Maritime Communications
Strategic Sectorial Spectrum Needs

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Conferência sobre Gestão do Espectro: Perspectivas, Desafios e Estratégias
Lisboa, 20 de setembro de 2013
RSPG Work Programme 2012 and Beyond

1. Future spectrum for wireless broadband
2. Preparation of the next World Radio Conference (WRC)
3. Increasing opportunities for shared use of spectrum
4. Furthering efficient interference management through exchange of regulatory best practices concerning regulation and/or standardization
5. **Strategic sectorial spectrum needs**
6. Addressing situations resulting in underutilization of spectrum
7. Cross-border spectrum coordination

Identify emerging spectrum needs and demand over the coming years, on (11) strategic sectors:
- (…)
- **Intelligent transport systems**
- (…)
- Maritime communications
Outline

- Maritime Business & Maritime Communications
- e-N@vigation
- Spectrum Challenges and Opportunities
- Regulatory and Standardization Issues
- Future Regulatory Framework...
- Concluding Remarks
Maritime Business
&
Maritime Communications
“Traditional” Business

- Maritime Safety Information (MSI)
- Meteorologic and Oceanographic Information (METOC)
Search And Reascue (SAR)
Global Maritime Distress and Safety System (GMDSS)
Automatic Identification System

- VHF DSC Channels
- SOTDMA
Vessel Traffic management System

- AIS
- Radar & Optic Sensors
- VHF voice (for coordination)
GMDSS – Assigned Spectrum

- **A1** (Sea Areas A1, VHF Voice (25KHz), VHF DSC (156.8 MHz), NAVTEX (490/518 KHz), INMARSAT HF NBDP)
- **A2** (Sea Areas A2, MF Voice (2182 KHz), MF DSC (2187.5 KHz), NAVTEX (490/518 KHz))
- **A3** (Sea Areas A3, HF, INMARSAT HF NBDP)
- **A4** (Sea Areas A4 >75ºN, COSPAS-SARSAT)

Ch 16 (156.8 MHz)
Ch 70 (156.525 MHz)
2182 KHz
2187.5 KHz
490/518 KHz

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GMDSS – Assigned Spectrum

- **Sea Areas**: A1, A2, A3, A4
  - **VHF (25kHz)**: Voice (Ch 16 (156.8 MHz)), DSC (Ch 70 (156.525 MHz))
  - **MF Voice**: 2182 KHz
  - **DSC**: 2187.5 KHz
  - **NAVTEX**: 490/518 KHz
  - **INMARSAT HF NBDP**: (>75ºN)
  - **COSPAS-SARSAT**
New Opportunities and Demands...

Broadband

?
e-N@vigation: Intelligent Transport System or Maritime Communications
IMO e-Navigation

“E-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment.”.

MSC 85/26/Add.1 annex 20
e-NAV Conceptual Model

Safety
Security
Environment Protection

Data Fusion

Voice
AIS
ECDIS
IBS/INS
ARPA
LRIT
VTS
GMDSS
(…)

Non-IP Services
IP Services

Business

Marine Information

Information Technologies

Connection Services

Physical Links

WWRS
MF
HF
VHF
MF
HF
VHF
SATCOM
UMTS/LTE
WiMax
e-NAV: Service Oriented Architecture

- Safety
- Security
- Environment Protection
- Processes
- Applications

Ship’s Own Purposes

Share with Community of Interest

IP Services

Broadband?
Agenda item 8.2

"Initial consideration by IMO technical bodies have identified that e-navigation could not be deployed without additional frequency allocations for these advanced maritime systems. Based on respective future studies both in IMO and ITU, spectrum requirements will be refined and validated.”
Spectrum
Challenges and Opportunities
Spectrum Challenges

- **25 KHz** (DSC ⇔ 9.6 Kbps)
- **3 KHz** (< 9.6 Kbps)
- **24 KHz** (< 64 Kbps)

Questions:

- New Standards/Allocations/Assignments?
- New Assignments (Analogue TV?)
- New Allocations (ITU/WRC)
Spectrum Opportunities

Cognitive Radio

- Reduced Occupancy on MMS Assigned Spectrum
- Significant world sailing activity occurs within 40 miles from coast line
- Existing Shore-based VHF infrastructure
- Multicarrier Modulation Schemes
Overcoming Spectrum Scarcity

Primary Users = Assigned Services
Secondary Users = Broadband VHF

MMS assigned channels for voice (secondary data on primary voice channels)
Pilot testing on “New technologies” allocated channels (DSA on assigned bands)

Build a little, test a little…
Regulatory and Standardization Issues
Incumbent’s QoS Assurance

**Static Allocation**
- Interference Abolition
  - No interference...
  - Trust on Regulators practices...
- Auditing
  - QoS Enforcement

**Dynamic Allocation**
- Interference Tolerance
  - Interference is allowed, but...
  - Trust on Secondary behavior...?!

**Maximization of Usable Capacity**
Spectrum “Multiplication” Exercise

Incumbent Harmful Protection

Static Allocation

Transition Plan

Dynamic Allocation

International Coordination

Current Regulatory Framework

Future Regulatory Framework
A Suitable Regulatory Framework
Evolution ...

- Identification, classification and Localization of Spectrum Users
- Control Interference Levels
- Assure Incumbents Rights
- Conciliate Demands
- Interference is Allowed
- Difficult to Register & Log Opportunistic Users
- Descentralized Spectrum Access Control
- Metrics Definition
- Enforcement
Back to Foundations...

Future Regulatory Framework

Current Regulatory Framework

- Promote Efficient Use of Spectrum
- Enforce QoS of Spectrum Users
- Remove Barriers throughout Telecomms Sector
- Support Telecomms Business
- (…)

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Strategic Sectoral Spectrum Needs

- e-Navigation
- Economical Activity
- Internet...
Obrigado!

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