



**CUTA Transit Exhibition 2022
Transport Action Ontario
Trip Report
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Overview of the Exhibition

We attended the CUTA Transit Exhibition in Montréal on October 25, 2022. We had split to cover the many booths and technologies more effectively, and we have grouped our observations by topic.



Route Management

A number of companies presented software products primarily oriented at route management. Most focus on the 'last mile' including the possibility of routing smaller, lighter vehicles to pick up or drop off passengers in more lightly travelled areas. These products are also applicable to the scheduling and routing of transportation services oriented at handicapped travellers. Most of these products also offer their software for use in routing and scheduling fixed route bus networks.

These companies seem to charge on a 'whatever they can get' basis. Sometimes, their charges are based on the population, sometimes on the number of buses, sometimes on ridership. In every case, it seemed like a rather generous 'fudge-factor' could be applied to the scheme used by these companies to collect revenue from their customers, the transit agencies.

Fare Management

Several companies were demonstrating hardware and software systems used to collect and manage fares. One company included a display of historical fareboxes extending over a century of transit use. This company included a large device to which a farebox could be mated, in order to release the currency and tickets in a secure fashion.

Increasingly, the fare management options being touted by these companies include such options as fare capping - where someone could tap their smartphone or smart watch to a reader and the system would charge them up to a maximum 'fair fare' at the end of an appropriate period. For example, if a person made a number of trips in a day, they might only be charged for a day pass instead of for the total number of individual ride tickets that would otherwise apply. Similar rules could be applied for week passes, monthly passes, or even annual passes.

These systems can also be used to provide the transit agency with valuable origin/destination data which can then be used in route planning and scheduling. It is not unlikely that there will eventually be convergence between fare management companies, and route management, and scheduling companies.

Buses at the Exhibition

There were over a dozen buses on display. Attendees could board, sit in the seats, and ask their questions of manufacturers' representatives. All but one were battery powered, with a lone hydrogen fuel cell outlier.

A significant issue with battery-electric buses is the means by which they are recharged.

The TTC is currently service testing electric buses from three vendors: BYD, Proterra, and Canada's New Flyer. These vehicles cannot operate for eighteen or more hours like the diesel or diesel-hybrid buses they have replaced. Hence e-buses tend to be used on shorter routes. One approach is to use two e-buses in place of a single diesel-based bus, bringing one back to the yard to recharge, and sending another out to take its place on route. In practice, four e-buses are needed to replace three diesel or hybrid buses. As there is also a shortage of bus drivers at many agencies, this is far from an ideal solution.

It appears that many agencies have been purchasing e-buses to provide quick bus route conversions, without having to install charger and grid connections on on-route opportunity charging. This is a short term electrification, but will cause problems at agencies with longer routes.

However, the use of on-route recharging bus models would alleviate that. This is not discussed enough in the transit press, but most vendors now offer roof rails for charging. For example, the Hastus e-bus charging system from the Exhibition uses a drop-down pantograph to recharge buses at stops. Montreal's STM uses such a system, which greatly increases e-bus range over depot-only charging battery bus models.



Scheduling and driver practice changes might also be required to help alleviate this issue. For example, if a bus from a previous trip were to be left charging at a stop, the driver of the next bus could take it over while arranging for the bus they had just driven to be charged. Drop down pantograph rechargers would be ideal to install at bus terminals, where buses wait for 3-10 minutes to allow driver rest and bathroom breaks.

There are many more battery bus models now available, in different sizes from small shuttles to highway coaches. In looking at and walking around in the 16 buses on the exhibit floor, it was clear how much bus designs have improved in the last twenty years or so. It seems that the following functions and features are what passengers expect in a new city bus:

New City Bus Must Haves

- Low floor for easier boarding and alighting, especially for mobility devices.
- Space for two or more strollers or wheelchairs.
- Robust air conditioning – with global warming this is increasingly an issue.
- No advertising obscuring the windows – passengers hate this. Passengers want to see the city, get their bearings, enjoy the sunshine, and observe the current weather.
- Decent seat width and pitch - some agencies install narrow seats to increase 'capacity' numbers but this only compresses passengers uncomfortably, especially on a busy vehicle and in heavy winter clothes. This really degrades the quality of the ride experience.
- Avoid forward facing seats over wheel wells – this results in very little leg room. Make these seats longitudinal instead.
- Automated stop announcements.
- Next stop displays.
- HEPA filters.
- Opening windows. Note that this flies in the face of the requirement for air conditioning and energy efficiency. Opening windows are primarily desired in cases where the air conditioning system has either failed or is insufficient for the current needs.
- USB chargers.

New City Bus Nice to Haves

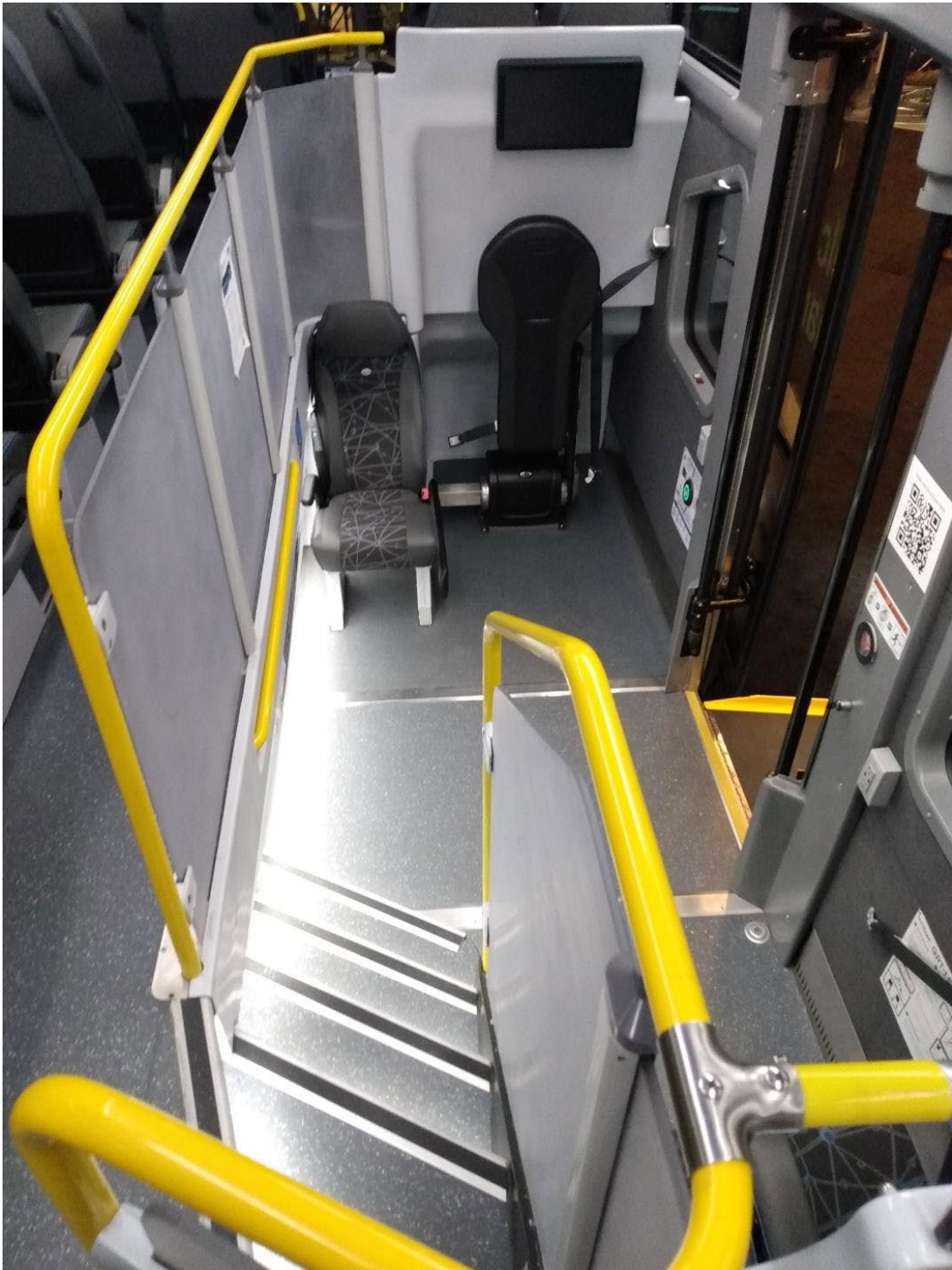
- Decent WiFi.
- Power outlets.
- Emissions free.
- Step free inside – not always possible, but makes for much easier movement within, for quicker loading and alighting as well as fewer accidental trip and fall incidents.

Style is low on the bus design priority list, and is typically just some streamlining of extremities, to avoid the square sandwich loaf appearance. What matters about buses is frequency, availability, and comfort. And the prime mover – is it clean, long range, and quick to refuel or recharge?

Coaches

Coaches are notorious for not being accessible.

Winnipeg-based bus manufacturer MCI has developed a model that has a lower-level side entrance for a wheelchair or mobility device, a chair for a friend, accompanying passenger, or caregiver, and stairs to connect to the rest of the bus. As such it is a 'deck-and-a-quarter' bus, as opposed to a double decker. The MCI D45LE is available in both diesel and electric versions.



Smart Bus Stops

Bus stops are finally getting smart, instead of relying on passengers having to have smartphones. Busier bus stops in some cities are now being equipped with LCD screens providing real time vehicle arrival updates and diversion notices where the transit agency has this data available. These use black and white electronic paper (e-paper), essentially a large Kobo e-reader type screen mounted on a bus stop pole, powered by a solar panel, to provide real-time vehicle arrival information via a cell phone network connection.

These Next Generation stop screens can include:

- Short-term route changes, such as routing around diversions, for special events, and rail-replacement bus services.
- Crowding status, where buses are equipped with automatic passenger counting technology.

Smart bus stops are one of several initiatives that transit agencies are installing to help passengers navigate transit systems without a smartphone, to quickly make decisions on which bus to take, or find out about diversions or service updates.

We visited the booths of two Canadian companies that manufacture such signs, Quebec's Buspas.com and Ontario's CP Stoneman, as well as US company Vix.

Buspas stop screens do not have buttons, as the display and the brochure photos show the signs being installed at 2m or higher. Presumably the objective of this is for better sight lines in a crowd, and to prevent graffiti and vandalism. Nonetheless, the screens have IP67 environmental protection rating with an aluminum housing (this standard stands for Ingress Protection – first digit is dust protection, second digit is for liquids). The company has tested their screens at temperatures between -30C and +70C.

The CP Stoneman device has an IK09 vandalism protection rating (these are impact protection ratings, which range from 00 to 10). Their stops are designed to be placed at about shoulder height, with a button, or four buttons on their larger screen versions, for optional user-prompted information:

- Text language options
- Text to voice
- Route map and/or schedule display
- Special services or promotions

The company is also considering adding an LED light under the solar panel for safety, and for situations where the device is located in busy locations or in poor weather.



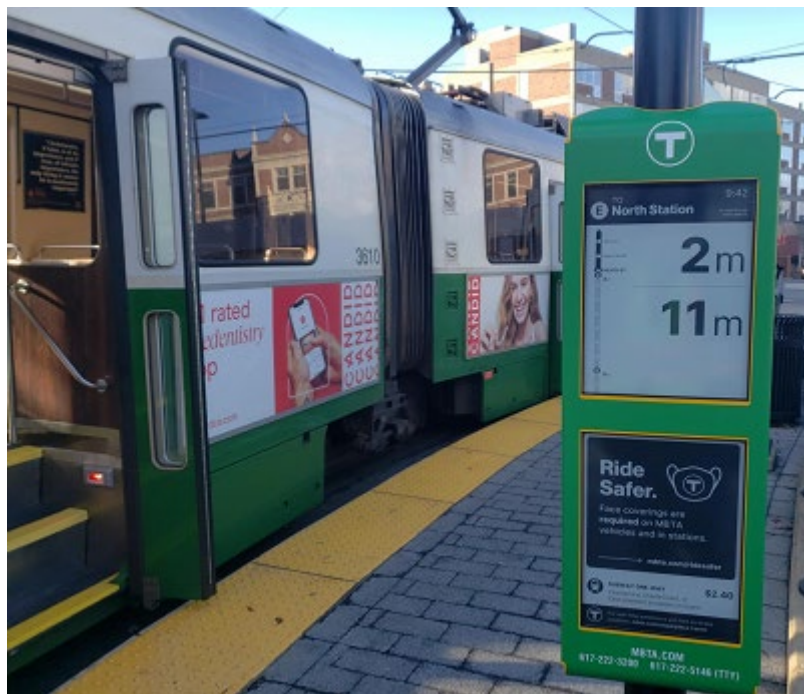
According to a [2021 Pew Research Center](#) study, about 15% of Americans don't have a smartphone, and statistic in Canada are probably similar. As well, people who make less than \$30,000 a year, are seniors, or have only a high school or less level of education are much less likely to have one, and smartphones running low on battery or having lost service can happen to anyone.

These e-paper signs are cheaper than full-colour displays sometimes installed at bus terminals and busy bus stops, costing between \$6,000 to \$10,000 each. They are easier to read than most existing screens because they are high-contrast and don't produce glare. The screens can also cycle through maps of different routes that serve the stop, which full colour signs don't currently do. The cost includes screen, computer, and cell phone transceiver, as well as a cooling system for summer operation. Batteries inside the display can last 3 years, and with a solar panel, much longer.

Because 1 in 12 men and 1 in 200 women are colour blind, and colour perception also wanes as we age, full colour signs are a 'nice to have'. Conveying information only using colour is against the Disability Acts in many provinces. It is a wonder that the Montréal Métro still uses colours to identify their different lines, having removed the line numbers a couple decades ago. This is a common practice in many jurisdictions. Colour blindness is one reason why routes designated by colour are usually also designated by number, as is the case in Ottawa.

Transit agencies also need to factor in how much sun a potential solar powered e-screen would be exposed to when installing electronic signs, since each sign needs to be charged by direct sunlight for at least two hours a day in order to function for the full day. Urban canyons characteristic of many downtown areas may significantly reduce the sunlight available to recharge the batteries used by smart bus stop signs.

In Ontario, Durham Region Transit has deployed some of these signs, and many US cities have been trialing e-paper screens. Boston deployed them at some bus and light rail stops in 2017. They expanded their installation to select bus stops throughout greater Boston in 2019 and plan to deploy the signs on the surface section Green Line branches over the next two years at a cost of \$3.4 million. The city has allocated the screens based on how busy the stops are, direct sunlight, and of course funding.



Although Boston found the signs' performance were not significantly affected by the cold, Minneapolis' screens experienced issues because they operate in a much more severe winter, colder than the manufacturer's testing lab. Below -20°C , the devices refresh is sluggish, and the screens start to ghost as they render information in different shades of gray. At -23°C , the signs were unable to display anything, even though they were able to pull the information they needed from the network. The agency is waiting to hear from the vendor on a solution.

Bus Load Sensing Technology

Insoft Research, an InfoDev company, has developed software that counts the number of passengers aboard a vehicle, from overhead cameras. It can also determine the number of children, strollers, wheelchairs, backpacks, luggage, even bags carried by passengers. This can be helpful to notify transit control of the capacity of the vehicle, as well as for cumulative data on the number of strollers and luggage on different routes.

TransLink Safety Presentation

Vancouver TransLink presented, not on their Broadway SkyTrain line extension under construction, nor their Rapid Bus lines, but on passenger safety, and how it impacts employees.

Their program is called QPR - Question, Persuade, Refer - for passengers that appear to be in distress. It is primarily training for suicide prevention. Essentially, any interruption of a passenger in distress is a good interruption, because it changes their thought patterns.

The concept is to question the passenger, ask them what they are about to do, persuade them to move out of immediate danger, and call for emergency personnel to which to refer them.

TransLink has seen how suicides and suicide attempts have resulted in severe employee trauma, causing time off work, and service delays.

The QPR program has been in place for a number of years and has greatly reduced incidents of suicide, resulting employee trauma, and major service delays. A recent improvement to the program has been the adoption of special code word for situations in which the QPR protocol is engaged, resulting in quicker reactions by dispatchers, and less embarrassment for the person of concern.