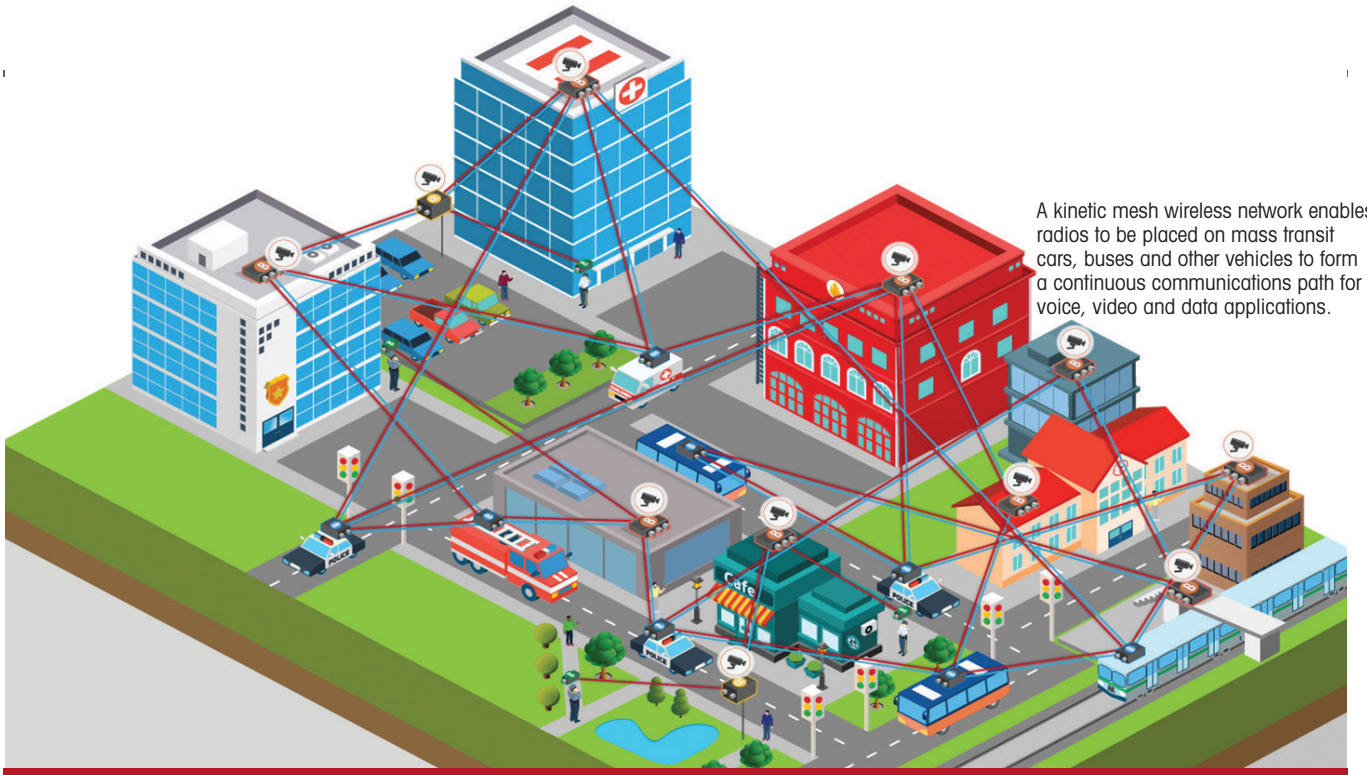


A kinetic mesh wireless network enables radios to be placed on mass transit cars, buses and other vehicles to form a continuous communications path for voice, video and data applications.

Mass Transit Has **Massive** Demands

By Robert Schena

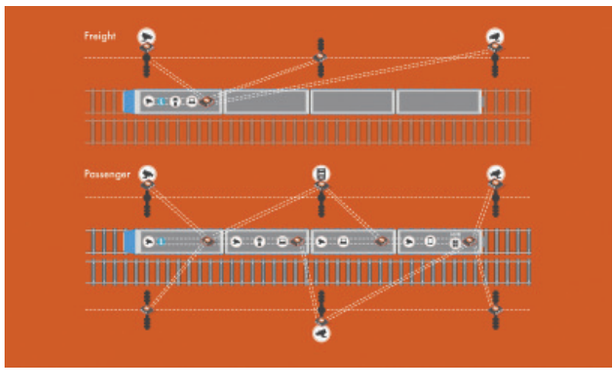
In major metropolitan cities like Chicago, city dwellers who take public transportation come to rely on apps that track arrivals of trains and buses. Failure of the technology that informs these apps is a big deal when passengers must get to work or to an appointment on time. If the app indicates that the next bus will arrive in 5 minutes and it does not arrive for an additional 10, then passengers have few alternatives.

Kinetic mesh private wireless networks offer a modern solution. They are equipped with technology that makes them a "living network" of sorts. Nodes communicate with each other rather than relying on a single controller node to drive communication. They possess the flexibility to transmit and receive data through a myriad of connectivity solutions, including LTE, satellite, point-to-point wireless or wired networks. This allows the network to rebuild and "heal" itself based on other available wireless nodes. Since there is no single point of failure, vehicles can maintain a nearly steady stream of communication with operations centers, aiding in applications such as arrival time tracking. The transit authority can monitor each vehicle's location, and vehicles can communicate their locations to tracking apps.

Kinetic mesh technology emerged as a result of 9/11 and the tragic results that ensued, including the failure of the communications infrastructure that fateful day. Kinetic mesh enables people and organizations to deploy networks into places where communications infrastructure have lacked in reliability, or to quickly move networks into places where they never existed. In other words, communications infrastructure can be deployed in real time.

Industries in Motion

Nodes provide mesh networks with flexibility and stable communications in even the most rugged, mobile environments. Living networks are very adaptable in this



Kinetic mesh enables radio technology transmission between trains and the wayside to facilitate Communication Based Train Control (CBTC).

way, and offer a distinct advantage over networks that require all the brain power to reside in controller nodes. A major disruption in the latter type of network often results in downtime.

This is one reason why these types of networks thrive when applied to systems with moving parts, so to speak. They are well-established in dynamic, rugged industries such as military, mining, and oil and gas. They also have demonstrated success when deployed on commercial freight trains and are a natural fit for their next venture, mass transit. Distance can present limitations in a mass transit system, but as long as each node can communicate with another node, the network will preserve its integrity.

A well-designed network should never see any disruption of service. When designing mesh networks for mass transit, technical staff account for variables unique to their industry, such as tunnels, subways, train dimensions, node-to-antenna ratios, and size of antennas.

This type of network also enables radio technology transmission between trains and the wayside to facilitate Communication Based Train Control (CBTC). Passenger trains that use Wi-Fi are interested in the highest bandwidth possible. Transmitters on trains roam between the vehicle and wayside points. This equates to zero data loss onboard the train. The nodes located on the trains communicate with all wayside nodes they can see, connecting and passing data between them all, so that when they do drop a wayside connection, there is no disruption. As a result, where most technologies have roaming times well above 50 milliseconds, a kinetic mesh network does not have to roam, as it is always connected and passing data between multiple nodes all the time.

Designing each node to serve as infrastructure enables all devices and the network itself to be mobile. Users can employ nodes on all manner of vehicles, including trucks, buses, and trains. In addition, these networks can transmit significant amounts of data: 100 Megabits or more. The mobile nature of the nodes also enables the aforementioned living network capabilities, giving it the critical ability to re-establish itself.

Safe Travels

Kinetic mesh helps promote passenger and pedestrian safety as well. The latter is particularly important in cities like Chicago where train grade-crossings are situated in the middle of a bustling metropolis. For example, if an automobile stalls on the tracks, the sensors accompanying nodes can detect the stalled car and alert engineers miles before the train reaches the crossing, giving them time to slow down or stop the train. With a node on board, vehicles also can transmit information to other vehicles in the mass transit system, allowing them to function more efficiently and safely. For example, node sensors on buses can detect the presence of other vehicles in the melee that accompanies many big city rush hour periods. In this way, they can help prevent crashes.

A network like this can also save lives by keeping track of equipment. The network can aggregate data onboard vehicles and send it to the operations center to analyze vehicle state-of-health and other equipment factors. Taking safety a step further, the node onboard each vehicle can monitor situations and alert operators that a valve, seal, or motor is overheating well before it does.

With a solid history of designing wireless network technologies, Rajant incorporates a high level of security, including configurable-per-hop, per-packet authentication into its technology, giving data and access optimum levels of protection.

Ubiquitous connectivity is growing in importance across industry sectors. The dependency on our communications infrastructure will grow exponentially and means a renewed focus on reliability and security. ■

Robert Schena is CEO and Founder of Rajant Corporation, a private wireless network provider. He has 30+ years of experience in broadband communications and telecommunications. Among his many achievements, in 2004, he was successful in changing US telecommunications regulations, resulting in obtaining the first FCC license for broadband services delivered in the US from a Canadian satellite. He serves on the Board of the Methodist Home for Children. In late 2010, Mr. Schena was named to Governor Corbett's Marcellus Shale Transition Team. For more information, please email bschena@rajant.com or visit www.rajant.com.