Intelligent Time-Synchronous Dynamic Hopping System Propels IoT Paybacks

The age of massive Internet-of-Things (IoT) connectivity is at hand.

IoT systems have the power to transform every item and activity across the physical business environment into nonstop nerve centers that continually monitor, detect and flag areas of waste and major opportunities to drive margins.

The business case is clear: IoT empowers companies to gain the same or an even greater degree of flash insights and operational precision, agility and speed as online merchants have long exploited. The potential for improving bottom-line profits is enormous. But seizing the array of IoT paybacks requires harnessing a level of technological prowess that far exceeds what most systems, relying on outdated and insufficient communications architecture protocols, can deliver.

The ability to operate seamlessly in today's complex and crowded Wi-Fi and channel frequencies environment requires an IoT platform that provides nearly unlimited guaranteed pathways for bi-directional wireless communications and 'future proof' scalability and sustainability.

Intelligent Time-Synchronous Dynamic Hopping vs. Static IoT Technology

Altierre's rapid intelligent time-synchronous dynamic hopping wireless IoT technology platform uniquely is built to operate in very high-density business environments and seamlessly support enterprise level applications.

Altierre's IoT system can easily cover a massive manufacturing plant or thousands of stores. The solution can literally support millions of bi-directional messaging sensors, while just a single Altierre access point can manage a 50,000-sq.-ft. store or environment.

That enterprise capacity and low very number of required access points stands in sharp contrast to other IoT systems that have been built to employ fixed, or static, channel wireless protocols and support a much smaller operational environment and much less complex and less crowded data communications spectrum.

Empowering IoT platforms relying on static transmission protocols to run enterprise scale applications, such as electronic price labels, forces service providers to develop and install "fixes" to work around system limitations. Static protocol IoT systems inevitably experience much greater channel interference and overall inferior performance. The fixes, or patches, also degrade system reliability including battery range and life span.

Mission Critical Factors

When comparing the performance of dynamic hopping architecture with existing IoT platforms, three factors are especially critical to take into account.

External Interference: Fixed or static IoT channel protocols are forced to overlap with extended Wi-Fi or neighboring wireless applications, which hinder system reliability. Static channels cannot support the many diverse uses of the wireless spectrum by multiple protocols.

Even Wi-Fi operates on a number of protocols that interfere with static channel performance. For example, empty channels in the Wi-Fi 802.11b protocol disappear in the Wi-Fi 802.11n mode. Static channel protocols, as a result, provide no room for expansion or upgrade in performance capability.

Altierre's intelligent time-synchronous dynamic hopping technology, on the other hand, virtually eliminates the potential for overlap and hence provides consistently flawless performance.

Internal Collisions: As more and more wireless devices and applications compete to function within the same working environment, fixed or static channel systems face increasingly significant performance hurdles.

In non-synchronous, fixed channel IOT systems, the number of devices seeking to connect to access points greatly increases the likelihood of collisions and system degradation.

This problem is caused not only by interference from external protocols but from the static system itself.

One solution to fixing the problem, theoretically, could be to significantly increase the number access points within an environment. Yet the extremely low number of open channels that a static system can leverage, in reality, severely limits that option.

Altierre's time-synchronous dynamic hopping technology infrastructure ensures that no device will ever experience spectral contention from another device. That is a major benefit for harnessing the full paybacks of IOT today and heading forward without any performance hindrance or expansion restriction.

Battery Lifespan: In addition to internal and external performance issues, static system battery lifespans are degraded by the exponentially higher number of repetitive, and unpredictable, attempts by sensors to connect with available access points. The result is eroded battery lifespan and higher system costs.

Altierre's system, developed to operate seamlessly on an enterprise-wide much broader scale, employs a proprietary time-synchronized model that ensures sensors and access points always connect successfully without excessive retrying, thus significantly extending battery lifespan to an absolute minimum of five years and typically much longer.

Why Altierre: Tech Specs

Dynamic Rapid Channel Hopping Architecture

The company's patented dynamic channel hopping technology, extremely limited need for data synchronization, and narrow transmission signals all dramatically decrease, if not eliminate, interference issues.

The probability of an Altierre device transmitting or receiving data on an overlapping channel at the same time as Wi-Fi limits the possibility of interference to less than 0.025%.

Altierre's narrow bandwidth signal (only a few hundred KHz) is like a pinprick compared with Wi-Fi's 22MHz wide bandwidth, further reducing any chance of interference, even when momentarily operating within the channel bandwidth of a Wi-Fi transmission.

In addition, the system's technology allows sensor to remain silent 99.9% of the time.

Other IoT systems, in contrast, typically run on a "static or fixed channel" architecture that requires manual spectrum analyses to find non-overlapping channel frequencies in a bid to lower the chances or amount of interference.

Further, in environments in which three or more Wi-Fi access points and four or more static channels are already in use, static wireless IoT systems are forced to share channels, with a resulting steep increase in interference.

Static channel systems also require frequent synchronization messaging between sensors and access points. The ongoing need to reconnect so often further degrades battery lifespan.

Altierre's intelligence dynamic hopping architecture overcomes all these issues and virtually eliminates any chance of significant interference.

Superior Data Throughput: Altierre vs. Zigbee

Static channel protocols were not designed to support enterprise applications involving extremely high volumes of transmissions. As the level of data transmissions grows, static channel systems become highly inefficient.

Zigbee, one of the most widely used wireless protocols, employs static system technology provides only seven "guaranteed" slots for transmitting data.

Zigbee and other static protocols also transmit data over an additional nine slots, known as contentious slots, raising the total number of slots to 16. But those nine slots are "open," meaning other Zigbee devices or applications can use them to send and receive data.

The result is degraded performance. If an access point on a static infrastructure is seeking to update prices on 900 tags, only seven of those transmissions will simultaneously connect successfully via the guaranteed time slots. The other 893 price changes will take much longer to execute as they fight to connect via the nine contentious slots or must serially connect on the 7 available guaranteed time slots. That imbalance creates a highly inefficient method for transmitting data.

Altierre's dynamic rapid channel-hopping architecture, in contrast, uniquely transmits data leveraging more than 1,000 guaranteed time slots. With Altierre's system, all 900 tags are updated instantly and simultaneously, without any transmission collisions or interference. All sensors and access points communicate over guaranteed time slots.

This fundamental difference in the two protocols can provide a full order of magnitude in "realized throughput" — in how quickly and accurately the price changes, in this scenario, are executed. That is a huge differentiating value proposition.

Altierre vs. Infrared: No Contest

Infrared protocols for transmitting data have been in use for some time. IR is at the core of the ESL solution offered by Pricer AB, for example.

But IR solutions come with significant drawbacks.

First and foremost, IR-based systems require direct line-of-sight connectivity. If a product display or stack of materials blocks the IR transmission, communications between the system and the tags are interrupted and terminated.

The crucial acknowledgement by the tag that it has received the data is severely hindered by the limited power of optical transmission, especially from the tag to the access point. That greatly diminished capacity to confirm the update, in turn, means that store associates must walk the floor to determine if all the tags have been correctly changed.

That is a major obstacle in mission critical situations where prices must be updated instantly, such as for changing prices to exploit a situational promotional opportunity. It also severely limits successful use in high-density environments, such as distribution centers and manufacturing facilities, where IR transmission can face ongoing interference from machinery and floor-to-ceiling racks. IR is also impractical for use in outdoor environments or where there is too much sunlight from skylights, which severely restricted or stop the system's functionality.

IR also is limited to a transmission rage of some 30 feet. As a result, rolling out the system requires installing an extremely high number of access points to cover, for example, a 50,000 sq. ft. store or environment. That means installing many more devices, higher levels of maintenance and greater energy use.

Altierre' system functions seamlessly and is unaffected by line-of-sight issues.

Altierre's technology infrastructure also supports a much wider transmission range, and a single access point can manage enough sensors to cover a 50,000 sq.-ft. space.

The system is also designed to provide robust bi-directional messaging — to send and to receive data — compared with more one-way communications protocols. The impact on the value of IoT is enormous as soon as companies seek to derive the diverse range of paybacks beyond the most basic application.

Altierre's bi-directional messaging platform is built specifically to transform stores, showrooms, dealership, manufacturing facilities and logistics operations into fully interactive centers for identifying areas of major loss and huge gain.

Predictable Power Consumption and Unlimited Scalability

With Altierre's IoT system, power consumption is highly predictable because sensors rarely need to communicate with access points. Each tag is synchronized within the network and communicates only at precisely dedicated times.

Altierre's system also employs an "intelligent" sensing technology so that any tag removed from the shelf or display case, in other words taken offline, will not prompt any expenditure of excess power.

In contrast, static channel systems keep searching and using up power by continuously attempting to make a connection with a sensor no longer in place.

Altierre system, developed precisely for today's complex and crowed wireless communication environment, has mastered the keys to provide consistent bi-directional flawless performance and "future proof" success.

The strength of the system's infrastructure also supports a nearly unlimited level of scalability. The platform can easily support millions of devices and is scalable to even much greater degrees without interfering in system performance.

For industries seeking to gain true competitive edge and leverage the full power of IoT heading forward, Altierre has the best technology platform available to win the race to seize greater profits and excel in the rapidly expanding era of hyper connectivity.