A Comparative study on Traditional Transport System and Intelligent Transport System

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***Abstract*-This paper presents intelligent transport system for communication in city environment. In this intelligent transport system, we provide information about bus's location and number of students, faculty present in the bus. The intelligent transport system follows the concept of VANET and uses the routing protocols. VANET plays a very important role in ADHOC networking. With the help of VANET, the intelligent transport can exchange information to-and-from another buses and also exchange the information to college. With the help of the VANET, we can track the bus location and all other information related to the bus.**

Keywords- VANET, Routing Protocol, Traditional Transport System, Intelligent Transport System, RSU

I. INTRODUCTION

In real world scenario, there are many facilities provided by academic organizations (i.e. Institutions, Colleges, and Universities etc.) and the transportation facility is the most important facility provided to passengers (Students, Faculty & other Staff Members). The traditional transport system does not provide message facility (i.e. sending and receiving messages) to other vehicles [8], [11]; neither provides the location of the Bus, which means we cannot track the vehicles easily [12]. So the passengers have to wait long to get the bus on their stoppage. One more problem the traditional transport system has is that it is unknown that what is the capacity of the seats i.e. the number of passengers travelling in the bus is unknown. Sometimes number of passengers is more than the available seats. Sometimes the seats are not vacant thus the passengers have to travel standing in the bus [3]. To overcome these types of problem we propose a new system called "Intelligent Transport System." In intelligent transport system, all the drawbacks and problems have been eliminated and effective, efficient and time-oriented system is provided [2]. For any organization, time-orientation is very important factor, if we talk about academics organization like institutions, colleges, and universities etc. they start their classes around 9 a.m. in the morning so all the students, faculty member, and other staff should reach there in time. One more important thing is that it reduces waiting time for all the students and faculty member. Another important thing we have analyzed that sometimes the number of seats are vacant and do not get filled, for example there is a bus having 40 seats, and the passengers travelling in that bus are 10, by having information of that bus we can shift those 10 people to another bus [5],[6].

II. THE PROPOSED SYSTEM

In the proposed system, the intelligent transport system has a device having SIM facility [10]. This SIM is used to send messages to RSUs and also used for receiving messages from RSUs and other devices. At every bus stoppage there will be a RSU. This RSU is responsible to hold the information about bus (i.e. availability of passengers in Bus and the location of the Bus) [6], [7]. RSU can broadcast the information of bus to other RSUs and other buses with in the range of RSUs. If there are no seats vacant in the bus then the bus should continue to travel to its destination without stopping anywhere. But if the bus has some seats available then it picks up the passengers until all the seats are full. This could be done effectively by having the full information about the availability and non-availability of

the seats and this information can be broadcasted by RSU. One more situation we face, that the bus runs with plenty of vacant seats in it for example the number of people travelling in the bus is 10 though the availability of seats is 40. In traditional Transport System because of absence of proper information the bus would continue to run, which means there will be the wastage of fuel. In order to avoid this wastage we could either shift these 10 passengers to another bus which has seats available or get these 30 seats filled by placing 30 people in the bus. This could be done with the help of intelligent transport System. One more benefit of this proposed system is that the college can also track the bus and its location and can be aware about all the information about bus and its passenger [12].

III. PROCESS OF PROPOSED SYSTEM

- At the starting point i.e. source. Suppose the bus has capacity of 40 seats and at this point the number of passengers (may be students or Faculty or other staff of college) are 10.
- 10 seats will be occupied and remaining 30 seats for another stoppage. So this information will send to RSU (i.e. other stoppage).
- At this stoppage, the RSU will have all the information about BUS. RSU send this information to waiting people that what is the location of the bus and availability of seats in the bus (i.e. 30). Now suppose there are 10 more people, they can easily get the bus and after having the seats occupied the remaining capacity of the bus will be 20. This information will be send to next stoppage with the help of RSU. And this information will broadcast to other buses with in the range of the RSU's [15].
- This procedure will repeat till there are no vacant seats in the bus.
- If at the next stoppage, the bus has no seat available and the passengers are waiting to get in that bus, with the help of RSU the information about the non-availability of seats could be send. And the bus now will directly go to the final destination because the bus will send the information to RSU and without any interruption it will continue its journey [4].
- RSU will communicate with other buses, and getting the location of the bus traced. If there are seats available then they can stop and can carry the passengers.
- If the bus has very few people traveling in it, it can send the message to RSU and other Buses of their route.
- Again RSU broadcast this message to other RSU and buses [9].
- Finally the people can change their bus and they can get to their route.

IV. FLOWCHART OF PROPOSED SYSTEM

Figure 1 shows the flowchart of the intelligent transport system. In this flow chart first we will start from the very first stoppage that will be our source. Now we will be headed towards the next stoppage. At the arrival on next stoppage it calculates the vacant seats of bus. If some seats are available, it sends this information to RSU and to the bus also about its route and stoppage. If no seat is available then the bus will send this information to RSU and will continue its journey to the final destination [3]. In case of bus having vacant seats the process will be repeated until all the seats of the bus are filled. If there is not a single seat available then the bus would not stop anywhere and will send this information to RSU. RSU than will communicate to other buses and instruct to pick these remaining people. At the last stoppage the bus checks how many people are sitting in the bus [14]. If there are more than 10 people sitting in the bus then this bus will continue to travel to the college but if there are less than 10 people available then these people will be shifted to other buses which have vacant seats.

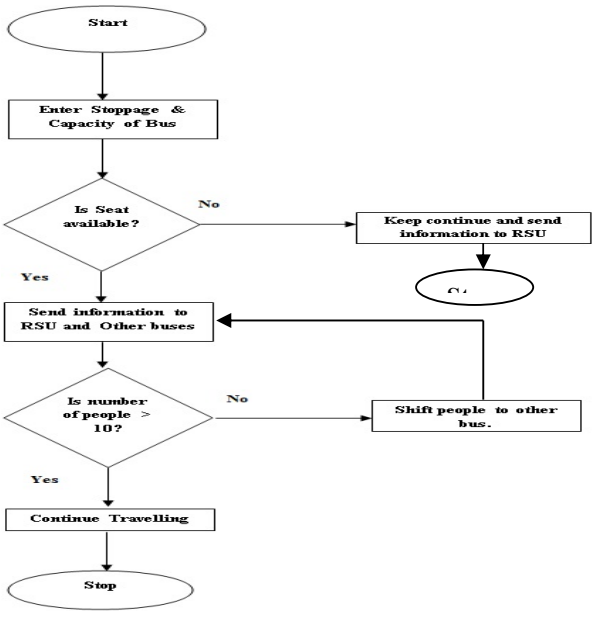

Fig 1 Flowchart of Intelligent Transport system

V. ARCHITECTURE OF PROPOSED SYSTEM

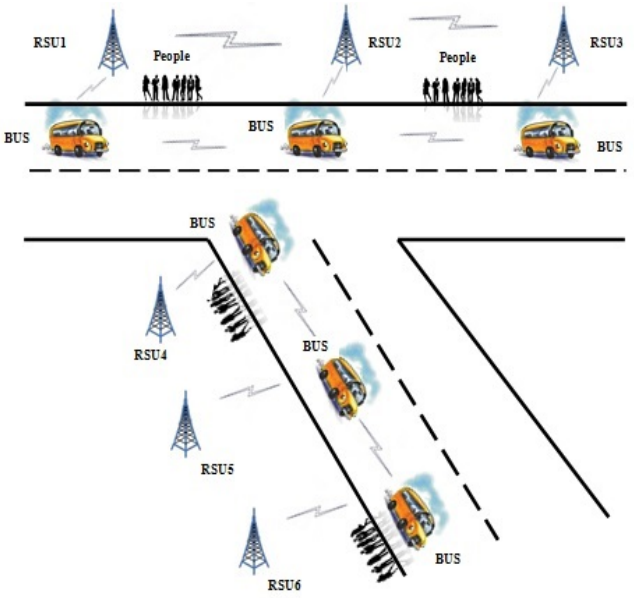

Fig 2-Architecture of Proposed System

As shown in the figure 2, the communication is being held from source to destination and also the calculation of the availability of seats in the bus. There are some RSUs (Road side unit) and vehicle (i.e. bus) running in the city [7]. These RSUs can send and receive the message to and from other RSUs. The buses also can communicate with other buses and RSUs of their route. At the stoppage there are some passengers (student, faculty members or other staff members) waiting for their bus. At this point they can get a message from the RSU about the location of the bus and the bus capacity as well. If due to any reason (may be traffic density in the city) the bus is late they will know about this and they can shift to other bus which are coming from other route on their stoppage [14].

VI. TRADITIONAL TRANSPORT SYSTEM VS. INTELLIGENT TRANSPORT SYSTEM

Table 1- Comparison between traditional transport system and intelligent transport system

System	Services		
	Message Sending	***Waiting time***	***Over Capacity***
Traditional Transport System	No	More	May be
Intellegent Transport System	Yes	Less	Never

Table 1shows the comparison between traditional transport system and intelligent transport system. As we can see in the table, traditional transport system cannot transfer message neither can it receive a message from other vehicles while intelligent transport system can send the messages and receive as well [1],[13]. Another difference is that the waiting time of the traditional system is more whereas in the intelligent transport system it is less. Last difference between both is that in the traditional transport system seats can get outnumbered but in the intelligent transport system it will never happen. With the help of these differences we can easily find out that the intelligent transport system can work more effectively and more efficiently because the intelligent transport system is always connected with RSUs and can communicate with other buses with the help of these RSUs [8].

VII. RESULTS

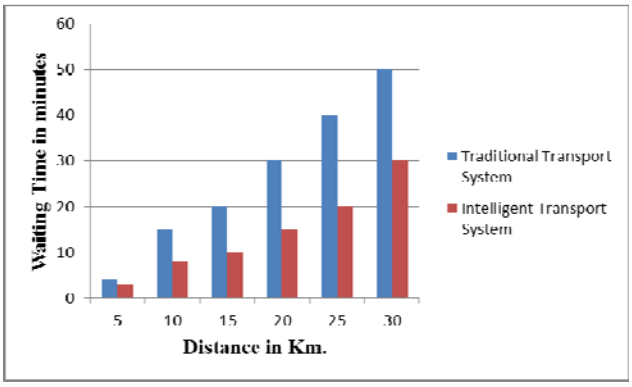

Fig 3- Waiting time vs. distance in Km.

As shown in the figure3, there is a comparison between waiting time of both the transportation system i.e. traditional transport system and intelligent transport system. As given in the chart, the waiting time of the traditional transport system is much more than intelligent transport system. The distance is covered from 5 to 30 km and the waiting time is from 0 to 60 minutes. Figure 3 shows that at every 5 km, the people will wait longer if they are travelling with traditional transport system while if they are travelling with intelligent transport system they do not have to wait longer. One more thing should be clear that the traditional transport system does not provide the message facility to other vehicles or travelling people so they are not aware about the location of vehicle or they are also not aware about the availability of seats in the vehicle. So we can say that our proposed model is much better in performance than the traditional transport system and our proposed system work more effectively and efficiently and provide far better facilities to the travelers.

Figure 4 shows the message delivery in time and the message delivery in percentage. In this figure we can see that the traditional transport system has poor message delivery while the intelligent transport system has good message delivery. It means in the traditional transport system there is no guarantee of delivering the message whereas in the intelligent transport system the message delivery is confirm.

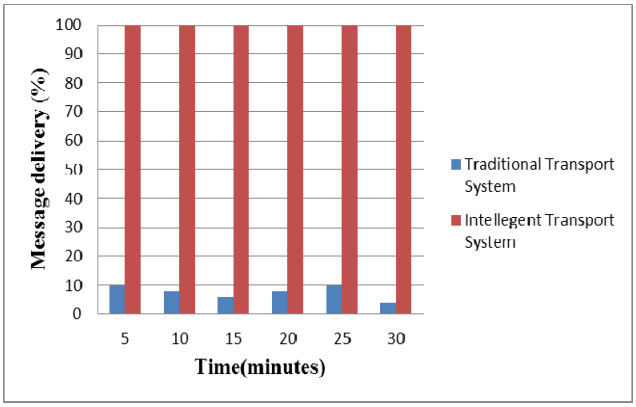

Fig4: Message delivery vs. time

One more difference between traditional transport system and intelligent transport system is that the messages can be sent manually that is either through the driver or the conductor of the bus about their location and status of the bus whereas in the intelligent transport system the message can be automatically send to the RSUs and other busses too with in their range. Due to this result, any organization can get all the information regarding the seats of the bus (i.e. the number of people travelling in the bus), the location of the bus (i.e. in which area the bus currently is). The message can be sent within every 5 minutes in both the transport system (Traditional and Intelligent). As you can see the message delivery is very low in the traditional transport system whereas in the intelligent transport system has high message delivery.

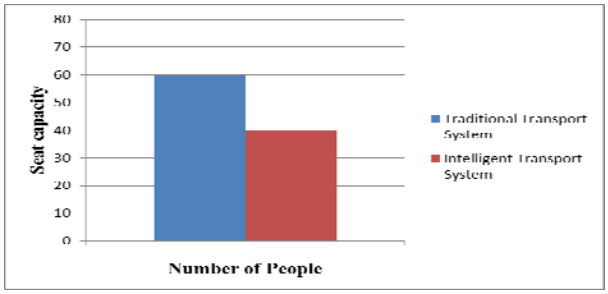

Fig. 5 Seat capacity vs. number of people

Figure 5 shows the capacity of the bus for both the transport system (Traditional and Intelligent transport system). As shown in the figure, the traditional transport system could be overloaded with the passengers while the intelligent transport system will not be overloaded. The main reason behind this difference is that in the intelligent transport system because of the exact information the people will be equal to the seats available. Whereas in the traditional transport system this ratio could be unbalanced i.e. numbers of people are more than the seats available.

VIII. CONCLUSION

We have analyzed the traditional transport system and our proposed model that is intelligent transport system, we can easily state that the traditional transport system works manually; it means we cannot establish the connection with transport system. We cannot send the message in the traditional transport system and we do not have the information about the availability of the seats in the vehicle too. With the help of the intelligent transport system, the problem of waiting for the bus can be solved because we can trace the location of the bus. We can also solve the problem of overloaded bus i.e. (travel by standing in the bus). With this proposed system any organization which will implement this system can be benefited.

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