

# Board & Ride – Hands-free 'Pay As You Go' Fare Collection

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# Key Presentation Takeaways

- Is your ticketing infrastructure costly and maintenance heavy?
- Are you losing passengers because ...
  - They do not understand which ticket is needed?
  - Or where they can buy it?
- Do you understand how to create seamless mobility for your ridership?
- Do you have access to 'big data' to get further insight into daily operations for better optimization?

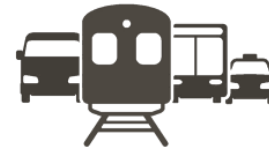
# Today's Challenges in Seamless Mobility



## for Passengers

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- Multitude of transport modes with different mobility providers
- Complicated fare systems to navigate
- Ticket purchases can be painstakingly slow and confusing



## for Operators

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- Costly fare collection infrastructure (vending machines, gates, etc.)
- Overcrowded vehicles with long boarding / alighting timeframes
- Limited customer service quality

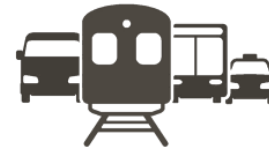
# Today's Challenges in Seamless Mobility



**for Passengers**

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**Which one is the right ticket  
and where can I buy it from?**



**for Operators**

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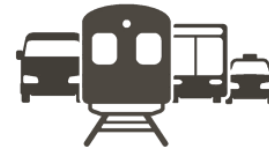
# Today's Challenges in Seamless Mobility



**for Passengers**

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**Which one is the right ticket  
and where can I buy it from?**



**for Operators**

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**How can I make it as easy as  
possible for my customers to  
buy from me?**

# Digital Migration of Ticket Sales

Comfort, User Experience & Service Quality

**Conventional Ticketing**  
purchase ahead of travel

**staff operated / self-service**



**e-Ticketing**  
pay-as-you-go

**CiCo**

with user interaction



**CiBo**

with user interaction



**BiBo**

hands-free



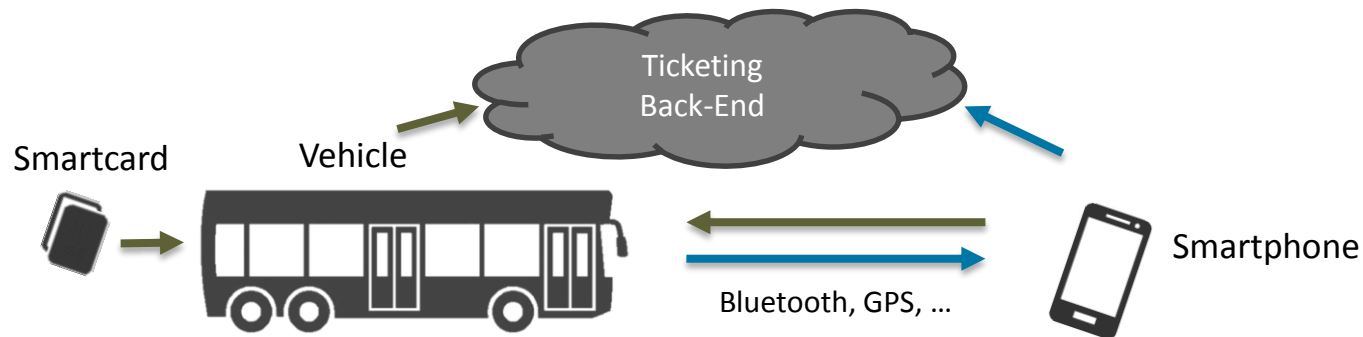
# Conceptual Approaches

## Vehicle-based systems

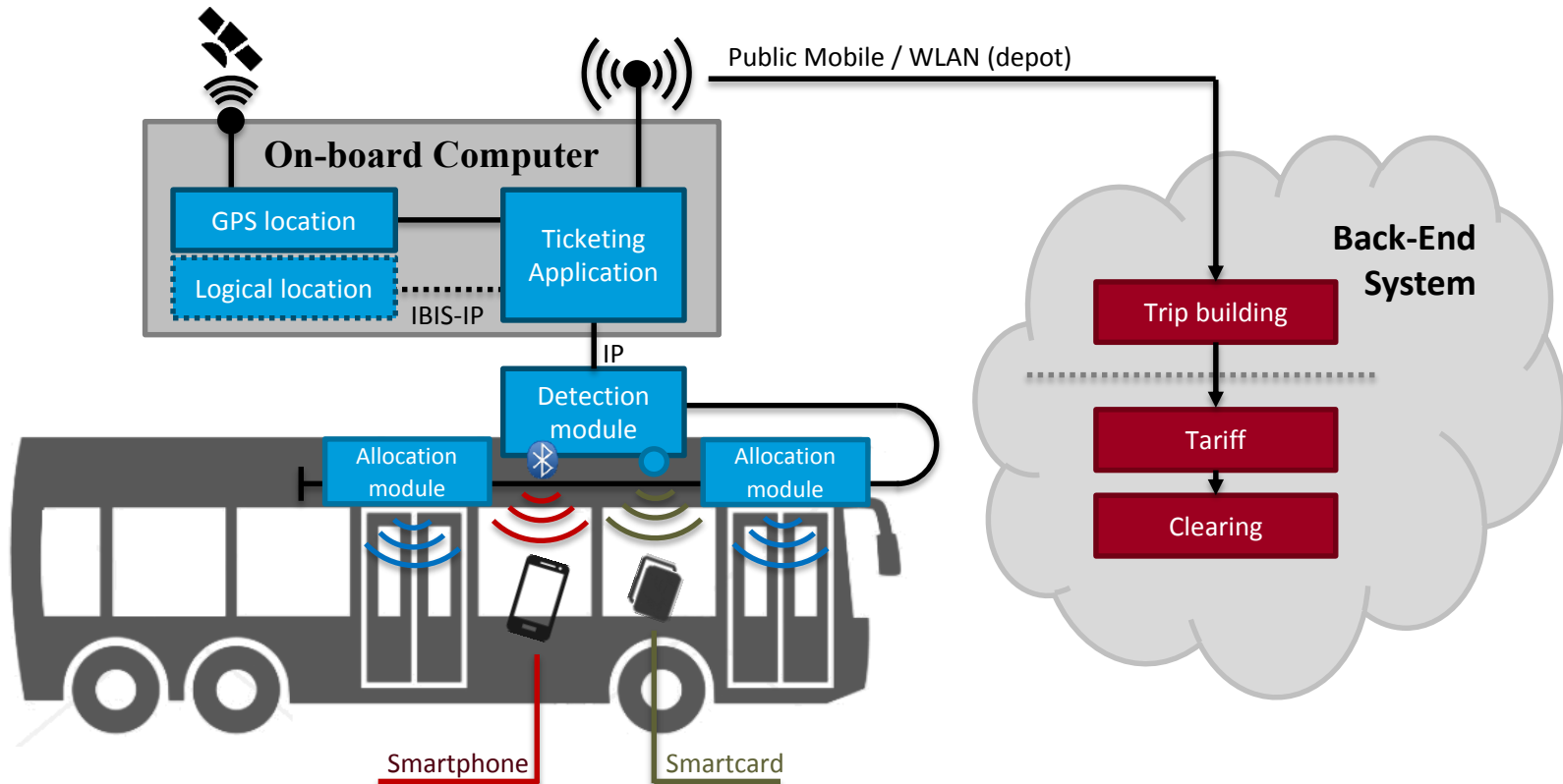
- + Multiple types of user media
- + Solution for most customer segments
- + Offline-capable system design
- + Hands-free comfort
- Higher technical complexity
- Higher infrastructure cost

## Smartphone-based systems

- Low technical complexity +
- Low infrastructure cost +
- Rapid deployment +
- Hands-free comfort +
- Solid public mobile coverage required -
- Only smartphones as user media -



# System Overview





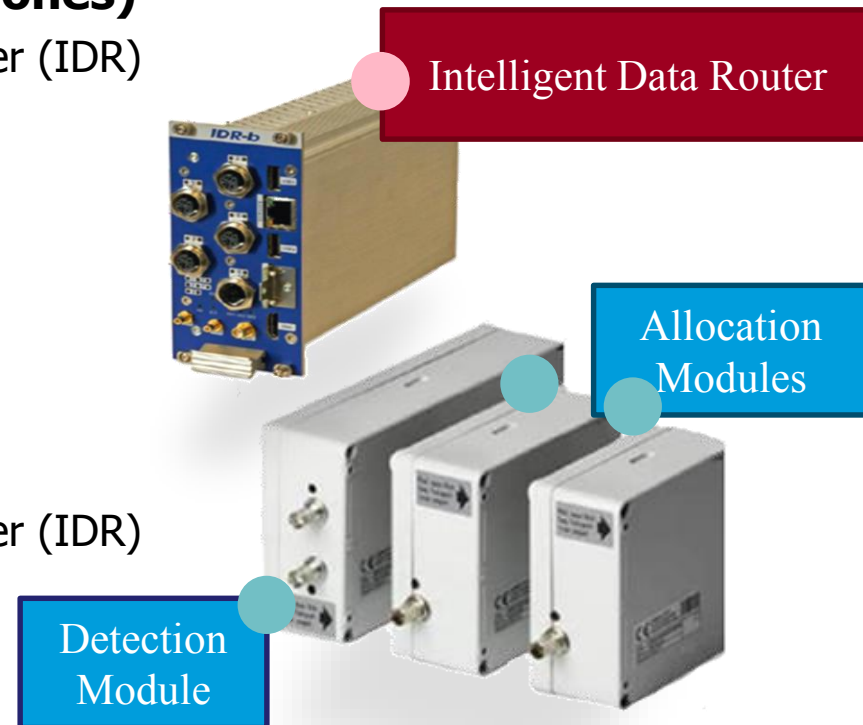
# On-board Presence Detection System

## Hybrid System (smart cards & smartphones)

- On-board computer, e.g. Intelligent Data Router (IDR)
- Detection Module (DM)
  - Bluetooth Low Energy (BLE) sensor
  - RFID reader
- Allocation Modules (AM)
  - RFID sensor

## Bluetooth only System (smartphones)

- On-board computer, e.g. Intelligent Data Router (IDR)
- High-grade Bluetooth interface and antenna



# User Media



- **Active Smartcard (RFID)**
  - ID-1 standard design card
  - ISO 14443 / 15693 interfaces
  - Secure communication with strong cryptography & anti-tracking
- **Smartphone (BLE)**
  - Android & iOS dedicated App or integration into existing public transit Apps
  - Connection-based pairing between smartphone and on-board system without any user interaction
  - Secure communication with strong cryptography & anti-tracking
- **Both media types provide a many to 1 read capability**
  - Mass transit capable with ability to process 300 user media in less than 15 seconds

# Presence Detection

## Automatic identification

– at stops

- Wake-up call
- Vehicle check-in



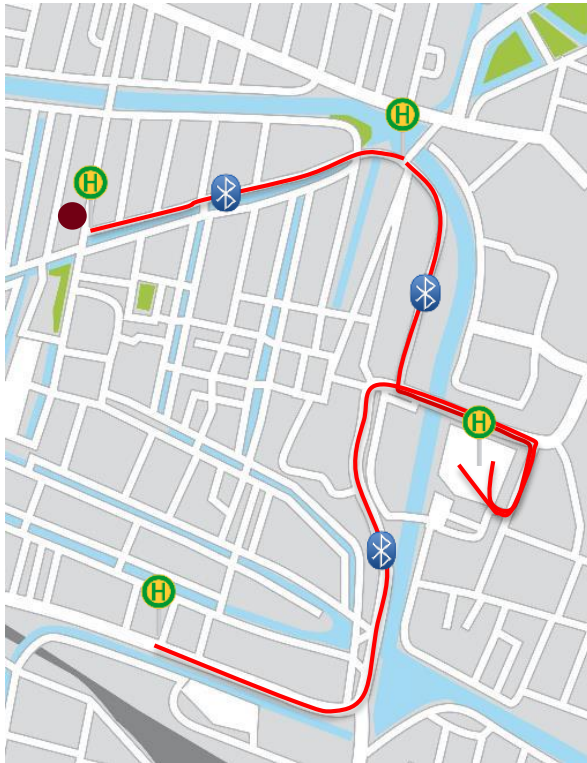
## Automatic detection

– during trip

- Recording of trip portions



# Functionality



- Boarding / Check In
- Detection(s)
- Transfer
- Detection(s)
- Automatic Check-Out

**Detections**

12:05	N 45° 38' 22"
	#377, #242, ...
12:09	N 45° 35' 13"
	#377, #113, ...
12:20	N 45° 33' 07"
	#377, #55
...	

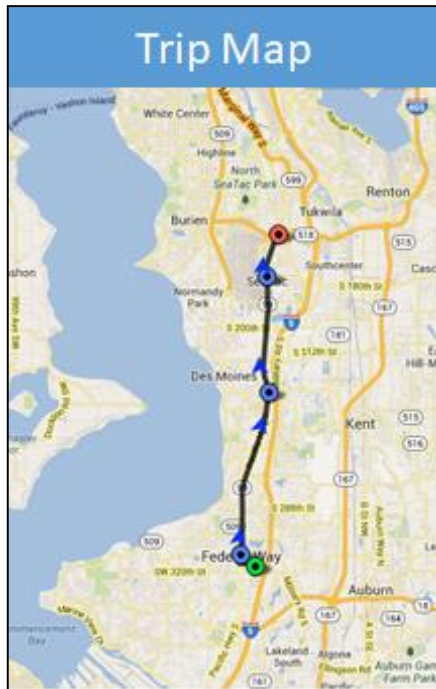


**Trips / Trip Segments**

**Smartphone #377**

12:05	Market Square
12:20	Main Station
...	

# Central System / Back Office



- **Configuration & Administration**
  - Device management of system
  - Collection & analysis of data
- **Web App Interface for User Account Management**
  - Registration, Profile, Account Overview, Cost Overview, Invoices/Balance, Payment Details
- **Trip Building**
- **Interface to Tariff & Clearing**

# A Hands-free Journey

The rider approaches the bus without having purchased a ticket



# A Hands-free Journey

As vehicle doors open, sensors look for riders boarding or alighting



# A Hands-free Journey

As the rider nears the door, presence detection identifies the rider





# A Hands-free Journey

The vehicle presence detection system is now aware the rider is on the bus



# A Hands-free Journey

And all the rider needs to do is pick a place to sit...



# A Hands-free Journey

As the vehicle moves, the presence detection system looks for the rider



# A Hands-free Journey

And ensures that the rider did not leave the vehicle



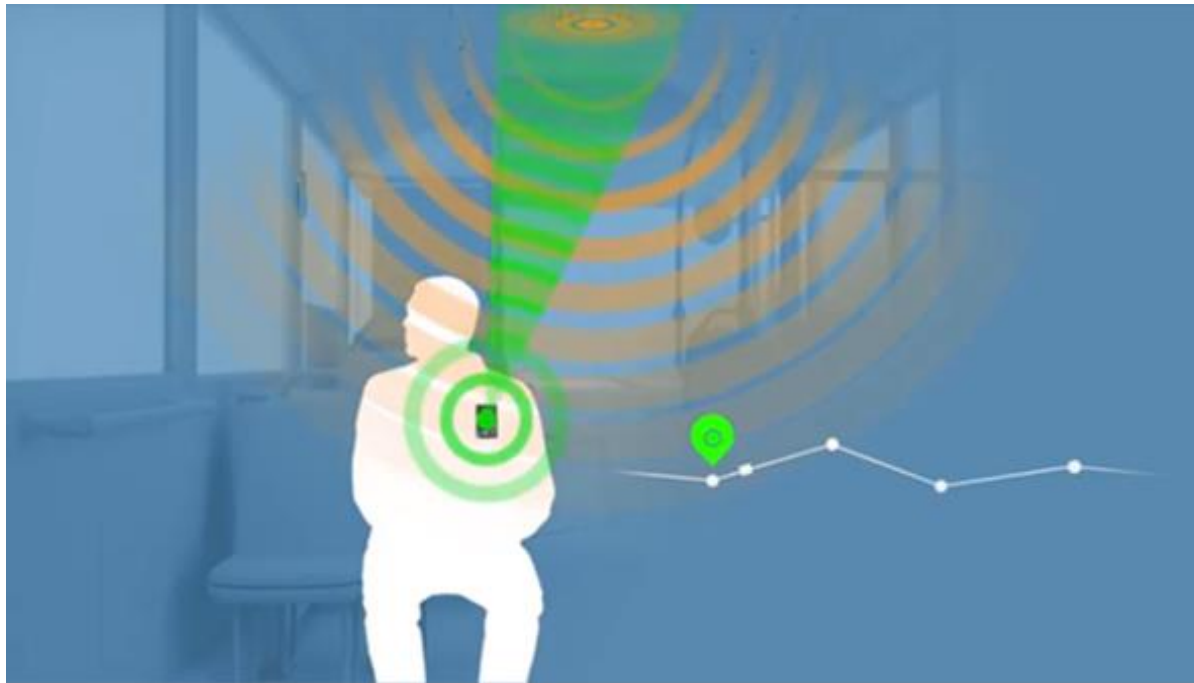
# A Hands-free Journey

As the vehicle reaches a stop, presence detection again looks for the rider



# A Hands-free Journey

And upon leaving the stop, verifies the rider is still onboard



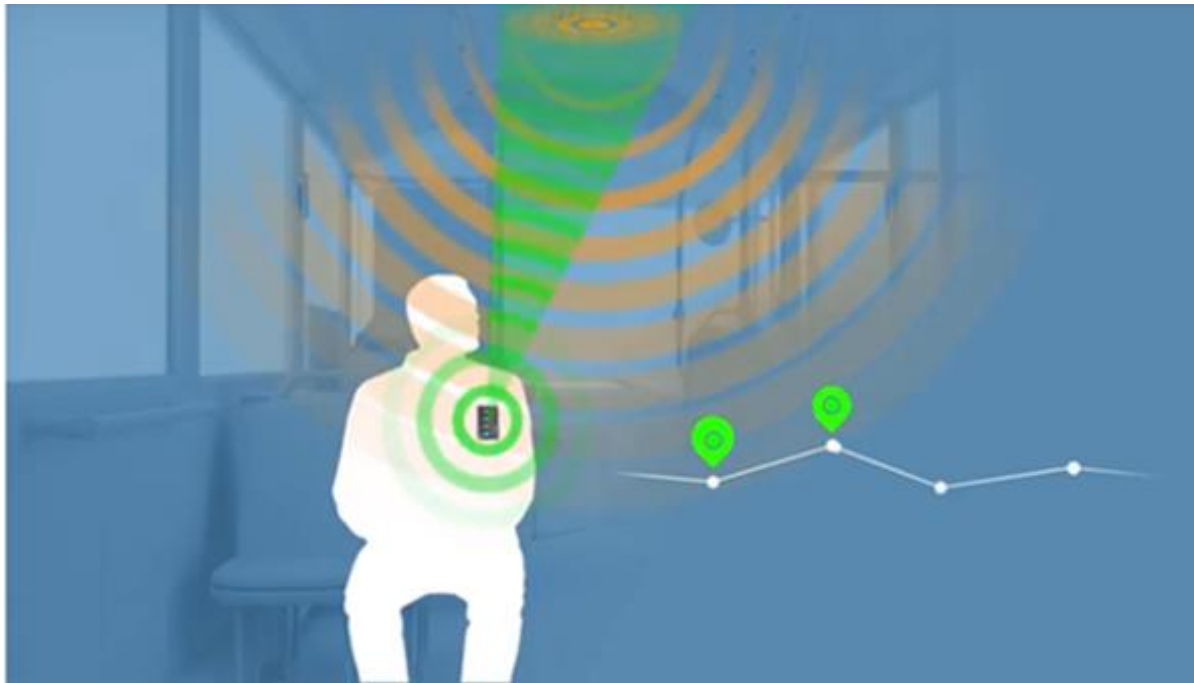
# A Hands-free Journey

Upon approaching each stop, the presence detection process is repeated



# A Hands-free Journey

To verify that the rider is still present on the bus after leaving each stop





# A Hands-free Journey

Once a rider reaches their stop, they simply leave the bus



# A Hands-free Journey

And the vehicle system detects that the rider has alighted the bus



# A Hands-free Journey

As the vehicle departs, the system provides complete rider journey data



# A Hands-free Journey

Rider information is sent to the Back Office for trip creation & fare calculation

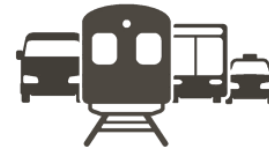


# Benefits for Everyone



## for Passengers

- 
- Easy to use – available everywhere & at all times, no up-front purchase
  - Seamless user experience without tariff knowledge
  - Free choice of user media with simple access
  - Optional best-price capping



## for Operators

- 
- Substantial cost reduction for infrastructure deployment & operation
  - Sustainable simplification of operational processes (cash, paper)
  - Replacement of cost-heavy channels with a future-proof technology and open interfaces