

# TerraNet

First day of dealings

Proximal solutions, multiple applications

Software

30 May 2017

**Price** **SEK13**

**Market cap** **SEK312m**

Net cash (SEKm) at 31 December 2016 4.4

Shares in issue 24.0m

Free float 41%

Code TERRNT B

Intended primary exchange Nasdaq First North

Secondary exchange N/A

TerraNet is a proximity networking software company with initiatives across a number of key applications including software for contextual awareness in mobile phones, connected car technology, audio headsets, IoT, multimedia video streaming, mHealth and the trading of surplus data capacity between smartphones. The company has attracted leading global firms to its propositions including Qualcomm, Autoliv, 3M Peltor, Saab and now IBM. Successful execution across any one of these applications should drive strong growth, but as the company's products are still very early stage, investment is high risk.

Year end	Revenue* (SEKm)	EBITDA (SEKm)	EPS** (SEK)	Net operating cash flow (SEKm)	Net debt/(cash) (SEKm)	EV/revenue (x)
12/15	0.4	(17.2)	(2.4)	(13.3)	(5.2)	584.5
12/16	2.7	(25.0)	(3.2)	(22.4)	(4.4)	85.4
12/17e	16.1	(52.3)	(3.1)	(50.4)	(59.5)	14.1
12/18e	55.2	(55.2)	(2.6)	(55.6)	2.3	4.1

Note: \*External revenues excluding own work capitalised. \*\*Normalised.

## Business description

TerraNet is an early commercialisation-stage software company with expertise in peer-to-peer communications. Its products encompass chip integration software, IoT, including connected cars and headsets, multimedia streaming, and GriDD, an innovative data capacity trading product.

## Next events

H117 earnings 23 August 2017

Q317 earnings 15 November 2017

FY17 earnings 27 February 2018

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## Early-stage company addressing multiple verticals

TerraNet is an early stage company with technology that includes software to communicate, trade data capacity and multicast video streaming without networks as well as providing contextual awareness for smartphones. The company has developed several applications and is working with a number of leading firms to commercialise them. Revenues are currently being generated from paid development work. We expect the first revenues from licensing and app sales to commence in 2018, principally from chip integration and data trading apps.

## Qualcomm chip software a major opportunity

TerraNet has developed contextual awareness (CA) software for the latest range of Qualcomm's Snapdragon chips, which it has commenced marketing to handset OEMs and app designers in China. The software will enable designers to create apps that alert users to opportunities arising from the local environment, such as the chance to be alerted to buy milk, or chat to a friend around the corner. This market opening has arisen because Google does not presently sell its software in China.

## Valuation: DCF share value range of SEK13.4-15.2

Our forecasts and valuation are predicated on TerraNet being successful in commercialising its key product lines, reaching a free cash flow positive position during 2020 and attaining estimated required funding of SEK70m up to that point. Our DCF-derived fair value range within this central scenario is SEK13.4-15.2 per share. The key 12-24 month milestones for TerraNet to demonstrate progress with this scenario are first sales of chip integration software in China in Q417, successful trials of vehicle-to-vehicle (V2V) software development kits, roll-out of GriDD and two to three client acquisitions in Multimedia Services in 2018. This is followed in 2019 by first licence revenues from V2V and other Internet of Things (IoT) lines. Clearly our base case is only one of a wide range of potential outcomes. Successful execution across a number of applications could drive upside to these forecasts. Equally, delays or setbacks could challenge the business's economic viability.

**TerraNet is a research client of  
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## Investment summary

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### Proximal solutions, multiple applications

TerraNet was founded in 2004 by entrepreneur Anders Carlus to develop ad-hoc mobile phone “mesh” networks (using the IEEE 802s.11S Mesh standard) for use outside established cell-phone networks. The group uses the proximal connectivity and mesh know-how at its core to create software solutions for a wide range of user groups, including smart phones, autonomous driving, headphone communications, trading surplus data capacity and the IoT sphere. The last two years have seen the group’s products, which are backed by more than 10 patents, attract major international firms including Autoliv, Qualcomm, Quantenna, 3M Peltor, Sony Mobile and India Object One. TerraNet is currently focused on the development of its three key business areas and its transformation from an R&D company to a global business with significant licence fee streams. TerraNet’s headquarters are in Lund, a key university/tech centre in Sweden, and it has sales representatives in San Jose, Hyderabad and Taipei. The company raised SEK100.1m (gross) from the issue of 7.7m shares in an IPO in May 2017. The largest shareholder, with 7.6% of total equity, is Danir AB, the holding company of board member and civil engineer/entrepreneur Dan Olofsson.

### Financials: Prospects to become cash flow generative in 2020

TerraNet is in the initial product commercialisation phase. The company has a debt free balance sheet, with SEK4.4m cash at end-2016 and a further SEK26.6m net of fees raised since year-end from recent share issues. Cash burn (operating plus investing cash flows) was SEK27.9m in 2016 and we forecast it to increase to SEK59.5m in 2017 as the group ramps up employee numbers and marketing spend. We forecast TerraNet to generate SEK16.1m in revenues this year and then achieve a revenue CAGR of 97% over the next four years to reach SEK241m in 2021. Our base case forecast is for the group to reach a positive EBITDA and become free cash flow generative during 2020. Before this stage, however, we assume that the group will require SEK70m in new funding in 2017-20, although following the successful raising of a net SEK 88.1m during the recent IPO, we do not expect it to need further funds until H218, which we estimate at only SEK20m.

### Valuation: Post-IPO DCF share valuation range of SEK13.4-15.2

We have valued TerraNet using a DCF model and peer comparison. Our base case DCF gives rise to a valuation range of SEK13.4-15.2 per share, including the net SEK 88.1m raised during the recent IPO. This reflects the assumed emergence of the group into free cash flow generation during 2020 and strong growth in revenues from V2V and Chip Integration revenues to 2021. Our cautious assumption that Chip Integration revenues in China taper from 2022 on the potential re-entry of Google to China has a significant dampening impact on the valuation. Absent this, a more favourable scenario points to a potential DCF valuation of above SEK600m. As is typical for a company at such an early stage in terms of commercialisation, it is a high-risk investment. Our valuations and forecasts are highly dependent on the group achieving its key milestones (see Exhibit 2) as well as raising ongoing funding as required.

### Sensitivities: A number of unique propositions

**Many products are unique with uncertain outlooks:** TerraNet operates in highly competitive markets with a high level of innovation and disruption. In terms of revenue security, TerraNet has yet to conclude any licensing deals and contracts for non-recurring engineering work totalled SEK7.1m at November 2016. A number of the key products such as GriDD are unique to the market, which gives rise to sensitivities in areas such as pricing and volumes. As a company with limited resources, TerraNet may find it difficult to defend its IP from exploitation by third parties.

**Funding:** A key sensitivity is the need for an estimated SEK160m in external funding to bring the group to cash flow break-even during 2020. The share price could accordingly react negatively to concerns about possible equity dilution. **Chip Integration:** Sales of contextual awareness software for flashing onto Qualcomm chips for Smartphones, which generates the largest share of revenues in our forecast until 2021, are sensitive to the potential return of Google to China. **IoT:** The auto sector has rigorous quality standards and long product life cycles so failure of TerraNet's technology to meet the required standards or use case would severely curtail revenues. The business case in the event of 5G being widely adopted as the primary means for V2V communications rests upon dedicated short-range communication (DSRC) or Wi-Fi being widely used as a redundancy system. **Multimedia Services:** Multimedia service revenues are likely to be sensitive to the pace of roll-out of Wi-Fi Aware handsets that will improve user experiences. **GriDD:** Sales of GriDD will be sensitive to cellular operators adopting the disruptive technology for customer retention purposes.

## Company description: Working in multiple verticals

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In recent years, new TerraNet management has created a number of imaginative use cases backed up by market research, to address modern needs. The company seeks to benefit from the upcoming launch of the Wi-Fi Aware standard and the resulting inclusion of features in new smartphones, which will further improve the peer-to-peer user experience. A cornerstone of the strategy is the creation of high-level connections with leading players in its markets, and here again it has been very successful, reaching agreements with Qualcomm, Autoliv, Saab, Quantenna, 3M Peltor and most recently IBM across TerraNet's range of technologies. Key software expertise includes:

- Contextual awareness software for Wi-Fi Aware chipsets, enabling apps to tailor services to react to what is in the device's environment (eg stores, parks) with low battery use.
- Proximate detection: rapid detection of mobile devices in proximate range with low battery use.
- Peer-to-multi-peer streaming of high-quality video content outside standard networks.
- Co-operative positioning: establishing vehicle positions without fixed reference points based on signal strength and signal angle from other vehicles, creating redundancy for GPS systems.
- Multi-hop, which extends the reach of mesh networks in V2V and peer-to-peer applications.

## Strategy: Monetising IP and building centres of excellence

TerraNet is at a key point in its transformation from a pure R&D business into an international sales and delivery driven organisation. The key focus of management is accordingly on the commercialisation of the range of applications generated from its core IP and the development of sales and marketing and support structures.

As regards product development, GriDD and Multimedia software are priorities for 2017, being at the key stage of marketing and attracting licence deals. The team is also building up the engineering capacity to undertake the non-recurring engineering (NRE) work required to initialise licence revenues. Management is also working to secure the long-term future of the business by establishing centres of excellence to maintain the pipeline of disruptive technology. It is also exploring acquisitions and JVs with potential to further fill the product pipeline and/or increase marketing reach. A further priority is ongoing progress towards building a growth and quality-oriented international organisation structure, with an effective bonus system, which can support its international sites in the US, India and Asia. TerraNet currently has approximately 30 employees, of whom 18 are development engineers at its Lund headquarters.

## **Monetisation**

Of the four key business areas, in terms of monetisation, Chip Integration is the most advanced. The group recently commenced marketing its Chip Integration software for inclusion on the latest Snapdragon chips to smartphone OEMs in China. A key component of the marketing strategy is the promotion of TerraNet's app development software (SDKs and APIs) to app developers and sellers. The software development kits (SDKs) and application protocol interfaces (APIs) will be provided free to developers to encourage the creation of an extensive body of apps incorporating contextual awareness based on TerraNet's software. Monetisation will come in the form of sales of the on-chip software to the OEMs to enable their customers to make use of the new generation of apps.

In IoT the group is working with a number of leading players to incorporate its software and features in their products, the aim being to generate volume-based licence revenues. TerraNet is already working with major firms such as Autoliv and 3M Peltor in automotive and headset applications for its software. It is also actively pursuing other use cases across a range of other verticals, including mHealth (with IBM), security, intelligent home and defence.

With the GriDD and Multimedia Services, the strategy is to firstly monetise the products by integration of the group's software into client company platforms (MNOs with GriDD and media companies with Multimedia Services) but also to produce apps as well as SDKs and APIs to generate licence and/or app sales revenues.

## **Management**

TerraNet's management and board encompass a very wide range of experience and talents (see biographies on the back page). In 2009, Pär-Olof Johannesson was appointed CEO and since then has overseen the transformation of the group's IP into a broad range of products. He has also been integral to the formation of numerous agreements with leading international groups, many of these realised via direct approach to their Swedish management (eg 3M Peltor, Saab, Volvo). US-based VP of Marketing and Sales Andrew Jue has over 29 years' experience in marketing and management in the areas of consumer electronics, semiconductors, multimedia, networking and software, with a background encompassing Broadcom Wireless Entertainment and National Semiconductor. New CTO Ola Samuelsson has a background in integrating sensors and connectivity technologies in several verticals with a background at Sigma Connectivity and Sony Mobile Communications.

The board includes Anders Rantén, an initial TerraNet seed funder, and owner entrepreneur and corporate executive, formerly at Malmö Aviation; Dan Olofsson, majority owner of TerraNet and founder and owner of Sigma, Epsilon and Teleca; Sami Niemi, founder and former CTO of Scalado, and Site Manager of Nokia and Microsoft in Lund; Conny Larsson, entrepreneur and business owner; and Gajinder Vij, product executive at Qualcomm.

## **Initial public offering**

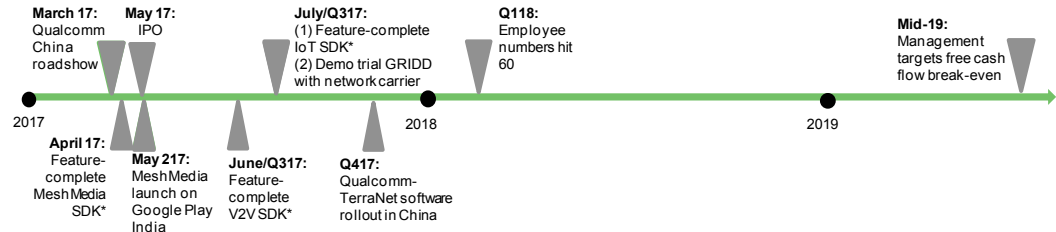
TerraNet undertook an initial public offering (IPO) in May 2017. The company issued 7.7m new B shares at a price of SEK13 per share. The issue raised SEK100.1m in new funds, of which costs are estimated to have been SEK12.0m.

Management and board members who took part in the recent IPO have signed lock-up agreements that expire 360 days after the first day of trading, which took place on 30 May 2017. This corresponds to approximately 10.7% of outstanding shares.

## Key milestones

Management has set out a number of milestones (see Exhibit 1) that it expects to achieve by end 2019. The milestones show the timeline to complete essential projects for the commercialisation of V2V, Chinese mobile OEM and GrIDD products.

**Exhibit 1: Management's milestone targets**



Source: TerraNet. Note: \*"Feature-complete" means ready for test and evaluation phase (typically six months) ahead of client integration.

In Exhibit 2 we summarise the milestones and events that we have used as cornerstones for our forecasts. These include assumptions and scenarios, such as Google re-entering the Chinese market in 2022, that are not based on expectation but the reasonable chance that they may occur in that timeframe.

**Exhibit 2: Milestones assumed in Edison base case forecasts**

Chip Integration	IoT
<b>Software licensing, Qualcomm</b> <ul style="list-style-type: none"> <li>■ <b>Q417</b> First sales of TerraNet software on Qualcomm chip.</li> <li>■ <b>YE18</b> Roll-out of Wi-Fi Aware to 24% of Snapdragon chips, TerraNet wins 18% of the addressable market.</li> <li>■ <b>YE19</b> Roll-out of Wi-Fi Aware to 35% of Snapdragon chips, TerraNet wins 30% of the addressable market.</li> <li>■ <b>YE20</b> Roll-out of Wi-Fi Aware to 65% of Snapdragon chips, TerraNet wins 40% of the addressable market.</li> <li>■ <b>2022</b> Google assumed to return to China. Sales of TerraNet software in China assumed to start to decline.</li> </ul>	<b>V2V</b> <ul style="list-style-type: none"> <li>■ <b>2019</b> US regulator announces choice of DSRC for mandatory V2V from 2023.</li> <li>■ <b>2018</b> TerraNet positioning and multi-hop tech found to meet industry standards.</li> <li>■ <b>2019</b> First sales of TerraNet V2V software via Autoliv. 11% share of OEM V2V market.</li> <li>■ <b>2021</b> DSRC starts to lose market share to LTE/5G.</li> <li>■ <b>2021</b> DSRC adopted as redundancy system in US. TN gains 17% market share.</li> <li>■ <b>2023</b> Introduction of mandatory V2V in US and take-off of after-market products. Leading to software sales for 21% of DSRC or Wi-Fi based V2V products.</li> </ul> <b>Audio</b> <ul style="list-style-type: none"> <li>■ <b>2018</b> TerraNet IP incorporated into 3M Group headsets and masks.</li> </ul>
<b>GrIDD</b> <ul style="list-style-type: none"> <li>■ <b>2018</b> Launch of GrIDD product, with assumption of no direct competitors.</li> <li>■ <b>2018</b> TerraNet gains MNO clients in EU, Ukraine and Russia, cover of 10% of the student population in these areas, market share 100%.</li> <li>■ <b>2019</b> Roll-out expanded to include Brazil, India and Turkey.</li> <li>■ <b>2020</b> Roll-out to US, Asian area. Market share 50%.</li> </ul>	<b>Multimedia Services</b> <ul style="list-style-type: none"> <li>■ <b>Q417</b> Launch MeshMedia app to c 12m subscribers of three existing media clients.</li> <li>■ <b>Q317</b> Launch of Wi-Fi Aware standard.</li> <li>■ <b>2018</b> Doubling of addressable market through new client gains.</li> </ul>

Source: Edison Investment Research

## The business: Software to multiple use groups

TerraNet organises its business into three key divisions:

**Chip Integration:** Software for incorporation into chipsets using the company's IP in peer-to-peer networking (communication outside cellular network and hotspot areas), device location, multi-hop and video streaming. TerraNet also produces software development kits (SDKs) and application protocol interfaces (APIs) for app developers. TerraNet is working with Qualcomm in China.

**Internet of Things:** Products now being trialled/commercialised include vehicle-to-vehicle communications, headsets enabling peer-to-peer communications, machine-to-machine communications for remote mining and industrial applications and mHealth applications. Companies currently working with TerraNet in this area include Autoliv, 3M Peltor and IBM.

**Multimedia Services:** This consists of GriDD and other multimedia-related software

- **GriDD:** GriDD is a system enabling the trading of data capacity on mobile phones developed by Sony Mobile and being promoted jointly with it. The trading can be done outside standard networks provided that the users are sufficiently close (c 100m or less with line of sight). The company is talking with major cellular operators (which we understand include Orange, Telenor and Millicom) and is also looking to produce apps to enable the public to use the service.
- **Other multimedia:** This business is built around TerraNet's core IP in peer-to-peer communications independent of external networks. The group offers out of network streaming and mirroring of content from one-to-many devices (multi-casting). TerraNet would like to work with major content providers such as Disney and Netflix to provide offline streaming to their customers. It has already reached commercial deals with three Asian content providers, with a shared app revenue model.

#### **First major success likely to come from Chip Integration**

We believe that the group has the best potential to realise its first major success in its **Chip Integration** business with the marketing of its contextual awareness software in China, with the leading global chip manufacturer Qualcomm. When flashed onto the latest series of Qualcomm's Snapdragon chips, the software enables phones to "wake up" only when they detect themselves to be proximate to someone or somewhere that is potentially useful to the customer. This has the benefit of limiting operating system activity and therefore reducing battery use. With the software on the chip, Chinese app makers can produce a new generation of applications assisted by SDKs and APIs created by TerraNet.

#### **IoT: V2V and connected headsets plug into potentially fast growing markets**

In the **IoT** sphere, headset software enabling peer-to-peer communication without network access looks likely to translate into early sales. The group is working with 3M Peltor to incorporate the technology into industrial use headsets for the likes of McDonalds.

TerraNet's plans for **V2V** are longer term in outlook but also tap into a potentially very large market, especially if V2V becomes mandatory in new vehicles sold in the US and EU in the early 2020s, as seems likely. We see the potential for TerraNet to take a double-digit share of the V2V market if its vehicle positioning and multi-hop technology (that relays signals via network users) is able to demonstrate reliability and safety to the level required by the automotive industry. TerraNet has partnered with Autoliv, the world's leading supplier of safety equipment to vehicle manufacturers with a high 22% revenue market share, giving it a highly valuable level of access to leading vehicle OEMs.

#### **YouGov studies show strong latent demand for a GriDD type service**

**GriDD**, the group's other unique mobile data trading product, addresses what appears to be significant unmet demand for a low-cost way for smartphone users to cheaply top up cellular data access when in places such as train stations, airports, student accommodation, etc. YouGov studies commissioned by TerraNet in more than a dozen countries including Germany, France, India, Russia, Brazil, Nigeria and the US show strong potential market demand, especially among younger segments of the population. It is looking to provide the technology to cellular operators to offer to their customers and also sell the product in app form. Some drawbacks of the technology are the requirement for users to remain wirelessly tethered while the buyer uses the data, and the need for the two parties to be within approximately 100 metres while undertaking the transfer. We believe that these will create natural limits to the size of the addressable market.

#### **Multimedia Services – enabling streaming while on-the-go independent of network access**

TerraNet's **Multimedia Services** product offers peer-to-multi-peer streaming of content from media services, which can be used when there is no network access or users wish to avoid high data



transfer fees. The use case is enabling families and groups to stream content from one user to others while travelling and also when at home, thus avoiding additional download charges to individual group members. TerraNet has signed agreements with three major content providers in Asia to create apps that enable multicasting while protecting the digital rights of the content owners.

The expected launch in Q317 of the Wi-Fi Alliance's new global standard, Wi-Fi Aware, and the roll-out of Wi-Fi Aware-enabled smartphones should have a positive impact on demand for TerraNet multimedia software by improving the customer experience. Wi-Fi Aware enabled phones and devices will allow the continuous "discovery" of devices within communication range with substantially reduced battery consumption than currently possible using Wi-Fi Direct, which is the current standard for peer-to-peer communications or Wi-Fi hotspots.

## Chip Integration

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### Qualcomm: Bringing contextual awareness to China

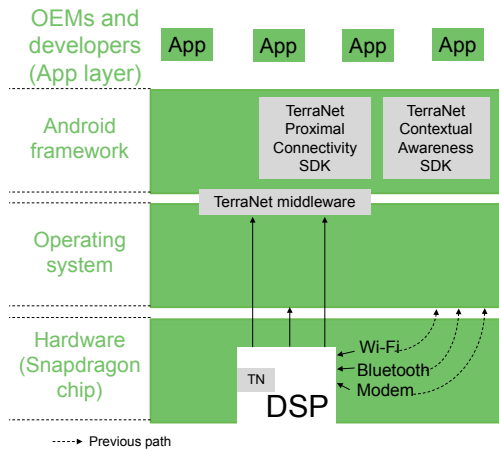
During 2016 TerraNet worked with Qualcomm (see "Background to cooperation with Qualcomm" below) to tailor its proximal connectivity IP for incorporation into Qualcomm's newest range of Snapdragon chipsets. The software works within the Wi-Fi Aware standard to improve the communication between the chip's digital signal processor (DSP), a smartphone's operating system and the android framework, to enable the device to offer contextual awareness (to "wake" the operating system when the user is near a store and remind them that they need groceries), continuous discovery (to continuously discover the location of other nearby devices) and proximal connectivity (to seamlessly connect peer-to-peer with nearby devices without external networks). Improvements to the chip mean that these "always on" services can be offered with low latency and, critically, low battery use.

The software also enables devices to communicate peer-to-peer with any Wi-Fi Aware-enabled device. With Apple now part of the Wi-Fi Alliance, this is likely to include both Android and Apple phones in the future. It should be noted that Wi-Fi Aware is an industry standard that has been developed by the Wi-Fi Alliance. TerraNet is a member of the association and partnered with Qualcomm to develop and showcase the world's first public demonstration of Wi-Fi Aware with NAN (Neighborhood Area Networking) at Mobile World Congress in February 2016.

The three types of software developed for this use by TerraNet are:

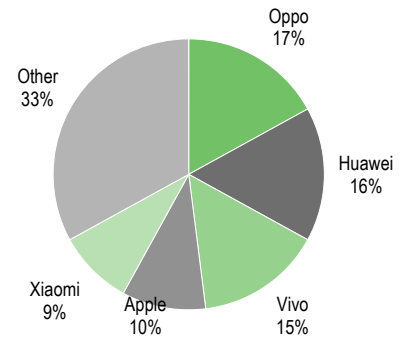
1. Optional software for smartphone manufacturers (OEMs) for inclusion (flashing) into the DSP of Qualcomm's latest Snapdragon 835 chip as well as the 810, 820 and 830 models (see Exhibit 3).
2. Middleware for Qualcomm's Snapdragon chips, which communicates between the applications and the operating system/hardware to increase app efficiency.
3. Two SDKs to enable android app developers to integrate features using proximal connectivity and contextual awareness into their apps.

**Exhibit 3: TerraNet software within the Android/Qualcomm Ecosystem**



Source: TerraNet

**Exhibit 4: Chinese smartphone market 2016**



Source: IDC Quarterly Phone Tracker, 6 Feb 2017

TerraNet’s software complements “All-ways Aware” hub software (not part of TerraNet IP), which Qualcomm integrated in the Snapdragon 835 introduced in January 2017. This is oriented to the IoT (rather than smartphone communication) use-case and reacts to seven constantly monitored inputs: time, location, certain places, beacons, headphones, activity and weather.

**The business case: Enabling contextual awareness in the Chinese market**

The software is expected to primarily sell in the Chinese market. A gap in the market has opened up because of Google Play’s absence from mainland China since 2010, following a censorship dispute with the Chinese government. This means that OEMs in that country do not have the benefit of Google’s contextual awareness software, which is widely incorporated into Qualcomm chipsets outside China.

TerraNet’s contextual awareness software works with the Wi-Fi Aware Standard, which is being incorporated by Qualcomm for the first time this year in the new high-end Snapdragon chipsets in China. TerraNet’s software will enable the creation of the next generation of intelligent apps using contextual awareness. Demand for such apps should drive OEMs to produce handsets containing Wi-Fi Aware and TerraNet’s software on their chip. Examples of apps that are enabled by contextual awareness include services that remind shoppers that they need grocery items if, for example, they are near a store or alert them when nearby stores are running promotions or friends are nearby.

We understand from management that Qualcomm is not offering any other software for inclusion on its chips that can perform this function, giving TerraNet a strong marketing position.

TerraNet’s strategy in the market is to offer its SDKs free of charge to app developers and to work (paid) with Chinese app developers and retailers to assist them in developing the apps. By driving up demand for the functionality in its chipset software, the company should monetise its work via increased chipset software licence fees from OEMs.

**The market**

During 2016 sales of smartphones in China grew 8.7% to 467m, according to IDC data. The top four Chinese manufacturers (see Exhibit 4) increased their share of unit sales from 46% to 57%.

By far the fastest growth of the top five manufacturers in 2016 was achieved by leading manufacturer Oppo, and number three player Vivo. They achieved unit sales growth of 122% and 97%, as compared with growth of 22% at Huawei and declines of 23% and 36% at Apple and Xiaomi, respectively. Both of these fast growing manufacturers incorporated Snapdragon chips into



their handsets in 2016. Furthermore, they both have a strong presence in the youth segment, especially among young women, who are expected to be a significant market for shopping-related contextual awareness apps. Given the importance of the social element to this market segment, we see a strong business case for these producers investing in contextual awareness software to enable their handsets to support cutting edge proximal connectivity based apps.

We also understand that Xiaomi and Meizu (not a top five manufacturer) recently signed patent agreements with Qualcomm, indicating the potential incorporation of Snapdragon chips into their handsets this year, which would also increase the addressable market.

The key players in Chinese app distribution and development are social/messaging platform Tencent with 18% share of distribution, search platform Baidu with 13% and handset OEM Xiaomi with 11%. While the business model does not currently anticipate generating revenues from SDK sales, it will be important for TerraNet to engage with these players to increase the demand for its chip software. At the same time, management believes that it will generate non-recurring engineering (NRE) revenues from assisting these companies to incorporate its technology into their apps and other products.

#### **Outlook: The success of Qualcomm's Snapdragon chips bodes well for demand**

Qualcomm is global leader in the smartphone application processor (AP) market, with market share estimated at 39% by Strategy Analytics. DigiTimes estimates Qualcomm's market share in China at 30% with its major competitor MediaTek having a c 40% market share. Research by US broker Rosenblatt Securities Inc is substantially more positive for Qualcomm, quoting a 50% Chinese market share in 2016 rising to 65% in 2017. We also see the potential for Qualcomm to further increase its market share this year, helped by the launch in January of the well-received high-end Snapdragon 835 chip and its leading position in IoT.

The roll-out of Wi-Fi Aware functionality that will create the addressable market for TerraNet's software will be limited in the initial phase to high-end Snapdragon 800-series chipsets. We then expect it to be extended down through the range over the next three to four years. Our model assumes Wi-Fi Aware is integrated into 10-15% of handsets at the premium end of the market in 2018 and into the high-end range of a further 20-25% of handsets in 2019. By 2020 we assume it will be rolled out to mid-range chipsets, such that it is available on 65% of Qualcomm's chips.

We expect TerraNet, helped by the recent release of discovery-enabling firmware drivers by Qualcomm, to make its first sales of contextual awareness software in late 2017, but for revenues from this line to only become material in 2018. At this stage, we assume an estimated addressable market of 23.6m chipsets and sales penetration of 22% of total Wi-Fi Aware chipsets, giving rise to sales of 5.2m units. With assumed growth in the chipset market and TerraNet achieving a 30% share of the addressable market, we expect sales to grow to over 30m units by 2020 (see Exhibit 5). The company anticipates initial charging in the region of \$0.20 (SEK1.8) per licence. We have adopted this price for 2018 and assume that the price declines at 10% pa thereafter to reach SEK1.31 (\$0.15) in 2021, giving rise to licence sales revenues of SEK62.8m.

<b>Exhibit 5: Chinese market – licence revenue forecasts</b>						
Millions	2016	2017e	2018e	2019e	2020e	2021e
<b>China smartphone sales</b>	<b>476.0</b>	<b>500</b>	<b>525</b>	<b>551</b>	<b>579</b>	<b>608</b>
Qualcomm share of chipsets (%), estimated	30.0	30.0	30.0	30.0	30.0	30.0
Software roll-out (% of Qualcomm chips), EOP		12.5	15.0	35.0	65.0	75.0
<b>Addressable market</b>		<b>18.7</b>	<b>23.6</b>	<b>57.9</b>	<b>112.8</b>	<b>136.7</b>
TerraNet share of addressable market, EOP		0.0	22.0	25.0	30.0	35.0
<b>TerraNet licence sales(units)</b>		<b>0.0</b>	<b>5.2</b>	<b>14.5</b>	<b>33.8</b>	<b>47.8</b>
Price (SEK/unit)		N/A	1.80	1.62	1.46	1.31
Change (%)		N/A	N/A	(10.00)	(10.00)	(10.00)
<b>TerraNet Chinese licence revenues (SEKm)</b>		<b>0.0</b>	<b>9.4</b>	<b>23.4</b>	<b>49.3</b>	<b>62.8</b>

Source: DigiTimes, Edison Investment Research

Qualcomm and TerraNet undertook a joint roadshow in China in April to promote TerraNet's IP, and TerraNet plans another marketing trip to the country in June. The company currently has quotes submitted to three major market participants and is looking to make its first chips sales in Q417. At the same time, TerraNet's SDKs will be available for developers to use via the Qualcomm website. TerraNet will use Qualcomm's payment and IP control systems for its SDK and middleware distribution in China, which should minimise its exposure to counterparty risk and theft of its IP.

Management also expects to generate c SEK8m per annum in NRE work from Qualcomm in coming years as the software in the chip is further refined and developed. The company also anticipates generating further high-single-digit/low-double-digit annual income from assisting Chinese companies to incorporate contextual awareness into their apps and devices from 2019. The group is also looking to generate further NRE revenues work from Wi-Fi router specialist Quantenna, as part of its ongoing work to improve and upgrade mesh communications between its routers. In total, NRE revenues are estimated to total SEK20m in 2018 and grow to c SEK40m in 2020 and 2021. We assume that margins on NRE work are only c 5%, so these assumptions do not significantly increase our earnings forecasts.

### **The potential return of Google to the market is a risk to the business case**

We see the possible re-entry of Google into the Chinese market as major area of uncertainty for TerraNet in this business line. As mentioned above, Google left the Chinese market following a censorship-related dispute with the Chinese government in 2010. On 12 March 2017, CNBC.com quoted a "senior Chinese lawmaker and former top official with knowledge of the negotiations" as saying that Google was still in talks with the Beijing government over "its plans to return to the mainland Chinese market". It reported that China had been in touch with Google through various channels and "there was a hope that a part of Google's business would return to China first, gradually followed by others" but that "no timetable had yet been set for Google's return". Differences over censorship appear to remain a key stumbling block to this return. Google's parent company, Alphabet, expressed its concerns in 2015 about the negative impact that abiding by Chinese censorship rules would have on Google's global operation, and on its image as a fair, open platform.

Nevertheless, if Google does return to China, we believe it is likely that Qualcomm will follow its practice in the rest of the world of offering Google's contextual awareness technology on its Snapdragon chipsets to Chinese OEMs. We do not see it as a foregone conclusion, however, that this would prevent Qualcomm from allowing Chinese customers to continue to have TerraNet's software flashed onto its chipsets. Depending on how long Google continues to remain outside the mainland Chinese market, it might well be that, having invested heavily in app development based on TerraNet's software, the major Chinese players in the app market will pressure the OEMs to continue to incorporate TerraNet's software in their handsets. They in turn could be expected to pressure Qualcomm to continue to offer the option of having TerraNet software flashed onto their chipsets, at least for existing models of devices.

For the sake of conservatism in our base case (see Exhibits 19, 21 and 22) we have assumed that Google will re-enter the Chinese market in five years' time (ie 2022). We assume that TerraNet's software will continue to be offered on Qualcomm Snapdragon chips already upgraded to incorporate the software but, as a result of competition from Google's IP, we model that unit sales of TerraNet's software will decline over the following five years to reach zero in 2026.

**Background to cooperation with Qualcomm:** TerraNet has a close relationship with Qualcomm that stretches back to the company's interactions with the US giant from its beginnings in the Lund Institute of Technology prior to its incorporation in 2004. Qualcomm's Director of Product Development Gajinder Vij sits on TerraNet's board. In late 2016, TerraNet became a certified design house of Qualcomm (not to be confused with Qualcomm's Authorised Design Centres), giving it

access to Qualcomm chip design data and the ability to customise and integrate its software on Qualcomm hardware for delivery to different customers in different markets.

## Internet of Things

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The industrial IoT business area commercialises the group's original mesh network technology. The company is commercialising a number of use cases, but the three key areas in the final stages of commercialisation and those that have attracted interest from major players in their industry are:

- **Wireless headsets:** Adding peer-to-peer communications to enable users to dispense with licence costs and improving over existing wireless solutions. Partner: 3M Peltor.
- **Connected Car:** Solving positioning issues and extending the range of communications for V2V applications using dedicated-short-wave communications frequencies (DSRC). Partner: Autoliv.
- **Defence communications:** Assisting in the creation of drone boat networks by streaming video and data between control and drone boats. Also, communications/video streaming capabilities for military headsets. Partner: Saab Defence.

### Headsets: No network needed and superior functionality

TerraNet's advance in headsets has been the incorporation of mesh-technology software into chipsets for headsets. Using Wi-Fi Aware protocols enables them to rapidly locate and speak with other users within transmission range while "off grid", with low latency, and low battery use. Alternatives currently in the market are headsets using radio frequencies, giving rise in walkie-talkie type simplex conversation with ranges of a few hundred metres to several kilometres. Tethering mobile phones to headsets enables normal duplex conversation but requires the user to carry the mobile phone around with them and be in range of a mobile network. It also incurs network costs.

Proximal awareness technology enables those within the system to locate each other and to communicate within a range of 100m. The technology is similar to that incorporated in Wi-Fi Aware mobile handset chips, but we understand that TerraNet's improvements are in its superior location technology, which enables the headsets to more rapidly locate other devices in the area, and TerraNet's own multi-hop IP. This can expand the reach of the network by up to 2km by relaying the signal across multiple users. The technology uses the transmitting power of the chip and Wi-Fi frequencies for peer-to-peer and peer-to-multi-peer communication for which no network charges are levied as it does not use cellular networks.

The use of a small chipset also significantly reduces the weight and bulkiness of the headset. The technology also generates savings in maintenance, by enabling chipsets to be upgraded directly without replacing the whole headset. The disadvantages are the smaller transmission ranges versus the other networks. Nevertheless, for many applications such as in the fast food industry and small warehouses and factories, this is not a significant limitation and the network can be expanded out to cover a much larger area using multi-hop if the team is distributed over a site.

### Business case: Volume-based revenues from inclusion in headsets and masks

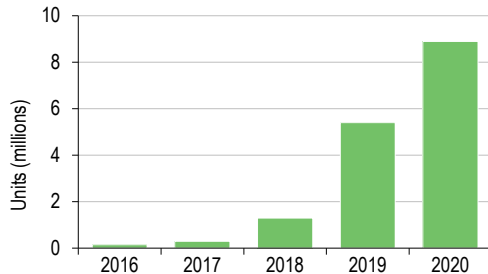
TerraNet is currently working with **3M Peltor**, one of the leaders in industrial, military and sporting headsets, to integrate its software into a number of its headsets and to monetise its technology with licence fees for each headset incorporating its IP. These high value units (typically costing \$400-\$1,300 each) are used in industries ranging from fast food, mining, military and heavy vehicle use.

### The market

The wireless headset market appears set for substantial growth over the next decade. The key drivers are expected to be growing affordability, increased use in outsourcing companies (call-

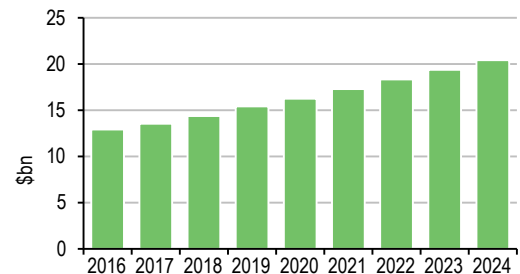
centres etc), as well as in media, entertainment, gaming and virtual reality applications. Another potential driver is the potential growth of “hearables” devices. These are part of the wearables family – headphones incorporating multi-sensor and communications features with the aim of providing users with access to music, fitness, hearing monitoring and hearing protection.

**Exhibit 6: Industrial hearables market**



Source: WiFore Wireless Consulting

**Exhibit 7: Wireless headset market**



Source: Grand View Research

Grand View Research forecasts 6% annual growth for the wireless headphone market in the 2016-2024 period to reach \$20.5bn (see Exhibit 7). We see the potential for these estimates to be exceeded given the likely evolution of new product types, with new use cases and features.

What is particularly high potential about hearables in this regard is the strong case for adoption in industry. The growth of high levels of hearing damage in employees from private sources, such as listening to loud music, is leading to increasing need for employers to protect themselves from hearing loss claims. A key way of doing this is by ensuring that employees are constantly monitored for the amount of noise they encounter in the work environment. WiFore Wireless Consulting forecasts industrial hearables sales to grow from less than 200,000 units to 9m units by 2020 driven to a significant degree by this use case.

For the retail market, we can see the potential for headsets with voice functionality that can enable users to talk to their devices (for example to communicate with Alexa, while gardening) without incurring network access fees to also grow in popularity. Such headsets could provide additional services such as hearing loss correction at a lower price point than current “medical” hearing aids.

### 3M Peltor contract

TerraNet is currently working with major industrial, sports and military headset manufacturer 3M Peltor to introduce its technology into its headsets. The contract is still at the NRE stage but management sees potential for first sales of headsets to take place in 2018.

Management believes it is possible that the technology will be rolled out across all headsets in 3M Peltor’s range. This reflects the benefits of adding two-way communications potential to headsets without materially increasing their bulk or weight and also increases the functionality of 3M Peltor’s headsets.

### Outlook: Market share gains expected to be driven by new customer acquisitions

We have based our sales forecasts for TerraNet’s entire audio (headsets) IoT business in 2019 on management’s risk-adjusted guidance (50% of 370k units) of sales of connected headset and masks to 3M Peltor and 3M Corp Research. We have then adjusted this upwards by an additional 20% to reflect potential sales to other headset suppliers. We have then applied the targeted SEK90 (\$10) per unit in licence fees to give rise to SEK19.5m in total revenues in 2019.

We have back-tested this against the headset market size estimates by Grand View Research resulting in a still low 1.4 basis point (ie 0.014%) implied market share in 2019. Thereafter, we have targeted a 13% CAGR in market share to 2.8 basis points 2024, giving rise to SEK51.4m revenues.

**Exhibit 8: Headset and Mask IoT revenues outlook (including sales to the 3M group)**

	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
<b>Wireless headset market (US\$bn)*</b>	<b>14.5</b>	<b>15.3</b>	<b>16.2</b>	<b>17.2</b>	<b>18.2</b>	<b>19.3</b>	<b>20.5</b>	<b>21.7</b>	<b>23.0</b>
TerraNet market share (%)	0.003	0.014	0.020	0.023	0.025	0.027	0.028	0.029	0.030
Revenue (US\$m)	0.4	2.2	3.2	3.9	4.5	5.2	5.7	6.3	7.0
<b>Unit price (SEK/unit)</b>	<b>90.0</b>	<b>87.3</b>	<b>84.7</b>	<b>82.1</b>	<b>79.7</b>	<b>77.3</b>	<b>75.0</b>	<b>72.7</b>	<b>70.5</b>
Change (%)	N/A	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)	(3.0)
<b>Unit sales ('000s)</b>	<b>39</b>	<b>223</b>	<b>341</b>	<b>425</b>	<b>511</b>	<b>603</b>	<b>686</b>	<b>779</b>	<b>886</b>
Change (%)	N/A	472.2	53.0	24.6	20.2	18.0	13.6	13.6	13.6
<b>TerraNet revenue (SEKm)</b>	<b>3.5</b>	<b>19.5</b>	<b>28.9</b>	<b>34.9</b>	<b>40.7</b>	<b>46.6</b>	<b>51.4</b>	<b>56.7</b>	<b>62.5</b>
Change (%)	N/A	455.0	48.4	20.8	16.6	14.5	10.2	10.2	10.2

Source: Edison Investment Research, Grand View Research. \*Based on Grand View Research estimate of market size of \$20.5bn in 2024 and a CAGR of 6% between 2016 and 2024.

### Connected car: Levering positioning algorithms and multi-hop know-how

TerraNet is currently working with Swedish tier one supplier of auto parts **Autoliv** to create a V2V communications system for both primary use and redundancy purposes. To date this has involved using dedicated short-range communication (DSRC) communications standards, but this is shortly to be expanded to include the LTE wireless standard.

#### TerraNet's IP works on DSRC, which may come to dominate V2V in the short term...

DSRC is very similar to Wi-Fi, being part of the 802.11p wireless standard, allowing low-latency peer-to-peer communication, bypassing the need for cellular and other wireless networks. This is a major consideration for the auto industry given the necessity for many vehicles to regularly roam outside existing cellular network areas. Price is also a major advantage for DSRC with the relevant modems only costing c \$2 and users not being required to pay for network access (eg cellular subscriptions). Additionally, because stronger radio transmitters are allowed in vehicles than personal devices, the communication range is upwards of several hundred metres between vehicles compared with c 100m with smartphones.

DSRC has gained the backing of US, EU and other governments, who have set aside frequencies for its use for V2V and vehicle-to-infrastructure (V2I) communication. The US Department of Transport announced in 2016 that it was throwing its weight behind advancing DSRC across the entire light vehicle fleet in the US. To this effect, it is currently holding large-scale trials of the technology in three locations in the US with plans to implement the networks in these areas in 2018. However, with the election of Donald Trump, whose administration is thought to be less disposed to favour DSRC, and the expected change in leadership at the US DOT and FCC, there is less certainty about the use of DSRC for V2V communications across the US.

#### ...and probably to provide redundancy afterwards

The major competitors to DSRC for V2V are LTE and 5G cellular technology. Their advantages to OEMs are their ability to fit into the existing connected car and IoT eco-systems and their fully intact evolutionary path. Proponents also argue that cellular infrastructure is already in place in most places whereas it will be necessary for governments to invest in road-side beacons on highways and junctions to enable V2I using DSRC.

Key factors hindering the cellular use case is that 5G has not yet been standardised and is not likely to be widely rolled out before 2020. LTE itself has drawbacks, relating to latency, accuracy of positioning and the necessity for the system to cope with high volumes of data transmission arising from measuring each change of vehicle position. It will also be a major challenge for the industry to secure the required dedicated spectrum needed to offer V2X services. We therefore see it as quite likely that cellular operators will join the cable industry in lobbying to gain control of the 5.9GHz band currently reserved in the US and elsewhere for DSRC, arguing that they need it for dedicated

V2V use. We see some prospect of them succeeding at some stage helped by their lobbying power, especially if they can show a superior performance to DSRC once 5G is standardised.

ABI Research forecast in January 2017 that LTE-V2X will reach 300m global subscribers by 2030, and it will be surpassed by 5G V2X at that point, rather implying high level of conviction for the use of 5G. We share the view that 5G technology is a threat in the long term as a primary network given the dominant ecosystem of cellular network and the above factors. We nevertheless believe that network cost issues may make this an unpopular political choice in the short term and this and delays in standardising 5G may delay implementation, leaving the way for DSRC to be the lead technology until well into the early 2020s.

Even if 5G becomes the dominant standard, we see a strong case for DSRC becoming a mandatory redundancy system for use when vehicles stray from cellular network areas or cellular congestion becomes an issue. If the DSRC frequencies are given to the cellular operators, there would still be a good case for DSRC to be able to use these frequencies outside the reach of cellular networks. Alternatively, TerraNet's other speciality, peer-to-peer using Wi-Fi frequencies, could be deployed.

### **Business case: Potential use case for both primary and redundant networks**

TerraNet has the following use case for its V2V IP, which it is looking to monetise via licence revenues for inclusion of its software in V2V devices.

#### **As a primary V2V network, using DSRC**

- Vehicle positioning algorithms to provide redundancy to satellite positioning systems.
- Multi-hop IP to extend the range of communications between vehicles.
- Rapid location of other V2V devices.

#### **Deploying collaborative positioning in primary V2V networks running on LTE/5G**

Co-operative positioning: The key use case being reduction of collision risk in V2V systems by offering faster vehicle positioning (low latency) and V2V and V2I information flows.

#### **As a redundant (secondary) network, most likely to be 5G, using the DSRC or Wi-Fi standards**

- Ability (using DSRC or Wi-Fi) to provide V2V services outside cellular network cover and in the event of cellular network congestion.

#### **Co-operative positioning and multi-hop use case**

TerraNet's advancements in the V2V sphere are being undertaken with Autoliv, backed by leading academics in the field from the Lund Institute of Technology. They have developed "Co-operative Positioning" algorithms that enable instantaneous mapping of the position of DSRC-enabled vehicles based on the signal strength and signal angles from other DSRC-enabled vehicles in the area. This IP is owned-jointly with Autoliv. The second key technology is TerraNet's own multi-hop IP, which uses the transmitters in in-range DSRC-enabled vehicles to relay information beyond the 400m-1km range of standard V2V transmissions (depending on the signal strength chosen). This extends the information flow to more vehicles, thereby providing drivers with more advanced warning of more potentially threatening events.

Pedestrians and other vulnerable road users can also be incorporated into the system via apps on their mobile phones, both alerting vehicles to their position as well as alerting them to dangers.

#### **Solving the problem of weak GPS in cities**

Co-operative positioning, enhanced by additional coordinates from multi-hop, provides redundancy for satellite global positioning systems (GPS) that can become unreliable when satellite signals are



reflected or blocked by nearby buildings. This is still a serious problem in big city environments. Evidence of the strength of this concern can be seen in the US Department of Transport's (DOT) September 2016 progress report on its V2V trials in NYC, where it placed a high degree of prominence to the question "How do we improve location accuracy in the face of random GPS location losses?"

Using radio signals to generate positioning data is made complex by signal shadows and other obstructions. TerraNet believes, however, that its and Autoliv's product resolves these issues and will satisfy the very high safety requirements of the auto industry. The partners are currently undertaking field tests while refining the hardware and plan to publish the results in mid-2017.

#### **Autoliv an attractive partner**

We see Autoliv as an attractive partner for TerraNet in this market. It is the leading global provider of automotive safety equipment, with a market share of c 39% in passive safety and 20-25% in active safety (source Autoliv). Furthermore, it is a key objective of Autoliv management to take the lead in active safety, so we expect it to make significant efforts to promote TerraNet's active safety technology to major automakers around the world if it continues to be promising. We are not aware of any other companies working with Autoliv to provide similar IP.

#### **TerraNet's key alliance with top Swedish academics and industry**

TerraNet's strategy in the auto sector has grown from its foundation in the Lund Institute of Technology, and its top level contacts with Swedish auto industry. In 2016 TerraNet was instrumental in the creation of the Swedish Centre of Excellence for Automotive Offline Connectivity combining leading academics and auto firms. Founder members include Autoliv, the Lund Institute of Technology at Lund University, Chalmers University of Technology, Scania Trucks, Volvo Cars, NEVS (National Electric Vehicle Sweden), Sony Mobile, Ericsson, Blackberry and SAAB.

#### **The market: Driven by new technology and regulation**

The active safety market is growing rapidly as advanced driving assistance systems (ADAS) increasingly take over risk control from drivers. Bain and Company forecast the global market to grow from \$8bn in 2016 to \$21-26bn in 2025. PWC forecasts the market for connected car solutions to grow from an estimated \$17.7bn in 2016 to \$42.8bn in 2022. If the market is to achieve this forecast, PWC estimates that it will be necessary for the industry to sell 320m connected car packages between 2016 and 2022, compared with current global new sales of c 95m a year.

We see the key drivers of penetration of V2V in new vehicles and the vehicle after-market as being regulatory, technology-driven (eg from its necessity in autonomous vehicles and better use-cases and greater reliability in both ADAS and non-ADAS vehicles) and ecosystem driven (eg growth in automated parking, increased familiarity and appetite for IoT devices and simply becoming more useful as more V2V cars are deployed on roads). A sign of the direction of regulation, the National Highway Traffic Safety Administration in the US (NHTSA) recently published a proposal that would require all new vehicles to be fitted with V2V and V2I (vehicle to central infrastructure) capabilities. If passed in 2019, implementation could begin as early as 2023. Another potential market driver is the expectation that Level 4 advanced driving assistance systems (ADAS) and driverless vehicles will require the integration of V2V and V2I systems to ensure optimum safety over the next two to three years.

Key sensitivities are likely to be privacy and safety issues, with stories of connected cars being regularly hacked leading to calls for the industry to pause and take stock, and regulatory, with key decisions as to whether to proceed with DSRC potentially hostage to cellular industry lobbying for 5G.

### **New vehicle/OEM market**

We expect the US to continue to be the main driver of V2V communications in the short term, but see the EU as a fast follower in vehicle regulation, so believe mandatory V2V for new vehicles will be established only two or fewer years apart. Assuming that the US and EU make V2V mandatory in 2023, the V2V market will encompass 41m new vehicles in the US and Western Europe. Apart from a few other fast follower regions and top-end cars in all markets, we believe that adoption in the rest of the world will be much slower. In particular, we believe that Chinese OEMs will be cautious due to the government's cautious approach to connected car technology. Nevertheless, assuming 18% penetration outside the US/EU gives rise to overall penetration of 50% and a V2V market of 53m units.

At that stage we assume in our base case scenario that DSRC will have lost 60% market share to 5G through the latter being adopted in different parts of the world as the standard primary communications medium. Based on DSRC's 40% share of this market and applying a 21% market share for TerraNet, assuming that its co-operative positioning and auto-hop IP is considered suitably effective, gives rise to a unit sales forecast of 4.5m in 2023 (Exhibit 9).

### **DSRC as redundant system for 5G**

With 5G potentially taking increasing share of the primary V2V market, we have also modelled for the potential for DSRC to become the redundant system of choice. We see the key drivers as being the need to provide for V2V to work outside cellular networks and during potential network congestion. Also, the low price of DSRC hardware of around \$2 per unit means that it can be mandatory without putting undue financial strain on drivers.

In Exhibit 9 we also model revenues for sales of V2V equipment as redundancy (back-up) to the 5G system, using either DSRC or Wi-Fi frequencies. We apply the same market share assumptions as employed in our DSRC as primary network estimates, but for sales of new cars containing V2V units in areas using 5G networks for V2V communications.

### **Aftermarket**

We see the potential for the aftermarket to become a significant part of the market following the introduction of mandatory V2V infrastructure in new cars. As mentioned above, installation of DSRC hardware is very low cost (around \$2 per unit), so we see low cost, combined with regulatory pressure to increase the number of V2V vehicles on the road, combined with significant safety benefits and insurance cost reductions as key drivers for this market segment.

Our forecast of after-market sales assumes that sales of software to drive aftermarket equipment are 50% of OEM sales in 2023, resulting in a total 5.6m unit sales (Exhibit 9).

### **Revenue forecast**

TerraNet targets an initial sales price for its V2V software net of Autoliv's share in the IP for approximately \$1 per V2V unit. We assume unit price declines of 10% per annum over the forecast period, reflecting increased sales volumes and competition from other technology.

**Exhibit 9: TerraNet V2V licence sales forecast**

(m)	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
<b>New vehicle primary use V2V installations</b>									
Global new car sales	95.7	97.8	100.0	102.2	104.5	106.8	109.2	111.6	114.1
Proportion incorporating V2V (%)	5.0	10.0	15.0	25.0	40.0	50.0	54.0	59.9	66.5
<b>Market V2V units new vehicles</b>	<b>4.8</b>	<b>9.8</b>	<b>15.0</b>	<b>25.6</b>	<b>41.8</b>	<b>53.4</b>	<b>59.0</b>	<b>66.9</b>	<b>75.9</b>
TerraNet/Autoliv mkt share (%)	0.0	11.0	13.0	17.0	19.0	21.0	22.0	22.0	22.0
DSRC market share (%)	100.0	100.0	100.0	80.0	60.0	40.0	20.0	15.0	10.0
<b>TerraNet unit sales to OEMs with DSRC as primary V2V system (m)</b>	<b>0.0</b>	<b>1.1</b>	<b>2.0</b>	<b>3.5</b>	<b>4.8</b>	<b>4.5</b>	<b>2.6</b>	<b>2.2</b>	<b>1.7</b>
<b>New vehicle redundancy-use V2V installations</b>									
<b>Market V2V units new vehicles</b>	<b>4.8</b>	<b>9.8</b>	<b>15.0</b>	<b>25.6</b>	<b>41.8</b>	<b>53.4</b>	<b>59.0</b>	<b>66.9</b>	<b>75.9</b>
5G market share areas (%)	0.0	0.0	0.0	20.0	40.0	60.0	80.0	85.0	90.0
Share of OEM V2V market (%)		11.0	13.0	17.0	19.0	21.0	22.0	22.0	22.0
<b>TerraNet unit sales to OEMs for redundancy systems*</b>		<b>0.0</b>	<b>0.0</b>	<b>0.9</b>	<b>3.2</b>	<b>6.7</b>	<b>10.4</b>	<b>12.5</b>	<b>15.0</b>
<b>After-market sales DSRC used as redundancy system*</b>									
TerraNet unit sales to OEMs with DSRC as primary V2V system (m)		1.1	2.0	3.5	4.8	4.5	2.6	2.2	1.7
TerraNet unit sales to OEMs for redundancy systems*		0.0	0.0	0.9	3.2	6.7	10.4	12.5	15.0
<b>Total TerraNet unit sales for primary and redundancy systems</b>		<b>1.1</b>	<b>2.0</b>	<b>4.3</b>	<b>7.9</b>	<b>11.2</b>	<b>13.0</b>	<b>14.7</b>	<b>16.7</b>
After-market sales to OEM sales (%)						50.0	70.0	90.0	110.0
<b>After-market license sales of primary and redundancy units (m)</b>						<b>5.6</b>	<b>9.1</b>	<b>13.2</b>	<b>18.4</b>
<b>Total licence sales</b>		<b>1.1</b>	<b>2.0</b>	<b>4.3</b>	<b>7.9</b>	<b>16.8</b>	<b>22.0</b>	<b>28.0</b>	<b>35.1</b>
Price per licence (SEK)		7.7	6.9	6.2	5.6	5.0	4.5	4.1	3.7
Change (%)		(10.0)	(10.0)	(10.0)	(10.0)	(10.0)	(10.0)	(10.0)	(10.0)
<b>Revenues (SEKm) V2V licence sales</b>		<b>8.2</b>	<b>13.4</b>	<b>26.9</b>	<b>44.3</b>	<b>84.4</b>	<b>99.6</b>	<b>113.7</b>	<b>128.3</b>

Source: Edison Investment Research. Note: \*Using DSRC or Wi-Fi if DSRC frequencies allocated to 5G.

We would emphasise at this point that our forecasts for TerraNet's V2V business are heavily reliant on a number of factors, about which it is too early to have any degree of certainty. These include:

- TerraNet's co-operative positioning and multi-hop software proving to have the ability to sufficiently extend and improve V2V communication and reliability to justify their adoption,
- The necessity of satisfying the quality requirements of the extremely safety-oriented auto industry,
- TerraNet being able to attain management's targeted price points for its software, and
- TerraNet not encountering competitors in the market with larger budgets, which have or are in the process of developing more advanced technology to perform these functions.

### Other Auto IoT

TerraNet has also set its sights on providing further auto related products via Autoliv. Ideas that it is working with include principally positioning awareness based services including an **Uber off-network fare finder** and **safety messaging for pedestrians**. With the former, using the device awareness function will enable ride-share drivers (eg for Uber and Lyft) to locate potential fares when outside cellular network areas or in the case the user does not want to pay for network use. This sort of service could be very popular in poorer areas of the developing world and therefore it could potentially be worth Uber and other companies paying TerraNet to incorporate their software into their own proprietary apps.

TerraNet also recently concluded a letter of intent with Swedish company **Mapillary** with the aim of developing and promoting V2V and infotainment features for the automotive industry. The aim is to use TerraNet's positioning know-how and Mapillary's street-level image base as building blocks for the features. Mapillary assembles its image collections with devices such as smartphones and dashcams through the use of computer vision and artificial intelligence.

TerraNet has also created a similar letter of intent with another Swedish tech firm, **Bitcraze**, which develops unmanned drones and has positioning tools that are able to determine the position of its quadcopters to within 10cm accuracy. The aim is for the parties to jointly promote Bitcraze's positioning technology, which has applications in the auto and other industries.

## Other IoT

### Defence (Saab Defence)

TerraNet has worked with Saab Defence to develop a system of controls for drone boats whereby a fleet of unmanned boats are controlled by a central boat. The system uses mesh communications as well as video streaming via multi-hop to control the boats out to greater distances.

### Security/Smart Home

We see significant potential for TerraNet's expertise in out-of-network communication to be deployed in connected home and security-related IoT. The company is currently adapting its peer-to-peer systems, device location and contextual awareness IP to connect peripheral devices and sensors and develop intelligent security solutions.

We also see potential for TerraNet's technology to be adopted by consumer electronics firms for incorporation into devices aimed at the domestic market, with redundancy and off-grid applications. A survey of UK consumers by Deloitte Research in 2016 showed that security cameras, security alarms and security motion devices all featured in the top six appliances that consumers are most likely to replace with a connected device. One third of respondents expected to replace security cameras and alarms, and 25% expected to similarly upgrade security motion sensors.

## Multimedia Services: GriDD and peer-to-multi-peer streaming

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### GriDD: An innovative trading platform for unused data

GriDD is a highly scalable and high volume potential trading platform enabling a secondary market for surplus data capacity for mobile subscribers. It is TerraNet's most mature product, having been developed jointly with Sony Mobile, which spent \$5-6m on the product. The software code and IP rights were acquired by TerraNet in June 2016 to commercialise with the aid of its mesh network technology expertise. TerraNet is now marketing the service with Sony Mobile in the form of a sales and marketing JV.

GriDD is designed to enable mobile subscribers to buy or sell data transmission capacity to third parties for immediate use at the time of the transaction in downloading or uploading content. It also offers the ability to undertake transactions when the buyer of the excess data is outside the reach of mobile networks (or does not have the means to connect to the network) as long as they are in the proximity (c 100m) of the seller. We see the student population as being the major market for the product in wealthier countries. Being largely budget-minded customers and willing to put up with some inconvenience in order to save money, they are likely to have the highest demand for the product. At the same time, they represent a segment of the market that cellular operators are willing to go the extra yard for in order to retain them for the longer term.

#### How it works

A prospective buyer of data capacity locates a nearby seller, using the location awareness software on the app, and agrees to the price requested by the seller. The seller's device is put into Wi-Fi Hotspot mode and the buyer connects to it as per a normal Wi-Fi access point. The buyer then transfers the content up to the data volume agreed initially via the seller's device.

As the seller must keep their device activated while the data is transmitted and cannot move out of range, this means that the buyer is only able to use the system for accessing data capacity at the time of the trade. The transaction is monitored by the software to prevent the buyer downloading too much data. Likewise, if the seller's connection to their mobile network is broken or the Wi-Fi

Hotspot link is broken, then the transaction is terminated with a reduced charge to the buyer. According to TerraNet, battery usage during the transfer is similar to that used in normal web browsing. We understand from TerraNet that security should not be a concern if the transfer is undertaken close by, with the encryption and authentication to mPay standard, which is enabled already within the Wi-Fi Direct standard.

### **The business case**

The business case for GriDD rests on it providing the following B2B and B2C benefits:

1. A forum for bringing buyers and sellers together,
2. A means of locating potential data buyers/sellers within peer-to-peer Wi-Fi range,
3. A system to ensure that the data has been delivered with a payment mechanism,
4. A tool for cellular operators to increase customer loyalty, reduce churn and potentially increase the price of bundles containing access to the service, and
5. A springboard to other products – such as enabling Uber drivers to sell data top-ups to riders, off-grid mPay solutions, and streaming music to groups in public spaces, etc.

The value of the system rests in bringing these capabilities together as well as its scalability and high-volume potential. For example, individuals can already turn their mobile devices into hotspots and transfer content using Wi-Fi frequencies to other devices without using wireless networks. Wi-Fi Aware-enabled smartphones will also be able to locate other similarly enabled users in the vicinity, but they are severely limited without the market place, payment mechanism and transfer controls. Similarly, cellular operators are unlikely to want to set up and maintain exchanges with each of the cellular operators in their international markets for something quite marginal to their businesses.

We believe that barriers to entry are likely to be limited in this business case. Once launched, we believe that other app developers are likely to introduce their own versions of the GriDD concept with the help of Wi-Fi Aware. Nevertheless, first-mover advantage together with the appropriate marketing – in this case leveraging off existing cellular networks – could give TerraNet the potential to build the largest market place, which, as with Facebook and Twitter, etc, would give it critical competitive advantages.

### **Monetisation**

TerraNet is looking to execute a two-pronged strategy roadmap for GriDD (similar to MeshMedia):

- An open-source platform to build a user community of GriDD independent of the mobile network operators (MNOs).
- A closed version where GriDD is integrated into the MNO's own apps and product bundles. TerraNet will also look to tailor and increase the range of services offered, for example offering video streaming capabilities that allow subscribers the ability to watch movies on the go by searching out nearby devices with surplus data capacity and being connected to the content.

For the closed version, TerraNet envisages being paid the equivalent of approximately \$0.20 (SEK1.8) per month per user by MNOs, which it will split equally with Sony Mobile. TerraNet will allow cellular operators the option to recoup part or all of this cost by letting them take a commission from the trades, reducing the amount paid to the seller.

We understand that TerraNet has already held discussions with Orange and Millicom. These talks have borne fruit in recent weeks, with Orange agreeing to test GriDD at its staff training university in Poland. This will enable the collection of usage and other data over a period of three to four months. TerraNet is also discussing the possibility of undertaking trials of GriDD in France and Norway with Orange and Telenor. For the app, it is looking to sell SDKs to third-party developers

and to use the freemium payment model for apps it develops itself, launching premium apps as the market matures.

One area that will need careful management is the relationship with MNOs and app customers. We believe that MNOs will want to limit the availability of the data trading service to the segments where they will not experience net revenue losses. For example, avoiding having customers with large data packages selling data cheaply to those with smaller, higher incremental cost data packages.

In our view, if GriDD or other data capacity-trading operators enter the market via publicly available apps, this could reduce the incentive of the cellular operator to deal directly with GriDD, not least because the customer loyalty benefits of allowing customers to use the service would fall away. Nevertheless, it is possible that they will be able to block customers with large data packages from selling data via the T&Cs and blocking access to apps, in which case the model of selling the product to MNOs and in app form could succeed.

#### **Other sensitivities**

Security may become an issue if misuse of the system results in the downloading of malware onto either the buyer or the seller's devices. Additionally, transactions may be disrupted if slow network speeds lead one or the other party to the transaction to break the transmission.

We see the potential upside for our forecasts if MNOs choose to have GriDD sold to more customer segments beyond our assumption that it will be sold only to students. This may occur in the event of more competitive conditions in the cellular markets or if the carrier experience of the customer retention benefits is positive.

GriDD may also expand its revenue generating potential with the addition of further features. For example, TerraNet is working on another derivative of GriDD, being a BitTorrent (a communications protocol for peer-to-peer file sharing) style feature, based on blockchain design that could convert data plans into virtual currency. Rather than paying cash to trade data, transactions could be undertaken using a virtual currency.

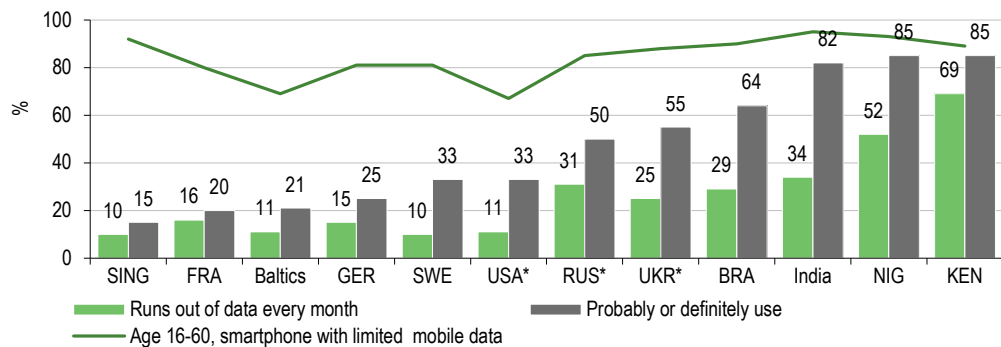
#### **The market: YouGov surveys show strong underlying market potential for GriDD**

Studies commissioned by TerraNet and undertaken by YouGov in 12 markets in 2016 (see Exhibit 10) indicated strong potential interest in such a data trading service. In six of the markets (Kenya, Nigeria, India, Moscow and St Petersburg [for Russia], Brazil, and Kiev [for Ukraine]), one quarter or more of the respondents indicated that they ran out of data on their packages every month. In these same markets, 50% or more of survey participants indicated that they would probably or definitely use the service.

While there was very strong demand in half of the markets, in at least 10 of the markets, 80% or more of people aged between 16 and 60 subscribed to limited mobile data packages. Even in the US, which is renowned for high numbers of unlimited data packages, in San Francisco and New York 70% of recipients were still operating with download limited data packages.



**Exhibit 10: Potential GriDD markets: key indicators 2016**



Source: YouGov. Note: \*Russia represented by Moscow and St. Petersburg, Ukraine by Kiev, USA by New York and San Francisco.

TerraNet has the technical ability to offer the GriDD service as an independent paid-for app that would enable users to transfer capacity between any mobile operators. Nevertheless, its strategy is to develop the product in cooperation with cellular operators to generate volume-based fees. This is being done primarily in order to reduce the potential for conflict with mobile operators, but it could also have the advantage of enabling GriDD to benefit from the MNOs' marketing reach and billing systems.

Some mobile operators have given a hostile reception to the idea, reflecting the potential for it to disrupt their business models with potential reductions in data bundle top-up revenues and increased data traffic on their networks without them receiving additional revenues. Nevertheless, we believe that there are likely to be benefits for cellular operators with regards to certain cost-sensitive customer segments. In particular, in reducing churn and increasing customer loyalty by offering customers a cost-saving service.

From this perspective, we see a particularly good use case in the student segment. Here we believe that a combination of high data demand, high price sensitivity and a tendency to congregate in close proximity in classes, while socialising and in student halls etc (assuming no provision of free Wi-Fi) would make GriDD an attractive service for students, as indicated by the YouGov surveys in a large number of markets. At the same time, the desire to attract a high market share of the student segment in recognition of their future potential high net worth (particularly university students) would increase the ROI for offering GriDD to this segment.

In the less wealthy countries, BRIC and Silicon Savannah countries (tech hubs) in Sub-Saharan Africa, where YouGov data suggests very high interest in the product, we believe that some mobile operators may be able to make a use case to offer GriDD more widely than the student segment. Budget-oriented city dwellers would probably reward the offer with increased loyalty and/or a fee for use, but this would need to cover the cost of lost data income and potential strain on network capacity. By contrast, we would not expect GriDD to make significant headway with wealthier users, given the relative inconvenience and potential security concerns.

### Outlook: International roll-out to MNOs the basis for growth

We have modelled the GriDD market assuming that the key target segment for MNOs' data trading element will be for students in senior secondary (high school) and tertiary (higher) education. We have assumed that TerraNet initially works within the EU28 countries, Russia and Ukraine in 2018 and expands into the highly prospective countries of Kenya, Nigeria, Brazil, India, Pakistan and Turkey in 2019. In 2020 we add Singapore, the US, and South Korea (resulting in a drop in the proportion of users with limited packages from 89% to 85%) and Japan, Indonesia and Iran the following year.

Key factors we have taken into account in estimating the addressable market are: smartphone ownership in the segment, use of limited data packages, the share of the market with MNOs that have signed up to use data trading services, and then the proportion choosing to use data trading services. This gives rise to our forecast of a market size of 14m in 2021, with GriDD's market share of 35% at that stage giving rise to 4.9m users and SEK44m revenues.

**Exhibit 11: Market for GriDD – senior secondary and tertiary students**

	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
<b>Total market (m)*</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>
Markets addressed by GriDD (%)	19.1	19.1	68.4	85.8	85.8	100.0	100.0	100.0	100.0	100.0
<b>Market addressed by GriDD (m)</b>	<b>34.9</b>	<b>34.9</b>	<b>125.1</b>	<b>157.0</b>	<b>157.0</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>	<b>182.9</b>
Proportion owning a Smartphone (%)	80.0	80.0	80.0	82.0	84.0	86.0	88.0	90.0	92.0	94.0
Proportion with limited mobile data packages** (%)	83.6	83.6	89.5	85.0	85.0	85.4	85.4	85.4	85.4	85.4
Users with limited data packages (m)	23.3	23.3	89.6	109.4	112.1	134.3	137.4	140.5	143.6	146.8
Proportion with carrier allowing data trading (%)	0.0	10.0	12.0	15.0	30.0	30.6	31.2	31.8	32.5	33.1
<b>Addressable market – carrier will allow data trading (m)</b>	<b>0.0</b>	<b>2.9</b>	<b>13.4</b>	<b>20.0</b>	<b>40.0</b>	<b>47.8</b>	<b>48.7</b>	<b>49.7</b>	<b>50.7</b>	<b>51.7</b>
Proportion choosing to use data trading services (%)	0.0	40.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
<b>Total market for data trading services (m)</b>	<b>0.0</b>	<b>1.2</b>	<b>4.7</b>	<b>7.0</b>	<b>14.0</b>	<b>16.7</b>	<b>17.1</b>	<b>17.4</b>	<b>17.7</b>	<b>18.1</b>
Market share GriDD (TerraNet) (%)	100.0	90.0	75.0	50.0	35.0	30.0	30.0	28.5	27.1	25.7
<b>Total users (m, estimated)</b>	<b>0.00</b>	<b>1.05</b>	<b>3.53</b>	<b>3.50</b>	<b>4.90</b>	<b>5.02</b>	<b>5.12</b>	<b>4.96</b>	<b>4.80</b>	<b>4.66</b>
<b>Price/month/unit SEK</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>	<b>0.85</b>
Change (%)	N/A	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)	(3.00)
<b>Revenues (SEKm)</b>	<b>0.0</b>	<b>10.4</b>	<b>33.9</b>	<b>32.6</b>	<b>44.3</b>	<b>43.9</b>	<b>43.5</b>	<b>40.9</b>	<b>38.4</b>	<b>36.1</b>

Source: Edison Investment Research. Note: \*Senior secondary and tertiary student populations in EU28, Ukraine, Russia, Kenya, Nigeria, Brazil, India, Pakistan, Turkey, Singapore, US, South Korea, Japan, Indonesia, Iran. \*\*Based on survey data in YouGov Survey into demand for GriDD for TerraNet 2016.

## Other Multimedia Services – Peer-to-multi-peer sharing

The core of TerraNet's Multimedia offering is MeshMedia, which enables the peer-to-peer transfer, streaming and mirroring of content from one-to-many devices (multi-casting) without the user needing to be within a network. It also assists with detection of other in-range devices while its multi-hop IP extends the transmission range to up to 2km by relaying signals across devices. The group's expertise in Mesh technology, which it is applying to the media field, has arisen from the company's own work as well as the acquisition in 2015 of the technology and IP of the US firm Cozybit, the pioneer of mesh technology. Additionally, Javier Cardona, the founder of Cozybit, who is widely recognised in the mesh networking field, joined TerraNet as an advisor following the acquisition in 2015.

### The business case

Taking into account that standard Wi-Fi Direct and Wi-Fi Aware smartphones already integrate peer-to-peer streaming to other devices and smart TVs, we see the key use cases for MeshMedia software as being to:

- Enable OTT (over-the-top – ie internet) content providers in poorer countries to expand their reach in the family market segments where there is either limited access or lack of affordability for multiple family members to download content using Wi-Fi and/or cellular networks.
- Enable subscribers to share content by streaming it from one family member to a number of others while travelling. This reduces network/roaming costs and also saves data storage capacity as fewer movies, etc, need to be stored on each mobile device.
- Enable teachers and educational institutions to stream videos and lectures to the devices of multiple students in classrooms or on field trips, etc, without requiring cellular or other networks.

TerraNet plans to launch its MeshMedia app in Q417, shortly after the launch of Wi-Fi Aware in Q317, and to commence selling software development kits (SDKs) to media companies at this stage. This software will be compatible with the Wi-Fi Alliance's new Wi-Fi Aware standard. It

should also work on devices not yet Wi-Fi Aware enabled, where it will use the previous Wi-Fi Direct standard.

The launch of Wi-Fi Aware in Q317 and the increasing penetration of Wi-Fi Aware handsets in the market should nevertheless improve the user experience because Wi-Fi Aware handsets allow:

- low battery use both while streaming data and while in proximal discovery mode,
- faster discovery of nearby users of mesh-network applications,
- communication between Android and iOS devices (with Apple having joined the Wi-Fi Aware standard), and
- the ability to create peer-to-peer networks that do not require the originating device to remain online in order to continue to operate (as is the case with Wi-Fi Direct).

### **Competition**

Comparison with the major streaming technologies (see Exhibit 12) shows MeshMedia's advantages. Only Miracast is able to offer peer-to-peer multicast streaming similar to MeshMedia's, but it is hardware dependant, requiring either Miracast certified equipment or the use of dongles in the receiving hardware.

Chromecast does not offer multicast streaming without additional technical IP and it requires a Wi-Fi network to undertake the streaming. Similarly, Apple's AirPlay requires the use of Apple hardware and is unable to provide multicasting.

## Exhibit 12: Key competitors – wireless content streaming systems and file sharing

Product (company)	Description
<b>Streaming – offline</b>	
<b>MeshMedia (app)</b> (TerraNet) Planned launch Q417	<p>The app will enable content transfers to one or many devices using the standard for peer-to-peer transmissions or standard Wi-Fi. It is expected to allow fast location of proximate devices, and the streaming of files, movies and music between mobile devices and laptops/displays up to c 100m distant. Multi-hop technology will potentially extend this distance up to 2km. Entirely software/app based, it requires no additional hardware. Content is encrypted with digital rights management supported. If the user has a Wi-Fi Aware-enabled handset (new from 2017) the transmission will be made using Wi-Fi Aware, which allows for low battery use. If the user does not, then the transmissions are made using Wi-Fi Direct, which is less battery-friendly. Similar to Google Chromecast, it will be limited to transmitting content from content providers under the terms specified by the providers. All transmissions are encrypted.</p> <p><b>Positives:</b> Can be used without external wireless transmission network. Establishes presence of potential file sharers in vicinity. Can be used to transmit from one to many devices as well as one-to-one. Enhanced security with encryption. When used offline (peer-to-peer) users do not need to incur data charges for close proximity transfers. <b>Negatives:</b> First version only to be available on Google Play, so not for use on iOS systems. Speeds vary with devices used and their proximity but potentially up to 40Mbps/sec. Battery use optimised only for Wi-Fi Aware handset.</p> <p><b>Planned price from launch in Q417:</b> Freemium and premium version at INR100 (\$1.47) on Google Play in India.</p>
<b>Airdrop/Airplay</b> (Apple)	<p>Airdrop is an ad-hoc system created by Apple that enables files to be transferred between Mac computers and Apple phones without a mail or mass storage device using Wi-Fi or Bluetooth. Airplay also enables wireless streaming of videos, music and photos to second-generation. Apple TVs, AirPlay speakers using Wi-Fi. If users are close then the system uses Wi-Fi Direct.</p> <p><b>Positives:</b> Free to use for Apple users. <b>Negatives:</b> Cannot be used to multicast (transmit from one to many devices). Apple content such as movies and music can only be shared between designated family members.</p> <p><b>Price:</b> Included as standard in Apple devices</p>
<b>Miracast</b> (Wi-Fi Alliance)	<p>Launched in 2012 by the Wi-Fi Alliance, Miracast uses Wi-Fi Direct to transmit signals within c 100m from Miracast-certified devices to displays. Content on the device is mirrored on the display (so called "clone and extend"). Content is encrypted with digital rights management supported.</p> <p><b>Positives:</b> Supports multicast. Widely used. Included (certified) on over 6,600 devices as of end-2016 (source Wi-Fi Alliance). Supports digital rights management. <b>Negatives:</b> Hardware dependant: Transmissions are limited to Miracast-certified devices or require the use of an adaptor plugged into an HDMI or USB port. Limited to 1080 HD transmission speeds. Latency levels not guaranteed.</p> <p><b>Price:</b> Included as standard in numerous devices. Dongle for displays \$60-100.</p>
<b>Streaming – online</b>	
<b>Chromecast</b> (Google)	<p>Launched by Google in 2014, content is transmitted by Chromecast using standard (networked) Wi-Fi from devices to displays, but is limited to transmitting content from enabled apps (Netflix, iPlayer, YouTube, etc).</p> <p><b>Positives:</b> Newer version supports Ultra HD 4K speeds. <b>Negatives:</b> Requires user to have Wi-Fi network connection. Requires additional tech to multicast. Hardware dependent, it requires either to be built into the devices or the use of an adaptor plugged into an HDMI port. Limit to streaming content from enabled apps.</p> <p><b>Price:</b> Chromecast 2/Chromecast Ultra Wi-Fi connected HDMI dongle: \$35/\$69. No service fee.</p>
<b>Freedocast</b>	<p><b>Description:</b> Freedocast is an Indian application that enables subscribers to broadcast live stream content to their followers on social media as well as to view content streamed from people they follow on social media.</p> <p><b>Positives:</b> Transmits from one to many devices. <b>Negative:</b> Requires network connection. Not DRM enabled.</p> <p><b>Price:</b> Free to download on Google Play.</p>
<b>Offline file sharing</b>	
<b>SHAREit (app)</b> (Lenovo)	<p>An app developed by Lenovo, usable across multiple platforms, which uses Wi-Fi Direct to transfer files between devices within c 100m while offline. World leader, used on 600m devices in 200 countries and the top downloaded app on Google Play in 24 countries.</p> <p><b>Positives:</b> Can be used without external wireless transmission network. Can be used to transmit from one to many devices (group-send). Can be used for transmissions to iOS as well as Google devices, plus laptops and tablets. <b>Negatives:</b> Advertises highest speed of 20 Mb/s.</p> <p><b>Price:</b> Free but with additional charges within the service.</p>
<b>Hike Direct (app)</b>	<p>Hike Direct is part of a WhatsApp-style messaging system in India. It currently uses Wi-Fi Direct (although may upgrade to Wi-Fi Aware once the standard is introduced) to enable offline file sharing similar to MeshMedia and SHAREit. Unlike TerraNet's proposition, it does not work directly with content providers.</p> <p><b>Positives:</b> No data charges using peer-to-peer connection, 100m proximity. <b>Negatives:</b> Lacks one-to-many feature of MeshMedia. No automatic discovery mechanism.</p> <p><b>Price:</b> Free.</p>
<b>SuperBeam (app)</b>	<p>SuperBeam 4.0 is an app available on Google Play that enables the sharing of large files between offline devices using Wi-Fi Direct. Before sending data, the receiving device must either come into contact (to use a QR code or NFC contact) to initiate the transfer or the receiver must input a manual code.</p> <p><b>Positives:</b> Quick transfer speeds, especially if devices are close. Can create a hotspot to send files to devices without the app installed.</p> <p><b>Negatives:</b> Not set up to easily send or receive files to the devices of strangers. No automatic discover mechanism.</p> <p><b>Price:</b> Free with advertising or \$1.99 on Google Play.</p>

Source: Google Play, Tech radar, company websites

### Outlook: Three Asian media clients and counting...

TerraNet's strategy is to work with content owners, such as Iflix, Disney and Netflix as well as social media sites, such as Facebook, to provide software for streaming services conforming with the content sharing rules of the provider. In addition to creating apps under revenue-sharing agreements, TerraNet is looking to offer content companies free SDKs and APIs to enable them to build apps within their brand family, which would generate licence revenues for the company. Revenue generation is anticipated to be based on metrics such as number of downloads and

updates and advertising revenues. TerraNet is also looking to the potential means to further the marketing and distribution of MeshMedia as well as the GridDD service using these companies. It is also open to the potential acquisition of a distribution channel with an existing marketing base.

TerraNet has already made a start marketing its services in India and Asia. The area provides fertile ground for expansion given poor access to cellular and Wi-Fi networks for large sections of the population as well as the presence of large family groups, which should drive demand for multicast streaming. The region will also serve as a test market for the technology before implementation in other markets.

In 2016, TerraNet signed a commercial agreement with ObjectOne for the benefit of its video entertainment subsidiary, TeluguOne, which provides local language video entertainment to the 78 million Telugu-speaking minority in India over YouTube. TerraNet launched a TeluguOne branded app incorporating MeshMedia and proximal connectivity features called ToneFlix on Google Play in late May. The launch attracted considerable media attention for the app, which enables the streaming of TeluguOne's content on an encrypted basis, supporting digital rights management. Revenues from the app are to be split between the two companies.

TerraNet is currently employing a freemium model to monetise the app, and is looking to benefit from the app being promoted by TeluguOne itself to its own 2.1m subscriber base.

TerraNet has also reached similar deals to create apps for Indian OTT TV and movie distributor YuppTV, and Malaysian company iflix.

YuppTV is the leading provider of Indian TV content globally. It provides international OTT subscriptions to over 200 Indian TV channels in 13 languages as well as Indian movies. According to Medianama.com, YuppTV had 5m subscribers in 2013 and reported revenues of \$11m. Given the likely double-digit growth in subscriber numbers since then based on the rapid take-up of OTT services globally, we see the potential for YuppTV to have in excess of six million subscribers in 2016.

We see strong subscriber growth potential from both YuppTV and TeluguOne. The Indian TV market had 152m pay TV subscribers in 2016 of which 68% was CATV and 32% (49m) direct to home (DTH), of which OTT services form a part. The share of the DTH sector is expected to increase over the next five years, reflecting the difficulty and cost of laying cable to remote communities. The number of pay-TV subscribers in total is forecast by Media Partners Asia to grow at a 3.8% CAGR to reach 183m in 2021.

Malaysia-based iflix operates a Netflix-type OTT service that has approximately 4m subscribers (according to Wikipedia) in Malaysia, the Philippines, Thailand, Indonesia, Sri Lanka, Brunei, the Maldives, Pakistan, Vietnam and Myanmar.

## Outlook

We have based our forecasts of app downloads on management's risk-weighted assessment of future app downloads (see Exhibit 13). We have back-tested this by assuming customer acquisitions enabling a doubling in subscriber numbers in 2019 and then a 36% CAGR in subscriber numbers over the following three years. This gives rise to penetration of its addressable market of 31% by 2021 (Exhibit 13), which we believe is reasonable.

TerraNet is looking to apply a freemium model to app pricing under these agreements. We have assumed for our model that 80% of users downloading the app stick to the free content, but 20% go on to pay for access to the premium version of the streaming service for \$0.85. This is a conservative take on management's target of c \$1 per premium content download, giving rise to SEK1.5 (\$0.18) in revenue per app download, which translates to SEK0.77 (\$0.09) per download after revenue sharing.

### Exhibit 13: MeshMedia app sales

	2017e	2018e	2019e	2020e	2021e
Addressable market (app downloads, m)	12.1	24.2	36.3	47.2	61.3
TerraNet market share (%)	2.9	8.2	18.5	24.1	30.7
<b>TerraNet app downloads (m)</b>	<b>0.4</b>	<b>2.0</b>	<b>6.7</b>	<b>11.4</b>	<b>18.8</b>
Average price/unit after revenue sharing (SEK)	0.77	0.72	0.76	0.78	0.80
<b>TerraNet revenue (SEKm)</b>	<b>0.3</b>	<b>1.4</b>	<b>5.1</b>	<b>8.9</b>	<b>15.1</b>

Source: Edison Investment Research

## mHealth with IBM

In March 2017, TerraNet announced an agreement with IBM to undertake a feasibility study into providing remote mobile health and medical diagnostics, working with IBM's Cloud App developer platform Bluemix and its video streaming subsidiary Ustream. The business case involves providing mobile health and remote medical diagnostics services to patients with no access to cellular networks using TerraNet's proximal connectivity and contextual awareness know-how and peer-to-peer video streaming. The study is expected to be located in Sweden and take six to nine months, commencing in Q217.

If successful, the intention is to initially supply the technology to medical tech companies and then to official mobile healthcare providers in the Nordic region, via either apps or licensed technology. The main demand is expected to be in the treatment of chronic conditions, ie chronic obstructive pulmonary disease, MS, diabetes, cholesterol, chronic heart failure, etc.

TerraNet management also sees significant potential to develop further products with IBM, particularly with Ustream, the wholly owned global IBM subsidiary for video streaming. With its global reach, the company could be a transformative DRM-partner for MeshMedia and GriDD.

## Smart Villages

TerraNet's additional use case for MeshMedia is a Smart Villages (SV) project in India. The project envisages the creation of 132 broadband equipped communities, typically densely populated, and comprising 50, 000-100,000 people. The project is to be funded by the Indian government and TerraNet is working with senior officials in the government to plan the network architecture to provide a low cost but robust solution. These would likely incorporate a combination of several Wi-Fi routers inside the village with one or two GSM base stations to relay signals to other villages and an LTE base station in a hub village to connect with the internet and cellular networks. TerraNet's multi-hop IP will enable the reach of the network to extend beyond the routers to the populated areas of the villages. The project is not expected to require significant capex by TerraNet. No details are yet available as to how it will be monetised.

## Offline gaming

TerraNet management sees a significant opportunity to monetise the potential of growth in offline gaming in Asia. TerraNet already has a fully functioning basic offline gaming app. MeshBricks uses Wi-Fi to connect app-enabled smartphones in the same vicinity to enable the users to compete in an interactive Tetra-style game. With TerraNet planning to be instrumental in bringing proximal connectivity capabilities to smartphones in China, it sees the potential to create SDKs to enable game developers to fully integrate contextual awareness in new games and to develop the market for offline gaming. The company has commissioned YouGov to undertake a study in the Japanese, South Korean and Chinese markets to determine market potential and inform its potential marketing strategy.



## Sensitivities

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**Early stage company:** Although it has been in business since 2004, with regards to its current product range TerraNet is still in a high-risk early commercialisation phase. This, together with the unique concepts underpinning of many of its products, means that some of its products may appear promising, but finally not find a market niche. Alternatively, they may themselves be disrupted by other products in development by other firms. A number of TerraNet's products have potentially short lifecycles and new products may not emerge to replace the loss of their revenues.

There is also significant uncertainty surrounding the potential pricing for products in commercialisation. The company also faces FX risk as it is likely to price largely in dollars but most of its costs are in Sweden krona. This adds significant risk to our forecasts, and the valuation of the company is likely to be sensitive to price discovery, both positive and negative. There is a lack of visibility concerning the potentially competing technology under development at other software firms, currently off the radar. Low level of orders in hand means that the share price is likely to be sensitive to order backlog releases. Furthermore, as a company with limited financial means, TerraNet may find its more successful products copied by other market participants and may not have the funds to prevent this infringement of its rights.

**Ongoing funding requirements:** Based on our forecasts, we believe that TerraNet will require SEK70m in funding over the 2017-20 period. The share price could be affected by concerns about the company's ability to raise debt or equity (with dilutive share issues).

**Strong potential for large-scale orders:** TerraNet's success in attracting high-calibre partners, such as Qualcomm, Autoliv and IBM, gives rise to the potential that the company may leverage significant sales from just one product selling in large volume.

**Chip Integration:** TerraNet's sale of software for mobile phone chips via Qualcomm in China is expected to form a significant proportion of revenues over the next five years. Its success is sensitive to the potential for Google to return to the Chinese market, given Qualcomm's strong relationship with Google, which provides this software on Qualcomm chips elsewhere in the world. We also see significant upside to our forecast sales if demand for TerraNet's contextual awareness software as a proportion of Wi-Fi Aware chipsets sold by Qualcomm is higher than the 25% we have assumed in 2019 and 35% in 2021.

**IoT: Auto:** The Auto business case rests heavily on TerraNet demonstrating the high degree of reliability and accuracy required by vehicle OEMs for its co-operative positioning and multi-hop technology. TerraNet's V2V software sales are likely to be positive affected if the US decides to make V2V using DSRC frequencies mandatory in 2019. If 5G cellular services become the standard for V2V, the stock will be sensitive to whether there is some provision for DSRC to become a required redundant technology. **Headsets:** Growth in the adoption of "hearables" would be likely positive for demand for peer-to-peer headset software.

**Multimedia Services:** Growth in revenues from TerraNet's multimedia peer-to-multi-peer software may be held back by the need for users to acquire Wi-Fi Aware handsets to reap the full benefit of low battery use peer-to-peer streaming and proximal awareness.

**GriDD:** Sales of GriDD will be sensitive to cellular operators adopting the disruptive technology for customer retention purposes. GriDD's strategy is for the group to provide the GriDD concept on a SaaS basis to MNOs as well as providing it to the public via app sales. We expect cellular operators to oppose this disruptive technology becoming freely available to the public, and this may lead to some business loss. With the take-off of Wi-Fi Aware, we see the potential for new entrants to the market.

## Financials

TerraNet's financial situation reflects its early commercialisation position in its three key product areas. The group generated external revenues of SEK0.4m and SEK2.7m in 2015 and 2016, respectively, which added to capitalised own development costs generated reported revenues of SEK3.7m and SEK3.9m, respectively.

Operating costs rose sharply in 2016 reflecting higher spending on taking products to the market place and ongoing product development. Spending on staff and consultants, net of the outlays on consultants capitalised as development costs, rose from SEK14.7m in FY15 to SEK21.3m in FY16. Sales and marketing spending went up from SEK3.1m to SEK3.8m, and admin expenses increased from SEK1.2m to SEK1.7m.

Losses at the EBITDA level rose from SEK17.2m in 2015 to SEK25.0m in 2016, which after sharp rises in amortisation of capitalised development and patent costs, led to operating losses of SEK18.0m and SEK37.6m, respectively.

**Exhibit 14: TerraNet revenue forecast**

SEKm	2015	2016	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
<b>Divisional split</b>												
Chip Integration	0.4	0.4	7.6	30.0	50.4	89.3	103.1	84.3	57.0	45.4	34.7	25.0
Multimedia Services	0.0	0.0	2.9	12.9	39.0	41.5	59.4	59.3	59.2	56.9	54.7	52.8
Of which GriDD	0.0	0.0	2.2	11.4	33.9	32.6	44.3	43.9	43.5	40.9	38.4	36.1
Of which other Multimedia	0.0	0.0	0.7	1.4	5.1	8.9	15.1	15.4	15.7	16.0	16.3	16.7
IoT	0.0	2.3	5.7	12.3	34.5	46.9	78.4	128.3	182.1	213.1	252.5	307.8
of which automotive	N/A	N/A	3.3	4.9	11.6	19.3	34.9	53.9	95.1	110.5	124.9	139.9
of which audio	N/A	N/A	1.8	3.9	15.1	10.9	15.3	40.7	46.6	51.4	56.7	62.5
of which other IoT	N/A	N/A	0.5	3.5	7.7	16.7	28.2	33.7	40.4	51.2	70.9	105.4
<b>Total revenues*</b>	<b>0.4</b>	<b>2.7</b>	<b>16.1</b>	<b>55.2</b>	<b>123.8</b>	<b>177.7</b>	<b>240.9</b>	<b>272.0</b>	<b>298.3</b>	<b>315.4</b>	<b>341.9</b>	<b>385.6</b>
Change (%)	N/A	584.4	504.1	242.2	124.4	43.5	35.6	12.9	9.7	5.7	8.4	12.8

Source: TerraNet accounts, Edison Investment Research. Note: \*External revenues excluding own work capitalised.

We forecast total revenues (excluding own work capitalised) of SEK16.1m this year, of which SEK15.9m represents non-recurring revenue and SEK0.3m volume-related revenues.

The NRE forecast is supported by an order backlog of SEK7.1m as of November 2016. Approximately half of this work is expected to take place for Chip Integration clients, principally arising from work for Qualcomm and Quantenna, and a further third for V2V and headset areas of the IoT segment.

From 2017 to 2021, we forecast external revenues to grow at a CAGR of 97%. We expect the Chip Integration division to be the main driver of this growth (see Exhibit 14), principally due to the expected demand in China for TerraNet's software on the Qualcomm chip. This is assumed to also be underpinned by ongoing NRE revenues from Quantenna and Chinese app developers and social media firms and app sellers such as Baidu and Tencent, which are likely to need technical assistance from TerraNet to get the most out of its software.

This gives rise to our 2021 Chip Integration forecast segment revenues of SEK103m, which represents a major 43% of total group revenues. IoT is expected to be the second largest contributor to revenue that year at SEK78m. From that point on, in our model Automotive is the key revenue driver. This is based on our assumption that sales of DSRC V2V units will reflect increasing demand for connected car/V2V software as production of vehicles with advanced driver assistance systems (ADAS) features grows. Also, we assume that OEMs will be preparing for the eventuality of legislation in the US and EU requiring V2V in all new vehicles.

We also are optimistic about growth prospects in the headset field using TerraNet's multi-hop and peer-to-peer communications as well as revenues from what we foresee as being newly developing

product streams in the IoT segment, as discussed above. By 2026, we assume that 36% of group revenue will be derived from the V2V segment, with IoT contributing 80% in total.

We forecast GriDD revenues at SEK44m in 2021. This is based on expected roll-out of the service to student populations around the world by their cellular operators, using TerraNet's SDKs. In reality, the forecast may easily be overshoot if the group is able to achieve sales of apps to the public without upsetting revenues from the cellular operators (which we have assumed for the base case is not possible) or on the downside if the launch of Wi-Fi Aware leads to the development of competing app services that lead the cellular operators to discount the value of the TerraNet offer.

In the other Multimedia Services operations, we forecast revenues of SEK15m in 2021. This assumes progress in the shared freemium revenues from peer-to-multi-peer apps in its already existing contracts with three Asian media firms and expectation of a few more similar contracts with firms of this size. It does not yet incorporate assumptions of a Netflix or Disney size customer acquisition, which is part of management's strategy.

From 2021 for our base case revenue assumptions, we assume that Google will return to China in 2022, as discussed above. We assume that this will lead to a steady decline in TerraNet's revenues in China from sales of software for Qualcomm's mobile phone chip to zero in 2026. At the same time, it leads to a sharp decline in NRE revenues from China in 2021, as NRE revenues generated from application developers and OEMs decline as the software is assumed to only be incorporated into chipsets of existing models and app development tails off. This leads to an 18% dip in 2022 Chip Integration revenues, which is compensated for at the group level by strongly growing IoT revenues. This is nevertheless forecast to lead to a slowdown in group revenue growth to 13% after a forecast 36% in 2021.

#### Exhibit 15: EBITDA split between NRE and volume based revenues

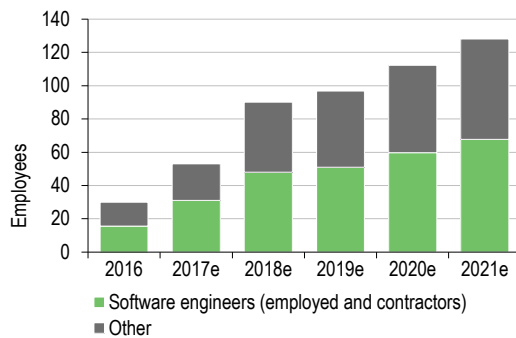
SEKm	2016	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
<b>NRE</b>											
Revenues	2.7	15.9	28.9	29.2	41.6	39.1	30.4	11.3	10.7	10.9	11.1
Expenses (e)	(2.5)	(15.1)	(27.4)	(27.8)	(39.5)	(37.1)	(28.9)	(10.8)	(10.2)	(10.4)	(10.6)
<b>EBITDA (e)</b>	<b>0.1</b>	<b>0.8</b>	<b>1.4</b>	<b>1.5</b>	<b>2.1</b>	<b>2.0</b>	<b>1.5</b>	<b>0.6</b>	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>
EBITDA margin (%)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
<b>Volume based revenues</b>											
Revenues	0.0	0.3	26.3	94.6	136.1	201.9	241.5	286.9	304.6	331.0	374.4
Expenses (e)	(25.2)	(53.4)	(83.0)	(117.8)	(127.8)	(160.1)	(185.4)	(211.6)	(220.5)	(229.0)	(237.8)
<b>EBITDA (e)</b>	<b>(25.2)</b>	<b>(53.1)</b>	<b>(56.7)</b>	<b>(23.2)</b>	<b>8.3</b>	<b>41.8</b>	<b>56.2</b>	<b>75.4</b>	<b>84.1</b>	<b>102.0</b>	<b>136.6</b>
EBITDA margin (%)	N/A	(19,825.6)	(215.7)	(24.5)	6.1	20.7	23.3	26.3	27.6	30.8	36.5
<b>Group</b>											
<b>Total revenues*</b>	<b>2.7</b>	<b>16.1</b>	<b>55.2</b>	<b>123.8</b>	<b>177.7</b>	<b>240.9</b>	<b>272.0</b>	<b>298.3</b>	<b>315.4</b>	<b>341.9</b>	<b>385.6</b>
Expenses	(27.7)	(68.4)	(110.4)	(145.5)	(167.3)	(197.2)	(214.3)	(222.3)	(230.7)	(239.4)	(248.4)
<b>EBITDA</b>	<b>(25.0)</b>	<b>(52.3)</b>	<b>(55.2)</b>	<b>(21.7)</b>	<b>10.3</b>	<b>43.8</b>	<b>57.7</b>	<b>75.9</b>	<b>84.7</b>	<b>102.5</b>	<b>137.2</b>
EBITDA margin (%)	(937.8)	(324.3)	(100.1)	(17.6)	5.8	18.2	21.2	25.5	26.8	30.0	35.6

Source: TerraNet accounts, Edison Investment Research. Note: \*Excluding own work capitalised.

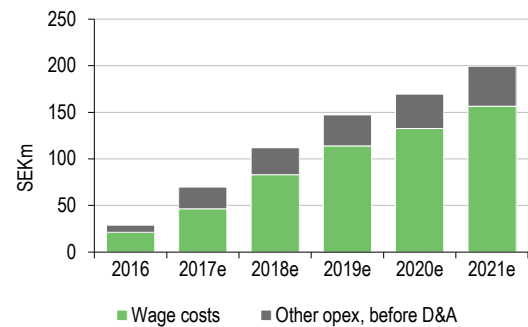
Our earnings forecasts take into account the differences in the cost profile for NRE and volume-based revenues. At present, the group is undertaking NRE work for only a small margin over its own costs, which we have modelled at 5%. The impact of this is that the margins and therefore earnings are particularly sensitive to licence fee revenues, which in themselves are not significantly related to outgoings, typically involving the download of software.

A major part of the cost base is employee costs. We assume that total employee numbers will rise from the current level of c 30 to 90 by end-2018 and 125 in 2021. Of this, the number of software engineers including consultants is assumed to grow to 48 in 2018 and 68 in 2021.

**Exhibit 16: Employee numbers YE forecast**



**Exhibit 17: Opex, before D&A costs**



Source: Edison Investment Research

Source: Edison Investment Research

After a sharp ramp up in costs relating to commercialisation and promotion of its software products, we forecast the group to become EBITDA positive in 2020 and from there to achieve a rapid increase in EBITDA margin to reach 37% in 2026.

Edison does not incorporate expected share issues into its model so, for the purpose of our model, we assume that growth is debt funded, leading to an uptrend in net finance costs in our model to 2021. This results in pre-tax losses continuing until 2020. We understand that TerraNet companies had tax losses carried forward at end 2016 of SEK145.5m. Accordingly, based on our earnings forecast, we assume that the group will not incur income tax until 2026.

## Cash flow forecast to turn positive during 2020

Total cash burn (operating plus investing) was SEK20.1m in 2015, growing to SEK27.9m in 2016 (see Exhibit 18). The principal use of funds was outlays to bring a number of products to the commercialisation stage. These costs were not significantly offset by the NRE revenue inflows of SEK0.4m in 2015 and SEK2.7m in 2016. We forecast that group operations absorb further cash of SEK59.5m in 2017 and SEK61.5m in 2018 as the group ramps up employee numbers and marketing spend.

Capitalised development costs are the only significant form of investment undertaken by the company. We expect these outlays to remain within a band of SEK6-9m over the next three years. Helped by net cash inflows of SEK26.6m (SEK28.0m before SEK1.4m issue costs) already received this year from funds not fully collected during 2016 from a November 2016 share issue, and a further share issue in January 2017, as well as the net SEK88.1m (SEK100.1m before SEK12m estimated issue costs) via the end-May 2017 IPO, we believe that the group is in a good position to fund its operations over the next year. We do not expect it to need further funds until H218, which we estimate at only SEK20m. This would be part of the total SEK70m in funding that we estimate TerraNet requires ahead of reaching free cash flow break-even in 2020.

During 2019, we expect operating cash burn to fall to SEK33.2m, as revenue growth in a number of key areas starts to grow sharply.

**Exhibit 18: Cash flow summary**

SEKm	2015	2016	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
Net income	(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2	67.4	77.4	75.5	104.0
Depreciation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Amortisation of other intangibles	0.8	12.5	7.1	7.8	7.4	7.7	8.3	9.3	10.3	11.1	11.8	12.5
Income tax expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.3	29.3
Net finance cost	0.0	0.0	0.0	(0.1)	1.2	2.5	2.0	0.2	(1.8)	(3.9)	(6.0)	(8.6)
Changes in working capital	3.9	2.7	1.9	(0.4)	(3.7)	(3.5)	(3.7)	(1.5)	(2.0)	(1.0)	(23.2)	(33.1)
<b>Total operating cash flows</b>	<b>(13.3)</b>	<b>(22.4)</b>	<b>(50.4)</b>	<b>(55.6)</b>	<b>(25.4)</b>	<b>6.8</b>	<b>40.1</b>	<b>56.2</b>	<b>73.9</b>	<b>83.7</b>	<b>79.3</b>	<b>104.0</b>
Purchase of property, plant and equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capitalised development costs	(6.8)	(5.1)	(9.1)	(6.3)	(8.2)	(9.6)	(11.3)	(12.2)	(12.7)	(13.2)	(13.7)	(14.2)
Purchase of other intangible assets	0.0	(0.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest received	0.0	0.0	0.0	0.4	0.4	0.8	0.8	0.8	1.8	3.9	6.0	8.6
<b>Total investing cash flow</b>	<b>(6.8)</b>	<b>(5.6)</b>	<b>(9.1)</b>	<b>(5.9)</b>	<b>(7.8)</b>	<b>(8.8)</b>	<b>(10.5)</b>	<b>(11.4)</b>	<b>(10.9)</b>	<b>(9.3)</b>	<b>(7.6)</b>	<b>(5.6)</b>
Dividends	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Share repurchase/issue	21.3	29.5	128.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Increase/decrease in borrowing	0.0	0.0	0.0	20.0	40.0	10.0	(30.0)	(40.0)	0.0	0.0	0.0	0.0
Interest paid	0.0	0.0	0.0	(0.3)	(1.6)	(3.3)	(2.8)	(1.0)	0.0	0.0	0.0	0.0
Other	0.0	(2.3)	(13.4)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total financing cash flow</b>	<b>21.3</b>	<b>27.2</b>	<b>114.7</b>	<b>19.7</b>	<b>38.4</b>	<b>6.8</b>	<b>(32.8)</b>	<b>(41.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Closing net debt (cash)</b>	<b>(5.2)</b>	<b>(4.4)</b>	<b>(59.5)</b>	<b>2.3</b>	<b>37.1</b>	<b>42.3</b>	<b>15.4</b>	<b>(28.3)</b>	<b>(91.4)</b>	<b>(165.8)</b>	<b>(237.4)</b>	<b>(335.9)</b>

Source: TerraNet accounts, Edison Investment Research

## Balance sheet debt free and boosted by recent cash raisings

TerraNet was debt free at end-2016 with cash balances of SEK4.4m, aided by share issues in 2016 that netted SEK32.8m after fees (SEK35m gross). Further funds from a January 2017 issue of 2.0m shares at SEK12 per share, and the late receipt of funds from a November 2016 share issue, are understood to have already brought in a further SEK26.6m in cash net of SEK1.4m in fees.

Added to this, TerraNet undertook an initial public offering (IPO) in May 2017. The company issued 7.70m new B shares at a price of SEK13 per share, raising a net SEK 88.1m in funds (SEK100.1m net of estimated issue costs of SEK12.0m). As a result of this capital raising we do not expect the company to have to raise further funds until H218, when we estimate that it will require an additional SEK20m.

Total assets of SEK30.6m at end 2016 are principally comprised of capitalised development costs of SEK20.7m and patents valued at SEK2.5m.

## Valuation

We derive a base case DCF valuation range for TerraNet of SEK13.4-15.2 per share, incorporating a WACC range of 14.5-15.5% (see Exhibit 19). This is based on our assumption of the group successfully commercialising its key product lines, becoming free cash flow (FCF) positive during 2020 and on our estimate of required funding of SEK70m up until that point. The mid-point of this valuation range (SEK14.3 per share) equates to a 2021 EV/sales multiple of 1.0x, which, when discounted back to 2017 at a 15% WACC, represents a multiple of 1.6x. This is above the not very well matched FY1 listed peer multiples of 1.1x, but within the range of the median and mean for peer M&A small caps of 1.6-2.4x.

TerraNet is currently commercialising products in a range of verticals, several of which have the potential to provide significant upside to investors. At the same time being at an early stage of commercialisation there is also the potential for the business to run into significant headwinds in its efforts to become cash generative. As such, we view the stock as a high risk investment, which needs to be considered alongside the valuation proposition.

## Chosen valuation methods: DCF with peer valuation

With TerraNet not yet generating positive earnings data, we have chosen to value the company with a combination of DCF and peer/M&A valuation, based on forecast sales data.

Our financial forecasts as laid out thus far in this document represent a base case scenario, applying assumptions as laid out in Exhibit 21. To scenario test our model we have incorporated a high and low case into our DCF. We also examine the impact on our model if we do not include the assumption that Google disrupts TerraNet's sales in China by returning to the market.

Our base case DCF gives rise to a valuation range of SEK13.4-15.2 per share, applying a 14.5-15.5% WACC range and 3% terminal growth assumption from 2026.

### Exhibit 19: DCF valuation

SEKm	2017e	2018e	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e
Revenue	16.1	55.2	123.8	177.7	240.9	272.0	298.3	315.4	341.9	385.6
Change (%)	504.1	242.2	124.4	43.5	35.6	12.9	9.7	5.7	8.4	12.8
EBITDA	-52.3	-55.2	-21.7	10.3	43.8	57.7	75.9	84.7	102.5	137.2
EBITDA margin (%)	-324.3	-100.1	-17.6	5.8	18.2	21.2	25.5	26.8	30.0	35.6
Change in working capital	1.9	-0.4	-3.7	-3.5	-3.7	-1.5	-2.0	-1.0	-2.0	-3.8
Working capital/sales	11.5%	-0.7%	-3.0%	-2.0%	-1.5%	-0.6%	-0.7%	-0.3%	-0.6%	-1.0%
Capex (Own work capitalised)	-9.1	-6.3	-8.2	-9.6	-11.3	-12.2	-12.7	-13.2	-13.7	-14.2
Capex/sales	-0.6	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Free cash flow	-59.5	-61.9	-33.6	-2.7	28.8	44.0	61.3	70.5	65.6	89.8
Terminal value						0.0				790.7
Total cash flow	-59.5	-61.9	-33.6	-2.7	28.8	44.0	61.3	70.5	65.6	880.5
Enterprise value	222.5	<b>Debt adjustment</b>				<b>Key assumptions</b>				
Net debt/(cash) adj. for 2017 equity issues	-119.1	Net debt/(cash) end 2016				(4.4)	WACC (%)			14.5-15.5
Equity valuation	341.6	Cash from share issues to date 2017				(114.7)	Terminal growth rate (%)			3.0
Shares in issue (m)	24.0	Adjusted net debt (cash)				(119.1)				
<b>Equity valuation (SEK/share)</b>	<b>14.3</b>									

Source: Edison Investment Research

As can be seen from the sensitivity table (Exhibit 20) the valuation is quite robust to changes in WACC and terminal growth assumptions. A one percentage point change in our WACC assumption from the mid-point of 15% of our 14.5-15.5% base case assumption leads to an increase/decrease in our base valuation of 6.6% and 6.1%, respectively.

### Exhibit 20: Base case DCF sensitivity analysis (SEK/share)

		Terminal growth				
		1.00%	2.00%	3.00%	4.00%	5.00%
WACC	18.00%	9.2	9.6	10.0	10.5	11.1
	17.50%	9.7	10.1	10.6	11.1	11.8
	17.00%	10.2	10.7	11.2	11.8	12.5
	16.50%	10.8	11.3	11.9	12.6	13.3
	16.00%	11.4	12.0	12.6	13.4	14.2
	15.50%	12.1	12.7	13.4	14.2	15.2
	15.00%	12.8	13.5	14.3	15.2	16.4
	14.50%	13.5	14.3	15.2	16.3	17.6
	14.00%	14.4	15.2	16.3	17.5	19.0
	13.50%	15.3	16.3	17.4	18.8	20.5

Source: Edison Investment Research

## DCF: Scenario analysis

Our scenario analysis (see Exhibit 21) explores the key areas of uncertainty for TerraNet as we see them.

- The potential for Google to return to the Chinese market and for its contextual awareness software to be used in place of TerraNet's in Qualcomm's chip (as is the case in the rest of world at present). Our low case scenario assumes that Google returns to mainland China in 2019, and software sales volumes fade to zero by 2023, whereas in our base case we have the



assumption of it returning in 2022 and revenues from software sales to mainland China fading to zero by 2026. In the high case assumption, Google does not return, in which case there is no disruption in sales of TerraNet's software for flashing onto Qualcomm chips to Chinese OEMs.

- Given the likely importance of the Chinese chip integration revenue stream we also look at the above assumption in isolation ie what is the explicit impact of no disruption to TerraNet's sales (rather than as part of our three scenarios, which include other varying scenarios).
- In the V2V market we explore alternative scenarios to our base case, that DSRC is implemented in the US and other international markets in coming years but that 5G gradually takes over from DSRC after 2021. Our base case assumes that DSRC (or Wi-Fi if DSRC frequencies are sold) will then become used as a redundant technology to 5G and TerraNet will generate alternative revenues from sales of DSRC software in the OEM and aftermarket. Our high case assumes that DSRC remains the dominant technology while our low case assumes that cars are not fitted with 5G redundancy units operating on DSRC or Wi-Fi frequencies.
- In GriDD we explore the base case that GriDD sales to MNOs are reduced by 40% versus our base case assumption by excessive competition from apps offering similar services in the market. Our high case assumes that sales to cellular operators are not disrupted by apps sales in the market and TerraNet is also able to enhance its earnings and not disrupt sales to its MNO customers by successfully launching its own app.

#### Exhibit 21: Scenario analysis

	Low case	Base case	High case
Chip integration and app sales: Return of Google to Chinese market causing decline in chip integration revenues	Google returns to China in 2019. Unit sales fall steadily to zero between 2019 and 2023	Google returns to China in 2022. Unit sales fall steadily to zero between 2022 and 2026	Revenues continue without disruption.
Autoliv V2V communication (threat from 5G)	As with base but no success with redundancy and aftermarket product.	As discussed in body of report.	DSRC remains primary V2V standard. Successful in aftermarket product also.
GriDD app downloads	40% lower technology licence sales to MNOs from 2020 due to competition from other apps in the market. No app sales.	No app sales	Successfully launch app. Freemium model with 90% churn and 10% paying SEK10.2 (\$1.15) for service
Other revenues	-20% of base		+20% of base
Cost base of remaining revenue	-10% of base		+10% of base

Source: Edison Investment Research. Note: See also Exhibit 22.

Our DCF scenario analysis (see Exhibit 22) shows how reactive the valuation is to revenues in the scenarios provided. In comparison with the mid-point of SEK272m of our base case valuation range of SEK13.4-15.2 per share, the high case using a WACC of 15.0% gives rise to a valuation of SEK672m, while the low case using the same WACC implies a negative valuation of SEK10.9 per share. This latter scenario remains negative even with a WACC of 10%.

By far the largest part of the high case valuation is the assumption concerning Chip Integration and the potential for Google's return. Taking away all other parts of the high case scenario and leaving only the assumption that Google does not return to China, or if it does, it does not impact sales of TerraNet's on-chip software, gives rise to a valuation of SEK26.8 per share (see Exhibit 23) – representing 82% of the high case scenario. The other significant part of the high case is the GriDD app downloads, adding SEK118m. In reality, our Autoliv V2V high case returns the same result as the base case because assuming DSRC remains the primary V2V technology, we would assume lower sales of DSRC redundancy equipment and vice versa if 5G were to become the primary technology.

Testing the low case for solely the case of Google returning to China within the Chip Integration scenario, we reach a still fairly robust valuation of SEK10.7 per share (see Exhibit 23), only a 38% reduction on our base case scenario. This is because the two scenarios are closer together than the assumption that chip sales are not disrupted by Google's return to China (ie because either Google does not return or it is unable to displace TerraNet's product if it does return). This is

because in this case we anticipate sales volumes increasing over time giving rise to high continuous cash flow streams not requiring high ongoing cost inputs, which contributes significantly to an increase in the DCF valuation.

The remainder of the gap between the low and base case principally relates to sensitivity to the case where TerraNet's V2V technology gains no traction as a redundancy or aftermarket product. This would result in sales falling sharply as 5G takes over as the primary technology for V2V communications. Removing this negative case, while leaving the other two, gives rise to an increase in the low case from negative SEK10.9 per share to a positive SEK3.6 per share.

**Exhibit 22: DCF case scenarios (see Exhibit 20)**
**Base case DCF**

Summary inputs:				Summary outputs:												
SEKm	FY17	FY21	FY26		SEKm	% of value										
Revenue	16	241	386		PV of FCF	(28)	-12%									
EBITDA	-52	44	137		PV of TV	250	112%									
EBITDA margin	-324%	18.2%	35.6%		Value of the cash flows	223										
EBIT	-59	35	125		Net cash*	119										
EBIT margin	-368%	14.7%	32.3%		<b>DCF equity value</b>	<b>342</b>										
Tax	0	0	-29		<b>DCF value per share (SEK)</b>	<b>14.3</b>										
Tax rate	0%	0.0%	23.8%		<b>DCF sensitivity to WACC and terminal growth</b>											
Working capital	1.9	-3.7	-3.8							Terminal growth rate						
Capex	-9	-11	-14							0%	1%	2%	3%	4%	5%	
Free cash flow	-60	29	90							10.00%	23.0	25.0	27.5	30.7	34.9	40.9
										12.50%	16.3	17.4	18.6	20.1	22.0	24.3
CAGR revenues FY17-FY26			42.3%							15.00%	12.2	12.8	13.5	<b>14.3</b>	15.2	16.4
Terminal cash flow growth			3.00%							17.50%	9.4	9.7	10.1	10.6	11.1	11.8
WACC			15.00%							20.00%	7.4	7.6	7.9	8.2	8.5	8.9

**High case DCF**

Summary inputs:				Summary outputs:												
SEKm	FY17	FY21	FY26		SEKm	% of value										
Revenue	19	279	529		PV of FCF	150	24%									
EBITDA	(57)	62	256		PV of TV	489	76%									
EBITDA margin	-301.7%	22.2%	48.4%		Value of the cash flows	639										
EBIT	(64)	53	242		Net cash*	119										
EBIT margin	-343.3%	19.0%	45.8%		<b>DCF equity value</b>	<b>758</b>										
Tax	0	0	(52)		<b>DCF value per share (SEK)</b>	<b>31.6</b>										
Tax rate	0.0%	0.0%	22.0%		<b>DCF sensitivity to WACC and terminal growth</b>											
Working capital	0.0	3.1	(5.0)							Terminal growth rate						
Capex	(11)	(13)	(19)							0%	1%	3%	4%	5%		
Free cash flow	(67)	52	179							10.00%	49.6	53.5	58.3	64.6	72.9	84.5
										12.50%	36.2	38.2	40.6	43.5	47.1	51.7
CAGR revenues FY17-FY26			44.9%							15.00%	27.6	28.7	30.1	<b>31.6</b>	33.5	35.7
Terminal cash flow growth			3.00%							17.50%	21.7	22.4	23.2	24.1	25.2	26.4
WACC			15.00%							20.00%	17.5	17.9	18.4	19.0	19.6	20.4

**Low case DCF**

Summary inputs:				Summary outputs:												
SEKm	FY17	FY21	FY26		SEKm	% of value										
Revenue	14	131	197		PV of FCF	(301)	79%									
EBITDA	(48)	(46)	(26)		PV of TV	(78)	21%									
EBITDA margin	-355.7%	-35.0%	-13.2%		Value of the cash flows	(379)										
EBIT	(54)	(54)	(37)		Net cash*	(119)										
EBIT margin	-403%	-40.7%	-18.9%		<b>DCF equity value</b>	<b>(260)</b>										
Tax	0	0	0		<b>DCF value per share (SEK)</b>	<b>(10.9)</b>										
Tax rate	0.0%	0.0%	0.0%		<b>DCF sensitivity to WACC and terminal growth</b>											
Working capital	0.0	1.4	(1.9)							Terminal growth rate						
Capex	(8)	(6)	(7)							0%	1%	2%	3%	4%	5%	
Free cash flow	(56)	(51)	(35)							10.00%	-15.2	-15.8	-16.6	-17.5	-18.8	-20.6
										12.50%	-12.3	-12.6	-13.0	-13.4	-14.0	-14.7
CAGR revenues FY17-FY26			34.7%							15.00%	-10.2	-10.4	-10.6	-10.9	-11.2	-11.5
Terminal cash flow growth			3.0%							17.50%	-8.7	-8.8	-8.9	-9.1	-9.2	-9.4
WACC			15.0%							20.00%	-7.5	-7.6	-7.6	-7.7	-7.8	-7.9

Source: Edison Investment Research. Note: \*Consists of net cash of SEK4.4m at 31 December 2016 plus cash inflows net of fees from a share issue in January 2017 and another in November 2016, for which some of the issue proceeds had not been collected by end-2016 as well as the net SEK 88.1m in funds from the May 2017 IPO.

**Sensitivity to software sales to Chinese OEMs**

In Exhibit 23 we analyse in isolation the impact of the high and low cases specifically related to chip integration software sales in China on the company valuation, ie in the high case there being no

disruption to sales of software to OEMs in China either because Google does not return to China or because its return does not affect sales of TerraNet's software. In the low case, the assumption is that Google returns to China in 2019 and unit sales of TerraNet's software fall steadily to zero between 2019 and 2023. To keep the assumptions straightforward, we adjust the cost sole base to remove the costs related to the NRE work the low case assumes no longer takes place, incorporating our assumption that this work is undertaken at a 5% EBITDA margin.

Apart from this, the scenarios are derived from the base case. The significant degree of variation between these two cases – with the high case at SEK26.8 per share and the low case at SEK10.7 per share, versus the base case valuation range of SEK13.4-15.2 per share – shows the degree of materiality of the Chinese licensing cash flows within our valuation and forecasts, and therefore their relevance as a key sensitivity.

### Exhibit 23: DCF scenarios – Qualcomm China Chip Integration assumptions

#### Scenario: High case: Qualcomm China Chip Integration revenues not interrupted

Summary inputs:				Summary outputs:							
SEKm	FY17	FY21	FY26		SEKm	% of value					
Revenue	16	241	472	PV of FCF	88	17%					
EBITDA	(52)	44	224	PV of TV	435	83%					
EBITDA margin	-324%	18.2%	47.4%	Value of the cash flows	523						
EBIT	(59)	35	125	Net cash*	119						
EBIT margin	-368%	14.7%	26.4%	<b>DCF equity value</b>	<b>642</b>						
Tax	0	0	(46)	<b>DCF value per share (SEK)</b>	<b>26.8</b>						
Tax rate	0%	0.0%	22.0%	<b>DCF sensitivity to WACC and terminal growth</b>							
Working capital	0.0	2.7	(3.7)								
Capex	(9)	(11)	(14)								
Free cash flow	(61)	35	160								
				Terminal growth rate							
				0%    1%    2%    3%    4%    5%							
				WACC	10.00%	42.5	46.0	50.3	55.8	63.2	73.6
					12.50%	30.7	32.5	34.6	37.2	40.5	44.5
					15.00%	23.2	24.2	25.4	<b>26.8</b>	28.4	30.4
					17.50%	18.1	18.7	19.4	20.2	21.2	22.3
					20.00%	14.4	14.8	15.3	15.8	16.4	17.0
CAGR revenues FY17-FY26			45.5%								
Terminal cash flow growth			3.00%								
WACC			15.00%								

#### Scenario: Low case: Qualcomm China Chip Integration revenues start to taper from 2019 and cease in 2024

Summary inputs:				Summary outputs:							
SEKm	FY17	FY21	FY26		SEKm	% of value					
Revenue	16	184	386	PV of FCF	(122)	-89%					
EBITDA	(52)	(9)	137	PV of TV	259	189%					
EBITDA margin	-324%	-5.0%	35.6%	Value of the cash flows	137						
EBIT	(59)	35	125	Net cash*	119						
EBIT margin	-368%	19.3%	32.3%	<b>DCF equity value</b>	<b>256</b>						
Tax	0	0	0	<b>DCF value per share (SEK)</b>	<b>10.7</b>						
Tax rate	0.0%	0.0%	0.0%	<b>DCF sensitivity to WACC and terminal growth</b>							
Working capital	0.0	2.7	(3.7)								
Capex	(9)	(11)	(14)								
Free cash flow	(61)	(18)	119								
				Terminal growth rate							
				0%    1%    2%    3%    4%    5%							
				WACC	10.00%	18.8	20.7	23.2	26.5	30.7	36.7
					12.50%	12.5	13.5	14.7	16.2	18.1	20.5
					15.00%	8.6	9.2	9.9	<b>10.7</b>	11.6	12.8
					17.50%	6.0	6.4	6.8	7.3	7.8	8.5
					20.00%	4.3	4.6	4.8	5.1	5.4	5.8
CAGR revenues FY17-FY26			42.3%								
Terminal cash flow growth			3.00%								
WACC			15.00%								

Source: Edison Investment Research. Note: \*Consists of net cash of SEK4.4m at 31 December 2016 plus cash inflows net of fees from a share issue in January 2017 and another in November 2016, for which some of the issue proceeds had not been collected by end-2016 as well as the net SEK88.1m in funds from the Nay 2017 IPO..

## Risk of equity dilution

Our base case forecasts assume a funding requirement of SEK70m through FY17 to FY20. For the purpose of our model we have presented this notionally as debt funding. In reality, this is likely to be funded by a mix of debt and equity.

## Listed peer and M&A based valuation

We have compared TerraNet with listed peers, principally oriented towards software businesses providing services to the communications sector, but also including companies providing software to the IoT, wearables and telematics sectors. None is a direct competitor to TerraNet, unfortunately, but all are proximate enough to provide a base with which to benchmark the stock.

With TerraNet still too early stage to produce meaningful historical revenues or EBITDAs we have applied market historic, current year and next year multiples for the company's listed peers with market capitalisations of less than \$500m to our forecasts of group revenues in 2019, 2020 and 2021. As we are applying metrics three years ahead of those used in the valuation multiples, we then discount the multiples back three years at a range of potential WACCs to give rise to a valuation.

In the case of the revenue numbers, our forecasts give rise to a valuation range of SEK10.2-13.2 per share (see Exhibit 24) based on listed peer comparisons discounted at a 15% WACC whereas the M&A comparison gives rise to SEK9.5-11.6 per share applying the median multiple for transactions completed in the last three years while this rises to SEK12.8-16.4 per share applying the mean multiples. The last two ranges reflecting the higher concentration of early stage companies similar to TerraNet.

The EBITDA comparison gives very low figures until we apply 2021 EBITDAs, at which point the group is forecast to be moving into its EBITDA and cash-generative stage. These multiples on listed peer comparison (see Exhibit 24) give rise to a valuation of SEK16.1 per share, while the median and mean M&A peer transactions give rise to valuations of SEK18.4 per share and SEK26.7 per share, respectively. With the company at such an early stage there is significantly higher forecast risk with EBITDA than sales forecasts. We therefore believe that greater weight should be given to the sales derived valuations, although the earnings-based numbers should not be ignored completely.

**Exhibit 24: Listed peer and M&A-based valuation**
**Listed peer valuation**

Sector multiples (x)	EV/sales (x)			EV/EBITDA (x)		
	last	1FY	2FY	last	1FY	2FY
Mean	2.1	1.5	46.5	7.6	9.9	12.6
Median	1.6	1.4	1.3	9.8	10.7	8.7
Mean sub \$500m	2.2	1.3	70.4	8.0	7.6	14.3
Median sub \$500m	1.5	1.3	1.2	9.9	12.1	8.8

SEKm	TerraNet sales forecast			TerraNet EBITDA forecast		
	2019	2020	2021	2019	2020	2021
Total	123.8	177.7	240.9	(21.7)	10.3	43.8
Applying median sub \$500m multiple	1.5	1.3	1.2	9.9	12.1	8.8
Enterprise value in year applied	188.1	223.2	296.9	N/A	124.6	385.8
<b>Value per share after discounting*</b>						
Discounted three years at:						
12.50%	10.6	11.6	13.8	N/A	9.4	16.9
15.00%	10.2	11.2	13.2	N/A	9.1	16.1
17.50%	9.9	10.8	12.7	N/A	8.8	15.4

**M&A valuation**

M&A multiples (x)	TV/sales (x)	TV/EBITDA (x)
	last	last
Mean	2.4	27.5
Median	1.6	15.8
Mean sub \$500m	2.3	23.9
Median sub \$500m	1.3	14.1

SEKm	TerraNet sales forecast			TerraNet EBITDA forecast		
	2019	2020	2021	2019	2020	2021
Total	125.6	179.8	243.3	-23.6	8.2	41.3
<b>Median historic multiple*</b>	<b>1.3</b>	<b>1.3</b>	<b>1.3</b>	<b>14.1</b>	<b>14.1</b>	<b>14.1</b>
Discounted for number of years:	3.0	4.0	5.0	3.0	4.0	5.0
<b>Value per share at discount rate of:</b>						
12.50%	9.8	11.1	12.4	N/A	9.5	20.0
15.00%	9.5	10.6	11.6	N/A	9.1	18.4
17.50%	9.2	10.1	10.9	N/A	8.8	17.1
<b>Mean historic multiple*</b>	<b>2.3</b>	<b>2.3</b>	<b>2.3</b>	<b>23.9</b>	<b>23.9</b>	<b>23.9</b>
Discounted for number of years:	3.0	4.0	5.0	3.0	4.0	5.0
<b>Value per share at discount rate of:</b>						
12.50%	13.3	15.6	17.8	N/A	11.4	29.2
15.00%	12.8	14.7	16.4	N/A	10.9	26.7
17.50%	12.3	13.9	15.3	N/A	10.4	24.5

Source: Edison Investment Research. Note: \*Calculated using pro-forma net cash balances. Based on M&A deals involving companies with total valuations of \$500m or less.



## Appendix 1: Listed peer multiples


**Exhibit 25: Listed peer multiples**

Name	Reporting currency	Market cap (m)	Net debt – last (m)	EBITDA margin (%)			EV/sales (x)			EV/EBITDA (x)			P/E (x)			Description
				last	1FY	2FY	last	1FY	2FY	last	1FY	2FY	last	1FY	2FY	
EVOLVING SYSTEMS INC	US\$	63	(2)	26.8	N/A	N/A	2.5	N/A	N/A	9.2	N/A	N/A	14.7	N/A	N/A	Software for mobile network operators
MELLANOX TECHNOLOGIES LTD	US\$	2,360	(102)	15.0	27.3	30.4	2.7	2.6	2.3	17.6	9.3	7.4	59.6	19.9	14.9	Ethernet interconnect software and services
TOMTOM	€	2,149	(134)	14.3	15.7	17.9	2.0	2.1	2.1	14.3	13.4	11.6	N/A	38.3	29.5	Software and hardware for fleet management/ navigation
NETGEAR INC	US\$	1,399	(361)	11.0	10.8	11.6	0.8	0.7	0.7	7.1	6.9	6.0	18.4	16.3	14.1	Software and hardware for routers
BROADSOFT INC	US\$	1,142	(95)	10.8	24.4	25.0	3.0	2.7	2.4	28.4	11.1	9.5	N/A	16.3	14.2	Communications software and services
FITBIT INC – A	US\$	1,282	(726)	(3.4)	(6.0)	(1.0)	0.3	0.3	0.3	N/A	N/A	N/A	N/A	N/A	N/A	Hardware for health and fitness devices
CSG SYSTEMS INTL INC	US\$	1,354	102	22.8	22.5	23.7	1.9	1.9	1.8	8.4	8.3	7.7	20.6	16.2	15.0	Business support software and services
IMAGINATION TECH GROUP PLC	£	305	41	(20.7)	24.8	29.4	3.1	2.5	2.4	N/A	10.1	8.3	N/A	22.5	12.3	Software and hardware for semiconductors
SILVER SPRING NETWORKS INC	US\$	535	(117)	(3.6)	3.5	8.2	1.3	1.4	1.2	N/A	38.6	14.6	N/A	182.9	31.6	Software for utility management
TELIT COMMUNICATIONS	US\$	456	18	12.3	14.3	16.5	1.6	1.4	1.2	13.4	9.8	7.5	31.8	18.5	13.4	Software for machine to machine communications
CONTROL4 CORP	US\$	446	(52)	6.0	12.2	12.8	1.8	1.6	1.5	31.2	13.4	11.6	58.4	19.0	16.9	Automation systems for the connected home
JIVE SOFTWARE INC	US\$	423	(120)	(0.5)	10.8	11.6	1.5	1.5	1.4	N/A	13.7	12.3	N/A	50.5	46.1	Communications software
COMPTEL OYJ	€	333	3	16.8	17.6	19.6	3.4	3.1	2.8	20.0	17.5	14.1	30.4	36.6	27.6	Software for telecommunications
BRIGHTCOVE	US\$	214	(28)	(0.8)	(2.6)	4.6	1.2	1.2	1.1	N/A	N/A	24.9	N/A	N/A	145.3	Software for online video platforms
ALLGON AB	SEK	232	(4)	(12.7)	5.7	9.8	1.8	1.1	0.9	N/A	19.3	9.0	N/A	47.0	11.5	Software for wireless communications
LIMELIGHT NETWORKS	US\$	336	(61)	(30.9)	14.3	16.6	1.6	1.5	1.4	N/A	10.7	8.7	N/A	58.7	34.6	Content delivery network services
FORESIGHT AUTONOMOUS HOLDING	ILS	638	(18)	N/A	N/A	(2,633)	N/A	N/A	1,039	N/A	N/A	N/A	N/A	N/A	N/A	Software for V2V and Telematics
CENIT AG	€	179	(43)	11.4	9.3	10.4	1.1	0.9	0.8	9.8	10.1	8.1	22.2	22.6	18.6	Software and consulting for manufacturers
REALNETWORKS INC	US\$	155	(66)	(25.0)	(10.8)	1.0	0.7	0.7	0.6	N/A	N/A	63.2	N/A	N/A	N/A	Internet streaming media delivery software
ADVANCED STABILIZED TECHNOLO	SEK	62	16	47.6	N/A	N/A	12.2	N/A	N/A	25.7	N/A	N/A	N/A	N/A	N/A	Software and hardware for marine communications
POINTER TELOCATION LTD	US\$	87	8	14.8	16.2	18.5	1.4	1.3	1.2	10.1	8.0	6.5	22.8	13.1	10.3	Software and hardware for vehicle location
EUROTECH SPA	€	52	3	(0.5)	5.8	11.0	0.9	0.8	0.7	N/A	13.8	6.5	N/A	N/A	22.7	Machine to machine integration software
TRAKM8 HOLDINGS PLC	£	37	4	15.8	9.1	14.6	1.5	1.5	1.3	10.2	16.8	8.8	8.5	36.8	15.4	Fleet management software and hardware
EXEOTECH INVEST AB	SEK	21	0	(148.1)	N/A	N/A	2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Software and hardware for antennae
QUMU CORP	US\$	27	(3)	(25.4)	(10.7)	(4.3)	0.8	0.8	0.7	N/A	N/A	N/A	N/A	N/A	N/A	Enterprise video content management platform
PEBBLE BEACH SYSTEMS	£	5	13	334.1	16.0	26.5	1.7	0.6	1.3	0.5	3.9	5.0	N/A	2.7	2.1	Software for broadcasters
ONSTREAM MEDIA CORP	US\$	8	3	(36.7)	N/A	N/A	1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Software for internet streaming/communications
<b>Mean</b>				9.7	10.5	(100.8)	2.1	1.5	46.5	7.6	9.9	12.6	56.6	20.8	18.0	
<b>Median</b>				8.4	11.5	12.8	1.6	1.4	1.3	9.8	10.7	8.7	(1.8)	18.5	14.9	
<b>Mean sub \$500m</b>				10.5	7.7	(164.3)	2.2	1.3	70.4	8.0	7.6	14.3	1.9	12.1	20.7	
<b>Median sub \$500m</b>				(0.5)	10.1	11.6	1.5	1.3	1.2	9.9	12.1	8.8	(2.9)	18.5	15.4	

Source: Edison Investment Research, Bloomberg. Note: Prices as at 24 May 2017. Calculations include negatives.

## Appendix 2: Recent deals in the sector

**Exhibit 26: Summary of transactions in North America, Western Europe and Asia-Pacific (March 2014-March 2017)**

Announce date	Target name	Acquirer name	Target country	Announced total value (US\$m)	Target enterprise value	Target trailing 12 month net sales	Target trailing 12 month EBITDA	TV/ rev	TV/ EBITDA
15/02/2017	International Entertainment Corp	Brighten Path Ltd	Hong Kong	157.5	113.1	39.9	18.4	7.4	16.3
08/12/2016	ServicePower Technologies	Diversis Capital LLC	UK	18.1	8.5	18.4	-1.0	1.1	
07/12/2016	Zheda Lande Scitech Ltd	Rise Sea Ltd	China	10.6		16.4		1.6	
05/12/2016	Perk Inc	Rhythmone PLC	US	40.6	25.1	74.1	3.2	0.6	12.8
26/10/2016	ParStream	Cisco	Germany						
07/09/2016	Epicurean and Co Ltd	Win Union Investment Ltd	Hong Kong	34.3		43.9		1.1	
22/06/2016	Telogis	Verizon	US	930.0					
31/05/2016	SciQuest Inc	Accel-KKR Co LLC	US	333.1	249.7	106.3	16.1	3.4	22.2
23/05/2016	Xura Inc	Siris Capital Group LLC	US	641.7	590.0	292.7	-23.5	2.2	
18/05/2016	inContact Inc	Nice Ltd	US	877.1	881.4	254.7	9.9	3.8	87.9
10/05/2016	NJK Corp	NTT Data Corp	Japan	34.5	41.3	95.9	7.1	0.8	11.8
27/02/2016	Global Link Communications Holdings Ltd	International Elite Ltd	Hong Kong	10.3		9.3		3.1	
05/11/2015	Polaris Consulting & Services Ltd/India	Virtusa Corp	India	130.1	233.7	311.5	38.6	1.0	7.9
02/11/2015	Constant Contact Inc	Endurance International Group Holdings Inc	US	883.5	591.2	361.9	52.2	2.4	16.9
09/10/2015	Jagged Peak Inc	Singapore Post Ltd	US	20.4	15.9	69.3	3.7	0.4	7.2
11/09/2015	TDI Co Ltd	Three Like Co Ltd	Japan	31.6	58.0	196.8	17.2	0.3	3.8
02/09/2015	Vianova Systems AS	Trimble Inc	Norway	46.9		14.9		4.2	
26/05/2015	Geeknet Inc	GameStop Corp	US	97.7	15.8	137.1	-8.4	0.7	
05/05/2015	Syntigo SA	Eurofiber Nederland BV	Belgium	37.0		59.0		0.4	
30/04/2015	Audience Inc	Knowles Corp	US	73.1	62.6	95.8	-73.3	0.8	
23/04/2015	AirITsystems GmbH	Amadeus IT Group SA	Germany	13.9		36.0		0.5	
13/04/2015	Orad Hi-Tec Systems Ltd	Avid Technology Inc	Israel	59.8	38.6	41.6		1.7	
03/03/2015	CDRator A/S	Enghouse Systems Ltd	Denmark	23.0		19.9		1.4	
02/03/2015	Mavenir Systems Inc	Mitel Networks Corp	US	526.3	289.7	129.8	-11.6	4.1	
25/02/2015	DR Systems Inc	Merge Healthcare Inc	US	70.0				1.6	
06/02/2015	LONGTU KOREA Inc	King Power International Group Co Ltd, LongTu Game HK Ltd, Far creative	South Korea	19.8	210.4	50.4	7.6	2.2	92.3
06/02/2015	MeVis Medical Solutions AG	Varian Medical Systems	Germany	9.9	50.3			1.3	3.1
28/01/2015	eFront	Bridgepoint Advisers Ltd	France	340.6	30.8	43.7	8.7	14.9	95.2
05/01/2015	DivX LLC	NeuLion Inc	US	62.5	111.1	79.5	9.4	0.8	6.6
17/12/2014	Finzsoft Solutions Ltd	Private Investor, Silverlake Axis Ltd	New Zealand	16.9	12.6	15.8	1.9	3.0	16.7
05/12/2014	Actuate Corp	Open Text Corp	US	258.5	122.9	107.3	-2.5	2.4	
14/10/2014	Allocate Software Ltd	HgCapital LLP	UK	166.9	99.8	59.8	7.3	2.8	23.5
02/09/2014	P&I Personal & Informatik AG	HgCapital LLP	Germany	58.4		129.7	54.5	5.5	15.3
21/08/2014	Imago Group PLC	ScanSource Inc	UK	40.6				0.5	
04/07/2014	Basset AB	Enghouse Systems Ltd	Sweden	9.4		11.1		1.1	
<b>Mean</b>				<b>179.0</b>	<b>175.1</b>	<b>97.4</b>	<b>6.4</b>	<b>2.4</b>	<b>27.5</b>
<b>Median</b>				<b>52.7</b>	<b>81.2</b>	<b>64.6</b>	<b>7.3</b>	<b>1.6</b>	<b>15.8</b>
<b>Mean sub \$500m</b>				<b>76.8</b>	<b>83.3</b>	<b>72.4</b>	<b>6.4</b>	<b>2.3</b>	<b>23.9</b>
<b>Median sub \$500m</b>				<b>40.6</b>	<b>54.2</b>	<b>54.7</b>	<b>7.3</b>	<b>1.3</b>	<b>14.1</b>

Source: Bloomberg, Edison Investment Research. Note: Only deals up to total deal value of \$1bn where total value to earnings multiples are available.

**Exhibit 27: Financial summary**

	SEKm	2015	2016	2017e	2018e	2019e	2020e	2021e	2022e
Year end 31 December		IFRS	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
<b>INCOME STATEMENT</b>									
Revenue		0.4	2.7	16.1	55.2	123.8	177.7	240.9	272.0
Employee and consultant expenses		(14.7)	(21.3)	(46.5)	(83.0)	(114.0)	(132.6)	(156.6)	(172.1)
Other operating expenses excl. D&A		(2.9)	(6.4)	(22.0)	(27.4)	(31.6)	(34.7)	(40.6)	(42.2)
EBITDA		(17.2)	(25.0)	(52.3)	(55.2)	(21.7)	10.3	43.8	57.7
Normalised operating profit		(18.0)	(37.6)	(59.4)	(63.1)	(29.1)	2.7	35.4	48.4
Amortisation of acquired intangibles		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exceptionals		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Share-based payments		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reported operating profit		(18.0)	(37.6)	(59.4)	(63.1)	(29.1)	2.7	35.4	48.4
Net Interest		0.0	0.0	0.0	0.1	(1.2)	(2.5)	(2.0)	(0.2)
Joint ventures & associates (post tax)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exceptionals		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Profit Before Tax (norm)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Profit Before Tax (reported)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Reported tax		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Profit After Tax (norm)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Profit After Tax (reported)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Minority interests		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discontinued operations		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net income (normalised)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Net income (reported)		(18.0)	(37.6)	(59.4)	(63.0)	(30.3)	0.2	33.4	48.2
Basic average number of shares outstanding (m)		7.5	11.7	18.9	24.0	24.0	24.0	24.0	24.0
EPS - basic normalised (SEK)		(2.40)	(3.22)	(3.15)	(2.63)	(1.26)	0.01	1.40	2.01
EPS - diluted normalised (SEK)		(2.40)	(3.22)	(3.15)	(2.63)	(1.26)	0.01	1.40	2.01
EPS - basic reported (SEK)		(2.40)	(3.22)	(3.15)	(2.63)	(1.26)	0.01	1.40	2.01
Dividend (SEK)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Revenue growth (%)		N/A	584.4	504.1	242.2	124.4	43.5	35.6	12.9
Gross Margin (%)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBITDA Margin (%)		-4399.4	-937.8	-324.3	-100.1	-17.6	5.8	18.2	21.2
Normalised Operating Margin		-4608.4	-1407.9	-368.3	-114.3	-23.5	1.5	14.7	17.8
<b>BALANCE SHEET</b>									
Fixed Assets		30.3	23.3	25.3	23.8	24.6	26.5	29.4	32.2
Intangible Assets		30.2	23.3	25.3	23.8	24.6	26.5	29.4	32.2
Tangible Assets		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investments & other		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Current Assets		6.8	7.3	61.5	23.7	36.5	47.2	51.0	58.1
Stocks		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debtors		1.6	2.9	2.0	6.0	13.6	19.5	26.4	29.8
Cash & cash equivalents		5.2	4.4	59.5	17.7	22.9	27.7	24.6	28.3
Other		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Current Liabilities		(9.3)	(7.8)	(8.8)	(32.4)	(76.3)	(88.7)	(61.9)	(23.8)
Creditors		(3.4)	(7.5)	(8.4)	(12.1)	(16.0)	(18.3)	(21.6)	(23.5)
Tax and social security		(5.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Short term borrowings		0.0	0.0	0.0	(20.0)	(60.0)	(70.0)	(40.0)	0.0
Other		(0.4)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Long Term Liabilities		(3.1)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)
Long term borrowings		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other long term liabilities		(3.1)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)	(2.9)
Net Assets		24.6	19.9	75.2	12.2	(18.1)	(18.0)	15.5	63.7
Minority interests		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shareholders' equity		24.6	19.9	75.2	12.2	(18.1)	(18.0)	15.5	63.7
<b>CASH FLOW</b>									
Op Cash Flow before WC and tax		(17.2)	(25.0)	(52.3)	(55.2)	(21.7)	10.3	43.8	57.7
Working capital		3.9	2.7	1.9	(0.4)	(3.7)	(3.5)	(3.7)	(1.5)
Exceptional & other		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tax		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net operating cash flow		(13.3)	(22.4)	(50.4)	(55.6)	(25.4)	6.8	40.1	56.2
Capex		(6.8)	(5.6)	(9.1)	(6.3)	(8.2)	(9.6)	(11.3)	(12.2)
Acquisitions/disposals		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net interest		0.0	0.0	0.0	0.1	(1.2)	(2.5)	(2.0)	(0.2)
Equity financing		21.3	29.5	128.1	0.0	0.0	0.0	0.0	0.0
Dividends		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other		0.0	(2.3)	(13.4)	0.0	0.0	0.0	0.0	0.0
Net Cash Flow		1.3	(0.8)	55.1	(61.8)	(34.8)	(5.2)	26.9	43.8
Opening net debt/(cash)		(3.9)	(5.2)	(4.4)	(59.5)	2.3	37.1	42.3	15.4
FX		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other non-cash movements		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Closing net debt/(cash)		(5.2)	(4.4)	(59.5)	2.3	37.1	42.3	15.4	(28.3)

Source: TerraNet accounts, Edison Investment Research

Contact details	Revenue by geography
TerraNet AB IDEON Science Park, Beta 6 Lund 223 70 Sweden +46 46 286 34 90 www.terranet.se	N/A
Management team	
<b>CEO: Pär-Olof Johannesson</b> Pär-Olof Johannesson is a highly experienced wireless industry executive with 20 years' experience in leading positions in multiple start-ups and large corporations. Previous roles include venture partner at Mankato Investments, business unit director at Flextronics GSM Division, as well as management positions at ABB, Ericsson China Radio Systems and research positions at the Swedish Ministry for Foreign Affairs and the Swedish Defence Research Institute.	<b>SVP, Head of R&amp;D and Engineering: Ola Samuelsson</b> A recent hire, starting at TerraNet in 2017, Ola Samuelsson has a Master of Science in Electrical Engineering from Lund Institute of Technology. He has a background as a manager in cellular and non-cellular technologies at Sony Mobile Communications as well as Head of Reference Design at Sigma Connectivity, Lund. His most recent responsibilities include integrating sensor and connectivity technologies in automotive, aviation and wearable segments as well developing reference designs in cooperation with chipset manufacturers.
<b>CFO: Anna Gallon</b> Anna Gallon is a senior executive and CFO with entrepreneurial experience. She has a bachelor's degree in business administration from Lund University. Her background is in auditing and she has held several positions in finance in different industries including the energy sector. Previously she was CFO at Hövding Sverige AB, a company also listed on Nasdaq First North marketplace.	<b>SVP, Sales and Global Account Management: Andrew Jue</b> Andrew Jue was previously a technology executive at Broadcom, Metta Technology, Mediamatics and National Semiconductor. His areas of expertise include Connectivity Technologies, Wi-Fi Aware™, IEEE 802.11S MESH, Wi-Fi-802.11, Bluetooth and NFC. Mr Jue has expertise in multimedia technologies and experience with key ecosystems, including Amazon, Netflix and Google.
<b>SVP, Business and Operations Manager: Mats Lindblad</b> Mats Lindblad is a senior executive with 15 years' experience as CEO, business area manager and other leading positions. Broad experience as management consultant, with clients including DaVita Care Inc., Sogeti, Biomet, SAS, ABB and Swedish Incubators & Science Parks.	<b>SVP, Head of Supply Chain and Operations: Stefan Pernstam</b> Stefan Pernstam has a background in supply chain logistics and operations at Flextronics, Ericsson Mobile and most recently as a consultant at Connecta, where he advised Tetra Pak and IKEA to on cost reductions and supplier and contract management. Prior to this he was head of production at Sony Ericsson's sites in Malaysia and Sweden.
<b>Chairman: Christian Lagerling</b> Christian Lagerling has over 20 years' experience advising, investing and starting up technology companies and bringing them to the US. Previous roles include founding partner at GP Bullhound and founder CEO at Beluca Ventures.	<b>Board member: Stefan K Persson</b> Stefan K Persson has close to 20 years' experience in product and business development from various international mobile phone and telecom companies, eg Ericsson, Sony Ericsson and Sony Mobile Communications, and has been globally responsible for product development in China, Sweden, the US and Japan. Stefan is currently COO at Bang & Olufsen A/S.
Principal shareholders	(%)
Danir AB	7.6%
Ålandsbanken Apb	3.9%
Håkan Thysell	3.7%
Knutsson Holdings AB	3.5%
Ålandsbanken Funds	3.2%
Måns Hultman	3.1%
Vincent Saldell	2.2%

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