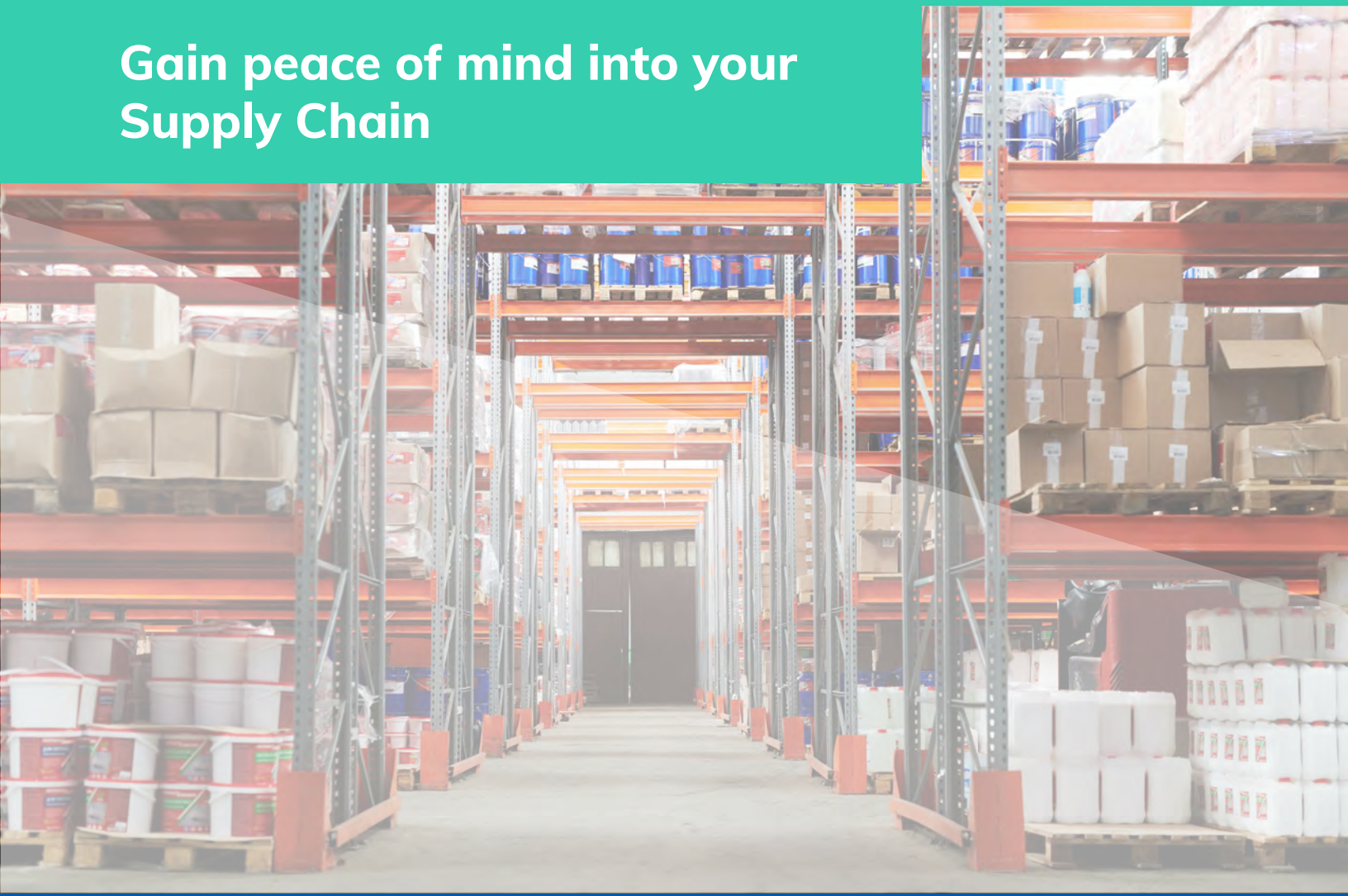# Lighting Up the Supply Chain with Cellular Based Asset Trackers

Gain peace of mind into your Supply Chain

In a world where supply chains have been optimized through outsourcing, management systems and digital transformation, a new gap has emerged that often leaves end-point stakeholders without visibility to their entire workflows. These gaps are created by the multiple handoffs that now occur from raw material suppliers to multiple production facilities to logistics, wholesalers and retailers. Each of these nodes in the supply chain are managed by disparate systems without offering full visibility to the entire stream.

In 2004 NIST funded a study by **RTI International** to evaluate the "Economic Impact of Inadequate Supply Chain Integration". The report estimates "… the total annual costs of inadequacies in supply chain infrastructures to be in excess of $5 billion for the automotive industry, and almost $3.9 billion for the electronics industry". Of these costs, the report estimates that 50% were in dealings with suppliers and 40% arose from interactions with customers.
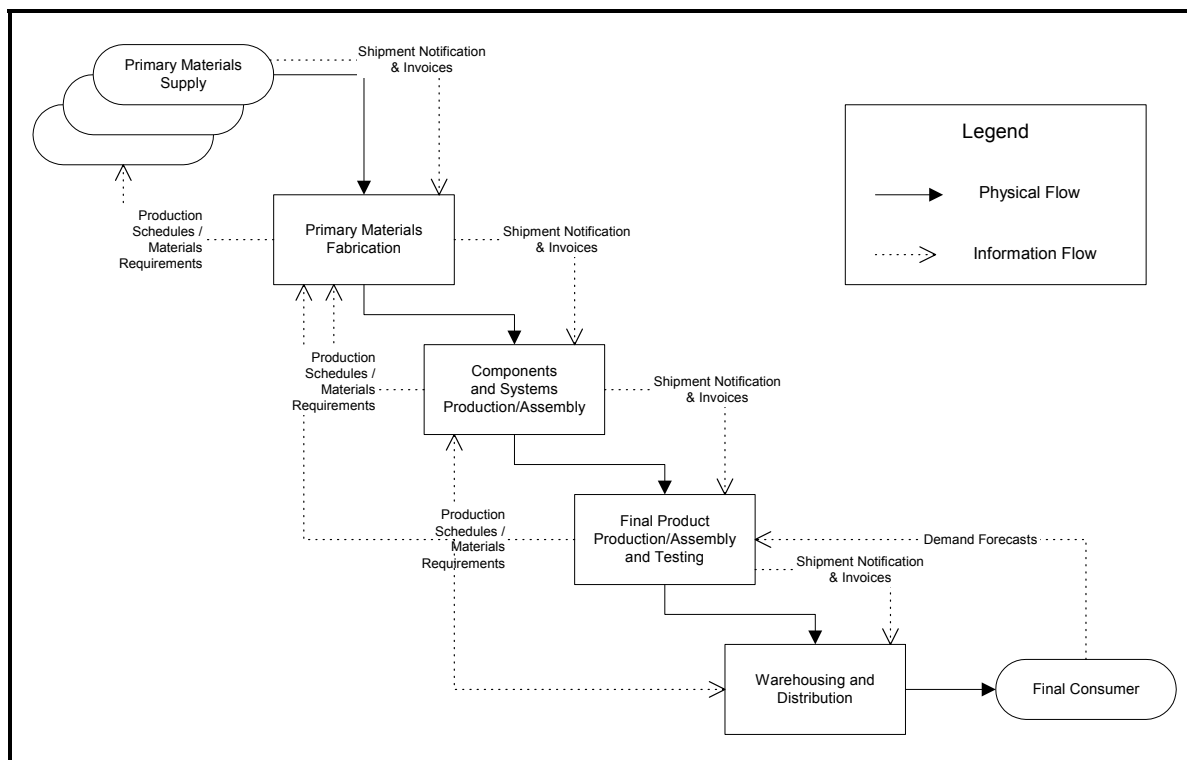

Figure 1. RTI International, Supply Chain Process Flows: Discrete Parts Manufacturing, 2004, accessed 27 January 2021, https://www.nist.gov/system/files/documents/director/planning/report04-2.pdf

How did this happen? The RTI International report does an excellent job of summarizing as follows:

" The trend toward integration began to reverse by the mid-1980s. Faced with rapid technological change, increasing global competition, and accelerating quality improvement expectations, many large enterprises found their agility in the marketplace hampered by the rigidity of their corporate structure. To concentrate on leveraging "core competencies," firms began to spin off subsidiary operations. This process began with a slow reversal of many conglomerate mergers, and the benefits noted above were overwhelmed by issues of communication, coordination, and corporate focus.

The necessity of developing core competencies, along with the arrival of low-cost computing and communication via the Internet, catalyzed the beginnings of vertical disintegration. With external communication and data transfer costs decreasing, much of the rationale for vertical integration began to erode. The potential emerged for a chain of firms, each focused on its own areas of expertise, to cooperate to provide products and services for final consumers. These factors have altered the strategic choices available to firms regarding the set of activities they choose to perform

"many large enterprises found their agility in the marketplace hampered by the rigidity of their corporate structure."

and the inputs they purchase in the market. The result of these and other developments has been to encourage new forms of organization that leverage modern information/production technologies (see Besanko, Dranove, and Shanley, 1996).

"

The solution proposed by the RTI research was supply chain integration. Each node in the supply chain sharing data with all the other nodes. Today, 15 years following the publishing of this report, full supply chain integration remains elusive to the vast majority of businesses.

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In 2019 Deloitte published a survey of "150 supply chain and technology leaders

about their experiences with 25 digital and analytics capabilities spanning the entire value chain." One question inquired about "real-time manufacturing asset intelligence" and only **26%** of respondents had made a significant investment. Another question inquired about "Real-time product intelligence" and only **22%** of respondents had made a significant investment. Interestingly, while 81% of respondents named cost reduction as a primary driver of these investments, 60% also named "improving the customer experience" as a primary driver.
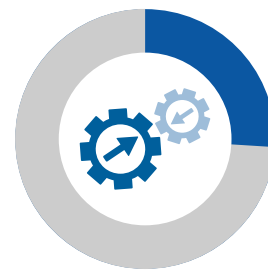
26%

have made a significant investment in real-time asset intelligence
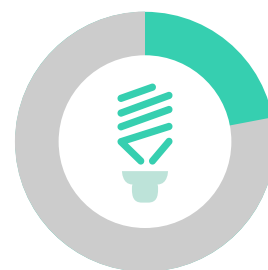
22%

have made a significant investment in real-time product intelligence

The year 2021 has arrived and still approximately only a quarter of those surveyed have made significant investments in having real time intelligence of manufacturing and product assets. In the 16 years that have passed since the RTI study was commissioned by NIST, the issues of having situational awareness of a disparate and fragmented supply chain have not been widely addressed. Real time intelligence is necessary to enable complete *situational awareness* of a supply chain.

"In the 16 years that have passed... the issues of having situational awareness of a disparate and fragmented supply chain have not been widely addressed."

Situational awareness can be described as "The perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their future status" (Endsley, p. 36). Business leaders are charged with the responsibility to "project the future status" and avoid surprises that cost businesses money. When products go missing in the handoffs from supply chain node to node, surprises happen. When environmentally sensitive products experience excursions, surprises happen.

"Situation awareness cannot be achieved without accurately PERCEIVING environmental elements and events with respect to the CURRENT time and space."

As supply chains have been disseminated to multiple parties in multiple locations, it is no longer good enough to know where something "used" to be, or how something "was" at a past point in time. Situation awareness cannot be achieved without accurately PERCEIVING environmental elements and events with respect to the CURRENT time and space. Knowing where things are NOW, and what condition they are currently in. Only then can we project future status with integrity.

It has been difficult, however to do this with any accuracy while our goods are migrating from one node to the next in our supply chain. As pallets, containers and goods are moved in and out of one facility to the next through multiple transportation mechanisms, they pass in and out of each of those nodes' enterprise systems. Items, containers and pallets may be scanned in and scanned out as they arrive and depart the node through various technologies such as RFID tags or even simple barcodes. But while housed IN the node, or while transporting from node to node, we are often blind. For most, we have not achieved a fully integrated supply chain with real-time situational awareness.

The solution to this problem is to track goods through the supply chain, through the actual nodes, independent of that unique node's enterprise system. Rather than attempting to achieve complete supply chain integration, we can achieve real-time situational awareness by working around disparate enterprise systems.

One mechanism to do this is through **cellular based asset trackers** that, when necessary, are equipped with environmental sensors. While this used to be technically feasible and prohibitively expensive, new cellular technologies have emerged that are designed specifically for this type of application, with price points that are now economically attractive.

"The solution to this problem is to track goods through the supply chain, through the actual nodes, independent of that unique node's enterprise system."

LTE-M and NB-IoT are two new cellular technologies that have been established to enable low power, wide area network connectivity for relatively simple devices that have much lower price points for both devices and data. Radios functioning on either LTE-M or NB-IoT bands use the existing, ubiquitous 4G network, enabling near continuous coverage anywhere. The radios are programmable, allowing for variances in reporting frequencies. Devices can check in daily or more frequently and can be programmed to check when an event occurs, such as a temperature excursion, an "open", or a drop/tilt. Because these radios use very low power and do not need to be in continuous communication, battery life can be extended to 14 years on a single set of 4 AA batteries. Finally,
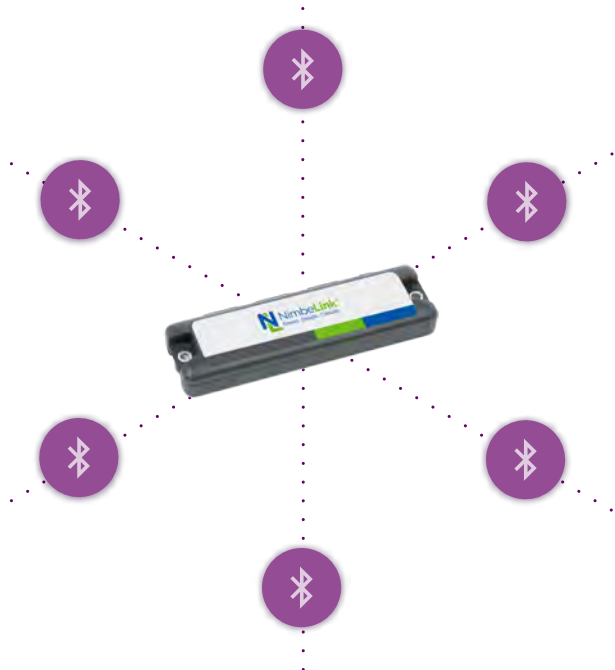
the most recent products now also include Bluetooth radios that can scan for even lower-cost Bluetooth asset tags, enabling hub and spoke implementations for tracking aggregated shipments, such as boxes on a pallet. Therefore it is now technically AND economically feasible to have a small device continuously collecting data on GPS location and environmental conditions and sending that data to the cloud via cellular radio.

The use of cellular based asset trackers now has the potential to "light up" all those supply chain nodes. Full real-time intelligence through each handoff, not just AT handoff but while in transport, while in the warehouse, and even potentially while in manufacturing, is achievable. This data can be available either in full-stack software solution with a single sign-on dashboard, or the data can be piped directly into your existing enterprise system through APIs.

What this means to business leaders seeking full real-time situational awareness is the ability to log into your enterprise system, such as SAP, NetSuite, SFDC, and others and see the current location of all the assets in your distributed supply chain. To know that they have not been dropped, opened or that the cold-chain has been maintained. Rather than learning from your customer that your product was compromised when it lands on their dock, you'll know before it leaves the warehouse. *Surprise averted, happy customer.*

Rather than learning that your supply line was compromised after a crate was opened or a temperature excrusion occurred and a scheduled manufacturing crew is now idled, you'll know before it arrives. *Surprise averted, happy operations.*
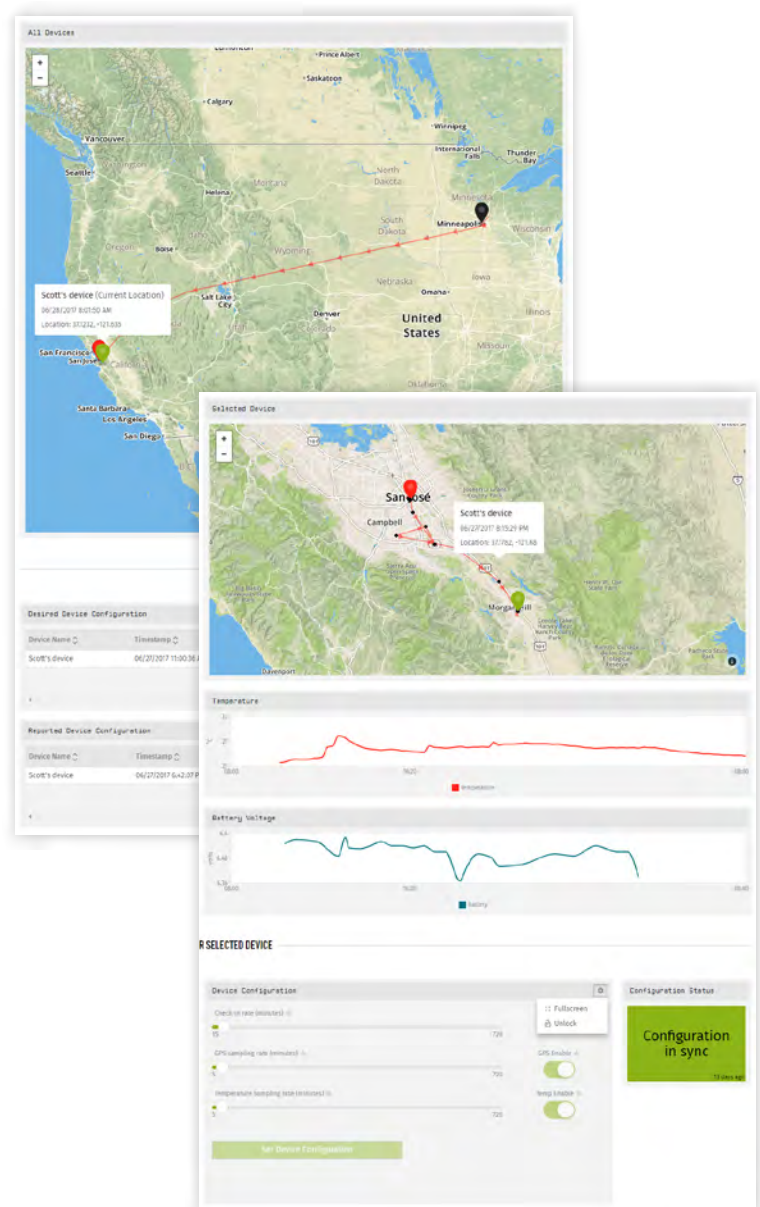
Example dashboard from NimbeLink

"...Insights into supply chain monitoring has the potential to create a significant ROI..."

Using these new cellular technologies to gain insights into supply chain monitoring has the potential to create a significant ROI to many organizations. Critical factors in calculating an ROI include efficiencies gained in operations, labor utilization, supplier reconciliation and safety and regulatory compliance. Further, some organizations may find new revenue streams by providing accurate tracking and environment information to customers.

For a blog that details ROI calculations for Asset Trackers, visit **NimbeLink.com**.

About NimbeLink

NimbeLink offers a portfolio of cellular based Asset Tracking devices that are deployed globally and tracking thousands of unique applications. Our Asset Trackers include a variety of environmental sensors and have a battery life that can be extended to as long as 14 years. With open APIs, our trackers can move data seamlessly into your existing enterprise software or full stack solutions are available through our channel partners which are listed on our website.

For more information, please visit our website at **www.NimbeLink.com**.

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