

The Robot Did It: Spectrum Policy and the Internet of Things

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The Internet is often referred to as “the web,” and that image of an intricate pattern of connecting points suggests the complexity, also, of the [Internet of Things](#). The Internet of Things builds on the Internet and its technologies and standards to connect “things” or people with each other, using sensors and other technologies embedded in objects to communicate and thereby to perform tasks, monitor activities, and provide information, for example. The sensor with a network connection that measures moisture in a field or detects gas leaking from a pipe belongs to the Internet of Things, as do most advanced robots. Robots are a prime example of the key components of the evolving Internet of Things: integrated sensors, optical recognition, spatial awareness, cognitive computing, and dependence on networks and wireless spectrum.

Because so many devices of the Internet of Things are, or will likely be, mobile, spectrum management is a policy area common to many of its parts. Regulatory authority is fairly centralized with the Federal Communications Commission (FCC), which holds the responsibility for managing all non-federal spectrum use. Federal spectrum users are overseen by the National Telecommunications and Information Administration (NTIA), part of the Department of Commerce. Neither agency is fully empowered to provide the framework for coordinating policies and regulations for the evolving Internet of Things. Congress, therefore, may have an important role in facilitating a coordinated, collaborative environment that fully serves all participants, both users and providers.

The likely expansion of the Internet of Things may lead to changes in multiple policy areas: farming, education, transportation, urban planning, and health, to cite some examples. Overlaying these areas are other fields of concern to policy makers, such as security, privacy, and standards. Many departments and agencies of the Executive Branch—as well as independent agencies such as the FCC—have or will have regulatory jurisdiction over some piece within this vast net. Coordinating policy decisions may be essential for addressing the course of expansion of the Internet of Things in the American economy.

The Internet of Things may be the focal point of far-reaching debates during the 114th Congress about the impact of technology on almost every facet of life and the likely role of government in responding to these changes. As the Internet of Things changes the world around it, policies may need to be modified to meet the demands of the new technologies. Because much of the traffic across the Internet of Things is expected to rely increasingly on wireless connections, decisions in the area of spectrum policy may figure prominently in shaping the future of the Internet of Things. Electromagnetic, or radio frequency, spectrum

refers to electro-magnetic waves transmitted at specific frequencies over distance and [time](#) to deliver sound and images, for example. The first commercial use of wireless spectrum was the radio telegraph, introduced before the beginning of the last century. Today, spectrum provides an invisible filament stretching throughout the web, facilitating many activities, as complex as guiding a self-driving vehicle or as simple as turning on a light bulb with a smartphone application.

Many discussions of the Internet of Things focus on the consumer services and benefits that it delivers, such as smartphone applications for home security. An overlap exists between consumer services for mobile broadband and consumer services through the Internet of Things. The policies that are appropriate for the former may not work well for the Internet of Things as it expands into new uses, new technologies, and new investments. In particular, the locus of current spectrum policy, the auction of spectrum licenses, may be encouraging overinvestment in consumer-oriented mobile services at the expense of a fully realized Internet of Things.

Current spectrum policy, notably as practiced in the allocation and assignment of access to this resource, may be narrowing opportunities for participation in the mobile Internet of Things by focusing on the spectrum needs for the wireless industry. Concerns about the concentration of spectrum license ownership and its impact on innovation and competition are widely shared by many policy makers and by the principle regulator of the wireless industry, the FCC. The FCC has two open proceedings that examine alternative policies for spectrum management: one that looks at new approaches to [licensing and sharing](#), and another that seeks a better understanding of the development of 5G and future [spectrum needs](#). These proceedings, however, continue the agency's focus on the wireless industries that have long been its responsibility.

A possible option for opening policy discussions to include emerging technologies might be to focus on the spectrum-dependent technologies that are poised, according to many industry observers, for adoption in the 2020 to 2025 time frame. More developed knowledge of these wireless technologies would allow stakeholders to propose policies based on the future and not on the past. The purpose would be to make government agencies and regulators more aware of the range of options offered by new technologies. In the area of spectrum policy, this approach might lead to a collaborative planning for fifth-generation (5G) wireless technologies across a broad cross-section of stakeholders. Although some consider 5G to be an evolution of existing wireless technologies and services, others see it as a broad term that describes many new technologies that rely on wireless connections, reaching across a wide sector of existing and yet-to-be-created uses.

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