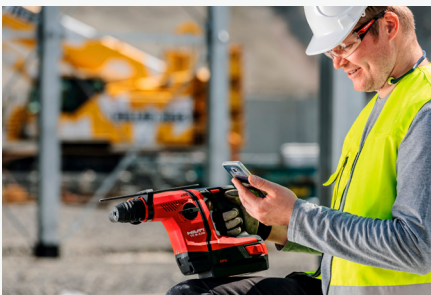




NFC FOR CONSTRUCTION INDUSTRY

TRACKING • AUTHENTICATION • SECURITY • MAINTENANCE



WHITE PAPER 2018

About wireless technologies

NFC brings data to your products

Near Field Communication (NFC) technology is designed for data transfer over short distances. Data is attached to items by means of NFC tags, which can store smaller amount of data locally, contain a web link or launch an app that can be opened using a smartphone. NFC solutions are used to verify the authenticity of products, such as spare parts for cars. This technology also improves safety at work: industrial machines can be equipped with video instructions.

"Every day, Confidex short-range wireless products connect more than 100 Million assets to data all around world."

RFID is the barcode 2.0

Radio Frequency Identification (RFID) tags can be read over distances of dozens of yards. This technology enables companies to monitor large streams of goods automatically.

Confidex RFID tags help Volvo use assets more efficiently at its car factory. By using the tags, the company has constant visibility over equipment utilization rates and can ensure that the right parts are in the production lines at the right time.

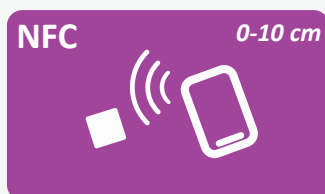
"Over 2 million people drive Volvos built around Confidex tags."

BLE enables more complex measuring in larger areas

Bluetooth Low Energy (BLE) technology enables data transfer over distances of hundreds of yards. Because this high-performance technology has an independent energy source, it can be used to monitor the condition of products, for example.

With BLE, companies can ensure that the cold delivery chain of frozen foods is never broken, from the production plant all the way to the grocery store. Beacons measure the product temperature at regular intervals and transfer the data to company systems.

"More than a million fresh products are delivered every day, with Confidex tags securing the cold delivery chain."



About NFC Connected Objects

- ✓ NFC technology enables simple and safe **two-way interactions between electronic devices**, allowing consumers to perform contactless transactions, access digital content, and connect electronic devices with a single tap.
- ✓ NFC complements popular wireless technologies such as Bluetooth.
- ✓ NFC also enables devices to **share information** at a distance that is less than 10 centimeters.
- ✓ Users can share business cards, make transactions, access information or provide credentials for access control systems with a simple touch.

Source: NFC Forum



Technology suppliers -
NXP and Confidex

NXP is the leading supplier of NFC and RFID IC's with a best in class portfolio across operating ranges - NTAG® NFC ICs, ICODE® NFC/HF ICs and UCODE® RAIN UHF ICs.

Confidex is the world's leading manufacturer of high-performing modular industrial-grade NFC & RFID tags and specialty labels, contactless smart tickets and Bluetooth® beacons.



About NFC Market

”The Global **Near Field Communication (NFC)** Market is poised to grow at a CAGR of around 17.9% over the next decade to reach approximately \$49.5 billion by 2025.



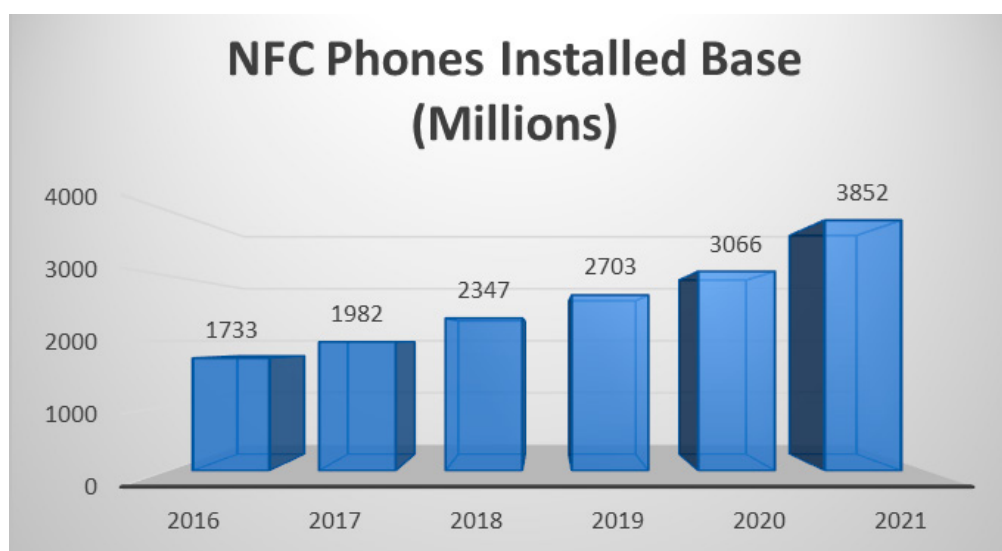
Source: The "Global Near Field Communication (NFC) Market Analysis & Trends - Industry Forecast to 2025" Research and Markets, Nov 2017.

A forecast of passive NFC/HF tags (silicon IC based)

In millions

2016	2017	2018	2019	2020	2021	2022
5.028	5.609	6.300	6.897	7.404	7.920	8.335

Source: IDTechEx Research: RFID Forecasts, Players and Opportunities 2017-2027 Updated in Aug 2017



NFC Phone Installed base – Source: ABI, Strategy Analytics, NXP

In 2017, **Apple** started support for reading NFC tags with iOS11, so that all **iPhone 7** and newer can read NFC tags just like **Android**. Most people now have an NFC reader available in their pocket to interact with NFC tags – leading to a fundamental change in how we interact with physical items and their digital counterparts.

The fact that NFC functionality is now in more and more people's pockets, is also the reason why **Hilti, the worldwide construction industry company** with technologically leading products, systems, software and services, **chose NFC as a primary technology** in taking its customer experience to the next level.

"Confidex had already proved to be fair and highly flexible partner as they supplied RFID tags for the **Hilti ON!Track** RFID asset management tool. Also, they are known for extremely robust NFC tags", **Ewald Kaluscha**, Program Manager for the Connected Tools program at Hilti, tells.

Hilti has always been known to provide the best tool services to its customers and the company continuously strives to take it to the next level.

"In the past, when a Hilti tool was broken on a jobsite, the customer would have to call our service hotline or dedicated sales representative to arrange a pick-up and repair service. For that, they still needed the tool model and serial number. Providing these details on the spot could take some time, especially if the tool's rating plate and serial number was worn off, due to heavy usage", Kaluscha explains.

"We soon realized that if we could help our customers reliably identify any Hilti tool and offer them tool-specific information and service, regardless where their jobsites were, then we would help them be more productive."

People are already familiar with NFC

"It was clear that we needed to create a simple, easy-to-use solution that did not require a new device. Everyone has a smartphone these days, so why not make use of them?" Jussi Silfver, Product Owner for Hilti Connect, explains.

Why Hilti chose NFC technology provided by Confidex & NXP



"Most of our customers are already familiar with NFC technology as it is part of our daily lives. It's in our credit cards, traveling cards or in cordless ear plugs. A completely new technology would be much harder to demonstrate to our customers", Silfver explains and continues:

"However, the major step forward for NFC is definitely that the two largest smartphone platforms, iOS and Android, are now both using it and we expect NFC usage to increase further in the near future."

Hilti customers save time and money

Hilti Connect is a free service for all customers. They simply need to download the app on their smartphone. All new Hilti tools have the NFC technology built in. The NFC chip is placed inside the tool and it doesn't wear off even in harsh weather conditions or when subjected to heavy wear. Hilti customers can easily retrofit their old tools at Hilti repair centers with the NFC technology.

"When a jobsite manager places his smartphone on the tool, the Hilti Connect app informs them instantly about the model and serial number, the entire repair history as well as the warranty service coverage. Also training videos, operating instructions or tool-related accessories are readily available with just a touch of their fingertip. Users can also request a repair pick-up service for the tool wherever they are", Kaluscha continues.



Product authentication to combat counterfeits

How to make sure that your equipment's warranty is in place? How to be sure that the correct part is used for an assembly? What if your subcontractor is using wrong parts or saving money by using a counterfeit sparepart?

When building a secure structure or entity, you need to be sure that you won't end up being sued for risking the safety of people with unsecure structures.

The risk is huge, but solution small and simple.

NFC offers a trusted, intuitive way to perform identification and authentication of individual products. This is because NFC tags have unique electronic identifiers (IC UIDs), to uniquely identify items and help trace them through the supply chain. By NFC technology with built-in security features, you can tag all parts and components and have them authenticated - as every worker

is carrying a mobile phone these days, the access to a reader is not a problem or an investment. Only thing you need to do is to set the guidelines in place and make sure that your contractors or workers know to check the correct parts.

The NFC tags come equipped with different IC security features to support different levels of protection, based on a product's values and safety requirements, and supply chain vulnerabilities. Higher-security IC's equipped with AES cryptography can support advanced authentication schemes - tag, message and/or mutual authentications.

Secure NFC technology can also be used to quickly confirm the originality and provenance of important documents, such as product certificates.



Product traceability to control supply chain

Today, NFC tags and labels are available in many form factors dedicated for operating in a harsh environment: hard tags or printable labels for metal surface, plastic, glass or wood. What ever you are working with. NFC enables smart phone users to identify and securely authenticate these products at any time, during manufacturing, distribution, chain of custody, or retail - with the tap of an NFC enabled phone.

Confidex is the pioneer for designing tags for demanding use cases. Weather it's a heat persistant tag or washing cycle proof plastic tag, one for round surfaces or hang tag for the bottom of a container - everything is possible, with optimal human and mobile readability. The most important thing is that every tag we provide works reliably providing data of the part it's attached to.

In case of higher security needs, Confidex tags can use NXP's NFC IC's with advanced AES cryp-

tography to support secure authentication mechanisms in the supply chain. Also, granular permissions can ensure that only authorized users and devices can access sensitive tag data (e.g. production or inspection data), and issue special read or write commands.

Typically RFID and NFC tags have performed poorly near metal and moisture, but Confidex has created unique patent-pending RFID antenna technology, overcoming the limitations caused by the environment. Also, NXP is the leading supplier of IC's with a best in class portfolio across operating ranges - NTAG® NFC ICs, ICODE® NFC/HF ICs and UCODE® RAIN UHF ICs.

The tags can be assigned to specific locations and distributors, and when working with cloud-based data management platforms, can be used to detect unauthorized channels and grey market diversions.



Managing resources between construction sites

Where are the materials and tools at the site? Is this the part I'm looking for? How can I report a broken tool?

You don't need to struggle anymore: NFC gives you accurate identification of the tool and possibility to report its status flexibly via mobile application. Tool model, serial number and other details can be provided on the spot. This saves time and money!

A major step forward for NFC is that the two largest smartphone platforms, iOS and Android, are now both using the technology and NFC usage is expected to increase further in the coming months.

The NFC tool tagging is already proving to be successful use case and customer feedback is positive - like Hilti customers already feel, benefiting from the modern technology used by their tool provider. Customer satisfaction is one of the founding blocks to built your success with.

As we know, finding lost tools or materials is tricky at large construction sites with many changing workers. NFC allows the builders to identify and book the tools in real-time: tap "begin" when they start to use the tool as well as tap "finish", when they return it. When misplaced, they can see where the tool was recently used.

This way also the managers always know where their resources are and what is the status of of them. If they need to order new tools, they know that, too, without a delay.



Tamper detection to protect sensitive materials

A part or material need to be brand new before installing or applying. How can you be sure that it's not used or broken already? Or a tool is broken. Who was the person using it for the last time?

To make sure that you have an unopened product package or an unused, intact replacement or refill part at hand, you can use tamper evident seals or labels, ideally combining mechanical and electronic components for multi-layered protection.

Confidex is experienced in designing tamper-proof or tamper-evident antennas. These are used e.g. in traffic as border control labels or as brand protection seal tags within distribution channel.

NXP's tamper evident NFC IC's feature a tamper loop, to help detect if a product has been mishandled or opened before the sale. A quick read of the tag status with an NFC phone verifies that the loop is intact, to confirm product integrity. This once-opened status is securely protected against manipulation.



User information and services

How to share information in an environment, where paper manuals and signs are exposed to harsh weather and physical damage by tools and machinery? How to be able to share secure information, when you need to protect it, but still keep it accessible. How to do this?

The solution is an NFC hard tag, designed for industrial environment. The Confidex tag housing is IP68: an impact, dust, water and chemical resistant - and also heat resistant, if needed. The Confidex hard tags have been tested and proven by millions of users in different environments, including construction and manufacturing industries.

Via NFC tagging, the user can instantly link to a web page or launch a mobile application, to access product details, after-sales services or useful digi-

tal tools that can enhance product usage. Content can easily be updated by the manufacturer via cloud-based content management system (CMS) or app development updates. NFC tags with larger data memory storage can be used where access to off-line data is crucial, in case where there is no connectivity, but data needs to be read or updated in the field.

The NFC IC is the gate to needed information, anywhere, anytime. IC functionalities and security features can be selected by the requirements of the use case, and a customer's specific needs: data storage (memory size), security features including digital signatures up to advanced cryptographic cores, interactivity features such as NFC tap counter values, as well as change of state capabilities such as opening detection or temperature sensing.



Proof of physical visitor presence

When a construction site needs guarding or maintenance by subcontractors, how can you know that they have been there for real? What if they just send the bill, without actually showing up – or even report false hours?

Luckily, advanced NFC IC technology enables secure visitor authentication, with proof of presence and confirmation of visit details, such as location and time. NXP's NTAG DNA technology comes with AES cryptography and SUN feature, enabling tag and message authentication, whilst proving of physical tag presence. Personnel in equipment maintenance, repair workers, or security guards can provide a new level of trust, with an auditable tag presence and secured data logs.

If you are the subcontractor, with this solution you can report exact hours and built trust in the partnership: you can prove the facility have been visited and you can show exact time stamp when it was done. Your workers know they are monitored and they will perform accordingly.

For sales purposes, it's a great advantage to tell without doubt that you can proof the visits. This can set you apart from competition and is a great asset for risk management.

It is also a great way to register maintenance information, keep track of history and insert notes for next visit.

LINKS BY CONFIDEX™ - INDUSTRIAL-GRADE NFC PRODUCTS

Reliable data built on Reliable LINKS - Confidex enables Industrial Digitalization

Confidex is the world's leading manufacturer of high-performing contactless smart tickets, modular industrial-grade beacons, RFID & NFC tags and specialty labels – the key enablers for short-range wireless IoT solutions that make industrial supply chains, transactions, asset tracking and authentication of goods more efficient and secure.

Over a decade in IoT

With strong combination of tag design competence, RF engineering, customization and manufacturing experience, our products and solutions serve demanding operating environments, like automotive industry, logistics and public transport. Since 2005 Confidex has become the trusted partner for system integrators and end users of INDUSTRY 4.0 technologies throughout the world.

Global presence

With our global network of partners we serve customers representing a broad range of industries in Europe, Americas, Middle-East and Asia Pacific. Among our partners and customers we are known from our passion to excel. Find out more at www.confidex.com

NXP - EXTENSIVE NFC TAG AND LABEL IC PORTFOLIO COVERING INDUSTRY STANDARDS

NXP Semiconductors N.V. (NASDAQ:NXPI) enables secure connections and infrastructure for a smarter world, advancing solutions that make lives easier, better and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving innovation in the secure connected vehicle, end-to-end security & privacy and smart connected solutions markets. Built on more than 60 years of combined experience and expertise, the company has over 30,000 employees in more than 30 countries and posted revenue of \$9.26 billion in 2017.

NXP is the technology co-founder of NFC, and has since played a pivotal role in expanding its worldwide presence. Today, NXP technology is found in more than 80% of all NFC-enabled smartphones, and over 80% of NFC tags and labels. NXP's market-leading solutions include NFC Forum certified tag ICs of the NTAG® and ICODE® product line-ups, and reader ICs. To accelerate and simplify implementations, NXP provides value-add services, such as high-speed encoding and trust provisioning in secure manufacturing facilities, as well as cloud-based authentication services to support high-security cryptographic operations. NXP is also leading supplier of RAIN UHF IC's. Find out more at www.nxp.com



WHAT IS NFC?

Near Field Communication (NFC) is a standards-based short-range wireless connectivity technology that makes life easier and more convenient for consumers around the world by making it simpler to make transactions, exchange digital content, and connect electronic devices with a touch. NFC is compatible with hundreds of millions of contactless cards and readers already deployed worldwide.

Source: NFC Forum

About NFC Forum

The NFC Forum provides a highly stable framework for extensive application development, seamless interoperable solutions, and security for NFC-enabled transactions. The NFC Forum has organized the efforts of dozens of member organizations by creating Committees and Working Groups.

In June 2006, only 18 months after its founding, the Forum formally outlined the architecture for NFC technology. The Forum has released 16 specifications to date. The specifications provide a “road map” that enables all interested parties to create powerful new consumer-driven products.

Both NXP and Confidex supply NFC Forum compliant tags (tag types 2, 4 and 5), to maximize interoperability with the reader infrastructure.

CASE: HILTI CONNECT APP ALLOWS HILTI'S CUSTOMERS TO IDENTIFY AND MANAGE TOOLS FROM THEIR SMARTPHONE **VIA NFC** BY CONFIDEX AND NXP

Hilti is a global leader in providing products and services to the construction industry. According to construction professionals around the globe the Liechtenstein based company manufactures the most durable power tools in the world. They are built to tolerate harsh weather, dust and heavy use. Subsequently, Hilti chooses only suppliers that can deliver the same top notch quality.

At the same time, Hilti offers much more than just tools and has now also introduced IoT (Internet of Things) technology to expand its service offering to its customers. The company launched Hilti Connect in early 2018 – an app that allows its customers to identify and manage tools from their smartphone. The service utilizes NFC technology provided by Confidex and NXP, primary technology in taking its customer experience to the next level.

When the Hilti Connect app was launched, it quickly surpassed 20.000 downloads. Today, it is a fast-growing solution that is continuously being improved.

Read more at: confidex.com/success-stories

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<https://www.confidex.com/nfc>

