Decision Zone Detection and Red Extension with Vantage Vector® Post-Webinar FAQ

Thank you for attending the Decision Zone Detection and Red Extension with Vantage Vector webinar hosted on March 4, 2021. If you missed the webinar, you can view the recording **on demand here.**

In this webinar, our speakers, Nader Ayoub, P.E., and Allison Palumbo, P.E., discussed the challenges of protecting motorists in the decision zone and presented advanced strategies using the Iteris Vantage Vector hybrid video and radar sensor to help prevent rear-end and right-angle collisions.

The webinar was highly attended and resulted in a high volume of questions and inquiries submitted during and after the event. We have answered all questions and organized them below by category.

If you have additional questions or would like a demo of any systems, please contact marketing@iteris.com.

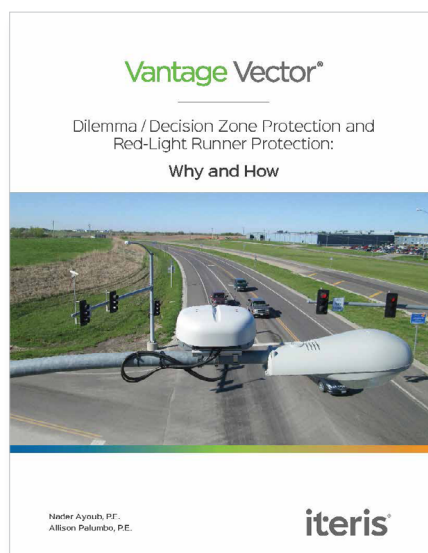| **1**	**2**	**3**	**4**
Decision Zone Detection	Red Protect / Red Extension	Decision Zone Detection and Red Protect	Vantage Vector

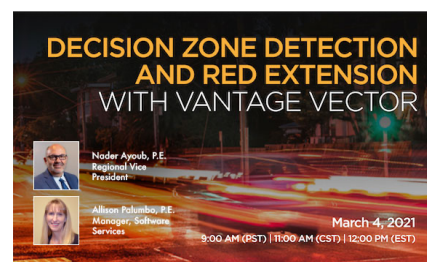## Additional Resources

Vantage Vector: Dilemma/Decision Zone Protection and Red-Light Runner Protection Manual

City Of Lakeland Leverages Iteris' Smart Mobility Solutions For Intersection Safety

View the Webinar Recording on Demand

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① Decision Zone Detection

Q: How does the controller receive the input for the varying extensions for the respective trip lines? Does the Vantage processor hold the call/output as the "Extension"?

A: That is correct. The detection processor recognizes a unique extension for each trip line or zone and uses it internally to control how long the detector channel input is "on" for the call it is sending to the controller.

Q: What passage/extension time is recommended to be programmed in the controller for phases with dilemma zone / decision zone detection? Some traffic signal plans we receive explicitly state passage times to be programmed, while others do not.

A: The passage/extension time for phases with decision zone detection should be to set to zero in the controller because the extension is handled by the detection processor. If an agency requires a specific extension time in the controller, the processor timing could be reduced to accommodate it.

Q: Does the green termination obey the minimum green? Or can the phase terminate at a time less than the min green?

A: Decision zone operation obeys all programmed timing parameters in the controller. The controller will not look for a gap in the decision zone until after the min green has been satisfied.

Q: Do you need to set up the stop bar presence detection to drop out?

A: Dropping out the stop bar presence detection after a gap is critical for efficiency. With the stop bar presence zone active, phases are kept green after all the vehicles on the approach have entered the intersection and the phase will not terminate properly for decision zone protection.

Q: What if the intersection is over capacity and you're trying to get as much efficiency as possible? Does that make this type of detection less influential at peak hours?

A: Typically, intersections that are over capacity do not have high approach speed at the same time as the oversaturated conditions. Lower speeds will not trigger the green extension. Also, the green extension will not go past the Max time set for the phase.

Q: During the presentation, was the chart with phase duration for free operation?

A: That is correct. The intersection shown was an isolated intersection running in free mode.

Q: Will this system work with coordination plans or is it meant for Free operation? How can this system be configured for coordinated phases that have a fixed yield point?

A: Decision zone protection controls when a phase can safely gap out to terminate the green, which occurs during free operation. Because coordinated phases do not typically gap out during coordination plans, a mode of coordination must be set in the controller that provides an actuated end to the coordinated phase.

For most controller manufacturers, there is a coord mode available that provides a non-actuated portion of a coordinated phase followed by an actuated portion. The amount of time allocated to the actuated portion is usually configurable by the user.

For example, in Siemens controllers, the Permissive Yield mode allows for a programmable yield period that serves as the actuated end of the coord phase. It is during this actuated portion of the coordinated phase, that decision zone detection would be applicable.

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Q: Would running the coordinated phases with an actuated portion reduce the side street delay?

A: Depending on your local controller software, running the end of the coordinated phase as actuated allows you to extend that phase if vehicles are in the decision zone. The coord phase would only extend when vehicles are on the approach so if it terminated early, the controller would service the cross-street sooner to effectively shorten the cross-street delay.

Q: Can the Vector provide decision zone protection for approach speeds greater than 55mph?

A: Yes. Please email marketing@iteris.com and we can provide you with Vantage Vector trip line settings for any higher speeds that you require.

Q: Is there a calibration involved for the decision zone such as free flow versus traffic congestion?

A: No. It is simply triggered by the speed and distance of the vehicle and is limited by the max timer in the controller. However, through much observation, what is often considered congested conditions (nearing saturation) do not have speeds high enough to trigger the decision zone detection.

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2 Red Protect / Red Extension

Q: Has Iteris tried to connect information collected and implemented with the Red Protect detection configuration with red-light enforcement?

A: Yes. The City of Lakeland, Florida has Red Protect implemented at intersections with red light enforcement [read the case study]. They have used the red-light enforcement to validate the SPM analytics, which visualizes and quantifies when, how often and for how long the Red Protect is triggered.

Q: Does the Red Protect time setting override the red clearance time programmed in the controller?
A: The programmed red clearance time is essentially the "minimum" amount of time that the red clearance will run. The Red Protect time will extend the red clearance timing up to the programmed "max" red extension time.

Q: When using this system can you program the standard phase red clearance to "0"?

A: No. The red clearance interval programmed in the controller is intended to provide safe passage for vehicles that enter the intersection legally. The red extension is only triggered if vehicles enter the intersection after the red is already on. Agency standard red clearance times should be programmed for normal operation when red extension is not triggered by a red-light runner.

Q: Should the controller be ATC compliant to handle the red extension?

A: Not necessarily. Red Protect / Red Extension is a feature that has been available in several controller manufactures for many years. Check with your controller manufacturer to determine which firmware versions have it available.

Q: Does the Red Protect detection work only with the Vantage Next processor or can it also work with older Edge2 processors?

A: The Vantage Vector sensor will work with the Vantage Next or Edge2 processors. On the Edge2 processor, Red Protect will be set up with a trip line where as with Vantage Next it can be set up with a speed sensitive zone.

Q: Can this Red Protect system distinguish between large trucks, which may not be travelling at the same speeds as cars but may still run the red light?

A: The radar currently does not distinguish between large trucks and vehicles.

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Q: Would it be correct to say that an agency failing to implement Red Protect is assuming liability when both detection and controller technologies are available?

A: We do not feel that the agency takes on any additional liability if the feature is not used. The use is dictated by agency standards of operations.

Q: What happens in case of failure to operate. Does the system have a fail-safe mechanism?

A: If no detection is working then the traditional controller timings, which are still programmed in the controller, continue to control the signal.

Q: Can you use the Red Protect feature during coordination? How does Red Protect work with coordination force-offs when the red is extended? Any issues with transition?

A: Yes. Red Protect can be used during coordination. The time that was used by the extension of the red clearance interval (typically 0- 3 seconds) is corrected within the following cycle. Newer controller firmware versions seem to do a better job at handling the extension time without causing transition. Some manufactures take time evenly from other phases proportionally and others will take it from the phase that follows the interval.

Q: What happens if the vehicle is decelerating or accelerating? Are you able to detect that? How does it affect the system?

A: If a vehicle is travelling or accelerates over a speed defined in the speed thresholds, it will be detected. The Red Extend timer will start timing down when the vehicle leaves the zone or is no longer in the defined speed threshold.

Q: Would you say that this solution is a stopgap measure until ITS solutions like GLOSA patch this problem (provided drivers follow the advisories) or would you say that this solution has the potential to complement ITS solutions like GLOSA?

A: These solutions will be used even after advisory messages are being received by drivers. Drivers that do not pay attention to the advisories will still have the potential to be in a crash.

Q: How are driver expectations affected by the Red Protect feature?

A: Drivers only see what they are used to seeing and expect to see (simply a green indication, then a fixed yellow interval, and then red).

Q: Does extending the red risk encouraging bad driver behavior, especially at other intersections that are not equipped?

A: No. Drivers cannot tell that the red extension is in effect and can still be ticketed for entering the intersection on red.

Q: How will the Red Protect features interact with preemption for fire or railroad?

A: Preemption should override all timing parameters and will operate as designed but you may want to verify it with your controller manufacturer.

Q: Which controllers are capable of using the input from Vantage Vector to provide red interval extension?

A: Iteris is currently using Red Extension with Siemens, Econolite and McCain controllers. Intelight also has this feature. Please check with other controller manufacturers to learn if the feature is available.

Q: How well is this system received by law enforcement, depositions or in court?

A: The laws on what constitutes a red-light violation are clear and have no conflicts with this approach. In the 15+ years of using this controller feature, we have not had any challenges. What is actually new here is the introduction of a new sensor (Vantage Vector) that makes this approach much easier to implement.

Q: There is a MAX RED setting in Econolite Cobalt controllers. Do you have a recommended setting for this parameter?

A: Yes. The controller software has limits of how long the red can be extended. The amount of extension depends on the distance needed to travel to be out of a conflicting vehicle path. It should be at least the time it would take to travel from the detector through the intersection. Depending on the distance of the detection and width of the intersection, it will probably be around the range of 5 seconds.

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Q: When using the Red Protect / Red Extend, do you expect that it will get activated every cycle? Are there settings to ensure it will only be used when absolutely necessary?

A: It will not extend every cycle. In our experience, it is triggered about 40 times per day at a heavy intersection. Adjusting the detection parameters can adjust the number of times it is triggered. Lowering the threshold speed will cause it to trigger more often and raising the threshold speed will cause it to trigger less often.

Q: Have any safety issues been experienced for pedestrians?

A: When Red Extension is activated, the pedestrian movements are delayed along with their corresponding vehicle phases.

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3 Decision Zone Detection and Red Protect

Q: What type of intersection controller will be able to accomplish all these features? Have you identified non-compliant controllers to do this functionality?

A: All controllers can do decision zone protection because the setup only uses basic controller timings. For Red Protect, we have not identified any specific controller manufacturers that do not have the feature.

Q: How will this interact with transit signal priority (TSP)?

A: Transit Signal Priority (TSP) will override the green timing so that the phase will not gap out due to decision zone detection. However, if vehicles enter the intersection during red clearance interval, the red would be extended if the feature is programmed.

Q: Is there a way to model the signal's behavior with the Vantage Vector in signal modeling software, like Synchro?

A: Not at this time.

Q: Can this be calibrated to highly mixed traffic conditions such as those in India?

A: Yes. The system is monitoring presence (with the video detection at the stop bar, including all vehicles and bikes), and vehicle speed with the radar on the advanced approaches (any type of vehicle including bikes).

Q: Do controller manufacturers/cities modify the parameters set by Iteris to fit in with local contexts where applicable (i.e. a bend before the junction which would mean a lower average speed of traffic)?

A: Yes. The local agency makes fine tuning adjustments to adjust for field conditions. For example, if the posted speed is 45 but local observation shows actual speeds ranging higher (or lower) then adjustments can be made to the design.

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4 Vantage Vector®

Q: Is the "trip line" a type of advanced detection?

A: Yes. Trip line detectors can only be used for advanced detection, not stop bar presence.

Q: Can you create trigger line zones that overlap?

A: No. Trigger lines have to have some separation.

Q: What if two approach lanes are for a left turn and separate right turn? Does the trip line cross both lanes?

A: The trip line could cross both lanes if both lanes are same phase but not if separate phases.

Q: Do Vantage Vector advanced detectors collect speed and occupancy data? If so, do you have a central software to pull the data?

A: The Vantage Vector sensor combined with the Vantage Next detection platform offers 16 lane-by-lane radar detection zones that can provide speed and occupancy data through our VantageLive! software.

Q: The vertical and horizontal lengths of detection zone seem to be adjustable. How will the different lengths influence the design?

A: The length of the zone will affect how long a vehicle is detected within the zone. The extension time programmed starts counting down only after the vehicle leaves the zone. When calculating the amount of extension necessary for a particular zone, this distance is taken into account.

Q: Are the radar zones lane-by-lane?

A: The trip lines are not lane-by-lane but the 16 radar zones provided by the Vantage Vector on the Vantage Next detection system are lane-by-lane. The radar zones can also be used for this type of operation.

Q: Are the 16 zones per unit, per radar, or per video detector?

A: The 16 zones are radar zones per sensor (approach), which are available in addition to the 32 video zones per approach and 5 trip lines per approach.

Q: Is the VantageLive! system still cloud-based?

A: Yes. VantageLive! is a cloud-based solution.

Q: How big of a problem is vehicle occlusion with both types of radar, such as a car following a large truck? Additionally, is the vehicle length accounted for in the red extension since it will take slightly longer to clear the intersection?

A: Closely spaced vehicles (especially a truck followed by a closely space car) can experience occlusion. In this case, the detection would turn on when the lead vehicle enters and will stay on until the last vehicle leaves the zone. The on-time will be accurate but the count from the zone will not increment for the second vehicle.

Q: Is there an optimum placement of the sensor for this system if you have 6 lanes in your approach?

A: Typically, a 6-lane approach has a dual left. In these cases, we might suggest placing the camera near the lane line that separates the through lanes from the left-turn lanes (or just toward the shoulder on a narrow cross street distance).

Q: Do all approaches have to have Vantage Vector sensors to use this on the main streets?

A: Many agencies only use the Vantage Vector on high-speed approaches. It can be operated on the same processor as traditional cross-street cameras.

Q: What type of data collection is possible with the Vantage Vector?

A: The Vantage Vector sensor on the Vantage Next detection platform provide intelligence that no other sensor or combination of sensors can offer. Data collected includes: turning movement counts, approach volumes, ATD/AADT, approach speeds, bike counts, pedestrian counts and speed and more.

The Vantage Vector is the optimal detection system for ITS applications, Signal Performance Measures (SPM) software and adaptive traffic control systems.

Q: Can you provide a free demo of the detection system?

A: Absolutely. Please email marketing@iteris.com if you have any questions or would like a free product demonstration.

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