Advanced Communication and SATCOM Solutions

Submarine Capability beyond 2025

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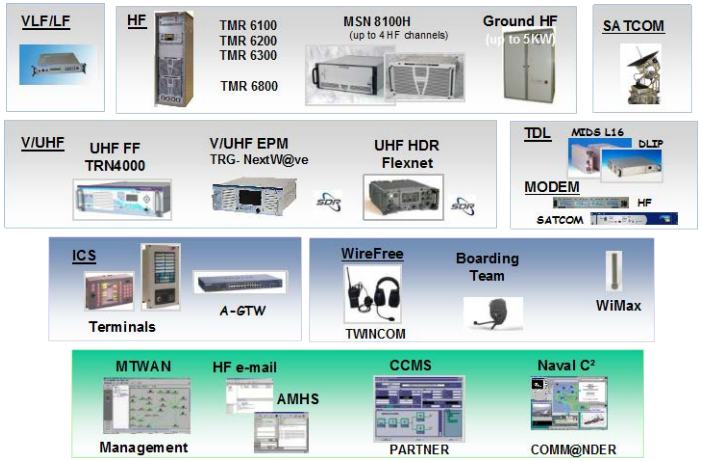
THALES

Thales Naval Communications

Naval Communications is a core expertise for Thales

- Thales is the sole company world wide having in house and able to deliver any part of a Naval Coms system



- Thales is having a large back-ground and know-how enabling to invest in innovative coms solution for navies

Thales makes Naval Coms Solutions easy to use
Reliable and tailored to exact Customer's needs

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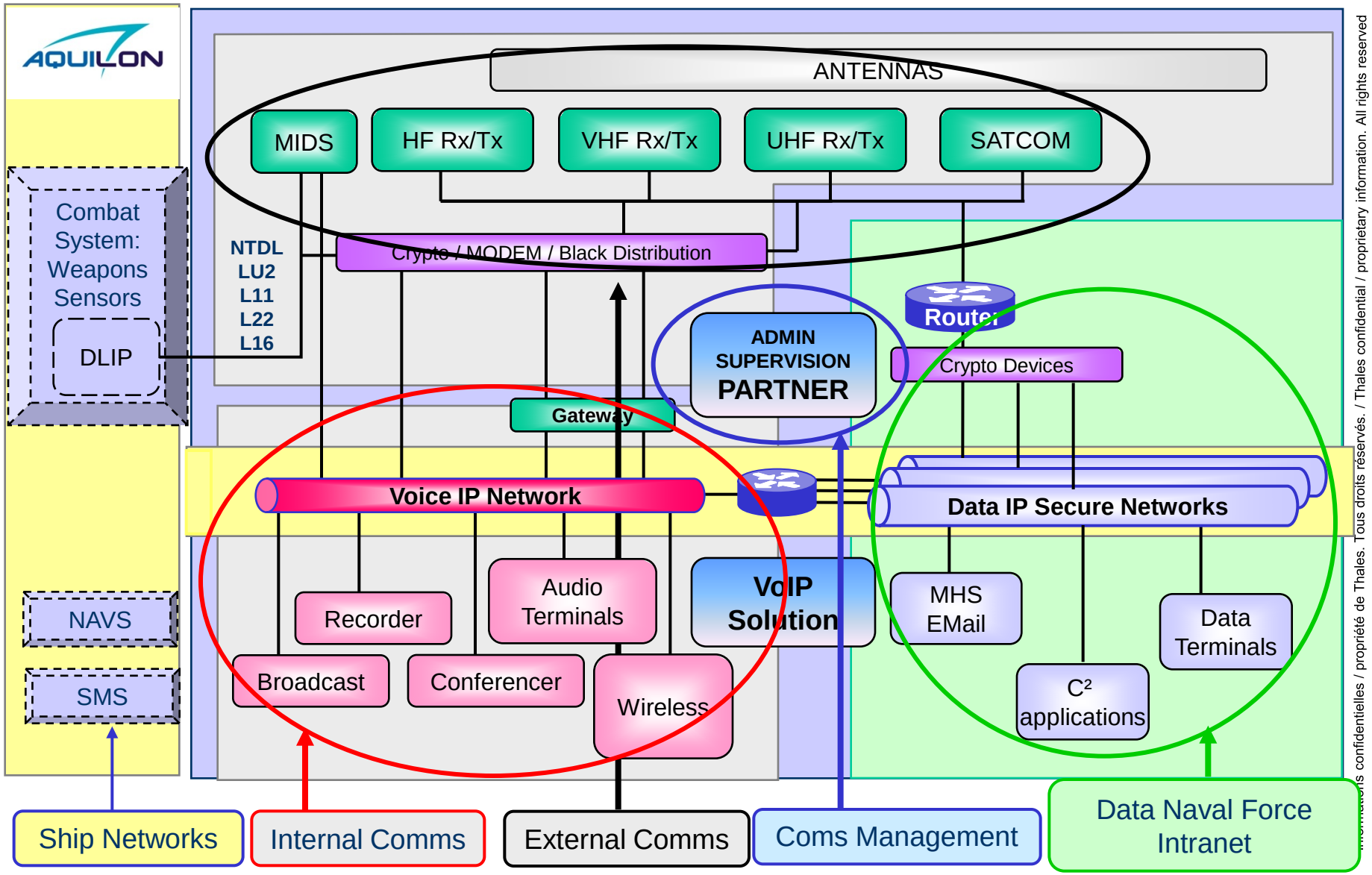
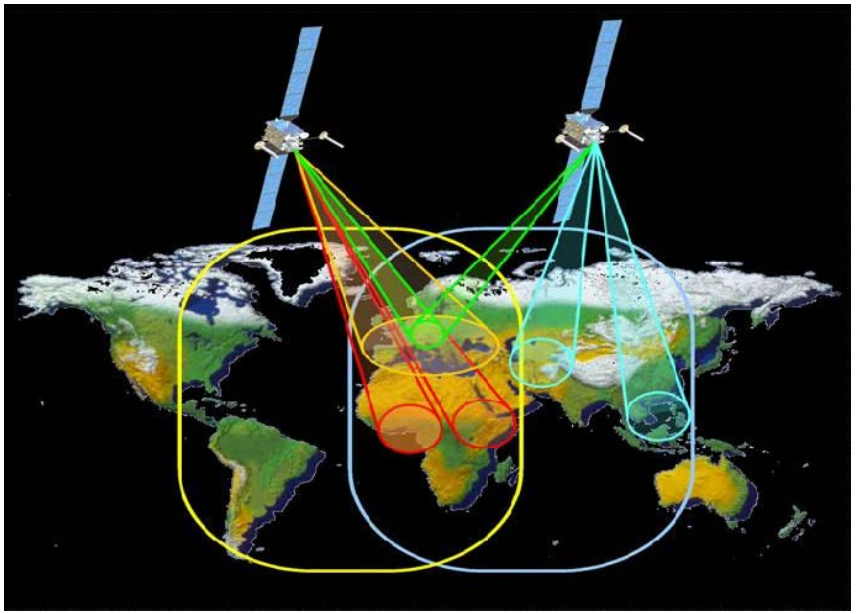
Communications System architecture



Naval MILSATCOM: A highly valuable capability …

Long haul

- **Connect forces in deployed theatre to Head Quarter and dispersed assets**
- **Availability of the communication wherever, whenever**
- **Worldwide Coverage**



Key Asset To Navies

- **High Data Rate**
- **Protected Communications**
- **LPE/LPI**
- **Interoperability with allied nations (STANAGs, MIL-STDs, …)**

MILSATCOM: An Ethernet Socket Anywhere

… which will not replace the other means of Communications

- Because you need a satellite
- Because satellite resources could be limited
- Because you ‘normally’ need to be at periscope depth to transmit or receive data
- Because some countries have interest in areas not covered by the GEO satellite constellations

Areas where Thales’s solutions could make the life of submariners easier

Thales's Naval MILSATCOM Offer

C, X, Ku, Ka Frequency bands

Multiband capabilities

Easy Integration

Full set of Naval Specific functions

- **Seamless antenna handover**
- **ESM Mode**
- **Advanced Mask Management**

Modem Agnostic

- **Legacy or customer recommended**
- modem 21e

From

DIVESAT

40 cm up

SURFSAT-S

to 2.60 m

SURFSAT-L

At Sea

The Most Comprehensive Offer on the Market

THALES

DIVESAT Terminal

General

- Medium to High Data Rate
- Voice & Data Services
- X, Ku or Ka band

RF performances

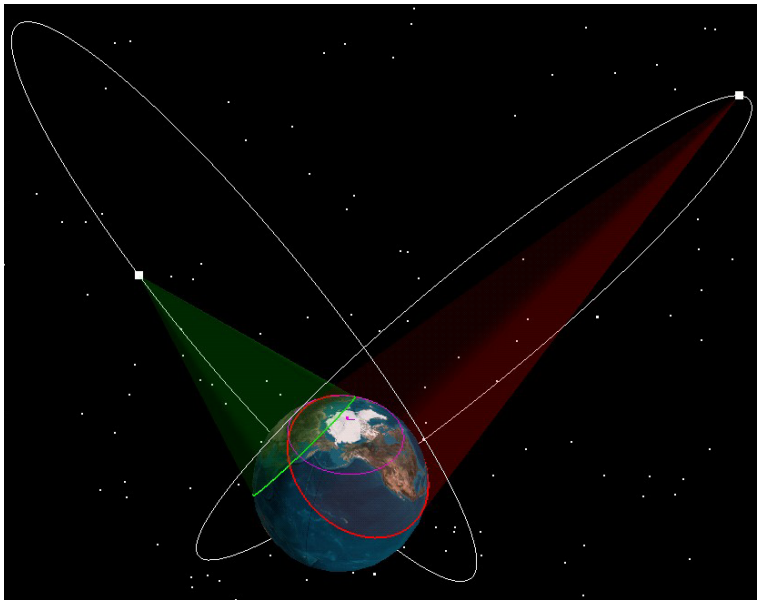
- STANAG 4484, MIL-STD-188-164A
- EIRP to transmit up to 512 kbps in Ka-band

Other

- Compact 3-axis pedestal
- Beacon or Ephemeris Tracking
- Dual Band capability

What about Polar Areas ?

- **GEO satellite constellations do not cover polar areas**
  - Communications are impossible at latitude above 80°
  - The reliability of the communication links at latitude above 70° is not always guaranteed for mobile users
- **Some countries are considering the use of Polar HEO satellites to offer 24/7 reliable High Data rate communications in X and Ka-band**

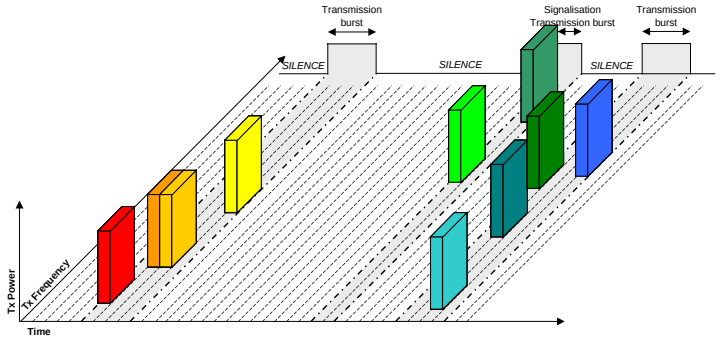


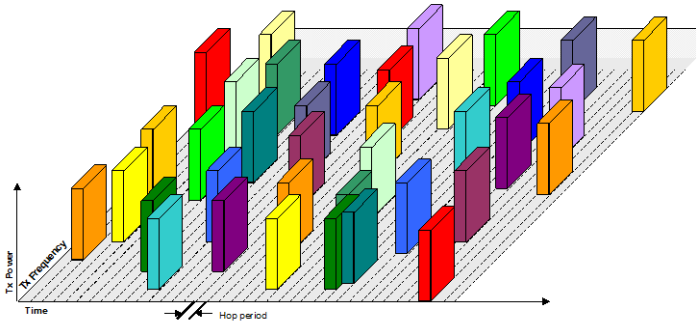
Combining a 3-axis architecture and Ephemeris Tracking capability, DIVESAT is compatible with GEO and Polar HEO and shortens the duration of communications

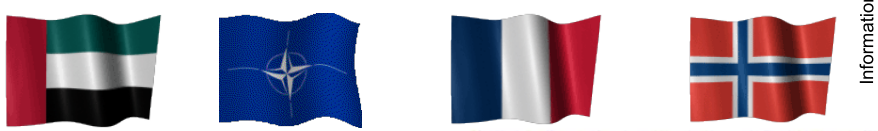
Modem 21e – a keystone for Naval SATCOM

Modem 21e brings a sound answer to all specific needs of MILSATCOM aboard modern submarines

- **Spectral Efficiency**
- **Anti-jamming**
- **ESM Mode**
- **Adaptive Coding & Modulation**
- **Spectrum Spreading**
- **Instantaneous re-synchronisation**
- **LPE/LPI**
- **Virtually impossible to locate the transmitter**







… And the SATCOM Indiscretion ?

- **In standard configurations subs require to be at periscope depth to establish SHF SATCOM links**
  - SHF signals do not travel through sea water
  - SATCOM terminal is located on the top of one of the sub communication mast
- **RTOF, DIVESAT mounted on a recoverable buoy,**
  - Gives submarines the possibility to transmit and receive at depth
  - Enables communications of longer duration while the submarine remains safe

THALES

Naval Communications

- More than 25 years of experience in Naval Communication Systems
- A fully comprehensive offer including internal and external communication at frequencies ranging from VLF to EHF
- Advanced Set of Naval Specific Capabilities: ESM Mode, EPM Modem …
- SATCOM solutions compatible with current and future GEO constellations as well as the upcoming Polar HEO constellations