

High Occupancy Toll Lane Solution



always one step ahead

Kapsch TrafficCom High Occupancy Toll (HOT) Lane Solution.

In the face of growing urban congestion and the high cost of creating new capacity on free-ways, more and more Roadway Authorities are considering new High Occupancy Toll (HOT) lanes or the conversion of existing High Occupancy Vehicle (HOV) to HOT lanes in order to improve highway quality of service and to make the maximum use of existing highway infrastructure. HOV lanes are lanes reserved for vehicles with a driver and one or more passengers in order to expand the throughput of the respective lane. HOT lanes are HOV lanes where single-occupancy vehicles (SOVs) can drive when they pay a toll.

Kapsch TrafficCom provides an end-to-end HOT lane technology solution which utilizes sophisticated toll collection and traffic information systems. These provide travelers a free or fee-based option for a faster and more reliable trip.

HOT lanes, equipped with Kapsch TrafficCom's technology, are managed through price and occupancy restrictions to maintain free flow conditions even during the height of rush hour. This unique flexibility in tolling fee structures enables users to maintain free flow traffic conditions, increase speed, and expand mobility options by reducing the number of vehicle hours traveled.

With the advance of HOT lanes, Departments of Transportation (DOTs) and Roadway Authorities can generate a new source of revenue that can be used to fund transportation improvements, relieve chokepoints, add new lanes and expand a regions carpool lanes.

We make your traffic flow.

Flexibility, reliability and accuracy are key to successful implementations of road user charging strategies. In the Kapsch solution, these qualities are evident when a vehicle passes under a charge point. The Kapsch solution uses road side equipment (RSE) to quickly, reliably and securely capture tag data using 5.9 GHz DSRC as the communications technology. Thus transactions are recorded in real time, by communicating via open standard protocols based on IEEE 802.11p and IEEE 1609 WAVE standards. The 5.9 GHz DSRC allows for interoperable readers and tags to access the Electronic Toll System (ETC) in a fair and transparent way. Prices of the user's trip can be varied automatically and are shown to the

drivers before they reach the charged area variable message signs. The prices are set dynamically for the mutual benefit of the provider and consumer and offer flexibility as the basis for successful traffic management in today's world. Kapsch TrafficCom's technology operates with banking-grade security that protects user privacy for payments and related applications. The accuracy of the Kapsch system ensures that only vehicles which are travelling in the HOT lanes are charged. Vehicles travelling in the general purpose lanes – even though equipped with an operation-ready tag – are not. The Kapsch system measures the tag's lateral position and thus can distinguish whether or not the vehicle is using the HOT lane.

Kapsch TrafficCom **HOT Lane Solution.** Components and Main Features.



Kapsch TrafficCom's end-to-end solution is a full service system designed to maximize throughput and improve congestion. The Kapsch HOT tag, which is based on 5.9 GHz DSRC, allows a driver to declare the number of passengers in the vehicle with a simple push of a button. Road side equipment records data elements stored in the tag's configurable memory and transmits them to the central office for transaction verification, processing and if needed, enforcement.

5.9 GHz DSRC.

Tolling solutions using 5.9 GHz DSRC technology are considered by many to be the natural successor to the proprietary 915 MHz-based systems deployed across the U.S. Systems conforming to the 5.9 GHz DSRC standard are intended to provide an interoperable communications backbone for future national Electronic Toll Collection (ETC) systems. In the long-term, 5.9 GHz DSRC will become the standard for all wireless vehicular communications. DSRC is used in the U.S. Department of Transportation's national Vehicle Infrastructure Integration (VII) initiative, which is a program that will introduce a whole new range of real-time safety features, driver information and e-commerce applications.

Variable Message Signs.

Variable Message Signs (VMS) are used to indicate to drivers the currently applicable tolls for specific road segments and vehicle occupancies (e.g., Road X costs \$2 for Single-occupant vehicles, \$1 for 2-occupant vehicles, and is free for all vehicles carrying 3 or more people). As these charges may vary over time and date, as well as location and degree of congestion, it is essential for drivers to be informed of the current usage charges. Toll operators can add flexibility to their road network by adapting road segment usage fees to optimize revenue and minimize congestion. In addition to indicating road usage fees, VMS's can also be used to provide real time traffic information to drivers. For instance, they can be used to notify drivers of roadway incidents, congestion and/or road hazards.

Self Declaration HOT Tag.

Kapsch's new self declaration HOT tag is a simple to use and affordable device, designed to address the needs of HOT lanes. It is equipped with a selector button that enables the user to easily declare the number of occupants in a vehicle. These tags communicate 5.9 GHz DSRC back to the road side equipment, aka tolling readers, in order to book the correct tolling transaction to the user's account. Enforcement personnel, such as police, may then be notified of the number of occupants in each vehicle, to enable verification that the multi-occupant vehicles which travel for free indeed have as many occupants as the driver claims. Kapsch's HOT tags support both stored-value accounts, as well as user-registered accounts which can be accessed and serviced online.

Tolling Readers.

The 5.9 DSRC Tolling Reader TRX-9250 is a compact roadside infrastructure device utilizing wireless communications in the 5.9 GHz dedicated short range communication (DSRC) band. It supports the 802.11p WAVE standard for information exchange with on-board equipment in multi and single lane tolling environments. The transceiver's built-in directed DSRC antenna enables localized communication zones, which reduce interference from adjacent receivers and facilitates localization of passing vehicles. This localization capability is key in HOT lane environments in order to avoid wrong tag-reads from vehicles using general purpose lanes. The readers localize the tags with high accuracy, allowing them to distinguish between various lanes. The readers can compute accurate lane reads of tags even when the HOT lanes are separated from general purpose lanes by just a double white line.

There are 4.2 billion lost hours and 2.9 billion gallons of wasted fuel creating a \$78 billion annual drain on the U.S. economy.

Source:
<http://mobility.tamu.edu/ums/report/>

How to enforce HOT Lanes?

Automatic License Plate Recognition System (ALPR): Electronic Toll Collection (ETC) systems may be optionally equipped with a Vehicle Enforcement System (VES), put in place to collect tolls from toll violators and deter toll violations. A VES consists of visible light spectrum or IR-sensitive fully-integrated cameras. These systems incorporate built-in automatic vehicle detection and license plate recognition functionality, in order to correlate tag-read data or missing data with the corresponding registered vehicle license plate number. The ALPR system consists of high resolution cameras with built in IR illumination, tuned to provide the best possible detection, capture and automatic license plate recognition accuracy.

Mobile Enforcement Vehicles.

Electronic Toll Collection (ETC) systems without a vehicle enforcement system (VES) may be augmented with Mobile Enforcement Vehicles (MEV) in order to enforce toll collection for toll violators. MEVs are vehicles equipped with portable 5.9 GHz DSRC readers, which allow the enforcement officer to read the OBU of passing vehicles and identify toll violators. Once identified, toll violators may be enforcement and payment collected.

Kapsch TrafficCom's end-to-end HOT technology solution is designed to keep traffic flowing while ensuring the highest level of flexibility, accuracy and security using state-of-the-art open protocol based technologies.

Why should the user make a declaration?

The declared vehicle passenger load allows the HOT system to charge a variable fee based on vehicle passenger load combined with certain other parameters such as location, time of the day and degree of congestion. It is thus offering unique flexibility in the tolling fee structures that help maintain free flow conditions and ideal traffic profiles.

What about existing infrastructure?

Due to its high accuracy in locating the tag's lateral position, the Kapsch HOT system can easily be deployed on existing infrastructure without the need to create barriers or any other separation between HOT and general purpose lanes, since it is able to identify whether the tag has been used within or outside of the HOT lane.

