

## SOLUTION BRIEF



### HIGHLIGHTS

Bigbelly's smart waste and recycling solution transforms the public waste and recycling collection into a smart connected process. It significantly reduces waste management costs and makes a positive impact on the quality of life for citizens and visitors. Bigbelly solutions are placed in high traffic, high density areas which are also an ideal platform for Ruckus Wi-Fi access points.

Together, the Bigbelly smart system with Ruckus Wi-Fi provides:

- Leading smart waste and recycling solution to enhance public space attractiveness, improve sanitation and reduce waste collection costs by as much as 80%.
- Market leading Wi-Fi that provides end users with highly reliable broadband Internet access to help bridge the digital divide, provide a critical amenity to the community and support new city services.

### KEY BENEFITS:

- Cleaner, enhanced public spaces with improved waste management and reliable public Wi-Fi
- Low cost expansion of public Wi-Fi coverage leveraging wireless meshing to Bigbelly mounted Ruckus Wi-Fi access points
- Reduce waste collection costs up to 80% with trash compacting and on-demand trash collection
- Enable IoT applications by supporting IoT sensor deployments, which can also be powered from the existing Bigbelly solar system
- New funding and monetization capabilities via both traditional signage and Wi-Fi based advertising

### THE CHALLENGE

Cities worldwide are looking at how they can leverage technology to increase overall efficiencies, deliver new services and improve the overall lives of their citizens. One opportunity is waste management, which constitutes a significant percentage of a typical city budget. Large cities can pay over \$2,000 per year per trash bin for trash collection. Even then, existing trash cans are dirty and can spill trash when too full. Traditionally, cities have developed static waste collection routes to empty every trash bin according to a pre-determined schedule, once or twice a week.

At the same time, cities are interested in public Wi-Fi as a way to bridge the digital divide and improve the overall lifestyle of citizens and visitors. Wi-Fi can be difficult to deploy in public areas as there often are no easy or convenient locations for the Wi-Fi access points that can provide power as well as a way to securely mount APs in an aesthetically pleasing way. In addition, the location of the Wi-Fi access points is important and need to be where people congregate to ensure appropriate coverage.

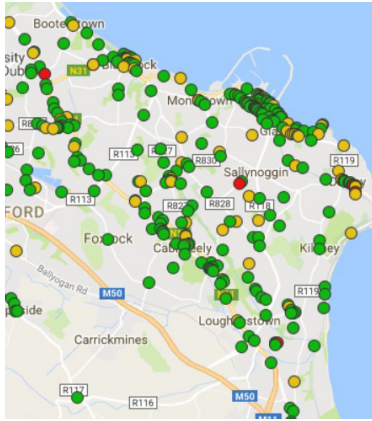
### THE SOLUTION

Bigbelly is a smart waste and recycling management solution that gathers, consolidates, and analyzes data from smart collection stations. Smart, connected, sensing stations on the street come in multiple sizes and waste stream variations to accommodate the various levels of public space waste generation in different areas of a city. Each station communicates real-time status to a centralized management dashboard. The fully integrated system delivers an actionable, up-to-the-minute view of a cities' entire waste and recycling footprint.

Bigbelly pioneered the concept of delivering compaction capabilities into the public right of way by using solar energy to power the patented compactors. The compaction capability delivers waste containment and dramatically increases on-street capacity to reduce collection frequency. Cities save money by knowing when to collect and when not to utilizing real-time data. Bigbelly allows Cities to balance a route with appropriate capacity at each location. Savings occur with reduced bag usage, reduced refuse vehicle mileage, and reduced fuel consumption for an overall increase in operational effectiveness. Fewer truck trips on the street calms traffic, noise, and congestion while decreasing a city's carbon footprint and greenhouse gas emissions.

The Bigbelly system can be further leveraged to support the Ruckus Smart Wi-Fi solution to create reliable public Wi-Fi service. Bigbelly systems are typically placed in common areas where people

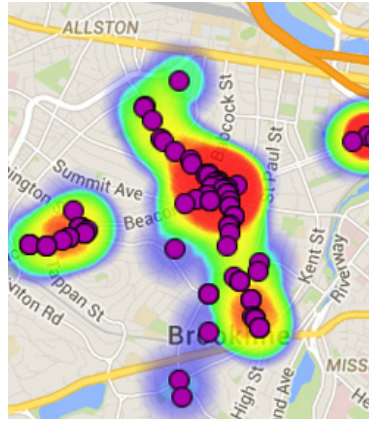




Real-time visibility in software to entire public waste operation



Cleaner, less congested parks—the urban oasis



Waste generation pattern recognition and analysis



Public messaging platform “where the people are”

congregate so they provide the perfect locations to mount the Ruckus Wi-Fi access points. In addition the solar power capabilities provide sufficient power for the access points. This helps to solve two common challenges of public Wi-Fi solutions—mounting locations and power.

Ruckus Smart Wi-Fi features BeamFlex high-performance adaptive antenna technology that is designed to handle the densest urban areas. This highly efficient antenna technology enables better overall coverage so more devices can be connected across a larger area, reducing the number of access points required, which is especially valuable for outdoor deployments since it enables simplified, lower cost deployments and a solution that is easier and less complex to manage.

To connect users securely, cities can use the Ruckus Cloudpath security and policy management solution ideally suited for municipal and community Wi-Fi and IoT applications. Cloudpath enables cities to provide each Wi-Fi user, or IoT device, with a secure connection and apply custom network policies based on unique and highly secure PKI certificates—the gold standard for network security. It includes a simple portal that cities can customize to onboard the first-time users to the network. After the initial onboarding, users and devices connect automatically so long as their certificate remains valid. Cloudpath supports nearly all devices, including IoT sensors and IP video cameras as well as most phones, tablets and laptops.

With Bigbelly and Ruckus Smart City Wi-Fi, you can:

- Deploy a smart waste and recycling platform and enable Wi-Fi and IoT applications in a fully integrated solution.
- Provide secure, public Wi-Fi to visitors and residents to help eliminate the digital divide and create a thriving city environment
- Keep city streets clean and trash free while significantly reducing overall waste management costs.