Cost Effective and Scalable Realization of ESM and ELINT systems using Common Building Blocks

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Outline/content

Background
  • Mergers and Acquisitions
  • ESM/ELINT Product Management Challenges

Generic ESM/ELINT Building Blocks
  • Antenna’s
  • Receivers
  • Processors
  • Human Machine Interfaces
  • Support Systems

ESM ELINT Product Portfolio
  • HES21
  • EPS200
  • ESP2
  • UME/SME

CONCLUSIONS
Mergers and Acquisitions

- In 1999, the Swedish company Saab obtained a 49% equity stake in the South African company Avitronics.
- This was followed by Saab acquiring a 100% of Avitronics in 2005 and Avitronics becoming Saab Avitronics.
- In 2010 further internal restructuring resulted in Saab Avitronics becoming part of the Electronic Defence Systems (EDS) business area.

As a result, a common organisation was established within the Electronic Warfare product area.
ESM/ELINT Product Management Challenges

• Two companies active within Electronic Warfare, merging into a common development organisation
• ESM/ELINT products from both parts of the organisation
• Glaringly obvious that the market size for ESM/ELINT, which is much smaller compared to the Self Protection market, is insufficient to sustain the investment in all products

Strategy

• Development of products have to be actively managed in working towards reuse and share of building blocks, avoiding duplication of efforts
• Incremental (Spiral) development model to manage investment and mitigate technical risk
• To remain competitive scalable solutions are needed to provide for the full spectrum of ESM/ELINT market needs
• Digital Receiver convergence strategy to be pursued
ESM/ELINT Products are based on common building blocks and architecture

- Antenna’s and front-ends
- Receivers
- Processors and Controllers
- ESM Server
- HMI Clients
- EW Support System

Support Systems for mission planning and post mission analysis
Generic building blocks
Antenna Subsystems

- High Gain DF antennas
- Compact amplitude/phase difference antenna arrays
- Mast mounted antenna arrays
- High DF accuracy linear Interferometer antenna arrays
Generic building blocks

Receivers

- Wideband Channelised FFT based Digital Receivers
  - 0.5-18 GHz RF bandwidth
  - 1 GHz IF, 500MHz instantaneous bandwidth
  - 20 MHz channel width
  - Simultaneous signals handling
  - IF intra pulse capture

- 2-18 GHz IFM Acquisition Receivers

- Frequency Multiplexed Video Detector Receivers

- Narrow BW Superheterodyne Analysis Receivers

- Digital Video Processing
Generic building blocks

Processors and Controllers

- ESM Digital Receiver Controller
  - Digital Receiver modules
  - 2-18GHz IFM acquisition receiver
  - ESM Processor

- ESM Server & SW application
  - System Control
  - Emitter Identification
  - Geo location
  - Recording
  - ESM HMI Client access

- ELINT Controller
  - Digital Receiver modules
  - Pulse Processor
  - ELINT computer
Generic building blocks
Operators environment

- HMI originally developed for Naval Surface/Subsurface systems
  - Operator in the loop emphasis
- Adaptations made for airborne systems
- Adaptations for ground based systems
- Client/Server
Generic building blocks
Support system EGSS (EWTools)

- Full EW data management, generation and analysis system.
- Adaptable to existing EW databases, XML Import and Export.
- Allows integration of third party EW systems. One organisation - One support Tool - Multiple EW target systems.
- Full In-country reprogramming and analysis capability
EGSS

EW Lib

- Mission library management/generation for:
  - RWR, ESM, ELINT, MAW, LWS, ECM, CMDS

- Manages preprepared
  - Electronic Order of Battle (EOB)
    - Threat systems
    - Chaff and Flare
    - Mission libraries

- Receiver management
  - Resource management
  - Search Strategies

- Analysis
  - Ambiguity, Emitter parameter

- Report generation.

EW Tech

- Library analysis

- Together with EWLib provides fast library updates

- Multi Sensor analysis capability

- Emitter data analysis

- Countermeasures, analysis
Intelligence database

- Relational data repository
  - Land, Sea, Air
  - Platforms, emitters, weapons
  - Images, diagrams, documents

Integrated GIS
- EW Planning
- EOB Analysis
- Automated Intercept Analysis

Integration with Mission Data Generation tools (EWLib)
HES-21
ESM, ELINT AND SELF-PROTECTION SYSTEM

Description
Provides ESM, ELINT and Self Protection by means of Countermeasures. Highly integrated system, designed for operation in dense signal environments with modern radars, providing excellent tactical situational awareness.

Strengths
- Long-range detection, automatic emitter identification and geo-location capabilities.
- Excellent tactical situational awareness in terms of:
  - electronic order of battle (EOB)
  - data-strategic collection
  - analysis capabilities for creation and maintenance of electronic intelligence databases and libraries for emitter identification.

Key platforms
Saab 2000 AEW&C. HES-21’s subsystems in operation on various fighter, transport and helicopter aircraft.
EPS
ESM AND ELINT SYSTEM

**Description**
Cost effective solution with modular and scalable architecture providing ESM and ELINT capability for ground based and airborne applications.
The system provides excellent tactical situational awareness and capture high quality technical intelligence data.

**Key platforms**
Medium-large sized aircraft and helicopters, ground fixed and mobile installations.

**Strengths**
- Different available antenna configurations
- Scalable receiver architecture based on Wideband Digital Receiver
- Stand alone operation or distributed sensors - system-of-systems
- Long-range detection, automatic emitter identification and geo-location capabilities.
- Excellent tactical situational awareness
- ELINT data capture and analysis
EPS-200 ESM/ELINT SYSTEM

- EAA
- Omni
- Optional SpinDF
- ESM Digital Receiver Controller
- Data Transfer Unit
- Ethernet Switch
- ESM Server
- TCP/IP Ethernet
- Hotlink
- RF CAL signal
- RF signals
- Control and status
- External CMS
- Op HMI

SAAB
ESP-2
ESM ELINT SYSTEM

Description
ESP-2 is a compact, lightweight stand alone ESM/ELINT system for detection, measurement, location and classification of radar signals.

Emitter data is transferred via a real-time data link to the ground based Remote ESP Terminal (RET).

Key Platforms
UAV and small to medium sized aircraft

Strengths
- Acquisition, analysis and precision direction finding (DF) of emissions from search, tracking, navigation and fire control radars.
- 0.5 to 18GHz frequency coverage
- Accurate signal parameter measurements and analysis.
- On-board recording capability.
ESP-2 ESM/ELINT SYSTEM

Remote ESP Terminal (RET).

Operator Workstation on board RET (option).

Op HMI

Emitter Location Controller (ELC)

Data Link

Omni Antenna

ESP Antenna Array (EAA)
UME and SME
ESM, ELINT

Description
Tactical ESM and ELINT family of systems for surface and submarine applications. Radar ESM system with designated ELINT and radar ESM with full ELINT system capabilities.

Strengths
- Capable rapid analysis and determination of Electronic Order of Battle.
- Capability of rapid reaction time in high pulse densities with high sensitivity, and parallel ELINT analysis capability, without jeopardizing platform safety.
- Compact and easy to install and maintain

Key Platforms
Submarines (Types 209, 214 etc.)
Surface Vessels such as Frigates, OPV, MCMV etc.
U/SME ESM/ELINT SYSTEMS
Conclusions

- A product development strategy that is based on generic building blocks is being followed to realise cost effective, scalable and adaptable ESM/ELINT solutions.
- As a result a sustainable product portfolio to meet the entire spectrum of ESM/ELINT market requirements has been created successfully.
- The Digital Receiver (DRx) has been identified as the key component for future convergence of receiver technologies and a strategy for using it as the base for flexible and scalable ESM/ELINT solutions is being followed.