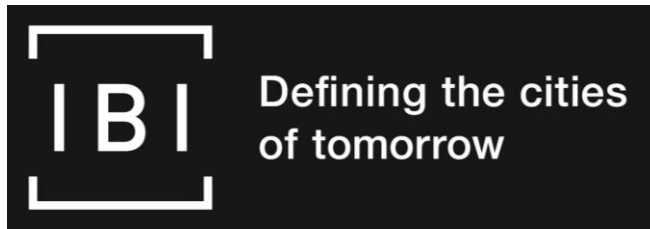


Using Commoditized HW for Fare Validation: Design Considerations and Challenges

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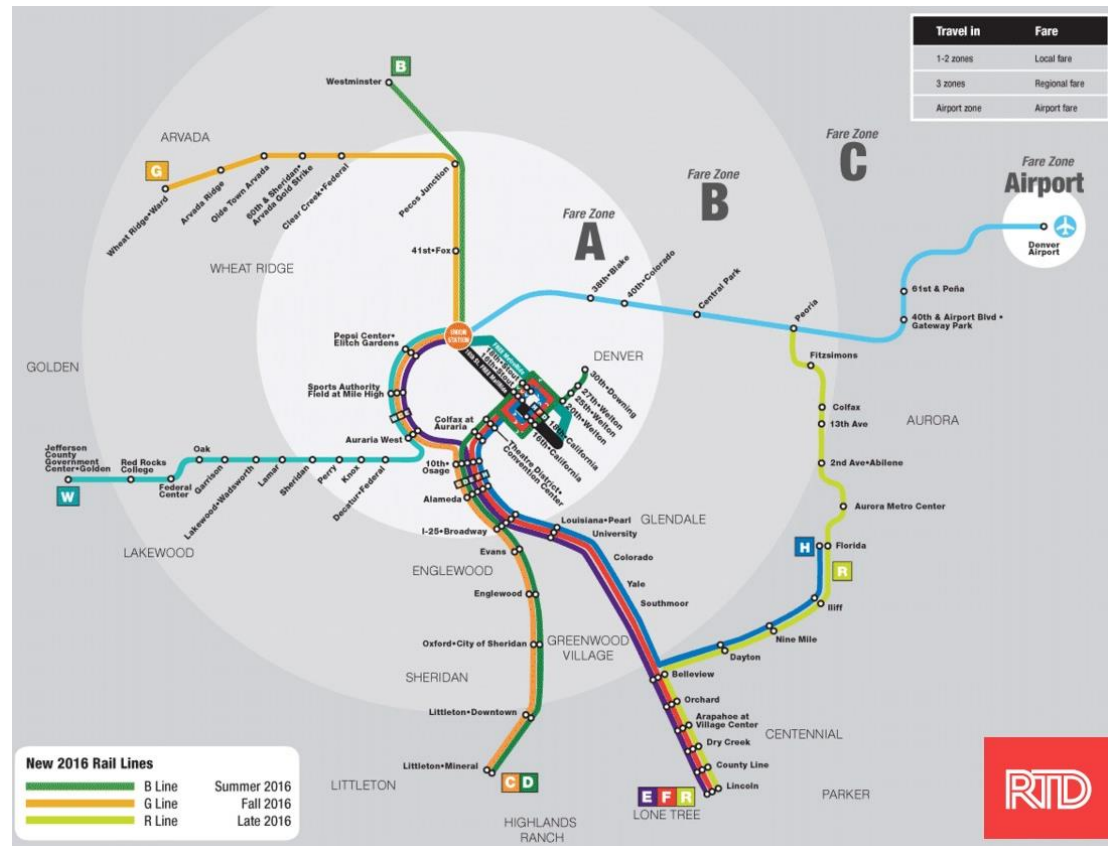
2018 Fare Collection/Revenue Management
& TransTech Conferences

Outline

- RTD Rail
- Fare Enforcement Challenges
- Fare Validation Solution and Architecture
- Challenges
 - Data Security
 - Mobile Device Use Policy
- Lessons Learned

Introduction to RTD Rail

- 85 miles across 10 light rail and commuter rail lines
- Undergoing rapid expansion through Fastraks program



Challenges with Smart Media Fare Enforcement

- Smart Media Technology PoP Enforcement by Fare Inspectors on RTD Rail
- 2016: Using Motorola MC75 handheld Devices
 - Poor battery life (~2-3 hours)
 - Replacements were hard to source.
 - Unreliable software, with frequent crashes and device freezing during switching between validation and citation applications.
 - Citation vendor was moving to an iOS platform.



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Finding the Validation and Enforcement Solution

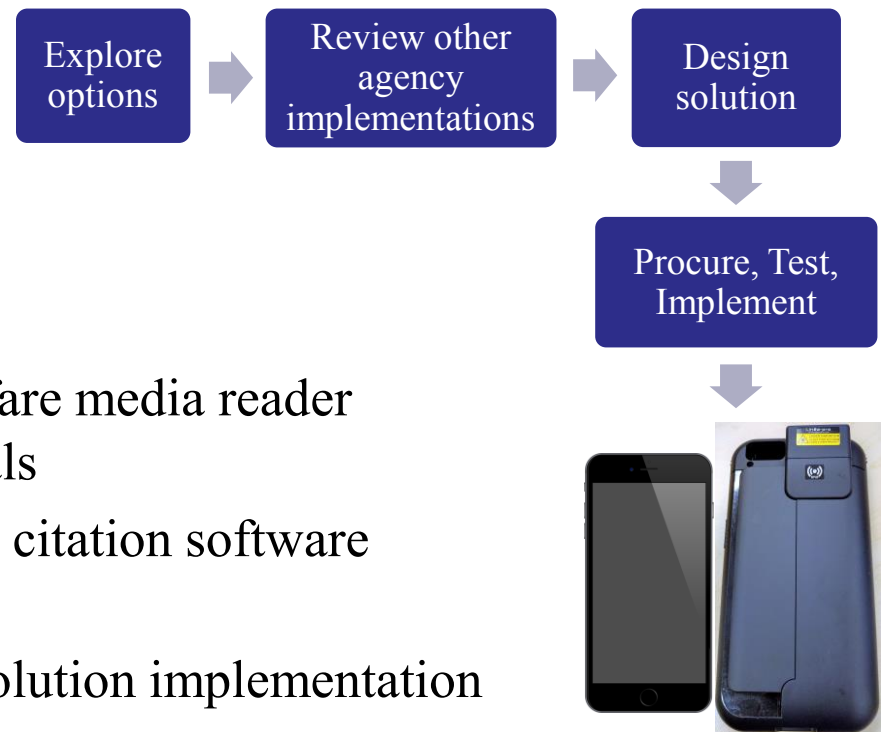
- Motivations

- Resolve issues with current hardware
- Desire to use more open, commoditized hardware

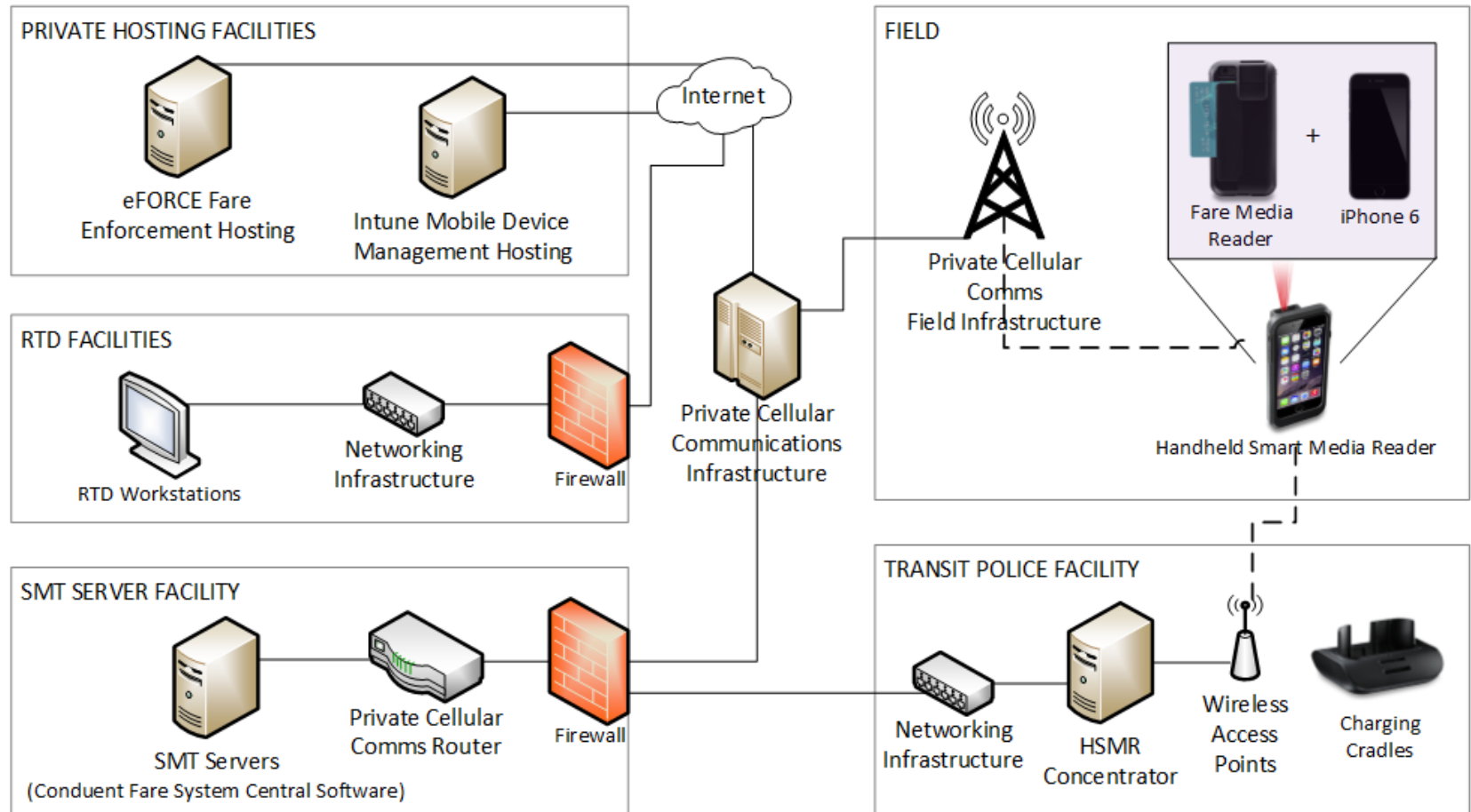
- Solution

- iOS device integrated with a fare media reader case, and associated peripherals
- Migration of enforcement and citation software to iOS
- Mobile device management solution implementation

- Process



Designing the System Architecture



Procuring and Implementing The Handheld Smart Media Reader

HSMR Hardware Procurement

Apple iOS Devices

Fare Media Reader Case

Hardware Peripherals
(Portable battery, belt
clip, charging cords, etc.)

Coordination of hardware
and firmware design with
Fare and Citation Vendor

Fare Enforcement Software iOS Migration

Migration of current
Windows based code to
iOS

Coordination of software
and security design with
HSMR Hardware

Fare Citation Software Upgrade

Rollout of Fare Citation
iOS application across
devices

Coordination of fare
citation software
functionality with HSMR
Hardware capabilities

Mobile Device Management Software Implementation

MS Intune Software Implementation and Configuration

Challenges: Ensuring Data Security

- RTD couldn't simply use the commoditized hardware, "as is"
- Design required use of a Secure Access Module (SAM) microprocessor chip
 - Stores secure key for cryptographic authentication of fare media
 - Incorporated into fare media reader
- Need to closely coordinate hardware and software design



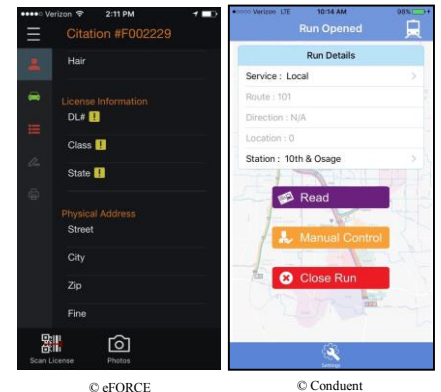
MIFARE SAM AV2

Challenges: Defining Mobile Device Use Policy

- RTD had concerns with using a consumer device for fare enforcement
 - Need to limit non-enforcement related use
 - Maintain battery life and restrict data usage
 - Ensure device and data security
- Agency needs to have
 - A defined mobile device use policy
 - And a mechanism to enforce the policy
- Solution was to use a Mobile Device Management Software

Lessons Learned

- Using commoditized hardware for activities involving secure data is not as easy as it may seem
 - Fare enforcement requires secure authentication protocols
 - Requires close cooperation with vendors
 - May involve policy level changes
- However, there are benefits
 - Potential for use with mobile ticketing solutions
 - Ease of use for fare enforcement staff
 - Greater control over device



Questions?

Thanks!

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