

Riding the Mobile Ticketing Wave

A Challenge for Transport Operators



The advent of mobile ticketing services provides new challenges and opportunities for transport operators. In this Viewpoint, Arthur D. Little highlights five key questions transport operators need to answer to maximize the benefits of mobile ticketing.

Mobile ticketing services enable multi-modal ticketing platforms

In today's era of increasing mobility, multi-modal transport platforms are increasing in importance (see the Arthur D. Little report, *The Future of Urban Mobility*), and passengers are expecting more convenient ticketing options. Airlines have already embraced mobile boarding passes and are now taking further steps towards NFC (Near-Field Communication) smartphone-enabled ticketing services. Railway and bus operators have also begun to introduce NFC-enabled, mobile ticketing services and are even moving towards Digital Multimodal Mobility Assistants (DMMAAs). A key trigger for this trend is the uptake of smartphones with embedded NFC chips. We expect a rapid uptake of NFC contactless ticketing applications, which will complement paper-based tickets and contactless card solutions.

Operators that have already implemented contactless card platforms (SmartCity cards) are moving quickly towards mobile ticketing services, which enable passengers to book and validate their tickets on a (multi-modal) journey. Key customer benefits lie in reduced queuing time, a richer travel experience and access to adjacent services.

DMMAAs are taking mobile ticketing services even one step further. While mobile ticketing is strictly speaking just functionality, DMMAAs are holistic, intermodal platforms. They represent the "over-system" for mobile ticketing services across multiple transport operators.

We are convinced that transport operators can either embrace mobile ticketing services proactively – or stand beside and watch others do so. IT-integrators, transport aggregators or web players are starting to move into operators' value chains by offering mobile ticketing platforms. Worse, new competitors such as privatized train operators or long-distance bus companies may leap frog and reap the full benefits of mobile ticketing.

Global uptake of multi-modal mobile ticketing services

Airline operators are already regularly providing mobile boarding passes via 2D barcodes. The worldwide airline alliance, IATA, is now taking this a step further with its Fast Travel initiative; the objective is to establish a worldwide airline mobile ticketing service standard for NFC smartphones. IATA's ambition is to ensure that 80 percent of passengers worldwide can use a self-service suite by 2020 on NFC-enabled smartphones as a key lever to accelerate passenger flows through airports.

Railway operators are following this trend, led by mass-passenger urban transport systems. Many have already adopted contactless ticketing solutions as these decrease queuing and validation times, key to efficiently carrying a myriad of passengers during commuting times. The next step is to deploy mobile ticketing services via applications on smartphones, NFC enabled or otherwise. National long-distance train operators are following this trend. Figure 1 (overleaf) illustrates several examples.

Figure 1: Contactless/mobile ticketing systems at railway operators

	Examples				
Country	Hong Kong	UK	Netherlands	Germany	Austria
Railway	MTR Various	Public Transport National Rail Various	NS Hispeed Bus Connexxion All public transport in NL	Deutsche Bahn Various local operators	Verkehrsverbund Ostregion incl. Wiener Linien (Public transport)
Service Name	Octopus Card	Oyster Card	OV-chipkaart	Touch & Travel	Wiener Mobilitätskarte**
Form	Contactless Card	Contactless Card	Contactless Card	mobile ticketing	Contactless Card
Technology	RFID*	RFID	NFC	NFC 2D barcodes	To be defined
NFC mobile ticketing services	Not yet	MultiPass initiative to introduce NFC-enabled mobile ticketing by 2015	Goal is for the service to be NFC smartphone compatible	NFC smartphone capable since 2012	To be defined
Remarks	Since 1997 Adopted by 95% of the population	Since 2003 80% of travel occurs via over 40 m cards	Since 2011 Objective to fully replace paper tickets	Since 2011 on all national long-distance routes	Launch planned for 2015

Notes: *) RFID stands for Radio-frequency identification; **) Will replace the annual tickets used for about 30 years
Source: Arthur D. Little, company webpages

Across the globe, new mobile ticketing services are being launched frequently. Recent examples include a service in Krakow (Poland), which enables consumers to buy and validate tickets with a tap of their NFC phone or by scanning a QR code. In London the mobile phone can now be used to pay for travel on the Underground System. Valencia (Spain) has also launched an NFC ticketing service which is to be expanded to further cities.

A range of DMMA implementations are taking these initiatives one step further, aiming at providing a convenient intermodal travel experience, including mobile ticketing across multiple operators. Austria, for example, plans to introduce a nationwide multimodal mobility assistant (Project SMILE). Deutsche Bahn has introduced the DMMA platform, qixxit, in 2013. Non transport operators are also entering the scene; Daimler has launched a DMMA platform, moovel.

Who will dominate the mobile ticketing value chain?

As mobile ticketing services proliferate, transport operators do not need to decide if, but rather how and when, they want to embrace mobile ticketing services. First, operators need to establish which role they want to adopt; operators can either become providers of an integrated mobile ticketing platform or focus on their core competence of transporting the passengers and outsource steps in the value chain to other players. The mobile ticketing value chain, illustrated in Figure 2, is more

complex than traditional travel and many (new) players want to take a role in it.

Mobile ticketing services enable passengers **to plan a trip anytime** from anywhere on their smartphone. Further, they can use ancillary services, such as integrating their travel plan into their calendars or receiving real-time information about their pending journey.

After having searched online for the best ticket price across various transport alternatives, passengers can then use their smartphone for ticket **booking**, immediate payment and other value-added services, like booking follow-up transit (taxi, bus, etc.) or hotels at their destination.

When starting a **journey**, passengers can manage their ticket **bookings** on their smartphones. Typically, the transport operator provides these services, as he has proprietary access to the booking system. However, operators can also outsource these functionalities to IT system integrators or travel aggregators.

For **ticket validation**, the ticket information on smartphones is typically being read out by gateways or by a special reading device of the train controller. The technical challenge for train operators lies in the link of the controlling device to their real-time booking systems to make sure that the booked ticket is still valid, has the right price and is not fraudulent. This requires continuous connectivity of the controlling devices, which is often a challenge when underground or during long distance travel.

Figure 2: The mobile ticketing travel value chain



Source: Arthur D. Little

Billing the ticket and providing ancillary **Value-Added Services**, such as location-based services, weather information or store finders can be enhanced by mobile ticketing services. Operators can target passengers much more precisely as they receive detailed travel and contact information via the passenger's smartphone.

Transport operators need to manage the complexity of the mobile ticketing value chain and to be aware of new players seeking to take over parts of it.

Complex decisions for transport operators ahead

Mobile ticketing is complex. It requires the establishment of a **full ecosystem** with a variety of players, decisions on which of the **mobile ticketing standards** and technologies to embrace and significant up-front investments.

The mobile ticketing service value chain ideally requires a **platform integrator** as an umbrella for the (multi-modal) mobile ticketing ecosystem. Again, operators need to decide if they want to play this role.

Transport operators also need to decide between the numerous mobile ticketing technologies available, illustrated in Figure 3. Operators will have to continue to provide multiple mobile ticketing technologies to address different passenger segments. These will be a mix of smartphone applications using various transmission technologies for the ticket information and of Contactless Card solutions.

Transport operators then have to decide which mobile ticketing application standard to adopt. Calypso (used by SNCF and SNCB), ITSO (UK) and VDV Kern (Deutsche Bahn and ÖBB) are open, interoperable standards. The Mifare standard is a proprietary solution used by ÖBB and NS Hispeed. It thereby remains a particular challenge to ensure that mobile ticketing solutions are interoperable nationwide and across borders.

Finally, the profitability of mobile ticketing business cases is uncertain. Therefore, new mobile ticketing implementations often benefit from initial public subsidies. **Necessary investments** include the establishment of a mobile ticketing platform, upgrades of vending machines, training of sales and train personnel, as well as the upgrade or replacement of ticket validation systems. Naturally, a mobile ticketing service also generates ongoing operating and maintenance costs.

There is an upside potential for mobile ticketing, but it only materializes over time. First, mobile ticketing services reduce **operational costs** as much shorter ticket validation times (from about ½ minute for paper-based tickets to split-seconds) could enable staff to be reduced or shifted to other customer service activities. The mobile distribution of tickets and increased self-care can lead to a further reduction of sales staff and of ticket vending machines. **Revenue upsides** lie in increasing customer satisfaction and the possibility to offer adjacent services via targeted advertising campaigns, resulting in significant cross-sell opportunities. Also, mobile ticketing can lead to less fraud, by reducing "free riding" and fake-proof mobile ticketing applications.

Figure 3: Comparison of mobile ticketing transmission technologies

	Bluetooth	WLAN	QR-Code	Near Field Communication (NFC)
Advantages	<ul style="list-style-type: none"> Established technology Supported by all mobile OS systems Can communicate with several devices at a time No need for direct contact of devices (long range) 	<ul style="list-style-type: none"> Established technology Supported by all mobile OS systems Fast exchange of large data volumes possible Allows mobility and availability 	<ul style="list-style-type: none"> Established technology Supported by all major mobile OS systems Many QR-Readers available on the market 	<ul style="list-style-type: none"> Secure technology Fast and convenient to use Upgradability of smart-phones with NFC-stickers Works when battery is off
Disadvantages	<ul style="list-style-type: none"> Since data is transferred over radio waves, data exchange is insecure Bluetooth uses the battery power of the device in order to operate 	<ul style="list-style-type: none"> Since an open WLAN has to be used, data exchange is insecure Very expensive infrastructure costs (large number of routers needed) 	<ul style="list-style-type: none"> No data exchange possible Needs battery power Easily duplicable → No guarantee of authenticity M-Payment can only be used with payment provider applications 	<ul style="list-style-type: none"> Delayed hardware standardization of NFC Necessity to have a secure element, for which numerous players compete Currently low, but accelerating, adoption of NFC smartphones
Summary	<ul style="list-style-type: none"> Reaches a wide market Insecure No established services for payment available Focus of use: Data transfer 	<ul style="list-style-type: none"> Insecure (open WLAN) Inconvenient when used for mobile payment (need to connect to the WLAN) Focus of use: data exchange, internet surfing 	<ul style="list-style-type: none"> Inconvenient when it comes to mobile payment (need for a scanner app) No guarantee of authenticity Focus of use: scanning links to websites 	<ul style="list-style-type: none"> Secure technology Clear trend in various industries to use NFC Focus of use: mobile payment, mobile ticketing and many services beyond

Source: Arthur D. Little

How should transport operators embrace mobile ticketing?

Once transport operators have made the decision to embrace mobile ticketing, they need to make several decisions. First, operators should fine-tune their role along the mobile ticketing value chain and help develop the ecosystem. The realization of mobile ticketing can be entirely operator driven, or handled by a separate entity, which can act more independently in developing the required partnerships with system integrators, mobile operators, Trusted Service Managers, mobile application providers, NFC chip providers, etc. Such entities can be managed in the form of a Public-Private Partnership.

Secondly, transport operators need to decide which technology and standard to adopt for their mobile ticketing service.

Finally, transport operators need to implement mobile ticketing services, initially with a pilot and friendly-customer tests before rolling-out the system entirely. As a rule of thumb, the implementation of a mobile ticketing system takes about 9-12 months for pilots and 2-3 years for system-wide deployment.

It's not about if, but how to launch mobile ticketing services

Passengers increasingly expect transport operators to provide mobile ticketing services given smartphone uptake, long-established similar services at airlines and multiplying mobile ticketing implementations worldwide. Transport operators therefore need to answer five questions:

1. Have we made clear **decisions** whether to be a leader or a follower in the mobile ticketing wave, and which role we want to have in the value chain?
2. Are we prepared to **gather mobile ticketing experiences now**, e.g. by running pilots?
3. Are our ongoing investments into our ticket systems future proof, i.e. compatible with mobile ticketing solutions or even with holistic Digital Multimodal Mobility Assistant platforms?
4. How can we ensure that **others do not eat deeply into the mobile ticketing value chain**?
5. Are we sufficiently taking advantage of **upside opportunities** from mobile ticketing implementations, i.e. shopping, advertising or location-based information services?

Arthur D. Little's global team of telecom and travel and transportation management consultants has supported railway, airline and other transport operators to solve their most complex connectivity and mobile business issues, including mobile ticketing implementation projects.

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Arthur D. Little

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