customer benefits**
  - From the possibility of digital processing and compression, making much more efficient use of the network's capacity.
  - The key benefits (compared to analogue television broadcasts):
    - wider choice in TV and radio channels; improved picture and sound quality (depending on the system settings); greater flexibility due to portable and mobile reception; enhanced information services (e.g. Electronic Programming Guide or enhanced 'teletext' services (with enhanced graphics); increasing market competition and innovation
- **Industry benefits**
  - new industry has arisen, producing:
    - lower prices (per channel) for broadcasters; pay-tv services (i.e. conditional access system (CAS)); new transmitter networks; new receiver devices (e.g. set-top-boxes, PC-card and USB-based receivers, Integrated Digital Television sets)

Release of valuable spectrum for mobile broadband

- **Governments: the availability and efficient management of radio spectrum is an important driver for economic growth**
  - e.g. total value of services that depend on the use of radio spectrum in the EU exceeds EUR 250 billion, about 2.2 per cent of the annual European GDP
  - 2008 US spectrum auctions of the 700 MHz band raised USD 19.1 billion for 56 MHz of spectrum, implying an average value of USD 340 million per megahertz.
  - German auction of May 2010 assigning 60 MHz in the 800 MHz band raised proceeds of EUR 3.57 billion, or EUR 60 million per megahertz
  - France, the auction of 60 MHz in the 800 MHz band raised EUR 2.6 billion or EUR 40 million per megahertz
- **The importance of the digital dividend bands for the mobile community**
  - larger service area per base station.
  - UHF frequencies penetrate buildings more easily
- **An efficient allocation of the digital dividend is expected to boost innovation in ICT and help provide new and more affordable services.**

Treatment of incumbent users

- **Existing users (including broadcast network operators and PMSE users) are present in the very same bands where new types of non-broadcasting allocations/services are foreseen**
  - incompatibility issues are bound to emerge and need to be resolved
- **Incumbent broadcasters also claim significant parts of the digital dividend as they need additional spectrum to launch new channels and services**
  - currently HDTV and perhaps later 3D television
  - make these services sufficiently attractive to switch off their analogue networks
- **Potentially large impact of cross-border interference**
  - harmonization and coordination at sub-regional or regional level
- **Other incumbent uses in the UHF band**
  - refarming solutions, including financial compensations

Coordinating the Digital Dividend with neighbouring countries

- **WRC-07 and WRC-12**
  - established an international framework
  - each country to decide, whether to continue its use of the upper UHF band by television broadcasting or military applications, or to use for mobile services.
  - international condition: whether neighbouring countries agree
  - bilateral or multilateral negotiation
- **Growth of mobile data services**
  - International and domestic pressure to make spectrum available to the mobile service
  - In cases where bilateral negotiations meet difficulties, the ITU assistance may be requested to facilitate a successful outcome
- **The GE06 Agreement**
  - international framework applicable to 119 countries for the use of the UHF band by television broadcasting.
  - modification procedure, bilateral and multilateral discussions
  - Renegotiating the GE06 Plan does not require renegotiating the GE06 Agreement

Market developments

- **Allocating digital dividend is a national strategy decision**
- **Digital dividend is an important driver for economic growth**
- **Market developments are resulting in the spectrum demand growth**
  - Phased approach of spectrum release is preferable
  - Demands vary between different countries for digital terrestrial television and wireless broadband;
  - Any model is bound to be very sensitive to economic growth or downturn.
  - Economic downturn will affect consumption (and demand for spectrum), and the decline in consumption may be more severe than expected.
- **Demand drivers**
  - Digital terrestrial television
  - Wireless broadband

Allocation of the Digital Dividend

- **Bands identified for IMT by WRC-07 and WRC-12**
  - Interference, cross-border frequency coordination, preferably at regional level, is a pre-requisite for this purpose.
  - A regional coordinated approach, by which all countries in a region jointly agree to use these bands in a consistent way is therefore obviously preferable.
  - Allocating the 700 MHz and/or 800 MHz bands to the mobile service would still enable a large portion of the *digital dividend* to be allocated to television broadcasting in the remaining parts of the UHF band.
  - Could result in the loss of channels which may already have been negotiated with neighbouring countries, it requires bilateral and possibly multilateral frequency coordination discussions
- **Clear regulatory situation is required for**
  - handling of possible interference into broadcasting receivers in cases where a base station of the mobile service is established and transmits on frequencies adjacent to those to be used by broadcasting
- **International standardization**
  - improvement of the immunity of broadcasting receivers

Recent decisions in relation to the allocation of the Digital Dividend

- **Important decisions concerning digital dividend:**
  - on the analogue switch-off date
  - the technology for digital terrestrial television
  - the allocation of a sub-band for mobile services
- **Examples in the Report**

  Table 6-1 Overview of digital switchover dates in Europe (DigiTag)

  Table 6-2 Overview of the allocation of sub-bands for mobile services in a number of countries

  Annexes 1 and 2

  more detailed information on the experience reported by countries in response to a questionnaire sent by the ITU in relation to the allocation and implementation of the digital dividend (Germany, France).

Conclusions

- **The use of radio frequency spectrum**
  - has a social and economic impact for a country
  - a public choice and often implies highly political discussions.
- **WRC-07 and WRC-12**
  - decisions provide a major opportunity to national spectrum decision makers to bridge the digital divide by allocating part of the *digital dividend* to the mobile service.
  - international harmonization is already well advanced and can ensure the availability of low cost equipment for broadband mobile access
- **Regulatory environment needs to be organised to address jointly the planning of the *digital dividend* and the *analogue switch-off***
- **For achieving a successful transition to digital terrestrial television and to successfully implement the digital dividend**
  - legal and regulatory measures for the migration to digital networks;
  - harmonised allocation of the *digital dividend* spectrum;
  - integration of all the relevant stakeholders into the process;
  - regional harmonization and cross-border coordination negotiations

Thank you !

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