Really, what is the internet of things?

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The Internet of Things, IoT, the cloud, big data...buzzwords for the modern age. But, asks Won Kim, Jaehyuk Choi and colleagues in the Department of Software at Gachon University, in Gyeonggi-do, South Korea: Is the IoT actually anything new and how does it work? Writing in the *International Journal of Web and Grid Services*, the team offer some answers and a high-level view of the IoT from the perspective of its architecture.

"The IoT is defined as the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure," explain the researchers. The 'things' are smart devices with some kind of sensor and network communication functionality and can include anything from webcams and microphones to environmental gas sensors, medical diagnostics devices and infamously the smart refrigerator.

"In a sense, the IoT is not really new," the team says. "All the components of the IoT have been around for some time: the Internet, smart embedded devices, sensors of various types and communication technologies that connect devices." They point out that there have been available for some time services that collect data from sensors, transmit it to other devices or central servers for data processing and data mining and tools that actuate and manage remote devices, such as weather stations and even vacuum-cleaning robots and lawnmowers.

One thing that is perhaps new is that increasingly the smart devices that make up the IoT now usually require their own internet protocol, IP, address. Research suggests that by 2020 there will be 30 billion or so

connected "things" each with a unique IP and the majority of those will be wireless devices. Such vast numbers and the vast quantities of data they will generate will almost certainly only be manageable with distributed 'cloud services' and 'big data' computer facilities.

"Although many IoT applications have come to the market, the big challenge is to develop IoT applications and business models that will fill the unmet needs and wants of users," the team reports. Moreover, these solutions must be commercially viable. The trade press and early adopters are finding their way testing the smart devices and systems. However, the Internet of Things is yet to mature to match the hyperbole, energy requirements, applications, and costs must all shift substantially to allow us to recognize and realize what benefits the IoT will ultimately bring us.

More information: Kim, W., Choi, J., Jeong, O-R., Han, W-J., Kim, C., Loh, W-K. and Yoo, J. (2015) 'On the Internet of Things', Int. J. Web and Grid Services, Vol. 11, No. 4, pp.410-426.

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