

AIS Pilot Project Using UHF in Korea 1996

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Background(1)

- Sea Disaster in Korea(해양사고)
 - 1995.7 A tanker, SeaPrince, runned on a rock(씨프린스호)
 - 1995.9 A tanker, Yuil, went down(유일호)
- A preventive of the ocean pollution(해양오염방지대책)
 - 1995.10 Plan from the party & the government(당정협의)
 - 1995.11 MOMAF requests ADD Technology “Spin-off”
 - 국방핵심기술 민수화 기술이전(“전산지도정보 및 도시용 S/W)
 - 기술이전 요청기관 : MOMAF (해양수산부)
 - 기술이전 기관 : ADD (국방과학연구소)
 - 1995.12 -1996.12 AIS Pilot Project (271,000,000 Won)

Background(2)

- Project Team & Role
 - MOMAF(Mr. Dong Kyu Park) : Evaluation
 - Ministry of Maritime Affairs & Fisheries(해양수산부)
 - ADD(Sang Zee Lee, Ph.D) : System Integration
 - Agency for Defency Development(국방과학연구소)
 - KRISO (Sang Hyun Seo, Ph.D) : ECDIS
 - Korea Research Institute of Ships & Ocean Engineering, KORDI
 - 선박해양공학분소(해양연구소)
 - KMU(Prof. Duk Soo Lee) : Safe Routing & Ship Operation
 - Korea Maritime University(한국해양대학교)
 - CPS(Mr. Jong Hoon Lee) : AIS Development
 - Computer Projection System : Domestic Company (주)씨피에스

Purpose

- Prevent the ocean pollution in the coast due to the sea disaster of the oil tanker
- Develop AIS Prototype System
 - Monitoring System in MOMAF HQ
 - Systems for the Control Center on the Seashore
 - Shipborne Equipment
 - Communication Link including the Repeater
 - Generation of the Standard Specifications

Introduction to AIS

- AIS : Automatic Identification System
 - Named by IMO in 1996
 - Allow efficient exchange of navigational data for 4s(shore-to-ship, ship-to-ship) operation
- Two different AIS Approach in 1996
 - AIS using VHF/DSC
 - AIS using Broadcast Technique(BT)/STDMA
 - Self-organized Time Division Multiple Access

AIS using VHF/DSC(1)

- Developed by IALA
 - International Association of Lighthouse Authority(국제등대학회)
- Adopted as ITU-R M.825 by ITU
 - International Telecommunication Union(국제원격통신연합)
- About VHF/DSC
 - Originally developed for voice communication
 - Channel 70 for common use
 - 1200 baut data rate, FSK
 - Occupation rate of channel 70 and other working channel should not be greater than 10% and 30% respectively

AIS using VHF/DSC(2)

- AIS using Channel 70 only
 - 0.1 Erlang for “Distress & Safety Call(조난구조요청)”
 - Voice and data communication
 - Valdez port in Alaska : 3-4 ships a day
- AIS using Channel 70 & Working Channel
 - Channel 70 is used only as gateway
 - Additional working channel should be required
 - Prince William Sound : about 10 or more ships

AIS using BT/STDMA(1)

- Developed by Finland & Sweden
 - IMO Report NAV 42/WP.2 (Annex 6)
- Named as
 - GP&C(Global Positioning & Communication) Transponder or
 - S4(Shore-ship, ship-ship) Transponder
- Characteristics
 - Pre-defined short time-slots in the same period
 - One broadcast, all others receive in a allotted time-slot
 - More than 600 ships with 9600 bps for 1 min. update

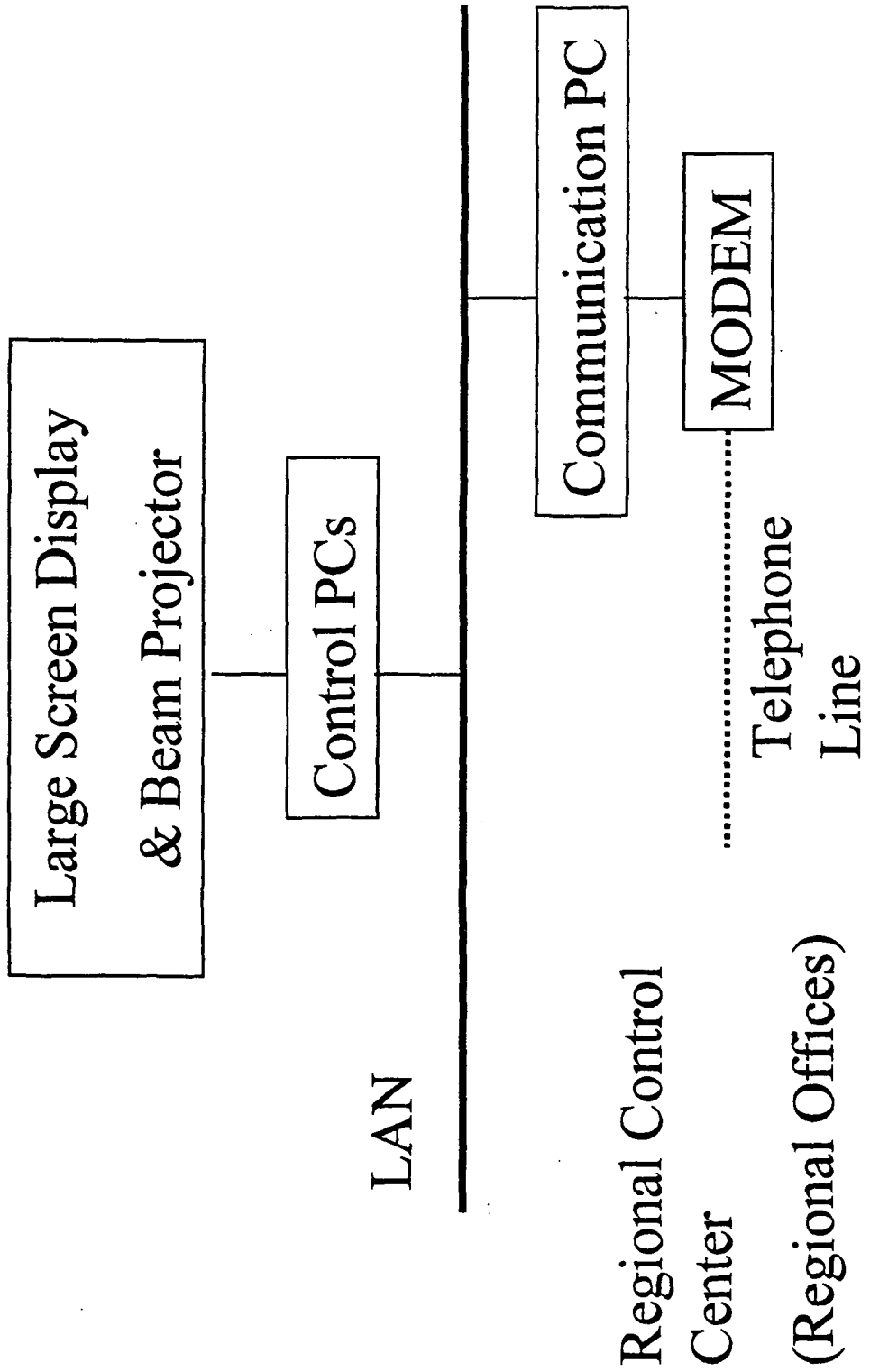
AIS using BT/STDMA(2)

- Basic Requirements
 - Exact timing synchronization
 - World wide Common Channel Allocation
- About STDMA
 - Time slot : 20 Bytes data/total 32Bytes
 - 2250 time slots(26.67ms)/minute at 9600 bps
 - Self-organized allocation of vacant time-slot

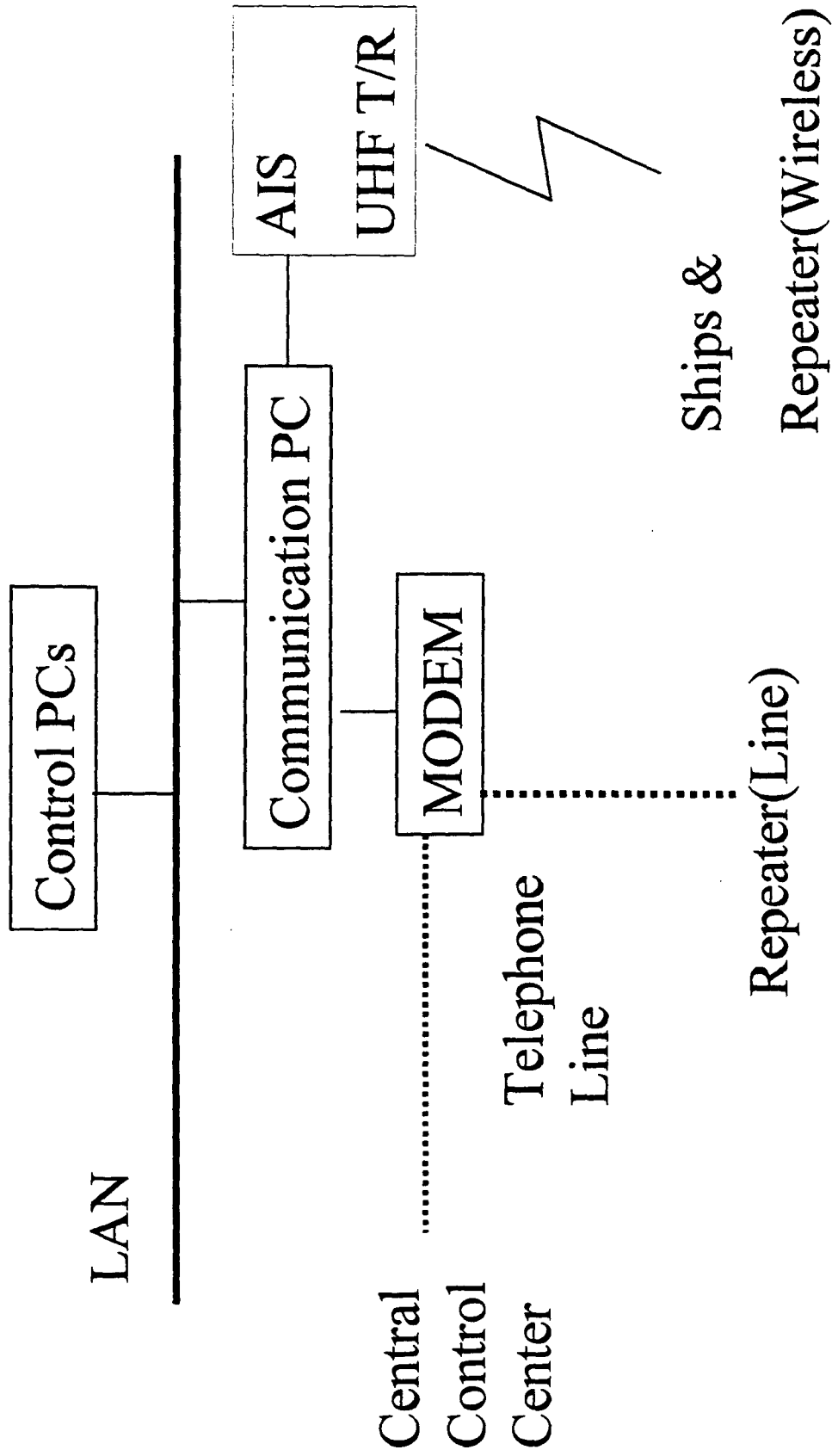
AIS pilot project in Korea

- System Configuration
 - System for the Central Control Center in MOMAF HQ
 - Systems for Regional Control Center in Regional Maritime Affairs & Fisheries Office
 - Repeaters
 - Shipborne Equipments

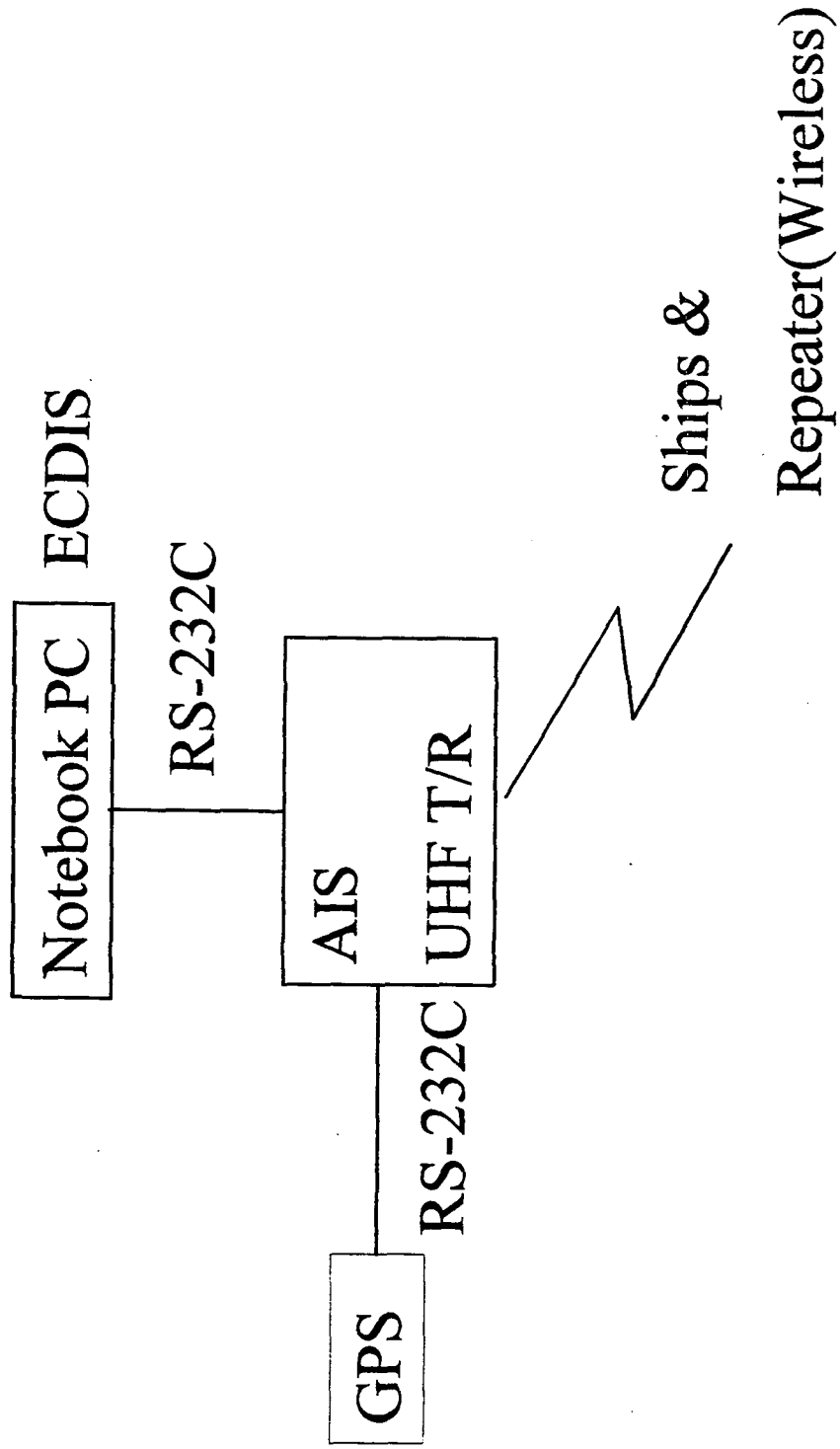
Central Control Center System in MOMAF HQ



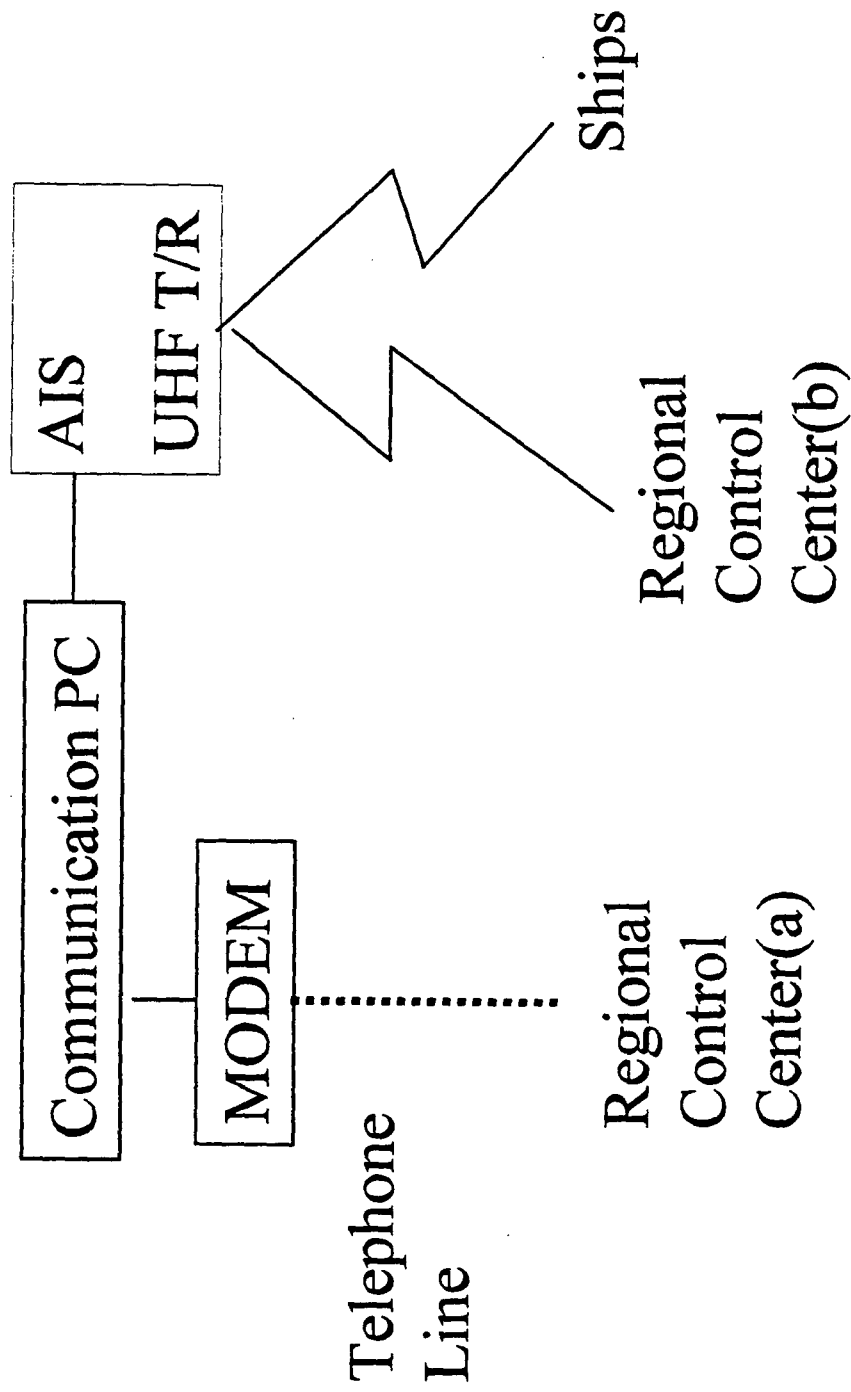
Regional Control Center System



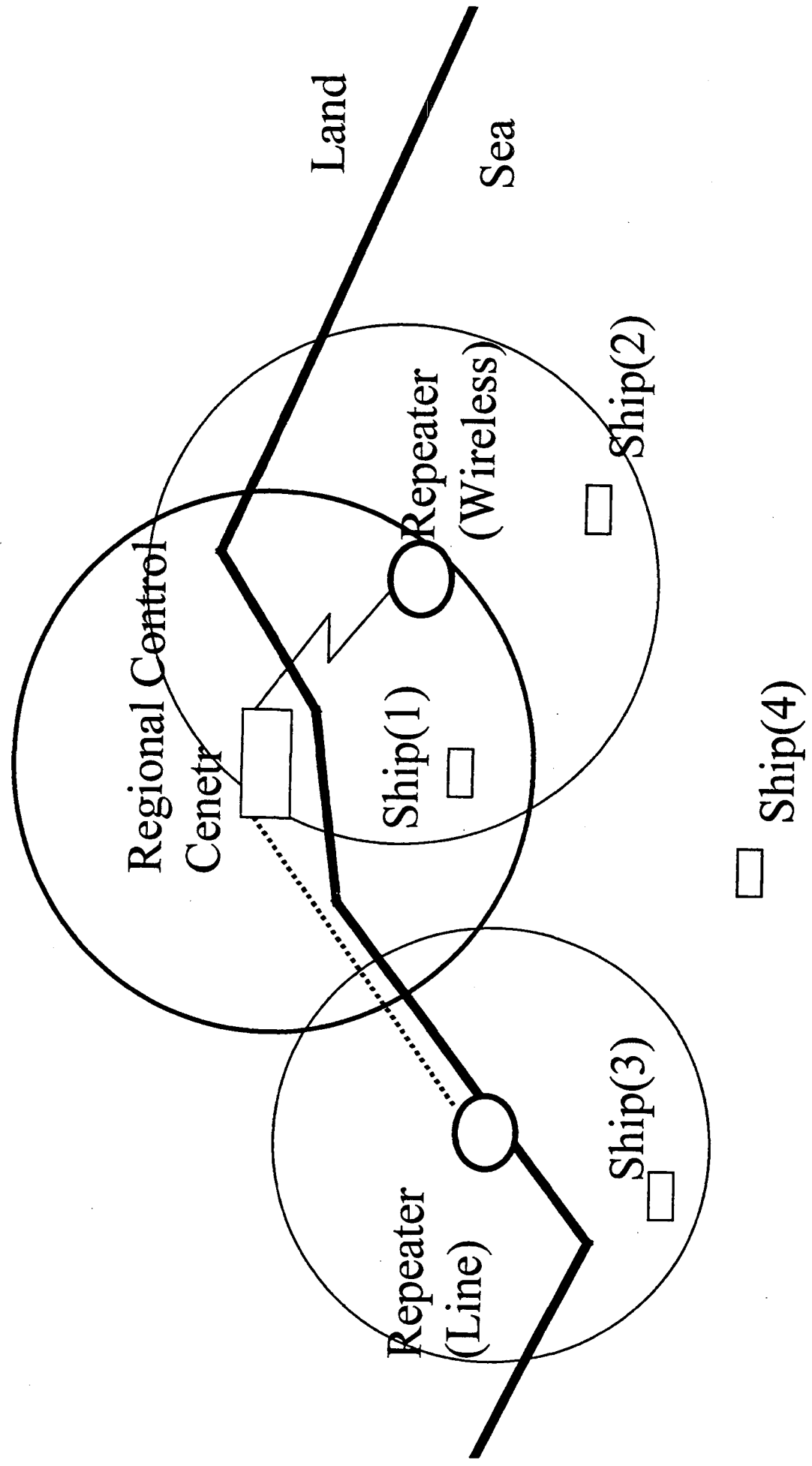
Shipborne Equipment



Repeater(1)



Repeater(2)



Repeater(3)

- Repeater(Line)
 - Data communication with modem through telephone line
 - At any position on seashore with antenna tower
 - Existing lighthouse can be a good candidate
 - Easy extension of range along the seashore
- Repeater(Wireless)
 - Island or buoy with line-of-sight can be used
 - The sola cell for power source
 - One AIS can be used both for repeating & Interrogation

Wireless Link

- UHF instead of VHF
 - VHF was not permitted for AIS project
 - 25Khz bandwidth
 - 30Km range with 20 watt power output
 - Voice channel with MODEM for data communication

Future Study

- Development of the detailed repeater specification and its realization
- Realization the internationally standard AIS using SOTDMA and being compatible with DSC
- Interoperability with VTS