Design Principles of Tenet

Asymmetric Task Communication
Any and all communication from a master to a mote takes the form of a task. Any and all communication from a mote is a response to a task.

Addressability
Any master in a Tenet can communicate with any mote or master in that Tenet. Any mote in a Tenet can communicate with at least one master in that Tenet.

Task Library
Motes provide a limited library of generic functionality, such as timers, sensors, simple thresholds, data compression, and FFT transforms. Each task activates a simple subset of this functionality.

Software and Tools

Tasking API
Tasking API provides functions to describe a task to run on the motes.
Example: sample(), actuate(), send(), count(), avg()

Transport API
Transport API provides functions to disseminate tasks and collect data from the network:
send_task(task_description)
attr* read_response(wait_interval)

Centralized Routing: Centroute
Tenet supports Centroute for mote-to-master and master-to-mote routing. Centroute features:
- Low control and state overhead on the motes
- Low churn – routes are determined during initialization or to recover from packet loss
- State and route management on the masters thereby simplifying the code on the motes

Deployment and Testing tool: Tenetrun
To simplify deployment and testing, “Tenetrun”:
- Daemons the processes that constitute the master stack and restarts them if they fail.
- Instantiates multiple copies of the master stack to emulate multiple masters in a single physical host.

Applications and Deployments

Ambient Structural Vibration monitoring
Continuous structural monitoring and event detection
“sample(3 channels, 20 Hz) → send(stream)”
(http://enl.usc.edu/projects/bridge/)

Pursuit Evasion Game
Pursuer robots estimate the location of evaders and corral them.
“sample(0xaa, RSSI) → compare(LT, 0xaa, 125, 0xbb) → deleteactivetaskif(0xbb) → send()”
(http://enl.usc.edu/projects/peg/)

Wildlife (Lizard/snake) monitoring
Cyclops take pictures of the trap, run image processing algorithms to detect the animals, and the result directs the biologists to the trap that has captured lizards or snakes.
“periodic(2 mins) → detect_lizard(0xbb, 0xaa) → not(0xaa) → deleteactivetaskif(0xaa) → send(stream)”

http://tenet.usc.edu