REST Service: FleetSolver-Submit

ROUTEPERFORM.COM
ROUTE PLANNING WEB SERVICES FOR DEVELOPERS

Welcome

Welcome to the FleetSolver web service reference guide. This solver is our most powerful tool to solve fleet-level routing problems that can involve dozens of routes and hundreds of stops. There are two web services, one to submit and one to retrieve. This document covers the SUBMIT portion. Both web services are straightforward, powerful, dependable, and allow web developers to rapidly add critically important route planning capabilities to their solution(s).

This document provides information related to this set of web services only. Please keep in mind that we offer a variety of pre-built web services. We may also enhance existing web services or develop entirely new services case-by-case. Contact us for more information.

The documentation is intended as a comprehensive reference manual. As a means to jump-start your implementation we'd also recommend our:

 INTERACTIVE SDK

 CODE EXAMPLES – READY TO RUN CODE FOR VARIOUS PLATFORMS

BEFORE YOU BEGIN

- API KEY - TO GAIN THOSE LAVISH ACCOLADES FROM YOUR BOSSES, CUSTOMERS, PEERS AND GROUPIES, YOU FIRST NEED AN API KEY. CONTACT US FOR YOUR KEY TO GET STARTED.

- GEOCODING - WE REQUIRE ALL YOUR INPUT STOPS TO BE GEOCODED (POSSESS LAT/LON COORDINATES). IF YOUR ADDRESSES ARE NOT CURRENTLY GEOCODED, YOU WILL NOT BE ABLE TO PASS THEM TO OUR SERVICE.

  WE ARE AGNOSTIC AS TO WHAT DIGITAL MAP YOU PREFER TO USE. AS LONG AS YOU HAVE GEOCODED DATA YOU CAN TIE-IN TO OUR SERVICE SEAMLESSLY.

- GEOGRAPHIC DATA COVERAGE — WE SUPPORT ALL OF NORTH AMERICA, THE UK, MOST ALL OF MAINLAND EUROPE, AUSTRALIA & NEW ZEALAND, A GOOD PORTION OF ASIA AND SOUTH AMERICA AND PORTIONS OF AFRICA AS WELL. IF YOU HAVE ANY QUESTIONS ABOUT YOUR LOCALE PLEASE CONTACT US.

- ENCRYPTION - WE REQUIRE ALL WEB TRAFFIC BE PASSED AS ENCRYPTED (HTTPS & TLS1.2).

- REST/JSON - THE FLEETSOLVER CALL IS A RESTFUL WEB SERVICE. WE USE JSON AS INPUT AND OUTPUT.

SERVICE OVERVIEW & PURPOSE

SOME KEY POINTS TO KNOW ABOUT THIS FLEETSOLVER WEB SERVICE:

- THE SERVICE IS DESIGNED TO ALLOW YOU TO OPTIMIZE DOZENS OF ROUTES AND HUNDREDS OF STOPS WHILE HANDLING FOR COMPLEX RULES LIKE TIME WINDOWS, CAPACITIES, RULES, AND MUCH MORE.

- THE SERVICE OFFERS 'FLEET SIZING' WHERE IT CAN INFORM YOU OF HOW MANY ROUTES ARE NEEDED TO ACCOMPLISH THE WORK. BY SEEKING TO MINIMIZE OVERALL COSTS, IT KNOWS TO PREVENT EXTRA DRIVING OF COURSE BUT ALSO TO ELIMINATE LABOR BOTH IN THE FORMS OF REDUCING OVERTIME AND ELIMINATING ENTIRE ROUTES WHEN POSSIBLE.

- THE SERVICE ALLOWS FOR UP TO 1,000 STOPS AND 50 ROUTES PER SOLVE.

- THE SERVICE ALLOWS YOU TO DEFINE YOUR STARTS AND ENDS AS DEPOTS AND CAN HANDLE MULTIPLE DEPOTS IN CASE YOU HAVE A GEOGRAPHICALLY COMPLEX SCENARIO RELATED TO WHERE YOUR ROUTES BEGIN AND END.

- BEAT THE TRAFFIC! THE SERVICE USES HISTORICAL AVERAGES ON THE REAL STREET NETWORK (NOT ALL COMPETITORS DO).

- ACCOUNT FOR DRIVER BREAKS AND LUNCH. STAY COMPLIANT WITH JOHNNY LAW!

- RESTRICT UNWANTED DRIVING SUCH AS AVOIDING U-TURNS, TOLL ROADS, LOW OVERPASSES FOR LARGE VEHICLES, AND MUCH MORE.

Suitability

This particular set of services offers full-featured fleet-level route optimization. Users of this service range from 1-vehicle operations to those with dozens of vehicles being routed simultaneously.

Fleet-wide route optimization is done as a pre-planning operation. For instance, it is suitable that you plan routes for a Wednesday on the Tuesday previous. Or perhaps you plan routes for all of next week on the Friday previous. The service is flexible, you can plan for 1 day, or multiple days. You can plan for 1 driver, or multiple drivers. Also, the system allows you to route plan for multiple depots, set sophisticated business rules like times, capacities, driver skills, vehicle attributes, workday limits, and more.

Understand therefore, that the fleet routing service is at its strongest when you supply many routes worth of data at the service and allow it to determine the 'best' (least costly) way to perform the routing. The service trims-out driving, pairs-down overtime and even eliminates entire input routes by simply not using routes that aren't needed. This is called 'fleet sizing' and this service therefore is suitable if you are looking for a solver that can tell you how many (few) drivers/hours/miles-kms are needed to accomplish the work at hand.

If you wish to route plan for a single route, or if you have many routes and intend to use them equally, then you may wish to review the 'single route' web service, it may be more suitable for you. This service is not suitable for a few particular cases. For instance, if you canvas streets that require you to drive all streets rather than driving to particular points or transporting individuals as passengers. Such routing requires specific data input for multi-leg trips (a person being picked up, going to a doctor, next to a pharmacy, then being dropped off) that our service simply isn't structured to do because of the specialized data input requirement involved.

ABOUT ROUTE PLANNING

WE'D BE REMISS TO NOT GIVE YOU A LITTLE OVERVIEW ON ROUTE PLANNING ITSELF. IT TURNS OUT THAT THE MATH REQUIRED TO ACCOMPLISH ROUTE PLANNING IS REALLY HARD. IN FACT, IT IS MONUMENTALLY HARD. IT IS WHAT THEY CALL IN THE MATH WORLD AN 'N-HARD' CHALLENGE. AS IN, YOU CANNOT SOLVE IT WITH BRUTE FORCE, YOU NEED BRAINS APPLIED AS BRAWN ALONE ISN'T GOING TO CUT IT.

AS AN EXAMPLE:
3 STOPS = 6 POSSIBLE COMBINATIONS (ABC, ACB, BAC, BCA, CAB, CBA)
6 STOPS = 720 POSSIBLE COMBINATIONS
11 STOPS = 31 MILLION+ COMBINATIONS
20 STOPS = 2,432,000,000,000,000+ COMBINATIONS (WHOA…)
100 STOPS = $9.332621544 \times 10^{157}$ – AND YEP, WE STILL CAN SOLVE IT

FRET NOT! IF YOU ARE READING THIS DOCUMENT THEN YOU'VE FOUND THE RIGHT TOOL FOR THE JOB. WE'VE TUNED OUR SERVICE AND ALGORITHMS OVER THE COURSE OF TIME BY BUILDING TENS OF THOUSANDS OF ROUTE PLANS FOR OUR CLIENTS.

AS YOU CODE YOUR SIMPLE REQUESTS TO OUR ROUTING SERVICE YOU GET TO BE THE INSTANT BENEFICIARY OF INDUSTRY-PROVEN LOGIC THAT WILL EASILY ADD ROUTING FUNCTIONALITY TO YOUR EXISTING CORE SOFTWARE. OUR ARCHITECTURE RUNS IN THE AWS AND AZURE CLOUD TO ENSURE THE BEST POSSIBLE SCALABILITY AND RELIABILITY FOR USERS OF THIS SERVICE.

REQUESTS 📢

THIS SERVICE ACCEPTS POST REQUESTS VIA HTTPS. THE PARAMETERS AND VALUES ARE TRANSFERRED IN THE BODY OF THE REQUEST AS JSON. THIS SERVICE RUNS ASYNCHRONOUSLY. THE 'SUBMIT' CALL WILL SEND THE JOB TO THE SERVICE AND THE 'RETRIEVE' CALL WILL LATER BE CALLED TO GATHER RESULTS. SYNTAX REQUIRED IS OUTLINED BELOW. JOBS CAN TAKE UP TO SEVERAL MINUTES TO COMPLETE. WE ASK THAT YOU CHECK ON THE RETRIEVE REQUEST NO MORE THAN EVERY 30 SECONDS.

‹··› Sample Code: Request URIs

Utilizing this endpoint verifies that you have read and agree to the EULA in the appendix of this document.

https://www.routeperform.com/services/v2/fleet-solver-submit/

https://www.routeperform.com/services/v2/fleet-solver-retrieve/ (noted here, but documented elsewhere)

HTTP Headers:
X-RP-ApiKey (Required)
X-RP-PassThroughGUID (Required – see below for explanation)

see below for information on body parameters

Submit Request Parameters

The body text of the request will contain all input parameters. Body text is JSON-formatted. HTTPS://EN.WIKIPEDIA.ORG/WIKI/JSON

‹··› Sample Submit Request: An Example

```
{
    "requestOptions": {
      "routeRestrictions": {
        "uTurnPolicy": 1
      }
    },

    "depots": [
        {
          "depotID": "1",
          "depotDisplayName": "HQ",
          "latitudeY": 32.707992,
          "longitudeX": -117.160740
        },… (multiple depots can of course be provided)
    ],
    "routes": [
        {
          "routeID": "ABC",
          "routeDisplayName": "Joe Smith",
          "startDepotID": "1",
          "endDepotID": "1",
          "startRouteAsEarlyAs": 1317999600000,
          "startRouteNoLaterThan": 1317999600000,
          "capacityLimits": "1000",
          "maxTotalHours": 10.5,
          "maxDrivingHours": 8,
          "hoursBeforeOTBegins": 8
        },… (multiple routes can of course be provided)
    ],
    "inputStops": [
        {
          "stopID": "A101",
          "stopDisplayName": "Main St. Hardware",
          "latitudeY": 32.728328,
          "longitudeX": -117.171133,
          "serviceMinutes": 5,
          "capacityToDeliver": "25"
        },… (multiple stops can of course be provided)
    ]
}
```

SUBMIT REQUEST - GENERAL PARAMETERS – IN HEADERS (SEE URI ABOVE)

Parameter name	Type	Description
apiKey	string	Your unique authentication token gathered from our portal.
passthroughGUID	string	A GUID provided to uniquely identify each request. You may also pass this as a request header (recommended). The GUID should be truly unique, do not re-use the same GUID later for the retrieve request.

SUBMIT REQUEST - GENERAL PARAMETERS

Parameter name	Type	Description
requestOptions		See section below on routeRestrictions.

DEPOTS

Parameter name	Type	Description
depotID	string (50)	A unique identifier for an input depot. A value must be supplied, and values may not contain spaces. Use of only alpha and numeric characters is encouraged.
depotDisplayName	string(50)	A human-readable name for an input depot. If left blank, the depotID value will be applied.
latitudeY	double	(required) Latitude portion of the geographic coordinate. Example: 32.708328
longitudeX	double	(required) Longitude portion of the geographic coordinate. Example: -117.161133

ROUTES

Parameter name	Type	Description
routeID	string (50)	A unique identifier for an input route. A value must be supplied, and values may not contain spaces. Use of only alpha and numeric characters is encouraged.
routeDisplayName	string (50)	A human-readable name for an input route. If left blank, the routeID value will be applied.
startDepotID	string (50)	(see depot section) Note: a startDepotID must match the depotID value for a provided depot.
endDepotID	string (50)	(see depot section) Note: a startDepotID must match the depotID value for a provided depot.
startRouteAsEarlyAs	long	See Appendix A for full information. A startRouteAsEarlyAs must be provided.
startRouteNoLaterThan	long	See Appendix A for full information. A startRouteNoLaterThan must be provided. This value can match startRouteAsEarlyAs if you wish to have a fixed start time rather than a range.
capacityLimits	string	The maximum numeric quantity of the route. This can represent volume, weight, or any numeric measurement you prefer and will need to coincide with the capacity values on the stops provided. Multiple capacity values can be passed with a space between values but must remain consistent throughout.
maxTotalHours	double	Example: 10
maxDrivingHours	double	Example: 6
hoursBeforeOTBegins	double	Example: 8
maxStopsOnRoute	integer	Defaults to 99. Valid values are between 1 and 99.
maxKilometers	integer	Defaults to 999. Valid values are between 1 and 9999.
inputBreaks		(optional) See section below on breaks.
routeRules	string (250)	Rules allow you to list the skills and specialties of a route (vehicle and/or driver) such as 'lift gate;spanish speaking;level2'. Multiple rules can be passed via a semicolon delimiter. Rules are also passed for stops so that route and stop rules that match allow a route to handle or not handle any particular stop.
routeRefreshCandidates		(optional) See section below on routeRefreshCandidates.

ROUTEREFRESHCANDIDATES

It is possible to allow any route to 'refresh'. A refresh is a mid-route visit to a depot that will allow it to refresh (reset) its capacityLimits at that depot and therefore it enables the route to continue working. As an example, a propane delivery vehicle can distribute 2000 units per day but can only handle 700 units at any 1 time. It can therefore potentially 'refresh' twice to take on more capacity mid-route to continue to deliver propane throughout the full route's workday. Conversely, you can also refresh a vehicle to deplete it of inventory it is accruing. For instance, a vehicle performing pickups that requires a refresh to empty the vehicle to allow it to continue on.
Note: No more than 10 refresh candidates are allowed per route.

Parameter name	Type	Description
depotID	string (50)	A unique identifier for an input depot that was supplied in the depots input. The 'best' depot is chosen for the refresh and typically that is the depot closest in terms of drive time from the geographic point where/when the capacity constraints were reached on the route.
minutesAtRefresh	double	The number of minutes to perform the refresh upon arrival at the depot. Must be non-negative and less than 999 minutes per stop.

```
"routeRefreshCandidates": [
    {
      "depotID": "HQ",
      "minutesAtRefresh": 15
    },
    {
      "depotID": "Annex",
      "minutesAtRefresh": 20
    }
]
```

ROUTERESTRICTIONS

Parameter name	Type	Description
vehicleType	integer	Valid values: • 1 – Any vehicle (default) • 2 – Large/Commercial vehicle This will then avoid street segments with commercial street avoidance (such as parkways), be less likely to traverse residential streets, etc.
tollRoadPolicy	integer	Valid values: • 1 – Avoid when possible • 2 – Indifferent (default) • 3 - Prefer
uTurnPolicy	integer	Valid values: • 1 – Freely allow (default) • 2 – Allow • 3 – Discourage • 4 – Prohibit Even when fully prohibited, u-turns may still be necessary at some dead-ends or stops to ensure continuity. Side-of-street approach settings can be coupled with u-turns to further discourage any/all u-turns.
superhighwayPolicy	Integer	Valid values: • 1 – Avoid when possible • 2 – Indifferent (default) • 3 - Prefer
weightRestriction	double	(optional, only applied for vehicleType of large/commercial) A value in kilograms used to limit street selection. For instance, a 10,000 kg vehicle can't traverse a bridge with a 9,000 kg limit.
heightRestriction	double	(optional, only applied for vehicleType of large/commercial) A value in

		meters used to limit street selection. A value in meters used to limit street selection.
widthRestriction	double	(optional, only applied for vehicleType of large/commercial) A value in meters used to limit street selection.
lengthRestriction	double	(optional, only applied for vehicleType of large/commerciral) A value in meters used to limit street selection.

INPUTSTOPS

📎 Note: No more than 1000 stops can be supplied.
Note: All stops should be in one contiguous region within several
hundred miles/kms of each other.

Parameter name	Type	Description
stopID	string (50)	A unique identifier for an input stop. A value must be supplied, and values may not contain spaces or pipes. Use of only alpha and numeric characters is encouraged.
stopDisplayName	string (50)	A human-readable name for display used in the response. If left blank, the stopID value will be applied.
latitudeY	double	(required) Latitude portion of the geographic coordinate. Example: 32.708328
longitudeX	double	(required) Longitude portion of the geographic coordinate. Example: -117.161133
serviceMinutes	double	The number of minutes to service the stop upon arrival. Must be non-negative and less than 999 minutes per stop.
capacityToDeliver	string	Optional. The numeric quantity to be delivered at this stop. This can represent volume, weight, or any numeric measurement you prefer and will need to coincide with the capacity limits provided for your routes. Multiple capacity values can be passed with a space between values but must remain consistent throughout.
capacityToPickUp	string	Optional. The numeric quantity to be picked-up at this stop. This can represent volume, weight, or any numeric measurement you prefer and will need to coincide with the capacity limits provided for your routes. Multiple capacity values can be passed with a space between values but must remain consistent throughout.
timeWindow1Start	long	Optional. Used to specify the start time of a time window of arrival. A timeWindow1Start must accompany and precede a timeWindow1End. Wider time window durations make for better

		optimization. See Appendix A for full information.
timeWindow1End	long	Optional. Used to specify the end time of a time window of arrival. A timeWindow1Start must accompany and precede a timeWindow1End. Wider time window durations make for better optimization. See Appendix A for full information.
routeRules	string (250)	Optional. Rules allow you to list the skills and specialties required to complete this stop. For example, 'lift gate;spanish speaking;level2'. Multiple rules can be passed via a semicolon delimiter. Rules are also passed for routes so that route and stop rules that match allow a route to handle or not handle this particular stop.
pairingID	string (50)	Optional. Exactly two stops can share a unique pairingID that connects them. The stop then with a positive 'capacityToPickUp' value is done as the 1st part, and the common paired stop with a positive 'capacityToDeliver' value is done as the 2nd part. If supplied, values may not contain spaces or pipes. Use of only alpha and numeric characters is encouraged.
priority	string (10)	Optional. Valid values: • "highest" • "normal" (default) If not all stops can be routed then stops with elevated priority values will attempt to be routed and potentially forsake stops without elevated priority values. For example, if you supply 100 stops with 50 elevated, and the routes are limited to handle 80 total stops then it likely will route all 50 elevated priority stops, and 'back fill' the most advantageous 30 of the 50 non-elevated stops within the 80 total stops selected to be routed.
curbApproach	integer	Optional. Valid values: • 0 – Either side (default) • 1 – Left only

		• 2 — Right only • 3 — Either side with U-turn at stop discouraged Note: One way streets may render curbApproach values meaningless for particular stops.

INPUTBREAKS

Note: No more than 3 breaks can be supplied per route.
Note: Each break must be chronologically before the next.
Note: Breaks will not be applied after end depots. Breaks may apply
back-to-back if the previous break's duration is long enough to justify
the next break to be immediately taken (this is a rare condition).

Parameter name	Type	Description
breakID	integer	A unique identifier for an input break. Typically, an incremented integer.
breakDurationInMinutes	double	(required) Must be positive and may not exceed 120 minutes.
breakApplyAfterXMinutes	double	(required) Must be positive and may not exceed 1000 minutes. Each break's value must be chronologically later than a previous break's value.

```
"inputBreaks": [
    {
        "breakID": 1,
        "breakDurationInMinutes": 15,
        "breakApplyAfterXMinutes": 120
    },
    {
        "breakID": 2,
        "breakDurationInMinutes": 30,
        "breakApplyAfterXMinutes": 240
    }
]
```

SUBMIT RESPONSE – OVERVIEW

REVIEW THE HTTPSTATUSCODE FIRST. VALUE 200 'OK' CONFIRMS THE
SERVICE RETURNED A RESPONSE BUT DOES NOT VERIFY THAT THE JOB STATUS
COULD BE RETURNED. IN THE EVENT SUCH AS BAD INPUT DATA IT COULD FOR
INSTANCE RETURN A 200 'OK' BUT LACK JOB STATUS RESULTS.

THE POSSIBLE HTTPSTATUSCODE RETURN VALUES ARE PLENTIFUL. FOR
EXAMPLE: HTTPS://EN.WIKIPEDIA.ORG/WIKI/LIST_OF_HTTP_STATUS_CODES

THE BODY TEXT OF THE RESPONSE WILL CONTAIN ALL OUTPUT RESULTS. THIS
BODY TEXT RETURNED WILL BE JSON-FORMATTED.

THE HTTP CONTENT-TYPE IS "APPLICATION/JSON;CHARSET=UTF-8"

ABOUT JSON:
HTTPS://EN.WIKIPEDIA.ORG/WIKI/JSON

THE RESULTCODE VALUE WILL VERIFY THE SUCCESS OR FAILURE OF THE
REQUEST. APPENDIX B LISTS ALL POSSIBLE RESULT CODES.

```
{
    "passThroughGUID": "{the GUID you provided}",
    "outcome": {
       "resultCode": 2000,
       "resultCodeDesc": "Successfully submitted",
       "routingJobID": "xyz123…"
    }
}
```

Submit Response - Content

The body text of the response will contain all output results. This body text returned will be JSON-formatted.

Response - General output

Element name	Type	Description
passthroughGUID	string	A GUID provided to uniquely identify each request that is output in the response.

Response-outcome

Element name	Type	Description
resultCode	integer	See Appendix B for full information.
resultCodeDesc	string	Text that is a readable representation of the result code returned.
routingJobID	string	This unique system-generated identifier confirms that your job is queued and you will use this as input for the 'retrieve' web service request to gather job results.

APPENDIX A — INPUT TIMES

HANDLING TIMES IS TRICKY, MAINLY BECAUSE ROUTE PLANS CAN SPAN TIME ZONES. ROUTE PLANS CAN ALSO SPAN DAYS (PAST MIDNIGHT AND BEYOND). TIME OF DAY ALSO MATTERS FOR TRAFFIC-RELATED ASPECTS. THE SIMPLE SYSTEM DESCRIBED BELOW MUST BE USED FOR FORMATTING TIMES TO SAFEGUARD AGAINST ANY AMBIGUITY RELATED TO INPUT TIMES.

EPOCH TIME (AKA UNIX TIME) — WE USE EPOCH TIME TO PASS VALUES AS LONG NUMBERS. EPOCH TIME AS A STANDARD HAS ALLOWED THE COMPUTING WORLD TO PUT ITS FOOT IN THE SAND AT A CHOSEN POINT (1970) AND TO STANDARDIZE TIMES AS SECONDS PAST THAT PARTICULAR MOMENT IN TIME.
HTTPS://EN.WIKIPEDIA.ORG/WIKI/UNIX_TIME

ALSO, UTC TIMES ARE USED EXCLUSIVELY.
HTTPS://EN.WIKIPEDIA.ORG/WIKI/COORDINATED_UNIVERSAL_TIME

NOTE THAT YOU MUST SUPPLY MILLISECONDS AS WELL, THIS IS <u>IMPORTANT</u> THAT YOU ADD MILLISECONDS FOR YOUR INPUT TIMES.

NOTE THAT INPUT TIMES PRIOR TO JAN 1, 2000 ARE DISALLOWED.

TRAFFIC IMPLICATIONS:

A ROUTE START DEPOT AND START TIME ARE REQUIRED INPUTS. BY PROVIDING THE START DEPOT AND START TIME YOU ENABLE THE SYSTEM TO BE TIME-AWARE AND THEREFORE TO RETURN ROUTE PLANS THAT MOST LIKELY MIRROR THEIR REAL-WORLD ACTIVITY.

'EXPECTED TRAFFIC' - HISTORICAL TRAFFIC AVERAGES ARE USED FOR PLANNING. SINCE WE ARE DOING ADVANCE PLANNING, WE USE TIME STUDIES FOR KNOWN TRAFFIC AND APPLY THAT KNOWN/EXPECTED ACTIVITY FOR THE PLANS THAT YOU GENERATE.

IT DOES NOT MATTER IF YOU CHOOSE A DATE THAT IS A MONTH AGO OR YEAR AGO OR A MONTH AHEAD OR YEAR AHEAD… IT WILL USE THE EXPECTED TRAFFIC BASED

ON HISTORICAL AVERAGES. IN OTHER WORDS, IF YOU GIVE IT A DATE FROM 1980 THEN YOU DON'T HAVE TO WORRY THAT IT IS USING TRAFFIC ACTIVITY FROM DECADES AGO, IT WILL USE THE LATEST PERTINENT DATA SET OF HISTORICAL AVERAGES. FOR INSTANCE, IF IT IS A FRIDAY AND YOU ARE PLANNING ROUTES FOR NEXT WEDNESDAY, THEN IT IS PROPER TO USE HISTORICAL AVERAGES FOR THAT PURPOSE AND TO CHOOSE A WEDNESDAY DATE (PAST OR FUTURE) TO BE PASSED IN TO TRIGGER THE SOLVER TO USE TYPICAL WEDNESDAY TRAFFIC IN THE EQUATION.

THIS IS BEING RESTATED FOR EMPHASIS, THE WEEKDAY SUPPLIED FOR THE START IS IMPACTFUL. FOR INSTANCE, A FRIDAY MIGHT HAVE MUCH HEAVIER TRAFFIC THAN A SUNDAY. IT IS BEST IF YOU KNOW THE WEEKDAY THAT THE PLANNED ROUTE WILL BE RUN TO MATCH IT WITH A HISTORICALLY CHOSEN MATCHING WEEKDAY. (FOR INSTANCE, APPLY FRIDAY AVERAGES TO A ROUTE TO BE RUN ON A FUTURE FRIDAY.) OR YOU CAN JUST SET ALL PLANNED ROUTES TO RUN AS THEY WOULD ON A FRIDAY (LET'S SAY THAT IS YOUR BUSIEST TRAFFIC DAY) REGARDLESS OF WHAT DAY THEY MIGHT ACTUALLY RUN. THIS ALLOWS YOU TO ERROR ON THE SIDE OF CAUTION ESSENTIALLY BUT SLOWING-DOWN THE ROUTES NOMINALLY AS A PRECAUTION.

THE START TIME ALSO MATTERS AS OUR SERVICE POSSESSES TIME STUDIES FROM EVERY FEW MINUTES SO PROVIDING A VALID START TIME ALLOWS YOU TO ACCOUNT FOR RUSH HOUR AND THE GENERAL EBB AND FLOW OF TRAFFIC AS IT EVOLVES THROUGHOUT THE DAY.

TIME ZONE IMPLICATIONS: 🗺️

IF YOU TRAVERSE MULTIPLE TIME ZONES, YOU MUST SUPPLY A START DEPOT AND A ROUTE START TIME. THE START TIME SHOULD BE REPRESENTATIVE OF THAT LOCAL TIME FOR THAT START DEPOT'S LOCATION (BUT TRANSLATED TO UTC WHEN SENT TO THE SERVICE).

ALL TIMES SUPPLIED AS TIME WINDOWS SHOULD BE RELATIVE THEN TO THAT START DEPOT'S TIME ZONE (AGAIN, UTC TRANSLATED BEFORE BEING SUBMITTED). IF A STOP'S TIME WINDOW IS 1 TIME ZONE (1 HOUR) DIFFERENT THAN THE START DEPOT'S TIME ZONE THEN YOU'D NEED TO ADJUST THE DATA SUPPLIED TO ACCOUNT FOR THIS.

ALL TIMES RETURNED BY THE SERVICE WILL BE IN RELATION TO THAT START DEPOT'S START TIME (IN UTC). SO EVEN IF YOU 'CHANGE' TIME BY CROSSING TO ANOTHER TIME ZONE, THE ESTIMATED TIMES OF ARRIVAL WON'T FLIP TO THE LOCAL TIME FOR ANY PARTICULAR STOP BUT INSTEAD WOULD STAY CONSISTENT TO THE START LOCATION'S TIME ZONE THROUGHOUT.

AS YOU MAY KNOW, TIME ZONES AREN'T CONSTANT THROUGH TIME BUT RATHER CAN IMPOSE TIMES BASED ON THE TIME OF YEAR. THE SUM TOTAL OF THIS COMPLEXITY LEADS US TO SIMPLY MAINTAIN A CONSISTENT USE OF TIMES BASED ON THE START DEPOT'S START TIME AS WE HANDLE ROUTE PLANNING SERVICES.

EXAMPLE:

LET US PLAN A ROUTE FOR AN UPCOMING FRIDAY. IN SUCH CASES, YOU'LL MOST LIKELY WANT TO USE A 'TYPICAL' FRIDAY FOR TRAVEL SPEEDS AS THEY WILL LIKELY BE REPRESENTATIVE OF THE UPCOMING FRIDAY.

WE'LL REFERENCE A PARTICULAR HISTORIC FRIDAY BY DATE. LET'S CHOOSE FRIDAY, OCTOBER 7, 2011 FOR THIS EXAMPLE. (YOU COULD CHOOSE ANY FUTURE OR HISTORIC FRIDAY FOR THIS PURPOSE, THE KEY IS THAT YOU HAVE SET IT TO USE FUTURE PLANNING WITHIN YOUR OPTIONS AREA).

LET'S SAY ALSO WE ARE PLANNING A ROUTE ORIGINATING IN LOS ANGELES, CA THAT WILL START IN PACIFIC TIME. LET'S START IT AT 8:00 AM LOCAL.

THE FIRST STEP IS TO CONVERT THE 8:00 AM TIME TO UTC TIME. THIS WILL IRON-OUT ANY CONSIDERATIONS HAVING TO DO WITH DAYLIGHT SAVINGS TIME OR STANDARD TIME FOR THAT TIME ZONE FOR THAT DATE. UTC TIME ESSENTIALLY UNDERSTANDS THE 'OFFSET' FOR YOUR TIME ZONE. MOST EVERY PROGRAMMING LANGUAGE HAS A '.TOUNIVERSALTIME' (OR SIMILAR) FOR THIS PURPOSE. FOR THIS OCT 7TH DATE THAT WAS CHOSEN, THE UTC OFFSET IS -7 HOURS WHERE 8:00 AM LOCAL EQUATES TO 3:00 PM GMT (UTC).

THE NEXT STEP THEN IS TO CONVERT THE UTC TIME TO UNIX/EPOCH. YOU'LL WANT TO DO THIS IN CODE, BUT YOU CAN DOUBLE-CHECK YOUR VALUES VIA THIS WEBSITE: HTTPS://WWW.EPOCHCONVERTER.COM/

DATE/TIME CONVERSION RESULTS:
LOCAL TIME (PACIFIC): OCT 7TH, 2011 @ 8:00 AM

GMT/UTC TIME: OCT 7TH, 2011 @ 3:00 PM (-7)
EPOCH TIME IN MILLISECONDS: 1317999600000

THE EPOCH TIME IS WHAT YOU'LL SUPPLY TO US. IT IS IMPERATIVE THAT YOU CONVERT TIMES TO UTC TIMES BEFORE DERIVING THE EPOCH TIME THAT YOU SUPPLY.

APPENDIX B – RESULT CODES

RESULTCODES

Result Code	Value	Notes
SuccessfullyProcessed	2000	Not to be confused with the http result code of 200.
NotProcessed	0	
ErrorNoAPIKeySupplied	1	
ErrorInvalidAPIKeySupplied	2	
ErrorInvalidRequestSupplied	10	Please verify your JSON data is in valid format.
ErrorDuringPreValidation	20	General error when validating input data.
ErrorDuringWrappingRequest	21	Internal.
ErrorDuringWrappingProcessing	22	Internal.
ErrorDuringWrappingCallout	23	Internal.
ErrorDuringProcessingRequest	24	Internal.
ErrorNoInputDepotsSupplied	1000	
ErrorTooManyInputDepotsSupplied	1001	
ErrorZeroLengthDepotID	1002	
ErrorTooLengthyDepotID	1003	
ErrorDepotIDContainedIllegalCharacter	1004	Disallowed: Pipe (|)
ErrorDepotIDValueProvidedWasNotUnique	1005	
ErrorDepotInvalidLatLonValueProvided	1006	
ErrorDepotDisplayNameContainedInvalidCharacter	1007	
ErrorNoInputRoutesSupplied	1100	
ErrorTooManyInputRoutesSupplied	1101	
ErrorZeroLengthRouteID	1102	
ErrorTooLengthyRouteID	1103	
ErrorRouteIDContainedIllegalCharacter	1104	

ErrorRouteIDValueProvidedWasNotUnique	1105	
ErrorRouteHasNoDepot	1106	
ErrorRouteHasInvalidDepotID	1107	
ErrorRouteDisplayNameContainedIllegalCharacter	1108	
ErrorTooLengthyRouteDisplayName	1109	
ErrorRouteMaxDrivingExceedsMaxTotal	1110	
ErrorRouteOTBeginsExceedsMaxTotal	1111	
ErrorRouteMaxTotalHoursTooBrief	1112	
ErrorRouteMaxDrivingHoursTooBrief	1113	
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