

**PAPERS**

**1343 Near-Capacity Wireless Transceivers and Cooperative Communications in the MIMO Era: Evolution of Standards, Waveform Design, and Future Perspectives**

By *L. Hanzo, M. El-Hajjar, and O. Alamri*

| INVITED PAPER | The design of multiple-input-multiple-output (MIMO) techniques is discussed, which promise to deliver the speed and reliability needed by current wireless communications systems. However, they impose both a high channel estimation complexity as well as a high pilot overhead, and hence a range of radical noncoherent MIMOs dispensing with channel estimation is designed.

**1340 Prolog, R. O'Donnell**

**1390 State of the Art in 60-GHz Integrated Circuits and Systems for Wireless Communications**

By *T. S. Rappaport, J. N. Murdock, and F. Gutierrez*

| INVITED PAPER | This paper discusses how broadband 60-GHz devices foreshadow the massively broadband future; it introduces relevant design and implementation concepts and reviews current circuit and antenna developments.

**1386 Prolog, J. Esch**

**1440 Estimating the Energy Use and Efficiency Potential of U.S. Data Centers**

By *E. R. Masanet, R. E. Brown, A. Shehabi, J. G. Koomey, and B. Nordman*

| INVITED PAPER | These centers house servers, and storage and network devices; this paper provides equations to estimate their total electricity demand and also to estimate potential electricity savings.

**1437 Prolog, J. Esch**

**DEPARTMENTS**

**1334 POINT OF VIEW**

The Fourth Paradigm: Data-Intensive Scientific Discovery  
By *K. M. Tolle, D. S. W. Tansley, and A. J. G. Hey*

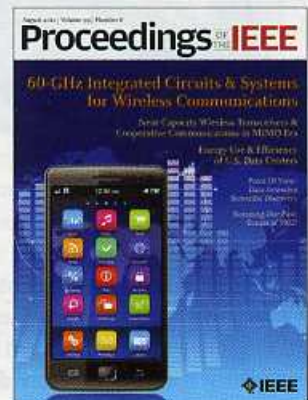
**1338 SCANNING THE ISSUE**

**1454 SCANNING OUR PAST**

Events of 1912—The Year the IRE was Born!

**1459 FUTURE SPECIAL ISSUES/SPECIAL SECTIONS**

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**On the Cover:** This month we highlight the paper on 60-GHz Integrated Circuits and Systems for Wireless Communications, in this regular papers issue, with an artist's conception of a generic communications device, utilizing this technology.