

# Risk Regulation Regimes of Radio Frequency Information Technology

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## INTRODUCTION

A pinnacle in e-governance was reached with the development of information systems that utilize radio frequency technologies. For example, Radio Frequency (RF) towers' capabilities as communication and monitoring devices enable efficiency maximization and real-time solutions. Also, Advanced Imaging Technology (AIT) allows for quick and reliable information processing for purposes of tracking and surveillance. There are several advantages to government's use of Radio Frequency Information Technology (RADFIT) such as the ability to quickly communicate across a wide range of global positioning systems, management of communication portals, and survey of visitors entering secure environments in the case of millimeter wave scanning.

The main issue with the use of Radiofrequency Electromagnetic Wave (RFEMW) technologies is balancing the benefits provided from implementing the RADFIT systems with the environmental effects of electromagnetism. Regulation of technologies is controversial as agencies and stakeholders struggle to weigh benefits and costs. Hood et al. (2001) presents a framework for understanding regulatory policy domains by classifying benefits and costs of Information Technology (IT) sciences according to competing political systems: interest group, entrepreneurial, client, and majoritarian. The interaction of these political context elements influences the corresponding risk regulation regimes, namely the ideologies and activities of IT systems consumers, producers, and regulatory bodies. By examining risk regulation regimes of the RADFIT sphere, public policy implications and future research directions emerge that may improve participatory confidence and informational effectiveness while mitigating threats to communities.

The main purpose of the manuscript is to discuss RADFIT risk regulation regimes and RFEMW issues

more broadly in addition to touch upon community engagement and public management alternatives. Political context elements of risk regulation regimes are presented first. According to the *interest group* political system, incrementalism and the status quo are introduced as encumbrances to policy change. Lack of organization in the public policy arena limits viable alternatives and contributes to government lethargy. The *entrepreneurial system*, indicative of rational choice and new public management, is subsequently discussed as the prompt and elicitor of RADFIT solutions. Modernism and progression serve as societal themes that steer entrepreneurialism in IT and public sector activities in general. Next, the *client system*, involving administrative responsibility, is highlighted as the regime offering the most potential for bureaucratic discretion and inquiry. The opportunities for interaction between regulatory agencies and resident stakeholders, creates inconsistencies and marginalization of particular societal participants. Then, the *majoritarian system*, serving as the basis for democratic forms of governance, is detailed so as to review the unresolved paradoxes involved in representative decision rules such as voting. Second, community leadership initiatives, despite the obstacles posed by political context elements, are illustrated to show the current state of organized opposition to RADFIT proposals. Recommendations and areas for further research follow in an attempt to consolidate diffuse community efforts.

There are several objectives of this entry. The controversy over RADFIT solutions is examined to explain how political context elements dictate risk regulation regimes of the RFEMW sphere. This entry aims to provide an overview of the bureaucratic considerations underlying RADFIT guidelines and public policy as well as the response by communities. Public administration theory and recommendations for future action provide frameworks for additional policy analysis. The goal is not to provide a comprehensive review of the

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RFEMW regulatory arena but instead to illuminate indicators that create the onset and resonance of various risk regulation regimes of RADFIT applications along with implications for communities.

## BACKGROUND

There are millions of RF tower base sites in the world. The United States alone has more than 301,779 RF tower and transmission base sites (Cellular Telecommunications Industry Association, 2013). In many cases the towers stand from 50 feet to 200 feet tall. RF base sites also exist in the form of small individual devices less than 2 feet by 1 feet in size that may be mounted on building roofs or siding. The environmental effects of RF tower bases have been of concern to community residents and researchers alike. For example, RF tower installation at public schools has been strongly opposed by community voluntary initiatives and other political activist groups (Steinfeld, 2013). The RF towers utilize RFEMW technology, as do AIT scanners that are commonly used to scan subjects entering secure areas. In May 2013, the Transportation Security Administration (TSA) disposed of approximately 800 Rapiscan full body scanners, called “puffer” machines, due to concerns regarding irradiation of subjects (Jansen, 2013). Millimeter wave imaging systems replaced the puffer machines and function by emitting RFEMW in the millimeter spectrum (30-300 gigahertz) to render images that look like photographic negatives (Elias, 2012). As of September 2012, TSA deployed about 700 AIT scanners, or Whole Body Imagers (WBI), with plans to have a total of 1800 in use by 2014 (Elias, 2012).

While testing on humans is lacking in many areas, review of literature indicates concerning reports on the effects of RFEMW on cellular organelles. Several researchers have concluded that RFEMW affects plasma membrane in cells. Cleary et al. (1996) found that plasma membrane signal transduction is impacted by RFEMW and Capri et al. (2004) demonstrated that 900 megahertz of RFEMW led to an increase in annexin V-positive human lymphocytes, which contribute to onset of carcinogenesis, and an increase in mitochondrial membrane potential. Differently, Huang et al. (2008) and Sannino et al. (2009) failed to show significant genotoxic effects of RFEMW. However, while Hook et al. (2004) recently found no effect on

Molt-4 T-lymphoblastoid cells at different exposure levels, Phillips et al. (1998) previously concluded that Molt-4 T-lymphoblastoid cells were affected by different types and levels of RFEMW exposure, as evidenced by single-strand breaks in the observed DNA. Research conclusions involving RFEMW experimentation are conflicting and thus doubt has been cast in the minds of both supporters and opponents of RADFIT solutions.

On January 3, 1996, the Federal Communications Commission (FCC) passed the Telecommunications Act “to promote competition and reduce regulation in order to secure lower prices and higher quality services for American consumers and encourage the rapid deployment of new telecommunications technologies” (Telecommunications Act, 1996). According to Section 332(c)(7)(B)(iv), “No state or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission’s regulations concerning such emissions.” In conjunction with this limitation, Section 214(e)(1)(a) grants telecommunications carriers eligibility to provide their own telecommunications facilities in areas designated as “universal service,” even if a competitor is already providing wireless service coverage for the area (O’Neill, 1999).

Section 253(a) reinforces carriers’ rights in citing “No state or local statute or regulation, or other state or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.” Incidentally, the Telecommunications Act may be in violation of Fifth and Tenth Amendment Constitutional protections. The Fifth Amendment, states that persons cannot “be deprived of life, liberty, or property, without due process of law,” and the Tenth Amendment declares that “The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people” (U.S. Constitution, 1789).

For AIT, Sections 101 and 109 in the Aviation and Transportation Security Act of 2001 provide for federal government’s authority to utilize RADFIT. Section 101(f)(8) makes it lawful for TSA to “identify and undertake research and development activities necessary to enhance transportation security” and Section 109(a)(5) provides for the lawful use of wireless technologies

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