

Appendix B

Senior Design Project : Statement of Work

OVERVIEW

We have been contracted to design and deploy a prototype low power wireless sensor environment on the Lafayette College campus. This environment shall support both fixed and mobile sensors allowing for environmental monitoring, alarm monitoring and vehicle/material position tracking. Technical requirements are contained in the Systems Requirements Document.

DEPLOYMENT

The prototype system shall be deployed on the Lafayette College campus in Easton, PA. The coverage area shall be restricted to 90% of the geographical area and external to campus buildings. An engineering study shall be performed to select equipment installation sites.

BUDGET

Materials costs shall be limited to \$3,000.

ENGINEERING RESOURCES

Eighteen [18] eager entry level engineers and one burned out faculty member shall comprise the engineering team.

TECHNICAL RESOURCES

The Lafayette College Engineering Division shops shall be the primary technical resource for prototype fabrication.

STANDARDS

All engineering shall be performed under best engineering practices. All documentations shall be provided in electronic form and under configuration management

SCHEDULE

The design and deployment of the system shall be performed between January 24, 2005 and May 13, 2005. Initial circuit board artwork is due to the shop by March 11, 2005.

DELIVERABLES

At the end contract period the team shall provide a detailed technical report, all documentation required for manufacturing, test reports, and a demonstrable prototype system.

Senior Design Project : Requirements Document

- R000 Wireless sensor node networks shall provide highly available remote sensor connectivity to specified geographic regions external to structures. Highly available service is defined as availability of 0.90 in ninety [90] percent of the area in the geographic region.
- R001 Both fixed and mobile sensors shall be supported.
- R002 Four [4] analog [0-5 volt single-ended], eight [8] digital [logic levels single-ended], and one [1] RS-232 sensor interfaces shall be supported.
- R003 The network shall support four [4] forty-eight [48] byte data messages from each sensor node every minute.
- R004 Each sensor node in a network shall have a unique node address supporting two hundred fifty-six [256] unique nodes.
- R005 Each sensor network shall have a unique network address supporting two hundred fifty-six [256] unique linkable networks.
- R006 Bidirectional communications shall be supported between all sensor nodes across all networks.
- R007 Networks may be linked by conventional communication techniques.
- R008 A network shall be self-configuring.
- R009 Wireless communications shall be implemented for use in the United States using a single channel in low power unlicensed spectrum as specified in FCC Part 15. Linx Technologies is the customer-preferred vendor [CSE].
- R010 A time stamp [UTC] shall be affixed to each message at time of message creation.
- R011 A single voltage rechargeable source capable of powering the node for twenty-four [24] hours without external power shall be provided for each node.
- R012 Nodes may be installed in remote locations without commercial power.
- R013 Given the mission criticality and environment, nodes shall be implemented in NEMA 4 enclosures.
- R014 Each node shall support fault localization to the line-replaceable unit [LRU] level.
- R015 An error reporting mechanism shall be implemented.

- R016 The design of the system shall be manufacturable.
- R017 The design and deployment shall be such that nodes safely interact with their environment and are sustainable.
- R018 Nodes shall support both solicited and timed requests for sensor data.
- R019 Nodes shall provide a maximum of twenty [20] milliamps total at five [5] volts for supply bias to external digital and analog sensors and fifty [50] milliamps total at twelve [12] volts for supplying external serial devices.
- R020 TBD space shall be provided in the enclosure for used devices.