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A Coach Intelligent Transport System (CITS) to serve as an Automated Market Place for *all Coach Operators in the Hyderabad City*

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ABSTRACT

Intelligent transportation systems (ITS) hold great promise for public works professionals seeking to optimize those public investment strategies that deal with traffic congestion and other growth pressures. Advanced traffic and fleet management systems as well as traveller information and vehicle-based systems can take advantage of information technology advances and private market products to substantially improve the productivity, connectivity, and safety of transportation. And as the new federal transportation act further spurs deployment of these systems, ITS research programs will continue to play a vital role in supporting such deployment and the overall evolution of ITS. Such research includes developing technology tools, providing testing and evaluation environments, and helping advance the state of the practice.

Traffic control has been an issue since humans put the first wheels on the first cart. The modern world demands mobility. Cars represent the main method of mobility, but today's congested highways and city streets don't move fast, and sometimes they don't move at all. Intelligent traffic systems (ITS), sometimes called intelligent transportation systems, apply communications and information technology to provide solutions to this congestion as well as other traffic control issues. Intelligent Transportation Systems (ITS) represent a major transition in transportation on many dimensions. ITS is an

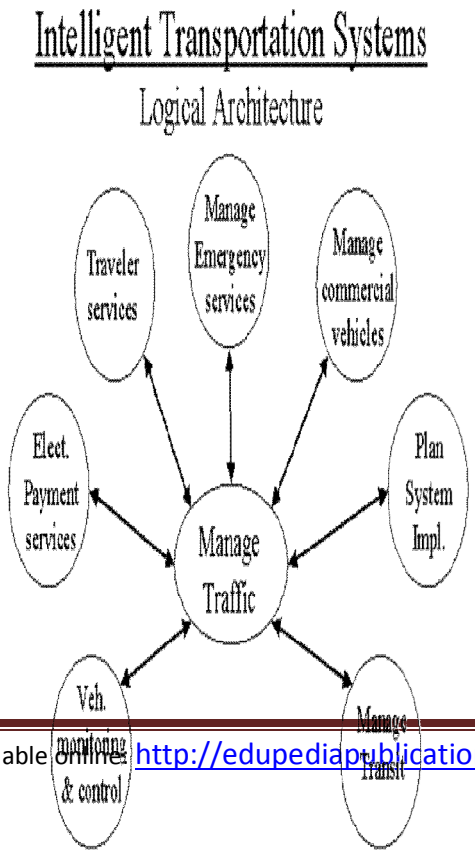
International program intended to improve the effectiveness,and efficiency of surface transportation systems through advanced technologies in information systemscommunications, and sensors. ITS (Intelligent Transport Systems) is a system which is designed to promote advance technology, to ensure that the Electronic Toll Collection System (ETC) is effective and to support safe driving. With this system, people, roads, and vehicles use the latest information communication technology.

The intelligent transport system (ITS) takes the first step towards meeting this challenge by providing effective, reliable and meaningful knowledge to motorists in time. Problems like high traffic congestion, low transportation efficiency, low safety and endangered environment can be solved through innovative and sophisticated ways of handling latest techniques that have emerged in recent years in integrating information technology, electronics and telecommunication with roads and traffic management. Intelligent transportation systems, or ITS, encompass a broad range of wireless and wire line communications-based information, control and electronics technologies.

INTRODUCTION

In 1986, an informal group of academics, federal and state transportation officials, and

representatives of the private sector began to meet to discuss the future of the surface transportation system in the United States. These meetings were motivated by several key factors. First, the group was looking ahead to 1991 when a new federal transportation bill was scheduled to be enacted. It was envisioned that this 1991 transportation bill would be the first one in the post-Interstate era. The Interstate System, a $130 billion program, had been the centerpiece of the highway program in the United States since the mid-1950s. By 1991 this project would be largely complete. A new vision for the transportation system in the United States needed to be developed. While the Interstate had had a major and largely positive impact in providing unprecedented mobility at a national level, transportation problems remained. From the perspective of 1986, highway traffic delays were substantial and growing. Rush-hour conditions in many metropolitan areas often extended throughout the day. Further, safety problems abounded, particularly highway safety.



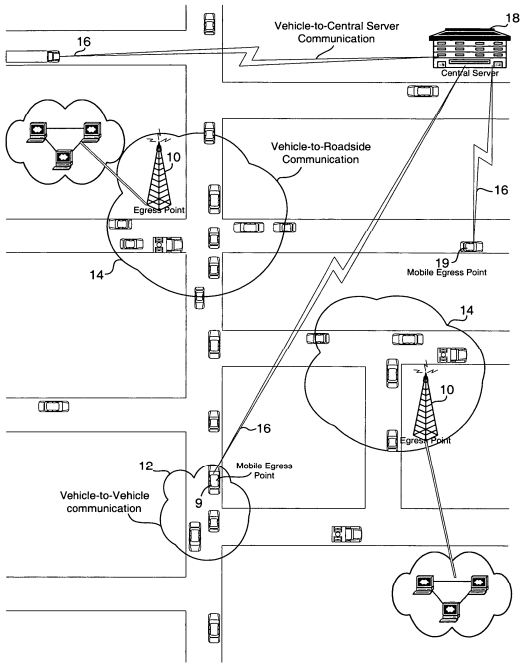
INTELLIGENT TRANSPORTATION TECHNOLOGIES

Intelligent transportation systems vary in technologies applied, from basic management systems such as car navigation; traffic signal control systems; container management systems; variable message signs; automatic number plate recognition or speed cameras to monitoring applications, such as security CCTV systems; and to more advanced applications that integrate live data and feedback from a number of other sources, such as parking guidance and information systems; weather information; bridge deicing systems; and the like. Additionally, predictive techniques are being developed in order to allow advanced modeling and comparison with historical baseline data. Some of the constituent technologies typically implemented in ITS was described in the following sections

COMMUNICATION TECHNOLOGIES:

The use of networks for communications between the electronic control units of a vehicle in production cars dated from the beginning of the 1990s. The **Controller Area Network** (CAN) was first introduced by BOSCH with the clear intent to serve communication systems for automotive applications and it is still dominant in automotive

networks. The CAN is not fully satisfying requirements such as predictability, performance and dependability which are mandatory in automotive communications. To overcome the limitations of the CAN technology, a number of technologies have been developed for designing automotive networks such as **Time-Triggered Protocol** (TTP), **Time-Triggered CAN** (TTCAN), **Byte flight** and **Flexray**. Wireless communication technologies such as ZigBee, Bluetooth (Bluetooth, 2006) and Wi-Fi are also expected to be widely employed in the near future in automotive communication. It is evident that wireless communications can be used in- vehicle, inter-vehicle and between vehicle and infrastructure in transportation applications. Bluetooth is currently the most widely used automotive wireless technology for in-vehicle communication and Wi-Fi is used for vehicle to vehicle communication by several pilot research projects, e.g., the Car2Car consortium Ultra Wide Band (UWB) is an emerging wireless technology that uses a very large bandwidth. It is targeted for multimedia networking whereas 802.11 networks address data networking. Intelligent collision avoidance and cruise control systems can be developed using UWB technology as those systems need high ranging accuracy and target differentiation capabilities. UWB technology can also be integrated into vehicle entertainment systems by downloading high- rate data from road-side infrastructure UWB transmitters. Communication Air-interface, Long and Medium range (CALM) has many potential applications in V2V and V2I communication. ZigBee will be able to fill the gap left by these other technologies, mainly in the interconnection of wireless sensor devices with vehicles and infrastructure. The ZigBee standard has evolved since its original release in 2004 and it is a low cost low power wireless networking standard for sensors and control devices. ZigBee provides network speeds of up to 250kbps and is expected to be largely used in typical wireless sensor network applications where high data rates are not required. Table 1 shows a comparison between five technologies relating to the most important factors which need to be considered in the ITS application domain. ZigBee, Bluetooth, Wi-Fi and UWB have been designed for short-range wireless applications with low power solutions and can be used at the in-vehicle and vehicle to infrastructure communication.



Sensing technologies:

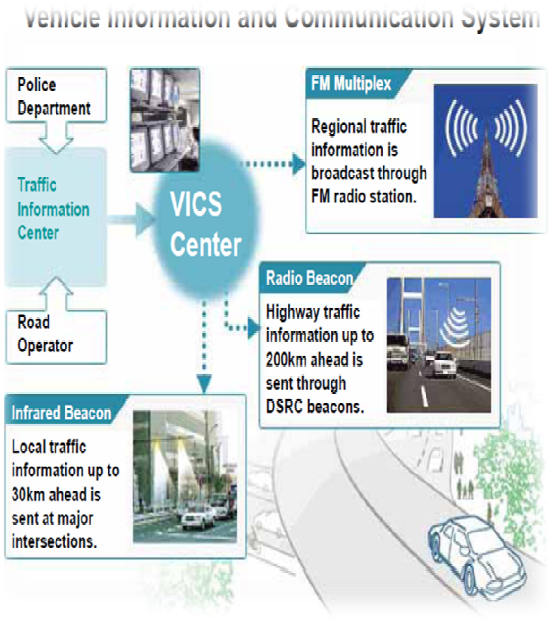
Technological advances in telecommunications and information technology coupled with state-of-the-art microchip, RFID, and inexpensive intelligent beacon sensing technologies have enhanced the technical capabilities that will facilitate motorist safety benefits for intelligent transportation systems globally. Sensing systems for ITS are vehicle and infrastructure based networked systems, e.g., Intelligent vehicle technologies. Infrastructure sensors are indestructible (such as in-road reflectors)

devices that are installed or embedded on the road, or surrounding the road (buildings, posts, and signs for example) as required and may be manually disseminated during preventive road construction maintenance or by sensor injection machinery for rapid deployment of the embedded radio frequency powered (or RFID) in-ground road sensors.

INTELLIGENT TRANSPORTATION SYSTEMS:

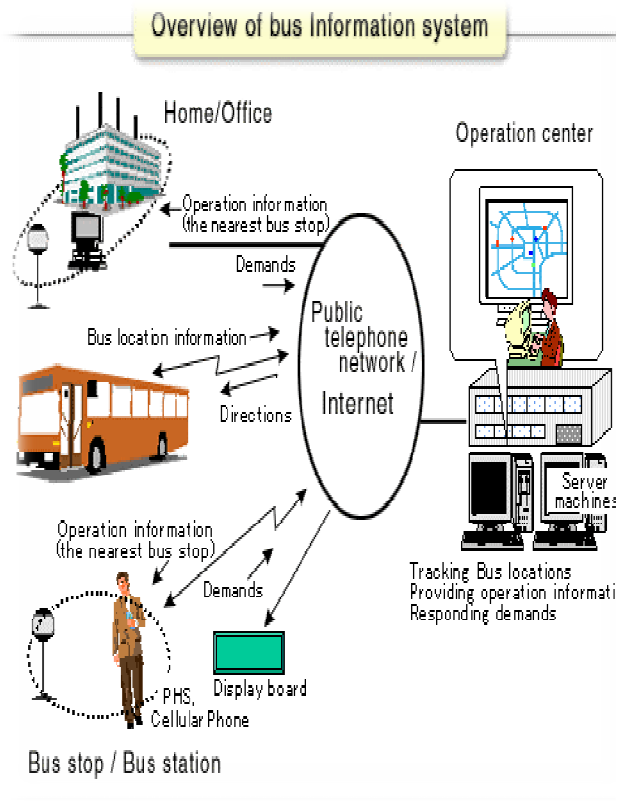
As mentioned earlier, the technology oriented functional areas and the application oriented functional areas constitute the basic system components of the Advanced Transportation Network System. Thus, they make up the whole physical architecture, which account for how the system works.

Important safety or trip related messages could be given audibly so that the driver doesn't have to look away from the road. In addition to ITS normal function of generating voice output, the computer generates an electrical waveform that is approximately the same as a human voice.



ADVANCEDPUBLIC TRANSPORTATION SYSTEMS

Advanced Public Transportation Systems (APTS) include applications such as automatic vehicle location (AVL), which enable transit vehicles, whether bus or rail, to report their current location, making it possible for traffic operations managers to construct a real-time view of the status of all assets in the public transportation system. APTS help to make public transport a more attractive option for commuters by giving them enhanced visibility into the arrival and departure status (and overall timeliness) of buses and trains. This category also includes electronic fare payment systems for public transportation systems, such as Spica in Japan or T-Money in South Korea, which enable transit users to pay fares contactless from their smart cards or mobile phones using near field communications technology.22 Advanced public transportation systems, particularly providing "next bus" or "next train information, are increasingly common worldwide, from Washington, DC, to Paris, Tokyo, Seoul, and elsewhere.



A Study of Bus Rapid Transit:

ITS technologies are being implemented more commonly in European, North American countries, and Australia than in developing countries. BRT systems in developing countries are still limited in ITS applications because of the capital and operating costs. ITS technologies mainly contribute to the image, safety, and operating speed but are not essential features for a successful BRT system. The BRT systems in Bogotá, Quito, Beijing, Mexico City, and all Brazilian systems are successful examples that have not implemented or have very limited ITS technologies. Transit Signal Priority (TSP), real time passenger information systems, and Automatic Fare Collection (AFC) are examples of typical ITS applications in BRT systems. Implementation of TSP has grown rapidly among the U.S. transit systems. Real time passenger information systems increase productivity of passengers while waiting for buses, avoid crowding at stations, and enhance the image of the shelters. Automatic Vehicle Location (AVL) systems help track the locations of vehicles, which can be used for real time fleet management and future planning purposes. The global positioning system based AVL system is perhaps the most popular among the available location technologies. One of the new ITS technologies for BRT are lane assist systems being implemented in the BRT systems in Orlando and Minneapolis. Lane assist permits BRT vehicles to operate at higher operating speeds with improved safety. Precision docking technology (implemented in Las Vegas, but more popular in European cities) helps reduce dwell time. Some features below applied in several BRT systems. i. Fare Collection Methods - Automatic fare collection (AFC), although originating in other transit systems, has become a regular feature of BRT systems worldwide. Advanced AFC with a common smart card allows integration of several modes in one single system, which offers customer convenience (GTZ 2006). In surveys carried out among transit users in Hong Kong, Taipei, New Delhi, London, Oslo, Copenhagen, Washington D.C., San Francisco, Chicago, Rome, Bangkok, Seoul, and Istanbul, smart cards were noted as being effective in promoting ridership, increasing customer satisfaction, improving boarding time, and increasing ease of access. AFC usually generates important data for demand forecasting and operational planning. However, three recent examples demonstrate that AFC may not be as beneficial as it appears.

Overview of bus rapid transit system

With population increase, increasing transportation demand has led to debilitating traffic in most major

cities. Figure indicate population increases of some ma

APPLYING VEHICULAR NETWORKS FOR REDUCED VEHICLE FUEL CONSUMPTION AND CO2 EMISSIONS:

These days the detrimental effects of air pollutants and concerns about global warming are being increasingly reported by the media. In many countries, fuel prices have been rising considerably. In terms of the air pollution problem, greenhouse gas (GHG) emissions from vehicles are considered to be one of the main contributing sources. Carbon dioxide (CO2) is the largest component of GHG emissions. For example, in Japan in 2008, the amount of CO2 emissions from vehicles (200 million ton) is about 17 percent of the entire CO2 emissions from Japan (1200 million ton). The Kyoto Protocol aims to stabilize the GHG concentrations in the atmosphere at a level that would prevent dangerous alterations to the regional and global climates. As a result, it is important to develop and implement effective strategies to reduce fuel expenditure and prevent further increases in CO2 emissions from vehicles.

A significant amount of fuel consumption and emissions can be attributed to drivers getting lost or not taking a very direct route to their destination, high acceleration, stop-and-go conditions, congestion, high speeds, and outdated vehicles. Some of these cases can be alleviated by implementing Intelligent Transportation Systems (ITS).

DEVELOPMENT AREAS

Intelligent Transportation System (ITS) is a field of very rapid development in all the areas that it is concerned with. Hence, for simplicity the overall development of ITS can be grouped into the nine development areas of Intelligent Transportation Systems which include the following:

- Advances in navigation systems.
- Electronic toll collection systems.
- Assistance for safe driving.
- Optimization of traffic management.
- Support for public transport.
- Increasing efficiency in commercial vehicle operations.
- Support for pedestrians.
- Support for emergency vehicle operations.

The information can be displayed on the display in various ways including characters, simple diagrams or speed map displays. This information is provided by the Vehicle Information and Communication System (VICS), which can send and receive information as required.

There are two types of congestions. The congestion caused by incidents such as stalled cars, flat tires, and traffic crashes are called non-recurring congestions while recurring congestions are those occurring at particular locations because the roadway's capacity doesn't meet the demand of high numbers of vehicles.

PUBLIC-PRIVATE PARTNERSHIPS

A primary issue is the need for public-private partnerships for ITS deployment. One can contrast ITS with the Interstate System, the major transportation program in this nation in the 20th century. The Interstate System could be characterized as a public works system. The funding was provided exclusively by the public sector and the fundamental decisions about the deployment of the Interstate System were made by the public sector. ITS, on the other hand, will require deployment of infrastructure, largely by the public sector, and in-vehicle equipment by the private sector. Therefore, ITS can be characterized as both a public works and a consumer product system. This will require unprecedented levels of cooperation between the public and private sectors if ITS is to work effectively as a national "seamless" system. The hardware and software in the infrastructure must be compatible with the hardware and software in the privately-acquired in-vehicle equipment. While stand-alone ATMS (i.e., infrastructure) and ATIS (i.e., in-vehicle equipment) could work well, researchers are convinced that coordinated use of ATMS and ATIS will be much more effective than stand-alone systems of either type. Therefore, for optimal system operations, coordination and compatibility between ATMS and ATIS is essential. This requires close cooperation between the public and private sectors. In the United States, this cooperation has often not been strong. So ITS presents an important set of institutional challenges in developing an effective public/private partnership for ITS research and development, testing and deployment.

TRANSPORTATION AND CHANGE:

The linking of conventional infrastructure with the technologies of information systems, communications, sensors and advanced mathematical methods for the movement of both people and freight is an extraordinary development. We cannot begin to foresee the changes (possibly both positive and negative) that will result from the development of this transportation/information infrastructure. Think, for example, about the changes that came about as a result of the Interstate System, a $130 billion program, starting in 1956. The Interstate program can be thought of as an expansion, in-kind, of a conventional highway system. Granted, the Interstate was a substantial expansion in capacity and network

size, but it was an in-kind improvement nonetheless. Yet, we had a hard time predicting what would happen as a result of this implementation. For

Objectives of ITS

The objectives of the ITS programs are to improve the surface transportation which includes the following:

- Reducing traffic congestion;
- Smoothening the traffic flow;
- Reducing traffic accidents;
- Improving safety;
- Enhancing the mobility of travelers, especially the elderly and disabled;
- Increasing the productivity of the transportation infrastructure;
- Reducing the use of energy;
- Reducing fuel consumption;
- Reducing pollution;
- Reducing capital and operating costs;
- Increasing the viability of public transportation;
- Responding more effectively to incidents;
- Increasing the ease and convenience of travel
- Improving the environment; etc.

CONCLUSION

The focus for ITS in the future is clearly on deployment. Taking research and operational test results and putting them into routine practice is the emphasis in the ITS world today. How to best advance the deployment agenda is currently a matter of intense discussion in the ITS community. The best approach is for ITS to focus on regions as critical units of economic competition. Often, we speak of the "competitive region". First, the natural partnership between ITS and the nascent National Information Infrastructure (Nil), a communications network of unprecedented scale, scope and functionality, can provide substantial deployment benefits to both. Second, the strong trend toward freight and traveler intermodals provides a critical boost to ITS technologies. This is where ITS can help overcome intermodalism's weak point ~ the transfer process ~ through information and communication technology. Pulling these ideas together:

This is an ambitious vision and one that will require substantial leadership to achieve the technology deployment and the institutional change that will be needed to achieve such an outcome. ITS has had a dynamic but short history. Challenges have been overcome in these early years. Many remain for the fixture. When the Transportation Quarterly celebrates its 100th anniversary, I believe we will look back on this time as a seminal period in the history of transportation and one in which a truly intermodal transportation/information infrastructure was deployed, advanced by our ITS program.

Intelligent Transportation Systems represent the next step in the evolution of a nation's entire transportation system. ITS is expected both nationwide and worldwide to be the most effective measure for solving serious road traffic problems, as a source of generating new industries, and as a leader of the advanced information and telecommunications society. Thus ITS, which combines humans, roads, and vehicles using state-of-the-art IT technologies, is not only an effective means to resolve these problems but is also an infrastructure which will help revolutionize industry and society in the 21st century.

ITS has brought to the car culture an era of car multimedia revolution in which, communication between the inside and outside of the vehicle is realized. As this develops into the more real ITS age, the vehicle, until now a "closed room," will be an "open" space, with in- and out-flow of information. A vehicle has until now been regarded as just a means of transportation, but this concept will subsequently be broadened. More concretely, a vehicle, while it is still mobile, will be a space much like an office or a home, from which it is possible to freely communicate and Also, ITS is an essential element in creating a global advanced information and telecommunications society. As a result, it is expected that there will be an expansion of economic frontiers, balanced national land development, and the creation of a standard of living for the people such that they can realize a truly comfortable and affluent lifestyle.