



# On Michigan's Famous Mackinac Bridge, wi4 Mesh and wi4 Fixed Solutions Facilitate Understanding Bridge Stress



## Enterprise Overview: Michigan Department of Transportation (MDOT)

The Michigan Department of Transportation builds, operates and maintains the entire transportation infrastructure owned by the State of Michigan. This includes all roads and bridges, in addition to traffic signals, surveillance cameras, weather monitoring equipment and dynamic messaging signs. MDOT maintains an integrated wireless, fiber and copper communications network for the management and monitoring of all assets under MDOT control.

## The Challenge: Use an annual event to highlight the importance of stress monitoring for all MDOT-maintained bridges.

In the aftermath of the collapse of the I35W bridge over the Mississippi River in Minneapolis, the testing of highway bridges for mechanical stress has taken on a new urgency. MDOT had already planned to deploy a network of remote bridge monitors, and saw an opportunity to demonstrate their value by testing a monitoring system during the annual Labor Day Bridge Walk.

During the event, half the bridge is closed to vehicular traffic and open for some 57,000 pedestrians to walk the length of the span. MDOT decided to measure the stresses on the bridge during this unusual event, then compare the measurements to normal before and after stress baselines, allowing the organization to identify stress variations under different conditions. In addition, MDOT was able to leverage their investment in a Vehicle Infrastructure Integration (VII) test bed by including their test bed vehicles in the data collection, analysis and display process.

One considerable obstacle MDOT faced in setting up the test was time; the organization needed to plan and deploy a temporary communications system in just 30 days.

## The Solution: A high-speed wireless communications link between bridge data collection devices and test bed vehicles.

To ensure a successful test, MDOT needed telemetry equipment that would deliver high-speed connectivity and accurate, real-time data transport that would be efficient in a temporary network and that could be deployed quickly and easily.

Already enjoying a strong relationship with Motorola, MDOT built a system consisting of wi4 Mesh and wi4 Fixed Point-to-Point and Point-to-Multipoint products. The network provided the link between bridge monitoring data collection devices and MDOT's Motorola-equipped test bed vehicle containing a ML900 laptop.

The network configuration consisted of a Canopy® Advantage module attached to a series of data collection devices and located on the bridge. This module was paired with a second module approximately 1.5 miles away at the Bridge Authority's

## CUSTOMER PROFILE

### Enterprise

Michigan Department of Transportation (MDOT), Lansing, Michigan, USA

### Industry

Highway Bridge Stress Management

### MOTowi4™ Solution

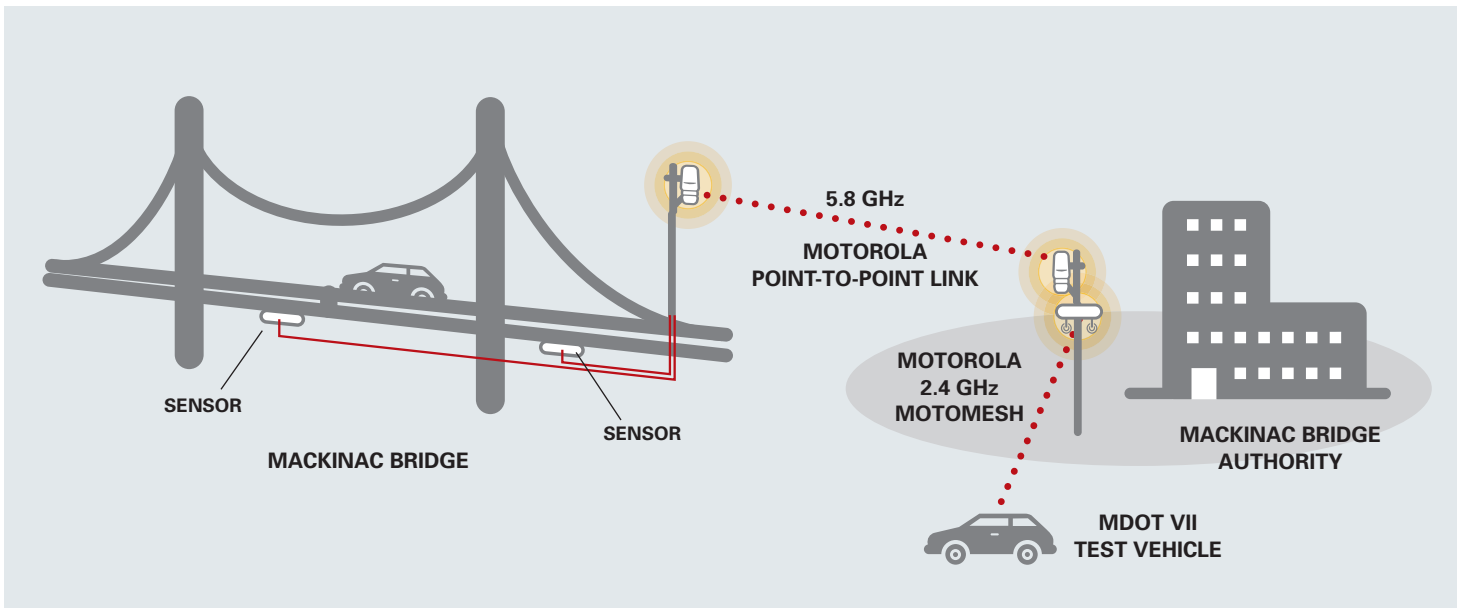
- wi4 Mesh and Fixed Solutions
- Mesh technology
- Point-to-Point technology
- Point-to-Multipoint technology

### Solution Features

- Remote monitoring
- High-speed wireless broadband connectivity
- Real-time data delivery and display
- Network integration

### Benefits

- Bridge mechanical stress monitoring
- Accurate data collection and transport
- Preventive bridge maintenance
- Increased highway safety



“MDOT has had significant success with Motorola on many past projects, which made them a natural choice for this critical project. The challenges of integrating multiple systems over the communications link and the need to go from a concept to an installed and operational system in three weeks presented many unique challenges. However, we were already confident in the performance of the Motorola wi4 equipment, as well as Motorola’s understanding of the urgency and high visibility of the project, so we knew they would be able to implement a reliable and effective communications system on time.”

— Gregory D. Krueger, Statewide ITS Program Manager, MDOT

facility on shore. Data from the collection devices was distributed via a MOTOMESH Vehicle Mounted Modem (VMM) to a Motorola ML900 ruggedized mobile laptop computer located either within the bridge authority building or in the VII test bed vehicle. Motorola also helped MDOT meet its short turnaround goal by supplying design and integration services.

**The Benefits: Fast deployment, high-speed connectivity, accurate data collection and real-time data transport and display.**

Installation of the wireless broadband network was accomplished during the week of August 27, 2007. Data collection began on Saturday, September 1 and continued through Tuesday, September 4. Although results of the test were still being analyzed and compared to baseline figures, the network conclusively validated its ability to deliver the high-

speed linkage and high performance levels MDOT expected.

The test demonstrated that Motorola’s wireless broadband systems can be deployed quickly and easily as temporary network installations. In addition to bridge monitoring, MDOT recognized that the Motorola network could be used as a statewide communications system with multiple uses ranging from bridge health monitoring or environmental monitoring to longer term objectives such as tolling and weigh in motion.

MDOT is also considering expanding the system beyond structural stress monitoring and management to include weather monitoring and display sign message management.



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