Structural Health Monitoring of Bridges

Using Wireless Sensors Networks

Aruna Seneviratne

Structural Health Monitoring

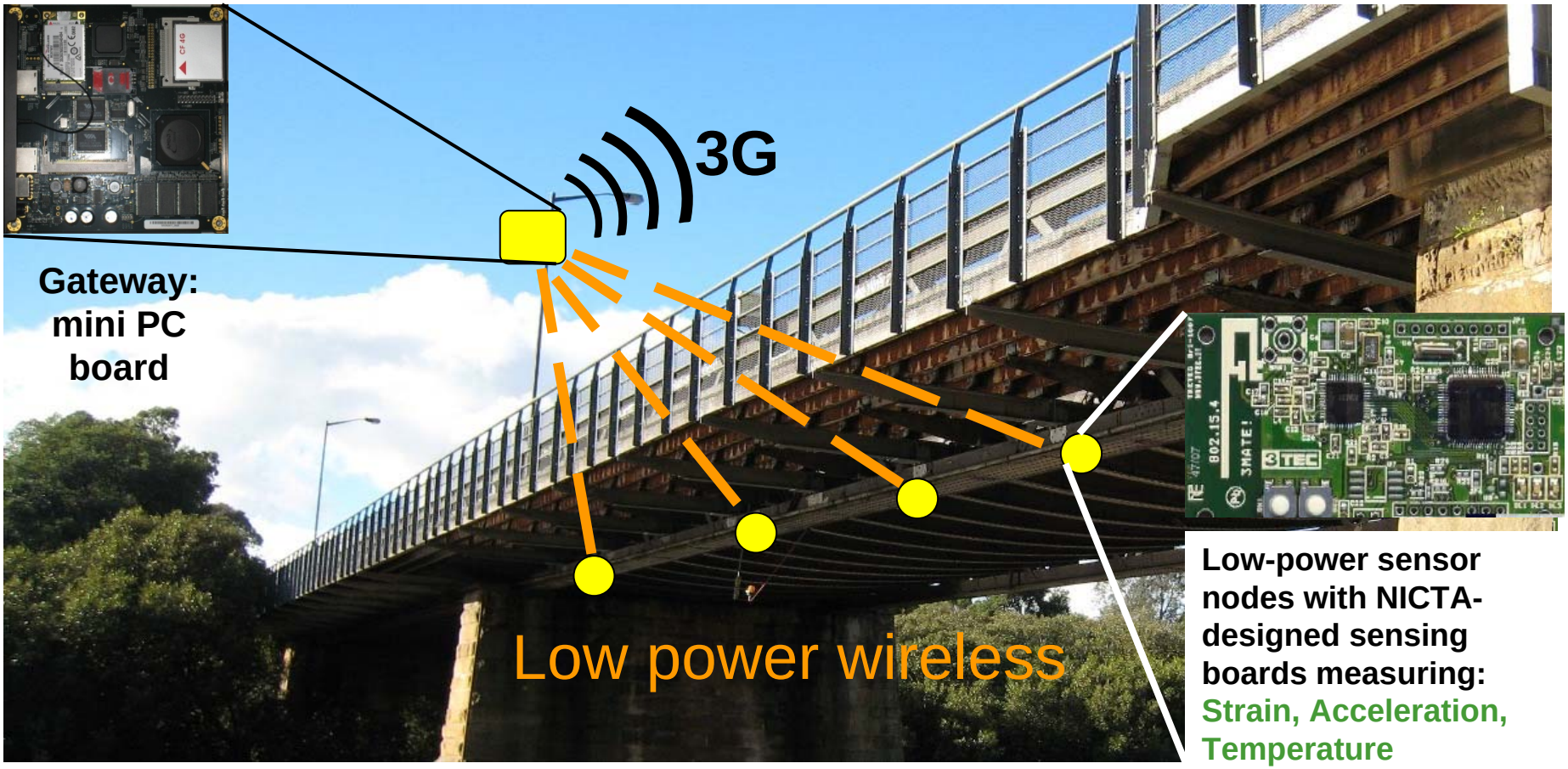
NICTA

- Estimating of the state of structural health, or Detecting the changes in structure that effect the performance
- Two major factors:
  - Time-scale of change
  - Severity of change
- Two major SHM categories:
  - Disaster Response (earthquake, explosion, etc.)
  - *Continuous Health Monitoring (ambient vibrations, wind, etc.)*

SHM of Bridges - Vision

- Consider a bridge instrumented by hundreds of smart wireless sensors, which are reporting information necessary to evaluate the structural health of the bridge.
  - If an event happens, this network can identify the location of structural damage/change as well as its severity
  - The network can also be used to monitor structural health in a continuous basis, diagnose any structural problem early and deal with it appropriately

Prototype



Actual bridge deployment within Sydney metro area

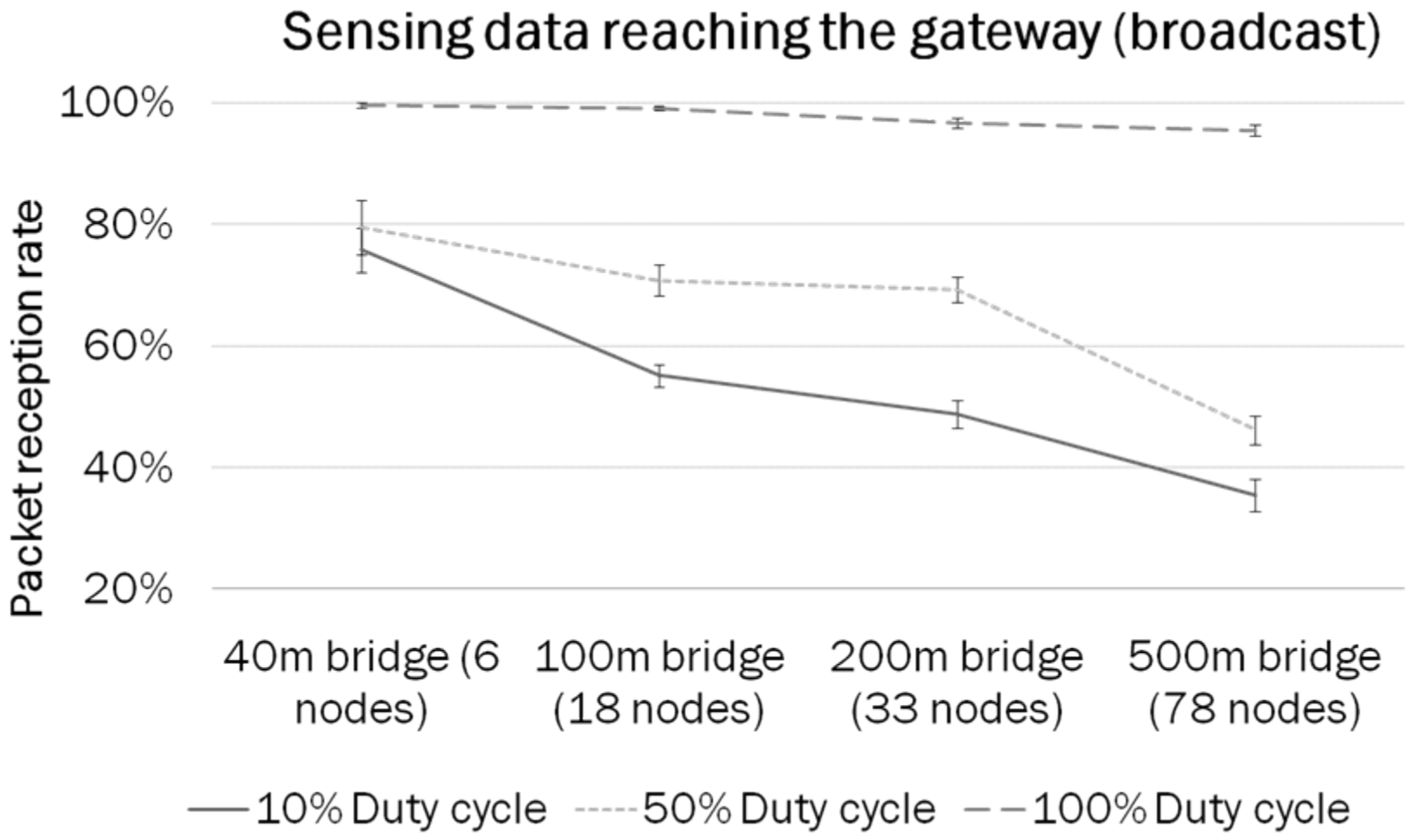
Options in Testbed Design

NICTA

	Wireless	Wired
Deployment	Easy	Hard
Cost	Cheap	Expensive
Lifetime	Not guaranteed	Guaranteed
Information	May be lost	Full
Reprogram	Non-trivial	Trivial

How important are the differences?

Simulation results



Lifetime: 13.3 days 5.6 days 3.2 days

First Phase and the Road Ahead

NICTA

- Establish a wired testbed
- Testbed design
  - remotely managed experiments,
  - automated measurements management,
  - fully programmable,
  - energy not a restriction (on for months), but closely measured.
- Validate sensors against current regime
- Monitor wireless network performance

Thank You!

NICTA

Questions? Comments?