

# ICT Networks Power Consumption

Ward Van Heddeghem

Supervisor(s): Mario Pickavet, Didier Colle

## I. INTRODUCTION

With rising world-wide adoption of broadband Internet access and mobile communication and increasing demands for higher bit rates, the power consumption in telecommunication networks is growing. This presents economical, technical and environmental issues. To reduce the energy and carbon footprint of communication networks, it is key to know where energy is consumed most. This paper characterizes the power consumption in different types of networks

## II. NETWORK ARCHITECTURES

Generalized, the ICT network can be split up in a limited number of *core* networks (such as the Internet), a number of *access* networks and network equipment located at the *customer premises* (such as an ADSL modem or a mobile phone). We consider the following fixed line access networks technologies: twisted pair copper-based ADSL and VDSL, fiber-based point-to-point (PtP) and gigabit passive optical networks (GPON). We consider the following wireless access technologies: WiMax (think of city-wide wifi), HSPA (broadband Internet access for handsets such as mobile phones) and LTE (newest, proving theoretical peak download rates up to 300 Mbps).

## III. POWER CONSUMPTION

We estimated the power consumption per subscriber of the different architectures based on equipment data sheets, own measurements and external literature sources such as [1] for wireless data and [2] for core power consumption. The results are shown in Figure

1. The power consumption has been given as a function of the user's access bit rate.

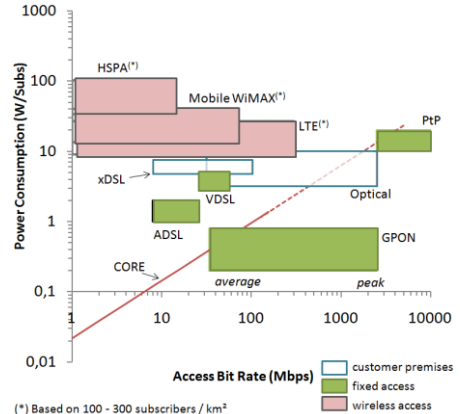


Figure 1. Power consumption per subscriber for different network technologies

## IV. CONCLUSION

The main share of power consumption is – for fixed line access – currently attributed to customer premises equipment such as ADSL modems. For wireless access the largest power consumers are the base station. With rising access bit rates, the power consumption of the core networks is expected to increase considerably.

## V. REFERENCES

- [1] M. Deruyck, et al., “Power consumption in wireless access networks,” in European Wireless Conference, Lucca (Italy), 2010
- [2] J. Baliga et al., “Energy consumption in optical ip networks,” Lightwave Technology, Journal of, vol. 27, no. 13, 2009.