PROVING THE VALUE OF IoT:

A SYSTEM INTEGRATOR'S GUIDE

WiTRA™

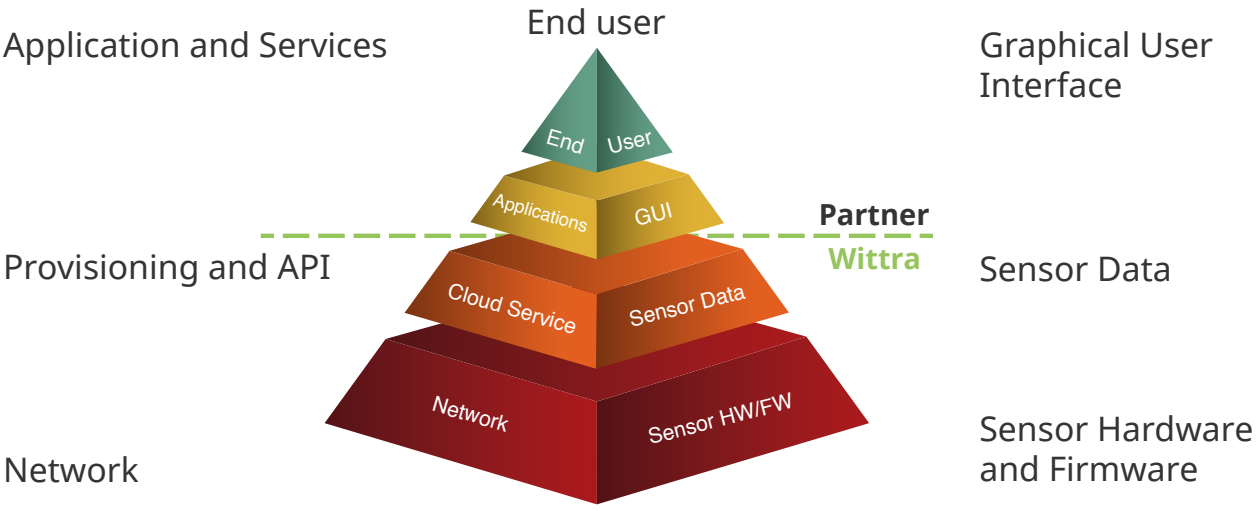
INTRODUCTION

Håkan Dackefjord was out on his routine run when he spotted a new bicycle leaning against a tree, passing the same bike every day for the next week, wondering if it had been stolen or misplaced. It was this thought that got Håkan thinking, where is my stuff and what is it doing?

Håkan began researching location technology and current solutions in the market and soon realized that the IoT technologies today were competing within two distinct positioning categories – indoor and outdoor. The indoor market was filled with LPWaN solutions and outdoor consisted mainly of satellite and cellular technologies. Neither of which were suitable to track objects like bikes, tools or machines. Thinking about the bike he understood that a multitude of tracked objects within the IoT space would be moving, and specifically between indoor and outdoor spheres, and in complex environments such as cities or construction sites. A viable asset tracking system would therefore need to work successfully within every type of environment. Unfortunately, no such tracking system existed.

In 2013, Wittra® Sweden AB was founded, Wittra® technology has gained significant traction in the IoT industry and received several awards for its ground-breaking patent protected technology in location intelligence. This technology allows seamless tracking between indoor and outdoor spheres, no matter what the environment.

IOT IMPLEMENTATION - COMMON CHALLENGES & SOLUTIONS



IoT is widely regarded as both the present and the future for business of all sizes. However, getting blinded by the possibilities and opportunities that the technology presents in theory can make it seem like it is an easy ride to implement a fully functional IoT system. According to a study from Cisco, this is pretty far from the truth. 74% of all surveyed companies stated that they had not been successful in their IoT initiatives, and 60% had the opinion that IoT initiatives look good on paper, but prove to be more complex than expected. This means that partnerships are crucial in order to get from the planning stages to successful implementation. Having realistic expectations, engaging in collaboration between IT and the business operation, and making sure your internal IT works seamlessly with external partnerships proved to be key in companies with successful IoT implementation.

INCREASED FOCUS ON SECURITY

IoT-based attacks have unfortunately increased in frequency as the technology is getting more widely spread. According to a survey from Gartner, almost 20% of the surveyed companies had observed at least one IoT-based attack in the past three years. Protecting against these threats are of crucial importance for companies who rely on their IoT environment to execute their business operation, but it is just as important for companies that are just now starting up their IoT implementation projects. Being aware of the importance of security means that your business can include security calculations into the IoT implementation budget.

WHAT ARE THE MAIN IOT SECURITY CONCERNS?

• Lacking Compliance
New IoT devices are released every day, crowding the market with cheap and un-safe alternatives (and not all high-end products are safe to use). One of the biggest IoT security concerns is that some IoT developers are more concerned with product design than with security.

• Device Update Management
Insecure software and firmware is another big security risk. All kinds of software need continuous updates to eliminate risks, but for many IoT devices, updates are not made automatically, and even if they are updated, they are sometimes not optimized for secure updates.

• Lacking Physical Security
Even if many IoT devices can be used without user intervention, they still need to be physically secured. For some industries this is more of a threat than others. In a warehouse environment the risks of someone tampering with a physical device may not be that high, but on an outdoor location, such as a construction site, it is more of an issue.

In essence, it is crucial that you use secure devices from a trusted company, that use secure updating, and that you can guarantee physical security for you devices. These are two measures that most companies can take to increase their IoT security:

1. Visibility
Make sure that you know what all your devices do and the level of risk of each one of them.

2. Network Segregation
Keep different devices as separate from each other as possible.
Another factor for IoT security is the emerging 5G network. Many companies have for a long time been hesitant towards going from wire to wireless. Since 5G delivers better performance and better security, it will likely lead to an increasing amount of IoT implementation projects.

CHOOSING THE RIGHT TECHNOLOGY

In order to harness the power in next gen, big data driven, and intelligent automation, the foundation of the technology needs to be sound. For new companies that are making their first IoT related decisions, this is much easier than for established companies. Established companies have to manage their IT environment and make sure that new hardware and software can be integrated into their established practices. Your IoT technology needs:

- **The highest levels of security**
- **Data delivery performance, bi-directional communications**
- **Flexibility, easy integrations**
- **Industry standards that allow for interoperability**

It is common that automated systems are used without being connected to each other, which leads to data being stored in silos. Another challenge is that many systems use outdated applications that are made to work for specific hardware, making it difficult to integrate them into more advanced IoT systems. This is why it is important to invest in a complete solution for your IoT projects. One of the keys when working on IoT implementation is to make sure that the new system consists of components that are based on industry standards that allow for interoperability. Being able to share and consolidate data is key in order to get the most out of your IoT projects.

MAKING SURE THE TECHNOLOGY IS EASY TO USE

As we mentioned earlier, most companies feel that IoT is "easier said than done". A company can buy the latest technology and implement it perfectly, but if its users cannot use it properly, it will in the end be inefficient. It is always best to go for a solution that is easy to manage and use, and preferably that is implemented as a complete solution.

By using IoT solutions that don't require constant involvement also means that your staff can spend their time on analysing and working on the data that is being generated, instead of managing IoT related problems.

Wittra has several products that can help your company in implementing efficient and secure IoT solutions, and we offer a complete solution that contains all you need to become IoT ready. We are also dedicated to support our customers, making sure that IoT becomes as good in practice as it sounds in theory.

Contact us to learn more about what we can do to make your IoT projects come to fruition.

THE TECHNOLOGY BEHIND WITTRA'S SOLUTIONS

At Wittra, we want to give our customers a smart, flexible, secure, efficient and future-proof solution to keep track of their things. That's why we have based the Wittra IoT solution on open standards and low-power wireless networks based on 6LoWPAN. That clunky acronym stands for the latest version of the Internet Protocol (IPv6) and Low-power Wireless Personal Area Networks (LoWPAN). 6LoWPAN is a set of standards defined by the Internet Engineering Task Force (IETF), which creates and maintains all core internet standards and architecture work including HTTP (web), SMTP (email), TCP, UDP and many others. The reason we are using 6LoWPAN is because it is a key technology for wireless embedded devices on internet and revolutionizing networking technology that allows data to be carried efficiently over radio links, letting the smallest devices with limited processing ability transmit information wirelessly using an internet protocol. And it's not just us, more and more companies are embracing 6LoWPAN as their standard for wireless communication.

Let us have a look at why 6LoWPAN is such a smart choice, why using open standards is so important when it comes to building an IoT environment, and how you as our customer can benefit from all this.

WHY WE ARE USING 6LOWPAN

There are always a lot of trends when it comes to technology. Some come and go, while others become standard. The trick to create sustainable and successful technical solutions is to find out which is which. The reason why 6LoWPAN seems to be a trend turning into a standard is because decades of IP technology and wireless network development is coming together in a smart way, allowing developers and users to connect more things to the cloud and allowing for a more efficient and affordable way

to collect and transmit data in IoT environments, and in the case of your customers - at job sites. The Wittra solution can reach anywhere and let you collect sensor and positioning data from your key assets for a more reliable operation and improved support and maintenance. IP-based technologies have existed for decades, are very well known, and have been proven to work and scale. That's why we are using 6LoWPAN. The benefits of this protocol stack up:

● It's perfect for connecting things to the internet. The low-power, IP-driven nodes and large mesh network support make this technology a great option for Internet of Things (IoT) applications. With 6LoWPAN it's possible to connect more things to the cloud through low-power wireless sensors, making it easier for you to keep track of your valuable assets.

● 6LoWPAN works great with open IP standards, and it offers end-to-end IP addressable nodes. IP-based devices can be connected easily to other IP networks without the need for translation gateways and proxies. There's no need for a gateway, only a router which can connect the 6LoWPAN network to IP. It's a simple out-of-the-box solution that's quick and easy for you to deploy.

● 6LoWPAN is using a mesh network where the mesh routers can route data to others nodes in the network, making it resilient, self-healing and with a minimum of errors. This is lowering the maintenance needs for you as a user. It just works.

● It's energy-efficient. The LoW in 6LoWPAN stands for low-power, and the leaf nodes in the network can sleep for a long time, saving energy when they're not in use. This also means less maintenance for you as a user. The only thing you need to care about is where your stuff is, and this solution will tell you just that.

● It's secure. IoT environments can be vulnerable to hackers, so security is very important. 6LoWPAN connected to the internet and 802.15.4 provides a variety of security suites. 6LoWPAN can use AES-128 link layer security, which means that you get both authentication and encryption. It is also possible to implement digital signatures to improve your security further.

● 6LoWPAN operates equally well over both wireless and wired connections.
IP networks allow the use of existing network infrastructure. This makes things much easier for the customer allowing many different applications to use separate networks.

● It allows for automation and using tools. By automating data monitoring, analysis, predictive maintenance, and using tools for managing and diagnosing networks, you save both time and money, and your workplace becomes smarter, more sustainable and productive.

● You can create smart grids. Smart grids enable your devices to use micro mesh networks and can use the IPv6 protocol to better optimize the systems and services. This will let you monitor, locate and control your assets so you can work more efficiently.

To sum it up, with 6LoWPAN it's possible to connect more things to the cloud through low-power wireless sensors, making it much easier for you to digitize your industry and keep track of your valuable assets.

WHY WITTRA USES OPEN STANDARDS

In order to make our solutions future-proof we always keep our eyes on the horizon to keep track of new trends and developments. What we are seeing is that equipment and environments like trucks, storage facilities, factories etc. are likely to use standardized networks that can support different types of sensors. We believe these networks will be based on open standards that make them useful not only for the sensors, but also for after-market and 3rd party devices that require network access.

The reasons why we believe open standards are the way to the future are:

● Open standards are specified in an open and free way, with standards processes and documents available to anyone. It encourages innovation, improvements, interoperability and a better understanding by a wider audience.

● With open standards, the developers don't need to use specific technologies or rely on one single supplier.

● Open standards means fewer problems with integrations, and leads to more efficient development. It also means that the developers can convert data from obsolete applications without trouble.

● When developers aren't forced into using systems from one vendor or the other, they get more creative freedom and use systems that actually match the needs of the application.

● With standards that are open and accessible to everyone, it is much easier to port an application from one platform to another. This means that you spend less time on clunky integrations and more time on actually improving your applications.

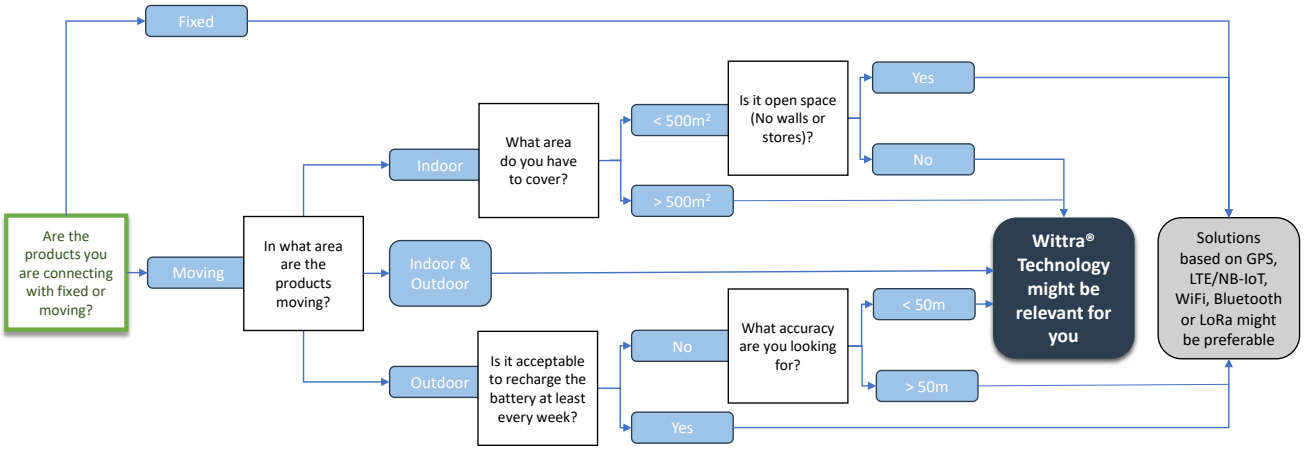
In the end, using open standards is all about making our solution as future proof as possible for our customers. With the combination of 6LoWPAN and open standards we can give you a solution that works out-of-the-box, and that you never have to think about once it is up and running.

THE FUTURE OF 6LOWPAN

As we said in the beginning, more and more companies are using open standards and 6LoWPAN for their applications and solutions, and we believe its use is only going to grow and expand. With 6LoWPAN, devices all utilize the same Internet Protocol (IP) standard, allowing them to talk with each other with no interference issues, no matter if it is at home or on the factory floor. An interoperability that allows different sensors and end devices to be added, removed, or moved to a different location, making the network extremely flexible and scalable. The 6LoWPAN protocol excels in many areas, but especially when there's a requirement to integrate more devices in the future.
As we see it, the communication part of our solution will most likely be supported by already deployed data networks. Wittra's belief is that these standards will be based on the internet IPv6 protocol that 6LoWPAN is based on.

Our mission has always been to deliver tomorrow's solutions today, allowing you to work smarter, that's why we are using 6LoWPAN.

CAN YOU LEVERAGE THE WITTRA TECHNOLOGY?



The Wittra® technology delivers accurate indoor positioning and minimizes the power consumption for positioning outdoors. By utilizing specific ISM frequencies together with patented positioning techniques, Wittra® can track items kilometers from a base station with very low power consumption and outstanding accuracy. The low power radio chips have been developed to support long-range sub-GHz narrow band communication, time of flight distance measurements, context awareness and location accuracy. All optimized in a system for you to deploy by licensing our technology or buying the products.

The core Wittra® technology is protected by 48 granted and pending patents across 11 patent families,

About Wittra

In 2013, Wittra® Sweden AB was founded as a consequence of the team's tireless research, insight, and ongoing development. Since that time, Wittra® technology has gained significant traction in the IoT industry and received several prestigious awards for its ground-breaking technology in location intelligence. This technology is currently protected by 51 patents, making it possible to seamlessly track assets between the indoor and outdoor spheres, no matter what the environment. The next step has been to utilize emerging standards to create products with the right market fit. As a result, Wittra® has launched its first applications into the market, providing a simple, practical solution for keeping track of your things.

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