Communications networks used in homes, the so called Home Area Networks (HANs), both wired and wireless, to a great extend determine the quality of telecommunication services perceived by an end user. The most important indicator of this quality is the binary throughput measured in bits per second, which tells us how long we load a film or a game from the network: in seconds, minutes or maybe hours. The proposed project goal is to increase this throughput in two practically important cases, namely the HANs based on plastic optical fibers with large core (around 1 mm), and HANs using wireless transmission employing lighting LEDs.

In order to perform this task we shall create numerical models of all the link elements starting with the transmitter (LED). The proposed project also includes the development of numerical models of the two transmission channels: light propagation in SI POF with large core diameter and indoors light propagation. After creation of a (nonlinear) LED model as well as a (linear) model of transmission channel (POF, indoors propagations) various modulations efficiency will be analyzed. In particular, PAM (Pulse Amplitude Modulation), CAP (Carrierless Amplitude Phase), and DMT (Discrete MultiTone) performances will be modeled by software. The knowledge gained in the project course will improve the design and analysis of the systems with limited bandwidth and significant nonlinearity, and help to avoid numerous errors in this process. Furthermore, the development of the dynamic model of power-current LED characteristic, and the determination of receiver structures suitable for each modulation may be used in other research.