Demystifying “Track & Trace” vs “Real-Time Tracking” vs “Monitoring”

November 30, 2017 - **Cindy Dickey**

Read Time | **10 Mins.**

Have you ever performed a Google search for a GPS, RFID, or temperature data logger solution? If so, you may have used or seen these terms interchangeably: “Tracking,” “Real-Time Tracking,” and “Monitoring” in your search results. The terms are not all the same, so let’s clarify these terms with regards to supply chain or asset visibility, and look into which one you need for your business requirement.

Whether you are a supply chain person or are in charge of managing assets (such as medical or construction equipment) for your firm, you are likely looking to get better control over your goods or assets through the use of a GPS or RFID based visibility solution. A Google search in this direction may yield you results of companies calling their solutions as “Tracking”, “Track n Trace”, “Real-Time Tracking” or “Monitoring” among the many describers used.

Let’s start by looking up the dictionary meaning of these terms and then understand their relevance in the context of supply chain or asset visibility solutions.

The Dictionary Meaning

1. Track & Trace

Let consult the dictionary for the words “track” and “trace” in context of visibility technologies.

What is “track?”

5 a: the course along which something moves or progresses

The definition of “track” refers to following the course of something such as your shipment, asset, or even a temperature trail of a package.

What is “trace?”

2 a: a mark or line left by something that has passes; also : FOOTPRINT
b: a path, trail, or road made by the passage of animals, people, or vehicles

"Trace" is following a trail that was left behind by the movement of a shipment or an asset. It is the act of following the track. Sounds pretty similar to "track" doesn't it?

So, what is the difference between track and trace, and why does it matter?

"Track" is when you know where you want to reach (the end objective is clear) and then start following a trail to get there, while "trace" applies to those of you who are like Sherlock Holmes and always follow trails to uncover and understand the events along its way or the actual end destination with the end objective in mind.

Hence, Track and Trace is equal to following a shipment or an asset, but there is no indication on whether it is followed when it is in-transit or after it is completed – it could be while the shipment is in transit or the asset in operation or at a later time leading to some ambiguity on whether it is live information or not.

2. Real-Time Tracking

In simple terms, "real-time tracking" is "live track and trace." The meaning of "real time" as per the dictionary is as follows:

: the actual time during which something takes place
- the computer may partly analyze the data in *real time* (as it comes in)- R.H. March
- chatted online in *real time*

It is the actual time during which an event takes place. So, following a shipment in "real time" means following it when it is actually taking place or when it is "live." Why is this important?

"Real-time" data is more actionable than "track and trace" data for several reasons:

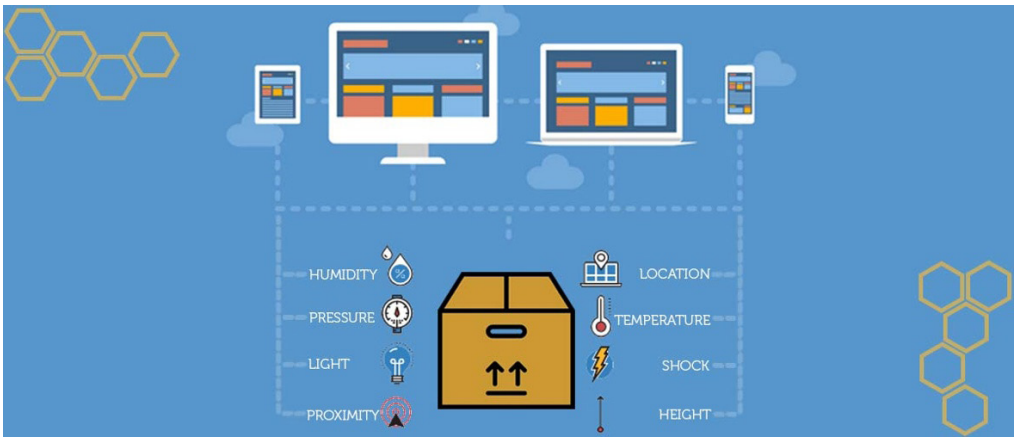
1. Awareness of an issue: If you know that your consignment's temperature is rising in real time, you can take immediate action to mitigate the risk to your sensitive pharma or frozen goods consignment.

2. Reaction time to fixing a problem is much shorter – thereby increasing the probability of

successfully fixing it.

3. Action insights: You will also know in real-time if the problem has been fixed and the temperature is once again within the thresholds for the vaccine or frozen food consignment to reach your customer in top condition.

3. Monitoring



What does the dictionary say about “monitoring” with regards to your supply chain? This is the most important point of clarity.

> c : one that monitors or is used in monitoring: such as (1) : anelectronic device with a screen used for display (as of television pictures or computer information) (2) : a device for observing a biological condition or function • a heart *monitor*

In context of visibility, there is a reference made to monitoring a biological function. Let us examine this more closely.

Consider a biological function such as the blood pressure. We don’t say “track and trace” of blood pressure because it is something that is always measured “live” or in “real-time.” The same applies to your heart-rate or brain-waves or any other biological function.

So, what is the difference between “real-time tracking” and “monitoring?” It boils down to the fact that “real-time tracking” is typically used when there is only one parameter that is being tracked in real-time, while “monitoring” can be used to indicate one or more parameters simultaneously that are simultaneously monitored in real-time.

You can monitor a patient’s pulse, heart-rate, blood pressure, or monitor their “body’s vital stats” altogether. Body’s vital stats are always in real-time, because anything out of the ordinary is cause for immediate action and perhaps even a long-term care solution.

Similarly, when the word “monitoring” is used in the visibility context of goods or assets, you can monitor either one or more parameters of your goods or assets in real-time. For instance you monitor a shipment’s location alone or you can monitor a shipment’s location, temperature, and damage condition altogether.

Therefore, the two rules to remember when monitoring is used to describe a visibility solution are:

Rule 1: Monitoring is always in real-time
Rule 2: Monitoring can apply to one or more parameters simultaneously (Example: Location, Temperature, Pressure, Shock, and so on)

Therefore, if your IoT solution vendor mentions that their solution "monitors," ask how many parameters and whether it is in real-time. If not, the word "monitor" is being used incorrectly.

Commonly Used Visibility Technologies – Barcode, RFID, GPS, GSM, and BLE: What Category Do They Belong To?

We use multiple technologies and solutions for our supply chain/logistics visibility needs or to monitor assets such as vehicles, construction equipment, medical devices or other inventory. Let us study about some common technologies available in the market and their "track," "trace," and "monitoring" capabilities.

1. Barcodes

Barcodes are coded labels which are pasted on goods or assets and can be scanned manually when needed to confirm an item's identity at a location. Since this is not done in real-time, it is considered a traditional "Track & Trace" technology, with intensive man-hours required to implement.

2. RFID

RFID tags are more sophisticated when compared to barcodes where-in you are able to scan an asset without the need of "line of sight" scanning (as with the case of barcodes). Within a warehouse, you can setup readers by zones and know instantly when your inventory or fork-lifts moves across these zones. Therefore, within a warehouse environment, it is indeed "real-time tracking" if you have readers covering the warehouse from wall to wall, and across every nook and corner. Yet, such solutions are typically expensive and thus RFID is only partly a real-time

solution in reality.

Even if an RFID solution is real-time in nature, why is it not “monitoring?” It is because the RFID reader typically scans only one parameter, which is the identity (ID) of that asset to find out which zone it is at. Imagine if you have packages that are vulnerable to temperature changes or are fragile in nature - you will never know if they are contaminated or damaged by simply locating it in your warehouse – you need condition sensors to accomplish this which RFIDs do not typically possess.

3. BLE Beacons/Tags

Bluetooth Low Energy (BLE) beacons (also referred to as BLE tags) technology are poised to replace RFID (especially Active RFID).

See why BLE is replacing RFID!

BLE works in a manner similar to RFID, but has strategic advantages including cost, long battery-life of beacons/tags, and the ability to use a smartphone as a reader. The biggest advantage is often considered to be the low-energy data transmission protocol which allows BLE beacons to store and transmit condition data along with its unique beacon identity. This provides beacons with the ability to “trace” multiple parameters for shipments, assets, inventory, packages, and more.

How does a BLE solution become a monitoring solution?

All BLEs need a hotspot gateway such as a mobile phone or a GSM/W-Fi enabled Bluetooth device. If this hotspot gateway is a real-time mobile monitoring device, then the BLE beacon solution is an ideal “monitoring” solution for supply chain – end to end.

If you are using BLE beacons to log data (where a hotspot gateway is unavailable) and then collect the data at another location where a hotspot gateway becomes available (such as temperature trails that were recorded and stored in the beacon and sense when it reaches the final destination), it becomes a limited “Track & Trace” solution – similar to a temperature data logger. This is less ideal than a real-time monitoring solution where you have hotspot gateways all along your supply chain because a change is temperature in-transit for instance becomes less actionable – putting your goods at risk of contamination.

4. GPS/GSM Trackers

Typically these GPS vehicle trackers log the GPS data beamed from the satellite and transit them in real-time over the internet through the use of a GSM SIM based data plans or through Wi-Fi. Unless, there are large patches of cellular network absence, this technology is always “real-time tracking.”

When does it become monitoring? It becomes monitoring, when your tracker is able to collect more than just location information (such as temperature, pressure or shock) and transmit it in real-time along with the location.

Assume your goods are fragile! You would not just need to know if someone at a transit warehouse is handling some packages in a manner that could damage it, but also where it is happening so you can contact you’re the right warehouse promptly to prevent further damage to

your consignment.

GPS/GSM based tracking or monitoring devices can also be hotspot gateways that can sense BLE beacons in their surroundings. When used together, assuming the device is portable to sense moving beacons in-transit, then the solution truly becomes an end-to-end package-level supply chain “monitoring” solution.

Watch Roambee’s BeeBeacon solution in action – the industry’s first end-to-end wireless BLE/GSM/Wi-Fi based monitoring solution providing location and condition at a package-level.

Which Is the Right Solution for You? Barcodes, RFID, GPS, GSM, or BLE?

The question you are probably asking now is which technology or solution should I choose for my visibility needs? While there is no one-size-fits-all solution for a tracking, real-time tracking, or a monitoring solution, there are smarter choices you can make depending on your use-case or problem scenario. To make an informed decision, here are some of key points to evaluate for your business requirement:

1. What is the frequency at which I need visibility data?

Some shipment monitoring applications such as last-mile delivery of fresh foods may need turn-by-turn monitoring of the shipment’s location and condition, while a construction equipment may need only a daily status update about its location, or real-time alerts when they leave a secured yard.

2. Do I need only current data or also the past-data audit trail?

If you are monitoring a temperature sensitive item, the temperature trail of the leg of the journey that has been completed is as important as the current temperature to determine the quality of the item. If the quality has been compromised, you’ll have better insight into when, where, or why the event that compromised the quality of your item occurred.

3. Do I need to know only one parameter (such as real-time location) or multiple parameters (such as temperature, pressure, etc.) about my goods or assets?

Determine the factors that would affect the condition or health of your goods or assets – their sensitiveness to temperature or shock for instance.

4. What is the level of visibility I need? At a vehicle, container, pallet or shipment level?

By analyzing the level of insight (number of parameters) you need about your asset, the interval at which you require visibility, and whether a continuous audit trail is required, you can determine if a basic "track and trace" solution will work for you or you need "real-time tracking" or "monitoring."

Once you have decided on the type of visibility you need, you can start finding the IoT solutions providers who can address your use-case effectively.

Learn how to choose your IoT solutions provider wisely!

When it doubt – always go for a "monitoring solutions" vendor because a monitoring solutions vendor can address "track and trace" and "real-time tracking," but the converse is not always true! A "real-time tracking" or "track and trace" vendor cannot successfully address "monitoring."

The Roambee Path! – "Monitoring"

Back in 2013, the Roambee team discovered that the solutions available in the market were mostly in the track and trace or real-time tracking categories – such as GPS vehicle tracking or RFID. In the case of temperature data loggers too, the customer got to know about what went wrong with their shipment only after it arrived at the destination – which was not actionable – making it nothing more than a tracing solution. Even when a vehicle or shipment was tracked in real-time the location of the vehicle was the only parameter that was being tracked.

Location or temperature alone is insufficient for actionable insights!

Imagine you are trying to prevent the quality compromise (melting) of those yummy ice-creams

you just shipped out. With location tracking in real-time, you will know where your vehicle is, where it has stopped, and the route that is being taken. Is that enough to determine if the goods are at risk of contamination? No! A vehicle that has deviated from its route and stopped for many hours cannot definitively indicate that the temperature is not being preserved in that truck - it could simply be a traffic pile-up or route deviation due to a construction activity on the road. Thus, you are once again in the same situation as you were before implementing your GPS vehicle tracking solution, wondering whether to put your precious resources in the field to tackle this situation or just let it pass – in spite of having real-time tracking on your vehicle or goods.

If you were tracking temperature alone in real-time (and not location) and the driver's phone got damaged in an accident, you still couldn't learn where he or she was and reach the spot on time to save the driver and your goods.

Roambee wanted to provide "trusted analytics" using real-time visibility where the customer knows with confidence what is happening to their goods or assets, and whether it is in danger, so that they can act accordingly. To do this, we required more than real-time location tracking; we needed real-time tracking of the shipment condition as well. To achieve this, we built a solution using a combination of technologies such as GSM/BLE/Wi-Fi to provide end to end visibility indoors, outdoors, and in-transit across the enterprise.

This vision gave birth to Roambee's monitoring solution for goods and assets. Due to the nature of our service model, which is an on-demand, pay-as-you-go type, and the fact that Roambee's solution covers the entire journey of a package or asset (from the warehouses to yards to in-transit and in-field), we are an "On-Demand, End-to-End Enterprise Goods & Assets Monitoring" firm.

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