The 6424 MeshScape® Wireless Sensor Input/Output Node Integrates a Variety of Sensors into a Self-Forming and Self-Healing Wireless Network or can act as an equipment controller as an On/Off relay switch.

Features at a Glance

- MeshScape-compatible wireless sensor node
- Line-powered mesh node
- Operates on a worldwide and license-free 2.4 GHz ISM radio band with 15 user-selectable channels
- Star and star-mesh network topologies
- Data rates up to 250 kbps
- 10-bit analog to digital conversion resolution
- Two RJ11 connectors for easy installation
  1. Four Analog-to-Digital Channels:
     - Two 0 ~ 3 VDC or 0 ~ 10 VDC analog signals
     - Two 0 ~ 3 VDC or 4 ~ 20 mA analog signals
  2. Four digital I/O for on/off monitoring/control
  3. 1 Optically isolated solid state relay for switching up to 50V AC/DC @ 1Amp + 2 Digital I/O
- RoHS-compliant
- FCC-compliant hardware modules
- Available in indoor/outdoor (NEMA) enclosure

MeshScape GO Networking

The Wi-IO uses the industrially-proven MeshScape GO networking system, which employs patented Persistent Dynamic Routing™ (PDR) techniques to form a self-configuring wireless mesh network. PDR uses a node-initiated network formation to enable efficient topology discovery and facilitates network re-formation (required in ever-changing RF environments) by applying "best route" information. With MeshScape, you can deploy industrial-class wireless mesh networks that are:

- **Self-administering:** a self-forming and self-healing mesh network requires no administration
- **Robust:** a network that ensures multi-route reliable data transmission over extensive distances
- **Responsive:** a network that quickly adapts to changes in topology and radio frequency (RF)
- **Power efficient:** very low power consumption
- **Scalable:** with the application, can scale to hundreds of wireless nodes with minimal overhead
- **Low latency:** very short network data delivery times

Wi-IO Input/Output

The Wi-IO enables wireless bi-directional communication to virtually any analog sensor, digital sensor, or serial output device. Each Wi-IO node provides great flexibility, with four analog inputs and four digital I/O pins that connect directly to sensors and output devices.

Ease of Installation

The Wi-IO can be installed in minutes with no need to run network wires. It serves as a MeshScape 6424 Mesh Node in a star or star-mesh network topology. Installation is also made easier by the connection between the RJ11 connectors and the sensors or any other output devices.

Typical Applications

The Wi-IO is a general purpose device used to monitor a wide variety of analog, digital, and serial inputs and outputs. Examples of input switches and signals are light sensors and motion detectors as well as proximity, pressure, flow, amp, voltage, and serial instruments. Digital I/O enables output and verification of associated control points.

Long Range

The Wi-IO transmits at a radio power of 60-mW, allowing for communication distances of at least 750 feet clear line of sight.

Remote Monitoring/Control Software Features

The Wi-IO is designed to interface with any Modbus®- or MeshScape-compatible Remote Monitoring and Control software applications, such as Millennial Net’s Wi-EMS. The Wi-EMS is a full-featured and easy-to-use Wireless Energy Management System that provides all the tools you need to report, trend, and analyze energy consumption.
## 6424 Wi-IO Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External power supply</td>
<td>9 ~ 24</td>
<td>VDC</td>
<td></td>
</tr>
<tr>
<td>Power supply voltage for external devices</td>
<td>3.0 ± 0.5%</td>
<td>VDC</td>
<td>Max output current 50 mA</td>
</tr>
<tr>
<td><strong>Digital Input / Output Channels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of channels</td>
<td>4</td>
<td>channel</td>
<td>Each of the four channels can be configured as digital input or output channel; DIO1 and DIO3 can be configured through jumper for opto-isolated switching output and return.</td>
</tr>
<tr>
<td>Logic “1” input voltage</td>
<td>2.8</td>
<td>VDC</td>
<td>Minimum</td>
</tr>
<tr>
<td>Logic “0” input voltage</td>
<td>0.5</td>
<td>VDC</td>
<td>Maximum</td>
</tr>
<tr>
<td>Maximum output current</td>
<td>4</td>
<td>mA</td>
<td>Maximum</td>
</tr>
<tr>
<td><strong>Opto-isolated Output Channels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of channel</td>
<td>1</td>
<td>channel</td>
<td>Remotely controlled based on schedule or real time command</td>
</tr>
<tr>
<td>Maximum voltage</td>
<td>50</td>
<td>V, AC or DC</td>
<td></td>
</tr>
<tr>
<td>Maximum current</td>
<td>1</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td><strong>Analog-to-digital Converter Channels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of channels</td>
<td>4</td>
<td>channel</td>
<td>Through jumpers, two channels can be configured to accept 0 ~ 3 VDC or 0 ~ 10 VDC analog signals, and the other two can be configured to accept 0 ~ 3 VDC or 4 ~ 20 mA analog signals</td>
</tr>
<tr>
<td>Input impedance</td>
<td>197 (3V range)</td>
<td>KΩ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (10V range)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition time</td>
<td>20</td>
<td>µsec</td>
<td>Minimum</td>
</tr>
<tr>
<td>Resolution</td>
<td>10</td>
<td>bits</td>
<td></td>
</tr>
<tr>
<td><strong>Radio</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating frequency range</td>
<td>2405 ~ 2475</td>
<td>MHz</td>
<td>ISM band</td>
</tr>
<tr>
<td>Number of available channels</td>
<td>15</td>
<td></td>
<td>IEEE 802.15.4 channels 11 ~ 25</td>
</tr>
<tr>
<td>Channel spacing</td>
<td>5</td>
<td>MHz</td>
<td></td>
</tr>
<tr>
<td>Maximum RF transmit power</td>
<td>18</td>
<td>dBM</td>
<td></td>
</tr>
<tr>
<td>Receiver sensitivity</td>
<td>-95</td>
<td>dBM</td>
<td>At 10^-5 bit error rate</td>
</tr>
<tr>
<td>RF data transmission rate</td>
<td>250</td>
<td>Kbits/sec</td>
<td></td>
</tr>
<tr>
<td>Channel agility</td>
<td>Yes</td>
<td></td>
<td>Automatically realigns RF channel when network (MeshGate) switches to a new channel.</td>
</tr>
<tr>
<td><strong>Environmental &amp; Mechanical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 ~ +85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-40 ~ +185</td>
<td>°F</td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-10 ~ +55</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 ~ +131</td>
<td>°F</td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td>118 x 69 x 25.4</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.7 x 2.7 x 1</td>
<td>in</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>3.3</td>
<td>oz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>95</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td><strong>Regulatory Compliance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCC &amp; IC for unlicensed operation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All Wi-IO Inputs and Outputs are configured by switching jumper positions on Headers P2, P4, P6. Table 1 and Figure 1 describe Input/Output contacts on RJ11 connector. Table 2 and Figure 2 show Input/Output configuration on all Headers.

### Table 1: WI-IO RJ11 Contacts Descriptions

<table>
<thead>
<tr>
<th>Contact Number</th>
<th>I/O Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>ADC3: 0-3 VDC or 4-20mA</td>
</tr>
<tr>
<td>3</td>
<td>ADC2: 0-3 VDC or 4-20mA</td>
</tr>
<tr>
<td>4</td>
<td>ADC1: 0-3 VDC or 0-10 VDC</td>
</tr>
<tr>
<td>5</td>
<td>ADC0: 0-3 VDC or 0-10 VDC</td>
</tr>
<tr>
<td>6</td>
<td>Switched 3 VDC Output</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>DIO0: Digital I/O or UART TX output</td>
</tr>
<tr>
<td>9</td>
<td>DIO1: Relay A or Digital I/O or UART RX input</td>
</tr>
<tr>
<td>10</td>
<td>Power Input</td>
</tr>
<tr>
<td>11</td>
<td>DIO3: Relay B or Digital I/O or UART RTS output</td>
</tr>
<tr>
<td>12</td>
<td>DIO2: Pulse Input or Analog Output or Digital I/O or UART CTS input</td>
</tr>
</tbody>
</table>

### Table 2: WI-IO I/O Configurations

<table>
<thead>
<tr>
<th>I/O Description</th>
<th>Header</th>
<th>Pins</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analog I/O</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADC0: 0-3 VDC</td>
<td>P4</td>
<td>3-4</td>
<td>Off</td>
</tr>
<tr>
<td>ADC1: 0-3 VDC</td>
<td>P4</td>
<td>5-6</td>
<td>Off</td>
</tr>
<tr>
<td>ADC2: 0-3 VDC</td>
<td>P4</td>
<td>7-8</td>
<td>Off</td>
</tr>
<tr>
<td>ADC3: 0-3 VDC</td>
<td>P4</td>
<td>9-10</td>
<td>Off</td>
</tr>
<tr>
<td>ADC0: 0-10 VDC</td>
<td>P4</td>
<td>3-4</td>
<td>On</td>
</tr>
<tr>
<td>ADC1: 0-10 VDC</td>
<td>P4</td>
<td>5-6</td>
<td>On</td>
</tr>
<tr>
<td>ADC2: 4-20mA</td>
<td>P4</td>
<td>7-8</td>
<td>On</td>
</tr>
<tr>
<td>ADC3: 4-20mA</td>
<td>P4</td>
<td>9-10</td>
<td>On</td>
</tr>
<tr>
<td><strong>Digital I/O</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIO0</td>
<td>Always enabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIO1</td>
<td>P4</td>
<td>1-2</td>
<td>On</td>
</tr>
<tr>
<td>DIO2</td>
<td>P6</td>
<td>1-2</td>
<td>On</td>
</tr>
<tr>
<td>DIO3</td>
<td>P2</td>
<td>2-3</td>
<td>On</td>
</tr>
<tr>
<td><strong>Solid State Relay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay A</td>
<td>P4</td>
<td>1-2</td>
<td>On</td>
</tr>
<tr>
<td>Relay B</td>
<td>P6</td>
<td>1-2</td>
<td>On</td>
</tr>
</tbody>
</table>

* - Relay A and Relay B must be enabled together.