Blind Timing and Carrier Synchronization in Decode and Forward Cooperative Systems

Ali Arshad Nasir, Salman Durrani and Rodney A. Kennedy

Applied Signal Processing Group, CECS

1 Motivation

- Synchronization in Decode and Forward (DF) cooperative communication systems is a complex and challenging task requiring estimation of many independent timing and carrier offsets at each relay in the broadcasting phase and multiple timing and carrier offsets at the destination in the relaying phase.
- It has been shown that if the synchronization errors are large, the performance is hugely degraded and the benefits of cooperation may even vanish.
- Recently, there has been growing interest in blind solutions because the use of initial training sequences can reduce the data rate and may become unrealistic or impractical, especially in the context of emerging wireless ad hoc and cooperative networks which operate on opportunistic communication paradigm.

2 System Model

We focus on blind synchronization and channel estimation in DF cooperative communication systems with one source, $M$ relays and one destination equipped with $N$ antennas.

3 Broadcasting phase

Synchronization problem is identical to the Single Input Single Output (SISO) systems and appropriate SISO techniques can be employed [1].

4 Relaying phase

The synchronization problem in the relaying phase is more difficult and complicated than in the broadcasting phase. This is because of the need to estimate multiple timing and carrier offsets at the destination node.

5 Simulation Results

6 References
