

# On the Use of an Intelligent Ray Launching for Indoor Scenarios

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## ABSTRACT

This paper extends a discrete ray launching model IRLA (Intelligent Ray Launching Algorithm) to indoor scenarios. A typical office room has been selected to validate this model. The efficiency and suitability of IRLA for indoor scenarios will be investigated and comparison with two referenced indoor models are given. The comparisons show that the modified IRLA for indoor scenarios obtains high accuracy within a reasonable time scale. It is promising because it is uniquely efficient on computation of rays, which outperforms most of the propagation models.

## OBJECTIVES

- To use IRLA for indoor scenarios
- To validate IRLA in terms of accuracy and speed
- To compare performance with other models
- To further optimise IRLA for practical use

## Indoor Scenarios

- A typical UK office
- 255 Polygons
- Volume: 15 X 8 X 3 (m<sup>3</sup>)

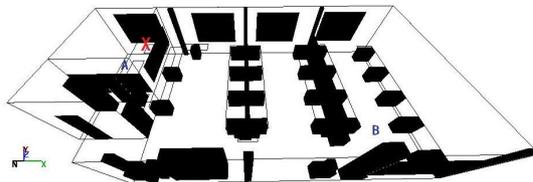
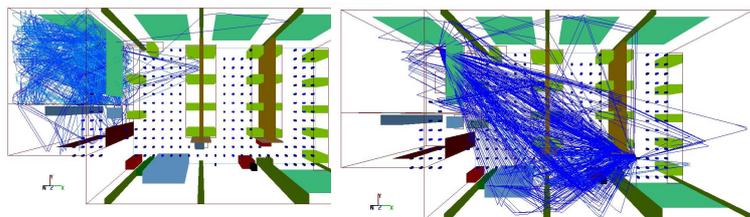


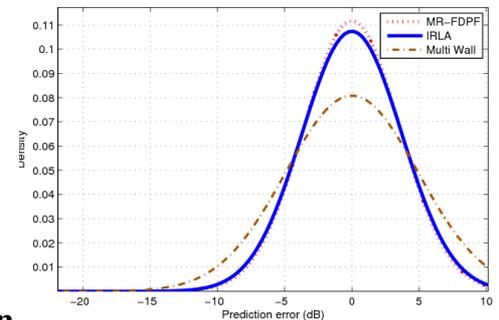
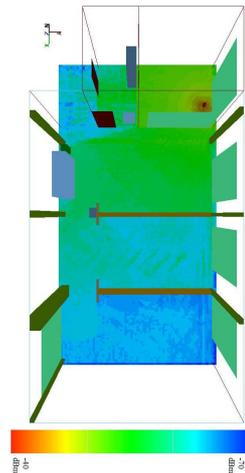
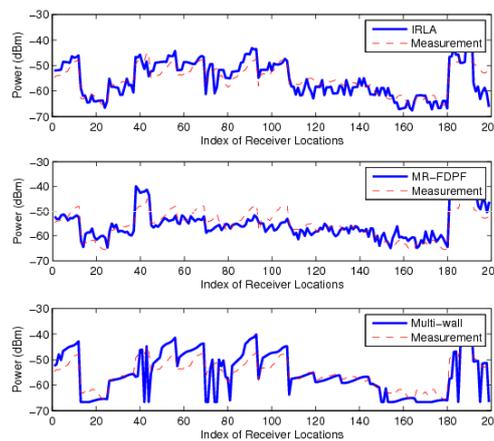
TABLE I  
PERFORMANCE COMPARISON

|           | IRLA | MR-FDPF | Multi Wall |
|-----------|------|---------|------------|
| RMSE (dB) | 3.5  | 3.5     | 5.6        |
| Time (s)  | < 60 | < 5     | < 1        |



## References

- [1] Z. Lai, N. Bessis, G. de la Roche, H. Song, J. Zhang and G. Clapworthy, An intelligent ray launching for urban coverage prediction, 3rd European Conference on Antennas and Propagation EUCAP 2009, Berlin, Germany, 23-27 March 2009, pp. 2867-2871.
- [2] G. de la Roche, J. Gorce and J. Zhang, Optimized implementation of the 3-D MR-FDPF method for Indoor radio propagation predictions, 3rd European Conference on Antennas and Propagation EUCAP 2009, Berlin, Germany, 23-27 March 2009, pp. 2241-2245.
- [3] Z. Lai, N. Bessis, P. Kunoen, G. de la Roche, J. Zhang and G. Clapworthy, A performance evaluation of a grid-enabled object-oriented parallel outdoor ray launching for wireless network coverage prediction, The Fifth International Conference On Wireless and Mobile Communications ICWMC 2009, Cannes/La Bocca, France, 23-28 August 2009, pp. 38-43



## Conclusion

This paper describes an extended ray launching model, IRLA, which is originally designed for outdoor scenario. A full indoor scenario is chosen to validate the performance of this model. Comparisons with two referenced models are investigated and recommendation of their usages are investigated.

Compared to other models, the advantages of the IRLA model are:

- It offers an accuracy similar to existing deterministic tools.
- The full 3D rays/prediction matrix are computed.
- It does not require preprocessing.
- It is fast compared to standard ray tracing methods.