Starlink

From 3G to 6G module

By Paul Jaulhiac and Cyril Vasseur

15/11/2024

SpaceX history

405
Total
Launches

367
Total
recoveries

339
Total
Relaunch

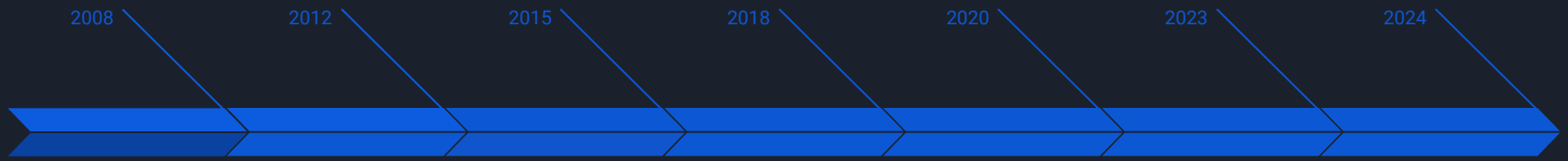
2002
SpaceX birth

2012-2020
First Private
Company able
to join ISS

Elon Musk

https://www.spacex.com/mission/

SpaceX history



2008 — Falcon 1

First orbital flight

2012 — Dragon

ISS

2015 — Falcon 9

First relaunch

2018 — Starlink

2020 — Crew Dragon

First manned fly

2023 — Flacon 9, Falcon heavy, Starship

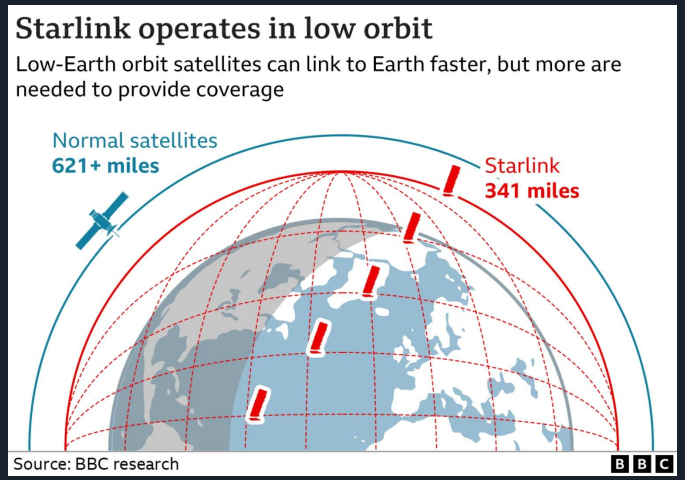
98 launch in One year

2024 — SuperHeavy

First capture

Behind Starlink

Img.1



Satellite

8000 → 42000

20 ms

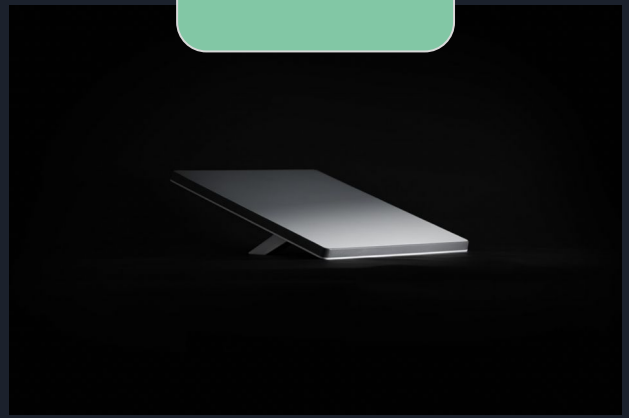
10,7 à 12,7 GHz

110 et 188 MHz
Radio Astronomy

https://www.bbc.com/news/technology-62339835
https://www.ouest-france.fr/sciences/espace/lexplosion-du-nombre-de-satellites-comme-starlink-menace-la-terre-et-sa-couche-dozone-1448088e-2fba-11ef-bdf9-9b702c715c92
https://www.futura-sciences.com/tech/actualites/ondes-satellites-starlink-parasitent-frequence-radio-dediee-astronomes-106461/

Behind Starlink

Super easy installation



Img.2

https://payloadspace.com/starlink-mini-impact-and-rapid-terminal-iteration-payload-research
https://www.starlink.com/fr/residential

home

40 euro in France

Without engagement

roaming

40 euro

50 GO

Boat

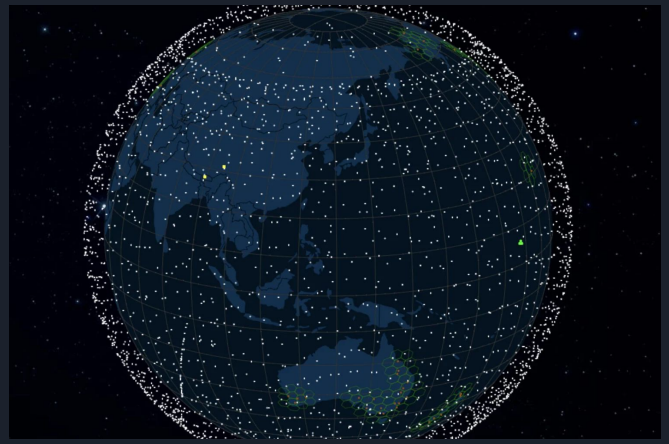
287 euro

50 GO

Starlink: Reaching Goals and Benefits

- Global Connectivity
- Low-latency internet
- Emergency response support

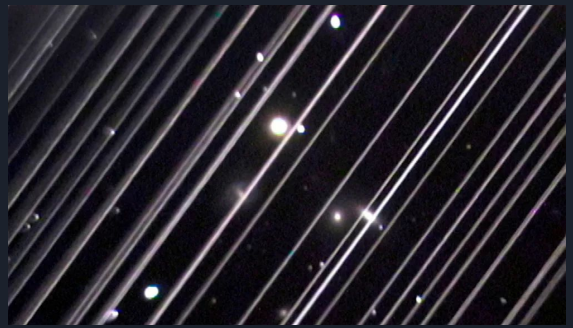
Img.3 https://www.nytimes.com/2023/02/09/world/europe/elon-musk-spacex-starlink-satellite-ukraine.html



Img.4
https://www.presse-citron.net/starlink-le-dilemme-spatial-entre-innovation-et-pollution-de-lorbite/

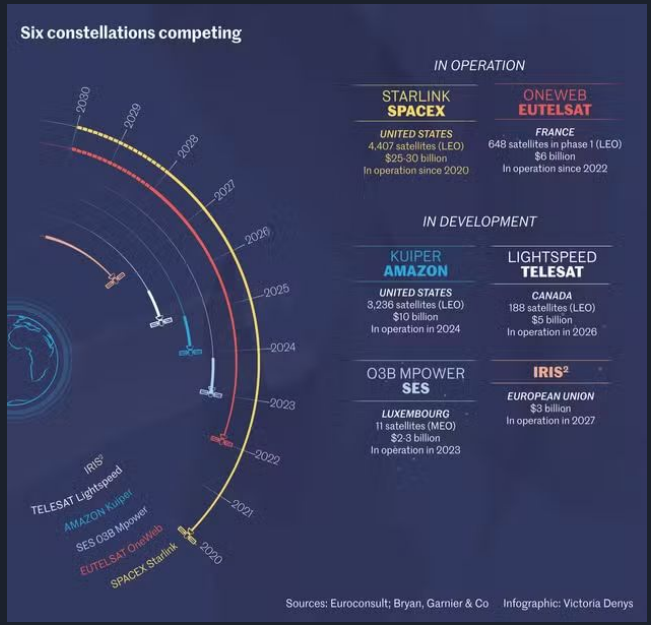
Technical and Commercial Challenges

- Deployment Cost and Profitability
- Competition and Adapting to the Market needs
- Space Pollution and Congestion



Img.5

https://www.pourlascience.fr/sd/astronomie/starlink-un-cauchemar-pour-les-astronomes-18885.php

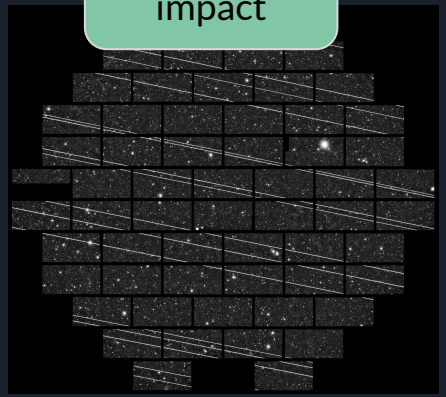


Img.6

https://www.lemonde.fr/en/economy/article/2022/12/26/elon-musk-s-starlink-and-the-battle-of-satellite-constellations_6009120_19.html

Environmental Impact

Luminous impact



Img.7

Disrupt astronomical observations and degrade data quality

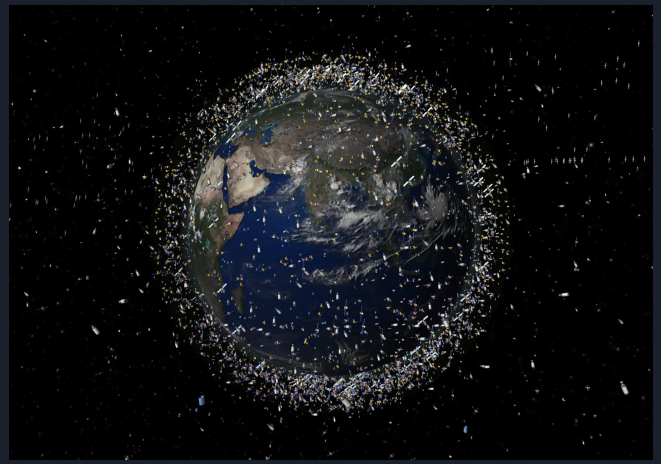
Challenges in astronomical research and object detection

Anti-reflective coatings and adjusted altitudes to reduce satellite visibility

https://france-science.com/cnes-spacex-trouve-un-accord-avec-la-national-science-foundation-pour-reduire-limpact-des-satellites-starlink-sur-lastronomie/

Ethical and Sovereignty Issues

Img.8



https://www.futura-sciences.com/sciences/questions-reponses/satellite-satellites-tournent-autour-terre-706
https://france-science.com/cnes-spacex-trouve-un-accord-avec-la-national-science-foundation-pour-reduire-limpact-des-satellites-starlink-sur-lastronomie

Space Monopolization: Concerns over orbital space managed by private companies

Data Sovereignty: Implications for data control and space governance.

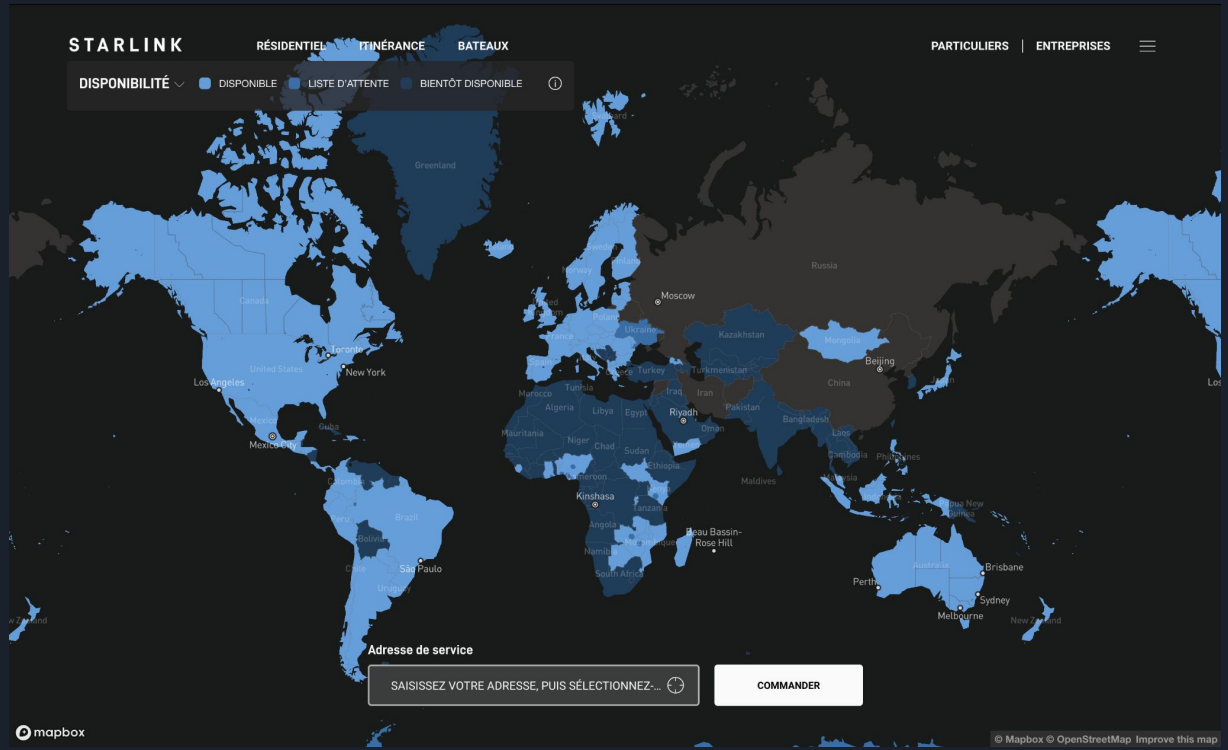
Reactions: Criticism from organizations like the International Dark-Sky Association, urging for global regulation.

Federal Communications Commission(FCC)

Starlink deployment and global access

North America, Europe, parts of South America, Asia, and Australia, with active expansion in underserved regions.

Remote access : Boat, forest, desert …



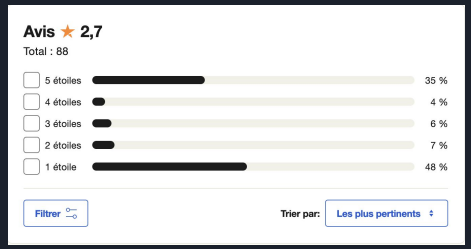
https://www.starlink.com/

Img.9

User feedback

https://fr.trustpilot.com/review/starlink.om

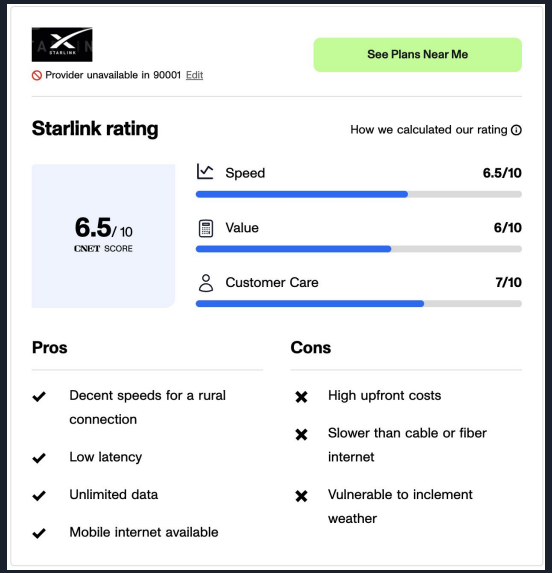
Img.11



Wifi -3m

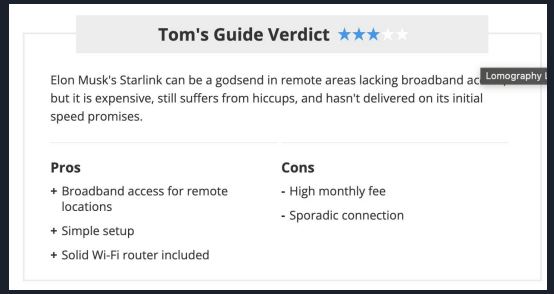
Service Client mauvais

Img.10



https://www.cnet.com/home/internet/starlink-internet-review/

Img.12



https://docs.google.com/presentation/d/1L8373TltxYLFzDnTrxNrXjrlQ_7S71tsbxMSpdpjKGo/edit#slide=id.g314e0c14714_1_100

User feedback

Lise_in_Oz 8 posts
★★★★★ 1w

Middle of the desert phone signal — Worth its weight in gold. My husband spends a lot of his working hours in the desert in no phone reception areas. Now instead of waiting for the next town, he call from the middle of the desert. Clear and unbroken calls.

Kim S.
★★☆☆☆ 2w Vote ···

Weather damage warning — Best internet speeds we have had. Beware though, the warranty does not cover weather related incidents! Our system was 3 months old when a hailstorm hit and put a hole in our dish. I put in a ticket about the incident, 5 days later they responded and said we would need to purchase a new one. We work from home and with having no internet, the response time was slow. It would be helpful if they were more contactable.

Linda Perth, WA 3 posts
★☆☆☆☆ 2w ✓ Verified

Worst. Customer service — Worst customer service I have experienced in along time. They refunded money into a closed account. The paperwork they require to prove account no longer exists is impossible and onerous. IT IS ALMOST IMPOSSIBLE TO SPEAK TO A HUMAN BEING. Returning the unit was also the same ridiculously hard process. They also charge fees from the moment you get the unit, not when it is actually installed so if you have building issues, you are still being charged even if you are not using Starlink yet. They do not make this clear.

Peter K. North Queensland, QLD
★☆☆☆☆ 3w

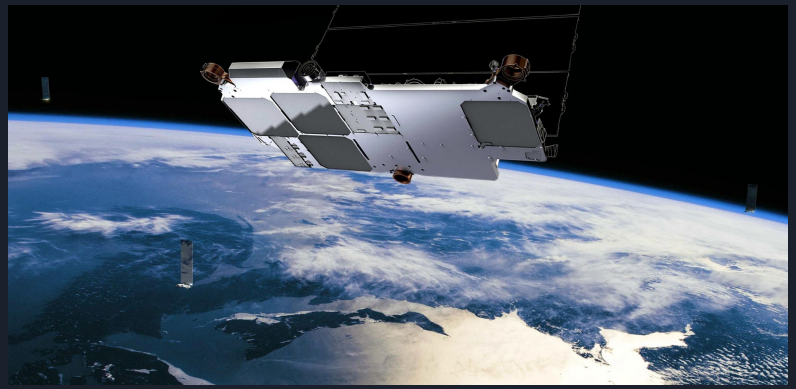
very poor — purchased a mini and all the information i was given was how quick and easy to set up , well seven hours later still nothing , will return for refund , never touch this product again , rubbish and zero help.

https://www.productreview.com.au/listings/starlink

Img.13

Potential Developments for the Long Term

- Increasing the Capacity
- Engineering New Features
- Integrating other SpaceX projects
- Working with Governments



Img.14

https://fr.le360.ma/economie/spacex-rencontre-des-difficultes-dans-le-deploiement-de-ses-satellites-starlink-v2_MEGFQKT2UBB7TBFPSSNZN2PNS4/

Img.15 https://www.20minutes.fr/high-tech/3051919-20210601-5-choses-que-vous-ignoriez-au-sujet-de-starlink

Conclusion

- Internet access, all around the World, with terrestrial network equivalent quality
- Expensive solution, not yet in a competitive market
- Important environmental impact
- Deployment threatened by upcoming regulations
- Mixed user feedback
- Still some margin for progress and developments

Sources

https://www.researchgate.net/publication/377231331_The_SpaceX_Starlink_Satellite_Project_Business_Strategies_and_Perspectives

https://www.arcep.fr/la-regulation/grands-dossiers-thematiques-transverses/lempreinte-environnementale-du-numerique/evenement-satellites-et-environnement.html

Contents