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Science, Technology, and Medicine: Issues Facing the 106th Congress, Second Session

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ABSTRACT

This report presents a brief review and analysis of several important public policy issues that are critically affected by and/or affect developments in science, technology, and medicine and that might come before Congress this session. The report follows IB10008, now archived, which covered these issues during the first session of the 106th Congress. The report is intended for staff and Members wishing a broad overview of these issues. Links to CRS reports and issue briefs that cover the issues in more detail are provided. The report will be updated as the issues evolve during the year.

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Summary

Science, technology, and medicine (STM) play an integral part in many of the policy issues that come before Congress. Much legislative action directly affects the progress of science, technology, and medicine. And advances in those areas significantly affect broader public policy issues. This report gives an overview of several of those issues and identifies CRS reports that treat them in more depth.

For FY2001, the Administration has requested an increase of 3% for all R&D funds compared to FY2000, including an increase of 7% for basic research. A key issue will be availability of funds because R&D is within the discretionary portion of the budget. Concerns have also been growing about shortages in the nation's technical workforce, and legislation is pending to increase permanently the number of such workers that can immigrate to the United States.

Legislation to permit the acquisition of stem cells and the funding of stem cell research by NIH is scheduled to be considered by the Senate. Legislative proposals to block NIH funding of such research are also likely. Attempts may be made in Congress to require that genetically modified foods be labeled as such in reaction to concerns about the health effects of such foods. Proposals to include prescription drugs in Medicare are raising concerns about drug pricing and possible price control. The industry argues that current prices are justified to fund further R&D while others claim that the prices charged to U.S. consumers are excessive. A related issue is a proposal to extend the patent life of drugs, a move companies argue is needed because of the growing cost of R&D. Others, however, claim such a move would foster continued high prices by keeping lower cost generics off the market.

Legislation to ease the entry of the regional Bell telephone operating companies into the long distance market is being considered. There are concerns that such easing may be harmful to competition. Legislative proposals are being considered to force cable TV companies to permit access to their cables by other companies providing broadband internet access. Legislation is also being considered to permit legal recognition of electronic signatures and ease the use of such signatures in electronic commerce, but some oppose those proposals on privacy grounds. The rapid growth of wireless services is putting a strain on FCC management of available frequency spectrum. In addition, action is being urged by some in Congress to accelerate development of standards for the next generation of wireless devices.

Growing concerns about ownership of intellectual property are complicating cooperative R&D development involving government, industry, and academia. Legislation and proposals for increased funding are emerging in an attempt to stem an apparent increase in "cyber" threats to the nation's critical infrastructure. Department of Energy (DOE) implementation of the National Nuclear Security Administration to manage DOE's nuclear weapons programs is creating controversy as to whether DOE is meeting statutory requirements.

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Introduction

During the second session of the 106th Congress, many issues are being addressed that will influence or be influenced by scientific, technological, and medical advances. Those issues can be divided into two classes: those whose primary policy focus is science, technology, and/or medicine, and broader public policy issues concerning public health, economic growth, national security, and related subjects. This report provides an overview of scientific, technological, and medical aspects of several key policy issues of both types that are on the agenda of the 106th Congress. The report is organized by major topic area. Relevant CRS issue briefs and reports are cited in the text. Consult the CRS Home Page [http://lcweb.loc.gov/crs/] or call CRS on 7-5700 to obtain the cited reports or identify material in the other areas.

Issues

Research and Development Budgets and Policy

Research and Development Budget. The National Science Foundation (NSF) estimates that in 1999, the United States spent $247 billion on research and development (R&D). Of that total, industry contributed about 69% and the federal government 27%. The federal share was the lowest ever reported by NSF. In 1970, federal R&D expenditures accounted for 57% of the nation's total R&D effort. Given the declining role of the federal government in the Nation's R&D enterprise, Congress may consider whether the Administration's numerous R&D initiatives focus on long-term high-risk research, as well as agency mission-related R&D, and do not duplicate industries' rapidly expanding R&D efforts.

The Administration has requested $85.33 billion for federal R&D budget authority in FY2001, a 3% increase over the estimated $82.74 billion for FY2000. Mirroring previous requests for R&D spending, the Administration is requesting a significant increase for civilian R&D (6.2%, $43.27 billion), while defense R&D funding (DOD plus DOE's weapons R&D, $42.06 billion) would remain flat. Between FY1993 and FY2000, federal civilian R&D has increased 27% in real dollars, while concomitantly, defense R&D has declined almost 9%.

The President's proposed $20.33 billion basic research budget represents a 7% increase over FY2000. The budget reflects the Administration's goal of obtaining a

"Balanced R&D Portfolio" by requesting significant increases in new or existing multi-agency, multi-discipline initiatives. Federal support for university-based R&D would increase 7.8%, reaching an estimated $17.83 billion in FY2001.

The budget highlights three initiatives, each built around a common theme. The first is a $600 million increase for information technology (IT) research spread over several existing IT R&D programs across 7 different agencies. The consolidated request for those programs for FY2001 is $2.3 billion. The second is a $289 million initiative in USDA and DOE aimed at converting "crops, trees, and other biomass into a vast array of fuels and products." The third is $495 million for the National Nanotechnology Initiative, which would double current funding levels of several separate agency programs for fundamental research at the nanoscale level.

The Administration has proposed new discretionary spending caps to accommodate its FY2001 budget request. However, if Congress decides to retain the current caps or sets new ones that are lower than those proposed by the Administration, the FY2001 R&D budget request could experience major alterations.

During the first session of the 106th Congress, the Senate passed S.296, the Federal Research Investment Act. A companion bill, H.R. 3161, has been introduced in the House. This bill is intended to encourage "the doubling of the annual authorized amount of Federal funding for basic scientific, medical, and pre-competitive engineering research" in 15 civilian agencies over an 11-year period.

Science and Technology Education. During the 1st session of the 106th Congress, the House Science Committee held several hearings exploring ways to improve the performance of U.S. students in science and mathematics and to increase the number of students pursuing scientific disciplines in undergraduate and graduate programs. The hearings covered issues such as inquiry-based instruction, teacher training and preparation, classroom technology, college admissions, and the establishment of partnerships between institutions of higher education and local school districts. One area that received attention was funding of education research (about 0.1% of all education spending is for education research). Education research has been described by some as fragmented and of questionable rigor, and many in Congress believe national educational research efforts are inadequate.

Several pieces of legislation in support of science and mathematics education — H.R. 210, H.R. 709, H.R. 1265, S. 1224, and S. 1266 — were introduced in the last session. In addition, the House Science Committee asked the General Accounting Office to conduct a survey of federal science and mathematics education projects that develop comprehensive curricula support for students at the precollege level. The results of that survey may serve as the basis for a hearing during the 2nd session of the 106th Congress. Also, it is anticipated that during the 2nd session, the House Science Committee will examine teacher recruitment, preparation, retention, and professional development (CRS Report 98-871 and CRS Info Pack IP518E).

The Education Flexibility Partnership Act of 1999 (P.L. 106-25) extends the authority of states to waive the requirements of certain federal regulations to all 50 states in return for greater accountability in educational achievement. One of the affected programs is the Eisenhower Professional Development Program, which gives

priority to math and science education. There is some concern that the waiver authority granted by the Act might lower that priority. The Act's sponsors maintain that most of the Eisenhower funds will still be used for improving math and science education (CRS Report 98-676).

Supply and Demand of the Technical Workforce. Reports and anecdotal accounts of the computer industry having trouble filling jobs are numerous. While opinions differ in the scientific and technical community as to whether there is indeed a shortage of information technology workers, many agree that the supply of technically skilled workers is "tight". A May 1999 report of the Computing Research Association, *The Supply of Information Technology Workers in the United States*, [http://www.cra.org/reports/wits/it_worker_shortage_book.pdf] analyzed the claims and concluded that the data are inadequate to determine if there is an imbalance between supply and demand.

Many colleges and universities are reporting increased enrollments in their undergraduate computer science and computer engineering departments. However, simultaneously with these increased enrollments, many of these same institutions are facing losses of departmental faculty. (See for example, Robin Wilson, *Computer Scientists Flee Academe for Industry's Greener Pastures*, Chronicle of Higher Education, September 24, 1999, p. A16). Faculty, both tenured and non-tenured, are being lured away by the attractive salaries of the computer industry and the opportunity to be engaged in the research and development of a startup company. A report examining this issue entitled *Supply of Information Technology Workers*, [http://www.cra.org/reports/wits/exec_summary.html] stated that the competition for university faculty by the private sector may threaten the health of university departments, and with it the supply of future IT workers.

Industry leaders contend that because of the lack of skilled workers in the scientific and technical fields, high technology companies have to rely more heavily on foreign workers on H-1B visas. Increasing the number of skilled foreign workers on temporary visas has and continues to be controversial (CRS Report 97-746). Proponents charge that foreign workers fill the needs of the industry and help to sustain growth. Critics maintain that industry should focus its energies and resources on educating and retraining U.S. workers for U.S. jobs. The American Competitiveness and Workforce Improvement Act (Title IV, P.L. 105-277) changed the number of H-1B workers from 65,000 to 115,000 in FY1999, 115,000 in FY2000, 107,500 in FY2001, and 65,000 in FY2002 and thereafter. In June of 1999, the annual allotment of H-1B visas was reached, three months before the end of the fiscal year. High technology industries lobbied to have the cap raised further. Legislation introduced during the 1st session would raise the H-1B cap permanently to 200,000 annually for FY2000-FY2002 (S. 1440, H.R. 2698) (CRS Issue Brief IB10044 and CRS Report RS20327).

Access to Federal R&D Data. The FY1999 omnibus appropriations bill (P.L. 105-277) required OMB to establish procedures whereby the public can obtain access to data from federally funded research, through provisions of the Freedom of Information Act. This was a major change from traditional practice. While permitted, federal agencies typically have not required grantees to submit research data, and

pursuant to a 1980 Supreme Court decision, agencies, under FOIA, did not have to give the public access to research data not part of agency records.

There has been considerable debate about this legislation. Opponents said that FOIA is an inappropriate vehicle to allow wider public access arguing that: using it will harm the traditional process of scientific research –- human subjects will refuse to participate in scientific research, believing that the federal government might obtain access to confidential information; researchers will have to spend additional time and money preparing data for submission to the government, thereby interfering within ongoing research; and government/university/industry partnerships will be jeopardized, because data funded jointly would be made available under FOIA. Proponents of the amendment say that "accountability" and "transparency" are paramount: the public should have a right to review scientific data underlying research funded by government taxpayers and used in making policy or setting regulations. OMB released final revisions to Circular A-110, as directed by law, on September 30, 1999. OMB limited access under FOIA to selected research data that the federal government cites or uses in actions having the force and effect of law. Legislation has been introduced (H.R. 88) to repeal the law but was not acted on during the first session. Court challenges may be raised to the circular, to the extent it represents a narrow interpretation of the law (CRS Report RL30376).

Government Performance and Results Act (GPRA). The Government Performance and Results Act of 1993, P.L. 103-62, (GPRA), encourages greater efficiency, effectiveness, and accountability in federal spending. It also requires agencies to set goals and to use performance measures for management and, ultimately, for budgeting. During the first session of the 106th Congress, agency performance plans, including those of the R&D funding agencies, that were submitted in conjunction with the FY2000 budget request, received close congressional scrutiny. Of particular interest were the performance measures set by the R&D funding agencies to assess the results of their R&D programs. The agencies will send Congress their FY2001 performance plans with their budget requests and will submit their first performance reports, for FY1999, by March 31, 2000. Both of those documents are likely to receive attention in oversight, authorization, and appropriations activities (CRS Report RS20257 and Congressional Research Service, *Performance Measure Provisions in the 105th Congress: Analysis of a Selected Compilation*, [http://www.house.gov/reform/press/99_01_5.htm]).

Because of the difficulty of using quantitative measures to evaluate research outcomes, the National Academy of Sciences (NAS) has recommended that federal agencies evaluate the outcomes of basic research using qualitative measures and other data, and called for better interagency research coordination (*Evaluating Federal Research Programs: Research and the Government Performance and Results Act*, 1999.) S. 296, the Federal Research Investment Act, authorizes funding for an NAS study on performance measures for research and specifies that the study evaluate the use of quantitative measures for administrative aspects of R&D. OMB would promulgate a list of appropriate "alternative" methods for analyses of research based on the study recommendations. The bill, passed by the Senate, includes provisions to automatically terminate "unsuccessful" federal research programs. A similar bill, H.R. 3161, has been introduced in the House.

Cooperative R&D. As R&D becomes more expensive, collaborative efforts among government, industry, and academia continue to expand. While there are various laws that encourage such efforts, additional issues have developed as a consequence of the implementation of those laws. During its first session, the 106th Congress addressed cooperative R&D within the context of patent reform, federal R&D funding, the future of the research and experimentation tax credit, and amendments to the Stevenson-Wydler Technology Innovation Act concerning cooperative research and development agreements (CRADAs). In the last session, changes were made in the patent laws and the research tax credit was extended. In this session, some are interested in considering a review of collaborative R&D particularly in relation to facilitating expansion of high-tech industries, including pharmaceuticals, biotechnology, telecommunications, and computers. Critics, however, believe the government should not fund research that supports development of commercial products. Legislation (H.R. 209) passed by the House to expedite procedures available to federal agencies for the licensing of government-owned inventions may again be considered by the Senate (CRS Issue Brief IB89056).

Biomedical Research and Applications

NIH Research. Biomedical research, supported principally by the National Institutes of Health (NIH), consumes over 40% of federal civilian R&D dollars. For FY2000, Congress gave NIH its second consecutive increase of over 14%, responding to widespread support for an effort to double the NIH budget over a five-year period starting with FY1999. The appropriation brought the total NIH budget to $17.8 billion, a $2.2 billion increase over FY1999. The Administration, preferring a slower growth path of 40%–50% over five years, has requested $18.8 billion for FY2001, an increase of $1 billion or 5.6%. During last year's budget deliberations, debate over adherence to the discretionary spending caps raised questions about significant increases for NIH; the debate is expected to recur this year since the caps currently in place are even tighter (CRS Issue Brief IB10018). In considering further increases in NIH's budget, Congress is likely to insist on a detailed accounting of how the FY2000 funds are being spent, whether they are buying good science, and whether additional large allotments are justified.

With its increased budget, NIH plans to continue its initiatives in four areas of research emphasis: genetic medicine and exploiting genomic discoveries; reinvigorating clinical research; involving other disciplines (chemistry, physics, mathematics, computer science, engineering) in medical research, especially bioinformatics; and eliminating health disparities among racial, ethnic, and socioeconomic subgroups domestically and reducing those disparities abroad. Some of those research areas are also the subject of pending legislation or have attracted oversight activity. Another ongoing issue is how NIH sets research priorities, including its efforts to make the process more understandable and to incorporate more public input (CRS Report 95-96).

Stem Cell Research. Two privately funded studies published in November, 1998, reported the first successful isolation and replication of human embryonic stem cells in the laboratory (CRS Report RS20266). Such cells have the potential to reproduce themselves indefinitely and to develop into many types of human tissues. Scientists consider this advance to be a very important breakthrough. Many are

anxious to do additional research on various medical and scientific applications, including the generation of healthy replacement cells for diseased-damaged tissue. These stem cells, however, are derived from human embryo fetuses, and because of this, stem cell research has sparked considerable controversy.

A key question before Congress this last session was whether stem cell research should be funded by the federal government. While federal funding of research using human embryos is currently prohibited, research using tissue from aborted fetuses is not. NIH initially was unclear about whether federal funds could be used to support research on stem cells derived from embryos. Acting on an HHS legal opinion, however, NIH announced in January 1999 that it would fund such research. Several Members wrote to the HHS Secretary questioning the decision, and it was the subject of hearings in both chambers.

As a result of that concern, the Administration asked the National Bioethics Advisory Commission (NBAC) to study the issue. NBAC released its report on September 13, 1999. The Commission recommended that research on stem cells from human embryos should be allowed to receive federal funding. The report stipulated that federal funds should be restricted to research using embryos remaining from infertility treatments involving in-vitro fertilization or from aborted fetuses. NBAC is opposed to the use of federal funds for research involving embryos created solely for scientific investigation. On December 2, NIH released proposed guidelines to allow researchers to apply for NIH funding for studies involving stem cells obtained from the private sector sources. The guidelines would permit federal funding for research on stem cells but would exclude funding for derivation of such cells from human embryos. This funding prohibition is a departure from the NBAC recommendation. While greeted with support by patients advocates, others believe the guidelines actually move NIH closer to supporting embryo research than at present. Some in Congress state that the may be attempts to block implementation of the proposed regulations this session. A vote appears likely on legislation (S.2051) allowing NIH to fund both the use and isolation of embyronic stem cells for research.

Public and Environmental Health

Genetically Modified Foods. Questions were raised during the 1st Session of the 106th Congress as to whether genetically modified or bioengineered foods were safe, and whether they should be labeled. Bioengineered foods, or genetically modified (GM) foods, refer to the use of recombinant DNA and related techniques to alter the genetic makeup of living organisms. These techniques allow scientists to identify and isolate genes of interest from any organism and put the genes into other organisms. Currently, GM food crops planted and marketed by U.S. farmers include canola, corn, potatoes, rice, soybeans, sunflowers, and tomatoes. All the food safety agencies –- the Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), and the Environmental Protection Agency (EPA) –- are involved in regulating GM foods (CRS Report RL30198).

Administration officials, scientists, and producer groups have all expressed strong support for the safety of these foods. They all claim that GM foods have environmental benefits because there is less need to use pesticides and farmers benefit from lower input costs. They also say these foods have been carefully tested, and that

genetic engineering is more precise than traditional cross-breeding, a technique that often transfers unwanted genes to the food plant. However, critics raised questions about whether the agencies had scrutinized properly the long-term effects of these products on human and environmental health. Critics and advocates of increased food labeling also have demanded the "right-to-know" which foods have been bioengineered. They want access to information on a label that would allow them to identify these products and then, if they choose, they could avoid their purchase and consumption.

In 1992, FDA determined that GM foods do not pose scientific and regulatory issues that are substantially different from those for conventional food. Special labeling may be required if the GM food significantly differs from its conventional counterpart such that the common name would no longer apply, or if they contain allergens. The agency concluded that it was unnecessary to mandate labeling to indicate the method by which a new variety of food was developed (e.g., that it was genetically engineered). In response to growing public concerns, FDA solicited views at three public meetings in November and December 1999 on the most appropriate way to inform the public about GM foods. FDA currently is reviewing comments received, and it says that those views will be used in evaluating and refining, as necessary, its policies.

Three bills have been introduced that would either mandate labeling of GM foods or regulate them as food additives. Similar bills with similar titles, "The Genetically Engineered Food Right to Know Act" (H.R. 3377) and "The Genetically Engineered Food Right-to-Know Act" (S.2080), would amend the FFDCA, the Federal Meat Inspection Act, and the Poultry Products Inspection Act to require labeling of foods that contain genetically engineered material. The Genetically Engineered Food Safety Act (H.R. 3882) would mandate that all GM foods go through FDA's current food additive process to ensure their safety.

U.S. exports of GM bulk commodities and seed may have to be labeled as well. On January 29, 2000, in Montreal, Canada, over 130 countries agreed to a "Biosafety Protocol" under the auspices of the 1992 Convention on Biological Diversity. Although the United States is not a member of that convention, the terms of the Protocol will affect how U.S. exported genetically modified commodities, particularly corn and soybeans, are labeled. The Protocol, after it is ratified in May 2000 and adopted by 50 countries, will cover all GM foods, feeds, and seeds. It states that all traded GM food products must be clearly identified with two statements. The first is that all GM foods and products must be identified with a label that states that they "may contain" living modified organisms. The second must state that the GM foods "are not intended for intentional introduction into the environment." The label is required to discourage farmers from planting the seeds from these products. Since most of the countries importing U.S. commodities are likely to adopt this Protocol, the United States will have to comply with these requirements for its exports.

Health Information Privacy. The public's concern about the privacy of individually identifiable health information has grown in recent years, with the rapid transition to managed health care and the increased use of information technologies to gather, process, and analyze health data. The growth of integrated health care delivery systems has led to the development of large databases containing personal

health information, and the number of health care organizations handling patient data has grown significantly. On October 29, 1999, the Secretary of Health and Human Services proposed a regulation to protect the privacy of personally identifiable health information that is maintained or transmitted in electronic form. The proposed health privacy rule is one of several standards mandated by the Administrative Simplification provisions of the 1996 Health Insurance Portability and Accountability Act (HIPAA, P.L. 104-191, 42 U.S.C. 1320d).

The health privacy regulation covers only health plans, health care providers, and health information clearinghouses (i.e., entities that facilitate and process the flow of health information between providers and payers). Under the proposed rule, health plans and providers are required to obtain a patient's voluntary consent to disclose information, unless the disclosure is related to treating an individual or paying for his or her care. Patients are also given the right to inspect and amend their medical records. Covered entities that fail to comply with the regulation would be subject to civil and criminal penalties, but patients do not have a private right of action to sue for violations of the law. The proposed rule does not preempt, or override, state laws that are more protective of health information privacy.

The public comment period on the proposal ended on February 17. Although the Secretary has not announced a date for issuing a final rule, the Administration has indicated that the regulation will be finalized later this year. The Department of Health and Human Services has announced plans to develop privacy and security rules for paper records.

Health industry groups and privacy advocates continue to lobby Congress to pass comprehensive health privacy legislation that would cover all types of organizations that handle health information in both electronic and paper form. In June 1999, the Senate Committee on Health, Education, Labor, and Pensions failed to mark up a health privacy bill. Some have indicated that Congress may attempt to pass health privacy legislation this year. Several health privacy bills have been introduced (S. 573/H.R. 1057, S. 578, S. 881, H.R. 1941, H.R. 2404, H.R. 2455, and H.R. 2470). Several patients' rights bills (e.g., S. 6, S. 326, H.R. 358, and H.R. 448) also contain provisions on health information privacy (CRS Issue Brief 98002).

Prescription Drugs. The debate over whether to add a prescription drug benefit to Medicare is one of the central issues before the 106th Congress. Medicare, which provides health insurance for 39 million elderly and disabled beneficiaries, generally pays only for drugs dispensed during hospital and short-term nursing home stays. Advocates for the elderly are pressing for Medicare drug coverage and measures to contain the rising cost of medications. Once a minor component of health-care spending, drug expenditures now take a substantial and rapidly rising share of health expenditures, due to increasing drug prices and the growing use of drugs for managing chronic diseases in an aging population. The high cost of drugs has drawn intense political interest and is a key driving force in the debate over Medicare drug coverage. Drug company executives argue price controls would limit the amount of money the companies could invest in R&D for new drugs.

Pharmaceutical companies are also lobbying to secure additional patent extensions, arguing, again, that the revenue is necessary to fund the high costs of drug

R&D. The patent-extension debate is expected to intensify because a series of patents on popular brand-name drugs (e.g., Claritin, Vasotec, Prozac, Prilosec) with combined sales of more than $40 billion are due to expire in the coming years. The 1984 Hatch-Waxman Act extended the patent life of many brand-name drugs, while at the same time speeding the approval of generic versions once the patent expires. Industry critics argue that industry already receives a substantial R&D subsidy. They point out that the companies do not bear all of the costs for new drug development. The federal government funds billions of dollars of basic biomedical research, primarily through the NIH, that provides a substrate of fundamental knowledge upon which the pharmaceutical companies rely. Federal policies also promote private sector development and commercialization of the results of federally funded research, often through cooperative ventures among government, industry, and academia (CRS Report 94-375).

Although the debate over Medicare coverage and drug pricing has captured the most attention, consumer groups and some public health experts have also voiced concern over FDA's prescription drug regulatory activities. The agency adopted regulations in the early 1990s to give fast-track approval of new drugs for AIDS and other life-threatening diseases. Congress passed the 1992 Prescription Drug User Fee Act (PDUFA), which allowed FDA to collect fees from drug companies to hire additional personnel to accelerate the drug approval process. The 1997 FDA Modernization Act reauthorized PDUFA and included several additional drug-related provisions (CRS Report 97-604 and CRS Report 98-263). While drug-approval time has been cut significantly, consumer advocates complain that FDA is compromising drug safety in its rush to approve new products.

The issue of prescription drug safety is attracting much congressional attention, both with respect to FDA regulation and in the broader context of Medicare reform and patients' rights. Last November's Institute of Medicine report, *To Err Is Human: Building a Safer Health System*, concluded that medical errors—including errors in prescribing, dispensing, and using prescription drugs—are a leading cause of illness and death. On February 22, 2000, the President's Quality Interagency Coordination Task Force (QuIC) issued its own evaluation of the IOM study, along with a set of recommendations for establishing a national medical-error reporting system. Based on the QuIC's recommendations (which largely mirror those of the IOM), the President has announced a series of initiatives designed to reduce the rate of medical errors nationwide. They include creating a federal Center for Patient Safety, which has strong congressional support, and establishing a state-based medical-error reporting system. Lawmakers have introduced medical-error legislation and have held several hearings on the issue. At the center debate is whether reporting should be mandatory or voluntary, and how best to get health care providers to report errors given fear of legal liability.

Global Change and Earth Sciences

The Congress has maintained an active and continuing interest in the implications of possible global climate change for the United States. In 1997, the parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to the Kyoto Protocol to establish binding commitments for reductions in greenhouse gases for the developed countries; however, the Kyoto Protocol has not yet received

the required number of ratifications to enter into force. If the Protocol were to enter into force, the United States would be committed to reducing its net average annual emissions of six greenhouse gases to 7% below baseline levels (1990 for carbon dioxide) during the period covering the years 2008 to 2012. At present, U.S. emissions are above baseline levels.

In November 1998, the United States signed the Protocol, but the Administration has not yet submitted it to the Senate for advice and consent to ratification. This delay responds to S.Res. 98, passed unanimously by the Senate in 1997, that stated that the United States should not agree to a protocol that did not impose binding requirements on developing countries or that would "result in serious harm to the U.S. economy or possibly produce little environmental benefit." Also, the FY2000 Budget Resolution (H.Con.Res. 68, H.Rept. 106-91) expressed the sense of Congress that no funds should be used to put the Kyoto Protocol into effect prior to Senate ratification of the treaty, as required by S.Res. 98.

In 1998 the parties met again to develop work plans for specific elements of the Kyoto Protocol. The deadline set for completing the work plans and the Protocol is the Sixth Session of the Conference of the Parties (COP-6), now set for November 13–24, 2000, in The Hague. Negotiations continued at the Fifth Meeting of the Conference of the Parties to the Convention (COP-5), held October 25–November 5, 1999, in Bonn, Germany. An aggressive schedule of work sessions was agreed to in order to complete the details of the Protocol by the November 2000 deadline.

Interest in the 106th Congress has focused on the scientific evidence for global warming and the uncertainties associated with future climate projections; performance and results of the Administration's climate change programs; conditions under which the United States would ratify the Kyoto Protocol; the implications for the U.S. economy of various options for complying with emissions reductions in the Protocol, if ratified; the extent to which carbon dioxide is considered a "pollutant" and whether the government has the authority to regulate it; the pros and cons of granting American companies credit for early action to reduce their emissions of greenhouse gases; and long-term research and development programs to develop new technologies to help stabilize greenhouse gas emissions.

Of particular interest to policymakers is whether enacting measures that would focus on carbon dioxide and other greenhouse gas reductions to meet the terms of the Protocol could be achieved at little or no net cost to the national economy, as some have suggested, or whether the Protocol might result in increased taxes, loss of jobs, or a dramatic jump in energy costs for Americans, as others have suggested. Also, with the submission of a $4.1 billion request in the President's FY 2001 budget for domestic programs related to climate change research, technology investments, and tax incentives, congressional committees are poised to examine the details of those spending proposals with an eye toward determining first, if they are worth the money, and second, what portion of the request might constitute sound contingency actions to deal with the potential of global climate change versus what portion might prematurely commit the United States to the Kyoto Protocol. Congress included provisions in FY 2000 appropriations prohibiting use of funds for implementing or preparing to implement the Kyoto Protocol, unless it has been ratified by the Senate.

Debate in Congress over the prospect of global warming and what the United States could or should do about it, produced legislation on both sides of the issue. During the first session, bills were introduced to grant business and industry credits for voluntary early actions that reduce greenhouse gas emissions (H.R. 2520, S. 547, S. 882) and to promote R&D on biomass and biobased industrial products to reduce greenhouse gas emissions (H.R. 2819, H.R. 2827, S. 935). Legislation was introduced in the House that would bar the EPA from regulating carbon dioxide without congressional approval (H.R. 2221). Two other House bills would strengthen provisions, respectively, in the Energy Policy Act of 1992 and in the Federal Non-Nuclear Energy Research and Development Act of 1974 with respect to potential climate change (H.R. 3384, H.R. 3385). In the Senate, legislation was introduced to provide for a $2 billion research, development, and demonstration program over 10 years to generate new technologies to help stabilize greenhouse gas emissions (S. 882). Another bill would revise U.S. energy policies in order to reduce greenhouse gas emissions, advance global climate science, promote technology development, and increase citizen awareness (S. 1776). A companion bill would amend the Internal Revenue Code to provide incentives for voluntary reductions of greenhouse gas emissions and to advance global climate science and technology development (S. 1777). Two other Senate bills (S. 1457 and S. 1055) deal with the issue of carbon storage (CRS Report 98-664; CRS Report RL30036; CRS Issue Brief IB89005; CRS Report 98-2; see also CRS Electronic Briefing Book on Global Climate Change [http://www.congress.gov/brbk/html/ebgcc1.html/]).

Space

Space Station. The National Aeronautic and Space Administration's (NASA) International Space Station (ISS) program continues to generate controversy. Although its first two segments were launched at the end of 1998, no further segments have been placed in orbit since then, because of delays in the launch of the third segment, Russia's Zvezda Service Module. Launch of that module is now expected in late summer 2000. Continuing concerns about Russia's ability to fulfill its commitments and about NASA's own cost overruns are the focus of the debate. Congress has defeated 21 attempts to terminate the space station program since 1991, but criticism of the program continues. Key questions for Congress are how to accommodate NASA's substantial cost increases for ISS without harming other NASA programs, how to react to continuing delays in the launch of Zvezda, and Russia's recent decision to continue operation of its existing *Mir* space station instead of focusing its modest resources on ISS. H.R. 1654, the FY2000-2002 NASA authorization bill, has passed the House and Senate; Senate conferees have been named. The Senate version caps total development costs and launch costs. The House version, H.R. 1654, sets no caps (CRS Issue Brief IB93017 and CRS Report RL30154). For FY2001, NASA is requesting $2.1 billion for ISS, a reduction of about $200 million from its FY2000 funding for the program, reflecting the expected ramping down of program funding as hardware is completed.

NASA Budget. For FY2001, NASA is requesting $14.04 billion, 3.2% above the FY2000 level. This is the first increase requested for NASA in 7 years. NASA's four priorities are building the space station, performing quality science, developing new space transportation, and enhancing shuttle safety. The first priority is discussed under space station (above). NASA's space science program is requesting an increase

of $206 million for FY2001. Included is funding for a major initiative, Living With a Star, whose aim is to increase our knowledge of how solar variability affects human-made technology, humans in space, and the Earth's climate. The projected 10-year cost of this program, about $1.4 billion, is substantial, and its payoff is uncertain at this time. Another space science concern is whether NASA's "faster, better, cheaper" policy for space missions needs revision in light of the two Mars mission failures last year. The FY2001 request also proposes a major, five-year program to develop base technology for the next generation reusable launch vehicle (RLV). This program is projected to cost $4.47 billion over the next five years, with the hope that industry will take over the project at that time to develop a commercial RLV capability for which NASA will be a customer. The program is quite complex and it is possible that NASA will have to bear all of the development costs. Shuttle safety also continues to be a major concern in Congress. NASA is starting a five-year, $1.9 billion effort to bring about major shuttle safety and operation upgrades. With some exceptions, however, NASA has not yet set priorities for that program.

Launch Vehicles. Congress is debating space launch vehicle issues on several fronts (CRS Issue Brief IB93062). The development of new space launch vehicles by the government and the private sector has been the subject of congressional attention for several years. It received new impetus in 1999 following an investigation into allegations that certain U.S. satellite manufacturing companies may have improperly transferred missile-related information to China in the course of launching U.S.-built satellites on Chinese launch vehicles. A special House committee chaired by Representative Cox investigated that and other issues concerning technology transfer to China. Among the committee recommendations (CRS Report RL30231) was that U.S. launch capacity be increased to make the U.S. launch services industry more competitive with countries like China. NASA is responsible for developing new reusable launch vehicles (RLVs, such as the space shuttle) while DOD is responsible for expendable launch vehicles (ELVs, what most people call rockets). Because the market for launch services is increasingly for commercial rather than government satellites, NASA and DOD have each entered into new cost-sharing arrangements with industry for developing new systems that require the companies to pay some of the costs. Other private sector companies are proceeding without direct government funding, although some are asking for government incentives. The focus is on loan guarantees or tax incentives. Loan guarantee legislation (S. 469) is pending in the Senate.

Other pending legislation (H.R. 2289, S. 1239) would facilitate investment in new space launch sites or "spaceports," or extend government indemnification of certain third-party liability claims for commercial space launch companies (H.R. 1526, H.R. 2607, S. 832). The FY2000 VA-HUD-IA appropriations bill (P.L. 106-74) extended the indemnification for one year as a stop-gap measure (existing authority would have expired on December 31, 1999), but the pending legislation would extend it for 5 or 10 years and is expected to be debated this session.

Other space launch vehicle issues continue to be controversial. One concerns whether the United States should negotiate new bilateral space-launch trade agreements with Russia, China, and Ukraine. The existing agreements expire in 2000 or 2001. Administration policy is to allow these trade agreements, which set the market terms under which those countries are permitted to launch U.S.-built satellites,

to expire in favor of free market policies as those countries move to market-based economies. The policy does not specify what happens for the countries that have not made that transition by the time the agreements end.

Commercial Satellite Exports. Another continuing debate is over the effect of Congress' decision to transfer responsibility from the Commerce Department to the State Department for exporting commercial communications satellites in the wake of issues about the technology transfer to China mentioned above. The U.S. aerospace industry and, reportedly, the Department of Defense have criticized the effect of that action because they argue it takes too long for the State Department to decide whether to grant export licenses resulting in the loss of U.S. contracts to build satellites or other products. Another concern is that insurance will become unavailable for U.S.-built satellites because technical information regarding satellite failures, for example, cannot be "exported" to foreign underwriters so they can determine their liability, without a State Department license. Most satellite insurance underwriters are outside the United States. Congress appropriated funds so the State Department can hire additional export license examiners, but industry and government concerns remain.

Global Positioning System. Debate is continuing on how best to use the Department of Defense's (DOD's) Global Positioning System (GPS) of navigation satellites for both military and civilian purposes (CRS Report 94-171). Although the satellite system is funded and operated by DOD, it is used widely by the civilian community. The Department of Transportation (DOT) cochairs with DOD an interagency task force on use of the system and has sought funding to expand the system's capabilities to make it better for civilian purposes. Growing demand for highly accurate GPS signals for purposes such as civilian air traffic control led the Administration to decide to add two signals specifically for civilian use to future GPS satellites at a cost of $400 million over 6 years. The Administration wants agencies to share the cost, but Congress has not agreed that this is a good use of DOT funds. For FY2000, DOT requested $17 million for its share, but Congress denied it in the DOT appropriations act (P.L. 106-69). It also denied funding for a related initiative in FY1999 (CRS Issue Brief IB92011).

Intelsat and Inmarsat Privatization. Congress is considering legislation related to the privatization of two international satellite communications organizations: the International Telecommunications Satellite Organization (Intelsat) and the International Mobile Satellite Organization (Inmarsat) (CRS Report RL30439). While these intergovernmental treaty organizations have made initial moves toward privatization, issues remain about their pace, the rules by which access to certain markets is authorized, and the final organizational structure of each privatized organization. Meanwhile, Lockheed Martin wants to acquire the Communications Satellite Corporation (Comsat), which serves as the U.S. representative to both Intelsat and Inmarsat. Following approval in September 1999 by the Federal Communications Commission, Lockheed Martin purchased 49% of Comsat's shares. Because the *Communications Satellite Act of 1962* sets ownership limits on Comsat, the Act must be changed if there is to be further acquisition.

Following activity in the 105th Congress, the Senate passed S. 376, the *Open-market Reorganization for the Betterment of International Telecommunications*

(ORBIT) Act, in July 1999. The *Communications Satellite Competition and Privatization Act*, H.R. 3261, was introduced in November 1999. Shortly thereafter, the House passed S. 376 by a voice vote with H.R. 3261 as an amendment in the nature of a substitute. Though several controversial differences remained between the bills, those differences were addressed in conference. The conference bill was reported on March 2 (H.Rept. 106-509) and passed the Senate that day by unanimous consent. The conference report has not yet reached the House floor.

The Administration has raised concerns about the conference agreement. Most notably, the Administration contends that the legislation could result in restrictions to consumers and reductions in U.S. market competition. In addition, the Administration argues that the bill would interfere with presidential authority to conduct diplomatic and foreign affairs, and potentially violate agreements with the World Trade Organization (WTO) and the International Telecommunications Union (ITU). Finally, the Administration has raised concerns about the bill's potential impairment of critical national security communications, though some of these were addressed in the conference report.

Telecommunications and Computers

Slamming. Slamming is the unauthorized change in a subscriber's telephone service provider. Two measures (S.58 and S.1084) to strengthen slamming regulations issued by the FCC were introduced in the 106th Congress but have not been acted upon to date. If FCC regulations do not result in a significant decrease in the incidence of slamming, it is highly likely that Congress may revisit this issue during the second session (CRS Issue Brief IB98027).

Federal Communications Commission. Congress has used the reauthorization process as a vehicle to assess the FCC's implementation of the 1996 Telecommunications Act and to examine proposals to restructure the agency. Dissatisfaction by some over FCC efforts to implement parts of the Act, such as the "schools-and-libraries" or "E-rate" program, as well as an increasing sentiment that the FCC should be restructured to better address a changing telecommunications environment, have given impetus to such efforts. As a "first step" in the reorganization process, FCC Chairman Kennard announced the establishment of two new bureaus (Enforcement and Consumer Information) that began operation on November 8, 1999. Hearings to examine the FCC restructuring proposal were held in October 1999 by the House Telecommunications Subcommittee. A six-member panel of House Commerce Committee members was established to study both how to reform the FCC and to present a proposal. That proposal is expected to stimulate legislative initiatives to be introduced in this session. While many observers support efforts to streamline the Agency, Chairman Kennard and some Members of Congress have cautioned that the FCC restructuring process should not be used to rewrite telecommunications policy (CRS Issue Brief IB98040).

Bell Entry into Long Distance. Present laws and regulatory policies applied to the Bell operating companies (BOCs) restrict them from offering long distance (interLATA) services within their service regions until certain conditions are met. The BOCs seeking to provide such services must file an application with the FCC and the appropriate state regulatory authority that demonstrates compliance with a 14-point

check list. The FCC, after consultation with the Justice Department and the relevant state regulatory authority will determine whether the BOC is in compliance and can be authorized to provide in region interLATA services. To date one BOC, Bell Atlantic, has been authorized to provide such services in New York. Concerns have been raised about whether such restrictions are overly burdensome and discourage needed investment in and deployment of broadband services. Legislation has been introduced in the 106th Congress that seeks to ease these regulatory restrictions as applied to data transmission (S. 1043, H.R. 1685, H.R. 1686, H.R. 2420) and further action on these measures is anticipated. Proponents of these measures feel that the lifting of such restrictions will accelerate the deployment of and access to broadband services, particularly in rural and under served areas. Opponents argue that such restrictions are necessary to ensure the growth of competition in the provision of telecommunications services and that the lifting of such restrictions will have an adverse effect on a dynamic and growing broadband marketplace (CRS Issue Brief IB10045, CRS Report RL30018).

Satellite Home Viewer Improvement Act and Loan Guarantees. The Satellite Home Viewer Improvement Act (SHVIA) was enacted in November 1999 to replace the 1988 Satellite Home Viewer Act. Under SHVIA (included in P.L. 106-113, the consolidated appropriations act), satellite companies are now allowed to retransmit local network television signals back into the same market from which they originated (called "local-into-local"). Under the earlier law, only "distant" network signals from another area could be retransmitted to satellite subscribers, and only if they could not receive those signals via an over-the-air antenna and did not subscribe to cable. The new law therefore permits more consumers to receive network programming, in addition to programming (such as HBO or ESPN) traditionally provided by satellite carriers. The law was intended, in part, to facilitate competition with cable in response to consumer complaints about cable rate hikes.

However, the satellite carriers do not have sufficient capacity on their satellites to carry all local programming for all communities in the nation. There are 1,600 local television stations across the country. The two U.S. satellite television companies, DirecTV and EchoStar, currently plan to offer local-into-local service only to the top markets, meaning that small and rural markets will not benefit from this service. There are 210 markets in the United States (as defined by Nielsen Media Research) and only 33 would be covered by those companies. In response to concerns about rural America being left out of this service, a provision was added to SHVIA as it was being debated in conference at the end of 1999 that would have established a loan guarantee program through the U.S. Department of Agriculture (USDA) to help companies provide local television to communities not served by Echostar or DirecTV. The provision was included in the conference report on the bill (H.R. 1554, H.Rept. 106-464) and passed the House, but Senator Gramm objected because it had not been discussed in the House or Senate and had not been referred to the Senate Banking Committee. Advocates of the provision agreed to remove it from the final version of the bill (S. 1964) in exchange for commitments by the House and Senate leadership to deal with the issue prior to March 31, 2000.

S. 1980, with language very similar to that which was removed from the conference version of H.R. 1554, was introduced in November 1999 and referred to the Senate Agriculture Committee. Senator Gramm has indicated that he plans to

draft a separate bill. Issues include whether a loan guarantee program is needed, who should administer such a program, whether the program should be only for companies that want to provide local television over satellites or whether it should be technology neutral, what companies should be eligible for the loan guarantees, how large the loans should be, and whether the government should guarantee 100% of the loan or only part of it. The key issue, however, is whether the goal is to ensure that all households in America can receive at least one local television station so they can listen to local weather alerts and community news, or whether it is to ensure that all households have alternatives to cable. According to the Federal Communications Commission (FCC), cable is within reach of 97% of the households with television in the United States, while about 5% are outside the reach of broadcast television. Thus approximately 3-5% of those households cannot get local television now, and one goal could be to make it possible for them to get at least one station in their vicinity. Conversely, only 33 of the 210 markets will receive local-into-local from either EchoStar or DirecTV. If the goal is to offer competition to cable in the other 177 markets, a different approach might be needed (CRS Report RS20425).

General Internet Issues. Despite a general reluctance to regulate the Internet, Congress has been drawn into such regulation in response to concerns about a variety of issues. Chief among them is how to prevent children's access to unsuitable material on the Internet, particularly pornography. Congress's first attempt to deal with the issue (the 1996 Communications Decency Act or "CDA") was overturned by the Supreme Court in 1997. In 1998, Congress passed the Child Online Protection Act, which its sponsors hoped would survive court challenges, but a federal judge issued a preliminary injunction against enforcement of major provisions of the Act in February 1999; the Justice Department has filed an appeal (CRS Report 98-670). Legislation that would require schools and libraries receiving "E-rate" universal service funding to use filtering technology to screen out objectionable Web sites is being debated. The House adopted language on this issue on June 24, 1999, as an amendment to H.R. 1501, the juvenile justice bill, while the Senate Commerce Committee reported its version (in S. 97) on August 5 (S.Rept. 106-141). The two are similar in concept but differ in specifics (CRS Report RS20036). The Senate approved language in its version of the juvenile justice bill (S. 254) requiring Internet Service Providers to provide filtering software to residential customers.

Protecting the privacy of personal information on the Internet has been another area of congressional interest. Congress passed legislation protecting children's privacy in 1998 (P.L. 105-314), but concerns about privacy both for children and adults remain (CRS Report RS20035). Several bills have been introduced (H.R. 313, H.R. 367, H.R. 369, H.R. 1685, H.R. 3560, S. 809, and S. 854). Congress and the Administration both prefer industry self-regulation in this area, but there is concern about the industry's ability to police itself, in the wake of repeated media stories about Web site operators not abiding by the terms of their own privacy policies. Also under debate is the question of whether Congress should limit unsolicited commercial e-mail ("junk e-mail" or "spam") (CRS Report RS20037). S. 759, H.R. 1685, H.R. 1686, and H.R. 2162 address the spam issue. Another issue is protecting consumers against fraud, including over the Internet. Two bills focus particularly on protecting senior citizens in this regard (H.R. 612, S. 699) while another (S. 1015) focuses on investors. What organization should be responsible for issuing Internet domain names

(CRS Report 97-868) and issues concerning the Next Generation Internet (CRS Issue Brief IB95051) are also being debated.

Broadband Internet Access. Broadband Internet access — via digital subscriber line (DSL), cable modem, or other technologies — gives users the ability to send and receive data at speeds far greater than current modem access over conventional telephone lines. With deployment of broadband technologies beginning to accelerate, the federal government is seeking to ensure fair competition among the vendors of broadband service so that it will be available and affordable to all who want it. Currently, debate in the 106th Congress centers on two proposed legislative approaches. One (H.R. 1685, H.R. 1686. H.R. 2637) would compel cable companies to provide "open access" to competing Internet Service Providers. The other (H.R. 1685, H.R. 1686, H.R. 2420, S. 877, S. 1043) would ease certain restrictions and requirements, imposed by the Telecommunications Act of 1996, on incumbent telephone companies who provide high speed data access (CRS Issue Brief IB10045).

Encryption technology. Debate continued concerning U.S. policy on the use of encryption to ensure communication privacy and security, and the level of access the government should have to the keys needed to decrypt encrypted information (known as key recovery) for law enforcement or national security purposes. Legislation was introduced (H.R. 850 and S. 798) to affirm the rights of businesses and individuals to use and sell strong encryption without mandating key recovery, and to relax export controls on strong encryption without key recovery. In the House, five committees reported on H.R. 850, but no full House vote was taken. On September 16, 1999, the Administration announced changes to its encryption policy, making encryption products of any key length exportable without a license, after a technical review, to users in any country except seven "terrorist countries".

The Department of Commerce's Bureau of Export Administration issued regulations to implement the new policy on January 12, 2000. According to the new rules, exporters must report to the government on where the encryption product is exported and provide the government with information about the product's intended use and its sales distribution channels. In addition, if source code (computer language instructions) is made publicly available (under "open source" policies) and no royalty is charged for its use, the code is not subject to export restrictions. Since the new policy was announced, the momentum in the House for voting on any encryption legislation has dwindled. In September, the Administration also transmitted to Congress proposed legislation (called the Cyberspace Electronic Security Act) that would ensure that law enforcement maintains its ability to access decryption information stored with third parties. It would also authorize $80 million over four years for the FBI Technical Support Center, which will serve as a technical resource in responding to the use of encryption by criminals. That legislation was not introduced during the first session (see CRS Issue Brief IB96039).

Electronic Signatures. Electronic signatures, a means of verifying the identity of the user of a computer system to control access or authorize a transaction, are increasingly being used in electronic commerce. Several technologies can be used to produce electronic signatures, the most prominent being digital signatures, which use cryptographic techniques to provide data integrity (verification that a message has not been altered) and nonrepudiation (proof that the signature on an electronic document

is in fact signed by the person purported to sign it). Legislation has passed in the House (H.R. 1714) and Senate (S. 761) to enable the legal recognition of electronic signatures in interstate commerce, to establish requirements for government use of electronic signatures to enable electronic filing of information, and to promote the use of electronic signatures in electronic commerce. While industry groups support both bills, the Administration and consumer rights groups oppose parts of the House bill. A conference is expected early in the 2nd Session.

Spectrum Management and Wireless Technologies. In an effort to keep pace with the rapid developments in wireless technologies and services, the FCC has increased its activities in spectrum management rules and regulations. The wireless telecommunications industry has been growing significantly for many years. It accelerated since the FCC's auctions in the mid-1990s of licenses for personal communications services (PCS) to compete with existing cellular telephone services. In the past year or so, several newer wireless services have grown to the point of becoming economically viable to mass markets for both business and personal uses.

A burgeoning array of commercial wireless services are being offered or developed to provide voice and/or data transmissions in analog and/or digital format. (The number of subscribers of digital wireless services has steadily increased since their inception, and is now greater than the number of analog subscribers.) In addition to cellular telephone, and narrowband and broadband PCS services, other wireless services include the following: enhanced paging, which allows subscribers to send and receive text messages; specialized mobile radio (SMR), which was traditionally used for public safety and dispatching services, but now offers mobile services over the public switched telephone network (PSTN); Multichannel Multipoint Distribution Service (MMDS), also known as "wireless cable," originally conceived to provide television broadcasts, but now provides two-way data services including wireless Internet access, within a range of about 40 miles from each transmitting/receiving antenna (called a base station); Local Multipoint Distribution Service (LMDS), which provides high-frequency, high-bandwidth wireless services and consists of an omnidirectional antenna serving customers within about two miles of the base station; and satellite-based systems, which are being developed to provide voice and data services over a broad geographic range by using a constellation of low earth-orbiting satellites. Spurred by growth of e-mail and electronic commerce, many companies offering wireless services (including wireless telephone services) are now developing wireless Internet access services.

The FCC is working to accommodate the increasing demand for spectrum created by this myriad of services. In November 1999, the FCC announced a set of broad guiding principles for spectrum management, stating that "demand for spectrum has increased dramatically as a result of explosive growth in wireless communications." In December 1999, the FCC met with its Technological Advisory Council, a group of industry representatives, to discuss new technologies and developments of wireless services and spectrum management options. Auctions are planned to begin May 10, 2000, for spectrum previously occupied by TV-broadcast channels 60-69, and many companies plan to these or existing spectrum licenses to provide wireless Internet access. In addition, the FCC has made unlicensed spectrum available for low-power applications, such as cordless telephones, garage door

openers, and wireless computing and connection to local area networks. The FCC plans to provide additional spectrum for the operation of new wireless devices.

Another emerging issue concerning wireless services and spectrum management is the development of standards for Third Generation wireless (3G) devices. (The first generation of wireless services was the original cellular telephone systems first deployed in the 1980s, and the second generation is embodied in the digital PCS networks deployed in the mid-1990s.) The International Telecommunication Union, part of the United Nations, is pursuing the adoption of 3G standards to integrate various satellite and terrestrial wireless systems currently being deployed and developed, to promote global service capabilities and interoperability for the future. The ultimate goal is to enable mobile services subscribers to use the same service, including the same handset, anywhere in the world with a minimal number of additional operational modes embedded in the handset. Currently, the main competing digital wireless technologies for the 3G standard are based on the most prevalent existing modes: Code Division Multiple Access (CDMA), Global System Mobile Communications (GSM), and Time Division Multiple Access (TDMA). While all of these modes are used in the United States, GSM was adopted by the European Union and is established as a ubiquitous standard in Europe. U.S. industry groups have diverse opinions on how the 3G standard should be defined.

Several bills have been introduced in the 106th Congress addressing spectrum management issues. One provision, enacted as part of the FY2000 Defense Appropriations Act (P.L.106-79), requires the FCC to collect proceeds from the auction of portions of TV channels 60-69 by September 30, 2000. Many wireless industry developments and FCC considerations for managing spectrum may not require legislation. Congress, however, may be interested in ensuring that these developments and proceedings maximize competition and that all consumer and industry groups are treated fairly. The radiofrequency spectrum is a limited, valuable resource, and a delicate balance must be achieved to meet competing interests.

Technology Development

Intellectual Property/Patent Reform. Interest in protection of intellectual property has grown as its ownership becomes more complex because of increasing joint public and private support of research. A particular focus of that concern is cooperative R&D among the federal government, industry, and academia. Issues continue to be raised regarding the right of drug companies to set prices on drugs that were developed in part with federal funding or in conjunction with federal agencies. Conflicts have surfaced over federal laboratories patenting inventions that each collaborating party believes to be its own. For some federal agencies, delays continue in negotiating cooperative research and development agreements (CRADAs), because of disagreements over the dispensation of any intellectual property. Problems have been encountered by NIH in obtaining, for use in its research, new experimental compounds that have been developed and patented by drug companies. The companies are concerned that the effectiveness of the intellectual property will be diminished if new applications are discovered by NIH. These and other issues are expected to be explored as Congress addresses technology transfer (H.R. 209), drug pricing, and/or the implications of patent reform legislation passed last session (CRS Report 97-599 and CRS Report 98-862).

Advanced Technology Program. The Advanced Technology Program (ATP), a key element in Administration's efforts to promote economic growth through technology development, has been targeted for elimination since the start of the 104th Congress. Critics argue that R&D aimed at the commercial marketplace should be funded by the private sector, not by the federal government. This controversy was evident in the activities of the first session of the current Congress when the original House-passed appropriations legislation contained no funding for ATP. The legislation, as ultimately enacted, included FY2000 support for ATP that was 28% below the previous year. During the upcoming authorization/appropriation debates, similar questions may arise as to the appropriateness of federal government funding of the Advanced Technology Program, as well as the broader issues associated with a determination of the proper role of the federal government in technology development (CRS Issue Brief 91132, CRS Report 95-36, and CRS Report 95-50).

Technology Transfer. As technology transfer activities between federal laboratories and the private sector become more widespread, additional issues are surfacing as to, among others, fairness of opportunity, dispensation of intellectual property, and participation of foreign firms. H.R. 209 passed by the House in the first session may be considered in the Senate. It would promote the transfer of government-generated technology to the industrial community through the expeditious licensing of federally-owned patents (CRS Issue Brief IB85031). There also may be continued congressional oversight of technology transfer at the Department of Energy laboratories as a result of various controversies surrounding issues such as foreign participation in a CRADA aimed at developing extreme ultraviolet lithography (CRS Report 98-81) and competing claims on intellectual property arising from federally funded R&D.

Defense Research and Technology

Department of Defense (DOD) R&D Issues. The DOD Research, Development, Test and Evaluation (RDT&E) budget request for FY2001 is $37.9 billion. This is $300 million more than approved for FY2000 and $3 billion greater than what the Administration had proposed for FY2001 in its FY2000 budget request. The portion of the RDT&E budget that funds development of basic science and technology (S&T) may again be an issue. In 1998, Congress recommended that S&T funding increase 2% above inflation, from the FY1999 baseline. The FY 2001 request for S&T support is about $200 million short of that goal. Total proposed S&T spending to FY2005 would fall over $3 billion short. Last year, in the FY2000 authorization bill, Congress restated its intention that DOD meet these goals.

Ballistic missile defense (BMD) will likely be an issue this session. The primary issue this year will be whether the Administration will go ahead with a decision mid-year on whether or not to begin deployment of a National Missile Defense (NMD). The decision was to be made based on three intercept tests and assessments regarding cost, effectiveness, and diplomatic impact. The first of the tests (October 1999) successfully intercepted the target, although not without some problems in the functioning of major components. The second test, conducted in January, failed to intercept the target, probably due to a failure in the infrared seekers' cooling system. In the event of a positive deployment decision, the Administration has included procurement dollars in the NMD budget. Some funds could be obligated this year to

begin construction of missile sites. The goal remains to have an initial operating capability by FY2005 against a small attack. The Administration plans to spend $10.4 billion on NMD between FY2001 and FY2005, including $1.9 billion in FY2001. The total BMD RDT&E request for FY2001 is $3.9 billion.

Critical Infrastructures. There is continuing interest in Congress about "cyber" threats to critical infrastructures. These are threats that infiltration into existing computer networks and facilities could result in serious disruption of critical information processing. In May 1998, Presidential Directive No. 63 (PDD-63) was issued, which required a set of actions by various agencies and interagency groups. The directive ordered those parties to determine what constitutes their critical infrastructure, to assess its vulnerability, and to take measures to secure the infrastructure (CRS Report RL30153). The Directive also seeks the cooperation of the private sector to secure its own critical infrastructures. The Administration released Version 1.0 of its National Plan in January 2000. The Administration is requesting $621 million in FY2001 for computer and network security research and development in support of PDD-63. This includes $50 million for an Institute for Information Infrastructure Protection. The Institute would be an R&D fund, operated at the National Institute for Standards and Technology, and not a research facility. Most of the $621 million would be spent by the National Security Agency and DOD.

Activities promoted by the Directive fall into different committee jurisdictions. In July, H.R. 2413 was introduced. It would reinforce both the role of NIST in setting standards and guidelines for computer security technologies used in non-classified federal systems and its role in helping the private sector set standards for encryption, digital signatures, and electronic authentication technologies. Section 1043 of the FY2000 defense authorization bill (P.L. 106-65) establishes a DOD Information Assurance Initiative which, among other things, requires the Secretary to design an information assurance guidebook for DOD agencies and an information assurance test bed. S. 1998, introduced in December, 1999, would amend Chapter 35 of title 44 U.S. Code to specify activities and responsibilities for planning and implementing computer security programs, consistent with other laws and OMB guidelines.

DOE Nuclear Security Programs. Operation of the National Nuclear Security Agency (NNSA) started on March 1, 2000. This agency, established by the FY2000 defense authorization act (P.L. 106-65), includes most of DOE's defense activities, including all of its nuclear weapons programs. A prime motivation for the NNSA was to enhance security and improve management at the DOE weapons labs. There are significant concerns, however, about the new agency. Many in Congress believe that DOE's implementation is not in accord with law. They argue that the only manager overlapping both the NNSA and DOE should be the Secretary of Energy. It was Congress's intent, they claim, to keep the current DOE management structure away from the weapons program, because poor DOE management was the main reason for the security problems. DOE, however, argues that there are some functions in both agencies that should be under the same person, and that putting different individuals in those positions would result in wasteful duplication and would limit the Secretary's authority to manage the new agency. Another concern is how barriers constructed by the NNSA will affect scientific interaction between the DOE civilian and defense R&D programs. There is now substantial collaboration among several such programs, particularly inertial confinement fusion and high-performance computing,

and it is possible that the existence of NNSA will complicate future interaction (CRS Report RL30445).

Last year, DOE related significant problems with construction of the National Ignition Facility (NIF). In particular, assembly of the main laser beams would require maintaining a degree of cleanliness in the assembly areas beyond the capabilities of Lawrence Livermore National Lab (LLNL). It would be necessary, therefore, to contract with industrial engineering firms that had such capabilities — primarily in the semiconductor industry — to work with LLNL in assembling the laser. This requirement would add substantial sums — about 30 to 40% — to the total construction cost and extend the time to completion. Further investigation of the NIF project revealed serious management problems as well as some significant technical uncertainties with the laser's optics and target. The latter could result in a serious degradation in the laser's capabilities unless solved, although the R&D to resolve the problems would not add substantially to the project's overall cost. DOE has not asked for additional funds for the project, stating that they will come from other parts of the weapons program. Some in Congress, however, have stated that additional funds might be needed if the rest of the stockpile stewardship program is not to be compromised. A new cost baseline is not expected until May 2000, by which time DOE appropriations hearings are likely to be over (CRS Report 97-464).