

SUSTAINABILITY COMPARISON BETWEEN ACCESS NETWORK TECHNOLOGIES

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The following expert assessment by Prof. Dr. -Ing. Kristof Obermann from the University of Applied Sciences (Technische Hochschule) Mittelhessen was commissioned by the German Broadband Association, BREKO.

The objective of this study is to examine the sustainability of the different access technologies FTTH – Fiber to the Home (GPON, XGS-PON and Point-to-Point), FTTB – Fiber to the Building (G.fast), HFC cable networks (DOCSIS 3.1) and FTTC (VDSL2 Vectoring, Super Vectoring).

For this purpose, power consumption and weight of the system technologies were determined for the following scenarios (in Germany): nationwide supply, urban areas, rural areas, and exemplarily the semi-urban area Haltern am See with real data from the telecommunications network in this area. The parameter weight was chosen because it can serve as an indicator for the resources needed during production and disposal. Different capacity rates (share of homes connected) were used for the parameters power consumption and weight, both in absolute terms and in relation to the marketed bitrate of the respective technology.

The results stipulated that the examined FTTH technologies are the most energy-efficient and therefore the most sustainable access technologies both in terms of total power consumption and the marketed bitrates of 1 Gbit/s.

In terms of total power consumption (in Megawatt), FTTH networks require up to 2.6 times less energy than FTTB networks. In comparison to FTTC networks, the power consumption of FTTH Networks is up to 3 times lower. The most significant difference can be seen between FTTH and HFC networks: FTTH networks use up to 6 times less energy than HFC networks (DOCSIS 3.1).

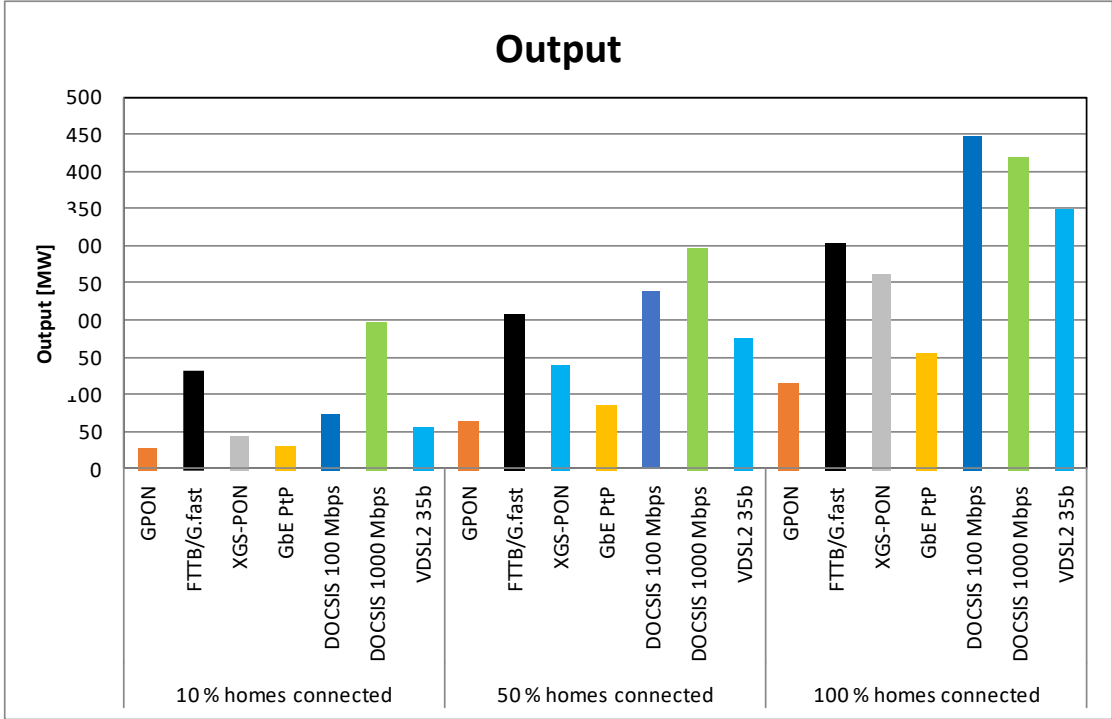


FIGURE 1: TOTAL POWER CONSUMPTION (IN MEGAWATT) OF ACCESS TECHNOLOGIES, IN RELATION TO A NATIONWIDE SUPPLY AND DIFFERENT DEGREES OF CONNECTION (HOMES CONNECTED IN %)

However, when power consumption (in Megawatt) of the Gigabit-capable access technologies (FTTH, FTTB, HFC cable networks) is regarded in relation to a bitrate of 1 Gbit/s (see figure 2), FTTH networks use up to 3.6 times less energy than FTTB networks and almost 8 times less energy than HFC cable networks (DOCSIS 3.1).

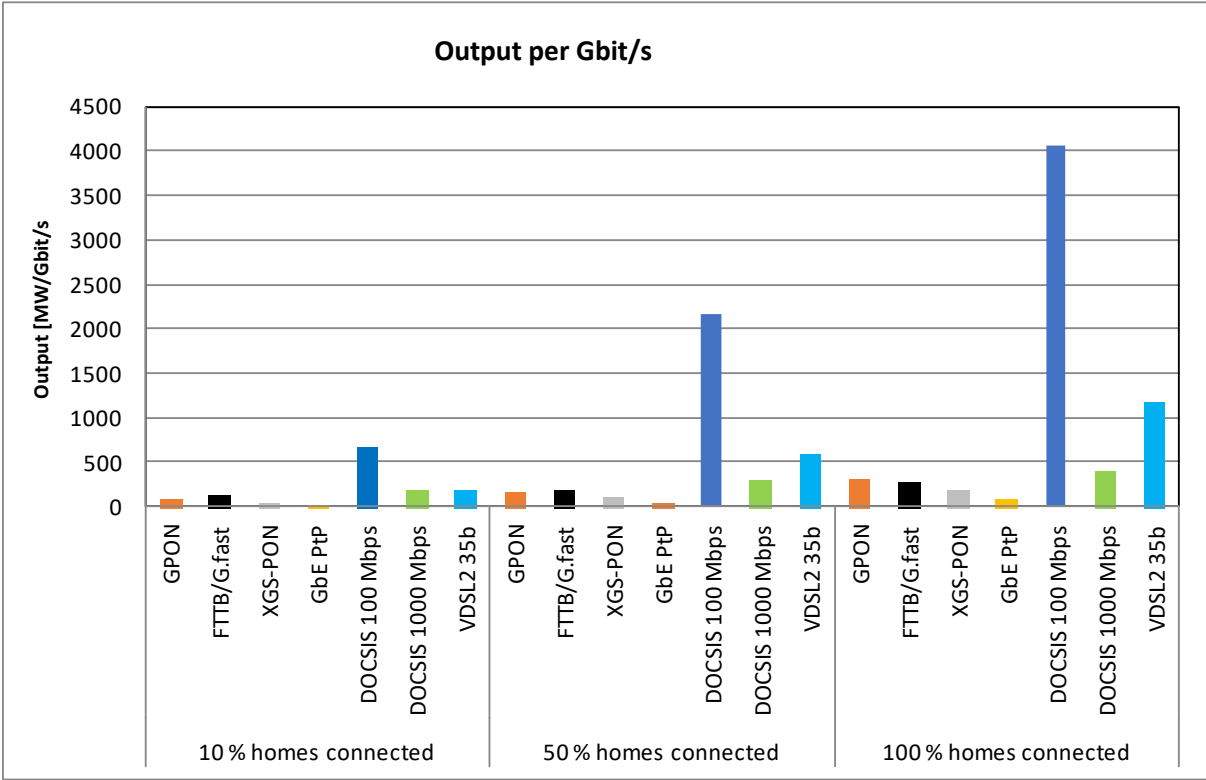


FIGURE 2: TOTAL POWER CONSUMPTION (IN MEGAWATT PER GBIT/S) OF GIGABIT-CAPABLE ACCESS TECHNOLOGIES IN RELATION TO A BITRATE OF 1 GBIT/S, ASSUMING A NATIONWIDE SUPPLY WITH DIFFERENT LEVELS OF CONNECTIONS (HOMES CONNECTED IN %)

Furthermore, fiber networks allow for further potential energy savings: By setting components like routers to sleep mode / “standby” mode more frequently, households could additionally save up to 40% of energy (and therefore, CO₂), according to experts.

In conclusion, FTTH access technologies are more energy-efficient than FTTB, FTTC and HFC cable networks in every scenario and at almost every level of connected households. The study’s results underline the significance of fiber deployment (FTTH) as a sustainable basis for the digitalization of economy and society. To this end, the German Federal Government should set up a framework that allows for a further acceleration of fiber deployment in order to provide sustainable and future-proof FTTH networks everywhere as soon as possible. Due to the increased use of fiber networks, the power consumption of digital infrastructure can be reduced significantly.