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# E-TICKETING BECOMES INTELLIGENT TICKETING



We are “not travelling less, but more intelligently” is the conclusion in the Difu Report 2/2013 of the German Institute for Urban Studies. Technical innovations like smartphones and new services such as flexible bike- and car-sharing have changed people’s mobility behaviour. The transport options have become more flexible and can be used individually. For example, bicycles or cars can be used as required for specific routes at specific times, and combined where suitable with public transport services. As a result of this development, there is a growing demand for multimodal information and services, so that public transport companies have to respond with an unaccustomed flexibility. They need to adapt to changing mobility behaviour and become more dynamic. One important advance is the introduction of e-ticketing, which marks a step away from rigid tariff structures towards multimodality with a single ticket.

### Münster: The first really flexible e-ticket

“The specialists are currently looking at Münster as a driving force for innovation in modern ticketing,” commented Dr Henning Müller-Tengelmann, financial director of Stadtwerke Münster (SWMS) when they introduced e-ticketing in March 2013. The Münster public utility was the first public

transport provider in Germany to adopt the e-ticketing solution from IVU with best-price calculation, opening up options for combinations with other modes of transport. It was this that led to the success of the new technology.

In the so-called ‘Cycle City’, the bike is the number one mode of transport. It is highly valued and enjoys a cult status. In contrast, the bus is often regarded as an umbrella for the cyclists and is used above all when the weather is poor or as a way of bridging two shorter sections of a cycle journey. The consequence is that there are considerable fluctuations in demand over the course of the day and depending on the weather conditions. Public transport finds itself competing in terms of price and convenience with the bicycle, which can be used without cost and is always available. This is where the e-ticketing solution has a role to play: The intention is that automatic tariff calculations will reduce the inhibitions against using public transport and make it more attractive for parts of journeys while at the same time doing away with on-board sales in the form of paper tickets, which reduces the burden on the bus drivers and speeds up boarding. Finally, the combination with other municipal offers will increase the service character and promote customer loyalty.

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Martin Müller-Elschner, CEO

**Dear readers,  
Dear customers of IVU,**

With the increased spread of new technologies such as the smartphone, information can be made available in a variety of ways, offering increased flexibility. Travellers can plan their trip chains more effectively, making full use of intermodal possibilities. These trends must also be taken into consideration by public transport companies if they wish to remain competitive. New e-ticketing concepts and apps that provide real-time information are important steps on the way to more individual and flexible mobility.

Whether in Münster in Germany or Ibagué in Colombia, public transport operators are turning to cashless payments. But these solutions can offer much more than simply a means of payment. The wide variety of ways in which e-ticketing solutions can be adapted to suit local conditions and the needs of passengers are shown by the public transport operators in these two very different cities.

In the field of logistics, catering for individual requirements is also a factor for success. DHL-Kurier is to offer parcel deliveries within a defined time window, including the option of same-day delivery. Operating in the background is a reliable solution: the journey planning function in IVU.locate.

We hope you will be inspired by the creative concepts of your colleagues when you read this edition of IVU News, and perhaps also in March at our 26th User Forum in Berlin!

**Best wishes**

Martin Müller-Elschner

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### The PlusCard becomes intelligent

The SWMS PlusCard has existed in Münster since 2001, and as a customer card it has offered individual discounts at some 180 partner businesses in Münster. But without a chip, the PlusCard could not provide feedback about how the card was actually being used. This led to the idea of modernising the PlusCard in accordance with the VDV-KA standard and with additional mifare emulation so that it could then be used as an e-ticket. The VDV-Core application (VDV-KA) is a central security management standard introduced in 2005 which establishes uniform security mechanisms, making it possible to use e-ticketing chip cards across public transport companies. The check-in (and at some stage in the future also the check-out) is controlled by two IVU.validators at Door 1 and Door 2. A total of 170 vehicles of SWMS Münster and 30 buses of partner companies have been fitted out with the new technology.

### 90 minute ticket for occasional users

On 1 March 2013, the 90 minute ticket was introduced as the first step in the phase-in of the e-ticket. SWMS Münster intentionally chose a new product for the occasional users as the entry product rather than targeting the existing season tickets.

The 90 minute ticket offers a so-called mini flat rate of € 1.90 for a 90 minute journey in the city area – which at 303 km<sup>2</sup> is as large as the city area of Munich. The new ticket is particularly interesting for the occasional users of public transport. It offers flexible trips without any

need to worry about the most economical tariff. The SWMS background system registers all the trips of the e-ticket-holder, and at the end of the day if the holder has had more than two short trips it will automatically charge the best price of € 4.30 for an all-day ticket. The passengers only have to validate their tickets by means of the IVU.validator at the check in terminal. The system calculates the relevant tariff. At the end of each month the holder is invoiced for all the trips, and the payment is booked by direct debit from the holder's bank account. As an alternative, a pre-paid version is being prepared for this year. With this the customer can transfer a certain amount of credit to the e-ticket. This is then reduced by € 1.90 for each journey with the card. In addition to the technical conversion of all stationary ticket vending machines, more than 60 sales outlets are being fitted out with the new IVU.ticket.box.

The people of Münster welcomed the new service right from the start. Only three days after its introduction, more than 2,000 orders had already been received. In December 2013, nearly 15,000 customers were using the 90 minute ticket.

### The e-ticket to encourage off-peak travel

In June 2013 a flexible season ticket was introduced (the 'Flex-Abo') as the first season ticket in Germany to offer flexible charges. The basic fee for the monthly flexible season ticket is € 29.50, provided all the journeys begin Monday to Friday after 8.00 a.m., or at any time over the weekend. The background to this idea is that SWMS wanted to reduce the



With the so-called folding-bike season ticket the PlusCard sets on multimodality



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burden on the public transport system during the morning rush hour. The FlexAbo is intended to offer an incentive for those who are able to travel later in the day. If it proves necessary to start a journey in the rush hour, then the system automatically adds a daily surcharge of € 1.00. However, a cost cap ensures that the total monthly charge does not exceed € 45.50 – the price of the normal Münster season ticket.

### Trains, taxis, folding bikes and parking cards

In order to utilise the flexibility of the PlusCard throughout the Münster area, SWMS is gradually adding new applications. For example, since June 2013 the e-ticket can also be used on local train services. This involved installing IVU.validators at all the railway stations in Münster. In October 2013 the system was further extended so that e-ticketing is also possible with the so-called taxi buses. These offer an additional service for customers living some distance from the main bus routes, who can phone for a taxi to take them to the nearest bus stop. In order to allow convenient payment by e-ticket, the fleet of 220 taxis operated from the central taxi service were fitted with mobile card readers.

Step by step, other services are being included, so that over time customers will be able to use a wide range of services with only one card,

according to their personal preferences. A further option which was integrated in 2013 is the so-called folding-bike season ticket. With their sights set on multimodality, SWMS offer a real addition to their public transport services. "If our customers combine the timetable app, the right season ticket and their own muscle power then they can move about very flexibly," comments SWMS boss Dr Müller-Tengelmann. The folding bike season ticket is available to e-ticket-holders for € 9.99 a month. It then allows the transport in the buses of the city utility without further charge.

In future it is intended to include car-sharing services, and possibilities for using the e-tickets in inner-city multi-storey car parks, in the bike station, for buying tickets for the swimming baths, theatres, and cinemas, for using lending libraries, as well as for making payments in shops, cafés and restaurants, and for sporting and leisure events.

### E-ticketing is popular

E-ticketing solutions are not only appreciated by the bus drivers and public transport companies. The passengers also seem to be delighted with the newly gained flexibility. For the third time in succession, SWMS Münster 2013 came out on top in the 2013 TNS Infratest survey to determine the best-liked public transport company

or association in Germany and Austria. The passenger figures underline the success of the company. From 35 million passengers in 2011, the number increased to 39 million in 2013. And a further increase is expected for 2014. "Satisfied customers like to travel by bus," concludes Reinhard Schulte, company secretary of SWMS.

### Security and data protection

Making things simple and convenient for the passengers involves a lot of complex technology in the background. Tariff rules have to be modelled accurately and charges have to be calculated reliably. Hundreds of thousands of data items have to be collected and processed every day, while making sure that security and data protection are guaranteed.

In order to exclude the possibility that unwanted individual mobility profiles could be generated, personal data and user data of the passengers are processed in separate systems. Only the final invoice is allocated to the relevant user. In addition, the VDV-KA standard includes a cryptographic key which ensures that the e-ticketing chip card is protected against improper use, so that information cannot be illicitly copied and a stolen card cannot be used by third parties. ■

## INTERVIEW WITH REINHARD SCHULTE, COMPANY SECRETARY OF STADTWERKE MÜNSTER

**Mr Schulte, SWMS is the first public transport company in Germany to introduce really flexible e-ticketing. Your customers have been showing how much they appreciate the system. How have you managed to attract customers who are not attracted to technical innovations?**

With new tariff products which offer real added value for the customers and which are easy to use: Get a card, hold it in front of the validator, and travel. We take care of all the rest.

**How do you expect mobility behaviour to develop? Can you see future trends?**

There are a number of trends. Firstly, there is a growing difference between mobility in rural areas and in the large cities. In rural areas, the public transport services are finding things increasingly difficult, but in the expanding large cities they are making advances. Here there is also an increase in intermodal and multimodal mobility. The key question then is: Who will be the system integrator? In Münster we are preparing ourselves for this role.

**With regard to these developments, what further possibilities can you foresee for e-ticketing?**

I can think of three topics:

1. A part of e-ticketing should be dynamic electronic tariffs, both for season ticket holders and for occasional users. We are still in the early stages here.
2. Automatic price determination in urban and regional transport by means of check-in and check-out.
3. In the medium term, bringing together the chip card and smartphones on the basis of the VDV-KA standard.

**Are new mobility projects already being planned?**

We have already established the platform for our multimodal e-ticketing. Now we have to implement the roadmap for our customers. That means the gradual marketing of services which offer real additional value for our customers, while always keeping in mind our watchword: 'Keep it simple'.

**Thank you very much for this interview.**



# IBAGUÉ: LOOKING FORWARD TO THE NEW E-TICKETING SOLUTION

■ **What is well received in Germany can also generate excitement in South America. In order to increase the profitability of its bus operations, the Colombian city of Ibagué, with 500,000 inhabitants, is introducing the e-ticketing solution from IVU together with planning and fleet management systems. The press and the local radio were reporting enthusiastically in advance about the 'latest technology from Germany'.**

The economic viability of the bus services in Ibagué is suffering due to increased fare-evasion and irregularities in the fare receipts returned by drivers. The crime rate in the city is also high. Regular robberies and cases of embezzlement further reduce the revenues of the public transport operators. Cash can only be held in small amounts and maximum security is required for its transport. The expectation is that the cashless electronic ticketing solution from IVU will now ease these difficulties. In addition, a central fleet management system should ensure that vehicles are deployed more efficiently and will enable a rapid response if problems are encountered.

## Day labourers and security requirements

The reasons for the interest shown in the e-ticketing solutions are very different from those typically advanced in Germany. In Ibagué, the public transport operators are primarily interested in cashless solutions which offer more security. In an emerging economy like Colombia the gap between rich and poor is wide, and the daily receipts from even a single driver can prove attractive to some. The takings have to be guarded closely by security personnel. Bus drivers also face a high risk of being attacked. But with the new e-ticketing solutions, the buses are to be freed completely from carrying cash. Another advantage is that the advanced sales will accelerate the boarding process, because the driver will no longer have to receive and check fare payments or give out change. The long waits to get onto the buses will soon be a thing of the past. There will be more opportunities to buy tickets in advance and new technology is being installed to speed things up further. This is particularly important during the rush hour periods, because in Colombia many people are hired as day labourers, and they only buy a ticket when they need one, i.e. before and after a working day. The demand for tickets at peak times is correspondingly high.

The Colombian passengers are already looking forward to the changes. The e-ticketing systems are regarded as being very convenient and safe. As an example of the positive attitudes, the local radio station La Carinossa welcomed the imminent introduction of the system under the headline: "A German company is bringing the latest technology and software to Ibagué."

## The technology

For the e-ticketing, all the buses will be fitted with an IVU.validator at the entrance door. The fare for the journey is automatically debited, and a turnstile allows access if the ticket is accepted. The chip card is used as an electronic wallet, which has to be filled in advance at one of the vending points. The card is credited by the IVU.ticket.box which is installed as a sales terminal at the public transport company's own outlets, or in a supermarket or kiosk. An electronic credit limit ensures that the cash takings at each selling point are not too high, so that the security risk remains calculable. The new IVU.fare operates as background system to administer the cards, devices, selling points, sales personnel, sales accounts, and to impose the relevant limitations.

## Rights administration

The public transport operator can control the complicated rights management and the administration of the complex cryptographic key by means of the new trust centre IVU.fare.trust. IVU's engineers have developed advanced templates which can be used in the background to translate the hierarchies and cryptography into an easily applicable system. This means that the operator himself is able to activate all the devices used for advanced sales, for access control and in the control centre. The necessary cryptography is carried out on a Secure Access Module microcontroller (SAM). Each type of equipment has its own SAM, which contains the relevant rights and instructions for the device. Colour coding makes the allocation easier for the customer. For example, validators have a green SAM and advanced sales devices a yellow one. The SAM management is secured by a red SAM. From the activation through the sale and the boarding control to settlement, the complete e-ticketing solution from IVU will be implemented in Ibagué.

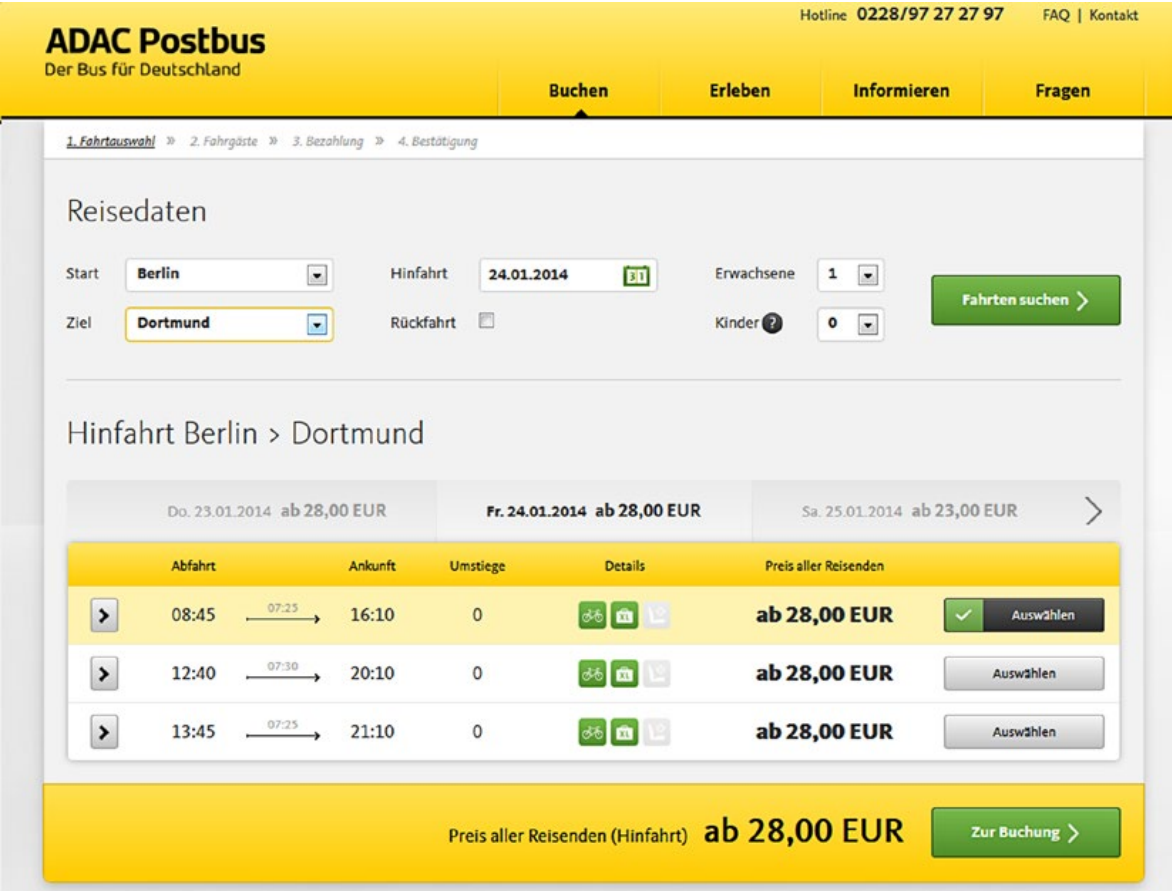
A total of seven public transport companies provide services in Ibagué, with more than

1,000 buses. Step by step, the existing fleet and the small buses which are to be introduced will be equipped with the necessary systems for e-ticketing, GPS-location and communications. As the central controlling system, IVU.fleet then provides optimised operations, so that the size of the fleet can be reduced and the profitability be enhanced. Initial pilot operations have already begun with the first five buses. ■



A well thought-out system with colour-coded SAMs makes it simple to activate the e-ticketing equipment

# ADAC POSTBUS ON THE ROAD



The new online-shop allows a quick and easy booking of tickets

■ Since starting up in autumn 2013, ADAC Postbus has already set new standards in inter-city bus transport. The successful launch has been supported by IVU, which has provided all the operating systems for the new coach services.

Since the start of November, twenty-four cities across Germany have been connected by coach services provided by ADAC Postbus, a company owned jointly by Deutsche Post and the ADAC motoring association. The services are to be gradually increased over the coming months, so that some 30 of Germany's largest cities will soon be connected by a fleet of 60 modern coaches.

The IT systems for the operations of the new coach service company are from IVU. Components from the IVU.suite have been supplied for planning and control centre operations, as well as for online booking and passenger information services – all of this running from a high-availability computer centre. And because the coach service and ticket sales of ADAC Postbus have to be available round the clock, IVU guarantees reliable 24-hour operations.

The time plan for the project was an ambitious one. In only five months, all the systems were to be installed and configured in accordance with

the customer's wishes. With the use of tried-and-tested standard products such as IVU.plan this was no problem for IVU's engineers. And in only a few weeks' time the components for the passenger information service will also be going into operation. IVU.cockpit will be installed on the Android smartphones of the coach drivers and will transmit the positional data of each coach to the central IVU.realtime server. This calculates any delays and passes the information on to the operational control centre. At the same time, the passengers will also be kept informed via the company website, [www.adac-postbus.de](http://www.adac-postbus.de).

### IVU.ticket.shop

It was also possible to agree on additional new requirements and to implement these without delays. For example, IVU.ticket.shop was developed for the sale of tickets. This is a completely new booking system offering four separate channels for ticket purchases. Passengers can now use the online shop, visit one of the many ADAC centres or post offices, phone a call centre, or buy a ticket on-board directly from the driver. It is also possible to reserve a preferred seat.

The new central background inventory administration system IVU.fare.inventory ensures that

the ticket prices for all vending channels are calculated accurately in accordance with the tariff, with the additional possibility for dynamic price control which takes the utilisation rate into account. The background system also administers not only bookings for journeys and seat reservations but also the charges payable for additional travel options such as bulky luggage or a bicycle.

"The start of our new coach service has gone really smoothly. Systems and vehicles were ready to start operations punctually despite the extremely short lead time to completion," comments Dr Joachim Wessels, Managing Director of ADAC Postbus, on the successful market entry of his company. "The services are already being positively received. Due to the effective planning and control of our vehicles and the flexible new ticketing system we are well-equipped for a stepwise expansion of our fleet over the coming years." ■

24 cities across Germany are connected by a fleet of 60 modern coaches. This year the services will be increased, so that some 30 cities will be connected.





## IVU.PLAN, RELEASE 14: PAPER TICKETING MADE EASY NEWS FUNCTIONS

In time for the Public Transport User Forum, IVU presents Release 14, offering a new, improved version of IVU.plan. The most important functionalities include:

### Aspect-based planning with operative trains

The 'Operative train model' replaces the 'Train combination concept' in IVU.rail, offering much improved performance. This opens up the possibility of simultaneous integrated resource planning of personnel and rolling stock. The new model can be used for direct planning of rail transport with the train as the central object. Trains can be integrated from the timetable planning or imported from the scheduling systems. This then provides the basis for planning vehicle workings. The new approach can also be coupled with aspect-based planning, providing improved flexibility and efficiency in the rail transport sector.

### Tabular graphic timetable planning (TGF)

Tabular graphic timetable planning was newly developed as a result of a customer survey conducted in 2013 in order to enhance the ergonomics and practicality. Proven concepts were adapted to provide a sound basis for the further development of timetable planning in which the graphic and tabular processing layers can now be used in parallel, while an improved line graphic increases the flexibility. By means of drag and drop, all functions can be directly executed in the graphics.

### Further development of run schedule optimisation (R-OPT)

With Release 14, the scheduling optimisation for railways can include detailed models of repair and maintenance facilities and their capacities. Distinctions can be made between the maintenance lines for different rail vehicle types within the maintenance facility. In addition, all global and detailed vehicle working specifications included in the manual planning can be supported in the optimisation.

### Personnel dispatching

Various smaller new developments have been implemented for personnel dispatching applications in the rail sector. The most important of these include the option of processing all duties of one day in the duty editor, a much extended search and filter function, rapid access to the most important status changes, and the simplified cancellation and reactivation of duties. ■



Karl-Heinz Reiss has been voted Bus Driver of the Year for 2013 in his district, and has received an award from the Verkehrs- und Tarifverbund Stuttgart (VVS) for his outstanding work. His passengers appreciate his good humour and his reliability when it comes to answering questions about the timetable or connections. The information he needs is provided by his trusted companion – the IVU.ticket.box.

Since 2004, VVS has regularly been acknowledging the daily contributions made by bus drivers with its awards for 'Bus Driver of the Year'. In each of the five districts in the public transport association, the passengers can vote for their favourite driver. In Böblingen in 2013 the winner was 59-year-old Karl-Heinz Reiss. He has been working for the bus company Däuble Reisen

since 1999 and he regularly cheers up his passengers with his jokes and friendly attitude. And if he drives past anybody struggling to catch the bus then he is known to stop a bit before the bus stop in order to let the passenger get on board without any overexertion.

In his daily work he is supported by an IVU.ticket.box. These robust and user-friendly on-board computers are installed on all the vehicles operating within the VVS association. They provide the right ticket at the touch of a button, and using the wireless communications function Karl-Heinz Reiss is able to obtain up-to-date information about connections from the operational control centre. This means he can continue to offer the best service, and perhaps this year he will once again be voted Bus Driver of the Year. ■

## START SIGNAL FOR THE MOBILITY BROKER

In October 2013 the start signal was given for the 'Mobility Broker' research project funded by the Federal Ministry for Economics and Energy. Multimodality on one platform is the aim of the project. By bringing together all mobility options in a region in a single marketplace, the passengers can be offered both unimodal and also multimodal travel options in accordance with their preferences (travel time, changing time, price, modes of transport). The platform for the marketplace will be a mobile app, so that access will be possible on a mobile device everywhere and at any time. The users will always be able to find the mobility option that suits them best – whether bus, train, pedelecs, electric cars, taxi, or rideshares. The 'Mobility Broker' is based on an integrated mobility concept for flexible intermodality, with the goal of improving in particular the first and last mile of the journey chain. The new platform is to be tested first in the Aachen region, and the project is being organised by ASEAG (Aachener Strassenbahn und Energieversorgungs-AG). Research partners in addition to IVU include RWTH Aachen University, Stadtwerke Osnabrück, and regio iT gesellschaft für informationstechnologie mbh.



## NEW MULTI-CLIENT SALES AND TELEMATICS SYSTEM FOR WESTPHALIA



WVG (Westfälische Verkehrsgesellschaft) organises public transport across 88 towns and local communities in western Germany, covering an area of 9,000 km<sup>2</sup>. Every day, more than 700 buses and 730 personnel are on the roads. In order to ensure that they operate as efficiently as possible and to further increase the quality of the public transport services provided, WVG was looking for a new sales and telematics system. The decision was taken to introduce components of the IVU.suite. With WVG as a new customer, IVU will now be able to demonstrate the full range of its capabilities in both Münster and the Westphalia region.

In addition to the multi-client capability, an important feature of the new system for WVG was that it

also integrates the functions for operational control (ITCS) and for electronic fare management (EFM). Systems are being supplied to generate real-time data, for the operating desks, and for ITCS, including communications between the drivers and the control centres. In the background, an appropriate back-office system guarantees the supply of data.

The stepwise installation of the IVU.ticket.box on-board computers for a combined fleet of more than 700 buses is already being planned. For the mobile terminals, for example in taxi buses, the IT-9000 from Casio is being installed, together with IVU.cockpit on-board computer software. All the systems include the functionality for e-ticketing in accordance with the VDV-KA standard, and the modern quad-core processors offer considerably

enhanced computing capacity. In addition, the higher resolution of the new display improves usability.

The multi-client strategy with user and group entitlements makes it possible to guarantee the data sovereignty of the participating companies. In the operational centres, information is only visible if it has been given clearance and is required for operational purposes. Bus services can be displayed for all the public transport companies and the available connections are shown. In addition, the data can be centrally maintained in the background system. ■

## THE NEW IVU.TICKET.BOX WITH HIGH-RESOLUTION DISPLAY



A powerful quad-core processor, a high-resolution display with 1024 x 768 pixels and a modern user interface – that is the new IVU.ticket.box.

A considerably higher resolution naturally requires a more powerful processor. Therefore, IVU's engineers decided to fit out the new IVU.ticket.box with a quad-core processor. Offering the same level of performance as a smartphone, it is able to operate at temperatures ranging from -25° to 70° Celsius. The prototypes were developed by IVU engineers, including Jens Frerichs (left picture), who are based at IVU Aachen. Already in spring the first customers will test the new units in pilot operations. The users will not only benefit from a high-resolution display, but will also be impressed by the GUI design makeover. ■



The IVU.ticket.box with the new user interface



# KEEPING AN OVERVIEW OF GERMANY'S WATERWAYS

The WSV national navigation mark database



■ In Germany's capital city Berlin alone there are more than 1,700 navigation marks. A new navigation mark database has been introduced to ensure convenient and transparent nationwide administration.

Waterways have stop signs, speed limits, and parking restrictions just like roads and railways. Fixed or floating marks are installed to ensure that internal waterways and coastal waters can be navigated safely. In order to maintain a nationwide overview, the Federal Waterways and Shipping Administration (WSV) and the Federal Ministry of Transport and digital Infrastructure (BMVI) put out a call for tenders for the development of a modern database with catalogue administration system. The tender submitted by IVU Traffic Technologies AG was accepted. On the basis of IVU.locate, a database web application has been developed to register and administer all navigation marks on Germany's inland waterways. Pilot operations started last October.

In the past, information was recorded locally and administered on paper or using a variety of data formats. Now it is possible to access data from a unified central system. With the aid of the navigation mark database from IVU, all fixed and floating navigation marks on inland waterways under the responsibility of WSV can be registered quickly and easily, along with all their relevant

attributes. Subsequently, the navigation marks are available on the WSV intranet. In addition to being utilised for administration purposes, the data will also form the basis for the production of the German electronic navigational charts for inland waterways (Inland ENC's) and the Digital Federal Waterways Chart (DBWK2). The project is being supported by the Federal Office for IT-Services (DLZ-IT BMVI) in Ilmenau, Thuringia, which was responsible as a partner of WSV for the technical supervision, and which is now in charge of supervising the operations.

## Catalogue system with dynamic data structure

A particular challenge has been the development of the catalogue administration system with dynamic data structure for the flexible administration of all relevant types of object. An additional offline system also allows data registration outside the waterway and shipping offices. Despite the offline registration and the dynamic data structure, the IVU engineers were able to ensure the continual consistency of data and data structures.

The old datasets have already been successfully migrated to the new system. Training has also been concluded for the first offices, which have been able to begin pilot operations. The remaining offices will follow step-by-step, and in future

all 39 water and shipping offices and the seven waterway construction authorities will be able to employ the Web application.

## Active and open cooperation

"This has fully satisfied our expectations – both in terms of the functionality and the project implementation," comments project co-worker Wieland Haupt on the work of the team. The three project partners cooperated actively with one another right from the start. For example, from an early stage the IVU engineers involved the client in the development of the final product by regularly reporting on the status of the project and setting up mid-development checkpoints. At the same time, WSV contributed the specialist expertise of its staff and DLZ-IT provided technical input and both contributed actively to the design of the new system. IVU engineers accompanied WSV personnel, for example during their visits on ships, in order to gain a better understanding of the internal workflows of WSV. The uncomplicated project cooperation generated a basis for mutual respect. Wieland Haupt sums up the situation as follows: "I already feel at home with the system, and I look forward to being able to work with it soon in real-life operations". ■



# DHL-KURIER

## On-time parcel delivery – even on the same day

■ **In an age of unceasing technological revolutions, customers are not willing to wait long for their deliveries. The new smartphone, the game console, or some other object of desire should ideally be delivered to the customer that same day. This is now possible in Germany thanks to a new delivery service – DHL-Kurier.**

If nobody is at home to receive a parcel delivery then the result is dissatisfaction on both sides. The customers will have to wait longer for their parcel, or may even have to go and collect it personally from somewhere else. On the other hand the driver has not been able to deliver the parcel, will have to take care of the further handling, and in the worst case may have made an entire trip for nothing. This is now going to change. DHL, part of the worldwide logistics group Deutsche Post DHL, has come up with a service that should help to solve the problem and considerably increase the satisfaction of its customers. With DHL-Kurier, customers will be able to arrange for delivery within a predefined time window, even on the same day. The customer selects this service directly when placing the online order and can choose the delivery option he prefers. All the rest can then be left to the online shop and DHL. DHL has already concluded partnership arrangements with various major online providers such as Gourmetfleisch.de or Allyouneed.com.

The new delivery service is particularly important for the delivery of foodstuffs. If the goods arrive on the day they were ordered then it is possible

to guarantee that they will be fresh and the customer will be considerably more satisfied with both the products and the service. The reluctance to place orders for food online can be overcome and in the longer term the number of new customers can be increased.

Thanks to DHL-Kurier, same day deliveries as well as evening deliveries at specific times are now possible in German cities such as Cologne, Berlin, Munich, and the Ruhr district conurbation. More than 10 million households can already benefit from the new service. In the course of this year the service is to be extended to cover a total of 14 German conurbations.

### Complex delivery route planning

The new service increases the complexity of the delivery route planning. In the case of simple deliveries without any time restrictions, the delivery areas can be planned statically. This means that a driver will work in a defined area and will take all the available parcels out on the daily delivery trip. However, if smaller numbers of deliveries have to be made within specific time windows then planning on the basis of districts is no longer efficient. This is where IVU.locate can help – a geoinformation system (GIS) which for many years has also included a module for trip optimisation. In combination with integrated geo-analyses it is possible to plan optimised daily delivery routes. Instead of static delivery areas, drivers are now assigned dynamic delivery

routes which can be served in parallel to the regular delivery process.

### Automated processes

The DHL customer data which is relevant for the deliveries is automatically imported by IVU.locate via interfaces to be integrated in the route calculation. The result is a list of all relevant deliveries for that day together with the respective time windows. Once the customer has placed the order, then all processes through to the completion of the route planning are fully automated.

In future, a Track-and-Trace interface could be provided for the system. Other options could also be integrated such as the collection of returned goods or of empty packaging.

With the help of IVU.locate, DHL has been able to introduce a completely new and innovative service which adds an important component to the range of delivery services. For this application, IVU.locate was provided as a standard solution so that it was only necessary to adapt it for the relevant data collection and preparation process.

For further information about DHL-Kurier visit: [www.dhl.de/kurier](http://www.dhl.de/kurier). ■

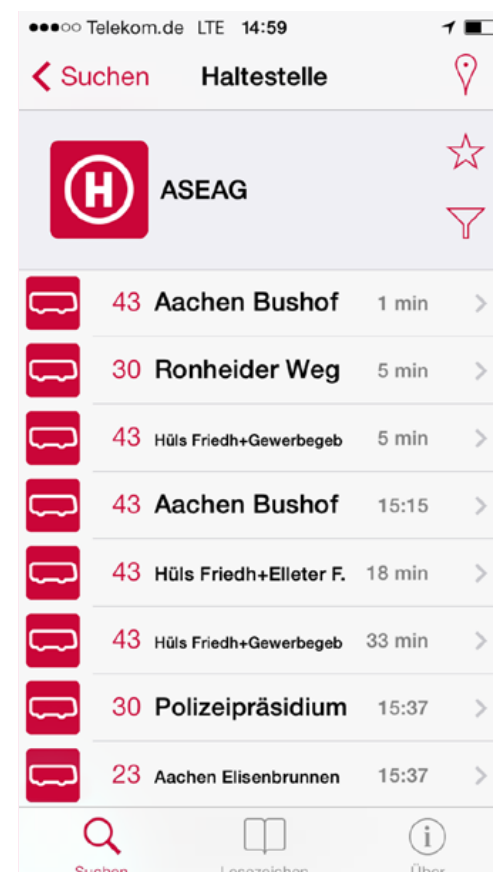


Every day IVU.locate automatically calculates the optimum delivery routes for all parcels and for each time window



# NEW MOBILITY APP FOR AACHEN

More than 2,000 bus stops at your fingertips



■ In December, ASEAG (Aachener Strassenbahn und Energieversorgungs-AG) presented its new passenger information app ASEAG mobil. In addition to the 57 dynamic passenger information displays currently being installed in the Aachen area, passengers will in future also be able to access real-time departures for more than 2,000 bus stops directly while on the move using the iOS und Android app. The app has been developed by IVU, which is already providing this service successfully in London.

Operating public transport services on 68 routes with a total length of more than 1,250 kilometres and 2,000 bus stops, ASEAG ensures the mobility of the people of Aachen and the surrounding areas. Particularly now during the winter season, punctual connections and short waiting times are important. And if buses are delayed then the most important thing is to inform people as quickly as possible. In order to ensure that passengers in Aachen will not have to wait in the cold for their bus, the ASEAG mobil app now offers live updates of timetable information. Without leaving their warm café, travellers can find out about the latest departure times of the fleet of red buses. The app provides a direct view into the operational control centre and sends the real-time data for the requested bus services to the user's smartphone within seconds. If there are delays or any other operational disturbances, the background system IVU.realtime calculates

the revised departure time from the bus stop to the nearest minute.

The basic system which provides the foundations for the delivery of real-time data was already installed by IVU in the 1990s. An Intermodal Transport Control System (ITCS) was introduced at ASEAG to collect the positional data from the on-board computers in the buses and pass this on to the operational control centre and the passenger information media only two seconds later. Today, the operational control system IVU.fleet and the passenger information system IVU.realtime can process up to 5,000 of these reports every second

"Our app is a further component of a comprehensive passenger information network," comments ASEAG CEO Michael Carmincke about the new service. "The smartphone has become the most important medium for mobile information and is something that our passengers could not do without. Thanks to ASEAG mobil they are now able to find out about the updated departure times of our buses much more conveniently. This makes it possible to plan journeys individually with more precision."

The latest assessments of the new app show how passengers welcome such a service. With four out of five stars both in the Google Play Store and in the App Store the mobile timetable information services is doing very well. "A really practical app. Now

at last I know where the bus is," comments one user. In particular, people appreciate how much easier the app makes it to plan their own individual journeys.

However, there is still one hitch to be overcome. Because Aachen is situated close to the borders with the Netherlands and Belgium, some cross-border services are operated by companies from these neighbouring countries which have so far not been able to provide any real-time data. In such cases ASEAG mobil makes use of the available timetable data, which is presented as a clock time in contrast to the real time data, which counts down the time to departure. The different format makes it easy for users to make a distinction when they are planning their journey and to make appropriate allowances. ■

**ASEAG (Aachener Strassenbahn und Energieversorgungs-AG)** provides public transport services in Aachen and the surrounding region. With more than 67 million passengers every year, ASEAG is the largest public transport company in Germany to operate solely with buses. There are some 2,000 bus stops on 68 routes with a total length of more than 1,250 kilometres.



# OPEN DATA

## New opportunities for public transport companies?

■ Open Data is increasingly being discussed in the public transport sector. The key question is whether transport data, and in particular dynamic real-time data, should be made available to third parties via open interfaces? What advantages could there be for public transport companies?

The greatest opportunity offered by Open Data clearly lies in the wider distribution of the transport data and the creation of an information network which significantly increases the acceptability of public transport and makes it more attractive for potential passengers. This is apparent in particular with the development of apps. If the data is freely available then there are no restrictions on the creativity of the developer community. The apps are mostly developed for a certain target-group or for specific applications. In addition, the developers generate their apps on their own initiative and do not expect any payment from the public transport company, which is therefore not faced with development costs. Many apps are offered to the end users free of charge through the app stores of the smartphone platforms.

The discussion focuses above all on access to real-time data sets. In the past these were mostly only offered on electronic displays at the stops or on the website of the public transport company. But they can play a decisive role in making public transport more attractive.

### Data sovereignty vs. plurality

One argument often advanced against making data openly available is that this could lead to a break developing between the provision of information and the sale of tickets. The search for information, they argue, is often the first step towards a purchase; before each journey, the passengers find out the best way to reach their destination, and then buy the appropriate ticket. In the opinion of many public transport companies it is only possible to be sure that the tariff corresponds to the journey information which has been given if the second step follows closely on the first. Another factor is that the quality of the information provided by third parties on the basis of Open Data is beyond the control of the public transport company. Errors can arise as the result of false or incomplete processing of data, or information can be inconsistent if there have been delays in the data processing.

However, this risk can also represent an opportunity for the public transport companies, which can attach a quality seal 'Direct from the operator' to their own information, and in this way enhance their own image. Transport for London (TfL) demonstrates how to go about this. Their conditions of use for the open data can be summarised in a single sentence: Use our data, but don't pretend you are us. And tickets can still only be purchased through London's Oyster Card system.

### Unified Realtime API (URA) and cloud computing

The URA and IVU.realtime.cloud feature an innovative interface specification and server infrastructure for the provision of dynamic mobility data. They were developed specially for data exchange with clients who have only limited resources available, for example smartphone users. IVU.realtime.cloud can be scaled to suit the size of the datasets and the computing capacity that these require. The limited resources of the various end devices represented an important condition which was taken into account for the new development.

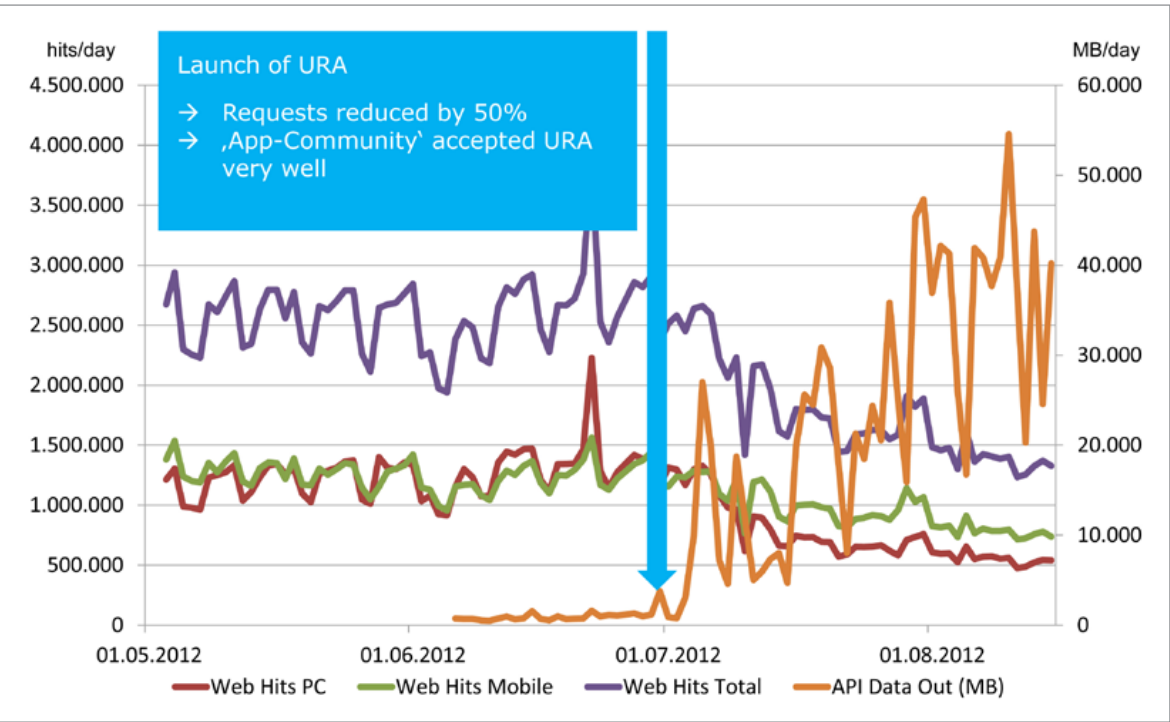
VDV has also discussed the topic of Open Data in depth, and in the latest VDV newsletter 7030 it advises its members to use caution. The association suggests as an alternative the concept of 'Open Services', which it recommends without reservations. In this sense, URA/IVU.realtime.cloud offers open services for the provision of real-time data.

### Screen Scraping

A further argument in support of Open Data relates to the problem of screen scraping. If no official interface (API) is available, app providers go to the existing website of the public transport company for the real-time data they need. This results in high and cost-intensive server loads. Another factor is that these unofficial interfaces are neither stable nor documented. Any layout change on the website can potentially also change the interface format. On the other hand, the app provider must accept the limited functionalities that are offered by the website.

IVU.realtime.cloud solves this problem on the basis of the Windows Azure Cloud infrastructure by distributing all user enquiries on a corresponding number of virtual machines. This reduces the workload stepwise. The public transport company then only receives consolidated enquiries and answering these places appreciably less burden on its resources. This consolidation of enquiries is additionally supported by the filter and search functions in the URA. In London, the official launch of the new technologies in June 2012 led to a 50 % reduction in web access within only a few weeks.

For the new Open Data service by means of URA/ivu.realtime.cloud, Transport for London and IVU received the 'Grow with Public Transport Award' at the UITP World Congress 2013 in Geneva. ■



# START OF OPERATIONS IN UTRECHT



■ **Following on from the Friesland and Groningen-Drenthe regions, the private Dutch public transport operator was able to win a third concession for the Utrecht region, which is also the largest concession nationwide. On 8 December 2013 at 2.00 a.m. Qbuzz started its operations and will be providing its services for the next ten years.**

In order to be able to transport some 200,000 passengers in the region reliably to their destinations every day, Qbuzz has introduced 168 new vehicles into the fleet. These are being equipped with the on-board computer IVU.box.touch. 133 vehicles have already been fitted out and the remaining 35 will follow in the coming weeks. A particularly critical point was the integration of the existing fleet of 142 vehicles from the previous operator. Despite different hardware configurations, they had to be migrated into the new system within one day. Thanks to standardised interfaces this went smoothly, so that all the buses could begin operations punctually. The passengers hardly noticed anything, and they were able to use their public transport as usual. By June 2014, however, all the old vehicles will have been re-equipped with the new, more powerful IVU on-board computers.

Since it was founded in 2008, Qbuzz has relied on the systems of the IVU.suite and from operational control, through passenger information services, to settlement it has chosen its standard solutions. Release 13.2 was delivered for the new Utrecht concession, and this includes some new features. For example, an integrated environmental function ensures that the vehicle power is throttled down in inner-city areas, reducing the environmental impact of the buses and also ensuring that they operate more economically.

Another new feature supports the display of coloured route numbers and symbols on the vehicles so that passengers who are waiting at the bus stop will be able to see at a glance which route the approaching bus serves.

By the end of the project, two further new features are to be included. A new network function will ensure that in the event of disturbances within the GSM network the system will automatically switch to another provider in order to ensure an uninterrupted data connection between the vehicle and the operational control centre. It will also be possible to communicate with dynamic bus stations. In large bus stations, buses are not allocated a fixed position in advance. They notify the bus station shortly before their arrival and they are then told which stand to go to. IVU.fleet notifies the bus station system regularly via an interface about which vehicles will be arriving. Shortly before the bus arrives, the IVU.box.touch reports the vehicle via a field system (wireless or inductive) directly to the bus station system.

For Qbuzz, their decision in favour of the IVU systems has been justified in particular by the rapid and timely delivery. Some 90 per cent of the project have already been completed, and the remaining work will be completed in the coming months. The head of project at Qbuzz, Klaas van Esch, is proud of the joint achievements: "In retrospect, this was the largest concession transfer and system integration in the Netherlands, and probably worldwide, in such a short time. The punctual start of all the systems on the eve of 8 December was a major success for the entire team." ■

## SAVE THE DATE

### IT-Trans

18. – 20.02.2014, Karlsruhe

### Public Transport User Forum

10. – 11.03.2014, Berlin

### MainDays

19. – 20.03.2014, Potsdam

### Connecticum

06. – 09.05.2014, Berlin

### General meeting of IVU

03.06.2014, Berlin

### GEOMATICA ANDINA

16. – 17.06.2014, Bogotá D.C.

### InnoTrans

23. – 26.09.2014, Berlin

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