

SPECTRUM MANAGEMENT

Further Consideration of Options to Improve Receiver Performance Needed

Why GAO Did This Study

The growth of commercial wireless-broadband services and government missions, including public safety and defense, has increased demand for radio-frequency spectrum. FCC and NTIA attempt to meet this demand while protecting existing users from harmful interference that can arise as new services and users come on line. To manage harmful interference, FCC and NTIA have historically focused on transmitters—the equipment that emits signals. But, receivers also play a role. Congress and others are considering if further action to improve receiver performance to reduce harmful interference could help enhance spectrum efficiency and meet the growing demand for spectrum.

The Middle Class Tax Relief and Job Creation Act of 2012 directed GAO to study spectrum efficiency and receiver performance; GAO studied four areas related to improving receiver performance, including (1) actions taken by manufacturers and commercial licensees, (2) actions taken by the federal government, (3) challenges, and (4) options identified by stakeholders. GAO reviewed federal regulations and reports prepared by FCC, NTIA, industry stakeholders, and other researchers, and interviewed spectrum users, industry associations, and other stakeholders.

What GAO Recommends

FCC should consider collecting information on the practical effects of options to improve receiver performance. FCC replied that it had initiated such a fact-gathering process; GAO believes FCC's process to date may not provide information on the practical effects of these options.

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What GAO Found

Manufacturers and commercial licensees have taken a variety of actions to improve receiver performance. For some services, industry associations—comprised of manufacturers, commercial licensees, and others—have developed voluntary standards that are often used to design and procure receivers, such as those in cell phones and televisions, and to help improve receiver performance. Stakeholders also reported privately negotiating to resolve interference problems and sharing of information as having helped improve receiver performance.

The federal government has used standards and taken other actions to improve receiver performance. Some federal spectrum users, like the Coast Guard and Department of Transportation, have specified or mandated use of industry standards for receivers using certain agency spectrum-based services. The National Telecommunications and Information Administration (NTIA), which manages the federal government's use of spectrum, has also mandated receiver standards for many federal spectrum assignments, such as those for land mobile radios used by emergency responders and radar systems. The Federal Communications Commission (FCC), which manages commercial and other nonfederal spectrum use, believes it lacks general authority to impose receiver standards and rather relies on the marketplace to improve receiver performance. In specific cases, FCC has provided incentives for nonfederal spectrum users to improve receivers. Both NTIA and FCC have taken additional actions to improve receiver performance, like undertaking studies and hosting public workshops.

Although industry and government have taken actions, stakeholders identified three challenges to improving receiver performance:

- *Lack of coordination across industries when developing voluntary standards:* Standards are often developed for a single industry and not coordinated with those using adjacent spectrum.
- *Lack of incentives for manufacturers or spectrum users to incur costs associated with using more robust receivers:* The benefits of improved receiver performance, namely freed-up spectrum for new services and users, often accrue to others and not those incurring the costs to improve receivers.
- *Difficulty accommodating a changing spectrum environment:* When spectrum is repurposed for a new use, upgrading or replacing receivers currently in use to mitigate interference can be difficult and take considerable time.

In addition to greater use of voluntary industry standards, stakeholders GAO interviewed identified several other options to improve receiver performance. For example, interference limits would explicitly set a level of interfering signals that a receiver must tolerate before a user could seek government action to resolve interference problems. Each option entails trade-offs, and many stakeholders noted that a one-size-fits-all solution is likely not desirable or possible. Further, some options, such as interference limits, have not been implemented, and others, such as mandatory standards, have only been implemented for a limited number of users, primarily federal users. Therefore, the practical effects of these options—that is, what would happen if these options were individually or collectively implemented—are not well known, particularly for nonfederal users.