

# PeaceWing Concept

U.S. State Department Pilot Project for GDIN



**Environmental Research Aircraft and Sensor Technology (ERAST) Program**

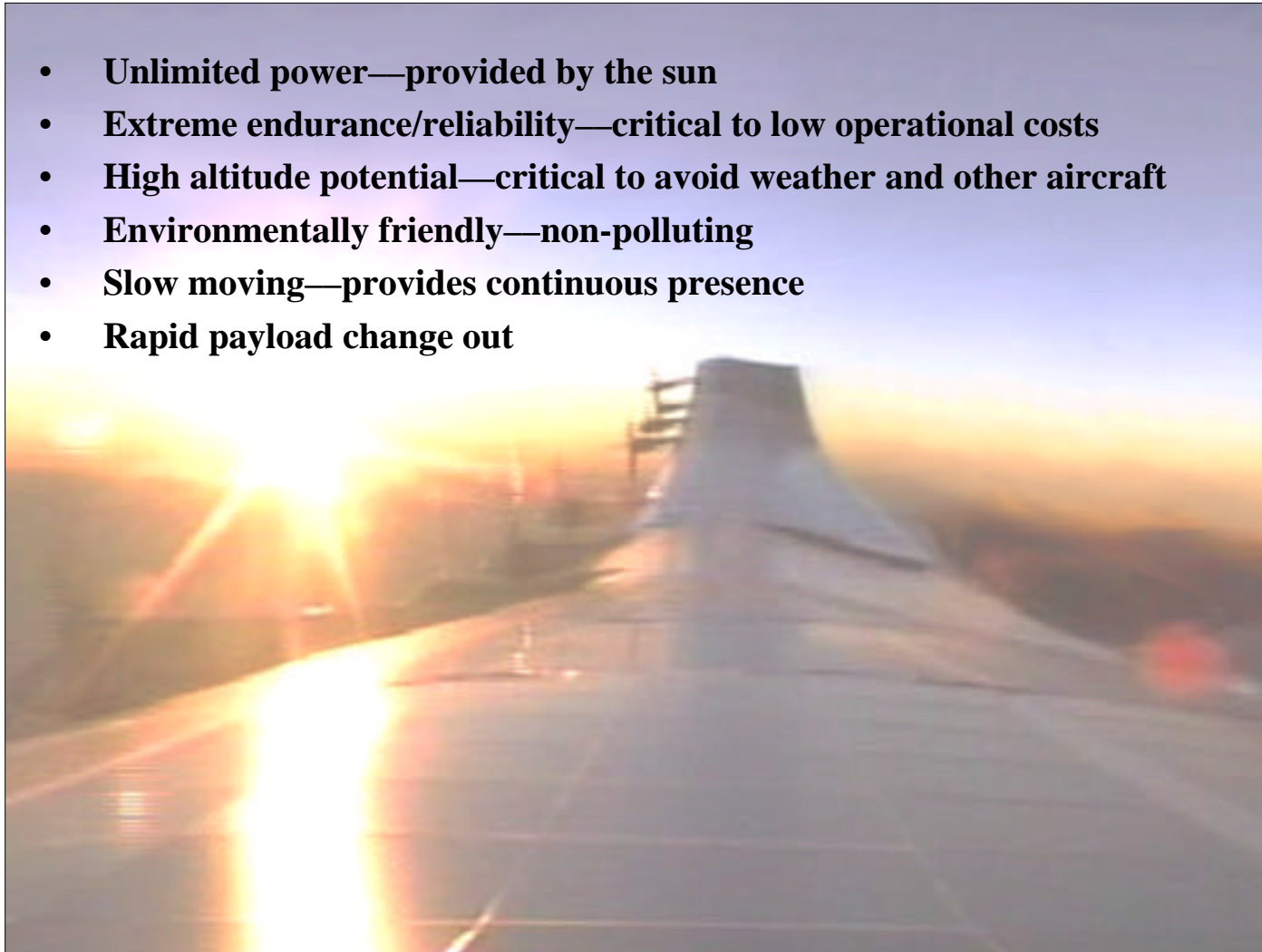
**Ankara, Turkey**

**April 2000**



# Solar-Powered Robotic Airplanes

- **Unlimited power—provided by the sun**
- **Extreme endurance/reliability—critical to low operational costs**
- **High altitude potential—critical to avoid weather and other aircraft**
- **Environmentally friendly—non-polluting**
- **Slow moving—provides continuous presence**
- **Rapid payload change out**



# Concept

- **Solar-powered “atmospheric satellites” represent a revolutionary technology breakthrough with global impact**
- **Next generation platform for low cost telecommunications and observing relief operations**
- **Hovers over intended geographic area indefinitely**
- **Above all weather and air traffic**
- **Complement to modern aircraft and satellites**
- **User friendly and easy to fly**



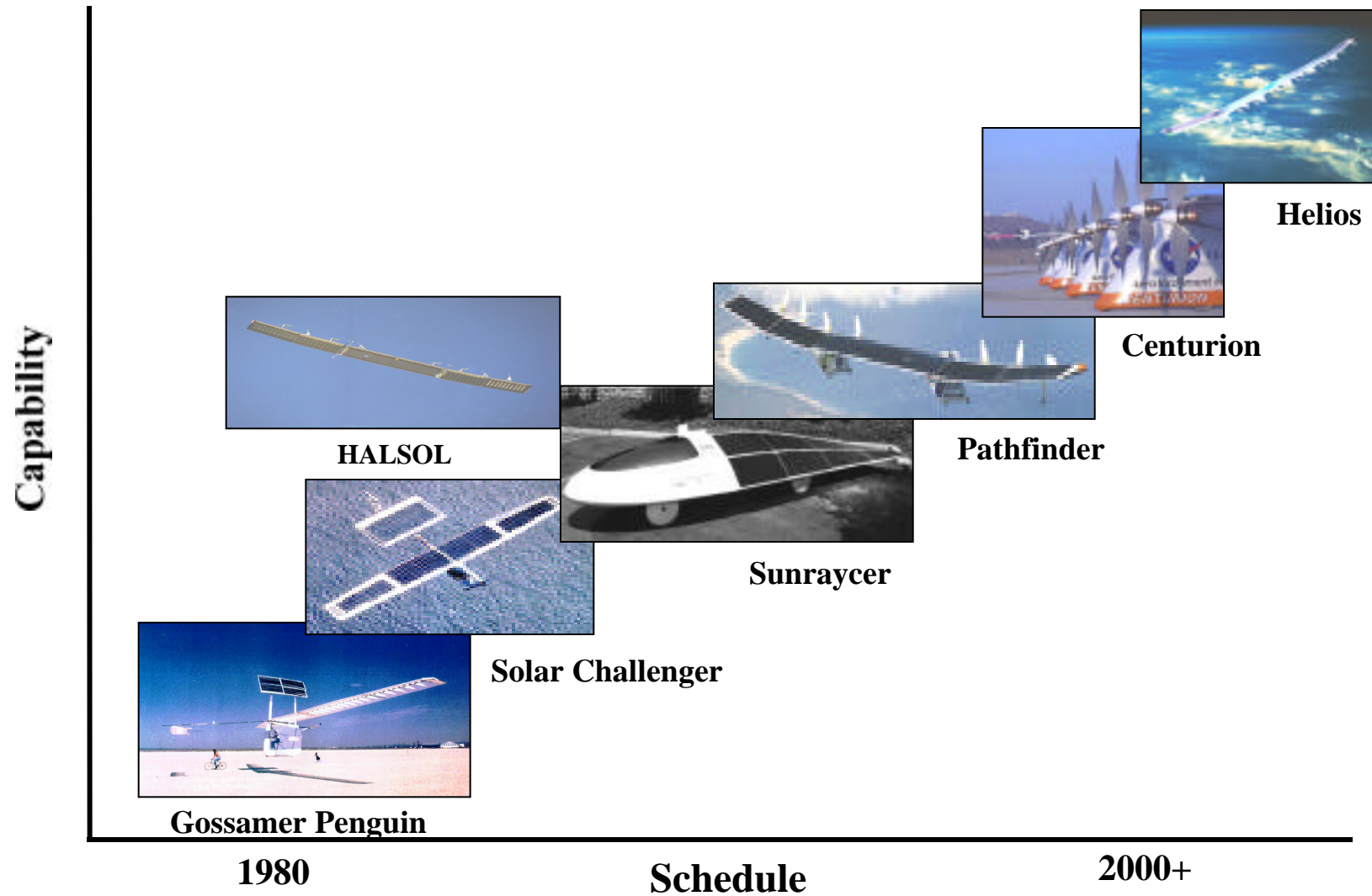
# Specific Capabilities

- **High-altitude, long-endurance (HALE) solar - powered airplane**
  - Provides 6 months on-station at 65,000 feet; 100 kg payload
  - Carries 100 kg payload
  - Stable sensor platform
  - Satcom capable
  - Daytime flights available now
  - “Virtual eternal” flight by 2003
- **“Substitute satellite”**
  - Continuous day/night, power-on-demand, operations for telecommunications, remote sensing and air sampling
  - Operates in stationary orbits or at great range
  - Order of magnitude cheaper than satellites
  - Extremely reliable
  - Extremely slow



Centurion

# Solar Plane Technology Path



# Technology Background

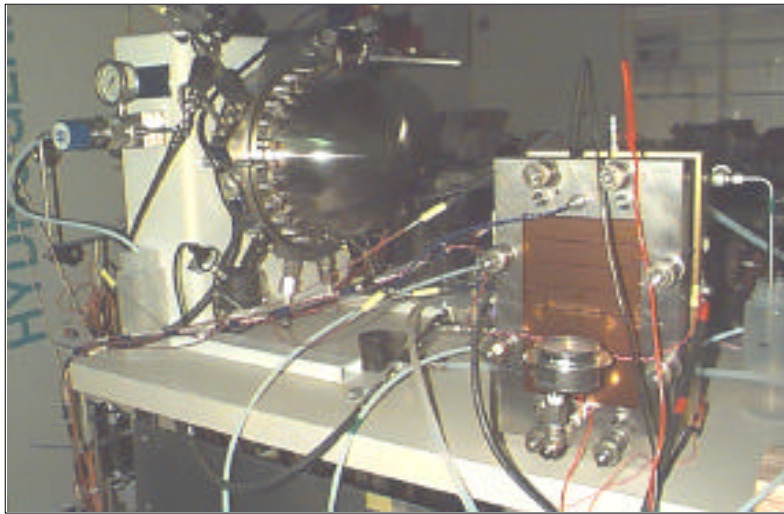
- U.S. military initiated solar powered UAVs for missile defense in 1992
- NASA and AeroVironment (AV) have developed HALE solar UAVs since 1994
- Pathfinder set world record in Hawaii –71,500 ft in July 1997
- Pathfinder Plus set new world record in Hawaii–80,201 ft in August 1998
- Centurion made successful maiden flight on November 1998 at NASA Dryden; lifted 600 lbs to low altitude
- Helios Prototype is 2.5X the size of Pathfinder; designed to fly to 100,000 ft in 2001 using solar cells and batteries for short duration flights; first flight August 1999
- Helios will fly high using renewable energy for day/night operations—extreme endurance operations in 2003



Pathfinder Plus  
Pacific Missile Range Facility (PMRF)  
Barking Sands, Kauai

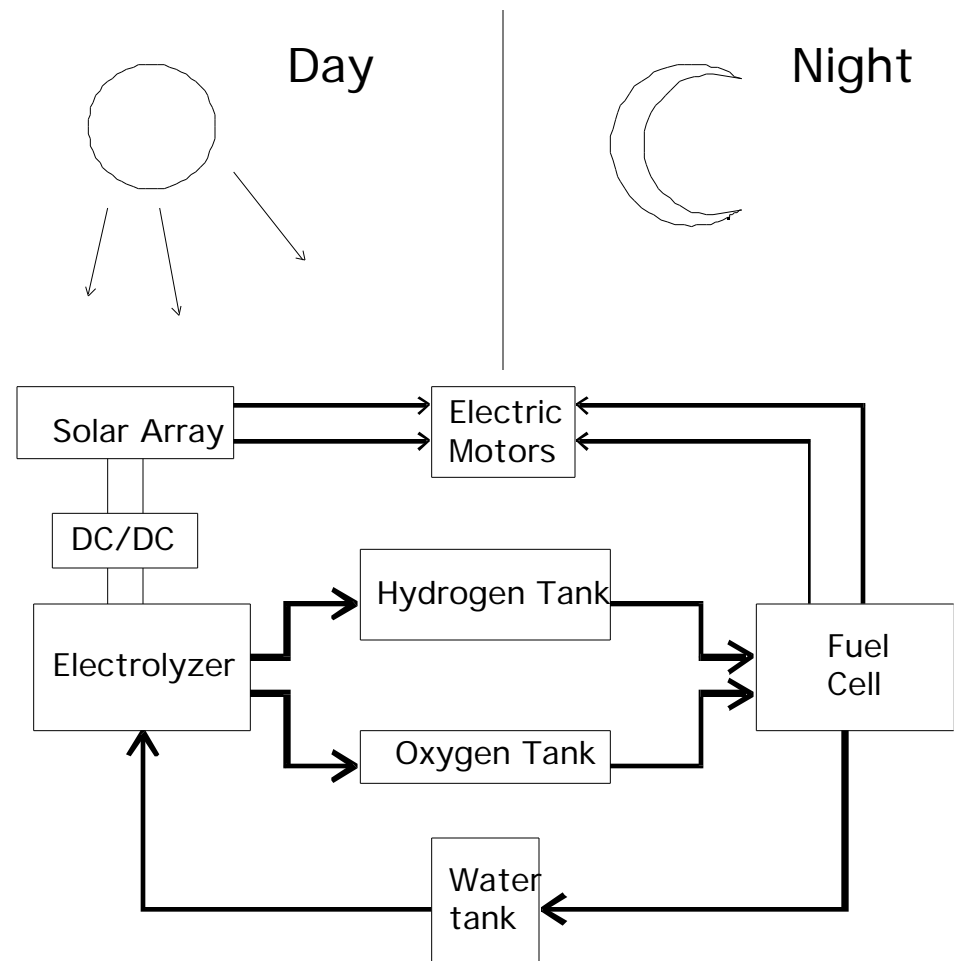


# Helios Power System Concept—Fly by Night



- Helios requires lightweight, high performance RFC system not available in the marketplace
- Closed cycle system with thermal control necessary for cold, HALE operations
- Basic fuels are water and sunlight
- Battery technology not sufficient

## Regenerative Fuel Cell (RFC)



# Operational Experience

- **Aircraft flown in Hawaii and California extensively**
- **Hundreds of accident-free hours flown in civil and military airspace**
- **Small, high performance sensors flown to observe the environment**
- **Aircraft can accommodate over-the-horizon satellite communications**
- **System rapidly deployable**





# Sensor Technologies

**Airborne Real Time Imaging System  
(ARTIS)**



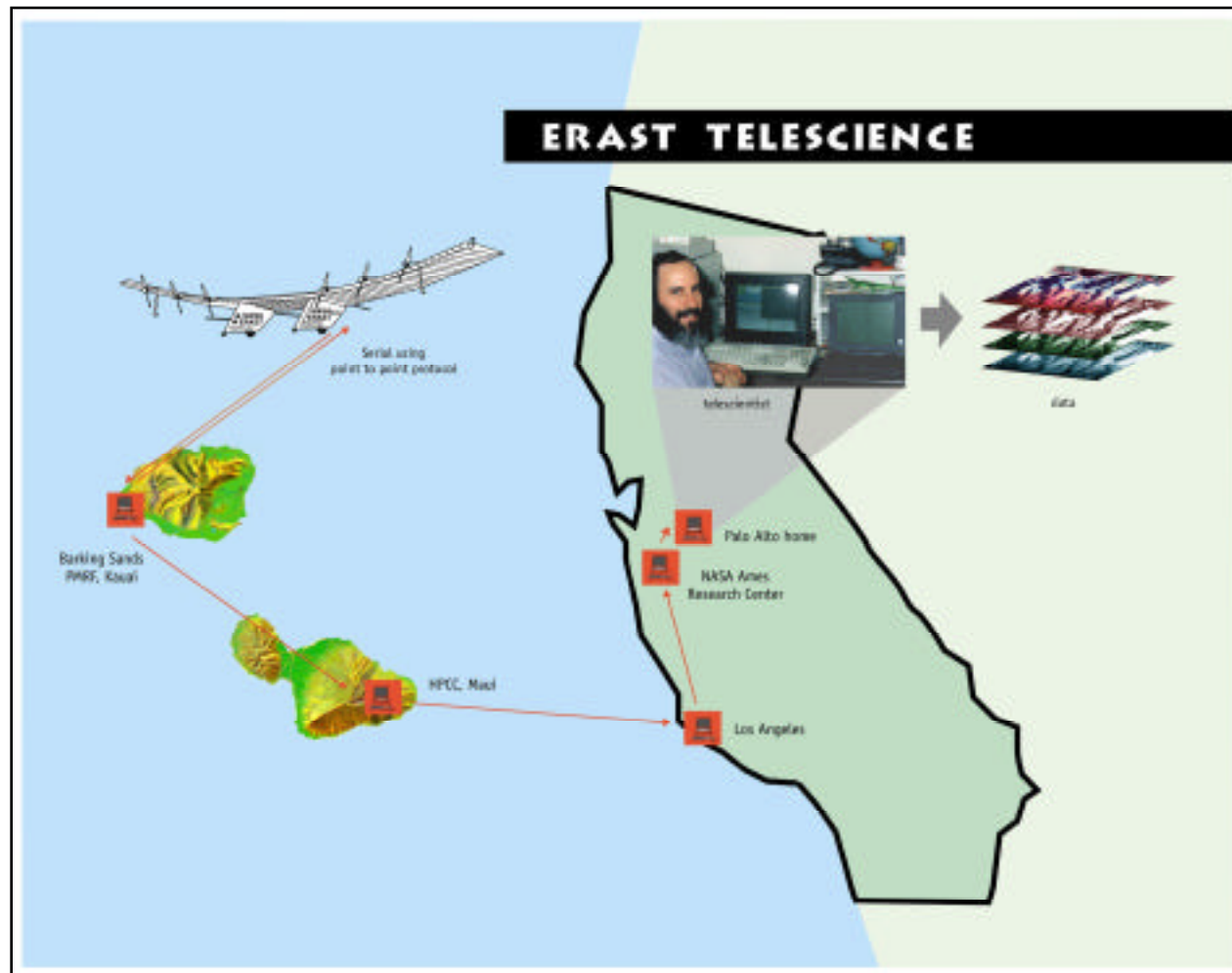
**High altitude Optics**



**Digital Array Scanning Interferometer  
(DASI)**

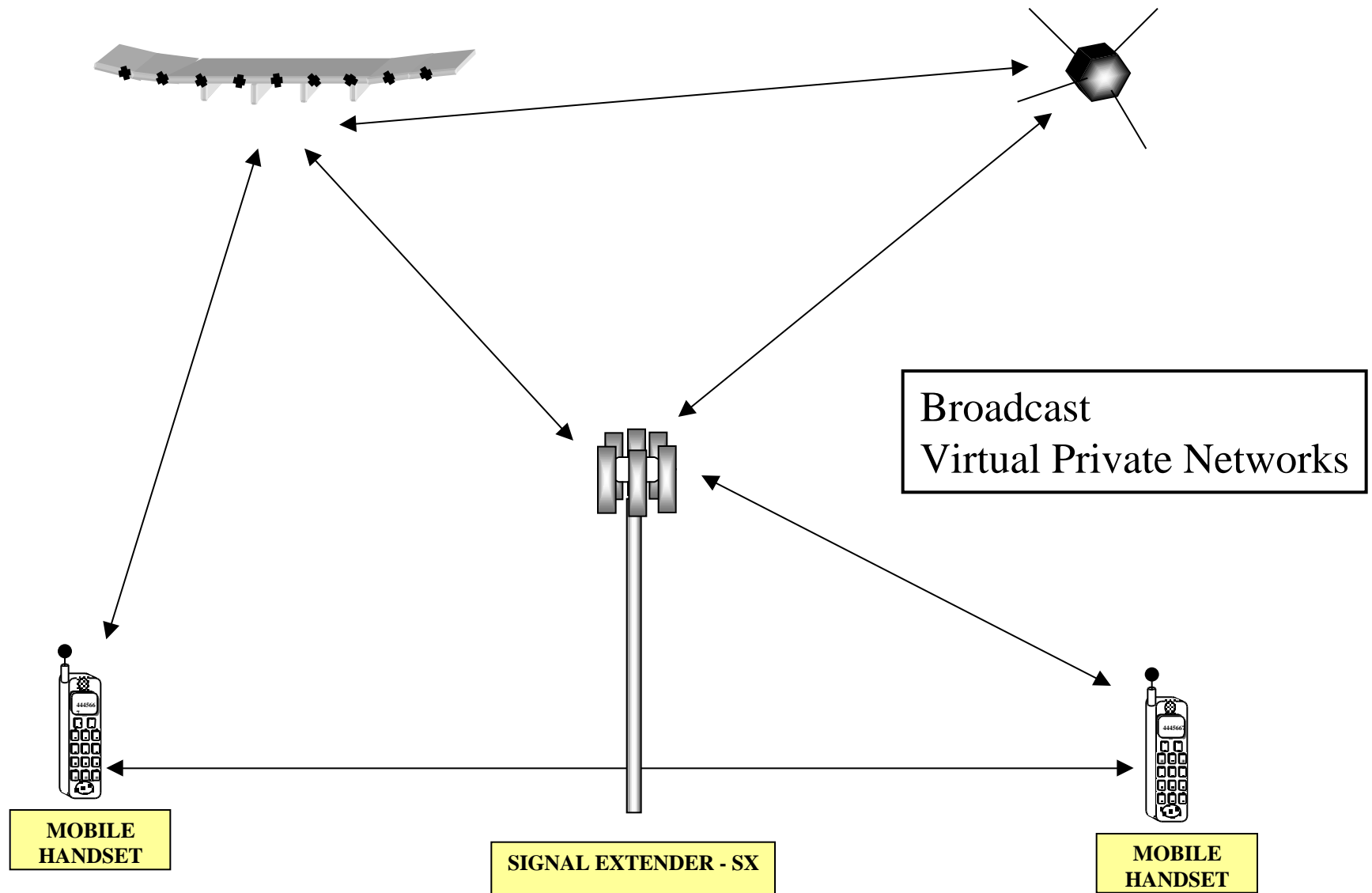


# Virtual Operations



**Near-real-time remote sensing operations using the Internet**

# Airborne Telecom Concept



# Appeal–Education Outreach



Hawaii 1998



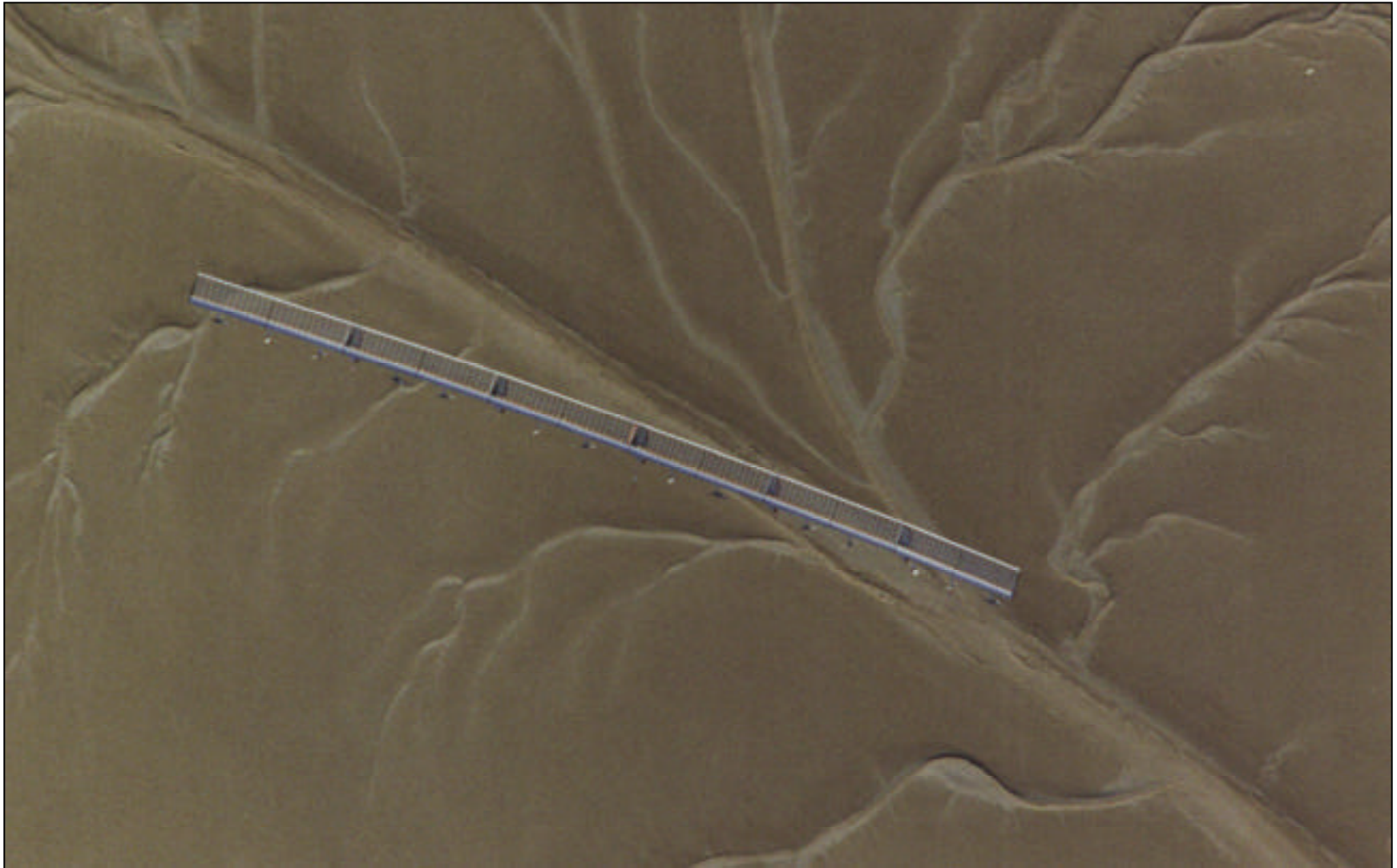
# Helios Prototype–August 1999



**Wingspan–247 ft**

AeroVironment, Inc.  
c/o Bob Curtin  
4685-3H Industrial Street  
Simi Valley, CA 93063  
805/581-2187  
curtin@aerovironment.com  
www.aerovironment.com  
or  
Dale Tietz  
512/263-8054  
vraptor01@aol.com

# Helios Prototype In Flight





# PeaceWing–Pathfinder Plus and Helios

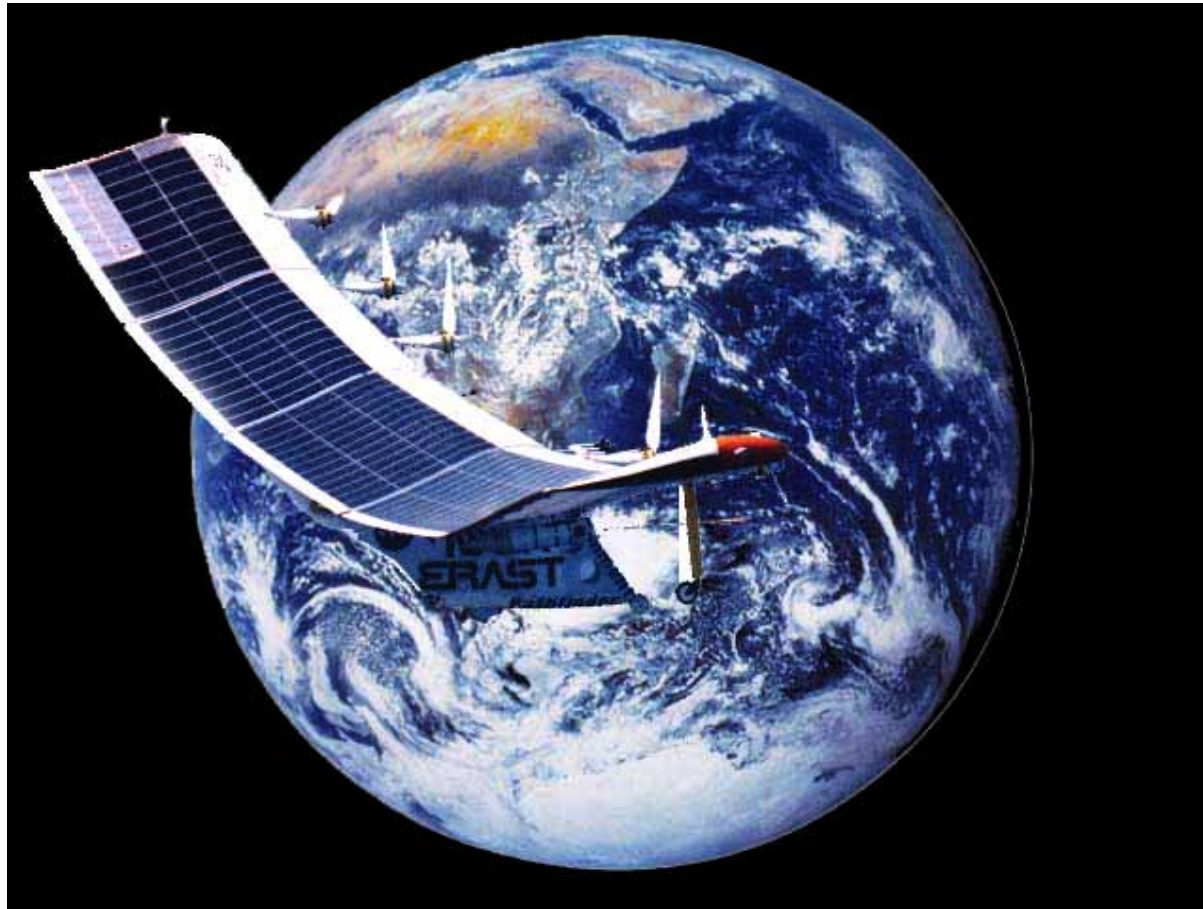
Kenya

Italy

Mexico

Turkey

Brazil



**Ready for demonstrations**