

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:

ITS Field Controller

HPE GL10 IoT Gateway Series

Manufactured by Hewlett Packard Enterprise.

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 essential to the creation and maintenance of the INDOT ITS network.

GL10 is a computer, designed for field conditions. It is using Linux based operating system and applications, supported by INDOT Advanced traveler management system.

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 ATIS network (TMC) and Dynamic Message Signs (permanent 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.
- Provide interface between existing network (TMC) and other climate and vehicle detection equipment.

2. Product History:

These devices have been chosen to replace AFPs, used in the network for almost 15 years. Suggested device functionally and environmentally meets or exceeds specifications of existing AFPs. They demonstrate very high reliability 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 to the **ITM No. 949-10P**

3. Product Availability: GL10, manufactured by Hewlett Packard Enterprise is the best 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 other manufacturers to present their products to be tested to **ITM No. 949-10P**.

4. Product Cost: The next closest product is Dell Embedded Box PC 3000 suite ranging in price from \$749.00 to \$1765.59. However, INDOT has existing relationships with HPE that make future maintainability of this product easier than those of competing products.

5. Project Compatibility: GL10 is among few products on the market that maintain full compatibility with all existing technologies related to the TMC ATMS.

Model	HPE GL10
Application	
Vehicle detection < 4 interfaces	X
Vehicle detection 20 interfaces	X
Bluetooth Travel time	X
Video Encoder (MPEG4)	X
CCTV Control	X
DMS Control (Overhead)	X
DMS Control (Portable)	X
Vehicle operation	X
Cost	\$1175.20

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. GL10 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:** HPE, Inc is providing 5 years warranty for GL10. The average life cycle of the GL10 is evaluated as 6 to 10 years. There are units currently in service installed in 2017. Annual replacement rate, including damage done by lightning, is 25 units. With average cost of \$1175.20, maintenance cost per unit does not exceed \$180.00. Replacement of GL10 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.

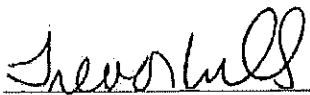
11. **Length of Time that Approval is Effective:** 2/2018 to 2/2021

Prepared By: Konstantin Veygman

Field Engineer

INDOT-ITS Technology Deployment Division

Date:

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

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



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Version History:

HPE GL10 IoT Gateway Series

Overview

HPE GL10 IoT Gateway
(Formerly HPE EL10 Intelligent Gateway)



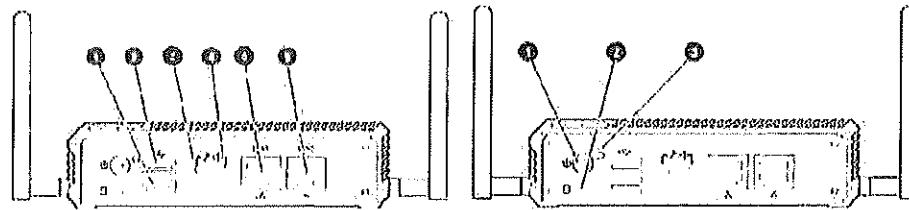
Is your company struggling with moving analytics to the edge of your network?

HPE IoT Gateways enable organizations to rapidly acquire, analyze and take action on real-time data as it's being collected for additional analysis at a later stage. Bringing computing and analytics close to the edge accelerates the speed of your decision-making and reduces the chance of lost opportunities or a missed red flag. HPE IoT Gateways are a perfect complement to the industry's first HPE Edgeline Converged Edge Systems for expanding your Internet of Things (IoT) infrastructure beyond traditional data center confines and to enable true edge computing.

The HPE GL10 IoT Gateway is an entry-level ruggedized compute solution designed for data aggregation and light analysis at the edge itself. It is optimally configured with CPU, memory, connectivity and an expansion I/O selection to address a host of IoT needs. HPE IoT Gateways are designed to operate in harsh edge environments, such as such as manufacturing plants, oil and gas facilities and power stations, where wide operating temperature ranges, tolerance for high levels of shock/vibration and resilience against ingress are the norm.

These IoT Gateways are complete solutions out-of-the-box, designed to be easy-to-use and quick-to-deploy. Standard in box are universal power kit and universal mounting kits enabling these systems to be placed in a wide range of locations.

Standard Features

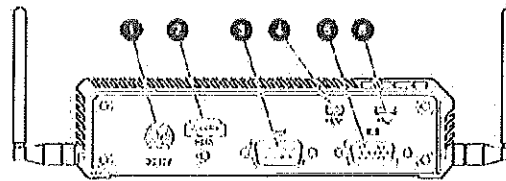


Front Panel Components

1. USB 2.0 standard (Type A) port
2. USB 3.0 standard (Type A) port
3. Mic
4. Audio Out
5. LAN 1 connector (10/100/1000 Mbps)
6. LAN 2 connector (10/100/1000 Mbps)

Front Panel LEDs and Buttons

1. Power On/Off Button & LED
2. Drive LED
3. Reset Button (recessed)



Rear Panel Components

1. Power connector
2. HDMI standard (Type A) port
3. Serial port connector (RS-232 or RS-422/485 via jumper change)
4. HDMI micro (Type D)
5. VGA connector
6. Micro-USB 2.0 (Micro-AB) port

Configuration Information – Factory Integrated Models

Key features of HPE IoT Gateways

- **Purpose Built:** HPE IoT Gateways are ruggedized compute solutions designed to operate in a variety of edge environment – Industrial, Manufacturing, Smart Infrastructure, Oil & Gas etc.
- **Optimum Configuration:** Optimum CPU, memory, connectivity and expansive I/O selection addresses a host of IoT needs.
- **Designed for Future Capabilities:** Product designed to support a host of modular connectivity options that are customer upgradeable providing a strong foundation for future growth.
- **Secure Platform:** I/O Port Disablement, BIOS Password, Secure Boot. HPE Aruba software such as ClearPass to authenticate edge devices and secure VPN to protect remote connections
- **Industrial Grade:** Extended operating temperature -20°C to 60°C, Passively cooled, Shock and Vibration Tested, IP40 Certified
- **Complete Solution:** Complete Solution: Easy-to-use and quick-to-deploy including a universal power kit (USA, UK, EURO and JPN) as well as universal mounting kit in support of DIN rail and wall mount applications are standard in box.

The HPE GL10 IoT Gateway offers the following unique benefits:

- **Price/performance-optimized:** IoT Gateway designed for entry level deployments
- **Optimally configured:** Intel Atom CPU, 4GB RAM, 32 GB SDD Storage and an expansive I/O selection.
- **Low power solution:** 12 Volts DC with locking connector (typical total power consumption of 10.5 Watts)
- **Designed for Future Capabilities:** 2 mini-PCIe card slots enable a host of connectivity options that are customer upgradeable providing a strong foundation for future growth requirements.

Processor	Intel® Atom™ Model	SoC HFM Frequency	SoC LFM Frequency	Cores	L2 Cache	Power	DDR3 MHz
	E3826	1.46 GHz	533 MHz	2	1 MB	7W	1067

NOTE: For more information regarding Intel® Atom, please see the following URL:
<http://www.intel.com/content/www/us/en/processors/atom/atom-processor.html>

Chipset Integrated with SoC
Graphics Intel® HD Graphics (Integrated with SoC)
 Base: 533 MHz
 Burst: 667 MHz

Memory	Type	DDR3 Small-Outline (SO-DIMM)	
	Supported DIMMs	DDR3L-1067 4GB (1R x 8)	
	DIMM Slots Available	1	(1 DIMM slots per processor, 1 channels per processor, 1 DIMMs per channel)
	Maximum Capacity (SO-DIMM)	4GB	(1 x 4GB SO-DIMM)

NOTES:

- The SoC supports 2 memory channels but a DIMM slot is available on only 1 channel
- Only 4GB SO-DIMMs are currently offered with this model, but it's compatible with 2GB/8GB SO-DIMMs.
- Registered DIMMs (RDIMMs), Load Reduced DIMMs (LRDIMMs) and Non-Volatile DIMMs (NVDIMMs) are not supported.

Expansion slots One (1) PCI Express Full-Mini Card Expansion Slot – Slot #1
 One (1) PCI Express Half-Mini Card Expansion Slot – Slot #2
 • Slot #1 can also be used for mSATA
 • Slot #1 and Slot #2 support PCIe and USB signaling
NOTE: This system model is pre-wired with 4 antenna attach points for use with wireless module options

Network Controller Intel® i210AT – One (1) 10/100/1000Mbps Ethernet Port
 Realtek 8111G – One (1) 10/100/1000Mbps Ethernet Port
NOTE: This system model does not support Power-over-Ethernet (PoE).

Storage Controller and Devices SATA controllers are integrated in the Intel® Atom™ SoC

Slot #	Technology	Bus Width	Connector Width	Form Factor	Supported Sizes
SFF Drive Bay	SATA 3GB/s	x1	x1	2.5" SFF	32 GB
mSATA Slot (shared with slot #1)	SATA 3GB/s	x1	x1	mSATA	N/A (Third-party)

NOTE: The SFF drive in this system model is not hot-swappable.

Maximum Internal Storage Drive Bay 32 GB 1 x 32 GB
 mSATA Slot N/A (Third Party)

NOTE: This system is compatible with any SFF or mSATA drive, but only selected SSDs are currently offered.

Power Supply External AC 36W (12V, 3A) universal power supply kit (USA, UK, EURO and JPN)

System Fans None. Passively cooled fan less product

Interfaces Power Input – IEC 60130-10 Type A (5.5mm x 2.5mm) w/ threaded locking ring support
 One (1) RS-232 Serial Port – switchable to RS-422/485 4-wire by internal ribbon cable changes
 Two (2) USB 2.0 Ports – 1 standard (Type-A) and 1 Micro-AB
 One (1) USB 3.0 Port – 1 standard (Type-A)
 One (1) VGA Port – supports 2560 x 1600 @ 60 Hz
 Two (2) HDMI Port – 1 standard (Type A) and 1 micro (Type D), supporting 1920 x 1080 @ 60 Hz
 One (1) Mic In and One (1) Audio Out
 Power On/Off Button & LED
 Drive LED
 System Reset Button
 Four (4) pre-wired antenna attach points for wireless module options
 • 2 x WWAN SMA Female
 • 2 x Wi-Fi RP-SMA Female

Operating System Support	<p>For more information on Hewlett Packard Enterprise's Certified and Supported systems for the OS' available for your system, please visit our OS Support Site: http://www.hpe.com/info/ossupport</p> <p>ROM, BIOS and Driver Support For more information on Hewlett Packard Enterprise's Certified and Supported systems for the latest software ROM, BIOS and drivers available for your system, please visit our Support Center Site: NOTE: http://www.hp.com/go/ossupport and our driver download page which can be found from the HPE Support Center: http://www.hpe.com/support/hpesc</p>
Industry Standard Compliance	<p>Microsoft® Logo certifications USB 2.0 and 3.0 Support ACPI 2.0 Compliant International/Ingress Protection (IP): IP40 Rated NOTE: IP40 – protected against ingress of objects such as tools and small wires >1mm, but not liquids.</p>
Security	<p>I/O Port Disablement BIOS Password UEFI Secure Boot HPE Aruba Secure VPN (for protecting remote connections) HPE Aruba ClearPass (for authenticating edge devices)</p>
Trusted Platform Module	<p>Trusted Platform Module 1.2 (Infineon SLB9635) is embedded on the system, and can be enabled and disabled using the BIOS NOTE: The TPM (Trusted Platform Module) is a microcontroller chip that can securely store artifacts used to authenticate the system. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008, 2012/2012 R2. BitLocker leverages the enhanced security capabilities of a Trusted Platform Module (TPM). The TPM works with BitLocker to help protect user data and to ensure that a server running Windows Server has not been tampered with while the system was offline. For more information about TPM, including a white paper, go to: https://www.hpe.com/h20195/v2/gethtml.aspx?docname=c04939549 NOTE: The TPM key is unique to every TPM deployed system and must be retained. Misplacing or losing the key could result in data loss.</p>
Form Factor	<p>HPE GL10 IoT Gateway is a standalone product. Universal mounting kit allows for wall or DIN rail mounting. Optional VESA kit is available.</p>
Warranty	<p>This product is covered by a global limited warranty and supported by Hewlett Packard Enterprise Services and a worldwide network of Hewlett Packard Enterprise Authorized Channel Partners resellers. Hardware diagnostic support and repair is available for three years from date of purchase. Support for initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through customized service agreements. NOTE: System Warranty includes 3-Year Parts, 0-Year Labor, 0-Year Onsite support with next business day response. Additional information regarding worldwide limited warranty and technical support is available at: http://h20564.www2.hpe.com/hpsc/wc/public/home</p>

NOTE:

This section lists some of the steps required to configure a Factory Integrated Model. To ensure only valid configurations are ordered, Hewlett Packard Enterprise recommends the use of a Hewlett Packard Enterprise approved configurator. Contact your local sales representative for information on configurable product offerings and requirements.

Step 1: Base Configuration (Choose System)

HPE IoT Gateway System	HPE EL10 Intel® Atom Dual Core 1.46GHz 4GB 32GB w/o Operating System Intelligent Gateway	847976-B21
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NOTES:

- HPE Part Number and ordering systems will maintain "EL10" nomenclature in support of maintaining all necessary and required safety and regulatory certifications

Step 2: Choose Option Kits (End User Installation)

GL10 supports 1 FMC and 1 HMC

- One (1) PCI Express Full-Mini Card Expansion Slot #1
- One (1) PCI Express Half-Mini Card Expansion Slot #2

GL10 does not support HPE LTE Option Kits due to user inaccessible SIM location on the GL10

Connectivity Modules	HPE Edgeline Wide Temperature Wi-Fi Option Kit (FMC)	845779-B21
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NOTES:

(Min:0, Max:1 – 1 x Full-Mini Card or 1 x Half-Mini Card

Min:0 Max:2 – 1 x Half-Mini and 1 x Full-Mini Card)

- PCI Express Full-Mini Card (FMC) with PCIe interface to system
- Supports wide operating temperature of -20°C to 60°C
- Wi-Fi Module supporting 802.11 a/b/g/n, 2.4/5.0 GHz, and 2x2 MIMO.
- Speeds up to 300 Mbps.
- Includes 2 Wi-Fi Antennae that attach to chassis

HPE Edgeline Wide Temperature WWAN 3G Option Kit (FMC) 845788-B21

NOTES:

- PCI Express Full-Mini Card (FMC) with USB 2.0 interface to system
- SIM slot is located on the underside of the module
- Supports wide operating temperature of -20°C to 60°C
- 3G/3.75G (HSPA+) WWAN module. Speeds up to 21.0 Mbps Download and 5.76 Mbps Upload.
- Supported frequencies: GSM | GPRS | EDGE: 850, 900, 1800, 1900 MHz, UMTS | HSPA: 800 / 850*, 900, AWS 1700,1900, 2100 MHz, * includes Bands B6 and B19 (800 MHz) as a subset of B5 (850 MHz)
- Includes 2 WWAN Antennae that attach to chassis

HPE Edgeline Wi-Fi/BT Option Kit (HMC) 874669-B21

NOTES:

- PCI Express Half-Mini Card (HMC) with Wi-Fi PCIe and BT USB interfaces to system
- IEEE 802.11a/b/g/n/ac 2.4/5.0 GHz, and 2x2 MIMO.
- Dual-Mode Bluetooth 2.1 (+EDR), 3.0 (+HS), 4.0 (BLE)
- Wi-Fi speeds of up to 867 Mbps
- Non Wide Temp -20 - 45 o C
- Includes 2 Wi-Fi Antennae that attach to chassis

Step 3: Choose Additional Options

Mounting HPE EL10 Intelligent Gateway VESA Mounting Kit 848461-B21

Accessories HPE Edgeline Wide HPE IP67 3G LTE and Wi-Fi Ant w 2m cabl 876592-B21

Antenna Options HPE Edgeline Wide HPE IP67 3G LTE and Wi-Fi Ant w 2m cabl 876592-B21

NOTES:

- WWAN - 2x MIMO 698-960/1710-2690MHz
- Wi-Fi - 2X MIMO 2400-2500/4900-5900MHz
- Size - 145 x 135 x 25mm with 2m cable length
- IP 67 suitable for outdoor use
- 3G / LTE WWAN and Wi-Fi Support

HPE GL10 IoT Gateway

Chassis Dimensions (H x W x D) Aluminum Housing
35.98 mm (1.4") x 138.5 mm (5.5") x 116.4 mm (4.6")

Weight 0.68 KG (1.5 lbs)
Power Typical: 5.9W
Maximum: 10.6W

Shock and Vibration **Operational Shock** 30 G, IEC 60068-2-27, half sine, 11 ms duration
Operational Vibration 3 Grms, IEC 60068-2-64, random, 5 - 500 Hz, 1 hr/axis
NOTE: Shock and Vibration testing conducted on a system configured with SSDs

System Inlet Temperature **Extended Operating** -20° to 60°C (-4° to 140°F) at sea level with extended temperature peripherals
NOTE: Operating temperature range can be reduced if any non-wide temperature options are configured in the system.

Non-Operating -40° to 60°C (-40° to 140°F)

Relative Humidity **Operating** 5 to 95% relative humidity (Rh), 40°C (104°F) maximum wet bulb temperature, non-condensing

Non-Operating 5 to 95% relative humidity (Rh), 40°C (104°F) maximum wet bulb temperature, non-condensing

Acoustic Noise None - Passively cooled solution with solid state drives

Emissions Classification (EMC)	FCC Rating	Class B
	Normative Standards	CE/FCC Class B (w/o RF) with base model only CE/FCC Class B (RF), PTCRB, GCF with Intel AC7260 Wi-Fi Card and Teitl HE910G 3G module
	NOTE:	Product conformance to cited product specifications is based on sample (type) testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

Summary of Changes

c04884747 - Worldwide - Version 8 - December 18, 2017

United States