Cool Vendors in Smart City Applications and Solutions, 2014

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Analyst(s): Nagayoshi Nakano, Alfonso Velosa, Earl Perkins, Anshul Gupta, Satish R.M

Smart city solutions have evolved beyond hype and experimental projects. Solution-optimized smart cities that are focused on improving cross-city services, transportation management systems and energy use are now having a tangible and positive effect on city-based quality of life.

Key Findings

- 4R Energy is promoting a new sustainability system to recycle electric vehicle (EV) high-performance lithium ion batteries for secondary usage in homes, emergency batteries and EV charging stations.
- Eutech Cybernetic has developed a platform that provides managers and planners with an integrated view of a city or urban development’s IT and operational technology (OT) elements that facilitates decision making and provides security and visualization capabilities.
- Goji delivers smart locks that provide control over physical access to homes and facilities using a mobile phone. This provides real-time picture alerts via text or email of individuals who access a facility.
- Petra Systems uses its smart energy modules for distributed power generation for smart city infrastructure.
- Savari’s solutions are focused to realize "Traffic Engineering" and E-Payment applications by delivering contextualized alerts and services that are based on data/information analytics.

Recommendations

- Look for applications and solutions that optimize smart city operational benefits and improve quality of life for citizens.
- Invest in solutions and applications that leverage mobile-driven ecosystems, which build on the consumerization of IT and the global proliferation of mobile devices and infrastructure.
Align short-term goals (through an objective-driven, multiyear road map) with a clearly defined long-term smart city strategy that spans transportation, energy management and waste and with overall operational requirements.

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Analysis

This research does not constitute an exhaustive list of vendors in any given technology area, but rather is designed to highlight interesting, new and innovative vendors, products and services. Gartner disclaims all warranties, express or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

What You Need to Know

Smart city business tends to shift its emphasis from infrastructure projects such as infrastructures of smart grids and EV transportations to operational phase that is gaining momentum. Within this transition, it is more important to understand how the reduction in environmental loads will be achieved in the long term and how quality of life will be realized — which will be potentially impacted by operations — as well as how citizens can enjoy smart city benefits in their daily lives while society optimizes the opportunity of reducing the environmental footprint, such as CO₂ emissions and similar wastes. It is worthwhile to note that a smart city inevitably produces waste products such as EV batteries (after their usefulness is complete). This means that a smart city can contribute to reductions in environmental footprints but does not mean that a smart city does not produce a waste footprint. The following vendors are worth considering in crafting a smart city strategy because they have developed cool applications and solutions for the operational phase and for postdeployment.

4R Energy

Yokohama, Japan (www.4r-energy.com/en/)

Analysis by Nagayoshi Nakano
**Why Cool:** 4R Energy demonstrates a new business model for the postconstruction phase in a smart city. One of the key infrastructure components in the smart city is a transportation system that is supported by EVs. The more EVs with batteries that are becoming widely used in smart cities, the more battery waste as an environmental burden that will be produced. 4R Energy’s business model contributes to the reduction in CO₂ emissions through promoting zero-emission mobility concerning EVs and the reduction in waste products by establishing a sustainable cycle of lithium ion batteries that operates within the concept of 4R, which stands for reuse, refabricate, resell and recycle.

The requirement ranges of the discharge and charge capacity for lithium ion batteries are different between driving usage, such as for EVs, and stationary usage, such as for homes. Consequently, lithium ion batteries for EVs (the principal usage of these batteries), which require maximum discharge and charge rates of 1 to 2 C, are expected to be reused for stationary usage, which requires 0.1 to 0.3 C; this makes it possible to realize a longer battery life by maximizing the use of remaining capacity and also contributes to the reduction of waste and the promotion of renewable energy systems.

In order to optimize secondary usage of the batteries, 4R Energy is developing simulation/forecast systems to accurately evaluate remaining capacity and performance values by combining historical EV driving data from principal usage and data that is measured at the time the batteries are collected for reuse.

4R Energy delivers refabricated lithium ion batteries in module form and/or in the form of battery packs for use in microgrids, buildings and factories (as part of building energy management systems [BEMSs] and factory energy management systems [FEMSs]), housing complexes/communities, middle-class photovoltaic-generation-related systems, high-speed charging stations, small-scale commercial facilities/public facilities and electric storage systems for homes.

Once this system for the secondary-usage cycle is established, it will have a wide and significant impact on the EV and battery markets, such as price reductions not only for EV models, but also for home battery systems, by taking into account the secondary usage in advance.

Examples of secondary usage include backup for lighting at gas stations, backup for lighting and security systems at elementary schools in Miyazaki Prefecture and power supplies for refrigeration compressors in delivery service trucks.

**Challenges:** Because 4R Energy is a joint-venture company of Nissan Motor — which has the strength of developing technologies — and Sumitomo — which has the strength of cultivating new markets — lithium ion batteries for secondary usage are limited to the batteries that are used in Nissan EV models.

The first challenge for 4R Energy is how it can achieve the advantage of scale with the limited resource of Nissan EV models, which were just put on the market in 2010 and so will continue to be used for a given time period and require a little more time for replacement (which means battery recycling).
In Japan and the global EV markets, batteries are used in other EVs, such as from Toyota Motor (which is a major player), Mitsubishi Motors and Tesla. The second challenge for 4R Energy is how it can cope with batteries from non-Nissan EV models for secondary usage. There is a possibility that 4R Energy’s grand mission of creating a sustainable cycle as part of a low-carbon society will be a half-finished story unless the company includes non-Nissan EV models in its secondary-usage cycle. However, currently, the first priority for 4R Energy must be to establish best practices based on batteries from Nissan EVs.

The value of information involving EV driving data, overall battery quality and conditions for secondary usage has not been widely disclosed, nor perhaps been recognized at all. In this new secondary-usage world of batteries, where no organization has previously ventured (and hence with which there is limited familiarity), it is critically important for 4R Energy to assess and fairly report remaining battery capacity for secondary usage and to guarantee battery quality.

The third challenge for 4R Energy is how it can deliver valuable information on batteries for EVs and secondary usage in a transparent and fair manner to society, to show that its evaluations are done objectively and not in a black box.

**Who Should Care:** Being a smart city does not mean that the city does not have an environmental footprint. Nonetheless, a smart city does contribute to reducing its environmental footprint, which implies that producing waste is not avoidable. For example, a current trend in smart cities throughout the world is to not only emphasize constructing EV transportation infrastructures, but also to operate the infrastructures well, including efficiently using EV mobility methods. Smart city organizations, including planners, should consider how they should address emerging societal issues to reduce waste that is produced by greater use of EVs and mobility infrastructures, such as charging stations. It is essential to realize the total optimization of the smart city, with a wider and longer scope of lifetime assessment, and not just a partial optimization of it (by only reducing CO₂ emissions).

**Eutech Cybernetic**

**Singapore** ([www.ecyber.com](http://www.ecyber.com))

*Analysis by Al Velosa*

**Why Cool:** Eutech has created software by which it aims to integrate, optimize and analyze the data of the real world. The company’s platform enables the essential information in a smart city to be integrated into one platform. It then creates the metadata that will enable city managers and executives to effectively leverage that data in a way that was not possible before, thereby enabling them to improve performance and identify cost reduction opportunities.

Eutech has worked with a design partner to map out an individual’s journey in a city, thus ensuring that the user’s experience factors into all of Eutech’s thinking about how to optimize the use of the city’s processes (which includes business processes, metadata and systems).

Eutech integrates three key aspects into its iVivaCloud solution, which is its operational intelligence platform for smart city management:
- Multiple software (for example, ERP, GIS, control and building management) systems and devices (for example, sensors and actuators) from the city

- The core business process layer of the city

- Unified communications in the city

So far, Eutech’s team has deployed its solution in two developments — Dubai Festival City and Cairo Festival City — and is in the process of rolling it out in Barangaroo (Sydney, Australia) and Yanbu, Saudi Arabia. The company partners with firms such as Orange, BT and National Computer Systems (SingTel). Eutech has developed 30 apps for its customers and is getting ready to roll out its API (due 3Q14) to developers as well as enable them to use the iViva business process layer to develop their own apps to extend the iViva platform.

The applications are communications-enabled because Eutech has integrated communications throughout its iVivaCloud solution. This is designed to increase collaboration for, as an example, first-responder teams or maintenance teams so that they can communicate with local and remote teams and even citizens.

**Challenges:** Eutech faces four core challenges:

- **Complexity:** Eutech faces a complex market. As a small company, this situation stretches its people and its capabilities because it needs to respond to a broad and changing array of issues.

- **Conservative customers:** The construction and real estate industry tends to be very conservative on how it does things. Given the trillions of dollars of assets, the industry slowly adopts technology- and software-driven processes that can make it more efficient. This impacts the cash flow of a smaller company such as Eutech.

- **Partners:** In working with its major partners (listed previously), Eutech encounters cultural and procedural obstacles involving those organizations’ systems. A startup tends to be more flexible than an organization with thousands of employees and very specific processes. Eutech has had to develop systems and processes to work at the slower speed of a megavendor, as well as the relatively high revenue requirements of a megavendor.

- **Competition:** There is a rapidly developing focus on the Internet of Things (IoT) and smart city markets by megavendors and startups alike, and Eutech faces competition from a broad range of vendors.

**Who Should Care:** This involves business development managers within technology and service providers (TSPs) who are looking for a key software partner to integrate their technology into a working smart city solution. General system integrators should look at Eutech because it has satisfactorily demonstrated its software platform in demanding global markets, which facilitates project development. City department managers across a range of smart city service areas should consider Eutech’s software solutions to integrate their IT and OT sets of data to get a better picture of their city or community.
Goji
San Francisco, California (www.gojiaccess.com)

Analysis by Earl Perkins

Why Cool: Goji is an example of using the innovation of the IoT to deliver security as one of its services. Goji Smart Lock is intended to redefine the concept of leveraging camera technology, wireless networking, credential keys and encryption with the traditional door lock to create a new way of securing physical access to homes and businesses. A camera that is built into the lock can send picture alerts directly to a remote smartphone application (whose owner can open the door from anywhere) while an electronic key stored on the smartphone serves as the door key. The key also personalizes the application to the user. A programmable fob for users without smartphones or for temporary use is also available. Goji’s Web application (for Windows, Apple and Android) allows for the programming of both smartphone and fob-based keys, can set up use cases (such as schedules for limited, temporary or one-time access) and makes provisions for lost or stolen smartphones and fobs. The concept of rekeying a lock takes on a different meaning with millions of Goji electronic keys available per person. The product supports Bluetooth LE, Wi-Fi and ZigBee connectivity to allow links with home automation networks as needed, with additional protocol support in development.

Goji has inked agreements with smart home and business control automation providers such as Control4, iControl Networks and Savant Systems, as well as Staples Connect, to allow integration with those systems. Although it is directed primarily to the consumer market for homeowners, Goji Smart Lock can and will be used in business installations and to provide secure access within business facilities. Properly ruggedized, such locks could find their way into remote sites where managing access remotely is needed, such as electric utility substations and automated facilities at oil and gas sites. Condominium developments and planned communities may use such locks as a standard for smart home access of the future.

Challenges: Goji will face considerable competition, some from large-scale providers that are long accustomed to the fiercely competitive, connected home markets. To maintain momentum, the company must build a network of partners and resellers quickly and achieve rapid visibility. In an ill-defined market, Goji may own part of the responsibility for defining the role of security in the IoT (see "'Internet of Things' Deployments Pose a Challenge to Smart-City Information Strategies").

Goji’s ultimate value will lie in services — expanding the basic programmable access abilities that the company offers to address other needs of the connected home and then providing that to its customer base. Goji will either have to partner with others to provide value additions to the platform or quickly deliver new features or features that are integrated with other elements of the smart city.

Who Should Care: Small and midsize business owners may be interested in the programmable access features of Goji as well as home and office architects and designers who are involved in planned community, condominium and hospitality sites. Real estate brokers will appreciate Goji’s alternative to the proverbial lockbox. Existing home security business executives will also be interested in partnerships to expand their portfolio of video surveillance and home protection. Potential international channel partners should also take notice.
Of course, homeowners themselves may also be interested.

Petra Systems
South Plainfield, New Jersey (www.petrasystems.com)

Analysis by Anshul Gupta

Why Cool: Petra Systems is a provider of distributed smart solar power and recently transformed to include intelligent, efficient and remotely managed networks for smart city infrastructure.

Solar technology is at the core of Petra Systems' solution offering as the company-developed smart energy module "SunWave" to distribute and control solar power that is gathered by solar panels in the most optimized way. SunWave includes a solar microconverter, a solar panel and a communication system. It can work with traditional solar panels built by any other vendor, can be easily installed onto electricity poles or roof tops and can connect to a utility company's grid directly at the pole. The solution works with existing and new installations, and Petra Systems aims to improve efficiencies and reduce the cost of installed solar-electric systems. Petra Systems' solar technology is an intelligent, digitally controlled, distributed and scalable product to manage power out of solar panels, grids and batteries.

SunWave offers a very cost-effective solution to harvest solar energy because it can work with a series of small, distributed solar panels that can be installed, for example, on electricity poles or streetlight poles. This avoids massive land requirements for setting up solar farms as well as costs in building substations or transformers because Petra Systems can connect to a utility's grid directly at each point of a solar panel.

Petra Systems' expanded Smart City Solution (SCS) includes a new product that lets municipal public works departments (PWDs) connect and remotely manage streetlights, energy generation, surveillance, data and communication networks. SCS helps PWDs to lower energy expenses through light-emitting diode (LED) retrofits and offers networks to a smart city that can be used to capture, communicate and analyze data at little to no additional cost. SCS employs ZigBee wireless mesh, which works with Ethernet, cellular or WiMax networks at the backhaul to connect, control and monitor each module remotely.

Challenges: Petra's solar technology offers a cost-effective solution for harvesting solar energy in a distributed structure as well as in a stand-alone structure. The overall ROI compared with other renewable energy solutions such as hydro and wind makes it a costly proposition.

Petra's SCS offers the added advantage of networked infrastructure on top of reduced energy expenses but only for entities with common surveillance, monitoring and energy expenses.

Who Should Care: Utility companies looking for a flexible, scalable solar energy solution that is equipped with a smart grid should find Petra's solution quite interesting.

Solar energy solution providers that are heavily engaged in solar panel manufacturing may find collaboration opportunities with Petra.
Municipal works departments will find the added advantage of smart, connected infrastructure besides reduced energy bills using Petra’s SCS.

Savari
Santa Clara, California (www.savarinetworks.com)

Analysis by Satish R.M.

**Why Cool:** Savari creates products and intellectual property (IP) to make roads smarter and safer for cars and pedestrians. The company has developed technology that enables smart roads: This is technology that enables cars to communicate with other cars and to road side infrastructure. Savari’s wireless-based technology allows cars travelling at high speeds to communicate with other cars in the vicinity and provides collision alerts to the driver. The company’s solution encompasses not only hardware and software platforms, but also deployable driver applications. This solution comprises a fusion of vehicle and road information with a wireless communication component to greatly enhance the end value to customers. The wireless communication component is achieved using dedicated short-range communication (DSRC), which is short-range to midrange wireless communication specifically designed for automotive use and a corresponding set of protocols and message sets. DSRC protocols ride over Institute of Electrical and Electronics Engineers (IEEE) 802.11p (see Note 1) enhancements.

Savari surpasses the competition in Intelligent Transportation Systems (ITS) not only by offering technology for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2X) communication, but also by taking a vertical integration approach through providing easy-to-use, flexible software development kit (SDK) and Web-based management — enabling applications other than for vehicle/driver safety. Solutions are focused to realize Traffic Engineering and E-Payment applications by delivering contextualized alerts and services based on data/information analytics. Consequently, this technology allows infrastructure providers to monetize their investment with new revenue-generating applications. Smartphone platforms revolutionized the communications industry by providing a platform with almost infinite possibilities (think “apps”). Savari’s technology is poised to do the same, with safety and mobility being the primary applications.

Once a vehicle is connected to other vehicles and to the road, the application possibilities are numerous. Savari’s vision is aligned with the U.S. Department of Transportation (DOT) and the automotive world that see cooperative technology as a must for road automation, along with the coexistence of today’s sensors such as vision/radar. Safety systems on vehicles have been largely limited to one-way information gathering (for example, radar or camera); vehicles have never exchanged information with other vehicles or with the road. This is about to undergo a radical change with V2X technology. Imagine that your vehicle can now alert you about intersection lights or pedestrians before you see them, inform you about congestion ahead in real time or park itself at the shopping center. This technology makes all this a reality and paves the way for automated driving. Savari is well-positioned to take advantage of its technology to gain a leadership position in ITS for smart city solutions and applications.

**Challenges:** The V2X market is just opening up. Savari has been successful thus far in the United States, undergoing trials with the U.S. DOT and automotive OEMs. Supporting Tier I automotive
OEMs is a resource-intensive process and usually requires long development cycles. The main challenge is to quickly scale up, knowing that a huge market capability exists; however, the exact product fit and form are still evolving.

The customer base is twofold: infrastructure providers (government) and automotive OEMs. Both types of customers have long product acceptance cycles, needing a significant resource base for support through the acceptance cycle, as well as future support.

**Who Should Care:** Savari products will be of immense interest to every user of roadways, including pedestrians, because its applications integrate vehicle and road information to enhance safety and mobility while reducing emissions. Vehicle manufacturers, road infrastructure providers, government entities, ITS research labs, automotive Tiers I and II manufacturers, communication-tech companies and semiconductor companies are among the stakeholders whose operations or businesses will be impacted by Savari products and IP.

The National Highway Traffic Safety Administration (NHTSA), a federal wing of the U.S. DOT, has recently announced that it is moving forward with this ("talking cars") technology. A government mandate would force open a market base of all 300 million cars that are in the United States. Markets in the EU, Korea, Japan, China and so forth would soon follow.

**Gartner Recommended Reading**

*Some documents may not be available as part of your current Gartner subscription.*

"Commercial Operational Intelligence Platforms Are Coming to Market"

"Cool Vendors in Smart City Applications and Solutions, 2013"

"'Internet of Things' Deployments Pose a Challenge to Smart-City Information Strategies"

**Note 1 IEEE 802.11p**

IEEE 802.11p is a draft amendment to the IEEE 802.11 standard to add Wireless Access in Vehicular Environments (WAVE). It defines enhancements to 802.11 that are required to support ITS applications. This includes data exchange between high-speed vehicles, as well as between vehicles and roadside infrastructure, in the licensed ITS band of 5.9GHz (5.85GHz to 5.925GHz).