Autotrén: A GRT System for Cities in Emerging Economies
• Who we are, where we stand
• The economic model
• Open control
• Outlook
ModuTram: Who we are

High-tech company in Mexico’s “Silicon Valley”

Founded 2009

Mission: Improve urban mobility

What we do:

• GRT system integrator
• ATN control system developer
• ATN vehicle chassis integrator

Our product: Autotrán
Autotrán supply chain

Technology providers

- Automation
  ModuTram
- Vehicle chassis
  Various
- Vehicle body
  BECCAR
- Guideway
  ESTRUCTURAS DIVA
- Passenger stations
  DIPRO INNOVATION DESIGN
- Access control, fare collection

General contractor
- Operation
- Maintenance

Technical system integrator
ModuTram
Where we stand

Test facility in Guadalajara

Demo facility in Cuernavaca

Test facility expansion (under construction)
PRT or GRT?

**PRT**
- Ride alone or with passengers of your choice
- Non-stop service

**GRT**
- Ride with others
- Intermediate stop(s) possible
The economic model

- Public-private partnership
- General model copied from Bus Rapid Transit
- Adapted for GRT
Public-private investment model

Example:

<table>
<thead>
<tr>
<th>Investor</th>
<th>System Element</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>Guideway, Buildings</td>
<td>40%</td>
</tr>
<tr>
<td>Builder-Operator with rights to GRT technology</td>
<td>Automation, central facility equipment</td>
<td>30%</td>
</tr>
<tr>
<td>Existing transportation (bus) concessionaires</td>
<td>Vehicles</td>
<td>27%</td>
</tr>
<tr>
<td>Company with fare collection infrastructure</td>
<td>Ticketing and access control equipment</td>
<td>3%</td>
</tr>
</tbody>
</table>
Concessioned operation model

Example:

Fares (collected at station) → Operations Trust Fund
Revenue concentration and distribution

- Operation Concession: 50%
- Vehicle Concession: 42%
- Fare collection Concession: 3%
- Supervising Agency: 5%
What happens when a change is made to a vehicle, that affects its control or protection device(s)?
The entire control system may need to be revalidated!
Open Control

GRT System

Central facilities

Control network

Stations

Guideway

Standardized interface

Vehicles

Independent of vehicle-specific technologies

Independent of what’s outside the vehicle
Open Control

Communication protocol based on an open standard (SAE J1939 with extensions)

Benefit:
Validation can be performed on a dynamometer
Open Control
Outlook

Commercial average speed range (km/h)

- Pod Rapid Transit
- Light rail (exclusive), monorail
- Bus Rapid Transit (BRT)
- Subway, Heavy rail

Maximum capacity range - Thousands of passengers per hour per direction