

# Terranet

Mangold Insight – Commissioned Research – March 2021

**MANGOLD**

## On track to offer better security

Terranet, which develops Voxelflow, a driver-assistance technology for use in vehicles, has successfully shown a prototype of Voxelflow together with its business partner Mercedes-Benz at an automotive industry event. This is the first step in Voxelflow's goal to undergo testing in vehicles, which is expected to occur in the second half of 2021. Voxelflow remains in an early development phase, but has great potential to become an industry standard for cars in urban traffic.

## New scenario analysis indicates greater potential

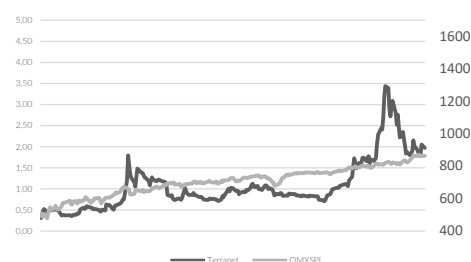
Mangold has valued the company based on a volume scenario for Terranet's product in both vehicles and trucks. Based on this, we presume that Voxelflow will reap 5 percent of the radar market and 20 percent of the lidar market. Our foundation is based on Level 2 driverless vehicles. This scenario conveys a fairer picture of the potential of the company's product, Voxelflow.

## Raised price target

Mangold has opted to raise the price target for Terranet based on revised forecasts and assumptions. The new price target is set at SEK 4.70, compared to SEK 2.50 previously. The increase is based on our market analysis, where we assume that Terranet's Voxelflow takes market share from both radar and lidar. Mangold has chosen to value the company using a DCF-model that takes account of high levels of risk. Mangold believes, however, that it is important to point out that the company is in an early phase, and that an in-vehicle product is many years away. Meanwhile, the technology in driverless vehicles continues to improve and activity is high, which could lead to greater interest in the company.

## Information

Rec. price/Price target (SEK)	Buy 4.70
Risk	High
Price (SEK)	2,02
Market value (MSEK)	336
No. of shares (million)	217
Free float	83.7%
Ticker	TERRNTB
Next report	12 May 2021
Website	<a href="http://terranet.se">terranet.se</a>
Analyst	Jan Glevén



## Price trend

	1 m	3 m	12 m
TERRNTB	-34,6	132,7	287,2
OMXSPI	4,9	15,3	70,9

## Key ratios

	2019	2020	2021P	2022P	2023P
Sales (KSEK)	4,510	3,871	4,000	4,000	4,000
EBIT (KSEK)	-42,194	-31,662	-33,131	-37,712	-41,638
Profit/loss before tax (KSEK)	-19,619	-18,604	-16,543	-21,370	-21,369
EPS, adjusted (SEK)	-0.06	-0.06	-0.05	-0.07	-0.07
EV/Sales	122	151	155	143	131
EV/EBITDA	neg	neg	neg	neg	neg
EV/EBIT	neg	neg	neg	neg	neg
P/E	neg	neg	neg	neg	neg

## Ownership structure

	Capital	Votes
Maida Vale Capital	25,159,723	14.8%
Avanza Pension	12,096,002	7.1%
Nordnet Pension	6,177,967	3.6%
Knutsson Holdings	5,949,996	3.5%
Fredrik Olsson	4,374,072	2.6%
Other shareholders	115,745,117	68.3%
Total	169,502,877	100%

# Investment Case

## Winning technology on the radar

Mangold reiterates its strong buy recommendation for Terranet and suggests a raised price target of SEK 4.70 based on a 12 month projection period. Terranet develops a new in-vehicle technology, Voxelflow, used for advanced driver assistance. This technology is set to complement today's radar and lidar systems. The company also has several projects in positioning and 5G technology, which could bear fruit in the longer term. Mangold is of the view that the Voxelflow technology makes up the core value in the company. This is also the technology on which the company has opted to focus its development resources.

*Price target of SEK 4.70 equal to an upside of over 130%*

*Voxelflow technology will develop*

## An attractive market

Mangold projects that the demand for vehicle cameras and imaging systems will grow steadily going forward amid higher demand for vehicle security. Terranet's objective is for Voxelflow to complement both radar and lidar. We believe this positioning will gain traction, while also creating opportunities for contracts and collaborations with players in the automotive industry.

*Growing market for Voxelflow*

## A competitive technology

The Voxelflow technology offers several advantages compared to existing solutions such as radar and lidar. It is both cheaper and easier to integrate into vehicles. The image quality of Voxelflow is sharper, and the technology works far better in poor weather conditions than current market products. The technology is intended to become a standard in vehicles, which can then be supplemented by both lidar and radar.

*Technology complements both radar and lidar*

## Deals and collaboration a likely way forward

Major players in the realm of driverless vehicles are continuously seeking more enhanced technologies than what radar and lidar has demonstrated thus far. Some subcontractors are choosing to develop new lidar technology themselves, or to buy startups with the latest technology. This creates opportunities for new players like Terranet, who through their cutting-edge technology for driver-assistance systems for vehicles can meet market demand. Mangold is positive that Terranet could be included in some kind of deal, and has identified potential business partners (see initial analysis). A deal would most likely raise the company's value dramatically. This event has not been reflected in this analysis.

*High likelihood of business relations with Tier 1 companies or semiconductor companies*

## Attracting leading project partners

Terranet is in an early phase of its development, but has already gained confidence from industry leaders such as the German automotive manufacturer Mercedes-Benz, the American entertainment company Disney, and Swedish automotive subcontractor Haldex. Mangold assigns a high probability for Terranet to attract more business partners going forward, which makes a takeover scenario likely.

*Collaboration with Mercedes-Benz a key trigger*

# Terranet – Update

## **On track to offer better security**

Terranet, which develops Voxelflow as a form of driver support and anti-collision system, is challenging existing radar and lidar systems. The company is early on in its product cycle, and has shown one prototype to date. This prototype was presented in February 2021 alongside its business partner Mercedes-Benz at the Startup Autobahn event. The event is hosted with the aim to showcase disruptive technology, co-founded by Daimler and the University of Stuttgart, and organised by Plug and Play which is an organisation for startups based in Silicon Valley. Various industry leaders are associated with the event, including Porsche and Bosch.

*Terranet develops software that will complement radar and lidar systems*

## **Enhanced collaboration with Mercedes-Benz**

Terranet is working alongside Mercedes-Benz on Voxelflow. The aim is to make the technology an industry standard and thus improve the conditions for existing radar, lidar and camera systems. This has resulted in a minor order for a prototype, as well as a Memorandum of Understanding on extended, more in-depth collaboration. Next, Voxelflow will be demonstrated in a demo vehicle. This is expected to occur during the second half of 2021.

*Voxelflow in demo vehicle in next stage*

In the longer run, Voxelflow is to be launched in one of Mercedes-Benz's model programmes. Besides Mercedes-Benz, Terranet has various collaboration projects, including a project with industrial consultants AFRY. This collaboration focuses on technical services in 3D image perception and Autonomous Vehicles (AV) and Advanced Driver-Assistance Systems (ADAS). The project with Disney has been put on hold amid hurdles caused by the global pandemic. Terranet remains assured that the project will resume. Finally, the company also collaborates with Haldex.

*Collaboration with AFRY*

## **Benefits of Voxelflow technology**

Voxelflow is based on an algorithm creating software technology that is intended to complement lidar and radar in Autonomous Vehicles (AV) and Advanced Driver-Assistance Systems (ADAS). Data generated by Voxelflow is used by the vehicle's automatic steering and braking system to avoid collisions. The majority (i.e. 94 percent) of all traffic accidents are due to human errors. To prevent accidents from happening, current technology needs to be improved. Lidar and radar, the most common camera technologies, are inadequate when it comes to avoiding accidents at short range. In particular, a driver's attention during the final three seconds before a collision is crucial.

*Human error is the root cause of traffic accidents*

The Voxelflow system comprises three event cameras and a laser scanner, which are integrated into the windscreen and headlights. This technology generates a 3D image in nanoseconds. The system specifies the speed, direction and position. Current technology for driver-assistance systems use 2D pixel-based image systems, which are inferior in poor weather conditions for example. Voxelflow has performed well in rain, snow and fog compared to radar and Lidar.

*3D technology at the leading edge*

# Terranet – Update contd.

## **The need for improved technology**

The automotive industry needs better and safer technology to help prevent short range collisions. Lidar, the most widely used technology in AV/ADAS, is best suited to ranges beyond 30 to 40 meters. Lidar is based on laser beams that scan objects. Voxelflow is different since it uses 3D-technology and event-based sensors, which in turn are more likely to detect obstacles and objects at close range (corner-case collisions), such as a pedestrian suddenly stepping out from behind a parked car. With Voxelflow the response time can be reduced to 5 milliseconds, compared to 300 milliseconds with lidar. This equates to a braking distance of 5.3 meters for a vehicle travelling at 70 km/h. Voxelflow dramatically cuts the reaction distance from 6 meters to 6 centimeters. The aim is to develop Voxelflow from 250,000 voxels per second to over 1 million voxels per second.

*Short response time with Voxelflow*

## **Management team strengthened**

Terranet's executive management comprises of CEO Pär-Olof Johannesson and CFO Johan Wångblad. The latter has been with the company since autumn 2020 and has extensive experience of the automotive industry, with various leading roles at Volvo Cars. Here, Johan Wångblad experience ranges from projects in innovation to projects from the Volvo Cars Technology Fund.

*Johan Wångblad new CFO with long experience from Volvo Cars*

Christian Larsson is the company's Product Manager and is also part of the executive management team. This also applies to Simon Morris, who is Terranet's Business Development Manager since the beginning of 2021. He has long experience of advanced imaging systems for vehicles.

Another new team member in management is Michaela Berglund, who is CMO (Chief Marketing Officer). Dirk Smits operates from Silicon Valley in California as the inventor and developer of Voxelflow. Rights and contracts regarding Voxelflow have been renegotiated with Dirk Smits, founder of the imaging system. The new contract strengthens Terranet's position as the licence is now exclusive, global, not time-restricted, and relates to Automotive and Transportation Vehicles. Finally, royalties payable on commercialisation are in the low single-digit figures.

*Michaela Berglund new CMO*

*Dirk Smits, the founder, operates from Silicon Valley*

## **Raising capital for continued development**

Terranet carried out a new share issue in 2020, and raised capital through the subsequent redemption of share warrants. In total the company raised SEK 70 million. In March 2021, Terranet can bring in further capital via share warrants (TO2). Given that utilisation is fully triggered, the company will raise more than SEK 40 million. In August 2021, the company has the opportunity to raise more capital via a series TO3 warrants, and a capital injection on the same scale as TO2.

*Development requires capital*

*Capital injection through warrant issue*

## **New long-term owners**

As Terranet has brought in capital, it has also attracted new owners. The largest shareholder is Maida Vale Capital, which owns about 16 percent of Terranet. Knutsson Holdings is also a new owner, holding about 3.7 percent. Mangold is of a positive view on new shareholders with long-term commitments.

*New owners - with long-term commitments*

# Terranet – Estimates

## Market volume, vehicles

In this analysis, Mangold has opted to make forecasts based on the potential number of cars and trucks that could be equipped with Voxelflow technology, which in turn is based on a percentage of the radar and lidar market. The volume of cars sold in North America, the EU and China forms the basis for assumptions about future earnings for Voxelflow. From this, cars fitted with driver assistance at level 2 have been selected as relevant for analysis. Information on levels of autonomy can be found in our initial analysis. Subsequently, the percentage of vehicles that can be categorised as level 2 is based on data from Terranet. In the USA and EU, the percentage is 25 and 35 percent respectively. For China it is estimated at 5 percent, and for trucks globally it is 15 percent.

*Level 2 equipped vehicles are the basis for our assumptions*

*Higher proportion of level 2 in USA and EU than China*

### MANGOLD – ESTIMATES ASSUMPTION

(Mln)	Volume vehicles	Percentage Level 2	Total	Radar	Lidar	Voxelflow
USA	15	25%	3.7	2.9	0.7	
EU	10	35%	3.5	2.8	0.7	
China	19	5%	1.0	0.8	0.2	
Trucks	5	15%	0.8	0.6	0.2	
<b>Market share (MUSD)</b>				0.4	0.4	0.8

Source: Statista, ACEA, CPCA, Terranet

## Estimates for Voxelflow

Terranet intends to capitalise on its technology by providing licensing for its software from which it will obtain a fee. We have assumed this fee to equal USD 100 per vehicle. Terranet will primarily be collaborating with OEMs and Tier 1 companies, examples of which can be found in our initial analysis. Mangold is assuming that Terranet will have a finished system ready for vehicle integration starting 2024. Until then, Mangold does not foresee any significant earnings, even though different collaborations could generate earnings. The forecast assumption of Terranet taking 5 percent of the radar market and 20 percent of the lidar market is deemed to materialise in 2027. The market has been analysed in USD, and then converted to SEK using the conversion rate USD 1 = SEK 8.50.

*Voxelflow software set at USD 100 per vehicle in our analysis*

*Terranet can take 5 % of radar and 20 % of lidar market in our base scenario*

### TERRANET – ESTIMATES

(MSEK)	2024	2025	2026	2027	2028	2029	2030
<b>Sales Voxelflow</b>	61	243	406	607	971	1,517	2,427
<b>Growth</b>		300%	68%	49%	60%	56%	60%

Source: Mangold Insight, Terranet

# Terranet – Valuation

## Terranet valued using a DCF-model

Mangold values Terranet using a DCF-model. The forecast period extends until 2030. Mangold has assumed a return requirement of 16 percent. This generates a justified value of SEK 4.67 per share. Earnings are far in the future, which implies that the degree of uncertainty in our forecasts is high.

*Fair value SEK 4.67*

In the initial analysis, Mangold made investors aware that there is high M&A activity in the field of autonomous vehicles and LiDAR, as well as radar technology. In particular, this relates to the acquisition of companies. Based on these observations, Mangold also views Terranet as a potential takeover company. In its analysis, Mangold has chosen to take account of upcoming share dilutions from the two warrant series in March and August 2021.

*Full dilution*

### TERRANET – DCF

(KSEK)	2021P	2022P	2023P	2024P	2025P	2026P	2027P...	2030P
EBIT	-33,131	-37,712	-41,638	-31,561	-17,738	28,109	88,024	690,905
Free cash flow	-33,738	-46,680	-46,727	-34,958	-21,147	20,637	74,106	226,429
Terminal value								4,408,293

Assumption	Discount rate	Growth	Tax
	16%	3%	22%

### Fair value

Enterprise value	1,389,512
Equity value	1,419,231
Price target per share	4.70

Source: Mangold Insight

## Sensitivity analysis

In a base case, Mangold has assumed a discount rate of 16 percent. This table shows how the share price changes when the return requirement changes.

### TERRANET – SENSITIVITY ANALYSIS

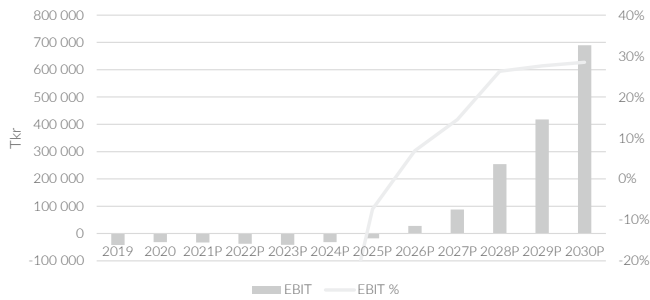
Disc. rate %	15%	Base case	17%
Base case	5.40	4.67	4.06

Source: Mangold Insight

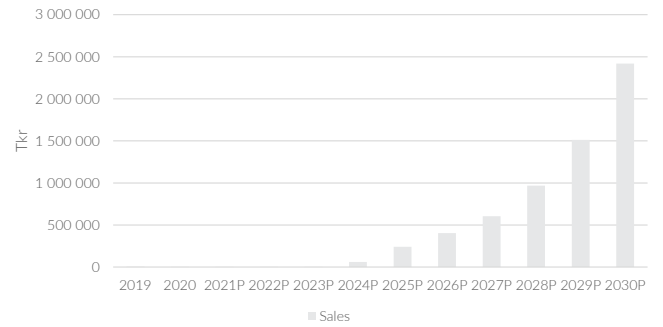
*Share worth SEK 4.00–5.40 applying discount rate of between 15–17%*

# Terranet – Appendix Diagram

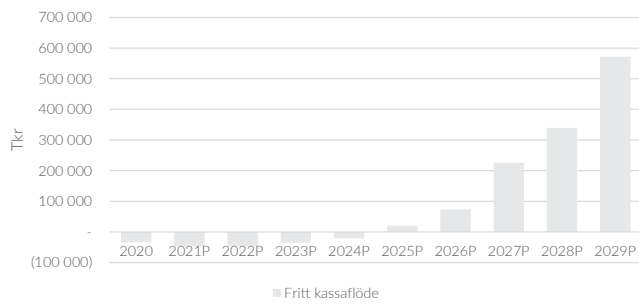
Terranet - EBIT and margin



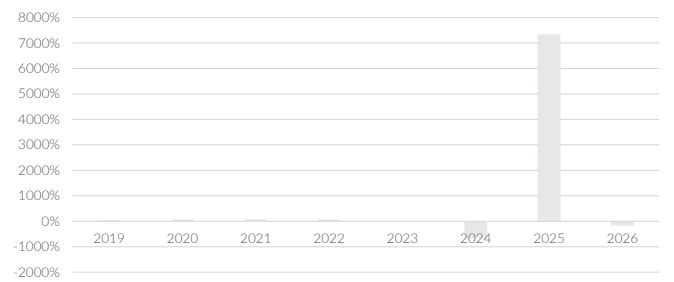
Terranet - Sales and Growth



Terranet - Free Cashflow



Terranet - Equity/Asset Ratio



# Income statement and balance sheet

<b>Income statement (KSEK)</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021E</b>	<b>2022E</b>	<b>2023E</b>	<b>2024E</b>	<b>2025E</b>
Sales	8,635	4,510	3,871	4,000	4,000	4,000	60,613	242,452
Cost of goods sold	0	0	0	0	0	0	-45,460	-157,594
Gross profit	8,635	4,510	3,871	4,000	4,000	4,000	15,153	84,858
Gross margin	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	25.0%	35.0%
Employee cost	-24,951	-16,555	-11,853	-14,400	-16,800	-19,200	-19,200	-21,600
Other operating expenses	-24,080	-20,469	w20,544	-20,000	-20,000	-20,000	-20,000	-72,736
Depreciation/amortisation	-21,321	-9,680	-3,136	-2,731	-4,912	-6,438	-7,507	-8,255
Operating profit/loss	-61,717	-42,194	-31,662	-33,131	-37,712	-41,638	-31,553	-17,732
Operating margin							neg	neg
Net interest expense	151	-4,482	-3,231	-2,955	-2,955	-2,955	-2,955	-6,955
Profit/loss	-61,566	-46,676	-34,893	-36,086	-40,667	-44,593	-34,509	-24,687
Taxes	0	0	0	0	0	0	0	0
Net profit/loss	-61,566	-46,676	-34,893	-36,086	-40,667	-44,593	-34,509	-24,687

<b>Balance sheet</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021E</b>	<b>2022E</b>	<b>2023E</b>	<b>2024E</b>	<b>2025E</b>
<b>Assets</b>								
Cash and bank balances	-715	11,569	31,194	114,128	58,635	11,831	26,734	68,403
Accounts receivable	3,124	1,050	1,233	2,466	3,699	4,039	11,625	19,612
Inventories	0	0	740	1,233	1,479	1,818	5,231	8,825
Non-current assets	475	1,224	1,224	1,224	1,224	1,224	1,224	1,224
Total assets	14,425	12,511	16,260	17,634	18,871	19,983	17,985	16,187
	29,255	26,354	50,650	136,685	83,908	38,896	62,800	114,250
<b>Liabilities</b>								
Accounts payable	2,334	2,787	740	1,479	2,219	3,635	10,463	17,650
Liabilities	4,116	12,264	32,264	32,264	32,264	32,264	32,264	32,264
Total liabilities	6,450	15,051	33,004	33,743	34,483	35,899	42,727	49,914
<b>Equity</b>								
Restricted equity	24,213	50,503	90,503	230,503	230,503	230,503	230,503	230,503
Non-restricted equity	-1,408	-39,200	-72,857	-127,562	-181,078	-227,506	-210,430	-166,167
Total equity	22,805	11,303	17,646	102,941	49,425	2,997	20,073	64,336
Total liabilities and equity	29,255	26,354	50,650	136,685	83,908	38,896	62,800	114,250

Source: Mangold Insight



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Mangold most recently analysed Terranet on 03 march 2021.

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Mangold owns shares in Terranet.

Mangold performs/has performed services for the company and receives/has received compensation from the company for these services.

Mangold comes under the supervision of the FI.

Recommendation structure:

Mangold Insight grades its share recommendations for 12 months ahead, based on the following structure:

Strong buy – An upside in the share of at least 20%

Moderate buy – An upside in the share of 10–20%

Neutral – An upside and downside in the share of 0–10%

Moderate sell – A downside in the share of 10–20%

Strong sell – A downside in the share of at least 20%