Patent Portfolio for "Embedded SIMs" and the "Internet of Things"

Background

The "Internet of Things" (IoT) and "Machine to Machine" (M2M) technologies will transform multiple industries over the next two decades. As the knowledge-based economy grows, primary assets include intellectual property. We are marketing a patent portfolio encompassing essential technologies to be successful in wide adoption of M2M and IOT solutions. The patent portfolio addresses critical problems of Embedded SIMs, Improved Security, and Battery Life. They have been created and packaged by a seasoned and demonstrated inventor.

Inventor

John Nix, an inventor with success developing valuable patents, is selling a portfolio of 8 issued patents, 2 allowed patents, and 12 applications for key IoT/M2M technologies described below. John has successfully created value through the monetization of his inventions, having sold patents to leading technology firms, such as (i) Skype (now Microsoft) acquiring a first portfolio for VoIP in 2009 and (ii) Google purchasing a second portfolio for LTE handover in 2012. Large US mobile network operators have also licensed a third portfolio for femtocells.

Market

Long-term, IoT both opens new markets and improves productivity. "The fact that there will be a global system of interconnected computer networks, sensors, actuators, and devices all using the internet protocol holds so much potential to change our lives that it is often referred to as the internet's next generation."[1] Even moderate growth rates compounded over more than a decade will have significant impact on many businesses. Analysis Mason forecasts that the number of cellular M2M connections will grow at an annual growth rate of 19% between 2014 and 2025 to reach 1.3 billion at the end of the period.[2] Similarly, Machina Research predicts overall IoT revenue worldwide will grow from a level of $294 billion in 2015 to $1.9 trillion by 2025[3], representing approximately 21% annual growth over a decade. This rapid adoption is enabled by continuation of the ~25+ year trend for decreasing costs of wireless bandwidth and devices. In order to support the expected growth for IoT over the next decade and beyond, several new technologies are required.

Problems Addressed

(1) **Embedded SIMs**. Traditional, physical SIM cards are not practical for many IoT applications[4]. Phone subscribers can manually switch their SIM card as necessary. Manually changing SIM cards is often not feasible with IoT. Equipment such as tracking devices or smart meters can be widely or even globally distributed. The GSMA began publishing detailed standards for replacement of the SIM card with an "embedded SIM" in late 2013[5]. The importance of the standard is confirmed with the adoption by the auto industry of the new embedded SIM standard.[6] Other industries will likely follow, including traditional mobile phone manufacturers are planning to adopt the standard.[7] McKinsey predicts a compound annual growth rate of embedded SIMs of 95% from 2016 – 2022, reaching more than $5 billion in annual sales.[8]

(2) **Improved Security**. Many IoT applications have security requirements with important differences from regular mobile phone service. As one example, more than half of all IoT applications by 2020 will not include the functionality of a 3GPP SIM card (either physical or embedded)[9]. In other words, the *fundamental security for mobile networks (i.e. 3G/4G LTE) is designed for mobile phones and not M2M modules. Securing M2M devices requires new technology.*[10] An IoT device that is deployed for many years needs the capability to derive its own private keys. Extended use of the same private key over time decreases security[11]. As one of many examples, if ownership or control of a deployed device changes through mergers, etc., legal and regulatory compliance may mandate change of private keys. Periodic key rotation may be required as well[12].

(3) **Long Battery Life**. A common industry goal for IoT applications is a module that supports a 5-10 year battery life[13]. LTE standards have been recently modified to significantly reduce power consumption for M2M applications[14].

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Essential IP

These essential technologies will be required to support the growth of IoT. The portfolio consists of the following 8 patents with associated active continuation applications and international counterparts. The full portfolio includes ~1000 pages and ~140 drawings (reduced by ~50% when shared figures and text are not counted):

(1) **Embedded SIMs**. U.S. Patents 9,100,175; 9,319,223; and 9,351,162, with continuation applications. U.S. Patent Application 15/010,905 with a "Notice of Allowance". International applications PCT/US2014/068544 and EP 14868381.6. The patents address essential technology with embedded SIMs such as (i) key derivation and exchange and (ii) the use of two-factor authentication. Four different evidence of use charts are available for the above listed U.S. patents and GSMA Embedded SIM standards.

(2) **Improved Security.** U.S. Patents 9,118,464; 9,276,740; 9,288,059; 9,300,473, with continuation applications. U.S. Patent Application 14/789,255 with a "Notice of Allowance". International applications PCTUS2014062435; AU2014342646; and GB1608573. The patents provide security for IoT systems independent of SIM card functionality, supporting the majority of future IoT deployments without SIMs or embedded SIMs. Secure, scalable, and flexible solutions described in the patent applications support *a module deriving its own private key and public key pairs*. In this manner, private keys do not need to be transferred outside the module or read by any other entity, thereby simultaneously both enhancing and simplifying security.

(3) **Long Battery Life.** U.S. Patent 9,350,550 and continuation application. The patent solves important power management issues for M2M modules using 4G LTE networks. 3GPP addressed the concerns with the release of the "NB-IoT" specification, which is now a subset of LTE. Modules using NB-IoT with a multi-year battery life will likely use the patented claims in order to minimize time in the "connected" state.

The above patents can provide valuable intellectual property assets a company with growing IoT businesses, and the patents are available for sale. The sole inventor for these applications, John Nix, is the lead inventor for ~24 issued U.S. patents and approximately a dozen additional U.S. and foreign patent applications. John has more than 15 years experience leading the development and successful commercialization of VoIP, Internet, and mobile phone technologies. For the IoT patents listed above, John was awarded "Creator of the Year" for 2016 by the Intellectual Property Law Association of Chicago[15].

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