MIMO Communication Systems

Advances in Efficient Signal Detection

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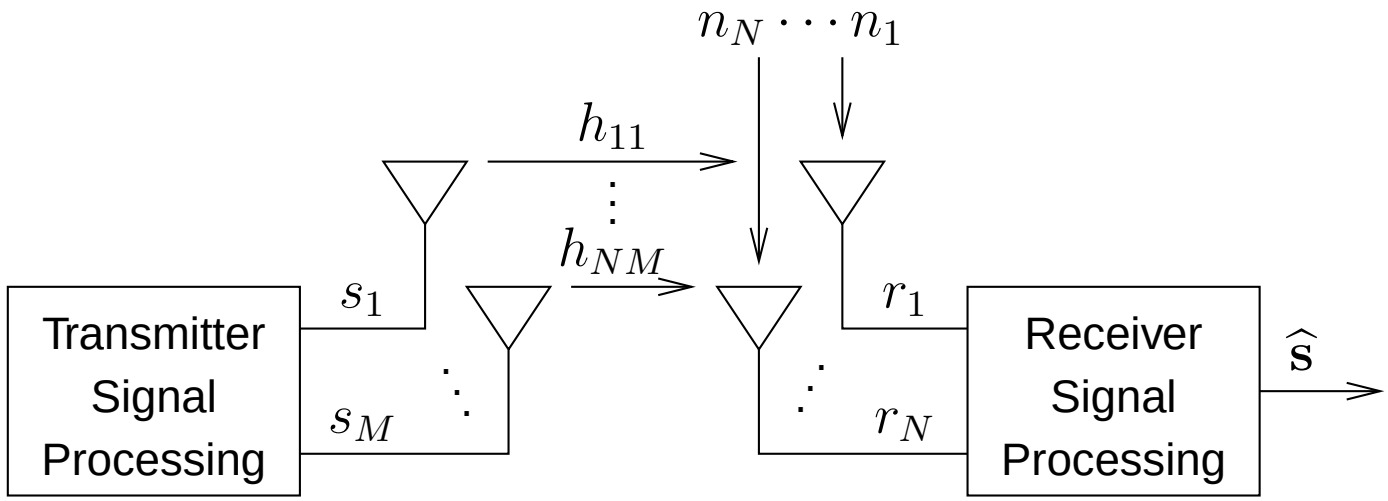
MIMO Communications



$$\begin{bmatrix} r_1 \\ \vdots \\ r_N \end{bmatrix} = \begin{bmatrix} h_{11} & \cdots & h_{1M} \\ \vdots & \ddots & \vdots \\ h_{N1} & \cdots & h_{NM} \end{bmatrix} \begin{bmatrix} s_1 \\ \vdots \\ s_M \end{bmatrix} + \begin{bmatrix} n_1 \\ \vdots \\ n_N \end{bmatrix}$$

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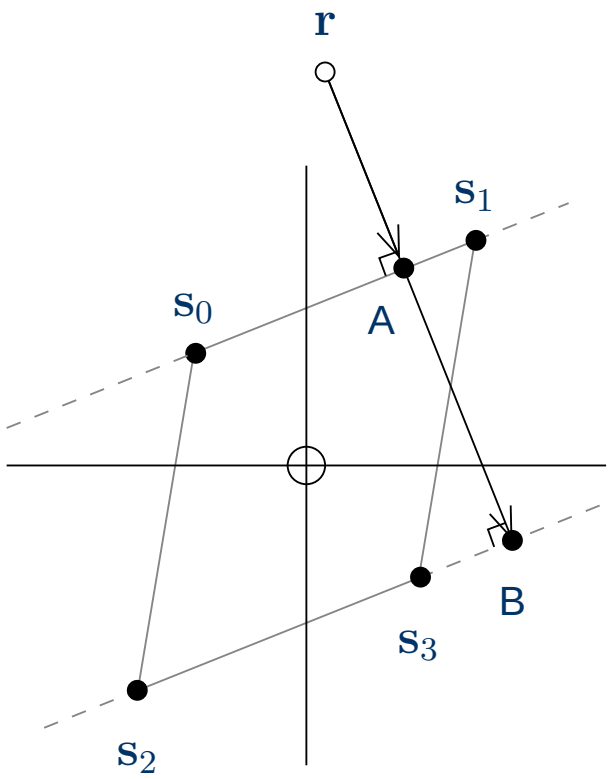
- In AWGN, equivalent to:

$$\mathbf{s}_* = \underset{\mathbf{s}\in\mathcal{X}^M}{\operatorname{argmin}} \left|\mathbf{r} - \mathbf{H}\mathbf{s}\right|^2$$

Geometry of MIMO Detection



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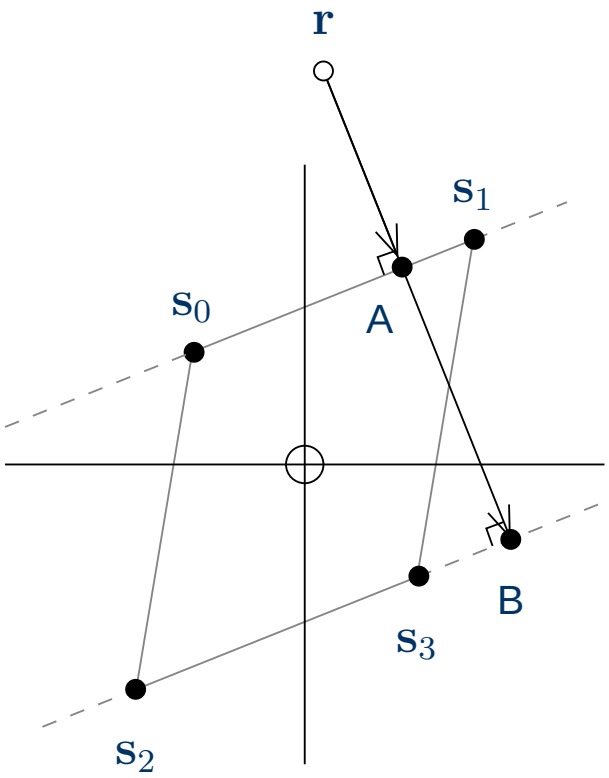

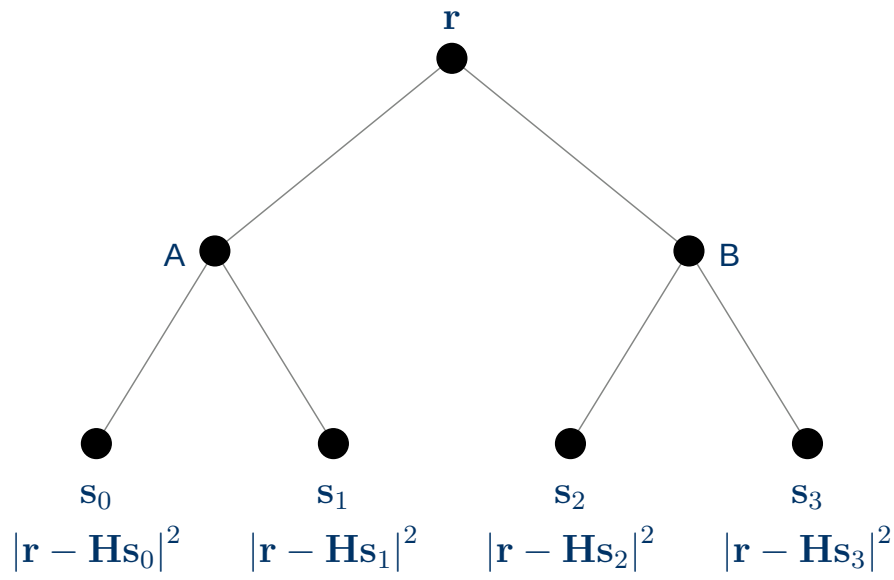

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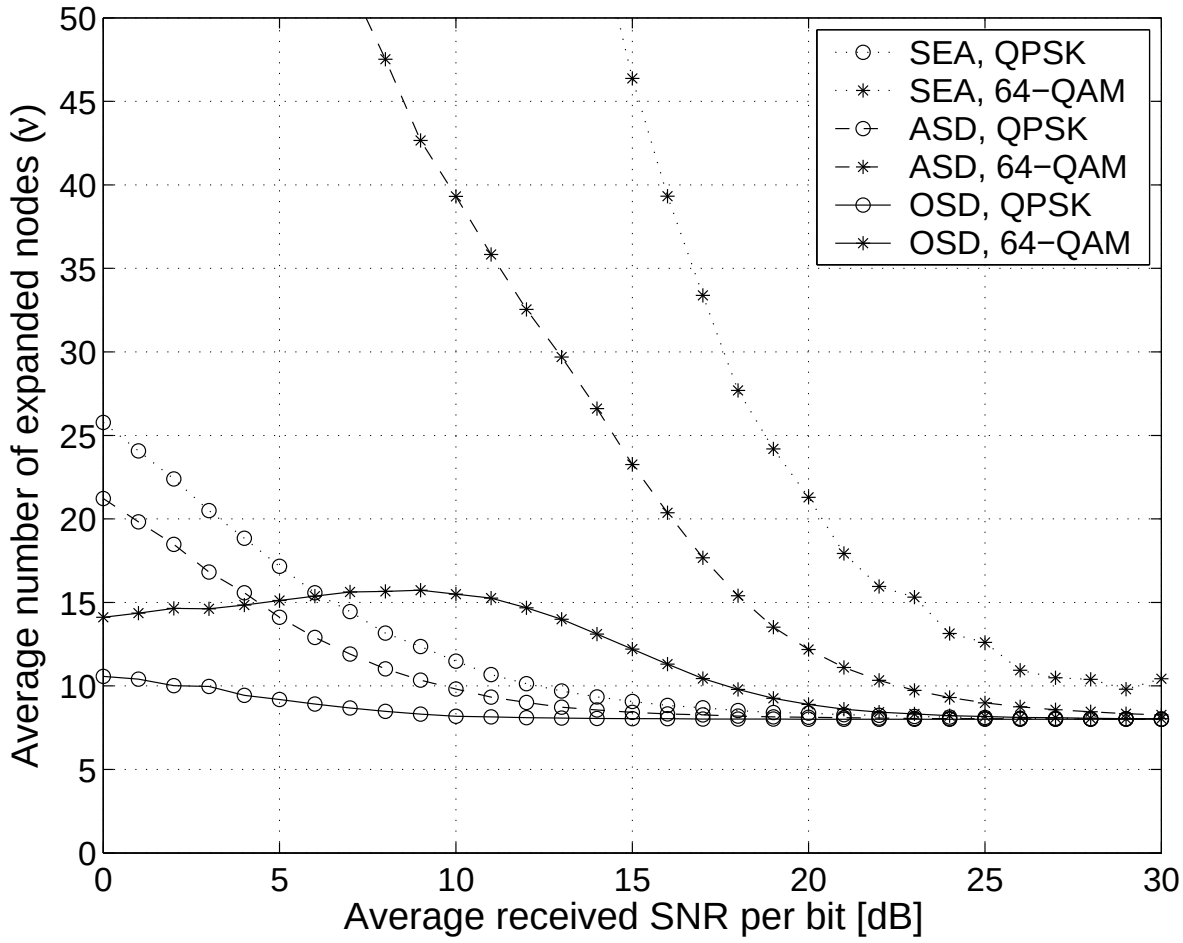
  - Reduced decoding time and variance
  - Competitive sub-optimal solution in fixed time for delay-sensitive applications

Some Results



- 4x4 MIMO system
- QPSK and
- 64-QAM modulation