Review on Need of Transit Signal Priority at Junction Having Priority Lanes – A Case Study of Ahmedabad

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Abstract—Due to heterogeneous traffic conditions prevailing in India and large size of buses compared to other vehicles buses cause delay and inconvenience which makes bus transit less appealing to passengers. India has a large number of increasing vehicles as the increasing number of middle class can now afford to buy the vehicles. From past a few years we got see as many transit options Technologies. At many oversaturated signalized/unsignalized intersections due to absence of priority signal for transit both normal and transit vehicles have to face travel time delay in peak hours. Thus in this a review has been prepared for Ahmedabad traffic, and what role RFID has to play in signal priority for BRT.

Keywords-- Priority lanes, Travel time delay, Transit Signal Priority, BRT, RFID

I. INTRODUCTION

The rapid growth of vehicular traffic in past a few years has been alarming to transportation engineering field. In the traffic composition like India it has become the need of hour to study the various traffic scenarios in order to opt the proposed plans for implementation. In major urban areas with increasing population and advances in automobile technologies, the traffic congestion problem has spread from the central business district (CBD) to suburban streets. TSP is one of the promising technologies that may help reduce intersection delay and in turn total transit travel time. The valuation of travel time savings has been an important theme in transportation research because it is the single largest contributor to the benefits of many transportation projects. Indian cities are characterized by high densities, intensely mixed land use patterns. Traffic in India are uncontrollable, and are characterized by chaotic traffic situation. Most of the intersections are unsignalized. Unsignalized intersections in India are uncontrollable and no priority rules. Although India has launched various rapid transit like Kolkata Metro, Delhi Metro and the Namma Metro and The Janmarg Ahmedabad BRT service but traffic is still a problem in India.

Bus Rapid Transit (BRT) has emerged as a viable option to enhance transportation capacity and provide increased levels of mobility and accessibility. Traffic conditions in India are getting worse day by day. Building infrastructure, levying proper taxes to curb private vehicle growth and improving public transport facilities are long-term solutions to this problem. The average number of vehicles in India is growing at the rate 10.16 percent annually, since spending hours in traffic jam has become part and parcel of metropolitan life style, leading to health and environmental hazards. The vehicle penetration in metropolitan cities like Mumbai is suffering from about 590 vehicles per Km of road stretch and Bangalore with around 5 millions of vehicle ply over a network that extends barely up to 3000kms.

Bus Rapid Transit (BRT) has emerged as a viable option to enhance transportation capacity and provide increased levels of mobility and accessibility.

BRTS in India:-

Operational (4) - New Delhi, Ahmedabad, Pune, Jaipur, Indore

Under Implementation (9)- Bhopal, Surat, Pimpri, Vishakhapatnam, Rajkot

DPR/DFR (6)- Chennai, Guwahati, Kolkata, Lucknow, Vadodra, Bangalore

II. TRAFFIC SCENARIO AT SIGNALIZED INTERSECTION IN AHMEDABAD

At present in Ahmedabad there are as many intersections which face the congestion and delay at signalized intersections due to interference due to transit (BRT) lanes. During peak hours a mammoth crowd of traffic is seen at major corridors having priority lanes like at Helmet crossroad, Shivrangi, Nehrunagar rotary, Manekbaug, Dharnidhar, Anjali roundabout. Many a times on the busy route mass transit commuters have to face the travel time delay due to absence of transit priority. Day by day this is migrating whole commuters back to private transport ultimately leading to lack of passengers for mass transit.
There is the need of hour to promote public, mass transit as much as possible from sustainable environment and increasing vehicle population point of view.

III. NEED OF STUDY

Due to heterogeneous traffic conditions prevailing in India and large size of buses compared to other vehicles buses cause delay and inconvenience which makes bus transit less appealing to passengers.

At many oversaturated signalized/unsignalized intersections due to absence of priority signal for transit both normal heterogeneous traffic as well as transit vehicles have to face travel time delay in peak hours.

There is also plenty number of cases of collisions/accidents at intersections between normal traffic and transit vehicles.

Normal traffic at different leg takes much more clearance time compared to transit vehicles.

Due to delays at intersections pollution is at its limit.

Manually operation at every intersection just because of the absence of priority signals.

IV. RESEARCH OBJECTIVE

Giving priority to people occupancy rather than the routine method of prioritizing vehicle per occupancy.

To cut the travel time delay at intersections due to priority lanes.

To minimize the conflict points at intersections by introducing TSP measures.

Accessing potential benefit of RFID for transit vehicle detection for BRT route.

V. STUDY AREA –AHMEDABAD CITY

The city of Ahmadabad, founded in 1411 AD as a walled city on the eastern bank of the river Sabarmati. At present in Ahmadabad there are as many intersections which face the congestion and delay at signalized intersections due to interference due to transit (BRT) lanes.
Vehicle Composition

At the time of formation of Gujarat there were only 43000 vehicles registered in 1961. The figure rise to 72 lacs vehicles by 2004, of this 73% were 2 wheelers. Currently the annual growth of vehicle population in Ahmedabad is 13%.

(Source: Regional Transport Office Data)

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VI. NEED OF TRANSIT SIGNAL PRIORITY

The primary objective of TSP is to reduce the transit travel time by reducing delay at signalized intersections. It is believed that with the amount of congestion along a major Arterial, a system like this can greatly increase the operational efficiency of the transit vehicle and maintain a better schedule adherence. Another anticipated benefit of TSP is to increase the overall vehicular flow along the corridor. If the transit vehicles are able to more smoothly, then their effectiveness will affect the flow of traffic behind them. Priority can be active or passive:

Passive Priority strategies can be listed as below:

- Adjustment of Cycle Length
- Area-wide Timing Plans
- Phase Splitting
- Metering Vehicles

Active priority strategies need bus detection:

- Phase Extension (Green Extension)
- Early Green (Red Truncation)
- Actuated Transit Phase (Red Interruption)
- Phase Insertion
- Green Truncation
- Phase Rotation

VII. ACESSING POTENTIAL BENEFIT OF RFID FOR TRANSIT VEHICLE DETECTION

A wide variety of ITS technologies can be integrated with BRT system to improve its system performance in terms of travel times, reliability, convenience, operational efficiency, safety and security. The hardware requirements for transit signal priority are dependent upon the characteristics of the surrounding area and/or available technologies. There are several methods of detecting and Processing transit vehicle information, including

- Inductive Loop
- Radio Frequency Identification (RFID)
- Infrared Detection
- Audio Detection
- Global Positioning System

Radio frequency identification (RFID) transmits the identity of an object or a person wirelessly. A basic RFID system is composed of tags and readers. The RFID tag is an object that stores data, information and is attached to products. RFID reader, also known as the transmitter, is a device that can receive and interpret the information from the tags. RFID reader transmits this information to a RFID host computer with the proper software.

VIII. RECOMMENDATION

1. Modern signal priority systems.
2. RFID for instant vehicle detection the moment transit is at bus stop.
3. Steps to improve BRT priority.

IX. CONCLUSION

1. The entire BRT network can be improved by adopting above methodology and developing a priority changes for travel time savings.
2. Promoting BRT mode by providing conditional priority ultimately will lead to reduction in the congestion and jam at adjacent approaches as more and more public will switch their mode from private vehicles to mass transit.

REFERENCES

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