DOCUMENT ABSTRACT

TITLE	AEP innovative solutions for travel tickets
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DATE	2/2019
TRANSLATION	English: Gianni Becattini
CIRCULATION	Public for customers
SUMMARY	This document contains a brief presentation of innovative AEP solutions for travel tickets, with particular reference to those dedicated to occasional users, as a replacement for traditional paper tickets. It consists of 6 sections: • Section 1: introduction • Section 2: QR-code technology • Section 3: NFC technology • Section 4: EMV bank card technology • Section 5: the innovative AEP solutions and their common characteristics • Section 6: summary NOTE: slide #39 related to Italian domestic Bancomat has been eliminated from this international version

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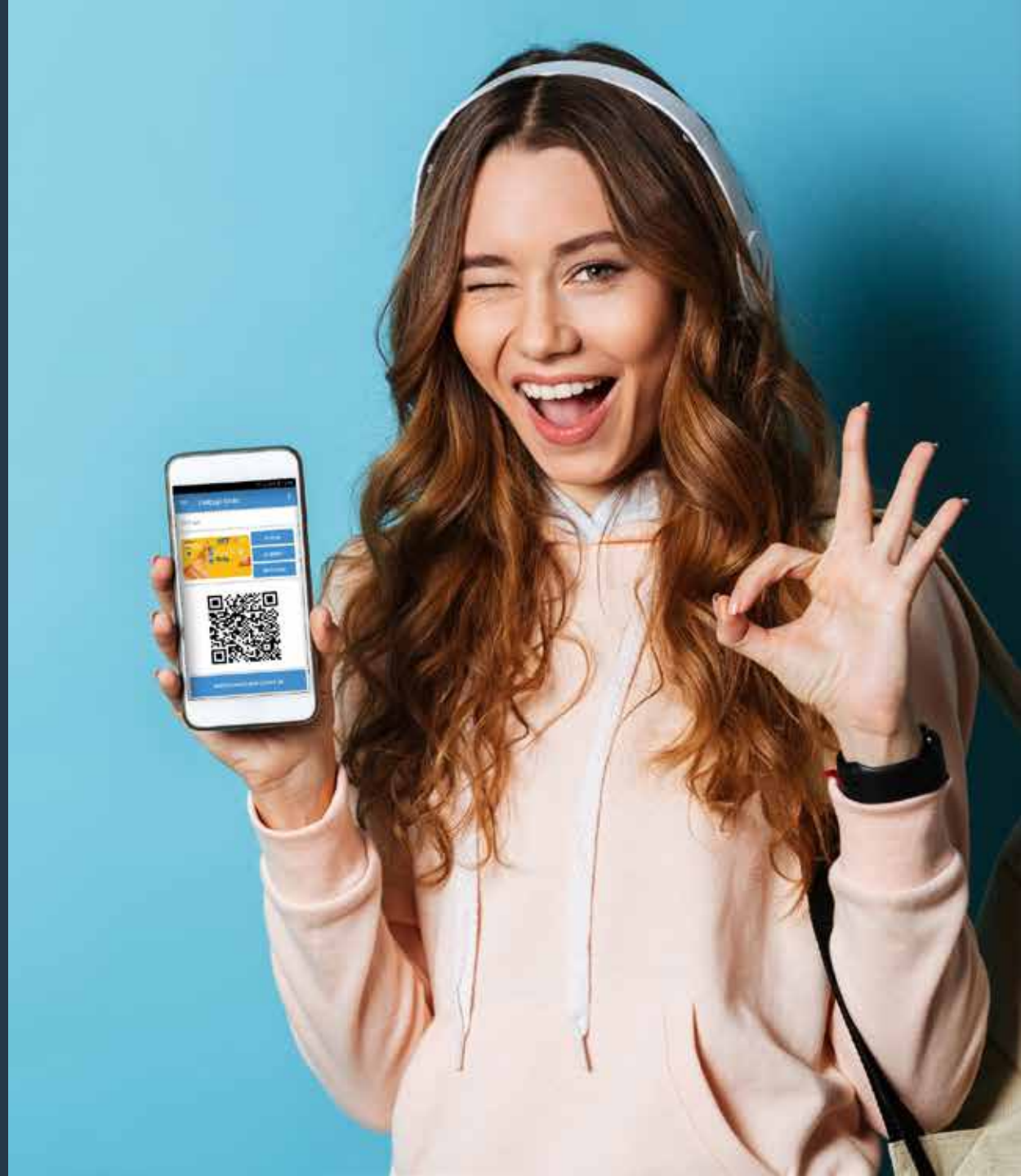
AEP
INNOVATIVE SOLUTIONS
FOR TRAVEL TICKETS

20 1999 2019 YEARS ANNIVERSARY CELEBRATION AEP



SECTION 1
INTRODUCTION

OLD PAPER TICKETS ARE OBSOLETE

THEY CANNOT BE TRACKED

THEY CAN BE EASILY COUNTERFATED

THEY CANNOT BE SOLD VIA INTERNET

VALIDATORS REQUIRE PHYSICAL MANTAINANCE

OUTDATED USER EXPERIENCE

ETC.

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THE WORLD IS READY

TO ABANDON
OLD PAPER TICKETS

AND WE TOO

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NEVER WITHOUT

SMARTPHONES ARE TODAY'S
COMPANIONS FOR EVERYONE

USERS ARE ASKING FOR
NEW AND SMARTER WAYS
TO LIVE PUBLIC TRANSPORT

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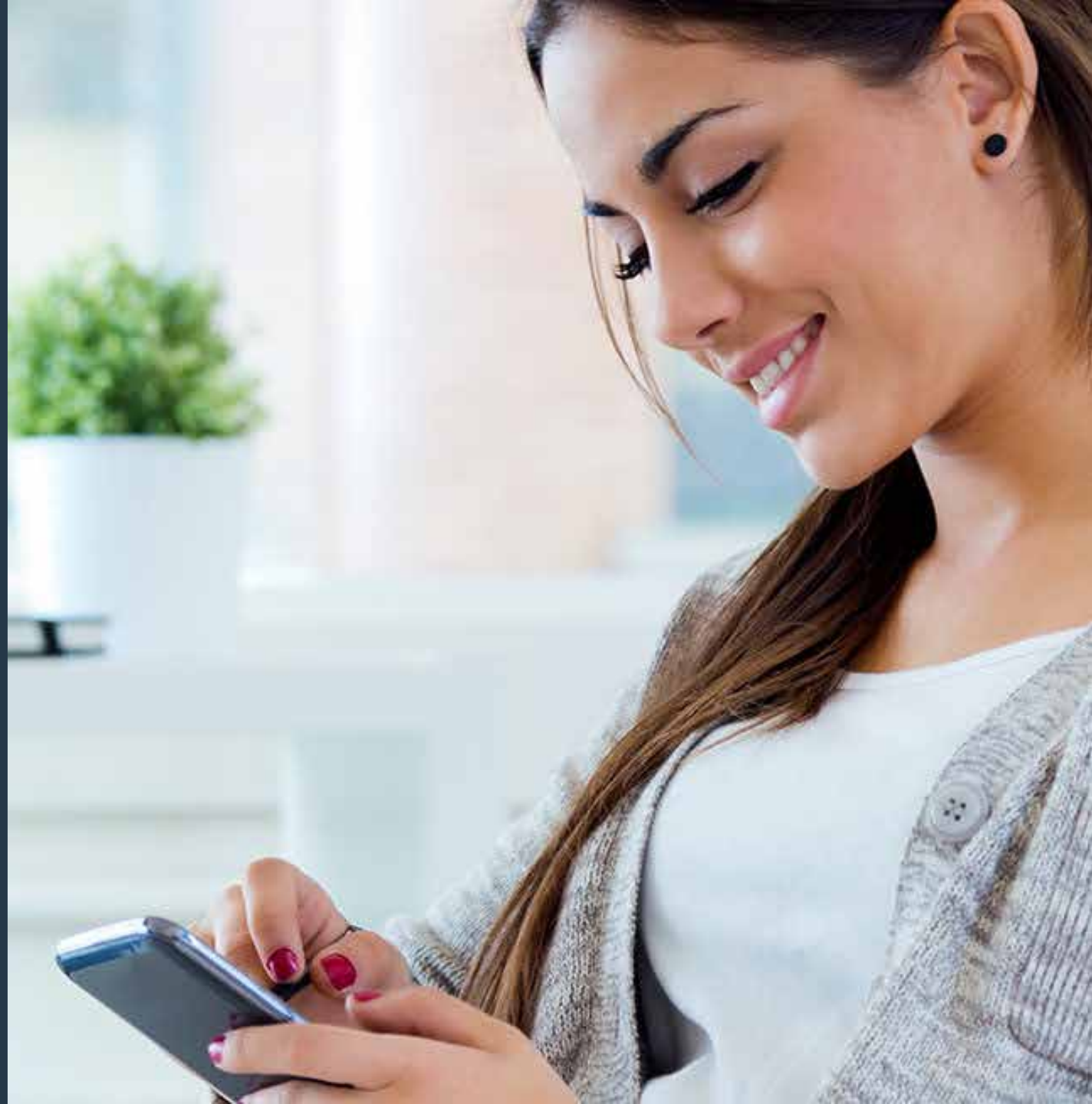

NOW THEY CAN USE SMARPHONES TO ACCESS PUBLIC TRANSPORT!

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AEP INNOVATIVE SOLUTIONS ARE VERY APRECIATED BY THE USERS

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BUY TICKETS
WHEN AND WHERE
YOU ARE COMFORTABLE TO

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QUEUES WILL BE A THING OF THE PAST!

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REPLACING PAPER TICKETS
THE TECHNOLOGIES

NFC-HCE

QR-CODE

CHIP-ON-PAPER

OPEN LOOP EMV

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INDEPENDENTLY FROM THE CHOSEN TECHNOLOGY

TICKETING SYSTEMS
POSSIBLE OPERATING APPROACHES

CARD-BASED TICKETING

ACCOUNT-BASED TICKETING

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CARD BASED TICKETING (CBT)

IN A TRADITIONAL CARD-BASED SYSTEM DATA STRUCTURES ARE CONTAINED IN SMART CARDS

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ACCOUNT BASED TICKETING (ABT)

IN ABT SYSTEMS
DATA ARE TOT CONTAINED
IN THE PHYSICAL CARD

THEY ARE STORED IN THE CENTER
IN A VIRTUAL CARD
WITH THE SAME DATA STRUCTURE
AS A PHYSICAL CARD

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ACCOUNT BASED TICKETING

THE PHYSICAL CARD IS USED MAINLY AS AN «ID» TO LINK THE CUSTOMER TO THE VIRTUAL DATA ON THE SERVER

ANY PHYSICAL CARD

CAN BE IN THEORY USED
AS A MEDIUM
FOR ACCESSING THE VIRTUAL CARD

STRONG AUTENTICATION
CAPABILITIES
ARE STRONGLY ADVISABLE

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International Organization for Standardization

ACCORDING ISO/TR 20526:20

ISO/TR 20526:2017, Account-based ticketing state of the art report

VTS

IS THE AEP'S TECHNOLOGY

TO BUILD UNIVERSAL APPLICATIONS

NOT DEPENDENT
ON SPECIFIC E-TICKETING SYSTEMS

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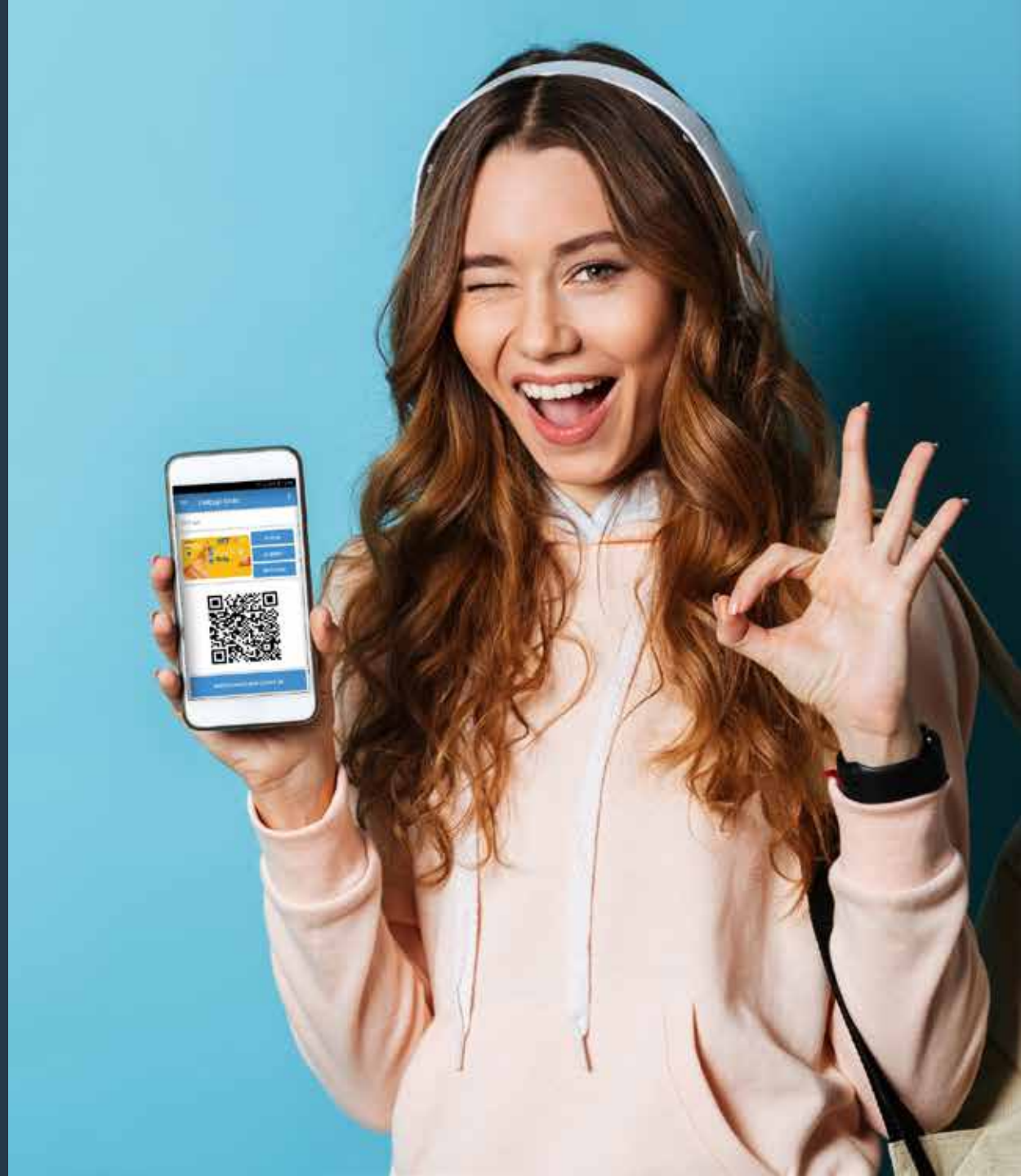

AMONG VTS BENEFITS

THE CAPABILITY TO CREATE APPLICATIONS
THAT CAN INDIFFERENTLY OPERATE
AS ABT OR CBT

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VTS: ABT & CBT

- VTS CAN OPERATE IN BOTH MODES:
  - ABT: ACCOUNT BASED TICKETING
  - CBT: CARD BASED TICKETING
- VTS INTEGRATES AND OVERCOMES BOTH CONCEPTS, ADDING NEW OPERATING MODES AND THEIR COMBINATIONS

vts powered

SECTION 2
QR-CODE TECHNOLOGY

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QR-CODE

QR-CODE ARE
MACHINE-READABLE
OPTICAL LABELS
THAT CONTAINS DATA

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QR-CODE IS READ-ONLY

QR-CODES CAN BE READ
BUT NOT WRITTEN

E.G. YOU CANNOT STORE IN THEM
VALIDATION DATA

DATA IN QR-CODE ARE USED
TO STORE SOME TICKET DATA
AND AS AN ID AS WELL
FOR ACCESSING
ACCOUNT BASED INFORMATION

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QR-CODE SYSTEMS
USE MAINLY THE ABT APPROACH

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QR-code

AEP OWNS THE ENTIRE APPLE

AND CAN THUS OFFER MUCH MORE FUNCTIONS WITH RESPECT TO SIMPLE HOMEBUILT ONESIDED SOLUTIONS

BACKEND CENTRAL SYSTEM

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VALIDATORS (SOFTWARE)

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TICKET & SMARTPHONES

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COMM SYSTEM

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QR-code

SO YOU CAN ALSO PREPRINT AND DISTRIBUTE SMART PAPER TICKETS

AND WE REALLY «BURN THEM OUT» !

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QR-code

CRYPTOGRAMS

A QR-CODE TICKET
IS BASED ON A CRYPTOGRAM
GENERATED AND SIGNED
BY MEAN OF A SAM MODULE

QR-CODES CONTAIN CRYPTOGRAMS

VALIDATORS & INSPECTORS USE THEIR SAM
TO VERIFY THE CORRECTNESS
OF THE CRYPTOGRAM

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QR-code

THE CENTER ONLY CAN PRODUCE CRYPTOGRAMS

FOR SECURITY REASONS
CRYPTOGRAM ISSUING SERVICES
ARE CENTRALIZED

NOBODY ELSE IS AUTHORIZED
TO PRODUCE CRYPTOGRAMS

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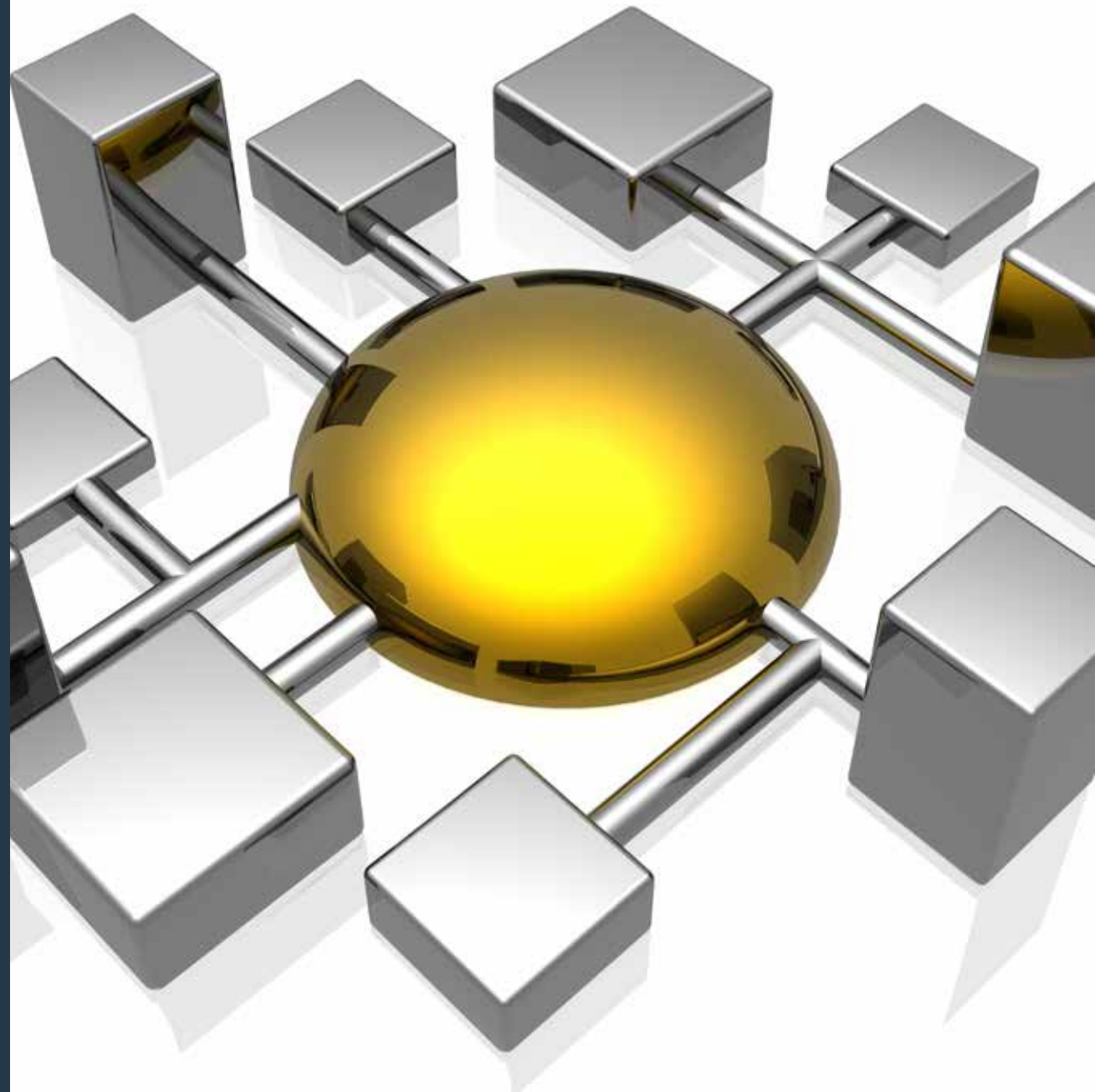

WHICH KIND OF TRAVEL DOCUMENTS CAN BE IMPLEMENTED WITH QR-CODES?

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QR-code

QR-CODE ALLOWS...

QR-CODE IS A PERFECT SOLUTION FOR SHORT TIME VALIDY AND LOW COST TICKETS

QR-CODE SUPPORTS CARNETS (MULTI-RIDE)

QR-CODE SUPPORTS TRANSFERS (MORE BUSES WITHIN A CERTAIN TIME)

QR-CODE SUPPORTS MULTI PASSENGER

BUT YOU CAN ALSO USE QR-CODE FOR SEASON TICKETS!

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*THE PERFECT SOLUTION FOR LOW COST TICKETS AND SHORT TRIPS

WHO SELLS CRYPTOGRAM-BASED SMART PAPERS?

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QR-code

SMART PAPER TICKETS CAN BE ISSUED ON-BOARD

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QR-code

SELLING ON BOARD

SOME UNITS MUST ISSUE TICKETS ALSO
WHEN THE CONNECTION TO THE CENTER
IS NOT AVAILABLE

THEY (E.G. CDB-6 PLUS ON BUSES)
AUTOMATICALLY PRE-PURCHASE
CRYPTOGRAMS WHEN ON-LINE
AND KEEP THEM IN STOCK
FOR WHEN OFF-LINE

CRYPTOGRAMS ARE COMPLETED
AT THE MOMENT
OF TICKET ISSUING

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QR-code

SMART PAPER TICKETS CAN BE ISSUED FROM RETAILERS AND TVMS

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QR-code

YOU CAN BUY SMART PAPER TICKETS FROM WEB-SHOP **STAYING HOME!**

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QR-code

SMART TICKETS CAN BE PURCHASED BY SMARTPHONES

...AND THE QR-CODE ON THE SCREEN CHANGES PERIODICALLY TO PREVENT CHEATING SCREENSHOTS

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AND FIRST OF ALL WE DO...
A REAL VALIDATION!

QR-code

QR-NFC VALIDATION

IT IS POSSIBLE TO TRANSFER
TOWARD THE VALIDATOR
EXACTLY THE SAME DATA
CONTAINED IN THE QR-CODE

SAME USER EXPERIENCE AS CARDS
EASIER/FASTER THAN QR-CODE
CAN BE USED ONLY
ON ANDROID DEVICES

THIS IS NOT THE REAL
BIDIRECTIONAL NFC SYSTEM
SEE NEXT SECTION FOR FURTHER
INFORMATION

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QR-code

VALIDATION CAN BE PERFORMED ON-LINE AND OFF-LINE

THE VALIDATION IS FIRST ATTEMPTED ON-LINE

A TRANSACTION IS ALWAYS SHORTER THAN 500 MS

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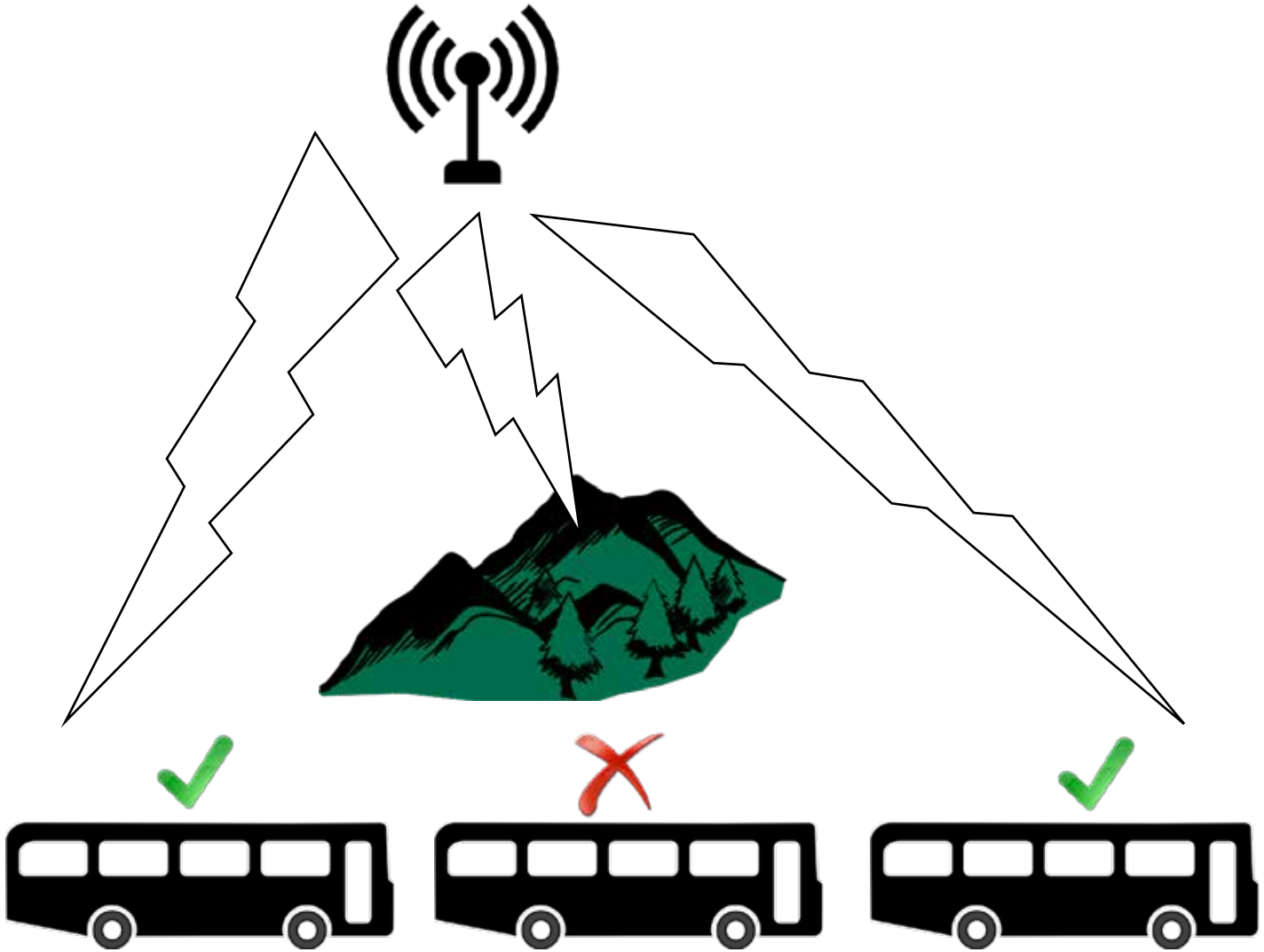

HARDWARE REQUIREMENTS

QR-CODE SOLUTIONS CAN BE USED ON RECENT GENERATION AEP EQUIPMENT:

FUTURA 3B

FUTURA 3ALX

CDB-6 PLUS

CDB-4 PLUS

(WITH OPTICAL READER)

QR-code

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QR-code

SECURITY OPTIONAL ENHANCHEMENTS

ADDING PERSONAL ELEMENTS TO THE CRYPTOGRAM COULD STRONGLY ENHANCHE SECURITY

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QR-code

SELF-VALIDATION

IF THERE IS NO VALIDATOR ON BOARD
IT IS POSSIBLE TO USE SELF-VALIDATION
BY THE TRAVELLER HIMSELF

SELF-VALIDATION IS ALWAYS PERFORMED
AT THE CENTRAL SYSTEM LEVEL
USING GLOBAL SAM SERVICES
AND OFFERS THEREFORE A GOOD
SECURITY LEVEL

BUT WE LOOSE IN THIS WAY
THE COMPLIANCE TO MANDATORY
VALIDATION DUTIES

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QR-code

ADVANTAGES

- WIDE APPLICATION SPECTRUM: PAPER TICKETS & SMARTPHONES
- CAN BE USED ON ANDROID & APPLE SMARTPHONES

ISSUES

- REQUIRES RECENT-GENERATION EQUIPMENT
- AN OPTICAL READER IS REQUIRED

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SECTION 3
NFC TECHNOLOGY

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NFC AND HCE

NFC IS A TECHNOLOGY THAT ENABLES SMARTPHONES TO ESTABLISH A SHORT RANGE COMMUNICATION WITH ANOTHER ELECTRONIC DEVICE

WITH THE AID OF HCE TECHNOLOGIES (OR DERIVED) SMARTPHONES CAN EMULATE MANY SMART CARD USED IN PUBLIC TRANSPORT

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NFC

AEP NFC SOLUTIONS ARE ALREADY IN OPERATION!

SINCE OCTOBER 2ND 2018
MORE THAN 30.000 USERS
DOWNLOADED THE
GTT (TURIN) APP
REALISED AND BASED ON
THE AEP VTS SDK
MOREOVER THEY VALIDATE
VIA NFC ON OVER
7.000 AEP DEVICES
AND ON THE METRO (REALISED
BY THALES – A THIRD PARTY COMPANY)
IN TURIN

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BTLE VALIDATION COMING SOON!

iOS 7

iBeacons

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NFC

ADVANTAGES

- CAN BE USED ALSO WITH LEGACY EQUIPMENT
- ONLY THE STANDARD ISO CONTACTLESS READER IS REQUIRED
- FAST VALIDATION
- USER EXPERIENCE IS SIMILAR TO CARDS
- CAN EMULATE WIDE RANGE OF SUPPORTS (CARDS AND COPS)
- CAN SUPPORT A WIDE TARIFF RANGE

ISSUES

- APPLE SMARTPHONES ARE NOT OPEN TO MODERN SOLUTIONS
- THEIR NCF INTERFACE CAN BE USED ONLY FOR APPLEPAY

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SECTION 4
EMV BANK CONTACTLESS CARDS

EMV

EMV CONTACTLESS SOLUTION
FOR DEBIT / CREDIT CARDS

CONTACTLESS EMV OPEN LOOP PAYMENT

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EMV

EMV CONTACTLESS CARDS ARE THE SMARTEST, SAFEST AND FASTEST WAYS FOR EVERY DAY PAYMENTS

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ACCORDING THE TRANSPORT FOR LONDON MODEL

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EMV

EASY AND SAFE
YOU'LL ONLY HAVE TO TAP AT EACH ENTRY

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EMV

BY NIGHT, THE BEST FARE WILL BE CALCULATED AND APPLIED, BASED ON THE EFFECTIVE JOURNEYS

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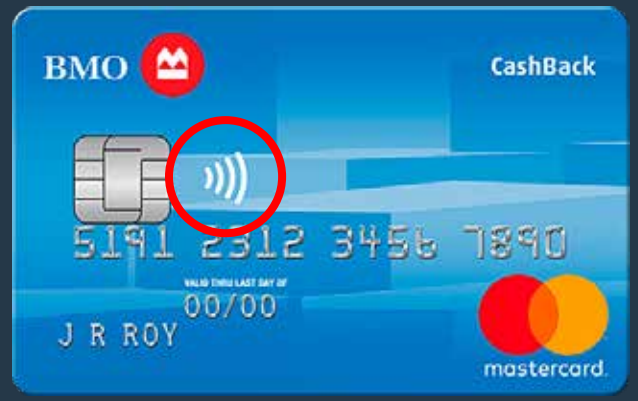
EMV

ALL THE CONTACTLESS CARDS PROVIDED BY THE MAIN INTERNATION CIRCUIT ARE SUPPORTED



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mastercard.

VISA

maestro.

V PAY

READY FOR:

AMERICAN EXPRESS

DISCOVER

EMV

PHYSICAL CARD IS NO MORE NECESSARY

YOU CAN USE YOUR SMARTPHONE APPLE OR ANDROID!

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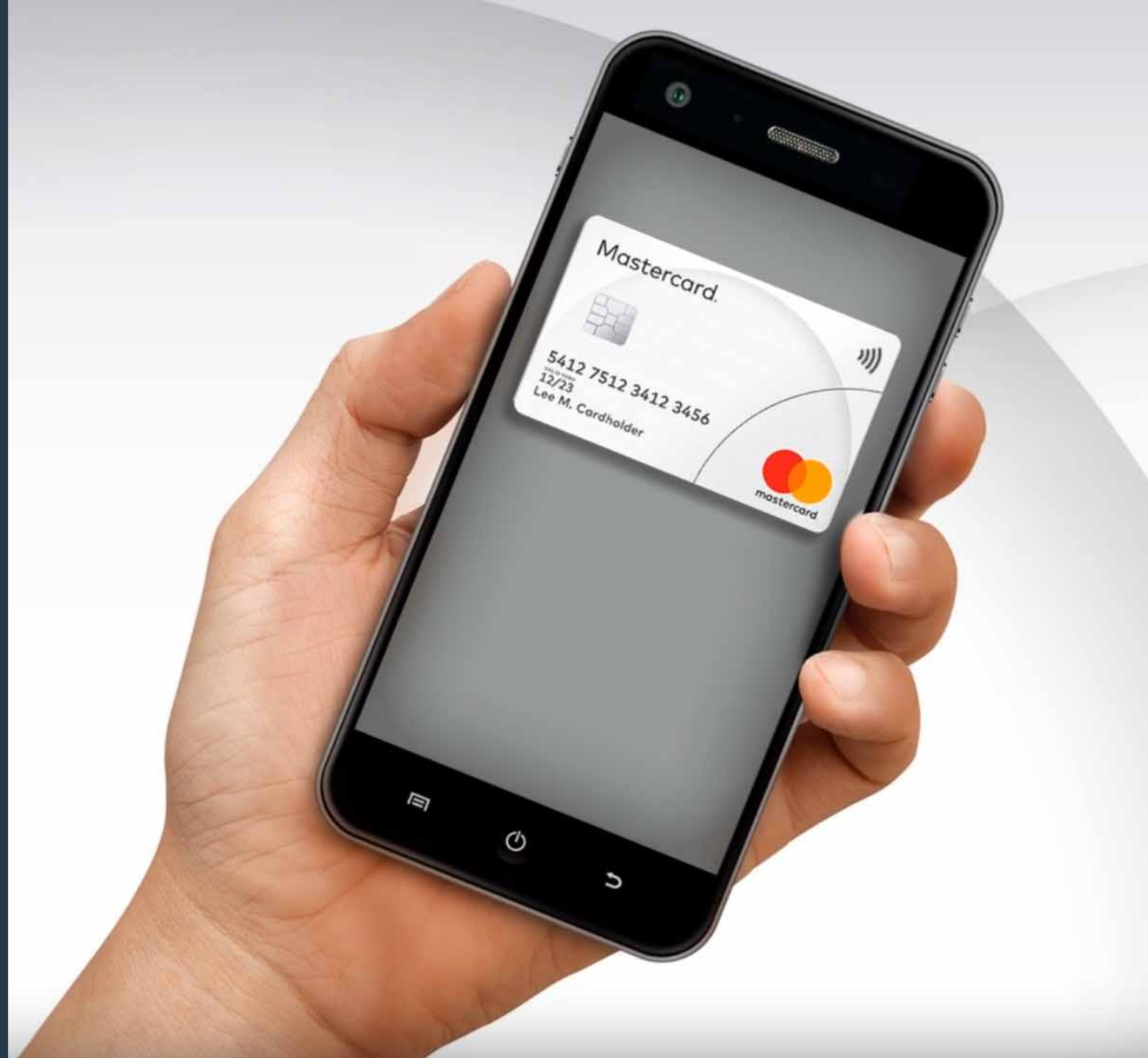

EASY AS...

1 2 3

1. SIGN THE ET-PAY CONTRACT
2. INSTALL EQUIPMENT
3. START TO OPERATE

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EMV

et pay

NEITHER EMV CARDS CAN STORE VALIDATION INFORMATION

ALSO EMV SYSTEMS USE THE ABT APPROACH

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EMV

ADVANTAGES

- NO CARD TO REQUEST
- NO TICKET TO BUY
- NO REGISTRATION REQUIRED
- NO EXCUSES FOR CLOSED SHOPS
- JUST TAP AND GO!

ISSUES

- CARD READERS MUST BE PCI-PTS CERTIFIED
- MORE COMPLEX INFRASTRUCTURE

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FURTHER INFORMATION

ASK FOR OUR DOC P/N 704433 FOR FURTHER INFORMATION

SECTION 5
AEP INNOVATIVE SOLUTIONS & THEIR COMMON FEATURES

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FROM AEP HUGE KNOW-HOW
A WIDE RANGE
OF FULLY INTEGRATED

INNOVATIVE SOLUTIONS

FOR COMPANIES
OF ANY DIMENSION

10 BUS | 100 BUS | 500 BUS | US | 2.000+ B

AEP INNOVATIVE SOLUTIONS

et vts

et mobile

et pass

QR-CODE

NFC-HCE

QR-CODE

CHIP-ON-PAPER

OPEN LOOP EMV

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AEP SOLUTIONS ENABLE YOU TO EASILY **KEEP EVERYTHING UNDER CONTROL** EVEN IN REAL TIME

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AEP SOLUTIONS **REDUCE THE COSTS** OF YOUR SALES NETWORK

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AEP SOLUTIONS RESPECT THE REGULATIONS* FOR VALIDATING TICKETS AT EACH TRIP

* ITALIAN LAWS, OCT 27TH 2016, N. 255

ACCORDING
REAL WORLD EXIGENCES

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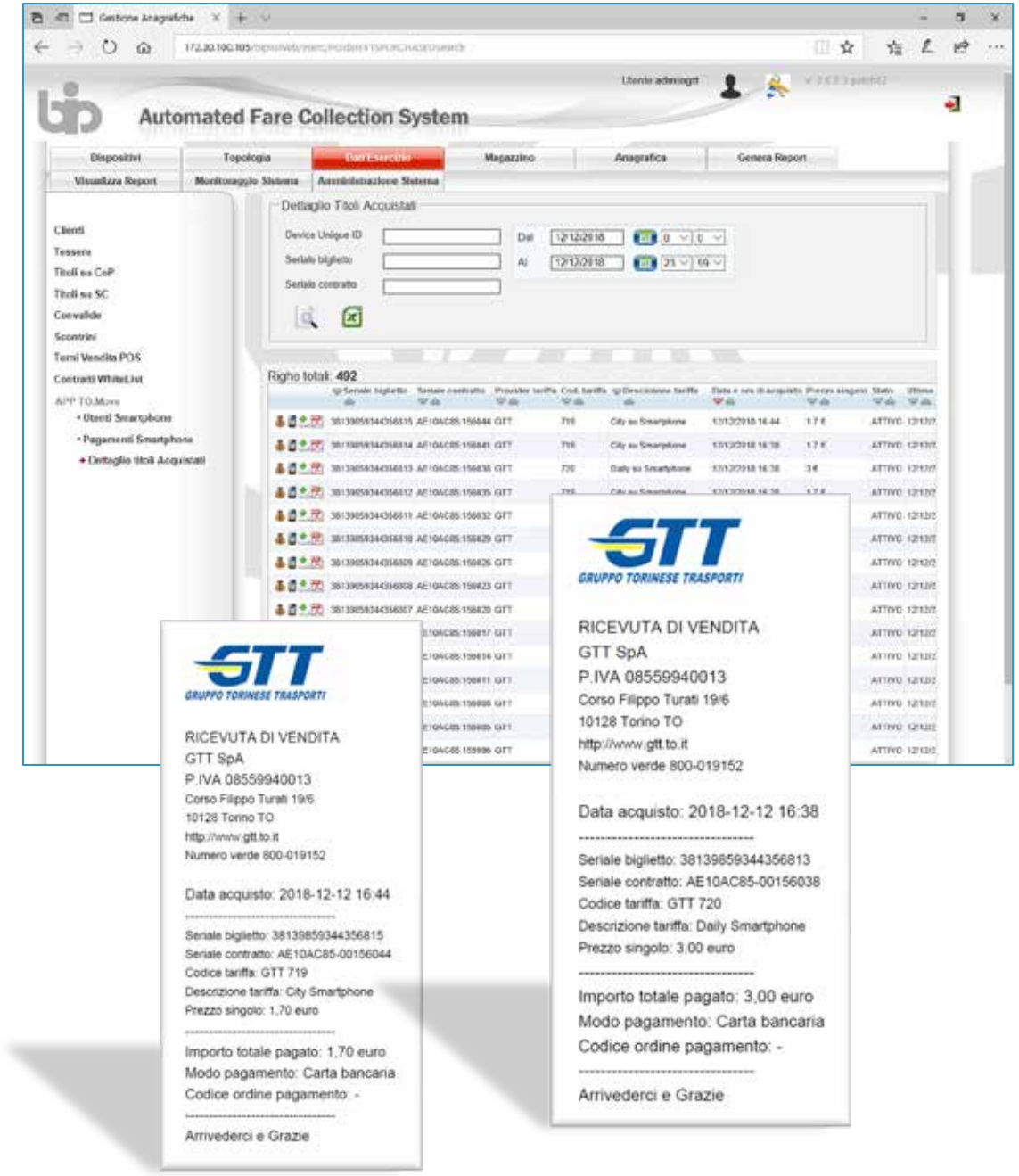
AEP SOLUTIONS
FULFILL YOUR
TAX OBLIGATIONS

TICKETS ARE ALWAYS
AUTOMATICALLY
GENERATED IN PDF
AND CAN BE
DOWNLOADED BY
THE CUSTOMER



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AEP SOLUTIONS ALLOW

ONBOARD CONTROL

OF ALL KINDS
OF SUPPORTS:

NFC

QR-CODE

AUTOVALIDATION

BTLE

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AEP SOFTWARE DEVELOPER'S KIT

AEP SOLUTIONS ARE OPEN
AEP SDKS MAKE IT POSSIBLE TO
DEVELOP YOUR OWN
ANDROID APPS
OR INTEGRATING INNOVATIVE
FUNCTIONS
IN EXISTING APPS

SECTION 5
RECAPPING

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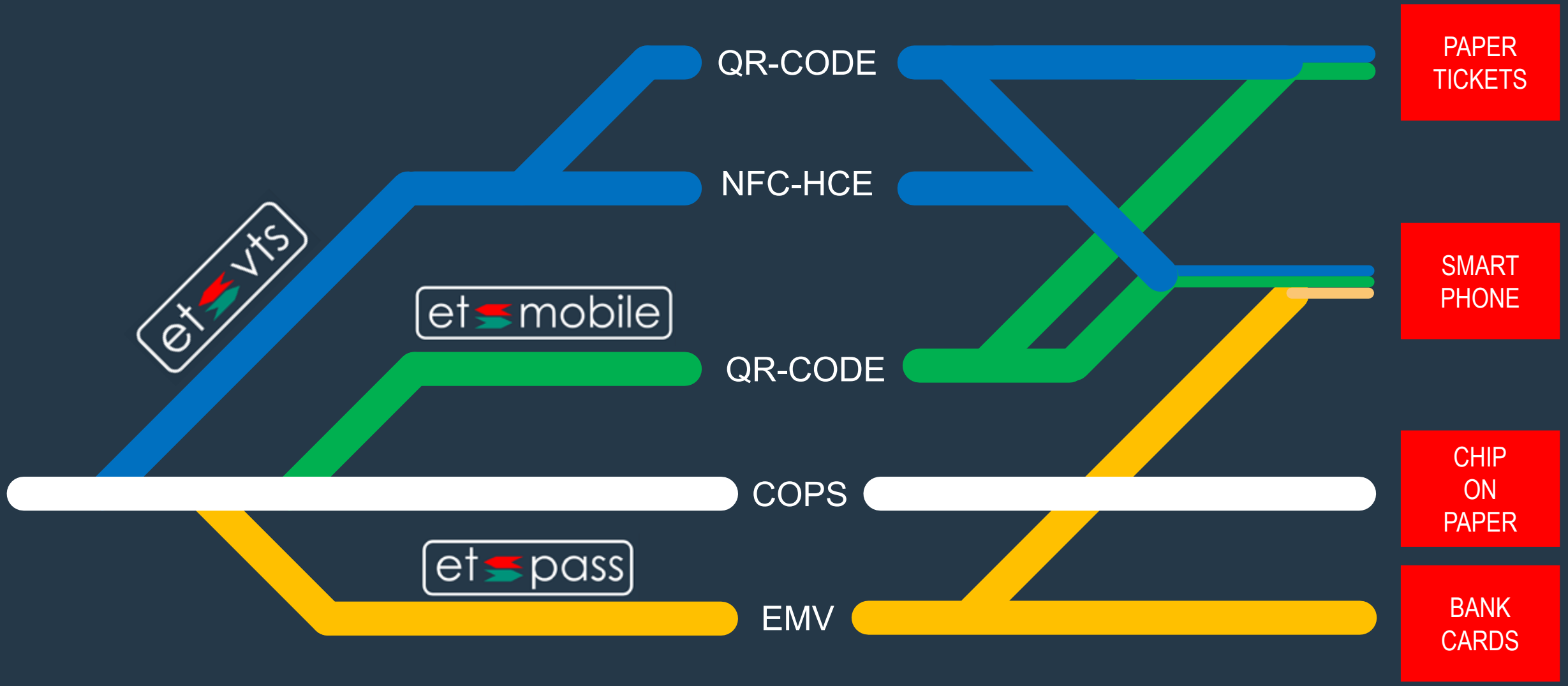
AEP SOLUTIONS AND SUPPORTS



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BRIEF RECAP

ONE SINGLE VALIDATOR!

	EMV contactless	NFC	QR code	Auto validation	BTLE
Works on Android Smartphones	●	●	●	●	●
Works on Apple Smartphones	●		●	●	●
Processes smart paper tickets			●		
Is fully certificated for standard PCI-PTS	●				
Equipped with an optical reader			●		
Equipped with a Bluetooth (BTLE) module					●
Fully integrated with all AEP Solutions	●	●	●	●	●
Fully integrated with Ticketing Systems	●	●	●	●	●

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TICKETING SYSTEMS
ARE NOT ALL EQUAL

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CHANGELOG

- 2019.02.02 E01.03
  - Nuova edizione completamente rivista
- 2019.02.07 E01.04
  - Aggiunte slide 19-20-21-28-29
  - Tolto asterisco da slide 15
- 2019.02.18 E01.05
  - Aggiunte slide 12-20 su ABT
  - Modificata slide 22
  - Aggiunte slide 23-24
  - Aggiunta slide 58
- 2019.02.19 E01.06
  - Cambiato «ET-MOBILE» con «QR-code» nelle slide 30 e 31
  - Levato marchio AFCS nelle slide 18-19-20
  - Eliminata slide 27 (era doppia con quella in zona convalida)
  - Aggiunta slide 67 (Appendino)
  - Aggiunta slide 47 (iBeacon)