



# UEINet™ Series Ethernet I/O

## Ultra Compact Gigabit Ethernet I/O modules

- Two independent Gigabit (1000/100/10Base-T) Ethernet Interfaces
  - One port for Control, the second for diagnostics or
  - Both ports bonded/teamed for redundant network access
- Compact: 2.7" x 4" x 4.1"
- Over 70 different I/O configurations
- Rugged: 100 g shock, 5 g Vibration, -40 to +50 °C, 0 - 70,000 feet (-40 to 70°C with optional UEINet-FAN)
- Real-time: 1000 I/O scans in < 1 millisecond
- IEEE 1588 synchronization
- Inter-device sync interface
- Complete Windows, Linux, VxWorks, QNX support and more
- LabVIEW™, MATLAB® support and more
- Optional deployments include:
  - UEIPAC, standalone controller with Linux or VxWorks OS
  - UEISim, Simulink target (standalone or hosted by PC)
  - UEIModbus, Modbus TCP I/O



### General Description:

The UEINet chassis provides ultra-compact, Ethernet based I/O module suitable for a wide variety of distributed data acquisition, control, and SCADA applications. Based on UEI's popular PowerDNA® Cube architecture, the new series is designed for applications requiring distributed I/O with a very small footprint.

The UEINet chassis is an extremely rugged, Gigabit Ethernet-based I/O interface. The wide variety of I/O boards allows you to configure one or more cubes to match the specific I/O requirements of your application. The PowerDNA Cube is ideally suited for a wide variety of industrial, aerospace and laboratory data acquisition and control applications.

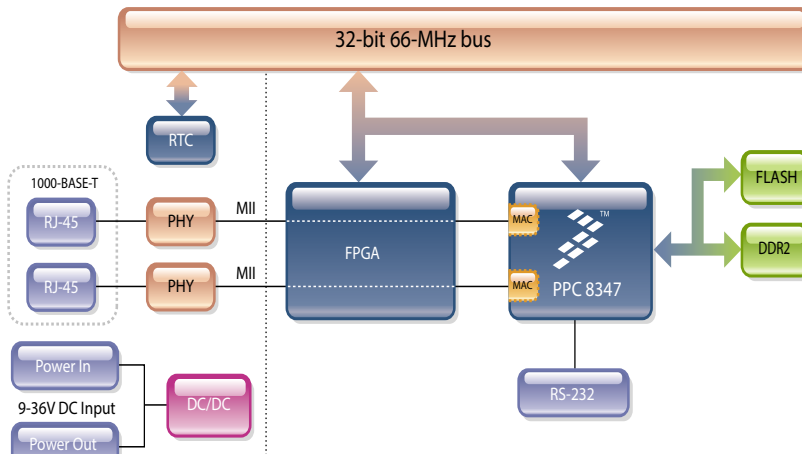
UEINet chassis are 2.7" x 4.1" x 4", and are packed with power and flexibility. Each UEINet module consists of two primary subsections: a Core Module and an I/O board.

The "standard" UEINet is designed to run as a slave I/O unit controlled directly by a host PC. The UEINet PAC UPG option allows the unit to run as a stand-alone device running an application you write in either Linux or VxWorks operating systems. Simulink users can use the UEINet SIM UPG option to enable the ability to build applications in Simulink. These simulink modules may be run on a host PC, stand-alone on the UEINet, or in a SCADA mode where a stand-alone application runs, but can be tuned by the host PC. Finally, there the UEINet Mod UPG allows the UEINet to run as a MODBUS TCP node, and the UEINet OPC-UA allows the UEINet to run as an OPC-UA server.

The Core Module occupies the top portion of the chassis and provides two independent Gigabit Ethernet Network Interface Controllers (NICs) with separate IP addresses. These may be configured as a control port and a diagnostic port or they may be teamed/bonded to allow redundant network access. The control port is the primary interface from the host PC. The diagnostics port allows other computers (or a different thread on the host) to interrogate the I/O and system status of the Cube.

The Core module also provides provides the 8347 series PowerPC CPU, two USB 2.0 controller ports (active only with the UEIPAC option), indicator lights, timing/trigger interface, configuration ports and internal power supply. It's the brains of the UEINet and controls the unit's operations including the interface with the host Controller (and other Cubes), acting as the primary processor in stand alone deployments, as well as supervising the activity of the I/O board.

### UEINet CPU/NIC Block Diagram:



The remainder of the chassis contains the I/O board. A custom (though fully COTS) I/O configuration is possible by specifying the UEINet with any of UEI's DNA-series I/O boards. An overview of these board is also provided on the following pages, while detailed specifications can be obtained from the various I/O boards' datasheets. With over 60 different I/O boards available, we're sure to have just what your application requires.

## General Description (continued):

In standard UEINet (also known as PowerDNA mode) the host communicates with the UEINet chassis in one of three ways. The first is simple, single point, programmed I/O. This mode is simple and is suitable for most systems where high speed or precise sample timing is not required. The second is the ACB (Advanced Circular Buffer). In ACB mode data is written to and from buffers on the I/O boards rather than directly to the Ethernet port. ACB mode is preferred for high speed acquisition/control or where precise timing is required as the buffers are large enough to assure data is not lost due to Ethernet timing latencies. The third mode is VMAP/DMAP. In V/DMAP mode, cubes use our patented DAQBIOS Ethernet protocol to assure deterministic real-time performance and achieve sub-millisecond response times across distributed systems including over 1000 I/O (analog and/or digital) points.

Software is included, providing a comprehensive, yet easy-to-

use API that supports all popular operating systems, including Windows, Linux, and most real-time operating systems—such as QNX, Intime, VXworks, and more. Additionally, the UEIDAQ Framework—an even higher level Windows driver—supplies complete support for those creating applications in many popular Windows programming languages, as well as data acquisition software packages such as LabVIEW and MATLAB/Simulink. A slightly more complex and powerful API (referred to as the “low-level” driver) supports programmers of Linux, VxWorks and QNX. Though not as simple to use as the UEIDAQ framework, this API is quite simple and powerful. It also exposes more advanced functionality and provides the lower level system control we find most Linux, VxWorks and QNX programmers demand.

The UEINet-FLANGE, mounting option allows the UEINet series to be easily mounted to any flat surface. The UEINet-DR, DIN rail mount allows the unit to be mounted to any standard 35 mm DIN rail.

## UEINet Chassis specifications:

Standard Interfaces	
Gigabit Ethernet	Two independent 1000/100/10Base-T interfaces, each with a unique IP address (connected via standard RJ-45 connectors)
USB 2.0	Two ports, one controller, one slave (with optional UEIPAC upgrade only)
Config/General	RS-232, 9-pin “D”
Sync	Custom cable to sync multiple cubes
Host Communications	
Distance from host	100 meters max, CAT5+ cable
Ethernet data transfer rate	20 megabyte per second
Analog data transfer rate	>6 megasample per second. Capable of sustained transfer of any cube configuration
DMAP I/O mode	update 1000 I/O channels (analog and/or digital) in less than 1 millisecond, guaranteed
Processor	
CPU	Freescale 8347 series, 400 MHz, 32-bit
Memory	128 MB (not including on-board Flash)
Status LEDs	Attention, Read/Write, Power, Comm Active
Environmental	
Temp (operating)	Tested to -40 °C to 50 °C -40 °C to 70 °C with optional UEINET-FAN
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration (IEC 60068-2-64)	10–500 Hz, 5 g (rms), Broad-band random
(IEC 60068-2-6)	10–500 Hz, 5 g, Sinusoidal
Shock (IEC 60068-2-27)	100 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations
Altitude	70,000 ft
MTBF	97,000 to 126,000 hours (depending on version)
Physical Dimensions	
All UEINet chassis	2.7” x 4.1” x 4.0”
Weight	< 1.7 Lb (771 g) Including I/O board
Power Requirements	
Voltage	9 - 36 VDC (AC adaptor included)
Power Dissipation	10 - 18 W dependent on I/O board selected
Reliability	
MBTF	160,000 hours

## UEINet Advantages:

### Easy to configure and deploy

- Over 70 different I/O boards available
- Built-in signal conditioning
- Gigabit Ethernet based (100/10Base-T compatible)
- Flange kit for mounting to wall/flat surface
- Standard COTS delivery and support

### True Real-time Performance

- 1 msec updates guaranteed with 1000 I/O
- Up to 6 million samples per second
- Use VxWorks, QNX, RTX

### Flexible Connectivity

- Dual 1000Base-T Gigabit Ethernet ports with independent IPs. Set as control or diagnostic ports or as a redundant network interface.
- Dual USB 2.0 controller ports (UEIPAC and UEISIM options only)

### Stand alone and Modbus options

- UEIPAC, standalone controller with Linux or VxWorks OS
- UEISim, Simulink target (standalone or hosted by PC)
- UEIModbus, Modbus TCP I/O

### Rugged and Industrial:

- All Aluminum construction
- Operation tested from -40°C to 50°C (up to 70°C with optional UEINET-FAN)
- Vibration tested to 5 g, (operating)
- Shock tested to 100 g (operating)
- All I/O isolated from Cube and host PC.
- Operation to 70,000 feet

## UEINet Interface description:

### A Network Connectors

Dual independent Gigabit (1000/100/10Base-T) Ethernet ports, each with a unique IP address.

### B USB Ports

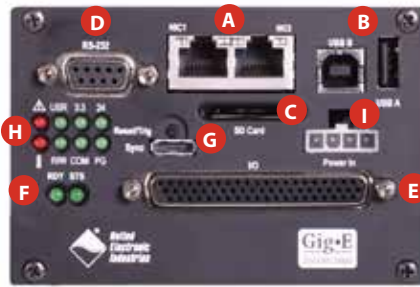
Two USB 2.0 controller ports. Controller port suitable for connection to external peripheral devices. Slave port suitable for connecting the cube to a host computer. The USB ports are not usable in PowerDNA mode.

### C SD Card Slot

Secure Digital (SD) Card slot for onboard data storage. It also stores linux embedded programs deployed on the cube using the embedded toolkit. Supports FAT12, FAT16 and FAT32 filesystems.

### D Serial Port

Using the supplied serial cable, you perform initial PowerDNA setup of the operating parameters from any serial terminal running at 57,600 baud/8 data bits/no parity/1 stop bit. From a terminal program you can, for instance, change the IP address from the default, if necessary. You also download updated firmware through the serial port. The serial port is usable for RS-232 communications.



### F I/O Layer Status LEDs

These two green lights give a visual indication of the status of each I/O layer.

**RDY** - Ready • **STS** - Status

### G Sync Connector & Reset Button

High-speed Cube-to-Cube synchronization connector allows multiple cubes to be synchronized. The reset button is Recessed to prevent accidental activation, this button resets the CPU layer for activities such as downloading and installing new firmware for the Cube.

### H Cube Status LEDs

These LEDs monitor power supplies, internal temperature, fan operation, CPU heartbeat and input current.

### I Power Connector

Power-In, 9-36V DC either from the DNA-PSU-24 (included with the Cube), or a user-supplied source.

### E I/O Board Slot

The UEINet series can be ordered as a chassis with any DNA-series I/O board. Boards installed in the I/O slot perform the various analog, digital and communications functions you need for your specific application. Your signals may be connected directly to the I/O board via your custom cabling or take advantage of our wide variety of easy-to-use, external screw terminal panels. DNA-series boards ordered with your UEINet chassis are factory installed.

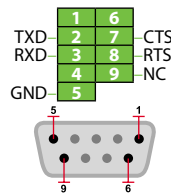
## Pinout Diagrams:

### Power In<sup>1</sup> (molex)

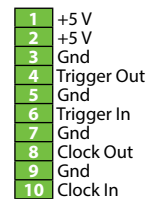


<sup>1</sup> Mating connector available from Digikey, Molex PN 39-01-4040

### Serial (RS-232)



### Synchronization



## Ordering Guide:

Part Number	Description
<b>UEINet Standard Configurations (includes universal AC power supply, serial and ethernet cables)</b>	
UEINet 1553	Dual redundant MIL-STD-1553 interface, ,
UEINet 429	ARINC 429 interface with 6 Tx channels and 6 Rx channels,
UEINet	UEINet chassis without an I/O board. May be ordered with any of over 60 different DNA-series I/O boards
<b>Upgrades</b>	
UEINet PAC UPGD	Upgrade the UEINet to a stand alone Linux based I/O module
UEINet PAC VXW	Upgrade the UEINet to a stand alone VxWorks based I/O module
UEINet SIM UPGD	Upgrade the UEINet to a Simulink target that will run stand alone or from a host based simulink application
UEINet MOD UPGD	Upgrade the UEINet to support Modbus TCP
<b>Accessories</b>	
UEINet-FLANGE	Bottom-mount flange assembly allows UEINet to be mounted to any flat surface
UEINet-FAN	Cooling fan backplate allows operation at temperatures up to 70°C
UEINet-DR	DIN rail mount for UEINet modules (standard 35 mm)
DNX-CC	Optional conformal coating of all internal boards