Info on SEGA

- How many wireless nodes are there in the current system?

We have 138 nodes operating at 17 sites in AZ and CA, the latter sites in support of the University of California’s Institute for the Study of Ecological and Evolutionary Climate Impacts (ISEECI). This will expand to a total of 154 nodes at 21 sites as ISEECI completes planned deployments.

- What type of wireless communication is used (satellite, GSM, 3G, 4G, ...)?  I see the current draft mentions satellite plugins, does that mean all nodes use satellite communication?

All nodes form and maintain a multi-hop tree topology with a root node. Network formation uses minimum number-of-hops objective function. Nodes communicate using the unlicensed 915 MHz band and narrowband modulation. The root node connects to a ruggedized linux server that in turn is connected to a cellular data modem. The linux server connects with the SEGA real-time data center at the NAU campus using the MQTT data transfer protocol to enable reliable communication over what has proved to the unreliable cellular data infrastructure. Where cellular data service is not available, we use satcom modems.

- Does SEGA use a custom / in-house RTOS? Or does it use a publicly available / off-the-shell RTOS?

WiSARD nodes use a custom time-triggered RTOS that is tightly integrated with a time/frequency-hopped PHY/MAC protocol. This combination enables nodes to go into deep hibernation between scheduled time/frequency rendezvous for time synchronization and data transfer.

- How often has the networking failure happened?  Are we talking about few times a month, once a month, once a year, etc.?

The failures occur roughly at the rate of once every three months across all sites.

- When a networking failure happens, how many nodes are often affected?  Does the failure cascade to a set of nodes (like a subnet) or does it only affect a node or two?

When a failure occurs, it often spreads from one node to others, eventually disabling subnets or sometimes the entire site.

- When a networking failure happens, is it easy to identify which nodes are affected?  Must humans be sent to the site to physically reset the affected nodes?

The failure causes nodes to seek to rejoin, expending high levels of energy for radio operation. Nodes eventually deplete their energy sources. Humans must visit the site to re-start the network.

- Is there a good but small diagram that shows the structure of SEGA, that we can use in the proposal?  We don't have much space, so a large figure can't be used.

Looking for one…