January 4, 2024

From: William A. Root, 2700 Burcham Drive Apt 234 East Lansing MI 48823
billroot23@gmail.com; tel 517 333 8707
To: www.regulations.com
Subjects: Advanced Computing Docket BIS-2022-0025; RIN 0694-AI94 Public Comments
Reference: December 15, 2023, Extension of Comment Period
from December 18, 2023, to January 17, 2024

These Comments revise January 1, 2024 comments, by deleting performance density (PD), for consistency with the decision about 40 years ago to delete integrated circuit (IC) controls based on their size, because of a finding that the ubiquity of small ICs made impossible the enforcement of controls on their export.

Facts – Since November 17, 2023:

(1) There are three different definitions of "computers" in the EAR:
- (a) 4A003.b, c Adjusted Peak Performance exceeding 70 Weighted TeraFLOPS(WT), defined by Technical Note on "Adjusted Peak Performance" ("APP") at end of CCL Category 4 and by License Exception APP 740.7(c) Computer Tier 1 destinations;
- (b) 4A090.a Computers, electronic assemblies, and components containing integrated circuits, any of which meets or exceeds the limit in:
  - a. 3A090.a Integrated circuits having one or more digital processing units having either of the following:
  - a.1 a total processing performance of 4800 or more, or
  - a.2 a total processing performance of 1600 or more and a performance density of 5.92 or more);

  plus b re end-use controls and definitions in Notes 1 and 2 and Technical Notes 1 to 4;
- (c) Supercomputer (734, 744) A computing system having a collective maximum theoretical compute capacity of 100 or more double-precision (64-bit) petaflops or 200 or more single-precision (32-bit) petaflops within a 41,600 ft^3 or smaller envelope (per 772.1 definition); and the development, production, use, operation, installation (including on-site installation), maintenance (checking), repair, overhaul, or refurbishing of a supercomputer located in or destined to the PRC (per 744.23a1 and a3 end-use);

There are z sub-items added to 3A001, 4A003, 4A004, 4A005, 5A002, 5A004, 5A992, 5D002, and 5D992, to cover what is also controlled by 3A090 or 4A090 (CCL Category 4 introduction Notes, including Note 3 unchanged, resolve how to determine which ECCNs apply to overlaps between 4A003 and 4A004/4A005/5A002/5A004); and z sub-items are also referred to in 736 Supplement No. 1 d, d2, d3, d4;740.2a9iiB; 740.7b1, 740.8a; 740.16a2, b2ii; 740.17b2iD, Note to b2, b3i, b3iiiB, b3iv, f1; 742.6a6ii, iii, 744.23a3iiD, 748.8z; 758.1g5, 758.6a2, 772.1 Specially Designed definition Note 1; 3A001 LVS, NAC, Related Controls (2); 3E001 Regional Stability; 4A003 Note to List Based License Exceptions; 4A003 Related Controls (1), (2); 4D001 STA; 4E001 TSR (3), APP, ACE, STA; 774 Supp6 Sensitive List 3(i, ii, iv, v) ;

(2) Following apply only to Macau and D:5: 732 Supp3:17, 19 (twice); 734.9h2i, ii; 734 Supp1:a2viii (twice); 736 Supp1: d2ii (twice), d4A (twice), d4B; 740.8a NAC (3 times), a2 (twice), b1, c1; 742.6a6i (twice), a6ii (twice); 744.6c2i (twice), c2ii (twice), c3ii; 744.23a1iiB, a2i, a2ii, a3i, a3iiA; Following apply only to D:1, D4, D5 excluding A:5, A:6 (*i.e.*, Israel): 740.8b1; 742.6iii; 744.23a3i, iiC; 4E001 TSR(3), ACE

(3) 736 Supplement No. 1d2 Temporary General License (TGL), expiring December 31, 2025, overcomes 742.6a6iii Regional Stability controls;
(4) 740.2a9iiA, B advanced computing restrictions on all License Exceptions apply only to Macau and D:5;
(5) 740.16a2ii APR License Exception largely removes US reexport controls on new advanced computing items;
(6) Regional stability applies to advanced computing in 742.6a6ii, iii, iv, b10, 3A001, 3A090, 3D001, 3E001, 4A003, 4A004, 4A005, 4A090. 4D001, 4E001, 5A002, 5A992, 5A004, 5D002, 5D992, 5E002, 5E992, 9A515;
(7) 744.23a1 supercomputer and a3 other advanced computing items you know will be used in China or Macau (license review presumption of denial for Macau and D:5);
(8) "Specially designed": its 772.1 definition Note 1; 3A001b2, b3 Note, c, d, e3, e3 Note, f; 3A991 k, l; 3D001 heading, TSR; 4A003 heading, GBS, NB1 Note 2, c Note 2, g; 4A004 heading; 4A994 heading, Note 1 NB1, a, c, e Note 2, j, k; 4D001a; 5E001d, e twice; 5A002a Note 2; 5A004 Note 1 re b, Note 2d; 9A004e, f, f1, f1b, g, v, x; 9A515 Related Controls, b, d, e, f, g, g2, x; 774 Supp6 Sensitive List Category 3(iv) 3D001; "presumptively specially designed": 5A002 Related Controls; 5A004 Related Controls (1); "specially designed or modified": 4A003c; 4A005 heading; 4D001 STA; 4D001b, b2; 4E001b2; 9A515; "specially designed or modified, and limited": 5A002 Technical Note for items specified by paragraph a1 of Note 2; "specially designed and limited": re 5A002 Note 2a1b1, 5A002 Note to paragraph b of Note 2 banking use or money transactions; "limited": 5A002 Technical Note to b of Note 2, j1a1, j1a2; 5D992 Related Controls (1);
(9) "Designed": 3A001.a1, a2, a2 Note, b1 Note 1, Note 2b, b1c, b7a, b7b, b7c, b7d, e1a Technical Note 3, e1b Technical Note 4, g Note 2, h Note 3, i; 3A090 NAC twice, Note 2 twice, Technical Note 2; 3A991h, j1 Note 2, j2 Note 4, Technical Note re Note 3 PDK; 4A090 Note twice; 5A002 re b Note 2, g; "designed or modified": 3A001 MT applies; 4A004b Technical Note 2; 5E001c4b Note; 5A002c, d, e; 5A004a Note;
(10) "Capable of": 3a001b5; 4A003 Note; 4A994c1; "capability": 744.6c3ii; 3A001b1d; 4A004b Technical Note 2; 5E001b2, b3; 5A002a, Note 1b, Note 2a1a, Technical Note to b Note 2, c, d; 9A515b; "usable": 5A002a Note 1b; "can be activated": 5A002a;
(11) "Described": 740.19b16, 17; 744.6c3iC; 3D001 TSR; 3E001 TSR; 5A002a4, a Technical Note 2, Technical Note 2a, Note 2a1a1a, z1-5; 5A004 NAC, 5A004 Technical Note 3 times; 5A992c; 5D002z1-9; 9A515 heading twice; 774 Supp6 Sensitive List Cat 3i. ii. iv. v;
(12) "Data centers": 3A090 NAC; 4A090 NAC;
(13) "Special Comprehensive Licenses": 3D001 Reporting Requirements; 3E001 Reporting Requirements.

Analyses

Re Fact (1) technical parameters
(a) The three types of computers overlap, but no one of them subsumes either of the others;
(b) Supercomputer is limited to 64 bit double precision or 32 bit single precision, whereas 4A003b covers not only 64 bit double precision but also covers 128 bit quadruple precision but no 32 bit single precision and 4A090/3A090 multiplies TOPS by any bit length;
(c) More than 40 years ago, integrated circuit export controls based only on small size were decontrolled, because their ubiquity made export control impossible; Performance Density (PD) now recontrols on this basis, with different PD definitions for 4A090/3A090 and for supercomputers and the former being applied to 1600 Total Processing Performance (TPP) or more and a separate 4800 TPP control with no accompanying PD limit;

(d) If the Weighted 4A003b parameter were added to 4A090/3A090, controls to China would, unintentionally, be more liberal than to other countries; but if Weighted were deleted from 4A003b, the speed parameters triggering license requirements to China or to other countries would be close to identical;

(e) 4A090/3A090 apply to hybrid and analog computers, whereas 4A003b applies only to digital computers. These Comments do not address hybrid or analog computers, because they involve Missile Technology Control Regime Categories 13 and 16 and hybrid also involves USML XIc16, which are beyond the scope of what the US should propose be amended in the Wassenaar Dual Use List;

(f) Prior notification and denial license policy nullify 740.8 NAC as a License Exception; and

(g) No USG export control administrator and no exporter or reexporter or transferor in country knows which of these differing texts to follow.

Re Facts (2 to 7) targeted destinations

(a) Wassenaar controls do not target specific countries or regions. If US proposals to Wassenaar were to do so, they would either be dead on arrival or the beginning of lengthy negotiations involving much more than just advanced computing.

(b) Regional Stability is now the reason given for the new controls on export to Country Group D:5 and Macau. Regional Stability was first used in 1981, to evade a 1981 Export Administration Act amendment requiring discontinuation of unilateral National Security controls. “Regional Stability” to describe proposed multilateral national security controls is the exact opposite of the original purpose of “Regional Stability.”

(c) 740.7(c) License Exception APP eligible for all computers, including electronic assemblies and specially designed components therefor and eligible for export or reexport to Tier 1 destinations, which include following nine countries from D:5 which are also 4A090 and, therefore, 4A003z, 4A004z, or 4A005z: (Central African Republic, Congo Democratic Republic of, Cyprus, Eritrea, Ethiopia, Haiti, Somalia, Venezuela, Zimbabwe);

Re Fact (5) reexport: US reexports to D:1 countries were decontrolled when the US had the opportunity to object to exports by other COCOM members to COCOM proscribed countries of COCOM controlled items under a rule of unanimity. Shortly before COCOM’s demise, in 1994, COCOM repealed the rule of unanimity and Wassenaar has not revived such a rule. Reexports of US-origin items to the following 8 D:1 countries eligible for the APR 740.16aii License Exception would otherwise be controlled for new items to D:5: Belarus, Burma, Cambodia, China, Iraq, Libya, Russia, Venezuela. North Korea would be a 9th such country, except that it is expressly excluded from that APR License Exception;

Re Facts (8, 9, 10, 11) specially designed, designed, capable, described

(a) Wassenaar does not define “specially designed.” The existing 2013 US definition, so-called catch-all plus release, was relevant to transfers of items from the USML to the CCL, but is not relevant to Wassenaar.

(b) Neither Wassenaar nor the US define designed, capable, or described;

(c) Described literally includes decontrolled as well as controlled texts;

(d) None of these words serve a useful purpose, because they are surrounded by other terminology, which is adequate;

Re Fact (12) data centers

(a) A data center is the location where a computer and related other equipment may be stored;

(b) Moving equipment into or out of a data center in no way affects its technical description;

Re Fact (13) Special Comprehensive Licenses were deleted from EAR 752 years ago.

Recommendations

Recommended Export Administrative Regulations (EAR) Revisions

Delete all the terminology identified in Facts (1 to 13) (including the word "integer''from 3A090 (3A1a4) Technical Note 2) and substitute:

(1) 3A001 Reason for Control: add "and 3A001a4" to NS1, add "not in NS1" to NS2, and delete RS1;
3A001 LVS N/A: add "3A001a4"; GBS except 3A001a4;
3A001a4, change "[Reserved]" to:

a4 Integrated circuits, not covered by 3A001a3, a10c, a11b, a13, or a.14.a.3, having one or more digital processing units having a 'Total Processing Performance' ('TPP') of 4800 or more;
Technical Notes:

1 'Total Processing Performance' ('TPP') is 2 x 'MacTOPS' x 'bit length of the operation,' aggregated over all processing units on the integrated circuit.

1a For purposes of 3A1a4, 'MacTOPS' is the theoretical peak number of Tera (10^{12}) operations per second for multiply-accumulate computation (D = A x B).

1b The 2 in the 'TPP' formula is based on industry convention of counting one multiply-accumulate computation, D = A x B, as 2 operations for purposes of data sheets. Therefore, 2 x MacTOPS may correspond to the reported TOPS or FLOPS on a datasheet.

1c For purposes of 3A1a4, 'bit length of the operation' for a multiply-accumulate computation is the largest bit length of the inputs to the multiply operation.

1d Aggregate the TPPs for each processing unit on the integrated circuit to arrive at a total. 'TPP' = TPP1 + TPP2 + … + TPPn (where n is the number of processing units on the integrated circuit).

2 The Rate of MacTOPS is to be calculated at its maximum value theoretically possible. The rate of 'MacTOPS' is assumed to be the highest value the manufacturer claims in manual or brochure for the integrated circuit. For example, the 'TPP' threshold of 4800 can be met with 600 tera operations (or 2 x 300 'MacTOPS') at 8 bits or 300 tera FLOPS (or 2 x 150 'MacTOPS') at 16 bits. If the IC is for MAC computation with multiply bit lengths that achieve different 'TPP' values, the highest 'TPP' value should be evaluated against any parameters in 3A1a4."

(2) 4A003 heading delete "specially designed"; Reason for Control delete RS;
at end of Category 4 delete APP Technical Note;
4A003.b and c delete and substitute:

b Digital computers containing integrated circuits any of which meets or exceeds the limit in 3A001a4;

c "Electronic assemblies" enhancing performance by aggregation of processors so that the "TPP" of the aggregation exceeds the limit in 4A003b;

3) 740.7 License Exception: heading change "(APP)" to "(TPP, STD)";
740.7c1, move the following eight D5 countries from CT1 to CT4: Central African Republic, Congo Democratic Republic, Cyprus, Egypt, Haiti, Somalia, Venezuela, and Zimbabwe;
740.7c2, c3i twice, c3ii, and c3iii, change "APP" to "TPP";
740.7c2 after "to Tier 1 destinations," insert "except "supercomputers," as defined in 772.1,"
740.7c3i after "unlimited TPP" insert "except "supercomputers," as defined in 772.1,"
740.7d1, move the following ten D5 countries from CT3 to CT4: Afghanistan, Belarus, Burma, Cambodia, China, Cyprus, Lebanon, Libya, Russia, Sudan
740.7d3i and d3ii twice, change "APP" to "(STD)";

Re-letter existing 740.7e to 740.7f;
Establish new 740.7e *(e) Computer Tier 4 destinations*
740.7e1 Eligible destinations
The destinations that are eligible to receive exports and reexports under paragraph (e) of this section include (in alphabetical order, those moved from CT1 and CT3 to CT4 plus following not now listed in either CT1 or CT3: Cuba, Iran, North Korea, South Sudan, Syria**)**
740.7(e)(2) Eligible commodities
The only License Exceptions to CT4 are those listed in part 746 or 740.11(b).
Revise 740.7f (former 740.7e), revise to read:
See 743.1b1 and 743.2b of the EAR for reporting requirements of certain items under License Exceptions TPP or STD.

(4) 772.1 *Supercomputer* (734, 740.7c3i, 742.4, 744) Digital computer exceeding TPP 4800 limit, above which an ECCN 4A003.b license is required, by a 10^5 multiplican (10^3 peta less tera plus 10^2 for 100 in existing 772.1 definition)

(5) 742.4a1i change "D:1" to "D:5" twice;
742.4a1ii after "600 series" insert "or "supercomputer"; after "ITAR" insert ", namely, subject to a policy of denial for the following 8 countries listed in 126.1d1: Belarus, Burma, China (including Macau), Cuba, Iran, North Korea, Syria, and Venezuela (which include the 4 countries listed in EAR E:1 and E:2); and a policy of denial or case-by-case review for the following 16 countries listed in 126.1d2f-o, r-w: Afghanistan, Cambodia, Central African Republic, Cyprus (except as temporarily removed), Democratic Republic of Congo, Eritrea, Ethiopia, Haiti, Iraq, Lebanon, Libya, Russia, Somalia, South Sudan, Sudan, Zimbabwe, as specified in paragraphs f-o, r-w";
Delete 742.4a1iii, 742.4a2, 742.4a7, and 742.4a9.

(6) 743.1b1, change APP to TPP, STD;
743.2b, change "Adjusted Peak Performance" ("APP") to "Total Processing Performance" ("TPP")

<u>Recommended US proposal to Wassenaar</u>

4A1, 4A1a, 4A1a2 Note, 4A3, 4A3c Note 2, 4A3g, 4A4, 4A5 headings delete "specially designed";
4A3b, c Delete b and c and substitute:
b Digital computers containing integrated circuits any of which meets or exceeds the limit in 3A1a4;
c "Electronic assemblies" enhancing performance by aggregation of processors so that the "TPP" of the aggregation exceeds the limit in 4A3b;
4A4 Technical Note 2 Delete "designed or modified" and delete "capability";
4D1a, b, b1, b2, 4D4 delete ""specially designed" or modified"
4D1b1 Delete and substitute: "Digital computers having a TPP exceeding 1600."
4E1b1 Delete and substitute: "Digital computers having a TPP exceeding 1600."

3A1.a4 Delete [Reserved] and substitute:
a4 Integrated circuits, not covered by 3A1a3, a10c, a11b, a13, or a14a3, having one or more digital processing units having a 'Total Processing Performance' ('TPP') of 4800 or more;
Technical Notes:
1 Total Processing Performance' ('TPP') is 2 x 'MacTOPS' x 'bit length of the operation,' aggregated over all processing units on the integrated circuit.

1a For purposes of 3A1a4, 'MacTOPS' is the theoretical peak number of Tera (10^{12}) operations per second for multiply-accumulate computation (D = A x B).

1b The 2 in the 'TPP' formula is based on industry convention of counting one multiply-accumulate computation, D = A x B, as 2 operations for purposes of data sheets. Therefore, 2 x MacTOPS may correspond to the reported TOPS or FLOPS on a datasheet.

1c For purposes of 3A1a4, 'bit length of the operation' for a multiply-accumulate computation is the largest bit length of the inputs to the multiply operation.

1d Aggregate the TPPs for each processing unit on the integrated circuit to arrive at a total. 'TPP' = TPP1 + TPP2 + … + TPPn (where n is the number of processing units on the integrated circuit).

2 The Rate of MacTOPS is to be calculated at its maximum value theoretically possible. The rate of 'MacTOPS' is assumed to be the highest value the manufacturer claims in manual or brochure for the integrated circuit. For example, the 'TPP' threshold of 4800 can be met with 600 tera operations (or 2 x 300 'MacTOPS') at 8 bits or 300 tera FLOPS (or 2 x 150 'MacTOPS') at 16 bits. If the IC is for MAC computation with multiply bit lengths that achieve different 'TPP' values, the highest 'TPP' value should be evaluated against any parameters in 3A1a4.

Sensitive List (may not be exported, reexported, or transferred (in-country), except to the countries listed in country Group A:5): Revise introductory texts for Category 3 i and ii and full texts for iv and v to read:

i 3A1.b.2 (including those controlled under 3A1a4) – "Monolithic Microwave Integrated Circuit" ("MMIC") amplifiers that are any of the following:

ii 3A1.b.3 (including those controlled under 3A1a4) – Discrete microwave transistors that are any of the following:

iv 3D1 – "Software" for the "development" or "production" of equipment controlled under 3A1b2, 3A1b3, 3A2g1, or 3A2g2 (including those controlled under 3A1a4).

v 3E1 – "Technology" for the "development" or "production" of equipment controlled under 3A1b2, 3A1b3, 3A2g1, or 3A2g2 (including those controlled under 3A1a4).

Delete "specially designed": 3A1b2, b3 Note, c, d, e3, e3 Note, f; 3D1 heading, 5E1d, e twice; 5A2a Note 2; 5A4 Note 1 re b, Note 2d; 9A4e, f, f1, f1b, g, v, x;

Delete "specially designed or modified, and limited": 5A2 Technical Note for items specified by paragraph a1 of Note 2;

Delete "specially designed and limited": 5A2 Note 2a1b1, 5A2 Note to paragraph b of Note 2 banking use or money transactions;

Delete "limited": 5A2 Technical Note to b of Note 2, j1a1, j1a2;

Delete "Designed": 3A1.a1, a2, a2 Note, b1 Note 1, Note 2b, b1c, b7a, b7b, b7c, b7d, e1a Technical Note 3, e1b Technical Note 4, g Note 2, h Note 3, i; 5A2 re b Note 2, g;

Delete "designed or modified": 5E1c4b Note; 5A2c, d, e; 5A4a Note;

Delete "capable of": 3A1b5;

Delete "capability": 3A1b1d; 5E1b2, b3; 5A2a, Note 1b, Note 2a1a, Technical Note to b Note 2, c, d;

Delete "usable": 5A2a Note 1b;

Delete "can be activated": 5A2a;

Delete "described" and substitute "controlled": 5A2a4, a Technical Note 2, Technical Note 2a, Note 2a1a1a, 5A4 Technical Note 3 times; Sensitive List Cat 3i. ii. iv. v.