



Itron

OpenWay Riva™

Next Generation IoT Solution
for Smart Utilities and Cities



Creating new business outcomes for today's challenges

Introducing OpenWay Riva, the next generation IoT Solution for Smart Utilities and Cities. OpenWay Riva is a significant leap forward in technology built upon Itron's existing OpenWay Cisco IPv6 network. We have added a powerful distributed computing platform for accelerating innovation quickly and securely. Itron and our technology partners are working with global utilities and municipalities to develop and validate use cases that leverage these new capabilities to make real-time operational decisions at the edge of the network, enabling what we call the "active grid" or "active network." An active network drives measurable valuable business outcomes. A few of the outcomes the OpenWay Riva solution is delivering include:



FOR SMART CITIES

Connected Infrastructure

Foundational to a smart city is smart utility services where energy and water use is being monitored and proactively managed for waste reduction, conservation and sustainability goals.

Cities must be connected to realize the benefits and value of these programs. Being connected allows smart cities to leverage data and technology to drive real operational efficiencies and outcomes that matter to citizens and businesses.

Itron is a world leader in connecting infrastructure and managing data with over 150 million connected devices in cities throughout the globe.

Itron's next generation solution for smart cities is built upon its proven OpenWay IPv6 network. The OpenWay Riva solution connects Internet of Things devices through a powerful, fully standards-compliant distributed computing platform enabling endless possibilities for emerging city applications.

Total Outcomes

Itron is taking it a step further beyond connecting infrastructures and managing data to delivering outcomes. Through distributed applications and cloud services, Itron can help solve problems for cities faced with challenges such as resource waste reduction, electric transportation, streetlight management, water conservation and management of renewable power. Itron cannot do all of this alone. Through an ecosystem of partners utilizing the interoperable platform developed by Itron, cities have access to new applications much faster than in the past.

FOR ELECTRICITY

Diversions Detection

With the OpenWay Riva solution, electric power diversion detection can now be based on real-time, continuous, and localized analysis of changes in electricity current flows and voltage levels in the distribution network to distinguish legitimate metered loads versus those from theft. Through the meter's ability to communicate directly with other meters at different levels of the network, and knowing exactly where they are located on the distribution system, the application identifies when current is drawn on the secondary of a transformer that did not go through a meter, greatly increasing the accuracy and timeliness of diversion detection.

Detection of Unsafe Grid Conditions

High-impedance connections (HIC) or "hot spots" on the low-voltage distribution system represent a serious and ongoing safety risk, as well as causing customer voltage problems and utility energy losses. By continuously calculating and monitoring impedance throughout the lower voltage system, distributed intelligence changes the game for HIC detection. The OpenWay Riva high impedance application provides a practical and cost-effective solution for utilities to identify these losses, voltage anomalies and potential safety issues before they become a safety hazard or a costly liability.

Transformer Load Management

Intelligence within each smart meter allows the load on individual distribution transformers to be analyzed continuously and managed locally in real time. OpenWay Riva meters communicate with each other locally and continually calculate the total load on the transformer and know when a transformer is approaching overload conditions, whether from the line side or customer side. When this occurs, a distributed analytic running on the meters determines whether to shut off controlled loads behind the transformer, turn on or increase local distributed generation behind the transformer, or take other actions to reduce loading below allowed levels.



FOR GAS

Safety

The OpenWay Riva solution combines peer-to-peer communications and analysis of data throughout the gas distribution network to aid in pipeline safety. Utilities can pair methane sensors, seismic sensors, flood sensors and more with remote disconnect valves – enabling the utility to potentially alleviate dangerous situations and improve the safety of communities, employees and first responders.

System Integrity

The Itron Riva Developers Community is an open ecosystem of partners for the OpenWay Riva solution, allowing many best in class providers to operate on one unified network. New applications from other technology vendors are emerging to monitor pressure, temperature, pipeline stress via strain gauges, to perform pressure studies, and to hit check in dates for cathodic protection reports to aid in pipeline integrity management.

Methane Sensing

The OpenWay Riva solution's methane sensing application helps keep utility personnel and customers safe by monitoring for changing levels of methane. Further, remote disconnect valves can be paired with the methane sensor to shut off gas service when elevated levels of methane are detected. By deploying methane sensors in highly-populated areas of a utility service territory such as hospitals, schools, amusement parks, shopping centers and sports venues, methane gas leaks can be identified more quickly and gas service automatically shut-off immediately—alleviating potentially dangerous situations before they arise.

FOR WATER

Water Leak Detection

Proactive leak detection is much more valuable to a utility and a consumer than finding out about leaks after they happen. The OpenWay Riva solution's leak detection application includes an acoustic leak sensor and analysis and presentment software designed to be permanently installed, enabling the utility to continuously monitor its entire distribution network. The leak sensor is powered by the OpenWay Riva water module and supplies acoustic samples to the module for storage and transmission through the network to leak detection software. The leak detection software enables the utility to identify and prioritize potential distribution leaks for maintenance, reducing water loss and enabling the utility to address leaks prior to them becoming costly main breaks.

Remote Disconnect

Itron has certified two third-party remote disconnect valves to operate within the OpenWay Riva solution. With open standards allowing more flexible interoperability, additional vendor products will be available to water utilities. This advanced functionality enables utilities to remotely disconnect or limit water flow to an end customer. It reduces the need to roll a truck to perform this function, saving the utility a significant amount of money while enhancing the safety of field crews.

Advanced Sensing

The OpenWay Riva solution's open ecosystem of partners will enable the deployment of a variety of additional sensors on the water distribution system to monitor pressure and water quality. In addition to continuous health monitoring of the system, advanced sensing data can be correlated with other data to enhance analysis, reporting, and prioritization of problem solving.





Discover the Active Grid... when it comes to how we manage the delivery and use of energy and water, or how we run our cities, there's a lot of opportunity for improvement. Each year in the U.S. alone, hundreds of billions of dollars in energy and water are wasted, stolen or otherwise lost before reaching the end user.

As migration toward urban centers increases, cities are under increasing pressure to manage resources more effectively, and utilize new technology to make the urban landscape more livable, sustainable and economically vibrant. Today's challenges require a solution built for the Internet of Things world. Itron calls this the **Active Grid** or **Active Network** – both referring to the infrastructure being utilized by electric, water, and gas utilities and smart cities. The Active Grid leverages significant advancements in IoT technology, including distributed intelligence; software-defined communications; multi-application networks; cloud computing; data analytics; and a new generation of battery-powered edge devices and sensors to achieve new and better outcomes that were simply not possible just a few years ago.

These technologies come together in Itron's OpenWay Riva – an IoT solution that delivers new and differentiating value to enable smart utilities and cities. Utility smart metering may often provide the initial impetus for network infrastructure investment, but the benefit stream can be broadened significantly and at a manageable incremental cost with the right building blocks in place. The OpenWay Riva IoT solution was developed on four key tenets that, when applied together, redefine what is possible for the Active Grid.

ONE MULTI-PURPOSE NETWORK, MANY APPLICATIONS

The OpenWay Riva solution provides utilities and cities with a unified, scalable, multi-purpose IoT network infrastructure. This means that once the network is deployed, it's easy and cost effective to expand the value of the network investment over time. This standards-based IPv6 multi-application network, jointly developed by Itron and Cisco, separates the network infrastructure from the devices and applications that run on it. This means that new devices and applications can be added easily to the network, just like a new laptop or a printer would be added to an enterprise-class IT network. It also provides standardized, robust security; state-of-the-art network management tools; and quality of service to dynamically prioritize network traffic based on application and business requirements for an IoT world – all while utilizing a common and existing IT skill set to keep operations simple and support costs under control.

As previously discussed, Itron is actively developing new distributed analytic applications for water, electricity, gas and smart city use cases. In the Active Grid smart metering is just one app running on the multi-purpose network.

OPEN ECOSYSTEM OF APPLICATION INNOVATORS

The OpenWay Riva IoT solution has been architected to provide an open application, interoperable environment that enables third-parties to embed Itron Riva technology into their devices, or to develop apps to run on the platform. Commercially available chip set manufacturers are putting the Itron Riva technology on their standard products so hundreds of device manufacturers will have immediate access to join the network. To this end, Itron recently launched its Itron Riva Developer's Community and Itron Idea Labs to drive new innovation and grow a robust ecosystem of developers and applications for this platform. This means utilities and smart cities are not reliant on one vendor for product innovations. Device and sensor manufacturers can more easily work together to bring new applications faster to market.

OpenWay Riva. IoT Solution for Smart Utilities and Cities



**MULTI-PURPOSE
NETWORK**



**ECOSYSTEM OF
APPLICATION INNOVATORS**



**DISTRIBUTED
INTELLIGENCE**



**ADAPTIVE COMMUNICATION
TECHNOLOGIES**

DISTRIBUTED INTELLIGENCE OPTIMIZES DECISIONS

Having sensors and devices at the edge of the distribution network enables better data analysis and decision-making and control both at the device level, where it may be more appropriate, and at the back-office when timeliness may not be the most important factor. Operational actions that can be optimized vary from service to service depending on the type and timeliness required, say for instance, in the case of pipeline safety where real-time action is critical and can be achieved through distributed intelligence and local action in sensing devices. Proactive water leak detection may not be as critical to saving lives, but there is tremendous value in terms of conservation and economic losses that may make having distributed edge sensors in the water system crucial to a city or utility. Electrical applications discussed earlier, such as transformer load management performed at the device level through a distributed analytic in the device, can save money and time by knowing when the transformer is approaching overload situations and taking action to avoid this situation.

The OpenWay Riva technology delivers three groundbreaking distributed intelligence capabilities to optimize data analysis, decisions and control from the device level to the back-office, enabling real-time problem solving:

Location Awareness

Meters and grid devices equipped with OpenWay Riva technology now know where they are on distribution networks in relation to other grid assets (other meters, sensors, etc.). This awareness is enabled by continuous monitoring and algorithmic interpretation of electrical characteristics relative to various grid devices within the network. Locational awareness opens up an entirely new frontier of edge applications while greatly improving the accuracy, resolution and timeliness of data and edge analytics.

Multi-Protocol Support

The Linux computer and robust processing power in the OpenWay Riva communications module support multiple communication/application protocols. This enables different types of grid devices to communicate and work together to solve problems. For instance, meters aren't limited to "speaking" just metering protocols anymore. Smart meters can also speak the language of other systems such as distribution automation, load control, EV chargers or solar inverters to enable localized, integrated action in response to changing conditions at the edge of the network.

Unprecedented Processing Power

Think of what your smart phone can do today compared to early cell phones. Thanks to increasing affordability of processing power, Itron has embedded the computing equivalent of a smart phone or desktop computer in a meter or grid device at a price point that's competitive with other current offerings. With that kind of computing power to crunch high-resolution data and ample memory to develop unique applications at the edge, the possibilities are endless.

ASSURED CONNECTIVITY WITH ADAPTIVE COMMUNICATIONS TECHNOLOGY (ACT)

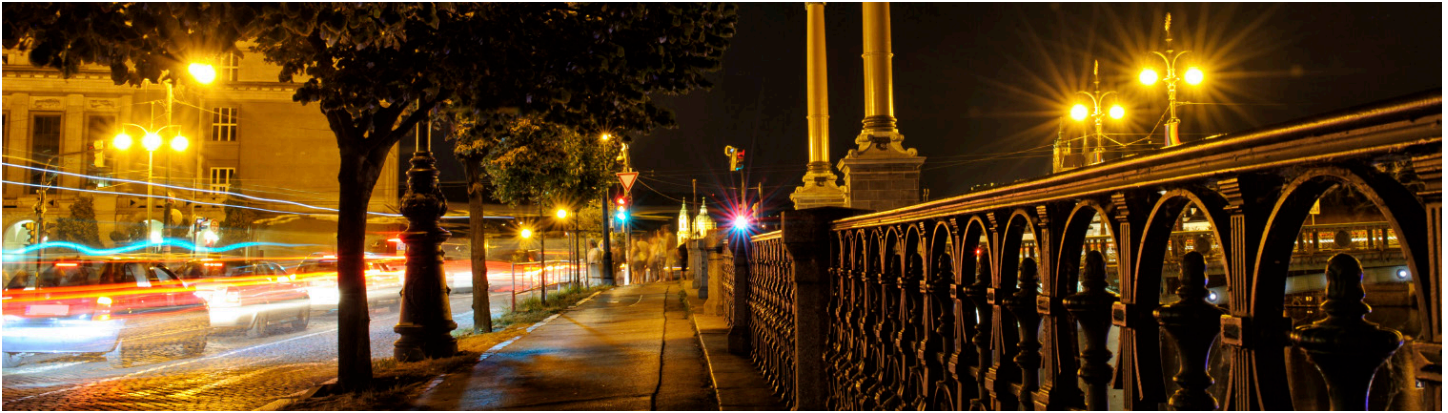
What if you could deploy a network that incorporates multiple communications technologies – RF mesh, Powerline Carrier and Wi-Fi – on the same chip or module? And no matter what, that device will always choose and utilize the most reliable and fastest communication path and most efficient modulation based on its location and distance from other devices, environmental operating conditions and the nature of the application or data. This would change everything. With the OpenWay Riva platform, this process of dynamic communication happens intelligently and continuously, at all levels of the network, for every link, every message and every device.

Adaptive communications, in combination with Cisco's network management tools and quality of service, deliver a new standard for network performance, reliability and cost of ownership.

Adaptive Communications Technology

ACT provides a single, unified communications network that is ideal for both dense and difficult urban environments as well as lower-density suburban and rural areas. Deployment of the network infrastructure becomes easier, faster and less costly, especially for the last 5 to 10 percent of the network, when the costly "hard-to-reach" areas and meters must be addressed. Through device level IPv6 peer to peer communication where every device has a unique IP address, every device is able to talk to each other individually or in groups which greatly enhances real-time analytics abilities to immediately solve operational issues.

Most importantly, the reliability and adaptability of the OpenWay Riva solution means that the network assures connectivity and performance with minimal infrastructure, resulting in a very attractive cost of ownership.



A COMPLETE SOLUTION

The OpenWay Riva IoT solution for smart utilities and cities is the only solution available on the market that delivers valuable outcomes to business challenges utilizing distributed intelligence and adaptive communications technology.

The OpenWay Riva solution brings true interoperability for an open ecosystem of grid devices and network sensors over the Cisco IPv6 network – delivering the active

grid for smart utilities and cities. Deploying a unified solution on one multi-purpose network provides well-defined points of interoperability between systems, and greatly simplifies and reduces integration costs and difficulties. So electricity, gas and water utilities and cities can focus on creating business value through outcomes that improve services and enhance the lives of customers and citizens.

EQUIPPED FOR THE FUTURE

The Takeaway is Clear

The OpenWay IoT solution for smart utilities and cities is the next generation platform designed to not only support smart metering requirements of today, but support a broad spectrum of applications across gas, water, and electric utilities and smart cities. The OpenWay Riva IoT solution is ready for whatever the future will bring.



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