算法研究

可防御SSDF攻击的宽带压缩频谱感知

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摘要：

SSDF（Spectrum Sensing Data Falsification）攻击是认知无线网络中对频谱感知性能危害最大的攻击方式之一。基于认知无线网络中信号频域的固有稀疏性，本文结合了压缩感知(CS)技术与平均一致(average consensus)算法，建立了可防御SSDF攻击的分布式宽带压缩频谱感知模型。本文建立了次用户的声望值指标，用以在分布式信息融合的过程中更加准确地排除潜在的恶意次用户影响。在感知阶段，各个CR节点对接收到的主用户信号进行压缩采样以减少对宽带信号采样的开销和复杂度，并做出本地频谱估计。在信息融合阶段，各CR节点的本地频谱估计结果以分布式的方式进行信息融合，排除潜在恶意次用户的影响，得到最终的频谱估计结果。仿真结果表明，本文提出的分布式频谱感知模型可以有效地抵御SSDF攻击，提高了频谱感知的性能。

关键词：　认知无线电；宽带频谱感知；SSDF攻击；压缩采样；平均一致算法

Compressed wideband spectrum sensing defensive against SSDF attacks

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Abstract:

Spectrum Sensing Data Falsification (SSDF) attack is one of the most important threats to the spectrum sensing for wireless cognitive radio networks. On the basis that the wireless signal in cognitive radio network is inherently sparse in frequency domain, this paper develops a distributed compressed wideband spectrum sensing approach which combines compressed sensing and average consensus algorithm and defensive against SSDF attacks. To distinguish the potential malicious node more precisely, we evaluate reputation values for each of the CR nodes which will be used at the fusion stage. At sensing stage, compressed sensing is performed at each CR nodes to sample the received wideband signal at practical complexity and cost, and then locally reconstruct the frequency domain signal. At fusion stage, the local spectrum sensing results of each CRs are fused distributed and exclude the influence of potential malicious node at the same time without a fusion center. Simulation results show that spectrum sensing performance is enhanced using our proposed model and can defend against SSDF attacks.

Keywords: cognitive radio　wideband spectrum sensing　Spectrum Sensing Data Falsification(SSDF)　compressed sampling　average consensus

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