

# California Integrated Travel Project (Cal-ITP) Market Response Summary

Automated Passenger Counting

Issued by:

Caltrans, on behalf of the California Integrated Travel Project

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## **Disclaimer**

This Market Response Summary Report provides a summary of the Market Sounding process that occurred for the California Integrated Travel Project (Cal-ITP) in July and August, 2020. In order to protect the Market Sounding respondents' commercial information, and to foster candor, the information outlined in this report is summarized without reference to specific companies or products. This report will provide clarification as to whether certain information is attributable to Market Sounding participants or to Cal-ITP. Caltrans and its regional and local partners conducted this Market Sounding exercise by collecting written information and conducting follow-up interviews about the knowledge and capabilities of various market players and industry professionals. The information outlined in this report represents the individual commercial views and interests of these Market Sounding participants. This report is intended solely for informational purposes and is not to be construed, under any circumstances, by implication or otherwise, as a recommendation for any specific policies, solutions or services.

## Executive Summary

While technologies exist that satisfy many agencies, there does not yet exist a technology or that could work in every transit vehicle in California, particularly for small and rural operators . Every relevant sector will need to be involved to close this gap.

- California is a large state with over 300 transit operators.
- Each of these operators is likely to have acquired bespoke, customized vehicles, which make it difficult to broadly implement any one solution.
- Ensuring that agencies have access to better standardized products and information will streamline implementation.
- Solution providers seem to have two of three areas of expertise: experience working with transit operators, experience working at a large scale, or expertise with passenger-detecting technologies. Creating opportunities for knowledge development and transfer will unlock new opportunities and approaches.

This combination of factors leads us to believe that there may be a real gap in the marketplace requiring government or other substantial entity incentive to spur research, development, and business models such that simpler, reproducible and scalable solutions are available.

## **I. Goal**

To efficiently direct resources that will expand access to accurate and reliable Automated Passenger Counting (APC) technology for small and rural transit agencies.

## **II. Introduction**

California is one of the leading economies in the world, home to many of the private sector's mobility innovators, and one of the largest and most complex public transportation systems in the United States. Public transportation is foundational to making cities work, and to meeting California's environmental and equity goals. Today, California residents and visitors face a disaggregated public transportation network that: is often not as user-friendly as it could be; is costly to operate; faces new competition for riders in many places; and is subject to changing customer expectations around convenience.

Transit operators rely on several technologies and disparate data to serve their riders. Among these, transit vehicle capacity is of particular interest to California for three reasons.

- Transit agencies need to know how many people ride their vehicles, both for their own operations planning and to satisfy federally mandated reporting, which requires significant time and resources that could be better directed to serve customers.
- Automated Passenger Counting (APC) technologies exist to ease the collection and verification of passenger counts, but these are prohibitively expensive for smaller and rural agencies to obtain and operate, which is an unacceptable equity issue.
- Passengers have always been interested in knowing how many people are on the vehicle before they board, and the ongoing requirement for social distancing makes this information even more essential to transit journey planning and execution.

### **A. Purpose of this Market Sounding**

The goal of this Market Sounding was to inform Cal-ITP and its partners on what California might do to encourage focus and investment in APCs.

This Market Sounding exercise provided an opportunity for a structured and candid dialogue between the private and the public sectors. The Market Sounding not only

tested the viability of the project's objectives, it also obtained feedback on how aspects of the project should be defined in order to ensure private sector participation and to foster competition.

Cal-ITP's stated goals were:

- Gain insights on the landscape of providers, institutional, procedural and market barriers and possible partnership opportunities.
- Understand how Cal-ITP could make reliable passenger counting technology more affordable and accessible to all California agencies (potentially for inclusion in California's Minimum GTFS Guidelines).
- Further Cal-ITP's understanding of the customer information technology product landscape, particularly as it relates to small and rural transit agencies.

## **B. Cal-ITP's Assumptions**

Through initial research and analysis, Cal-ITP developed some early assumptions about what the constraints are for transit operators to identify, obtain and operate APC technology across California. These six assumptions were tested in this Market Sounding process.

**Assumption 1: Both real time and historical passenger counts have distinct value.**

- Real time counts are useful for passengers as they plan and execute trips.
- Historical counts are useful for operations planning and reporting.

**Assumption 2: Different levels of aggregation have value.**

- Per-vehicle counts are useful for trip planning.
- Aggregated route, stop, and time counts are useful for operations planning and reporting.

**Assumption 3: National Transit Database (NTD) certification is a necessary and difficult requirement to clear.**

- Agencies spend a significant amount of time and resources fulfilling their reporting requirements around ridership to the NTD and others.
- Some agencies augment their personnel effort with technology, but it is also time and resource-consuming to obtain NTD certification on a fleet deployment.

**Assumption 4: The public's privacy must be protected, particularly vulnerable populations.**

- Security footage is often used to count passengers.

- Demographically, the groups of people who ride more transit in California are more likely than others to be over-policed.
- Encouraging transit agencies to collect and store more camera footage increases the risk of misidentification and abuse by enforcement.

**Assumption 5: Small and rural agencies have limited options and limited resources.**

- While vendors do scale their costs based on agency/fleet size, the lower price point is not low enough for half of California’s transit agencies. Our research found that:
  - Agencies currently pay between \$3,000-5,000 for hardware and installation per vehicle, plus several thousand dollars annually in licensing fees for the processed data. These devices are often part of larger contracts with other devices, making it difficult to parse out the precise cost of APC service.
  - Only about half of California’s fixed route transit agencies use APCs today. Of those, 59% are certified for NTD reporting.
- Riders waiting on low-frequency routes are even more sensitive to capacity issues, especially during COVID-19. These riders are more significantly impacted by having to wait for the next vehicle, and would benefit most from real time trip information.

**Assumption 6: Current APC offerings are either affordable or accurate, but not both.**

- Many agencies we spoke with have delayed acquiring APCs because they’ve heard there aren’t good options on the market.
- Very few agencies today provide real time passenger occupancy information.

**C. Criteria for Automated Passenger Count devices**

Cal-ITP believes any APC solution for California would have to meet several criteria, which were included in the Market Sounding.

- **Credible Business Model.** Must fulfill customer needs at a price sustainable to the vendor.
- **Quality Assurance.** Both accurate and precise, with clearly defined validation methods and performance standards.
- **Maintenance.** Low requirements of time and cost for agencies to keep the system functioning, with an ongoing plan to support changes in data standards and address vulnerabilities.

- Privacy. Must protect user privacy and establish clear policies to store, share, and destroy all personally identifying data.
- Barriers. Acknowledgement of known or foreseen deployment obstacles.
- Funding. Note any resources needed upfront or on an on-going basis, such as office support, driver support, hardware, software, additional development time, and presumed existing equipment. Distinguish startup costs from maintenance costs, and indicate how costs would scale for agencies of different sizes (from fewer than 10 vehicles to hundreds).

#### **IV. Methodology**

On July 10, 2020, Cal-ITP distributed a Market Sounding document to companies and organizations in the transit passenger information sector, and published the same document through the Caltrans website. Interested parties were invited to a Market Sounding kick-off event on July 17 on Webex. During this one-hour event, Cal-ITP Program Manager, Gillian Gillett, provided the background and objectives of the Cal-ITP project, after which Cal-ITP consultant, Ruth Miller, introduced the setting and process of the Market Sounding, and answered questions. Over 30 people joined the event. Submissions from private sector companies were received until August 7.

Follow-up discussions were held until September 11. These interviews were held under the Chatham House Rule to foster greater candor from the respondents. These interviews generally followed the topics laid out in the Market Sounding document. After finalizing the interviews, a panel of technical consultants compiled the key findings reported in the sections below.

#### **Respondents**

The following organizations, listed in alphabetical order, submitted a Market Sounding response.

- Acumen
- AI Agora
- Axon Vibe
- Engie
- GMV Syncromatics
- Hitachi Rail
- Ito World
- Liftango
- Route Reports
- Stream It
- StreetLight Data

- TecTransIT
- Teleste
- Transit App
- Transit Clock
- Via Mobility

## V. Findings

The findings are structured as follows.

- Section A describes relevant market feedback on the Cal-ITP objectives and assumptions.
- Section B presents the initiatives suggested by respondents to meet objectives and overcome barriers.

### A. Feedback on Cal-ITP Objectives and Assumptions

Respondents that commented on the objectives and assumptions were supportive.

Caltrans intentionally did not discuss budget or how respondents may be involved in future steps, in order to broaden responses, identify barriers and roles, and to spur innovation.

### B. Initiatives to Meet Objectives and Overcome Barriers

There are roughly seven approaches to counting passengers.

1. **Active driver input.** Require the driver to push a button every time a passenger boards or alights. Precise. Potentially more accurate in systems with lower ridership, where the risk of crowded boardings/alightings is lower. Low cost, but pulls the driver from their core work and from serving the customer.
2. **Fare Collection.** Count the number of passengers who have paid to board, even where the payment is \$0. Aside from the risk of inaccuracy due to fare evasion, unless the rider has to tap both on and off, wouldn't track when a user alights. Reasonably precise for route-level statistics.
3. **Lasers.** Position a "curtain" at the front and back doors, and record each time the beam is broken. Either use multiple beams to determine direction of movement, or assume all front door usage is for entries and back door for exits. Reliability diminishes in crowded conditions, and door behavior can be unreliable.
4. **Cameras.** Position either visible spectrum or Lidar cameras through the vehicle, and use machine vision to define and count the number of human bodies or faces. Potentially very accurate, and given that many vehicles already have cameras, potentially low cost. Adding more cameras would create concerns

among over-policed communities, and the storing/processing of footage creates privacy risks that need to be justified and managed.

5. **Weight.** Assume each additional passenger has some average weight, or observe incremental changes in weight as each passenger boards/alights. Risk of high inaccuracy given luggage, crowding, and the variability of the human body.
6. **Mobile phones.** Offer free WiFi and track devices that have joined the network. Mobile device use varies among communities, and research is needed to make inferences. Precision would be a factor. Creates privacy risks that need to be justified and managed.
7. **Require advanced bookings.** Prohibit riders from boarding a vehicle without a reservation, and count reservations for ridership counts. Raises prohibitive equity concerns and drastically reduces the customer experience by limiting choice.