Importance of ICT and its applications in the development and integration of performance in seaports

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Outlines

- *Introduction.*
- *What is a Smart port.*
- *Wireless and satellite communications networks.*
- *Navigation and tracking systems and applications.*
- *Examples of ICT applications and services offered in Smart ports.*
- *Information Technologies and integration between different Maritime services.*
- *Advantage of integration.*
- *Conclusion.*

Introduction

- *Maritime industry is a global transporter of the goods of globalized economics.*
- *Shipping plays a vital role in global economy and over 90% of the world trade carried by sea.*
- *Efficient transportation of cargoes impact on both consumer and the economy.*
- *ICT plays a vital role for improving efficiency of maritime transport and protection of sea.*
- *The Smart port uses ICT technologies extensively to create high-tech port.*
- *ICT is very important for collecting, storing, processing, presenting and distributing relevant data and information to the participants in maritime transport.*

What is Smart port? (from the point of view of ICT)

- *All work of the port are fully automated and all devices are connect via IoT.*
- *Over all port operation services can be enhanced by moving to a paperless environment and providing a valuable and relevant solution that completely restructures the manual process of documents exchange between port community members.*
- *In port operations, the integration of various infrastructures, both physical and IT, includes different networks and positioning technologies.*
- *The ability to be able to work together to effectively share information, both for the benefit of port and for its customers.*

ICT networks in maritime sector

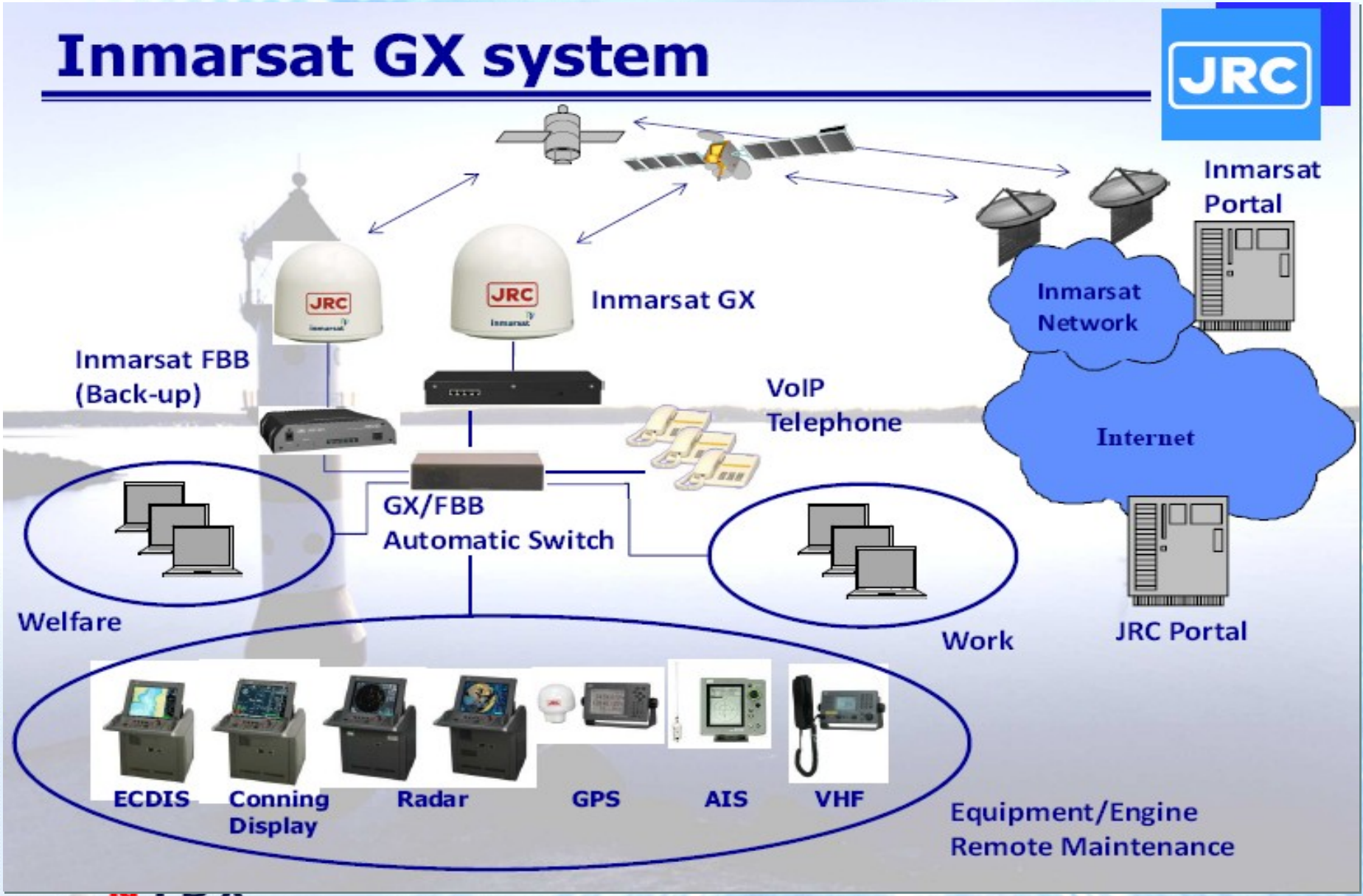
- ***ICT Networks covers:-***
  - ✓ ***Terrestrial networks(HF/VHF/ UHF radio,fiber optics and landlines).***
  - ✓ ***Cellular radio systems(GSM, 3G and 4G).***
  - ✓ ***Mobile broadband system(WiMAX, WI-FI).***
  - ✓ ***Satellite communication systems(Inmarsat, Iridium, Althuraya, etc.).***
  - ✓ ***Satellite Navigation system(GPS, Glonass, Galileo, etc.).***
  - ✓ ***Internet (Web, E-mail, Electronic payment).***
  - ✓ ***Broadcasting systems (DVB, DAB).***
  - ✓ ***Sensing technology employing sensors to feed control systems with both vehicle-based data (Radar, RFID, CCTV, infrared- and visible-band cameras).***

Innovation of maritime communication by ICT

Analogue ⇨ Digital Broadband ⇨ Network

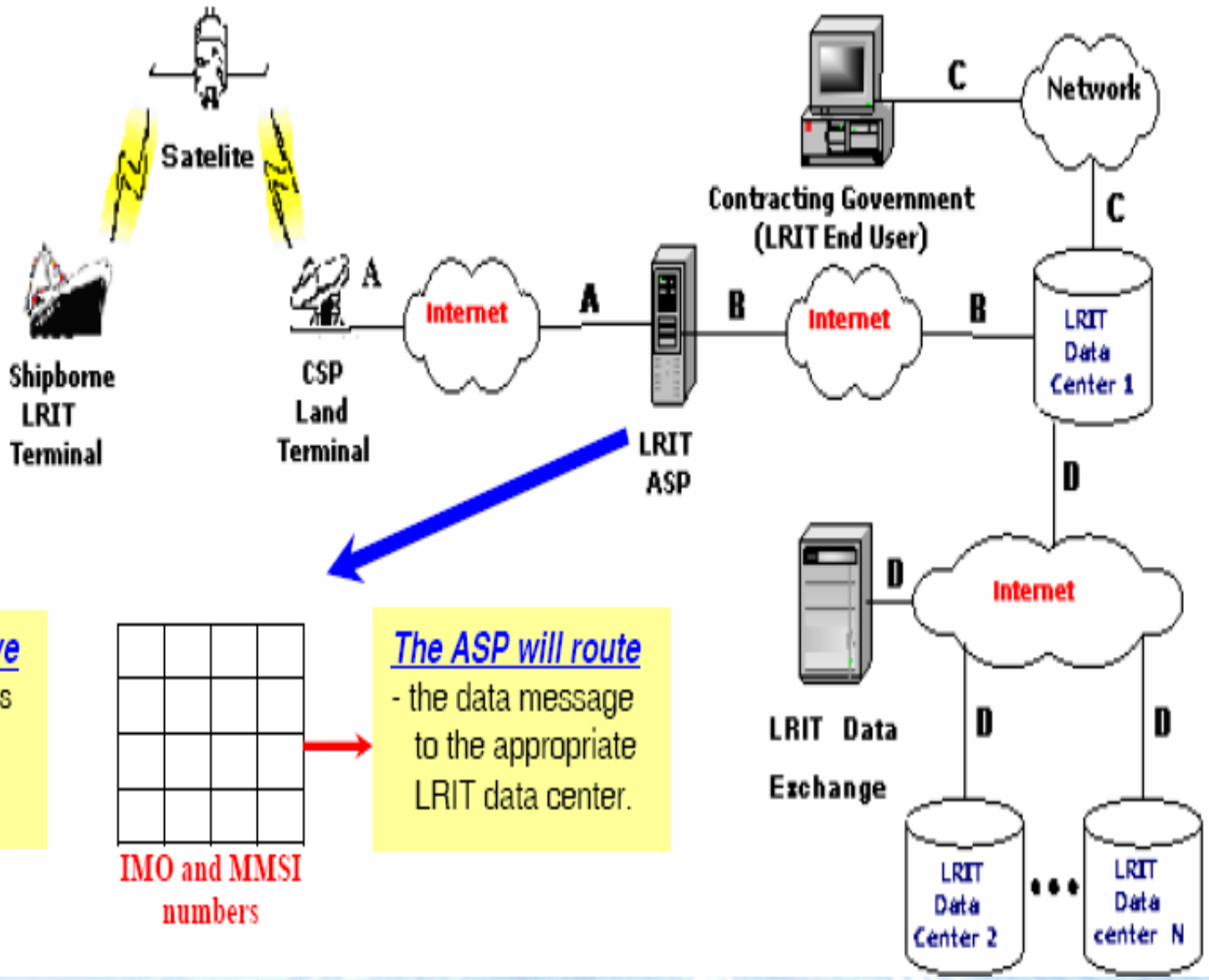
- **GMDSS Modernization Plan**
  - NAVTEX ⇨ NAVDAT
  - MF/HF Digital Voice
  - VHF Data Exchange System (VDES)
- **High-Speed Internet Network**
  - FBB/ESV ⇨ Inmarsat GX
- **Intelligent Traffic Management**
  - VTS ⇨ VTMIS
  - New Radar
  - AIS Aids to Navigation
- **Efficient Navigation**
  - Advanced Navigation System
  - HF Oceanographic Radar
- **Integrated Solution**
  - Next-Generation Coast Station (GMDSS)

Inmarsat GX system



Applications of GNSS Systems

LRIT System



The ASP will remove

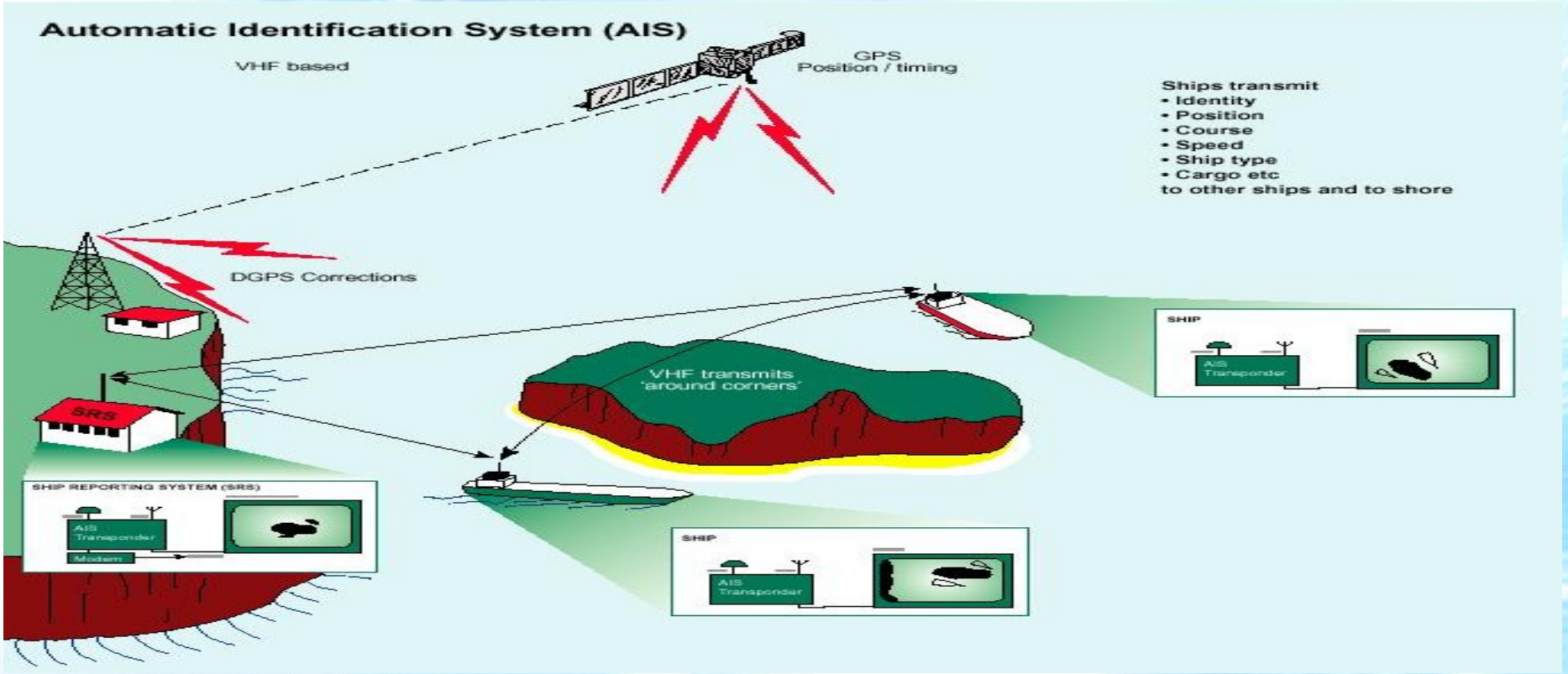
- the LRIT equipment's unique number from the message

IMO and MMSI numbers

The ASP will route

- the data message to the appropriate LRIT data center.

AIS Tracking System



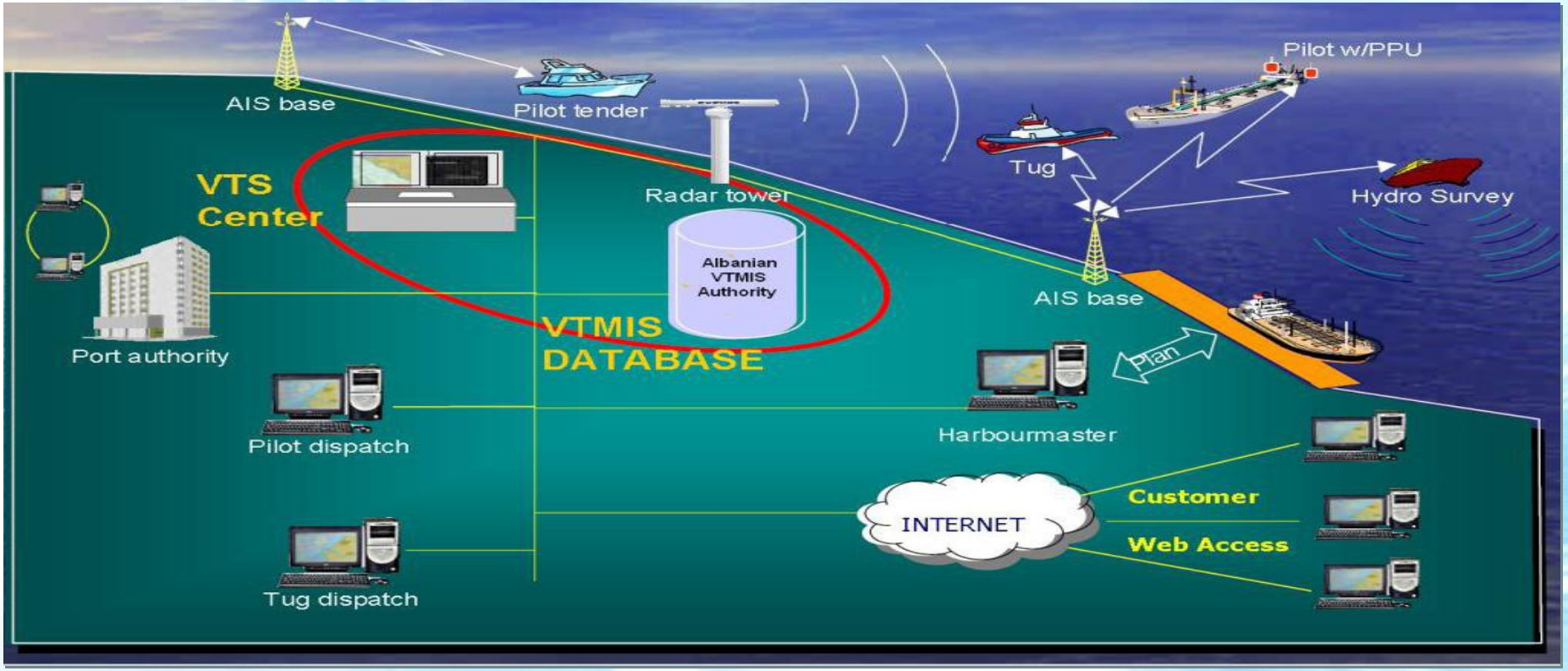
The principle of AIS is to allow automatic exchange of shipboard information from the vessel's sensors between two ships and between a vessel and shore stations within VHF range .

Main Services of Galileo

Navigation	Open Service(OS)	Free Service; Mass Market	
	Commercial (CS)	Encrypted; Sub-meter Aaccuracy	
	Safety of Life (Sol)	Open Service + Integrity and Authentication of Signal. Guaranteed Service	
	Public Regulated (PRS)	Encrypted; Integrity; Continuous Availability	
SAR	Search & Rescue	Near real-time; Precise; Return link	

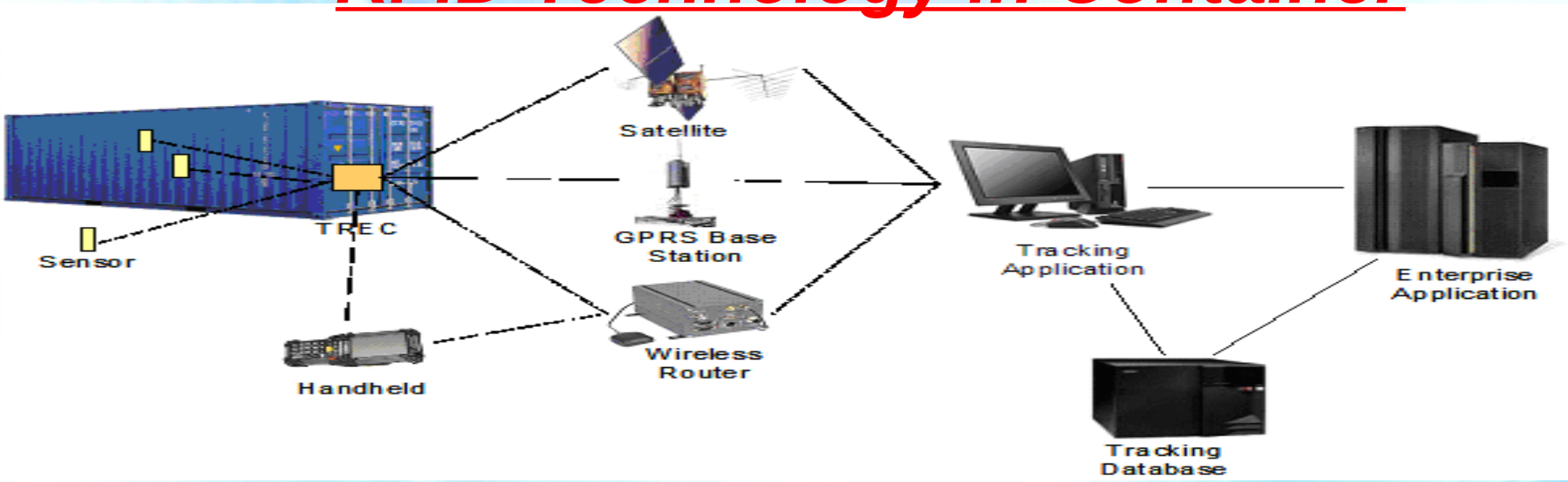
*Galileo n*ear Real-Time; Precise; Return link for *SAR*

VTS/ VTMIS Service



a new transport applications based on ICT have emerged, ranging from traffic management systems(navigation and traffic management) and monitoring applications to more advanced applications integrating live data and feedback from a variety of information sources.

RFID Technology in Container



Advantages:-

- *To improve container security and regulatory compliance, improved quality, container identification, location and tracking, and access control.*
- *Human errors can be reduced by up to 70% and in-port transaction completion time can be reduced by up to 50%.*
- *RFID real-time data allows for dynamic optimization, better planning, higher efficiency and overall performance as a whole.*
- *Container information can be accessed, through a Web application, by clients anywhere in the world.*

Port Community System

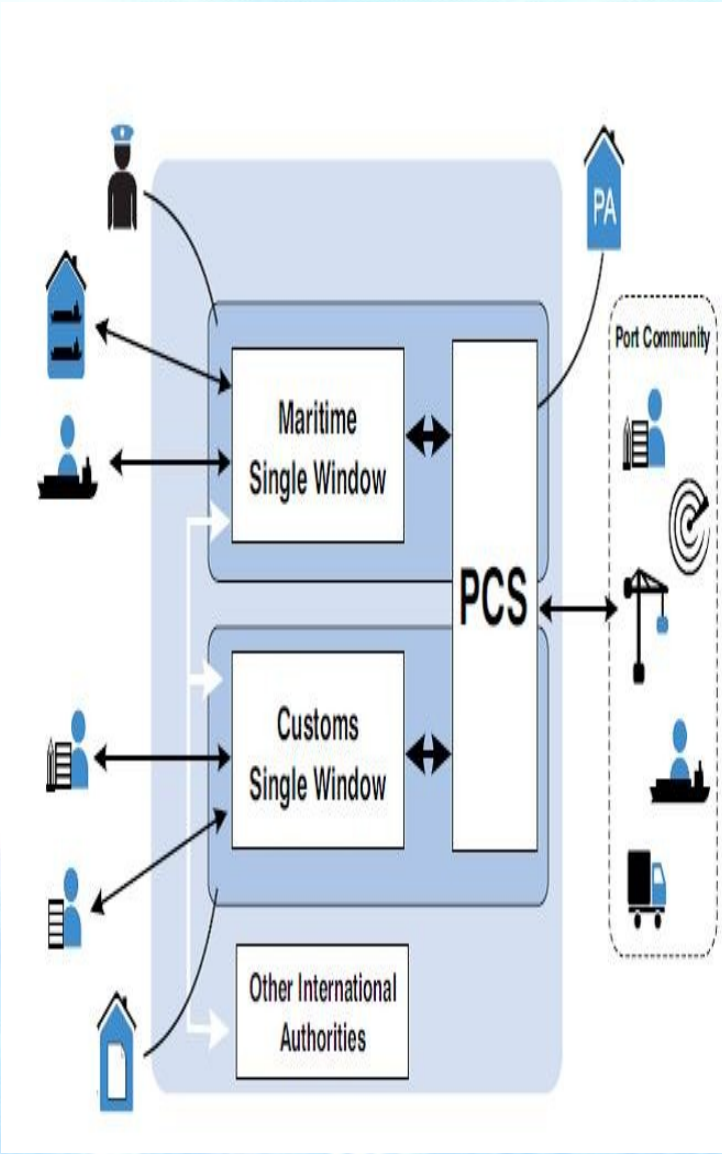
PCS is a software enables intelligent and secure exchange of information between all members of the port community.

Objective:-

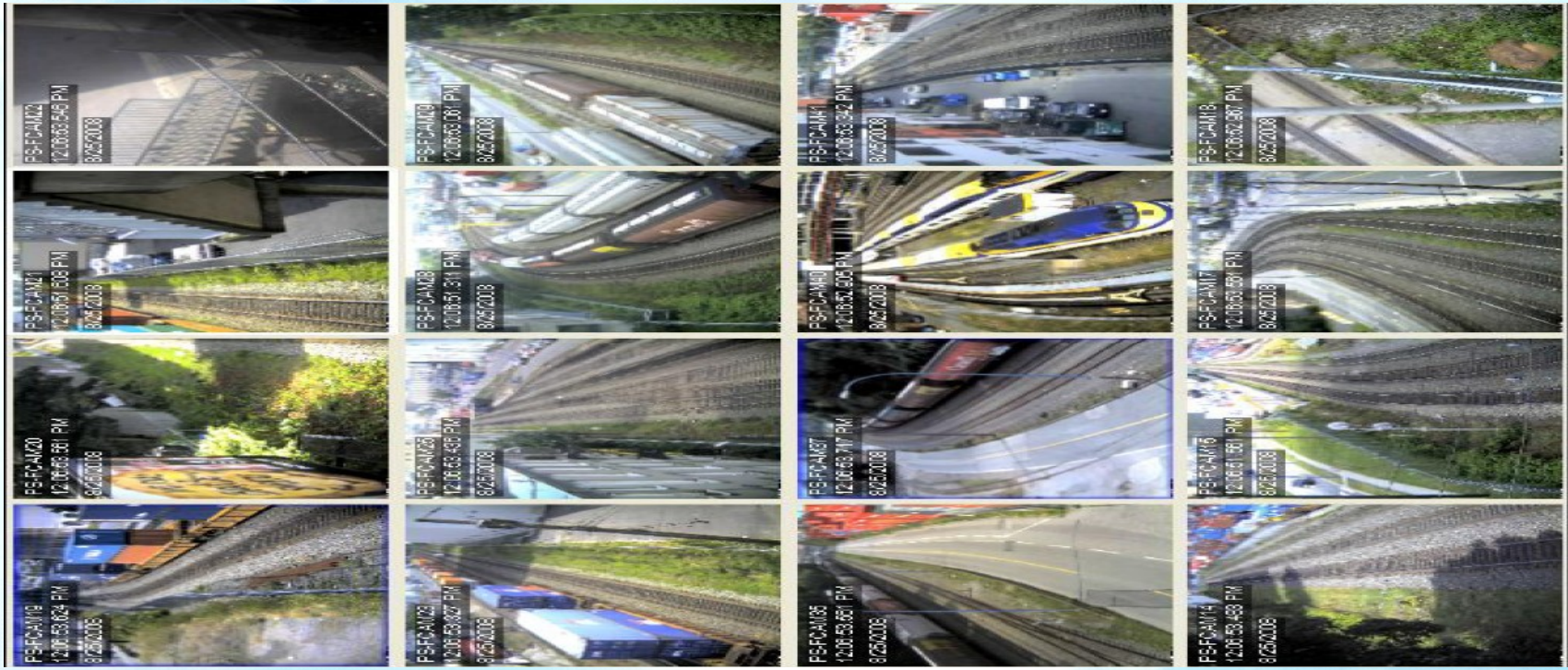
Improve competitive position of the port and its community.

Main benefits:-

- ***Quality and real time exchange of information .***
- ***Paper reduction (converted to a digital and automated environment).***
- ***Time reduction(provides smoother logistics and more efficient operations) .***
- ***Transparency of information and fraud decrease.***
- ***Improve track and trace efficiency.***
- ***Message standardization .***



Smart Yard Management System



- ***Smart Yard employs a network of fixed and digital video cameras connected to digital video servers.***
- ***Cameras provide live streaming video of vulnerable security areas and potential threats to vulnerable areas within the facility viewed on a customized GUI.***
- ***GUI shows intrusion points and critical port locations so that port authority controllers can view and control cameras positioned.***

Friend or Foe Detection System (FFDS)

- *It is an important element of protection of critical infrastructure and hazardous material or loading points within the port.*
- *All personnel and visitors authorized to access the facility would receive an active RFID tag, which is constantly scanned by an array of scanners installed throughout the facility.*
- *Tag geo-spatial information is displayed on the GUI, thus revealing the location of each person at any time.*
- *If the Virtual Fence is breached, FFDS automatically validates approaching "authorized" personnel to prevent false alarms.*

Intermodal Container Exit System (ICES)

- ***ICES is an automated application for tracking and recording intermodal containers exiting, or entering a container yard.***
- ***VOCR which takes video imagery from moving containers, extracts relevant data and populates a database with the extracted data.***
- ***ICES capture and store Trailer numbers; Front and rear license plates; Driver's license data; Video of vehicle and container; Video and audio of driver and guard interaction at the port; Biometric capture of fingerprints.***

Port Information System

PIS integrate and interface between the following system:-

- ***Terminal Operating system (TOS)***
- ***Port community system(PCS).***
- ***Maritime Single Window(MSW)***
- ***Warehouse Management System (WMS).***
- ***Work Force management (WFM).***
- ***Port management information system(PMIS).***
- ***Document Management system(DMS).***

IT and Integration between Maritime services

- ***Port face complex range of operational challenges in management environments.***
- ***The important competitive advantage of a port is to move cargo quickly and safely via port.***
- ***Information systems are used to enhance efficiency of terminal operations and improve turnover.***
- ***Secure flow of information is vital in order to provide quick, reliable and cheap services at seaports.***
- ***It is important to integrate electronic business workflow in the port community via port single window.***
- ***Web interface enables shipping company agent to interact with the Port Authority, the Customs Office and the logistics provider.***
- ***IMS supports the port authority's decision making and communication with the stevedores and the warehouse.***

Advantage of integration between different systems

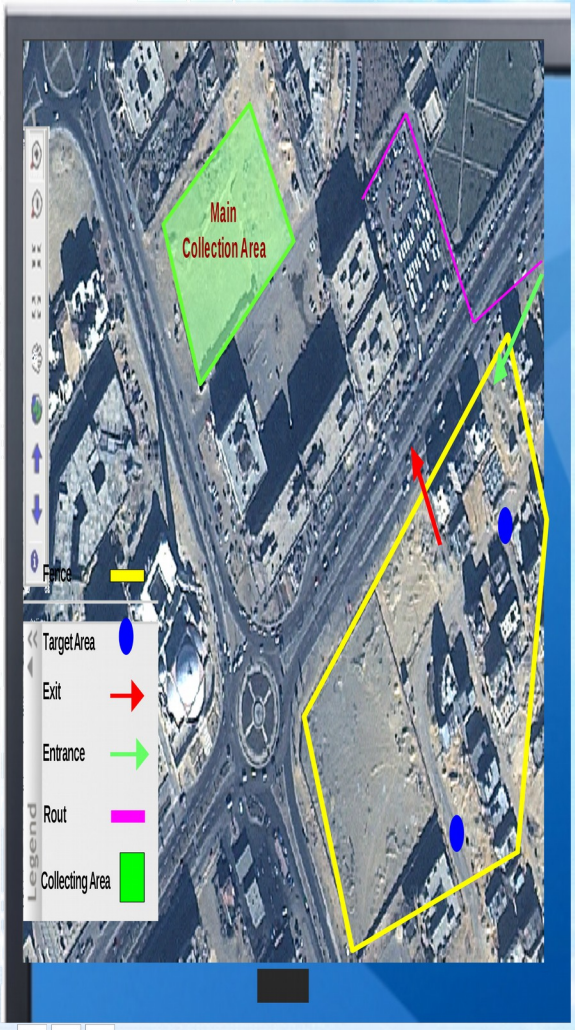
- Most efficient movement of goods.
- Reduce the overall amount of administrative work by providing some means of capturing information at once and allowing controlled access by all appropriate members of the port community.
- Wasted effort is avoided because duplication of entry and storage of data is reduced to a minimum.
- Time required to release cargoes is reduced because the necessary information is instantly available to those who may need it.
- Meet rising customer expectations and stay ahead of the competition.

Summary

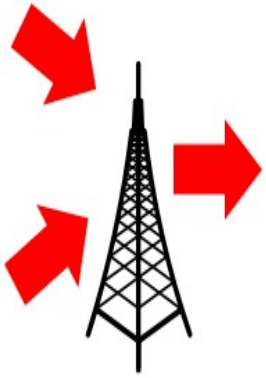
- ***Growth of e-business is having major effects on the maritime transportation industry.***
- ***Deployment of consolidated ICT solutions is considered as a crucial factor for efficient operations of smart port.***
- ***Automation achieve the optimization of the Port Management processes by decreasing the vessel & cargo turn-around time for making the necessary real time data available for port operations and performing data analysis for decision makers.***
- ***Ongoing revolution in ICT, smart devices and IoT can interconnect port with high-speed internet, extensive use of data analytics and innovative mobile solutions to enhance services and it benefit all users at Smart Port***
- ***Key factors contributing to the success of ICT infrastructure in the smart port are:-***
  - ✓ ***The ability to meet the changing demands of users***
  - ✓ ***To keep up with rapid developments in IT***
  - ✓ ***The ability to accommodate new technologies developments without having to constantly restructure.***

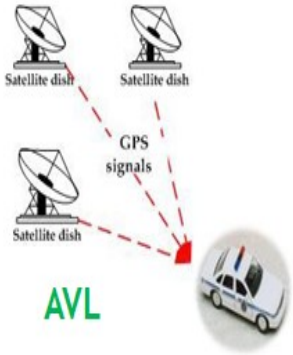
Thank You for Attention

Public Safety

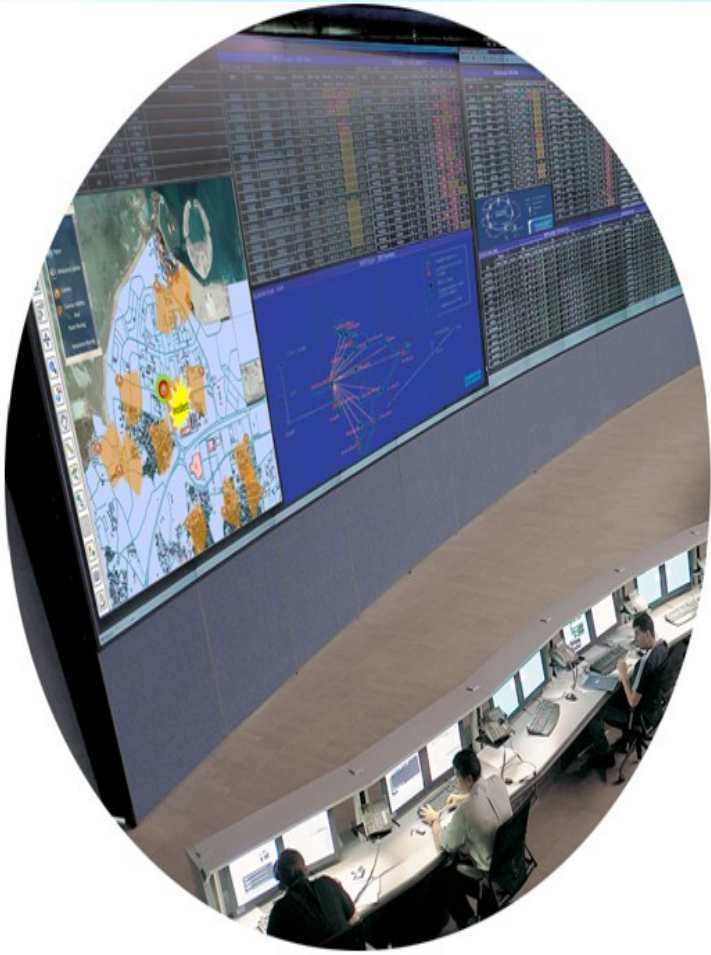


Surveillance


Transmission
Station

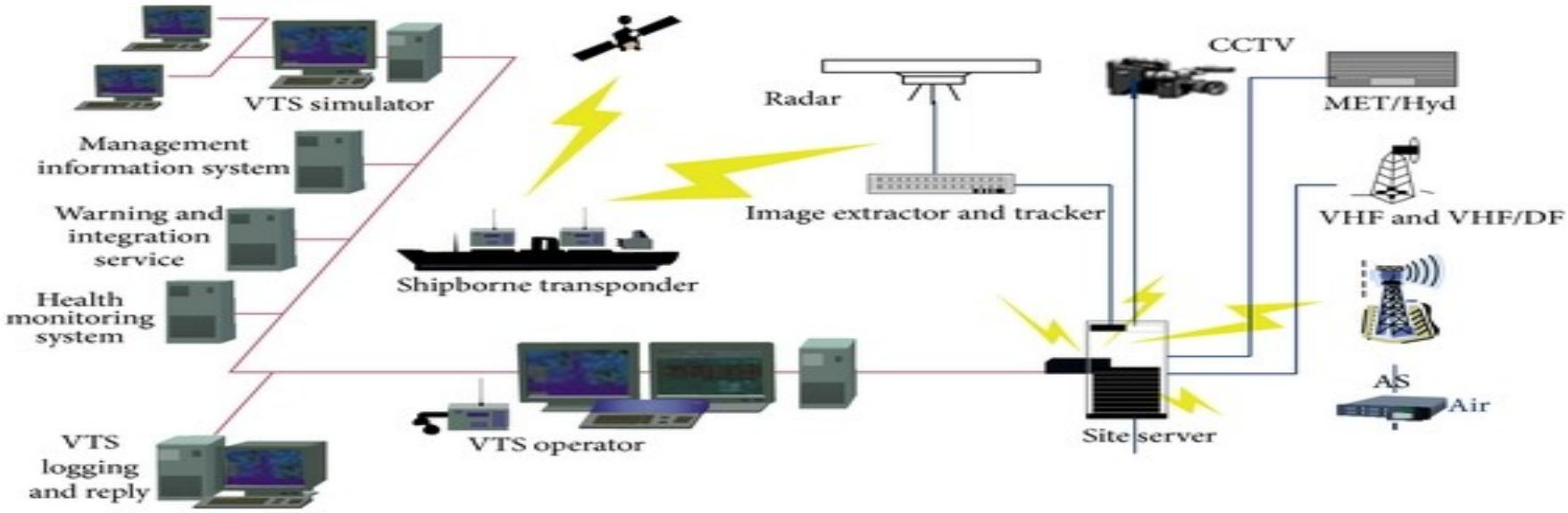
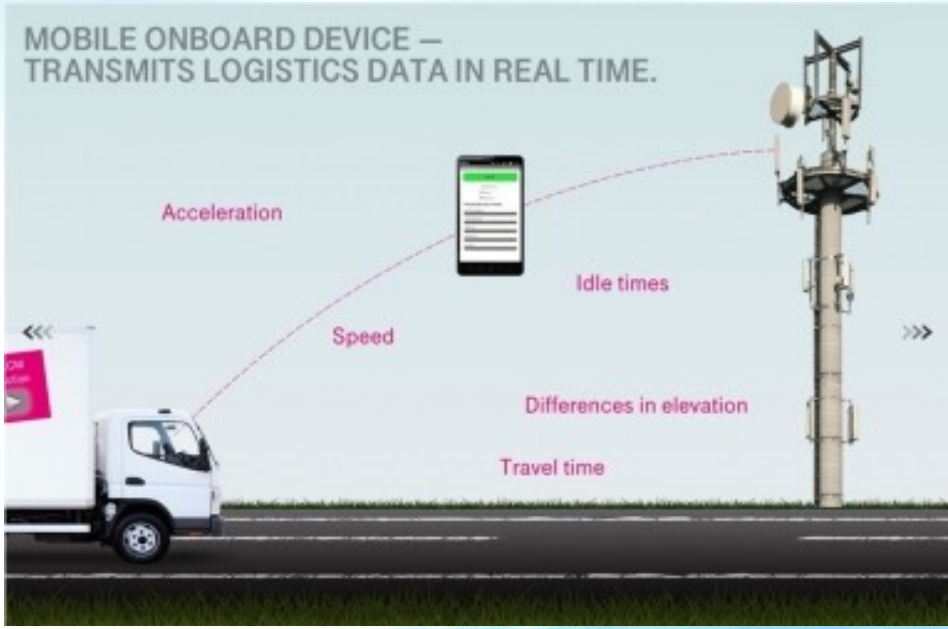


AVL


Control Room

Mission Planning Surveillance Viewing

System architecture of VTS service



Mobile Broadband application for transportation