



A Presentation to The Nordic HF Conference and the HFIA

The Canadian Forces Integrated High Frequency Radio System Project (IHFRSP)

Commander Kristof Langland
Directorate of Information, Command and Control
Project Director





Purpose - Information Brief

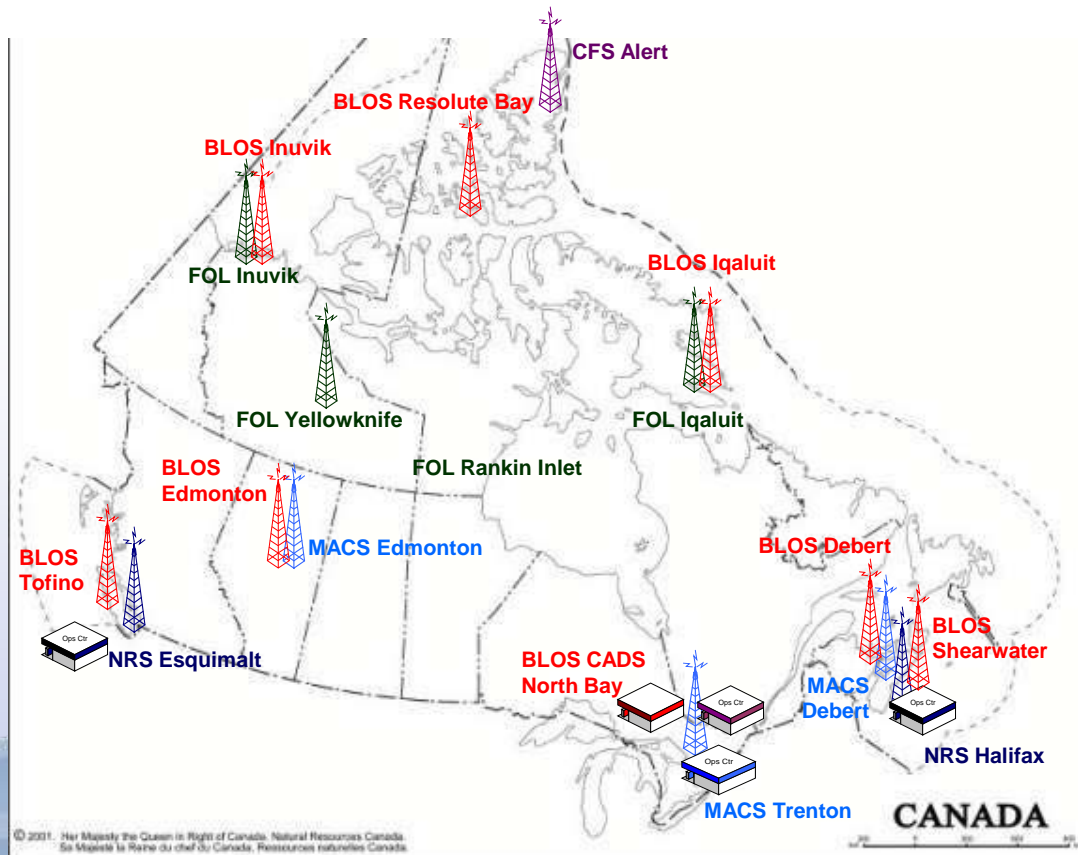
- To describe the IHFRS project



Current HF Radio Systems

- Military Aeronautical Communications System (MACS)
- Naval Radio Stations (NRS)
- Canadian Air Defence Sector (CADS) (BLOS) Sites
- Canadian Forces Information Operations Group (CFIOG) Site(s)
- NORAD Forward Operating Locations (FOL) U/S

SOF, Comms Reserve, Portable Air Control Squadron operate tactical HF systems without permanent dedicated static base stations





Status Quo - Deficiencies

- **Existing HF systems obsolete or beyond economic repair. Cannibalization possibilities ending.**
- **Existing legacy systems exacerbate O&M costs in procurement, trg, maint and operation**
- **Inability to take advantage of technological improvements (NETCENTRIC Warfare)**
- **Inadequate coverage in North**



Current Status

- Project Approved and Funded for Options Analysis and Proof of Concept in January 2010
- Work ongoing in 2010/11 to finalise an Options Analysis and Draft Concept of Operations
- Planning to build a proof of concept and trial HF Networking services in 2011/2012.



Broad Options

- **Option One - Fix the Maintenance Issue (Rust Out)**
 - Technology Refresh for another 10 yrs past FOC
 - Existing systems remain stove-piped and only support legacy systems
- **Option Two – Integration**
 - Technology Refresh for another 10 yrs past FOC
 - Integrated HF system (Combine all 5 stovepipes)
 - Achieve Inter-Operability with NATO and US DoD
- **Option Three – Integrated NETCENTRIC HF System**
 - Major insertion of new and future Technology to last 20 yrs
 - Networked and Nodal Operational Level Integrated HF system
 - Add Full Northern Coverage of integrated Networked system
 - Delivery of Operational Nodes – Limited Mobile Platforms



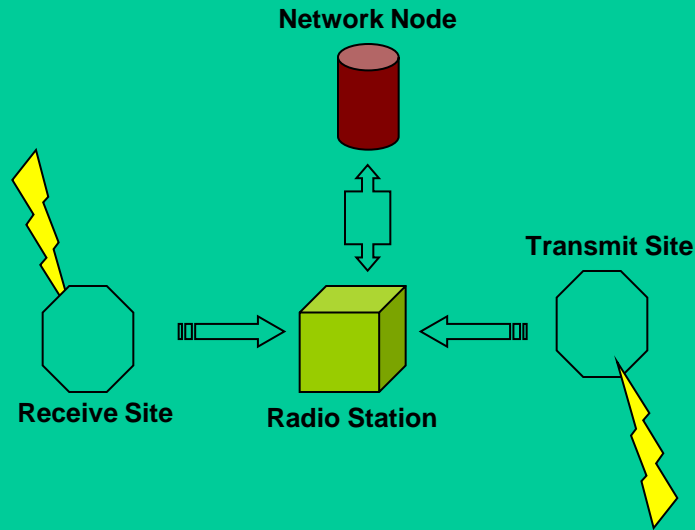
Quick Look – Future Concept

- Networked HF systems that are smaller, very technically advanced and less maintenance intensive than current legacy systems
- Will provide Strategic employment but with an operational level focus
- Communications Research Centre Canada and Defence Research and Development Canada Contracted to support Conceptual work and Options Analysis



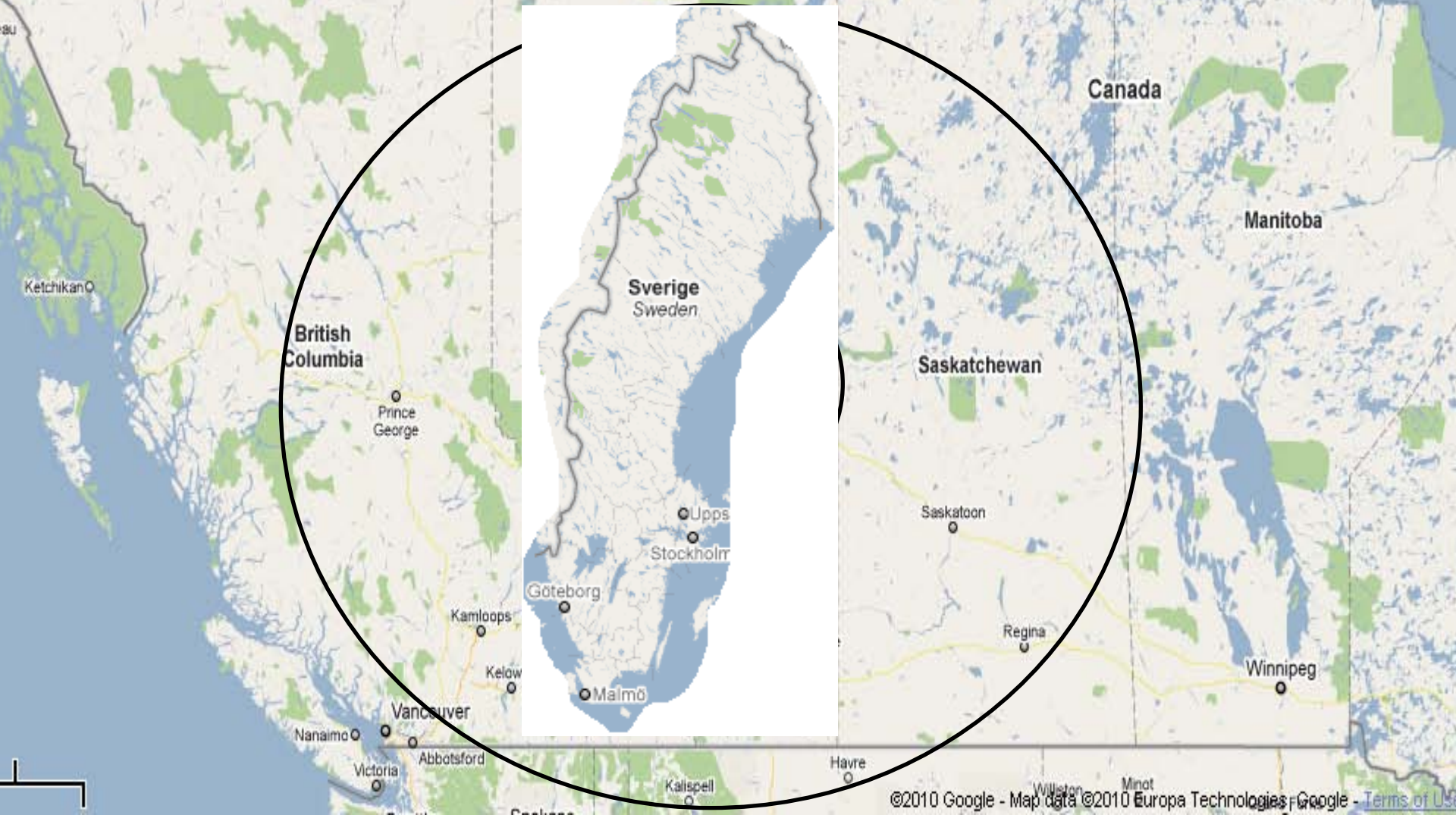
Future Concept What is a Wideband HF Network Node?

A network is a system of interconnected parts.



Nodes are the parts of a network,
and edges are the relationships
between those parts of the network

Quick Look – Future Concept of a single Wideband Networked HF Station and its coverage area.





Current Work

- Examine the feasibility of an HF network to achieve Canada-wide coverage, at 3kHz and 6 KHz (ISB) bandwidth. This should provide a communications footprint over the entire Canadian land-mass, including the far north and the Maritime and Air approaches.
- This work includes investigation of:
 - Radio spectrum requirements and issues related to enabling a Canada-wide HF mesh architecture. This includes analysis of interference, spectrum sharing, capacity.
 - Tx power requirements, link robustness/availability and multi-channel schemes.
 - Unique Arctic conditions, given the challenging radio propagation environment.
 - Networking techniques for an HF mesh architecture. This includes considerations of connectivity and throughput.
 - Concepts and techniques to support non-fixed and lower power platforms.
- The solution should consider new concepts and technologies such as policy based traffic management, quality of service mechanisms, channel utilization techniques, encoding processes, modulation techniques and software defined radio systems.



Current Work (Cont)

- The following capability requirements will be considered in this work:
 - Provision of secure telephony services to ships, aircraft, vehicles, and portables and automatic interfaces to the infrastructure DND voice telephone network;
 - Provision of broadcast, point to point and networked topologies;
 - Capability for classified and unclassified operation;
 - Delivery of an integrated command and control system by providing networked services;
 - Provision of interoperability with principal allies
 - Maximum re-use of current sites, infrastructure and equipment;
 - Provision of a redundant path to the High Arctic Data Communications System (HADCS).



Challenges

- Examine and ascertain the technical feasibility of moving the current Narrowband (3khz SSB) HF system to Wideband (3-24Khz DSB).
- Examine the frequency spectrum issues to deliver the necessary spectrum to operate the proposed concept. This may involve International Agencies and Governments.
- Ensure that what is delivered will meet the needs of the future, rather than the present operating environment. This may include a significant Research and Development component.
- Examine new concepts such as Policy Based Traffic Management, Quality of service initiatives, channel utilization techniques, encoding processes, modulation techniques and software defined radio systems to determine the optimum delivery to support the proposed system.



Contacts

- Cdr Kristof Langland
 - Project Director
 - Kristof.langland@forces.gc.ca

- Questions?