

*How tomorrow moves*



# CSX Strategic Research

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# Vibration Monitoring Concept

- Leverage existing fiber optic cabling along right of way to act as a continuous detection and monitoring system



# Opportunities



Copper Cable Theft



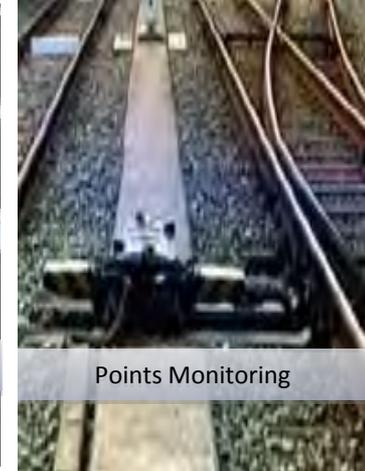
Train Tracking



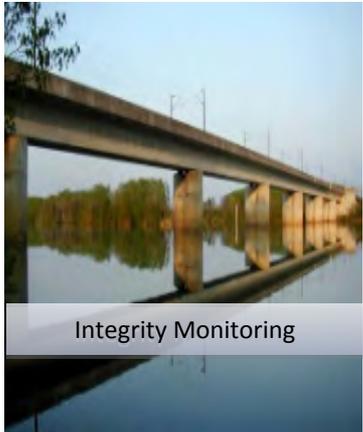
Damage to networks



Flat Wheel Detection



Points Monitoring



Integrity Monitoring



Proof of Attendance



Level Crossings



Bridge Collision Warning



Intrusion





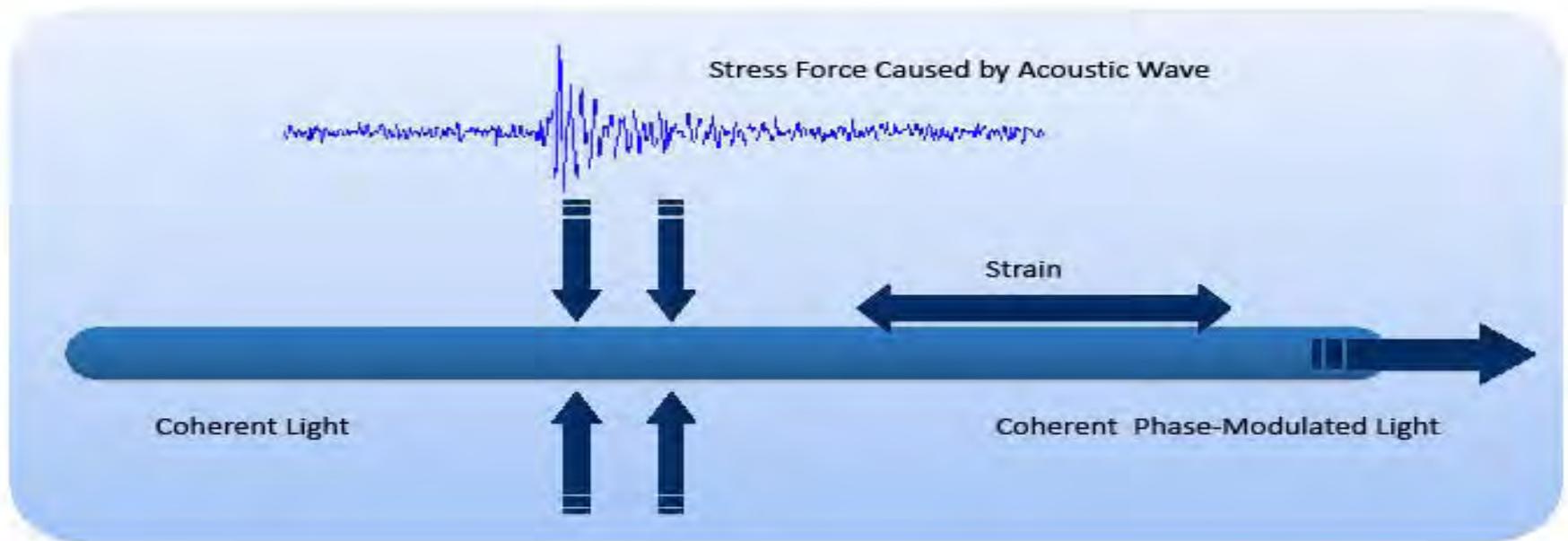
# Status

- We are jointly working with British Telecom and FoTech on developing test plans to determine if fiber optic cable can be used as a detection and monitoring system
- We are working with the industry to test and share our results



# How Does It Work?

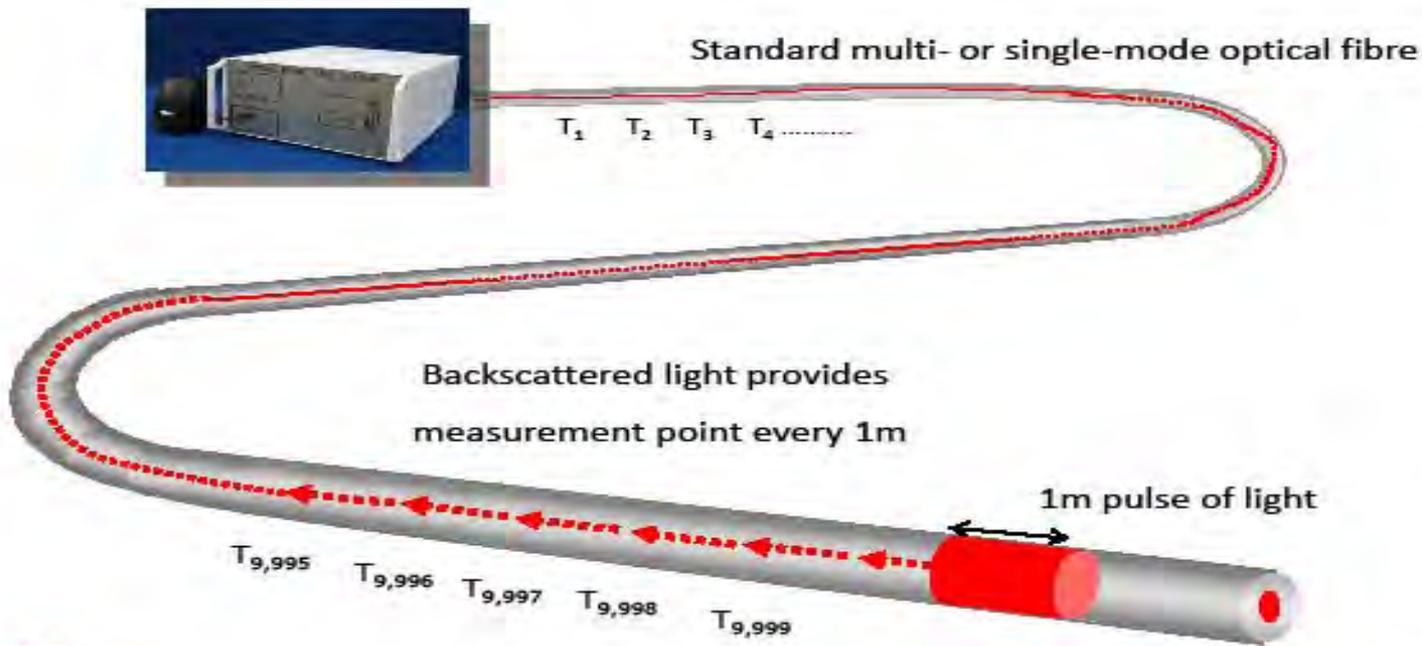
## Distributed Acoustic Sensor using Fibre



# How Does It Work?

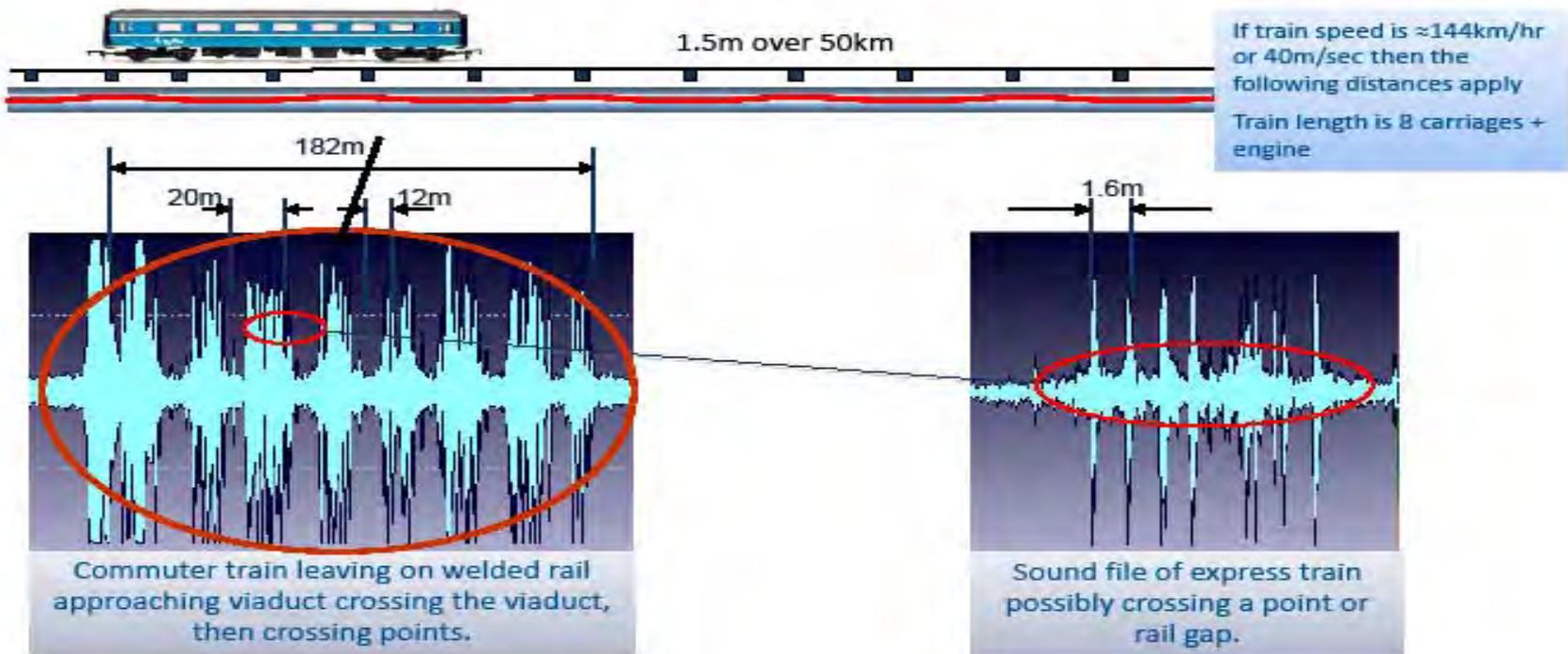
The fibre is the sensor

Measurements all along a 10km fibre = 10,000 sensors!!



# How Does It Work?

## Initial Testing with Rail





# Plan

- CSX has ~10,000 miles of fiber along our track that we can access
  - We believe this fiber can be used to monitor our traffic for location and defects
- Tests are planned at:
  - TTCI Pueblo, CO test track
  - West Springfield, PA
    - Supersite: Acoustic Bearing, Optical Geometry, Wheel Impact Load, Hot Bearing Detection Systems



# Proof of Concept Approach

Incorporates multiple incremental development steps:

1. Deployment of a Sensor at TTCl
2. Performance of various tests to gather data to create the Acoustic Signatures
3. Verification that the signatures report the correct car health events
4. Movement of the Sensor from TTCl to CSX
5. Comparison of the results of the Sensor unit against data provided by the CSX Supersite  
*This is where further fine tuning may also be undertaken to take account of the effects of the different environment*



# Outcomes

- Transitions us from depending on fixed point discrete data measurement systems to continuous data measurements
  - Enables us to determine the location of these events to within a meter
  - Lower cost detection and location system as compared to current technologies
  - Provides potential for predictive analysis of upcoming events



# Questions ??

