

Connected Vehicles and Weather – The Vehicle Data Translator (VDT) Version 3.0



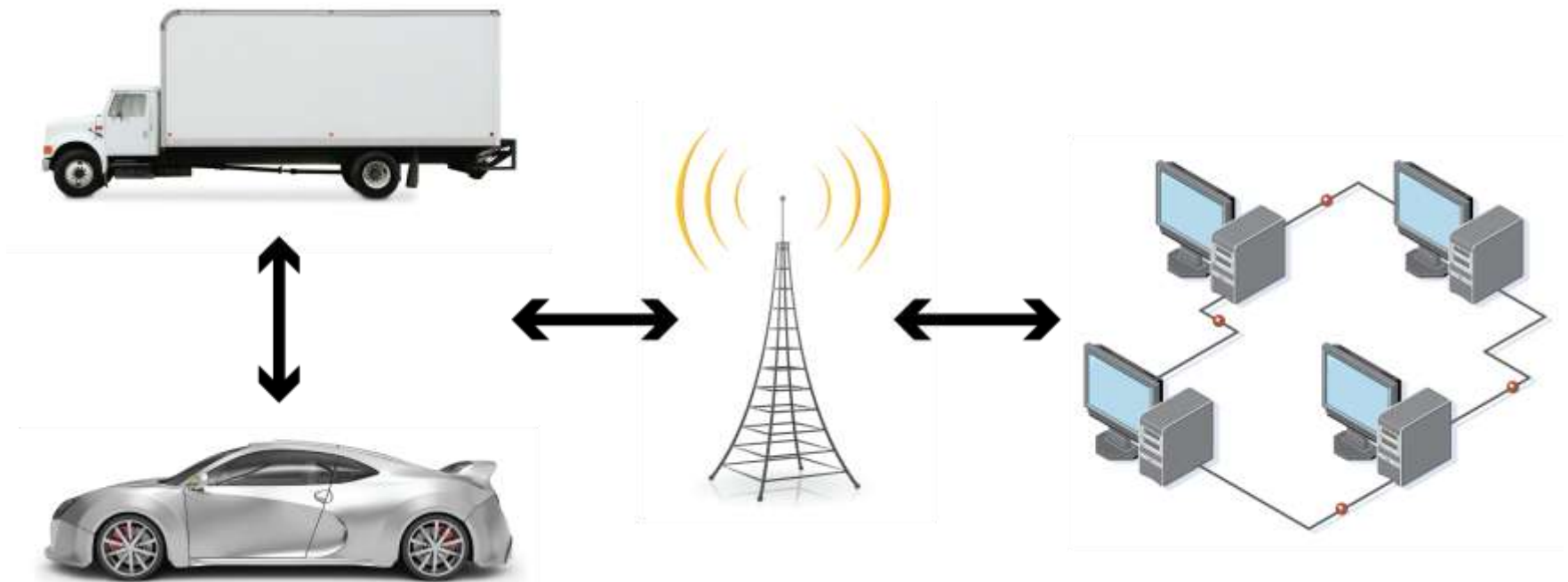
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U.S. Department of Transportation
Federal Highway Administration

Weather Observations from Connected Vehicles

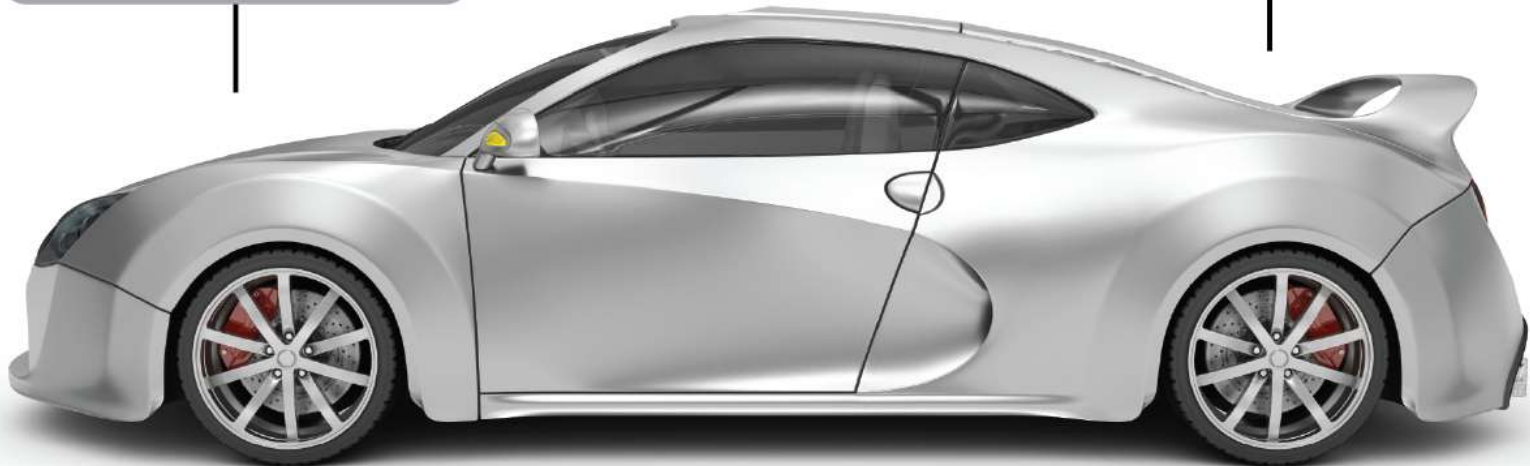


Weather Observations from Connected Vehicles



Barometric Pressure
Windshield Wiper Setting
Headlights Status
Ambient Air Temperature

Speed and Heading
Adaptive Cruise Control (ACC)
Location and Elevation
Hours of Operation



Anti-lock Braking System (ABS)
Brake Status
Stability Control
Traction Control

Yaw/Pitch/Roll
Accelerometer
Steering Angle
Differential Wheel Speed

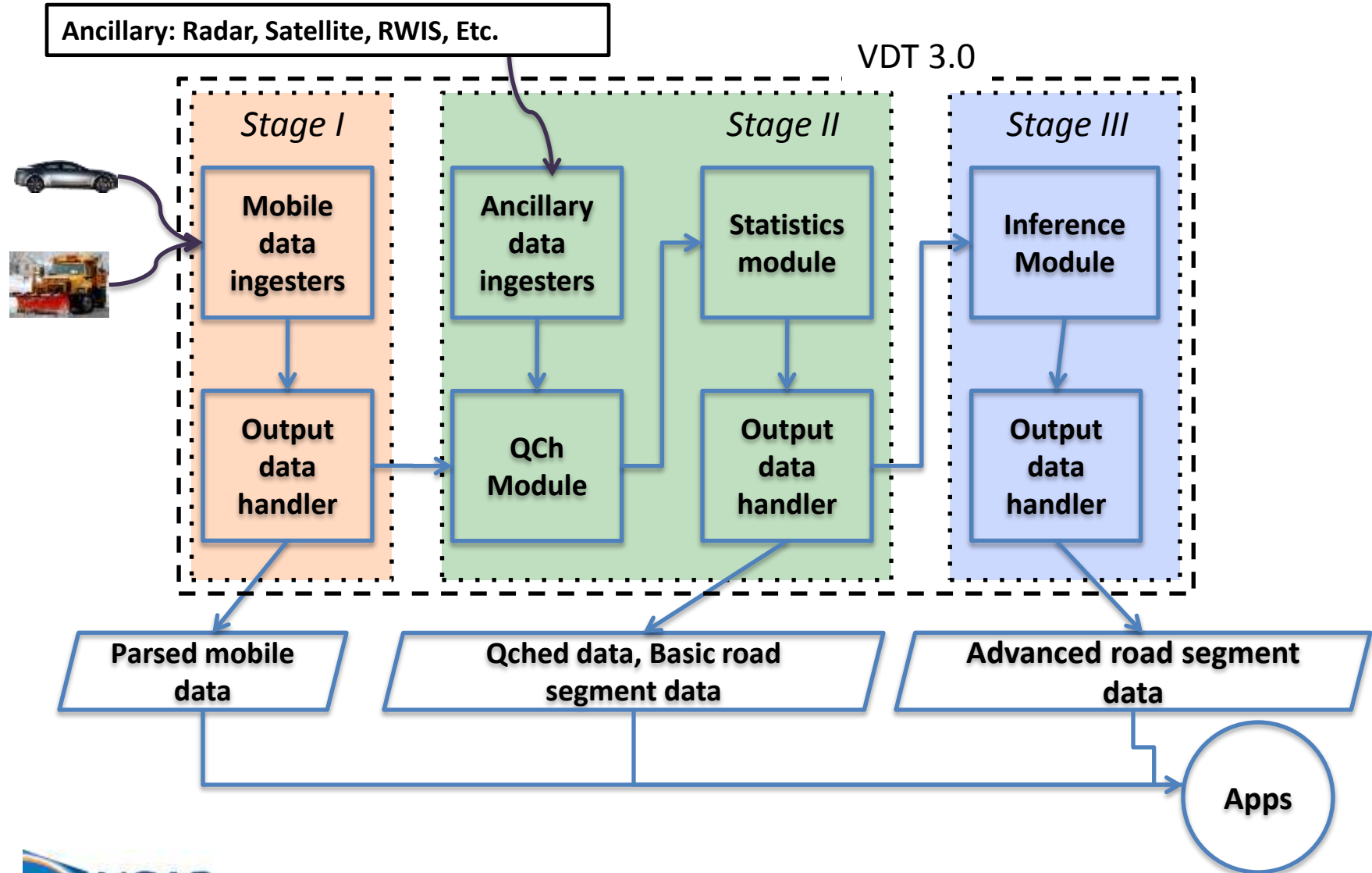
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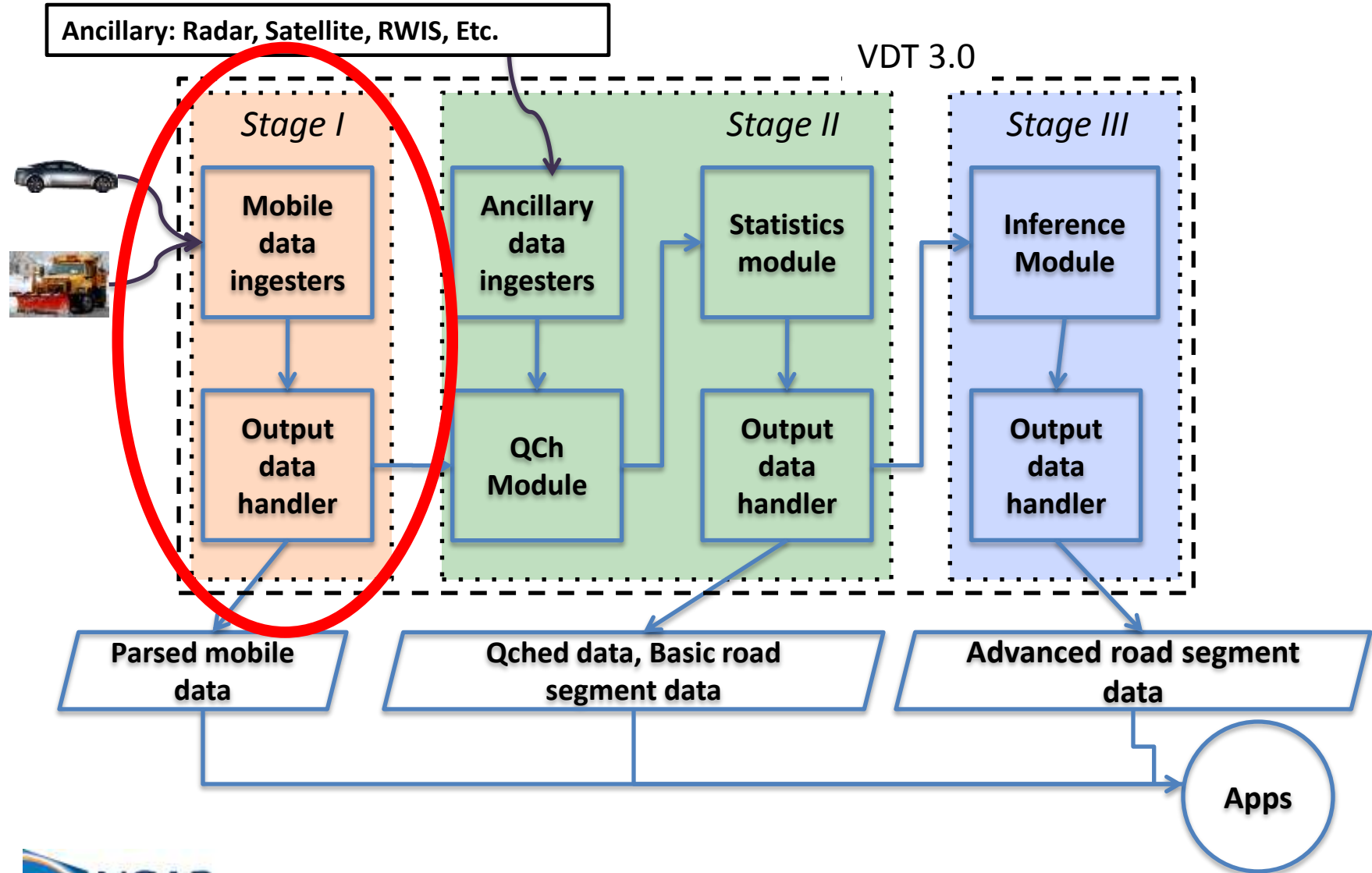
Objectives

- **Develop and improve the Connected Vehicles' role in "Anytime, Anywhere Road Weather Information"**
- **Better Characterization of current weather and road-weather conditions**
- **Accurate Quality Checking and/or Quality Control of vehicle data**
- **Development of inferred road segment specific weather and road-weather information for end-user applications**

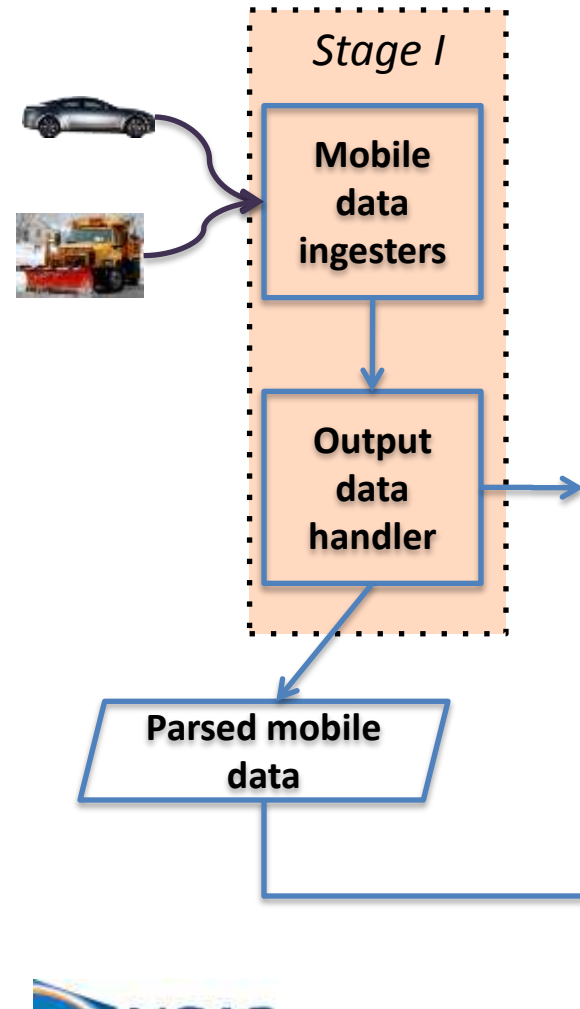
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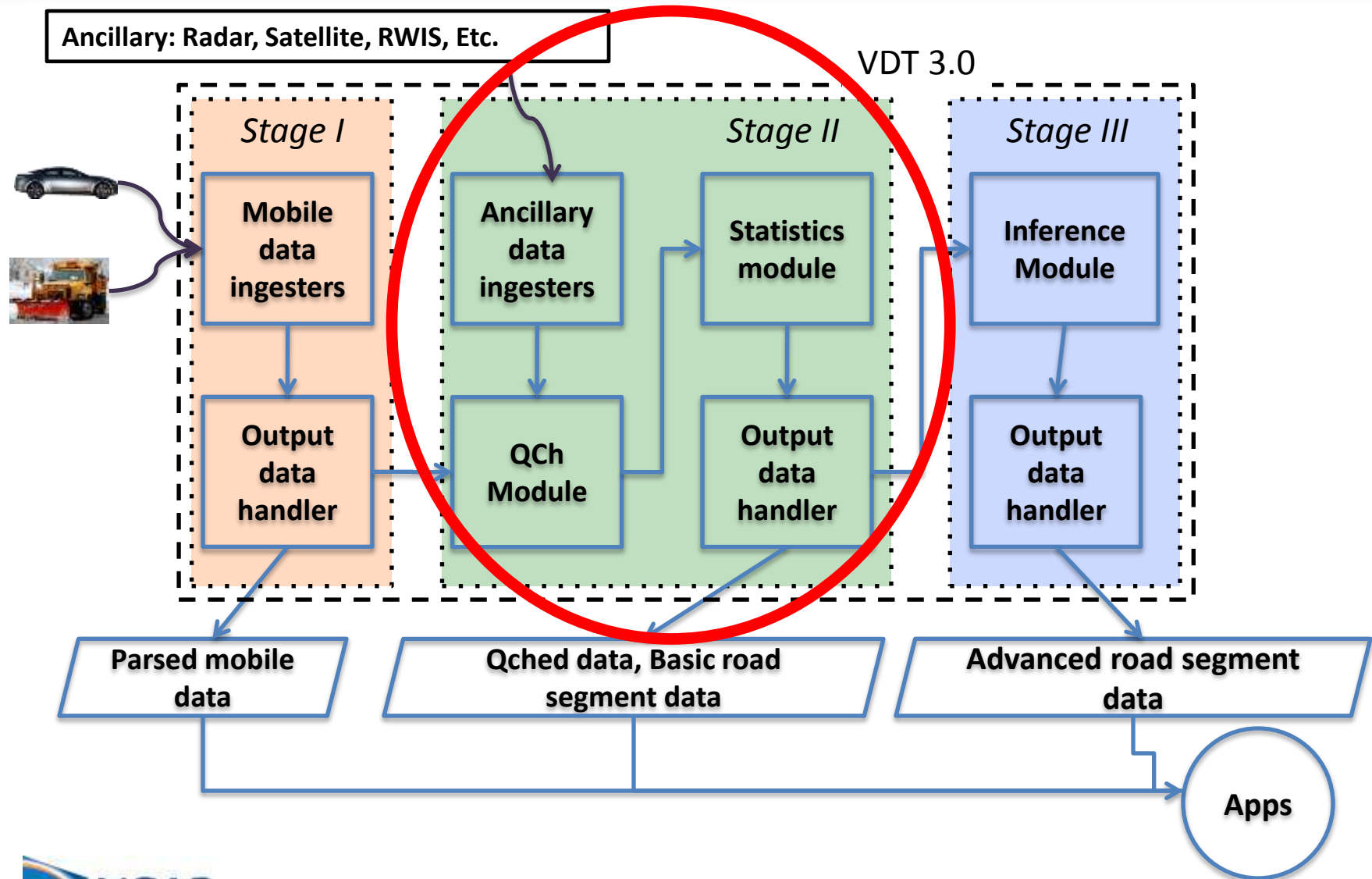


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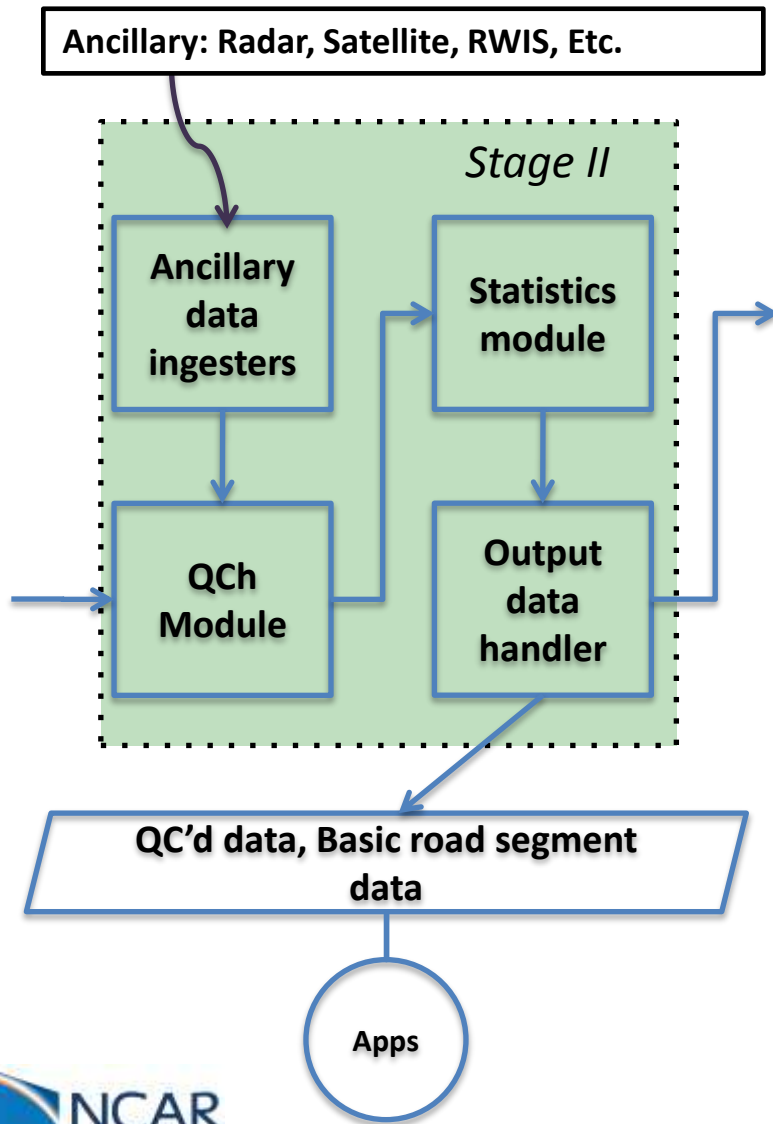


- Ingest vehicle data from CANBus & aftermarket sensors
- Data parsed, sorted/binning
- Light Quality Control
- Sorted by time, road segment and grid cell
 - Segments & grids user defined
- All processed data available for other applications

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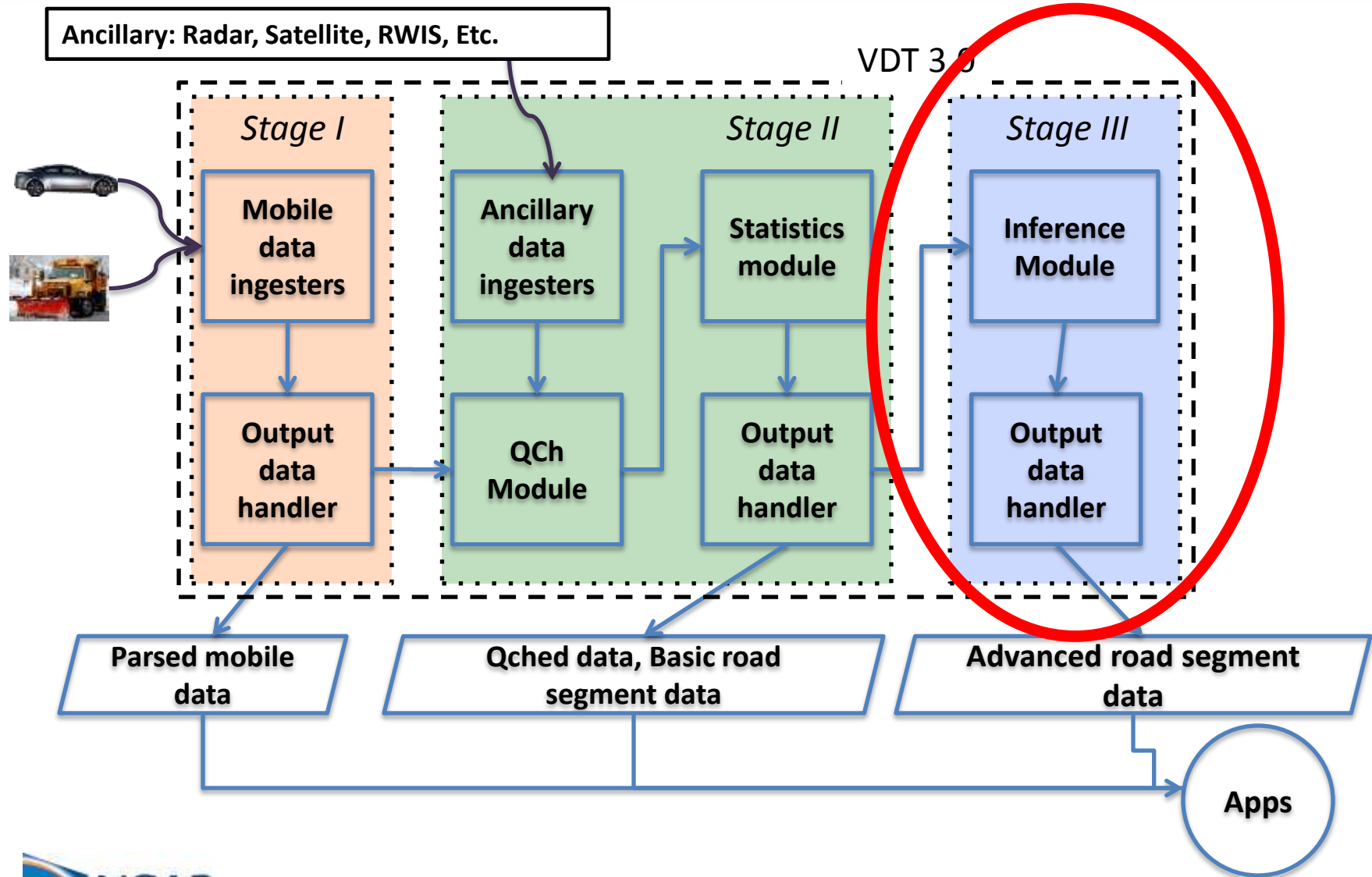


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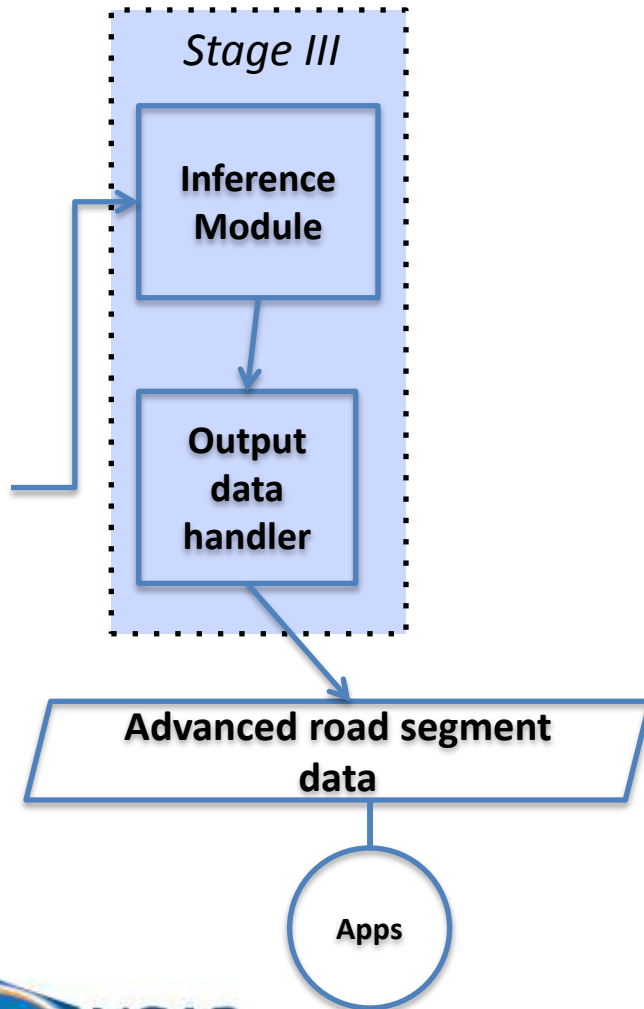


- Ingest ancillary data for QC and Stage III
- Quality Checks
 - From *Clarus*: Sensor Range, Spatial, Climate Range
 - New Mobile Data Tests: Data Filtering (tunnel, slow speeds), Model Analysis, Neighboring Vehicle, Combined Algorithm
- Combines point data into basic road segment products
 - Temp range, speed, etc

Vehicle Data Translator (VDT) – Version 3.0



Vehicle Data Translator (VDT) – Version 3.0



- More sophisticated road impact information
- Precipitation Type and Intensity: combines basic vehicle (e.g. wiper, temp), weather radar and satellite data
- Visibility: combines basic vehicle (e.g. headlight, wiper, temp), satellite and fixed weather station data
- Pavement Condition: combines more vehicle (e.g. ABS, traction, etc) , weather radar and satellite

APPLICATIONS – IMO Project



Barcode	TrackID	Miles	Shots	Materials	
AE	AT-267509	98.7	4.9	11074 lbs 50#	More Details...
TPUR220	AT-267509	95.2	2.7	11203 lbs 50#	More Details...
TPUR228	AT-267509	2.6	0.1	220 lbs 50#	More Details...
TPUR401	AT-267509	0.0	0.0	None	More Details...
TPUR229	AT-267509	0.3	0.1	10 lbs 50#	More Details...
TPUR226	AT-267509	0.5	0.1	10 lbs 50#	More Details...
TPUR236	AT-267509	0.1	0.0	None	More Details...
TPUR311	AT-267509	0.0	0.0	None	More Details...
TPUR340	AT-267509	0.0	0.0	None	More Details...

All Rows / Track AT 267509
Miles / Shots:
• 50#7 → 26.7 mi / 4.9 sh
• 50#2 → 2.0 mi / 0.0 sh
• 50#1 → 10.1 mi / 0.0 sh

Material Usage
• 50#7 → 12203 lbs (5.78 tons)

Compacted Material Usage
• 50#7 → 11554 lbs (5.18 tons)

End of Shift Reports – MnDOT

- Material Management
- Efficiency

Observation assimilation

- Accurate pavement temperature modeling
- Fill in the gaps between fixed stations

MDSS

- Where do the roads need treatment?
- Real-time pavement temperatures

VDT 3.0 Development

- Algorithm tuning and development
- Quality Checking refinement

APPLICATIONS



VDT-based weather alerts

- ❖ Impending weather hazards
- ❖ Alerts from other vehicles
- ❖ Re-routing
- ❖ Decision support

Not just for the everyday driver!

APPLICATIONS



Road Maintenance – Where are we losing the road to ice?
When should we paint or repair?

APPLICATIONS



Road Maintenance – Where are we losing the road to ice?
When should we paint or repair?

Route Specific Impact Warnings for...



APPLICATIONS



Road Maintenance – Where are we losing the road to ice?
When should we paint or repair?

Route Specific Impact Warnings for...



School Buses



APPLICATIONS



Road Maintenance – Where are we losing the road to ice?
When should we paint or repair?

Route Specific Impact Warnings for...



School Buses



Truckers



APPLICATIONS



Road Maintenance – Where are we losing the road to ice?
When should we paint or repair?

Route Specific Impact Warnings for...



School Buses

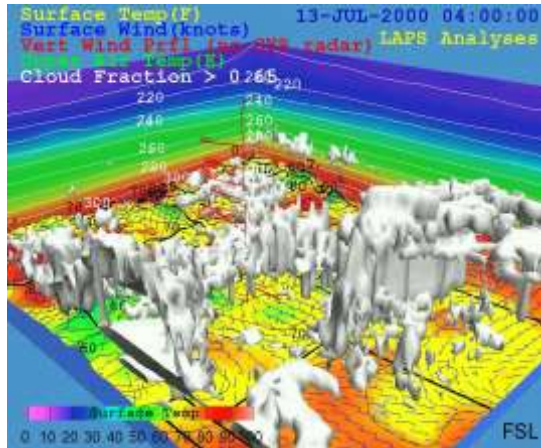


Truckers



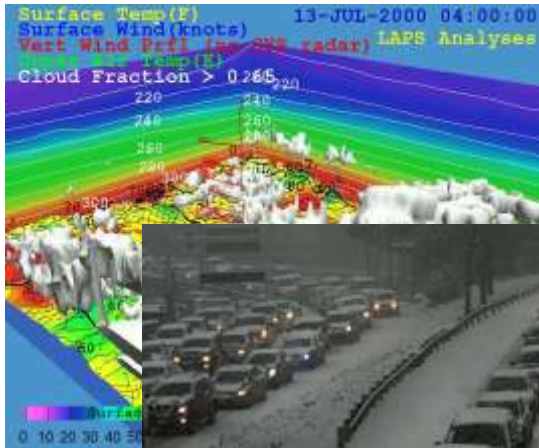
EMS

More APPLICATIONS



Numerical Weather Modeling

More APPLICATIONS

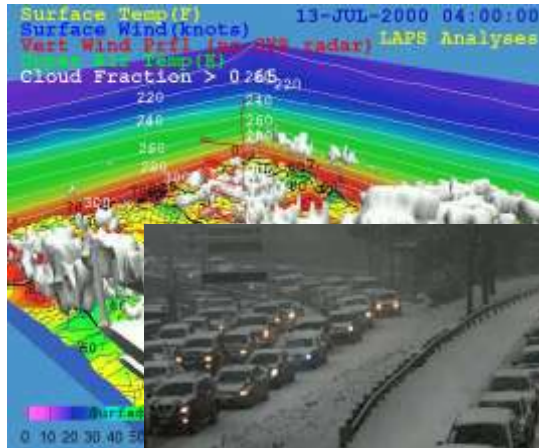


Numerical Weather Modeling



Traffic Modeling and Alerting

More APPLICATIONS



Numerical Weather Modeling



Traffic Modeling and Alerting



Weather Modeling – complex terrain

More APPLICATIONS



Numerical Weather Modeling



Traffic Modeling and Alerting



Weather Modeling – complex terrain



Other surface transportation users

Thanks!



RAL home research technology people/org publications events pressroom for staff

NCAR Connected Vehicles | RAL Google Custom Search Search RAL advanced

You are here: NCAR • RAL • WSAP • Connected Vehicles

Overview	Connected Vehicles
Publications	Objective
Presentations	To develop an understanding of the feasibility of utilizing Connected Vehicle weather-related data elements in weather application development.
Press	
Contacts	Description

The use of vehicles to collect weather data offers an opportunity to revolutionize the weather enterprise by significantly increasing the density of weather observations near the surface and providing unique datasets for deriving and inferring road condition information.

Nonetheless, the use of data from vehicles poses significant technical challenges, particularly with respect to data quality and quantity. The amount of data potentially flowing through a vehicle-based data network could be immense and it is likely that many prospective users will not be capable of handling the vast quantities of data that are expected. Applications (middleware) must be implemented to facilitate the use of vehicle-based weather data because the feasibility of utilizing vehicle probe data will be lower and there will be substantially more risk in its use without such a function.


Projects Related to:

SURFACE TRANSPORTATION

- Maintenance Decision-Support System (MDSS)
- Connected Vehicles
- Clarus QCh Algorithms
- Railway Weather

Main project sponsors

Intelligent Transportation Systems Joint Program
Office - U.S. Department of Transportation



http://www.rap.ucar.edu/projects/connected_vehicles/

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