MIFARE BEYOND TICKETING

CONTACTLESS SOLUTIONS FOR SMART CITIES

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FTF-CIT-N1924
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PUBLIC USE

AGENDA

- Smart Mobility – overview & products
- Smart Mobility - global trends & market figures
- Mass Transit e-Fare collection
- NFC tags – city & transport info
- Bike sharing
- Car sharing
- Parking
- AVI
- Mobile solutions

SMART MOBILITY – OVERVIEW & PRODUCTS

Fleet management

Mass Transit e-Fare collection

CAR SHARING

NFC Tags City & Transport info

Smart Mobility

BIKE SHARING

FUEL REFILL & E-CHARGING
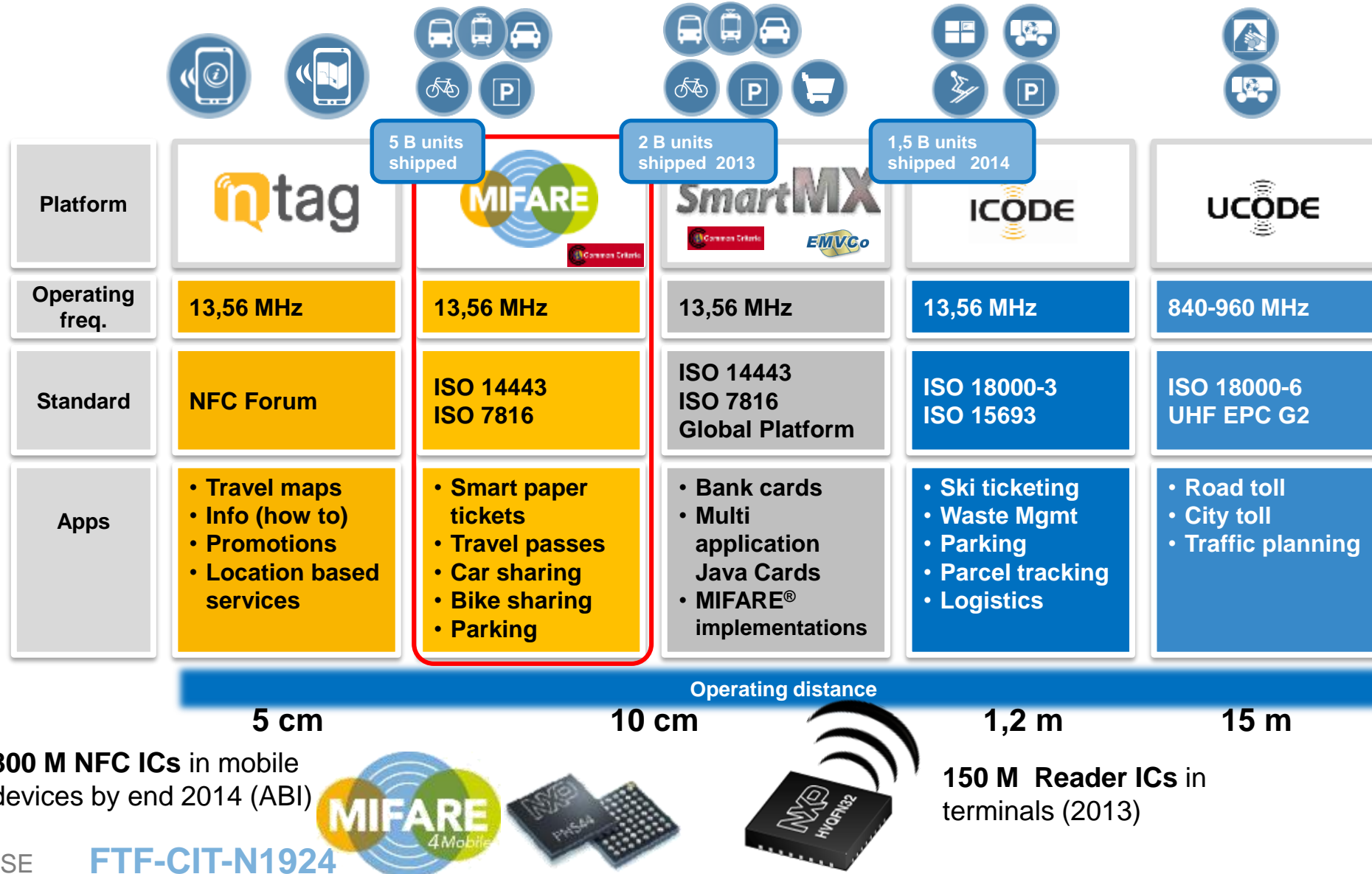
AVI – Automatic Vehicle Detection

PARKING

Commuters lose 1 week lifetime per year in traffic congestions (compared to 1980)

- **4 B people in cities today**
- **7- 20 B people in cities by 2050**
- **Smart Cities will compete for growth**
  - Attract talents, economic growth, tax income
- **Smart Cities are defined around 6 axis:**
  - Infrastructure, **Mobility** ☞ solve CO_2 & efficiency

NXP's Contribution to a Smarter Mobility

	ntag	MIFARE	SmartMX	ICODE	UCODE
Platform		5 B units shipped	2 B units shipped 2013	1,5 B units shipped 2014	
Operating freq.	13,56 MHz	13,56 MHz	13,56 MHz	13,56 MHz	840-960 MHz
Standard	NFC Forum	ISO 14443 ISO 7816	ISO 14443 ISO 7816 Global Platform	ISO 18000-3 ISO 15693	ISO 18000-6 UHF EPC G2
Apps	• Travel maps • Info (how to) • Promotions • Location based services	• Smart paper tickets • Travel passes • Car sharing • Bike sharing • Parking	• Bank cards • Multi application Java Cards • MIFARE® implementations	• Ski ticketing • Waste Mgmt • Parking • Parcel tracking • Logistics	• Road toll • City toll • Traffic planning

Operating distance

5 cm	10 cm	1,2 m	15 m

800 M NFC ICs in mobile devices by end 2014 (ABI)

150 M Reader ICs in terminals (2013)

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Smart Mobility – NXP's Track Record

- **<u>14 M trips a day in London</u>** accelerated and secured in by NXP technology

- **<u>2 out of 3 Dual IF bank cards</u>** rely on NXP technology enabling convergence with MIFARE® based applications

- **<u>150 M terminals WW</u>** for all kinds of c'less applications rely on NXP's RF-technology

- **<u>800 M NFC</u>** enabled mobile devices will be powered by NXP technology end of 2014 enabling smart mobility on mobile devices

- **<u>16 cities commercial on mobile ticketing</u>** with MIFARE by end of 2013

- **<u>SW Development Kits</u>** to accelerate the creation of apps

MIFARE – the #1 Choice for e-Ticketing & Mobility Solutions

77% MIFARE product market share
successfully maintained in 2014*

Within the 77% of market share

- NXP CPU +16% growth by fast acceleration to (MIFARE DESFire / MIFARE Plus)

- NXP CPU +6% increase in market share on (MIFARE DESFire / MIFARE Plus)

- Nearest competitor CPU -7% in market share

- NXP memories 50% market share above nearest competitor

14%

NXP 4%

NXP 5%

MIFARE, 77%
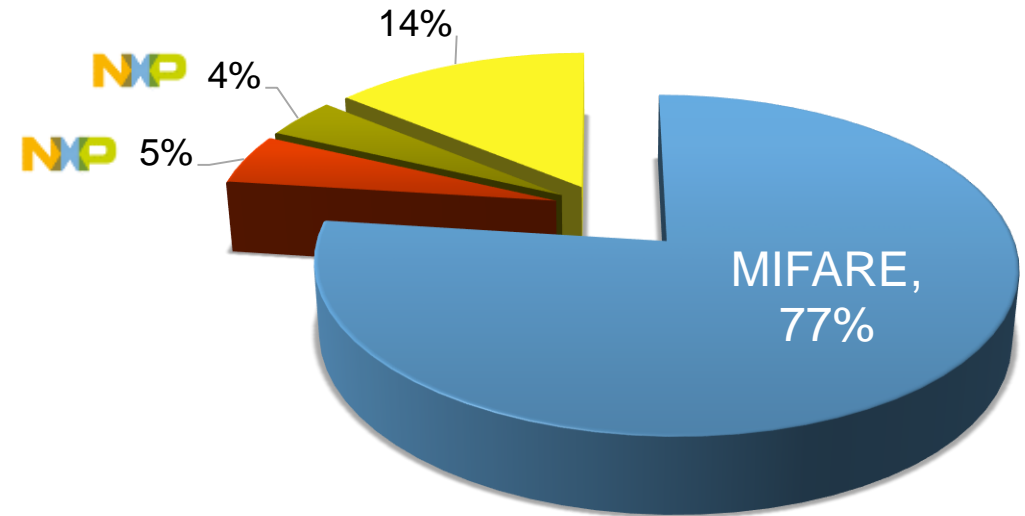
*ABI 2014: NXP continues its leading market share position with a combined memory and microcontroller share of more than 70%
In 2014, ABI did not count smart paper tickets (ABI 2013 considered smart paper tickets which resulted in a combined market share of 77%)
Inclusion of the smart paper ticketing market results in a maintained 77% market share of MIFARE products

Smart Mobility – NXP's Vision

Clean and **green** Smart Cities facilitating *efficient* and **[safe]** mobility
for individuals and goods.
Maximizing *productivity* and **recreation** time
for commuters between home,
work, education and leisure.

SMART MOBILTIY – GLOBAL TRENDS & MARKET FIGURES

Trends in Smart Mobility – Worldwide

- Mass transit ticketing migrating to higher security (MIFARE Plus, MIFARE DESFire)

- Passenger information going mobile (w/wo NFC)

- Strong interest in ticket loading / top up via NFC mobile devices

- Backend centric systems

  - acceptance of EMV cards

  - account based

  - side tokens on BYOD

- Bike sharing, car sharing & parking integrated with transit cards

  - Troika (RUS), Stuttcard (GER), Urbana(SLO)

- Traffic management – passenger flow in ungated systems

  - HF & UHF combo

- AVI going towards passive UHF technology with security

  - number plate authenticity, road tolling, parking

Secure...Mobility

1,2 B people rely on NXP's
MIFARE products daily
in 736 cities
in more than 70 countries
up to 14 M transactions / city / day

Connected..Mobility

150 M Reader ICs
800 M NFC mobile by 2014
400k Developers via MIFARE SDK

NXP

MASS TRANSIT E-FARE COLLECTION

MIFARE Products Securing Transactions Day by Day 33 M/Day in 10 Cities – 250 M/Day Worldwide

Installation	# transactions	Product securing transactions
TFL – London	14 M / day	MIFARE DESFire
Sao Paulo	5 M / day	MIFARE Plus
Delhi Metro	4 M / day	MIFARE DESFire
Troika – Moscow	3,5 M / day	MIFARE Plus
Touch & Go – Kuala Lumpur	3 M / day	MIFARE Plus
NOL – Dubai	1,5 M / day	MIFARE DESFire
Myki – Melbourne	1 M / day	MIFARE DESFire
Clipper – San Francisco	0,7 M / day	MIFARE DESFire
Rabbit – Bangkok	0,6 M / day	MIFARE DESFire
Tap – Los Angeles	0,5 M / day	MIFARE Plus

Based on an average 2$ fare this would be equivalent to 500 M$ /day!

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MIFARE DESFire® – a Good Investment

Field Proven

14 M transactions / day
+60 mega cities

Sustainability

Features+
Security+

2002 — DESFire EV0
2008 — DESFire EV1
2015 — DESFire EV2

Interoperability

Innovation

MIFARE DESFire EV2
Ready to post install
MIFARE Account®

+400K App
developers

MIFARE SDK Coming soon.

Partnerships

Business Partners	Mobility Partners	App Store for Mobile & Cards
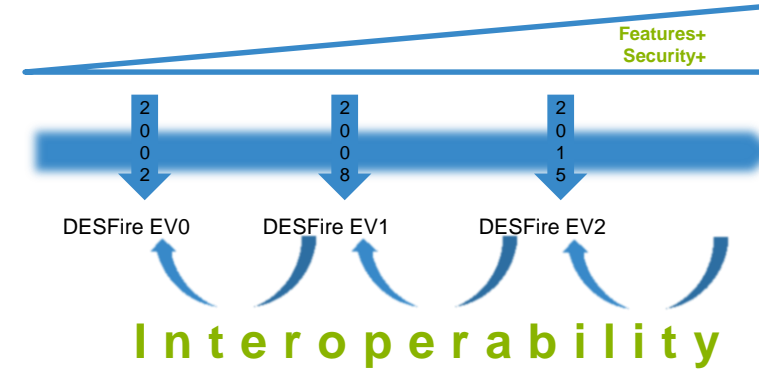
- Banks
- Mobile Network Operators
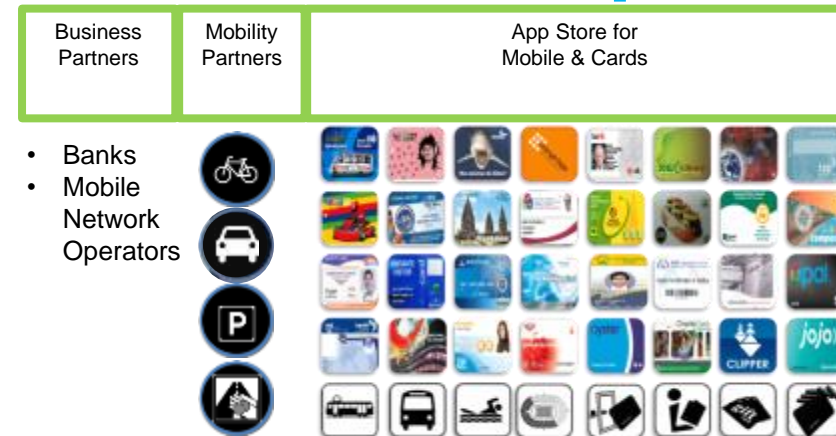
MIFARE PLUS – Your Security Insurance

Field Proven

3,5 M transactions / day
+12 mega cities

Sustainability
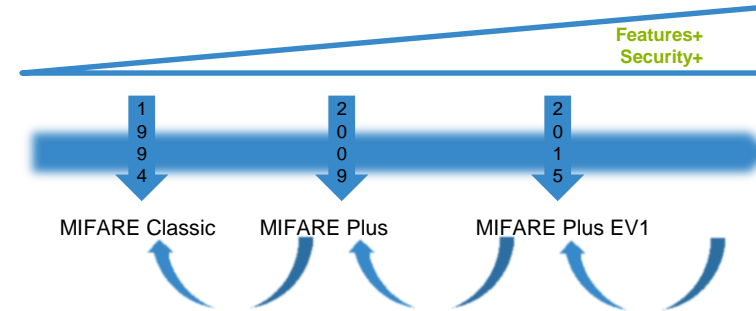
1994	2009	2015
MIFARE Classic	MIFARE Plus	MIFARE Plus EV1

Features+
Security+

Partnerships

Business Partners	Mobility Partners	App Store for Mobile & Cards

- Banks
- Mobile Network Operators

Security on demand

SWITCH TO HIGHEST SECURITY WHEN YOU NEED IT

SPOT ON SECURITY e.g. OPT. AES AUTH AT TVMs only

Cutting costs start with what you have NO OTHER PRODUCT CAN DO THIS!!

Security+
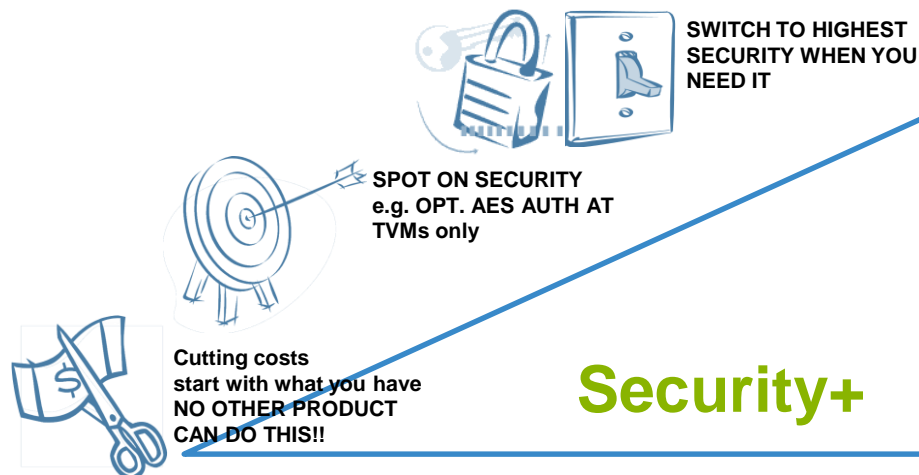
NFC TAGS
CITY & TRANSPORT INFO

Barcelona – 8000 NFC Tags to Provide Visitors with Info

- France based NFC specialist Connecthings

- Product NTAG213

- Placement
  - bike stations
  - hotels
  - hostels
  - tourist offices
  - tourist attractions

- **solution:**   tags, personlization, mobile platform – using phone browser
  special preferences tailored user individual (cookies)
- **owner / sponsor:**   Barcelona Town hall
- **biz model:**   yearly fixed fee + additional for inclusion of new services
  cost savings on passenger information, inc. customer traffic
- **Information / content:**   directly coming from owner / sponsor

BIKE SHARING

Bike Sharing – in Heavy Deployment

736 cities active
+ >200 planned/under construction

814k bikes active

+114k bikes within 3 months 2014
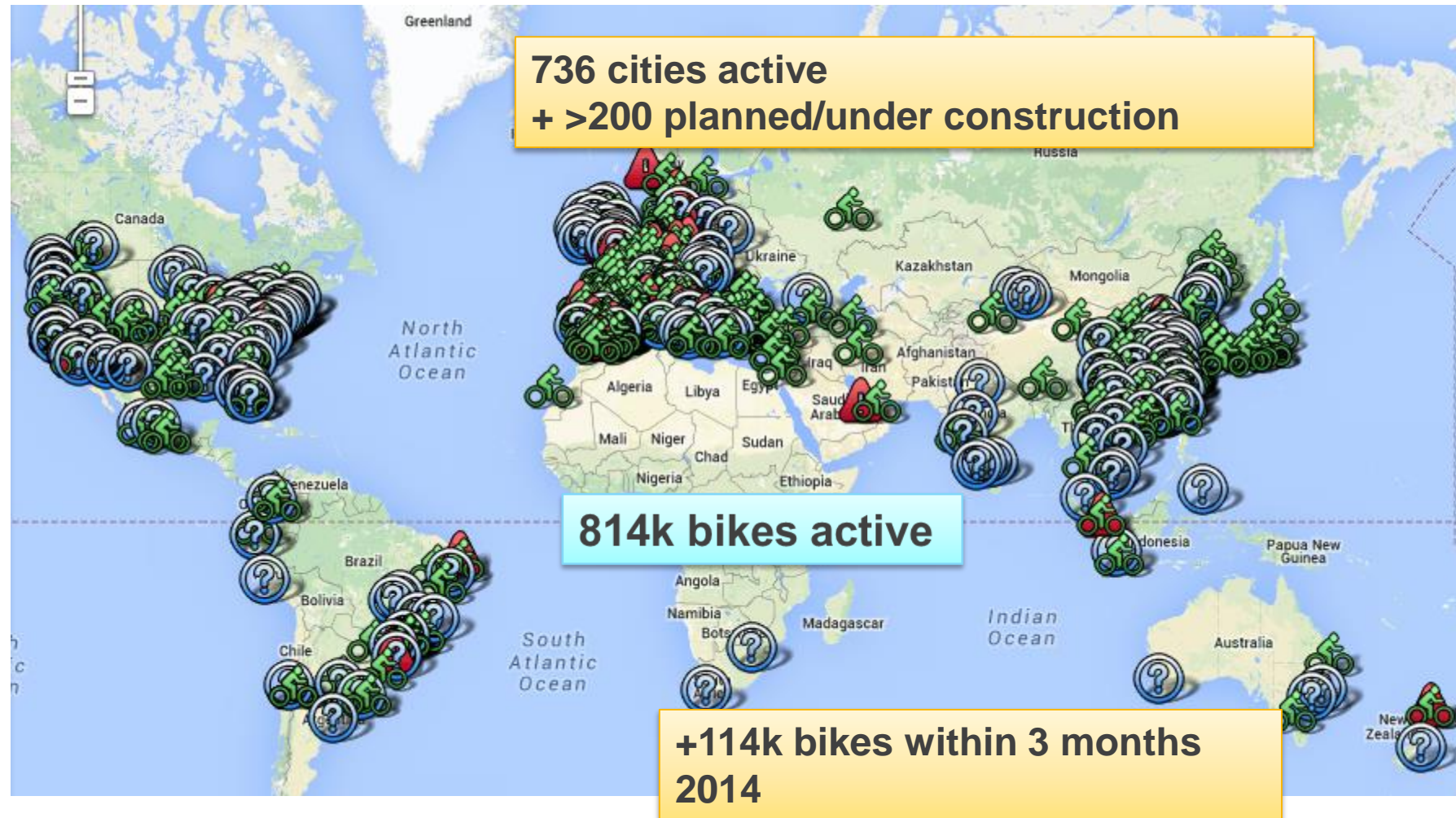
Bikeparking Example Barcelona

- Bikebox service based on DESFire

Strategy: Strong Connected Ecosystem

Build up relationships

- MIFARE® as product of choice:
  - Leveraging from MIFARE ecosystem
  - Easy application design
  - Large existing infrastructure
  - Winning new customers

- Application note for bike sharing/car sharing
  - Get away from UID only use

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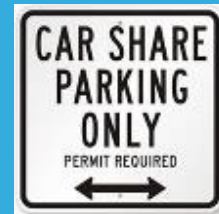
CAR SHARING

Development Users – Booming in Americas

CARSHARING MARKET TRENDS IN THE AMERICAS

Member Growth in the Americas*

+ 27% users within 6 months in 2013

51% increase in Canada

Mexico doubled

Jan/14

Jul/13

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 (Jan)
Brazil (n=1)								98	347	910	2,884	3,326
Mexico (n=1)										750	2,654	5,634
Canada (n=19)	7,007	10,001	11,932	15,663	26,878	39,664	53,916	67,526	78,856	101,502	147,794	224,523
United States (n=24)	25,640	52,347	61,658	102,993	184,292	279,234	323,681	448,574	560,572	806,332	995,926	1,228,573
The Americas (n=45)	32,647	62,348	73,590	118,656	211,170	318,898	377,597	516,198	639,775	909,494	1,149,258	1,462,056

How Does It Work?

Introduction car2go

- Next to Zipcar biggest car sharer
- Founded by Daimler and Europcar
- Operating **in 25 cities in Europe and USA**

  > 500k registered users
  > 9000 cars incl. 1100 e-cars
- Membership card (DESFire) opens car
- Type in pin in board computer
- Drive
- Picked up & leave anywhere in town

PARKING

Smart Mobility: an Easy and Convenient Way from A to B
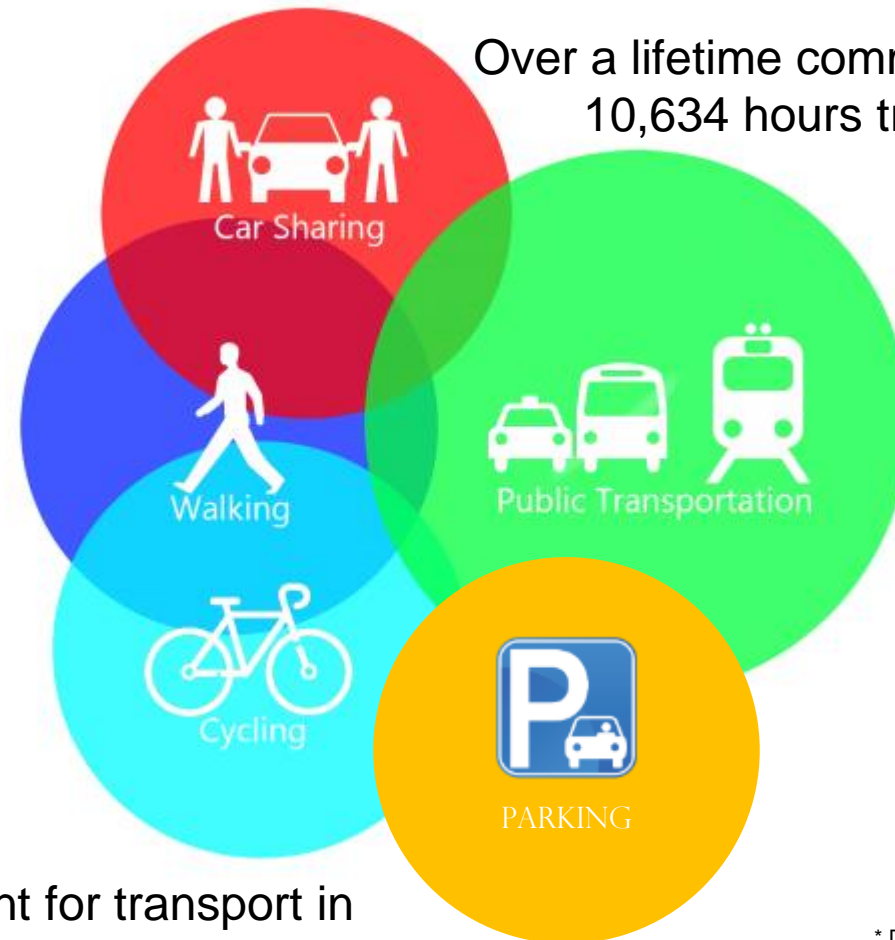
Over a lifetime commuters spend average 10,634 hours travelling to work*

13% of income spent for transport in Europe (15% in USA)**

* Daily Mail
** Eurostat

Why Are We Looking into Shared Services

- Leverage existing systems
- Increasing end user convenience
- Driving adoption
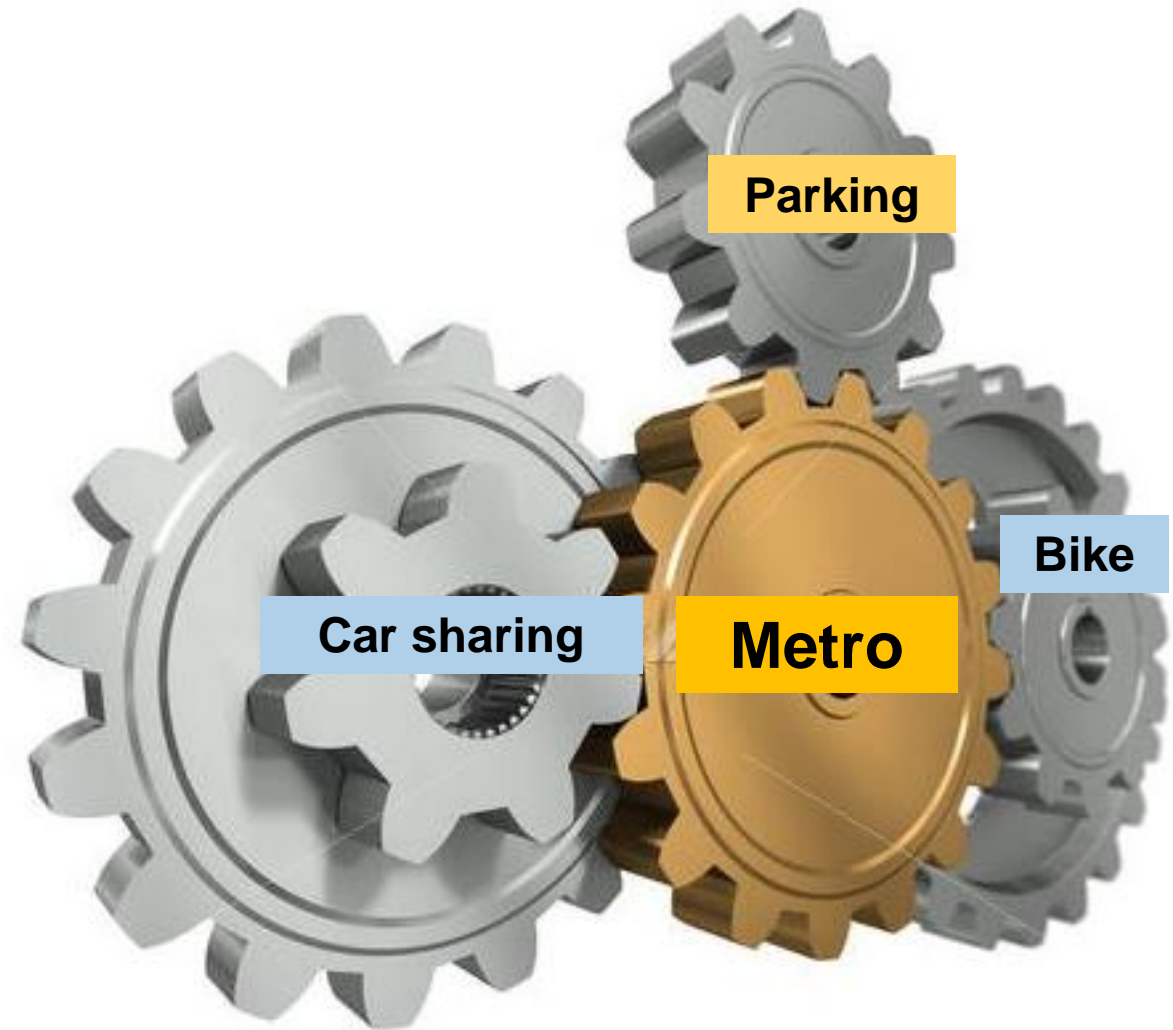
Example Success Stories

- Parking facilities at Munich Airport are equipped with long range RFID (UHF) infrastructure for AVI (Automatic Vehicle Identification) based on NXP tag ICs

- The technology allows a quick and reliable detection of vehicles in the parking area

- The infrastructure is specifically used for the fleet solutions operators DriveNow, car2go and AlphaCity

DriveNow

AlphaCity

CAR 2GO

NXP

AVI – AUTOMATIC VEHICLE DETECTION

Long Range Secure – Increasing Traffic Efficiency

- H'way 95 express lane: travel speed +200% standard lane / +300% express lane
- UCODE DNA further improve detection rate, authenticity, privacy & BOM
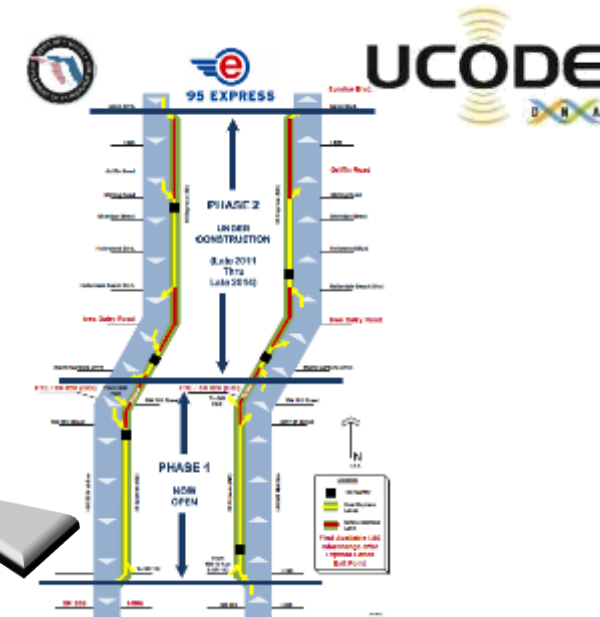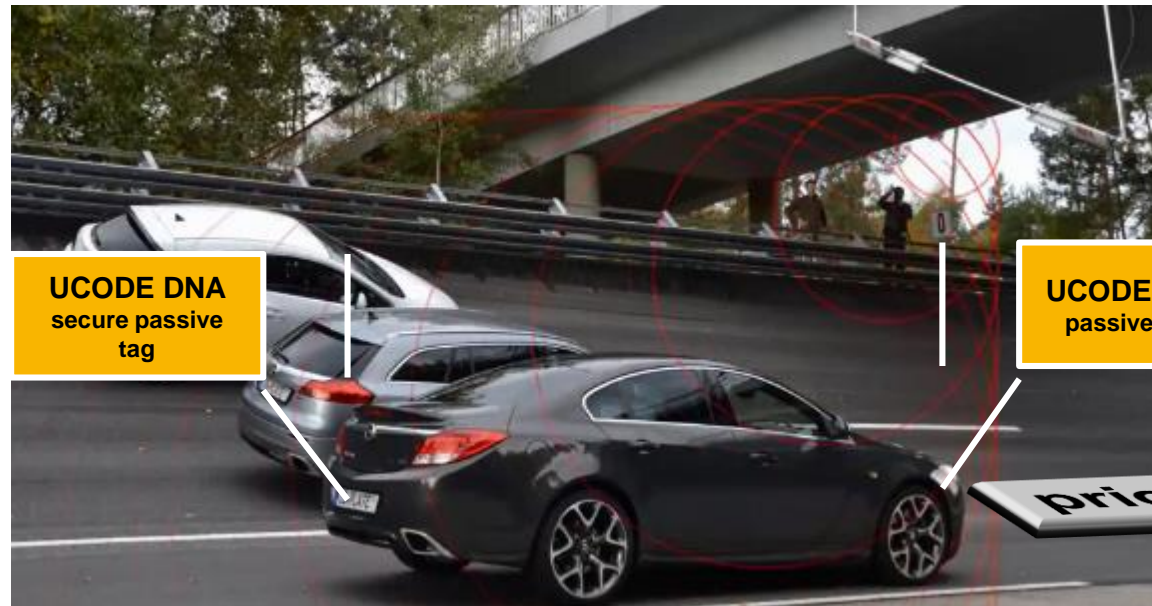
Long Range Secure – Protecting Road Users

United States, 2012

- Every 2 hours 1 pedestrian died in car accidents[1]

- Every 7 minutes 1 pedestrian got injured[1]

- Ages 65 contribute to 20% of overall deaths[1]

- >20% children who died in 2012 where pedestrians[1]

- UCODE DNA
  - Protecting vulnerable road users
  - Eliminating abuse
  - Maintain privacy
  - Lowest BOM

THE SECURE RFID TAG IN THE BACKPACK

UCODE

1) 2014, Centers for Disease Control and Prevention, National Center for Injury Prevention and Control

MOBILE SOLUTIONS

MIFARE SDK

authenticate(pw);
write(data);
read();

--> 90 0a 00 00 01 00 00
<-- a2 de cd 02 c8 46 2b 31 95 af
--> 90 af 00 00 10 b0 cc bc ed 4f c8 32 c9 08 dc e2 4d 86 ca ec 3c 00
<-- 76 73 d9 49 71 3f f2 d1 91 00

--> 90 0a 00 00 01 00 00
<-- a2 de cd 02 c8 46 2b 31 95 af
--> 90 af 00 00 10 b0 cc bc ed 4f c8 32 c9 08 dc e2 4d 86 ca ec 3c 00
<-- 76 73 d9 49 71 3f f2 d1 91 00

Over the Air Top-Up

Unsecure environment

E2E Secure connection

authenticate(pw);
write(data);
read();

Backend
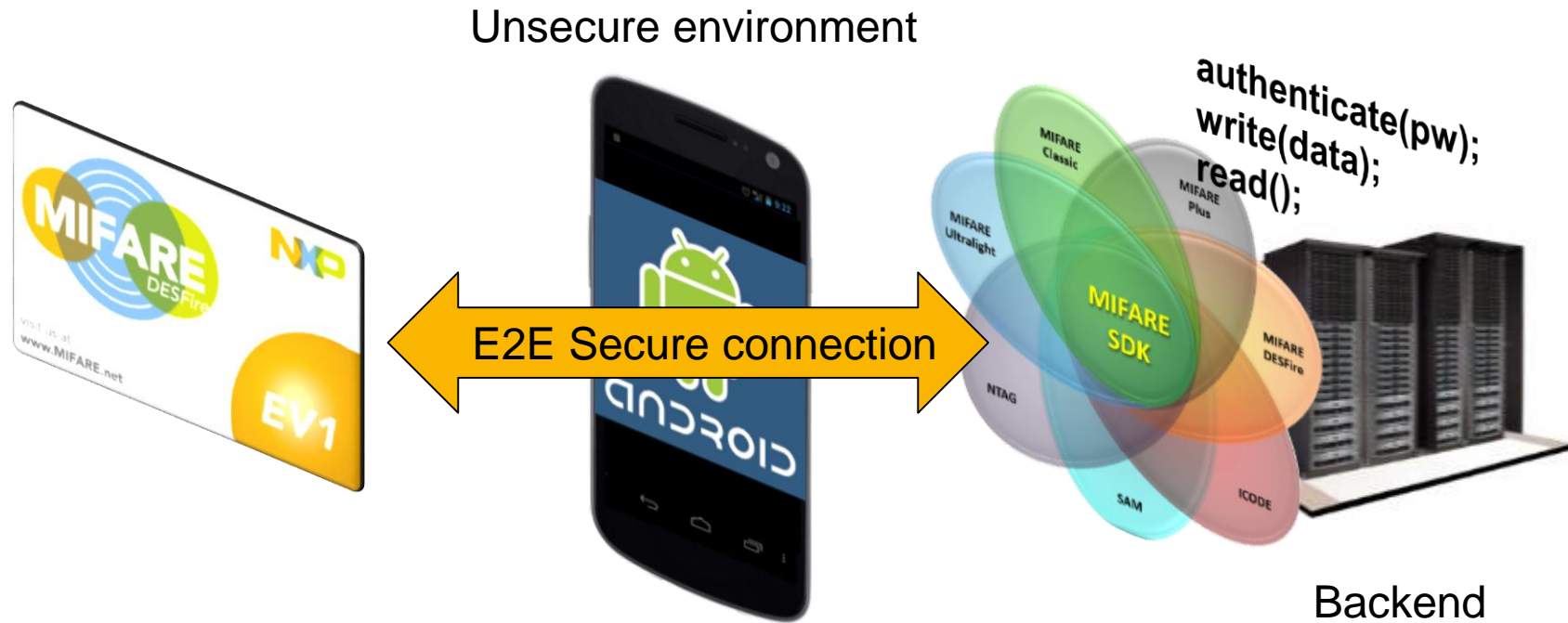
NFC Mobile Ticketing MIFARE® Commercial Roll Outs

ATTRIBUTION STATEMENT