

# 1 Dynamic Beacon Scheduling Formula

- **Contact Score** ( $S_c$ ): Measures how recently neighbors were detected
- **Density Factor** ( $D_f$ ): Measures how many neighbors are currently detected

## 1.1 Contact Score

Contact score equals 1.0 when neighbors are detected, and decays linearly when no neighbors are present:

$$S_c = \begin{cases} 1.0 & \text{if } N_{neighbors} > 0 \\ \max(0, 1 - \frac{t_{current} - t_{lastContact}}{30}) & \text{otherwise} \end{cases} \quad (1)$$

## 1.2 Density Factor

Density factor increases linearly with the number of neighbors, up to a maximum of 10 neighbors:

$$D_f = \min(1.0, \frac{N_{neighbors}}{10}) \quad (2)$$

## 1.3 Interval Calculation

The beacon interval is calculated as follows:

$$\begin{aligned} I_{base} &= I_{min} + 0.7 \cdot (I_{max} - I_{min}) \\ I_{contact} &= 0.6 \cdot S_c \cdot (I_{base} - I_{min}) \\ I_{density} &= 0.4 \cdot D_f \cdot (I_{base} - I_{min}) \\ I_{final} &= \max(I_{min}, \min(I_{base} - I_{contact} - I_{density}, I_{max} \cdot 0.8)) \end{aligned} \quad (3)$$

## 1.4 Interpretation

This formula makes beacons more frequent (smaller interval) when:

- Neighbors were recently detected (high  $S_c$ )
- Many neighbors are present (high  $D_f$ )

And less frequent (larger interval) when:

- No neighbors have been detected for a while (low  $S_c$ )
- Few neighbors are present (low  $D_f$ )

## 2 Results

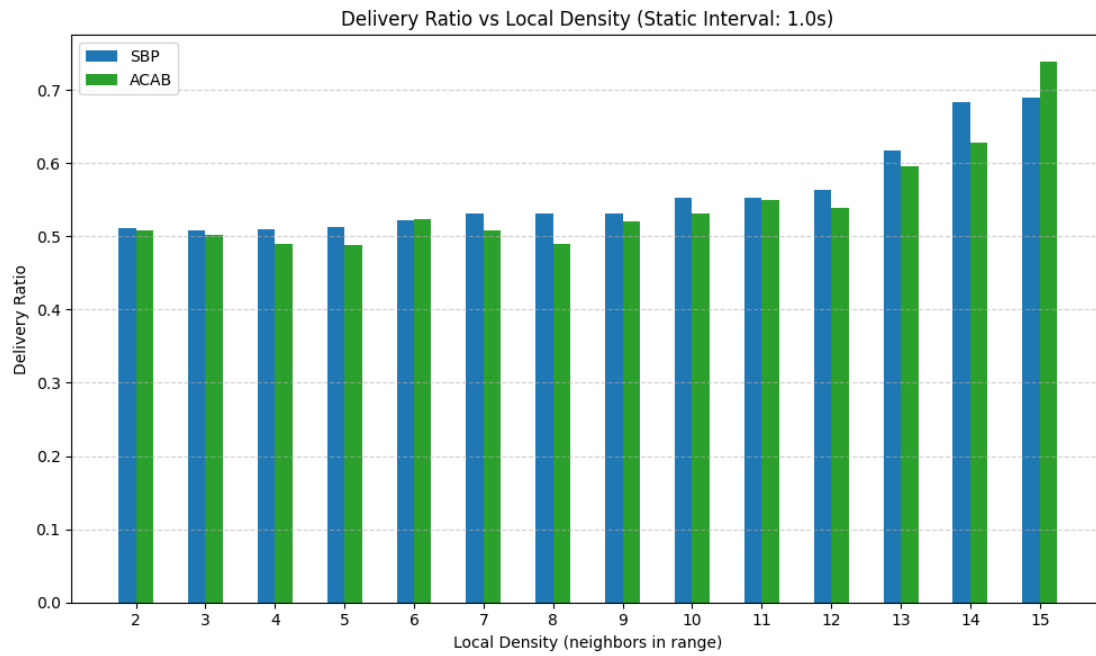


Figure 1: Delivery Ratio for Static Interval 1.0s