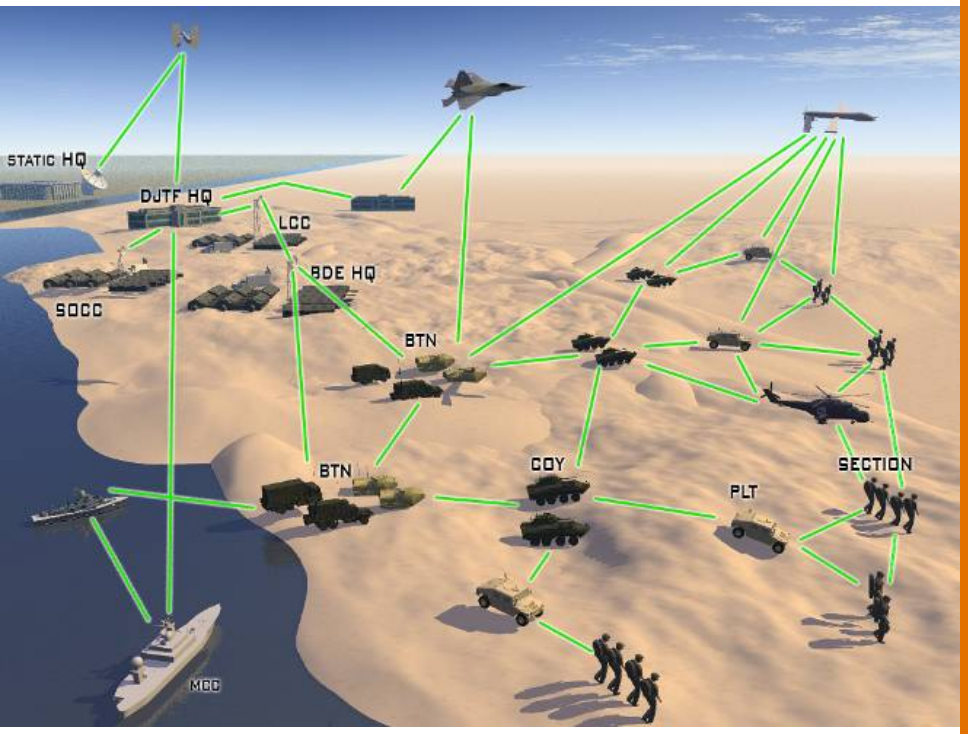
Defence Materiel Organisation
Ministry of Defence



NBWF

Rationale, Status and Future

Organisatie
DMO/JIVC
E. Heertje
Information manager

First a short detour

Although technically superior V2000 (Philips) lost the videoplayer battle from VHS (JVC) because of two reasons….

Topics

- **End User Lessons Learned recent operations**
- **NATO Waveform Strategy**
- **Some aspects that differentiates NBWF from other WF initiatives**
- **For which operational scenario's NBWF is a fit and how does that relate to WBNWF's?**
- **NBWF status, future and challenges**

"The message needs to come through"

NLD Lessons Learned (Iraq, Afghanistan, Burdundi, Mali)

1. Lack of interoperability felt increasingly between coalition partners e.g during convoy operations and special ops

2. Complex radios and related systems have entered service without proper instruction and training

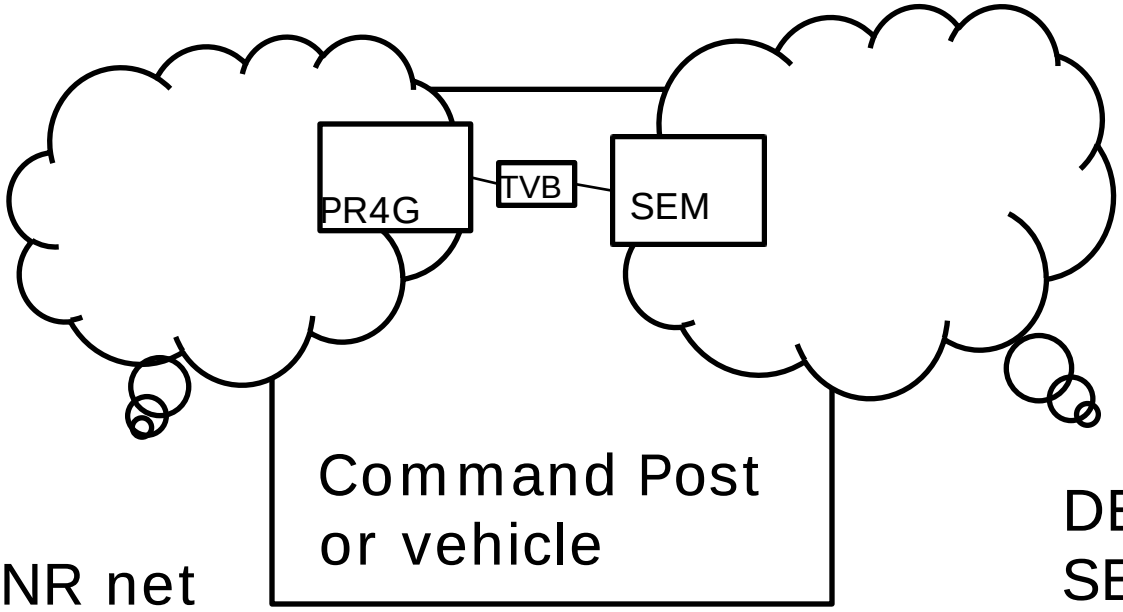
3. VHF losing its role as primary comms means (no connectivity with compound; AOR=> 180x200km =>TACSAT)

4. HF also losing ground opposed to TACSAT and Inmarsat

5. ***[..] "Within the design and procurement of new C3I systems interoperability and network enabled capability should be a guiding principle."***

DEU / NLD cooperation

E.g. DEU MBT units need to co-ordinate with Dutch units Division Schnelle Kräfte (DEU) / 11 AMB (NLD)



NLD:
PR4G CNR net

DEU:
SEM CNR net

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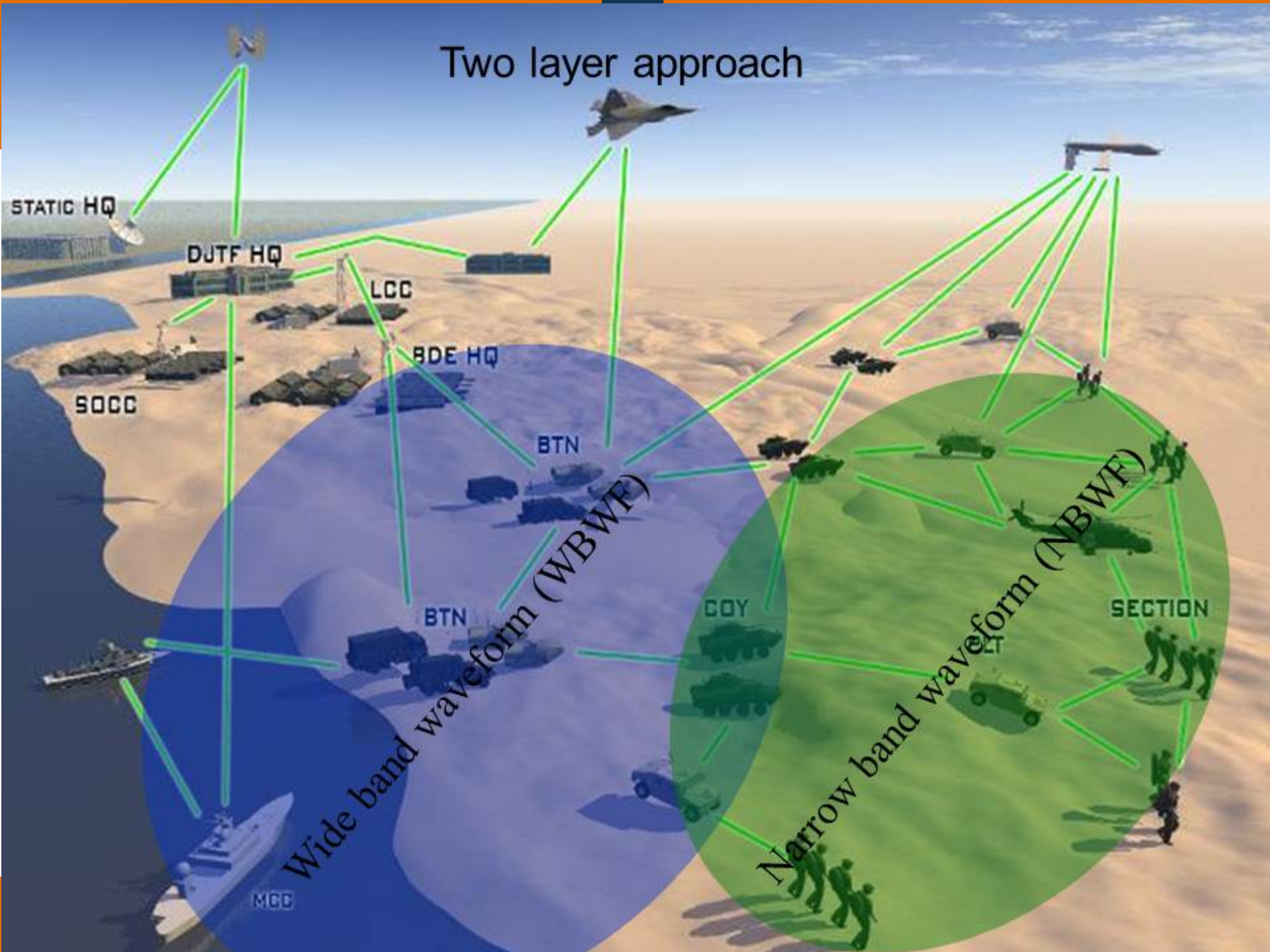
Two layer approach
STATIC HQ
DJTF HQ
LCC
BDE HQ
SOCC
BTN
BTN
COY
SECTION
LT
MCC
Wide band waveform (WBWF)
Narrow band waveform (NBWF)

NATO Waveforms strategy

AC/322-N(2012)0187 (NR)

Step 0: Definition of operational scenario's
Step 1: Identify potential national roles within NATO in scenario's
Step 2: NATO defines coalition Comms Services Catalogue
Step 3: NATO builds waveform strategy synchronised with ongoing waveform efforts
Step 4: Nations perform national role vs Waveform mapping
Step 5: Nations Estimate national support to initiatives

Step 0: Operational scenarios/Current Order of battle

modular force components operations

lots of specialised units of different sizes (btn, coy, plt, tm) from different countries

E.g.: CBRN, EOD, PSYOPS, iSTAR (HUMINT, SIGINT, UGS), EW/jammer, CIMIC, RECCE

Step 0: Operational scenario's/Vignettes

14 vignettes defined, eg:

- Crowd Control
- Neutralisation of a Gang Leader Stronghold

Step 1: National Roles/Dutch policy

'*In the interest of the Netherlands*', policy document

Operational capacities of the [Dutch] Armed forces should be integrable into a larger context, both civil and militarily, national and international. This **demands** a **high level of interoperability** both on a **(materiel)technical level**, but also w.r.t. doctrines and mission preparation

Step 2: Comms services catalogue/Example Services within a vignette

- Battalion level and above: VBTCF
- Company level: VBTC
- Platoon/Section level: VBCF or VBT
- Team level: VB or VBF

Voice or video [!sidenote: entails much difference for the medium!]
Blue force tracking
Targeting (and critical combat functional services such as JChat)
Core services (e.g. e-mail, maps, photographs, etc,)
Functional services (other combat, CS and CSS FSs such as database access or replication).

Growing development: near real-time combining of sensor data in multi-national operations, e.g. SIGINT, joint fires

Step 3: NATO vision/NATO Communication Services Roadmap (1)

Technical Report 2013-SPW008905-11 on NBWF:

Description 6.1.1.3.1

Offers a **tactical secure waveform** for NATO coalitions. It targets tactical land domain, but [695]also Air and land when these forces connects and interact with Land environment. It can operate at **VHF and UHF band**. It falls outside the typical NATO common funding scope, however it **enables interoperability** between NATO Nations and/with Non NATO Nations operating in the same coalition.

It is **aligned with PCN** concept where a secure transport network is created to offer multiple [696]Community of Interest at different security classifications(domains). It is offered to all NATO Nations **without IPR** to ease implementation. It does not want to compete with other, more sophisticated, National WF but it wants to complement them to achieve interoperability.

Step 3: NATO vision/NATO Communication Services Roadmap (2)

Timing 6.1.1.3.2

Start 1/1/2017, duration 20 years [698]

Finish 1/1/2037 [699]

Relevance 6.1.1.3.3

Highly relevant in different contexts, primary in a tactical domain []

Step 4: Nations perform national role vs Waveform mapping

The Netherlands:

- NBWF vs voice gateway PR4G / SEM
- We have not yet participated in interoperable WBNWF initiatives
- We do have a SATURN migration path (F35, F16comms upgrade, NH90, Chinook, Navy ships)

Step 5: Nations Estimate national support to initiatives

NBWF: CAN, NOR, DEU

SATURN: GBR, FRA, DEU

ESSOR countries / CoalWNW countries

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NBWF specifics

All informed group call, situational awareness data, multicast (sensor) data, data

- Secure
- Embedded SA
- Multi HOP / Ad Hoc Networking
- IP enabled/network-capable

Nice, but are those unique selling points ???

e.g. CoalWNW, ESSOR-WF, WNW, R&S NBWF, ANW2

What technical aspects are its main drivers

- V/UHF (=>used spectrum adaptable to circumstances)
  - VHF => relatively good range&penetration also in woodland
  - UHF/narrowband => good range/penetration in city when using ‘high grounds’ relays
- IPR free (as opposed to propietary implementations)
- Releasable to NATO/partners PfP (NR base level, AES256)
- Good scalability
  - Fit for use in high numbers in crowded spectrum
- Profile concept should make the NBWF easy to deploy
- NBWF focuses on range above throughput.
- Future additions will make the NBWF fit for a much broader range of scenario’s (swiss army knife solution)
- Developed with porting to generic platforms in mind (SDR, not necessarily SCA), not resource intensive
- 25/50 KHz up to 80 kbps

And what makes the NBWF stand out for the end-user

- Solution when when over-the-air multi-national V&D interoperability/BFT is needed at the tactical edge
- Mobile&dismounted use (as opposed to static&deployed use) [no (fixed) infrastructure to make use of, quickly deployable]
- Long range/good penetration needed
- Easy involvement of PfP countries
- There is only one open-spec NBWF initiative.

This makes the NBWF is an enabler for modular force components operations and shortening of the sensor-shooter loop for ground operations.

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Synthesis NBWF vs NATO waveform strategy

PROBABLY YES:

- Potential Hostile Force Interference
- Neutralisation of a Gang Leader Stronghold
- Close Urban Warfare
- Operation over a very wide area with high mobility (e.g. logistics Vignette)

PROBABLY NOT:

- Crowd control
  (alternatives exist UHF-handheld → TETRA, TETRAPOL, LTE)
- Base protection
  (directly around base [deployed] alternatives exist e.g. DPRMR, LTE; long range patrols: maybe NBWF can play a role)

What makes an (interoperable) WBNWF stand out?

Does support video and aggregrated (large quantities of transit) data as opposed to the NBWF

Within the Wireless Reference Architecture proposed for a *higher layer of connectivity* i.e. at higher command levels.

Fit for large (multi-national/joint) operations with relatively *high mobility* (mobile CP's, fluid connectivity)

A kind of interoperable moving radio relay?

WBWF achilles heel as a one size fits all solution

Range

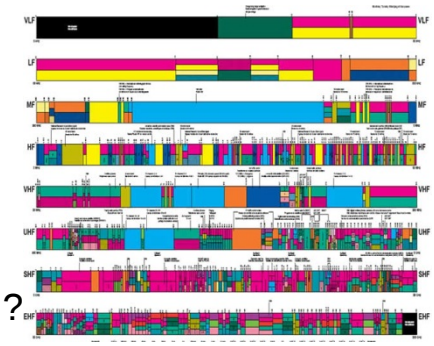
Max range specified by one WBNWF initiative:

· 20km at 1 Mbps

· 35km at 256 Kbps

Defined with high altitude antennas!

Range misleading based on our experiences on flat terrain with HCDR/NTDR/ANW2 normal antenna height, mobile use, 225-400MHz (only a few km's). Laws of physic are stubborn….



Frequency supportability/scalability

Carrier size: 1,25 MHz and hopping(difficult to allocate in Band I)

How many 1.25 MHz carriers can we in practice support in Nato Band I?

Alternative means

Is wired interoperability (TP2000, FMN) at HQ/(forward) CP/Compound not often an alternative for wireless interop in current operations?

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NBWF Status/Plans

STANAGS/ed1 Ready for ratification,
Break-of-silence by one nation which mainly has to do with security issues.

Different PHY development platform and target platform implementations exist and tested in the fields

Higher layers (MAC, ROUTING) extensively optimised in OMNET++ simulation model

Plans for a reference implementation 2017…, target implementations, 2018?

- NBWF/EPM(ed2, hopping) on roadmap
- RBCI
- AGA variant,
- other profiles (e.g data-only)

How to get this of track?

Take aways & Questions

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