

ATTACHMENT A:

SF Taxi Data Conceptual Design

Please review the conceptual design. We anticipate that existing software will be able to meet most of the goals described in the RFI / RFQ, and are including this conceptual design to fully describe the functionality that the SFMTA envisions for the system. Please use this document as a reference in creating a response to the RFI/RFQ.

Summary	3
Background	4
Current issues with dispatch in San Francisco	4
<i>Taxi dispatch</i>	4
Participants in the taxi industry	4
Taxi hardware and software	5
SF Taxi Data system.....	6
Goals.....	6
<i>Other dispatch</i>	6
Business Processes.....	6
Overview.....	6
Customer requests dispatch.....	7
<i>Dispatch via a 3rd-party Online Dispatch Referral Company (phone app)</i>	8
<i>Dispatch to multiple vehicles</i>	9
<i>Dispatch to multiple fleets</i>	11
<i>Dispatch via “traditional” calls directly to a Dispatch Company</i>	13
Customer takes ride	13
<i>Customer takes ride</i>	13
<i>Customer is absent</i>	15
<i>Driver never arrives</i>	16
Driver changes status	16
<i>Driver goes on/off duty, etc.</i>	16
<i>Driver start/ends shift</i>	17
Dispatch Company pushes real-time data	18
<i>Dispatch Company pushes real-time data</i>	18
SFMTA Regulator uploads new data.....	19
SF Taxi Data website.....	19
Regulatory reports	19
Non functional requirements.....	19
Agility.....	19

Capacity/Performance.....	19
<i>Capacity</i>	19
<i>API Service Level Agreements</i>	20
<i>SLA Monitoring</i>	20
Data retention	20
Disaster Recovery.....	20
Documentation	20
Escrow/Code	21
Extensibility	21
Failure Management	21
Fault tolerance	21
Maintaining SF Taxi Data	21
Online Dispatch Referral Company Vetting and Provisioning	21
Release Management:	21
Reliability	21
Scalability	22
Security	22
Testing	22
<i>Acceptance test</i>	22
<i>Performance tests</i>	22
<i>Bug-tracking database</i>	22
<i>Sandboxes for Online Dispatch Referral Company and Dispatch Companies</i>	22
Business Entities	23
Dispatch Company	25
<i>Fields</i>	25
Dispatch Request	25
<i>Fields</i>	25
Driver.....	26
<i>Fields</i>	26
Fleet	27
<i>Fields</i>	27
Medallion/Permit	27
Online Dispatch Referral Company	27
<i>Fields</i>	28
Shift	28
<i>Fields</i>	28
Trip	28

<i>Fields</i>	28
Vehicle	29
<i>Fields</i>	29
Vehicle Location	30
<i>Fields</i>	30
API	30
Vehicle data feed	30
<i>Outbound vehicle data feed</i>	30
Business Entity API	30
<i>Message Descriptions</i>	31
Dispatch API	31
<i>Online Dispatch Referral Company originates dispatch request</i>	32
<i>Dispatch Company originates dispatch request</i>	33
<i>Message Descriptions</i>	33
Completed Trip API	34
<i>Message Descriptions</i>	34
Shift Change API	35
<i>Message Descriptions</i>	35
Customer Satisfaction API	35
Glossary	36

Summary

San Francisco’s Municipal Transportation Agency (SFMTA) intends to implement a system called “SF Taxi Data” for aggregating and disseminating constantly updated data related to taxis.

SF Taxi Data will have no public face per se. Instead the system will provide a standard way for 3rd parties to track taxis and make electronic dispatch requests—allowing “voluntary” central dispatch.

Voluntary central dispatch

San Francisco has long had dozens of taxi fleets and consequent calls for a “central dispatch” to make it possible for a customer to simply have **any** taxi dispatched without having to contact many separate fleets.

On the other hand, individual taxi fleets have spent years building their own brands, and don’t want their investment wasted by requiring that **all** dispatches go through a central system.

SF Taxi Data provides a mechanism for 3rd parties to easily dispatch a taxi from any fleet in the city—without requiring that *all* customer dispatches originate via SF Taxi Data.

However customers will not be able to use SF Taxi Data directly. By publishing the specifications for receiving data and requesting dispatches, SFMTA intends that SF Taxi Data will foster the creation of 3rd party Online Dispatch Referral Companies. These 3rd party companies will make use of SF Taxi Data facilities to allow their own customers to request vehicles, rather than requiring each 3rd party dispatch referral company to negotiate with individual fleets.

Taxi regulation for the 21st century

The new system will allow SFMTA to better manage and monitor taxis (and other vehicles) as part of the transportation network.

SF Taxi Data will also eventually migrate regulatory management of fleets and drivers from a largely manual process to an electronic one.

Background

San Francisco’s Municipal Transportation Agency (SFMTA) operates San Francisco’s entire surface transportation network – that encompasses pedestrians, bicycling, transit, vehicular traffic and parking - and regulates the taxi industry.

Current issues with dispatch in San Francisco

Taxi dispatch

The taxi industry in San Francisco is under pressure to modernize in the face new competitors that include town car service Uber, car-sharing companies like City Car Share and Zip Car, “open-jaw” car sharing services from Daimler (car2go) and BMW and “sharing economy” ride sharing services like SideCar, Zimride and others.

Customers and drivers alike are frustrated with the current system in which customers cannot assume that a dispatched taxi will actually arrive, nor can drivers assume that a customer will be at a dispatched pickup when the taxi arrives.

Customers in areas outside San Francisco’s downtown core also face the very real possibility that they will not be able to get a taxi *at all* simply because the economics of driving a taxi empty for the return route make such trips economically infeasible for the driver.

Furthermore, and most importantly in the long term, taxis represent an important and flexible public transit resource for SFMTA; and careful management of taxis offers benefits far beyond reducing customer and driver frustration. For instance, by properly managing taxis, San Francisco can reduce reliance on private vehicles, especially along busy transit routes, and thereby speed up transit along those corridors.

Participants in the taxi industry

In San Francisco, these participants play a role in the taxi industry:

Drivers	In San Francisco, there are 7,000 permitted taxi drivers, all of whom are independent operators running their own businesses. Some drivers hold their own permit to operate a taxi, while other drivers lease taxis from an individual permit holder or a fleet on a short-term or long-term basis.
Medallion or permit holders	In San Francisco each taxi vehicle must have an operating permit. A full-time (24/7/365) permit issued to an individual is called a medallion. Another type of operating permit is the “Single Operator Permit” which is issued to an individual and may only be operated part-time. There is also a class of temporary permits issued to companies, which may be operated full-time but have a term limited to the lifetime of a single vehicle. These permits may be operated by a fleet or an individual, depending on the individual business arrangement of the permit holder and/or the conditions on the permit. The number of permits defines the number of taxis that are legally allowed to operate in the City.
Fleets Color Schemes	Every taxi must be affiliated with a fleet of similarly painted cabs (giving rise to the term “color scheme” to describe each fleet). There are nearly thirty taxi fleets in San Francisco, but the largest four fleets (Yellow, Luxor, Arrow and Town) account for more than half of the medallions.
Dispatch	A Dispatch Company acts as middleman between a customer and driver, dispatching customer

Companies	requests to drivers. There are currently ten dispatch companies in San Francisco.
Dispatchers	<p>Some Dispatch Companies deal with only a single fleet while others handle multiple fleets.</p> <p>In addition, some Dispatch Companies dispatch requests electronically to the drivers using a Computer Aided Dispatch system, while others dispatch by radio only. By December 31, 2012, all fleets are required to have the capacity to provide “electronic trip data”, including, at a minimum, the ability to produce data that can generate reports using off-the-shelf database and spreadsheet software, and which records the following information:</p> <ul style="list-style-type: none"> (i) Driver's identification established by authentication through driver's license swipe or other secure system; (ii) Date of shift; (iii) Vehicle Number and vehicle license number; (iv) Medallion number (manually entered); (v) Number of passengers on each trip (manually entered); (vi) GPS-generated origin and destination of each trip; (vii) The fare for each trip including applicable fees charged; (viii) The mileage for each trip; (ix) The total number of trips for each shift; (x) The time of hire and discharge for each trip; (xi) The starting and ending times and total hours of each shift. <p>Dispatchers work at Dispatch Companies routing requests to drivers.</p>

CAD/AVL vendors	<p>Some Dispatch Companies dispatch via Computer Aided Dispatch systems that include Video Display Terminals in taxis.</p> <p>There are multiple different CAD systems in use in San Francisco (from Wireless Edge, VeriFone, CMT and Cabulous).</p> <p>Automated Vehicle Location (AVL) systems use GPS to report the current location of vehicles.</p>
-----------------	--

Online Dispatch Referral Company	<p>3rd party companies like Taxi Magic and Cabulous have recently entered the taxi business. They act as referral agents between customers and Dispatch Companies. These companies provide customers with smartphone applications that make it easier for the customers to request a taxi.</p> <p>These “Online Dispatch Referral Companies” might take into account information besides the customer’s current location that Dispatch Companies do not track, for instance:</p> <ul style="list-style-type: none"> • the reputation of nearby drivers • the customer’s language preferences • other data <p>San Francisco would like to foster the creation of more such companies and SF Taxi Data provides software infrastructure to simplify entry of new firms.</p>
----------------------------------	---

SF Taxi Regulator	SFMTA acts the regulator of the taxi industry in San Francisco. The division of Taxis and Accessible Services fulfills this role within SFMTA.
-------------------	--

Taxi hardware and software

Taxis in San Francisco may have a variety of hardware and software.

Meter	<p>Every taxi must have a meter, which shows the taxi fare and prints receipts.</p> <p>Meters may have a wide variety of other functions as well, including, for instance, logging the driver in, although these functions may also be done by the Video Display Terminals as well.</p>
-------	---

CAD Systems	Some fleets are electronically dispatched using a Computer Aided Dispatch (CAD) system.
-------------	---

Video Display	Such a system consists of a centralized part, used by dispatchers at the Dispatch Company, which connects wirelessly or by radio to a Video Display Terminal (also sometimes called a
---------------	---

Terminal	Mobile Data Terminal) in the front seat of each taxi for use by the driver.
Mobile Data Terminal	Such a Video Display Terminal can have a wide variety of functions, including information about dispatched calls, GPS location and credit card processing, but also including, for instance, mapping, text messaging, and many other features.
Smartphone E-hailing	<p>Increasingly taxi drivers use smartphones to communicate with their customers in addition to using the traditional dispatch equipment.</p> <p>For instance, Cabulous dispatches requests made by customers using the Cabulous phone application to a nearby driver’s smartphone.</p> <p>Since such communication doesn’t go through the traditional dispatch system, this type of communication is sometimes called “electronic hailing” or “e-hailing.”</p>

SF Taxi Data system

Goals

Other dispatch

Besides taxi, it will eventually make sense for SFMTA to be able to manage any type of dispatch, including, perhaps, school buses, grocery deliveries and bike messengers.

Business Processes

Overview

SF Taxi Data seeks to address a collection of business processes that fall into several different categories.

Category	Description
Customer requests dispatch	<p>A customer requests that a vehicle be dispatched using an Online Dispatch Referral Company.</p> <p>Variations include:</p> <ul style="list-style-type: none"> • Dispatch to multiple vehicles • Dispatch to multiple fleets • Driver declines request • Service for a pickup at a future time • Communication breakdown • Dispatch via “traditional” calls directly to a Dispatch Company
Customer takes ride	<p>A customer takes a ride.</p> <p>Variations include:</p> <ul style="list-style-type: none"> • Vehicle arrives; customer not present • Customer waiting; vehicle doesn’t arrive
Driver changes status	A driver changes their status (e.g. from on-duty to off-duty)
SFMTA Regulator uploads new	Periodically MTA regulators will need to upload new data to SF Taxi Data in response to changes to fleets, vehicles and drivers.

data

For the first release of SF Taxi Data, these changes can be managed in an ad hoc way, perhaps , for instance, by uploading spreadsheet files.

The following technical processes support the user processes:

Dispatch
Company
pushes real-time
data

Each company dispatching vehicles in San Francisco will push near real-time (every six seconds) data for their entire fleet to SF Taxi Data.

Variations include

- Communication breakdown
 - Data sent by Dispatch Company is inconsistent with SF Taxi Data
 - Online Dispatch Referral Company wants information for a subset of data
-

The following business process are not part of the first version of SF Taxi Data, but should be anticipated in later versions.

Dispatch
Company
updates fleet

There is a consistent movement of medallions between fleets as medallion holders decide to change companies. This occurs at the rate of 0 to 6 per month, and the effective date of any change is always the first of each month. Temporary permits may expire, or may be revoked and re-issued to another person or entity. These changes are subject to regulatory review and are currently handled largely manually. SF Taxi Data must provide a user interface for qualified users to enter this information directly into SF Taxi Data.

Variations include:

- Regulator doesn't approve request
- Regulator places a hold on the request
- SFMTA issues a temporary medallions or permits with fixed expirations

Communication breakdown

Regulators
receive notice of
violation

As part of normal data collection, SF Taxi Data can review real-time data delivered by Dispatch Companies for compliance with regulatory rules and notify SFMTA Regulators when data suggests that there may be a compliance issue.

In such a case, SF Taxi Data will notify Regulators (e.g. by email) that further investigation is warranted.

Variations include:

Regulators change compliance thresholds over time

The following business process are not part of the first version of SF Taxi Data, but should be anticipated in later versions.

Customer requests dispatch

A customer requests that a vehicle be dispatched.

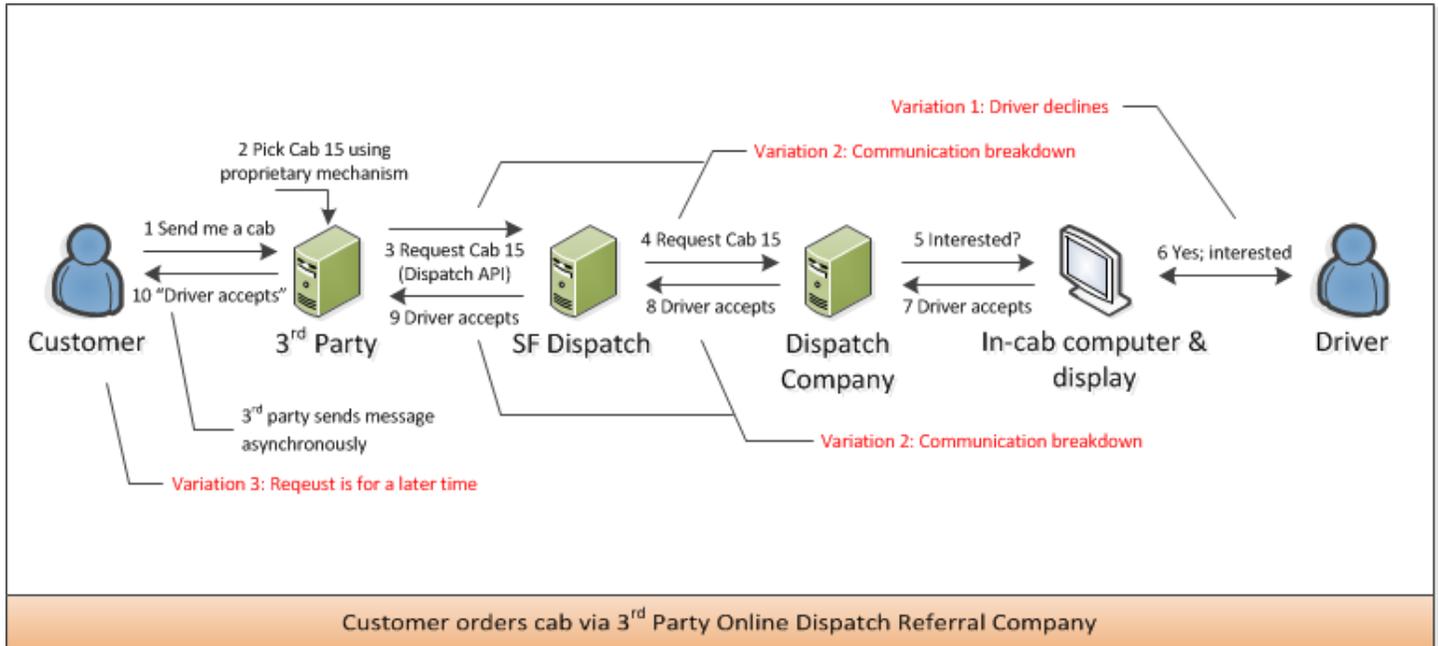
SF Taxi Data exists in part to encourage 3rd party Online Dispatch Referral Companies to enter the taxi dispatch referral market in San Francisco, improving taxi dispatch efficiency and increasing satisfaction for both drivers and customers.

SF Taxi Data will provide a unified electronic mechanism for dispatching any vehicle in the city-wide fleet of vehicles without concern for the details of a specific fleet's dispatch infrastructure.

Dispatch via a 3rd-party Online Dispatch Referral Company (phone app)

This process describes the round-trip process of ordering a vehicle using an Online Dispatch Referral Company.

In this case, by the time the customer requests a vehicle, they have already enrolled with the Online Dispatch Referral Company and described their preferences, home location and whatever other information the Online Dispatch Referral Company needs to best dispatch a vehicle to the customer.



1 Customer says "Send me a taxi" The customer opens a web or phone application for an Online Dispatch Referral Company, requests a taxi and submits a request to send a taxi to their currently location.

Depending on the Online Dispatch Referral Company the user may be able to offer additional incentives to the driver, for instance:

- A prearranged tip amount
- A prearranged credit card payment

The Online Dispatch Referral Company immediately responds saying that they have received the request.

The user may now close the phone application, while the Online Dispatch Referral Company tries to dispatch a vehicle.

2 3rd Party picks taxi 15 The Online Dispatch Referral Company uses near real-time vehicle data delivered by SF Taxi Data plus its own proprietary vehicle selection algorithm to select a specific taxi for the customer.

For instance, the company might take into account:

- The customer's current location
- The reputation of nearby drivers
- The customer's language preferences
- Other data

		After running the algorithm the Online Dispatch Referral Company selects a specific vehicle to request.
3	3 rd Party requests taxi 15	The Online Dispatch Referral Company requests the specific vehicle selected in the previous step electronically via SF Taxi Data.
4	SF Taxi Data forwards request for taxi 15	SF Taxi Data forwards the request for taxi 15 to the appropriate Dispatch Company.
5	Dispatch Company forwards request to taxi 15	The Dispatch Company forwards the request to the driver in taxi 15. The request appears on the driver's Video Display Terminal in the taxi, and displays not just the request but additional information about the request, including, perhaps: <ul style="list-style-type: none"> • The Online Dispatch Referral Company that initiated the request • Any special incentives the customer may have offered (e.g. a prearranged tip amount)
6 7	Driver accepts request	The driver accepts the request using exactly the same mechanism they have always used to respond to dispatch requests—via the driver's Video Display Terminal.
8	Dispatch Company reports that the driver accepts the request	The Dispatch Company communicates back to SF Taxi Data that the driver has accepted the request. A Dispatch Company is required to respond to a request within 90 seconds even if the requested driver has not yet made a decision about this dispatch.
9	SF Taxi Data reports that the driver accepts the request	SF Taxi Data communicates back to the Online Dispatch Referral Company that the driver has accepted the request.
10	3 rd Party reports that the driver accepts the request	The Online Dispatch Referral Company sends a message to the customer's phone that a vehicle is on its way.

Variation 1: Driver declines

In step 6, it is possible for the driver to decline a request. In this case, the driver's response will be communicated back to the Online Dispatch Referral Company (using the same mechanism as steps 7-9).

The Online Dispatch Referral Company can then try to dispatch a different vehicle for the customer or report back to the customer that no vehicle could be found.

Variation 2: Communication breakdown

It is possible for a dispatch request not to make a full round-trip from Online Dispatch Referral Company to SF Taxi data to Dispatch Company and back again.

Variation 3: Dispatch is for a later time (or date)

The customer can also specify that they want a vehicle to be dispatched at some time in the future.

In this case, the Online Dispatch Referral Company includes the time requested in their call to SF Taxi Data and this information is forwarded to the Dispatch Company and then to the driver. The driver accepts or rejects the request as they do today for a future pickup.

Dispatch to multiple vehicles

To save time for the end user, rather than dispatching one vehicle at a time, the Online Dispatch Referral Company may request multiple vehicles in the same dispatch request. This allows multiple drivers to decide if they want to respond to a dispatch at the same time—at the cost of possibly resulting in multiple drivers accepting the request. To

handle this, the Online Dispatch Referral Company may need to submit a follow-up “Dispatch Cancellation” message to all but one of the drivers that accepted the dispatch.

To dispatch multiple vehicles, the Online Dispatch Referral Company sends the ids of the various vehicles in the request listed in preference order (e.g. “send 5 or 6, with a preference for 5 over 6”).

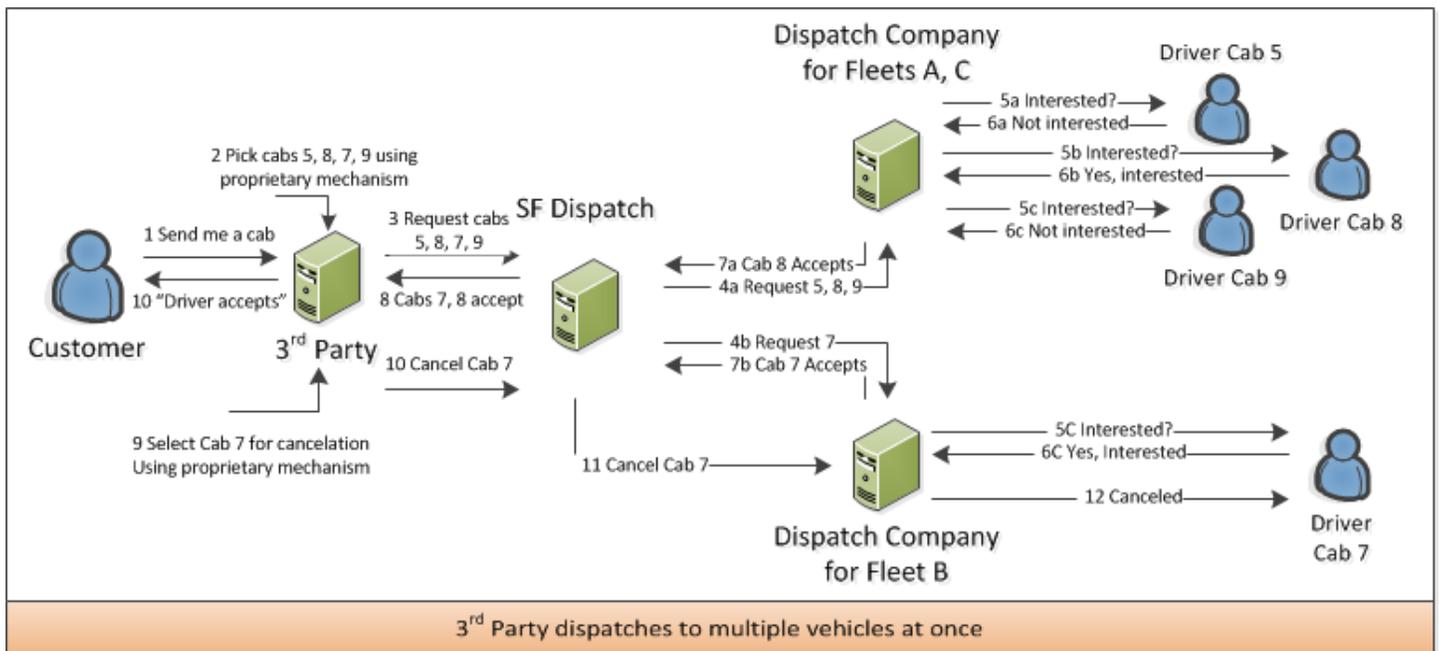
The vehicles requested do not need to all be in the same fleet; SF Taxi Data will split up the list of requests into requests for the appropriate Dispatch Companies and send as many requests as needed in parallel to include requests for all the vehicles in the request.

For instance, a hypothetical request for vehicles 5, 8, 7, 9 where vehicles are associated with these Fleets and Dispatch Companies:

Id	Fleet	Dispatch Company
5, 9	Fleet A	Dispatch Company 1
7	Fleet B	Dispatch Company 2
8	Fleet C	Dispatch Company 1

Would cause SF Taxi Data to forward two separate requests:

- 5, 8, 9 to Dispatch Company 1
- 7 to Dispatch Company 2



1	Customer says “Send me a taxi”	Customer requests cab using phone app
2	3 rd Party picks taxis 5, 8, 7, 9	The Online Dispatch Referral Company picks several taxis to request in parallel. The order indicates the preference, with earlier number having higher preference
3	3 rd Party requests taxis 5, 8, 7, 9	The Online Dispatch Referral Company requests the specific vehicles selected in the previous step electronically via SF Taxi Data.

4	SF Taxi Data forwards request for Dispatch Companies	SF Taxi Data splits the request and sends requests for cabs: <ul style="list-style-type: none"> • 5, 8, and 9 to the Dispatch Company for fleets A & C • 7 to the Dispatch Company for fleets B
5	Dispatch Company forwards requests to taxis	The Dispatch Company forwards the request to the drivers in each of the requested taxis.
6	Driver accepts request	Zero or more drivers accept the request
7	Dispatch Company reports that the driver accepts the request	The Dispatch Company communicates back to SF Taxi Data which drivers have accepted the request.
8	SF Taxi Data reports results	SF Taxi Data communicates back to the Online Dispatch Referral Company which drivers have accepted the request.
9	Online Dispatch Referral Company decides which cabs to cancel	If more than one driver has accepted a request, the Online Dispatch Referral Company selects which cabs should be canceled (for cab 7 in this example).
10	Online Dispatch Referral Company cancels cabs	Online Dispatch Referral Company sends a cancelation message (for cab 7 in this example) for all canceled cabs.
11	SF Taxi Data forwards cancelation	SF Taxi Data forwards the request to cancel the cabs to the appropriate Dispatch Companies.
12	Dispatch Companies cancel dispatch	Each Dispatch Company forwards the cancelation to the appropriate drivers.

Dispatch to multiple fleets

Rather than requesting a specific vehicle, the Online Dispatch Referral Company may instead allow one or more Dispatch Companies to pick a vehicle for them.

To dispatch to multiple fleets, the Online Dispatch Referral Company may leave the list of requested vehicles empty and instead specify a list of Fleets that should be allowed to fulfill the dispatch.

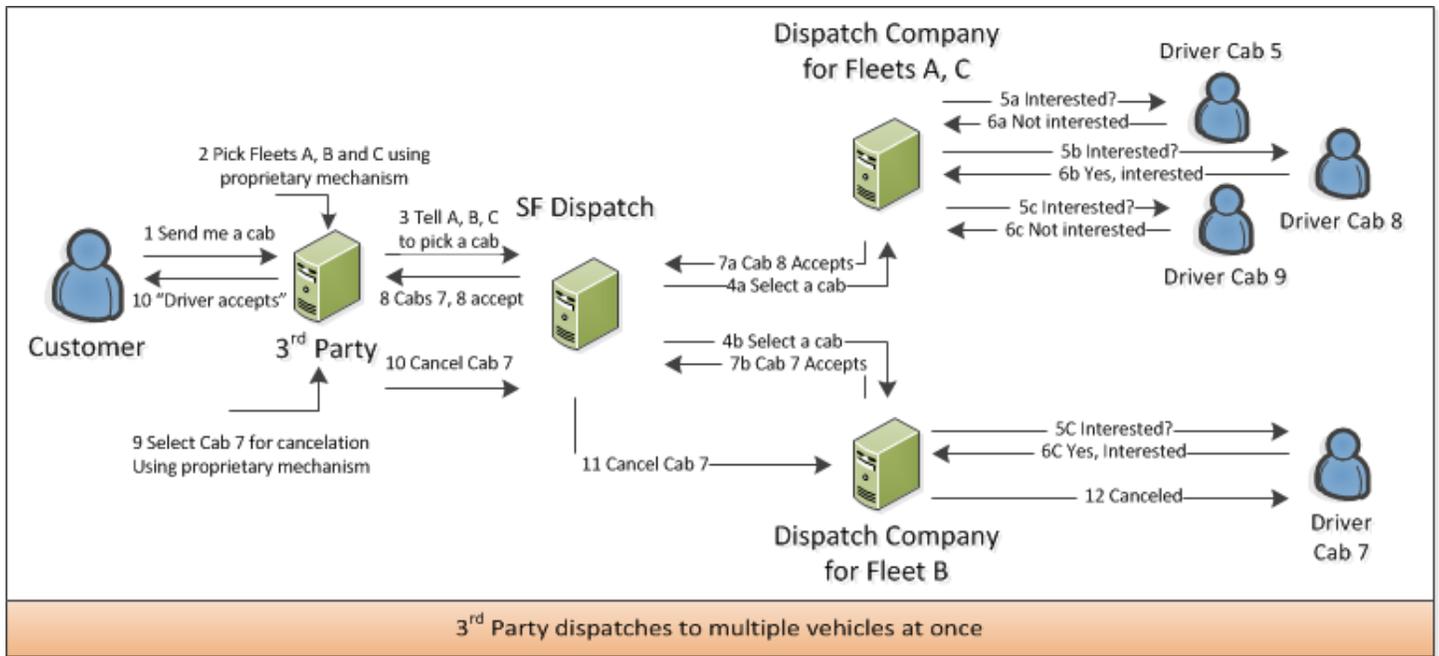
In this case, SF Taxi Data will forward “generic” dispatch requests to each of the appropriate Dispatch Companies. For instance, with the example table from the previous section, given a request for a vehicle from Fleets A, B or C, SF Taxi Data would forward two separate requests:

- Fleet A and B to Dispatch Company 1
- Fleet C to Dispatch Company 2

In this case, drivers in fleets other than A, B and C should not even know that this dispatch was requested.

Once again, because multiple drivers may accept a dispatch that is sent this way, the Online Dispatch Referral Company may need to send a “Dispatch Cancellation” message to all but one of the drivers.

Note: either the vehicle list or the Fleet list must be empty: either the request is for specific vehicles or all decisions about dispatch are delegated to Dispatch Companies.



1	Customer says "Send me a taxi"	Customer requests cab using phone app
2	Online Dispatch Referral Company picks fleets A, B and C	The Online Dispatch Referral Company picks several fleets to request in parallel.
3	Online Dispatch Referral Company requests taxis from Fleets A, B and C	The Online Dispatch Referral Company requests the specific fleets to select a cab on their own.
4	SF Taxi Data forwards request for Dispatch Companies	SF Taxi Data splits the request and sends requests for cabs: <ul style="list-style-type: none"> to the Dispatch Company for fleets A & C to the Dispatch Company for fleet B
5	Dispatch Company forwards requests to taxis	The Dispatch Company select drivers for the dispatch
6	Driver accepts request	Zero or more drivers accept the request
7	Dispatch Company reports that the driver accepts the request	The Dispatch Company communicates back to SF Taxi Data which drivers have accepted the request.
8	SF Taxi Data reports results	SF Taxi Data communicates back to the Online Dispatch Referral Company which drivers have accepted the request.
9	Online Dispatch Referral Company decides which cabs to cancel	If more than one driver has accepted a request, the Online Dispatch Referral Company selects which cabs should be canceled (for cab 7 in this example).
10	Online Dispatch Referral Company	Online Dispatch Referral Company sends a cancellation message (for cab 7 in this

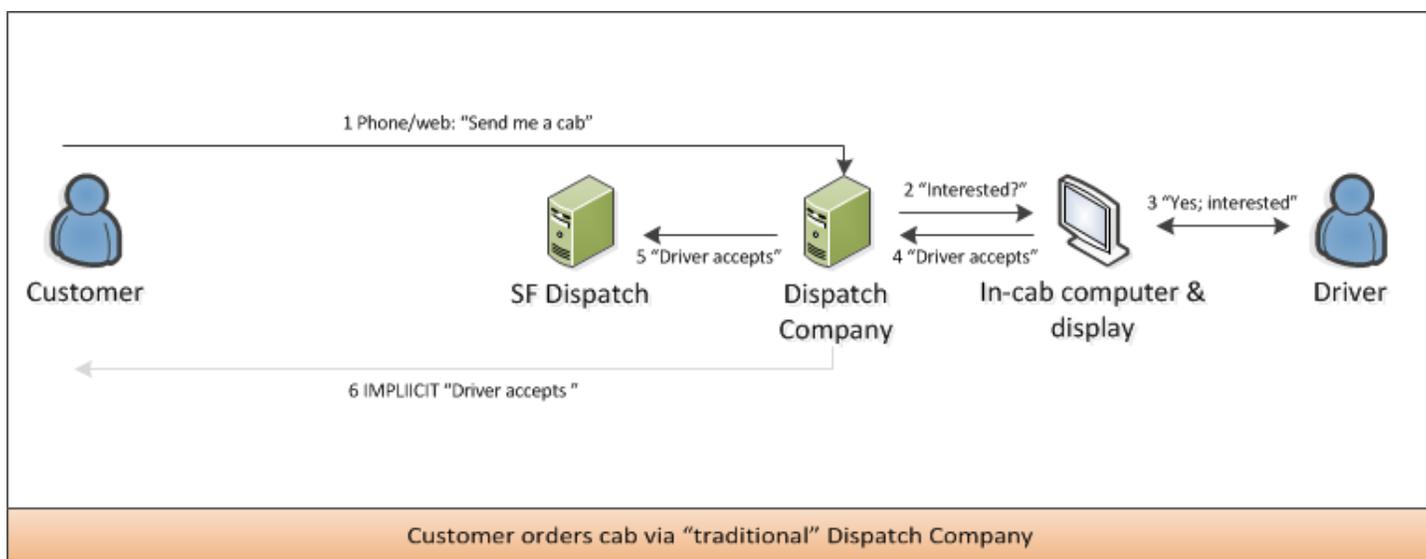
	cancels cabs	example) for all canceled cabs.
11	SF Taxi Data forwards cancelation	SF Taxi Data forwards the request to cancel the cabs to the appropriate Dispatch Companies.
12	Dispatch Companies cancel dispatch	Each Dispatch Company forwards the cancelation to the appropriate drivers.

Dispatch via “traditional” calls directly to a Dispatch Company

This process describes the round-trip process of ordering a vehicle using a “traditional” Dispatch Company rather than an Online Dispatch Referral Company.

The customer calls a Dispatch Company by phone (or, in some cases, by web) makes the request and waits for the taxi to arrive.

This process differs from today’s “normal” process of ordering a vehicle only because information about the dispatch is communicated back to SF Taxi Data.



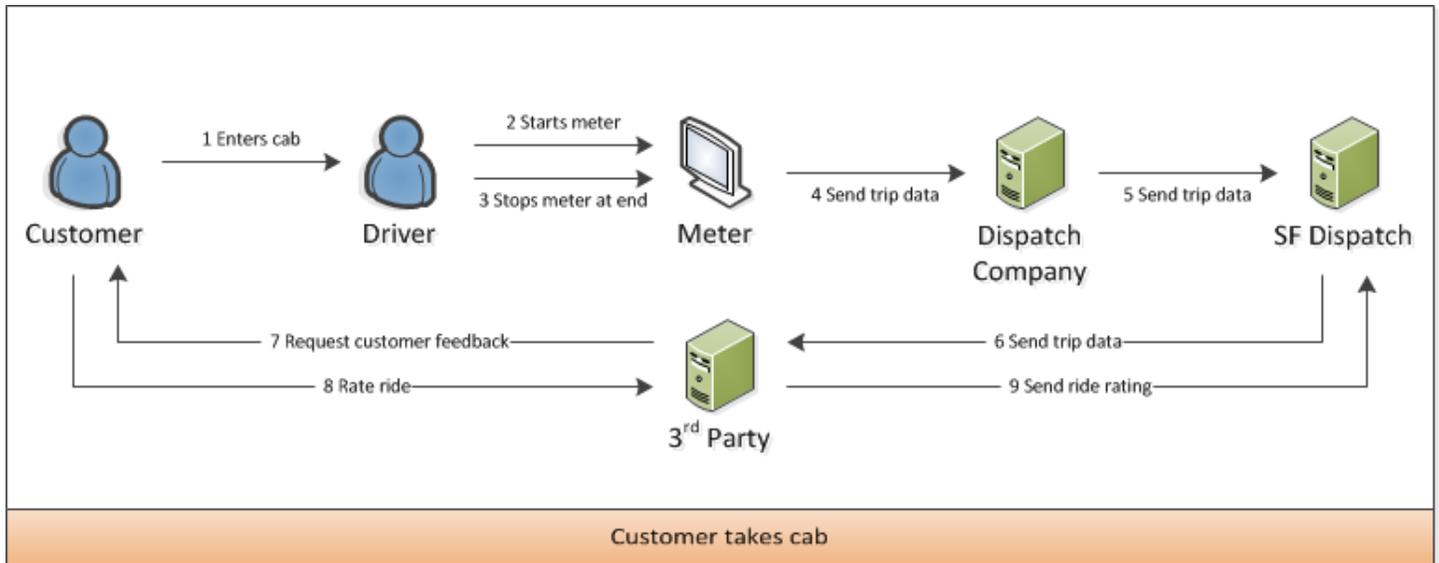
1	Customer says “Send me a taxi”	The customer simply makes a call to a Dispatch Company dispatcher who collects information from the customer.
2	Dispatcher forwards request to specific vehicle	The dispatcher picks a specific vehicle and forwards the request to the driver, which appears in the driver’s Video Display Terminal.
3/4	Driver accepts request	The driver accepts the request via the driver’s Video Display Terminal.
5	Dispatch Company reports dispatch	The Dispatch Company automatically reports the dispatch to SF Taxi Data as part of their near real-time data feed to SF Taxi Data.

Customer takes ride

Customer takes ride

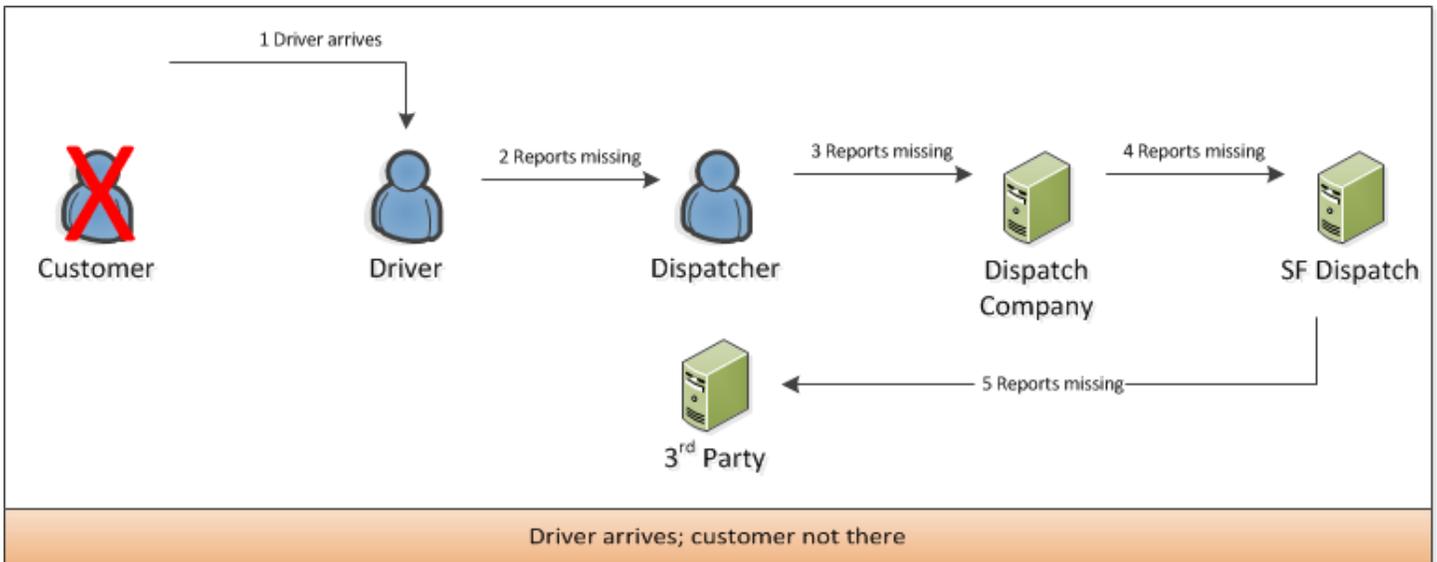
A customer takes a previously dispatched vehicle.

This process differs from today’s “normal” process of taking a dispatched vehicle only because payment information about the ride is sent from the Dispatch Company to SF Taxi Data as part of the data feed from the Dispatch Company to SF Taxi Data.



1	Customer enters taxi	Same as today
2	Driver starts meter at start of ride	Same as today
3	Driver stops meter at end of ride	Same as today
4	Meter sends information	The meter sends payment information to the Dispatch Company.
5	Dispatch Company forwards information	Dispatch Company sends meter information to SF Taxi Data using the normal real-time data feed.
6	SF Taxi Data forwards information	SF Taxi Data forwards information to Online Dispatch Referral Company that originated the dispatch
7	3 rd Party request feedback	Online Dispatch Referral Company asks customer for rating (1-5 stars) for trip
8	Customer rates ride	If the customer elects to rate the ride they send data to the Online Dispatch Referral Company
9	Send vehicle and driver rating	Online Dispatch Referral Company forwards ratings to SF Taxi Data

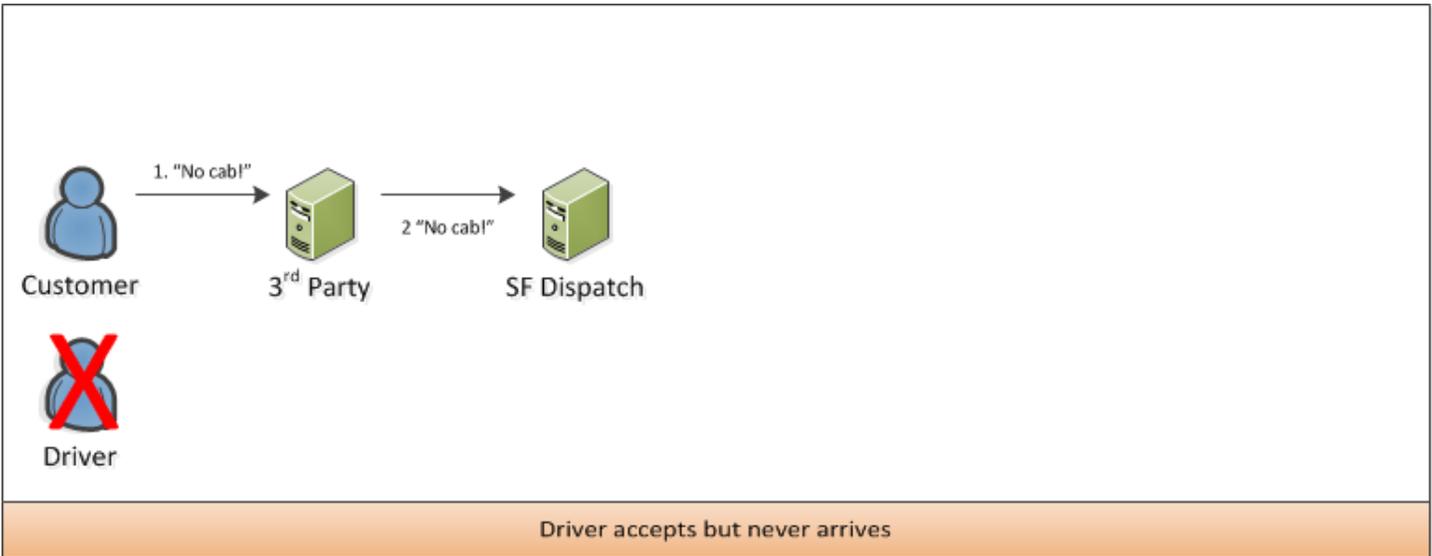
Customer is absent



In this variation, when the vehicle arrives at the dispatch location, the customer is not there.

1	Driver arrives	Discovers customer is missing
2	Driver reports to dispatcher	Same as today
3	Dispatcher reports missing customer	Driver reports that the customer was missing (using the Dispatch Company's proprietary internal dispatch system).
4	Dispatch Company reports missing customer	Dispatch Company reports the missing customer via the Customer Missing Message
5	SF Taxi Data reports missing	SF Taxi Data reports the missing customer via the Customer Missing Message

Driver never arrives



In this variation, the driver never arrives at the dispatch location.

If the customer has used an Online Dispatch Referral Company they should report this to that company. If the customer has requested dispatch directly from a Dispatch Company, they should report this via the city’s 311 service.

1	Customer reports missing cab	Via 3 rd party phone app
2	Online Dispatch Referral Company reports missing cab	SF Taxi Data reports the missing customer via the Vehicle Missing Message

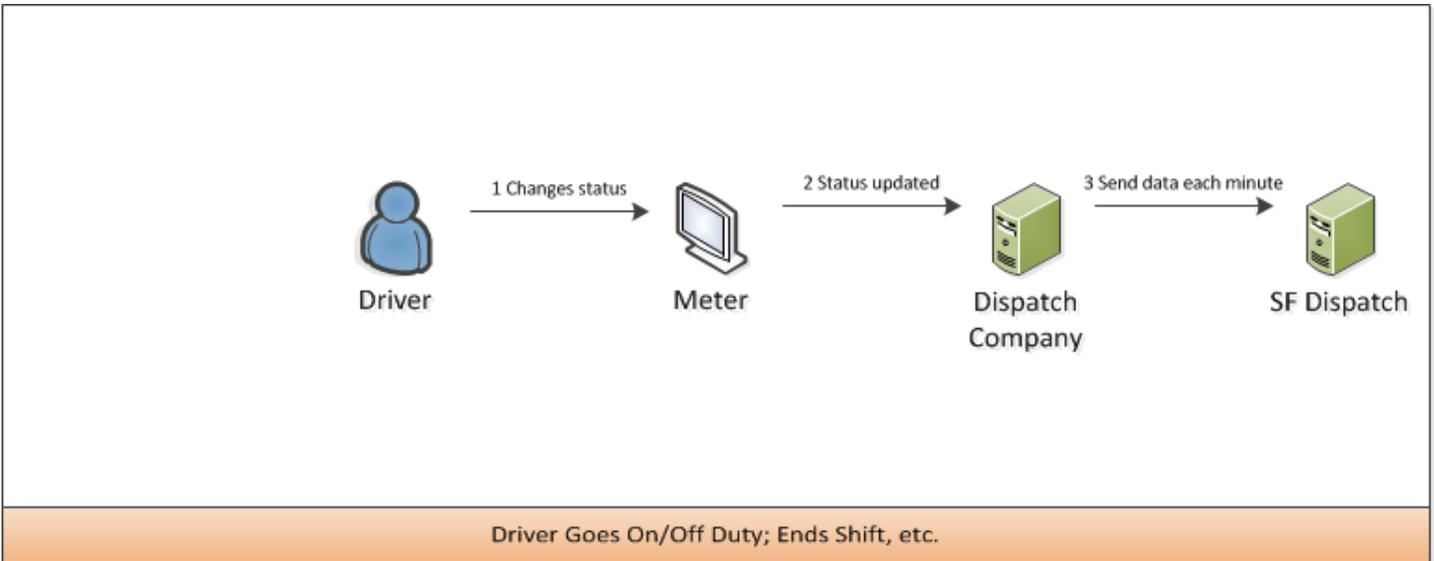
Driver changes status

Driver goes on/off duty, etc.

A driver changes his status. There are three possible statuses:

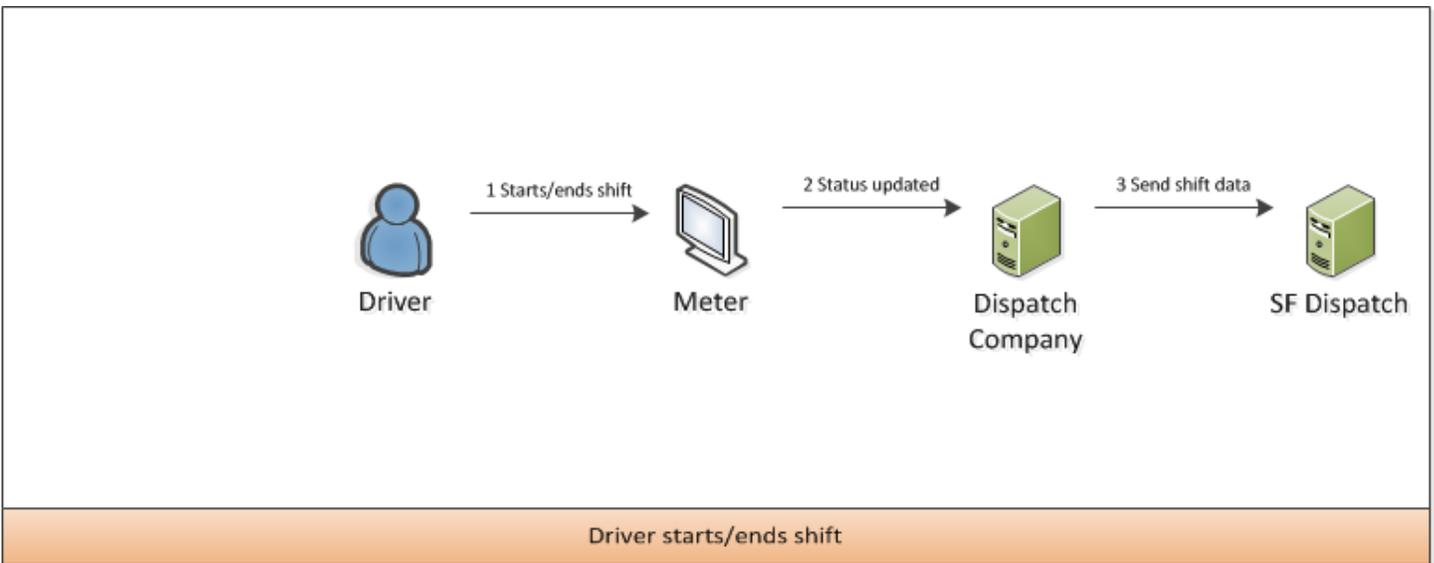
- Off-duty during shift (as opposed to end of shift)
- Trip underway (there are passengers in the vehicle; on the way to pick up passengers)
- Empty (on-duty and free to pick up passengers)

This process differs from today’s “normal” process of changing the driver’s status only because driver status informaton is sent from the Dispatch Company to SF Taxi Data as part of the data feed from the Dispatch Company to SF Taxi Data.



1	Driver changes status	The exact mechanism depends on the specific hardware in the vehicle.
2	Meter sends status change	This information is already being sent today.
3	Dispatch Company forwards information	Dispatch Company sends meter information to SF Taxi Data using the normal real-time data feed.

Driver start/ends shift



A Dispatch Company must report to SF Taxi Data when a driver starts or ends a shift.

1	Driver starts/ends shift	Same as today
2	Meter sends status change	Same as today
3	Dispatch Company forwards information	Dispatch Company sends meter information to SF Taxi Data via the Shift started message or Shift ended message .

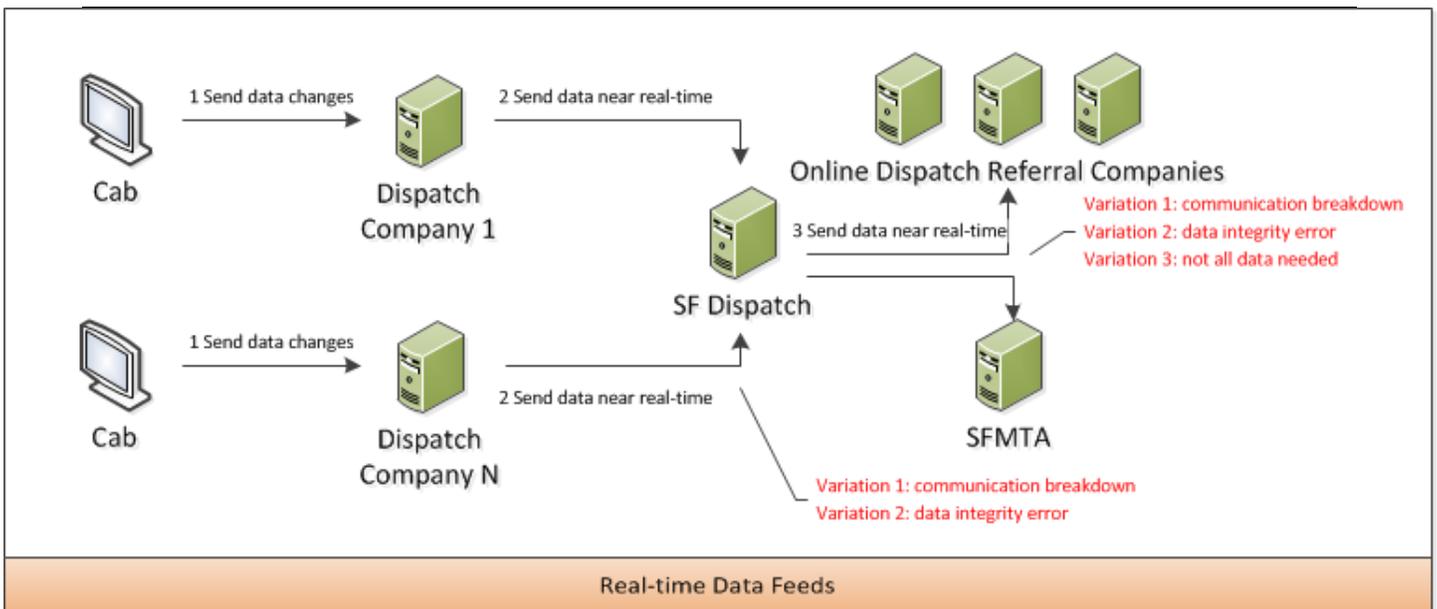
Dispatch Company pushes real-time data

Dispatch Company pushes real-time data

Each Dispatch Company in San Francisco must publish data about their entire fleet in near real-time. In turn SF Taxi Data republishes a portion of this data to Online Dispatch Referral Companies and a different portion to various regulatory agencies, including SFMTA.

The complexity of this process is not in overall structure of the operation but in the technical details of the transfer and what happens when something goes wrong.

1	Meters send data	The meter communicates various actions taken by the driver to the Dispatch Company. This information is already being sent today.
2	Dispatch Company sends feed	Each Dispatch Company aggregates the data for its entire fleet and publishes it periodically to SF Taxi Data.
3	SF Taxi Data sends feed	SF Taxi Data in turn aggregates data for the entire city and publishes it periodically to each of Online Dispatch Referral Companies and regulatory agencies.



Variation 1: Communication breakdown

By its very nature, real-time data feeds are prone to communication breakdowns: the sender can be unsuccessful in generating data, the data transmission can fail or the recipient can fail to properly receive the data.

Variation 2: Data sent by Dispatch Company is inconsistent with SF Taxi Data

It is possible for data integrity issues to arise between the Dispatch Companies and SF Taxi Data. For instance, a Dispatch Company feed may refer to:

- a vehicle or driver that SF Taxi Data doesn't know about
- a vehicle that has been removed from service
- a trip taken by a vehicle previously reported as off-duty
- other conditions

SFMTA Regulator uploads new data

Periodically MTA regulators will need to upload new data to SF Taxi Data in response to changes to fleets and drivers.

This data defines data for many of the [Business Entities](#):

- Dispatch Company
- Driver
- Fleet
- Medallion/permit
- Online Dispatch Referral Company
- Vehicle

For the first release of SF Taxi Data, these changes can be managed through a secure website for uploading data in a predefined format. This web functionality will only be available to designated SFMTA staff and secured by both network restrictions and two factor user authentication.

SF Taxi Data website

Although SF Taxi Data is principally an electronic clearinghouse with no user interface, there are some cases in which regulators—but not the general public—will need a user interface to view reports.

This section describes some sample reports needed as part of the first release, however, the exact definition of the reports needed will be determined at a later date.

Regulatory reports

The proposer will maintain a reporting website that is accessible only to SFMTA staff. These reports will include the ability for users to create ad-hoc reporting in addition to predefined reports including the following subject areas.

- Taxi Utilization
- Geographic demand – based on neighborhood, census blocks and other geographies
- Special event peak demand – example PGA Tournament or America’s Cup Races.
- Correlation of taxi demand and supply with weather conditions
- Average trip distance and rates
- Driver and medallion holder driving hours and response rate to dispatches
- Company response rate to dispatches by referral company
- Service Level Agreement monitoring

Non functional requirements

Agility

Proposer will follow an agile method to software upgrades by enhancing the system frequently and incrementally.

Capacity/Performance

Capacity

The system should initially be able to track data for:

- 20,000,000 trips each year
- 10,000,000 dispatch requests per year
- 5,000 vehicles

- 5,000 medallions/permits
- 20,000 drivers
- 1 shift for each driver each day
- 100 fleets
- 100 Online Dispatch Referral Companies
- 20 Dispatch Companies

These limits represent increases over today's volumes.

The system should be structured so that capacity can increase well beyond these values over the foreseeable lifetime of SF Taxi Data—at least by a factor of 2 over 5 years.

API Service Level Agreements

SF Taxi Data will receive a large amount of vehicle location information.

The system should be able to handle receiving data from a total of several thousand vehicles every six seconds with the several thousand vehicles split among separate broadcasts by up to 20 different Dispatch Companies (see [Vehicle data feed](#)). These numbers are initial estimates and subject to change.

The system should be able to handle broadcasting data for several thousand vehicles every six seconds to up to 100 different Online Dispatch Referral Companies.

The system should be able to handle an unlimited number of simultaneously broadcast messages to various API's (see [API](#)). These messages may not be lost—but neither do they need to be synchronous.

For messages in the [Dispatch API](#) (for which end-customers will be time sensitive), 95% of responses must be delivered within one second and 99% within two seconds. These responses are typically simply acknowledgements.

For messages in the other, less time-sensitive, API's 95% of messages must be delivered within six seconds and 99% within a minute.

[Dispatch Request Disposition Messages](#) must be initiated within 90 seconds of receiving a [Dispatch Request Message](#) whether or not all the Dispatch Companies have succeeded in sending a response. That is, an Online Dispatch Referral Company should receive an answer to their Dispatch Request within this time limit even if that response is that SF Taxi Data has not received any responses.

SLA Monitoring

There must be a monitoring system in place to prove to MTA regulators that all of these SLA's are being achieved.

Data retention

All SF Taxi Data data should be kept permanently, but can be archived for performance reasons.

It is less important to keep the vehicle location data available than other data (e.g. dispatch and waybill information).

Archived data should be recoverable if needed within 24 hours.

Disaster Recovery

The proposer will propose a disaster recovery plan to maintain high availability for the continued dispatch of taxis during a local major disaster.

Documentation

Documentation must be provided for the following:

- Procedures for uploading data securely from the SFMTA to the SF Taxi Data system
- Architectural documentation
- How to access and run SFMTA reports
- Access/download of all data for post-hoc analysis.

Escrow/Code

All software for the SF Taxi Data system shall be maintained in escrow to be available to the SFMTA in case of breach of contract by the proposer.

Extensibility

The first version of SF Taxi Data is largely an experiment in collecting data that will be helpful to the taxi industry and to SFMTA regulators. With that in mind, SF Taxi Data should be built in a way that guarantees that major changes in future versions can be accommodated.

In particular these are likely to come in future versions of SF Taxi Data:

- A robust public website
- A web-based workflow system for managing fleets and drivers
- New API's
- New Business Entities
- New attributes to existing Business Entities
- Extension to industries other than the taxi industry—including allowing the capacity for customers to dispatch a trip using one of several modes of travel via a single phone application

Failure Management

SFMTA will be notified within 5 minutes of any system failure with an estimated time to recovery. Within 24 hours of recovery, proposer will detail cause of system failure and actions to prevent similar failure in the future.

Fault tolerance

Proposer will provide documentation of fault tolerance and back up procedures that ensure no data loss and a plan to meet the availability criteria in event of catastrophic system failure.

Maintaining SF Taxi Data

The proposer will outline a three year maintenance contract for SF Taxi Data with quarterly invoicing detailing service level and any financial penalties for period of billing.

Online Dispatch Referral Company Vetting and Provisioning

Referral companies must be first approved and licensed by the SFMTA before API access is granted. Proposer will maintain API keys for individual referral companies and grant the SFMTA a management tool to turn on and turn off access to the hub for these third party vendors. The license agreement shall specify which data elements will be made available to the 3rd party and which to the SFMTA.

Release Management:

The proposer will propose a release management plan that includes frequent software improvements to the SF Taxi Data system with ability to roll back to ensure smooth transitions.

Reliability

The SF Taxi Data system must be available 24 hours/day, 365 days/year with outages of less than two (2) hours per month or 99.7 % except for scheduled maintenance.

Reliability statistics must be monitored and made available to SFMTA through SLA reports available on the website.

Messages sent to and from SF Taxi Data via the various SF Taxi Data API's must never be lost, so there must be a guaranteed delivery system.

It must also be possible to recognize that Dispatch Companies and Online Dispatch Referral Company are themselves not responding reliably, for instance that:

- a Dispatch Company fails to send vehicle data every six seconds
- a Dispatch Company stops sending Completed Trip
- an Online Dispatch Referral Company stops sending Dispatch Request information

These conditions must be monitored and made available to SFMTA through website reports

Scalability

How will SF Taxi Data respond to suddenly or gradually increasing load?

Must be able to scale horizontally (e.g. more low-end machines rather than increased speed of large machines)

Database scalability: archiving strategy for large data

Security

SF Taxi Data must be secured to prevent unauthorized access. There are three different levels of authorization:

1	Licensed Read-only 3 rd parties	Authorized to view read-only specified data via the Vehicle data feed and Business Entity API
2	Licensed Dispatching 3 rd parties	Authorized to use all the API's—but only to view specified data
3	SFMTA	Authorized to use all the API's and also to view private data

The SF Taxi Data website must be secured against attacks from common vulnerabilities, such as SQL injection, denial of service, cross-site scripting.

Service Level Agreement: Proposer will submit a draft service level agreement that includes financial penalties for not meeting service levels.

Testing

Acceptance test

Proposer will outline a procedure for the SFMTA to approve new version and accept changes in the system.

Performance tests

Proposer will outline performance tests to demonstrate that it can handle load and performance criteria outlined above.

Bug-tracking database

SFMTA must have access to the bug-tracking database used to manage bugs and resolution timeframe for the SF Taxi Data system.

Sandboxes for Online Dispatch Referral Company and Dispatch Companies

We need sandbox environments for all components to be tested before going into production:

- Online Dispatch Referral Companies
- Dispatch Companies
- SF Taxi Data system itself

Parties should be able to use a sandbox environment after a low level of vetting, but must pass more thorough tests to get out of the sandbox into production.

Business Entities

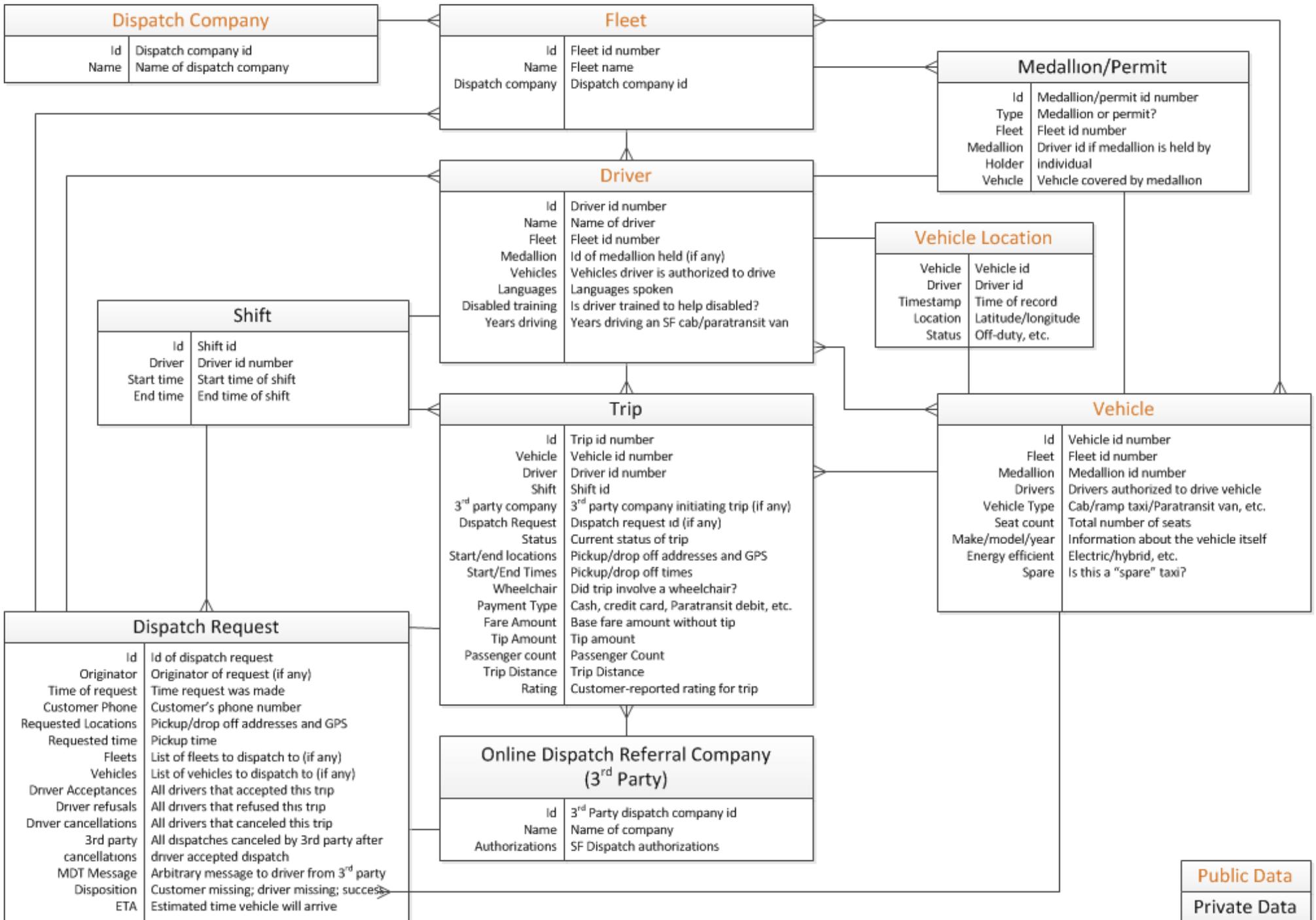
This section defines information related to the Business Entities that the SF Taxi Data system needs to save.

Only some of this information will be available to licensed companies..

The SF Taxi Data system must keep data for these entities in such a way that the current state of each entity is immediately available—but SFMTA staff can track the history of all changes to each entity.

For instance, it should be possible to determine:

- which vehicles were in service for any day in the history of SF Taxi Data
- all Fleets a medallion has ever been associated with
- who was driving a particular cab for any given day
- whether some drivers routinely take overly-long routes from pickup to drop off
- patterns of traffic at the San Francisco International Airport
- etc.



Dispatch Company

Describes a company that dispatches trips to drivers.

Some Dispatch Companies dispatch to only one fleet, while other dispatch to multiple fleets.

Dispatch Company information is available to licensed Online Dispatch Referral companies and the SFMTA, and can be accessed via the [Business Entity API](#).

Dispatch Company information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id number of the dispatch company
Name	Name of the dispatch company

Dispatch Request

Describes a request by a customer to have a vehicle dispatched to them—which may come from an Online Dispatch Referral Company or directly from a Dispatch Company.

Dispatch Requests are private, proprietary data that are available **only** to the Online Dispatch Referral Company that initiated the Dispatch Request in the first place. Dispatch Requests are available to an Online Dispatch Referral Company via the [Dispatch API](#).

Fields

Id	Unique id generated by the Originator that will identify all communication about this dispatch through its entire lifecycle.
Originator	Id of company originating this dispatch request. If the dispatch came via an Online Dispatch Referral Company this will be the id of that company. If the dispatch came through “traditional” dispatch (e.g. the customer phones a Fleet directly) this will be the id of the Dispatch Company (since no Online Dispatch Referral Company is involved).
Customer Phone	Phone number of customer
Time of request	Date and time request was made
Requested Pickup Location	Address and latitude/longitude for requested pickup location
Requested drop off Location	Address and latitude/longitude for requested drop off location (if given by customer)
Requested pick up time	Time requested by customer for pickup (typically “now”)
Vehicles	Zero or more vehicle ids of vehicles that should be dispatched, listed in preference order. If no ids are specified, the Online Dispatch Referral Company is allowing the Dispatch Company itself to select a vehicle to dispatch. In this case, the Online Dispatch Referral Company can use the Fleet Ids field to specify which Fleets should be allowed to dispatch a vehicle. If one or more id is specified, the Online Dispatch Referral Company is asking the Dispatch Company to dispatch only to the specific vehicles requested.

	When a Dispatch Company sends a Dispatch Request (as opposed to a Online Dispatch Referral Company), this field should be filled with the ids of the vehicles to which the Dispatch Company actually offered the dispatch. (e.g. if the Dispatch Company dispatches by zone, only the ids of cabs in the zone should be listed here).
Fleets	<p>In the special case where the Online Dispatch Referral Company has not given specific Vehicle Ids, this field lists all the Fleets the Online Dispatch Referral Company is willing to allow to try to dispatch a vehicle.</p> <p>If the Vehicle Ids field and the Fleet Ids field are both empty, the Online Dispatch Referral Company is requesting that any vehicle from any Fleet may be dispatched, and all Dispatch Companies may try to dispatch any vehicle.</p> <p>When a Dispatch Company sends a Dispatch Request (as opposed to a Online Dispatch Referral Company), this field should be empty if the Vehicle Ids field contains values, and otherwise should include all Fleets that the Dispatch Company actually offered the dispatch.</p>
Driver acceptances	All drivers who accepted the request
Driver refusals	All drivers who refused the request
Driver cancellations	All drivers who accepted a request but later canceled their acceptance
3 rd Party cancellations	All vehicles canceled by Online Dispatch Referral Company
MDT Message	<p>Text describing the parameters of the dispatch. This is text sent by the Online Dispatch Referral Company for the driver's benefit and shows whatever the Online Dispatch Referral Company wants the driver to know about this dispatch. Information might include:</p> <ul style="list-style-type: none"> • Prepaid tip amount • Customer agrees to forfeit \$10 if they're not at pickup
Disposition	<ul style="list-style-type: none"> • Dispatch pending • No vehicles available • Dispatch scheduled
ETA	Estimated arrival time for dispatched vehicle

Driver

Describes an individual driver who may be—but need not be—a medallion holder.

Driver information is available to licensed Online Dispatch Referral companies and the SFMTA, and can be accessed via the [Business Entity API](#)

Driver information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id number of the driver
Name	Name of driver
Fleet	The id of the driver's Fleet

Permit number	The id of the driver's medallion or permit if they are the permit holder
Vehicles	The ids of all vehicles the driver is authorized to drive
Languages	Languages spoken by the driver
Disability training	Has the driver received special training for helping the disabled?
Years driving	How many years has this driver been driving professionally in San Francisco?
Advanced Driver	Has this driver passed advanced training (yes or no)

Fleet

Describes a fleet of vehicles. For taxis, this is synonymous with a "Color Scheme."

Fleet information is available to licensed Online Dispatch Referral companies and the SFMTA, and can be accessed via the [Business Entity API](#).

Fleet information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id number of the fleet
Name	Name of the fleet
Dispatch Company Id	The id of the Dispatch Company that dispatches for this fleet.
Dispatcher ID	The id of the individual dispatcher

Medallion/Permit

Describes a taxi medallion or permit that gives the authority to drive a taxi legally. Some medallions/permits are held by drivers; others by a fleet.

Medallion/permit information is private.

Medallion/permit information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id of the medallion
Type	Indicator for type of medallion or permit
Fleet	The id of the Fleet associated with the medallion
Permit Holder	If the medallion or permit is held by a driver, the id of that driver (empty if the medallion or permit is held by a fleet)
Vehicle	The ids of the vehicle associated with the medallion or permit

Online Dispatch Referral Company

Describes a company that acts as an intermediary between customers and Dispatch Companies.

Online Dispatch Referral Company information is private, proprietary information.

Online Dispatch Referral Company information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id of the Online Dispatch Referral Company
Name	Name of the Online Dispatch Referral Company
Authorizations	API's this Online Dispatch Referral Company is authorized to use. For example, the Dispatch API may require special authorization.
Trips	All trips dispatched by this Online Dispatch Referral Company.

Shift

Describes changes as drivers come on and go off shift.

Shift information is private.

Shift information is sent as drivers change shifts via the [Shift Change API](#).

Fields

Id	Id of shift
Driver	Id of driver for shift
Start time	Time when driver started shift
End time	Time when driver ended shift

Trip

Describes all completed trips—no matter how the trip was initiated.

Trip data is all private—except in the case that the trip was initiated by an Online Dispatch Referral Company, in which case they receive trip data for their own trips.

Trip information is private—but will be sent to the Online Dispatch Referral Company that originated the trip via the [Completed Trip API](#).

Fields

Id	Id of trip
Vehicle	Id of vehicle for trip
Driver	Id of driver for trip
Dispatch Company	Id of Dispatch Company for trip
Shift	Id of driver's shift
Online Dispatch Referral Company (3 rd party)	Id of Online Dispatch Referral Company for trip
Dispatch Request	Id of Dispatch Request that originated this trip
Status	<ul style="list-style-type: none">• Dispatched• Underway• Completed• Driver never showed• Customer never showed
Start/end locations	Locations (address and latitude/longitude) for starting and

	ending locations
Start/end times	Actual pickup/drop off times
Wheelchair	True if a wheelchair was transported as part of the trip.
Payment Type	Indicator for type of payment: <ul style="list-style-type: none"> • Cash • Credit card • Paratransit debit card • Other card (gift card, corporate card, etc.) • Not paid
Fare amount	Fare amount from meter
Tip amount	Tip amount if available
Passenger count	Number of passengers if known
Trip distance	Distance of trip
Vehicle / Driver Rating	Rating 1-5 stars by customer

Vehicle

Describes a vehicle for hire authorized to carry passengers.

Vehicle information is available to licensed Online Dispatch Referral companies and the SFMTA, and can be accessed via the [Business Entity API](#).

Vehicle information is uploaded periodically to SF Taxi Data by SFMTA (see [SFMTA Regulator uploads new data](#)).

Fields

Id	Id of vehicle
Fleet	Id of vehicle's fleet
Medallion	Id of vehicle's medallion or permit
Drivers	Id's of drivers authorized to drive this vehicle
Vehicle type	<ul style="list-style-type: none"> • Taxi • Ramp Taxi • Other
Seat count	Number of available seats
Make	Make of vehicle
Model	Model of vehicle
Year	Year of vehicle
Fuel Type	<ul style="list-style-type: none"> • Gasoline • Compressed Natural Gas (CNG) • Hybrid • Electric • Biodeisel

GHG Score	<ul style="list-style-type: none"> A number indicating the level of carbon emissions from the vehicle based on a formula to be provided by SFMTA
Spare	<p>Is this a “spare” cab?</p> <p>(Some cabs can only be used on a contingent basis when the regular cab is unavailable because of a mechanical problem. Such vehicles are “spares.”)</p>

Vehicle Location

Describes a vehicle’s current location.

Vehicle Location information is available to licensed Online Dispatch Referral companies and the SFMTA, and can be accessed via the [Vehicle data feed](#)

Fields

Vehicle	Id of vehicle
Driver	Id of driver
Timestamp	Time of location record
Position	Latitude/longitude of vehicles’ current position
Status	<p>Current status of vehicle:</p> <ul style="list-style-type: none"> Off duty Empty (on-duty) Occupied

API

Vehicle data feed

Each Dispatch Company must push data for each of their fleets every six seconds.

To conserve bandwidth, if the data for a given vehicle hasn’t changed, data that hasn’t changed since the last data push should not be sent for unchanged data. However, to guarantee data consistency, all data (even unchanged data) should be sent every two minutes.

The contents of a Vehicle data feed are identical to the fields of a [Vehicle Location](#) entity.

Outbound vehicle data feed

Each Online Dispatch Referral Company will be allowed to receive data every six seconds about every taxi in the system.

SF Taxi Data must therefore forward the messages from the Dispatch Companies to the Online Dispatch Referral Companies.

Business Entity API

The Business entity API is used to query relatively static entity information that will appear in the more dynamic fields. In particular, this API provides information about:

- Dispatch Companies
- Fleets
- Drivers
- Vehicles

There are only two messages in this API one to request all the business entities of a given name, another to return the information.

Message Descriptions

Business Entity Request Message

Message Fields

Id	Id of the request
Originator	Id of the Online Dispatch Referral Company making the request
Entity	Name of the business entity to retrieve, one of: <ul style="list-style-type: none">• Dispatch Companies• Fleets• Drivers• Vehicles

Business Entity Response Message

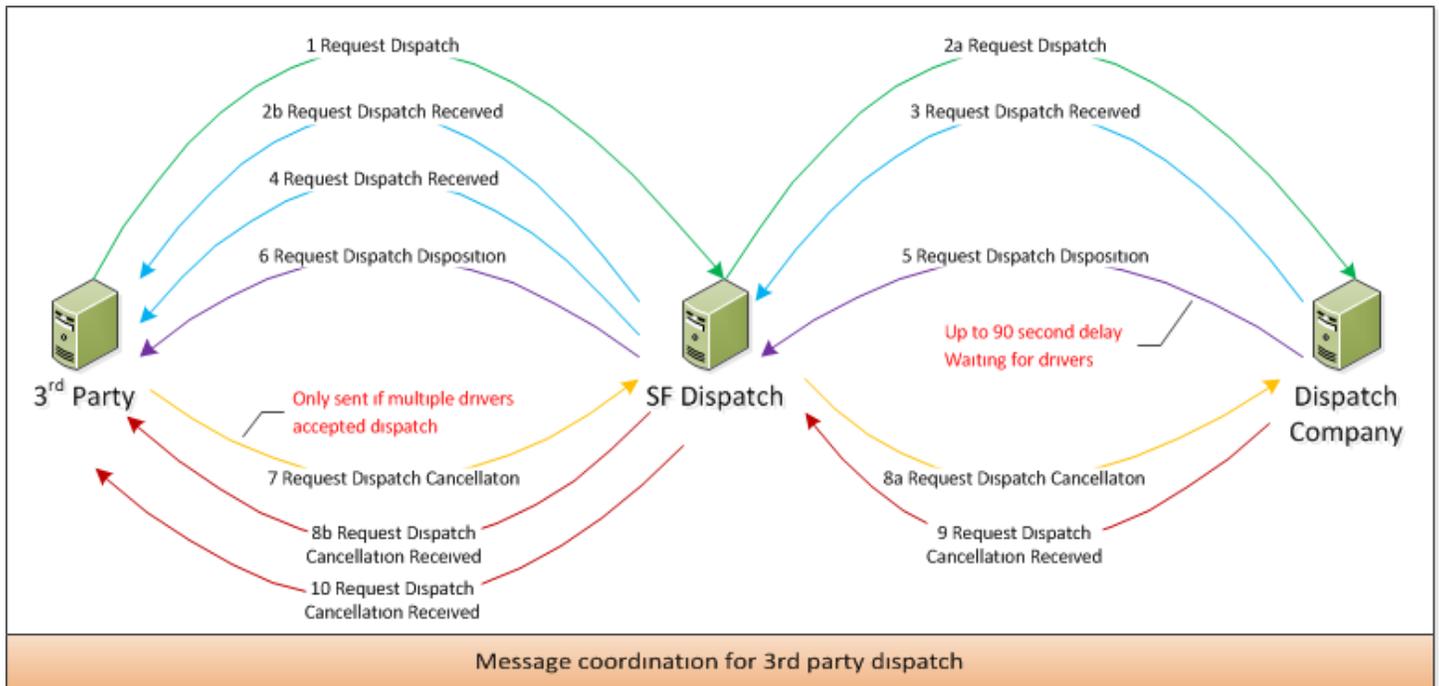
Message Fields

Id	Id of the original request
Result	The result of the request (a serialized version of all the entities of the appropriate type).
Error	Any error that occurred in the request

Dispatch API

A vehicle dispatch must be an asynchronous series of messages since it requires the driver to accept or reject a request. Furthermore, because of potential communication failures, intermediate information must be sent to make sure the communications have gone through.

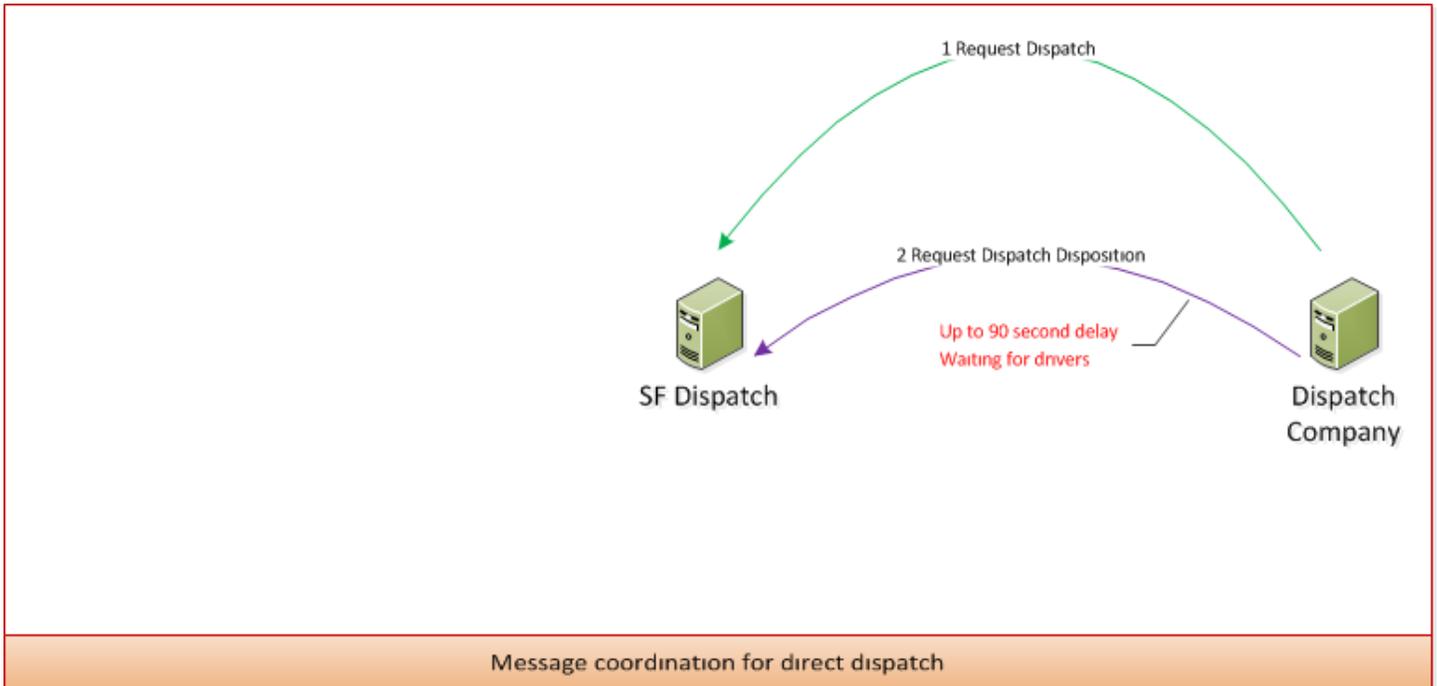
Online Dispatch Referral Company originates dispatch request



Message coordination for Online Dispatch Referral Company dispatches proceed in this sequence:

- 1) Online Dispatch Referral Company posts a **Dispatch Request** message
- 2) SF Taxi Data processes the **Dispatch Request** message and
 - a) Posts a **Dispatch Request** message to one or more Dispatch Companies
 - b) Posts a **Dispatch Request Received** message back to the Online Dispatch Referral Company including only the fact that SF Taxi Data has received the request
- 3) Dispatch Company processes the **Dispatch Request** message and posts a **Dispatch Request Received** message back to SF Taxi Data
- 4) SF Taxi Data processes **Dispatch Request Received** message from Dispatch Company and posts the **Dispatch Request Received** message back to the Online Dispatch Referral Company containing information about which Dispatch Company has acknowledged receipt
- 5) Zero or more drivers at each Dispatch Company accept a request within 90 seconds and Dispatch Company posts **Dispatch Request Disposition** message to SF Taxi Data
- 6) SF Taxi Data processes **Dispatch Request Disposition** messages and forwards **Dispatch Request Disposition** messages to Online Dispatch Referral Company
- 7) Online Dispatch Referral Company processes all received **Dispatch Request Disposition** messages and (optionally) posts a **Dispatch Request Cancellation** message to SF Taxi Data
- 8) SF Taxi Data processes the **Dispatch Request Cancellation** message and
 - a) Posts a **Dispatch Request Cancellation** message to one or more Dispatch Companies
 - b) Posts a **Dispatch Request Cancellation Received** message back to the Online Dispatch Referral Company including only the fact that SF Taxi Data has received the request
- 9) Dispatch Company processes the **Dispatch Request Cancellation** message and posts a **Dispatch Request Cancellation Received** message back to SF Taxi Data
- 10) SF Taxi Data processes **Dispatch Request Cancellation Received** message from Dispatch Company and posts the **Dispatch Request Cancellation Received** message back to the Online Dispatch Referral Company containing information about which Dispatch Company has acknowledged receipt.

Dispatch Company originates dispatch request



Message coordination for direct dispatch

When no Online Dispatch Referral Company is involved in a dispatch (probably because the customer called the Fleet directly), the Dispatch Company sends Dispatch Request messages directly to SF Taxi Data, and the sequence is much simpler:

- 1) Dispatch Company posts a **Dispatch Request** message
- 2) Dispatch Company waits for drivers to respond and then sends a **Request Disposition** message.

Message Descriptions

Dispatch Request Message

The contents of a Dispatch Request message are identical to the fields of a [Dispatch Request](#).

Dispatch Request Received Message

This message simply acknowledges that SF Taxi Data or one of the Dispatch Companies has received a Dispatch Request message.

It says nothing about the final disposition of the dispatch itself, which probably has not yet been decided in any event.

If the recipient can't process the request for some reason, the Dispatch Request Received message specifies an appropriate error code.

Message Fields

Dispatch Request id	The reference number (unique id) that was sent by the Online Dispatch Referral Company in the original Dispatch Request message.
Recipient	Entity that originally sent the message. This can be either SF Taxi Data itself or one of the Dispatch Companies. The same message is used to acknowledge receipt of the Dispatch Request along the entire path.
Error code	Error, if any, for instance: <ul style="list-style-type: none"> • Success (that is, "no error") • The original request was inconsistent or incomplete; request canceled

- There was an error trying to forward the request to a Dispatch Company
- Dispatch Company reports some other error to be determined

Dispatch Request Disposition Message

Message Fields

Dispatch Request id	The reference number (unique id) that was sent by the Online Dispatch Referral Company in the original Dispatch Request message.
Recipient	Entity that originally sent the message. This can be either SF Taxi Data itself or one of the Dispatch Companies. The same message is used to acknowledge receipt of the Dispatch Request along the entire path.
Error code	Error, if any, related to the request as a whole (errors for individual vehicles are below in the Disposition field): <ul style="list-style-type: none"> • Success (that is, “no error”) • Can’t dispatch now • Others to be determined
Disposition	For each vehicle requested, a code indicating the disposition, for instance: <ul style="list-style-type: none"> • Driver accepted dispatch request • Driver declined dispatch request • Driver didn’t respond at all to dispatch request • Dispatch Company declined request without contacting driver at all • Error occurred (no such vehicle, off-duty, others to be determined) • ETA that the vehicle will arrive at pickup location

Customer Missing Message

When a dispatched vehicle arrives at the pickup location, but the customer is not there, the Dispatch Company should send a “Customer Missing” message. Such a message must always have a Dispatch Request id to a previously existing Dispatch Request.

Message Fields

Dispatch Request id	The reference number (unique id) that was sent by the Online Dispatch Referral Company in the original Dispatch Request message.
---------------------	--

Vehicle Missing Message

When a dispatched vehicle doesn’t arrive at the pickup location, the Online Dispatch Referral Company should send a “Vehicle Missing” message. Such a message must always have a Dispatch Request id to a previously existing Dispatch Request.

Message Fields

Dispatch Request id	The reference number (unique id) that was sent by the Online Dispatch Referral Company in the original Dispatch Request message.
---------------------	--

Completed Trip API

Whenever any trip is completed, the associated Dispatch Company must send payment information about the trip. This message must be sent no matter whether the trip was dispatched or hailed.

Message Descriptions

Completed Trip Message

The contents of a Completed Trip message are identical to the fields of a [Trip](#).

Completed Trip Received Message

This message acknowledges that SF Taxi Data has received a Completed Trip message and indicates any error in the message

Message Fields

Trip id	Unique identifier that identifies this trip (hailed or dispatch)
Dispatch Request id	Id of the original Dispatch Request for which this information is being sent (or none if there was no dispatch request because the ride was “hailed” on the street).
Error code	Error, if any, for instance: <ul style="list-style-type: none">• Success (that is, “no error”)• The Dispatch Request id refers to a nonexistent (or already “completed”) Dispatch Request• Data in Completed Trip message was somehow inconsistent with itself or other data

Shift Change API

Whenever any driver comes on shift or goes off shift the associated Dispatch Company must send information about the driver’s shift.

Message Descriptions

Shift started message

Message Fields

Shift Id	Id for shift
Driver Id	Id for driver
Start time	Start time of shift

Shift ended message

Message Fields

Shift Id	Id for shift
Driver Id	Id for driver
End time	Start time of shift

Customer Satisfaction API

Whenever any trip is completed, the associated Dispatch Company may send a Customer Satisfaction message if it’s appropriate. Since not all customers will supply this information, the message is optional.

Customer Satisfaction Message

This message indicates that a customer has provided satisfaction information about their ride.

Message Fields

Trip id	Unique identifier that identifies this trip
Cab never arrived	True if the customer reports that the cab never arrived despite agreeing to the dispatch
Vehicle Rating	Customer rating from 1 to 5 stars.
Driver Rating	Customer rating from 1 to 5 stars.

Glossary

AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
MDT	Mobile Data Terminal
VDT	Video Display Terminal
Computer Aided Dispatch	
Online Dispatch Referral Company	An Online Dispatch Referral Company is a 3 rd party company that does not directly dispatch vehicles from a fleet, but instead brings requests for a dispatch to a Dispatch Company that a relationship with a fleet. Taxi Magic and Cabulous are existing examples. Customers use their phone applications to order taxis from established taxi fleets.
Dispatch Company	
Color Scheme	A taxi industry-specific term for a fleet of vehicles.
Mobile Data Terminal	An in-taxi display of data connected to and communicating with a Dispatch Company. Synonym for Video Display Terminal.
Video Display Terminal	Synonym for Mobile Data Terminal