



GISOpen, 2017. április 12., Székesfehérvár

# Internet a világűrből

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Space Generation Advisory Council

Magyar Asztronautikai Társaság

Soproni Egyetem



**Magyar  
Asztronautikai  
Társaság**



**SPACE GENERATION  
ADVISORY COUNCIL**

CAN'T STOP ELON MUSK —

# SpaceX plans worldwide satellite Internet with low latency, gigabit speed

SpaceX designing low-Earth orbit satellites to dramatically reduce latency.

JON BRODKIN - 11/17/2016, 10:08 PM

TECH & SCIENCE

## SATELLITE STARTUP RAISES \$1.2BN FOR SPACE INTERNET

BY ANTHONY CUTHBERTSON ON 12/20/16 AT 8:22 AM

REPORT SCIENCE SPACE

# SpaceX is pushing hard to bring the internet to space

by Russell Brandom | @russellbrandom | Mar 17, 2017, 9:14am EDT

Special Report

# Sky-fi dawn of the space Internet era



In the near future billions of people across the globe could benefit from broadband internet access in remote areas provided by balloons, drones and satellites. After investigating the possibilities, risks and opportunities of these technologies members of the Space Generation Advisory Council (SGAC), a group of students and young professionals in the space sector, have made four recommendations to help spread the 'sky-fi' concept.



**László Bacszárdi**  
Head of Institute of Informatics and Economics, University of Sopron, Hungary

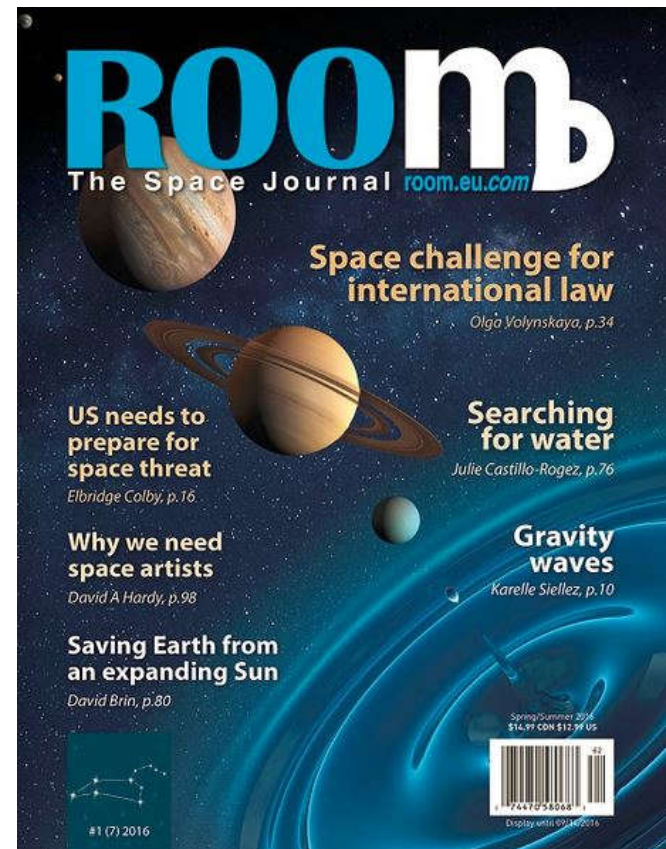
The internet plays an essential role in everyday life - from communication, broadcasting and navigation to real-time information about any topic and, of course, virtually all business and government operations now depend on it. In the developed world, people can hardly imagine a daily routine without the Internet but, despite the benefits it delivers to 21st century life, only 39% of the world's population has internet access - meaning some four billion people continue to live their lives without it.

Internet access could greatly improve the lives of these four billion people, so many companies are now seeking to provide internet services to the developing world.

broadcasting router, gateway or antenna, which is eventually connected to the global network via fibre optic cables.

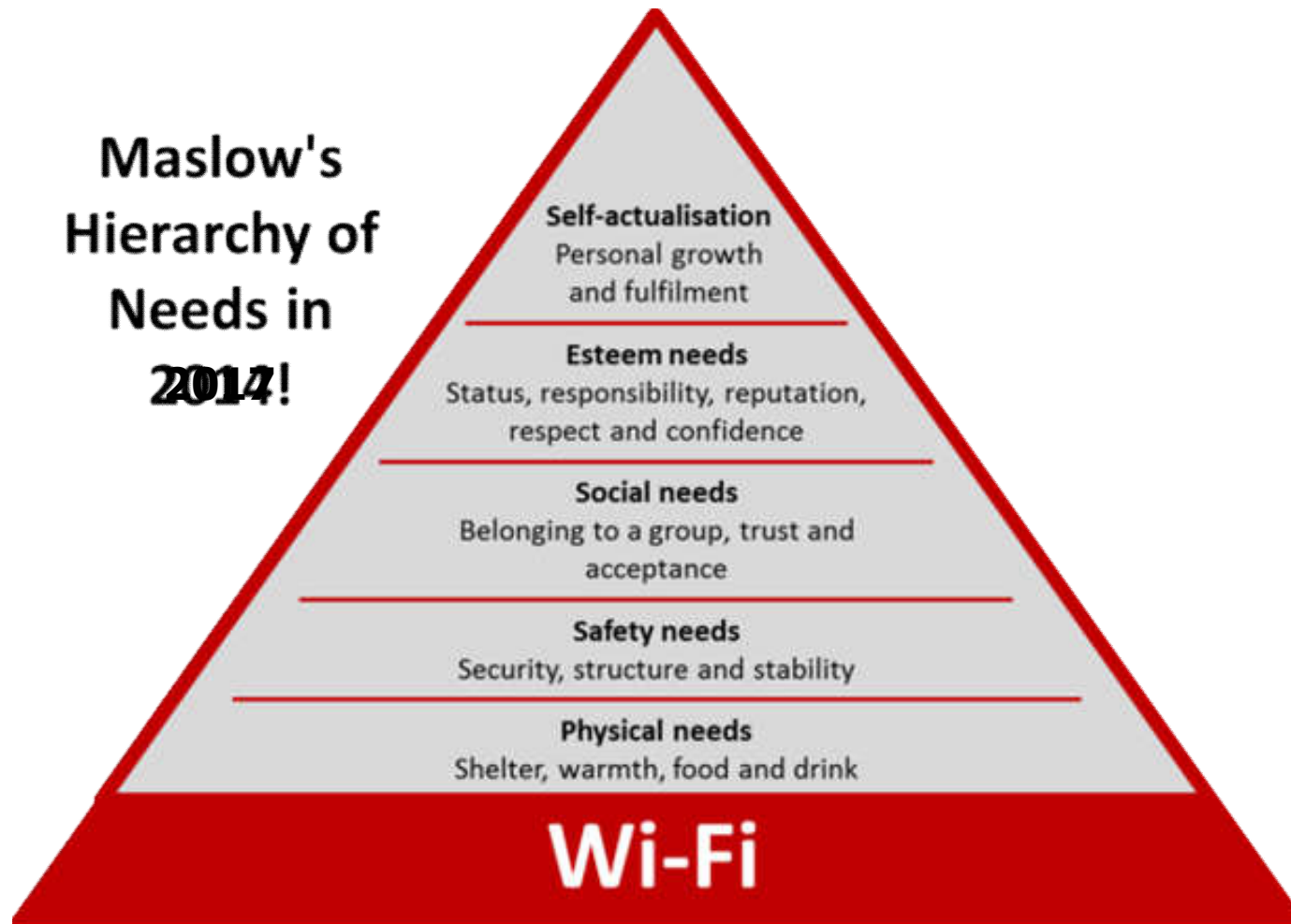
However, such architecture is not feasible in many developing countries, where the requirement of building new infrastructure is a significant barrier to internet access. Often this is compounded by the sheer expense of connecting populations distributed over large areas where the adjacent infrastructure - such as electricity - might also be absent or of insufficient reliability.

The idea of providing global internet coverage to disconnected populations has been widely discussed by both academia and commercial companies. In 2013, a student team at the International Space University (ISU) suggested providing sustainable and affordable internet

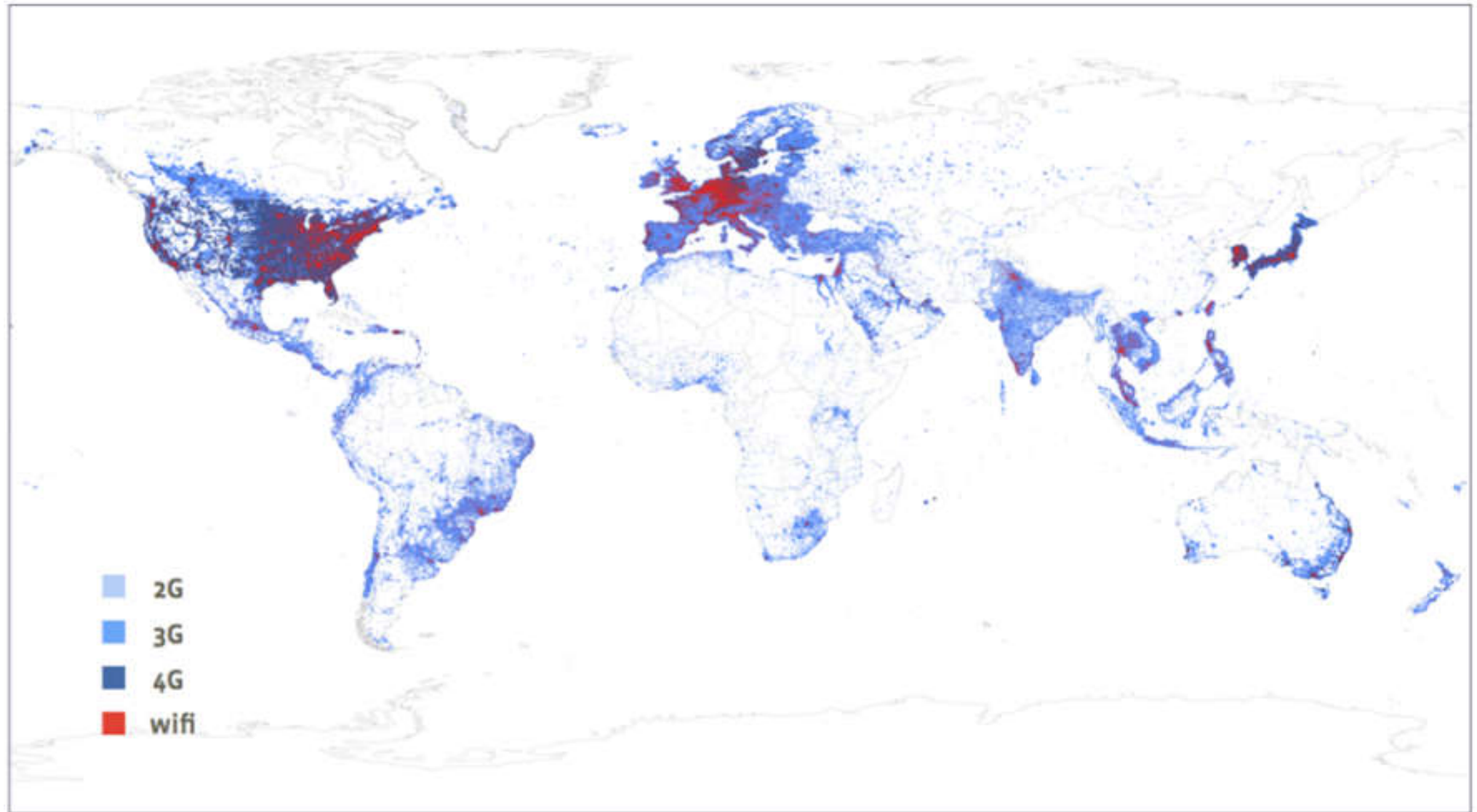


# De miért is?

## Maslow's Hierarchy of Needs in **2014!**



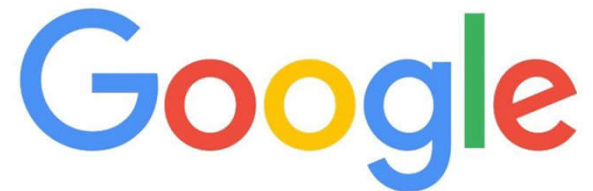
# De miért is?



# De miért is?

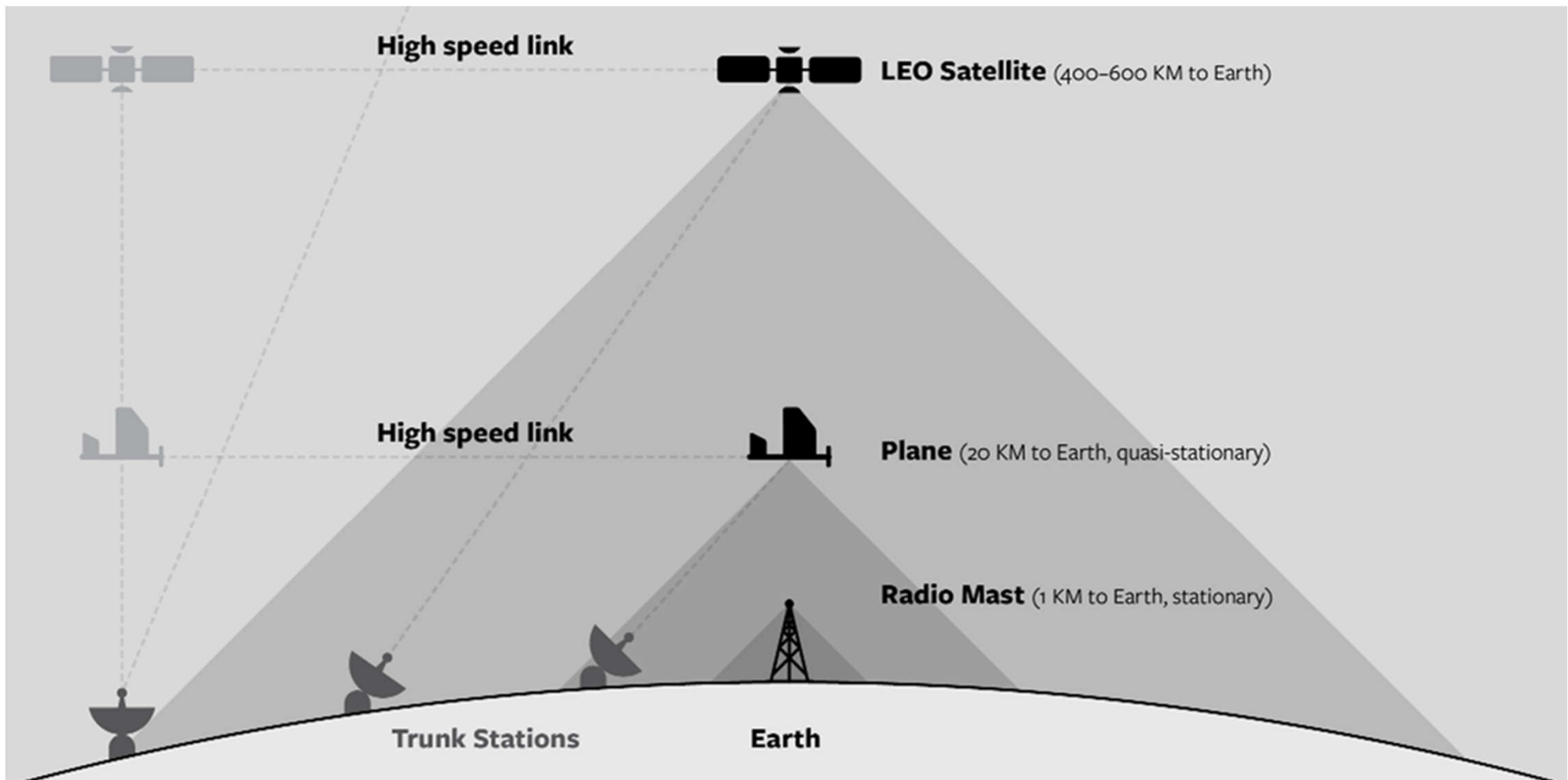


# Szereplők

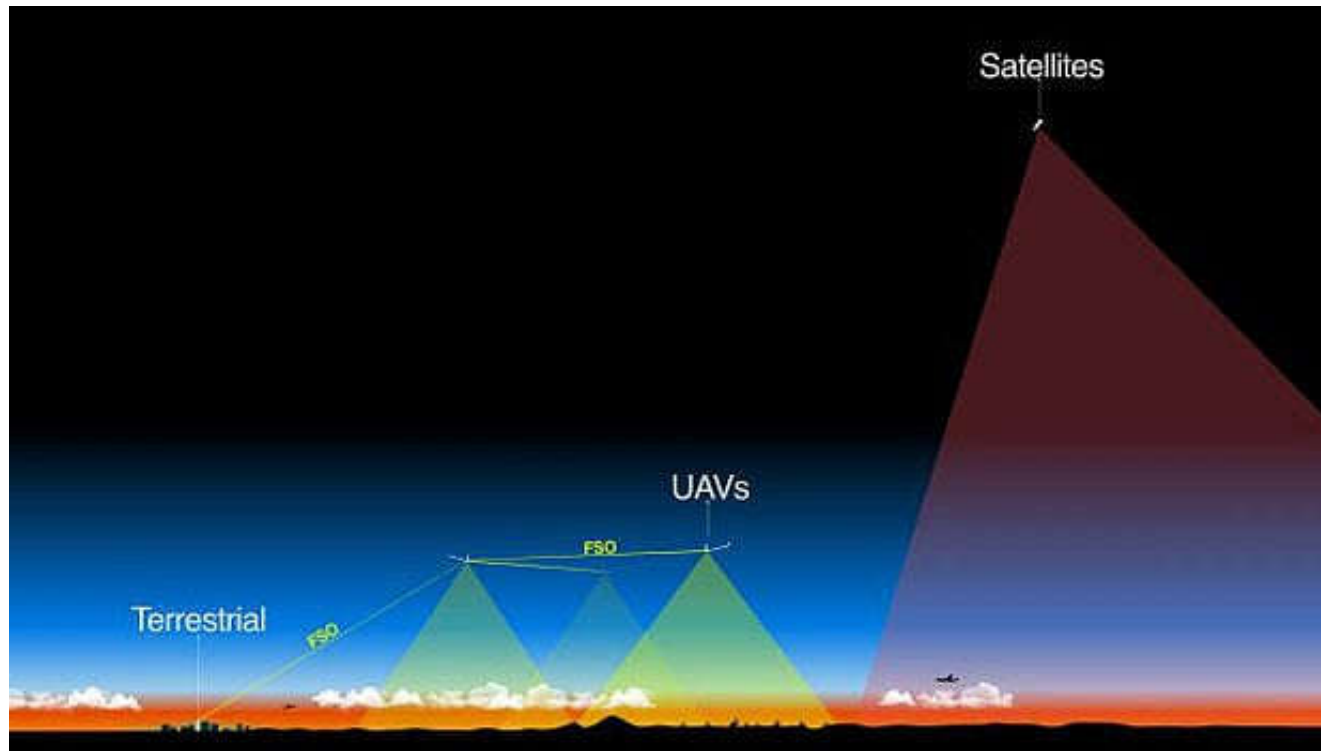
The Google logo, consisting of the word "Google" in its signature multi-colored font (blue, red, yellow, blue, green, red).The Facebook logo, featuring the word "facebook" in white lowercase letters on a dark blue rectangular background.The neWeb logo, featuring a stylized globe icon to the left of the word "neWeb" in a bold, green, sans-serif font. Below "neWeb" is the tagline "Access for Everyone" in a smaller, black, sans-serif font.The SpaceX logo, featuring the word "SPACEX" in a bold, blue, sans-serif font. The letter "X" is stylized with a grey swoosh that extends to the right.



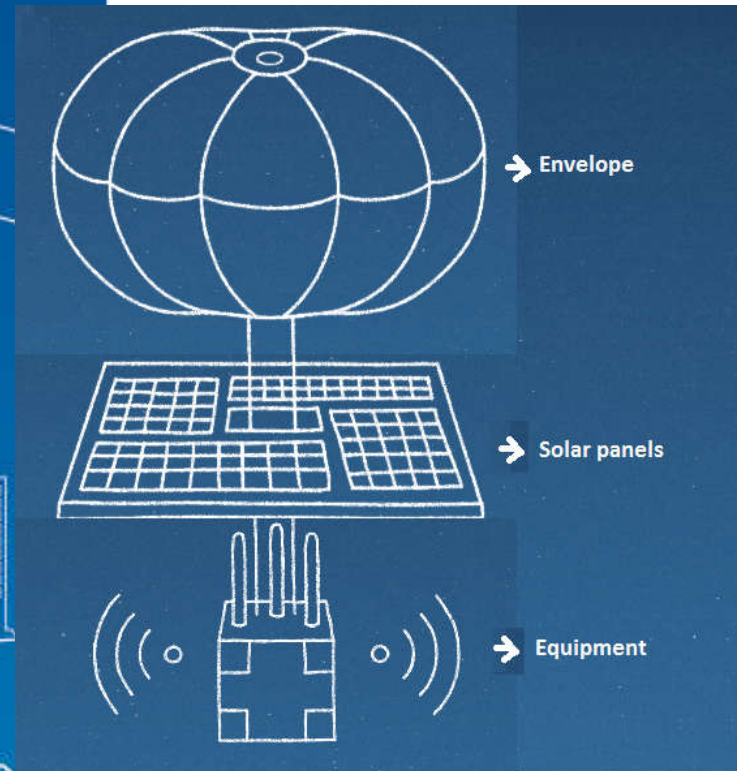
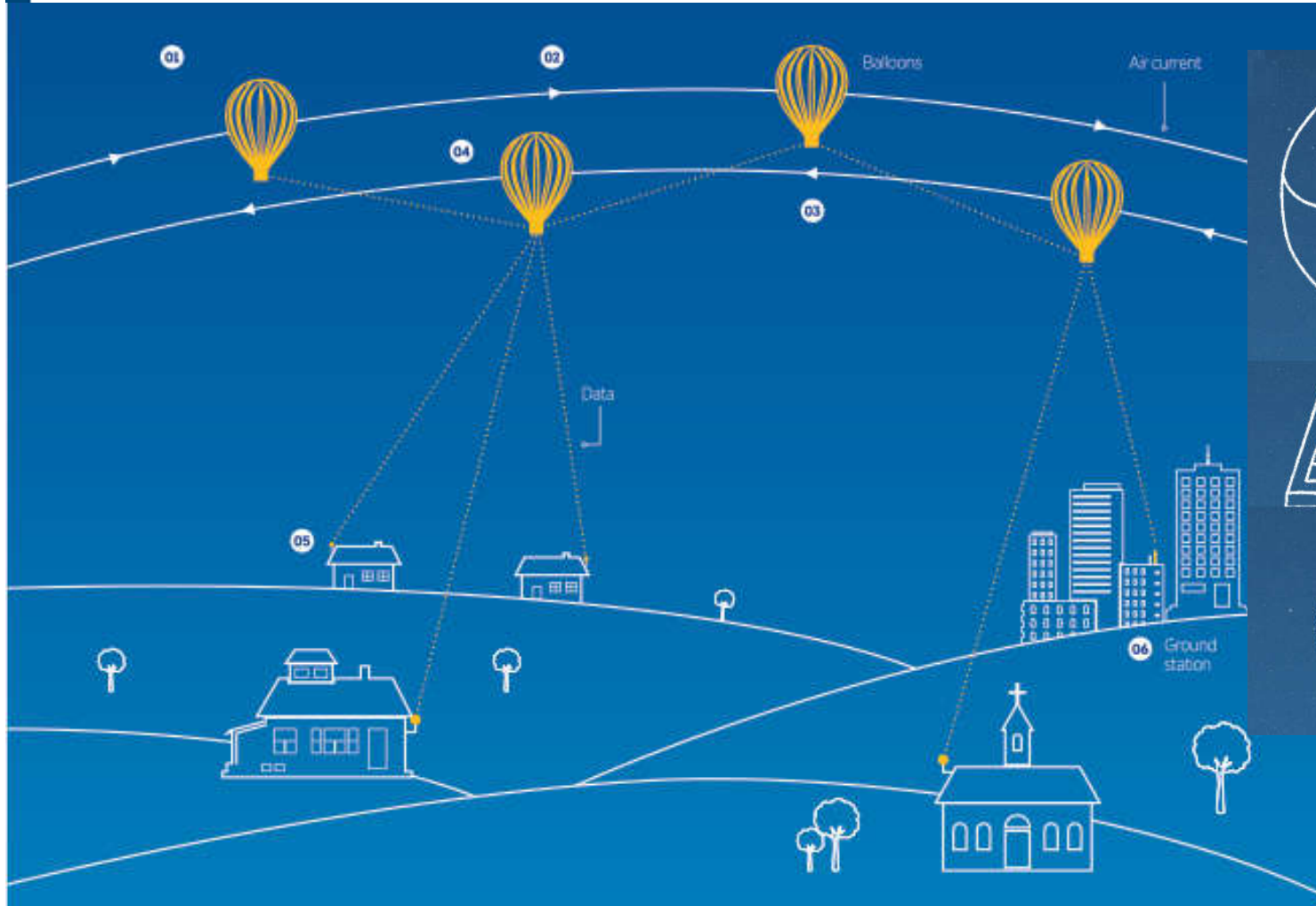
# Lefedettségi nézőpontból (1)



# Lefedettségi nézőpontból (2)



# Google



# Google



# Google



# Facebook



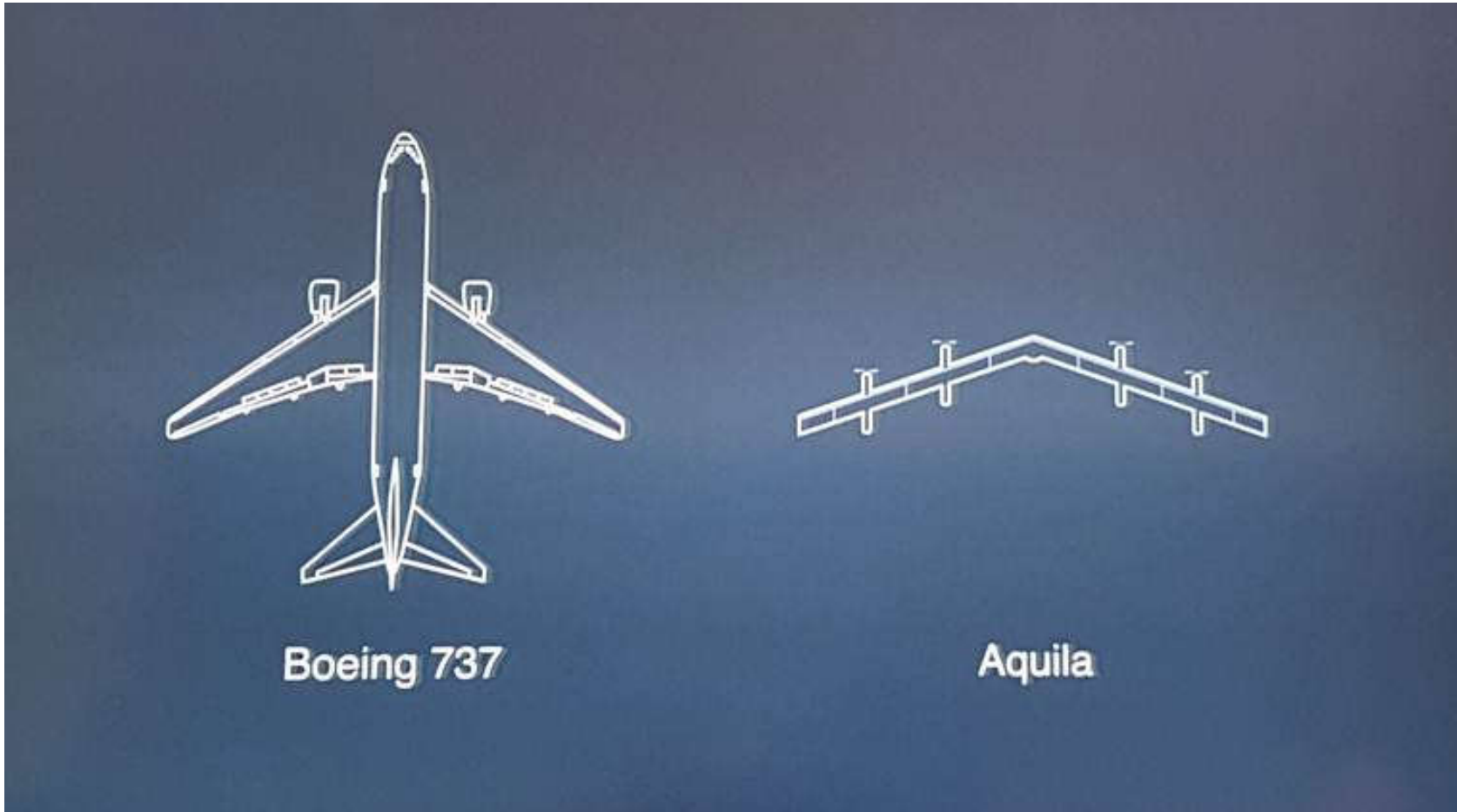
*Kép: C. Metz, Facebook is about to test its enormous solar-powered drone, Wired, Jul 2015*

# Facebook



*Kép: H. Kelly, Facebook's giant internet drone nails test flight, CNN, July 21 2016*

# Facebook





# Facebook

## AQUILA

To help bring internet connectivity to more people, Facebook is designing solar-powered airplanes that will beam internet signal to people in remote, underserved regions within a 60-mile diameter. Each aircraft is designed to be in the air for up to 90 days at a time.

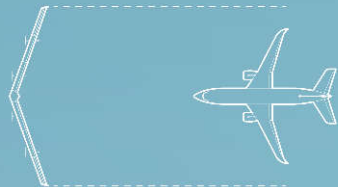
### FLIGHT ALTITUDE

Aquila is designed to fly at altitudes between 60,000 and 90,000 feet.



### WINGSPAN

Aquila has a wingspan bigger than a Boeing 737 airplane.



### WEIGHT

Aquila weighs a third as much as an electric car. About half the mass of the airplane is devoted to batteries.



### POWER USAGE

At 60,000 feet, Aquila can fly using just 5,000 W of power — about as much as three hair dryers.



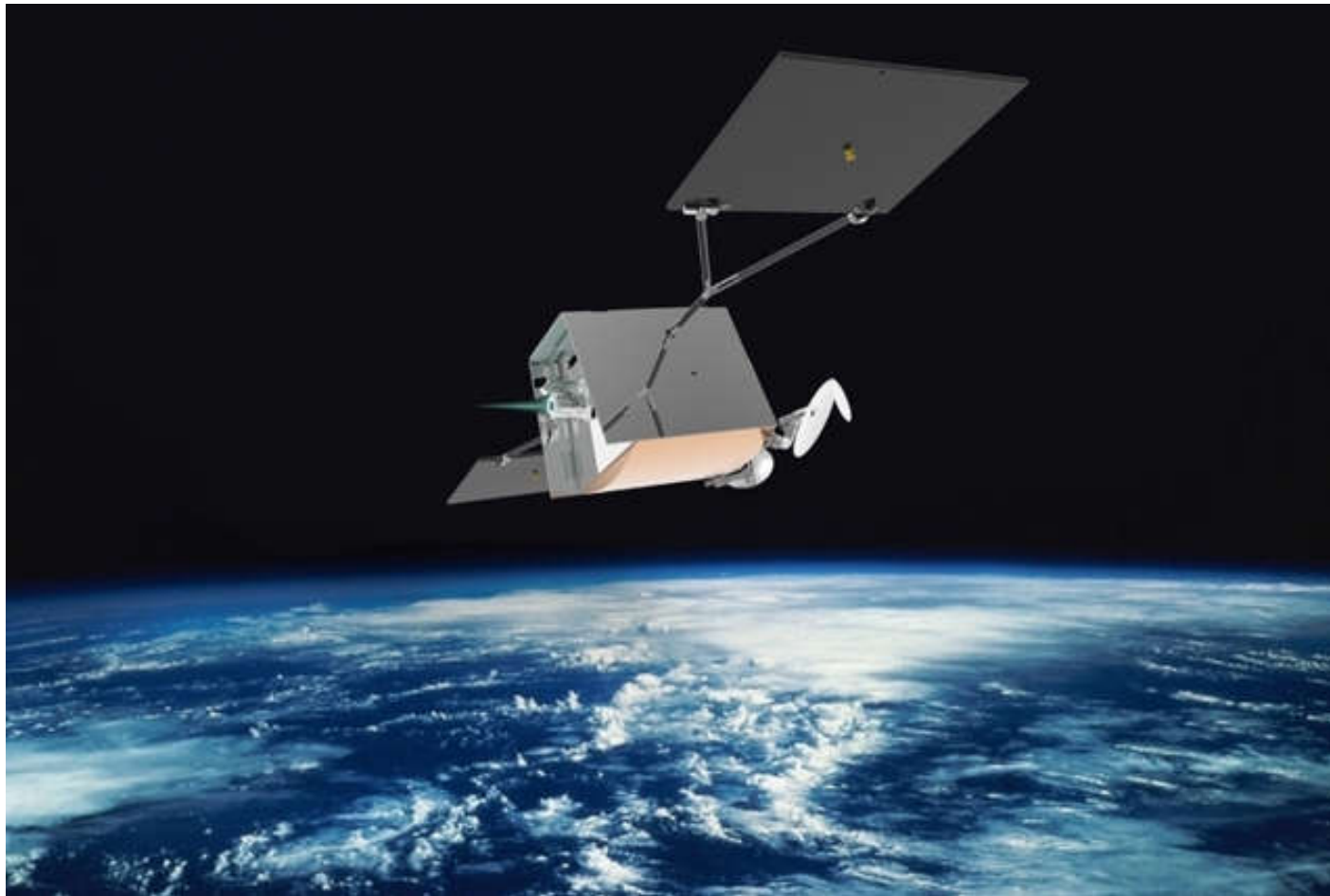
### WHY SOLAR

Solar airplanes are a less expensive way to deliver internet than fiber or microwave links. They require less maintenance, and don't need to land as often as traditional aircraft.

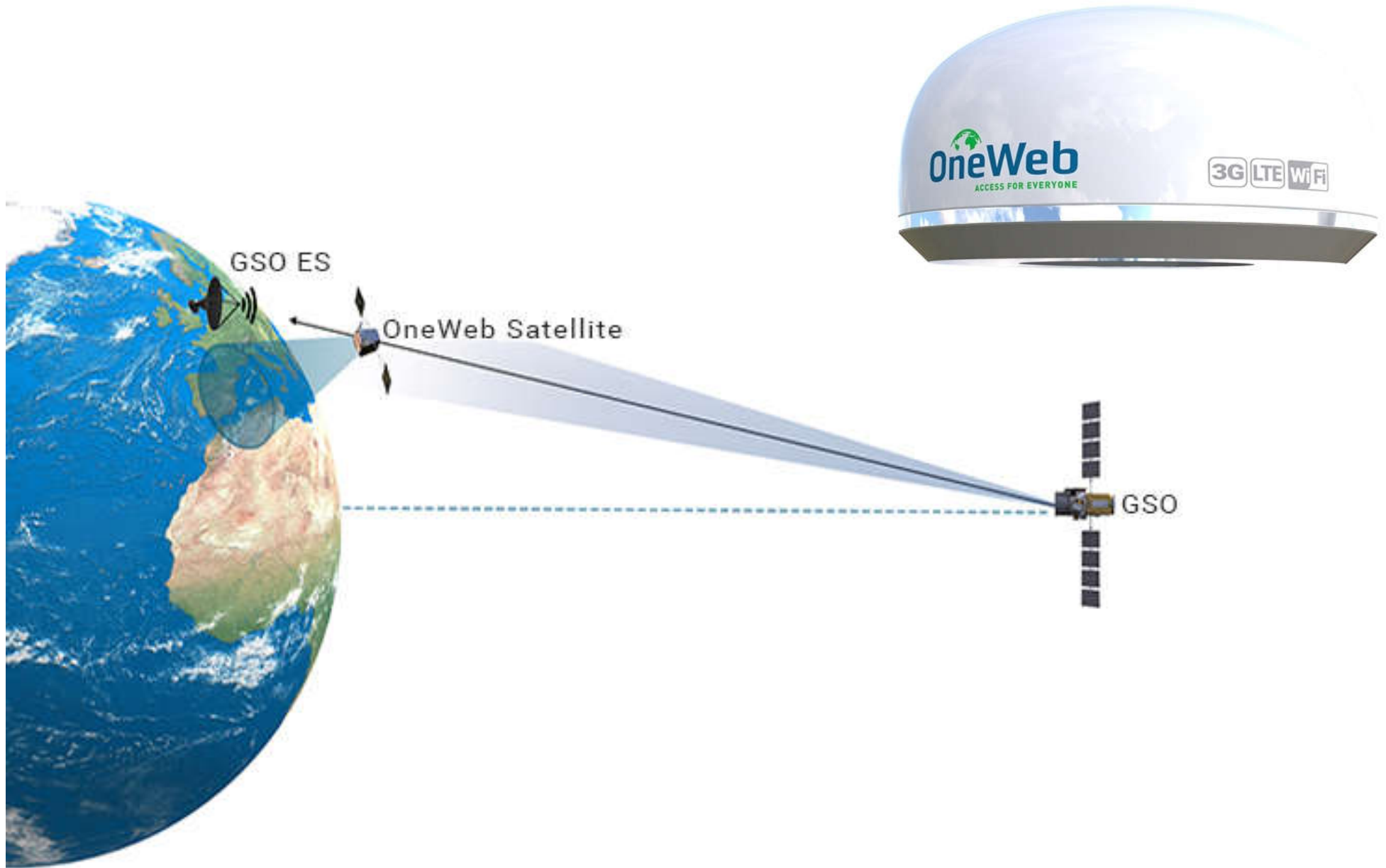
### SPEED

Because it's very large, Aquila is very slow. It flies at less than 80 miles per hour. That's the best endurance speed, allowing Aquila to stay aloft for months at a time.

# Műholdak



# OneWeb



# Space Generation Congress

# Space Generation Congress



SGC 2013

BEIJING ★ CHINA

# Communications Working Group

## Space Internet Opportunities and Risks



SPACE GENERATION  
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# Our Group



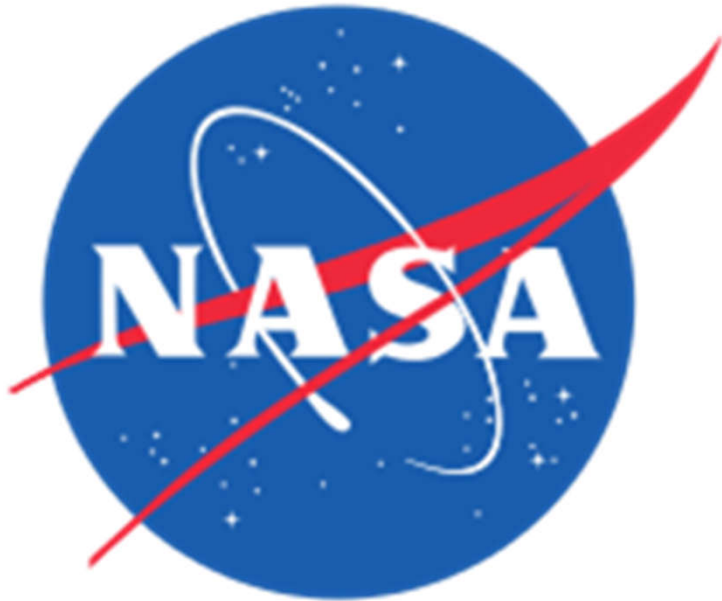
**Moderator:** Emma Braegen (Australia)

**Subject Matter Experts:** Praskovia Milova (Russia), Andreas Hornig (Germany)

**Delegates:** Anders Fuglseth (Norway), Anne Thye (Denmark), Brandon Morrison (USA), Elizabeth Hillstrom (USA), Gal Sekler (Israel), Hripsime Matevosyan (Armenia), Ignasi Lluch Cruz (Spain), Janna Bruner (Israel), Jesus Gonzalez (Colombia), Jørn Efteland (Norway), Kristian Solbakken (Norway), Laszlo Bacsardi (Hungary), Mansoor Shar (UK), Nikolai Joseph (USA), Semion Semionov (Israel), Terje Bratlie (Norway), William Crowe (Australia), Yevgeny Tsodikovich (Israel)

Thanks to **Don Cornwell** for your help and advice!

# Sponsors



**NASA SCaN**

Space Communications and Navigation



# Purpose

*Investigate possibilities and risks of using satellites, drones, and high altitude balloons to provide widespread access to internet.*



# Process/Considerations

Split into groups representing interests:

- satellite
- balloons
- drones
- government

Determined benefits, costs, and issues

Investigated different business models and technological challenges



# Balloons

Portable, easy to deploy

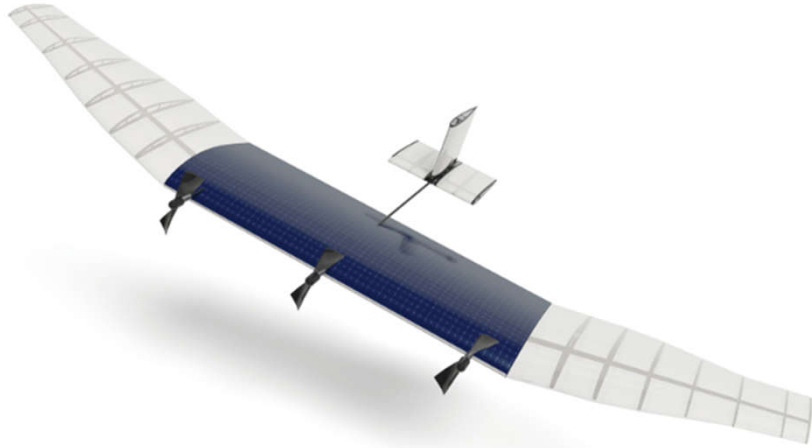
Inexpensive, but  
frequently replaced

Short range

- many individual nodes
- increases networking complexity



# Drones



Rapid response

Emergency services usage

More expensive than balloons

Many nodes → complicates networking

# Satellites

Long range

Large coverage area

Global relay network

High initial costs

R & D and launch availability bottleneck



*The solutions to global networking challenges likely combine multiple technologies.*



# Recommendations

Conduct market studies to illustrate demand

Institute a phased approach

Let governments serve as anchor tenants and expedite regulatory processes

Provide future connectivity to Internet Service Providers to ensure commercial sustainability



# Internet a világűrben

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