Department for Transport

Title	Digital Traffic Regulation Orders: D-TRO Beta Validation rules documentation
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1. Document Control

1.1 Version History

Version	Author	Summary of changes	Date
1.0	PA Consulting	Additional validation rules added in for Beta updates to data model	June 2024

1.2 Document Review

Version	Reviewer(s)	Date
1.0	Jon Harrod Booth (Harrod Booth Consulting, for the Department for Transport)	June 2024

1.3 Approved Versions

Version	Approver(s)	Date
1.0	John Cooper (Department for Transport, Product Owner)	June 2024

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2. Terms and Abbreviations

Term / Abbreviation	Definition
D-TRO	Digital Traffic Regulation Order
DfT	Department for Transport
TRA	Traffic Regulation Authority
ICD	Interface Control Document

3. Introduction

Britain is on the verge of a transport revolution and the Department has recently delivered the Future of Mobility, Urban Strategy as part of the Future of Mobility Grand Challenge. The Strategy prioritises providing a regulatory framework that evolves with transport technology and advocates data sharing to improve operation of the transport system.

Traffic Regulation Orders (TROs) are the legal orders made under the Road Traffic Regulation Act 1984 which define the rules of the road network. They currently provide Traffic Authorities with powers to place permanent, temporary, or experimental restrictions on traffic for the purposes of safety or traffic management. Orders therefore provide a vital mechanism for enforcement on the road network. Digitisation of these orders and providing them as standardised data would provide many benefits, including: (1) improving existing services (e.g., satnav routing); (2) providing new services; (3) reducing enforcement and processing costs to highway authorities; (4) reducing congestion; and (5) provision of the digital infrastructure for connected and automated vehicles.

This document specifies the semantic validation rules that submitted D-TRO records will be executed against before acceptance into the central storage system.

4. Target Audience

The target audiences of this document include:

- Traffic Regulation Authorities (TRAs) and any Solution Providers that currently manage IT contracts within the authority.
- The D-TRO Service Owner who will be responsible for long-term support, maintenance, and continual improvement of the Service.

5. Validation approach

Schema validation

Schema validation ensures that submitted D-TROs align with the data model. Schema validation is executed at the time of submission. The current version of the schema can be requested through the schema endpoint defined in the ICD or can be found within the TRO-DD GitHub repository: https://github.com/Department-for-Transport-External/TRO-DD

Semantic validation

Semantic validation ensures that submitted D-TROs contain quality and representational data beyond alignment with the schema. Semantic validation is executed at the time of submission. The current version of the semantic validation rules can be found in section 7. Semantic validation is defined through three approaches. The first is to use JSON native validation where possible to validate ranges or types. The second is to define more complex, dependent rules using Json Logic (https://jsonlogic.com/). These rules are defined using the JSON logic syntax and are created under a semantically versioned ruleset. Finally, any more complex rules are defined within the D-TRO service codebase.

Validation strategy for supporting multiple versions

When a D-TRO is submitted the request body must include a version of the data schema that the D-TRO is to be validated against. There is a relationship between the schema version number and a semantic rules version number document. As semantic validation rules are defined in section 7, they are assigned an ‘introduced in version’ number showing which version they are applied to, therefore any D-TRO submitted with the corresponding schema version will be validated against that versions ruleset and any lower versions ruleset. If a D-TRO is submitted against one version of the schema and semantic rules, future updates can be made against the version of the schema it was originally submitted against. Updates can also be submitted against a higher version of the schema and rules and will be accepted against the higher version if validation is successful.

6. Assumptions, Constraints, Risks and Dependencies

ID	Scenario	Impact
01	Street Works Act (SWA) code list is maintained externally so may change without notice.	A change to the SWA code list may render previously accepted records invalid if an update is attempted if the code changes.
02	DfT may not be aware of the association between a Traffic Regulation Authority and a Solution Provider.	Records may be rejected if a system is not in place for traffic authorities to nominate solution providers to provide their data.

7. Semantic validation rules

Current Applicable rules

Rule ID	Applicable Data Field	Secondary data field(s)	Rule Definition	Introduced in Version
1.	Source.actionType		Each instance shall be unique.	3.2.0
2.	Source.currentTraOwner		This must be a string, and numeric value of the string must match an entry in the SWA code list.	3.2.0
3.	Source.reference		This must be a string.	3.2.0
4.	Source.section		This must be a string.	3.2.0
5.	Source.traAffected		This must be a string with the IDs (separated by commas) of the TRAs affected by the current D-TRO. Each ID numeric value must match an entry in the SWA code list.	3.2.0
6.	Source.traCreator		This must be an int with the ID of the TRA that created the current D-TRO. The ID numeric value must match an entry in the SWA code list.	3.2.0

7.	Source.troName		This must be a string with a descriptor name for the TRO.	3.2.0
8.	Provision.actionType		Each instance shall be unique.	3.2.0
9.	Provision.orderReportingPoint		Shall be one of: “experimentalAmendment”, “experimentalMakingPermanent”, “experimentalNoticeOfMaking”, “experimentalRevocation”, “permanentAmendment”, “permanentNoticeOfMaking”, “permanentNoticeOfProposal”, “permanentRevocation”, “specialEventOrderNoticeOfMaking”, “ttroTtmoByNotice”, “ttroTtmoExtension”, “ttroTtmoNoticeAfterMaking”, “ttroTtmoNoticeOfIntention”, “ttroTtmoRevocation”, “variationNotice" “troOnRoadActiveStatus"	3.2.0
10.	Provision.provisionDescription		This must be a string.	3.2.0
11.	Provision.provisionIndex		ProvisionIndex must be sequential for all Provision instances in D-TRO record	3.1.2
12.	Provision.reference		This must be a string.	3.2.0
13.	RegulatedPlace.description		This must be a string.	3.2.0
14.	Geometry.version		This must be an int with the version number of the selected geometry.	3.2.0
15.	if Geometry is PointGeometry	Use of Point Geometry	Value and usage must be consistent.	3.2.0
16.	if Geometry is LinearGeometry	Use of Linear Geometry	Value and usage must be consistent.	3.2.0
17.	if Geometry is Polygon	Use of Polygon	Value and usage must be consistent.	3.2.0

18.	if Geometry is DirectedLinear	Use of Directed Linear	Value and usage must be consistent	3.2.0
19.	ExternalReference.lastUpdateDate		This must be a date. It must be in the past	3.2.0
20.	UniqueStreetReferenceNumber.nsgStreetName		This must be a string. Should be within valid SWA USRN code range for given SWA.	3.2.0
21.	UniqueStreetReferenceNumber.nsgStreetNumber		This must be a string. Should be within valid SWA USRN code range for given SWA.	3.2.0
22.	UniqueStreetReferenceNumber.usrn		This must be an int representing the ID of the Unique Street Reference Number that appears in the National Street Gazetteer.	3.2.0
23.	ElementaryStreetUnit.esu		This must be an int representing the ID of the Elementary Street Unit that appears in the National Street Gazetteer	3.2.0
24.	Regulation.timeZone		Must be IANA format (e.g. Europe/London)	3.1.2
25.	SpeedLimitValueBased.mphValue		Must be one of defined values (e.g. 10, 20, 30, 40, 50, 60, 70)	3.1.2
26.	one of SpeedLimitValueBased, SpeedLimitProfileBased, GeneralRegulation or OffListRegulation must be present.		Conditional to be checked (4-way condition)	3.1.2
27.	OverallPeriod.start	OverallPeriod.end	end must be later than start, if present	3.1.2
28.	Period.start	Period.end	end must be later than start, if present	3.1.2

29.	TimePeriodOfDay.start	TimePeriodOfDay.end	end must be later than start, if present	3.1.2
30.	OverallPeriod.start	any Period.start	any Period.Start shall not be earlier than OverallPeriod.start	3.1.2
31.	OverallPeriod.end	any Period.end	any Period.end shall not be later than OverallPeriod.end, if present	3.1.2
32.	RateLineCollection.sequence		Values must be sequential for all RateLineCollection instances in RateTable	3.1.2
33.	RateLine.sequence		Values must be sequential for all RateLine instances in RateLineCollection	3.1.2
34.	RateLineCollection.minValueCollection	RateLineCollection.maxValueCollection	max must be greater than or equal to min	3.1.2
35.	RateLineCollection.startValidUsagePeriod	RateLineCollection.endValidUsagePeriod	end must be later than start, if present	3.1.2
36.	RateLineCollection.minTime	RateLineCollection.maxTime	max must be greater than min	3.1.2

37.	GeneralRegulation.RegulationType = dimensionMaximumWidth	WidthCharacteristic.comparisonOperator must = lessThan or LessThanOrEqualTo AND vehicleWidth must be between 0 and 6	Value and comparator present >0 <= 10m	3.1.2
38.	GeneralRegulation.RegulationType = dimensionMaximumLength	LengthCharacteristic.comparisonOperator must = lessThan or LessThanOrEqualTo AND vehicleLength must be between 0 and 40	Value and comparator present >0 <= 40m	3.1.2
39.	GeneralRegulation.RegulationType = dimensionMaximumWeightEnvironmental	GrossWeightCharacteristic, HeaviestAxleWeightCharacteristic	Value and comparator present >0 <= 50t	3.1.2

40.	GeneralRegulation.RegulationType = dimensionMaximumWeightStructural	GrossWeightCharacteristic, HeaviestAxleWeightCharacteristic	Value and comparator present >0 < 50t	3.1.2
41.	NumberOfOccupants, AgeOfDriver, TimeDriverLicenseHeld, GrossWeightCharacteristic, HeightChar..., LengthChar..., WidthChar..., HeaviestAxleChar..., NumberOfAxlesChar...		For numerous condition sub-types where multiplicity = 2, the defined operators must define a range i.e. one operator shall be "greaterThan" or "greaterThanOrEqualTo" and the second operator "lessThan" or "lessThanOrEqualTo" and the range limits must be meaningful (i.e. not height "less than" 1.0 metres AND height "greater than" 5.0 metres - which is impossible to satisfy).	3.1.2
42.	VehicleCharacteristics,yearOfFirstRegistration		shall be >1900 and less than or equal to current year value	3.1.2
43.	DayWeekMonth.dayType		each instance within DayWeekMonth shall be unique	3.1.2
44.	DayWeekMonth.monthType		each instance within DayWeekMonth shall be unique	3.1.2
45.	CalendarWeekInMonth.weekInMonth		each instance within CalendarWeekInMonth shall be unique	3.1.2
46.	WeekInMonth.applicableWeek		each instance within WeekInMonth shall be unique	3.1.2
47.	InstanceOfDayWithinMonth		each instance within InstanceOfDayWithinMonth shall be unique	3.1.2
48.	RateLineCollection.minTime		shall be equal to or greater than zero	3.1.2
49.	RateLineCollection.maxTime		shall be equal to or greater than zero	3.1.2

50.	RateLine.minValue		must be equal to or greater than zero	3.1.2
51.	RateLine.maxValue		must be equal to or greater than zero	3.1.2
52.	RateLine.minValue	RateLine. maxValue	max must be greater than min	3.1.2
53.	RateLine.value		must be equal to or greater than zero	3.1.2