Chennai Comprehensive Parking Management System - Case Study

City: Chennai, India

Year of Implementation: 2018

Chennai is the fourth largest metropolis in India with a population of about 7.5 million spread over 426 sq.km. Like many rapidly growing cities, the vehicular traffic has increased by about 9% YoY over the last 2 decades. This coupled with a limited growth in road infrastructure has led to significant stress on the parking system in Chennai. A low parking tariff has only increased the demand for parking.

Every trip, especially in a car, begins with the thoughts of availability of parking space, failing which app-based-cabs are often the go-to option. The city's ad-hoc parking system, which is highly unorganised, necessitates the vehicle to circle the block, before finding a space to safely park their vehicle – wasting time, fuel, adding to traffic congestion and polluting the environment through additional carbon dioxide emissions.

Chennai has over the last few years made a very systematic approach to increase the NMT infrastructure in the City. In addition to the NMT Policy impetus, the infrastructure provided has ranged from street improvement, providing cycling lanes to providing a public bicycle share system. Recognizing that Parking management is a fundamental part of better street design and also traffic demand management, Greater Chennai Corporation along with Chennai Smart City Limited has started the implementation of the a very strong IT supported Parking Management system.

The Parking Management Tender plan has been prepared after extensive consultation with partners like C40 Cities, ITDP and several stakeholders.

The parking system will be for the entire city with a current estimate of about 44000 on-street ECS spaces.

Approach & Features

Chennai is the first Indian city to implement an Area Wide Parking Management System unlike a stretch based model adopted conventionally. The parking system will allow the citizen to interact with the parking system via SMS, mobile app and website. The parking management system being implemented has the following marked changes compared to the existing system:

1. **Tariff**: The parking tariff is undergoing a 4-8 times hike from the current Rs 5 per hour. In locations of higher demand the parking rate is 8 times the current rate to encourage parking turnover and discourage long-term parking.

2. **System**: The parking system will become completely pre-paid unlike the current payment model where payment is done only after the parking event is completed. This is to discourage long term parking and also to not allow parking in non-designated locations.
3. **Enforcement**: In conjunction with the system mentioned above, the parking system will become more enforcement driven rather than the current delivery model where the onus of issuing a parking ticket is purely on the parking operator.
4. **Zonation**: In addition to the demand based parking tariff in the city, the parking vendor will undertake parking enforcement across the city. This will lead to regularisation of parking spaces across the city and bring greater control also also in sub-street where non-paid parking spaces will be regularised.
5. **Payment Modes**: The parking management system completely discourages cash transaction and provides for digital payment via various existing modes.
6. **Enforcement**: A factor critical to the success of the parking management system is the stringent enforcement of the 'no-parking' rule, which is rampantly flouted today. The enforcement has been delegated to the consortium of service providers, equipping them with the power to clamp or tow away the vehicle. The camera-based technology will alert the enforcement officer (appointed in each location) on the transgression of unpaid or illegal parking and prevent vandalism.
7. **Transparency:** The camera-based systems will also bring a transparency to the parking system, which currently faces allegations of ad-hoc rates and irregular enforcement, resulting in significant revenue leakage. The parking management system will soon be inter-linked with the multi-level car parking facilities – which will be billed higher than the on-street parking.
8. **Convergence with other Smart City projects:** The system will have its own control centre, which in turn, will be synced with the Corporation's upcoming Integrated Command and Control Centre.
9. **Real time data & Analytics:** The information regarding parking spaces, database of historical information of each location, spot-level prediction and revenue collection would be real time. This enables the local authorities in improving governance decisions based on parking demand, supply, patterns etc… without any time lag.

Payment to the operator in made on a formula that is linked to the parking event and enforcement and encourages proper control and prevents irregular parking on the streets.

Payment = $\Sigma [d_{fee,vehicle} + d_{fine,vehicle}] * e_{vehicle} * k_a * (1 + i)$

• $d_{fee,vehicle}$ is the duration for which a vehicle has paid parking fee

$d_{fine,vehicle}$ is the duration the vehicle is clamped and towed/stored

$E_{vehicle}$ is the ECS Factor for the respective vehicle type.

K_a is the Applicable Service Fee for a car

'i' is the incentive applicable (max ± 10%)

Technology

Camera-based technology will tell the user which slots are empty and the number-plate recognition centre will track the usage. For instance, if a user had parked their car for three hours and paid for that duration, ten minutes before the expiry, an alert will be sent on the app. The user can opt to recharge for an additional hour. The entire system will be automated and smartphone-enabled, but provisions have been made for basic phones and a cash system too.

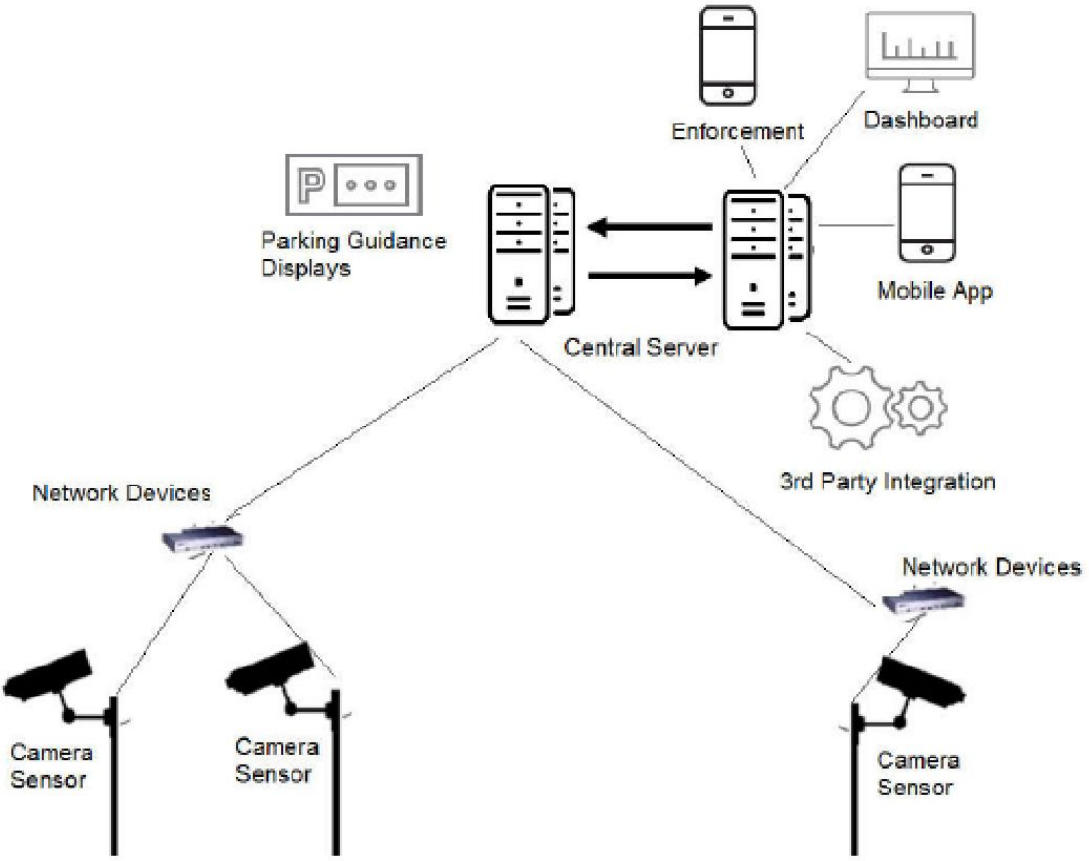


Figure 1: System Architecture

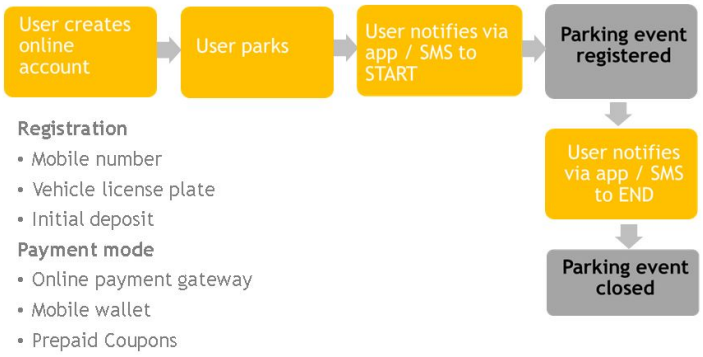
At the implementation level, the camera sensors at a particular location provide information regarding the available parking spaces, which is then transmitted through the network devices to a server. The central server provides the relevant information to the customers via an app and a website. An embedded analytics tool stores the data and provides real time information on parking availability, parking patterns, revenue generation and spot-level predictions.

The IT based parking management system will be further strengthened with a robust city-wide ITMS system to further improve enforcement.

Payment Use Cases

The parking management system is designed for both single time users and registered users.

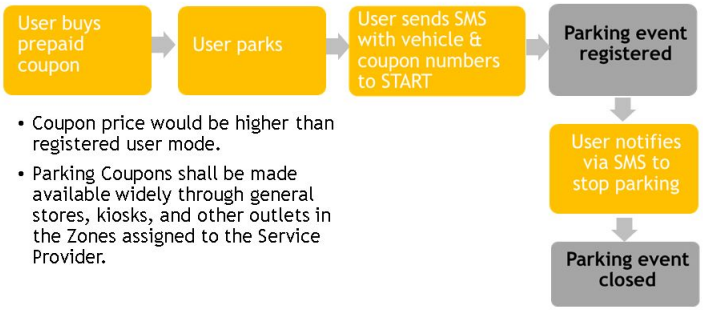
How the System works (for registered users)?



Registration
- Mobile number
- Vehicle license plate
- Initial deposit

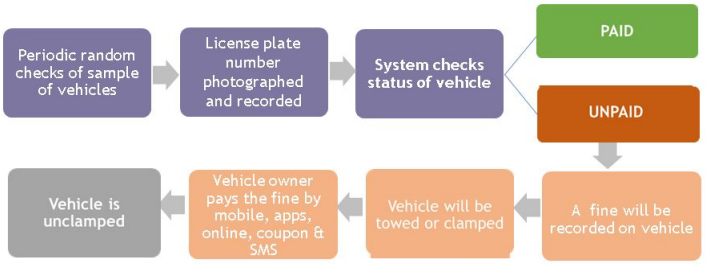
Payment mode
- Online payment gateway
- Mobile wallet
- Prepaid Coupons

How the System works (for one time users)?



- Coupon price would be higher than registered user mode.
- Parking Coupons shall be made available widely through general stores, kiosks, and other outlets in the Zones assigned to the Service Provider.

Enforcement in a paid parking zone



Penalty ≥ 4 x *E(vehicle)* x *F(car)* x *D(fine)*

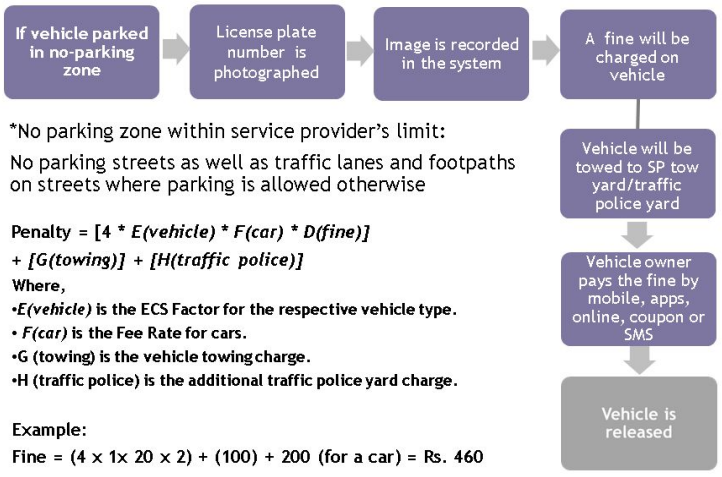
Where,

- *E(vehicle)* is the ECS Factor for the respective vehicle type.
- *F(car)* is the Fee Rate for cars.
- D(fine) is the duration the vehicle is clamped

Example:

Fine = 4 x 1 (ECS factor) x 20 (rate/hr for a car) * 2hrs (duration) = Rs. 160

Enforcement in a no-parking zone



*No parking zone within service provider's limit:

No parking streets as well as traffic lanes and footpaths on streets where parking is allowed otherwise

Penalty = [4 * *E(vehicle)* * *F(car)* * *D(fine)*]
+ *[G(towing)]* + *[H(traffic police)]*

Where,

- ***E(vehicle)* is the ECS Factor for the respective vehicle type.**
- ***F(car)* is the Fee Rate for cars.**
- **G (towing) is the vehicle towing charge.**
- **H (traffic police) is the additional traffic police yard charge.**

Example:

Fine = (4 x 1x 20 x 2) + (100) + 200 (for a car) = Rs. 460

Benefits of the Project

The Greater Chennai Corporation would be the first urban local body in India to implement the project on a PAN city level. The project is expected to reduce the street chaos and also reduce the amount of distance travelled by the citizens in search of parking, thereby reducing carbon emissions from vehicle exhaust.

It provides a safe parking space for cars, free from the risk of vandalism, theft and towing. There would be better traffic flow due to parking management resulting in shorter commuting time for the residents. The project improves the liveability of the city by prioritising the needs of pedestrians and non-motorists, while providing convenient options for vehicle-owners. There's an indirect but significant impact of reduction in carbon dioxide emission as vehicles don't have to circle around

neighbourhood for parking slot. PMS directly leads to better use of public spaces by negating encroachments on the road and designing pedestrian-friendly spaces.

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