

**CiViTAS**  
Cleaner and better transport in cities

**ÚSTÍ NAD LABEM**  
.....

## **Ústí nad Labem**

### R26.1 Strategic Traffic Management Study

November 2011



THE CIVITAS INITIATIVE  
IS CO-FINANCED BY THE  
EUROPEAN UNION

Project no.	TREN/FP7TR/218940 ARCHIMEDES
Project Name	ARCHIMEDES (Achieving Real Change with Innovative Transport Measure Demonstrating Energy Savings)
Start date of the Project	15/09/2008
Duration:	48 months
Measure:	26 – Strategic Traffic Management in Ústí nad Labem
Task:	11.3.4 – Strategic Traffic Management
Deliverable:	R26.1 Strategic Traffic Management in Ústí nad Labem
Due date of Deliverable:	14 <sup>th</sup> November 2010
Actual submission date:	22 November 2011
Dissemination Level	Public
Organisation Responsible	Ústí nad Labem
Author	David Grajovský
Quality Control	Dalibor Dařílek
Version	1.0
Date last updated	22 November 2011

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# 1 Introduction

## 1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITALity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme); CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

### **Objectives:**

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

### **Horizontal projects support the CIVITAS demonstration projects & cities by:**

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

### **Key elements of CIVITAS:**

- CIVITAS is coordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living ‘Laboratories’ for learning and evaluating

## 1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

## 1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

### 1.3.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

## 2 Ústí nad Labem

Ústí nad Labem is situated in the north of the Czech Republic, about 20 km from the German border. Thanks to its location in the beautiful valley of the largest Czech river Labe (Elbe) and the surrounding Central Bohemian Massive, it is sometimes called 'the Gateway to Bohemia'. Ústí is an industrial, business and cultural centre of the Ústí region.

Ústí nad Labem is an important industrial centre of north-west Bohemia. The city's population is 93859 living in an area of 93.95 km<sup>2</sup>. The city is also home to the Jan Evangelista Purkyně University with eight faculties and large student population. The city used to be a base for a large range of heavy industry, causing damage to the natural environment. This is now a major focus for improvement and care.

The Transport Master Plan, initiated in 2007, will be the basic transport document for the development of a new urban plan in 2011. This document will characterise the development of transport in the city for the next 15 years. Therefore, the opportunity to integrate Sustainable Urban Transport Planning best practices into the Master Plan of Ústí nad Labem within the project represents an ideal match between city policy framework and the ARCHIMEDES project.

The project's main objective is to propose transport organisation of the city, depending on the urban form, transport intensity, development of public transport, and access needs.

## 3 Background to the Deliverable

Currently, traffic on local roads has reached such a level that it is necessary to address issues of sustainable development and seek complex transport solutions for the city. The possibilities offered by construction of the new transport infrastructure are limited and the trend in the development of motor transport requires application of regulatory measures. Moreover, specific suitable alternatives and new opportunities must be developed. One objective of the city is aimed at regulation and segregation of motor transport in order to avoid safety risks for the population and to limit emission of harmful gases, noise and vibrations. It furthermore deals with priority for public transport (PT) and support of walking and cycling modes and also promotion for quality and cleaner life in the city.

The City of Ústí nad Labem has a target to develop a strategic traffic management strategy and implement measures to restrict traffic in the city centre. The goal is to improve traffic flow in the city and reduce the environmental impact of traffic. Within the CIVITAS task 11.3.4 Strategic Traffic Management, research has been conducted to analyse the conditions and structure of the existing traffic management in the current state, application of intelligent transport systems and transfer of traffic data in the city. The detailed results of this review of present systems and the data collected are presented, element by element, in section 4.

On the basis of the results, a proposal for optimal solution for strategic traffic management and ITS development will be designed within the CIVITAS task 3.8 Strategic Traffic Management in Ústí nad Labem. The conclusions of the review are presented in section 5 of this deliverable which will lead to a fuller system specification in Deliverable T26.1.

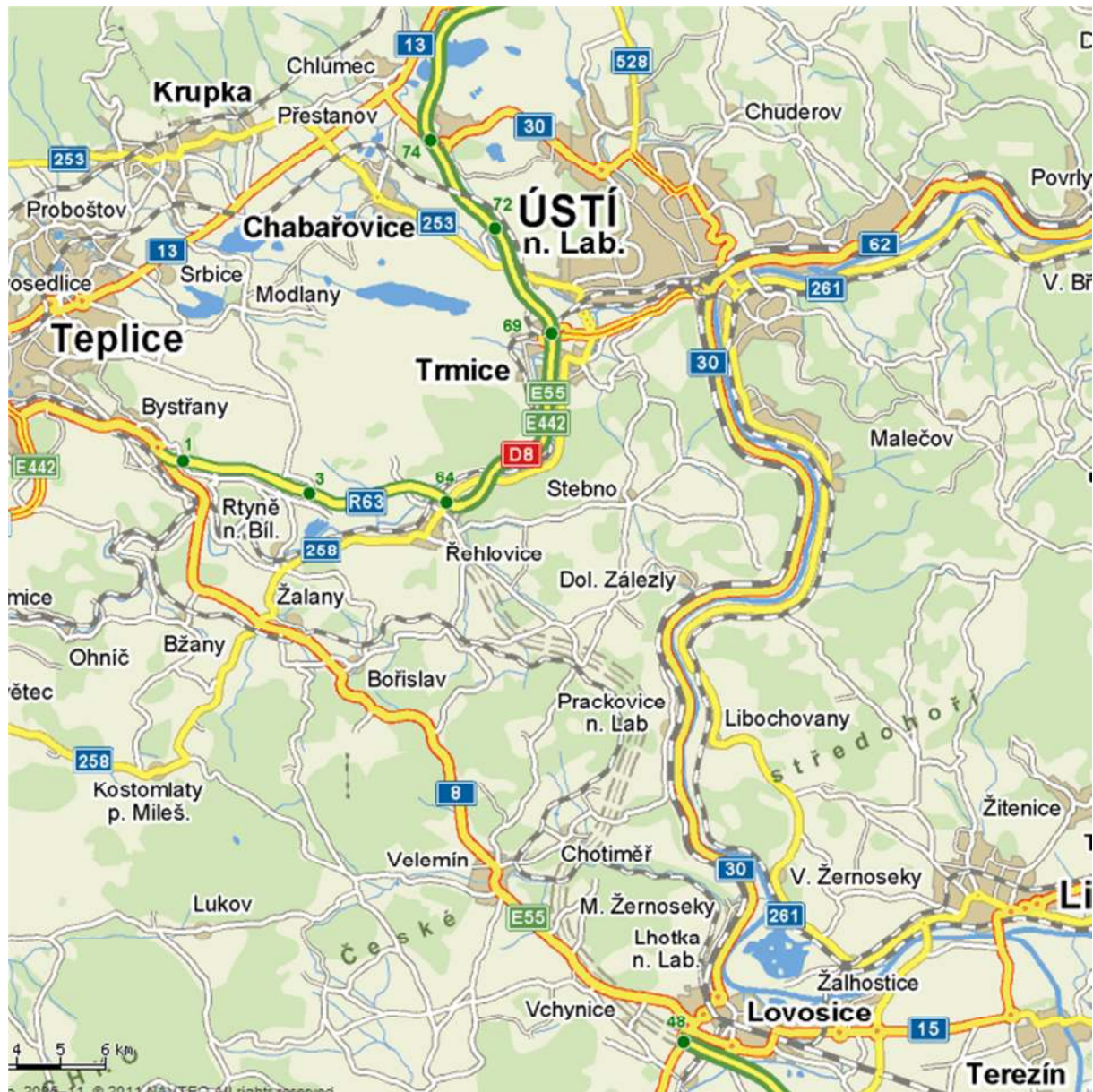
## 4 Current State of Traffic Management in Ústí nad Labem

The current status of the transport infrastructure and transport equipment on the territory of the city was analysed, which is the basis for gradual implementation of an intelligent transport system. The analysis was carried out within individual functional areas:

- Management and organization of road safety;
- Traffic information and data transfer;
- Parking of vehicles;
- Public transport;
- Freight transport;
- Transport surveillance systems;
- Payments system;
- Management and maintenance of transport infrastructure.

Furthermore, the final version of the draft of the Masterplan of the city was processed, in particular the parts relating to the transport infrastructure of the city. Based on the document, specific issues concerning the development of transport infrastructure were identified and the management of the transport system was subsequently designed.

Figure 1 - Major road infrastructure leading through the city of Ústí nad Labem



Source: [www.mapy.cz](http://www.mapy.cz)



## 4.1 Detailed Description of the Road Infrastructure in the City

The city of Ústí nad Labem is an important transport source and destination for both passenger and freight transport. Majority of transit traffic passes on the axis between the Czech Republic-Germany. There are two international routes leading through the territory - E442 and E55. These follow the path of locally designated roads as described in the following paragraphs.

Road E442 passes in the direction East-West and enters the city from Děčín by the road I/62. It follows by the roads I/30, II/613, highway D8 and I/30 towards Chlumec.

The road E55 passes in direction North-South. It leads through the city due to the unfinished section of the highway D8. It leads on D8 towards Lovosice on roads II/613, I/30 to the south. In the opposite direction, it leads from D8 to R63. After the completion of the highway D8, the road R63 will not exist anymore.

### Highway D8

The highway D8 passes through the Western part of the territory. It is one of the major connections of the city. In the near future, transit traffic should be redirected from the roads of classes I and II to this large capacity highway. Finalisation of the highway is, however, dependent on construction of the section Lovosice-Řehlovice, which is the last unfinished part of the highway leading through Prague-Dresden-Berlin. With regard to the progress of construction works, this document presumes completion of the highway D8 in its entire length.

Currently, the existing transport relations in the direction Czech Republic-Germany are realised by roads I/30 (II/613) and I/8 (R63). According to the transport surveys conducted, the bypass utilised more intensively is the road I/30, even though the road signs for route Lovosice→Trmice lead drivers on roads I/8, R63 and D8. The most important reason for this preference is the flat longitudinal profile of the road I/30, which allows relatively constant speed of goods vehicles on the vast length of the section.

The transport connection of Ústí nad Labem with the highway D8 is ensured by total of 4 levelled intersections leading to roads of classes I, II and III. These intersections are located outside the city. They are in:

- Trmice: Highway D8 is connected to the road II/613, which has a four-lane configuration at this point. This class II road is currently part of the bypass of the incomplete highway D8. The intersection is used primarily for trips to the central part of Ústí nad Labem, which will be sustained even after the completion of the highway.
- Předlice: Highway D8 is connected to the road III/25364, which is parallel with the highway and serves the adjacent development zone Předlice.
- Úžín: Highway D8 is connected to the road I/30, which enters the city in Všebořice. The intersection serves the commercial zone in the western part of Všebořice.
- Knínice: Highway D8 is connected to the road I/13 and continues in Božtěšice and Severní Terasa by the roads II/528 and I/30.

A traffic information display is located at the 70.6km point of the highway in the direction towards Prague. It would be appropriate to be add an additional device in order to reduce

congestion and risks of accidents occurring due to non-standard events or conditions on the road. The traffic information device should provide information on closures of a section of the highway D8 and offer suitable bypass routes, which would affect traffic situation in Ústí nad Labem.

### **Road I/30**

Road I/30 is one of the two roads of the I. class, which are located on the territory of Ústí nad Labem. It is one of the most frequented roads in the area. It is used for local transport with its source or destination in the city, as well as for transit traffic.

Road I/30 is used in the southern part of the city (direction from Lovosice) as the main transport link to the Central Bohemian Region. Together with the road II/613, the road I/30 constitutes the bypass of the unfinished section of the highway D8.

This major road is entering the territory on the left bank of the river Elbe from Lovosice. The section Lovosice→Ústí nad Labem is paid by toll as a bypass of the unfinished highway D8.

The section of the road between Žižkova and Hrnčířská street, leading under the bridge of Edvard Beneš, is one of the roads with the highest traffic intensity in the city - on average 25000 veh/24h on a working day. There will be a flood tub constructed in this section, which will eliminate the problems of frequent closures of the road due to floods of the river Elbe. Current status of the river levels and quantity of rainfall will be presented by variable traffic signs, including large directional information signs, operational information signs and at gates located at the entrances to the flood protected road. The system of variable traffic signs, however, does not address bypass routes. Drivers are only provided by the information that the road is closed.

Part of the road is served by public transport. The city hospital is located on the road, meaning that there are relatively strong pedestrian links across the street, which is one of the causes of numerous traffic accidents.

The road leads through the roundabout Bukov. This circular intersection of 5 roads is complex, consisting of subsidiary junctions with various priorities currently marked by vertical traffic signs, which is confusing for drivers.

The road I/30 continues on the city outskirts where, in the street Všebořická, the traffic intensity exceeds on working days the average of 22000 veh/24h.

By its characteristics, the road is primarily a utility road with a local distribution function. The road connects several residential and commercial localities, highway D8 and the city Teplice, causing high traffic intensity and traffic problems. The road has on the city territory a total of 10 intersections controlled by traffic lights. The intersection Pražská with Žižkova has preference for the integrated rescue system and a camera, which allows detection of a red light traffic offence. Other major intersections are controlled by traffic lights, including intersections Předmostí with Důlce, Hoření with Malátova and Bělehradská with Krušnohorská.

All these major intersections controlled by traffic lights are heavily frequented in all directions and intensively utilised by PT, again often in all directions. It would be appropriate to allow preference for PT for delayed vehicles on these intersections. However, the priority should be contingent, where the relevant prolonged phase is limited by a certain period of time.

The intersection Sociální Péče with Mezní is the only intersection, where priority for PT is currently applied. There are two coordinated traffic light controlled intersections on the street Havířská, which are also suitable for PT priority application.

### **Road I/62**

Road I/62 is the second of the class I roads passing through the city. It passes outside residential areas through industrial zones as a two-lane road. It is utilised also by transit traffic, in the direction of Děčín–Lovosice. The traffic intensity is most intensive in the section Hrnčířská-Mariánský bridge (on working days on average 31300 veh/24h) and in the section Mariánský bridge–Drážďanská street (29000 veh/24h). The road is served by city buses and trolleybuses. The intersection with Mariánským bridge is levelled. Two intersections are controlled by traffic lights with the preference for the vehicles of the integrated rescue system.

The road I/62 leads along the left bank of the Elbe river towards Děčín, where it crosses the bridge and continues to the border with Germany in Hřensko.

### **Road II/253**

This road is located in the western part of the city territory. It begins at the intersection of roads II/613 and II/258 in the commercial zone Trmice. It leads through the city as a street Majakovského. It is served by PT, connecting the commercial zone with the city centre. The road passes under railway bridges causing height restrictions and quite complex directional system. Presence of the commercial zone Trmice and the levelled intersection connecting the road with the highway D8 contribute to high traffic intensities.

The road II/253 continues to the west as the street Hrbovická through the city part Předlice. Part of the road is here served by PT leading to the Square of Prokop Veliký. The average traffic intensity on the square is on working days about 10 000 veh/24h.

On the western edge of the city, the road II/253 crosses the highway D8, to which it is linked by road III/25364, and continues towards Chabařovice.

### **Road II/258**

The road II/258 does not pass the city. It starts at the intersection of roads II/253 and II/613 and leads through the commercial zone Trmice, in parallel with the highway D8, to Řehlovice and further west to Duchcov. The road is an important connection of the city with the commercial zone, as well as other municipalities located to the west from Ústí nad Labem. It is essentially the only road linking Trmice with the city. It is served by public transport buses. Transport between the two cities is relatively intensive.

### **Road II/261**

Part of the long road II/261 leads through the city. It begins in Děčín and leads on the right bank of the river Elbe to Ústí nad Labem. Road parameters in the section between Děčín and Ústí nad Labem are worse than those of the road I/62, therefore the road II/261 primarily serves the cities on the right river bank rather than providing connection of Děčín and Ústí nad Labem. The road II/261 passes through the neighbourhoods Svádov (street Vítězná), Střekov (Děčínská, Železničářská, Litoměřická street), Brná nad Labem (Sebuzínská street),

Sebuzín and Církvice. The road connects the two road bridges across the river Elbe in Střekov, where it is served by trolleybuses. Other parts are served by public buses.

This is the only class II road located on the right bank of the Elbe river. It connects the bridges with the city centre. Its transport importance is thus significant and its closure would cause considerable traffic problems in the area. The traffic intensity on working days is on average between 6000 - 8000 veh/24h (on a typical working day).

### **Road II/528**

This road is located in the northern part of the city and links the road I/13 (connection to the highway D8) at the city part Knínice with the road I/30 in the Božtěšice region of the city Ústí nad Labem. The whole length of the road is located on the city territory as a street Petrovická. The road features a lane for slow vehicles, direct services of local facilities are very limited and the maximum permitted speed is 70 km/h. The road is served by PT up to the municipality Strážky. The traffic intensity is in the most frequented section Božtěšická–Široká, averaging 7800 veh/24h on working days.

### **Road II/613**

This four-lane road begins at the intersection connecting the highway D8 in Trmice. Levelled intersections further connect roads II/253 and II/258, which provide links of Trmice and Ústí nad Labem with the highway D8 at the south.

The road enters the city at the intersection with Tyršova street (II/253), where it links the commercial zone. The road continues as a street Žižkova through an industrial area, where direct services of local facilities are limited. The traffic intensity in this area by the Makro shopping centre is on working days on average 20000 veh/24h and in the most frequented area between the streets Střelecká-Fibichova 21200 veh/24h.

The road terminates on the road I/30 at the intersection Pražská with Přístavní, controlled by traffic lights. Relatively short distance between the traffic light controlled intersection and the major roundabout on the street Přístaviště, along with high traffic intensity, causes frequent congestions on the access roads. This road section is currently one of the most challenging transport nodes on the city territory.

High intensity of motor transport is given primarily by the necessity of bypassing the unfinished section of the highway D8, utilising the road II/613.

Beside the bypassing traffic, the road II/613 connects cities Dresden–Lovosice. The entire length of the road is served by public buses. Another intersection controlled by traffic lights on Žižkova is at the Makro shopping centre. PT operates along the main direction of the street Žižkova, and priority for PT is therefore not required.

### **Roads of III. class**

Most of the class III roads are of minor transport importance, with low traffic intensity. Their road parameters do not allow high traffic loads due to their narrow width, lack of visibility, complex configuration of terrain, etc.

Some of the major sections are served by PT. Trolleybuses operate on roads III/25841 (from Mariánský bridge to the street Poslední Cesta), III/25371 (in urban areas of the city) and III/25374. Public buses operate on roads III/25839 and III/26036.

### **Significant local roads**

Local roads are utilised not only by local transport, with its source or destination on the city territory, but partially also by transit traffic. Although most of the transiting traffic is diverted to roads of classes I and II, there are local roads in the city, which are used primarily by transit traffic (such as the street Tovární).

Local collective roads in the city are the streets Tovární (on average 15000 veh/24h), U Trati (18600 veh/24h), Klíšská, Textilní, Průmyslová, Okružní, Štefánikova, Masarykova (20000 veh/24h), Rooseveltova, Bělehradská, Malátova, Na Návsi, Výstupní, Neštěmická, Krčínova, Drážďanská (12400 veh/24h) and the bridges E. Beneše (18000 veh/24h) and Mariánský bridge (10600 veh/24h).

The majority of these roads with relatively significant traffic load are controlled by traffic lights, in particular in the city centre. The coordinated intersections are U Trati with Spojka, Panská with Revoluční, Panská with Brněnská and Špitálské square. All these intersections allow preference of vehicles of the Integrated Rescue System. The intersections U Trati with Spojka and the Špitálské square are equipped by surveillance cameras to detect cars passing on the red light phase. PT vehicles pass along this route.

Other traffic light controlled intersections are on the street Masarykova, specifically the intersections Masarykova with Sadová and Masarykova with Štefánikova. They both allow preference for vehicles of the Integrated Rescue System and they are also equipped with surveillance cameras. The intersection Masarykova with Štefánikova is coordinated with the pedestrian crossing by the Winter Stadium.

### **Pedestrian transport**

The majority of pedestrian routes lead through the city centre, primarily through the streets Revoluční, Hrnčířská and Masarykova. The main bus station is located on the street Revoluční. Pedestrians arrive to the city by regional buses and head into the city centre for various purposes, such as shopping (mainly at the shopping centre Forum, Labe, Sever or Zdar) or handling official affairs (at the Regional Office of the City, the Municipal Office of the City, the Regional Directorate of the Police of the Czech Republic, Regional Court, etc.). Other common sources and destinations of pedestrian trips are the railway stations, health or school facilities.

Examples of streets with intensive pedestrian traffic are the street Národního Odboje at Střekov (Regional Court), the street Sociální Péče (hospital) and especially streets connecting residential and shopping areas, such as the Krušnohorská, Seifertova or Výstupní street.

The main problems concerning safety of pedestrians occur on the most frequented roads. Clashes with intensive motor traffic can be resolved by controlling the intersections by traffic lights, including the pedestrian crossings, or implementing separated pedestrian crossings equipped with traffic light signals only for pedestrians. Some problematic spots are also located on less frequented roads, such as roads served by public transport, roads by large shopping centres, sport, school, health or cultural facilities.

Some intensively used pedestrian crossings are part of traffic light controlled intersections, such as pedestrian crossings at Masarykova with Sadová, Předmostí, Špitálské square and Malátova with Hoření. There are three separated pedestrian crossings designed outside

intersections – at the streets Masarykova (access to the sport stadium), U Nádraží (connection between the main railway station and the city centre) and Malá Hradební (new shopping centre). All three crossings allow preference of the Integrated Rescue System units. The pedestrian crossing on the Masarykova street is coordinated with the traffic light controlled intersection Masarykova with Štefánikova. The pedestrian crossing on the street Malá Hradební is coordinated with traffic light controlled intersections on the streets U Trati – Panská - Klíšská.

### **Significant civil engineering works on the road network**

Configuration of the terrain and location of the city at the confluence of two rivers requires rather demanding engineering structures, in particular in case of transport constructions. With the ongoing development of built-up areas, spatial capacity of the territory is exhausted and the existing reserves for transport routes require solutions, which are more technically and financially demanding.

The most significant transport constructions in the city are the bridges over the Elbe river – the historical bridge of Edvard Beneš, where PT trolleybuses currently operate, and Mariánský bridge. Pedestrian routes lead across both of the bridges, which link the two parts of the city on opposite banks of the river. Therefore their importance in the urban transport system is inherent. In case of operating failure of both of the bridges (as happened in 2002 during the floods), the city transport is completely paralysed, as the nearest bridge across the Elbe river is located in the city of Děčín.

On the western edge of the territory, several bridge flyovers were established due to the construction of the highway D8. For example, the bridge over the railway lines and the valley in Trmice is about 1,1 km long. Local roads in locations crossing the highway D8 also often required unique bridge solutions. Another relatively unique construction was implemented in relation to the reconstruction of the road II/613 (Žižkova street), which leads in close concurrence with the river Bílina. The constructed flyover currently allows operation of traffic in four lanes.

Special construction work was designed in the city to improve resistance of the street Přístavní in case of increased water levels of the Elbe river. The flood tub allows traffic to continue to flow on this important street, which is part of the road I/30, even when the river reaches above the street level.

Another bridge construction works are implemented in the city along the railway line in the city centre, where the lines lead above the ground level and the bridge arches are used to allow traffic of vehicles and pedestrians to flow underneath. Despite the solution, the railway lines present a relatively significant barrier in the city terrain. In the city part Krásné Březno, the streets U Podjezdu and U Cukrovaru pass under the railway by underpasses. This technical solution reflects the development of the railway station. The original underpass had a single lane and insufficient height for passage of vehicles. With the expansion of the station, there was a bridge structure added to the original underpass to meet the required standard. The original underpasses were not rebuilt. Both roads, however, are only moderately utilised by traffic.

There are no tunnel construction works on the city road network.

There are numerous pedestrian underpasses located under roads and railways on the city territory. The overpasses for pedestrians are currently being gradually removed.

## 4.2 Specific Risks

For the analysis and development of the telematics system and the proposal of the strategic management in Ústí nad Labem, it is necessary to take into account certain specific risks resulting from the local natural and climatic conditions (such as floods, falling rocks from the cliffs, frost and ice, etc.), as well as risks resulting from industrial activities in the area (such as accidents at factories).

The city of Ústí nad Labem is located in a valley (up to 400m deep) of the Elbe river and on the surrounding hills. The basin is bounded by two rock massifs – Mariánská rock on the north and Střekovská rock on the south-east, by the hill Větruše on the south and by the saddle on the east. The Elbe and Bílina river are the two major water flows through the city territory, with several tributaries in the area.

One of the specific risks is the possibility of falling stones or larger rock pieces along the roads I/30, I/62 on the left bank of the Elbe river, and II/261 on the right bank. Temporary closure of these roads may occur.

The local natural conditions cause the occurrence of floods. A large part of the city belongs to the flooding area of both Elbe and Bílina rivers, which demands implementation of flood controlling measures to protect the assets, residents and transport infrastructure and limit the resulting negative consequences. The two largest floods threatened the city of Ústí nad Labem in 2002 (12m of elevated water level; disastrous floods occurred on most of the territory of the Czech Republic), and in 2006, when the city experienced the second worst flood since the year 1940 (9m of elevated water level). Problems appear in particular on the frequently flooded part of the road I/30 (Pražská street). Therefore, the flood tub was constructed on the section between the street Žižkova and Hrnčířská. This solution resolves the problem of frequent closures caused by floods of the Elbe river. The current level of the Elbe river and quantity of precipitations will be shown on the variable traffic signs and adjustable gates at the entrance and exit of the flood tub. This system, however, does not address the issue of bypasses; it only provides information about the closure.

Although the area is characterized by predominantly mild winters, with low number of freezing days (up to 100) and low number of days with snow cover (less than 40), the risk resulting from frozen roads should be minimised by warning the drivers via the telematics system. Based on the information provided by meteo-stations, the system can give advanced alert on icing. Most commonly, icing occurs on bridges, which generally have lower temperature than roads at the ground level. Slippery road surfaces often occur in the hills, where braking is necessary more often and the wheels spin on the snow. This, in particular, appears on the bridges of E. Beneš and Mariánský, the connecting ramps, the road I/30 in the street Důlce or the street Přístavní by the river Elbe.

The development of the city is closely related to the development of industrial production. A key sector benefiting from the city location became the chemical industry. The industrial area Spolchemie is situated near the city centre defined by streets Tovární, Kekulova, Okružní, Solvayova, Klíšská and U Chemičky. Beside chemistry, food industry is developed in the city. The most important enterprise is Setuza, which is the largest producer of fats in the Czech Republic. The seat of the company is situated in Střekov, outlined by streets Purkyňova, Truhlářova, Nová and the railway line no. 503 Ústí nad Labem–Střekov–Děčín. Another large industrial area is the zone Severní Předlice, which is located west of Spolchemie. The risks

resulting from industrial production lie in the possibility of accidents in the factories. During the last ten years, Spolchemie has had more than 10 accidents, during which dioxins, chlorine, hydrogen chloride, hydrogen trioxide and other dangerous substances escaped into the air. In case of increased concentrations of adverse or harmful gases in the air, instructions are issued to exclude traffic from the affected area. For such emergency conditions, the large chemical factories (Spolchemie and Setuza) utilise colour light signalling accompanied by sound warnings. They are also equipped with glass plates with guidelines located by the entrances to the complex. If the signal is on, drivers may not enter the affected zone in order to avoid them inhaling dangerous substances.

Another specific industrial field is operation of the quarry Mariánská rock for phonolite mining. Blasting works taking place in the mining areas are announced by sound warnings. The risk of limiting or affecting the road traffic is low.

Traffic problems and congestion on the road network of Ústí nad Labem may also occur due to an emergency closure of D8 highway, which passes on the west and is currently the major transport connection to the city. In the near future, transit traffic should be transferred from roads of classes I and II to this large capacity highway. In order to realise such transfer, the last remaining missing section of the highway between Lovosice-Řehlovice must be constructed and thus the connection of Prague-Dresden-Berlin would be finalised. In terms of strategic traffic management in the city, an early notification system for emergency situations (and resulting road closures) and information on suitable bypassing routes should be provided.

### 4.3 Management and Organization of Road Traffic

Management system and road traffic organization includes light signalling and variable traffic signs.

#### *System of traffic management via traffic light signals*

Intersections with intensive traffic in the city, and locations, where it is appropriate in terms of road safety, are equipped by traffic light signalling devices. All implemented traffic light devices allow dynamic traffic management, depending on the actual traffic situation. One device allows preference of trolleybuses (intersection Sociální péče with Mezní) and seven devices are coordinated to provide sequential green light signals. The traffic management system realised by traffic lights includes camera surveillance system, which provides video-information on traffic from the relevant light-controlled intersection. The video message is transmitted to the monitoring centre of the traffic light administrator and to the Police of the Czech Republic in Řehlovice.

Another utilised technology is priority for the Integrated Rescue System on intersections. This system enables the rescue vehicles equipped with a radio transmitter to send a signal for priority passage on the relevant intersection. The device detects the direction of the rescue vehicle and the controller subsequently engages green light phase for this direction and red light phase for other directions.



The controllers of the traffic lights are equipped by basic logic that allows the signal plans to be adapted to the current transport situation. In case of less frequented periods, they reduce the time delay of vehicles at traffic light controlled intersections.

The following three basic algorithms are applied for management of traffic light devices:

- A fixed sequence of phases with possible extension of phases (dynamic management) and insertion of the phase for pedestrians based on request (button for pedestrians at a pedestrian crossing);
- Permanent green phase in the main direction with possible phase for pedestrians and extension of phases;
- Permanent red phase with possible phase for pedestrians and extension of phases (usually for night traffic).

Coordinated management of traffic lights is achieved either through coordination of the length of the cycle based on the cycle length of the overall group controller or based on dynamic coordination. For dynamic coordination, the order and length of the phases of traffic lights adapt, based on impulse of the group controller, in order to reach in the defined time implementation of the phase ensuring passage of vehicles in the coordinated group.

Traffic light devices in Ústí nad Labem and their basic functionality are listed in the following table:

Figure 2 - Intersections with traffic lights in the city

Code	Intersection	PT preference	Red light passage	Coordination
K01	Děčínská - Nár. Odboje	Rebuilt to a roundabout		
K02	Předmostí - Důlce	No	No	No
K03	Přístavní - Hrnčířská	No	No	No
K04	Přístavní - Drážďanská	No	No	No
K05	Pražská - Žižkova	No	Yes	No
K06	Crossing at the Main Railway Station	No	Yes	No
K07	Malá Hradební - U Trati - Spojka	No	Yes	Yes
K08	Panská - Revoluční	No	No	Yes
K09	Panská - Brněnská	No	No	Yes
K10	Špitálské náměstí	No	Yes	Yes
K11	Bělehraská - Sociální péče	No	No	No
K12	Sociální péče - Mezní	Yes	No	No
K13	Malátova - Hoření	No	No	No
K14	Masarykova - Sadová	No	Yes	No
K15	Masarykova - Štefánikova	No	Yes	Yes
K16	Žižkova - Makro	No	No	No
K17	Havířská - Spojovací	No	No	Yes
K18	Havířská - K Zahrádkám	No	No	Yes
P01	Winter stadium	No	No	Yes
P02	Bílinská	No	No	Yes

### Technological equipment of traffic light devices

#### Controller of traffic light devices

Traffic light devices are controlled by the micro-processor controllers. In Ústí nad Labem, the controllers are from the company AŽD-DAST Brno and Siemens. Controllers are connected by optical network or wirelessly by wi-fi with the supervising centre of the administrator (NTD Group). The controllers allow traffic dependent management - they adapt to the current traffic situation and respond according to the designed management logic.

#### Supervising centre for traffic light devices

The supervising centre of the administrator enables monitoring of the technical status and the management status of traffic light devices. In case of failure of a traffic light device, the controller sends an error message and, at the same time, sends SMS message to a mobile phone of a technician. There is no traffic management control centre implemented for Ústí nad Labem.

#### Traffic detectors

For detection of vehicles, traffic light devices are equipped by detectors - primarily inductive loop vehicle detectors of located in the ground. Near and remote detectors are usually placed

in front of an intersection in the city. The near detector is located about 1m in front of the stop line of the traffic light device, the remote detector usually about 30-50m. For the permanent red light phase, the remote detector allows fluent passage of the vehicle on the green light while in compliance with the permitted speed limit. Detectors can capture time gaps, volume and period of occupancy and, if two consecutive loops are implemented, also speed of vehicles.

Another utilised technology is infrared or microwave detectors with similar features as inductive loops, but without the need for any intervention into the road surface. The system that requires most investment is the video-detector, which enables wider scale of usage compared to other types of detectors. Camera can capture occupancy, time gap, speed and also passage of vehicles during the red light phase including their registration numbers.

#### Detection of PT vehicles

At most intersections, PT vehicles are detected by detectors together with all other vehicles, which does not allow them priority. The exception is the intersection Sociální péče with Mezní, where trolleybuses are detected by trolley contact detectors. Based on the detection, the management logic of the traffic light device controller engages the priority phase for the passage of a trolleybus. The management logic is not influenced by the parameter of the actual position of the trolleybus compared to the position according to its timetable. Therefore, all the delayed and on-time vehicles have the same level of preference at the intersection. Detection of PT buses is not implemented in Ústí nad Labem.

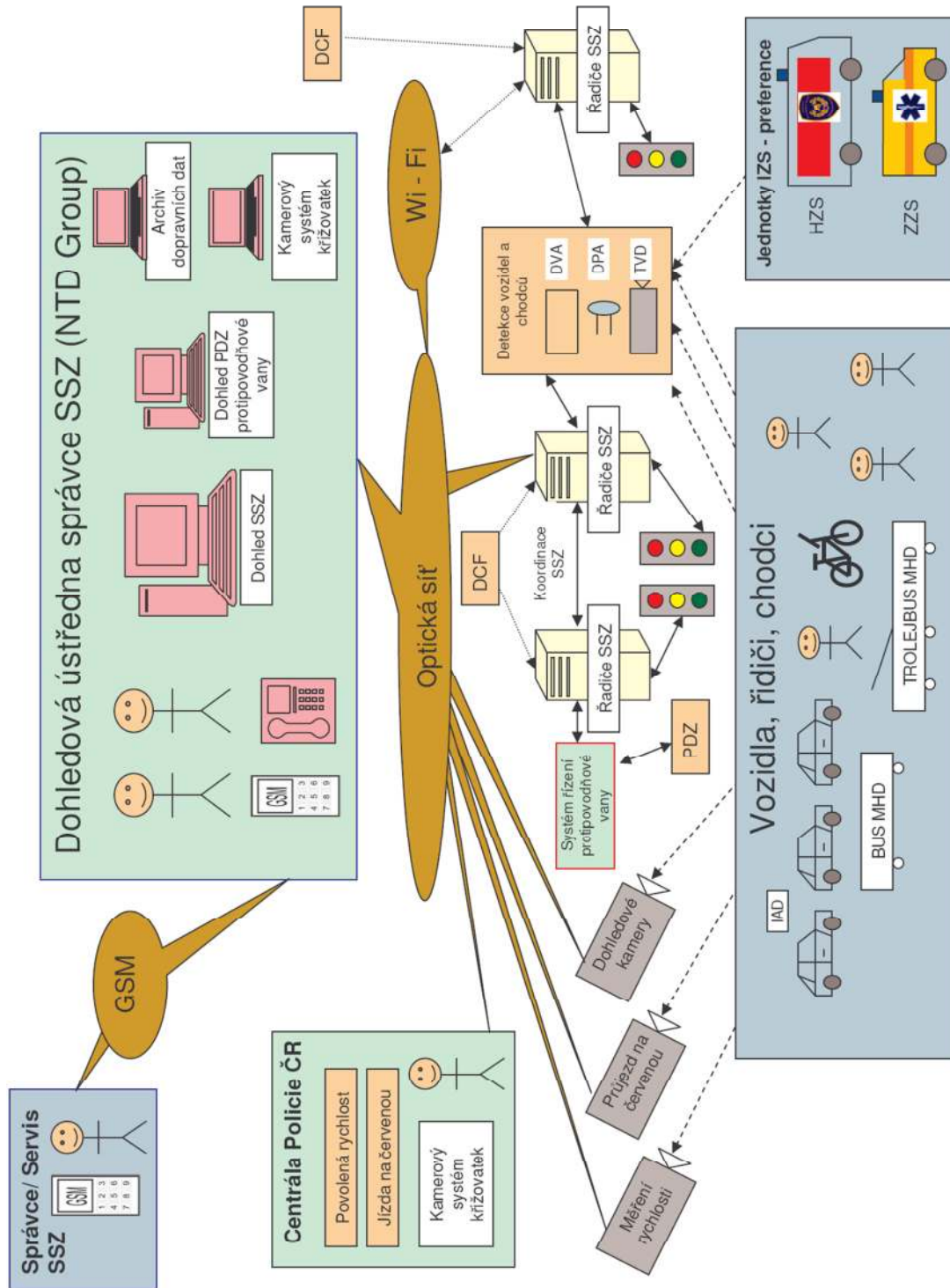
#### Detection of vehicles of the integrated rescue system

Vehicles of the integrated rescue system in the city are equipped with a device allowing wireless transmission of a signal to the traffic light device controller. The signal is recorded by IR beacons and the phase for passage of integrated rescue system vehicles is in the running programme added immediately after receiving the claim and, where appropriate, the time interval from a remote IR beacon. The phase is set to ensure non-conflict passage through the intersection by using the appropriate phase transition while preserving the time gap. When the traffic light device controller receives the claim for priority of passage from the integrated rescue system vehicle, it leaves the basic management logic and shifts to a separate algorithm, which is defined for execution of the phases towards integrated rescue system priority. In case of another claim for priority, the controller may extend the priority phase. After passage of the relevant vehicle and its logoff, the controller switches back to the normal mode.

#### The registry of vehicle claims

The traffic light device controllers are further equipped with registers of vehicle claims, which record and archive data from the traffic light device detectors. The servicing organisation (NTD Group) can, at request of the city, provide listings of archived data from these registers, which are then used for transport-engineering purposes. The number of passing vehicles is recorded even if the device switches to a blinking yellow mode. The vehicles are not counted only if the device is switched off and disconnected from electricity due to failure. Data in controllers are archived at the local level. When the memory capacity of the registry is full, the new data are rewritten over the oldest data. The memory capacity covers at least the three most recent months of archiving. Currently, the transport data are not transmitted online to a more strategic level.

Figure 3 – Current physical architecture of the management system of traffic light devices



## Legend for Figure 3:

<u>Legend:</u>
Správce SSZ – Administrator of traffic light devices (TLD)
Dohledová ústředna správce SSZ – Supervisory centre of the administrator of TLD
Dohled SSZ – Supervision of TLD
Dohled PDZ protipovodňové vany – Supervision of variable traffic signs of the flood tub
Archiv dopravních dat – Archive of traffic data
Kamerový systém křižovatek – Cameras system on intersections
Centrála Policie ČR – Centre of the Police of the Czech Republic
Povolená rychlost – Permitted speed
Jízda na červenou – Passage on the red light
Kamerový systém křižovatek - Cameras system on intersections
Optická síť – Optical network
Měření rychlosti – Speed measurement
Průjezd na červenou - Passage on the red light
Dohledové kamery – Surveillance cameras
Systém řízení protipovodňové vany – Management system for the flood tub
Řadiče SSZ – Controllers of traffic light devices
PDZ – Vvariable traffic signs
Koordinace SSZ – Coordination of traffic light devices
Detekce vozidel a chodců – Detection of vehicles and pedestrians
Vozidla, řidiči a chodci – Vehicles, drivers and pedestrians
IAD – Individual motor transport
Bus MHD – PT bus
Trolejbus MHD – PT trolleybus
Jednotky IZS – Bodies of the Integrated Rescue System

### ***Comparison of accidents and consequences on traffic light controlled intersections***

The number of accidents and their consequences on traffic light controlled intersections are summarised in the following table. The largest number of accidents occurred at the intersection Pražská with Přístavní. However, due to high traffic intensity on the entry routes, the relative accident rate is not high and this intersection is not assessed as dangerous. After the completion of the D8 highway, the traffic light signal should be changed here. Instead of the full colour light signal at the intersection and the evacuation green arrow in the opposite corner, directional light signal should be placed at the intersection, which would slightly reduce capacity of the entrance but it would increase safety of the left turn from the street Pražská. In terms of consequences, two serious injuries occurred on the traffic light controlled intersection Přístavní with Hrnčířská. After the completion of the flood tub, new

transport solutions for traffic light devices are proposed and, therefore, it is appropriate to evaluate impacts on the accident rate after about two years of operation.

**Figure 4 – Accident rate on individual traffic light controlled intersections in the city**

Code	Intersections	Period	No. of accidents	Heavy injuries	Light injuries	Proposed for modification
K 01	Děčínská – Nár. odboje	Currently reconstructed as a roundabout				
K 02	Předmostí – Důlce	1.2.2007-17.8.2009	44	0	2	YES
	Velká Hradební - Důlce	1.4.2007-25.1.2010	18	0	3	YES
K 03	Přístavní – Hrnčířská	25.2.2007-25.9.2009	42	2	4	NO
K 04	Přístavní – Drážďanská	26.1.2007-27.8.2009	25	0	3	YES
K 05	Pražská – Žižkova (ostrov)	3.7.2007-13.2.2010	50	1	3	YES
K 06	Crossing at the Main Railway Station	7.4.2007-20.4.2010	6	0	2	YES
K 07	Malá Hradební - U Ttrati - Spojka	11.3.2007-15.3.2010	20	0	1	YES
K 08	Panská – Revoluční	3.7.2007-12.2.2010	16	0	3	YES
K 09	Panská – Brněnská	20.2.2007-1.9.2010	20	0	5	YES
K 10	Špitálské náměstí	28.1.2007-7.7.2010	11	0	0	NO
K 11	Bělehradská – Sociální péče	2.3.2007-17.2.2010	27	1	3	YES
K 12	Sociální péče – Mezní	18.1.2007-21.8.2009	21	1	3	YES
K 13	Malátova – Hoření	1.7.2007-25.6.2010	16	0	1	NO
K 14	Masarykova – Sadová	26.4.2007-7.2.2010	17	0	5	YES
K 15	Masarykova – Štefánkova	11.1.2007-9.3.2010	8	1	1	NO
K 16	Žižkova – Makro	6.1.2007-9.11.2010	18	0	10	NO
K 17	Haviřská – Spojovací	23.1.2007-4.8.2010	17	1	5	NO
K 18	Haviřská – K Zahrádkám	12.2.2007-27.3.2010	24	1	11	YES
P 01	Crossing by the Winter Stadium	17.3.2008-15.6.2009	3	0	1	NO
P 02	Crossing on Bílinská	Not analysed due to ongoing construction works				

### Traffic management system realised via variable traffic signs

In Ústí nad Labem, variable traffic signs are installed on the street Přístavní (road I/30). It allows changes of traffic organisation in case of emergency, such as floods or torrential rains. The system is part of the flood tub. The variable traffic signs can divert traffic and announce closures of the street Přístavní in the section between the traffic light controlled intersections Pražská with Přístavní and Přístavní with Hrnčířská. In case of a closure, traffic is diverted by directional variable traffic signs into the streets Žižkova and Hrnčířská. The closure is realised via prohibiting variable traffic signs and via electrically operated gates with light signals. In case of a closure, controllers of traffic light devices respond by switching from the normal sequence to the blinking yellow mode. Closure of the particular section is activated either automatically, based on the impulse of the water level sensor in the water-pumping station of the flood tub, or remotely, based on the input from the Municipal Police station, where the control terminal and visualization of the management for variable traffic signs is located. It is possible to perform closure locally by two manual controllers located in streets Přístavní and Hrnčířská. The section is monitored by the cameras of the NTD Group and Police of the Czech Republic, and by city surveillance system of the Municipal Police. In case

of emergency, variable traffic signs can be also utilised for closures due to different reasons, for example due to large traffic accidents. The detailed description of the system is presented in following paragraphs.

#### System of variable traffic signs of the flood tub

For the closure of traffic passing through the flood tub, variable traffic signs are utilised. It includes the following:

- Large-sized variable traffic signs located on the portals at the arrival to flood tub in the direction from Děčín (IS 6c) and Lovosice (IS 6e);
- Variable traffic signs B1 “Entry prohibited for all vehicles” placed at the arrival to the flood tub in the direction from Lovosice, Děčín and ramps of the bridge of Edvard Beneš;
- Variable traffic signs IP 19 (separating lanes) located at the arrival to the flood tub in the direction from Trmice (Žižkova street) and the city centre (street Hrnčířská).

The transit-ability of the flood tub is reflected by traffic light signals at following localities:

- Intersection of the streets Pražská with Přístavní;
- Intersection of the streets Přístavní with Hrnčířská;
- Pedestrian crossing at the street Přístavní by the underpass below the railway line at the street U Můstku.

To restrict entrance to the closed flood tub, automatic gates located at the entrance to the flood tub in the direction from Lovosice, Děčín and at ramps of the bridge of E. Beneš are utilised. These automatic gates are 6m or 8m long and they mechanically close the traffic lanes.

The variable traffic signs and automatic gates, due to the division into six groups, can be utilised also for traffic modifications other than closures of the flood tub due to torrential rains or floods.

The above mentioned variable traffic signs, traffic lights and gates allow two basic settings:

- Regular mode for normal operational state - STATUS 1
- Closure mode for emergency situations – STATUS 2

For transition between these two modes, gradient sequences are defined, which allow evacuation of vehicles and subsequent closure.

For non-standard situations, manual control of the variable traffic signs is defined at the local management level. The manual control allows partial closures of the flood tub realised via specific groups of variable traffic signs and automatic gates. Control system of variable traffic signs further communicates with traffic light devices at the related intersection (Přístavní with Žižkova street).

### Management priorities for variable traffic signs

Variable traffic signs for the flood tub and related traffic light devices are controlled at several levels.

Radar sensor of the pumping station can initiate automatic sealing of the flood tub in case of increased water levels. Furthermore, the flood tub can be closed from the Municipal Police station.

At local level, changes in the variable traffic signs for the flood tub can be realised directly on the spot by two manual controls. Variable traffic signs are controlled in predefined groups, which allow the arrangement of partial closures.

Manual control at Žižkova street operates variable traffic signs for the direction towards Děčín. Manual control at Hrnčířská street operates variable traffic signs for the direction towards Lovosice, and variable traffic signs and the automatic gate for the bridge of Edvard Beneš.

If a traffic light device is controlled manually, the device automatically does not react on other commands.

Information on manual control is marked on the device and is signalled to the control station of the Municipal Police.

Management priorities for variable traffic signs are following:

- the highest priority is control at local level (i.e. manual control);
- medium priority is control from the Municipal Police station;
- the lowest priority is automatic reaction on the impulse sent from the sensor of a pumping station.

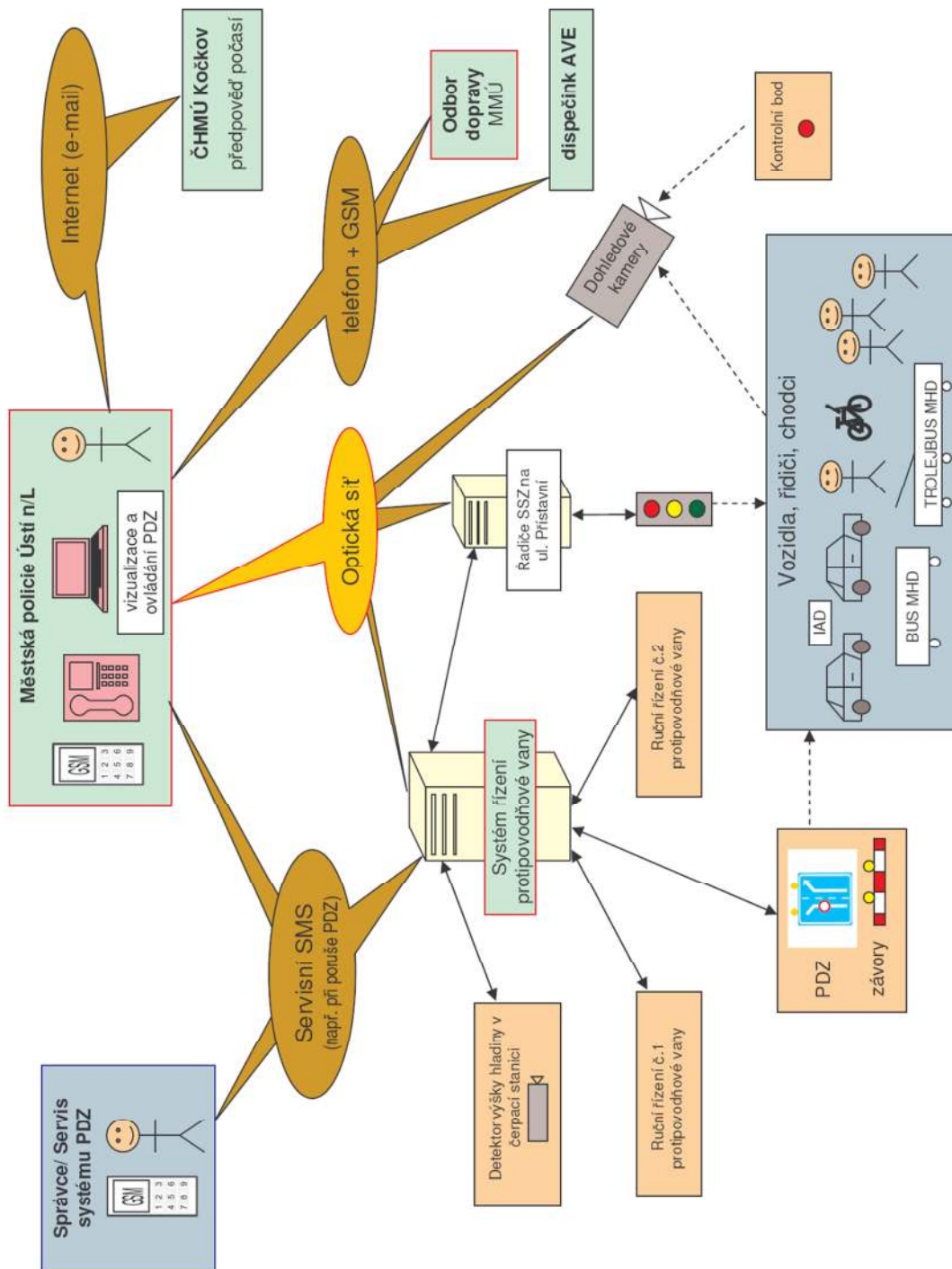
Both manual control devices have the same priority.

In case of closure of the flood tub, the reopening can be made only from the same or higher priority control level.

The scheme of the physical architecture of the management system for variable traffic signs is presented on the following scheme.



Figure 5 - System of traffic management realised via variable traffic signs at the street Přístavní



## Legend for Figure 5:

Legend:

Správce/servis systému PDZ – Administrator/service of variable traffic signs (VTS)  
 Městská Policie – Municipal Police  
 Předpověď počasí – Weather forecast  
 Servisní SMS, např. při poruše PDZ – SMS to the servise, e.g. in case of failure of VTS  
 Optická síť – Optical network  
 Telefon + GSM – Telephone & GSM  
 Detektor výšky hladiny v čerpací stanici – Detector of the water level in the pumping station  
 Systém řízení protipovodňové vany – Management system for the flood tub  
 Ruční řízení č.1 protipovodňové vany – 1<sup>st</sup> manual control of the flood tub  
 Ruční řízení č.1 protipovodňové vany – 2<sup>nd</sup> manual control of the flood tub  
 PDZ – VTS  
 Závory – gates  
 Řadiče SSZ na ul. Přístavní – controllers of traffic light devices on the street Přístavní  
 Dohledové kamery – Surveillance cameras  
 Odbor dopravy MMÚ – Department of Transport, Ústí nad Labem Municipality  
 Kontrolní bod – Check point  
 Vozidla, řidiči a chodci – Vehicles, drivers and pedestrians  
 IAD – Individual motor transport  
 Bus MHD – PT bus  
 Trolejbus MHD – PT trolleybus

## 4.4 Traffic Data and Information

Collection of traffic data and information takes place in Ústí nad Labem at local systems, which are not interconnected. Individual entities utilise those traffic data and information, which directly relate to their activities (traffic management, public transport, service of traffic signs, maintenance, security, ensuring passability, etc.). The total volume of traffic data obtained and used is quite large; however, these data are utilised or archived only in locally-driven systems. Similar situation relates to traffic information, although, some entities in the city transfer the traffic information to the National Traffic Information Centre (NDIC).

Following source of traffic data and information are available in Ústí nad Labem:

### *Department of Transport, Ústí nad Labem Municipality*

The Department of Transport at the Ústí nad Labem Municipality is the administrative authority for local roads on the city territory. Therefore, it also records and permits closures of roads, it provides permits for special usage at local roads, it permits transport construction

works and their components, it keeps the register of vehicles, map evidence of roads, it operates the city parking system, etc. The Department also provides technical materials for development of the urban information and navigation system.

The Department of Transport thus collects the following traffic and travel information:

- Information on planned and actual closures and limitations on the city territory;
- information on transport of oversized cargo;
- information on changes of traffic organization;
- information on road construction works;
- information on charged parking places (primarily in the city centre);
- information from the registry of vehicles.

Part of the traffic information is available on the official website of the Municipality ([www.usti-nad-labem.cz](http://www.usti-nad-labem.cz)).

#### **NTD Group:**

NTD Group is a company responsible for maintenance of traffic light signalling devices on the city territory. Therefore, the company has access to data from the system of traffic management of traffic light devices and to information from traffic cameras located at traffic light controlled intersections. Traffic data from detectors of traffic light devices enable dynamic traffic management and provide information on traffic intensity. Operation data from the traffic light device controllers provide information about management and failures. Information from traffic cameras provide visual message about traffic on monitored locations. Collected and archived data and information are of the following types:

- Data from traffic light device detectors, which are partially available only in the off-line mode. Notes from the controller registers are used mainly for transport-engineering purposes. Traffic light device controllers further include registers of vehicles which passed the traffic light device detectors. Data processed from detectors are recorded and archived. Based on these registers, service company (NTD Group) can, at the request of the city, gain listing of archived traffic data, which are then used for transport-engineering purposes. Part of the data can be transmitted on-line from a controller to the superior level (monitoring system of traffic light devices). However, most of the data is archived only at the local level.
- The output from the traffic cameras is available at the NTD Group and in the operational centre of the Police of the Czech Republic in Usti nad Labem. Records are utilised mainly for assessment of traffic rule violations (driving on a red light, excessive speed, etc.).
- Information about failures of traffic light devices is transmitted to the monitoring centre of the NTD Group and via GSM network to the service technician. If a traffic light device is, due to a failure, in a flashing yellow mode, there is high probability of congestions and thus higher possibility of traffic accidents at the entrances to the traffic light controlled intersection. Therefore, it is important traffic information with high priority.

The above listed traffic data and information are not currently utilised for providing information to drivers and travellers about current traffic situation in the city.

### ***Municipal Police of Ústí nad Labem***

The Municipal Police has access to visual data from the city cameras system (MKS). These surveillance cameras are primarily used for supervision on the security situation at public spaces. Some of the cameras are, however, located at locations where it is possible to monitor the current traffic situation. Regarding the number of cameras, the MKS provides the most extensive source of data in visual format. The output from the cameras system is currently not utilised for purposes of traffic information, neither for other entities, such as administrators of the transport infrastructure, winter maintenance or the integrated rescue system. With regard to the valid legislation, possibilities of the output video data and related personal data are limited. Currently, protection of personal data does not allow providing previews from cameras to anyone beyond the operational centre of the Municipal Police.

The Municipal Police also dispose of reports of events occurring in the city, some of which may affect road safety and traffic fluency. The Municipal Police has the possibility to provide selected information to the National Traffic Information Centre (NDIC) into their United System of Traffic Information (JSDI).

### ***The dispatching centre of the Public Transport Company of Ústí nad Labem***

The dispatching centre of the PT Company of Ústí nad Labem has information about the current position and movement of the PT vehicles. On the basis of monitoring position and delay of vehicles, it is possible to indicate locations with traffic problems. PT vehicle can be thus utilised as floating vehicles for traffic data collection and predict estimation of driving speed and travel time on specified routes. Another source of data is verbal information about the current traffic problems provided by PT drivers. For transmission of such information, dedicated radio network of the PT Company is used. It would be appropriate to transmit selected information also to a traffic information centre.

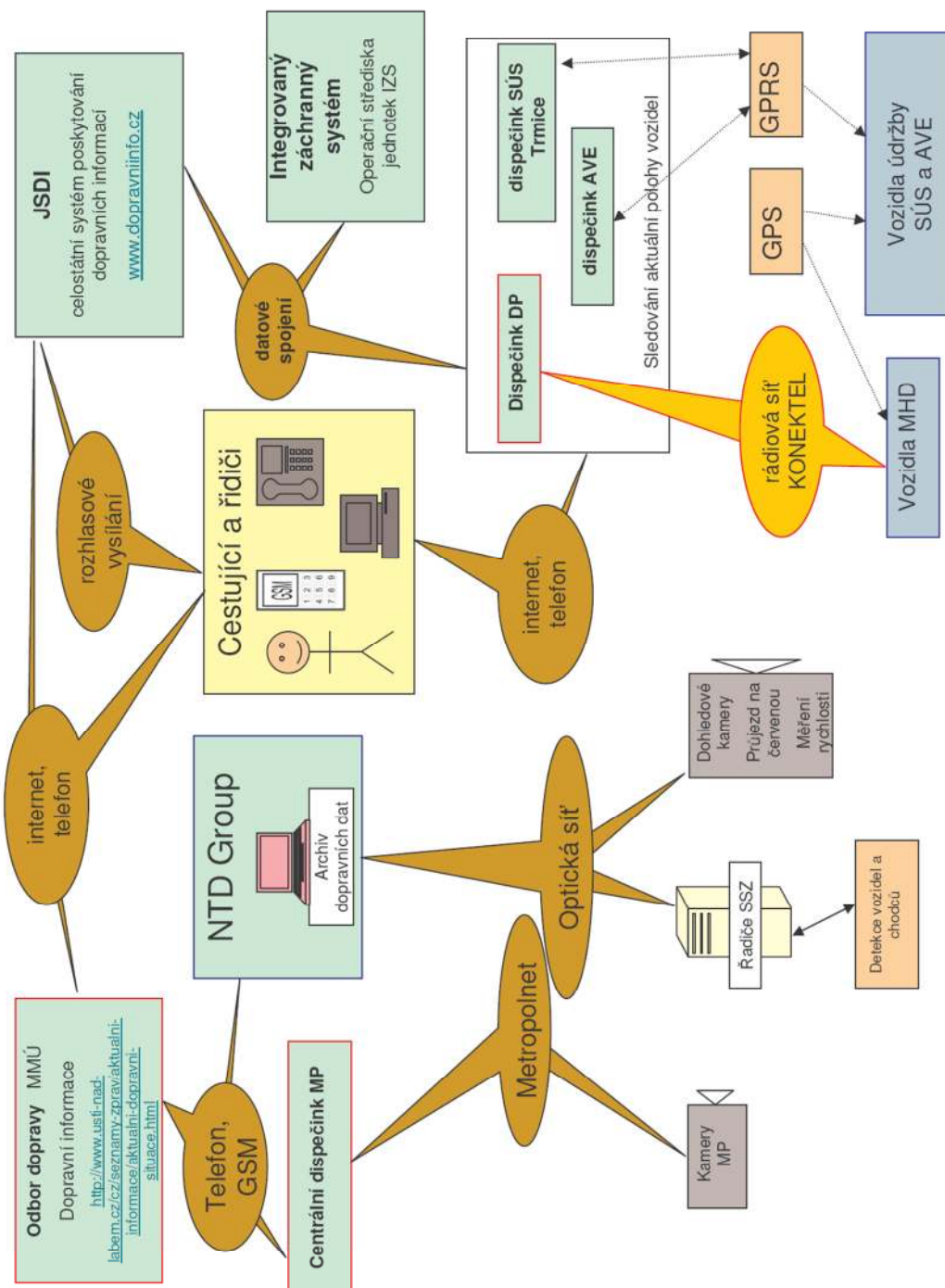
### ***The dispatching centre of the maintenance service for local roads***

The control dispatching centres of the companies SÚS Trmice (administration for road maintenance) and AVE (road treatment) in winter collect information on passability of local roads and transit sections of state roads. Transmission of information on passability is processed for the National Traffic Information Centre (NDIC). It would be appropriate to use the output also at the local level, both for an information centre and for a management centre.

### ***Travellers and drivers***

Traffic participants are a valuable source of traffic information. They usually provide information via telephone. Typically, problems occur with identification of a specific location of the event, determination of the extent and verification of relevance. Such traffic information should be processed at the city traffic information centre and, once verified, information should be provided to the management centre and to the National Traffic Information Centre (NDIC).

Figure 6 – Current physical architecture of the subsystem of traffic data and information



Legend for Figure 6:

Legend:

Odbor dopravy MMÚ – Department of Transport, Ústí nad Labem Municipality

Dopravní informace – Traffic information

Internet, telefon – Internet, telephone

Rozhlasové vysílání – Radio broadcasting

JSDI - United System of Traffic Information

Centrální dispečink MP – Dispatching centre of the Municipal Police

Cestující, řidiči – Travellers, drivers

Datové spojení – data connection

Integrovaný záchranný systém (IZS) – Integrated Rescue System

Operační střediska jednotek IZS – Operation centres of the Integrated Rescue System

Optická síť – Optical network

Dispečink DP – Dispatching centre of the PT Company

Dispečink SÚS Trmice – Dispatching centre of SÚS (road maintenance)

Dispečink AVE – Dispatching centre of AVE (road treatment)

Sledování aktuální polohy vozidel – Monitoring position of vehicles

Kamery MP – Cameras of the Municipal Police

Řadiče SSZ – Controllers of traffic light devices

Dohledové kamery – Surveillance cameras

Průjezd na červenou – Passage on the red light

Měření rychlosti – Speed measurement

Detekce vozidel a chodců – Detection of vehicles and pedestrians

Radiová síť KONEKTEL – radio network KONEKTEL

Vozidla MHD – PT vehicles

Vozidla údržby SÚS a AVE – Service vehicles of SÚS and AVE

## 4.5 Parking in the City

Individual and garage parking in the city is operated by the Municipal Services of Ústí nad Labem, the contributory organization founded by the city. Its activities include regular monitoring of parking premises and parking machines and their repair. In addition to the parking lots with parking machines, there are parking places with a gate access system located in the city. Operating time of both types of parking is Mon-Fri 7am-6pm and 8am-1pm.

Parking premises:

- the street Spojovací
- the street Prokopa Diviše
- the street Klášterní (ČNB)
- the street Pařížská
- the street Dlouhá
- the street Velká Hradební (Union Bank)
- the street Velká Hradební
- the street Velká Hradební (Culture House)
- the street Bratislavská
- the street Stroupežnického
- the street Bělehradská
- the street Winstona Churchila (Ceremonial Hall)
- the street Masarykova (rear wing)
- the street Winstona Churchila (hotel Vladimír)
- the street W. Churchila (House for Children and Youth)
- the street Masarykova (towards Teplice)
- the street Masarykova (towards the city centre)
- the street Londýnská
- the street Moskevská (park)
- the street Předmostí
- Špitálské square (OZP)
- the street Klíšská (Ústecký Deník)
- the street Klíšská (Městské spa)
- Špitálské náměstí (Losan)
- Špitálské náměstí (park)
- the street Vaníčkova (park)
- the street Vaníčkova (theatre)
- the street Žukovova (restaurant U Lípy)
- the street Varšavská (Činoherní theatre)
- the street Raisova (park)

Outside of the selected location, parking price per each started hour is 10 CZK and 70 CZK per day. An increased fare applies in street Malá Hradební (20 CZK/hour, 100 CZK/day), an increased fare with a progressive rate is in the street Dlouhá (20 CZK for the first started hour, 50 CZK for each additional hour, 200 CZK/day), and reduced fare applies in the street of W. Churchill by the hotel Vladimír (5 CZK/hour, 30 CZK/day). Parking of motorcycles is free.

### **SMS parking**

Since 2008, drivers have an opportunity to pay for parking in the city not only at the parking machines, but also via SMS messages. Price of the service is 15CZK, including VAT. Each SMS can pay one hour of parking by sending a text to the Municipal Police in the following form:

“xx (the number of the parking lot) the licence plate number”

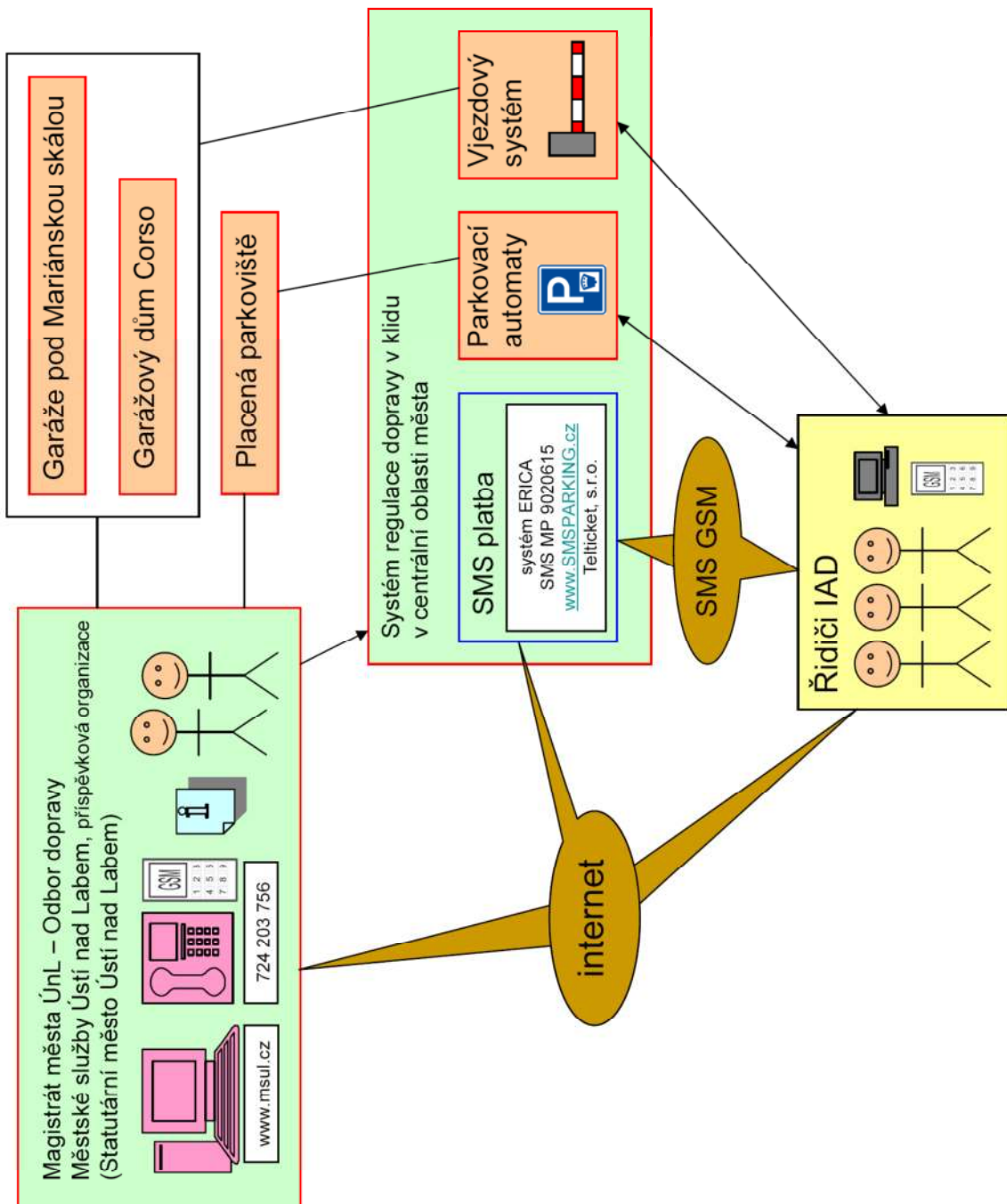
to the telephone number 9020615. Parking can be extended by sending an SMS each hour. The operator of the service is the company TELTICKET. Monitoring of parking payments is carried out by the Municipal Police by devices for on-line control.

Resident permit cards are issued to applicants whose permanent residence is at place immediately adjacent to the road section with paid parking.

Other parking facilities are at the parking garages located at the Mariánská rock and in Krásné Březno. The garages below the Mariánská rock have four above ground floors with a total capacity of 424 vehicles. Payment for parking is realised by collecting a short-term parking card from the ticket system or in advance at the garage attendant, who can issue a payment voucher and a long-term parking card. Parking in the Mariánská rock garage is free of charge for the first 3 hours, then 5 CZK/hour. Price for parking in the garage Corso is 15 CZK/first hour, 10 CZK/next hour and 150 CZK/day. Reduced rates at both locations are available for parking for 1 week, 2 weeks or 1 month.



Figure 7 - The current physical architecture of the parking subsystem



## Legend for Figure 7:

Legend:

Magistrát města Ústí nad Labem, Odbor dopravy – Ústí nad Labem Municipality, Department of Transport

Městské služby Ústí nad Labem – Municipal Services of Ústí nad Labem

Garáže pod Mariánskou skálou – Collective garage Mariánská rock

Garážový dům CORSO – Collective garage CORSO

Placená parkoviště – Paid parking area

Systém regulace dopravy v klidu v centru města – Regulatory system for parking in the city centre

SMS platba – SMS payment

Parkovací automaty – Parking machines

Vjezdový systém – Entrance system

Řidiči IAD – drivers of individual motor vehicles

## 4.6 Public Transport

PT is in the city operated by the PT Company of Ústí nad Labem, a joint-stock company of the city. The company operates trolleybuses and buses and the cableway to Větruše hill. In terms of modal split, public transport is slightly less utilised than individual transport in the city. Increasing attractiveness of public transport services is therefore an important objective of the city. One of the possibilities for improvements is utilisation of available technologies for city public transport. In-depth survey of PT services was conducted in 2009 in order to optimise routes, timetables and usage of all PT lines in the city.

Basic data on city public transport collected from the annual report of the PR Company of Ústí nad Labem in 2009:

- |                         |                  |
|-------------------------|------------------|
| • Number of vehicles    | 136              |
| • Number of lines       | 32               |
| • Length of lines       | 451 km           |
| • Number of connections | 2429             |
| • Number of passengers  | 184 thousand/day |

The above data shows that, in the framework of regional cities of similar size, PT Company of Ústí nad Labem is one of the major operators of public transport.

### 4.6.1 PT Infrastructure and Preferential Measures

PT lines are operated within the main traffic space on local roads. In the city centre, PT vehicles serve the streets Hrnčířská, Revoluční, Masarykova and Malá Hradební, which are the backbone roads of the city.

Preferential measures for trolleybuses are applied at the traffic light controlled intersection Sociální Péče with Mezní (the preferred direction is left-turn) and further realised by traffic

signs in the city centre at Mírové square (entrance prohibited for individual motor transport). Detection of buses is not applied in the city. Preferential measures are neither applied for driving lanes, there are no lanes dedicated to PT vehicles only. During busy hours, delay of PT therefore increases. Most of the traffic light controlled intersections in the city are utilised by PT vehicles. In terms of passability and delay, the most problematic intersection is at Předmostí, where a PT vehicle must often stop twice before passing the traffic signal.

The most frequented transport nodes with regard to the city PT, are the following stations in the city - Hraničář, Theater, and Main Railway Station. These three stations are also the major transfer points in the city (trolleybus/bus/train).

## 4.6.2 Vehicle Fleet

All public transport vehicles are equipped with position monitoring device by means of GPS. Position of a vehicle is transmitted either at regular intervals or in stations by radio signal into the dispatching centre of the PT Company. Vehicles are further equipped by radio device for communication with a dispatcher of the PT Company and by voice message informing about the current station and the next station.

### 4.6.2.1 Dispatching centre of the PT Company of Ústí nad Labem

Technical support for public transport, solving non-standard and emergency situations, monitoring and recording the position of PT vehicles is ensured by continuous operation by at least two personnel at the dispatching centre of the PT Company. The dispatching centre is located in the PT Company headquarters on the street Revoluční 26. It is equipped with supervisory and control system for position monitoring of each vehicle at individual lines. It also allows radio communication with PT drivers via Konektel network and dial-up telephone connection to other related entities, including road maintenance service, the police, the transport control system, service organizations, etc. Transmitter of the dedicated network Konektel is located in Severní Terasa.

The dispatch centre is equipped with computer software for monitoring vehicle position, evidence of all events related to each trip of a vehicle and communication with a driver. Visualization and control is carried out by standard desktop computer with two-monitor screens and a large wall screen. In addition to position tracking, the dispatching centre organises backup services, registers delays and ensures communication.

If needed, the dispatchers have mobile phones and fixed-line phones to inform or ask for cooperation, especially during emergency situations, such as winter conditions requiring maintenance, situations endangering safety of passengers or drivers, technical issues or delays.

The dispatch centre is further connected to the security system of transport controllers (PANIC), which is used in the event of emergency of transport control personnel. The system is also connected to the Municipal Police station.

The dispatchers are able to provide information about PT passengers, although primarily, such information is provided by the PT information centre, which, however, does not operate

permanently. Information for travellers is usually provided via telephones at passenger request.

### 4.6.3 PT Information Centre

PT Information Centre provides information about current changes of PT services, timetables and fares. There is also an Internet search engine available to locate specific PT lines. The PT Information Centre is also accessible via Internet or via toll-free telephone line 800100613.

Timetables can be also downloaded to mobile phones and then displayed directly at the user. The PT Information Centre is located in the Revoluční street no. 26. The operating hours are Mon-Fri 7:00am – 3:00pm.

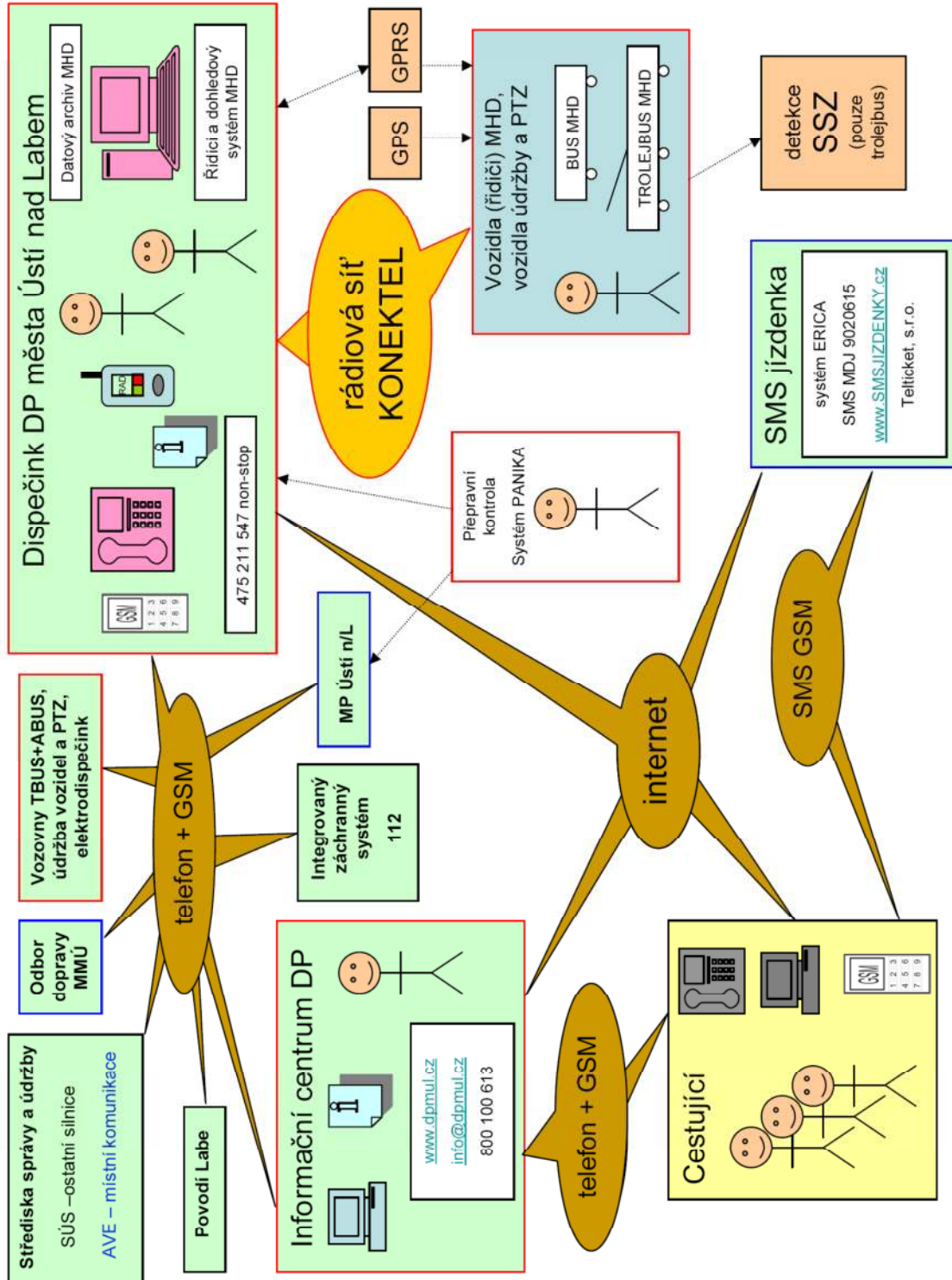
### 4.6.4 SMS Tickets

PT fares in the city can be paid through SMS tickets. This ticket can be purchased by sending an SMS text “MDJ” on the telephone number 9020615. Validity of the ticket is 40 minutes. This service is experiencing significant increase of users. The operator of the service is TELTICKET Ltd.

### 4.6.5 The Current Physical Architecture of the PT Subsystem

Based on the analysis of the current state, the scheme of the existing physical architecture of the PT subsystem in Ústí nad Labem was processed. The scheme defines entities participating in providing and ensuring PT services on the city territory, passengers and interrelated communication.

Figure 8 - The Current Physical Architecture of the PT Subsystem



Legend for Figure 8:

<u>Legend:</u>
Střediska správy a údržby – Centres for administration and maintenance
SÚS, ostatní silnice – SÚS, other roads
AVE, místní komunikace – AVE, local roads
Odbor dopravy, Magistrát města Ústí nad Labem – Department of Transport, Ústí nad Labem Municipality
Vozovny TBUS+ABUS – Depo of TBUS&ABUS
Údržba vozidel a PTZ – Maintenance of vehicles
Elektrodispečink – Electro-dispatching centre
Dispečink DP města Ústí nad Labem – Dispatching centre of PT Company of Ústí nad Labem
Datový archiv MHD – Data archive of the PT Company
Řídící a dohledový systém MHD – Management and supervision centre of the PT Company
Povodí Labe – Elbe river basin
Informační centrum DP – Information centre of the PT Company
Integrovaný záchranný systém – Integrated Rescue System
MP Ústí nad Labem – Municipal Police of Ústí nad Labem
Radiová síť KONEKTEL – radio network KONEKTEL
Přepравní kontrola – Transport control
Systém PANIKA – PANIKA system
Vozidla, řidič MHD, vozidla údržby a PTZ – PT vehicles, PT drivers and service vehicles
Bus MHD – PT bus
Trolejbus MHD – PT trolleybus
Telefon+GSM - Telephone&GSM
Cestující - Passengers
SMS jízdenka – SMS ticket
Detekce SSZ, pouze trolejbus – Detection at traffic light devices, only for trolleybuses

## 4.7 Freight Transport

There is no co-ordinated centre for the goods and cargo transport system in Ústí nad Labem. Individual companies operate their own transport chains.

Authorisation of transport of especially heavy or oversized items and use of vehicles, whose dimensions or mass exceed the limit, is in the Czech Republic established on the basis of §25 of Act No.13/1997 Coll. on Road Infrastructure, as amended by administrative authorities, which are according to §40 of the above mentioned law:

- municipal office (Ústí nad Labem Municipality) for local roads and publicly accessible utility roads;
- regional authority (Regional Office of Ústí nad Labem) for roads of I., II. and III. class, excluding highways and expressways, where the route lies within the region;
- Ministry of Transport for routes beyond the region limits.

Data needed to issue the authorisation are stated in §40 (Special Usage of Roads), Decree No.104/1997 Coll., for execution of the law on Road Infrastructure, as amended. Request for authorization of special usage of a road is submitted to the Administrative Office by the person, whose interest is to be enabled. In addition, the request contains total weight and dimensions of the freight vehicles, its height, required date of transport, source and destination of the trip. The applicant also proposes the suitable transport route.

## 4.8 Surveillance Systems

### 4.8.1 Surveillance Centre of the Municipal Police of Ústí nad Labem

The essential devices of the surveillance system of the Municipal Police are cameras of the closed television circuit (CCTV). They are placed on pillars or walls of buildings; some of them are fixed, most of them can pivot / swivel. In addition to crime prevention, they may contribute to improved road safety. Currently, the Municipal Police utilises three surveillance camera systems - Intelix, Omnicast and Gotenbrick systems.

Cameras of the Municipal Police are connected by optical network, owned and managed by the company Metropolnet, with the dispatching centre of the Municipal Police of Ústí nad Labem. The dispatching centre can remotely control the cameras, their position or zoom. The dispatching centre has continuous operation of three workers. It allows communication with police officers via radio network. The dispatchers are in contact with other entities via fixed or mobile phones, in particular with individual centres for road administration and maintenance to gather data on passability of local roads and on bypasses, etc.

For flood risks, personnel of the Elbe Basin are contacted. Furthermore, Municipal Police receives warnings from dispatchers of Spolchemie factory on leakage of dangerous substances into the atmosphere. Municipal Police is further in contact with the Department of Transport of the Ústí nad Labem Municipality and with NTD Group. During non-standard situations, Municipal Police of course communicates with the other sectors of the integrated rescue system. At request, Police of the Czech Republic receives from the Municipal Police records captured by cameras. Furthermore, they communicated via telephones mainly information on stolen and towed away vehicles.

The dispatching centre of the Municipal Police has also access to the visual system and management of the flood tub, thus they may, for example, set the variable traffic signs to one of the two positions. In case of failure of traffic light devices, the dispatchers receive SMS message.

The city inhabitants, if needed, may contact the Municipal Police by telephone on the line 156. Information on activities of MP and incidents in the city may be found on [www.usti-nl.cz/cz/ostatni/mestska-policie](http://www.usti-nl.cz/cz/ostatni/mestska-policie). Communication with inhabitants during emergency situations is realised via Warning and Information System for the Population (VISO), which allows for example sending of mass SMS messages to mobile phones of citizens.

The current physical architecture of the Surveillance System of the Municipal Police of Ústí nad Labem defines entities communicating with the dispatching centre of the Municipal Police and their interrelations, as presented on the following scheme.





Legend for Figure 9:

Legend:

Radiová síť MP – Radio network of the Municipal Police

Vozidla MP – Vehicles of the Municipal Police

Dispečink MP Ústí nad Labem – Dispatching centre of Municipal Police of Ústí nad Labem

Služba 24 hodin – 24 hour service

Vizualizace a řízení protipovodňové vany – Visualisation and management of the flood tub

Převážní kotrola – Transport control

Telefon - Telephone

Integrovaný záchranný systém – Integrated Rescue System

Policie ČR – Police of the Czech Republic

Odcizená vozidla – Stolen vehicles

Odtážená vozidla – Towed away vehicles

Záznam MKS – Records from Municipal Camera System

Varovné SMS zprávy – Warning SMS message

Varovný systém ČHMÚ – Warning system of the Hydro-meteorologic Centre of Czech Republic

Obyvatelstvo - Inhabitants

Povodí Labe – Elbe river basin

Dispečink DP – Dispatching centre of PT Company

Dispečer Spolchemie - Dispatcher of Spolchemie

Odbor dopravy, MMÚL – Department of Transport, Ústí nad Labem Municipality

Správce SSZ – Administrator of traffic light devices

Střediska správy a údržby – Centres for administration and maintenance

SÚS, ostatní silnice – SÚS, other roads

AVE, místní komunikace – AVE, local roads

Servisní SMS, např. při poruše PDZ – service SMS, e.g. for failure of variable traffic signs

Systém řízení PDZ protipovodňové vany – Management system of PDZ of the flood tub

SSZ – traffic light devices

PDZ – variable traffic signs

Kamery MP – Surveillance cameras of the Municipal Police

## 4.8.2 Traffic Supervisory Systems

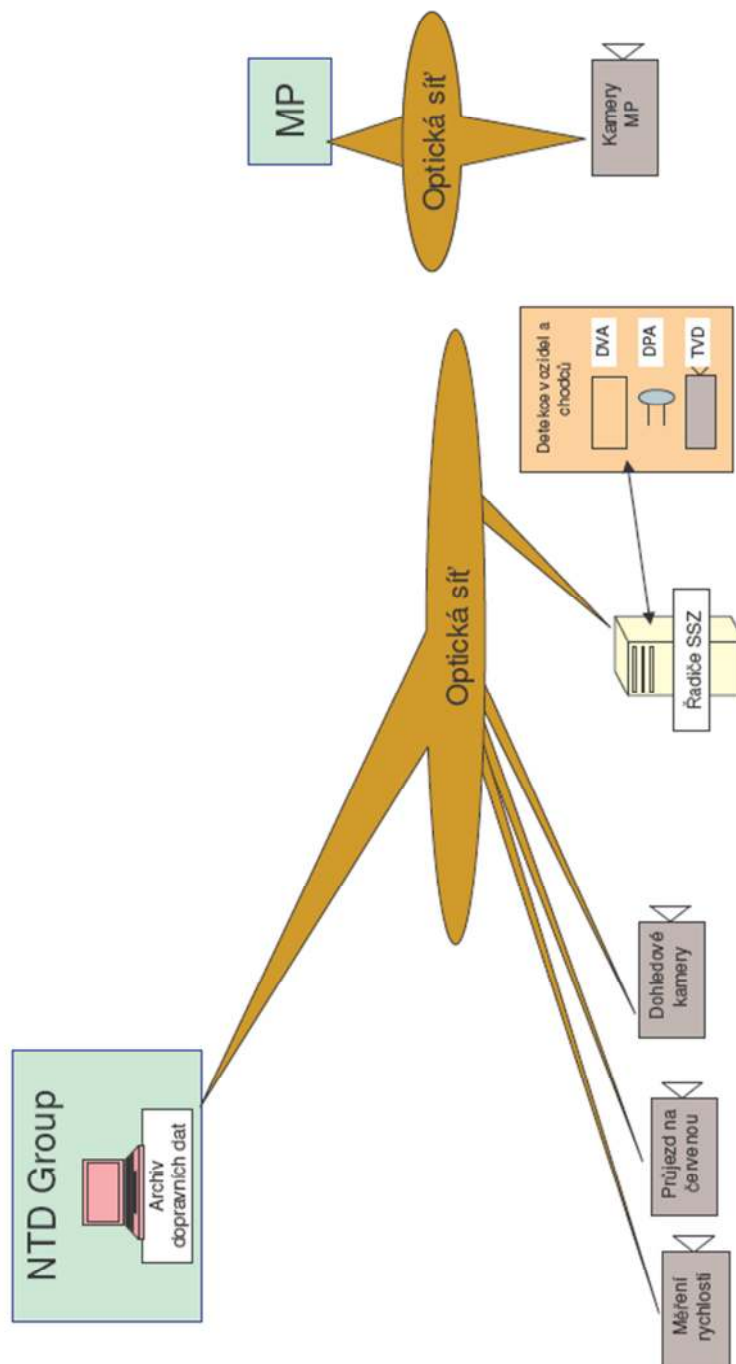
To increase road safety and discipline of drivers, there are devices installed on the network, which allow CCTV surveillance of roads, measure speed of vehicles and detect vehicles passing on the red light. All of these devices are actively utilised to determine violations of traffic rules. Most of these systems were implemented along with the construction of new traffic light devices at intersections or crossings.

Devices for detection of the red traffic light passage offence are installed on the following intersections or crossings:

- traffic light controlled intersection K05 Pražská with Žižkova
- traffic light controlled intersection K07 Malá Hradební with U Trati and Spojka
- traffic light controlled intersection K10 Špitálské náměstí
- traffic light controlled intersection K14 Masarykova with Sadová
- traffic light controlled intersection K15 Masarykova with Štefánikova
- traffic light controlled crossing K06 Main Railway Station

Another supervisory system measures speed either at the road profile (instantaneous speed measurement) or at road section (average speed measurement). These devices are located on streets Pražská and Masarykova. Sector speed is measured on the street Pražská in the section before the intersection with the street Žižkova. The measurement was realised within the opening of the highway D8 - 807 to Germany. The main task of the measuring device is to control speed of passing vehicles on the highway bypass. The device for profile (instantaneous) speed measurement is installed on the street Masarykova at the entrance to roundabout Bukov. It was implemented in the framework of a package of measures realised in order to slow down and calm traffic and improve safety of pedestrians on the street Masarykova. Other device for speed measurement is installed on the street Klíšská in the section Londýnská - Špitálské square.

Figure 10 - Current physical architecture of the supervisory system for detection of traffic rules violations



## Legend for Figure 10:

Legend:

Archiv dopravních dat – Archive for traffic data

Optická síť – Optical network

Měření rychlosti – Speed measurement

Průjezd na červenou – Passage on the red light

Dohledové kamery – Surveillance cameras

Řadiče SSZ – Controllers of traffic light decives

Detekce vozidel na červenou – Detection of vehicles passing on the red light

MP – Municipal Police

Kamery MP – Cameras of the Municipal Police

## 4.9 Rescue Systems

There are three operating centres established in Ústí nad Labem for receiving emergency calls from the public telephone network and the GSM network. Each operating centre ensures reception of calls, recording of message and activation of appropriate sections:

- **Line 150**, Fire Rescue Brigade (HZS of Ústí region, headquarters at Masarykova street)
- **Line 155**, Medical Emergency Service (ZZS of Ústí region, local headquarters at Sociální Péče street)
- **Line 158**, Police of the Czech Republic (District Department of Ústí nad Labem at Masarykova street)

Calls on the international emergency line 112 are received by the Telephone Centre for Emergency Calls (TCTV 112), which is located at the headquarters of the fire brigade (HZS of Ústí region). Technology of these telephone emergency centres connects the basic elements of the integrated rescue system: the Fire Brigade, Police of the Czech Republic and the Medical Emergency Service. This allows fast assessment of the emergency situation and immediate response by relevant rescue team. Modern software equipment enables identification of the address of the caller from a home fix telephone line or to detect location of a mobile phone. The 112 emergency call centres in the Czech Republic are linked with each other via voice and data connection and are fully mutually substitutable. In the case of overload or failure of one of the call centres in a region, calls are automatically redirected to the other call centre without any delay or quality degradation. Therefore, it is guaranteed that a citizen reaches a call centre anytime.

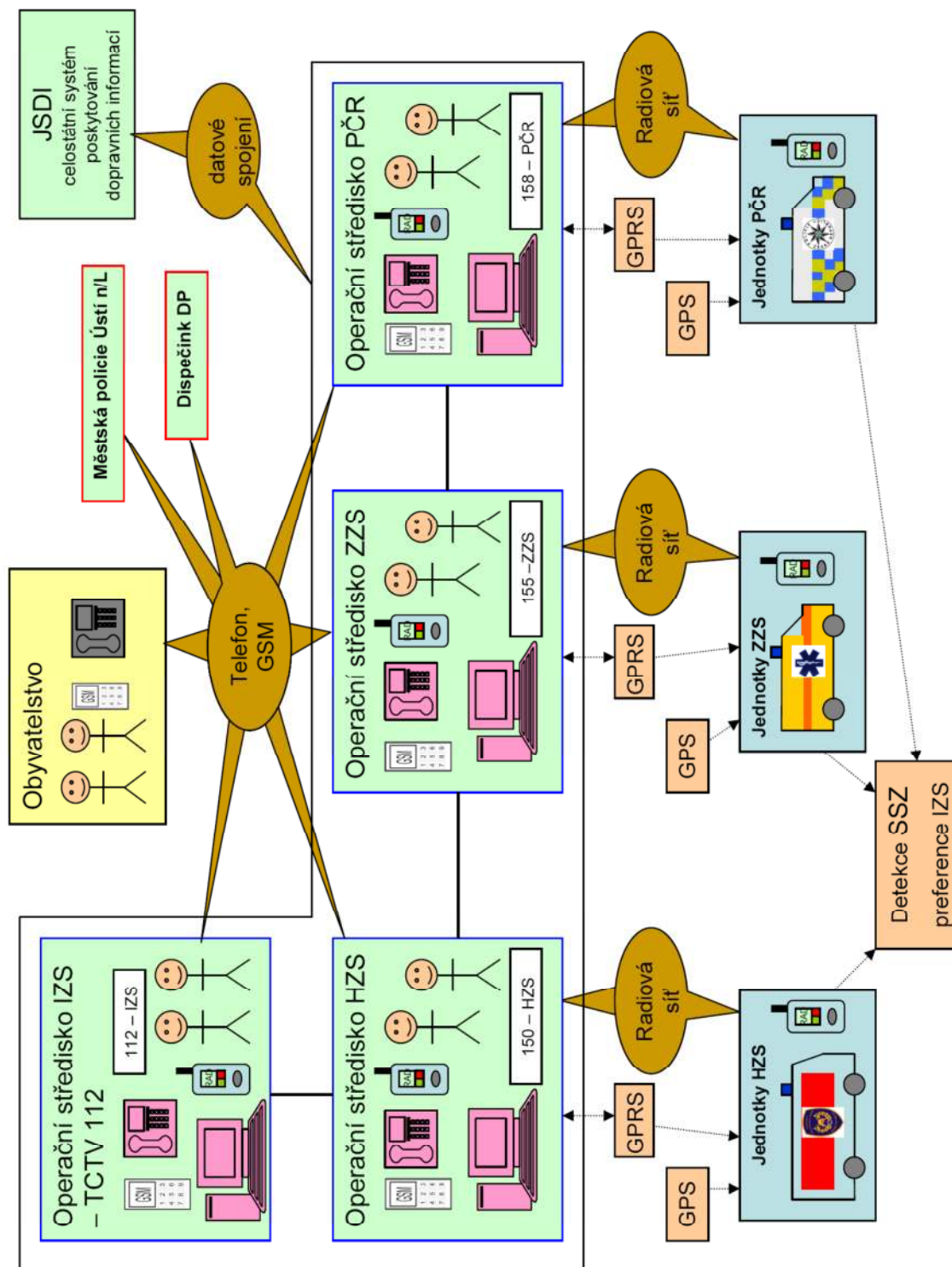
TCTV 112 in Ústí nad Labem operates nonstop with at least two dispatchers and more dispatchers are on duty if needed. In case of need, the service is backed up by dispatchers of the Line 150.

Due to these benefits and technology, emergency calls to the Line 150 are usually, in most of the regions in the Czech Republic, redirected to TCTV 112.

In case the reported event has impact on traffic situation in the concerned area, the dispatcher indicates this fact in the electronic form. Data from this electronic form are automatically transferred into the Unified System of Traffic Information (JSDI) of the National Traffic Information Centre (NDIC), as stated by law of the Czech Republic. The transition is realised immediately in order to keep the national information database up to date. The NDIC takes appropriate steps to inform drivers and passengers about the event and passability as soon as possible. Data on planned closures are also transmitted to the NDIC and the feedback is sent to the Fire Brigade via a data mailbox.

HZS of the Ústí region cooperates with the PT Company of Ústí nad Labem during non-standard, which require, for example, evacuation of large amount of people, children from schools, etc. If necessary, it is possible to utilise the city camera system based on a telephone request. In the future, it would be appropriate to enable access to the city camera system not only for bodies of the integrated rescue system, but also other entities, such as PT Company of Ústí nad Labem, SÚS (administration of road maintenance) or AVE (road treatment), etc.

Figure 11 - Current physical architecture of the subsystem of the Integrated Rescue System (IZS)



Legend for Figure 11:

Legend:

Operační středisko – Operation centre  
IZS – Integrated Rescue System  
HZS – Fire Brigade  
ZZS – Medical Emergency Service  
PČR – Police of the Czech Republic  
TCTV 112 – Telephone Centre for Emergency Calls 112  
Městská policie – Municipal Police  
Dispečink DP – Dispatching centre of PT Company  
JSDI – United System of Traffic Information  
Datové spojení – Data connection  
Radiová síť – Radio network  
Detekce SSZ – Detection of the traffic light devices  
Preference IZS – Preference for the Integrated Rescue System  
Jednotky - Unites

## 4.10 Transport Payments

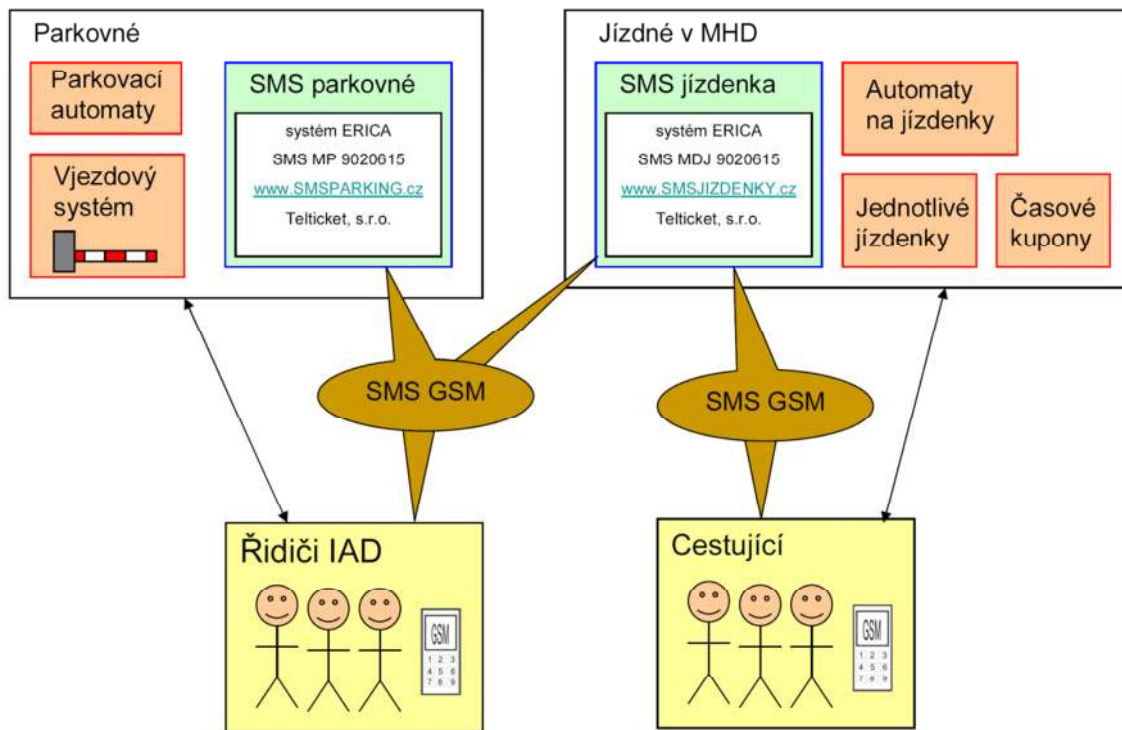
The only transport payments required in the city are the parking charges at selected locations. (See section 4.5).

Payments for entrance to the city centre or for transit of specific city sections are not implemented in Ústí nad Labem.

Payments for PT services are realised in two ways. It is possible to pre-order a time voucher, which is paid at the beginning of the valid period (7, 15, 30, 90, 180 or 365 days), or a ticket can be obtained for a single journey, valid for 30min, 60min or 24hours. Tickets for city PT can be paid via SMS tickets. Since the beginning, this service experienced significant increase in usage.



Figure 12 - Current physical architecture of the subsystem of transport payments



Legend for Figure 12:

<u>Legend:</u>
Parkovné – Parking fees
Parkovací automaty – Parking machines
Vjezdový systém – Entrance system
SMS parkovné – SMS parking
Jízdné MHD – PT fees
SMS jízdenka – SMS tickets
Automaty na jízdenky – Ticket machines
Jednotlivé jízdenky – Single tickets
Časové kupony – Time vouchers
Řidiči IAD – Drivers of individual motor vehicles
Cestující - Passengers

## 4.11 Management and Maintenance of Transport Infrastructure

Management and maintenance of roads in Ústí nad Labem is carried out on roads of I. (only maintenance), II. and III. class by the company SÚS of the Ústí region in Trmice. Other local roads are managed and maintained by the company AVE Ústí nad Labem, Ltd.

### 4.11.1 Management and Maintenance of Main Roads

The authority responsible for management of transit sections of roads of II. and III. class and maintenance of transit sections of roads of I., II. and III. class in the Ústí nad Labem is the contributory organisation Management and Maintenance of Roads of the Ústí Region, whose founder Ústí nad Labem region. Its headquarters are in Dubí. For districts of Ústí nad Labem and Teplice, roads are managed and maintained from the facility in Trmice. The operating plan of winter maintenance was conducted for this area. The territory is divided into individual sectors, with the highest priority for roads of the I. class. In Ústí nad Labem, such roads are I/30 and I/62. Individual sectors, however, do not cover the whole length of all the roads in the city. The most problematic road sections are on streets Důlce (I/30) and Sociální Péče (I/30).

#### *The dispatching centre of SÚS of the Ústí region in Trmice*

The dispatching centre of SÚS in Trmice employs in winter always at least one dispatcher in continuous operation. The dispatcher in charge is responsible for removal of defects in passability at specific road sections and for reporting about passability. The dispatcher is in contact with drivers of all maintenance vehicles via radio network and via mobile phone in case of radio signal failure. Maintenance vehicles are equipped with GPS receivers, which subsequently process obtained data for statistics (e.g. passed routes, type of sanding, etc.). Real information about passability conditions of roads is collected by workers, who carry out field survey during a day. Furthermore, the dispatcher monitors weather forecast via Internet (especially [www.dopravniinfo.cz](http://www.dopravniinfo.cz)), collects data from weather-stations and from cameras on highways and receives information from the other dispatching centres in Trmice, Velké Březno, Žalany and Želénky. via telephone, the dispatcher is in touch with the dispatching centre of the PT Company of Ústí nad Labem. Drivers of PT vehicles inform the centre about non-standard situations, e.g. inability to continue in a journey, which alerts the adequate services, such as winter maintenance of AVE or SÚS.

### 4.11.2 Management and Maintenance of Local Roads

Management and maintenance of local roads is carried out by the company AVE of Ústí nad Labem, Ltd. in two modes – summer and winter. Summer maintenance of roads includes regular cleaning. Winter maintenance consists in particular of ensuring passability of specific local roads in the ownership of the city, based on the Operation Plan for winter maintenance issued by the municipal authorities.

### ***Operation Plan for winter maintenance***

The winter period starts on 1<sup>st</sup> November and ends on 31<sup>st</sup> March of the following year. During this period, the main dispatching centre of AVE in Krásné Březno (the street Neštěmická) operates continuously. Winter maintenance is carried out only on local roads of I., II. and III. class. Local roads are in Ústí nad Labem divided into four groups, according to their priority. Roads of 1<sup>st</sup> priority should be passable after 4 hours since the weather event negatively influencing a road. Roads of 2<sup>nd</sup> priority should be passable after 12 hours and roads of the 3<sup>rd</sup> priority after 48 hours. Other roads have no time limit.

The 1<sup>st</sup> priority group includes speed and collective local roads served with PT and with intensive traffic, access local roads to health facilities and other important local roads.

### ***The dispatching centre of AVE***

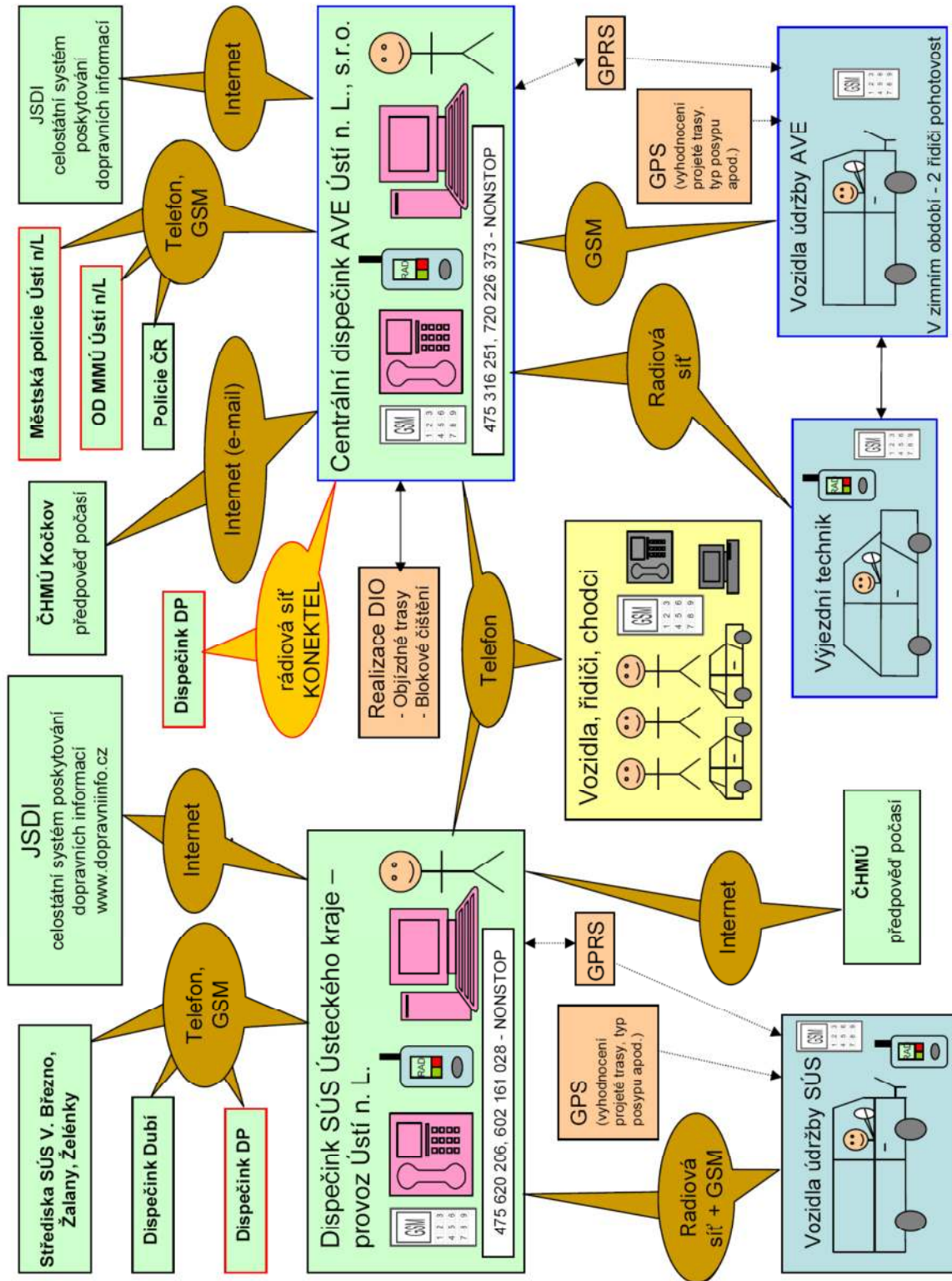
In winter periods, the dispatching centre of AVE operates permanently with at least one dispatcher. The person is responsible for removal of defects in passability of specific local roads and reporting on related events. The dispatcher is in contact with all service vehicles via mobile phones. During winter, 2 drivers are continuously on duty. Service vehicles are equipped with GPS receivers, which subsequently process obtained data for statistics (e.g. passed route, type of sanding, etc.). The dispatcher controls operation of a technical worker via radio network and thus gathers real-time information on road passability.

Other activities of a dispatcher include monitoring and evaluating of weather conditions obtained from data of the Hydro-meteorologic Centre of the Czech Republic (ČHMÚ) in Kočkov. Based on the conditions, other personnel are summoned on duty.

The dispatcher is also in contact with the Municipal Police, the Police of the Czech Republic and the Department of Transport of the Municipality. The dispatcher communicates with the dispatching centre of the PT Company via the radio network Konektel. Drivers of PT vehicles inform the centre about non-standard situations, e.g. inability to continue in a journey, which alerts the adequate services, such as winter maintenance of AVE or SÚS.

The dispatching centre, furthermore, provides data and traffic information into the United System of Traffic Information (JSDI).

Figure 13 - Current physical architecture of the subsystem of maintenance of local roads



Legend for Figure 13:

Legend:

Střediská SÚS – offices of SÚS

Dispečink – Dispatching centre

Dispečink DP – Dispatching of the PT Company

Dispečink SÚS Ústeckého kraje – Dispatching centre of SÚS in Ústí region

JSDI – United System of Traffic Information

ČHMÚ – Hydro-meteorologic Centre of the Czech Republic

Předpověď počasí – Weather forecast

Městská Policie – Municipal Police

OD MMÚL – Department of Transport, Ústí nad Labem Municipality

Radiová síť – Radio network

Realizace DIO -

Objízdny trasy – Bypassing routes

Blokové čištění – Street cleaning

Centrální dispečink AVE – Dispatching centre of AVE

Vyhodnocení projeté trasy, typ posypu, atd. – Assessment of the passed route, type of road gritting, etc.

Vozidla údržby – Maintenance vehicles

Výjezdni technik – Technical personnel

V zimním období 2 řidiči pohotovost – 2 drivers on duty in winter periods

## 5 Proposal of Solution

Specific details of the solution proposed for traffic management in Ústí nad Labem have been developed in detail within the subsequent CIVITAS task 3.8 “Strategic Traffic Management”, which follows on from the research study presented here. The full solution will be described in deliverable T26.1. The following paragraphs introduce the way in which the information collected as part of the study will be used to reach the solution.

In general, the following functional sectors were defined to design the architecture of the solution:

- Management and organisation of traffic on roads in the city
- Traffic data and information
- Parking of vehicles
- Public transport
- Freight transport
- Traffic surveillance and monitoring systems
- Emergency systems
- Traffic payments
- Maintenance and administration of road infrastructure

This list of functional fields is based on proposals and good practice of intelligent traffic management systems realised in the Czech Republic and abroad. These fields outline the essential proposal for the strategic traffic management in Ústí nad Labem.

To ensure proper functionality of the transport chain, individual physical subsystems are divided into four basic classes:

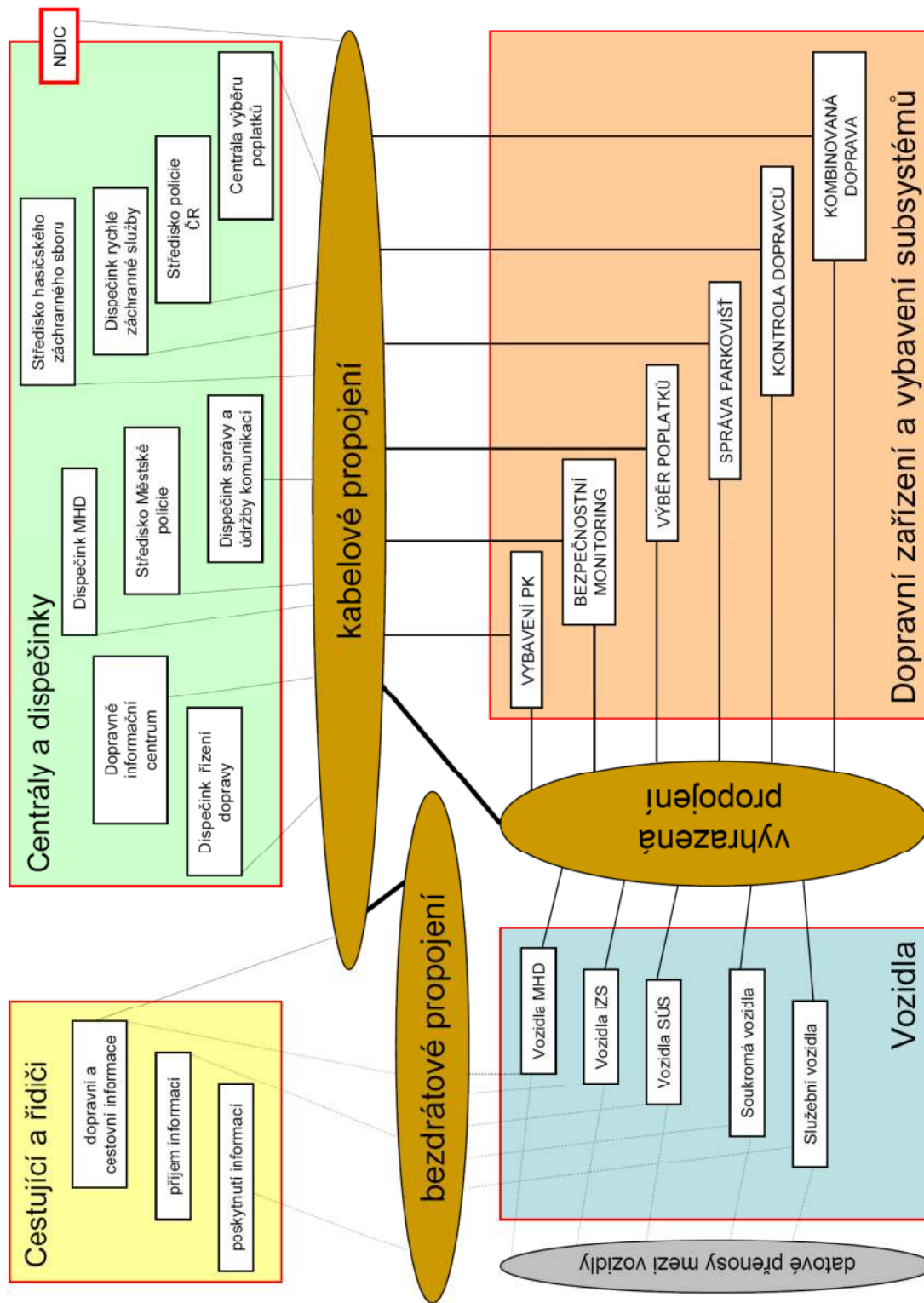
- dispatching centres and headquarters
- devices for communication and equipment of subsystems
- in-vehicle systems
- users, drivers, passengers

The dispatching centres provide management, evaluation and other functions of the transport system. Individual centres communicate with each other. They gather information via communication devices and in-vehicle systems in order to carry out required tasks.

Communication devices provide a direct connection between the road infrastructure and vehicles. The devices ensure monitoring, data collection or command execution and subsequently distribute messages to the communication network (including for example information tables). Each of these devices is bound to at least one of the traffic centres.

In-vehicle systems, such as navigation systems or higher forms of security functions and control functions, share traffic information. They provide data for communication devices, which communicate with drivers or passengers of personal vehicles as well as PT vehicles and vehicles of the Integrated Rescue System. The users provide travel and traffic data to individual users and to the public.

Figure 14 - Proposed physical architecture for Intelligent Telematics System in Ústí nad Labem



Legend for Figure 14:

Legend:

Cestující a řidiči – Passengers and drivers

Dopravní a cestovní informace – Traffic and travel information

Příjem informací – Reception of information

Poskytnutí informací – Provision of information

Centrály a dispečinky – Dispatching centres and stations

Dopravně informační centrum – Traffic information centre

Dispečink řízení dopravy – Dispatching for traffic management

Dispečink MHD – Dispatching centre of the PT Company

Středisko Městské Policie – Municipal Police station

Dispečink správy a údržby komunikací – Dispatching centre of road management and maintenance

Středisko hasičského záchranného sboru – Fire Brigade station

Dispečink záchranné služby – Dispatching centre of the Emergency Rescue Service

Středisko policie ČR – Centre of the Police of the Czech Republic

Centrála výběru poplatků – Centre for collection of payments

NDIC – National Traffic Information Centre

Kabelové propojení – Cable connection

Bezdrátové propojení – Wireless connection

Vozidla - Vehicles

Vozidla MHD – PT vehicles

Vozidla IZS – Vehicles of the Integrated Rescue System

Vozidla SÚS – Vehicles of SÚS

Soukromá vozidla – Private vehicles

Služební vozidla – Business vehicles

Datové přenosy mezi vozidly – Data transfer among vehicles

Vyhrazená propojení – Dedicated connection

Vybavení PK – Road equipment

Bezpečnostní monitoring – Surveillance monitoring

Výběr poplatků – Collection of payments

Správa parkovišť – Administration of parking premises

Kontrola dopravců – Monitoring of carriers

Kombinovaná doprava – Combined transport

Dopravní zařízení a vybavení subsystémů – Transport equipment of individual subsystems



## 5.1 Conclusion

Within the CIVITAS task 11.3.4, analysis of the current traffic management in the city of Ústí nad Labem was conducted. It describes in detail the architecture of the existing transport subsystems and their mutual integration and communication, which is not optimal and is often realised via telephone connections of operators of individual subsystems. Data transfer is neither rapid nor complete. Therefore, information may not be available to all or to some of the subsystems of traffic management in required time.

Given the large number of separate subsystems for traffic management, road maintenance, PT operation, parking management, management of the Integrated Rescue System, etc., and their problematic interconnection, the proposed solution for strategic traffic management in Ústí nad Labem was not based on the existing architecture of management systems. The reason was particularly the problematic sharing of traffic information, which optimisation would require significant investments and technological and organizational changes.

The more effective solution is to change the entire traffic management system, which would enable integration of all the existing subsystems and continuous real-time sharing of information. Development of the solution is processed in detail in the CIVITAS task 3.8 Strategic Traffic Management.