Candidate Detectors for Comparison

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I. Candidate Detectors for Comparison

SISO AWGN channel without fading which is a lower bound of ML performance can be used as a benchmark to evaluate the performance of proposed algorithm.

Table. I shows the first order candidate detectors to be compared, including Likelihood Ascend Search (LAS), Reactive Tabu Search (RTS), Layered Tabu Search (LTS) and Random Restart Reactive Tabu Search (R3TS).

Table. II shows the second order candidate detectors to be compared, including Belief Propagation based on Markov Random Field (BP-MRF) with damping, Belief Propagation based on Scalar Gaussian Approximation and Factor Graph (FG BP-SGA), Probability Data Association based on Gaussian Approximation (PDA-GA) and Multi-Restart Mixed Gibbs Sampling (MR-MGS).

TABLE I
DETECTOR CANDIDATES FOR COMPARISON (FIRST ORDER)

Detectors	**Complexity**	**BER Performance**		**Note**
		Low Order Modulation Scheme (4QAM)	High Order Modulation Scheme (16QAM, 64QAM)	
LAS	$O(n_t^3)$	near optimal at hundreds of antennas region	N/A	comparable with linear detectors.
RTS	higher than LAS but without magnitude increase	near optimal	far from optimum	N/A
LTS	higher than RTS	near optimum (at several tens of antennas region)	near optimum (at several tens of antennas region)	complexity gets higher for large system but with out order increasing.
R3TS	$N_{restart}O(n_t^3)$	near optimum (at several tens of antennas region)	near optimum (at several tens of antennas region)	complexity gets higher for high order modulation scheme and larger array size.

TABLE II
DETECTOR CANDIDATES FOR COMPARISON (SECOND ORDER)

Detectors	**Complexity**	**BER Performance**		**Note**
		Low Order Modulation Scheme (4QAM)	High Order Modulation Scheme (16QAM, 64QAM)	
BP-MRF	$O(n_t^2 n_r)$	near optimum (at several tens of antennas region)	far from optimum performance	
FG BP-SGA	$O(n_t^2)$	near optimum (at several tens of antennas region)	far from optimum performance	
PDA-GA	$O(n_t^3)$	near optimum (at over one hundred of antennas region)	Not clear	
MR-MGS	$O(\log_2(M) n_t^3)$	near optimum (at several tens of antennas region)	near optimum (at several tens of antennas region)	complexity is higher than MMSE $O(n_t n_r^2)$, but nominal, without order increasing.