Iridium Satellite LLC
Presentation to 9th Session of the Commission on Promulgation of Radio Navigational Warnings

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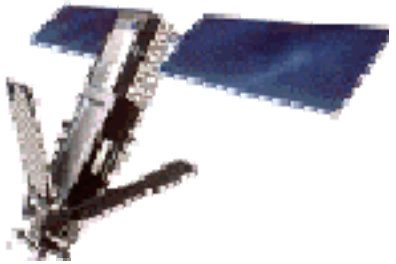
IRIDIUM

Outline

- Company Overview
- Iridium Satellite Network
- Iridium and the Maritime Sector
- Polar Maritime Distress and Safety Services (PMDSS)

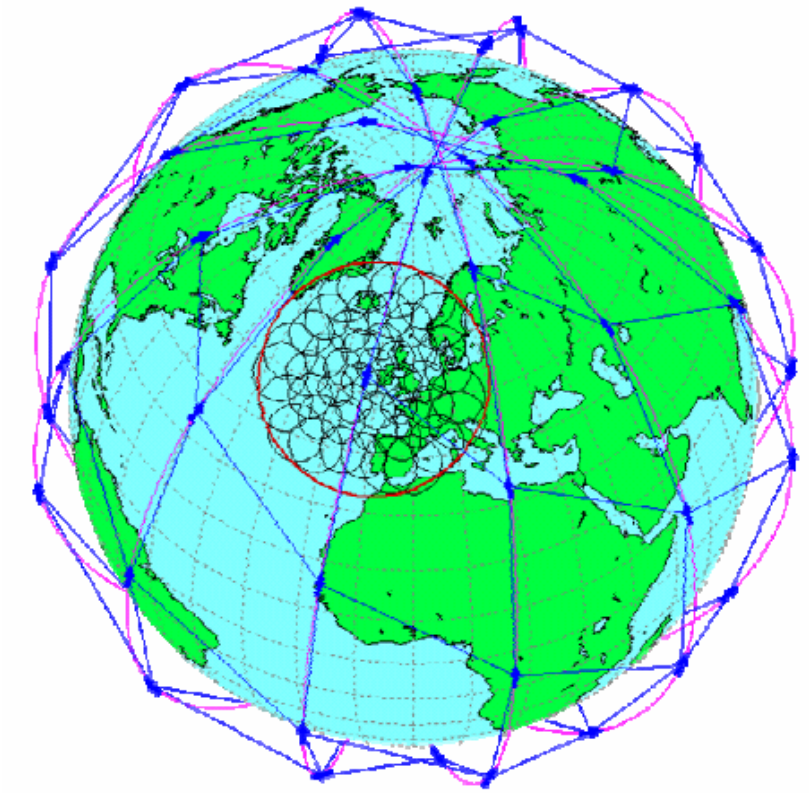
Company and Network Overview

- Iridium Satellite LLC was founded in December 2000
  - **We are not the same company as Iridium LLC**
  - **We acquired the physical operating assets of Iridium LLC including the satellite constellation, the terrestrial network, real property and intellectual property**
  - **Very strong, sustained subscriber growth; cash-flow positive since 2003**
- Satellite Constellation
  - **66 fully-operational satellites and 10 in-orbit spares**
  - **Global, 24-hour, real-time coverage**
  - **Full constellation life to mid-2014**
- Gateways
  - **Provide terrestrial interconnection and back-office**
  - **Commercial gateway in Arizona**
    - **Architecture incorporates redundancy**
  - **Back-up facilities in Alaska and Arizona**
- Satellite Network Operations Center
  - **Main facility in Virginia**
  - **Back-up facility in Arizona**

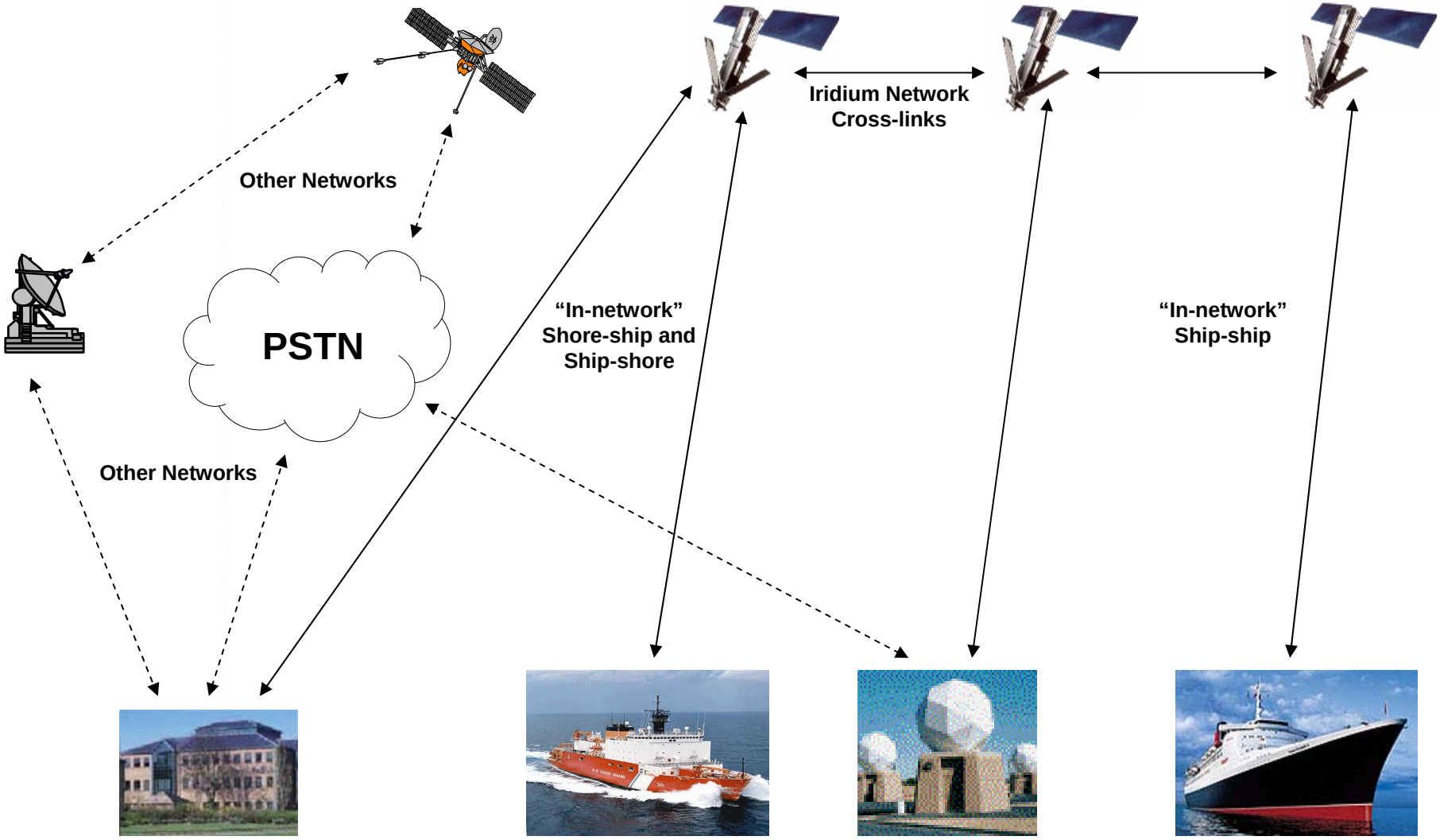


Iridium Network Capabilities

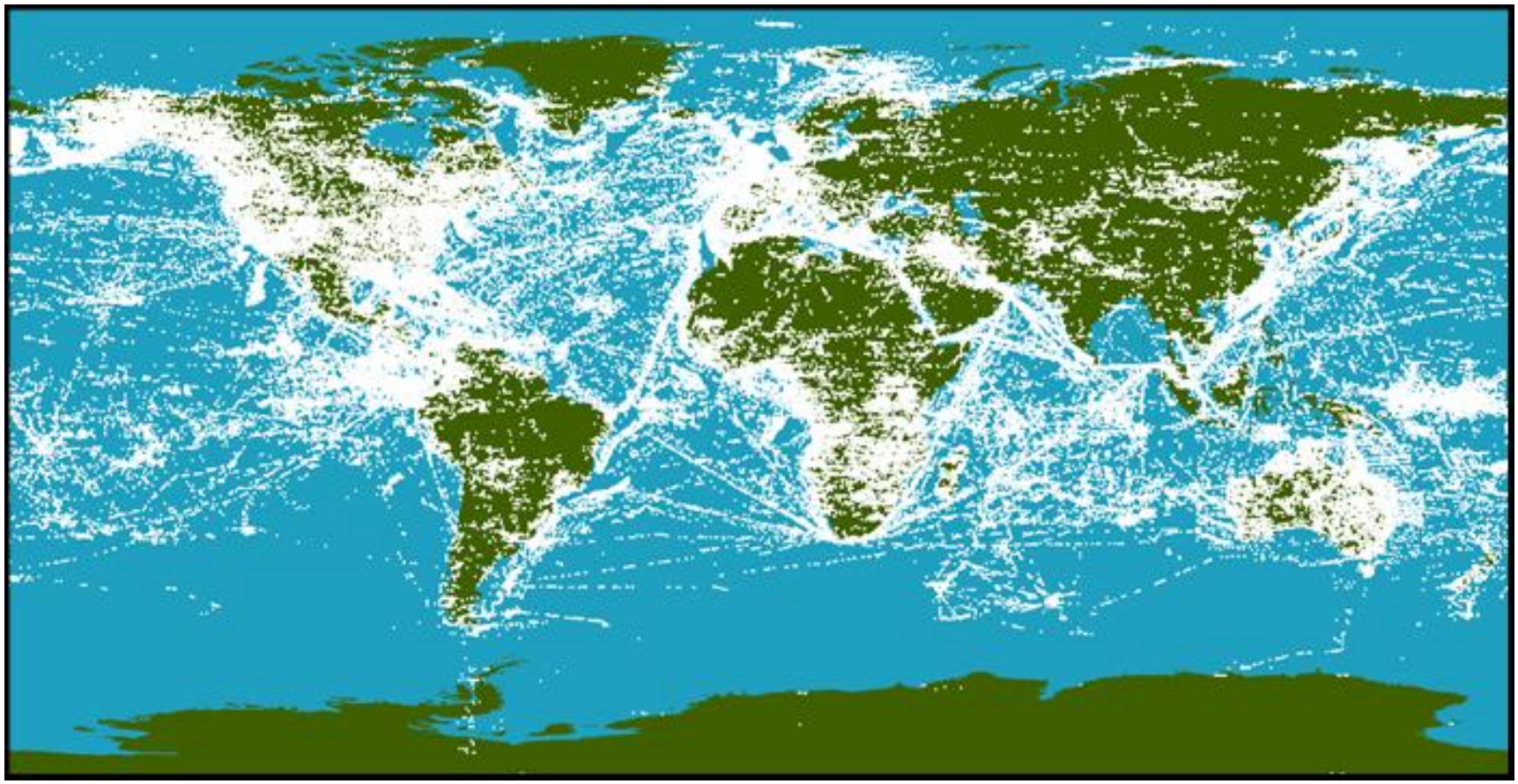
- Pole-to-pole coverage
  - **Polar Regions (90°S - 90°N)**
  - **All Ocean Areas - No Gaps**
- Requires only one gateway
- No reliance on regional infrastructure/ground routing
- Satellite diversity assures high probability of access
- Security ensured through digital network
- Minimal call set-up time, and low latency
- Priority Access



Overall Network Architecture



One System, Globally



Snapshot showing use, in several sectors, over one month

Constellation Longevity Assessment

- Iridium satellite constellation is in excellent health
  - Hardware attrition rates are stable - well below previous predictions
  - System providing very high level of service availability
  - Provides robust voice and data services
  - System operating under much less stressful conditions than designed to
  - New company has implemented a full suite of life-extending measures
- Analysis of constellation lifetime shows -
  - Highly-successful software and system maintenance procedures
  - At least 66 spacecraft predicted to remain operational beyond 2014
  - Expected post-2014 attrition increases gradually and is manageable
- Program initiated for self-funded replenishment of spare satellites, launches planned to begin by 2013

Continuous Development

- Constructing additional TT&C facilities at Iridium's existing site in Alaska
  - **New gateway earth stations have also been announced, to be located at Svalbard (Norway) and Beijing (China)**
- Plans and funding are in place for replenishment of the existing network, extending beyond 2020
- The current system is robust, and upgrades to increase or alter functionality are straightforward
- Recent developments include
  - **Fax and Enhanced Messaging**
  - **Group Calling under development**
  - **Network quality guarantee**
  - **Maritime iBroadband service**
- At 30th June 2007, Iridium had 203,000 subscribers, an increase of 44,000 or 27.7% since 30th June 2006
  - **Maritime subscriptions to Iridium increased by 18%, and overall maritime traffic via Iridium increased by 12%, during this period**

The Next Generation

- IridiumNEXT was announced at Satellite 2007
  - New network will incorporate current network and build upon existing strengths
  - Reverse-compatible with existing terminals
- Continuing studies through 2007-2008 for the development of the next-generation constellation
  - Identifying and defining customer and system requirements
  - Surveying industry for new and innovative capabilities and technologies
  - Developing IridiumNEXT network architecture
  - Selecting development and deployment partners
    - **First partnerships were announced in August 2007: Partners include Avaliant; Boeing; General Dynamics; KinetX; MicroSat Systems, Inc; Trident Sensors**
  - We – users, developers and providers – all need to focus on functional requirements and the needs of the user, rather than on prescribed delivery mechanisms

Typical Maritime Terminal

- Iridium maritime unit
- Omni–directional antenna (non-tracking)
- RJ–11 and RS-232 connections
  - Extension phones, PABX connection
  - Data service connection
- Low-cost equipment
- Simple installation

Wide Array of Solutions

- Voice, including Crew Calling and Pre-paid
- Data
- Paging
- Short Messaging Service (SMS)
- Short Burst Data (SBD)
- Ship Security Alert System (SSAS); and
- Other developments include
  - Direct Internet, with transparent compression
  - Group Calling under development
  - Fax and enhanced messaging
  - Network quality guarantee

Key Maritime Projects

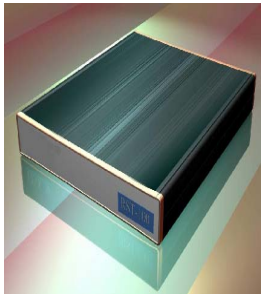
- Hardware tested to applicable international standards, including IEC 60945 and 60950, as appropriate
- Currently providing several services, including
  - Crew Calling
  - Fax
  - SSAS
  - VMS
  - “Tsunameters” in the Tsunami Warning System
- System compliant with requirements for LRIT
  - As these are understood “now”
  - Currently examining the business case
- Monitoring other IMO activities with interest, including
  - GMDSS developments, including
    - **The revision of IMO Resolution A.888 (21)**
    - **The creation of the new Arctic NAVAREAS**
  - Development of e-Navigation strategy

Single Box Solutions for All Maritime Needs

- Maritime Equipment
  - SSAS, VMS, Identification & Tracking
- Data Capable
  - RS-232 interface for data connectivity
    - Direct Dial
    - Direct Internet
    - Short Burst Data (eg Tracking)
    - SMS (SSAS)

NAL Research (USA)

Thrane & Thrane



Beam

Thomas G. Faria

Seawave (USA)

ASE/WCC (USA)

Polar Maritime Distress & Safety Services

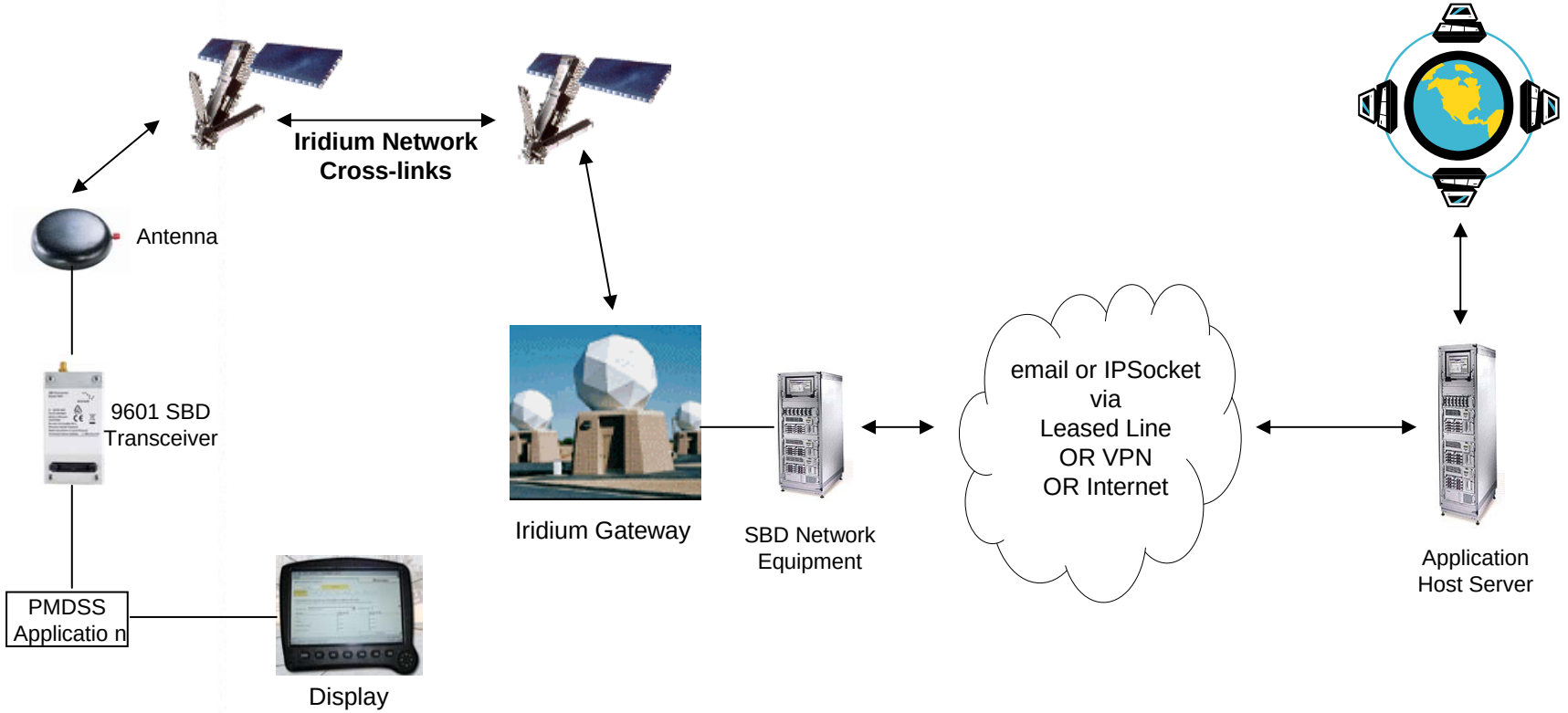
- New NAVAREAs extend to 90° North
  - MSI must be available within the whole NAVAREA
  - Existing “recognised” services do not extend this far
- Survey of satellite service providers largely reflected the requirements of the GMDSS
  - These functional requirements should not be greatly altered by the revision of IMO Resolution A.888 (21)
  - These requirements can be fulfilled by software and applications within the terminal, and by network management procedures
- Basic requirements can be met by Iridium system (network and transceivers), combined with existing user-interfaces: no need for retraining

PMDSS Implementation

- Options – three phases
  - Rapid deployment with existing system and services
  - Enhancement or modification of existing system and services
  - Development of new system and services
- We need to know exactly what the functional requirements are, and how these might change due to e.g, e-Navigation
  - Is the requirement simply for the dissemination of Arctic or Polar MSI (PMSI) to ships, or are more services needed?
  - If more services are required, what are they, and will provision in the Arctic NAVAREAs equate to GMDSS?
- Will there be a process of “recognition” or will ship owners be able to install anything that meets the requirements?
- Will IMO Resolution A.707 (17) be applied and, if so, will it need redrafting to apply to systems other than Inmarsat?

Phase 1 - Overview

- Quick deployment
  - Use existing Iridium bearer services
  - Use existing field hardware
  - Use existing solution architecture



Phase 1 - Details

- All vessels entering the PMDSS “geo-fence” would report to the PMDSS server that they had entered the PMDSS zone, and wish to receive PMSI reports
  - **Uses existing field hardware with a modified application, to be defined according to the scope of requirements**
  - **Can use existing short-burst data (SBD) service**
  - **Geo-fence can be defined as almost any area**
- PMSI and other reports would be sent to each ship registered in the PMDSS zone
  - **Confirmation of delivery to each ship possible**
  - **Report sent by SBD**
- When the ship left the PMDSS geo-fence, the ship’s terminal would report to the PMSI or PMDSS server and the server would stop sending reports to the ship

Phase 1 - Development

- Development required
  - Application development of an existing maritime tracking terminal
    - For example, Faria Watchdog VMS unit
    - Full scope of development not yet clear, as this will depend upon the scope of the services required
  - Server application development
    - Requires data feed from PMSI or PMDSS provider(s)
    - Again, the full scope of development will depend upon the services required

Phase 2 – Interim Solution

- All vessels within the PMDSS geo-fence would receive PMSI reports via the Iridium paging service
  - **This would require software development for the SBD transceiver**
    - **The scope of development would depend upon the services required**
  - **The geo-fences would be defined at the network level**
  - **Ships would automatically receive alerts and messages – no registration required**
    - **This assumes that the devices are correctly provisioned at the time of activation**
  - **Application could be augmented with the ability to send confirmation of receipt of the PMDSS alert or message**
    - **This would depend upon the scope of services required**
  - **This would use existing field hardware with a modified application**
    - **The modification would depend upon the scope of services required**

Phase 2 - Development

- Development required
  - Application development for an existing maritime tracking terminal
    - For example, Faria Watchdog VMS unit
    - The full scope of development depends upon the services required
  - A special group paging configuration would be required within the Iridium network
  - Server application development
    - Requires data feed from PMSI or PMDSS server or provider

Phase 3

- Final solution – new product
  - Phase 2 would use a modified SBD transceiver, which has more capabilities than are needed for PMSI-only, and hence could prove to be more expensive than necessary
    - This depends upon the services required
  - Phase 3 would be spun-off from other developments and services which could produce a low-cost, receive-only device within the Iridium paging network
    - This assumes that the service requirement extends only to the dissemination of PMSI
    - Such a device could reduce the cost of hardware by $100s, and could facilitate a self-contained PMSI receiver without an external antenna
- Will e-Navigation make this unnecessary?
  - What about applications to non-SOLAS craft?

Iridium Distribution Network

- Iridium sells through a network of over 100 leading providers of satellite communications
- Many are members of CIRM
  - A few are shown here
- Partners offer value-added products and services
  - E-mail applications
  - Crew-calling administration
  - Split billing
  - Specialist applications such as asset-tracking
- *For additional details about our partners, please see our website www.iridium.com*

Are there any questions?