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AS PARKING PROFESSIONALS, we are no strangers to technological innovation; our industry turns on technology and new ideas and concepts are all around us. But every once in a while, a new idea comes along that has the potential to completely change the way our industry does its business, and the Skymeter smart meter is one such innovation.

In the winter of 2009, the Winnipeg Parking Authority had the opportunity to trial the first Skymeter prototypes in the city. It was a fascinating experience, and this article will pass along the technology concept, the results of the Winnipeg pilot, and subsequent developments.

The Skymeter Device

The Skymeter device is a wireless, autonomous, electronic meter the size of a smartphone that is installed on the dash or windshield of a vehicle and powered by the 12V dash outlet. It consists of software and several sensors, including GPS, with sufficient accuracy to determine the correct parking operator and correct parking charge virtually anywhere in the world. It also has a cell phone SIM card and memory for receiving and storing onboard time/fee tables (a billing database called a pricemap) and sending billing data.

All of this points directly to a day when parking service providers will simply distribute availability and charge appropriate market rates driven by time, location, supply, and demand; a much different world from today's operator-provided, hardware-based cash and credit payment platforms.

The device records all parking events (place, time, and duration). It knows where it is at any moment—it knows when it is moving, when it is stopped, and for how long. It encrypts and stores this data and periodically transmits the resulting user bill for payable parking events to a third party invoicing organization for consolidation into monthly bills or direct account debit. The fee/time structures and geographical locations of parking zones are established by the parking service providers participating in the solution. They are stored onboard to avoid moving private location information from the vehicle; the transmitted billing information for each Skymeter user is forwarded to the customer management point, reconciled with the user account for each operator, and billed to the user each month. It is possible for the user to audit his own location data, but it is unnecessary for a parking authority to do so.

Through its geographic accuracy, the Skymeter can distinguish among any number of public and private parking operators and can accommodate any array of parking business rules (times, days, prices, and exceptions). It can do this securely and privately in all on- and off-street locations, including underground parking garages.

At the moment, Skymeter is best used as a service layer—in addition to traditional meters and gating sys-

tems, in the same manner as pay-by-cell parking—to accommodate frequent parkers who need to move around a busy city core or university center. In the future, however, these kinds of devices, fitted to vehicles and built into onboard devices in the same manner as iPods and Bluetooth, will pay for parking for us.

As the rate structures reside “in the cloud” and are updated wirelessly, they can be easily changed, adjusted, or modified to favor or discourage high and low parking demand zones, smaller vehicles, preferred locations, and preferred time segments. Parked vehicles can be easily counted with their numbers displayed and conveyed to the driving public without expensive hardware sensors or control systems. Skymeters can also be used to accommodate more advanced transportation management applications such as road tolling, emissions reduction, usage-based insurance, and road-use charging, as is currently being debated in Europe and Asia. Most valuable is that the Skymeter is completely hands-free and “brain-free;” once purchased and placed, it requires the parker to do absolutely nothing except park his car (legally) and pay his monthly bill. In a world where parkers seek and are willing to pay for simplicity in making their parking purchases, this is a welcome improvement over “pay by plate” technology, which burdens parkers with remembering their license plate numbers, parking zone numbers, and logging in or out.

The Skymeter is interesting to us as professionals because it is the first wireless device that uses pricing databases and sensor data in the cloud to manage payment, rather than metering hardware at the curbside or in the parking lot. It is a revolutionary concept because, beyond a small and inexpensive in-car device, it requires no other hardware to operate, and all costs and benefits can be passed directly to the user. The Skymeter is to parking what the cell phone has been to personal and business communications: a means whereby the customer buys the technology directly through consumer outlets and uses the service through remote communications, and the service provider simply provides the carrier.



In each test case, we found the device tracked vehicle movements well and very precisely throughout the city, even through downtown areas. The accuracy appeared to be within three feet, which was sufficiently accurate to withstand customer scrutiny.

A Revolutionary Concept

In addition to its inherent simplicity, what attracted me most to the Skymeter concept was its ready application to existing operations and ability to transform our traditional and complicated array of rates, times, conditions, fees, and regulations into simple usaton charges.

The Skymeter could tell when a vehicle entered an underground garage, and when it exited—without the use of gates or control terminals—and send an accurate invoice based on time and space used at programmed rates for each customer. It could measure how long an on-street patron used a parking meter and construct an accurate map of the locations occupied, complete with date/time/fee data, and a street view image of the parking stall. It could consolidate all parking charges for each customer—on- and off-street, regardless of where they parked—into one monthly bill chargeable to a pre-authorized debit account of credit card.

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System Test

The Winnipeg experiment used Google Maps and street view data compiled by Winnipeg Parking Authority staff to develop precise parking stall locations, along with rate and time zone tables to construct remote billing. As the test was for overall concept, the device delivered was an early prototype package developed by the Skymeter Corporation. The actual prototype device was a bit big, roughly equal to the size of a stapler. It contained three boards, a SIM card, memory chip, and transmitter, and was powered by a long cable that fit into the DC power supply in a vehicle. As the test was a proof of concept only, the WPA recruited 10 volunteers who mounted the devices on their dashboards and provided test credit card accounts.

Test subjects ranged in age from 30 to 80, and parking habits included a mix of on and off street preferences. The test was allowed to run for four months, and participants were asked to verify their parking locations, fees, and timings as noted on their monthly invoices when they arrived via their credit card statements.

As an interesting additional feature, we noted that

the devices had a native ability to transmit RFID signatures. This suggested an undeveloped capability around self-identifying each device to control gates and enforcement computers.

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Customer Feedback

Customer feedback was enthusiastic. The 10 member testing team universally loved the device and wanted to continue with the program; their observations were that the device itself should be smaller (the commercial version is much smaller), but they loved the idea of being free of parking meters and control devices. They commented that the billing process worked fine, and that the ability to disregard meters and receive a consolidated monthly bill for only the parking that they actually used was fabulous. Several said that the consolidated report was excellent for managing business expenses.

Toward the end of the test, we received a visit from the regional news team of the Canadian Broadcasting Corporation. The reporter was fascinated with the device and we went out for a drive, using special test software to track the Skymeter all the way along on a portable laptop. The reporter was excited about the possibility of using the device to pay for parking; the resulting news story was very positive and even made the 11 p.m. National Evening News as a lead story on new and useful technology.

Simplicity for the Customer

Parking management by satellite improves access and mobility for people and communities. It improves the driver experience, and can reduce machine and operating costs for service providers. In addition to its parking application, the technology can seamlessly and simultaneously address road and parking congestion and peak travel. Its most powerful attribute is that it handles any kind of parking circumstance with incredible flexibility and customer ease of use, while dramatically reducing the cost of managing parking space in all environments.

Based on our tests in Winnipeg, we are predicting the Skymeter concept will be the technology to watch in the current decade. **P**



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