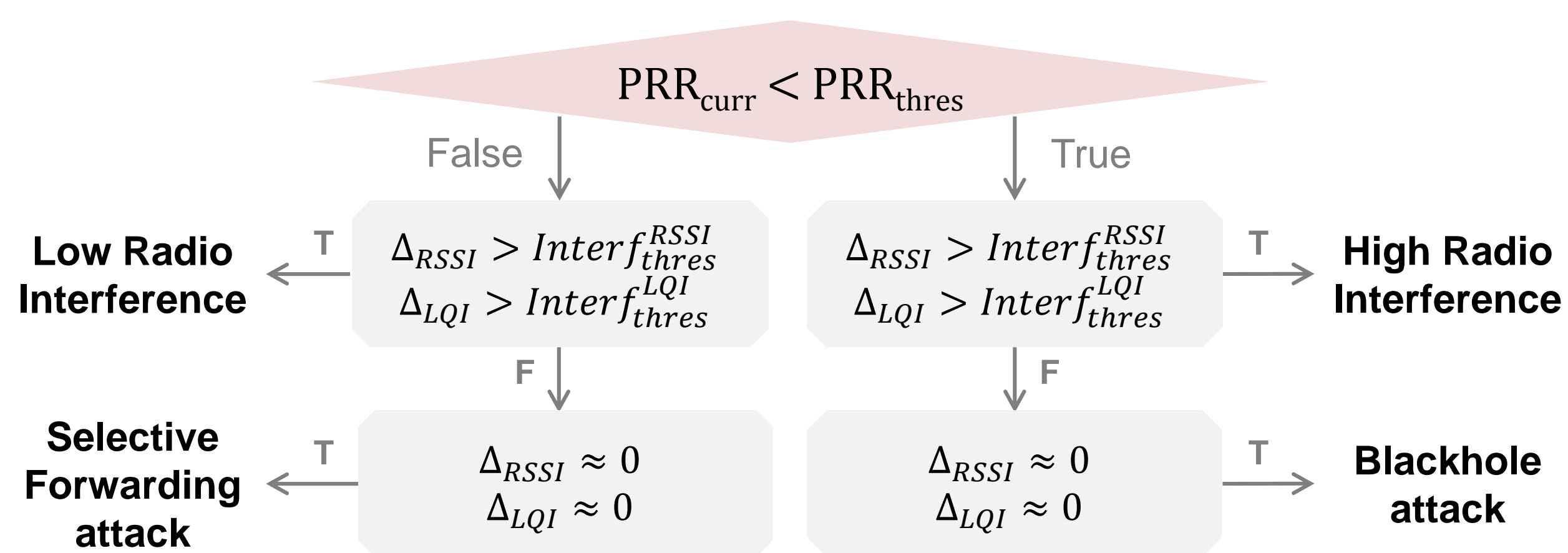


Fine-Grained Analysis of Packet Loss Symptoms in Wireless Sensor Networks

Bilal Shebaro, Daniele Midi, Elisa Bertino

Motivations and Contributions

- A common problem in WSN are packet losses, due to attacks affecting the nodes or the wireless links connecting the nodes.
- For better efficiency in attack responses, we need a tool to correctly identify the attack causes.
- We propose and build a fine-grained analysis (FGA) tool that investigates the causes of packet losses and reports the most likely cause of these losses.**
- FGA uses link and neighborhood profiles (RSSI, LQI, PRR).
- Validated through real-world experiments.
- Our FGA tool can be used in many different application such as forensics and real-time response systems.



Experimental Analysis

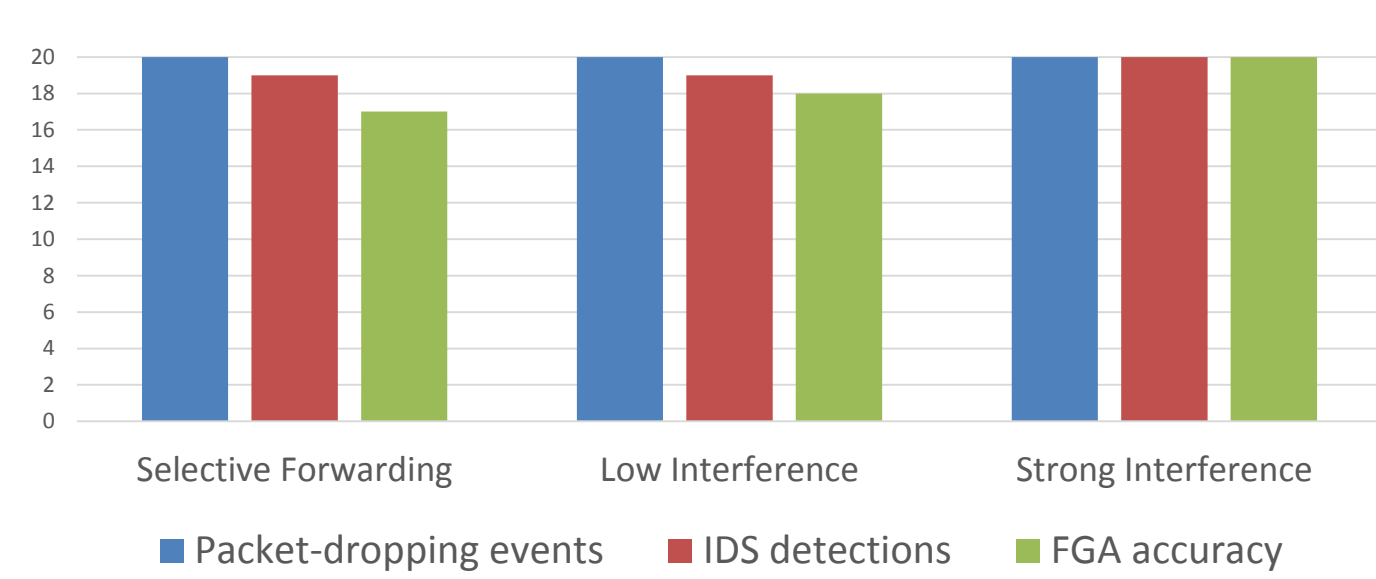
1. Building Profiles at initial network setup for each link $n' \rightarrow n$

$$AvgRSSI_{nn'} = \frac{\sum_{i=1}^{100} RSSI_{nn'}^i}{\# \text{recv. msgs from } n'} \quad AvgLQI_{nn'} = \frac{\sum_{i=1}^{100} LQI_{nn'}^i}{\# \text{recv. msgs from } n'} \quad PRR_{nn'} = \frac{\# \text{recv. msgs from } n'}{100}$$

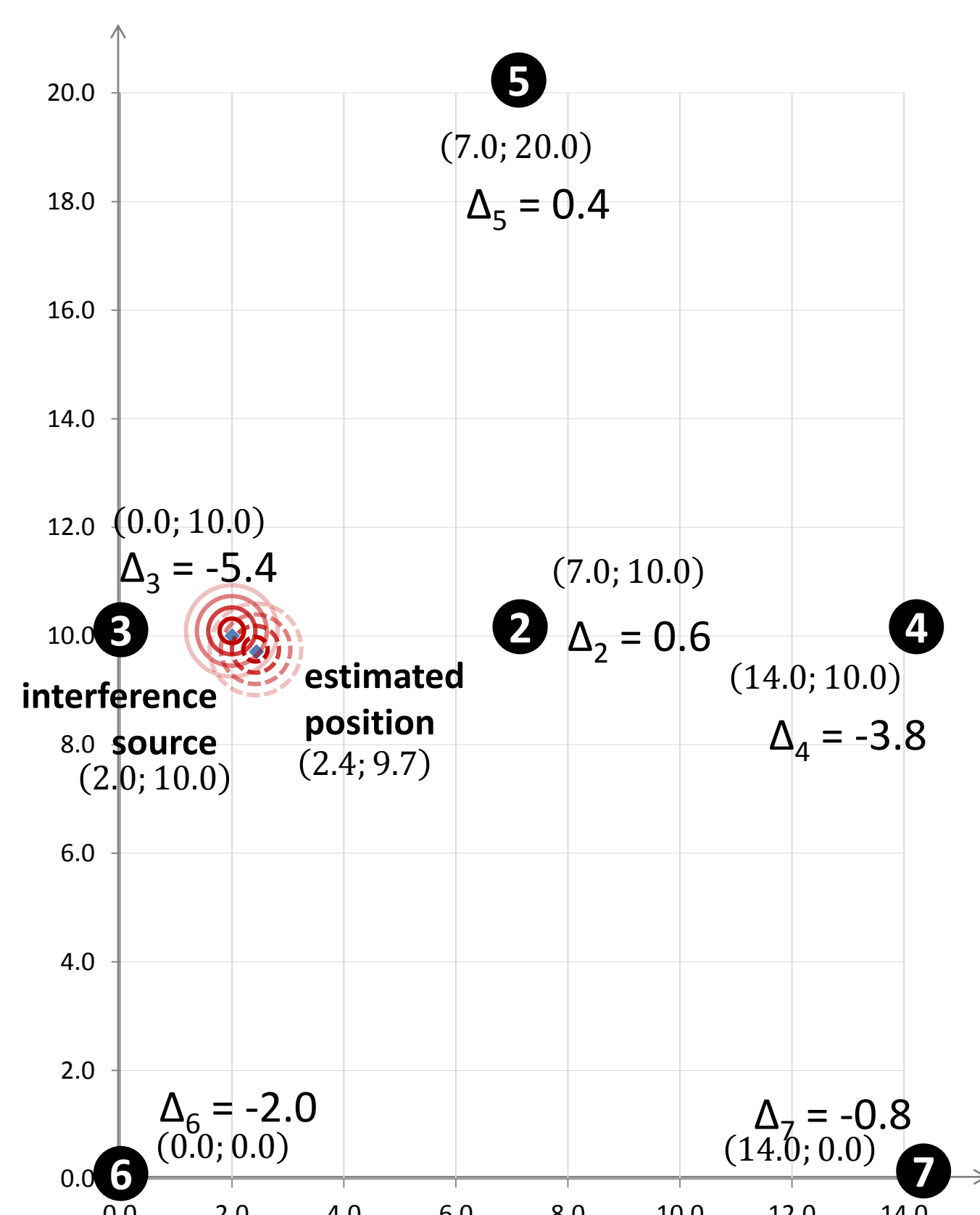
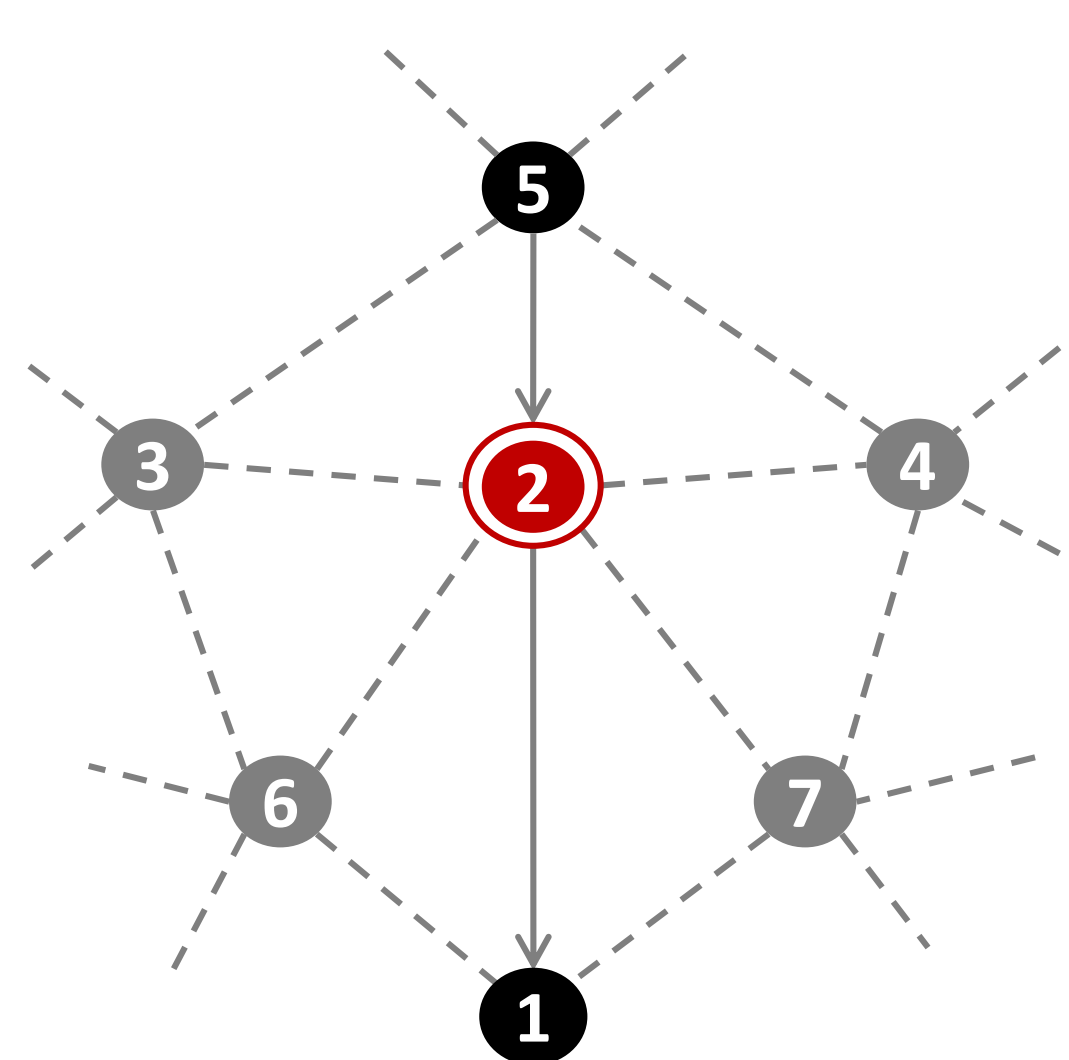
2. Selective Forwarding attack

3. Low Interference attack

4. Strong Interference attack



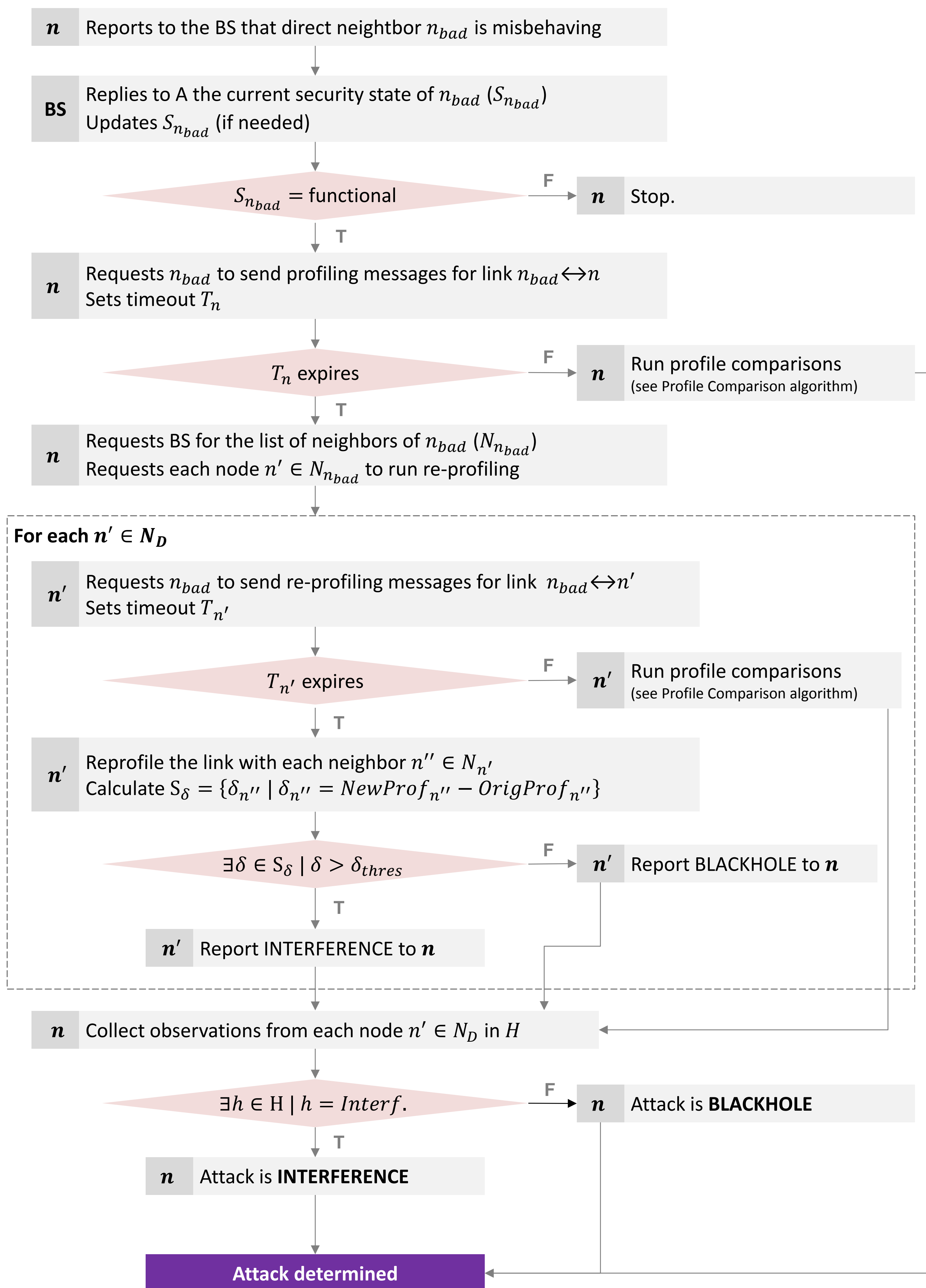
5. Locating the source of interference



Actual Position	Est. Position	% Error
(14.0, 10.0)	(13.8, 10.1)	0.773%
(14.0, 20.0)	(14.0, 19.9)	0.288%
(2.0, 10.0)	(2.4, 9.7)	2.153%

Fine-Grained Analysis Algorithms

DETECTION OF THE CAUSE OF PACKET LOSS



LOCATION OF THE SOURCE OF INTERFERENCE

