meant less a loss of authority by deans and department chairmen than a gain in influence for graduate students and junior faculty allied with sympathetic senior men. One-man–one-vote will probably not soon become the governing principle in departmental affairs, but what is likely to persist is the effect of direct, rude, and often very personal criticism of faculty by their juniors on political grounds. At best, the experience could lead to a democratization of departmental politics and, at worst, to a further polarization of faculty and even to the rise of political tests.

Any list of the problems of the universities this spring should probably be led by the campus guerrillas. At Stanford, the cost of campus disruptions during the spring quarter alone is estimated at $580,000, about half in out-of-pocket expenses and the rest attributable to lost time not worked by employees. About $100,000 is chalked up to window breaking, not covered by insurance, and other damage. Skyrocketing costs of insurance and campus security measures have hit university budgets at a time when many institutions are operating in the red. For many radicals, the university is simply an extension of the establishment they are attacking and a source of recruits to their ranks. As a target, the university is an easy mark. Among the many problems the university faces in defending itself is that in moving for the prosecution in the civil or criminal courts, or through campus judicial machinery, of those accused of causing serious disturbances or damage; radicals often gain impact on campus with charges of persecution.

Of the new cadres of nonviolent political activists one must ask whether their present ardor will endure through all that slogging in the precincts and through the probable disappointments of the next election and the next. It should also be noted that perhaps a majority of these activists are not interested in what one calls "trivial change." Their disenchantment with Congress as it operates, for example, is thorough. Perhaps most significantly, many of those who have decided to work within the system to change it hope, but only half-believe, it can be done that way.

Berkeley has provided a lot of symbols and, in the ideological bazaar that the Sather Gate plaza has become, it was possible last month to hear Buddhists and Baptists bear witness within sound of each other, to listen to the Arab guerrillas extolled, and to read a banner whose top line proclaimed the hopes and perhaps the doubts of people involved in the new politics on campus: "Violence has made the people aware. Sanity may win them."

—JOHN WALSH

Domestic Communications Satellites: FCC Still Looking at the Options

When the Federal Communications Commission (FCC) first asked for suggestions for a domestic communications satellite system, in 1966, there was no shortage of responses.

- The Communications Satellite Corporation (Comsat) submitted a plan for a system which it proposed to build and operate.
- The American Telephone and Telegraph Company (AT & T) joined Comsat's proposal, though the two firms differed on who should own which parts of the system.
- The Ford Foundation recommended that revenues from a domestic satellite system be utilized to help support educational television.
- The General Electric Company (GE) suggested that communications satellites could ultimately provide a whole range of communications services —not only traditional telephone and television transmission but also computer communications and fast "telemail" (rapid transmission by satellite of business letters and documents).

Four years later, there is still no domestic satellite system. The FCC has yet to decide the issue, and, though the agency promises quick action, no one is quite sure what will happen—or when. Comsat and the three major television networks are urging a quick decision.

The problem is not technology. For the last 5 years an international satellite system (called Intelsat) has steadily expanded its operations; it now has satellites over three oceans (Atlantic, Pacific, and Indian), a round-the-world transmission capacity, 75 members, and 41 earth stations.

Comsat, specially created by Congress to do the job, supervised the growth of Intelsat, of which Comsat (a private corporation) owns more than 50 percent. But the technology is not so exotic as to be limited to the United States; the Canadians are already working at plans for their own domestic satellite system, with the actual satellites to be launched (as Intelsat's are) by the National Aeronautics and Space Administration.

What, then, stymies development of an American system?

Because the nation's communications system (unlike those of many other countries) is now run privately, Congress decided that a satellite system—to be interconnected with the existing land network—should also be privately run.

Naturally, then, the owners of the existing terrestrial communications system (principally AT & T) haven't pressured the FCC to rush into approving a potential competitor. Also, today's ground system is still giving most users what they want, though telephone service has deteriorated and some experts say the ground system alone can't keep pace with future demands.

One immediate advantage of a satellite system would be its flexibility in handling peak communications demands from different geographical areas at varying times during the day. For the moment, however, television transmission appears to be the one big customer for a satellite system. The more exotic uses suggested by GE may be farther in the future.

Without anyone's crying "crisis," the government has been free to ponder and reponder the major questions involved in authorizing a domestic satellite system: Who should be permitted to own the system, and under what conditions?

Despite apparent agreement in 1966 between Comsat and AT & T, the two companies now may present plans for separate systems. There are other possible contenders, too: the University

Computing Company in Dallas, the three television networks, and cable television interests.

Time may have intensified, not simplified, these rivalries, but the FCC is not to blame for all, perhaps not even for most, of the delay. Twice—once in August 1967, when the FCC reportedly was preparing to approve plans for a pilot system, and again in early 1969—the White House intervened and ordered separate "studies."

The first reexamination (part of a bigger look at communications by a commission chaired by Eugene V. Rostow, then Under Secretary of State for Political Affairs) took 17 months, continuing until December 1968. By then, a new President had been elected, and a new White House staff felt obliged to look at the domestic satellite issue; their report appeared only last January.

Now, however, the initiative rests with the FCC, and the agency's intentions remain uncertain.

The last White House report recommended a policy of *laissez faire*. Under the proposal, the FCC would permit anyone to put up a satellite system as long as the sponsor had adequate financial and technical capabilities. If the satellite system flopped financially, so be it.

The virtue of this policy, according to the White House, is flexibility: it encourages maximum experimentation with satellite communications and doesn't inhibit innovation by creating a perpetual monopoly.

So far the FCC has not embraced this doctrine. Instead, it has asked (again) for formal proposals from industry and has postponed final decision. The first such proposal—from Comsat—is likely to reach the FCC in the near future.

What makes the satellite question so difficult to resolve?

Like most American communications controversies, the issue involves the mammoth American Telephone and Telegraph Company, which has monopolized domestic communications. A number of recent FCC decisions have chipped away at that monopoly; for example, the FCC has decided to permit private microwave companies to establish services that compete directly with AT & T and its Bell System for the business of large commercial and industrial customers who need "private lines" for their voice, computer, and telegraph communications.

Satellites are viewed as another way to give AT & T competition.

Some communications specialists shy away from ostracizing Bell altogether, for fear that satellites will lose their biggest and most imaginative user.

"AT & T has made major contributions to the development of our communications system," says FCC Commissioner Kenneth Cox. "I do not think it would be fair, or in the public interest, to exclude Bell from full participation in the satellite technology, to the extent that it can be applied to serve telephone customers."

If Bell puts up a satellite, however, no one else may have the courage to do so. Bell, after all, can instantaneously tap enough traffic (from long distance telephone calls) to make the system a success.

For the moment, there won't be too much other traffic. In fact, the only other possible major source of business appears to be the three major television networks, which, having recently experienced a rate increase from AT & T, would like to free themselves from Bell's terrestrial network. The networks could decide to construct their own system or to rely on someone else to make the required investment of about $100 million.

Time—with the advent of a cable television network (which would need to be "interconnected" by satellite), the growth of computer communications, and the rise of new services—could turn this trickle of business into a fast-flowing stream or a giant river. Whatever decision the FCC makes now could determine who commands these rich waterways. That was the problem in 1966; it still remains the problem today.

Meanwhile, some of the more imaginative proposed uses for satellites appear to have disappeared from the realm of the possible—at least for the near future. The uncertain economics of the satellite system has eliminated satellites as a source of revenue for educational television, though noncommercial programs apparently will be transmitted free of charge. A more exotic idea—transmitting television programs directly to homes via satellite—also has floundered, on the shoals of high costs and possible interference problems.

—ROBERT J. SAMUELSON

A former Science *news intern, Robert J. Samuelson is now a* Washington Post *reporter.*

APPOINTMENTS

Mahlon B. Hoagland, chairman, biochemistry department, Dartmouth College, to director, the Worcester Foundation for Experimental Biology. . . . **Frank J. Dixon**, chairman, experimental pathology department, Scripps Clinic and Research Foundation, named chairman, biomedical research departments at the foundation. . . . **Ronald W. Stark**, acting chairman, entomology department, University of California, Berkeley, to dean, Graduate School, University of Idaho. . . . **J. L. McHugh**, former acting director, office of marine resources, Department of the Interior, to head, new office for the international decade of ocean exploration, National Science Foundation. . . . **Alexander L. Clark**, acting executive secretary, behavioral sciences division, National Academy of Sciences–National Research Council, to associate dean, Lyndon B. Johnson School of Public Affairs, University of Texas. . . . **Jacob Bigeleisen**, professor of chemistry, University of Rochester, to chairman, chemistry department at the university. . . . **Robert A. Marshak**, professor of physics, University of Rochester, to president, City College, City University of New York. . . . **Stephen Horn**, dean, graduate studies and research, American University, to president, California State College, Long Beach. . . . **Garven Hudgins**, education writer for the Associated Press, to director, office of institutional research, National Association of State Universities and Land-Grant Colleges. . . . **Floyd L. Culler**, assistant laboratory director, Oak Ridge National Laboratory, to deputy director of ORNL. . . . **Z. A. Kaprielian**, director, graduate center for engineering sciences, University of Southern California, to dean, School of Engineering at the university. . . . **Nathan S. Washton**, professor and coordinator of science education, Queens College, City University of New York, to director of the new American Environmental Science Academy at the college.

Erratum. In the Appointments section (1 May, p. 561), Seymour S. West was reported as chairman of the engineering department, University of Alabama, Birmingham. Dr. West was appointed chairman of the engineering biophysics department.

Erratum: In the report "Brain norepinephrine: Enhanced turnover after rubidium treatment" by J. M. Stolk *et al.* (24 April, p. 501), the second sentence of paragraph 1, column 1, page 501, should read "The effectiveness of another alkali ion, lithium, in the treatment. . . ."