Mynaric

On track for commercial roll-out in 2019

So far this year, Mynaric has made significant advances in terminals for space deployment. This keeps it on track for commercial roll-out during 2019 and positions it as a potential key supplier to the mega-constellations of satellites and aerial platforms currently under development by companies such as Facebook, Google and SpaceX.

Significant technical and commercial progress

During Q118, a communications subsystem from Mynaric was launched on a third-party satellite. In September, Mynaric announced that the first optical ground station for satellite communications had successfully passed its site acceptance test, so it was beginning serial production of both ground-to-air and ground-to-space optical ground stations. In October, the company announced the signature of a memorandum of understanding with an undisclosed company building a low Earth orbit (LEO) satellite constellation. The first satellites equipped with Mynaric's terminals should be launched in late-2019. Mynaric remains on track to complete development and qualification of its smallsat laser communication product in early-2019, which is in line with the timeline stated at the IPO. This paves the way for serial production and deployment on LEO mega-constellations thereafter.

Customer engagement intensifying

Total output during H118, was more than half the prior full-year value (€2.7m H118 vs €3.2m FY17). Output benefited from the final milestone payments for the first ground-to-space terminal (delivered in the summer), some deliveries of airborne terminals for trials by a US client and several studies for other clients, as well as accelerated development of space-borne terminals in conjunction with a potential customer. Similarly, H118 operating losses were greater than half the FY17 level (€2.5m H118 vs €3.1m FY17) as Mynaric geared up for commercial production by adding employees in engineering and sales and strengthened the team based in North America. Management estimates that cash-burn for the group was around €6.6m during H118.

Valuation: Analysis of potential revenues

As Mynaric is still at a pre-commercial stage, we show a scenario analysis looking at potential revenues derived from deployment of the technology in airborne and satellite communications networks of differing sizes. We calculate that a cluster of 250 airborne communications platforms could need €125m of Mynaric's equipment, and a constellation of 100 small satellites could need €100m.

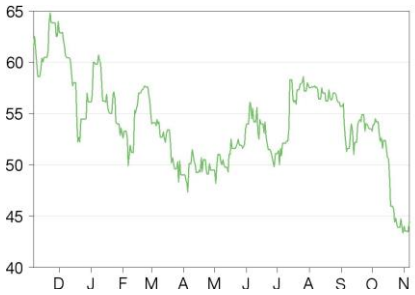
Consensus estimates for Mynaric Lasercom

Year end	Total output (€m)	EBITDA (€m)	EBIT (€m)	PAT (€m)	DPS (€)	P/E (x)
12/16	1.3	(1.7)	(3.1)	(1.8)	0.0	N/A
12/17	3.2	(2.9)	(1.8)	(3.1)	0.0	N/A
12/18e	13.7	N/A	(4.1)	(4.1)	0.0	N/A
12/19e	35.0	N/A	(0.6)	(0.6)	0.0	N/A

Source: GBC/mainfirst

Price	€44.35
Market cap	€120m

Share price graph



Share details

Code	MOY
Listing	Deutsche Börse Scale
Shares in issue	2.7m
Last reported net cash at end-June 2018	€17.3m

Business description

Mynaric has developed free space laser communication equipment that uses light to transmit data in high-capacity communication networks in the air and in space.

Bull

- Wireless laser technology gives faster data rates than conventional microwave transmission.
- Wireless laser technology potentially brings internet connectivity to remote regions.
- Mynaric technology is cost-effective for mega-constellations.

Bear

- Technology not proven in complete communications networks.
- Rate of commercial roll-out dependent on network operators securing funding.
- Limited number of potential network operators to which it can sell equipment.

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H118 technical and commercial progress

At this stage of Mynaric's evolution, technical progress is more important than financial metrics. So far this year, the company has made significant advances in terminals for space deployment, putting it on track for commercial roll-out in the airborne sector during FY19 and the space sector during FY20, thus positioning it as a key supplier to the mega-constellations of satellites and aerial platforms currently under development.

Exhibit 1: Product availability

	Air-to-air transmitter/receiver Cross-link terminal	Air-to-ground transmitter/receiver Ground link terminal	Ground-to-air transmitter/receiver Ground station
Stratosphere	Tested. Achieved 1Gpbs transmission. Available for production 2017	Tested. Achieved 10GBps transmission. Available for production 2017	Available for production 2017. Serial production to commence H218.
Space	Critical development milestone reached Jan 2018. Subsystem launched H118. In development, available H219 for live trials.	Critical development milestone reached Jan 2018. Subsystem launched H118. Complete system In development.	Available for production 2017. Product acceptance tests H118. Serial production to commence H218.

Source: Company data

First live trials on board a satellite scheduled

In January, Mynaric announced that it had reached a critical development milestone for its space-borne terminal on schedule, although details were not disclosed because of concerns about commercial sensitivity. Following that, a communications subsystem was launched on a third-party satellite to enable the first trials of ground-to-space links on a satellite rather than a laboratory environment. Mynaric remains on track to complete development and qualification of its smallsat laser communication product in early-2019, which is in line with the timeline stated at the IPO. This paves the way for serial production and deployment on LEO mega-constellations thereafter.

Exclusive agreement with Leti to enhance system performance

In April, Mynaric announced that it had formed an exclusive partnership with French research institute Leti, in which Leti's next generation of Avalanche Photodiodes (APDs) will be used in Mynaric's communication systems. The new APDs are expected to be around 10 times more sensitive than existing variants. This will enable Mynaric to significantly extend link communication distances and decrease system complexity. Reduced system complexity is expected to lead to lower production costs, size, weight and power consumption of Mynaric's laser communication units, increasing their attractiveness to people designing constellations of interconnected aircraft, drones and satellites. Management expects to receive the first APD samples during Q119 and to be able to deliver the first terminals incorporating the APDs Q319.

Development of ultra-lightweight terminal for digital agriculture

In June, Mynaric announced that it had begun to develop an ultra-lightweight (< 2kg) laser communication terminal for an undisclosed commercial partner to be used within an unmanned aerial vehicle (UAV) for digital agriculture purposes. Applications will include surveying acres of crops in minimal time and collecting information from the ground on potential insect problems or watering issues. UAVs flying at 8,000ft can survey 40,000 square acres of crops in an hour, generating a vast amount of data that farmers can use to tailor their use of pesticides and herbicides. The terminal is being designed to downstream information at a data rate of 1 Gbps at distances up to 10km. Management expects that it will be available in early-2020.

Commencement of serial production

In September, Mynaric announced that the first optical ground station for satellite communications had successfully passed its site acceptance test. This unit will be used to establish high-speed

bidirectional links with LEO satellites by the customer. Having proven the technology, Mynaric has begun serial production of both ground-to-air and ground-to-space optical ground stations, with multiple units of each type scheduled for delivery by end Q119. Management believes that this makes Mynaric the only commercial supplier of optical ground stations to have commenced serial production.

First MoU with satellite constellation builder

In October, Mynaric announced that it had signed a memorandum of understanding with an undisclosed company building a LEO satellite constellation. The first satellites equipped with Mynaric's terminals are scheduled for launch in late-2019. These will be part of a demonstration programme prior to rolling out the full constellation, which will potentially involve several hundred satellites and require more than one thousand Mynaric terminals.

H118 financials

Customer engagement intensifying

Our analysis of operating performance looks at the income statement of the main operating subsidiary, Mynaric Lasercom, as this gives a better view of performance than an examination of the income statement of the top-level entity, Mynaric AG. Although direct comparison of the H118 performance with the corresponding period in the prior year is not possible because the information is not available, a comparison with the full FY17 results shows some very favourable trends. H118 revenue benefited from the final milestone payments for the first optical ground station that was delivered in the summer, some deliveries of airborne terminals for trials by a US client and studies for half-a-dozen other clients. In total, H118 revenues were more than half the full FY17 level (€1.2m H118 vs €2.0m FY17). 'Other own contribution', which reflects the amount of development activity on projects that are not linked to customer contracts, was more than the level reported for the whole of FY17 (€1.8m H118 vs €1.2m FY17), as Mynaric continued with the development of space-borne terminals in conjunction with a potential customer. Total H118 output, which comprises revenues, inventory movement, 'other own contribution' and 'other operating income', was more than half the prior full year value (€2.7m H118 vs €3.2m FY17). Personnel expenses followed a similar pattern (€2.2m H118 vs €3.1m FY17), as management geared up for commercial production by adding employees in test, production, logistics, procurement, quality control and sales and strengthened the team based in North America. The total number of employees has increased from around 40 at the end of December 2017 to around 80 currently. H118 operating losses were greater than half the FY17 value (€2.5m H118 vs €3.1m FY17).

Cash burn

Since Mynaric is exempted from providing a cash flow because of its size, details of cash consumption are not available. Mynaric listed on the Scale index of the Deutsche Börse on 30 October 2017. Immediately before listing it raised €27.3m (gross) at €54.0/share. Net cash (there is no debt) for the top-level company, Mynaric AG, reduced by €9.5m during H118 to €17.3m at end-H118. However, this does not provide a proxy for cash-burn, as the reduction in cash reflects cash provided to the operating subsidiaries. We note that the cash balance held by the German subsidiary Mynaric Lasercom increased by €2.9m during H118. There is no information available about the cash held by the US subsidiary, Mynaric USA. Management estimates that effective cash burn for the group was around €6.6m during H118. The cost of equipment to support in-house assembly and test as the company prepares for serial production is not expected to be significant. During H118, the value of tangible fixed assets held by Mynaric Lasercom increased by €0.6m to €1.3m while intangible assets (primarily capitalised development) increased by €1.8m to €2.9m. Inventories halved to €0.2m and receivables remained broadly unchanged at €0.7m.

Outlook

Management has not provided formal guidance for FY18, although the H118 report notes that "Financial performance in the second half of 2018 is expected to surpass that of the first half due to the onset of serial production of ground stations, as well as other factors." We expect that the positive trends during the remainder of the year will be followed by potential commercial deployment in 2019. Recent technical advances put Mynaric in a good place to provide equipment to key projected constellations that are getting closer to actual implementation.

- **Facebook**: While Facebook has abandoned its in-house development of an unmanned aircraft for carrying broadband communications links, it still intends to create an airborne network, but by partnering with an established aerospace company for the aircraft. We note that Facebook has been confirmed as Mynaric's partner for the successful air-to-ground test carried out in 2017.
- **ICEYE**: First satellite launched January 2018. This will download data gathered by its on-board synthetic aperture radar via an optical communications link to BridgeSat's proposed network of ten ground stations, the first of which is already operational.
- **Loon**: Having used two Loon balloons in late 2017 to provide internet access to remote areas of Puerto Rico following the deactivation of entire cell phone networks by hurricanes, Loon graduated from a project to an Alphabet subsidiary in July 2018 and has announced its first commercial agreement, which is with Telkom Kenya.
- **SpaceX**: In February 2018 SpaceX launched two demonstration satellites: Tintin A and Tintin B. In March 2018, the Federal Communications Commission (FCC) approved SpaceX's applications for its planned 4,500 satellite constellation, Starlink. These satellites are designed to communicate with each other using optical links.

Valuation

The share price has fallen by around 20% from a peak of €55.30 in September and is currently trading around 18% below the IPO level of €54.0/share.

Mynaric is still at the pre-commercial phase and is not expected to be profitable until FY20. This limits the value of any analysis based on peer multiples, which do not ascribe any value for the substantial growth that may be realised after FY19 when many of the proposed mega-constellations that could potentially deploy Mynaric's terminals are scheduled for launch. It is not surprising therefore that Mynaric's FY19 EV/sales multiples are at the upper end of our sample of listed peers involved in optoelectronics components and subsystems, all of which are at a later stage of corporate development than Mynaric.

Exhibit 2: Comparison of peer multiples

Company name	Market cap ($m)	Year 1 EV/sales (x)	Year 2 EV/sales (x)
Accelink Technologies Co	16,638	3.0	2.4
EMCORE Corp	136	0.8	0.7
Finisar Corp	1,956	1.2	1.0
Infinera Corp	964	0.8	0.5
Lumentum Holdings	3,461	2.1	1.9
NeoPhotonics Corp	362	1.2	1.0
Mynaric AG	120	6.8	2.7

Source: I/B/E/S, GBC, mainfirst Note: prices as at 1 November 2018.

We supplement the peer-based approach with a scenario analysis showing potential revenues achievable if the technology is deployed in communication systems of different sizes. We split the analysis into two types of system. The first looks at communication networks based on smaller LEO satellites, which typically have more than 100 satellites each. The second looks at communication networks based on many more, less expensive platforms, which may be either UAVs, aircraft or

balloons. A communications satellite has space-qualified terminals, which are more expensive than those on an airborne platform.

Exhibit 3: Analysis of potential revenues

Internet LEO system				
Cost of payload* (€m)	2	2	2	2
% payload composed of Mynaric systems	50%	50%	50%	50%
Number of satellites in constellation	50	100	200	300
Revenues attributable to Mynaric (€m)	50	100	200	300
UAV, aircraft, balloon-based system				
Cost of payload (€m)	1	1	1	1
% payload composed of Mynaric systems	50%	50%	50%	50%
Number of platforms in constellation/cluster	50	100	250	500
Revenues attributable to Mynaric (€m)	25	50	125	250

Source: Edison Investment Research. Note: *payload is the part carrying out the communications or sensing function.

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