

The Future of HF Frequency Management

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SELEX
Communications

Introduction

- SELEX Communications. A new name with a fine pedigree
 - > Marconi's Wireless Telegraph Company
 - > GEC-Marconi
 - > Marconi
 - > Marconi-Selenia Communications
 - > Selenia Communications
 - > SELEX Communications



SELEX
Communications



Introduction

- The Need for Change
- Enablers for Change
- New Management Systems
- Benefits
- Restraints and Challenges
- Timescales
- Conclusions

The Need for Change

- The WRC-07 Agenda item 1.13

“taking into account Resolutions **729 (WRC 97)**, **351 (WRC 03)** and **544 (WRC 03)**, to review the allocations to all services in the HF bands between 4 MHz and 10 MHz, excluding those allocations to services in the frequency range 7 000-7 200 kHz and those bands whose allotment plans are in Appendices **25**, **26** and **27** and whose channeling arrangements are in Appendix **17**, taking account of the impact of new modulation techniques, adapting control techniques and the spectrum requirements for HF broadcasting;”

The Need for Change

- HF is an important communications bearer
 - > Provides BLOS communications
 - > Lower cost of ownership when compared to SATCOM
 - > National ownership without reliance on other nation's infrastructure
 - > Flexible, easy deployment [military, civil emergency]
- New Modems & Protocols Have Been Designed but They Require More Bandwidth
 - > To support Digital Broadcasts (DRM)
 - > To support IP based traffic

The Need for Change

- Broadcaster have a Good Case
 - > New technology
 - > Improved services to a large number of people
- Frequency Allocations Methods are Inefficient
 - > Frequencies are allocated to user regardless of how often it is used
 - > Frequency used not optimised for link or traffic type
 - > Multiple frequencies allocated to user to cover changes in propagating conditions.

Enablers for Change

- Automatic Link Establishment (ALE) Systems
 - > 2G ALE (Mil-Std-188-141B) or 3G ALE (STANAG 4538)
- Deliver Benefits
 - > Can be fully automated using Management Systems
 - > Uses a selection of frequencies chosen from across the spectrum
 - > Frequency reuse (Interference detection and avoidance)
 - > ALE systems can avoid frequencies that are being used by others
 - > Good for systems where there are a variety of link lengths with different propagation characteristics requiring different frequencies

Enablers To Change

- Listen Before Transmit (LBT)
 - > Processing power enables
 - Detection of occupancy
 - Detection of various waveforms
 - Real time channel availability
 - > Standards Requirements
 - ALE
 - 2G-ALE
 - 3G-ALE (BW0)
 - 3G-HDL (BW2)
 - SSB Voice
 - MIL-STD-188-110 (Serial Tone PSK)
 - FED-STD-1052 PSK modem
 - STANAG 4529
 - STANAG 4285

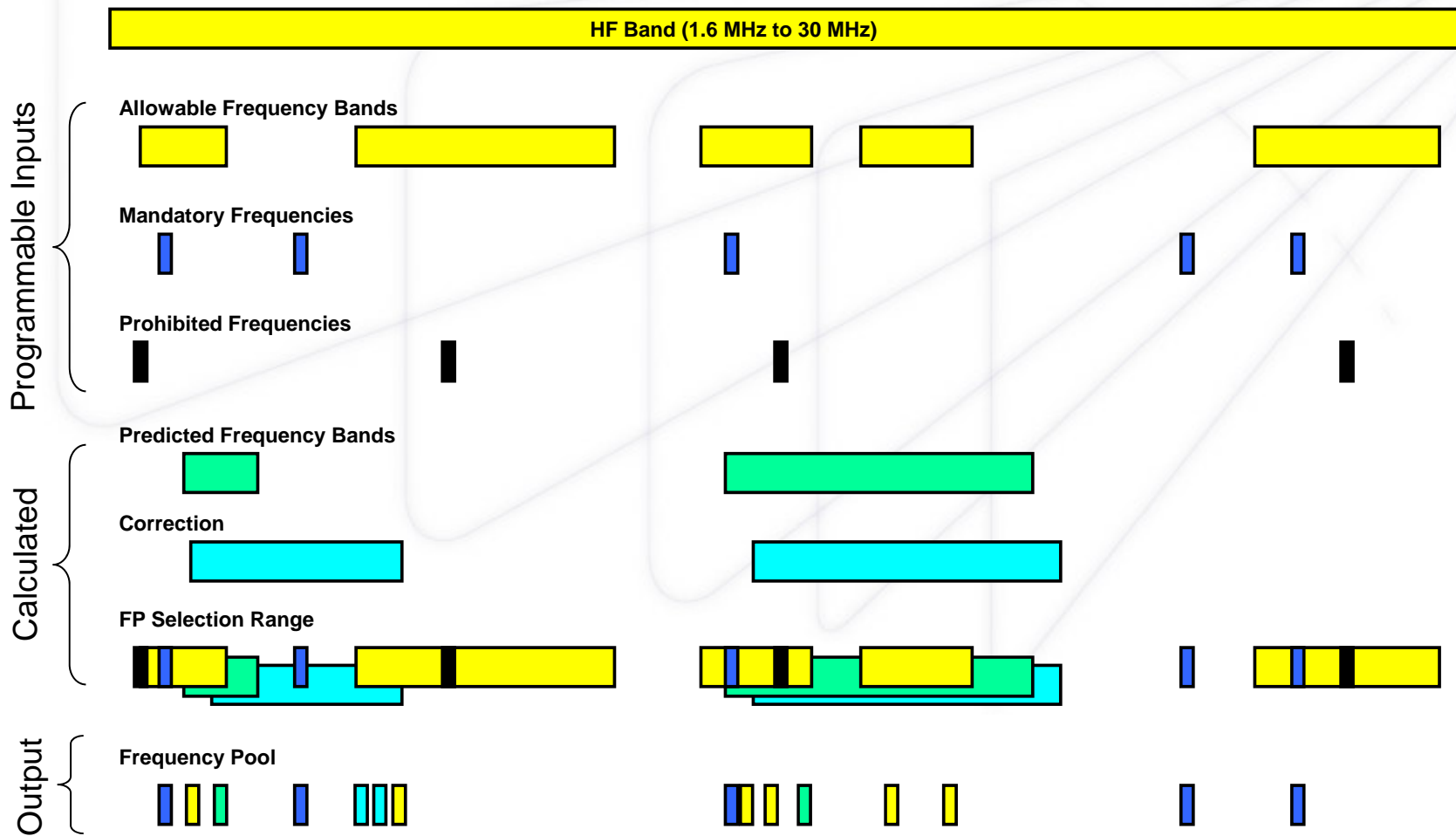
Enablers for Change

- Intelligent Link Maintenance
 - > Real time evaluation of links
 - > Data Rate Change
 - > Frequency agile systems

New Management Systems

- Management Systems
 - > Dynamic Frequency Selection (DFS) from across the spectrum
 - > Controlling 2G & 3G ALE Systems
- What is DFS
 - > Generating ALE frequency pools specific to a net and the time of day.
 - > Frequency pool valid for a predefined period of time
 - > Interference Mitigation by regular changes
 - > Exploiting HF bandwidth more efficiently

Dynamic Frequency Selection



Benefits

- Better Utilisation of the HF Bands
 - > Uses bandwidth which is not in use
- Offers Increase Capacity
 - > Bandwidth can be shared between different users
- Pseudo Random Frequency Use
 - > Attractive to military users
- Regular Changes to Frequency Pools
 - > Limits interference between DFS system and conventional systems

Restraints and Challenges

- How Much of the HF Band Can Be Opened up?
 - > Do We Need to Protect?
 - Civil Broadcast Frequencies
 - Civil Aviation
 - Emergency Channels (Maritime)
 - Radio Astronomy
 - Amateur Bands
- Regulation. How Much?
 - > Complete Deregulation?
 - For Use by Any Body
 - > Limited Regulation?
 - Certain Users
 - Certain Waveforms
 - Bandwidth Limitations
 - Time / Bandwidth Limits
 - Power
- Important Consideration
 - > Benefits to the user will be too great to be ignored.

Timescales

- The Technology Is Available Now
- They Are Compatible With Conventional ALE and Non ALE Systems
- Sweden's HF2000 System Is DFS Enabled (Deployed End 06)
- NATO FMSC Technical Working Group Recently Recommended the Adoption of a Similar Approach
- Bandwidth for DFS Operation Allocated at WRC-07

Conclusions

- Demand for HF Bandwidth Will Continue to Increase.
 - > Changing the Way We Use the HF Band Will Help Us to Meet This Demand.
- Need to use the HF Band more efficiently
- DFS Systems Are Not a Threat but an Opportunity
- DFS Systems Are Here to Stay

Thank you for your
Attention
Any Questions?

Additional Slide

- The European Position

“Further HF spectrum for broadcasting will assist the successful uptake of the European DRM digital radio standard.”

“potential for a more flexible approach to allocations in the HF spectrum as opposed to supporting spectrum allocations specific to different sectors”