Near Space Communications Systems

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Space Data CORPORATION

Overview

Space Data produces high-altitude communications platforms that:

- Provide emergency response communications within 30 minutes and coverage over hundreds of miles within 2 hours
- Require minimal or no infrastructure, a capability that's critical in post-disaster scenarios and remote locations
- Support voice, data and asset tracking
- Have been in commercial operation for more than 3 years and are now being purchased in quantity by the U.S. Air Force
- Are cost-effective, recoverable and immediately available
- Can be tailored to users' specific needs and support interoperability

Space Data® CORPORATION

What We Do

SkySite® Platform at 100,000 ft

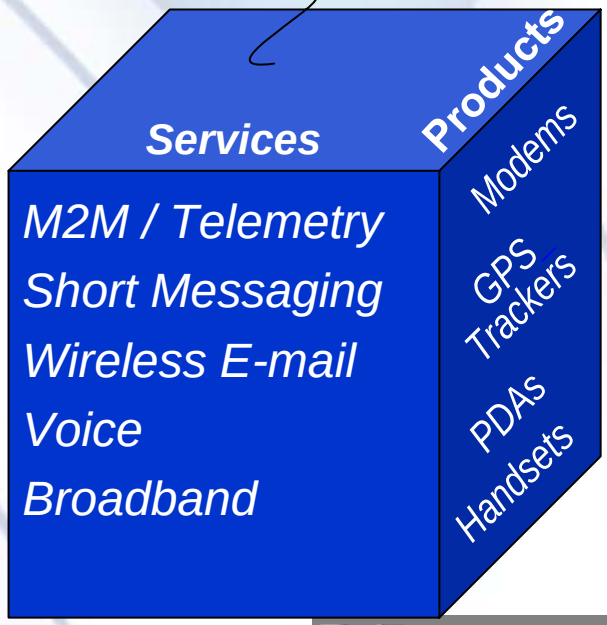
Fill gaps in terrestrial wireless networks providing ubiquitous coverage to

1) enterprises operating in rural areas,

2) wireless service providers, and

3) government agencies

for services and products including:



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The Solution Simply Integrates 3 Proven Technologies

- Integrated with proprietary altitude / network control & logistic systems

Weather Balloons

- 20-Mile Altitude
- A Century of Experience
- Simple Logistics
- All Weather Operations
- FAA Acceptance of two 6 lb payloads

+

Ever Shrinking Wireless Devices

1990: 1365 grams

Single Ch. Analog Radio

93% Weight Reduction over 15 yrs. + more functions

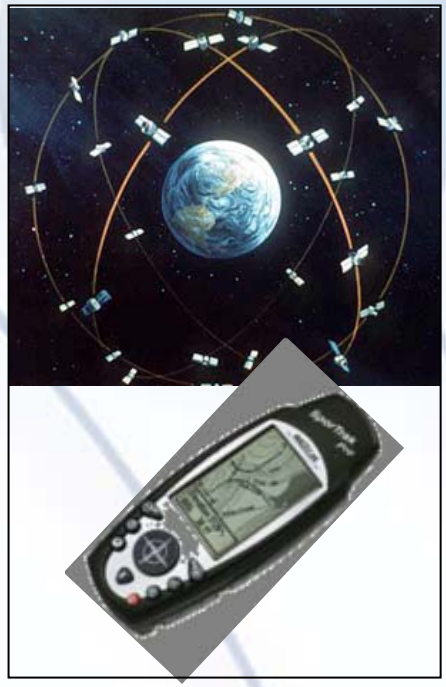
2005: 95 grams

3 bands + Bluetooth +
+ MP3 + TV + Organizer
+ GPS +Mpixel Camera

- Base Station Radios are also Shrinking (i.e. Picocells and Femtocells)
- Expendable
- Infrastructure keeps pace with Moore's Law

+

GPS Network



- Precise Timing
- Location
- Inexpensive

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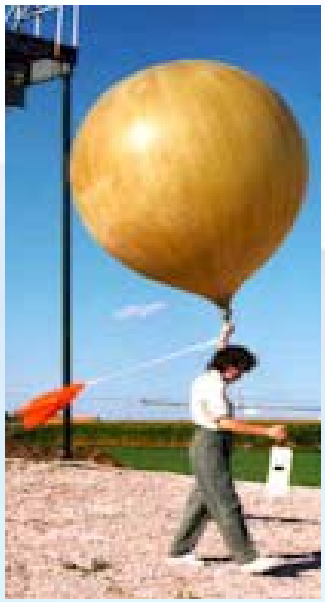
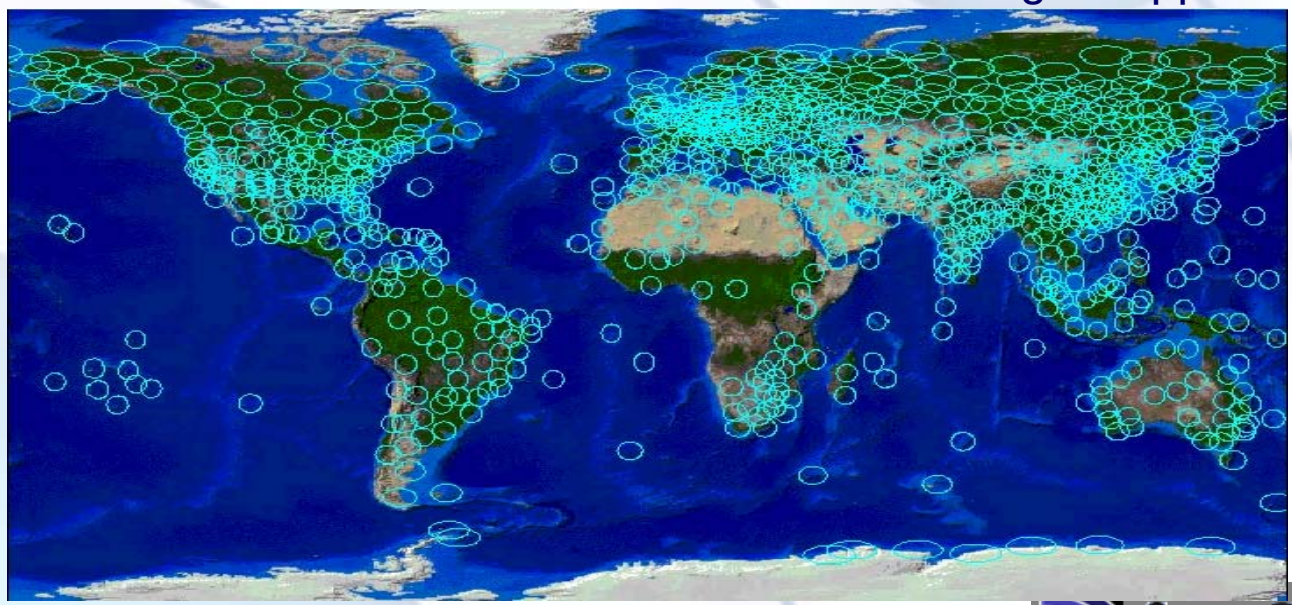
Weather Balloons: over 80 Years of Reliable Launch Experience with Worldwide Coverage

- 880 worldwide sites launch 2X / day at noon / midnight
- Over 800,000 launches / yr with no incidents of Aircraft Damage
- FAA rules permit unmanned use in National Air Space (NAS) if:
  - 1) Total payload mass suspended from balloon < 12 lb
  - 2) Each payload package must be < 6 lbs
  - 3) Payloads must separate with 50 lb force
- FAA Regulations bar winged UAVs from NAS
  - Est. will take more than a decade and more than $400 M to gain approval





Developing a UAS collision-avoidance system will be a more complex task than the development of TCAS. It took the aviation community more than a decade and about $400 million to develop TCAS, notes Andrew Lacher, Mitre Corp. UAS program lead. Aviation Week 2-21-07

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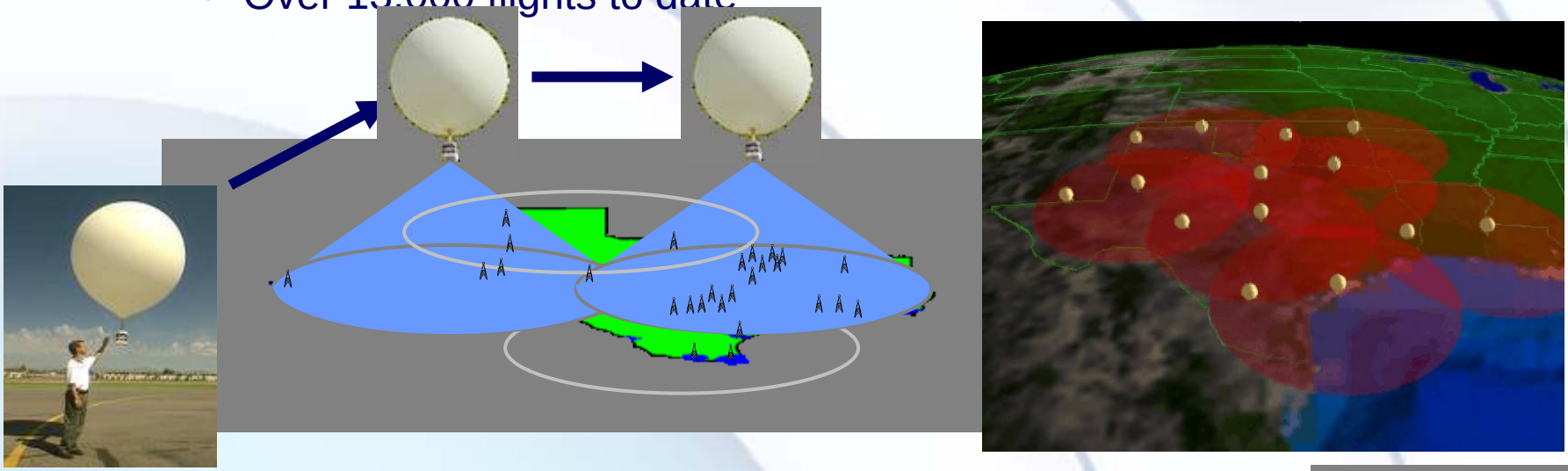
Space Data's Coverage Solution

Our network consists of transceivers on weather balloons at 100,000 feet

- **A single *SkySite*® covers everything under a 420-mile diameter circle**
  - Single SkySite = 300 terrestrial towers
- **Only 41 M2M or 200 Voice SkySites needed to cover the entire US**
- **Uses industry standard protocols:**
  - Interoperates with existing carriers who utilize towers
  - Interoperates with existing user devices
- **In 24 x 7 operations for the past 39 months**
  - Over 180,000 flight-hours of cumulative near-space operations
  - Over 13,000 flights to date



Each SkySite rises to 100,000 feet and levels off. In the uniform winds at that altitude, a constellation of interlocking SkySites float in unison to blanket large regions with coverage. New SkySites are launched every 12-24 hours to replace the previous constellation which is taken down, recovered and reused.

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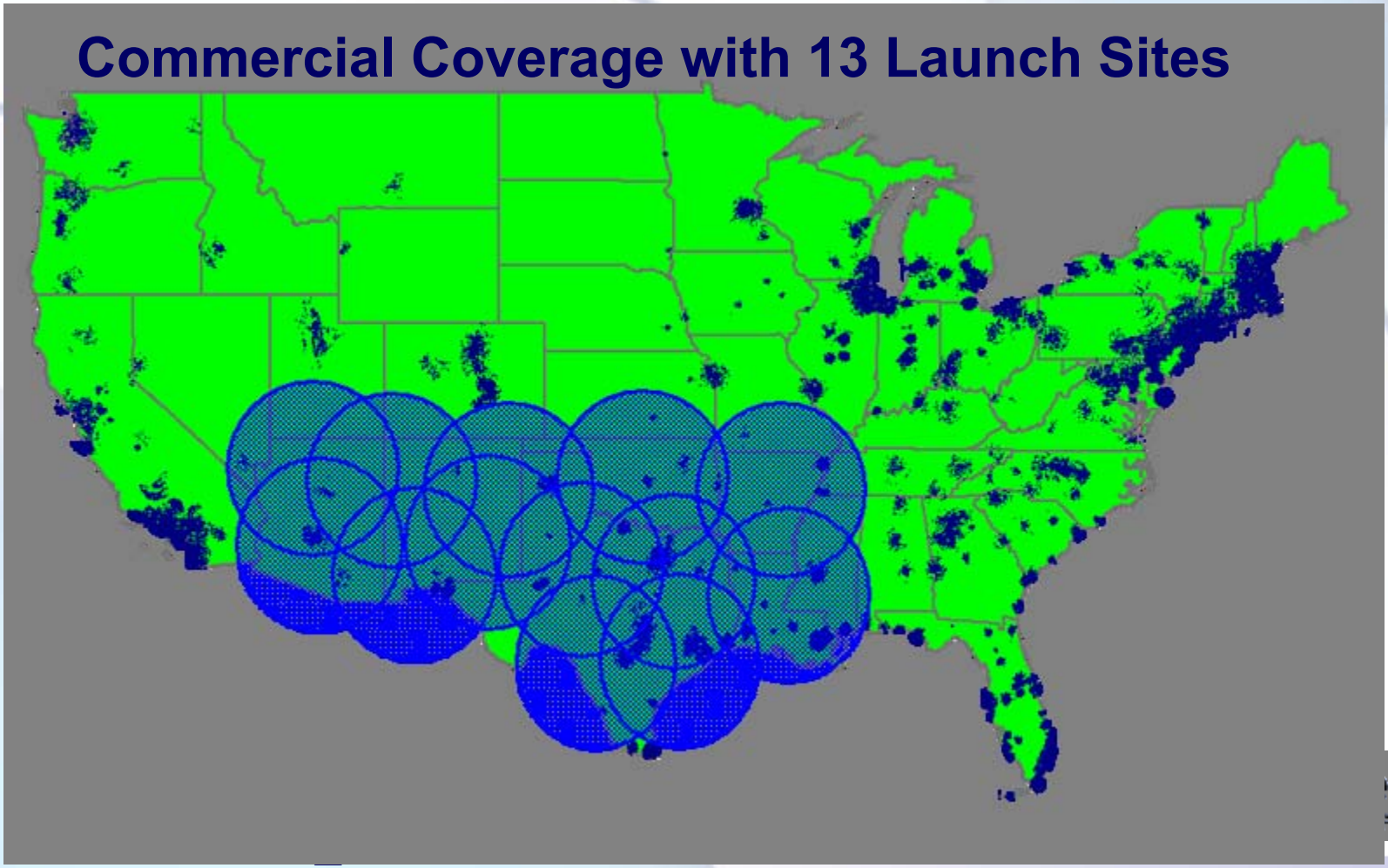
Space Data's Commercial Machine-to-Machine Network

- Full Constellation provides ubiquitous coverage to > 20% of CONUS
- Tower-based urban coverage provided through roaming to SkyTel
- In operation for over 3 years focused on oil and gas markets
- Over 13,000 flights, over 180,000 flight hours, over 85% recovery rate



Types of Near Space Platforms

Platforms

Tethered Aerostats

- Limited mission envelope
- Already militarily exploited

Free-Floating Weather Balloon

- Limited mission envelope
- Already exploited

Altitude Control, Free-Floating Weather Balloon

- Moderate mission envelope
- Technology commercially mature and military deployment imminent

Altitude Control, Free-Floating Hi-Altitude Balloon

- Moderate mission envelope
- Limited military exploitation

Station-Keeping Hi-Altitude Airship

- Broad mission envelope
- Technology not mature

Low Risk Low Payoff

Continuum of Near-Space Assets

High Risk High Payoff

Recovery Method		
Tethered Descent	Parachute Descent Controlled Parachute Descent Parafoil Descent Glider Descent	Controlled Platform Descent

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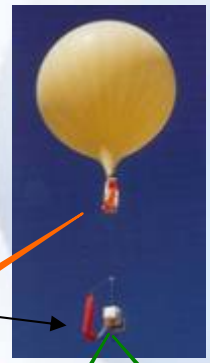
Courtesy of Air Force Space Battle Lab

Combat SkySat Demonstration, March 2005

- Demonstrated Forward Air Controller Mission
  - Interoperability of Modulations and Bands

Two Linked PRC-148's

Dual Payload SkySat Platform



NOC

Chandler, AZ

Land Line

Remote Ground Station and mission launch

RGS acts as gateway

FM – Terrestrial Band

AM – Aeronautical Band

Recovery Vehicles

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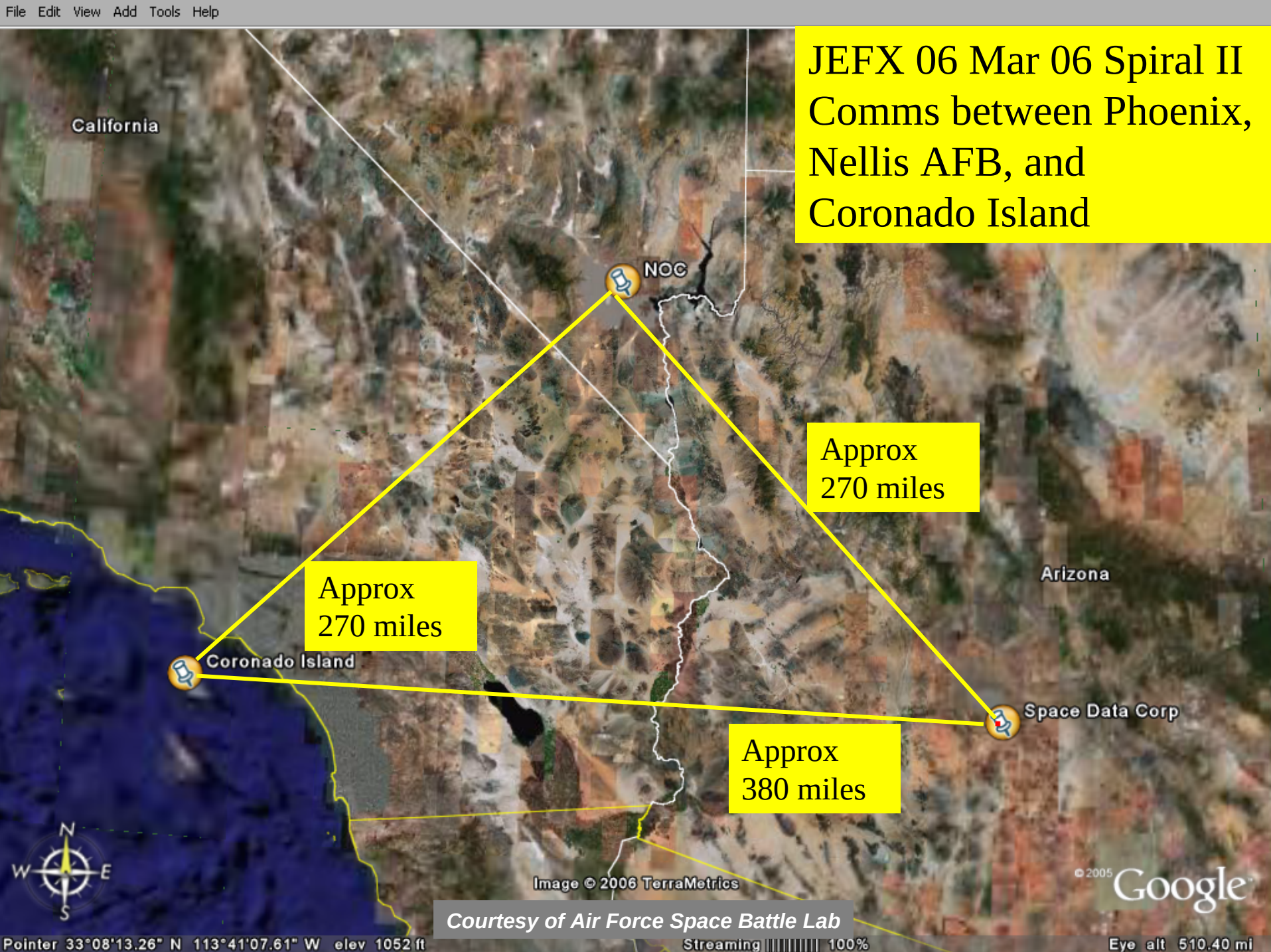
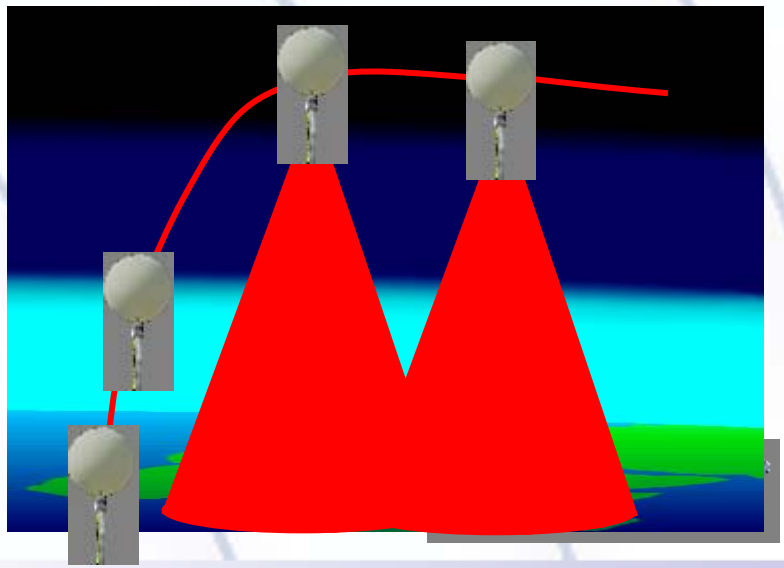
Combat SkySat Demo: March ‘05

Graphic courtesy of Air Force Space Battlelab


File Edit View Add Tools Help
JEFX 06 Mar 06 Spiral II
Comms between Phoenix,
Nellis AFB, and
Coronado Island
California
NOC
Approx
270 miles
Arizona
Approx
270 miles
Coronado Island
Space Data Corp
Approx
380 miles
N
W
E
S
Image © 2006 TerraMetrics
©2005 Google
Courtesy of Air Force Space Battle Lab
Pointer 33°08'13.26" N 113°41'07.61" W elev 1052 ft
Streaming 100%
Eye alt 510.40 mi

Near Space Communications System (NSCS)

- Deployment contract with USAF
  - $49 M / 5 year IDIQ Contract
  - Awarded Aug. 2006
  - Free-floating Balloons
    - Comm Relay – secure voice/data
    - “Truck” to carry lower 6-pound payloads to Near Space
  - Three Versions:
    - 225 - 375 MHz (UHF/FM)
    - 30 - 88 MHz (LVHF/FM)
    - UHF / VHF cross-band payload
  - 65,000 - 100,000 ft operation for 6 to 12 hours
- Training materials and Ground Stations delivered 1Q07
- Active Programs
  - Initial deployment quantities on order
  - U.S. Southern Command
    - Joint Urgent Operational Need – JS approved validation
  - U.S. Central Command
    - Quick Reaction Capability



Applications for Homeland Security

- Support FEMA, State/Federal agencies in contingencies (power outage, hurricanes, earthquakes, etc.)
- Enhance border and coast monitoring efforts, filling in coverage gaps and tracking assets
- Extend comms and personnel/asset tracking for wildland fires
- Provide extended communications for transportation security

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Emergency Response

- Broad communication coverage for recovery management
- Group talk ability
  - Effective at coordinating large number of first responders
- Initial replacement of telecommunications infrastructure
- Bridge comms between federal, state & local authorities

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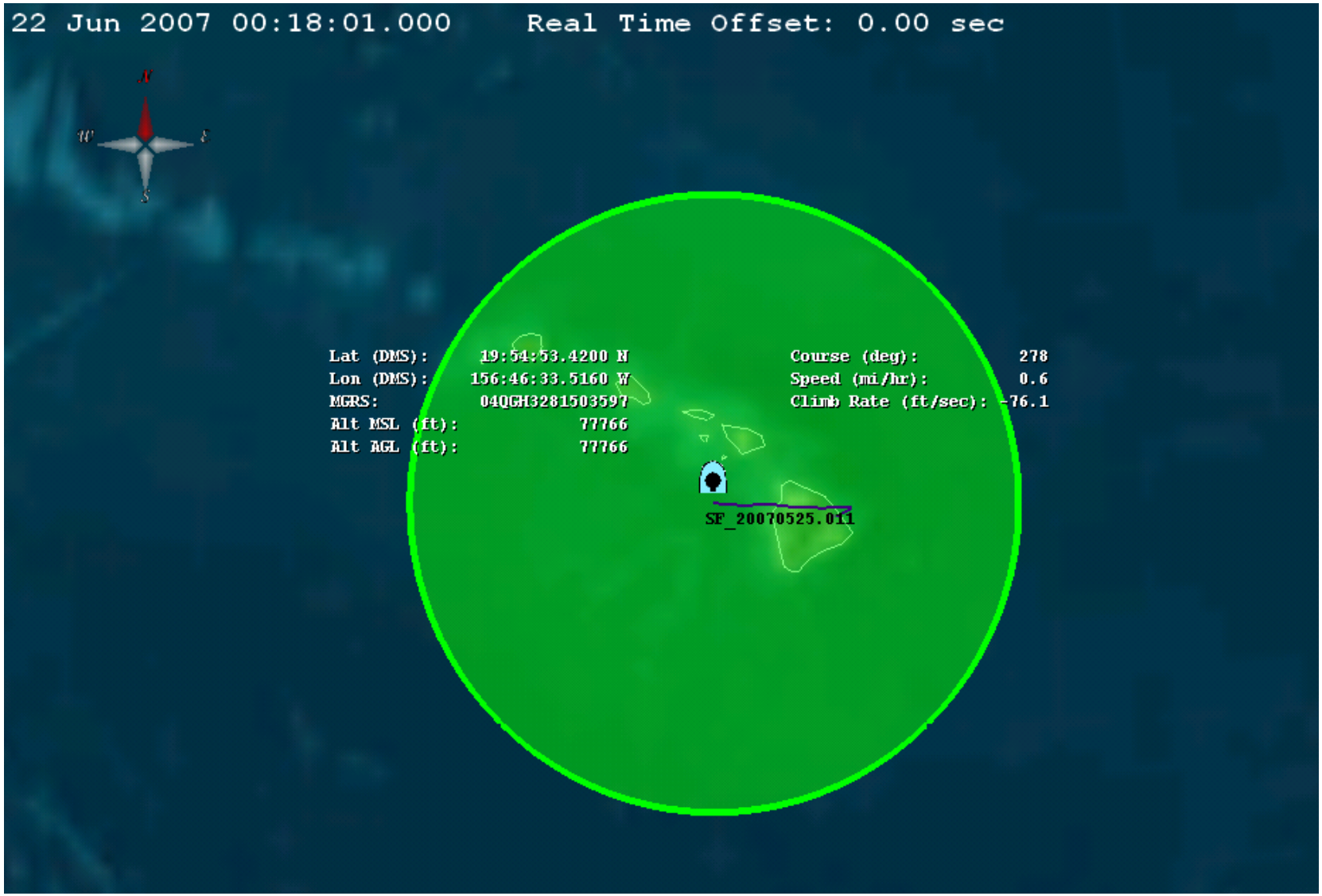
Animation courtesy Air Force Space Battlelab

SkySat Coverage at 77K



Courtesy Det 2 Arizona Air National Guard

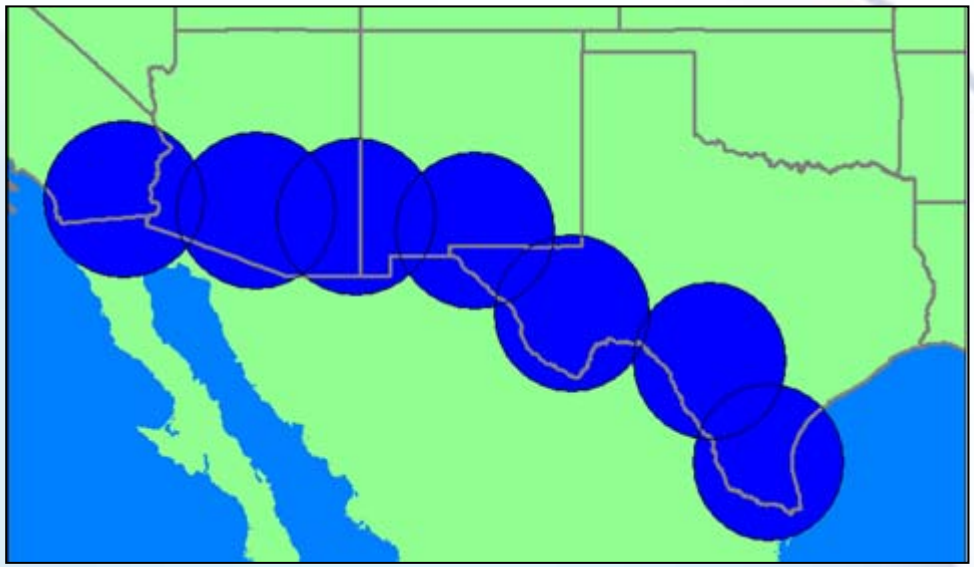
SkySite® Voice Repeater Kit

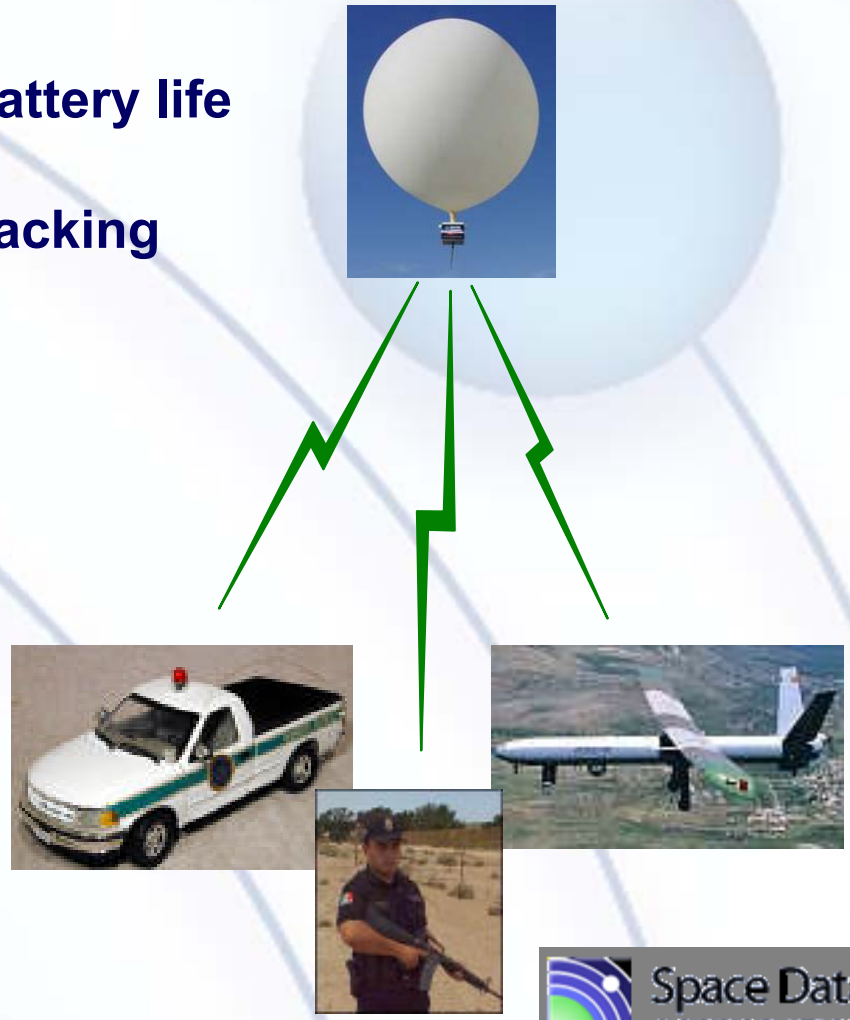
- Demonstrated at Assoc. of Public safety Comm. Officers (APCO) Conference
  – August 2006 in Orlando, Florida
- Responsive communications for disaster recovery operations


Demonstrated Coverage of Single Payload to Standard Motorola Handheld Radios at APCO 2006
Savannah
Albany
GEORGIA
ALABAMA
Troy
Enterprise
Dothan
Waycross
Brunswick
Valdosta
Mobile
Crestview
DeFuniak Springs
Pensacola
Tallahassee
Panama City
Perry
Jacksonville
Gainesville
Ocala
Orlando
FLORIDA
Lakeland
Tampa
St. Petersburg
Port St. Lucie
Atlantic Ocean
Gulf of Mexico
Straits of Florida
Miami
Freeport City
THE BAHAMAS
Nassau
Great Guana
Key West N.W.R.
65
75
95
10
4
589
869
821

Border Protection

- Digital, encrypted voice for Border Patrol agents
- Covers deep canyons & extends battery life
- Supports agent comms. & asset tracking
- Responsively tasked





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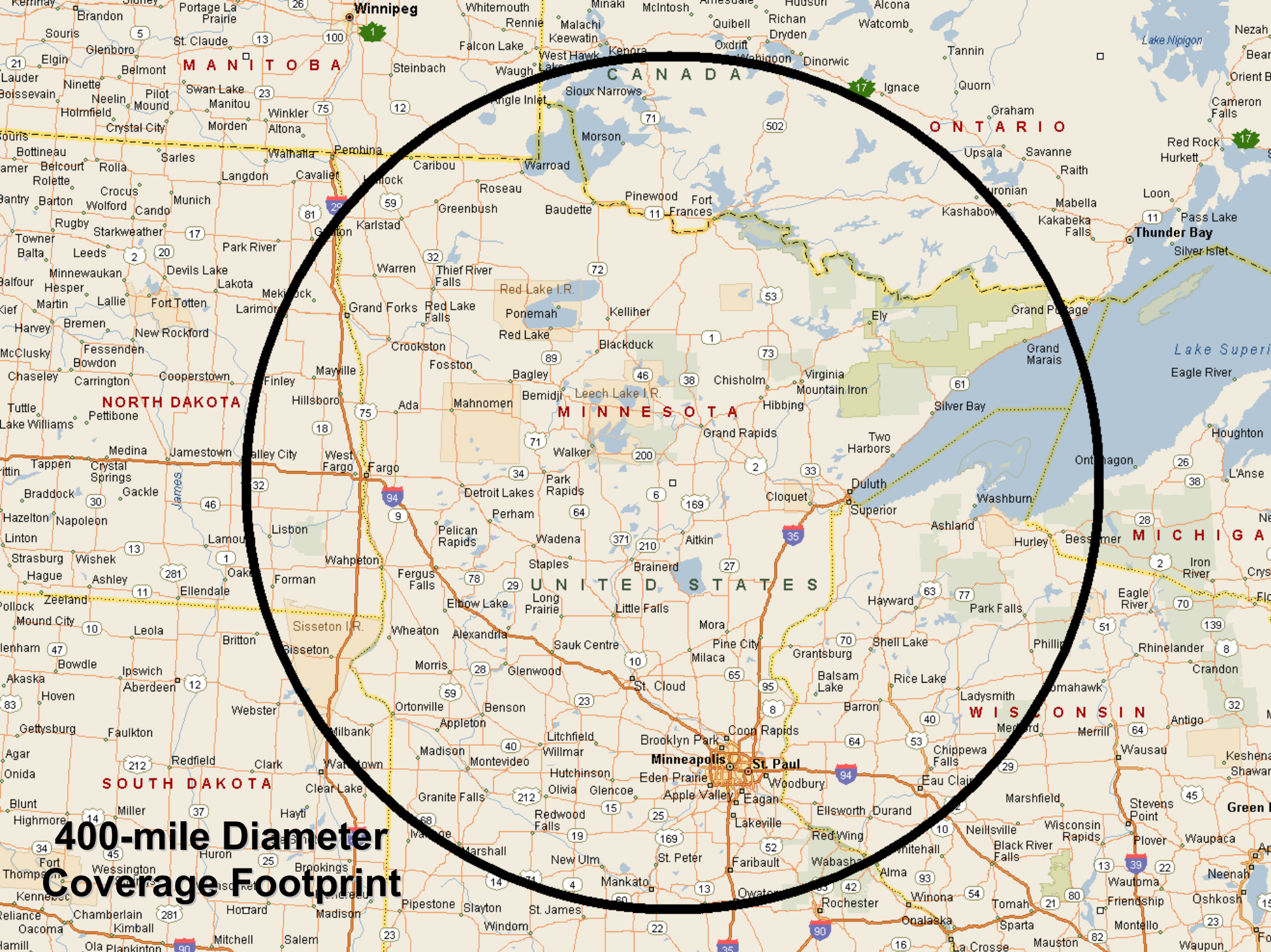
400-mile Diameter
Coverage Footprint
Winnipeg
MANITOBA
CANADA
ONTARIO
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
UNITED STATES
WISCONSIN
MICHIGA
Thunder Bay
Minneapolis
St. Paul
Fargo
Duluth
Grand Forks
Red Lake I.R.
Leech Lake I.R.
Sisseton I.R.
Lake Superi
Lake Nipigon

Coastal Protection

- Extend off-shore / international waters comms
- Expanded comms for specific emergency events
- Comms over greater lengths of waterways when needed
- Broader USCG involvement in disaster recovery

Coverage for Puget Sound & Straits of Juan de Fuca

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Wildland Fires Proof-of-Concept Configuration

Dual Payload
SkySat Platform

Portable
Ground
Station

or

Relocatable
Ground
Station

Launch & Recovery Vehicle

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Transportation Security

- Asset tracking
- Rapid dissemination of information over broad areas
- Facilitate interoperability
- Coordinate protection activities sector-wide
- Support specific transportation security events
- Support broad secure comms architectures
- Improve security across all modes of transportation
- Support mobile command post
- Coordination across federal, state & local agencies

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Typical Near Space Platform Launch

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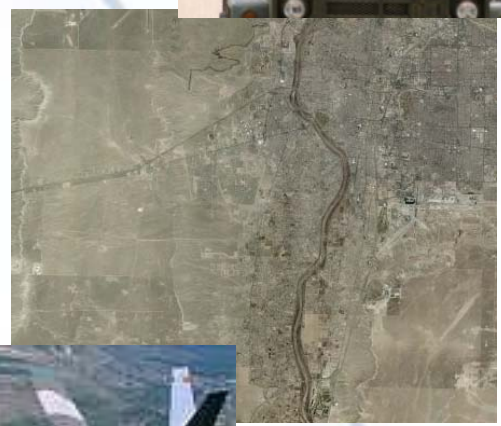
Near Space Platform Applications

- Emergency Response
- Border Patrol Comm. / ISR
- Wildland Fire Comm/Tracking
- Tactical Ground-to-Ground Comms.
  - Convoy Support
  - Special Operations
- Intelligence, Surveillance & Reconnaissance (ISR)
  - “Truck” to carry special payloads to altitude
  - Visual / IR Imagery
- Tactical Air-to-Ground
  - Supports low-flying aircraft
- High Bandwidth Data Relay
- Other satellite-like missions



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Interoperability

Bridging Repeater supports communication between security agencies

- Cross-banding
- Coordination
- Broad coverage
- Responsive

Public Safety

Military

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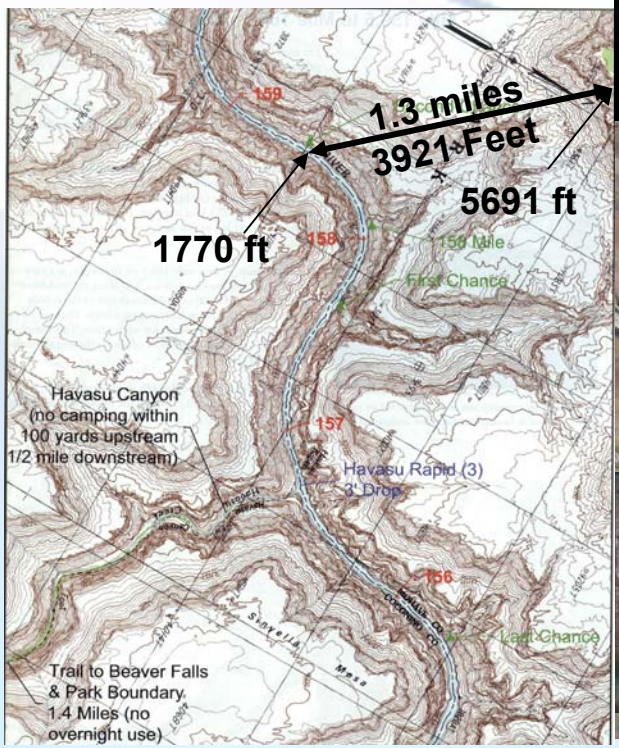
Good Coverage in Challenging Topography

- 220 Mile link from bottom of Grand Canyon on Aug 3, 2006
  - Used 900 MHz, 2-way handheld radio
  - Only “5 palms” of sky visible
- LEO Sat phone only worked 2 out of 15 min
- Walls too high for GEO Sat Comms.



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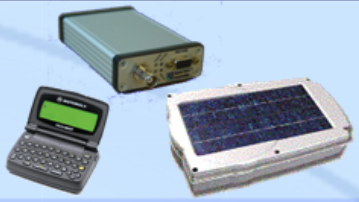
Applications & Devices

Data Markets	Applications	Devices	Key Benefits
Oil and Gas	Production Automation Asset Tracking Field Comm.		• Replaces CDPD being decommissioned this year (75,000 wells losing coverage) • Monitor assets for greater efficiency & security • Low cost service to coordinate field operations
Industrial Automation	Irrigation Alarm Systems Meter Reading		• Control and monitor water usage • Secure assets inexpensively in remote areas • Read rural utility meters for energy usage
Fleet Tracking	Trailer Tracking Cargo Tracking		• Low power/small device easily integrates on trailer • Track individual pallets using GPS tags
Personal Messaging	In-field work force comm.		• Over 1.1 million compatible devices deployed • New, lower-cost PDAs entering market from Asia
Gov't Markets	**Applications**	**Devices**	**Key Benefits**
Emergency Response	Dispatch service		• Call up police / fire personnel in rural areas • Voice on standard Land Mobile Radios
Homeland Security & Defense	Tracking / Communication Intelligence		• Track material & soldiers in hostile areas • Encrypted voice communications for military • Monitor & triangulate on enemy communications

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Near-Space: High Resolution, Low Cost

QuickBird 60 cm natural color

$60,000,000 vehicle
$15,000,000 launch

SkySite® natural color demo

$600 for vehicle construction*
$50 launch*

* Not strictly an apples-to-apples comparison

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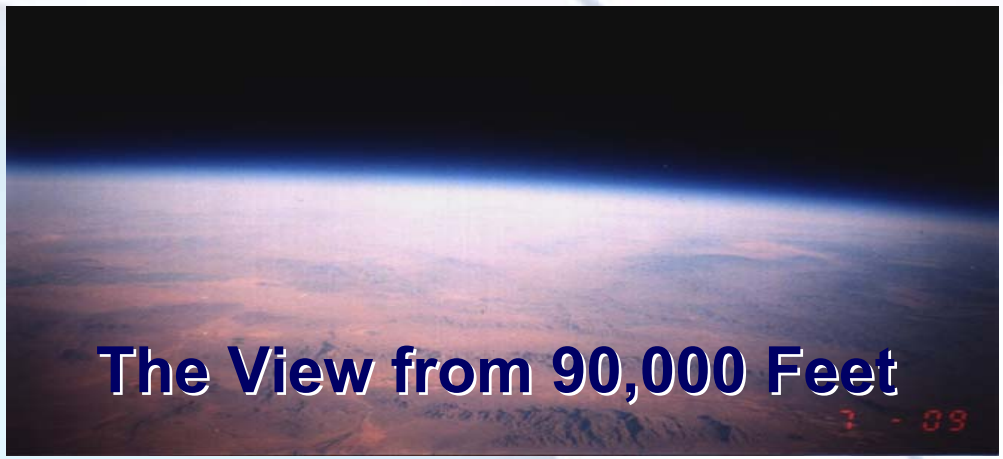
Conclusion/Recommendations

- Responsive platform exists now to provide broad wireless coverage safely above affected areas
  - No reliance on infrastructure
  - Store until required… launch as needed
- Homeland Security suited payload version available for demo now
  - System can be tailored to specific user needs
- Incorporate into disaster response plans now
  - Experience shows “real time integration” nearly impossible



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