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OPTIMISATION OF PUBLIC TRANSPORT

Stanislav Mirvald

Department of Geography, Pedagogical Faculty, University of West Bohemia, Plzeň, Czech Republic

Abstract: Optimisation of public transport as a tool of regional policy. The system principles in providing attachment to public transport for settlement units. Steps applied to creating models of public transport network with the example of Plzeň - South district.

Key words: regional policy, public transport, models

1. INTRODUCTION

Public transport support, based on the principle of socially oriented market economy, is one of the important tools of regional policy. Public transport must create a stable system, warranting standards for people of all classes living even in the most remote regions. Additionally, regional social and economic development depends on a stable public transport system as it enables optimal utilization of regional potential and optimal settlement dispersion, thus contributing to a sustainable environmental development. Public transport ensures both, mobility of the work force, as well as access to services, which are essential conditions for preserving the desirable demographic structure and social relations.

In a case, the public transport system is disrupted, there appears an immediate negative impact not only on the people living in the particular region, e.g. the increase of unemployment, but also on manufacturers. As a result, the quality of living in the particular region decreases, which leads to depopulation, especially in small towns and villages and consequently causes their decline.

Two mutually opposing interests need to be taken into consideration when creating the public transport system. On one side, there are passengers who stand in need of fast,

comfortable, frequent and cheap public transport. On the other side, there are public transport providers who strive for the highest financial profits. As the state is responsible for socially indispensable transport services, it should solve the conflict by transferring and using its legal power on a regional level. The state must guarantee the right to commute to work and to access services. For various reasons, not all people can use a car. It has been stated that in highly industrialized countries, up to 40% of population are either not able or cannot afford to use private transport.

2. PRINCIPLES OF PUBLIC TRANSPORT SYSTEM

Railways are considered the backbone network of public transport. Railway transport is preferred on the basis of its ecological, voluminous and comforts reasons. Buses provide public transport services in areas where railway transport is not accessible. A functioning public transport system is determined by mutual synthesis of the railway and bus transport. Such synthesis is primarily based on time harmonization of individual lines of both train and bus services, e.g. harmonization enabling customers to change from one line to another with minimal loss of time.

The most important train stations in railway network can function as terminals, from which busses can further transport passengers to centres located far from the railway public transport. From the main regional centre, it is possible to create monocentric integrated transport systems, combining more types of transport, for example urban, railways and busses. Spatial organization of public transport system in a particular region requires an analysis of directions, intensity and time structure of individual types of public transport.

All citizens have the right to basic transport services, which originate from the need for attaching towns and villages to the public transport system with adequate frequency and distance accessibility from every stop. The maximal walking accessibility to a stop of public transport proposed in the Czech Republic is two kilometres for villages over 200 inhabitants. Simultaneously, a proposal has been made to require the provision of a minimally five to six lines on working days and at least three lines on weekends and public holidays. Minimal daily frequency drops for villages under 200 inhabitants and at the same time the maximal walking accessibility rises up to three kilometres. A strict or exact solution is impossible. Villages around 200 inhabitants can go through temporal fluctuation above or under this limit. The maximal walking accessibility up to two or three kilometres results in four or six kilometres of daily walking in total. This is unbearable for the ill, old or disabled or for young children. Such and similar circumstances demand alternative transport for remote stops of public transport.

In the Netherlands for example, it is the village that provides transport to the nearest public transport stop. More factors need to be considered when deciding whether a town or a village should be attached to the public transport system with the minimal

walking distance or without such a minimal distance. Factors for consideration are for example: morphological aspects (e.g. flat or hilly countryside) or varying quality of roads connecting villages with the nearest public transportation stop, especially with a train stop. Therefore, generating public transport system requires different approaches resulting in different, specific solutions that are in accordance with the geographical conditions of a particular region.

3. GENERATING MODELS OF A PUBLIC TRANSPORT NETWORK

Current transport communications and set demographic structure provide the basic data for creating public transport network. Railways, bus lines and integrated transport systems serve as the basis of public transport network. Hierarchically different transport terminals and other transport nodes - cities, towns and villages are created on this basis. Typology and hierarchy of transport communications as well as settlement structures influences determination of the trend of further public transport development. Despite various regional differences, gradual steps for creating a model of regional public transport can be traced which can be consequently further applied to a specific area.

Demanding a more elaborate solution, Plzeň-South district was selected as a demonstration for creation of such a model. Firstly, we determine the location of the backbone of the transport network where railway transport has a fundamental role. This location enables an attachment of all important regional centres that can potentially become the main terminal of public transport. In the Plzeň-South district, the railway attaches all of the most important centres (Fig. 1). In case of the monocentric transport network, when the majority of public transport is orientated to a dominant centre, as it happens in the Plzeň-South district, this system is enriched by an integrated transport system providing union to urban transport. With the example of the Plzeň-South district, railway can be suitably utilized as a backbone network of an integrated transport system (Fig. 2).

Secondly, we determine regional centres that can function as transport terminals of a lower hierarchical level and also as potentially important centres in neighbouring regions that can be utilized for the public transport system of an analyzed region. Mutual integration and the complementing of transport terminals are beneficial for social and economic development in a region. When constructing integrated transport terminals, the following factors are crucial: hierarchy of road network, the existence of railway network and transport service provided to the highest number of centres with a minimal distance accessibility to transport terminals (Fig. 3).

The attachment of remaining centres is the final step in completing the public transport system within a region. It is very important to decide to what extent transport terminals can be utilized for servicing neighbouring centres. Tracking is determined

when railways are utilized, whereas when using bus transport other alternative solutions appear. Direct bus connection from the dominant region centre can be a reasonable functioning solution in some case (Fig. 4).

Various approaches can be used for the optimal use of the public transport network when transport terminals are accepted as starting points for supporting services in individual parts of a region. Public transport routes that are arranged monocentrically towards terminals enable combining the flow of vehicles in both directions in a closed cycle. The direction of lines can be changed at shorter distances, so that some centres would not be discriminated from the time and pricing accessibility (Fig. 5). Suggested approach lead to a united public transport system that integrates all dominant centres with a corresponding transport terminal. Perimeter interconnection of transport terminals creates potential for interconnecting all cities, towns and villages in a region. It brings many options for working opportunities and services in a region.

Resume

Optimalizace veřejné dopravy

Veřejná doprava je významným nástrojem regionální politiky. Její stabilní systém lze považovat jako základ udržení kvality života obyvatel a zachování sídelního systému, zejména v excentricky položených oblastech.

Za hlavní princip systému veřejné dopravy lze považovat vytvoření páteřní sítě s preferencí železniční dopravy. Řešeno je také právo obyvatel na dopravní obsluhu z hlediska frekvenční dostupnosti a vzdálenostní dostupnosti na zastávky.

Rozmanitost regionů nezamezuje stanovit další postupy vytváření modelů regionální veřejné dopravy s obecnou aplikací. Postupy jsou zároveň vyjádřeny v konkrétní realitě na příkladu okresu Plzeň - jih.

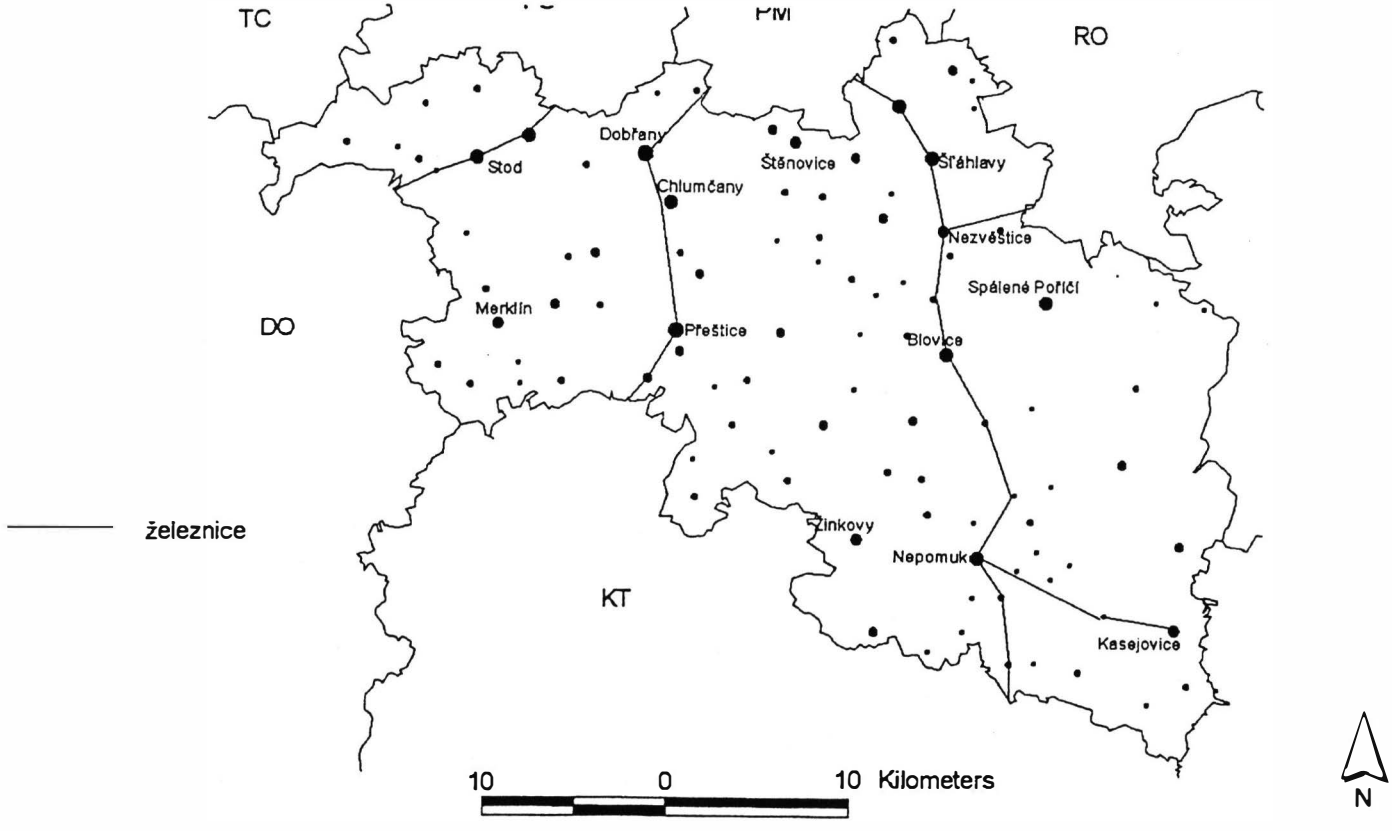

Fig. 1 Backbone network of public transportation

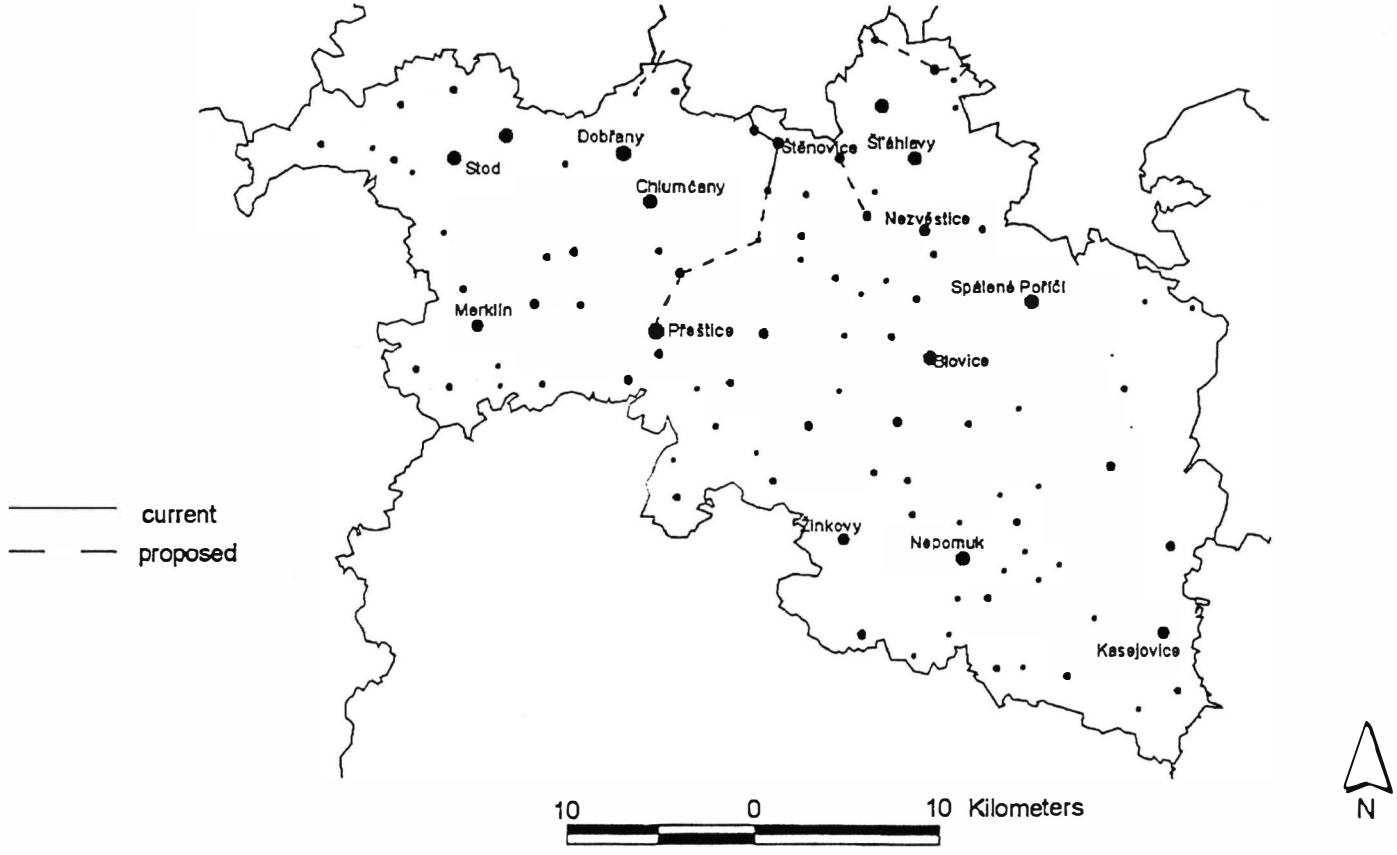

Fig. 2 Integrated transportation systems

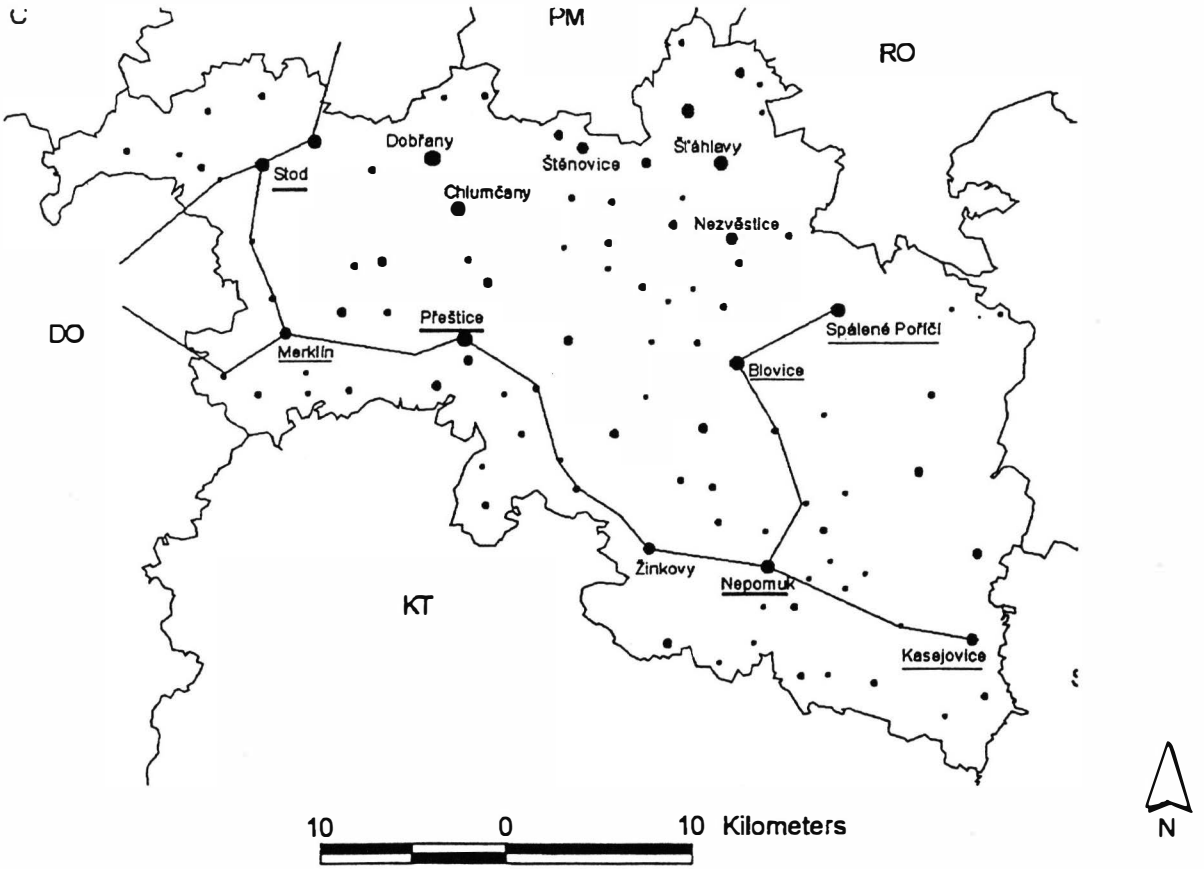

Fig. 3 Interconnection of transportation terminals

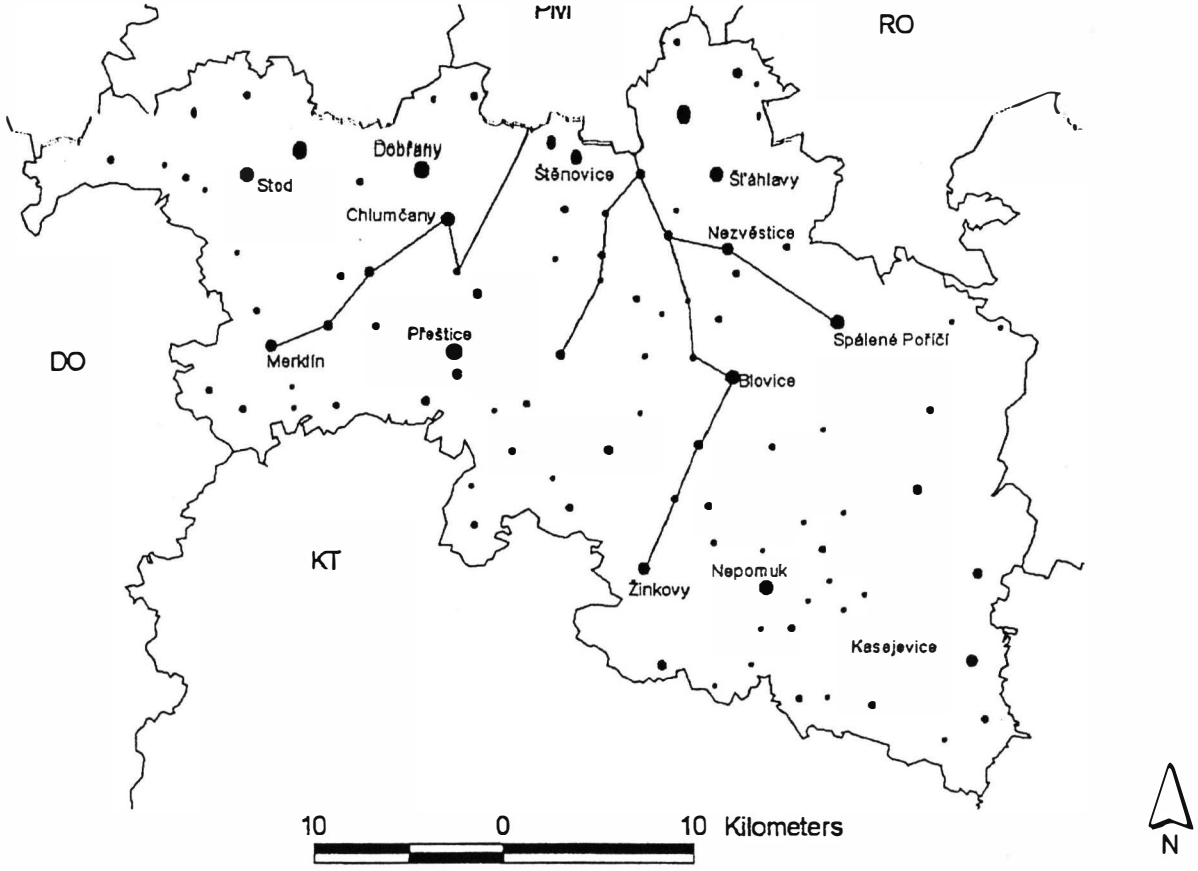

Fig. 4 Direct bus connection to Plzeň

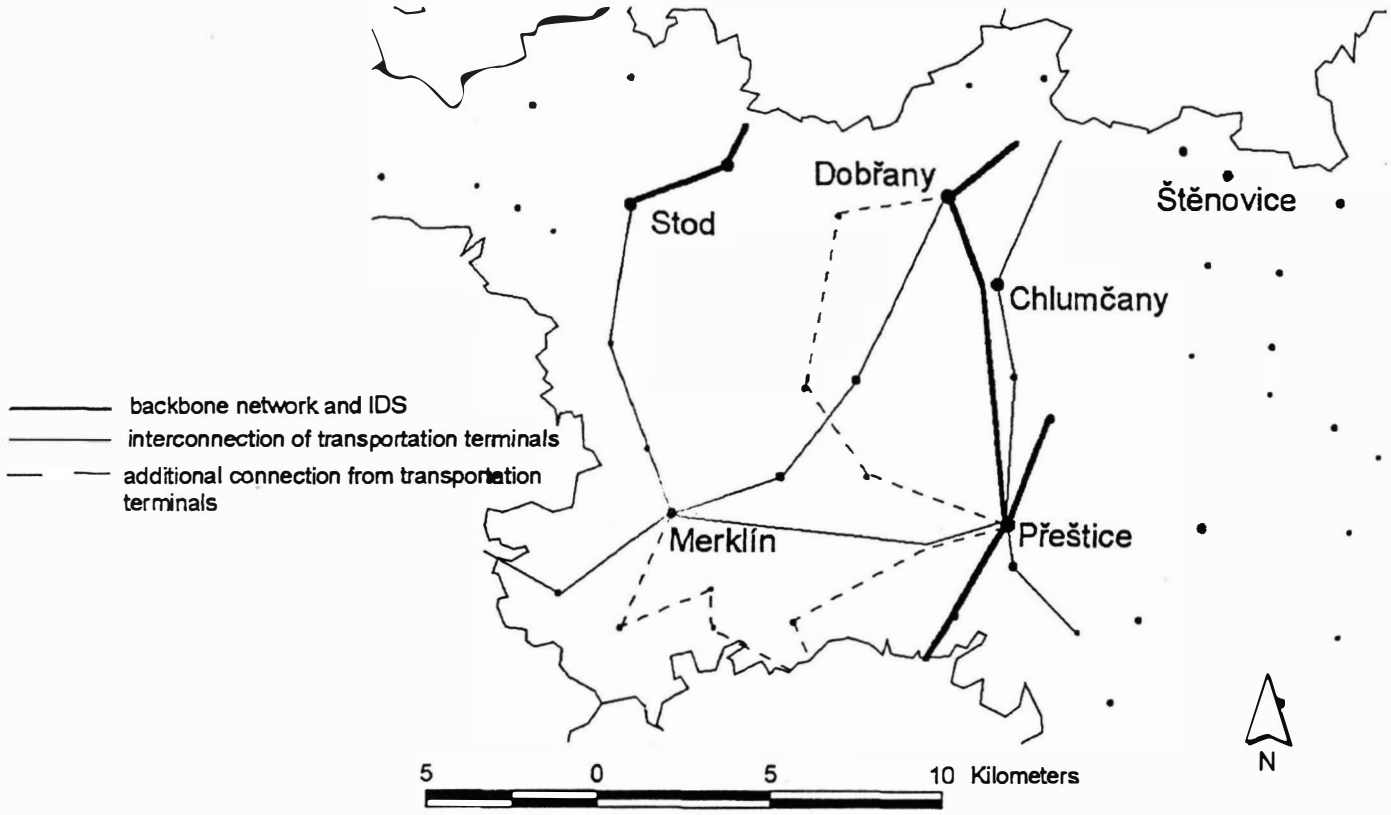

Fig. 5 Demonstration of a complex public transportation system - Plzeň-south district