

# Common *BalloonSat* Payload Program

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# Topics

- Background
- Program Vision
- Differences with HASP
- Next Steps

# Background

- NMSU participated in the test flight of a NASA 34 Mft<sup>3</sup> balloon on May 31/June 1, 2008.
- Total flight was over 24 hours and maximum altitude was 120,000 feet
- NMSU flew the basic science experiment and many of the subsystems for the *NMSUSat* that was developed under the University Nanosatellite Program.
- Also tested groundstation operations from Fort Sumner, NM, Holbrook, AZ, and the NMSU campus over the Internet.

# Background

- How was this arranged?
  - NMSU is the M&O contractor for the CSBF, so we used connections to make the link-up
- What were the restrictions?
  - Be ready to fly without major impacts to NASA's mission
  - Could not dictate flight date, moon conditions (critical for us), flight altitude, or flight duration (NASA's 24-hour minimum flight objective at 120,000 feet was fine for us so this was not a problem)
  - Must be ready for all pre-flight tests on demand

# Background

- What infrastructure was required?
  - We requested our own C&T link so they were not allowed to interfere with NASA's operational support; we used VHF amateur frequencies and a low-power transmitter
  - We requested space for payload prep and groundstation staging both at Fort Sumner and Holbrook. This was not a major issue for CSBF.
  - We requested batteries for the payload which is a normal part of CSBF accommodations for experiments
  - We requested CSBF power-on/power-off commanding which is normal experimenter support

## Background

34 Mft<sup>3</sup> balloon  
inflated for launch



## Background

Payload and carrier on the flight line



## Background

NMSU *BalloonSat*  
payload on the  
carrier.





## Background

Region southeast  
of Albuquerque,  
NM taken at 20:55  
UTC on 5/31/08 at  
36 km altitude  
from east of  
Albuquerque, NM



# Program Vision

- Ultimate goal is to give more students mission opportunities in a **predictable** manner
- Can we fly 4 to 6 similar university missions on a common carrier?
- Each payload would be < 50 kg in mass
- Provide common mechanical, electrical, and communications interfaces
  - Batteries and/or user-supplied solar panels
  - IP-based packet communications on the carrier and from the groundstation to the university POC

# Program Vision

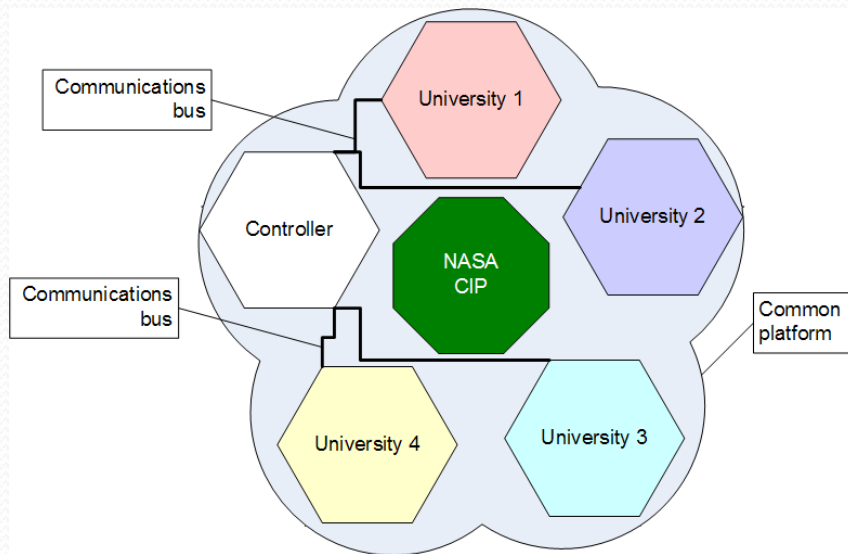
- Each team would fly standalone missions
- Who might be interested in these flights?
  - Nanosat teams wishing to try out satellite electronics and groundstations in near-space conditions
  - Universities wishing to prove they can be competitive with a cubesat/nanosat program
  - Universities wishing to have a near-space experience without the uncertainties of launch dates, ITAR problems, or just the hassles of a satellite launch program.

# Program Vision

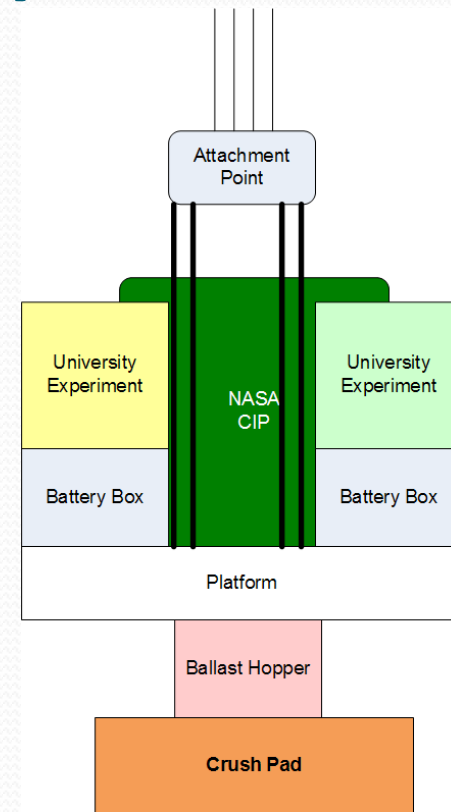
- Teams selected through competition for slots on annual or biannual basis (TBD)
- There would need to develop the common infrastructure
  - Hopefully NASA and/or Air Force would fund this
- Negotiate with NASA for the balloons and the CSBF support crew
- There would need to be funding for infrastructure support crew to maintain the hardware and interface with the CSBF crew. User fees?

# Program Vision

## Schematic top view of carrier and payloads



## Schematic side view of carrier and payloads



# Differences with HASP

- The LA Space Grant runs the HASP program for small experiments and a few 20-kg class payloads.
- So what is the difference?
  - No sensor experiments here, only full payloads
  - Each payload will need to have full normal operations support from their POC; flight support will do nothing other than power up/power down commands
  - POC may be located at home school and communicate with NASA facilities over Internet

# Next Steps

- Determine if there is a need for this type of program and, if so, who wants to join in.
- If we go forward, we will need to find sponsors to at least build and maintain the infrastructure.
- Develop necessary interface control documents
- Determine if there is a user fee or try to find sponsorship to underwrite launch costs
- Determine methodology for payload selection and reporting results