Where does the industry stand as we approach Hannover Messe and the 2022 halfway point?

Internet of Things (IoT) has been a popular technological trend over the last decade, writes Fred Yentz, the chief executive and co-founder of Tartabit, as he introduces our special report previewing Hannover Messe, one of the world's largest trade fairs dedicated to industrial innovation. Although the term IoT was first introduced in 1999, it did not accelerate in popularity until 2010/11 and only reached mass market in 2014. But the IoT connection predictions have been mostly overhyped, predicting between 25 to 50 billion connected devices before the end of 2020. In 2021 there were 14.6 billion IoT connections, including cellular IoT (1.9bn), wide-area IoT (2.1bn) and short-range IoT (12.5bn). The market is expected to exceed 30 billion connections, growing 13% (CAGR) annually and reaching 30.2bn IoT connections by 2027

Fred Yentz
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The global Covid-19 pandemic forced lockdowns in early 2020 and is still a major factor in our daily lives but it has accelerated the digital transformation significantly. In this rapid digitalisation era, companies are looking for ways to innovate and offer better services as well as to save money. IoT has benefited from this major force as well. IoT is being increasingly adopted by companies to innovate. Thanks to the major investments in cloud technologies, even mission critical systems can be moved to cloud, and are now being dominated by a handful of hyperscale ecosystem providers.

A few months ago, I looked deep into the space, talked with key industry members, and tried to identify some of the most important topics that should take shape in the IoT domain this year. Today, as we are well into the second quarter of the year and many of us prepare to attend Hannover Messe, I thought it would be good to dive a little deeper into a few of the most active topics and see what others within the IoT Now subscriber base think.

With the digital transformation wind behind the IoT growth, let's look at some immediate trends that will shape the market in 2022.

1. Shift to hyperscalers

The shift to cloud for IT has been dominated by hyperscalers. Industry 4.0 requires the full digitisation of production processes and enterprise workflows, hence increasingly IoT implementations are also now shifting towards these hyperscalers as scalability and robustness become major requirements for these applications. IoT deployments are becoming more sophisticated and large scale. These complex applications need more data processing power as well as advanced tools such as analytics, artificial intelligence (AI) and machine learning (ML). Hyperscalers provide low-cost on-boarding, scalable software tools, and robust management platforms.

AWS, **Microsoft**, and **Google** have been investing heavily and dominating the hyperscalers market. Increasingly more players are trying to imitate the hyperscalers to provide these advantages. But the leaders will continue to maintain their grip and drive the market.

The hyperscaler shift is one of the most easily identified trends which is materialising before our eyes. Amazon and Microsoft are the leading hyperscale cloud providers, dominating the market with combined market share of over 50% and still going strong. In the last quarter of 2021 Microsoft had reported US$22.1bn in revenues and 46% growth for Azure and other cloud services, which demonstrates the strong demand for its hyperscale services. Amazon Web Services (AWS) revenues were also up by 40% to US$40bn in the same period, but Microsoft has been narrowing the gap for the market share. Google also benefitted from the trend with US$5.5bn revenue in the fourth quarter of 2021, also up 44% year-over-year, maintaining its position as a distant third. The end is nowhere in sight. Analyst firm **Dell'Oro** predicts this trend will continue with data centre spending to increase 61% by 2026. Dell'Oro forecast data center capex to hit US$350bn by 2026 compared to US$218bn in 2021. ▶

What makes hyperscalers so strong and attractive for businesses is a collection of advantages. At the minimum they provide massive computing, storage and networking capabilities which their clients can scale as needed. The performance and scalability parallels between hyperscalers and the needs of today's 5G centric communication service providers (CSPs) are becoming more common. As such, we see many CSPs and hyperscalers beginning to collaborate in the areas of virtualised core and multi-access edge computing (MEC) services. IoT applications in particular start with a small set of devices and can scale rapidly in number and geographic deployment. Management of large IoT deployments and hyperscaler data ingestion results in the collection of big data which in turn brings additional requirements such as analytics, AI and cyber security to name a few. But hyperscalers can provide additional services such as IoT connectivity, which will expedite the process from idea to production, helping companies gain an advantage over competitors. Global cloud providers have additional offers, such as localised connectivity, commercial and regulatory compliance, low-touch provisioning, interoperability, centralised management and visibility. Hyperscalers do this with optimum effectiveness thanks to the amazing engineering behind these technologies.

The hyperscale cloud providers have been listening to the needs of Industry 4.0 customers, and we are seeing a strengthening of hybrid cloud environments which are essential for critical operations where plants, substations, and distribution centres need enough autonomous functionality to operate even when disconnected from their central networks.

Due to the importance and focus the hyperscaler cloud companies have placed on the Industry 4.0 marketplace it should not be surprising to see the presence throughout Hannover. Even if you don't see them front and centre to many application and use cases all you need to do is take a peek behind the curtain and they will likely be found within the partner or vendor pages of many exhibitors.

2. Surge in utilities, logistics and asset tracking will drive adoption of LwM2M

It is easy to understand the growth in low power IoT when you we look at the high-volume use cases which could not be successfully deployed in the past due to power usage or data plan costs. That said, new low power (LP) technologies fit the requirements which can be summarised as follows:

- Low cost (capex and opex)
- Small form factor
- Low energy consumption
- Long distance connectivity (including challenging locations)
- High capacity
- Strong security

Only by meeting these requirements, the deployment of many IoT devices will be feasible and the IoT applications will make business sense. The LPWAN technologies provide the ability to deploy a large volume of battery-powered, low-cost constrained devices covering a wide area including challenging urban and rural terrain.

These IoT applications are also referred as massive IoT applications. ▶

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Even though LPWAN technologies provide necessary tools for massive IoT applications, the connectivity landscape is still very fragmented. No connectivity technology has ubiquitous coverage. When it comes to spectrum used for LPWAN we can talk about two options: licensed and unlicensed. The licensed spectrum is the cellular connectivity provided by the mobile network operators (MNO) which own these spectrums for which they have paid billions of dollars in auctions to their governments. The LPWAN technologies used for cellular IoT applications are mainly narrowband IoT (NB-IoT) and long-term evolution for machines (LTE-M) within the 4G standards specified by 3GPP and the emerging 5G New Radio (NR).

In the manufacturing domain message queuing telemetry transport (MQTT) protocol has been used predominantly for IoT connectivity. MQTT is a TCP based protocol, which has a persistent connection and allows industrial applications that require acknowledgements to function more reliably. LwM2M is, however, a UDP based protocol and has much lower overhead (up to 95%).

LwM2M works quite well in lightweight industrial applications, such as energy and utilities for smart meters, asset tracking and logistics. While LwM2M will not replace MQTT, a surge in such applications will drive the adoption of LwM2M. One application that is frequently talked about are overlay monitoring networks that can monitor and measure industrial processes without interfering with existing critical or real-time control networks. LPWA networks also allow direct sensor-to-cloud applications to be deployed for critical sense point monitoring without the high capital cost of gateway hardware. LwM2M will also benefit from the evolution of LPWANs, both on unlicensed spectrum, such as LoRaWAN, and licensed spectrum, such as NB-IoT and Cat-M, which provide lower data packet transmission loss compared to MQTT.

As these licensed technologies took time to mature, we saw several unlicensed technologies emerge to fill the need. Unlicensed technologies typically use the regional ISM frequency bands. On the unlicensed spectrum front, there have been many proprietary radio frequency solutions provided for various niche machine-to-machine (M2M) applications for a long time. Within the last decade several standards have emerged as leading LPWAN technologies, LoRa being the most prolific. While other technologies such as Sigfox have been available to the market, the open standard LoRaWAN protocol has become the dominant non-cellular technology. **ABI Research** predicts that by 2026 LoRa will account for over a one-fourth share of all LPWA network connections and more than half of all non-cellular.

During the first half of this year, it has been very interesting to see such a focus on LWM2M based IoT product and service roll outs. LWM2M has been seen as the product life cycle / device management protocol but now we are seeing a shift for LWM2M to be the data transport protocol of choice for low power devices. In our opinion, this is one of the most exciting spaces to watch as we move through the balance of the year.

3. Mobile edge computing (MEC)

As the IoT solutions get more complicated, data processing becomes an important function of the implementation. Specifically, where the data processing takes place is a key consideration. To optimise applications, data processing can be pushed to the edge which requires more computing power at the edge. For some use cases, especially when real-time response is crucial, it is necessary to have the data processing and data storage to be near the application and end-device, cutting the round-trip delay time to the cloud. Although this is in contrast to the cloud-computing, MEC has seen an increasing demand.

Hyperscalers are also extending their capabilities to the edge, which will be the next frontier for the dominant players. More to be seen as the year unfolds with regard to MEC but you can be sure that edge processing, atomic ML and AI applications are emerging in the industrial sectors where latency and persistent cloud interaction could be viewed as a liability.

4. Mobile private networks (MPN)

5G deployments are increasing every year and by 2027 it is expected to cover 75% of the world's population. 5G New Radio (NR) promises high throughput, low latency and large data volumes. While the push to deploy 5G globally continues, 2022 might not be the year that IoT applications shifts to 5G. Massive IoT technologies, such as NB-IoT and Cat-M, which are primarily low on complexity, low-cost devices with long battery life and low throughput are expected to grow at a higher rate than broadband IoT next few years.

Private implementations of 4G/5G are ready to take advantage of these massive IoT technologies. The spectrum allocated for MPNs will create a more immediate demand in 2022. And, this demand will most likely come from factories, warehouses and ports.

5. The emergence of satellite

As the need for IoT becomes global for applications such as asset tracking, logistics and even smart agriculture in very rural areas, global network coverage becomes a necessity. Since the early 1990s deployment of low earth orbiting satellites (LEO) initially launched by **Motorola** backed **Iridium**, satellite coverage has been an intriguing venture. With the cost base of launching the LEO satellites now much lower, interest has been growing in these ventures and a bunch of companies are going after this satellite IoT market. Although 2022 will not be the year that satellite IoT will become mass market, we expect to see satellite emerging as an alternative to the IoT needs of the geographically remote areas.

The first half of 2022 we have seen the new satellite LEO and Sat-IoT companies really make a play to get the exposure we feel they deserve within the IoT ecosystem. Many of these companies have had additional influx of capital investment, published expanded launch plans, and are seeking approvals to operate in expanded geographies. When global coverage is achieved and IoT device network attached or reporting ▶

frequencies become 30 minutes or less the promised new sought after use cases will start to emerge. Once viewed as a competitor to terrestrial IoT operators, satellite is becoming a sought-after roaming partner or solution partner for large MNOs who have a backlog of customer requirements needing connectivity over sea and in the most remote locations.

Perhaps one of the most exciting sectors to watch will be the advancements on the 5G-NB-IoT direct to satellite connection models which is supported by the newest releases of the 3GPP standards. When this becomes a commercial reality, many of the current devices can be affordably designed for both terrestrial and satellite networks which will reduce the cost of entry as well as the operating expenses of satellite centric IoT solutions.

6. Unlicensed LPWA national networks emerge

As the need for low power and low cost IoT devices emerged before the licensed wireless technologies matured, we saw several unlicensed technologies emerge to fill the need. **SigFox** and LoRa are commonly recognised as being two of the most prolific. While the unlicensed technologies were being deployed in controlled private networks at the beginning of their lifecycle, we have seen a shift over time toward more National deployments. Interoperability between networks was seen as problematic and often viewed as a downside of LoRa versus the licensed spectrum or the traditional 2G,3G and 4G LTE networks.

This year we will continue to see build out and accelerated adoption of National LoRa networks such as **Everynet**'s US national network which satisfies the long-standing need of an unlicensed LPWAN network in the US. At the same time the **LoRa Alliance** has continued to release technology improvements which promise easier transition of devices from network to network to solve some of the highest volume use cases within asset tracking.

7. Low code/no code

Implementing enterprise focused IoT centric solutions means rapid integration of IoT Sensor Data into the markets most prolific enterprise applications. IoT can no longer stand alone in vertical stove piped applications. As such IoT integration and rapid solution development is driving the demand for easy-to-use low code solutions which can be quickly and easily used by developers who may not have deep IoT device and network understanding. Mass adoption of IoT demands that every developer should have access to real time IoT information without the pre-requisite IoT deep knowledge. Low code and no code solution integration is here today and here to stay.

While we have watched the IoT market grow for a few decades, we seem to be sadly aware of the market lagging behind the expectations of many industry analysts. This year as we emerge from the grips of the global pandemic, in combination with perhaps more rational market expectations, with the exception of global logistics issues and supply constraints, I think the IoT sector might surprise us with better-than-expected results. It has been a long time in the waiting, but I believe more strongly that as we reach the midpoint of 2022 it is safer to say that significant growth and innovation will come from the LPWA side of the IoT market.

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Make the right IoT business connections in a changing market

Amy García, the chief marketing officer of IoT services and connectivity player Pod Group, speaks to Antony Savvas about key issues in the evolving market, and how providers can effectively serve the needs of businesses

Tony Savvas: Big things have been predicted for the IoT services market for many years, how has it panned out in reality?

Amy García: We can all see the huge potential of IoT, but it hasn't grown as quickly as predicted. There are several reasons for this, but although the technology is there and has been for some years now, the market is still very fragmented and for the enterprises deploying IoT solutions, very complex to manage.

The main challenges we come across time and time again for our enterprise customers is that the connectivity options on offer are not customised to IoT.

Mobile network operators (MNOs) provide IoT connectivity options, but their networks were for the most part designed for consumer applications with higher average revenue per user (ARPU). This means that the bandwidth, low latency and flexible data packages required for IoT applications are often not available.

For SMEs, there is also the issue of commitments that may be unachievable, and the lack of global coverage from one provider, which means making agreements with many different operators worldwide: a huge challenge to manage.

TS: Do mobile virtual network operators (MVNOs) have any advantage in the market, when taking account of the current state of play?

AG: MVNOs often provide more flexible packages and have more in-depth knowledge of the different applications for vertical sectors, but they often rely on the MNO for infrastructure and support, which means they offer the enterprise very little visibility and control over their connectivity.

For this reason, we introduced the term Enterprise Network Operator (ENO) about two years ago to describe the solution that we offer the enterprise.

We believe it better fits our offering because we have deployed our own core network, which includes both a private and public core, plus our own global international mobile subscriber identities (IMSIs) to provide coverage worldwide.

TS: What are the advantages for enterprises when using your model?

AG: Our services are deeply integrated with our platform, we provide managed services to the enterprise which are customised and tailored to each use case.

The enterprise has full visibility over its connectivity, whether on public or private networks - or a combination, but it doesn't need the skillsets in-house to run and manage the network.

Everything is provided as-a-service. This is our ENO concept (**www.whatisaneno.com**).

TS: Last year, you were acquired by Giesecke+Devrient (G+D), a specialist in eSIMs and eSIM management, what advantages does this ownership offer you in the market?

AG: This puts us in a very interesting position in the market, since we are the only provider of both eSIMs and an eSIM management platform, and the global connectivity both on and off the private network.

This means we can provide a very advanced eSIM solution, which includes the widest range of profiles, both native (in-country) and roaming.

These can now be combined on a single stock-keeping unit (SKU), meaning that enterprises need only one provider, one SIM and one platform to manage all their global connectivity.

In addition, since we have control over the SIM card, we can provide customised SIM applets to enhance security and device management, and enable massive deployment of IoT devices, such as zero touch provisioning – this allows the SIM to securely download the profile over-the-air (OTA) once it is switched on in the destination market.

This greatly reduces device manufacturing costs and complexity of rolling out global IoT deployments. ▶

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Our strategy is currently aligned with telco go-to-market strategies, in fact we work more as a partner or channel for the operators rather than competing with them

TS: Your company will be at the forthcoming Hannover Messe event in Germany, what are you focusing on there?

AG: The combined offering as mentioned above is called ENO ONE, and at Hannover Messe we will be launching our ENO ONE Global eSIM, which is the main reason for our presence there.

TS: You mentioned previously that the IoT services market is very fragmented, do you believe it will become more consolidated, with further acquisitions generally, for instance?

AG: Yes, I think we will see more consolidation in the market, but also more partnerships and the development of ecosystems to provide end-to-end solutions to the enterprise. I think it is clear that IoT applications are so diverse, and there are so many different variables, that no one size fits all, particularly for connectivity.

It is also important for all players to work together to integrate their solutions, for example, hardware and platform providers with connectivity providers. This is why we have designed our connectivity management platform, Pod IoT Suite, to be fully compatible with a wide range of IoT hardware and software. And we are continuing to grow our ecosystem through partnerships, so we can provide one pane of glass for the enterprise to manage their IoT applications end-to-end.

TS: The competition for the supply of IoT services to companies seems to be between traditional telcos and companies like yours, do you see a time when telcoms operators will perhaps get closer to Pod Group and others, as part of joint go-to-market strategies – rather like operators are beginning to get closer to big public cloud service companies in the joint provision of services to end customers?

AG: Our strategy is currently aligned with telco go-to-market strategies, in fact we work more as a partner or channel for the operators rather than competing with them. Our focus has always been on SMEs and enabling the long tail of enterprise IoT applications, an area telcos are not necessarily targeting due to lower ARPUs, and the need for more customised solutions that they are often not equipped to provide. At Pod this has been our core business for over 20 years, and we have worked side by side with our enterprise customers in different sectors to develop connectivity solutions that solve specific problems in the field.

TS: In terms of contract values for IoT services to organisations of all sizes, are they now proving to be more lucrative for providers like you, considering the continuing global roll-out of 5G, for instance, and organisations seeking to connect more things to support mission-critical data, processes and apps?

AG: Yes, the advent of IP-based connectivity technologies such as 4G and 5G have helped to drive growth among enterprise IoT applications. It is now easier for enterprises to manage their IoT connectivity as part of their overall enterprise network. This is also a driver for private LTE and 5G enterprise networks that provide increased security and lower latency, particularly for mission critical applications.

The deployment of these networks, and particularly the ability to roam on and off both private and public networks, will be a key factor in the growth of enterprise IoT. The main objective of Pod and G+D here is to simplify and secure these connections for the enterprise, giving them one point of contact for their IoT connectivity solution and one pane of glass to manage their devices.

TS: Finally, we have covered some key industry areas here, and you are taking part in a business conference and expo which has a rich heritage in driving industry trends. What would you like to say to Hannover Messe attendees and industry watchers in summing up?

AG: IoT is on the cusp of massive growth as technologies and market conditions converge to allow enterprises of all sizes to deploy IoT solutions globally.

Pod and G+D are in a unique position to provide simple, scalable and secure IoT connectivity for the enterprise. To find out more, I would encourage people to visit us in **Hall 5, booth G42**, or check our website at **www.podgroup.com**.

Dashcam connectivity keeps fleets safe and enables improved driving

idrive's IoT video telematics dash camera measures driver behaviour, records video, tracks vehicles, and uses artificial intelligence to correct drivers in real-time. Providing professional transport fleet clients, who are continually on the move, with live in-cab feedback, GPS tracking data and video file uploading immediately on a global scale, requires reliable connectivity at a competitive rate so idrive turned to Pod Group's embedded SIM (eSIM) offering to ensure seamless and secure global connectivity across different networks at competitive rates, while managing devices across the world with just one stock-keeping unit (SKU) number

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By 2035 it is estimated that there will be more than two billion vehicles on the world's roads, commercial vehicles making up a quarter of these drivers. Currently thousands of people are killed daily throughout the world by road accidents and many of these accidents involve some type of human error.

For companies that employ fleet drivers, there is a huge responsibility to ensure both the safety of their drivers and others on the road, as well as the reputation and safety of their business. At a time when businesses must strive to remain viable, unforeseen additional costs through damage, injury or harm to their business' reputation are hard to bear.

To help alleviate some of this responsibility for transportation professionals, idrive has developed an artificially intelligent (AI) dash camera system that reduces accidents by well over 50% and provides in-cab coaching to prevent accidents in real-time.

The application

The idrive AI is a professional video event recorder that simultaneously captures two HD videos, one of the driver and one of the front of the vehicle, to ▶

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give fleet managers a full picture of what is going on inside a vehicle. The idrive AI is an intelligent camera system that features machine learning and driver recognition capabilities to capture detailed data for driver behaviour coaching.

"When a driver is being monitored they pay more attention to the rules of the road," says Sean O'Neil, the chief executive of idrive. "Our artificially intelligent system can also watch the driver for active distractions or drowsiness and alert them if those behaviours are detected. This is critical to preventing potential accidents from occurring." idrive uses advanced artificial intelligence to help in fleet monitoring. The idrive AI Cam helps companies identify and correct risky driving behaviour. Machine vision can detect distracted driving, drowsy driving, safe following distance, and driver recognition via facial recognition.

Using AI and in-cab alerts combined with **Pod Group**'s telematics data transmission allows idrive fleets to reduce risky driving events by as much as 70%. Sensors incorporated in the device can detect different driving patterns such as hard braking and acceleration, aggressive driving, swerving, speeding, and open doors. Any of these trigger events will cause the device to save the video recording immediately before and afterwards, providing a clear picture of the moments surrounding an incident.

When combined with the cellular connectivity module, the video cameras provide real-time insights into the vehicle, so clients can monitor and observe their entire fleet securely from any desktop or mobile device immediately. All of the data collected is uploaded via Pod Group's eSIMs and is critical to generating driver reports that are used to coach drivers and get them back out on the road in a safer manner.

Solve the problem

When devices are installed in busy, continually moving vehicles, it is essential that they can constantly transmit GPS and telematics data to HQ, and that changes can be made without having to interrupt the workflow of the fleet. Added to this, idrive devices need to be deployed anywhere in the world, without losing connection or having to manually access devices.

With Pod Group's eSIM solution, global connectivity is ensured by enabling seamless connection to both native (in-country) and roaming network profiles, with more than 600 networks in 185 countries covered. The combination of Pod Group 's multi-international mobile subscriber identification (IMSI) applet on the eSIM bootstrap profile and multiple additional profiles on the SIM also adds resilience in the event of network issues or future rate changes on one of the profiles, as the SIM can still switch between multiple core networks.

These profiles can be swapped and updated over-the-air (OTA) when the devices are already in the field. This helps to optimise costs when rolling out global deployments, as devices can be shipped and then configured once they reach their destination.

Not only that, the capacity to pick and choose different networks for different situations means that native (in-country) profiles can be used for lower latency and cost. Using just one SKU to customise their coverage plan ensures that idrive can use the most cost-effective network in any given area, essential when dealing with large and expensive packages of video data.

Facilitated by the unique connectivity solution and flat data rate provided by Pod Group, idrive is able to enhance its service and offer the reliable devices its customers require. "Working with Pod Group allows us to provide excellent global coverage for all of our fleet customers worldwide," explains Kelli Cosio of idrive Global. 'We chose Pod Group as our provider because of the ease of use and competitive pricing."

idrive's hardware is perfectly complemented by Pod Group's resilient eSIM technology, OTA provisioning and flat-rate roaming across borders. Together these technologies will grow and improve as the IoT expands.

As an additional service, idrive offers in-house data analysis for customers, relieving managers of the task and ensuring that their fleet data is being professionally monitored. idrive, in turn, knows that it can rely on Pod Group for 24/7 expert technical support from a team with 20 years of first-hand experience in the IoT sector.

"We have received excellent service and support," says Cosio. "idrive's association with Pod Group means that the company can confidently supply a sophisticated service integrated via reliable, intelligent and continuous connectivity, and future proof its devices however much the company's business expands." ■

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Giesecke+Devrient
Creating Confidence

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Next-gen eSIM technology

ENO ONE

Simple Scalable Secure

- ONE SKU for your devices
- Scalable globally, configurable remotely
- Managed and billed via ONE platform
- Completely secure
- Delivered “as a Service”
- White label option available

The leaders in eSIM combined with the world’s first Enterprise Network Operator bring you next-gen eSIM technology ENO ONE.
Discover what ENO ONE can do for your enterprise

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