

ITS Rocky Mountain

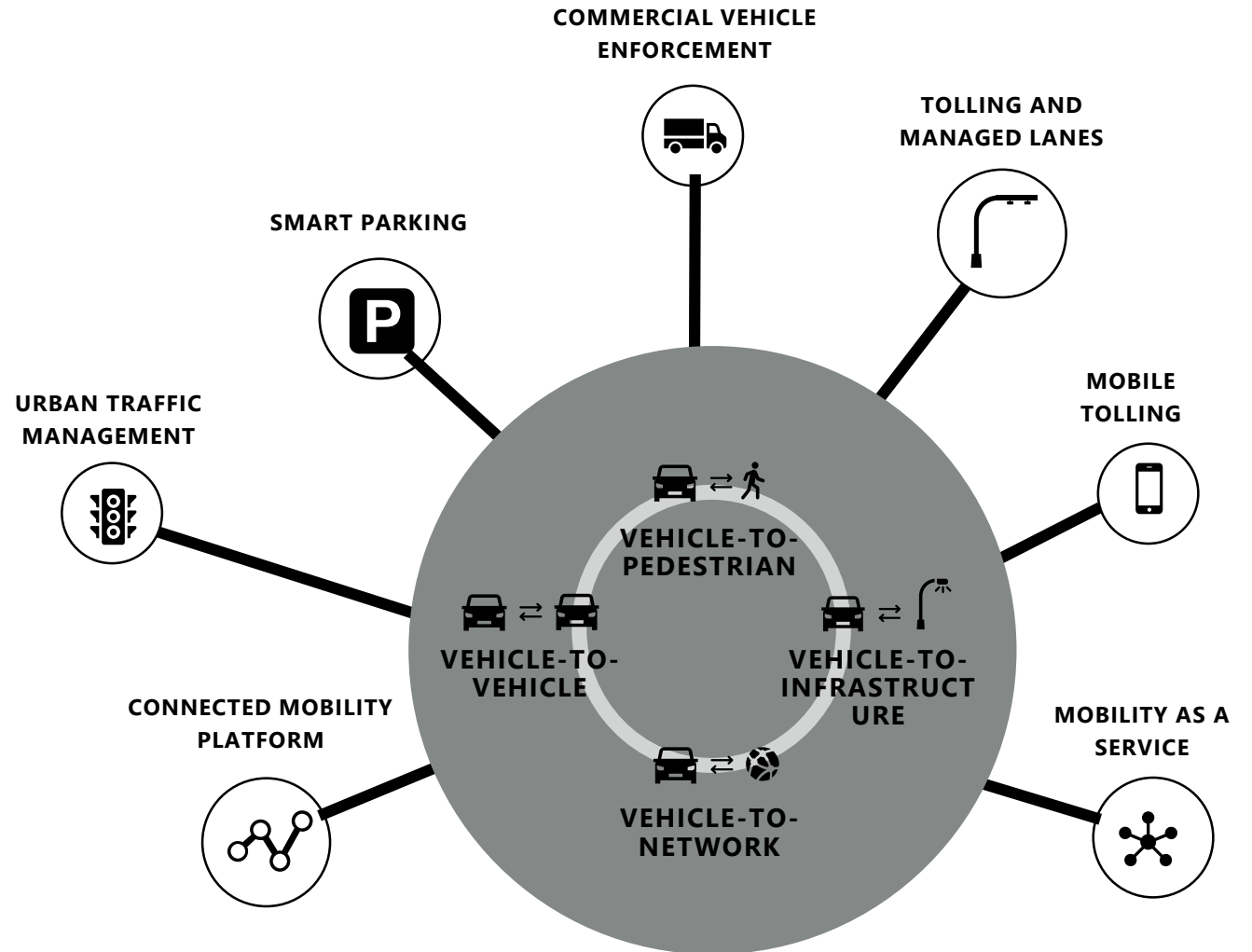
*Annual Meeting
September 17, 2019*



Agenda

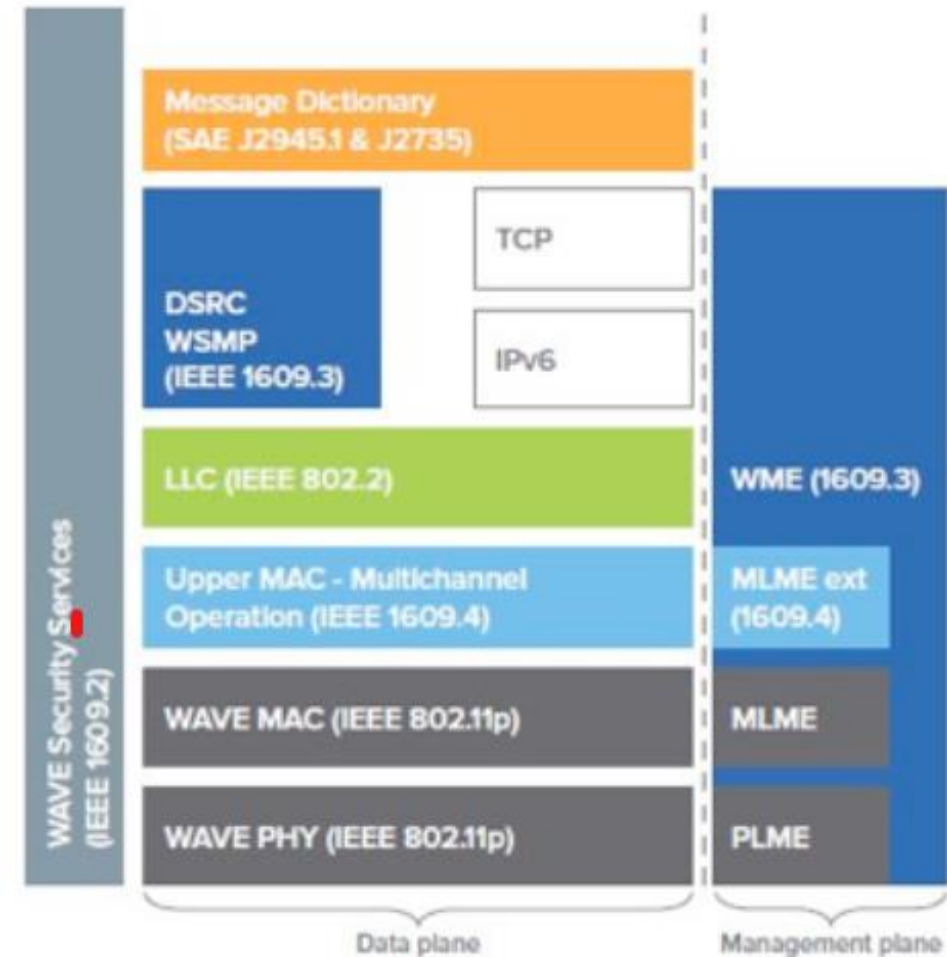
- > Interoperability
- > Technology
- > Operationalizing

CONNECTED VEHICLE ENABLES TOMORROW'S TRANSPORTATION EVOLUTION



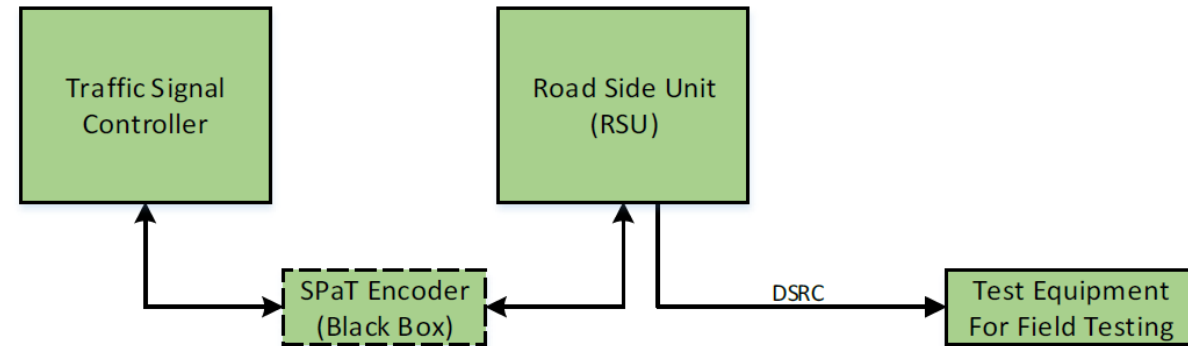
- > Standards and national certification bodies are meant to help
 - > USDOT RSU 4.1 Specification
 - > Omni Air
 - > SAE/IEEE/ISO/3GPP

- > SCMS introduces another layer of complexity



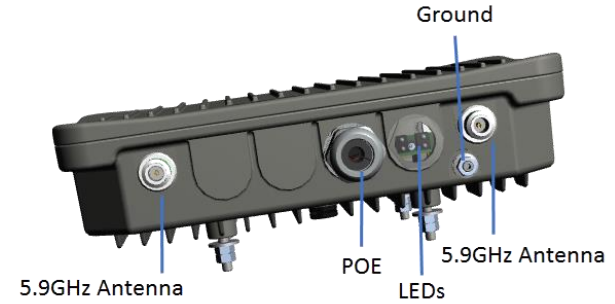
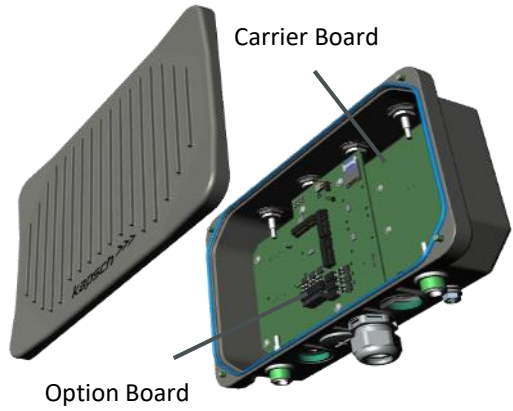
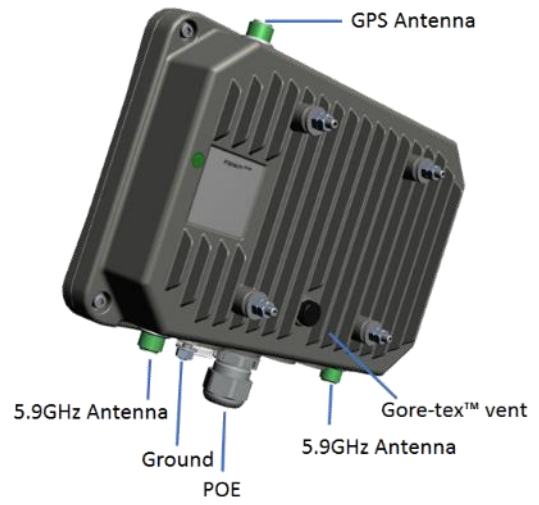
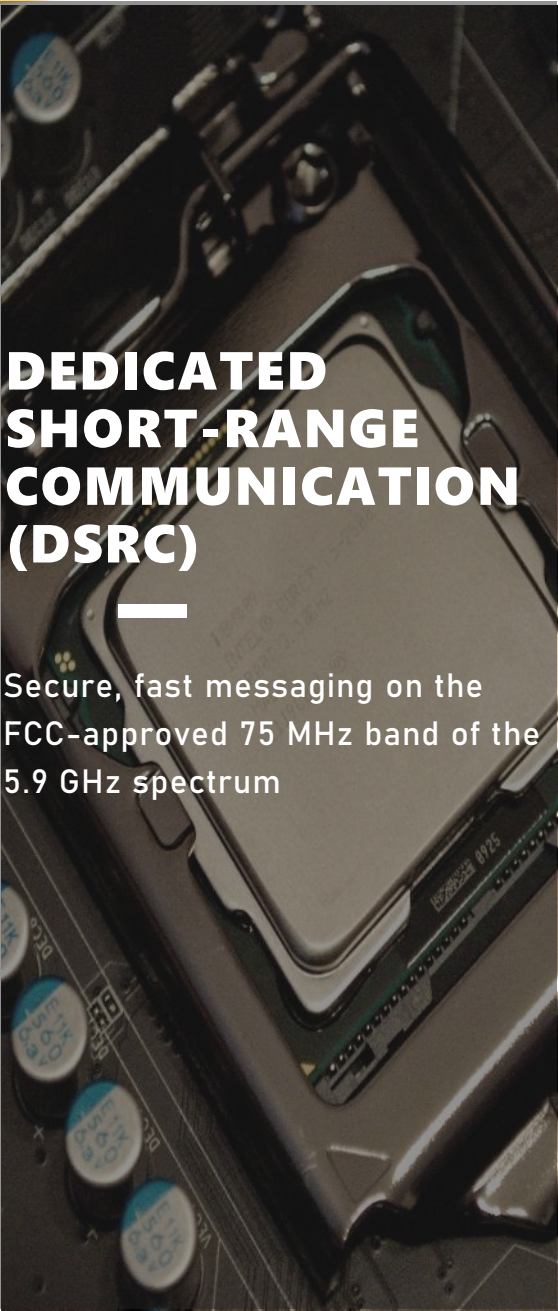
Interoperability – It's not all it's made up to be!

- > What's gone wrong
 - > Data set interpretation
 - > Interfaces implemented differently
- > What's gone right
 - > Florida DOT D5 SR-434/PedSAFE/I-75 FRAME
 - > Standardized testing approach
 - > Product qualification
 - > Smart Columbus
 - > Marysville, OH



DEDICATED SHORT-RANGE COMMUNICATION (DSRC)

Secure, fast messaging on the
FCC-approved 75 MHz band of the
5.9 GHz spectrum



RIS-9160 ROADSIDE UNIT



**FLEXIBLE MOUNTING
OPTIONS**



**MEETS OR EXCEEDS
ENVIRONMENTAL
REQUIREMENTS**



**HSM FOR SECURE
CERTIFICATE STORAGE**

CELLULAR V2X (C-V2X)

C-V2X is a new technology that allows direct safety communication independent of cellular network. It features enhanced range and reliability for direct communication without network assistance



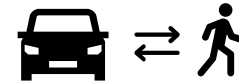
ENHANCED RANGE AND RELIABILITY



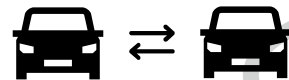
COST EFFICIENT



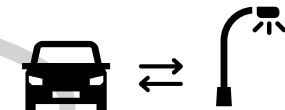
FORWARD-COMPATIBLE EVOLUTION TO 5G



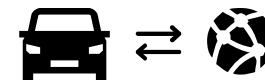
VEHICLE-TO-PEDESTRIAN



VEHICLE-TO-VEHICLE



VEHICLE-TO-INFRASTRUCTURE



VEHICLE-TO-NETWORK

What does an agency do with the data?

Product Vision



Corridor Management Platform

A transportation data aggregation, warehousing, and processing platform that enables data sharing, advanced analytics, and application development in support of the connected mobility ecosystem



SCALABLE



EXTENSIBLE



MAXIMIZE
EFFICIENCIES
PROPRIETARY AND CONFIDENTIAL



MAXIMIZE SAFETY &
SECURITY

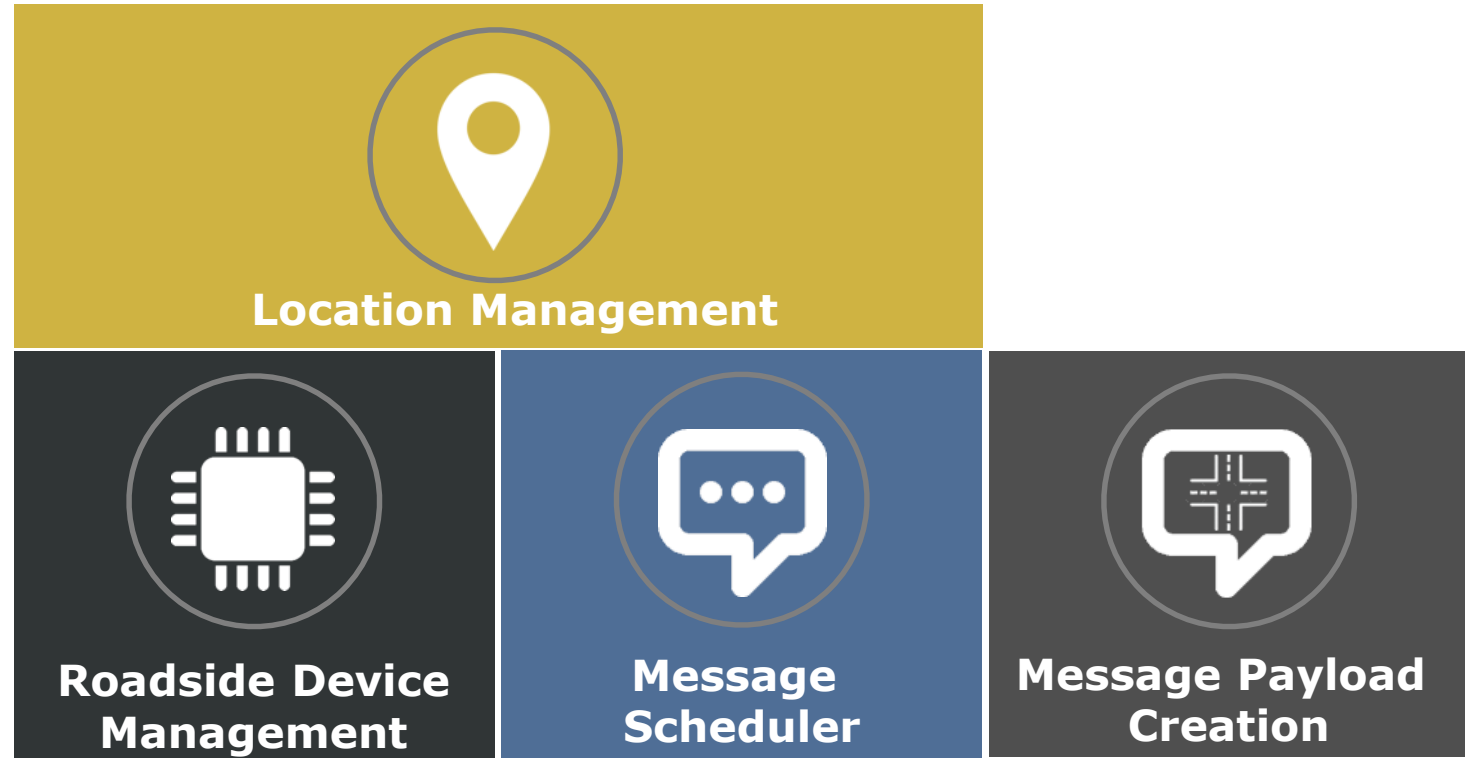


FAST, ACTIONABLE
INSIGHTS

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Corridor Management – Managing Roadside Units and Outgoing Roadside Messages

- Locations Identify intersections or road segments where multiple devices may reside (RSUs, Traffic Controllers, etc.)
- MAP and TIM/RSM messages and message scheduling are associated with locations and will be transmitted via any/all RSUs associated with that location.
- MAP and TIM/RSM message payloads can be generated via the MAP/TIM/RSM creation tools.
- Messages can be scheduled for transmission via multiple RSUs over multiple locations.



CMM – Managing Incoming Messages – Live Data

View BSMs, PSMs, MAP, TIM, SPaT, and Ped Light data Live



- > Visualize data generated from the corridor
- > Make available for existing and future systems
- > Envision predictive and proactive use cases
- > Leverage data across entire transportation ecosystem

The screenshot displays the Kapsch CMM interface. On the left, a sidebar shows details for 'Test Location 1238', including its name, coordinates (38.847844, -77.373480), time zone (Pacific Standard Time), and location status (Errors). Below this, a list of devices is shown: 'Test 1235' (RSU) with a red dot and 'errors - No Heartbeat', 'RSU Test 33388' (RSU) with a green dot and 'Everything looks fine', and 'Metering Equipment' (RSU) with a green dot and 'Everything looks fine'. A 'Messages' section shows 'Test Message 12' with details '44 | MAP | 11/22/2018 - N/A'. At the bottom of the sidebar are 'EDIT' and 'REMOVE' buttons. The main area is a map of El Camino Real, showing various data points represented by icons (cars, pedestrians, etc.) and blue arrows indicating traffic flow. The map includes street names like Mill Rd, Page Mill Rd, and El Camino Real, and various landmarks and businesses.

Closing

- > Don't underestimate the interoperability challenge
- > Watch the technology market closely
- > Consider operational benefits and challenges

Thank you.

Steve Sprouffske
National Practice Lead, Connected Vehicle Services
Steve.sprouffske@Kapsch.net

Kapsch TrafficCom

Kapsch TrafficCom North America
8201 Greensboro Drive, Suite 1002
McLean, VA 22102
USA
Phone: +1 760.525.5454


www.kapsch.net

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Services and Products




V2V

- Collision avoidance
- Emergency electronic brake light
- Emergency vehicle approaching
- Video exchange



V2I

- Intersection Warning
- Warnings: Speed, Construction Zone and School Zone
- Emergency communications
- Transit priority
- Emergency vehicle preemption

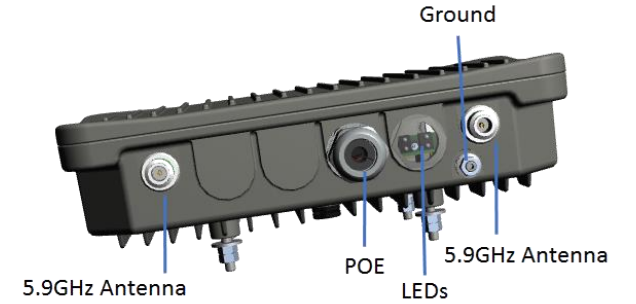
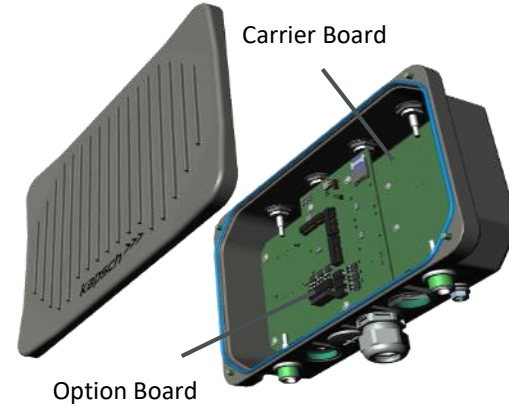
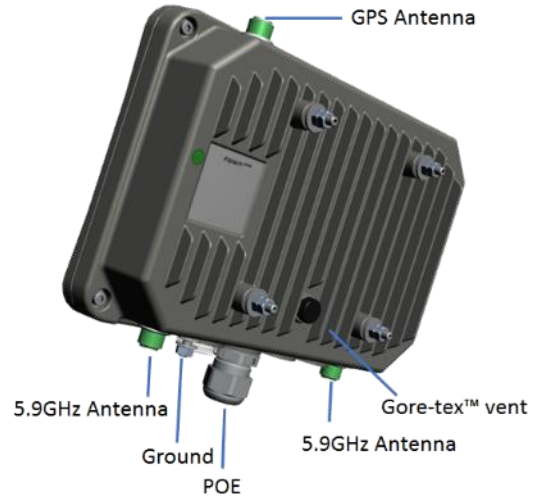


V2P

- Pedestrian warning
- Pedestrian in intersection

DEDICATED SHORT-RANGE COMMUNICATION (DSRC)

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kapsch >>>
challenging limits

RIS-9160 ROADSIDE UNIT



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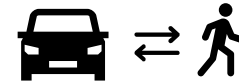
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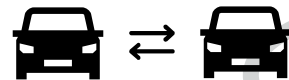
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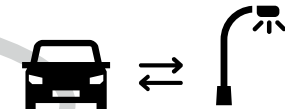
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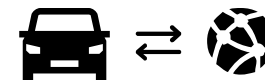
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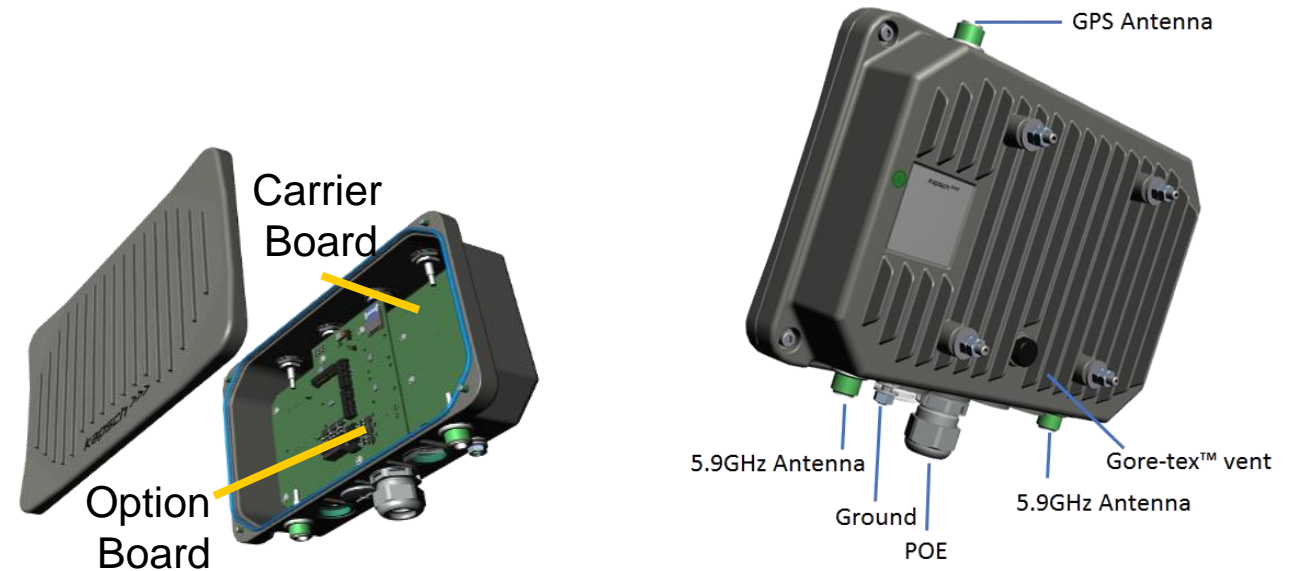
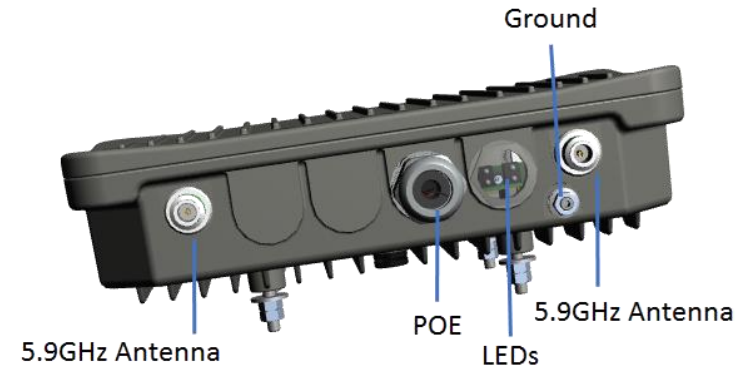
VEHICLE-TO-INFRASTRUCTURE



VEHICLE-TO-NETWORK

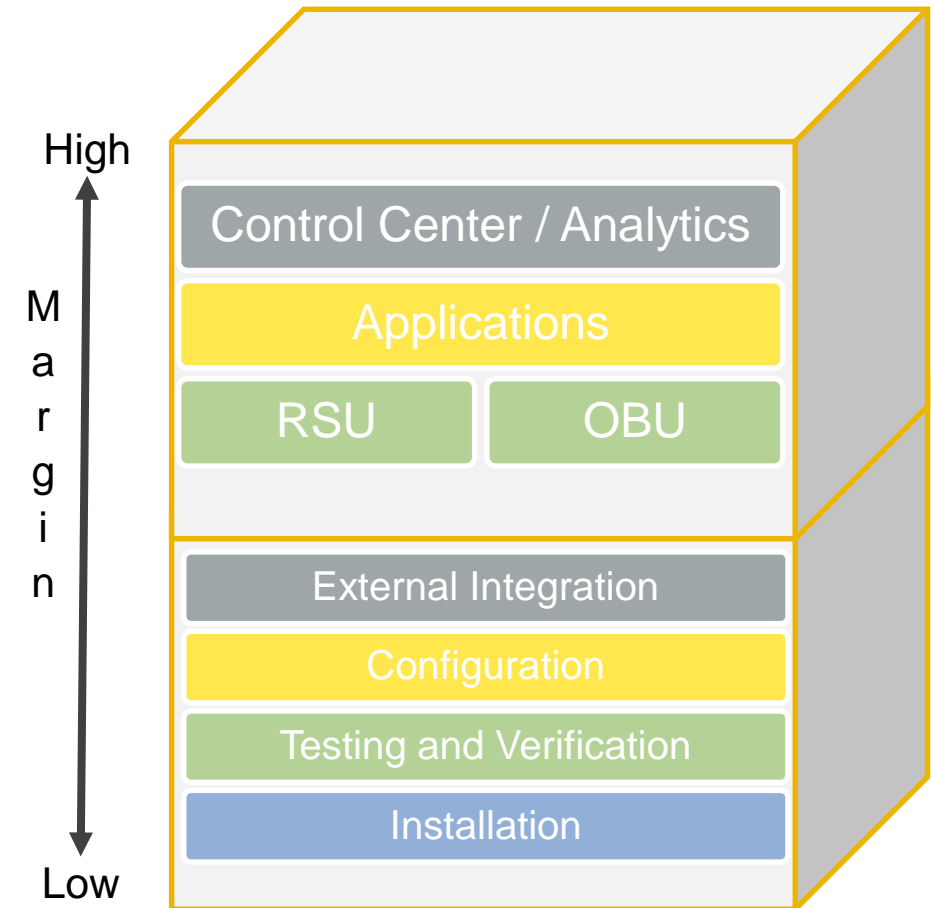
RIS-9260 C-V2X RSU

- > Same physical characteristics as the 9160
- > C-V2X and DSRC supported
- > Multi-mode operation available soon
- > QC 9150 chipset
- > Delivered 125 units to Colorado for deployment on the I-70 Mountain Corridor west of Denver

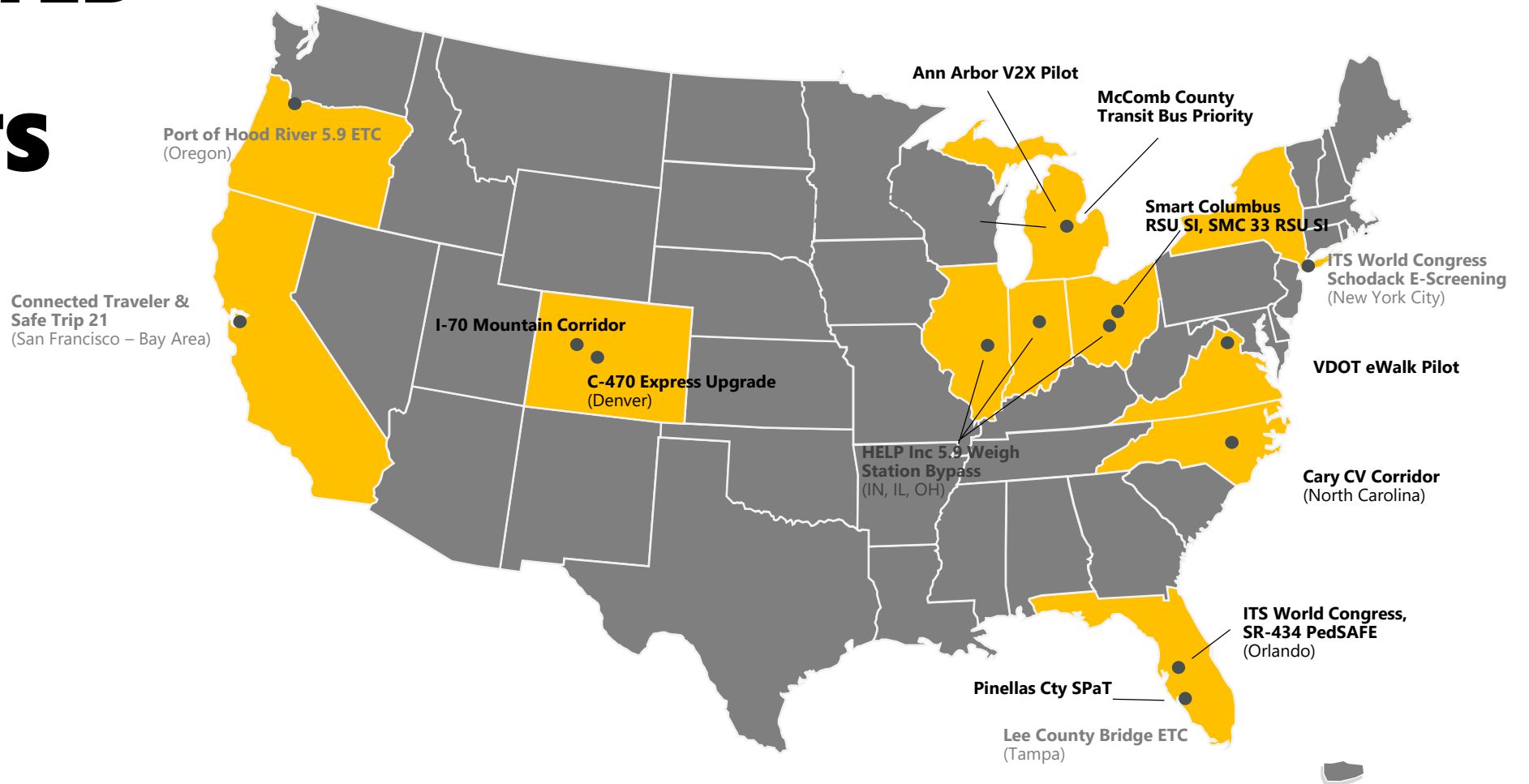


CAV Services Strategic Focus

- > Provide high margin data-centric operational services at scale
 - > V2X in a Box (V2XaaS)
 - > Safety and mobility focused services (V2I, V2N, V2P)
 - > Data analytics
- > Assuming Component Sales or Distributorship will continue but not the primary focus of this plan



UNITED STATES CONNECTED VEHICLE PROJECTS



CANADA CONNECTED VEHICLE PROJECTS



CV Sales Activity



2019 Active Pursuits		
Dallas Cintra	CV Ecosystem	\$10,500,000.00
I-66 CV	Potential for CV as sub to INDRA	\$1,500,000.00
NY City	Congestion Pricing RFP – CV only portion of solution	\$400,000.00
Kentucky CV Corridor	DSRC RSU, Installation services	\$265,000.00
LA Metro Pilot	Intersection and Ped safety and mobility	\$-
LACDPW eWalk	Ped safety	\$46,000.00
Econolite	SC3, SCMS and Support for Cary	\$225,011.00
H407	SC3 and SCMS	\$117,926.00
Sumitomo	Internal Demo System	\$28,527.00
Equipment Sales	CVV, RSU and OBU	\$57,739.00
Georgia	RSUs	\$500,000.00
Utah Statewide	C-V2X RSU – 150	\$540,000.00
WSP	MNDOT Snowplow Signal Priority	\$46,453.00
		\$14,226,656.00

Recent Awards		
Pinellas County Florida	CV Corridor	\$267,045
Equipment Sales	CVV, RSU OBU	\$42,736
Econolite / Ohio TRC	Pinball – Custom Light Control plus OBUs & RSUs	\$121,000
Columbus RSU	RSU Corridor in Ohio	\$950,000
Calgary	CV Corridor with Emergency Preemption (PoC Pilot)	\$198,634
Ohio DOT Smart Corridor 33	R33 (Submitted as Sub)	\$500,000.00
Total		\$2,079,415

Key Initiatives



> Strategic

- > V2XaaS
- > Trusted Partner / Distributorship
- > OEMs
- > MNOs
- > Data service providers
- > Strategic account regional projects

> Corridor level services

- > Fusion of legacy and connected data driven use cases
- > “Aftermarket” OBU
- > DSRC and C-V2X platforms
- > RSU
 - > Omni-Air certification in September
 - > C-V2X only variant