Doprava a spoje –elektronický časopis Fakulty prevádzky a ekonomiky dopravy a spojov Žilinskej univerzity v Žiline, ISSN 1336-7676

COMPUTER NETS AND WIRELESS TECHNOLOGIE USING IN THE SUBURBAN PUBLIC AND OUT-PLANT-FREIGHT TRANSPORTATION

Daniela Šusteková, Marta Knutelská[1]

Key words: Computer nets, wireless technologie, city and regional transportation, fleet management, out-plant freight-transportation, , road transport, servers, board computer.

Abstract: In this article there are described computer nets and wireless technologies using in the suburban public and out-plant-freight transportation. There is described the management of the suburban public transportation using supporting by IT and connection freight cars with the centre and with the board-computer.

1. Introduction

Computer nets creating are now indispensable trend and necessary condition of distributed access to information sources to nets application using. Computer net enables from one place and in a short time an access to databases, information sources, reservation services, company portals or shopping centers.

When we imagine the future, we are dreaming about mobility without any limitations, about exact and available information together with a higher safety. Time of the mobility has incurred a huge increase of the transportation volume in the whole world that is why the transportation became very important economic factor. Firms and companies that are using means of transport (for example trucks) cannot connect these devices by using any type of cables because of their mobility. They are forced to look for another solution.

The GSM net formation and later GPRS net formation have put foundation trend to creation of computer networks using mobile nets. This trend has allowed the wireless nets penetration into the corporate infrastructure and has accelerated their next development. It has enabled immediate location of transport devices in terrain through GPS and their connection. This led to simplified road transport (trucking) management with huge positive effects on costs and revenues.

[1] RNDr. Daniela Šusteková, PhD. Departement of Quantitative Methods and Economic Informatics, University of Žilina, , Univerzitná 1, Žilina, Slovakia, e-mail: sustek@fpedas.uniza.sk.

RNDr. Marta Knutelská, PhD. Departement of Quantitative Methods and Economic Informatics, University of Žilina, , Univerzitná 1, Žilina, Slovakia, e-mail: marta.knutelska@fpedas.uniza.sk.

2. Management of the suburban public transportation using of new advanced technologies

New technologies have a huge potential that can be used in the all types of transportation. In the suburban public transportation transport there are these technologies used in following areas:

2.1. Passenger services – fast and flexible dispatch at different passenger flow.

· ***City Transportation in the city***

Entry can be placed only in the front door and in this case passenger places electronic wallet to the terminal at the front door and ticket value is debited. If the passenger has electronic ticket, after placing this ticket to the terminal validity of it can be checked. Invalid electronic ticket is signalled with coloured light (red, orange, ...) or with sound.

Entry can be placed at all the door. System consists of central computer placed in the car (close to the driver) and one or two terminals placed next to the doors. Handling passengers is similar to the situation when they enter the front door but is much more comfortable when many passengers are travelling.

· ***Regional, suburb transportation***

In this case, terminal is placed next to the front door of the car. Passenger places electronic wallet to the terminal and ticket value is debited. If the passenger has electronic ticket, after placing this ticket to the terminal validity of it can be checked. Invalid electronic ticket is signalled with coloured light (red, orange, ...) or with sound. New ticket can be obtained by choosing from the alternatives on the terminal.

It is possible to transfer all data from the bus to the centre and back using all available technologies that have a sufficient capacity for the communication (Radio, GSM/GPRS, WI-FI, etc.).

2.2. Custom centre – tools and facilities for card outgoing and administration in a control system.

· ***Personalization*** – personalise workplace can be connected to the server using LAN network or WAN network that enables on-line work. In case when it is not possible to connect the personalise workplaces to the network, a personalize databases replication of this workplaces is done using modem communication.

2.3. *Advanced booking* – sale and chip card personalisation.

Self-service places – ticket office available 24 hours daily.

***Information system*:**

Vehicle is equipped with a visual information system as well as acoustic. The vehicle is moving on the predefined route from where it is necessary to report information. Automation of an information system is supported by GPS system that enables the vehicle localisation.

· Exterior tables

Luminous tables serve to inform passengers about the number of the line, last stop and also other on-the-way stops. Tables display all needed information for correct identification of the car and therefore they make travelling easier. Informative luminous tables are made of highly luminous LED diodes. High luminosity of diodes and automatic brightness regulation ensure very good readability during whole day (day or night).

· Inside tables

Inside informative tables display name of the current stop, next stop as well as other stops, fare stage, time, number of the line, etc.

2.4. Stationary information system

Is equipped with a series of the light-boards that are installed on the all Bus Stops, platforms and a big through nodes. This system provides real-time arrival and departure information.

Exterior multifunctional tables - *s*creen is made of highly luminous segments of yellow LED diodes. These segments can be composed vertically or horizontally what allows creating the table according to customer's requests. Also mechanic, holders or stand can be used.

Interior multifunctional tables - Display is made of highly luminous segments of red LED diodes with 660 nm wave length. Intensity of LED lightness is regulated according to inside illumination what ensure optimal readability.

Information Generation that is available for travellers using Internet and mobile phones. Information mediums are concentrated on a back-office where data are executed and further distributed.

Transportation check – evidence of not-paying customers including extra charges to travel cost, connection with back-office of a terminal system, inspector's work survey.

Fleet management – evaluation of overall operational effectiveness of Transportation Company, management support including. All devices and application software are connected into a single system which is capable of processing traffic data, generating statistics thereof, and generating management reports for planning and managing Transport Company. Connection of individual components of the system provides complex information on efficiency of operation and also, it is possible to simulate new conditions for the case of newly created requirements or limitations. Planning of all processes is based on real data, so it is possible to estimate potential changes much more accurately and thus to discover weak points in the operation of transport company.

Localisation of transport vehicles – evaluation of deviation from time schedule.

Internet card filling – travellers can credit their chip-card through Internet.

Reservation system – seat reservation through terminals or web interfaces, reservations are recorded on central server and distributed to each transportation company with complete reservation list - for all lines and all vehicles.

Device Management System – system is fully serviced by remote access, on-line observation of actual status of each component what encompasses not only operational status but also keeping applications and firmware updated. This makes service and maintenance much easier.

3. Connection between trucks and centre using GPS and GPRS

Following text describes computer net realization in the company providing transport and logistics. Using of GPS and GPRS technologies to connect transport devices with the whole company's computer network enabled simplification of transport management, namely domestic freight traffic and international truck transport along with a strong cost cutting and increasing of income and profit.

3.1. Computer network is created:

Central part is made from LAN network with components:

Dispatching computer

Computers in workrooms

Computers on the economy section

Communication server

Freight cars with a board-computer [Pict. 1] with a GPS receiver and GPRS terminal

Picture 1

3.2. Functionality of single workplaces

Board-computer in a vehicle's cabin scans a vehicle position using GSM and according to the data the computer is filling daily record of driver's performance. Driver inputs expenses into the computer that he has during a working day. All data from the board-computer are sent to the central computer using GPRS and then to the dispatcher where they are executed and evaluated.

According to information from centre where requests for transport are gathered, the dispatcher sends commands to drivers.

Data from board-computer are used by dispatcher for:

Monitoring of the vehicle status

Monitoring of driver's output

On the economic section for:

Preparing of invoices

Monitoring of the expenses

3.3. Advantages of the freight cars connection using GPS and GPRS

Described realisation simplifies transport management, namely domestic freight traffic and international truck transport along with a strong cost cutting and increasing of income and profit. More precisely there can be specified following advantages.

Localisation of vehicles

Optimization of driver's work

Electronic daily record of vehicle

Electronic daily record of driver

Automatic processing of the driver's output

List of lines

Consumption checking

Cost saving

Simple and quick assembly without check on vehicle

Minimizing manual manipulation

Access into the system 24 hours daily anywhere in the world

4. Conclusion

Mobile nets enable a wide using spectrum in a road transport and it is necessary for each organization to connect computers into computer network in all objects independently on the fact whether these objects are static in some areas or are moving out of the main building. GPRS enables this connection and according to the fact that it is covering almost whole Europe, it is very profitable to use this service for the buses and trucks connection. These technologies will be replaced with new technologies of the third generation of mobile nets when they will be covering needed monitored area.

Literature:

[1] Kállay F., Peniak P. *Počítačové síte a jejich aplikace*, Grada 2003, ISBN 80-247-0545-1, 353 s.

[2] Pužmanová, R. *Bezpečnost bezdrátové komunikace*, 1.pub.., CP Books a.s. Brno 2005, ISBN 80-251-0791-4

[3] Pužmanová, R. *Bezdrátová první, Network Computing*, 11/2003, ISSN 1214-3138, str. 63-67.

[4] Professional Computing, *Magazín pre IT profesionálov*, DCD publishing s.r.o, ISSN 1214-5335 - 12 krát ročne.

[5] Šusteková D. Počítačové siete a Internet, 1. pub., Žilinska univerzita EDIS 2007, 155 s.

Referee: Doc. Ing. Ján Zelem, CSc., University of Žilina
Enter to publishing: 30th October 2012