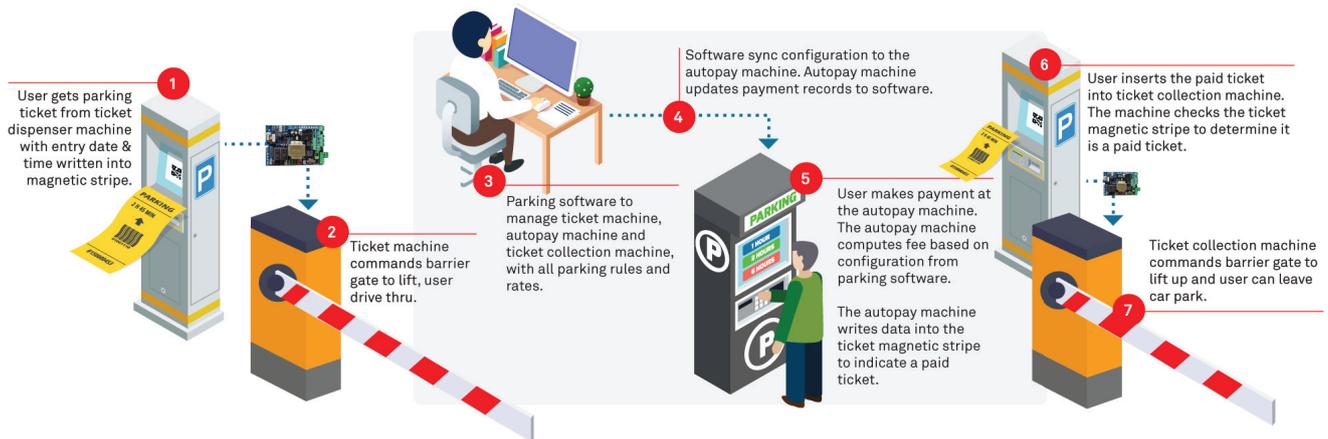


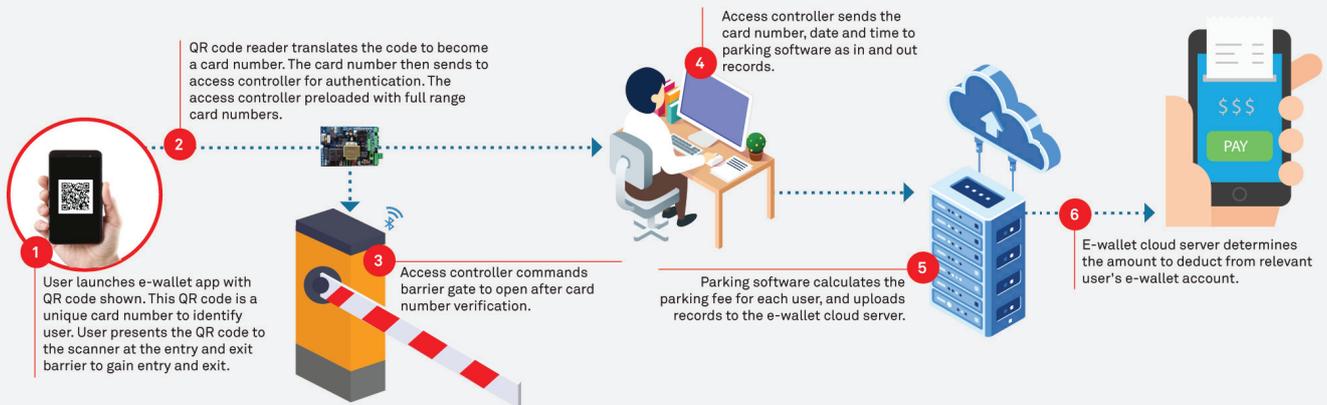
Comparison between Conventional, Semi Cloud and TimeTec Full Cloud Parking System

Conventional Parking System still the most commonly used system in today's parking operation, Semi-Cloud Parking System is introduced as a transitional solution to improve the shortcomings of Conventional Parking System, and TimeTec Full Cloud Parking System is the answer to the future parking system.

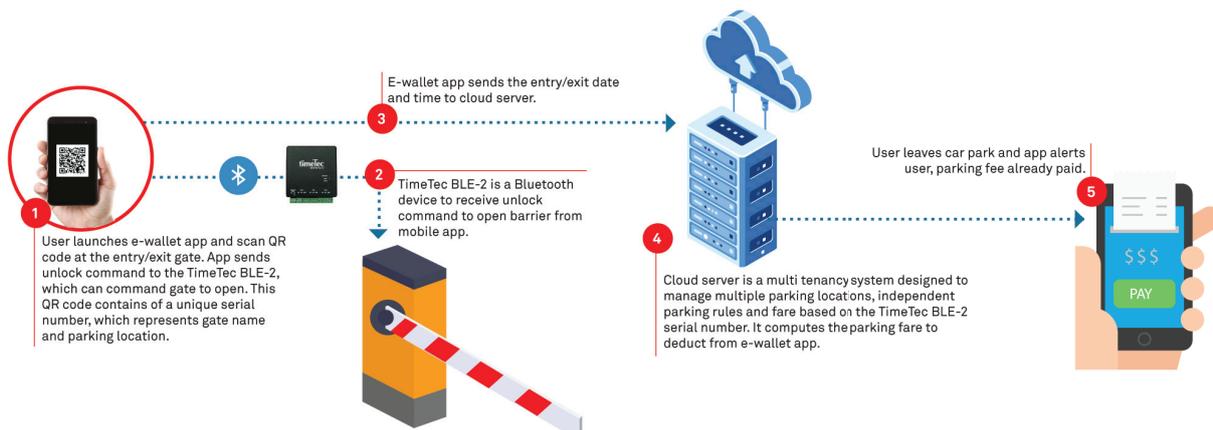
Conventional Parking Solution



Semi Cloud Parking Solution



TimeTec Full Cloud Parking Solution



	CONVENTIONAL	SEMI CLOUD	TIMETEC FULL CLOUD MULTI-TENANT
HARDWARE			
Barrier Gate	Require	Require	Require
QR Code Scanner	Not Require	Require	Not Require
Access controller	Require	Require	Simple
Computer	Require	Require	Not Require
Ticket Dispenser	Require	Not Require	Not Require
Autopay Machine	Require	Not Require	Not Require
Hardware Cost	Very High	High	Very Low
Maintenance Cost	Very High	High	Very Low

Conventional:

A series of locally-based hardware devices are required, requiring high investment and maintenance cost as well as heavy technical knowledge and support to deploy all the hardware and wiring. In this system, Parking A system and Parking B system at different locations can't communicate with each other.

Semi cloud:

A relatively high hardware investment cost. Parking A and Parking B systems may appear centralized under one e-Wallet App, however at each parking location, the front-end barrier control system and the back-end parking management system are both standalone systems. This fragmented case-to-case installation basis complicates multiple locations deployment.

TimeTec Full Cloud:

A multi tenancy system which can handle different parking locations, parking operators, parking rules and fares. Full Cloud solution manages all access rules and parking fare settings under one account. Any changes in rules, fares or parking locations can be done and managed remotely under one account.

	CONVENTIONAL	SEMI CLOUD	TIMETEC FULL CLOUD MULTI-TENANT
COMMUNICATION AND WIRING			
Hardware Wiring	Complicated	Complicated	Minimum
Local Network	Require	Require	Not Require
Internet	Not Require	Require	Require
Bluetooth	Not Require	Not Require	Require (available on phone)

Conventional:

Using local network as backbone to link up parking software, ticket dispenser, autopay machine and controller to manage all entry and exit operations.

Semi cloud:

Using local network as backbone, which requires heavy cabling work and it requires Internet connection to link up the local computer with parking management software to the e-wallet server.

TimeTec Full Cloud:

Full cloud solution requires less cabling work, only requires Bluetooth during entry and exit of car park, Internet connection to compute and pay parking fee and minimum wiring from the TimeTec BLE-2 to a barrier gate.

	CONVENTIONAL	SEMI CLOUD	TIMETEC FULL CLOUD MULTI-TENANT
MANAGEMENT SOFTWARE			
Access Controller Software	❌ Require Local Computer	❌ Require Local Computer	✅ Not Require
Parking Management Software	❌ Require local computer, Windows-based or web-based	❌ Require local computer Windows-based or web-based	✅ Cloud Server
E-wallet	❌ Can't support e-Wallet or complicated to support	✅ Yes	✅ Yes

Conventional:
Everything is stored in local computers as a closed environment system.

Semi cloud:
This system stores user credentials, entry/exit records in local software which is the access controller software and parking management software, however it does not have any payment records. The payment records are stored inside the e-wallet cloud server. Therefore, parking operators need to refer to both databases to consolidate all records.

TimeTec Full Cloud:
This system stores user profiles, entry-exit records and payment records under one account. The parking operator can have full overview to all records and integrate them with their system. The e-wallet system can make sure that the consolidated database is in Full Cloud solution as well.

	CONVENTIONAL	SEMI CLOUD	TIMETEC FULL CLOUD MULTI-TENANT
USER CREDENTIALS & CREDENTIAL SECURITY			
User Credential	❌ Parking Ticket	❌ QR code in e-wallet App	✅ E-wallet account (QR Code at barrier)
Storage	❌ Parking ticket ID	❌ Preloaded all e-Wallet card ID	✅ Not Require
Security	✅ Medium	❌ Low	✅ High
Environmental Friendly	❌ Paper	✅ Yes	✅ Yes
Cost	❌ Paper cost	✅ No cost on credential	✅ No cost on credential
Cashless	❌ Cash	✅ Yes	✅ Yes
User Experience	❌ Not Good	✅ Good	✅ Good

Conventional:
Using dedicated parking tickets as credential, which can only be read by the local autopay machine and ticketing machine. The ticket is secured but easily damaged or lost. Besides the parking tickets, any parking receipt required by the users are also provided in printed form too.

Semi cloud:
Using conventional access control system which are scanner and access controller to recognise user's credential such as QR code inside an e-wallet app. The system generates a unique card ID which is the QR code content for each e-wallet app users, regardless of its usage. All the card IDs have to be preloaded into each access controller at every entry and exit barrier. This mechanism only suitable for office towers that cater to employees, but it is not practical for public parking, and it is also the lowest security among the three systems, because the QR Code as credential can be easily stolen by perpetrators to enter and exit of a parking area, but the parking fees will be charged to the account owner. Moreover, whenever the card ID listing leaks from the access controller, hackers can generate all QR codes and used them at any car parks.

TimeTec Full Cloud:
Using the e-wallet app user account as credential. After the e-wallet App user scans the QR code placed on the entry barrier to enter the car park, the same account cannot scan the code to enter/exit from another car park at different locations. This would prevent any misuse of the e-wallet app user account. The QR Code is used to identify which parking barrier either entry or exit and identify different parking locations.

	CONVENTIONAL	SEMI CLOUD	TIMETEC FULL CLOUD MULTI-TENANT
MANAGEMENT SOFTWARE			
Database Distribution	❌ Fully stored at parking operation location	❌ Partially stored at parking operator location and cloud server	✅ Fully on cloud server
Software Upgrade & Maintenance	❌ Manual upgrade on all individual local computers	❌ Manual upgrade on all individual local computers	✅ Fully managed upgrade and maintenance on cloud server
Software Testing / Troubleshooting	❌ Complicated	❌ Complicated	✅ Simple
API Integration	❌ Partially Available	❌ Partially Available	✅ Fully Available
System Deployment	❌ Complicated	❌ Complicated	✅ Easy

Database Distribution

Conventional:

Parking software and database will be installed at a parking operation location and it is more difficult to integrate with 3rd party system.

Semi cloud:

Parking software will be installed at a parking operation location and some of the information will be uploaded to the cloud server. The cloud server will not have the full view of the entire system. It is difficult to generate reports or perform business analysis, and it poses a lot of challenges merging the database for business insight.

TimeTec Full Cloud:

All information and databases are centralized. The business owner will be able to generate reports and perform big data analysis in real time as the database is centralized. It is also easier to perform the entire backup on the cloud and stored it securely to prevent any data lost.

Software Upgrade & Maintenance

Conventional:

All software update and maintenance are controlled by the software provider, very tedious when performing a software upgrade and maintenance.

Semi cloud:

Upgrade of software is becoming very challenging because any modification of programming code on business logic (e.g parking rate calculation, parking area setup and etc) will need to be manually deployed and installed at a parking operator location. All the parking operator locations are distributed at different locations and this would involve a lot of resources and time to perform the upgrade.

TimeTec Full Cloud:

All information and databases are centralized. The business owner will be able to generate reports and perform big data analysis in real time as the database is centralized. It is also easier to perform the entire backup on the cloud and stored it securely to prevent any data lost.

Software Testing/Troubleshooting

Conventional and Semi Cloud:

It creates more complications for software testing. Since different software are located at different locations (e.g parking operator location), a lot of manual work or on-site testing will need to be done to ensure that all the software are integrated correctly and working seamlessly. Failure in the local software might cause the overall parking system to stop functioning.

TimeTec Full Cloud:

The solution communicates directly with the cloud environment. The testing process can be carried out from any location or parking operator offices. Thus, it reduces the resources and time required to perform software testing.

API Integration

Conventional and Semi Cloud:

API is partially available or limited. Since the database is not centralized and part of the solution is installed at a parking operator location, some information might not be available in the cloud server. This has reduced or impacted the capabilities to build additional API for software integration purpose.

TimeTec Full Cloud:

Database and parking software are available from the cloud server directly. It can offer more API capabilities for software integration. It is a fundamental concept for a cloud solution to communicate and work with other third-party solutions via API.

System Deployment

Conventional:

Even though both hardware and software are setup in the same parking site, it is complicated because it involves a lot of hardware and software integration and wiring works. The same amount of work has to be repeated at different parking sites.

Semi cloud:

The system deployment is complicated. You will need to install the parking management software at each parking operation location with all the barrier gates and access controllers connected. Upon completion, all parking rules and initial setup need to be done on-site. An additional configuration will need to be done in order to communicate with the cloud server for payment processing.

TimeTec Full Cloud:

System deployment is much simpler. Most of the setup and configuration can be done via cloud or via API method. Only minimum hardware configuration is required to be done on-site. The access control hardware can be integrated with any third-party vendors.