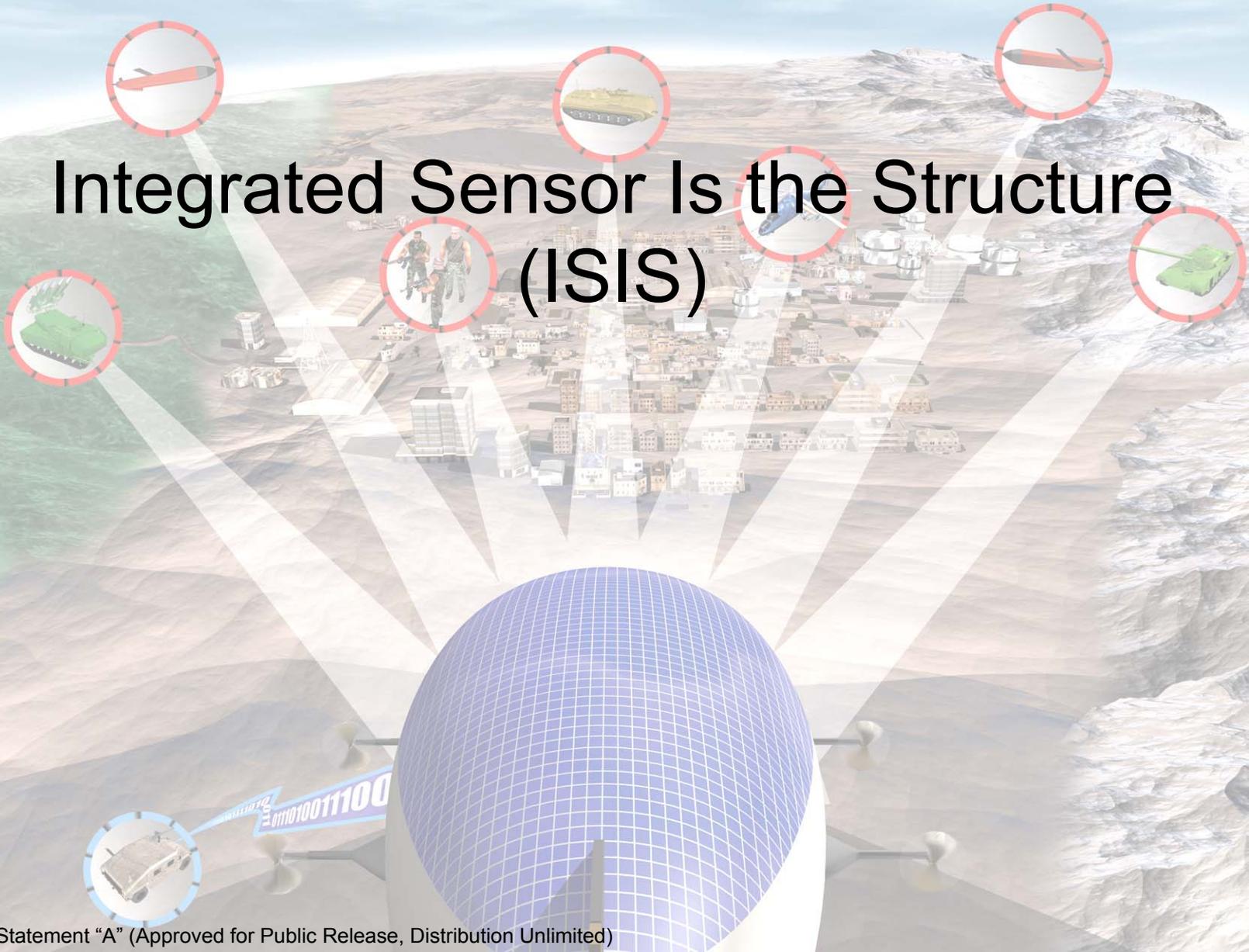
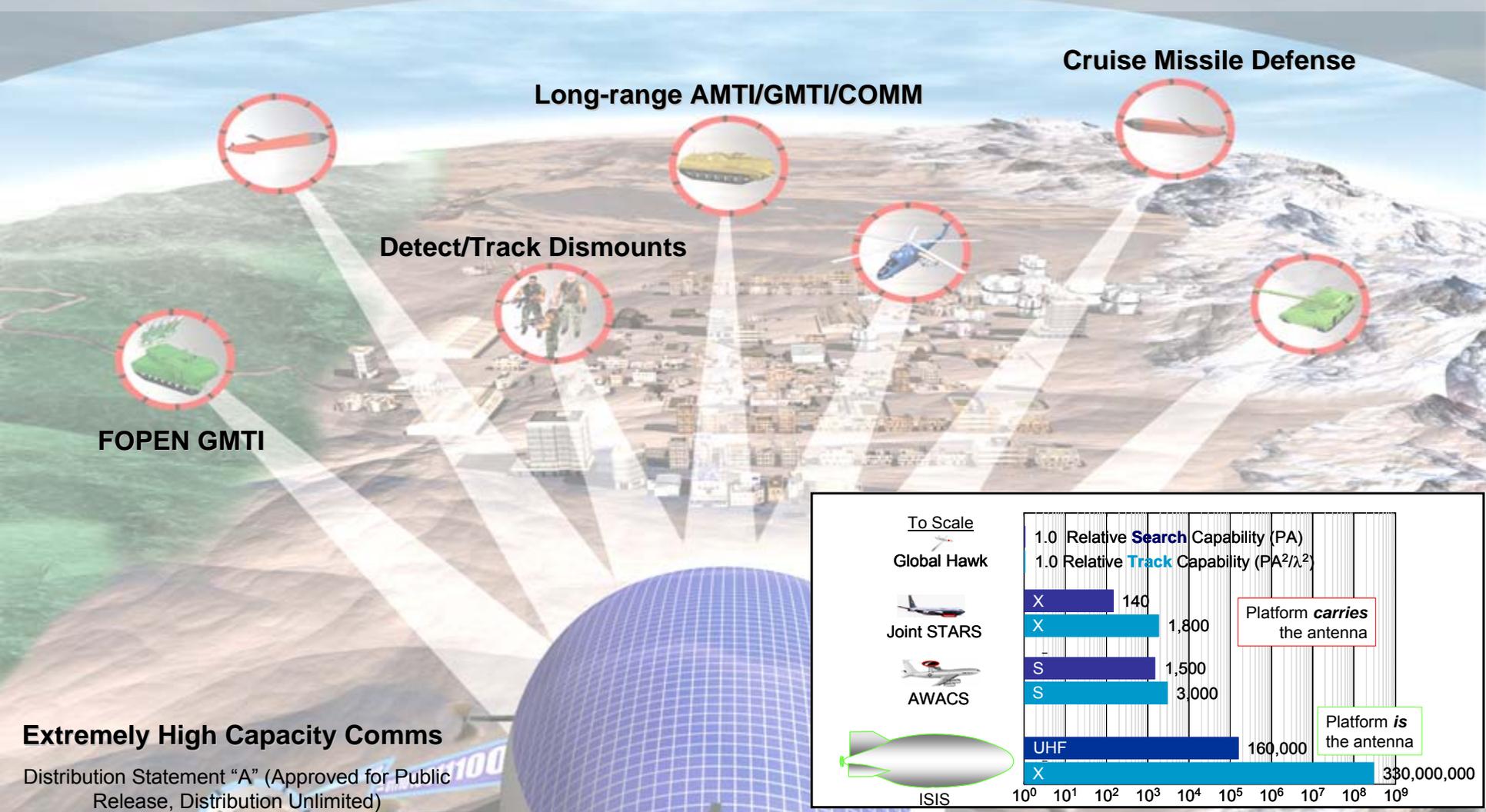


Integrated Sensor Is the Structure (ISIS)



Simultaneous AMTI/GMTI Operation via Dual Band (UHF/X-Band) Aperture



Distribution Statement "A" (Approved for Public Release, Distribution Unlimited)

Global Relocation <10 days – 600km Sensor Radius – No In-Theater Ground Support
 10+ year Operational Lifetime – 99% Availability for 1 year

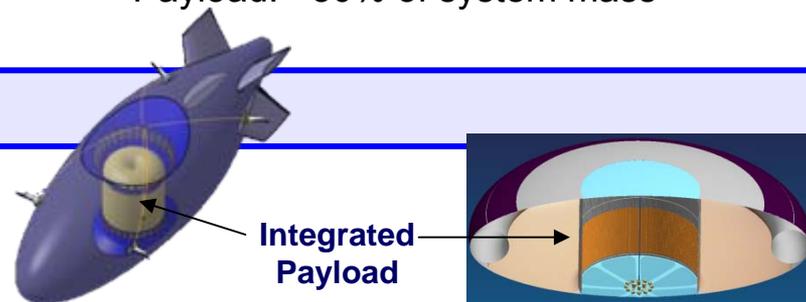
Conventional

Payload: 2-3% of system mass

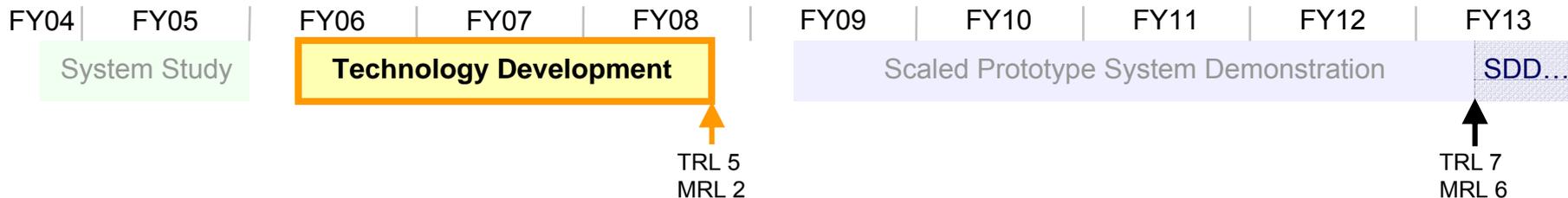


ISIS New Paradigm

Payload: >30% of system mass



Enabling Technologies	DARPA ISIS Accomplishments
Hull Material	<ul style="list-style-type: none"> Improved lifetime by 10x while reducing fabric mass 4x over state-of-the-art
Active-Array Antenna	<ul style="list-style-type: none"> Performance from size, not power Removed heavy high power electronics, cooling Removed structure: Flexible panels bonded onto pressure vessel Low-power Transmit/Receive modules based on low-cost "cell phone" technology
Power System	<ul style="list-style-type: none"> Solar-regenerative power with fuel cells instead of batteries Airspeed: 60 knot sustained, 100 knot sprint



Addressing critical hardware technology needs

- | | <u>Achieved</u> | |
|---|--|---------|
| <ul style="list-style-type: none"> • Low areal-density advanced hull material <ul style="list-style-type: none"> – Areal density $\leq 100 \text{ g/m}^2$ – Matrix glass transition temperature (T_G) $\leq -90^\circ\text{C}$ – Fiber strength-to-weight $\geq 1000 \text{ kN}\cdot\text{m/kg}$ – Fiber retains $>85\%$ strength at 5 years | <p>90.6 g/m²
-101°C
1274 kN-m/kg
>85% at 22 years</p> | } Mass |
| <ul style="list-style-type: none"> • Lightweight, low-power density AESA <ul style="list-style-type: none"> – Areal density $\leq 2 \text{ kg/m}^2$ – Power consumption $\leq 5.0 \text{ W/m}^2$ on receive – Bonded to hull material | <p>1.8 kg/m²
4.7 W/m²
Passed</p> | |
| <ul style="list-style-type: none"> • Extremely low-power Transmit-Receive modules <ul style="list-style-type: none"> – FOM $\geq 1 \times 10^4 \text{ W}^{-2}$ – Demonstrated TRL5 (MTTF $> 10^6$ Hours) | <p>1.1 x 10⁴ W⁻²
MTTF $> 1.98 \times 10^6$ Hours</p> | } Power |
| <ul style="list-style-type: none"> • Novel power systems for stratospheric airships <ul style="list-style-type: none"> – Demonstrate 400 W-hr/kg regenerative system | <p>779 W-hr/kg</p> | |

"High-Definition" Picture of All Moving Targets → 10x Resolution Improvement

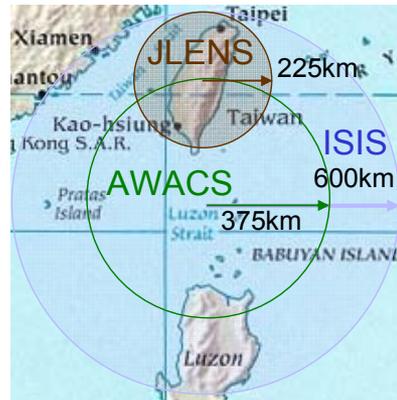


SEA ← → LAND ← → AIR
Pulse-to-Pulse aperture reconfiguration enables all missions simultaneously

Global Relocation <10 days – 600km Sensor Radius – No In-Theater Ground Support
10+ year Operational Lifetime – 99% Availability for 1 year

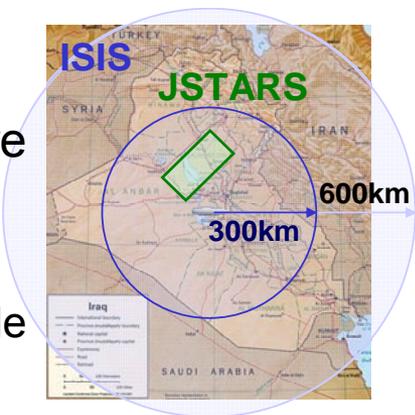
Complete Air Picture

- AWACS (70's) and E-2 (60's) – designed for hard targets of their day
- ISIS is designed for the theoretical limit at the radar horizon
 - Single-platform search, track, and fire-control



Unobscured Surface Target

- Joint STARS (70's) designed for tanks in the Fulda Gap
- ISIS is designed for dismounts across the entire Line-of-Sight
 - LSRS-like resolution
 - 300km @ 3° grazing angle
 - 600km line-of-sight



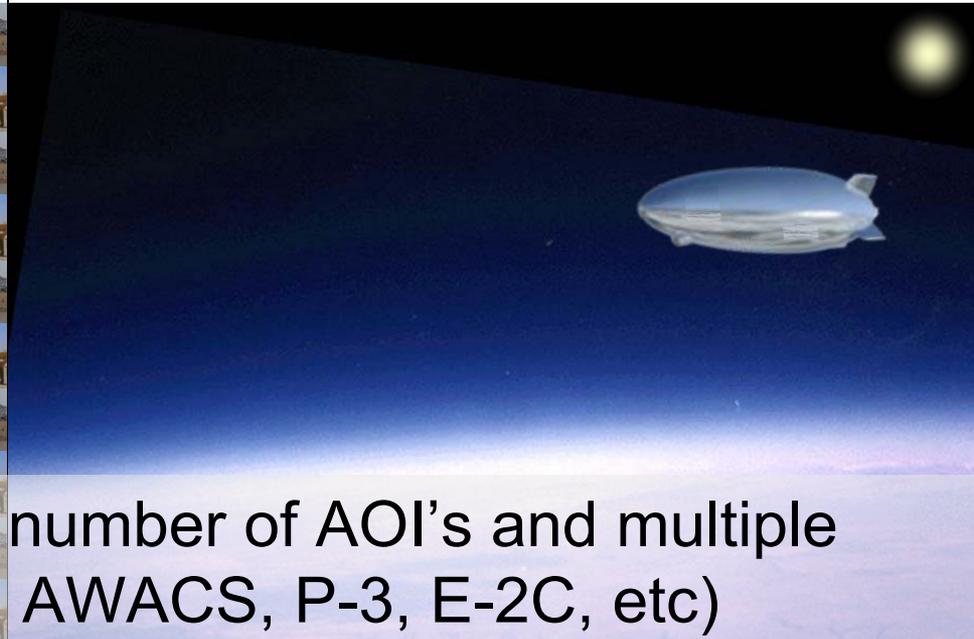
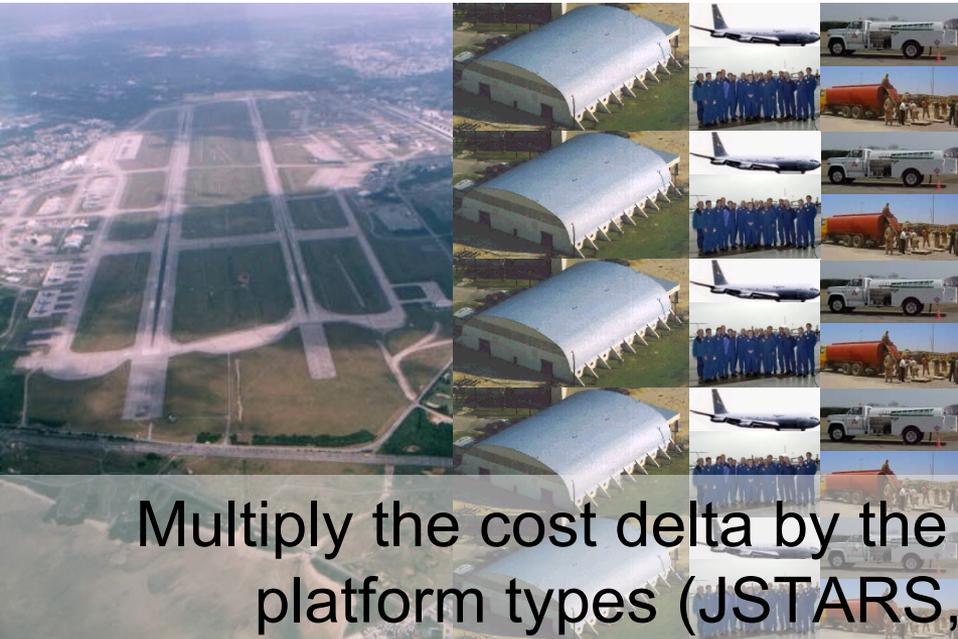
Wide-Area Foliage Penetration GMTI

- Joint STARS precision across an extremely large operational area



- Forward-deployed aircraft-based ISR
 - Local air base
 - Multiple aircraft for single orbit
 - Air crews
 - Ground crews
 - Fuel supplies
 - Maintenance facilities

- CONUS-deployed ISIS
 - Unmanned
 - Launched from U.S. locations
 - Global deployment in 10 days
 - Regenerative fuel sources
 - Ten-year service life
 - Permanent CONUS ground station



Multiply the cost delta by the number of AOI's and multiple platform types (JSTARS, AWACS, P-3, E-2C, etc)

