# Internet Lite for Sustainable Development

Josef Noll[4,7], Wisam A. Mansour[4,], Christine Holst[1], Sudhir Dixit[4] , Felix Sukums[2], Helena Ngowi[3], Flora Kaunja[3], Danica Radovanovic[4], Elibariki Mwakapeje[5], Maurice Isabwe[6], Andrea S. Winkler[1,8], and Bernard Ngowi[2]

[1]Centre for Global Health, Institute of Health and Society, University of Oslo, Oslo, Norway; [2]Muhimbili Medical Research Centre, National Institute for Medical Research (NIMR), Dar es Salaam, Tanzania; [3]Dept. of Veterinary Medicine and Public Health, Sokoine University of Agriculture, Morogoro, Tanzania; [4]Basic Internet Foundation, Kjeller, Norway; [5]Dept. of Food Safety and Infectious Biology, Norwegian University of Life Sciences (NMBU), Adamstua Campus, Oslo, Norway; [6]Dept. of Information and Communication Technology, University of Agder, Grimstad, Norway; [7]Dept. of Technology Systems, University of Oslo, Oslo, Norway; [8]Center for Global Health, Department of Neurology, Technical University of Munich, Germany;

## Abstract

Digital Divide is one of the key challenges for mankind. Despite attempts to digitally include people, the divide is bigger than ever. This contribution[1] to a sustainable future promotes «Internet lite» as the new paradigm for providing everyone with the opportunity to participate in the digital society. The contribution first addresses the reasons for the digital divide, thereafter address free access to information as catalyst for the sustainable development goals (SDGs) and provides the path towards «Internet lite for all».

## Introduction and Background

The Internet has developed from information distribution to become the business enabler, indicated by the fact that the top 6 largest companies by market value are all IT-companies[2]. However, the gap between developed and developing countries is still wide. Access to Internet is a commodity in Europe, while only a minority of people in Africa have the capability to participate in the digital society.



According to ITU[3], Nearly 90% of young individuals are not using the Internet in Africa, Asia and the Pacific. Giving the move to digital industries, access to information is not a question of affordability, it is a question of sustainability.

Figure 1: Mobile Internet Penetration from 2016 to 2020 [Source: GSMA[5]]

As ITU further points out, 84.2% of households in Europe have Internet access, while only 18% of households in Africa have Internet access. In developed countries, 94% of young people aged 15-24 use the Internet, as compared to only 30% in least developed countries (LDCs). This digital gap, leaving 70% of young people in LDCs without an opportunity to participate in the digital life, is one of the reasons for migration from rural to urban areas, or even further.
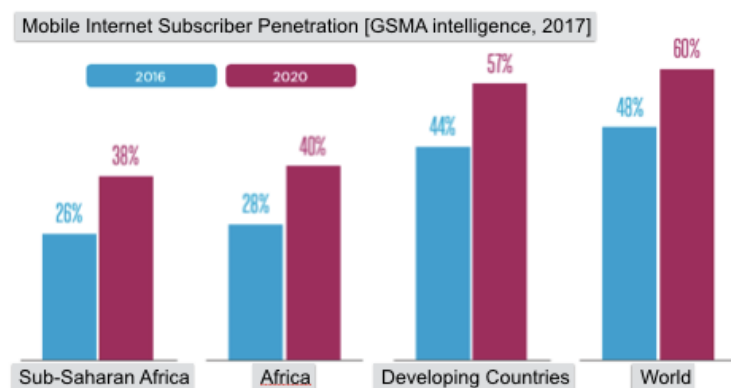
---

[2] The 100 largest companies in the world by market value in 2018, https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-value/

[3] ITU, ICT Facts and Figures 2017, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf

**Internet Lite for All**

Our understanding is that digital inclusion should address everyone in the society, and that everybody shall have free access to information. «Internet access is a human right», and free access to information, named «Internet lite for all», is the way to establish a sustainable solution. The basic model is adapted from commuting on roads: Pedestrians and cyclists can use the road for free, while car and truck drivers have to pay. This freemium (free & premium) model can be applied for Internet access, with free access to information, and premium access to entertainment, games and other broadband content.

From our experiences in project activities, especially the «Non-discriminating Access for Digital Inclusion» (DigI) project[4], we see that an «Information Spot» per village is the core concept for digital inclusion and societal empowerment. Our developments suggest that the information spot should contain a village/society server carrying information and providing free access in the society. An example of such a village server is developed during the DigI project, being


Figure 2: Freemium concept for Internet Lite for All

available at yeboo.com. Figure 2 provides a sketch of the Local Information Spot, here with an integrated Wifi hot-spot connected to the local core network.
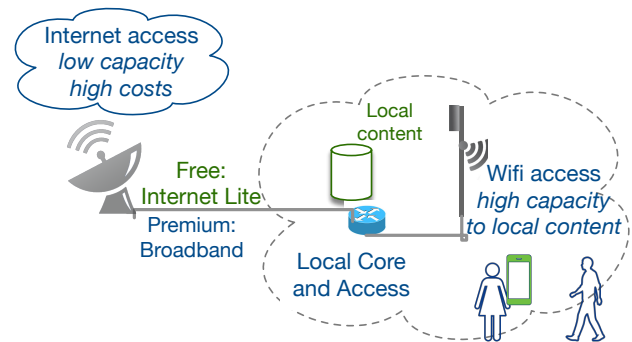
**Traditional Business models are not sufficient to include all**

Though Mobile Operators see a continuous rise the number of SIM cards, with unique Mobile Subscribers raise from 43% (2016) to 50% (2020), the expectations from GSMA on the Mobile Economy[5] shows that the mobile internet subscriber penetration in Sub-Saharan Africa (SSA) will reach only about 38% in 2020. That means that about 2/3 of the population in SSA will not be part of the digital economy.

There are several reasons why digital inclusion lacks uptake[6] in SSA: *(i)* phone prices, *(ii)* availability and affordability of the mobile broadband network coverage, *(iii)* traffic speed and *(iv)* lack of local content. While *(i)* phone prices fall continuously, with smartphones being available in the 20-30 US$ price range, *(ii)* availability of the mobile broadband network coverage lacks behind. Operators have only limited funds for network deployment, and thus mobile broadband networks will be first deployed where there is the highest return on investment (ROI). The respective governments focus often on voice connectivity (2G), thus leaving mobile broadband network deployment as an answer to sufficient ROI.

Secondly, customers with as little as 1-2 US$/month for communication purposes are of little interested for mobile operators, as the cost of customer registration into the operators infrastructure exceeds 60 US$. Thus, operators can't profit from people with ultra-low income, and rather focus on people higher up in the pyramid. Third, operators focus on content which is attractive to people, i.e. entertainment, sports, and games.

---

[4] The «Non-discriminating Access for Digital Inclusion» project: http://DigI.BasicInternet.no

[5] GSMA, The Mobile Economy, Sub-Saharan Africa 2017, https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

[6] Josef Noll, Sudhir Dixit, Danica Radovanovic, Maghsoud Morshedi, Christine Holst, Andrea S. Winkler, "5G Network Slicing for Digital Inclusion", IEEE COMSNETS 2018, Jan 2018, Bangalore, India

Access to non-profit information such as health and education will loose when competing with commercial content.

As a result, almost half of the mobile connections (44%) will be 2G connections by 2020 in Eastern Africa (EAC), according to GSMA[5]. Given the low capacity networks, and related them to the lack of local content *(iv)* and lack of (digital) literacy are other factors hampering the uptake of mobile broadband.

An information spot in each village, combined with a village server, will address topics *(ii)* to *(iv)*



Figure 3: Prototype of health spot at Kjeller, Norway

directly, and through fixed installed tablets enable the access to the Internet for *(i)* people without smartphones. Our example of established at Kjeller (see Figure 3) and rolled-out to 3 villages in Tanzania, carries digital health information[7], alongside with information from the village leaders and social network content provided by users themselves.

As the health information is supported by animation and videos and presented using Tanzanian Swahili, it contributes to digital literacy. Though, our vision for a sustainable future is that NGOs, Universities, companies and societies will contribute with contextualised content representing the needs of the society.

**Internet lite as a catalyst for the SDGs**

The sustainable development goals (SDGs) and especially Targets 9.C «*Significantly increase access to information and communications technology, and strive to provide universal and affordable access to the Internet least developed countries by 2020*» and Target 16.10 «*Ensure public access to information and protect fundamental freedoms…*» are the core drivers for our work. Information spots with «Internet lite for all» will directly answer Target 16.10, and enable the access to information and communications in areas where it is not economically viable to deploy mobile broadband.



Figure 4: «Internet Lite», addressing Target 9.C and Target 16.10, as catalyst for the SDGs

The next chapter will bring an example of how digital health information will contribute to SDG 3 *«Good Health and Well-Being»* as an example why «Internet lite for all» is the catalyst for the majority of the SDGs. We would especially emphasise digital information for education in SDG 4, empower women and girls through information (SDG 6), digital jobs and participation in the digital economy (SDG 8), as well as strong contributions to SDG 10 on reduced inequalities with and amongst countries. We envision everyone to contribute with information on the village platform, and thus contribute to the digital partnership in SDG 17.

---

[7] Village platform with dedicated health information  https://yeboo.com/ health_information_dashboard.php

**Digital Health for health knowledge and digital literacy**

The spread of digital technologies and global interconnectedness has a significant potential to accelerate progress towards achieving the health-related SDG 3 at a global level. Primary focus has been on health information systems, given a clear benefit for governments and societies. However, health information systems have a tendency to neglect people and societies that are digitally excluded.

It has clearly been recognised that digital divides influence digital literacy, engagement in social and educational life, and therefore overall participation and collaboration in an online society[8,9]. Our approach is to use digital health information to promote early access of health care services and the application of preventative strategies, ultimately reducing morbidity and mortality.

The Village platform residing at our information spot carries dedicated health information[10], being freely available to everyone. We are currently performing an intervention study in the villages of Izazi and Migoli in the Iringa district in Tanzania to develop health messages, promote the messages and assess the effect of digital health promotion. The selected health messages address HIV/AIDS, tuberculosis (TB) and *Taenia solium* cysticercosis/taeniosis (TSCT).

Ongoing work addresses key performance indicators (KPIs) for assessing both digital literacy and health knowledge uptake in order to evaluate digital health promotion as compared to traditional paper-based health information.

**Technical Realisation of Internet lite**

As addressed earlier, the network is often the limiting factor, being low-capacity 2G, congested 3G or a satellite link limited traffic (see Figure 2). Providing «*Internet Lite for All*» in an «*Information Spot*» is our contribution to the SDGs. Following the principles of net-neutrality, we suggest



Figure 5: Village information spot with local core network

filtering after content type, with information (text, pictures and local content) being free, while broadband content such as entertainment, video and games are premium content. Providing a local core network as shown in Figure 5 will enable the functionality of Internet Lite. Filtering of content types is happening in the local core network (see Figure 6), which also provides the village server. The concept is relatively inexpensive, our realisation costs around 300 US$ for the local core network, including solar panel and battery for operation and charging of devices.

Filtering between free and premium content is performed at the local network control centre (LNCC), which also supports the village server. Filtering information for the LNCC is provided through the core network infrastructure,
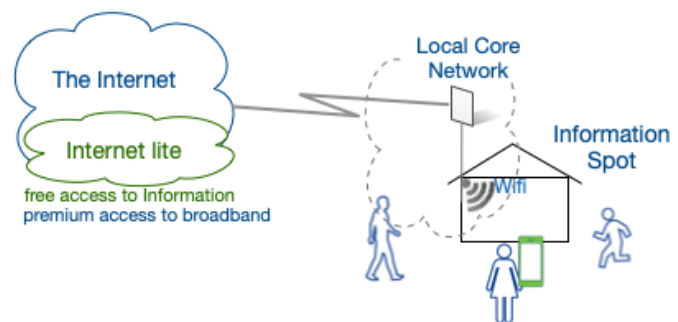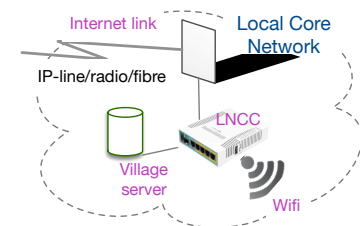


Figure 6: Local Core Network with Village server and local network control centre (LNCC)

8 A. van Deursen and J. van Dijk, "Internet skills and the digital divide," New Media & Society, vol. 13, no. 6, pp. 893–911, 2011. [Online]. Available: https://doi.org/10.1177/1461444810386774

9 Health Information, as provided through the DigI project in Tanzania: https://yeboo.com/ health_information_dashboard.php

10 D. Radovanovíc, B. Hogan, and D. Lalic´, "Overcoming digital divides in higher education: Digital literacy beyond facebook," New Media & Society, vol. 17, no. 10, pp. 1733–1749, 2015. https:// doi.org/10.1177/1461444815588323

provided by the Basic Internet Foundation. The core network infrastructure supports also voucher generation for the premium access to information. In our cost analysis[6], we pointed out that Internet Lite can serve up to 300 users over a 1 Mbit/s line, with a cost of 7 US$ per month for visiting around 100 Web pages[11]. Using traditional Internet access, only 50 users could be served, with costs of 38 US$ for visiting 100 Web pages.

**Call for collaboration and conclusions**

Our multi-cultural and multi-dimensional team with 11 partners from 8 countries in the DigI project has established digital health information for *(i)* contributing to better health, *(ii)* supporting digital literacy, and *(iii)* demonstrating digital information access as catalyst for the SDG 3.

We see the importance of free access to information, addressing directly the Targets 9.C and 16.10 of the SDGs, as the catalysts for the sustainable development goals. Our concept of one information spot per village provides free access to information, following the vision *«Internet lite for all».* In order to ensure net-neutrality, our approach of *Internet lite* provides content type filtering, with free access to text, pictures and local video, and premium access to video, voice, games and other entertainment content.

The health spots for Africa have costs of roughly $300. Even on a 1 Mbit/s line we can provide 300 people with free access to information, using either locally available tablets or their own smart-phones, and in addition light and power to charge the phones.

Given the societal advances in digital literacy, digital inclusion and the participation in the digital society, *Internet lite* is seen as the enabler to connect the unconnected 3.5 billion people on the planet and to become the catalyst for the Sustainable Development Goals (SDGs). We envision everyone to contribute with information on the village platform, and thus contribute to the digital partnership in SDG 17.

---

[11] The cost analysis[6] is performed using a 1 Mbit/s satellite link costing 2000 US$/month as an example.