

Evolution of Satellite Communications

Digital Ship Bergen - 2019

Early Maritime Communications

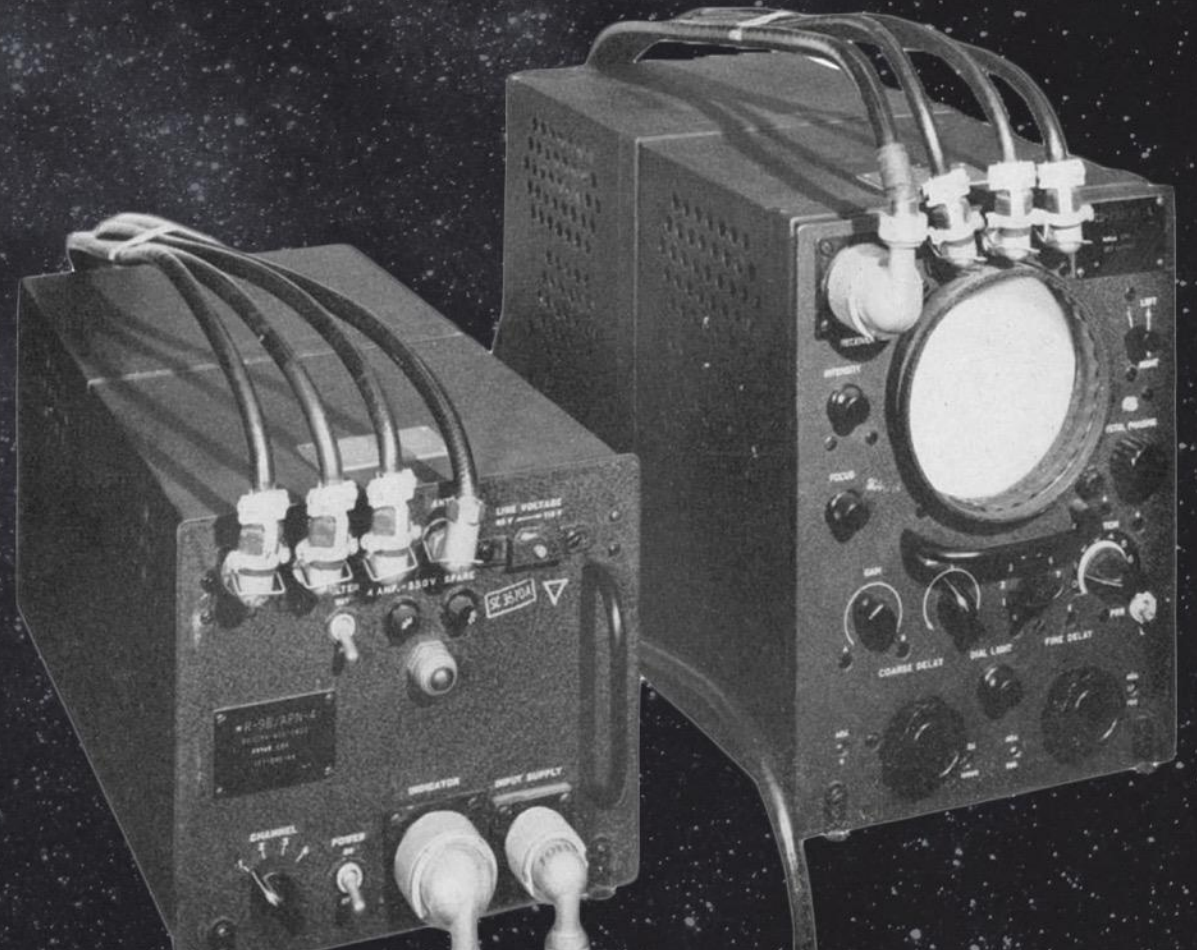
- Semaphore flags and Morse code
- First radio installed in 1906 by Stone Radio & Telegraph Company
- GMDSS used HF, MF and VHF in the 1990s and has not really changed until today



FIGS. 1 AND 2.—DIAGRAM OF CIRCUITS FOR SENDING AND RECEIVING STATIONS.

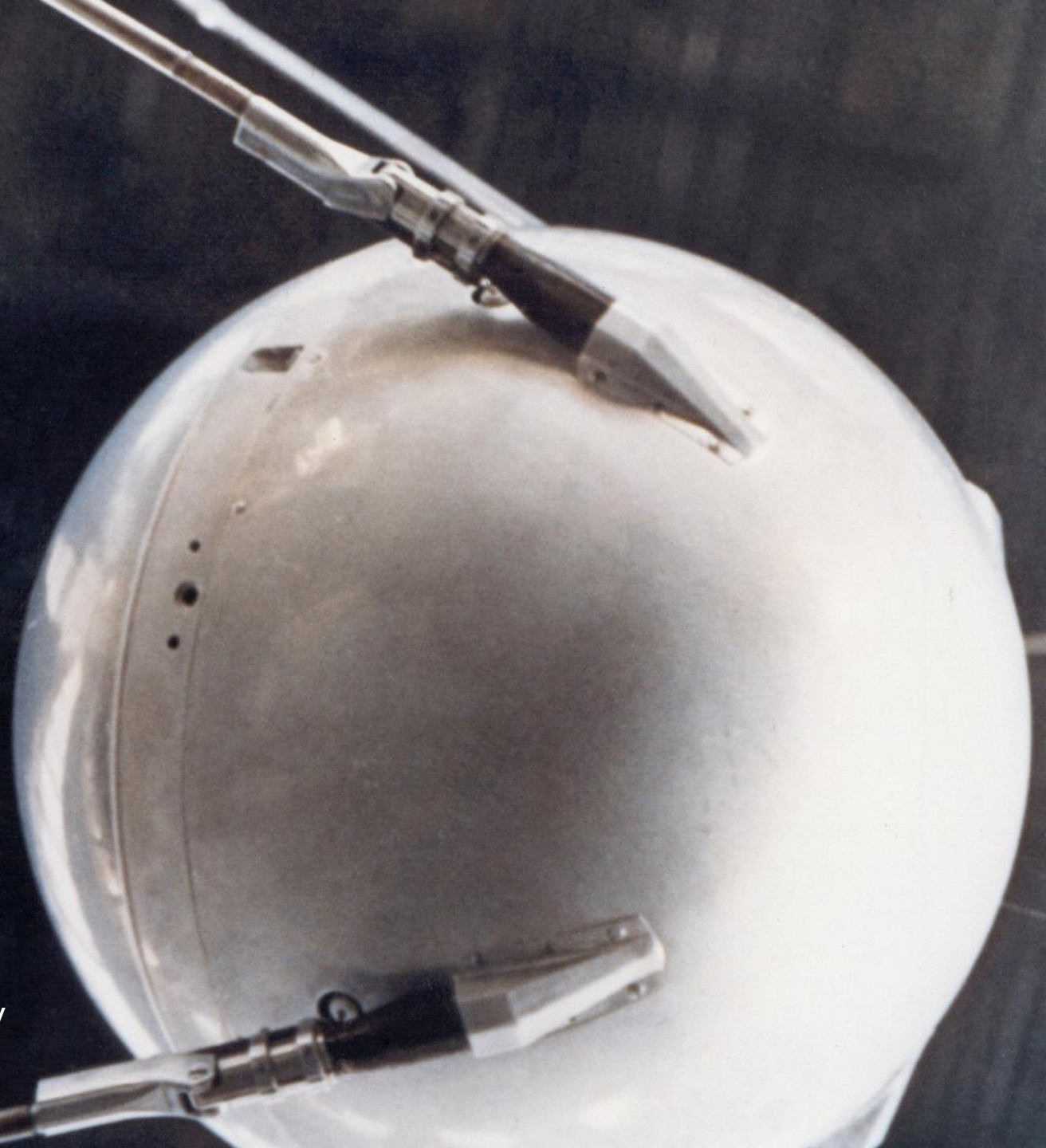
The Connected Ship of the Past

- 1942 the first LORAN System was placed in operation
- Four station between the Chesapeake Capes and Nova Scotia
- HF, MF and VHF for ship-to-ship and ship-to-shore connectivity



Early Satellite Communications

- 1957 - Sputnik was launched
- John Hopkins University measured the Doppler shift and found the satellite's position and velocity
- 1960 - Echo 1 launched by NASA was the world's first satellite capable of relaying signals to other points on Earth
- 1963 - Syncom 2 allowed voice and image transmission
- 1965 - Intelsat 1, the first commercial satellite!
- These developments played a major role in the innovation which drive Maritime Satcoms today

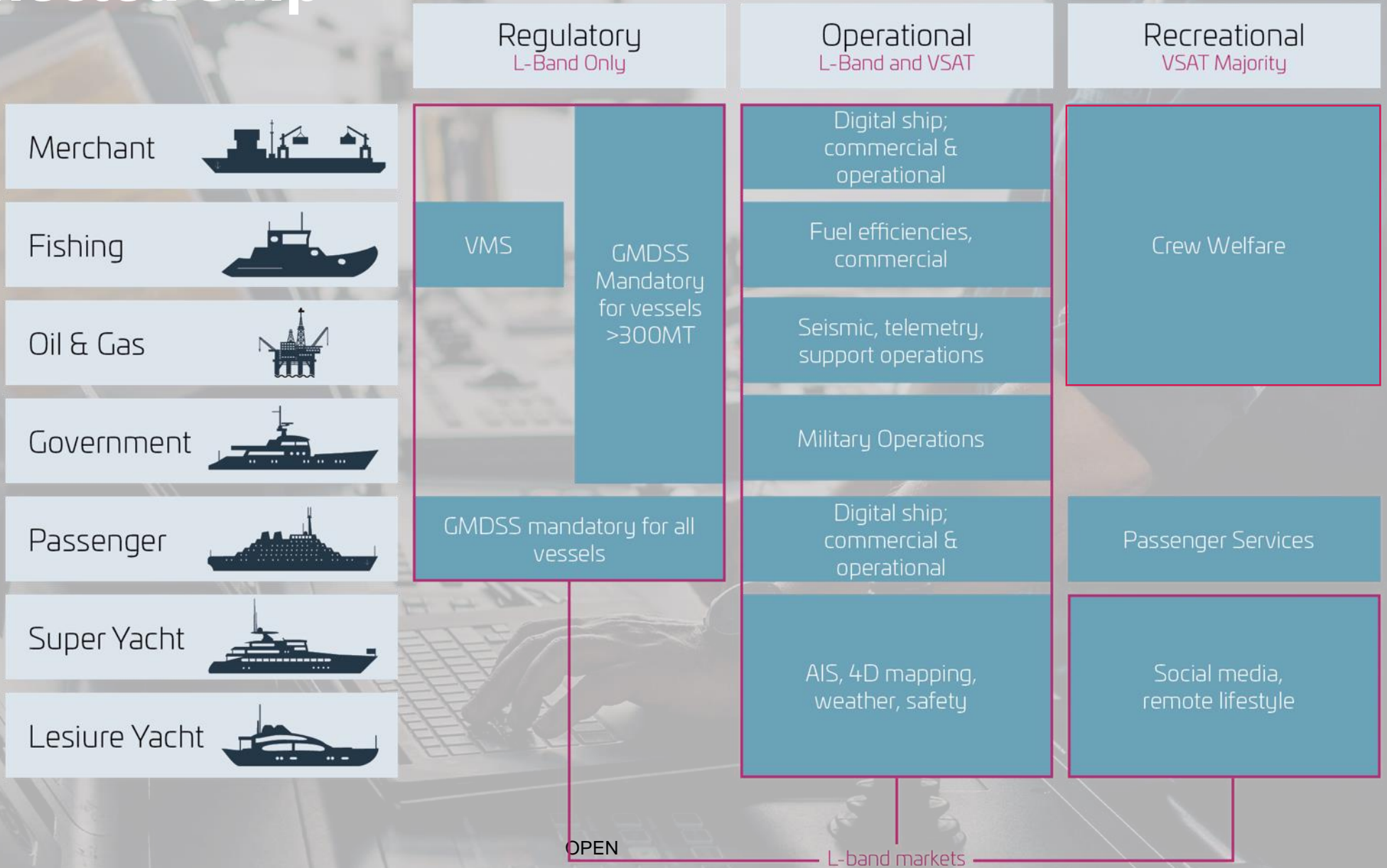


The Connected Ship of the Today

- In 2016, about 400,000 maritime satellite terminals are in operation
 - Safety
 - Weather
 - Location
 - Operational Efficiency
- Using VSAT: Ku, Ka
 - Larger terminals, weather sensitive (susceptible to rain fade), often regionalized or coverage based services
 - Higher data rates good for higher bandwidth applications and passenger services
- Using L-Band
 - Smaller size, weather resilient (no rain fade)
 - High reliable needs like current position or weather forecast
 - Great for onboard operations or business
 - Crew Welfare
 - Global Coverage (Iridium Certus)

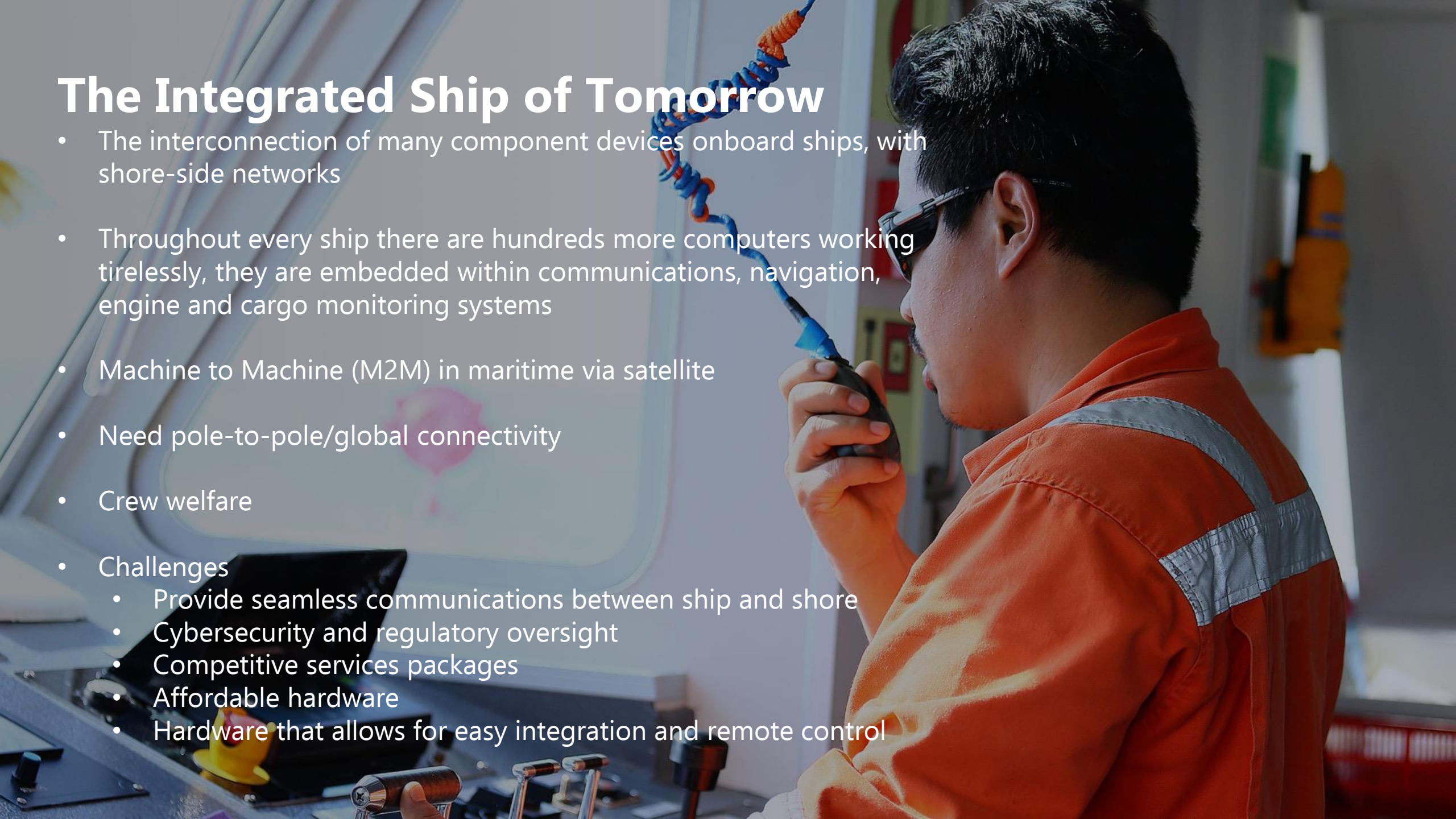


The Connected Ship



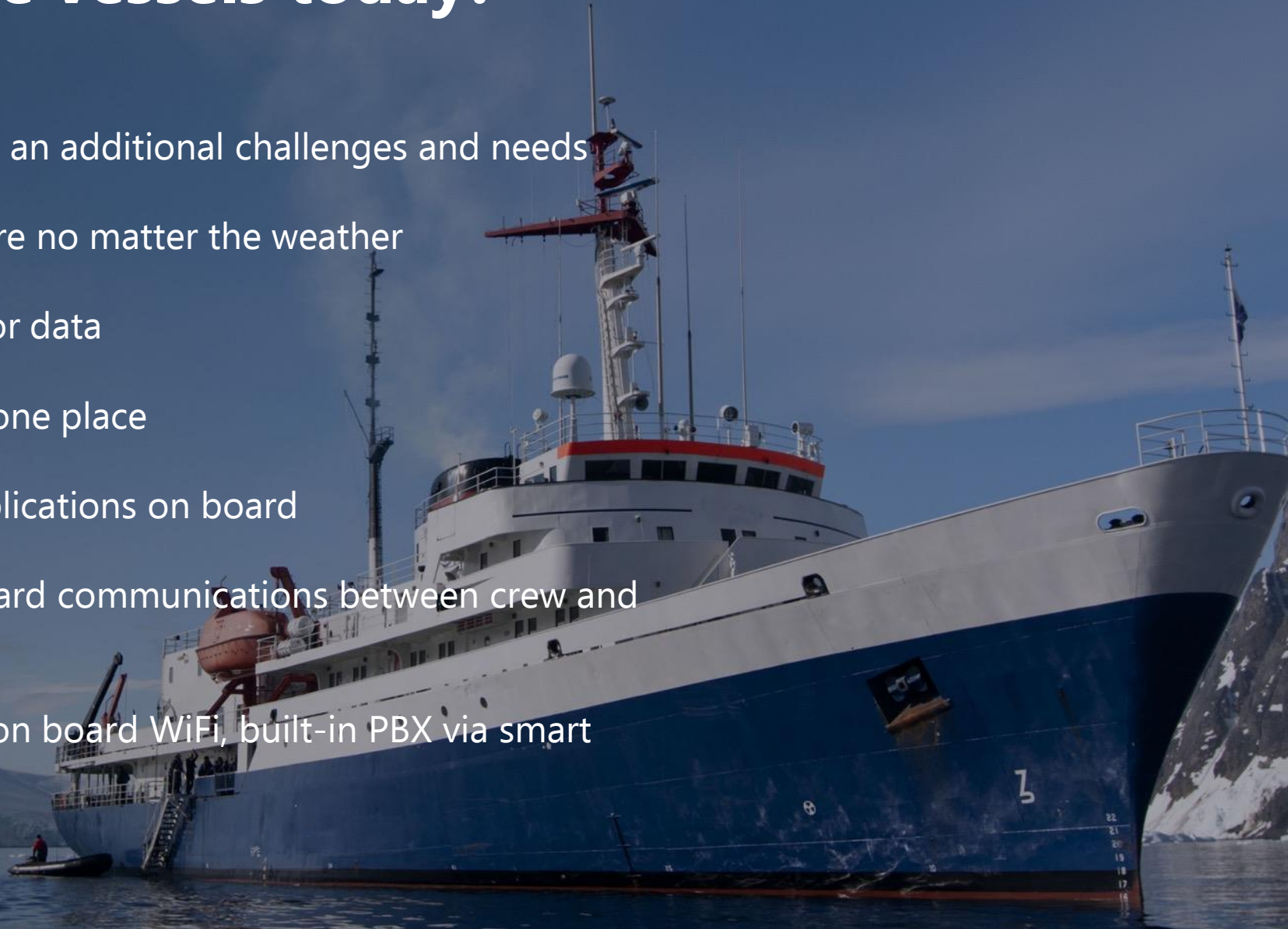
The Integrated Ship of Tomorrow

- The interconnection of many component devices onboard ships, with shore-side networks
- Throughout every ship there are hundreds more computers working tirelessly, they are embedded within communications, navigation, engine and cargo monitoring systems
- Machine to Machine (M2M) in maritime via satellite
- Need pole-to-pole/global connectivity
- Crew welfare
- Challenges
 - Provide seamless communications between ship and shore
 - Cybersecurity and regulatory oversight
 - Competitive services packages
 - Affordable hardware
 - Hardware that allows for easy integration and remote control



What can we provide vessels today?

- Worldwide Coverage
 - Arctic shipping routes provide an additional challenges and needs
- Location of assets wherever they are no matter the weather
- Reliable operation for critical sensor data
- Clear voice communications all in one place
- Low latency – opening up new applications on board
- Connected Crew – seamless on board communications between crew and captain
- Crew welfare – high quality voice, on board WiFi, built-in PBX via smart phone



How? Thales VesseLINK and Iridium Certus

- Thales VesseLINK and Iridium Certus provide highly reliable communications fit for stand alone utilization or VSAT companion
- Location Services delivered to your servers on your schedule
- Pole-to-pole coverage and low latency through Iridium satellites
- 3-Managed High Quality Voice Lines for your business and crew with built in PBX
- Radio Gateway for Land Mobile Radio connectivity to the shore
- All protected by administrator controlled settings
- Best Iridium based L-band upload speeds at 256kbps streaming, 352 kbps and 704kbps download respectively



Tomorrow's Solution Today: VesseLINK



Best effort IP data up to 352kbps
at launch moving to 704kbps
256kbps streaming



Built-in management portal for
configuration and monitoring



API and command set for secure
remote management by partners



Preferred routing & dynamic
switching (VSAT or 4G/LTE)

Thank you!

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THALES

