

New Mobility Consulting

Business Rules Document

P+R

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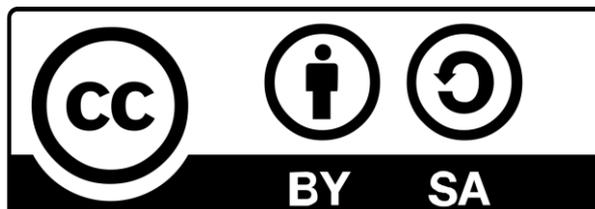


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1. INTRODUCTION

The reason of this Business Rules document is to specify what are the possible rules to implement for a P+R. This is not about how to implement them, but about what must be supported.

From a MoBIB perspective, as for all card-based system it is interesting to have a various, but limited set of implementation schemes, which are not in the scope of the present document.

The document is based on Belgian needs and environment. It can be easialy extrapolled to other mobility schemes.

1.1. Purpose

This document is a basic document, describing the business rules to support the functional use cases and their technical specifications.

1.2. Scope

The scope is the P+R; “Park and Ride”. This means all possible combination of parking and public transport or shared mobility. The point of view is the ticketing and associated pricing when intermodal rules are applicable.

There are different objectives in P+R and the implementation may vary depending on the objective:

- Real P+R: The objective is to reduce the number of cars in the city by offering an alternative based on Parking and Public transport or other mode.
- Parking to allow the usage of the public transport. This is the case for example for Car Parks around an airport. Without a place where to leave the car, it’s not possible to take the plane.
- “Cross-selling”: The Car park exists. The transport offer exists. Combining the two gives a discount to promote the usage of the two.

Those objectives will be discussed in detail in chapter 2

1.3. Overview

P+R implies a parking usage and a transport usage where both are combined. The main rule is [Pay less for P+R than the sum of the two].

The parking may be “period based” or “prestation based”. In other wordd, you can pay for unlimited usage during a period (a pass) or pay per use (a ticket). For the mobility part, it can also be “period based” or “prestation based” (“trip based”).The mode for Parking may be different of the mode for transport.

The supporting information systems can be card based or ID Based. The supporting information system for Parking may be different than the supporting information system for the Ride.

The different use cases are:

- Buy (pre-pay)
 - o Ticket or passes
 - o In common or separately
- Use and control : The level of control may vary
- Pay (post-paid)

2. DEFINITIONS

2.1. Global Rule

The P+R rule is “If a passenger uses, simultaneously, parking (P) and public transport or associated transport (R for Ride), the passenger pays less than the sum of the price of the parking and the price of public transport”. There are certain additional rules / limitation:

- The reduction is normally on the parking, not on the public transport but both are possible.
- The reduction on the parking may be higher than the price of the public transport. In this case, it is important to be able to control that the public transport has effectively been used.

There is an alternative rule “The passenger using a parking, can get a reduced price for the public transport from and to the parking”. In this case, the usage of parking is not controlled, only the public transport price is specific from or to a parking.

Example: P+R Avignon. The local city bus requires a ticket to be used. It is free when it is used from the bus stop at the external parking. The implementation is very simple: When the passenger takes the bus at the stop P+R, he receives 2 tickets. One for immediate usage and another to come back.

Both rules are not supported simultaneously.

Finally, another element is the treatment of the price difference between the price paid by the passenger and the sum of both services, this may (but must not) be paid by a third party.

2.2. Objectives

2.2.1. Real P+R:

The objective is to reduce the number of cars in the city by offering an alternative based on Parking and Public transport or other mode. In this case, the parking is in the sub-urban area. The objective of this parking is to catch the cars that will go to the city [*Use Case 1*]. Two kind of usage have to be avoided:

- Cars using this parking for a local usage
- Cars staying in this parking for a long time.

Those two usages have for effect to reduce the number of place available for real P+R. It is not exceptional that a deterrent price is used for the parking: for exemple 25 EUR per day for the car park, except if the public transport has been used where the price is 1 EUR. It is then really important to be sure that the public transport has been used. There are 2 control mechanisms:

- The P+R use a shuttle to the city center. You can only pay the reduced price at the shuttle start, in the center.
- When you pay, the system verifies that there is at least a validation for public transport in the city centre.

2.2.2. Car Park as support for public transport

If you go to a supermarket, and there is no place for your car, you will go to another one. The supermarket doesn't want that the parking is used for other purpose than going to the supermarket. You can receive two hours for free if you have bought something.

It is the same for public transport. Nevertheless, there are different situations:

- It is an additional revenue for the public transport and the user has no alternative. This is typically the case for airport. The parking fee is high and the operator doesn't care if the parking is used for another usage than taking the plane. This is sometimes done for train (B-Parking for SNCB for example). No check has to be done for a discount. [\[Use Case 2\]](#).
- It is a combined service for public transport with the idea that the parking may support the public transport offering. In this case, we are in a similar situation as the supermarket. The parking will be cheaper if there is a public transport usage. But in this case what is important is not where the passenger go (check if it is in the city center) but only that public transport has been used (check that there is a validation) [\[Use Case 3\]](#).

2.2.3. “Cross-selling”

“Cross-selling” is a classical marketing technique. A user buying a PC may be interested by a mouse and if he buys also a printer, he will have a discount. A similar technique may be used for parking and additional mobility service. The goal is not to reduce traffic jam but to increase what is sold. Typically, you can have the opportunity to find a bike ib Bike Sharing for the last kilometre [\[Use Case 4\]](#). In this case no verification of the usage is done. The goal is to sell. This Use Case, is used by Cambio in a non P+R approach: if you have a season pass for public transport, you receive a discount for your pass for Cambio shared car.

2.3. Pass or on demand (for Parking)

[\[Use Case 1\]](#) is normally on demand and only on demand. There can exists passes for the public transport but the principle is that the parking cannot be “reserved”, this means no pass for parking. Season pass for this use case is [\[Use Case 3 or 4\]](#). The idea is to allocate the places in the parking until the parking is full. Reserve places for cars that will perhaps not come is not in the philosophy of this approach and if you have a pass, you cannot accept that there is no place for you.

[\[Use Case 2\]](#) can be occasional or pass based.

[\[Use Case 3\]](#) can also be occasional or pass based. For the people having a pass, a place must be reserved. The remaining available places can be allocated on demand. There exists a risk that there will be no place left for occasional users.

[\[Use Case 4\]](#) is pure parking management, with season passes and occasional users. The additional service is just an add-on.

2.4. Validation or existence verification

2.4.1. Verifications base

For [\[Use Case 2\]](#) there is no link between P & R than validation has no interest but also verify if there exists another service has no interest. For user convenience, it's perhaps interesting to use the same media like the MoBIB card or the smartphone.

For [\[Use Case 3 or 4\]](#) if there exist a season pass for both, the discount is done at the moment the second pass is sold and there is no need to check the validation. But both must be sold together, or when the second is sold and the discount is applied, there must be a way to verify that there a previous contract exist. This is the standard principle of “cross selling”.

If it is not a pass but an occasional usage, for [\[Use Case 3 or 4\]](#), the principle is the same: either both are sold together at a special price, or when the second is paid, it must be possible to verify that the first exist.

[Use Case 3] has some additional special requirements, to be sure that the objective is reached “use the parking to facilitate the transport usage”:

- Verify the existence of a ticket or a pass for the public transport may be enough to give the discount, if this discount is low.
- If we want to be sure that the transport is used, validation must be checked and this validation must be in the surround of the parking

[Use Case 1] requires to be sure that the transport has been used and has been used to go to the city. In this case the validation must be checked, at least that there is a validation in the center of the city.

2.4.2. Validation check

Validation can only be made if the public transport is “validation based” and not “control based” like in the trains (SNCB).

Validation to be checked in an Account Based System is very tricky, for the following reasons:

- At the moment to pay, there must be a communication between the payment system of the parking and the ABT. Majority of parking are card based and take the decision of how much has to be paid based on the parking ticket or card.
- At the moment to pay, you must be sure that the validation in the vehicle has been transmitted to the Account Based Systems.

To assume that it will be the case on a 24/7 base, is nearly impossible.

Validation is necessary but a validation event on the card is also necessary. Normally, for security reason, it is the case but validation systems based on dynamic QR-Code on smartphone, don't register and event on the device. In this case, we go back to the ABT risks.

It is excluded also systems like SMS or M-Ticket to be used for P+R and certainly for real P+R *[Use Case 1]*

2.5. Detailed rules

2.5.1. Pass(P)+Pass(R)

2.5.1.1. Buy

When bought together the price is directly calculated. The simplest case is when both durations are the same. If one is bought first, the price reduction is calculated during the second transaction.

2.5.1.2. Usage

When the parking or the public transport is used, the only thing to do is to verify the “right to use”. The usage with a pass is unlimited than there is no additional control to be done..

2.5.1.3. Verification

The price calculation is based on the ownership of both passes, not the usage. Nothing, regarding the P+R – Combination of two services, is verified at usage.

2.5.2. Pass(P)+Ticket(R)

2.5.2.1. *Buy*

The pass for Parking is bought at nominal price. There can be a reduction on the public transport ticket when it is sold but, only if it is ticket with an origin-destination. This is a marginal case, which should not normally occur in P+R.

2.5.2.2. *Usage*

Specific ticket with a special price if the origin/or destination is the place of the parking can be a solution. As explained earlier in this document, it is the solution used in Avignon, in a special context where the parking is free.

2.5.2.3. *Verification*

The problem that can occurs is the same as the Diabolo for Zaventem. The user may buy a ticket “from/to the parking” but use it on a shorter distance and thus, use it as a non P+R ticket for the price of the P+R ticket. There are two possibilities to avoid that abuse: sell only the ticket at the parking or control the validation location, parking is the only place where the validation is possible for this ticket.

In any cases, it’s an exception difficult to implement and that must be limited.

2.5.3. Ticket(P)+Pass(R)

2.5.3.1. *Buy*

The user has a pass for the public transport and occasionally uses the car park and receive a discount for this occasional use of the parking. The discount is calculated, and deducted from the parking amount.

2.5.3.2. *Usage*

The Car Park ticket is used for occasional use. This is the case of a regular user of public transport using car park occasionally.

2.5.3.3. *Verification*

The verification level 1 is “does there exist a valid pass for public transport in the surrounding areas of the Car Park?”

The verification level 2 is “does it exist but also has it been used in the right geographic location?”. In order to make this control possible, events with corresponding location must be registered.

The verification level 3 is added on the level2: “verify that time of the Ride is consistent with time of Park”.

2.5.4. Ticket(P)+Ticket(R)

2.5.4.1. *Buy*

When bought together the price is directly calculated. This is the classical approach for occasional P+R. For tickets, public transport is usually pre-paid (thus paid before usage) and car park, post-paid (after usage). Consequently, the price discount is granted on the last payment, for the car park ticket.

2.5.4.2. Usage

The occasional user enters the parking and “registers” the entrance time. Then, he leaves with the public transport, returns and pays the parking. Like, in the previous case, he can have already the Ride ticket and there will be no associated transaction related P+R when the public transport is bought. The only verification must be at parking level: Is there a public transport usage.

2.5.4.3. Verification

Verification is the same 3-levels approach as for the previous one where the Ride is a pass.

2.6. Card Based vs System Based

In a card-based system, the authorisation to use is based on the information stored on the card. Events are written on the card. The information is also known in the back-end system but possibly with some delay.

System Based (or ID Based or Account Based) stores the information in the backend. The card is only used as an identifier. Nothing else than the link to the back-end can be found on the card. This means that for verification, the answer must come from the back-end.

2.6.1. Card Based (P) or System Based (P)

Normally the discount is granted on the parking, based on the existence of the “Ride”. If the system is card based, the price is calculated using information on the card itself. If it is system based, it must be calculated based on information coming from the system. There is no impact for the P+R.

2.6.2. Card Based (R)

When the Ride is card based, all information may be on the card. The right to use must be on the card to have an operational system. Even “events” data may be on the card. For efficient P+R, it is important to have the information on the card.

There is no problem for the P+R to combine both informations. The information is on the card and can be read by the payment machine of the parking.

2.6.3. System Based(R)

When the Ride is system based, nothing else than the ID is on the card. This means that to take a decision on the price, the “Parking” system must be connected to the “Ride” back-end. If the Parking is card-based (in order to be able to work off-line), it will not be possible to work with a system-based Ride (which requires to be “on-line”).

2.7. Scenarios

	Card(P)+Card(R)	ABT(P)+Card(R)	Card(P)+ABT(R)	ABT(P)+ABT(R)
Ticket(P)+Ticket(R)	Green	Green	Yellow	Green
Pass(P)+Ticket(R)	Yellow	Yellow	Yellow	Yellow
Ticket(P)+Pass(R)	Green	Green	Yellow	Green
Pass(P)+Pass(R)	Green	Green	Yellow	Green

For a first overview, Scenarii will be limited to

1. Pass (P) – Pass (R) for the same period. This is the case for someone who want for example combine Parking and train for a certain period. The scenario is limited to a unique parc place associated with the pass.
2. Ticket (P) – Pass (R). This is the case for someone who has a pass and use occasionnaly the car park or use different car parks.
3. Ticket (P) – Ticket (R) : This is the case for pure occasional usage.

3. CONCLUSION

In the future, ABT for all will be an interesting solution. ABT for public transport and card for P+R generates risk of transmissions. But if both are ABT post paid, the system can wait all the transaction before calculating the price. The rules can be also very complex.

For the moment, the only valuable solution is at least card based system for public transport with validation event written on the card. A system like the M-Ticket of De Lijn or QR-Code of SNCB cannot allow high discounts → You can be sure that there is a ticket, not that it is used. If the discount for the parking is higher than the price of the transport ticket, there must be a control on the event.

Before implementing a system, it must be clearly identified what to do:

- Pure P+R to reduce car congestion in the city
- Parking to facilitate the usage of the public transport
- Cross selling of different mobility solutions.