2crsi

THE INTERNET OF THINGS

Demystifying IoT

Understanding the Internet of Things (IoT),
a complete project perspective.

Executive Summary

The "world" where we see the exchange of data between everyday devices–valves, cars, and thermometers, for example–and the Internet, is known as the Internet of Things. The explosion of technology from this development has opened up a plethora of opportunities for those in IT.

To take advantage of the many possibilities, and to dovetail with the IoT world, one must balance needs with the constraints of the IoT. The exchange of data can take place in different ways and with a variety of software and hardware options, but the best choice depends upon the type of data, the rate at which it must be transferred, and the task intended for the data.

Affordable and flexible servers that are engineered to specifically meet the needs and constraints of the IoT information flow are the key to ease of analytics, fast results, and reduced Total Cost of Ownership.

What is the IoT?

Consider small devices–your watch, your thermometer, your bathroom scale, the motor of a pump–connecting to the Internet, sending data. This is the Internet of Things (IoT).

In April 2015, AT&T® announced that it had 20 million connected objects on its network, not including phones or tablets. According to IDC®, as of 2015, fifteen billion devices worldwide are already "connected," but 85% of existing industrial devices are still not a part of the Internet of Things. IDC projects that in the next 5 years, we can expect to see another 50 billion devices joining the IoT.

So ubiquitous is the IoT, that a completely new field of industry is developing, known as wearable technology. This creates an incredible market opportunity for all IT industries, from chip manufacturers to data centers, via software: e.g., Intel® announced Curie®, a computer that fits inside a button, IBM® is positioning Informix® as a prime database for IoT, 2CRSI™ is designing a range of servers to handle specific IoT loads.

This white paper discusses some technological constraints of IoT.

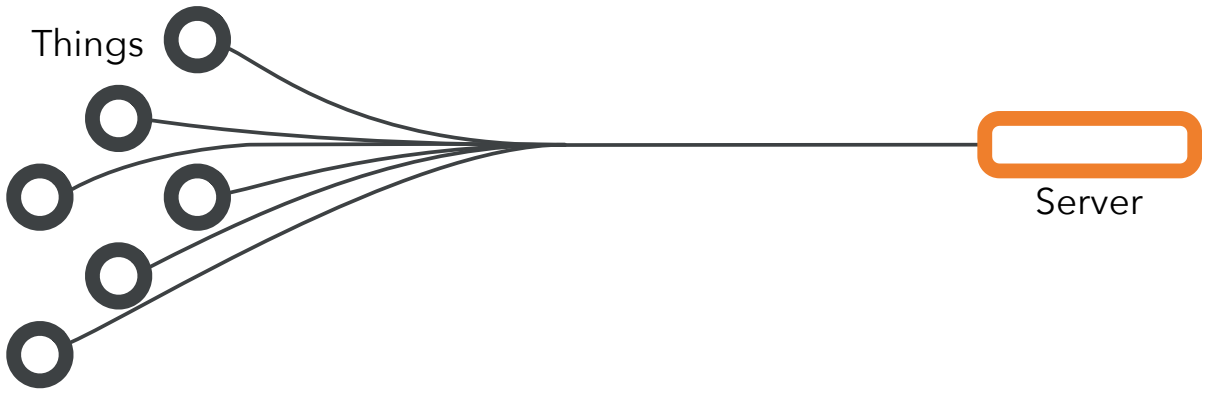
The dynamic of the Internet is evolving from a human-centric environment to one where Machine to Machine (M2M) dominates.

Communication Architecture

How can my device send data to a server where processing, such as Big Data analytics, can occur ?

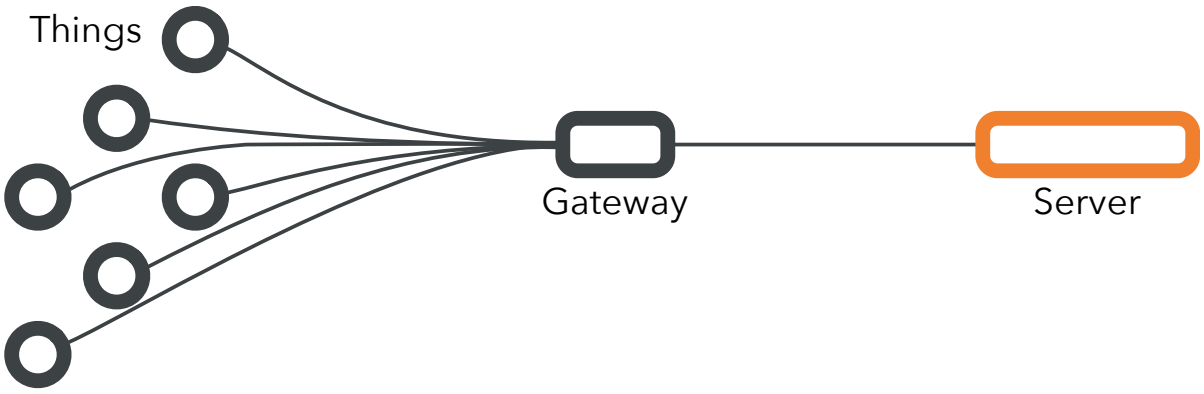
Direct Things are communicating directly with the server	**Unit of information:** small **Volume:** predictable
Gateway Things are communicating with a gateway, which communicates with the server	**Unit of information:** small to medium **Volume:** less predictable
Cloud Things are communicating to the server via the cloud	**Unit of information:** small **Volume:** unpredictable

Direct



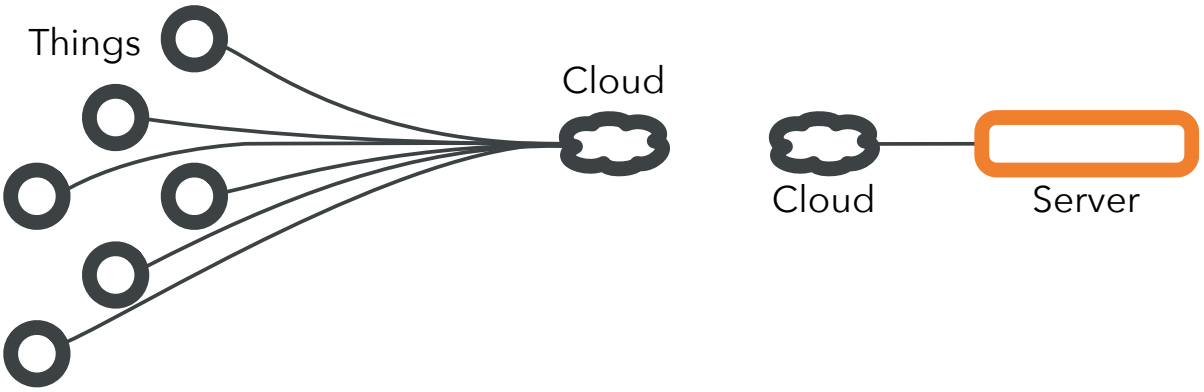
In the direct model, the things are sending information to the server as they produce it. Imagine a smart meter sending the current electricity consumption every 15 minutes. Typically, the unit of information is small: a few bytes. The volume is predictable during the early phase of the project. In the case of a smart meter, you will know how much and when data will be sent.

Gateway



In the gateway model, things send information to the server via a gateway. The gateway is responsible for early processing of the information. Imagine a thermometer sending its information to the gateway every 5 seconds, but the gateway only sends the temperature changes to the server. The volume is less predictable, as it is filtered by the gateway. The unit of information remains small, but depending on the job you ask the gateway to do, it can be larger. As gateways are full-blown computers, you can imagine having databases running on these, like IBM Informix.

Cloud



Things are out there in the wilderness of our civilization, sending data through networks like Sigfox™ or LoRaWAN. Those networks transmit information at a slow rate of only 100 bits per second. It sounds low compared to the existing 4G, and the promise of 5G, but do you need 20Mbit/s to transmit temperature increase in a warehouse?

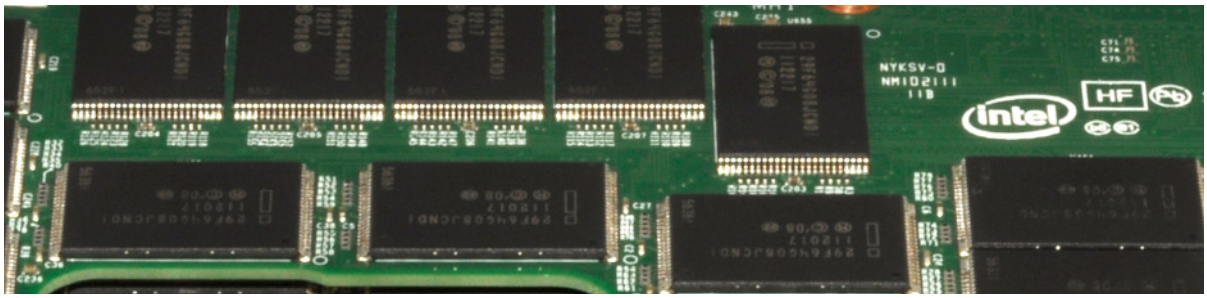
Software

When designing an application, a few questions need to be considered, including: **Is it okay to lose data? At what pace will data come? And, most importantly, what are you trying to deliver with the collected data?**

Losing data seems outrageous to many, but in some situations, it may be okay: if your home refrigerator does not send you its inner temperature for a couple minutes, it's no problem. It is, of course, a different scenario with a valve in a nuclear power station.

Applications can also be split in multiple tiers; of course, the thing needs to be programmed, the gateway, too, along with the processing on the back end. Collected data can be used for analytics; hence the data must be available quickly.

Hardware



Some constraints on the hardware seem obvious. Of course the thing is a hardware component, but you can also have a gateway, which introduces a new level of equipment. However, a lot of **IoT** specialists simply put the processing of the data in the cloud, and this can be an overly simplistic approach: we have already discussed some of the constraints in terms of data transmission and software.

The 2CRSI Expertise

2CRSI is developing a range of servers capable of managing the requirements of processing IoT's information flow.

Servers must be able to quickly process information from the network. This can be achieved by using 1 Gbit/s, 10 Gbit/s, 40 Gbit/s, or any permutation of those. Memory can be used to buffer the flow as it is written to disk. Disks like **HGST** He, also known as helium drives, are fast, durable, and produce less vibration, guaranteeing a more constant dataflow. Data, which will be needed for processing in analytics, could be stored on high-end SSDs, like Intel's S3x00 series or NVMe disks, like Intel's P3x00 series, and will enable lightning-speed analytics. The operating system and other ancillaries are stored on a normal SSD. The entry-level appliance is shipped as a 1U rackable form factor, which can be configured to accommodate small to large demand. Such a server is extremely flexible and affordable—available from the mid $4k.

2CRSI IoT Receiver in its 1U form factor.

Benefits

IoT can bring new revenues to your organization. As an example, a pedometer sells for $10, a connected pedometer sells for $100. Service opportunities are also growing to help people understand and integrate IoT features in their products.

By studying the project in a global way and not only focusing on the things and the gateways, you can more precisely pinpoint your computer power on the back-end servers. 2CRSI focuses on limiting the number of servers vs. a cloud approach: optimized hardware will ease analytics, give faster results, and reduce the TCO (Total Cost of Ownership).

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