Simplifying the Business Bar Coded Boarding Pass Implementation Guide

Effective 1 June 2009

4th Edition

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International Air Transport Association
Montreal – Geneva

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ACRONYMS

Please refer to the glossary in the Appendix A.1 for definitions.

1D	One dimension
2D	Two dimensions
ADL	Additions and Deletions List
ASCII	American Standard Code for Information Interchange
ATB	Automated Ticket/Boarding Pass
BCBP	Bar Coded Boarding Pass
BGR	Boarding Gate Reader
CMOS	Complementary Metal Oxide Semiconductor
CRS	Computerised Reservation System
CUSS	Common Use Self Service
CUTE	Common Use Terminal Equipment
DCS	Departure Control System
DfT	Department for Transport
DPAF	Direction de la Police aux Frontières
DPI	Dots per inch
e-BP	Electronic Boarding Pass
ET	Electronic Ticketing
GPP	General Purpose Printer
IATA	International Air Transport Association
IEC	International Electrotechnical Commission
I.D.	Identification
ISO	International Organisation for Standardisation
PDF417	Portable Data File 417
PECTAB	Parametric Table
PNL	Passenger Name List
PNR	Passenger Name Record
RFID	Radio Frequency Identification
RFP	Request for Proposals
StB	Simplifying the Business
TSA	Transportation Security Administration

1. FOREWORD

In developing and enhancing the IATA standard for Bar Coded Boarding Pass (BCBP) it has become apparent that there are a number of topics which, whilst not appropriate for inclusion in the text of the standard, are fundamental to obtaining a clear understanding of how BCBP can be implemented.

Further, given the variety of stakeholders, there appears to be significant benefit in documenting various aspects of the overall processes to promote a common understanding and standardised approach to BCBP implementation.

Consequently, this 'Implementation Guide 4th Edition' explains the Bar Coded Boarding Pass functionalities and provides guidelines, checklists and best practices. This new edition covers the latest developments that occurred at the Passenger Service Conference in October 2008: the digital signature for mobile BCBP and the BCBP XML standard.

This publication is intended for the project manager in charge of the implementation of BCBP at an airline or an airport.

Specifically, it should be noted that this publication is not a binding document - the formal texts relating to BCBP are contained in the appropriate Resolutions and Recommended Practices adopted by the IATA Passenger Services Conference.

Any comments, suggestions or proposals for enhancements, especially best practices, are welcome and should be directed to:

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For more information on BCBP please refer to:
http://www.iata.org/stb/bcbp/

2. INTRODUCTION

This section contains information on the BCBP project background and benefits to industry stakeholders and passengers.

2.1. About Simplifying the Business

BCBP is one of the initiatives of Simplifying the Business (StB), a cost reduction, change management programme IATA's Board of Governors voted as one of IATA's top priorities for 2005 and beyond.

IATA is "Simplifying the Business". We are challenging ourselves as an industry to find cost reduction possibilities in our industry's complex processes. While today's consumers expect convenience, they are not willing to pay for the complexity that makes it possible. The answer lies in simplifying processes and making the most effective use of existing technology.

IATA's role as a leader of change is to bring all of the parties together with a common vision to develop industry-wide standards. Additionally, working closely with our technology partners, IATA will ensure that all parts of the world have the support necessary not only to keep pace with, but also to benefit fully from change.

Why "Simplifying the Business"? Because making a more efficient travel experience for everyone will benefit both the industry and the customer. The aim is to improve customer service whilst saving the industry up to US$14 billion in annual costs.

With that original goal, IATA concentrated its efforts on five core projects:

- E-ticketing (ET)
- Bar-Coded Boarding Pass (BCBP)
- IATA e-freight
- Common Use Self-Service (CUSS) Check-in
- Radio Frequency ID (RFID) for aviation

Delivering these projects is of paramount importance to our member airlines. In 2008, ET, CUSS and RFID were closed while two new projects were launched: Fast Travel and Baggage Improvement Programme.

2.2. How IATA supports airlines

In order to support airlines and stakeholders in the implementation of the initiatives, IATA's StB team has developed a support model (see fig. 1) that includes matchmaking with industry suppliers, events, materials, industry campaigns, consultancy and a help desk. Information can be accessed through a portal (see fig. 2) and a knowledge base (see fig. 3). The portal provides links to materials, reports, campaign results and matchmaking. The knowledge base contains Frequently Asked Questions (FAQ) and allows visitors to log an enquiry that will be answered by industry experts.

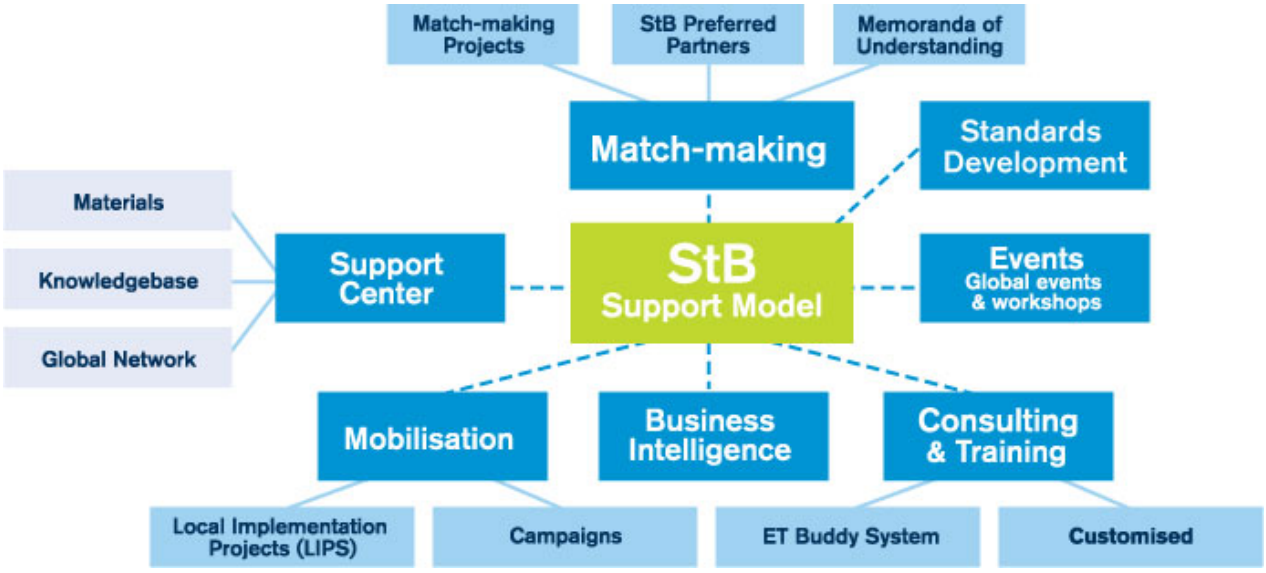


Figure 1 - StB Support Model

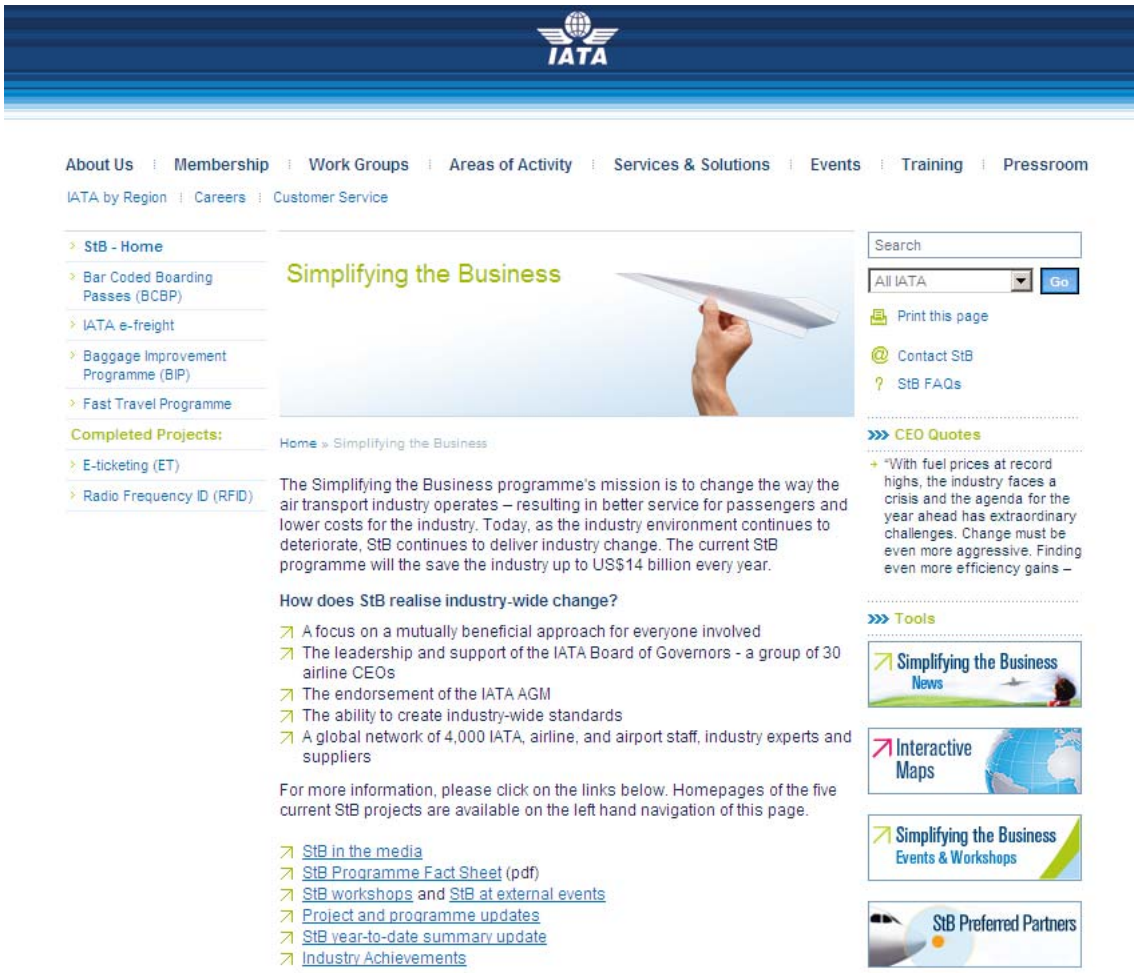


Figure 2 - Welcome page of the StB Portal

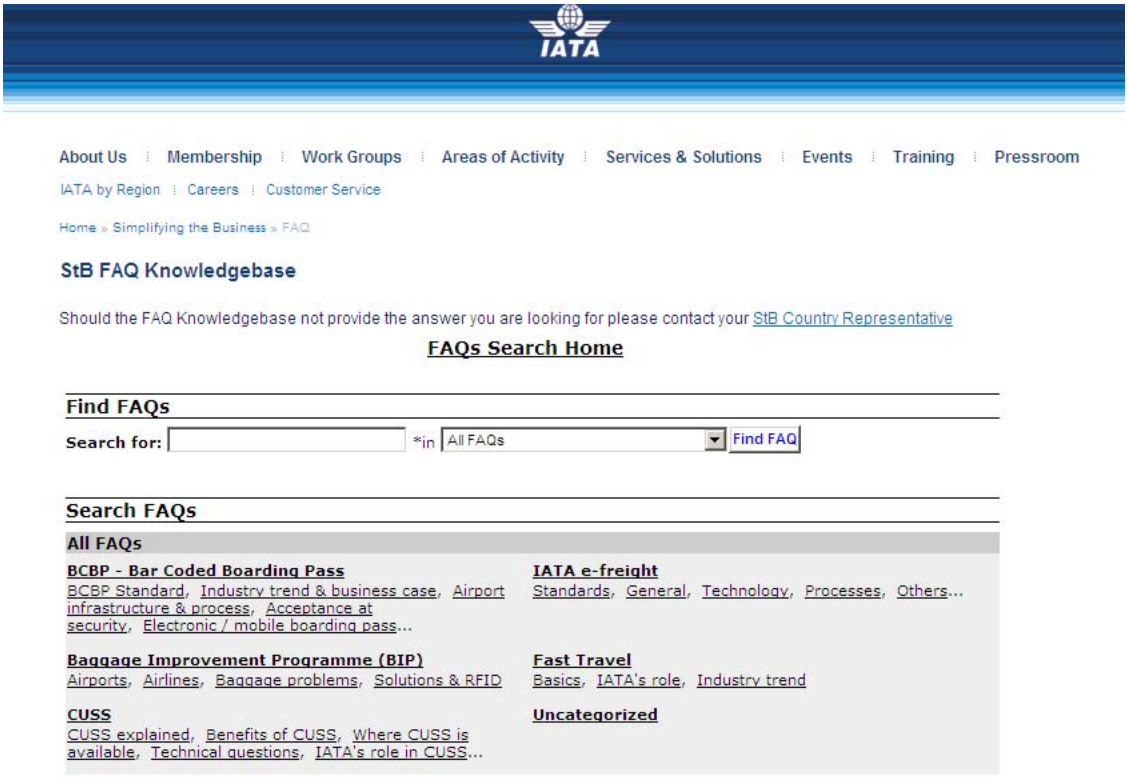


Figure 3 - Welcome page of the StB Knowledge Base

2.3. About Bar Coded Boarding Pass

The IATA Board of Governors' mandate for 100% BCBP by end 2010 defines the time frame for an industry shift to greater efficiencies and improved customer convenience.

2.3.1. Facts and figures

BCBP drivers are proven and low cost technologies that enable the development of web services for passenger check-in.

BCBP is the industry standard method of producing boarding passes, replacing all other boarding passes. IATA estimates that web check-in will save airlines about US$3.50 per checked-in passenger. 100% BCBP will amount to up to US$1.5 billion in annual industry savings.

BCBP naturally follows the implementation of ET. The ATB format and magnetic stripes are linked to the paper version of the ticket. As the paper ticket disappears, BCBP provides a more effective and flexible solution, adapted to ET. With the elimination of ATBs for tickets, the cost of maintaining printers and readers only for boarding passes is dramatically increased. BCBP printers and readers can cost as little as 1/3 of ATB equipment. ATB stocks with a magnetic stripe are no longer needed: at up to $50 per thousand, they are much more expensive than plain paper.

Bar Coding is a mature technology. Bar codes have been used successfully in other industries (e.g. consumer goods, parcels transport) for more than 20 years.

2.3.2. Market trends

IATA tracks the adoption of the standard by its stakeholders. A list of carriers, airports and DCS vendors that have implemented the IATA 2D BCBP standard can be found on the StB portal: www.iata.org/stb/bcbp/

In a survey conducted by IATA in October 2006 with 246 airlines, among the challenges faced by airlines while implementing BCBP, respondents rated “deployment in airports” as the most difficult task and “building a business case” as the easiest one (see fig. 4).

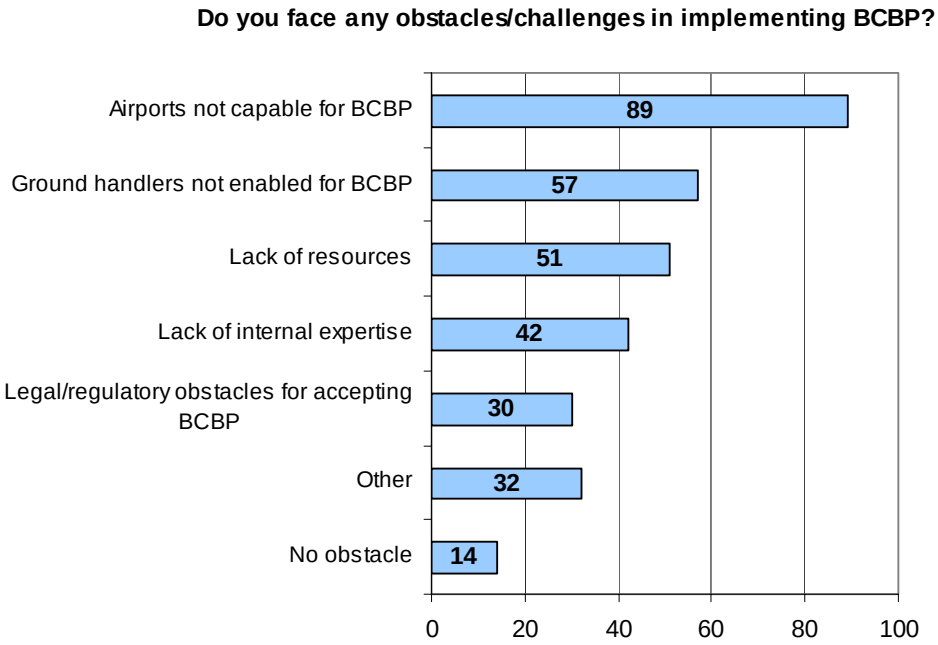


Figure 4 - Challenges to implementation - IATA survey May 2006

2.3.3. The BCBP standard

The Passenger Service Conference 2004, in unanimously approving Resolution 792, set BCBP as an industry standard. IATA’s Board of Governors, in mandating a 100% deadline, confirmed that it is the only global industry standard for boarding passes.

The IATA standard known as “Resolution 792 Bar Coded Boarding Pass” defines “the required characteristics of the elements and format of the Bar Code on the Boarding Pass”. Its purpose is to provide solutions for an ET world and to fully replace the previous standard for boarding passes known as “Resolution 722c Automated Ticket/Boarding Pass – Version 2”. The PSC approved in 2008 a sunset date of 31 December 2010, which matches the mandate for 100%. It confirms that 100% BCBP corresponds to the elimination of mag stripes for boarding passes.

The BCBP standard defines PDF417 as the unique symbology to be used to encode the data on paper boarding passes. PDF417 is an ISO standard bar code available in the public domain. It also defines that a mobile phone can be used as a boarding pass (mobile BCBP) provided that it can display one of three selected 2D matrix codes.

2.3.4. The rationale for BCBP

In an automated boarding control environment, a boarding pass can be either an ATB card or a BCBP. Boarding passes are delivered through 4 channels: check-in desks, self-service kiosks, web sites and mobile phones. A BCBP can be obtained through each channel (see fig. 5).

Availability of boarding passes per check-in channel	ATB / mag stripe boarding pass	BCBP
Desk	X	X
Kiosk	X	X
Web site	-	X
Mobile	-	X

Figure 5 - Availability of boarding passes per check-in channel

With the elimination of paper tickets, the boarding document does not carry a flight coupon anymore. This allows a more flexible format for the boarding pass.

The passenger can now print a boarding pass at home, as the document can be printed on simple paper. Passengers can either go to the “bag drop” area or bypass the check-in desks and go directly to security.

Moreover, the boarding pass may now contain all the legs of the journey, instead of one document per leg, as was previously the case.

The BCBP standard provides a through check-in solution for carriers that were using their own bar coding solution.

The main benefits come from the change in the check-in process which:

- Allows passengers to check-in online via the Internet,
- Simplifies the passenger’s experience and removes airport check-in hassles,
- Relieves congested airport check-in halls,
- Creates new marketing opportunities.

There are also savings coming from the change in the coding technology:

- Simple paper replaces ATB stock and boarding pass wallets
- General Purpose Printers replace boarding passes printers
- Bar code readers replace magnetic stripe readers

2.4. The BCBP project by IATA

Airlines mandated IATA to facilitate the implementation of BCBP. IATA will lead the project without interfering in airlines’ projects.

2.4.1. The Board mandate

The mandate given by IATA’s Board of Governors is the full global implementation of BCBP, supported by two deadlines:

- End 2008: all airlines BCBP capable, i.e. every airline has issued at least one BCBP
- End 2010: 100% BCBP usage, i.e. every boarding pass contains the IATA 2D bar code

2.4.2. What the IATA project team can do

The project team focuses on delivering the mandate:

Objectives	Actions
Provide the basis for global implementation	Publish standards, the implementation guide and the cost model
Raise awareness and educate	Organise workshops dealing with implementation and the cost model
Contribute to business cases	Collect market data and publish market trends
Support decision making process	Answer questions and manage a public knowledge base
Facilitate implementation	Select "StB Preferred Partners" (see Appendix D for selection process) for matchmaking with carriers
Speed-up deployment	Develop tools to collect airlines implementation requests

2.4.3. What the IATA project team can NOT do

The IATA project team will NOT interfere with airlines' projects.

IATA will NOT	IATA would rather
Implement a project for a carrier	Introduce Preferred Partners that provide services
Consult on a project for a carrier	Introduce Preferred Partners that provide consulting
Finance a project for a carrier	Provide tools and data to support a business case
Recommend a vendor	Organise a matchmaking event, e.g. workshop

2.5. The BCBP business case

BCBP represents significant benefits and savings for the industry compared to magnetic stripes boarding passes. BCBP also enables airlines to deliver boarding passes through new channels, like web and mobile, instead of traditional check-in desks.

2.5.1. Cost savings

Based on data kindly provided by airlines and vendors, we assume the following industry cost ranges for the purpose of our analysis:

Category	Product	Unit costs
Boarding Pass Printer	Thermal printer	Between USD 700 and USD 1,600
	ATB2 printer	Between USD 3,500 and USD 5,000
Boarding Gate Reader	2D bar code scanner	Between USD 700 and USD 2,000 (gun or flat bed scanner)

	ATB2 reader	Between USD 3,500 and USD 5,000
Paper stock	Plain paper stock	Less than USD 0.01
	ATB2 paper stock (with a magnetic stripe)	Between USD 0.03 and USD 0.06

Based on data kindly provided by airlines and airports, we assume the following industry average costs for the purpose of our analysis:

Category	Service	Unit costs
With bags	Processing a passenger with bags at a check-in desk (including CUTE charges and staff)	USD 4.50
	Processing only bags for a checked-in passenger (including CUTE charges and staff)	USD 1.50
Without bags	Processing a passenger without bags at a check-in desk (including CUTE charges and staff)	USD 3.00
	Check-in a passenger on a web site (marginal cost)	USD 0.00

2.5.2. Implementation costs

Implementing BCBP will be a different project from one airline to the other, depending on the airline's existing infrastructure and strategy, with a clear impact on costs:

- One airline, owning its Departure Control System, may face significant IT development cost to upgrade the system to produce the 2D bar code with the right data, whereas another airline, using a system provider's solution, may benefit from the BCBP free of charge (included as the default boarding pass).
- One airline, owning its boarding pass printers and boarding gate readers at each station, may incur a large investment cost when replacing all of them, whereas another airline, using shared printers and readers at all stations, may benefit from 2D capable devices provided at a lower cost by the airports or ground handlers.
- One airline, with strong branding requirements, may spend a large amount of time and money on designing a new boarding pass, including colour background, whereas another airline, more focused on costs, may decide to use blank paper stock across the network and IATA's recommended layout, in order to minimise operating costs.

As a conclusion, the implementation cost may be very low for an airline operating in common use environment on plain stock, or pretty high for an airline operating mostly in a dedicated environment with dedicated stock.
The savings will also vary accordingly. The latter will mainly save by enabling web and mobile check-in, whereas the former will mainly save from reducing infrastructure operating costs.

2.5.3. Comparison between BCBP and other solutions

There are two main business cases for the adoption of the BCBP standard:

- Either the airline is using boarding passes with magnetic stripes
- Or the airline is using boarding passes with 1D bar codes.

The following table (see fig. 6) compares the BCBP standard to the two main alternatives:

Format type	IATA standard 2D bar code	1D bar code	Mag stripe / ATB
Benefits			
Home Printing	Yes	Yes	No
Plain paper stock	Yes	Yes	No
Mobile solution for security points	Yes	Yes	No
Interlining – through check-in	Yes	No	Yes
Multiple segments	Yes	No	No
Interoperability	Yes	No	Yes
Costs			
Low cost equipment	Yes	Yes	No
Low maintenance	Yes	Yes	No
Low migration cost	Yes	No	N/A
Operations			
Accepted at security in every airport	Yes	No	Yes
Installed based in every airport	Yes	Yes	Yes
Fallback solution when system fails	Yes	Yes	Yes
Innovations			
Allows future use of mobile phones	Yes	Yes	No
Allows future storage of biometrics	Yes	No	Yes
TOTAL YES	**14**	**8**	**6**

Figure 6 - Comparison table between 2D bar code, 1D bar code and mag stripe ATB

2.5.4. Key differentiators between the IATA 2D standard and its alternatives

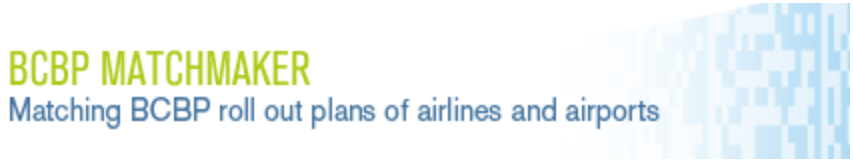
Differentiator	Description	IATA 2D standard	Alternatives
Interline through check-in	Boarding passes for the entire journey on interline partner flights	The IATA standard enables each interline through check-in partner to issue a standard boarding pass for another segment on a different carrier.	Issuing a boarding pass for a segment requires knowing the type of bar code used by the carrier. Many types of 1D bar codes are used (e.g. code 128, code 2-of-5) and the layout of the data in each code may vary.
Multiple segments	Enables a single boarding pass valid for multiple flight segments on the same journey.	Fitting several segments on one document saves paper, for the customer and the carrier who have to print one page in total instead of one page per segment and reduces hassle for the passenger.	The ATB standard requires one document per segment. 1D bar code documents can also handle only one segment.
Interoperability	The systems operate together correctly on Common Use Terminal Equipment.	The standard guarantees that when a carrier wants to issue a 2D bar coded boarding pass in an airport, it can rely on an IATA standard.	When issuing a 1D bar code the carrier should make sure that the gate readers and kiosk printers are capable of printing and reading the format and layout of the bar code, as well as check that the local DCS/boarding application will handle the data correctly.
Cost of migration	Migration from airline's existing solution for boarding passes to the IATA standard 2D bar code.	The data storage capacity of 2D bar codes is similar to magnetic stripes. The items required in BCBP are similar to ATB. The software cost of migration is limited.	1D bar codes can replace manual operations such as keying a sequence number but do not replace the reading of ATB and the collection of data.
Biometrics	Biometrics enable a secure ID check at boarding. A template containing finger print data is stored on the boarding pass.	Storing the image of the fingerprint is only possible on a smartcard. However a template with 256 characters could be used to represent a fingerprint, which could be stored in a 2D bar code, for instance in the individual airline use field.	A 1D bar code is limited to 30 characters on a typical boarding pass and cannot be used to store biometrics.

2.5.5. Main considerations

- Automated Boarding Control: the solutions selected in this comparison have to meet the pre-requisite of Automated Boarding Control as in Recommended Practice 1789. They also need to rely on a mature technology.
- Acceptance at security check points: agents at the security check points today perform a visual check of the boarding pass. They will accept a boarding pass printed on ATB stock but not necessarily with a magnetic stripe, as they do not use the magnetic stripe to check the document. Acceptance may be an issue for home printed boarding passes, which are printed on plain paper. If the security staffs are not trained to recognise such documents they might not let the passenger go airside.
- Equipment installed base: some laser scanners can read only 1D bar codes, some others can read 2D bar codes including the IATA 2D standard and a third category can be upgraded so that it reads 2D bar codes.
- Fallback solution: The stub of the ATB is the passenger receipt whereas the main part is for the airline's use. If the system fails, the airline can still rely on a manual count of the boarding passes as a fallback flight closing solution. The home printed boarding pass does not provide such a solution, unless the BCBP includes a tear-off part for the airline to use.
- Mobile phones: Using the mobile phone as a boarding pass involves displaying the bar code on the screen of the mobile phone.

2.6. The BCBP Matchmaker

The BCBP Matchmaker is a secure web site designed by IATA to speed up BCBP implementation at airports worldwide.



Airlines can enter their BCBP rollout plan. Airports can update the status of equipment and BCBP related processes. Airlines and airports can agree on dates and exchange notes via the request feature.

IATA supports the airlines and airports in using the BCBP Matchmaker and ensures that they update the data and reply to requests. For more information, visit the BCBP Matchmaker page: http://www.iata.org/stb/bcbp/Matchmaking.htm

3. STAKEHOLDER MANAGEMENT

This section provides an overview of the stakeholders and describes the type of relationship an airline will have to manage.

3.1. Stakeholders in the BCBP project

The BCBP project generates a win-win solution at industry level. All stakeholders have to invest and all shall benefit from the transition to BCBP.

Stakeholders	Scope	Benefits	Requirements
Airlines	- IATA members - Airlines having Interline Through Check-in agreement with IATA members	- Cost savings for each passenger checked-in - Increased branding opportunities	- Development of web check-in, - Upgrade of check-in and boarding equipment, - Upgrade of Departure Control System - Staff training
Airports	Airports where airlines use automated boarding control	Space savings resulting in increased capacity and less congestion	- Provide the new type of boarding pass at desks - Read them at the gates - Coordinate acceptance at concessions (e.g. lounges, duty free shops)
Passengers	Passengers flying with IATA member airlines	- Print the BCBP at home - Proceed directly to security / immigration or to the “bag drop” area	Only a web access and a printer.
Ground handlers	Companies serving IATA member airlines	Competitive issue for ground handlers, as BCBP is the new standard for boarding passes	- Implement BCBP at the request of airlines, providing higher level of service
Governments (Security, Immigration, Customs)	Countries where IATA member airlines operate	Unique industry data format on every boarding pass, enabling automated control	- Need to be informed of the new look and feel of the document - Bar code readers may be required at the access control point.
Industry suppliers (DCS, printers, scanners)	Companies that provide current or future check-in and boarding solution	- Availability of very reliable bar code equipment - Development of new solutions for mobile BCBP	- Provide a simple solution to support the BCBP standard

The complexity in the BCBP project comes from the variety and the number of stakeholders involved (see fig. 7).

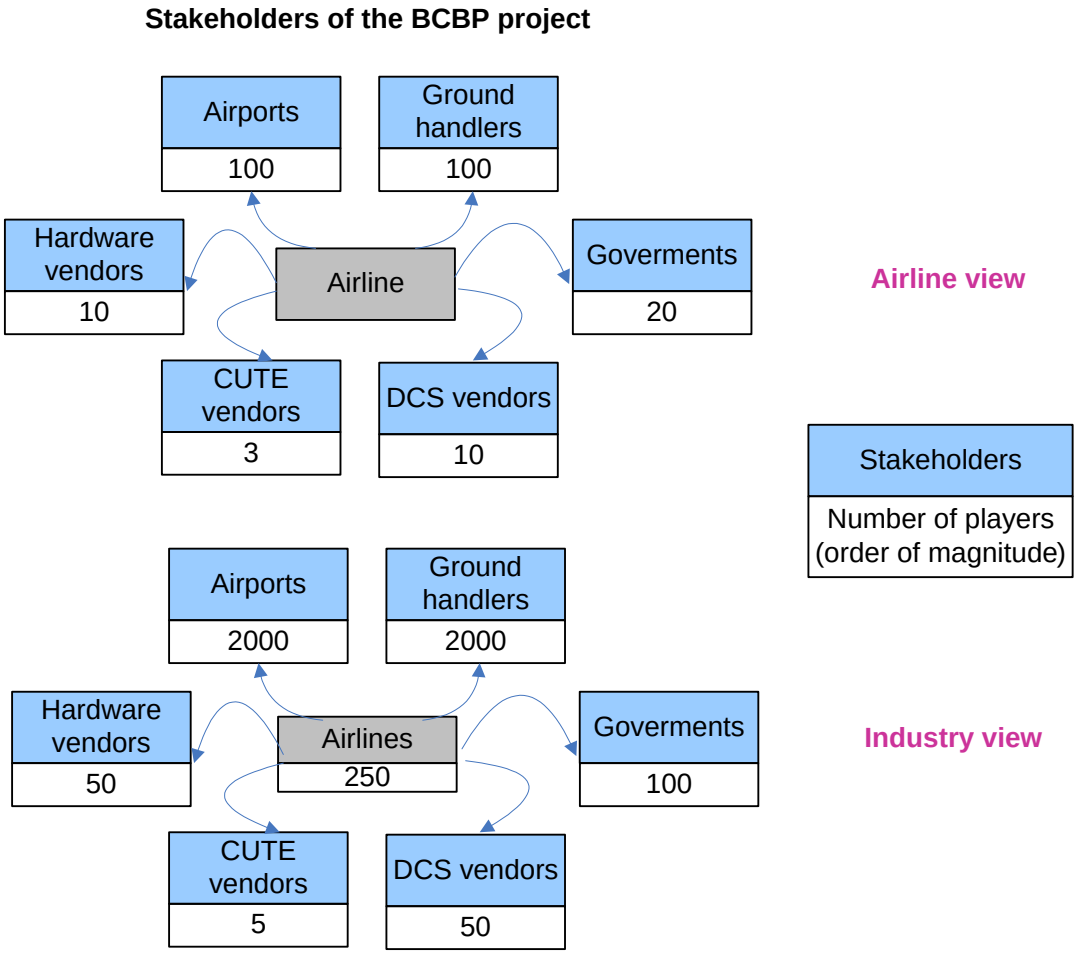


Figure 7 - Stakeholders in the BCBP project

3.2. Dealing with airports

Airports owning check-in and boarding infrastructure should request advice from carriers operating their facilities.

IATA monitors the availability of 2D bar code capable equipment at more than 2000 airports in the world. An interactive map of the world airports (see fig. 8), available on the StB portal, shows the status of shared equipment and allows zooming in on one region or one airport. The 2D capability of airport equipment is represented in colour-coded balloons.

Definition

Platinum means that all the airlines in scope are capable of printing BCBP at the airport. Green means that at least one airline in scope is capable of printing BCBP at the airport. Orange means that there is a plan to get the shared boarding pass printers to support 2D. Red means that there is no airline in scope capable of printing BCBP at the airport.

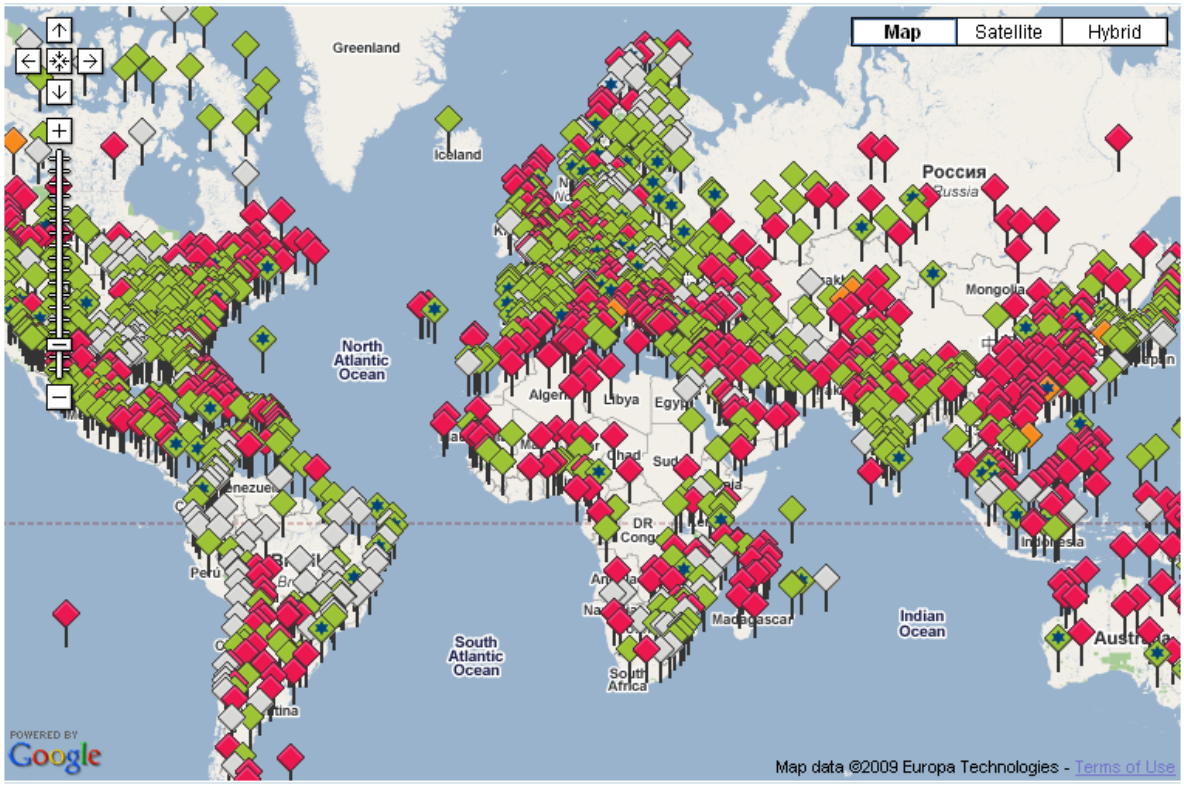


Figure 8 - Map of world airports offering 2D capable printers

3.2.1. Infrastructure

For example, the Greater Toronto Airport Authority (GTAA) has decided to implement 100% BCBP equipment in 2 terminals. The communication process with airlines could be summarized by:

1. GTAA has informed airlines (and IATA) of its plans
2. GTAA has requested input on infrastructure needs from carriers

Each carrier had to fill out the following form:

Topic	Airline input
Airline code	2 letters
Passenger validation (gate)	Software Y/N, Hardware Y/N
Scanning hardware for validation	LED Y/N, Beep Y/N, Red/Green Y/N
Preferred scanning hardware	Brand & Model
1D capable	Y/N When?
2D capable	Y/N When?
LSR communications	1 way / 2 way
BGR required for reading bar codes	Y/N When?
Application 2D bar code ready	Y/N When?
Comments	

3.2.2. Software

Aéroports de Paris (ADP) has decided to implement 100% BCBP in Charles de Gaulle (CDG) Terminal 1. Airlines whose applications are not 2D bar code ready can use the bar code equipment. ADP provides a translator for magnetic data to BCBP data adapted to each carrier's pectab. The carriers and the airport have to agree where to insert the 2D bar code on the boarding pass (see fig. 9). Carriers provided ADP with pectabs and paper stock samples to perform the tests.

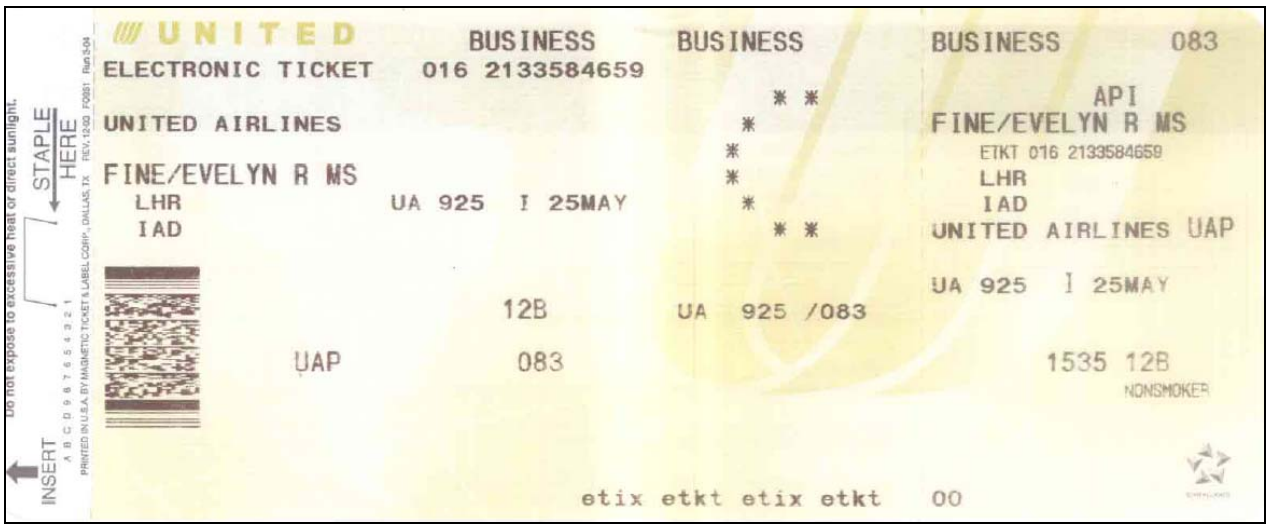


Figure 9 - Boarding pass with 2D bar code courtesy of ADP and UA

3.2.3. Charges

Assuming that one airline manages to check-in 50% of its passengers on the web, the airline should be able to cut the need for check-in counters and corresponding staff by half. The CUTE charges may still be calculated on the actual departing passenger counts.

Check-in costs	Basis	Amount (not actual data)	Potential Reduction
Check-in counter annual rent	Per counter per year	$100,000	50%
Check-in Staff	Per year	$40,000	50%
CUTE passenger charge	Per departing passenger	$0.60	0%

In a space constrained airport self-service check-in would enable one airline to open more flights in a limited check-in area and to process more flights with a limited staff.

3.2.4. Home printed BCBP acceptance

Airport authorities may require that a sample home printed BCBP be provided prior to accepting them at security.

3.3. Dealing with ground handlers

Ground handlers are a key stakeholders in the BCBP project. They process passengers from check-in to boarding, they issue boarding passes at check-in counters and check them at the gate.

It is airlines' role to request that their handling agents use the BCBP standard. The Airport Handling Manual provides a standard handling agreement (AHM 810), which includes the provision of IATA standards. In the case of boarding passes, the IATA standard is BCBP.

3.4. Dealing with security and governments

The rules dictating what travel documents are required to proceed through security and immigration checkpoints are set by local or national administrations. Depending on the country, requirements related to boarding passes may vary from a simple visual check to stamping, stickers or other local procedures.

It is airlines' role to engage the local authorities and request that bar coded boarding passes, issued at the airport or remotely, on paper or on mobile phones, are equally accepted.

4. IMPLEMENTING A BCBP PROJECT

This section provides our recommendations for managing the BCBP implementation project. One key issue is to have a team in place with a proper organisation. It is especially true for a BCBP project as it involves multiple disciplines in the company and multiple external stakeholders, all with different motivations. Everyone must understand one's roles and responsibilities.

4.1. The project team

A BCBP project requires various skills and expertise. One needs to make sure that those resources are available for the project and that the roles and the responsibilities of each participant are clearly defined. Typical reasons for slow and uncoordinated projects include:

- Lack of structure
- Lack of definition of the project
- Missing roles and responsibilities
- Missing executive level sponsorship

4.1.1. Participants

The project team will consist of participants coming mainly from 7 departments within the company (see fig. 10). Those persons should dedicate fully or partly to the project and an executive level officer should sponsor the project.

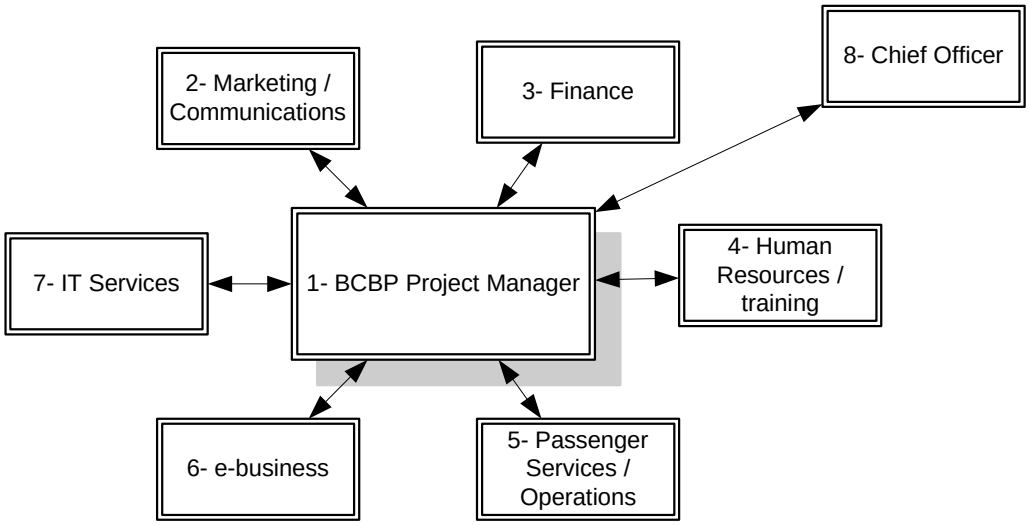


Figure 10 - Organisation of the project team

4.1.2. Roles

The role of the participants should cover the main project tasks. Most roles are straightforward to assign as they relate to participants jobs or activities.

Function	Roles
1- Project management	Business case, planning, budget, coordination, monitoring progress
2- Marketing / Communications	Boarding pass layout, internal and external communication, advertising, launch
3- Finance	Financial evaluations of cost model and requests for proposals
4- Human Resources	Training staff
5- Passenger Services / Operations	Handle the new boarding passes in airports
6- e-business	Upgrade web site
7- IT services	Upgrade information systems such as DCS
* Chief Officer	Sponsoring, stakeholder management

4.1.3. Responsibilities

The project manager needs to define a responsible participant for each task or deliverable. The sponsor of the project may be asked to facilitate this definition.

Function	Responsibilities
1- Project management	Deliver the project within time and budget
2- Marketing	Leverage opportunities of the new boarding pass type
3- Finance	Leverage potential cost savings
4- Human Resources	Facilitate resources to drive the adoption of the new boarding pass
5- Passenger Services / Operations	Support customers and staff in the use of the boarding pass type
6- e-business	Deliver user-friendly and reliable web interface
7- IT services	Deliver a global and compatible infrastructure
* Chief Officer	Set targets, remove roadblocks

4.2. Critical IT infrastructure elements

Boarding passes can either be issued via an airline's web site or at the airport. In the latter case, the check-in is processed either through the Departure Control System or through the systems of ground handlers. Moreover, when interlining with partner airlines, a boarding pass for each segment must be issued.

The chart below (see fig. 11) outlines the connections between systems in order to measure the impact of a full-range BCBP infrastructure.

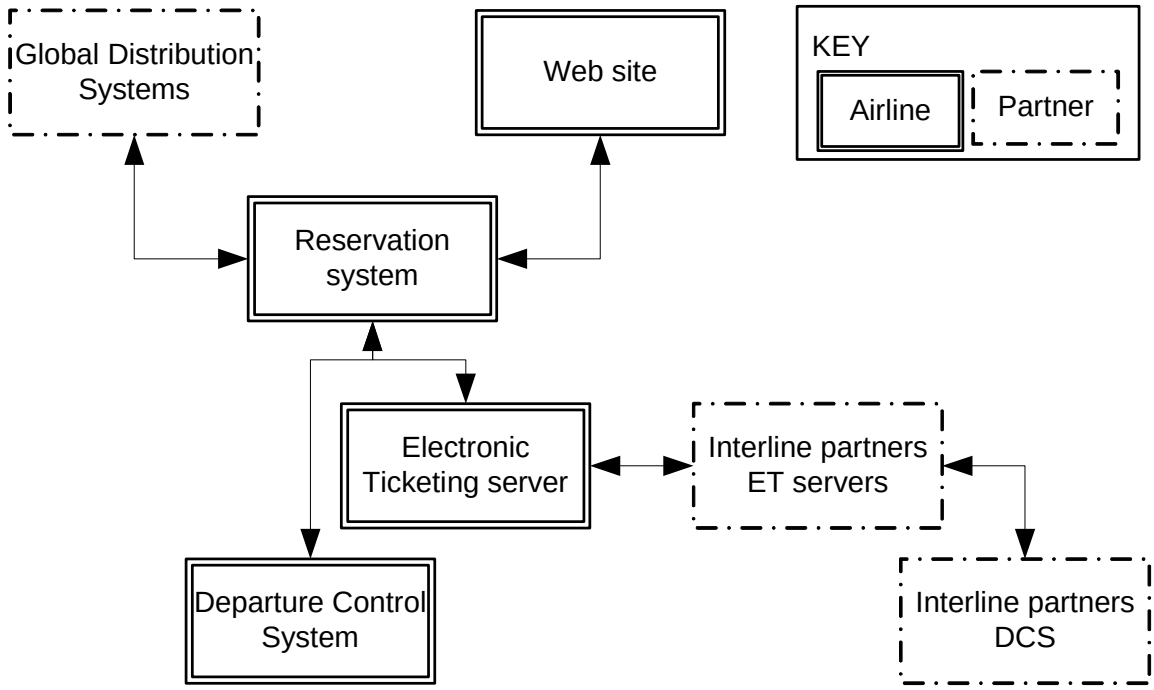


Figure 11 - Organisation of the critical IT infrastructure interface elements

An airline's BCBP project can actually be broken into four sub-projects:

Sub-project	Objective	Complexity
Airline system	System BCBP capable	- Several applications, e.g. check-in application, boarding applications - On several platform, e.g. Windows XP or NT - On several CUTE, e.g. SITA or ARINC
Airports	Equipment BCBP capable	- Potentially 100+ stations in a network - Potentially 1000+ dedicated printers to retrofit - Host DCS or local DCS - Own staff or ground handler
Ground handlers	System BCBP capable	- Potentially 30+ GHAs using 13+ different DCS - 5000+ GHAs worldwide
Partner airlines	System BCBP capable	- Potentially 40+ ITCI agreements - 15+ DCS vendors

4.3. Project tracking

A BCBP project takes place at different locations at the same time and involves different stakeholders in each location. Project tracking is necessary to avoid conflicts between teams or customer service breakdowns for passengers. Examples illustrating project tracking are shown in the sections below.

4.3.1. Situational assessment

Once the stakeholders and their relationships are identified, each scenario needs to be evaluated. The project manager should define a ranking method and collect the data on an on-going basis. The resulting tables (see fig. 12-14) will serve to set priorities and track progress.

Airport system situation

1-Station	2-CUTE	3-Ground handler	4-DCS	5-DCS status
CDG	VendorA	Handler1	DCS1	Ready
LHR	VendorA	Handler2	DCS2	Planning
LGW	VendorA	Handler1	DCS2	Planning
GVA	VendorB	Handler2	DCS3	No plan
MXP	VendorC	Handler3	DCS3	No plan

Figure 12 - Airport system situational assessment table

Airport equipment situation

1-Station	6-Desk printers	7-Gate readers	8-Airline Kiosks	9-CUSS Kiosks
CDG	Ready	Ready	Ready	N/A
LHR	Ready	Ready	Ready	N/A
LGW	Ready	Ready	Ready	N/A
GVA	Ready	Ready	N/A	Planning
MXP	Unknown	N/A	N/A	Unknown

Figure 13 - Airport equipment situational assessment table

Airport security situation

1-Station	10-Home printed BCBP
CDG	Accepted
LHR	Accepted
LGW	Accepted
GVA	Accepted
MXP	Unknown

Figure 14 - Airport security situational assessment table

Notes:

1. *Station: the list of all the stations served by the carrier*
2. *CUTE: vendor of the Common Use Terminal Equipment*
3. *Ground handler: name of the handler operating at each station*
4. *DCS: name of DCS operating at each station*
5. *DCS status: a DCS is ready when it supports BCBP natively*
6. *Desk printers: 2D bar code capability of printers at all desks used by the airline*
7. *Gate readers: 2D bar code capability of readers at all gates used by the airline*
8. *Airline kiosks: 2D bar code capability of printer and reader at all airline kiosks*

9. *CUSS kiosks: 2D bar code capability of printer and reader at all CUSS kiosks used by the airline*
10. *Home printed BCBP: acceptance by security, immigration and airport authority*

4.3.2. Progress tracking

Each task or activity managed by the project team should also be tracked. The progress-tracking table (see fig. 15) ensures a good level of coordination and facilitates reporting to internal stakeholders.

Activity	Status	Deadline
Project Management issues	In progress	30/10/06
Assessment of 3rd party ground handlers readiness	In progress	30/10/06
Internal staff training	To be initiated	31/12/06
Web site configuration	Completed	31/12/06
Internet & external awareness plans	Initiated	31/03/07
Study for new equipment / technology / software	Initiated	31/03/07
Layout of the boarding pass	In progress	30/06/07

Figure 15 - Project progress tracking table

Another useful template would list on a monthly basis the key activities, their status and their expected delivery dates. Such a template allows for tracking activities that are on target and those that are behind schedule.

IATA uses its own colours to report on the progress of airlines and airports towards BCBP capability.

4.3.3. Risk assessment

A risk that is clearly identified is easier to deal with and to mitigate. Here are some risks related to the project that may occur:

- Airport infrastructures are not ready or not compatible
- Third parties not aligned or not able to support BCBP
- Legal department not aligned
- Customers are not informed correctly and do not use the system properly
- Airline management not on board
- Staff are not aware of the project or procedures

4.4. Roll out

The implementation of a BCBP project involves prototyping and testing of applications, integration with airport environment and other hardware equipment. It is highly recommended to first conduct pilot phases and then proceed to a step-by-step rollout phase, in order to tackle problems and fix them as they occur. Here are examples of steps in each implementation phase.

4.4.1. Pilot phase

The pilot phase should focus on a simple case, for example:

- Enabling 2 stations, i.e. 1 route, with 2D scanners at the gates
- Enabling web check-in on that route
- Limiting the pilot to passengers with carry-on bags only

Enabling a station for web check-in means ensuring home-printed BCBP are accepted at security and immigration, 2D bar code readers are available at the gates and the DCS can handle BCBP data. Depending on web check-in usage, the passengers in this pilot would account for maybe 10% of boarding passes on every flight. The passenger on the flight can easily be checked-in manually in case of a technical problem.

Once an airline has had the BCBP development completed for them by their DCS supplier or in-house DCS team, the implementation at airports around the world becomes a relatively straight forward operation. It depends on the way the DCS application works: it could be as simple as updating the database for the airports to change settings and then ensure they have the correct pectab downloaded for the site, or just changing the datastream at site. If the development has been completed in the airline host DCS then there is nothing technical required other than the CUTE administrators or airline DCS team updating the settings.

4.4.2. Roll out phase

The roll out phase will broaden the scope of the implementation step by step:

- Add more stations
- Add desks and kiosks printing BCBP
- BCBP accepted for passengers checking bags
- Add interline through check-in partners

If no agreement exists between interline partners, an ATB2 boarding pass will be issued for checked-through passengers.

4.4.3. Getting to 100% BCBP

The ultimate goals for all airlines and the industry is to reach 100% BCBP:

- Airline's DCS is 2D bar code capable
- In every airport the DCS used is 2D bar code capable
- In every airport the printers are 2D bar code capable
- All interline partners issue BCBP on the airline's flights

4.5. Checklist

The checklist contains 6 steps: Evaluate – Plan – Decide – Develop & Deploy – Train – Communicate. The purpose of this checklist is to help the airlines drive their BCBP project and not overlook any critical elements.

4.5.1. Evaluate

The first phase of the checklist consists of understanding the various requirements of the project and evaluating the status of equipment and resources with respect to those requirements.

The following items are of interest:

Action	Status
Evaluate bar coding equipment (printers, readers): installed base, ownership of equipment, migration plans, selected vendors	
Evaluate IT infrastructure (DCS, web site): capabilities of current versions regarding BCBP, selected vendors	
Evaluate processes and staff (check-in, boarding): training organisation, internal procedures, expertise and resources available	
Assess readiness of external stakeholders (vendors, airports, ground handlers): list of stations, CUTE, readiness	
Calculate cost-benefit: market and usage growth assumptions, quotations from vendors or internal department	

4.5.2. Plan

The second phase consists of translating the evaluation into an action plan. The key elements of the action plan are:

Action	Status
Define the objectives the airline wants to achieve in order of priority. It could be cost reduction or improved passenger service for example.	
Define the timing the airline is targeting. Time constraints may come from airport infrastructure, decisions from alliance partners or implementation of e-ticket.	
Assess the benefits expected from the project. It could be facilitation of through check-in or traffic growth at space-constrained airports.	
Assess the costs related to the project. The upgrade of the departure and control system is a potential source of cost if not included in a larger migration process.	
Assess the risks caused by the project. For example, throughput may be slow at the gate if the print quality is not adequate	
Consider the consequences of the airline not following the mandate: compatibility issues in airports, through check-in problems and poor customer service are likely to occur.	
Define the type of team required for the project. Involve IT and web resources, as well as coordinators with airports, ground handlers and governments.	

4.5.3. Decide

The third phase consists of making decisions and signing contracts. The implementation phase is really launched at this stage.

Action	Status
Select ATB and/or BCBP in kiosks: cost reduction comes from the replacement of ATB equipment by GPP and bar code readers, but it is recommended to secure the transition phase with dual mode equipment	
Choose BCBP readers at gates: how many readers per gate, hand held or integrated to the BGR, decode capabilities beyond the IATA standard	
Define web check-in: tutorial, login options, features available, communication and promotion plan	
Define BCBP Layout: 1 or 2 bar codes, fields mentioned, fonts used, branding, display advertising or not	
Contract with vendors: timing, pricing, quality assurance, expertise, dedicated resources	

4.5.4. Develop and deploy

The fourth phase is the heart of implementation. It includes the upgrade of hardware and software as well as the deployment in stations. The complexity of this phase highly depends on the breadth of the network covered by the airline.

Action	Status
Upgrade the web site check-in features	
Upgrade the Terminal Emulator: unless there is an alternative solution with CUTE or third parties	
Upgrade the Departure Control System: unless there is an alternative solution with CUTE or third parties	
Create test flights: the airline creates flights in the DCS from which sample BCBPs can be printed and tested	
Run trials: in each station the equipment may vary, a trial should be conducted before going into production	

4.5.5. Train

The fifth phase guarantees smooth operations. As processes are changed, operations are affected and stakeholders must be trained. Various training methods may prove to be effective: room training (an instructor in front of colleagues in a room) or peer training (one colleague teaching his/her colleague at workplace).

Action	Status
Train agents at the gate: to maintain or exceed the level of throughput achieved with ATB, they need to become familiar with scanning a bar code	
Train agents at the desk: BCBP allows multiple segments on the same documents, agents will have to explain it to customers	
Train security staff: they may need to scan bar codes as well if requested by the local security agency	
Ground handlers: they will have to handle the new type of boarding pass	

4.5.6. Communicate

The sixth and last phase focuses on the passenger and guarantees the success of the project. Cost savings will come from the increased usage of BCBP. At the end of the project it is recommended that airlines conduct an analysis of both the financial and operational success.

Action	Status
Inform governments: one airline using BCBP in one country does not necessarily mean that other airlines can simply do it as well, it is recommended to contact the government anyway	
Inform airports: passengers will circulate in the airport with a new airline document, the layout may vary from other airline documents, the airport needs to receive a sample BCBP	
Educate passengers: tutorial for online check-in, raise awareness on the multiple segment document	
Advertise: mainly on the airline's properties such as mailings, web site, displays in the terminal, bus carrying passengers to the aircraft	
Issue a press release: list of stations available, features of online check-in, level of through check-in	

4.6. Project map

The steps of the project can be mapped onto a passenger travel chart, from home to the aircraft (see fig. 16). The Departure Control System (DCS) is involved in every check-in mode and in the boarding stage.

A BCBP project can start with any of the channels:

- At the airport
- On the web
- On the kiosks
- Or even on mobile phones

Although several channels can be initiated simultaneously, airlines tend to start with one of them, and generally choose the web check-in first.

Once the BCBP is available online and printed at home, the project manager has to inform the airports of the introduction of the new type of boarding pass. Using the IATA standard will facilitate this step as airports can easily check the content of the bar code.

Then the BCBP needs to be read at the gate: it is both a hardware and a software issue as we have seen. At the same time the agent at the gate needs to be trained, in order to accept the BCBP and handle the bar code reader properly.

Once the boarding process is automated with the new standard, additional bar codes can be introduced. Upgrading the kiosk involves ensuring that the print quality of the General Purpose Printer (GPP) is adequate and upgrading the airline application so that it handles bar codes and GPP. The same happens at the desk, although the owner of the equipment may be different.
The following section provides a timeframe for the project.

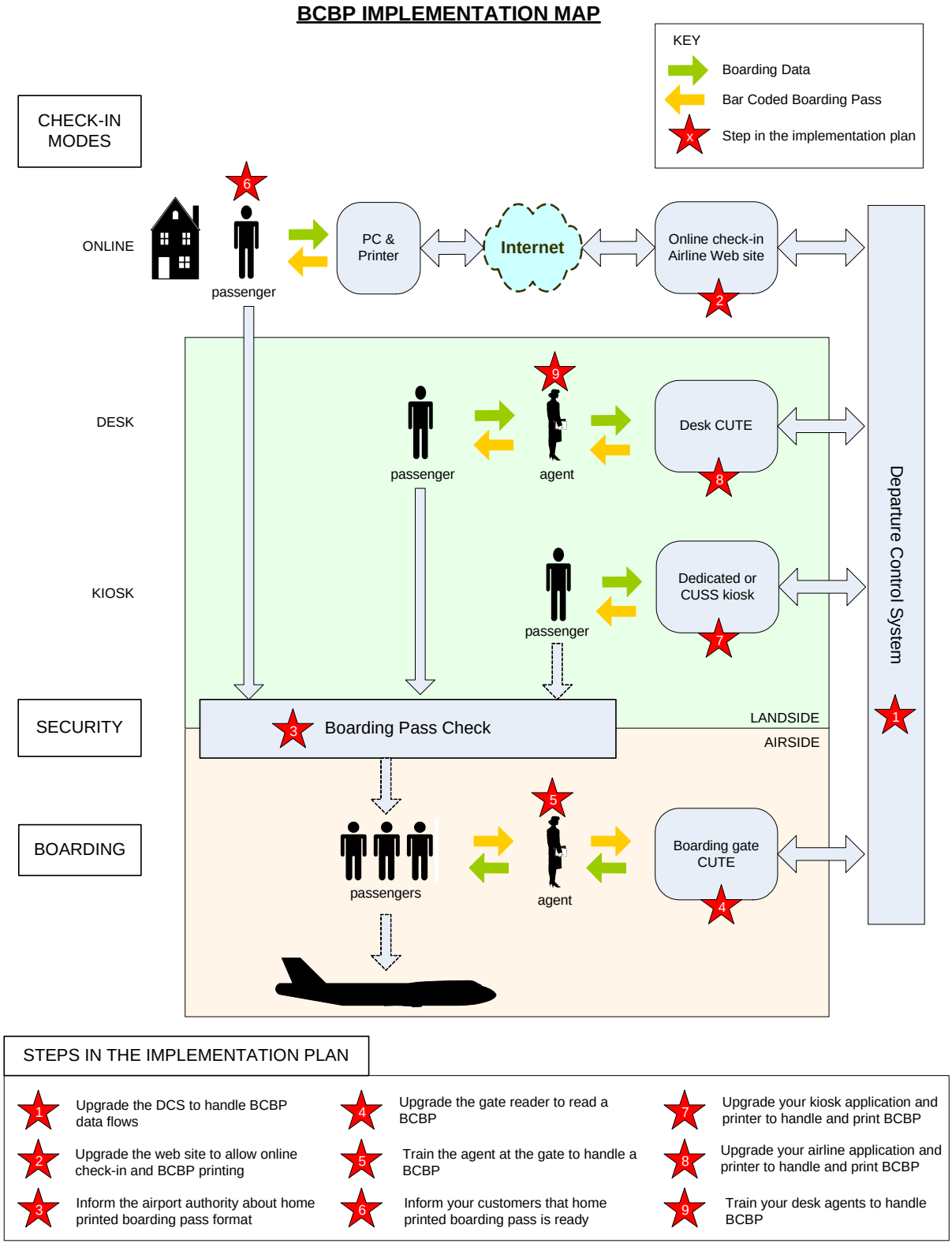


Figure 16 - BCBP implementation map

4.7. Timeframe

We provide the following timeframe as guidance only (see fig. 17). The objective of this time chart is to help BCBP project managers get a vision of the timeframes of the project in order to book resources in advance.

Phase	Time	Tasks / steps / achievements	Estimated average length
	Start T=0	Start reading, planning, building team	1 month
Evaluate	T+1 months	Project team ready	
		Start evaluations	2 months
Plan	T+3 months	Evaluations ready	
		Start cost-benefits analysis	2 months
Decide	T+5 months	Plan ready	
		Decision making process	1 month
Develop & Deploy	T+6 months	Decision made – project launched	
		Start upgrading infrastructure	
		Development and testing of TE	3 months
		Certification TE	2 weeks
		Deployment TE	1 week per site 1 year for 50 sites
Train		Training staff	2 days per site
	T+12 months	BCBP is in production	
		Develop and test interline BCBP	3 months
	T+21 months	Run site surveys	2 months
		Publish results	1 month
	T+24 months	Project done	

Figure 17 - Example of timeframe for a BCBP project

4.8. Best practices

During meetings with stakeholders we have collected stories about implementations, some of which we have decided to publish in this guide. We hope it will help more stakeholders to start implementing and provide us with additional stories for our next edition.

4.8.1. Contingency plans

Once an airport removes all the ATB equipment, it still has to deal with passengers in transit who may still hold traditional boarding passes.

The transition phase is two-fold:

- Perform manual boarding for passengers in transit coming with traditional boarding passes. This number should not be big and declining strongly in the coming years
- Inform connected airports that they should accept BCBP and perform manual boarding until they can install bar code readers at the gates

4.8.2. Dedicated kiosks

As it is the airline's decision to choose the printer type, airlines such as Air France or Air Canada have selected GPP instead of ATB to reduce costs.

4.8.3. Gates readers

Depending on the ownership of the equipment, the decision to implement bar code readers may vary. In some airports it may depend on the terminal.

Equipment Ownership	Where (examples)	Solutions (examples)
Airline	CDG2F	AF decided to implement 2D bar code readers at all the gates to read the BCBP printed at their dedicated kiosks
CUTE Local User Board (CLUB) / Airport Operation Committee (AOC) / Airline Operators' Committee (AOC)	MUC	The Munich CLUB has agreed to pay a vendor (SITA) a monthly fee to use 2D bar code readers
Airport	CDG1	In CDG, Aéroports de Paris (the airport) decided to implement 2D bar code readers at all the gates

4.8.4. Transition solution

The TAP example (see Appendix) is a good illustration of a transition solution. Two bar codes are printed on the same document: the 2D IATA standard and a 1D proprietary bar code. The 1D bar code is a code 128 containing only the seat number on 3 characters. The agent at the gate will use one code or the other depending on the equipment provided at the gate.

5. KEY BCBP COMPONENTS

The purpose of this section is to outline the key components underlying the airline's BCBP project. This section describes the technical elements of the implementation of BCBP. The key technical issues concern 2D bar code, web site, printers, readers and systems. This publication does not address technical details, as this is left to each carrier and its vendors, and is intended to provide a working basis so that technical and non-technical persons can work together on the project.

5.1. 2D bar codes

The IATA standard 2D bar code replaces the magnetic stripe standard and provides an alternative to non-standard bar codes. The section below describes the bar code symbology and the content of the bar code.

5.1.1. Bar codes history at a glance

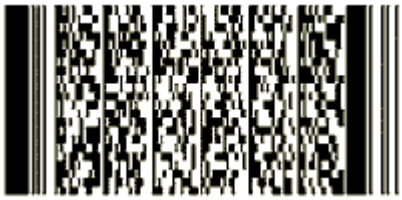
Date	Description	Examples
1970's	The first bar code readers were installed in supermarkets in the 1970's. Retail packaging contain one dimensional (1D) bar codes defined by either Universal Product Codes (UPC) or European Article Numbering (EAN). Other 1D bar code symbologies include the Code 2-of-5 used on bagage tags as defined in the IATA Resolution 740.	 1D bar code
1990's	The first two dimensional (2D) code, known as Code 49, was invented in 1987. PDF417, the 2D code selected by IATA in the BCBP standard, was invented in 1991 and is in the public domain, meaning that there is no fee associated with the printing and the reading of the code.	 Stacked 2D code
2000's	The latest generation of 2D codes, known as matrix codes, are square rather than rectangular like the 1D bar codes or earlier 2D stacked codes. The Aztec code (1995), Datamatrix and QR code (1994) are used by airlines and in the public domain. Those codes fit nicely on the screen of mobile phones.	 2D Matrix code

Figure 18 - Key dates in the evolution of bar codes

Original bar codes scanners were laser scanners and could read 1D bar codes. Scanners with a moving beam enabled the use of stacked 2D codes, like PDF417. The latest Charge Coupled Device (CCD) scanners are image sensors that can read 2D matrix codes, as well as the 1D bar

codes and 2D stacked codes. CCD scanners take a picture of the code; software analyzes the image and converts it into a data string. Although CCD was invented in 1969, CCD imagers became a commodity after 2000 with the development of digital cameras.

5.1.2. PDF417

The major element added by the BCBP standard is the two-dimensional (2D) bar code displayed on the document.

There are several bar code generating algorithms, known as symbologies, to encode data into a bar code that is available for public use. One of those symbologies, called PDF417, widely used for logistics and access control applications around the world, has been selected in the BCBP standard. Read more about PDF417 in the Appendix.

Figure 19 shows an actual PDF417 bar code from a British Airways Bar Coded Boarding Pass containing the following data:

M1LEOPOLD/EMR EZQ7O92 GVALHRBA 00723319C002F00009100

Figure 19 - Example of a PDF417 bar code courtesy of British Airways

The BCBP standard enables the encoding up to 4 flight legs in the same BCBP. The ATB standard recommended issuing one boarding pass for each flight leg. The multiple flight capability reduces hassle for the passenger who needs just one document for the whole journey. Multi-leg boarding passes enabled by the M format are explained in more details in the ‘data format’ section.

In order to ensure interoperability, data encoded into the 2D bar code should strictly comply with the IATA standard.

5.1.3. Aztec

Aztec is one of the three symbologies selected in the BCBP standard for mobile boarding passes. The Aztec code is defined in the ISO standard 24778. Aztec codes are square, with a square bullseye pattern in the center.

Figure 20 - Example of an Aztec code courtesy of Air France KLM

The storage capacity of Aztec enables to encode 900 alphanumeric characters in a 83x83 cells code.

Matrix codes, like Aztec, fit more easily on the screens of mobile phones than linear codes, simply because most screens are more square than linear. The finding pattern in the center makes it also easier to read because the center of the screen is less likely to be affected by a lens than the edge of the code.

Notes

- The three 2D matrix codes selected in the BCBP standard are all ISO standards, in the public domain, that can be used free of charge (no licence fee).
- More details about the symbologies can be found in the Appendices.

Recommendations

- Airlines can chose any of the three symbologies for their mobile boarding passes. The choice can be based on regional preferences (e.g. QR in Asia), on technical preferences (e.g. Aztec finding pattern in the centre) or other considerations (e.g. the airline previous experience with one symbology).
- Scanners used to read mobile boarding passes should support all of the three symbologies.

5.1.4. Datamatrix

Datamatrix is one of the three symbologies selected in the BCBP standard for mobile boarding passes. The Datamatrix code is defined in the ISO standard 16022. Datamatrix codes are square, with a finding pattern on the perimeter.

The storage capacity of Datamatrix enables to encode 862 alphanumeric characters in a 80x80 cells code.

5.1.5. QR code

QR code is one of the three symbologies selected in the BCBP standard for mobile boarding passes. QR code is defined in the ISO standard 18004. QR codes are square, with a finding pattern in three corners of the matrix.

The storage capacity of QR code enables to encode 938 alphanumeric characters in a code size 17 (85x85 cells) with low error correction.

QR code was designed to support Kanji characters (Chinese characters used in the Japanese writing system).

5.1.6. Size of the bar codes

The size of the bar code is not defined in the standard. This section provides recommendations on the size of the bar code printed on paper.

The bar code should be:

- Large enough to cope with the limited resolution capacity of the readers,
- Small enough to fit within the limited scan width or window size of the readers,
- Close enough to the edge of the page as the foot of a mounted scanner may prevent reading

It is recommended that a full-page A4-style boarding pass contain two copies of the bar code. Experience has shown that passengers tend to fold the page. When there are two codes on the page, chances are that one of them is not folded. It could even appear on the top quarter-page.

The format includes a "For individual airline use" field. The field size allows up to 255 characters per segment (from 00 to FF in ASCII-printed hexadecimal), or a total of 1020 characters for the 4 segments.

Bar code readers work well on PDF417 reading up to 800 characters in one symbol. Although the standard allows up to 4 segments, it is unlikely to find boarding passes including 4 segments, each of them with more than 200 characters for airline individual use.

It is recommended that the owner of the bar code reader performs a test with a worst-case scenario bar code containing the maximum number of characters allowed by the M format with 4 segments encoded. The read error rate should be calculated with this configuration.

The issuer of the boarding pass should perform similar tests on the size of the bar code printed on boarding passes, to prevent incidents such as a bar code that does not fit on the boarding pass (see fig. 20).

Figure 21 - Test of bar code size courtesy of Lufthansa Systems

A survey of the samples provided by 30 airlines using BCBP shows that it would be possible to define a maximum and minimum size for the bar code (see fig. 21). That would enable scanners to have a sufficient resolution to read smaller codes and a sufficient window size to cope with larger codes.

Bar code size	Min	Max	Average
Number of columns	4	12	7
Number of rows	9	34	18
Length (mm)	29	72	50
Height (mm)	9	22	13
Dim (Height/Rows)	0.35	1.11	0.79

Figure 22 - Bar code average size of BCBP samples

For an optimal read rate it is recommended to design bar codes that aim at the average size above, and to ensure that all the equipment used will produce bar codes within the range above.

5.2. BCBP Standard (Resolution 792)

5.2.1. Data format

Airline issue one boarding pass per passenger. Before the BCBP standard, airlines issued one boarding pass per flight leg (if an itinerary segment contains two legs with the same flight number, one boarding pass per leg is needed to indicate the seat number). The BCBP standard enables airlines to encode either one flight leg or several legs into a single bar code and boarding pass. The format of the data in the 2D bar code is defined in the BCBP standard. For a definition of terms used in the items, refer to the IATA RP 1008 'GLOSSARY OF COMMONLY USED AIR PASSENGER TERMS'.

Definitions

- "OPERATIONAL LEG" means a flight that is physically operated and identified by its airline designator and flight number. Any other airline designators and/or flight numbers associated with the same flight are considered to be non-operational flights.
- "FUNNEL FLIGHT" means a flight composed of two or more member flights, which is identified by the airline designator and flight number of one of the members. Legs AD and DE comprise Segment AE (ADE), and are identified by the member flight number DL 123.

Recommendation

The standard requires that airlines populate:

- All the mandatory items. If an item is not available at time of issuance of the boarding pass (e.g. seat number for a stand-by passenger), the item should be populated with blanks, so that the number of characters is correct.
- The conditional items available in their system. If an item is not used by the airline system for the flight (e.g. document verification or selectee indicator), the item should be populated with blanks. The size of the field can be defined if some of the last fields are not used.
- The airline individual use item at their convenience. An item defined in the mandatory or conditional field should be encoded in those fields, not in the airline field.

The BCBP standard contains fields and items defined and agreed by airlines. It is in the interest of the airline to strictly comply with the data format, so that interline partners and third parties can read the data. If the data do not comply with the standard format, the passenger will have face the consequences of the partner or third party requiring the bar code data, e.g. the operator of a lounge or fast track scanning boarding passes to grant access to the facility.

There are 3 levels of 2D bar code non-compliance with the BCBP standard:

Level	Description	Consequence
1 - Item formatting	The item is not formatted correctly, e.g. leading zeros or trailing blanks missing	Risk of un-readable value
2 - Item value	The value encoded is not defined, e.g. a proprietary value for compartment code or seat number	Un-readable value
3 - Field formatting	The field does not contain the correct items, or items do not have correct lenghts	Un-readable bar code

Attachment A in Resolution 792 defines the formatting of each item. Alpha-numerical items are usually left justified with trailing blanks (e.g. passenger name DESMARAIS/LUC_____), whereas numerical items usually have leading zeros (e.g. seat number 001A).

Attachment C in Resolution 792 defines the values acceptable for each item. For example, the values for the “source of check-in” are defined in this attachment, and the values for the “Baggage tag licence plate number” are in the BSM specifications, RP1745. This is also where the sizes of the variable length fields are defined.

Note on variable size fields

Item 10 (Field size of following structured message – unique) should only count for the length of the conditional data identified as unique.
Item 17 (Field size of following structured message – repeated) should only be the lenght of the conditional repeated items.
Item 6 (Field size of following variable size field) is the sum of values of item 10, item 17, plus 2 characters for items 8 and 9 and 4 characters for items 10 and 17, plus the size of item 4.

Note on item 25 – Baggage tag licence plate numbers

The deployment of CUSS Kiosks (On-Site and Off-Site) and of Web and Mobile Check-In is increasing the pressure of taking efficient delivery of the baggage at the airport. This aspect of the customer experience has shown to be a growing bottleneck which needs to be resolved. To address this challenge IATA has created the "Common Use Bag Drop" (CUBD) committee. The CUBD committee has identified one key enabler to facilitate the implementation of common baggage solutions: item 25, baggage tag licence plate number.
Item 25 contains 13 characters:

- 1: leading digit – 0 for interline tag, 1 for fallback tag, 2 for interline rush tag
- 2-4: carrier numeric code
- 5-10: carrier initial tag number (leading zeros)
- 11-13: number of consecutive tags (allows for up to 999 tags)

5.2.2. Encoding one flight leg

The M format is used for single leg or multiple legs. Encoding one leg will set the value of 'number of legs encoded' to '1'. The example below (see fig. 23) uses a fixed-length field with 60 positions, according to the BCBP standard published in June 2009.

	Item number	Element Description	Field Size	Unique / repeated	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Notes
Mandatory items	1	Format Code	1	U	M																				
	5	Number of Legs Encoded	1	U	1																				
	11	Passenger Name	20	U	D	E	S	M	A	R	A	I	S	/	L	U	C								
	253	Electronic Ticket Indicator	1	U	E																				
	7	Operating carrier PNR Code	7	R	A	B	C	1	2	3															
	26	From City Airport Code	3	R	Y	U	L																		
	38	To City Airport Code	3	R	F	R	A																		
	42	Operating carrier Designator	3	R	A	C																			
	43	Flight Number	5	R	0	8	3	4																	
	46	Date of Flight	3	R	2	2	6																		August 14th
	71	Compartment Code	1	R	F																				
	104	Seat Number	4	R	0	0	1	A																	
	107	Check-In Sequence Number	5	R	0	0	2	5																	
	113	Passenger Status	1	R	1																				
	6	Field size of following variable size field	2	R	0	0																			0 in Decimal = 00 in Hexidecimal
Conditional items - Flight segment #1	8	Beginning of version number	1	U																					
	9	Version number	1	U																					
	10	Field size of following structured message - unique	2	U																					
	15	Passenger Description	1	U																					
	12	Source of check-in	1	U																					
	14	Source of Boarding Pass Issuance	1	U																					
	22	Date of Issue of Boarding Pass	4	U																					
	16	Document Type	1	U																					
	21	Airline Designator of boarding pass issuer	3	U																					
	23	Baggage Tag Licence Plate Number (s)	13	U																					
	17	Field size of following structured message - repeated	2	R																					
	142	Airline Numeric Code	3	R																					
	143	Document Form/Serial Number	10	R																					
	18	Selectee indicator	1	R																					
	108	International Documentation Verification	1	R																					
	19	Marketing carrier designator	3	R																					
	20	Frequent Flyer Airline Designator	3	R																					
	236	Frequent Flyer Number	16	R																					
	89	ID/AD Indicator	1	R																					
	118	Free Baggage Allowance	3	R																					
	4	For individual airline use	Var	R																					
Security	25	Beginning of Security Data	1	U																					
	28	Type of Security Data	1	U																					
	29	Length of Security Data	2	U																					
	30	Security Data	Var	U																					

Figure 23 - Format M example one flight leg

5.2.3. Encoding multiple flight legs

In the example below 2 flight legs are encoded, setting the value of 'number of legs encoded' to '2' (see fig. 24).

	Item number	Element Description	Field Size	Unique / repeated	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Notes
Mandatory items	1	Format Code	1	U	M																				
	5	Number of Legs Encoded	1	U	2																				
	11	Passenger Name	20	U	D	E	S	M	A	R	A	I	S	/	L	U	C								
	253	Electronic Ticket Indicator	1	U	E																				
	7	Operating carrier PNR Code	7	R	A	B	C	1	2	3															
	26	From City Airport Code	3	R	Y	U	L																		
	38	To City Airport Code	3	R	F	R	A																		
	42	Operating carrier Designator	3	R	A	C																			
	43	Flight Number	5	R	0	8	3	4																	
	46	Date of Flight (Julian Date)	3	R	2	2	6																		226 = August 14th
	71	Compartment Code	1	R	F																				
	104	Seat Number	4	R	0	0	1	A																	
	107	Check-In Sequence Number	5	R	0	0	2	5																	
	113	Passenger Status	1	R	1																				
	6	Field size of following variable size field	2	R	4	C																			76 in Decimal = 4C in Hexadecimal
Conditional items - Flight segment #1	8	Beginning of version number	1	U	>																				
	9	Version number	1	U	3																				
	10	Field size of following structured message - unique	2	U	1	8																			24 in Decimal = 18 in Hexadecimal
	15	Passenger Description	1	U	1																				
	12	Source of check-in	1	U	W																				
	14	Source of Boarding Pass Issuance	1	U	W																				
	22	Date of Issue of Boarding Pass (Julian Date)	4	U	6	2	2	5																	6 = 2006, 225 = August 13th
	16	Document Type	1	U	B																				
	21	Airline Designator of boarding pass issuer	3	U	A	C																			
	23	Baggage Tag Licence Plate Number (s)	13	U	0	0	8	5	1	2	3	4	5	6	0	0	3								
	17	Field size of following structured message - repeated	2	R	2	9																			41 in Decimal = 29 in Hexadecimal
	142	Airline Numeric Code	3	R	0	1	4																		
	143	Document Form/Serial Number	10	R	1	2	3	4	5	6	7	8	9	0											
	18	Selectee indicator	1	R																					Not applicable to that flight
	108	International Documentation Verification	1	R	1																				
	19	Marketing carrier designator	3	R	A	C																			
	20	Frequent Flyer Airline Designator	3	R	A	C																			
	236	Frequent Flyer Number	16	R	1	2	3	4	5	6	7	8	9	0	1	2	3								
	89	ID/AD Indicator	1	R																					
	118	Free Baggage Allowance	3	R	2	0	K																		
	4	For individual airline use	Var	R	L	X	5	8	Z																

Mandatory items - Flight segment #2	7	Operating carrier PNR Code	7	R	D	E	F	4	5	6																
	26	From City Airport Code	3	R	F	R	A																			
	38	To City Airport Code	3	R	G	V	A																			
	42	Operating carrier Designator	3	R	L	H																				
	43	Flight Number	5	R	3	6	6	4																		
	46	Date of Flight (Julian Date)	3	R	2	2	7																			227 = August 15th
	71	Compartment Code	1	R	C																					
	104	Seat Number	4	R	0	1	2	C																		
	107	Check-In Sequence Number	5	R	0	0	0	2																		
	113	Passenger Status	1	R	1																					
	6	Field size of following variable size field	2	R	2	D																				45 in Decimal = 2D in Hexadecimal
Conditional items - Flight segment #2	17	Field size of following structured message - repeated	2	R	2	9																				41 in Decimal = 29 in Hexadecimal
	142	Airline Numeric Code	3	R	0	1	4																			
	143	Document Form/Serial Number	10	R	0	9	8	7	6	5	4	3	2	1												
	18	Selectee indicator	1	R																						
	108	International Documentation Verification	1	R	1																					
	19	Marketing carrier designator	3	R	A	C																				
	20	Frequent Flyer Airline Designator	3	R	A	C																				
	236	Frequent Flyer Number	16	R	1	2	3	4	5	6	7	8	9	0	1	2	3									
	89	ID/AD Indicator	1	R																						
	118	Free Baggage Allowance	3	R	2	P	C																			
	4	For individual airline use	Var	R	W	Q																				
Security	25	Beginning of Security Data	1	U	^																					
	28	Type of Security Data	1	U	1																					
	29	Length of Security Data	2	U	6	4																				100 in Decimal = 64 in Hexadecimal
	30	Security Data	100	U	G	I	W	V	C	5	E	H	7	J	N	T	6	8	4	F	V	N	J	9		
					1	W	2	Q	A	4	D	V	N	5	J	8	K	4	F	0	L	0	G	E		continued from previous row
					Q	3	D	F	5	T	G	B	N	8	7	0	9	H	K	T	5	D	3	D		continued from previous row
					W	3	G	B	H	F	C	V	H	M	Y	7	J	5	T	6	H	F	R	4		continued from previous row
					1	W	2	Q	A	4	D	V	N	5	J	8	K	4	F	0	L	0	G	E		continued from previous row

Figure 24 - Format M example two flight legs

5.2.4. Version management

Resolution 792 was initially published in 2005. In the initial version two formats existed: M and S. This initial M format had a structure containing 60 characters: this structure remained unchanged in all following versions, including the latest in 2009.
The M format published in 2007 had the same mandatory structure as the initial M format, but included also conditional items and a version number, set to 1. In 2007 the S format was removed from the standard.
In 2008, the standard was extended to mobile phones and some conditional items of M format were added or modified, setting the version number to 2.
In 2009, the version 3 of the BCBP standard includes a new optional security field, to be used where a digital signature is required.

Recommendation

The BCBP Working Group recommended that:

- The effective date of any standard is the date of publication (June), unless mentioned otherwise.
- Only the latest version is published in the manual, currently (June 2009) version 3. Version 1 and 2 are still effective until terminated by the JPSC, like ATB2.
- Airlines should support the current version and the previous version - currently 2 and 3 - to allow for stakeholders to implement the new version.
- Airlines should support a new version no later than 1 year after it is effective.
- Future versions will contain the year of publication. In case there are several versions in the same year the 2nd version of the year would be 2008-2

5.2.5. E-Ticket Itinerary receipt

The BCBP standard allows including a 2D bar code on the ET Itinerary Receipt. The mandatory data should all be populated except seat number and sequence number, which are available only at time of check-in. However airlines offering seat pre-assignment are able to populate the seat number. In the conditional data, only the item 16 ‘Document type’ must be populated, to indicate that the document is an Itinerary Receipt, not a Boarding Pass. All the other fields are optional.
Resolution 722f – Electronic Ticket Airline (6.2.1.7) and Resolution 722g – Electronic Ticket Neutral (6.2.3.8) confirm this possibility from a ticketing perspective.

> Optionally a 2D bar code compliant with Resolution 792 "Bar Coded Boarding Pass" may be printed, in order to make the itinerary receipt machine readable at a self-service kiosk for example. The items of the bar code should be populated as much as possible with the data available in the system at the time of issuance. The item 16 should be used and contain the value "I" standing for "Itinerary Receipt" so that the check-in application can recognise that the bar code is printed on an Itinerary Receipt and not on a Boarding Pass.

Figure 25 - Extract from Resolution 722f and 722g

5.2.6. Digital signature

The security field is optional and to be used only when required by the local security administration. This field contains a digital signature of variable length, the length of the field and a type of security data (that defines the algorithm used).
The digital signature is part of a public key infrastructure (PKI): the airlines own their private key, used to generate the digital signatures, and distribute their public keys to third parties who need to verify the signatures.

Each signature is unique to an airline and a boarding pass: if the bar code data are modified, they won't match the signature any more. Moreover a signature cannot be generated without the private key. Consequently only an airline can generate a boarding pass with a digital signature and the bar code cannot be tampered with.

Notes

- The bar code data (mandatory, optional and individual airline use fields) remain unchanged and can be read regardless the digital signature. The security field is a separate field that enables a third party to verify that the bar code data were not tampered with.
- The requirements for the digital signature (algorithm, etc.) are provided by the local authorities that are mandating the signature. IATA is only providing the structure for the signature to be stored in the bar code.

5.2.7. BCBP XML

The BCBP Working Group owns the business requirement document that defines the exchange of BCBP data between an airline system and a third party, e.g. an airport security checkpoints. The BCBP standard notes that IATA PADIS XML message standards shall be used for the exchange of BCBP data. PADIS is defined under Resolution 783 – Passenger and Airport Data Interchange Standards.

The message sent by the authority scanning the BCBP contains a header and the bar code data, as oulined below. Some items are mandatory because they enable to identify the originator of the message.

Field Name	M / O	Description	Example	Format	Subtype	Note
TRANSACTION_DATE_TIME	M	Message creation date/time (includes seconds and sub-seconds)		xsd:dateTime		Expressed in UTC time or local time.
AIRPORT_CODE	M	Airport 3 letter code where the BCBP is scanned	LHR	string		
TERMINAL_CODE	O	Local code identifying an airport terminal	T3	string		Terminal identification where multiple terminals exist under one airport code
ORIGINATOR_TYPE	M	Type of entity that scanned the BCBP and is sending the message	Security	string	IATA codeset	Airport, Security, Ground Handler, Lounge, Parking, Hotel…
ORIGINATOR LOCATION	O	Location of entity performing the scan functions	Point A	1-70an		e.g., Lufthansa Senator Lounge
DELIVERING_SYSTEM	O	Identifier of the delivering system of the data if different from the originator (e.g. same system provided to two carriers on different contracts, need to identify which participant is sending the message)	TBD	TBD		Inverted form of the domain name. ex: gov.ca.sfo or com.united
TRANSACTION IDENTIFIER	M	A unique identifier to relate all messages within a transaction	Integer > 0	String 32		Used by sender to uniquely identify each message sent
AGENT ID	O	Agent sign id				This would be the agent signed in using the system doing the scanning ,when available
BARCODE_DATA	M	Data contained in the barcode		Base64binary		Some non printable data

The airline system receives a message and sends back a reply, as outlined below.

Field Name	M / O	Description	Example	Format	Subtype	Note
Reply	M	Yes or No		Boolean		
Reason code	M*	Code for the reason of a 'no' reply		Integer		
Free text	O	Free text provided by the airline		String		

Notes

- The scope of the BCBP XML business requirements document is to define the format of messages exchanged between an airport security checkpoint and an airline system when a BCBP is scanned.
- The scope is not to define how security agents decide which passenger can go through the checkpoints and how to communicate their decisions with the passengers. The BCBP XML messages do not interfere with the existing security processes.

The BCBP XML schema is on the PADIS extranet:
http://extranet2.iata.org/sites/padis_xml_typex_releases/default.aspx

Recommendations

- The BCBP XML schema is published to ensure that the airlines and third parties who wish to exchange BCBP data always do it in a consistent manner, to avoid uncessary duplication of efforts, potential misinterpretations and associated costs.
- However the development of data exchange should be based on a multilateral local agreement. The BCBP XML schema is not encouraging such agreements, but wherever those agreements take place it recommends the most efficient implementation.
- The message sent back by the airline system validates the authenticity of the bar code and the readiness of the passenger to fly. However the decision to let the passenger go through the airport security checkpoint remains an airport security's decision. It is also the airport security's decision to provide the passenger with explanation in case of refusal.

5.3. Boarding pass

5.3.1. Boarding pass history at a glance

The industry defined the ATB2 in 1991 to replace the Transitional Automated Ticket (TAT) created in 1981.

American Airlines started using 1D bar codes (code 128) on boarding passes in 1998 at self-service and curbside check-in (see fig. 25). This was expanded to include flight check-in on aa.com as well.

Figure 26 - Boarding pass with a proprietary 1D bar code courtesy of American Airlines

Alaska Airlines started putting 2D bar codes on their web boarding passes in 1999, and these passes allow up to four segments to be printed on one piece of paper, all in one bar code.

IATA approved a standard for 2D bar codes on boarding passes in November 2004. Resolution 792 is known as the Bar Coded Boarding Pass standard.

5.3.2. Check-in data

When the boarding pass is issued at check-in, the IATA standard requires the input of some specific data. Here is a typical flow of data introducing the PNR code (see fig. 22).

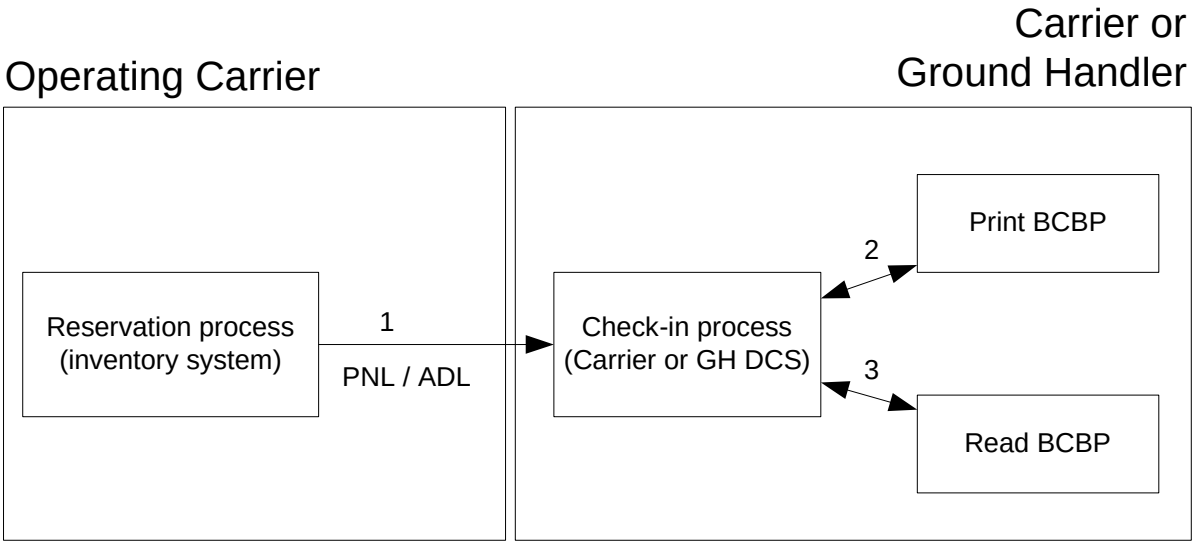


Figure 27 - Data flow of passenger information at check-in

1. The reservation process of the operating carrier sends the Passenger Name Records (PNR) to the check-in process
2. The check-in process enables the printing of the BCBP, either at check-in desk, kiosk or on the web. Once the passenger is checked-in, a message is sent back to the check-in process
3. The BCBP are read at the gate, messages are sent back as flown

The content of the Passenger Name List (PNL) and the Additions and Deletions List (ADL) are described in the Recommended Practice 1708.

5.3.3. Layout of the boarding pass

Unlike Resolution 722c for ATB (see fig. 26), Resolution 792 for BCBP does not define a standard layout of the boarding pass. However the BCBP layout does have some constraints in order to guarantee readability. As layouts may vary from one airline to another, staffs need to be trained to read and accept the new documents.

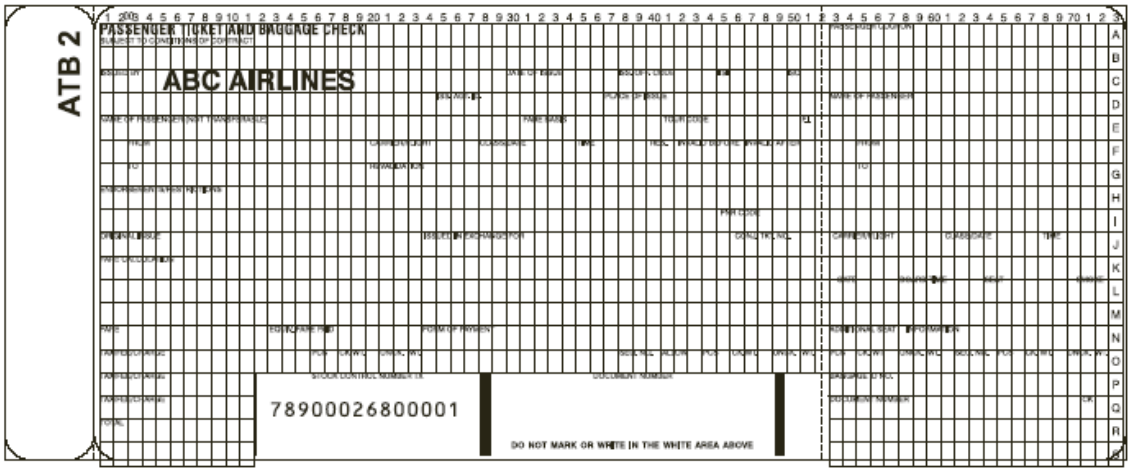


Figure 28 - ATB layout as specified in Resolution 722c

Leveraging on ATB back slip advertisements, BCBP offers a new branding opportunity for carriers. As the layout is free format and the BCBP printed at home and carried for 24 hours, it is a good opportunity to display practical information as well as advertisements. Figure 27 shows an example of how the back of the ATB may be used today to display advertising or services.

Figure 29 - Back of an ATB card with magnetic stripe courtesy of JAL

The layout of the boarding pass is not defined in the standard. The sections below provide recommendations to facilitate the implementation and interoperability of BCBP.

5.3.4. Mandatory text

Recommended Practice 1706d, attachment A defines mandatory fields to be printed on a boarding pass (see fig. 28).

Field	Comments
Marketing Carrier	
Passenger name	
Sequence #	
From	Airport name + code
To	Airport name + code
Class	Full name
Ticket type	Paper or Electronic
Flight #	
Date	Calendar DD-MM, not Julian!
Departure time	HH:MM
Boarding time / Gate closes	HH:MM
Seat	
Boarding Gate	

Figure 30 - Mandatory text on a boarding pass

It is recommended to use a bigger font for:

- Key passenger information such as boarding time and seat number
- The ET logo so that the ground handlers do not look for the coupon

5.3.5. Size of the boarding pass

Three sizes are currently used by IATA member airlines: the ATB size, the A4 or letter size and the identification card size (see illustrations in Appendix).

Size	Description	Dimensions
ATB	Defined in Resolution 722e, par. 6.6.2	20.32 x 8.23 cm 8 x 3.25 inch
A4 / Letter	- The international standard is ISO 216, which defines A4, amongst other - In the US, Letter is the most commonly used size	A4: 21 x 29.7 cm Letter: 8 1/2 x 11 inch
Identification card	Defined in ISO 7810. ID-1 is commonly used for banking cards, driving licenses, loyalty cards and business cards	8,56 x 5.40 cm 3.37 x 2.12 inch

There are several advantages to this smaller size and one potential drawback. Passengers will find it easier to store a credit card in their wallet (no need to fold) than folding an A4 page twice (which is still more convenient than ATB stock that cannot be folded and does not fit in a pocket). It also saves paper at the kiosk by 75% or increases the paper capacity of the kiosk by 300%. The limit to this size is the quantity of information to be printed and the space available of the bar code.

5.3.6. Boarding pass for infants

Airlines have different procedures regarding boarding passes and infants. When an adult travels with an infant, some airlines deliver one boarding pass for both the adult and the infant, whereas some airlines deliver two boarding passes, one for the adult and one for the infant.
In the first case, item 15 (Passenger description) should be set to the value 6 (adult with infant), and in the second case, the value would be 0 for the adult boarding pass and 4 for the infant boarding pass.
This item may be useful in particular for security checkpoints and self boarding gates. Security checkpoints that require scanning one boarding pass for every individual, adult or infant, and are looking for duplicates, are likely to reject the infant on the ground that the same name / seat / flight was already scanned (from the adult boarding pass). Item 15 may prevent this issue. At a self boarding gate, the item 15 set to 6 may allow a passenger carrying an infant to use the gate, rather than scanning two boarding passes.

Recommendation

It is recommended that:

- Airlines issuing a separate boarding pass for infants enter INF in the seat number
- Airlines issuing a unique boarding pass for the adult travelling with an infant enter the value 6 in the item 15 of the bar code

5.4. Web BCBP

BCBP and web check-in are closely related. Web check-in is a service to customers that will deliver cost savings to airlines as soon as the boarding pass is not collected at an airport check-in desk anymore. However a boarding pass printed at home without a bar code does not help reducing costs because it does not automate the boarding process. The real value of web check-in is delivered when a boarding pass is printed from the web site and the bar code is read at the boarding gate. This is the purpose of the BCBP standard

5.4.1. Web page example

Web check-in is typically made available 24 hours before departure, compared with 2 or 3 hours before departure at the check-in desk (see fig. 29). There is no clear standard for check-in hours: it depends on airport, airline and country.

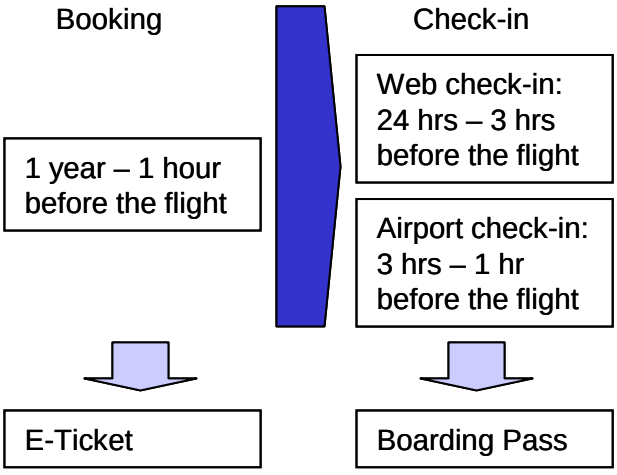


Figure 31 - Web check-in timeframe

The same interface as on the kiosk for seat selection can be offered (see fig. 30). The web site should deliver the BCBP in a printer-friendly format, such as an Adobe Portable Document Format (PDF).

Figure 32 - Example of web check-in seat selection courtesy of British Airways

If the customer chooses to print his/her own boarding pass, he/she may proceed directly to the fast bag drop point or even to security check if travelling with a carry-on bag only. If any printing problem occurs or the BCBP is lost, the customer should be offered an alternative solution, such as re-printing a boarding pass at a kiosk in the airport.

The penetration of Internet is rapidly growing. Two-thirds of the population in North America has access to the Internet, one third in Europe and almost 10% in Asia, for a total of one billion Internet users by the end of 2005. Compared to the number of airline passengers, Internet has become a significant distribution channel and service tool. Internet growth is driving web check-in development.

This example shows the identification page for online check-in (see fig. 31). It clearly displays the check-in process (1-select reservation, 2-reservation details, 3-print boarding pass) and the progress (step 1 highlighted). Identification field options are the passenger name, the “record locator” (PNR) or the login using the frequent flyer number.

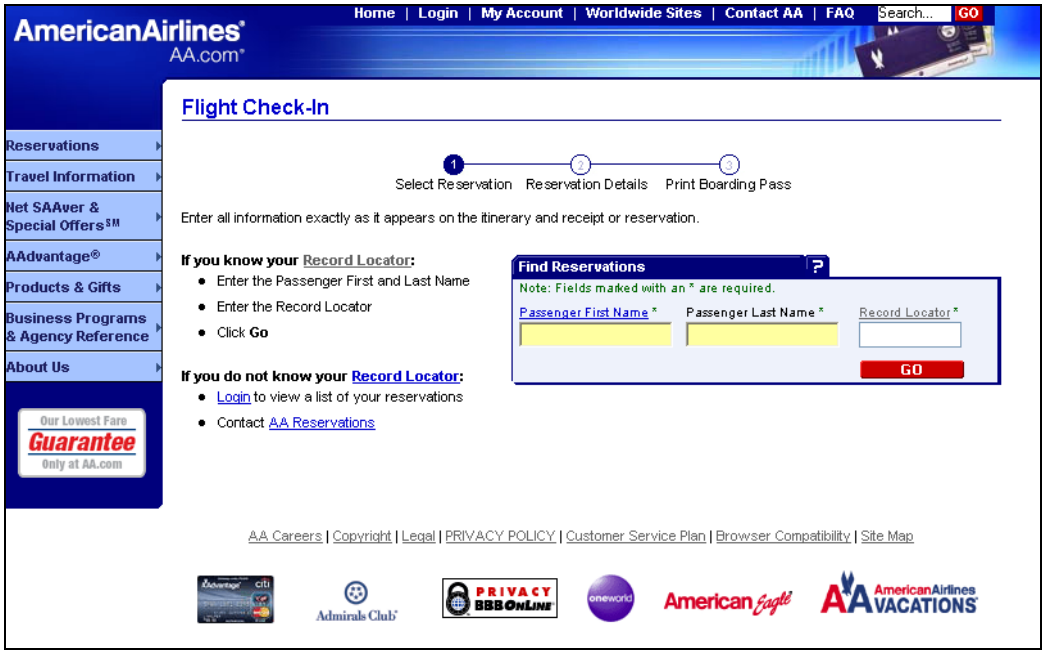


Figure 33 - Screen shot of flight check-in page Courtesy of American Airlines

5.4.2. Architecture

The web server, through a connection to the DCS host, displays the check-in web page. The same host enables customers to check-in at a kiosk in the airport (see fig. 32).

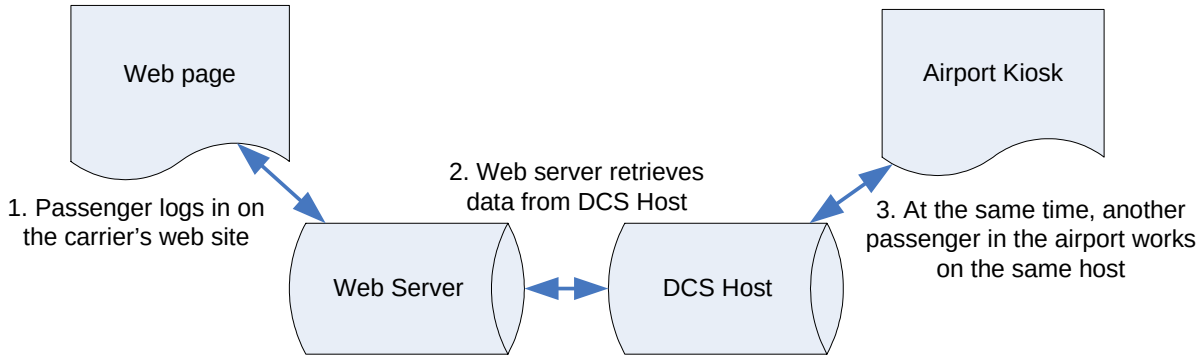


Figure 34 - Architecture of DCS host connection to web server

Alternatively, the kiosk could run a web-based application and communicates directly with the web server that communicates with the host.

5.4.3. Features

Some recommended features include:

- Identification: a selection of last name, frequent flyer ID, flight number or credit card number
- Tutorial: how to check-in online and how to print a BCBP at home
- Trial printing: test the printer at home
- List of stations: from which station one can use web check-in and home printed BCBP
- Conditions: open hours, eligibility to use BCBP (e.g. children, ET, bags)
- Frequently asked questions

5.4.4. Process

Web check-in is often presented by airlines as the fastest and easiest way to check-in. It requires only 3 simple steps:

1- Log in,
2- Select the flight, the passenger and the seat,
3- Print the Boarding Pass.

Some airlines add services such as:

- Receive the boarding pass by fax,
- Request upgrades,
- Edit Frequent Flyer Programme number.

Once the passenger is checked-in, it is recommended to send a confirmation by email, including the next steps, e.g. where to go, what to do with luggage, what if the printer did not work (see example in fig. 33).

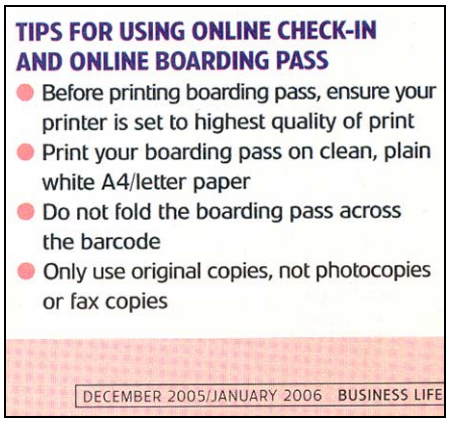


Figure 35 - Tips for passengers using web check-in courtesy of British Airways

5.5. Mobile BCBP

Web and mobile check-in offer passengers the option to receive a 2D bar code on their mobile phone, i.e. get a mobile BCBP (see fig. 34). The concept is similar to paper BCBP, a bar code being displayed on the screen of the mobile phone instead of being printed on paper. Several carriers have already implemented Mobile BCBP.

Figure 36 - Example of Mobile BCBP courtesy of Delta airlines

The BCBP standard published in June 2008 extends the scope of BCBP to mobile devices and introduces 3 new symbologies for use on mobile phones.

5.5.1. Selecting a symbology

New symbologies, known as matrix codes, were needed because PDF417 is not adapted to being displayed on a screen. There are dozens of matrix codes available in the market. IATA has selected 3 symbologies because they are all ISO standard available in the public domain, widely used around the world, however IATA has no preference for one of the 3 symbologies (see section 5.1).

The arguments for each symbology are:

- Aztec: no need for a quiet zone, finding pattern in the middle, both should make it easier to read on mobile
- Datamatrix: well supported and used in various industries
- QR (quick response): quick to read, widely used in Asian countries

Airlines may choose any of them according to their preferences. The data encoded in the bar code will be the same, independently of the bar code selected. The scanners should be able read any of them, and they are equally supported by handsets.

5.5.2. Sending a 2D bar code to a mobile device

Sending a 2D bar code to a mobile device depends on:

- The mobile network
- The handset
- The transmission (SMS / MMS / Wap push / email/ application)

The tables below evaluate the pros and cons of the 5 potential transmission channels, not including price and penetration, which depend on each country.

SMS (Short Message Service)

Pros	Cons
Consumers knowledgeable about SMS Good customer delivery experience High percentage of devices are SMS compatible	Limitation in data content, may be possible to send a bar code with 60 characters (M 1 leg without conditional data), impossible to send a bar code with conditional data or multiple legs Bar code size optimization related to handset type is needed Not possible in Canada/U.S due to carrier and technology constraints

MMS (Multimedia Messaging Service)

In this scenario the 2D bar code is embedded as an image in the MMS.

Pros	Cons
Robust enough to incorporate airline branding Good Customer delivery experience	Regional differences in coverage Some countries may require special permissions to deliver MMS.

Wap push (Wireless Application Protocol)
In this scenario, a link is sent by SMS. The passenger clicks on the link, which opens a connection to download a page on the phone, containing the 2D bar code.

Pros	Cons
Robust enough to incorporate airline branding No content limitation (within screen display and device memory)	Need mobile data access to download

Email
In this scenario, the email contains all the flight related information, as well as the 2D bar code as attachment.

Pros	Cons
Robust enough to incorporate airline branding No content limitation (within screen display and device memory)	Needs bar code optimisation for screen Low control over how the barcode is displayed Limited support on mobile devices

Application
In this scenario the passenger has installed an application on the phone. The application has to update the flight details and generate the 2D bar code.

Pros	Cons
2D bar code generated by the application, adapted to the size of the screen Robust enough to incorporate airline branding No content limitation (within screen display and device memory)	Requires upfront installation by the user Limited support on mobile devices

5.5.3. Size of the 2D bar code displayed

The number of cells of the bar code depends on the number of characters encoded:

- Number of chars * symbology = number of cells

The number of pixels used depends on the number of pixels available on the handset.

- Number of pixels per cell * number of cells = number of pixels

The physical size of the bar code displayed on the handset depends on the resolution of the handset, i.e. the size of each pixel

- Size of pixel * number of pixels = physical size of bar code

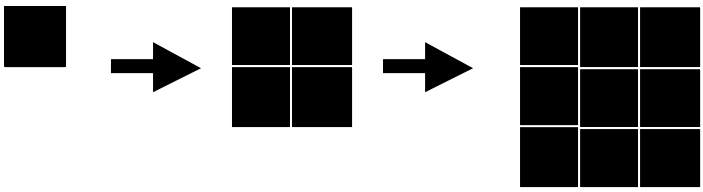


Figure 37 - One bar code cell displayed in 1, 2 or 3 pixel width

It is possible to optimize the size of bar code by increasing the number of pixels per cell (see fig. 35). Reading a bigger bar code should be easier for a scanner, although tests performed by IATA partners did not validate it. If the bar code is smaller due to the high resolution of a particular device, then it may not scan.

5.5.4. Reading the 2D bar code from the handset

There are several parameters to consider:

- The size of the screen: must be large enough to fit the 2D bar code
- The features enabled: MMS/email/wap

It is recommended to test handsets and allow only customers handsets that are supported. Other recommendations include:

- The backlight on the handset is required.
- The passenger should hold the phone.

All scanners are not equal for reading 2D bar codes from mobile phones. There are flat-bed scanners and mounted scanners:

2D BC scanner	Flat bed	Mounted	Comments
Fix length focus	YES	NO	Higher reading speed
Line of sight of BC	NO	YES	Faster detection of BC

When scanning the bar code, the resolution of the 2D bar code matters, e.g. a module read by IER must be at least 0.25mm.

5.5.5. Processing mobile BCBP at the gate

Some airlines have chosen to print a receipt at the gate. This may be done during the transition, but it is not really paperless.

Several reasons have been advanced for issuing a receipt:

- Passenger convenience, who likes to keep a receipt
- Crew convenience, who prefer to see the receipt than read from a phone
- Airline policy, that requires to switch off mobile phone when boarding

Whichever the reason, the goal of mobile BCBP is to go paperless.

Retrieving the 2D bar code before boarding may be a challenge depending on how the 2D bar code was received on the handset:

- SMS / MMS: the message is saved and retrieved from the inbox at the gate
- Wap push: the page is downloaded at the time of check-in and saved, and retrieved from saved pages at the gate
- Email: the email is stored and retrieved from the inbox at the gate

5.5.6. Other industries

The Swiss Railways provide such a service to travellers owning a mobile phone. The bar code (see fig. 36) is sent to the mobile phone via MMS and scanned in the train.

Figure 38 - Bar code displayed on the screen of a mobile phone courtesy of SBB CFF

5.6. Printers

A General Purpose Printer (GPP) can print images and bar codes (see fig. 37). It replaces or complements the ATB printer and can also print bag tags. A GPP comes in different sizes and technologies and usually costs less than an ATB printer. Recent personal inkjet or laser printers, used at home or office, have sufficient resolution to print the quality required by BCBP.

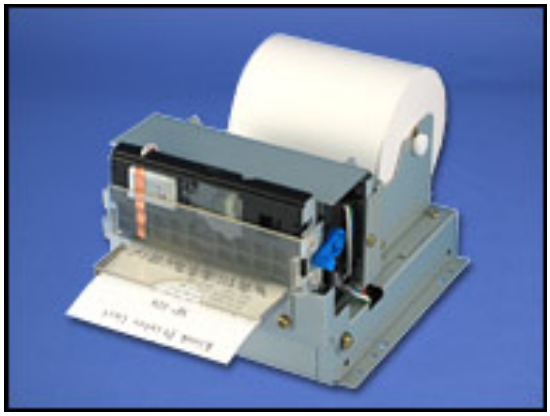


Figure 39 - Example of a printer for kiosk

The printing of BCBP should not be underestimated. It impacts the data that will be encoded, the printer and the paper. Those factors may vary a lot from one station to another and require print quality tests, as described in this section.

5.6.1. Presentation of printers

Resolution 722e defines the 5 printing techniques (see fig. 38). The direct thermal printers are adapted to the printing of bar coded boarding passes in an airport environment. Kiosks are typically equipped with 200 dpi and more direct thermal printers, capable of printing 2D bar codes.

Printing technique	Description	2D bar code
Direct Thermal	Direct thermal printers with a minimum resolution can print 2D bar codes	OK
Thermal Transfer	multi-pass printer ribbons may not provide the quality required, as they are designed for human readable characters.	Single pass ribbon only
Laser	Ink jet and laser printers, typically used at home, are capable of printing an adequate quality 2D bar code, provided that they have a high enough resolution, such as 600 dpi	OK
Ink Jet		High end printers only
Dot Matrix Impact	Impact printers are not designed to print 2D bar	NO

	codes on boarding passes	

Figure 40 - Printing techniques supporting 2D bar codes

5.6.2. Thermal printers

There are two thermal printing methods: 'direct thermal' and 'thermal transfer'. Each method uses a thermal print head that applies heat to the surface being marked.

- Thermal transfer printing uses a heated ribbon to produce durable, long-lasting images on a wide variety of materials.
- No ribbon is used in direct thermal printing, which creates the image directly on the printed material. Direct thermal paper stock is more sensitive to light, heat and abrasion, which reduces the life of the printed material.

Direct thermal printing uses chemically treated, heat-sensitive paper stock that blackens when it passes under the thermal print head. Direct thermal printers have no ink, toner, or ribbon. Their simple design makes thermal printers durable and easy to use. Because there is no ribbon, direct thermal printers cost less to operate than inkjet, laser, impact, and thermal transfer printers. Most mobile printers use direct thermal technology.

In thermal transfer printing, a thermal print head applies heat to a ribbon, which melts ink onto the material to form the image. The ink is absorbed so that the image becomes part of the paper stock. This technique provides image quality and durability that is unmatched by other on-demand printing technologies. The specific label material and ribbon must be carefully matched to ensure print performance and durability.

5.6.3. ATB Technical Specs

The Association of European Airlines (AEA) manages the ATB technical specifications. The ATB specs define the concept of parametric tables or pectabs, which are used by all ATB printers and readers.

The latest available ATB technical specs were amended in December 2007. Since 2002, the AEA specs enable users to add a PDF417 bar code to the boarding passes. All ATB printers that have upgraded their firmware to comply with AEA2002 can print the BCBP standard bar code (see fig. 39).

Figure 41 - Example of direct thermal ATB printer that can print PDF417 courtesy of Intermec

A future amendment of the ATB specs is discussed as we write this document. The amendment would enable a host system to request information from the device, such as type of printer or firmware.

In 2006 roughly 80% of the ATB printers can print 2D bar codes or can be upgraded to print 2D bar codes (see fig. 40).

2D bar code capability	ATB printers (examples)	Installed base (estimation)
Print 2D bar codes	IER 567 Intermec PF4i	80%
Can be upgraded	Fujitsu 9840 IER 557	
Not 2D bar code capable	Dassault BPR 600 IER 457	20%

Figure 42 - 2D bar code capable ATB printers installed base

5.6.4. Paper specifications

Paper specifications for kiosks are described in Recommended Practice 1706e including:

- Paper Grammage[1]
- Thickness
- Brightness
- Thermal image optical density
- Thermal image stability
- Plasticizer resistance
- Bar Code scanning
- Print head residue

Note: *to identify direct thermal paper, just scratch the surface. If it scratches, it shows the direct thermal layer. If not, it means that the printer is using a ribbon with thermal transfer.*

5.6.5. Bar code print quality

The coding of the PDF417 requires several parameters. It is recommended to test the quality of printing with several test flights, on several readers and papers, before using the bar code in production. Here is some guidance on the main parameters:

- Narrow bar (element) size: from 0.25 mm (0.010 in; 10 mil).
- Height: minimum of 6.35 mm (0.254 in).
- Ratio: Wide element to narrow element — not less than 3:1.
- Quiet zone — as measured on the face material:
    - Minimum: 7 times narrow bar (element): 1.778 mm (0.070 in).
    - Preferred 10 times narrow bar (element): 2.54 mm (0.100 in).
- Print Contrast Signal: not less than 80% at a wavelength of 633 nm.

During the test phase, it is recommended to analyze the bar code print quality. ISO/IEC 15415 standard defines the “bar code print quality test specification – Two-dimensional symbols”. The test provides quality grades on various parameters, using scales with grades from 0 to 4 (see fig. 41).

Codeword Yield	Grade
≥ 71%	4
≥ 64%	3

[1] Paper grammage is a metric measure of paper weight based on the same square meter sheet of paper, regardless of paper grade.

≥ 57%	2
≥ 50%	1
< 50%	0

Figure 43 - Example of grading scale for measuring print quality of a PDF417 bar code

The kind of parameters to be analysed are: codeword yield, symbol contrast, modulation, axial non-uniformity, grid non-uniformity, unused error correction.

The result of a bar code check according to the test procedure would tell the grades for each of the parameters (see fig. 42).

```
  Webscan TruCheck
Mon 18-Jan-1999 08:26:24PM
Firmware 2.68B

UCC: Not an allowed symbology


Decoded PDF Data:


Overall ANSI Grade: A(3.8)

ANSI/ISO Parameter Avg Values:
1.UEC:    100% A        Pass
2.Rl/Rd: 90/9  A        Pass
3.SC:      81% A        Pass
4.MinEC:   61% A        Pass
5.MOD:     75% A        Pass
6.Def:      2% A        Pass
7.DCD:   10/10 A        Pass
8.DEC:     84% A        Pass
9.MinQZ:   10  A        Pass
Results of each scan:

      M
      i         D
      n   M     e         G
 S  E R   i     c         r
 C  D e   n M D o D       a
 A  G f S E O E d E Q     d
 N  E l C C D F e C Z     e
==  = = = = = = = =       =
 1. A A A A A A A A A  -> A
 2. A A A A A A A A A  -> A
 3. A A A A B A A A A  -> B
 4. A A A A A A A A A  -> A
 5. A A A A A A A A A  -> A
 6. A A A A B A A A A  -> B
 7. A A A A A A A A A  -> A
 8. A A A A A A A A A  -> A
 9. A A A A A A A A A  -> A
10. A A A A A A A A A  -> A
```

```
General Characteristics:

Aspect Ratio = 3.2
BWG= 8%
BWG= +1.2 MIL
Nominal X Dim = 15.0 mil
PCS = 90.0%
MRD = 52% (68-16)


Symbol Matrix Info:
PDF Decode:  36 CWs
12 Rows by 3 Cols
Security Level: 2
Total Error Detection
 and Correction Code Words: 8
Error Correction Budget: 6
Codewords decoded incorrectly: 0
Codewords not decodable: 0
Error Correction used: 0
Error Correction not used: 6
Unused Error Correction Grade = A
Start/Stop ANSI/ISO Param Grade = A
 3.8/06/650

Raw PDF Codewords:
 1.  000  019  057
 2.  718  003  182
 3.  808  281  842
 4.  120  056  000
 5.  240  068  840
 6.  841  780  002
 7.  238  728  582
 8.  806  806  806
 9.  806  806  900
10.  900  287  106
11.  730  280  607
12.  165  897  701
  *=Fixed by Error Correction
  * (Decoded Wrong)
  #=Filled in by Error Correction
  #=(Not Decoded)
```

Figure 44 - Verification of the print quality of a PDF417 bar code

5.7. Readers

The 2D bar code requires specific equipment, known as a Bar Code Reader, to decode it. It replaces or complements the Magnetic Stripe Reader. If existing equipment can read 1D bar codes, the vendor may be able to retrofit them to read 2D. Vendors also retrofit ATB readers with a 2D bar code reader to provide dual mode readers (example see fig. 43).

Figure 45 - Example of ATB and bar code reader courtesy of Unimark

A key challenge in the deployment of BCBP is to ensure that boarding gates are 2D bar code enabled.

There are several stages at the airport where the BCBP can be read:

- At a gate
- At a lounge
- At duty-free
- At security
- At a kiosk
- At bag-drop

The main purpose of the boarding pass is to identify the passenger boarding an aircraft. It may also be used for passengers accessing a service or a restricted area.

5.7.1. Decoding capabilities

An airline rolling out BCBP should make sure that the readers available across its stations could read the IATA standard. Although PDF417 is likely to be read by laser readers, some laser readers may not be compatible (see fig. 44).

Reading technologies	ATB	Laser 1D	Laser 2D	Imager
Cost level	High	Low	Low	Medium
Installed base	Wide	Limited	Limited	Very Limited
Can read ATB	Yes	No	No	No
Can read 1D	No	Yes	Yes	Yes
Can read PDF417	No	No	Yes	Yes
Can read 2D matrix	No	No	No	Yes

Figure 46 - Comparison of bar code reading technologies

Notes:

- *ATB readers can be retrofitted with a BCBP reader. Vendors offer such a dual-mode reader in order to go through the transition phase where 2 standards coexist.*
- *1D Bar Code reader may not be able to read 2D Bar Code BCBP: a software upgrade may be enough in some cases.*
- *2D Bar Codes readers are imaging devices, using CMOS like in digital cameras. The software processes the images and decodes the symbols.*

Each reading material has different capabilities, even within a vendor's product line (see fig. 45). To know whether it is compatible, refer to the exact product reference and make sure it does read PDF417.

Dual Reader	ATB	1D	PDF417	2D Matrix
IER 627 BC	Yes	Yes	Yes	No
IER 801 BC	Yes	Yes	No	No
Unimark EC2000	Yes	Yes	Option	Option
Unimark EC2000 SE	Yes	Yes	Yes	Yes

Bar code Reader	ATB	1D	PDF417	2D Matrix
HHP IT4600	-	Yes	Yes	Yes
HHP ScanTeam 5700	-	Yes	No	No
Intermec ScanPlus1800	-	Yes	Yes	No
Intermec ScanImage1470B	-	Yes	Yes	Yes
Metrologic MS5145	-	Yes	No	No
Metrologic MS1690	-	Yes	Yes	Yes
Symbol LS4000i	-	Yes	Yes	No
Symbol LS2208	-	Yes	No	No

Source: Vendors.

Figure 47 - Examples of readers and their decoding capabilities for 1D and PDF417

Note: *Some vendors may mention 'IATA' in the 'decode capability' section of the characteristics. As there are several types of bar codes recommended by IATA – namely '2-of-5' codes for bag tags and 'PDF417' codes for boarding passes – the vendors should clarify this feature.*

5.7.2. Scanning performance

The reading distance (between reader and bar code) and the scanning area (length-width) of a scanner are related. A smaller distance, or range, provides a better resolution. The example below (see fig. 46), based on Intermec 1470B, demonstrates that relationship.

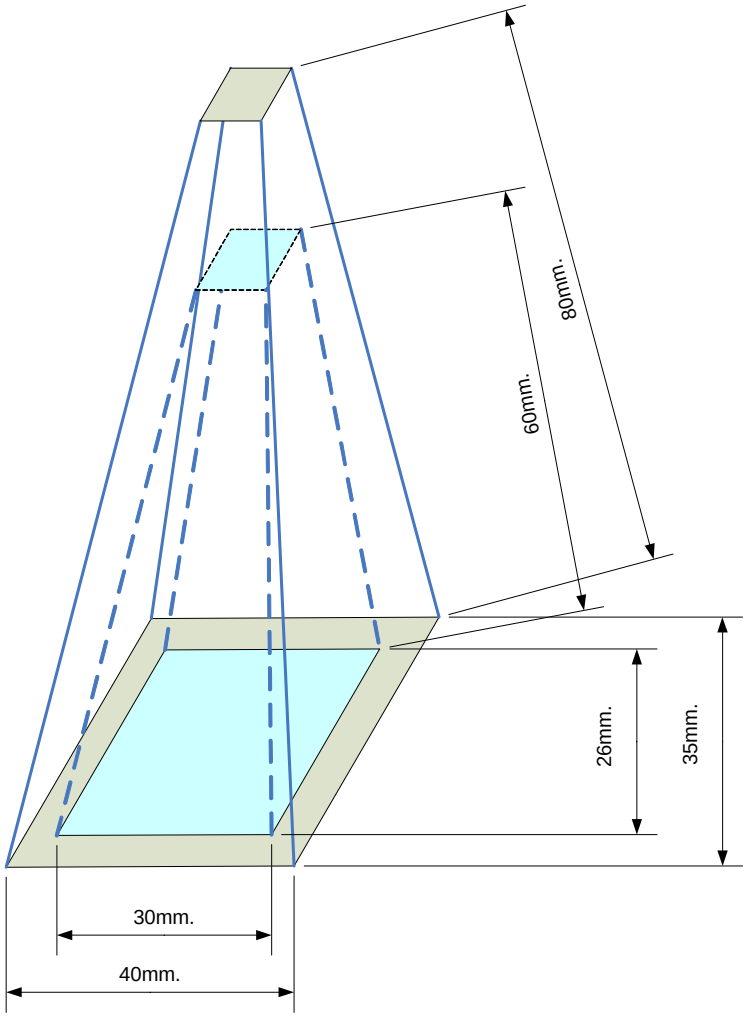


Figure 48 - Scanning range and resolution courtesy of Intermec

At a scanning distance of 60mm for example (see fig. 47), a scanner has a window of 40x30mm. If the scanning distance is doubled to 130mm, the window is 73x55mm, which enables to scan a bar code physically larger. However there is a trade-off. Scanners can read bar codes within a certain distance depending on the resolution. For example a scanner can read a bar code (at any resolution) at a minimum distance of 40mm. If the resolution of the bar code is 0.125, the bar code can be read in the distance range between 40mm and 70mm. If the bar width is bigger, for example 0.33, the bar code will be physically bigger but can also be read from a larger range, between 40 and 130mm.

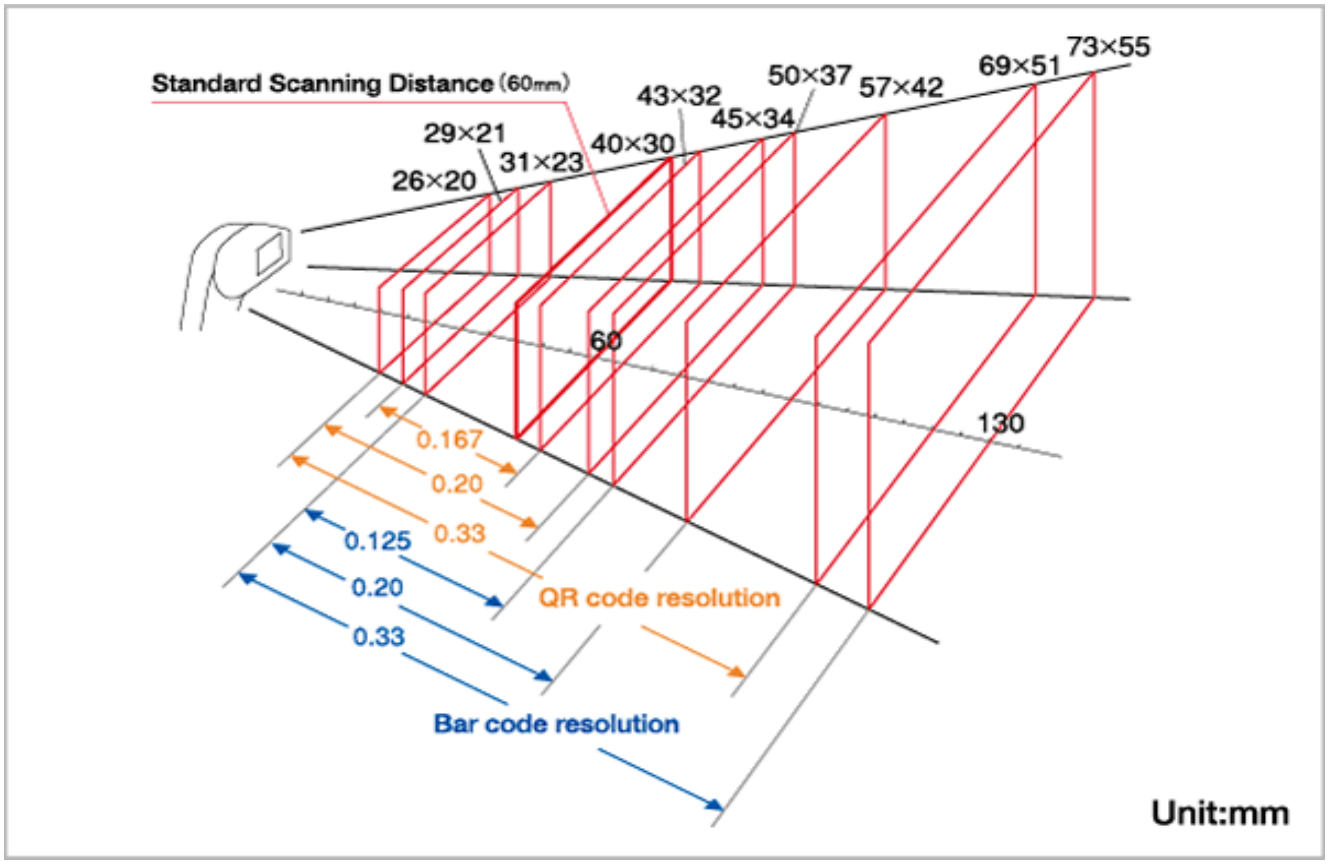


Figure 49 - Scanning range and resolution courtesy of Denso

5.7.3. Types of readers

Bar code scan engines can be integrated in various types of reader. Each type of reader is adapted to a location or a process.

Boarding gate reader

A Boarding Gate Reader is designed to read ATB. It can be retrofitted to read BCBP as well (see fig. 48). It is a solution, called dual mode, to the transition phase from ATB to BCBP.

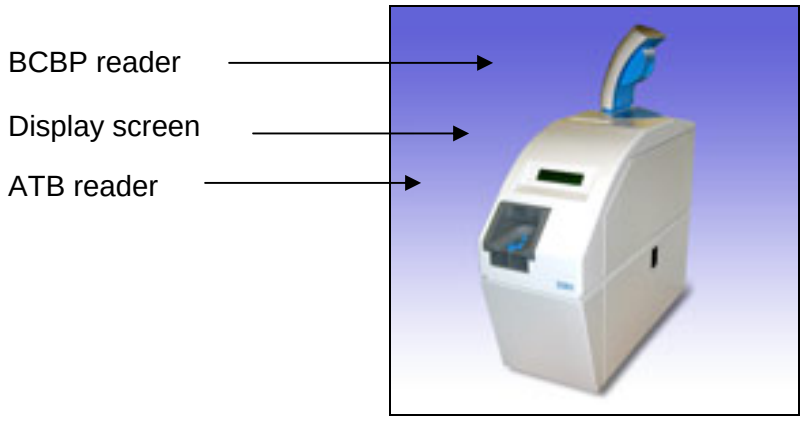


Figure 50 - Example of ATB reader retrofitted with a bar code scanner, courtesy of IER

Hand held reader
When using a basic hand held reader (see fig. 49), the computer screen is used as a control screen. More sophisticated readers include a display for usual messages such as “code read” or “OK for boarding”.

Figure 51 - Example of hand held bar code reader, courtesy of HHP

Embedded reader
Check-in kiosks typically include an ATB device, a GPP and a bar code reader. Scanning the bar code on a home-printed BCBP will allow the passenger not only to modify its check-in when arriving in the airport, but also to print bag tags. Some other documents, such as passports, may use a 2D bar code for identification (see fig. 50).

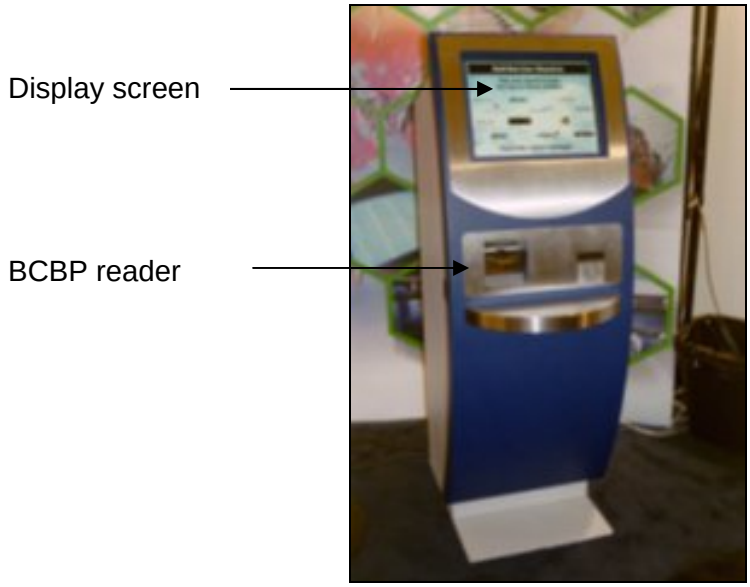


Figure 52 - Example of kiosk retrofitted with a 2D bar code reader, courtesy of ARINC

5.7.4. Selection criteria

The key selection criteria involved in a Request for Proposal are:

- Reading capability (1D, PDF417, Aztec, Datamatrix, QR code)
- Type of reader (BGR, hand-held, embedded)
- Cost of acquisition
- Cost of maintenance

- Certification in a CUTE environment
- Presence of read indicators (good read/bad read, light or sound)
- Ability of device to support text/graphic display (board/no board status)
- Availability as retrofit to existing ATB
- Read rate (99% first time read under 1 second for example)
- Connectivity (RS 232, USB)

5.7.5. Best practices

Most airlines and airports implement dual mode readers that can read both ATB and BCBP during the transition period.
It is recommended to conduct trials to define the throughput of passengers per minute. The reader must then provide a read rate that matches the defined throughput.

5.8. Departure Control System

The Departure Control System (DCS) is an airline's central system for check-in and boarding. IATA has identified the 15 providers of DCS used by IATA member airlines and runs a survey of their BCBP capability. Most DCS providers support or plan to support BCBP. IATA will engage the remaining providers.

The features offered by a DCS typically include:

- Flight scheduling
- Self-service kiosk and web check-in: displays traveller itineraries, provides interactive seat maps, verifies flight status and generates boarding passes
- Boarding control: Gate reader verifies passenger information before boarding approval, ensures accuracy of flight data, identifies boarding anomalies such as duplicate seats
- Aircraft Load Control

The benefits are:

- Self-service kiosk and web check-in: improve customer service, reduce airport queues
- Boarding control: faster, more accurate closeout of flights

To become BCBP capable an airline has to upgrade its DCS so that it supports the IATA 2D bar code as the default boarding pass solution.

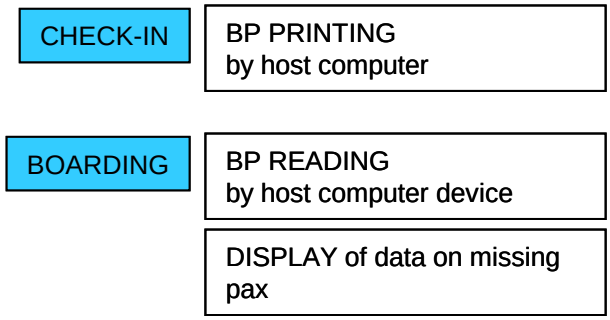
5.8.1. Automated Boarding Control

The Automated Boarding Control (ABC) Recommended Practice 1789 was published by IATA in 1987 and set the basis for improvement of the:

- Security measures;
- Quality of passenger services functions;
- Accuracy of down-line messages, statistics and revenue accounting;

- Efficiency of airline operation.

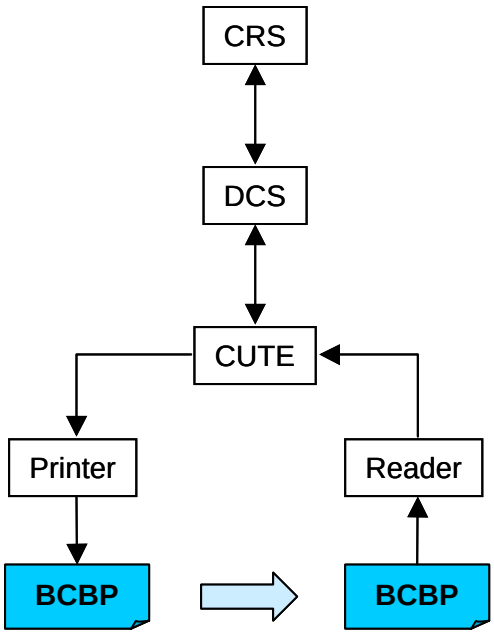
Automated Boarding Control (RP1789)



In the Automated Boarding Control process (Recommended Practice 1789), as the host computer prints the boarding pass at check-in and reads it at boarding, it can display the list of missing passengers. Or, if the reader is stand-alone, it can display a list of sequence numbers boarded to identify missing passengers, and the agent can then use the DCS interface to obtain data on missing passengers.

5.8.2. Common Use Terminal Equipment

CUTE is a generic airline industry term defined in RP 1797 for a facility that allows individual users, through a transparent mode to access their host DCS (see fig. 51), to make the same entries and to get the same responses as they would through their own terminal equipment, i.e. boarding pass printers and boarding gate readers.



Configuration of CUTE environment

Figure 53 - Data flow in a CUTE environment

The CRS is the reservation system providing the list of passengers booked for a flight.
The DCS is an application running either on a server that is hosted by the airline in a central location or on a local airport server.
The CUTE is installed in the airport. The CUTE provides a connection to the DCS and to devices such as printers and readers.
The bar code printed on the BCBP contains data coming from the CRS through the DCS and the CUTE. The data, e.g. passenger name, are captured by the reader at the gate and sent back to the CRS.

Any future evolution of the CUTE technical specification should include as strategic drivers:

- The use of commodity hardware and off-the-shelf software to reduce the total cost of operation
- The consistency with IATA Resolution 792 'BCBP'

5.8.3. Client/Server architecture

The Server is called the Host, where the DCS is hosted. The Client is called the Terminal Emulator, where the agent interacts with the system.

Upgrading the Terminal Emulator (TE) and deploying the latest version is one of the critical steps in the implementation of BCBP.

Upgrading the TE requires its certification for the CUTE environments, such as SITA's CUTE or ARINC's MUSE (see IATA Strategic Partners in Appendix).

The CUTE vendors will ask airlines to provide the new TE version to test it. Then the TE will be deployed in each airport, where it will be tested on the local infrastructure.

The following aspects of the local infrastructure may be impacted:
- Boarding Gate Reader: CUTE workstation peripheral that reads magnetic stripes
- Laser Scan Reader: CUTE workstation peripheral that reads bar code data

Some reworking needs to be done on site with the CUTE operator.

The operator would proceed to a test flight. The airline should provide the operator with a test environment, including test bar codes.

Just before starting the boarding process, the Departure Control System (DCS) sends the list of checked-in passengers to both the Terminal Emulator (TE) and the Boarding Gate Reader (see fig. 52). During the boarding process, the Boarding Gate Reader returns the names of passengers boarded and the DCS submits a refreshed list of checked-in passengers.

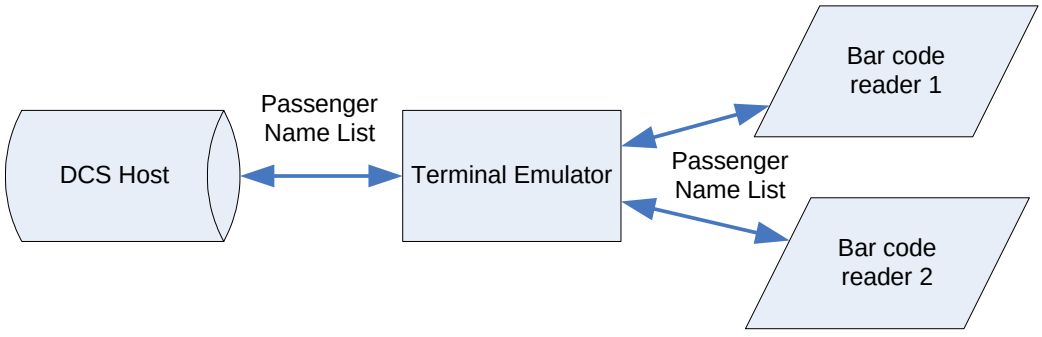


Figure 54 - Data flow of passenger list to gate readers

5.8.4. ATB

In the ATB world a parametric table, or pectab, is used to display the data on the document. Migrating from ATB to BCBP requires reprogramming the pectab in the host to include a bar code.

In the ATB model, the host sends the data as well as the pectab in order to print the ATB (see fig. 53). Format code W is the ATB2 magnetic stripes specifications defined in Resolution 722c attachment 'C'.

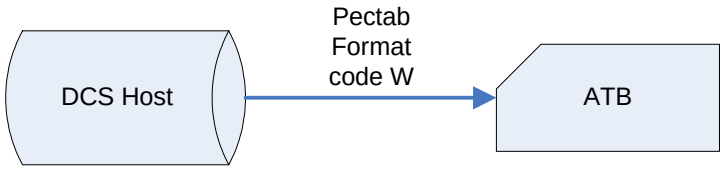


Figure 55 - Data flow of ATB printing

The ATB reader decodes the data stored in the magnetic stripe according to format code W and transmits the data to the boarding application (see fig. 54).

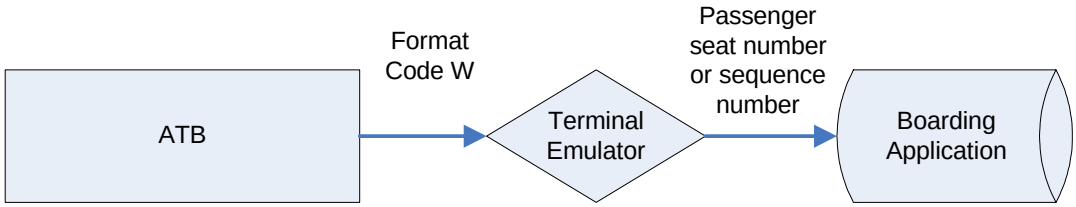


Figure 56 - Data flow of ATB reading

5.8.5. BCBP

Implementing BCBP natively means that the airline programmes the host so that it sends a BCBP stream (see fig. 55).

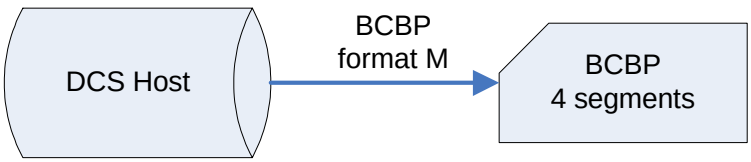


Figure 57 - Data flow of BCBP printing with host reprogramming

The Terminal Emulator (see fig. 56) is upgraded so that at the boarding gate it handles the BCBP stream in M format.

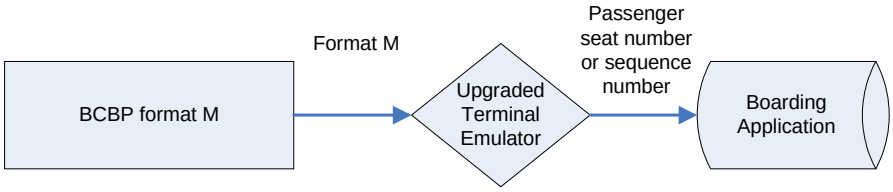


Figure 58 - Data flow of BCBP reading with reprogramming of the Terminal Emulator

5.8.6. Solution for the transition

The host sends format code W but BCBP requires M format. The format converter W→M may be in the airline application or may be provided by a CUTE provider or other software vendor (see fig. 57). Using third-party (CUTE or other software vendors) utilities may allow for "emulation of magnetic operations", whereby an airline host or application which is written for magnetic operations today continues to work as it has before BCBP, and the third party's software dynamically converts the magnetic stripe oriented commands from the airline host or application into BCBP commands and vice-versa.

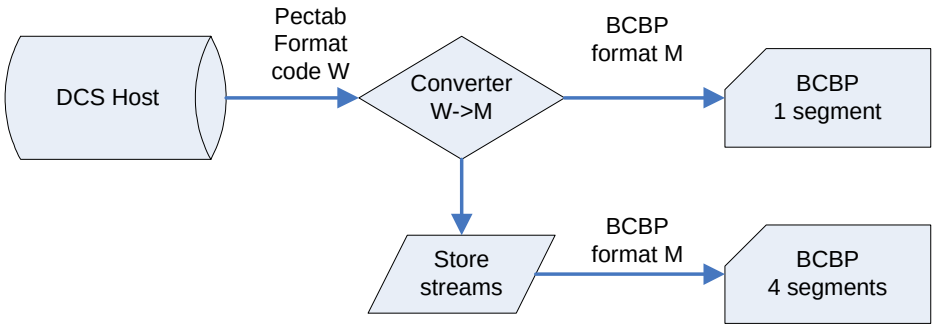


Figure 59 - Data flow of BCBP printing without touching host

This option consists in not touching the terminal emulator (see fig. 58). Instead the BCBP stream coming for the read in M format is converted into a stream in W format for the boarding application.

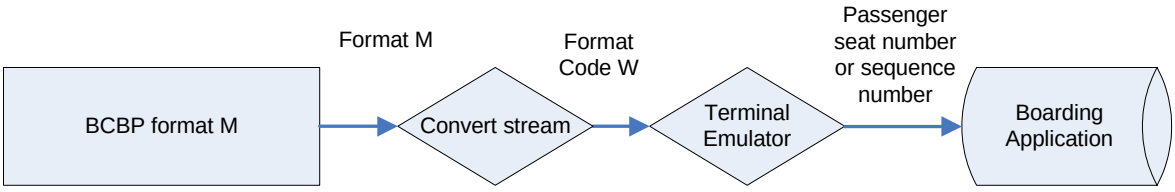


Figure 60 - Data flow of BCBP reading without upgrading the Terminal Emulator

5.9. CUTE / CUPPS

Common Use Passenger Processing Systems (CUPPS) is a Recommended Practice 1797x published by IATA in June 2008, to replace the Common Use Terminal Equipment (CUTE). Trials are conducted but no live implementation yet.

CUPPS has a rigidity that requires a unique certification for all vendor platforms, all vendor peripherals and all airline applications. The unique certification saves costs in certification and enables quicker roll-out of new airline features and new peripherals.

CUPPS, like CUTE, is the platform that connects the airlines DCS with the check-in and boarding equipment at the airport. CUTE is live at about 400 airports around the world, mainly major airports with several airlines.

6. PASSENGER PROCESSING

This section focuses on the impact of BCBP on passenger processing. BCBP involves a change in the process, as the passenger is not required to be physically in the airport to check-in. Airlines will be interested to know when web checked-in passengers arrive at the airport. Governments are likely to ask for verification of the boarding document to ensure that the passenger going airside is actually on the airline's passenger list. Several locations at an airport are impacted by BCBP.

6.1. Check-in desk

Passengers checked-in at home may check-in their bag at a traditional check-in counter or when available at a dedicated bag drop-off point (see fig. 59).

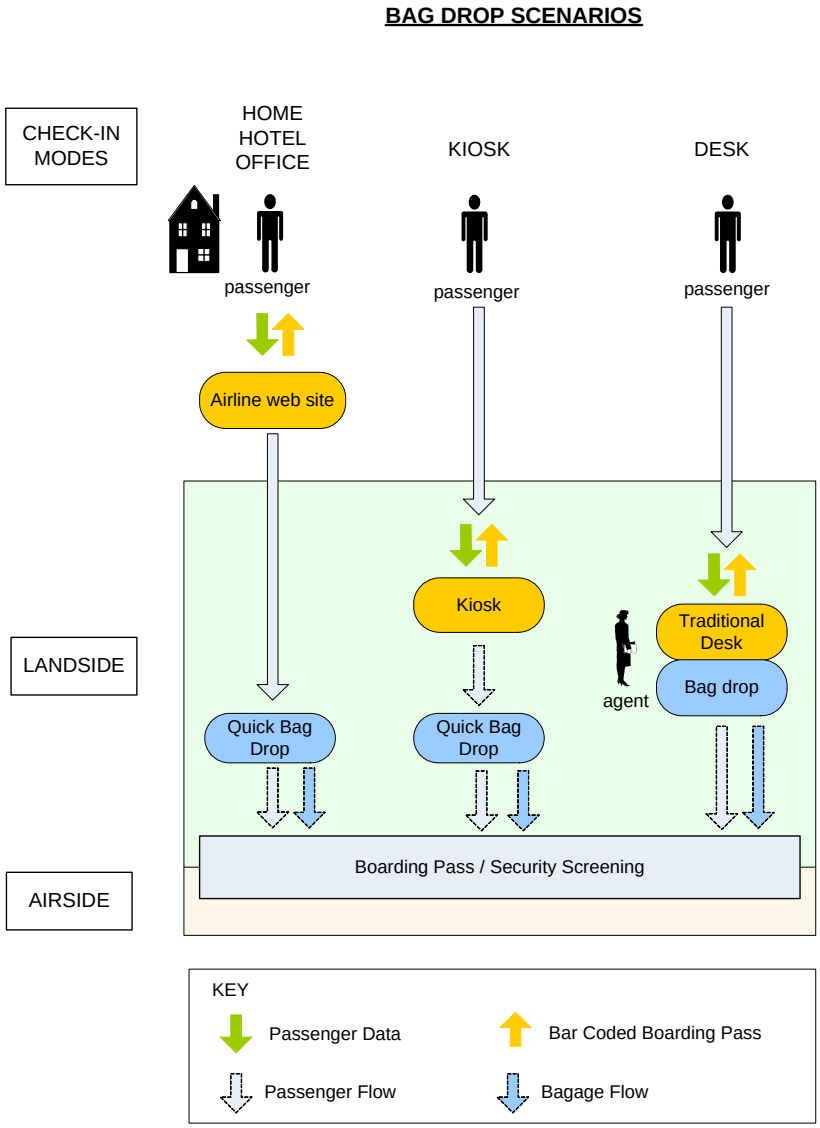


Figure 61 - Dedicated baggage drop-off point for checked-in passengers

6.2. Baggage drop-off

Passengers who have printed their boarding pass at home and have to check bags do not want to wait at the check-in desks. Airlines have created ad-hoc baggage drop off points. In a self-service environment, the baggage drop off becomes automated and the passenger uses a BCBP to initiate the transaction that will issue the baggage tag (see fig. 60).

Figure 62 - Illustration of automated bag drop courtesy of IER

Baggage drop-off point should be advertised at the time of web check-in (see fig. 61) and inside the airport, so that the passenger does not waste time in line at the check-in desk.

Figure 63 - Advertisement for new baggage drop-off service courtesy of Air France

In the case of common use baggage drop, the system may require to populate item 23 in the bar code with the licence plate numbers.

The recommended process is defined by the Common Use Bag Drop committee. Airlines can decide to populate several tags in the bar code but to activate in the system only the tags that have been scanned at the bag drop point. Airlines can either provide a detachable stub, or simply provide a new bar code with activated bag tag numbers.

6.3. Boarding gate

There are two key issues when a passenger shows up at the gate with a BCBP: ensure that the BCBP belongs to the owner, and handle the boarding pass properly.

6.3.1. Passenger processing

The Operating Carrier is supposed to check the identity of the passenger. With a home printed BCBP this check may be carried out at the gate, i.e. the last stage in the process. The purpose of passenger identification is to make sure that the person boarding is entitled to the flight.

The passenger must present a piece of identification and a BCBP at the airport. The following identification process (see fig. 62) is recommended:
1.The passenger and the I.D. are matched by looking at faces
2.Then the I.D. and the BCBP are matched by looking at names
3.The BCBP are matched with the PNL by sequence and flight number
4.The passenger can access the flight

Figure 64 - Passenger identification model

Step 1 can be improved by using biometrics. In the future, steps 1 to 4 can be performed together by using self-boarding with a biometric boarding pass.

6.3.2. Boarding pass handling

Most agents at the gate are used to tearing the boarding passes up. They keep the stubs so that in case of a system failure they can still count the number of boarded passengers.

Home printed boarding passes are not pre-cut. Mobile BCBP are stored on mobile phones: there is nothing to cut. Although some agents feel more comfortable or secure with the stubs, fallback solutions should be defined to cope with system failures. The new boarding process should be based on the majority of cases, not on the exception such as a system failure.

Recommendation

- Airlines and ground handlers should reconsider their boarding procedures to prevent from tearing up boarding passes, as it is not convenient with home printed boarding passes and not possible with digital boarding passes (nothing to tear up).
- Airlines and ground handlers should instead consider fallback procedures in case of system failure or scanner failure.

In case of system outage the connection to the host is lost, and as there is no software locally, the agents have to go manual. Manual boarding is a fallback solution, consisting in keeping the stub and counting passengers manually. Dealing with bar codes when there is no reader is not considered manual boarding. It is just called typing the sequence number in.

6.3.3. Boarding time

Boarding time is critical for airlines that want to guarantee on-time departure. Airlines have developed boarding techniques, such as United's Wilma, to speed up boarding time. It is important that the scanning of the boarding pass (read speed and read rate) and the handling of the boarding pass (no tear up) are quick in order to speed up the boarding process.

6.3.4. Self boarding

Trials by several airlines have proven that self-boarding is an effective solution that will remove repetitive tasks from gate agents and allow them to spend more time with customers (see fig. 65). BCBP will further improve throughput as some tests show that passengers find it quite intuitive to use.

Figure 65 - Example of self-boarding gate in Munich courtesy of Lufthansa

6.4. Security, immigration and taxes

The rules governing identification and authorization will vary from one country to another depending on the local transportation authority.

6.4.1. Departing passengers screening

The security staffs control the airside access. Checking valid flights ensures that:

- Passengers are entering the right terminal
- Passengers are not going airside after boarding has closed or when a flight is cancelled

The authorities can use the 2D bar code on the BCBP to automate the control. Recording a set of fields for each BCBP enables to track duplicates.

Recommendation

The following fields define a unique BCBP, without storing personal data:

- Date of flight
- Operating carrier code
- Flight number
- Seat number
- Sequence number

Sequence number should be unique for a given flight. However an airline may use a blank sequence number for an infant. The seat number helps to differentiate the infant (usually INF) from the adult.

If a duplicate BCBP is detected at security check:

- It may be that a passenger went airside, came back landside, and returned airside
- Otherwise the airline and other agents are alerted

6.4.2. Fast track

A fast track is a service offered to selected passengers to bypass the queue at a security checkpoint. An agent controlling the passenger's boarding pass decides whether to grant the access to the fast track. The BCBP enables to automate the control, and consequently to make it self-service.

Recommendation

The following items should be used to control a boarding pass and grant access to the fast track:

- Operating carrier designator
- Compartment code

There is no specific item in the bar code such as 'access to fast track'.

6.4.3. Immigration

The ET Itinerary Receipt provides proof of return travel where required by immigration. A proof of onward travel is provided by BCBP, where accepted.

Recommendation

- Government requiring immigration agent to stamp the boarding passes should reconsider their policy and processes in order to accept digital boarding passes (that cannot be stamped because they are not paper).
- Immigration agent should prevent from stamping over the bar codes, because the stamp will make the bar code unreadable, which will delay the boarding of the aircraft.

6.4.4. Taxes

In some countries authorities require passenger to pay departure taxes at a counter located before the security checkpoint. Passengers who paid the tax receive a sticker that is then scanned when entering security.

Recommendation

- Tax agents should not place the sticker on the bar code, which makes it impossible to read at the boarding gate and causes delays on flights.
- Tax authorities should reconsider the sticker, which does not fits on digital boarding passes (because they are not paper). They should stop issuing stickers. They should instead use the IATA 2D bar code that contains necessary data such as airline and flight codes and sequence numbers.

6.5. Arrival

Passengers with checked-in bags must carry the receipts. The bag receipts contain 10 digit numbers that could fit into the 2D bar code. Staffs who inspect bags and passengers may want to scan the bar code instead of just reading the receipts.

6.6. Concessions

6.6.1. Duty Free

Only passengers with valid Boarding Pass are entitled to Duty Free purchases. Where applicable the duty free shops will need to read BCBP. During the transition period, a manual entry is still available.

6.6.2. Airline lounge

The agent at the lounge desk usually performs a visual check of the BCBP. A bar code scan may facilitate the verification and enable data collection.

6.7. Capacity planning

IATA publishes the Airport Development Reference Manual, which covers passenger terminal facilities. It analyzes the passenger behaviour and provides recommendations and simulation tools of queuing time at key areas such as check-in counters, passport control, hold room, loading area, baggage claim unit. The latest version (9^{th}) was published in January 2004, which is before the BCBP standard was published and the web and mobile check-in were popular. Airport planners are invited to read the Manual and use their own judgement to adapt their simulation to the key developments that took place in the last 5 years.

Recommendation

Passengers can issue their boarding pass at home or receive it on their mobile phones. The need for check-in counters is decreasing and is replaced by the need for bag drop counters.

- Airlines and airports working on capacity planning should take into account the check-in channels enabled by BCBP (web and mobile).
- Airlines channel usage forecast should be used to plan the capacity of check-in counters.

6.8. Issues and solutions

6.8.1. Fraud prevention

Ill-intentioned persons may falsify their BCBP by changing the flight number or class of service. They may also simply print two copies of the BCBP and pass one to a friend, or even create a counterfeit BCBP. Technical solutions exist, e.g. algorithms, called certificates, which can for example secure the bar code if necessary.

Risk	Description	Mitigation
Duplicate	2 copies of the same valid boarding pass	Reject second copy of a boarding pass
Modified	A feature of a valid boarding pass has been modified	- Check that the passenger is on the PNL - Add a certificate to the bar code that proves that the bar code has been modified
Forged	A forged bar code has been created	- Check that the passenger is on the PNL - Add a certificate to the bar code that proves that the bar code is not the original

Of course, a forged BCBP will not entitle the person carrying it with any right to travel, nor will it create any confusion with the system. The official information is stored in the airline's system. It is recommended that a disclaimer state on the BCBP that the document itself has no value and is being issued for ease of processing only.

Hence when confronted with a problematic BCBP, e.g. the sequence number is not found in the system, the staff should request that the passenger return to the check-in desk.

To prevent any confusion, DB, the German Railways, have added a security feature to the bar code. In the DB case the agent enters a key, or certificate (see 9. and 10. on figure 63), that will be validated against the bar code. In an airport environment that validation could be automated and would prove that the bar code has been generated by an airline and has not been modified.

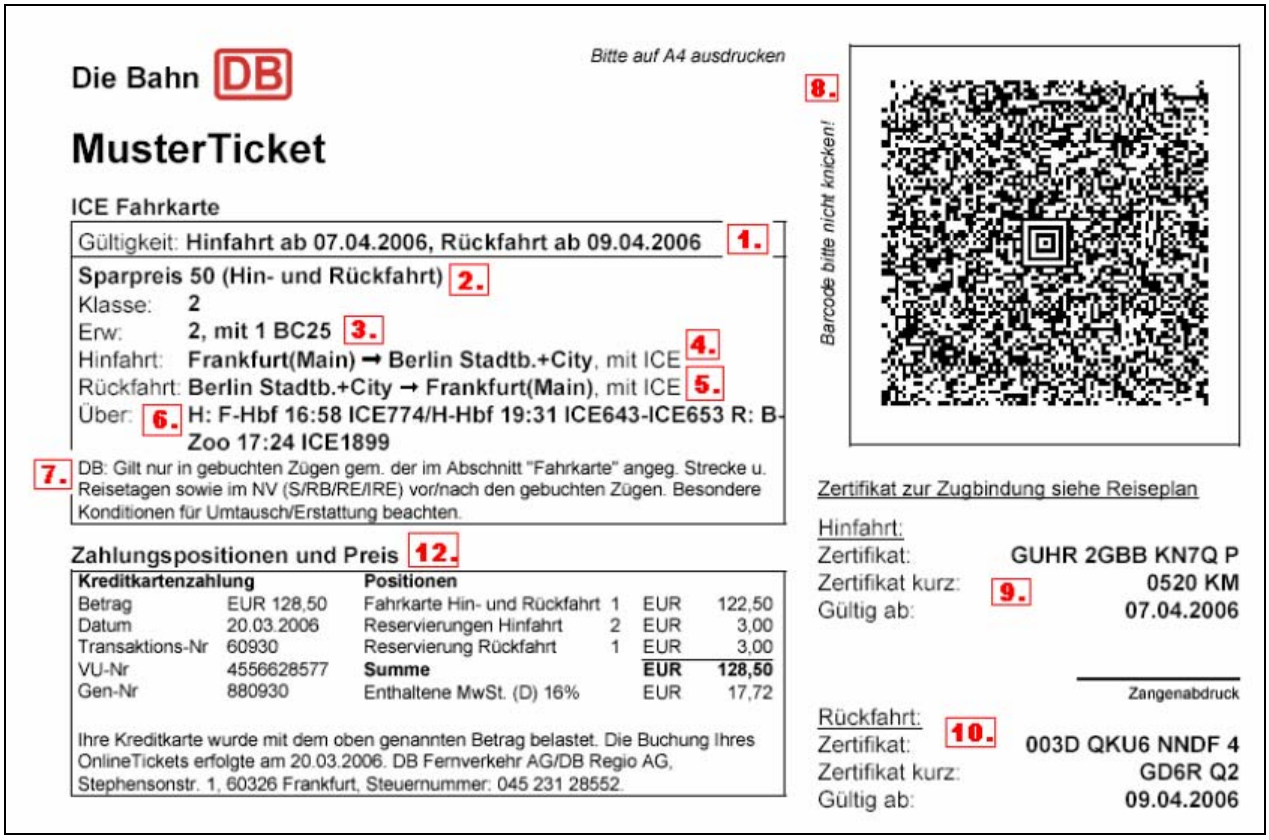


Figure 66 - 2D bar code and certificate courtesy of Deutsche Bahn

In the UK for example, home printed boarding passes are systematically scanned at security checkpoint to track duplicates. The airports have deployed simple mounted scanners connected to a PC and a dedicated application. A vendor has even developed an application using a web cam that takes a picture of the passenger when the boarding pass is scanned (see fig. 64).

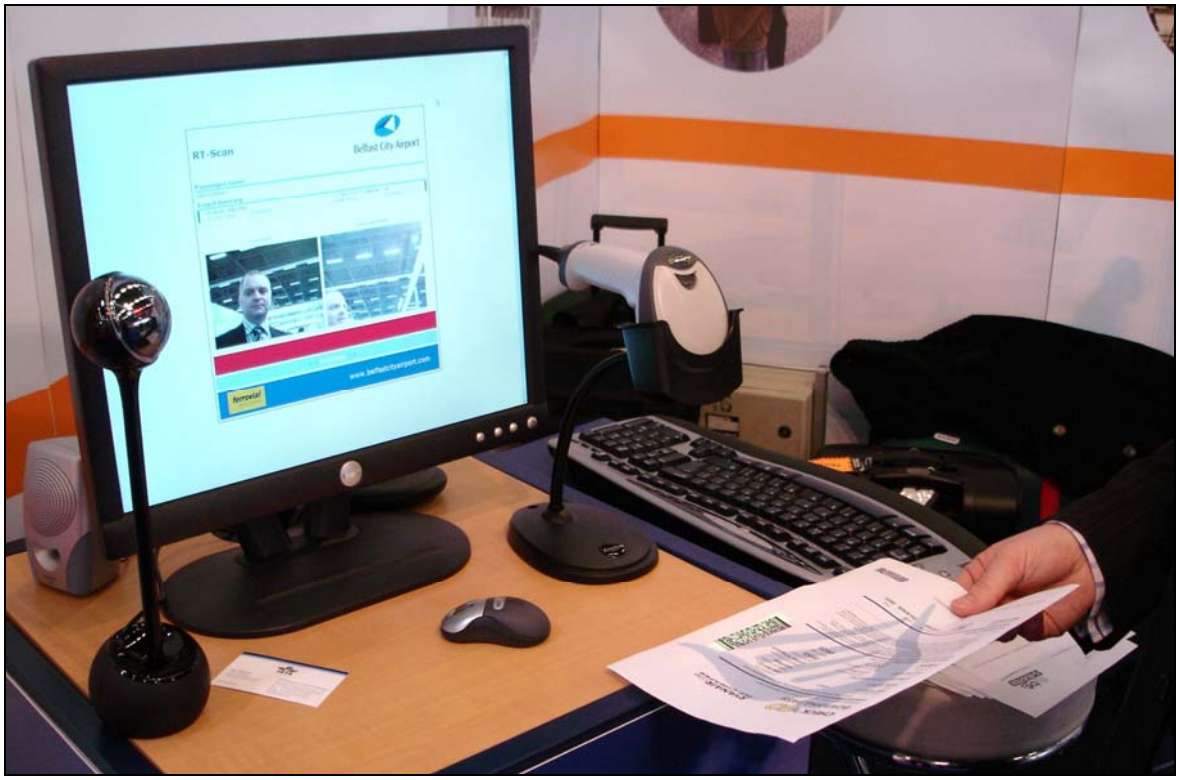


Figure 67 - Application scanning bar codes to prevent duplicate boarding passes

6.8.2. Passenger data

Passenger checked-in at home may not have entered all required passenger data. Airlines may be fined when carrying passengers with missing data.

6.8.3. 'Go show' passengers

Passengers without booking willing to travel may show up at the airport at the last minute. Those passengers, called 'go shows', are not on the PNL. The agent at the check-in desk or at the gate may be able to add them to the list of passengers. It is recommended that the agent check the validity of the ticket, especially when it is an e-ticket (ET).

The deployment of ET will drive the implementation of DCS in airports, which in turn will facilitate the implementation of BCBP.

7. MEDIA USED AS BOARDING PASSES

The airline industry has decided to use the BCBP standard for 100% of the boarding passes. The BCBP standard is about boarding data: it enables other technologies to leverage on the data. Airlines may decide to use other media as boarding passes. This does not interfere with the 100% BCBP mandate because the scope of BCBP is the boarding passes issued by airlines, as opposed to the media belonging to the customers and used as a pass.

Passenger Media	Technology	Media Maturity	Technology Maturity
Mobile phone	NFC	Medium	Medium
Iris or fingerprint	Biometrics	Medium	Medium
E-passport	RFID	Medium	Medium

Notes on maturity:

- *Low: Trial stage*
- *Medium: Used by early adopters*
- *High: Mainstream*

7.1. Mobile phones (NFC)

The concept of mobile Radio Frequency (RF) boarding pass is similar to BCBP or ATB, except that the data is stored in a chip. RF is a mature technology, for example for personal access control. Initiatives such as the Near Field Communication (NFC) technology aim at developing contact-less identification into mobile phones.
Airlines such as Japan Airlines provide IC Card readers on their check-in kiosks (see fig. 66)

Figure 68 - Kiosk embedded 2D bar code scanner and IC card reader courtesy of JAL

The IATA Resolution 791 'Specifications for airline industry integrated circuit card (ICC) – version 03' defines the use of ICC or smart cards. The purpose of Resolution 791 is to support interline ET. The data contains an element called 'Boarding data' of length 60, which is not sufficient to include the BCBP data. The current ICC standard cannot support the BCBP standard (see fig. 67).

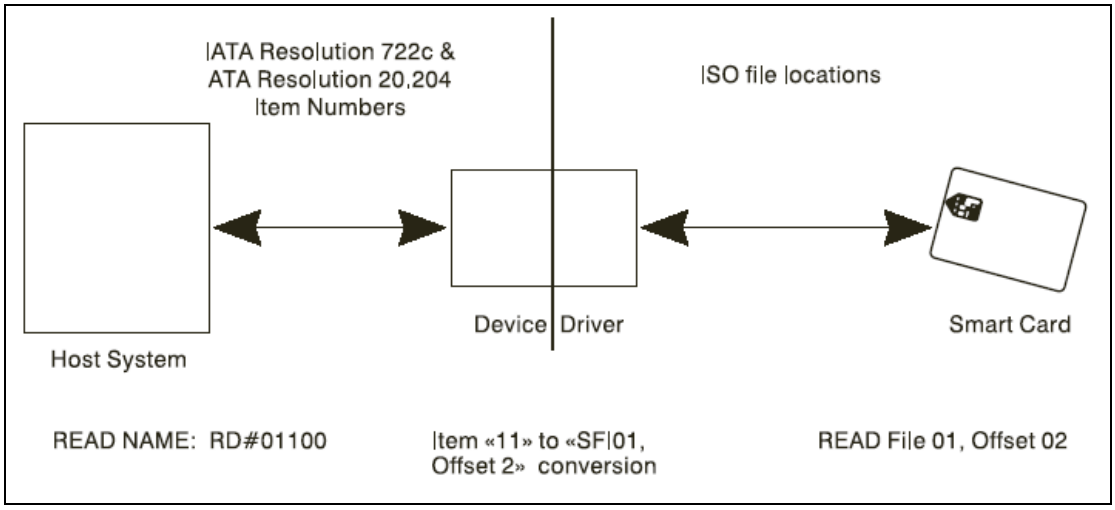


Figure 69 - ICC standard defined in IATA Resolution 791

ANA has launched a new service called SKIP in September 2006. A scanner at security reads the RF enabled phone or the RF mileage card and prints a receipt containing the seat number. The passenger skips all the check-in process and can proceed directly to the gate (see fig. 68).

Figure 70 - SKIP check-in process with RF card courtesy of ANA

7.2. Biometrics

In this concept the boarding pass actually becomes a virtual one (see fig. 69). By identifying the passenger and matching its biometrics to the database, the boarding system will let him/her get on board or not. As biometrics is becoming popular it may be a solution in the future.

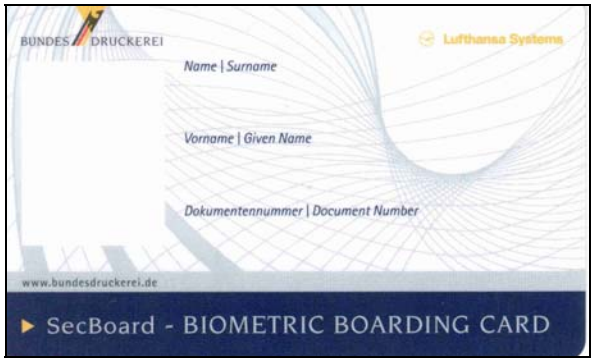


Figure 71 - Sample of Biometric Boarding Card courtesy of Bundes Druckerei

7.3. E-Passport

Phasing boarding passes out in favour of a paperless process is a fascinating idea. It would simplify the business, as no boarding pass would be required at the airport any more. The e-passport could serve as a unique identifier (see fig. 70-71). However, in the absence of a detailed implementation plan and arguments to overcome regulatory hurdles to paperless travel, the e-BP is still a dream.

Figure 72 - e-passport architecture courtesy of Bundes Druckerei

As a matter of fact, allowing passengers through the security check point would require the security guards to connect to all the airlines' DCS and all travellers would have to use biometrics for identification.

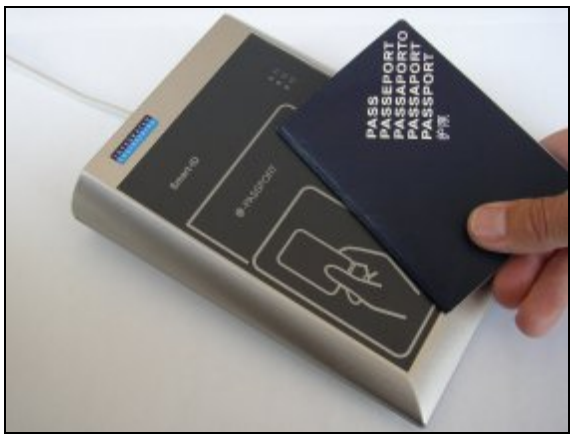


Figure 73 - e-passport reader courtesy of Integrated Engineering

APPENDIX A - RESOURCES

The BCBP standard depends on the work of various groups within IATA, airlines and other organisations and relies on a series of documentation coming from IATA conferences or other bodies for standardisation.

A.1 BCBP Glossary of Terms

AUTOMATED TICKET/BOARDING PASS (ATB) is described in Resolutions 722c and 722d. It is a single copy non-carbonised ticket (normally on card stock) with each coupon imprinted separately. Each coupon used for air transport is comprised of a flight coupon and a detachable passenger receipt and a boarding pass for a specific flight.

CARRIER

- Validating Carrier: the airline that sold the ticket and whose numeric code is the ticket number of the flight coupons
- Marketing Carrier: the airline recorded as the transporting carrier on the flight coupons
- Operating Carrier: the airline actually providing the transportation (this may be different from the Marketing carrier in certain bilateral agreements such as code-share situations)

COMMON USE TERMINAL EQUIPMENT (CUTE) SYSTEMS are described in Recommended Practice 1797. CUTE is a generic airline industry term (not to be related to vendor's products and services) for a facility which allows individual users, through a transparent mode to access their host computer(s), make the same entries and get the same responses as they would through their own terminal equipment.

COMPUTER RESERVATIONS SYSTEM (CRS) / SYSTEM PROVIDER means a computerized system containing information about schedules, availability, fares and related services, and through which reservations can be made and/or tickets issued.

DEPARTURE CONTROL SYSTEM (DCS) is an automated method of performing check-in, capacity and load control and dispatch of flights.

DOCUMENT NUMBER is the unique identification number of a traffic document as outlined in Recommended Practice 1720a. The document number comprises the airline code, form code, serial number and a check digit.

ELECTRONIC TICKET (ET) means the Itinerary Receipt issued by or on behalf of the Carrier, the Electronic Coupons and, if applicable, a boarding document.

ITINERARY RECEIPT means a document or documents forming part of the Electronic Ticket, which contains the information and notices required in accordance with Resolutions 722f and 722g.

PASSENGER NAME RECORD (PNR) means a record of each passenger's travel requirements, which contains all information necessary to enable reservations to be processed and controlled by the booking and participating airlines.

PECTAB Parametric Table – an ATB pectab defines the locations on a Boarding Pass where data appears, also for reading.

TICKET means either the document entitled “Passenger Ticket and Baggage Check” or the Electronic Ticket, in each case issued by or on behalf of Carrier, and including Conditions of Contract, notices and the Coupons contained in it.

A.2 Industry Groups

Bar Coded Boarding Pass is a highly multi-disciplinary issue and as such has an impact on many industry functions, practices and standards. The following summarises the main industry groups involved with BCBP:

A.2.1 Passenger Services Conference (PSC)

Responsible for the adoption of Resolutions and Recommended Practices specifying standards and procedures on Passenger Services related issues, including the Bar Coded Boarding Pass Resolution.

A.2.2 Common Use Self-Service Management Group (CUSS MG)

The IATA CUSS standard allows airlines to share self-service kiosks and passengers to enjoy the same convenience they have with banks ATMs. 28 airlines and 25 international airports are attending CUSS MG. CUSS MG publishes a manual and a web site and hold conferences to discuss standards. CUSS kiosks printing Boarding Pass are concerned with BCBP.

A.2.3 BCBP Working Group

The BCBP Working Group is a sub-group of the CUSS MG.

A.2.4 Association of European Airlines (AEA)

Defines standards such as AEA 99 for bar code pectab printing and AEA 2001 SSD for switching pectabs.

A.2.5 International Organization for Standardization (ISO)

ISO and IEC (the International Electrotechnical Commission) form the specialised system for worldwide standardisation. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organisation to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organisations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

A.2.6 Simplifying Passenger Travel (SPT)

SPT is a program involving IATA that focuses on air travellers and facilitating their journey while emphasizing the security benefits of processing known passengers automatically.

A.3 Reference Documents

This document refers to IATA documents as well as other standards. For further information on those documents, it is recommended to contact the publisher directly.

A.3.1 The BCBP Resolution

The IATA standard is published in the Passenger Service Conference Resolution Manual as Resolution 792 'Bar Coded Boarding Pass'. A copy of the Resolution is provided in on the IATA StB portal.

A.3.2 Other Resolutions

Other standards related to our document are published in the Passenger Service Conference Resolution Manual:

722c	Automated Ticket/Boarding Pass – Version 2 (ATB2)
722e	Automated Ticket/Boarding Pass (ATB) and Multiple Purpose Document (MPD) – Coupon-by-coupon technical specification
728	Code designators for passenger ticket and baggage check
761	Flight numbers
762	Airline Designators
767	Assignment of airline accounting codes and airline prefixes
791	Specifications for airline industry integrated circuit card (ICC) – version 03

A.3.3 Recommended Practices

Also in the Passenger Service Conference Resolution Manual, we refer to Recommended Practices:

1008	Glossary of commonly used air passenger terms
1706d	Non-ATB document specifications for Common Use Self-Service (CUSS) Kiosks
1706e	Paper specifications – Documents to be printed by a General Purpose Printer (GPP) in a Common Use Self-Service (CUSS) kiosk
1708	Passenger Name List (PNL) and Additions and Deletions List (ADL)
1789	Automated Boarding Control
1797	Common Use Terminal Equipment (CUTE) Systems

A.3.4 IATA Manuals

IATA provides guidance in several manuals available on the IATA online store:

	Airport Development Reference Manual – latest edition January 2004
	Airport Handling Manual - 2007

A.3.5 The AEA specifications

Most of the ATB printers follow the specifications from the AEA:

	ATB Technical Specifications (Amended August 2002)
	ATB Technical Specifications (Amended December 2006)

A.3.6 The ISO/IEC standards

We refer to the ISO/IEC for standards such PDF417 or the size of paper:

216	Writing paper and certain classes of printed matter -- Trimmed sizes -- A and B series
15415	Information technology — Automatic identification and data capture techniques — Bar code print quality test specification — Two-dimensional symbols
15438	Information technology — Automatic identification and data capture techniques — Bar code symbology specifications — PDF417
16022	Information technology — Automatic identification and data capture techniques — Data Matrix bar code symbology specification
18004	Information technology — Automatic identification and data capture techniques — QR Code 2005 bar code symbology specification
24778	Information technology — Automatic identification and data capture techniques — Aztec Code bar code symbology specification

APPENDIX B - BCBP SAMPLES

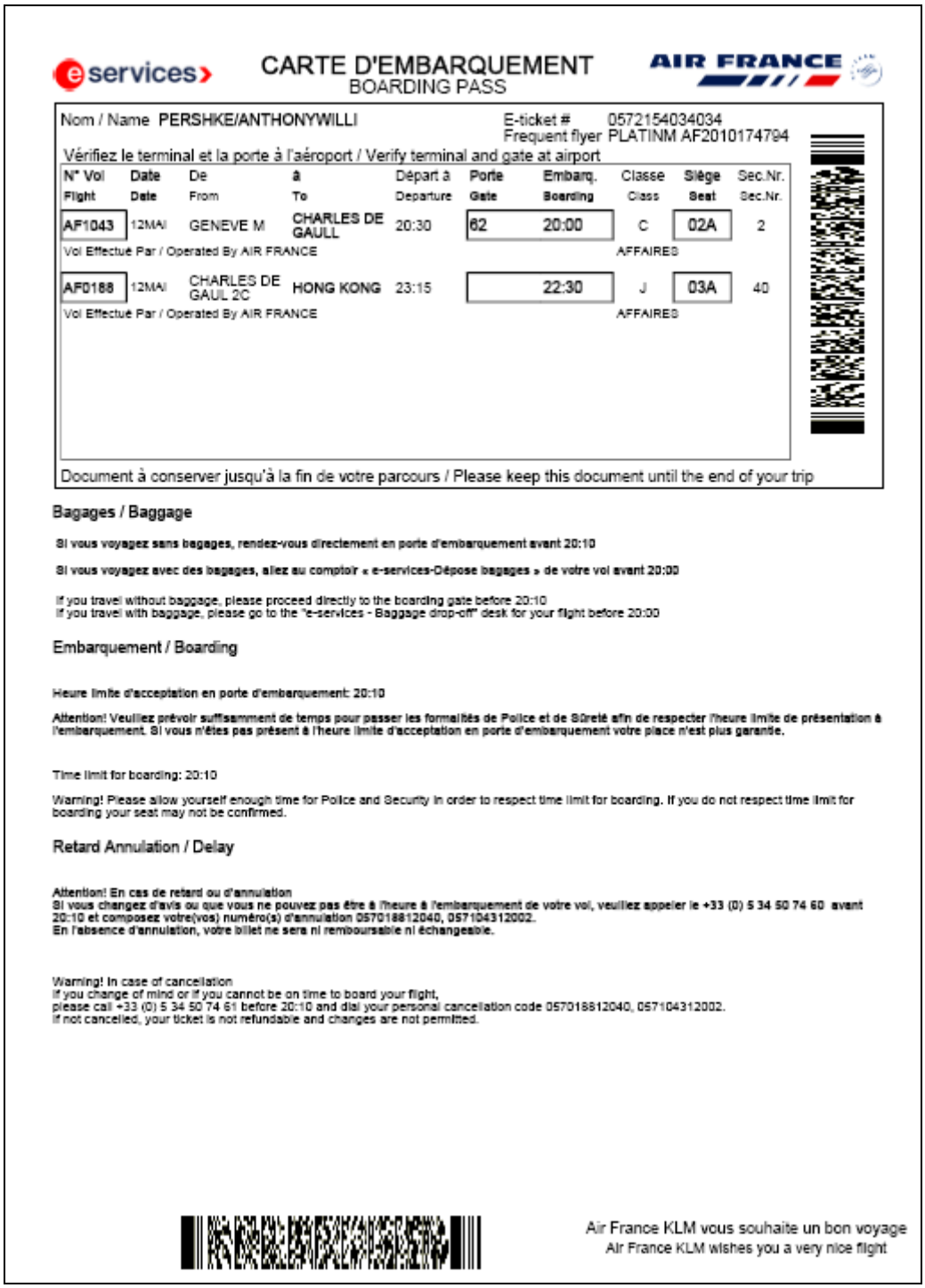
The following pages present samples of BCBP printed either:

- From the web: the BCBP provided on the web usually fit on a full page, which is larger than the ATB stock
- At a kiosk: the BCBP printed at a kiosk are usually provided on plain paper and in the dimensions of the ATB stock
- Or at a desk: the BCBP printed at a desk are usually provided on ATB stock

We also present alternative bar code and boarding pass formats, for information. There are several 2D bar code standards on the market, such as Datamatrix, QR Code or Aztec. PDF417 is only one of the 2D bar code symbologies, mainly used for access control, where as 2D matrix codes mentioned above are mainly used in the industry, for small parts marking for example.

B.1 BCBP printed at home

B.1.1 AF - Air France Web



eservices

CARTE D'EMBARQUEMENT
BOARDING PASS

AIR FRANCE

Nom / Name PERSHKE/ANTHONYWILLI

E-ticket # 0572154034034
Frequent flyer PLATINM AF2010174794

Vérifiez le terminal et la porte à l'aéroport / Verify terminal and gate at airport

N° Vol / Flight	Date / Date	De / From	à / To	Départ à / Departure	Porte / Gate	Embarq. / Boarding	Classe / Class	Siège / Seat	Sec.Nr. / Sec.Nr.
AF1043	12MAI	GENEVE M	CHARLES DE GAULL	20:30	62	20:00	C	02A	2
Vol Effectué Par / Operated By AIR FRANCE							AFFAIRES		
AF0188	12MAI	CHARLES DE GAUL 2C	HONG KONG	23:15		22:30	J	03A	40
Vol Effectué Par / Operated By AIR FRANCE							AFFAIRES		

Document à conserver jusqu'à la fin de votre parcours / Please keep this document until the end of your trip

Bagages / Baggage

Si vous voyagez sans bagages, rendez-vous directement en porte d'embarquement avant 20:10

Si vous voyagez avec des bagages, allez au comptoir « e-services-Dépose bagages » de votre vol avant 20:00

If you travel without baggage, please proceed directly to the boarding gate before 20:10
If you travel with baggage, please go to the "e-services - Baggage drop-off" desk for your flight before 20:00

Embarquement / Boarding

Heure limite d'acceptation en porte d'embarquement: 20:10

Attention! Veuillez prévoir suffisamment de temps pour passer les formalités de Police et de Sûreté afin de respecter l'heure limite de présentation à l'embarquement. Si vous n'êtes pas présent à l'heure limite d'acceptation en porte d'embarquement votre place n'est plus garantie.

Time limit for boarding: 20:10

Warning! Please allow yourself enough time for Police and Security in order to respect time limit for boarding. If you do not respect time limit for boarding your seat may not be confirmed.

Retard Annulation / Delay

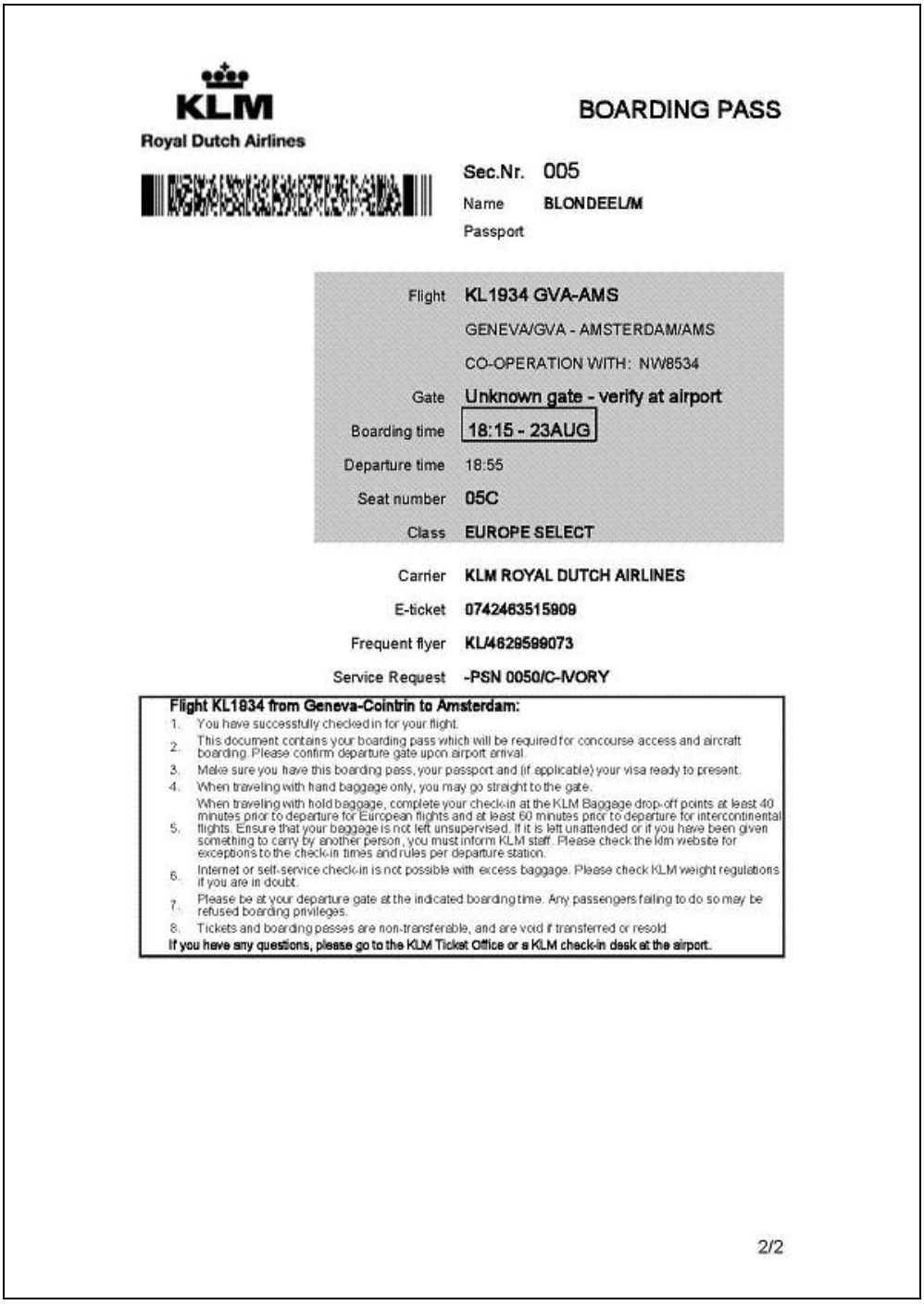
Attention! En cas de retard ou d'annulation
Si vous changez d'avis ou que vous ne pouvez pas être à l'heure à l'embarquement de votre vol, veuillez appeler le +33 (0) 5 34 50 74 60 avant 20:10 et composez votre(vos) numéro(s) d'annulation 057018812040, 057104312002.
En l'absence d'annulation, votre billet ne sera ni remboursable ni échangeable.

Warning! In case of cancellation
If you change of mind or if you cannot be on time to board your flight,
please call +33 (0) 5 34 50 74 61 before 20:10 and dial your personal cancellation code 057018812040, 057104312002.
If not cancelled, your ticket is not refundable and changes are not permitted.

Air France KLM vous souhaite un bon voyage
Air France KLM wishes you a very nice flight

Figure 74 - Sample of BCBP printed on Air France web site

B.1.2 KL - KLM Web check-in



KLM
Royal Dutch Airlines

BOARDING PASS

Sec.Nr. 005
Name BLONDEEL/M
Passport

Flight	KL1934 GVA-AMS
	GENEVA/GVA - AMSTERDAM/AMS
	CO-OPERATION WITH: NW8534
Gate	Unknown gate - verify at airport
Boarding time	18:15 - 23AUG
Departure time	18:55
Seat number	05C
Class	EUROPE SELECT
Carrier	KLM ROYAL DUTCH AIRLINES
E-ticket	0742463515809
Frequent flyer	KL/4628599073
Service Request	-PSN 0050/C-IVORY

Flight KL1934 from Geneva-Cointrin to Amsterdam:

1. You have successfully checked in for your flight.
2. This document contains your boarding pass which will be required for concourse access and aircraft boarding. Please confirm departure gate upon airport arrival.
3. Make sure you have this boarding pass, your passport and (if applicable) your visa ready to present.
4. When traveling with hand baggage only, you may go straight to the gate.
5. When traveling with hold baggage, complete your check-in at the KLM Baggage drop-off points at least 40 minutes prior to departure for European flights and at least 60 minutes prior to departure for intercontinental flights. Ensure that your baggage is not left unsupervised. If it is left unattended or if you have been given something to carry by another person, you must inform KLM staff. Please check the klm website for exceptions to the check-in times and rules per departure station.
6. Internet or self-service check-in is not possible with excess baggage. Please check KLM weight regulations if you are in doubt.
7. Please be at your departure gate at the indicated boarding time. Any passengers failing to do so may be refused boarding privileges.
8. Tickets and boarding passes are non-transferable, and are void if transferred or resold.

If you have any questions, please go to the KLM Ticket Office or a KLM check-in desk at the airport.

2/2

Figure 75 - Sample of BCBP printed from the KLM web site

B.1.3 CO - Continental Web check-in

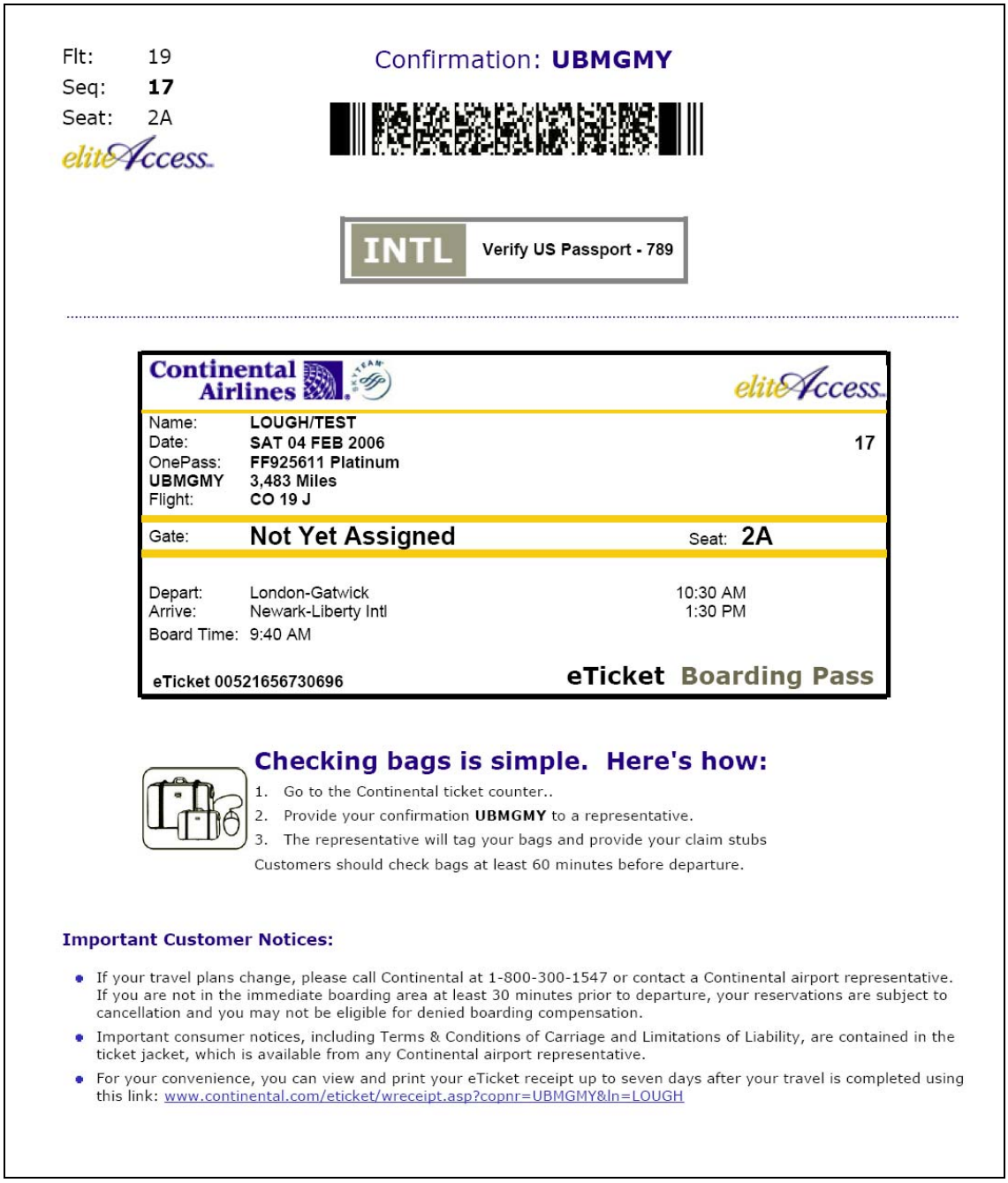


Figure 76 - Sample of BCBP printed from the Continental web site

B.1.4 BA - British Airways Web

BRITISH AIRWAYS

BOARDING PASS

NAME OF PASSENGER
BEHAN/ PM MR

47961149/GOLD

SEQ. NO.
007

FROM
GENEVA **GVA**

TICKET TYPE
e-ticket
NO COUPON

CLASS
CLUB
EUROPE

TO
HEATHROW (LONDON) **LHR**

FLIGHT	DATE	TIME	SEAT	GATE CLOSES
BA0727	**22 JUL**	**11:55**	**03A**	**11:45**

PLEASE REMEMBER TO BRING YOUR RELEVANT TRAVEL DOCUMENTS WITH YOU.

TRAVEL INFORMATION

Your flight departs from : Geneva Airport

If you have hand-baggage only then you can proceed to the security checkpoint

If you have baggage to check in please take it to : Check-in Desk 86 - 87

You must check in your baggage at least 30 **minutes prior to departure.**

Boarding closes 10 **minutes before departure.**

You must allow enough time to board.

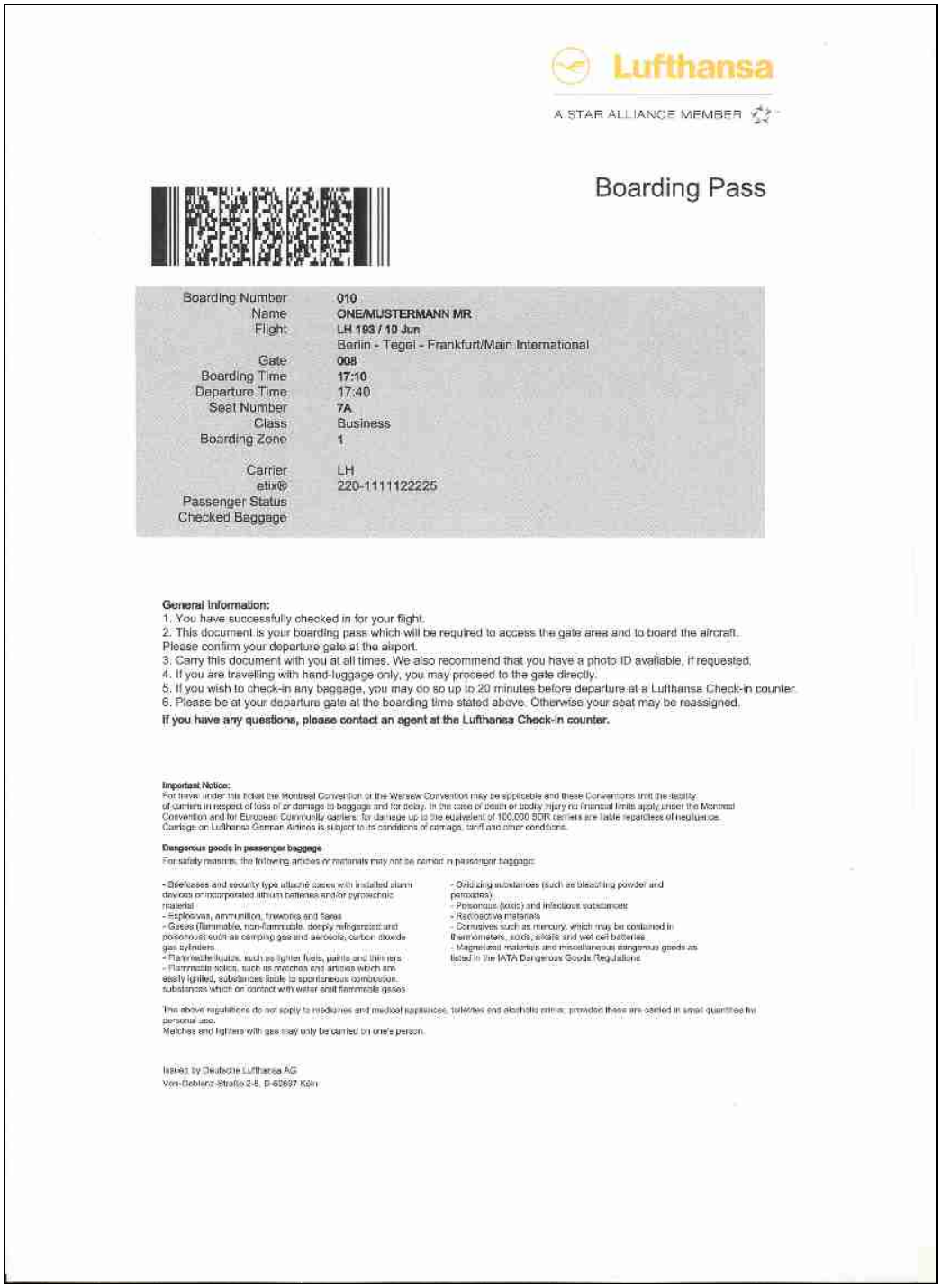
Passenger Baggage:
Must not contain Compressed gases (aerosols, oxygen bottles), Explosives (fireworks, ammunition), Flammable solids or liquids (lighter fuel, matches), Radioactive material, Oxidising material (bleach), Corrosives (acids, alkalis, mercury wet cell batteries), Magnetised materials, Poisons and Infectious materials, Briefcase with alarm devices (medicines and toilet articles for use on board are exempt from these restrictions).

AIR TRANSPORTATION
If the passenger's journey involves an ultimate destination or stop in a country other than the country of departure the Warsaw Convention or the Montreal Convention may be applicable and these Conventions govern and may limit the liability of carriers for death or bodily injury and in respect of loss of or damage to baggage.

NAME	FLIGHT	DATE	TIME	SEAT	TICKET
BEHAN/ PM MR	**BA0727**	**22 JUL**	**11:55**	**03A**	**e-ticket**

Figure 77 - Sample of BCBP printed from the British Airways web site

B.1.5 LH - Lufthansa Web check-in



Lufthansa

A STAR ALLIANCE MEMBER

Boarding Pass

Boarding Number	010
Name	ONE/MUSTERMANN MR
Flight	LH 193 / 10 Jun
	Berlin - Tegel - Frankfurt/Main International
Gate	008
Boarding Time	17:10
Departure Time	17:40
Seat Number	7A
Class	Business
Boarding Zone	1
Carrier	LH
etix®	220-1111122225
Passenger Status	
Checked Baggage	

General information:
1. You have successfully checked in for your flight.
2. This document is your boarding pass which will be required to access the gate area and to board the aircraft. Please confirm your departure gate at the airport.
3. Carry this document with you at all times. We also recommend that you have a photo ID available, if requested.
4. If you are travelling with hand-luggage only, you may proceed to the gate directly.
5. If you wish to check-in any baggage, you may do so up to 20 minutes before departure at a Lufthansa Check-in counter.
6. Please be at your departure gate at the boarding time stated above. Otherwise your seat may be reassigned.

If you have any questions, please contact an agent at the Lufthansa Check-in counter.

Important Notice:
For travel under this ticket the Montreal Convention or the Warsaw Convention may be applicable and these Conventions limit the liability of carriers in respect of loss of or damage to baggage and for delay. In the case of death or bodily injury no financial limits apply under the Montreal Convention and for European Community carriers: for damage up to the equivalent of 100,000 SDR carriers are liable regardless of negligence. Carriage on Lufthansa German Airlines is subject to its conditions of carriage, tariff and other conditions.

Dangerous goods in passenger baggage
For safety reasons, the following articles or materials may not be carried in passenger baggage:

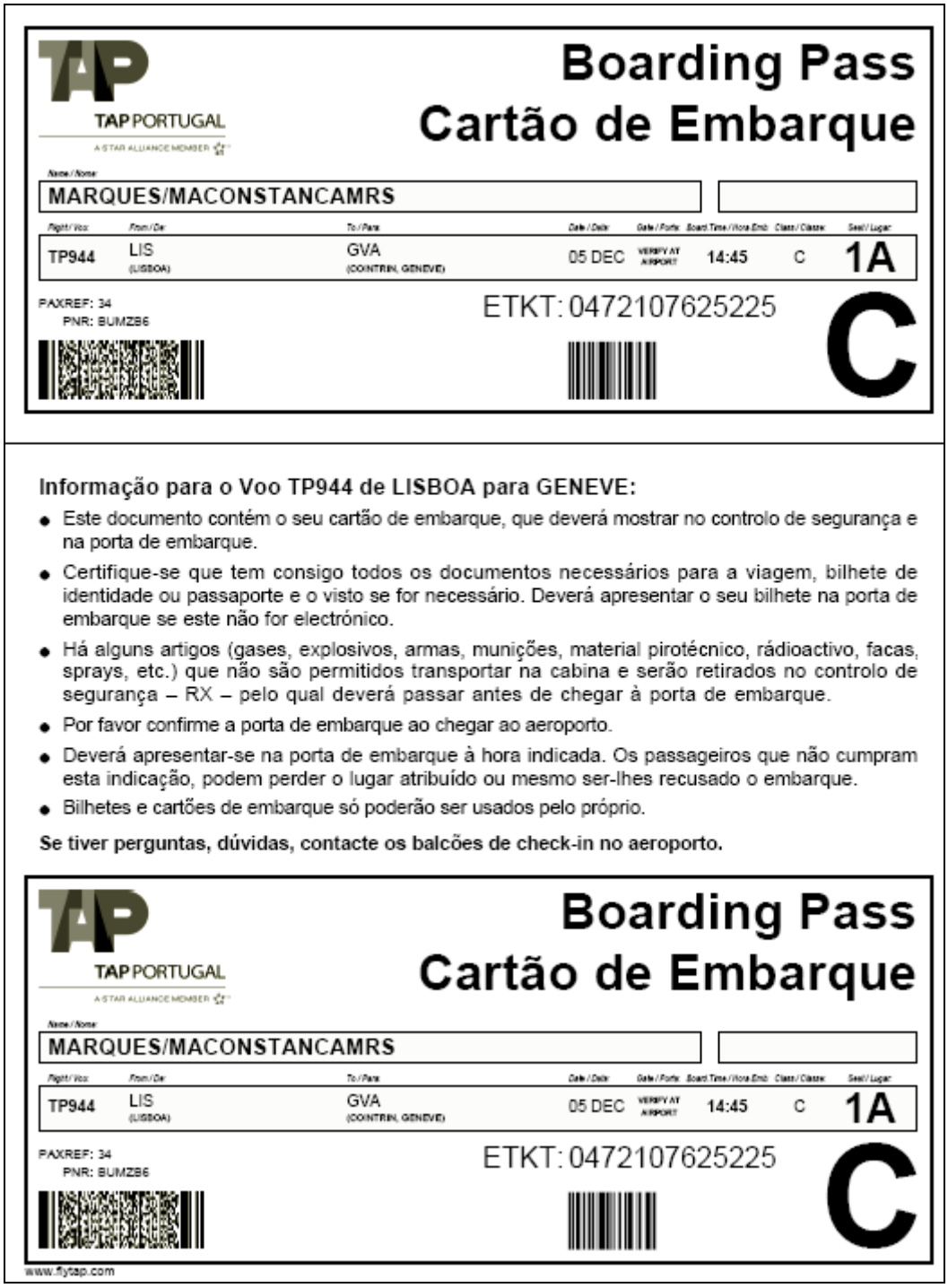
- Briefcases and security type attaché cases with installed alarm devices or incorporated lithium batteries and/or pyrotechnic material
- Explosives, ammunition, fireworks and flares
- Gases (flammable, non-flammable, deeply refrigerated and poisonous) such as camping gas and aerosols, carbon dioxide gas cylinders
- Flammable liquids, such as lighter fuels, paints and thinners
- Flammable solids, such as matches and articles which are easily ignited, substances liable to spontaneous combustion, substances which on contact with water emit flammable gases
- Oxidizing substances (such as bleaching powder and peroxides)
- Poisonous (toxic) and infectious substances
- Radioactive materials
- Corrosives such as mercury, which may be contained in thermometers, acids, alkalis and wet cell batteries
- Magnetized materials and miscellaneous dangerous goods as listed in the IATA Dangerous Goods Regulations

The above regulations do not apply to medicines and medical appliances, toiletries and alcoholic drinks, provided these are carried in small quantities for personal use.
Matches and lighters with gas may only be carried on one's person.

Issued by Deutsche Lufthansa AG
Von-Gablenz-Straße 2-6, D-50679 Köln

Figure 78 - Sample of BCBP printed from the Lufthansa web site

B.1.6 TP - TAP Web check-in



TAP PORTUGAL
A STAR ALLIANCE MEMBER

Boarding Pass
Cartão de Embarque

Name / Nome
MARQUES/MACONSTANCAMRS

Flight / Voo	From / De	To / Para	Date / Data	Gate / Porta	Board Time / Hora Emb.	Class / Classe	Seat / Lugar
TP944	LIS (LISBOA)	GVA (COINTRIN, GENEVE)	05 DEC	VERIFY AT AIRPORT	14:45	C	1A

PAXREF: 34
PNR: BUMZB6

ETKT: 0472107625225

C

Informação para o Voo TP944 de LISBOA para GENEVE:

- Este documento contém o seu cartão de embarque, que deverá mostrar no controlo de segurança e na porta de embarque.
- Certifique-se que tem consigo todos os documentos necessários para a viagem, bilhete de identidade ou passaporte e o visto se for necessário. Deverá apresentar o seu bilhete na porta de embarque se este não for electrónico.
- Há alguns artigos (gases, explosivos, armas, munições, material pirotécnico, rádioactivo, facas, sprays, etc.) que não são permitidos transportar na cabina e serão retirados no controlo de segurança – RX – pelo qual deverá passar antes de chegar à porta de embarque.
- Por favor confirme a porta de embarque ao chegar ao aeroporto.
- Deverá apresentar-se na porta de embarque à hora indicada. Os passageiros que não cumpram esta indicação, podem perder o lugar atribuído ou mesmo ser-lhes recusado o embarque.
- Bilhetes e cartões de embarque só poderão ser usados pelo próprio.

Se tiver perguntas, dúvidas, contacte os balcões de check-in no aeroporto.

TAP PORTUGAL
A STAR ALLIANCE MEMBER

Boarding Pass
Cartão de Embarque

Name / Nome
MARQUES/MACONSTANCAMRS

Flight / Voo	From / De	To / Para	Date / Data	Gate / Porta	Board Time / Hora Emb.	Class / Classe	Seat / Lugar
TP944	LIS (LISBOA)	GVA (COINTRIN, GENEVE)	05 DEC	VERIFY AT AIRPORT	14:45	C	1A

PAXREF: 34
PNR: BUMZB6

ETKT: 0472107625225

C

www.flytap.com

Figure 79 - Sample of BCBP printed from the TAP web site

B.1.7 AC - Air Canada Web check-in

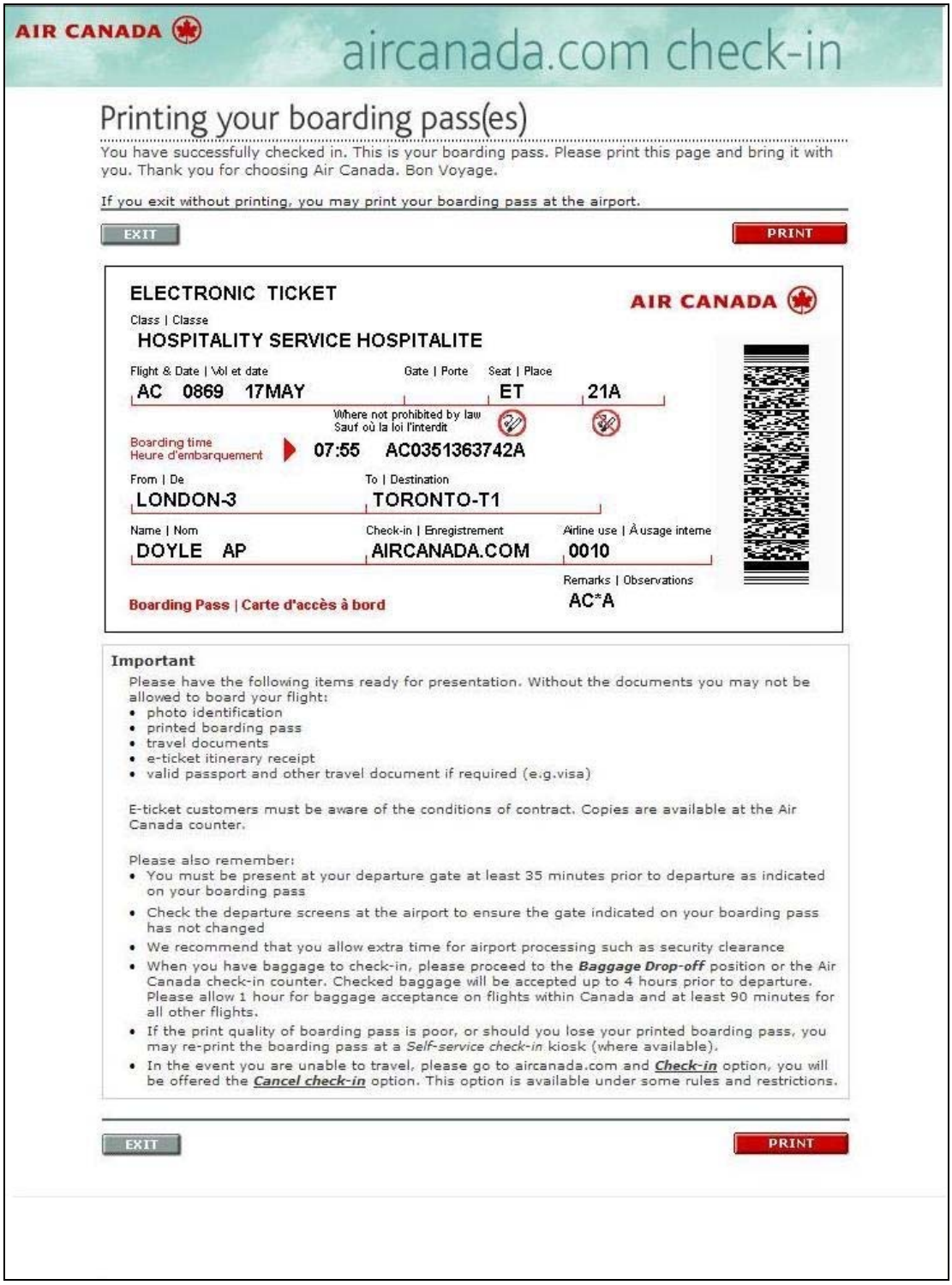
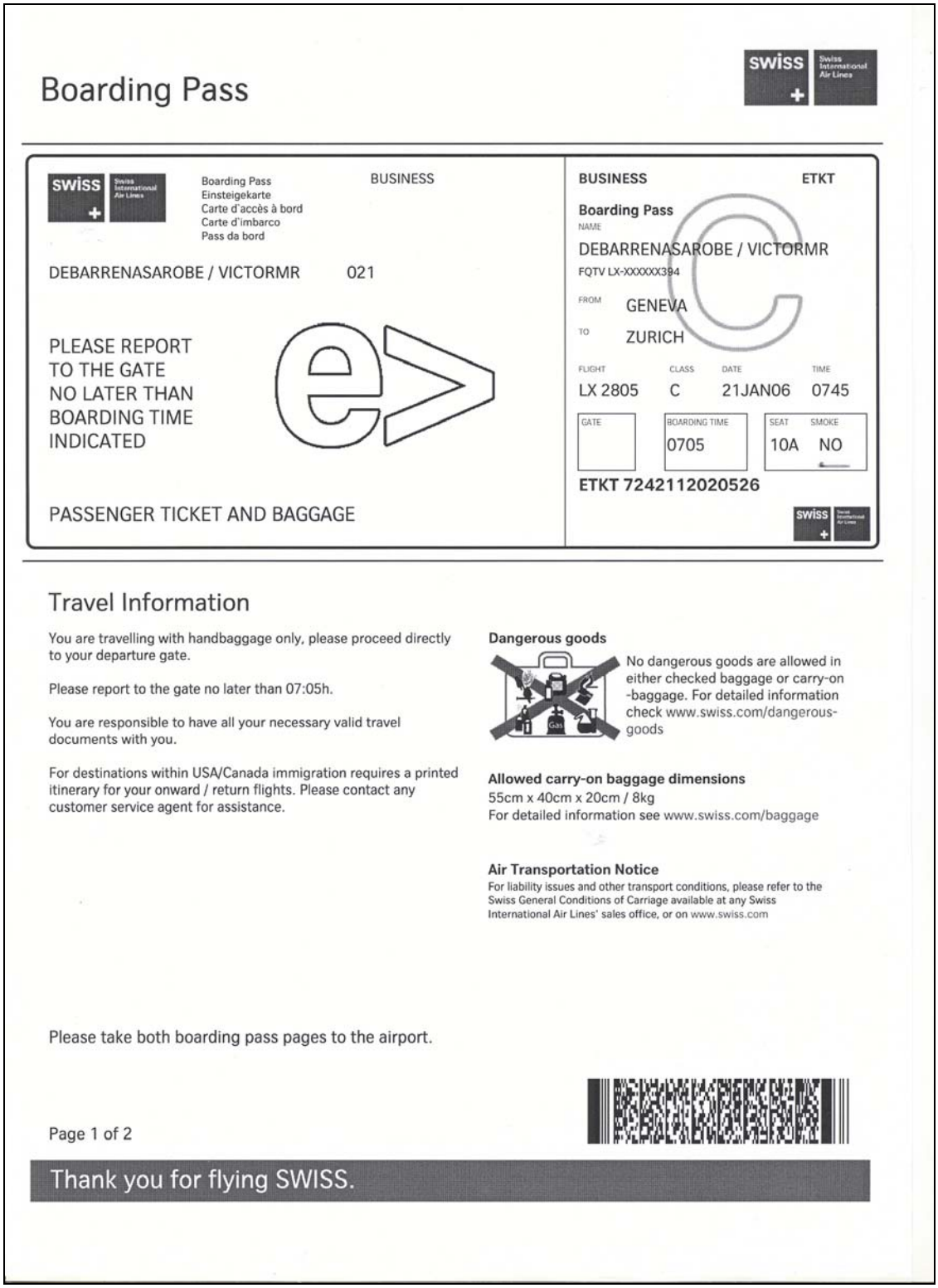


Figure 80 - Sample of BCBP printed from the Air Canada web site

B.1.8 LX - Swiss Web check-in



Boarding Pass

swiss Swiss International Air Lines

Boarding Pass
Einsteigekarte
Carte d'accès à bord
Carte d'imbarco
Pass da bord

BUSINESS

DEBARRENASAROBE / VICTORMR 021

PLEASE REPORT TO THE GATE NO LATER THAN BOARDING TIME INDICATED

PASSENGER TICKET AND BAGGAGE

BUSINESS ETKT

Boarding Pass

NAME

DEBARRENASAROBE / VICTORMR

FQTV LX-XXXXXX394

FROM GENEVA

TO ZURICH

FLIGHT	CLASS	DATE	TIME
LX 2805	C	21JAN06	0745

GATE	BOARDING TIME	SEAT	SMOKE
	0705	10A	NO

ETKT 7242112020526

Travel Information

You are travelling with handbaggage only, please proceed directly to your departure gate.

Please report to the gate no later than 07:05h.

You are responsible to have all your necessary valid travel documents with you.

For destinations within USA/Canada immigration requires a printed itinerary for your onward / return flights. Please contact any customer service agent for assistance.

Dangerous goods

No dangerous goods are allowed in either checked baggage or carry-on -baggage. For detailed information check www.swiss.com/dangerous-goods

Allowed carry-on baggage dimensions

55cm x 40cm x 20cm / 8kg

For detailed information see www.swiss.com/baggage

Air Transportation Notice

For liability issues and other transport conditions, please refer to the Swiss General Conditions of Carriage available at any Swiss International Air Lines' sales office, or on www.swiss.com

Please take both boarding pass pages to the airport.

Page 1 of 2

Thank you for flying SWISS.

Figure 81 - Sample of BCBP printed from the Swiss web site

B.2 BCBP printed at a kiosk

B.2.1 AF - Air France kiosk

Figure 82 - Sample of BCBP printed from the Air France kiosk

B.2.2 DL - Delta kiosk

Figure 83 - Sample of BCBP printed from the Delta kiosk

B.3 Mobile BCBP

B.3.1 LH - Lufthansa mobile BCBP

Figure 84 - Sample of mobile BCBP courtesy of Lufthansa

B.3.2 NW - Northwest mobile BCBP

Figure 85 - Sample of mobile BCBP courtesy of Northwest

B.3.3 QR - Qatar Airways mobile BCBP

Figure 86 - Sample of mobile BCBP courtesy of Qatar Airways

B.3.4 SK - SAS mobile BCBP

Figure 87 - Sample of mobile BCBP courtesy of SAS

B.3.5 JK - Spanair mobile BCBP

Figure 88 - Sample of mobile BCBP courtesy of Spanair

B.4 Others

The purpose of this section is to clarify the alternative types of boarding passes available in the market.
One alternative is the matrix code as an equivalent of PDF417. In the absence of IATA standard, the compromise between the two symbologies is:

- Small size of code (Datamatrix, QR code)
- Against low cost of readers (PDF417)

When the IATA standard was published, only PDF417 was used on boarding passes, QR code was used on a regional level and Datamatrix was not used.
The examples below tend to show that the symbology issue does not support the comparison with the added value of being an industry standard.

B.4.1 PDF417 printed on ATB card

A PDF417 code can fit on an ATB card, even on the stub (see fig. 82).

Figure 89 - Sample of BCBP printed on ATB card without magnetic stripe

B.4.2 Datamatrix printed on ATB card

A Datamatrix code will require even less space than a PDF417 code containing the same data (see fig. 83).

Figure 90 - Sample of BCBP printed on ATB card – Datamatrix code

B.4.3 PDF417 printed on credit card size stock

A PDF417 code will even fit on a surface the size of a credit card (see fig. 84).

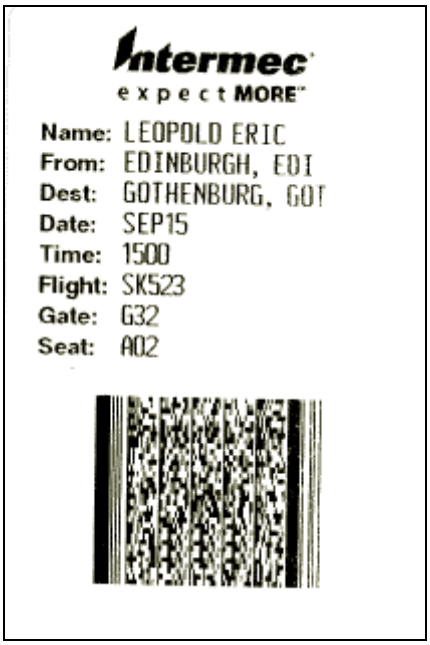


Figure 91 - Sample of BCBP printed on a credit card size stock

B.4.4 Datamatrix printed on a credit card size stock

A Datamatrix code, being even smaller, would fit even better (see fig. 85).

Figure 92 - Sample of BCBP printed on a credit card size stock – Datamatrix code

B.4.5 TICKET/BOARDING DOCUMENT ONLINE BY SNCF

The French railways are using a 2D bar code format called Aztec (see fig. 86). The International Union of Railways (UIC), which counts 167 members including the Swiss Railways, via Rail Canada, the American Railroads and the French railways, has adopted this code as a standard. For more information about UIC please refer to the website: http://www.uic.asso.fr/

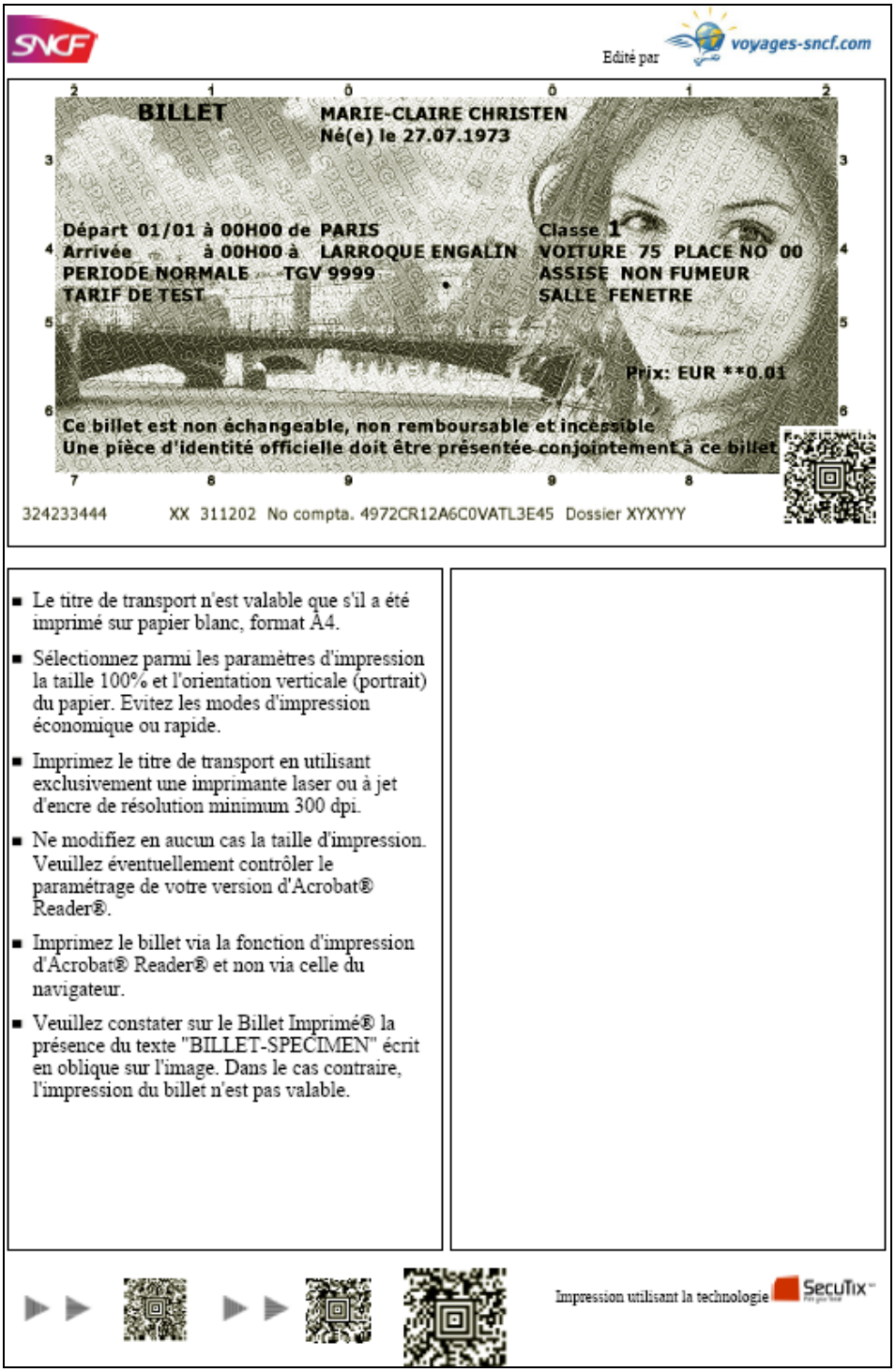


Figure 93 - Sample of home printed BCBP for the French Railways – Aztec code

B.4.6 TICKET/BOARDING DOCUMENT ONLINE BY SBB CFF FFS

The Swiss railways are using a 2D bar code format called Aztec (see fig. 87).

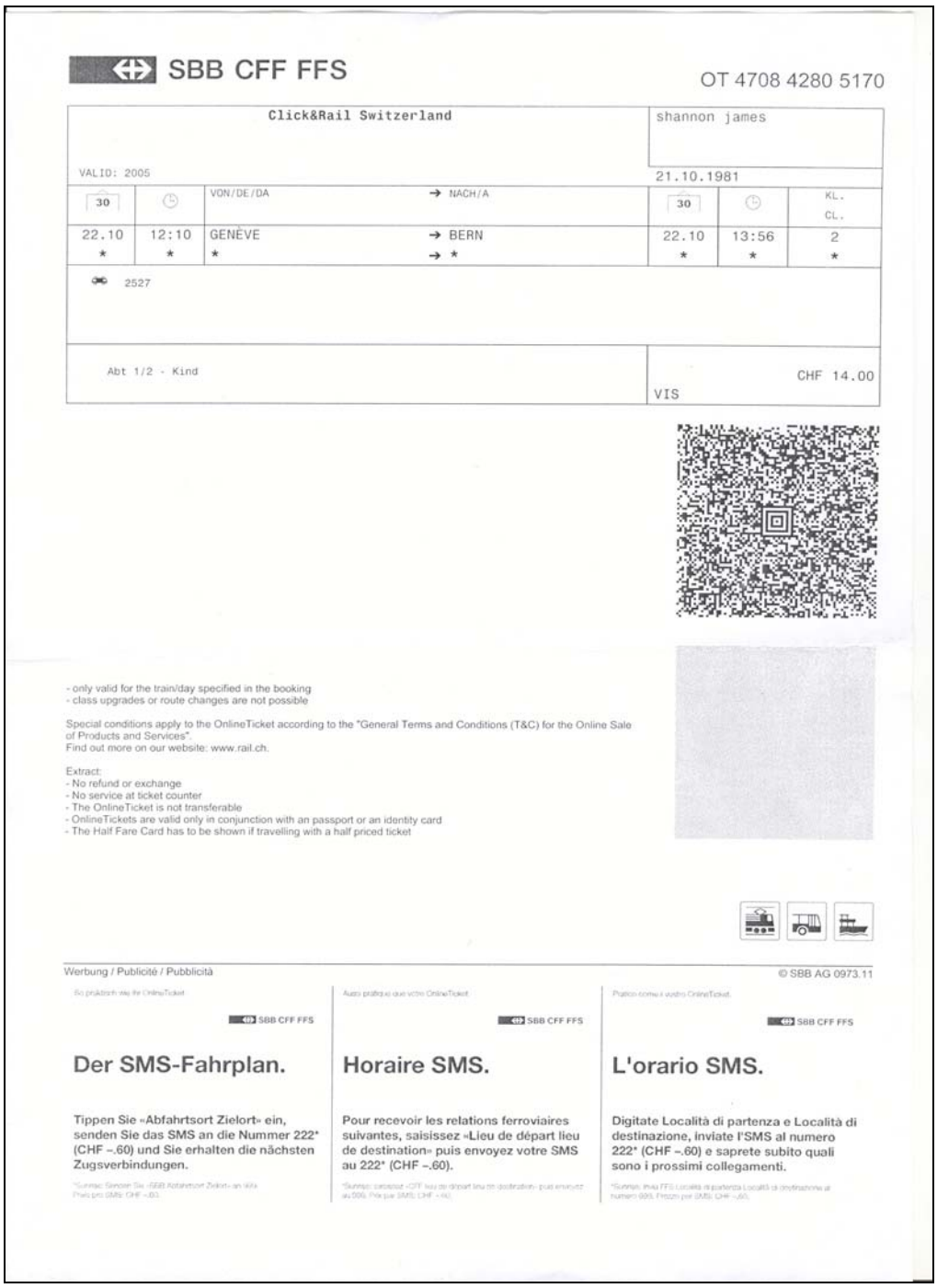


Figure 94 - Sample of BCBP printed at a desk for Swiss Railways – Aztec code

APPENDIX C - PDF417

PDF417 is a standard of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), defined in the document ISO/IEC 15438:2001. According to this standard, the PDF417 symbology is “entirely in the public domain and free of all user restrictions, licences and fees”. The specifications of the PDF417 provide all the parameters used to create such a bar code (see fig. 88).

Structure of the PDF417 symbol

Parameter	Definition
Quiet zone	A quiet zone is a blank margin that prevents the reader from picking up information that does not pertain to the bar code that is being scanned. The blank zone will not send any signal, hence the name “quiet”. The symbol shall include a quiet zone on all four sides with a minimum size of 2X (see X definition below)
Start / stop pattern	A special pattern that provides the reader with start / stop instructions as well as scanning directions.
Left / right row indicator	A character that contains information about the structure of the symbol (number of rows and columns, error correction level)
Data codeword	Codewords containing the data. Pad codewords, error correction codewords and function codewords are also generated.

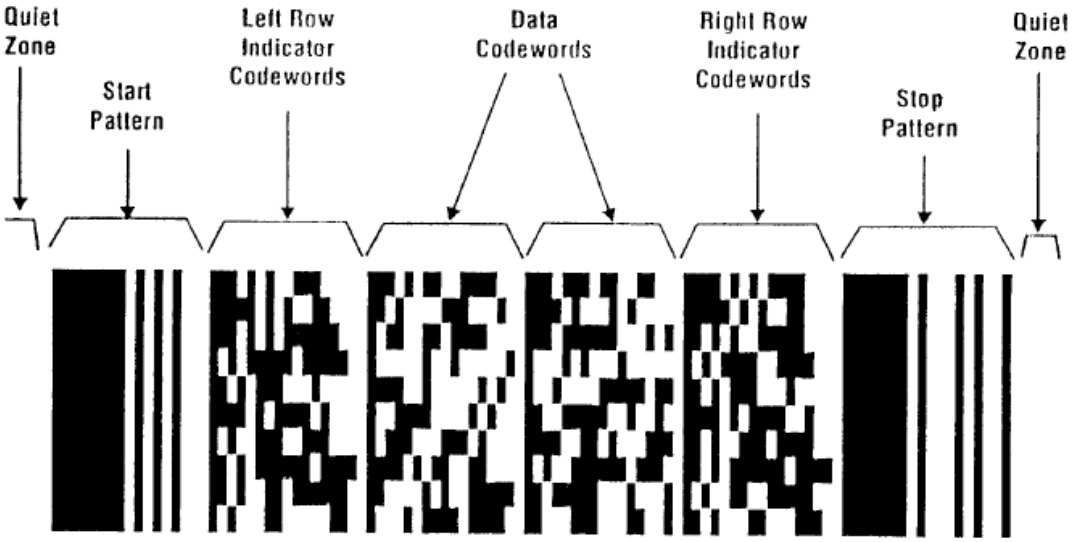


Figure 95 - Structure of the PDF417 symbol as defined in the ISO/IEC 15438

The name of this symbology derives from the structure of the symbol. The codewords are made of blocks containing 17 positions or “modules”. The codewords consist of 4 bars and 4 spaces, each of which can be one to six modules wide (see fig. 89). A codeword is defined by the width of each element, bar or space.

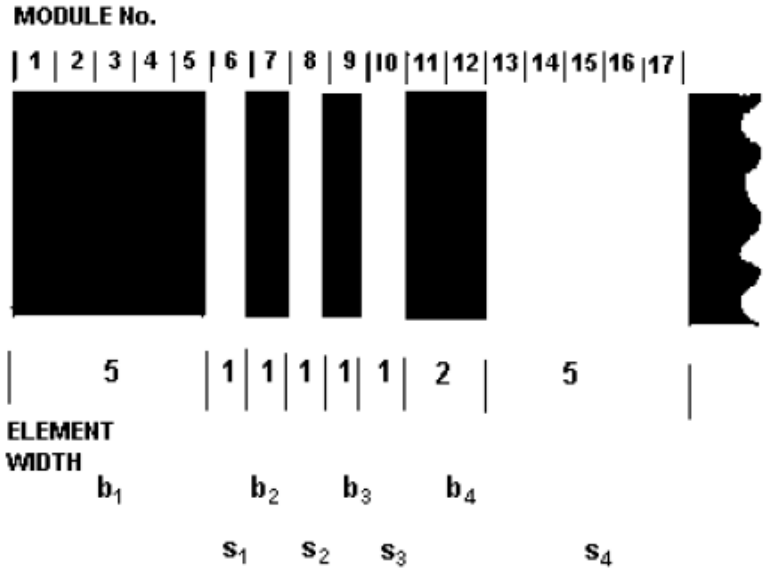


Figure 96 - PDF417 is composed of 4 elements whose widths add up to 17 modules

Parameter	Definition	Recommendation
X	Width of a module. The X Dimension should be constant throughout a symbol	A minimum X dimension is recommended in the IATA standard (see Appendix C)
Y	Row height.	The PDF417 standard recommends that Y ≥ 3X.

Algorithms then relate codewords and ASCII characters. Data compaction schemes are used to achieve high level encoding. The text compaction mode encodes up to 2 characters per codeword. It includes all printable ASCII characters plus three control characters: tab, line feed and carriage return. In byte compaction mode, the algorithm converts six data bytes to five PDF417 data codewords. In numeric compaction mode, the algorithm converts 44 consecutive numeric digits to 15 or fewer PDF417 data codewords. Numeric compaction is used to encode long strings of consecutive numeric digits.

Although PDF417 is a 2D bar code, it is in reality a stack of 1D bar codes. The decode algorithm uses scan lines which enables laser scanners that read 1D bar codes to also read PDF417 (see fig. 90), whereas the laser scanners would not read 2D matrix codes.

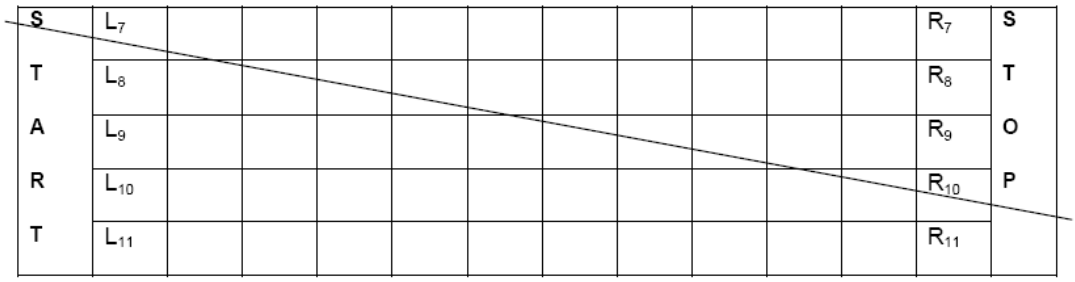


Figure 97 - Schematic showing a scan line crossing rows of the PDF417 symbol

The main reason for selecting 2D bar codes instead of 1D bar codes is that they can store more data in a given space. Airlines can play with the settings to fit as much data as possible on the boarding pass.

Here are some examples of how the size of the bar code varies depending on the number of characters. The settings used for the following examples are:

EC level	3
X dim	0.03cm
X to Y ratio	3
Number of columns	adapted to the number of characters

Example 1:
- Content: 36 characters
- String: QWERTYUIOPASDFGHJKLZXCVBNM1234567890
- Width: 5 Columns
- Size: 4.5 x 1.0 cm
- Bar code:

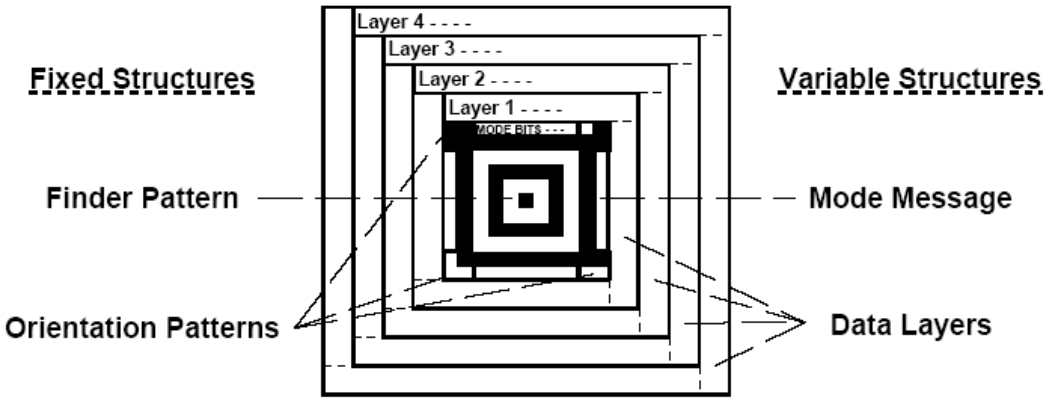
Example 2:
- Content: 108 characters
- String: QWERTYUIOPASDFGHJKLZXCVBNM1234567890QWERTYUIOPASDFGHJKLZXCVBNM 1234567890 QWERTYUIOPASDFGHJKLZXCVBNM1234567890
- Width: 5 Columns
- Size: 4.5cm x 1.5cm
- Bar code:

Example 3:
- Content: 324 characters
- String: QWERTYUIOPASDFGHJKLZXCVBNM1234567890QWERTYUIOPASDFGHJKLZXCVBNM 1234567890QWERTYUIOPASDFGHJKLZXCVBNM1234567890QWERTYUIOPASDFGHJK LZXCVBNM1234567890QWERTYUIOPASDFGHJKLZXCVBNM1234567890QWERTYUIOP ASDFGHJKLZXCVBNM1234567890QWERTYUIOPASDFGHJKLZXCVBNM1234567890QW ERTYUIOPASDFGHJKLZXCVBNM1234567890QWERTYUIOPASDFGHJKLZXCVBNM1234 567890
- Width: 9 Columns
- Size: 6.3 x 2.0 cm
- Bar code:

APPENDIX D - AZTEC

Aztec is defined in ISO/IEC 24778.

Structure of code:



Size and capacity:

# of Data Layers	Symbol Size (in x)	Codeword Count x Size	Symbol Bit Capacity	Symbol Data Capacities		
				Digits	Text	Bytes
1*	15 x 15	17 x 6	102	13	12	6
1	19 x 19	21 x 6	126	18	15	8
2*	19 x 19	40 x 6	240	40	33	19
2	23 x 23	48 x 6	288	49	40	24
3*	23 x 23	51 x 8	408	70	57	33
3	27 x 27	60 x 8	480	84	68	40
4*	27 x 27	76 x 8	608	110	89	53
4	31 x 31	88 x 8	704	128	104	62
5	37 x 37	120 x 8	960	178	144	87
6	41 x 41	156 x 8	1248	232	187	114
7	45 x 45	196 x 8	1568	294	236	145
8	49 x 49	240 x 8	1920	362	291	179
9	53 x 53	230 x 10	2300	433	348	214
10	57 x 57	272 x 10	2720	516	414	256
11	61 x 61	316 x 10	3160	601	482	298
12	67 x 67	364 x 10	3640	691	554	343
13	71 x 71	416 x 10	4160	793	636	394
14	75 x 75	470 x 10	4700	896	718	446
15	79 x 79	528 x 10	5280	1008	808	502
16	83 x 83	588 x 10	5880	1123	900	559

APPENDIX E - DATAMATRIX

Datamatrix is defined in ISO 16022.

There are two types: ECC 200, using Reed-Solomon error correction, which is recommended, and ECC 000 to 140, using levels of convolutional error correction.

Size and capacity:

Table 7 — ECC 200 symbol attributes

Symbol size[a]		Data region		Mapping matrix size	Total codewords		Reed-Solomon block		Inter–leaved blocks	Maximum data capacity			% of codewords used for error correction	Max. correctable codewords
Row	Col	Size	No.		Data	Error	Data	Error		Num.	Alphanum.[d]	Byte		Error/ erasure[b]
10	10	8 x 8	1	8 x 8	3	5	3	5	1	6	3	1	62,5	2/0
12	12	10 x 10	1	10 x 10	5	7	5	7	1	10	6	3	58,3	3/0
14	14	12 x 12	1	12 x 12	8	10	8	10	1	16	10	6	55,6	5/7
16	16	14 x 14	1	14 x 14	12	12	12	12	1	24	16	10	50	6/9
18	18	16 x 16	1	16 x 16	18	14	18	14	1	36	25	16	43,8	7/11
20	20	18 x 18	1	18 x 18	22	18	22	18	1	44	31	20	45	9/15
22	22	20 x 20	1	20 x 20	30	20	30	20	1	60	43	28	40	10/17
24	24	22 x 22	1	22 x 22	36	24	36	24	1	72	52	34	40	12/21
26	26	24 x 24	1	24 x 24	44	28	44	28	1	88	64	42	38,9	14/25
32	32	14 x 14	4	28 x 28	62	36	62	36	1	124	91	60	36,7	18/33
36	36	16 x 16	4	32 x 32	86	42	86	42	1	172	127	84	32,8	21/39
40	40	18 x 18	4	36 x 36	114	48	114	48	1	228	169	112	29,6	24/45
44	44	20 x 20	4	40 x 40	144	56	144	56	1	288	214	142	28	28/53
48	48	22 x 22	4	44 x 44	174	68	174	68	1	348	259	172	28,1	34/65
52	52	24 x 24	4	48 x 48	204	84	102	42	2	408	304	202	29,2	42/78
64	64	14 x 14	16	56 x 56	280	112	140	56	2	560	418	277	28,6	56/106
72	72	16 x 16	16	64 x 64	368	144	92	36	4	736	550	365	28,1	72/132
80	80	18 x 18	16	72 x 72	456	192	114	48	4	912	682	453	29,6	96/180
88	88	20 x 20	16	80 x 80	576	224	144	56	4	1 152	862	573	28	112/212
96	96	22 x 22	16	88 x 88	696	272	174	68	4	1 392	1 042	693	28,1	136/260
104	104	24 x 24	16	96 x 96	816	336	136	56	6	1 632	1 222	813	29,2	168/318
120	120	18 x 18	36	108 x 108	1 050	408	175	68	6	2 100	1 573	1 047	28	204/390
132	132	20 x 20	36	120 x 120	1 304	496	163	62	8	2 608	1 954	1 301	27,6	248/472
144	144	22 x 22	36	132 x 132	1 558	620	156	62	8[c]	3 116	2 335	1 555	28,5	310/590
							155	62	2[c]					

APPENDIX F - QR CODE

QR code is defined in ISO 18004.

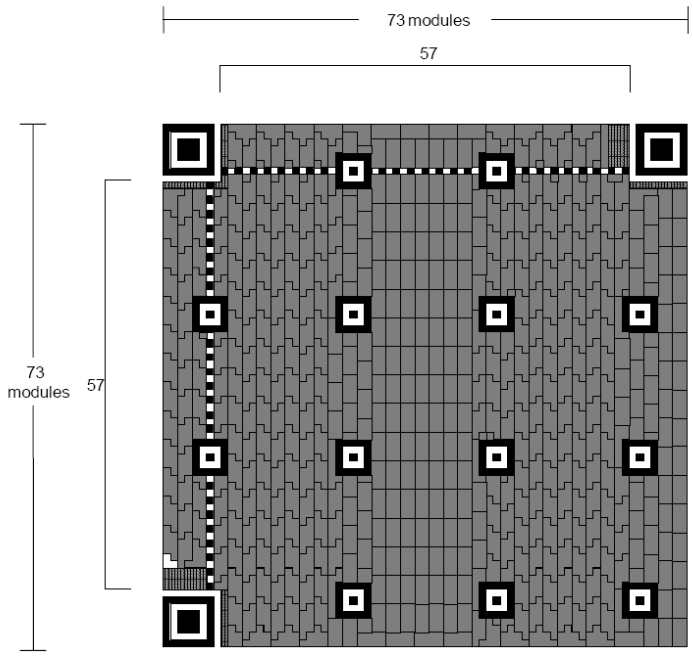
QR code has 4 levels of error correction (Reed-Salomon), allowing recovery of a percentage of codewords

Error Correction Level	Recovery Capacity % (approx.)
L	7
M	15
Q	25
H	30

Encoding Kanji characters

Input character	"点"
(Shift JIS value):	**935F**
1. Subtract 8140 or C140	**935F - 8140 = 121F**
2. Multiply m.s.b. by C0	**12 × C0 = D80**
3. Add l.s.b.	**D80 + 1F = D9F**
4. Convert to 13-bit binary	**0D9F →0 1101 1001 1111**

The size of the code is called a version. Version 14 of QR code has 73 modules:



Version 14

Capacity in codewords :

Table 1 — Codeword capacity of all versions of QR Code 2005

Version	No. of Modules/ side (A)	Function pattern modules (B)	Format and version information modules (C)	Data modules except (C) ($D=A^2-B-C$)	Data capacity [codewords][a] (E)	Remainder Bits
M1	11	70	15	36	5	0
M2	13	74	15	80	10	0
M3	15	78	15	132	17	0
M4	17	82	15	192	24	0
1	21	202	31	208	26	0
2	25	235	31	359	44	7
3	29	243	31	567	70	7
4	33	251	31	807	100	7
5	37	259	31	1 079	134	7
6	41	267	31	1 383	172	7
7	45	390	67	1 568	196	0
8	49	398	67	1 936	242	0
9	53	406	67	2 336	292	0
10	57	414	67	2 768	346	0
11	61	422	67	3 232	404	0
12	65	430	67	3 728	466	0
13	69	438	67	4 256	532	0
14	73	611	67	4 651	581	3
15	77	619	67	5 243	655	3
16	81	627	67	5 867	733	3
17	85	635	67	6 523	815	3
18	89	643	67	7 211	901	3
19	93	651	67	7 931	991	3
20	97	659	67	8 683	1 085	3

Capacity in alphanumeric characters

Version	Error correction level	Number of data codewords	Number of data bits	Data capacity			
				Numeric	Alphanumeric	Byte	Kanji
6	L	136	1 088	322	195	134	82
	M	108	864	255	154	106	65
	Q	76	608	178	108	74	45
	H	60	480	139	84	58	36
7	L	156	1 248	370	224	154	95
	M	124	992	293	178	122	75
	Q	88	704	207	125	86	53
	H	66	528	154	93	64	39
8	L	194	1 552	461	279	192	118
	M	154	1 232	365	221	152	93
	Q	110	880	259	157	108	66
	H	86	688	202	122	84	52
9	L	232	1 856	552	335	230	141
	M	182	1 456	432	262	180	111
	Q	132	1 056	312	189	130	80
	H	100	800	235	143	98	60
10	L	274	2 192	652	395	271	167
	M	216	1 728	513	311	213	131
	Q	154	1 232	364	221	151	93
	H	122	976	288	174	119	74
11	L	324	2 592	772	468	321	198
	M	254	2 032	604	366	251	155
	Q	180	1 440	427	259	177	109
	H	140	1 120	331	200	137	85
12	L	370	2 960	883	535	367	226
	M	290	2 320	691	419	287	177
	Q	206	1 648	489	296	203	125
	H	158	1 264	374	227	155	96
13	L	428	3 424	1 022	619	425	262
	M	334	2 672	796	483	331	204
	Q	244	1 952	580	352	241	149
	H	180	1 440	427	259	177	109
14	L	461	3 688	1 101	667	458	282
	M	365	2 920	871	528	362	223
	Q	261	2 088	621	376	258	159
	H	197	1 576	468	283	194	120
15	L	523	4 184	1 250	758	520	320
	M	415	3 320	991	600	412	254
	Q	295	2 360	703	426	292	180
	H	223	1 784	530	321	220	136
16	L	589	4 712	1 408	854	586	361
	M	453	3 624	1 082	656	450	277
	Q	325	2 600	775	470	322	198
	H	253	2 024	602	365	250	154
17	L	647	5 176	1 548	938	644	397
	M	507	4 056	1 212	734	504	310
	Q	367	2 936	876	531	364	224
	H	283	2 264	674	408	280	173

APPENDIX G - StB PREFERRED PARTNERS (StB PP)

Simplifying the Business (StB) is the industry's top priority and as such requires the involvement of all key stakeholders. Two of these are vendors and service providers. Their business knowledge, expertise and solutions provide tangible benefits to IATA and its Member airlines and will be critical in the successful implementation of the Simplifying the Business programme.

To acknowledge the value that these vendors and service providers can add in assisting in the implementation of the Simplifying the Business initiative, a new membership category has been created - StB Preferred Partners.

Organisations that provide an StB related solution might be interested in becoming an StB Preferred Partner, in order to take advantage of the privileged business opportunities linked to the StB projects. This new category has been created to provide our Strategic Partners with privileged business opportunities linked to the StB initiatives.

In addition to the membership privileges currently offered to Partners, "StB Preferred Partners" (StB PP) will have the following exclusive benefits:

- IATA will facilitate the targeted match-making between the StB PP and airlines through the use of market intelligence gathered by IATA's regional teams through individual airline meetings
- Access to subject matter experts and the StB team for StB relevant matters
- Exclusive and free participation at the StB regional workshops
- Exclusive and free exhibition at the StB regional workshops
- Exclusive sponsorship opportunities at the StB regional workshops
- When relevant, working with the StB team on the content of the StB regional workshops (such as in airline case studies)
- Exclusive opportunity to promote their products/services at spotlight sessions when available at StB regional workshops
- Access to special StB Session with IATA's DG, Sr. Management & StB team (when offered)
- The exclusive IATA Strategic Partnerships Extranet site
- Special StB Strategic Partner logo for use on promotional materials
- Listing in IATA StB Preferred Partner directory

StB Preferred Partners offering BCBP products and services are presented in alphabetical order:

Amadeus Global Travel Distributions S.A.

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Amadeus is a technology provider and the leading global distribution system (GDS), serving the marketing, sales and distribution needs of the world's travel and tourism industries. Its comprehensive data processing centre serves over 66,000 travel agency locations and some 10,000 airline sales offices, totalling around 330,000 points of sale located in over 215 markets worldwide.

Through Amadeus, travel agencies and airline offices can make bookings on 95 per cent of the world's scheduled airline seats. The system also provides access to over 53,400 hotel properties, some 45 car rental companies serving over 29,000 locations, as well as ferry, rail, cruise, tour operators and insurance companies.

Amadeus is a leading IT solutions provider to the airline industry; 149 airlines use Amadeus' Altéa Sell as the sales and reservation system in their offices, to provide passengers with superior and seamless service at optimal cost.

Amadeus' new generation Customer Management Solutions include Altéa Plan (inventory management system) and Altéa Fly (departure control system). British Airways, Qantas and Finnair are the first customers to implement these solutions.

e-Travel, Amadeus' e-commerce business unit, is the global leader in online travel technology and corporate travel management solutions. It services travel agencies in 90 countries, and powers the websites of over 260 corporations and more than 60 airlines and hotels.

Amadeus is headquartered in Madrid, Spain. For the year ended 31 December 2004, the company reported revenues of EUR 2,056.7m and net income of EUR 208m. The Amadeus data centre is in Erding (near Munich), Germany and its principal development offices are located in Sophia Antipolis (near Nice), France.

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ARINC Incorporated is the world leader in transportation communications and systems engineering. The company develops and operates communications and information processing systems and provides systems engineering and integrated solutions to five key industries: airports, aviation, defense, government and surface transportation.

ARINC sponsors industry committees and participates in related industry activities that contribute to flight safety and efficiency. The work of the ARINC sponsored committees and related efforts, or ARINC Industry Activities, is completed on behalf of the aviation community and benefits aviation at large.

Incorporated in 1929 to provide reliable and efficient radio communications for the airlines, ARINC is headquartered in Annapolis, Maryland, with over 3000 employees worldwide. ARINC is ISO 9001 certified.

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DESKO GmbH has designed, manufactured and marketed solutions for professional data entry applications for more than 10 years. -Travel and Security Solutions -e-Passport Solutions -Banking Solutions - Payment- and EFT-Systems. As well, customer designed versions of these technologies are available.

IBM

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IBM is a leading provider of e-business and IT services, solutions, and products to all segments of the travel and transportation industry, including airlines, airports, and global distribution systems.

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IER is a leading manufacturer of ticketing and passenger management systems for the transportation industry's air, rail and sea sectors.
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Intermec Technologies offers the aviation industry comprehensive solutions designed to improve productivity and decrease costs specifically in the areas of maintenance, cargo, passenger services, and ramp operations.

With more than 20 years of history servicing the airline industry, Intermec has long history of innovation, reliability, and service.

Lufthansa Systems Group GmbH

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Lufthansa Systems is one of the leading IT service providers for the airline and aviation industries worldwide. As systems integrator, the wholly-owned subsidiary of the Lufthansa Group covers the entire range of IT services, including consulting, development, implementation and operation.

Lufthansa Systems provides its IT infrastructure and operations services to a variety of industries. Headquartered in Kelsterbach near Frankfurt/Main, Germany, the company has branches in Germany and 17 countries and employs about 4,500 people worldwide.

In business year 2004, Lufthansa Systems recorded sales of EUR 628 million.

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Mobiqa's objective is "Mobilising the Business". Our vision is the fully mobilised passenger journey.

Mobiqa are world leaders in mobile boarding solutions and offer carriers an extended range of products and services including our industry-leading mobi-pass™ mobile boarding pass product, mobile check-in and flight status alerts.

Mobiqa have over six years of specialist experience in sending industry standard barcodes to passengers' mobile devices via SMS, MMS, WAP and Email technologies. With an extensive database of mobile devices and relationships with mobile network operators worldwide, clients of Mobiqa include the leading players in the airline industry. Mobiqa are suppliers of mobile solutions to a number of the world's leading airlines and are at the leading edge of development and testing of mobile barcoded boarding passes (mBCBPs).

NCR

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NCR Corporation (NYSE: NCR) is a global end-to-end self-service solutions provider in all consumer channels including travel, Leading how the world connects, interacts and transacts with business, NCR's customers include 26 major corporations, including 21 airlines (domestically and internationally based). As the global leader in self-service for more than 40 years, NCR is extending this leadership and leveraging the success of its airline check-in framework to extend this adaptability into correlating travel markets.

Now, NCR's solutions have expanded to support hotel, cruise line, car rental and other off-airport locations to enable more people to use self check-in and check-out services. NCR has over 8,400 devices deployed at 300+ airports worldwide. NCR believes that everyone deserves the right to self-service, naturally.

		Together with our airline, car rental agency, hotel and other travel and hospitality partners around the world NCR are rethinking and re-engineering the way we interact with the customer. We already do the same for category leaders in retail, banking and healthcare. In fact, every year, more than 23 billion self-service transactions are processed through NCR solutions.
SITA	Paul Brock Manager, Industry & Government Affairs 26, Chemin de Joinville P.O. Box 31 1216 Cointrin-Geneva Switzerland Tel:41 22 747 6740 Fax:41 22 747 6166 email:paul.brock@sita.aero	SITA is the world's leading provider of global information and telecommunications solutions to the air transport industry. With over 50 years experience, it offers a total service to around 740 air transport industry members and more than 1,800 customers, supporting them globally in over 220 countries and territories. The company offers a total service to the air transport industry, providing value-added solutions which include: application services - meeting the requirements for airline, airport, aerospace, aircraft applications and systems; end-to-end desktop and infrastructure services; and network services focusing on systems integration, outsourcing and consulting, in support of complex solutions.
Travelport	N/A	Travelport GDS is a major Global Distribution Service (GDS). Utilizing some of the fastest, most flexible and efficient networks and computing technologies Travelport GDS provides comprehensive electronic data services for airlines, travel suppliers, travel agencies, e-commerce sites and corporations Travelport GDS is the Leading processor of Internet travel distribution, managing a significant share of all online agency bookings worldwide. This makes Travelport GDS the largest processor of travel transactions in the U.S. on any given day. Travelport GDS offers a complete range of E-Ticketing products to fit every airline requirement. Travelport GDS also offers industry leading fares and pricing technology such as pan Worldspan e-Pricing® and Rapid Reprice®.
TravelSky Technology Limited	Ray Shengqi He Marketing Department Floor 18, Tower C, Raycom InfoTech Park No. 2, Ke Xue Yuan South Road Haidian District, Beijing 100080 P.R. China Tel:86 10 6250 8455 Fax:86 10 6250 8421 email:sqhe@travelsky.com	As the leading provider of IT solutions for China's air travel and tourist industry, TravelSky Technology Ltd. operates all Chinese airlines' Inventory Control Systems. They also provide travel agencies, at more than 6,500 locations, with the ability to search, price and book air and travel products with the world's scheduled air services and other travel vendors. The company's next generation Departure Control System has also been set up to complete an integrated service plan for all industry players and ordinary consumers benefiting from China's rapid air-traffic growth. TravelSky is listed on The Stock Exchange of Hong Kong (Stock Code: 00696). TravelSky.com, developed and owned by TravelSky, is the dominant air travel portal of China.
T-Systems International GmbH	Wolfgang Stamm Director Accounting Systems & Output Management Emil-von-Behringstr. 6	T-Systems is one of Europe's leading providers of information and communications technology (ICT). Within the Deutsche Telekom Group, T-Systems is responsible for supporting the business customer segment. With the powerful Telekom Global Net, T-

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Systems links up all important business locations around the globe and provides ICT solutions and services to a variety of industries including airlines, airports and tour operators.

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