Holistic Near Field Communication (NFC) Approach Digital access Based on IoTize

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Abstract:
Near Field Communication (NFC) uses contactless mechanism to build key enablers that greatly facilitate the adoption of new innovative applications. The Internet of Things promises a world in which physical objects of all kinds Wireless Short Range Communication Technology Devices. A Holistic NFC Approach based on Internet of Things (IOTize) has been proposed & applied. The main component of IoTize is the connectivity module, which contains a co-processor that supports NFC and the direct connection of the module to the debug port of a system's microcontroller. NFC is a key component of the solution and unique power saving features and also a secure proof-of presence technology for security industries, Building maintenance, Health Care exploring, interfacing event access control applications. The Future response of IoTize is overwhelmingly positive for NFC in various Communication ecosystems.
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I. INTRODUCTION

The revolutionary impact of NFC technology is large and most recognize NFC's role as a key enabler of the Internet of Things. Especially the utilization in conjunction with mobile phones offers great opportunities.With the configuration parameters set in the Smartphone app, the installer taps the NFC tag and maintains the connection while the unique identifier of the machine is read and the configuration is transferred. As the IoTize becomes a key element of the Future Internet and a critical national/international infrastructure, the need to provide adequate security for the IoTize infrastructure becomes ever more important. IoTize applications use sensors and actuators embedded in the environment and they collect large volumes of data on room temperatures, humidity, and lighting to optimize energy consumption and avoid operational failures that have a real impact on the environment Holistic NFC approach from different viewpoints, including developing and optimizing hardware, critical communication and standards, software, mobile components, privacy and protection, usability research, and environment and business issues. Most smart phones are now sold with an integrated NFC hardware module, and nearly all smart phones / mobile operating systems (MOSs) have NFC support, which is significant proof of their performance and usefulness through technology dissemination. NFC is compatible with current Radio Frequency Identification (RFID) infrastructure, such as passive RFID tags and contactless readers associated with ISO 14443. In order to engage in an NFC interaction, a user needs to touch her smart phone alternatively to an NFC tag, another smart phone, or an NFC reader. The

smart phone communicates with each mentioned device in a different fashion. When touched to an NFC tag, the smart phone reads/writes data from/to the tag. When touched to another smart phone, they exchange data. When touched to an NFC reader, the reader reads the data stored in the Secure Element (SE) of the smart phone.

Near field communication may be a sort of contactless communication between devices like smartphones or tablets.Contact less communication enables a user to wave the smartphone over an NFC-compatible device to move information without rubbing the devices together or taking multiple measures to fix a connection. NFC technology is common in parts of Europe and Asia and spreads rapidly throughout the United States.Near-field communication ensures interoperability through the NFC Platform between different wireless communication methods, such as Bluetooth and other NFC standards like FeliCa— common in Japan.This ensures that NFC is stable with various versions of the technology and remains easy to use.Compatibility is that the key to the expansion of NFC as a well-liked payment and digital communication method. It must be ready to communicate with other wireless technologies and be ready to interact with differing types of NFC transmissions..

IoT solution called IoTize. It is supported connectivity and security technologies that are all currently available. However, it brings these technologies together in a way that is easy to implement in a product and can be generalized to a very wide range of products from white goods to industrial applications. Additionally, IoTize responds to a true and immediate need in most products today. It allows designers to deport their product's user interface to a smart phone or tablet. This makes it possible to simplify a product's material design to reduce material costs and the likelihood of material breakdowns. Designers can then provide diverse, rich and evaluative user interfaces via smart phone applications (ex. for

production testing, support diagnostic testing, and product control). They can evolve these interfaces over time to supply new functionality to finish users and may leverage the web to deliver applications to the user. Finally, IoTize can add compatibility to devices that were not originally built to support the link-it is compatible with deployed devices and can be implemented without altering the software and hardware of their origin.

II. BACKGROUND

Near Field Communication (NFC) standards were first developed by the NFC forum, which was founded by a consortium of Nokia, Sony and Philips within the year 2004. It is a wireless communication standard using frequency waves. The devices use the 13.56 MHz frequency which enables short-range data transfer and communication. NFC transfers data at speeds starting from 106 Kbit/s to 424 Kbit/s, depending upon the protocol used. The devices should be in close proximity to at least one another to enable communication. The range may vary depending upon the device form, casing and therefore the antennae size, but it's but 10 centimeters (usually but 4 cms). The link is established in a very short period of time, ranging from 100-150 milliseconds.

These characteristics differentiate it from other wireless communication technologies like Bluetooth and Wi-Fi. NFC are often a useful technology for intuitive data transfer between two devices in close proximity. It is also safer and easier to use in applications like contactless money transfer and ticketing, where security and turnaround times are respectively of prime importance. NFC also can be utilized in one way communication mode when employing a passive NFC tag. This will reduce the value of the system and can be suitable to be used cases where a RFID tag is employed currently. The market for NFC is continuously expanding in both active and passive form. Cell phones are arising to be the most important adopters of NFC technology

in peer-to-peer mode. According to Frost & Sullivan, the amount of mobile phones which have adopted NFC will increase to 863 million by 2015, which can account for 53% of total mobile phone sales.

While NFC technology can do many things, the task most people think of tends to be making payments with a smartphones. It's a clear, easy to understand scenario. You've finished shopping and you walk up to buy your purchases. You whip out your Smartphone, hold it up to a receiver at the register, type during a quick PIN to spot yourself and therefore the purchase charges to your electronic mastercard . There are already applications that make this method of payment compelling. In 2011, Google announced Google Wallet and Google Offers, a pair of products that cash in of NFC technology. The basic function of Google Wallet is what we just talked about -- replacing your physical mastercard . But it also can store other information like customer loyalty cards and special offers.

Apple iOS 11's support of NFC tags means that all iPhone 7s and newer Apple phones will be able to read NFC tags just like Android devices also providing opportunities for Android and Apple developers to innovate and make apps which will read near field communication (NFC) tags. This, combined with the explosion of IoT devices — some analysts predicting 36 billion IoT devices in use by 2020 — means IoT and NFC applications are soon to take off. This means most of the people who own smartphones now have an NFC reader available in their pockets to interact with NFC tags or commission and control an IoT device anywhere and at any time.

III. NFC AS A HORIZONTAL TECHNOLOGY

NFC makes linking and commissioning wireless as simple as pressing an NFC reader / writer against the linked devices. Embedding an NFC linked tag chip into electronic products makes access

easier to monitor. Users with a mobile device activated by NFC initiate contact over the NFC interface. Microcontroller software limits access to those with appropriate credentials.In this case, it operates as both a network node and the network credential manager simultaneously.

Merits of Wireless pairing and network commissioning

- Proximity required by NFC offers increased security over longer range, or open credential transmission approaches
- User intent-driven approach provides consumers greater control
- One-touch approach offers convenience and time savings.

A. *Bluetooth pairing:* Including NFC capability in Bluetooth designs brings tremendous convenience to consumers by localizing the Bluetooth pass code management function into an NFC-enabled reader/writer.

- Eliminates the typical pairing steps of searching for Bluetooth devices, manually adding the device once found, and entering pass codes
- Enhances the customer experience
- Auto power up from deep sleep
- Offers increased security (NFC proximity for commissioning versus longer range wireless protocols)

B. *Wi-Fi pairing:* Rather than typing in passwords, providing credentials to enable access to a secured Wi-Fi network is as easy as tapping an NFC-enabled device to the router. Transfer of credentials for network extenders requires only one tap against the router to retrieve, and one tap against an extended to program.

- NFC-enabled devices connect by one-tap against the router
- Offers increased security (NFC proximity versus longer range wireless credential broadcast protocols)
- Provides consumer convenience.

C. Home automation commissioning: Commission home automation networks more easily through NFC-enabled devices. Users tap NFC-enabled mobile phones on gateways and collect network parameters, which they then pass on to home automation items, creating smart devices.

- Fast, accurate commissioning saves time
- Convenience to consumer is a key selling point

D. Zero power configurations: An NFC tag embedded into a PCB and connected to the board electronic circuitry via a hardwired serial bus provides a permanent, contactless bridge between the products' MCU and the outside world. The passive (no power required) operation of NFC tags allows reading/writing of data from/to tag memory via the wireless interface even if the device has no power.

- NFC tag's nonvolatile memory stores configuration data and maintains it without power
- The NFC tag data is accessible via the wireless interface without disassembling products, or even removing them from their packaging

IV.PLUG'N PLAY CONNECTIVITY

IoTize is the Holistic approach to connectivity that leverages the smartphone as both a user interface and supports the connectivity to adapt to a variety of uses connects to networks via

smartphone. The Internet of things (IOT) is all about improving user experience through feature innovation and value added services. IoTize use of the near field communication (NFC) interface means user simply tap a smartphone to IoTize to obtain the necessary application and connect. IoTize wakes up and pairs complementary connection like Bluetooth or Wi-Fi as necessary. Along with NFC, IoTize is discreet, activating only when in use thus reducing undesirable emissions and power consumption. IoTize modules connect to system processor via one of serval supported communication channels (debug, serial, Modbus, CAN). It is simply configured for the target system to provide proof-of-concept demonstration in just minutes, without recoding or redesigning the target application as in Fig.1.

Fig.1 User initiated Transactions

IoTize™ TapNLink and TapNPass are complete solutions for connecting your existing electronic designs to the Internet of Things (IoT). They offer plug'n play connectivity that integrates into your embedded system by configuration alone thus eliminating the need to design circuitry or code firmware. These qualified radio modules (NFC, Bluetooth, Wi-Fi, LoRa, SigFox, etc.) enable it inerrant connection to information appliances (smartphones, tablet PCs, etc.) for permanent connection to WAN or LPWAN. They ensure data integrity and control access to connected systems

with a qualified, scalable security infrastructure. To exploit data remotely and supervise connected systems, they provide an open, MQTT-based implementation for rapid Cloud integration with public or private IoT platforms.

All IoTize features (RF interfaces, security measures, Cloud relays, etc.) are encapsulated, qualified and implement by simple configuration. This approach eliminates the need for extensive development, circuitry redesign and coding. This allows for greater flexibility in maintaining and upgrading systems to adapt to evolving customer needs and technologies. It also eliminates the need to acquire extensive new knowledge or skills, thus eliminating risks and shortening time-to-market of your IoT enabled products.

IoTize™ minimizes the expertise, effort, time and risks associated with integrating IoT connectivity in your existing system design. First, IoTize modules combine a co-processor with wireless communication and security technologies. Our co-processor manages communications with the processor / microcontroller in your system via its debug port or a system bus. You simply configure the IoTize module with the location an access parameters for the variables that you need to access. *System Configuration* - Using IoTize, system installers can leverage the smartphone interface or app to quickly and easily create a specific machine configuration. With the configuration parameters set in the smartphone app, the installer taps the NFC tag and maintains the connection while the unique identifier of the machine is read and the configuration is transferred. The installer then launches a verification app that confirms the coherence and validity of the configuration.

Maintenance and Monitoring - The installer uses NFC and the smartphone to make the connection and validate the machine. Then the installer wakes up, configures and opens a long-range, low-power interface, which is then used for permanent

monitoring of machine status and alarms. When an alarm is detected, the installer uses NFC to connect to the correct machine, signs the machine out of the monitoring network, corrects the problem, and verifies correction via the NFC interface.

V.NFC RESULTS AND ANALYSIS

This analysis will provide us challenging and promising guidelines for pursing rigorous and business relevant research on NFC and its applications, services.NFC as a new emerging research area has attracted the attention of both practitioners and academicians. As cited before, academic research activities on NFC area have increased significantly. While developing new NFC enabled applications or services, ecosystem of NFC technology clearly needs to be considered. Such new applications or services can bring new business models, processes with new players. Especially the capabilities, characteristics and roles of stakeholders need to be evaluated and modified when necessary, in order to satisfy the requirements of new business models and processes. Cultural differences on adopting NFC enabled technologies could be an interesting area for investigation.

Day today life NFC Enabled Mobile Phone become more popular nowadays. So many NFC research in motion in companies like Qualcomm, ZTE Corporation, Philips, Samsung, Sony, Nokia, NXP Semiconductors, etc. The chart shows leading companies across major patenting authorities' priority wise as in Fig.2.
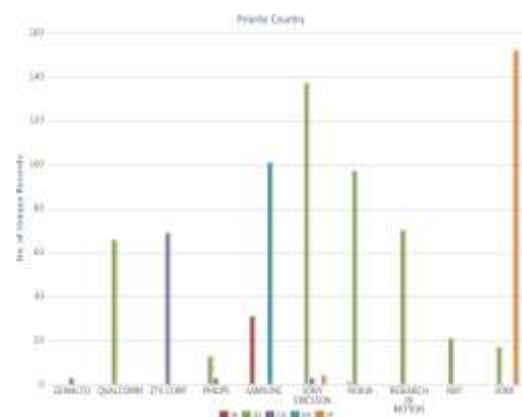
Fig.2 leading companies across major patenting authorities

Fig.3 Global NFC Market Growth

- In 2020 NFC- Enabled Mobile Phones shipments for 2.2 billion.
- NFC adopted across all handset OEMs, Covering all OS's.
- 72% by 2020, up from 52% in 2016 and 18% in 2013.
- Apple Pay, Samsung Pay, Android Pay, etc.
- Global NFC market to exceed reach 21.84 Billion by 2020.
- Contactless POS Payments become standard in Europe, Sweden and also going to implement in many countries.

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NFC Connecting the Unconnected

- User-initiated NFC-enabled connections, commission and control of Internet of Things.
- NFC embeds intelligence in unpowered, unconnected objects.
- Access To Data from Unpowered, unconnected objects..

- NFC Technology is designed for sensitive uses, Such as IOT applications in Payment System, transport ticketing, Corporate access and cloud computing authentication as in Fig 3 & 4.
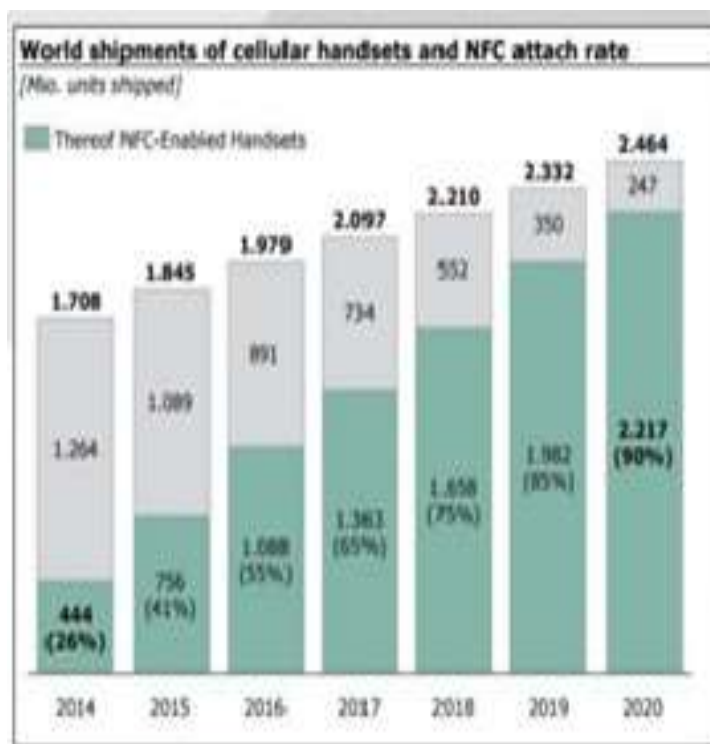

Fig.4 NFC Attach Rate

VI.CONCLUSION

In this paper, we proposed the NFC Technology in commercial and industrial applications combined with IoTize to modernize the process of interfacing event access control, Health Care exploring, Building maintenance and security industries. Near Field Communication (NFC) provides the possibility of linking virtual information between physical devices through proximity. IoT implementation on existing products in Convening, Better security and Energy savings. NFC as enabling key for this method by use of smart phone (android/iPhone) we can developed & improved NFC proximity next high level by using IoT technology i.e. IoTize. In Future Almost every object or place can be equipped with a NFC tag and thus provide proximate identification and useful related information to a nearby user of a smart device as NFC enabled smart phone. NFC is a

platform which offers various applications in different fields. In Future NFC provides an important contribution in the various fields, its principles and properties are already being applied to improve access and quality of and most importantly reduce the cost of system.

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