# Bus Rapid Transit: a pilot project for bus priority in Shanghai


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## Abstract

*This paper gives an overview of the bus priority pilot project at Shanghai, which is supported by the French Ministry of Industry, the French Ministry of Transport and which is conducted by a consortium of industrial partners.*


## 1. Introduction

It is recognized that most of Chinese cities are facing traffic congestion problems, generating problems for the mobility of people and goods. Usual traffic management systems have reached their limit in terms of congestion management, and it might be an opportunity for examining innovative intelligent traffic management systems, having more flexibility and more interactions with their environment.

The priority systems enabling the urban buses to cross the signalized junction with no delay is among the solutions for improving the mobility of people. It has to be understood as one of the numerous components of the overall management transportation solution, including vehicle monitoring, tolling and ticketing, as well as traveler information.

The *Bus Priority* approach does not replace all other investments which have to be done for mass transports (tramways, metro or trains), but it takes advantage of existing infrastructures at a low cost and gives significant benefits.

This project is a 'pilot' based on French experience on bus priority, undertaken on a limited number of crossroads, in order to demonstrate the feasibility and all advantages of such Bus Priority system in Shanghai (BPSH). A goal is also to initiate a strong cooperation on this topic with Shanghai representatives.

## 2. Objectives of the BPSH project

There is no international standard directly applicable to the bus priority system, and existing solutions are rarely compatible each other. As a matter of fact, the first bus priority solution installed on a site becomes naturally the only possible solution for the city and the bus network, establishing some kind of monopoly for the continuity and interoperability of systems.

In France, a large amount of work has been undertaken in the early 2000 in order to standardize the bus priority systems, and mainly the data communication exchanges between the vehicles and the infrastructure. Today, there is a French national standard, called Diaser (NFP 99-071), which guaranty the compatibility amongst existing systems.

The main objective of this pilot project is to provide and test on-board and on-road equipments complying with this standard. In the future, this standard might constitute the key element for extending and deploying the bus priority system in Shanghai conurbation.

## 3. The French partnership

The consortium is headed by Sodit company, a traffic and transport consultancy present in Europe and China for priority systems.

The major industrial partner is the Thales group, represented by the French entity Thales Transportation System and the local Chinese entity, Thales Software System in Shanghai.

Citilog, a SME specialized in video monitoring and measurement of traffic, might contribute to the project for the tracking of buses and the management of the congestion in the crossroads.

The French Ministry of transports is represented by experts from the Certu organization.

## 4. Technical description of the system

On a technical point of view, the bus priority system at signalized crossroads needs the 3 following set of components:

- Detectors to localize the bus in the traffic flow;
- A communication between the detectors and the traffic light controller, in order to transmit the order of switching the green phase;
- A receiver connected to the traffic light controller, transforming the signal into commands for the controller.

When a bus approaches the crossroad, it is localized (internally or externally) then sends a priority request to the traffic light controller via the specified receiver.

The effect on the traffic signal plan will be either:

- to reduce the 'red' time, when the bus arrives at a red stage,
- to lengthen the 'green' time, in case the bus arrives at the end of this stage,
- to insert a special green stage.
- or to do nothing is the bus can cross during the green stage.

The Chinese environment differs from the typical European one, as the roads are much larger; they have many lanes, including lanes dedicated to buses or cyclists. Moreover, the numbers of buses operating on a bus line as well as the numbers of bus lines and transport operators are quite impressive.

In order to define the best fitting Bus Priority system, it is necessary to combine existing and well-assessed technical components in an innovative approach. For instance, it is proposed to identify fixed and variable parameters of the priority vehicles if we want to manage the priority level of several buses approaching a crossroad. As a consequence, the priority algorithms have to be adapted to the situations.

As a matter of fact, the project started by an analysis of different use cases, and the optimization of the technical solution.

## 5. Organization of the demonstration

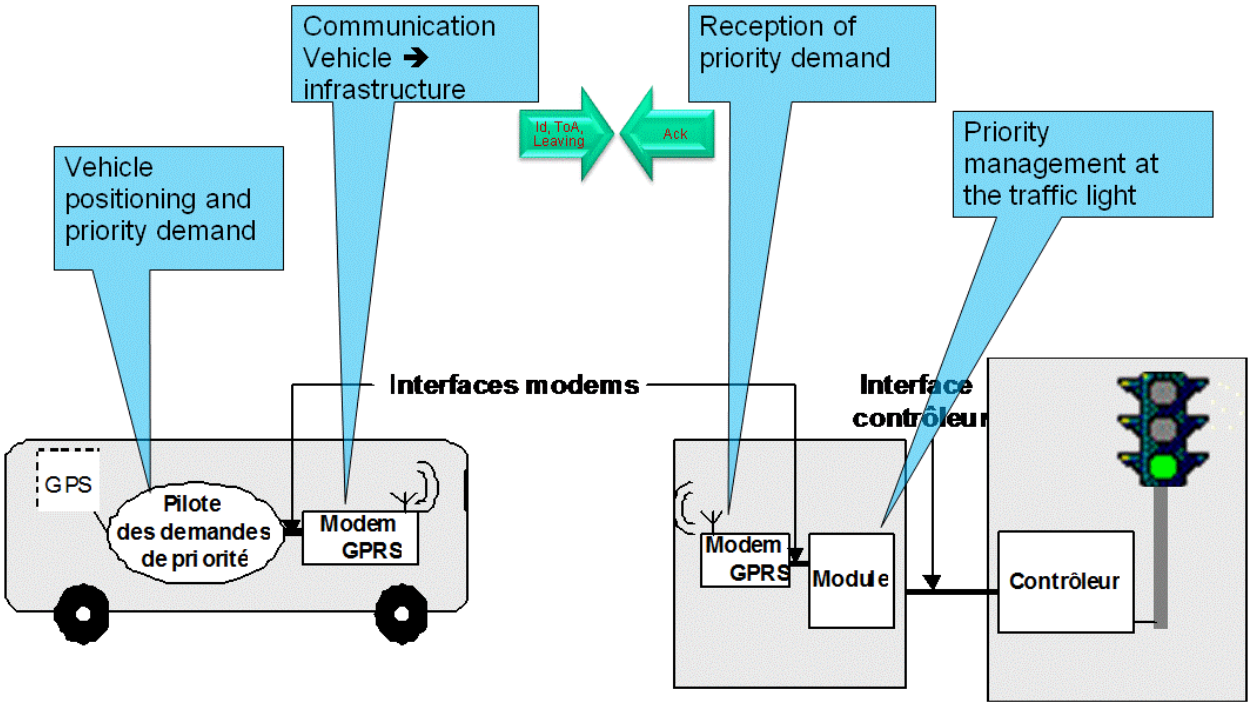
This project is organized into 5 steps:

- Context analysis for the bus priority solution
- Design of the system
- Adaptation of existing components
- Demonstration on site
- Study for future evolutions

The on-site demonstration will be conducted on 6 crossroads located on Puxi, in the Caohejing hi-tech park. Four of these crossroads are aligned on Tianlin Road. There is no lane reserved to buses.

Three bus lines are crossing this site (93,120,830).

Equipments are going to be installed in November 2008. After a one-month period for testing and validating all technical components, the demonstration will be conducted during a 3 months period, during the first quarter of 2009.




## 6. Conclusion

The Universal Exposition at Shanghai will open its doors on the 1st May 2010, and will last for 6 months. During this period, Shanghai will welcome millions of visitors in addition of the normal activity of the city.

Shanghai authorities are preparing this worldwide event by developing public transport and modernizing the road infrastructure. It is foreseen more than 4000 buses specially dedicated to the service of the Expo site, operating all days from and to all part of the city. Fleet management and travel information services are among the new developments for this event. The priority to public transport will have a positive effect on its efficiency, by reducing the travel times and the uncertainty on the time of arrival.

The Universal Exposition event accelerates the enhancement of public transports, and gives the opportunity for modern and efficient transport solutions to be tested and deployed in Shanghai.

Technologies available in France are the results of more than twenty years of researches and evaluations. With the strong support of the municipality of Shanghai, of transport companies, and of local industrial partners, we expect effective and the more efficient solutions will be made available soon in china.

## 10. Acknowledgements

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