The mobile computing revolution has been phenomenal, and its growth continues unabated. Advances in mobile computing and wireless communications, widespread adoption of mobile devices, and the availability of a vast array of low-cost applications that run on mobile devices are substantially changing the mobile computing landscape. Mobile phone ownership is at near-saturation levels in many countries, and mobile phones are becoming the dominant platform for many of our daily activities—for communicating, accessing information, shopping, learning, being entertained, and socializing. The deployment of smart, context-aware online applications is creating a new paradigm in computing and wireless communication.

The key drivers of this mobile revolution are

- the amalgamation of computing, communications, and consumer electronics—the 3 Cs—in small devices;
- wireless connectivity with other such devices and the Internet;
- the ability to integrate voice, data, and multimedia; and
- increasing affordability for those not only in the developed world but also in developing regions.

These factors facilitate the seamless and transparent creation, storage, processing, sharing, and use of different content types anytime, anywhere, and on a variety of devices.

The Rise of Mobile Devices

Analysts predict that by 2016, there will be 10 billion connected mobile devices in use globally, and smartphone traffic will be 50 times what it is today.¹ According to a Credit Suisse estimate, in 2014, more than a billion smartphones will be sold and cloud-based mobile apps will have increased by 90 percent compared to 2009.² A vast array of applications on platforms such as the iOS, Android, and Windows Phone 7 are being developed at a tremendous rate. (For more information, see the “Mobile Computing Infographics” sidebar.)

Mobile technology is attracting much interest from businesses and their stakeholders, as they come to realize its value and untapped potential. We’re also seeing some unusual uses of mobile networks and applications. One example...
is individuals making mobile payments and person-to-person money transfers through simple mobile phones and microfinancing services, such as the M-Pesa system used in emerging economies where banks or banks’ branches don’t exist. Another example is law enforcement agencies reviewing mobile phone usage logs to track suspects and gain leads and insights. Also, organizers are using mobile social networks and short message services to gather people to protest against government policies and actions.

With users throughout the world carrying around so much computing and communication power, mobile devices are pushing the creation of novel applications and business models and mobilizing and refining business processes. When deployed to their full potential, mobile devices will radically change the way people work, how companies operate and compete, and how members of society interact and live.

Outlook
Numerous synergistic trends make the outlook for mobile computing bright. These include applications leveraging cloud computing and innovative mobile-phone-based solutions addressing real-world problems. Such trends also include the emergence of 4G broadband wireless networks, low-cost tablets, smartphones and net-book computers, bring your own device (BYOD) policies, the Internet of Things (IoT), the new Internet Protocol version 6 (IPv6), and context-aware enterprise and social applications. According to a recent Ark Group report, by 2016, mobile devices will account for nearly 60 percent of Internet data traffic.

In the coming years, we expect to see greater use of speech-enabled and gesture-responsive enterprise and social applications. Sophisticated, computational-, or storage-intensive applications will be deployed on clouds and accessed from low-end mobile devices, and augmented-reality applications might become prevalent. We’ll become an always-connected society, with people in both developed and developing countries connected through wireless networks. Furthermore, many household and personal gadgets (such as TVs, security monitors, game consoles, and personal health monitors) and equipment (such as refrigerators, air-conditioners, heaters, ovens, and lighting systems) will become connected to the IoT, making them accessible and controllable via a mobile device. When this happens, we’ll begin to interact with such gadgets and equipment in new ways.

We will see a new world facilitated by better mobile devices, networks, services, and applications, and user interest in—and addiction to—mobile applications will increase across all age groups. The enhanced mobile landscape will become the new normal. To embrace this scenario, business leaders, IT executives, and entrepreneurs are asking the following questions: What new opportunities do mobile and wireless computing offer? What are their untapped potentials? How can we use them in innovative ways to our (strategic) advantage? What are the appropriate mobile business models, processes, and management practices? How do we address security and privacy issues that arise in this context? How can we best address the related technical, developmental, operational, organizational, and societal challenges?

In this Issue
The five theme articles in this issue cover mobile multimedia applications, the deployment of mobile data services, mobile data security and privacy, the prospects of upcoming 4G networks, and the impact of weather on mobile and wireless communications. Mobile multimedia applications, including mobile games, are attracting the interest of industry
leaders, researchers, and users and are driven by ongoing advancements in mobile devices, software tailored for mobile use, and high-bandwidth communication. Examining this fertile area, the first article, “Mobile Multimedia Applications: Delivery Technologies,” presents an overview of mobile multimedia applications—video and audio-visual services—and discusses key issues and challenges in deploying such services. It also illustrates a few potential business models, supported by a case study.

The next article discusses how to select the right mobile business model and appropriate data service when deploying an application. “Deploying Mobile Data Services: An Australian Case Study” identifies 12 motivations for organizations to implement mobile data services and presents an analytical model for deciding on suitable mobile data services and applications to meet organizational objectives.

Although there are many mobile applications both in use and under development, many of them don’t incorporate adequate security and privacy measures. Insecure mobile applications can have severe repercussions for users as well as for the organizations deploying the apps. To help resolve this problem, the third article, “Addressing Security and Privacy Risks in Mobile Applications,” examines potential threats and security issues in the mobile environment and proposes a development approach to enhance mobile-application security.

The drive to deploy new sophisticated applications that demand a high data-transfer rate is attracting significant interest in 4G wireless communications from mobile service providers, researchers, and investors. In “4G Wireless Networks,” the authors provide insight into this wireless communication network, reviewing the different generations of cellular communication networks (1G to 3G) and outlining various technologies facilitating 4G networks.

Mobile and wireless communication performance and reliability, as well as communication and navigation satellites such as GPS satellites, are susceptible to adverse space weather (conditions of the sun, the Earth, and solar wind) and magnetic storms. The ability to forecast impeding adverse events is the key to minimizing their effect on communication systems. The final article, “Mobile and Wireless Communication: Space Weather Threats, Forecasts, and Risk Management,” outlines space weather effects and describes three space weather forecast models that help wireless communication service providers and users take precautionary actions to minimize interruptions and potential risks.

In the future, businesses and individuals will rely more on mobile computing and communications, which will continue to be a fertile area for research and development. As the computer scientist Alan Kay has said, “The best way to predict the future is to invent it.” We hope the articles in this special issue help you think the unthinkable and contribute to the new mobile landscape.

References

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