# The Computerworld Honors Program

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## Final Copy of Case Study

**Status:**
Laureate

**Year:**
2013

**Organization Name:**
Thailand Royal Irrigation Department

**Organization URL:**
http://www.rid.go.th/ and http://www.waterforthai.go.th/

**Project Name:**
Thailand Royal Irrigation Deploys Public Safety and Data Communications Wireless Video Mesh Network for Advanced Flood Forecasting

**Please select the category in which you are submitting your entry:**
Safety & Security

**Please provide an overview of the nominated project. Describe the problem it was intended to solve, the technology or approach used, how it was innovative and any technical or other challenges that had to be overcome for successful implementation and adoption. (In 300 words or less.)**

During annual monsoon seasons, vast areas of Thailand are highly vulnerable to flooding and the country needed an extensive advance flood warning system to mitigate property damage and save lives. To fill this need, Thailand's Royal Irrigation Department (TRID) deployed the world's first, large-scale wireless mesh network capable of delivering live high-definition (HD) wireless video feeds of river water levels as well as telemetry data for real-time flood forecasting and historical data collection. The live data from early flooding upstream helps engineers and meteorologists predict the time and extent that flooding will occur downstream. In addition to the live HD video feeds to TRID's control room, the system provides live VGA resolution video feeds of the Chao Phraya River to the

public via the Internet. TRID uses a wireless infrastructure mesh network that covers a geographical distance of 372 km (231 miles). The rough terrain and enormous length of the project called for early conceptualization, detailed site surveys, tower design and technology trials. After two successful pilot deployments, the installation team completed the main deployment using Firetide mesh nodes along the Chao Phraya River. Each node links wirelessly to adjacent nodes upstream and downstream to form the mesh network. With link distances, or "hops," of 20-45 km between nodes, the system delivers up to 240 Mbps bandwidth with less than a one millisecond delay per hop for smooth, real-time data and video delivery for the entire length of the network. TRID's mesh network provides full redundancy so if a link fails, another link takes over immediately with no noticeable interruption in service. The actual combined length of all links, including redundant links, deployed within the 372 km geographical distance totals 550 km or 341 miles.

**When was this project implemented or last updated? (Please specify month and year.) Has it incorporated new technologies and/or other innovations since its initial deployment? (In 300 words or less.)**

The TRID project was first implemented in 2010 to collect and monitor river water levels continuously and record the data for real-time analysis. The ability to collect live telemetry data provides Thai authorities with the information needed to make immediate mission-critical decisions, as well as capture necessary data to plan for future floods. The network also supports a supervisory control and data acquisition (SCADA) system that communicates and monitors the functionality and physical status of large water gates and dams that influence the amount of water being released downstream. Soon after its initial deployment, video surveillance cameras were added to the wireless mesh network to provide real-time monitoring of river levels for the government and the public. The entire network was completed in May of 2012 and consists of 64 Firetide HotPort 7020 wireless mesh nodes and 27 Panasonic PTZ WV-SW395E cameras. Deployment of the wireless video network was completed in less than one year, whereas a wired network would have required two to three years to complete. The wireless network can be easily expanded for future uses at a lower cost than deploying an outdoor wired network.

**Is implementation of the project complete? If no, please describe the project's phases and which phase the project is now in. (In 300 words or less.)**

The project is currently completed but due to its success and cost-effectiveness, it may be expanded over time to cover larger areas.

**Please provide at least one example of how the technology project has benefited a specific individual or organization. Feel free to include personal quotes from individuals who have directly benefited from the work. (In 300 words or less.)**

Government Benefits: This project provides an invaluable information delivery system for water management and natural disaster management including real-time HD video streaming of actual river conditions with sensor data for water levels, temperature and water quality. By correlating real-time telemetry data with historical information, flood forecasters can more accurately predict the timing and changes of river levels downstream so action can be taken to protect lives and property. Public Benefits: Thailand citizens, the media (or anyone with Internet access) can view actual river conditions in real time without waiting for government reports or warnings. During the 2011 monsoon season, Thailand's Chao Phraya River basin experienced the worst flooding in more than half a century. The flood waters inundated nearly 240 thousand square km of land with average depths of 1.8 to 3 meters. More than 12.8 million people across 58 Thai provinces were affected by the flood, and the death toll from July through October rose to more than 600. The flood of 2011 was the world's fourth costliest natural disaster with estimated damages exceeding $45 billion USD. Throughout this monsoon flood of 2011, the TRID wireless network captured live video of rising river levels and made the images accessible to the Thai people via a real-time web feed. Nearly 300,000 daily web hits provided live images and information of the entire flood situation to the citizens and public safety officials of Thailand. The web feed proved to be a huge success and played an important role in providing citizens with real-time information needed to make critical decisions for moving valuable property in time to avoid the flood waters. Despite the flood's massive devastation, the wireless network aided in saving countless lives and billions of dollars in property damage.

**Would this project be considered an innovation, a best practice or other notable advancement that could be adopted by or tailored for other organizations and uses? If yes, please describe that here. (In 300 words or less.)**

Yes. A wireless mesh network like the one deployed in Thailand can be used by any organization or government agency looking to provide a reliable data or video communications system for disaster management in locations where network cabling is not readily available and too costly to deploy. Be it a subway system, a police department, a shipping port, or a government agency looking to deploy a homeland security or emergency response system, such a network could be an expansive fixed infrastructure like the one in Thailand or a rapidly deployable mobile system for immediate disaster relief to any location. Benefits of Firetide Wireless Infrastructure Mesh Superior video performance, providing

up to 70 Mbps throughput, for real-time video streaming equal in quality to wired networks. High scalability capable of supporting thousands of mesh nodes over hundreds of square miles. Seamless integration a wireless mesh network can extend existing wired or wireless networks to cover any location and it enables all Ethernet-based IP devices to operate over the wireless infrastructure without any modification or special configuration. Unequaled network security provides multiple levels of security including proprietary protocols, multiple authentication settings, and end-to-end encryption. Uninterrupted mobility offering long distance roaming without interruption, the wireless mesh network can provide real-time, two-way video and data onboard fast-moving public transportation and public safety vehicles.

**If there are any other details that the judges should know about this project, please note them here. (In 300 words or less.)**

Each year the reigning King of Thailand, Bhumibol Adulyadej, takes a journey up the Chao Phraya River to get a better understanding of the well-being of the Thai people and to get a first-hand look at the river and the massive agricultural fields it feeds. Now at the age of 84, the King is unable to physically travel up the river, but still wishes to monitor rising water levels during the monsoon season in order to provide awareness of potential flooding for the Thai people and to keep a close eye on the health of the country's agricultural crops along the river. To acknowledge the King's birthday wishes to protect the country's citizens and agricultural crops during the annual monsoon floods, the Thailand government decided to deploy a video and data network that enables him to continue to "travel" the river via the Internet and to enable citizens, security, and agricultural officials to monitor a significant length of the flood prone Chao Phraya River basin. After a full year of extensively testing different ADSL, satellite, GSM/3G and wireless technologies for this massive video and data network, TRID selected and deployed Firetide's high-bandwidth wireless mesh network to provide reliable live HD video feeds and mission-critical water level data applications 24/7. The Thailand network, which covers a geographical distance of 372 km (231 miles), is the world's longest fully redundant mesh network. To view real-time video of the river levels transmitted over Firetide's wireless mesh network, visit http://203.150.226.24/. This site includes an interactive map allowing visitors to select views from many different cameras along the length of the river. More information can also be found at http://www.firetide.com/thailandroyal.aspx