

**Testimony of**

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**Before**

**The U.S. House of Representatives  
Committee on Energy and Commerce  
Subcommittee on Telecommunications and the Internet**

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Mr. Chairman, Ranking Member, and Members of the Subcommittee:

Good morning. I am Julius Knapp, Deputy Chief of the Office of Engineering and Technology at the Federal Communications Commission (FCC). I welcome this opportunity to discuss the FCC's proceeding to provide for the introduction of ultra-wideband (UWB) devices.

### **Introduction**

Ultra-wideband technology holds great promise for a vast array of new products that have the potential to provide significant benefits for public safety, businesses and consumers. Some of the applications for this technology include radar imaging of objects buried under the ground or behind walls, short-range high-speed data devices, and vehicle radar systems.

UWB devices operate by employing very narrow or short duration pulses that result in very large or wideband transmission bandwidths. With appropriate technical standards, UWB devices can operate using spectrum occupied by existing radio services without causing interference, thereby permitting scarce spectrum resources to be used more efficiently. To that end, the Commission reviewed extensive comments that were filed in the UWB proceeding by numerous industry stakeholders.

On February 14, 2002, the Commission adopted a First Report and Order establishing rules to allow development and marketing of unlicensed low power UWB devices. The Commission's action is a cautious first step in authorizing UWB technology. The technical rules

are based in large measure on standards recommended by the National Telecommunications and Information Administration (NTIA) that NTIA believes are necessary to protect against interference to vital federal government operations, including safety systems. In taking its action, the Commission expressed concern, however, that the standards may be overprotective and could unnecessarily constrain the development of UWB technology. Upon adoption of the First Report and Order, the Commission indicated an intent to review these standards and explore more flexible technical standards to address the operation of additional types of UWB operations and technology.

### **Overview of the New Provisions for UWB Devices**

The Commission categorized UWB devices into three types: (1) imaging systems; (2) vehicle radar systems; and (3) communications and measurement systems.

The first category, imaging systems, includes ground penetrating radars (GPRs), wall imaging systems, through-wall imaging systems, surveillance systems and medical systems.

- Ground penetrating radars detect the location and image of buried objects and can be used for applications such as law enforcement investigations and for detecting flaws in bridges and roadways.
- Wall-imaging systems can be used to examine the foundations of buildings and to locate objects such as pipes inside a wall.

- Through-wall imaging devices can be used by law enforcement, fire and rescue organizations for hostage rescue and locating persons trapped inside a burning building.
  
- Surveillance systems, although technically not imaging, can operate as “security fences” by establishing a stationary radio frequency (RF) perimeter field and detecting the intrusion of persons or objects in that field.
  
- Medical imaging is used to detect the location or movement of objects within the body of a person or animal.

Imaging systems generally need to operate in the lower parts of the radio spectrum in order to work properly. However, these are also the parts of the spectrum that are used the most heavily by other radio services. The recently adopted rules generally allow imaging systems to operate below 960 MHz or above 3.1 GHz, prevent them from causing interference in the most sensitive frequency bands used for services such as air traffic control and the global positioning system. The rules also restricted the users to include law enforcement, fire and emergency rescue organizations, scientific research institutions, commercial mining companies, licensed health care practitioners and construction companies. At the request of NTIA, the FCC will coordinate the operation of all imaging systems with the federal government.

The second category of UWB technology permitted by these rules is vehicle radar systems. Vehicle radars can be used for collision avoidance, safer deployment of airbags, and smoother suspension systems that better respond to road conditions. These systems will operate in the upper reaches of the spectrum between 22 and 29 GHz, where the spectrum is not as heavily used as lower frequency bands.

The third category of UWB devices is communications and measurement systems. These devices can be used for applications such as high-speed home and business networking devices, in-home distribution of digital TV signals, and storage tank measurement devices. Existing users of the spectrum expressed the greatest concerns about this category of devices due to the potential for widespread and uncontrolled use. The Commission restricted operation of these devices to the frequency band 3.1-10.6 GHz, thereby avoiding the parts of the spectrum that are used most heavily, including the GPS band.

### **Protection of Existing Radio Services Against Harmful Interference**

The establishment of standards to protect against harmful interference from UWB devices has been a daunting task. Most interference issues involve potential interactions between two, or perhaps a few, radio services, because the energy generated by a particular service tends to be limited to a narrow range of frequencies. In contrast, UWB devices emit energy over wide swaths of the spectrum used by dozens of services, raising the possibility of many potential interference interactions, each of which needed to be analyzed.

Since the UWB proceeding commenced in 1998, many parties filed comments in the Commission's rules making proceeding raising concerns about potential interference from UWB devices to the personal communications service, multipoint distribution service, satellite digital audio radio service, GPS, and others. The Federal Government, under the auspices of NTIA, also evaluated potential interference to a wide variety of systems such as GPS, aeronautical navigation systems, weather radars, and systems used by agencies such as the Department of Defense, the National Aeronautics and Space Administration, and the Department of Transportation.

The FCC's engineering and technology staff analyzed the extensive tests performed by NTIA, Stanford University, the University of Texas and others. We reviewed and considered more than 700 filings that were submitted in the Commission's rule making proceeding. We also coordinated extensively with NTIA.

We are extremely confident that the standards the Commission adopted will protect against harmful interference to other radio services. For example, the rules require ultra-wideband communications devices to operate above 3.1 GHz, well away from the frequency band at 1.6 GHz used for GPS. In addition, any spurious emissions in the GPS spectrum would need to be suppressed by 34 dB below the emissions limits that apply to millions of existing radio frequency devices - - in other words, more than 2000 times less than the radio noise permitted to be emitted by a personal computer.

The FCC plans to closely monitor the introduction of this technology through our equipment authorization program. In addition, the Commission is committed to take enforcement action for noncompliance with the rules and to act expeditiously to resolve any instances of interference.

### **Coordination with NTIA**

As I previously mentioned, FCC staff coordinated extensively with NTIA staff in developing the standards adopted in the First Report and Order and in large part based the standards on measures that NTIA believes are necessary to protect against interference to vital federal government operations. Throughout the proceeding NTIA and FCC staffs were in constant dialogue. Because UWB devices emit energy over large swaths of spectrum, emissions into spectrum used by both Government and non-Government systems cannot be avoided. Therefore, both NTIA and the FCC have shared jurisdictional responsibilities. Given the multitude of radio services that could potentially be affected by UWB emissions and the complexity of the technical analyses, it should not be surprising that there were different points of view on some issues among the agencies as well as the parties. However, the staffs of the Commission, NTIA and the other Federal agencies and departments worked together cooperatively to develop rules that will enable initial deployment of some UWB technologies while ensuring that incumbent government systems are fully protected against harmful interference.

### **Next Steps: Further Testing and Measurements**

UWB technology is still in its infancy and it is important that the government continue to monitor the development of this technology. Additional scientific work is needed to expand our understanding of this technology and its interference potential as it develops.

As I mentioned earlier, the Commission has committed to review the standards for UWB devices in the next six to twelve months. We are undertaking a study at the Commission's Laboratory in Columbia, Maryland, to better understand whether the limits that were adopted are appropriate, particularly relative to the levels of background noise that may already exist from other devices. We plan to make the results available to the public for evaluation by the end of the year. We have invited other organizations to perform further studies of UWB technology as well.

### **Reaction to the First Report and Order**

The reactions to the Commission's decision on UWB have generally been quite favorable. Several companies have announced that they plan to introduce new UWB products very soon. We recognize that some UWB interests have raised concerns about the new rules, in particular, manufacturers and users of ground penetrating radars. We also realize that some non-Government radio services may not be satisfied that they will be adequately protected against interference. We are confident that any remaining issues can be resolved in an expeditious manner.

## **Conclusion**

I would like to thank you, Mr. Chairman, for the opportunity to appear before you today. This concludes my testimony and I would be pleased to answer any questions you or the other members may have.