Review Article

Smart Planet

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Abstract A Ka-band satellite internet connectivity provides a high speed broadband Internet service from Yahsat, covering 28 countries across Africa, Middle East and South West Asia. The Ka-band internet service is a fluctuating one. It has limited access depending on the subscription bandwidth. This paper assesses the carrying capacity of a subscribed service in a typical Nigeria Private University. This private University has subscribed for C and Ku bands services before that of Ka band at different time. How many internet users were able to access the Ka-band services were assessed by simple survey over a period of time. The method of survey used was a "one question interview", office to office on a daily basis over the subscription period. Accumulated responses were retrieved and analysed from which conclusion and recommendations were made. From all indications, it was concluded that Ka-band Satellite services' carrying capacity is small, given the research findings.

Keywords smart planet, smart world, smart cities

Introduction

Due to the proliferation of the Internet and daily emergence of new technologies, we keep pushing the boundaries of the possible. Marketplaces are changing rapidly and customer expectations are shifting. Manufacturers are producing smarter products to deliver smarter services. Companies that are not responding to customer demand for quality and technology innovation are becoming irrelevant. The world is changing and getting smaller and smarter [1].

On November 6, 2008, IBM president Sam Palmisano began a conversation with the world about the promise of a smarter planet. He referred to new generation of intelligent systems and technologies. IBM's goal was to build a smart planet with other companies and communities around the world. The company believes we can build a better future if we are willing the make the necessary changes. Better infrastructure. Better healthcare. Better energy. Better education. How do we achieve that? IBM believed that technology could make the world work better. IBM has the technology and know-how to build a Smarter Planet [2]. Common things like computers, phones, mobile devices, cars, power grids, and waterways are infused with computational power. A trillion of intelligent things are being connected and forming a system of systems or an "Internet of things" (IoT). With the infusion of intelligence into the planet, it is becoming smart. IBM's Smarter Planet vision was driven by three I's—instrumentation, interconnectedness, and intelligence [3, 4]:

- *Instrumentation:* We now have the means to measure and sense the state of everything. Everything will become instrumented: cities, healthcare networks, power grids, supply chains, and natural systems like rivers.
- *Interconnectedness*: The Internet of things will connect people, systems, and things like cars, phones, cameras, etc. It will allow them to interact and communicate with each other. The Internet and social media allow people to collaborate.

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- *Intelligence*: Virtually all things, systems, and processors are becoming intelligent. Sensors, actuators, and RFID are making devices smarter and enabling them to respond quickly and accurately.

As illustrated in Figure 1, the smart planet or world integrates the physical, cyber, social and thinking spaces [5]. The smart planet refers to a complex system of systems including big data, cities, cloud, commerce, energy, mobile enterprise, and security. Smart planet initiative is enabled by machine-to-machine sensor-based communication. Sensors automate smart planet by providing information about processes. Smart planet uses software and computing to produce smarter products and smarter services. Smart planer promises to apply modern technology to gain understanding of our surroundings.

IBM's newest study reveals that the Internet of Things (IoT) provides the foundational infrastructure for a smarter planet and that the key developments related to IoT include mobile technology, big data, cloud computing, and smart networks [6].
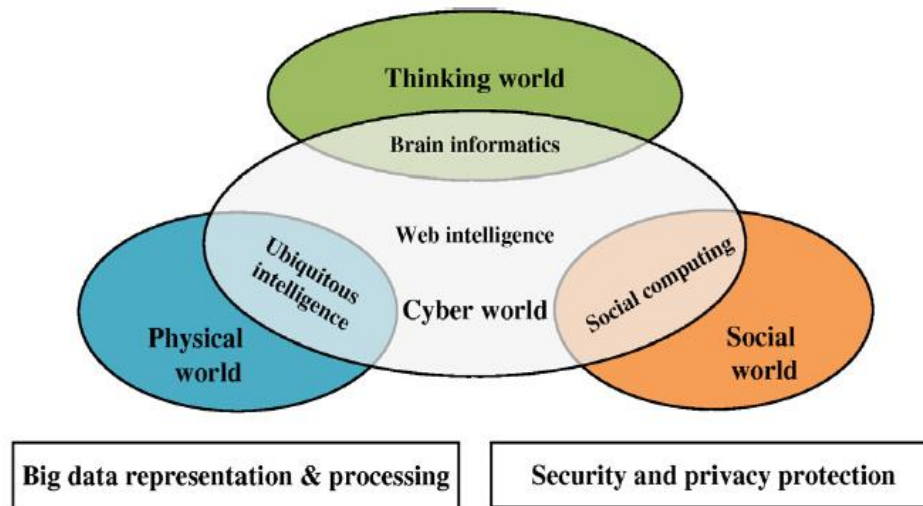

Figure 1: Enabling technologies of smart planet/world [5]

Applications

Smart planet concept has been implemented as smart everything: smart power grids, smart homes, smart space, smart structure, smart community, smart buildings, smart cities, smart services, smart hotels, smart hospitals, smart schools, smart transportation, smart governance, smart agriculture, smart food, smart water, smart healthcare delivery, smart governance, smart safety/surveillance, smart education, smart computing, smart traffic system, smart workplace, smart environment, smart factory, smart manufacturing, and much more. Most of these systems are driven by technological evolution offering low power many-things, wireless almost-everything, and wireless sensor networks. These complex systems are managed by business and government leaders. IBM is the leader in the smart planet system development.

Within a year after IBM launched the Smarter Planet initiative, hundreds of IBM clients began to build smarter systems to become relevant and efficient. The objective of Smarter Cities is to work with city governments in developing systems and services to achieve a Smarter Planet. Major cities around the world using IBM Smarter Cities technology include Surat in India, Peterborough in United Kingdom, Dublin in Ireland, and Tucson in Arizona. IBM collaboration and strategy are helping industry, government, transportation, energy, education, healthcare, cities, and other businesses work smarter and contribute to building a smarter planet. IBM had a symposium in Spain in 2010 to share the stories of a smarter planer. In Spain, eight hospitals and 470 primary care clinics implemented smarter healthcare systems across their facilities.

Benefits and Challenges

The planet itself would be a better place when smart technologies are used everywhere. According to IBM, smart use of technology opens the way for smart people, smarter home and cities, smarter law enforcement, smarter government services, and smarter transportation.

In implementing smart cities, a lot of data is being collected but they don't know what to do with it. In order to be smart, we should be able to leverage information and use it for a something that is useful to improve the cities' conditions. With the ability to analyze information and make the right decision, we can do more with less.

Conclusion

The ultimate goal of the smart planet is to achieve the harmonious coexistence of individuals, computers, and society. Building the smart planet will require the effort and dedication of smart people everywhere [7]. Forward-thinking business leaders, governments, and citizens around the world have started to address the complexity introduced by smart planet and to take advantage of capturing the potential of smarter systems to achieve economic growth. Businesses of all sizes are faced with pressure and challenges to remain relevant and successful. Market growth will occur as machine-to-machine communication takes place. Smart planet will produce smart people, smart technology, and smart business. It will eventually encompass every aspects of the physical and social living.

References

[1]. Winter Green Research, "Smarter planet software innovation market strategies, shares and forecasts, worldwide, nanotechnology, 2011-2017," Oct. 2011
http://www.acutemarketreports.com/report/smarter-planer-software-innovation-market
[2]. "Let's build a smarter planet" http://s3.amazonaws.com/effie_assets/2010/4625/2010_4625_pdf_1.pdf
[3]. Smarter Planet," http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/smarterplanet/
[4]. O. Casile, "IBM, for a smarter planet and smarter cities," *Smarter Cities*, EMEA IBM Innovation Center, La Gaude, France, July 2011.
[5]. H. Liu et al., "A review of the smart world," *Future Generation Computer Systems*, 2017.
[6]. R. van den Dam, "Internet of things: The foundational infrastructure for a smarter planet," *Internet of Things, Smart Spaces, and Next Generation Networking* (Conference Proceedings), August 2013, pp. 1-2.
[7]. "A smarter planet will need smart people," https://www-935.ibm.com/services/multimedia/CbD_Overview.pdf

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