VIA ELECTRONIC FILING

February 4, 2014

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Notice of Ex Parte Presentation

Oceus Networks and Space Data Corporation
PS Docket No. 11-15

Dear Ms. Dortch:

On January 31, 2014, Jerry Knoblach, Chairman and CEO and Jerry Quenneville, VP, Business Development of Space Data Corporation, and Douglas Sharp, Director of Engineering, and Jay Chauhan, Oceus Networks, Inc. met with David Simpson, Bureau Chief; Kenneth Moran, Senior Deputy Chief; Thomas Beers, Chief, Policy Division; Eric Panketh, Chief, Operations and Emergency Management Division; Clete Johnson, Chief Counsel for Cybersecurity; Rasoul Safavian, Chief Technologist; and Behzad Ghaffari, Chief, Systems Engineering, of the FCC Public Safety and Homeland Security Bureau ("PSHSB").

Space Data Corporation and Oceus Networks ("DACA Testing Partners") briefed the PSHSB attendees on the results of a July 2013 test of a high altitude balloon platform outfitted with a 4G LTE payload to assess the viability of using a deployable aerial communications architecture (DACA) for communications restorations within the first 72 hours of a disaster. DACA Testing Partners highlighted the key results of the test and recommended further actions

that the Commission could take to enable the use of DACA by FirstNet and other public safety users in the event of a disaster.

The materials presented during the meeting are attached as Appendix A. In addition, a full DACA test report prepared by the DACA Testing Partners is filed as a separate attachment.

Please contact me with any questions.

Respectfully submitted,

/s/ Jay Chauhan_____
Jay Chauhan

Regulatory Counsel for Oceus Networks

cc: David Simpson
Kenneth Moran
Thomas Beers
Eric Panketh
Clete Johnson
Rasoul Safavian
Behzad Ghaffari

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Deployable Aerial Communications Architecture (DACA)

4G LTE BROADBAND

Test Flight, Results, and Recommendations

Presented to FCC PSHSB Staff
January 31, 2014

Experiment Overview

- **Date**: July 2, 2013
- **Location**: Near government facilities in Boulder, Colorado to facilitate coordination with the National Telecommunications and Information Administration (NTIA), National Institute of Standards and Technology (NIST), and the Public Safety Communications Research (PSCR) program
- **Duration**: 4 Hours
- **Maximum Height:** Controlled Ascent to 70,000 Feet
- **Signal Coverage Area:** 100 mile radius
- **DACA Test Platform:** Space Data SkySite Balloon outfitted with modified Oceus Network Xiphos 4G LTE unit
- **Test Cases Evaluated:**
  - Initiate signal transmission from ground
  - Determine whether ground based user devices could communicate with DACA
  - Assess performance of platform as it rose into the stratosphere
  - Explore potential interference issues with non-synchronized terrestrial networks

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Rapidly Deployable Wide Area Coverage

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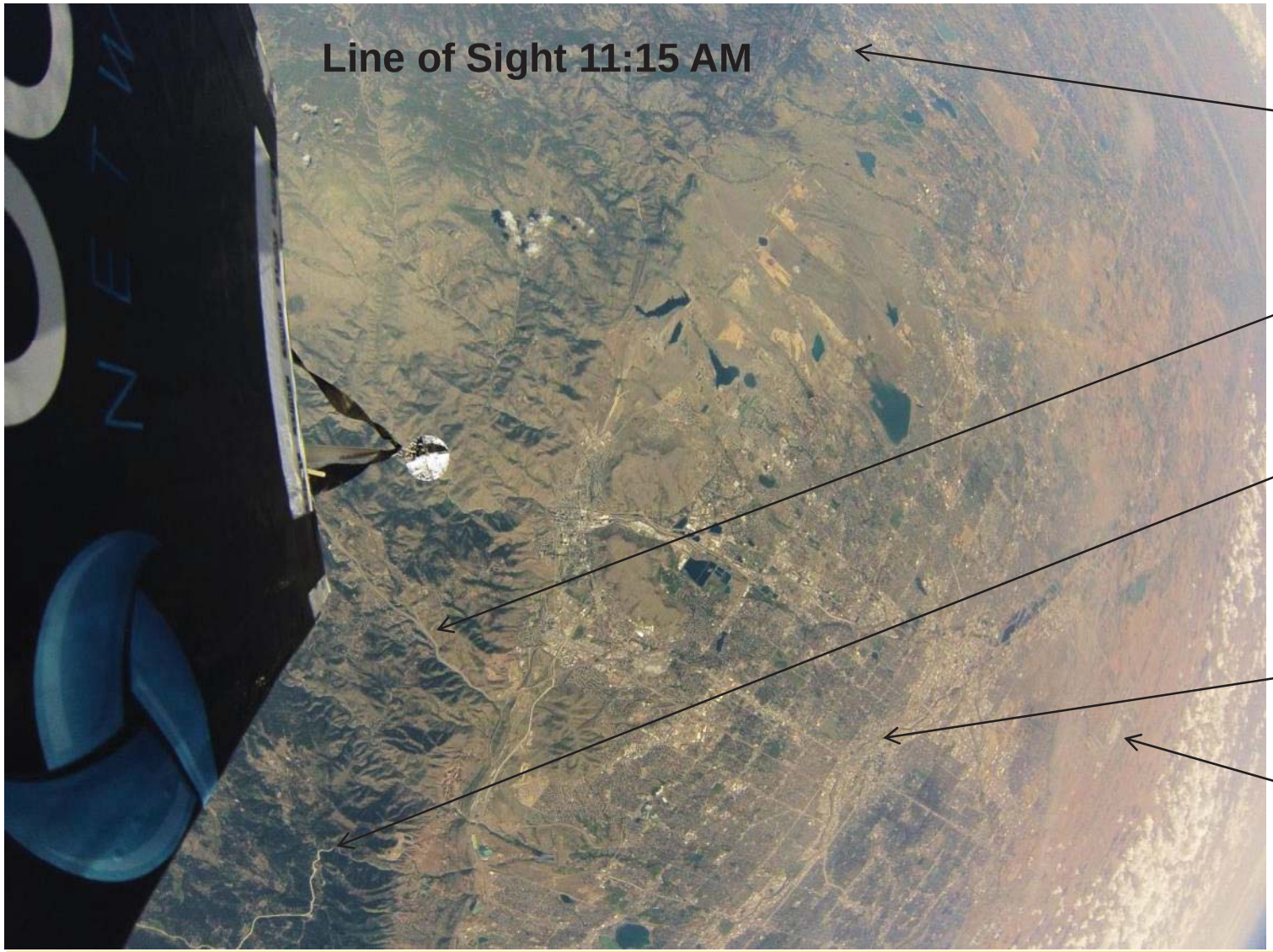
Rapidly Deployable Wide Area Coverage



NIST Boulder

I-70 toward Eisenhower Tunnel

Clear line of sight into mtn. valleys not a problem

Downtown Denver

Denver International Airport

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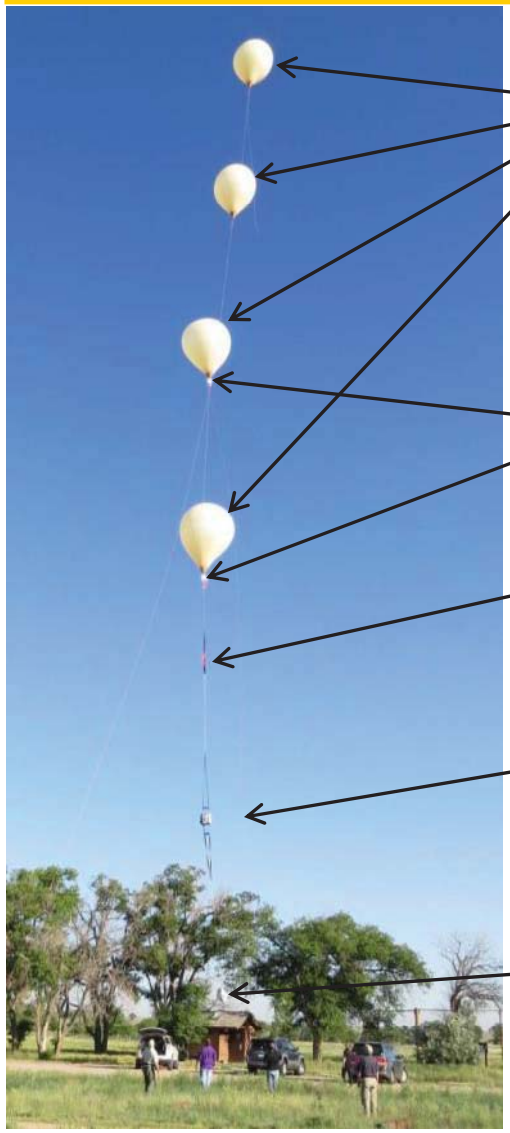
4G LTE Flight Train



2000g Latex Weather Balloons

Redundant 900 MHz SkySites
Control link, vent & ballast

Parachute

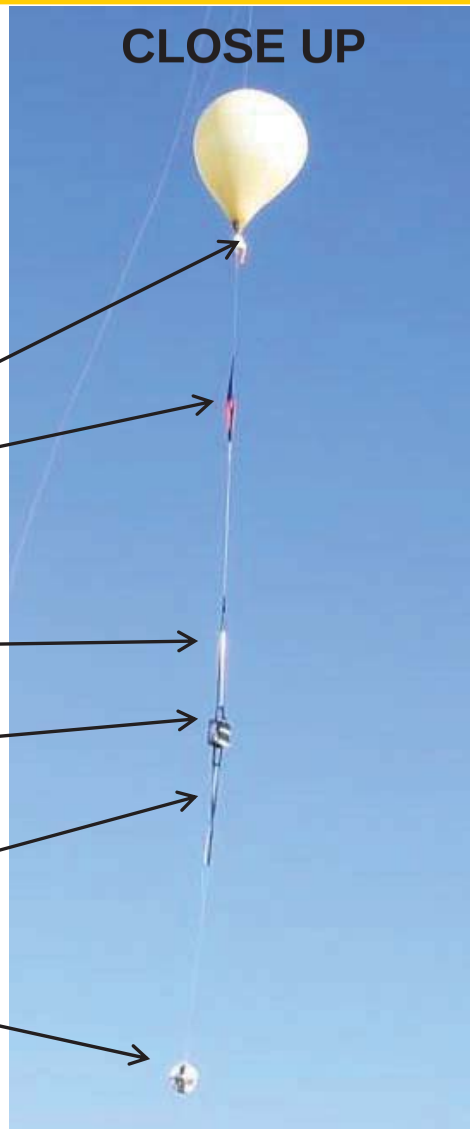
Downtilted RX Antenna

Xiphos Band 14 LTE Network in a Box
mass reduced with 6 hr. batt. = 49 lbs

Downtilted TX/RX Antenna

Radar Reflector with Transponder

CLOSE UP



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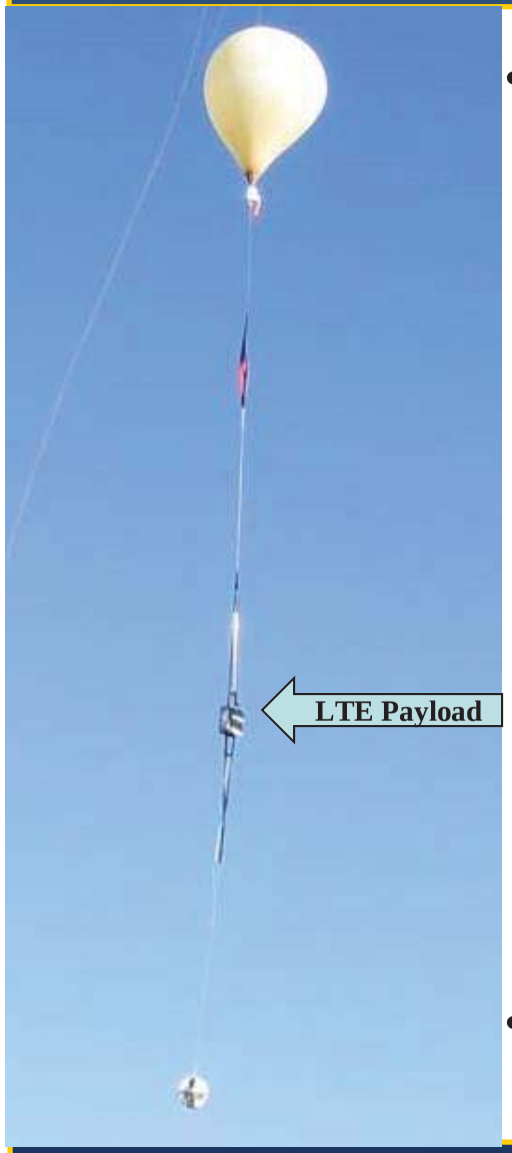
Xiphos 4G LTE Payload



- **Payload**: Modified Oceus Xiphos 4G LTE system reduced in size and weight for SkySite Platform installation
  - Digital Unit – Ericsson DUL10
  - Radio Unit - Ericsson RUS01
    - Type Approved by the FCC under Type ID: TA8AKRC11895-1 on 21 October 2011
    - Power – Capable of 60W Power; Test Run at 20W
  - Evolved Packet Core (EPC)
    - MME, PGW, SGW, HSS, OAM - Oceus Networks
    - Computing Hardware System - Oceus Networks
  - GPS Receiver – Ericsson
  - Antenna – Diversity, dual-omnidirectional – Space Data
  - Battery system – Space Data

- **Spectrum**: Operated in FirstNet Spectrum (Band 14) under STA and permission of FirstNet Board

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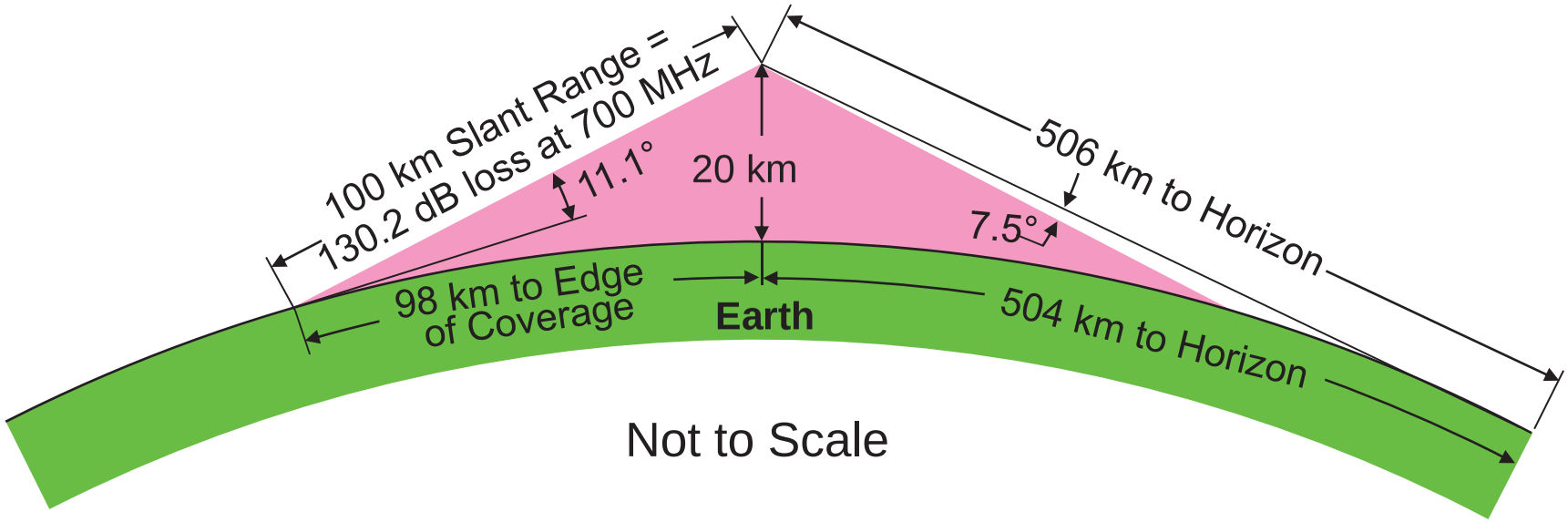
LTE SkySite Coverage Geometry
No Timing Offset

- Coverage Circle size limited by timing and link budget
  - Link budget compensated by UE ERP and gain of antenna, LNA, at SkySite
  - Protocol timing (max timing advance for LTE = 0.67 us or 100 km round trip)
- At 20 km altitude (65,617 ft) and max. slant range to user of 100 km
  - Delta from nearest to farthest user = 100 - 20 = 80 km
  - Free space path loss is –130.2 dB at 700 MHz
  - Min. user elevation angle is 11.1° equivalent to being 0.2 miles. from a 200-foot tower
- Motorola LEX 700 handset output is 23 dBm results in -95.3 dBm power at SkySite Receiver after SkySite 12 dBi gain, 120 deg antenna



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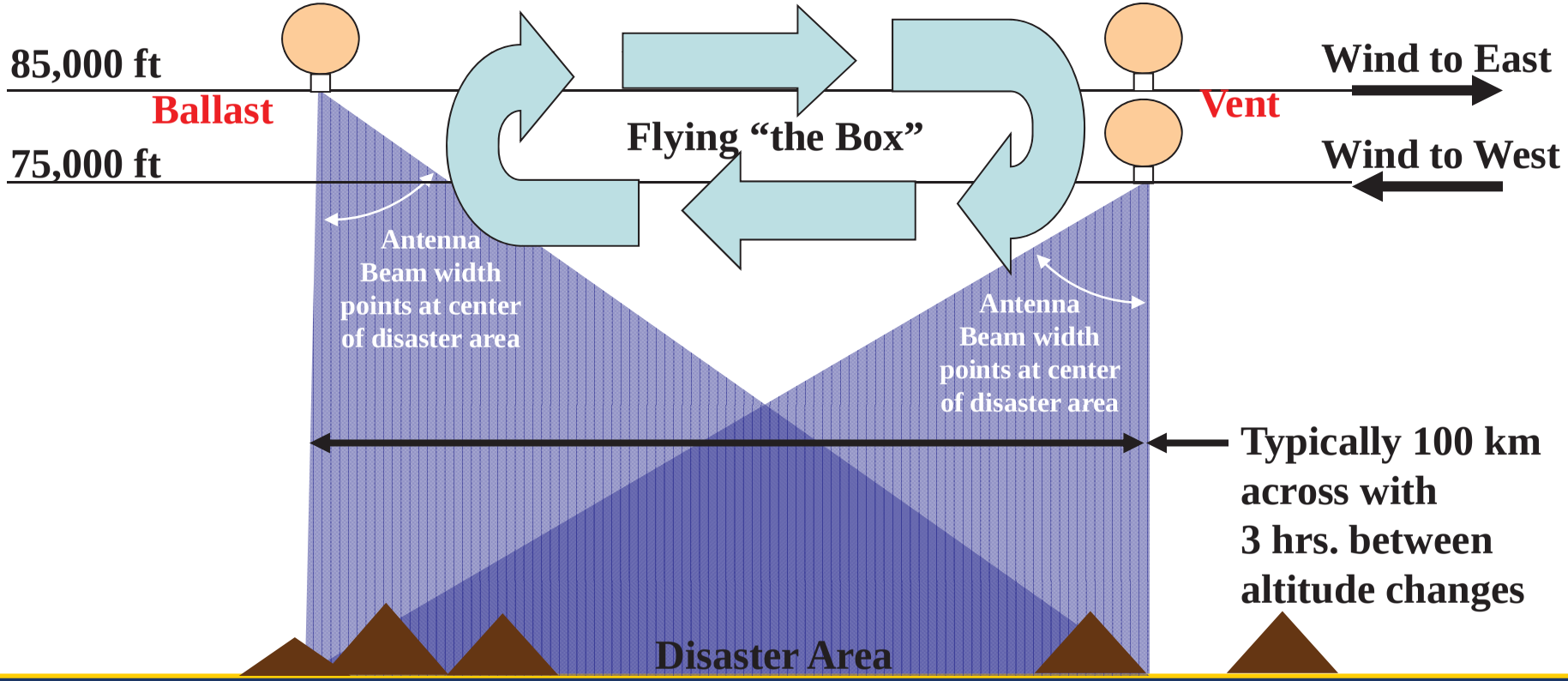
Wind Steering Keeps Balloon over Area
Spotlight Antenna limits Spectrum Use Area

Stratosphere: many strata of wind with various directions/speeds to select from

- Venting to descend or ballasting to ascend selects a desired wind layer
- Mid-winter/mid-summer winds all in one direction: need 2-4 launches/day then

Platform is stable enough to point directional antenna at center of disaster area

- Directional antenna beam can spotlight area to restrict spectrum area of use



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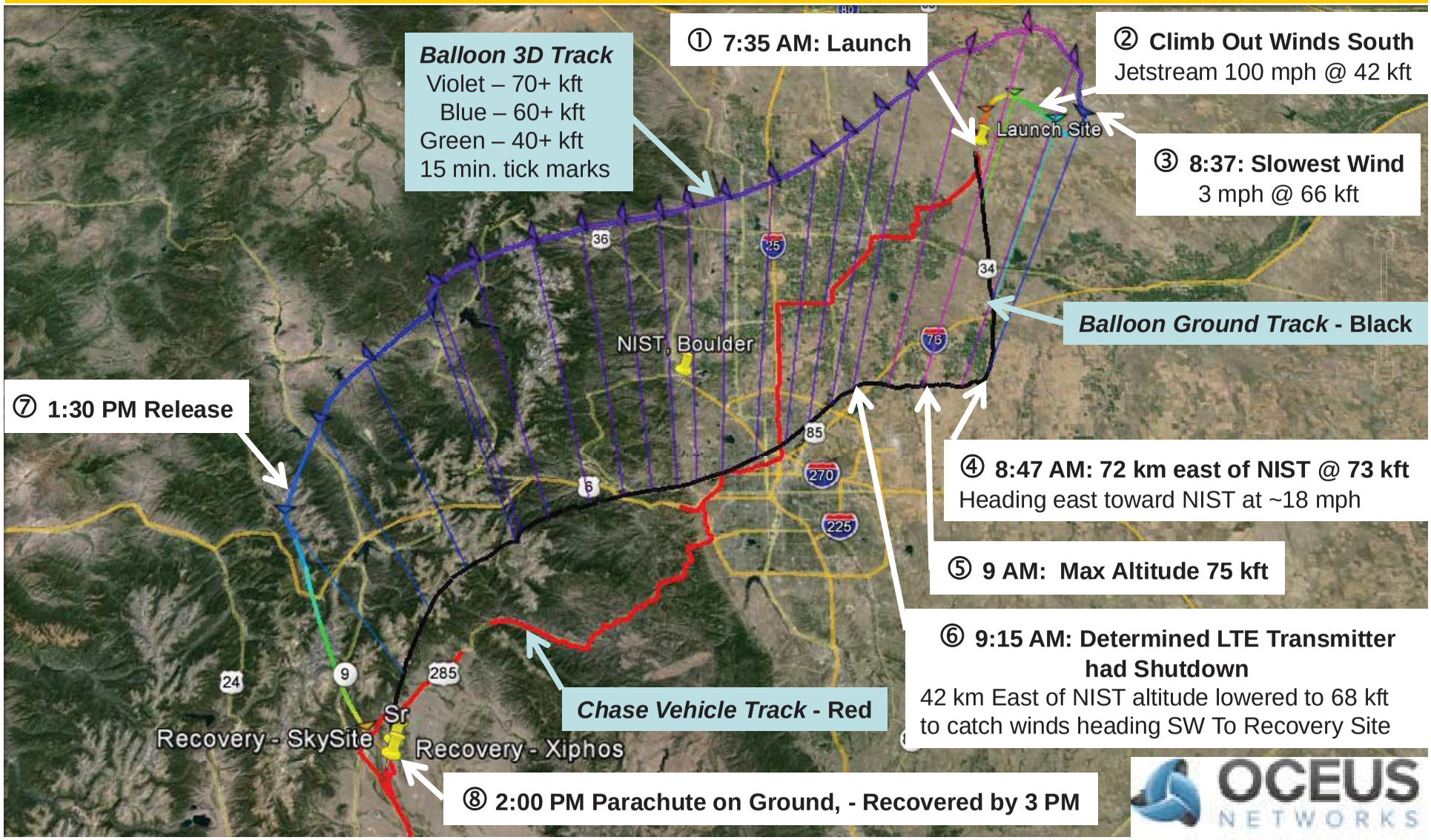
DACA 2JUL13 Flight: 3D SkySite Flight Path



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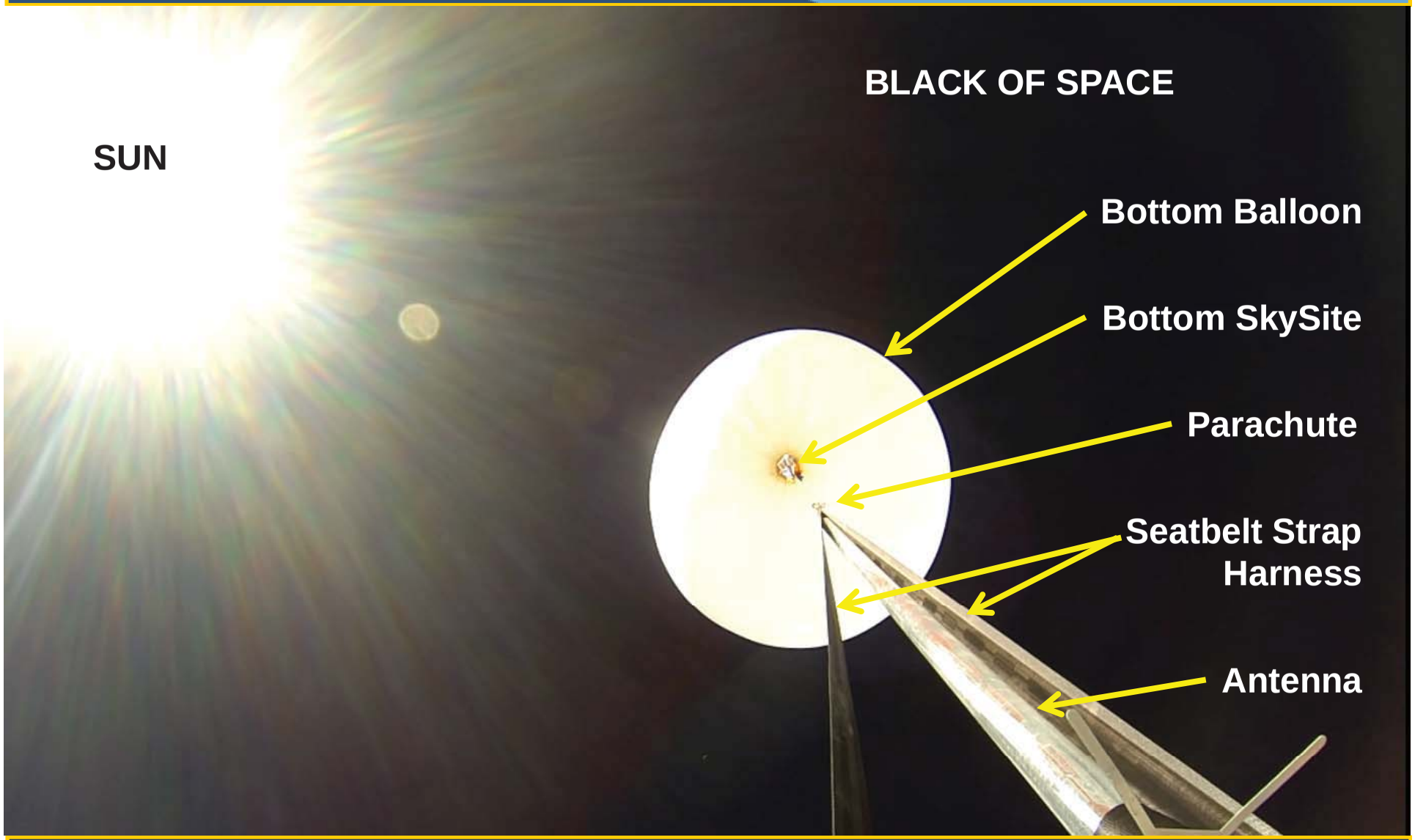
Up Video at Altitude Shows Very Stable Antenna



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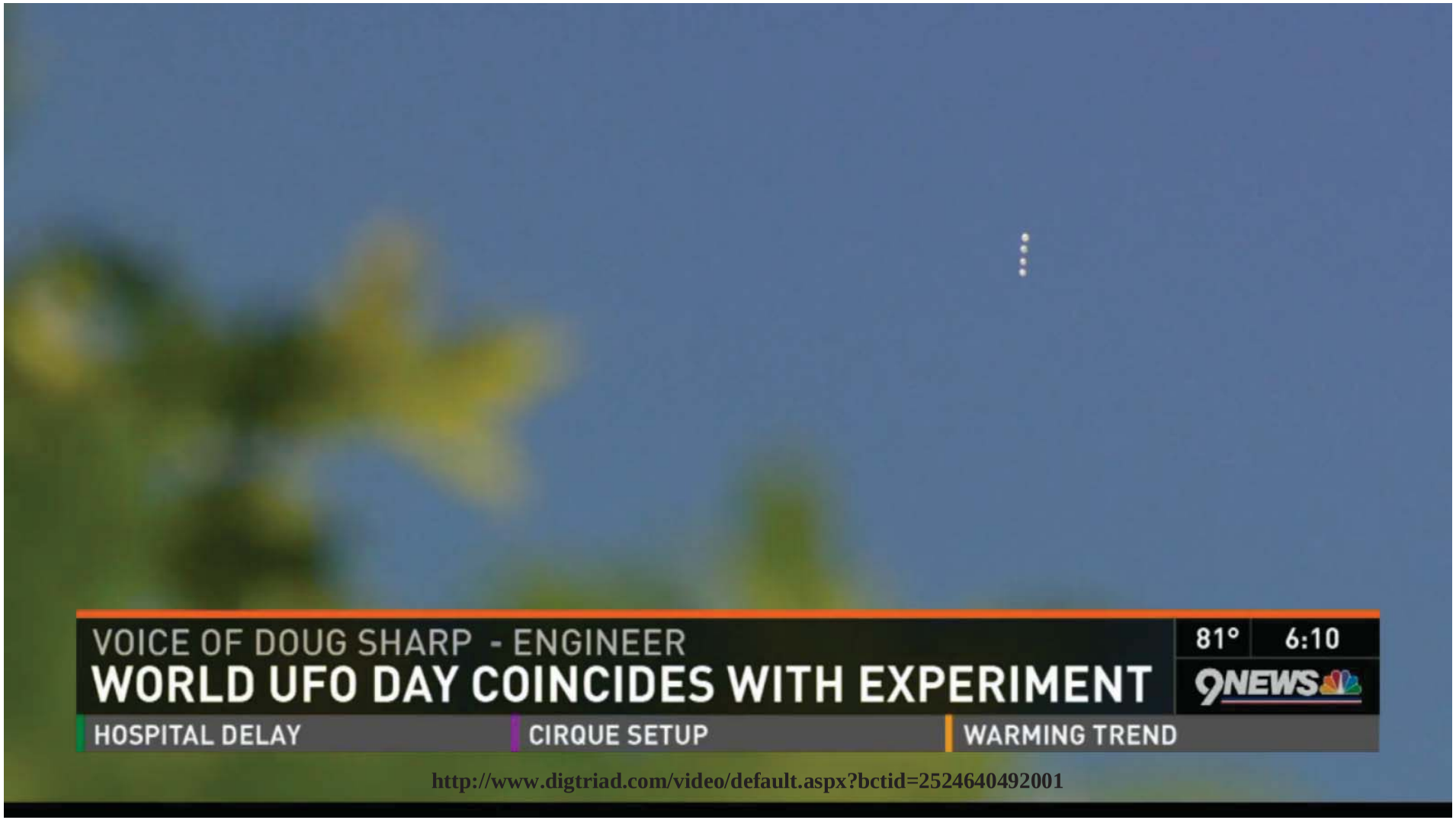
Made the KUSA Denver News



http://www.digtriad.com/video/default.aspx?bctid=2524640492001

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Key Findings

Key Findings

1. Long range or “boomer cell” operation with LTE is possible provided the “extended range” parameter is implemented and set within the eNodeB. Our initial experiment was successful with stations both at the center and edge of cell.

2. All equipment flown during DACA operation must be hardened to withstand the harsh environment of high altitude operation. Hardening should include, but might not be limited to, frequency reference oscillators, GPS and timing reference equipment, and heat generating components (like power amplifiers).

3. Some level of interference between non-synchronized systems was found. Further test data would be required to exactly quantify.

4. Existing FAA regulations allow controlled high altitude flights. Winds of 3 mph at 66,000 feet would have provided full 8 hours of battery life for mission with only 24 miles of drift even without venting/ballasting balloon to different altitudes.

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Next Steps

Next Steps:

FCC should further study the feasibility of certain DACA configurations, including, but not limited to:

1. Authorization of DACA platforms operating in public safety broadband spectrum (LTE 3GPP Band 14), under a governance model acceptable to FirstNet, which facilitates rapid restoral of communications without interference to existing ground based systems.

2. Deployment of DACA in Band 14 using the most appropriate delivery platform. (High Altitude, Airborne / Aircraft based, Tethered operation)

3. Options to synchronize and operate in conjunction with existing ground based Public Safety LTE systems.

4. Investigate LTE Small Cell developments as reductions in Size, Weight and Power of eNodeB equipment will allow longer battery life; especially since test showed less than 20 W of transmit power is needed to close links to User Equip.

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