ADVANCED SUPER HORNET

Outpacing threats in a 2030+ A2/AD environment … affordably!

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Evolution of the Super Hornet

Capability Continuum

Block I

New Air Vehicle Design

- Lethality
- Survivability
- Range
- Bring back
- Payload

Block II

Mission Systems Insertion

- Advanced pilot vehicle interface
- Advanced computing systems
- Joint Helmet Mounted Cueing System
- AESA radar
- MIDS
- ATFLIR
- IDECM Blk IV
- IRST
- Advanced Networking & Fusion

Advanced Super Hornet

Adv. Capability Insertion

- Enhanced Survivability
- Conformal Fuel Tanks
- Enclosed Weapons Pod
- Enhanced Engine
- Next Generation Cockpit
- Internal IRST
- Missile / Laser Warning

Time

NAVAIR, public release SPR-2013-458

Investing Today - Reducing Risk & Ensuring Readiness

Advanced Super Hornet

Adv. Capability Insertion

- Longer Range
- Low Observability
- Significant Acceleration Increase
- Enhanced Situational Awareness

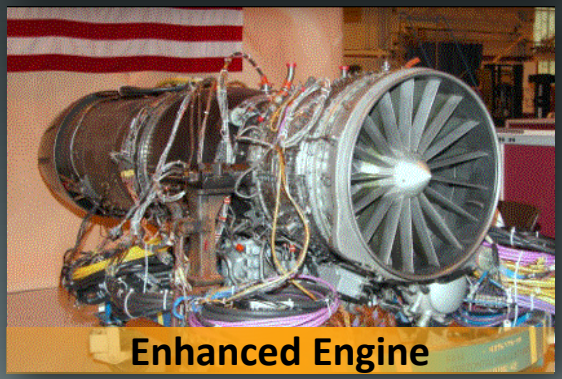
Enhanced Survivability

Internal IRST

AESA Radar Upgrades

Conformal Fuel Tanks

Next Generation Cockpit



Enhanced Engine

Enclosed Weapons Pod

Significant Industry Funded Initiatives

Advanced Super Hornet Prototype Demonstration Pillars

Low Cost /Low Risk Fleet Insertion

- Designed for rapid retrofit and forward fit
- Demonstrate CFT maintenance concepts
- Provide risk reduction for production articles

Increased Range & Endurance

- Validate CFT & EWP drag for cruise/loiter
- Assess flying qualities
- Increased bring-back
- Growler compatible design

Reduced Signature

- Validate RCS w/In-flight measurements
- Modular 1st/2nd day capabilities
- Ship maintainable

Designed to Operate in the 2030+ A2/AD Environment

Advanced Super Hornet Prototype Test Configuration

Conformal Fuel Tanks (CFTs)

Prototype: Designed to validate aerodynamic and signature performance with partial CFT fuel load; 1500 lbs.

Production: 870 lbs. empty – will hold 3500 lbs. of useable fuel; adding 260 NM of combat range

Signature Reduction

Production-ready signature enhancements enable capability against advanced threats

Enclosed Weapons Pod (EWP)

Prototype: Designed to validate aerodynamic and signature performance; 2050 lbs.

Production: 900 lbs. empty – will hold ~2500 lbs. of weapons for low signature missions

On-Aircraft Flight Demonstration is Ultimate Proof of Viability

Advanced Super Hornet Prototype Flights

- Commenced flying on 5 August 2013
- 15 flights to-date; 25 hrs.
- 9 additional flights planned; 14 hrs.
- Flights in STL operating areas and Pax River NAS air-space

10 Months from Concept to Flight

Conformal Fuel Tanks

Prototype CFTs

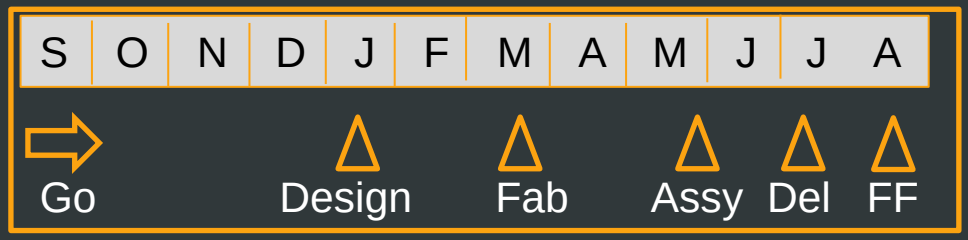
- Outer mold-line shaping derived from wind-tunnel and signature testing
- Prototype CFTs designed & manufactured by Northrop Grumman

Production CFTs

- Holds 3500 lbs. of useable fuel
- Requires internal fuel system “plumbing” changes that can be retro- fitted onto existing aircraft or forward-fitted onto new aircraft
- Provides additional space for added weaponry or electronic equipment
- Enhances selected missions where very low-signature is necessary

Enhances Super Hornet & Growler Mission Capability and Flexibility

“Napkin to First Flight” in 10 months

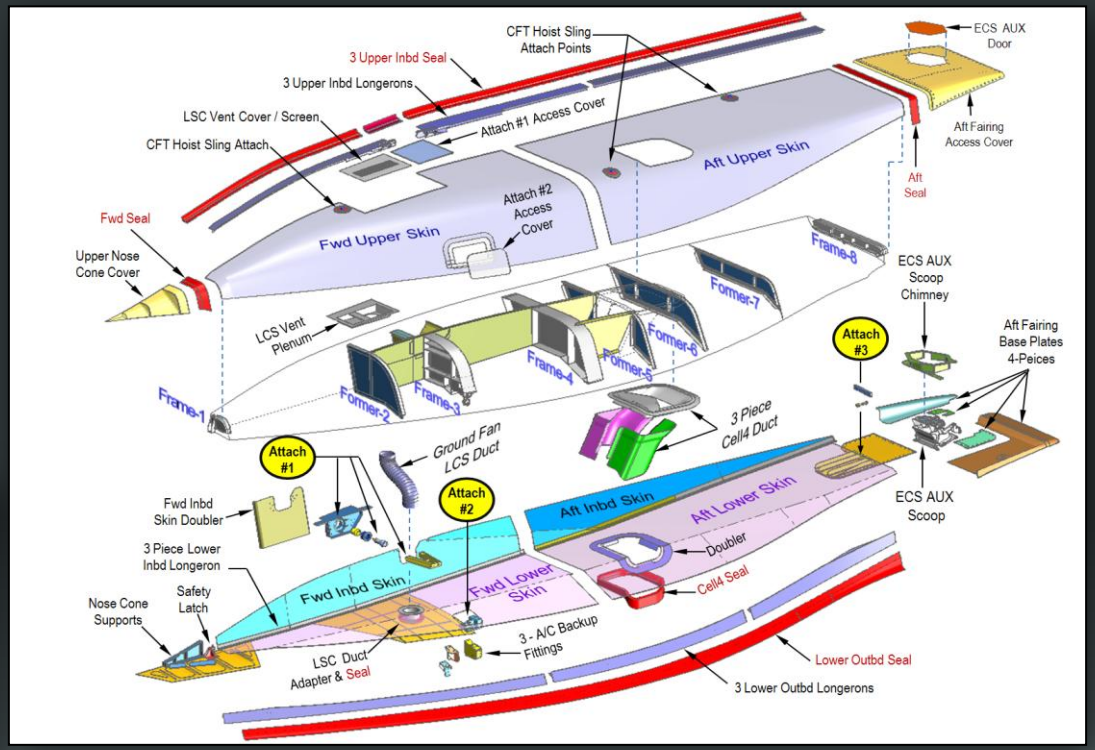


Northrop Grumman Invested Company Funds to Develop the CFTs

CFT Structural Arrangement

- ~207 parts per tank
- Composite upper skins
- Metal lower skins and floors
- Fastened construction

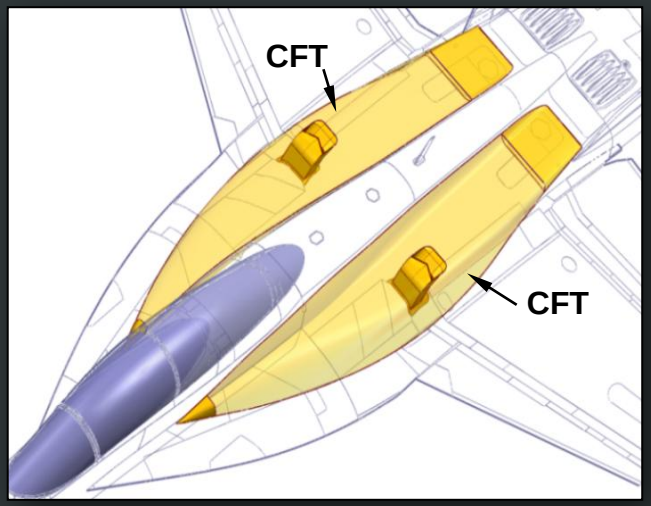
CFT System General Concept

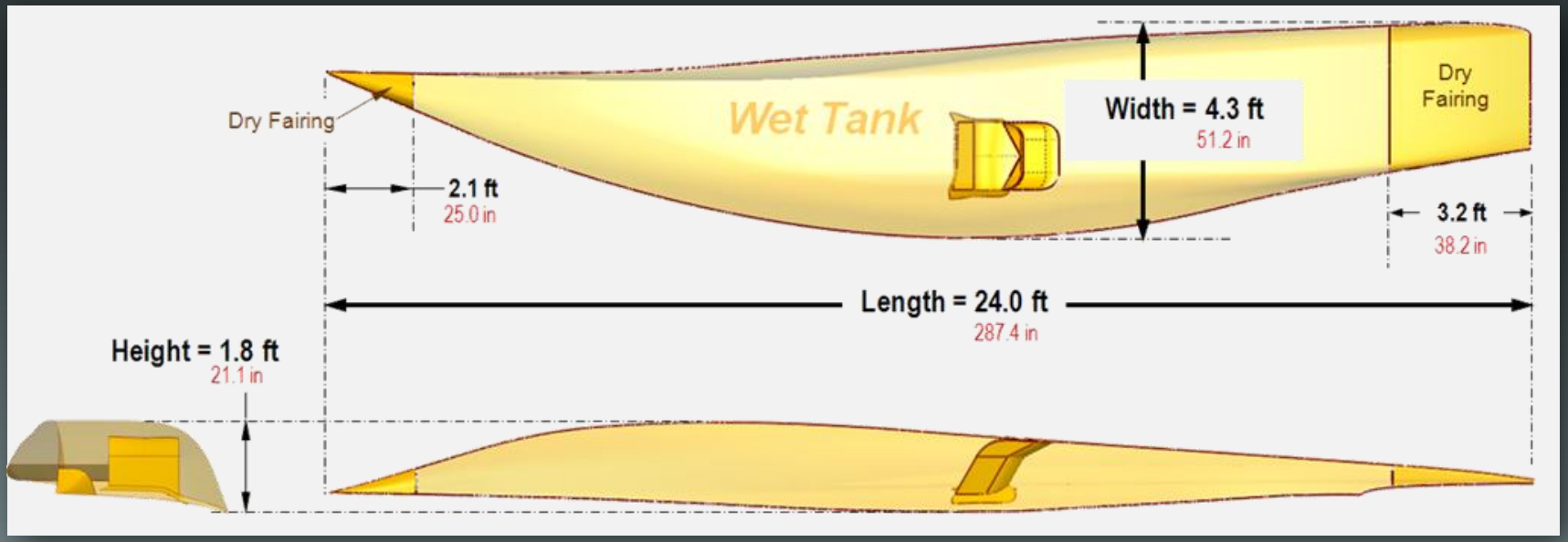


CFT Specifications

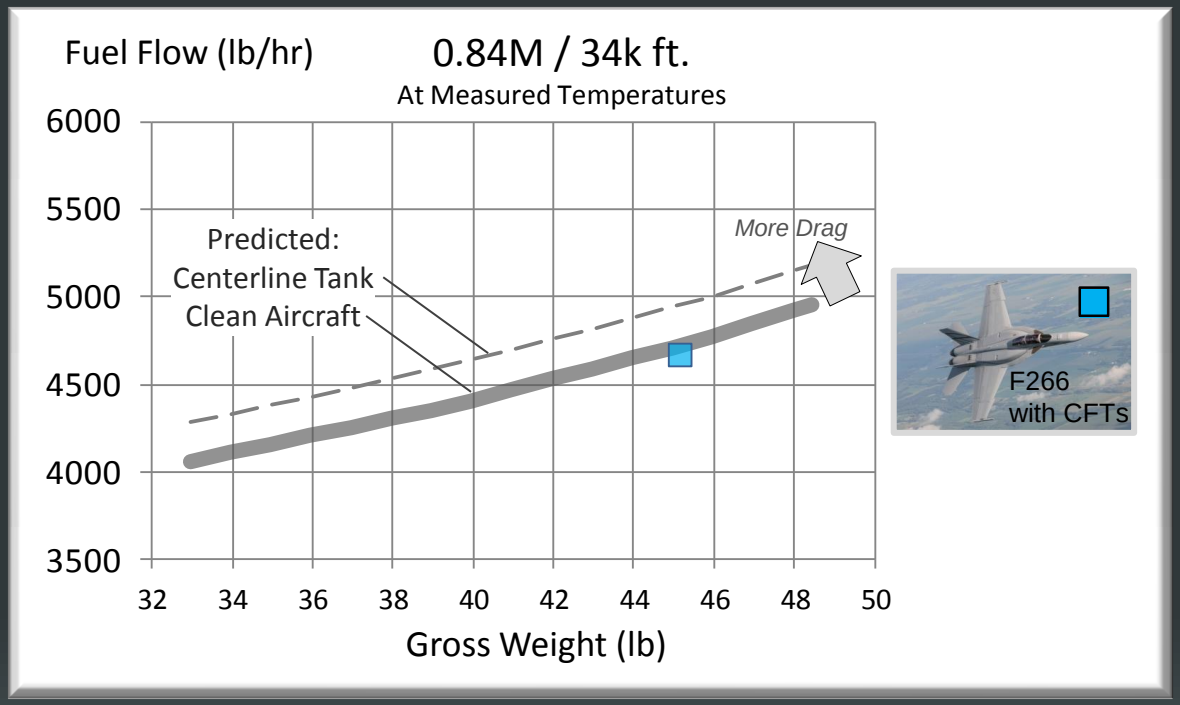
Prototype

- CFT weight will simulate a production CFT at low fuel state
- Designed to carry 3500 lbs of fuel
- Production shape representative
  - Demonstrate flying qualities
  - Considers maintainability



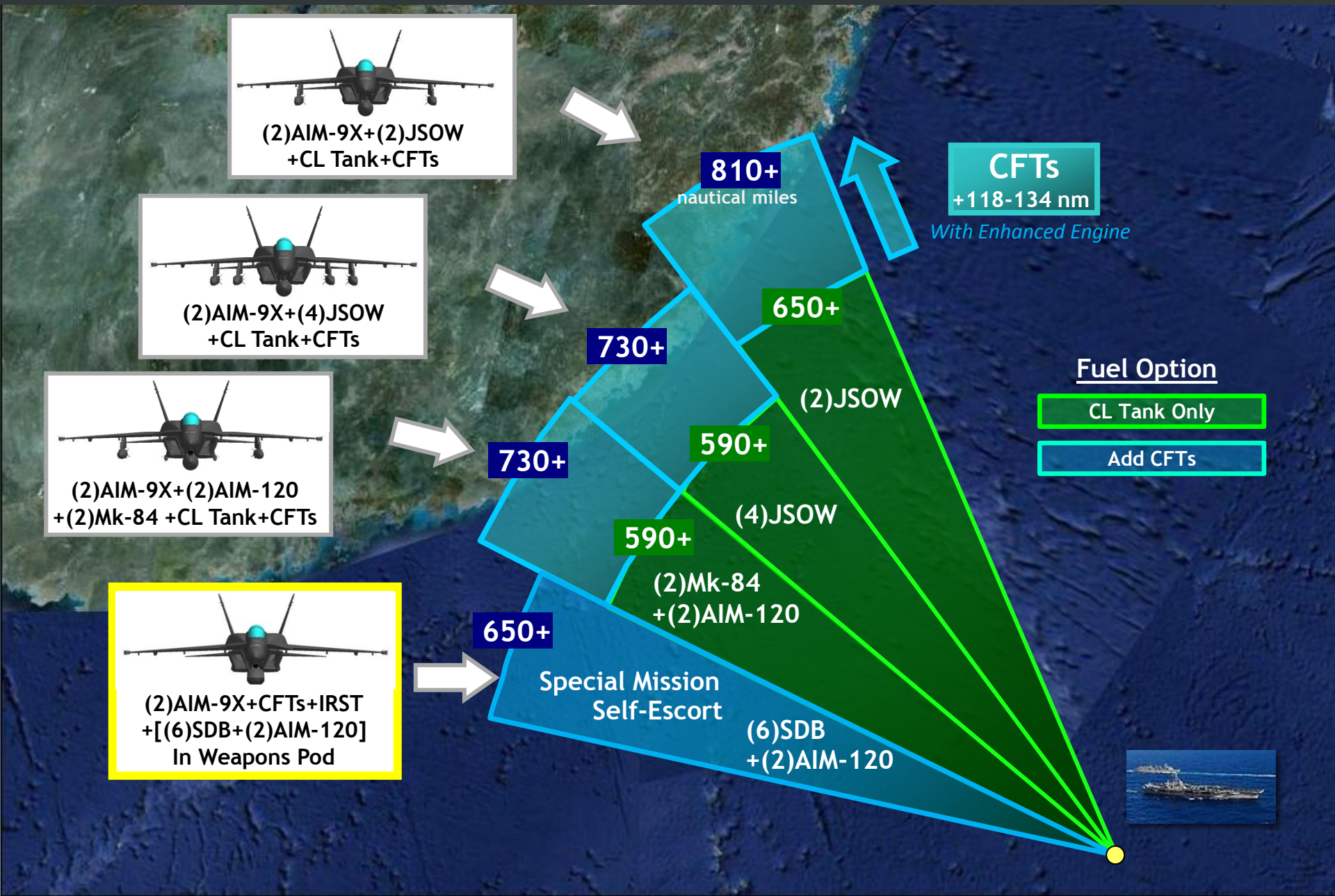


Fuel Burn Rate w/CFTs Confirm Zero/Negative Drag Impact



- F264 clean aircraft flown side-by-side with F266 w/CFTs on 6 August 2013
- Fuel burn rate (drag) demonstrated to be same or better with CFTs
- Extracted drag data consistent with wind tunnel predictions

Enclosed Weapons Pod + CFTs Enables a Day 1 Super Hornet Option



EA-18G Growler with CFTs and Next Generation Jammer (NGJ)

Add CFTs, Remove External Tanks

- Same mission performance with 3,000 lbs. less fuel
- 600+ lbs reduced landing weight
- Reduces fuel required for bring-back by 400 lbs.
- Un-obscured field-of-regard for jamming

Enhanced Capability at Lower Cost

Enclosed Weapons Pod (EWP)

Prototype EWP

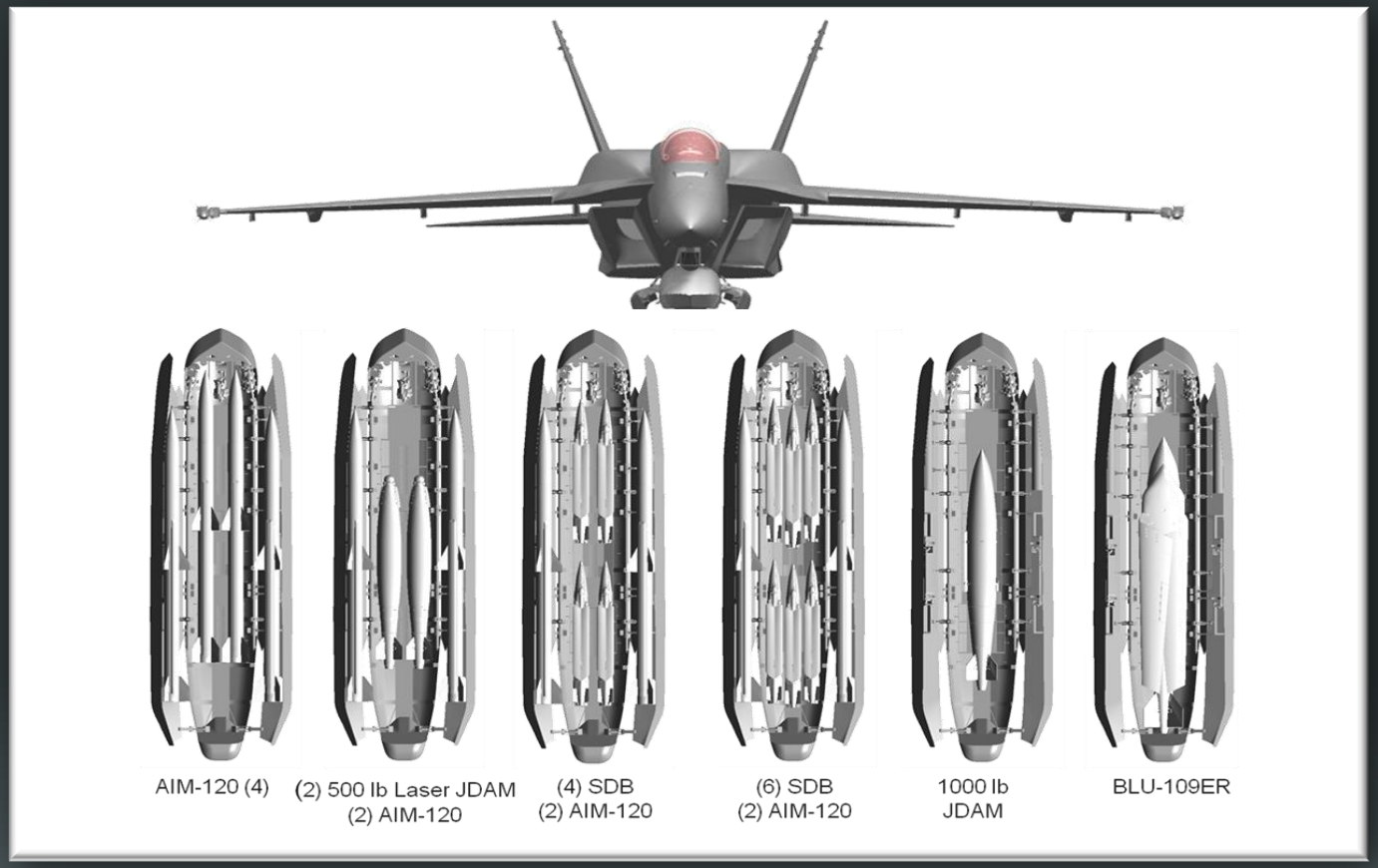
- 2050 lbs. – designed to validate aerodynamic and signature performance

Production EWP

- 900 lbs. – will hold ~2500 lbs of weapons

Optimized for Day 1, Low Signature Missions

Enclosed Weapons Pod (EWP) Operational Flexibility



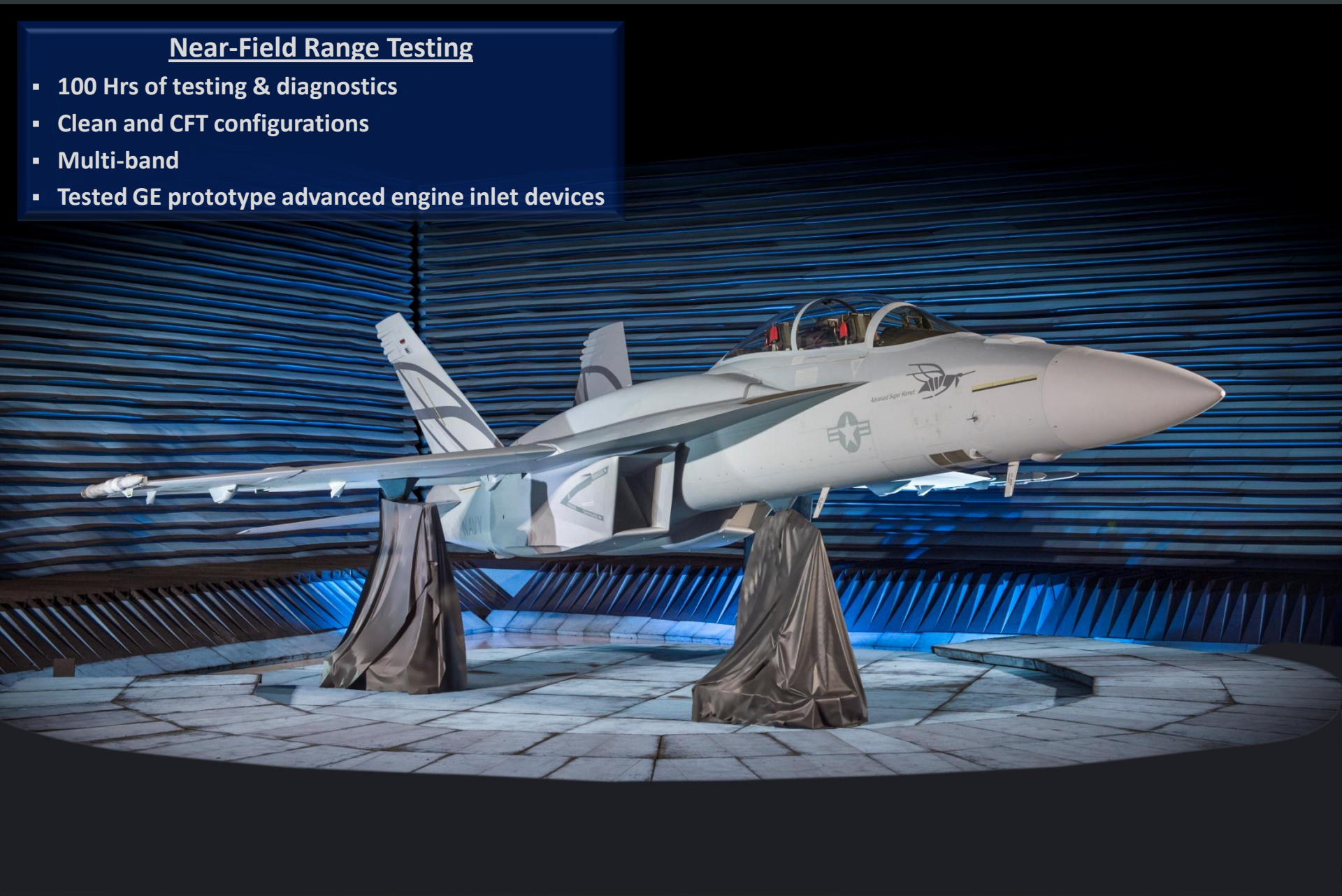
- Provides modular 1st day low signature weapons carriage
- Supports a broad array of DoD air-to-air and air-to-surface weapons
- Provides full envelope maneuvering capability
- Can be carried on centerline and inboard wing stations
- Used to support specialized avionics and sensors

Validating More Than 50% Improvement Over Current LO Signature

- ***Signature enhancements***
  - Designed to counter 2030 + threats
- ***CFTs and EWP designed for low signature missions***

- ***All procedures and materials enable rapid transition to production***
- ***Signature design equally suitable for forward-fit and retro-fit***
- ***Signature validated in both Boeing's near-field test facility and the Navy's Atlantic Test Range***

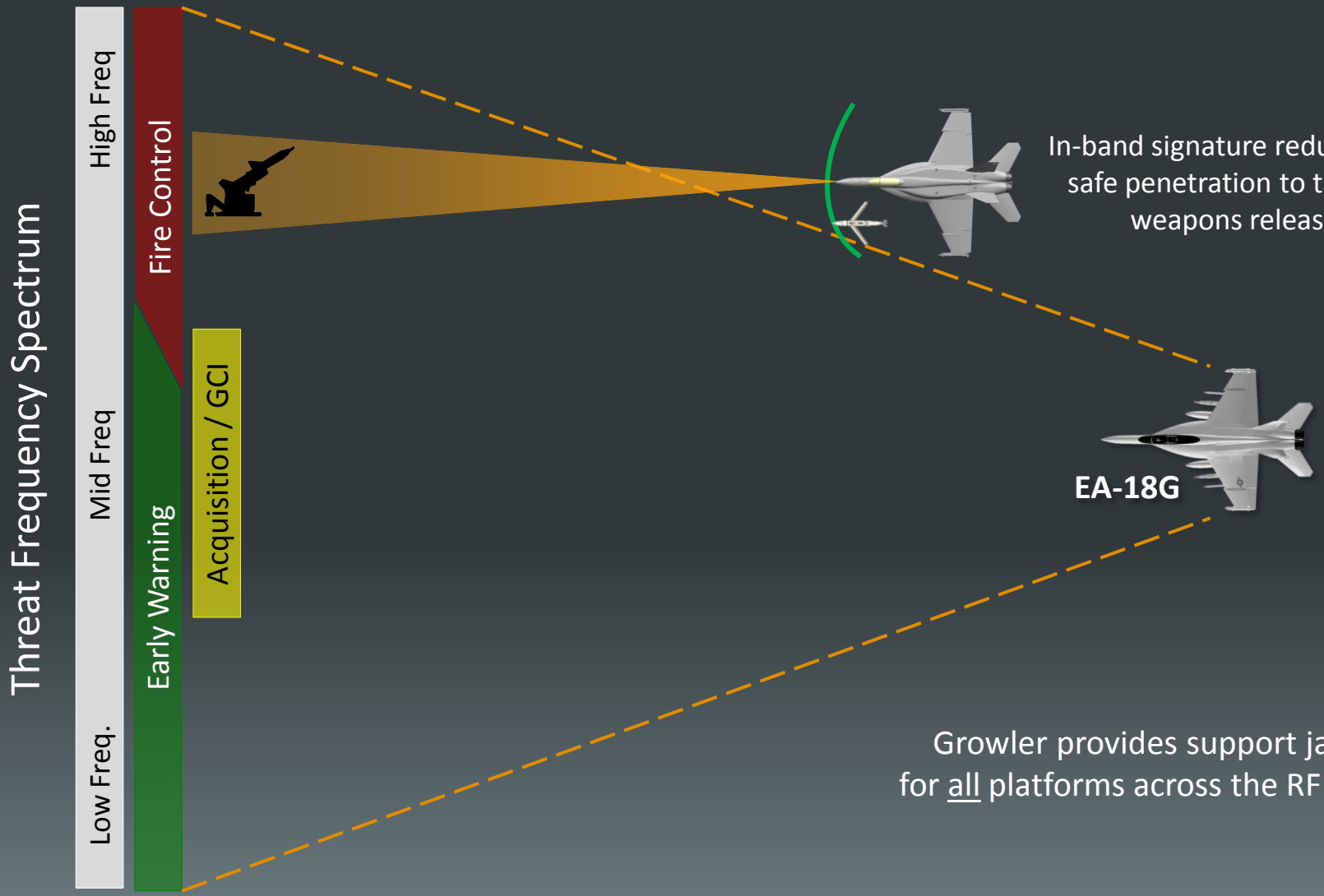
Near-Field Testing Validating Signature Design Prior to Flight



Near-Field Range Testing

- 100 Hrs of testing & diagnostics
- Clean and CFT configurations
- Multi-band
- Tested GE prototype advanced engine inlet devices

How much stealth is needed for the 2030+ A2AD Environment?



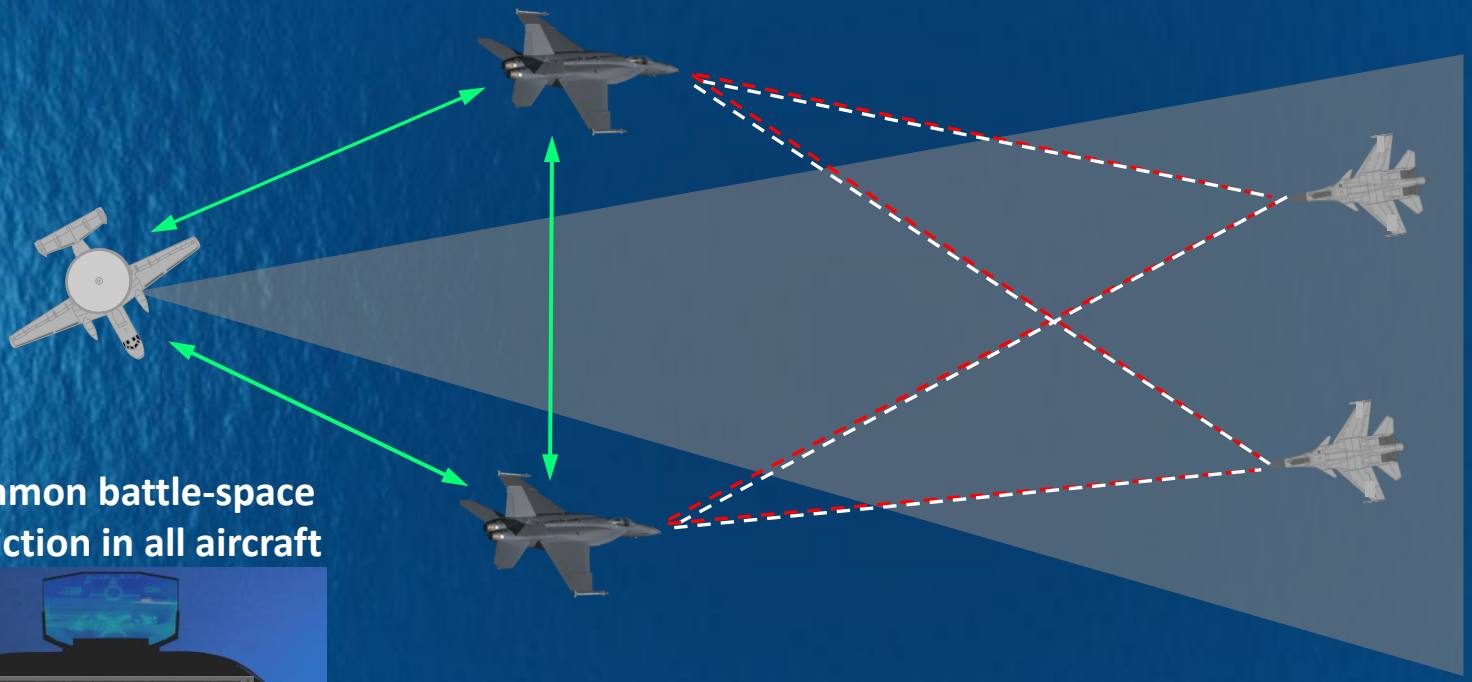
Total Survivability Solution to Counter Emerging Threats

Affordable Innovation

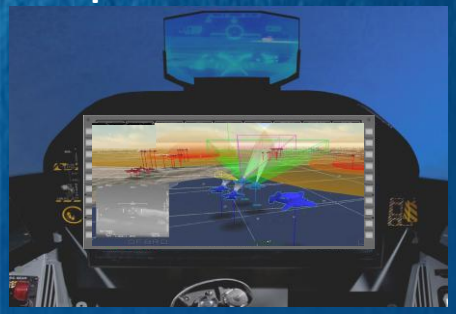
- **Maintainability and ground support features**
  - Designed to be supportable at the Organizational level
  - Uses existing maintenance procedures and maintainer training
- **Advanced Super Hornet features are retrofit-able or available for incorporation onto new aircraft**
  - Retrofit of CFTs and additional signature enhancements require minimal down time

What's Next?

2014 Flight Demonstration
Multi-Ship/Multi-Spectral Fusion Demonstration



Common battle-space Depiction in all aircraft



Radar
IRST
ATDL

IRST *- Infra-Red Search & Track*
ATDL *- Advanced Tactical Data Link*

Common Operating Picture Enables Extended Range Air-to-Air Engagements

Evolutionary Approach, Revolutionary Results

Outpacing Future Threats …. Affordably and Reliably