

Inverttech Electronics

Engineering, R&D & Consulting, Market Analysis in:
Smart Label Technology / RFID / Transponders, Patents,
RF and Microwave, Electromagnetic engineering
Microelectronics and IC Design

Statement of Opinion about Xped Corporation Pty Ltd.

Executive Summary:

Xped have developed novel technologies that can be integrated into a new generation of smarter devices that can be connected to and controlled using the industry standard Near Field Communication / NFC interface feature found on most of today's smartphones.

NFC is used to transfer data to allow the smartphone to establish a secure wireless connection with the device. This wireless connection is then used to transfer secure data packets of a small file describing all the functionality necessary for the phone to control or monitor the device. Additional data can also be transferred over the NFC interface that allows consumer related content to be triggered on the phone. This feature has been designed specifically to send and define events or circumstances to trigger content such as coupons, promotional offers or even software patches with just the tap of a phone. I have not seen NFC used in this way and it appears to be a revolutionary method to send data and to control devices. The benefits are that users are able to connect to devices in the easiest possible manner and in a secure way.

Xped has developed an integrated platform solution opening up broad opportunities for developers wanting to create devices that will be part of the emerging Internet of Things / IoT with low cost, fast data rate, battery less and even remote charging capabilities.

I feel there is great additional commercial opportunity for these technologies to be adopted into much wider markets than traditionally seen in the extant near field data transport space, including sensors, wearable devices, consumer electronics, passive battery-less, tracking and industrial sectors.

Xped is leading the way for developers looking for a powerful but light weight IoT platform that utilises low cost, low power solutions, offers full design flexibility, future proofing, remote logging, over the air updating, an e-commerce payment system and simple machine-to-machine (M2M) connectivity, configuration and maintenance. Xped are currently looking to raise capital to grow the team, accelerate their product roadmap, launch into wider territories and extend its partner network.

Detailed assessment:

I was recently introduced to Xped, an innovative Adelaide company involved with developing exciting technology for smart connected products suitable for enabling the Internet of Things (IoT). In meeting the founders John Schultz and Chris Wood and watching them demo and explain their novel solutions I quickly realised that I had come across something very special and ground breaking.

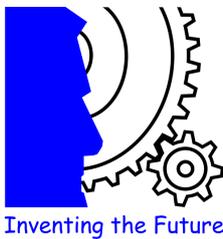
As the now ubiquitous web browser changed the world by enabling us to interact with any web site, Xped's breakthrough technology enables us to interact with a new generation of device, irrespective of its type or brand using a single app running on your mobile phone, tablet or computer. They call this app the Device Browser, affectionately named "DeB". In brief, Xped have developed the world's first Device Browser that works with an NFC discovery and pairing system and a powerful content delivery arrangement, forming one of the most comprehensive platforms I have yet seen for the IoT. The platform benefits all parties in the IoT ecosystem from developers, manufacturers, resellers and the end user and significantly simplifies how devices are designed, operate and connect with people and machines.

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For end users, Xped's solution is elegantly simple. Simply tap a Near Field Communication (NFC) enabled smartphone running the Device Browser to a device and it's ready to control. The phone automatically discovers the device, sets up a secure wireless network, gathers any resources needed and learns how to render the user interface; all from the one tap. This revolutionary, Auto Discovery Remote Control (ADRC), technology is the heart of the Device Browser.

The extant problems:

Current systems that utilise the smartphone to connect to devices require an app for each type or brand of device. Some vendors are proposing to open an API interface to their app, however, this solution is still brand specific and non-interoperable across device brands. With an explosion of device types predicted, we are rapidly destined to succumb to "App Overload" if we continue on this ad hoc and piecemeal path.

Current industry technology demands significant skill and resources to write a device app needed to provide the wireless connectivity and user interface for smartphones. This barrier significantly alienates many SME's and hobbyists from participating in the IoT ecosystem. Manufacturers currently invest huge resources on market research and trials trying to determine how their customers are using their products, their likes and preferences. There currently exists a huge disconnect between the manufacturers visibility of customer's needs and the customers themselves. The industry desperately needs a standard to avoid a proliferation of proprietary IoT and M2M networks that have limited or no ability to be interoperable. The challenge is how to create a single standard that caters for a myriad of business requirements and device types, even those not yet invented. This has proven to be impossible...until now.

The Xped solution:

Profiles are abolished with the Device Browser. The era of the IoT has inspired device developers globally to conceive connected devices, limited only by their imaginations. Current systems, like ZigBee and ZWave are based on fixed device profiles or API's; others supply device modules or building blocks, limiting how devices and systems are built. For example to build a door lock you need the door lock profile, to build a TV, you need a TV profile. It is not scalable and possible to foresee and design profiles for every type of device imagined or desired to be built. The Xped platform abolished fixed profiles. A device instead becomes "self-describing", automatically teaching its control and communication interface to a controller, machine, or other device. The controller runs a unique single app, called a "Device Browser", which can interpret the describing data to automatically make the required communication connections, gather appropriate resources and build a user interface. A controller therefore needs only one app, the Device Browser, to interact with any device, rather than one app for each device or brand.

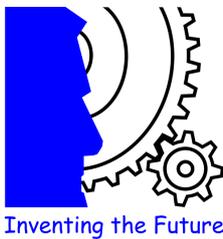
In the same manner as the web browser, web server, HTML and HTTP were able to standardise the way people interact with web pages, the Xped team have developed from the ground up, the Device Browser, device server, RML (Resource Markup Language) and RCP (Resource Control Protocol), standardising the way people and devices interact. This system has been developed specifically for the unique requirements of devices, rather than shoe horning existing web technology into the device connected ecosystem. The result is a non-compromised solution that works for the lowest common denominator like a small sensor, right up to a complex system such as a car.

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The self-describing nature of the system allows developers to unleash their creativity to develop any product, with any functionality, using virtually any data transport layer; taking control of their product roadmap and associated business requirements.

No need for an app:

The Xped platform abolishes the need for developers to write a device app. The functionality, resources and user interface of a device are fully described in a document, using an open source language called the Resource Modelling Language (RML) developed specifically for this new generation of device. It is based on XML and even simpler to learn and use than the HTML language used industry wide to create web sites. This drastically simplifies the device design process reducing time and cost. The RML document is stored as a file in the memory of the device. A remote version of the RML can also be accessed from a remote location such as a URL. The Device Browser reads and processes RML and using the data to pair, learn about and interact with the device. This adaptive system also simplifies forming M2M capable networks where further development is underway.

NFC:

Firmware installed within the device manages the integration of NFC and protocols for wireless connectivity. What impressed me greatly was not only Xped's innovative use of existing Near Field Communication (NFC) technologies but the development they had made in a new generation of ultra-low power near field communication signalling, called Near Field Ping (NFP). Xped have developed technologies that can be integrated into a new generation of devices that can be connected to and controlled using the industry standard NFC found on most phones today. NFC is used to transfer data, including the manufacturer, model, network security keys, network parameters, etc. to allow the Device Browser to establish a secure wireless connection with the device. This secure wireless connection is then used to transfer secure data packets when the user controls or monitors the device. NFC has been used to setup wireless networks, however using it to then initiate learning about the device and a establishing a control and monitoring interface to the device is unique and very clever. I have not seen NFC used in this way and it appears to be a revolutionary way to send data and control devices. The benefits are that users are able to connect to devices in the easiest possible manner and in a secure way.

Trigger data:

Also, additional trigger data can be transferred over the NFC link that allows content to be triggered on the phone. Content material such as files, messages, etc. can be transferred directly over the NFC link, or transferred over a wireless network, which is then stored in the memory of the phone. This now resident content can be triggered to be activated, run, displayed, etc. based on trigger conditions sent over the NFC. This feature has been designed specifically to send content such as coupons, promotional offers or even software patches with just the tap of a phone. The content and associated trigger data can be designed by the owner, manufacturer or establishment housing the NFC equipped device and published to the system using a web page. The system can be applied to a vast array of applications, from user interface updates for devices, software patches, delivery of offers and coupons for retailers, loyalty systems, etc. The trigger conditions could be based on time, date, location, NFC re tap, network proximity, etc. and best defined to be triggered based on parameters that are most relevant and pleasing to the user.

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An e-commerce system is designed natively into the platform to support micropayments, making it simple to monetise content and services, transforming device manufacturers from box movers to service providers.

Near Field Ping / NFP signalling:

Additionally I was able to observe a very innovative near field data transport technique that had been developed by the Xped team to overcome a number of the limitations of conventional NFC. The NFP feature comprises a bi-directional, carrier-less, low energy pulse modulation system that operates in the magnetic near field. It eliminates the need to use an RF carrier, thus significantly reducing circuit power consumption by several orders of magnitude. As a result of some proprietary software and hardware, the ground-breaking solution can be ported to even the lowest resourced microprocessors and implemented with just a small handful of low cost discrete components. One of the advantages of being very low power is that the NFP circuitry can be always active, overcoming the current problems of higher battery drain by leaving the power hungry NFC circuitry turned on and active. NFP also supports a variety of antenna coil form factors from tiny to large coils, well beyond the constraints seen with presently used NFC coils. This characteristic opens up markets for ultra-small battery supported products where NFC is difficult or impossible to implement.

The wide form factor coil possible with NFP also opens up opportunities for greater distance transmission range as well as wireless charging capabilities. Xped has developed an integrated solution that incorporates NFC, NFP and wireless charging using a single antenna coil. This facilitates opportunities for developers wanting to create devices that will be part of the IoT with low cost, fast data rate, battery less and / or wireless charging capabilities. I feel there is great opportunity for Xped's technologies to be adopted into much wider markets than traditionally seen in the near field data transport space, including sensors, wearable devices, consumer electronics, battery-less, tracking and industrial applications.

Energy management

Xped have incorporated natively built in energy management functionality simplifying the management of resource usage. Devices equipped with optional power monitoring circuits are able to periodically report power usage to the Device Browser that then presents this data to the user; from both instantaneous real time usage and historical data. The sustainability of this system is highlighted with the ability for any device to publish resource usage, allowing sophisticated management algorithms to be developed for smart networks and homes of the future.

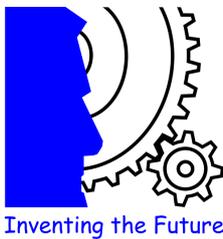
With billions of sensors and other devices rolling out in the future, the accumulated power consumption of such a vast network is not insignificant, thus any improvements in consumption and its management at a device level accumulates to huge savings in global energy and resource requirements. Xped's solution is extremely light weight, running on the smallest and lowest power processors, allowing them to be powered down most of the time, briefly waking up and communicating data only when necessary. Lower air interface traffic not only reduces power but allows larger networks to be created without congestion. End devices that require less power allows for easier adoption of energy harvesting solutions to increase battery life, or remove the need for a battery altogether.

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Hub:

A hub manages and coordinates the network and its security which can include any number of devices or controllers and facilitate out of home control and cloud services; including content delivery, coupons and special offers, device data and fault monitoring.

Multiple types of hub implementations are on the Xped roadmap including PC and cloud version. Data can be stored, consolidated and processed on the hub and rule based applications can add intelligence to the system. Xped's architecture supports both connected and non-connected devices. Their solution allows products to work intelligently "out of the box", even when Internet connectivity is not available. Rather than relying on a cloud to provide smart behaviour, the intelligence is in the devices themselves, creating a new generation of truly smart devices. However, a host of additional services and functionality such as remote monitoring, over the air updates, remote messaging, e-commerce transactions, etc. are enabled when the device does have access to the Internet.

This ability to operate off line will be highly desirable for consumers concerned about privacy. They can feel secure by opting out of the connected world when desired, while still being a fully integrated part of a smart home. Additionally, manufacturers are challenged by the process of entering the daunting world of the IoT. With so many proprietary systems being developed, many manufacturers are uncertain about adopting cloud dependent systems and third party platforms that may not align with their business requirements.

The cost of devices can also be significantly reduced compared to other systems, by not mandating an Internet connection or web server in the device. Low cost devices such as sensors can be simply wirelessly connected to one or more Internet connected devices, such as a smartphone, home gateway or router. Additionally, this allows these higher power processor based products to act as a supervisory "traffic cop", pre-processing and coordinating data locally, without the constant need to send all raw data over an Internet connection; improving security, reducing bandwidth, power consumption and cost.

User Interface:

The Xped system enables a new style of user interface to be created for devices, with the freedom to tailor an interface to suit the user, context or mode of operation. The user interface on the phone can complement, yet simplify the traditional fixed interface of displays, switches and dials found on existing products. The developer can even remove this traditionally product bound interface altogether, moving it to the phone or controller, reducing costs, increasing flexibility and reliability. This also opens up huge opportunities for enriching the user experience for devices that were traditionally not suited to having a user interface due to inaccessibility, size, environmental or cost restrictions.

Legacy devices:

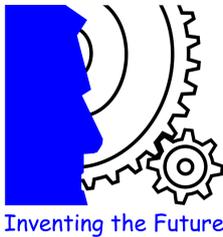
To successfully manage the evolutionary transition between today's and tomorrow's devices, Xped has also developed bridging devices such as an infrared blaster and smart plugs that allow non-ADRC devices to be controlled today, such as TVs, DVD players, air conditioners, etc. Non NFC enabled phones can also be configured to be controllers.

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With the company's IP backing of patent applications; the breadth, flexibility and simplicity of this open platform, Xped has created a broad portfolio of technologies good enough to set the standard for the future of the IoT and M2M and to become a significant player in the rapidly emerging space.

I will conclude with a few points on the commercial side to augment the preceding technical overview.

- **THE MARKET:** With Cisco estimating that more than 99% of physical "things" currently remain unconnected and predicting 25 billion devices to be connected by 2015 and 50 billion by 2020, there is a huge opportunity to connect the unconnected. The Xped platform breaks down the barriers of IoT adoption including implementation costs; simplicity of adoption, design and maintenance; and providing a standard platform to suit the needs of the IoT and M2M systems. Xped disrupts industry business models, by transforming manufacturers from box movers to service providers and fosters relationships between all stakeholders in the ecosystem, including developers, manufacturers, distributors, service providers and consumers.
- **THE BUSINESS MODEL:** Xped proposes to monetise the technology through chip sales, licensing fees and royalties, cloud service charges and e-commerce revenues. The next few weeks will also see the launch of their product roadmap, providing initial cash flow and demonstrating the functionality and market need for the technology, ultimately fuelling the drive for developer adoption.
- **THE TEAM:** The Xped founders have run other successful businesses for decades. The experienced team of nine spans diverse expertise in creative marketing, digital media, business administration and management, retail distribution, manufacturing and logistics, accounting, software design, electronics, radio and RF hardware engineering, i.e. all the factors required to engender success.
- **MOVING FORWARD:** To seed the market, a number of consumer products and reference designs are about to be launched into the smart home market as well as a range of developer tools, including an Arduino Shield and hub, as seen on Kickstarter, equipping developers to create this new generation of device.

Leigh Turner
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28 May 2015