Government reins on private satellites

The possibility that increasing numbers of privately owned satellites may be photographing the earth from space in coming years has prompted the federal government to develop regulations for licensing the operators of such systems. The recently formulated final version of the regulations goes into effect Aug. 10. At the heart of this controversial issue has been the search for a balance between freedom of the press and national security.

On March 24 of last year, the National Oceanic and Atmospheric Administration (NOAA) published a preliminary version of its proposed rules, which promptly drew a hail of fire from the press—a growing user of such photos—and led to legal dueling from both sides, as well as from the Defense and State Departments and other parties. Further debate followed, as well as an analysis by the Congressional Office of Technology Assessment (SN: 7/11/87, p.28) and some modifications by NOAA of its original proposal.

Under the rules, an addition to the 1984 Land Remote-Sensing Commercialization Act, the granting of a license can be blocked by the Secretary of Defense on grounds of national security, as well as by the Secretary of State in cases of conflict with the government's "international obligations." Though the license will be granted by the Department of Commerce (of which NOAA is a part), the Secretaries of Defense and State will in effect have the power to veto it, terminate a license already granted or suspend operations of such a private system "for a specified period of time or until certain specified requirements are met." In addition, the government will be able to seize any "object, record or report if there is probable cause to believe that [the item] is being or is likely to be used to commit a violation."

The rules avoid citing specific definitions of either "national security" or "international obligations," saying only that they "will not be invoked as a basis for taking any action adverse to the interests of licensees, applicants or users unless the remedy is necessary and effective under existing judicial standards."

The applicant for a license is required to provide such details as the proposed system's start-up date, expected operational lifetime and range of orbits and altitudes. The rules do not set a limit to the allowable spatial resolution, or sharpness, of a system's sensors, but the information is still required, as are the planned spectral bands. Also mandatory is a listing of "all existing or anticipated agreements regarding system operation between the applicant, its affiliates and subsidiaries, and any foreign nation, entity or consortium."

Foreign-owned systems ("systems" is used throughout the rules to include not just earth-sensing satellites but also individual sensors on other kinds of spaceborne platforms) pose other kinds of complications. One example is the SPOT satellite system, operated by the French government space agency (CNES), whose data are available and marketed in the United States by a private firm called SPOT Image. The U.S. State Department expressed concern about language in the preliminary version of the rules because of the difficulty of determining whether certain foreign-owned entities are truly public, semipublic or private; but NOAA dealt with the matter by simply concluding that CNES is "a public entity." The preliminary rules had cited an illustrative example suggesting that any satellite-system operator would need a license if it maintained data-processing and distribution facilities in the United States, but NOAA now plans to decide that on a case-by-case basis.

EOSAT, the U.S. private company that markets Landsat data, is not yet affected by the rules, but will need to follow them for the planned launching of Landsat 6, and hopes to become the first private Landsat owner with the coming of No. 8 in 1997.

—J. Eberhart

The art of computer graphics

More than three centuries ago, Dutch artist Jan Vermeer created a number of luminous paintings that displayed his deft hand and deep insight into how light behaves. A similar understanding of the way in which light is reflected from surface to surface recently led a group of computer graphics researchers to simulate on a computer screen the pearly highlights, the bleeding of color from one surface to another and the subtle gradations of reflected light characteristic of Vermeer's paintings.

Cornell Program of Computer Graphics

A computer-generated scene inspired by a Vermeer painting.

"The [computer graphics] community has been doing simulations based on poor fundamental science," says Donald Greenberg of Cornell University in Ithaca, N.Y. "We had to go back to the physics before we could do the simulation accurately."

Greenberg and his colleagues combined two standard computer graphics techniques—ray-tracing and radiosity—to create their image. Normally, ray-tracing shows the effect of a large number of light rays as they reflect off objects, while radiosity renders the light scattered in all directions from textured surfaces. By including the way in which one surface, whether mirror-like or rough, reflects light to another surface, the researchers generate a more realistic picture.

The Cornell technique may be useful for simulating complex structures and complicated pieces of equipment such as car engines. Says Greenberg, "As we increase the complexity of the environments we model, we won't be able to understand them unless we use more sophisticated lighting techniques."

The technique's greatest drawback is that it takes about two days on a VAX minicomputer to generate an image like the one shown. Greenberg and his group are now working on reducing the computation time. The group presented its results last week in Anaheim, Calif., at the Association for Computing Machinery's SIGGRAPH conference.

—I. Peterson