(GTFS)-Flex use cases

OTP summit
Oslo
March 2019
GTFS

- Fixed stops
- Fixed order
- Fixed path of travel
- At least some at fixed times
GTFS-flex

- Hail-and-ride (flag stops)
- Deviated Fixed-Route
- Taxis (and zone based-DAR)
- Everything else :D
GTFS-flex concepts

- Locations and location groups
- Booking
  - Booking rules
  - Booking times
- Driving times
GTFS-flex components

- GTFS-FlexibleTrips
- GTFS-BookingRules
- GTFS-BookingTimes
- GTFS-ContinuousStops
- GTFS-BookingTransactions [experimental]
Description: hail-and-ride services are fixed-route services, which often have designated stops in addition to their flexible behavior. They may or may not operate at designated times.

Along the designated route, riders may hail the vehicle, which will stop along the road and allow the rider to board. The rider may also be able to request to be dropped off at a place of their choosing along the route in a similar fashion.

Extensions used:
GTFS-FlexibleTrips, and GTFS-BookingRules

or

GTFS-ContinuousStops

Files with flex features:
trips.txt
stop_times.txt
locations.geojson
Overview:

In dotted segment, operated on snow days instead of the standard alignment of the route, bus will travel and only stop when a pickup is requested from the road, or a drop off is requested from onboard the bus.
locations.geojson

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "id": "si_MarineRd",
      "geometry": {
        "type": "LineString",
        "coordinates": [
          [-71.03163242340086, 42.330710480773504],
          [-71.05019330978394, 42.33032976717174],
          [...]
        ]
      }
    }
  ]
}
```

routes.txt

```
route_id,route_short_name,route_long_name
ri_11,11,City Point - Downtown
```

stop_times.txt

```
trip_id,stop_sequence,arrival_time,departure_time,stop_id,pickup_type,drop_off_type
ri_11,1,10:00:00,10:00:00,si_1,0,0
ri_1,2,10:10:00,10:10:00,si_3,0,0
ri_1,3,si_MarineRd,3,3
ri_1,4,10:30:00,10:30:00,si_4,0,0
[...]
```

trips.txt

```
route_id,service_id,trip_id,trip_headsign
ri_11,service1,ti_1,Downtown
```

---

**Hail-and-ride**  
(flag stops)
Hail-and-ride (flag stops)

Or:

Referencing the shape in shapes.txt and the

<table>
<thead>
<tr>
<th>route_id,route_short_name,route_long_name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ri_11,11,City Point - Downtown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>route_id,service_id,trip_id,trip_headsign</th>
</tr>
</thead>
<tbody>
<tr>
<td>ri_11,service1,ti_1,Downtown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>trip_id,stop_sequence,arrival_time,departure_time,stop_id,pickup_type,drop_off_type,continuous_pickup,continuous_drop_off</th>
</tr>
</thead>
<tbody>
<tr>
<td>ti_1,1,10:00:00,10:00:00,si_1,0,0,1,1</td>
</tr>
<tr>
<td>ti_1,2,10:10:00,10:10:00,si_3,0,0,3,3</td>
</tr>
<tr>
<td>ti_1,3,10:30:00,10:30:00,si_4,0,0,1,1</td>
</tr>
</tbody>
</table>

[...]

Referencing the shape in shapes.txt and the
Description: deviated fixed-route services operate on a schedule that serves certain stops at certain times, but in between those stops they operate in any number of ways. They may or may not follow a shape, may or may not require advanced reservation, may deviate in areas, or only to designated points, and may deviate for only pickup, only drop off, or both.

Extensions used:
GTFS-FlexibleTrips, and GTFS-BookingRules, (and GTFS-BookingTransactions)

Files with flex features:
trips.txt
stop_times.txt
locations.geojson
location_groups.txt
booking_rules.txt
Deviated Fixed-Route

Example: RCT “Island Pond” route

Overview:

The Island Pond serves a sequence of fixed stops, and follows a designated route line in between those stops. In between designated stops, the service will deviate upon reserved request. In between the two directional runs, the vehicle operates as a dial-a-ride service within Newport.
### Deviated

#### Fixed-Route

**stops.txt**

<table>
<thead>
<tr>
<th>stop_id</th>
<th>stop_name</th>
<th>stop_lon</th>
<th>stop_lat</th>
</tr>
</thead>
<tbody>
<tr>
<td>si_0012</td>
<td>Shaw's Manor</td>
<td>-72.15751647949219</td>
<td>44.95265089681472</td>
</tr>
<tr>
<td>si_0013</td>
<td>Morgan United Church</td>
<td>-72.13417053222656</td>
<td>44.949006285310986</td>
</tr>
<tr>
<td>si_0014</td>
<td>Michaud Manor</td>
<td>-72.12593078613281</td>
<td>44.961518484706204</td>
</tr>
<tr>
<td>si_0015</td>
<td>Waterfront Plaza</td>
<td>-72.10172653198242</td>
<td>45.003772531931666</td>
</tr>
</tbody>
</table>

**locations.geojson**

```json
{
    "type": "FeatureCollection",
    "features": [
        {
            "type": "Feature",
            "id": "li_buff",
            "properties": {},
            "geometry": {
                "type": "Polygon",
                "coordinates": [
                    [...]  
                    [-72.13022232055664, 44.94232389645868],
                    ...
                ]
            }
        }
    ]
}
```

(also in file... li_newport for in town DAR)
Deviated Fixed-Route

### trips.txt

<table>
<thead>
<tr>
<th>route_id</th>
<th>service_id</th>
<th>trip_id</th>
<th>mean_duration_factor</th>
<th>safe_duration_factor</th>
<th>booking_rule_id</th>
</tr>
</thead>
<tbody>
<tr>
<td>817</td>
<td>Thursdays</td>
<td>ti_817_0715</td>
<td>1.5</td>
<td>2</td>
<td>bri_1</td>
</tr>
</tbody>
</table>

### stop_times.txt

<table>
<thead>
<tr>
<th>trip_id</th>
<th>stop_sequence</th>
<th>stop_id</th>
<th>to_stop_sequence</th>
<th>arrival_time</th>
<th>departure_time</th>
<th>min_arrival_time</th>
<th>max_departure_time</th>
<th>pickup_type</th>
<th>drop_off_type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ti_817_0715</td>
<td>1</td>
<td>li_0012</td>
<td></td>
<td>09:20:00</td>
<td>09:20:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>2</td>
<td>li_buff</td>
<td>5</td>
<td>09:20:00</td>
<td>09:20:00</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>3</td>
<td>li_0013</td>
<td></td>
<td></td>
<td></td>
<td>09:20:00</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>4</td>
<td>li_0014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>5</td>
<td>li_0015</td>
<td></td>
<td></td>
<td></td>
<td>09:45:00</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>6</td>
<td>li_newport</td>
<td></td>
<td>09:45:00</td>
<td>12:00:00</td>
<td>09:45:00</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>ti_817_0715</td>
<td>7</td>
<td>li_0015</td>
<td></td>
<td>12:00:00</td>
<td>12:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### booking_rules.txt

<table>
<thead>
<tr>
<th>booking_rule_id</th>
<th>booking_type</th>
<th>prior_notice_last_day</th>
<th>prior_notice_last_time</th>
<th>prior_notice_start_day</th>
<th>prior_notice_start_time</th>
<th>prior_notice_service_id</th>
<th>message</th>
<th>phone_number</th>
</tr>
</thead>
<tbody>
<tr>
<td>bri_1</td>
<td>2,1</td>
<td>1,16:30:00,7,07:30:00</td>
<td>MonThruSat</td>
<td>The Island Pond is a deviated shuttle route that is Wheelchair Accessible, ADA Compliant and open to the General Public. If you live within 3/4 mile of the shuttle route and would like to ride the shuttle, please call to schedule a ride.</td>
<td>+1 802 334 0243</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Taxis (and Zone based-DAR)

Description: Taxi services are services that only operate when a request is made. The user designates both the pickup and the drop off location, based on an allowed area for each choice.

The taxi may be shared ride, and may take actions not requested by the rider. But from the riders’ perspective, there are only two relevant stop_times in the trip: the pickup and the drop off.

Extensions used:

GTFS-FlexibleTrips, GTFS-BookingRules, and GTFS-BookingTimes, (and GTFS-BookingTransactions)

Files with flex features:

trips.txt
stop_times.txt
locations.geojson
location_groups.txt
booking_rules.txt
booking_times.txt
Overview:

Monday through Friday, 6:30am to 5:30pm, riders may request a ride from any location in Oakdale to any other location in Oakdale.

Example: SRT Oakdale (CA) Dial-a-Ride
locations.geojson

```json
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "id": "li_oakdale",
      "properties": {},
      "geometry": {
        "type": "Polygon",
        "coordinates": [
          
        
      ]
    }
  ]
}
```

trips.txt

```
route_id,service_id,trip_id,mean_duration_factor, safe_duration_factor, mean_duration_offset, safe_duration_offset, booking_rule_id, booking_time_id
817,MonSat,ti_817_0715,1.5,2,0,5,bri_1,bti_1
```
### Taxis (and Zone based-DAR)

#### stop_times.txt

<table>
<thead>
<tr>
<th>trip_id, stop_sequence, stop_id, arrival_time, departure_time, pickup_type, drop_off_type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ti_817_0715, 1, li_oakdale,,, 2, 0</td>
</tr>
<tr>
<td>ti_817_0715, 2, li_oakdale,,, 0, 2</td>
</tr>
</tbody>
</table>

#### booking_rules.txt

<table>
<thead>
<tr>
<th>booking_rule_id, booking_type, prior_notice_duration_min, prior_notice_duration_max, message, phone_number</th>
</tr>
</thead>
<tbody>
<tr>
<td>bri_1, 1, 60, 1440, &quot;The Oakdale Dial-a-Ride is a curb to curb service in the city of Oakdale. Call to schedule your ride at least 2 hours before your trip&quot;, +1 530 334 0243</td>
</tr>
</tbody>
</table>

#### booking_times.txt

<table>
<thead>
<tr>
<th>booking_time_id, start_time, end_time, mean_duration_factor, safe_duration_factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>bti_1, 06:30:00, 10:30:00, ,</td>
</tr>
<tr>
<td>bti_1, 10:30:00, 13:30:00, 1.75, 2.25</td>
</tr>
<tr>
<td>bti_1, 13:30:00, 17:30:00, ,</td>
</tr>
</tbody>
</table>
Everything else

- Single designated stop to single designated stop at no particular time = BookingTimes
- Train station stop to anywhere in a zone, timed with train = FlexibleTrips
- Zone-based dial-a-ride, on demand only, with different destinations possible depending on pickup = BookingTimes (multiple trips)
- Train station stop to anywhere in a zone, at time of request, no reservations allowed = BookingTimes (booking_type = 0)
- Service to on-demand checkpoint from scheduled departure = FlexibleTrips
- Travel between two set stops, along a dedicated roadway with no traffic, upon request only = BookingTimes
- Travel between two groups of stops, on demand, where only travel from the first group to the second group is allowed = BookingTimes
- Travel within a zone to a train station that is also within the zone. Vehicle returns to station at particular times (so other locations are not available at those times). = FlexibleTrips