IPI-DataEx – Data Exchange Standard
Data: Parking Rate and Occupancy

Date: December 1, 2017

This document describes the current concepts proposed for sharing parking Rate and Occupancy data.

These documents will be converted into a data standard after the public review and comment period closes on January 15, 2018.

Instructions on submitting comments on these working papers can be found on the IPI-DataEx website: www.parking.org/ipi-dataex
Parking Rates and Occupancy Data Group

The first standard developed will focus on Parking Location, Parking Rate, and Parking Occupancy data. The Parking Location data working papers were issued for public comment; that period has now closed and the working group is integrating and reviewing all comments received. The Parking Rate and Occupancy working papers (this document) are now available for public comment through January 15, 2018. Public comments on the three sets of working papers will be reviewed and these three documents will be consolidated to form the first IPI-DataEx data standard. Through the development of this standard, IPI will refine its process to develop standards and organize the governance structure.

This standard will facilitate the sharing of parking location, rate, and occupancy information between firms. This includes map services, online marketing and aggregator services, event ticketing platforms, transit and transportation agencies, and other organizations that have a need to know parking location, rate, and/or occupancy of parking facilities and general information about their operations.

The scope of the Location standard is defined in the working papers released in June 2017. For more information and to download a copy, please visit www.parking.org/ipi-dataex.

The scope of the Rate Data includes:

- Location Name (location data)
- Areas (location data)
- Rate Description
- Rate Availability and Expiration
- Rate Construction (times and fees)
- Rate Surcharges (taxes, fees, etc.)
- Rate ancillary information (inventory, credential, membership, etc.)

The scope of the Occupancy Data includes:

- Location Name (location data)
- Areas (location data)
- Parking Supply (the amount of parking that exists)
  - Type of space
  - Quantity of spaces
  - ID of spaces (if providing space detail)
  - Space characteristics (height, width, etc.)
  - Method of determining occupancy
  - Expiration date of information
- Parking Demand (the actual use of parking)
  - Method of determining occupancy
  - ID of spaces (if providing space detail)
  - Space usage time (time occupied and time open)
As a reminder, this initial effort is not considered the complete standard; additional data elements that provide richer and more real-time information will be added to the standard with additional sections.

**Benefits of Rate and Occupancy Standard**

Parking information is becoming highly valuable to support customer needs. The ability of an entity to share location data as well as rate and occupancy information helps consumers make more informed decisions about options that best fit their transportation and parking needs.

Currently, there is not a common method to share location, rate, or occupancy information. How should the name of the parking location be identified? Who are the contacts for the location, and how and where are the entrances and exits located? When is the parking facility open for operation? Is it available for use by the public?

By providing a standard for sharing this information, firms will be more quickly and accurately able to share and find location, rate, and occupancy data to support value-added services that can be offered to businesses and consumers.

Defining a standard for sharing parking data will allow the industry and consumers of parking data to more effectively incorporate the data into their services.

**Use Cases Supported by the Standard**

The following use cases are examples of data sharing that the Parking Rate and Occupancy Standard is intended to support. Additional use cases will also be supported and added to the standard to ensure the standard supports them effectively.

Use Cases:

1) Share parking rate and occupancy information with Map provider to present parking rate and occupancy information on Map.
2) Share parking rate and occupancy information with Aggregator.
3) Update parking information with Map provider or Aggregator.
4) Present parking rate and occupancy on a self-managed or 3rd party-hosted website or mobile application.
5) Configure parking rate in PARCs, meters, and other revenue and access control systems.
Data Standard Permission and Security

1) **Access and security to data is controlled by the Distributing Party of the data.**

   It is the responsibility of the Distributing Party of the data to implement a security protocol that protects access to data on the Distributing Party’s network. Typically, a Distributing Party will issue an authorization token to a specific Receiving Party to validate and control access to specific data sets.

   The Distributing Party should manage the specific amount of data a Receiving Party can access. It is customary that different Receiving Parties will receive different sets of data.

2) **Receiving Party should confirm ownership of data when data for a location record previously received is newly received from a different Distributing Party.**

   Due to the distributed nature of data ownership in the marketplace, it is expected that a Receiving Party will eventually receive data on a specific location record from different sources.

   The Receiving Party should have a data procedure to identify conflicting data records for the same location record and a process to validate the appropriate data owner.

   **Examples of this scenario:**

   Example 1: Parking Operator A transfers management duties of Parking Location 1234 to Parking Operator B. Thus, at one time Parking Operator A was the Distributing Party for Parking Location 1234. Parking Operator B became the new Distributing Party when it took over management duties.

   A Receiving Party has Parking Location 1234 in its database with a record update date/time of June 15, 2016 by johndoe@parkopA.com.

   A Receiving Party receives a new data feed for Parking Location 1234 in its database with a record update date/time of March 31, 2017 by Janesmith@parkB.com.

   Receiving Party should have a process to contact parties to confirm which record is accurate.

   Example 2: Parking Operator A is managing Parking Location 6789 and is a Distributing Party for the location. Owner C owns Parking Location 6789 and is a Distributing Party for the location. In this example, there are two Distributing Parties.

   Receiving Party will decide which data elements are different and which to use. Most likely the difference will be in the logos provided and contact information. Receiving party can merge contact info and logo info into a single location record or select one of the Distributing Parties as the default source as they determine is appropriate.
Parking Rate and Occupancy Working Papers

The following documents are included in the working papers available for review and comment:

- 17-12-01 IPI-DataEx Rates and Occupancy Summary: This document.
- 17-12-01 IPI-DataEx Data Relationship: Contained within this summary document, visual representation of how the different data elements relate to each other. The diagram also layers in the next data groups to have data standards developed.
- 17-12-01 IPI-DataEx Rates and Occupancy Data Elements: Details of the defined data elements. This document is issued as a protected MS Word file to allow public comment.

During the review period, provide comments by the following means:

1) Electronically: Visit parking.org/ipi-dataex for instruction.
2) Online Meetings: Visit parking.org/ipi-dataex for details on scheduled calls. The online meeting hosted to introduce the Parking Location working papers is available online as well at this website.

Parking Rate Data Elements

The proposed data elements included in the Rate standard are defined in the document 17-12-01 IPI-DataEx Rates and Occupancy Data Elements.

The data set is segmented into seven domains. Each domain is a grouping of similar data elements. The domains do not necessarily represent table structures. The seven domains are:

- **Location**: Name, ID numbers—this domain is defined in the location data standard.
- **Area**: Area name, Area ID--this domain is defined in the location data standard.
- **Record**: details on record creation and updates provided by the source of the data.
- **Rate Table**: provides descriptions on the rate table, period rate table is available for use, and expiration time of the rate table.
- **Rate Construction**: defines the specific time durations and fees for specific parking.
- **Rate Surcharges**: defines additional fees and taxes associated with the rate table.
- **Rate Ancillary**: defines additional parameters associated to a rate table such as authorized users of a rate table and responsible party for collecting fees.

The document provides initial definitions for each data element, the suggested format to transfer data, and where appropriate, defined lists to ensure consistency on specific data elements.
Parking Rate

The working papers introduce a concept to define a Rate Table and the critical data elements to include in a rate table. It also introduces a concept to define a collection of rate tables at a facility that can be updated on a collective basis. The following are key terms and their associated definitions:

**Rate Line**: Also called a rate band, the fee to park a vehicle for a specific amount of time.

Examples:  
- 0-1 hour $2  
- 20 minutes-45 minutes $1  
- Daily $15  
- Monthly $165

**Rate Table**: A collection of rate lines that define the progressive fees that should be charged for a specific parking event.

Example: Rate Table Example  
- 0-1 hour $1  
- 1-2 hours $3  
- 2-4 hours $5  
- 4-12 hours $10  
- 12-24 hours $15 (could be considered a daily max)

**Rate Matrix**: A collection of rate tables for a specific facility that may be active at any time.

**Tariff**: The amount charged to a customer. It is a calculated amount based on reading a single or multiple rate lines associated with a parking event based on the entry and exit time of a parker.

A Rate Table in the data standard includes summary information to provide additional description about the collection of rate lines and conditions of their use:

**Rate Name**: Common name used at a facility.

**Rate ID**: Identification to associate a specific rate table across various platforms and devices. This includes online services, PARCS, pay station, mobile payment provider, etc.

**Rate Type**: Describes that type of the rate table define the fees for daily, contract/monthly, event, validation, etc.

**Rate Availability**: Whether the rate table is available to the public or restricted to defined groups.

**Rate Active Times**: When the rate table is active as defined by specific days and times.

**Rate Expiration**: When the rate table is replaced by a new rate table or permanently deactivated from use.
**Rate Responsible Party:** The entity responsible for collecting fees from customers when using this rate table. Example: a rate table used by a 3rd party marketing firm or mobile payment firm where the money is collected by the 3rd party versus the actual garage owner.

<table>
<thead>
<tr>
<th>Rate Name</th>
<th>Rate Active Times</th>
<th>Rate Expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekend Su--Sa 0000--2400</td>
<td>valid 20160116T0000</td>
<td>expires 20171231T2359</td>
</tr>
<tr>
<td>Weekend Day Su--Sa 0800--2100</td>
<td>valid 20180101T0000</td>
<td>expires 20180115T2359</td>
</tr>
</tbody>
</table>

**Key Concepts**

- A facility may have multiple rate tables active simultaneously during a specific time of the day.
- Rate tables have effective periods--times of a day when a parker should expect to pay the rates defined (i.e., active Mon-Fri 6 am until 12 am, Fri at 5 pm through Mon at 2 am, etc.)
- Rate tables have expiration dates and time--times when the rate table expires and is no longer valid for use or replaced by a new rate table.
- Facilities can have their Rate Matrix replaced with a new Rate Matrix to allow simpler rate table revisions.
Parking Occupancy Elements

The proposed data elements included in the Rate standard are defined in the document 17-12-01 IPI-DataEx Rates and Occupancy Data Elements. The data is segmented into seven domains. Each domain is a grouping of similar elements, and do not necessarily represent table structures. The seven domains:

- **Location**: Name, ID numbers—this domain is defined in the location data standard.
- **Area**: Area name, Area ID—this domain is defined in the location data standard.
- **Record**: details on record creation and updates provided by the source of the data.
- **Supply**: defines the parameters of the supply of parking. This is the total number of spaces usable for parking. It can be defined as demarcated or non-demarcated.
- **Space**: defines the specific space ID and associated information on a specific space such as space characteristics, methods of occupancy detection, and valid time of space information.
- **Demand**: defines the parameters of reporting actual use of parking in an area.
- **Demand Space**: defines the occupancy status of a specific space and associated use start and end times.

The document provides initial definitions for each data element, the suggested format to transfer data, and where appropriate, defined lists to ensure consistency on specific data elements.

Parking Occupancy

Occupancy has been deconstructed into two data segments: Supply and Demand. Supply is the data that defines the number of vehicles or spaces that can be parked in the defined area. Demand is the data that defines the actual number of vehicles parked, or spaces occupied.

By separating the Occupancy data into a Supply and Demand segment, the intent is to improve the efficiency of communicating demand data (real-time parking space usage). It is assumed that Demand Data will be communicated very frequently, potentially more frequently than every five minutes. It is assumed that Supply data should not change frequently and could be communicated every day. This approach enables the Supply data segment to communicate a majority of the data on parking spaces, while the demand data is limited to communicating critical data that changes frequently.

Supply data includes data elements that define the type of parking supported in the area, methods used to detect usage, space count, and space characteristics. When defining the supply for a parking area, an entity can communicate if the space count is based on actual demarcated spaces (i.e., there are five parking spaces, defined as five lined parking spaces), or if the supply count is based on derived.

As an example of a derived supply count, consider a street curb that is not marked with specific spaces. The street curb is 300 feet long and the controlling entity assumes the average length of a vehicle parking is 15 feet. The derived available supply is 20 spaces. A different entity could use a different average length of 20 feet and report 15 spaces. It is the responsibility of the entity to determine the appropriate method to use when sharing derived space supply.