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SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE

Exercise IEEE 802.15.4

INTERNET OF THINGS

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1 | Exercise IEEE 802.15.4

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.

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

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.

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

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

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

1.3. Exercise 2.2

1.4. Exercise 2.3