

# RFi

## English

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The advent of wireless communications, whether terrestrial or satellite-based, has had profound economic and social impacts in Canada and throughout the world. Wireless services, (Cellular Phones, Wireless LAN, GPS, Bluetooth, Satellite Communication, Broadcasting and Imaging, etc.) have become indispensable parts of any country's infrastructure. They offer great convenience and mobility, two features that continue to be widely embraced by an increasing number of consumers. However, the accelerated pace of progress in this field over the last decade or so has led to the proliferation of services and applications which are often incompatible. This has created a situation of confusion and a sense of frustration by the average consumer as a number of different devices are required for access to multiple wireless applications. This situation of a heterogeneous mix of applications, networks and standards is reminiscent of that of computer networks before the advent of the Internet. If the Internet experience is any indication, there are substantial gains to be realized by consolidation and harmonization of the various wireless services. Such developments require a new approach to wireless systems with a set of new enabling technologies and are the subject of intense R&D efforts for future generation wireless systems. One of the key technologies needed for these future systems consists of developing highly agile and reconfigurable RF (Radio Frequency) front-ends, i.e., intelligent RF front-ends. This application aims at developing the methodologies, designs and components required to develop the enabling technologies that will help bring about such front-ends using advanced RF and digital technologies. Because RF circuits are analog, thus inherently 'dumb', their intelligence can be brought about only by first making them easily tunable and controllable and then through their tight integration with digital platforms that will implement signal processing algorithms for their adaptive control. By developing such technologies, RF front-ends will become truly transparent so that world phones or wireless devices offering integrated cellular, GPS, Wireless LAN and Bluetooth services, for example, can be made efficiently and cost-effectively with one RF front-end.