Regional Development Forum 2008

"Bridging the Standardization Gap in Developing Countries"
for the Asia-Pacific Region
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Radiocommunication Standardization and ITU-R Study Groups

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ITU-R Standardization

Two principal outputs:

- Regulatory Instruments (mandatory, having international treaty status)
  - Radio Regulations (RR) - decisions of World Radiocommunication Conferences (WRCs)
  - decisions of ITU Regional Radiocommunication Conferences (RRCs) and associated Plans
  - ITU-R Recommendations incorporated in RR by reference
- Voluntary Standards – other ITU-R Recommendations *(published in electronic format on CD and Internet)*

http://www.itu.int/publications/publications.aspx?lang=en&parent=R-REC&selection=6&sector=1

Radiocommunication Assembly

- 91 3 … Radiocommunication assemblies shall provide the necessary technical bases for the work of the world radiocommunication conferences and respond to all requests from world radiocommunication conferences.

Article 13 of ITU Constitution

- 129 1 A radiocommunication assembly shall deal with and issue, as appropriate, recommendations on questions adopted pursuant to its own procedures or referred to it by the Plenipotentiary Conference, any other conference, the Council or the Radio Regulations Board.

Article 8 of ITU Convention

Objectives of a Radiocommunication Assembly

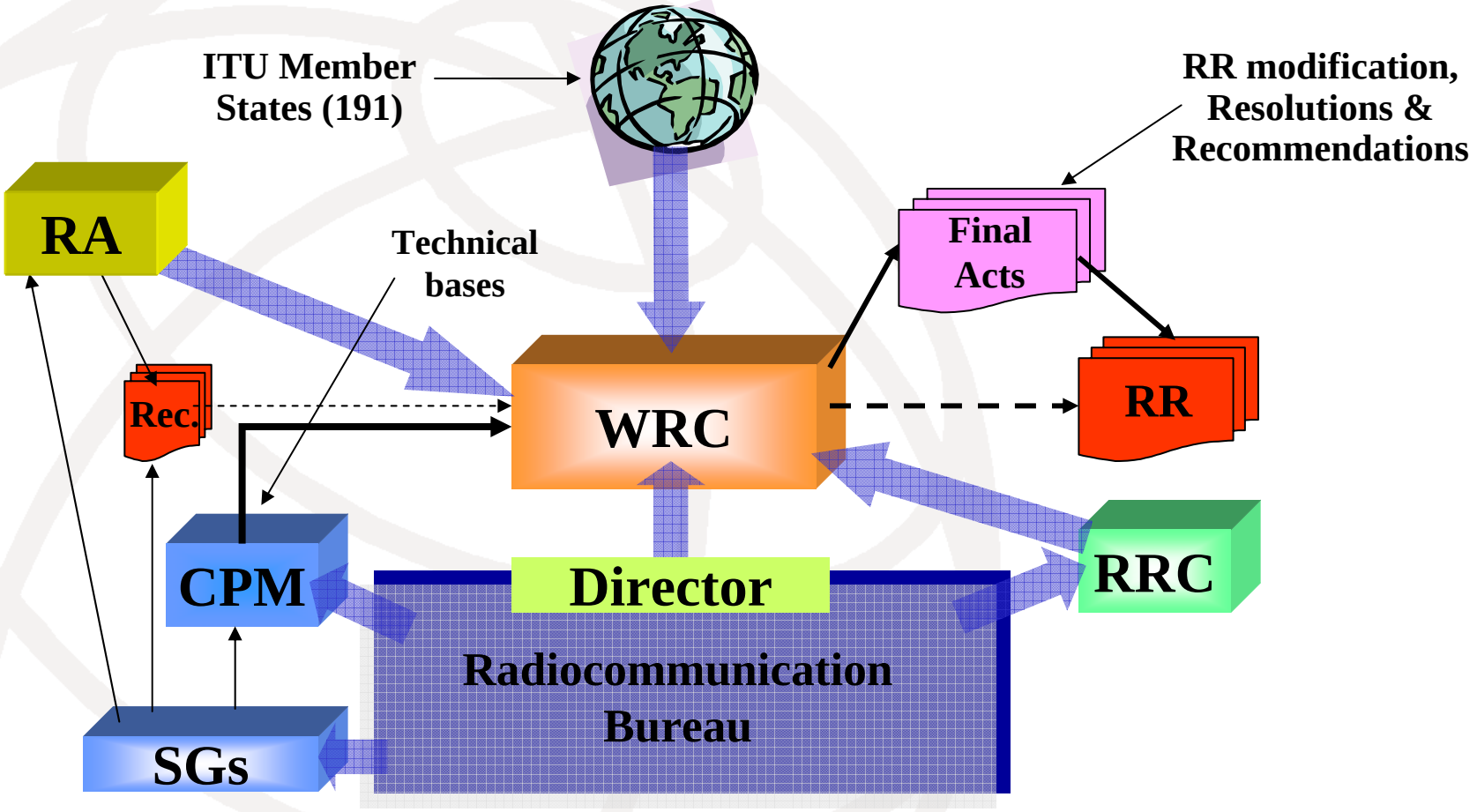
- Review working methods and procedures, particularly of the ITU-R Study Groups
  - new and revised ITU-R Resolutions
- Establish SG work programme for next study period
  - ITU-R Questions
- Establish structure of Study Groups
- Elect Chairmen and Vice-Chairmen of SGs, CPM, SC and RAG
- Approve ITU-R Recommendations (in practice, by exception)

Development, Approval and Application of ITU-R Recommendations

ITU-R Recommendations:

- are developed by experts from Administrations, operators and private companies (>1500 experts from most countries)
- are approved by the ITU Member States either by correspondence or at the Radiocommunication Assembly
- are voluntary standards (except those incorporated in RR by reference). However, even voluntary ITU-R Recommendations are, in practice, applied everywhere
- application of ITU-R Recommendations incorporated in RR is mandatory for spectrum management on the international level
- applied by spectrum management specialist/planners, system designers, radiocommunication operators/engineers, etc.

ITU-R Study Groups prepare technical bases for WRC



RR: Radio Regulations (treaty status)
SGs: Study Groups (+ SC)
WRC: World Radiocommunication Conference
CPM: Conference Preparatory Meeting
RA: Radiocommunication Assembly
Rec: Recommendations (international voluntary standards)

Radiocommunication Study Groups

Res. ITU-R 4-5 of Radiocommunication Assembly 2007:
- 6 ITU-R Study Groups:

SG 1: Spectrum management
SG 3: Radiowave propagation
SG 4: Satellite services
SG 5: Terrestrial services
SG 6: Broadcasting service
SG 7: Science services

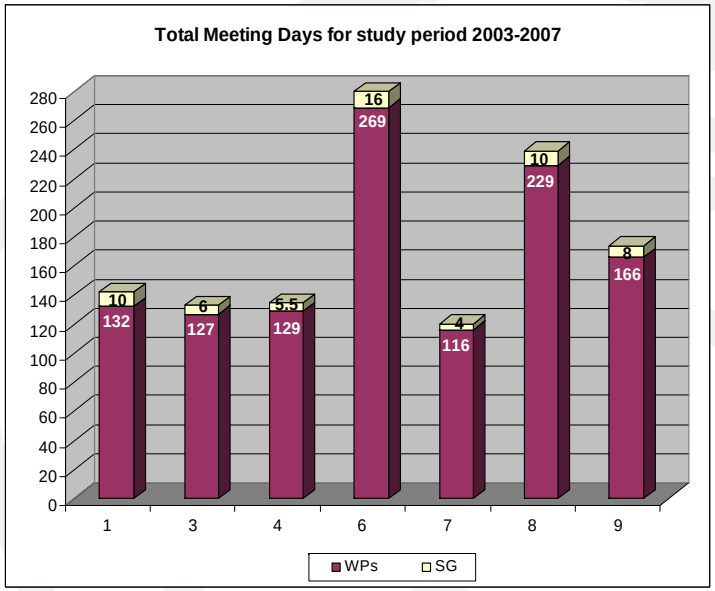
- **>900 Recommendations**
- **"Standards" in areas of spectrum management and radio technology**
- **Result of consensus from meetings of world-wide experts**
- **Some referred to in RR**
- **Used by spectrum planners and system designers**

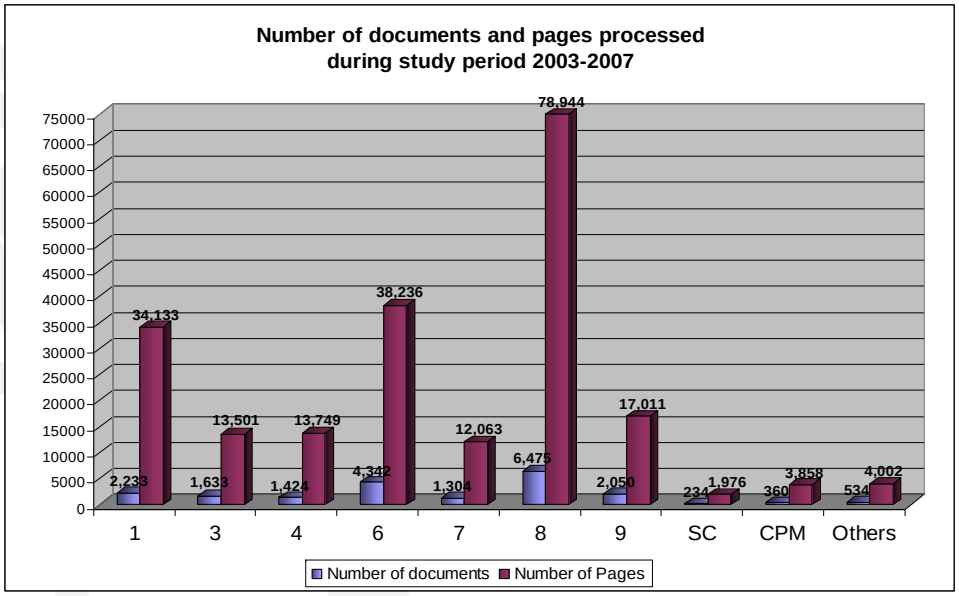
In addition:
CCV: Coordination Committee for Vocabulary
CPM: Conference Preparatory Meeting
SC: Special Committee on regulatory and procedural matters

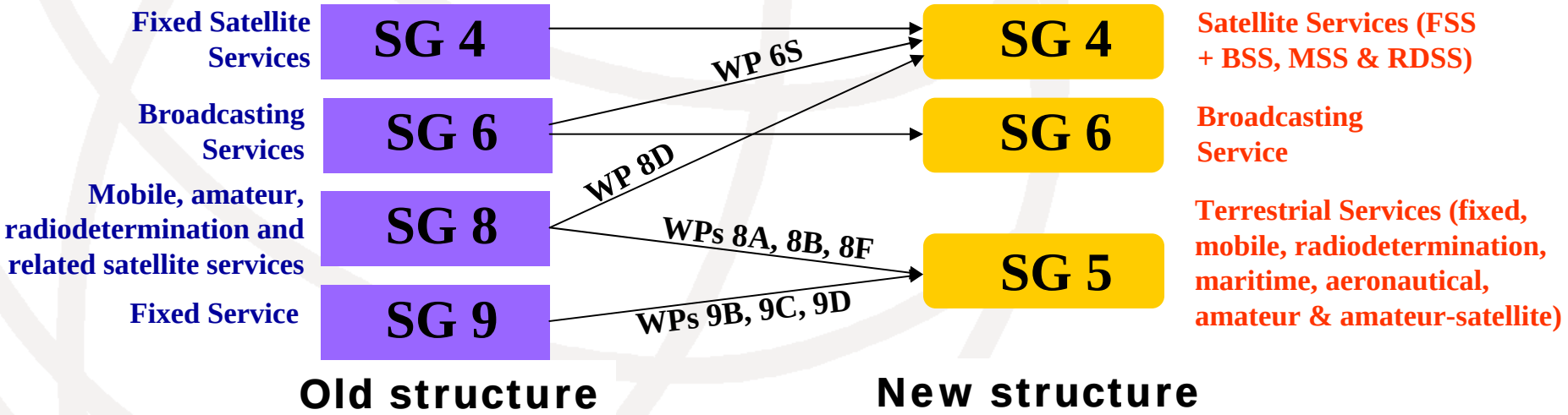
Supported by Counsellors and Assistants in Study Group Department of BR

See Web page at: http://www.itu.int/ITU-R/go/rsg

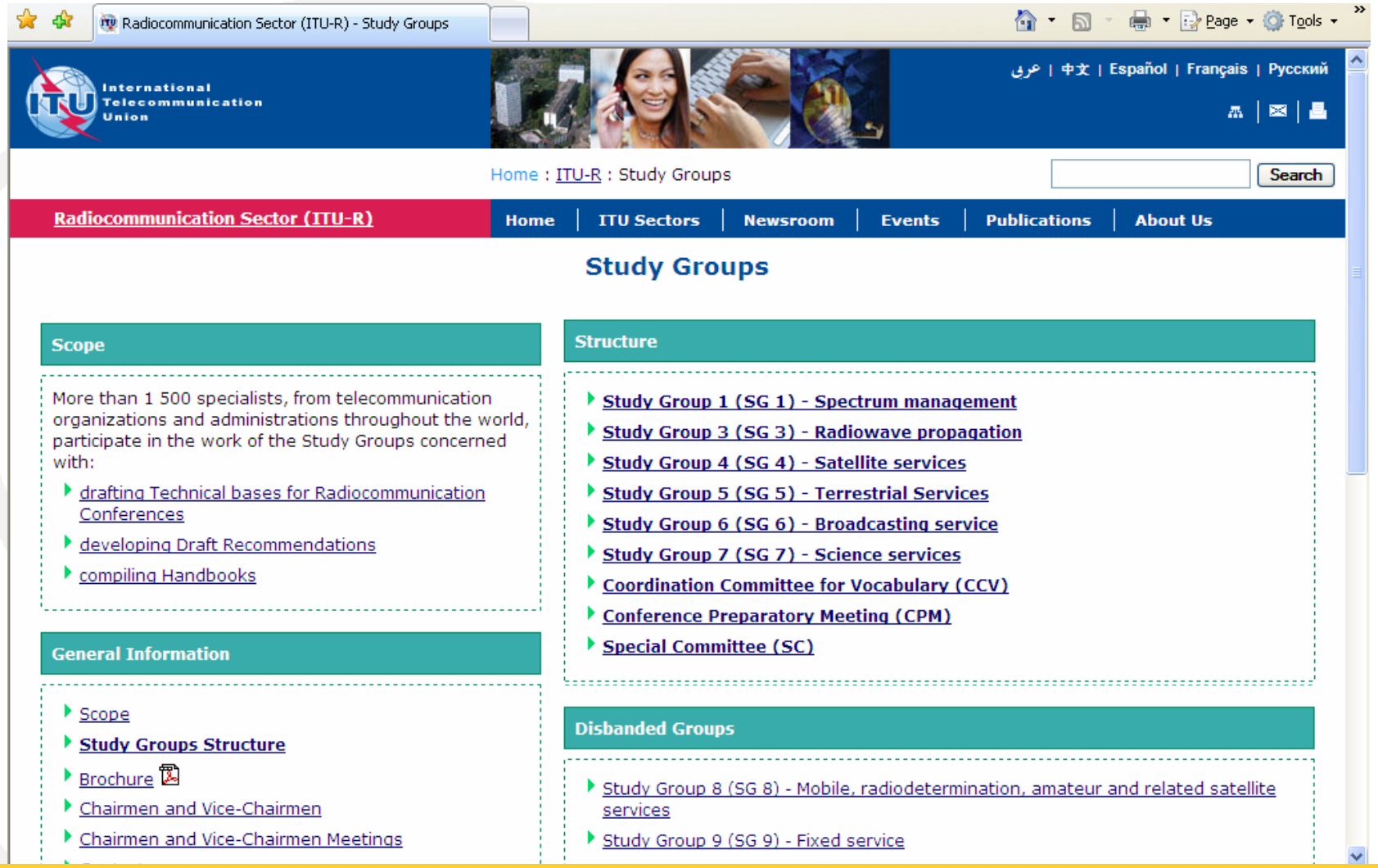
ITU-R Study Group meeting statistics





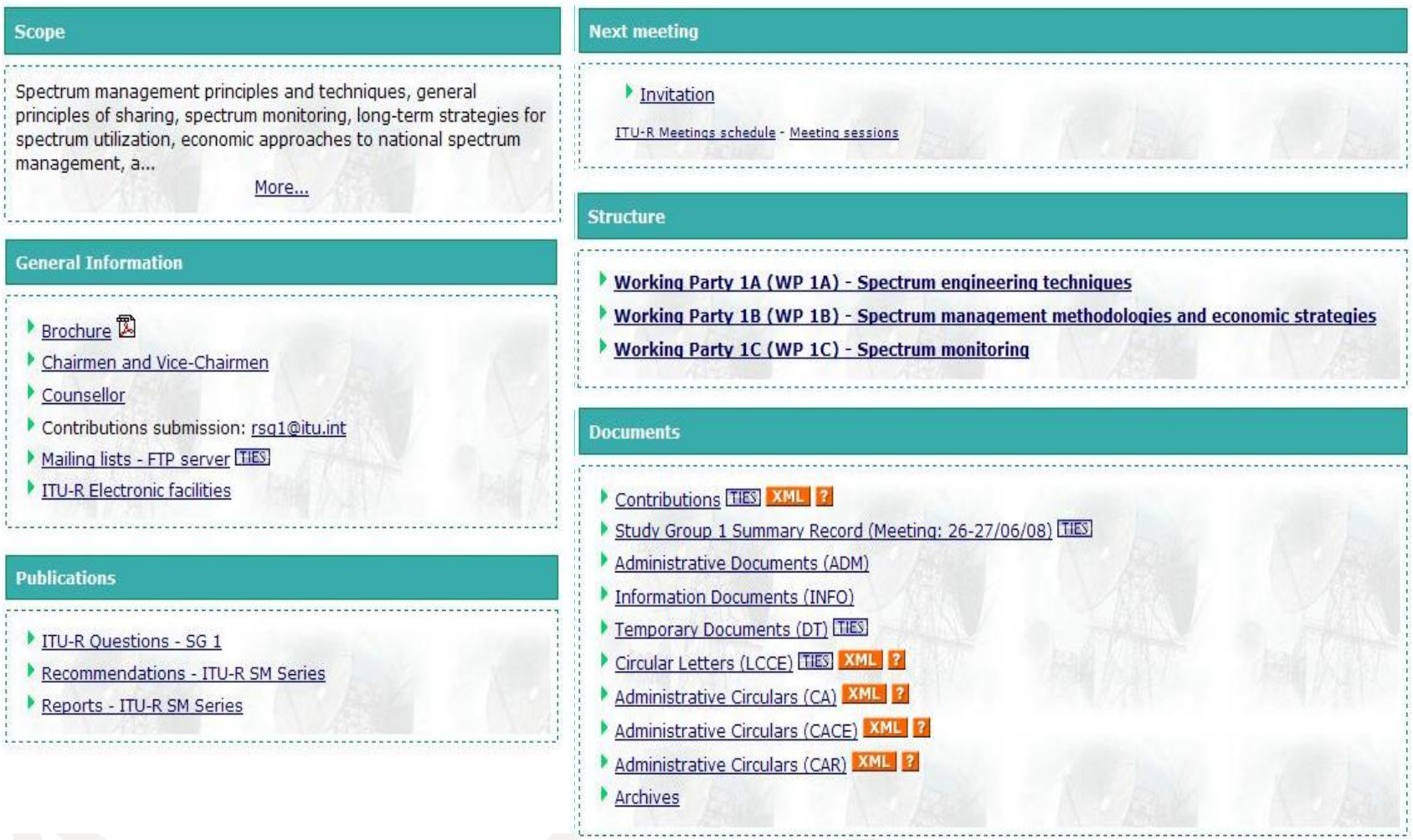


ITU-R Study Groups on Internet



See: http://www.itu.int/ITU-R/go/rsg

SG Web Page Structure
(using SG 1 as a sample)



Study Group 1
"Spectrum management"

Next SG-1 Meeting	Scope
▸ 24–25/09/09 ▸ Place : **Geneva**	**Spectrum management principles and techniques, general principles of sharing, spectrum monitoring, long-term strategies for spectrum utilization, economic approaches to national spectrum management, automated techniques and assistance to developing countries in cooperation with the Telecomunication Development Sector.**

Topics covered

- UWB, SRD, compatibility with active and passive services and RAS,
- Measurements of Radio noise, monitoring receivers/stations, DF …
- International spectrum regulatory framework
- National spectrum management aspects (regulatory, economic, strategic, planning, …)

Next WP Meetings - Place : Korea (except WP 1C)

WP 1A - Spectrum engineering techniques	▸ 25.02–04/03/09
WP 1B - Methodologies and economic strategies	▸ 25.02–04/03/09
WP 1C - Spectrum monitoring	▸ 16–22/09/09

Study Group 3
"Radiowave propagation"

Next SG-3 Meeting	Scope
11–12/06/09 Place : **Geneva**	• Propagation in ionized and non-ionized media • Development of prediction methods

Topics covered

- Characteristics and mapping of propagation medium
- Propagation prediction methods for
  - terrestrial broadcasting,
  - slant path from satellites
  - mobile and personnel,
  - ionospheric propagation

Next WP Meetings - Place : **Geneva**

WP 3J - Propagation fundamentals	1–10/06/09
WP 3K - Point-to-area propagation	1–10/06/09
WP 3L - Ionospheric propagation and radio noise	1–10/06/09
WP 3M - Point-to-point and Earth-space propagation	1–10/06/09

Study Group 4 “Satellite Services”

Next SG-4 Meeting	Scope
16–17/10/08 Place : **Geneva**	Systems and networks for fixed-satellite, broadcasting-satellite, mobile-satellite and radiodetermination-satellite services

Topics covered

- All technical and sharing issues related to non-planned and planned bands
- HEO, HIO (characteristics and interference calc. methods)
- HDFSS (definition and characteristics)
- IP, Global broadband Internet access via Satellite
- Use of systems in FSS, BSS and MSS for early warning and relief operations

Next WP Meetings - Place : **Geneva**

WP 4A - Efficient orbit/spectrum utilization for FSS and BSS	06–15/10/08
WP 4B - Systems, air interfaces, performance and availability objectives for FSS, BSS and MSS, including IP-based applications and satellite news gathering	24/09–01/10/08
WP 4C - Efficient orbit/spectrum utilization for MSS and RDSS	29/09–08/10/08

Study Group 5 “Terrestrial Services”

Next SG-5 Meeting	Scope
▸ 10–11/11/08 ▸ Place : **Geneva**	Systems and networks for fixed, mobile, radio-determination, amateur and amateur-satellite services.

Topics covered

- IMT-2000, IMT-Advanced, maritime and aeronautical mobile services
- Fixed, mobile, portable and nomadic communications, including Broadband Wireless Access (BWA), RLANs, HAPS
- Adaptive systems at HF
- Software defined and cognitive radio systems (technical aspects)

Interim Structure (except WP 5B), Next WP Meetings - Place : **Geneva** (except WP 5D)

WP 5A - Land mobile service excluding IMT; amateur and amateur-satellite service	▸ 28/10–06/11/08
WP 5B - Maritime mobile service including Global Maritime Distress and Safety System; aeronautical mobile service and radiodetermination service	▸ 29/10–07/11/08
WP 5C - Fixed wireless systems; HF systems in the Fixed and Land Mobile Services	▸ 27/10–05/11/08
WP 5D - IMT Systems	▸ 08–15/10/08

Study Group 6 “Broadcasting Service”

Next SG-6 Meeting	Scope
▸ 03–04/11/08 ▸ Place : **Geneva**	Programme production, Programme assembly, Delivery, Reception quality (incl. vision, sound, multimedia, data, etc.)

Topics covered

- Protection criteria for digital TV and sound systems (RRC-06)
- Spectrum issues at HF
- Multimedia and data broadcasting for mobile reception
- Large Screen Digital Imagery (LSDI)
- Recording formats

Next WP Meetings - Place : **Geneva**

WP 6A - Terrestrial broadcasting delivery	▸ 24–31/10/08
WP 6B - Broadcast Service assembly and access	▸ 23–29/10/08
WP 6C - Programme production and quality assessment	▸ 20–24/10/08

Study Group 7 “Science Services”

Next SG-7 Meeting	Scope
▸ 06 and 14/10/08 ▸ Place : **Geneva**	• Systems for space operation, space research, Earth exploration and meteorology • Remote sensing (active/passive) systems on both ground and space-based platforms • Radio and radar astronomy • Standard frequency and time signals

Topics covered

- EESS and Met-Sat service for disaster prediction, detection and climate monitoring
- Deep space research (e.g. Mars)
- Future of leap second
- Protection of the Radio astronomy service from other services

Next WP Meetings - Place : **Geneva**

WP 7A - Time signals & frequency standard emissions	▸ 07–13/10/08
WP 7B - Space radiocommunication applications	▸ 07–13/10/08
WP 7C - Remote sensing systems	▸ 07–13/10/08
WP 7D - Radio astronomy	▸ 07–13/10/08

Some important topics in Radiocommunication Standardization

- **Mobile (cellular) communications**
  - IMT (IMT-2000 & IMT-Advanced)
- **Broadband Wireless Access (BWA)**
  - fixed & mobile (terrestrial) & satellite
- **Digital Broadcasting**
  - Mobile TV
- **Spectrum management**
  - Software-Defined/Cognitive Radios
- **Emergency communications**
  - Use of radiocommunications in emergency situations
- **Environmental monitoring**
  - Climate Change

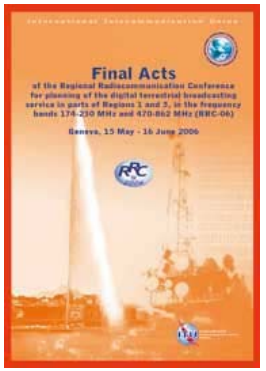
IMT

- **Legal**
  - Spectrum identification in the ITU Radio Regulations: lower (450-470 & 698-960 MHz), medium (1 710-1 885, 1 885-2 025, 2 110-2 200, 2 300-2 400, 2 500-2 690 MHz) plus satellite component global bands; higher (3 400-3 600 MHz, some countries & with sharing constraints)
- **Technical**
  - Recommendation ITU-R M.1457 - Detailed specifications of the radio interfaces of IMT-2000
  - Recommendations ITU-R M.1580 & ITU-R M.1581 - Generic unwanted emission characteristics of base & mobile stations using the terrestrial radio interfaces of IMT 2000
- **Operational**
  - Recommendation ITU-R M.1308 – Evolution of land mobile systems towards IMT-2000
  - Handbook - Migration to IMT-2000 Systems

Digital Broadcasting

Terrestrial digital broadcasting carries many advantages over the analogue system (similar for satellite):

- Expanded services
- Higher quality video and audio and lower power consumption
- Greater variety and faster rates of data transmission
- More spectrum efficiency - several programmes in one channel



ITU's Regional Radiocommunication Conference (RRC-06) established the GE06 treaty agreement heralding the development of 'all-digital' terrestrial broadcast services for sound and television in Europe, Africa, Middle East and the Islamic Republic of Iran by 2015. The digital switchover will "leapfrog" existing technologies and help provide connectivity to underserved and remote communities, **representing a significant step towards reducing the digital divide**.

Digital TV (Rec. ITU-R BT.601); **Video** (Rec. ITU-R BT.1306); **Audio** (Rec. ITU-R BS.1114); **Satellite** (Rec. ITU-R BO.1408); **HTDV** (Rec. ITU-R BT.709)

Draft new ITU-R Report: Transition from analogue to digital terrestrial broadcasting (Overview of broadcasting technologies; application and implementation of digital broadcasting; transition issues; case studies)

Mobile TV

ITU-R studies:

- user requirements
- system characteristics
- data transmission mechanisms
- content formats
- interoperability

FIGURE 3

An example of enhanced handheld receivers for digital BSS (sound)

Rap 2049-03

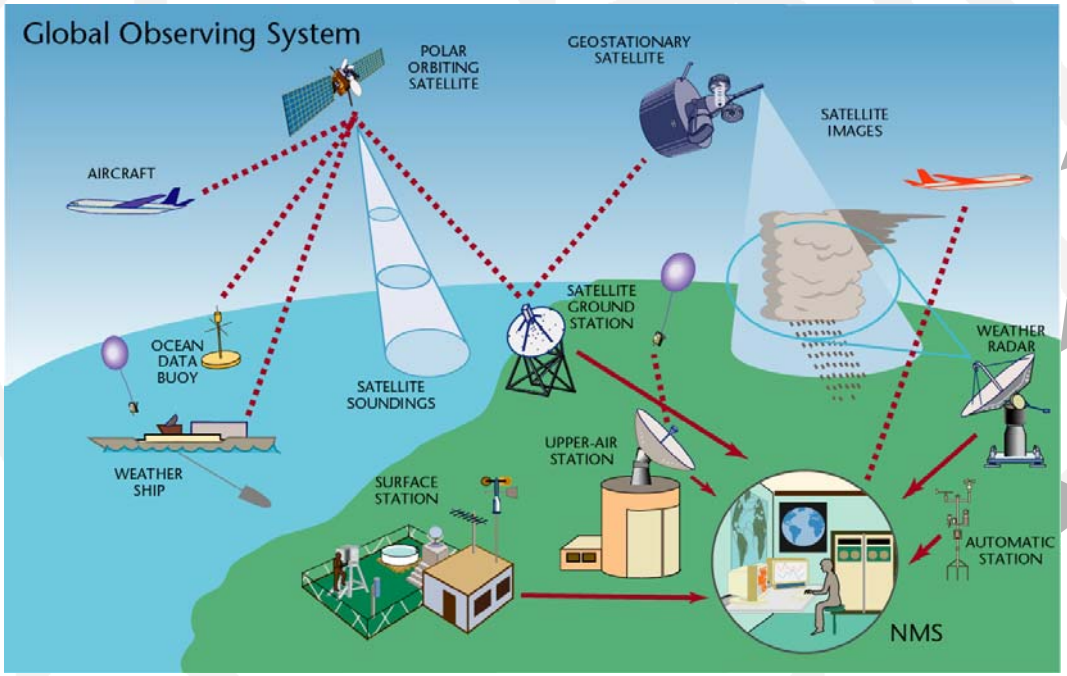
Recommendation ITU-R BT.1833: **Broadcasting of multimedia and data applications for mobile reception by handheld receivers**

Current systems:

- ISDB-T (Japan)
- T-DMB (Rep. Korea)
- DVB-H (Europe)
- FLO (US)

Climate Monitoring, Radio Technologies and Remote Sensing

Global Observing System (World Meteorological Organization (WMO))



Spectrum

Non-interference operation

Computing

The backbone of the environment monitoring system built on the radio-based remote sensors (active and passive).

Remote sensing is the main component of the environment monitoring system. ITU-R "standards" for development and use of remote sensing are contained in RS-Series of ITU-R Recommendations (developed in ITU-R Study Group 7). ITU-D Study Group 2 develops report on the use of remote sensing for disaster prediction, detection and mitigation.

ITU-R Reports

ITU-R Report – "A technical, operational or procedural statement, prepared by a Study Group on a given subject related to a current Question or the results of studies…" (Resolution ITU-R 1-5)

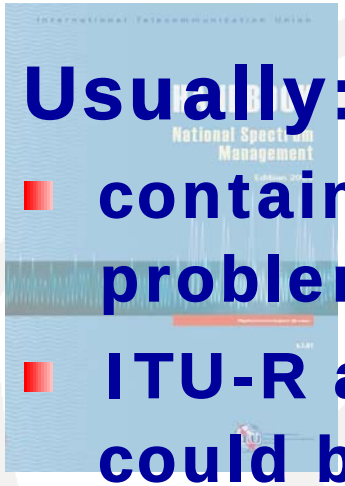
Example of ITU-R Reports:

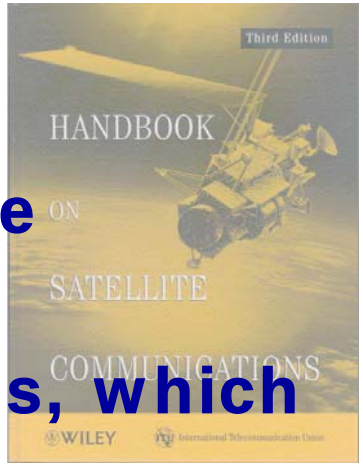
- Guidance on the regulatory framework for national spectrum management (SM.2093)
- Economic aspects of spectrum management (SM.2012)
- Current and future use of the band near 13.5 GHz by spaceborne active sensors (RS.2068)
- Spectrum requirements for the future development of IMT-2000 and IMT-Advanced (M.2078)
- Digital satellite broadcasting system (television, sound and data) with flexible configuration (BO.2101)

ITU-R Reports available (free of charge) from:

http://www.itu.int/publications/publications.aspx?lang=en&parent=R-REP&selection=7&sector=1

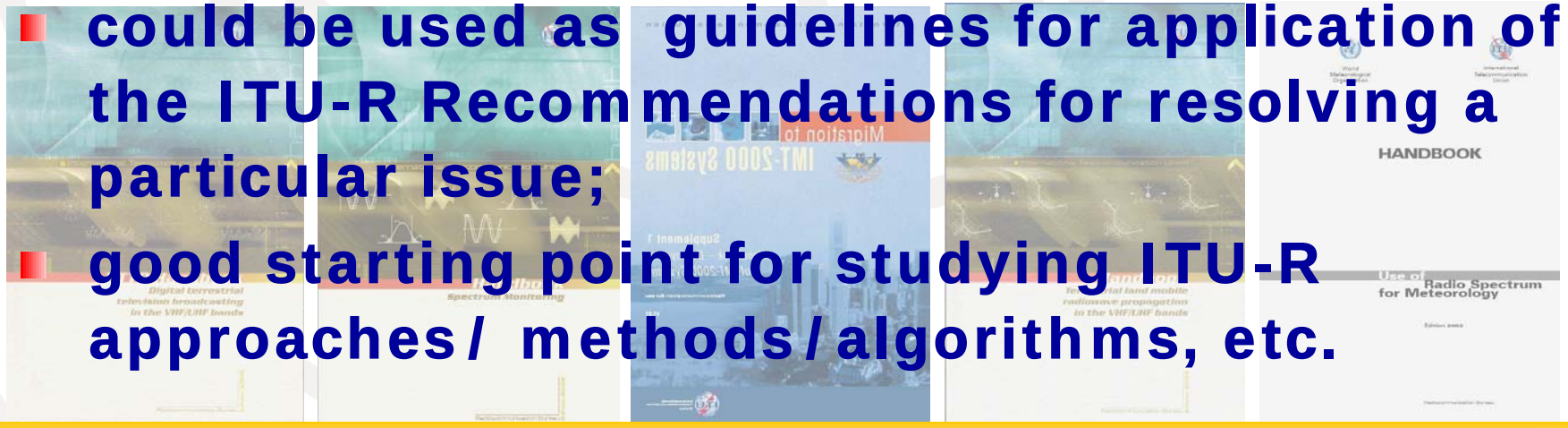
ITU-R Handbooks





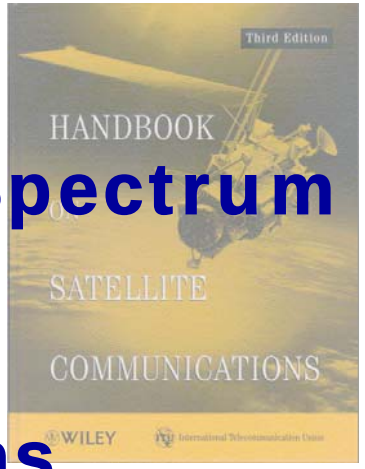
Usually:

- **contain the general description of the problem;**
- **ITU-R approved methods/approaches, which could be applied;**
- **could be used as guidelines for application of the ITU-R Recommendations for resolving a particular issue;**
- **good starting point for studying ITU-R approaches/ methods/algorithms, etc.**



See at: http://www.itu.int/publications/publications.aspx?lang=en&parent=R-HDB&selection=8&sector=1

Examples of ITU-R Handbooks



- National Spectrum Management
- Computer aided techniques for Spectrum Management
- Satellite Communications
- Propagation on Earth-space paths
- Use of radio spectrum for meteorology
- Digital terrestrial TV broadcasting
- Land mobile including wireless access
- Frequency adaptive systems

See at: http://www.itu.int/publications/publications.aspx?lang=en&parent=R-HDB&selection=8&sector=1

Bridging the Standardization Gap

- ITU-R serves as focal point for international radio standardization
- ITU-R strives to work closely with ITU-T and ITU-D on a number of key standardization issues:
  - Mobility
  - Climate change
  - Emergency communications
- Seeks harmonized, cooperative strategies to avoid duplication
  - Encourage greater participation in standardization activities, particularly by developing countries
- Cooperative strategy seen as key area of discussion at WTSA

Thank you
for your attention

Additional information

ITU-R Recommendation series

- **BO:** Satellite delivery
- **BR:** Recording for production, archival and play-out; film for television
- **BS:** Broadcasting service (sound)
- **BT:** Broadcasting service (television)
- **F:** Fixed service
- **M:** Mobile, radiodetermination, amateur and related satellite services
- **P:** Radiowave propagation
- **RA:** Radio astronomy
- **RS:** Remote sensing systems
- **S:** Fixed-satellite service
- **SA:** Space applications and meteorology
- **SF:** Frequency sharing and coordination between fixed-satellite and fixed service systems
- **SM:** Spectrum management
- **SNG:** Satellite news gathering
- **TF:** Time signals and frequency standards emissions
- **V:** Vocabulary and related subjects

Some recent and future ITU-R Seminars

- ITU-R seminar "Software Defined Radio and Cognitive Radio Systems" in Geneva:
  - programme: http://www.itu.int/ITU-R/study-groups/docs/rwp5a-programme.pdf
  - presentations: http://www.itu.int/ITU-R/study-groups/seminars/rwp5a-radio/
- Regional BR seminar on spectrum management (Region 2) in Argentine - see at: http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=buenos-aires-2008&lang=en
- Regional BR radiocommunication seminar for Arab region in the United Arab Emirates - see at: http://www.itu.int/ITU-R/index.asp?category=conferences&rlink=abu-dhabi-2007&lang=en
- BR Biennial Seminar 8-12 December 2008, Geneva – see at: http://www.itu.int/md/R00-CA-CIR-0174/en