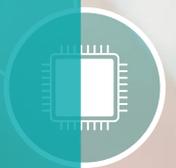




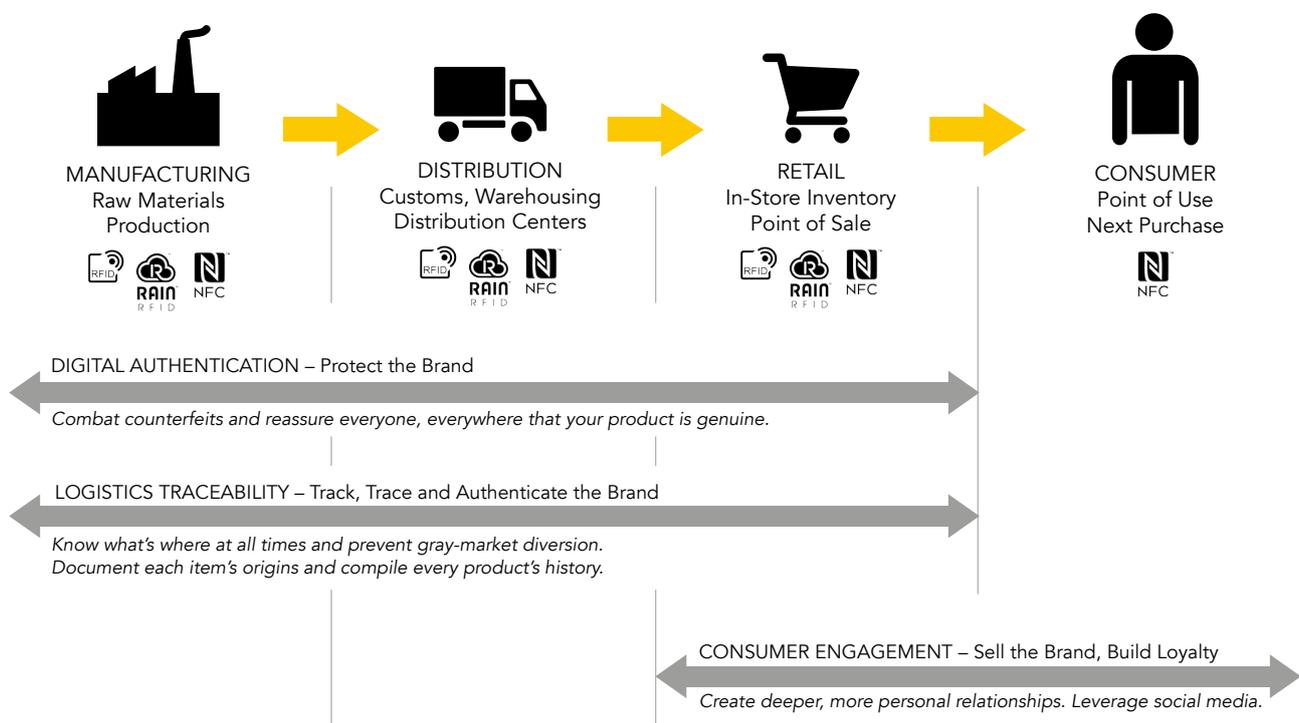
# Make Your Products Smarter and More Secure with RFID-NFC

Best-in-class solutions for digital product authentication, logistics traceability & consumer engagement.



# Strong. Streamlined. Connected.

RFID-NFC is a gateway to the digital era, giving you more ways to strengthen your brand, streamline your operations, and connect with consumers – so you can increase revenue.



RFID-NFC strengthens brands and adds value at every point in the product life cycle, from raw materials to the consumer's hand – and beyond

## Digital Authentication

With RFID-NFC, each tagged item has its own DNA, in the form of a unique ID number securely embedded inside. Tagged items can be identified at any time, and can digitally verify that they're genuine, so it's easy to tell what's legitimate and what's not. That makes it much harder for counterfeiters to present copies as genuine items. What's more, with NFC-enabled tags, a simple tap with an NFC smartphone is all it takes to verify authenticity, so everyone – even consumers – can join the fight against fakes.

**Counterfeiting and piracy – a \$ 1.3 trillion global financial loss, projected to reach \$ 2.8 trillion by 2020**

Source: ICC, OECD, Vandagraf

### Logistics Traceability

The backend system that supports RFID-NFC gives you global, real-time visibility into supplier, warehouse, and retail inventories, so your operations are more efficient, more cost-effective, and more secure. From raw materials to the store shelf – and at every point in between – you always know what’s where, and can document each item’s status. The ability to track, trace, and authenticate items anywhere in the supply chain, at any time, makes your logistics more efficient and more secure, making it much harder to divert products into grey markets and unauthorized channels.

### Consumer Engagement

RFID-NFC gives your product a voice, so you can communicate directly with consumers before, during, and after the sale. RFID-NFC takes you that “last mile” to the customer, offering helpful advice, useful information, special services, loyalty programs, and access to exclusive online communities, even after your product leaves the store. A quick tap of an NFC smartphone starts each dialog, and each dialog is an opportunity to create a deeper, more personal relationship. The result is better informed, more engaged consumers who are more likely to choose your brand again and again.

# NXP: The best in RFID – NFC Technology

**NXP leads the  
RFID-NFC Market**

**#1  
in tags & identification**

**#1  
in bank cards**

**#1  
in eGov documents**

**#1  
in NFC for mobile**

**#1  
in contactless readers**

NXP’s RFID-NFC solutions are already leading in smart products all over the world, helping brand owners make the most of the digital era by keeping their brands strong, streamlined, and connected.

NXP holds the top position in every key RFID-NFC segment, including tags and authentication, NFC for mobile, contactless readers, POS terminals, and high-security applications, such as smart identity cards for banking and access, and eGov documents, including ePassports.

We use the latest technologies to support the complete range of RFID-NFC formats, and deliver true, end-to-end ecosystem solutions that deliver smart, secure functionality with the best in accuracy and speed. We’re known for our ability to drive innovation, and continuously build on our extensive patent portfolio, which covers foundational RFID-NFC technologies.

Our commitment to RFID for the long term leads us to invest significantly in R&D, and drives us to be a leading participant in standardization and regulation activities, like those of the GS1, ISO, IEC, and the NFC Forum.

**NXP’s industry-leading  
RFID - NFC solutions ensure  
a product’s **origin,**  
**originality,** and **integrity.****

# Three Ways to a More Robust Brand

RFID-NFC is a group of technologies with one thing in common: they all build a better brand. Operating over varying distances and at different frequencies, the three RFID-NFC formats – long-range, vicinity, and proximity – offer a mix of features that can easily be tailored to meet your exact needs.

.....▶ **LONG RANGE**

840 to 960 MHz; up to 10+ m with special reader; fast, reading hundreds of items in a second; primarily supply chain (warehouse, distribution center), inventory and theft detection applications



## Long Range

Long-range RFID can read tags over the greatest distance – up to 10 meters or more – and without direct line of sight. The technology operates in the UHF range (840 to 960 MHz), requires a dedicated stationary or handheld RAIN RFID reader, and uses an anti-collision feature to identify multiple tags simultaneously. The ability to scan up to 20,000

items per hour at once makes long-range RFID a leading choice for warehousing, inventory, and other supply-chain applications. The latest generation also offers exceptionally high levels of security, with support for cryptographic algorithms. RAIN RFID is the industry alliance for UHF RFID, and the name commonly used for UHF-based RFID solutions.

.....▶ **VICINITY**

13.56 MHz; up to 1.2 m with special reader; up to 7 cm with NFC smartphone; identification of multiple tags; supply chain and consumer applications



## Vicinity RFID

Operating at 13.56 MHz, vicinity RFID is a medium-range technology that's compatible with NFC. Vicinity RFID tags are often read by a dedicated reader, at up to 1.2 meters, but can also be configured to be read by a standard, off-the-shelf NFC smartphone, at up to 7 centimeters. Compatibility with NFC expands the options, since people outside

the supply chain – such as customs agents, retail field staff, and consumers – can perform digital authentication and access product data with just the tap of an NFC smartphone. The latest generation of vicinity RFID supports cryptography, for high-level data security.

.....▶ **PROXIMITY**

13.56 MHz; up to 10 cm with special reader; up to 4 cm with NFC smartphone; identify one tag at a time; primarily for consumer applications



## Proximity RFID

This category includes several close-range technologies operating at 13.56 MHz, with NFC being the most notable. NFC tags can be read by anyone using one of the nearly two billion NFC-enabled smartphones and tablets currently in the market. That means there's no need to invest in special readers, and brand owners can take advantage of

NFC's widespread penetration in smartphones to let anyone check if the product is genuine, in what's known as crowdsourced authentication. Proximity RFID protects data with enhanced security, with options for encryption and the EMVCo-level security features used in banking.



RFID-NFC identifies items at the unit, carton, or pallet level

## RFID-NFC lets you

- **Protect your brand** with anytime, anywhere digital authentication
- **Control your supply chain** with digital track, trace, and authentication features
- **Create deeper customer relationships** with personal interactions and exclusive experiences
- **Make better decisions** based on real-time data analytics

### A Closer Look

RFID-NFC refers to contactless technologies that identify items over a range of distances, in most cases without the need for a battery. RFID-NFC tags combine a tiny microchip with an antenna that picks up electromagnetic energy beamed at it from a reader. When a tag senses the beamed energy, the tag sends its unique identifier to the reader. The unique identifier can be tied to other types of information, stored in the tag's memory, or can be connected to the cloud, so it's possible to identify, authenticate, track, trace, and interact with individual

tags. Battery-powered tags can even be equipped with sensors, so packages can indicate if they've been exposed to excessive temperatures or humidity. Although the different RFID-NFC formats operate at close, medium, or long range, they're all designed to keep data secure. Some even support cryptography, for a very high level of data protection.



# Added Advantages

Equipped with multiple memory options, enhanced security features, and the ability to generate data in the cloud, RFID-NFC lets brand owners do more.

## Enlist an Army of Brand Protectors

The fact that vicinity and proximity RFID tags can be read by anyone with a standard NFC smartphone creates a new and exceptionally powerful way to protect brands. When anyone can verify authenticity with a simple tap of a phone, counterfeits are easier to identify, and fakes are harder to pass off as genuine. Brand owners can enlist everyone they work with, including distributors and retailers, without investing dedicated equipment or special

expertise. What's more, even people not directly related to the supply chain can help defend the brand, since customs officials and everyday consumers can digitally authenticate products in the field. The backend system in the cloud tracks information about tag location and time, checks results, and flags deviations in the cloud, so any issues with authenticity, tampering, or diversion can be dealt with immediately.

## Crowdsourced Authentication

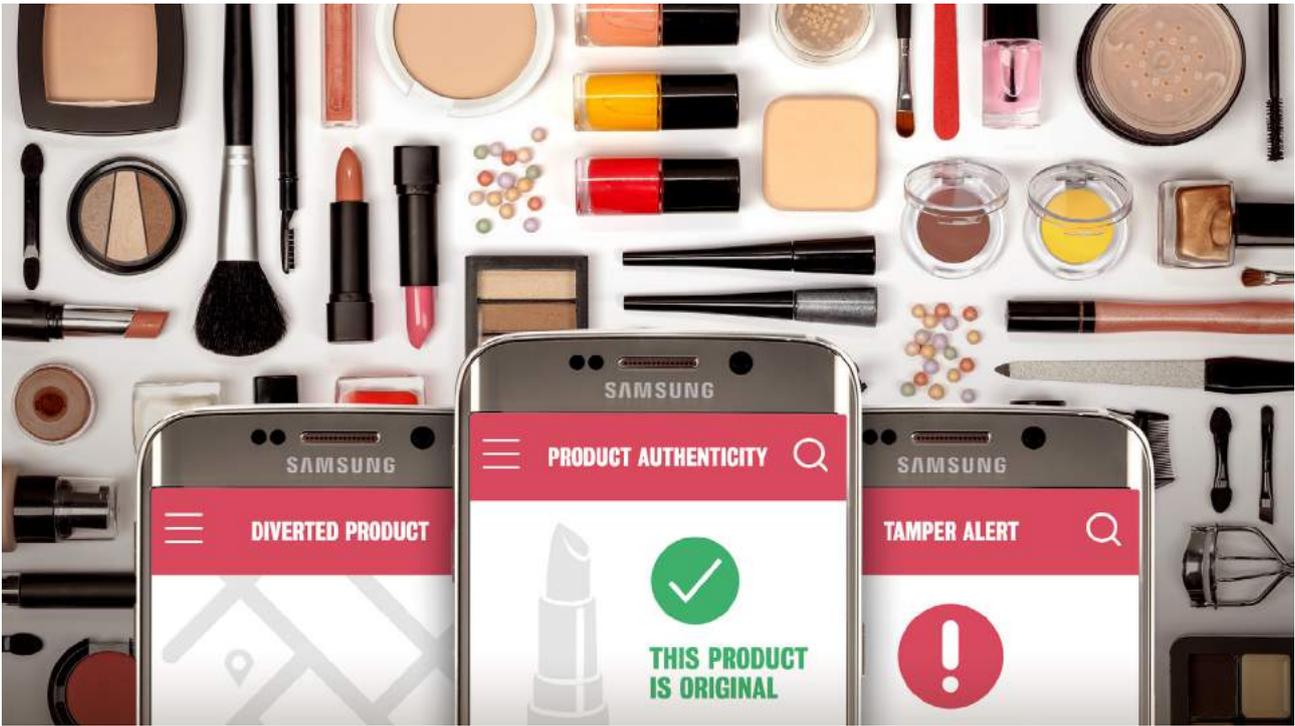


When anyone can uncover a fake, counterfeiters have nowhere to hide

## Create Deeper, More Lasting Customer Relationships

Giving consumers the ability to authenticate brands is only just the beginning. That one tap of a smartphone can be a gateway to a whole range of options, from added product details and recommendations, to warranty management and after-sales services, or even privileged access to special

rewards programs and exclusive brand communities. RFID-NFC gives consumers unprecedented access to information, services, and experiences, whenever and wherever they want it. The result is increased engagement, over a longer period, and lasting brand value.



Tagged products give consumers new ways to engage, for deeper relationships

**Give Your Consumables an Edge**

In the market for branded consumables and accessories, RFID-NFC can increase follow-on sales and add a new level of automation. Consider a personal-care appliance, like a toothbrush, which needs a new head. At the store, when you're buying the new head, you can verify authenticity and access extra information, like recommended usage and coupons, by a simple tap of the NFC tagged consumable with your phone. At home,

when you mount the new head on the toothbrush, the main unit can authenticate the head and automatically adjust settings based on the type bought, so you're always using the right speed and pulse settings. Later on, the main unit can even notify you, based on usage, when it's time to get another new head. As a next step, you can tap your phone to the head and get a link to an authorized e-commerce site, where you can place an order.



Genuine parts authentication + greater automation = increased revenue

# Work Smarter with Help from the Cloud and Data Analytics

RFID-NFC makes it possible to collect data and make better decisions, throughout a product's complete life cycle. For each manufactured product, there's a data profile in the cloud that's associated with the unique digital identifier of the product's RFID-NFC tag. Each time a tag reader interacts with the product's tag, there's an update to the product's online data profile. This makes it easier to uncover inefficiencies, identify product performance and usage, and gather the knowledge needed to make better decisions, whether it's in the supply chain itself, in the store, or after the sale.

## Continuous Supply-Chain Improvement

Cloud-based data lets you gauge the effectiveness of each business process, in real time. You can register the who, what, when, and where of every transaction, to create a detailed history of each tagged product's progress through manufacturing, distribution, and retail outlets. Serialized traceability at every point, at the item level and the box level, makes it easier to detect gray markets, product diversions, and shrinkage. Digital authentication helps combat counterfeits, and tags equipped with tamper alerts can flag any tampering or misuse. The backend system also lets you optimize inventory visibility, to ensure the right options are always in stock, and helps retailers stay ahead, with timely replenishments.

## Valuable Consumer Insights

Once the product arrives on the retail shelf, consumer interactions can become part of the data profile, while respecting privacy laws. Each time the tag is read by a consumer using a smartphone, to check authenticity or access extra information, the transaction can be captured. The resulting data can help marketers quantify interest and learn more about buying behaviors. After the purchase, consumers can choose to participate further, with opt-in profiles, loyalty programs, apps, and other personalized services. Over time, these consumer interactions can yield valuable insights about product usage and performance, individual customer preferences, and brand loyalty.



RFID-NFC enables continuous improvement throughout the supply chain, and deeper insights into consumer behavior



# Real-World Inspiration

Here's a look at how some of our customers are using RFID-NFC to protect their brands, improve logistics, and create deeper consumer relationships.



## BOTTEGA VENETA

### Bottega Veneta

Since 2010, this Italian designer, known for unsurpassed craftsmanship and attention to detail, has used RFID to make sure everything related to their supply chain – from raw materials and final products to customer returns – can be traced and digitally authenticated. The system makes use of NXP ICODE's unique privacy mode. As a result, only Bottega Veneta's dedicated readers can detect or trace tags, so consumers can be confident that any information about their purchase remains completely private.



## MouTai

Named for the Chinese town where it originated, MouTai is a special-occasion liquor that, due to its unique reputation and higher price, is a target for counterfeiters and illegal trade. The bottles are now equipped with tags that can be read by either a dedicated ICODE reader or an NFC smartphone or tablet. The setup provides traceability from source to sale, and lets anyone – inspectors, customs officers, retailers, or everyday consumers – verify authenticity and learn more about what's inside the bottle.



## Vivienne Westwood

### Vivienne Westwood

The luxury fashion brand Vivienne Westwood is tagging its products with woven brand labels by TexTrace that incorporate NXP's RFID protection. The woven UCODE UHF labels are used for product authentication, to help protect against counterfeits, shrinkage and an increased gray-market activity. The labels allow items to be tracked throughout the supply chain, with easy authentication at the border or in the store using standard RFID reader technology. As an integral part of the product as opposed to a hangtag or care label, the tags are encoded and shipped directly to suppliers. And because brand labels are legally part of a product, the brand owner can take action against unauthorized sales.



# Geantet-Pansiot

This artisanal winery in France's renowned Burgundy region equips all their bottles with NXP MIFARE® Ultralight C tags, for NFC authentication with encryption. At any time, inspectors, distributors, and retailers can quickly verify authenticity in the field and combat illegal diversion, just by tapping an NFC smartphone or tablet to the back label. NFC also lets consumers authenticate bottles at the point of sale and learn more about the estate, the vintage, and how best to store and serve the wine.



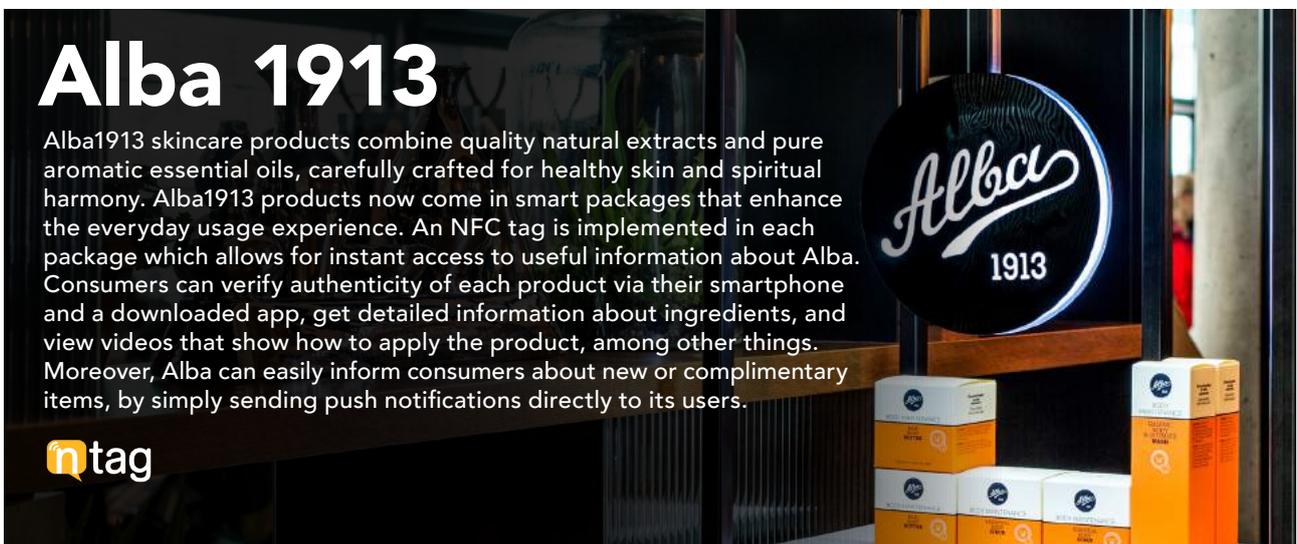
## Arena

This leading Italian brand for aquatic sports and waterwear uses NFC tags, embedded in swimsuits, to create personal, two-way relationships with swimmers. A proprietary app lets consumers verify authenticity and access product information, such as fit guidelines and fabric care, at the point of sale, and then, after the purchase, gives them exclusive access to a social-media community that includes special offers, discussion groups and even access to professional athletes.



## Alba 1913

Alba1913 skincare products combine quality natural extracts and pure aromatic essential oils, carefully crafted for healthy skin and spiritual harmony. Alba1913 products now come in smart packages that enhance the everyday usage experience. An NFC tag is implemented in each package which allows for instant access to useful information about Alba. Consumers can verify authenticity of each product via their smartphone and a downloaded app, get detailed information about ingredients, and view videos that show how to apply the product, among other things. Moreover, Alba can easily inform consumers about new or complimentary items, by simply sending push notifications directly to its users.



# Broadest Selection. Highest Performance.

As the identification industry's number-one supplier of semiconductor technology, NXP has assembled a best-in-class portfolio of RFID-NFC solutions. Our products deliver standout performance across every operating range and at every level of security, so you can always find the right fit for your application, now and in future.

## ▶ LONG RANGE

### UCODE®

NXP's EPCglobal-compliant UCODE passive UHF transponder ICs offer high anti-collision rates, high sensitivity for long read range, and wide frequency range for worldwide application.

Varying memory sizes and other special features, including cryptography (UCODE DNA), make it easy to select the best cost/benefit option for your application.

NXP Family	Frequency (MHz)	Operating Range with Dedicated Reader (max)	Security Features	Global Standards
	840 to 960	10+ m	Base	ISO/IEC 18000-6 EPC Gen2 EPC Gen2 V2
	840 to 960	10+ m	AES encryption	ISO/IEC 18000-6 EPC Gen2 EPC Gen2 V2

## ▶ VICINITY

### ICODE®

NXP's ICODE platform, which accounts for billions of ICs in the field and thousands of successful installations globally, represents the largest installed base by far for vicinity RFID. ICODE also

comes with AES cryptographic authentication (ICODE DNA), NFC phone readability and cloud connectivity, and is backed by a broad selection of widely available support tools.

NXP Family	Frequency (MHz)	Operating Range with Dedicated Reader (max)	Security Features	Global Standards
	13.56	1.2 m	Enhanced	ISO/IEC 15693 ISO/IEC 18000-3 NFC Forum T5T
	13.56	1.2 m	AES encryption	ISO/IEC 15693 ISO/IEC 18000-3 NFC Forum T5T

## ► PROXIMITY

### NTAG®, MIFARE® & SmartMX®

NXP's NTAG family provides multiple interactivity features (including a built-in counter), supports protection with NXP's originality signature, and can be configured for password protection and backend risk management. MIFARE, which is fully compatible with NFC, adds chip encryption.

Our SmartMX contact / dual interface controllers offer EMVCo-certified operation, for the same high-level security as used in bank cards. All three families are equipped with multiple memory sizes, to support varying levels of on-chip data storage.

NXP Family	Frequency (MHz)	Operating Range with Dedicated Reader (max)	Operating Range with NFC Smartphone (max)	Security Features	Global Standards
	13.56	10 cm	4 cm	Enhanced	ISO/IEC 14443 NFC Forum T2T/T5T
	13.56	10 cm	4 cm	3DES/AES encryption	ISO/IEC 14443 ISO/IEC 7816 NFC Forum T2T/T4T
<b>SmartMX</b>	13.56	10 cm	4 cm	EMV-Co certified with encryption	ISO/IEC 14443 ISO/IEC 7816 GlobalPlatform

### Recommended NFC/RFID Reader ICs for your Complete System Solution

Depending on your tag choice, NXP has the right NFC and vicinity RFID reader IC for your design. These high-performance readers offer best operating range, yet ultra-low standby power consumption.

We reduce complexity and add flexibility at every point in development, so you can set up your complete NFC system in record time.

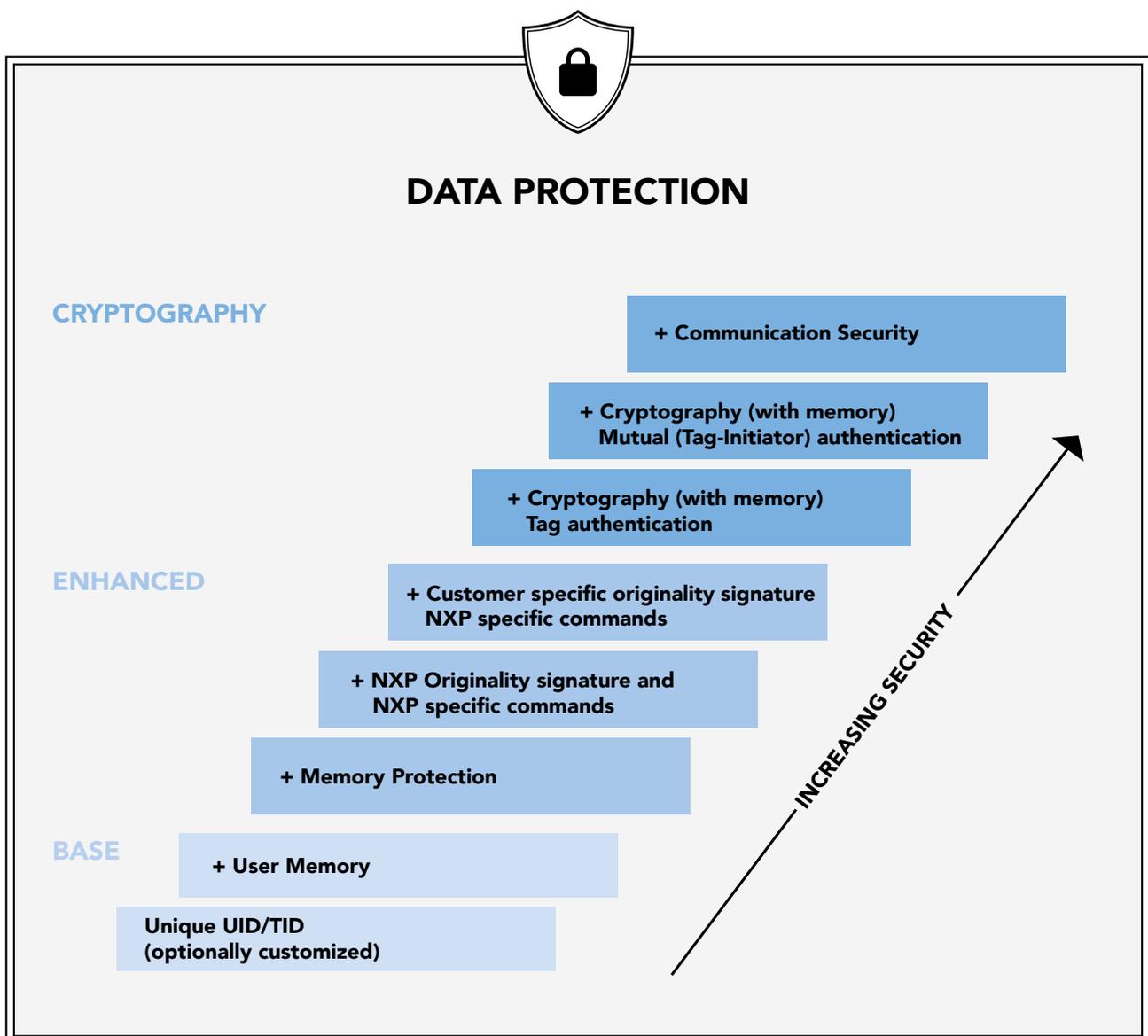
Reader IC	Frequency (MHz)	Output Power	Tag Family Supported	Global Standards
<b>SLRC610</b>	13.56	1.3 W	ICODE	ISO/IEC 15693 ISO/IEC 18000-3 NFC Forum tag type support: 5
<b>MFRC630</b>	13.56	1.3 W	NTAG, MIFARE, SmartMX	ISO/IEC 14443A NFC Forum tag type support: 1,2,4



- NXP owns more than 80% of the market for NFC tags.
- More than 80% of all NFC-equipped smartphones use NXP technology.

# Scalable Data. Protection. Unmatched Security.

We offer a range of security levels, so you can match protection to the specific needs of your product, your supply chain, and the threats your brand is likely to face. Because we bring our deep experience in high-security applications, including eGov, banking, and access, to the design of our RFID-NFC tags, we're uniquely positioned to offer highly sophisticated security features, like cryptography.



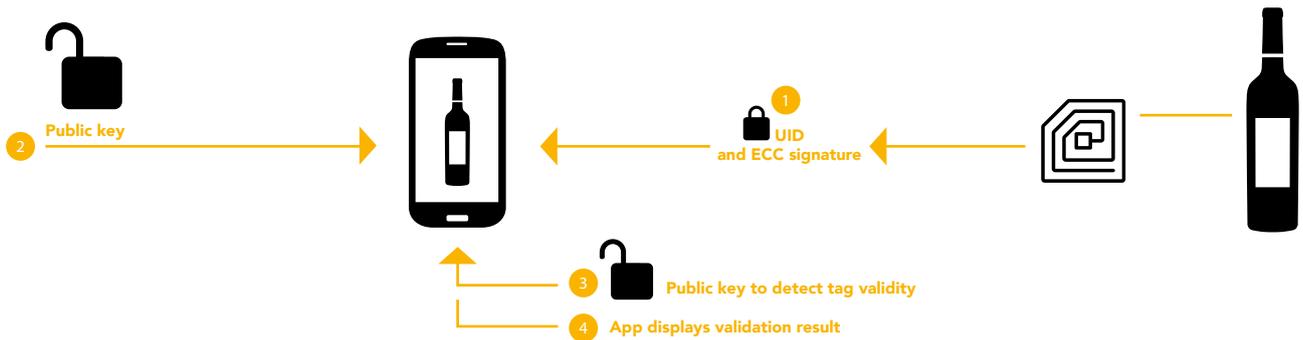
# NXP's Scaled Approach

Our laser-like focus on security yields unique features and options you won't find with other solutions. Here are just two examples:

## NXP's Originality Signature

NXP's standards-based algorithm for a digital elliptic curve cryptography (ECC) signature enables offline verification, so the RFID-NFC tag can be validated without having to access the cloud.

In the example, an NFC smartphone acts as both a tag reader and a validation terminal, using the ECC signature to validate the tag on the local app.



### NXP Originality Signature for offline validation

- 1 Reader speaks first: „Reader on; Tag here.“
- 2 Mobile app scans the item equipped with NFC tag to retrieve the chip's unique identifier (UID) and ECC signature (an identifier signed with a private key at initialization)
- 3 App gets public key from cloud or local app storage.
- 4 App uses the public key to check the chip's signature versus its identifier, thereby detecting offline the tag's validity.
- 5 App displays validation result.

## NXP's Cryptographic Tag Authentication

NXP takes security to a new level, with RFID-NFC tags that support cryptographic algorithms, including the Advanced Encryption Standard (AES), which is trusted by national governments to protect classified information. When using cryptography, the vicinity reader or NFC smartphone reader, act as a commu-

nication terminal to transfer secret information on the NFC tag to a secure server in the cloud, where verification takes place. Symmetric-key ciphers use the same key or a secret, for encrypting and decrypting a message.



### NXP Cryptographic Tag authentication

- 1 Reader speaks first.
- 2 Mobile app scans the item fitted with an NFC tag to retrieve the chip's unique identifier (UID).
- 3 Smartphone contacts server. Server generates a challenge (a unique random number that varies with each scan).
- 4 Challenge is returned to smartphone, which passes it to tag chip.
- 5 Chip encrypts challenge with a secret key stored on it.
- 6 Smartphone sends encrypted challenge with secret key to server.
- 7 Using secret key, server decrypts message and verifies initial challenge.
- 8 Server returns verification result, with chip identifier, to smartphone.

# Take the Next Step

The following resources offer more information about NXP's best-in-class solutions for RFID-NFC.

## LONG RANGE SOLUTIONS

<http://www.nxp.com/ucode>

<http://www.nxp.com/ucodedna>

<https://nxp-rfid.com/products/ucode/>

## VICINITY SOLUTIONS

<http://www.nxp.com/icode>

<https://nxp-rfid.com/products/icode/>

## PROXIMITY SOLUTIONS

<http://www.nxp.com/nfc>

<http://www.nxp.com/ntag>

<http://www.nxp.com/mifare>

<https://nxp-rfid.com/products/ntag/>

<http://www.mifare.net/>

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