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E DELL'INFORMAZIONE

Exercise IEEE 802.15.4

Internet of Things

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1.1. Data

- $\lambda = 0.15$ persons/frame
- Beacon-enabled mode
- CFP only
- 1 packet fits 1 slot
- 1 PAN coordinator
- 3 camera nodes
- R = 250 kbps
- L = 128 Byte

1.2. Exercise 2.1

We can compute the Probability Mass Function of the output rate using the Poisson distribution.

$$P(N = k) = \frac{e^{-\lambda}\lambda^k}{k!} = \frac{e^{-0.15}0.15^k}{k!} \tag{1.1}$$

We can compute the PMF of the output rate by setting the right value of k in the Poisson distribution formula, where N is the observed number of people in the frame.

$$P(r = r_0) = P(N = 0) = \frac{e^{-0.15}0.15^0}{0!} = e^{-0.15} = 0.8607 \tag{1.2}$$

$$P(r = r_1) = P(N = 1) = \frac{e^{-0.15}0.15^1}{1!} = 0.15e^{-0.15} = 0.129 \tag{1.3}$$

$$P(r = r_2) = P(N > 1) = 1 - P(N = 0) - P(N = 1) = \\ = 1 - 0.8607 - 0.1291 = 0.0102 \tag{1.4}$$

// TODO grafico??

1.3. Exercise 2.2

We can compute the slot time T_s from the definition of nominal bit rate.

$$R = \frac{L}{T_s} \tag{1.5}$$

$$T_s = \frac{L}{R} = \frac{128 \cdot 8 \text{ bit}}{250 \text{ kbit/s}} = 4.096 \text{ ms} \tag{1.6}$$

1.4. Exercise 2.3