IEEE1451 standard in wireless sensor networks using TinyOS message abstractions

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Introduction

- TinyOS uses by default the message buffer abstraction message_t
- Message_t can be passed between different link layers
- Currently developers don’t use standardized commands in TinyOS for read each channel sensor

Why use IEEE 1451 Standard in TinyOS

- IEEE 1451 is a global and open standard
- Extended wireless interfaces support
- Standard data formats and commands
- Low overhead in each transaction with motes
- It uses independent component that describe each IEEE1451.0 command
- It includes Transducer Electronic Datasheet TEDS used in calibration an autoconfiguration with hardware platforms
- IEEE1451 framework is executed on top of TinyOS Layers

TinyOS Components compliant IEEE1451

Applications

Weather Station node

NCAP node (Base station)
- Ultrasonic WD and WS (CH1)
- Pressure Piezoresistive sensor (CH2)
- Tipping Bucket Rain Gage (CH3)
- Temperature and Humidity (CH4)
- Solar radiation (CH5)

Platform: Tmote Sky
Support: TinyOS 1.X and TinyOS 2.X is in development

Example of Standard TEDS in a WTIM node

<table>
<thead>
<tr>
<th>TEDS</th>
<th>Memory Used (ROM)</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MetaTEDS (IEEE1451.0)</td>
<td>40 bytes</td>
<td>WTIM number of physical channels</td>
</tr>
<tr>
<td>Transducer Channel TEDS (IEEE1451.0)</td>
<td>99 bytes</td>
<td>Configuration parameters in each physical channel</td>
</tr>
<tr>
<td>User’s Transducer Name TEDS (IEEE1451.0)</td>
<td>25 bytes</td>
<td>Channel information name ASCII</td>
</tr>
<tr>
<td>PHY TEDS (IEEE1451.5)</td>
<td>66 bytes</td>
<td>Physical Configuration interface</td>
</tr>
<tr>
<td>Calibration TEDS (IEEE1451.5)</td>
<td>60 bytes</td>
<td>Calibration parameters</td>
</tr>
</tbody>
</table>