EMTRAC

Bus Rapid Transit (BRT)

The EMTRAC system utilizes precise positioning technology and secure RF communication to enable Bus Rapid Transit (BRT) vehicles to non-intrusively adhere to route-schedules.

EMTRAC-equipped vehicles are capable of V2I (vehicle-to-infrastructure) and V2V (vehicle-to-vehicle) communication. A number of key EMTRAC features enable vehicles to improve performance by requesting signal priority at *the appropriate times*.

EMTRAC-equipped BRT, Brampton, ON (photo by Sean Marshall)

Route-Schedule Adherence

Transit performance is improved by a number of features unique to the EMTRAC system, which enable vehicles to request signal priority *when needed*. These features include:

Conditional Priority: Conditional priority utilizes real-time vehicle status to determine whether signal priority should be requested—and it is often the best solution for achieving effective transit performance with minimal traffic disruption. According to ITS America[1]:

> Conditional priority means that a smaller percentage of transit vehicles are requesting priority, but may be viewed as preferable if the emphasis is more on improving service reliability than on decreasing absolute travel time.

Adaptive Priority: This unique system reacts to *real-time changes in traffic density* to notify the controller when an approaching bus reaches pre-defined ETA time-points during its approach. *As traffic fluctuates, so do the positions of ETA time-points*. Traffic controllers then modify phase timing to reduce the impact on the intersection while also maintaining coordination with other intersections along the corridor.

Actuated Priority: EMTRAC-equipped buses can request priority for specific intersection *lanes*. For example, left-turn lanes may be granted signal priority when buses enter the lane and request priority for the specified direction.

1. Baker, Ronald J., et al. An Overview of Transit Signal Priority. Ed. James Chang. Washington, DC: Intelligent Transportation Society of America. 2004. ITS America.

EMTRAC utilizes multiple global navigation systems, augmented by inertial navigation (three-axis gyro and accelerometer), to deliver precise actuated priority requests.

The EMTRAC system is uniquely capable of helping buses take full advantage of existing BRT features while helping transit agencies implement a high-quality "transit system that delivers fast, comfortable, and cost-effective urban mobility."[2]

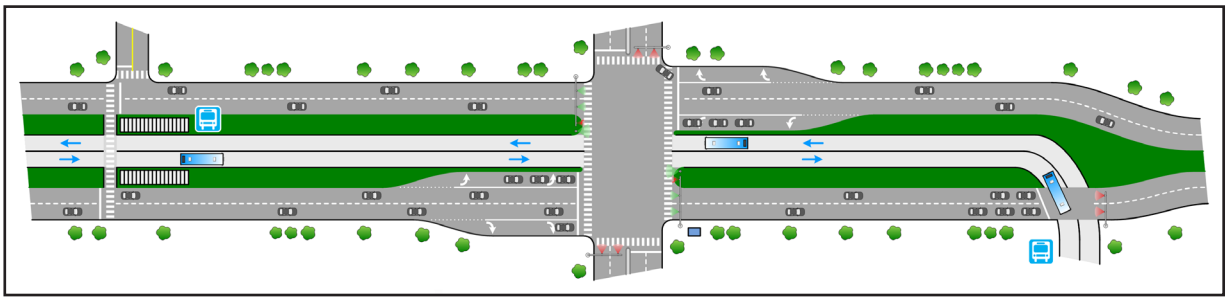

Illustration of a median busway for BRT, utilizing EMTRAC for lane-specific signal priority as well as other priority features

The EMTRAC system enhances the following "essential features that define BRT"[3]—*without requiring additional hardware*:

- **Dedicated Right-of-Way** and **Busway Alignment**: EMTRAC-equipped vehicles are able to automatically open entrance gates to dedicated BRT lanes.
- **Off-Board Fare Collection**: Vehicles may request signal priority at near-side stops (depending on *door status*) or while approaching far-side stops (depending on *stop-request status*).
- **Intersection treatments**: In addition to signal priority, precision vehicle detection allows for *lane-specific actuated* phasing.
- **Platform-Level Boarding**: Account for faster loading times by customizing the conditions under which priority is requested. As a result, *signal phases are not altered until necessary*.

Transit agencies are also able to remotely monitor real-time BRT activity with the *EMTRAC Central Monitor software*. This software provides a map display of vehicle and intersection activity, as well as detailed event logs and many other functions

BRT in Monterrey, Mexico, utilizing EMTRAC to allow cross-traffic priority signaling to allow protected right-turns into a terminus station

2. Wright, Lloyd, and Walter Hook. Bus Rapid Transit Planning Guide. New York: Institute for Transportation and Development Policy, 2007.

3. "What Is BRT?" Institute for Transportation and Development Policy. ITDP, Web. 6 Aug. 2015.