Section 4 Node List

The node list displays all the nodes being used and allows the user to change the visualization settings. The nodes information can be displayed in various forms such as charts/histograms/scatter plots. By right clicking on the node you can change the intervals for when the color change will appear by selecting the Health Status Settings. To add a node the user must right click on the node list and select add node. This brings up the mote properties dialog box where you can create a unique node ID and name the node. To delete a node the user must highlight the node they wish to delete and right click and select delete node. When a node is deleted it permanently deletes that node and all associated information to that node. The node properties dialog box can be opened by selecting the properties menu from the topology map or by double clicking a node in the node list. The properties box allows the user to name the mote, and on the color tab the user can select different colors for charting the mote.

Section 5 Visualization Tabs

Moteview provides 7 different tabs for visualization including; data, command, charts, health, histogram, scatter plots, and topology which provide different ways to view the data.

The data tab displays sensor readings that are received from the nodes in the connected network. There are columns that display information including; nodeID, server timestamp and sensor values from the sensor board firmware packet. The data from the sensors is converted into standard engineering units. The columns can be sorted by left-clicking the column header, which will allow the user to sort by nodeID, parent, temperature, voltage, last result time, or any other sensor reading. When the column header is right-clicked a pop-up menu with unit conversions appears.

The command tab allows the user to change the nodes parameters wirelessly. These commands are not stored in the EEPROM therefore are volatile. To modify the data and transmission rate the user must click on the systems tab which is located on the left side of the command tab, then select the nodeID, and make sure the check all nodes box is checked to ensure you can modify all nodes in the network. Enter the desired data rate and click the "set" button. The minimum rate that can be supported is 300 ms for high-powered nodes. The default rate is about 2 seconds for high-power applications and 3 minutes for low-power applications. To get the unique ID of a mote the user must click on the systems tab and select the node and press "get". To change the LED status click the "LED" tab on the side of the command tab, and select the nodeID and if you wish to change the LED for all the nodes make sure the "all nodes" box is checked. There are three colors you can make the nodes; red, green, or yellow. On turns the LED on, off turns it off and toggle to toggle the state of the LED the press "set" to set the specified nodes.

The chart tab lets the user create graphs from the information it receives from the nodes. Up to 3 sensor types can be selected for plotting; therefore creating 3 different graphs. Up to 24 different nodes can be selected for plotting by checking

the boxes next to the nodes list. Each node receives a different color and a legend is displayed on the right side of the window. The x-axis on the graph displays date and time, while the y-axis shows the data collected in engineering units. The user has 4 tools to help view the charts; zoom, pan, zoom out fully and reset to original view.

The *XMesh* application generate health packets on regular intervals, health packet encapsulate the state of the wireless mesh over time. The health tab displays the latest health packet reading that has been received from each node. The columns that can be found on this tab are nodeID, health packet contents and server timestamp. By left clicking on the column header you can once again sort the data by nodeID, last result time, or any other of the health readings.

The histogram tab displays a bar chart that summarizes the distribution of a single sensors data. The x-axis shows the data in engineering units and the y-axis shows % fro the instances for each sensors values.

The Scatter plot tab has the ability to plot 2 sensors reading against each other for a set of nodes. The scatter plot is a visual comparison of each sensors data fields and help to determine what kind of relationship exists between them.

The topology tab shows a mote network map with placement and parenting information, which allows users to view the topology of the modes in the network. Nodes initially show up in the left hand corner of the topology map but can be dragged to new locations on the map. When the bitmap is right clicked a visualization properties dialog box appears. There are 4 tabs in this dialog box including; sensor, isobar, node, and health. The Sensor tab allows users to specify a minimum and maximum sensor values and associate these values to specific colors. On the isobar tab the user can decide whether they want a gradient on the topology view and they also can specify the mote radius. On the node tab there are 3 choices for mote visualization which include; none, where no nodes are displayed, BlackDot, where a BlackDot is used to display the node, or MoteGlow which is a color circle that displays the nodeID and the circle's color is based on the sensor values specified in the above section. On the health tab the user can specify the duration at which the link between the nodes goes grey. If no packets were received after the specified time the link would not turn grey.

In order for MoteView to display data received from the sensors the user must check on the "live" checkbox. When MoteView is in live mode, it automatically refreshes the node list, charts, and topology vies as packets are received. If live is not checked the time-bar at the bottom of the visualization tab with be enabled, and will allow users to scroll back and forth and view data collected at different times. There are playback controls that will animate data collected over a period of time and the user can set the playback interval.

Source: MoteView User Manual