



# **ITU Workshop on Policy and Regulations for Newly Established Regulators in the Asia Pacific Region**

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## **Radio Spectrum Management**

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# Issues

- Spectrum Policy
- Spectrum Planning
- Monitoring and Compliance
- New issues in spectrum management
- Developing Spectrum Management Capacity
- International Best Practice

# Spectrum Policy and Planning

- Spectrum Policy
- Regulatory Approach
- Spectrum Planning
- Authorizing use of spectrum
- Assigning spectrum
- Spectrum Pricing

# Spectrum Policy (1)

## Key Questions for Spectrum Policy

- Who: Who can access the spectrum?
- What: what band can they use?
- Where: where can they use it?
- How: what can they use it for?
- How much (bandwidth to assign)?

And finally

- How to manage potential interference?

# Spectrum Policy (2)

- Elements of Spectrum Policy
  - Clear objectives
  - Clear rules, rights and obligations spelled out
- These are sometimes lacking for new regulators
  - Taking over the spectrum management role from incumbent Telco
  - Regulator's objectives are not those of the Telco
  - Need to re-establish control despite lacking resources

# Approach to Regulation (1)

- Spectrum is a vital *national resource*
- As a vital *input to many industries*, it needs to be carefully managed
- Spectrum must be used *efficiently*
- Spectrum is also a necessary input for *public and community services*.

## Approach to Regulation (2)

- Regulation should be “fit for purpose”
  - Don't regulate unless it is necessary to achieve objectives
  - Lighter touch regulation
- Who should make decisions: regulators or users? Regulators should avoid making decisions that are best left to users
- Those who benefit should pay costs of managing spectrum (cost recovery)

# Spectrum Planning

- 'Top down' process
  - ITU Radio Regulations and Table of Allocations (Region 3)
  - National Spectrum Plan
  - Band Plans
  - Channel Plans
- Important to get the framework right
  - Plan for the future (Wrong decisions now can hurt you later!)

# Authorizing use of spectrum

- Why license spectrum use?
  - Primary reason is to manage interference
- Problems arise from uncontrolled use of spectrum
- Licences or 'unlicensed' spectrum?
  - 'Unlicensed' does not mean no rules
- License spectrum or devices?

# Assigning Spectrum

- Spectrum assignment: who is authorized to use the spectrum?
- Traditional approach is 'first come first served'
  - Generally works well where supply is greater than demand
  - Not so good if demand is high
- Other methods: beauty contests, lotteries, auctions

# Spectrum Pricing

- How much should users pay to gain access to spectrum?
  - Free? (Unlicensed use)
  - Cost-based?
  - Incentive pricing?
- Those who benefit from regulation should bear the cost
- Prices can also improve efficiency

# Spectrum Monitoring and Compliance

- Taking a coordinated approach to compliance/enforcement
- The role of monitoring
- Licensing enforcement
- Licence database

# Compliance/Enforcement (1)

- Enforcement often a problem for newly established regulators
- Unauthorized spectrum use is common
- Problems:
  - Interference management
  - Cost to revenue
- Inaccurate database of licences
- Licence renewal processes may be inadequate

## Compliance/Enforcement (2)

- Penalties for unauthorized use of spectrum
- Penalties for late payment of licence fees
- Frequency monitoring can detect illegal users

# Frequency Monitoring

- Monitoring has several purposes:
  - Tracking sources of interference
  - Detecting illegal users
  - Spectrum “health check” (identifying congested bands or areas)
- Monitoring can be expensive (equipment, manpower)
  - Identify priority areas for monitoring

# Licence Database

- Good database management is required for licences
- Link monitoring with compliance
- Desirable to have clear rules regarding licence use
- Best practice: make database publicly available (e.g. Malaysia, Australia)

# New Developments

- Finding new ways to share spectrum
- Administered Incentive Pricing
- Spectrum Auctions
- Spectrum Trading
- Spectrum Liberalisation
- Government use of spectrum

# Spectrum Sharing (1)

- Greater demand for spectrum requires new ways to share spectrum
  - New radio technologies such as dynamic spectrum access facilitate sharing
- Increasing use of 'spectrum commons' (unlicensed/class licensed spectrum)

## Spectrum Sharing (2)

- Spectrum underlays and overlays
  - Underlays allow low powered use across occupied spectrum (e.g. UWB)
  - Overlays allow higher powered 'listen before transmit' technologies (dynamic spectrum access)
- 'Private parks' managed by private band managers, not the regulator

# Spectrum Pricing (1)

- While traditionally regulators have just tried to recover costs, they are now moving to incentive pricing
- Administered Incentive Pricing pioneered in UK
  - ➔ Used when spectrum is not auctioned
  - ➔ Aim is provide incentives for efficient use
  - ➔ Aiming to approximate market value
- Also used in Australia, Singapore, Hong Kong, NZ, Japan, Nigeria

# Spectrum Pricing (2)

- Pricing factors
  - Bandwidth, band location, geographic location ('congestion tax') and coverage
  - Cost of using alternative methods (e.g. wireline)
- The more spectrum you use (deny to others) the more you should pay

# Spectrum Auctions

- Spectrum should go to the highest valued use and user
- Price based allocations are best way to allocate spectrum to highest valued use
  - Auctions not beauty contests or lotteries
- While they can be a useful source of revenue, this is not the goal

# Spectrum Trading

- Trading of spectrum is now seen as important by many countries
  - Spectrum is free to move to its highest valued use
- Trading of licences or trading of spectrum?
  - Allow traded spectrum for existing use only or allow new uses?
  - Ideal would be to allow freedom to change use, but this complicates interference management
- Prior approval or just registration of trades?

# Liberalisation/Flexibility

- Quest for technology neutral, service neutral spectrum allocation
  - Australia 'spectrum licences', US 'interference temperature', NZ management rights, UK spectrum usage rights
- Dynamic spectrum access technologies make this possible, and perhaps necessary?
- No one has yet managed to implement a truly liberalised approach

# Government use of spectrum

- In many countries, government agencies are among the largest spectrum users
  - ➔ Sometimes in commercially valuable bands
- Need to ensure adequate spectrum for government/public services
- But government users still need to use spectrum efficiently
- Government users should pay for spectrum
  - ➔ Cave Review (UK) , IRGSH (Australia)

# Developing Spectrum Management Capacity

- New Regulators face difficult task in building skills
- Need for training, particularly “hands on” training
- Very useful ITU sources
  - For example ICT Regulation Toolkit
- Software (frequency assigning, licence database)

# International Best Practice (1)

- Should be *clear objectives*
- Clear *responsibilities* of regulator and spectrum users
- Because spectrum is a valuable national resource and an integral part of a modern economy, regulation should *encourage (efficient) spectrum use* while protecting against *harmful interference*.

# International Best Practice (2)

- Many countries are moving away from traditional 'command and control' approach
  - Lighter touch regulation
- New approaches:
  - Aim to allow flexible use, allowing users to make decisions (not regulator)
  - Market based allocation, spectrum pricing and trading to promote efficient use



**Thank You**

Questions?