GROWTH ACCELERATION PARTNERS

WANT A SLICE OF THE $1.5 TRILLION IoT PIE? THE SECRET IS IT'S ABOUT THE DATA AS MUCH AS THE DEVICES

IoT & CONNECTED DEVICES

Between 2020 and 2030, the number of Internet of Things (IoT) devices worldwide is set to almost double, according to Statista.

That may not sound like much, but when you consider the projected number of devices to be at 29 billion by the end of the decade — and you add in figures from Transforma Insights, which put the total addressable market at $1.5 trillion USD — then the opportunity for your organization to benefit could not be clearer.

By embracing the IoT and connected devices, you can do almost anything, from improving the customer experience, to creating new revenue streams, to driving innovation. Yet IoT development is often harder than it looks.

Apart from the challenges many software projects face, from the data processing layer to the user interface, there is also the connectivity and coverage element. Will your network penetrate through your bricks-and-mortar infrastructure? Will you have enough coverage for your entire shop or factory floor? Will noise or interference throttle your application's performance?

There are various pros and cons with IoT connectivity technologies.

Wi-Fi accounts for 31% of all IoT connections, and while its ubiquity, compatibility and cost are all typically positive, its range and network congestion are often negative attributes. Power consumption for non-wired devices is a big disadvantage here, hence the need for lower power technologies like BLE and Zigbee.

BLE (Bluetooth Low Energy) clearly has power consumption to its advantage, but at a trade-off of bandwidth and range complexity.

- Note: BLE Mesh was proposed to address range issues, as it allows near-by devices to "chain" together to pass along messages to the nearest access point. But the drawback is hardware vendors may not have included that functionality in their software stack.

Zigbee has reliability and scalability, as well as less resistance, but again suffers with range and can be a walled garden.

LoRaWAN has a very strong range, but at the cost of low bandwidth and high latency.

With regard to messaging protocols, the choice is between MQTT (Message Queuing Telemetry Transport), CoAP (Constrained Application Protocol) and HTTP. MQTT is a layer over TCP, which is more associated with reliable connection, while CoAP is a layer over UDP, better associated with speed in real-time data transmission over reliability.

According to Chris Smith, a research and development leader at Growth Acceleration Partners (GAP), the use of MQTT would not be used by an actual wearable or IoT device in practice. However, said IoT device could use MQTT-SN and would require a gateway to bridge between MQTT-SN and MQTT.

“Most likely, said IoT device would communicate to an Access Point — in cases for BLE, Zigbee and LoRaWAN — and the Access Point would use MQTT or HTTP to route messages back to a collector; whereas Wi-Fi devices would generally use HTTP or CoAP,” Smith said.

“CoAP is really more about speed and lower power consumption. The existence of an existing web server architecture isn't advantageous to CoAP since HTTP web servers cannot natively speak CoAP. A translation proxy is required to bridge the gap between CoAP and HTTP.”

While this is a simple guide, your project needs to traverse this technical tightrope in order to get the right trade-offs. Cost, performance and scalability all need to be considered, and this is where a trusted solutions provider such as GAP can come in. With the September 2023 acquisition of Mission Data, a full-service digital product development firm, GAP has acquired a wealth of experience on IoT and connected device client projects, from the fanciful to the fundamental.

One client project for Kroger — a leading American supermarket chain offering a variety of groceries and household products — represented the first foray into large scale IoT was with a major multi-department U.S. retailer. GAP worked across two different initiatives: putting temperature sensors into fridges and freezers, as well as interactive shelving across the store.

For the former initiative, the system uses IoT sensors to monitor the temperature of refrigerated cases along with data tracking what types of products are in those cases. The solution interacts with Associate Task Management (ATM) — a mobile technology that streamlines store operations — to alert or assign tasks to the associates. The IoT sensors initiate actions through a network of devices directly to handhelds, monitors, and alerting devices.

For companies involved in the production or retail of fast moving consumer goods (FMCG) such as food, safety regulations are understandably stringent. Fines for making mistakes can run into the millions of dollars. Previously, the client would require store employees to walk around with an electronic device and manually check fridge and freezer temperatures. The solution was to place a Zigbee-enabled temperature monitor in each cold storage unit to not only provide real-time monitoring, but help save many person-hours in the process. For the interactive shelving, the primary benefit was in updating pricing in real-time, even to the extent of dynamic pricing.

From a technical perspective, the challenges and learnings were across the process:

- How to deploy sensors at scale, which was where Zigbee came in to play
- How to reliably communicate from those sensors to a gateway
- How the gateway can reliably and securely communicate back to the cloud

The biggest lesson however — and this applies to almost any technical project — is that the data is king. This is a fundamental truism of IoT, and understanding this allows organizations to take the next steps forward.

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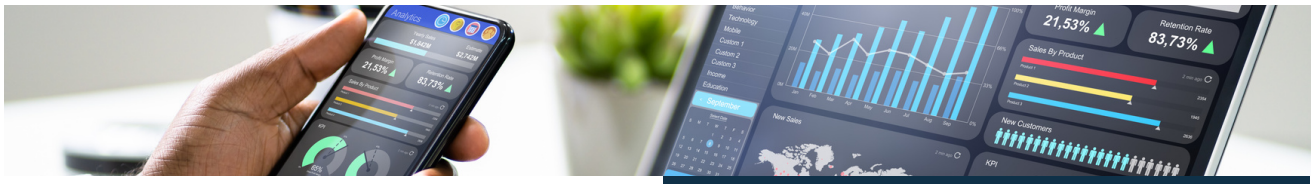

Take this [2022 article from Diginomica] focusing on the logistics industry as an example: “Having millions of sensors may be impressive. But it’s the meaningful data they produce that is of real interest. And it’s the business decisions that can be made because of the data that is produced… that’s where the power behind IoT lies.”

In the temperature sensor use case, the data gathering — from taking data from thousands of locations, aggregating and dashboarding the data, and creating time-series databases to analyze them — is just the first (long) step. Once the project is rolled out, another layer of insight can be added on top in the form of predictive maintenance, embedding logic with the data to assess the likelihood of when a freezer will stop working.

Oftentimes, it is a question of understanding the true business value of your data. In many instances, a pilot project can help unlock this insight. A frequently cited and long-standing figure from Cisco finds [three in five IoT initiatives stall] at the proof of concept (POC) stage. One of the ways to remedy this is to get an experienced partner on board, because they have likely already done the experimentation for you.

An example here is with our client Otocast, which has a platform offering [mobile, location-based audio guides] to various points of interest, enhancing the tour experience. GAP engineered a location-aware 3D audio experience within the Otocast iOS mobile app, leveraging the Bose AR SDK. Through previous projects, it was ascertained that beacons would be the ideal solution for this use case. This innovation enabled users to enjoy enhanced audio tours without the need to look at or hold their mobile phones.

This experience and knowledge means more than being able to spin out whimsical POCs into real business ideas. It is the ability to recommend the right protocol and vendor, but also the flexibility of being agnostic where necessary, or taking into account clients’ preferences.

Ultimately, if you want a slice of that $1.5T market, not to mention the wider business benefits, you need to team up with a partner who understands not just IoT, but the data underpinning it.

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