



## Innovating emergency response through FL-600 Higher Airspace

- United Nations Sustainable Development Goals (SDGs)
- The 39<sup>th</sup> Session of the ICAO Assembly
- The Second Global Air Navigation Industry Symposium (Montreal, December 2017)
- AN-Conf/13 Operations in Higher Airspace (Montreal, October 2018)



## Operations above 60.000 ft

- Commercial Operations above FL600
- States Aviation Administration description of National Airspace
- Satellite-Based-Navigation

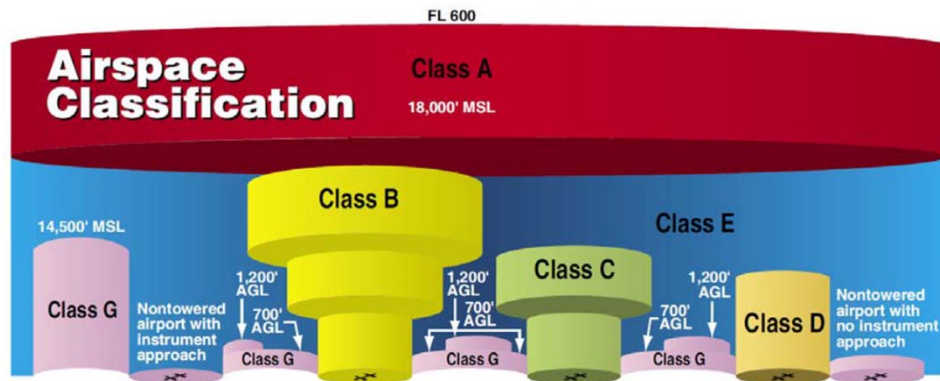


# Why is FL600 significant?

- Limitations:
  - Technological
  - Physiological
  - Physical and
  - Administrative



# Airspace Classification





## High Altitude Pseudo Satellite



**Satellites**  
Long endurance  
Global coverage  
High capital cost

Zephyr is a lightweight, solar-electric powered, very long endurance remotely piloted air vehicle

HAPS are complementary to both satellites and fuel-powered aircraft providing affordable, persistent, local and flexible satellite-like services

HAPS are:

- Enduring like a satellite – many weeks (months)
- Focused yet flexible like an aircraft – re-deployable
- Cost effective



**“Classic” UAV**  
Short endurance  
Local footprint  
High operational cost

Zephyr persists in the stratosphere above weather and above conventional air traffic for many weeks



## High Altitude Platform Station Lighter than Air

Innovative HAPS LTA\*

A Unique solution for regional permanence



**SATELLITE**  
Long endurance **but revisal time in hours**  
Global coverage  
very low vulnerability  
High CAPEX

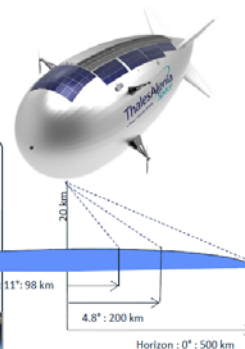


**UAV**  
Short endurance  
Capacity of projection  
High performance Payloads HALE  
High OPEX

**STRATOBUS™**

- Long endurance
- Multi mission (Telecom, Observation, Environment, Navigation)
- High performance Payloads
- Upgradable
- Low OPEX

View from 66,000 ft above Page, Arizona from HiSentinel80 airship





## The Stratollite

### Satellite:

Long Duration + Global Access + High Initial Cost, Low Operating Costs + Expensive Persistence

### High Altitude Aircraft:

Short Duration Persistence + Local Access, Lower Altitude + Payload Recoverable + Reusable and modifiable + High fuel & Maintenance Costs

### Stratollites

- Long Duration Persistence
- Global Access
- Low Operating Costs
- Swift Payload Recovery, Reuse and Modification



## Loon



1500+ Balloon Flights and counting  
 27+ Million KM flown since 2013 project launch  
 700.000 Flight Hours successfully flown  
 => Balloon duration record +198 days



## Loon



**Nabil Naoumi - ICAO**  
*Air Navigation Commissioner*

**THANK YOU!**