

WPAN/LPWAN IoT architectures

–TP1–

IEEE 802.15.4 a low-rate low-power WPAN standard

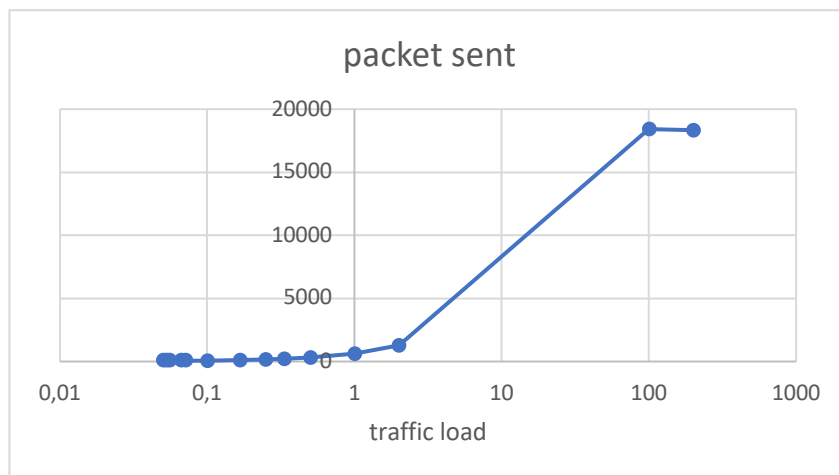
I. Delivery Rate vs Traffic Load

1. Relation between traffic load and interval

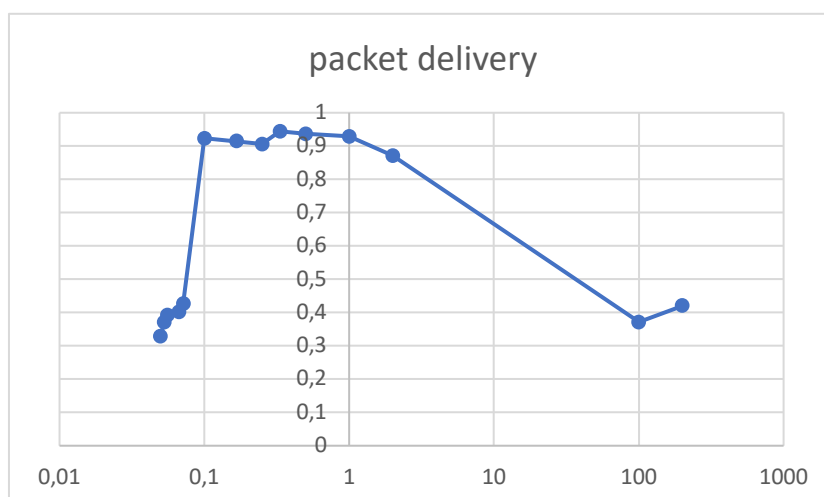
In the context of CBR (Constant Bit Rate), this relation is equal to:

$$trafficload = \frac{1}{interval}$$

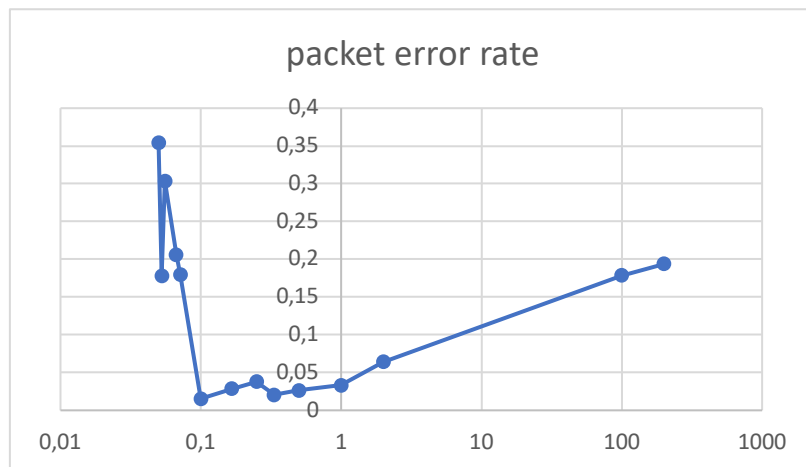
2. Number of sent packets



3. Packet delivery rate



4. Packet error rate



5. Relation between delivery rate and traffic load

We can observe a kind of parabola. When the traffic load is very small, the interval between packets is very high: too few packets are sent. When the traffic load is higher, the interval is lower: too many packets are sent and the network is facing a congestion.

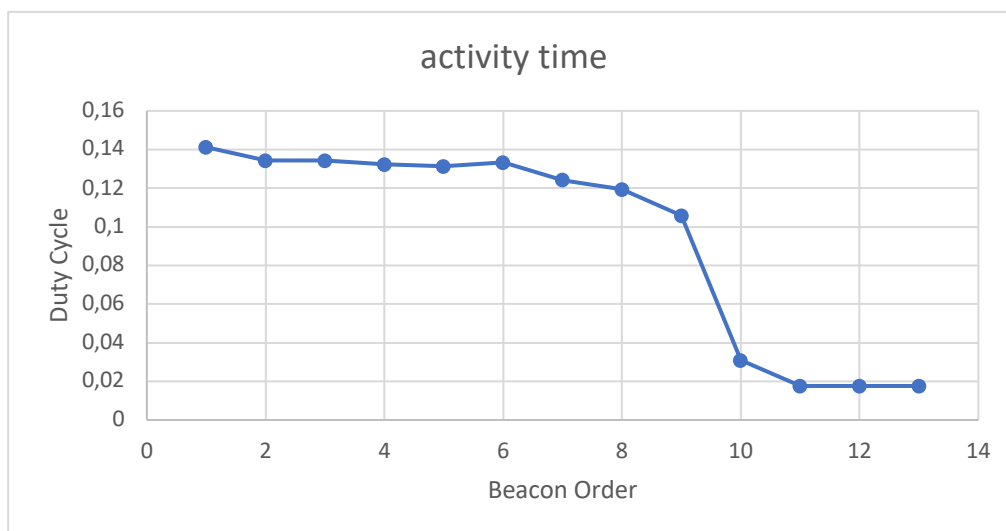
II. Duty cycle vs Beacon Order

1. Relation between duty cycle and energy consumption

More the duty cycle, or node's activity, more the energy consumption. This relation may have a form like:

$$\text{energyconsumption} = a \cdot \text{duty cycle}^n + k$$

2. Relation between duty cycle and Beacon Order



Considering a slotted CSMA/CA, more the activity of all the nodes, less the availability of the medium. Indeed, as in Wi-Fi the medium access depends on the activity and the number of nodes: when the activity is dense, only a few slots are available.