

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:

Aries Field Processor:

AFPmicro

AFPfusion

Sensoray 22535

1. Description of Need:

The ITS Technology Deployment Division of the Indiana Department of Transportation is seeking approval for the equipment essential to the creation and maintenance of the INDOT ITS network.

AFP is a computer, designed for field conditions. It is using LINUX based operating system, developed and supported by IMS, Inc.

Required functionality includes:

- Support unique addressing in the network using Internet Protocol address.
- Provide interface between existing network (TMC) and vehicle detectors (Microloops or Microwave).
- Provide interface between existing network (TMC) and CCTV camera, including software based digital video coding/decoding and transfer video to TMC and PTZ control commands from TMC to camera.
- Provide interface between existing network (TMC) and Highway Advisory Radios, including storage of the .wav Play Files.
- Provide interface between existing ATIS network (TMC) and Dynamic Message Signs (overhead and portable).
- Provide interface between existing network (TMC) and Travel Time signs.
- Provide interface between existing network (TMC) and Weigh-in-Motion data collection stations.

2. Product History:

These devices have been chosen at the inception of the system approximately 18 years ago and since are the main part of each remote component. Over 600 of AFP 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. 949-10P

3. Product Availability: AFP, manufactured by Iron Mountain Systems, Inc., is only product on the market, meeting all requirements. Although there are computers on the market carrying LINUX based Operating System, capable of interfacing with some of the vehicle detection and video systems, there is none, which is rugged enough for field conditions and can interface all types of equipment and existing network. There were no attempts by the manufacturers to present their products to be tested to ITM No. 949-10P. Google search for Field Processor returns only devices, designed specifically for purpose and sold with the System (purpose) for which they are designed.

4. Product Cost: There is no equipment on the market, meeting the requirements, to make a cost comparison with. The next closest product is Dell Latitude E6420 suite ranging in price from \$1,374.00 to \$4,552.00. However, these products will not communicate with the existing field hardware.

5. Project Compatibility: AFP is the only computer on the market that is compatible with existing ITS hardware. Application matrix below describes which AFP model can be used to interface various (listed) technologies and TMC. The lowest cost AFP model is being selected for any particular project based on the technology needs.

Model \ Application	AFPmicro	AFPfusion	Sensoray 22535
Vehicle detection up to 24 interfaces		X	
Bluetooth Travel time	X	X	
Video Encoder (MPEG4)		X	X
CCTV Control		X	X
DMS Control (Overhead)	X	X	
DMS Control (Portable)	X		
HAR Function	X	X	
Vehicle operation		X	
Cost	\$2,175.00	\$2,600.00	\$400.00

6. Maintenance: Desired equipment is designed such a way, that most of maintenance functions: monitoring up/down time, restoring functionality, updating/upgrading – can be done remotely, which drives down maintenance cost. Training is available on line in Wiki Notes, accessible for tech personnel from any location in Indiana. Low failure rate (less than 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. AFP is essential component that allows communication between TMC and field hardware. 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. Iron Mountain Systems, Inc is providing 5 years warranty for AFP. The average life cycle of the AFP is evaluated as 6 to 10 years. There are units currently in service installed in 2007. Annual replacement rate, including damage done by lightning, is 25 units. With average cost of \$4,500.00, maintenance cost per unit does not exceed \$200.00. Replacement of AFP is predominantly driven by technology progress, rather than wear.

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 # 949-10P Field Processor/Controller.

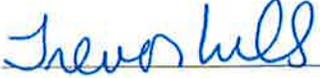
11. Length of Time that Approval is Effective: 02/2018 until 02/2021

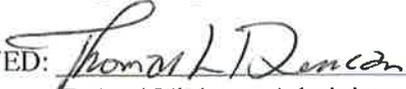
Prepared By: Konstantin Veygman

Field Engineer

INDOT-ITS Technology Deployment Division

Date: 2/5/2018

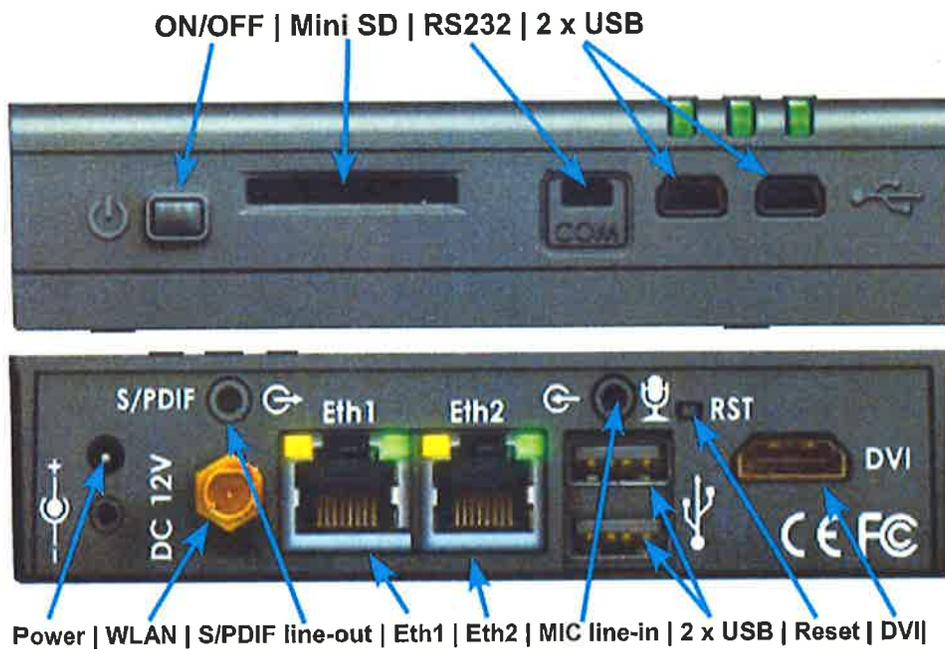
APPROVED:  Date: 2/9/18
INDOT Deputy Commissioner
Engineering Services and Design Support

APPROVED:  Date: 2/09/18
Federal Highway Administration

ARIES Field Processor AFPmicro



With Heatsink installed



**REQUIRES ARIES ITS EMBEDDED LICENSE FOR USE WITH
INFRASTRUCTURE ASSETS. CONTACT IRON MOUNTAIN SYSTEMS, INC.
FOR MORE INFORMATION @ (951) 491-0153 OR
SALES@IRONMOUNTAINSYSTEMS.COM**

AFPmicro

PROCESSOR

Type: Shall be an Intel Atom Z530 or greater.
Cores: Shall be a 32-bit single core minimum.
Clock: Clock speed shall be 1.6GHz minimum.
Chipset: Intel System Controller Hub US15W Chipset or equivalent.
Total Dissipated Power of CPU/Chipset shall not exceed 2W Max.

MEMORY

Installed 2GB DDR2-533 - Soldered to motherboard.

DISK DRIVE

Solid State Disk: 16 GB Minimum with a 1x SATA connector for Internal 2.5" SSD. Installed.

GRAPHICS GPU

Intel Graphics Media Accelerator GMA500 or equivalent.
Display Interface: One (1) DVI up to 1600 x 1200 @ 60Hz (via HDMI port).
Shall include a Video HDMI to DVI adapter.

AUDIO

Codec: Realtek ALC662-VC-GR HD audio codec.
Audio Output: Analog stereo output Digital 5,1+2 channels S/PDIF output via 3.5mm jack.
Audio Input: Analog stereo Microphone input via 3.5mm jack.
Shall include Audio 3.5mm to RCA cable

NETWORKING

Quantity Two (2) GbE LAN ports minimum.
eth0/LAN1: Realtek RTL8111F-CG GbE controller (RJ-45)
eth1/LAN2: Realtek RTL8111F-CG GbE controller (RJ-45)

WIRELESS

WLAN: 802.11 b/g/n (2.4GHz Qcom LR802UKN2 module or equivalent).

EXTERNAL CONNECTIVITY

USB: Quantity Four (4) USB 2.0 (combination of type-A USB port or mini USB port) - shall include Two (2) Mini-USB plug to USB type-A receptacle adapters.
Serial: Quantity One (1) Serial communication port ttyS0/COM1: Native RS232 via mini serial connector. Shall include One (1) Mini-serial to DB9-male adapter
SD Mini-SD slot: Support SD/SDHC/SDXC cards. SD1.1 with transfer rates up to 25 MB/s. No media is required.

SHALL SUPPORT THE FOLLOWING FUNCTIONALITY

Auto-On
Wake-on-LAN
Wake-on-Timer
PXE Boot
Watchdog
Phoenix BIOS
BIOS Legacy mode

OPERATING SYSTEM (Support for)

Ubuntu 14.04 LTS (Trusty Tahr) Server as a minimum.
Linux Kernel: 3.13 or greater.
OS Installed: Not required.

OPERATING CONDITIONS

Input Voltage: Shall support unregulated +10 – 15VDC input.
Nominal input voltage: Shall be +12 VDC.
Power Consumption: Shall not exceed 9 Watts.
Operating Temperature: -20°C – 70°C.
Humidity: 5 - 95% RH, Non Condensing.

ENCLOSURE

Material: Die Cast Aluminum.
Cooling: Passive Cooling Fanless Design (No internal or external fans).
Dimensions: Shall not exceed 4.6in (11.5cm) x 4.0in (10.1cm) x 1.1in (2.7cm).
Weight: Shall not exceed 1 lbs (454 grams).
Shall include a wall mounting bracket.
Shall include a heat sink, if required to achieve the operating temperature range.

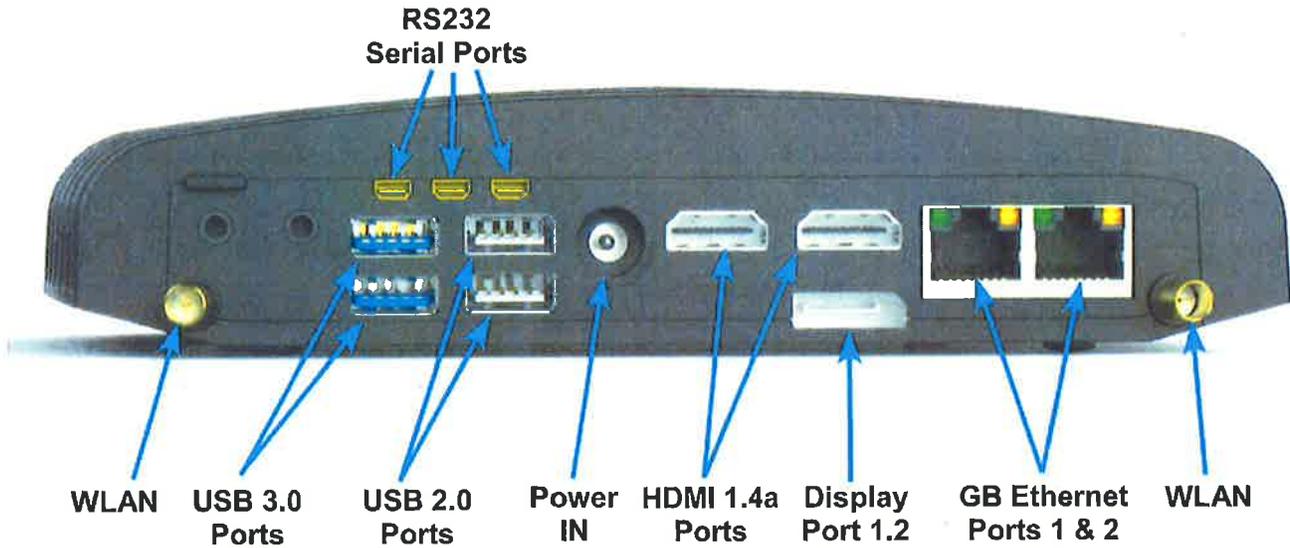
POWER SUPPLY

Wall adapter: One (1) input 100 - 240VAC 50/60Hz, 18W output @ 12 VDC, 1.5 Amps.
DC Power Cord: Shall include One (1) DC plug lock, pigtail power cable, 4 ft minimum length.

WARRANTY: 3 years.

SOFTWARE REQUIREMENTS: ARIES ITS Embedded License, by Iron Mountain Systems, Inc. Version 5.32.15 Minimum.

ARIES Field Processor AFPfusion



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AFPfusion

PROCESSOR

Type: Shall be an Intel 4th Gen Core I7 (4600U) or greater.
Cores: Shall be a 64-bit dual core minimum.
Clock: Clock speed shall be 2.1GHz minimum (with turbo boost to 3.3GHz minimum).
Chipset: Intel 8 Lynx Point LP PCH Chipset or equivalent.
Total Dissipated Power of CPU/Chipset shall not exceed 15W Max.

MEMORY

Installed 8GB SO-DIMM204-pin DDR3L 1333/1600 SDRAM.
Expandable to 16GB.

DISK DRIVE

Solid State Disk: 128 GB Minimum with internal 2.5" SSD. Installed.

GRAPHICS GPU

Intel HD4400 or equivalent.
Graphics Memory: 512MB
Display Interface: Minimum Two (2) ports, (1) DisplayPort 1.2 up to 3200x2000 @ 60Hz and (1) HDMI 1.4a up to 4096x2304 @ 24Hz or (2) HDMI 1.4a up to 4096x2304 @ 24Hz.
Shall include a Video HDMI to DVI adapter.

AUDIO

Codec: Realtek ALC888-VC2 HD audio codec.
Audio Output: Analog stereo output Digital 7.1 channels S/PDIF output via 3.5mm jack.
Audio Input: Analog stereo Microphone input via 3.5mm jack.
Shall include Audio 3.5mm to RCA cable

NETWORKING

Quantity Two (2) GbE LAN ports minimum.
eth0/LAN1: Intel I218 GbE "Clarkville" PHY + PCH Integrated MAC (RJ-45) or equivalent.
eth1/LAN2: Intel I211 GbE controller (RJ-45) or equivalent.

WIRELESS

WLAN: 802.11 ac (2.4GHz or 5GHz) Intel 7260HMW module or equivalent).
Bluetooth 4.0.

EXTERNAL CONNECTIVITY

-USB 3.0: Quantity Four (4) USB 3.0 (combination of type-A USB port or mini USB port) - shall include Two (2) Mini-USB plug to USB type-A receptacle adapters, if required. Shall be backwards compatible to USB 2.0.
-USB 2.0: Quantity Two (2) USB 2.0 (combination of type-A USB port or mini USB port) - shall include Two (2) Mini-USB plug to USB type-A receptacle adapters, if required.
-Serial: Quantity One (1) Serial communication port ttyS0/COM1: Native RS232 via mini serial connector.
Two (2) 2-wire RS232 Shall include One (1) Mini-serial to DB9-male adapter.
- Micro SIM slot with dedicated interface to mini PCIe full size slot.

SHALL SUPPORT THE FOLLOWING FUNCTIONALITY

Auto-On
Wake-on-LAN
Wake-on-Timer
Wake-on-USB
PXE Boot
Watchdog

OPERATING SYSTEM (Support for)

Ubuntu 14.04 LTS (Trusty Tahr) Desktop as a minimum.
Linux Kernel: 3.13 or greater.
OS Installed: Not required.

OPERATING CONDITIONS

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Power Consumption: Shall not exceed 24 Watts.
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Humidity: 5 - 95% RH, Non Condensing.

ENCLOSURE

Material: Shall be Die Cast Aluminum.
Cooling: Shall be of a Passive Cooling Fanless Design (No internal or external fans).
Dimensions: Shall not exceed 7.5in (19cm) x 6.3in (16cm) x 1.6in (4cm).
Weight: Shall not exceed 1 lbs (454 grams).
Shall include a wall mounting plate (not bracket).

POWER SUPPLY

Wall adapter: One (1) Input 100 - 240VAC 50/60Hz, 60W output @ 12 VDC, 5.0Amps shall be included.

WARRANTY: 3 years.

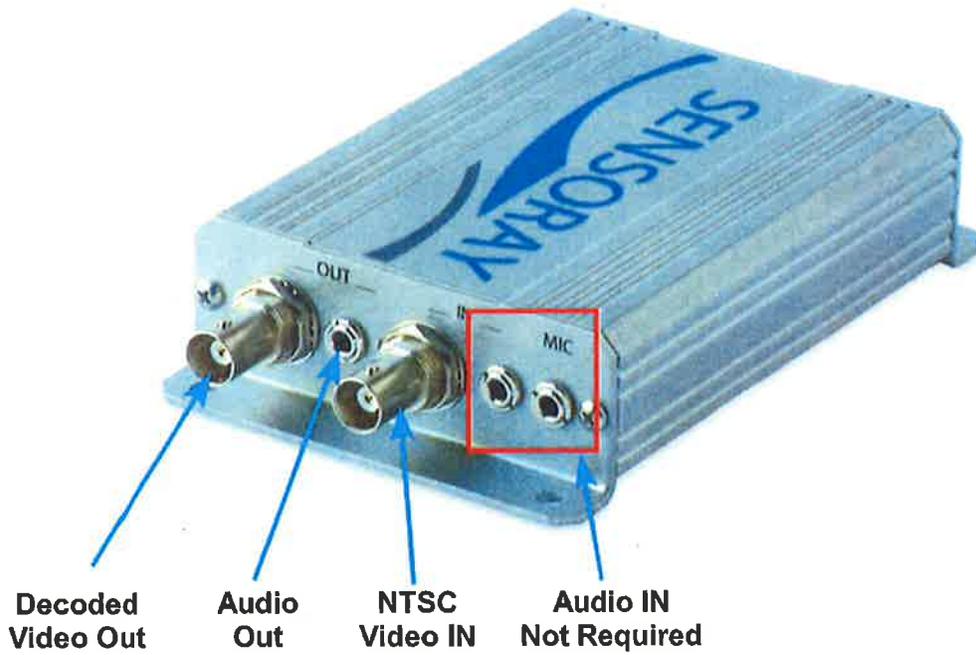
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Video Encoder 2253S-ET Sensoray Inc.



Digital I/O

USB 2.0
Interface



Decoded
Video Out

Audio
Out

NTSC
Video IN

Audio IN
Not Required

Sensoray Video Encoder Model 2253S-ET Specifications

Video

Input

1 NTSC/PAL composite, 75 Ohm

Output

1 NTSC/PAL composite, 75 Ohm

Preview format

640x480@ 30 fps (NTSC); 720x576@25 fps (PAL); YUV4:2:2, GREY8, JPEG, RGB

Audio - Not required.

Streams

Encoding format Video: H.264 HP@L3, MPEG-4 ASP, JPEG;

Output stream format

Elementary audio/video, MPEG-4 program stream (.MP4), MJPEG AVI, Transport Stream

System

Interface

USB 2.0 High-speed

Digital I/Os

1 input, galvanically coupled or optically isolated

1 output, optically isolated

Power consumption

<1.5 W (300 mA @ 5 V) from USB port

Operating temperature

Extended version: -40 to +85 °C

Dimensions

2253S: 5.14" x 3.28" x 1.14"

Must include a 3ft USB 2.0 Compliant Cable (USB A to B Male to Male)

qpa-apfs-specs-for-indot_2014.txt

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WARRANTY: 3 years.

SOFTWARE REQUIREMENTS: ARIES ITS Embedded License, by Iron Mountain Systems, Inc. Version 5.32.15 Minimum.

Video Encoder (External)
 sensoray 2253S or equivalent.

