

# PROCESS AND METHODS USED TO DEVELOP THE JANUS STANDARD

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Standing In For

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## DISCLOSURE

Joao Alves could not attend at the very last minute. I volunteered to speak about my knowledge of JANUS. I do not speak for Joao, CMRE, or NATO



## BACKGROUND

- Perhaps 8-10 years ago, initial meetings were held at CMRE to discuss the lack of common approaches to acomms.
- At the time there were no STANDARDS for digital acomms
- Over perhaps a year a group of self-invited engineers and scientists from around the world gathered at CMRE to reach agreement on a basic acomms approach. The group developed a FOCUS:
  - ✓ A “simple” method that could be implemented on any commercial modem
  - ✓ A low data rate was acceptable for a variety of specific applications
  - ✓ It must have a robust physical layer scheme – tolerate limited multipath and modest range rate.
- Various individuals and groups accepted tasks relating to waveform definition, performance measurements, higher layer protocols, CONOPS, etc. The mandate was for an open standard that would benefit both NATO and the wider community. CMRE took the lead in developing a complete definition of the physical layer
- Physical layer – transmitter described in writing and in Matlab in complete

# NATO STANAG

Once the core definitions of JANUS were established, a formal request was made to NATO to begin the multi-year process of establishing and accepting a formal STANAG (Standardization Agreement)

1. CMRE was funded to develop the core capability – Project leads were Kim McCoy, John Potter, and Joao Alves, assisted by other CMRE personnel, and outside advisors and consultants.
2. Complete definitions and descriptions available on a CMRE-hosted website, open to anyone with registration.
3. Establish a formal NATO Industrial Advisory Committee (NIAG) with Joao Alves as Sponsor, to bring in:
  - Engineers & scientists
  - Modem manufacturers
  - Process Consultants
  - Interested “observers”
4. The year-long (funded) NIAG project supported multiple meetings of the NIAG where highly detailed descriptions of every aspect of a communications system were developed, reviewed, and eventually agreed upon.
  - PHY – reviewed and expanded on characterizing performance
  - Link Layer – 7 bytes of information, 1 byte for CRC. This layer allocates the bit structure. Cargo packet identified.
  - MAC, network Layers – much effort devoted to this, with some success
  - CONOPS – much discussion, charts, recommendations – useful, but operational experience will

## NIAG Products

The most important (personal opinion) NIAG product was development of multiple “test vectors” and a scoring system which provide a common base of performance expectations for modem manufacturers. The basic receiver could successfully process most, but not all of the vectors (example: high range rate)

The NIAG completed the link layer bit allocations – a contentious exercise

The NIAG identified CONOPS appropriate for JANUS (examples: submarine rescue, underwater IFF)

The NIAG assisted the Sponsor with paperwork to formalize the applications for the STANAG

The NIAG participants had great dinners around Europe and the USA 4-5 times during the year

## JANUS Status

- Multiple commercial manufacturers have implemented either the basic JANUS algorithms and/or have added their own enhancements
- CMRE has provided multiple opportunities for T&E and more are forthcoming
- Tests have been conducted in various parts of Europe
- NATO navies, especially Portugal's, have contributed resources, especially submarines, to the T&E with JANUS.

# CONCLUSIONS

The JANUS STANAG process provides an adaptable mechanism for the development of agreements among academics, manufacturers, and users of acomms.

- ❑ A lead organization, with funding, is the starting point
- ❑ Participation by the Lead, academics, technically capable vendor organizations, and potential users is necessary to establish a FOCUS
- ❑ A smaller technical group is needed to develop the core physical layer, with attention given to higher layer protocols. This is done by the Lead, with outside assistance as required.
- ❑ Extensive review, comment, and suggested modification by an organized, interested, outside group. This group should be as diverse as possible.

The JANUS process shows that a Sponsor with funding is necessary for a Standard to be developed.

A successful Standard requires participation by multiple participants, each with a “special” point of view. Expect the process to be contentious, but very rewarding (don’t forget those dinners!)

Finally, the NATO process requires acceptance by ALL (?) NATO countries. Personal opinion – not a good idea.

## FOOTNOTE

As speculation, I believe CMRE will soon initiate another acomm standards process, this time devoted to a higher data rate modulation scheme able to transfer modest volumes of data.

My recommendation will be to leverage JANUS as a header packet which carries a cargo packet developed under this new Standard.

JANUS was primarily a European activity, as the US Navy was not interested. Perhaps NSF can support US collaboration if CMRE does proceed with a new Standard....?