

יר בנתיב: ל ש"ח

In Israel a globally unique toll system ensures that car drivers who want to avoid the morning traffic on the way into Tel Aviv can really do so – and enjoy a congestion-free journey into the city.

Commuter travel without traffic jams and hold-ups? A traffic control system in Israel has been making this possible since the start of 2011. On Highway 1 between Jerusalem and Tel Aviv the traffic on a special Fast Lane essentially regulates itself – via a toll system that relies on market principles: drivers can decide for themselves whether having the right to use the Fast Lane is worth the current toll fee.

Lanes with a special right of way have been around for a long time: as bus and taxi lanes, or as HOV (high-occupancy vehicle) lanes for vehicles carrying several people. These lanes serve to assist public transport and make better use of road capacities through carpools. The basic idea of controlling the flow of traffic with variable toll rates is not new either. In the United States there are several regions where the toll for special lanes is graded depending on the time of day. However, these are rigid systems. If the actual flow of traffic does not match the grading of the toll fees, drivers can get stuck in traffic despite having paid a high fee.

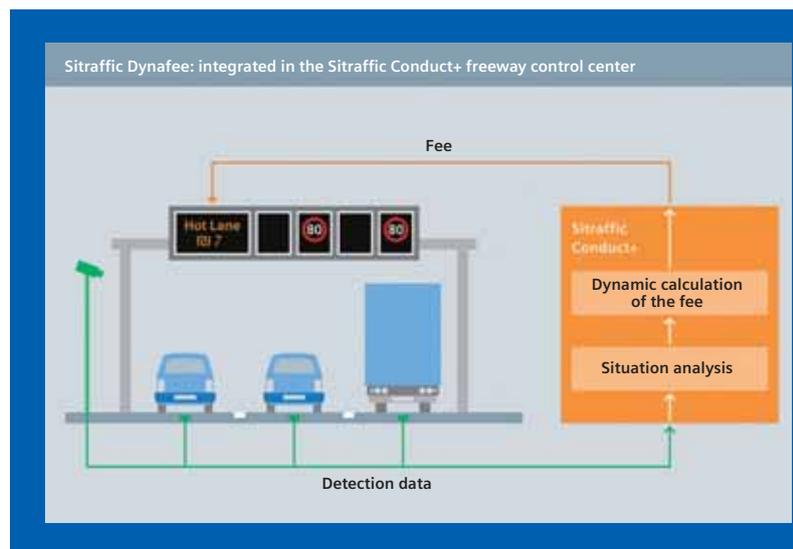
The traffic control system for the 13-kilometer-long Fast Lane of Highway 1 in the Tel Aviv area, developed as a pilot project by Siemens in partnership with the Technical University of Munich, is quite different. This HOT (high-occupancy toll) lane guarantees a minimum quality of traffic in return for the toll paid: “The usage fee is calculated according to the current traffic situation and adjusted to demand every minute,” says Jörg Schnependahl, Head of Customer Service and Transportation Solutions at Siemens Infrastructure & Cities. “Depending on the traffic it costs between 7 and 75 shekels, which is 1.40 to 16 euros.” After a start-up phase the tariff is now adjusted automatically. The intelligent traffic control system corrects possible sources of error itself via closed control loops – to a certain degree the system learns from experience. Between the Lod and Kibbutz Galuyot junctions, detectors at intervals of around 1.5 kilometers measure the number of vehicles and their speed in real time.

Video cameras also detect the license plate numbers, and the drivers receive a monthly bill delivered to their postbox.

What is special about this system is that part of the income from the toll lane is used to finance free shuttle buses. Anyone who wants to can now park their car outside the city and travel into the center by bus, avoiding the toll fee completely.

The engineers had two clear goals when programming this novel traffic control technology: First, the toll lane has to offer a guaranteed travel speed so that the drivers accept the toll-based service as a permanent solution. “The instrument that regulates this is the dynamically calculated fee. The cost should regulate the flow of traffic onto the Fast Lane so that there are no notable delays,” says Siemens traffic expert Thomas Sachse. Second, the fee cannot be excessively high. If too few drivers use the Fast Lane, the second target of making optimal use of the total road capacity will not be met.

The system calculates the toll dynamically.



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Clear message: at the entrance to Highway 1 drivers can decide for themselves whether arriving more quickly is worth 7 shekels.



So the algorithm that calculates the toll has to meet two conflicting specifications. Unsurprisingly, the real-world results are not always clear cut. “In such cases,” Sachse says, “the system gives speed of travel priority over the minimum volume of traffic.”

In any case, drivers need not be concerned with the complex calculation process. They must simply decide whether to use the lanes with the slow-moving traffic or the toll-based Fast Lane. To aid this decision, display boards along the highway provide information on the current traffic situation on the highly frequented normal lanes and the current tariff for the Fast Lane.

After just over a year of operation the verdict is positive. Since commissioning in January 2011, around 6,000 cars per day have used the Fast Lane on Highway 1. The system could set the toll for the day at such a rate that the volume of traffic and average speed remain within the optimal range. However, the fee that drivers are willing to accept largely depends on the time of day: when the main commuter traffic starts at around 7 a.m. the tariff rises to 4 or 5 euros – and in peak times hurried commuters pay as much as 16 euros.

Outside of peak hours willingness to pay declines sharply, even when the normal lanes are clogged with traffic in the afternoons and the Fast Lane offers a large reduction in journey times for just 1.40 euros. The Siemens traffic researchers believe the main reason lies in the purpose of the journey: in the morning, on the way to work, time really does appear to be money. In the afternoons the drivers are apparently making private trips and not inclined to pay to arrive more quickly.

The system has thus proved its effectiveness in practice, concludes Schneppendahl. “Because the traffic in the Fast Lane is always flowing, the morning commuters are spared a lot of stress – and the environment is spared a lot of unnecessary CO₂ emissions.” □

The fee and the amount of use vary throughout the day.

