

HEARING
on
High Performance Computer Export Controls

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Statement of

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Mr. Chairman and Members of the Committee:

I am pleased to be here today to discuss export control issues for high performance computers. My testimony is based on work we have conducted over the past few years, particularly our December 2000 report, and work we are currently completing for the Congress.

As you know, export controls continue to be a contentious part of our national security debate. Over the past several years, there has been continuing congressional concern over the rationale for revising these controls and their effect on our national security. U.S. policy with respect to the export of sensitive technology, including computers, seeks to balance the national interest in promoting economic growth and trade against the essential national security requirement to prevent the proliferation of technologies related to weapons of mass destruction, missiles, and advanced conventional weapons.

The United States has long controlled the export of high performance computers to sensitive destinations, such as Russia and China. These computers have both civilian and military (dual-use) applications, and the recent technological advancements in computing power have been rapid. The Department of Commerce has primary responsibility for licensing these dual-use items and other agencies--State, Defense, and sometimes Energy--help to weigh promotion of commercial interests in exporting items against protection of national security interests. The regulations for high performance computer control thresholds are currently based on a computer's composite theoretical performance as measured in millions of theoretical operations per second (MTOPS).

We recently reported that the growing ability of other countries to cluster lower performance computers has made the current computer export control system ineffective in limiting countries of concern from obtaining high performance computing capabilities for military applications. In that report, we also reported that MTOPS is an outdated and invalid means for determining whether individual high performance computers should be licensed for export. We recommended that executive branch agencies convene a panel of experts to (1) conduct a comprehensive assessment of available options to address weaknesses of computer export controls and (2) make a

determination on what U.S. countermeasures, if any, are necessary to respond to any computing-related enhancements of military or proliferation capabilities in sensitive countries. The Departments of Commerce and Defense disagreed with the need to implement these recommendations because they said they were already engaged in interagency reviews of similar issues. However, when asked for documentation on how the agencies were pursuing the points covered in our recommendation, the agencies provided none. As a result, we believe our recommendations are still valid and we raised this matter to the attention of Congress in the December report.

On January 10, 2001, President Clinton announced a significant relaxation in export control licensing and notification thresholds for high performance computers and a proposal to eliminate almost all controls on exports of computer hardware. Today, I will discuss our observations about these changes, specifically, (1) our evaluation of the President's justification for changing the computer control thresholds, (2) our evaluation of the support for the President's policy proposal to shift the emphasis of controls from hardware to software controls, and (3) implications of these changes.

To assess the President's justification for changing the computer control thresholds and to evaluate the support for the President's policy proposal, we reviewed the President's January 2001 report to the Congress and announcement of computer control changes. We also reviewed Defense documents showing the results of calculations in support of the new control threshold. We interviewed officials from the Departments of Defense, Commerce, and State; and the national laboratories, Lawrence Livermore and Oak Ridge. We interviewed officials from major computer manufacturers, IBM, and SUN Microsystems, as well as the computer scientist responsible for the Top 500 List of the most advanced high performance computers in the world. We also reviewed a Defense Department technical report and interviewed its authors. In addition, we interviewed officials of the Commerce Department's Information Systems Technology Advisory Committee. To identify implications of the computer control threshold and policy changes, we reviewed the President's report to the Congress and White House fact sheet on computer control and policy changes. We also reviewed interagency inspector general reports on export controls. In addition, we interviewed officials of the Departments of Commerce, Defense, and State. We also obtained and analyzed Commerce Department statistics on the disposition of notifications and license applications.

SUMMARY

The President's January 2001 changes in the export control thresholds for high performance computer exports are not adequately justified. While the President's report recognizes that high performance computing capabilities will become increasingly available to other countries through computer clustering, the report fails to address all militarily significant uses for computers at the new thresholds and assess the national security impact of such uses, as required by law. The inadequacies of the President's report are further compounded by continued use of a flawed measure for assessing computer performance.

The support for the President's policy proposal for relaxed U.S. computer controls also is not adequate. Although the new policy was based on a conclusion that computer hardware exports can no longer be controlled, the executive branch did not adequately assess alternative control options. Our prior report identified several other options. In addition, the new policy would focus more attention on using new software controls to protect U.S. national security interests, even though such controls have yet to be identified and developed.

We identified several implications of the changes to the control thresholds and the proposed change in U.S. computer export control policy related to increased risks for U.S. national security.

The inadequacies of the President's justifications again demonstrate the need for a comprehensive study of the issues involved.

The new rules effectively eliminate routine prior U.S. government review of computer exports below the licensing threshold to sensitive countries. In the past, we found that establishing a notification threshold lower than the licensing threshold was useful in that it allowed the U.S. government to deny or defer some exports, or make other exports conditional upon additional safeguards.

Raising licensing control thresholds in January 2001 increases the risk that more powerful computers might be exported without a license to sensitive customers nearly a year before Defense projects that these customers could attain the same computing power by clustering less powerful computers.

Defense and Commerce officials said that the U.S. government will have to rely more heavily on computer vendors to "know your customers" and assess their intentions to use computers for proliferation purposes. Past evidence has shown this reliance may be misplaced.

The policy proposal would reduce information that might be useful in detecting patterns of exports to customers engaged in proliferation activities because it would eliminate an annual reporting requirement that provides information on end users.

BACKGROUND

High performance computers and related components (for example, processors) are controlled under the Export Administration Act and the implementing Export Administration Regulations. The act authorizes the Commerce Department to require firms to obtain licenses for the export of sensitive items that may pose a national security or foreign policy concern. The Departments of State, Energy, and Defense assist Commerce, which administers the act, by reviewing export applications and supporting Commerce in its reviews of export control policy. Since 1993, the President has revised U.S. export control requirements for high performance computers six times, including the revisions announced in January 2001. Since 1996, the executive branch

has organized countries into four computer "tiers," with each tier after tier 1 representing a successively higher level of concern related to U.S. national security interests.

Tier 1. U.S. export control policy placed no license requirements on tier 1 countries, primarily those in Western Europe and Japan.

Tier 2. Exports of computers above a specific performance level to tier 2 countries in Asia, Africa, Latin America, and Central and Eastern Europe required licenses.

Tier 3. Exports to countries such as Russia, China, India, Pakistan, and Israel required a license above a specified performance threshold and also required advance notification of a vendors' intent to export computers above a certain threshold.

Tier 4. Exports of high performance computers to tier 4 countries, such as Iran, Iraq, and North Korea, were essentially prohibited.

As of January 2001, tiers 1 and 2 were combined.

To help inform congressional decision-makers about changes in U.S. export controls on computers, the National Defense Authorization Act of 1998 requires the President to report to the Congress the justification for changing the notification thresholds for exports of high performance computers to certain sensitive countries. The report must, at a minimum, (1) address the extent to which high performance computers with capabilities between the established level and the new proposed level of performance are available from other countries, (2) address all potential uses of military significance to which high performance computers at the new levels could be applied, and (3) assess the impact of such uses on U.S. national security interests.

The Act also requires computer exporters to notify the Commerce Department in advance of any proposed high performance computer exports to sensitive "tier 3" countries that pose a concern for military or proliferation reasons. Since the threshold for notifications was set lower than the threshold for licensing, it served as a "tripwire" for triggering advanced U.S. government review of exports to potentially sensitive end users. Under this procedure, exporters must apply for a license if any executive branch agency in the licensing process objects to a proposed computer export. In addition, the Act requires an annual report to the Congress, which includes a list of all computer exports to tier 3 countries, including information on the end use and end user of computers.

On January 10, 2001, the President announced that the control threshold above which computers exported to countries like Russia and China would need a license would be raised from 28,000 MTOPS to 85,000 MTOPS, effective immediately. He further announced that the performance threshold requiring notifications of computer exports also would be raised from 28,000 MTOPS to 85,000 MTOPS. The new notification threshold will take effect on Tuesday, March 20.

INADEQUACIES IN THE ANALYSIS USED TO SUPPORT CHANGES IN COMPUTER CONTROL THRESHOLDS

The President's January 2001 decision to raise the licensing and notification thresholds from 28,000 MTOPS to 85,000 MTOPS for high performance computer exports were not adequately justified in that they did not meet all three criteria of the law. The President's report addresses the first criterion—the worldwide availability of high performance computers--by recognizing that other countries could be expected to achieve computing capabilities through computer clustering. The President also set a licensing control threshold of 85,000 MTOPS based on the availability of clustering technologies projected to be available by the end of 2001. In our December 2000 report, we noted that high performance computing up to about 70,000 MTOPS is attainable by clustering.

However, the President's report fails to meet the last two criteria in that it did not address all computer uses of military significance to which high performance computers could be applied at the new thresholds and did not assess the national security impact of such uses at the new control threshold, as required by law. The report's section on the computer uses of military significance is based largely on Defense- and Commerce-sponsored studies issued in 1995 and 1998 and addresses only selected examples of military significance; it does not address or even identify all known military uses to which high performance computers up to the new control threshold could be applied. The President's report did not address all such computer uses, even though this information was available from the 1998 Department of Defense- and Commerce-sponsored study that was used as the basis for these sections of the report. For example, the report does not note that applications for 3-dimensional modeling of armor and anti-armor and 3-dimensional modeling of submarines can be run on computers at about 70,000 MTOPS. The President's report does not state that computers rated up to 85,000 MTOPS could operate all but four of the 194 militarily significant applications identified in the 1998 Defense- and Commerce-sponsored study. Moreover, new information that we obtained from Defense since the January President's report was issued suggests that there may be between 300 to 500--not 194--militarily significant computer applications used by the Defense Department today.

Furthermore, the President's report makes no reference to how specific identified uses at the new threshold would affect U.S. national security; hence, it does not clearly identify the national security risks to be addressed as countries of concern acquire high performance computing capabilities. For example, the report did not discuss the national security impacts on the United States of Russia, China, or other countries obtaining high performance computing up to the new control thresholds, even for those applications identified. Without a clear analysis and explanation of the national security interest in controlling the export of high performance computers, it is difficult to determine what militarily critical computer applications need to be protected.

The inadequacies of the President's report are further compounded by continued use of a flawed measure--MTOPS--that is no longer valid for measuring individual computer

performance found in today's computers. The executive branch continues to use MTOPS because current law calls for use of this measure for notification purposes. In our December 2000 report, we stated that the MTOPS measure does not account for new designs of individual processors or for clustering computers to achieve high performance computing levels.

SUPPORT FOR PROPOSED POLICY SHIFT NOT ADEQUATE

On January 10, 2001, the President also proposed a new high performance computing control policy that shifts the emphasis of the controls from hardware-based controls to stronger software controls. If implemented, the policy would (1) remove controls on computer exports to all but seven countries, (2) eliminate notification and reporting requirements of the National Defense Authorization Act, and (3) increase awareness within industry and government of, and develop stronger controls over, critical national security software applications.

The President's January 2001 proposal for a new high performance computing control policy is based on a conclusion that exports of computer hardware can no longer be controlled. However, the executive branch did not conclusively demonstrate that there are no viable options for replacing the discredited MTOPS measure as the basis for continued hardware controls. Defense Department officials we interviewed could not document or support conclusions in a key Defense technical report that was identified as the analytical basis for the broad policy change. For example, DOD officials, when asked could not provide evidence to support their conclusions that there is necessary technical expertise in tier 3 countries to cluster to *any* performance level. According to computer experts we interviewed, performance levels of clustered computer systems depend on which applications are to be used; the report did not address this fact. In addition, this report rejected some options for new measures because they would be too costly and complex to implement yet the report's authors developed no cost data or estimates to support this conclusion. Even though the new policy would focus more attention on using new software controls to protect U.S. national security interests, these software controls have yet to be identified and developed. Also, awareness of current software controls would need to be strengthened within industry and government to make these software controls more effective, according to Defense Department officials.

IMPLICATIONS OF ANNOUNCED THRESHOLD AND POLICY CHANGES

We identified several implications of the announced changes to computer licensing and notification thresholds and proposed policy change to eliminate hardware controls over computers and develop stronger controls over sensitive military applications software.

The inadequacies of the President's justifications for raising the performance thresholds to 85,000 MTOPS at this time and for eventually abandoning computer hardware export controls demonstrates the need for further study of the issues involved before the United States commits to the President's proposals. This is especially critical given that new software controls are untested. In our December 2000 report on high performance

computers, we recommended that executive branch agencies comprehensively assess ways of addressing the shortcomings of computer export controls (including the development of new performance measures) and of countering the negative effects on U.S. national security of increased availability of high performance computing. Although Commerce and Defense did not agree with this recommendation, we believe this recommended course of action is still valid. Unless the executive branch implements these recommendations and the reporting requirements of the National Defense Authorization Act, the United States will not be prepared to fully assess and mitigate the risks it may face by adopting the President's proposals for revising U.S. high performance computer export controls.

Since the announced changes set a licensing and advance notification threshold at the same level for the first time, the new rules effectively eliminate routine prior U.S. government review of any computer exports below the licensing threshold--now 85,000 MTOPS--to sensitive tier 3 countries.

In the past, the presence of a notification threshold lower than the licensing threshold has given the United States the opportunity to block some exports and to condition others on the inclusion of specific conditions. For example, between February 3, 1998 (when procedures implementing the law went into effect) and September 30, 2000, the U.S. government received 3,764 completed notifications of intent to export computers. As shown in figure 2, the Department of Commerce responded to 204 of these notifications by asking the vendors to submit license applications before proceeding with the exports. We found that 165 of those applications did not result in approved export licenses. Of these 165, the Department of Commerce denied 12 of the applications and returned the other 153 applications to the vendor without approving the license. According to Commerce officials, these applications were returned for various reasons, including concerns over end-users and incomplete information. The Department conditioned its approval of the 39 remaining applications on the inclusion of certain conditions. Without a comprehensive assessment of the potential national security impacts of the proliferation of high performance computing, it is impossible to assess the significance of these 165 unapproved license applications.

Because the President has raised the licensing threshold to 85,000 MTOPS almost one year before the date that DOD estimates that other countries would be able to achieve such performance levels, tier 3 countries would be able to freely obtain American high performance computers almost a year before they would be able to assemble comparable cluster systems. According to the Defense Department, high performance computers are important enabling technology for military and proliferation purposes, which can reduce the time and resources needed to develop such capabilities.

As part of the proposed policy change to eliminate hardware controls on computer exports to tier 3 countries, the U.S. government would eliminate licensing controls on computer exports to most countries. This change would require the U.S. government to rely more on computer vendors' ability and willingness to "know your customers" and assess their intentions to use computers for proliferation. In the past, computer

vendors' inability or unwillingness to do so has resulted in shipments or diversions of computers to Russia and China in violation of the law. For example, on July 31, 1998, the Department of Justice announced that IBM East Europe/Asia Ltd. entered a guilty plea and received the maximum allowable fine of \$8.5 million for violating 17 counts of U.S. export laws in shipping computers to Russia.

As part of the proposed policy change, the executive branch would seek to repeal the statutory requirement for an annual report on all computer exports to potentially sensitive destinations, thus reducing information that might be useful in detecting patterns of exports to customers engaged in proliferation activities. The inspector generals of Commerce, Defense, Energy, and State said in 1999 that the U.S. government lacks an overall mechanism for assessing the cumulative effect of patterns of exports or technology transfers.

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Mr. Chairman, this concludes my prepared testimony. I would be happy to respond to any questions you or other members may have.

CONTACT AND ACKNOWLEDGEMENT

For future contacts regarding this testimony, please contact me at (202) 512-4128. Individuals making key contributions to this testimony included, Stephen M. Lord, Jeffrey D. Phillips, Claude T. Adrien, Pierre R. Toureille, Hai Tran, and Richard Seldin.