

Version 3.0

Document history

Date	Version	Description	Author
22/12/2016	1.0		
14/12/2018	2.0	resend functionality added; minor corrections	Ssa
16/01/2019	2.1	new endpoint	SSa
24/01/2023	3.0	Update Endpoint REST Version	Jonatan Moerman Matthias Van Wulpen

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1. Introduction

This document describes the interactions with the "**Gents parkeer- en verblijfsregister (GPR)**". The GPR is based on the "Nationaal Parkeer Register (NPR)" that is made available by the Servicehuis Parkeer- en Verblijfsrechten (SHPV, Service House Parking and Staying Rights). The interactions with the GPR mimic the interactions with the NPR as close as possible, although there will be some minor differences.

1.1 Goal

This document is aiming at a clear understanding of all possible interfaces to the GPR for all potential stakeholders.

1.2 Overview and scope

The GPR enables participants to register rights and retrieve rights information for enforcement and settlement. GPR is hosted at **District09**, the IT-Partner of the City of Ghent, and made accessible through open and standard protocols.

Starting points:

- Stakeholders will be governmental entities like municipalities, private owners of parking garages and private service providers, which connect to the GPR to acquire parking or staying rights or for enforcement;
- The design is based on the design of the NPR
- The interfaces will be equal to all stakeholders

1.3 Definitions

AreaManager	Party responsible for exploitation of parking areas like municipalities, governments or private parties.
Enforcer	Party responsible for enforcement of the parking rights (i.e. parking officer)
GPR	Gents parkeer- en verblijfsregister
Service	The result or effect of a task of an organization, employee or application based on legal obligations or agreements, which provides the needs of multiple organizations, employees or applications.
Web service provider	A party that publishes a web service.
Web service requester/consumer	A party that consumes a web service.
Web service	A web service is a special occurrence of a service focused at the service between applications.

	WSDL is extensible to allow description of endpoints and their messages regardless of what message formats or network protocols are used to communicate, however, the only bindings described in this document describe how to use WSDL in conjunction with SOAP 1.1, HTTP GET/POST, and MIME.
REST API	A REST API (Representational State Transfer Application Programming Interface) is a type of web service that uses HTTP requests to GET, PUT, POST and DELETE data. It is designed to work with web services, and uses a set of rules to create predictable URLs that make it easy to understand and use. REST APIs are often used to access web-based databases or other services, and can return data in a variety of formats, including XML and JSON.
OpenAPI Specification	OpenAPI Specification (OAS) is a language-agnostic specification for describing RESTful APIs. It provides a format for describing the structure of an API, including the endpoint URLs, available operations, request and response formats, and other information. This allows for easy documentation and client code generation for the API.

2. Global Design

2.1 Context

In figure 1 the context of the GPR is depicted. Concerning the interfaces three significant entities can be defined:

- **Enforcers**
By instructions of municipalities and private parties, enforcement of the system will be done. Therefore the enforcer role needs interfaces to check a parking right.
- **Area Managers**
Area managers own or operate parking space and regulate and charge the usage. Rights based on other vehicle related usage of streets, areas or buildings can also be registered.
- **Providers / Acquirers**
Providers will acquire parking or staying rights for areas on behalf of their customers based on contracts with the City of Ghent. People that want to acquire a parking or staying right, will interact with the providers. For electronic registration of a right, the provider will interact with the GPR system using a limited set of well described, standardized interfaces.

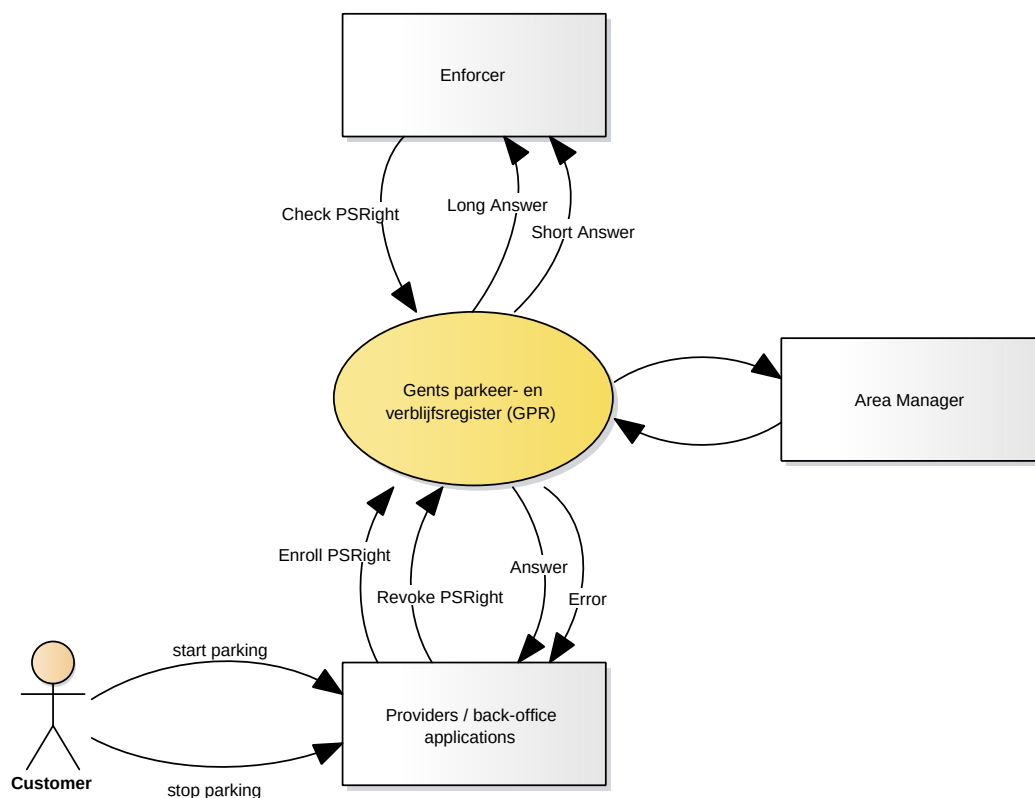


Figure 1 Context diagram

2.2 Usages

The usages that are available for registration in the GPR are listed in the table below.

Niveau 1	Niveau 2	Niveau 3	Niveau 4	usageld
Parkeren				PARKEREN
	Betaald Parkeren			BETAALDP
		Standaard Ticket (Betaald) Parkeren		STDP
		KortParkeren		KORTP
			Gratis Parkeren	GRATISP
			Ultrakort Parkeren	ULTRAP
	Vergunning- Parkeren			VERGUNP
		Bewoners- Parkeren		BEWONERP

		(algemeen)	BewonersParkeren (specifiek)	BEWP
			AutodelerParkeren	AUTODELERP
		Marktkramer		MARKTP
		Zorgverstreker		ZORGP
		Veegwagen		VEEGP
		Anoniem politievoertuig		POLITIEP
		Forfaitair Parkeren		FORFAITP
		Forfaitair "Betaald" Parkeren		FORFAITBETP
		Forfaitair Vergunning-Parkeren		FORFAITVERGUNP

2.3 URL versions

This version of the GPR Interface description describes the current interface with URL <https://gprapi.stad.gent/>. The test environment is available at <https://gprapi.st.stad.gent/>

2.4 Disclosure of parking information: List of selling points

An up-to-date list of selling points is available for all providers. Additionally there's an endpoint for requesting the list at real time (see ch 7)

2.5 Technology guidelines message exchange

This version of the interfaces will be implemented according to the REST standards and exposed through a rest api. The api uses District09 provided client certificates to identify and authenticate users and uses the internet solely as transport layer.

The exchange of information can be divided in 2 layers:

- I. Transport layer
In this layer the actual connection is established through Internet. For all transport layer communication 2-sided TLS must be used.
- II. Application Layer
Messages and endpoints are defined using REST principles in the openapi 3.0 specification

The content is based on the functional specification. Content definition is based on the starting points in 1.2.

2.6 Security

Transport between requester and provider must use mutual SSL (also known as two-way SSL). Identification of both web service requester and web service provider will be done by PKI certificates. Parties using a PKI certificate will be authenticated and identified by the CN in the certificate.

2.7 How to get the openapi3.0 spec

The openapi spec is hosted alongside the rest api and accessible through the swagger, There are 4 openapi documents, 1 for each role and a full spec.

The swagger can be obtained by browsing to <service url>/swagger (The PKI certificate is necessary for this request)

From there you can select 1 of the 4 documents and also retrieve the openapi spec json

Note that this swagger is only visual and is not intended to be used to send actual requests.

3. Overview of web service messages

The GPR web service is used by all entities to interact with GPR.

The following methods are available:

- Methods to be used by rights acquirers (providers) (see Ch 4)
 - Post v1/psright/enroll (EnrollPSRight)
 - Put v1/psright/revoke/{id} (RevokePSRight)
 - Get v1/psright/{id} (RetrieveRightInfo) (see ch6)
 - Post v1/psright/search (RetrieveRightInfo) (see ch6)
 - Post v1/pricing/calculate (CalculatePrice)
- Methods to be used by enforcers (see Ch 5)
 - Post v1/psrightcheck/check (CheckPSRight)
 - Post v1/psrightcheck/search (RetrieveCheckInfo) (see ch6)
- Methods to be used by area managers (See Ch 6)
 - Get v1/psright/{id} (RetrieveRightInfo)
 - Post v1/psright/search (RetrieveRightInfo)
 - Post v1/psrightcheck/search (RetrieveCheckInfo)
- Methods to be used by all entities (See Ch 7).
 - Get v1/sellingpoint
 - Post v1/location/locateareas (RetrieveAreasByLocation)
 - Post v1/location/retrieveareaRegulationfares (RetrieveAreaRegulationFareInfo)
 - v1/health/am-i-up

The messages of GPR are defined with UTC times unless otherwise described.

All messages definitions and examples are present in the openapi spec and swagger. (see 2.3)

4. Methods to be used by providers

4.1 POST v1/psright/enroll

4.1.1 Message dialogue

A rights acquirer sends a request message **EnrollPsRightRequest** to GPR, containing the data of a PsRight to be registered in GPR. GPR sends a response message **EnrollPsRightResponse** along with http status code 201 if registration was successful. If the registration was not successful an error response **HttpValidationProblemDetails** is returned containing information of the errors.

The rights acquirer is identified by the common name (CN) in its certificate.

The rights acquirer should be authorized for the provided area, if not, the right is not registered and an error message is sent.

The request message contains at least the following information:

- Identification of an area. The way to specify an area should be one of the following:
 1. *areaManagerId* and *areald*.
 2. coordinates (*LocationCoordinates*), consisting of a *latitude* and *longitude* in WGS84 format.
 3. *sellingPointId*.

If more than one identification is provided, GPR will use the list above to determine priority, e.g. if *areaManagerId/areald* + *coordinates* are provided, the combination *AreaManager/areald* will be used to specify the area.

If the identification provided does not match any of the supported methods, the PsRight will not be recorded and the rights acquirer will receive an error message.

- Usage of the PsRight (*usageld*).
- Identification of a vehicle (*vehicleId*).
- Date and time when the PsRight starts (*startTimePsRight*).

Optional information:

- Country code of a vehicle (*countryCodeVehicle*).
- Date and time when the PsRight ends (*endTimePsRight*).
- With *amountPsRight* and *vatPsRight* an amount can be registered with the enrollment of a PsRight.
- Identification or description that a rights acquirer can register with a PsRight (*referencePsRight*).
- A GUID to uniquely identify a request sent to GPR (*correlationId*).

To record a PsRight properly, GPR needs to know the area and the area manager to which the area belongs.

When an area is specified through *areaManagerId/areald*, these data are known immediately.

When an area is specified through coordinates, GPR collects all areas containing the specified location, and the area corresponding with the specified usage will be selected as the area to record with the PsRight.

When an area is specified through a *sellingPointId*, GPR collects all areas containing the specified selling point, and the area corresponding with the specified usage will be selected as the area to record with the *PsRight*.

If the area determination results in "no area found" or "more than one area found", the *PsRight* will not be recorded and the rights acquirer will receive an error message.

endTimePsRight can be provided immediately, but it can also be provided at a later stage, using the request method **v1/psright/revoke (see 4.2)**.

Business Rule: A rights acquirer is obliged to terminate any *PsRight* he acquires. It is advised that a (known or default) *endTimePsRight* is always provided immediately. This *endTimePsRight* can be adjusted later via a call to **v1/psright/revoke**.

For usage and rules concerning the elements in the request message, see the request example and Annex A.

If no error occurs, the *PsRight* is recorded in GPR. The response message sent by GPR contains:

- The area manager and area for which the *PsRight* is recorded, except when these were already specified in the input (*areaManagerId/areald*)
- Calculated price (*amountPsRightCalculated*, *vatPsRightCalculated*), based on the regulation imposed on the area by the area manager. A price calculation is done only when *endTimePsRight* was provided in the request message. A specification of the calculated price is added if the calculation involved another regulation than the standard regulation, or when more than one regulation was involved in the calculation. In these cases, the price is lower than the usual price according to the standard regulation, because a rebate applies.

Examples of rebate regulations are day tickets, evening tickets etc.

NOTE: if GPR was not able to do a calculation, *amountPsRightCalculated* and *vatPsRightCalculated* will be absent.

- Adjusted end time (*endTimePsRightAdjusted*). GPR will provide an adjusted end time in these cases:
 - When a right can only be acquired for a limited duration (e.g. maximum parking time of one hour). In this case an adjusted end time will be given when no *endTimePsRight* was provided, and also when an *endTimePsRight* was provided that extends the maximum allowed duration.
 - When the *endTimePsRight* was provided in the request, and it is possible to extend duration for the same *PsRight* price.
 - When in an area with parking interruption a right is registered when a future right is already present. In these cases the end time of the newly registered right will be adjusted, because the parking interruption needs to be maintained.

An adjusted end time overrules the end time provided by the rights acquirer (but does not take away the obligation for the rights acquirer to terminate the *PsRight*).

4.2 PUT v1/psright/revoke

4.2.1 Message dialogue

A rights acquirer sends a request message **RevokePsRightRequest** to GPR, containing the identification of a PsRight, and a time at which the right should end. GPR sends a response message **RevokePsRightResponse** if registration was successful. If the registration was not successful an error response **HttpValidationProblemDetails** is returned containing information of the errors.

The rights acquirer is identified by the common name (CN) in its certificate.

If the right already has an EndTime, it is possible to shorten the duration of the right, but it is also possible to extend the duration. Extending a right is only allowed when the original endTime of the PsRight has not passed yet.

The request message contains at least the following information:

- Identification of a PsRight (*psRightId*).
- Date and time when the PsRight should end (*endTimePsRight*).

Optional information:

- A GUID to uniquely identify a request sent to GPR (*correlationId*).

If no error occurs, the response message sent by GPR contains:

- Calculated price (*amountPsRightCalculated*, *vatPsRightCalculated*), based on the regulation imposed on the area by the area manager. A specification of the calculated price is added if the calculation involved another regulation than the standard regulation, or when more than one regulation was involved in the calculation. In these cases, the price is lower than the usual price according to the standard regulation, because a rebate applies. Examples of rebate regulations are day tickets, evening tickets, etc.
NOTE: if GPR was not able to do a calculation, *amountPsRightCalculated* and *vatPsRightCalculated* will be absent.
- Adjusted end time (*endTimePsRightAdjusted*). GPR will provide an adjusted end time in these cases:
 - When a right can only be acquired for a limited duration (e.g. maximum parking time one hour). In this case an adjusted end time will be given when no *endTimePsRight* was provided, and also when an *endTimePsRight* was provided that extends the maximum allowed duration.
 - When the *endTimePsRight* was provided in the request, and it is possible to extend duration for the same PsRight price.
 - When in an area with parking interruption a right is registered when a future right is already present. In these cases the end time of the newly registered right will be adjusted, because the parking interruption needs to be maintained.

An adjusted end time overrules the end time provided by the rights acquirer (but does not take away the obligation for the rights acquirer to terminate the PsRight).

4.3 CalculatePrice

4.3.1 Message dialogue

An entity sends a request message **CalculatePriceRequest** to GPR, containing the data of a fictional PsRight, to calculate its price. GPR sends a response message **CalculatePriceResponse** if price calculation was successful. If the registration was not successful an error response **HttpValidationProblemDetails** is returned containing information of the errors.

The request message contains the information necessary to calculate the price of a PsRight, which could be an actual PsRight (calculate before recording), a potential PsRight (price inquiry) or a hypothetical PsRight (e.g. testing, what if?).

The entity is identified by the common name (CN) in its certificate.

A rights acquirer should be authorized to do a calculate price for the specified area. If not, an error message is sent.

When the request message is used to calculate price before recording an actual PsRight, it is possible to include a vehicleId. When a vehicleId is provided in the request message, GPR checks whether the recording of a PsRight is allowed in combination with a possible minimum parking interruption as instated by the Areamanager. Rights acquirers can only use a message with a vehicleId when they are authorized to acquire rights for the specific area. When a rights acquirer has no authorization an error message will be given.

When a vehicleId is not provided in the request message, GPR calculates the price based on the provided information and does not perform extra checks for minimum parking interruption and/or authorizations. This request can be used by all entities to acquire information about any parking area known in the GPR, therefore including areas in which no PsRightId's can be acquired.

The request message contains the following information:

- Identification of an area. The way to specify an area should be one of the following:
 1. *areaManagerId* and *areald*.
 2. coordinates (*LocationCoordinates*), consisting of a *latitude* and *longitude* in WGS84 format.
 3. *sellingPointId*.

If more than one identification is provided, GPR will use the list above to determine priority, e.g. if *areaManagerId/areald* + *coordinates* are provided, the combination *AreaManager/areald* will be used to specify the area, and the location will be omitted. If the identification provided does not match any of the supported methods, the PsRight will not be calculated and the rights acquirer will receive an error message.

- Usage of the PsRight (*usageId*).
- Date and time when the PsRight starts (*startTimePsRight*).

Optional information:

- Identification of a vehicle (*vehicleId*).
- Country code of a vehicle (*countryCodeVehicle*).
- Date and time when the PsRight ends (*endTimePsRight*).

To be able to calculate the price of a PsRight properly, GPR needs to know the area and the area manager to which the area belongs.

When an area is specified through *areaManagerId/areald*, these data are known immediately.

When an area is specified through coordinates, GPR collects all areas containing the specified location, and the area corresponding with the specified usage will be selected as the area to calculate a price for.

When an area is specified through a selling point, GPR collects all areas containing the specified selling point, and the area corresponding with the specified usage will be selected as the area to calculate a price for.

If the area determination results in "no area found" or "more than one area found", the rights acquirer will receive an error message.

If no error occurs, the response message sent by GPR contains

- The area and area manager for which a calculation was done, unless this was already specified in the input (*areald/areaManagerId*).
- Calculated price (*amountPsRightCalculated* , *vatPsRightCalculated*), based on the regulation imposed on the area by the area manager. A price calculation is done only when *endTimePsRight* was provided in the request message. A specification of the calculated price is added if the calculation involved another regulation than the standard regulation, or when more than one regulation was involved in the calculation. In these cases, the price is lower than the usual price according to the standard regulation, because a rebate applies. Examples of rebate regulations are day tickets, evening tickets, etc. NOTE: if GPR was not able to do a calculation, *amountPsRightCalculated* and *vatPsRightCalculated* will be absent.
- Adjusted end time (*endTimePsRightAdjusted*). GPR will provide an adjusted end time in these cases:
 - When a right can only be acquired for a limited duration (e.g. maximum parking time one hour). In this case an adjusted end time will be given when no *endTimePsRight* was provided, and also when an *endTimePsRight* was provided that extends the maximum allowed duration.
 - When the *endTimePsRight* was provided in the request, and it is possible to extend duration for the same PsRight price.
 - When in an area with parking interruption a right is registered when a future right is already present. In these cases the end time of the newly registered right will be adjusted, because the parking interruption needs to be maintained.

An adjusted end time overrules the end time provided by the rights acquirer.
- A list that further specifies *amountPsRightCalculated* (*SpecifCalcAmountList*). The list is only present when the calculated amount is based on additional regulation(s), besides the standard regulation of the area.

5. Messages to be used by enforcers

5.1 POST v1/psrightcheck/check

5.1.1 Message dialogue

A checking organization sends a request message **CheckPsRightRequest**. GPR responds with a message **CheckPsRightResponse** if the request was processed successfully. If the request was not successful an error response **HttpValidationProblemDetails** is returned containing information of the errors.

The checking organization is identified by the common name (CN) in its certificate.

The checking organization must be authorised to check for PsRights in the specified area. If not, GPR will send an error message and no information is given.

The request message contains at least the following information:

- Identification of an area. The way to specify an area should be one of the following:
 1. *areaManagerId* and *areald*.
 2. coordinates (LocationCoordinates), consisting of a Latitude and Longitude in WGS84 format. If more than one identification is provided, GPR will use the list above to determine priority, e.g. if *areaManagerId/areald* and *CheckLocation* are provided, the combination *AreaManager/areald* will be used to specify the area, and the location will be omitted. If the identification provided does not match any of the supported methods, GPR will return an error message and no information will be given.
- Usage that is checked (*usageld*).
- Identification of a vehicle (*vehicleId*).
- Date and time at which must be checked whether or not a PsRight is present (*checkTime*)
- *includeExtraInformation*. If this indicator is set to "false" (no), the checking organization wants a response that consists of a allowed only. If this indicator is set to "true" (yes), a response is given that consists of a allowed with additional information if available.

Optional information

- Country code of a vehicle (*countryCodeVehicle*).
- Identification or description that a checking organization can register with the logging in GPR of a check (*referenceCheckOrg*).

To check for PsRights properly, GPR needs to know the area that is checked and the area manager to which the area belongs.

When an area is specified through *areaManagerId/areald*, these data are known immediately.

When an area is specified through coordinates, GPR collects the areas containing the specified location.

All areas with a usage either matching the specified usage, or with a usage that is more specific than the specified usage, will be considered in the check for PsRights.

If the area determination results in "no area found", GPR will return an error message and no information will be given.

If no error occurs, the response message contains the following information:

- Answer given by GPR at a request to check for a PsRight for a certain vehicle in a specified area at a specified time (*allowed*).
- A list containing the data of 1 or more areas that have been checked (*checkedAreas*).
- A list of 1 or more PsRights associated with the check for PsRights and for which information is given (*relevantPsRights* with *CheckPsRightExtraInfo*).
 1. Identification of a right (*psRightId*).
 2. Identification of an area (*areaId*).
 3. Description of an area (*areaDesc*).
 4. Date and time of the start and end of a PsRight (*startTimePsRight* and *endTimePsRight*).
 5. Adjusted end time and date when a PsRight has ended (*endTimePsRightAdjusted*).
 6. Description or reference of a right (*referencePsRight*).
 7. Identification of a sellingpoint (*sellingPointId*).
 8. Description of a selling point (*sellingPointDesc*).
 9. Identification of a usage (*usageId*).
 10. Description of a usage (*usageDesc*).
 11. Description of a regulation imposed by the area manager (*regulationDesc*).

The check results in a *CheckAnswer*, which is returned in the response message. The following *CheckAnswers* are possible:

- 'true'(Yes), meaning that either a PsRight was found that is valid in the specified area at *CheckTime*, or that at *checkTime* no PsRight is required for the specified area.
- 'false'(No), meaning that no PsRight was found that is valid in the specified area at *CheckTime*, while at *checkTime* the presence of a valid PsRight is required.

Together with *allowed*, the list of areas that have been considered, is returned. This is not done when the area was specified in the request message.

If the *ExtraInfoIndicator* was set to "true" in the request, GPR will provide extra information, which is:

In case of *allowed* = "true"

- Information about the PsRight that was found, or a message that a PsRight is not required.

In case of *allowed* = "false"

- Information about PsRights found in other areas of the same area manager code and the same *usageId* (Note: a checking organization receives only information about areas where the organization is authorised to check).
- Information about PsRights found in the area specified, before and after check time, within a time frame of 24 hours.

Every check for PsRights is logged in GPR. The logging consists of the data provided in the request message *CheckPsRightRequest*, and the *allowed* (true or false) that GPR has given.

6. Messages to be used by area managers

6.1 Get v1/psright/{id}

6.1.1 Message dialogue

This method can be used to retrieve a specific PsRight based on a *psRightId*.



The area manager or acquirer sends a GET request with the relevant *PsRightId* in the uri. GPR responds with a message ***PsRightInfo***.

The area manager or acquirer for which information is retrieved, is identified by the common name (CN) in its certificate. Acquirers can only retrieve the PsRights they acquired.

All information concerning a specified right is returned. If no rights were found, the response consists of an empty message.

The response message contains the following information:

- Identification of a vehicle (*vehicleId*).
- Identification of a right (*psRightId*).
- Description or reference of a right (*referencePsRight*).
- Country code of a vehicle (*countryCodeVehicle*).
- Identification of a selling point (*sellingPointId*).
- Start time and date when a PsRight has started (*startTimePsRight*).
- End time and date when a PsRight has ended (*endTimePsRight*).
- Adjusted end time and date when a PsRight has ended (*endTimePsRightAdjusted*).
- Identification of an acquirer (*psRightAcquirerCode*).
- Description of an acquirer (*psRightAcquirerDesc*).
- Identification of an area manager (*areaManagerId*).
- Description of an area manager (*areaManagerDesc*).
- Identification of an area (*areaId*).
- Description of an area (*areaDesc*).
- Identification of a usage (*usageId*).
- Description of a usage (*usageDesc*).
- Time and date of registration when a right has been registered in GPR (*createdOn*).
- Time and date of registration when a right has been stopped in GPR (*revokedOn*).
- Geographical position which was provided with the registration of a right (*latitude* and *longitude*) in WGS84 format.
- The price for a parking right as determined by the provider (*amountPsRight*).
- The value added tax (V.A.T.) of the price for a parking right as determined by the provider (*vatPsRight*).
- The price for a parking right as determined on basis of the data in GPR (*amountPsRightCalculated*).
- The value added tax (V.A.T.) of the price for a parking right as determined on basis of the data in GPR (*vatPsRightCalculated*).

6.2 POST v1/psright/search

6.2.1 Message dialogue

This method can be used to retrieve the rights that were present for a certain vehicle around a specified date and time.

The area manager or acquirer sends a request message ***RetrieveRightInfoByFilterRequest***. GPR responds with a message ***PsRightInfo***.

The area manager or acquirer for which information is retrieved, is identified by the common name (CN) in its certificate.

The request message contains the following information:

- Identification of a vehicle (*vehicleId*).
- Date and time (*indicatorTime*) around which the right information should be retrieved.

For the area manager, the information of all rights registered in GPR for the specified vehicle that were started or stopped within 24 hours around the *IndicatorTime*, are returned. If no rights were found, the response consists of an empty message.

For acquirers only PsRights they acquired are retrieved.

The response message contains the following information:

- Identification of a vehicle (*vehicleId*).
- Identification of a right (*psRightId*).
- Description or reference of a right (*referencePsRight*).
- Country code of a vehicle (*countryCodeVehicle*).
- Identification of a selling point (*sellingPointId*).
- Start time and date when a PsRight has started (*startTimePsRight*).
- End time and date when a PsRight has ended (*endTimePsRight*).
- Adjusted end time and date when a PsRight has ended (*endTimePsRightAdjusted*).
- Identification of an acquirer (*psRightAcquirerCode*).
- Description of an acquirer (*psRightAcquirerDesc*).
- Identification of an area manager (*areaManagerId*).
- Description of an area manager (*areaManagerDesc*).
- Identification of an area (*areaId*).
- Description of an area (*areaDesc*).
- Identification of a usage (*usageId*).
- Description of a usage (*usageDesc*).
- Time and date of registration when a right has been registered in GPR (*createdOn*).
- Time and date of registration when a right has been stopped in GPR (*revokedOn*).
- Geographical position which was provided with the registration of a right (*latitude* and *longitude*) in WGS84 format.
- The price for a parking right as determined by the provider (*amountPsRight*).
- The value added tax (V.A.T.) of the price for a parking right as determined by the provider (*vatPsRight*).
- The price for a parking right as determined on basis of the data in GPR (*amountPsRightCalculated*).
- The value added tax (V.A.T.) of the price for a parking right as determined on basis of the data in GPR (*vatPsRightCalculated*).

6.3 POST v1/psrightcheck/search

6.3.1 Message dialogue

This method can be used to determine if a certain vehicle was checked around a specified time, and what check result was given by GPR.

Example of usage: in cases of parking tax additional assessments, or objections to additional assessments.

The area manager employee sends a request message **RetrieveCheckInfoRequest**. GPR responds with a message **PsRightCheckInfo**.

The area manager for which information is retrieved, is identified by the common name (CN) in its certificate.

The request message contains the following information:

- Identification of a vehicle or disabled person's parking card (*vehicleId*).
- Date and time (*indicatorTime*) around which the check information should be retrieved.

For the specified area manager, information of all logged check answers registered in GPR for the vehicle, with a reference date-time within 24 hrs. of IndicatorTime, are returned. If no check answers were found, the response consists of an empty message.

The response message contains the following information:

- Identification of a vehicle or disabled person's parking card (*vehicleId*).
- Identification of an area manager (*areaManagerId*).
- Description of an area manager (*areaManagerDesc*).
- The country of origin of the vehicle licence plate, as provided by the enforcer in a check for PsRights (*countryCode*).
- Date and time of the check of the PsRight (*checkedTime*).
- Indicator denoting if the checking organization received extra information, while checking for PsRights (*isCheckedExtraInfo*).
- Description or reference of a right (*referencePsRight*).
- Answer given by GPR at a request to check for a PsRight for a certain vehicle in a specified area at a specified time (*checkAnswerHasRight*).
- Code of a PsRight checking organization (*enforcerCode*).
- Description of a PsRight checking organization (*enforcerDescription*).
- Identification of a usage (*usageId*).
- Identification of an area (*areaId*).
- Description of an area (*areaDescription*).
- Specification of the area that is checked for the presence of PsRights (*latitude and longitude*).

7. Messages to be used by all entities

7.1 POST v1/location/locateareas

7.1.1 Message dialogue

An entity sends a request message **RetrieveAreasByLocationRequest**, containing a location. GPR sends a response message **AreaUsageExtraInfo**, containing a list of areas matching the specified location, together with their usage, as well as the address that is closest to the specified location (if available).

The entity is identified by the common name (CN) in its certificate.

The request message contains the following information:

- Identification of an area. The way to specify an area should be one of the following:
 1. *areaManagerId* and *areald*.
 2. Coordinates consisting of a *latitude* and *longitude* in WGS84 format.
 3. *SellingPointId*.
 If more than one identification is provided, GPR will use the list above to determine priority, e.g. if *areaManagerId/areald* + *coordinates* are provided, the combination *areaManagerId/areald* will be used to specify the area, and the location will be omitted.

Optional information:

- Date and time for matching areas at an x moment (*referenceTime*).
- Usage of the areas to retrieve (*usageld*).

If no reference date-time is provided, all current and future areas matching the specified location, are retrieved. Otherwise all areas valid at reference date-time, matching the specified location, are retrieved.

If a *usageld* is provided, only found areas matching the specified *usageld* are returned, otherwise all areas are returned. The hierarchy in the *usagelds* is not taken in account.

If no error occurs, the response message sent by GPR consists of the following

- List of areas matching the specified location consisting of *areald*, *AreaDesc*, *startDateArea*, *endDateArea*, *usageld*, if applicable.

7.2 POST v1/location/retrievearearegulationfares

7.2.1 Message dialogue

An entity can ask for information about the areas, regulations and fares that are recorded in GPR. It is possible to ask information about one specific area, as well as information about all recorded areas.

The entity for which information is retrieved, is identified by the common name (CN) in its certificate.

The request message contains the following information:

- Identification of an area manager (*areaManagerId*).

Optional information:

- Identification of an area (*areald*).
- Reference date-time (*checkTime*).

If no reference date-time is provided, the current and future data will be retrieved, otherwise the data that are valid on reference date-time will be retrieved.

If no *areald* is provided, all recorded areas will be retrieved, as well as all recorded regulations and all recorded fares.

If an *areald* is provided with a reference date-time, the specified area is retrieved, together with the associated regulation(s) and the associated fare(s).

If no areas were found, the response consists of an empty message.

If no error occurs, the response message sent by GPR consists of the following

- List of areas matching the specified request (*AreaUsages*) consisting of *areald*, *areaDesc*, *startDateArea*, *endDateArea*, and *usageld*, if applicable.
- List of regulations for the retrieved areas (*regulations*) consisting of *regulationId*, *regulationDesc*, *isAdditionalRegulation*, *startDate* and *endDate*, *timeFrames*.
- List of Fare data for the retrieved regulations (*fares*) consisting of *startDate*, *endDate*, a list of fare parts (*farePeriods*) consisting of *startDuration*, *endDuration*, *amount*, *totalAmount*, and *stepSizeFare*.

7.3 GET v1/sellingpoint

7.3.1 Message dialogue

An entity can ask for information about the selling points that are available in GPR and their corresponding areas.

The entity for which information is retrieved, is identified by the common name (CN) in its certificate.

The request should contain the following query parameters:

- Date and time for collecting the list of sellingpoints (*ReferenceDate*)

If no selling points were found, the response consists of an empty message.

If no error occurs, the response message sent by GPR consists of the following

- List of sellingpoints consisting of *sellingpointId*, *areaManagerId*, *areald*, *areaStartDate*, *areaDescription*, *description*, *startDate*, *endDate*, *longitude*, *latitude*,

7.4 v1/health/am-i-up

A Connected system is always allowed to send an am-i-up request in order to check the availability of GPR and the connection. The Response by GPR (if possible) contains OK or NOK and the error.

7.4.1 Message dialogue

An entity sends a Get request. GPR sends an empty response with a status 200 OK in case of success, else an error will be returned.

The entity is identified by the common name (CN) in its certificate.

If no error occurs, the response sent by GPR consists of a http status 200 OK

8. Error handling

8.1 Error procedure

In this chapter the procedure for connected systems is described in case of an error situation. From the point of view of the connected system two types of errors can occur after sending a request to GPR:

1. An 'expected' error based on content of the message, lack of authorization, etc
2. An unexpected problem: lost connection to the service, service unavailable, internal server error etc

Case 1 Reply with an error message:

All these error messages are errors in the Request itself, the error should contain one of more error codes from Annex A "List of error messages". A resend of the Request is not allowed because it will result in the same error: a repair of the content of the Request is required.

All returned errors should follow the problem details format as described in RFC 7807.

(<https://www.rfc-editor.org/rfc/rfc7807>) In cases of Annex A, title will contain the error code and detail the description. An extra property errors will be available with a list of found issues processing the request.

Contact the Help Desk if analysis of the Request shows that a parameter in GPR seems incorrect.

case 2 State "Communication lost":

This state is started when the Connected system does not get a Reply on a Request within a certain period (e.g. a time-out after 10 seconds) or a status code 500/503 is returned. The following procedure starts:

1. The Connected system should decide after a certain number of retries (e.g. 3 times) to stop sending Requests to GPR and buffer them.
2. Start sending am-i-up requests, for example every 60 seconds.
3. After 5 minutes of communication loss, contact Help Desk
4. After communication is re-established (according to Help desk or when the am-i-up returns OK), start sending buffered messages with the original GUID.

8.2 Resending a Request

A connected system can always resend a Request with the original GUID (CorrelationId in the request body). If GPR already processed the request and the response was not received, the original Response based on the GUID is replied, if the message type and GUID of the resent Request is the same as an already processed request, the original response is returned and the other content of the message is neglected.

A. Annex A – List of error messages and informational message

ErrorCode	ErrorDesc
1	No current regulation for areamanager id <AreamanagerId>, area id <areaid>
5	No PsRight required
8	Usage Id does not exist or is not valid
9	Area could not be determined uniquely
10	Area does not exist or is not valid
11	Area manager does not exist or is not valid
13	Sellingpoint is not valid
100	Area is not provided
102	No authorisation
103	Invalid parking duration
104	Checking organization has no authorisation to check
110	PsRight not found <i>If there are no rights found after "RetreiveRightInfo" there will not occur an error code 110. Not finding rights is not an error situation.</i>
204	It is not possible to grant PsRightId until dd/mm/yyyy hh:mm:ss (UTC) or It is not possible to grant PsRight as long as previous right has not ended.
205	Too many PsRights for AreaUsage
206	Required data not filled
1011	No GIS layer defined
1021	No unique Base Regulation
1031	AreaUsage does not exist or is not valid