Verhelst Associates White Paper

Mobile RFID Event Registration

CAPTURING MARKET RESEARCH FOR REAL-TIME ANALYTICS

Experiential event attendees are all assigned an RFID-enabled badge and lanyard which becomes transparent as they engage with exhibitors

Introduction:

Experiential consumer events are designed to attract a highly targeted audience, offering direct engagement with manufacturers, distributors, and local retailers. These events provide a hands-on experience within a specific niche, free from the distractions common at larger trade shows.

By creating a closed-loop environment where both products and attendees are tracked and monitored, these events enable measurable consumer interactions, offering valuable insights into attendee interest and engagement.

Advanced attendee registration, paired with RFID (Radio Frequency Identification) enabled badges, addresses a key aspect of passive market research. Tagging both products and displays at the event generates complementary data, which is then processed by software to produce actionable insights.

Bringing together leading competitors within a specific product category in a neutral, public setting promotes the industry. This setting allows potential customers to establish their own evaluation criteria, making it an ideal environment for accurate data collection.

A passive RFID solution, where both attendees and products are tagged and read at key interaction points, removes the need for constant "badge swipe" data collection. This enables the event to measure product interest and, indirectly, assess sales techniques, display effectiveness, and product positioning in a comparative context.

Using RFID For Attendee Tracking

RFID technology has long been considered for attendee tracking at events, offering benefits such as movement monitoring, session attendance tracking, and lead retrieval. Traditional single and 2D barcode-enabled badges, which pass data in one direction (e.g., for basic lead retrieval), have evolved into more advanced matchmaking technologies. These systems can detect nearby attendees, facilitating networking based on profile settings when paired with RFID readers.

A conventional RFID setup tracks attendees by scanning RFID-enabled badges as they pass through entry and exit points in event halls and meeting rooms. This provides real-time attendee counts and, when analyzed against registration data, offers insights into attendee demographics, decision-making levels, and engagement patterns. Organizers can determine who attends specific sessions and how long they spend on the show floor.

Challenges in Implementation

Despite its advantages, RFID tracking comes with several challenges:

- **Read Range Optimization** – Ensuring accurate scans without gaps that allow attendees to slip through undetected while preventing false readings from those merely passing by.
- **Physical Installation** – Setting up RFID readers requires significant infrastructure, often involving costly labor and technical expertise to install, connect, and dismantle the equipment post-event.
- **Technical Complexity** – Factors such as tag placement on attendees, environmental influences, and the movement patterns of high-traffic areas affect accuracy. Expanding coverage without an extensive overhead network adds to the complexity.

- **Data Aggregation & Analysis** – A live network must collect and process data into actionable insights. Event organizers also need training to interpret the information effectively.

While RFID presents a powerful tool for attendee tracking, overcoming these logistical and technical challenges is key to maximizing its potential.

Information vs. Revenue

Traditional event organizers often require attendee registration to build a qualified attendee base and gather detailed demographic profiles. This data is a valuable asset, closely guarded by show management, as it enhances the event's overall value.

In exchange for handling online pre-registration, onsite registration, and badge generation, organizers frequently partner with technology providers. These providers gain exclusive access to exhibitors and sponsors, offering fee-based lead retrieval and management services in return for lower badge production costs. Typically utilizing a combination of hardware readers and mobile software applications, these solutions capture attendee information when a badge is scanned and provide it to paying exhibitors.

Despite the variety of lead collection methods available—from simple business card exchanges to advanced mobile scanning—only about 50% of exhibitors typically invest in lead retrieval services. However, this still represents a significant revenue opportunity for registration companies that enter such agreements.

The Missing Link: Attendee Movement Tracking

Traditional attendee badges primarily capture basic registration data and lead retrieval interactions. What they lack, however, is insight into attendee movement patterns. Key questions remain unanswered:

- Where do attendees go, and when?
- How long do they stay in specific areas?
- Are certain sections of the event avoided?
- Do decision-makers navigate the event differently than general attendees?

Understanding these movement patterns could provide valuable insights for event organizers, exhibitors, and sponsors, helping optimize event layouts, improve attendee engagement, and enhance the overall experience.

Understanding Predictive Analytics

Analyzing event data has traditionally involved collecting attendee information and handing it over to external organizations. These firms review industry trends, attendee demographics, geographic data, and other big data sources to produce insights. Their findings typically come in the form of recommendations for the following year's event, aiming to improve attendance, quality, and relevance.

However, this model presents three key challenges:

1. **Industry Dynamics** – Entire industries can shift in just 12 months.
2. **Relevance Over Time** – Insights from this year's event may not be valid a year later.
3. **Immediate Adjustments** – How can organizers address issues in real-time rather than waiting until the next event?

The Power of Real-Time Insights

Event organizers have the ability to make immediate adjustments—if they have access to real-time data. For example:

- If a particular area has low traffic, repositioning an attraction at the end of an aisle can encourage attendees to continue exploring rather than turning away.

- If a significant number of attendees leave a session at the same time, organizers can analyze the timestamp to understand what content is being presented and who is speaking. These insights can help refine programming to better match audience expectations.

While both traditional predictive models and real-time analysis have their place, real-time data offers the unique advantage of allowing organizers to make strategic adjustments on the fly, improving attendee experience and engagement as the event unfolds.

Other Attendee Tracking Options

While RFID technology dates back to 1935 in theory, its practical applications for tracking goods emerged in the 1960s, with the first patents for active RFID tags filed in the early 1970s.

A key alternative to RFID involves active tags communicating with Beacons placed throughout an indoor space. Imagine your phone displaying a message from a nearby retailer or an interactive display greeting you personally because your badge or phone signaled a nearby Beacon. These interactions are not only personalized but also tracked and recorded for analysis.

Battery-powered active tags function by waking up the nearest Beacon, allowing both the tag and the Beacon to transmit location data while receiving additional information.

Common Tracking Methods at Events

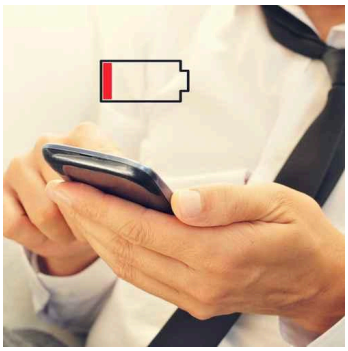
The two most frequently used attendee tracking methods at events and trade shows are:

1. **Battery-Enabled Badges** – Attendees wear badges embedded with active RFID tags that communicate with Beacons.

2. **Mobile App-Based Tracking** – Attendees download an event app that utilizes their phone's NFC (Near Field Communication) and Bluetooth Low Energy (BLE) capabilities to interact with Beacons.

Challenges and Considerations

Each method has its limitations:



- **Cost** – Active RFID tags are significantly more expensive, costing several dollars each, compared to passive tags which cost just a few cents.
- **Battery Drain** – Mobile-based solutions rely on Bluetooth and NFC, which drain phone batteries quickly, often rendering them ineffective by mid-afternoon.
- **Beacon Deployment** – While Beacons are low-cost, they typically do not network in real-time. Instead, they store collected data locally, requiring manual retrieval and transfer.
- **Maintenance** – Most Beacons run on batteries that require constant monitoring, recharging, or replacement. Additionally, increasing the read range consumes more power.
- **User Adoption** – Attendee demographics play a critical role in adoption. Not all attendees are comfortable downloading and installing third-party applications or sharing their location data publicly.

Conclusion

While RFID and Beacon technology offer powerful tracking and engagement opportunities, their effectiveness depends on balancing cost, power efficiency, real-time data needs, and attendee acceptance. Understanding these factors is key to deploying a successful attendee tracking system.

Portability Helps Manage The Unknown

One of the biggest barriers to implementing RFID solutions at events is the challenge of deploying antennas capable of accurately reading tags in motion—especially in crowded, high-traffic entryways. Traditional RFID setups rely on fixed installations such as floor mats, security gates, or overhead devices, all of which require:

- Secure mounting
- Power and data cabling
- Precise tuning to maximize coverage

The Limitations of Fixed RFID Deployments

Installing fixed RFID antennas and readers at an event typically requires multiple trade professionals, including electricians, network specialists, and stagehands to set up trusses or archways. This results in high initial costs, logistical complexity, and a lack of flexibility. Adjustments are nearly impossible without coordinating personnel to relocate equipment—an impractical task when managing multiple entrances and aisles.

A Game-Changing Mobile RFID Solution

Verhelst Associates has developed a cutting-edge **mobile RFID platform** that integrates advanced antenna and reader technology into **portable, self-powered units**. These devices can be deployed and repositioned easily with minimal labor. Additionally, the company has designed **modular, visually appealing units** for antennas, readers, and wireless network repeaters.

How It Works

The system leverages **wireless mesh technology**, creating an interconnected network of devices that continuously relay attendee movement data back to a central registration server. Powered by **advanced rechargeable lithium-ion batteries**, this solution enables real-time tracking and deeper demographic insights.

Key Benefits

- **Flexible Deployment** – Interchangeable RFID antennas adapt to different traffic conditions. Units can be moved from session rooms to exhibition halls, optimizing data collection in real-time.
- **Extended Battery Life** – High-capacity lithium-ion battery packs last a full day and can be recharged over 1,000 times. A simple battery swap by a single staff member ensures uninterrupted operation.
- **Dual Power Options** – Devices can run on battery or AC power for extended use.

By eliminating the need for complex installations and enabling on-the-fly adjustments, this mobile RFID solution revolutionizes attendee tracking, offering event organizers a smarter, more flexible way to monitor movement and engagement.

Moving Collection Modules To Where The Action Is

The ability to capture attendee data at a general session entrance and then seamlessly transition the equipment to a breakout session room makes this a highly cost-effective event research solution.

With antennas and readers positioned at meeting room entrances, organizers can, within hours, redeploy them to strategic locations on the show floor. This agility allows for broader attendee movement tracking and data collection—maximizing insights without significantly increasing operational costs.

Localized Network: Efficient, Real-Time Data Collection

Traditional real-time data collection systems rely on expensive facility network ports and cloud-based aggregation, often requiring extensive infrastructure. The Assess system offers a more efficient alternative by leveraging an **internal wireless mesh network**.

How It Works

- Antennas and readers communicate through strategically placed **wireless routers and nodes**.
- These connect to a **mesh gateway**, which links to a **point-to-point, high-gain wireless antenna**.
- The focused network antenna transmits data to the **main registration server**, which connects to the Internet via a dedicated line.

Dual Data Processing for Reliability

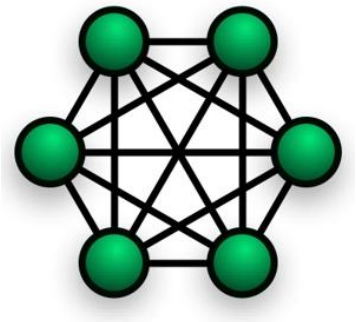
This **localized network** not only collects and stores data but also pushes it to the cloud, where scalable big-data processing takes over. The processed insights are transmitted back through a **secure VPN**, allowing event organizers to monitor key metrics in real-time via a **dashboard accessible on tablets, laptops, or other internet-connected devices**.

By maintaining both a **local server** and a **cloud-based backup**, the system ensures **data redundancy**, guaranteeing continuous access to attendee insights and analytics.

Advancements in RFID Capture Technology

Originally developed for tracking inventory and goods in fulfillment processes, RFID technology has evolved significantly. Engineers have overcome key challenges, such as reading tags attached to metal objects or high-water-content items (like humans) and improving durability for harsh environments, including ocean containers and pallets.

Innovative Antenna Designs

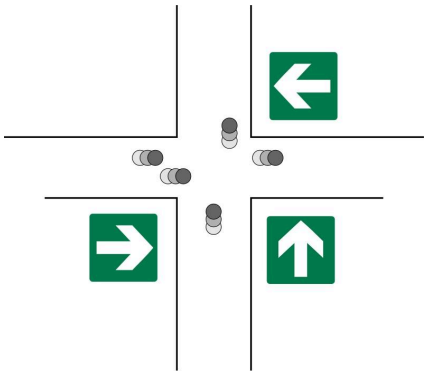


Modern RFID antennas come in various formats to enhance tracking capabilities:

- **Embedded Floor Mats** – Read tags from below as attendees walk across.
- **Rectangular Antennas** – Capture tags at different heights for broader coverage.

To clarify, **antennas read tags** and transmit the data to a **reader**, which processes the information and determines the appropriate action. A common example is a hotel keycard—where an antenna in the door handle reads the card, and a programmed system verifies the credentials to unlock the door.

Directional and Heat Map Tracking



Advancements in RFID now enable **multi-antenna arrays** with intelligent readers that can **determine movement direction**—a game-changer for event tracking. In venues with multiple entry and exit points, this allows organizers to analyze traffic flow more accurately.

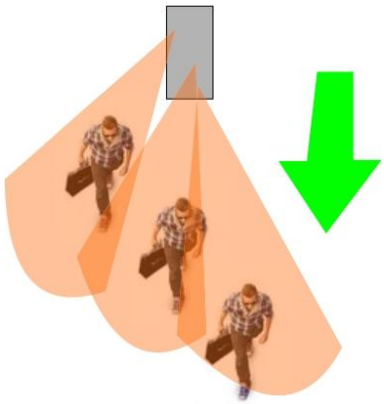
By combining RFID with the latest processing technology, **antenna-reader systems can generate real-time movement and heat maps**, identifying attendee congestion points and high-interest zones. This provides valuable insights for optimizing event layouts and improving attendee experiences.

Power and Connectivity Innovations

New low-power RFID devices reduce the need for extensive cabling. Many now utilize **Power over Ethernet (PoE)**, where data and power are delivered through a single network

cable. This advancement is crucial for **mobile, rechargeable RFID solutions**, such as those developed by **Verhelst Associates**.

Hybrid RFID Tags for Extended Performance



A breakthrough in RFID tag technology is the **Battery-Assisted Passive (BAP) tag**, which combines the strengths of both **passive** and **active** tags. Unlike passive tags, which rely solely on antenna energy to be read, **BAP tags momentarily activate a built-in battery to amplify their signal**. This allows for:

- **Extended read range**
- **Longer battery life (lasting several years)**
- **More reliable data capture in large event spaces**

Conclusion

With advanced antennas, intelligent readers, and hybrid tag technology, RFID has become a powerful tool for tracking attendee movement, optimizing event layouts, and enhancing data collection—all while improving efficiency and reducing infrastructure costs.

Incorporating RFID into Product Interaction

Understanding human behavior is essential when designing product displays that encourage engagement. While traditional trade show interactions often involve direct conversations between attendees and exhibitors, the engagement process begins long before the event.

Attendees meticulously plan their convention experience—booking flights, hotels, and transportation, scheduling meetings, and identifying key products and services of interest. Despite this investment of time and money, many attendees, when approached on the show floor, instinctively respond with, *"No, that's alright, I'm just looking,"* preferring to explore products on their terms.

Even subtle behaviors, such as avoiding eye contact, signal a reluctance to engage until the attendee is ready.

Enhancing Product Engagement with RFID

The Assess **RFID solution** enables **seamless, non-intrusive interactions** between attendees and product displays. With **mobile RFID readers** integrated into exhibits, attendees can simply swipe their badges across a reader surface to request more information on specific products.

Key features include:

- **Data Collection:** Miniature PCs equipped with Ultra High Frequency (UHF) RFID readers capture unique attendee badge data.
- **Self-Service Engagement:** Integrated video and audio playback provide product descriptions without requiring staff intervention.
- **Targeted Lead Collection:** RFID-enabled stations allow exhibitors to gather data on interest levels for specific products, rather than relying on a single lead collection point.

Attendees given the freedom to explore independently often make different choices than when directed by exhibit staff, leading to **more organic and valuable engagement data**.

Verhelst Associates - Assess RFID Solution

The **Assess** offers a modular system that can function as a **turnkey registration, event analytics, and lead management solution** or seamlessly integrate with existing registration systems to provide **real-time analytics and lead fulfillment tracking**.

Key Capabilities:

- **Smart Badge Integration:** Supports both full-color plastic badges with embedded RFID tags or simple RFID-enabled paper labels.
- **Session Tracking:** Creates temporary pairings between attendees and specific products to analyze interest and compare engagement data.

- **Directional Movement Analysis:** Tracks attendee flow in and out of session rooms, exhibit zones, and the show floor.
- **Portable and Flexible Deployment:** RFID tracking modules can be positioned anywhere—without requiring extensive setup from multiple trade professionals. These units can also operate on **rechargeable battery power**, eliminating reliance on external electricity sources.
- **Customizable Coverage:** Configurable antennas/readers can be placed at **entrances, trade show aisles, and product displays** to maximize data collection.

Delivering Actionable Insights

With an efficient installation and **redeployment-friendly** design, the system delivers **a measurable return on investment (ROI)** by collecting vast amounts of valuable event data.

Captured data is stored **locally and in the cloud** for redundancy and further processing. Event organizers can access real-time insights through a **secure VPN web portal**, featuring **customizable dashboards and intuitive infographics** to facilitate data-driven decision-making.

By integrating RFID into product displays, exhibitors gain **deeper insights into attendee behavior**, while attendees enjoy a more engaging and personalized event experience.