v1.9.9

CMT Data Reports

December 2017

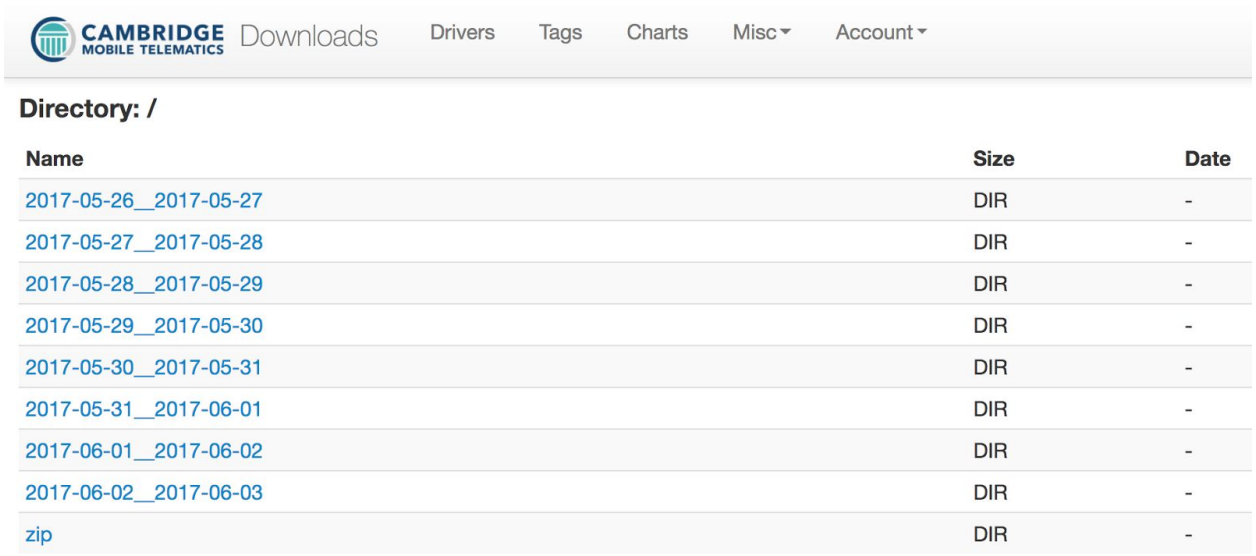
This document provides an overview of the standard data and reports that CMT can generate. Please note that in addition to these, CMT can generate a variety of customer-specific reports on request. It is also possible to customize or modify the details of the format and fields of these reports if necessary. Please also note that web APIs exist or can be made for these datasets.

Downloading Reports

Reports are uploaded by CMT on a daily basis and cover a 24 hour period. To access the data, please visit the web page:

https://my.cmtelematics.com/downloads.php

and log on. Clicking on the “Misc” tab and selecting “Downloads” will lead to a web page like the following:



Any data report can then be accessed by clicking on the appropriate web link.

Three types of directories are present at the top level:

- The primary source of driving data resides in the daily trip directories (e.g. “2017-05-26__2017-05-27”). A new directory is added each day.
- If any drivers are using CMT’s DriveWell Tag, additional tag-only data will be present in the “taglogs” directory. This directory is updated daily.
- After the previous two directories and associated files are created, a single zip file containing a compressed copy of the data is written to the “zip” directory.

The parameters above are configurable. For example, CMT can report data weekly, or produce a single report covering all trips to date. Once the data reporting process has started, CMT will upload data in an automated fashion. All the data is encrypted at rest and is transferred securely on download.

Each of these three directories contain various reports and subreports. We discuss each of these directories and their associated data in detail below.

Daily Reports

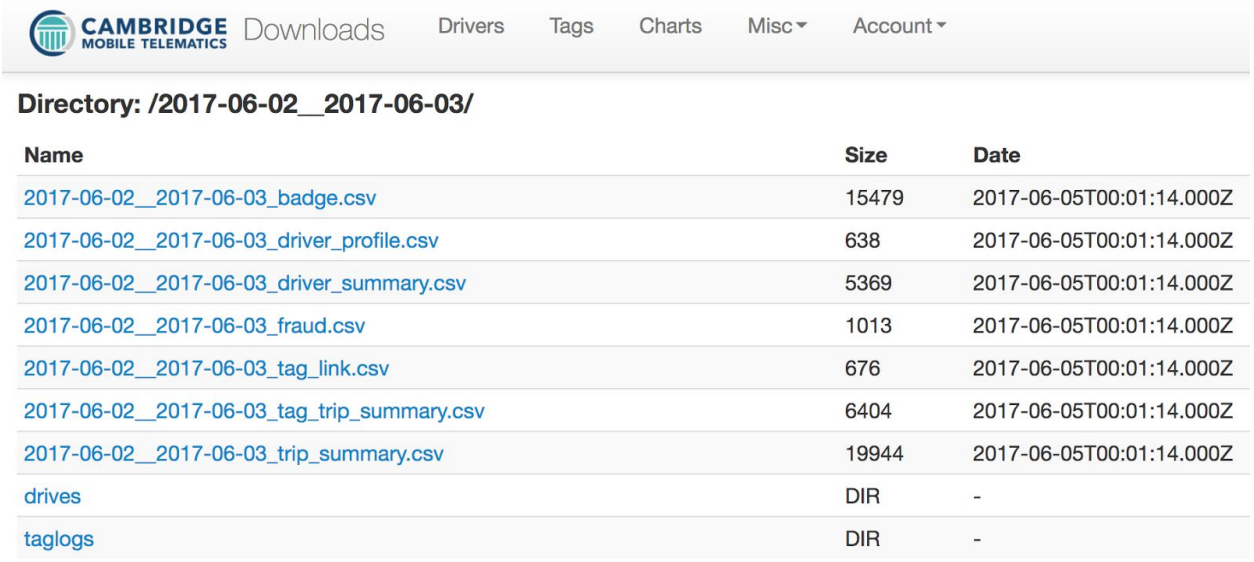
Data reports are most commonly generated daily, although as mentioned above, we can generate them with alternate periodicity (e.g. weekly). In the daily case, each day, a new directory is generated, corresponding to 24 hours of driving data.

We typically define the data of a data report by the trip start time in UTC; data reports are then generated three days after the actual trip to allow for delays in upload. Alternately, data reports can use the local time zone of a trip, or use the trip's upload time to the server. For a more complete discussion of these options, please see the section "Alternate Time Measures".

Data reports remain on the web portal for 7 days, at which time they are removed. However, the data reports are generated from underlying data which persists indefinitely. Therefore, it is always possible to reproduce a data report at a later date.

A daily trip directory has the form "2016-07-25__2016-07-26". The name is of the form "startdate__enddate", and contains trips that occurred on or after the start date (with time relative to UTC) and before the end date. In the example above, that would correspond to all drives on July 25, 2016. If the client wished to receive data weekly instead of daily, the date range would vary accordingly.

After clicking on a daily trip directory, the web portal will display a subdirectory like:



Driver Summary Report

The file “2016-07-25__2016-07-26_driver_summary.csv” contains summary information about each driver.

The app allows the driver to indicate if they were not driving during a trip. For instance, they might indicate that they were a passenger. We provide two scores: one in which we honor the user’s labels of their own drives, and another in which we rely solely on algorithmically generated drive labels. Therefore, each driver appears in the report twice (once for each score). The two scores can be distinguished by examining the “honoring_user_drive_labels” column.

- email: [string] Current registered e-mail address. [This field can be suppressed on request.]
- short_user_id: [int64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- group_id: [int64] If the user has an associated group ID number, this will be displayed; otherwise, the field will be blank.
- policy_number: [float64] If the user has an associated policy number, this will be displayed; otherwise, the field will be blank.
- average_score: [float64] The average user score over a fixed period of time defined by “scoring_interval” below. This value lies between 40 and 100, and is the score used for the leaderboard. It is a nonlinear combination of the subscores listed below.
- average_score_accel: [float64] The average acceleration subscore over the scoring interval.
- average_score_brake: [float64] The average braking subscore over the scoring interval.
- average_score_turn: [float64] The average cornering subscore over the scoring interval.
- average_score_speeding: [float64] The average speeding subscore over the scoring interval.
- average_score_phone_motion: [float64] The average phone motion subscore over the scoring interval.
- total_distance_km: [float64] The total distance driven that was scored over the scoring interval.
- total_trip_count: [int64] The number of trips that were scored over the scoring interval
- scoring_interval: [string] The length of the scoring interval (typically, “14 days”).
- honoring_user_drive_labels: [boolean] Whether we honor user labels for drives, or rely on algorithmic classification.
- score_date: [string, YYYY-MM-DD HH:MM:SS.SSSSSS] The date on which the score was computed.
- tag_user: [boolean] Whether the user is using tag or app-only version of the app.
- fleet_id: [int64] The fleet_id is a positive integer that uniquely identifies the overall “fleet” group that the user is a member of. For non-fleet customers, this field may be blank

- team_id: [int64] The team_id is a positive integer that uniquely identifies the fleet team that the user is a member of. For non-fleet customers, this field may be blank.

Note that an average score is recorded once per day; for data reports spanning multiple days, there will be multiple rows for each user, with one row per day.

Driver Profile Report [Optional]

The file "2016-07-25__2016-07-26_driver_profile.csv" contains personal information about the driver, specifically:

- short_user_id: [int64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- email: [string] Current registered e-mail address. [This field can be suppressed on request.]
- username: [string, UTF-8] This is the nickname as entered by the user. If the user leaves this field blank, it will be set to the username of their e-mail address.

Phone Trip Summary Report

The file "2016-07-25__2016-07-26_trip_summary.csv" contains summary information for each drive that occurred within the date range recorded by the phone. (Note: the file string is "trip_summary", not "phone_trip_summary".) If the tag is enabled, tag information will also be present. We list the fields below:

- email: [string] Current registered e-mail address. [This field can be suppressed on request.]
- short_user_id: [int64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- deviceid: [string] The deviceid is a random 16-byte string unique to an installation on a device. If user uses two phones, this will show up as two distinct deviceids.
- tag_mac_address: [string] This is a MAC address unique to a tag, with a form like "4c:b8:2c:00:17:11".
- driveid: [string] This is a random string unique to each drive, e.g. "1aff36c0-8bdc-479d-a0d8-1c2aae7050f7". It can be used to associate a drive in the summary report with one of the corresponding detailed drive reports (described in the subsequent section).
- tag_trip_number: [int64] The tag keeps a counter of trips (both with and without the phone present); this field records that number. Note that it is possible (but unusual) for multiple driveids to share the same tag_trip_number, depending on trip segmentation on the phone versus the tag. If the user is running in app-only mode, this field will be blank.
- trip_start: [string, YYYY-MM-DD HH:MM:SS] The inferred starting time of a trip, in UTC.
- trip_end: [string, YYYY-MM-DD HH:MM:SS] The ending time of a trip, in UTC.

- trip_start_local: [string, YYYY-MM-DD HH:MM:SS] The inferred starting time of a trip, in the local time zone at the position of the trip's start.
- trip_end_local: [string, YYYY-MM-DD HH:MM:SS] The inferred ending time of a trip, in the local time zone at the position of the trip's start [sic].
- utc_offset_with_dst: [string] The time zone (specifically, the UTC offset with local time zone at the trip's starting location). For example, since Boston is GMT - 4 hours, a trip in Boston would have utc_offset_with_dst = '-04:00:00'.
- startlat: [float64] Latitude at the start of the trip, in decimal degrees.
- startlon: [float64] Longitude at the start of the trip.
- endlat: [float64] Latitude at the end of the trip.
- endlon: [float64] Longitude at the end of the trip.
- distance_mapmatched_km: [float64] Distance travelled, in kilometers, including inferred initial distance.
- duration_minutes: [float64] Time spent travelling, in minutes, including inferred initial time.
- recorded_duration_minutes: [float64] Time spent travelling, in minutes, excluding inferred initial time.
- mean_speed_kph: [float64]: Average speed in kilometers per hour, based on the trip duration and distance traveled, including inferred initial distance.
- trip_mode: [string] The automatically inferred trip mode. This field is empty for trips with the CMT DriveWell Tag. Possible modes include:
    - airplane
    - bike
    - bus
    - car
    - ferry
    - foot
    - offroad
    - passenger
    - train
- classification_confidence: [float64] The confidence in the estimate of trip_mode. This field is empty for trips with the CMT DriveWell Tag.
- hardware_manufacturer: [string] E.g., "Apple", "samsung".
- hardware_model: [string] E.g., "iPhone7,2".
- user_label: [float64] The user-supplied trip mode label. If the user has not labelled the trip themselves, this field is blank.
- Scoring points: CMT scores each drive on five characteristics. These scores are used internally and are not shared with the driver. The scores are non-negative, and typically will lie between 0 and 100. In rare circumstances, the score can exceed 100. Larger numbers indicate worse driving.
    - overall_points: [float64]
    - accel_points: [float64]
    - braking_points: [float64]

    - cornering_points: [float64]
    - speeding_points: [float64]
    - phone_motion_points: [float64]
- Star ratings: These are the ratings presented to drivers. The possible values are {1,2,3,4,5}. Larger numbers indicate better driving.
    - star_rating_overall: [float64]
    - star_rating_accel: [float64]
    - star_rating_braking: [float64]
    - star_rating_cornering: [float64]
    - star_rating_speeding: [float64]
    - star_rating_phone_motion: [float64]
- nighttime_driving_minutes: [float64] Minutes driven at night, where “night” is defined as the time from dusk until dawn in the relative to the starting longitude and latitude.

Badge Report

DriveWell users earn badges for specific types of safe driving behavior, e.g. gentle braking or avoiding phone distractions for a sufficient length of time or number of drives. Moreover, after a specific badge is earned, it “unlocks” a subsequent badge of the same type. For example, after completing 5 trips with 4+ star, a driver is awarded the “Pace Car Driver” badge; after completing 15 trips with 4+ stars, a driver is awarded the subsequent “Road Master” badge.

The file “2016-07-25__2016-07-26_badge.csv” summarizes the badge status for each driver. It has the following format:

- email: [string] Current registered e-mail address. [This field can be suppressed on request.]
- short_user_id: [float64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- badge_name: [string] This is the badge name as seen by the server (as opposed to the more colorful description presented to the user in the app). The set of badge names can grow, but currently consist of:
    - TOTAL1, TOTAL2, TOTAL3
    - ACCEL1, ACCEL2, ACCEL3
    - DISTRACTION1, DISTRACTION2, DISTRACTION3
    - SPEEDING1, SPEEDING2, SPEEDING3
    - TURN1, TURN2, TURN3
    - BRAKE1, BRAKE2, BRAKE3
- badge_progress: [int64] The percentage of completion of a badge, which will be an integer between 0 and 100.
- date_awarded: [string, YYYY-MM-DD HH:MM:SS] The date that a badge was awarded, in UTC. If badge_progress<100, this field will be empty.

Fraud/Anomaly Report

The file “2016-07-25__2016-07-26_anomaly.csv” summarizes a set of anomalous activities logged. We report anomalous events based on the CMT server time stamp (because in this case we cannot necessarily trust the phone’s time stamp.) The report has the following format:

- email: [string] Current registered e-mail address. [This field can be suppressed on request.]
- short_user_id: [int64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- deviceid: [string] The deviceid is a random 16-byte string unique to an installation on a device. If user uses two phones, this will show up as two distinct deviceids.
- anomaly_type: [string] The anomaly_type is one of the following set; note that this set is extensible:
    - GPS_OFF - the GPS is turned off
    - MOCK_LOCATION_PROVIDER - faking location through a different app
    - LOCATION_SERVICES_OFF - location services are turned off
    - APP_INSTALLED - the app has been installed
    - TRIP_INTERRUPTED - the trip stopped early (i.e., app was force quit, low battery)
    - BACKGROUND_REFRESH_OFF - app cannot send data to the server when it is running in the background
    - FORCE_QUIT - the user has force quit the app
    - APP_UNINSTALLED - the app is uninstalled
    - BLUETOOTH_OFF - Bluetooth is turned off
    - LOW_BATTERY - the phone has low battery
    - GPS_ON - the GPS is turned on
    - LOCATION_SERVICES_ON - location services are turned on
    - BACKGROUND_REFRESH_ON - app can send data to the server when it is running in the background
    - DEVICE_IS_JAILBROKEN - the device is jailbroken
    - BLUETOOTH_ON - Bluetooth is turned on
    - STANDBY_ON - the app is in standby mode
    - STANDBY_OFF - the app is no longer in standby mode
    - LOGIN - user is logged into the app
    - LOGOUT - user is lagged off from the app
    - POWER_SAVE_MODE_ON - the phone is power save mode
    - POWER_SAVE_MODE_OFF - the phone is no longer in power save mode
    - PANIC_ALERT_ON - (supported in certain app versions). A panic alert is sent to a chosen destination.
    - PANIC_ALERT_OFF - (supported in certain app versions) A panic alert is not being sent.
- anomaly_device_time: [string, YYYY-MM-DD HH:MM:SS] The time, in UTC, of the anomaly as reported by the device (phone).

- anomaly_server_time: [string, YYYY-MM-DD HH:MM:SS] The time, in UTC, that the server received the report of the anomaly. The time range of the report refers to the anomaly_server_time.

Tag Trip Summary Report

When a vehicle is equipped with a tag, we can record trips whether or not a phone is present. When the next trip is taken with a phone, these tag logs are uploaded to the server. We record the following information for each tag trip when the phone is **not present**:

- tag_mac_address: [string] This is a MAC address unique to a tag, with a form like "4c:b8:2c:00:17:11".
- tag_trip_number: [int64] The tag keeps a counter of trips (both with and without the phone present); this field records that number. Note that it is possible (but unusual) for multiple driveids to share the same tag_trip_number, depending on trip segmentation on the phone versus the tag.
- log_id: [int64] In certain rare circumstances, the tag can reset its log (but retain the same MAC address). To distinguish drives in the event of a log reset, we provide the log_id as a unique identifier for each log.
- tag_trip_start: [string, YYYY-MM-DD HH:MM:SS] Trip start in UTC
- tag_trip_end: [string, YYYY-MM-DD HH:MM:SS] Trip end in UTC
- duration_moving_minutes: [float64] Minutes that the car is in motion (e.g., driving).
- duration_stopped_minutes: [float64] Minutes that the car is at rest (e.g., parked or at a traffic light).
- duration_total_minutes: [float64] Sum of duration_moving_minutes and duration_stopped_minutes.
- tag_mileage_estimate_km: [float64] Estimate of the distance driven in kilometers.
- tag_oriented: [boolean] Whether or not the tag could be oriented relative to the car. If the tag cannot be oriented, the subsequent fields will be blank.
- tag_acceleration_points: [float64] The sum of the risk points of the (forward) acceleration events during the trip.
- tag_braking_points: [float64] Count of above-threshold braking events.
- tag_cornering_points: [float64] Count of above-threshold cornering events.
- tag_overall_points: [float64] Weighted sum of tag_acceleration_points, tag_braking_points, and tag_cornering_points.
- accel_count_low: [int64] The count of the number of low acceleration events in the forward (longitudinal) direction of the vehicle (3.0-3.5 m/s^2).
- accel_count_med: [int64] The count of the number of medium acceleration events in the forward (longitudinal) direction of the vehicle (3.5-5.0 m/s^2).

- accel_count_high: [int64] The count of the number of high acceleration events in the forward (longitudinal) direction of the vehicle (5.0+ m/s^2).
- brake_count_low: [int64] The count of the number of low acceleration braking events in the reverse (longitudinal) direction of the vehicle (3.0-3.5 m/s^2).
- brake_count_med: [int64] The count of the number of medium acceleration braking events in the reverse (longitudinal) direction of the vehicle (3.5-5.0 m/s^2).
- brake_count_high: [int64] The count of the number of high acceleration braking events in the reverse (longitudinal) direction of the vehicle (5.0+ m/s^2).

Note that for the tag_*_points fields, larger values indicate worse driving. The per trip risk points are not normalized by trip length.

When comparing the tag trip summary to the phone trip summary, a few notions are important to keep in mind.

- A tag has no GPS, and thus no notion of local time; therefore, all tag trip times are in UTC.
- The relationship between a phone's notion of a trip and a tag's notion of a trip can be complex. Typically, each tag trip has a single corresponding phone trip. However, if the phone was not present, we will see a tag trip with no phone trip. Moreover, if the phone segmented the trip, there may be multiple phone trips corresponding to a single tag trip.
- Note that although there is a "phone_present" field, we do not list the short_user_id, because it is possible (but rare) for more than one app user to be associated with the same tag trip.
- When producing a report, we provide data on all tag trips that were *processed on our server* during the date range of interest (as opposed to trips that occurred during the date range of interest). These two time ranges typically align, but if there is a delay in uploading tag logs, the tag trip time can precede the processing time.

Tag Link Report

If a driver is using a tag-enabled app, they can link their app with one or more physical tags. The file “2016-07-25__2016-07-26_tag_link.csv” describes these links. It has the following format:

- tag_mac_address: [string] The tag MAC address.
- short_user_id: [int64] The short_user_id is a positive integer unique to each user. A user may change their e-mail address, but the short_user_id will persist.
- start_date: [string, YYYY-MM-DD HH:MM:SS] The time the tag was linked in UTC.

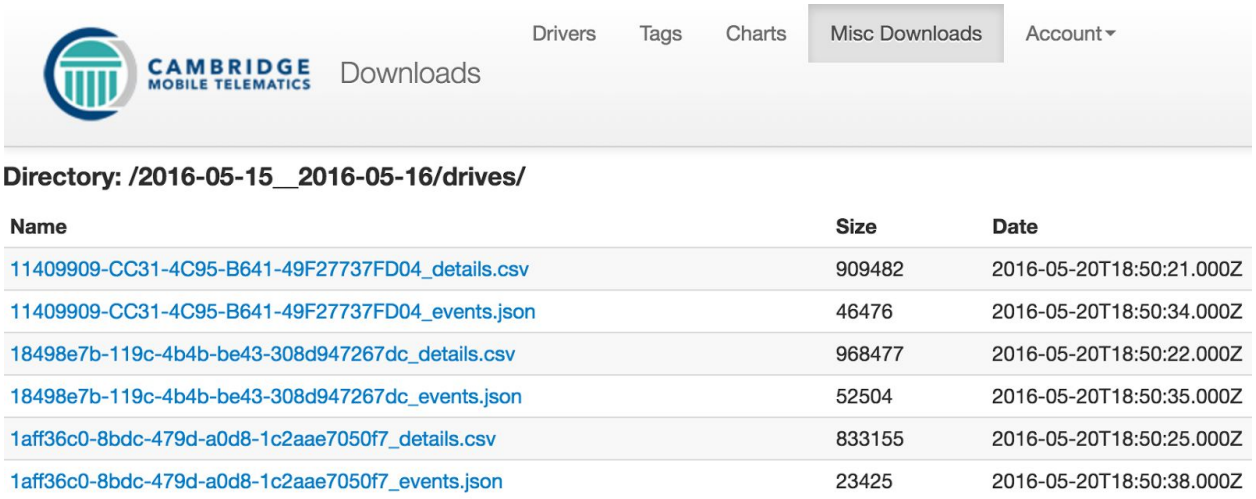
Team Summary Report [Optional]

Fleet customers may wish to see team-based scores in addition to user-based scores. It has the following format:

- fleet_id: [int64] The fleet_id is a positive integer that uniquely identifies the overall fleet group that the user is a member of.
- fleet_name: [string] The name displayed to fleet managers on the fleet portal to identify the fleet.
- fleet_reporting_name: [string] The name used in company reports to identify the fleet. This may be the same as the fleet_name, or may be an internal reporting code for the company's use.
- team_id: [int64] The team_id is a positive integer uniquely identifying the team that is scored
- team_name: [string] The name displayed to fleet and team managers on the fleet portal.
- average_score: [float64] The average team score over a fixed period of time defined by "scoring_interval" below. This value lies between 40 and 100, and is the score used for the leaderboard. It is a nonlinear combination of the subscores listed below.
- average_score_accel: [float64] The average acceleration team subscore over the scoring interval.
- average_score_brake: [float64] The average braking team subscore over the scoring interval.
- average_score_turn: [float64] The average cornering team subscore over the scoring interval.
- average_score_speeding: [float64] The average speeding team subscore over the scoring interval.
- average_score_phone_motion: [float64] The average phone motion team subscore over the scoring interval.
- total_distance_km: [float64] The total distance driven by the team that was scored over the scoring interval.
- total_trip_count: [int64] The number of team trips that were scored over the scoring interval
- scoring_interval: [string] The length of the scoring interval (typically, "14 days").
- honoring_user_drive_labels: [boolean] Whether we honor user labels for drives, or rely on algorithmic classification.
- score_date: [string, YYYY-MM-DD HH:MM:SS.SSSSSS] The date on which the score was computed.

Drive Reports [Optional]

The "drives" subdirectory contains detailed information on each drive. This report is optional; depending on the actuarial and analytical goals for the report, these (large) files can be included or excluded. If they are produced, clicking on the directory will reveal a set of files such as the following:



Each drive has an associated driveid, as listed in the Trip Summary report in the previous section. We produce two reports for each drive. For example, for the drive with driveid "11409909-CC31-4C95-B641-49F27737FD04", the reports are:

- 11409909-CC31-4C95-B641-49F27737FD04_details.csv
- 11409909-CC31-4C95-B641-49F27737FD04_events.json

In the example above, there are trip-level reports from three trips.

Drive Detail Report

Continuing our example from above, the file

11409909-CC31-4C95-B641-49F27737FD04_details.csv

contains detailed 15 Hz data from the corresponding drive. The CSV file contains the following fields:

- time: [int64] Time, measured in UTC epoch milliseconds.
- mm_lat: [float64] Map-match-corrected latitude.
- mm_lon: [float64] Map-match-corrected longitude.
- mm_dist_km: [float64] Distance travelled on this trip so far. If the initial portion of the trip is prepended (i.e., if it was not directly measured, but inferred from the end of the previous trip), then the mileage during the prepended portion will be reported as zero, but the first measured mileage will include the prepended mileage. So, in the case of prepending, the mm_dist_km field will be identically zero, then suddenly jump to a non-zero value once the prepending has ended.
- gps_speed(m/s): [float64] Refined estimate of GPS speed.
- gps_heading: [float64] Refined estimate of GPS heading, in degrees.
- gps_valid: [int64] During some periods of time, GPS measurements are not valid or highly unreliable; for example, reliable measurements are not produced while the GPS is locking on to the satellite constellation, or if a vehicle drives through a tunnel. We set gps_valid to "1" when gps_speed(m/s) and gps_heading are reliable; "0" otherwise.

- accel_lon_smoothed: [float64] Smoothed acceleration in meters/second^2 in the forward direction of the vehicle from phone's accelerometer.
- accel_lat_smoothed: [float64] Smoothed acceleration in meters/second^2 in the lateral direction of the vehicle from phone's accelerometer.
- accel_valid: [int64] During some periods of time, the phone's accelerometer measurements may be unreliable; for example, if the phone is dropped in the car, the measurements from the accelerometer will be invalid for a few seconds until the phone's orientation can be recovered. We set accel_valid to "1" to indicate that accel_{lon,lat}_smoothed is valid; "0" means not.
- tag_lon_smoothed: [float64] [Only available if tag installed.] Smoothed acceleration in meters/second^2 in the forward direction of the vehicle from tag's accelerometer.
- tag_lat_smoothed: [float64] [Only available if tag installed.] Smoothed acceleration in meters/second^2 in the lateral direction of the vehicle from tag's accelerometer.
- tag_vert_smoothed: [float64] [Only available if tag installed.] Smoothed acceleration in meters/second^2 in the vertical direction of the vehicle (i.e., direction of gravity) from tag's accelerometer.
- tag_valid: [int64] [Only available if tag installed.] During some periods of time, we may not have access to reliable accelerometer measurements from the tag (for example, in rare cases there may be a transient communication failure between the tag and phone). "1" means tag_{lon,lat,vert}_smoothed are valid; "0" means not.
- roll_rate: [float64] Rate of vehicle roll (in degrees/second). "Roll" is rotation perpendicular to the forward direction of the vehicle; vehicles experience roll if they drive from a flat to banked road. A positive value corresponds to a left tilt.
- pitch_rate: [float64] Rate of vehicle pitch (in degrees/second). "Pitch" is rotation perpendicular to the lateral direction of the vehicle; vehicles experience pitch as they crest a hill. A negative value corresponds to a decline in the road.
- yaw_rate: [float64] Rate of vehicle yaw (in degrees/second). "Yaw" is rotation perpendicular to the vertical direction; vehicles experience yaw when they make a left or right turn. A positive value corresponds to a right turn.
- distraction: [int64] "1" means the driver is actively using their phone; "0" means the phone is stable.

Drive Event Report

Continuing our example from above, the file

11409909-CC31-4C95-B641-49F27737FD04_events.json

contains information about events data (e.g., harsh braking, speeding, etc) from the corresponding drive. It contains the information used to draw the event-enhanced trajectory on our web portal.

The JSON format is as shown in the following example. More detailed descriptions of the fields follow below.

JSON Example


```
{ "events": [
        {       "event_type": 4,
                "displayed": "web",
                "lon": -71.154451,
                "ts": "2016-05-13T19:24:00Z",
                "value": 3.312,
                "severe": false,
                "lat": 42.402876,
                "speed_kmh": 7.31,
                "max_mss": 3.3},

        {       "event_type": 2,
                "displayed": "web",
                "lon": -71.297518,
                "ts": "2016-05-13T19:34:09Z",
                "value": 3.315,
                "severe": false,
                "lat": 42.443092,
                "speed_kmh": 38.66,
                "max_mss": 3.3}
        …]
"waypoints": [
        {       "display_code": [0, 0],
                 "speed_limit_kmh_raw": 80.0,
                 "max_speed_kmh": 79.479,
                 "lon": 28.164475526099999,
                 "ts": "2017-10-30T09:05:05Z",
                 "link_id": 771248418,
                "speed_limit_kmh": 80.0,
                "lat": -25.8450701907,
                "prepended": true,
                "avg_moving_speed_kmh": 79.183}
        …]
}
```


JSON “events”

The “events” refer to unsafe braking, cornering, acceleration and phone motion events. The events element gives the different events detected during the drive. The thresholds for the events are 0.32g for braking, 0.32g for acceleration, and 0.45g for cornering. The events are computed with some aggregation (of events very close in time) and smoothing to produce the

reported values. On a turn, a positive value is a left turn, while a negative value is a right turn.

- "event_type": [int64] The numeric key to “event_type” is:
    1. Phone motion [This value is deprecated.]
    2. Harsh braking
    3. Harsh cornering
    4. Harsh acceleration
- "Displayed": [string]
    - “app” indicates that the event should be displayed on the app and in the web portal.
    - “web” indicates that the event should only be displayed on the web portal.
    - “none” indicates that the event is purely informational and is not displayed.
- This field indicates whether or not the event is displayed in the web portal; it will typically be “web”.
- "lon": [float64] longitude
- "lat": [float64] latitude
- "ts": [string, YYYY-MM-DDTYY:MM:SSZ] ISO 8601 timestamp
- "value": [float] magnitude of acceleration (meters/second^2)
- "severe": [boolean] moderate versus severe events
- "speed_kmh": [float64] mean speed during event
- "max_mss": [float64] An acceleration event may last for a second, during which we record many acceleration measurements. The “value” above reflects a weighted average of the above-threshold acceleration; the “max_mss” is the single largest magnitude observed during the event.
- “duration_sec”: [float64] Duration of the event in seconds.
- “speed_delta_kmh”: [float64] Change in speed, from two seconds prior to the event, to two seconds after the event.
- “duration_for_speed_delta_sec”: [float64] Duration of the speed window, which should be 4 seconds greater than “duration_sec”.
- “turn_dps”: [float64] Cornering, measured in degrees per second.

JSON “waypoints”

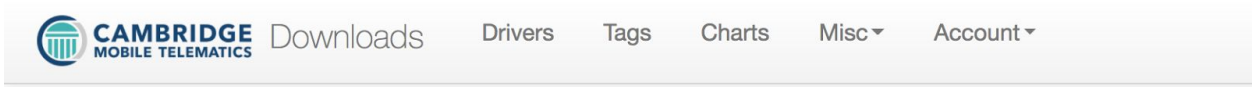
The “waypoints” refer to a point along the (map-matched) trajectory that defines the driver’s route. The trajectory also includes speeding information. A pair of consecutive waypoints define a portion of a road segment; a single waypoint contains information about the following road segment.

- "Display_code": [int64] This is a pair of integers (X,Y) encoding information about the previous road segment.
    - X:
        - -1 indicates prepending, i.e. the road segment was inferred from the

previous trip, rather than measured directly.
        - 0 indicates no speeding.
        - A positive integer indicates speeding.
    - Y:
        - 0 indicates no phone motion
        - 1 indicates phone motion
- "max_speed_kmh": [float64] The maximum speed driven between this waypoint and the following waypoint.
- "lon": [float64] longitude
- "lat": [float64] latitude
- "ts": [string, YYYY-MM-DDTYY:MM:SSZ] ISO 8601 timestamp
- "link_id": [float] This is an internal CMT code for a road segment. (Although these are represented as floats, the value will always be integral.)
- "avg_moving_speed_kmh": [float64] Mean positive speed over the following road segment
- "speed_limit_kmh_raw": [int64] Speed limit for the following road segment. (Values greater than or equal to 900 encode special road information and should be ignored.)
- "speed_limit_kmh": [float64] Certain types of consecutive road segments (e.g., highway on-ramps and highways) may suffer from extremely large discontinuities in speed limits. In that case, the posted speed limit does not reflect a safe driving speed. To address this problem, the “speed_limit_kmh” field uses the maximum speed limit of the current road segment, and the previous and following road segments.
- “phone_motion”: [If present, value is always “1”.] Indicates distracted driving (e.g., the phone’s screen is on; the car is traveling >15kph; the phone is moving in a manner consistent with human use for at least 3 seconds).
- “prepended”: [If present, values is always “true”.] Indicates that the segment was not measured directly, but was inferred based on the location of earlier trips and map matching. Prepended segments will only occur at the beginning of a trip.

Tag Log Reports

When the phone is not present but the driver has the CMT DriveWell Tag installed, driving information is still logged to the tag. The “taglog” directory contains files like:



Directory: /2017-06-12__2017-06-13/taglogs/

Name	Size	Date
4cb82c00177c_000049839.tar.gz	208328	2017-06-15T03:09:22.000Z
4cb82c001787_000002524.tar.gz	244179	2017-06-15T03:09:21.000Z
4cb82c0abed3_000029340.tar.gz	444410	2017-06-15T03:09:22.000Z
4cb82c0ea6ed_000035467.tar.gz	246779	2017-06-15T03:09:21.000Z
4cb82c0ea6f8_000052604.tar.gz	280707	2017-06-15T03:09:22.000Z
4cb82c140a2c_000070484.tar.gz	432330	2017-06-15T03:09:21.000Z
4cb82c143ce7_000022252.tar.gz	500820	2017-06-15T03:09:22.000Z
4cb82c1510e9_000035490.tar.gz	262027	2017-06-15T03:09:22.000Z

Each file contains information about a single tag. If a tag log file (e.g., "4cb82c00177c_000049839.tar.gz", corresponding to the tag with MAC address "4c:b8:2c:00:17:7c" and tag log with log_id[1] 49839) is downloaded, gunzipped and untarred, it will produce a directory, e.g.:

4cb82c001711

This directory will contain two subdirectories. The first subdirectory is called "event", and contains files like:

event_000748.csv
event_000749.csv
...

The second subdirectory is called "impacts" and contains files like:

impact_000748.csv
impact_000749.csv
...

Each file corresponds to the acceleration events or potential impacts during a single trip, with time stamps, as recorded by the tag. The CSV file has fields:

- time: [float64] Time in UTC epoch seconds, to two digit precision.
- ax: [float64] Acceleration in meters/second^2 in x-axis of tag
- ay: [float64] Acceleration in meters/second^2 in y-axis of tag
- az: [float64] Acceleration in meters/second^2 in z-axis of tag
- a_forward: [float64] Acceleration in meters/second^2 in forward direction of vehicle
- a_left: [float64] Acceleration in meters/second^2 in lateral direction of vehicle (leftward accel is positive)
- a_up: [float64] Acceleration in meters/second^2 in vertical direction of vehicle (upward accel is positive, so with gravity, this value is typically around 9.8)

[1] Please confer "Tag Trip Summary Report" for a discussion of the log_id.

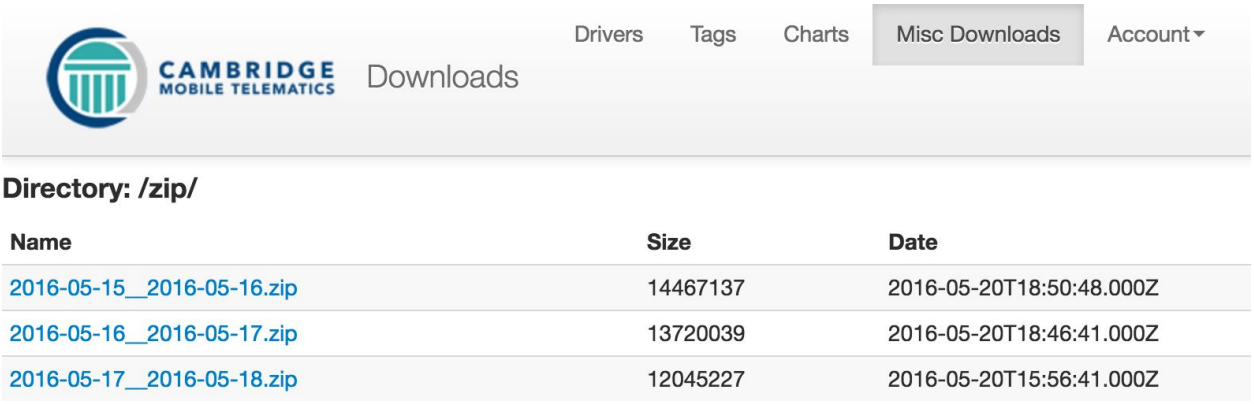
The a_forward, a_left, and a_up fields are only populated if the tag can be oriented; if not, they are empty.

Impacts have a higher acceleration threshold than events, and are recorded at a higher frequency.

The data in these files corresponds to all the tag logs processed on the time range of the report. In particular, it is possible that logs of trips that occurred before the report's time range may be present in the tag logs.

Zipped Reports

As the Daily Trip Reports consist of a large number of files and subdirectories, it can be useful to be able to download all the data as a single file. To facilitate that, CMT updates a daily "zip" directory. Each day's zip file will unzip into a complete copy of the file and directory structures described above.



Alternate Time Measures

When producing a data report for a target time range, we need to decide which trips fall within that range. We offer three different notions of trip time: UTC, local time, and upload time.

Data from a user's drive may not be immediately uploaded at the end of a trip. For example, if the user enables wifi-only uploads, the trip will not upload until their phone next connects to a viable wifi hotspot. Therefore, if using UTC or local trip start time, it is advisable to delay the creation of the data report by several days. We recommend a 3 day latency, as it is sufficient to upload >99% of all trips.

Alternately, we can produce data reports based on the upload time to CMT's server. Using the upload time induces no delay in reporting on the drive, and guarantees that all uploaded trips

appear in a report. However, the trips uploaded on a given day may have occurred in the past (due to, for instance, the wifi-only upload scenario described above.) Therefore, the recipient of the data report would need to decide how to reconcile older trips.

Alternate Delivery Mechanisms

By default, reports are uploaded to the CMT web portal as described above. We can also provide reports via SFTP, instead of or in addition to the web portal.