

Waveform development and Management perspective

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Summary

- Leonardo SDR products: the waveform portfolio
- Waveform development & porting
- Waveform management issue
- The need for policy and procedures to manage the products
- Certification to adopted and applicable standards



SWave HHE



VM3-Lite (50W+Cosite)



STANAG 4204/05

VHF 30-88 MHz; UHF 225-400 MHz with 25 kHz
G2G Interoperability with Voice and Data

SelfNet SBW

225÷512 MHz with 1.3 MHz BW
G2G Interoperability with Voice and Data

SelfNet NBAW

30÷512 MHz with 25KHz
NB-AW Voice and Data Communications

SelfNet EASY II

VHF 30÷88MHz; UHF 225÷512MHz
EPM G2G Voice and Data Communications

MIL 188-220 C

datalink for IP traffic for
Narrowband Legacy WFs



SWave MB1



VB1 (50W+Cosite)

STANAG 4204/05

VHF 30-88 MHz; UHF 225-400 MHz with 25 kHz
G2G Interoperability with Voice and Data

SATCOM

UHF-FM/AM 225MHz to 400 MHz
(292 – 318 MHz uplink, 243 -270 MHz downlink)
in TDMA, DAMA, with 5 or 25 kHz

SelfNet SBW

225÷512 MHz with 1.3 MHz BW G2G
Interoperability with Voice and Data

SINGCARS

30-88 MHz with 25 KHz bandwidth;
EPM GAG Interoperability with Voice Communications

SelfNet NBAW

30÷512 MHz with 25KHz
NB-AW Voice and Data Communications

SelfNet EASY II

VHF 30÷88MHz; UHF 225÷512MHz
EPM G2G Voice and Data Communications

MIL 188-220 C

datalink for IP traffic for
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SWave™ Avionic



SWave™ VQ1



SWave™ Naval

STANAG 4204/05

VHF 30-88 MHz; UHF 225-400 MHz with 25 kHz
G2G Interoperability with Voice and Data

ESSOR HDR

All IP MANET 225-400 MHz; 1,25 MHz bw
Throughput 1Mbps ; SC- FDMA

STANAG 4285

HF with 25 KHz bandwidth;
HF Interoperability with Data exchange from
75 up to 3600bps

MIL 188-110 B

HF Data Modem up to 4800 bps
- Robust serial tone mode for degraded HF links

STANAG 4538

HF Technical Standard for an Automatic Control
System Data Link with ARQ

STANAG 5066

Profile for HF Radio Data Communications, Reliable
email and Data over HF

SATURN

225-400 MHz, with 25 kHz bandwidth;
GAG Interoperability with Voice communications
up to NATO Secret

SATCOM

UHF-FM/AM 225MHz to 400 MHz
(292 – 318 MHz uplink, 243 -270 MHz downlink) in
TDMA, DAMA, with 5 or 25 kHz

SelfNet SBW

225÷512 MHz with 1.3 MHz BW G2G
Interoperability with Voice & Data

SINGCARS

30-88 MHz with 25 KHz bandwidth;
EPM GAG Interoperability with Voice Communications

HaveQuick I/II

225-400 MHz, with 25 KHz bandwidth;
GAG Interoperability with Voice communications up to NATO Secret

SelfNet EASY II

VHF 30÷88MHz; UHF 225÷512MHz
EPM G2G Voice and Data Communications

MIL 188-220 C

datalink for IP traffic for
Narrowband Legacy WFs

Waveform development & porting

- Leonardo provides a complete portfolio of SDR products
- A rich set of waveforms has been developed for the different radio platform types (HH, MP, Vehicular, Naval, Avionic)
- SDR technology allows to reduce the TTM and optimize porting costs
- Same waveform for different targets implies proper configuration management

Waveform management

Waveform development: 2 cases

1. waveform First development: “national” level
 2. waveform First development: “international” level
- The first development of a national waveform sets the base for code porting on the other platforms: no need to implement an initial “base waveform”
 - The first development of an international interoperability waveform (eg ESSOR HDR) requires the implementation of a “base waveform” (BF) to be reused for several portings on different national target platforms.
 - Typically, such BF is wide enough to fit different platform architectures

The need for policy, procedures and infrastructure

- Management of waveforms is essential, especially when they are developed and used within an international context and for interoperability purposes
- Policies, procedures, specific entities identification and the establishment of a proper infrastructure, are necessary for the correct definition, use, and maintenance of the products created by the community
- In addition, validation and certification are capabilities that such an ecosystem should be able to support

The need for policy, procedures and infrastructure

- For international common applications (waveforms) a common registry/repository could be envisaged
- Only common SW (= Base waveform) is needed to be developed and maintained: the common registry/repository could contain (or provide pointers to) artefacts useful for waveform porting, general enough to be applicable to any capable platform. For this reason, Target software (waveforms) are not expected to be included in the common registry/repository
- Repository may include any common documentation (requirements and design) useful for porting

Certification to adopted and applicable standards

- Validation and Certification are needed capabilities for interoperability assurance
- Waveform conformance to the standards is an important matter
- The verification should cover multiple aspects:
 - Architecture-based Standards (SCA, ESSOR...) compliance
 - Waveform “over-the-air” interface compliance
 - TRANSEC/COMSEC compliance/certification

CONCLUSIONS

- Leonardo has developed a rich set of waveforms over different target platforms
- Management of these products is essential for their correct maintenance and evolution
- Especially when dealing with international products, policy, procedures and infrastructure should be defined and put in place
- Validation and certification capabilities, as well, are part of the overall ecosystem, in order to ensure interoperability and proper operational behavior

THANK **YOU** FOR YOUR ATTENTION



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