PUBLIC-INTEREST FINDING FOR PROPRIETARY-MATERIAL USE

ROUTE: VARDES NO: VAR
PROJECT NO: VAR COUNTY: VAR
PROJECT DESCRIPTION: Programmatic approval.
FHWA OVERSIGHT: ☒YES ☐NO
PROPRIETARY MATERIAL:
SmartSensor SS105 (microwave radar);
SmartSensor HD SS125
Manufactured by Wavetronix LLC

Remote Traffic Microwave Sensor (RTMS) G4
Manufactured by Image Sensing Systems, Inc.

1. Description of Need:

The ITS Technology Deployment Division of the Indiana Department of Transportation is seeking approval to create a recurring special provision and ultimately incorporate into the Standard Specifications equipment important to the detection and measurement of the traffic on Indiana roadways.

Desired materials are non-intrusive radar-based vehicle sensors. Installed on the side of the road, they provide capability to detect, count, determine speeds of passing vehicles, and, in some configurations, classified them.

Required functionality includes:

- Provide ability to monitor 8-12 user defined zones (lanes of traffic).
- Provide ability to detect presence of vehicle in the detection zone, count vehicles passing through the zone, determine speeds of vehicles, and classify vehicles.
- Provide ability to monitor up to 250 ft of road surface (across the lanes).
- Provide interface with existing network (TMC).
- Provide accurate, per-line data.

2. Product History:
These devices have been in use in Indiana for over 8 years. Over 200 of SS105, SS125, and RTMS G4 devices are currently being used in Indiana. They demonstrate very high reliability (over 96% uptime) and maintainability. Desired product is currently listed on INDOT Approved Materials List for Traffic Signal and ITS Control Equipment under ITS AFP Controller. Testing was conducted according the **ITM No. 953-10P**

3. Product Availability: SmartSensors, manufactured by Wavetronix LLC and RTMS G4 by Image Sensing Systems, Inc. are only product on the market, meeting all requirements.

Although there are many vehicle detecting microwave radar sensors, most of them are designed for different purposes. There were no attempts by the manufacturers to present their products to be tested to **ITM No. 953-10P**.

4. Product Cost: There is no equipment on the market, meeting the requirements, to make a cost comparison with. The next closest product is Microwave Vehicle Motion Sensor TC26-B manufactured by MS SEDCO and priced $3300.00. However, this device is not capable of counting, speed detection, and classification of the vehicles.

5. Project Compatibility: Desired products are the only products on the market that meet INDOT requirements for the vehicle detection and data compatibility with currently used Data Bases..

6. Maintenance: Desired equipment is very reliable. Current system allows for remote monitoring of the detection sites which drives the maintenance costs down. Training is available on line in Wiki Notes, accessible for tech personnel from any location in Indiana. Low failure rate (less then 5% including "acts of God") and short order turn around time results in the minimal storage requirement.

7. Engineering Analysis: This application is programmatic by nature and unique not to a specific ITS project, but to the ITS architecture that is already in place. Microwave radar sensors are essential components that allow monitoring of the live traffic volumes, speed, and clssification. The specifications are needed for synchronization with existing system and not unique to the specific project.

8. Expanded Economic Analysis: Due to the fact, that there is no equipment on the market to do comparison life cycle analysis, it may be stated that actual yearly maintenance cost is low. The average life cycle of the desired product is evaluated as 5 years. There are units currently in service installed in 2008. Annual replacement rate, including damage done by lightning, is 8 units with approximately 200 units being now in service.

9. Contractual or Performance Implications: Use of desired items does not impose any restrictions on the use of other items on the contracts.

10. Attach Supplemental Documentation: Attached are:

a) INDOT ITS Architecture;
b) ITM # 953-10P Microwave Vehicle Radar.

11. Length of Time that Approval is Effective: 3/1/2012 to 3/1/2014

Prepared By: Konstantin Veygman

Field Engineer

INDOT-ITS Technology Deployment Division

Date:

APPROVED: _____ Date: 3/27/12
INDOT ~~Deputy Commissioner~~ Director of
Engineering Services and Design Support

APPROVED: _____ Date: 3/27/12
Federal Highway Administration

INDOT has developed ITS infrastructure in urban areas statewide. It consists of vehicle detection, Closed Circuit TV cameras (CCTV), Highway Advisory Radio (HAR) sites, Dynamic (Variable) Message Signs (DMS), Travel Time Signs (TTS), and Virtual Weigh-in-motion (VWIM), Weigh-in-Motion (WIM), and Automatic Traffic Recorder (ATR) stations.

All data collected by the detectors and cameras is distributed to the Traffic Management Centers (TMCs). Information addressed to the driving public is sent from TMCs to the DMSs, HARs, and TTSs.

Communication to and from TMCs is provided via hybrid wireless/fiber optic means. The communication system is based on a "Back Bone", consisting of several nodes called Communication Data Processors (CDPs), connected with each other via redundant circuits (licensed wireless or fiber optic). The TMC is connected directly to the CDPs. Networking and communication equipment located at the TMC comprises the TMC Core Devices group. Field Core Devices installed at CDPs and major nodes include FCC Licensed and non-licensed wireless equipment, terminating and interfacing Fiber Optic equipment, and other networking equipment.

A typical INDOT ITS System consists of up to 3 distinguished groups of devices, described as follows.

1. Traffic Management Center (TMC) Core Devices. This group consists of major networking and communication equipment.
2. Field Core Devices. This group consists of FCC Licensed and non licensed wireless equipment, terminating and interfacing Fiber Optic equipment, and all networking equipment.
3. Field Devices. This group consists of:

    a) Public information devices: DMS, TTS, HAR;
    b) Detection devices: CCTV Cameras, non-invasive inductive detectors, microwave detectors;
    c) Communication and networking devices: field processors, radios, fiber optic equipment, field switches.
    d) Traffic Monitoring System devices: Virtual Weigh-in-motion (VWIM), Weigh-in-Motion (WIM), and Automatic Traffic Recorder (ATR): system controllers, roadway sensors, and communication and networking devices.

Existing ITS infrastructure is being expanded according with ITS Strategic Deployment Plan located at:
http://trafficwise.org/stratplan/TrafficManagementStrategicPlan_v2-4.pdf

Each ITS project involving Federal Funds adheres to the National ITS Architecture and the Systems Engineering Process as defined in 23 CFR 940. A Systems Engineering form is being completed and submitted to the FHWA for review and approval on each federally funded ITS project.

INDIANA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT

PROCEDURE FOR BENCH TESTING, FIELD TESTING, AND APPROVAL LIST REQUIREMENTS FOR MICROWAVE VEHICLE RADAR
ITM No. 953-10P

1.0 SCOPE.

1.1 This test procedure covers the methods that a Microwave Vehicle Radar is evaluated in the field, and is placed, maintained, or removed from an approval list.

1.2 The values stated in either English or acceptable SI metric units are to be regarded separately as standard, as appropriate for a specification with which this ITM is used. Within the text, SI metric units are shown in parenthesis. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way.

1.3 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 ITM Standards.

806 Approval List Requirements

2.2 NTCIP Standards.

1103 NTCIP Transportation Management Protocol (TMP)
9012 NTCIP Testing Guide for Users
NEMA TS2-1998

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101 and NEMA TS-2 Section 1.

4.0 SIGNIFICANCE AND USE. This ITM is used to evaluate, approve, maintain approval, and remove from the approval listing a Microwave Vehicle Radar which is placed on the Department's List of Approved Traffic Signal and ITS Control Equipment. Each model of the Microwave Vehicle Radars will be bench tested and field tested separately.

5.0 APPARATUS. Complete ITS fully functional system

6.0 SAMPLING. The manufacturer shall furnish, at no cost to the Department, one randomly selected production-run Microwave Vehicle Radar of each model for bench testing and field testing.

7.0 PROCEDURE.

7.1 The manufacturer of the material shall submit the Preliminary Product Material Evaluation Form (Appendix A) for each model type of the Microwave Vehicle Radar which the manufacturer is requesting to be added to the listing.

7.2 The manufacturer of the material shall submit with the Evaluation Form the following:

7.2.1 An invoice showing an initial zero dollar amount ($0.00) for the use of the evaluation sample material during the evaluation. The invoice shall also list the deferred cost of the material that the Department would pay if the material is purchased instead of returned upon the successful completion of the evaluation.

7.2.2 A certification of environmental testing shall be furnished with each major unit approval request indicating the unit has been tested and is in accordance with the environmental requirements from NTCIP. The certification shall specify the model and serial number of the Microwave Vehicle Radars tested. A complete log of each test shall be provided to the Department and will be maintained by the Department. The log shall indicate which, if any, component failed during the test, when the component failed, and the steps taken to repair the Microwave Vehicle Radar. The log shall include the date of testing, name and title of person conducting the tests, a record of conditions throughout the tests, and a temperature and humidity verses time chart. The maximum report interval of any chart shall be 24 h. The chart shall be from a recording machine used to monitor the status of the environmental chamber during testing.

7.2.3 Operation and Maintenance Manual(s), including theory of operation, schematics and components parts listing

7.2.4 One randomly selected production run Microwave Vehicle Radars for bench testing and field testing

7.2.5 List of required software and any additional items required to realize the full potential of the product.

8.0 SUBMITTAL REVIEW. The documentation, including the environmental testing, will be reviewed for usability of the Microwave Vehicle Radar with Department approved NTCIP based ITS system in Indiana. The manufacturer's recommended schedule and extent of maintenance will be reviewed for acceptability.

9.0 BENCH TESTING. The Microwave Vehicle Radar will be bench tested for compatibility with all ITS equipment assemblies used by the Department. The Microwave Vehicle Radars will be verified for full NTCIP functionality and full manufacturer's claimed optional functionality.

10.0 FIELD TESTING. The field testing of the Microwave Vehicle Radar will consist of installing the Microwave Vehicle Radars cabinet on the tower for a period of up to 12 months to monitor the following:

10.1 A log of any failures for the Microwave Vehicle Radar.

10.2 The relative ease of use for the field personnel

10.3 Overall build quality and expected lifecycle of the Microwave Vehicle Radars. The build quality and expected lifecycle shall be comparable with existing Microwave Vehicle Radars.

11.0 REPORT. A final report will include the notations and findings from the electronic bench test and field testing results and documentation.

12.0 APPROVAL LIST.

12.1 Approval of Microwave Vehicle Radar. The Microwave Vehicle Radar model may be placed on the approval list when the following conditions are met:

12.1.1 A potential net benefit to the Department is realized by inclusion of the item on the approved list.

12.1.2 The unit passes the NTCIP environmental requirements.

12.1.3 The required documentation is submitted.

12.1.4 The bench and field testing are completed with satisfactory results.

12.1.5 No excessive amount of routine or periodic maintenance is required.

12.1.6 There are no failures with any of the different types of ITS assemblies or individual components used by the Department.

12.1.7 All manuals, documents, and required software to realize the full potential of the Aries Field Processor are submitted

12.1.8 Only minimal maintenance operations were necessary during the field testing.

12.2 Maintaining Approval.

12.2.1 The ITS Technology Deployment Division shall be notified each time any update or revision is made, and an explanation of the changes and benefits of the change shall be submitted. ITS Technology Deployment Division will determine if and to what extent a revision is to be placed into field operation and may fully re-evaluate the Microwave Vehicle Radar with the revision.

12.2.2 If the manufacturer makes any changes to an approved model to correct a non-NTCIP compliant or safety issue, the Department shall be notified immediately. The manufacturer shall correct all existing equipment purchased by the Department either directly, by contract, or through agreement prior to the change being incorporated at the manufacturer's production level.

12.2.3 A design change to an approved model shall require a submittal of the documented changes. At the discretion of the Department, resubmission of the model for testing and evaluation may be required. Permanent addition or removals of component parts or wires, printed circuit board modifications, or revisions to memory or processor software are examples of items that are considered to be design changes.

12.3 Removal from Approval List. Microwave Vehicle Radars will be removed from an approval list for, but not limited to, the following reasons:

12.3.1 Changes in the Microwave Vehicle Radar components or production process that fail testing and/or evaluation

12.3.2 If three consecutive years elapse without furnishing the Microwave Vehicle Radar.

12.3.3 Performance of the Microwave Vehicle Radar no longer meets the intended purpose

12.3.4 Recurring similar product failures indicate a manufacturer's defect

INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF OPERATIONS SUPPORT
PRELIMINARY INFORMATION FOR PRODUCT MATERIAL EVALUATION

Trade Name _____ Date _____

Manufacturer _____ Patented? Yes _____ No _____ Applied for _____

Address _____
Street No (P. O. Box) City State Zip Code

Representative _____ Phone No ( )_____

Address _____
Street No (P. O. Box) City State Zip Code

Product Information _____

_____

Materials Composition _____

_____

_____

** Is this product considered HAZARDOUS MATERIAL when disposing of non-used or surplus materials? Yes _____ No _____

** What is the shelf life of this material? Years _____Months _____N/A_____

Recommended Use-Primary _____

_____

_____

Recommended Use-Alternate _____

_____

_____

Advantages and/or Benefits _____

_____

_____

** Materials specifications by manufacturer, installation/operation manual, maintenance manual, literature, test results, guarantee, hazardous material data sheets, plan, picture or sketch must be submitted with this form. In the case of electronic devices the schematic diagram, parts list, and parts layout diagram must be submitted for each printed circuit board within the device.

Meets following specifications:

AASHTO _____ _____

ASTM _____ _____

OTHER _____

Use by highway authorities or similar agencies in other states.

Agency	Years Used	Remarks
_____	_____	_____
_____	_____	_____
_____	_____	_____

** Has product ever been evaluated by and rejected for use by a governmental agency?

Yes _____ No _____ If yes, by what agency and for what reason?

_____

_____

Will demonstration be provided? Yes _____ No _____

Availability: Seasonal _____ Nonseasonal _____ Delivery at site _____

After receipt of order, are quantities limited? Yes _____ No _____

** Will FREE SAMPLES be furnished? Yes _____ No _____
If yes, Quantity Furnished _____

** If the sample is salvageable, do you desire to have it returned Yes _____ No _____

(Desired return of salvageable samples will be at the supplier's expense.)
(The manufacturer agrees upon the return of salvageable samples, such samples may be damaged or non-operable. Normal care will be taken that the samples, when returned, are in operable condition; INDOT, however, does not guarantee that the returned samples are operable.)

Will laboratory analysis be furnished? Yes _____ No _____

** Approximate cost _____ Royalty Cost _____

When was the product introduced to the market? _____

This product is an alternate for what product? _____

_____

_____

Will warranty be provided? Yes _____ No _____ If yes, for how long? _____

Background of company, including principal products _____

_____

_____

_____

What offices of the Indiana Department of Transportation have been contacted?

_____

Additional Information _____

_____

_____

_____

(Attach additional sheets as necessary)

Person furnishing information _____
Name Title

Address _____
Street No (P. O. Box) City State Zip Code

Items marked ** MUST BE RESPONDED TO or further consideration may not be given for this product.

Please mail this form to:

Manager, Office of Traffic Engineering
100 N. Senate Ave., Room N925
Indianapolis, IN 46204-2249

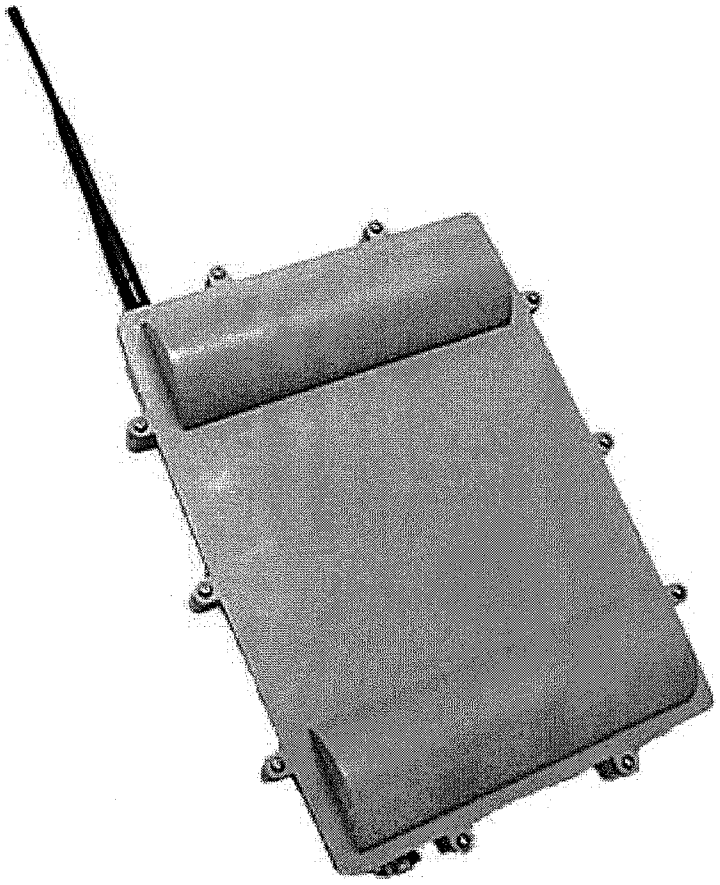
If INDOT elects to evaluate your product/material - traffic signal equipment will be shipped to:

Electronic Technician 1
Indiana Department of Transportation
7701 East Melton Road
Gary, IN 46403

While all other materials to be evaluated will be shipped to:

ITS Field Engineer
Indiana Department of Transportation
8620 East 21st Street
Indianapolis, IN 46219

SmartSensor SS105



Reliable, Non-Intrusive ITS Traffic Radar

Logan Harris
Director of Engineering
Intelligent Transportation Systems

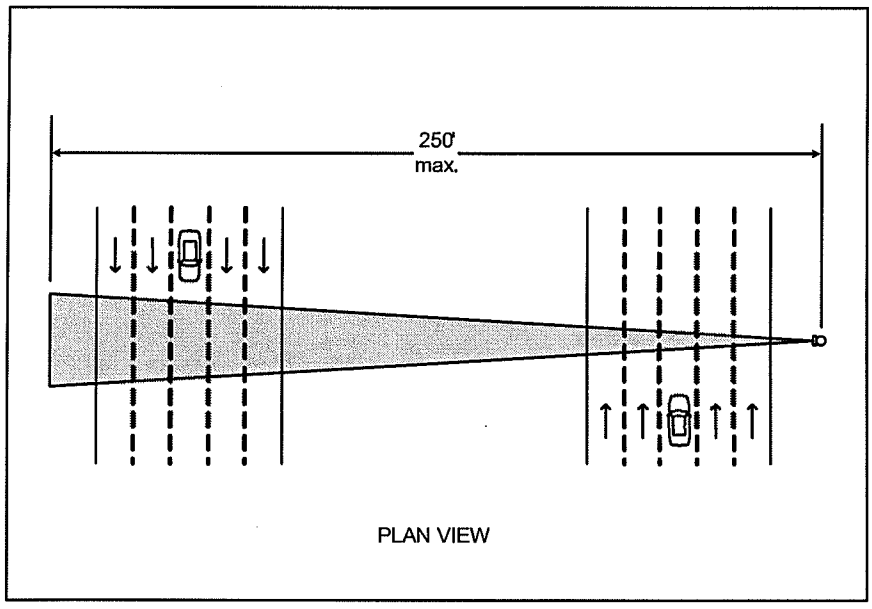
Wavetronix, LLC
Aug. 20, 2002

SmartSensor HD

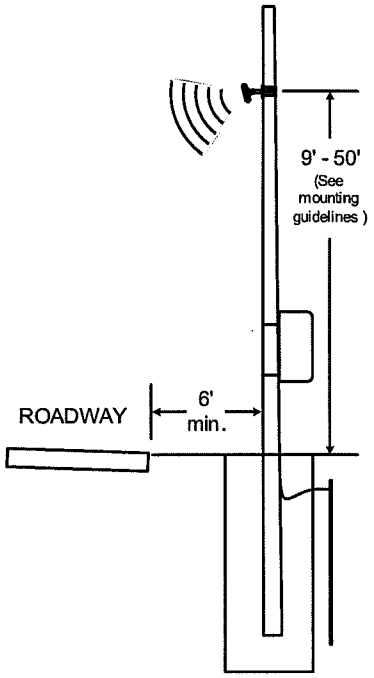
The SmartSensor HD™ delivers consistently accurate data for traffic monitoring systems, even in slow or congested traffic. Operating at five times the bandwidth, the HD has five times the resolution of the original SmartSensor, a detection range of 250 feet and the ability to simultaneously detect up to 10 lanes of traffic.

Features

- Detects up to ten lanes of traffic
- Reports the speed, length and classification of individual vehicles
- Works over barriers, guardrails, medians and gores
- Accurately detects lane-changing vehicles
- Patented Digital Wave Radar II™ technology
- Patented auto-configuration process for PC and Pocket PC®
- Easy to install and operate
- Remote accessible for easy management
- Flash upgradeable
- Integrates with Wavetronix Click!™ products
- Requires no tweaking or tuning
- All-weather, all-condition performance
- No performance variance due to temperature
- Flash memory protects data storage
- Automated manufacturing process



PLAN VIEW



SMART iQ SENSOR®