GRIPEN NG FOR THE NETHERLANDS
ENHANCED FIGHTING CAPABILITY

ON THE MENU…

- SAAB AB
- GENERATIONS vs REQUIREMENTS
- THE COMPROMIZE DILEMMA
- THE ARENA
- GRIPEN NG
- THE NG PROGRAMME
- MULTI ROLE
- SUMMARY
- THE OFFER

A HISTORY OF HIGH TECHNOLOGY

1941

First B17 delivered

1948

Tunnan – first flight

1979

First order for RBS 15

1990

First laser simulator BT46

1993

First Gripen delivered

2002

First contract for NLAW

2005

Contract for Neuron

2006

Saab 2000 ERIEYE™ AEW&C

2008

Gripen Demo – first flight

SAAB

1937 Saab is founded

1990 Saab Automobile independent company

2000 Saab acquires Celsius

2005 Saab acquires Grintek

2006 Saab acquires EMW

1646

Bofors Järnbruk is founded

1894

Alfred Nobel acquire Bofors

1948

First order for Carl Gustaf

1998

StriC in operation

1950–

Development of fighter radar

1970–

Development of GIRAFFE

1980–

Development of ARTHUR

1990–

Sea Giraffe AMB is launched

SAAB

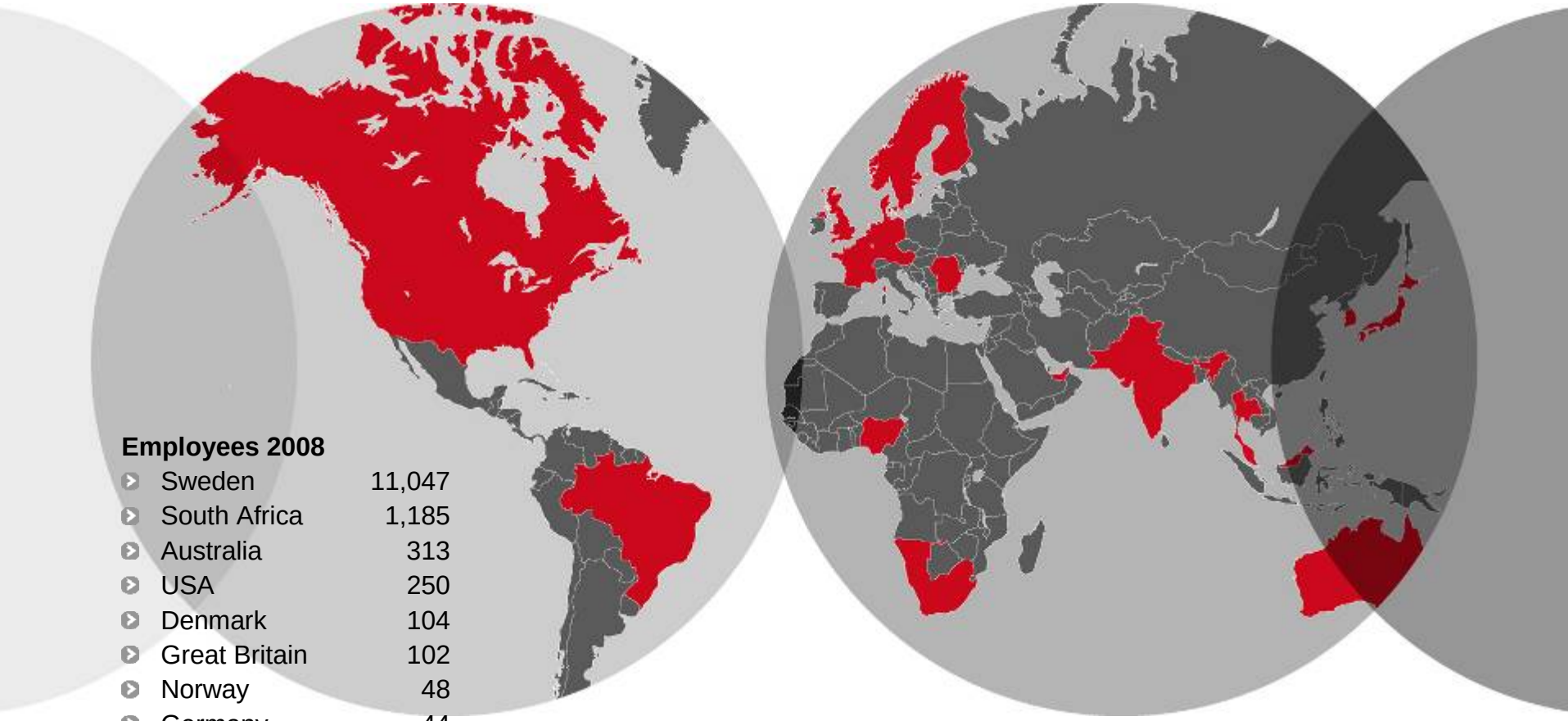
A MAJOR TRANSFORMATION

- From one dominating customer to multiple customers
- From unique Swedish to internationally interoperable
- From defending borders to protecting flows

BUSINESS CONCEPT

Saab constantly develops, adopts and improves new technology to meet changing customer needs. Saab serves the global market of governments, authorities and corporations with products, services and solutions ranging from military defence to civil security.

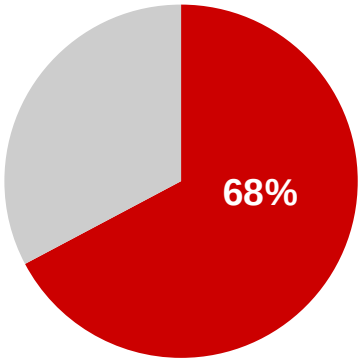
SAAB WORLDWIDE



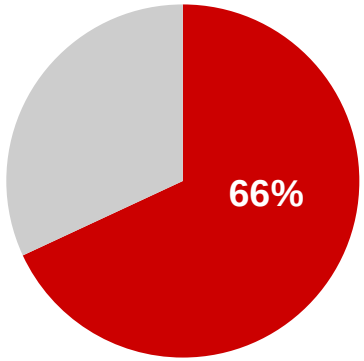
Employees 2008

Sweden	11,047
South Africa	1,185
Australia	313
USA	250
Denmark	104
Great Britain	102
Norway	48
Germany	44
Switzerland	34
Other	77

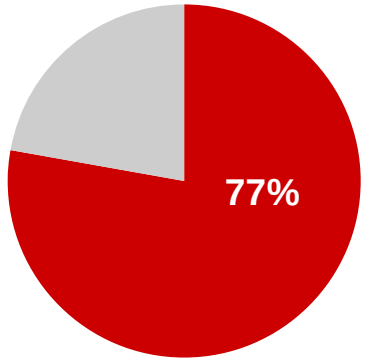
INTERNATIONAL BUSINESS



Sales



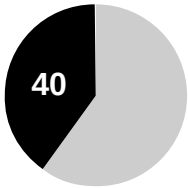
Order bookings

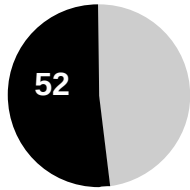


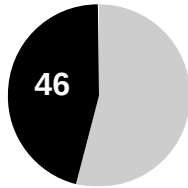
Order backlog

Jan-Dec. 2008

- International
- Sweden







Full year 2001

- International
- Sweden

THE SEGMENTS AND THE BUSINESS UNITS

Defence and security solutions

- Saab Aerotech
- Saab Grintek Technologies
- Saab Surveillance Systems
- Saab Systems
- Saab Security
- Combitech

Systems and products

- Saab Avitronics
- Saab Barracuda
- Saab Bofors Dynamics
- Saab Microwave Systems
- Saab Training Systems
- Saab Underwater Systems

Aeronautics

- Saab Aerostructures
- Saab Aerosystems
- Gripen International

AERONAUTICS

Operations

- Gripen program
- Unmanned aerial vehicles (UAVs)
- Supplier to international aircraft programs
- Leasing of Saab regional aircraft

Key strategic issues

- Export Gripen
- Invest in technology to win new business
- Secure position in next European Air Power System

OUR HERITAGE

… more than 4300 a/c delivered during 70 years

WHAT KIND OF FIGHTER?

DISCUSSION AROUND;

- GENERATIONS
- REQUIREMENTS
- THE NATION´S NEED
- THE ARMED FORCE`S NEED
- THE AIR FORCE´S NEED
- TYPE OF OPERATIONS
- WHICH THEATRE?

4, 4.5, 4+, 4++, 5th, 6th GENERATION…?

SAAB

Performance: A question of Generations ...?

5:th gen. … as defined by Lockheed Martin ...
http://www.lockheedmartin.com/data/assets/corporate/press-kit/F-22-Brochure.pdf

Defining the 5TH Generation Fighter

	F-35	Gripen
Advanced Stealth	✓	✗
Supercruise Speed	✗	✓
Extreme Fighter Agility	✗	✓
Sensor Fusion	✓	✓
Joint Force Enabler	✓	✓
	4,6?	4,8?

LM states:

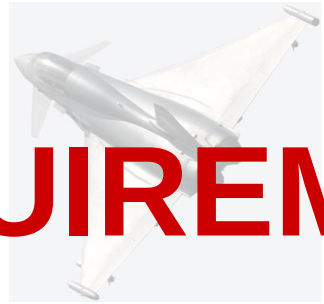
http://www.jsf.mil/contact/con_faqs.htm

...

Does the F-35 supercruise?
No, neither the F135 or F136 engines were designed to supercruise.

...

4, 4.5, 4+, 4++, 5th, 6th GENERATION…?



REQUIREMENTS

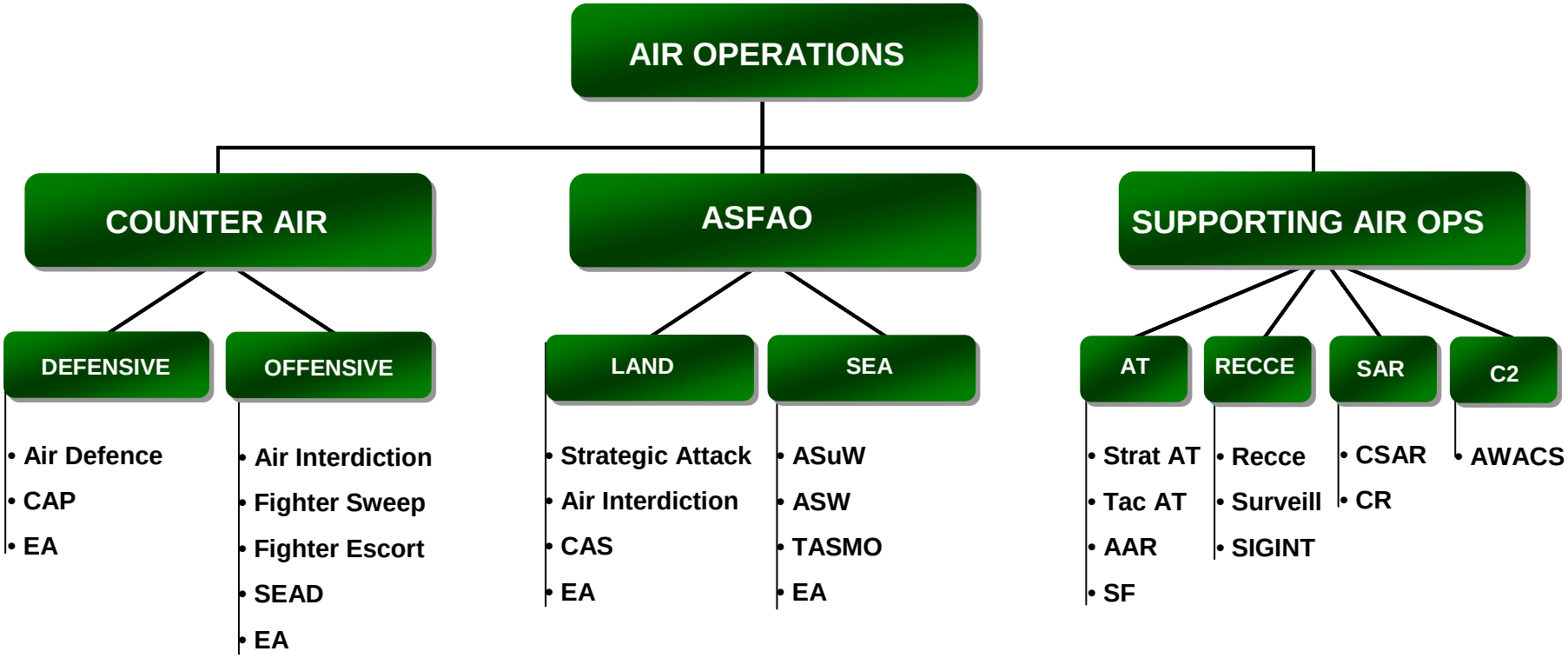
instead of

“GENERATIONS”

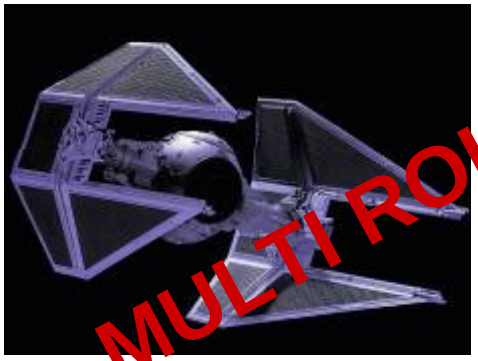
WHAT ARE THE REQUIREMENTS?

- Political aspirations
  - Offensive/Defensive/Force Projection?
  - Likely Threat (and Growth)
  - Industrial Participation/ Technology Transfer
- Numbers
  - Affordability
  - “Quantity is Quality by itself”…
  - “Air Force killers” due to operating costs
  - “Army, Navy killers” due to operating costs
- Alone or in a coalition?

MISSION TYPES



ONE SHIP – MULTIPLE MISSIONS??



MULTI ROLE FIGHTER = A COMPROMIZE


HIGH BATTLE
DEEP BATTLE
REAR BATTLE
NEAR BATTLE

DIFFERENT ROLES



HIGH BATTLE

COUNTER AIR

AD – SWEEP – ESCORT




Nearly impossible to move up (speed, shape, agility, thrust, drag etc.)

NEAR BATTLE

SAO

CAS – NTISR

REAR BATTLE

ASFAO

BAI –– SEAD/DEAD


DEEP BATTLE

ASFAO

AI – DAS(SOF) – SA

SAAB

Performance: Air-to Air

In the words of Lieutenant General George K. Muellner, USAF ...

- *JSF design: 70% for air-to-ground, 30% for air-to-air."*

  Director and program executive officer, Joint Advanced Strike Fighter

- *... the JSF complements the F-22 in the high-low mix. The F-22, as the high-end of the force mix, is designed to dominate the air superiority arena through the combination of stealth, supercruise, integrated avionics, and large internal weapons bays. The JSF, as the low-end, will be designed as a stealthy multi-role air-to-ground fighter reliant on the enabling force of the air dominant F-22. …*

  PRESENTATION TO THE HOUSE NATIONAL SECURITY COMMITTEE SUBCOMMITTEE ON MILITARY PROCUREMENT

  Principal deputy, Office of the Assistant Secretary of the Air Force (Acquisition)

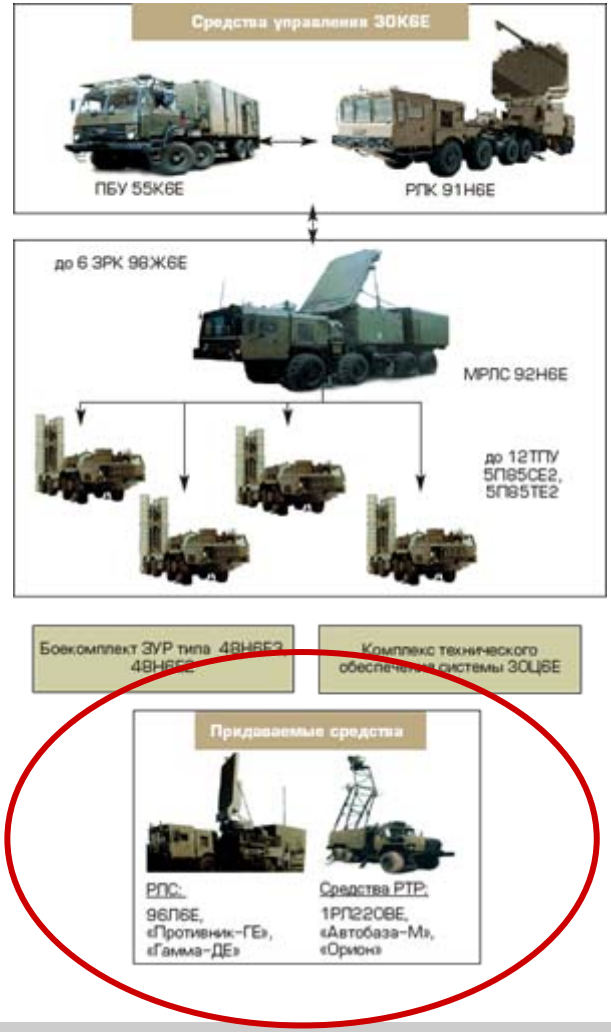
THE COMPLEX FUTURE

(E.g. … enemy fighters will always be threatening your assets)

SAAB

THE THEATRE

SA-21



SU-35

PAK-FA

J-10

SA-20

SA-21

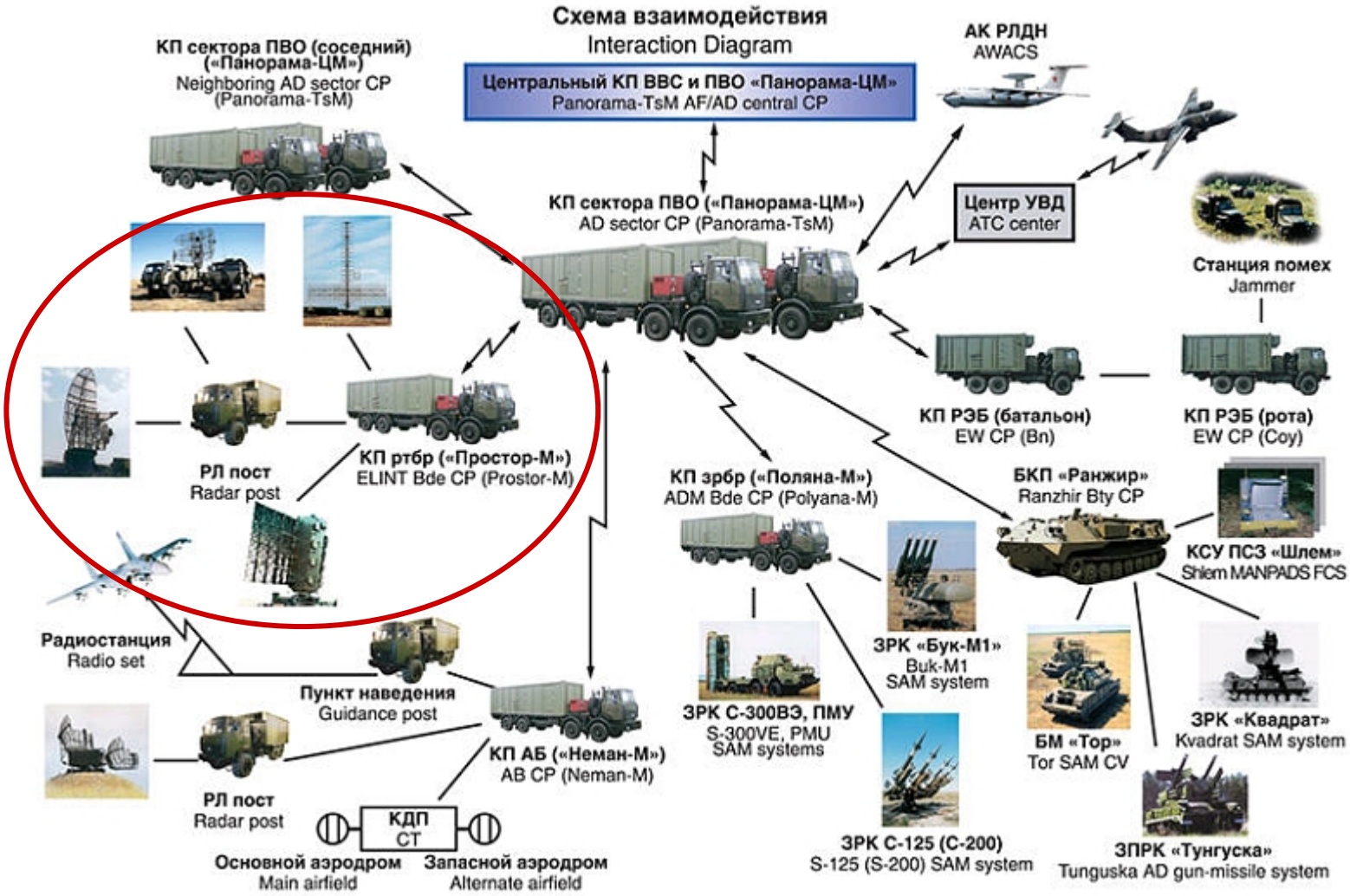
SA-23

Pictures: Courtesy Airpower Australia

www.ausairpower.net

SAAB

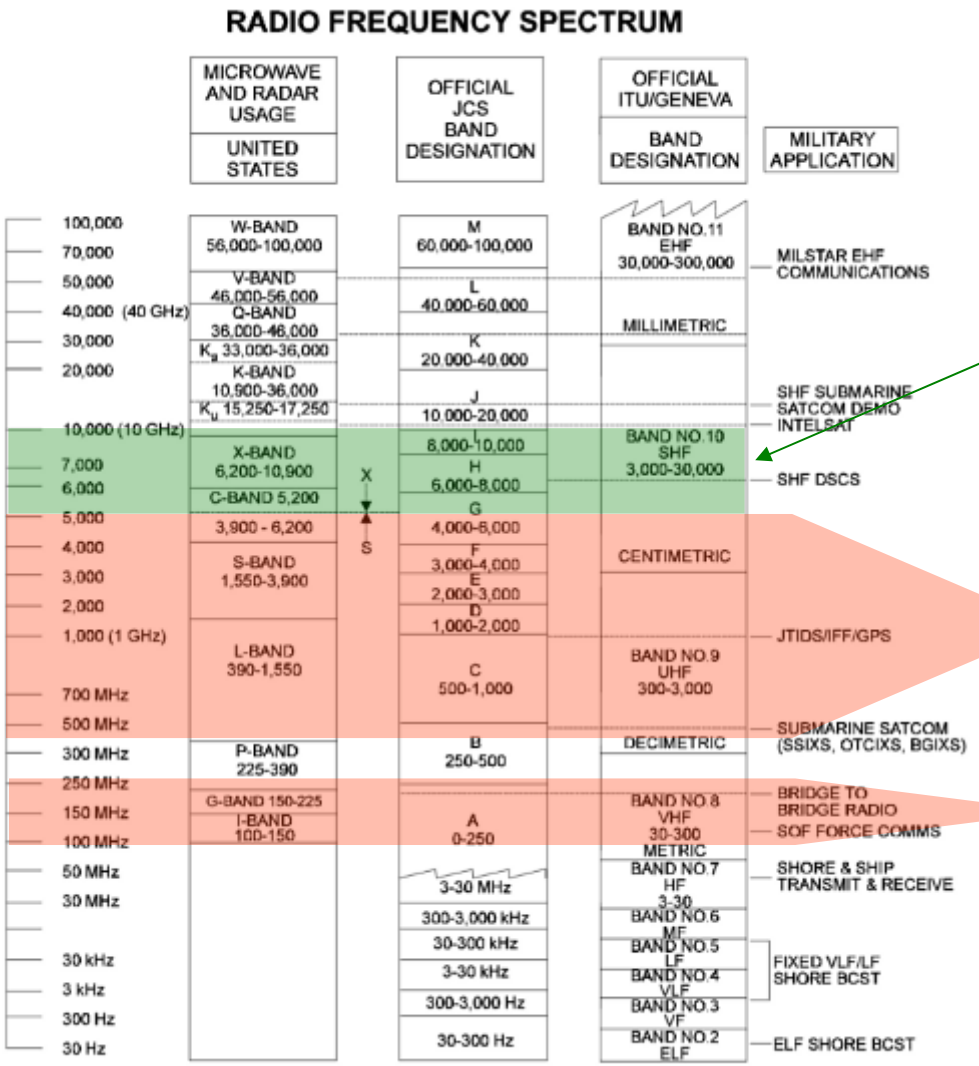
DOUBLE DIGIT IADS



Pictures: Courtesy Airpower Australia

www.ausairpower.net

NEW BANDS…



Classic “Legacy” AD radars

S-400 Triumf LEMZ 96L6E Cheese Board L-band

VNIIRT Gamma DE L-band high power AESA search radar in deployed configuration.

The new 3 dimensional NNIRT 1L119 Nebo SVU AESA is an improved new technology VHF band SAM battery acquisition radars

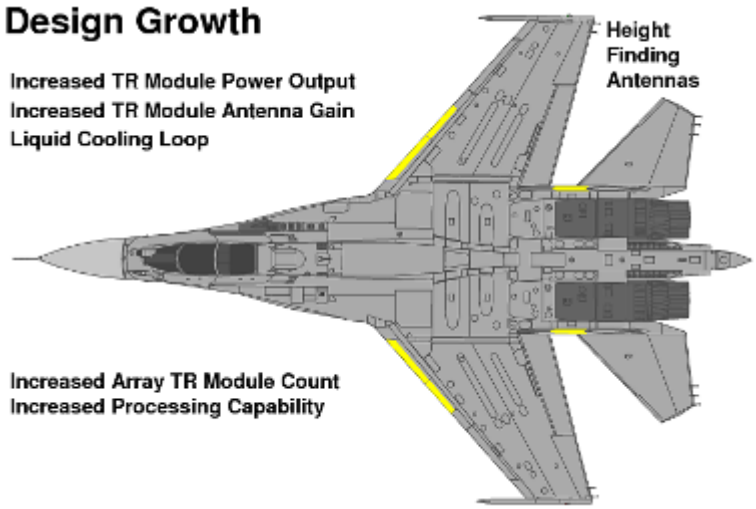
VHF-band high mobility Vostok E demonstrator deployed.

Pictures: Courtesy Airpower Australia

www.ausairpower.net

SAAB

ONLY GROUND BASED SYSTEMS, OR …



Pictures: Courtesy Airpower Australia

www.ausairpower.net

PASSIVE SYSTEMS…

Radar versus Stealth

Passive Radar and the Future of U.S. Military Power

By AREND G. WESTRA

Faced with the prospect of aerial stealth proliferation, states in the 21st century are looking for antistealth defense options. One such alternative, passive radar, appears a cost-effective counter to stealth. *Passive radar* is a receive-only system that uses transmitters of opportunity.[1] Integrating a system of netted receivers, passive radar can detect, track, and target piloted and unpiloted stealth systems and provide cuing for antiair weapons systems. A passive radar system emits no radio energy and can be well camouflaged in both urban and rural landscapes. The threat system produces no indications on friendly radar warning receivers and is difficult to locate and target. Faced with a passive radar threat, the United States may find itself unable to achieve air superiority at an acceptable cost.

As this article shows, ongoing advances in passive radar will deny traditional means to defeat enemy air defenses, make air superiority difficult to achieve against a passive radar opponent, and require changes in thinking to maintain U.S. power projection capability. In developing this central idea, this article describes the history of the battle between aircraft and radar, the rise of stealth and counterstealth, and the ongoing surge in passive radar and how it relates to advances in signal processing and sensor fusion. Additionally, this article assesses the passive radar threat to stealth, posits implications for future U.S. military power, and recommends a U.S. course of action regarding passive radar.

Aircraft versus Radar

"The defensive form of warfare is intrinsically stronger than the offensive"—so argued Carl von Clausewitz in *On War*.[2] The static warfare of the late 19th century and the

Lieutenant Colonel Arend G. Westra, USMC, is a Marine Air-Ground Task Force Plans Officer at 3d Marine Aircraft Wing, Marine Corps Air Station Miramar, San Diego, California.

Sailor monitors radar screen in Combat Direction Center aboard USS *John C. Stennis*

136 JFQ / issue 55, 4th quarter 2009 ndupress.ndu.edu

JFQ / issue 55, 4th quarter 2009

(*Joint Force Quarterly is published by the National Defense University Press for the Chairman of the Joint Chiefs of Staff*)

" A new paradigm is emerging, enabled by advances in networked computing and passive radar technology".

" Passive radar will play a critical role in future conflict. Ongoing advances in passive radar will deny traditional means of defeating enemy air defenses, make air superiority difficult to achieve against a passive radar opponent…"

"Increasingly, combatants will use passive radar and weapons systems to detect, acquire, track, and target aerial stealth platforms. Against such systems, stealth on its own will likely provide inadequate protection for manned aircraft, UAVs, and missiles."

" We cannot afford to spend billions on stealth, only to fail to thoroughly understand and counter rival systems."

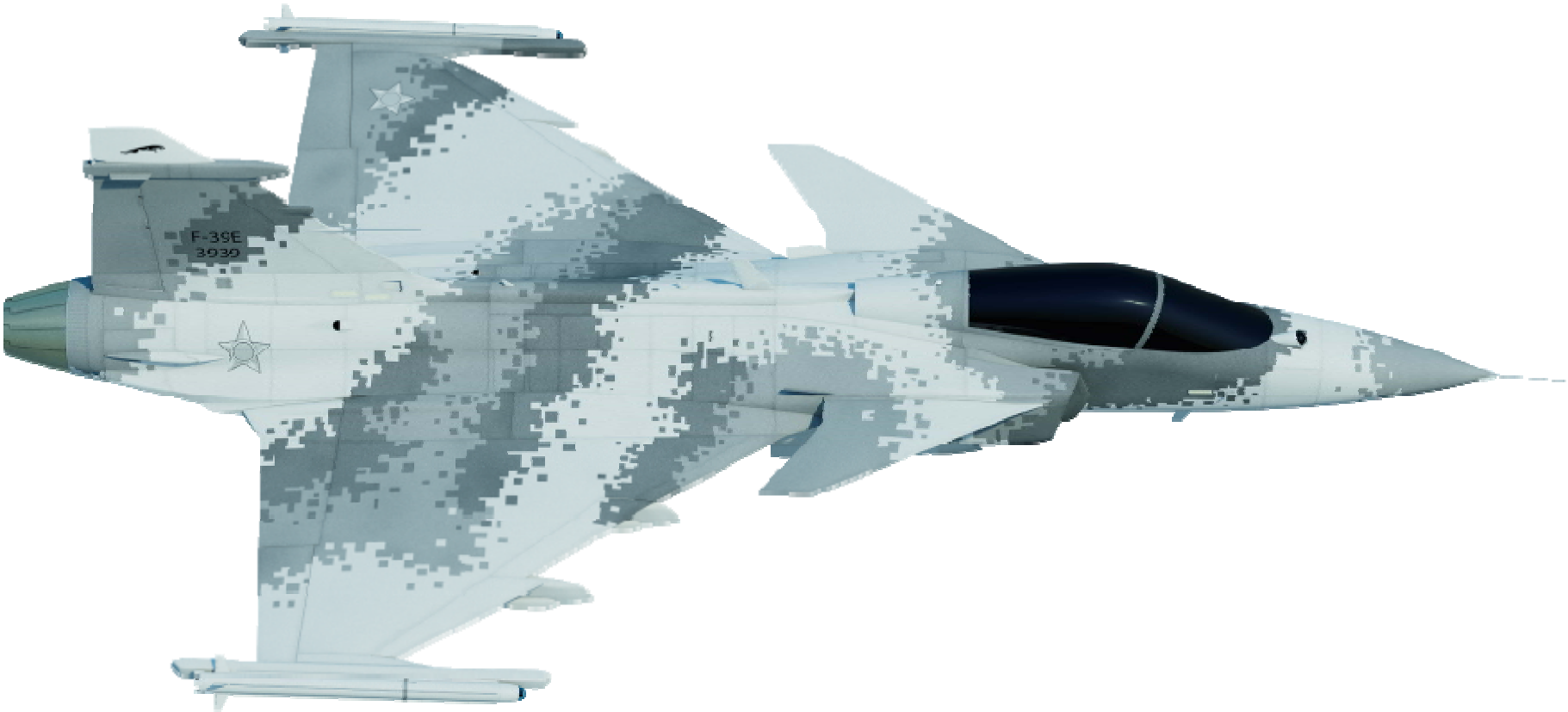
SAAB

THE SOLUTION

GRIPEN NG
THE AIRCRAFT

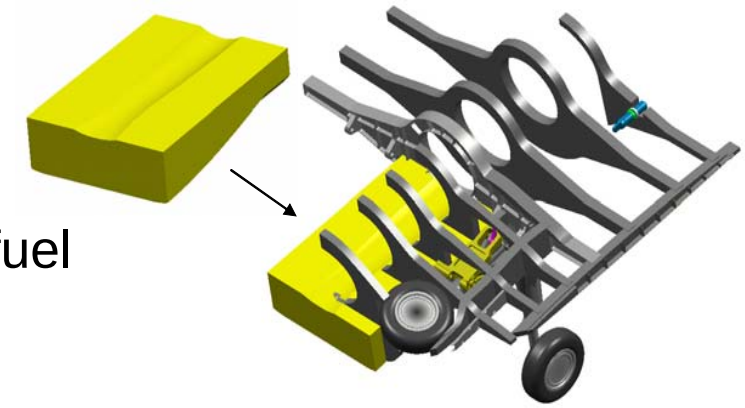
Number of Stations	10
Empty weight	15 700 lb
Basic flight design weight	20 000 lb
MTOW	36 400 lb
Internal fuel	7 300 lb
External fuel	8 300 lb
Payload	>13 000 lb

REACH



REACH

- INCREASE INTERNAL FUEL
  - New and moved main gear
  - Old main gear bay – 900 kg extra fuel



- 450 Gallons EXTERNAL TANK
  - Optimized for minimized drag
  - Super Sonic drop tanks

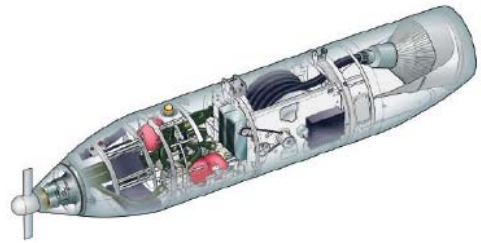
450 Gallons external tank

REACH (cont.)

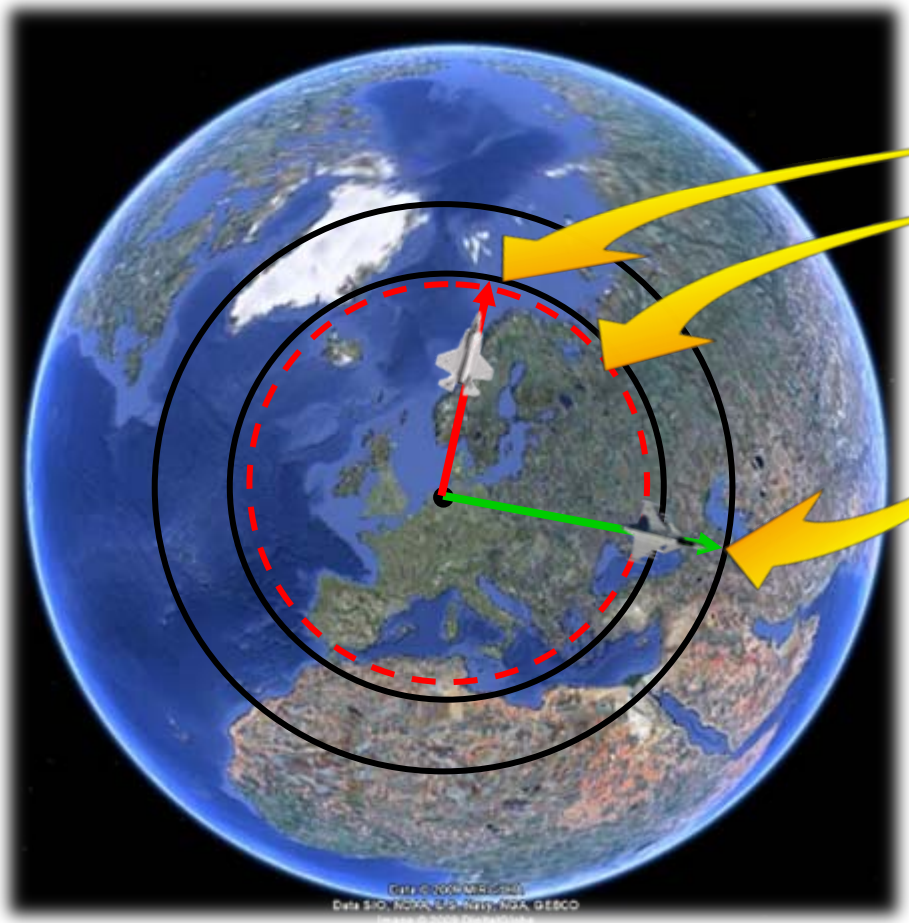
- RETRACTABLE TELESCOPIC PROBE
  - Minimized drag
  - Minimized RCS

- AIR TO AIR REFUELLING
  - C -130 Hercules
  - KC -135
  - Airbus 310 MRTT
  - KDC-10
  - Boeing 707

- BUDDY TO BUDDY REFUELLING



RANGE



JSF – 1456 Nm *

LO mode – 1370 Nm *

30% extra fuel gives 8% longer range…

GRIPEN NG – 2200 Nm

** Request for Binding Information Response to the Royal Norwegian Ministry Of Defence. Executive Summary – Part One*

BIG FIGHTERS HAVE BIG DRAG…

- Mission:
  - Supercruise to CAP 250 nm out.
  - Maximize CAP time.

2xRAMJET BVR+2xWVR
Mach 1.1

26 min to station
50 min CAP

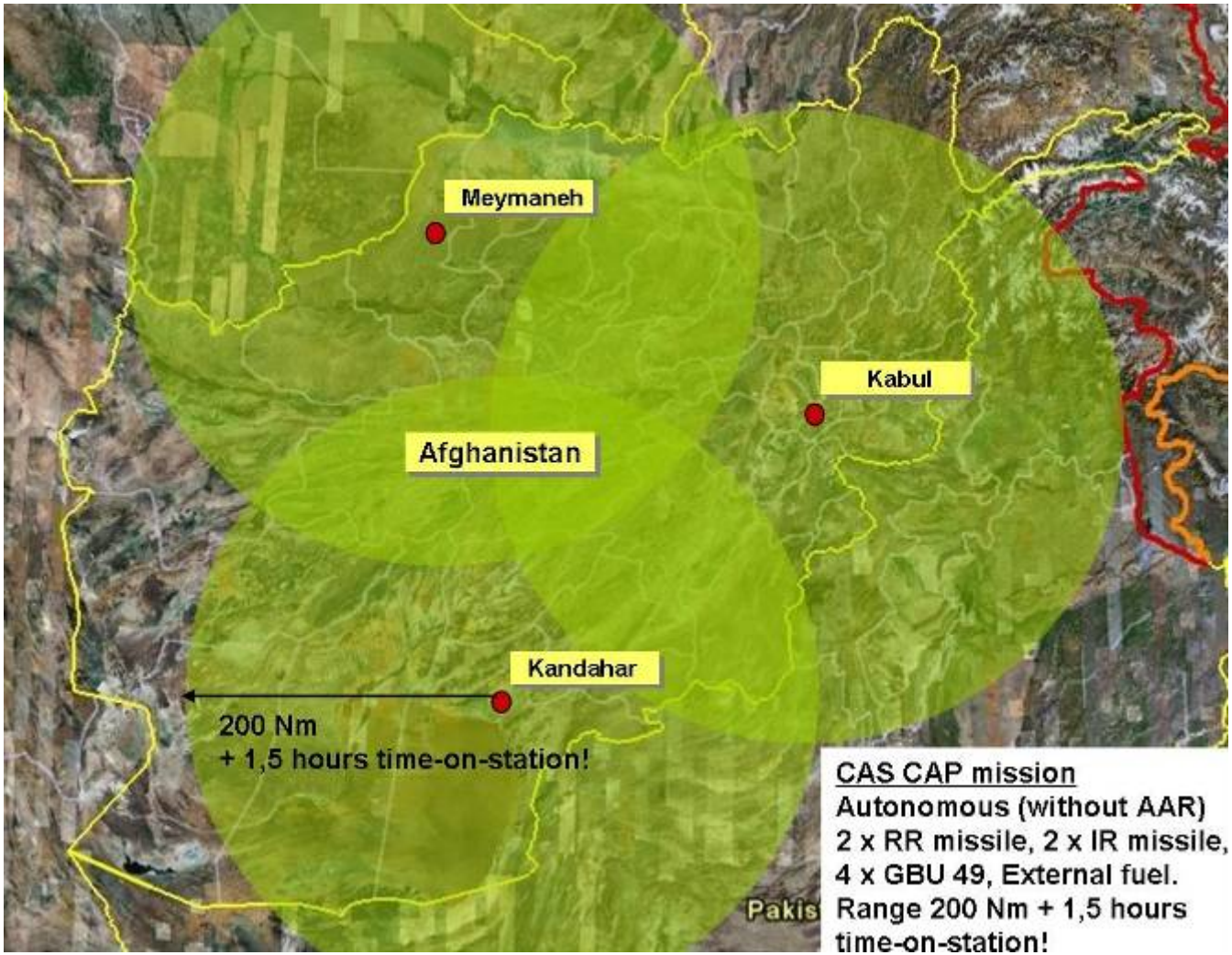
6xMRAAM+2xSRAAM
Mach 1.1

25 min to station
30 min CAP

2 x AMRAAM
Mach 1.1

No supercruise capability

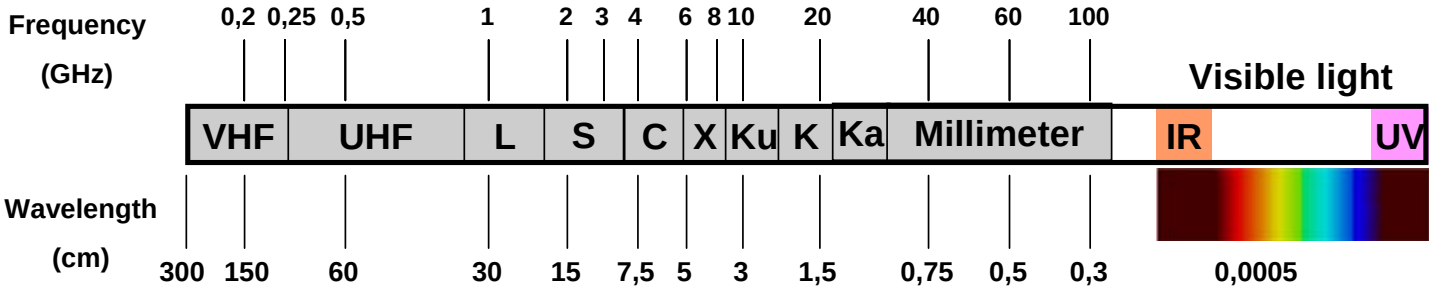
RADIUS IN AFGHANISTAN



CAS CAP mission
Autonomous (without AAR)
2 x RR missile, 2 x IR missile,
4 x GBU 49, External fuel.
Range 200 Nm + 1,5 hours
time-on-station!

ACCESS

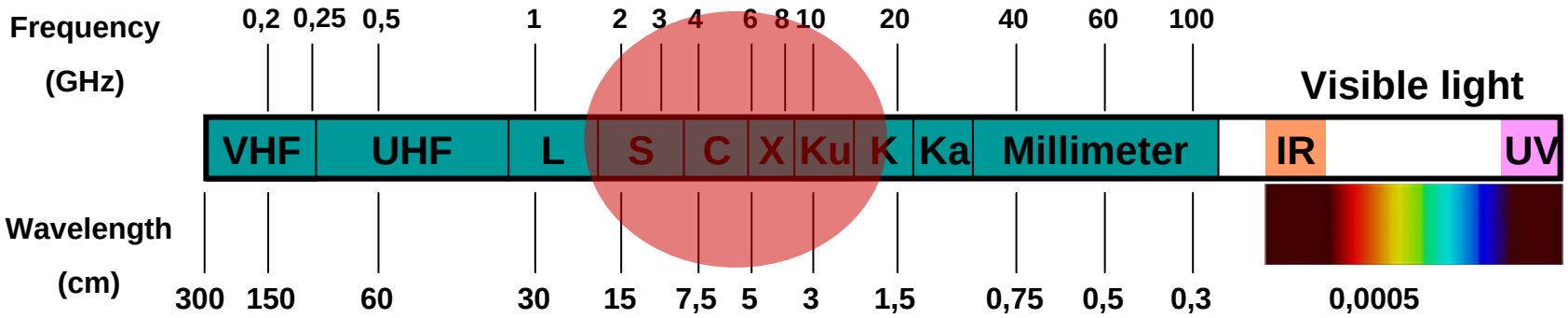
Key features – Balanced Design,
“Broadband Low Observability”



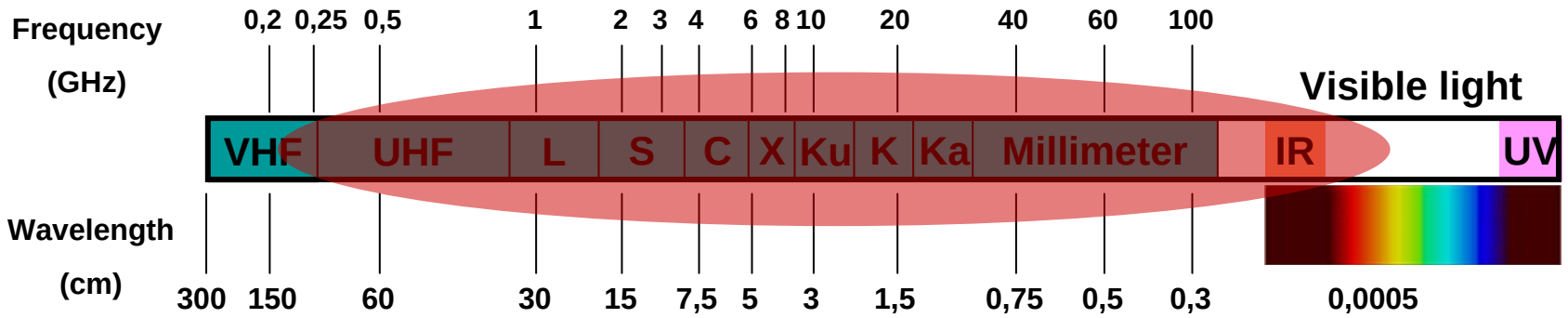
- RCS, Radar Cross Section
  - X- and Ku-band
  - Lower frequency bands; UHF/L-/S- C-band
- LCS, Laser Cross Section
- Infra-red (IR) radiation
- Ultra violet (UV) and Visual signature
- Radio frequency (RF) emission control (EMCON)

BALANCED DESIGN

NARROW-BAND APPROACH

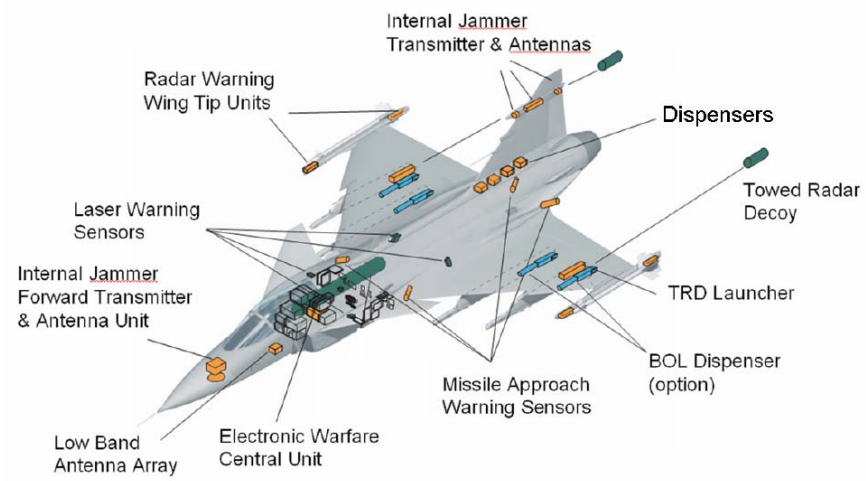


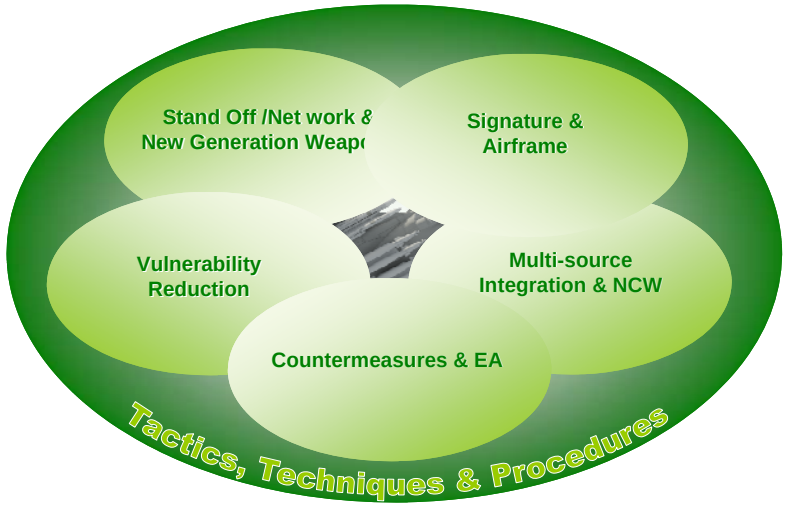
GRIPEN APPROACH



ACCESS

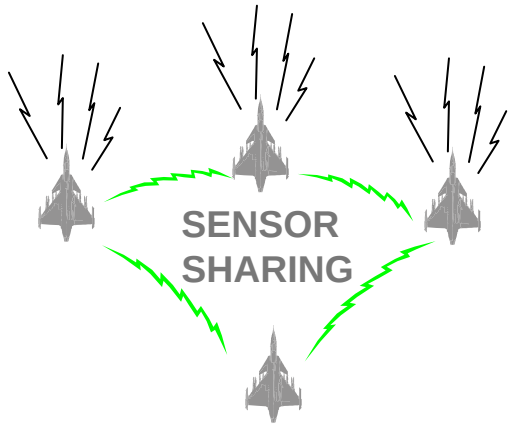
- SUPERIOR SELF PROTECTION
  - Missile Approach- / Laser Warning System
  - Towed Decoy
  - Enhanced ESM
    - Wider bandwidth
    - DRFM





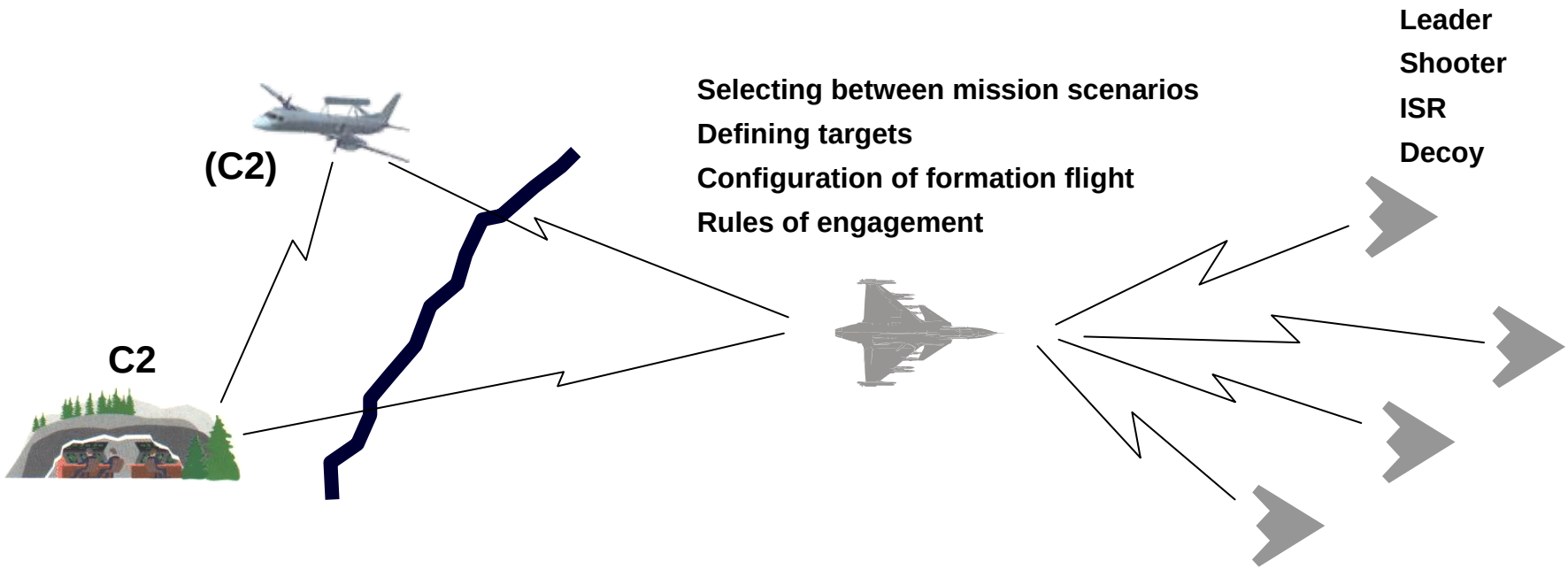
ACCESS

- ADVANCED REAR SEAT
  - Sensor Sharing
  - Electronic Attack
  - Air Battle Management
  - UCAV Lead



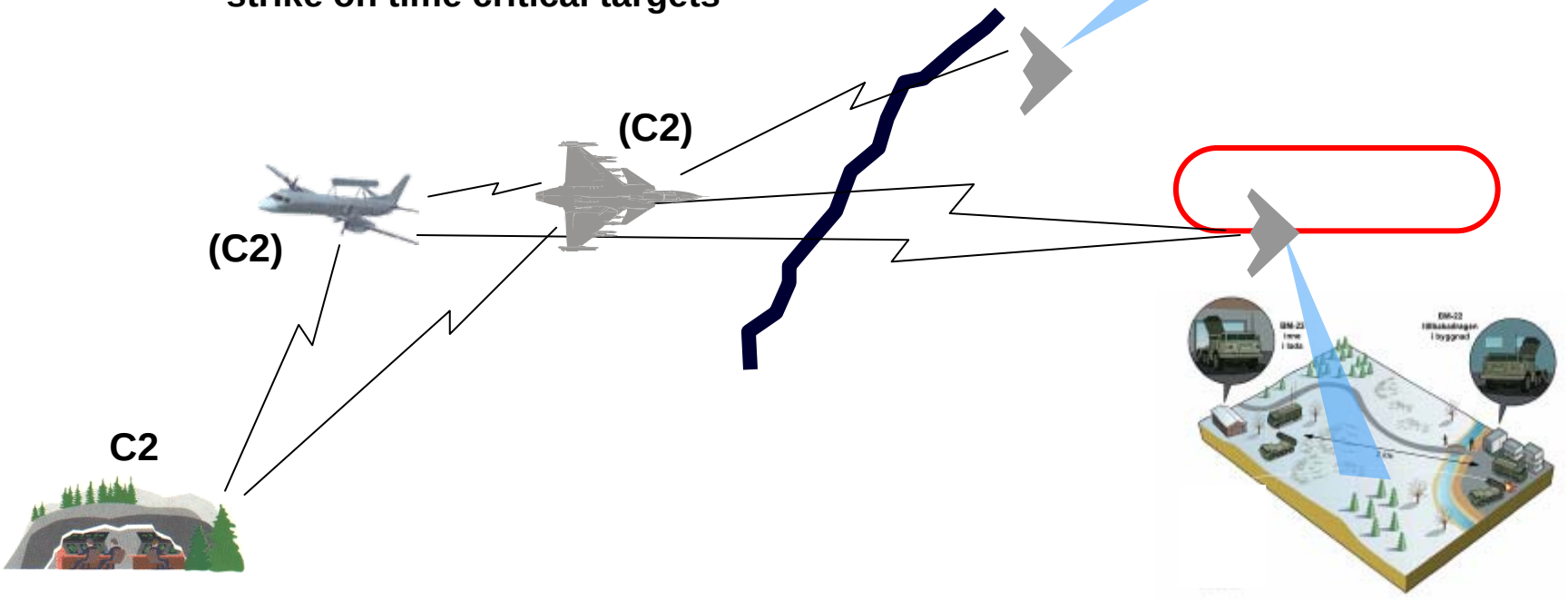
ACCESS

- **Gripen NG with UCAV´s**
  - Extending the reach and payload capacity of the manned fighter which acts as Command & Control, i.e. UCAV as an intelligent, reusable stand-off platform. One fighter may control several UCAVs

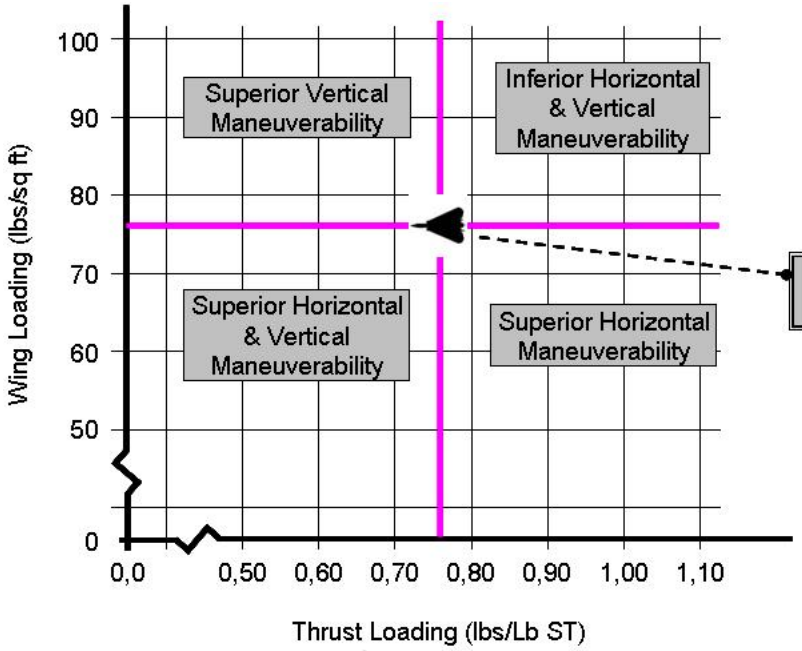


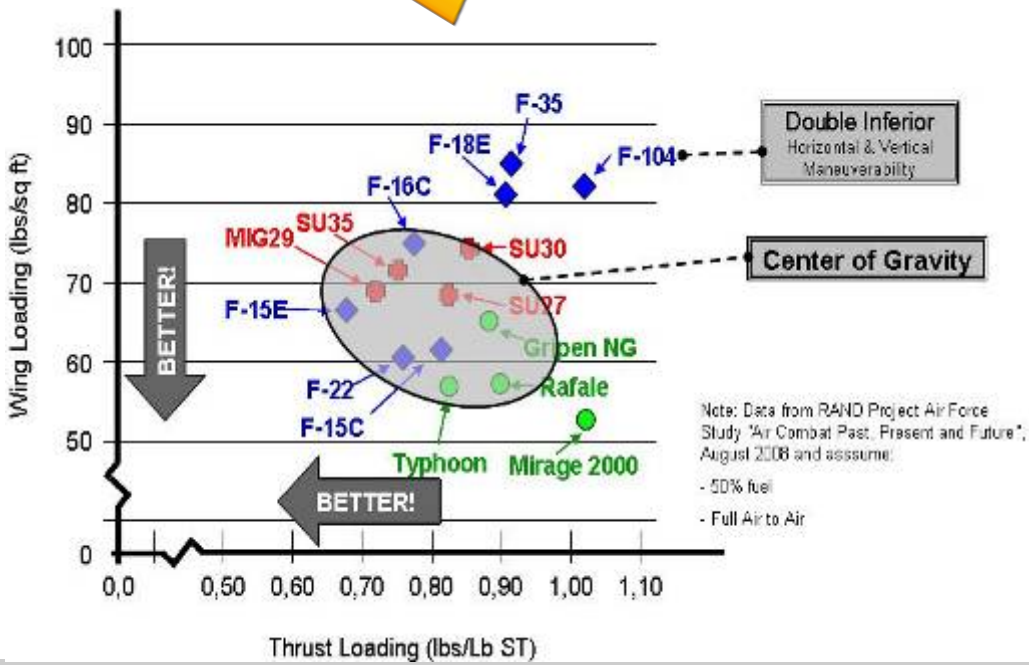
ACCESS

- **Time sensitive targeting**
  - **Utilize UCAV's extensive endurance to loiter for very long periods waiting for a window of opportunity to strike on time critical targets**

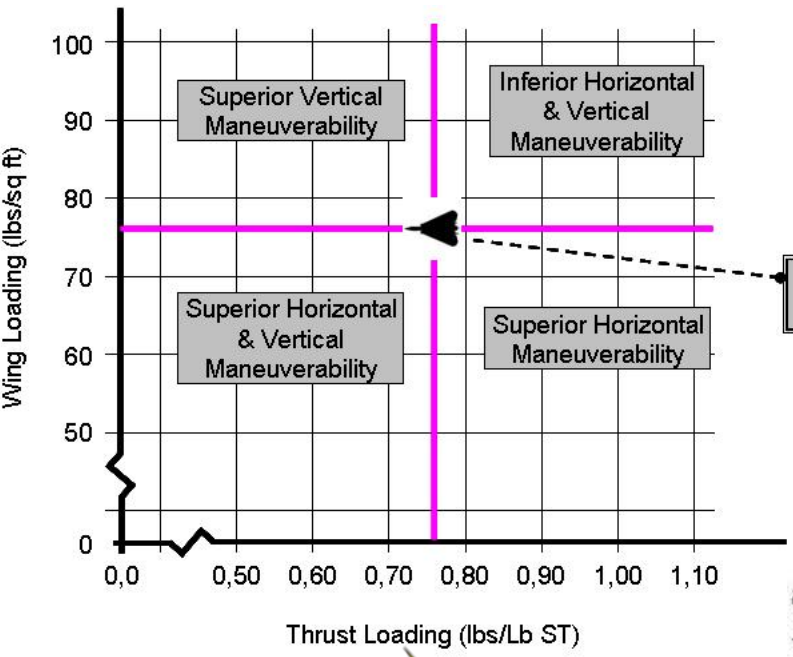


Performance: WVR Air Combat Maneuvering

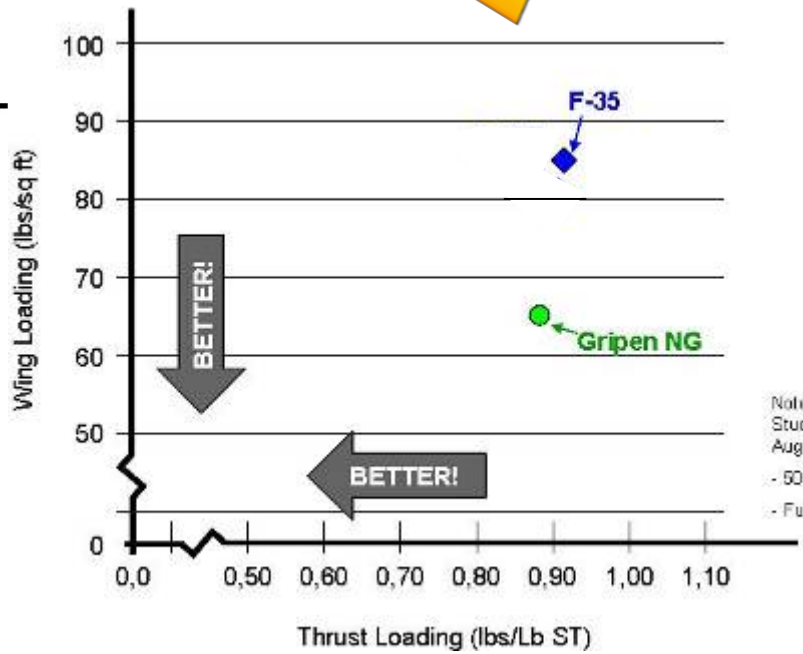




Performance: WVR Air Combat Maneuvering



- 49 500 pounds in Air to Air config
- Just 42 000 pounds thrust
- Just 460 sq feet of wing area
- Makes 108 pounds per sq feet (1/3 worse than F-16)
- Worse than F-105 "Lead Sled"….



Note: Data from RAND Project Air Force Study "Air Combat Past, Present and Future", August 2008 and assume:

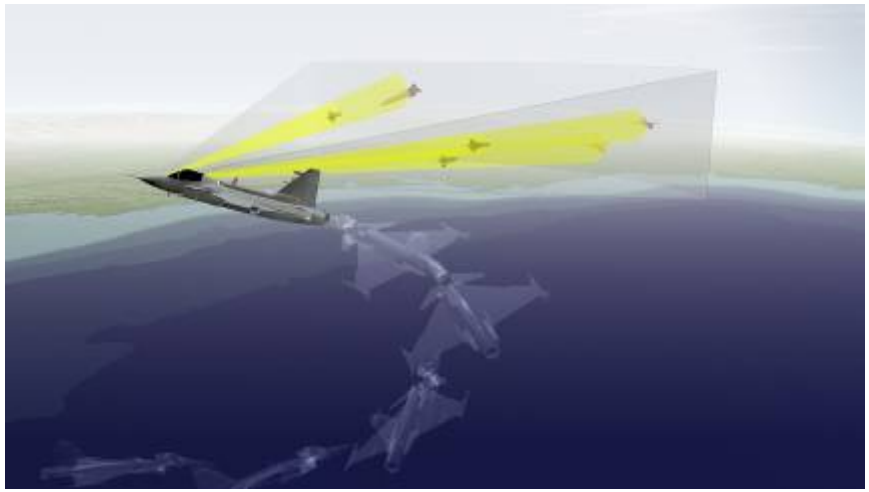
- 50% fuel
- Full Air to Air

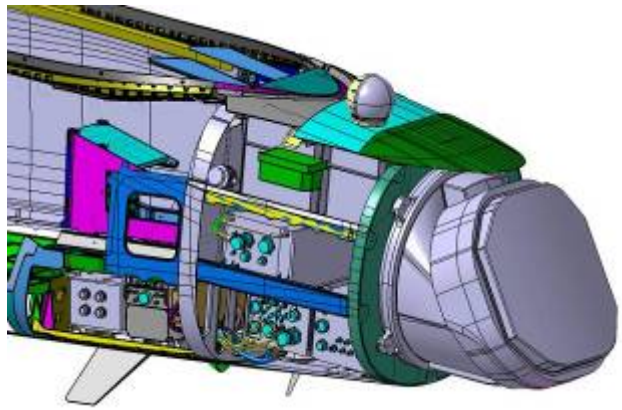
SAAB

AWARENESS

AWARENESS

- ES 05 RAVEN
  - SELEX GALILEO SAAB partnership
  - 2nd Generation AESA
  - Swash Plate
  - A-A, A-G and ESM Modes





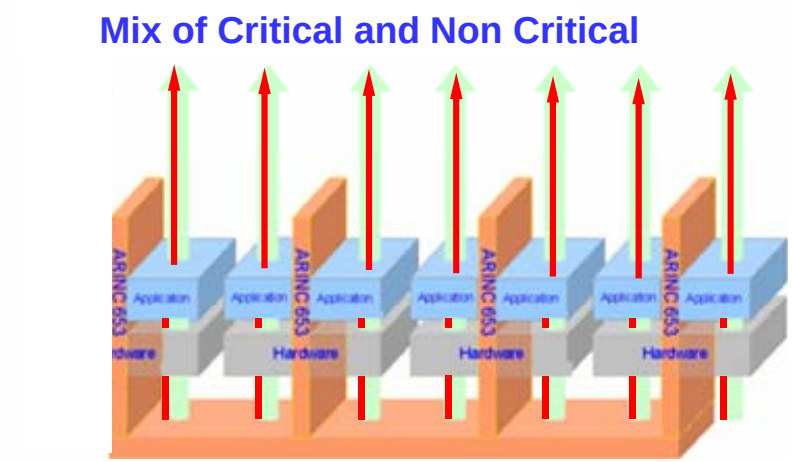
AWARENESS

- SERVICE PROVIDING COCKPIT
  - Leaving the Sensor Handling Cockpit-era.
  - Touch Panels
  - DVI
  - 3-D Audio
- SUPERIOR SENSOR FUSION
  - Radar
  - IRST
  - Weapon sensors
  - Sensor pods
  - Electronic Warfare sensors
  - 3rd Party Sensors (air-land-sea)

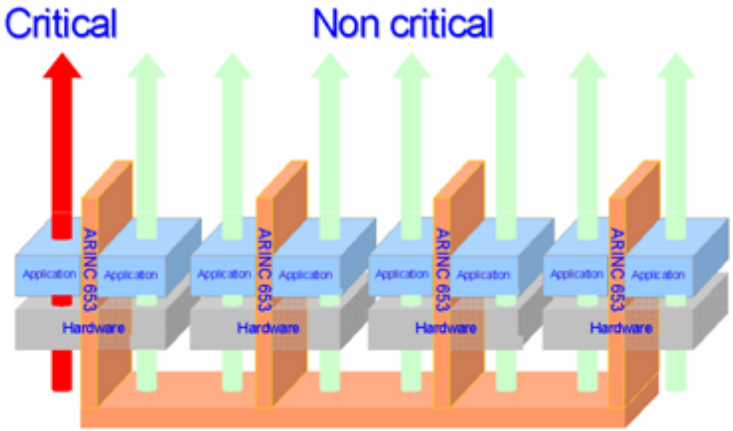
AWARENESS

- NEW AVIONICS SYSTEM
  - Use layer and partitions – separate flight critical from mission critical functionality
  - Open system architecture
  - Efficient development and testing of complex functions
  - Modifiable architecture with COTS
  - Improved data bus structure
  - Modern development methods - model based development

LEGACY



GRIPEN NG



KEEPING THE CODES

UNITED KINGDOM RESPOND?

By DAVE PUGLIESE THU, NOV 26 2009 COMMENTS(23) DAVID PUGLIESE'S DEFENCE WATCH

Filed under: Joint Strike Fighter, access codes

By David Pugliese
Ottawa Citizen

The Netherlands has announced that the first Joint Strike Fighter test aircraft came in at a slightly lower cost than anticipated but the JSF program will still have to deal with concerns in the United Kingdom about the refusal by the Pentagon to turn over the software codes needed for future upgrades of the plane.

The software codes are key to the plane's electronic systems and without that information, JSF partner nations, including Canada, won't able to maintain or upgrade the aircraft in the future without U.S. help. The codes control most systems on the plane, ranging from weapons to radar and flight performance.

Canadian Defence Department spokeswoman Lianne LeBel told ***Defence Watch*** that Canada has no concerns about the software code issue and that it has been aware that the codes would not be provided.

"The JSF program provides DND with unparalleled access to technology and technical data to assist DND in making an informed decision regarding the Next Generation Fighter Capability," she noted. "Should DND proceed with the JSF program, DND would be provided with all the information necessary to operate and sustain the aircraft over the life of the program. To date, no decision has been made by the Government of Canada on the procurement approach or a choice of a Next Generation Fighter aircraft, including the Joint Strike Fighter."

Unlike in Canada, however, there is concern in the United Kingdom about the refusal by the Pentagon to provide the codes.

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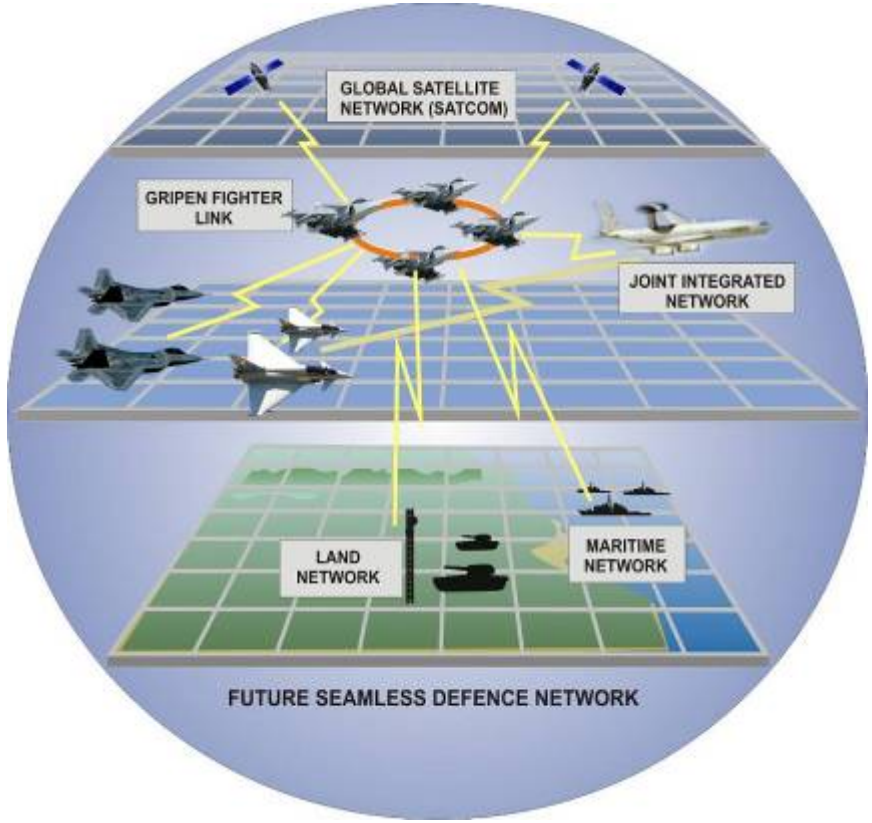
15	16	17	18	19	20	21
22	23	24	25	26	27	28

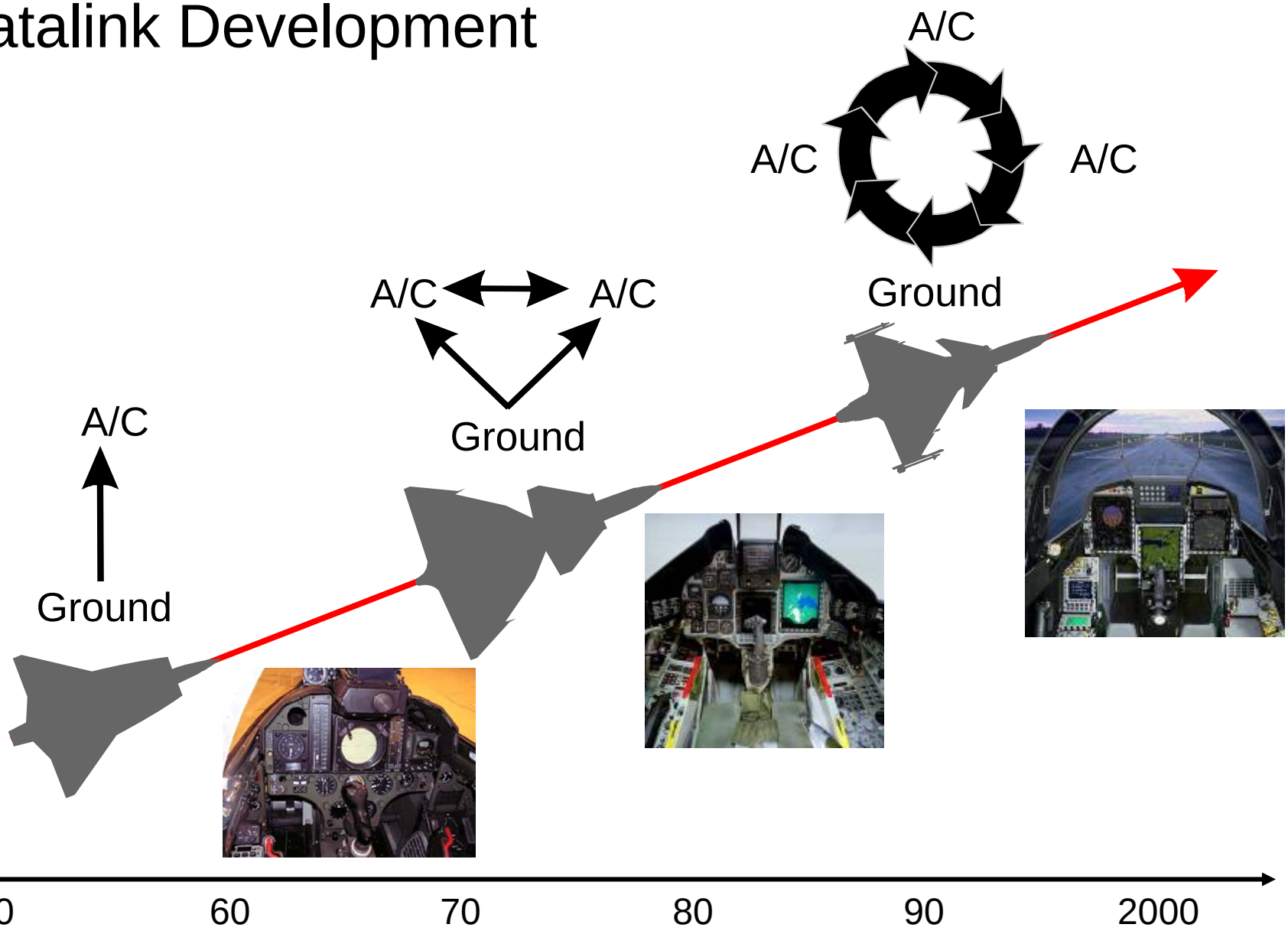
AWARENESS

- NETCENTRIC
  - World leader in data links
  - Fully integrated
    - Land
    - Ship
    - Air
    - Space
  - Revolutionary fighter link
  - Sensor sharing
  - Understand the battle before take off



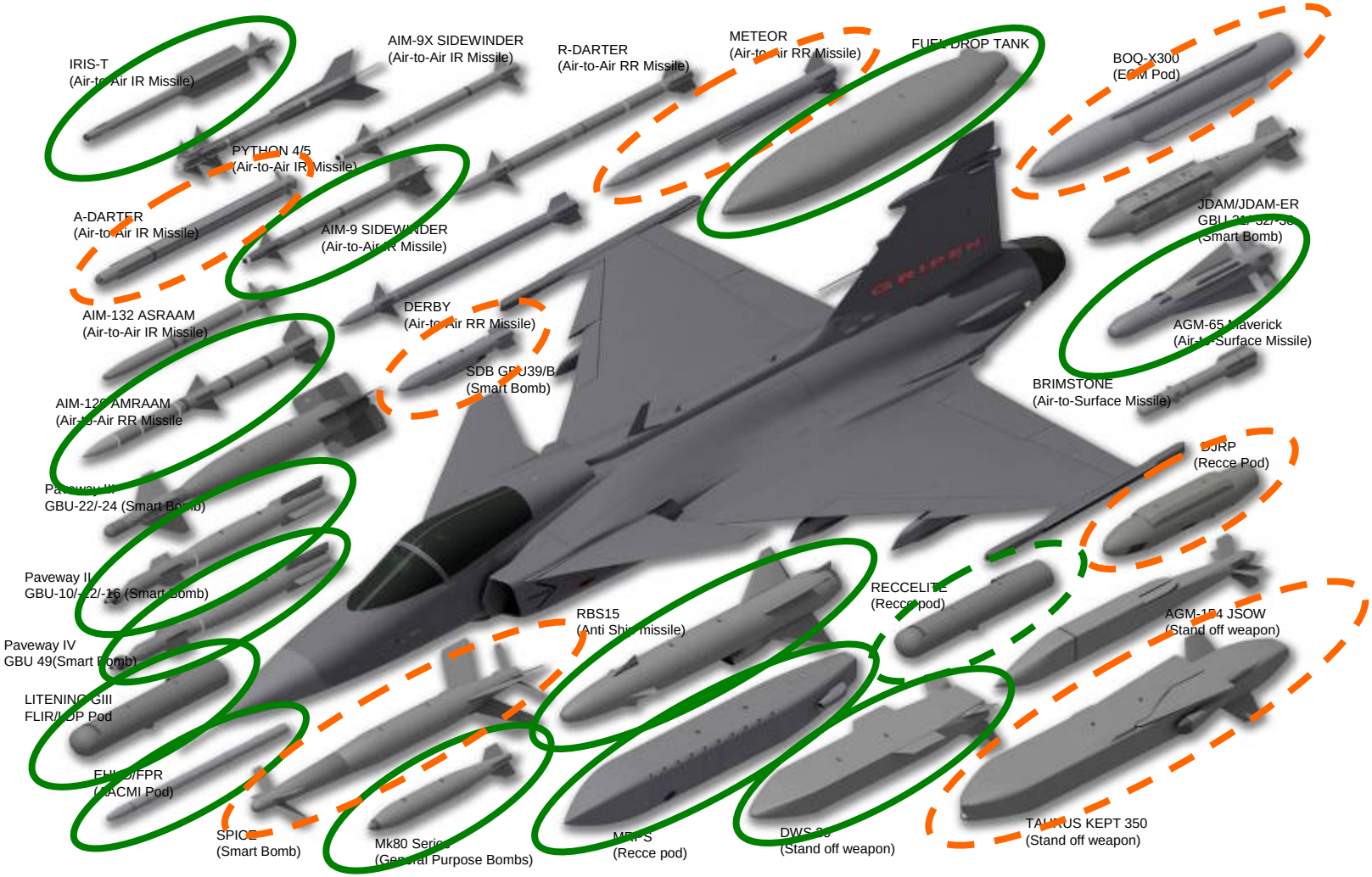
Example: SATCOM – LINK 16 – FIGHTER LINK (TIDLS) – DIGITAL CAS LINK (VMF)

Datalink Development

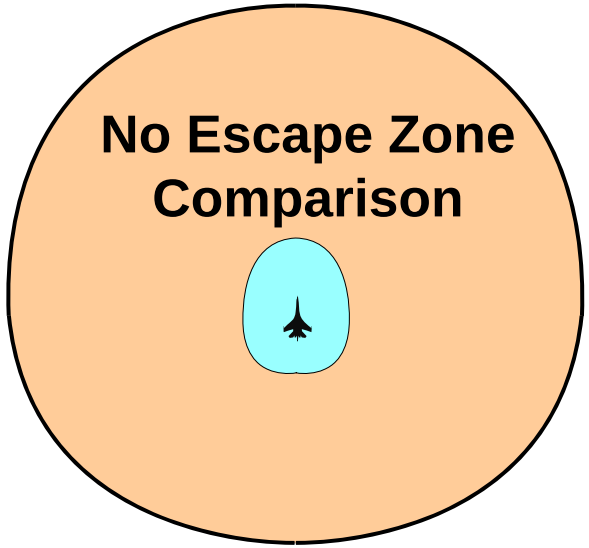


FIRE POWER

Flexibility of Fire Power



GRIPEN NG – BVR



Many times more capable than current MRAAMs

RANGE

BVRAAM

MRAAM

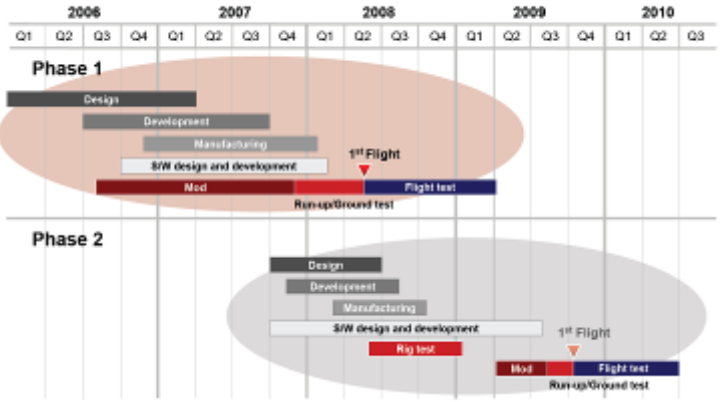
GRIPEN NG – WVR
IRIS-T AIR-TO-AIR WITHIN VISUAL RANGE

- Good balance WVR/BVR missiles
- HMD – increased situation awareness
- Killing capability
  – cruise missiles
- Killing capability
  – air to air missiles
  and SAMs

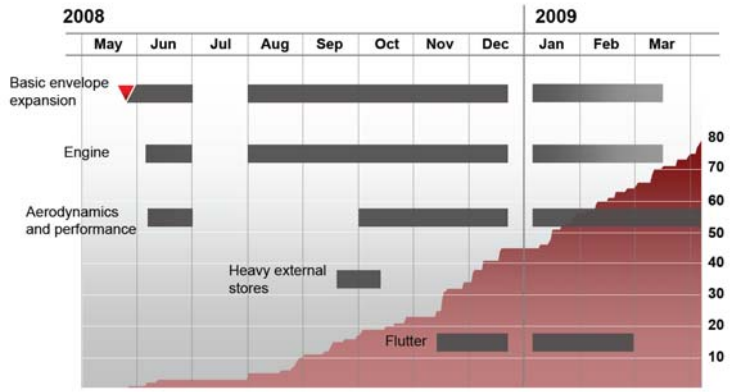
GRIPEN NG PROGRAMME

A PROGRAMME FOLLOWING THE PLAN

MASTER SCHEDULE – GRIPEN DEMO



FLIGHT TESTS



On schedule

On schedule?...

SAAB

Multi Role?

MARITIME OPERATIONS

SURVEILLANCE & RECCE

COASTAL DEF OPERATIONS

- •Destroy/Neutralize /Deter Shore-Based threats
- • Tactical Scouting
- • Clearing minefields
- • Protecting MCM Forces
- •Occupying Key Positions/Areas

PROTECTION OF SHIPPING

- • Sea Control
- • Distant and Close Escort
- • Naval Cooperation and Guidance for Shipping
- • Convoying

SEA CONTROL OPERATIONS

- • Establishment and Maintenance of a Recognised Maritime Picture
- • Shaping Operations
- • Barrier Operations
- • Layered defence
- •Exclusion Zones

MARITIME INTERDICT. OPS

- • Seaborne Enforcement
- • Destroy/Neutralize/ Deter Hostile Forces Afloat (Surface & SubSurface)
- • Interdiction of Enemy Forces
- • Interdiction of Commercial Shipping
- • Embargoes and Quarantine

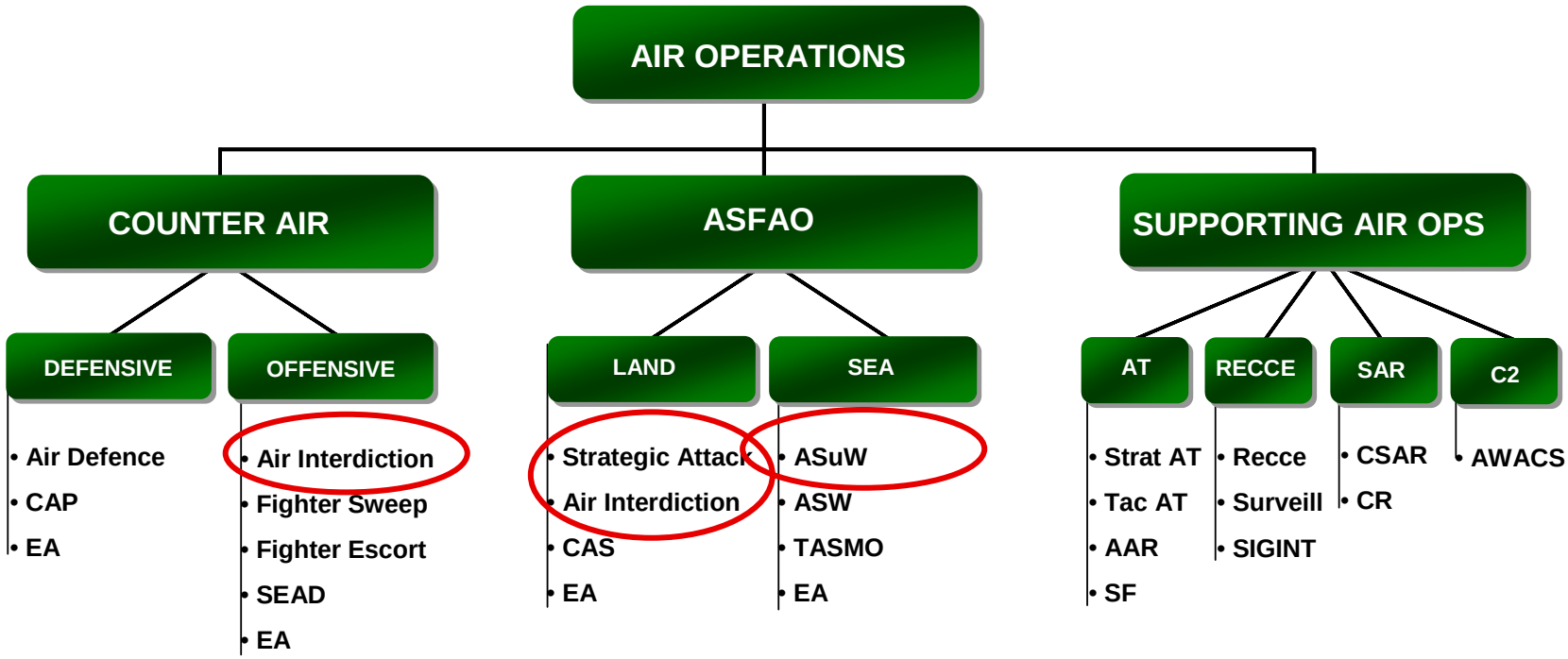
MARITIME POWER PROJECTION OPS

- • Maritime Air Strikes
- • Amphibious Operations
- • Special Operation Forces

MARITIME SUPP JOINT AIR DEF

WRONG PLACE…

Multi-Role?


AIR OPERATIONS
COUNTER AIR
ASFAO
SUPPORTING AIR OPS
DEFENSIVE
OFFENSIVE
LAND
SEA
AT
RECCE
SAR
C2
• Air Defence
• CAP
• EA
• Air Interdiction
• Fighter Sweep
• Fighter Escort
• SEAD
• EA
• Strategic Attack
• Air Interdiction
• CAS
• EA
• ASuW
• ASW
• TASMO
• EA
• Strat AT
• Tac AT
• AAR
• SF
• Recce
• Surveill
• SIGINT
• CSAR
• CR
• AWACS

CHANGING FOCUS…

REPLACING THIS

WITH THIS

IS LIKE

REPLACING THIS

WITH THIS

To what area and with what mission will you send your fighters?

GRIPEN NG

True Multirole – NATO Interoperable

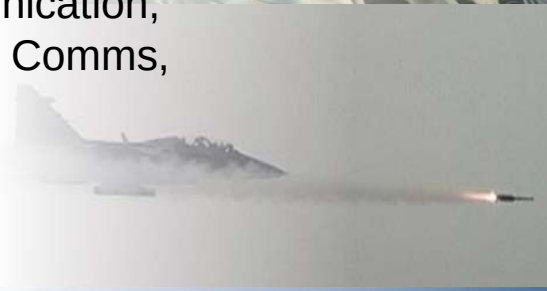
- Air-to-air
- Air-to-Ground
- Reconnaissance

The aircraft will meet the demanding operational requirements of the RNLAF over the next 50 years and its unrivalled multirole capability will provide the RNLAF with tactical flexibility in an unknown future.

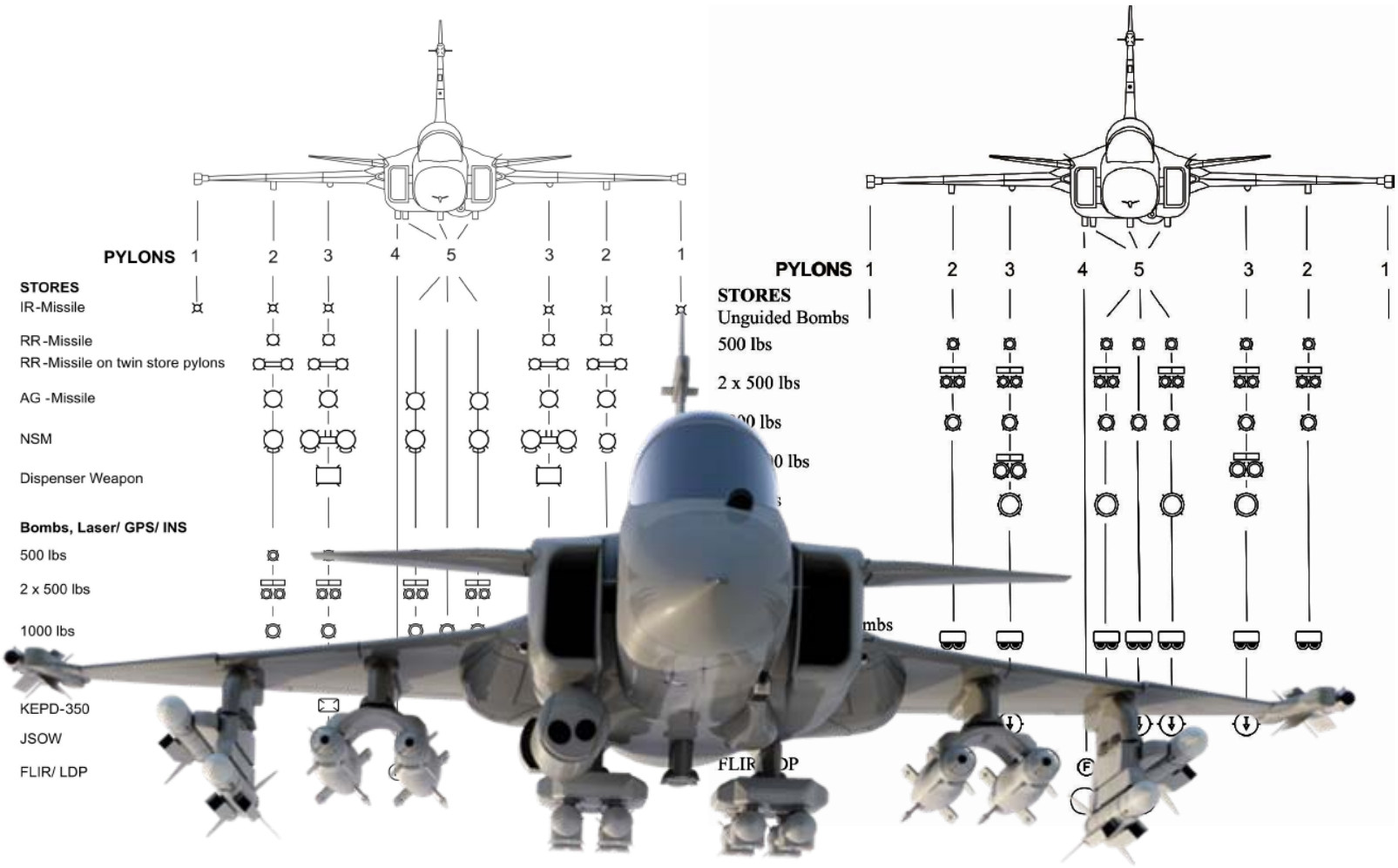
Operational Dominance and Flexibility

- **Superior Situational Awareness**
  - AESA Radar, IRST, HMD, Leading Edge Avionics Design, Next Generation Data processing Capability, State-of-the-art Cockpit
- **Net Centric Capability**
  - Advanced Data Communication, Dual Datalinks, Satellite Comms, Video Links

- **Mission Survivability**
  - Electronic Attack, Missile Attack Warning, Towed Decoy, Advanced ECM, ESM
- **Air-to-Air Superiority**
  - METEOR, Amraam, IRIS-T, AIM-9X
  - 12 Missile capability
  - SUPERCRUISE

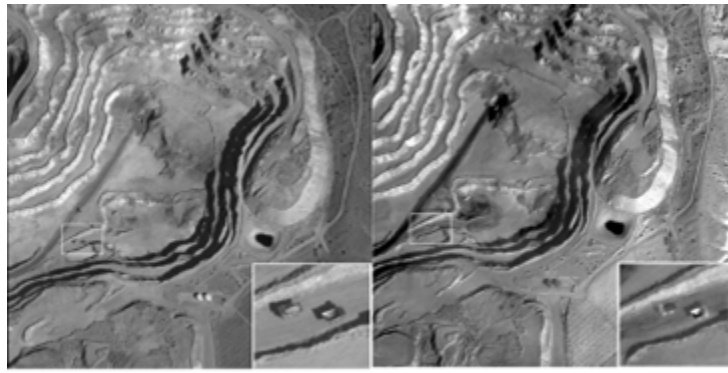


Flexible Payload



Reconnaissance

- Strategic Recce Capability
- Tactical Recce Capability
- A national asset in peace as well as in times of war.



VISIBLE IR

Strategic Reach

Un-refueled range (internal + external fuel)

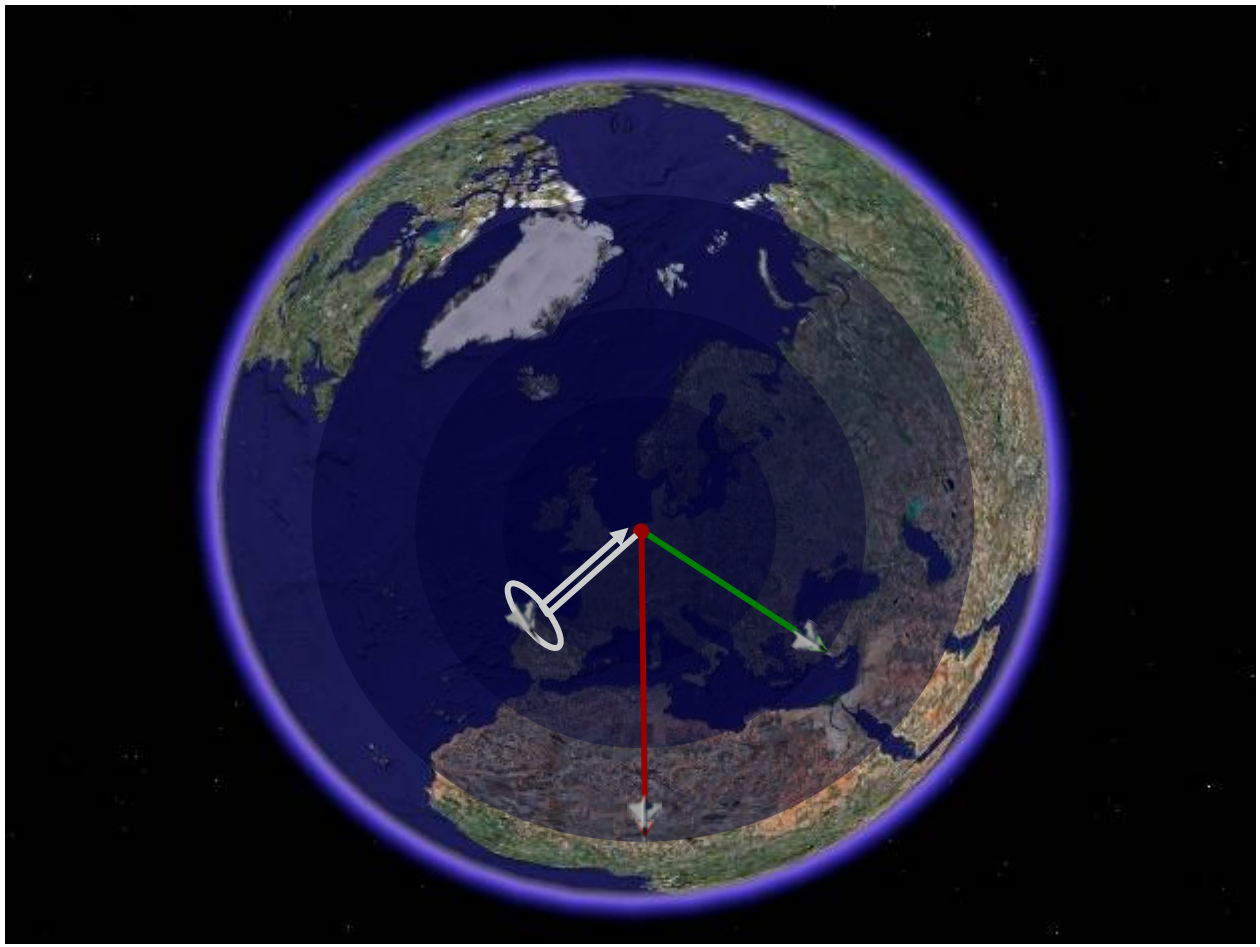
4075 km

Un-refueled range (internal fuel)

2500 Km

Combat radius (incl 30 min on station)
Ex. 4 RR + 2 IR + ext fuel

1300 Km



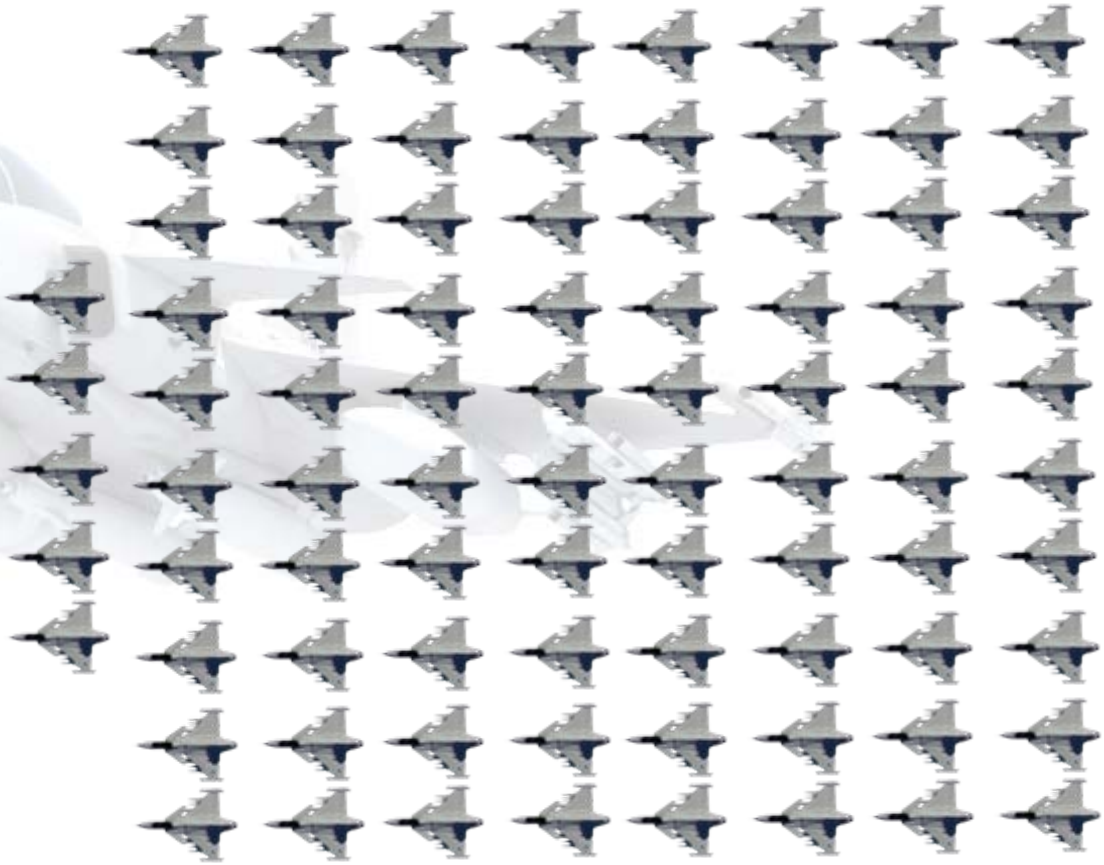
The Gripen NG "All inclusive Package" Part I

Aircraft

85 Gripen NG
(1 Gripen NG Test Aircraft)

Role equipment for 85 a/c

Aircrew equipment
Aircrew Helmet Mounted Display
Fuel Drop Tanks
Pylon sets
EW systems
IRST systems
Chaff & Flare dispensers



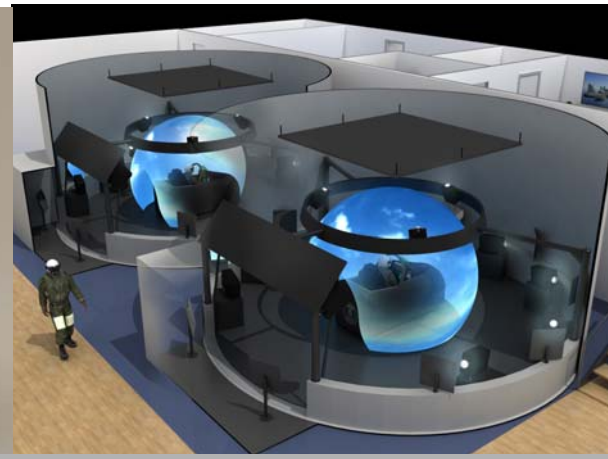
The Gripen NG "All inclusive Package" Part II

Mission Support equipment

- Mission Planning & Evaluation Systems
- Digital Map Generating System
- Threat Library Support System
- Radio Frequency Planning System
- Maintenance Ground Support System

Training

- Mission Simulators
- Deployable Mission Simulator
- Desktop Training Systems
- Computer Based Training Systems
- Pilot training
- Ground Crew Training



The Gripen NG “All inclusive Package” Part III

Logistics

- Ground Support Equipment
- Field Service Representatives
- Ground Crew Support
- Aircrew Support
- Fly-away spares package
- Technical Publications
- LRU Spares Package
- GSE

THE POWER OF PARTNERSHIP

- 100% OFFSET GUARANTEED
- PROVEN TRACK RECORD
- WORLD LEADING INDUSTRIAL PARTNERS
- LONG-TERM COMMITMENT

GRIPEN NEXT GENERATION

A Multi-Role Fighter For The Multi-Role Force

SAABGROUP.COM