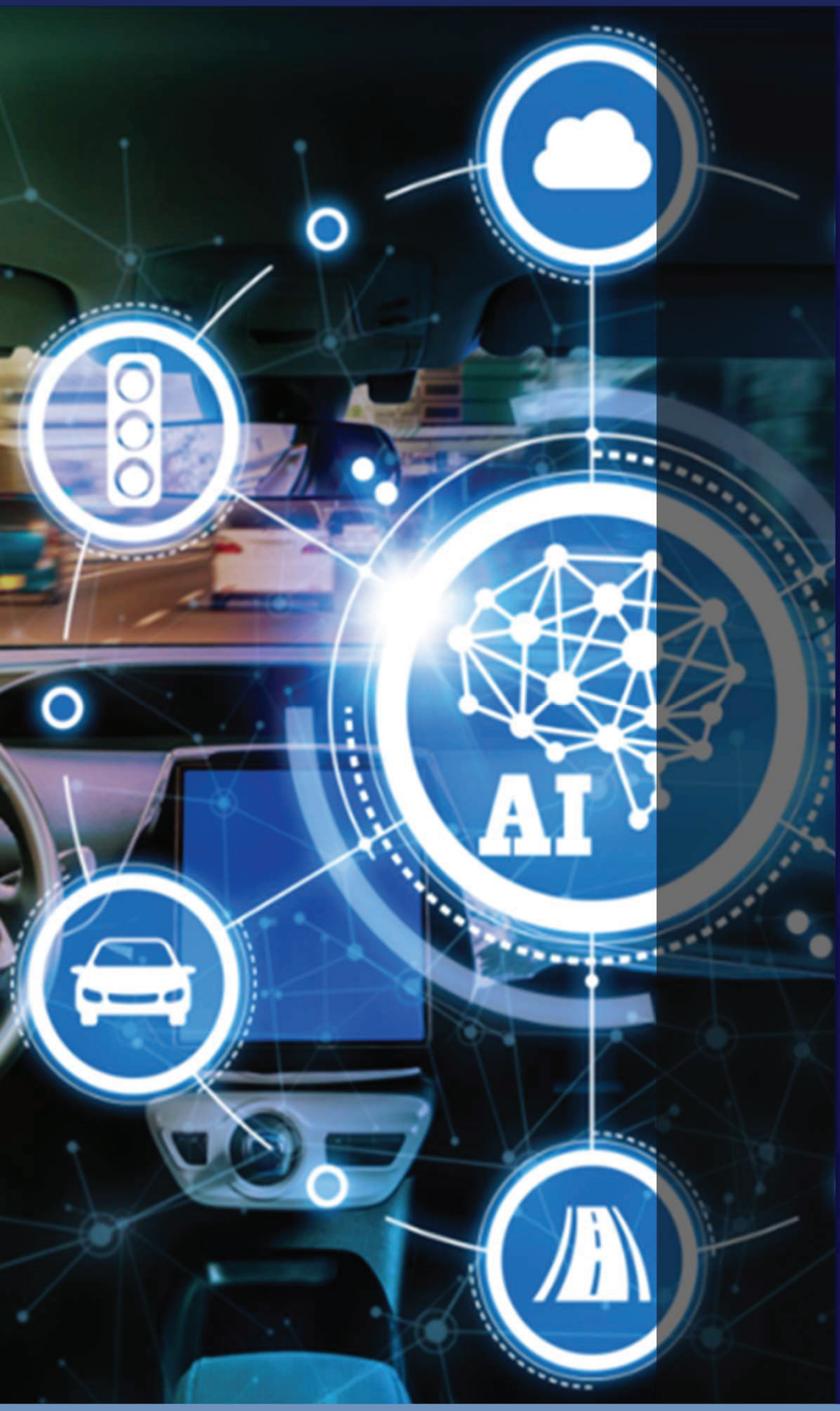
BLUE-BAND



ADVANCED INTEGRATION Device

(AID)

Minimum Product Specifications

Integrator - AI

PS-002

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ADVANCED INTEGRATION DEVICE – (AID)
MINIMUM PRODUCT SPECIFICATIONS

Section 1 AID ADVANCED INTEGRATION DEVICE SUMMARY

(a) The Advanced Integration Device (AID) provides agencies with unprecedented Integration of transportation technologies. You are no longer constrained to the limited scope of independent device features. Configure smart logic outputs (triggers) to produce cohesive behaviors between devices and services that are used to accomplish specialized transportation applications. Enhance existing intelligent infrastructure by allowing the (AID) to fill operational gaps. Device incompatibility with existing systems is no longer an issue. Agencies may now deploy a mix/match of products and connect them through a common interface using the (AID). Reduce development time by requesting driver creation for new technologies. Develop new drivers and sub-systems directly to the (AID) to enable challenging applications. The (AID) supports many transportation-adopted features, standards, and technologies to provide a wide range of uses and flexibility, making it the most versatile edge device in traffic.

Section 1.02 DEFINITIONS

(a) Speed – The rate of a traveling object. The unit of measurement as a minimum for speed shall be mph for vehicles and Inch/sec for pedestrians.

(b) Length – The extent of a traveling object from end to end. The unit of measurement as a minimum for length shall be in feet

(c) Occupancy – The duration of a traveling object occupying the area of detection. The unit of measurement, as a minimum for occupancy , shall be represented by a percentage of time, while in a defined detection zone.

(d) Classification – Assigned classifications - a number based on a range of a traveling object's lengths shall be able to provide FDOT 13 classifications.

(e) Headway – Time between the front of a leading object and the front of a trailing object. The unit of measurement as a minimum for Headway shall be reported in milliseconds

(f) Gap – Time between the rear of a leading object and the front of the trailing object. The unit of measurement as a minimum for GAP shall be reported in milliseconds

(g) Wrong Way – The event in which an object travels in the opposing direction of the intended flow.

(h) Origin – Starting point of a traveling, uniquely identified object within a segment of two points

(i) Destination – Ending point of a traveling, uniquely identified, object within a segment of two points

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(j) Uniquely identified – An object that can be specifically identified and tracked with either an arbitrary or technology specific, identifier

(k) BB2X (BLUE-BAND TO EVERYTHING) – software/hardware combinations that allow Integration with many different technologies, devices, and infrastructures.

(l) Unlimited – Unlimited unless constrained by a standard, product, hardware, or technology

(m) Lane – A passage defined with a specific name or identifying group of numbers.

(n) Approach – A meeting point for a collection of lanes with movement in the same direction.

(o) Zone – A common interface to reference a lane or approach, or a zone of detection

Section 1.03 MINIMUM REQUIREMENTS

(a) (AID)'s Vehicle Data Collection Requirements Shall provide speed min, max, average, and 85th percentile speed (in MPH) by lane, approach, and zone

(b) Shall provide occupancy min, max, average occupancy time (in milliseconds), and occupancy % by lane, approach, and zone

(c) Shall provide volume by lane, approach, and zone

(d) Shall provide length min, max, and average length (in feet) by lane, approach, and zone

(e) Shall provide headway min, max, and average Headway (in milliseconds) by lane, approach, and zone

(f) Shall provide gap min, max, and average gap (in milliseconds) by lane, approach, and zone

(g) Shall provide unlimited lanes, approaches, and zones

(h) Shall provide a count of wrong-way vehicles by lane, approach, and zone

(i) Shall provide axle counts of vehicles by lane, approach, and zone

(j) Shall provide multiple interfaces for consumption of the collected data including: NTCIP 1209, secured HTTP REST API, HTTP push, downloadable reports, GUI reports

(k) Shall provide the ability to have proprietary interfaces developed and deployed for the purpose of adding functionality to consume the collected data

(1.1) (AID) REQUIREMENTS FOR ACTUATED SIGNAL CONTROL

(a) Shall provide the ability to place, and clear, calls on traffic signal detector channels using multiple interfaces including (but not limited to): SDLC, contact closure, and standard traffic signal detector racks

(b) Shall provide the ability to place, and clear, calls for a minimum of 64 detector channels for each controlled traffic signal controller

(c) Shall provide the ability to place, and clear, calls on traffic signal phases using NTCIP 1202

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(d) Shall provide the ability to place, and clear, calls for 16 phases for each controlled traffic signal controller

(e) Shall provide the ability to read and generate load switch output states (Signal State: red, yellow, green, walk, and don't walk) using multiple interfaces including: NTCIP 1202 and SDLC

(f) Shall provide the ability to interface and control multiple traffic signal controllers, and models, concurrently

(g) Shall place calls on detector channels and phases when associated detectors fail

(h) Shall place calls, for at least one updated interval, for actuations that have cleared between detector channel and phase updates

(i) Shall provide the ability to manually call, and clear, detector channels and phases for the purpose of testing or manual control

(j) Shall be a driver/peripheral architecture with the ability to add proprietary interfaces developed and deployed for the purpose of interfacing with unsupported traffic control devices

(k) Shall provide the ability to control traffic signal detectors, and phases, with conditional logic such as checking an object's metadata, including (but not limited to): speed, length, dwell time, ingress, egress, detection zone, sensor, wrong-way, and near miss

(l) Shall provide an interface for external services to interface with a traffic signal controller through a secured HTTP REST API

Section 1.04 (AID) MINIMUM REQUIREMENTS FOR PROBE DATA

(a) Shall provide the ability to collect unique ID's from vehicles

(b) Shall provide the ability to collect unique ID's from pedestrian

(c) Shall provide the ability to relate the unique ID's to a location

(d) Shall provide the ability to allow the unique ID's to be accessed through a Rest API

(e) Shal provide the ability to interface with a SaaS travel time software system

Section 1.05 AID MINIMUM REQUIREMENTS FOR CV2X RSU OPERATION

(a) Shall provide the ability to provide pedestrian safety messages to the RSU

(b) Shall provide the ability to provide vehicular safety messages to the RSU

(c) Shall provide work zone safety messages to the RSU

(d) Shall communicate to the RSU using TCP/IP protocol

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Section 1.06 (AID) SUMMARY OF REQUIRED INTEGRATED CAPABILITIES

(a) The (AID) shall provide speed reporting
(b) The (AID) shall provide occupancy reporting
(c) The (AID) shall provide volume reporting
(d) The (AID) shall provide length reporting
(e) The (AID) shall provide headway reporting
(f) The (AID) shall provide gap reporting
(g) The (AID) shall provide Origin, Destination, and a unique identifier
(h) The (AID) shall provide lane and approach designation
(i) The (AID) shall provide wrong way detection reporting
(j) The (AID) shall detect stopped vehicles (true presence)
(k) The (AID) shall provide a contact closure output
(l) The (AID) shall provide SDLC Interface to signal cabinet
(m) The (AID) shall provide data push.
(n) The (AID) shall provide a Graphical User Interface (GUI)
(o) The (AID) shall store data collected
(p) The (AID) shall be able to accept input and report its location
(q) The (AID) shall provide communication wirelessly for network connectivity.
(r) The (AID) shall be IP addressable and communicate over (Ethernet) TCP/IP protocol
(s) The (AID) shall have the ability to be monitored remotely
(t) The (AID) shall apply logic to the data inputs and provide outputs based on the logic applied.
(u) The (AID) shall be able to post to a NTCIP digital messaging sign over TP/IP
(v) The (AID) shall be able to read SPAT (Signal Phase & Timing) data over SDLC from signal control peripherals and display detection actuation status and green, yellow, and red signal head status visualization
(w) The (AID) shall be able to directly interface with the traffic signal controller over TCP/IP and provide detection output information to the traffic signal controller using the NTCIP 1202 Standard.

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Section 1.07 INTEGRATED DETECTION SENSOR ACCURACY MINIMUM REQUIREMENTS

(a) **Volume Accuracy:** The volume data shall be within 5% of truth for a direction of travel during all conditions. Individual lane volume data shall be within 5% of truth during all conditions. The percentage of missed detection and the percentage of false detections for each lane shall not exceed 10%.

(b) **Occupancy Accuracy:** Occupancy data shall be within 10% of truth for any direction of travel on a roadway and shall be provided per-vehicle in seconds. For example, if the true occupancy of a vehicle in a detection area is 30 seconds, then the measured occupancy shall be between 27 seconds and 33 seconds. Individual lane occupancy shall also be within 5% of truth.

NOTE: SOME VALUES MAY BE CALCULATED BY THE INTEGRATOR IF THE INTEGRATED SENSOR DOES NOT PROVIDE ALL REQUIRED DATA

(c) **Length Accuracy:** The (AID) shall correctly determine length reported in feet for 90% of detected vehicles. The length data shall be within +/- 3 ft.

(d) **Speed Accuracy:** Individual car speed data shall be accurate to within +/- 5 mph for any direction of travel. Average speed data for any individual lane shall be accurate to within +/- 5mph. The (AID) shall provide per-vehicle speed measurements on 95% of vehicles. The (AID) shall provide per-vehicle speed measurements in which 90% of the measurements are +/- 5 mph.

Wrong Way Accuracy: The (AID) shall correctly determine if a vehicle is traveling opposite to the normal flow of traffic. Wrong-way may be identified by negative speed reporting or other wrong way designations. Wrong-way shall detect and report a minimum of 98% of the vehicles traveling the wrong way.

(e) **Probe Data Accuracy:** The (AID) shall detect Bluetooth ID's at a minimum of 98% accuracy in the (AID) detection area.

Section 1.08 MAINTENANCE

(a) **Maintenance:** The (AID) shall not require adjustment to maintain performance. Once the (AID) is configured, it shall not require additional manual recalibration to maintain the accuracy.

Section 1.09 PHYSICAL PROPERTIES

(a) **Physical Properties:** All external parts of the (AID) shall be Industrial rated for temperature. All fasteners exposed to the elements shall be type 304 or 316 passivated stainless steel.

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Section 1.10 POWER

(a) **Power:** The (AID) may utilize low power consumption upon request and be able to be powered by solar energy. The (AID) shall include a 12v DC power supply.

Section 1.11 OPERATING CONDITIONS

(a) **Operating Conditions:** The (AID) shall be capable of continuous operation over an ambient temperature range of -40°F to 165°F (-40°C to 74°C).

Section 1.12 TESTING

(a) **Testing:** The (AID) shall be tested using manufacturer limits of operations and shall meet the local agencies' specifications and guidelines for testing an (AID). The integrated vehicle detection sensor will be compared against ground truth data collected during the same time by human observation or by another method approved by the local agency.

Section 1.13 COMMUNICATION

(a) **Communication:** The (AID) shall communicate to the end user over Ethernet TCP/IP 10x100 base Tx. The (AID) shall have a RJ-45 port. The (AID) shall have the option for WIFI communication. All communication addresses shall be user-programmable. The (AID) may have one or more compliant DB9 connectors upon request. All wireless communications are secure and that wireless devices are Federal Communications Commission (FCC) certified.

Section 1.14 PROBE DATA (UNIQUE ID)

(a) **Identifier:** The (AID) shall utilize Bluetooth to establish a unique encrypted vehicle identifier, time, and location. The (AID) shall have the ability to report the same encrypted Bluetooth ID from origin of segment A to destination of segment A. The (AID) shall have the ability to filter unique Identifier by signal strength.

Identifier: The (AID) shall utilize Lidar to establish a unique encrypted Pedestrian identifier, time, and location. The (AID) shall have the ability to report the same encrypted Lidar ID from origin of zone A to destination of zone A.

Section 1.15 SOLID STATE DETECTION OUTPUTS

(a) **Detection Outputs:** The (AID) contact closure peripheral outputs shall meet or exceed the requirements of NEMA TS2-2003, 6.5.2.17. and/or the peripheral manufacturers' specifications.

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Section 1.16 CONFIGURATION AND MANAGEMENT

(a) **Configuration and Management:** The (AID) shall retain its programming in nonvolatile memory. The (AID) communication addresses shall be user-programmable. The (AID) shall accept multiple simultaneous user access with the ability to change previously defined parameters.

(b) The (AID) shall have a GUI interface accessed over the network utilizing a web browser.

(c) The (AID) shall have the ability to assign users and user access levels.

(d) The (AID) shall have the ability to download its configuration

(e) The (AID) shall have the ability to upload and restore or replace a configuration

(f) The (AID) shall have the ability to update its software/firmware by uploading a file

(g) The (AID) shall have the ability to add drivers or peripherals by uploading a file

(h) The (AID) shall only integrate with sensors and peripherals that provide a data output over TCP/IP

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