Common Payment System (CPS) System Requirements
SPEAKERS

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TODAY’S AGENDA

01 | PURPOSE OF THIS WEBINAR
   • Share concept development activities from Smart Columbus with stakeholders

02 | WEBINAR CONTENT
   • Smart City Challenge and Smart Columbus Program Overview
   • Smart Columbus Common Payment System Project Overview
   • Smart Columbus Common Payment System Requirements
   • Technical Details Discussion
   • How to Stay Connected
   • Stakeholder Q&A

03 | WEBINAR PROTOCOL
   • All participant lines have been muted during the webinar in order to reduce background noise
   • Questions are welcome via chatbox during the Q&A Section
   • The webinar recording and presentation materials will be posted on the Smart Columbus website
CHALLENGE
AND PROGRAM
OVERVIEW
$40 MILLION  78 APPLIED  COLUMBUS WON

VISION:  
To empower our residents to live their best lives through responsive, innovative and safe mobility solutions.

MISSION:  
To demonstrate how an intelligent transportation system and equitable access to transportation can have positive impacts on every day challenges faced by cities.

OUTCOMES:  
Safety, Mobility, Opportunity, Environment, Agency Efficency, Customer Satisfaction
PROBLEM STATEMENT & CHALLENGES

• Disconnected mobile apps and payment options
• Lack of a comprehensive platform to plan, book, and pay
• Unbanked users must rely on cash for transportation options
• Public agencies face obstacles when requesting trip data from Mobility Providers
CONCEPT FOR PROPOSED SYSTEM

- Pay for all transportation services using a single account
- Ability to register multiple payment methods
- Integration with COTA’s back-office
- Fund CPS accounts using prepaid debit cards or cash at COTA TVMs
- IVR System
- Use the OS share anonymous trip and payment data
SYSTEM REQUIREMENTS
Development Process

1. Break down the system into functional group categories

2. Develop the technical requirements for system components

3. Link requirements with user needs, constraints and interfaces as described by the ConOps
Step 1
Break down the system into major system components

Major System Components

- CPS Back-Office
- COTA Back-Office
- Operating System
- Personal Information Device
- Parking Operator Application
- Website
- Interactive Voice Response System
- Smart Mobility Hubs
- Mobility Provider Central Systems
- Mobility Provider Equipment
- Event Parking Management Central System
- Point of Sale Terminals
- Third-Party Users
- Farebox
Step 2
Develop the technical requirements for system components

Requirement Description (EPM Central System)

- In the event that the service for which the funds are being held is not realized, the hold on the funds shall be removed and credit restored to the Traveler account as necessary.

- The CPS shall be fully compliant with Payment Card Industry (PCI) standards, including ensuring that all customer credit card payments completed using the system shall avoid any access to or storage of credit card numbers on any City or COTA-operated computers.

- The CPS shall be capable of integration with COTA's back-office account-based system, allowing users to associate any COTA-issued fare product with a registered CPS account.
SYSTEM REQUIREMENTS

<table>
<thead>
<tr>
<th>User Need</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMTPA/CPS-UN019-v01</td>
<td>NFC Integration</td>
</tr>
<tr>
<td>MMTPA/CPS-UN022-v01</td>
<td>CPS Account</td>
</tr>
<tr>
<td>MMTPA/CPS-UN023-v01</td>
<td>Payment Media</td>
</tr>
<tr>
<td>MMTPA/CPS-UN025-v01</td>
<td>Pay Once</td>
</tr>
<tr>
<td>MMTPA/CPS-UN026-v01</td>
<td>Existing Fare Products</td>
</tr>
<tr>
<td>MMTPA/CPS-UN021-v01</td>
<td>Mobile Ticketing</td>
</tr>
<tr>
<td>MMTPA/CPS-UN034-v01</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>MMTPA/CPS-UN035-v01</td>
<td>Future Growth and Maintainability</td>
</tr>
<tr>
<td>MMTPA/CPS-UN036-v01</td>
<td>Compliance</td>
</tr>
<tr>
<td>MMTPA/CPS-UN029-v01</td>
<td>Storage of Sensitive Data</td>
</tr>
<tr>
<td>MMTPA/CPS-UN030-v01</td>
<td>Reimbursement</td>
</tr>
<tr>
<td>MMTPA/CPS-UN031-v01</td>
<td>Security and Encryption</td>
</tr>
</tbody>
</table>

**Constraint 2**

The MMPTA/CPS system must integrate with COTA’s new Fare System. It is necessary for COTA’s new Fare System vendor to develop modules for the Operating System and adhere to open data and open architecture design principles.

**Constraint 3**

Mobility Providers must be willing to integrate with the Operating System through open standards and to accept the CPS as payment method.

**Step 3**

Link the requirements with user needs, constraints and interfaces as described by the ConOps.

**Requirement Description (Interactive Kiosk)**

COTA shall be responsible for managing COTA fare information and will make fare information available to the CPS.

<table>
<thead>
<tr>
<th>Interface</th>
<th>Source Element</th>
<th>Destination Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPS-IX2842-V01</td>
<td>CPS</td>
<td>COTA</td>
</tr>
<tr>
<td>CPS-IX2842-V01</td>
<td>COTA</td>
<td>CPS</td>
</tr>
<tr>
<td>CPS-IX2843-V01</td>
<td>CPS</td>
<td>COTA</td>
</tr>
<tr>
<td>CPS-IX2844-V01</td>
<td>COTA</td>
<td>CPS</td>
</tr>
</tbody>
</table>
REQUIREMENTS BY THE NUMBERS

• 350+ Requirements
• 35+ Subcomponents
  • Shared Accounts, Administration, PCI Compliance, Notifications, etc.
• 17 Requirement Types
  • Functional, Performance, Interface, Data, Security, etc.
• 14 Functional Groups
  • CPS Back-Office, COTA Back-Office, Personal Information Device, etc.
• 5 Levels of Importance
  • Shall, Shall Not, Should, Should Not, May
• 4 Verification Methods
  • Inspection, Demonstration, Test, Analysis
Three categories of requirements based on major system components:

• Payment Processing (Back-Office)
• Hardware (Farebox, POS, TVM)
• Operating System

For each category:

• Description
• Example requirements
• Discussion

Summary and Lessons Learned
PAYMENT PROCESSING (BACK-OFFICE)

Sub-Components

- Shared Accounts
- Payment Processing
- Administration
- PCI Compliance
- Software Development Kit
- Payment Device Information
- Reporting

- Guest Accounts
- Provider Accounts
- Traveler Accounts
- PCI Compliance
- Incentives and Rewards
- IVR Processing
- COTA Central Fare Management System
# PAYMENT PROCESSING (BACK-OFFICE) REQUIREMENTS

<table>
<thead>
<tr>
<th>REQ ID</th>
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</thead>
<tbody>
<tr>
<td>CPS-FN2500-V01</td>
<td>The CPS shall provide back-end integration with COTA's fare management system.</td>
</tr>
<tr>
<td>CPS-FN2559-V01</td>
<td>The CPS shall be capable of integration with COTA's Back Office account-based system, allowing Users to associate any COTA-issued fare product with a registered CPS account.</td>
</tr>
<tr>
<td>CPS-FN2560-V01</td>
<td>The CPS shall be capable of integration with COTA's smart card.</td>
</tr>
<tr>
<td>CPS-FN2561-V01</td>
<td>The CPS shall be capable of integration with COTA's fare subsidy programs.</td>
</tr>
<tr>
<td>CPS-FN2564-V01</td>
<td>The CPS shall provide landing pages for integration with the MMTPA to pay for multimodal trips.</td>
</tr>
<tr>
<td>CPS-FN2565-V01</td>
<td>The CPS shall provide landing page for integration with the EPM application to pay for parking.</td>
</tr>
<tr>
<td>CPS-FN2591-V01</td>
<td>Integration with the MMTPA shall provide a seamless User experience for the Traveler by not requiring a separate logon to the MMTPA.</td>
</tr>
<tr>
<td>CPS-FN2488-V01</td>
<td>The CPS shall allow travelers to utilize existing COTA period pass products, which permit journeys within the COTA network, subject to time restrictions.</td>
</tr>
<tr>
<td>CPS-FN2644-V01</td>
<td>Payment transactions shall be processed in real-time through the CPS.</td>
</tr>
<tr>
<td>CPS-FN2645-V01</td>
<td>The CPS shall provide access to landing pages allowing Travelers to pay instantly without being redirected away from the app to complete the transaction.</td>
</tr>
<tr>
<td>CPS-FN2646-V01</td>
<td>The CPS shall provide landing pages to manage Traveler and Provider accounts.</td>
</tr>
<tr>
<td>CPS-FN2730-V01</td>
<td>All virtual fare product interfaces presented on the PID shall be configurable by authorized City/COTA individuals.</td>
</tr>
<tr>
<td>CPS-FN2491-V01</td>
<td>When applying virtual transfer credits toward a multi-leg transit trip, the remainder of the cost of the trip shall be taken from the Traveler account (stored cash value).</td>
</tr>
<tr>
<td>CPS-FN2500-V01</td>
<td>The CPS shall provide back-end integration with COTA's fare management system.</td>
</tr>
<tr>
<td>CPS-FN2506-V01</td>
<td>Administrative accounts shall include fine-grained permission levels (e.g., View Only, Limited Access, and Full Control).</td>
</tr>
</tbody>
</table>
1. Integration with the COTA is a critical part of the CPS project. What does integration look like? What COTA systems will the CPS be integrated with?

2. The CPS will ultimately be owned and administered by an NGO. How does this align with COTA’s vision for the CPS?
3. How will payment processing and reconciliation with the various service providers be handled?

4. Several requirements identify the collection of PII data. How will this data be managed to ensure privacy?
HARDWARE (FAREBOX, POS, TVM)

Sub-Components:

• Transit Vehicle On-Board Fare Management
• Payment Device Reader
• Point of Sale Terminal Payment Management
• Mobility Provider Payment Management
## SAMPLE HARDWARE (FAREBOX, POS, TV)

### REQUIREMENTS

<table>
<thead>
<tr>
<th>REQ ID</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>CPS-FN2602-V01</td>
<td>The CPS may integrate with the contactless RFID reader (compliant with ISO 14443 Type A and B standard) of existing COTA fareboxes for NFC-enabled mobile devices.</td>
</tr>
<tr>
<td>CPS-FN2603-V01</td>
<td>The CPS shall integrate with COTA's existing fareboxes to allow recognition of a mobile app presenting a ticket ID via an optical barcode on the device screen, or (if supported by the device) through NFC.</td>
</tr>
<tr>
<td>CPS-FN2604-V01</td>
<td>Activating an e-ticket shall cause the ticket to expire from the Traveler account.</td>
</tr>
<tr>
<td>CPS-FN2605-V01</td>
<td>If the mobile device of the Traveler is NFC enabled, and compliant with ISO 18092/ISO 21481, the device shall broadcast the same unique serial number that is encoded in the QR code.</td>
</tr>
<tr>
<td>CPS-FN2606-V01</td>
<td>The CPS shall be capable of digitally rendering optical codes (mobile e-tickets) for optical scanning at provider reader equipment.</td>
</tr>
<tr>
<td>CPS-FN2607-V01</td>
<td>Mobile e-tickets shall be machine readable 2D optical code compliant with ISO-15415, encoding the unique serial number.</td>
</tr>
<tr>
<td>CPS-FN2608-V01</td>
<td>Mobile e-tickets shall serve to create the identifier used to validate and track the ticket and associated transactions in the system.</td>
</tr>
<tr>
<td>CPS-FN2792-V01</td>
<td>COTA fareboxes shall manage COTA fare information on transit vehicles.</td>
</tr>
<tr>
<td>CPS-FN2793-V01</td>
<td>COTA fareboxes shall provide traveler fare collection interface on transit vehicles.</td>
</tr>
<tr>
<td>CPS-FN2794-V01</td>
<td>COTA fareboxes shall provide COTA fare collection data.</td>
</tr>
<tr>
<td>CPS-FN2795-V01</td>
<td>COTA fareboxes shall provide COTA payment device interface.</td>
</tr>
<tr>
<td>CPS-DR2776-V01</td>
<td>The CPS shall generate QR code, bar code, NFC, BLE or activation code, as appropriate.</td>
</tr>
<tr>
<td>CPS-DR2776-V01</td>
<td>The CPS shall generate QR code, bar code, NFC, BLE or activation code, as appropriate.</td>
</tr>
<tr>
<td>CPS-IF2563-V01</td>
<td>The CPS shall provide an interface between POS and CPS to allow users (e.g. unbanked users) to load cash at COTA ticket vending machines (TVMs) to fund a Traveler account.</td>
</tr>
</tbody>
</table>
1. The SyRS includes several requirements focused on hardware functionality (i.e., Bluetooth and NFC transponders). Does Columbus have plans to install hardware as part of the project? How will the CPS interface with existing COTA fareboxes?

2. How will unbanked users, or users who prefer to pay with cash, use the system?
Sub-Components

• Payment Broker
• Anonymous Data
• Analytics
• User Feedback
• Public APIs
<table>
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<tr>
<th>REQ ID</th>
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<tbody>
<tr>
<td>CPS-FN2468-V01</td>
<td>The payment broker in the OS shall provide a shared account ledger.</td>
</tr>
<tr>
<td>CPS-FN2469-V01</td>
<td>The payment broker shall not maintain PCI data. The CPS Back-Office will maintain this sensitive information in a secure environment.</td>
</tr>
<tr>
<td>CPS-FN2470-V01</td>
<td>The payment broker shall receive payment information from the MMTPA through CPS landing pages.</td>
</tr>
<tr>
<td>CPS-FN2471-V01</td>
<td>The payment broker shall receive payment information from the EPM application through CPS landing pages.</td>
</tr>
<tr>
<td>CPS-FN2469-V01</td>
<td>The payment broker shall not maintain PCI data. The CPS Back-Office will maintain this sensitive information in a secure environment.</td>
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<td>The payment broker shall receive payment information from the MMTPA through CPS landing pages.</td>
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<tr>
<td>CPS-FN2471-V01</td>
<td>The payment broker shall receive payment information from the EPM application through CPS landing pages.</td>
</tr>
<tr>
<td>CPS-FN2464-V01</td>
<td>Data posted to the OS shall have PII obfuscated so that it may be available to third-party users.</td>
</tr>
<tr>
<td>CPS-FN2642-V01</td>
<td>Third-party users shall be given access into the Operating System for anonymous trip and payment data.</td>
</tr>
<tr>
<td>CPS-FN2643-V01</td>
<td>City of Columbus users shall be given access into the OS for performance measurement data and reports.</td>
</tr>
<tr>
<td>CPS-FN2642-V01</td>
<td>Third-party users shall be given access into the Operating System for anonymous trip and payment data.</td>
</tr>
<tr>
<td>CPS-DR2647-V01</td>
<td>The CPS shall provide anonymous payment data to the OS for storage in accordance with OS practices.</td>
</tr>
<tr>
<td>CPS-DR2775-V01</td>
<td>The storage time of anonymous payment data in the OS shall be configurable up to a maximum of 10 years by the City/COTA.</td>
</tr>
</tbody>
</table>
1. What is included in the shared account ledger and how does it work?

2. Will Service Providers be expected to add users to the shared accounts ledger? How will this work for large TNCs, for example?

3. Describe how the Payment Broker works.
4. How is Columbus proposing to use open data standards? How can other agencies benefit from what Columbus is doing?

5. How do you plan to capture anonymous data? How will it be shared? What types of reporting will be available?
SUMMARY / LESSONS LEARNED

1. Prioritize early engagement with transportation providers
2. Shared account vs. single pay system
3. Fare System Upgrade
4. Requirements development
5. Sustainability and social equity
6. Agile project development
UPCOMING MILESTONES

- **System Requirements Specification**
  - December 2018

- **Release RFP/Procurement/NTP**
  - December 2018 – March 2019

- **Vendor Agreements**
  - March 2019 – January 2020

- **CPS Release 1**
  - June 2019

- **CPS Release 2**
  - September 2019

- **CPS Release 3**
  - November 2019

- **MMTPA/CPS Go Live**
  - January 2020

- **Data Collection**
  - January 2020 – January 2021
SCHEDULE

**MMTPA**
- **MMTPA RFP**
- **MMTPA VENDOR SELECTION**
- **MMTPA NTP 12/14/18**
- **GO LIVE MMTPA 8/20/19**

**MMTPA/CPS**
- **DRAFT CONOPS MMTPA/CPS**
- **FINAL CONOPS**
- **FINAL 12/19/18**
- **CPS NTP 3/22/19**
- **COBINED GO LIVE 1/7/20**

**CPS**
- **DRAFT CPS SYST REQ**
- **CPS RFP**
- **RFP RELEASE 12/10/18**
- **CPS APP VENDOR SELECTION**
- **CPS DEVELOPMENT**

**Timeline**
- **APRIL 2018**
- **OCTOBER 2018**
- **FEBRUARY 2019**
- **AUGUST 2019**
- **JANUARY 2020**

**Key Dates**
- **RFP RELEASE 8/11/18**
- **MMTPA NTP 12/14/18**
- **GO LIVE MMTPA 8/20/19**
- **COMBINED GO LIVE 1/7/20**

**Legend**
- **SYSTEMS ENGINEERING**
- **PROCUREMENT**
- **AGREEMENTS**
- **DEVELOPMENT**
- **TESTING INTEGRATION**
Public comment period open for the CPS System Requirements:

- November 21- December 5, 2018

- Where to find it:
  - View the System Requirements at: https://smart.columbus.gov/projects
  - Click Comment Payment System
  - Direct link to file:
    - https://smart.columbus.gov/uploadedFiles/Projects/SCC-B-SysReq_CPS_DRAFT_20181022_for_USDOT.PDF

- How to comment:
  - Please email comments to: kldepenhart@columbus.gov
    - Subject line: CPS Comments
      - Include your contact information
  - State whether or not you represent a vendor interest
HOW TO STAY CONNECTED

USDOT SMART CITY CHALLENGE PROGRAM INQUIRIES:
Kate Hartman, Chief - Research, Evaluation and Program Management
Intelligent Transportation Systems
Joint Program Office
Kate.Hartman@dot.gov

SMART COLUMBUS INQUIRIES:
Alyssa Chenault, Communications Project Manager
anchenault@columbus.gov

Upcoming Smart Columbus Webinars:
• Overview of Emerging Technologies: Connected Electric Autonomous Vehicles and Truck Platooning – 1/30

Webinar recording and materials will be available at itsa.org and smart.columbus.gov
SIGN UP FOR OUR E-NEWSLETTER

Contact:
SmartColumbus@columbus.gov

Columbus.gov/smartcolumbus

@SmartCbus
QUESTIONS?
The boundaries for the system of interest are not well-defined and there appear to be several requirements focused on systems outside the boundaries of the proposed system (i.e., requirements about COTA Fare System).

Are COTA and the SCOS part of the CPS system? It is not clear what your system boundary is.

CPS-FN2500-V01 – “The CPS shall provide back-end integration with COTA's fare management system.”
  - Need more details, what will be integrated? What specific data will be shared, etc.
TOPICS – OPERATION AND OWNERSHIP

• Who is responsible for operations and administration of the CPS? The requirements include several activities that will require staff to support day-to-day operations? Who will be doing this? And please note that the context diagram and “Users” don’t define an entity responsible for this functionality. For example:
  • Who is going to be responsible for disputes, etc.?  
  • Who will be responsible for providing help to Travelers? 
  • Who will be running reports, etc.?
TOPICS – HARDWARE

• The SyRS includes several requirements focused on the functionality of hardware (i.e., Bluetooth and NFC transponders) that appears to be installed in various vehicles (e.g., TNCs, buses, etc.) or in other places.
  • Is Columbus planning to deploy BLE transponders to support transactions?
  • Is Columbus planning to deploy NFC transponders to support transactions?
  • Is Columbus planning to deploy contactless transponders to support transactions?
  • Is this project planning to deploy Fareboxes as part of this project?

• CPS-FN2562-V01 – Do POS terminals currently allow cash to be added? Does the POS terminal issue a pre-paid card for the unbanked?
• CPS-FN2468-V01 – “The payment broker in the OS shall provide a shared account ledger.”
  • What is included in the shared account ledger? Need more details.
  • Recommend establishing parent/child requirements that describe what is included in the shared account ledger

• CPS-FN2514-V01 – “Providers shall have the ability to add Users to the shared accounts ledger in the OS, so that Travelers can access other modes of transportation.”
  • It’s not clear what this means. Why would Uber be adding users to the ledger? I’m confused.
TOPICS – ANONYMOUS DATA

• Line 201 – “The broker will be responsible for directing payment requests to the CPS payment processor and for capturing anonymous trip and payment data for analytics.”
  • It is not clear how anonymous payment data can be collected (payments need to be tied to an account). What are Columbus’ plans to anonymize this type of data?
TOPICS – IVR SYSTEM

• CPS-FN2636-V01 – “The CPS shall be capable of generating a phone number for use by the Traveler to initiate a trip via the IVR system.”
  • I’m confused. Why does a phone number need to be generated and what is the Traveler expected to do with the phone number to initiate a trip?

• CPS-FN2637-V01 – “The CPS shall be capable of generating a trip code for use by the Traveler to initiate a trip via the IVR system.”
  • Once the traveler gets a trip code from the IVR, what do they do with it? How would I pay for a mobility service (i.e., bikeshare) with this code?