5th Generation Aerial Target (5GAT) Study Overview

Presented at NDIA, 3 October 2012
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5-D Systems
Agenda

- 5GAT Need
- 5GAT Purpose
- 5GAT Concept Evolution
- 5GAT Study Details
- 5GAT Study Status
- 5GAT Future
QF–16 is a 4th Generation Threat Representation

Future weapons programs will need to verify performance against advanced threats; programs include F–35, upgrades to F–22, PATRIOT, AMRAAM, Aegis, STANDARD Missile, and Sidewinder
5GAT Purpose / Mission

- 5GAT is intended to augment QF–16
- 5GAT represents an affordable solution to complement the QF–16 with 5\textsuperscript{th} Generation characteristics
  - Reduced signature platform
  - Internal carriage for advanced augmentation devices to meet requirement to represent current / future 5th Gen threats
- Government Owned Design
Government Baseline
- Developed Conceptual Design
- Developed OML – Supported by wind tunnel testing
- Identified likely suitable engines
- Determined Resulting Performance
- Developed Initial System Requirements & Specs

Approached Industry for Study
- 5GAT Study (design / cost)
Physical Size – comparable to F-16
“Characteristics” – equivalent to 5\textsuperscript{th} gen threats
12,000 lb class GTOW
Twin Jet Engines
Full Scale Mission
Operation – Effectively a full scale subscale
  ◦ Fully unmanned; not optionally piloted like previous full-scale drones
  ◦ Operational differences from subscale
    • Runway takeoff
    • Runway landing
    • Redundancy rather than parachute as “failsafe”
Design and Cost Study Program Objectives

- Increase confidence in:
  - Unit Cost
  - Program Cost
  - Operational and Support Cost

- Study Strategy
  - Mature the government conceptual design to a “possible” Preliminary Design state
  - Encourage use of value added existing GFE
  - Encourage proven low cost techniques from other aircraft classes
  - Price the resulting design
    - Provide traceability to contractor historical cost data
5–D and CEi Teamed to Pursue the 5GAT Study

- **5–D**
  - Full scale target experience dating back to 1980s
  - Sub scale target experience

- **CEi**
  - Target development and manufacturing experience
  - Wide range of subscales from subsonic to supersonic for USAF, US Navy, and foreign customers
5GAT Govt Airframe
Used on T-38 jet trainer

Turbojet with afterburner

<table>
<thead>
<tr>
<th>Engine Speed</th>
<th>RPM</th>
<th>Thrust</th>
<th>Specific Fuel Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military</td>
<td>16,542</td>
<td>2,680 lbs (min)</td>
<td>1.03 lb/hr/lb of thrust (max)</td>
</tr>
<tr>
<td>Maximum Afterburner</td>
<td>16,542</td>
<td>3,849 lbs (min)</td>
<td>2.20 lb/hr/lb of thrust (max)</td>
</tr>
</tbody>
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Standard Day Sea Level Static Performance
Three considerations determine the keys to success for 5GAT – Cost, Cost, Cost

- Must be more cost effective than converting 5th gen manned fighter
- Must be more cost effective than modifying existing 4th gen fighter and incorporating 5th gen characteristics
- Must be more cost effective than conventional military high performance aircraft development and production approach
Consideration – how are general aviation aircraft companies able to develop and produce lower cost aircraft?

Consider VLJ aircraft in production
- Acknowledge performance differences
- Acknowledge some military requirements differences
- Are there VLJ elements that can be applied?

Consider other aircraft classes including high performance kit aircraft
- Are there elements that can be applied?
Cost of commercial business jets scales well with empty weight

Consider Eclipse 500
- Current price: $2.75M
- Empty weight = 3,550 lb

5GAT weight is 2.03x Eclipse 500
- Empty weight = 7,221 lb $5.5M
All-composite airframe with low cost manufacturing approach
- Large parts of airframe made as single components (skins and substructure)
- Sparse internal structure for finite airframe lifetime

GFE surplus jet engines

Avionics and software adapted from aerial targets, not tactical aircraft
Study cost data submitted
Study preliminary design basis established
  ◦ Not the only way to configure/build, but the basis for the cost submitted in the study
Represents substantial departure from
  ◦ Conventional military manned aircraft development
  ◦ Legacy Full-Scale target development
Approach is “morph” of subscale and full-scale development
  ◦ Cost basis partially dependent on “similar to” analysis of target system efforts, subsystems, components, and integration
Future 5GAT Actual Program

- Varying level of confidence among community / Government with respect to cost
- Risk reduction opportunities being researched – intent would be to improve confidence across community / Government
- Future program TBD