



Indoor positioning using audio features of FM radio signals

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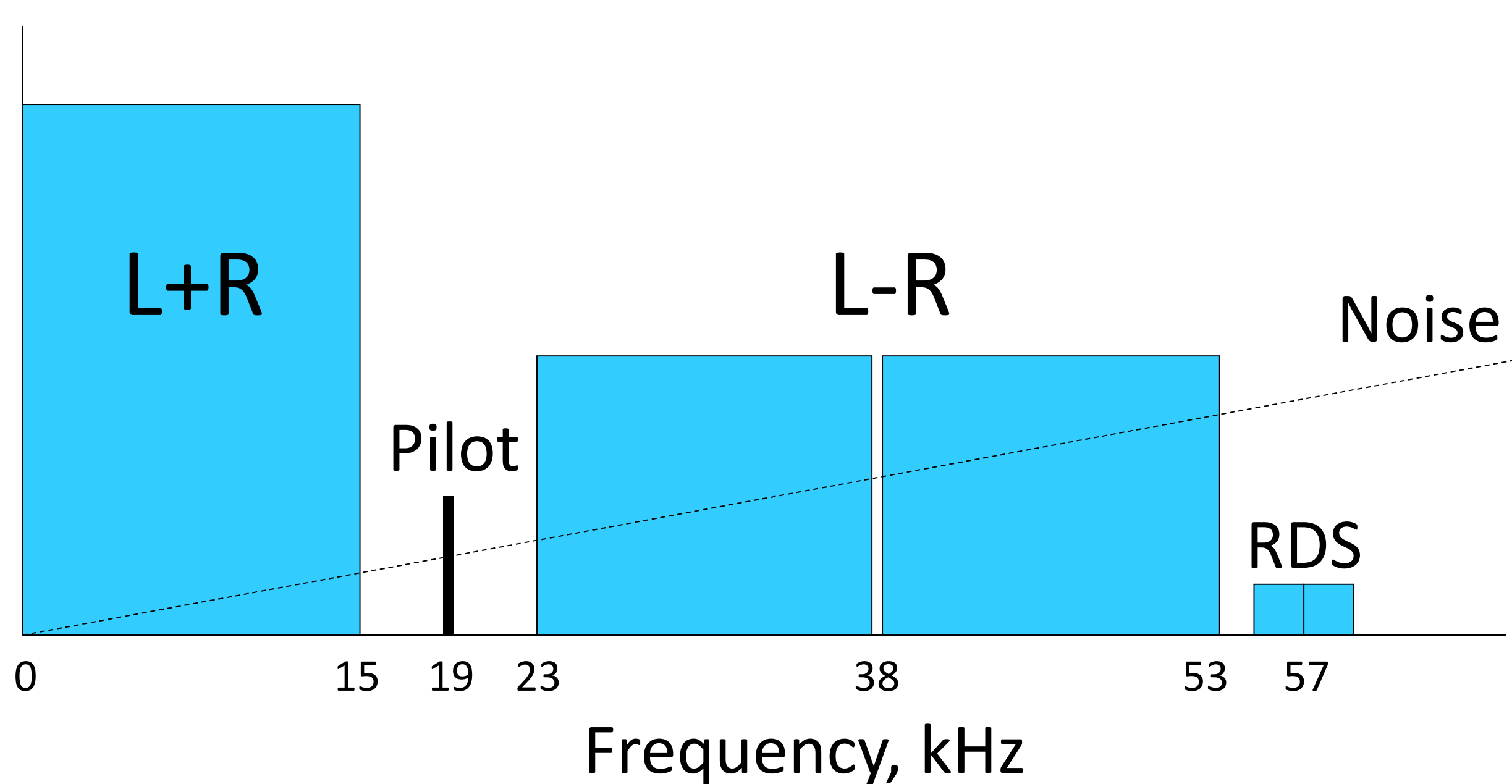
Introduction

- GPS is not available indoors.
- Wi-Fi has limited coverage and can be prohibited in sensitive environments.
- Specialized systems are expensive.

Why FM audio localization?

- FM is embedded in many devices;
- Off-the-shelf transmitters (10-20 euro);
- Signal-strength based FM localization shows good performance [1].
- However, signal strength readings might not be available or could be too coarsely-grained.

Stereo FM signal structure

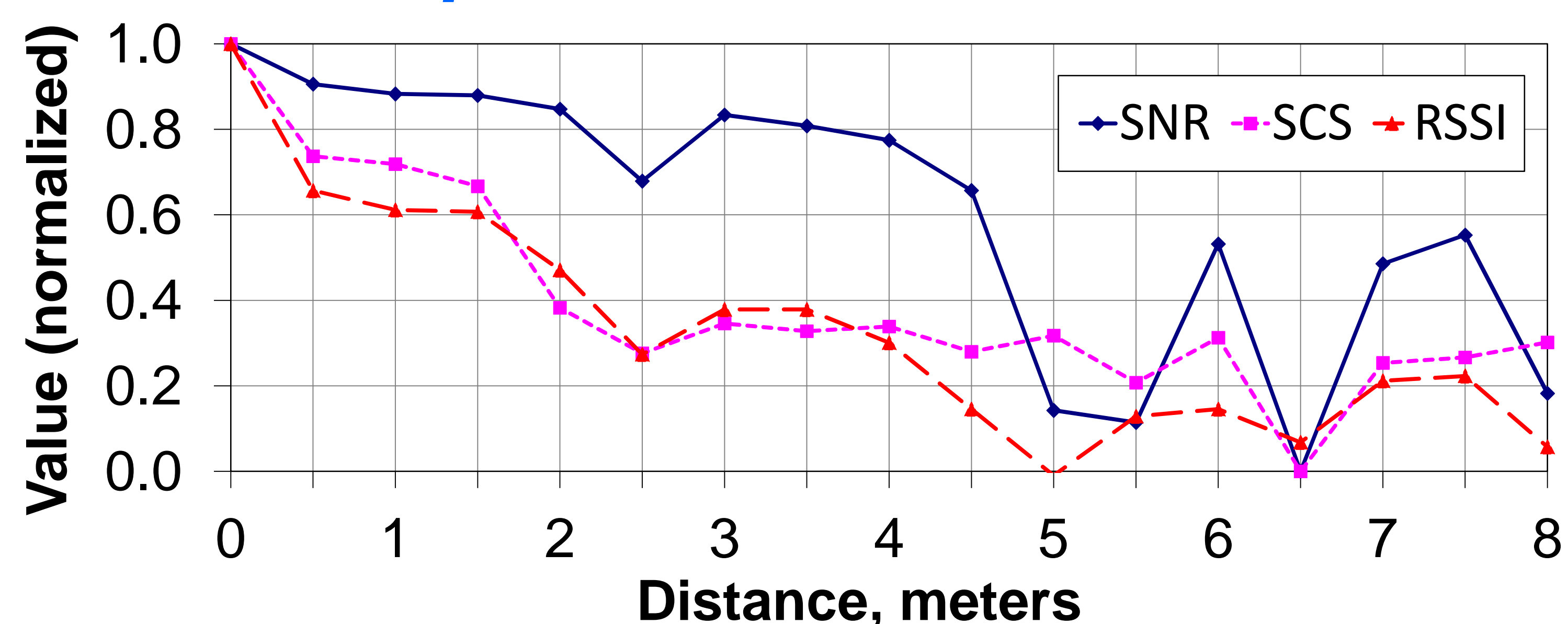


Three signal features potentially dependent on distance/noise:

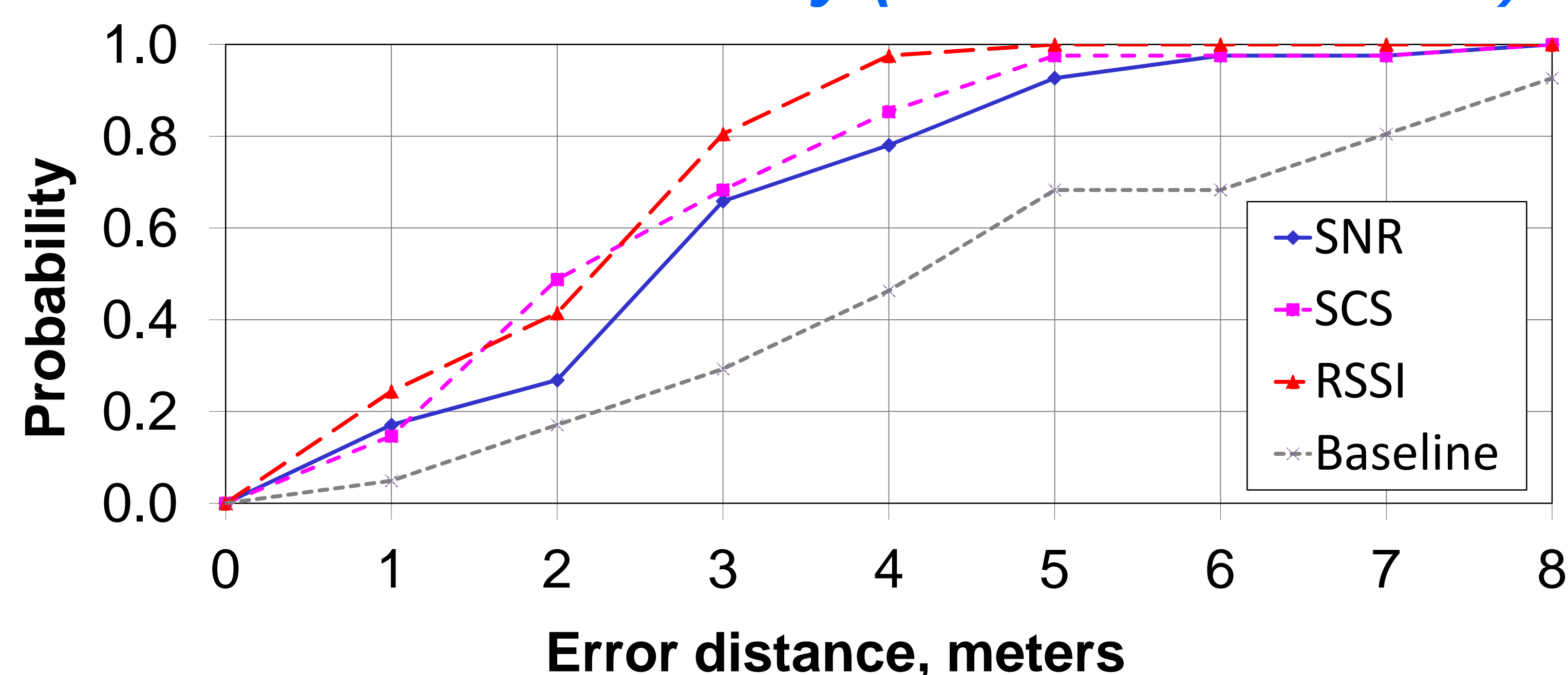
- Received signal strength (RSS)
- Signal-to-noise ratio (SNR)
- Separation of stereo channels (SCS)

Results

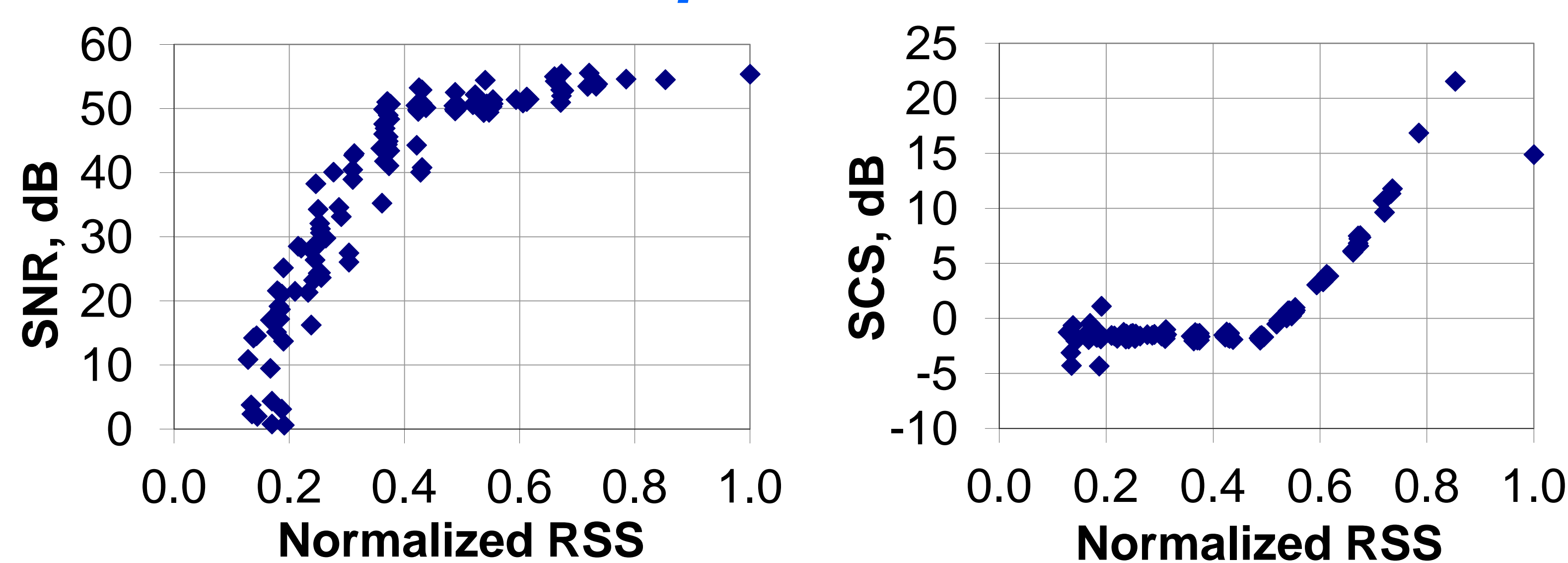
Dependence on distance



Localization accuracy (in a 12x6 m room)



Relationship between features



Summary

- SCS works best at short distances.
- SNR is more suitable at longer ranges.
- RSS works at all distances.

[1] A. Matic, A. Popleteev, V. Osmani, O. Mayora-Ibarra. *FM Radio for Indoor Localisation with Spontaneous Recalibration*. Journal of Pervasive and Mobile Computing, Vol. 6 (6), 2010. PP. 642–656.