The Benefits of Mobile NFC for Air Travel

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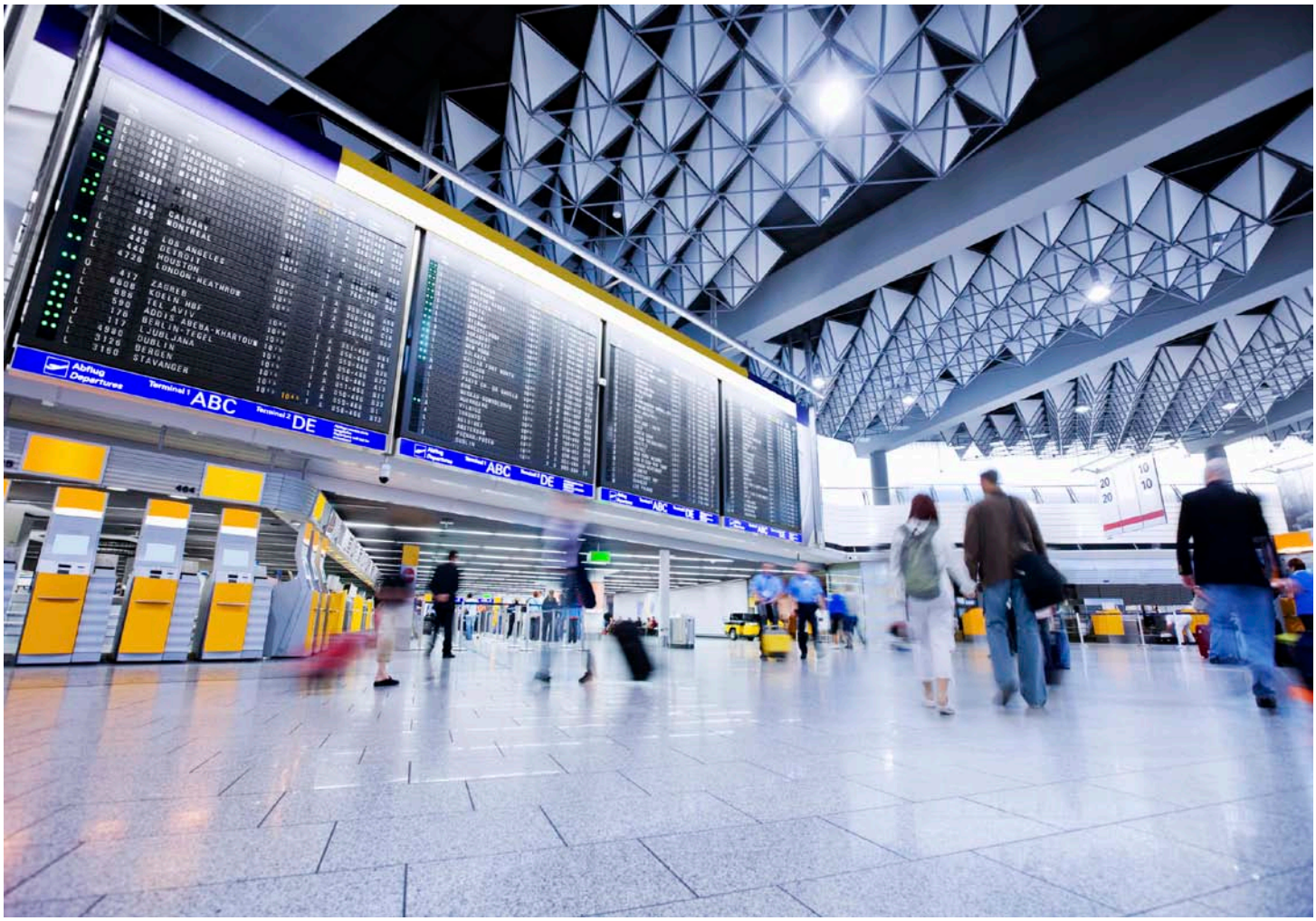

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1 EXECUTIVE SUMMARY

This document identifies the benefits that Universal Integrated Circuit Card (UICC, also known as the "SIM card")-based, mobile Near Field Communications (NFC) services can bring to the airline industry, airport authorities and the air-traveller. GSMA and IATA have joined forces to develop this initial common understanding of the opportunities that mobile NFC could bring to the air-traveller. This forms the basis for future collaboration to develop the ideas and concepts presented in this document. Six different use cases have been defined where mobile NFC can bring great benefits to the airlines, airport authorities and the air-traveller, namely:

- Passenger check-in
- Baggage check-in
- Security check-point
- Lounge access
- Boarding
- Post-flight

Each use case is introduced and the benefits to each party defined. This will form the basis of further, more detailed, collaborative work to be conducted by GSMA and IATA. The primary focus of the white paper is on the improvements brought by mobile NFC to airline and airport operations and the benefits that innovative services can bring to the customer's journey.

2 INTRODUCTION

2.1 Overview

This document is the output of collaboration between the GSMA and IATA to define the benefits of mobile NFC services for air-travel. This white paper builds upon the work done by GSMA on mobile NFC services and by IATA to improve the way in which the air-transport industry operates.

2.2 Scope

The aim of this white paper is to define how UICC-based mobile NFC services can bring value to the airline industry and improve the ease and convenience for the customer's journey.

The UICC provides an open, standards based platform to provide the customer with multiple NFC services. Furthermore, this allows for fair competition between service providers on one common platform. The benefit for the customer is that he/she can chose between services and service providers. The UICC based solution meets international security standards and offers the same customer experience worldwide, which is independent of the mobile phone type.

2.3 Definition of Terms

Term	Description
ACI	Airport Council International
AFOM	Association Francaise des Operateurs Mobiles
BCBP	Bar Coded Boarding Pass
CATS	Corporate Air Travel Survey
EMD	Electronic Miscellaneous Document
ET	Electronic Ticket
FIMs	Flight Interruption Manifest
GDS	Global Distribution System
GSM	Global System for Mobiles
GSMA	GSM Association
IATA	International Air Transport Association
IOSA	IATA Operational Safety Audit
MCO	Miscellaneous Charge Order
MNO	Mobile Network Operators
MMS	Multimedia Messaging Service
NFC	Near Field Communications
OTA	Over-The-Air
RFID	Radio Frequency Identification
SD	Security Domain
SE	Secure Element
SIM	Subscriber Identity Module
SMS	Short Messaging Service
SP	Service Provider
StB	Simplifying the Business
UICC	Universal Integrated Circuit Card (also known as the "SIM card")
vMPD	Virtual Multi-Purpose Document

2.4 Document Cross-References

Ref	Document Number	Title
[1]	GSMA_153_WP510_001	Mobile NFC Services http://www.gsmworld.com/documents/nfc_services_0207.pdf
[2]	IATA e-Services	www.iata.org/e-services
[3]	IATA Fast Travel	www.iata.org/fast-travel

2.5 The Role of the GSMA

The GSMA is the global trade association representing over 750 GSM Mobile Network Operators across more than 200 countries and territories worldwide and over 200 manufacturers and suppliers. The primary goals of the GSMA are to ensure mobile and wireless services work globally and are easily accessible, enhancing their value to individual customers and national economies, while creating new business opportunities for operators and their suppliers. Hence the GSMA provides the ideal forum to represent the MNO community for the purposes of defining mobile NFC services (see www.gsmworld.com).

MNO collaboration in this area ensures a consistent approach in the development of mobile NFC services among mobile operators and other involved parties in the industry and hence promotes interoperability, leading to standardisation on a global scale and prevents market fragmentation (see reference document [1]).
At the time of writing this document, over 61 of the largest MNOs are working together in the GSMA's Pay-Buy-Mobile project to develop a common vision on UICC-based, NFC-enabled mobile services. They represent over 50% of the worldwide GSM market and currently address over 1.5 billion customers.

2.6 The Role of the IATA

Air transport is one of the most dynamic industries in the world. The International Air Transport Association (IATA) is its global trade organization.

For over 60 years, IATA has developed the commercial standards that have built a global industry. Today, IATA's mission is to represent, lead and serve the airline industry. Its members comprise some 230 airlines - the world's leading passenger and cargo airlines among them - representing 93 percent of scheduled international air traffic i.e. 2.4 billion passengers.

Representing

IATA seeks to improve understanding of the industry among decision makers and increase awareness of the benefits that aviation brings to national and global economies. It fights for the interests of airlines across the globe, challenging unreasonable rules and charges, holding regulators and governments to account, and striving for sensible regulation.

Leading

IATA's aim is to help airlines help themselves by simplifying processes and increasing passenger convenience while reducing costs and improving efficiency. The groundbreaking Simplifying the Business (StB) initiative is crucial in this area. Moreover, safety is IATA's number one priority, and IATA's goal is to continually improve safety standards, notably through IATA's Operational Safety Audit (IOSA). Another main concern is to minimize the impact of air transport on the environment.

Serving

IATA ensures that people and goods can move around the global airline network as easily as if they were on a single airline in a single country. In addition, it provides essential professional support to all industry stakeholders with a wide range of products and expert services, such as publications, training and consulting. IATA's financial systems also help carriers and the travel industry maximize revenues.

For the benefit for all parties involved:

For consumers, IATA simplifies the travel and shipping processes, while keeping costs down. Passengers can make one telephone call to reserve a ticket, pay in one currency and then use the ticket on several airlines in several countries.

IATA allows airlines to operate safely, securely, efficiently and economically under clearly defined rules.

IATA serves as an intermediary between airlines and passenger as well as cargo agents via neutrally applied agency service standards and centralized financial systems.

A large network of industry suppliers and service providers gathered by IATA provides solid expertise to airlines in a variety of industry solutions.

For governments, IATA seeks to ensure they are well informed about the complexities of the aviation industry to ensure better, long-term decisions.

3 BUSINESS DRIVERS

This document will highlight the benefits of NFC mobile services for the Customers/ Passengers, the Airlines / airports and the MNOs.

IATA's Simplifying the Business (StB),
The StB program's mission is to change the way the air transport industry operates – resulting in better service for passengers and lower costs for the industry.

Two StB initiatives have been identified where mobile services and NFC can provide benefits: e-Services (see reference document [2]) and Fast Travel (see reference document [3]), these are described below.

3.1 e-Services (Ancillary Services)

Recognizing the trend of growing airline ancillary services, the IATA Board of Governors approved the launch of IATA e-services project in December 2009.

IATA e-services project aims to facilitate sales and collection of ancillary services through all distribution channels with the adoption of IATA's electronic miscellaneous document (EMD) standard. Other interim solutions such as vMPD/MCO or airlines proprietary solutions could not deliver a standardized approach to collect and account ancillary revenues, which restricts market access and creates problems for interlining (i.e. travelling across multiple airlines on one itinerary). IATA e-services project has also helped to take the remaining paper out of the airline ticketing processes.

The Industry benefit is expected to reach US$2.9 billion in 2014 through increased revenues from ancillary services distribution on multiple channels and reduced costs upon elimination of paper documents.

The 100% EMD 2013 deadline is an airline industry priority and represents the next and final step in IATA's e-travel vision, following the successful completion of 100% ET and 100% BCBP) projects.

3.1.1 The e-Services Benefits

For Airlines:

- A global industry standard for issuance of documents to support sales of ancillary services.
- An industry standard solution that delivers a common process across all sales channels:
- Can be issued by travel agents via the GDS.
- Can replace all miscellaneous documents (except Flight Interruption Manifests [FIMs]).
- Can be interlined to partners.
- More efficient processes and increased back-office productivity.
- Increased visibility in Revenue Accounting and Revenue Management (audit, report and control of ancillary services).

For Passengers:

- More flexibility. EMDs allow passengers to customize their journey, purchasing only the services they value, from fast track security to wifi access.
- Easier access. Passengers are able to purchase services on the web, at a kiosk, on mobile phones, at check-in desks or from travel agents.
- Less hassle. These services can now be offered across multi-leg journeys, even those that involve multiple airlines, making life simpler for passengers traveling on alliance or interline partners.
- Less stress. No more pieces of paper to lose. And just as ET made changes to tickets easier, e-services makes changes to these services easier.

For travel agents

- Access to new opportunities to sell additional services.
- Capability to issue and track EMDs via their own systems, providing increased productivity, market intelligence and more efficient corporate billing and control.
- Support corporate requirements for tracking and travel budget follow-up.

3.2 Fast Travel Programme (Self-Service)

Today, passengers stand in long lines to complete airport formalities. According to the 2009 IATA Corporate Air Travel Survey (CATS), over 50% of passengers worldwide want more self-service options to speed up their journey.

IATA's Fast Travel program provides passengers with self-service options in five areas:

- Bags ready-to-go: Enabling passengers to deliver their bags tagged for acceptance by a check-in agent, speeding up the check-in process for those passengers traveling with baggage.
- Document check: Allowing passengers to scan their travel documents at kiosks for onward transmission and validation to meet government agency requirements, avoiding document checks at the check-in desk.
- Flight re-booking: Enabling passengers to obtain a new boarding pass for cancelled or delayed flights via self-service kiosks, avoiding long lines at transfer desks.
- Self-boarding: Providing automated boarding gates for passengers, like in a train or metro station, reducing boarding queues.
- Bag recovery: Allowing passengers to report a missing bag at a kiosk instead of waiting in line at a baggage service.

The Fast Travel Benefits

Fast Travel will save between US$0.8 and US$1.6 billion across the industry every year, depending upon industry adoption. Passengers will be able to have more control over their journey and complete airport formalities faster. Expediting all airport processes to reduce or eliminate queues will be the main benefit for passengers but also for airlines and airports.

The Fast Travel 2020 vision is to provide 80% of global passengers with self-service options throughout their journey. Mobile services are becoming one important part of the self-service component, which passengers will use more and more.
IATA has defined the end to end passenger air-travel process as described in figure 1 below:

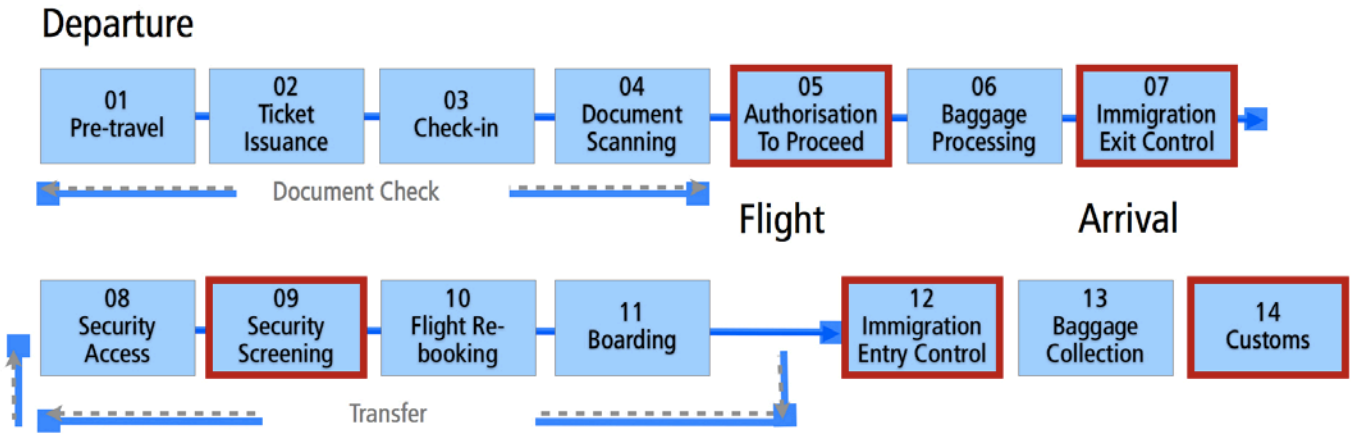

Figure 1: End to End Passenger Air-travel Process

Mobile services and NFC can provide benefits in several key areas of this 14 step process map - this is described in section 6 of this document.

4 MOBILE NFC OVERVIEW

Near Field Communications (NFC) represents a new wave of mobile innovation enabling a wide range of new services.

Many consider NFC to be the "third wave" in the mobile telephony revolution. The first wave was mobile voice and text communications, the second wave was mobile internet communications. The third wave (with NFC) allows the mobile phone to be used to realise immediate and tangible service transactions at the touch of a handset.

This requires however the use of a dedicated NFC mobile device. NFC is an enabling technology that allows performing transactions in a simple movement with a mobile phone. This includes mobile payments, ticketing, and access control and information exchange. Unlike other technologies like Bluetooth, the transaction is performed in a voluntary gesture, in full respect of people's data privacy.

A specific Mobile NFC application has to be developed by Service Providers (SPs) to allow their customers to perform service transactions with a NFC mobile device.Different solutions for the location of the application on a secure element (SE) within the mobile device have been debated. The secure element (SE) could be UICC-based (also knowned as the SIM card), a micro-SD card or an embedded, non removable chip. The UICC based solution is perfectly suited to realise the vision of interoperable, global and secure NFC mobile service.

To realise that vision, MNOs around the world have been working with key players in the NFC ecosystem, including: banks, transportation authorities, handset manufacturers, UICC manufacturers, government authorities and standardisation bodies.

This has resulted in great momentum to rapidly deploy mobile NFC services worldwide. Mobile NFC holds the promise to open up a whole new range of services and applications.

Many pilots involving UICC-based NFC have been successfully completed around the world. The customer feedback from these pilots has been overwhelmingly very positive. It is widely demonstrated that there is a huge demand for UICC-based NFC services as they will bring ease and convenience to the customer life-style. Customers are very keen to adopt the range of new NFC services that can be provided via their Mobile Network Operator (MNO).

Recently, there are a number of commercial services that have launched with the UICC-based SE solution and the number of commercially available UICC-based NFC handsets is increasing. Relevant recent announcements include:

- Launch of Isis in the United States, a joint venture between Verizon, T-Mobile, AT&T Mobility, Discover Financial Services and Barclaycard.
- Memorandum of Understanding signed between South Korean (SK Telecom) and Japanese operators (KDDI and Softbank) to work on interoperable contactless technologies;
- Joint venture launched by operators (KPN, Vodafone and T-Mobile) and banks (ABN Amro Bank, ING Group and Rabobank) in Holland;
- France-Telecom Orange announces that 50 per cent of its new smartphone orders in 2011 will be NFC-enabled handsets across Europe. In France, Orange are committed to ensuring at least 500,000 devices are NFC enabled;
- Joint venture between Bell, Telus and Rogers announced in Canada for contactless payments;

While major NFC chip makers predict 40 to 50 million NFC phones or more will be on the market by the end of 2011, recent forecast from Juniper Research[1] indicate that "around 52 million consumers will adopt new mobile technologies such as NFC and other physical mobile payment methods to pay for everyday goods and services by 2011", NFC is an enabling technology. It operates over a short range (typically between 0 and 4cm) at a wireless frequency of 13.56 MHz in 3 different modes, each with its own set of specific use cases and service offerings

- Card Emulation mode
- *Peer-to-Peer mode*
- *Reader-Writer mode*

In Card emulation mode, the mobile device can be used to perform secure transactions such as mobile payments (see Figure 2).

Figure 2: Example of a Mobile Payment transaction

In Peer-to-Peer mode, two-way data transfer can occur between two NFC devices when they are brought together. This can enable services such as: Mobile Ticketing transactions (see Figure 3), Exchange of business cards, (see Figure 4)

[1] http://www.juniperresearch.com/reports.php?id=226

Figure 3: Example of mobile ticketing

Figure 4: Example of exchanging business cards

In Reader-Writer mode, there is a one-way data exchange from typically a Radio Frequency IDentification (RFID) tag to the mobile device. This permits the mobile phone to be used to access information such as bus time-tables, information about historic places or museum pieces simply by bringing the mobile phone near to an RFID tag (see figures 5 and 6)

Figure 5: Examples of using an NFC phone to access information from a tag

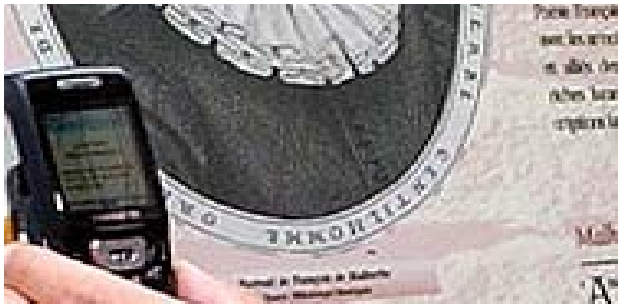

Figure 6: Examples of using an NFC phone to access information from a tag

The GSMA as part of its Pay-Buy-Mobile initiative is promoting the use of the Universal Integrated Circuit Card (UICC, also known as the "SIM card") to be the location where the NFC applications are stored. The UICC provides an open platform, that conforms to international standards, to allow multiple service providers (such as banks, transportation authorities, airlines, retailers etc) to offer their services and applications. The benefits of the UICC is that is provides a level-playing field for multiple service providers to offer their services to the end user. The benefit for the end user is that he/she can access the services on the UICC via a common user interface.

On the UICC, specific Security Domains (SDs) are created. This recently standardized technology enables Services Providers (SPs) such as Airlines or Airport Authorities to have specific SDs allocated to them. Each SD has unique encryption keys, providing the right level of confidentiality, data integrity and authentication necessary for the SP's services. This means that an airline application can securely reside in any UICC (that conforms to the standards). This provides flexibility and interoperability, as there is no need to develop a specific application for a specific device or a specific Mobile Network Operator. Figure 7 shows an example of the multi-SDs possible in a UICC to support multiple applications.

Figure 7: Example of multi-SDs in a UICC to support multiple applications
Source AFOM

The range of new innovative use cases is described below.

5 INNOVATIVE USE CASES

This section of the paper will describe the benefits of relevant NFC mobile solutions at various steps of IATA 14-step passenger process.

Mobile services and NFC technology can be applied and provide benefits for all air transport stakeholders at multiple touch points of the passenger end to end process.

This section gathers use cases examples where benefits for passengers are clearly identified.

5.1 Passenger Check-in

Self-service check-in is now widely developed within the air transport industry. IATA estimates that by 2013, 70% of passengers will use one of the three self-service channels (i.e. kiosk, web, mobile) to check-in.

To date, passengers can obtain their boarding pass in variety of ways, such as: paper document, email, SMS, MMS, Email etc. All of these modes use the IATA BCBP (Bar Coded Boarding Pass) standard. All boarding passes include a 2D bar code that is used as a token and read at various process points at the airport.

While this is already a major step forward in terms of passenger process, NFC will bring significant additional benefits to this process as it will replace the physical bar code image while keeping the standardised data structure in the NFC chip.

How does this work?

Passengers will use one of the existing self-service channels to perform their check-in transaction. Once check-in is complete, passengers will obtain their NFC boarding token over the air (OTA).The boarding pass data will be securely stored in the NFC mobile handset.

Benefits for passengers

Ergonomics and ease of use: Passengers will not have to carry a paper document to go through the various airport touch points or to board the aircraft at the gate as the boarding pass information is stored locally in the mobile NFC phone.

Scanning their boarding pass at one of the airport touch point is made extremely easy for passengers. Passengers will only have to present their mobile NFC phone in close proximity to the target reader for the boarding pass data to be read (unlike with bar codes, there is no need to worry about how to position the screen of the phone with the reader or whether to remain still while the reader is scanning).

Reliability: As opposed to an electronic bar code image, once the NFC boarding pass is stored in the chip, the mobile phone doesn't need to have network connectivity or to be switched on in order to read the data. Roaming or flat battery issues will not be a problem for mobile boarding pass users.

Benefits for Airlines and Airports

The NFC Boarding pass is handset make and model independent. Therefore, airlines will be able to push NFC boarding passes to their passengers in a standardised way. This removes the constraint of screen resolutions or other hardware specifications of the mobile phone that they currently have to deal with when sending a bar code image.

Airport will be able to implement more scanning points, enabling passengers to swipe phones in an ergonomic and easy manner, speeding up passenger process flow and so reducing queues. This will enable passenger localisation and provide strong operational benefits for both airlines and airports.

5.2 Baggage Check-in

Hold baggage is still perceived as one of the major impediments to self-service check-in as passengers still have to queue to drop their bags at a desk, where the process is not optimised for that function. Moreover, new airline business models based on unbundled offerings is generating more congestion at airports. Passengers increasingly have to pay for ancillary services on top of their airline ticket. Baggage charges have now become one of the most frequent additional charges passengers have to pay while at the airport.

In conjunction with IATA's Fast Travel and e-Services projects, NFC technology will enable major process improvements for both baggage acceptance and payment of baggage charges at airports. This will facilitate the overall baggage acceptance process and help deliver the full self service check-in value proposition.

How does this work?

Passengers already checked in will go to a kiosk and easily identify themselves with their NFC mobile phone (where their boarding pass is stored as described above) and get their bag tags printed. Once the tags applied to the bags, they will go to a process point dedicated to baggage acceptance only. At this bag drop location, they will identify themselves using their NFC phone again and drop their bags.

Should any additional charge be required for their baggage (excess, extra bag, etc.), the airline issues an EMD for electronically accounting of the fee. Passengers will be able to use their NFC mobile phone to perform the payment transaction.

Benefits for passengers

- Ergonomics and ease of use: the identification of the passenger at the kiosk or at the bag drop position will be much easier and seamless for travellers.
- Reduced transaction time at kiosk and bag drop, therefore reduced queuing time.
- Seamless process and one stop shop for check-in and payment of ancillary fees. Should ancillary fees need to be collected, passengers can pay on the go at the process point without being redirected to a sales position frequently far away from the check-in area.

Benefits for Airlines and Airports

The NFC Boarding pass token will allow much easier passenger identification for all process points at the airport like bag drop. This will significantly improve processing times and reduce queues.

Flexibility: Airlines and airports will be able to apply their new business models with far less operational drawback for the passenger process.

5.3 Security Checkpoint

IATA and Airport Council International (ACI) are recommending that airports implement centralised security checkpoints as opposed to gate screening. As a result, it is important to identify passenger credentials to access security. Fast Tracks are also increasingly implemented by airlines and airports. Eligibility for Fast Track access usually depends on the passenger category (business class, frequent flyer etc.) or is granted to last minute passengers. It can also be offered by the airline or the airport as a payable service to any passenger.

To facilitate implementation, it is therefore necessary to deploy access control processes to verify eligibility without slowing down the passenger flow. NFC technology provides a seamless solution to perform this eligibility check.

How does this work?

Depending on their flight details (the system can verify the correct date, time, and location of flight gate) passengers will be granted access to security.

Other data fields contained in the NFC boarding token could be used as eligibility criteria to use a Fast Track Lane (e.g. class of travel, frequent flier tier).

Eligible passengers will swipe their NFC phone at the entrance of the security check point and will be directed to the correct lane.
Passengers may also purchase Fast Track access via their NFC mobile phone.

An access voucher will then be sent to their mobile phone for them to use in order to access Fast Track.

Benefits for passengers

Ergonomics and ease of use: Passenger will only use their phone to be granted access to the security checkpoint with no need to carry a paper boarding pass.
Premium service: Passengers who have the right credentials or have purchased an access voucher from the airlines or the airport can use their NFC token to access Fast Track.

Benefits for Airlines and Airports

The NFC Boarding pass token will allow much easier passenger segregation at security and will enable passenger localisation without degrading the process flow.Airlines will obtain information about the location of their passengers. This will provide a much better decision making process for flights departure and flight operational management. Ancillary revenues can be generated as Fast Track access can be offered to passengers prior to arrival or directly at the airport.

5.4 Lounge Access

As for security Fast Track, NFC will become a strong enabler to facilitate lounge access control and ancillary revenue generation.

How does this work?

Lounge access depends on a variety of criteria generally linked to the class of travel and/or frequent flyer tier. This information is available in the NFC boarding token. NFC technology will therefore facilitate access control to lounges as passengers will only have to swipe their mobile phones to verify eligibility.

Passenger may also be offered to buy a lounge access. NFC will then allow a last minute purchase at the airport and carry the voucher for access control at the entrance.

In case of disruption, the airlines or airports will also have the possibility to easily push lounge access vouchers to their passengers.

Benefits for Airlines and Airports

As for Fast Track security, NFC will enable a better management of passenger eligibility and therefore provides a better differentiating mechanism for premium passengers. Being able to easily sell these services before arriving or at the airport will generate a significant source of ancillary revenue.

5.5 Boarding

The boarding process is key in airlines operations. On time departure mainly depends on how this process is managed.
IATA's Fast Travel Program recommends implementation of Self Boarding to provide a better passenger experience as well as improve and speed up the overall process. One of the main challenges that airlines face in Self Boarding implementation is the ergonomics around the access control process. While bar coded boarding passes have already improved the process compared to magnetic stripe tokens, passengers are still not familiar with the self-scanning process and often find difficulties in properly positioning the bar code on the reader and remaining still while the reading occurs etc..

NFC technology will bring much better ergonomics in this process. It is a user friendly solution that improves implementation of self-boarding for airlines and airports.

How does this work?

At the gate, passengers will just have to present their mobile NFC phone in close proximity to the boarding gate reader to be granted access to the aircraft.

Benefits for passengers

The scanning process is much more user friendly and passengers won't have to deal with different technologies or processes specific to different airlines or airports. Passengers would benefit from a unique and standardized process.

Benefits for airlines and airports

NFC will enable increased penetration of self-boarding, which is already identified as a significant cost reduction process for the industry.

The user friendly aspect of the NFC scanning will remove implementation constraints related to ergonomics around the positioning of gate readers (right height and orientation for agents to easily scan the boarding token) and enable dual mode implementation (agent boarding/ self boarding).

5.6 Post-flight

On arrival, most of passengers are using another mode of transportation to reach their final destination. Most airports are linked to city centres by direct high speed trains. Today, many passengers need to buy a separate ground transportation ticket on arrival at the airport. NFC will enable airlines to sell add-on ground transportation tickets and send the NFC ticket OTA to their passengers.

How does this work?

When buying their airline ticket, passengers can also buy ground transportation tickets for their transfer from the airport to the city centre, for example. The ticket will be stored on the NFC phone and used to directly board the ground transport (e.g. train).

Benefits for passengers

This offers the possibility to buy transfer tickets at time of flight reservation. In addition it provides a seamless end to end travel, including transfer to city centre. Moreover, it uses the same technology already used by many ground transportation systems around the world.

Benefits for Airlines

Mobile NFC will facilitate the implementation of true intermodal terminal and operations at airport. It will also facilitate ancillaryrevenue generation by offing ground transportation services in conjunction to airline tickets.

6 FURTHER BUSINESS IMPLICATIONS

While these innovative use cases highlight obvious benefits in terms of passenger process and experience, to achieve them, airport infrastructure such as NFC compatible gate readers or payment terminals will need to be upgraded.

Furthermore, at the time of writing, industry payment standards are not fully set-up. In the light of these cost implications and challenges, a detailed air transport industry business case needs to be established to validate the economic viability of NFC technology applied to in the air transport industry.

Pending further discussions between GSMA and IATA, the aim is to develop a common set of guidelines that promote the use of a common service platform. This will allow airlines, airport authorities to easily develop applications and services for the UICC that are device and MNO independent. This will allow the end users to experience a range of applications and services in a seamless way that improves their journey.

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