

1. Record Nr.	UNINA9910151959403321
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Titolo	Advances in multi-channel resource allocation : throughput, delay, and complexity // Bo Ji, Xiaojun Lin, Ness B. Shroff
Pubbl/distr/stampa	[San Rafael, California] : , : Morgan & Claypool, , 2017
ISBN	1-62705-983-0
Descrizione fisica	1 online resource (132 pages) : illustrations (some color)
Collana	Synthesis lectures on communication networks, , 1935-4193 ; ; # 17
Disciplina	384.54524
Soggetti	Radio resource management (Wireless communications)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Part of: Synthesis digital library of engineering and computer science.
Nota di bibliografia	Includes bibliographical references (pages 103-114).
Nota di contenuto	<p>1. Overview --</p> <p>2. Intra-cell scheduling -- 2.1 Introduction -- 2.2 A simple system model -- 2.3 Pitfalls of the classical MaxWeight policy -- 2.4 Queue-length-based approaches -- 2.5 Delay-based approaches -- 2.6 Intuition of achieving optimality -- 2.7 Rate-function delay optimality -- 2.7.1 Assumptions on the arrival processes -- 2.7.2 Upper bound on the delay rate-function -- 2.7.3 Sufficient condition of rate-function delay optimality -- 2.7.4 Dominance property: frame-based scheduling and perfect matching -- 2.7.5 Vector matching in bipartite graphs -- 2.7.6 Proof sketch of rate-function delay optimality -- 2.8 Throughput optimality -- 2.8.1 Optimal throughput region -- 2.8.2 Sufficient condition of throughput optimality -- 2.9 Scheduling policies -- 2.9.1 Rate-function delay-optimal policies (DWM and DWM-n) -- 2.9.2 Throughput-optimal policies (DWM and d-MWS) -- 2.9.3 Low-complexity hybrid policies -- 2.10 Near-optimal delay rate-function -- 2.10.1 Delay-based server-side greedy -- 2.10.2 Main result and intuition -- 2.10.3 Equivalence property: delay-based queue-side-greedy -- 2.11 Simulations -- 2.12 Conclusion --</p> <p>3. Network-wide scheduling -- 3.1 Introduction -- 3.2 Single-channel solutions based on MaxWeight -- 3.2.1 A simple network model -- 3.2.2 The MaxWeight algorithm -- 3.2.3 Low-complexity approximations to MaxWeight -- 3.2.4 Single-channel CSMA algorithms -- 3.3 Using multiple channels -- 3.3.1 Independent CSMA chains across channels -- 3.3.2 Complementary schedules across</p>

channels: a departure from -- MaxWeight -- 3.3.3 What to do if there is only one physical channel? -- 3.3.4 The notion of delay -- 3.3.5 Utility-maximization vs. throughput-maximization -- 3.4 Multi-channel CSMA algorithm -- 3.5 throughput/delay/complexity analysis -- 3.5.1 Utility optimality -- 3.5.2 Delay performance -- 3.5.3 Computational complexity and communication overhead -- 3.5.4 VMC-CSMA under exogenous packet arrivals -- 3.6 Implementation -- 3.7 Performance evaluation -- 3.8 Inter-cell coordination in OFDM systems -- 3.8.1 Model for an OFDM multi-cell system -- 3.8.2 Distributed algorithms based on multi-channel Gibbs sampling -- 3.9 Conclusion -- 3.10 Additional notes -- Bibliography -- Authors' biographies.

Sommario/riassunto

The last decade has seen an unprecedented growth in the demand for wireless services. These services are fueled by applications that often require not only high data rates, but also very low latency to function as desired. However, as wireless networks grow and support increasingly large numbers of users, these control algorithms must also incur only low complexity in order to be implemented in practice. Therefore, there is a pressing need to develop wireless control algorithms that can achieve both high throughput and low delay, but with low-complexity operations. While these three performance metrics, i.e., throughput, delay, and complexity, are widely acknowledged as being among the most important for modern wireless networks, existing approaches often have had to sacrifice a subset of them in order to optimize the others, leading to wireless resource allocation algorithms that either suffer poor performance or are difficult to implement. In contrast, the recent results presented in this book demonstrate that, by cleverly taking advantage of multiple physical or virtual channels, one can develop new low-complexity algorithms that attain both provably high throughput and provably low delay. The book covers both the intra-cell and network-wide settings. In each case, after the pitfalls of existing approaches are examined, new systematic methodologies are provided to develop algorithms that perform provably well in all three dimensions.
