NXP

Protect your brand with secure RAIN RFID product authentication

How brand-conscious manufacturers of high-value goods can prevent counterfeiting and channel diversion with UCODE Guard

The high cost of vulnerabilities in the supply chain

At first glance, it might not seem like high-end fashion brands, producers of pharmaceuticals and safety-critical vehicle components have a lot in common, but they all depend on **secure supply chains** for their success.

Whether it's a luxury purse, a prescription medication or an airbag designed for a specific car, the complex network of partners used to deliver products and hold inventories also serves to meet consumer expectations for quality and authenticity.

A robust supply chain, trusted to deliver genuine articles, is central to maintaining consumer confidence and fostering trust in the brand. And yet the supply chain is also where you'll find two of the biggest threats to the brand's value – counterfeit products and channel diversions. That's because weak supply chains are vulnerable to manipulation and give fraudsters, thieves and unauthorized resellers the opportunity to profit at the brand's expense.

The counterfeit products and channel diversions associated with unprotected supply chains can damage brand reputations, lower revenues and, in the case of medications and other consumables, do physical harm.

Counterfeit products and unofficial overruns

The presence of fake products in the supply chain can devalue a brand in several ways. If consumers buy products that they believe are authentic, but find that the quality is less than they expected, their confidence in the brand declines.

Also, if there are too many reports of counterfeit products, consumers can lose faith in their ability to distinguish genuine products from fake ones, driving them away from the brand. Worse still, fake products where the original was designed for safety can cause real harm to patients, consumers and the public further eroding trust in the brand, creating liability.

Fake fashion items
are often inferior in quality and performance, creating a negative consumer experience and impacting brand perception.

Fake medicines and cosmetics
often use different ingredients and formulas. They may not work effectively and can even be toxic.

Safety critical components
do not operate as per the original putting drivers and public at risk.

Channel diversions

With channel diversions, an authentic product is bought at a discounted price in one region and then sold at a higher price in another region. The result is often a significant financial loss for the brand owner. What's more, criminal resellers may mix counterfeit products into the resale market, creating an even bigger loss for the brand owner. In the case of prescription drugs, unauthorized diversion can lead to shortages of essential medications in low-price countries.

Secure RAIN RFID to the rescue

High-level protection along the supply chain

To strengthen their supply chains, and minimize the threat posed by counterfeit products and channel diversions, brand owners and manufacturers can use secure product authentication.
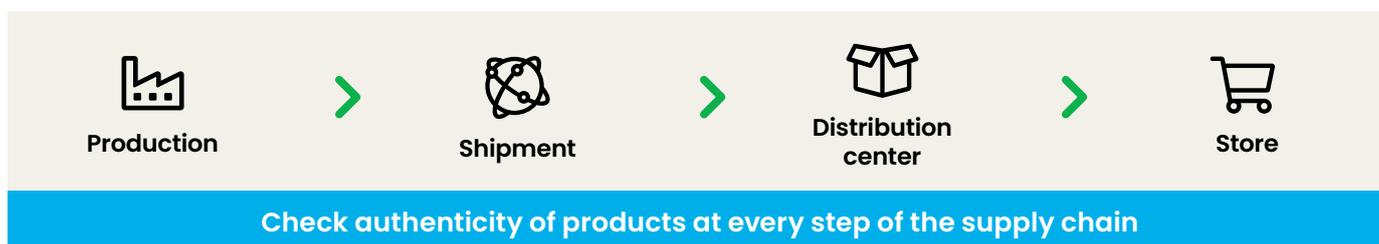
Secure product authentication can help to protect the supply chain by making it easier to identify and track genuine products. RAIN RFID, a wireless technology that connects items to the cloud, helps businesses identify, authenticate and locate each item in real time. Every item equipped with a secure RAIN RFID tag has its own unique identity embedded in its tag and allows supply chain participants to securely authenticate that identity. RAIN RFID offers supply chains a significant advantage because it helps prevent manipulation by using advanced methods to securely identify the product's originality.

Using RAIN RFID tags that offer secure product authentication lets stakeholders along the supply chain identify, track and verify the origin of a given item.

That means warehouse workers, customs inspectors and delivery personnel can use the security functionality of the smart label for product authentication to confirm that the product—for example a high-value fashion item or medication—they're dealing with is genuine and being sold through an authorized channel.

Because secure product authentication can occur at multiple points in the supply chain—from the source to the store—there are fewer opportunities for fraud to take place. Brand owners and manufacturers can securely and efficiently track the production of raw materials and follow items as they move through shipment, containers, distribution centers, and on to the pharmacy or final assembly in a vehicle.

Efficient and secure authentication from source to store narrows down the window of fraud

Production > **Shipment** > **Distribution center** > **Store**

Check authenticity of products at every step of the supply chain

Secure authentication with UCODE Guard

NXP's UCODE Guard uses RAIN RFID technology and is designed to enable secure product authentication. Embedded in a tag, label, the product itself or attached to a package, UCODE Guard can help brand owners and producers to securely and efficiently track their goods along the supply chain. UCODE Guard-based tags can be read over distances of several meters without line of sight, and allows tracking of goods from source though the entire supply chain to the consumer (whether that is in the store, in the hospital or in the garage). A RAIN RFID reader, which is used to communicate and securely authenticate with the tag, supplies the necessary energy for communication. UCODE Guard is so efficient that batteries are not necessary, removing system complexity and accelerating the volume of items that can be authenticated. The RAIN RFID reader can also perform bulk reads of multiple RAIN RFID tags in seconds, so items can be processed quickly and automated, mitigating risk of error whilst speeding up operations.

The secure authentication process supported by UCODE Guard is based on secret cryptographic keys and uses a standardized authentication scheme to achieve its security objectives. The type of cryptography used is called Advanced Encryption Standard (AES) and it works with private keys, which contain the secrets used to verify the authenticity of the product. These secrets are stored in a secure vault inside the chip and are never transmitted from the tag to the reader, and are therefore protected from cloning. These features help to make the authentication process both secure and trustworthy.

How it works

- Secret keys are never transmitted
- Secret keys are locked and cannot be read
- The standardized challenge and response use keys, random numbers and unique identifiers as input parameters
- Challenge and response bit streams change for each authentication sequence
- The encryption method (AES) is standardized and public
- Only if the two keys are the same, the verification becomes successful

Bag with UCODE Guard RAIN RFID tag
Secret key: ABC

Unique identifier

AES encrypted challenge

AES encrypted response

RAIN RFID reader
Secret key: ABC

Verify ✓ ✗

UCODE Guard is designed to deliver security, automation and speed

Benefits for high-value fashion brands

- Helps prevent channel diversion and unauthorized average sales price erosion
- Helps increase sales quantity of brand original products
- Helps prevent compromising the perception of high quality

Benefits for pharmaceutical manufacturers

- Helps ensure pharmaceutical products are original and thus will work as expected
- Helps pharmaceutical manufacturers prevent product diversions
- Helps pharmaceutical manufacturers keep sales and not lose them to fakes

Benefits for automotive manufacturers

- Helps to ensure genuine parts are used increasing brand credibility
- Reduces risk of fake parts; reducing risk to life
- Helps ensuring OEM parts are used in aftermarket growing revenues and customer loyalty