

TALL Tales in Embedded TALL Sensing

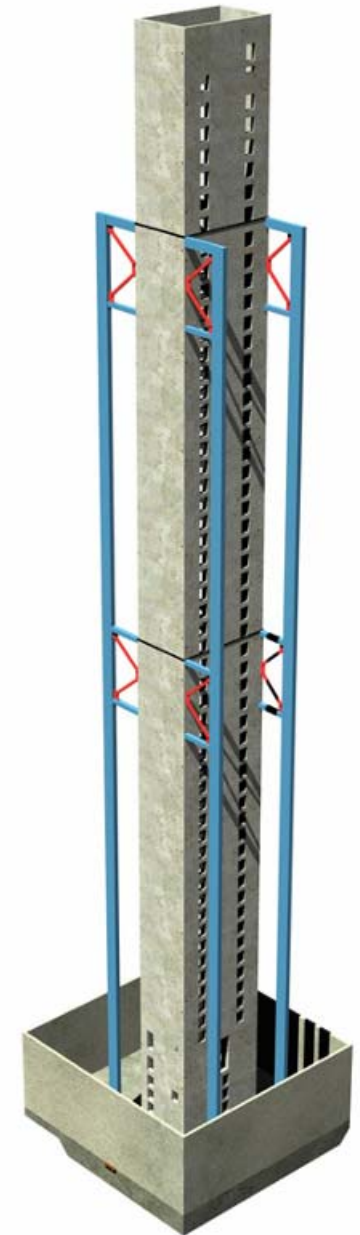
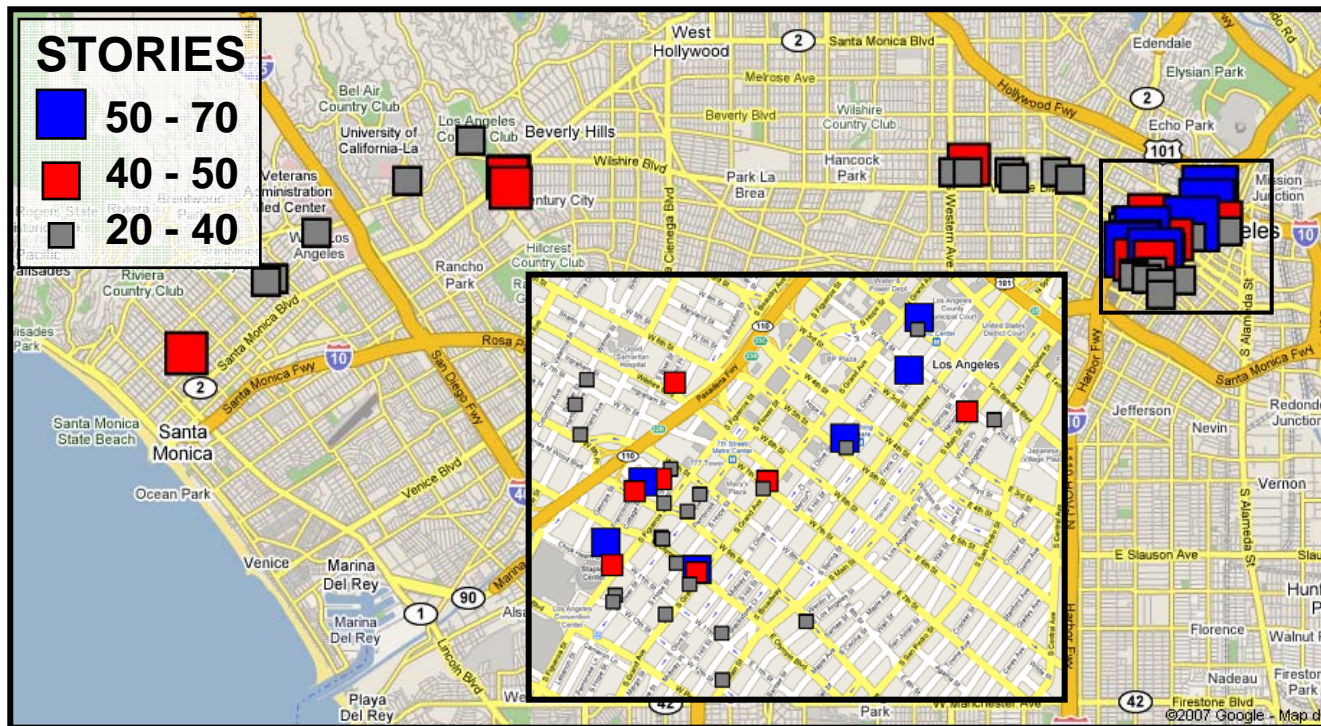


Derek Skolnik, Martin Lukac

V. Naik, W. Kaiser, P. Davis, J. Wallace, D. Estrin

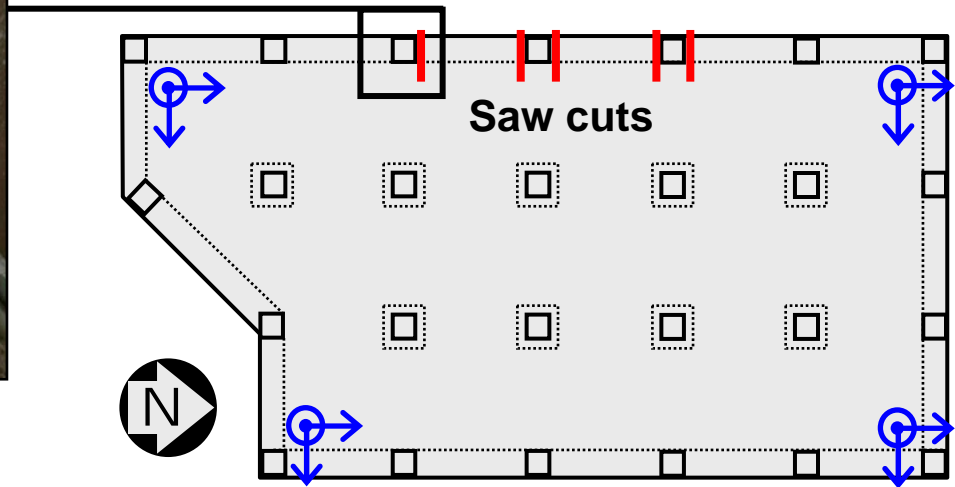
Tall Building Boom

- Performance-based “alternative” designs require peer review per UBC 97
- Update LA-DBS instrumentation requirements



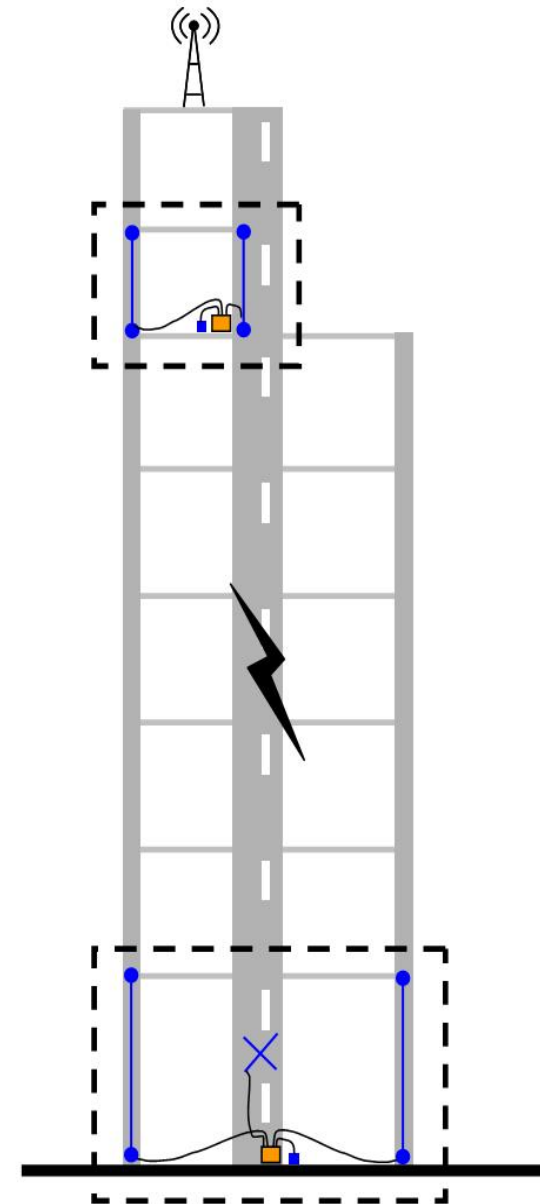
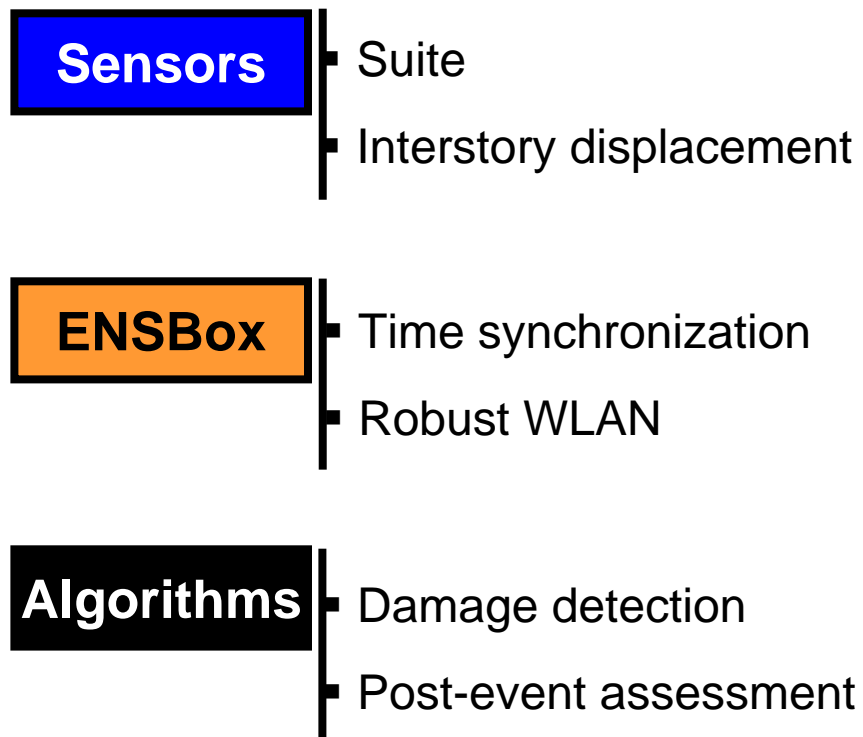
Structural Health Monitoring

- Rapid post-event assessment
 - minimize downtime
- Damage Detection
 - need more than acceleration



SHMnet System

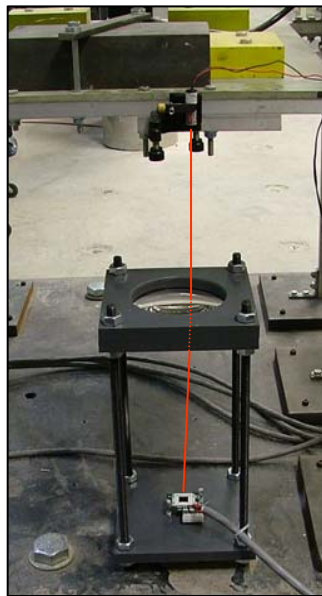
- Model-driven deployments



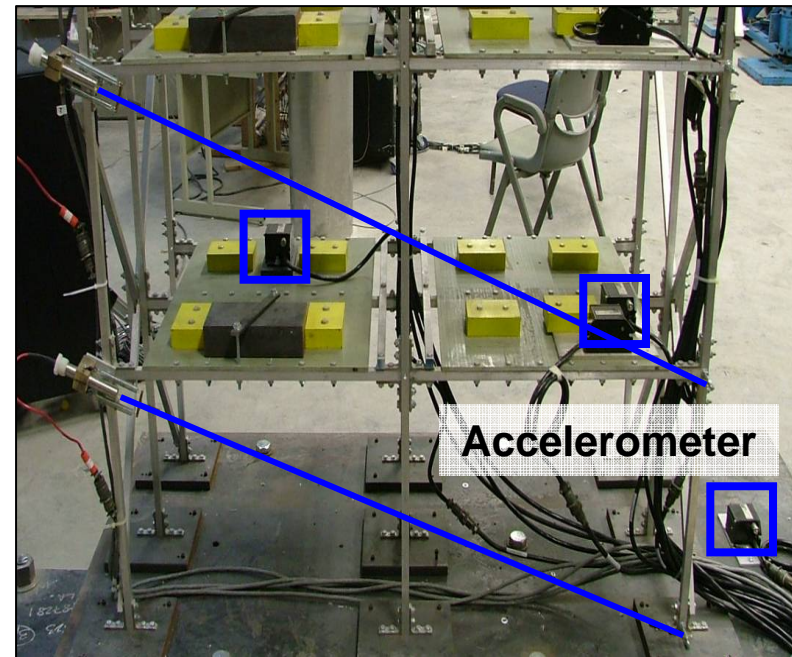
Sensor Development

- Two approaches used to measure interstory displacements
 - double integration of acceleration
 - LVDT with spring tensioned wire
- New non-contact sensor

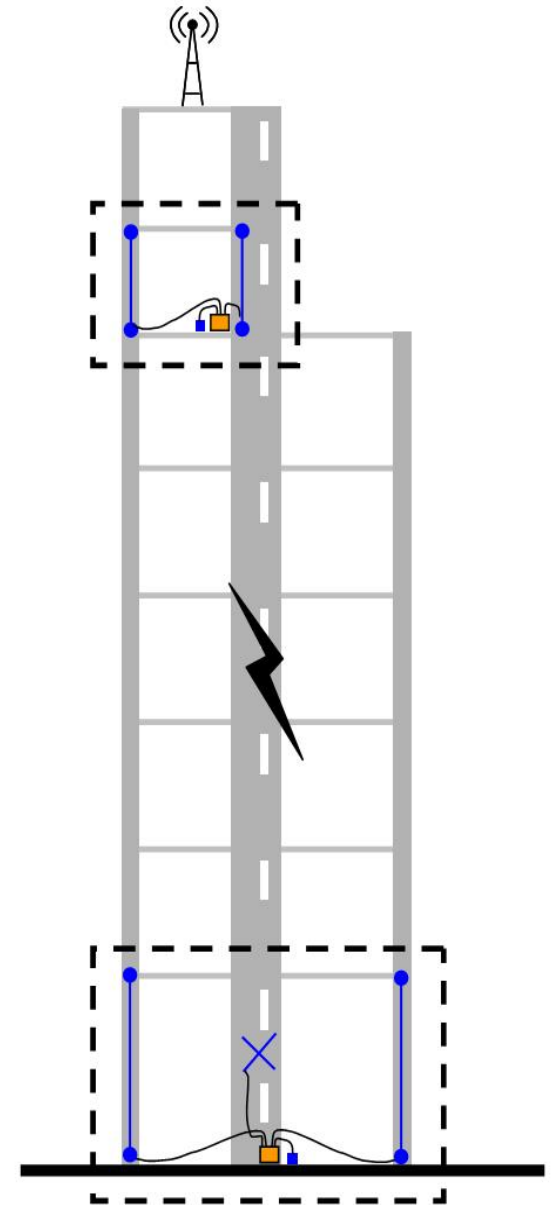
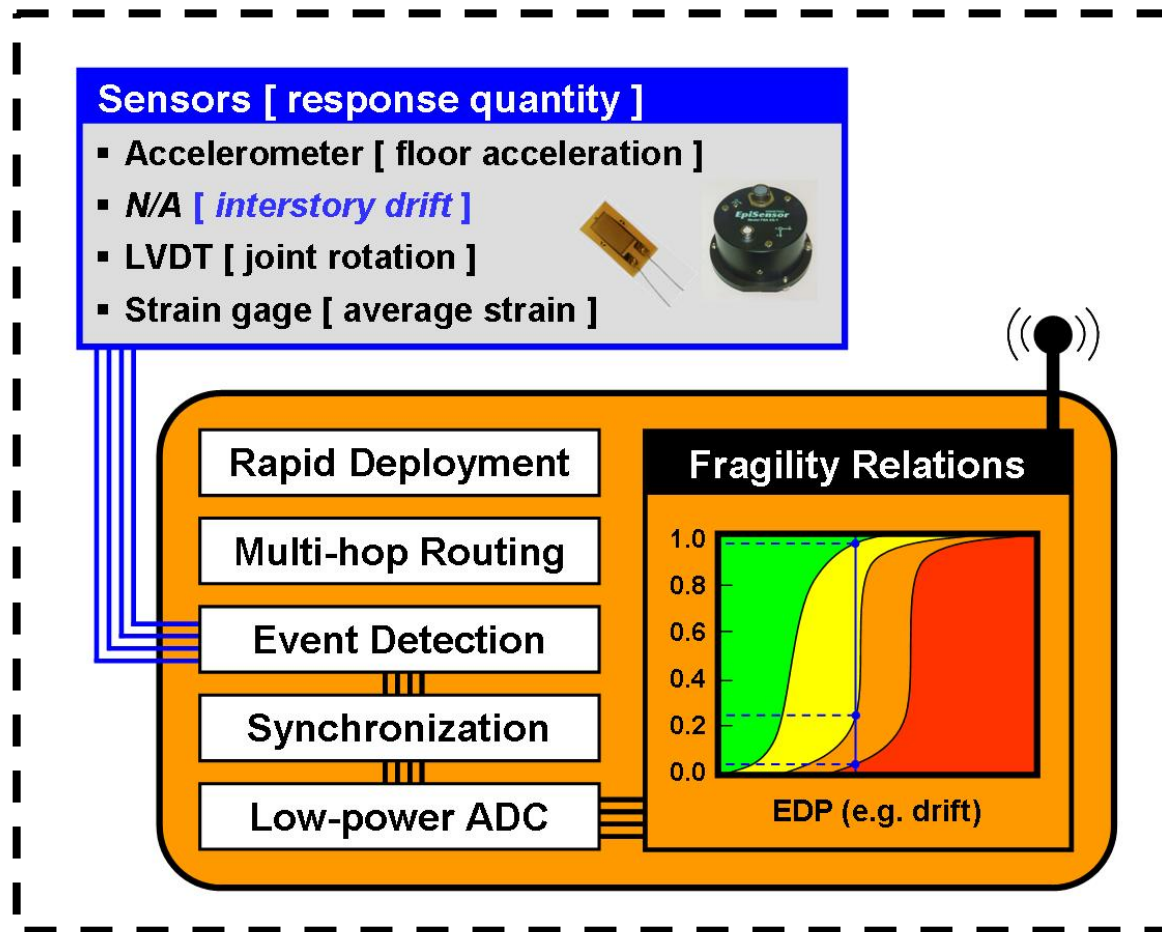
Laser
Plano-convex lens
Photodiode



LVDT

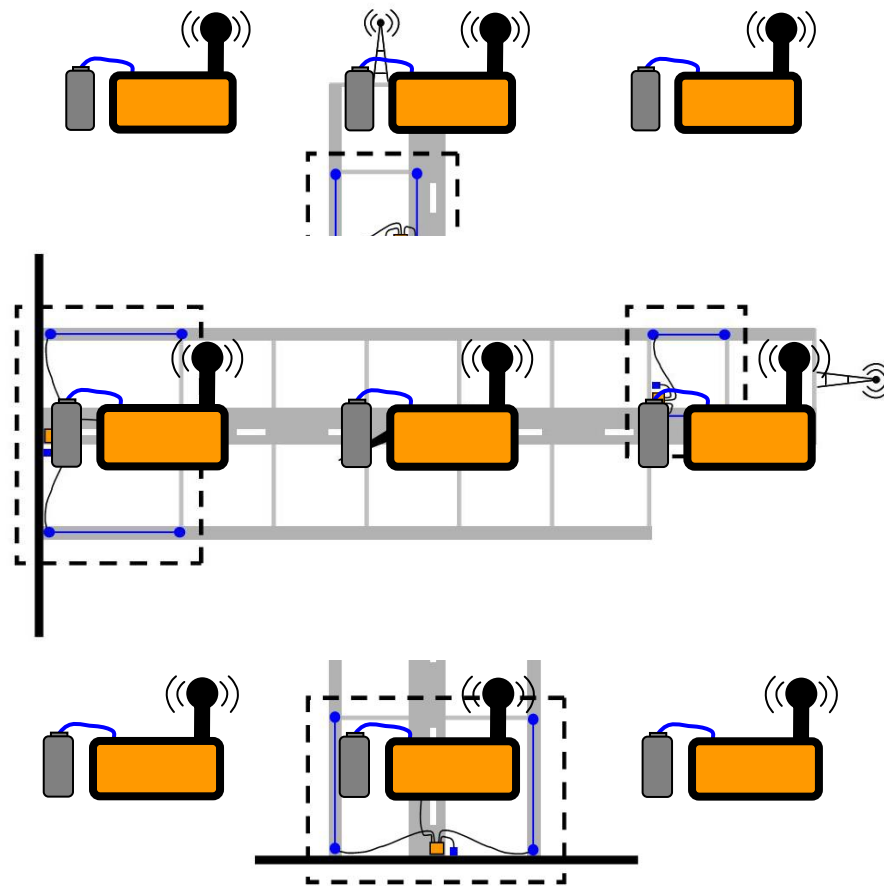


SHMnet Systems



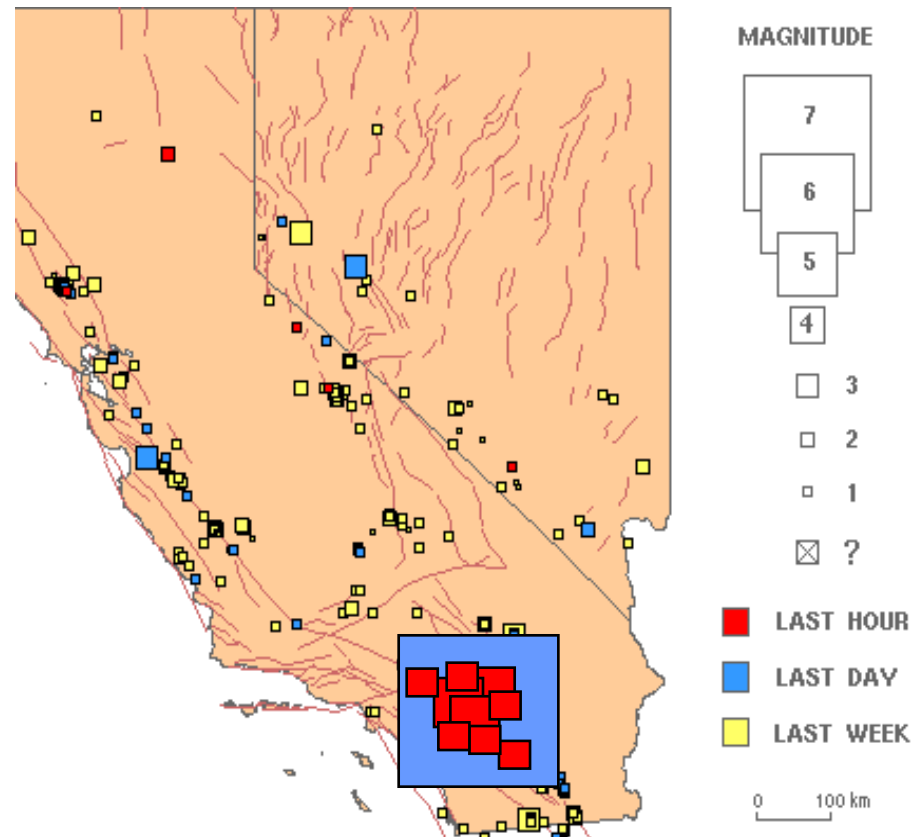
SHMnet → GeoNet standing up

- System shared with GeoNet
- Difference: deployment scenarios and sensors
- Rapidly deployed after earthquakes
- 0.5 – 1.0 Km grid
- Active \geq month



GeoNet: Aftershock Chaser . . .

- Frequency of aftershocks determined by size of initial shock (Omori's Law)
- Small EQ -> aftershocks for a few weeks
- Large EQ -> aftershocks for a few years
- Opportunity to study earthquake propagation near epicenter



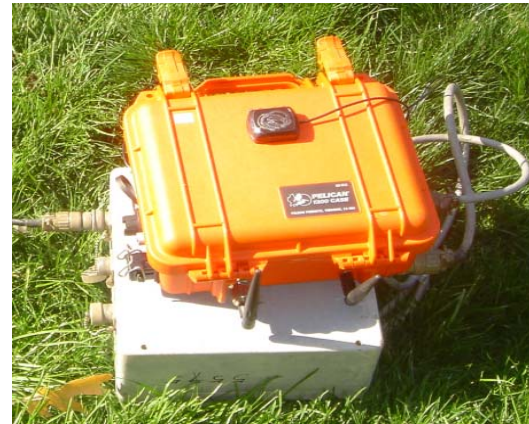
MASE & Peru vs GeoNet

- Long term
- Big batteries
- Solar panels
- Power hungry ADC
- Active seismometer



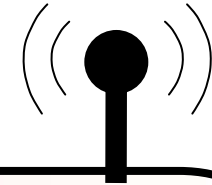
5 days

- Short term – smaller batteries
- Integrated low power ADC
- Passive seismometer
- LEAP2 platform
- Sleep scheduling



30+ days

Sleep Scheduling: Impact on the Entire System



Data Transport / Routing

- Preserve routes between sleep cycles
- Aggressive route repair after wake up

Time Synchronization

- Maintain sync across sleep cycles
- Most important when no GPS available

System Management

- Disruption Tolerant Shell (DTS)
- Used in MASE network, applicable here

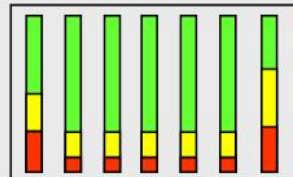
Deployment

- Determine network capacity as deploying
- Bound on sleep scheduling

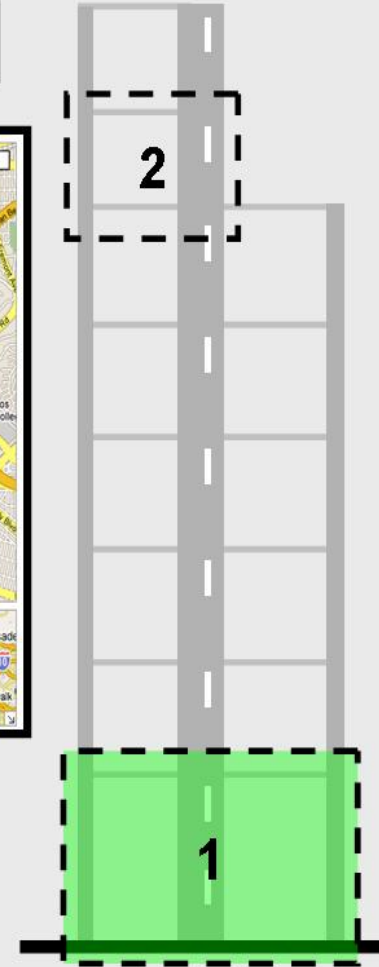
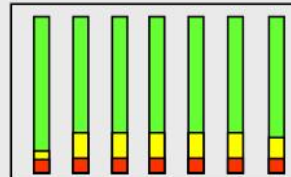


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PT slabs

Network



MRI 1



Thank You

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