4E

Energy Efficient End-use Equipment
International Energy Agency

ENERGY EFFICIENCY POLICY BRIEF

EDNA8

The Wasted Energy of Connected Devices

The 4E Electronic Devices and Networks Annex (EDNA) provides policy guidance to members and other governments aimed at improving the energy efficiency of *connected devices* and the *systems* in which they operate. EDNA is focussed on the increased energy consumption that results from devices becoming connected to the internet, and on the optimal operation of *systems of devices* to save energy.

Connecting devices to the internet has profound implications for energy use, in three areas:

1. **DIGITALISATION:** connected devices can assist the digitalisation of the energy system by creating new ways to save energy and support renewables.

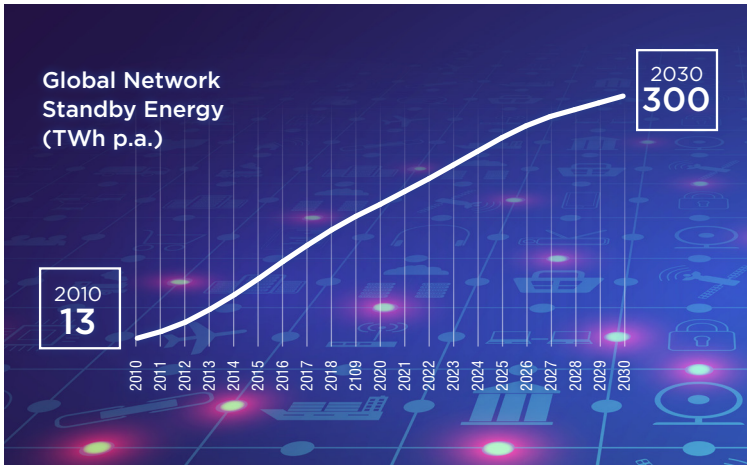
2. **WASTED ENERGY:** connected devices can waste considerable energy in (networked) standby mode.

3. **UPSTREAM CONSEQUENCES:** connected devices can result in increased data traffic, leading to increased energy use in the data network and data centres.

This policy brief covers the second topic – Wasted Energy.

Observations for Policy Makers

- "Network standby" energy is the energy used by a connected device when not performing its primary function, but maintaining a network connection. By 2030 it is estimated that 300 TWh per annum could be wasted by network standby energy globally, which is the same as the current electricity consumption of the UK.



- The network standby power of many devices can be reduced by improved product design and selection of appropriate communications protocols.

- Examples of mandatory and voluntary policies used to address the issue of network standby include the EU Ecodesign regulation for networked standby, Korea's E-standby label, the US ENERGY STAR® program, and voluntary industry agreements in the EU and USA for set-top boxes.

- Energy harvesting technologies (EHTs) capture ambient energy from sources such as light, heat, vibration and electromagnetic radiation, and convert this into electricity. Currently some connected devices such as sensors and thermostats are powered by EHTs and thus use no mains power or batteries.

- Deployment of EHTs to power the network standby function of a range of connected devices could result in so-called "Network Zero" devices – devices which use no mains power for their network communications function. This presents a significant opportunity for innovation.

More Information

Further information is available from **https://edna.iea-4e.org** and by contacting the EDNA operating agent at **info@edna.iea-4e.org**

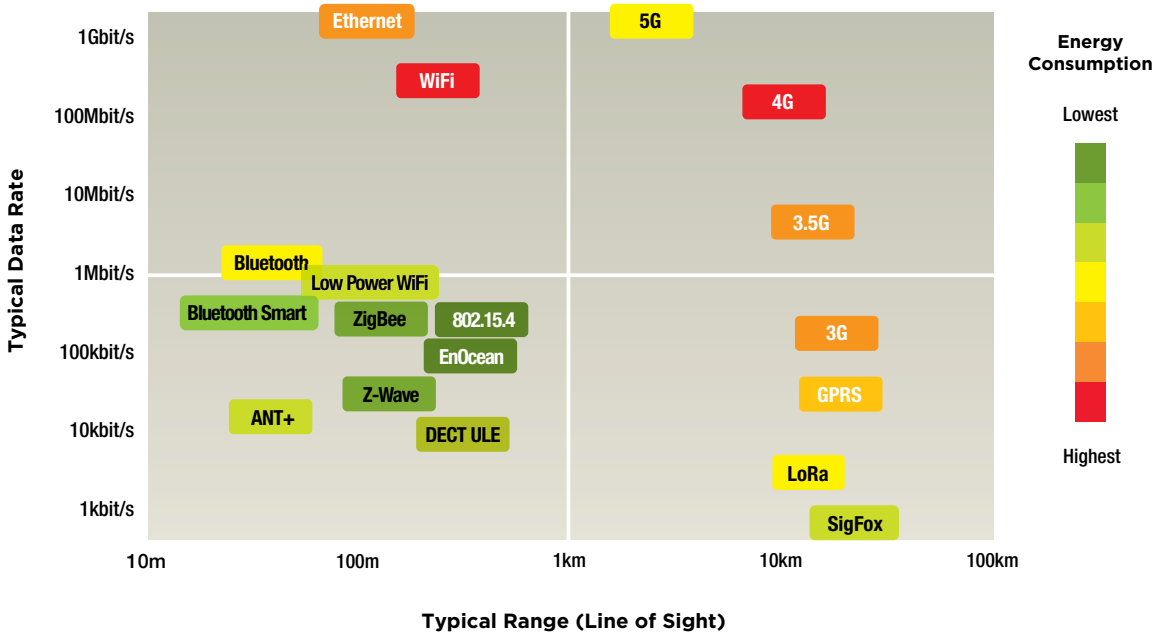
Published April 2020

Key Findings

Communications protocols matter

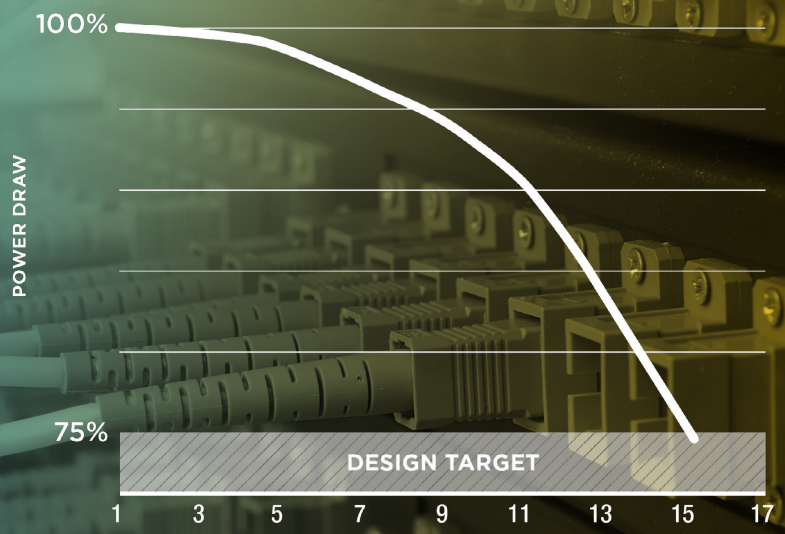
The amount of energy required for network communications is dependent on functional necessities such as range, data transfer rate and latency (response time).

- The choice of communications protocol (e.g. Ethernet, WiFi, Bluetooth, etc.) has a significant impact on network standby power. Within each of the communications protocols, optional data traffic management solutions are also available which can significantly reduce network standby power.



Increase Design Effort

The network standby power of many devices can be reduced by implementing a considered and targeted product design process. However this can increase the required design time, particularly for first generation products.



Take a Wholistic Approach

Other design factors which influence network standby power are overall device power management strategies and choice of silicon chip technology.