International Journal of Trend in Research and Development, Volume 5(4), ISSN: 2394-9333
www.ijtrd.com

Green Communication

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Abstract **-** Green communication refers to communication that is sustainable, energy-efficient, energy-aware, and environmentally aware. It is also an environmental-friendly communication. Hence, green communication is urgently needed. This paper provides a brief introduction to green communication including wireless and wired networks.

Keywords*: Green Communication, Green Computing, Wireless Green Communication*

I. INTRODUCTION

Advances of mobile communication devices, such as smart phones, smart watches, and wearable healthcare devices, have moved us toward the era of smart society. Such devices have become an indispensable part in our daily life because they allow us to exchange information reliably from anywhere, any time. The globalwireless data traffic shows no signs of slowing down. However, there has been increase in the unnecessary energy consumption of the mobile communication devices. The increasing volume of transmitted data is sustained at the expense of a significant carbon footprint by the mobile communications industry. The implication of wireless network's environmental and social responsibility (energy efficiency and environmental impact) has been disregarded. Computers themselves risk becoming the "energy hogs" of the future, unless something is done.Powering the over 1 billion personal computers, the over 4 billion fixed and mobile telephones and computer networks around the world requires approximately 1.4 Petawatt-hr a year (1.4×10^{15} W-hr) of electricity [1]. The projected carbon footprint until 2020, of the mobile communications is shown in Figure 1 [2].

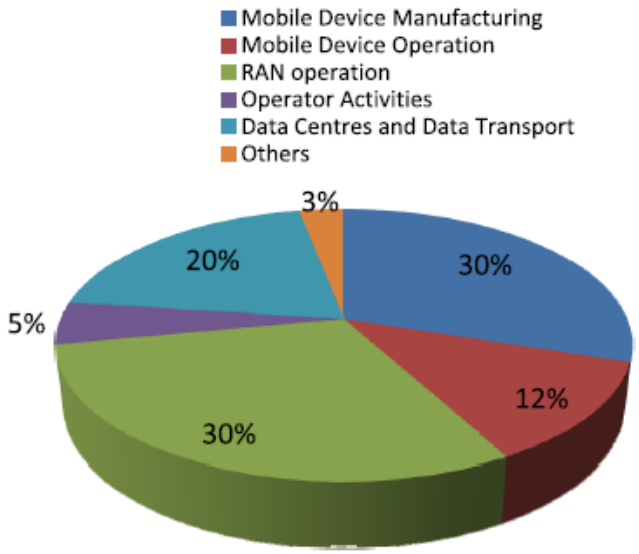

Figure 1: Carbon Footprint of mobile communication (projected in 2020) [2].

The proliferation of information and communication technology (ICT) systems is causing energy consumption levels to reach distressing rates. There is a request of environmental protection from users and governments to reduce CO2 emissions due to ICT. The United Nations Climate Change Conferences have been held yearly to evaluate the progress in dealing with climate change since 1995.Green communication aims at balancing the resource usage and consequently saving the energy of entirely mobile and wireless networks.

II. SOME CHARACTERISTICS

ICT is one of the keys to a future low-carbon and sustainable society and the wireless communication networks constitute the largest share of the ICT. Communications technologies will be critical to achieving large-scale energy savings. Reduction of the green house gases caused by the telecommunication sector is known as greening of telecommunication, which has many facets. It can be classified broadly in terms of greening of telecommunication networks, green telecommunication equipment manufacture, atmosphere friendly design of telecommunication buildings and safe telecommunication waste disposal [3].

The key idea behind the concept of green communication is to find a way on how to encourage people to change their behavior in order to increase efficient use of communication systems. Green communication satisfies the same criteria for green technology [4]:

i. It minimizes the degradation of the environment;
ii. It has zero or low greenhouse gas (GHG) emission
iii. It promotes healthy and improved environment for all forms of life;
iv. It conserves the use of energy and natural resources;
v. It promotes the use of renewable resources.

Key techniques of green communication mainly include cognitive network, network coding, and smart grid [5]:

- *Cognitive Network:* This network can effectively improve the spectrum resource utilization efficiency and the network transmission performance. Cognitive radio plays a crucial role in improving the utilization efficiency of radio spectrum.
- *Network coding*: This involves removing redundant routes to improve the network throughput. Network coding technology saves network bandwidth and improves the link utilization.
- *Smart Grid*: This provides the modern electricity grid with a high-speed, fully integrated, twoway communication technological framework. It facilities measuring, monitoring, protecting and controlling functions.

CONCLUSION

The exponential growth of mobile systems makes it difficult to ignore their carbon footprint. It is important any emerging technology is harmonized with our mother nature. This means better fuel efficiency and better processes would mean even better things for the environment.

Green communication is a new focus within the telecommunications industry. It has attracted significant

attention from academia, industry, and government agencies due to its ability to create eco-friendly power efficient networks. It has been observed that telecommunications applications can have a significant impact on lowering greenhouse gas emissions and power consumption.

For more information on green communication, one should consult books in [6-11] and other books available at Amazon.com. One should also consult the journal exclusively devoted to it:*IEEE Transactions on Green Communications and Networking*.

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