ADP-RCL Cross Feature Validation: Rule Catalog

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Contents

Background

1Spatial has put together a rule package ("ADP-RCL Cross Feature Validation") to validate Address Point (ADP) and Road Centerline (RCL) data against one another. Data may be submitted in any schema, however, attributes must be mapped to the fields detailed in Schema Mapping below to accommodate validation.

This rule catalog provides documentation for the current state of the rule package. The rule catalog is broken into the following sections:

- **Schema Mapping** – classes and attributes used during ADP-RCL Cross Feature Validation
- **Pre-Processing** – actions to ensure attributes used in ADP-RCL Cross Feature Validation are present and follow expected formatting
- **ADP-RCL Cross Feature Validation** – validations that verify address points and centerlines are synchronous in attribution and spatial location

Schema Mapping

The following classes and attributes are used in the ADP-RCL Cross Feature Validation. Unless otherwise noted, attributes listed below are necessary to be mapped from source data and may not match the conditionality requirements set forth by the National Emergency Number Association (NENA) Standard for NG9-1-1 GIS Data Model schema (NENA-STA-006.1.1-2020).

Indicates mapping is only applicable if field exists in the submitted dataset, otherwise no mapping required

Table 1. Schema Mapping for ADP-RCL Cross Feature Validation.

Class	Attribute
Address Point (ADP)	NENA Globally Unique ID
ADP	Address Number Prefix*
ADP	Address Number
ADP	Address Number Suffix*

Class	Attribute
ADP	Street Name Pre Modifier*
ADP	Street Name Pre Directional*
ADP	Street Name Pre Type*
ADP	Street Name Pre Separator*
ADP	Street Name
ADP	Street Name Post Type*
ADP	Street Name Post Directional*
ADP	Street Name Post Modifier*
ADP	Unit*
ADP	CTU Name
ADP	Incorporated Municipality*
ADP	Unincorporated Community*
ADP	Neighborhood Community*

Class	Attribute
ADP	County*
ADP	State*
ADP	Country*
ADP	MSAG Community Name
ADP	geometry
Road Centerline (RCL)	NENA Globally Unique ID
RCL	Left Address Number Prefix*
RCL	Right Address Number Prefix*
RCL	Street Name Pre Modifier*
RCL	Street Name Pre Directional*
RCL	Street Name Pre Type*
RCL	Street Name Pre Separator*
RCL	Street Name

Class	Attribute
RCL	Street Name Post Type*
RCL	Street Name Post Directional*
RCL	Street Name Post Modifier*
RCL	Left From Address
RCL	Left To Address
RCL	Right From Address
RCL	Right To Address
RCL	Parity Left
RCL	Parity Right
RCL	CTU Name Left
RCL	CTU Name Right
RCL	Incorporated Municipality Left*
RCL	Incorporated Municipality Right*

Class	Attribute
RCL	Unincorporated Community Left*
RCL	Unincorporated Community Right*
RCL	Neighborhood Community Left*
RCL	Neighborhood Community Right*
RCL	County Left*
RCL	County Right*
RCL	State Left*
RCL	State Right*
RCL	Country Left*
RCL	Country Right*
RCL	MSAG Community Left
RCL	MSAG Community Right
RCL	geometry

Pre-Processing

Pre-processing actions ensure attributes are formatted appropriately in preparation for the ADP-RCL Cross Feature Validation.

Table 2. Pre-processing Actions for ADP-RCL Cross Feature Validation.

Class	Action	Description	Purpose
None	Set Session Parameter - 1DataGateway SupplierID	Generate a 1DataGatewaySupplierID parameter.	Creates a parameter within the submission session to record the supplier ID. The supplier ID is used in pre-processing actions that translate local values to standard values.
ADP/RCL	Populate NENA_Globally_Unique_ID if not populated	Generate a NENA_Globally_Unique_ID if one does not exist for a feature.	If a unique ID value is not present, this pre-processing action will create one for that feature.
Domain Tables	Attribute Capitalization - Domain Translation Tables	If a value for a text string is not present, set the value to null. If a value for a text string is present, convert it to all uppercase lettering.	If an alphanumerical field is blank or contains only spaces, this sets the value to null. If an alphanumerical string is present, this sets the lettering to uppercase capitalization. For example, "" is set to null, and "Street" is set to "STREET".

Class	Action	Description	Purpose
ADP	CTU_Name Capitalization - Address Points	If a value for a text string is not present, set the value to null. If a value for a text string is present, convert it to all uppercase lettering. In this pre-processing action, the following fields are converted to null (if no value is present) or uppercase capitalization (if value is present): • CTU Name	If a value is blank, the action will set it to null. For values that are populated with alphabetical strings, the value is set to all uppercase characters.

Class	Action	Description	Purpose
ADP	Site Address Point Attribute Fields	If a value for a text string is not present, set the value to null. If a value for a text string is present, convert it to all uppercase lettering. In this pre-processing action, the following fields are converted to null (if no value is present) or uppercase capitalization (if value is present): • Address Number Prefix • Address Number • Address Number Suffix • Street Name Pre Modifier • Street Name Pre Directional • Street Name Pre Type • Street Name Pre Separator • Street Name • Street Name Post Type • Street Name Post Directional • Street Name Post Modifier • Unit • Incorporated Municipality • Unincorporated Community • Neighborhood Community • County • State • Country • MSAG Community Name	Prepares ADP attributes for the ADP-RCL Validations. If a value is blank, the action will set it to null. For values that are populated with alphabetical strings, the value is set to all uppercase characters.

Class	Action	Description	Purpose
RCL	CTU_Name Capitalization - Road Centerlines	If a value for a text string is not present, set the value to null. If a value for a text string is present, convert it to all uppercase lettering. In this pre-processing action, the following fields are converted to null (if no value is present) or uppercase capitalization (if value is present): • CTU Name Left • CTU Name Right	If a value is blank, the action will set it to null. For values that are populated with alphabetical strings, the value is set to all uppercase characters.

| Class	Action	Description	Purpose
RCL	Road Centerlines Attribute Fields	If a value for a text string is not present, set the value to null. If a value for a text string is present, convert it to all uppercase lettering. In this pre-processing action, the following fields on both sides of the RCL feature are converted to null (if no value is present) or uppercase capitalization (if value is present): • Address Number Prefix • Street Name Pre Modifier • Street Name Pre Directional • Street Name Pre Type • Street Name Pre Separator • Street Name • Street Name Post Type • Street Name Post Directional • Street Name Post Modifier • Parity • Incorporated Municipality • Unincorporated Community • Neighborhood Community • County • State • Country • MSAG Community Name	Prepares ADP attributes for the ADP-RCL Validations. If a value is blank, the action will set it to null. For values that are populated with alphabetical strings, the value is set to all uppercase characters.

Class	Action	Description	Purpose
ADP	Domain Translations - ADP	If a value is populated, translate the value to a value from the associated NENA standard domain or supplier-specific values specified in the Public Safety Answering Point's (PSAP's) Data Verification Form. For this validation, domain translations are done for the following values: • Street Name Pre Type • Street Name Post Type • Street Name Pre Directional • Street Name Post Directional • CTU Name • County • MSAG Community Name	Translates local values to standardized values. Standardized values are based on the NENA and PSAP-specific domains.

Class	Action	Description	Purpose
RCL	Domain Translations - RCL	If a value is populated, translate the value to a value from the associated NENA standard domain or supplier-specific values specified in the Public Safety Answering Point's Data Verification Form. For this validation, domain translations are done for the following values: • Street Name Pre Type • Street Name Post Type • Street Name Pre Directional • Street Name Post Directional • Parity Left • Parity Right • CTU Name Left • CTU Name Right • County Left • County Right • MSAG Community Name Left • MSAG Community Name Right	Translates local values to standardized values. Standardized values are based on the NENA and PSAP-specific domains.
RCL	Road Centerlines Null Parity Attribute Field Handling	If Parity_Left or Parity_Right fields are not populated, calculate the correct parity value based on Address_To and Address_From values.	Calculates the correct parity value (E, O, B, or Z) based on the To and From Address values for an RCL feature.

ADP-RCL Cross Feature Validation

The following tasks describe the process of the ADP-RCL Cross Feature Validation. During this validation, fishbone lines (orange in the diagram below) are generated from address points to the correlating address location along the road centerline.

Figure 1
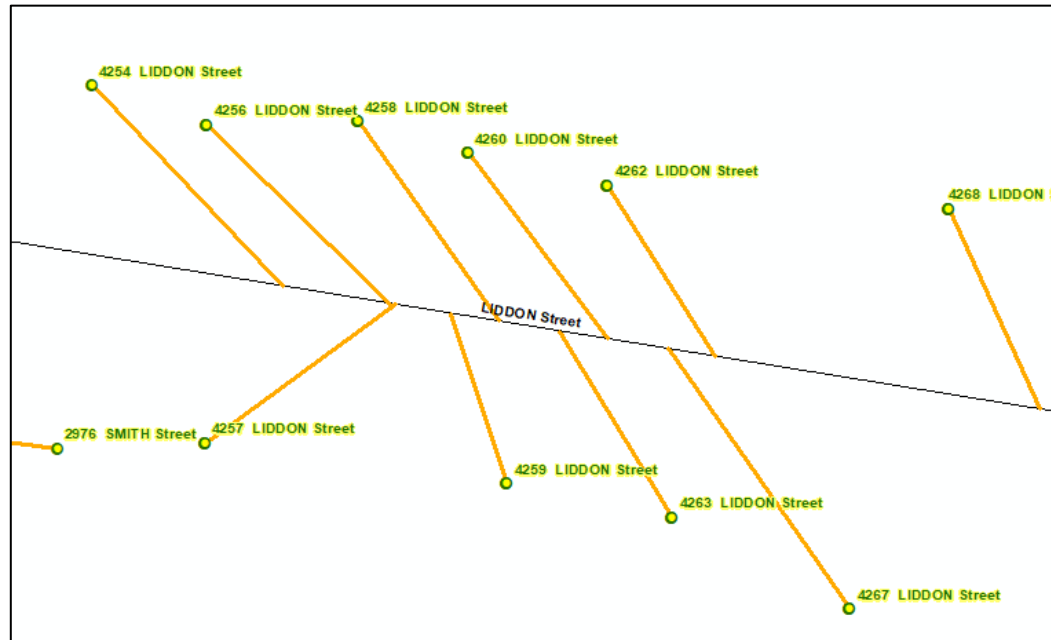
The table below details each step of the validation process. The first column, Class, indicates the primary feature layer that is evaluated during that step. The Task column refers to the name of the rule or action that is conducted during that step in the process, while Description provides additional details on that step. If a markup is created during the step, it is noted as to which Markup layer a feature is generated in the Markup Layer column. If a feature is created for the Markup Layer, its associated Violation and Comment are noted in the table below.

Sides of RCL features with "OOJ" in the MSAG Community Name field and ADP features with "OOJ" in the MSAG Community Name field are excluded from these checks.

Table 3. Tasks in the ADP-RCL Cross Feature Validation.

Class	Task	Description	Markup Layer	Violation	Comment
RCL	Fishbone Processing 1 - Remove Road Centerlines without Range	If a road centerline has all zero or null values for the To and From address fields, exclude the feature from further validation in the ADP-RCL Cross Feature Validation.	n/a	n/a	n/a
RCL	Fishbone Processing 2 - Create Fishbone - Map Address Point to Road Centerline feature	Create a Fishbone line to link an address point with its correlating address location along the road centerline using the fields mapped during schema mapping (except MSAG Community Name).	Markup_Fishbone	n/a	n/a
ADP	Fishbone Validation 1 - Markup Address Points with no Road Centerline match	Create a markup for site address points that had no Fishbone line created in action Map Address Point to Road Centerline (i.e. no match was found).	Markup_Point	ADP not matched to RCL Features	Check Address Number, Street, County, State, CTU Name, Unincorporated Community, Neighborhood Community fields
RCL	Fishbone Processing 3 - Determine Address Point Side of the Road	Record whether the fishbone (address point) is located on the left or right side of the road centerline based on an evaluation of the geometric properties of the road centerline (start/end point locations), the conversion to vectors, and calculation of dot products.	n/a	n/a	n/a

Class	Task	Description	Markup Layer	Violation	Comment
Markup_Fishbone	Fishbone Processing 4 - Evaluate Address Point mapped to multiple Road features	In the instances where there are multiple road centerline matches for an address point, determine if there is a single correct match by performing a side of street, single populated side range, and parity evaluation and remove the other match's linking feature. If neither fishbone can match on a side of street, single populated side range and parity evaluation then remove both fishbones and create a markup at the location of the address point.	Markup_Point	ADP not matched to RCL Features	Check Address Number, Street, County, State, CTU Name, Unincorporated Community, Neighborhood Community fields or RCL with no Address Point in range
Markup_Fishbone	Fishbone Processing 5 - MultiUnit Address Point handling	For instances where many address points share the same address number (e.g. apartments or multi-tenant complexes), determine the average position of all fishbone endpoints, determine the new proportional distance along the centerline of the fishbone start-point, update the fishbone geometry to these new start/end point locations, update the Markup_Fishbone.proportion value, and finally delete the duplicate fishbone objects.	n/a	n/a	n/a

Class	Task	Description	Markup Layer	Violation	Comment
RCL	Fishbone Processing 6 - Refine Fishbone end point location along Road Centerline	After determining the side of the centerline that the Fishbone resides, recalculate the starting position of the fishbone geometry to more closely match the proportional distance position along the centerline based on the road centerline's address range values.	n/a	n/a	n/a
RCL	Fishbone Validation 2 - Markup Address Point misordered along Road Centerline feature	Check that address point location is in numeric sequential order along corresponding road centerline.	Markup_Line (derived from Fishbone line)	Address misordered along RCL	Address misordered along RCL
Markup_ Fishbone	Fishbone Validation 3 - Markup Address Point misordered along Street Route	Check for crossing fishbones which go to different RCL features and create a markup on the address point to mark the out of order site address point.	Markup_Line (derived from Fishbone line)	Address misordered along RCL	Address misordered along RCL
Markup_ Fishbone	Fishbone Validation 4 - Markup Address Points mapped to multiple Road Centerline features	Create markup lines (using the fishbone geometries) where there is more than 1 road centerline location that an address point links to.	Markup_Line (derived from Fishbone line)	Address Point maps to multiple Road Centerlines	Look for overlapping Road Centerline range(s)

Class	Task	Description	Markup Layer	Violation	Comment
ADP	Fishbone Validation 5 - Markup Address Point on wrong side of Road Centerline feature	During the fishbone creation process, the fishbone feature is populated with a "RIGHT" or "LEFT" value indicating what side of the centerline the fishbone is located. Check each address point to ensure it is on the side of the centerline with the same parity and range. If an address point is on the opposite side of the road centerline based on the address point address_number, fishbone.side, and road centerline.parity_left/right values, create a markup point for that address point.	Markup_Point	Address on opposite side of RCL	Parity mismatch between AddressPoint.AddrNo and RCL.Range side value
RCL	Fishbone Validation 6 - Markup Road Centerline From Range value greater than To Range value	Check that if the road centerline address range attribute fields are not null or 0 then the To value is greater than or equal to the From value.	Markup_Line	From address is greater than To address	Depending on violation, the Comment field for the Markup_Line will be populated with one of the following:\n\nFROM_LEFT is greater than TO_LEFT\n\nFROM_RIGHT is greater than TO_RIGHT\n\nBoth Right & Left: FROM values greater than Both Right & Left: TO values

Class	Task	Description	Markup Layer	Violation	Comment
Markup_Line	Fishbone Validation 7 - Markup Road Centerline with reversed Digitized Direction and Address Range	Check Markup_Line objects where From address is greater than To address against Markup_Line objects where address points are misordered along RCL in order to highlight instances where there is a discrepancy between the road centerline's digitized direction and it's populated address range values.	Markup_Line (derived from RCL)	Possible Digitized Direction and Range flip	Possible Digitized Direction and Range flip