GETTING THERE:

NFC Authentication Token in MaaS Applications

NFC FORUM

Making secure, reliable MaaS a reality

On the face of it, getting from Point A to Point B should be a simple and straightforward exercise. But in today's fast-paced, urbanized world, there's nothing simple about travel – whether you're commuting to work or navigating a new city on a business trip or vacation. There are multiple tickets to buy and present, multiple transportation modes to coordinate, multiple route schedules to factor in, and more.

Mobility as a Service (MaaS) has emerged as a solution to these challenges. The concept of MaaS is to integrate all forms of transport – including payment and authentication – so that a traveler can seamlessly plan, pay for, and access all the modes of transportation needed to get from Point A to Point B, efficiently and affordably. One recent research report claims that the MaaS market is growing at a CAGR of 16.8% and will be worth nearly $520 million by 2030[1].

Implementing MaaS is a complex undertaking. For one thing, MaaS covers a wide range of use cases requiring user authentication. Near Field Communication (NFC) technology has emerged as is well suited means to satisfy these many authentication needs. NFC is fast, simple, and reliable – and it can operate across multiple form factors, from tokens to cards to devices such as smartphones.

This white paper discusses the different NFC authentication use cases and methods available for MaaS and offers recommendations for how to best implement them.

Ensuring MaaS security

Digital payment services have delivered tremendous benefits to MaaS applications: speeding payment, reducing waiting lines, minimizing fraud, increasing convenience, reducing resource requirements, and more.

Still, authentication remains a concern due to unauthorized use. The combination of NFC-enabled devices and NFC tags provides the extra degree of authentication needed to address these concerns – without requiring more time or effort.

Today, city dwellers in many parts of the world can take a train to work, transfer to a bus for the next part of the commute, complete the trip via bicycle, buy a soft drink, and access their office building – all with a single transit card or smartphone.

Each of these use cases requires a different security level. For example, bonus point promotions and discount coupon services for retail beverage purchases need a relatively low level of authentication, but bus ticketing and payments require stronger authentication because the value of the service is higher.

As the following examples demonstrate, NFC technology enables transport operators and related businesses to employ the appropriate authentication method for each use case.

[1] https://www.businesswire.com/news/home/20220628005870/en/Worldwide-Mobility-as-a-Service-Market-to-Reach-519.69-Billion-by-2030-at-a-CAGR-16.8---ResearchAndMarkets.com

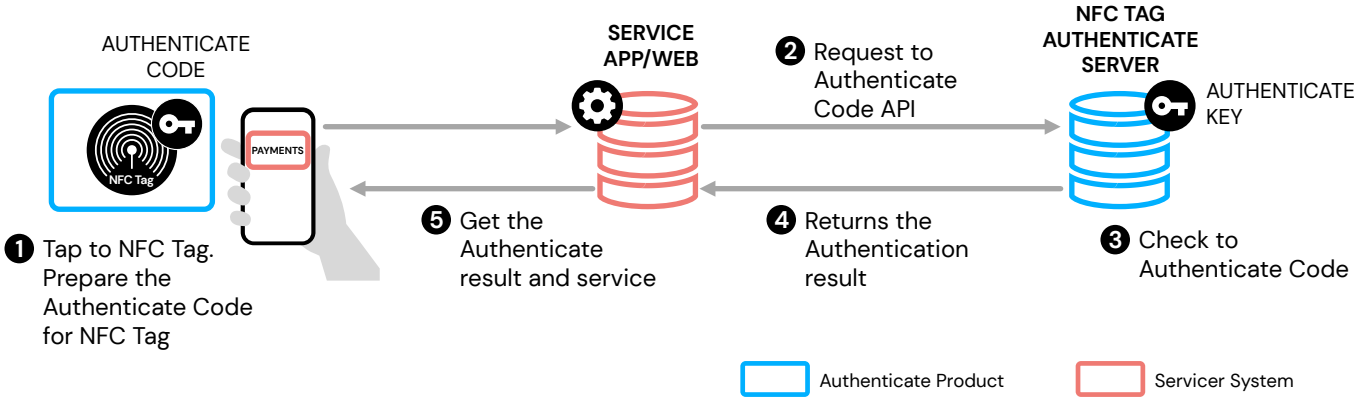
Use case #1: Retail purchases

The idea behind MaaS is to make the entire transport user experience as seamless, swift, friction-free, and enjoyable as possible. Since transport riders often make retail purchases enroute – buying items such as refreshments and reading material – any MaaS solution will need to accommodate these purchases.

NFC technology is well suited for quickly and easily enabling retail purchases while helping travelers avoid long lines and credit or debit card hassles.

In this example, NFC begins by supporting Electronic Know Your Customer. The patron touches an NFC-enabled smartphone to an NFC tag to authenticate their identity, or taps a tablet with the smartphone to enable NFC CE mode.

With the user's identity verified, the payment transaction can be performed. There are two methods available to access the NFC tag data: NDEF and tag proprietary. Retailers seeking greater flexibility would likely choose NDEF, while those opting for increased security protection would use a tag proprietary method.



Tag Token Authentication

NFC provides an effective way for tags to be authenticated for MaaS use cases. In this example, the user taps the tag and the tag responds by creating the token message containing an authentication code followed by a set of randomly-generated characters. This authentication token is sent to the web service server. The web service server then sends an inquiry to the authentication server to confirm the authenticity of the tag. The token is composed of an Advanced Encryption Standard (AES) key value, a UID value, and a randomly-generated set of characters created by the tag each time it is tapped.

Use case #2: Online ticketing and inspection for bus lines

NFC technology supports ticketing and inspection for bus lines, speeding rider access, simplifying inspection for drivers, ensuring data security, and giving bus operators the flexibility to tailor the deployment to their preferences.

NFC tags for bus ticketing

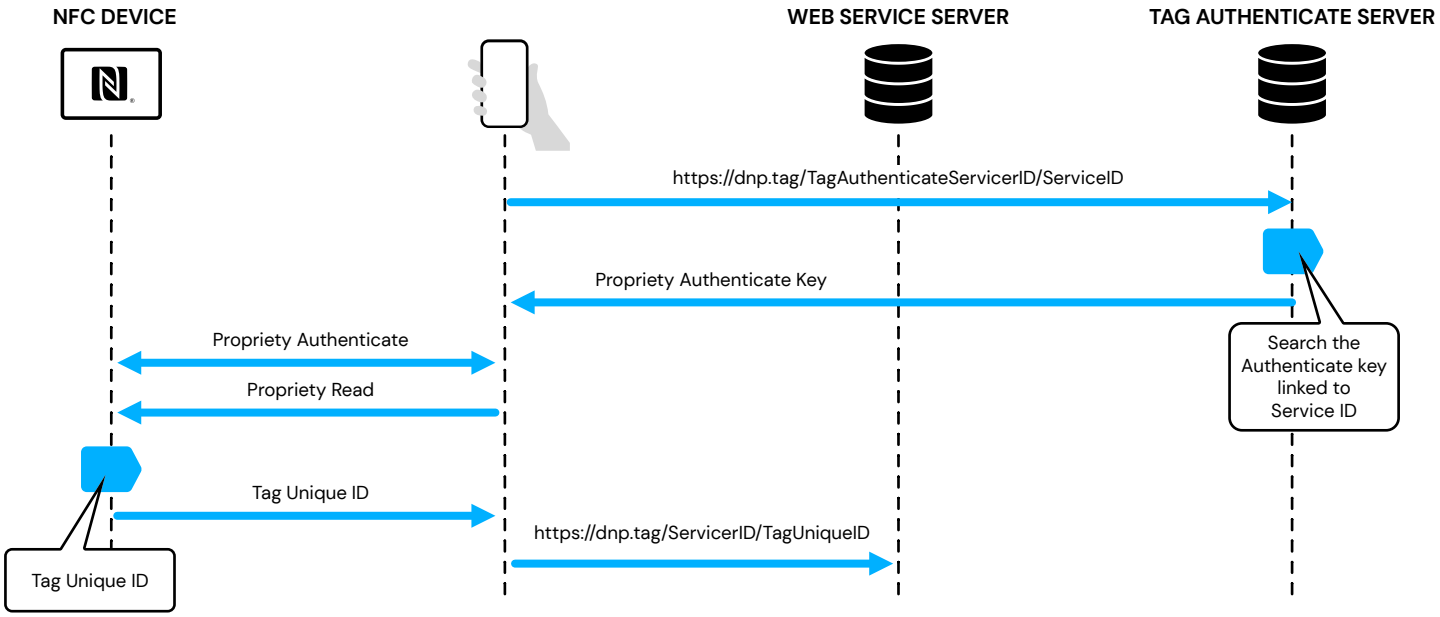
In this example, tickets are purchased online. The rider arrives at the bus stop and taps the NFC-enabled device to an NFC tag, which launches the ticket app. The rider then pays the one-time fare or purchases a monthly pass. The purchased ticket is stored online for checking, while the service protects the ticket from cloning.

NFC tags for bus ticket inspection

When the bus arrives, the rider boards the bus and taps the NFC-enabled smartphone to an NFC tag encoded in read-only mode. This triggers a message from either the rider's smartphone app or the ticketing service to the bus driver's inspection terminal, confirming that the ticket is being used.

In addition to speeding boarding and reducing work for bus drivers, this approach has the advantage of securely performing all processing online, reducing the security risks posed by offline processing. The application server handles all fare ticket authentication and data protection.

With this approach, transport operators also have the flexibility to select their preferred method of accessing NFC tag data: either NDEF access or tag-proprietary.



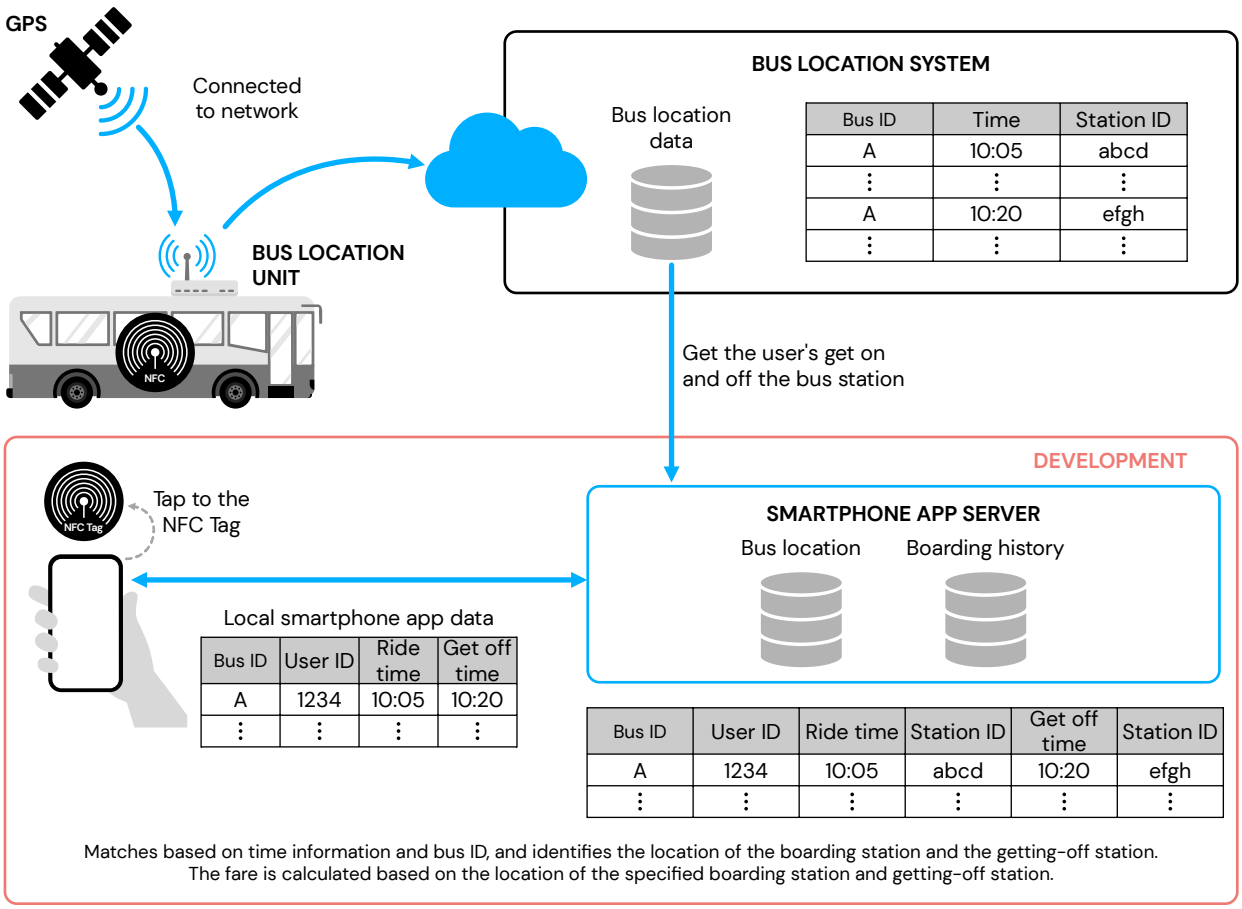
Use case #3: Offline ticket inspection for bus lines

NFC technology also supports offline ticket inspection for bus operators utilizing the bus GPS system.

In this use case, each bus is equipped with an NFC tag in read-only mode mounted near the door. The bus GPS system tracks the bus's journey and captures the time when it stops at each bus stop. As riders board the bus, they tap their smartphones on the NFC tag. When riders exit the bus upon reaching their destinations, they touch their smartphones once again to the NFC tag.

The bus fare is calculated by comparing the rider's boarding and unboarding times to the bus's locations at those times on its route, as captured by the GPS system.

The advantage of this method is that it enables people to ride the bus even if their smartphones are offline. Afterwards, the fare calculation is made and the purchase is processed online.



Use case #4: Zone ticketing and inspection for trains

The use of NFC tags enables NFC technology to support zone ticketing and inspection for train travel. Train operators benefit from easier, more secure ticketing and improved ticket inspection enforcement without added workload or resources.

NFC tags for train ticketing

A rider seeking to purchase a train ticket taps an NFC tag with their smartphone, which launches the ticket app. The rider then pays the fare for the trip or buys a monthly pass. The ticket is then stored online for checking. Because the ticket is kept online, the server is able to protect the ticket from cloning.

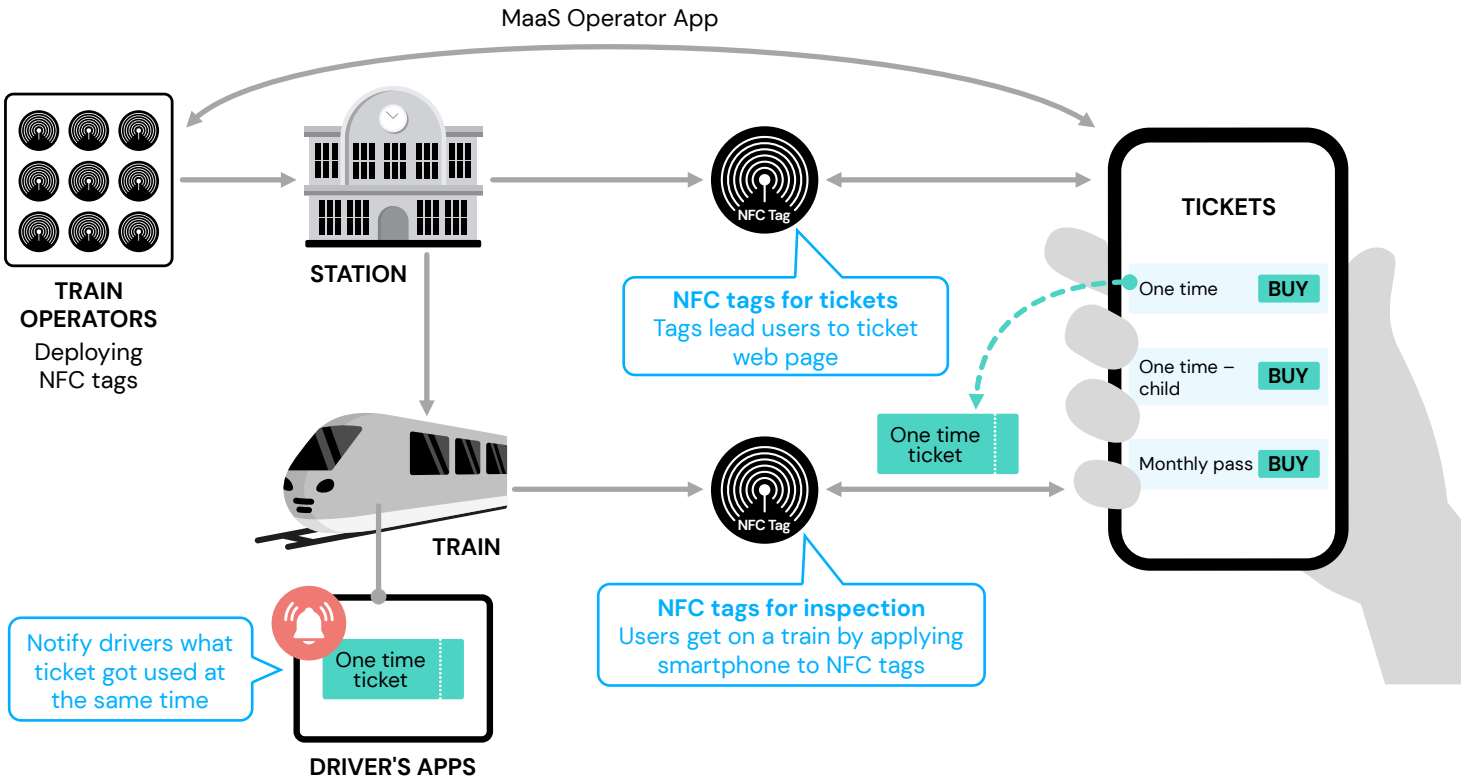
NFC tags for train ticket inspection

NFC automates ticket inspection for train operators through the use of NFC tags. The tag, encoded in read-only mode, is mounted inside each train car near the doorway. As the rider gets on the train, they touch their NFC-enabled smartphone to the NFC tag.

The check-in is captured in the rider's smartphone app or a ticketing server. The app or ticketing server then communicates with the train conductor's inspection terminal, notifying the conductor that the ticket is being used.

Because all processing is performed online, the application server is able to handle all fare ticket authentication and protect all data. Train operators can access the NFC tag data through either NDEF or tag-proprietary access.

This use case is restricted to environments in which riders' smartphones have online access; there is no offline version of this use case.



Use case #5: Online pay-as-you-go ticketing and inspection for trains

Pay-as-you-go ticketing ensures that passengers pay only for the actual distance of their train ride, enabling them to save money over zone-based tickets. For these passengers, NFC technology supports online ticket purchase, easy check-in and checkout, and simplified ticket inspection.

NFC tags for train pay-as-you-go ticketing

In this use case, the rider arrives at the train station and taps an NFC-enabled smartphone to an NFC tag to launch the ticket app. The rider selects the "pay-as-you-go" option, and the ticket is purchased and stored online, enabling the server to protect the ticket from cloning.

NFC tags for train ticket inspection

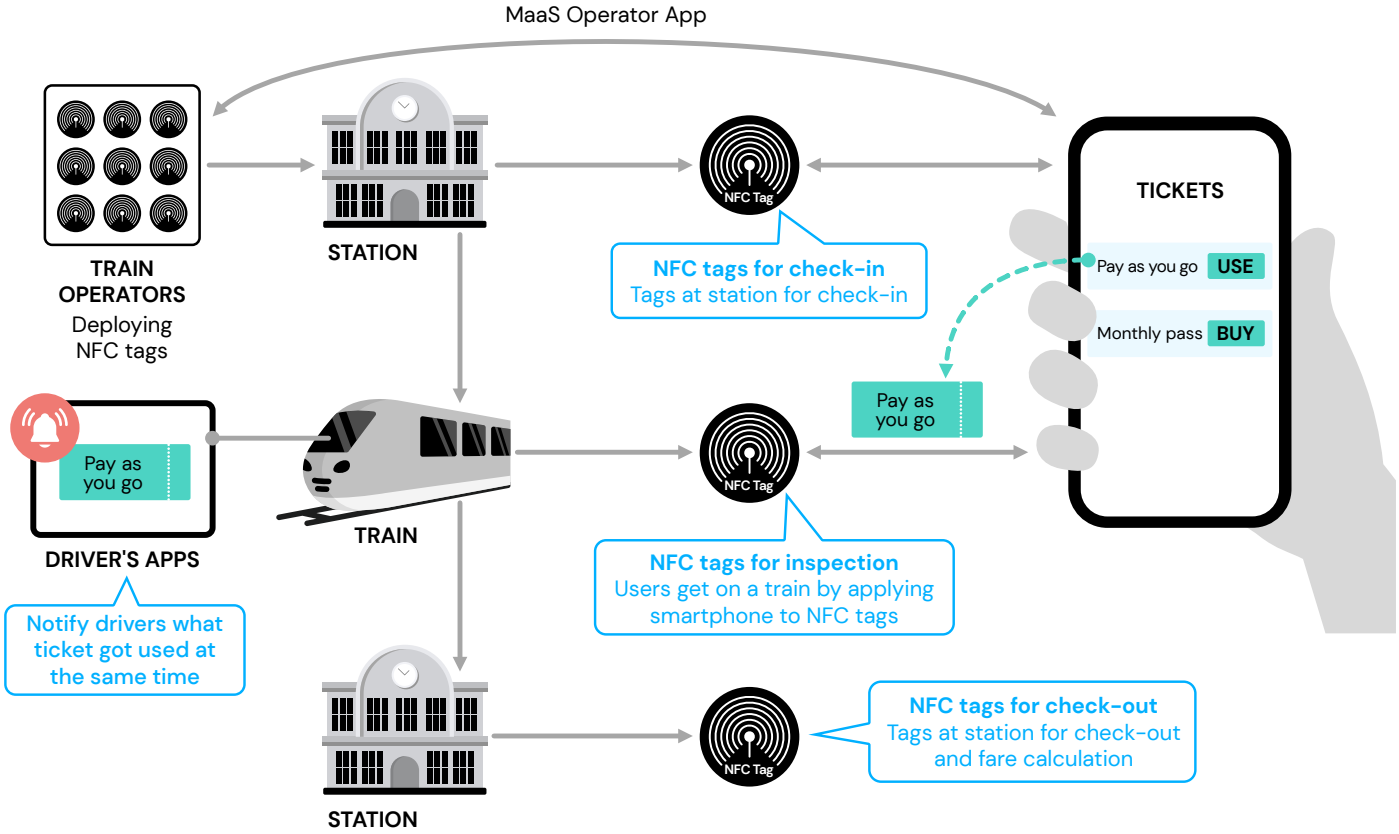
The rider boards the train and, having purchased a pay-as-you-go ticket, checks in by touching an NFC-enabled smartphone to an NFC tag located near the boarding door.

The train conductor is automatically notified via an inspection terminal that the ticket is being used, having received communications from the rider's smartphone app or the ticketing server.

NFC tags for train pay-as-you-go checkout

Riders disembarking from the train touch their NFC-enabled smartphones to an NFC tag (encoded in read-only mode) to check out and calculate their fares. If there is no inspection tag, pay-as-you-go riders self-report the stations where they have boarded and disembarked.

This method is more secure because all processing is performed online and the application server handles all fare ticket authentication and data protection. NFC tag data can be accessed via NDEF or a tag-proprietary means.



Use case #6: Offline pay-as-you-go ticketing for trains

Network service interruptions or other technical problems can sometimes cause a lack of connectivity. In this situation, NFC technology is still able to support the use of NFC tags for check-in, inspection, and checkout.

NFC tags for train check-in

The rider begins by boarding the train and tapping an NFC-enabled smartphone on an NFC tag to obtain the check-in tag ID. The ticket app on the rider's smartphone remembers the check-in tag ID if the network connection is lost. When the network connection is restored, the app connects to the app server for processing.

NFC tags for train ticket inspection

The rider boards the train and, having purchased a pay-as-you-go ticket, checks in by touching an NFC-enabled smartphone to an NFC tag located near the boarding door. Even though the network is offline, the ticket app on the rider's smartphone is able to share the rider's boarding and alighting information from its database with the train

conductor. This information is then automatically sent to the inspection terminal to confirm that the ticket has been used.

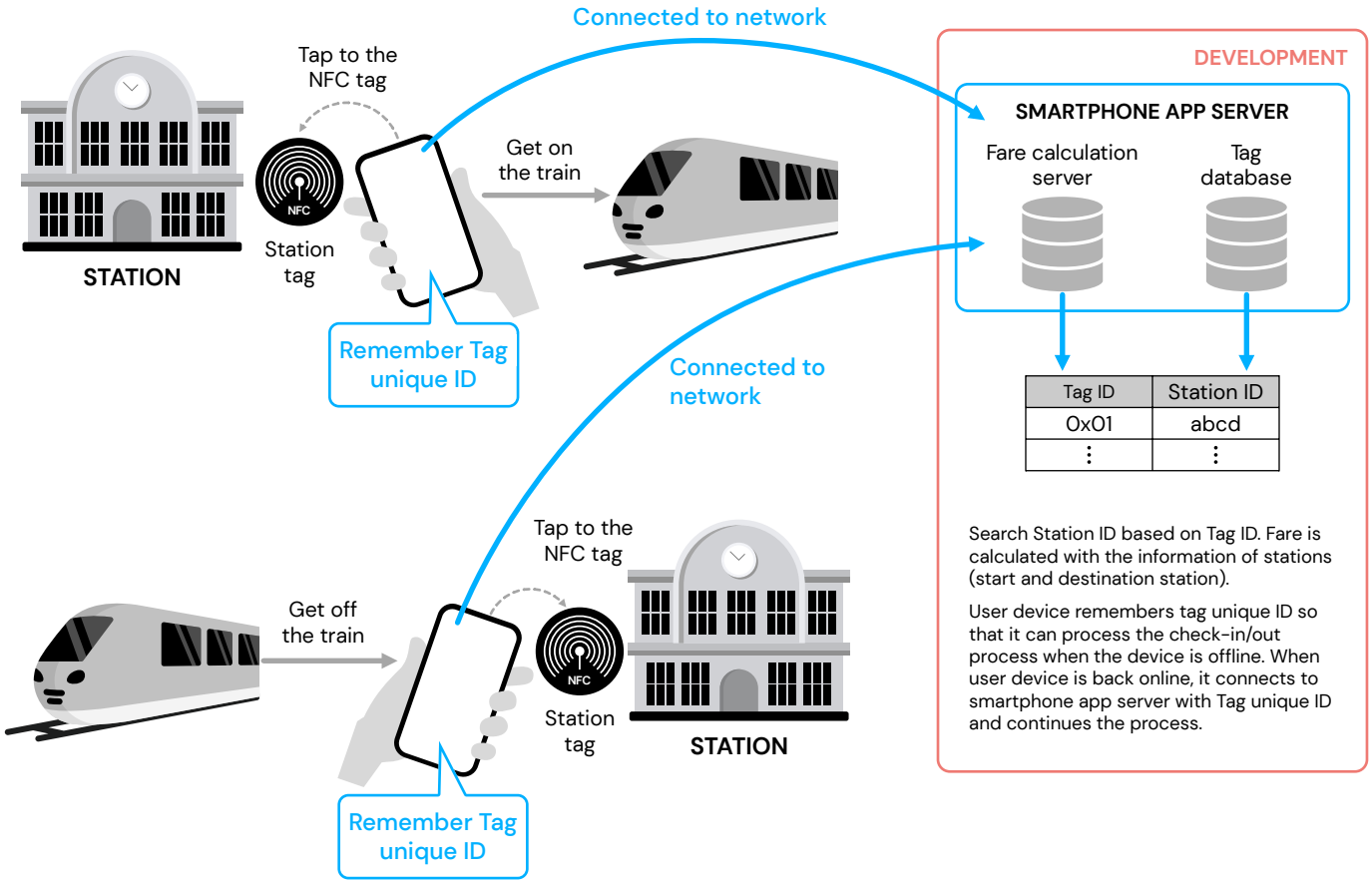
NFC tags for train checkout

An NFC tag encoded in read-only mode is installed at the train platform. When riders disembark from the train, they tap the NFC tag to check out and calculate their fares.

If there is no inspection tag, pay-as-you-go riders self-report the stations where they have boarded and exited.

In the event of a network outage, the rider's ticket app remembers the checkout tag ID during the outage. When the network is restored, the app reconnects to the app server for processing.

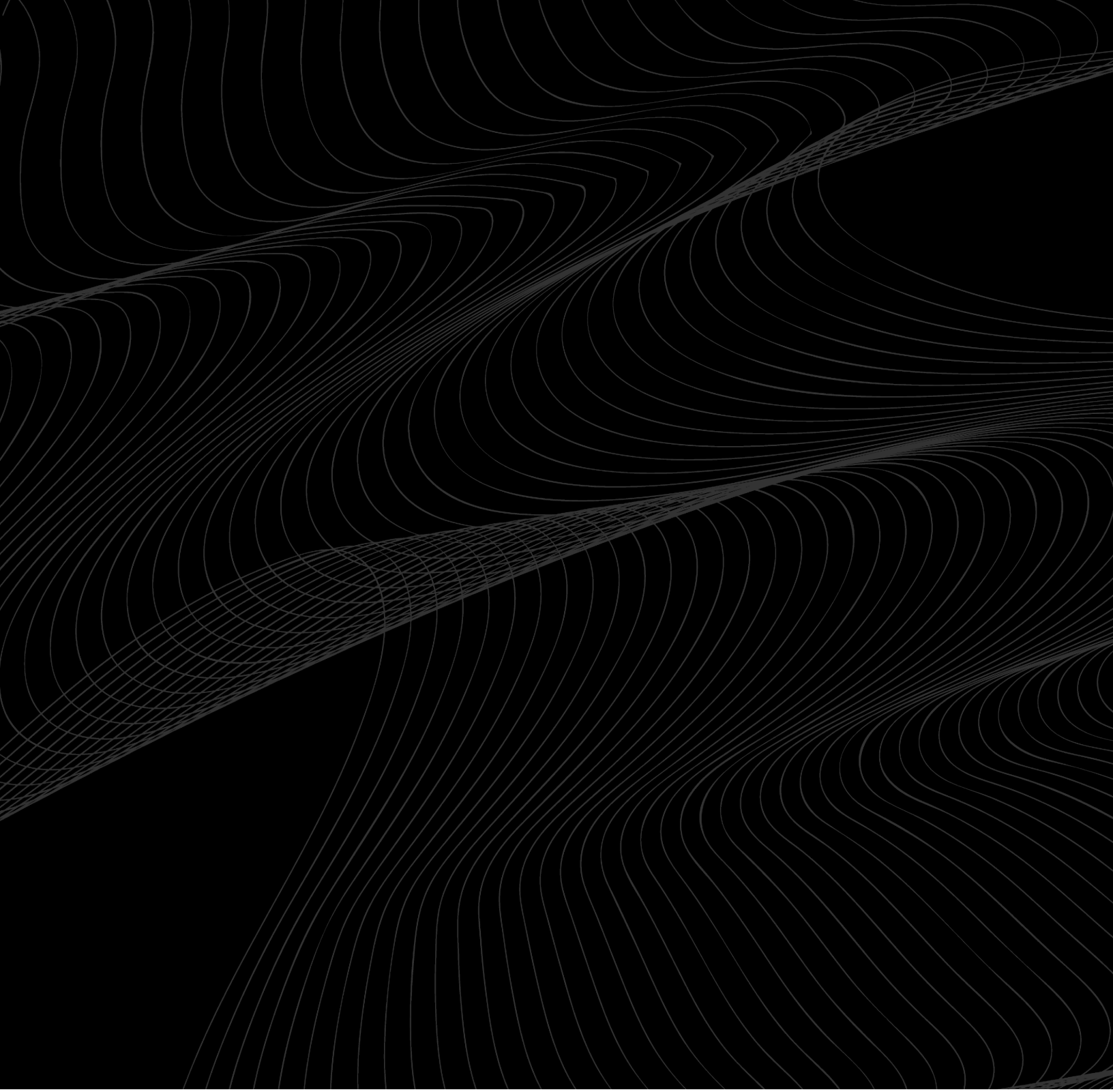
The application server handles all fare ticket authentication and data protection. Again, there are two ways to access the NFC tag data: via NDEF or a tag-proprietary solution.



You can get there with NFC

As these use cases demonstrate, NFC can fulfill the full variety of MaaS authentication needs while delivering several advantages. It keeps costs under control by leveraging your existing NFC capabilities and systems. Because NFC is easy to set up, learn, and implement, deployment is swift and efficient. And since NFC supports varying security requirements for multiple use cases, it enables you to add an extra measure of security where it's need – without adding time, effort, or complexity to the user experience.

There's more to know about NFC for MaaS. For further information, visit nfc-forum.org.



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