

## Bredbandiga gruppantennor - fortsättningen

- Stig Ekestorm
  - FM-doktorand
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  - Teknisk officer
  - MSSE Electronic Warfare  
Naval Postgraduate School  
Monterey, CA, USA, 2000



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FÖRSVARSMAKTEN

## Bredbandiga gruppantenner - fortsättningen

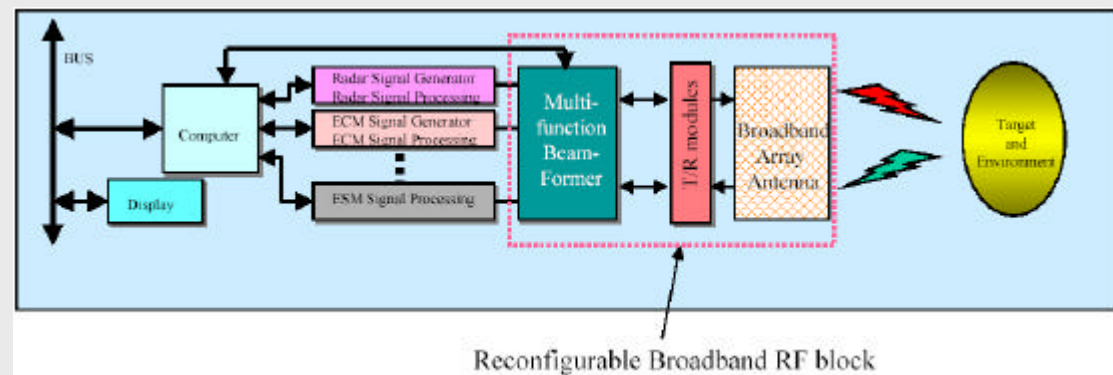
- Delaktiga i SSF-projektet  
*”Antenna Analysis and Design”*
  - **Project 3: Inherently Wideband Antennas**
    - Hans Steyskal/Henrik Holter, TET/KTH
  - **Project 4: Active Impedance Matching for Wide Band and Wide Angle Scanning Arrays**
    - Hans Steyskal/Stig Ekestorm, TET/KTH

## Bredbandiga gruppantenner - fortsättningen

- Delaktiga i forskningsprojekt vid FOI:
  - **Simuleringsplattform för en aktiv multifunktionsantenn (MFA)**
    - Hans Frennberg, Inst. för Mikrovågsteknik/FOI
  - **Bredbandiga flerfunktionsantenner (BFA)**
    - Anders Nelander, Inst. för Spaningsradar/FOI
    - KTH studie – Bredbandiga tunna gruppantenner
      - Hans Steyskal/Stig Ekestorm, TET/KTH

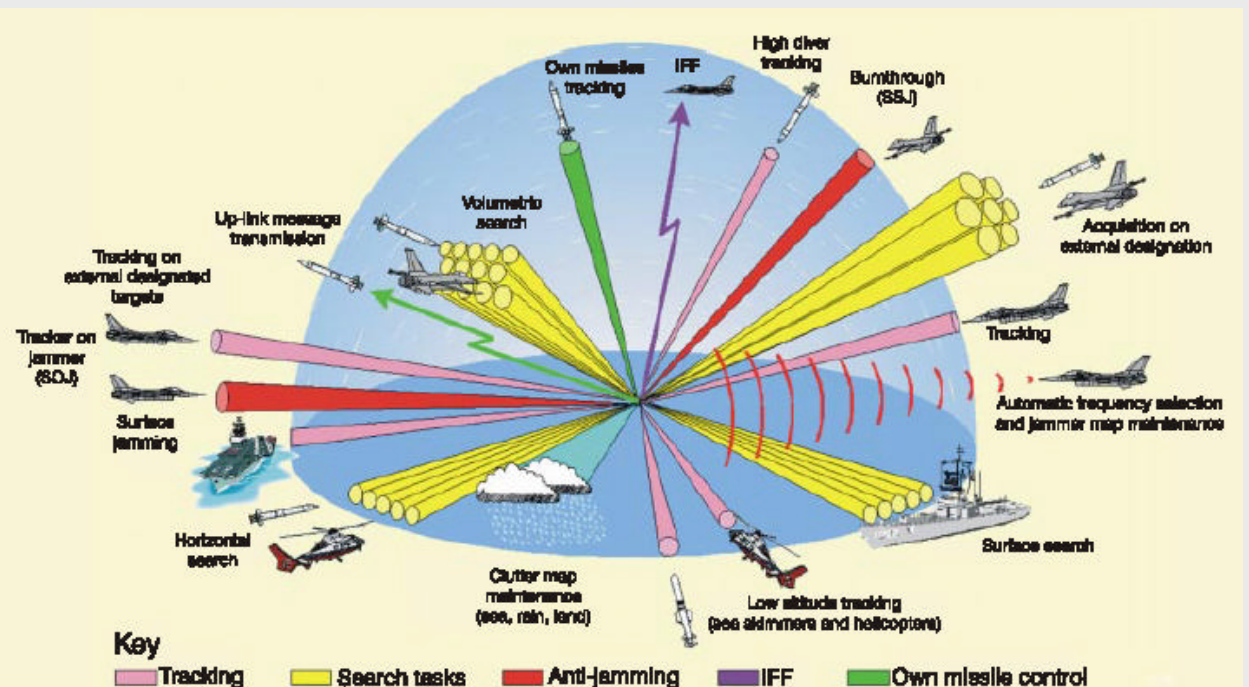
## Simuleringsplattform för en aktiv multifunktionsantenn (MFA)

- Studera och utveckla teknik för ett integrerat multifunktionssystem för alla vitala mikrovågsfunktioner på en farkost
- Projektet finansierat via medel från strategiska forskningskärnor (FOI)
- Försvvarshögskolans (FHS) representation:
  - Stig Ekestorm
  - Michael Tulldahl



## Simuleringsplattform för en aktiv multifunktionsantenn (MFA)

- Beskrivning av multifunktionssystem ur såväl tekniskt som operativt perspektiv
- Framtagande av design-principer för simulator
- Utveckling av testversion av simulator



## Bredbandiga flerfunktionsantennor (BFA)

- KTH studie
  - **Bredbandiga tunna gruppantennor**

### Objective

Advance the understanding of wideband phased arrays

- explore new principles and fundamental limitations
- develop thin planar antenna elements for wideband arrays  
(bandwidth ? 1 octave, scan ? ? 60?)

## KTH studie – Bredbandiga tunna gruppantenner

### Background

KTH has considerable experience in wideband arrays

- novel computational approach for wideband array analysis
- design methodology for flared notch elements
- wideband RCS (scattering) analysis of conformal arrays

Present wideband elements such as the flared notch element

- require large volume (depth) that limit low freq. and conformal applications
- are complicated to manufacture
- may need improved polarization characteristics
- may need reduced weight

## KTH studie – Bredbandiga tunna gruppantenner

### KTH Tentative Plans

Explore spiral elements over groundplane  
(informal cooperation with Henrik Holter)

Explore planar array element pattern  
synthesis

- inspiration from Georgia Tech approach
- electrically connected elements over groundplane
- optimize wide band / wide scan
- GA or other optimization algorithm

Explore merits of interconnecting circuits  
between array elements

- generalization of simple conducting contact
- feasible at different levels relative to patch element

Explore merits of nonuniform element  
feeding

- e.g. sparse element feeding at low end of freq. band

## KTH studie – Bredbandiga tunna gruppantenner

### Computations

- Unit cell analysis technique
- Finite-Difference Time-Domain (FDTD) method
- PB-FDTD (Periodic Boundary FDTD)
  - Developed by Henrik Holter during his Ph.D. studies at TET/KTH
  - E-mail: henrik.holter@telia.com
  - Henrik Holter, Ph.D.  
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## KTH studie – Bredbandiga tunna gruppantenner

?

- Inspiration from the Georgia Tech approach?
  - Fragmented aperture on dielectric substrate with groundplane
  - Optimisation using Genetic Algorithms (GA)
  - “A New Class of Broadband Planar Apertures”, Allerton 2001
- Any results?
  - Test of the PB-FDTD program with an interface for developing optimisation features
  - 4700 simulation runs

