Salo
IT Solutions

NOAA

ALERT-2 Working Meeting
NOAA Phase I SBIR Project

October 24, 2007
Sacramento, CA

Timothy J. Salo
Salo IT Solutions, Inc.
salo@saloits.com

NOAA Phase I SBIR Project

- Overall Objectives
  - Develop a next-generation suite of wireless communication protocols for automated flood warning systems
    - Freely available (open, non-proprietary) protocol specification
    - Implementation
- Phase I Duration:
  - July 16, 2007 – January 15, 2008

NOAA Phase I SBIR Project

- Phase I Deliverables
  - Online Tools (http://www.alert-2.com/)
    - ALERT-2 mail lists
    - ALERT-2 document repository
  - ALERT-2 Requirements Specification
    - Initial version distributed, available online
    - A few comments received, mostly minor
    - Soliciting comments via phone
  - Draft ALERT-2 Protocol Specification

Phase II Plans

- Intend to submit Phase II proposal
  - Due mid-March 2008
  - If funded, start August 2008
- Likely contents
  - Implement ALERT-2 protocols
  - Deploy in field tests
- I will need your support

Salo
IT Solutions

NOAA

ALERT-2 Working Meeting
ALERT-2 Requirements

October 24, 2007
Sacramento, CA

Timothy J. Salo
Salo IT Solutions, Inc.
salo@saloits.com

ALERT-2 Requirements

- Draft version 0.1: August 25, 2007
  - Distributed in early September
  - Dozens of downloads
  - A few, minor comments
- Does this document represent a consensus of the ALERT community?

ALERT-2 Requirements

- 3.1 Equipment

  - Support bidirectional communication

  - Not *require* remote nodes to receive

ALERT-2 Requirements

- 3.2 Performance
  - Provide enhanced throughput
    - TBD messages per hour
    - Bluewater Design modem provides this
  - Ensure better channel utilization
    - TBD per cent utilization
    - Time slotted protocol would be nice (required)
  - Support larger networks
    - 1024 nodes

ALERT-2 Requirements

- 3.2 Performance (cont)
  - Support more sensors per node
    - Pretty much unlimited
  - Support more networks per channel
    - 15 networks per share a single RF channel
  - Ensure minimum latency
    - Report latency of less than TBD

ALERT-2 Requirements

- 3.3 Reliability
  - Reduce or eliminate packet loss due to congestion
    - Bluewater Design modem will help somewhat
    - Time-slotted MAC protocol probably required
  - Detect and discard packets that contain transmission errors.
    - Bluewater Design modem will provide this

ALERT-2 Requirements

- 3.3 Reliability (cont)
  - Minimize the number of packets that are lost as a result of congestion or transmission errors
    - Bluewater Design modem will help
    - Time-slotted MAC protocol may be required
    - Link-layer retransmission may be required

ALERT-2 Requirements

- 3.4 Naming and Addressing
  - Ensure that every ALERT-2 *node* is assigned a permanent, globally unique identifier
    - e.g., 48-bit IEEE MAC address
    - Use in databases (?)
  - Permit every ALERT-2 *node* to be configured with a text identifier
    - Software, other nodes should be able to read this
    - Use in databases (?)

ALERT-2 Requirements

- 3.4 Naming and Addressing (cont)
  - Use a short address for most purposes
    - e.g., 16-bit address to save bandwidth and energy
    - Address of node might change
      - e.g., don’t use in database

ALERT-2 Requirements

- 3.5 Application Services
  - Support multiple applications per node
    - e.g., network management application; stream guage application, ...
  - Permit a specific application to be addressed
  - Support multiple application protocols
    - Different applications may use different protocols

ALERT-2 Requirements

- 3.5 Application Services (cont)
  - Provide an unreliable datagram service
    - Hope single packet gets to destination
    - Equivalent to current ALERT protocol
  - Provide a reliable datagram service
    - Make sure single packet gets to destination
  - Provide a reliable transport service
    - Make sure lots of data get to destination

ALERT-2 Requirements

- 3.6 Application Protocols
  - Each application should have its own protocols specified
  - ...

ALERT-2 Requirements

- 3.7 Interoperability and Compatibility
  - Ensure interoperability between implementations and vendors
    - Products that conform to the ALERT-2 specification should be assured of interoperating with each other
  - Share an RF channel with the original ALERT protocol
    - Significant ALERT-2 functionality may not be available in mixed ALERT/ALERT-2 networks

ALERT-2 Requirements

- 3.7 Interoperability and Compatibility (cont)
  - Support existing transmitters and transceivers
    - Bluewater Design modem designed to do this

ALERT-2 Requirements

- 3.8 Extensibility
  - Permit new versions of the ALERT-2 protocol to be deployed incrementally
  - Permit new applications and new application protocols to be deployed without changes to the underlying ALERT-2 protocols
  - Permit application protocol to change without affecting other applications

ALERT-2 Requirements

- 3.9 Network Administration, Management
  - Support remote network management
  - Permit passive base stations
  - Support automatic base station fail-over
  - Minimize manual configuration
  - Configure routers and routing automatically.

ALERT-2 Requirements

- 3.10 Energy Conservation
  - Permit remote nodes to sleep
    - Important, but may be hard to do well
  - Operate with limited computational power and storage capacity in remote nodes

ALERT-2 Requirements

- 3.11 Security
  - Optionally ensure the integrity of data
  - Optionally prevent disclosure of data
  - Optionally ensure that the source of data is identified
  - Optionally ensure that data packets cannot be replayed
  - Optionally authenticate users or applications
  - Optionally authorize operations

ALERT-2 Requirements

- 3.12 Intellectual Property
  - Make protocol specifications freely available
  - Permit implementation without paying fees