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# Interference Coordination for 5G Cellular Networks

 Springer

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# Preface

With the 4G cellular networks reaching saturation, the 5G networks have recently attracted growing attention and research efforts in both academic and industry communities. The 5G cellular networks are featured as very-high-density base stations and wireless devices and integration of heterogeneous networks. As a result, advanced interference management schemes are critical for achieving the desired network throughput. Due to the high density of wireless devices, users located in the cell boundary area probably share the same channel resources with other users in the same area associated with neighboring cells, thereby causing severe interference to each other. In addition, the heterogeneous networks will add complexity in dealing with the mutual interference. This Springer Brief presents interference coordination techniques for future 5G cellular networks. Starting with an overview of existing interference management techniques, this Brief focuses on practical interference coordination schemes based on beamforming and user scheduling. The proposed schemes aim to deal with the intercell interference in multicell MIMO networks, cross-tier interference in device-to-device communications underlying cellular networks, and inter-network interference in cognitive radio networks. The performances of the proposed schemes are evaluated both analytically and numerically in terms of several performance parameters, including the sum rate, multiplexing gain, and outage probability of the networks. The results show that the proposed schemes can significantly reduce the effect of interference and improve the quality of service of the networks.

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# Acronyms

5G	Fifth generation
BS	Base station
ICI	Intercell interference
CSI	Channel state information
MIMO	Multiple-input multiple-output
D2D	Device to device
M2M	Machine to machine
CR	Cognitive radio
OCI	Other-cell interference
TDMA	Time-division multiple access
OFDMA	Orthogonal frequency-division multiple access
SINR	Signal-to-interference-and-noise ratio
BER	Bit error rate
DoF	Degrees of freedom
ML	Maximum likelihood
MMSE	Minimum mean square error
C-RAN	Cloud radio access network
IA	Interference alignment
RAN	Radio access network
BBU	Baseband unit
UE	User equipment
LAN	Local area network
DU	D2D user
DR	D2D receiver
SLNR	Signal-to-leakage noise ratio
QoS	Quality of services
SNR	Signal-to-noise ratio
PR	Primary receiver
PT	Primary transmitter
ST	Secondary transmitter
SR	Secondary receiver

SD	Spatial direction
SUS	Semi-orthogonal user selection
SU	Secondary user
SVD	Singular value decomposition
mmWave	Millimeter wave