

Flexibility in frequency Management

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Definition of flexibility

- **Quick and easy Access ?**
 - Increase Unlicensed bands
 - Shorten Licensing procedures and reduce conditions
- **Limited technical conditions ?**
 - Give freeway to Innovative Technology
 - Change allocation / assignment procedures
- **Commercial basis ?**
 - Auctions
 - Spectrum Trading

Quick and easy access

- do not surprise frequency managers with your plans and work on spectrum access before the system is available
 - Be clear on what you want
 - Do not invent yourself a usable frequency (range)
 - Do not expect harmonisation over Europe right away

Thesis 1: *informing spectrum managers early about plans is the best support for quick access*

Quick and easy access

- **Be aware: you are not alone in the spectrum**
 - Do not expect to be exclusive or to have the best frequency band.

The Spectrum Scarcity Problem is a problem of

- Finding sharing techniques, or
- Moving incumbent users to other frequency bands, or
- Reducing allocated bands for incumbent users, forcing these to use new technology

Quick and easy access

Banks want certainty on the regulatory situation

- ITU made allocations to enable Teledesic, Skybridge and SkyStation,
- CEPT made allocations for GSM, DSRR, ERMES, DECT, TFTS, UMTS etc, before these systems were there, (some were never !)

Certainty is contrary to flexibility !

Quick and easy Access

- **Unlicensed bands**
 - Create quick access;
 - may block long term flexibility: one can not manage unlicensed bands in short term
 - Still Rules necessary to allow sharing
 - Protect yourself against interference
 - Receiver quality figure ?

Thesis 2: unlicensed bands do not remedy all problems; these also create problems

Limited technical conditions

- Most improvement in spectrum efficiency comes from sharing !
- Exclusive allocations get rare, only for safety and high density use; Noise limited design of systems should be finished
- Sharing is only possible when certain technical conditions are met.

Thesis 3: *flexibility and relaxation of technical conditions contain elements of contradiction*

Innovative technology

- Ultra Wide band
- Dynamic Frequency Selection
- Adaptive Power Control
- Frequency Agile Systems
- Conversion from analog to digital
- Software defined Radio

Thesis 4: *a number of these techniques provide the flexibility necessary to have access, and increase spectrum efficiency; they may only partly be counted as supporting flexibility in frequency management*

Allocation / assignment procedures

The ITU Radio Regulations are an international treaty !

- ITU is a slow organisation
- ITU uses allocation of frequency bands for categories of services
- Allocations are to services, not to systems

Allocation / assignment procedures

- The worldwide market wants allocation to systems (GSM, UMTS) (*identification !*);
- Allocation to services is more flexible !
- No economical means for refarming
- Harmonisation decreases flexibility and takes time, but is commercially still attractive !

Thesis 5: *flexibility decreases harmonisation possibilities, and may diminish market potential*

Conclusion

- **Introducing more flexibility needs serious attention; its application needs serious attention; however, stand-alone solutions may result from it;**
- **The approaches used up to now by spectrum managers have their merits and need continuation; harmonisation may be a positive side-effect**

It will need experience to find the optimal balance between the two approaches !