United States Coast Guard Spectrum Management CG-672



Presentation to Developing World Regulators and Spectrum Managers







Overview

- Coordination and Spectrum Management
- Coast Guard Mission
- ≻WHERE?
- ► WHY? and HOW?
 - ➤Safety of Life at Sea (SOLAS)
 - Global Maritime Distress and Safety System (GMDSS)
- ≻Summary

Coordination and Spectrum Management

R

E

RF does not stop at the border(s)!!!

MEMBER





National Spectrum Management - How it's managed in the USA



 NTIA (National Telecommunications Information Administration) Regulates spectrum for Federal agencies

 FCC (Federal Communication Commission) Regulates spectrum for Non-Federal, Commercial, Public and Private entities



FCC-regulated frequencies are available to federal agencies on a case-by-case basis when coordinated and agreed to by the FCC (examples: State and Local non-federal authorities)

National Coordination

- Coast Guard works with the Federal Communications Commission (FCC) to establish Civil Maritime Rules
- Formally under 47 CFR Part 80
- Defines radio stations on land and onboard ship.
- This radio service allocation provides for safety of life and property at sea and on inland waterways.

International Coordination



International Coordination

- **NTIA** RCS (Radio Conference Subcommittee)
 - Develops <u>US Federal</u> positions for World Radio Conference (WRC)
 - Leads International Telecommunications Union (ITU)
 Working Party Delegations
- FCC WAC (World Radio Conf Advisory Committee)
 Develops US non-Federal positions for WRC
- **DOD** IPWG (International Permanent Working Group)
- Develops DOD/Military Service and NATO positions
- State Department Special Committee
 - Reconciles and establishes US final positions
 - State also head of (Conference Preparatory Meetings (CPM) and WRC delegations

- As part of the U.S. Delegation to the UN World Radio Conference (WRC), the Coast Guard helps shape International Telecommunications Policy.
- Accomplished through the UN International Telecommunications Union (ITU) (Geneva, Switzerland)
- Also participates in the UN International Maritime Organization (IMO)(London, UK) and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) (Paris, France)

International Telecommunications Union

- World Radio Conference (WRC) US Maritime Reps
 - Next WRC is in 2019. CG-672 will be sending 1 Rep & 3 contractors
- Conference Preparatory Meeting (CPM) US Maritime Reps
- Study Group 5:
 - Working Party 5A Land mobile service excluding IMT; amateur and amateur-satellite service
 - Working Party 5B Maritime mobile service including the Global Maritime Distress and Safety System (GMDSS); the aeronautical mobile service and the radiodetermination service
 - Working Party 5C Fixed wireless systems; HF systems in the fixed and land mobile services
- Inter-American Telecommunication Commission (CITEL)

Establish a Region 2 (North and South America and Carribbean)
 position for WRC Agenda Items



International Maritime Organization –

- Navigation, Communication, Search & Rescue (NCSR)
 - Of Technical Working Group CG-672 participates in the developing Recommendations and Standards in coordination with ITU WP5B as well as GMDSS policy and procedures, Polar communications, and search and rescue (SAR) communications. Support CG-NAV and CG-SAR. Sponsored Iridium application to become a GMDSS service provider.
- IMO/ITU Joint Experts Group
 - Establish IMO WRC positions
 - Global Maritime Distress and Safety System (GMDSS) Modernization

Navigation Communication Search and Rescue (NCSR)
 ^{06 December} support

WRC-19 US Maritime Agenda

- VHF Data Exchange System (VDES) Preparations to defend VHF Satellite uplink.
- Iridium Prepare consequential changes to the Radio Regulations as a result of additional GMDSS satellite providers.
- GMDSS Modernization Prepare consequential changes to the Radio Regulations as a result of this effort.
- Define Autonomous Maritime Devices









Coast Guard Mission

U.S. COAST GUARD

- The Coast Guard's primary purpose is to safeguard our nation's maritime interests and environment around the world.
- >By law, the Coast Guard has 11 missions:
 -5 Homeland Security Missions
 - -6 Non-homeland Security Missions

MISSIONS

Homeland Security Missions

- (A) Ports, waterways and coastal security.
- (B) Drug interdiction.
- (C) Migrant interdiction.
- (D) Defense readiness.
- (E) Other law enforcement.

> Non-Homeland Security Missions

- (A) Marine safety.
- (B) Search and rescue.
- (C) Aids to navigation.
- (D) Living marine resources (fisheries law enforcement).
- (E) Marine environmental protection.
- (F) Ice operations.

Migrant interdiction



\$500 million in cocaine seized in 1 stop



We find "subs" carrying drugs too



Marine Safety

an "ambulance and police service" for mariners



Deepwater-Horizon oil spill management



USCG "clearing a path"



USCG response to Hurricane Dorian



Latest...10 September 2019, 24 rescued from cargo ship "Golden Ray" capsized off the Georgia coast



Cutting though the hull of cargo ship "Golden Ray" to rescue the remaining 4 trapped crew



Average Coast Guard Day

- Conducts 45 search and rescue cases;
- Saves 10 lives;
- Seizes 874 pounds of cocaine and 214 pounds of marijuana
- Conducts 57 waterborne patrols of critical maritime infrastructure;
- Interdicts 17 illegal migrants;
- Conducts 24 security boardings in and around U.S. ports;
- Screens 360 merchant vessels for potential security threats prior to arrival in U.S. ports;
- Completes 26 safety examinations on foreign vessels;
- Conducts 105 marine inspections;
- Investigates 14 marine casualties involving commercial vessels;
- Facilitates movement of \$8.7B worth of goods and commodities through the Nation's Maritime Transportation System.

Where?

Where does Coast Guard operate?



All over the globe

International waters



Coast Guard Spectrum Requirements

- Coast Guard operates multiple assets that require national level spectrum certification
 - Coast Guard Cutters
 - Global Maritime Distress & Safety System (GMDSS)
 - Fixed Wing and Rotary Aircraft
 - Land Stations



LORAN, DGPS, NAVTEX 100-518KHz

Security/Utility/LMR/AIS 162-174MHz

□VHF Marine, CG AUX/AIS 156-162MHz

CG AUX Operations/Misc 130-150MHz

■Video Links 21-24GHz

□ Microwave/TACAN 900-945MHz

Microwave/TACAN 1000-2400MHz

Radars/RACONS 2400-4000MHz

SAR/Working/MF/HF 2-30MHz

□ Microwave 7/8GHz

- ■VHF Aeronautical 100-130MHz
- ■Mutual Aid (S160) 30-100 MHz, 150-157MHz
- UHF Aeronautical/SAR/Working 200-400MHz
- Radars/RACONS 9000-11000MHz
- LE Working/Link/Utility 406-420MHz

Where does the USCG use these frequencies?

- On all of our Assets including aircraft and marine vessels
- Connection with Federal, State, and Local
- Satellite, Radar, P-P microwave, 2-way, etc.,
- International waters

Types of USCG Maritime Assets

USCG Cutter



Short range interceptor



- Surface Search Radar
- SAR Sea Search Radar
- Close-in-Weapons System (CIWS)
- Various VHF, UHF & EHF Radiocommunication
 Systems

Types of USCG Airborne AssetsFixed WingRotary Wing





- Search & Weather Radar
- Air Search Radar
- NAVSTAR GPS
- Radiocommunications suite

WHY? and HOW? SAFETY, SAFETY, SAFETY

Safety of Life at Sea* (SOLAS)

Chapter IV – Radiocommunications

- Digital Selective Calling (DSC)
- Emergency Position Indicating Radio Beacon (EPIRB)
- Global Maritime Distress Safety System (GMDSS)

Chapter V - Safety of navigation

- Navigation safety services (Radio Beacons)
- Automatic Identification Systems (AIS)
- * International Maritime Treaty through the International Maritime Organization (IMO)

Digital Selective Calling (DSC)

- > DSC used to initiate communications (911 of the seas)
- Priorities: Distress, Urgency, Safety, Routine
- Types of Call: All Ships, Group, Geographic Area, Individual
- Distress Calls are "All Ships" calls:





DSC equipped maritime radio

Maritime Mobile Service Identities (MMSI) numbers uniquely identify your vessel and must be obtained for each vessel through BOATS US, FCC, IRAC, etc, depending on whether the vessel is private, commercial, or Federal.

The DSC radio must also be installed with a GPS receiver.

Digital Selective Calling (DSC) **Distress** button



ENT

CLR

P-CH

VEM SCAN

CALL

BLL OPEN

Emergency Position Indicating Radio Beacons work on small boats and are required on large ships

EPIRB'S



Utilize VHF frequencies (406 MHz and 121.5 MHz)







2

Signal is forwarded to the nearest ground station for verification

Local User Terminal

3

EPIRB Activated

-

Mission Control Center

Rescue Coordination Center

Rescue 21



RACON

Triggered by S-Band or X-Band Radar





RADIO BEACONS

Reason why some bridges need RACONs



Example: Ship radar display for RACONs at San Francisco to Oakland Bay Bridge



Automatic Identification System ("AIS") on VHF marine channels



What is GMDSS?

- A global maritime distress and safety system
- Uses satellite, advanced terrestrial technology, and shipboard radio systems
- Facilitates rapid, automated distress alerting to shore-based rescue authorities
- Facilitates timely, automated safety communications to mariners

FUNCTIONAL REQUIREMENTS OF GMDSS AND INTERNATIONAL REQUIREMENTS

GMDSS compliant ships at sea must be able to:

Transmit ship-to-shore distress alerts by at least two separate and independent means, each using a different radiocommunication service

Receive shore-to-ship distress alerts

Transmit and receive ship-to-ship distress alerts

Transmit and receive search and rescue coordinating communications

REQUIREMENTS cont'd

- Transmit and receive on scene communications
- Transmit and receive signals for locating
- Transmit and receive maritime safety information
- Transmit and receive general radio communications from shorebased radio systems or networks
- Transmit and receive bridge-to-bridge communications

Why GMDSS?

- Enhance <u>Worldwide</u> Ship-to-Shore Communications for distress alerts
- Serve as "umbrella" for existing/future communications technologies
- Links equipment carriage requirements to where ships operate (Sea Areas)

GMDSS Applies To:

SOLAS Class Vessels –

- Commercial, 300 GRT or greater
- Passenger ships

Does Not Apply To:

- > Recreational boats
- > Fishing vessels

> Vessels that operate exclusively on the Great Lakes.

1

Components of GMDSS

> System of Systems

DSC – Primary Component of GMDSS

MF, HF & VHF-FM & Voice Comms

>NAVTEX (NAVDAT HF *future*)

Coastal coverage (MF) up to 450 miles offshore

➤Inmarsat – Iridium

Survival craft VHF radios

System of Systems continued....

SITOR / NBDP (simplex teletype over radio/narrow band direct printing) Weather updates

SafetyNet/EGC (Enhanced Group Call)

➢Inmarsat C

Additional assets

Satellite 406 MHz EPIRB

Maritime Safety information (MSI) and Urgent Marine Information Broadcast (UMIB) Voice Broadcasts

SART (Search and Rescue Transponder)

10/11/2019

Principles of Communications International Maritime Satellite (Inmarsat)

Mobile Satellite Communications

Worldwide Coverage Map



Limit of global beam coverage for Inmarsat A, B, C, D, E, M

Alianiic Ocean Region-West

Pacific Ocean Region

Attantic Ocean Region-East



Inmarsat-phone coverage

The events but of service of the edge of coverage beams fluctuates depending upon a variety of conditions. The map depicts immersalts expectations of coverage but does not represent a quarantee of service. Inmarsaf Castomer Care Tel: +44 (0) 171 728 1777 FaX: +44 (0) 171 728 1746 E-Mall: customer_pare/simmarsal.org 0 immarsi, interatival Mobile Safelle Oganization, 1837

Recent addition to GMDSS Iridium "Pole to Pole" constellations



PAST/PRESENT The FUTURE??? (is here) Operations though the North West passage.



0-20 Nautical Miles







Sea Area A1

10/11/2019

0-100 Nautical Miles







Latitude 70N to 70S

Within Coverage of Geostationary Maritime Satellites (INMARSAT)

HF DSC





Sea Area - A3



Polar Regions: 70N to 90N & 70S to 90S

MF, HF, Polar orbiting satellites (Iridium)

Outside Sea Areas A1, A2, A3

···· iridium

Area A4 Established Feb 1, 199[°]



Polar Regions: 70N to 90N & 70S to 90S

MF, HF, Polar orbiting satellites (Iridium)

Outside Sea Areas A1, A2, A3

···· iridium

Area A4 Established Feb 1, 199[°]

USCG SUMMARY

- Spectrum Management must be handled both Nationally and Internationally
- USCG Operates around the globe under a number of missions
- Has a host of spectrum dependent systems used for National Security, Search & Rescue, and Maritime Safety
- SOLAS and GMDSS are crucial to maritime safety
- SEMPER PARATUS Always Ready!

Coast Guard Spectrum Personnel

- Derrick J. Croinex (Chief, Comms Policy)
- Jerry Ulcek
- Rick Joyce
- Ron Blackmore
- Russell Levin

(Chief, Comms Policy) (Intrn'l/Nat'l Spectrum) (Attorney) (FSD)

(GMDSS Stds, Policy)

(202) 475-3551
(202) 475-3607
(202) 475-3556
(202) 475-3552
(202) 475-3555

Questions?

