



# Setting up Rules for Secondary Markets in Spectrum Trading

**Workshop on  
Economic Aspects of Spectrum Management**

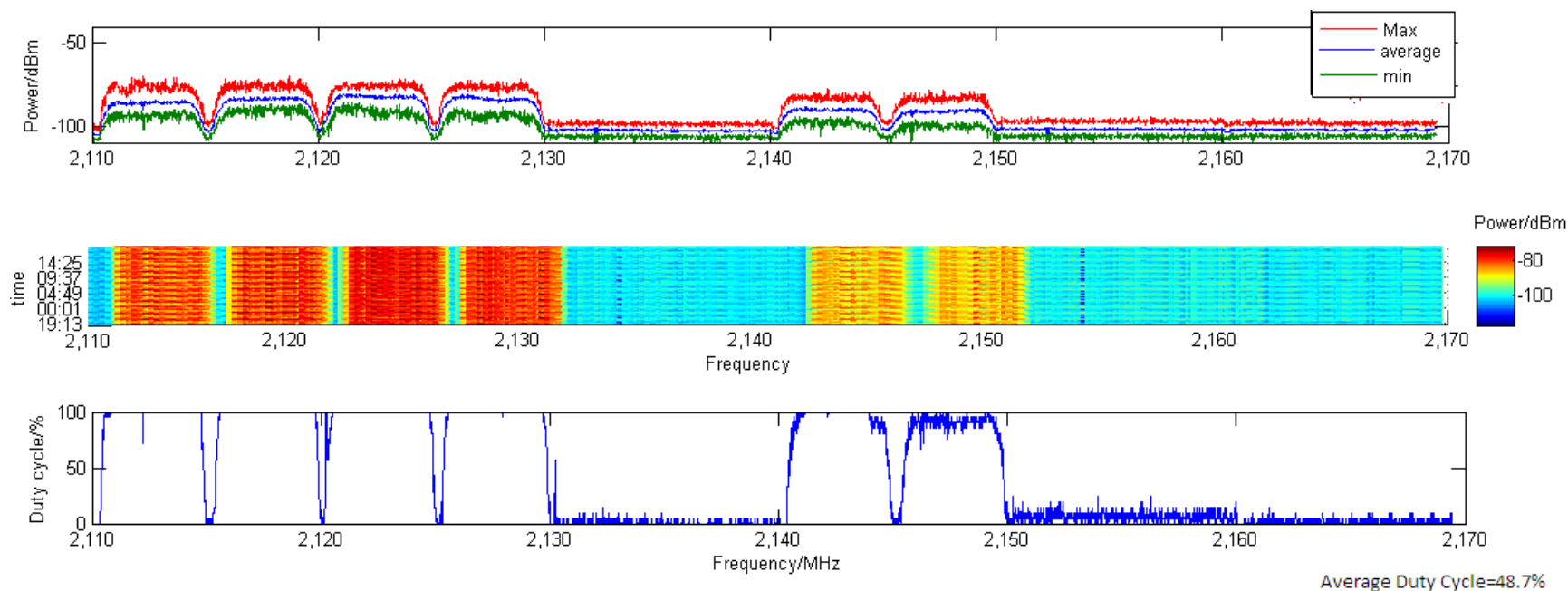
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Dr. Azim Frad  
DG of Radio Licensing and Planning  
Communications Regulatory Authority (CRA), MICT



# Spectrum Utilization Profile

- Not all operators, licensees or technologies use spectrum with similar occupation every place
- Not all operators feeling lack of spectrum similarly





# Objectives of Spectrum Trading

Making licensed spectrum quickly be available to whom are more capable to use it efficiently

Preventing spectrum hoarding and banking

Streaming idle/non-efficient employed spectrum toward the licensees who face lack of spectrum or have excessive spectrum demand

# Example

- Population: 5 million
- Area: 107,029 km<sup>2</sup>
- 2×12 MHz in 1800 MHz Frequency band
- Cell phone penetration: 103%
- Broadband penetration: 15%
- **Questions:**
- How much spectrum regulator allow operator to sale?
- What will happen to operator's obligation in the Isfahan province?





# Market Force to Introduce into Spectrum Management

## Auction

whereby  
spectrum block  
licenses are  
sold to the  
highest bidder

## Spectrum Pricing

where owners  
of apparatus  
licenses are  
charged to use  
the radio  
spectrum

## Secondary Trade

whereby  
owners of  
spectrum  
usage rights  
whether block  
or site license  
can sell or  
lease all or part  
of the rights  
associated with  
their licenses

## Liberalization

whereby the  
owners of  
licenses can  
have their  
spectrum  
usage rights  
changed if they  
meet  
conditions  
defined by the  
regulator

# Concept of Spectrum Trading



Permission granted by licensing authority to licensee, in the context of license, to sale or lease to others in accordance with secondary trade regulation



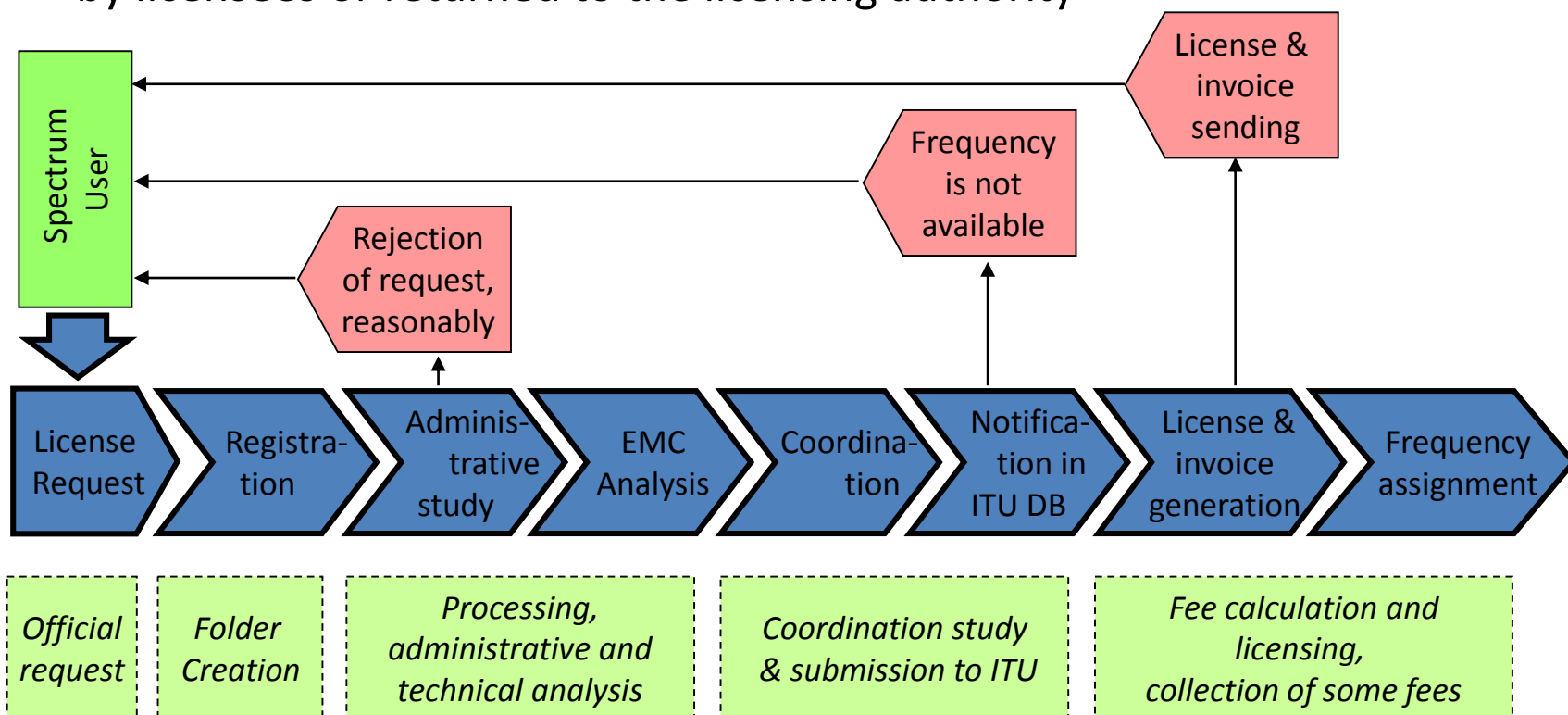
The tradable rights as well as the amount of right that could be traded shall be clearly and carefully identified inside the granted license



*Spectrum rights normally cover details stating the precise technical, or operational characteristics, of the radio system that will be used from a specified location, or within a specified area.*

# Traditional Licensing

- Within the validity period of a radio license, the frequency must be used by licensees or returned to the licensing authority





# Disadvantage of Traditional Radio Licensing Method

## ***Returning Back of Spectrum is Very Difficult***

- Issuing license is more easier than returning back spectrum to authority, even if supported by regulations

## ***Unknown Market Value of Spectrum***

- The value of spectrum deemed to be the price that licensee pay to the authority, despite the possibly higher value of spectrum in market,

## ***Late Awareness of Spectrum Inoccupation***

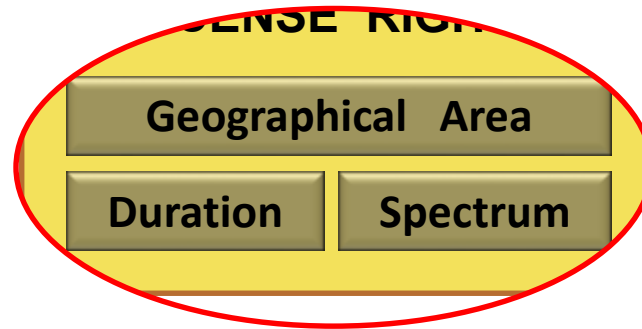
- In many cases, spectrum managers are too slow to get informed that licensed spectrum are under-utilized while market could sense more faster,

## ***Spectrum Hoarding by Licensees***

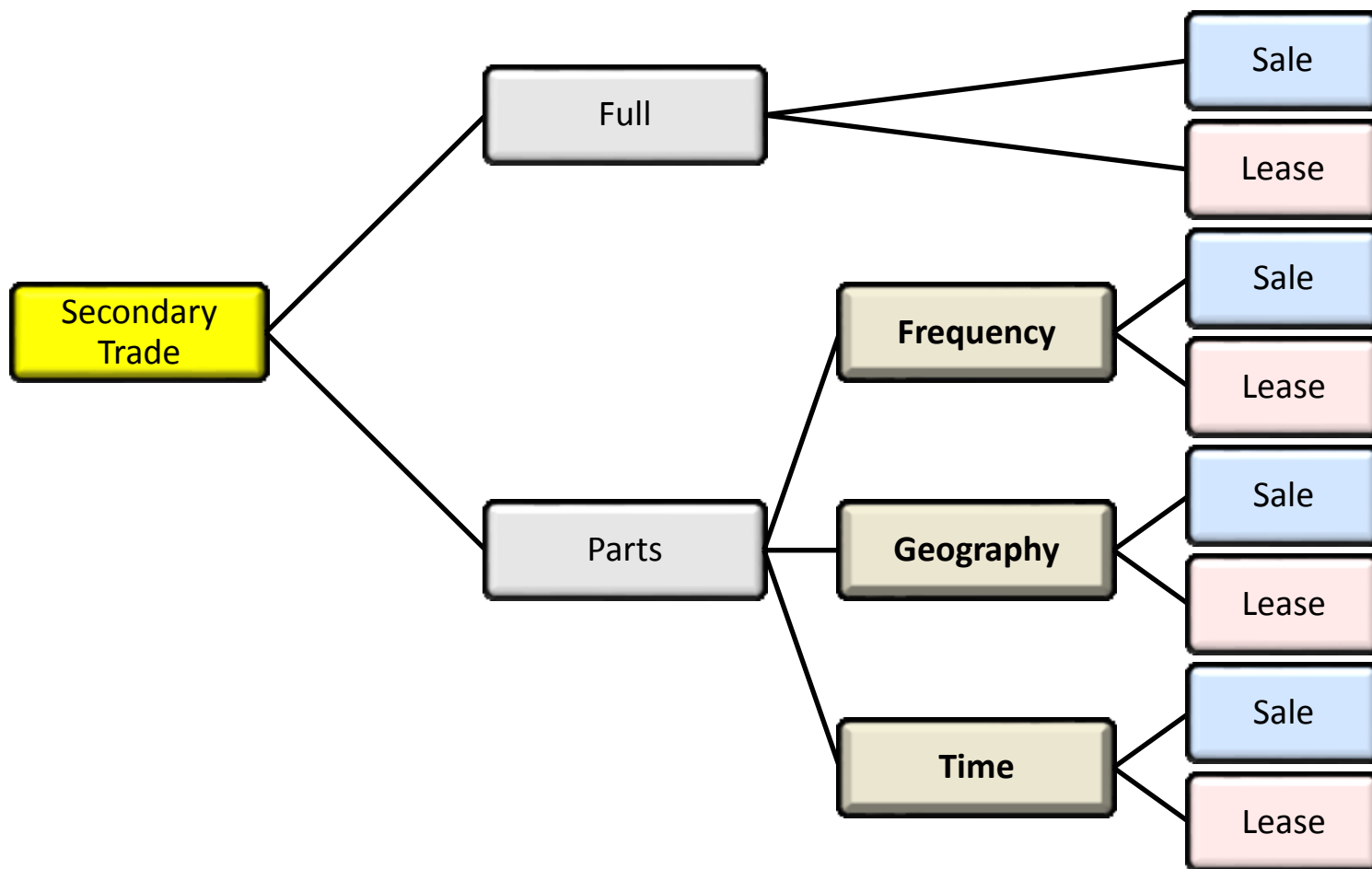
- Licensees having no/less need to spectrum in some geographical areas, cannot transfer usage right to the others for better use



# Spectrum Space



# Methods of Spectrum Secondary Trade





# License having Tradable Rights

## Market Study

- The real need of applicant shall be discovered from the expected usage information.

## Transparent Right

- The definition of the spectrum rights should be as clear as possible but also as nonrestrictive (flexible) as possible.

## Reserve Reallocation

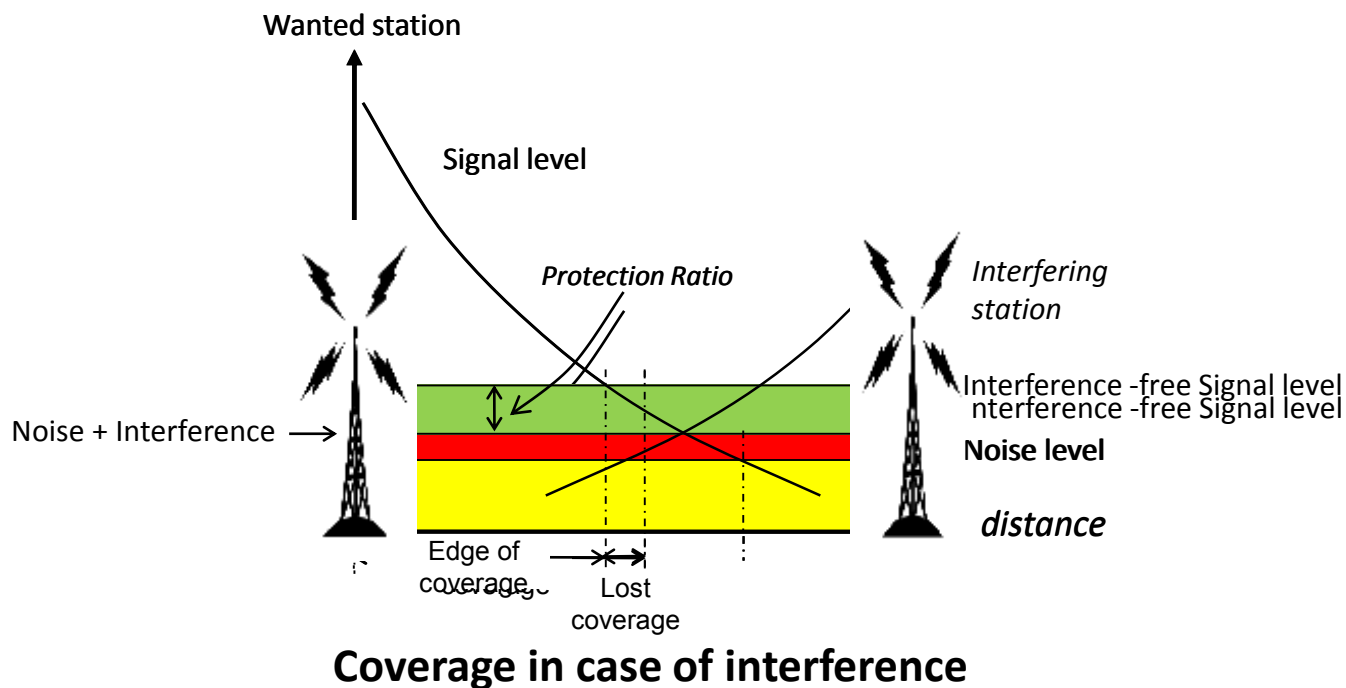
- Should include the right to reclaim the spectrum before the license has expired, if it should be necessary to meet, for example, the requirements of an international agreement to reallocate the spectrum.

## Flexibility

- The definition of the spectrum rights should be as clear as possible but also as nonrestrictive (flexible) as possible.

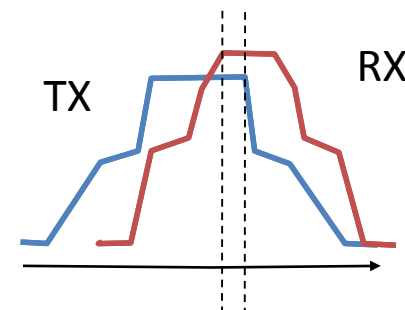
# Interference Influence on Coverage Area

- Interference will shrink coverage area

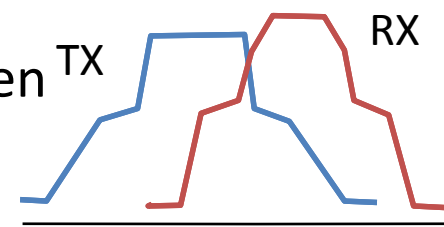


# Interference Classification

- **In-band interference,** whereby there is bandwidth overlap between the unwanted transmitter and victim receiver



- **Out-of-band interference,** whereby there is no bandwidth overlap between the unwanted transmitter and victim receiver. There are two sub-types of this path:



- In-band emissions received out-of-band (due to imperfections in the filtering of the receiver or due to closely spacing);
- Out-of-band emissions received in-band (due to imperfections in the filtering of the transmitter or due to closely spacing);

# Overcoming Interference



## Issue in Technically Flexible License

- Due to usage and technology **flexibility** in spectrum market, determination of exact restriction would be i
- Defining following items in license would like ensure interference free operation, at least:



1. In-band and out of band **Emissions Rights** which specify characteristics of the RF signals that license holder can transmit

2. **Spectrum Quality Benchmarking**, which gives an indication of the impact of other interference from users of the radio spectrum on the level of service which can be achieved at the receiver



# Risky Change Through the Spectrum Trade

- **Change of Service:** The ability of the licensee to change the service they provide may raise problems, particularly where there are a number of countries with many borders,
  - the potential technical and interference problems;
  - the impact of changing service on the users of their existing service.
- There is also the question of protection from cross border **interference** that would arise from a national allocation that **differs** from Article 5 of the RR.
- **International obligation** of administrations in border area must be ensured



# Preparation for Spectrum Trading

**Publish Regulation and provide relevant transparent instrument**

**Establish official and software spectrum trading system for registration and conduction of administrative procedure**

**Provide frequency bands that trade can take place on**

**Review the existing spectrum licenses to clarify whether they allowed to trade relevant rights**

**Provide overall and band-wised spectrum cap for FDD and TDD frequency bands**



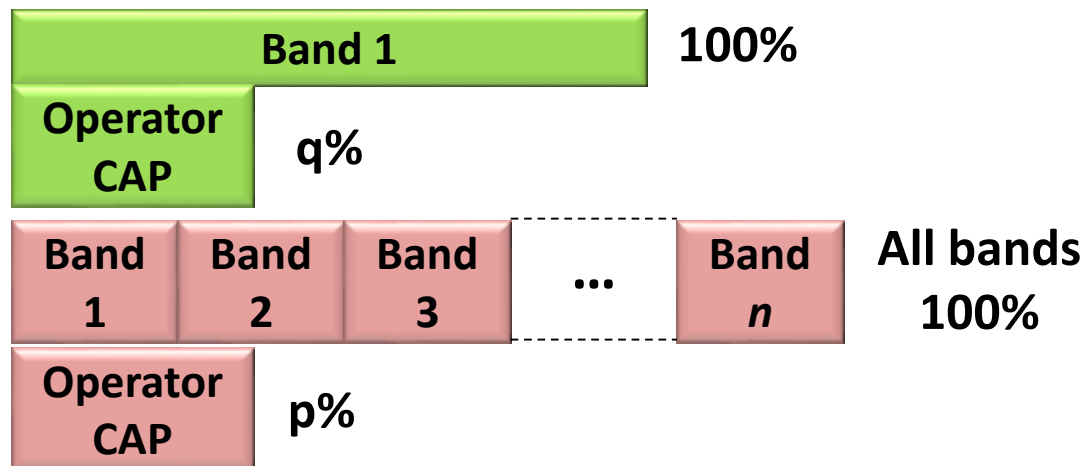


# Spectrum Trading Regulation

- Definitions
- Condition of license that its right to be soled or leased
- Condition of sellers and buyers
- Condition of frequency band
- Administrative procedure of trade
- Framework on how to make decision by authority
- Conditions and framework of sale/release contract
- Penalties
- Payable fees



# Spectrum (Geography/Time) Cap



- Regulator may impose CAP on only **group** of frequency bands not all of them, e.g. below 1 GHz
- **Example:**  $p$  in India and UK are 25% and 30%, respectively  
 $q$  in India is 50%
- **Reason:** Preventing market move toward monopoly or duopoly
- *Same concept is applicable to Geography and Time*
- *The amount that each operator can bid is restricted to several CAPs*



# Spectrum/Geography/Time Floor

## Minimum Tradable Right

- The amount of proposed right to trade **shall not be too small** to be practical, resulting in inefficient use of spectrum and unnecessary administrative costs

## Minimum Remaining Right

- The **remaining resource for seller** shall not be lower than the threshold amount that is likelihood to change the essence of license,

e.g. MNO to MVNO / National operator to local operator



# License and Frequency Band Conditions

**The frequency band shall be allocated through a market mechanism**

**Licensee has not been exempted from payment of spectrum utilization fee**

**The remain of license validity period shall be more than a certain duration**

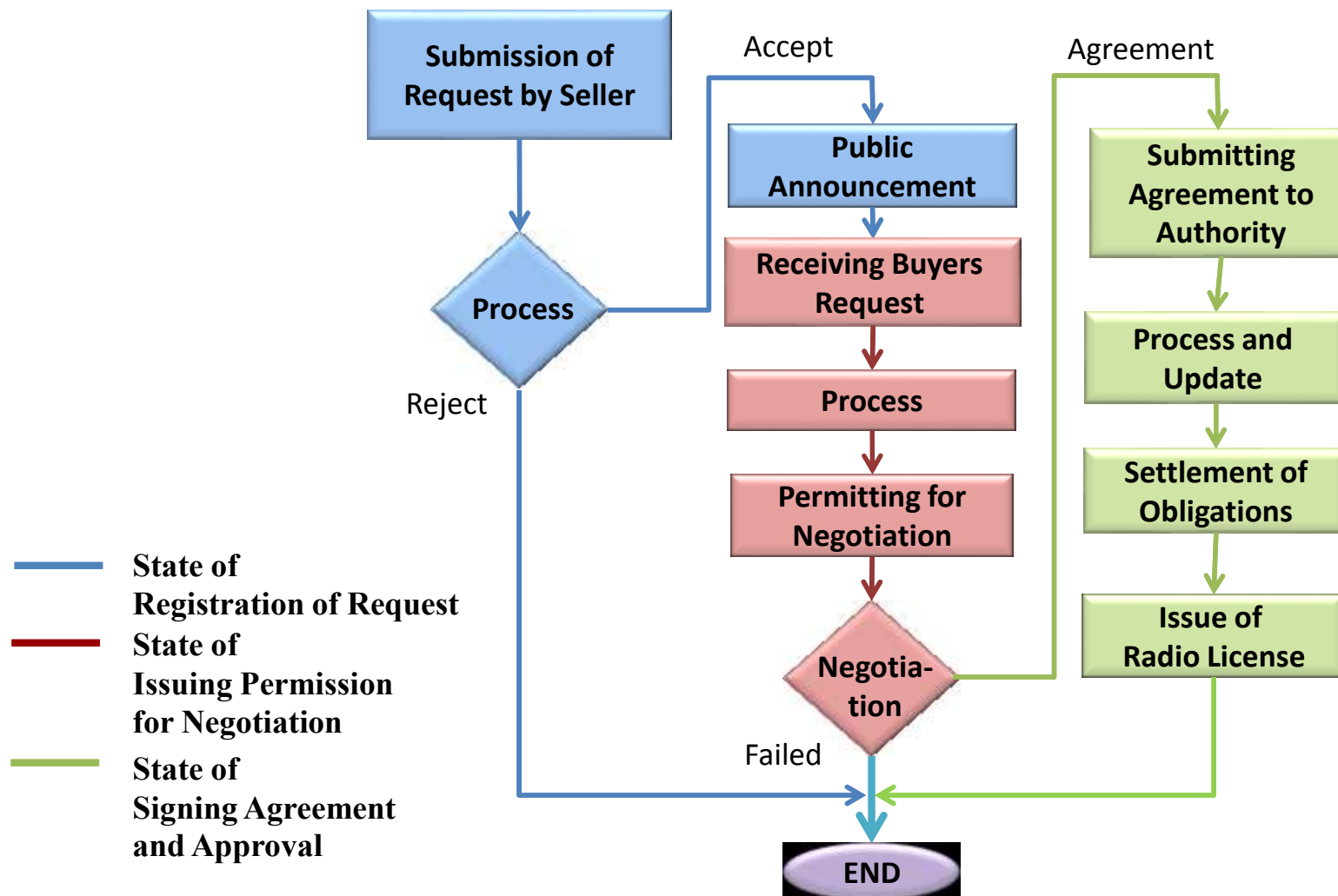
**Trading of license right in the concerned frequency band was permitted**

**The frequency band has not been traded ago within certain period of time**

**Buyer shall have rollout plan to utilize spectrum**

**The frequency lot shall meet the spectrum**

# Spectrum Trade Procedure



# Case Studies

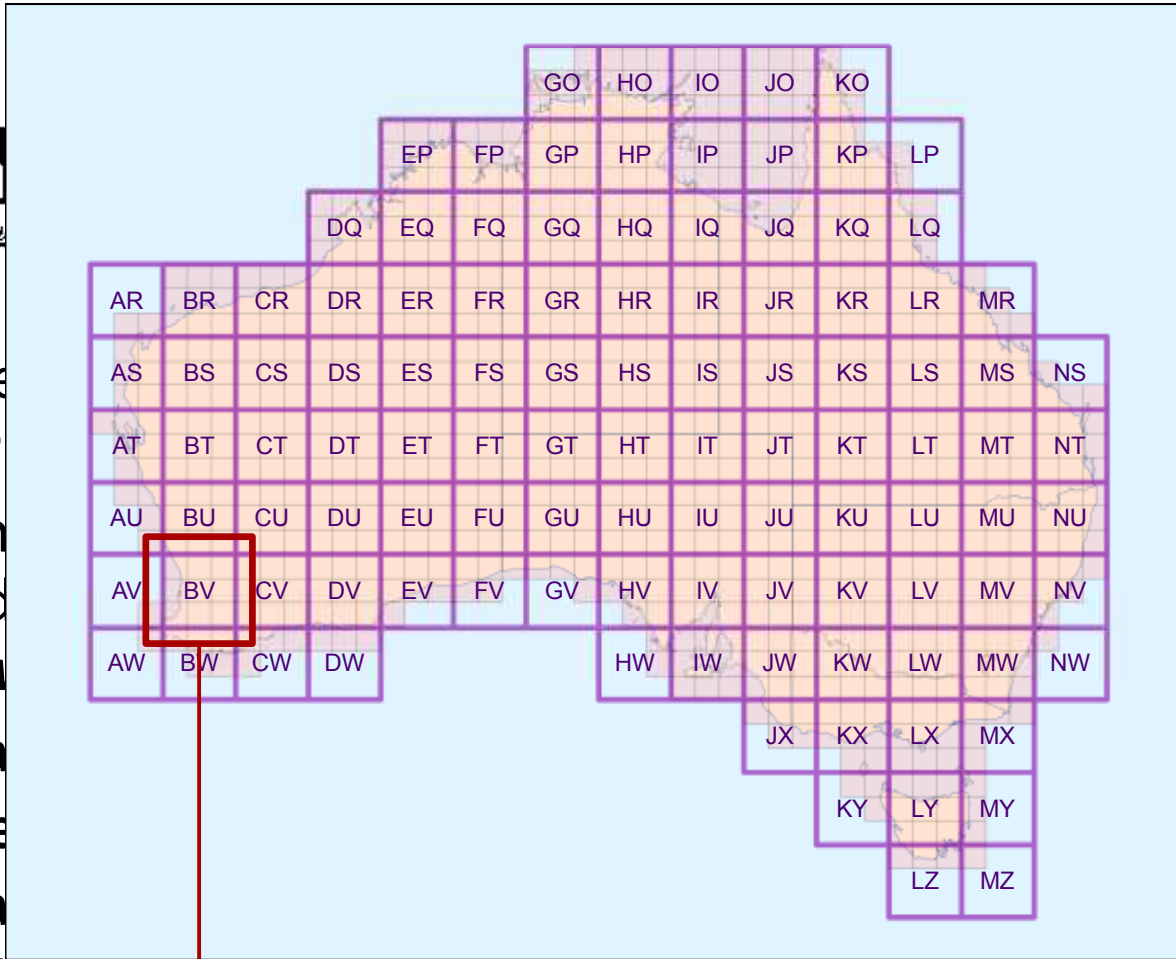
- A few countries are exploring for allowing market trading in spectrum licenses:  
Australia, New Zealand, UK, Iran, etc
- Condition of usefulness of spectrum trading:  
If the trading value to be determined by standards of competitive market efficiently, the trading expected to improve spectrum efficiency
- If the trading values are governed by artificial speculation, gains from holding rather than using scarce resources, or anticompetitive objectives, trading will not results desired efficiency





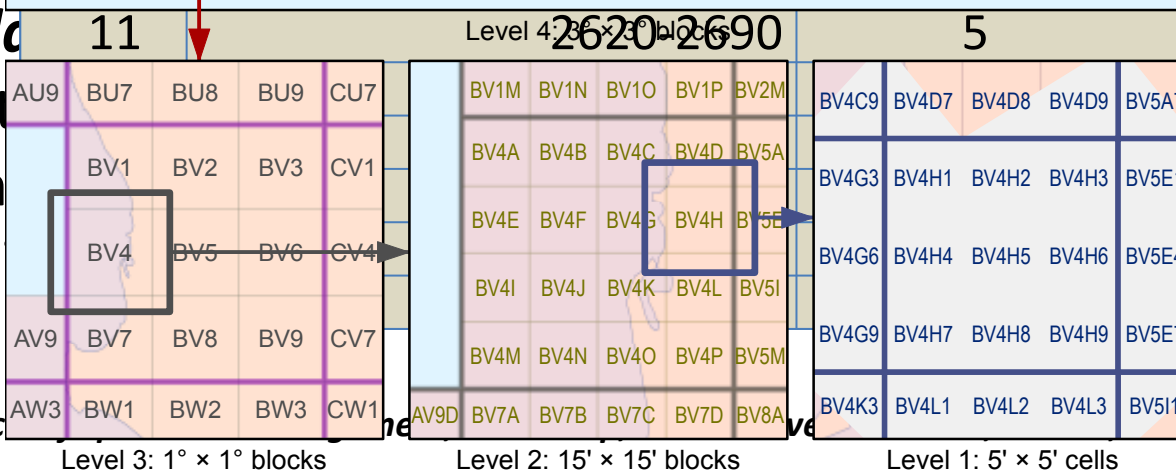
# Tables for 2012

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# The Wireless Telegraphy (Mobile Spectrum Trading) Regulations 2011



- Transfer of all or parts of the rights and obligations arising by virtue of a wireless telegraphy license is permitted
- Currently trading of frequencies in this list permitted
- OFCOM may disagree with trade in several cases including:
  - competition is likely to be distorted as a result of the transfer
  - in the interests of national security
  - License holder has unpaid legal fees based on regulation

<i>Frequency bands</i>
880 – 915 MHz
925 – 960 MHz
1710 – 1781.7 MHz
1805 – 1876.7 MHz
1899.9 – 1980 MHz
2110 – 2170 MHz





# Parameters to Influence in Trade Price

The paid amount for the frequency band that the seller paid

Market dimension that spectrum could be used for

Existing demands and proposals in market to buy or lease the spectrum

Period of remaining validity, the longer the period the greater the value of the license

Flexibility of license owner in technical condition and delivered services. The fewer restrictions that are imposed on the use of the spectrum the greater the value of the license and conversely the more restrictions the lower its value



# Guidelines to Consent or Reject Trading Requests

- In designing flexible spectrum management, authorities should always have the interests of the **end user in mind**
- In certain cases, it may in fact be necessary to limit flexibility, notably **as a means of addressing issues of market power or interference**.
- The goal is to create a framework for assigning spectrum that **permits market forces** to act for the benefit of the end user
- Assignment mechanisms should be selected with the aim of **boosting competition**
- A more flexible regulatory regime in a country will only realize its full potential if the principle of greater flexibility is also applied in the **international level**



**END**