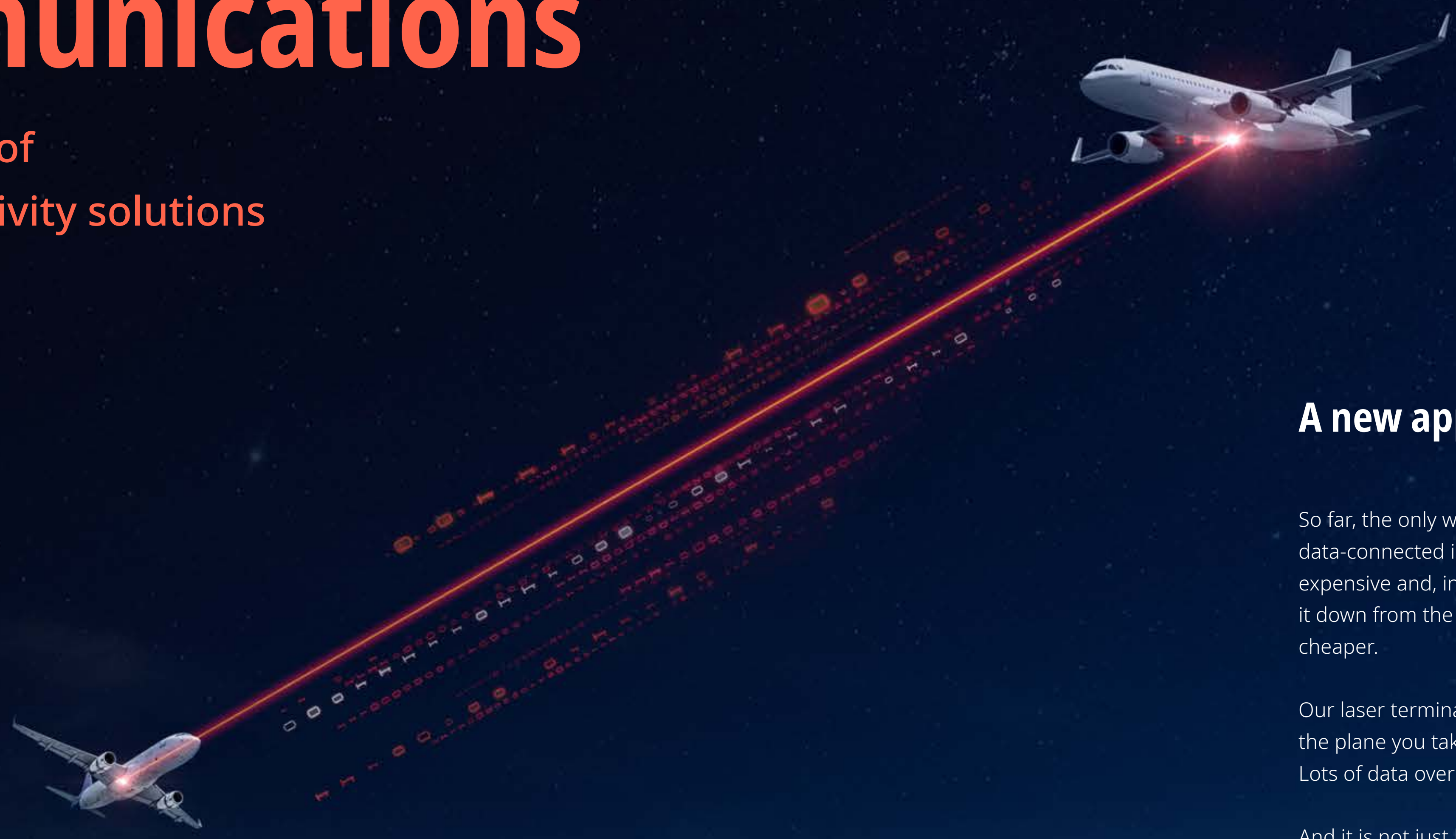
H1 2018

Half-Year Report

mynaric

Laser communications

A cornerstone of future connectivity solutions



A new approach to telecom networks

So far, the only way to increase network capacity and keep devices data-connected is to lay fiber optic cables. However, that is hugely expensive and, in practice, often logistically difficult. So why not beam it down from the skies or space? It makes life so much easier and cheaper.

Our laser terminals can be placed on satellites, or drones – or even the plane you take to go on holiday – and send data to each other. Lots of data over really long distances.

And it is not just between two aircraft or two drones or two satellites but numerous. Hundreds, even thousands. This creates a network of flying objects all linked by laser communication and capable of delivering broadband internet to any place on earth no matter how remote. And it does all this without the need for optical fibers in the ground.

Tomorrow's Telecommunication Landscape

A glimpse into the future of omnipresent connectivity

Laser
Radio

Satellite Telecom Networks

Constellations in space are networks of hundreds or even thousands of satellites all linked by laser communication. The distances achievable between each satellite create networks that can bridge distances circling the entire planet.

Earth Observation Satellites

Currently only 70% of information collected by Earth Observation satellites makes it back to Earth for interpretation. Laser communication solves this bottle-neck and allows for all information collected to be transmitted back to the ground.

High Altitude Networks

Airborne platforms, such as balloons or unmanned aerial vehicles (UAVs), in high altitude above commercial air traffic are interconnected using high-speed laser communication links to form flying networks. These are then linked to the existing terrestrial network through high-speed air-to-ground connections.

Commercial Aircraft Networks

Airplane constellations are laser-linked networks of airplanes which provide lightning fast in-flight WiFi connectivity and real-time aircraft data to help both cockpit and ground maintenance teams.

Continuous Surveillance

Drones, balloons and airplanes continuously generate enormous amounts of data for government agencies, commercial applications and for scientific purposes. Laser communication allows downstreaming of such data securely in real time for research and interpretation.

Radio Frequency

Radio frequency (RF) technologies such as 3G, 4G, or even 5G, are typically used to connect end-users to the final leg of the communication network, the 'last mile'. Today, dense networks of cellphone towers provide this in cities. In the future high-altitude networks are indented to do the same for rural connectivity and satellites constellations for remote connectivity.

Urban

Cities are mostly connected using fiber optic and copper cabling. A high density of people or devices economically justifies the installation of cellphone towers which each, individually, may only cover a few blocks of a street, or even less.

Rural

In many rural areas, it is not economically sensible to deploy a dense network of fiber optic cables and cellphone towers, as too few people or devices per area require a connection. Moving the delivery of data to high-altitude networks changes the economics and allows for widespread network service.

Remote

Remote areas typically have a very low density of people or devices per area, yet the total demand for connectivity by all end-users in sum is significant. Often no telecommunication infrastructure at all is available on the ground. Broadband service delivered by satellite constellations can cover vast areas and allow economic connectivity for remote regions populated by far-flung villages, ships, oilrigs, aircraft and so on.

Welcome to Terabit Speed

Laser communication is blazing-fast. It can transmit huge amounts of data in fractions of a second and easily outperforms RF technology. The current world records with millimeter wave technology and in the optical domain are a clear illustration of this. The current records achieved a data rate that was over **320 times higher** for laser communication and these advances will only grow larger in the future.

World records long distance wireless communication
in Gbps (Gibabit per second)

40
Millimeter radio communication

13,160
Laser communication

Data	Size	Time*	Typical scenario
Audio Podcast	5 MB	0.004 s	Listening to a podcast while driving on the Amazonas
HD movie	4 GB	3.2 s	Streaming a movie during a long-distance flight
Self-driving car sensor data	25 GB	20 s	Send generated data to headquarters for AI training
Blueprint of human DNA	200 GB	160 s	Sending a copy to Mars (just in case)

* Transmission time assuming current 10 Gbps laser communication technology

Electromagnetic Waves

Laser communication allows for bandwidths inaccessible to other wireless long-distance communication technologies. Our current systems allow up to **10 Gbps** and we are working on pushing this to **multiple Tbps** (Terabit per second) in the future. This means no more buffering, no more dead spots in the middle of fields. Data rates like this are possible because laser communication uses an electromagnetic frequency that is many orders of magnitudes higher than what is used by RF technologies. And while RF is already reaching its technical limits laser communication is still in its infancy with a lot of potential for improvements in the future.

So Small, It's Mobile

Good things come in small packages. So things are getting smaller these days. Mobile phones have shrunk from the size of house bricks to be truly handheld computers that fit in suit pockets. Computers used to take up an entire room but now sit comfortably on your lap. And satellites, too, are shrinking in the same way. No longer are they huge constructions of several metric tons that need a dedicated rocket launch to get into orbit. Nowadays, satellites are getting small. Smallsats, in fact. Or microsats only 10 cm³ in size and weighing no more than 1.5 kg.

To match the reduction in size of satellite technology, and to best suit the needs of constellation builders in the stratosphere who are using super-light drones and balloons, we too focus on miniaturization with laser terminals that fit many airborne and spaceborne uses and ground stations capable of being transported and used wherever they are needed.

Small. Smaller. Lasercom.

All of Mynaric's products are developed with their application in mind, so our terminals are carefully crafted to fit the restrictive low size, weight, and power consumption (SWaP) constraints of airborne and space scenarios and our ground stations are designed to meet the challenge of being mobile enough to serve their exacting terrestrial applications.

Scenario	Typical aperture diameter	Deployment time
Mobile Laser satellite gateway	0.4 m	0.5 man-days
Mobile X-band satellite gateway	5 m	3 man-days

Built-in Security

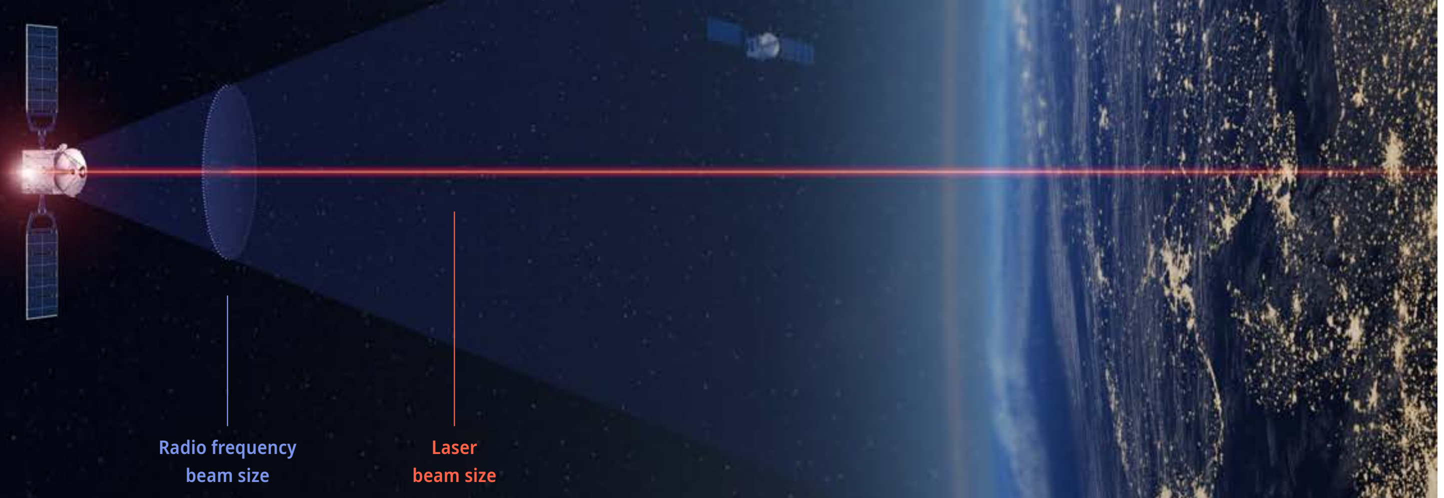
When you send an email to someone, you only intend for the recipient to read it. It does not matter whether it is to a friend or the company CEO, security really matters these days and current radio frequency (RF) communication does not offer it. However, laser communication does.

Mission: Impossible

Laser communication systems use beams with very small beam divergence which is physically inaccessible to radio frequency technologies. This makes laser communication systems extremely secure because one would have to get into the narrow beam to eavesdrop on a connection. Considering that this beam is actually moving as it sends data, this is an almost impossible task to pull off.

Typical scenario	Link distance	Laser beam size	Ka-band beam size	X-band beam size
Air-to-ground link from UAV	50 km	1 m	1,600 m	3,200 m
Air-to-air link of high-altitude constellation	200 km	5 m	6,500 m	13,000 m
Space-to-ground link of Earth observation mission	1,400 km	35 m	45,000 m	90,000 m
Inter-satellite link of LEO constellation	4,000 km	111 m	145,000 m	290,000 m

Laser aperture size: 80 mm, Ka-band antenna size: 300 mm, X-band antenna size: 600 mm. Assuming physical limits for lowest possible beam size.



No License Required for Operation

If you want to establish satellite internet you do not just have to build your satellite and launch it: you also have to apply for a license from every country you wan to provide your service via RF beams. You have to pay the costs associated with each licensing regime and you have to wait for your application to be accepted.

Laser communication is not regulated by the International Telecommunication Union and it can be used without restrictions and does not require costly licenses. The reason for this is that its inherent small beam size avoids interference with other systems and renders any restrictive regulation in the future highly unlikely.

The Variation in Regulation

There is not just a long wait for the licenses necessary for operating RF-equipment exemplary in the Ka- or X-band; the licenses will also only allot you a fraction of the spectrum that is available and will only be approved after a costly application process.

Typical scenario	Typical available bandwidth	Time to approval	Free/Regulated
Satellite downlink X-band	1 GHz	> 12 Months	Regulated
Satellite downlink Ka-band	2 GHz	> 12 Months	Regulated
Satellite downlink Laser	12,000 GHz	Immediately	Free

Dear shareholder, it has been a remarkably busy and successful six months.

We delivered, in late June, an optical ground station for low Earth orbit (LEO) applications to a customer in the United States and on receipt of this unit, we confirmed our commitment to producing additional ground stations for LEO and ground stations for air and stratospheric applications by the end of March next year. It is the first time in company history we are producing multiple copies of the same products and as such marks the move to serial production for our ground segment products.

Work on our lasercom terminal for inter-satellite links is also ongoing with development soon to be completed ahead of ramping up production just in time to match the deployment schedule of most LEO constellations. We are in close contact and negotiations with multiple constellation operators intending to launch first satellites equipped with laser communications as soon as possible as part of phase 1 missions. Compliance with these launch plans is our utmost priority for the continued development of our inter-satellite link terminal. It is a critical condition for winning the contracts not only for phase 1 missions typically entailing a couple of satellites, but also for entire constellations of often hundreds of satellites that will succeed phase 1 missions.

Commentary to follow later in this report will tell of an aerospace telecommunications market growing at an astonishing rate. For example, the number of companies building low Earth orbit constellations solely for Internet of Things applications now exceeds 20; and this is before we consider broadband communication constellations whose activities are underpinning exponential growth. In the airborne segment, frontrunners are demonstrating the maturity - and pushing the limits - of what can be provided by airborne vehicles such as stratospheric balloons, and this is acting as a catalyst for growth.

In essence, what we are experiencing currently is a market being driven by the availability of a set of technologies that jointly enable new applications that were unthinkable before. Many of these applications radically change the economic assumptions of what is and what is not possible and new companies – both started by venturous newcomers and established industry veterans – are emerging at an astonishing rate to leverage on the new opportunities. Laser communications is one of the crucial technologies enabling these new business models and we are positioned better than ever to become a leading player in the lasercom market.

Our work on photodiodes with the world-renowned CEA-Leti is a case in point: a technological breakthrough that promises to revolutionize the already-remarkably high key specifications of our products. Twinned with laser communications' innate physical advantages over RF communication – specifically with regard cost, speed and security – the exclusive agreement means that there is practically no way around Mynaric for any company interested in achieving the most efficient and highest performing wireless connection between aircraft, satellites and the ground available to the market.

So, we await further successes in the coming months: sat plumb in the middle of numerous key developments. We will be exploiting technological advances to improve our products; adapting the processes and procedures to ensure serial production of the numbers of units the market requires; and, expanding internationally to fully capture the market potential.

We look forward to updating you on these developments and further successes in our next annual report.

Dr Wolfram Peschko
Gilching, October 2018

MANAGEMENT

Dr. Wolfram Peschko
CEO
Strategy, Finance and Management

Dr. Wolfram Peschko, Chief Executive Officer of Mynaric, has been with the group since 2011 and heads strategy, finance and general management divisions. He has more than 30 years of senior management experience leading companies of up to 1000 employees.

Dr. Markus Knapek
CCO
Business Development

Dr. Markus Knapek is one of the co-founders of Mynaric and, as a Board Member of Mynaric, is responsible for sales, business development and commercial strategy of the group. He is a world-renowned expert in laser communications and performed research on the atmospheric effects of optical communications at the German Aerospace Center (DLR) prior to founding Mynaric.

Joachim Horwath
CTO
Technical Lead

Joachim Horwath is co-founder of Mynaric and, as CTO, has led product development in the field of wireless laser communication since 2009. As a Board Member of Mynaric, he is responsible for the technical direction of the group. For many years he worked as a researcher at the German Aerospace Center (DLR) on laser communication prototypes and demonstration campaigns before founding Mynaric.

1

Company development

REVIEW

Our primary focus – and the driver of all we have done – in the last six months has been centered on moving our product development to serial manufacture.

From business development contributing to the manufacturing process with their feedback on what the market requires, to our international collaborations harnessing the latest technological developments to enable higher specification and more saleable products, all strands of Mynaric have come together to shape this ongoing fundamental reorganization from a development company to a production company.

Work done in collaboration with international, expert partners - such as **CEA-Leti** in France with whom we announced a collaboration in April - has allowed us to incorporate top-end technological developments at the same time as moving processes towards manufacture. By working exclusively with Leti we availed ourselves of a new photodiode that promises sensitivity improvements at least 10 times greater than existing sensitivity: a truly market-changing development in the field of laser communication And swiftly after this announcement, we were able to inform the market that we were diversifying in other areas of output: a new lightweight laser terminal, of under 2 kg, which can be fitted to compact drones for precision agriculture applications will serve as another addition to our product offering.

In June, Business Insider reported on our - hitherto unpublicized - collaboration with the social media giant **Facebook** and our joint-work on achieving a record 10 Gbps laser link between a plane and the ground. The story broke just as Facebook announced it was to pursue partnerships with technical specialists to achieve high-altitude connectivity instead of producing an in-house unmanned aerial vehicle – the Aquila drone.

Mynaric USA, our Huntsville, Alabama-based US subsidiary, used the occasion of the Farnborough Air Show to announce its formal long-term research collaboration with the **Ohio State University's College of Engineering.** The research agreement focuses on emerging technologies, as well as advancing and improving current high-speed communications technology, including laser-based optical communications. It also allows us on-tap access to some of the leading aeronautical test facilities in the United States.

Initial research activities will soon begin with airborne experimental flight research performed at Ohio State's Don Scott Airport (KOSU) through the College's Center for Aviation Studies.

In the last month we have reached a key milestone with our formal move to serial production of two types of optical ground station for, respectively, air-to-ground and space-to-ground bidirectional data transfer. Production processes are being established throughout the company following the first delivery of an optical ground station to a customer in the United States.

In harnessing all of the lessons learned during the production of this key product, we are now able to implement the practical experience gleaned to shape and polish serial production procedures going forward.

OUTLOOK

The next six-month period will be dominated by continued work on fundamental changes to processes as we produce our laser communication products.

The physical manifestation of our increased manufacturing capabilities will see multiple optical ground stations for airborne platforms and for low Earth orbit platforms available by the end of Q1 2019.

We will also carry forward our collaboration with CEA-Leti on the next generation of Avalanche Photodiodes: a real game-changer that will eventually lead to a new, improved terminal for stratospheric applications. In exploiting the potential of this ground-breaking technological development, we will steal a march on our nearest competitors whose terminals will have a hard time achieving the reach and reduced size, weight and power (SWaP) of our products.

In parallel, development of our terminal for inter-satellite links for LEO satellites will continue. The development is a critical condition for winning phase 1 contracts of satellite constellat on operators and a key milestone towards the large-scale deployment of our laser communications products as part of mega-constellations.

A lot of our work in the next six months will be focused on expediting the development of our product offering.

Work on physically moving the company towards serial production will continue apace. Development work will be moved into manufacturing mode, and we will continue to ensure that our procurement policies source companies and suppliers that can provide the required amount of commercial-off-the-shelf components we need at a cost that is both good value for us and cost-effective for our customers.

In the coming months we will also be implementing automation of testing procedures, along with automation of other key processes and procedures, in the move to serial production.
And progress is being made on our new premises not far from where we currently operate. A state-of-the-art building equipped with clean rooms, labs, testing facilities and production suites will come online next year.

In more general terms, it remains our absolute intention to position Mynaric as the world-leading supplier of laser communication products to the aerospace network industry and everything we are working on is towards fulfilling those aims.

2
Market development

REVIEW

The aerospace networks market is now moving at a breathless pace in all segments: space, air and ground.

Space

Private investment in space totaled $3.4bn in the year to June 2018, according to **Seraphim Capital** [i], a venture capital company that focuses on the space sector.

The Financial Times – which recently produced a series on investment in New Space technologies – reported on the figures from Seraphim Capital and concluded:

> **"A big growth area is using satellites to deliver broadband to commercial aircraft and high-speed terrestrial internet to the 4bn people globally who still do not have access."**
>
> Financial Times, 2018

Mark Boggett, chief executive of Seraphim, added: "In the past few years, investor interest in space has gone crazy." [ii]

At a commercial level, **Facebook** has stated its intention to launch a satellite in early-2019 capable of sending down broadband internet to the unconnected and underserved.

The social media giant, in comments to Wired magazine[iii] , gave no specifics surrounding the project – called 'Athena' – but did state:

> **"We believe satellite technology will be an important enabler of the next generation of broadband infrastructure, making it possible to bring broadband connectivity to rural regions where internet connectivity is lacking or non-existent."**
>
> Facebook, July 2018

At the end of March, the Federal Communications Commission in the United States issued an order approving **SpaceX's** application for its initial Starlink constellation. Prior to this, in February, SpaceX successfully

Space

deployed two demonstration smallsats – nicknamed Tintin A and B – which have begun communicating with Earth stations. Both smallsats are designed to communicate with each other using optical laser links.[xxxiv]

Telesat has selected Thales Alenia Space and Maxar Technologies to collaborate on the design of its LEO constellation.[iv] The agreement – which the company is at pains to point out is not a manufacturing contract - positions the two companies as a potential team which could ultimately build the 117-satellite system when Telesat makes an award in mid-2019.

In August, Telesat selected **Airbus Defence and Space** as a major industrial partner to support its System Design and Risk Management phase for constellation. Under the terms of the contract, Airbus will perform system optimization, requirements engineering, and initial design of key hardware and software components for space, ground and user terminal segments of the Telesat LEO system.[xxxv]

And speaking at the World Satellite Business Week conference in Paris in August, Erwin Hudson, Telesat LEO vice president, stated that whilst the company's ideal LEO constellation size is 292 satellites, the system is being designed to scale to 512 "if…we can justify that on a business and economic basis".[v]

NASA and the US Army have made it known that they are interested in exploiting commercial optical communication developments for use with affordable micro-satellites to increase bandwidth and improve on current military satellites that use radio waves.[vi] Indeed, the Aerospace Corporation, the Californian non-profit corporation that operates a federally-funded research and development center, successfully tested for NASA a data rate of 100 megabits per second from a cubesat to the ground, achieving rates 50 times greater than typical communication systems for this size of spacecraft[vii].

ICEYE, which is in the process of launching 18 microsats that are capable of seeing through clouds to provide clear pictures of the surface of the Earth, announced in May that it has raised $34 million in a Series B funding round.[viii] ICEYE has also announced it has entered into agreement with BridgeSat to use their ground network to deliver data to customers.[ix]

A new constellation of nanosatellites has been announced by the company **CLS (Collecte Localisation Satellites)** who, with the backing of Thales Alenia Space, is planning a constellation of 20 nanosatellites by 2021.[x]

The new entity, called **Kinéis**, aims to provide global localization and data collection services in sectors such as logistics, agriculture or outdoor

REVIEW

Space

activities through the Internet of Things (IoT). Kinéis says it will provide "a unique, universal connectivity, entirely dedicated to the connected objects industry. Every object equipped with a Kinéis modem can be located and transmit data wherever it is, whatever the conditions".

LeoSat Enterprises, which is launching what it claims to be "the fastest, most secure and widest coverage data network in the world via a constellation of low-Earth-orbit satellites", has announced that it has achieved an important milestone by securing commercial agreements valued at over $1 billion.(xi)

OQ Technology, founded in 2016, has announced that it has secured around €6 million, with funding provided by the LuxIMPULSE national space program and the **European Space Agency (ESA)**. The IoT start-up is targeting oil and gas, maritime, industry 4.0 and transport segments for its services for tracking and managing assets in remote areas.(xii)

OQ joins a growing field of satellite IoT start-ups who have launched, or will soon launch, pathfinder satellites by the end of the year. These include **Astrocast**, **Fleet Space Technologies**, **Helios Wire**, **Hiber Global** and **Kepler Communications**. With OQ and the above-mentioned Kinéis, there are now at least 20 satellite IoT start-up companies planning to build constellations.

Air

Facebook will pursue its plans to establish internet delivery from high-altitude platforms through a series of strategic partnerships with technology partners as opposed to using its own drone. The social media giant explained in June that it was ceasing production of its in-house Aquila drone but continuing work on its ultimate aim of "getting everyone, everywhere online" by partnering with "leading companies in the aerospace industry" such as Airbus, who is developing its own high-altitude pseudo satellite – the Zephyr S.(xiii)

The announcement was followed swiftly by the news that we had – in collaboration with Facebook – established a 10 Gbps air-to-ground laser link in the United States: a record laser link from a moving aircraft to the ground.(xiv)

In August, it was reported that Facebook was supporting a proposal by the **Elefante Group** and **Lockheed Martin** to get the FCC to modify its rules to enable the development of stratospheric services, including high-altitude platform stations. In support of the company's request to the FCC, a Facebook spokesperson stated:

Air

> "Given HAPS' flexibility, capacity, large footprint, and lower-than-satellite latency, Facebook agrees with Elefante that HAPS backhaul will enable and complement 4G, 5G and IoT-enabling services and technologies."(xv)

Facebook, August 2018

Elefante Group, to date still operating in stealth mode, is known to be pressuring the FCC to permit sufficient access to spectrum for Stratospheric-Based Communication Services (SBCS) which will have on-board networking capabilities – a "Network in the Sky" – that would make entire markets 5G ready.(xvi)

The newly-independent **Loon** – formally Google Loon – revealed in July that it had won its first commercial contract and was supplying areas of Kenya with 4G internet access using high-altitude balloons: it was already conducting operations in Peru and Puerto Rico.(xvii) The company also reported that it has established a data connection of 1,000 km using seven balloons at an altitude of 20 km.

A blog on the company's website explained:

> "The connection originated from the ground at our launch site in Nevada, where packets of data were transmitted to a balloon 20 km overhead. That data travelled nearly 1,000 km along a network of six additional balloons, going from desert to mountains and back again. A few weeks later, we achieved another milestone by successfully sending data over 600 km between two ballons – our longest point-to-point link to date."(xviii)

Loon, September 2018

Airbus Defence and Space has reported on two key developments in its high-altitude platform project. It has recently revealed that it has successfully tested stratospheric 4G/5G defense applications with a high-altitude balloon demonstration. According to the company, the technology tested – an Airbus LTE AirNode – "represents a key part of Airbus' secure networked airborne military communications project, Network for the Sky (NFTS)".(xix)

Airbus flew and tested the communications solution in Canada at all altitudes up to 21 km above the Earth's surface, using a stratospheric balloon to create a high-altitude airborne cell site. The balloon's payload carried an Airbus LTE AirNode which provided a 30 km-wide footprint of coverage for

REVIEW

Air

private and secure communications. The balloon was tracked over 200 km, exchanging 4K video between the different assets.

Preceding this update was news that the company's unmanned aerial vehicle (UAV) – the Zephyr S – had logged a maiden flight of over 25 days, the longest duration flight ever made by a UAV.

A company spokesman stated that the Zephyr would provide 'new see, sense and connect capabilities' for both the commercial and military sector. The Zephyr, they continued, would potentially 'revolutionize disaster management [and] provide persistent surveillance, tracing the world's changing environmental landscape and will be able to provide communications to the most unconnected parts of the world'.[xx]

Research house **Juniper Research** reported that the number of connected aircraft will grow by 118% between 2018 and 2023. Their report envisages some 34,000 commercial and business aircraft outfitted by 2023.[xxi]

Inmarsat has recently entered into a 10-year strategic collaboration with Panasonic Avionics to offer broadband in-flight connectivity as well as "high-value solutions and services to customers in the commercial aviation industry worldwide".[xxii]

The company is already working with **Deutsche Telekom**, **Vodafone** and **Nokia** to build the European Aviation Network (EAN) which, it says, will create $30 billion worth of extra revenues for airlines by 2035. Other companies are working on similar projects to introduce in-flight broadband over the Americas.[xxiii]

Ground

BridgeSat used the occasion of the World Satellite Business Conference in Paris to announce that it had secured $10 million of Series B funding from **Boeing** as it continues its efforts towards establishing a network of ten optical ground stations around the world by 2019.[xxiv]

Indeed, **Boeing** has recently announced that it has set up a new Disruptive Computing and Networks division "to develop computing and communications solutions for advanced commercial and government aerospace applications." The company stated that it will seek out external technology partners to collaborate with on developing and accelerating "breakthrough solutions in secure communications, artificial intelligence and complex system optimization".[xxxvi]

RBC Signals, the Washington state-based ground station network provider, announced at the International Astronautics Conference in Bremen

Ground

recently that it had entered into a Memorandum of Understanding (MoU) with the Ecuadorian Space Agency to collaborate on an optical communication system for low Earth orbit (LEO) and lunar/deep space programs, which will include the Colombo-Ecuadorian Lunar Program (CELP).(xxv)

And closely following that announcement was news of Norway's **Kongsberg Satellite Services (KSAT)** signing an MoU with Germany-based TESAT Spacecom to work together on optical communications technology.(xxvi)

Astrocast's Internet of Things (IoT) network, planned by the Swiss startup, will use **Leaf Space's** ground station network for downlinks for their 64-unit nanosatellite constellation. Leaf Space announced that it will locate ground stations across six locations, providing dedicated service solely to Astrocast.(xxvii)

OUTLOOK

We stand ready to equip the market with the space terminals, air terminals and ground stations that these companies will need to offer the high-speed, secure and long-distance applications that their business plans promise.

Activity in low Earth orbit (LEO) will continue apace in the next 6-12 months.

OneWeb's first ten **Airbus Defence and Space**-built satellites are expected to be launched on a Soyuz rocket, from Europe's Guiana Space Center spaceport, in February 2019.[xxviii] The company's purpose-built satellite production factory in Florida, which will oversee the production of up to three satellites a day, is also expected to come online sometime in 2019.[xxix]

As already mentioned, **Facebook** will be launching its first satellite in early-2019 and they will be joined by the Beijing-based **Commsat**, who want to build a real-time data collection constellation, and who will also launch the first seven of a projected 72 low Earth orbit satellites by the end of this year.[xxx] And they are not the only company that will start actively launching their constellation satellites.

Indeed, Commsat joins – by our reckoning – at least 24 companies who will be launching the first satellites of their planned constellations in 2019. This is in addition to existing constellation builders continuing to populate their networks.

And next year, **Iridium** and **Amazon Web Services (AWS)** will launch CloudConnect: a development that will see the rest of the world brought within reach of AWS's Internet of Things services.[xxxi]

There are now over 70 companies in the process of establishing – or planning – constellations in LEO. These range from large companies such as **SpaceX** planning over 11,000 satellites to startups such as **Capella Space** planning just 36 satellites.

The uses of these constellations are myriad: Internet of Things and Machine-to-Machine, Broadband Internet, Earth Observation, Emissions Monitoring, Hyperspectral Imaging and Asteroid Tracking.

The number of individual satellites that these constellations will comprise of are huge: for internet constellations alone, over 12,500 satellites are proposed for the various networks: each of which will potentially require 3-4 laser terminals to comprehensively be able to communicate with each other.

And developments at high altitude will also proceed with the two titans Google and Airbus leading the way.

Loon will continue its commercialization of internet from its high-altitude pseudo platforms over the African continent. Following its first success in Kenya it is also in the process of establishing services in Uganda.[xxxii]

There is now every possibility that where this particular technology giant treads others will wish to follow. Just as an earlier Alphabet subsidiary – Waymo – essentially single-handedly kick-started the autonomous car market in the early-2010s so it could again well be that Google's influence in the high-altitude platforms market will also now be picked up by other companies given that the technology's proof of concept has been so successfully demonstrated.

Airbus, flushed with success in achieving the longest flight of a UAV in August, will take the Zephyr S to its new flight base at Wyndham airfield in Western Australia for further testing towards the end of this year, having agreed a strategic statement of intent with the recently-established Australian Space Agency.[xxxiii]

Airbus will also be continuing its work on its Network for the Skies following its successful test of stratospheric 4G/5G defense applications with a high-altitude balloon.

The vast majority of the projects listed here will inevitably have to consider optical communications to both future-proof their networks and guarantee as high a return on their investment as possible.

3

H1 2018 results

Mynaric Lasercom GmbH

mynaric

PROFIT AND LOSS STATEMENT

in EUR	01.01.2018 - 30.06.2018	01.01.2017 - 31.12.2017
Revenues	1,218,069.36	1,966,579.78
Increase or decrease in inventories of unfinished products and services	-257,772.81	-35,046.38
	960,296.55	1,931,533.40
Other own contribution	1,774,197.43	1,247,743.30
Other operating income	1,680.67	23,780.74
Total operating performance	**2,736,174.65**	**3,203,057.44**
Cost of materials		
a. Expenses for raw materials, consumables, supplies and for purchased goods	-449,170.91	-658,019.64
b. Expenses for purchased services	-503,190.41	-825,070.35
	-952,361.32	-1,483,089.99
Personnel expenses		
a. Wages and salaries	-1,843,829.25	-2,662,281.48
b. Social security contributions and expenses for pensions and other employee benefits	-368,509.76	-399,043.44
	-2,212,339.01	-3,061,324.92
Depreciation	-115.66%	-141.88%
on intangible fixed assets and property, plant and equipment	-107,620.90	-142,226.28
	-107,620.90	-142,226.28
Other operating expenses	-1,929,048.32	-1,605,840.82
Operating profit	**-2,465,194.90**	**-3,089,424.57**
Other interest and similar income	2,132.07	40,785.51
Interest and similar expenses	-32,103.31	-11,394.17
Financial results	**-29,971.24**	**29,391.34**
Profit from ordinary business operations	**-2,495,166.14**	**-3,060,033.23**
Taxes on income and earnings	-0.91	0.00
Earnings after taxes / net loss	**-2,495,167.05**	**-3,060,033.23**
Losses carried forward from the previous year	-5,938,286.04	-2,878,252.81
Balance sheet loss	**-8,433,453.09**	**-5,938,286.04**

BALANCE SHEET

ASSETS

in EUR	30.06.2018	31.12.2017
A. Fixed assets		
I. Intangible assets		
1. Self-created industrial property rights and similar rights and values	2,883,108.05	1,108,910.62
2. Purchased licenses, commercial Property rights and similar rights and values and licenses to such rights and values	22,883.00	34,817.00
	2,905,991.05	**1,143,727.62**
II. Tangible assets		
1. Technical equipment and machinery	742,021.70	499,456.35
2. Other equipment, factory and office equipment	184,021.71	181,047.00
3. Advance payments and facilities under construction	326,600.00	0.00
	1,252,643.41	680,503.35
	4,158,634.46	**1,824,230.97**
B. Current assets		
I. Inventories		
1. Raw materials, consumables and supplies	59,748.49	128,835.74
2. Work in progress, unfinished services	34,106.50	291,879.31
3. Advanced payments	151,520.00	0.00
	245,374.99	**420,715.05**
II. Receivables and other assets		
1. Receivables from goods and services	261,607.98	122,936.56
2. Receivables from affiliated companies	222,321.98	464,892.77
3. Other assets	224,405.44	46,805.89
	708,335.40	634,635.22
III. Cash on hand and bank balances	4,452,349.69	1,576,348.16
	4,452,349.69	1,576,348.16
	5,406,060.08	**2,631,698.43**
C. Prepaid expenses	19,662.76	35,112.53
	19.662,76	**35.112,53**
TOTAL ASSETS	9,584,357.30	**4,491,041.93**

LIABILITIES

in EUR		30.06.2018	31.12.2017
A.	**Equity**		
I.	Subscribed capital	32,455.00	32,455.00
II.	Capital reserves	10,564,203.78	7,564,203.78
III.	Balance sheet loss	-8,433,453.09	-5,938,286.04
		2,163,205.69	**1,658,372.74**
A.	**Provisions**		
	Other provisions	666,623.10	309,340.37
		666,623.10	**309,340.37**
C.	**Liabilities**		
	1. Advance payments received on orders	28,831.33	0.00
	2. Liabilities from goods and services	149,118.44	487,011.34
	3. Liabilities to affiliated companies	6,474,829.86	1,820,005.88
	3. Other liabilities	101,748.88	216,311.60
		6,754,528.51	**2,523,328.82**
TOTAL ASSETS		9,584,357.30	**4,491,041.93**

ABBREVIATED APPENDIX

A. GENERAL INFORMATION ABOUT THE COMPANY

Mynaric Lasercom GmbH has its headquarters in Gilching and is registered in the Commercial Register Munich (HRB 179806).

B. ACCOUNTING AND VALUATION METHODS

For the abridged semi-annual financial statements on 30 June 2018, the same accounting policies have been applied as for the last annual financial statement.

C. NOTES TO THE BALANCE SHEET

1. Fixed assets

Intangible assets include production costs of development projects in the amount of TEUR 2,883. In the previous year, development projects with production costs of TEUR 1,109 were reported under tangible fixed assets. On 30 June 2018, the development projects were reported as self-created industrial property rights and similar rights and values under intangible assets. Comparative values on 31 December 2017 have been adjusted accordingly in the balance sheet.

Property, plant and equipment primarily includes technical equipment and machinery in the amount of TEUR 742 (comparative value on 31 December 2017 TEUR 499) as well as advance payments and assets under construction in the amount of TEUR 327 (in comparison to TEUR 0 on 31 December 2017).

2. Receivables and other assets

As in the previous year, receivables have remaining terms of up to one year.

The receivables include TEUR 222 of receivables from affiliated companies. TEUR 148 of this amount pertain to the shareholder. In the previous year, receivables from affiliated companies in the amount of TEUR 59 were reported under receivables from goods and services, which were reclassified as receivables from affiliated companies. The comparative value on 31 December 2017 has been adjusted accordingly.

3. Equity

The shareholder, Mynaric AG, has decided to allocate capital reserves in the amount of TEUR 3,000. The payment was made on 28 June 2018.

4. Other provisions

The other provisions include, in particular, provisions from the personnel area of TEUR 400, legal disputes TEUR 125, outstanding invoices TEUR 62, financial statement and auditing costs TEUR 39, warranties TEUR 21 and other amounts of TEUR 19.

5. Liabilities

Liabilities to affiliated companies in the amount of TEUR 6,475 (comparative value on 31 December 2017 TEUR 1,820) are included in the liabilities. TEUR 5,526 of this amount pertain to the shareholder (comparative value on 31 December 2017 TEUR 1,606). Of the liabilities to the shareholder, TEUR 5,450 have a residual term of more than one year. Outstanding liabilities have a remaining term of up to one year.

In the previous year, liabilities to affiliated companies in the amount of TEUR 114 were reported under receivables from goods and services. These were reclassified as liabilities to affiliated companies. The previous year's balance sheet has been adjusted accordingly.

6. Deferred taxes

Deferred tax assets were taken into account up to the amount deferred tax liabilities are recognized. Accordingly, deferred tax assets in the amount of TEUR 799 are offset against deferred tax liabilities in the same amount. Due to the netting of these balance sheet items, these items are not reported and there is no impact on equity. The calculation was based on an average tax rate of 27.725%.

D. NOTES TO THE PROFIT AND LOSS STATEMENT

The sales revenues include investment subsidies from subsidized projects in the amount of TEUR 186, which were reported in the previous year in the amount of TEUR 328 under other operating income.

The selected comparative values for the previous year relate to the balance sheet on 31 December 2017 and the profit and loss statement for the period from 1 January to 31 December 2017.

E. OTHER INFORMATION

1. Other financial obligations

The other financial obligations from rental and leasing contracts amount to a total of TEUR 57 for the period from the second half of 2018 to 2020; of this, TEUR 31 is allocated to the second half of 2018.

2. Number of employees

During the first half of 2018, an average of 52 employees (comparative value on December 31, 2017 is 35) were employed.

3. Payout block according to § 268 (8) HGB

The highest amount of profit payout allowed is equal to the amount by which the available reserves minus losses, exceed the recognized amount of the development costs (TEUR 2,883).

4. Subsequent reporting

Events of particular importance that occurred after 30 June 2018 do not exist.

Gilching, 1 October 2018

Dr. Markus Knapek	**Dipl. Ing. Joachim Horwarth**	**Hubertus Edler von Janecek**
Managing Director	Managing Director	Managing Director

4

H1 2018 results

Mynaric AG

PROFIT AND LOSS STATEMENT

in EUR	01.01.2018 - 30.06.2018	18.04.2017 - 31.12.2017
Revenues	1,257,162.08	446,228.81
Other operating income	3,167.00	0.00
Total operating performance	**1,260,329.08**	**446,228.81**
Personnel expenses		
a. Wages and salaries	-642,941.89	-448,416.53
b. Social security contributions and expenses for pensions and other employee benefits	-96,277.12	-39,573.80
	-739,219.01	-487,990.33
Depreciation on intangible fixed assets and property, plant and equipment	-143,431.60	-48,396.07
	-143,431.60	-48,396.07
Other operating expenses	-1,118,552.82	-2,870,892.94
Operating profit	**-740,874.35**	**-2,961,050.53**
Other interest and similar income	32,126.69	2,284.69
Interest and similar expenses	0.00	-22.03
Financial results	**32,126.69**	**2,262.66**
Profit from ordinary business operations	**-708,747.66**	**-2,958,787.87**
Earnings after taxes / net loss	**-708,747.66**	**-2,958,787.87**
Losses carried forward from the previous year	-2,958,787.87	0.00
Balance sheet loss	**-3,667,535.53**	**-2,958,787.87**

BALANCE SHEET

ASSETS

in EUR	30.06.2018	31.12.2017
A. Fixed assets		
I. Intangible assets		
1. Purchased licenses, commercial Property rights and similar rights and values as well as licenses to such rights and values	161,563.00	191,056.00
	161,563.00	191,056.00
II. Tangible assets		
1. Other equipment, factory and office equipment	150,959.00	124,538.00
2. Advance payments and facilities under construction	110,000.00	0.00
	260,959.00	124,538.00
III. Financial assets		
1. Shares in affiliated companies	4,961,566.82	1,961,566.82
	4,961,566.82	1,961,566.82
	5,384,088.82	**2,277,160.82**
B. Current assets		
I. Receivables and other assets		
1. Receivables from affiliated companies	8,436,156.42	2,647,680.07
2. Other assets	231,713.91	293,882.74
	8,667,870.33	2,941,562.81
II. Cash on hand and bank balances	17,315,945.74	26,812,463.39
	17,315,945.74	26,812,463.39
	25,983,816.07	**29,754,026.20**
C. Prepaid expenses	68,074.04	52,035.58
	68,074.04	**52,035.58**
TOTAL ASSETS	31,435,978.93	**32,083,222.60**

BALANCE SHEET

LIABILITIES

in EUR	30.06.2018	31.12.2017
A. Equity		
I. Subscribed capital	2,704,304.00	2,704,304.00
II. Capital reserves	31,694,606.75	31,694,606.75
III. Balance sheet loss	-3,667,535.53	-2,958,787.87
	30,731,375.22	**31,440,122.88**
A. Provisions		
Other provisions	408,032.24	256,151.00
	408,032.24	**256,151.00**
C. Liabilities		
1. Liabilities from goods and services	112,343.39	268,667.29
2. Liabilities to affiliated companies	149,943.89	92,529.59
3. Other liabilities	34,284.19	25,751.84
	296,571.47	**386,948.72**
TOTAL LIABILITIES	31,435,978.93	**32,083,222.60**

ABBREVIATED APPENDIX

A. GENERAL INFORMATION

Mynaric AG has its headquarters in Gilching and is registered in the Commercial Register Munich (HRB 232763).

B. ACCOUNTING AND VALUATION METHODS

For the abridged semi-annual financial statements on 30 June 2018 the same accounting policies have been applied as for the last annual financial statements.

C. NOTES TO THE BALANCE SHEET

1. Shares in affiliated companies

The shares in affiliated companies consist of the 100% shareholdings in the subsidiaries Mynaric Lasercom GmbH and Mynaric USA, Inc. Mynaric AG has approved the capital reserve of TEUR 3,000 at Mynaric Lasercom GmbH, which was paid in on 28 June 2018.

2. Receivables and other assets

Receivables from affiliated companies in the amount of TEUR 8,436 (comparative value on 31 December 2017: TEUR 2,648) consist of receivables from Mynaric Lasercom GmbH and Mynaric USA, Inc.

Of the receivables from affiliated companies, TEUR 6,200 have a remaining term of more than one year. Outstanding receivables from affiliated companies have a remaining term of up to one year.

Other assets have a remaining term of up to one year.

3. Subscribed capital

The capital stock of the company amounts to EUR 2,704,304 and is divided into 2,704,304 bearer shares with a nominal value of EUR 1 each.

4. Capital reserves

Capital reserve results from § 272 para. 2 no. 1 HGB [German Commercial Code] and relates to additional payments above the issue price of no-par-value shares. The placement took place in full in the 2017 financial year.

5. Balance sheet loss

The net loss results from the net loss for the short financial year 2017 in the amount of TEUR 2,959 and the net loss for the current financial year in the amount of TEUR 709.

6. Other provisions

Other provisions include, in particular, provisions from human resources of TEUR 163, outstanding invoices TEUR 143, compensation of the Supervisory Board TEUR 37, financial statement and audit expenses TEUR 21, legal disputes TEUR 17 and other provisions TEUR 27.

7. Liabilities

The liabilities have a remaining term of up to one year.

D. NOTES TO THE PROFIT AND LOSS STATEMENT

The selected comparative figures for the previous year relate to the balance sheet on 31 December 2017 and the profit and loss statement for the period from 1 January to 31 December 2017.

E. Other information

1. Other financial obligations

The other financial obligations mainly consist of a 10-year lease for the period from April 2019 to March 2029 in the amount of TEUR 10,533, of which TEUR 577 is allocated to the second half of 2018 and TEUR 1,168 to 2019.

2. Number of employees

In the first half of the financial year, the company employed an average of 16 people (in comparison to 7 on 31 December 2017).

3. Subsequent reporting

Events of particular importance that occurred after 30 June 2018 do not exist.

Gilching, 1 October 2018

The Executive Board

Dr. Wolfram Peschko Chief Executive Officer	Dr. Markus Knapek	Joachim Horwath

RESPONSIBILITY STATEMENT

We confirm that to the best of our knowledge the reporting in the financial statements of Mynaric AG for the period from January 1 through June 30, 2018 provides, in accordance with the applicable accounting principles, a true and fair view of the results of operations, financial position, and net assets and that the course of business including the business result and the situation of the company are presented in such a way as to convey a true and fair view and that the significant opportunities and risks of the expected development of the Group are described.

Gilching, October 1, 2018

The Management Board

REFERENCES

[i] Seraphim Capital, July 17, 2018. Seraphim Global Space Index, July 2017 to June 2018
https://www.seraphimcapital.co.uk/insight/news-insights/seraphim-global-space-index-july-2017-june-2018

[ii] Financial Times, September 10, 2018. Investors open up new frontiers in space through collaborations
https://www.ft.com/content/0fe585e2-8f5b-11e8-9609-3d3b945e78cf

[iii] Wired, July 20, 2018. Facebook confirms it's working on a new internet satellite
https://www.wired.com/story/facebook-confirms-its-working-on-new-internet-satellite/

[iv] Telesat, July 30, 2018. Telesat Signs Consortium of Thales Alenia Space and Maxar Technologies, the Owner of SSL, to Further Develop Designs for Telesat's Global LEO Satellite Constellation
https://www.telesat.com/news-events/telesat-signs-consortium-thales-alenia-space-and-maxar-technologies-owner-ssl-further

[v] Space News, September 11, 2018. Telesat says ideal LEO constellation is 292 satellites, but could be 512
https://spacenews.com/telesat-says-ideal-leo-constellation-is-292-satellites-but-could-be-512/

[vi] Breaking Defense, August 2, 2018. Army, NASA Want Laser Micro-Satellites For 50 Times The Bandwidth
https://breakingdefense.com/2018/08/army-nasa-want-laser-micro-satellites-for-50-times-the-bandwidth/

[vii] Aerospace Corporation, August 2, 2017. Laser Communications Demonstrated from CubeSats for the First Time
https://aerospace.org/press-release/laser-communications-demonstrated-cubesats-first-time

[viii] ICEYE, May 24, 2018. ICEYE Raises $34M in Series B Financing and Confirms Nine Satellite Launches by End of 2019
https://www.iceye.com/press/press-releases/iceye-raises-34-million-dollars-series-b-financing-confirms-nine-sar-satellite-launches-by-end-of-2019

[ix] Via Satellite, May 21, 2018. BridgeSat Laser Terminals to Connect Iceye's Microsat Constellation
https://www.satellitetoday.com/innovation/2018/05/21/bridgesat-laser-terminals-to-connect-iceyes-microsat-constellation/

[x] Collecte Localisation Satellites, September 10, 2018. The Kinéis constellation of 20 nanosatellites will be dedicated to the Internet of Things
https://www.cls.fr/wp-content/uploads/Press-release-KINEIS.pdf

[xi] BusinessWire, September 11, 2018. LeoSat Hits Major Commercial Milestone of US$1Billion
https://www.businesswire.com/news/home/20180910005912/en/LeoSat-Hits-Major-Commercial-Milestone-US1Billion

[xii] Luxembourg Space Agency, September 17, 2018. Consortium of Luxembourgish Companies to Test an Innovative Approach for Satellite-Based IoT in Space
https://space-agency.public.lu/en/actualites/2018/Consortium-of-Luxembourgish-Companies-to-Test-an-Innovative-Approach-for-Satellite-Based-IoT-in-Space.html

[xiii] Facebook Code, June 27, 2018. High altitude connectivity: The next chapter
https://code.fb.com/connectivity/high-altitude-connectivity-the-next-chapter/

[xiv] Business Insider, June 29, 2018. Facebook tested plane-mounted lasers that fire super high-speed internet over California — here are the photos
https://www.businessinsider.com/photos-facebook-aquila-lasers-wireless-internet-california-tests-2018-6?r=US&IR=T

[xv] FierceWireless, August 17, 2018. Facebook supports Elefante's mission to get rulemaking on stratospheric platforms
https://www.fiercewireless.com/wireless/facebook-supports-elefante-s-mission-to-get-rulemaking-stratospheric-platforms

[xvi] FierceWireless, August 17, 2018. Elefante Group responds to critics of its proposed airship-powered system
https://www.fiercewireless.com/wireless/elefante-group-responds-to-critics-its-proposed-airship-powered-system

[xvii] CNBC, July 23, 2018. Google's Loon to bring 4G to remote areas of Kenya – via balloon
https://www.cnbc.com/2018/07/20/googles-loon-to-bring-4g-to-remote-areas-of-kenya--via-balloon.html

[xviii] Medium (Loon Blog), September 11, 2018. 1 connection, 7 balloons, 1,000 kilometers
https://medium.com/loon-for-all/1-connection-7-balloons-1-000-kilometers-74da60b9e283

[xix] Airbus, September 25, 2018. Network for the Sky: Airbus successfully tests stratospheric 4G/5G defence communications with balloon demonstration
https://www.airbus.com/newsroom/press-releases/en/2018/09/Network-for-the-Sky-Airbus-successfully-tests-stratospheric-4G-5G-defence-communications.html

[xx] Airbus, August 8, 2018. Airbus Zephyr Solar High Altitude Pseudo-Satellite flies for longer than any other aircraft during its successful maiden flight
https://www.airbus.com/newsroom/press-releases/en/2018/08/Airbus-Zephyr-Solar-High-Altitude-Pseudo-Satellite-flies-for-longer-than-any-other-aircraft.html

[xxi] Juniper Research, June 13, 2018. In-Flight Entertainment & Connectivity Revenues to Double from 2018, Exceeding $8.4 Billion by 2023
https://www.juniperresearch.com/press/press-releases/in-flight-entertainment-connectivity-revenues

[xxii] Inmarsat, September 20, 2018. Inmarsat and Panasonic Avionics enter into landmark strategic collaboration
https://www.inmarsat.com/news/inmarsat-and-panasonic-avionics-enter-into-landmark-strategic-collaboration/

[xxiii] Inmarsat, accessed October 19, 2018. European Aviation Network
https://www.inmarsat.com/aviation/aviation-connectivity-services/european-aviation-network/

[xxiv] Boeing, September 10, 2018. Boeing HorizonX Ventures Invests in BridgeSat to Advance Satellite Communications
http://boeing.mediaroom.com/2018-09-10-Boeing-HorizonX-Ventures-Invests-in-BridgeSat-to-Advance-Satellite-Communications

[xxv] RBC Signals, October 4, 2018. RBC Signals and Ecuadorian Civilian Space Agency (EXA) Announce Collaboration For Optical Communication System
http://rbcsignals.com/rbc-signals-and-ecuadorian-civilian-space-agency-exa-announce-collaboration-for-optical-communication-system/

[xxvi] KSAT, October 8, 2018. KSAT signs MoU with Tesat on optical downlink service
https://www.ksat.no/en/news/2018/october/ksat%20signs%20mou%20with%20tesat/

[xxvii] Astrocast, September 11, 2018. Astrocast Announces Agreement with Leaf Space for Global IoT Network Use of Ground Stations
https://www.astrocast.com/blog/2018/09/11/astrocast-announces-agreement-with-leaf-space-for-global-iot-network-use-of-ground-stations/

[xxviii] Sputnik News, October 10, 2018. Source Reveals Timing of OneWeb Satellites' Debut Launch on Russia's Soyuz
https://sputniknews.com/science/201810101068745626-russia-oneweb-satellite-launch-soyuz/

[xxix] Yahoo Finance, April 19, 2016. OneWeb to build 15 internet satellites a week at Florida factory
https://finance.yahoo.com/news/oneweb-build-15-internet-satellites-week-florida-factory-192526178--finance.html

[xxx] Global Times (China), October 8, 2018. Micro-satellite ready for blastoff
http://www.globaltimes.cn/content/1122169.shtml

[xxxi] CNBC, September 27, 2018. Satellite company partners with Bezos' AWS to bring internet connectivity to the 'whole planet'
https://www.cnbc.com/2018/09/27/amazon-partners-with-iridium-for-aws-cloud-services-via-satellite.html

[xxxii] Kaharatungu (Kenya), August 30, 2018. Google Loon Spreads Wings To Uganda, A Month After Launching In Kenya
https://www.kahawatungu.com/2018/08/30/google-loon-uganda-kenya/

[xxxiii] Airbus, September 2018. Airbus and Australian Space Agency deepen partnership
https://www.airbus.com/newsroom/press-releases/en/2018/09/Airbus-and-Australian-Space-Agency-deepen-partnership.html

[xxxiv] CNET, February 22, 2018. SpaceX Starlink satellite broadband gets off the ground
https://www.cnet.com/news/spacex-starlink-satellite-broadband-launches-falcon-9-vandenberg/

[(xxxv)] Airbus, August 2018. Airbus Defence and Space selected by Telesat to further develop the design of its LEO satellite constellation
https://www.airbus.com/newsroom/press-releases/en/2018/08/airbus-defence-and-space-selected-by-telesat-to-further-develop-.html

[(xxxvi)] Boeing, October 2018. Boeing Launches New Organization to Unleash the Power of Advanced Computing and Networks in Aerospace
http://boeing.mediaroom.com/news-releases-statements?item=130318

IMPRINT

Published by
Mynaric AG
Friedrichshafener Str. 3
82205 Gilching
Germany

Corporate Communications
e comms@mynaric.com
t + 49 8105 7999-0

mynaric