

## Research Note

### Machine-to-Machine Communications

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**Abstract** – This research note defines machine-to-machine communications and discusses the benefits and associated risks this technology brings to organizations.

## Introduction

The concept of machine-to-machine (M2M) communications has been around for decades. In fact, this concept can be traced as far back as World War II, when pilots used identification, friend or foe (IFF) to avoid hitting non-hostile targets.<sup>1</sup> Another technology, the remote controlled garage door, that may not be as old as IFF but something we all could probably relate to, which also uses the M2M communications concept.<sup>2</sup> However, being able to network the sensors in M2M devices, know that the garage door was left open, and send this information to the homeowner are new capabilities.<sup>3</sup> These types of interaction capabilities present in today's technology have given reason to many industries and organizations to think of innovative ways to use M2M communication to improve productivity and efficiency. A study done by Pike Research showed that in 2008, only 4% of the world's 1.5 billion electric utility meters were considered "smart meters."<sup>4</sup> As of October 2012, the study showed that 18% of the total electric utility meters were "smart."<sup>5</sup> The sudden increase of the smart meters, meters that use M2M communications, during this timeframe demonstrate that demand for this technology is on the rise. With the success of M2M technology in the utility industry, companies from other sectors are

hoping to implement M2M in similar ways. However, it is not surprising that companies will need to be cautious before implementing M2M, as there are associated risks that may or may not outweigh the benefits.

## **What is Machine-to-Machine Communication?**

Machine-to-machine communications is a term used to describe any wired or wireless automated communication between electronic machines.<sup>6</sup> The machines that are on this network can communicate and perform actions without human intervention.<sup>7</sup> An M2M system should have sensors, a Wi-Fi or cellular connection, and analytical software programs.<sup>8</sup> One of the factors that have caused the rise of M2M communications is that these components needed for an M2M system to work are becoming more accessible at lower costs with more power efficiency.<sup>9</sup> With the cost of the M2M components at a discount, the barriers to entry are no longer a luxury. Organizations are now more able to afford implementing M2M communications, which has lead to increased interest from many industries.

To better picture how M2M works, imagine a utility company such as Puget Sound Energy. By installing M2M capable meters in homes or other establishments, gas utility companies are able to collect real-time usage data that are automatically sent to the companies'

central computers where the data is analyzed and billing is determined without manual assistance from humans. Other practical uses of M2M systems include remote diagnostic and failure prevention purposes for manufacturers of medical devices and heavy machinery.<sup>10</sup> The important part of M2M communications is not only that it can remotely monitor the status of the equipment, but it can also turn this data into meaningful information such as triggering alerts to the manufacturer when a possible failure is on the horizon. This in no doubt helps companies improve customer satisfaction and quality control.

## **The Benefits of M2M**

Implementing M2M communications allows organizations to reap certain benefits including gathering data more efficiently, collecting data in larger quantities, and the flexibility of the sensor location.<sup>11</sup> As stated earlier, M2M can reduce the labor costs associated with collecting data manual such as having to monitor or status a utility meter. This also includes any training or transportation costs that are needed to conduct the job. However, not only does it reduce costs but it can also save a company time because a sensor can gather and send real-time data over a network much quicker than a technician. In addition, the M2M sensors are collecting data constantly and in much

larger quantities than a human can analyze or handle. With higher volumes of data at an organizations' disposal, utilizing the right tools and analyzing the large datasets it can lead to valuable information such as predicting industry trends (for more information on Big Data, please see my December 2012 research note "What is Big Data?"). Also, the sensors that collect data can communicate via a Wi-Fi or cellular network, which means the physical location of the sensor can be anywhere.<sup>12</sup> Although there are numerous benefits to using M2M communications, what are the costs or risks associated with implementation at this stage?

## **Risks of M2M Communications**

As I have alluded to earlier, the implementation of machine-to-machine communications does not come without its baggage. The most important risk factor of M2M is security.<sup>13</sup> Whenever communication is taking place over a network, whether public or private, there is always a possibility of hackers interrupting that flow of data. For instance, using our earlier example of the garage door opener, imagine if someone hacked onto the network that this M2M communication is operating on. Information being sent over the network regarding the garage door being opened can be used by a hacker to trend daily habits

and schedules of the families that reside in that home. Last year at the Mobile World Conference in Barcelona, there were examples being displayed by AdaptiveMobile of how hackers can use mobile devices to walk right through your front door.<sup>14</sup> These are just a couple of many security risks that come with M2M technology. The invasion of privacy and loss of data are we probably have all dealt with in the past due to hackers or malware attacks. However, with a hacker being able to physically enter your home or company building is a much scarier and harsher reality. Even more disturbing are potential hacks against medical devices, such as a heart monitor, which can lead to a fatal attack.<sup>15</sup> Another risk associated with security involves the lack of human intervention. According to Cathal McDaid, security consultant at AdaptiveMobile, security vulnerabilities may be exploited for extended periods of time before someone actually notices and is able to correct the vulnerability.<sup>16</sup> The main point of having M2M communications is to reduce human interaction, which means the system may not be checked for months on end. The longer the exploitation stays undetected, the greater the loss and negative impact an organization will realize.

## **Risk Consultants**

Another risk, which is not related to security, is the maturity of the M2M communications technology. Currently, the technology is still in the early stages of implementation, which means universal standards have not been established yet.<sup>17</sup> It may be in the best interest of an organization to wait until standards are established and approved before implementing M2M communications in order to avoid potential rework and restructuring.

## **Conclusion**

Due to the lower component costs of machine-to-machine communications, the need to create innovative ways to implement M2M has risen. Although, implementing M2M can generate benefits in lower labor costs, reduction in failure rates, and discovering trends due to increased volumes of real-time data, it can also bring risks and challenges. Among those challenges are the need to address network security and the establishment of implementation standards. These challenges must be considered and addressed before an organization decides to implement M2M communications.

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